# DRAINAGE ANALYSIS

## FOR

# RiverWoods Phase II

### Stone Quarry Drive
### Durham, NH

### Tax Map 209 Lot 33

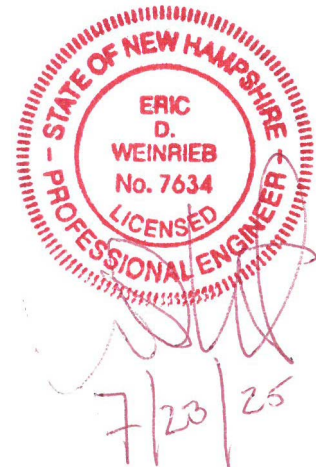**July 23, 2025**

*Prepared For:*

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**ALTUS**
E N G I N E E R I N G

Altus Project 5440

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# Section 1

## Narrative

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# PROJECT DESCRIPTION

The RiverWoods Durham is proposing to construct a second phase on an undeveloped parcel adjacent to the existing RiverWoods continuing care retirement community campus in Durham, New Hampshire. The 22.5-acre property is identified as Assessor's Map 209, Lot 33 and is located in the Office Research District. The project site is primarily woodland with sections forested wetland. Access is from NH 108 via the existing Stone Quarry Drive.

The proposal includes two new age-restricted multi-family housing buildings, a community center and a maintenance garage together with associated accessways and parking areas, utilities and stormwater infrastructure. These measures will include four bioretention ponds and a section of porous pavement. Pretreatment will be provided by catch basins with deep sumps and grease hoods. This proposed stormwater management system will reduce peak flows and treat runoff from the site's impervious areas prior to leaving the site.

## *Site Soils*

Michael Cuomo, NH soils scientist completed a site-specific soil survey (SSSS) for the project site. This survey indicates that the subject property can be broken into hydrologic soils groups (HSG) B, C and D. Test pits indicate that majority of the soils underlying the development area are comprised of clay. Information on soils in offsite areas was taken from a high intensity soil survey (HISS) done for the adjacent RiverWoods campus in 2018 and NRCS maps.

## *Pre-Development (Existing Conditions)*

Runoff generally flows through and off the site in a southerly direction to three points of analysis. POA #1 is an existing culvert under Stone Quarry Drive that captures flow from the western corner of the parcel. POA #2 is an offsite wetland to which the majority of the site and some offsite areas are directed. This offsite area was included as it represents the confluence of two wetland systems and an area affected by the relocation of Stone Quarry Drive. POA #3 is the southern property line where an existing stream captures the southeast portion of the lot. The sites hydrology is characterized by five existing subcatchments as delineated on the accompanying "Pre-Development Watershed Plan".

## *Post-Development (Proposed Conditions)*

The post-development conditions were analyzed at the same discharge points as the pre-development conditions as delineated on the accompanying "Post-Development Watershed Plan". Modifications to the delineated areas and associated ground cover were made to sub-

catchments to account for the proposed improvements to the property. As shown on the attached Post-Development Watershed Plan, the site was divided into forty post-development subcatchment areas. Site topography, existing features, proposed site improvements, proposed grading, drainage and erosion control measures are shown on the accompanying plan set. Recommended erosion control measures are based upon the December 2008 edition of the "*New Hampshire Stormwater Manual Volumes 1 through 3*" prepared by NHDES and Comprehensive Environmental, Inc. as amended.

## CALCULATION METHODS

The drainage study was completed using the USDA SCS TR-20 Method within the HydroCAD Stormwater Modeling System. Reservoir routing was performed with the Dynamic Storage Indication method with automated calculation of tailwater conditions. A Type III 24-hour rainfall distribution was utilized in analyzing the data for the 2, 10 and 25 year - 24-hour storm events using rainfall data provided by the Northeast Regional Climate Center (NRCC). As the project site lies within a Coastal and Great Bay Community identified by NHDES Alteration of Terrain, all rainfall amounts were increased by 15% to account for potential future increases in rainfall due to climate change. A time span of 0 to 48 hours was analyzed at 0.01-hour increments. Design infiltration rates used in the analysis were taken from the corresponding test pit logs. Pond summaries for the 100-year storm event are also included in the proposed analysis.

### *Disclaimer*

Altus Engineering, Inc. notes that stormwater modeling is limited in its capacity to precisely predict peak rates of runoff and flood elevations. Results should not be considered to represent actual storm events due to the number of variables and assumptions involved in the modeling effort. Surface roughness coefficients (n), entrance loss coefficients (ke), velocity factors (kv) and times of concentration (Tc) are based on subjective field observations and engineering judgment using available data. For design purposes, curve numbers (Cn) describe the average conditions. However, curve numbers will vary from storm to storm depending on the antecedent runoff conditions (ARC) including saturation and frozen ground. Also, higher water elevations than predicted by modeling could occur if drainage channels, closed drain systems or culverts are not maintained and/or become blocked by debris before and/or during a storm event as this will impact flow capacity of the structures. Structures should be re-evaluated if future changes occur within relevant drainage areas in order to assess any required design modifications.

*Drainage Analysis*

A complete summary of the drainage model is included in the appendix of this report. The following tables compare pre- and post-development peak rates and volumes at the Point of Analysis identified on the plans for the 1", 2, 10 and 25-year storm events:

**Stormwater Modeling Summary**
**Peak Q (cfs) for Type III 24-Hour Storm Events**

|  | 1" Storm (1.00 inch) | 2-Yr Storm (3.61 inch) | 10-Yr Storm (5.47 inch) | 25-Yr Storm (6.93 inch) |
|---|---|---|---|---|
| **POA #1 (West to CB)** |  |  |  |  |
| Pre | 0.01 | 2.40 | 4.26 | 5.12 |
| Post | 0.01 | 2.02 | 3.74 | 4.75 |
| **Change** | **0.00** | **-0.38** | **-0.52** | **-0.37** |
| **POA #2 (South to Wetland)** |  |  |  |  |
| Pre | 0.05 | 15.07 | 27.12 | 34.48 |
| Post | 0.10 | 13.31 | 23.08 | 30.05 |
| **Change** | **0.05** | **-1.76** | **-4.04** | **-4.43** |
| **POA #3 (South to Wetland)** |  |  |  |  |
| Pre | 0.00 | 6.43 | 16.14 | 24.80 |
| Post | 0.04 | 5.85 | 15.75 | 24.24 |
| **Change** | **0.04** | **-0.58** | **-0.39** | **-0.56** |

As the above table demonstrates, the proposed peak rates of runoff at the points of analysis will match or be decreased from the existing conditions for all analyzed storm events with the exception of the 1" event where the increases have been determined to be insignificant due to the fact that they total no more than 0.05 cfs and because decreases are shown in all larger storms. A decrease in the 1" storm is also not a requirement of the Town of Durham.

The following table demonstrates the pre- and post- volumes of runoff. As shown in the attached calculations, the use of porous pavement allows the infiltration of the town's requisite groundwater recharge volume which exceeds that required by the NHDES.

## Stormwater Modeling Summary
## Volume V (af) for Type III 24-Hour Storm Events

| | 1" Storm (1.00 inch) | 2-Yr Storm (3.61 inch) | 10-Yr Storm (5.47 inch) | 25-Yr Storm (6.93 inch) |
|---|---|---|---|---|
| **POA #1 (West to CB)** | | | | |
| Pre | 0.004 | 0.215 | 0.448 | 0.650 |
| Post | 0.008 | 0.212 | 0.424 | 0.606 |
| **Change** | **0.004** | **-0.003** | **-0.024** | **-0.044** |
| **POA #2 (South to Wetland)** | | | | |
| Pre | 0.038 | 2.198 | 4.597 | 6.679 |
| Post | 0.057 | 2.170 | 4.509 | 6.538 |
| **Change** | **0.019** | **-0.028** | **-0.088** | **-0.141** |
| **POA #3 (South to Wetland)** | | | | |
| Pre | 0.001 | 0.691 | 1.589 | 2.399 |
| Post | 0.064 | 0.966 | 1.987 | 2.882 |
| **Change** | **0.063** | **0.275** | **0.398** | **0.483** |

## POLLUTANT REMOVAL

Based on the New Hampshire Stormwater Manual (Volume 2), the following pollutant removal rates would be expected from the implementation of the proposed stormwater BMPs:

BMP      Pollutant          Removal Efficiency

Deep Sump Catch Basin -
     Total Suspended Solids (TSS)      15%
     Total Nitrogen (TN)      5%
     Total Phosphorus (TP)      5%

Bioretention Pond -
     Total Suspended Solids (TSS)      90%
     Total Nitrogen (TN)      65%
     Total Phosphorus (TP)      65%

Porous Pavement -
     Total Suspended Solids (TSS)      90%
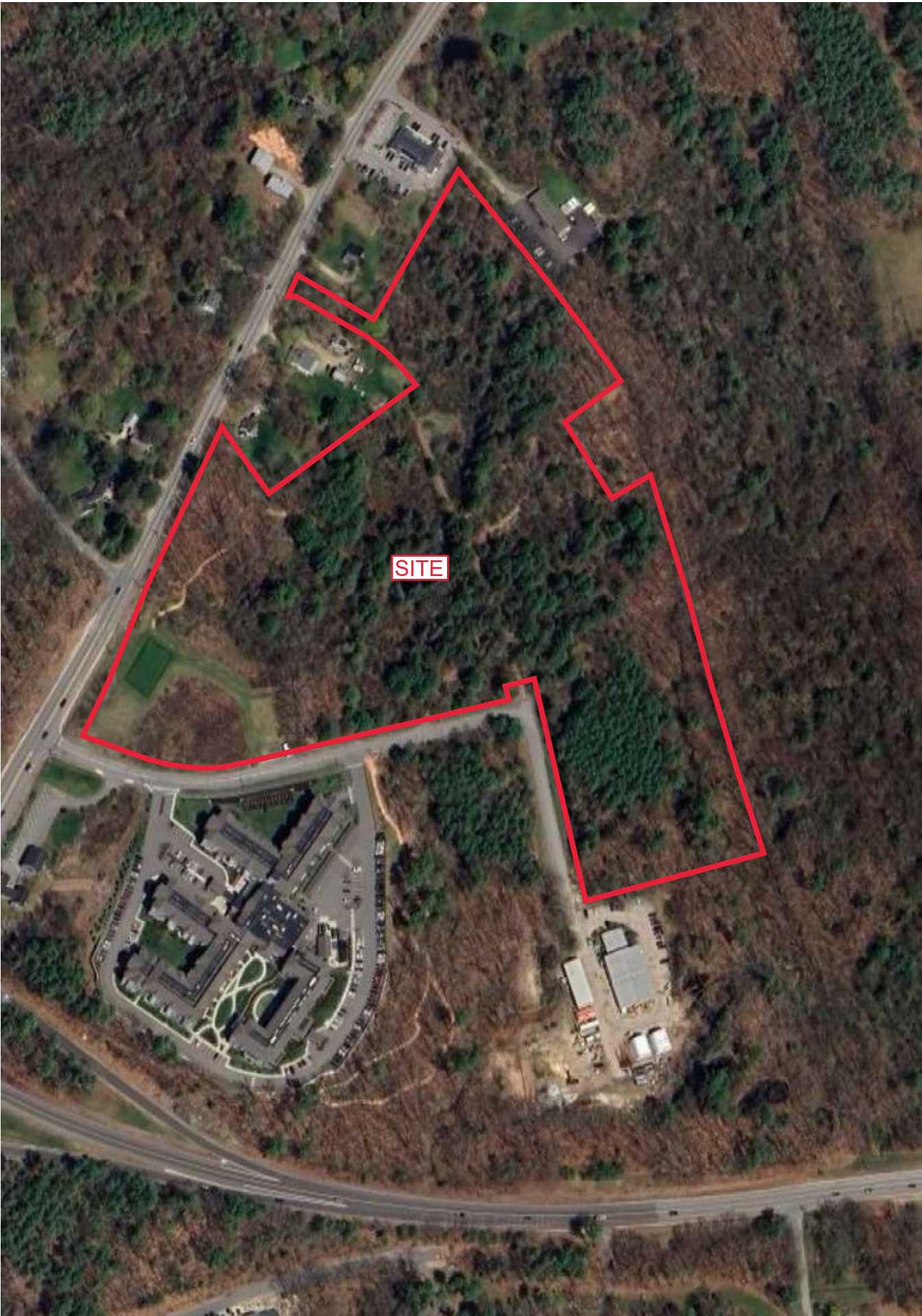     Total Nitrogen (TN)      60%
     Total Phosphorus (TP)      65%

**CONCLUSION**

This proposed development of property located on Stone Quarry Drive in Durham, New Hampshire will have minimal adverse effect on abutting properties and infrastructure as a result of stormwater runoff or siltation. Post-construction peak rates of runoff from the site will be at or lower than the existing conditions for all analyzed storm events with the insignificant exceptions noted above. The new stormwater management system will also provide appropriate treatment to and infiltration of runoff from the proposed impervious surfaces. Appropriate steps will be taken to properly mitigate erosion and sedimentation through the use of temporary and permanent Best Management Practices for sediment and erosion control, including deep sump catch basins with grease hoods, bioretention ponds and porous pavement.

# Section 2

## Aerial Photo and USGS Map

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SITE

# Section 3

# Drainage Calculations

Pre-Development
2-Year, 24-Hour Summary
10-Year, 24-Hour Complete
25-Year, 24-Hour Summary

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**2S**
North Corner

**2P**

12" CPP

**2R**
Wetland Flow Path

**2.1S**
Central

**2.1R**
Wetland Flow Path

**23R**
Wetland Flow Path

**1S**
West Corner

**1P**

15" RCP

**2.1P**

24" RCP

**3S**
SE Corner

**100L**
POA #100 - SW

**2.2R**
Wetland Flow Path

**2.2S**
South of SQ Drive

**200L**
POA #200 - South

**300L**
POA #300 - SE

**PRE-DEVELOPMENT**

| Subcat | Reach | Pond | Link |

Time span=0.00-48.00 hrs, dt=0.01 hrs, 4801 points
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN
Reach routing by Dyn-Stor-Ind method  -  Pond routing by Dyn-Stor-Ind method

**Subcatchment 1S: West Corner**
Runoff Area=85,332 sf  8.89% Impervious  Runoff Depth=0.02"
Flow Length=366'  Tc=9.8 min  CN=74  Runoff=0.01 cfs  0.004 af

**Subcatchment 2.1S: Central**
Runoff Area=494,247 sf  8.83% Impervious  Runoff Depth=0.02"
Flow Length=1,341'  Tc=15.8 min  CN=74  Runoff=0.04 cfs  0.022 af

**Subcatchment 2.2S: South of SQ Drive**
Runoff Area=105,068 sf  10.77% Impervious  Runoff Depth=0.05"
Flow Length=391'  Tc=6.0 min  CN=77  Runoff=0.03 cfs  0.010 af

**Subcatchment 2S: North Corner**
Runoff Area=284,221 sf  6.78% Impervious  Runoff Depth=0.01"
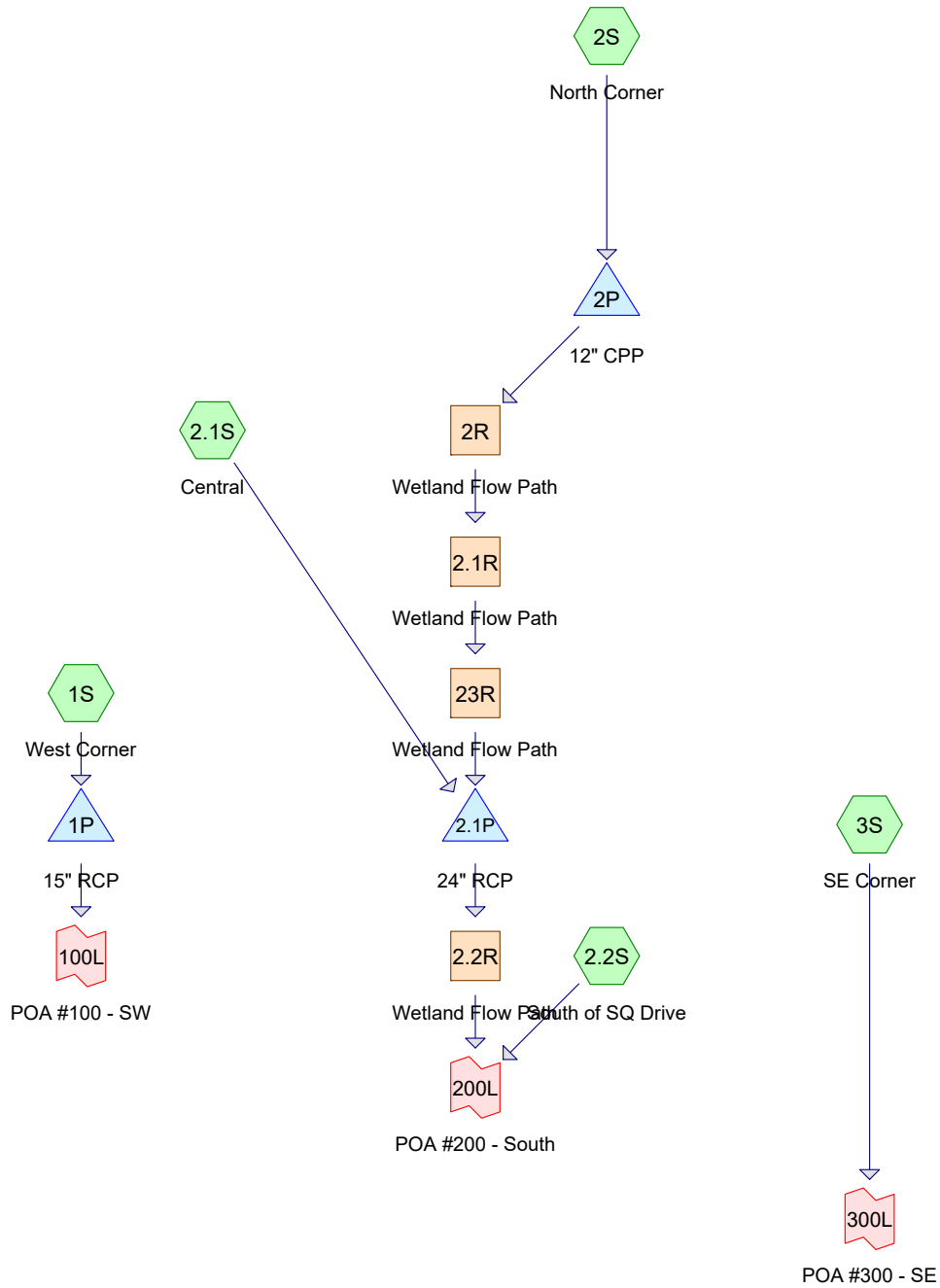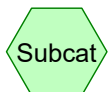Tc=0.0 min  CN=72  Runoff=0.01 cfs  0.007 af

**Subcatchment 3S: SE Corner**
Runoff Area=373,920 sf  2.67% Impervious  Runoff Depth=0.00"
Flow Length=1,149'  Tc=15.9 min  CN=68  Runoff=0.00 cfs  0.001 af

**Reach 2.1R: Wetland Flow Path**
Avg. Flow Depth=0.02'  Max Vel=0.23 fps  Inflow=0.01 cfs  0.007 af
n=0.040  L=344.0'  S=0.0075 '/'  Capacity=54.59 cfs  Outflow=0.01 cfs  0.007 af

**Reach 2.2R: Wetland Flow Path**
Avg. Flow Depth=0.03'  Max Vel=0.74 fps  Inflow=0.04 cfs  0.028 af
n=0.040  L=263.0'  S=0.0502 '/'  Capacity=141.18 cfs  Outflow=0.04 cfs  0.028 af

**Reach 2R: Wetland Flow Path**
Avg. Flow Depth=0.01'  Max Vel=0.57 fps  Inflow=0.01 cfs  0.007 af
n=0.040  L=151.0'  S=0.0446 '/'  Capacity=133.09 cfs  Outflow=0.01 cfs  0.007 af

**Reach 23R: Wetland Flow Path**
Avg. Flow Depth=0.01'  Max Vel=0.36 fps  Inflow=0.01 cfs  0.007 af
n=0.040  L=131.0'  S=0.0185 '/'  Capacity=85.86 cfs  Outflow=0.01 cfs  0.007 af

**Pond 1P: 15" RCP**
Peak Elev=52.31'  Storage=1 cf  Inflow=0.01 cfs  0.004 af
15.0" Round Culvert  n=0.012  L=60.0'  S=0.0037 '/'  Outflow=0.01 cfs  0.004 af

**Pond 2.1P: 24" RCP**
Peak Elev=47.65'  Storage=8 cf  Inflow=0.04 cfs  0.028 af
24.0" Round Culvert  n=0.012  L=78.0'  S=0.0135 '/'  Outflow=0.04 cfs  0.028 af

**Pond 2P: 12" CPP**
Peak Elev=59.70'  Storage=30 cf  Inflow=0.01 cfs  0.007 af
Outflow=0.01 cfs  0.007 af

**Link 100L: POA #100 - SW**
Inflow=0.01 cfs  0.004 af
Primary=0.01 cfs  0.004 af

**Link 200L: POA #200 - South**
Inflow=0.05 cfs  0.038 af
Primary=0.05 cfs  0.038 af

**Link 300L: POA #300 - SE**
Inflow=0.00 cfs  0.001 af
Primary=0.00 cfs  0.001 af

**Total Runoff Area = 30.826 ac   Runoff Volume = 0.042 af   Average Runoff Depth = 0.02"**
**93.16% Pervious = 28.718 ac     6.84% Impervious = 2.108 ac**

2S

North Corner

2P

12" CPP

2.1S

Central

2R

Wetland Flow Path

2.1R

Wetland Flow Path

1S

West Corner

23R

Wetland Flow Path

3S

SE Corner

1P

15" RCP

2.1P

24" RCP

100L

POA #100 - SW

2.2R

Wetland Flow Path

2.2S

South of SQ Drive

200L

POA #200 - South

300L

POA #300 - SE

**PRE-DEVELOPMENT**

Subcat    Reach    Pond    Link

Time span=0.00-48.00 hrs, dt=0.01 hrs, 4801 points
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN
Reach routing by Dyn-Stor-Ind method  -  Pond routing by Dyn-Stor-Ind method

**Subcatchment 1S: West Corner**
Runoff Area=85,332 sf  8.89% Impervious  Runoff Depth=1.32"
Flow Length=366'  Tc=9.8 min  CN=74  Runoff=2.56 cfs 0.215 af

**Subcatchment 2.1S: Central**
Runoff Area=494,247 sf  8.83% Impervious  Runoff Depth=1.32"
Flow Length=1,341'  Tc=15.8 min  CN=74  Runoff=12.48 cfs 1.245 af

**Subcatchment 2.2S: South of SQ Drive**
Runoff Area=105,068 sf  10.77% Impervious  Runoff Depth=1.51"
Flow Length=391'  Tc=6.0 min  CN=77  Runoff=4.22 cfs 0.304 af

**Subcatchment 2S: North Corner**
Runoff Area=284,221 sf  6.78% Impervious  Runoff Depth=1.19"
Tc=0.0 min  CN=72  Runoff=10.62 cfs 0.649 af

**Subcatchment 3S: SE Corner**
Runoff Area=373,920 sf  2.67% Impervious  Runoff Depth=0.97"
Flow Length=1,149'  Tc=15.9 min  CN=68  Runoff=6.43 cfs 0.691 af

**Reach 2.1R: Wetland Flow Path**
Avg. Flow Depth=0.45'  Max Vel=1.48 fps  Inflow=2.22 cfs 0.649 af
n=0.040  L=344.0'  S=0.0075 '/'  Capacity=54.59 cfs  Outflow=2.22 cfs 0.649 af

**Reach 2.2R: Wetland Flow Path**
Avg. Flow Depth=0.68'  Max Vel=4.79 fps  Inflow=13.20 cfs 1.894 af
n=0.040  L=263.0'  S=0.0502 '/'  Capacity=141.18 cfs  Outflow=13.19 cfs 1.894 af

**Reach 2R: Wetland Flow Path**
Avg. Flow Depth=0.28'  Max Vel=2.78 fps  Inflow=2.23 cfs 0.649 af
n=0.040  L=151.0'  S=0.0446 '/'  Capacity=133.09 cfs  Outflow=2.22 cfs 0.649 af

**Reach 23R: Wetland Flow Path**
Avg. Flow Depth=0.35'  Max Vel=2.04 fps  Inflow=2.22 cfs 0.649 af
n=0.040  L=131.0'  S=0.0185 '/'  Capacity=85.86 cfs  Outflow=2.22 cfs 0.649 af

**Pond 1P: 15" RCP**
Peak Elev=53.20'  Storage=137 cf  Inflow=2.56 cfs 0.215 af
15.0" Round Culvert  n=0.012  L=60.0'  S=0.0037 '/'  Outflow=2.40 cfs 0.215 af

**Pond 2.1P: 24" RCP**
Peak Elev=49.33'  Storage=2,463 cf  Inflow=14.47 cfs 1.894 af
24.0"  Round Culvert  n=0.012  L=78.0'  S=0.0135 '/'  Outflow=13.20 cfs 1.894 af

**Pond 2P: 12" CPP**
Peak Elev=60.71'  Storage=8,446 cf  Inflow=10.62 cfs 0.649 af
Outflow=2.23 cfs 0.649 af

**Link 100L: POA #100 - SW**
Inflow=2.40 cfs 0.215 af
Primary=2.40 cfs 0.215 af

**Link 200L: POA #200 - South**
Inflow=15.07 cfs 2.198 af
Primary=15.07 cfs 2.198 af

**Link 300L: POA #300 - SE**
Inflow=6.43 cfs 0.691 af
Primary=6.43 cfs 0.691 af

**Total Runoff Area = 30.826 ac   Runoff Volume = 3.103 af   Average Runoff Depth = 1.21"**
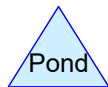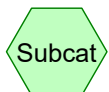**93.16% Pervious = 28.718 ac    6.84% Impervious = 2.108 ac**
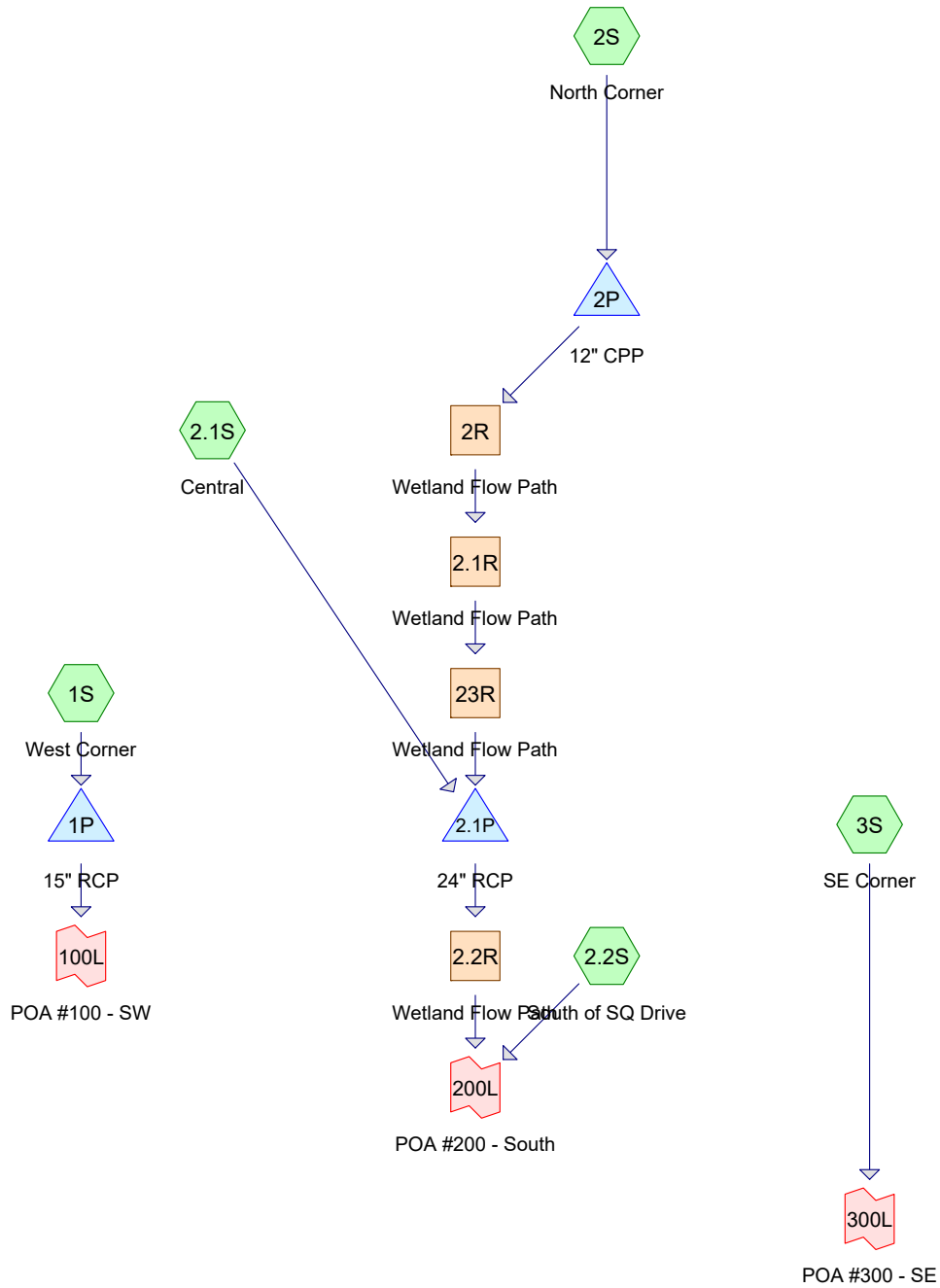
2S

North Corner

2P

12" CPP

2.1S

Central

2R

Wetland Flow Path

2.1R

Wetland Flow Path

1S

West Corner

23R

Wetland Flow Path

3S

SE Corner

1P

15" RCP

2.1P

24" RCP

100L

POA #100 - SW

2.2R

Wetland Flow Path

2.2S

South of SQ Drive

200L

POA #200 - South

300L

POA #300 - SE

**PRE-DEVELOPMENT**

Subcat    Reach    Pond    Link

## Area Listing (all nodes)

| Area (acres) | CN | Description (subcatchment-numbers) |
|---|---|---|
| 0.039 | 61 | >75% Grass cover, Good, HSG B  (2.1S, 3S) |
| 3.140 | 74 | >75% Grass cover, Good, HSG C  (1S, 2.1S, 2S, 3S) |
| 0.087 | 80 | >75% Grass cover, Good, HSG D  (2.1S, 2S) |
| 0.243 | 65 | Brush, Good, HSG C  (2.1S) |
| 0.039 | 98 | Paved parking, HSG B  (2.1S, 3S) |
| 1.406 | 98 | Paved parking, HSG C  (2.1S, 2.2S, 2S, 3S) |
| 0.227 | 98 | Paved parking, HSG D  (2.1S, 2.2S, 2S) |
| 0.174 | 98 | Paved roads w/curbs & sewers, HSG C  (1S) |
| 0.261 | 98 | Roofs, HSG C  (2.1S, 2S) |
| 2.232 | 55 | Woods, Good, HSG B  (1S, 2.1S, 2S, 3S) |
| 19.669 | 70 | Woods, Good, HSG C  (1S, 2.1S, 2.2S, 2S, 3S) |
| 3.308 | 77 | Woods, Good, HSG D  (2.1S, 2.2S, 2S) |
| **30.826** | **72** | **TOTAL AREA** |

## Soil Listing (all nodes)

| Area (acres) | Soil Group | Subcatchment Numbers |
|---:|---|---|
| 0.000 | HSG A | |
| 2.310 | HSG B | 1S, 2.1S, 2S, 3S |
| 24.894 | HSG C | 1S, 2.1S, 2.2S, 2S, 3S |
| 3.622 | HSG D | 2.1S, 2.2S, 2S |
| 0.000 | Other | |
| **30.826** | | **TOTAL AREA** |

Time span=0.00-48.00 hrs, dt=0.01 hrs, 4801 points
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN
Reach routing by Dyn-Stor-Ind method  -  Pond routing by Dyn-Stor-Ind method

**Subcatchment 1S: West Corner**
Runoff Area=85,332 sf  8.89% Impervious  Runoff Depth=2.74"
Flow Length=366'  Tc=9.8 min  CN=74  Runoff=5.53 cfs 0.448 af

**Subcatchment 2.1S: Central**
Runoff Area=494,247 sf  8.83% Impervious  Runoff Depth=2.74"
Flow Length=1,341'  Tc=15.8 min  CN=74  Runoff=26.96 cfs 2.595 af

**Subcatchment 2.2S: South of SQ Drive**
Runoff Area=105,068 sf  10.77% Impervious  Runoff Depth=3.02"
Flow Length=391'  Tc=6.0 min  CN=77  Runoff=8.55 cfs 0.607 af

**Subcatchment 2S: North Corner**
Runoff Area=284,221 sf  6.78% Impervious  Runoff Depth=2.57"
Tc=0.0 min  CN=72  Runoff=23.92 cfs 1.395 af

**Subcatchment 3S: SE Corner**
Runoff Area=373,920 sf  2.67% Impervious  Runoff Depth=2.22"
Flow Length=1,149'  Tc=15.9 min  CN=68  Runoff=16.14 cfs 1.589 af

**Reach 2.1R: Wetland Flow Path**
Avg. Flow Depth=1.19'  Max Vel=2.53 fps  Inflow=18.63 cfs 1.395 af
n=0.040  L=344.0'  S=0.0075 '/'  Capacity=54.59 cfs  Outflow=16.73 cfs 1.395 af

**Reach 2.2R: Wetland Flow Path**
Avg. Flow Depth=0.91'  Max Vel=5.61 fps  Inflow=24.09 cfs 3.990 af
n=0.040  L=263.0'  S=0.0502 '/'  Capacity=141.18 cfs  Outflow=24.09 cfs 3.990 af

**Reach 2R: Wetland Flow Path**
Avg. Flow Depth=0.83'  Max Vel=5.02 fps  Inflow=18.70 cfs 1.395 af
n=0.040  L=151.0'  S=0.0446 '/'  Capacity=133.09 cfs  Outflow=18.63 cfs 1.395 af

**Reach 23R: Wetland Flow Path**
Avg. Flow Depth=0.96'  Max Vel=3.53 fps  Inflow=16.73 cfs 1.395 af
n=0.040  L=131.0'  S=0.0185 '/'  Capacity=85.86 cfs  Outflow=16.62 cfs 1.395 af

**Pond 1P: 15" RCP**
Peak Elev=53.65'  Storage=1,011 cf  Inflow=5.53 cfs 0.448 af
15.0" Round Culvert  n=0.012  L=60.0'  S=0.0037 '/'  Outflow=4.26 cfs 0.448 af

**Pond 2.1P: 24" RCP**
Peak Elev=51.11'  Storage=18,912 cf  Inflow=38.13 cfs 3.990 af
24.0" Round Culvert  n=0.012  L=78.0'  S=0.0135 '/'  Outflow=24.09 cfs 3.990 af

**Pond 2P: 12" CPP**
Peak Elev=60.93'  Storage=11,719 cf  Inflow=23.92 cfs 1.395 af
Outflow=18.70 cfs 1.395 af

**Link 100L: POA #100 - SW**
Inflow=4.26 cfs 0.448 af
Primary=4.26 cfs 0.448 af

**Link 200L: POA #200 - South**
Inflow=27.12 cfs 4.597 af
Primary=27.12 cfs 4.597 af

**Link 300L: POA #300 - SE**
Inflow=16.14 cfs 1.589 af
Primary=16.14 cfs 1.589 af

**Total Runoff Area = 30.826 ac   Runoff Volume = 6.634 af   Average Runoff Depth = 2.58"**
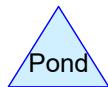**93.16% Pervious = 28.718 ac     6.84% Impervious = 2.108 ac**

## Summary for Subcatchment 1S: West Corner

Runoff    =    5.53 cfs @  12.14 hrs,  Volume=    0.448 af,  Depth=  2.74"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-48.00 hrs, dt= 0.01 hrs
Type III 24-hr  10-year Rainfall=5.47"

| Area (sf) | CN | Description |
|---|---|---|
| 7,590 | 98 | Paved roads w/curbs & sewers, HSG C |
| 37,391 | 74 | >75% Grass cover, Good, HSG C |
| 40,320 | 70 | Woods, Good, HSG C |
| 31 | 55 | Woods, Good, HSG B |
| 85,332 | 74 | Weighted Average |
| 77,742 | | 91.11% Pervious Area |
| 7,590 | | 8.89% Impervious Area |

| Tc (min) | Length (feet) | Slope (ft/ft) | Velocity (ft/sec) | Capacity (cfs) | Description |
|---|---|---|---|---|---|
| 4.5 | 35 | 0.1071 | 0.13 | | **Sheet Flow,** |
| | | | | | Woods: Light underbrush   n= 0.400   P2= 3.61" |
| 1.6 | 129 | 0.0388 | 1.38 | | **Shallow Concentrated Flow,** |
| | | | | | Short Grass Pasture   Kv= 7.0 fps |
| 0.6 | 55 | 0.0909 | 1.51 | | **Shallow Concentrated Flow,** |
| | | | | | Woodland   Kv= 5.0 fps |
| 3.1 | 147 | 0.0254 | 0.80 | | **Shallow Concentrated Flow,** |
| | | | | | Woodland   Kv= 5.0 fps |
| 9.8 | 366 | Total | | | |

## Subcatchment 1S: West Corner

**Hydrograph**



Type III 24-hr
10-year Rainfall=5.47"
Runoff Area=85,332 sf
Runoff Volume=0.448 af
Runoff Depth=2.74"
Flow Length=366'
Tc=9.8 min
CN=74

5.53 cfs

Runoff

Flow (cfs)

Time (hours)

## Summary for Subcatchment 2.1S: Central

Runoff      =      26.96 cfs @  12.22 hrs,  Volume=          2.595 af,  Depth=  2.74"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-48.00 hrs, dt= 0.01 hrs
Type III 24-hr  10-year Rainfall=5.47"

| Area (sf) | CN | Description |
|---|---|---|
| 4,537 | 98 | Paved parking, HSG D |
| 33,589 | 98 | Paved parking, HSG C |
| 5,448 | 98 | Roofs, HSG C |
| 49 | 98 | Paved parking, HSG B |
| 3,520 | 80 | >75% Grass cover, Good, HSG D |
| 69,745 | 77 | Woods, Good, HSG D |
| 10,593 | 65 | Brush, Good, HSG C |
| 71,371 | 74 | >75% Grass cover, Good, HSG C |
| 280,230 | 70 | Woods, Good, HSG C |
| 530 | 61 | >75% Grass cover, Good, HSG B |
| 14,635 | 55 | Woods, Good, HSG B |
| 494,247 | 74 | Weighted Average |
| 450,624 | | 91.17% Pervious Area |
| 43,623 | | 8.83% Impervious Area |

| Tc (min) | Length (feet) | Slope (ft/ft) | Velocity (ft/sec) | Capacity (cfs) | Description |
|---|---|---|---|---|---|
| 0.5 | 35 | 0.0200 | 1.18 | | **Sheet Flow,** <br> Smooth surfaces   n= 0.011   P2= 3.61" |
| 4.7 | 255 | 0.0165 | 0.90 | | **Shallow Concentrated Flow,** <br> Short Grass Pasture   Kv= 7.0 fps |
| 2.0 | 132 | 0.0501 | 1.12 | | **Shallow Concentrated Flow,** <br> Woodland   Kv= 5.0 fps |
| 0.4 | 67 | 0.0313 | 2.85 | | **Shallow Concentrated Flow,** <br> Unpaved   Kv= 16.1 fps |
| 1.0 | 89 | 0.0465 | 1.51 | | **Shallow Concentrated Flow,** <br> Short Grass Pasture   Kv= 7.0 fps |
| 4.3 | 289 | 0.0500 | 1.12 | | **Shallow Concentrated Flow,** <br> Woodland   Kv= 5.0 fps |
| 2.9 | 474 | 0.0106 | 2.72 | 13.61 | **Trap/Vee/Rect Channel Flow,** <br> Bot.W=2.00'  D=1.00'  Z= 3.0 '/'  Top.W=8.00' <br> n= 0.040  Winding stream, pools & shoals |
| 15.8 | 1,341 | Total | | | |

## Subcatchment 2.1S: Central

**Hydrograph**



Type III 24-hr
10-year Rainfall=5.47"
Runoff Area=494,247 sf
Runoff Volume=2.595 af
Runoff Depth=2.74"
Flow Length=1,341'
Tc=15.8 min
CN=74

26.96 cfs

## Summary for Subcatchment 2.2S: South of SQ Drive

Runoff     =        8.55 cfs @   12.09 hrs,  Volume=          0.607 af,  Depth=  3.02"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-48.00 hrs, dt= 0.01 hrs
Type III 24-hr  10-year Rainfall=5.47"

| Area (sf) | CN | Description |
|---|---|---|
| 5,341 | 98 | Paved parking, HSG D |
| 5,978 | 98 | Paved parking, HSG C |
| 53,584 | 77 | Woods, Good, HSG D |
| 40,165 | 70 | Woods, Good, HSG C |
| 105,068 | 77 | Weighted Average |
| 93,749 | | 89.23% Pervious Area |
| 11,319 | | 10.77% Impervious Area |

| Tc (min) | Length (feet) | Slope (ft/ft) | Velocity (ft/sec) | Capacity (cfs) | Description |
|---|---|---|---|---|---|
| 0.3 | 19 | 0.0200 | 1.05 | | **Sheet Flow,** Smooth surfaces   n= 0.011   P2= 3.61" |
| 1.4 | 118 | 0.0816 | 1.43 | | **Shallow Concentrated Flow,** Woodland   Kv= 5.0 fps |
| 0.7 | 254 | 0.0502 | 5.93 | 29.63 | **Trap/Vee/Rect Channel Flow,** Bot.W=2.00'  D=1.00'  Z= 3.0 '/'  Top.W=8.00' n= 0.040  Winding stream, pools & shoals |
| 2.4 | 391 | | | | Total,  Increased to minimum Tc = 6.0 min |

### Subcatchment 2.2S: South of SQ Drive



**Hydrograph**

Type III 24-hr
10-year Rainfall=5.47"
Runoff Area=105,068 sf
Runoff Volume=0.607 af
Runoff Depth=3.02"
Flow Length=391'
Tc=6.0 min
CN=77

## Summary for Subcatchment 2S: North Corner

Runoff     =       23.92 cfs @  12.00 hrs,  Volume=          1.395 af,  Depth=  2.57"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-48.00 hrs, dt= 0.01 hrs
Type III 24-hr  10-year Rainfall=5.47"

| Area (sf) | CN | Description |
|---|---|---|
| 27 | 98 | Paved parking, HSG D |
| 13,324 | 98 | Paved parking, HSG C |
| 5,932 | 98 | Roofs, HSG C |
| 254 | 80 | >75% Grass cover, Good, HSG D |
| 20,767 | 77 | Woods, Good, HSG D |
| 21,632 | 74 | >75% Grass cover, Good, HSG C |
| 199,815 | 70 | Woods, Good, HSG C |
| 22,470 | 55 | Woods, Good, HSG B |
| 284,221 | 72 | Weighted Average |
| 264,938 | | 93.22% Pervious Area |
| 19,283 | | 6.78% Impervious Area |

### Subcatchment 2S: North Corner

**Hydrograph**



Type III 24-hr
10-year Rainfall=5.47"
Runoff Area=284,221 sf
Runoff Volume=1.395 af
Runoff Depth=2.57"
Tc=0.0 min
CN=72

## Summary for Subcatchment 3S: SE Corner

Runoff     =       16.14 cfs @  12.23 hrs,  Volume=         1.589 af,  Depth=  2.22"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-48.00 hrs, dt= 0.01 hrs
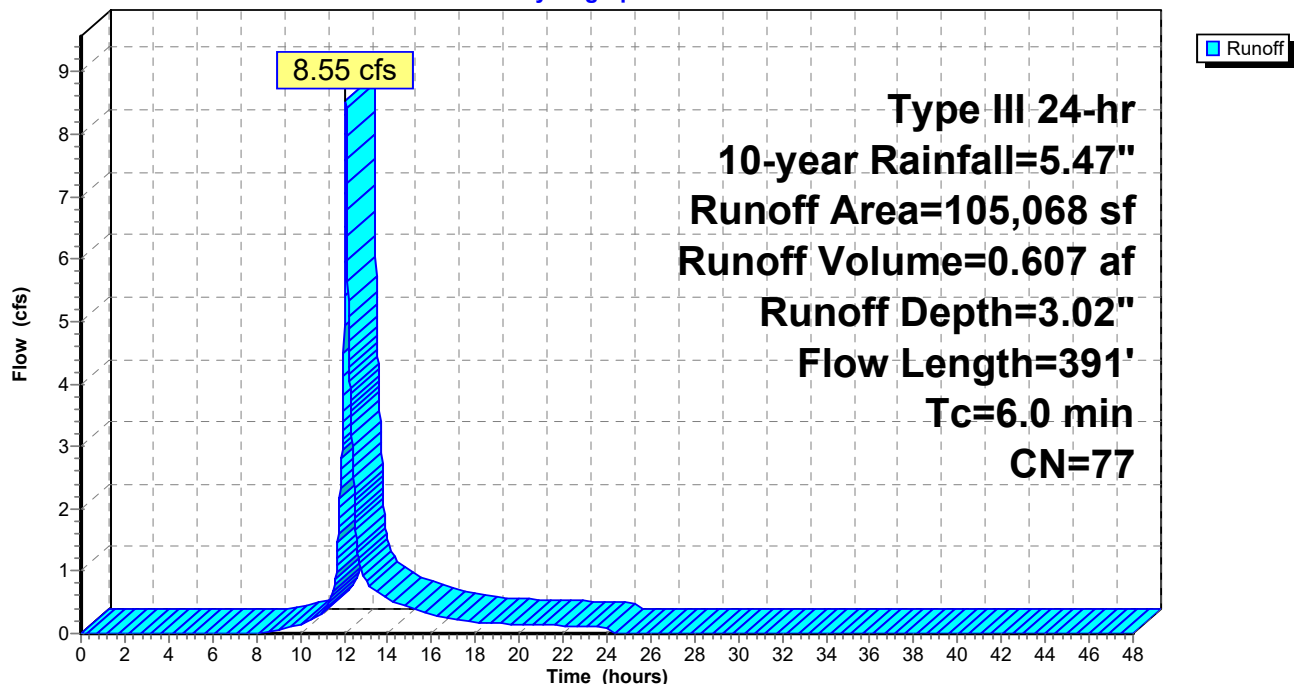Type III 24-hr  10-year Rainfall=5.47"

| Area (sf) | CN | Description |
|---:|---:|---|
| 8,365 | 98 | Paved parking, HSG C |
| 1,632 | 98 | Paved parking, HSG B |
| 6,383 | 74 | >75% Grass cover, Good, HSG C |
| 296,269 | 70 | Woods, Good, HSG C |
| 1,172 | 61 | >75% Grass cover, Good, HSG B |
| 60,099 | 55 | Woods, Good, HSG B |
| 373,920 | 68 | Weighted Average |
| 363,923 | | 97.33% Pervious Area |
| 9,997 | | 2.67% Impervious Area |

| Tc (min) | Length (feet) | Slope (ft/ft) | Velocity (ft/sec) | Capacity (cfs) | Description |
|---:|---:|---:|---:|---:|---|
| 8.5 | 90 | 0.1412 | 0.18 | | **Sheet Flow,** Woods: Light underbrush   n= 0.400   P2= 3.61" |
| 4.7 | 331 | 0.0554 | 1.18 | | **Shallow Concentrated Flow,** Woodland   Kv= 5.0 fps |
| 0.9 | 331 | 0.0554 | 6.22 | 31.12 | **Trap/Vee/Rect Channel Flow,** Bot.W=2.00'  D=1.00'  Z= 3.0 '/'  Top.W=8.00' n= 0.040  Winding stream, pools & shoals |
| 1.8 | 397 | 0.0160 | 3.63 | 25.39 | **Trap/Vee/Rect Channel Flow,** Bot.W=4.00'  D=1.00'  Z= 3.0 '/'  Top.W=10.00' n= 0.040  Winding stream, pools & shoals |
| 15.9 | 1,149 | | | | Total |

## Subcatchment 3S: SE Corner

**Hydrograph**



16.14 cfs

Type III 24-hr
10-year Rainfall=5.47"
Runoff Area=373,920 sf
Runoff Volume=1.589 af
Runoff Depth=2.22"
Flow Length=1,149'
Tc=15.9 min
CN=68

Runoff

Flow (cfs)

Time (hours)

## Summary for Reach 2.1R: Wetland Flow Path

Inflow Area =         6.525 ac,    6.78% Impervious,  Inflow Depth =   2.57"    for  10-year event
Inflow      =      18.63 cfs @   12.05 hrs,  Volume=           1.395 af
Outflow     =      16.73 cfs @   12.09 hrs,  Volume=           1.395 af,  Atten= 10%,  Lag= 2.1 min

Routing by Dyn-Stor-Ind method, Time Span= 0.00-48.00 hrs, dt= 0.01 hrs
Max. Velocity= 2.53 fps,  Min. Travel Time= 2.3 min
Avg. Velocity = 0.72 fps,  Avg. Travel Time= 7.9 min

Peak Storage= 2,278 cf @ 12.09 hrs
Average Depth at Peak Storage= 1.19'
Bank-Full Depth= 2.00'  Flow Area= 16.0 sf,  Capacity= 54.59 cfs

2.00'  x  2.00'  deep channel,  n= 0.040  Winding stream, pools & shoals
Side Slope Z-value= 3.0 '/'   Top Width= 14.00'
Length= 344.0'   Slope= 0.0075 '/'
Inlet Invert= 52.58',  Outlet Invert= 50.00'



### Reach 2.1R: Wetland Flow Path



**Hydrograph**

Inflow Area=6.525 ac
Avg. Flow Depth=1.19'
Max Vel=2.53 fps
n=0.040
L=344.0'
S=0.0075 '/'
Capacity=54.59 cfs

## Summary for Reach 2.2R: Wetland Flow Path

Inflow Area =       17.871 ac,   8.08% Impervious,  Inflow Depth =  2.68"   for  10-year event
Inflow      =     24.09 cfs @   12.43 hrs,  Volume=            3.990 af
Outflow     =     24.09 cfs @   12.44 hrs,  Volume=            3.990 af,  Atten= 0%,  Lag= 0.6 min

Routing by Dyn-Stor-Ind method, Time Span= 0.00-48.00 hrs, dt= 0.01 hrs
Max. Velocity= 5.61 fps,  Min. Travel Time= 0.8 min
Avg. Velocity = 1.93 fps,  Avg. Travel Time= 2.3 min

Peak Storage= 1,129 cf @ 12.44 hrs
Average Depth at Peak Storage= 0.91'
Bank-Full Depth= 2.00'  Flow Area= 16.0 sf,  Capacity= 141.18 cfs

2.00'  x  2.00'  deep channel,  n= 0.040  Winding stream, pools & shoals
Side Slope Z-value= 3.0 '/'   Top Width= 14.00'
Length= 263.0'   Slope= 0.0502 '/'
Inlet Invert= 46.52',  Outlet Invert= 33.33'

### Reach 2.2R: Wetland Flow Path



Hydrograph

Inflow Area=17.871 ac
Avg. Flow Depth=0.91'
Max Vel=5.61 fps
n=0.040
L=263.0'
S=0.0502 '/'
Capacity=141.18 cfs

## Summary for Reach 2R: Wetland Flow Path

Inflow Area =        6.525 ac,   6.78% Impervious,  Inflow Depth =  2.57"   for  10-year event
Inflow      =      18.70 cfs @   12.05 hrs,  Volume=              1.395 af
Outflow     =      18.63 cfs @   12.05 hrs,  Volume=              1.395 af,  Atten= 0%,  Lag= 0.4 min

Routing by Dyn-Stor-Ind method, Time Span= 0.00-48.00 hrs, dt= 0.01 hrs
Max. Velocity= 5.02 fps,  Min. Travel Time= 0.5 min
Avg. Velocity = 1.45 fps,  Avg. Travel Time= 1.7 min

Peak Storage= 560 cf @ 12.05 hrs
Average Depth at Peak Storage= 0.83'
Bank-Full Depth= 2.00'  Flow Area= 16.0 sf,  Capacity= 133.09 cfs

2.00'  x  2.00'  deep channel,  n= 0.040  Winding stream, pools & shoals
Side Slope Z-value= 3.0 '/'  Top Width= 14.00'
Length= 151.0'  Slope= 0.0446 '/'
Inlet Invert= 59.31',  Outlet Invert= 52.58'



### Reach 2R: Wetland Flow Path



Inflow Area=6.525 ac
Avg. Flow Depth=0.83'
Max Vel=5.02 fps
n=0.040
L=151.0'
S=0.0446 '/'
Capacity=133.09 cfs

## Summary for Reach 23R: Wetland Flow Path

Inflow Area =      6.525 ac,   6.78% Impervious,  Inflow Depth =  2.57"   for  10-year event
Inflow      =     16.73 cfs @   12.09 hrs,  Volume=           1.395 af
Outflow     =     16.62 cfs @   12.10 hrs,  Volume=           1.395 af,  Atten= 1%,  Lag= 0.5 min

Routing by Dyn-Stor-Ind method, Time Span= 0.00-48.00 hrs, dt= 0.01 hrs
Max. Velocity= 3.53 fps,  Min. Travel Time= 0.6 min
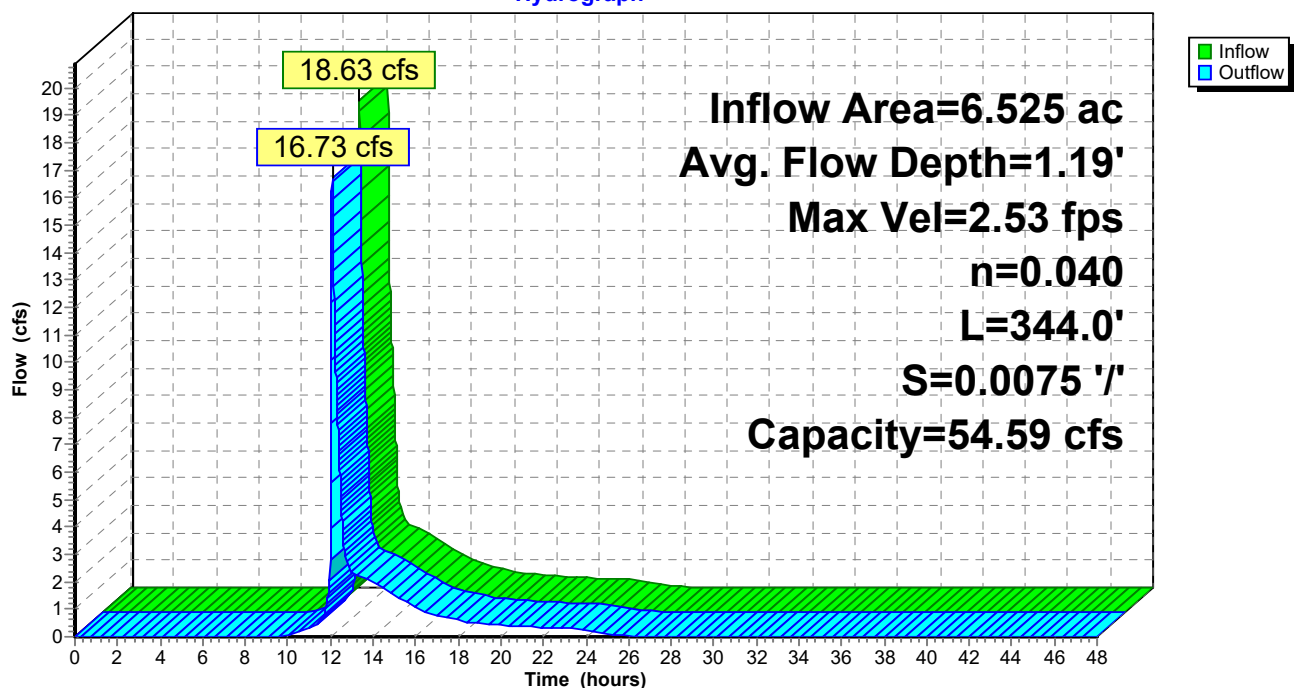Avg. Velocity = 1.03 fps,  Avg. Travel Time= 2.1 min

Peak Storage= 617 cf @ 12.10 hrs
Average Depth at Peak Storage= 0.96'
Bank-Full Depth= 2.00'  Flow Area= 16.0 sf,  Capacity= 85.86 cfs

2.00'  x  2.00'  deep channel,  n= 0.040  Winding stream, pools & shoals
Side Slope Z-value= 3.0 '/'   Top Width= 14.00'
Length= 131.0'   Slope= 0.0185 '/'
Inlet Invert= 50.00',  Outlet Invert= 47.57'

### Reach 23R: Wetland Flow Path

**Hydrograph**

16.73 cfs
16.62 cfs

Inflow Area=6.525 ac
Avg. Flow Depth=0.96'
Max Vel=3.53 fps
n=0.040
L=131.0'
S=0.0185 '/'
Capacity=85.86 cfs

Flow (cfs)

Time (hours)
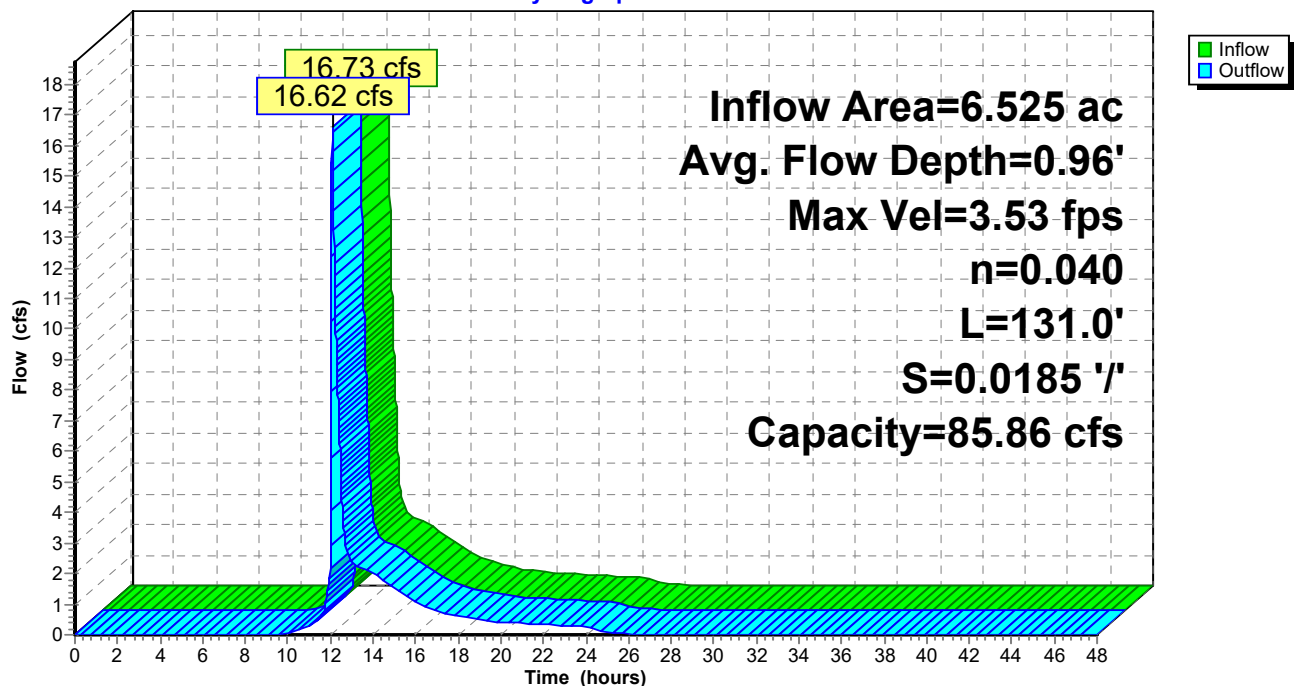
Inflow
Outflow

## Summary for Pond 1P: 15" RCP

Inflow Area = 1.959 ac, 8.89% Impervious, Inflow Depth = 2.74" for 10-year event
Inflow = 5.53 cfs @ 12.14 hrs, Volume= 0.448 af
Outflow = 4.26 cfs @ 12.23 hrs, Volume= 0.448 af, Atten= 23%, Lag= 5.5 min
Primary = 4.26 cfs @ 12.23 hrs, Volume= 0.448 af

Routing by Dyn-Stor-Ind method, Time Span= 0.00-48.00 hrs, dt= 0.01 hrs
Peak Elev= 53.65' @ 12.23 hrs Surf.Area= 2,904 sf Storage= 1,011 cf

Plug-Flow detention time= 1.4 min calculated for 0.448 af (100% of inflow)
Center-of-Mass det. time= 1.3 min ( 837.9 - 836.6 )

| Volume | Invert | Avail.Storage | Storage Description |
|---|---|---|---|
| #1 | 52.26' | 9,237 cf | **Custom Stage Data (Prismatic)** Listed below (Recalc) |

| Elevation (feet) | Surf.Area (sq-ft) | Inc.Store (cubic-feet) | Cum.Store (cubic-feet) |
|---|---|---|---|
| 52.26 | 10 | 0 | 0 |
| 53.00 | 85 | 35 | 35 |
| 54.00 | 4,401 | 2,243 | 2,278 |
| 55.00 | 9,516 | 6,959 | 9,237 |

| Device | Routing | Invert | Outlet Devices |
|---|---|---|---|
| #1 | Primary | 52.26' | **15.0" Round Culvert** <br> L= 60.0' RCP, end-section conforming to fill, Ke= 0.500 <br> Inlet / Outlet Invert= 52.26' / 52.04' S= 0.0037 '/' Cc= 0.900 <br> n= 0.012, Flow Area= 1.23 sf |

**Primary OutFlow** Max=4.26 cfs @ 12.23 hrs HW=53.65' TW=0.00' (Dynamic Tailwater)
└—**1=Culvert** (Barrel Controls 4.26 cfs @ 3.89 fps)

## Pond 1P: 15" RCP

**Hydrograph**
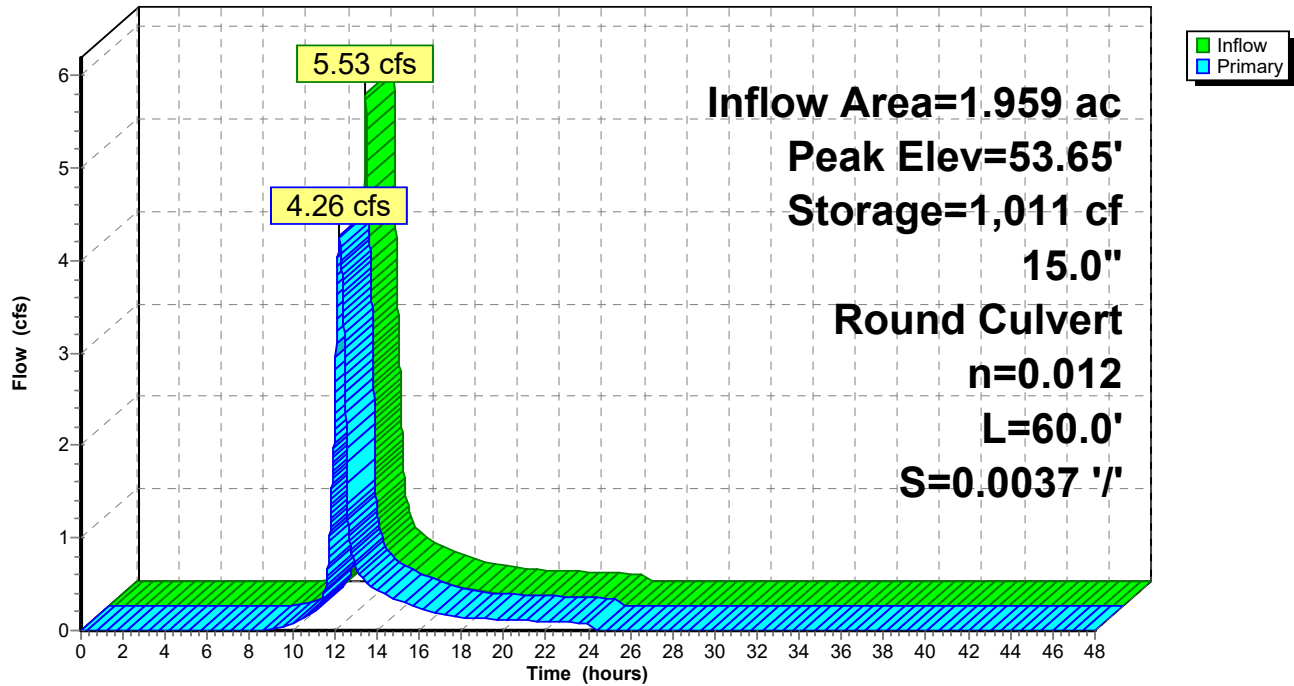


**Inflow Area=1.959 ac**
**Peak Elev=53.65'**
**Storage=1,011 cf**
**15.0"**
**Round Culvert**
**n=0.012**
**L=60.0'**
**S=0.0037 '/'**

## Summary for Pond 2.1P: 24" RCP

Inflow Area =       17.871 ac,   8.08% Impervious,  Inflow Depth =  2.68"   for  10-year event
Inflow      =     38.13 cfs @   12.19 hrs,  Volume=            3.990 af
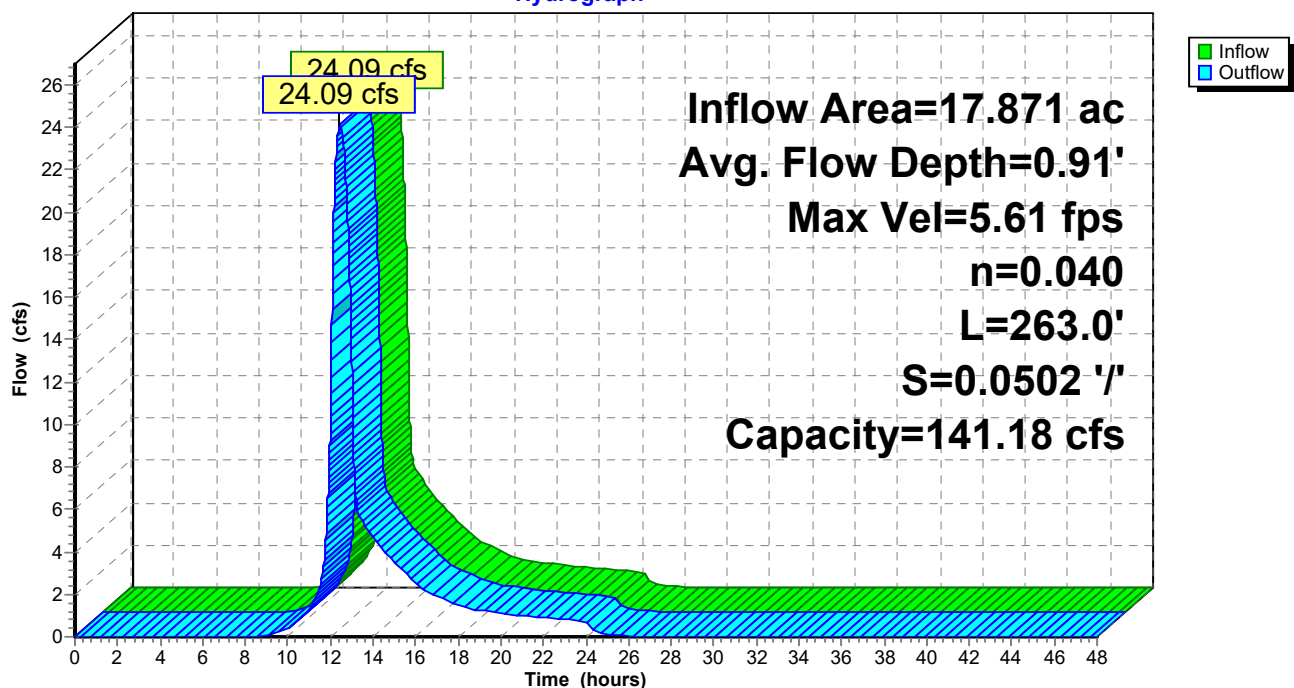Outflow    =     24.09 cfs @   12.43 hrs,  Volume=            3.990 af,  Atten= 37%,  Lag= 14.6 min
Primary   =     24.09 cfs @   12.43 hrs,  Volume=            3.990 af

Routing by Dyn-Stor-Ind method, Time Span= 0.00-48.00 hrs, dt= 0.01 hrs
Peak Elev= 51.11' @ 12.43 hrs   Surf.Area= 16,584 sf   Storage= 18,912 cf

Plug-Flow detention time= 4.8 min calculated for 3.990 af (100% of inflow)
Center-of-Mass det. time= 4.7 min ( 861.2 - 856.5 )

| Volume | Invert | Avail.Storage | Storage Description |
|---|---|---|---|
| #1 | 47.57' | 80,071 cf | **Custom Stage Data (Prismatic)** Listed below (Recalc) |

| Elevation (feet) | Surf.Area (sq-ft) | Inc.Store (cubic-feet) | Cum.Store (cubic-feet) |
|---|---|---|---|
| 47.57 | 100 | 0 | 0 |
| 48.00 | 164 | 57 | 57 |
| 49.00 | 2,506 | 1,335 | 1,392 |
| 50.00 | 7,196 | 4,851 | 6,243 |
| 51.00 | 14,807 | 11,002 | 17,244 |
| 52.00 | 31,534 | 23,171 | 40,415 |
| 53.00 | 47,779 | 39,657 | 80,071 |

| Device | Routing | Invert | Outlet Devices |
|---|---|---|---|
| #1 | Primary | 47.57' | **24.0"  Round Culvert** L= 78.0'  RCP, end-section conforming to fill,  Ke= 0.500  Inlet / Outlet Invert= 47.57' / 46.52'  S= 0.0135 '/'  Cc= 0.900  n= 0.012,  Flow Area= 3.14 sf |

**Primary OutFlow** Max=24.09 cfs @ 12.43 hrs  HW=51.11'  TW=47.43'  (Dynamic Tailwater)
└─**1=Culvert** (Inlet Controls 24.09 cfs @ 7.67 fps)

## Pond 2.1P: 24" RCP

**Hydrograph**



Inflow Area=17.871 ac
Peak Elev=51.11'
Storage=18,912 cf
24.0"
Round Culvert
n=0.012
L=78.0'
S=0.0135 '/'

38.13 cfs

24.09 cfs

Inflow
Primary

Flow (cfs)

Time (hours)

## Summary for Pond 2P: 12" CPP

Inflow Area =        6.525 ac,   6.78% Impervious,  Inflow Depth =  2.57"   for  10-year event
Inflow      =     23.92 cfs @  12.00 hrs,  Volume=            1.395 af
Outflow    =     18.70 cfs @  12.05 hrs,  Volume=            1.395 af,  Atten= 22%,  Lag= 2.6 min
Primary    =     18.70 cfs @  12.05 hrs,  Volume=            1.395 af

Routing by Dyn-Stor-Ind method, Time Span= 0.00-48.00 hrs, dt= 0.01 hrs
Peak Elev= 60.93' @ 12.05 hrs   Surf.Area= 15,490 sf   Storage= 11,719 cf

Plug-Flow detention time= 44.2 min calculated for 1.395 af (100% of inflow)
Center-of-Mass det. time= 44.1 min ( 876.6 - 832.4 )

| Volume | Invert | Avail.Storage | Storage Description |
|---|---|---|---|
| #1 | 59.65' | 35,764 cf | **Custom Stage Data (Prismatic)** Listed below (Recalc) |

| Elevation (feet) | Surf.Area (sq-ft) | Inc.Store (cubic-feet) | Cum.Store (cubic-feet) |
|---|---|---|---|
| 59.65 | 100 | 0 | 0 |
| 60.00 | 6,996 | 1,242 | 1,242 |
| 61.00 | 16,111 | 11,554 | 12,795 |
| 62.00 | 29,827 | 22,969 | 35,764 |

| Device | Routing | Invert | Outlet Devices |
|---|---|---|---|
| #1 | Primary | 59.65' | **12.0"  Round Culvert** L= 9.0'  CPP, projecting, no headwall,  Ke= 0.900 Inlet / Outlet Invert= 59.65' / 59.31'  S= 0.0378 '/'  Cc= 0.900 n= 0.012,  Flow Area= 0.79 sf |
| #2 | Primary | 60.75' | **87.0' long  x 4.0' breadth Broad-Crested Rectangular Weir** Head (feet) 0.20 0.40 0.60 0.80 1.00 1.20 1.40 1.60 1.80 2.00 2.50 3.00 3.50 4.00 4.50 5.00 5.50 Coef. (English) 2.38 2.54 2.69 2.68 2.67 2.67 2.65 2.66 2.66 2.68 2.72 2.73 2.76 2.79 2.88 3.07 3.32 |

**Primary OutFlow** Max=18.66 cfs @ 12.05 hrs  HW=60.93'  TW=60.13'   (Dynamic Tailwater)
├─**1=Culvert** (Inlet Controls 2.64 cfs @ 3.36 fps)
└─**2=Broad-Crested Rectangular Weir** (Weir Controls 16.02 cfs @ 1.01 fps)

## Pond 2P: 12" CPP

**Hydrograph**



Inflow Area=6.525 ac
Peak Elev=60.93'
Storage=11,719 cf

23.92 cfs

18.70 cfs

Legend:
- Inflow
- Primary

Y-axis: Flow (cfs)
X-axis: Time (hours)

## Summary for Link 100L: POA #100 - SW

Inflow Area =        1.959 ac,    8.89% Impervious,  Inflow Depth =   2.74"    for  10-year event
Inflow      =       4.26 cfs @   12.23 hrs,  Volume=            0.448 af
Primary     =       4.26 cfs @   12.23 hrs,  Volume=            0.448 af,  Atten= 0%,  Lag= 0.0 min

Primary outflow = Inflow, Time Span= 0.00-48.00 hrs, dt= 0.01 hrs

### Link 100L: POA #100 - SW

**Hydrograph**

## Summary for Link 200L: POA #200 - South

Inflow Area =       20.283 ac,    8.40% Impervious,  Inflow Depth =   2.72"   for  10-year event
Inflow      =      27.12 cfs @   12.34 hrs,  Volume=            4.597 af
Primary     =      27.12 cfs @   12.34 hrs,  Volume=            4.597 af,  Atten= 0%,  Lag= 0.0 min

Primary outflow = Inflow, Time Span= 0.00-48.00 hrs, dt= 0.01 hrs

### Link 200L: POA #200 - South

**Hydrograph**
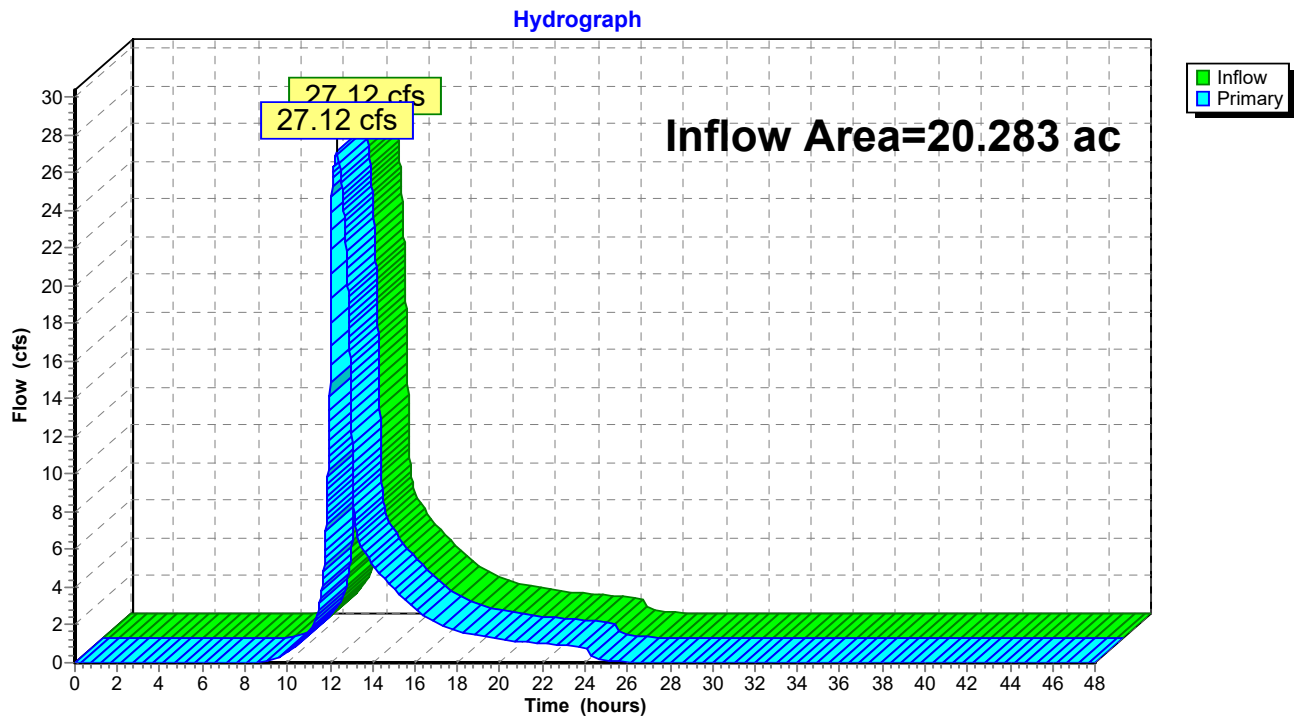
## Summary for Link 300L: POA #300 - SE

Inflow Area =        8.584 ac,    2.67% Impervious,  Inflow Depth =   2.22"    for  10-year event
Inflow      =      16.14 cfs @   12.23 hrs,  Volume=          1.589 af
Primary     =      16.14 cfs @   12.23 hrs,  Volume=          1.589 af,  Atten= 0%,  Lag= 0.0 min

Primary outflow = Inflow, Time Span= 0.00-48.00 hrs, dt= 0.01 hrs

### Link 300L: POA #300 - SE

**Hydrograph**

2S

North Corner

2P

12" CPP

2.1S

Central

2R

Wetland Flow Path

2.1R

Wetland Flow Path

23R

Wetland Flow Path

1S

West Corner

1P

15" RCP

100L

POA #100 - SW

2.1P

24" RCP

2.2R

Wetland Flow Path

2.2S

South of SQ Drive

200L

POA #200 - South

3S

SE Corner

300L

POA #300 - SE

**PRE-DEVELOPMENT**

Subcat    Reach    Pond    Link

Time span=0.00-48.00 hrs, dt=0.01 hrs, 4801 points
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN
Reach routing by Dyn-Stor-Ind method  -  Pond routing by Dyn-Stor-Ind method

**Subcatchment 1S: West Corner**
Runoff Area=85,332 sf  8.89% Impervious  Runoff Depth=3.98"
Flow Length=366'  Tc=9.8 min  CN=74  Runoff=8.04 cfs 0.650 af

**Subcatchment 2.1S: Central**
Runoff Area=494,247 sf  8.83% Impervious  Runoff Depth=3.98"
Flow Length=1,341'  Tc=15.8 min  CN=74  Runoff=39.25 cfs 3.764 af

**Subcatchment 2.2S: South of SQ Drive**
Runoff Area=105,068 sf  10.77% Impervious  Runoff Depth=4.30"
Flow Length=391'  Tc=6.0 min  CN=77  Runoff=12.13 cfs 0.865 af

**Subcatchment 2S: North Corner**
Runoff Area=284,221 sf  6.78% Impervious  Runoff Depth=3.77"
Tc=0.0 min  CN=72  Runoff=35.33 cfs 2.050 af

**Subcatchment 3S: SE Corner**
Runoff Area=373,920 sf  2.67% Impervious  Runoff Depth=3.35"
Flow Length=1,149'  Tc=15.9 min  CN=68  Runoff=24.80 cfs 2.399 af

**Reach 2.1R: Wetland Flow Path**
Avg. Flow Depth=1.53'  Max Vel=2.91 fps  Inflow=31.17 cfs 2.050 af
n=0.040  L=344.0'  S=0.0075 '/'  Capacity=54.59 cfs  Outflow=29.25 cfs 2.050 af

**Reach 2.2R: Wetland Flow Path**
Avg. Flow Depth=0.98'  Max Vel=5.85 fps  Inflow=28.17 cfs 5.814 af
n=0.040  L=263.0'  S=0.0502 '/'  Capacity=141.18 cfs  Outflow=28.17 cfs 5.814 af

**Reach 2R: Wetland Flow Path**
Avg. Flow Depth=1.05'  Max Vel=5.74 fps  Inflow=31.29 cfs 2.050 af
n=0.040  L=151.0'  S=0.0446 '/'  Capacity=133.09 cfs  Outflow=31.17 cfs 2.050 af

**Reach 23R: Wetland Flow Path**
Avg. Flow Depth=1.25'  Max Vel=4.08 fps  Inflow=29.25 cfs 2.050 af
n=0.040  L=131.0'  S=0.0185 '/'  Capacity=85.86 cfs  Outflow=29.14 cfs 2.050 af

**Pond 1P: 15" RCP**
Peak Elev=54.02'  Storage=2,363 cf  Inflow=8.04 cfs 0.650 af
15.0" Round Culvert  n=0.012  L=60.0'  S=0.0037 '/'  Outflow=5.12 cfs 0.650 af

**Pond 2.1P: 24" RCP**
Peak Elev=52.04'  Storage=41,604 cf  Inflow=55.24 cfs 5.814 af
24.0" Round Culvert  n=0.012  L=78.0'  S=0.0135 '/'  Outflow=28.17 cfs 5.814 af

**Pond 2P: 12" CPP**
Peak Elev=61.01'  Storage=13,034 cf  Inflow=35.33 cfs 2.050 af
Outflow=31.29 cfs 2.050 af

**Link 100L: POA #100 - SW**
Inflow=5.12 cfs 0.650 af
Primary=5.12 cfs 0.650 af

**Link 200L: POA #200 - South**
Inflow=34.48 cfs 6.679 af
Primary=34.48 cfs 6.679 af

**Link 300L: POA #300 - SE**
Inflow=24.80 cfs 2.399 af
Primary=24.80 cfs 2.399 af

**Total Runoff Area = 30.826 ac   Runoff Volume = 9.728 af   Average Runoff Depth = 3.79"**
**93.16% Pervious = 28.718 ac     6.84% Impervious = 2.108 ac**

# Section 4

## Drainage Calculations

Post-Development
2-Year, 24-Hour Summary
10-Year, 24-Hour Complete
25-Year, 24-Hour Summary
100-Year, 24-Hour Pond Reports

ALTUS
ENGINEERING

POST-DEVELOPMENT

2S
North Corner

2P
12" CPP

2R
Wetland Flow Path

2.1S
Central

2.1R
Wetland Flow Path

22R
Wetland Flow Path

23R
Wetland Flow Path

3S
SE Corner

67S
Landscape

10S
Parking Lot

21S
Parking Lot

31P
CB #8

22P
Bio #2

22S
To Bio #2

11P
YD #3-1

11S
Island

20S
Building

1S
West Corner

10P
Porous Pavement

18P
CB #3

18S
To Bio #1

16S
Island

15S
Building

14S
Building

13S
Building

12S
Building

15P
YD #4

14P
YD #5

13P
YD #6

12P
YD #7

10R
Swale

17P
Bio #1

1P
15" RCP

100L
POA #100 - SW

2.1P
24" RCP

30S
Roadside

30P
CB #10-2

31S
Roadside

44S
Roadside

2.2R
Wetland Flow Path

2.2S
South of SQ Drive

200L
POA #200 - South

62P
DMH #17-1

67P
CB #17

68P
DMH #16

40S
Building

40P
6" CPP

60S
Parking Lot

61S
Parking Lot

66S
Building

68S
Building

42S
Building

41S
Building

41P
YD #15

45S
Parking Lot

46S
Parking Lot

64S
Building

70S
Building

69S
To Pond

69P
Bio #3

42P
6" CPP

43P
10" CPP

45P
CB #13-2

46P
CB #13-1

43S
YD #21

63S
Building

44P
CB #14

47P

69R
Swale

70R
Woodland Flow Path

71R
Stream

48S
Roadside

48P
CB #12-2

50P
DMH #12

49P
CB #12-1

49S
Driveway

82S
Parking Lot

72R
Stream

80S
Building

80P
YD #24

83S
To Pond

73R
Stream

81S
Building

82P
6" CPP

83P
CB #23

83R
Woodland Flow Path

300L
POA #300 - SE

DMH #10
CB #10-1
DMH #13
6" CPP
YD #18
YD #19
YD #20
Bio #4

Subcat   Reach   Pond   Link

**Routing Diagram for 5440-Post**
Prepared by Altus Engineering, Inc.,  Printed 7/15/2025
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Time span=0.00-48.00 hrs, dt=0.01 hrs, 4801 points
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN
Reach routing by Dyn-Stor-Ind method  -  Pond routing by Dyn-Stor-Ind method

**Subcatchment 1S: West Corner**
Runoff Area=65,016 sf  9.83% Impervious  Runoff Depth=0.03"
Flow Length=366'  Tc=9.8 min  CN=75  Runoff=0.01 cfs  0.004 af

**Subcatchment 2.1S: Central**
Runoff Area=445,535 sf  8.04% Impervious  Runoff Depth=0.02"
Flow Length=1,341'  Tc=15.8 min  CN=73  Runoff=0.02 cfs  0.015 af

**Subcatchment 2.2S: South of SQ Drive**
Runoff Area=102,088 sf  10.13% Impervious  Runoff Depth=0.05"
Flow Length=391'  Tc=6.0 min  CN=77  Runoff=0.03 cfs  0.009 af

**Subcatchment 2S: North Corner**
Runoff Area=284,221 sf  6.78% Impervious  Runoff Depth=0.01"
Tc=0.0 min  CN=72  Runoff=0.01 cfs  0.007 af

**Subcatchment 3S: SE Corner**
Runoff Area=308,423 sf  2.18% Impervious  Runoff Depth=0.00"
Flow Length=1,149'  Tc=15.9 min  CN=68  Runoff=0.00 cfs  0.000 af

**Subcatchment 10S: Parking Lot**
Runoff Area=10,178 sf  99.02% Impervious  Runoff Depth>0.79"
Tc=790.0 min  CN=98  Runoff=0.01 cfs  0.015 af

**Subcatchment 11S: Island**
Runoff Area=588 sf  65.82% Impervious  Runoff Depth=0.32"
Tc=6.0 min  CN=90  Runoff=0.00 cfs  0.000 af

**Subcatchment 12S: Building**
Runoff Area=1,878 sf  65.12% Impervious  Runoff Depth=0.32"
Tc=6.0 min  CN=90  Runoff=0.02 cfs  0.001 af

**Subcatchment 13S: Building**
Runoff Area=1,349 sf  73.83% Impervious  Runoff Depth=0.40"
Tc=6.0 min  CN=92  Runoff=0.01 cfs  0.001 af

**Subcatchment 14S: Building**
Runoff Area=1,022 sf  77.79% Impervious  Runoff Depth=0.45"
Tc=6.0 min  CN=93  Runoff=0.01 cfs  0.001 af

**Subcatchment 15S: Building**
Runoff Area=1,377 sf  43.21% Impervious  Runoff Depth=0.15"
Tc=6.0 min  CN=84  Runoff=0.00 cfs  0.000 af

**Subcatchment 16S: Island**
Runoff Area=928 sf  26.51% Impervious  Runoff Depth=0.08"
Tc=6.0 min  CN=80  Runoff=0.00 cfs  0.000 af

**Subcatchment 17S: To Bio #1**
Runoff Area=2,893 sf  0.28% Impervious  Runoff Depth=0.02"
Tc=6.0 min  CN=74  Runoff=0.00 cfs  0.000 af

**Subcatchment 20S: Building**
Runoff Area=9,167 sf  100.00% Impervious  Runoff Depth=0.79"
Tc=6.0 min  CN=98  Runoff=0.19 cfs  0.014 af

**Subcatchment 21S: Parking Lot**
Runoff Area=2,620 sf  100.00% Impervious  Runoff Depth=0.79"
Tc=6.0 min  CN=98  Runoff=0.05 cfs  0.004 af

**Subcatchment 22S: To Bio #2**
Runoff Area=3,961 sf  0.00% Impervious  Runoff Depth=0.02"
Tc=6.0 min  CN=74  Runoff=0.00 cfs  0.000 af

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**Subcatchment 30S: Roadside**

Runoff Area=8,230 sf  53.10% Impervious  Runoff Depth=0.22"
Flow Length=204'  Tc=6.0 min  CN=87  Runoff=0.04 cfs  0.004 af

**Subcatchment 31S: Roadside**

Runoff Area=7,135 sf  71.11% Impervious  Runoff Depth=0.36"
Flow Length=143'  Tc=6.0 min  CN=91  Runoff=0.07 cfs  0.005 af

**Subcatchment 40S: Building**

Runoff Area=3,066 sf  100.00% Impervious  Runoff Depth=0.79"
Tc=6.0 min  CN=98  Runoff=0.06 cfs  0.005 af

**Subcatchment 41S: Building**

Runoff Area=2,120 sf  90.94% Impervious  Runoff Depth=0.63"
Tc=6.0 min  CN=96  Runoff=0.04 cfs  0.003 af

**Subcatchment 42S: Building**

Runoff Area=2,162 sf  100.00% Impervious  Runoff Depth=0.79"
Tc=6.0 min  CN=98  Runoff=0.04 cfs  0.003 af

**Subcatchment 44S: Roadside**

Runoff Area=4,663 sf  40.92% Impervious  Runoff Depth=0.15"
Tc=6.0 min  CN=84  Runoff=0.01 cfs  0.001 af

**Subcatchment 45S: Parking Lot**

Runoff Area=3,851 sf  71.88% Impervious  Runoff Depth=0.36"
Tc=6.0 min  CN=91  Runoff=0.04 cfs  0.003 af

**Subcatchment 46S: Parking Lot**

Runoff Area=4,489 sf  73.25% Impervious  Runoff Depth=0.40"
Tc=6.0 min  CN=92  Runoff=0.05 cfs  0.003 af

**Subcatchment 48S: Roadside**

Runoff Area=3,415 sf  55.67% Impervious  Runoff Depth=0.25"
Tc=6.0 min  CN=88  Runoff=0.02 cfs  0.002 af

**Subcatchment 49S: Driveway**

Runoff Area=3,652 sf  83.90% Impervious  Runoff Depth=0.45"
Tc=6.0 min  CN=93  Runoff=0.04 cfs  0.003 af

**Subcatchment 60S: Parking Lot**

Runoff Area=9,169 sf  78.19% Impervious  Runoff Depth=0.45"
Flow Length=116'  Tc=6.0 min  CN=93  Runoff=0.11 cfs  0.008 af

**Subcatchment 61S: Parking Lot**

Runoff Area=7,068 sf  91.98% Impervious  Runoff Depth=0.63"
Flow Length=111'  Tc=6.0 min  CN=96  Runoff=0.12 cfs  0.009 af

**Subcatchment 63S: Building**

Runoff Area=1,459 sf  65.52% Impervious  Runoff Depth=0.32"
Tc=6.0 min  CN=90  Runoff=0.01 cfs  0.001 af

**Subcatchment 64S: Building**

Runoff Area=1,506 sf  81.27% Impervious  Runoff Depth=0.50"
Tc=6.0 min  CN=94  Runoff=0.02 cfs  0.001 af

**Subcatchment 65S: Building**

Runoff Area=982 sf  80.86% Impervious  Runoff Depth=0.45"
Tc=6.0 min  CN=93  Runoff=0.01 cfs  0.001 af

**Subcatchment 66S: Building**

Runoff Area=1,478 sf  44.79% Impervious  Runoff Depth=0.11"
Tc=6.0 min  CN=82  Runoff=0.00 cfs  0.000 af

**Subcatchment 67S: Landscape**

Runoff Area=1,511 sf  10.32% Impervious  Runoff Depth=0.00"
Tc=6.0 min  CN=64  Runoff=0.00 cfs  0.000 af

**Subcatchment 68S: Building**

Runoff Area=1,370 sf  100.00% Impervious  Runoff Depth=0.79"
Tc=6.0 min  CN=98  Runoff=0.03 cfs  0.002 af

**Subcatchment 69S: To Pond**  Runoff Area=12,794 sf  0.00% Impervious  Runoff Depth=0.00"
Tc=6.0 min  CN=69  Runoff=0.00 cfs  0.000 af

**Subcatchment 70S: Building**  Runoff Area=6,905 sf  100.00% Impervious  Runoff Depth=0.79"
Tc=6.0 min  CN=98  Runoff=0.14 cfs  0.010 af

**Subcatchment 80S: Building**  Runoff Area=1,982 sf  84.56% Impervious  Runoff Depth=0.50"
Tc=6.0 min  CN=94  Runoff=0.03 cfs  0.002 af

**Subcatchment 81S: Building**  Runoff Area=1,200 sf  100.00% Impervious  Runoff Depth=0.79"
Tc=6.0 min  CN=98  Runoff=0.02 cfs  0.002 af

**Subcatchment 82S: Parking Lot**  Runoff Area=8,819 sf  89.53% Impervious  Runoff Depth=0.56"
Flow Length=214'  Tc=6.0 min  CN=95  Runoff=0.13 cfs  0.010 af

**Subcatchment 83S: To Pond**  Runoff Area=2,507 sf  0.00% Impervious  Runoff Depth=0.02"
Tc=6.0 min  CN=74  Runoff=0.00 cfs  0.000 af

**Reach 2.1R: Wetland Flow Path**  Avg. Flow Depth=0.02'  Max Vel=0.23 fps  Inflow=0.01 cfs  0.007 af
n=0.040  L=344.0'  S=0.0075 '/'  Capacity=54.59 cfs  Outflow=0.01 cfs  0.007 af

**Reach 2.2R: Wetland Flow Path**  Avg. Flow Depth=0.05'  Max Vel=1.04 fps  Inflow=0.11 cfs  0.047 af
n=0.040  L=263.0'  S=0.0502 '/'  Capacity=141.18 cfs  Outflow=0.10 cfs  0.047 af

**Reach 2R: Wetland Flow Path**  Avg. Flow Depth=0.01'  Max Vel=0.57 fps  Inflow=0.01 cfs  0.007 af
n=0.040  L=151.0'  S=0.0446 '/'  Capacity=133.09 cfs  Outflow=0.01 cfs  0.007 af

**Reach 10R: Swale**  Avg. Flow Depth=0.01'  Max Vel=0.14 fps  Inflow=0.00 cfs  0.004 af
n=0.035  L=44.0'  S=0.0050 '/'  Capacity=16.22 cfs  Outflow=0.00 cfs  0.004 af

**Reach 22R: Wetland Flow Path**  Avg. Flow Depth=0.00'  Max Vel=0.42 fps  Inflow=0.01 cfs  0.018 af
n=0.040  L=211.0'  S=0.0245 '/'  Capacity=392.58 cfs  Outflow=0.01 cfs  0.018 af

**Reach 23R: Wetland Flow Path**  Avg. Flow Depth=0.02'  Max Vel=0.43 fps  Inflow=0.02 cfs  0.024 af
n=0.040  L=131.0'  S=0.0185 '/'  Capacity=85.86 cfs  Outflow=0.02 cfs  0.024 af

**Reach 69R: Swale**  Avg. Flow Depth=0.03'  Max Vel=0.25 fps  Inflow=0.03 cfs  0.050 af
n=0.069  L=17.0'  S=0.0147 '/'  Capacity=14.11 cfs  Outflow=0.03 cfs  0.050 af

**Reach 70R: Woodland Flow Path**  Avg. Flow Depth=0.02'  Max Vel=0.12 fps  Inflow=0.03 cfs  0.050 af
n=0.400  L=57.0'  S=0.1404 '/'  Capacity=21.20 cfs  Outflow=0.03 cfs  0.050 af

**Reach 71R: Stream**  Avg. Flow Depth=0.02'  Max Vel=0.67 fps  Inflow=0.03 cfs  0.050 af
n=0.040  L=80.0'  S=0.0554 '/'  Capacity=31.12 cfs  Outflow=0.03 cfs  0.050 af

**Reach 72R: Stream**  Avg. Flow Depth=0.02'  Max Vel=0.35 fps  Inflow=0.03 cfs  0.050 af
n=0.040  L=88.0'  S=0.0160 '/'  Capacity=25.40 cfs  Outflow=0.03 cfs  0.050 af

**Reach 73R: Stream**  Avg. Flow Depth=0.03'  Max Vel=0.41 fps  Inflow=0.04 cfs  0.064 af
n=0.040  L=309.0'  S=0.0160 '/'  Capacity=25.38 cfs  Outflow=0.04 cfs  0.063 af

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**Reach 83R: Woodland Flow Path**       Avg. Flow Depth=0.02'  Max Vel=0.08 fps  Inflow=0.01 cfs  0.013 af
n=0.400   L=122.0'  S=0.0950 '/'  Capacity=17.44 cfs  Outflow=0.01 cfs  0.013 af


**Pond 1P: 15" RCP**       Peak Elev=52.32'  Storage=1 cf  Inflow=0.01 cfs  0.008 af
15.0"  Round Culvert  n=0.012  L=60.0'  S=0.0037 '/'  Outflow=0.01 cfs  0.008 af


**Pond 2.1P: 24" RCP**       Peak Elev=47.65'  Storage=9 cf  Inflow=0.04 cfs  0.039 af
24.0"  Round Culvert  n=0.012  L=17.0'  S=0.0135 '/'  Outflow=0.04 cfs  0.039 af


**Pond 2P: 12" CPP**       Peak Elev=59.70'  Storage=30 cf  Inflow=0.01 cfs  0.007 af
Outflow=0.01 cfs  0.007 af


**Pond 10P: Porous Pavement**       Peak Elev=0.00'  Storage=5 cf  Inflow=0.01 cfs  0.015 af
Outflow=0.01 cfs  0.015 af


**Pond 11P: YD #3-1**       Peak Elev=57.21'  Inflow=0.00 cfs  0.000 af
6.0"  Round Culvert  n=0.012  L=36.0'  S=0.0050 '/'  Outflow=0.00 cfs  0.000 af


**Pond 12P: YD #7**       Peak Elev=57.84'  Inflow=0.02 cfs  0.001 af
8.0"  Round Culvert  n=0.012  L=52.0'  S=0.0050 '/'  Outflow=0.02 cfs  0.001 af


**Pond 13P: YD #6**       Peak Elev=57.43'  Inflow=0.03 cfs  0.002 af
10.0"  Round Culvert  n=0.012  L=29.0'  S=0.0052 '/'  Outflow=0.03 cfs  0.002 af


**Pond 14P: YD #5**       Peak Elev=57.20'  Inflow=0.04 cfs  0.003 af
10.0"  Round Culvert  n=0.012  L=20.0'  S=0.0050 '/'  Outflow=0.04 cfs  0.003 af


**Pond 15P: YD #4**       Peak Elev=56.93'  Inflow=0.05 cfs  0.003 af
12.0"  Round Culvert  n=0.012  L=46.0'  S=0.0050 '/'  Outflow=0.05 cfs  0.003 af


**Pond 16P: CB #3**       Peak Elev=56.61'  Inflow=0.05 cfs  0.004 af
12.0"  Round Culvert  n=0.012  L=45.0'  S=0.0049 '/'  Outflow=0.05 cfs  0.004 af


**Pond 17P: Bio #1**       Peak Elev=56.42'  Storage=126 cf  Inflow=0.05 cfs  0.004 af
Outflow=0.00 cfs  0.004 af


**Pond 21P: CB #8**       Peak Elev=58.16'  Inflow=0.05 cfs  0.004 af
12.0"  Round Culvert  n=0.012  L=22.0'  S=0.0050 '/'  Outflow=0.05 cfs  0.004 af


**Pond 22P: Bio #2**       Peak Elev=58.16'  Storage=546 cf  Inflow=0.24 cfs  0.018 af
Outflow=0.01 cfs  0.018 af


**Pond 30P: CB #10-2**       Peak Elev=52.75'  Inflow=0.04 cfs  0.004 af
12.0"  Round Culvert  n=0.012  L=78.0'  S=0.0397 '/'  Outflow=0.04 cfs  0.004 af


**Pond 31P: CB #10-1**       Peak Elev=49.73'  Inflow=0.07 cfs  0.005 af
12.0"  Round Culvert  n=0.012  L=2.0'  S=0.0250 '/'  Outflow=0.07 cfs  0.005 af


**Pond 32P: DMH #10**       Peak Elev=47.42'  Inflow=0.11 cfs  0.047 af
24.0"  Round Culvert  n=0.012  L=57.0'  S=0.0135 '/'  Outflow=0.11 cfs  0.047 af


**Pond 40P: 6" CPP**       Peak Elev=53.73'  Inflow=0.06 cfs  0.005 af
6.0"  Round Culvert  n=0.012  L=174.0'  S=0.0150 '/'  Outflow=0.06 cfs  0.005 af

---

**Pond 41P: YD #15**

Peak Elev=50.97'  Inflow=0.10 cfs  0.007 af
8.0" Round Culvert  n=0.012  L=47.0'  S=0.0149 '/'  Outflow=0.10 cfs  0.007 af

**Pond 42P: 6" CPP**

Peak Elev=52.93'  Inflow=0.04 cfs  0.003 af
6.0" Round Culvert  n=0.012  L=150.0'  S=0.0175 '/'  Outflow=0.04 cfs  0.003 af

**Pond 43P: 10" CPP**

Peak Elev=50.31'  Inflow=0.14 cfs  0.010 af
8.0" Round Culvert  n=0.012  L=33.0'  S=0.0148 '/'  Outflow=0.14 cfs  0.010 af

**Pond 44P: CB #14**

Peak Elev=49.49'  Inflow=0.15 cfs  0.012 af
12.0" Round Culvert  n=0.012  L=31.0'  S=0.0048 '/'  Outflow=0.15 cfs  0.012 af

**Pond 45P: CB #13-2**

Peak Elev=49.74'  Inflow=0.04 cfs  0.003 af
12.0" Round Culvert  n=0.012  L=22.0'  S=0.0245 '/'  Outflow=0.04 cfs  0.003 af

**Pond 46P: CB #13-1**

Peak Elev=49.60'  Inflow=0.05 cfs  0.003 af
12.0" Round Culvert  n=0.012  L=12.0'  S=0.0325 '/'  Outflow=0.05 cfs  0.003 af

**Pond 47P: DMH #13**

Peak Elev=49.28'  Inflow=0.24 cfs  0.018 af
12.0" Round Culvert  n=0.012  L=67.0'  S=0.0051 '/'  Outflow=0.24 cfs  0.018 af

**Pond 48P: CB #12-2**

Peak Elev=48.79'  Inflow=0.02 cfs  0.002 af
12.0" Round Culvert  n=0.012  L=6.0'  S=0.0050 '/'  Outflow=0.02 cfs  0.002 af

**Pond 49P: CB #12-1**

Peak Elev=49.02'  Inflow=0.04 cfs  0.003 af
12.0" Round Culvert  n=0.012  L=46.0'  S=0.0050 '/'  Outflow=0.04 cfs  0.003 af

**Pond 50P: DMH #12**

Peak Elev=48.79'  Inflow=0.30 cfs  0.023 af
15.0" Round Culvert  n=0.012  L=106.0'  S=0.0040 '/'  Outflow=0.30 cfs  0.023 af

**Pond 60P: CB #17-1-2**

Peak Elev=50.60'  Inflow=0.11 cfs  0.008 af
12.0" Round Culvert  n=0.012  L=21.0'  S=0.0052 '/'  Outflow=0.11 cfs  0.008 af

**Pond 61P: CB #17-1-1**

Peak Elev=50.57'  Inflow=0.12 cfs  0.009 af
12.0" Round Culvert  n=0.012  L=3.0'  S=0.0367 '/'  Outflow=0.12 cfs  0.009 af

**Pond 62P: DMH #17-1**

Peak Elev=50.46'  Inflow=0.23 cfs  0.016 af
12.0" Round Culvert  n=0.012  L=25.0'  S=0.0052 '/'  Outflow=0.23 cfs  0.016 af

**Pond 63P: YD #21**

Peak Elev=51.76'  Inflow=0.01 cfs  0.001 af
12.0" Round Culvert  n=0.012  L=49.0'  S=0.0049 '/'  Outflow=0.01 cfs  0.001 af

**Pond 64P: YD #20**

Peak Elev=51.39'  Inflow=0.03 cfs  0.002 af
10.0" Round Culvert  n=0.012  L=35.0'  S=0.0049 '/'  Outflow=0.03 cfs  0.002 af

**Pond 65P: YD #19**

Peak Elev=51.13'  Inflow=0.04 cfs  0.003 af
10.0" Round Culvert  n=0.012  L=42.0'  S=0.0050 '/'  Outflow=0.04 cfs  0.003 af

**Pond 66P: YD #18**

Peak Elev=50.72'  Inflow=0.05 cfs  0.004 af
12.0" Round Culvert  n=0.012  L=11.0'  S=0.0509 '/'  Outflow=0.05 cfs  0.004 af

**Pond 67P: CB #17**

Peak Elev=50.25'  Inflow=0.28 cfs  0.020 af
12.0"  Round Culvert  n=0.012  L=74.0'  S=0.0050 '/'  Outflow=0.28 cfs  0.020 af

**Pond 68P: DMH #16**

Peak Elev=49.76'  Inflow=0.30 cfs  0.022 af
12.0"  Round Culvert  n=0.012  L=90.0'  S=0.0110 '/'  Outflow=0.30 cfs  0.022 af

**Pond 69P: Bio #3**

Peak Elev=48.79'  Storage=1,679 cf  Inflow=0.75 cfs  0.055 af
Outflow=0.03 cfs  0.050 af

**Pond 80P: YD #24**

Peak Elev=48.44'  Inflow=0.03 cfs  0.002 af
6.0"  Round Culvert  n=0.012  L=100.0'  S=0.0285 '/'  Outflow=0.03 cfs  0.002 af

**Pond 81P: 6" CPP**

Peak Elev=48.14'  Inflow=0.02 cfs  0.002 af
6.0"  Round Culvert  n=0.012  L=85.0'  S=0.0200 '/'  Outflow=0.02 cfs  0.002 af

**Pond 82P: CB #23**

Peak Elev=46.25'  Inflow=0.16 cfs  0.011 af
12.0"  Round Culvert  n=0.012  L=18.0'  S=0.0194 '/'  Outflow=0.16 cfs  0.011 af

**Pond 83P: Bio #4**

Peak Elev=46.25'  Storage=339 cf  Inflow=0.19 cfs  0.013 af
Outflow=0.01 cfs  0.013 af

**Link 100L: POA #100 - SW**

Inflow=0.01 cfs  0.008 af
Primary=0.01 cfs  0.008 af

**Link 200L: POA #200 - South**

Inflow=0.10 cfs  0.057 af
Primary=0.10 cfs  0.057 af

**Link 300L: POA #300 - SE**

Inflow=0.04 cfs  0.064 af
Primary=0.04 cfs  0.064 af

**Total Runoff Area = 30.826 ac   Runoff Volume = 0.149 af   Average Runoff Depth = 0.06"**
**87.29% Pervious = 26.907 ac    12.71% Impervious = 3.919 ac**

POST-DEVELOPMENT

2S — North Corner
2P — 12" CPP
2R — Wetland Flow Path
2.1S — Central
2.1R — Wetland Flow Path
22R — Wetland Flow Path
23R — Wetland Flow Path
2.1P — 24" RCP
2.2R — Wetland Flow Path
2.2S — South of SQ Drive

3S — SE Corner

10S — Parking Lot
21S — Parking Lot
11P — CB #8
10P — Porous Pavement
11P — YD #3-1
11S — Island
20S — Building
22P — Bio #2
22S — To Bio #2

1S — West Corner
17P — Bio #1
10R — Swale
1P — 15" RCP
100L — POA #100 - SW

18P — CB #3
12P — YD #3
13P — YD #4
14P — YD #5
YD #6
YD #7
17S — To Bio #1
16S — Island
15S — Building
14S — Building
13S — Building
12S — Building

30S — Roadside
30P — CB #10-2
2.1P — DMH #10
31P — CB #10-1
31S — Roadside
44S — Roadside

200L — POA #200 - South

40S — Building
40P — 6" CPP
42S — Building
41S — Building
41P — YD #15
42P — 6" CPP
44P — CB #14

60S — Parking Lot
61S — Parking Lot
45P — YD #20
45S — Parking Lot
46S — Parking Lot
46P — CB #13-1
43P — CB #13-2
43S — YD #21

62P — DMH #17-1
57P — CB #17
50P — CB #17-1-2
51P — CB #17-1-1
53P — YD #18
66S — Building
47P — CB #13

67S — Landscape
68P — DMH #16
68S — Building

65P — YD #19
65S — Building
64S — Building
64P — YD #20
63P — YD #21
63S — Building

70S — Building
69S — To Pond
69P — Bio #3

69R — Swale
70R — Woodland Flow Path
71R — Stream
72R — Stream
73R — Stream

48S — Roadside
48P — CB #12-2
50P — DMH #12
49P — CB #12-1
49S — Driveway
82S — Parking Lot

80S — Building
80P — YD #24
81S — Building
81P — 6" CPP
82P — CB #23
83P — Bio #4
83S — To Pond
83R — Woodland Flow Path

300L — POA #300 - SE

Subcat    Reach    Pond    Link

**Routing Diagram for 5440-Post**
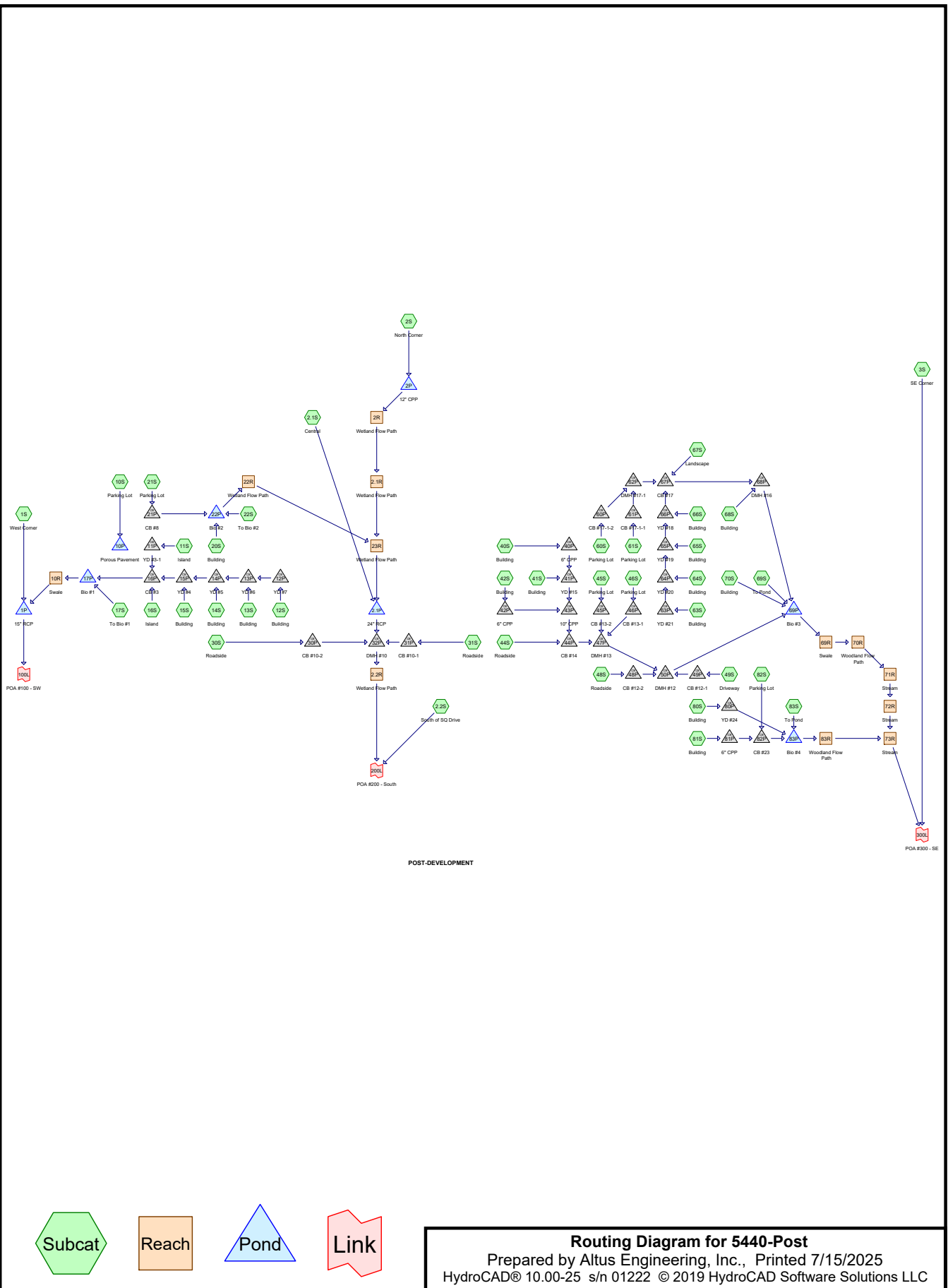Prepared by Altus Engineering, Inc.,  Printed 7/15/2025
HydroCAD® 10.00-25  s/n 01222  © 2019 HydroCAD Software Solutions LLC

Time span=0.00-48.00 hrs, dt=0.01 hrs, 4801 points
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN
Reach routing by Dyn-Stor-Ind method  -  Pond routing by Dyn-Stor-Ind method

**Subcatchment 1S: West Corner**

Runoff Area=65,016 sf  9.83% Impervious  Runoff Depth=1.38"
Flow Length=366'  Tc=9.8 min  CN=75  Runoff=2.06 cfs  0.172 af

**Subcatchment 2.1S: Central**

Runoff Area=445,535 sf  8.04% Impervious  Runoff Depth=1.25"
Flow Length=1,341'  Tc=15.8 min  CN=73  Runoff=10.62 cfs  1.069 af

**Subcatchment 2.2S: South of SQ Drive**

Runoff Area=102,088 sf  10.13% Impervious  Runoff Depth=1.51"
Flow Length=391'  Tc=6.0 min  CN=77  Runoff=4.10 cfs  0.295 af

**Subcatchment 2S: North Corner**

Runoff Area=284,221 sf  6.78% Impervious  Runoff Depth=1.19"
Tc=0.0 min  CN=72  Runoff=10.62 cfs  0.649 af

**Subcatchment 3S: SE Corner**

Runoff Area=308,423 sf  2.18% Impervious  Runoff Depth=0.97"
Flow Length=1,149'  Tc=15.9 min  CN=68  Runoff=5.30 cfs  0.570 af

**Subcatchment 10S: Parking Lot**

Runoff Area=10,178 sf  99.02% Impervious  Runoff Depth>3.36"
Tc=790.0 min  CN=98  Runoff=0.06 cfs  0.065 af

**Subcatchment 11S: Island**

Runoff Area=588 sf  65.82% Impervious  Runoff Depth=2.55"
Tc=6.0 min  CN=90  Runoff=0.04 cfs  0.003 af

**Subcatchment 12S: Building**

Runoff Area=1,878 sf  65.12% Impervious  Runoff Depth=2.55"
Tc=6.0 min  CN=90  Runoff=0.13 cfs  0.009 af

**Subcatchment 13S: Building**

Runoff Area=1,349 sf  73.83% Impervious  Runoff Depth=2.74"
Tc=6.0 min  CN=92  Runoff=0.10 cfs  0.007 af

**Subcatchment 14S: Building**

Runoff Area=1,022 sf  77.79% Impervious  Runoff Depth=2.84"
Tc=6.0 min  CN=93  Runoff=0.08 cfs  0.006 af

**Subcatchment 15S: Building**

Runoff Area=1,377 sf  43.21% Impervious  Runoff Depth=2.03"
Tc=6.0 min  CN=84  Runoff=0.08 cfs  0.005 af

**Subcatchment 16S: Island**

Runoff Area=928 sf  26.51% Impervious  Runoff Depth=1.72"
Tc=6.0 min  CN=80  Runoff=0.04 cfs  0.003 af

**Subcatchment 17S: To Bio #1**

Runoff Area=2,893 sf  0.28% Impervious  Runoff Depth=1.32"
Tc=6.0 min  CN=74  Runoff=0.10 cfs  0.007 af

**Subcatchment 20S: Building**

Runoff Area=9,167 sf  100.00% Impervious  Runoff Depth=3.38"
Tc=6.0 min  CN=98  Runoff=0.74 cfs  0.059 af

**Subcatchment 21S: Parking Lot**

Runoff Area=2,620 sf  100.00% Impervious  Runoff Depth=3.38"
Tc=6.0 min  CN=98  Runoff=0.21 cfs  0.017 af

**Subcatchment 22S: To Bio #2**

Runoff Area=3,961 sf  0.00% Impervious  Runoff Depth=1.32"
Tc=6.0 min  CN=74  Runoff=0.14 cfs  0.010 af

**Subcatchment 30S: Roadside**

Runoff Area=8,230 sf  53.10% Impervious  Runoff Depth=2.28"
Flow Length=204'  Tc=6.0 min  CN=87  Runoff=0.50 cfs  0.036 af

**Subcatchment 31S: Roadside**

Runoff Area=7,135 sf  71.11% Impervious  Runoff Depth=2.65"
Flow Length=143'  Tc=6.0 min  CN=91  Runoff=0.50 cfs  0.036 af

**Subcatchment 40S: Building**

Runoff Area=3,066 sf  100.00% Impervious  Runoff Depth=3.38"
Tc=6.0 min  CN=98  Runoff=0.25 cfs  0.020 af

**Subcatchment 41S: Building**

Runoff Area=2,120 sf  90.94% Impervious  Runoff Depth=3.15"
Tc=6.0 min  CN=96  Runoff=0.17 cfs  0.013 af

**Subcatchment 42S: Building**

Runoff Area=2,162 sf  100.00% Impervious  Runoff Depth=3.38"
Tc=6.0 min  CN=98  Runoff=0.17 cfs  0.014 af

**Subcatchment 44S: Roadside**

Runoff Area=4,663 sf  40.92% Impervious  Runoff Depth=2.03"
Tc=6.0 min  CN=84  Runoff=0.26 cfs  0.018 af

**Subcatchment 45S: Parking Lot**

Runoff Area=3,851 sf  71.88% Impervious  Runoff Depth=2.65"
Tc=6.0 min  CN=91  Runoff=0.27 cfs  0.019 af

**Subcatchment 46S: Parking Lot**

Runoff Area=4,489 sf  73.25% Impervious  Runoff Depth=2.74"
Tc=6.0 min  CN=92  Runoff=0.32 cfs  0.024 af

**Subcatchment 48S: Roadside**

Runoff Area=3,415 sf  55.67% Impervious  Runoff Depth=2.37"
Tc=6.0 min  CN=88  Runoff=0.22 cfs  0.015 af

**Subcatchment 49S: Driveway**

Runoff Area=3,652 sf  83.90% Impervious  Runoff Depth=2.84"
Tc=6.0 min  CN=93  Runoff=0.27 cfs  0.020 af

**Subcatchment 60S: Parking Lot**

Runoff Area=9,169 sf  78.19% Impervious  Runoff Depth=2.84"
Flow Length=116'  Tc=6.0 min  CN=93  Runoff=0.67 cfs  0.050 af

**Subcatchment 61S: Parking Lot**

Runoff Area=7,068 sf  91.98% Impervious  Runoff Depth=3.15"
Flow Length=111'  Tc=6.0 min  CN=96  Runoff=0.55 cfs  0.043 af

**Subcatchment 63S: Building**

Runoff Area=1,459 sf  65.52% Impervious  Runoff Depth=2.55"
Tc=6.0 min  CN=90  Runoff=0.10 cfs  0.007 af

**Subcatchment 64S: Building**

Runoff Area=1,506 sf  81.27% Impervious  Runoff Depth=2.94"
Tc=6.0 min  CN=94  Runoff=0.11 cfs  0.008 af

**Subcatchment 65S: Building**

Runoff Area=982 sf  80.86% Impervious  Runoff Depth=2.84"
Tc=6.0 min  CN=93  Runoff=0.07 cfs  0.005 af

**Subcatchment 66S: Building**

Runoff Area=1,478 sf  44.79% Impervious  Runoff Depth=1.87"
Tc=6.0 min  CN=82  Runoff=0.07 cfs  0.005 af

**Subcatchment 67S: Landscape**

Runoff Area=1,511 sf  10.32% Impervious  Runoff Depth=0.76"
Tc=6.0 min  CN=64  Runoff=0.03 cfs  0.002 af

**Subcatchment 68S: Building**

Runoff Area=1,370 sf  100.00% Impervious  Runoff Depth=3.38"
Tc=6.0 min  CN=98  Runoff=0.11 cfs  0.009 af

**Subcatchment 69S: To Pond**
Runoff Area=12,794 sf  0.00% Impervious  Runoff Depth=1.02"
Tc=6.0 min  CN=69  Runoff=0.32 cfs  0.025 af

**Subcatchment 70S: Building**
Runoff Area=6,905 sf  100.00% Impervious  Runoff Depth=3.38"
Tc=6.0 min  CN=98  Runoff=0.56 cfs  0.045 af

**Subcatchment 80S: Building**
Runoff Area=1,982 sf  84.56% Impervious  Runoff Depth=2.94"
Tc=6.0 min  CN=94  Runoff=0.15 cfs  0.011 af

**Subcatchment 81S: Building**
Runoff Area=1,200 sf  100.00% Impervious  Runoff Depth=3.38"
Tc=6.0 min  CN=98  Runoff=0.10 cfs  0.008 af

**Subcatchment 82S: Parking Lot**
Runoff Area=8,819 sf  89.53% Impervious  Runoff Depth=3.05"
Flow Length=214'  Tc=6.0 min  CN=95  Runoff=0.68 cfs  0.051 af

**Subcatchment 83S: To Pond**
Runoff Area=2,507 sf  0.00% Impervious  Runoff Depth=1.32"
Tc=6.0 min  CN=74  Runoff=0.09 cfs  0.006 af

**Reach 2.1R: Wetland Flow Path**
Avg. Flow Depth=0.45'  Max Vel=1.48 fps  Inflow=2.22 cfs  0.649 af
n=0.040  L=344.0'  S=0.0075 '/'  Capacity=54.59 cfs  Outflow=2.22 cfs  0.649 af

**Reach 2.2R: Wetland Flow Path**
Avg. Flow Depth=0.64'  Max Vel=4.62 fps  Inflow=11.57 cfs  1.875 af
n=0.040  L=263.0'  S=0.0502 '/'  Capacity=141.18 cfs  Outflow=11.56 cfs  1.875 af

**Reach 2R: Wetland Flow Path**
Avg. Flow Depth=0.28'  Max Vel=2.78 fps  Inflow=2.23 cfs  0.649 af
n=0.040  L=151.0'  S=0.0446 '/'  Capacity=133.09 cfs  Outflow=2.22 cfs  0.649 af

**Reach 10R: Swale**
Avg. Flow Depth=0.05'  Max Vel=0.38 fps  Inflow=0.07 cfs  0.040 af
n=0.035  L=44.0'  S=0.0050 '/'  Capacity=16.22 cfs  Outflow=0.07 cfs  0.040 af

**Reach 22R: Wetland Flow Path**
Avg. Flow Depth=0.04'  Max Vel=0.67 fps  Inflow=0.29 cfs  0.085 af
n=0.040  L=211.0'  S=0.0245 '/'  Capacity=392.58 cfs  Outflow=0.29 cfs  0.085 af

**Reach 23R: Wetland Flow Path**
Avg. Flow Depth=0.38'  Max Vel=2.11 fps  Inflow=2.51 cfs  0.734 af
n=0.040  L=131.0'  S=0.0185 '/'  Capacity=85.86 cfs  Outflow=2.50 cfs  0.734 af

**Reach 69R: Swale**
Avg. Flow Depth=0.23'  Max Vel=0.88 fps  Inflow=0.93 cfs  0.321 af
n=0.069  L=17.0'  S=0.0147 '/'  Capacity=14.11 cfs  Outflow=0.93 cfs  0.321 af

**Reach 70R: Woodland Flow Path**
Avg. Flow Depth=0.19'  Max Vel=0.41 fps  Inflow=0.93 cfs  0.321 af
n=0.400  L=57.0'  S=0.1404 '/'  Capacity=21.20 cfs  Outflow=0.93 cfs  0.321 af

**Reach 71R: Stream**
Avg. Flow Depth=0.16'  Max Vel=2.29 fps  Inflow=0.93 cfs  0.321 af
n=0.040  L=80.0'  S=0.0554 '/'  Capacity=31.12 cfs  Outflow=0.93 cfs  0.321 af

**Reach 72R: Stream**
Avg. Flow Depth=0.16'  Max Vel=1.29 fps  Inflow=0.93 cfs  0.321 af
n=0.040  L=88.0'  S=0.0160 '/'  Capacity=25.40 cfs  Outflow=0.93 cfs  0.320 af

**Reach 73R: Stream**
Avg. Flow Depth=0.19'  Max Vel=1.43 fps  Inflow=1.25 cfs  0.397 af
n=0.040  L=309.0'  S=0.0160 '/'  Capacity=25.38 cfs  Outflow=1.24 cfs  0.396 af

**Reach 83R: Woodland Flow Path**        Avg. Flow Depth=0.11'  Max Vel=0.25 fps  Inflow=0.33 cfs  0.076 af
n=0.400   L=122.0'   S=0.0950 '/'   Capacity=17.44 cfs   Outflow=0.32 cfs  0.076 af

**Pond 1P: 15" RCP**                    Peak Elev=53.11'  Storage=69 cf  Inflow=2.08 cfs  0.212 af
15.0" Round Culvert  n=0.012  L=60.0'  S=0.0037 '/'  Outflow=2.02 cfs  0.212 af

**Pond 2.1P: 24" RCP**                  Peak Elev=49.46'  Storage=3,036 cf  Inflow=12.85 cfs  1.803 af
24.0" Round Culvert  n=0.012  L=17.0'  S=0.0135 '/'  Outflow=11.20 cfs  1.803 af

**Pond 2P: 12" CPP**                    Peak Elev=60.71'  Storage=8,446 cf  Inflow=10.62 cfs  0.649 af
Outflow=2.23 cfs  0.649 af

**Pond 10P: Porous Pavement**           Peak Elev=0.52'  Storage=573 cf  Inflow=0.06 cfs  0.065 af
Outflow=0.03 cfs  0.065 af

**Pond 11P: YD #3-1**                   Peak Elev=57.49'  Inflow=0.04 cfs  0.003 af
6.0" Round Culvert  n=0.012  L=36.0'  S=0.0050 '/'  Outflow=0.04 cfs  0.003 af

**Pond 12P: YD #7**                     Peak Elev=57.99'  Inflow=0.13 cfs  0.009 af
8.0" Round Culvert  n=0.012  L=52.0'  S=0.0050 '/'  Outflow=0.13 cfs  0.009 af

**Pond 13P: YD #6**                     Peak Elev=57.62'  Inflow=0.22 cfs  0.016 af
10.0" Round Culvert  n=0.012  L=29.0'  S=0.0052 '/'  Outflow=0.22 cfs  0.016 af

**Pond 14P: YD #5**                     Peak Elev=57.49'  Inflow=0.30 cfs  0.022 af
10.0" Round Culvert  n=0.012  L=20.0'  S=0.0050 '/'  Outflow=0.30 cfs  0.022 af

**Pond 15P: YD #4**                     Peak Elev=57.49'  Inflow=0.37 cfs  0.027 af
12.0" Round Culvert  n=0.012  L=46.0'  S=0.0050 '/'  Outflow=0.37 cfs  0.027 af

**Pond 16P: CB #3**                     Peak Elev=57.49'  Inflow=0.46 cfs  0.033 af
12.0" Round Culvert  n=0.012  L=45.0'  S=0.0049 '/'  Outflow=0.46 cfs  0.033 af

**Pond 17P: Bio #1**                    Peak Elev=57.49'  Storage=933 cf  Inflow=0.56 cfs  0.040 af
Outflow=0.07 cfs  0.040 af

**Pond 21P: CB #8**                     Peak Elev=59.00'  Inflow=0.21 cfs  0.017 af
12.0" Round Culvert  n=0.012  L=22.0'  S=0.0050 '/'  Outflow=0.21 cfs  0.017 af

**Pond 22P: Bio #2**                    Peak Elev=59.00'  Storage=1,829 cf  Inflow=1.09 cfs  0.086 af
Outflow=0.29 cfs  0.085 af

**Pond 30P: CB #10-2**                  Peak Elev=53.00'  Inflow=0.50 cfs  0.036 af
12.0" Round Culvert  n=0.012  L=78.0'  S=0.0397 '/'  Outflow=0.50 cfs  0.036 af

**Pond 31P: CB #10-1**                  Peak Elev=50.00'  Inflow=0.50 cfs  0.036 af
12.0" Round Culvert  n=0.012  L=2.0'  S=0.0250 '/'  Outflow=0.50 cfs  0.036 af

**Pond 32P: DMH #10**                   Peak Elev=48.89'  Inflow=11.57 cfs  1.875 af
24.0" Round Culvert  n=0.012  L=57.0'  S=0.0135 '/'  Outflow=11.57 cfs  1.875 af

**Pond 40P: 6" CPP**                    Peak Elev=53.89'  Inflow=0.25 cfs  0.020 af
6.0" Round Culvert  n=0.012  L=174.0'  S=0.0150 '/'  Outflow=0.25 cfs  0.020 af

**Pond 41P: YD #15**　　　　Peak Elev=51.17'  Inflow=0.41 cfs  0.033 af
8.0" Round Culvert  n=0.012  L=47.0'  S=0.0149 '/'  Outflow=0.41 cfs  0.033 af

**Pond 42P: 6" CPP**　　　　Peak Elev=53.07'  Inflow=0.17 cfs  0.014 af
6.0" Round Culvert  n=0.012  L=150.0'  S=0.0175 '/'  Outflow=0.17 cfs  0.014 af

**Pond 43P: 10" CPP**　　　　Peak Elev=50.85'  Inflow=0.59 cfs  0.047 af
8.0" Round Culvert  n=0.012  L=33.0'  S=0.0148 '/'  Outflow=0.59 cfs  0.047 af

**Pond 44P: CB #14**　　　　Peak Elev=50.85'  Inflow=0.84 cfs  0.065 af
12.0" Round Culvert  n=0.012  L=31.0'  S=0.0048 '/'  Outflow=0.84 cfs  0.065 af

**Pond 45P: CB #13-2**　　　　Peak Elev=50.85'  Inflow=0.27 cfs  0.019 af
12.0" Round Culvert  n=0.012  L=22.0'  S=0.0245 '/'  Outflow=0.27 cfs  0.019 af

**Pond 46P: CB #13-1**　　　　Peak Elev=50.85'  Inflow=0.32 cfs  0.024 af
12.0" Round Culvert  n=0.012  L=12.0'  S=0.0325 '/'  Outflow=0.32 cfs  0.024 af

**Pond 47P: DMH #13**　　　　Peak Elev=50.85'  Inflow=1.43 cfs  0.108 af
12.0" Round Culvert  n=0.012  L=67.0'  S=0.0051 '/'  Outflow=1.43 cfs  0.108 af

**Pond 48P: CB #12-2**　　　　Peak Elev=50.84'  Inflow=0.22 cfs  0.015 af
12.0" Round Culvert  n=0.012  L=6.0'  S=0.0050 '/'  Outflow=0.22 cfs  0.015 af

**Pond 49P: CB #12-1**　　　　Peak Elev=50.84'  Inflow=0.27 cfs  0.020 af
12.0" Round Culvert  n=0.012  L=46.0'  S=0.0050 '/'  Outflow=0.27 cfs  0.020 af

**Pond 50P: DMH #12**　　　　Peak Elev=50.84'  Inflow=1.92 cfs  0.143 af
15.0" Round Culvert  n=0.012  L=106.0'  S=0.0040 '/'  Outflow=1.92 cfs  0.143 af

**Pond 60P: CB #17-1-2**　　　　Peak Elev=51.11'  Inflow=0.67 cfs  0.050 af
12.0" Round Culvert  n=0.012  L=21.0'  S=0.0052 '/'  Outflow=0.67 cfs  0.050 af

**Pond 61P: CB #17-1-1**　　　　Peak Elev=51.08'  Inflow=0.55 cfs  0.043 af
12.0" Round Culvert  n=0.012  L=3.0'  S=0.0367 '/'  Outflow=0.55 cfs  0.043 af

**Pond 62P: DMH #17-1**　　　　Peak Elev=51.04'  Inflow=1.23 cfs  0.092 af
12.0" Round Culvert  n=0.012  L=25.0'  S=0.0052 '/'  Outflow=1.23 cfs  0.092 af

**Pond 63P: YD #21**　　　　Peak Elev=51.88'  Inflow=0.10 cfs  0.007 af
12.0" Round Culvert  n=0.012  L=49.0'  S=0.0049 '/'  Outflow=0.10 cfs  0.007 af

**Pond 64P: YD #20**　　　　Peak Elev=51.56'  Inflow=0.21 cfs  0.016 af
10.0" Round Culvert  n=0.012  L=35.0'  S=0.0049 '/'  Outflow=0.21 cfs  0.016 af

**Pond 65P: YD #19**　　　　Peak Elev=51.32'  Inflow=0.28 cfs  0.021 af
10.0" Round Culvert  n=0.012  L=42.0'  S=0.0050 '/'  Outflow=0.28 cfs  0.021 af

**Pond 66P: YD #18**　　　　Peak Elev=50.99'  Inflow=0.36 cfs  0.026 af
12.0" Round Culvert  n=0.012  L=11.0'  S=0.0509 '/'  Outflow=0.36 cfs  0.026 af

**Pond 67P: CB #17**

Peak Elev=50.88'  Inflow=1.61 cfs  0.121 af
12.0"  Round Culvert  n=0.012  L=74.0'  S=0.0050 '/'  Outflow=1.61 cfs  0.121 af

**Pond 68P: DMH #16**

Peak Elev=50.85'  Inflow=1.72 cfs  0.130 af
12.0"  Round Culvert  n=0.012  L=90.0'  S=0.0110 '/'  Outflow=1.72 cfs  0.130 af

**Pond 69P: Bio #3**

Peak Elev=50.83'  Storage=7,720 cf  Inflow=4.51 cfs  0.342 af
Outflow=0.93 cfs  0.321 af

**Pond 80P: YD #24**

Peak Elev=48.58'  Inflow=0.15 cfs  0.011 af
6.0"  Round Culvert  n=0.012  L=100.0'  S=0.0285 '/'  Outflow=0.15 cfs  0.011 af

**Pond 81P: 6" CPP**

Peak Elev=48.24'  Inflow=0.10 cfs  0.008 af
6.0"  Round Culvert  n=0.012  L=85.0'  S=0.0200 '/'  Outflow=0.10 cfs  0.008 af

**Pond 82P: CB #23**

Peak Elev=47.67'  Inflow=0.78 cfs  0.059 af
12.0"  Round Culvert  n=0.012  L=18.0'  S=0.0194 '/'  Outflow=0.78 cfs  0.059 af

**Pond 83P: Bio #4**

Peak Elev=47.67'  Storage=1,453 cf  Inflow=1.01 cfs  0.077 af
Outflow=0.33 cfs  0.076 af

**Link 100L: POA #100 - SW**

Inflow=2.02 cfs  0.212 af
Primary=2.02 cfs  0.212 af

**Link 200L: POA #200 - South**

Inflow=13.31 cfs  2.170 af
Primary=13.31 cfs  2.170 af

**Link 300L: POA #300 - SE**

Inflow=5.85 cfs  0.966 af
Primary=5.85 cfs  0.966 af

**Total Runoff Area = 30.826 ac   Runoff Volume = 3.438 af   Average Runoff Depth = 1.34"**
**87.29% Pervious = 26.907 ac     12.71% Impervious = 3.919 ac**

POST-DEVELOPMENT

Subcat    Reach    Pond    Link

**Routing Diagram for 5440-Post**
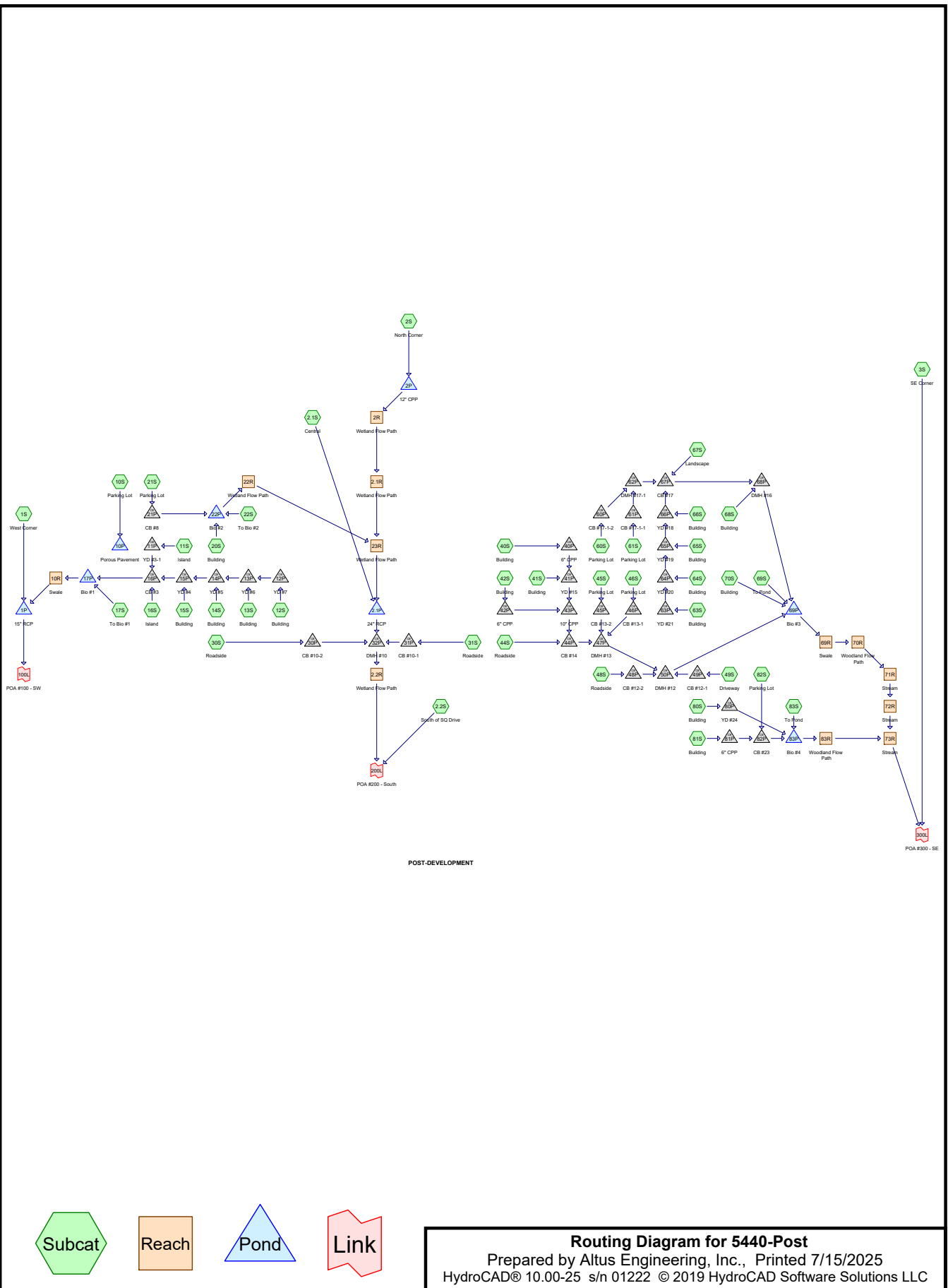Prepared by Altus Engineering, Inc., Printed 7/15/2025
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## Area Listing (all nodes)

| Area (acres) | CN | Description (subcatchment-numbers) |
|---|---|---|
| 0.229 | 61 | >75% Grass cover, Good, HSG B  (2.1S, 3S, 48S, 49S, 61S, 66S, 67S, 69S, 82S) |
| 3.987 | 74 | >75% Grass cover, Good, HSG C  (1S, 2.1S, 2.2S, 2S, 3S, 10S, 11S, 12S, 13S, 14S, 15S, 16S, 17S, 22S, 30S, 31S, 41S, 44S, 45S, 46S, 48S, 49S, 60S, 61S, 63S, 64S, 65S, 66S, 69S, 80S, 82S, 83S) |
| 0.107 | 80 | >75% Grass cover, Good, HSG D  (2.1S, 2.2S, 2S, 48S, 49S) |
| 0.203 | 65 | Brush, Good, HSG C  (2.1S) |
| 0.117 | 98 | Paved parking, HSG B  (2.1S, 3S, 49S, 61S, 67S, 82S) |
| 2.047 | 98 | Paved parking, HSG C  (2.1S, 2.2S, 2S, 3S, 30S, 31S, 44S, 45S, 46S, 48S, 49S, 60S, 61S, 66S, 80S, 82S) |
| 0.241 | 98 | Paved parking, HSG D  (2.1S, 2.2S, 2S, 3S, 48S, 49S) |
| 0.442 | 98 | Paved roads w/curbs & sewers, HSG C  (1S, 10S, 11S, 12S, 15S, 16S, 17S, 21S) |
| 0.035 | 98 | Roofs, HSG B  (66S, 68S, 70S) |
| 1.037 | 98 | Roofs, HSG C  (2.1S, 2S, 11S, 12S, 13S, 14S, 15S, 20S, 21S, 40S, 41S, 42S, 48S, 63S, 64S, 65S, 66S, 68S, 70S, 80S, 81S) |
| 1.930 | 55 | Woods, Good, HSG B  (1S, 2.1S, 2S, 3S, 67S) |
| 17.179 | 70 | Woods, Good, HSG C  (1S, 2.1S, 2.2S, 2S, 3S, 60S) |
| 3.274 | 77 | Woods, Good, HSG D  (2.1S, 2.2S, 2S) |
| **30.826** | **74** | **TOTAL AREA** |

## Soil Listing (all nodes)

| Area (acres) | Soil Group | Subcatchment Numbers |
|---|---|---|
| 0.000 | HSG A | |
| 2.310 | HSG B | 1S, 2.1S, 2S, 3S, 48S, 49S, 61S, 66S, 67S, 68S, 69S, 70S, 82S |
| 24.894 | HSG C | 1S, 2.1S, 2.2S, 2S, 3S, 10S, 11S, 12S, 13S, 14S, 15S, 16S, 17S, 20S, 21S, 22S, 30S, 31S, 40S, 41S, 42S, 44S, 45S, 46S, 48S, 49S, 60S, 61S, 63S, 64S, 65S, 66S, 68S, 69S, 70S, 80S, 81S, 82S, 83S |
| 3.622 | HSG D | 2.1S, 2.2S, 2S, 3S, 48S, 49S |
| 0.000 | Other | |
| **30.826** | | **TOTAL AREA** |

Time span=0.00-48.00 hrs, dt=0.01 hrs, 4801 points
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN
Reach routing by Dyn-Stor-Ind method  -  Pond routing by Dyn-Stor-Ind method

**Subcatchment 1S: West Corner**
Runoff Area=65,016 sf  9.83% Impervious   Runoff Depth=2.84"
Flow Length=366'  Tc=9.8 min   CN=75   Runoff=4.36 cfs  0.353 af

**Subcatchment 2.1S: Central**
Runoff Area=445,535 sf  8.04% Impervious   Runoff Depth=2.65"
Flow Length=1,341'  Tc=15.8 min   CN=73   Runoff=23.46 cfs  2.263 af

**Subcatchment 2.2S: South of SQ Drive**
Runoff Area=102,088 sf  10.13% Impervious   Runoff Depth=3.02"
Flow Length=391'  Tc=6.0 min   CN=77   Runoff=8.31 cfs  0.590 af

**Subcatchment 2S: North Corner**
Runoff Area=284,221 sf  6.78% Impervious   Runoff Depth=2.57"
Tc=0.0 min   CN=72   Runoff=23.92 cfs  1.395 af

**Subcatchment 3S: SE Corner**
Runoff Area=308,423 sf  2.18% Impervious   Runoff Depth=2.22"
Flow Length=1,149'  Tc=15.9 min   CN=68   Runoff=13.31 cfs  1.310 af

**Subcatchment 10S: Parking Lot**
Runoff Area=10,178 sf  99.02% Impervious   Runoff Depth>5.20"
Tc=790.0 min   CN=98   Runoff=0.09 cfs  0.101 af

**Subcatchment 11S: Island**
Runoff Area=588 sf  65.82% Impervious   Runoff Depth=4.33"
Tc=6.0 min   CN=90   Runoff=0.07 cfs  0.005 af

**Subcatchment 12S: Building**
Runoff Area=1,878 sf  65.12% Impervious   Runoff Depth=4.33"
Tc=6.0 min   CN=90   Runoff=0.21 cfs  0.016 af

**Subcatchment 13S: Building**
Runoff Area=1,349 sf  73.83% Impervious   Runoff Depth=4.55"
Tc=6.0 min   CN=92   Runoff=0.16 cfs  0.012 af

**Subcatchment 14S: Building**
Runoff Area=1,022 sf  77.79% Impervious   Runoff Depth=4.66"
Tc=6.0 min   CN=93   Runoff=0.12 cfs  0.009 af

**Subcatchment 15S: Building**
Runoff Area=1,377 sf  43.21% Impervious   Runoff Depth=3.70"
Tc=6.0 min   CN=84   Runoff=0.14 cfs  0.010 af

**Subcatchment 16S: Island**
Runoff Area=928 sf  26.51% Impervious   Runoff Depth=3.31"
Tc=6.0 min   CN=80   Runoff=0.08 cfs  0.006 af

**Subcatchment 17S: To Bio #1**
Runoff Area=2,893 sf  0.28% Impervious   Runoff Depth=2.74"
Tc=6.0 min   CN=74   Runoff=0.21 cfs  0.015 af

**Subcatchment 20S: Building**
Runoff Area=9,167 sf  100.00% Impervious   Runoff Depth=5.23"
Tc=6.0 min   CN=98   Runoff=1.13 cfs  0.092 af

**Subcatchment 21S: Parking Lot**
Runoff Area=2,620 sf  100.00% Impervious   Runoff Depth=5.23"
Tc=6.0 min   CN=98   Runoff=0.32 cfs  0.026 af

**Subcatchment 22S: To Bio #2**
Runoff Area=3,961 sf  0.00% Impervious   Runoff Depth=2.74"
Tc=6.0 min   CN=74   Runoff=0.29 cfs  0.021 af

**Subcatchment 30S: Roadside**
Runoff Area=8,230 sf  53.10% Impervious  Runoff Depth=4.01"
Flow Length=204'  Tc=6.0 min  CN=87  Runoff=0.87 cfs  0.063 af

**Subcatchment 31S: Roadside**
Runoff Area=7,135 sf  71.11% Impervious  Runoff Depth=4.44"
Flow Length=143'  Tc=6.0 min  CN=91  Runoff=0.81 cfs  0.061 af

**Subcatchment 40S: Building**
Runoff Area=3,066 sf  100.00% Impervious  Runoff Depth=5.23"
Tc=6.0 min  CN=98  Runoff=0.38 cfs  0.031 af

**Subcatchment 41S: Building**
Runoff Area=2,120 sf  90.94% Impervious  Runoff Depth=5.00"
Tc=6.0 min  CN=96  Runoff=0.26 cfs  0.020 af

**Subcatchment 42S: Building**
Runoff Area=2,162 sf  100.00% Impervious  Runoff Depth=5.23"
Tc=6.0 min  CN=98  Runoff=0.27 cfs  0.022 af

**Subcatchment 44S: Roadside**
Runoff Area=4,663 sf  40.92% Impervious  Runoff Depth=3.70"
Tc=6.0 min  CN=84  Runoff=0.46 cfs  0.033 af

**Subcatchment 45S: Parking Lot**
Runoff Area=3,851 sf  71.88% Impervious  Runoff Depth=4.44"
Tc=6.0 min  CN=91  Runoff=0.44 cfs  0.033 af

**Subcatchment 46S: Parking Lot**
Runoff Area=4,489 sf  73.25% Impervious  Runoff Depth=4.55"
Tc=6.0 min  CN=92  Runoff=0.52 cfs  0.039 af

**Subcatchment 48S: Roadside**
Runoff Area=3,415 sf  55.67% Impervious  Runoff Depth=4.12"
Tc=6.0 min  CN=88  Runoff=0.37 cfs  0.027 af

**Subcatchment 49S: Driveway**
Runoff Area=3,652 sf  83.90% Impervious  Runoff Depth=4.66"
Tc=6.0 min  CN=93  Runoff=0.43 cfs  0.033 af

**Subcatchment 60S: Parking Lot**
Runoff Area=9,169 sf  78.19% Impervious  Runoff Depth=4.66"
Flow Length=116'  Tc=6.0 min  CN=93  Runoff=1.07 cfs  0.082 af

**Subcatchment 61S: Parking Lot**
Runoff Area=7,068 sf  91.98% Impervious  Runoff Depth=5.00"
Flow Length=111'  Tc=6.0 min  CN=96  Runoff=0.86 cfs  0.068 af

**Subcatchment 63S: Building**
Runoff Area=1,459 sf  65.52% Impervious  Runoff Depth=4.33"
Tc=6.0 min  CN=90  Runoff=0.16 cfs  0.012 af

**Subcatchment 64S: Building**
Runoff Area=1,506 sf  81.27% Impervious  Runoff Depth=4.77"
Tc=6.0 min  CN=94  Runoff=0.18 cfs  0.014 af

**Subcatchment 65S: Building**
Runoff Area=982 sf  80.86% Impervious  Runoff Depth=4.66"
Tc=6.0 min  CN=93  Runoff=0.12 cfs  0.009 af

**Subcatchment 66S: Building**
Runoff Area=1,478 sf  44.79% Impervious  Runoff Depth=3.50"
Tc=6.0 min  CN=82  Runoff=0.14 cfs  0.010 af

**Subcatchment 67S: Landscape**
Runoff Area=1,511 sf  10.32% Impervious  Runoff Depth=1.89"
Tc=6.0 min  CN=64  Runoff=0.07 cfs  0.005 af

**Subcatchment 68S: Building**
Runoff Area=1,370 sf  100.00% Impervious  Runoff Depth=5.23"
Tc=6.0 min  CN=98  Runoff=0.17 cfs  0.014 af

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**Subcatchment 69S: To Pond**

Runoff Area=12,794 sf   0.00% Impervious   Runoff Depth=2.31"
Tc=6.0 min   CN=69   Runoff=0.78 cfs  0.056 af

**Subcatchment 70S: Building**

Runoff Area=6,905 sf   100.00% Impervious   Runoff Depth=5.23"
Tc=6.0 min   CN=98   Runoff=0.85 cfs  0.069 af

**Subcatchment 80S: Building**

Runoff Area=1,982 sf   84.56% Impervious   Runoff Depth=4.77"
Tc=6.0 min   CN=94   Runoff=0.24 cfs  0.018 af

**Subcatchment 81S: Building**

Runoff Area=1,200 sf   100.00% Impervious   Runoff Depth=5.23"
Tc=6.0 min   CN=98   Runoff=0.15 cfs  0.012 af

**Subcatchment 82S: Parking Lot**

Runoff Area=8,819 sf   89.53% Impervious   Runoff Depth=4.89"
Flow Length=214'   Tc=6.0 min   CN=95   Runoff=1.06 cfs  0.082 af

**Subcatchment 83S: To Pond**

Runoff Area=2,507 sf   0.00% Impervious   Runoff Depth=2.74"
Tc=6.0 min   CN=74   Runoff=0.18 cfs  0.013 af

**Reach 2.1R: Wetland Flow Path**

Avg. Flow Depth=1.19'   Max Vel=2.53 fps   Inflow=18.63 cfs  1.395 af
n=0.040   L=344.0'   S=0.0075 '/'   Capacity=54.59 cfs   Outflow=16.73 cfs  1.395 af

**Reach 2.2R: Wetland Flow Path**

Avg. Flow Depth=0.81'   Max Vel=5.27 fps   Inflow=19.20 cfs  3.919 af
n=0.040   L=263.0'   S=0.0502 '/'   Capacity=141.18 cfs   Outflow=18.90 cfs  3.919 af

**Reach 2R: Wetland Flow Path**

Avg. Flow Depth=0.83'   Max Vel=5.02 fps   Inflow=18.70 cfs  1.395 af
n=0.040   L=151.0'   S=0.0446 '/'   Capacity=133.09 cfs   Outflow=18.63 cfs  1.395 af

**Reach 10R: Swale**

Avg. Flow Depth=0.11'   Max Vel=0.64 fps   Inflow=0.30 cfs  0.072 af
n=0.035   L=44.0'   S=0.0050 '/'   Capacity=16.22 cfs   Outflow=0.30 cfs  0.072 af

**Reach 22R: Wetland Flow Path**

Avg. Flow Depth=0.05'   Max Vel=0.80 fps   Inflow=0.44 cfs  0.137 af
n=0.040   L=211.0'   S=0.0245 '/'   Capacity=392.58 cfs   Outflow=0.44 cfs  0.137 af

**Reach 23R: Wetland Flow Path**

Avg. Flow Depth=0.97'   Max Vel=3.54 fps   Inflow=17.02 cfs  1.532 af
n=0.040   L=131.0'   S=0.0185 '/'   Capacity=85.86 cfs   Outflow=16.92 cfs  1.532 af

**Reach 69R: Swale**

Avg. Flow Depth=0.39'   Max Vel=1.21 fps   Inflow=2.47 cfs  0.552 af
n=0.069   L=17.0'   S=0.0147 '/'   Capacity=14.11 cfs   Outflow=2.47 cfs  0.552 af

**Reach 70R: Woodland Flow Path**

Avg. Flow Depth=0.33'   Max Vel=0.57 fps   Inflow=2.47 cfs  0.552 af
n=0.400   L=57.0'   S=0.1404 '/'   Capacity=21.20 cfs   Outflow=2.47 cfs  0.552 af

**Reach 71R: Stream**

Avg. Flow Depth=0.28'   Max Vel=3.10 fps   Inflow=2.47 cfs  0.552 af
n=0.040   L=80.0'   S=0.0554 '/'   Capacity=31.12 cfs   Outflow=2.47 cfs  0.552 af

**Reach 72R: Stream**

Avg. Flow Depth=0.28'   Max Vel=1.80 fps   Inflow=2.47 cfs  0.552 af
n=0.040   L=88.0'   S=0.0160 '/'   Capacity=25.40 cfs   Outflow=2.47 cfs  0.552 af

**Reach 73R: Stream**

Avg. Flow Depth=0.31'   Max Vel=1.91 fps   Inflow=2.96 cfs  0.677 af
n=0.040   L=309.0'   S=0.0160 '/'   Capacity=25.38 cfs   Outflow=2.95 cfs  0.676 af

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**Reach 83R: Woodland Flow Path**   Avg. Flow Depth=0.15'  Max Vel=0.29 fps  Inflow=0.50 cfs  0.125 af
n=0.400  L=122.0'  S=0.0950 '/'  Capacity=17.44 cfs  Outflow=0.49 cfs  0.125 af

**Pond 1P: 15" RCP**   Peak Elev=53.52'  Storage=659 cf  Inflow=4.57 cfs  0.424 af
15.0" Round Culvert  n=0.012  L=60.0'  S=0.0037 '/'  Outflow=3.74 cfs  0.424 af

**Pond 2.1P: 24" RCP**   Peak Elev=51.35'  Storage=23,483 cf  Inflow=35.08 cfs  3.795 af
24.0" Round Culvert  n=0.012  L=17.0'  S=0.0135 '/'  Outflow=18.86 cfs  3.795 af

**Pond 2P: 12" CPP**   Peak Elev=60.93'  Storage=11,719 cf  Inflow=23.92 cfs  1.395 af
Outflow=18.70 cfs  1.395 af

**Pond 10P: Porous Pavement**   Peak Elev=1.48'  Storage=1,631 cf  Inflow=0.09 cfs  0.101 af
Outflow=0.04 cfs  0.097 af

**Pond 11P: YD #3-1**   Peak Elev=57.89'  Inflow=0.07 cfs  0.005 af
6.0" Round Culvert  n=0.012  L=36.0'  S=0.0050 '/'  Outflow=0.07 cfs  0.005 af

**Pond 12P: YD #7**   Peak Elev=58.07'  Inflow=0.21 cfs  0.016 af
8.0" Round Culvert  n=0.012  L=52.0'  S=0.0050 '/'  Outflow=0.21 cfs  0.016 af

**Pond 13P: YD #6**   Peak Elev=57.90'  Inflow=0.37 cfs  0.027 af
10.0" Round Culvert  n=0.012  L=29.0'  S=0.0052 '/'  Outflow=0.37 cfs  0.027 af

**Pond 14P: YD #5**   Peak Elev=57.90'  Inflow=0.49 cfs  0.036 af
10.0" Round Culvert  n=0.012  L=20.0'  S=0.0050 '/'  Outflow=0.49 cfs  0.036 af

**Pond 15P: YD #4**   Peak Elev=57.89'  Inflow=0.62 cfs  0.046 af
12.0" Round Culvert  n=0.012  L=46.0'  S=0.0050 '/'  Outflow=0.62 cfs  0.046 af

**Pond 16P: CB #3**   Peak Elev=57.89'  Inflow=0.77 cfs  0.057 af
12.0" Round Culvert  n=0.012  L=45.0'  S=0.0049 '/'  Outflow=0.77 cfs  0.057 af

**Pond 17P: Bio #1**   Peak Elev=57.89'  Storage=1,368 cf  Inflow=0.98 cfs  0.072 af
Outflow=0.30 cfs  0.072 af

**Pond 21P: CB #8**   Peak Elev=59.46'  Inflow=0.32 cfs  0.026 af
12.0" Round Culvert  n=0.012  L=22.0'  S=0.0050 '/'  Outflow=0.32 cfs  0.026 af

**Pond 22P: Bio #2**   Peak Elev=59.46'  Storage=2,733 cf  Inflow=1.74 cfs  0.139 af
Outflow=0.44 cfs  0.137 af

**Pond 30P: CB #10-2**   Peak Elev=53.13'  Inflow=0.87 cfs  0.063 af
12.0" Round Culvert  n=0.012  L=78.0'  S=0.0397 '/'  Outflow=0.87 cfs  0.063 af

**Pond 31P: CB #10-1**   Peak Elev=50.14'  Inflow=0.81 cfs  0.061 af
12.0" Round Culvert  n=0.012  L=2.0'  S=0.0250 '/'  Outflow=0.81 cfs  0.061 af

**Pond 32P: DMH #10**   Peak Elev=49.90'  Inflow=19.20 cfs  3.919 af
24.0" Round Culvert  n=0.012  L=57.0'  S=0.0135 '/'  Outflow=19.20 cfs  3.919 af

**Pond 40P: 6" CPP**   Peak Elev=53.99'  Inflow=0.38 cfs  0.031 af
6.0" Round Culvert  n=0.012  L=174.0'  S=0.0150 '/'  Outflow=0.38 cfs  0.031 af

**Pond 41P: YD #15**                    Peak Elev=52.44'  Inflow=0.63 cfs  0.051 af
          8.0" Round Culvert  n=0.012  L=47.0'  S=0.0149 '/'  Outflow=0.63 cfs  0.051 af

**Pond 42P: 6" CPP**                    Peak Elev=53.17'  Inflow=0.27 cfs  0.022 af
          6.0" Round Culvert  n=0.012  L=150.0'  S=0.0175 '/'  Outflow=0.27 cfs  0.022 af

**Pond 43P: 10" CPP**                   Peak Elev=52.29'  Inflow=0.90 cfs  0.073 af
          8.0" Round Culvert  n=0.012  L=33.0'  S=0.0148 '/'  Outflow=0.90 cfs  0.073 af

**Pond 44P: CB #14**                    Peak Elev=52.04'  Inflow=1.36 cfs  0.106 af
          12.0" Round Culvert  n=0.012  L=31.0'  S=0.0048 '/'  Outflow=1.36 cfs  0.106 af

**Pond 45P: CB #13-2**                  Peak Elev=51.94'  Inflow=0.44 cfs  0.033 af
          12.0" Round Culvert  n=0.012  L=22.0'  S=0.0245 '/'  Outflow=0.44 cfs  0.033 af

**Pond 46P: CB #13-1**                  Peak Elev=51.95'  Inflow=0.52 cfs  0.039 af
          12.0" Round Culvert  n=0.012  L=12.0'  S=0.0325 '/'  Outflow=0.52 cfs  0.039 af

**Pond 47P: DMH #13**                   Peak Elev=51.93'  Inflow=2.32 cfs  0.177 af
          12.0" Round Culvert  n=0.012  L=67.0'  S=0.0051 '/'  Outflow=2.32 cfs  0.177 af

**Pond 48P: CB #12-2**                  Peak Elev=51.71'  Inflow=0.37 cfs  0.027 af
          12.0" Round Culvert  n=0.012  L=6.0'  S=0.0050 '/'  Outflow=0.37 cfs  0.027 af

**Pond 49P: CB #12-1**                  Peak Elev=51.71'  Inflow=0.43 cfs  0.033 af
          12.0" Round Culvert  n=0.012  L=46.0'  S=0.0050 '/'  Outflow=0.43 cfs  0.033 af

**Pond 50P: DMH #12**                   Peak Elev=51.71'  Inflow=3.11 cfs  0.237 af
          15.0" Round Culvert  n=0.012  L=106.0'  S=0.0040 '/'  Outflow=3.11 cfs  0.237 af

**Pond 60P: CB #17-1-2**                Peak Elev=52.75'  Inflow=1.07 cfs  0.082 af
          12.0" Round Culvert  n=0.012  L=21.0'  S=0.0052 '/'  Outflow=1.07 cfs  0.082 af

**Pond 61P: CB #17-1-1**                Peak Elev=52.73'  Inflow=0.86 cfs  0.068 af
          12.0" Round Culvert  n=0.012  L=3.0'  S=0.0367 '/'  Outflow=0.86 cfs  0.068 af

**Pond 62P: DMH #17-1**                 Peak Elev=52.68'  Inflow=1.93 cfs  0.149 af
          12.0" Round Culvert  n=0.012  L=25.0'  S=0.0052 '/'  Outflow=1.93 cfs  0.149 af

**Pond 63P: YD #21**                    Peak Elev=52.51'  Inflow=0.16 cfs  0.012 af
          12.0" Round Culvert  n=0.012  L=49.0'  S=0.0049 '/'  Outflow=0.16 cfs  0.012 af

**Pond 64P: YD #20**                    Peak Elev=52.51'  Inflow=0.34 cfs  0.026 af
          10.0" Round Culvert  n=0.012  L=35.0'  S=0.0049 '/'  Outflow=0.34 cfs  0.026 af

**Pond 65P: YD #19**                    Peak Elev=52.50'  Inflow=0.46 cfs  0.035 af
          10.0" Round Culvert  n=0.012  L=42.0'  S=0.0050 '/'  Outflow=0.46 cfs  0.035 af

**Pond 66P: YD #18**                    Peak Elev=52.47'  Inflow=0.60 cfs  0.044 af
          12.0" Round Culvert  n=0.012  L=11.0'  S=0.0509 '/'  Outflow=0.60 cfs  0.044 af

---

**Pond 67P: CB #17**

Peak Elev=52.45'  Inflow=2.60 cfs  0.199 af
12.0" Round Culvert  n=0.012  L=74.0'  S=0.0050 '/'  Outflow=2.60 cfs  0.199 af

**Pond 68P: DMH #16**

Peak Elev=51.92'  Inflow=2.77 cfs  0.213 af
12.0" Round Culvert  n=0.012  L=90.0'  S=0.0110 '/'  Outflow=2.77 cfs  0.213 af

**Pond 69P: Bio #3**

Peak Elev=51.67'  Storage=11,205 cf  Inflow=7.51 cfs  0.575 af
Outflow=2.47 cfs  0.552 af

**Pond 80P: YD #24**

Peak Elev=48.68'  Inflow=0.24 cfs  0.018 af
6.0" Round Culvert  n=0.012  L=100.0'  S=0.0285 '/'  Outflow=0.24 cfs  0.018 af

**Pond 81P: 6" CPP**

Peak Elev=48.35'  Inflow=0.15 cfs  0.012 af
6.0" Round Culvert  n=0.012  L=85.0'  S=0.0200 '/'  Outflow=0.15 cfs  0.012 af

**Pond 82P: CB #23**

Peak Elev=48.31'  Inflow=1.21 cfs  0.094 af
12.0" Round Culvert  n=0.012  L=18.0'  S=0.0194 '/'  Outflow=1.21 cfs  0.094 af

**Pond 83P: Bio #4**

Peak Elev=48.30'  Storage=2,203 cf  Inflow=1.63 cfs  0.126 af
Outflow=0.50 cfs  0.125 af

**Link 100L: POA #100 - SW**

Inflow=3.74 cfs  0.424 af
Primary=3.74 cfs  0.424 af

**Link 200L: POA #200 - South**

Inflow=23.08 cfs  4.509 af
Primary=23.08 cfs  4.509 af

**Link 300L: POA #300 - SE**

Inflow=15.75 cfs  1.987 af
Primary=15.75 cfs  1.987 af

**Total Runoff Area = 30.826 ac   Runoff Volume = 7.048 af   Average Runoff Depth = 2.74"**
**87.29% Pervious = 26.907 ac    12.71% Impervious = 3.919 ac**

## Summary for Subcatchment 1S: West Corner

Runoff     =       4.36 cfs @  12.14 hrs,  Volume=          0.353 af,  Depth=  2.84"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-48.00 hrs, dt= 0.01 hrs
Type III 24-hr  10-year Rainfall=5.47"

| Area (sf) | CN | Description |
|---|---|---|
| 6,392 | 98 | Paved roads w/curbs & sewers, HSG C |
| 35,003 | 74 | >75% Grass cover, Good, HSG C |
| 23,590 | 70 | Woods, Good, HSG C |
| 31 | 55 | Woods, Good, HSG B |
| 65,016 | 75 | Weighted Average |
| 58,624 | | 90.17% Pervious Area |
| 6,392 | | 9.83% Impervious Area |

| Tc (min) | Length (feet) | Slope (ft/ft) | Velocity (ft/sec) | Capacity (cfs) | Description |
|---|---|---|---|---|---|
| 4.5 | 35 | 0.1071 | 0.13 | | **Sheet Flow,** Woods: Light underbrush   n= 0.400   P2= 3.61" |
| 1.6 | 129 | 0.0388 | 1.38 | | **Shallow Concentrated Flow,** Short Grass Pasture   Kv= 7.0 fps |
| 0.6 | 55 | 0.0909 | 1.51 | | **Shallow Concentrated Flow,** Woodland   Kv= 5.0 fps |
| 3.1 | 147 | 0.0254 | 0.80 | | **Shallow Concentrated Flow,** Woodland   Kv= 5.0 fps |
| 9.8 | 366 | Total | | | |

## Subcatchment 1S: West Corner

**Hydrograph**



Type III 24-hr
10-year Rainfall=5.47"
Runoff Area=65,016 sf
Runoff Volume=0.353 af
Runoff Depth=2.84"
Flow Length=366'
Tc=9.8 min
CN=75

4.36 cfs

Runoff

Flow (cfs)

Time (hours)

## Summary for Subcatchment 2.1S: Central

Runoff      =       23.46 cfs @  12.22 hrs,  Volume=        2.263 af,  Depth=  2.65"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-48.00 hrs, dt= 0.01 hrs
Type III 24-hr  10-year Rainfall=5.47"

| Area (sf) | CN | Description |
|---:|---:|---|
| 4,537 | 98 | Paved parking, HSG D |
| 25,778 | 98 | Paved parking, HSG C |
| 5,448 | 98 | Roofs, HSG C |
| 49 | 98 | Paved parking, HSG B |
| 3,520 | 80 | >75% Grass cover, Good, HSG D |
| 69,745 | 77 | Woods, Good, HSG D |
| 8,823 | 65 | Brush, Good, HSG C |
| 65,131 | 74 | >75% Grass cover, Good, HSG C |
| 249,553 | 70 | Woods, Good, HSG C |
| 530 | 61 | >75% Grass cover, Good, HSG B |
| 12,421 | 55 | Woods, Good, HSG B |
| 445,535 | 73 | Weighted Average |
| 409,723 | | 91.96% Pervious Area |
| 35,812 | | 8.04% Impervious Area |

| Tc (min) | Length (feet) | Slope (ft/ft) | Velocity (ft/sec) | Capacity (cfs) | Description |
|---:|---:|---:|---:|---:|---|
| 0.5 | 35 | 0.0200 | 1.18 | | **Sheet Flow,**<br>Smooth surfaces   n= 0.011   P2= 3.61" |
| 4.7 | 255 | 0.0165 | 0.90 | | **Shallow Concentrated Flow,**<br>Short Grass Pasture   Kv= 7.0 fps |
| 2.0 | 132 | 0.0501 | 1.12 | | **Shallow Concentrated Flow,**<br>Woodland   Kv= 5.0 fps |
| 0.4 | 67 | 0.0313 | 2.85 | | **Shallow Concentrated Flow,**<br>Unpaved   Kv= 16.1 fps |
| 1.0 | 89 | 0.0465 | 1.51 | | **Shallow Concentrated Flow,**<br>Short Grass Pasture   Kv= 7.0 fps |
| 4.3 | 289 | 0.0500 | 1.12 | | **Shallow Concentrated Flow,**<br>Woodland   Kv= 5.0 fps |
| 2.9 | 474 | 0.0106 | 2.72 | 13.61 | **Trap/Vee/Rect Channel Flow,**<br>Bot.W=2.00'  D=1.00'  Z= 3.0 '/'  Top.W=8.00'<br>n= 0.040  Winding stream, pools & shoals |
| 15.8 | 1,341 | Total | | | |

## Subcatchment 2.1S: Central

**Hydrograph**



23.46 cfs

Type III 24-hr
10-year Rainfall=5.47"
Runoff Area=445,535 sf
Runoff Volume=2.263 af
Runoff Depth=2.65"
Flow Length=1,341'
Tc=15.8 min
CN=73

Flow  (cfs)

Time  (hours)

Runoff

## Summary for Subcatchment 2.2S: South of SQ Drive

Runoff      =        8.31 cfs @  12.09 hrs,  Volume=          0.590 af,  Depth=  3.02"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-48.00 hrs, dt= 0.01 hrs
Type III 24-hr  10-year Rainfall=5.47"

| Area (sf) | CN | Description |
|---:|---:|---|
| 4,776 | 98 | Paved parking, HSG D |
| 5,561 | 98 | Paved parking, HSG C |
| 639 | 80 | >75% Grass cover, Good, HSG D |
| 52,111 | 77 | Woods, Good, HSG D |
| 1,323 | 74 | >75% Grass cover, Good, HSG C |
| 37,678 | 70 | Woods, Good, HSG C |
| 102,088 | 77 | Weighted Average |
| 91,751 | | 89.87% Pervious Area |
| 10,337 | | 10.13% Impervious Area |

| Tc (min) | Length (feet) | Slope (ft/ft) | Velocity (ft/sec) | Capacity (cfs) | Description |
|---:|---:|---:|---:|---:|---|
| 0.3 | 19 | 0.0200 | 1.05 | | **Sheet Flow,** Smooth surfaces   n= 0.011   P2= 3.61" |
| 1.4 | 118 | 0.0816 | 1.43 | | **Shallow Concentrated Flow,** Woodland   Kv= 5.0 fps |
| 0.7 | 254 | 0.0502 | 5.93 | 29.63 | **Trap/Vee/Rect Channel Flow,** Bot.W=2.00'  D=1.00'  Z= 3.0 '/'  Top.W=8.00' n= 0.040  Winding stream, pools & shoals |
| 2.4 | 391 | | | | Total,  Increased to minimum Tc = 6.0 min |

## Subcatchment 2.2S: South of SQ Drive

**Hydrograph**



Type III 24-hr
10-year Rainfall=5.47"
Runoff Area=102,088 sf
Runoff Volume=0.590 af
Runoff Depth=3.02"
Flow Length=391'
Tc=6.0 min
CN=77

8.31 cfs

Runoff

## Summary for Subcatchment 2S: North Corner

Runoff      =      23.92 cfs @   12.00 hrs,  Volume=      1.395 af,  Depth=  2.57"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-48.00 hrs, dt= 0.01 hrs
Type III 24-hr  10-year Rainfall=5.47"

| Area (sf) | CN | Description |
|---|---|---|
| 27 | 98 | Paved parking, HSG D |
| 13,324 | 98 | Paved parking, HSG C |
| 5,932 | 98 | Roofs, HSG C |
| 254 | 80 | >75% Grass cover, Good, HSG D |
| 20,767 | 77 | Woods, Good, HSG D |
| 21,632 | 74 | >75% Grass cover, Good, HSG C |
| 199,815 | 70 | Woods, Good, HSG C |
| 22,470 | 55 | Woods, Good, HSG B |
| 284,221 | 72 | Weighted Average |
| 264,938 | | 93.22% Pervious Area |
| 19,283 | | 6.78% Impervious Area |

### Subcatchment 2S: North Corner

**Hydrograph**



Type III 24-hr
10-year Rainfall=5.47"
Runoff Area=284,221 sf
Runoff Volume=1.395 af
Runoff Depth=2.57"
Tc=0.0 min
CN=72

## Summary for Subcatchment 3S: SE Corner

Runoff      =        13.31 cfs @  12.23 hrs,  Volume=           1.310 af,  Depth=  2.22"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-48.00 hrs, dt= 0.01 hrs
Type III 24-hr  10-year Rainfall=5.47"

| Area (sf) | CN | Description |
|---|---|---|
| 223 | 98 | Paved parking, HSG D |
| 5,324 | 98 | Paved parking, HSG C |
| 1,176 | 98 | Paved parking, HSG B |
| 14,143 | 74 | >75% Grass cover, Good, HSG C |
| 237,181 | 70 | Woods, Good, HSG C |
| 1,422 | 61 | >75% Grass cover, Good, HSG B |
| 48,954 | 55 | Woods, Good, HSG B |
| 308,423 | 68 | Weighted Average |
| 301,700 | | 97.82% Pervious Area |
| 6,723 | | 2.18% Impervious Area |

| Tc (min) | Length (feet) | Slope (ft/ft) | Velocity (ft/sec) | Capacity (cfs) | Description |
|---|---|---|---|---|---|
| 8.5 | 90 | 0.1412 | 0.18 | | **Sheet Flow,** |
| | | | | | Woods: Light underbrush  n= 0.400  P2= 3.61" |
| 4.7 | 331 | 0.0554 | 1.18 | | **Shallow Concentrated Flow,** |
| | | | | | Woodland  Kv= 5.0 fps |
| 0.9 | 331 | 0.0554 | 6.22 | 31.12 | **Trap/Vee/Rect Channel Flow,** |
| | | | | | Bot.W=2.00' D=1.00' Z= 3.0 '/'  Top.W=8.00' |
| | | | | | n= 0.040  Winding stream, pools & shoals |
| 1.8 | 397 | 0.0160 | 3.63 | 25.39 | **Trap/Vee/Rect Channel Flow,** |
| | | | | | Bot.W=4.00' D=1.00' Z= 3.0 '/'  Top.W=10.00' |
| | | | | | n= 0.040  Winding stream, pools & shoals |
| 15.9 | 1,149 | Total | | | |

## Subcatchment 3S: SE Corner

**Hydrograph**



Legend: ☐ Runoff

13.31 cfs

**Type III 24-hr**
**10-year Rainfall=5.47"**
**Runoff Area=308,423 sf**
**Runoff Volume=1.310 af**
**Runoff Depth=2.22"**
**Flow Length=1,149'**
**Tc=15.9 min**
**CN=68**

Flow  (cfs)

Time  (hours)

## Summary for Subcatchment 10S: Parking Lot

Runoff      =        0.09 cfs @  21.94 hrs,  Volume=        0.101 af,  Depth>  5.20"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-48.00 hrs, dt= 0.01 hrs
Type III 24-hr  10-year Rainfall=5.47"

| Area (sf) | CN | Description |
|---|---|---|
| 10,078 | 98 | Paved roads w/curbs & sewers, HSG C |
| 100 | 74 | >75% Grass cover, Good, HSG C |
| 10,178 | 98 | Weighted Average |
| 100 | | 0.98% Pervious Area |
| 10,078 | | 99.02% Impervious Area |

| Tc (min) | Length (feet) | Slope (ft/ft) | Velocity (ft/sec) | Capacity (cfs) | Description |
|---|---|---|---|---|---|
| 790.0 | | | | | **Direct Entry,** |

### Subcatchment 10S: Parking Lot

**Hydrograph**



Type III 24-hr
10-year Rainfall=5.47"
Runoff Area=10,178 sf
Runoff Volume=0.101 af
Runoff Depth>5.20"
Tc=790.0 min
CN=98

## Summary for Subcatchment 11S: Island

Runoff      =        0.07 cfs @   12.08 hrs,  Volume=        0.005 af,  Depth=  4.33"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-48.00 hrs, dt= 0.01 hrs
Type III 24-hr  10-year Rainfall=5.47"

| Area (sf) | CN | Description |
|---|---|---|
| 321 | 98 | Roofs, HSG C |
| 66 | 98 | Paved roads w/curbs & sewers, HSG C |
| 201 | 74 | >75% Grass cover, Good, HSG C |
| 588 | 90 | Weighted Average |
| 201 | | 34.18% Pervious Area |
| 387 | | 65.82% Impervious Area |

| Tc (min) | Length (feet) | Slope (ft/ft) | Velocity (ft/sec) | Capacity (cfs) | Description |
|---|---|---|---|---|---|
| 6.0 | | | | | **Direct Entry,** |

## Subcatchment 11S: Island

**Hydrograph**



0.07 cfs

Type III 24-hr
10-year Rainfall=5.47"
Runoff Area=588 sf
Runoff Volume=0.005 af
Runoff Depth=4.33"
Tc=6.0 min
CN=90

## Summary for Subcatchment 12S: Building

Runoff    =    0.21 cfs @  12.08 hrs,  Volume=    0.016 af,  Depth=  4.33"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-48.00 hrs, dt= 0.01 hrs
Type III 24-hr  10-year Rainfall=5.47"

| Area (sf) | CN | Description |
|---|---|---|
| 1,171 | 98 | Roofs, HSG C |
| 52 | 98 | Paved roads w/curbs & sewers, HSG C |
| 655 | 74 | >75% Grass cover, Good, HSG C |
| 1,878 | 90 | Weighted Average |
| 655 | | 34.88% Pervious Area |
| 1,223 | | 65.12% Impervious Area |

| Tc (min) | Length (feet) | Slope (ft/ft) | Velocity (ft/sec) | Capacity (cfs) | Description |
|---|---|---|---|---|---|
| 6.0 | | | | | **Direct Entry,** |

### Subcatchment 12S: Building

**Hydrograph**



Type III 24-hr
10-year Rainfall=5.47"
Runoff Area=1,878 sf
Runoff Volume=0.016 af
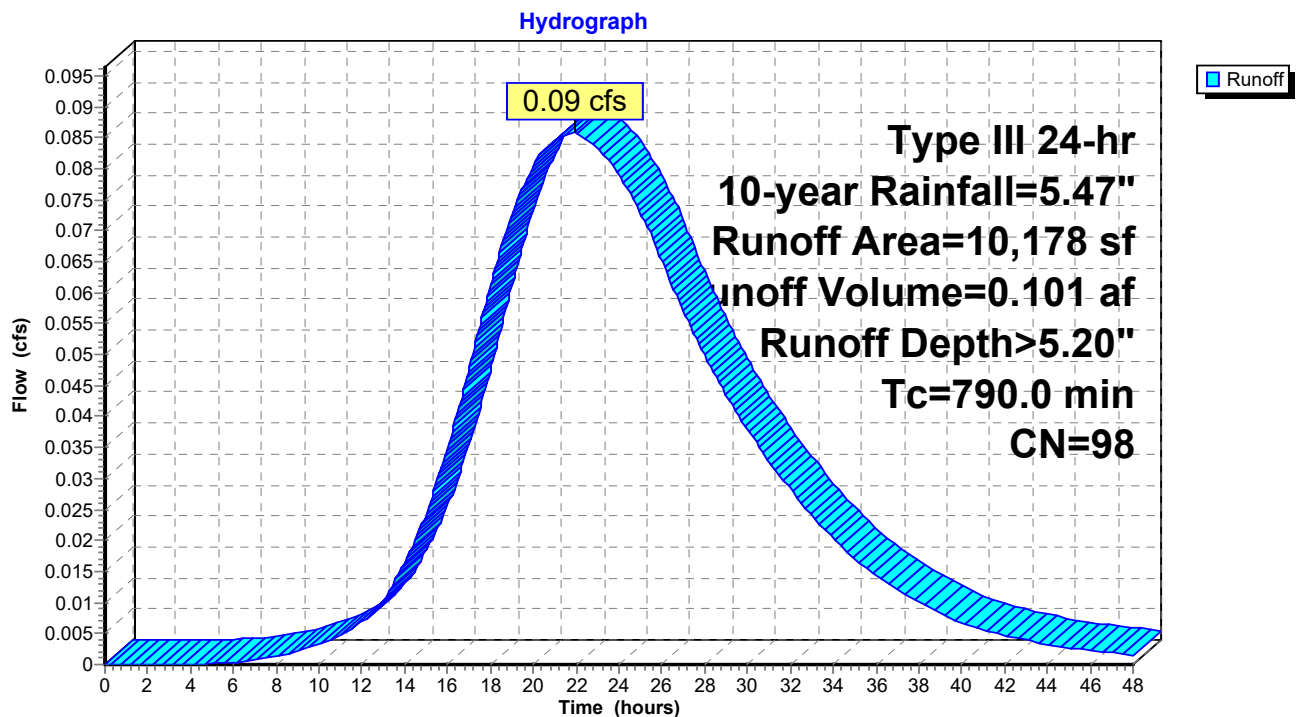Runoff Depth=4.33"
Tc=6.0 min
CN=90

0.21 cfs

## Summary for Subcatchment 13S: Building

Runoff      =        0.16 cfs @   12.08 hrs,  Volume=          0.012 af,  Depth=  4.55"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-48.00 hrs, dt= 0.01 hrs
Type III 24-hr  10-year Rainfall=5.47"

| Area (sf) | CN | Description |
|---:|---:|---|
| 996 | 98 | Roofs, HSG C |
| 353 | 74 | >75% Grass cover, Good, HSG C |
| 1,349 | 92 | Weighted Average |
| 353 | | 26.17% Pervious Area |
| 996 | | 73.83% Impervious Area |

| Tc (min) | Length (feet) | Slope (ft/ft) | Velocity (ft/sec) | Capacity (cfs) | Description |
|---:|---:|---:|---:|---:|---|
| 6.0 | | | | | **Direct Entry,** |

### Subcatchment 13S: Building

## Summary for Subcatchment 14S: Building

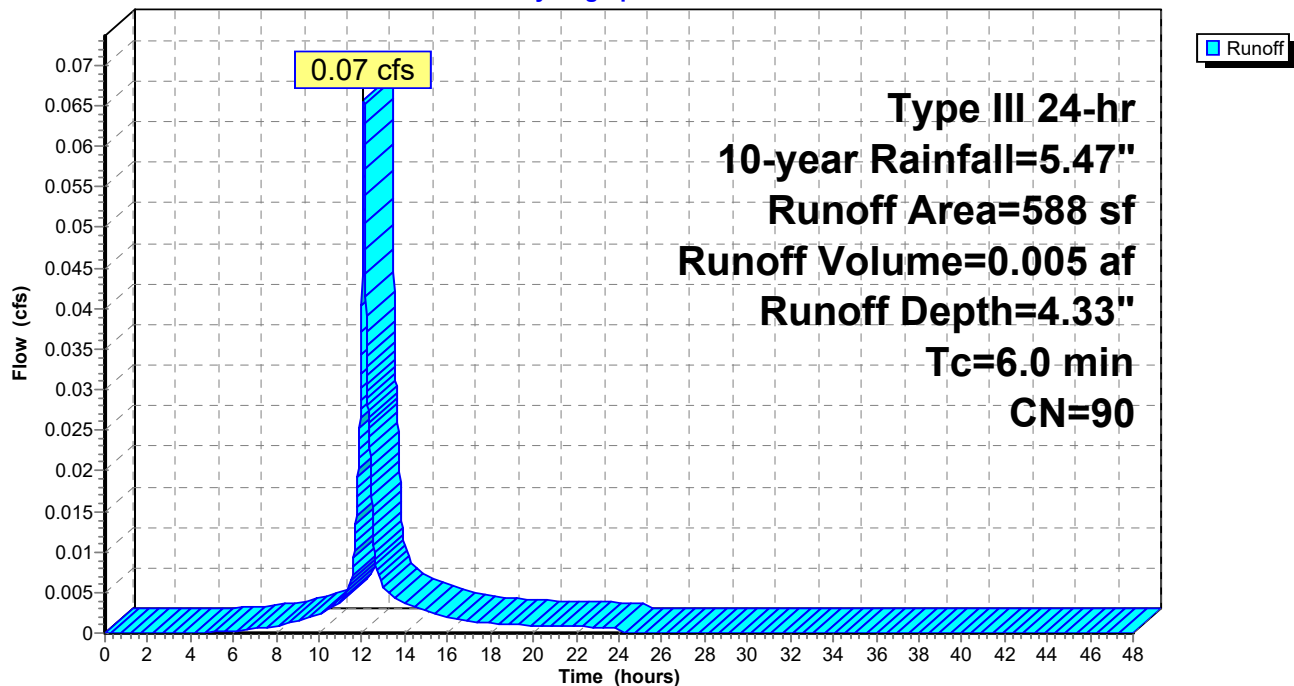Runoff      =        0.12 cfs @  12.08 hrs,  Volume=            0.009 af,  Depth=  4.66"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-48.00 hrs, dt= 0.01 hrs
Type III 24-hr  10-year Rainfall=5.47"

| Area (sf) | CN | Description |
|---|---|---|
| 795 | 98 | Roofs, HSG C |
| 227 | 74 | >75% Grass cover, Good, HSG C |
| 1,022 | 93 | Weighted Average |
| 227 | | 22.21% Pervious Area |
| 795 | | 77.79% Impervious Area |

| Tc (min) | Length (feet) | Slope (ft/ft) | Velocity (ft/sec) | Capacity (cfs) | Description |
|---|---|---|---|---|---|
| 6.0 | | | | | **Direct Entry,** |

### Subcatchment 14S: Building



**Hydrograph**

Type III 24-hr
10-year Rainfall=5.47"
Runoff Area=1,022 sf
Runoff Volume=0.009 af
Runoff Depth=4.66"
Tc=6.0 min
CN=93

0.12 cfs

## Summary for Subcatchment 15S: Building

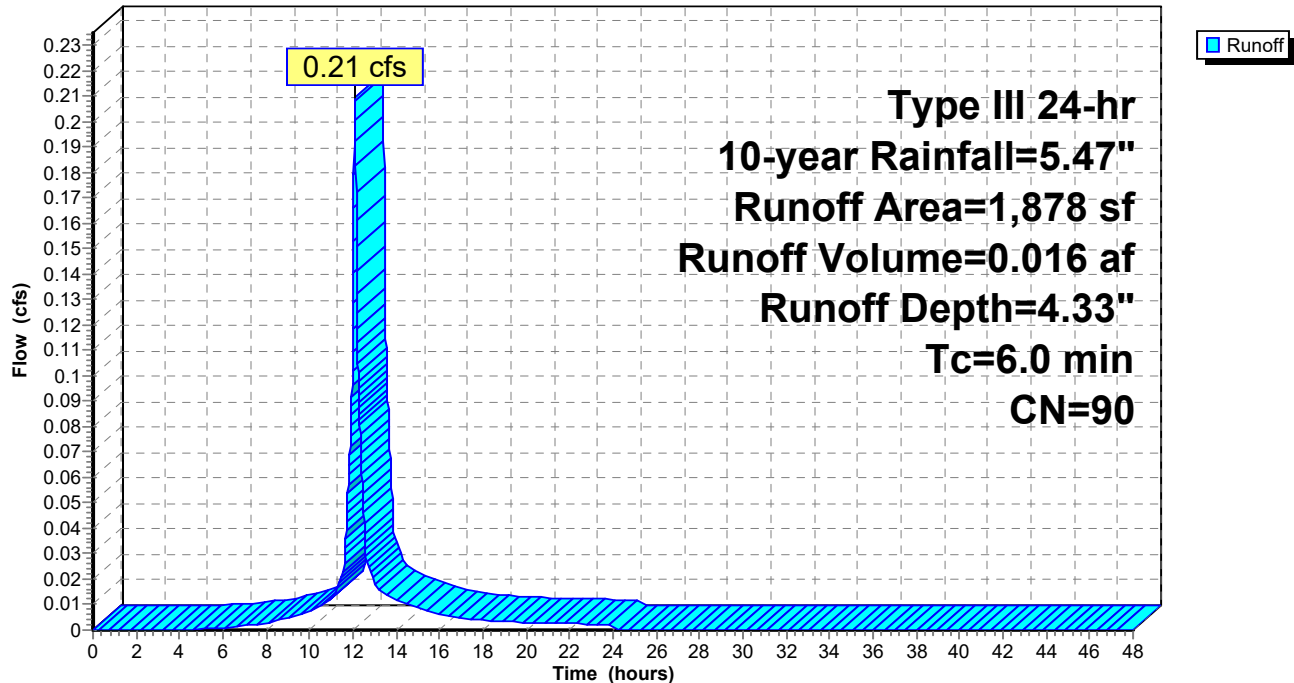Runoff      =        0.14 cfs @   12.09 hrs,  Volume=          0.010 af,  Depth=  3.70"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-48.00 hrs, dt= 0.01 hrs
Type III 24-hr  10-year Rainfall=5.47"

| Area (sf) | CN | Description |
|---|---|---|
| 484 | 98 | Roofs, HSG C |
| 111 | 98 | Paved roads w/curbs & sewers, HSG C |
| 782 | 74 | >75% Grass cover, Good, HSG C |
| 1,377 | 84 | Weighted Average |
| 782 | | 56.79% Pervious Area |
| 595 | | 43.21% Impervious Area |

| Tc (min) | Length (feet) | Slope (ft/ft) | Velocity (ft/sec) | Capacity (cfs) | Description |
|---|---|---|---|---|---|
| 6.0 | | | | | **Direct Entry,** |

### Subcatchment 15S: Building

**Hydrograph**



Type III 24-hr
10-year Rainfall=5.47"
Runoff Area=1,377 sf
Runoff Volume=0.010 af
Runoff Depth=3.70"
Tc=6.0 min
CN=84

## Summary for Subcatchment 16S: Island

Runoff      =        0.08 cfs @   12.09 hrs,  Volume=        0.006 af,  Depth=  3.31"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-48.00 hrs, dt= 0.01 hrs
Type III 24-hr  10-year Rainfall=5.47"

| Area (sf) | CN | Description |
|---|---|---|
| 246 | 98 | Paved roads w/curbs & sewers, HSG C |
| 682 | 74 | >75% Grass cover, Good, HSG C |
| 928 | 80 | Weighted Average |
| 682 | | 73.49% Pervious Area |
| 246 | | 26.51% Impervious Area |

| Tc (min) | Length (feet) | Slope (ft/ft) | Velocity (ft/sec) | Capacity (cfs) | Description |
|---|---|---|---|---|---|
| 6.0 | | | | | **Direct Entry,** |

### Subcatchment 16S: Island

**Hydrograph**



Type III 24-hr
10-year Rainfall=5.47"
Runoff Area=928 sf
Runoff Volume=0.006 af
Runoff Depth=3.31"
Tc=6.0 min
CN=80

0.08 cfs

Runoff

## Summary for Subcatchment 17S: To Bio #1

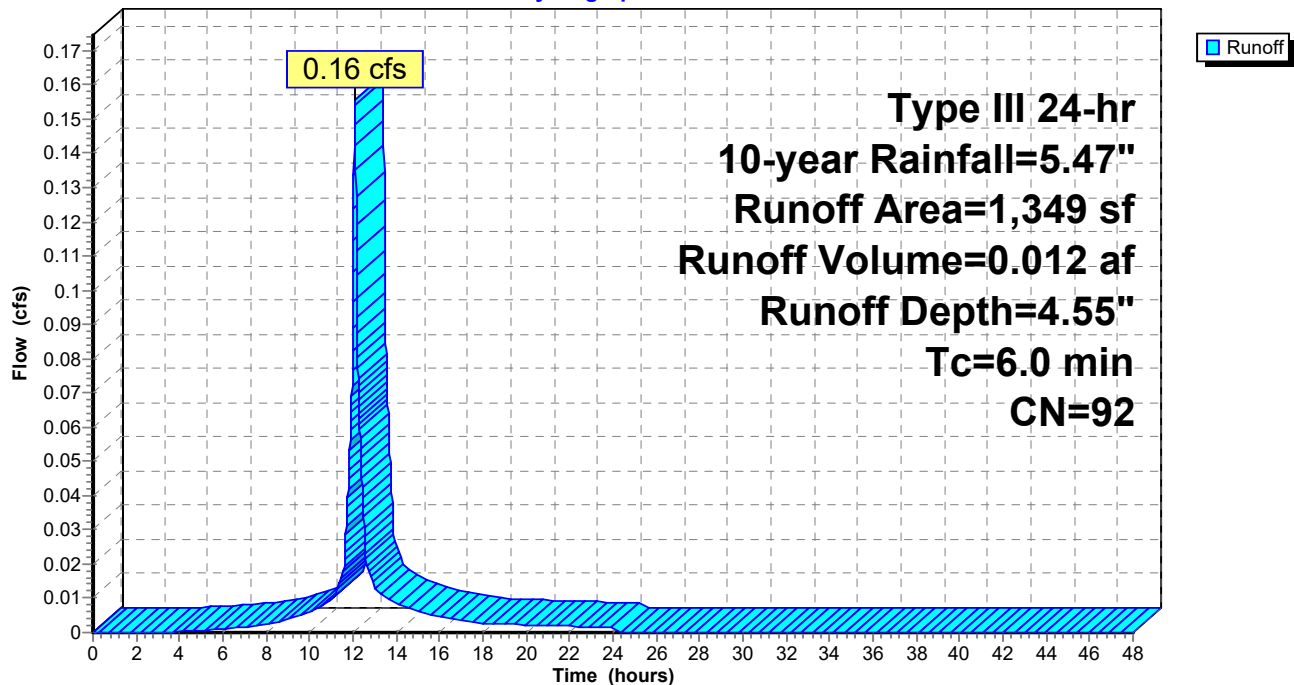Runoff      =        0.21 cfs @  12.09 hrs,  Volume=          0.015 af,  Depth=  2.74"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-48.00 hrs, dt= 0.01 hrs
Type III 24-hr  10-year Rainfall=5.47"

| Area (sf) | CN | Description |
|---|---|---|
| 8 | 98 | Paved roads w/curbs & sewers, HSG C |
| 2,885 | 74 | >75% Grass cover, Good, HSG C |
| 2,893 | 74 | Weighted Average |
| 2,885 | | 99.72% Pervious Area |
| 8 | | 0.28% Impervious Area |

| Tc (min) | Length (feet) | Slope (ft/ft) | Velocity (ft/sec) | Capacity (cfs) | Description |
|---|---|---|---|---|---|
| 6.0 | | | | | **Direct Entry,** |

### Subcatchment 17S: To Bio #1



**Hydrograph**

Type III 24-hr
10-year Rainfall=5.47"
Runoff Area=2,893 sf
Runoff Volume=0.015 af
Runoff Depth=2.74"
Tc=6.0 min
CN=74

0.21 cfs

## Summary for Subcatchment 20S: Building

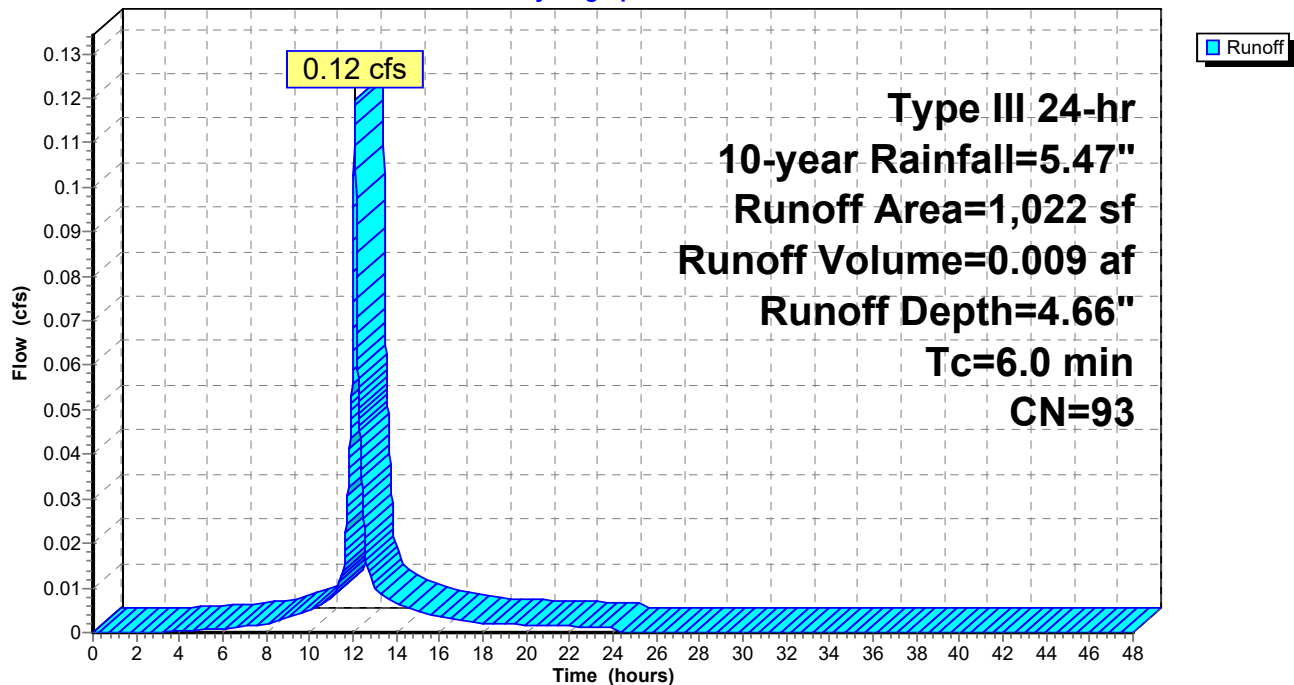Runoff      =        1.13 cfs @   12.08 hrs,  Volume=           0.092 af,  Depth=  5.23"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-48.00 hrs, dt= 0.01 hrs
Type III 24-hr  10-year Rainfall=5.47"

| Area (sf) | CN | Description |
|---|---|---|
| 9,167 | 98 | Roofs, HSG C |
| 9,167 | | 100.00% Impervious Area |

| Tc (min) | Length (feet) | Slope (ft/ft) | Velocity (ft/sec) | Capacity (cfs) | Description |
|---|---|---|---|---|---|
| 6.0 | | | | | **Direct Entry,** |

### Subcatchment 20S: Building

**Hydrograph**



Type III 24-hr
10-year Rainfall=5.47"
Runoff Area=9,167 sf
Runoff Volume=0.092 af
Runoff Depth=5.23"
Tc=6.0 min
CN=98

## Summary for Subcatchment 21S: Parking Lot

Runoff     =        0.32 cfs @   12.08 hrs,  Volume=          0.026 af,  Depth=  5.23"
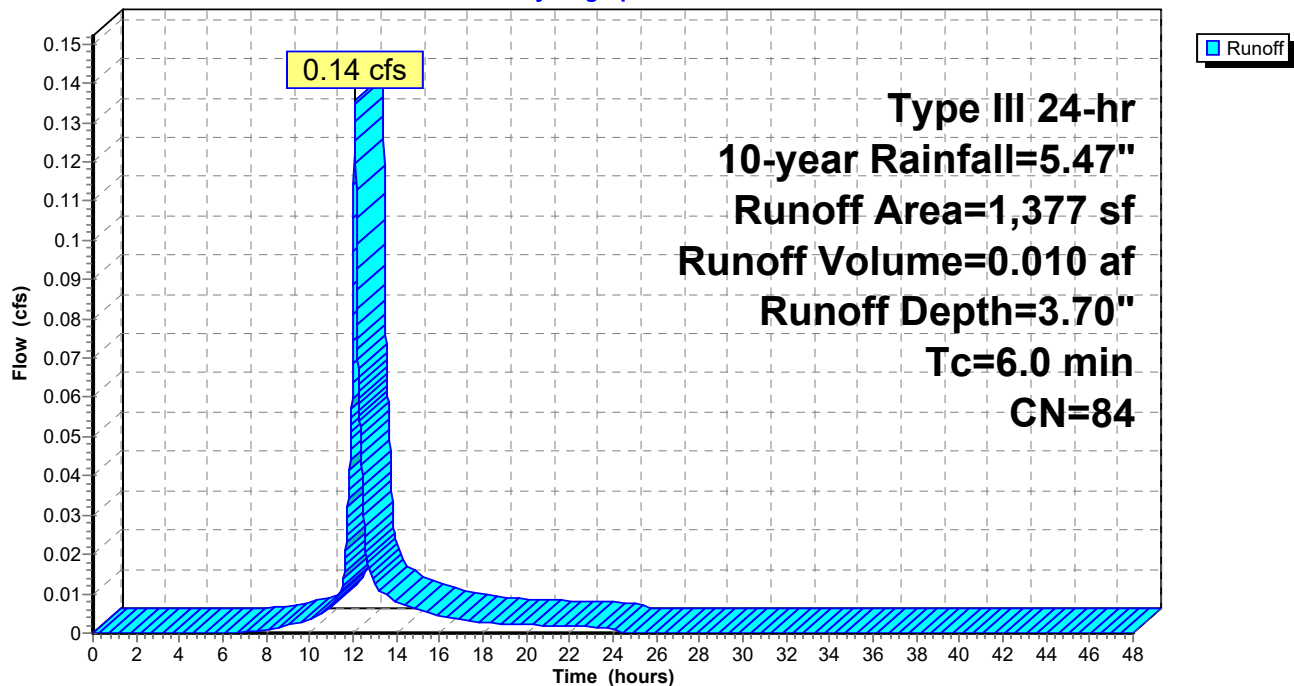
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-48.00 hrs, dt= 0.01 hrs
Type III 24-hr  10-year Rainfall=5.47"

| Area (sf) | CN | Description |
|---|---|---|
| 331 | 98 | Roofs, HSG C |
| 2,289 | 98 | Paved roads w/curbs & sewers, HSG C |
| 2,620 | 98 | Weighted Average |
| 2,620 | | 100.00% Impervious Area |

| Tc (min) | Length (feet) | Slope (ft/ft) | Velocity (ft/sec) | Capacity (cfs) | Description |
|---|---|---|---|---|---|
| 6.0 | | | | | **Direct Entry,** |

### Subcatchment 21S: Parking Lot

**5440-Post**
Prepared by Altus Engineering, Inc.
HydroCAD® 10.00-25  s/n 01222  © 2019 HydroCAD Software Solutions LLC
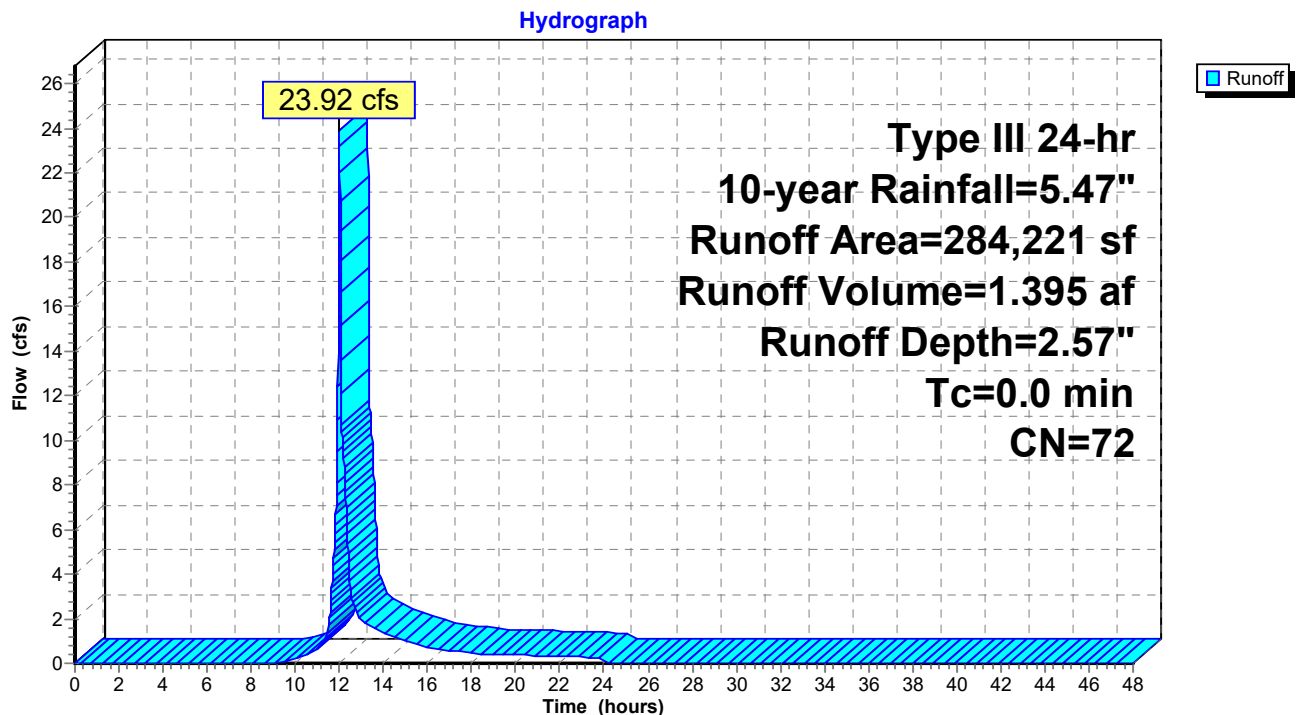
*Type III 24-hr  10-year Rainfall=5.47"*
Printed  7/15/2025

## Summary for Subcatchment 22S: To Bio #2

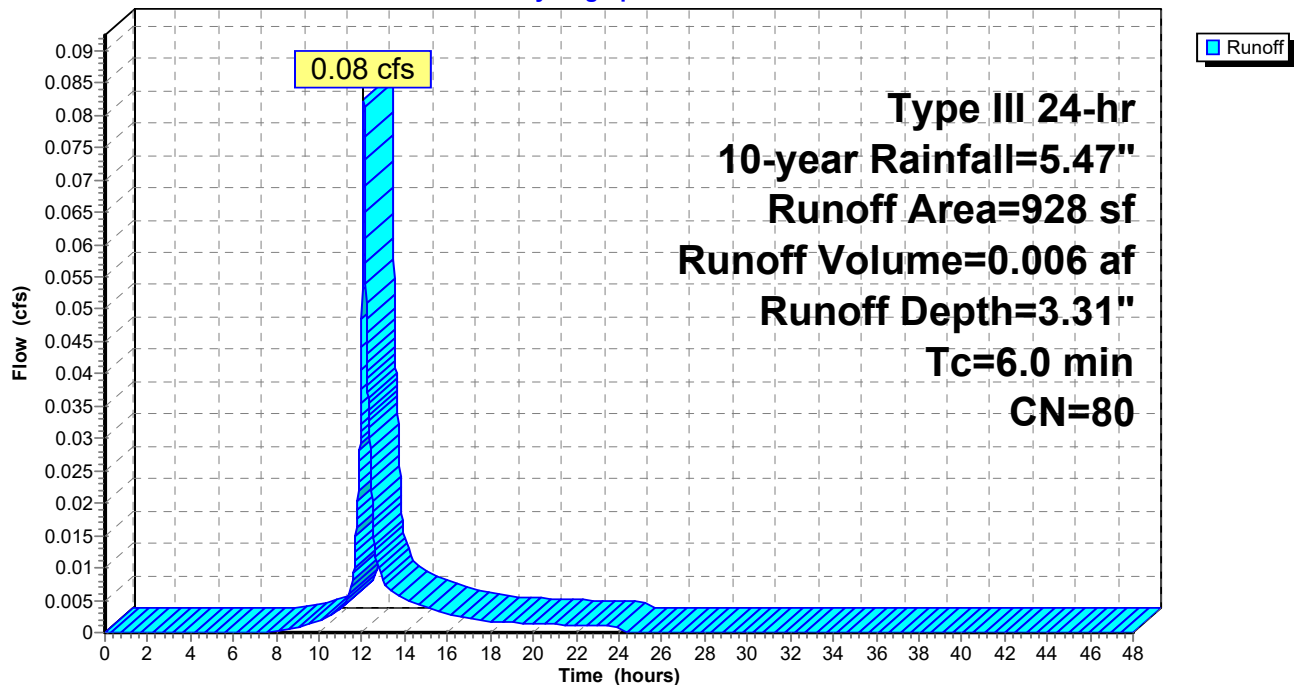Runoff    =    0.29 cfs @  12.09 hrs,  Volume=    0.021 af,  Depth=  2.74"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-48.00 hrs, dt= 0.01 hrs
Type III 24-hr  10-year Rainfall=5.47"

| Area (sf) | CN | Description |
|---|---|---|
| 3,961 | 74 | >75% Grass cover, Good, HSG C |
| 3,961 | | 100.00% Pervious Area |

| Tc (min) | Length (feet) | Slope (ft/ft) | Velocity (ft/sec) | Capacity (cfs) | Description |
|---|---|---|---|---|---|
| 6.0 | | | | | **Direct Entry,** |

### Subcatchment 22S: To Bio #2

**Hydrograph**



Type III 24-hr
10-year Rainfall=5.47"
Runoff Area=3,961 sf
Runoff Volume=0.021 af
Runoff Depth=2.74"
Tc=6.0 min
CN=74

## Summary for Subcatchment 30S: Roadside

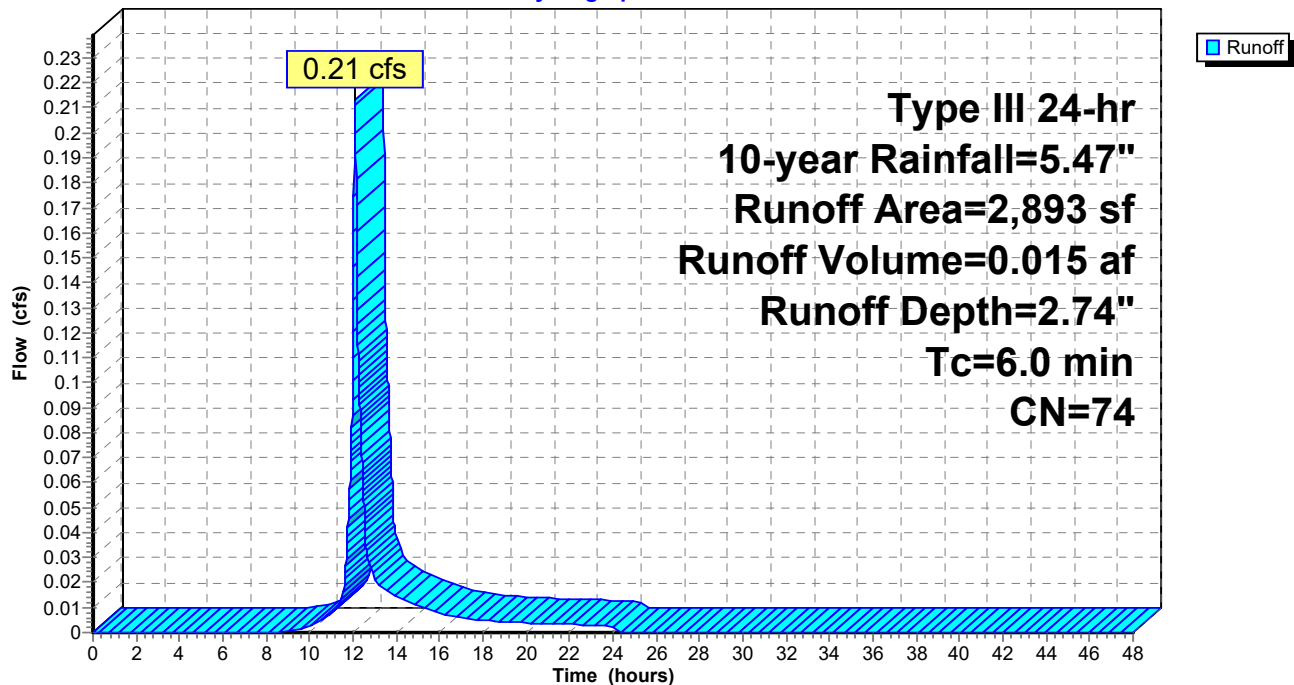Runoff      =       0.87 cfs @  12.09 hrs,  Volume=        0.063 af,  Depth=  4.01"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-48.00 hrs, dt= 0.01 hrs
Type III 24-hr  10-year Rainfall=5.47"

| Area (sf) | CN | Description |
|---|---|---|
| 4,370 | 98 | Paved parking, HSG C |
| 3,860 | 74 | >75% Grass cover, Good, HSG C |
| 8,230 | 87 | Weighted Average |
| 3,860 | | 46.90% Pervious Area |
| 4,370 | | 53.10% Impervious Area |

| Tc (min) | Length (feet) | Slope (ft/ft) | Velocity (ft/sec) | Capacity (cfs) | Description |
|---|---|---|---|---|---|
| 0.3 | 19 | 0.0200 | 1.05 | | **Sheet Flow,** Smooth surfaces   n= 0.011   P2= 3.61" |
| 2.9 | 185 | 0.0235 | 1.07 | | **Shallow Concentrated Flow,** Short Grass Pasture   Kv= 7.0 fps |
| 3.2 | 204 | Total,  Increased to minimum Tc = 6.0 min | | | |

### Subcatchment 30S: Roadside



Hydrograph

Type III 24-hr
10-year Rainfall=5.47"
Runoff Area=8,230 sf
Runoff Volume=0.063 af
Runoff Depth=4.01"
Flow Length=204'
Tc=6.0 min
CN=87

## Summary for Subcatchment 31S: Roadside

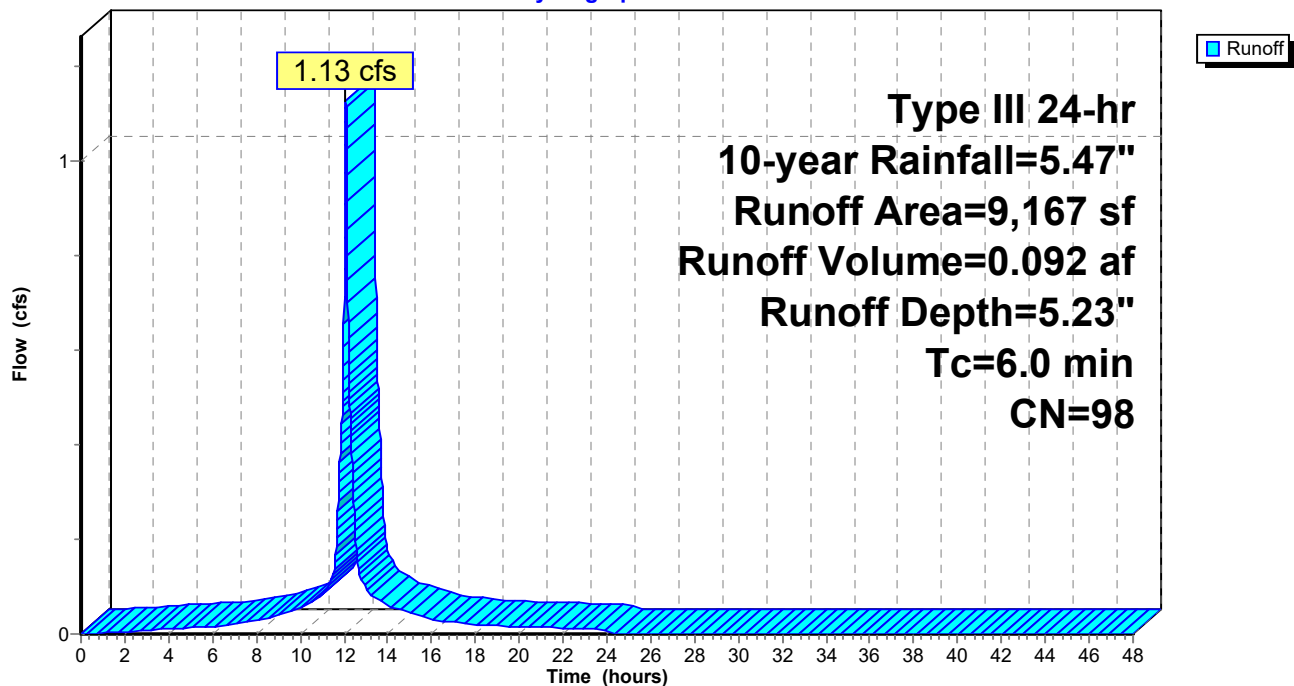Runoff      =        0.81 cfs @   12.08 hrs,  Volume=        0.061 af,  Depth=  4.44"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-48.00 hrs, dt= 0.01 hrs
Type III 24-hr  10-year Rainfall=5.47"

| Area (sf) | CN | Description |
|---|---|---|
| 5,074 | 98 | Paved parking, HSG C |
| 2,061 | 74 | >75% Grass cover, Good, HSG C |
| 7,135 | 91 | Weighted Average |
| 2,061 | | 28.89% Pervious Area |
| 5,074 | | 71.11% Impervious Area |

| Tc (min) | Length (feet) | Slope (ft/ft) | Velocity (ft/sec) | Capacity (cfs) | Description |
|---|---|---|---|---|---|
| 0.3 | 17 | 0.0200 | 1.03 | | **Sheet Flow,** Smooth surfaces   n= 0.011   P2= 3.61" |
| 3.0 | 126 | 0.0100 | 0.70 | | **Shallow Concentrated Flow,** Short Grass Pasture   Kv= 7.0 fps |
| 3.3 | 143 | | Total,  Increased to minimum Tc = 6.0 min | | |

### Subcatchment 31S: Roadside

**Hydrograph**



Type III 24-hr
10-year Rainfall=5.47"
Runoff Area=7,135 sf
Runoff Volume=0.061 af
Runoff Depth=4.44"
Flow Length=143'
Tc=6.0 min
CN=91

## Summary for Subcatchment 40S: Building

Runoff      =        0.38 cfs @   12.08 hrs,  Volume=          0.031 af,  Depth=  5.23"
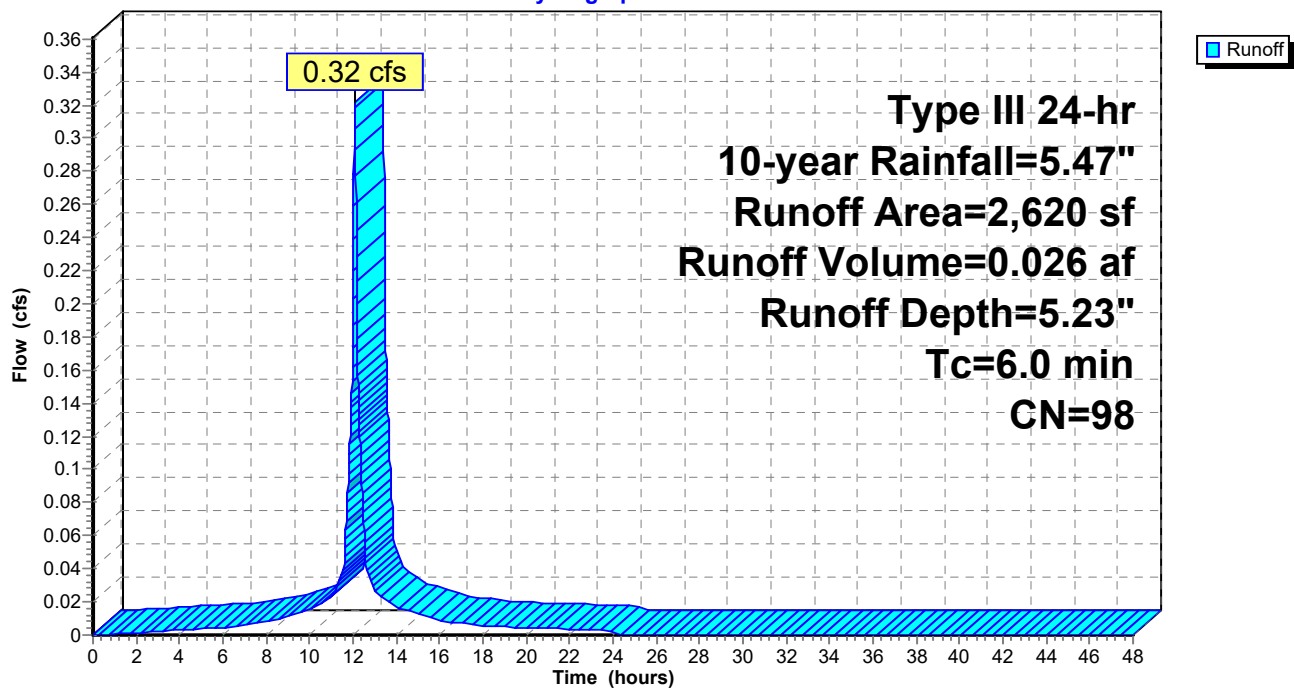
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-48.00 hrs, dt= 0.01 hrs
Type III 24-hr  10-year Rainfall=5.47"

| Area (sf) | CN | Description |
|---|---|---|
| 3,066 | 98 | Roofs, HSG C |
| 3,066 | | 100.00% Impervious Area |

| Tc (min) | Length (feet) | Slope (ft/ft) | Velocity (ft/sec) | Capacity (cfs) | Description |
|---|---|---|---|---|---|
| 6.0 | | | | | **Direct Entry,** |

## Subcatchment 40S: Building



**Hydrograph**

Type III 24-hr
10-year Rainfall=5.47"
Runoff Area=3,066 sf
Runoff Volume=0.031 af
Runoff Depth=5.23"
Tc=6.0 min
CN=98

## Summary for Subcatchment 41S: Building

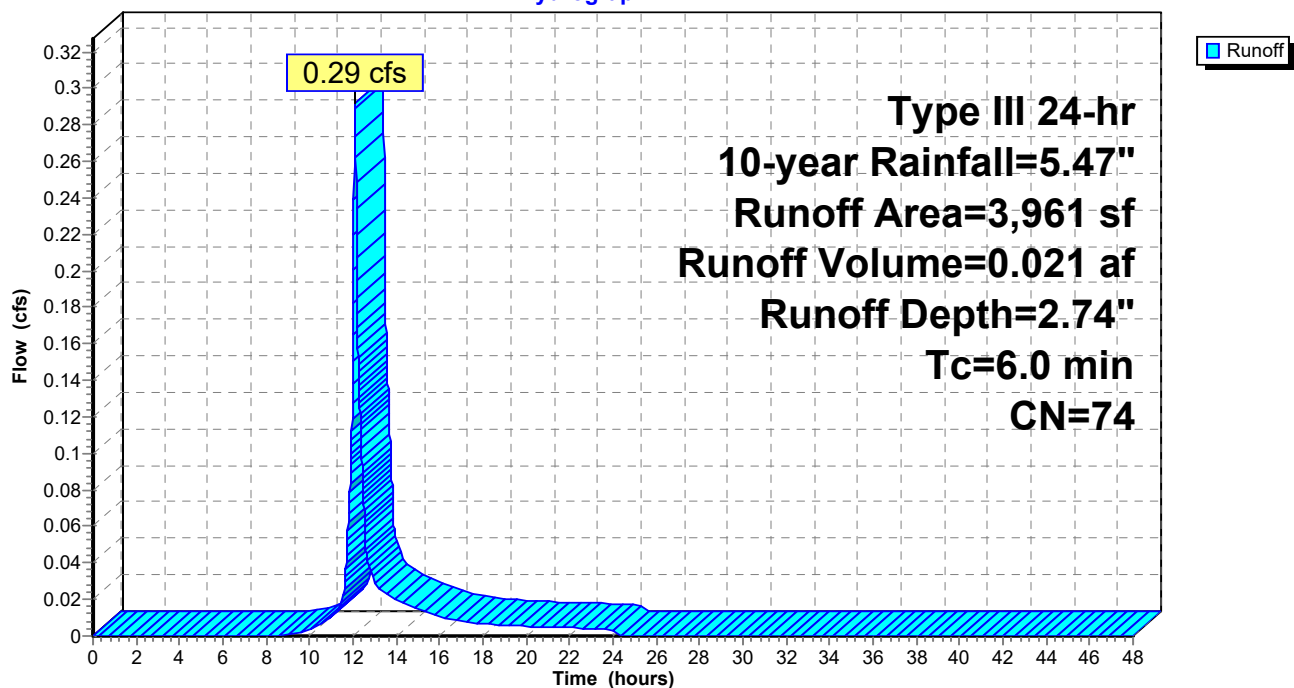Runoff      =       0.26 cfs @  12.08 hrs,  Volume=        0.020 af,  Depth= 5.00"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-48.00 hrs, dt= 0.01 hrs
Type III 24-hr  10-year Rainfall=5.47"

| Area (sf) | CN | Description |
|---|---|---|
| 1,928 | 98 | Roofs, HSG C |
| 192 | 74 | >75% Grass cover, Good, HSG C |
| 2,120 | 96 | Weighted Average |
| 192 | | 9.06% Pervious Area |
| 1,928 | | 90.94% Impervious Area |

| Tc (min) | Length (feet) | Slope (ft/ft) | Velocity (ft/sec) | Capacity (cfs) | Description |
|---|---|---|---|---|---|
| 6.0 | | | | | **Direct Entry,** |

### Subcatchment 41S: Building



**Hydrograph**

*Type III 24-hr*
*10-year Rainfall=5.47"*
*Runoff Area=2,120 sf*
*Runoff Volume=0.020 af*
*Runoff Depth=5.00"*
*Tc=6.0 min*
*CN=96*

0.26 cfs

Runoff

## Summary for Subcatchment 42S: Building

Runoff      =        0.27 cfs @   12.08 hrs,  Volume=        0.022 af,  Depth=  5.23"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-48.00 hrs, dt= 0.01 hrs
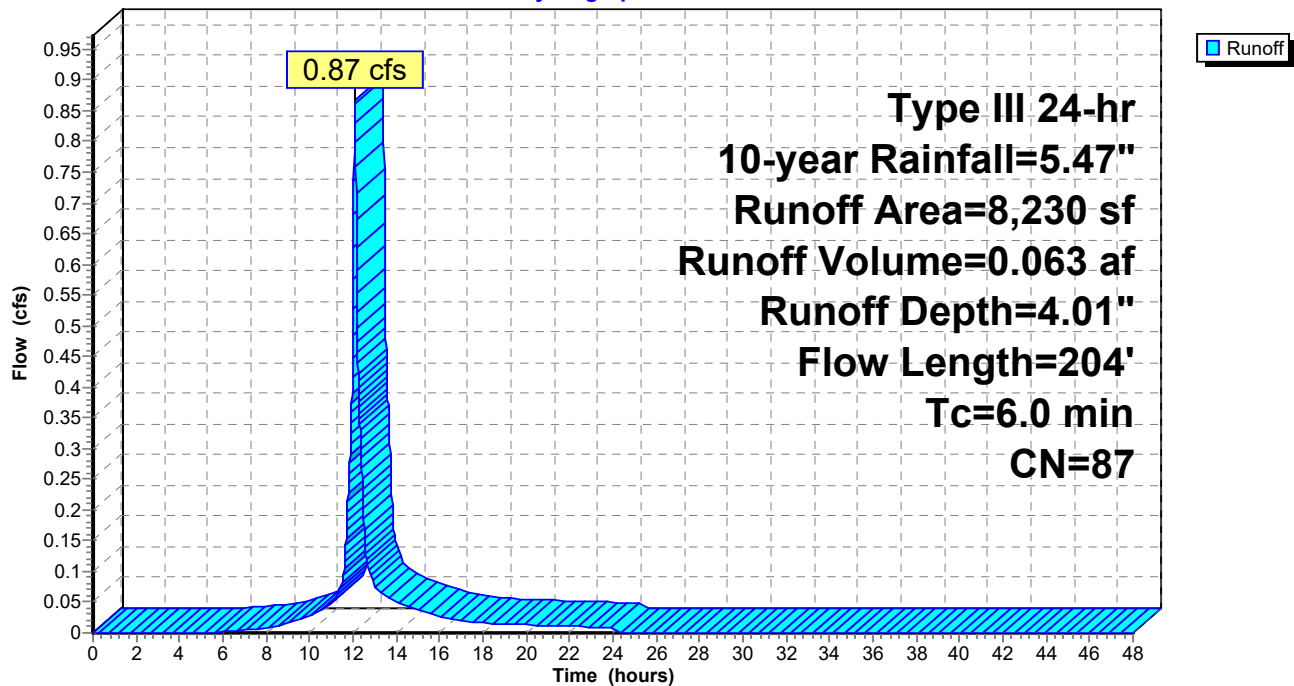Type III 24-hr  10-year Rainfall=5.47"

| Area (sf) | CN | Description |
|---|---|---|
| 2,162 | 98 | Roofs, HSG C |
| 2,162 | | 100.00% Impervious Area |

| Tc (min) | Length (feet) | Slope (ft/ft) | Velocity (ft/sec) | Capacity (cfs) | Description |
|---|---|---|---|---|---|
| 6.0 | | | | | **Direct Entry,** |

### Subcatchment 42S: Building

## Summary for Subcatchment 44S: Roadside

Runoff      =       0.46 cfs @  12.09 hrs,  Volume=          0.033 af,  Depth=  3.70"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-48.00 hrs, dt= 0.01 hrs
Type III 24-hr  10-year Rainfall=5.47"

| Area (sf) | CN | Description |
|---|---|---|
| 1,908 | 98 | Paved parking, HSG C |
| 2,755 | 74 | >75% Grass cover, Good, HSG C |
| 4,663 | 84 | Weighted Average |
| 2,755 | | 59.08% Pervious Area |
| 1,908 | | 40.92% Impervious Area |

| Tc (min) | Length (feet) | Slope (ft/ft) | Velocity (ft/sec) | Capacity (cfs) | Description |
|---|---|---|---|---|---|
| 6.0 | | | | | **Direct Entry,** |

## Subcatchment 44S: Roadside



Hydrograph

Type III 24-hr
10-year Rainfall=5.47"
Runoff Area=4,663 sf
Runoff Volume=0.033 af
Runoff Depth=3.70"
Tc=6.0 min
CN=84

0.46 cfs

## Summary for Subcatchment 45S: Parking Lot

Runoff      =        0.44 cfs @  12.08 hrs,  Volume=          0.033 af,  Depth=  4.44"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-48.00 hrs, dt= 0.01 hrs
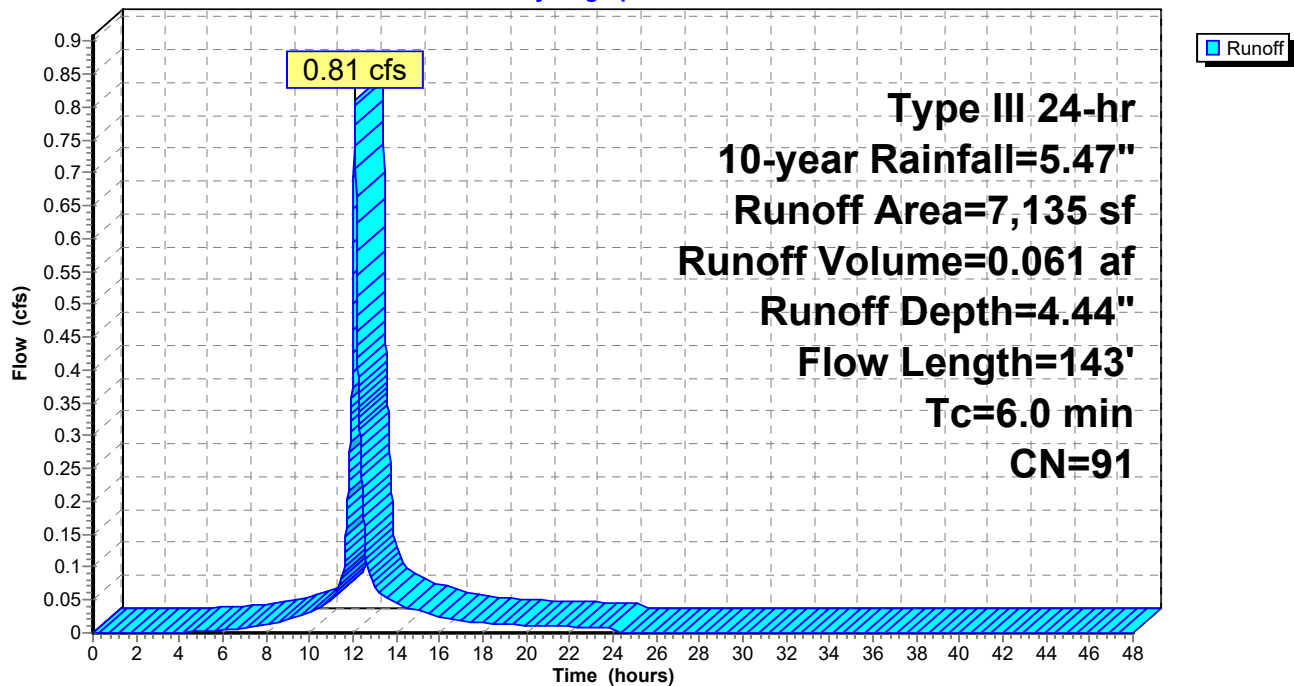Type III 24-hr  10-year Rainfall=5.47"

| Area (sf) | CN | Description |
|---|---|---|
| 2,768 | 98 | Paved parking, HSG C |
| 1,083 | 74 | >75% Grass cover, Good, HSG C |
| 3,851 | 91 | Weighted Average |
| 1,083 | | 28.12% Pervious Area |
| 2,768 | | 71.88% Impervious Area |

| Tc (min) | Length (feet) | Slope (ft/ft) | Velocity (ft/sec) | Capacity (cfs) | Description |
|---|---|---|---|---|---|
| 6.0 | | | | | **Direct Entry,** |

### Subcatchment 45S: Parking Lot

**Hydrograph**



Type III 24-hr
10-year Rainfall=5.47"
Runoff Area=3,851 sf
Runoff Volume=0.033 af
Runoff Depth=4.44"
Tc=6.0 min
CN=91

0.44 cfs

## Summary for Subcatchment 46S: Parking Lot

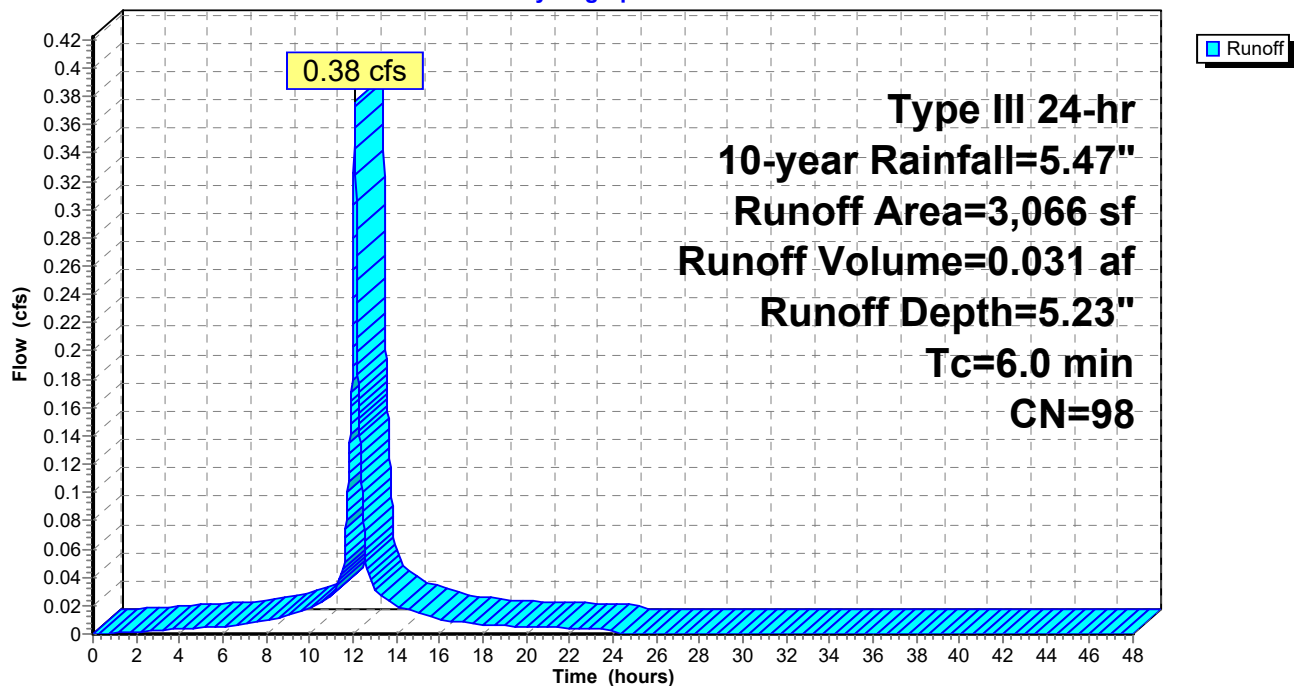Runoff      =        0.52 cfs @  12.08 hrs,  Volume=          0.039 af,  Depth=  4.55"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-48.00 hrs, dt= 0.01 hrs
Type III 24-hr  10-year Rainfall=5.47"

| Area (sf) | CN | Description |
|---|---|---|
| 3,288 | 98 | Paved parking, HSG C |
| 1,201 | 74 | >75% Grass cover, Good, HSG C |
| 4,489 | 92 | Weighted Average |
| 1,201 | | 26.75% Pervious Area |
| 3,288 | | 73.25% Impervious Area |

| Tc (min) | Length (feet) | Slope (ft/ft) | Velocity (ft/sec) | Capacity (cfs) | Description |
|---|---|---|---|---|---|
| 6.0 | | | | | **Direct Entry,** |

### Subcatchment 46S: Parking Lot

**Hydrograph**

## Summary for Subcatchment 48S: Roadside

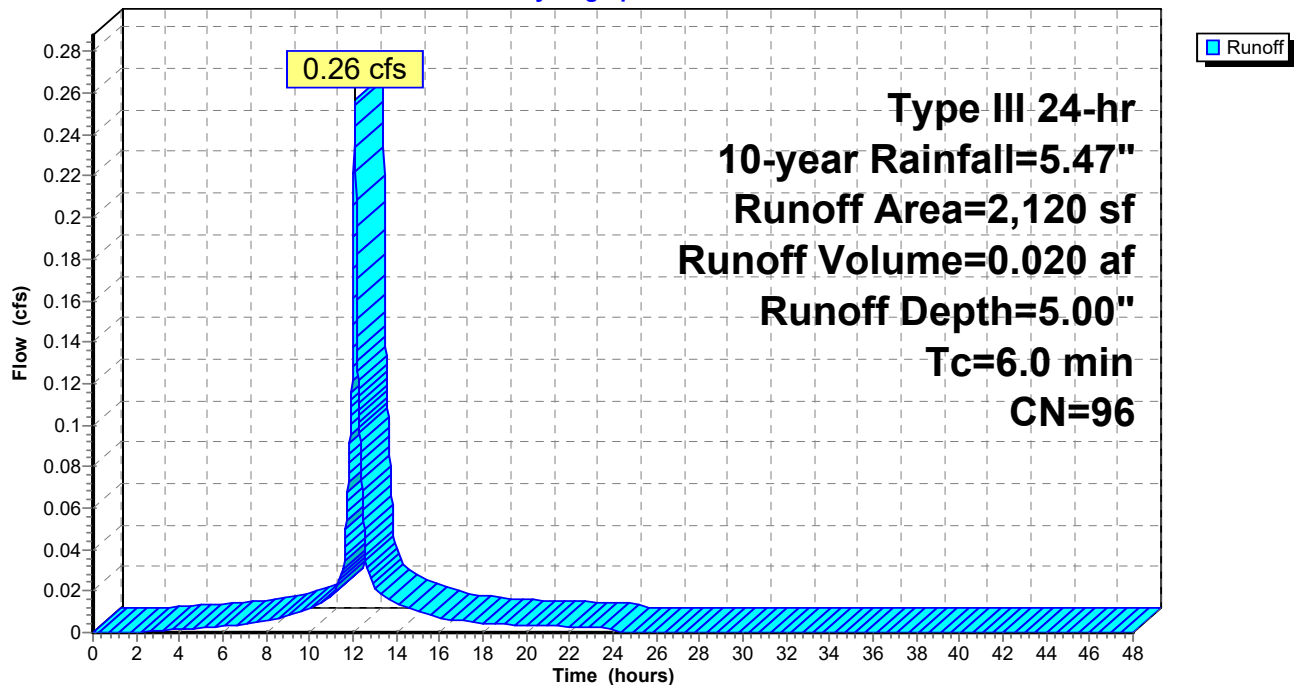Runoff     =        0.37 cfs @  12.09 hrs,  Volume=        0.027 af,  Depth=  4.12"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-48.00 hrs, dt= 0.01 hrs
Type III 24-hr  10-year Rainfall=5.47"

| Area (sf) | CN | Description |
|---|---|---|
| 245 | 98 | Paved parking, HSG D |
| 1,051 | 98 | Paved parking, HSG C |
| 605 | 98 | Roofs, HSG C |
| 229 | 80 | >75% Grass cover, Good, HSG D |
| 1,268 | 74 | >75% Grass cover, Good, HSG C |
| 17 | 61 | >75% Grass cover, Good, HSG B |
| 3,415 | 88 | Weighted Average |
| 1,514 | | 44.33% Pervious Area |
| 1,901 | | 55.67% Impervious Area |

| Tc (min) | Length (feet) | Slope (ft/ft) | Velocity (ft/sec) | Capacity (cfs) | Description |
|---|---|---|---|---|---|
| 6.0 | | | | | **Direct Entry,** |

### Subcatchment 48S: Roadside

**Hydrograph**



Type III 24-hr
10-year Rainfall=5.47"
Runoff Area=3,415 sf
Runoff Volume=0.027 af
Runoff Depth=4.12"
Tc=6.0 min
CN=88

## Summary for Subcatchment 49S: Driveway

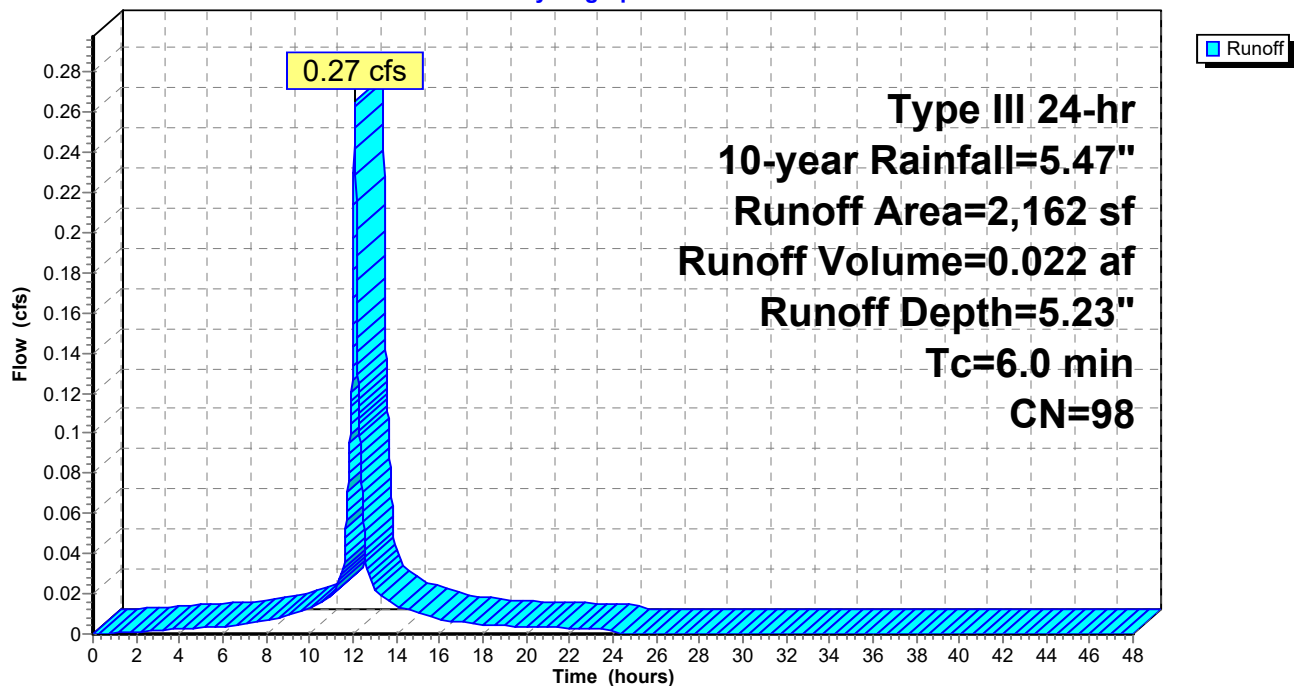Runoff      =       0.43 cfs @   12.08 hrs,  Volume=          0.033 af,  Depth=  4.66"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-48.00 hrs, dt= 0.01 hrs
Type III 24-hr  10-year Rainfall=5.47"

| Area (sf) | CN | Description |
|---|---|---|
| 700 | 98 | Paved parking, HSG D |
| 1,047 | 98 | Paved parking, HSG C |
| 1,317 | 98 | Paved parking, HSG B |
| 4 | 80 | >75% Grass cover, Good, HSG D |
| 174 | 74 | >75% Grass cover, Good, HSG C |
| 410 | 61 | >75% Grass cover, Good, HSG B |
| 3,652 | 93 | Weighted Average |
| 588 | | 16.10% Pervious Area |
| 3,064 | | 83.90% Impervious Area |

| Tc (min) | Length (feet) | Slope (ft/ft) | Velocity (ft/sec) | Capacity (cfs) | Description |
|---|---|---|---|---|---|
| 6.0 | | | | | **Direct Entry,** |

### Subcatchment 49S: Driveway

**Hydrograph**



Type III 24-hr
10-year Rainfall=5.47"
Runoff Area=3,652 sf
Runoff Volume=0.033 af
Runoff Depth=4.66"
Tc=6.0 min
CN=93

0.43 cfs

☐ Runoff

## Summary for Subcatchment 60S: Parking Lot

Runoff      =        1.07 cfs @   12.08 hrs,  Volume=        0.082 af,  Depth=  4.66"
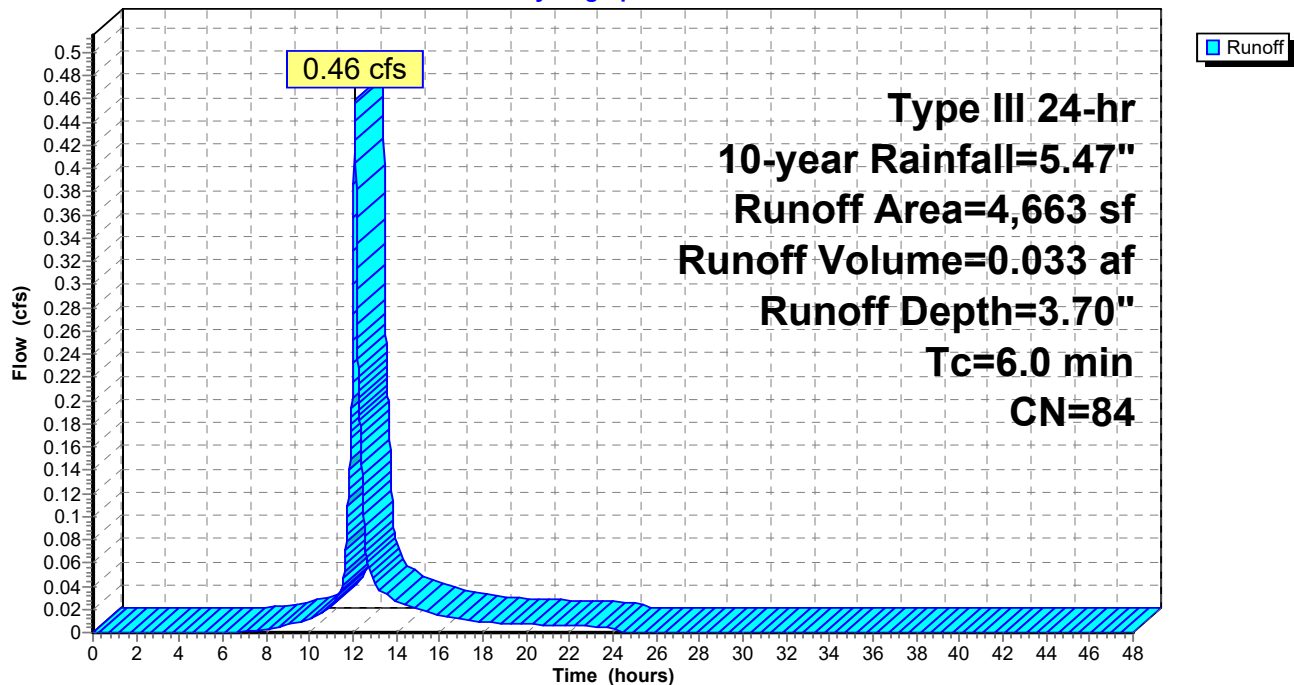
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-48.00 hrs, dt= 0.01 hrs
Type III 24-hr  10-year Rainfall=5.47"

| Area (sf) | CN | Description |
|---|---|---|
| 7,169 | 98 | Paved parking, HSG C |
| 1,516 | 74 | >75% Grass cover, Good, HSG C |
| 484 | 70 | Woods, Good, HSG C |
| 9,169 | 93 | Weighted Average |
| 2,000 | | 21.81% Pervious Area |
| 7,169 | | 78.19% Impervious Area |

| Tc (min) | Length (feet) | Slope (ft/ft) | Velocity (ft/sec) | Capacity (cfs) | Description |
|---|---|---|---|---|---|
| 0.4 | 24 | 0.0200 | 1.10 | | **Sheet Flow,** Smooth surfaces   n= 0.011   P2= 3.61" |
| 0.8 | 92 | 0.0100 | 2.03 | | **Shallow Concentrated Flow,** Paved   Kv= 20.3 fps |
| 1.2 | 116 | | Total,  Increased to minimum Tc = 6.0 min | | |

## Subcatchment 60S: Parking Lot

**Hydrograph**



Type III 24-hr
10-year Rainfall=5.47"
Runoff Area=9,169 sf
Runoff Volume=0.082 af
Runoff Depth=4.66"
Flow Length=116'
Tc=6.0 min
CN=93

## Summary for Subcatchment 61S: Parking Lot

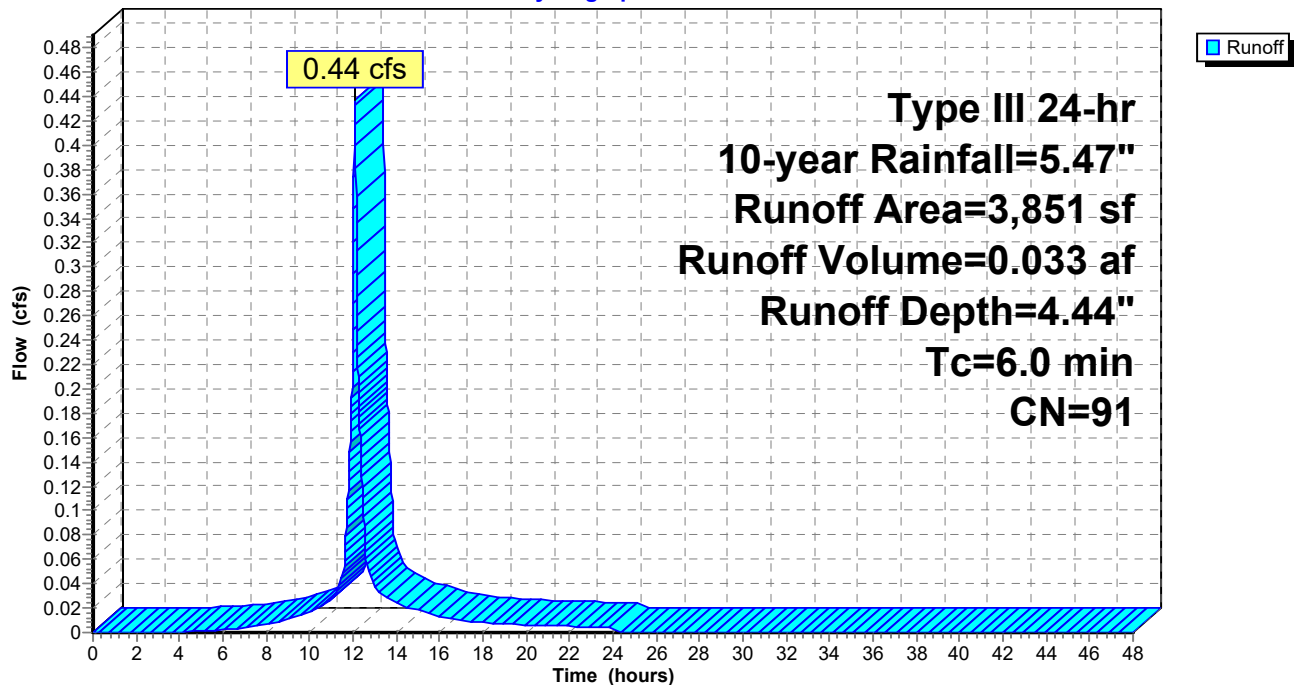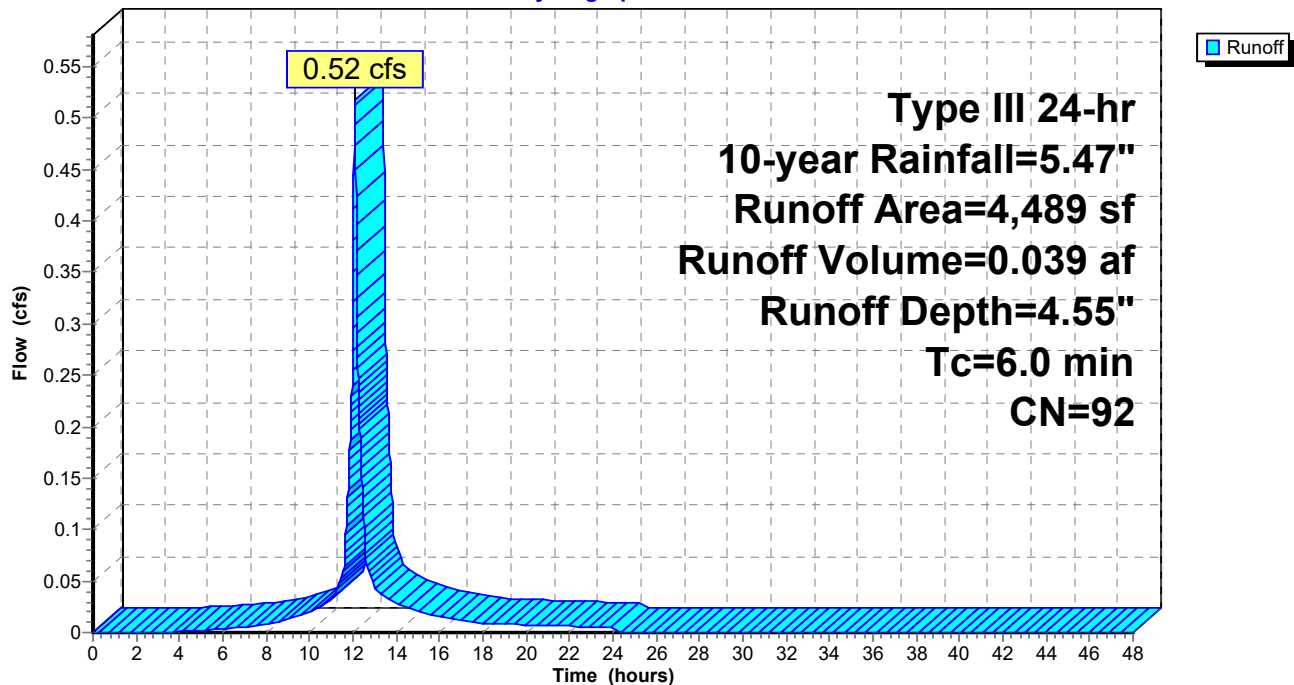Runoff      =        0.86 cfs @   12.08 hrs,  Volume=        0.068 af,  Depth=  5.00"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-48.00 hrs, dt= 0.01 hrs
Type III 24-hr  10-year Rainfall=5.47"

| Area (sf) | CN | Description |
|---:|---:|---|
| 4,574 | 98 | Paved parking, HSG C |
| 1,927 | 98 | Paved parking, HSG B |
| 335 | 74 | >75% Grass cover, Good, HSG C |
| 232 | 61 | >75% Grass cover, Good, HSG B |
| 7,068 | 96 | Weighted Average |
| 567 | | 8.02% Pervious Area |
| 6,501 | | 91.98% Impervious Area |

| Tc (min) | Length (feet) | Slope (ft/ft) | Velocity (ft/sec) | Capacity (cfs) | Description |
|---:|---:|---:|---:|---:|---|
| 0.4 | 24 | 0.0200 | 1.10 | | **Sheet Flow,** |
| | | | | | Smooth surfaces   n= 0.011   P2= 3.61" |
| 0.7 | 87 | 0.0100 | 2.03 | | **Shallow Concentrated Flow,** |
| | | | | | Paved   Kv= 20.3 fps |
| 1.1 | 111 | | | | Total,  Increased to minimum Tc = 6.0 min |

### Subcatchment 61S: Parking Lot



**Hydrograph**

Type III 24-hr
10-year Rainfall=5.47"
Runoff Area=7,068 sf
Runoff Volume=0.068 af
Runoff Depth=5.00"
Flow Length=111'
Tc=6.0 min
CN=96

## Summary for Subcatchment 63S: Building

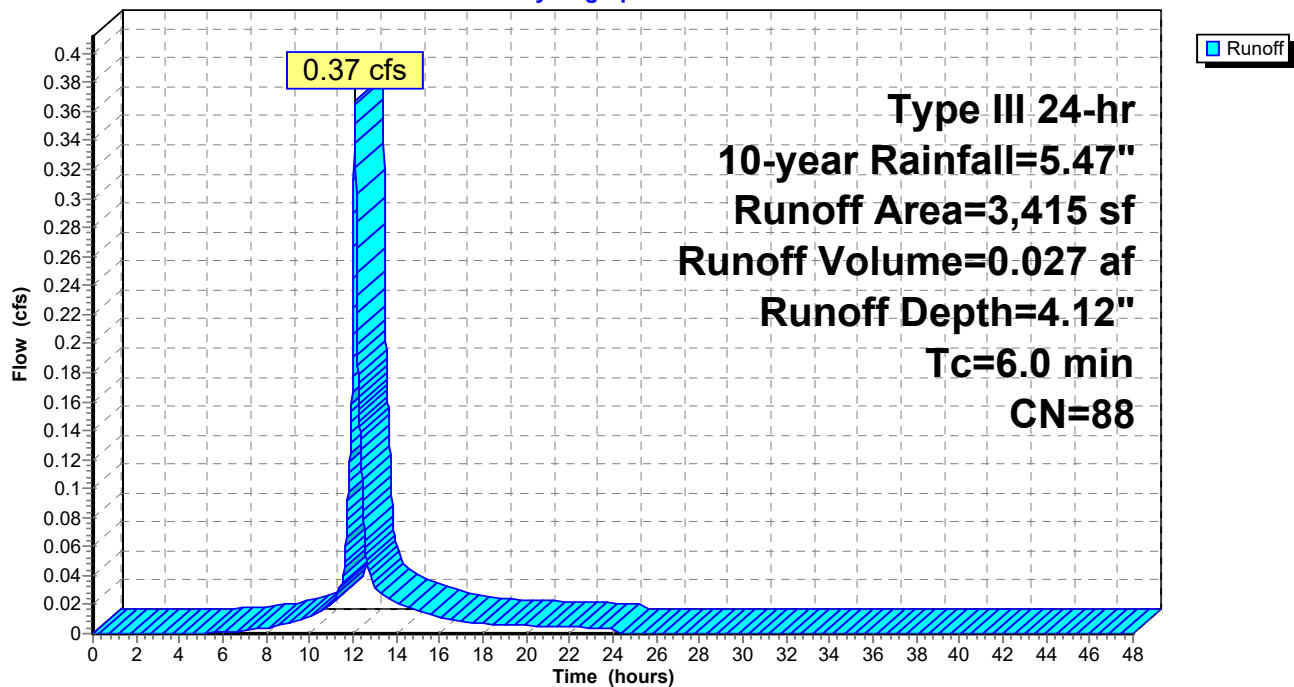Runoff      =        0.16 cfs @  12.08 hrs,  Volume=        0.012 af,  Depth=  4.33"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-48.00 hrs, dt= 0.01 hrs
Type III 24-hr  10-year Rainfall=5.47"

| Area (sf) | CN | Description |
|---|---|---|
| 956 | 98 | Roofs, HSG C |
| 503 | 74 | >75% Grass cover, Good, HSG C |
| 1,459 | 90 | Weighted Average |
| 503 | | 34.48% Pervious Area |
| 956 | | 65.52% Impervious Area |

| Tc (min) | Length (feet) | Slope (ft/ft) | Velocity (ft/sec) | Capacity (cfs) | Description |
|---|---|---|---|---|---|
| 6.0 | | | | | **Direct Entry,** |

### Subcatchment 63S: Building

**Hydrograph**



Type III 24-hr
10-year Rainfall=5.47"
Runoff Area=1,459 sf
Runoff Volume=0.012 af
Runoff Depth=4.33"
Tc=6.0 min
CN=90

0.16 cfs

## Summary for Subcatchment 64S: Building

Runoff      =        0.18 cfs @   12.08 hrs,  Volume=          0.014 af,  Depth=  4.77"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-48.00 hrs, dt= 0.01 hrs
Type III 24-hr  10-year Rainfall=5.47"

| Area (sf) | CN | Description |
|---|---|---|
| 1,224 | 98 | Roofs, HSG C |
| 282 | 74 | >75% Grass cover, Good, HSG C |
| 1,506 | 94 | Weighted Average |
| 282 | | 18.73% Pervious Area |
| 1,224 | | 81.27% Impervious Area |

| Tc (min) | Length (feet) | Slope (ft/ft) | Velocity (ft/sec) | Capacity (cfs) | Description |
|---|---|---|---|---|---|
| 6.0 | | | | | **Direct Entry,** |

### Subcatchment 64S: Building

**Hydrograph**



Type III 24-hr
10-year Rainfall=5.47"
Runoff Area=1,506 sf
Runoff Volume=0.014 af
Runoff Depth=4.77"
Tc=6.0 min
CN=94

0.18 cfs

## Summary for Subcatchment 65S: Building

Runoff      =        0.12 cfs @  12.08 hrs,  Volume=          0.009 af,  Depth=  4.66"
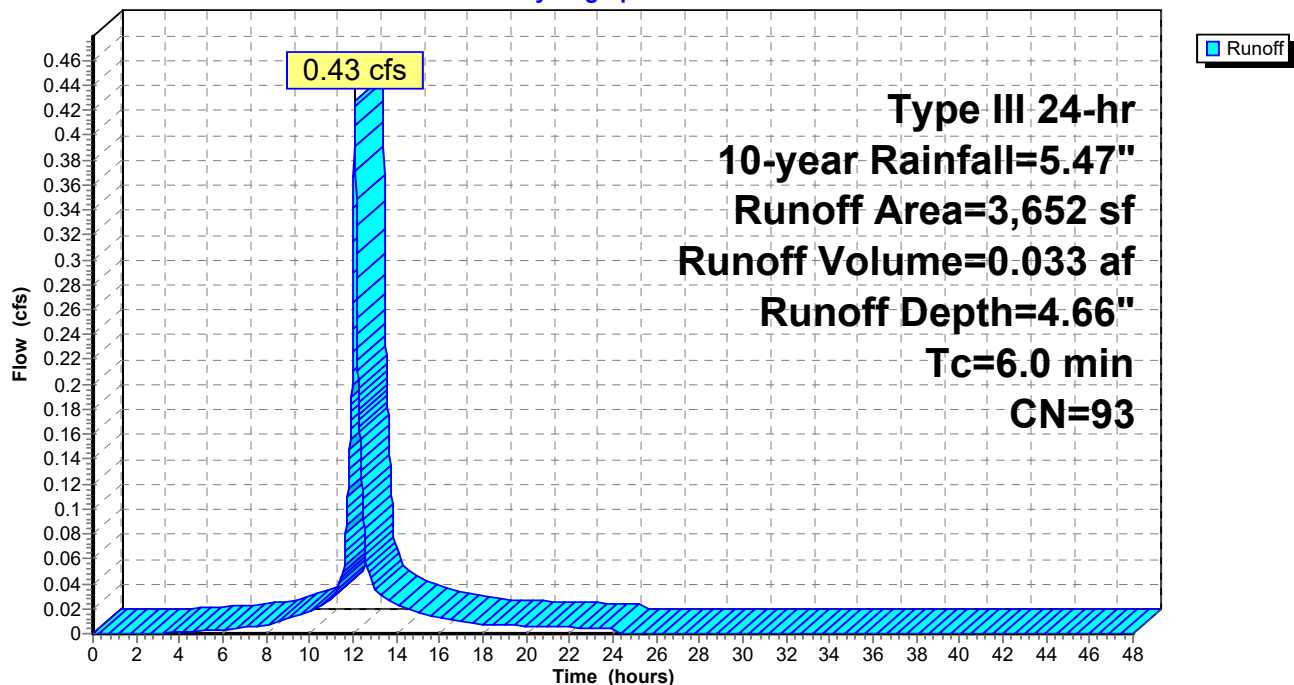
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-48.00 hrs, dt= 0.01 hrs
Type III 24-hr  10-year Rainfall=5.47"

| Area (sf) | CN | Description |
|---|---|---|
| 794 | 98 | Roofs, HSG C |
| 188 | 74 | >75% Grass cover, Good, HSG C |
| 982 | 93 | Weighted Average |
| 188 | | 19.14% Pervious Area |
| 794 | | 80.86% Impervious Area |

| Tc (min) | Length (feet) | Slope (ft/ft) | Velocity (ft/sec) | Capacity (cfs) | Description |
|---|---|---|---|---|---|
| 6.0 | | | | | **Direct Entry,** |

### Subcatchment 65S: Building

**Hydrograph**

## Summary for Subcatchment 66S: Building
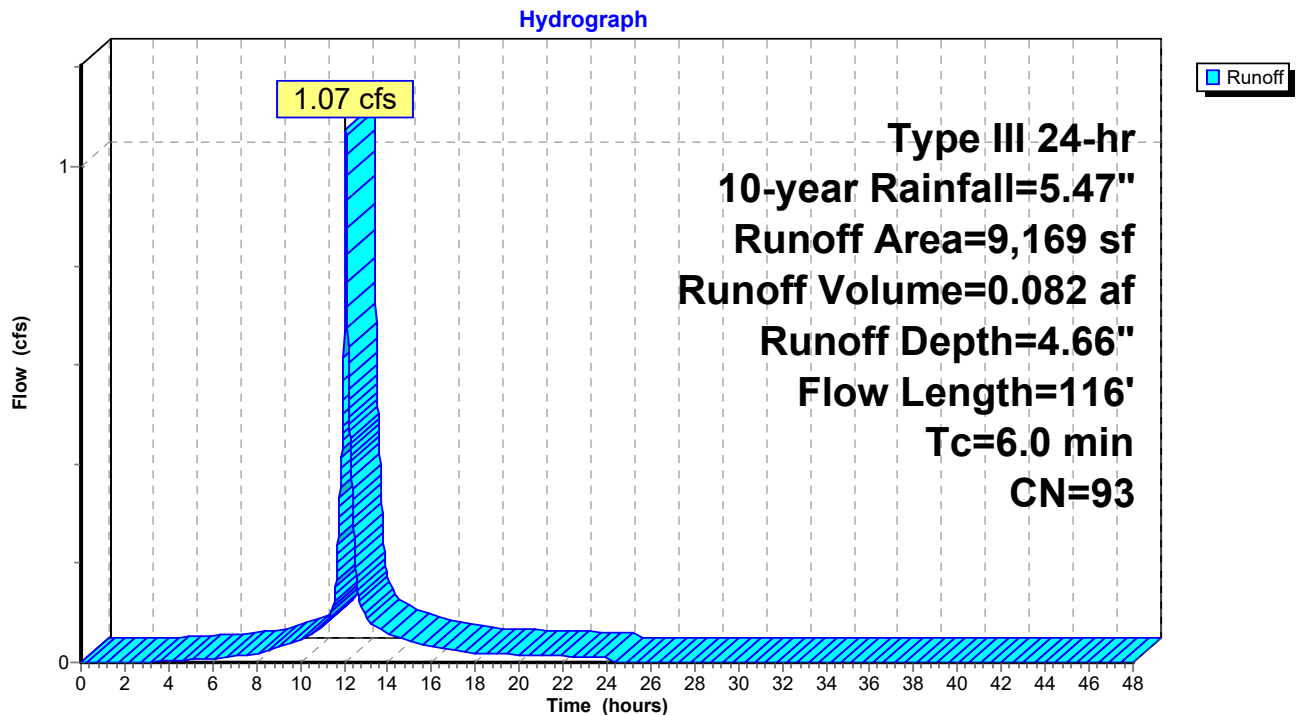
Runoff      =       0.14 cfs @   12.09 hrs,  Volume=        0.010 af,  Depth=  3.50"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-48.00 hrs, dt= 0.01 hrs
Type III 24-hr  10-year Rainfall=5.47"

| Area (sf) | CN | Description |
|---|---|---|
| 25 | 98 | Paved parking, HSG C |
| 161 | 98 | Roofs, HSG C |
| 476 | 98 | Roofs, HSG B |
| 486 | 74 | >75% Grass cover, Good, HSG C |
| 330 | 61 | >75% Grass cover, Good, HSG B |
| 1,478 | 82 | Weighted Average |
| 816 | | 55.21% Pervious Area |
| 662 | | 44.79% Impervious Area |

| Tc (min) | Length (feet) | Slope (ft/ft) | Velocity (ft/sec) | Capacity (cfs) | Description |
|---|---|---|---|---|---|
| 6.0 | | | | | **Direct Entry,** |

### Subcatchment 66S: Building

**Hydrograph**



Type III 24-hr
10-year Rainfall=5.47"
Runoff Area=1,478 sf
Runoff Volume=0.010 af
Runoff Depth=3.50"
Tc=6.0 min
CN=82

## Summary for Subcatchment 67S: Landscape

Runoff    =    0.07 cfs @   12.09 hrs,  Volume=    0.005 af,  Depth=  1.89"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-48.00 hrs, dt= 0.01 hrs
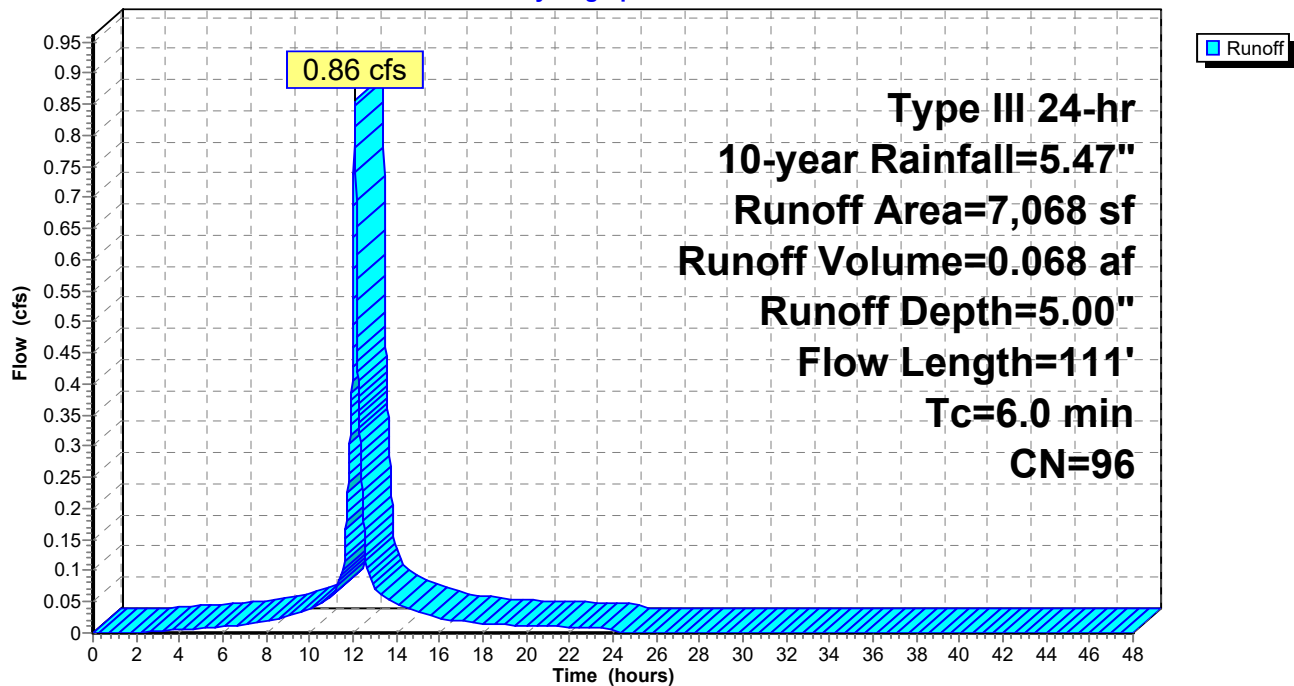Type III 24-hr  10-year Rainfall=5.47"

| Area (sf) | CN | Description |
|---|---|---|
| 156 | 98 | Paved parking, HSG B |
| 1,168 | 61 | >75% Grass cover, Good, HSG B |
| 187 | 55 | Woods, Good, HSG B |
| 1,511 | 64 | Weighted Average |
| 1,355 | | 89.68% Pervious Area |
| 156 | | 10.32% Impervious Area |

| Tc (min) | Length (feet) | Slope (ft/ft) | Velocity (ft/sec) | Capacity (cfs) | Description |
|---|---|---|---|---|---|
| 6.0 | | | | | **Direct Entry,** |

### Subcatchment 67S: Landscape

**Hydrograph**



Type III 24-hr
10-year Rainfall=5.47"
Runoff Area=1,511 sf
Runoff Volume=0.005 af
Runoff Depth=1.89"
Tc=6.0 min
CN=64

## Summary for Subcatchment 68S: Building

Runoff     =       0.17 cfs @   12.08 hrs,  Volume=         0.014 af,  Depth=  5.23"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-48.00 hrs, dt= 0.01 hrs
Type III 24-hr  10-year Rainfall=5.47"

| Area (sf) | CN | Description |
|---|---|---|
| 424 | 98 | Roofs, HSG C |
| 946 | 98 | Roofs, HSG B |
| 1,370 | 98 | Weighted Average |
| 1,370 | | 100.00% Impervious Area |

| Tc (min) | Length (feet) | Slope (ft/ft) | Velocity (ft/sec) | Capacity (cfs) | Description |
|---|---|---|---|---|---|
| 6.0 | | | | | **Direct Entry,** |

### Subcatchment 68S: Building

## Summary for Subcatchment 69S: To Pond

Runoff      =      0.78 cfs @   12.09 hrs,  Volume=      0.056 af,  Depth=  2.31"
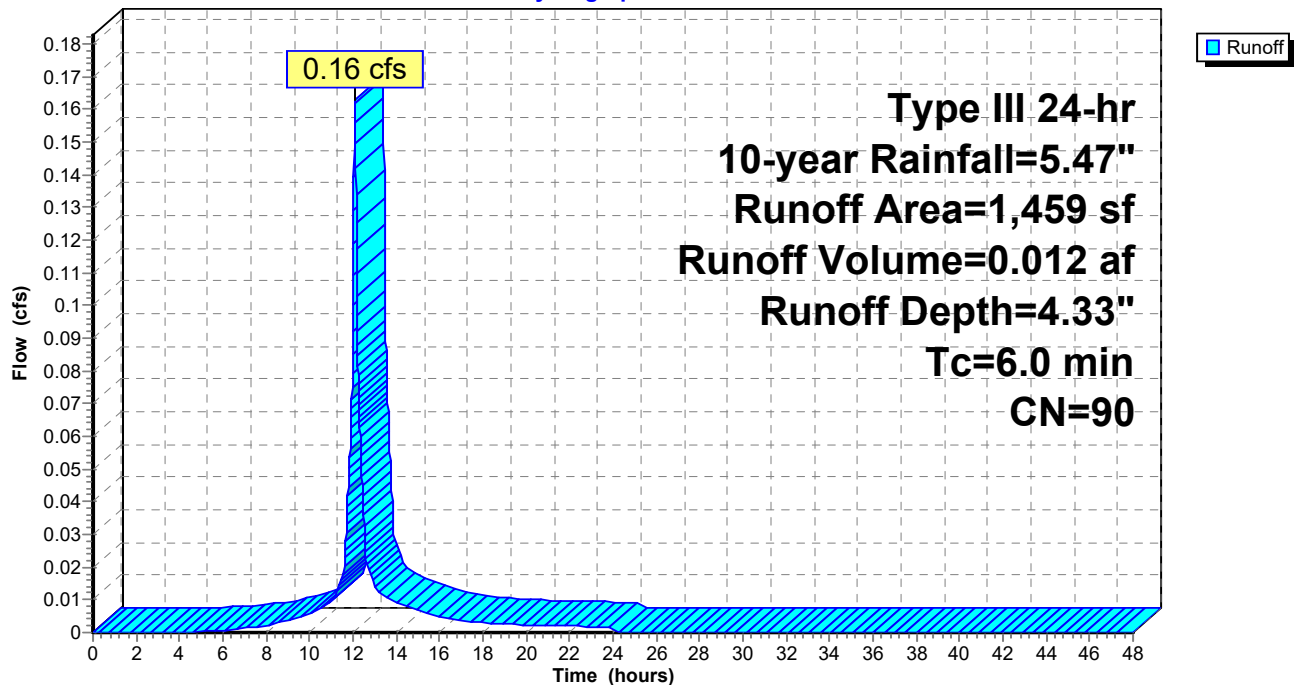
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-48.00 hrs, dt= 0.01 hrs
Type III 24-hr  10-year Rainfall=5.47"

| Area (sf) | CN | Description |
|---|---|---|
| 7,562 | 74 | >75% Grass cover, Good, HSG C |
| 5,232 | 61 | >75% Grass cover, Good, HSG B |
| 12,794 | 69 | Weighted Average |
| 12,794 | | 100.00% Pervious Area |

| Tc (min) | Length (feet) | Slope (ft/ft) | Velocity (ft/sec) | Capacity (cfs) | Description |
|---|---|---|---|---|---|
| 6.0 | | | | | **Direct Entry,** |

### Subcatchment 69S: To Pond

**Hydrograph**
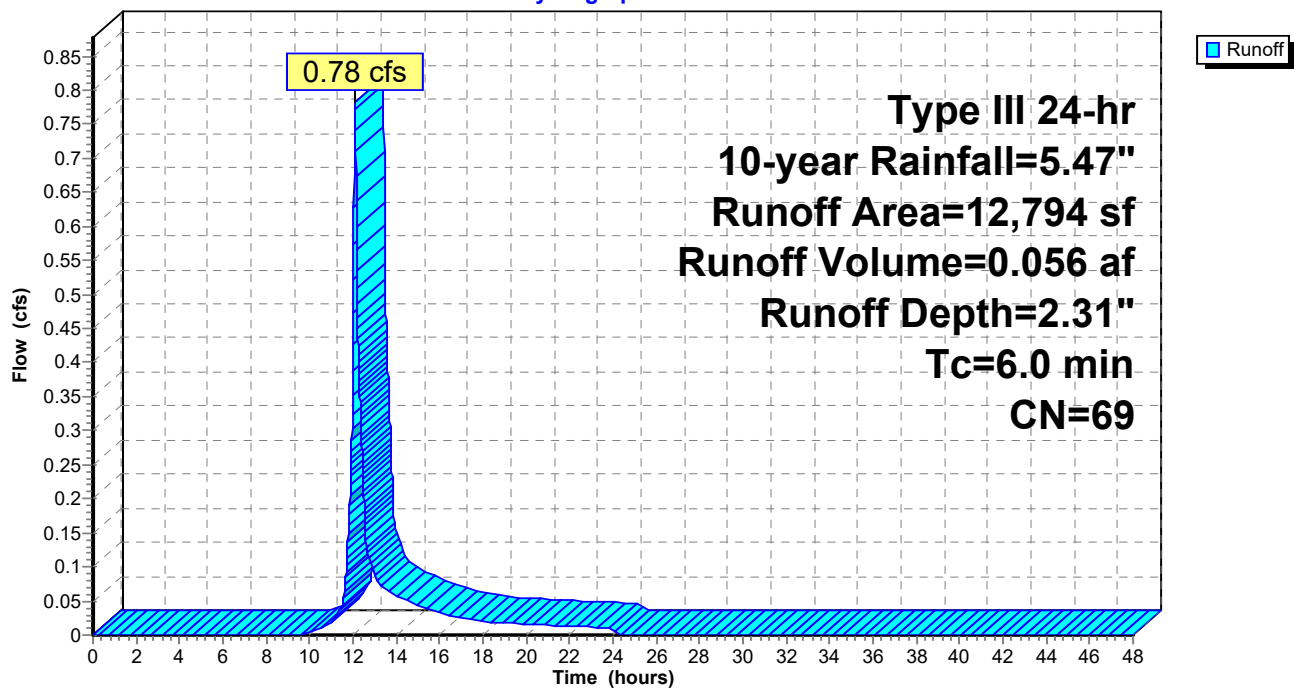


Type III 24-hr
10-year Rainfall=5.47"
Runoff Area=12,794 sf
Runoff Volume=0.056 af
Runoff Depth=2.31"
Tc=6.0 min
CN=69

## Summary for Subcatchment 70S: Building

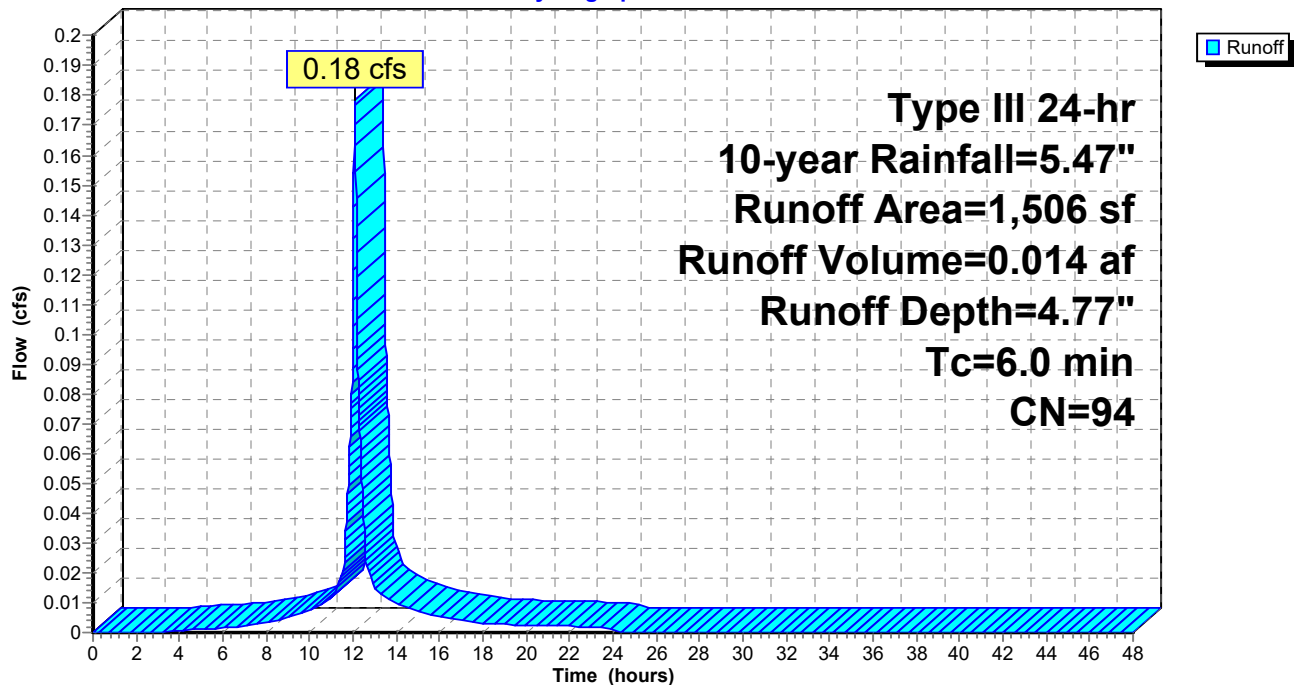Runoff      =        0.85 cfs @  12.08 hrs,  Volume=          0.069 af,  Depth=  5.23"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-48.00 hrs, dt= 0.01 hrs
Type III 24-hr  10-year Rainfall=5.47"

| Area (sf) | CN | Description |
|---|---|---|
| 6,802 | 98 | Roofs, HSG C |
| 103 | 98 | Roofs, HSG B |
| 6,905 | 98 | Weighted Average |
| 6,905 | | 100.00% Impervious Area |

| Tc (min) | Length (feet) | Slope (ft/ft) | Velocity (ft/sec) | Capacity (cfs) | Description |
|---|---|---|---|---|---|
| 6.0 | | | | | **Direct Entry,** |

### Subcatchment 70S: Building

**Hydrograph**
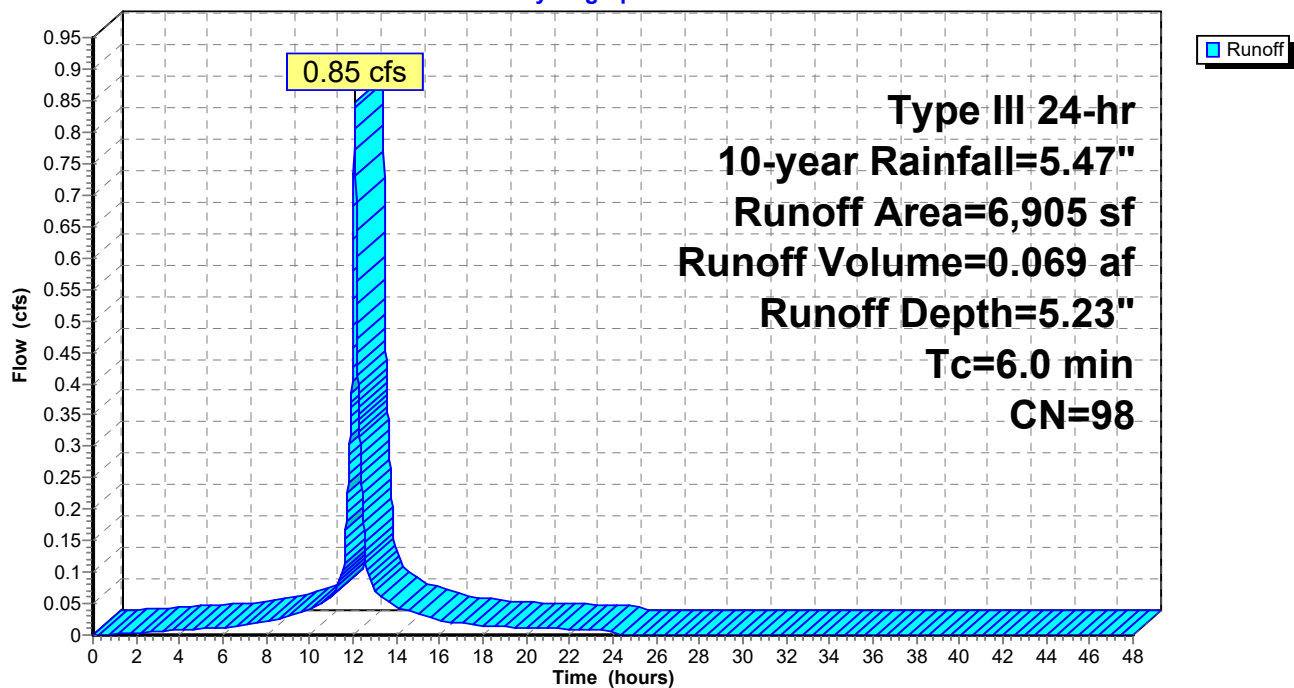


Type III 24-hr
10-year Rainfall=5.47"
Runoff Area=6,905 sf
Runoff Volume=0.069 af
Runoff Depth=5.23"
Tc=6.0 min
CN=98

## Summary for Subcatchment 80S: Building

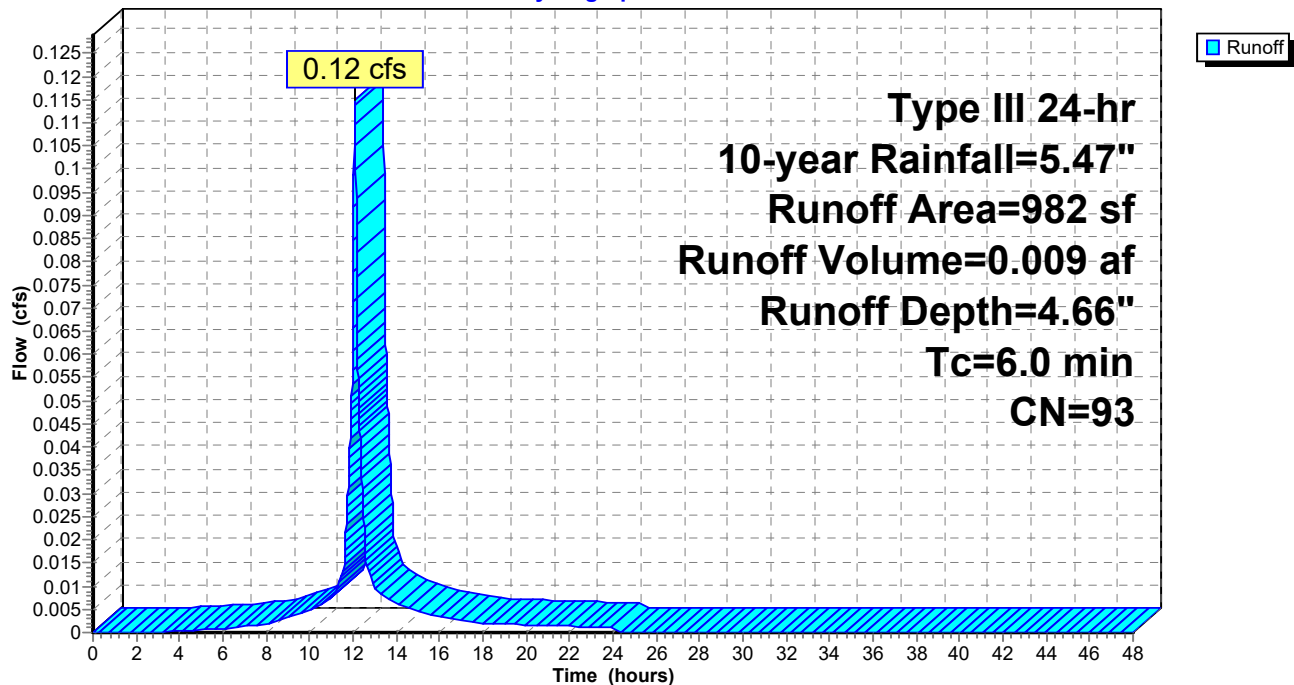Runoff      =         0.24 cfs @  12.08 hrs,  Volume=         0.018 af,  Depth=  4.77"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-48.00 hrs, dt= 0.01 hrs
Type III 24-hr  10-year Rainfall=5.47"

| Area (sf) | CN | Description |
|---:|---:|---|
| 1,200 | 98 | Roofs, HSG C |
| 476 | 98 | Paved parking, HSG C |
| 306 | 74 | >75% Grass cover, Good, HSG C |
| 1,982 | 94 | Weighted Average |
| 306 | | 15.44% Pervious Area |
| 1,676 | | 84.56% Impervious Area |

| Tc (min) | Length (feet) | Slope (ft/ft) | Velocity (ft/sec) | Capacity (cfs) | Description |
|---:|---:|---:|---:|---:|---|
| 6.0 | | | | | **Direct Entry,** |

### Subcatchment 80S: Building

**Hydrograph**



0.24 cfs

Type III 24-hr
10-year Rainfall=5.47"
Runoff Area=1,982 sf
Runoff Volume=0.018 af
Runoff Depth=4.77"
Tc=6.0 min
CN=94

## Summary for Subcatchment 81S: Building

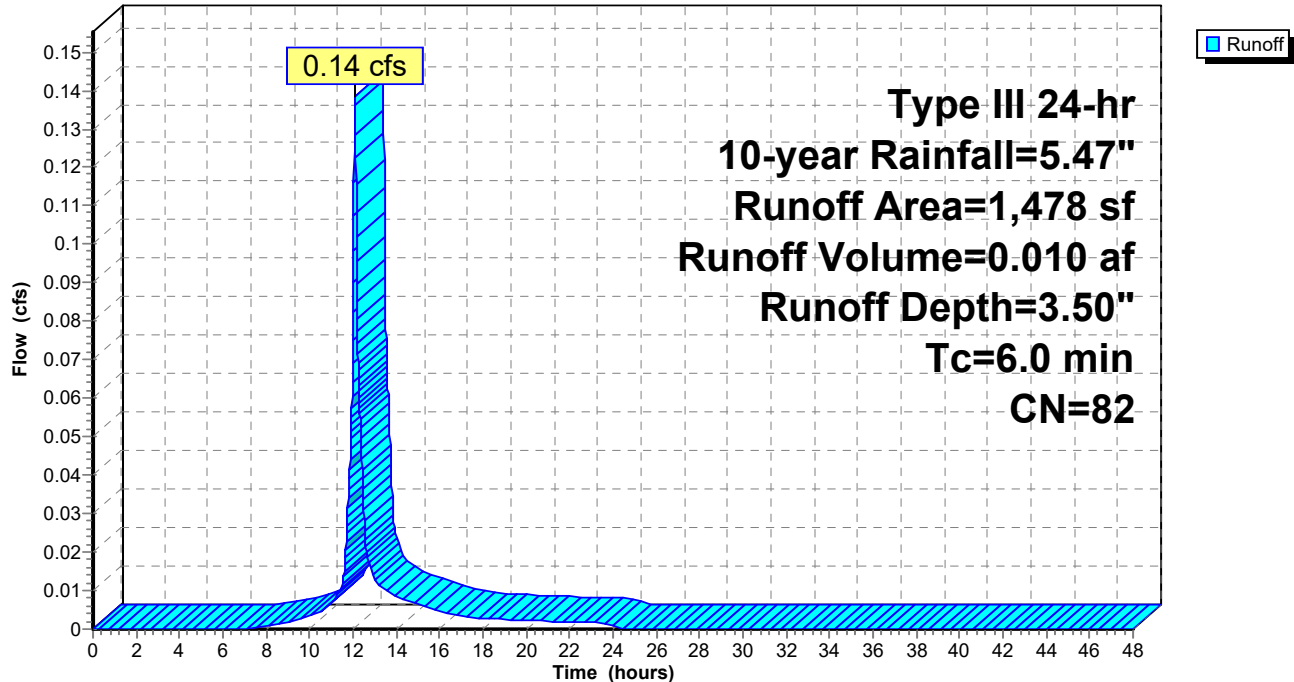Runoff     =       0.15 cfs @  12.08 hrs,  Volume=          0.012 af,  Depth=  5.23"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-48.00 hrs, dt= 0.01 hrs
Type III 24-hr  10-year Rainfall=5.47"

| Area (sf) | CN | Description |
|---|---|---|
| 1,200 | 98 | Roofs, HSG C |
| 1,200 | | 100.00% Impervious Area |

| Tc (min) | Length (feet) | Slope (ft/ft) | Velocity (ft/sec) | Capacity (cfs) | Description |
|---|---|---|---|---|---|
| 6.0 | | | | | **Direct Entry,** |

### Subcatchment 81S: Building



Hydrograph
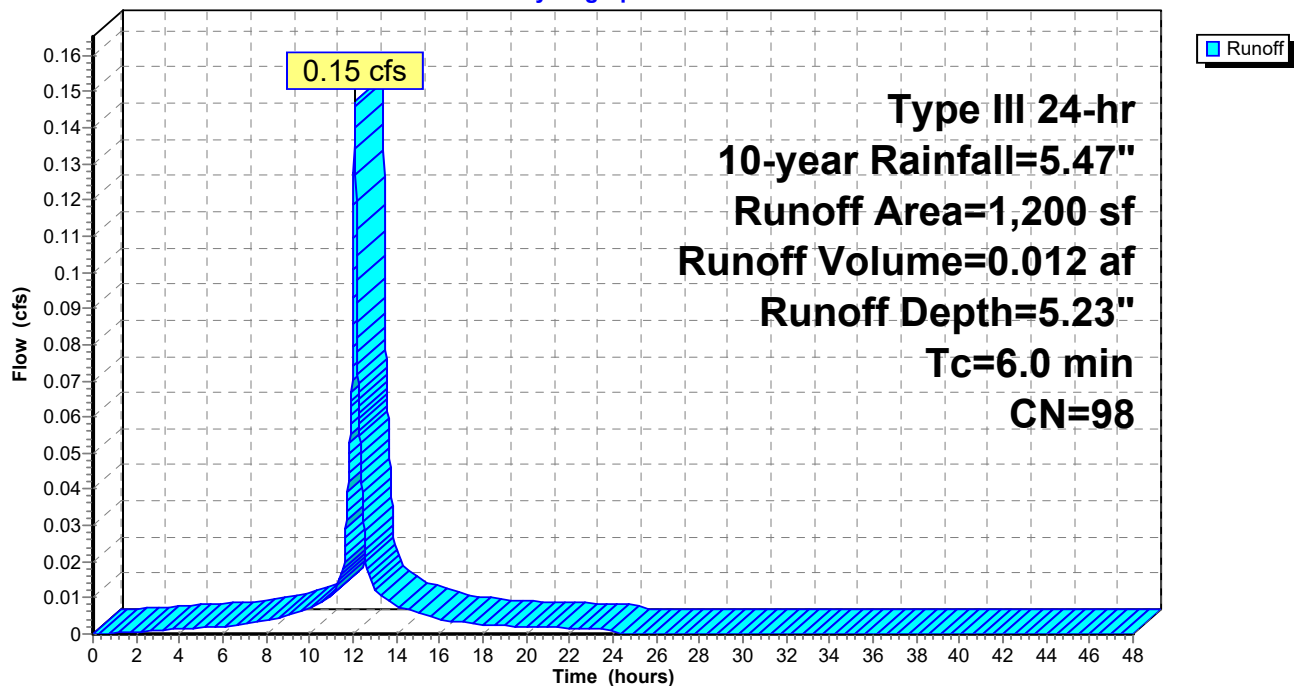
Type III 24-hr
10-year Rainfall=5.47"
Runoff Area=1,200 sf
Runoff Volume=0.012 af
Runoff Depth=5.23"
Tc=6.0 min
CN=98

## Summary for Subcatchment 82S: Parking Lot

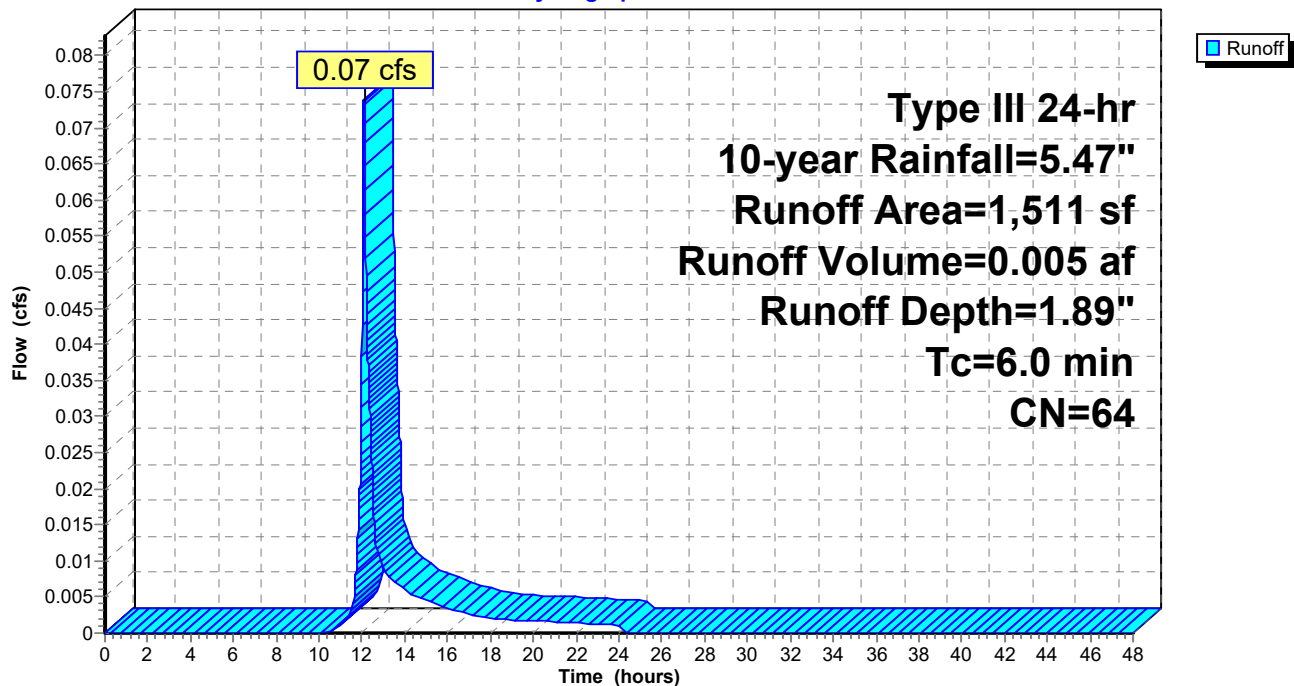Runoff     =      1.06 cfs @  12.08 hrs,  Volume=        0.082 af,  Depth= 4.89"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-48.00 hrs, dt= 0.01 hrs
Type III 24-hr  10-year Rainfall=5.47"

| Area (sf) | CN | Description |
|---|---|---|
| 7,436 | 98 | Paved parking, HSG C |
| 460 | 98 | Paved parking, HSG B |
| 303 | 74 | >75% Grass cover, Good, HSG C |
| 620 | 61 | >75% Grass cover, Good, HSG B |
| 8,819 | 95 | Weighted Average |
| 923 | | 10.47% Pervious Area |
| 7,896 | | 89.53% Impervious Area |

| Tc (min) | Length (feet) | Slope (ft/ft) | Velocity (ft/sec) | Capacity (cfs) | Description |
|---|---|---|---|---|---|
| 2.2 | 29 | 0.0631 | 0.22 | | **Sheet Flow,**<br>Grass: Short   n= 0.150   P2= 3.61" |
| 0.4 | 95 | 0.0400 | 4.06 | | **Shallow Concentrated Flow,**<br>Paved   Kv= 20.3 fps |
| 0.7 | 90 | 0.0100 | 2.03 | | **Shallow Concentrated Flow,**<br>Paved   Kv= 20.3 fps |
| 3.3 | 214 | | | | Total,  Increased to minimum Tc = 6.0 min |

### Subcatchment 82S: Parking Lot
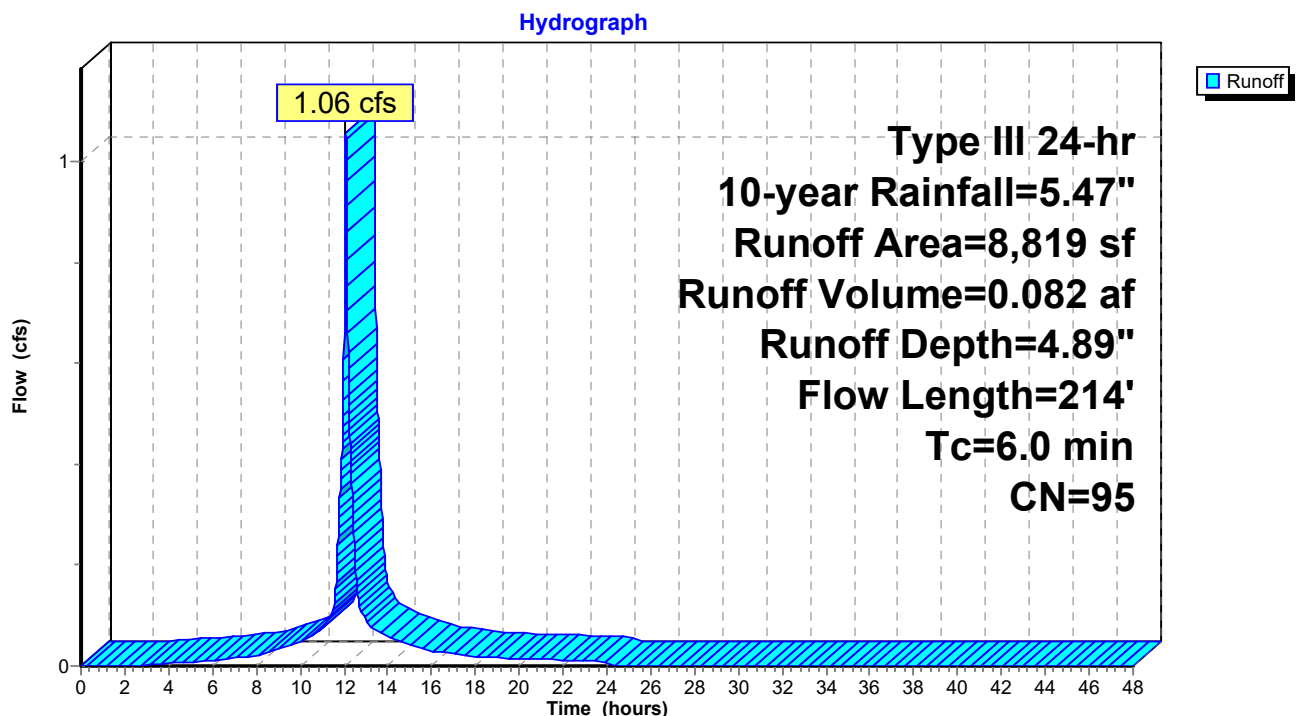
**Hydrograph**



Type III 24-hr
10-year Rainfall=5.47"
Runoff Area=8,819 sf
Runoff Volume=0.082 af
Runoff Depth=4.89"
Flow Length=214'
Tc=6.0 min
CN=95

## Summary for Subcatchment 83S: To Pond

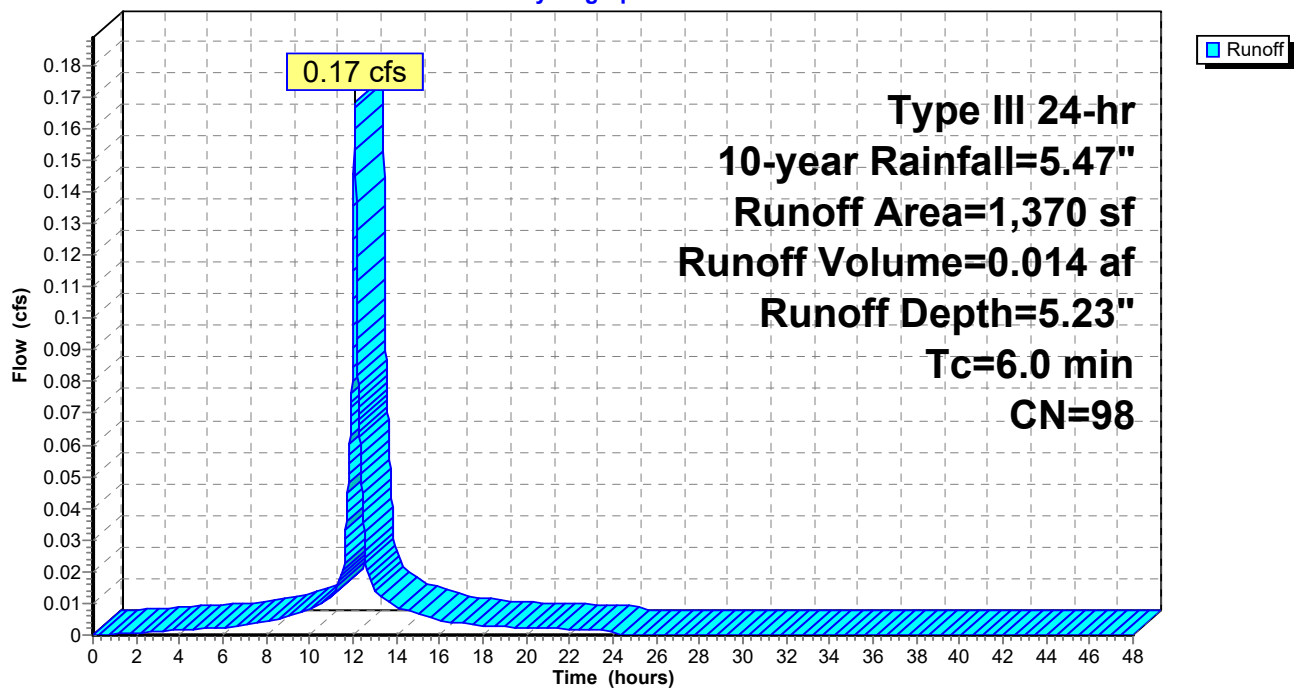Runoff      =        0.18 cfs @   12.09 hrs,  Volume=          0.013 af,  Depth=  2.74"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-48.00 hrs, dt= 0.01 hrs
Type III 24-hr  10-year Rainfall=5.47"

| Area (sf) | CN | Description |
|---|---|---|
| 2,507 | 74 | >75% Grass cover, Good, HSG C |
| 2,507 | | 100.00% Pervious Area |

| Tc (min) | Length (feet) | Slope (ft/ft) | Velocity (ft/sec) | Capacity (cfs) | Description |
|---|---|---|---|---|---|
| 6.0 | | | | | **Direct Entry,** |

## Subcatchment 83S: To Pond

**Hydrograph**



0.18 cfs

Type III 24-hr
10-year Rainfall=5.47"
Runoff Area=2,507 sf
Runoff Volume=0.013 af
Runoff Depth=2.74"
Tc=6.0 min
CN=74

☐ Runoff

## Summary for Reach 2.1R: Wetland Flow Path

Inflow Area =         6.525 ac,   6.78% Impervious,  Inflow Depth =  2.57"   for  10-year event
Inflow     =        18.63 cfs @   12.05 hrs,  Volume=              1.395 af
Outflow    =        16.73 cfs @   12.09 hrs,  Volume=              1.395 af,  Atten= 10%,  Lag= 2.1 min

Routing by Dyn-Stor-Ind method, Time Span= 0.00-48.00 hrs, dt= 0.01 hrs
Max. Velocity= 2.53 fps,  Min. Travel Time= 2.3 min
Avg. Velocity = 0.72 fps,  Avg. Travel Time= 7.9 min

Peak Storage= 2,278 cf @ 12.09 hrs
Average Depth at Peak Storage= 1.19'
Bank-Full Depth= 2.00'  Flow Area= 16.0 sf,  Capacity= 54.59 cfs

2.00'  x  2.00'  deep channel,  n= 0.040  Winding stream, pools & shoals
Side Slope Z-value= 3.0 '/'   Top Width= 14.00'
Length= 344.0'   Slope= 0.0075 '/'
Inlet Invert= 52.58',  Outlet Invert= 50.00'



### Reach 2.1R: Wetland Flow Path



Inflow Area=6.525 ac
Avg. Flow Depth=1.19'
Max Vel=2.53 fps
n=0.040
L=344.0'
S=0.0075 '/'
Capacity=54.59 cfs

## Summary for Reach 2.2R: Wetland Flow Path

Inflow Area =      17.467 ac,  10.03% Impervious,  Inflow Depth >  2.69"   for  10-year event
Inflow      =      19.20 cfs @   12.50 hrs,  Volume=          3.919 af
Outflow     =      18.90 cfs @   12.48 hrs,  Volume=          3.919 af,  Atten= 2%,  Lag= 0.0 min

Routing by Dyn-Stor-Ind method, Time Span= 0.00-48.00 hrs, dt= 0.01 hrs
Max. Velocity= 5.27 fps,  Min. Travel Time= 0.8 min
Avg. Velocity = 1.34 fps,  Avg. Travel Time= 3.3 min

Peak Storage= 944 cf @ 12.48 hrs
Average Depth at Peak Storage= 0.81'
Bank-Full Depth= 2.00'  Flow Area= 16.0 sf,  Capacity= 141.18 cfs

2.00'  x  2.00'  deep channel,  n= 0.040  Winding stream, pools & shoals
Side Slope Z-value= 3.0 '/'   Top Width= 14.00'
Length= 263.0'   Slope= 0.0502 '/'
Inlet Invert= 46.52',  Outlet Invert= 33.33'

### Reach 2.2R: Wetland Flow Path

**Hydrograph**



Inflow Area=17.467 ac
Avg. Flow Depth=0.81'
Max Vel=5.27 fps
n=0.040
L=263.0'
S=0.0502 '/'
Capacity=141.18 cfs

## Summary for Reach 2R: Wetland Flow Path

Inflow Area =        6.525 ac,   6.78% Impervious,  Inflow Depth =   2.57"   for  10-year event
Inflow      =     18.70 cfs @   12.05 hrs,  Volume=            1.395 af
Outflow     =     18.63 cfs @   12.05 hrs,  Volume=            1.395 af,  Atten= 0%,  Lag= 0.4 min

Routing by Dyn-Stor-Ind method, Time Span= 0.00-48.00 hrs, dt= 0.01 hrs
Max. Velocity= 5.02 fps,  Min. Travel Time= 0.5 min
Avg. Velocity = 1.45 fps,  Avg. Travel Time= 1.7 min

Peak Storage= 560 cf @ 12.05 hrs
Average Depth at Peak Storage= 0.83'
Bank-Full Depth= 2.00'  Flow Area= 16.0 sf,  Capacity= 133.09 cfs

2.00'  x  2.00'  deep channel,  n= 0.040  Winding stream, pools & shoals
Side Slope Z-value= 3.0 '/'  Top Width= 14.00'
Length= 151.0'  Slope= 0.0446 '/'
Inlet Invert= 59.31',  Outlet Invert= 52.58'



## Reach 2R: Wetland Flow Path

**Hydrograph**



Inflow Area=6.525 ac
Avg. Flow Depth=0.83'
Max Vel=5.02 fps
n=0.040
L=151.0'
S=0.0446 '/'
Capacity=133.09 cfs

## Summary for Reach 10R: Swale

Inflow Area =          0.230 ac,  42.35% Impervious,  Inflow Depth >  3.73"   for  10-year event
Inflow      =       0.30 cfs @   12.42 hrs,  Volume=            0.072 af
Outflow     =       0.30 cfs @   12.43 hrs,  Volume=            0.072 af,  Atten= 0%,  Lag= 0.7 min

Routing by Dyn-Stor-Ind method, Time Span= 0.00-48.00 hrs, dt= 0.01 hrs
Max. Velocity= 0.64 fps,  Min. Travel Time= 1.1 min
Avg. Velocity = 0.20 fps,  Avg. Travel Time= 3.7 min

Peak Storage= 20 cf @ 12.43 hrs
Average Depth at Peak Storage= 0.11'
Bank-Full Depth= 1.00'  Flow Area= 7.0 sf,  Capacity= 16.22 cfs

4.00'  x  1.00'  deep channel,  n= 0.035  Earth, dense weeds
Side Slope Z-value= 3.0 '/'   Top Width= 10.00'
Length= 44.0'   Slope= 0.0050 '/'
Inlet Invert= 53.60',  Outlet Invert= 53.38'



‡

### Reach 10R: Swale



**Hydrograph**

Inflow Area=0.230 ac
Avg. Flow Depth=0.11'
Max Vel=0.64 fps
n=0.035
L=44.0'
S=0.0050 '/'
Capacity=16.22 cfs

## Summary for Reach 22R: Wetland Flow Path

Inflow Area =        0.362 ac, 74.85% Impervious, Inflow Depth >  4.56"   for  10-year event
Inflow      =      0.44 cfs @   12.46 hrs, Volume=            0.137 af
Outflow    =      0.44 cfs @   12.51 hrs, Volume=            0.137 af,  Atten= 0%,  Lag= 3.0 min

Routing by Dyn-Stor-Ind method, Time Span= 0.00-48.00 hrs, dt= 0.01 hrs
Max. Velocity= 0.80 fps,  Min. Travel Time= 4.4 min
Avg. Velocity = 0.44 fps,  Avg. Travel Time= 8.0 min

Peak Storage= 116 cf @ 12.51 hrs
Average Depth at Peak Storage= 0.05'
Bank-Full Depth= 2.00'  Flow Area= 60.0 sf,  Capacity= 392.58 cfs

10.00'  x  2.00'  deep channel,  n= 0.040  Winding stream, pools & shoals
Side Slope Z-value= 10.0 '/'   Top Width= 50.00'
Length= 211.0'   Slope= 0.0245 '/'
Inlet Invert= 55.16',  Outlet Invert= 50.00'

‡

### Reach 22R: Wetland Flow Path



Inflow Area=0.362 ac
Avg. Flow Depth=0.05'
Max Vel=0.80 fps
n=0.040
L=211.0'
S=0.0245 '/'
Capacity=392.58 cfs

## Summary for Reach 23R: Wetland Flow Path

Inflow Area =        6.886 ac,  10.36% Impervious,  Inflow Depth >  2.67"    for  10-year event
Inflow      =      17.02 cfs @   12.09 hrs,  Volume=              1.532 af
Outflow     =      16.92 cfs @   12.10 hrs,  Volume=              1.532 af,  Atten= 1%,  Lag= 0.5 min

Routing by Dyn-Stor-Ind method, Time Span= 0.00-48.00 hrs, dt= 0.01 hrs
Max. Velocity= 3.54 fps,  Min. Travel Time= 0.6 min
Avg. Velocity = 0.74 fps,  Avg. Travel Time= 2.9 min

Peak Storage= 625 cf @ 12.10 hrs
Average Depth at Peak Storage= 0.97'
Bank-Full Depth= 2.00'  Flow Area= 16.0 sf,  Capacity= 85.86 cfs

2.00'  x  2.00'  deep channel,  n= 0.040  Winding stream, pools & shoals
Side Slope Z-value= 3.0 '/'   Top Width= 14.00'
Length= 131.0'   Slope= 0.0185 '/'
Inlet Invert= 50.00',  Outlet Invert= 47.57'



### Reach 23R: Wetland Flow Path



**Hydrograph**

Inflow Area=6.886 ac
Avg. Flow Depth=0.97'
Max Vel=3.54 fps
n=0.040
L=131.0'
S=0.0185 '/'
Capacity=85.86 cfs
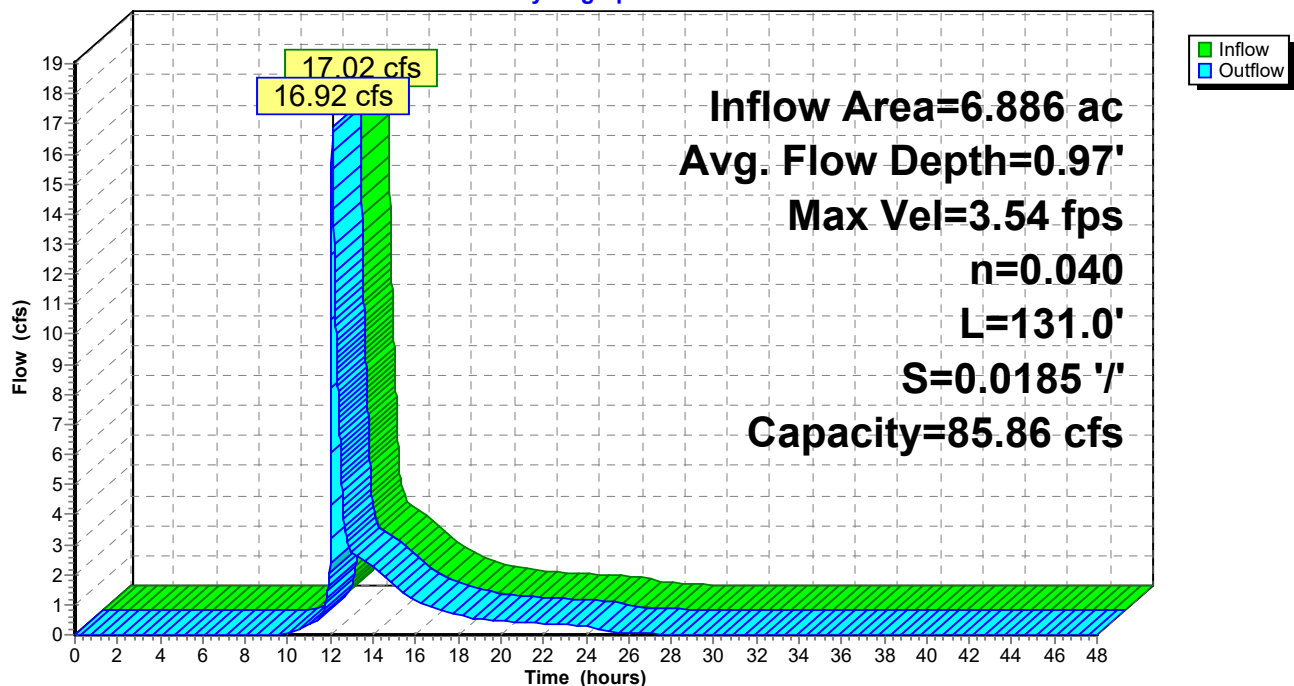
## Summary for Reach 69R: Swale

Inflow Area =        1.645 ac,  63.94% Impervious,  Inflow Depth >  4.03"   for  10-year event
Inflow      =      2.47 cfs @  12.38 hrs,  Volume=          0.552 af
Outflow     =      2.47 cfs @  12.38 hrs,  Volume=          0.552 af,  Atten= 0%,  Lag= 0.2 min

Routing by Dyn-Stor-Ind method, Time Span= 0.00-48.00 hrs, dt= 0.01 hrs
Max. Velocity= 1.21 fps,  Min. Travel Time= 0.2 min
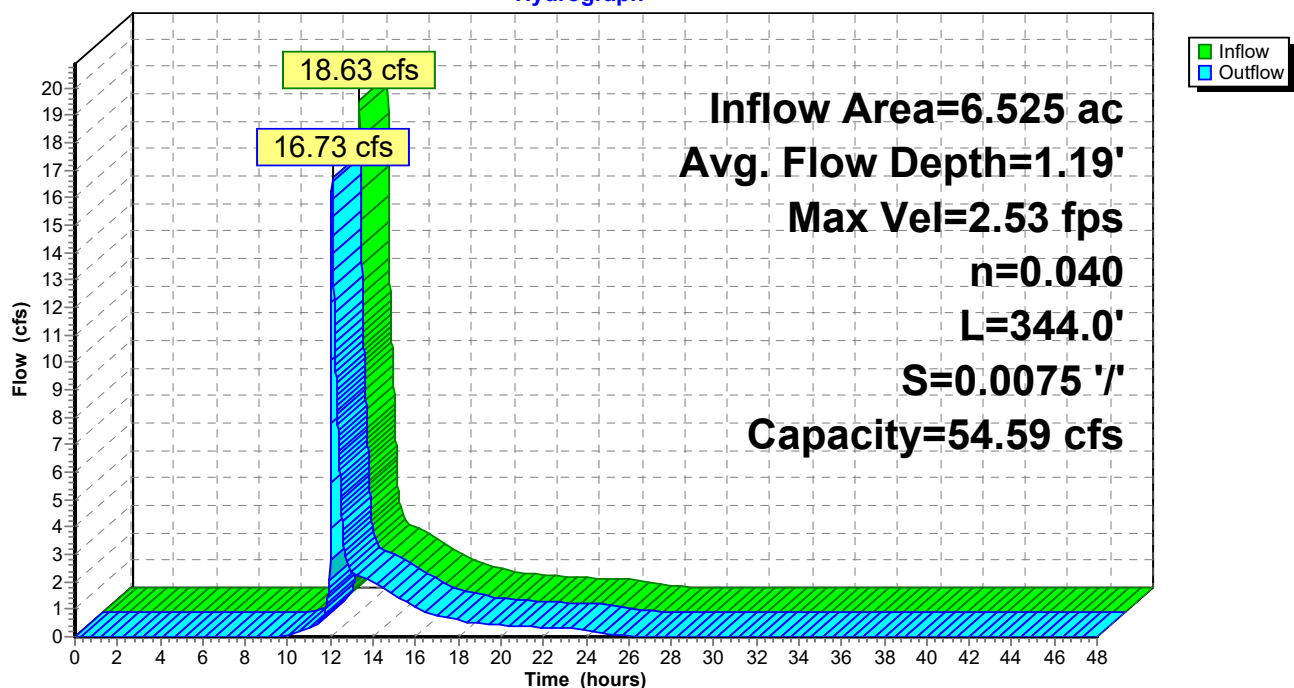Avg. Velocity = 0.34 fps,  Avg. Travel Time= 0.8 min

Peak Storage= 35 cf @ 12.38 hrs
Average Depth at Peak Storage= 0.39'
Bank-Full Depth= 1.00'  Flow Area= 7.0 sf,  Capacity= 14.11 cfs

4.00'  x  1.00'  deep channel,  n= 0.069  Riprap, 6-inch
Side Slope Z-value= 3.0 '/'   Top Width= 10.00'
Length= 17.0'   Slope= 0.0147 '/'
Inlet Invert= 45.25',  Outlet Invert= 45.00'

‡

### Reach 69R: Swale

**Hydrograph**
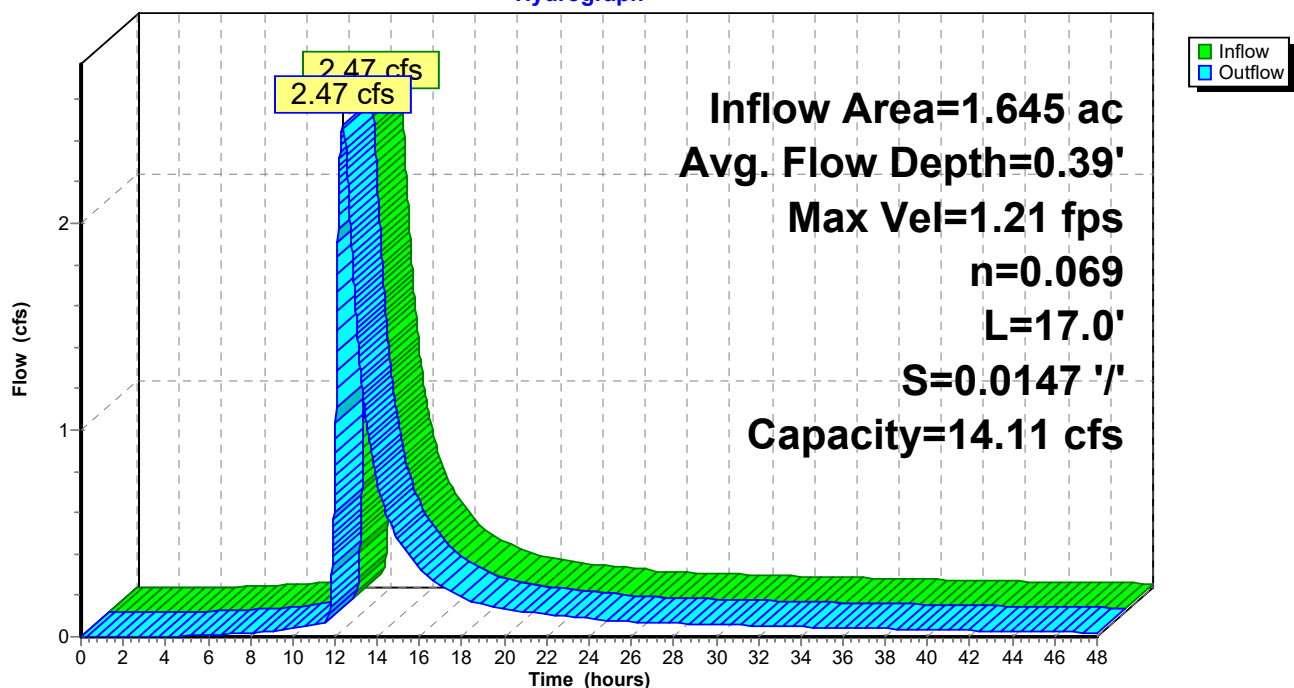


Inflow Area=1.645 ac
Avg. Flow Depth=0.39'
Max Vel=1.21 fps
n=0.069
L=17.0'
S=0.0147 '/'
Capacity=14.11 cfs

## Summary for Reach 70R: Woodland Flow Path

Inflow Area =         1.645 ac,  63.94% Impervious,  Inflow Depth >  4.03"   for  10-year event
Inflow      =      2.47 cfs @  12.38 hrs,  Volume=            0.552 af
Outflow     =      2.47 cfs @  12.40 hrs,  Volume=            0.552 af,  Atten= 0%,  Lag= 1.2 min

Routing by Dyn-Stor-Ind method, Time Span= 0.00-48.00 hrs, dt= 0.01 hrs
Max. Velocity= 0.57 fps,  Min. Travel Time= 1.7 min
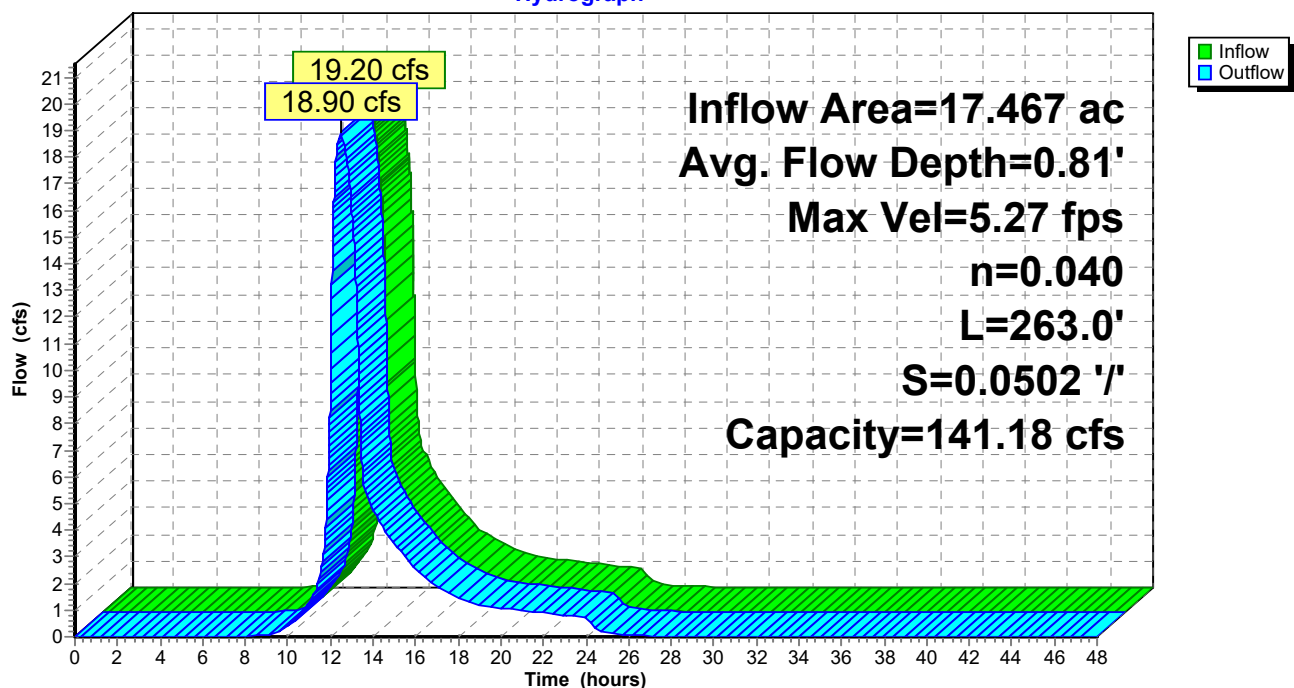Avg. Velocity = 0.16 fps,  Avg. Travel Time= 5.8 min

Peak Storage= 247 cf @ 12.40 hrs
Average Depth at Peak Storage= 0.33'
Bank-Full Depth= 1.00'  Flow Area= 20.0 sf,  Capacity= 21.20 cfs

10.00'  x  1.00'  deep channel,  n= 0.400  Sheet flow: Woods+light brush
Side Slope Z-value= 10.0 '/'   Top Width= 30.00'
Length= 57.0'   Slope= 0.1404 '/'
Inlet Invert= 45.00',  Outlet Invert= 37.00'

‡

### Reach 70R: Woodland Flow Path
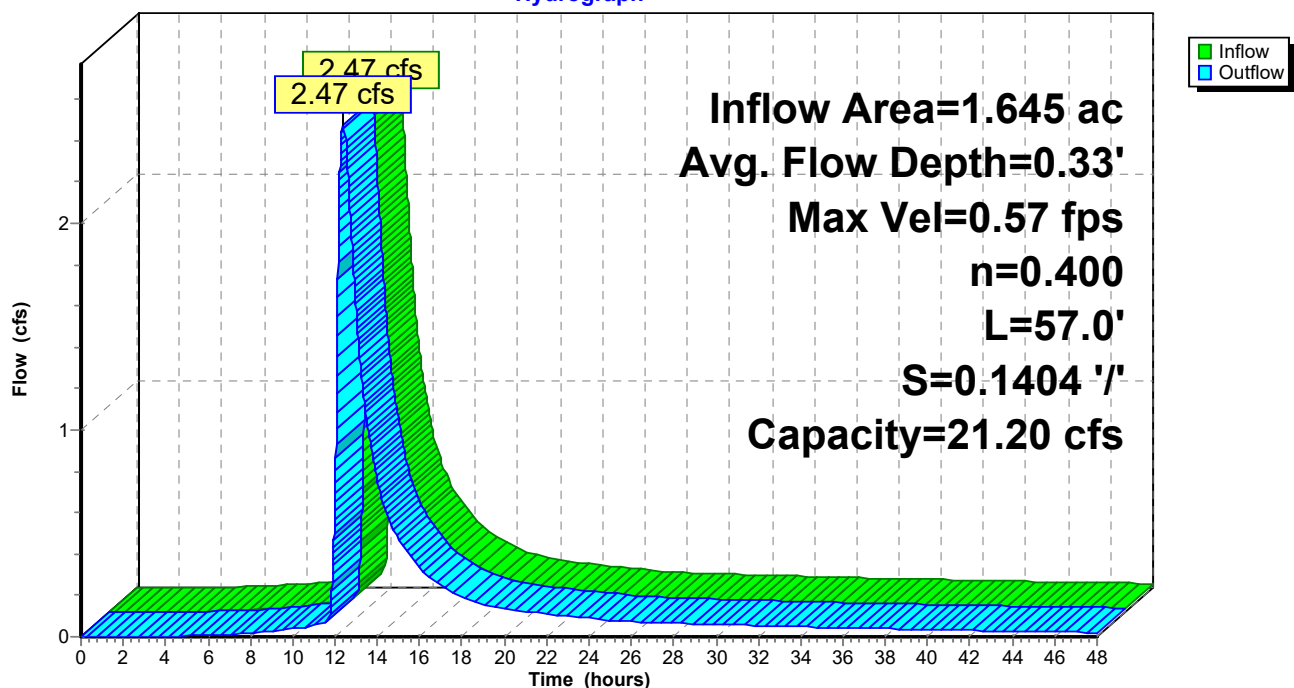


Inflow Area=1.645 ac
Avg. Flow Depth=0.33'
Max Vel=0.57 fps
n=0.400
L=57.0'
S=0.1404 '/'
Capacity=21.20 cfs

## Summary for Reach 71R: Stream

Inflow Area =        1.645 ac,  63.94% Impervious,  Inflow Depth > 4.03"   for  10-year event
Inflow      =      2.47 cfs @  12.40 hrs,  Volume=          0.552 af
Outflow      =      2.47 cfs @  12.41 hrs,  Volume=          0.552 af,  Atten= 0%,  Lag= 0.3 min

Routing by Dyn-Stor-Ind method, Time Span= 0.00-48.00 hrs, dt= 0.01 hrs
Max. Velocity= 3.10 fps,  Min. Travel Time= 0.4 min
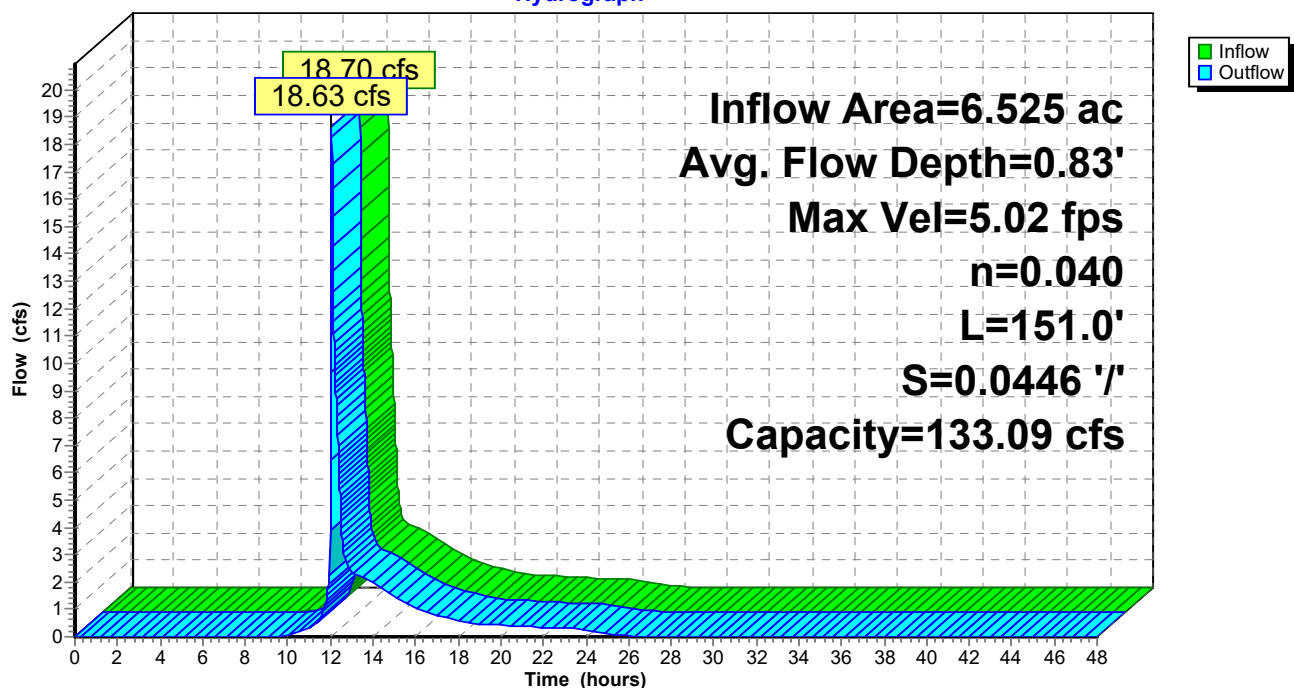Avg. Velocity = 0.93 fps,  Avg. Travel Time= 1.4 min

Peak Storage= 64 cf @ 12.41 hrs
Average Depth at Peak Storage= 0.28'
Bank-Full Depth= 1.00'  Flow Area= 5.0 sf,  Capacity= 31.12 cfs

2.00'  x  1.00'  deep channel,  n= 0.040  Winding stream, pools & shoals
Side Slope Z-value= 3.0 '/'   Top Width= 8.00'
Length= 80.0'   Slope= 0.0554 '/'
Inlet Invert= 37.00',  Outlet Invert= 32.57'

‡

### Reach 71R: Stream
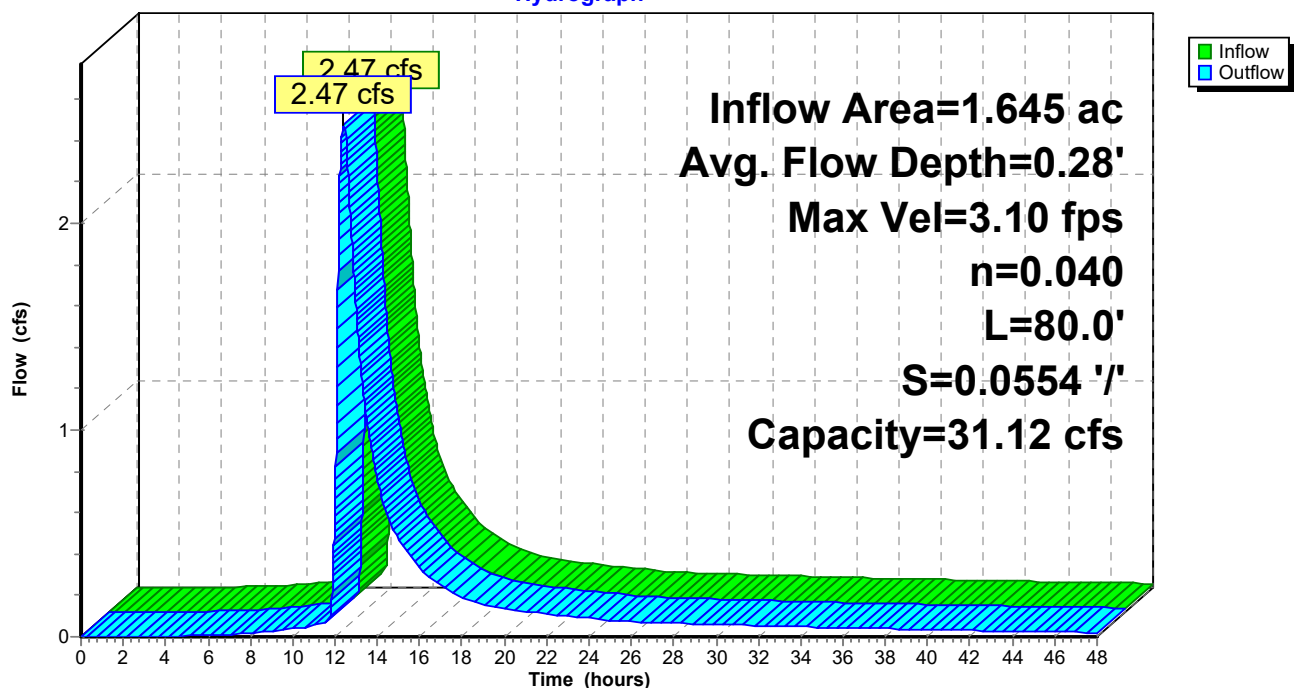


Inflow Area=1.645 ac
Avg. Flow Depth=0.28'
Max Vel=3.10 fps
n=0.040
L=80.0'
S=0.0554 '/'
Capacity=31.12 cfs

## Summary for Reach 72R: Stream

Inflow Area =        1.645 ac,  63.94% Impervious,  Inflow Depth >   4.03"    for  10-year event
Inflow      =     2.47 cfs @   12.41 hrs,  Volume=            0.552 af
Outflow     =     2.47 cfs @   12.42 hrs,  Volume=            0.552 af,  Atten= 0%,  Lag= 0.6 min

Routing by Dyn-Stor-Ind method, Time Span= 0.00-48.00 hrs, dt= 0.01 hrs
Max. Velocity= 1.80 fps,  Min. Travel Time= 0.8 min
Avg. Velocity = 0.50 fps,  Avg. Travel Time= 2.9 min

Peak Storage= 121 cf @ 12.42 hrs
Average Depth at Peak Storage= 0.28'
Bank-Full Depth= 1.00'  Flow Area= 7.0 sf,  Capacity= 25.40 cfs

4.00' x  1.00'  deep channel,  n= 0.040  Winding stream, pools & shoals
Side Slope Z-value= 3.0 '/'   Top Width= 10.00'
Length= 88.0'   Slope= 0.0160 '/'
Inlet Invert= 32.57',  Outlet Invert= 31.16'

‡

### Reach 72R: Stream

**Hydrograph**
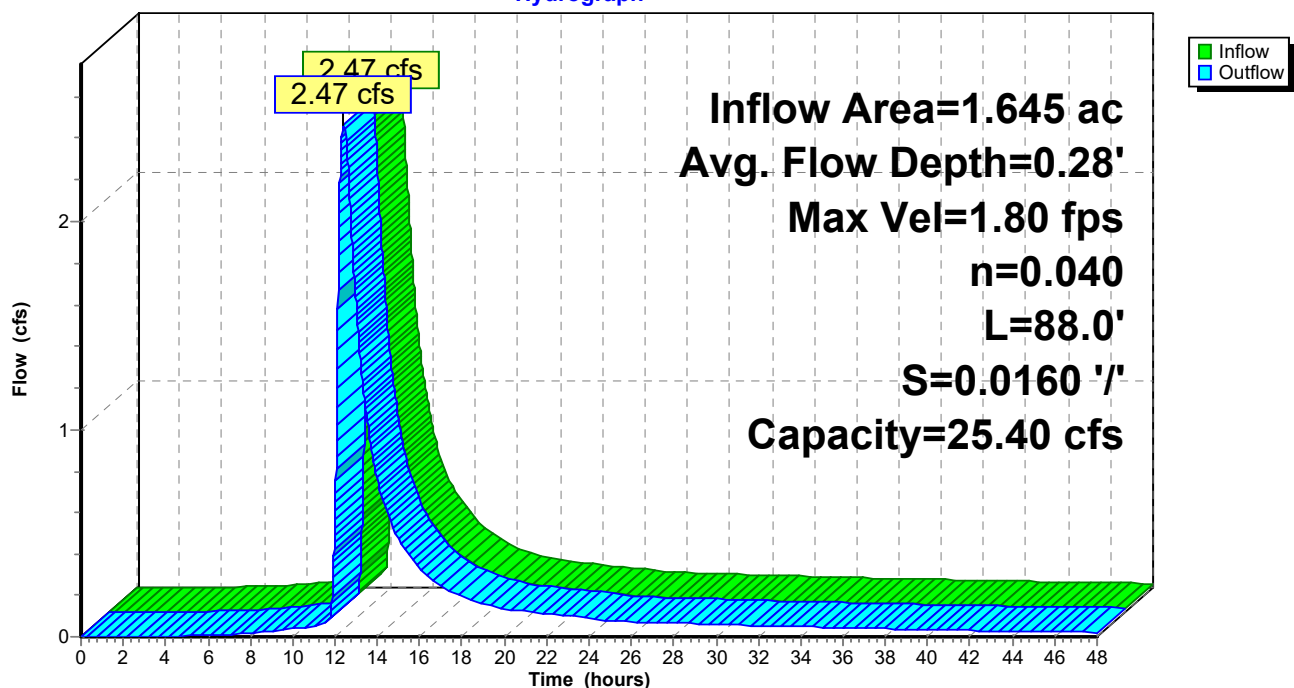
## Summary for Reach 73R: Stream

Inflow Area =         1.978 ac,  65.68% Impervious,  Inflow Depth >  4.11"   for  10-year event
Inflow      =      2.96 cfs @   12.42 hrs,  Volume=            0.677 af
Outflow     =      2.95 cfs @   12.46 hrs,  Volume=            0.676 af,  Atten= 0%,  Lag= 1.9 min

Routing by Dyn-Stor-Ind method, Time Span= 0.00-48.00 hrs, dt= 0.01 hrs
Max. Velocity= 1.91 fps,  Min. Travel Time= 2.7 min
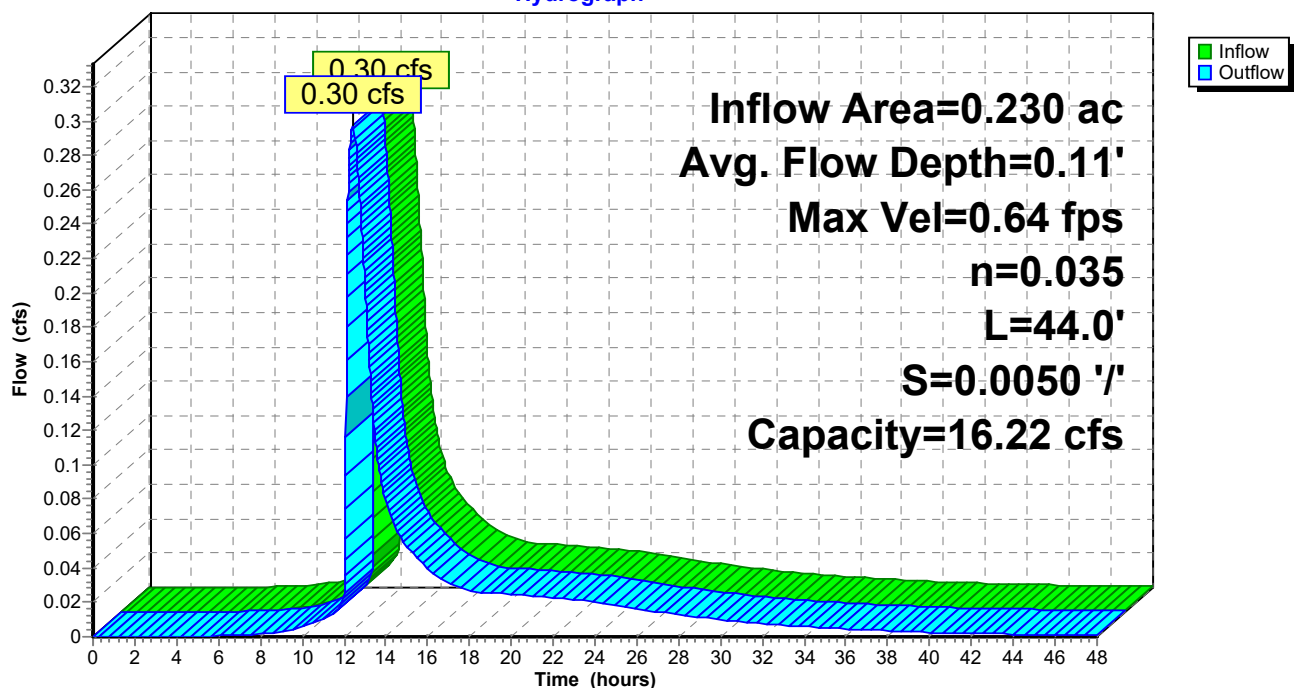Avg. Velocity = 0.54 fps,  Avg. Travel Time= 9.5 min

Peak Storage= 478 cf @ 12.46 hrs
Average Depth at Peak Storage= 0.31'
Bank-Full Depth= 1.00'  Flow Area= 7.0 sf,  Capacity= 25.38 cfs

4.00'  x  1.00'  deep channel,  n= 0.040  Winding stream, pools & shoals
Side Slope Z-value= 3.0 '/'   Top Width= 10.00'
Length= 309.0'  Slope= 0.0160 '/'
Inlet Invert= 31.16',  Outlet Invert= 26.22'

‡

### Reach 73R: Stream

**Hydrograph**
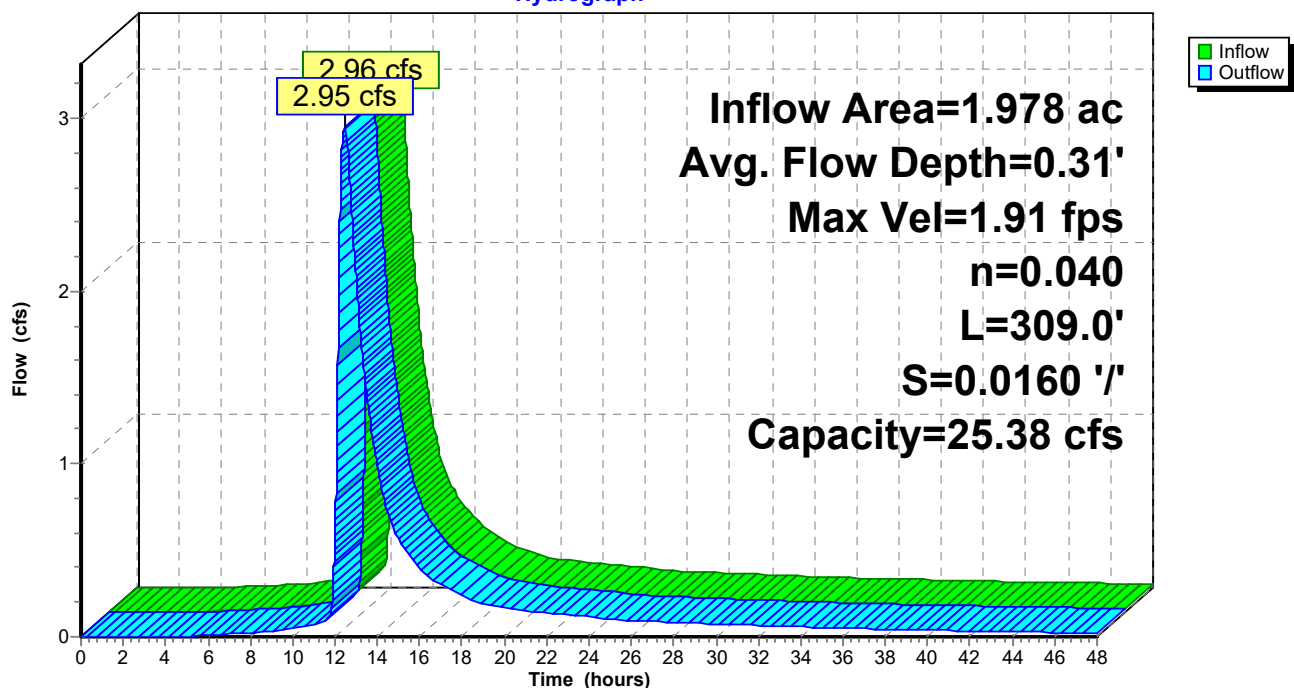


Inflow Area=1.978 ac
Avg. Flow Depth=0.31'
Max Vel=1.91 fps
n=0.040
L=309.0'
S=0.0160 '/'
Capacity=25.38 cfs

## Summary for Reach 83R: Woodland Flow Path

Inflow Area =         0.333 ac, 74.25% Impervious, Inflow Depth > 4.51"   for  10-year event
Inflow      =         0.50 cfs @   12.40 hrs, Volume=             0.125 af
Outflow      =         0.49 cfs @   12.49 hrs, Volume=             0.125 af,  Atten= 1%,  Lag= 5.5 min

Routing by Dyn-Stor-Ind method, Time Span= 0.00-48.00 hrs, dt= 0.01 hrs
Max. Velocity= 0.29 fps,  Min. Travel Time= 6.9 min
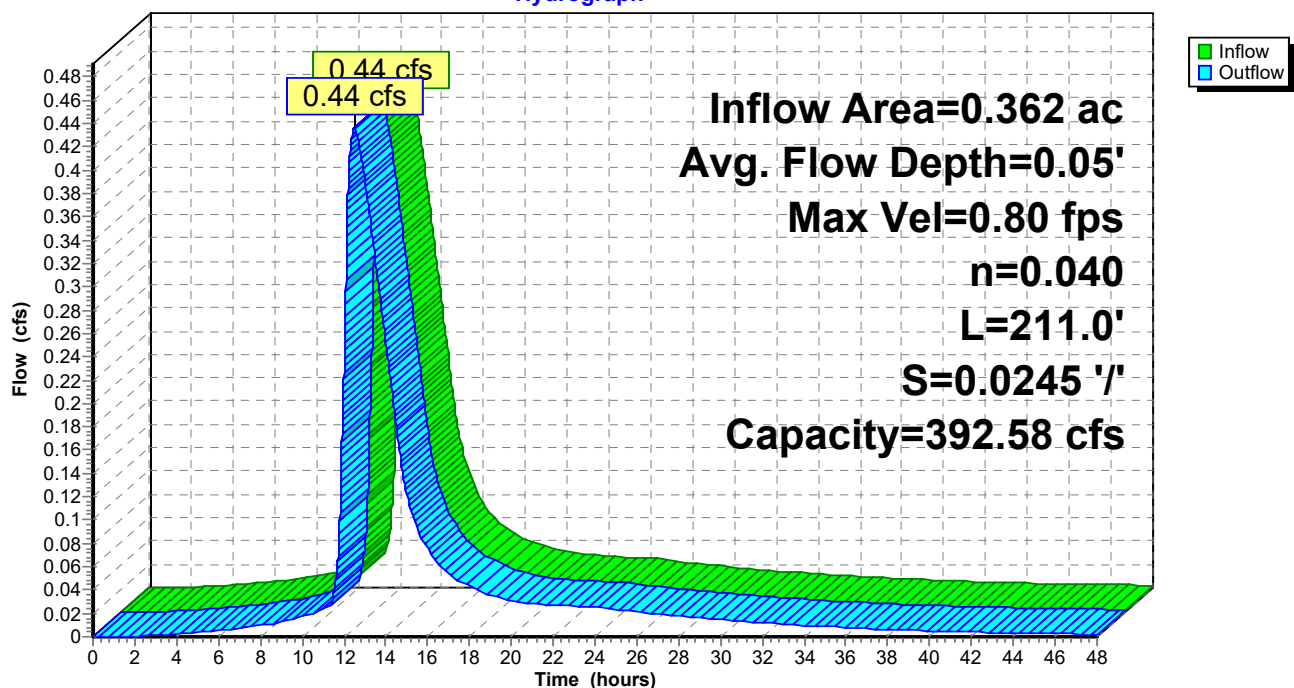Avg. Velocity = 0.09 fps,  Avg. Travel Time= 23.7 min

Peak Storage= 205 cf @ 12.49 hrs
Average Depth at Peak Storage= 0.15'
Bank-Full Depth= 1.00'  Flow Area= 20.0 sf,  Capacity= 17.44 cfs

10.00'  x  1.00'  deep channel,  n= 0.400  Sheet flow: Woods+light brush
Side Slope Z-value= 10.0 '/'   Top Width= 30.00'
Length= 122.0'   Slope= 0.0950 '/'
Inlet Invert= 42.75',  Outlet Invert= 31.16'
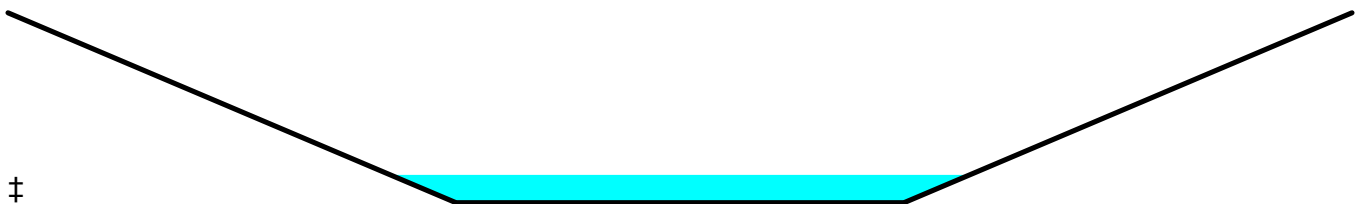
‡

### Reach 83R: Woodland Flow Path
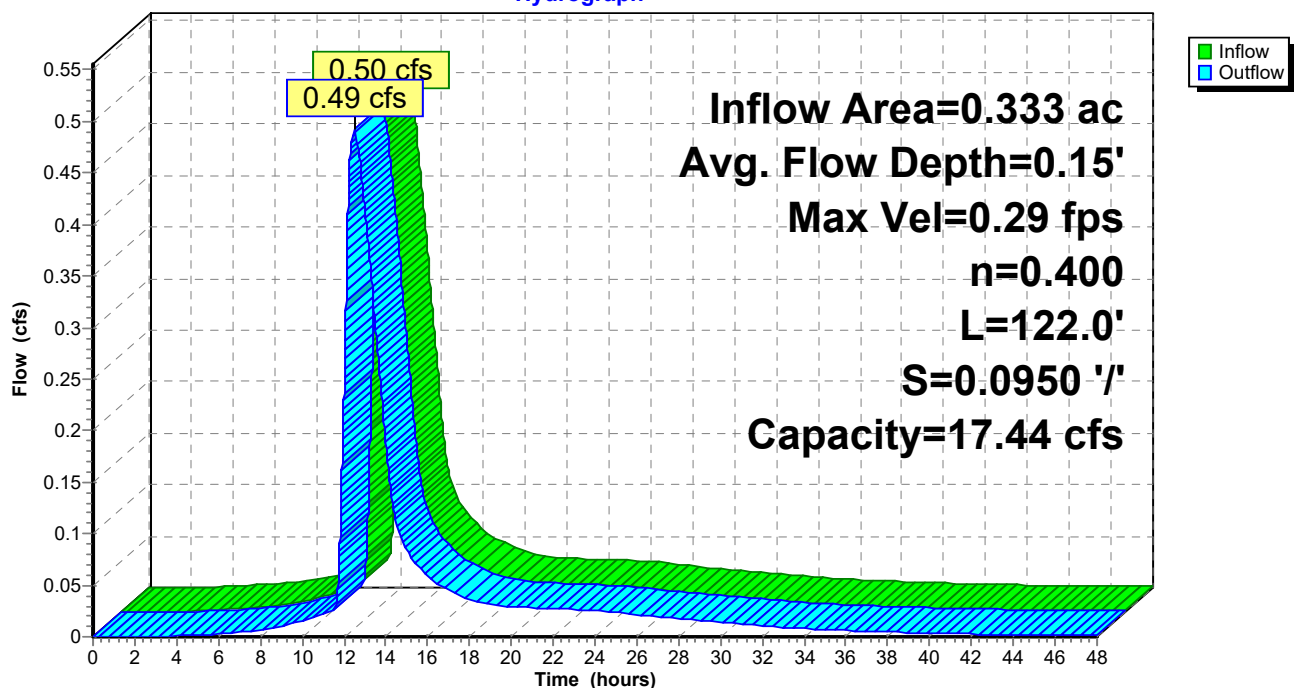


Inflow Area=0.333 ac
Avg. Flow Depth=0.15'
Max Vel=0.29 fps
n=0.400
L=122.0'
S=0.0950 '/'
Capacity=17.44 cfs

## Summary for Pond 1P: 15" RCP

Inflow Area = 1.723 ac, 14.18% Impervious, Inflow Depth > 2.96"  for 10-year event
Inflow   = 4.57 cfs @ 12.14 hrs, Volume= 0.424 af
Outflow  = 3.74 cfs @ 12.22 hrs, Volume= 0.424 af, Atten= 18%, Lag= 4.8 min
Primary  = 3.74 cfs @ 12.22 hrs, Volume= 0.424 af

Routing by Dyn-Stor-Ind method, Time Span= 0.00-48.00 hrs, dt= 0.01 hrs
Peak Elev= 53.52' @ 12.22 hrs  Surf.Area= 2,322 sf  Storage= 659 cf

Plug-Flow detention time= 1.0 min calculated for 0.424 af (100% of inflow)
Center-of-Mass det. time= 0.9 min ( 874.6 - 873.7 )

| Volume | Invert | Avail.Storage | Storage Description |
|--------|--------|---------------|---------------------|
| #1 | 52.26' | 9,237 cf | **Custom Stage Data (Prismatic)**Listed below (Recalc) |

| Elevation (feet) | Surf.Area (sq-ft) | Inc.Store (cubic-feet) | Cum.Store (cubic-feet) |
|------------------|-------------------|------------------------|------------------------|
| 52.26 | 10 | 0 | 0 |
| 53.00 | 85 | 35 | 35 |
| 54.00 | 4,401 | 2,243 | 2,278 |
| 55.00 | 9,516 | 6,959 | 9,237 |

| Device | Routing | Invert | Outlet Devices |
|--------|---------|--------|----------------|
| #1 | Primary | 52.26' | **15.0" Round Culvert**<br>L= 60.0' RCP, end-section conforming to fill, Ke= 0.500<br>Inlet / Outlet Invert= 52.26' / 52.04' S= 0.0037 '/' Cc= 0.900<br>n= 0.012, Flow Area= 1.23 sf |

**Primary OutFlow** Max=3.74 cfs @ 12.22 hrs HW=53.52' TW=0.00' (Dynamic Tailwater)
└─**1=Culvert** (Barrel Controls 3.74 cfs @ 3.77 fps)

## Pond 1P: 15" RCP

**Hydrograph**
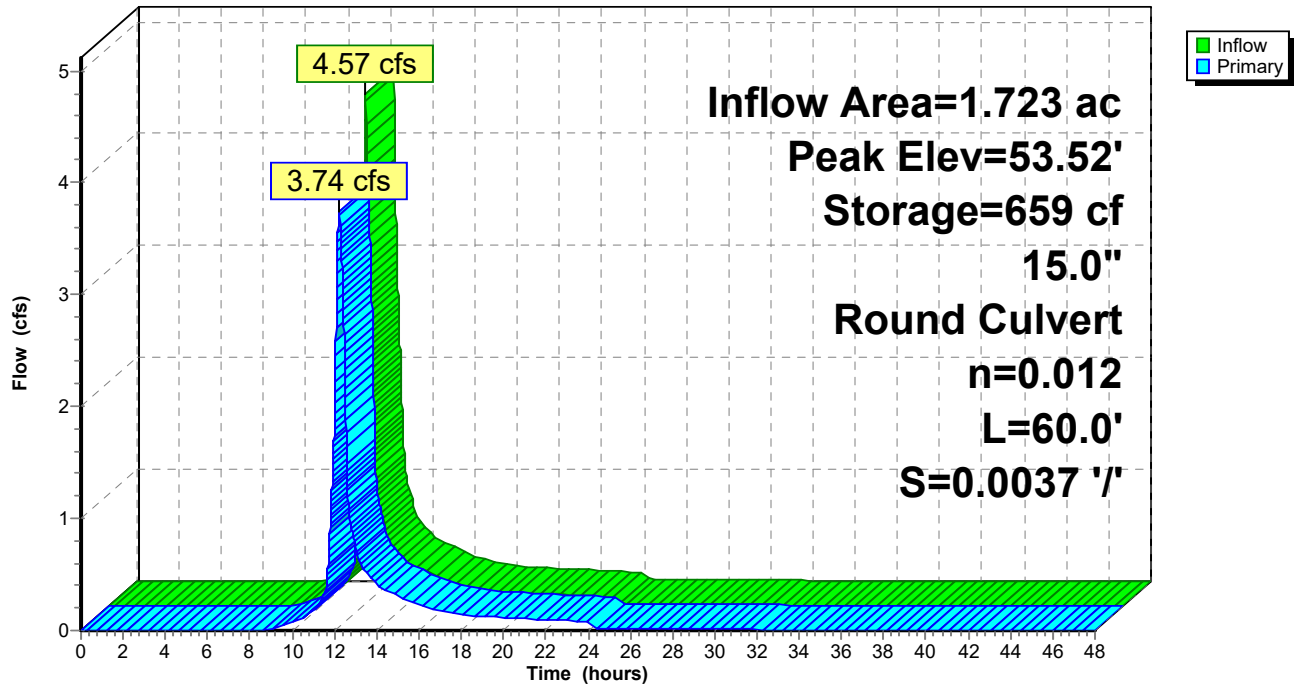


Inflow Area=1.723 ac
Peak Elev=53.52'
Storage=659 cf
15.0"
Round Culvert
n=0.012
L=60.0'
S=0.0037 '/'

## Summary for Pond 2.1P: 24" RCP

Inflow Area =　　  17.114 ac,  8.97% Impervious,  Inflow Depth =  2.66"   for  10-year event
Inflow　　=　  35.08 cfs @  12.18 hrs,  Volume=　　　  3.795 af
Outflow　　=　  18.86 cfs @  12.54 hrs,  Volume=　　　  3.795 af,  Atten= 46%,  Lag= 21.8 min
Primary　　=　  18.86 cfs @  12.54 hrs,  Volume=　　　  3.795 af

Routing by Dyn-Stor-Ind method, Time Span= 0.00-48.00 hrs, dt= 0.01 hrs
Peak Elev= 51.35' @ 12.50 hrs   Surf.Area= 20,687 sf   Storage= 23,483 cf

Plug-Flow detention time= 7.7 min calculated for 3.795 af (100% of inflow)
Center-of-Mass det. time= 7.6 min ( 872.3 - 864.6 )

| Volume | Invert | Avail.Storage | Storage Description |
|---|---|---|---|
| #1 | 47.57' | 80,071 cf | **Custom Stage Data (Prismatic)**Listed below (Recalc) |

| Elevation (feet) | Surf.Area (sq-ft) | Inc.Store (cubic-feet) | Cum.Store (cubic-feet) |
|---|---|---|---|
| 47.57 | 100 | 0 | 0 |
| 48.00 | 164 | 57 | 57 |
| 49.00 | 2,506 | 1,335 | 1,392 |
| 50.00 | 7,196 | 4,851 | 6,243 |
| 51.00 | 14,807 | 11,002 | 17,244 |
| 52.00 | 31,534 | 23,171 | 40,415 |
| 53.00 | 47,779 | 39,657 | 80,071 |

| Device | Routing | Invert | Outlet Devices |
|---|---|---|---|
| #1 | Primary | 47.57' | **24.0"  Round Culvert** L= 17.0'  RCP, end-section conforming to fill,  Ke= 0.500 Inlet / Outlet Invert= 47.57' / 47.34'  S= 0.0135 '/'  Cc= 0.900 n= 0.012,  Flow Area= 3.14 sf |

**Primary OutFlow** Max=18.22 cfs @ 12.54 hrs  HW=51.34'  TW=49.89'  (Dynamic Tailwater)
└─**1=Culvert** (Inlet Controls 18.22 cfs @ 5.80 fps)

## Pond 2.1P: 24" RCP



**Hydrograph**

Inflow
Primary

35.08 cfs

18.86 cfs

**Inflow Area=17.114 ac**
**Peak Elev=51.35'**
**Storage=23,483 cf**
**24.0"**
**Round Culvert**
**n=0.012**
**L=17.0'**
**S=0.0135 '/'**

Flow (cfs)

Time (hours)

## Summary for Pond 2P: 12" CPP

Inflow Area =        6.525 ac,   6.78% Impervious,  Inflow Depth =  2.57"   for  10-year event
Inflow     =      23.92 cfs @  12.00 hrs,  Volume=              1.395 af
Outflow   =      18.70 cfs @  12.05 hrs,  Volume=              1.395 af,  Atten= 22%,  Lag= 2.6 min
Primary   =      18.70 cfs @  12.05 hrs,  Volume=              1.395 af

Routing by Dyn-Stor-Ind method, Time Span= 0.00-48.00 hrs, dt= 0.01 hrs
Peak Elev= 60.93' @ 12.05 hrs   Surf.Area= 15,490 sf   Storage= 11,719 cf

Plug-Flow detention time= 44.2 min calculated for 1.395 af (100% of inflow)
Center-of-Mass det. time= 44.1 min ( 876.6 - 832.4 )

| Volume | Invert | Avail.Storage | Storage Description |
|---|---|---|---|
| #1 | 59.65' | 35,764 cf | **Custom Stage Data (Prismatic)**Listed below (Recalc) |

| Elevation (feet) | Surf.Area (sq-ft) | Inc.Store (cubic-feet) | Cum.Store (cubic-feet) |
|---|---|---|---|
| 59.65 | 100 | 0 | 0 |
| 60.00 | 6,996 | 1,242 | 1,242 |
| 61.00 | 16,111 | 11,554 | 12,795 |
| 62.00 | 29,827 | 22,969 | 35,764 |

| Device | Routing | Invert | Outlet Devices |
|---|---|---|---|
| #1 | Primary | 59.65' | **12.0"  Round Culvert**<br>L= 9.0'  CPP, projecting, no headwall,  Ke= 0.900<br>Inlet / Outlet Invert= 59.65' / 59.31'  S= 0.0378 '/'  Cc= 0.900<br>n= 0.012,  Flow Area= 0.79 sf |
| #2 | Primary | 60.75' | **87.0' long  x 4.0' breadth Broad-Crested Rectangular Weir**<br>Head (feet) 0.20  0.40  0.60  0.80  1.00  1.20  1.40  1.60  1.80  2.00<br>2.50  3.00  3.50  4.00  4.50  5.00  5.50<br>Coef. (English) 2.38  2.54  2.69  2.68  2.67  2.67  2.65  2.66  2.66<br>2.68  2.72  2.73  2.76  2.79  2.88  3.07  3.32 |

**Primary OutFlow** Max=18.66 cfs @ 12.05 hrs  HW=60.93'  TW=60.13'   (Dynamic Tailwater)
┌─**1=Culvert** (Inlet Controls 2.64 cfs @ 3.36 fps)
└─**2=Broad-Crested Rectangular Weir** (Weir Controls 16.02 cfs @ 1.01 fps)

## Pond 2P: 12" CPP

**Hydrograph**



Inflow Area=6.525 ac
Peak Elev=60.93'
Storage=11,719 cf

23.92 cfs
18.70 cfs

Legend: Inflow (green), Primary (blue)

Flow (cfs) vs Time (hours)

## Summary for Pond 10P: Porous Pavement

Inflow Area =        0.234 ac,  99.02% Impervious,  Inflow Depth >  5.20"   for  10-year event
Inflow      =        0.09 cfs @   21.94 hrs,  Volume=            0.101 af
Outflow     =        0.04 cfs @   30.53 hrs,  Volume=            0.097 af,  Atten= 59%,  Lag= 515.5 min
Discarded  =        0.04 cfs @   30.53 hrs,  Volume=            0.097 af

Routing by Dyn-Stor-Ind method, Time Span= 0.00-48.00 hrs, dt= 0.01 hrs
Peak Elev= 1.48' @ 30.53 hrs   Surf.Area= 2,761 sf   Storage= 1,631 cf

Plug-Flow detention time= 434.0 min calculated for 0.097 af (95% of inflow)
Center-of-Mass det. time= 386.3 min ( 1,842.5 - 1,456.2 )

| Volume | Invert | Avail.Storage | Storage Description |
|---|---|---|---|
| #1 | 0.00' | 2,808 cf | **Custom Stage Data (Conic)**Listed below |

| Elevation (feet) | Surf.Area (sq-ft) | Voids (%) | Inc.Store (cubic-feet) | Cum.Store (cubic-feet) | Wet.Area (sq-ft) |
|---|---|---|---|---|---|
| 0.00 | 2,761 | 0.0 | 0 | 0 | 2,761 |
| 1.25 | 2,761 | 40.0 | 1,381 | 1,381 | 2,994 |
| 1.50 | 2,761 | 40.0 | 276 | 1,657 | 3,040 |
| 2.50 | 2,761 | 5.0 | 138 | 1,795 | 3,227 |
| 3.17 | 2,761 | 40.0 | 740 | 2,535 | 3,351 |
| 3.50 | 2,761 | 30.0 | 273 | 2,808 | 3,413 |

| Device | Routing | Invert | Outlet Devices |
|---|---|---|---|
| #1 | Discarded | 0.00' | **0.500 in/hr Exfiltration over Wetted area**   Phase-In= 0.01' |

**Discarded OutFlow** Max=0.04 cfs @ 30.53 hrs  HW=1.48'   (Free Discharge)
└─**1=Exfiltration** (Exfiltration Controls 0.04 cfs)

## Pond 10P: Porous Pavement
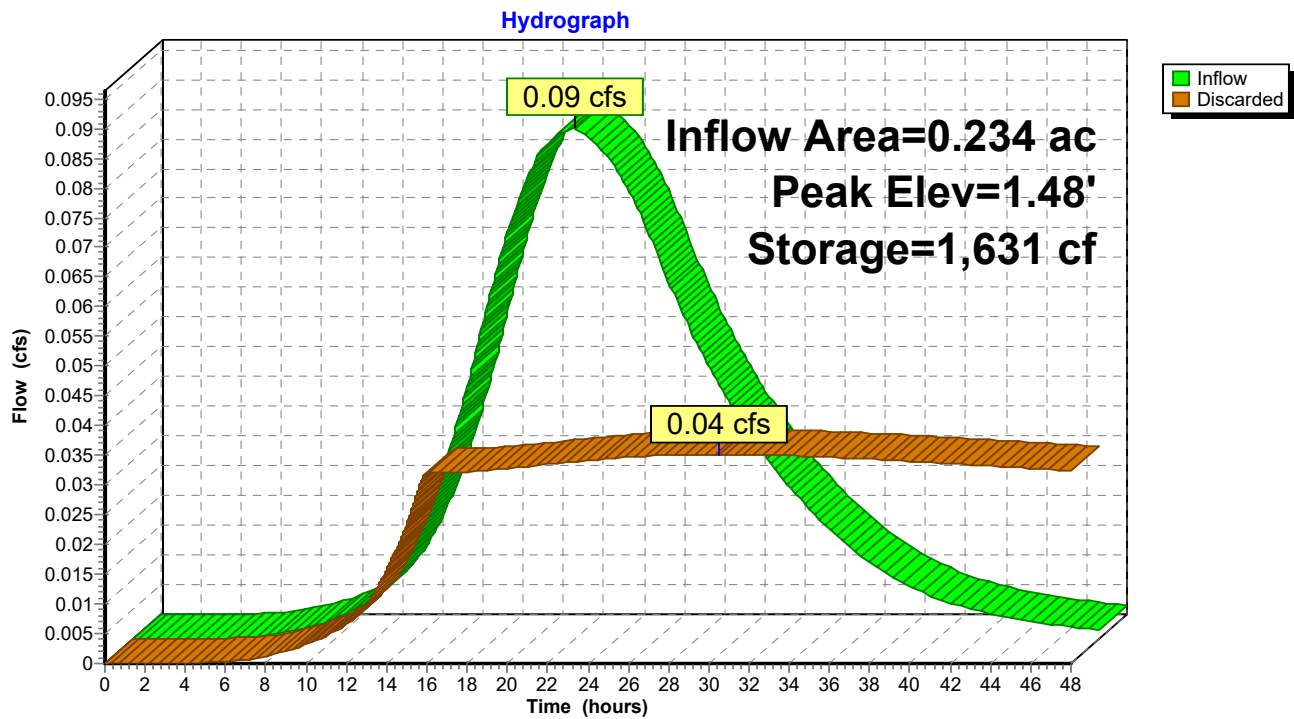


**Hydrograph**

Inflow Area=0.234 ac
Peak Elev=1.48'
Storage=1,631 cf

0.09 cfs

0.04 cfs

Legend:
- Inflow
- Discarded

## Summary for Pond 11P: YD #3-1

Inflow Area =        0.013 ac,  65.82% Impervious,  Inflow Depth =  4.33"   for  10-year event
Inflow      =      0.07 cfs @   12.08 hrs,  Volume=            0.005 af
Outflow     =      0.07 cfs @   12.08 hrs,  Volume=            0.005 af,  Atten= 0%,  Lag= 0.0 min
Primary     =      0.07 cfs @   12.08 hrs,  Volume=            0.005 af

Routing by Dyn-Stor-Ind method, Time Span= 0.00-48.00 hrs, dt= 0.01 hrs
Peak Elev= 57.89' @ 12.43 hrs
Flood Elev= 60.60'

| Device | Routing | Invert | Outlet Devices |
|---|---|---|---|
| #1 | Primary | 57.16' | **6.0"  Round Culvert**<br>L= 36.0'   CPP, square edge headwall,  Ke= 0.500<br>Inlet / Outlet Invert= 57.16' / 56.98'   S= 0.0050 '/'   Cc= 0.900<br>n= 0.012,  Flow Area= 0.20 sf |

**Primary OutFlow** Max=0.00 cfs @ 12.08 hrs  HW=57.59'  TW=57.60'   (Dynamic Tailwater)
└─**1=Culvert** ( Controls 0.00 cfs)

### Pond 11P: YD #3-1

## Summary for Pond 12P: YD #7

Inflow Area =        0.043 ac,  65.12% Impervious,  Inflow Depth =   4.33"   for  10-year event
Inflow     =      0.21 cfs @   12.08 hrs,  Volume=            0.016 af
Outflow    =      0.21 cfs @   12.08 hrs,  Volume=            0.016 af,  Atten= 0%,  Lag= 0.0 min
Primary    =      0.21 cfs @   12.08 hrs,  Volume=            0.016 af

Routing by Dyn-Stor-Ind method, Time Span= 0.00-48.00 hrs, dt= 0.01 hrs
Peak Elev= 58.07' @ 12.10 hrs
Flood Elev= 59.50'

| Device | Routing | Invert | Outlet Devices |
|--------|---------|--------|----------------|
| #1 | Primary | 57.76' | **8.0"  Round Culvert**<br>L= 52.0'   CPP, square edge headwall,  Ke= 0.500<br>Inlet / Outlet Invert= 57.76' / 57.50'   S= 0.0050 '/'   Cc= 0.900<br>n= 0.012,  Flow Area= 0.35 sf |

**Primary OutFlow** Max=0.20 cfs @ 12.08 hrs  HW=58.07'  TW=57.79'   (Dynamic Tailwater)
└─**1=Culvert** (Outlet Controls 0.20 cfs @ 1.91 fps)

### Pond 12P: YD #7



**Hydrograph**
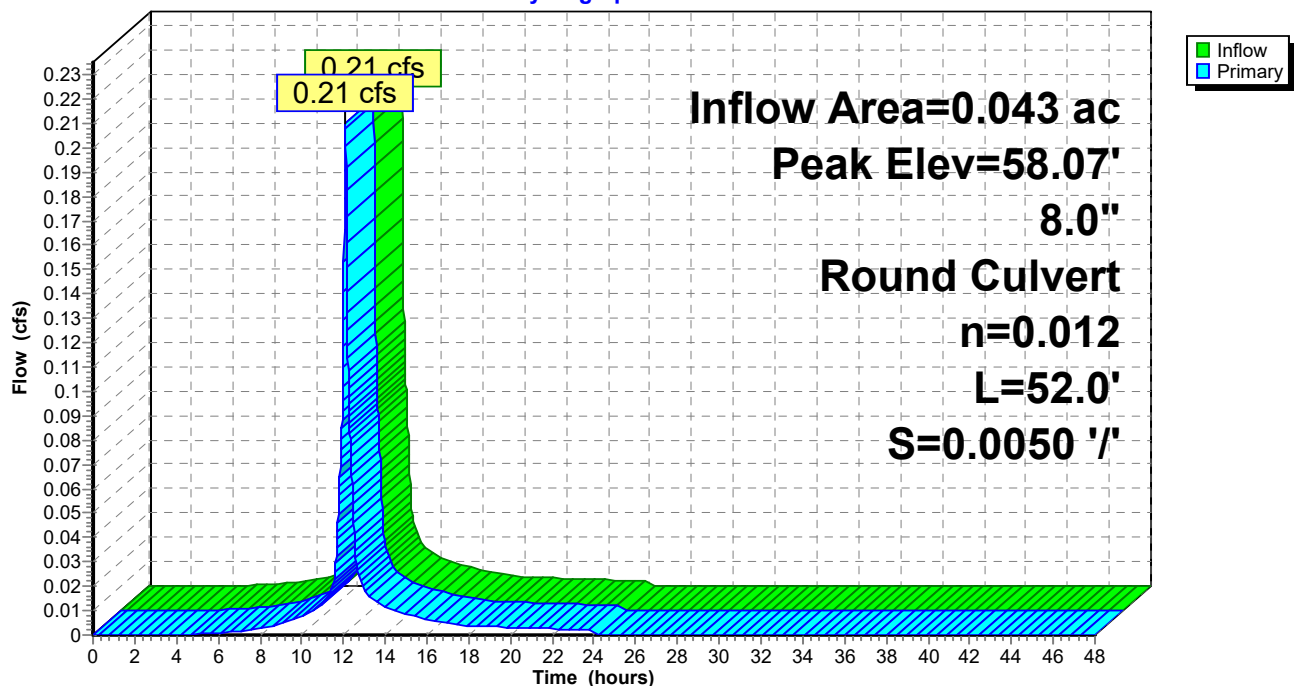
Inflow Area=0.043 ac
Peak Elev=58.07'
8.0"
Round Culvert
n=0.012
L=52.0'
S=0.0050 '/'

## Summary for Pond 13P: YD #6

Inflow Area =        0.074 ac,  68.76% Impervious,  Inflow Depth =   4.42"   for  10-year event
Inflow       =        0.37 cfs @   12.08 hrs,  Volume=              0.027 af
Outflow     =        0.37 cfs @   12.08 hrs,  Volume=              0.027 af,  Atten= 0%,  Lag= 0.0 min
Primary     =        0.37 cfs @   12.08 hrs,  Volume=              0.027 af

Routing by Dyn-Stor-Ind method, Time Span= 0.00-48.00 hrs, dt= 0.01 hrs
Peak Elev= 57.90' @ 12.42 hrs
Flood Elev= 60.00'

| Device | Routing | Invert | Outlet Devices |
|---|---|---|---|
| #1 | Primary | 57.33' | **10.0"  Round Culvert**<br>L= 29.0'   CPP, square edge headwall,  Ke= 0.500<br>Inlet / Outlet Invert= 57.33' / 57.18'   S= 0.0052 '/'   Cc= 0.900<br>n= 0.012,  Flow Area= 0.55 sf |

**Primary OutFlow** Max=0.33 cfs @ 12.08 hrs  HW=57.79'  TW=57.69'   (Dynamic Tailwater)
└─**1=Culvert** (Outlet Controls 0.33 cfs @ 1.56 fps)

### Pond 13P: YD #6

**Hydrograph**
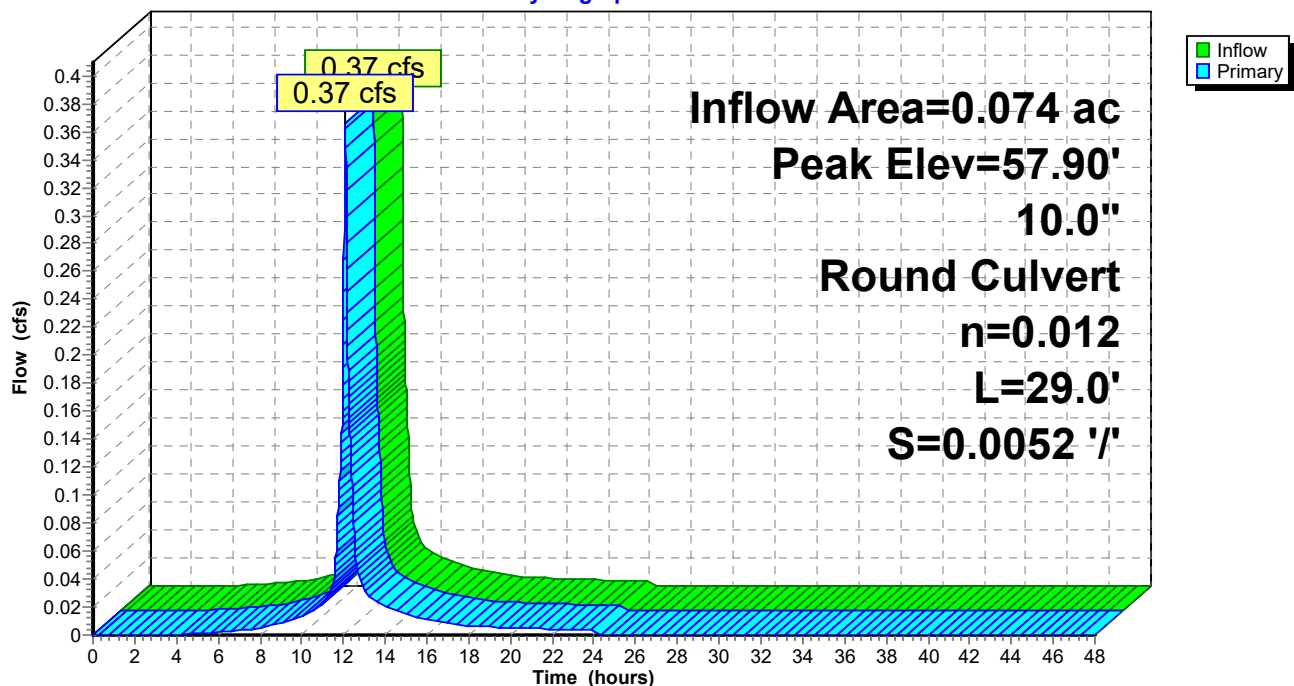
## Summary for Pond 14P: YD #5

Inflow Area = 0.098 ac, 70.93% Impervious, Inflow Depth = 4.48" for 10-year event
Inflow = 0.49 cfs @ 12.08 hrs, Volume= 0.036 af
Outflow = 0.49 cfs @ 12.08 hrs, Volume= 0.036 af, Atten= 0%, Lag= 0.0 min
Primary = 0.49 cfs @ 12.08 hrs, Volume= 0.036 af

Routing by Dyn-Stor-Ind method, Time Span= 0.00-48.00 hrs, dt= 0.01 hrs
Peak Elev= 57.90' @ 12.42 hrs
Flood Elev= 60.00'

| Device | Routing | Invert | Outlet Devices |
|--------|---------|--------|----------------|
| #1 | Primary | 57.08' | **10.0" Round Culvert** |
| | | | L= 20.0' CPP, square edge headwall, Ke= 0.500 |
| | | | Inlet / Outlet Invert= 57.08' / 56.98' S= 0.0050 '/' Cc= 0.900 |
| | | | n= 0.012, Flow Area= 0.55 sf |

**Primary OutFlow** Max=0.40 cfs @ 12.08 hrs HW=57.69' TW=57.63' (Dynamic Tailwater)
└─**1=Culvert** (Outlet Controls 0.40 cfs @ 1.31 fps)

### Pond 14P: YD #5

**Hydrograph**

## Summary for Pond 15P: YD #4

Inflow Area =        0.129 ac, 64.15% Impervious, Inflow Depth =   4.29"   for  10-year event
Inflow       =      0.62 cfs @   12.08 hrs,  Volume=               0.046 af
Outflow     =      0.62 cfs @   12.08 hrs,  Volume=               0.046 af,  Atten= 0%,  Lag= 0.0 min
Primary    =      0.62 cfs @   12.08 hrs,  Volume=               0.046 af

Routing by Dyn-Stor-Ind method, Time Span= 0.00-48.00 hrs, dt= 0.01 hrs
Peak Elev= 57.89' @ 12.42 hrs
Flood Elev= 60.00'

| Device | Routing | Invert | Outlet Devices |
|--------|---------|--------|----------------|
| #1 | Primary | 56.81' | **12.0"  Round Culvert**<br>L= 46.0'  CPP, square edge headwall,  Ke= 0.500<br>Inlet / Outlet Invert= 56.81' / 56.58'   S= 0.0050 '/'   Cc= 0.900<br>n= 0.012,  Flow Area= 0.79 sf |

**Primary OutFlow** Max=0.44 cfs @ 12.08 hrs  HW=57.63'  TW=57.60'   (Dynamic Tailwater)
 **1=Culvert** (Outlet Controls 0.44 cfs @ 0.87 fps)

### Pond 15P: YD #4

**Hydrograph**



Inflow Area=0.129 ac
Peak Elev=57.89'
12.0"
Round Culvert
n=0.012
L=46.0'
S=0.0050 '/'

## Summary for Pond 16P: CB #3

Inflow Area =       0.164 ac,  59.40% Impervious,  Inflow Depth =  4.17"   for  10-year event
Inflow      =      0.77 cfs @  12.09 hrs,  Volume=            0.057 af
Outflow     =      0.77 cfs @  12.09 hrs,  Volume=            0.057 af,  Atten= 0%,  Lag= 0.0 min
Primary     =      0.77 cfs @  12.09 hrs,  Volume=            0.057 af

Routing by Dyn-Stor-Ind method, Time Span= 0.00-48.00 hrs, dt= 0.01 hrs
Peak Elev= 57.89' @ 12.42 hrs
Flood Elev= 61.25'

| Device | Routing | Invert | Outlet Devices |
|--------|---------|--------|----------------|
| #1 | Primary | 56.48' | **12.0"  Round Culvert**<br>L= 45.0'   CPP, square edge headwall,  Ke= 0.500<br>Inlet / Outlet Invert= 56.48' / 56.26'   S= 0.0049 '/'   Cc= 0.900<br>n= 0.012,  Flow Area= 0.79 sf |

**Primary OutFlow** Max=0.45 cfs @ 12.09 hrs  HW=57.60'  TW=57.59'   (Dynamic Tailwater)
└─**1=Culvert** (Outlet Controls 0.45 cfs @ 0.63 fps)

### Pond 16P: CB #3



**Hydrograph**

Inflow Area=0.164 ac
Peak Elev=57.89'
12.0"
Round Culvert
n=0.012
L=45.0'
S=0.0049 '/'

## Summary for Pond 17P: Bio #1

Inflow Area =        0.230 ac, 42.35% Impervious,  Inflow Depth =  3.76"   for  10-year event
Inflow      =      0.98 cfs @  12.09 hrs,  Volume=          0.072 af
Outflow     =      0.30 cfs @  12.42 hrs,  Volume=          0.072 af,  Atten= 70%,  Lag= 19.8 min
Primary     =      0.30 cfs @  12.42 hrs,  Volume=          0.072 af

Routing by Dyn-Stor-Ind method, Time Span= 0.00-48.00 hrs, dt= 0.01 hrs
Starting Elev= 56.25'  Surf.Area= 487 sf  Storage= 37 cf
Peak Elev= 57.89' @ 12.42 hrs  Surf.Area= 1,182 sf  Storage= 1,368 cf  (1,331 cf above start)
Flood Elev= 59.25'  Surf.Area= 1,950 sf  Storage= 3,480 cf  (3,444 cf above start)

Plug-Flow detention time= 283.3 min calculated for 0.071 af (98% of inflow)
Center-of-Mass det. time= 266.2 min ( 1,065.8 - 799.6 )

| Volume | Invert | Avail.Storage | Storage Description |
|---|---|---|---|
| #1 | 54.75' | 3,480 cf | **Custom Stage Data (Conic)**Listed below (Recalc) |

| Elevation (feet) | Surf.Area (sq-ft) | Voids (%) | Inc.Store (cubic-feet) | Cum.Store (cubic-feet) | Wet.Area (sq-ft) |
|---|---|---|---|---|---|
| 54.75 | 487 | 0.0 | 0 | 0 | 487 |
| 56.25 | 487 | 5.0 | 37 | 37 | 604 |
| 57.00 | 774 | 100.0 | 469 | 505 | 899 |
| 58.00 | 1,239 | 100.0 | 997 | 1,503 | 1,377 |
| 59.00 | 1,797 | 100.0 | 1,509 | 3,012 | 1,952 |
| 59.25 | 1,950 | 100.0 | 468 | 3,480 | 2,110 |

| Device | Routing | Invert | Outlet Devices |
|---|---|---|---|
| #1 | Primary | 53.75' | **15.0"  Round Culvert** L= 30.0'  CPP, square edge headwall,  Ke= 0.500 Inlet / Outlet Invert= 53.75' / 53.60'   S= 0.0050 '/'   Cc= 0.900 n= 0.012,  Flow Area= 1.23 sf |
| #2 | Device 1 | 53.75' | **4.0" Vert. Underdrain**  C= 0.600 |
| #3 | Device 2 | 56.25' | **2.500 in/hr Exfiltration throiugh Media over Wetted area above 56.25'** Excluded Wetted area = 604 sf  Phase-In= 0.01' |
| #4 | Device 1 | 57.35' | **4.0" Vert. Orifice/Grate**  C= 0.600 |
| #5 | Device 1 | 58.75' | **24.0" x 24.0" Horiz. Orifice/Grate**  C= 0.600 Limited to weir flow at low heads |

**Primary OutFlow** Max=0.30 cfs @ 12.42 hrs  HW=57.89'  TW=53.71'  (Dynamic Tailwater)
└─**1=Culvert**  (Passes 0.30 cfs of 11.08 cfs potential flow)
  └─**2=Underdrain**  (Passes 0.04 cfs of 0.84 cfs potential flow)
    └─**3=Exfiltration throiugh Media**  (Exfiltration Controls 0.04 cfs)
  ├─**4=Orifice/Grate**  (Orifice Controls 0.26 cfs @ 2.94 fps)
  └─**5=Orifice/Grate**  ( Controls 0.00 cfs)

## Pond 17P: Bio #1



**Hydrograph**
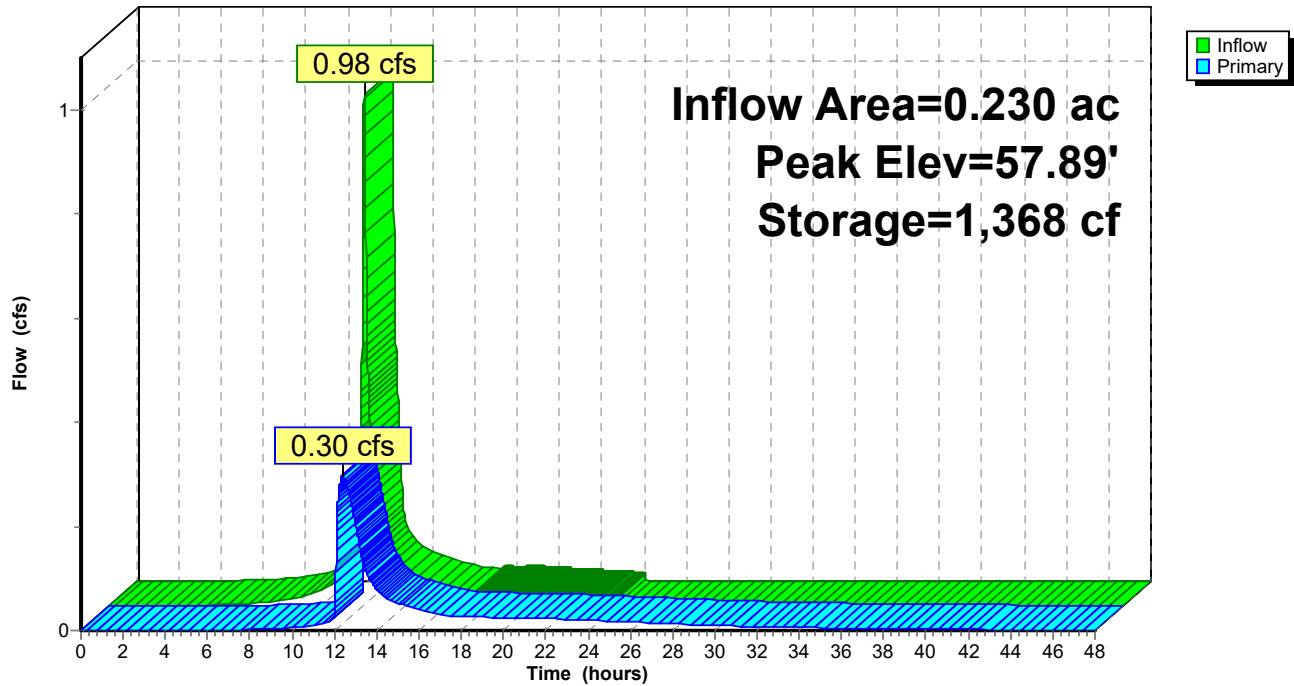
**Inflow Area=0.230 ac**
**Peak Elev=57.89'**
**Storage=1,368 cf**

Inflow
Primary

0.98 cfs

0.30 cfs

Flow  (cfs)

Time  (hours)

## Summary for Pond 21P: CB #8

Inflow Area =        0.060 ac,100.00% Impervious,  Inflow Depth =  5.23"    for  10-year event
Inflow      =      0.32 cfs @  12.08 hrs,  Volume=            0.026 af
Outflow     =      0.32 cfs @  12.08 hrs,  Volume=            0.026 af,  Atten= 0%,  Lag= 0.0 min
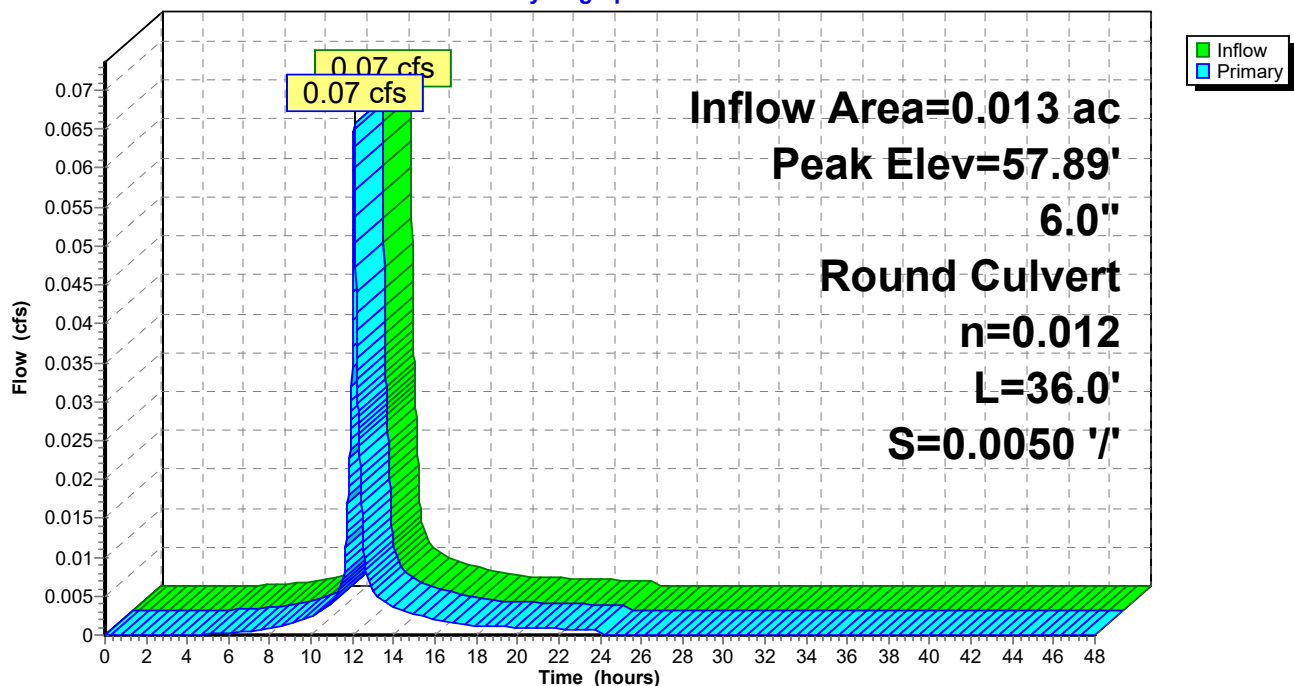Primary     =      0.32 cfs @  12.08 hrs,  Volume=            0.026 af

Routing by Dyn-Stor-Ind method, Time Span= 0.00-48.00 hrs, dt= 0.01 hrs
Peak Elev= 59.46' @ 12.47 hrs
Flood Elev= 60.20'

| Device | Routing | Invert | Outlet Devices |
|---|---|---|---|
| #1 | Primary | 57.86' | **12.0"  Round Culvert**<br>L= 22.0'   CPP, square edge headwall,  Ke= 0.500<br>Inlet / Outlet Invert= 57.86' / 57.75'   S= 0.0050 '/'   Cc= 0.900<br>n= 0.012,  Flow Area= 0.79 sf |

**Primary OutFlow** Max=0.00 cfs @ 12.08 hrs  HW=59.12'  TW=59.14'   (Dynamic Tailwater)
└─1=Culvert  ( Controls 0.00 cfs)

### Pond 21P: CB #8



**Hydrograph**

## Summary for Pond 22P: Bio #2

Inflow Area =      0.362 ac, 74.85% Impervious, Inflow Depth =  4.61"   for  10-year event
Inflow      =    1.74 cfs @  12.08 hrs, Volume=           0.139 af
Outflow    =    0.44 cfs @  12.46 hrs, Volume=           0.137 af, Atten= 75%, Lag= 22.4 min
Primary    =    0.44 cfs @  12.46 hrs, Volume=           0.137 af

Routing by Dyn-Stor-Ind method, Time Span= 0.00-48.00 hrs, dt= 0.01 hrs
Starting Elev= 57.75'  Surf.Area= 1,027 sf  Storage= 77 cf
Peak Elev= 59.46' @ 12.46 hrs  Surf.Area= 2,117 sf  Storage= 2,733 cf  (2,656 cf above start)
Flood Elev= 60.00'  Surf.Area= 2,511 sf  Storage= 3,983 cf  (3,906 cf above start)

Plug-Flow detention time= 263.1 min calculated for 0.136 af (98% of inflow)
Center-of-Mass det. time= 240.0 min ( 999.5 - 759.5 )

| Volume | Invert | Avail.Storage | Storage Description |
|---|---|---|---|
| #1 | 56.25' | 3,983 cf | **Custom Stage Data (Conic)**Listed below (Recalc) |

| Elevation (feet) | Surf.Area (sq-ft) | Voids (%) | Inc.Store (cubic-feet) | Cum.Store (cubic-feet) | Wet.Area (sq-ft) |
|---|---|---|---|---|---|
| 56.25 | 1,027 | 0.0 | 0 | 0 | 1,027 |
| 57.75 | 1,027 | 5.0 | 77 | 77 | 1,197 |
| 58.00 | 1,175 | 100.0 | 275 | 352 | 1,348 |
| 59.00 | 1,809 | 100.0 | 1,481 | 1,833 | 1,997 |
| 60.00 | 2,511 | 100.0 | 2,150 | 3,983 | 2,718 |

| Device | Routing | Invert | Outlet Devices |
|---|---|---|---|
| #1 | Primary | 55.25' | **15.0"  Round Culvert** L= 18.0'  CPP, square edge headwall,  Ke= 0.500  Inlet / Outlet Invert= 55.25' / 55.16'  S= 0.0050 '/'  Cc= 0.900  n= 0.012,  Flow Area= 1.23 sf |
| #2 | Device 1 | 55.25' | **4.0" Vert. Underdrain**  C= 0.600 |
| #3 | Device 2 | 57.75' | **2.500 in/hr Exfiltration throiugh Media over Wetted area above 57.75'**  Excluded Wetted area = 1,197 sf  Phase-In= 0.01' |
| #4 | Device 1 | 58.50' | **4.0" Vert. Orifice/Grate**  C= 0.600 |
| #5 | Device 1 | 59.50' | **24.0" x 24.0" Horiz. Orifice/Grate**  C= 0.600  Limited to weir flow at low heads |

**Primary OutFlow** Max=0.44 cfs @ 12.46 hrs  HW=59.46'  TW=55.21'  (Dynamic Tailwater)
└─**1=Culvert** (Passes 0.44 cfs of 11.19 cfs potential flow)
  ├─**2=Underdrain** (Passes 0.06 cfs of 0.84 cfs potential flow)
  │  └─**3=Exfiltration throiugh Media** (Exfiltration Controls 0.06 cfs)
  ├─**4=Orifice/Grate** (Orifice Controls 0.37 cfs @ 4.29 fps)
  └─**5=Orifice/Grate** ( Controls 0.00 cfs)

## Pond 22P: Bio #2



**Hydrograph**
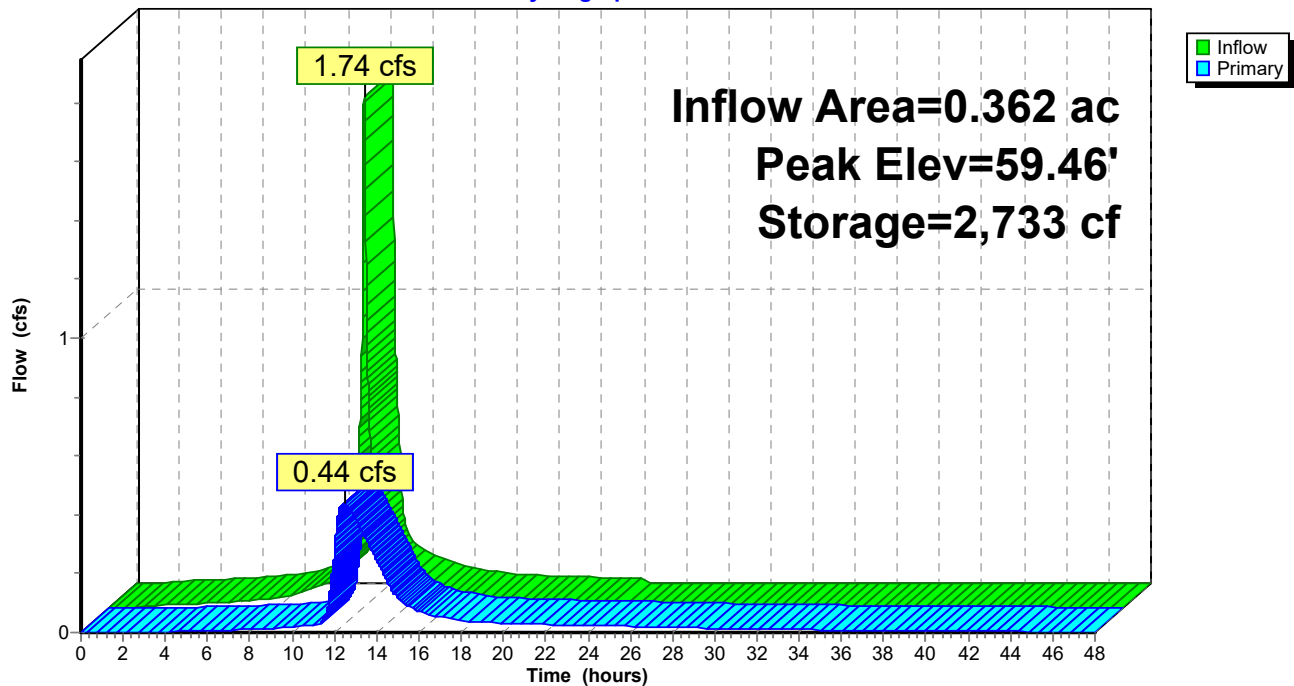
Inflow Area=0.362 ac
Peak Elev=59.46'
Storage=2,733 cf

1.74 cfs

0.44 cfs

Inflow
Primary

Flow (cfs)

Time (hours)

## Summary for Pond 30P: CB #10-2

Inflow Area =        0.189 ac,  53.10% Impervious,  Inflow Depth =  4.01"   for  10-year event
Inflow      =      0.87 cfs @  12.09 hrs,  Volume=           0.063 af
Outflow    =      0.87 cfs @  12.09 hrs,  Volume=           0.063 af,  Atten= 0%,  Lag= 0.0 min
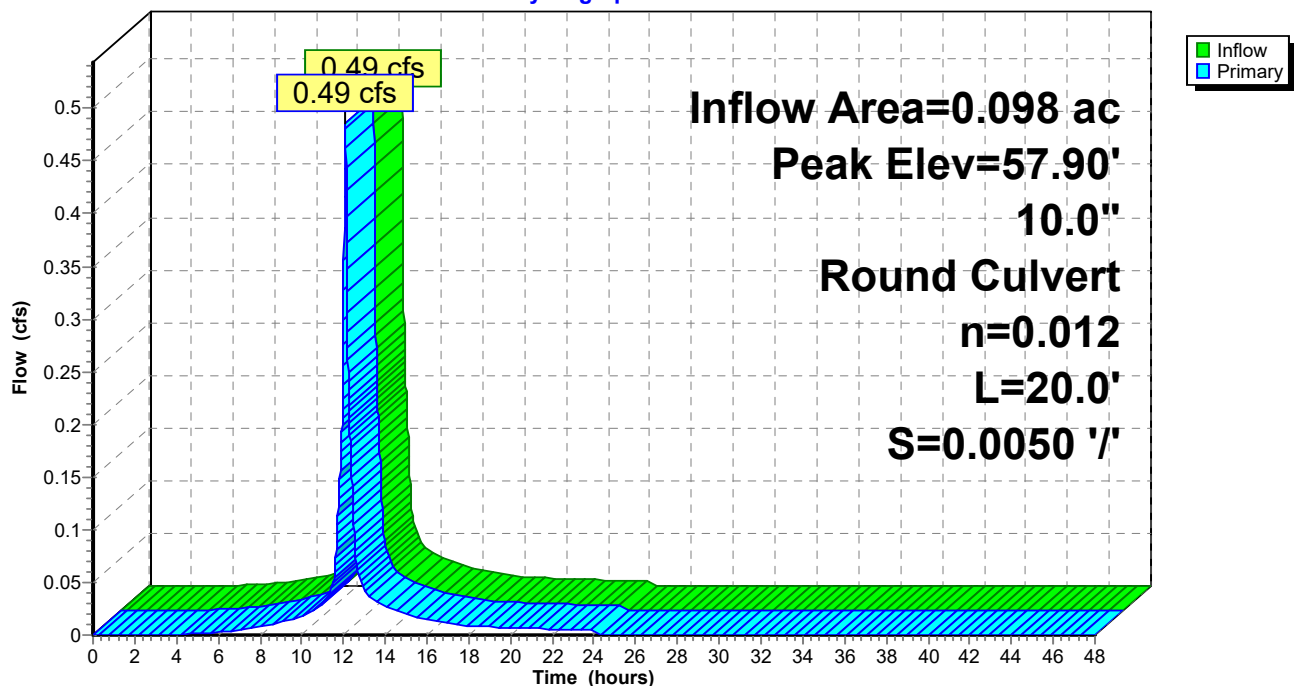Primary    =      0.87 cfs @  12.09 hrs,  Volume=           0.063 af

Routing by Dyn-Stor-Ind method, Time Span= 0.00-48.00 hrs, dt= 0.01 hrs
Peak Elev= 53.13' @ 12.09 hrs
Flood Elev= 56.65'

| Device | Routing | Invert | Outlet Devices |
|--------|---------|--------|----------------|
| #1 | Primary | 52.65' | **12.0"  Round Culvert**<br>L= 78.0'   CPP, square edge headwall,  Ke= 0.500<br>Inlet / Outlet Invert= 52.65' / 49.55'   S= 0.0397 '/'   Cc= 0.900<br>n= 0.012,  Flow Area= 0.79 sf |

**Primary OutFlow** Max=0.87 cfs @ 12.09 hrs  HW=53.13'  TW=49.20'   (Dynamic Tailwater)
└─**1=Culvert** (Inlet Controls 0.87 cfs @ 2.35 fps)

### Pond 30P: CB #10-2

**Hydrograph**



Inflow Area=0.189 ac
Peak Elev=53.13'
12.0"
Round Culvert
n=0.012
L=78.0'
S=0.0397 '/'

## Summary for Pond 31P: CB #10-1

Inflow Area =        0.164 ac,  71.11% Impervious,  Inflow Depth =   4.44"    for  10-year event
Inflow      =       0.81 cfs @   12.08 hrs,  Volume=              0.061 af
Outflow    =       0.81 cfs @   12.08 hrs,  Volume=              0.061 af,  Atten= 0%,  Lag= 0.0 min
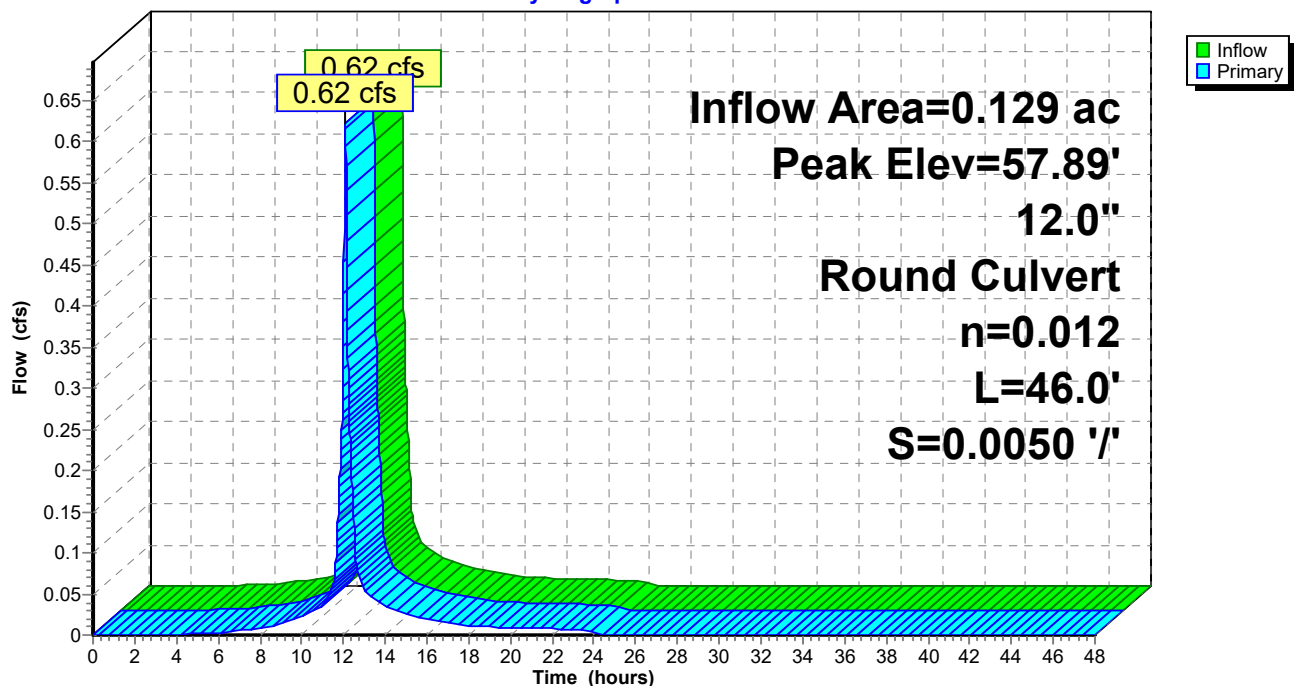Primary    =       0.81 cfs @   12.08 hrs,  Volume=              0.061 af

Routing by Dyn-Stor-Ind method, Time Span= 0.00-48.00 hrs, dt= 0.01 hrs
Peak Elev= 50.14' @ 12.08 hrs
Flood Elev= 53.60'

| Device | Routing | Invert | Outlet Devices |
|--------|---------|--------|----------------|
| #1 | Primary | 49.60' | **12.0"  Round Culvert**<br>L= 2.0'   CPP, square edge headwall,  Ke= 0.500<br>Inlet / Outlet Invert= 49.60' / 49.55'   S= 0.0250 '/'   Cc= 0.900<br>n= 0.012,  Flow Area= 0.79 sf |

**Primary OutFlow** Max=0.81 cfs @ 12.08 hrs  HW=50.13'  TW=49.20'   (Dynamic Tailwater)
└─**1=Culvert** (Barrel Controls 0.81 cfs @ 2.75 fps)

### Pond 31P: CB #10-1

## Summary for Pond 32P: DMH #10

Inflow Area =       17.467 ac,  10.03% Impervious,  Inflow Depth >  2.69"   for  10-year event
Inflow     =     19.20 cfs @   12.50 hrs,  Volume=            3.919 af
Outflow    =     19.20 cfs @   12.50 hrs,  Volume=            3.919 af,  Atten= 0%,  Lag= 0.0 min
Primary    =     19.20 cfs @   12.50 hrs,  Volume=            3.919 af

Routing by Dyn-Stor-Ind method, Time Span= 0.00-48.00 hrs, dt= 0.01 hrs
Peak Elev= 49.90' @ 12.50 hrs
Flood Elev= 53.70'

| Device | Routing | Invert | Outlet Devices |
|---|---|---|---|
| #1 | Primary | 47.29' | **24.0"  Round Culvert**<br>L= 57.0'   RCP, square edge headwall,  Ke= 0.500<br>Inlet / Outlet Invert= 47.29' / 46.52'   S= 0.0135 '/'   Cc= 0.900<br>n= 0.012,  Flow Area= 3.14 sf |

**Primary OutFlow** Max=19.20 cfs @ 12.50 hrs  HW=49.90'  TW=47.33'   (Dynamic Tailwater)
└─**1=Culvert** (Inlet Controls 19.20 cfs @ 6.11 fps)

### Pond 32P: DMH #10

## Summary for Pond 40P: 6" CPP

Inflow Area =          0.070 ac,100.00% Impervious,  Inflow Depth =   5.23"    for  10-year event
Inflow      =        0.38 cfs @   12.08 hrs,  Volume=              0.031 af
Outflow     =        0.38 cfs @   12.08 hrs,  Volume=              0.031 af,  Atten= 0%,  Lag= 0.0 min
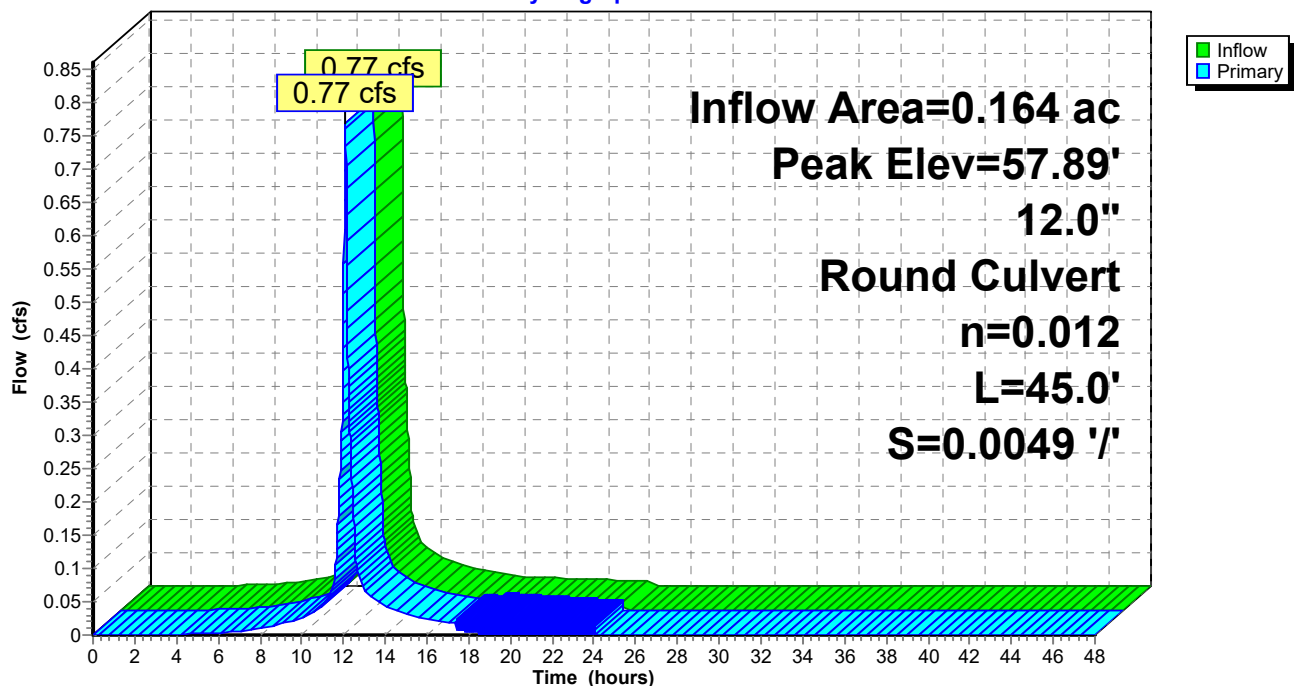Primary     =        0.38 cfs @   12.08 hrs,  Volume=              0.031 af

Routing by Dyn-Stor-Ind method, Time Span= 0.00-48.00 hrs, dt= 0.01 hrs
Peak Elev= 53.99' @ 12.08 hrs
Flood Elev= 56.90'

| Device | Routing | Invert | Outlet Devices |
|--------|---------|--------|----------------|
| #1 | Primary | 53.58' | **6.0"  Round Culvert**<br>L= 174.0'   CPP, square edge headwall,  Ke= 0.500<br>Inlet / Outlet Invert= 53.58' / 50.97'   S= 0.0150 '/'   Cc= 0.900<br>n= 0.012,  Flow Area= 0.20 sf |

**Primary OutFlow** Max=0.38 cfs @ 12.08 hrs  HW=53.99'  TW=52.15'   (Dynamic Tailwater)
└─**1=Culvert** (Inlet Controls 0.38 cfs @ 2.18 fps)

### Pond 40P: 6" CPP



**Hydrograph**
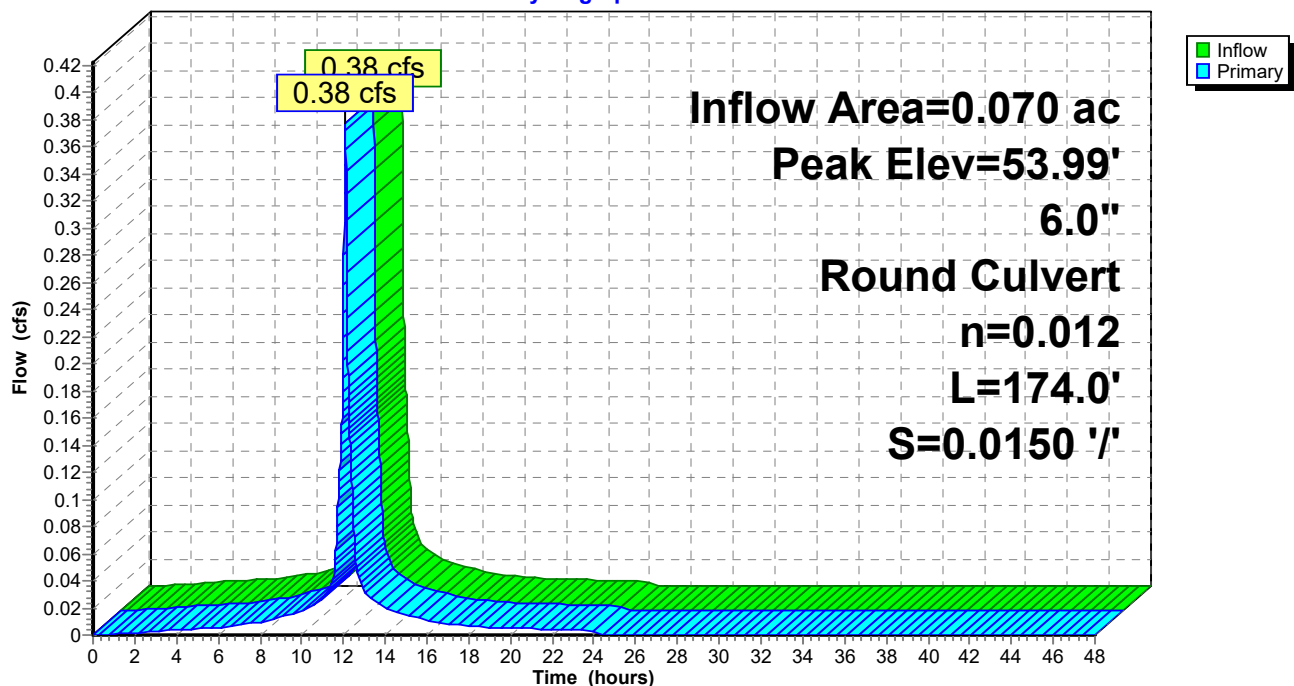
Inflow Area=0.070 ac
Peak Elev=53.99'
6.0"
Round Culvert
n=0.012
L=174.0'
S=0.0150 '/'

## Summary for Pond 41P: YD #15

Inflow Area =       0.119 ac,  96.30% Impervious,  Inflow Depth =   5.14"    for  10-year event
Inflow      =      0.63 cfs @   12.08 hrs,  Volume=              0.051 af
Outflow     =      0.63 cfs @   12.08 hrs,  Volume=              0.051 af,  Atten= 0%,  Lag= 0.0 min
Primary     =      0.63 cfs @   12.08 hrs,  Volume=              0.051 af

Routing by Dyn-Stor-Ind method, Time Span= 0.00-48.00 hrs, dt= 0.01 hrs
Peak Elev= 52.44' @ 12.12 hrs
Flood Elev= 55.80'

| Device | Routing | Invert | Outlet Devices |
|--------|---------|--------|----------------|
| #1 | Primary | 50.80' | **8.0"  Round Culvert** |
|  |  |  | L= 47.0'   CPP, square edge headwall,  Ke= 0.500 |
|  |  |  | Inlet / Outlet Invert= 50.80' / 50.10'   S= 0.0149 '/'   Cc= 0.900 |
|  |  |  | n= 0.012,  Flow Area= 0.35 sf |

**Primary OutFlow** Max=0.36 cfs @ 12.08 hrs  HW=52.15'  TW=52.09'   (Dynamic Tailwater)
└─**1=Culvert** (Outlet Controls 0.36 cfs @ 1.03 fps)

### Pond 41P: YD #15

**Hydrograph**



Inflow Area=0.119 ac
Peak Elev=52.44'
8.0"
Round Culvert
n=0.012
L=47.0'
S=0.0149 '/'

## Summary for Pond 42P: 6" CPP

Inflow Area =         0.050 ac,100.00% Impervious,  Inflow Depth =   5.23"    for  10-year event
Inflow      =      0.27 cfs @   12.08 hrs,  Volume=                0.022 af
Outflow     =      0.27 cfs @   12.08 hrs,  Volume=                0.022 af,  Atten= 0%,  Lag= 0.0 min
Primary     =      0.27 cfs @   12.08 hrs,  Volume=                0.022 af

Routing by Dyn-Stor-Ind method, Time Span= 0.00-48.00 hrs, dt= 0.01 hrs
Peak Elev= 53.17' @ 12.11 hrs
Flood Elev= 56.50'

| Device | Routing | Invert | Outlet Devices |
|---|---|---|---|
| #1 | Primary | 52.81' | **6.0"  Round Culvert**<br>L= 150.0'   CPP, square edge headwall,  Ke= 0.500<br>Inlet / Outlet Invert= 52.81' / 50.19'   S= 0.0175 '/'   Cc= 0.900<br>n= 0.012,  Flow Area= 0.20 sf |

**Primary OutFlow** Max=0.25 cfs @ 12.08 hrs  HW=53.15'  TW=52.09'   (Dynamic Tailwater)
└—**1=Culvert** (Outlet Controls 0.25 cfs @ 2.46 fps)

### Pond 42P: 6" CPP

**Hydrograph**
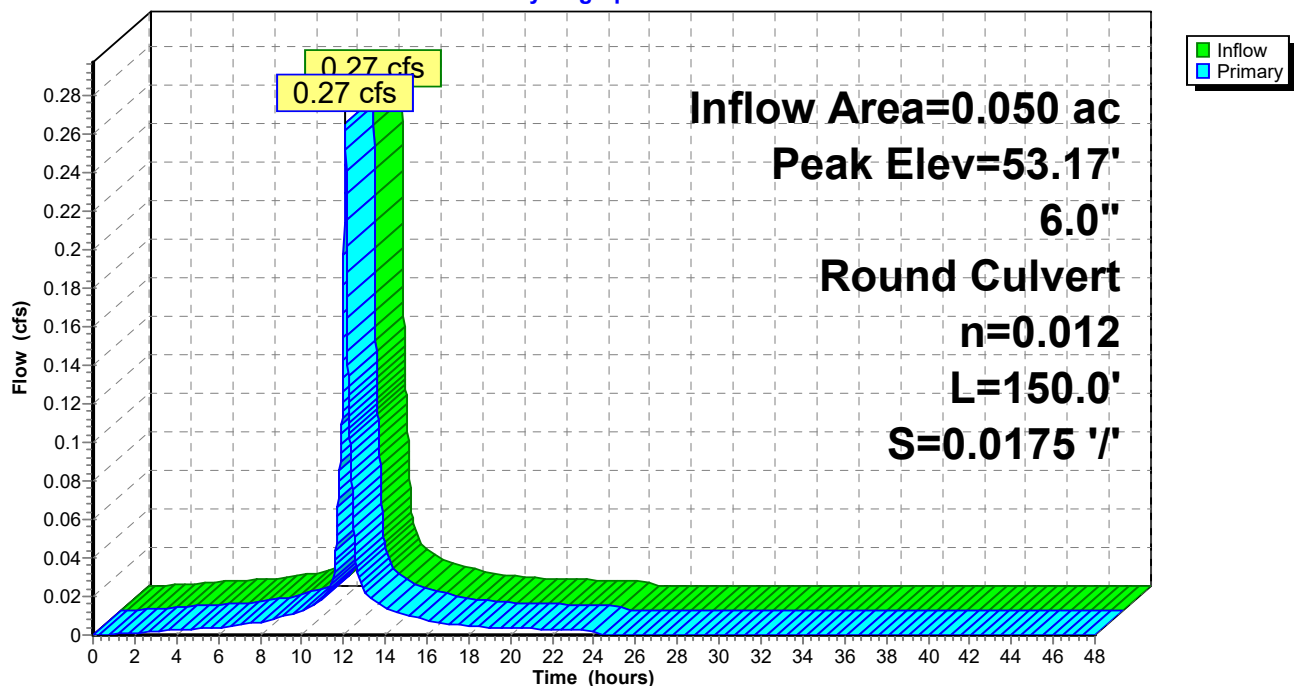
## Summary for Pond 43P: 10" CPP

Inflow Area =         0.169 ac,  97.39% Impervious,  Inflow Depth =   5.17"   for  10-year event
Inflow      =      0.90 cfs @   12.08 hrs,  Volume=            0.073 af
Outflow    =      0.90 cfs @   12.08 hrs,  Volume=            0.073 af,  Atten= 0%,  Lag= 0.0 min
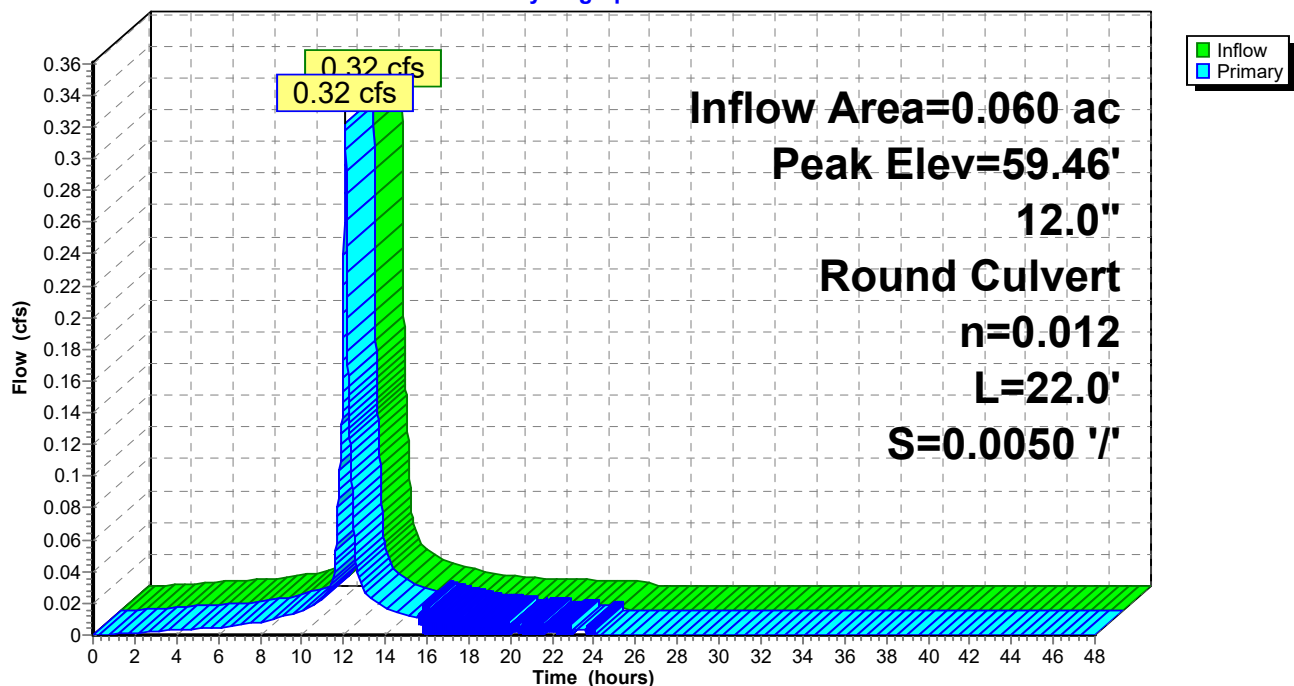Primary    =      0.90 cfs @   12.08 hrs,  Volume=            0.073 af

Routing by Dyn-Stor-Ind method, Time Span= 0.00-48.00 hrs, dt= 0.01 hrs
Peak Elev= 52.29' @ 12.12 hrs
Flood Elev= 56.50'

| Device | Routing | Invert | Outlet Devices |
|--------|---------|--------|----------------|
| #1 | Primary | 50.10' | **8.0"  Round Culvert**<br>L= 33.0'   CPP, square edge headwall,  Ke= 0.500<br>Inlet / Outlet Invert= 50.10' / 49.61'   S= 0.0148 '/'   Cc= 0.900<br>n= 0.012,  Flow Area= 0.35 sf |

**Primary OutFlow** Max=0.74 cfs @ 12.08 hrs  HW=52.09'  TW=51.88'  (Dynamic Tailwater)
└─**1=Culvert** (Outlet Controls 0.74 cfs @ 2.11 fps)

### Pond 43P: 10" CPP



**Hydrograph**

Inflow Area=0.169 ac
Peak Elev=52.29'
8.0"
Round Culvert
n=0.012
L=33.0'
S=0.0148 '/'

## Summary for Pond 44P: CB #14

| | | | | | |
|---|---|---|---|---|---|
| Inflow Area = | | 0.276 ac, 75.46% Impervious, Inflow Depth = 4.60"  for  10-year event | | | |
| Inflow | = | 1.36 cfs @  12.08 hrs, Volume= | | 0.106 af | |
| Outflow | = | 1.36 cfs @  12.08 hrs, Volume= | | 0.106 af,  Atten= 0%,  Lag= 0.0 min | |
| Primary | = | 1.36 cfs @  12.08 hrs, Volume= | | 0.106 af | |

Routing by Dyn-Stor-Ind method, Time Span= 0.00-48.00 hrs, dt= 0.01 hrs
Peak Elev= 52.04' @ 12.12 hrs
Flood Elev= 54.10'

| Device | Routing | Invert | Outlet Devices |
|---|---|---|---|
| #1 | Primary | 49.27' | **12.0"  Round Culvert**<br>L= 31.0'  CPP, square edge headwall,  Ke= 0.500<br>Inlet / Outlet Invert= 49.27' / 49.12'  S= 0.0048 '/'  Cc= 0.900<br>n= 0.012,  Flow Area= 0.79 sf |

**Primary OutFlow** Max=0.87 cfs @ 12.08 hrs  HW=51.89'  TW=51.84'  (Dynamic Tailwater)
└─**1=Culvert** (Inlet Controls 0.87 cfs @ 1.10 fps)

### Pond 44P: CB #14



**Hydrograph**

Inflow Area=0.276 ac
Peak Elev=52.04'
12.0"
Round Culvert
n=0.012
L=31.0'
S=0.0048 '/'

## Summary for Pond 45P: CB #13-2

Inflow Area =        0.088 ac,  71.88% Impervious,  Inflow Depth =  4.44"   for  10-year event
Inflow      =      0.44 cfs @   12.08 hrs,  Volume=              0.033 af
Outflow     =      0.44 cfs @   12.08 hrs,  Volume=              0.033 af,  Atten= 0%,  Lag= 0.0 min
Primary     =      0.44 cfs @   12.08 hrs,  Volume=              0.033 af

Routing by Dyn-Stor-Ind method, Time Span= 0.00-48.00 hrs, dt= 0.01 hrs
Peak Elev= 51.94' @ 12.12 hrs
Flood Elev= 54.65'

| Device | Routing | Invert | Outlet Devices |
|--------|---------|--------|----------------|
| #1 | Primary | 49.65' | **12.0"  Round Culvert**<br>L= 22.0'   CPP, square edge headwall,  Ke= 0.500<br>Inlet / Outlet Invert= 49.65' / 49.11'   S= 0.0245 '/'   Cc= 0.900<br>n= 0.012,  Flow Area= 0.79 sf |

**Primary OutFlow** Max=0.00 cfs @ 12.08 hrs  HW=51.78'  TW=51.84'  (Dynamic Tailwater)
└─**1=Culvert** ( Controls 0.00 cfs)

### Pond 45P: CB #13-2

**Hydrograph**



Inflow Area=0.088 ac
Peak Elev=51.94'
12.0"
Round Culvert
n=0.012
L=22.0'
S=0.0245 '/'

## Summary for Pond 46P: CB #13-1

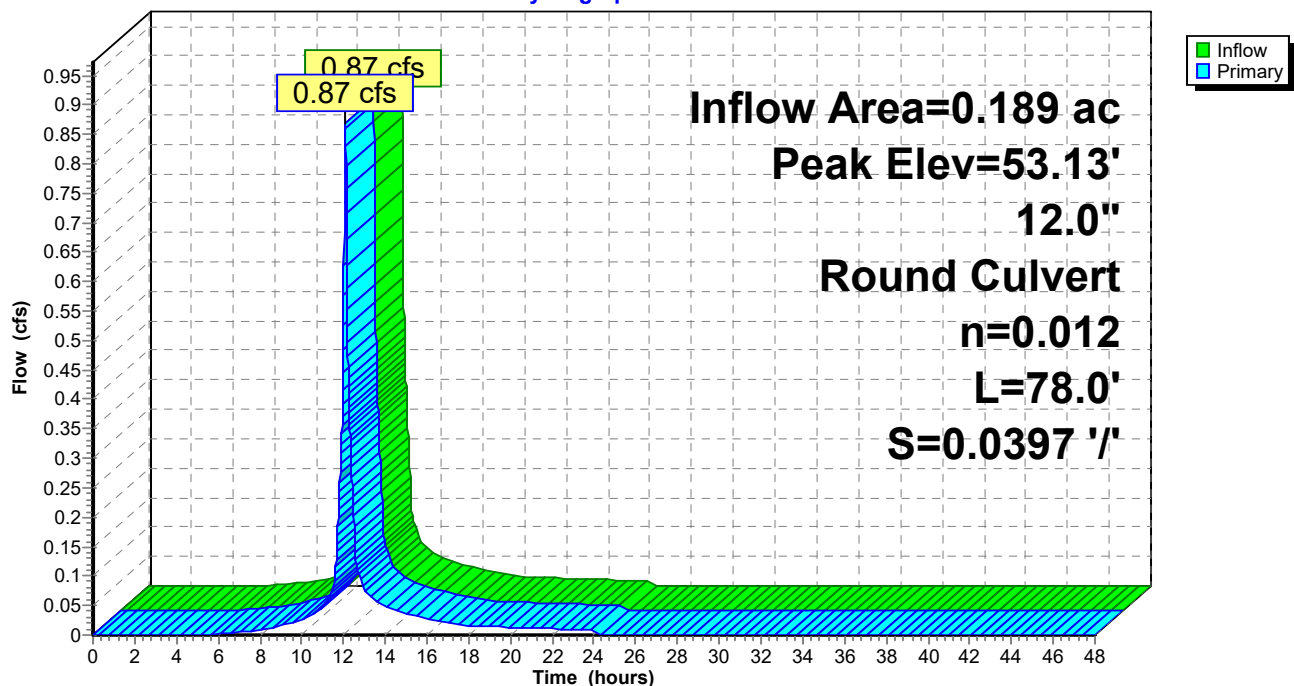| | | | | | |
|---|---|---|---|---|---|
| Inflow Area = | | 0.103 ac, | 73.25% Impervious, | Inflow Depth = 4.55" | for  10-year event |
| Inflow | = | 0.52 cfs @ | 12.08 hrs, | Volume= | 0.039 af |
| Outflow | = | 0.52 cfs @ | 12.08 hrs, | Volume= | 0.039 af,  Atten= 0%,  Lag= 0.0 min |
| Primary | = | 0.52 cfs @ | 12.08 hrs, | Volume= | 0.039 af |

Routing by Dyn-Stor-Ind method, Time Span= 0.00-48.00 hrs, dt= 0.01 hrs
Peak Elev= 51.95' @ 12.12 hrs
Flood Elev= 54.50'

| Device | Routing | Invert | Outlet Devices |
|---|---|---|---|
| #1 | Primary | 49.50' | **12.0"  Round Culvert** |
| | | | L= 12.0'   CPP, square edge headwall,  Ke= 0.500 |
| | | | Inlet / Outlet Invert= 49.50' / 49.11'   S= 0.0325 '/'   Cc= 0.900 |
| | | | n= 0.012,  Flow Area= 0.79 sf |

**Primary OutFlow** Max=0.00 cfs @ 12.08 hrs  HW=51.78'  TW=51.84'   (Dynamic Tailwater)
└─**1=Culvert** ( Controls 0.00 cfs)

### Pond 46P: CB #13-1

**Hydrograph**



Inflow Area=0.103 ac
Peak Elev=51.95'
12.0"
Round Culvert
n=0.012
L=12.0'
S=0.0325 '/'

## Summary for Pond 47P: DMH #13

Inflow Area =        0.467 ac, 74.30% Impervious,  Inflow Depth =  4.56"   for  10-year event
Inflow      =      2.32 cfs @  12.08 hrs,  Volume=            0.177 af
Outflow    =      2.32 cfs @  12.08 hrs,  Volume=            0.177 af,  Atten= 0%,  Lag= 0.0 min
Primary    =      2.32 cfs @  12.08 hrs,  Volume=            0.177 af

Routing by Dyn-Stor-Ind method, Time Span= 0.00-48.00 hrs, dt= 0.01 hrs
Peak Elev= 51.93' @ 12.11 hrs
Flood Elev= 54.90'

| Device | Routing | Invert | Outlet Devices |
|---|---|---|---|
| #1 | Primary | 49.01' | **12.0"  Round Culvert**<br>L= 67.0'   CPP, square edge headwall,  Ke= 0.500<br>Inlet / Outlet Invert= 49.01' / 48.67'   S= 0.0051 '/'   Cc= 0.900<br>n= 0.012,  Flow Area= 0.79 sf |

**Primary OutFlow** Max=2.15 cfs @ 12.08 hrs  HW=51.84'  TW=51.45'   (Dynamic Tailwater)
  **1=Culvert** (Outlet Controls 2.15 cfs @ 2.74 fps)

### Pond 47P: DMH #13

**Hydrograph**
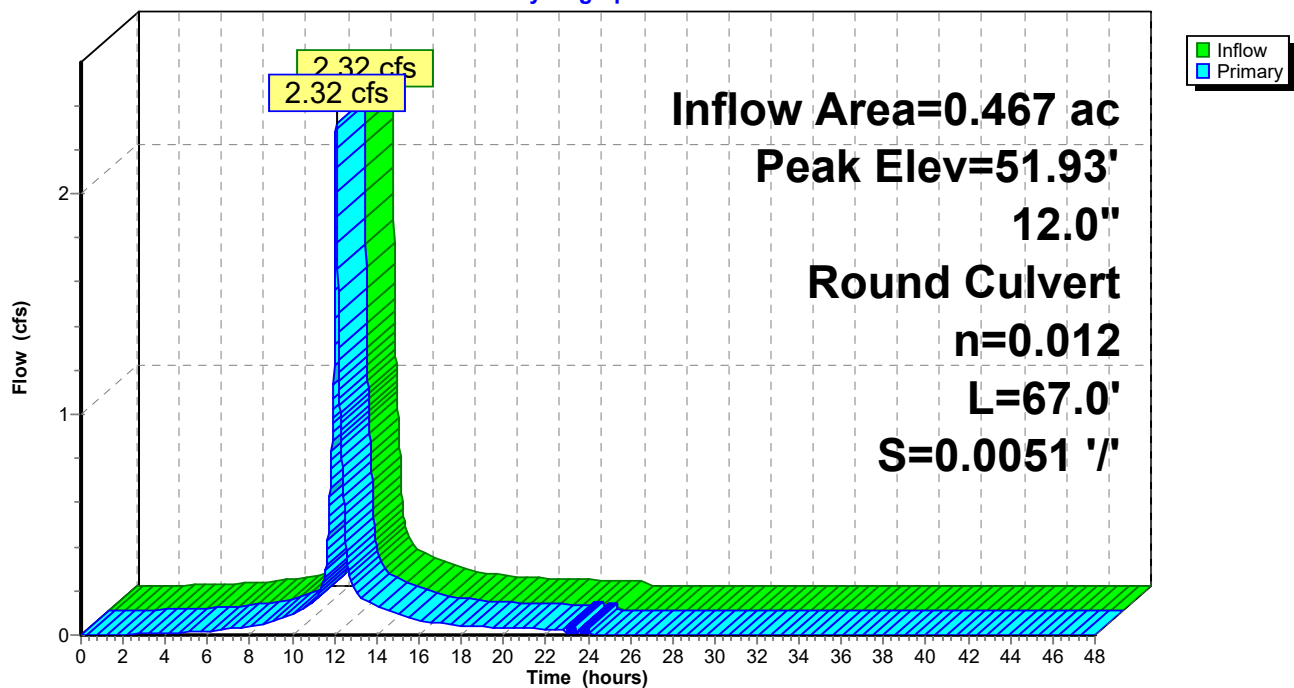
## Summary for Pond 48P: CB #12-2

Inflow Area =      0.078 ac,  55.67% Impervious,  Inflow Depth =   4.12"   for  10-year event
Inflow      =      0.37 cfs @  12.09 hrs,  Volume=           0.027 af
Outflow    =      0.37 cfs @  12.09 hrs,  Volume=           0.027 af,  Atten= 0%,  Lag= 0.0 min
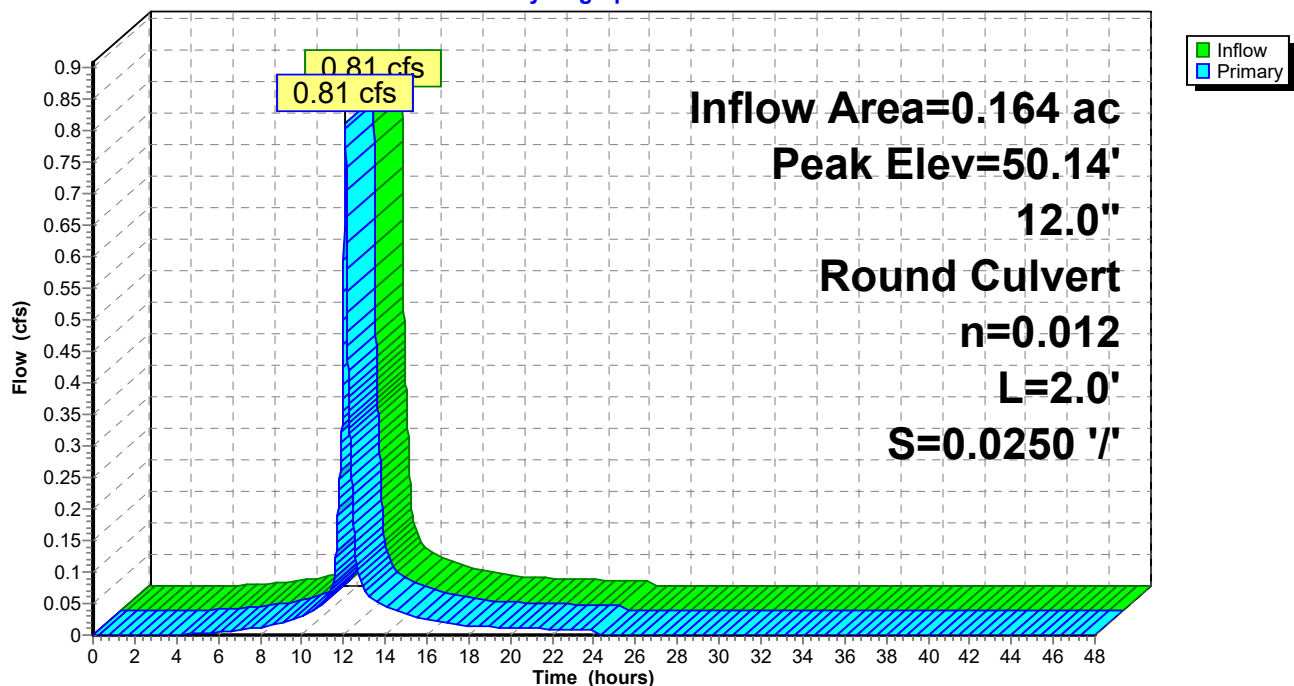Primary    =      0.37 cfs @  12.09 hrs,  Volume=           0.027 af

Routing by Dyn-Stor-Ind method, Time Span= 0.00-48.00 hrs, dt= 0.01 hrs
Peak Elev= 51.71' @ 12.36 hrs
Flood Elev= 52.60'

| Device | Routing | Invert | Outlet Devices |
|--------|---------|--------|----------------|
| #1 | Primary | 48.70' | **12.0"  Round Culvert**<br>L= 6.0'  CPP, square edge headwall,  Ke= 0.500<br>Inlet / Outlet Invert= 48.70' / 48.67'  S= 0.0050 '/'  Cc= 0.900<br>n= 0.012,  Flow Area= 0.79 sf |

**Primary OutFlow** Max=0.00 cfs @ 12.09 hrs  HW=51.41'  TW=51.46'   (Dynamic Tailwater)
└─1=Culvert  ( Controls 0.00 cfs)

### Pond 48P: CB #12-2

**Hydrograph**



Inflow Area=0.078 ac
Peak Elev=51.71'
12.0"
Round Culvert
n=0.012
L=6.0'
S=0.0050 '/'

## Summary for Pond 49P: CB #12-1

Inflow Area =        0.084 ac,  83.90% Impervious,  Inflow Depth =   4.66"   for  10-year event
Inflow      =       0.43 cfs @   12.08 hrs,  Volume=                0.033 af
Outflow     =       0.43 cfs @   12.08 hrs,  Volume=                0.033 af,  Atten= 0%,  Lag= 0.0 min
Primary     =       0.43 cfs @   12.08 hrs,  Volume=                0.033 af
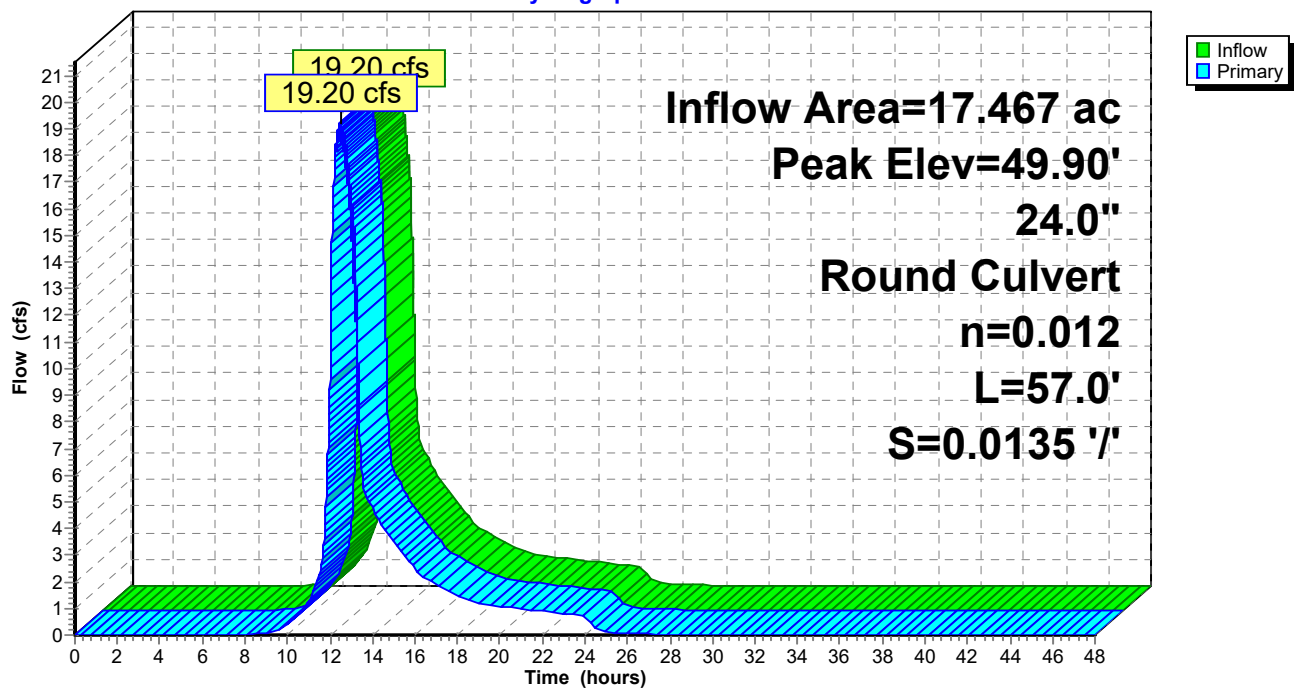
Routing by Dyn-Stor-Ind method, Time Span= 0.00-48.00 hrs, dt= 0.01 hrs
Peak Elev= 51.71' @ 12.36 hrs
Flood Elev= 52.60'

| Device | Routing | Invert | Outlet Devices |
|--------|---------|--------|----------------|
| #1 | Primary | 48.90' | **12.0"  Round Culvert**<br>L= 46.0'   CPP, square edge headwall,  Ke= 0.500<br>Inlet / Outlet Invert= 48.90' / 48.67'   S= 0.0050 '/'   Cc= 0.900<br>n= 0.012,  Flow Area= 0.79 sf |

**Primary OutFlow** Max=0.00 cfs @ 12.08 hrs  HW=51.41'  TW=51.45'   (Dynamic Tailwater)
└─**1=Culvert** ( Controls 0.00 cfs)

### Pond 49P: CB #12-1

**Hydrograph**
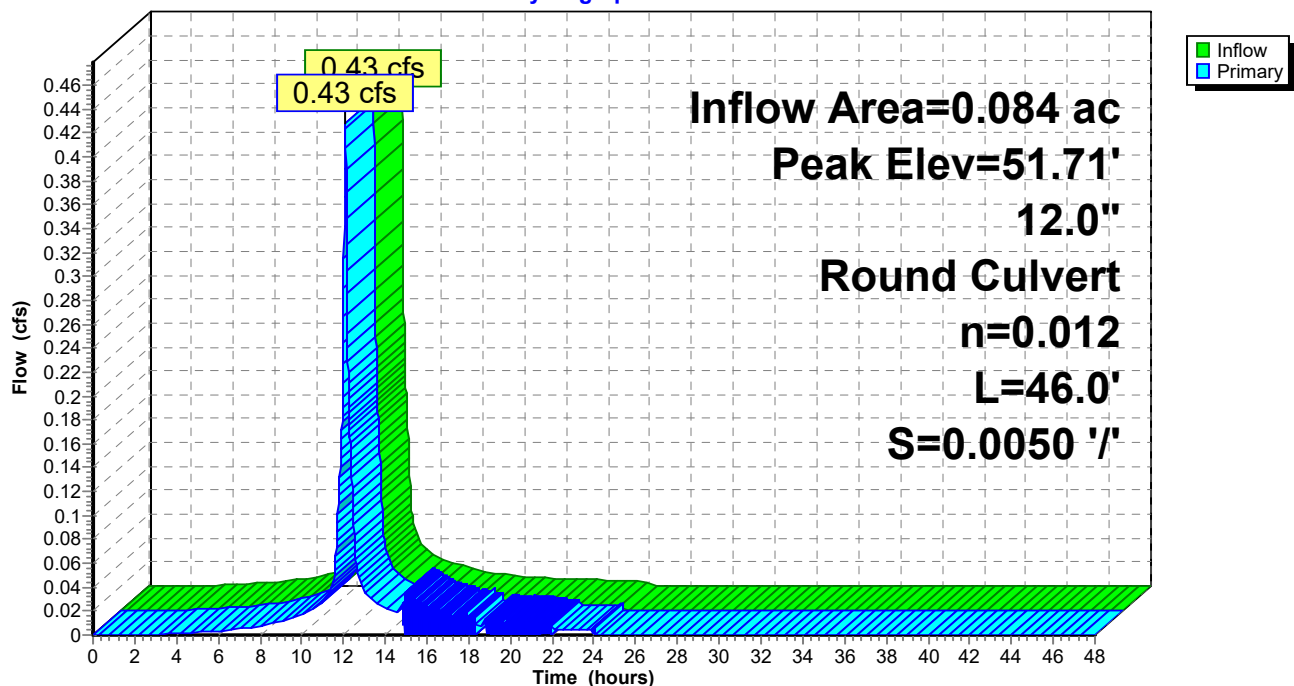
## Summary for Pond 50P: DMH #12

Inflow Area =        0.629 ac,  73.25% Impervious,  Inflow Depth =  4.51"   for  10-year event
Inflow      =       3.11 cfs @  12.08 hrs,  Volume=            0.237 af
Outflow     =       3.11 cfs @  12.08 hrs,  Volume=            0.237 af,  Atten= 0%,  Lag= 0.0 min
Primary     =       3.11 cfs @  12.08 hrs,  Volume=            0.237 af

Routing by Dyn-Stor-Ind method, Time Span= 0.00-48.00 hrs, dt= 0.01 hrs
Peak Elev= 51.71' @ 12.35 hrs
Flood Elev= 54.00'

| Device | Routing | Invert | Outlet Devices |
|--------|---------|--------|----------------|
| #1 | Primary | 48.42' | **15.0"  Round Culvert** |
| | | | L= 106.0'  CPP, square edge headwall,  Ke= 0.500 |
| | | | Inlet / Outlet Invert= 48.42' / 48.00'  S= 0.0040 '/'  Cc= 0.900 |
| | | | n= 0.012,  Flow Area= 1.23 sf |

**Primary OutFlow** Max=2.86 cfs @ 12.08 hrs  HW=51.46'  TW=51.15'   (Dynamic Tailwater)
└─**1=Culvert** (Outlet Controls 2.86 cfs @ 2.33 fps)

### Pond 50P: DMH #12

## Summary for Pond 60P: CB #17-1-2

Inflow Area =      0.210 ac, 78.19% Impervious,  Inflow Depth =   4.66"    for  10-year event
Inflow      =     1.07 cfs @   12.08 hrs,  Volume=            0.082 af
Outflow    =     1.07 cfs @   12.08 hrs,  Volume=            0.082 af,  Atten= 0%,  Lag= 0.0 min
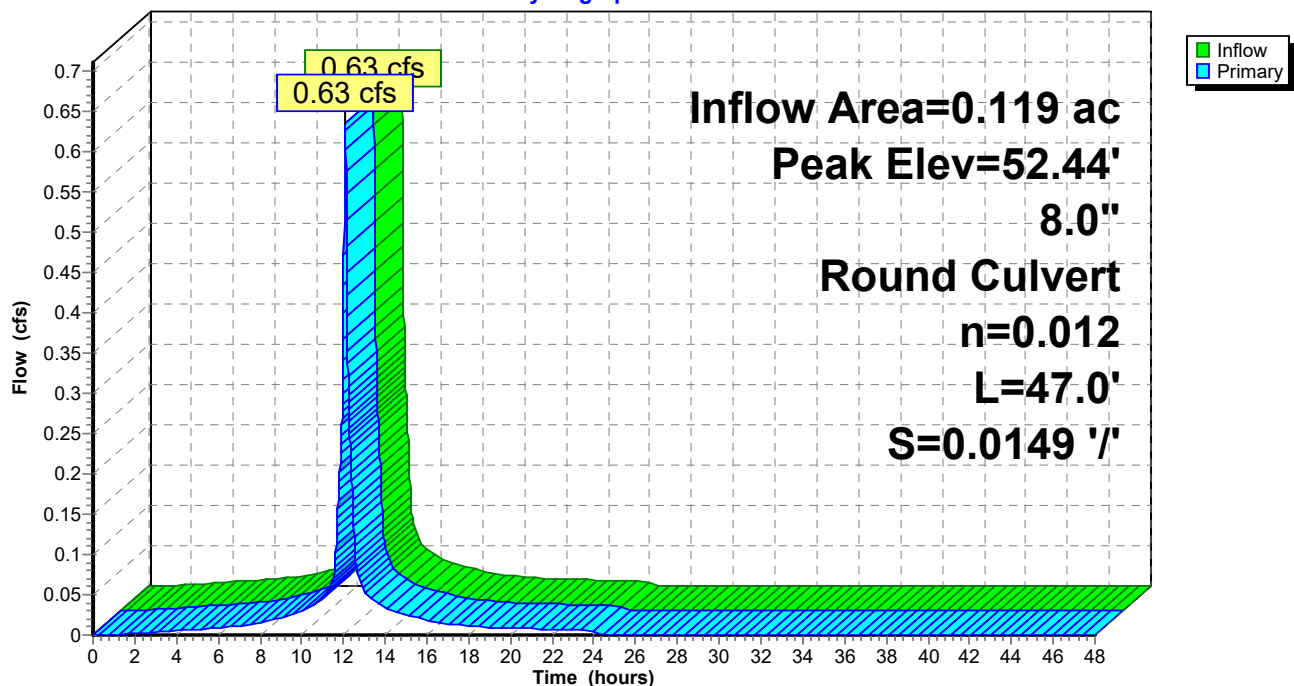Primary    =     1.07 cfs @   12.08 hrs,  Volume=            0.082 af

Routing by Dyn-Stor-Ind method, Time Span= 0.00-48.00 hrs, dt= 0.01 hrs
Peak Elev= 52.75' @ 12.12 hrs
Flood Elev= 54.90'

| Device | Routing | Invert | Outlet Devices |
|--------|---------|--------|----------------|
| #1 | Primary | 50.40' | **12.0"  Round Culvert**<br>L= 21.0'   CPP, square edge headwall,  Ke= 0.500<br>Inlet / Outlet Invert= 50.40' / 50.29'  S= 0.0052 '/'  Cc= 0.900<br>n= 0.012,  Flow Area= 0.79 sf |

**Primary OutFlow** Max=0.00 cfs @ 12.08 hrs  HW=52.48'  TW=52.53'   (Dynamic Tailwater)
└—**1=Culvert** ( Controls 0.00 cfs)

### Pond 60P: CB #17-1-2

**Hydrograph**



Inflow Area=0.210 ac
Peak Elev=52.75'
12.0"
Round Culvert
n=0.012
L=21.0'
S=0.0052 '/'

## Summary for Pond 61P: CB #17-1-1

Inflow Area =        0.162 ac, 91.98% Impervious,  Inflow Depth =   5.00"    for  10-year event
Inflow      =      0.86 cfs @   12.08 hrs,  Volume=            0.068 af
Outflow     =      0.86 cfs @   12.08 hrs,  Volume=            0.068 af,  Atten= 0%,  Lag= 0.0 min
Primary     =      0.86 cfs @   12.08 hrs,  Volume=            0.068 af

Routing by Dyn-Stor-Ind method, Time Span= 0.00-48.00 hrs, dt= 0.01 hrs
Peak Elev= 52.73' @ 12.12 hrs
Flood Elev= 54.90'

| Device | Routing | Invert | Outlet Devices |
|--------|---------|--------|----------------|
| #1 | Primary | 50.40' | **12.0"  Round Culvert** |
| | | | L= 3.0'   CPP, square edge headwall,  Ke= 0.500 |
| | | | Inlet / Outlet Invert= 50.40' / 50.29'   S= 0.0367 '/'   Cc= 0.900 |
| | | | n= 0.012,  Flow Area= 0.79 sf |

**Primary OutFlow** Max=0.00 cfs @ 12.08 hrs  HW=52.44'  TW=52.53'   (Dynamic Tailwater)
└─**1=Culvert** ( Controls 0.00 cfs)

### Pond 61P: CB #17-1-1



**Hydrograph**

Inflow Area=0.162 ac
Peak Elev=52.73'
12.0"
Round Culvert
n=0.012
L=3.0'
S=0.0367 '/'

## Summary for Pond 62P: DMH #17-1

Inflow Area =        0.373 ac, 84.19% Impervious,  Inflow Depth =   4.81"    for  10-year event
Inflow      =     1.93 cfs @   12.08 hrs,  Volume=            0.149 af
Outflow     =     1.93 cfs @   12.08 hrs,  Volume=            0.149 af,  Atten= 0%,  Lag= 0.0 min
Primary     =     1.93 cfs @   12.08 hrs,  Volume=            0.149 af

Routing by Dyn-Stor-Ind method, Time Span= 0.00-48.00 hrs, dt= 0.01 hrs
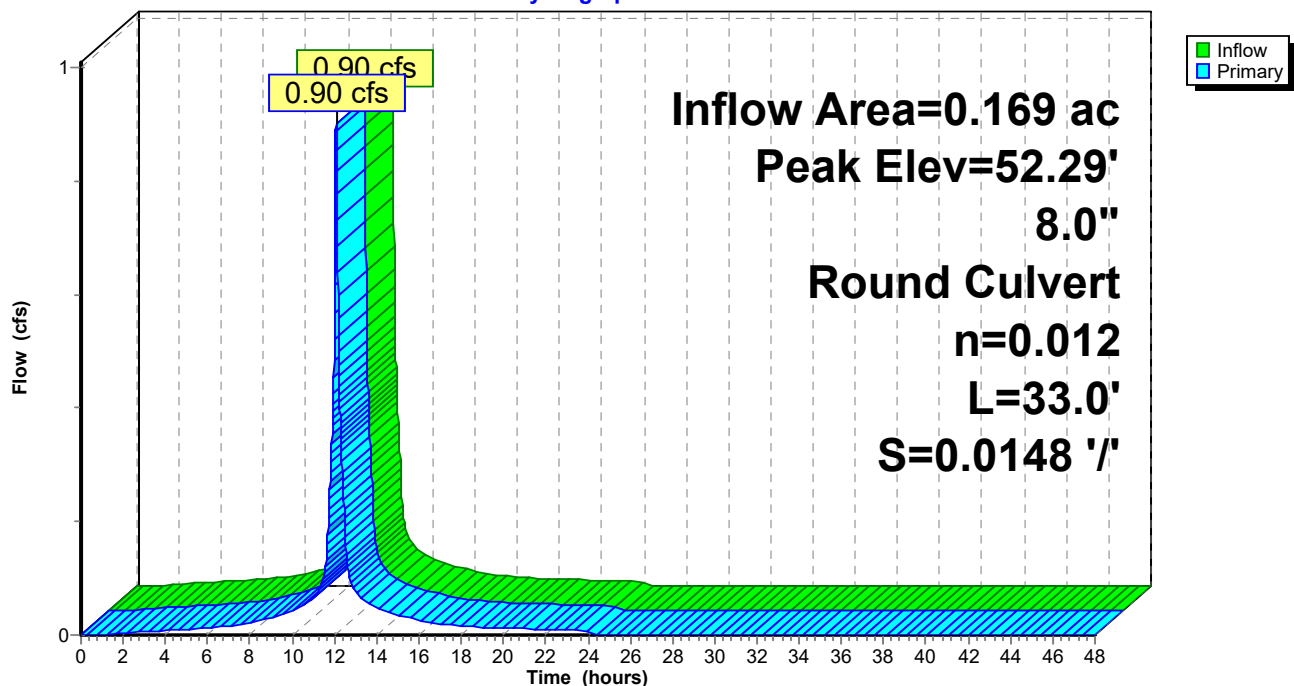Peak Elev= 52.68' @ 12.11 hrs
Flood Elev= 54.95'

| Device | Routing | Invert | Outlet Devices |
|---|---|---|---|
| #1 | Primary | 50.19' | **12.0"  Round Culvert**<br>L= 25.0'   CPP, square edge headwall,  Ke= 0.500<br>Inlet / Outlet Invert= 50.19' / 50.06'   S= 0.0052 '/'   Cc= 0.900<br>n= 0.012,  Flow Area= 0.79 sf |

**Primary OutFlow** Max=1.52 cfs @ 12.08 hrs  HW=52.53'  TW=52.37'   (Dynamic Tailwater)
└─**1=Culvert** (Inlet Controls 1.52 cfs @ 1.94 fps)

### Pond 62P: DMH #17-1

**Hydrograph**



Inflow Area=0.373 ac
Peak Elev=52.68'
12.0"
Round Culvert
n=0.012
L=25.0'
S=0.0052 '/'

## Summary for Pond 63P: YD #21

Inflow Area =        0.033 ac,  65.52% Impervious,  Inflow Depth =   4.33"    for  10-year event
Inflow      =       0.16 cfs @   12.08 hrs,  Volume=             0.012 af
Outflow     =       0.16 cfs @   12.08 hrs,  Volume=             0.012 af,  Atten= 0%,  Lag= 0.0 min
Primary     =       0.16 cfs @   12.08 hrs,  Volume=             0.012 af

Routing by Dyn-Stor-Ind method, Time Span= 0.00-48.00 hrs, dt= 0.01 hrs
Peak Elev= 52.51' @ 12.14 hrs
Flood Elev= 55.50'

| Device | Routing | Invert | Outlet Devices |
|--------|---------|--------|----------------|
| #1 | Primary | 51.70' | **12.0"  Round Culvert** |
|    |         |        | L= 49.0'   CPP, square edge headwall,  Ke= 0.500 |
|    |         |        | Inlet / Outlet Invert= 51.70' / 51.46'   S= 0.0049 '/'  Cc= 0.900 |
|    |         |        | n= 0.012,  Flow Area= 0.79 sf |

**Primary OutFlow** Max=0.00 cfs @ 12.08 hrs  HW=52.02'  TW=52.07'   (Dynamic Tailwater)
└─**1=Culvert** ( Controls 0.00 cfs)

### Pond 63P: YD #21



**Hydrograph**
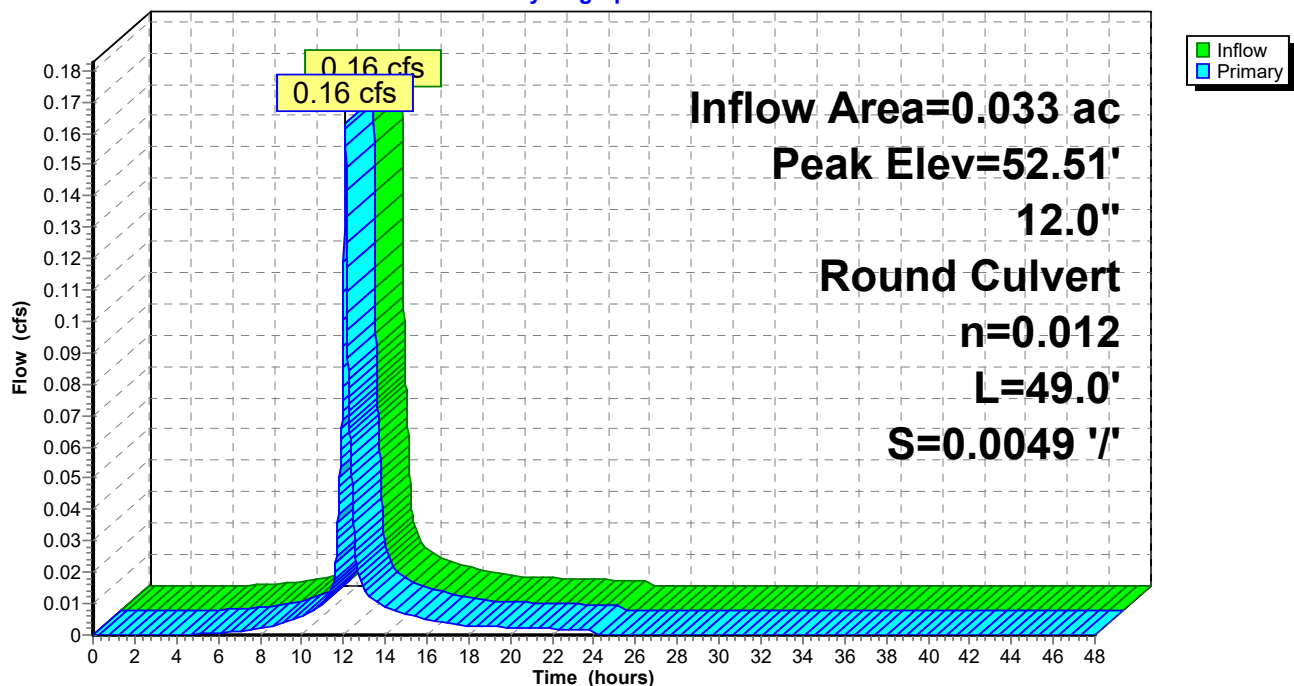
Inflow Area=0.033 ac
Peak Elev=52.51'
12.0"
Round Culvert
n=0.012
L=49.0'
S=0.0049 '/'

## Summary for Pond 64P: YD #20

Inflow Area =      0.068 ac, 73.52% Impervious, Inflow Depth = 4.55"   for 10-year event
Inflow     =     0.34 cfs @ 12.08 hrs, Volume=          0.026 af
Outflow   =     0.34 cfs @ 12.08 hrs, Volume=          0.026 af, Atten= 0%, Lag= 0.0 min
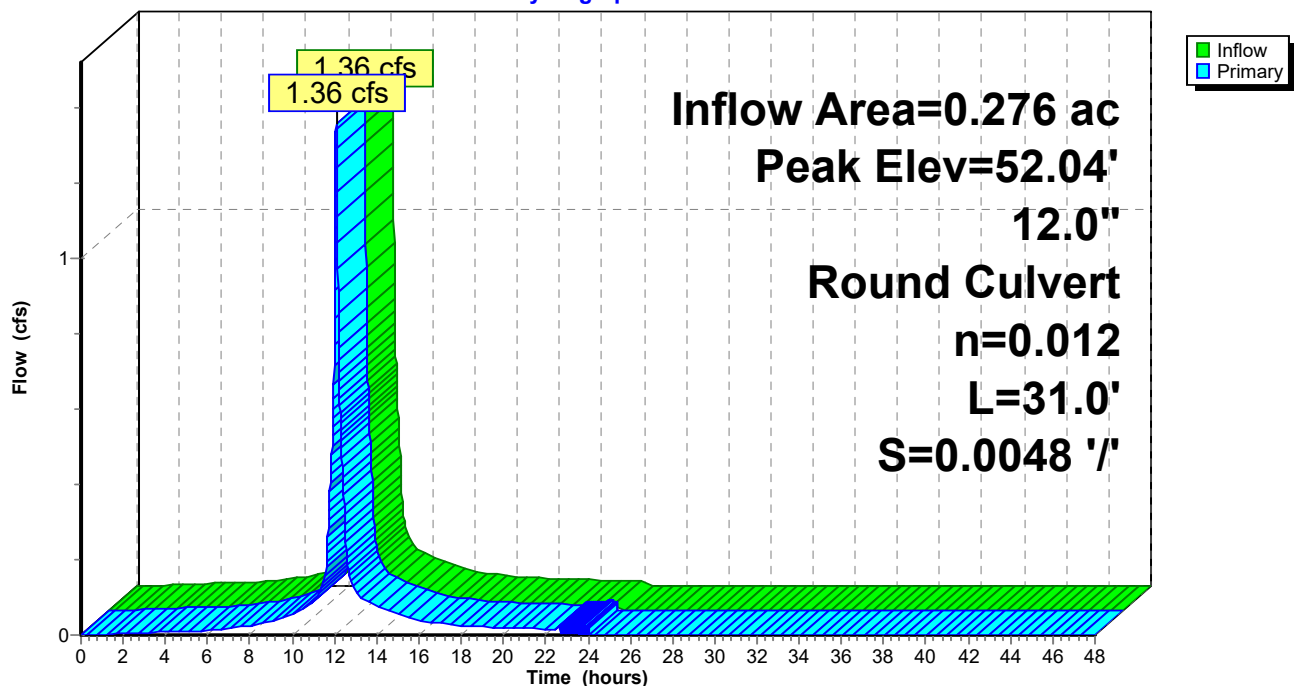Primary   =     0.34 cfs @ 12.08 hrs, Volume=          0.026 af

Routing by Dyn-Stor-Ind method, Time Span= 0.00-48.00 hrs, dt= 0.01 hrs
Peak Elev= 52.51' @ 12.13 hrs
Flood Elev= 55.80'

| Device | Routing | Invert | Outlet Devices |
|--------|---------|--------|----------------|
| #1 | Primary | 51.28' | **10.0" Round Culvert**<br>L= 35.0' CPP, square edge headwall, Ke= 0.500<br>Inlet / Outlet Invert= 51.28' / 51.11' S= 0.0049 '/' Cc= 0.900<br>n= 0.012, Flow Area= 0.55 sf |

**Primary OutFlow** Max=0.00 cfs @ 12.08 hrs HW=52.07' TW=52.20' (Dynamic Tailwater)
└─**1=Culvert** ( Controls 0.00 cfs)

### Pond 64P: YD #20

**Hydrograph**
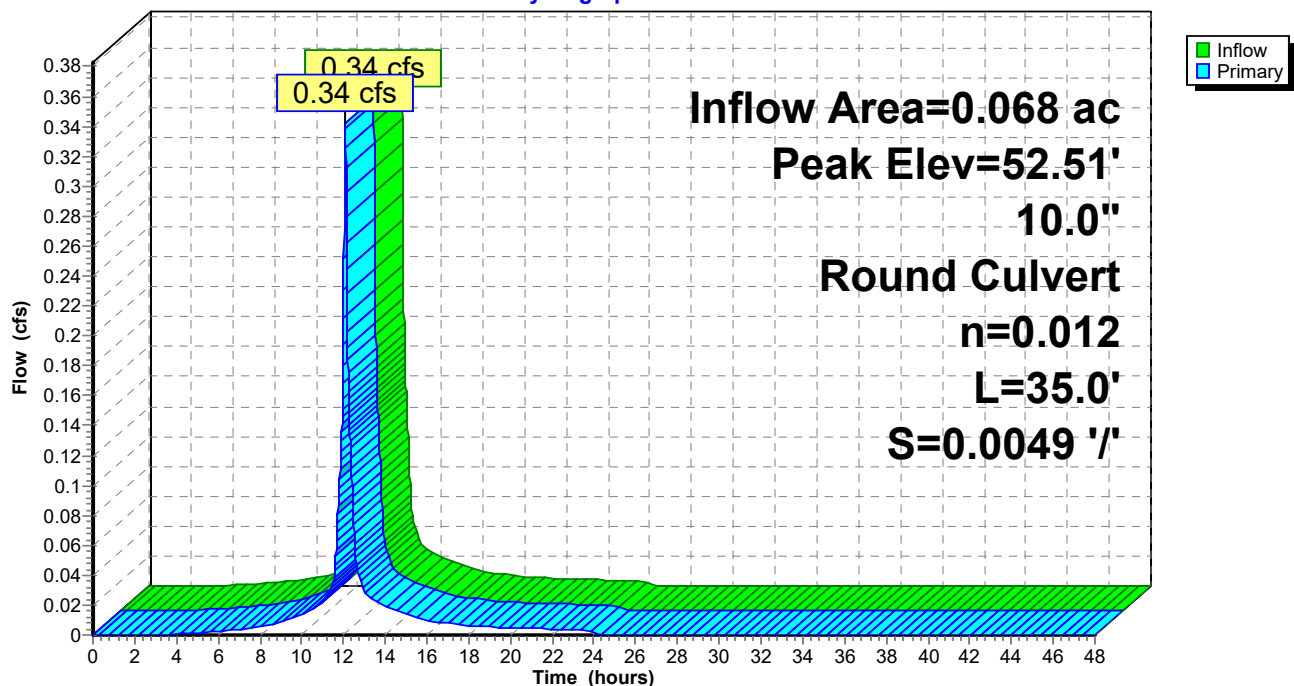
## Summary for Pond 65P: YD #19

Inflow Area =        0.091 ac,  75.35% Impervious,  Inflow Depth =   4.58"   for  10-year event
Inflow      =      0.46 cfs @   12.08 hrs,  Volume=              0.035 af
Outflow     =      0.46 cfs @   12.08 hrs,  Volume=              0.035 af,  Atten= 0%,  Lag= 0.0 min
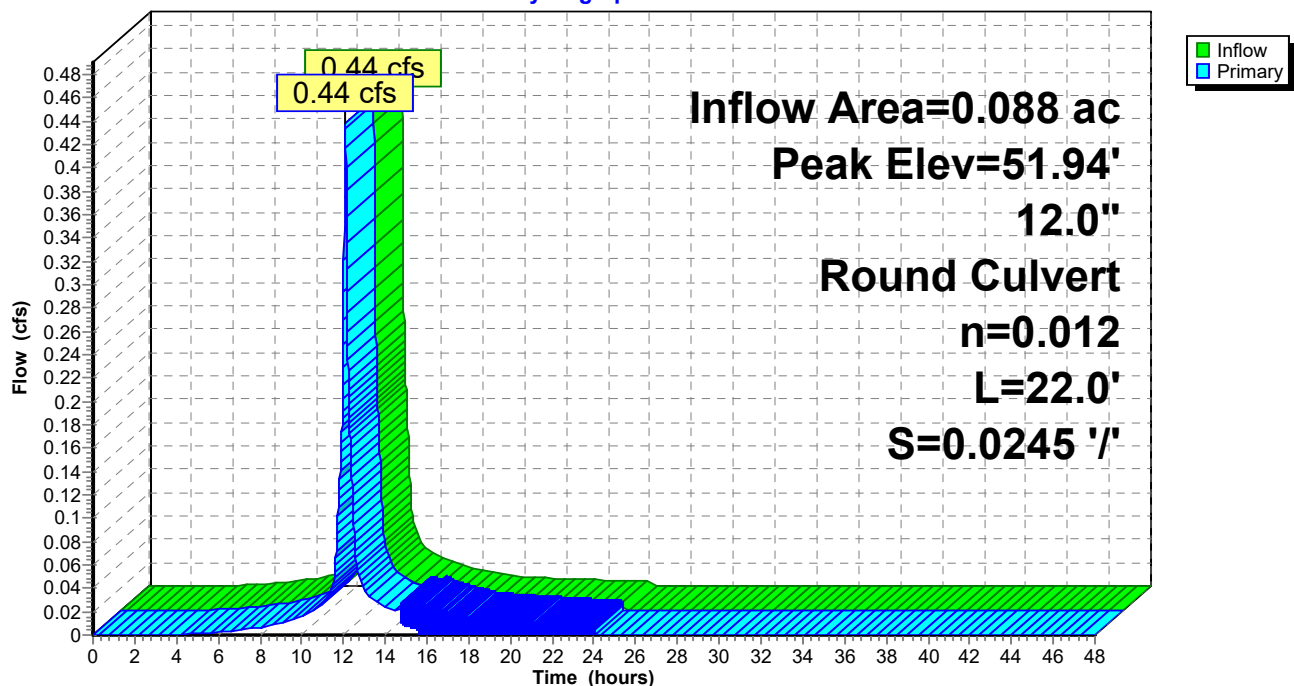Primary     =      0.46 cfs @   12.08 hrs,  Volume=              0.035 af

Routing by Dyn-Stor-Ind method, Time Span= 0.00-48.00 hrs, dt= 0.01 hrs
Peak Elev= 52.50' @ 12.12 hrs
Flood Elev= 56.00'

| Device | Routing | Invert | Outlet Devices |
|---|---|---|---|
| #1 | Primary | 51.00' | **10.0"  Round Culvert**<br>L= 42.0'   CPP, square edge headwall,  Ke= 0.500<br>Inlet / Outlet Invert= 51.00' / 50.79'   S= 0.0050 '/'   Cc= 0.900<br>n= 0.012,  Flow Area= 0.55 sf |

**Primary OutFlow** Max=0.00 cfs @ 12.08 hrs  HW=52.20'  TW=52.30'   (Dynamic Tailwater)
└─**1=Culvert**  ( Controls 0.00 cfs)

### Pond 65P: YD #19



Hydrograph
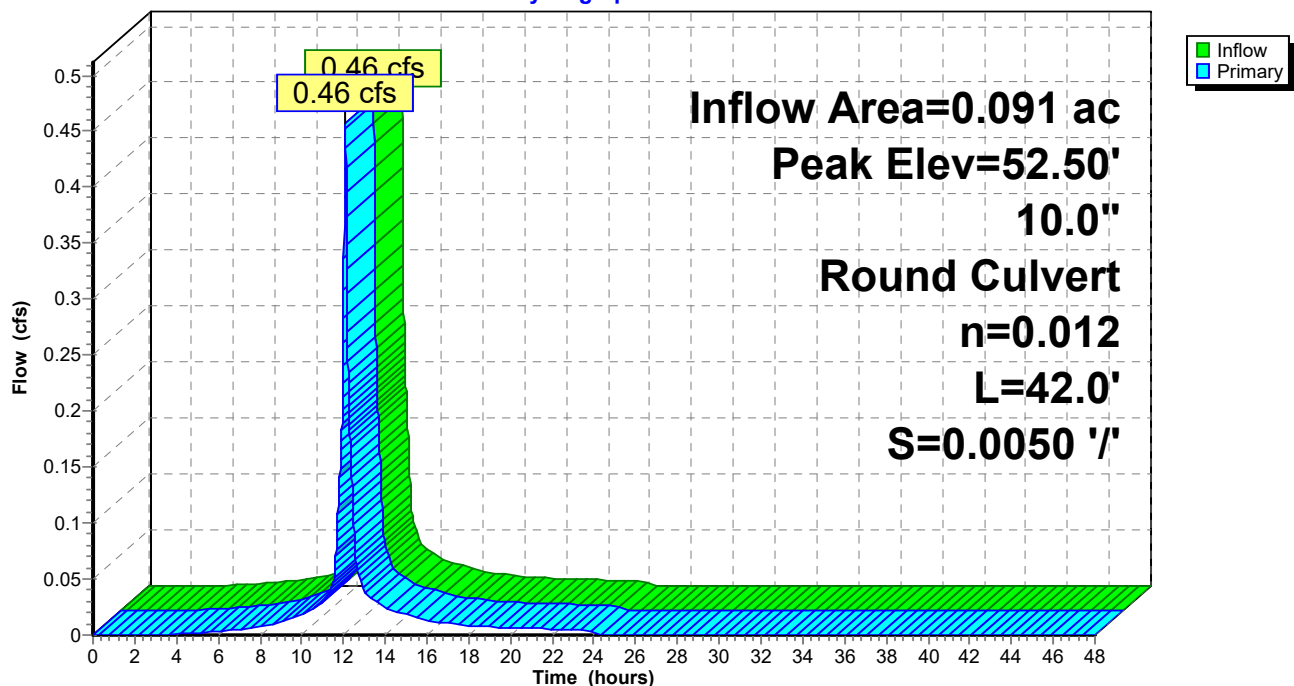
## Summary for Pond 66P: YD #18

Inflow Area =        0.125 ac,  67.02% Impervious,  Inflow Depth =   4.29"   for  10-year event
Inflow       =      0.60 cfs @   12.08 hrs,  Volume=            0.044 af
Outflow    =      0.60 cfs @   12.08 hrs,  Volume=            0.044 af,  Atten= 0%,  Lag= 0.0 min
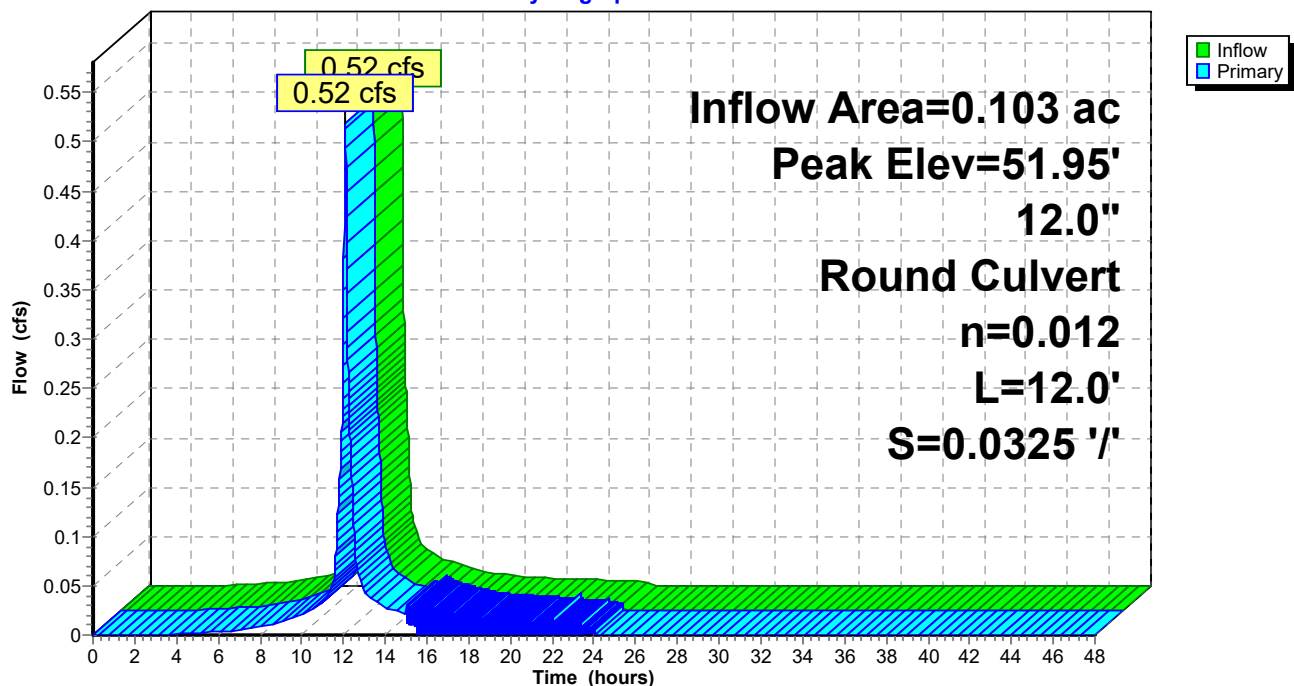Primary    =      0.60 cfs @   12.08 hrs,  Volume=            0.044 af

Routing by Dyn-Stor-Ind method, Time Span= 0.00-48.00 hrs, dt= 0.01 hrs
Peak Elev= 52.47' @ 12.11 hrs
Flood Elev= 55.55'

| Device | Routing | Invert | Outlet Devices |
|--------|---------|--------|----------------|
| #1 | Primary | 50.62' | **12.0"  Round Culvert** |
| | | | L= 11.0'   CPP, square edge headwall,  Ke= 0.500 |
| | | | Inlet / Outlet Invert= 50.62' / 50.06'   S= 0.0509 '/'   Cc= 0.900 |
| | | | n= 0.012,  Flow Area= 0.79 sf |

**Primary OutFlow** Max=0.00 cfs @ 12.08 hrs  HW=52.31'  TW=52.38'   (Dynamic Tailwater)
└─**1=Culvert** ( Controls 0.00 cfs)

### Pond 66P: YD #18

**Hydrograph**
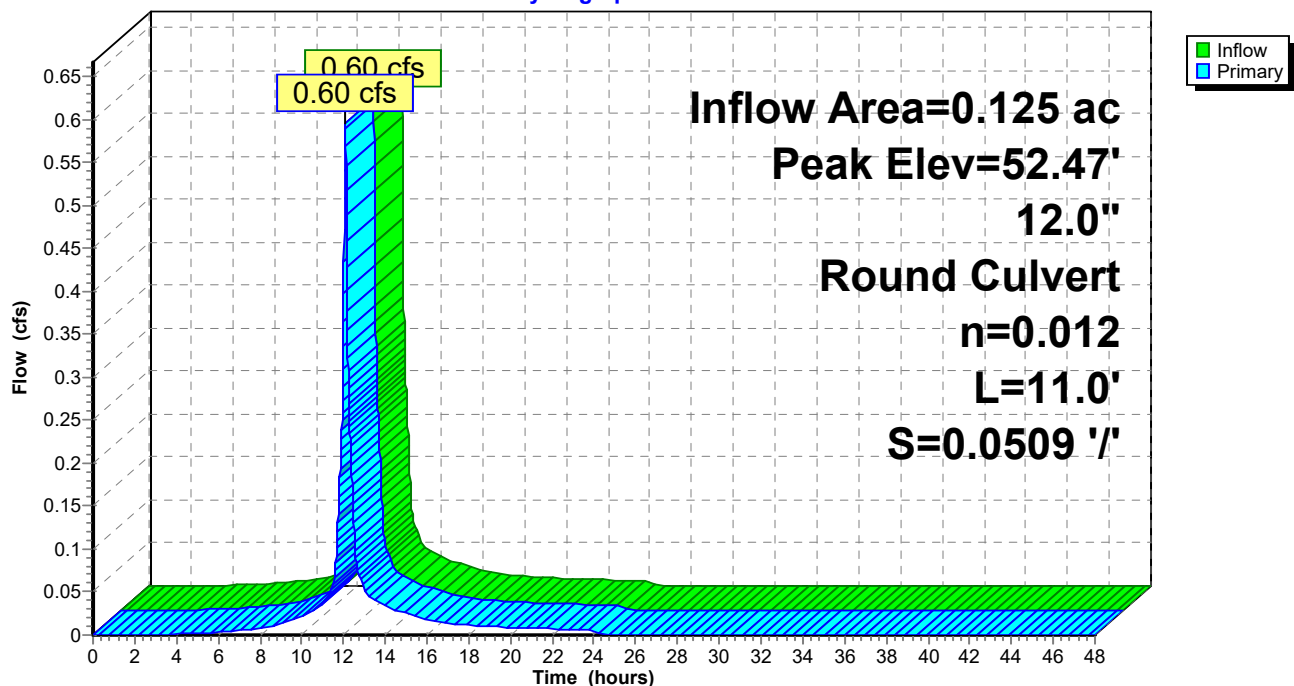


Inflow Area=0.125 ac
Peak Elev=52.47'
12.0"
Round Culvert
n=0.012
L=11.0'
S=0.0509 '/'

## Summary for Pond 67P: CB #17

Inflow Area =        0.532 ac, 75.35% Impervious,  Inflow Depth =   4.50"    for  10-year event
Inflow      =     2.60 cfs @   12.08 hrs,  Volume=             0.199 af
Outflow    =     2.60 cfs @   12.08 hrs,  Volume=             0.199 af,  Atten= 0%,  Lag= 0.0 min
Primary    =     2.60 cfs @   12.08 hrs,  Volume=             0.199 af

Routing by Dyn-Stor-Ind method, Time Span= 0.00-48.00 hrs, dt= 0.01 hrs
Peak Elev= 52.45' @ 12.10 hrs
Flood Elev= 55.55'

| Device | Routing | Invert | Outlet Devices |
|--------|---------|--------|----------------|
| #1 | Primary | 49.96' | **12.0"  Round Culvert**<br>L= 74.0'   CPP, square edge headwall,  Ke= 0.500<br>Inlet / Outlet Invert= 49.96' / 49.59'   S= 0.0050 '/'   Cc= 0.900<br>n= 0.012,  Flow Area= 0.79 sf |

**Primary OutFlow**  Max=2.45 cfs @ 12.08 hrs  HW=52.37'  TW=51.85'   (Dynamic Tailwater)
└─**1=Culvert**  (Outlet Controls 2.45 cfs @ 3.12 fps)

### Pond 67P: CB #17

**Hydrograph**
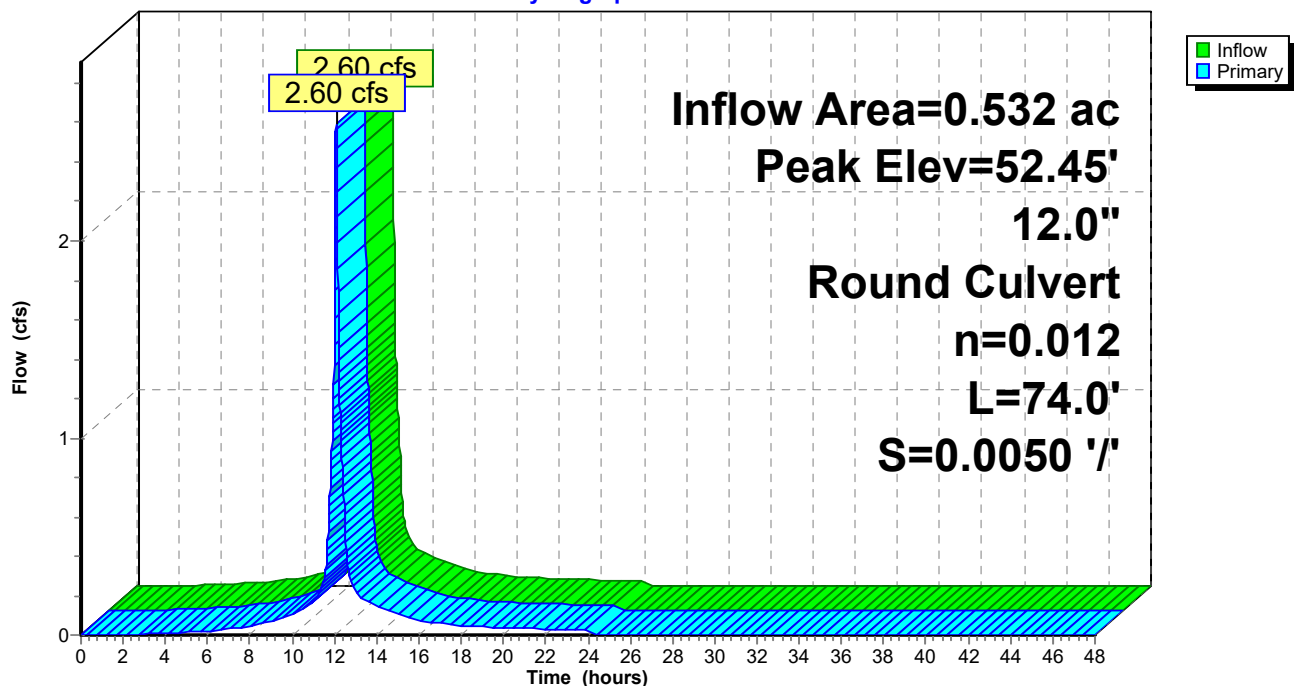
## Summary for Pond 68P: DMH #16

Inflow Area =        0.563 ac,  76.73% Impervious,  Inflow Depth =   4.54"    for  10-year event
Inflow      =     2.77 cfs @   12.08 hrs,  Volume=            0.213 af
Outflow     =     2.77 cfs @   12.08 hrs,  Volume=            0.213 af,  Atten= 0%,  Lag= 0.0 min
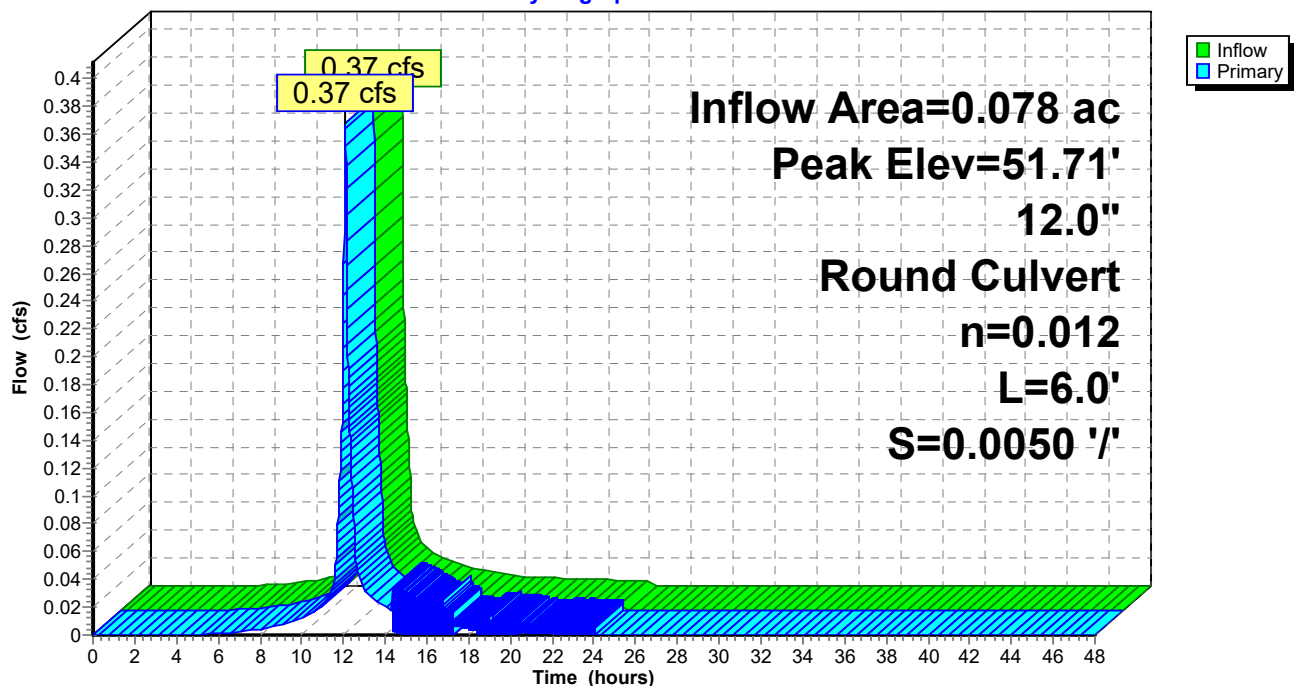Primary     =     2.77 cfs @   12.08 hrs,  Volume=            0.213 af

Routing by Dyn-Stor-Ind method, Time Span= 0.00-48.00 hrs, dt= 0.01 hrs
Peak Elev= 51.92' @ 12.11 hrs
Flood Elev= 56.10'

| Device | Routing | Invert | Outlet Devices |
|--------|---------|--------|----------------|
| #1 | Primary | 49.49' | **12.0"  Round Culvert**<br>L= 90.0'  CPP, square edge headwall,  Ke= 0.500<br>Inlet / Outlet Invert= 49.49' / 48.50'  S= 0.0110 '/'  Cc= 0.900<br>n= 0.012,  Flow Area= 0.79 sf |

**Primary OutFlow** Max=2.66 cfs @ 12.08 hrs  HW=51.85'  TW=51.15'   (Dynamic Tailwater)
└─**1=Culvert**  (Outlet Controls 2.66 cfs @ 3.39 fps)

### Pond 68P: DMH #16

**Hydrograph**
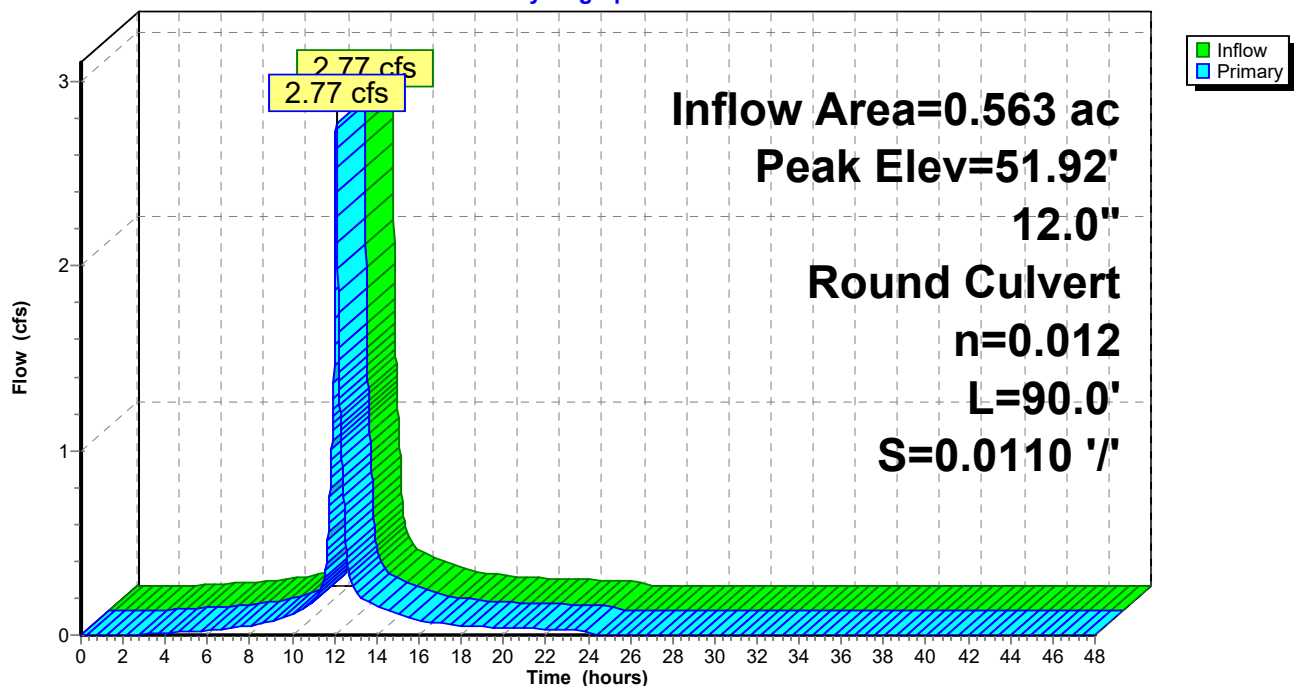
## Summary for Pond 69P: Bio #3

Inflow Area = 1.645 ac, 63.94% Impervious, Inflow Depth = 4.20" for 10-year event
Inflow = 7.51 cfs @ 12.09 hrs, Volume= 0.575 af
Outflow = 2.47 cfs @ 12.38 hrs, Volume= 0.552 af, Atten= 67%, Lag= 17.7 min
Primary = 2.47 cfs @ 12.38 hrs, Volume= 0.552 af

Routing by Dyn-Stor-Ind method, Time Span= 0.00-48.00 hrs, dt= 0.01 hrs
Starting Elev= 48.00' Surf.Area= 1,706 sf Storage= 128 cf
Peak Elev= 51.67' @ 12.38 hrs Surf.Area= 4,580 sf Storage= 11,205 cf (11,077 cf above start)
Flood Elev= 53.00' Surf.Area= 6,019 sf Storage= 18,236 cf (18,109 cf above start)

Plug-Flow detention time= 303.7 min calculated for 0.549 af (95% of inflow)
Center-of-Mass det. time= 274.0 min ( 1,052.3 - 778.3 )

| Volume | Invert | Avail.Storage | Storage Description |
|---|---|---|---|
| #1 | 46.50' | 18,236 cf | **Custom Stage Data (Conic)**Listed below (Recalc) |

| Elevation (feet) | Surf.Area (sq-ft) | Voids (%) | Inc.Store (cubic-feet) | Cum.Store (cubic-feet) | Wet.Area (sq-ft) |
|---|---|---|---|---|---|
| 46.50 | 1,706 | 0.0 | 0 | 0 | 1,706 |
| 48.00 | 1,706 | 5.0 | 128 | 128 | 1,926 |
| 49.00 | 2,381 | 100.0 | 2,034 | 2,162 | 2,619 |
| 50.00 | 3,056 | 100.0 | 2,711 | 4,874 | 3,319 |
| 51.00 | 3,935 | 100.0 | 3,486 | 8,360 | 4,223 |
| 52.00 | 4,918 | 100.0 | 4,417 | 12,777 | 5,233 |
| 53.00 | 6,019 | 100.0 | 5,459 | 18,236 | 6,365 |

| Device | Routing | Invert | Outlet Devices |
|---|---|---|---|
| #1 | Primary | 45.50' | **18.0" Round Culvert** L= 50.0' CPP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 45.50' / 45.25' S= 0.0050 '/' Cc= 0.900 n= 0.012, Flow Area= 1.77 sf |
| #2 | Device 1 | 45.50' | **4.0" Vert. Underdrain** C= 0.600 |
| #3 | Device 2 | 48.00' | **2.400 in/hr Exfiltration through Media over Wetted area above 48.00'** Excluded Wetted area = 1,926 sf Phase-In= 0.01' |
| #4 | Device 1 | 50.00' | **4.0" W x 30.0" H Vert. Orifice/Grate** C= 0.600 |
| #5 | Device 1 | 52.50' | **48.0" x 48.0" Horiz. Orifice/Grate** C= 0.600 Limited to weir flow at low heads |

**Primary OutFlow** Max=2.47 cfs @ 12.38 hrs HW=51.67' TW=45.64' (Dynamic Tailwater)
└─**1=Culvert** (Passes 2.47 cfs of 19.81 cfs potential flow)
 ├─**2=Underdrain** (Passes 0.16 cfs of 1.03 cfs potential flow)
 │ └─**3=Exfiltration through Media** (Exfiltration Controls 0.16 cfs)
 ├─**4=Orifice/Grate** (Orifice Controls 2.31 cfs @ 4.15 fps)
 └─**5=Orifice/Grate** ( Controls 0.00 cfs)

## Pond 69P: Bio #3

**Hydrograph**
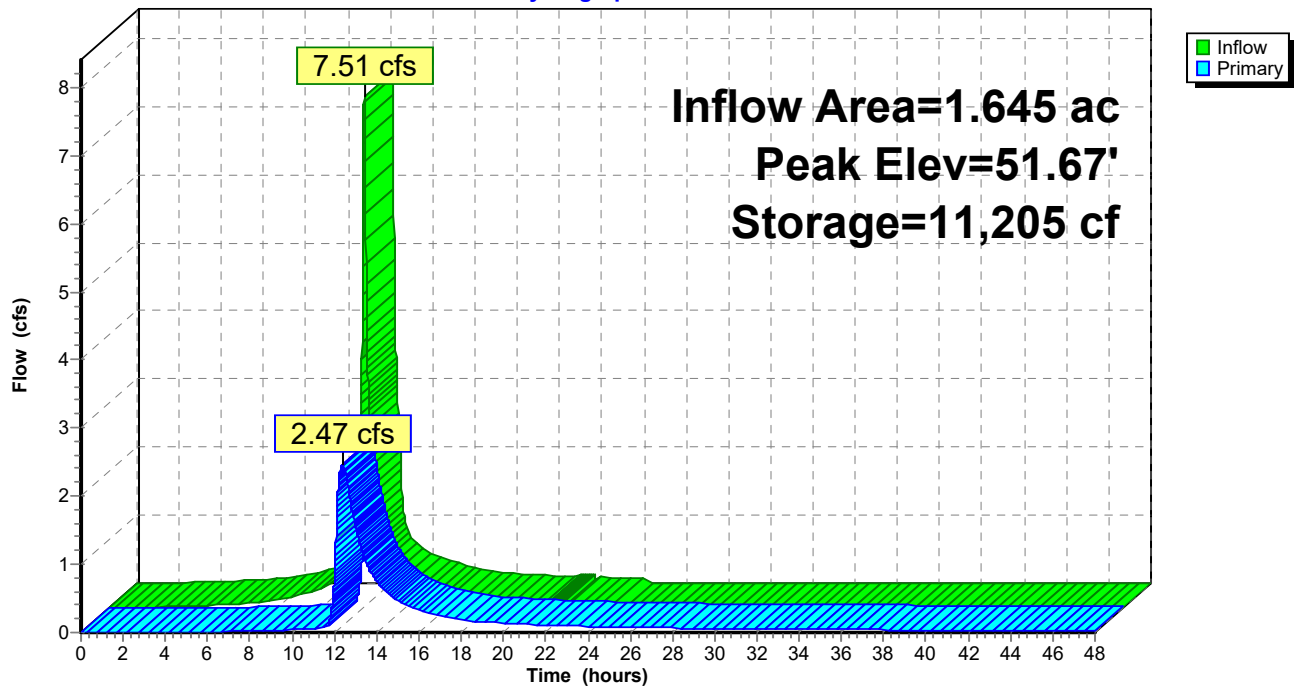


**Inflow Area=1.645 ac**
**Peak Elev=51.67'**
**Storage=11,205 cf**

## Summary for Pond 80P: YD #24

Inflow Area =        0.046 ac, 84.56% Impervious,  Inflow Depth =   4.77"   for  10-year event
Inflow      =       0.24 cfs @   12.08 hrs,  Volume=              0.018 af
Outflow     =       0.24 cfs @   12.08 hrs,  Volume=              0.018 af,  Atten= 0%,  Lag= 0.0 min
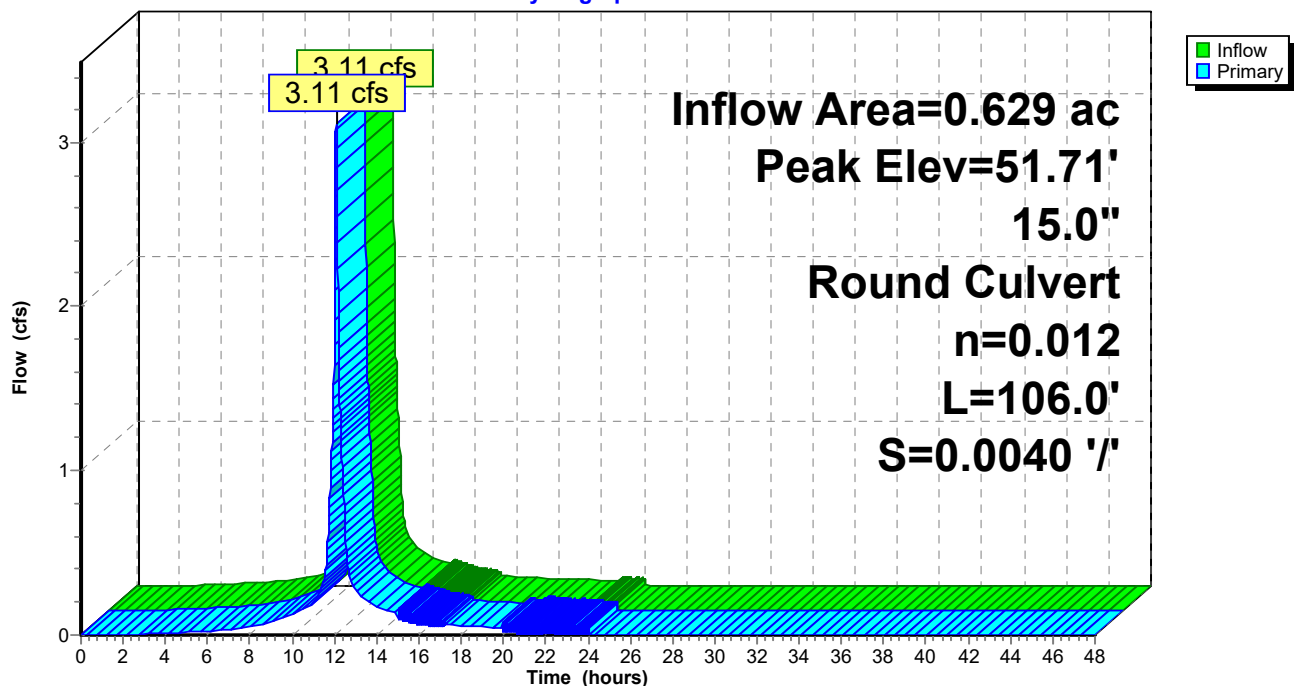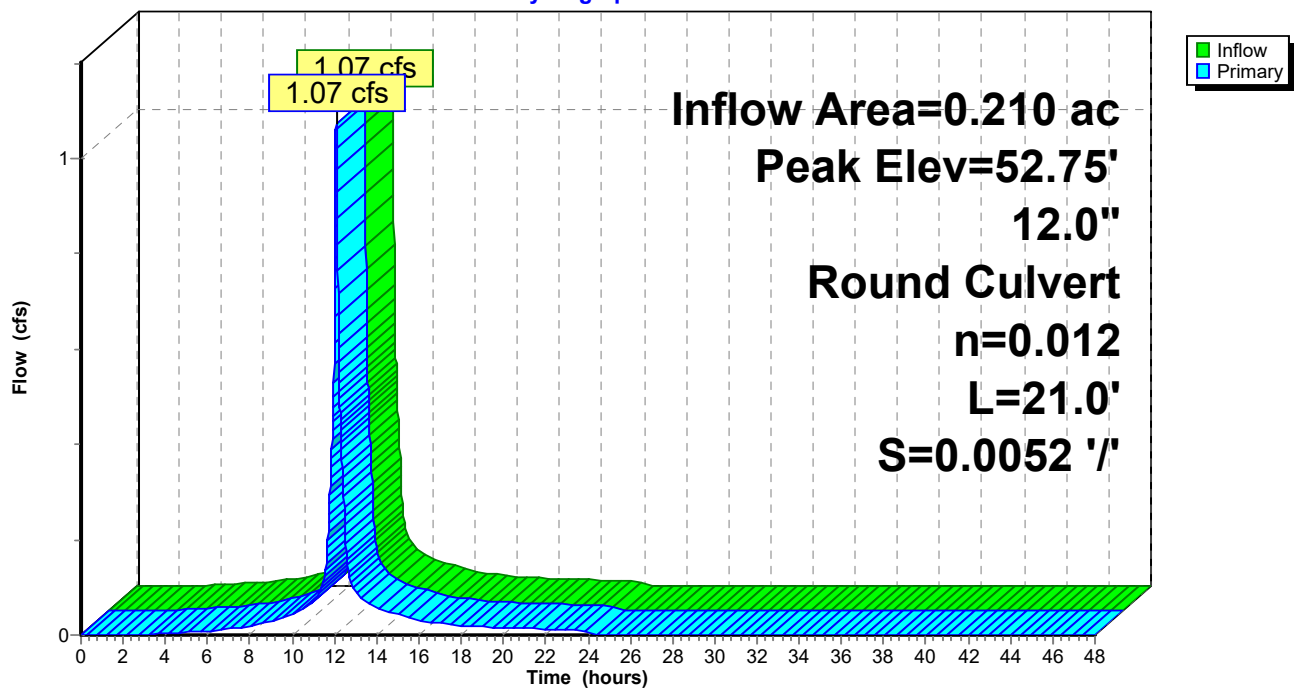Primary     =       0.24 cfs @   12.08 hrs,  Volume=              0.018 af

Routing by Dyn-Stor-Ind method, Time Span= 0.00-48.00 hrs, dt= 0.01 hrs
Peak Elev= 48.68' @ 12.10 hrs
Flood Elev= 52.00'

| Device | Routing | Invert | Outlet Devices |
|---|---|---|---|
| #1 | Primary | 48.35' | **6.0"  Round Culvert**<br>L= 100.0'   CPP, square edge headwall,  Ke= 0.500<br>Inlet / Outlet Invert= 48.35' / 45.50'   S= 0.0285 '/'   Cc= 0.900<br>n= 0.012,  Flow Area= 0.20 sf |

**Primary OutFlow** Max=0.23 cfs @ 12.08 hrs  HW=48.67'  TW=47.91'   (Dynamic Tailwater)
└─**1=Culvert** (Outlet Controls 0.23 cfs @ 2.42 fps)

### Pond 80P: YD #24

**Hydrograph**
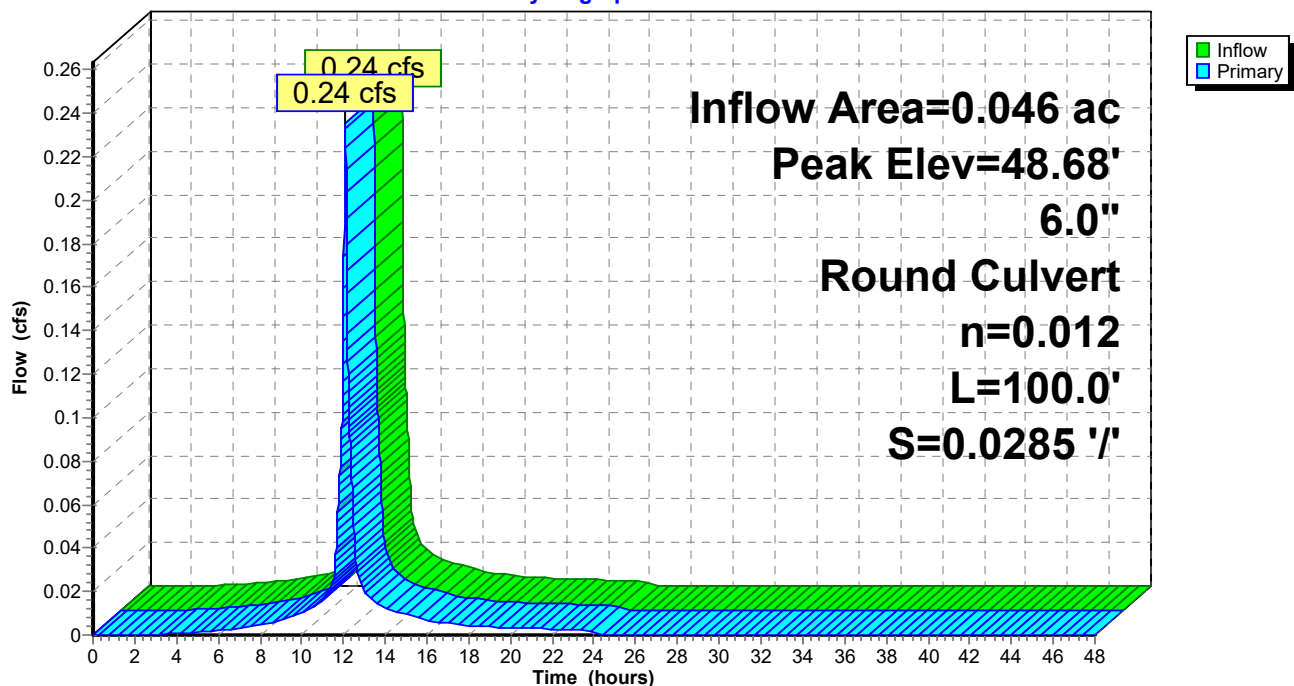
## Summary for Pond 81P: 6" CPP

Inflow Area =         0.028 ac,100.00% Impervious,  Inflow Depth =   5.23"    for  10-year event
Inflow      =      0.15 cfs @   12.08 hrs,  Volume=            0.012 af
Outflow     =      0.15 cfs @   12.08 hrs,  Volume=            0.012 af,  Atten= 0%,  Lag= 0.0 min
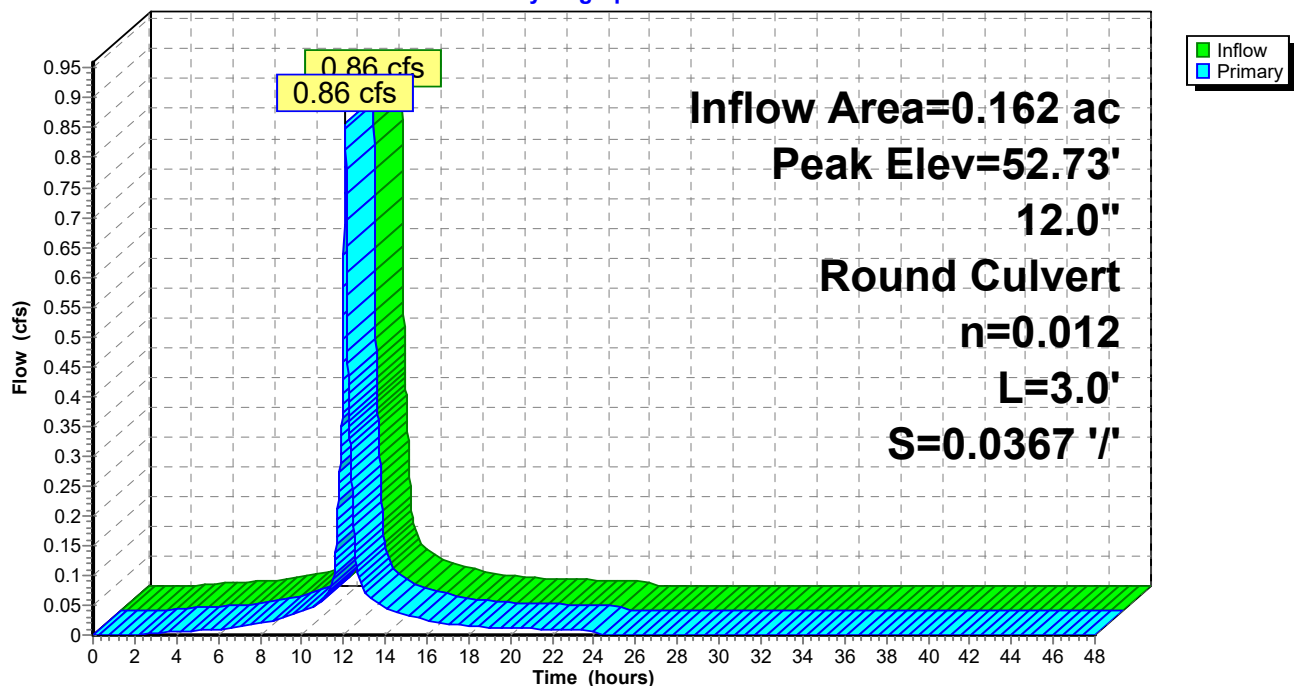Primary     =      0.15 cfs @   12.08 hrs,  Volume=            0.012 af

Routing by Dyn-Stor-Ind method, Time Span= 0.00-48.00 hrs, dt= 0.01 hrs
Peak Elev= 48.35' @ 12.12 hrs
Flood Elev= 52.25'

| Device | Routing | Invert | Outlet Devices |
|--------|---------|--------|----------------|
| #1 | Primary | 48.05' | **6.0"  Round Culvert**<br>L= 85.0'  CPP, square edge headwall,  Ke= 0.500<br>Inlet / Outlet Invert= 48.05' / 46.35'   S= 0.0200 '/'   Cc= 0.900<br>n= 0.012,  Flow Area= 0.20 sf |

**Primary OutFlow** Max=0.14 cfs @ 12.08 hrs  HW=48.34'  TW=47.97'   (Dynamic Tailwater)
└─**1=Culvert** (Outlet Controls 0.14 cfs @ 1.72 fps)

### Pond 81P: 6" CPP

**Hydrograph**
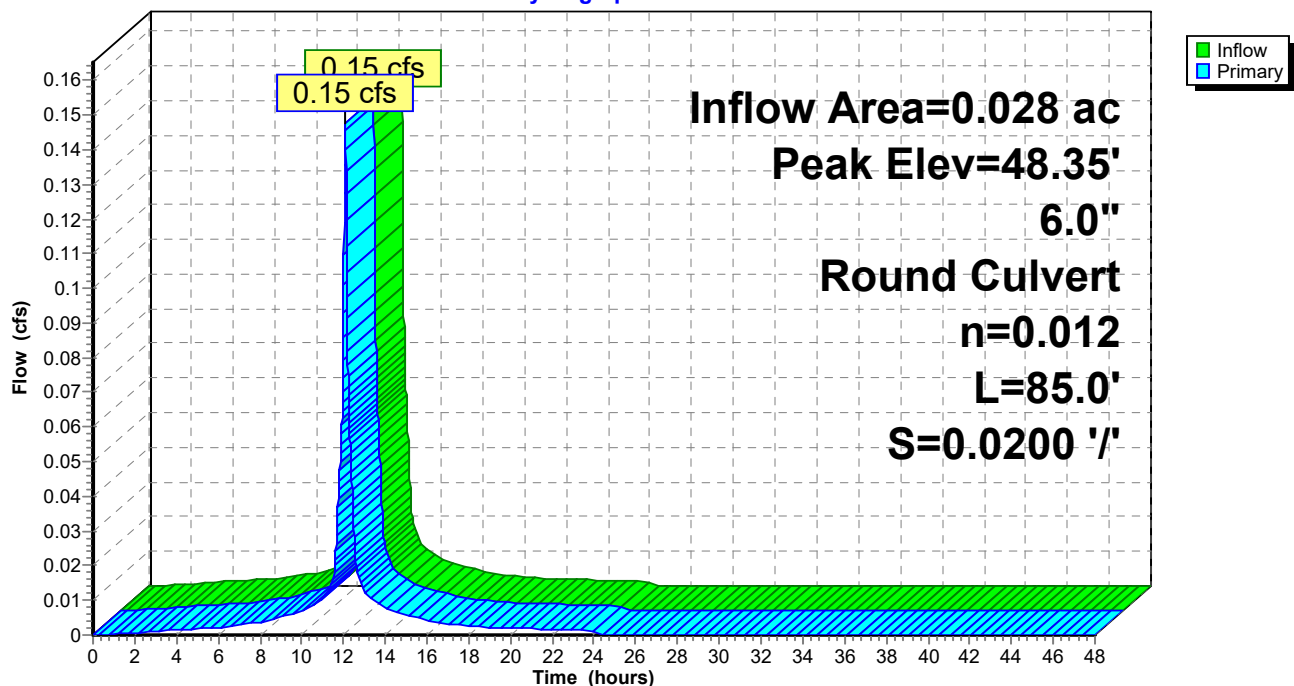
## Summary for Pond 82P: CB #23

Inflow Area =        0.230 ac,  90.79% Impervious,  Inflow Depth =  4.93"   for  10-year event
Inflow      =    1.21 cfs @  12.08 hrs,  Volume=         0.094 af
Outflow    =    1.21 cfs @  12.08 hrs,  Volume=         0.094 af,  Atten= 0%,  Lag= 0.0 min
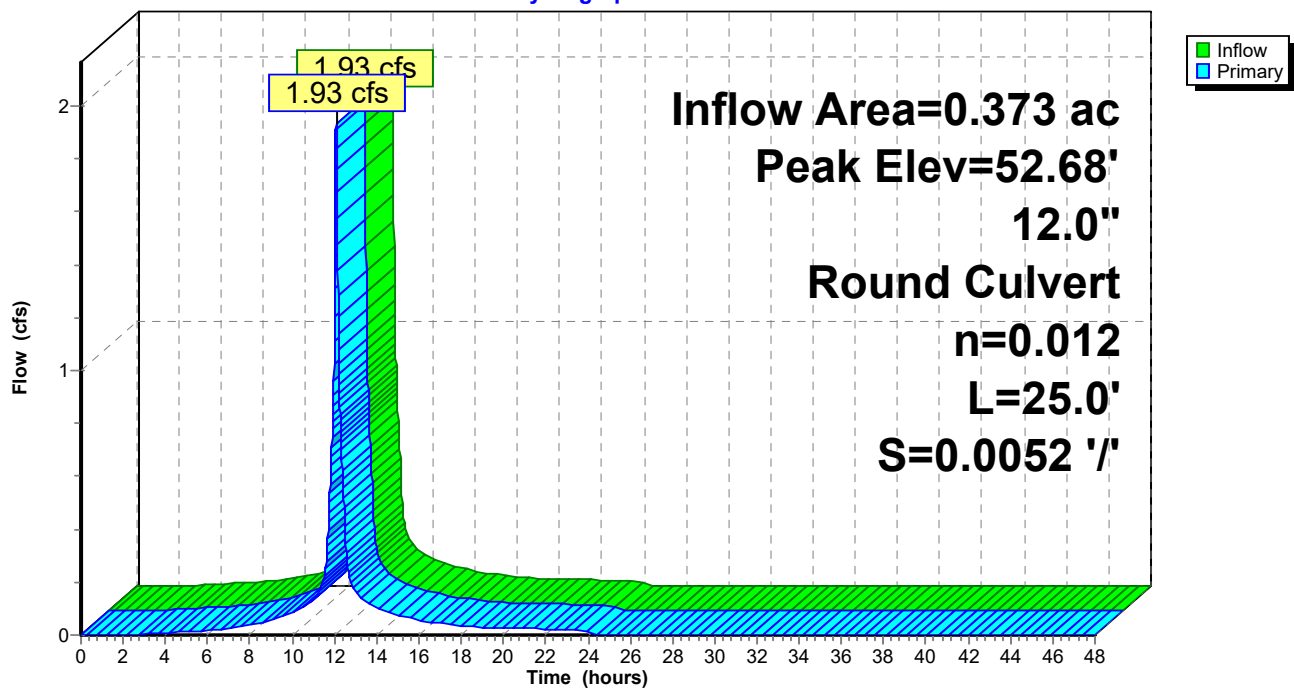Primary    =    1.21 cfs @  12.08 hrs,  Volume=         0.094 af

Routing by Dyn-Stor-Ind method, Time Span= 0.00-48.00 hrs, dt= 0.01 hrs
Peak Elev= 48.31' @ 12.40 hrs
Flood Elev= 49.85'

| Device | Routing | Invert | Outlet Devices |
|--------|---------|--------|----------------|
| #1 | Primary | 45.85' | **12.0"  Round Culvert**<br>L= 18.0'   CPP, square edge headwall,  Ke= 0.500<br>Inlet / Outlet Invert= 45.85' / 45.50'   S= 0.0194 '/'   Cc= 0.900<br>n= 0.012,  Flow Area= 0.79 sf |

**Primary OutFlow** Max=0.95 cfs @ 12.08 hrs  HW=47.97'  TW=47.91'   (Dynamic Tailwater)
└─**1=Culvert** (Inlet Controls 0.95 cfs @ 1.21 fps)

### Pond 82P: CB #23

**Hydrograph**
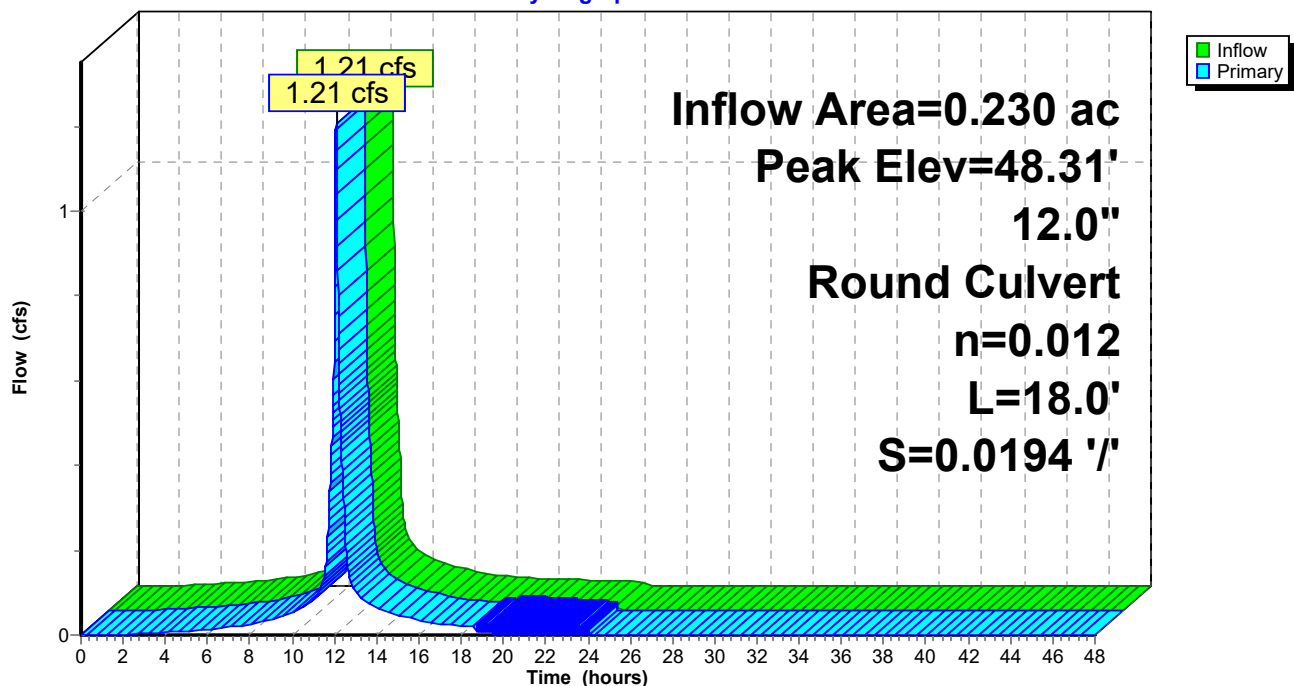


Inflow Area=0.230 ac
Peak Elev=48.31'
12.0"
Round Culvert
n=0.012
L=18.0'
S=0.0194 '/'

## Summary for Pond 83P: Bio #4

Inflow Area =        0.333 ac, 74.25% Impervious,  Inflow Depth =  4.53"   for  10-year event
Inflow      =      1.63 cfs @   12.08 hrs,  Volume=          0.126 af
Outflow    =      0.50 cfs @   12.40 hrs,  Volume=          0.125 af,  Atten= 69%,  Lag= 18.9 min
Primary    =      0.50 cfs @   12.40 hrs,  Volume=          0.125 af

Routing by Dyn-Stor-Ind method, Time Span= 0.00-48.00 hrs, dt= 0.01 hrs
Starting Elev= 45.50'  Surf.Area= 315 sf  Storage= 24 cf
Peak Elev= 48.30' @ 12.40 hrs  Surf.Area= 1,345 sf  Storage= 2,203 cf  (2,179 cf above start)
Flood Elev= 49.00'  Surf.Area= 1,691 sf  Storage= 3,270 cf  (3,247 cf above start)

Plug-Flow detention time= 216.0 min calculated for 0.125 af (99% of inflow)
Center-of-Mass det. time= 208.3 min ( 980.2 - 771.9 )

| Volume | Invert | Avail.Storage | Storage Description |
|---|---|---|---|
| #1 | 44.00' | 3,270 cf | **Custom Stage Data (Prismatic)** Listed below (Recalc) |

| Elevation (feet) | Surf.Area (sq-ft) | Voids (%) | Inc.Store (cubic-feet) | Cum.Store (cubic-feet) |
|---|---|---|---|---|
| 44.00 | 315 | 0.0 | 0 | 0 |
| 45.50 | 315 | 5.0 | 24 | 24 |
| 46.00 | 451 | 100.0 | 192 | 215 |
| 47.00 | 785 | 100.0 | 618 | 833 |
| 48.00 | 1,199 | 100.0 | 992 | 1,825 |
| 49.00 | 1,691 | 100.0 | 1,445 | 3,270 |

| Device | Routing | Invert | Outlet Devices |
|---|---|---|---|
| #1 | Primary | 43.00' | **15.0"  Round Culvert**  L= 26.0'  CPP, square edge headwall,  Ke= 0.500  Inlet / Outlet Invert= 43.00' / 42.85'   S= 0.0058 '/'   Cc= 0.900  n= 0.012,  Flow Area= 1.23 sf |
| #2 | Device 1 | 43.00' | **4.0" Vert. Underdrain**  C= 0.600 |
| #3 | Device 2 | 45.50' | **2.500 in/hr Exfiltration through Media over Surface area above 45.50'**  Excluded Surface area = 315 sf  Phase-In= 0.01' |
| #4 | Device 1 | 47.05' | **4.0" Vert. Orifice/Grate**  C= 0.600 |
| #5 | Device 1 | 48.50' | **24.0" x 24.0" Horiz. Orifice/Grate**  C= 0.600  Limited to weir flow at low heads |

**Primary OutFlow** Max=0.50 cfs @ 12.40 hrs  HW=48.30'  TW=42.90'  (Dynamic Tailwater)
└─**1=Culvert** (Passes 0.50 cfs of 12.77 cfs potential flow)
  └─**2=Underdrain** (Passes 0.06 cfs of 0.95 cfs potential flow)
    └─**3=Exfiltration through Media** (Exfiltration Controls 0.06 cfs)
  └─**4=Orifice/Grate** (Orifice Controls 0.44 cfs @ 5.00 fps)
  └─**5=Orifice/Grate** ( Controls 0.00 cfs)

**Pond 83P: Bio #4**



**Hydrograph**

Inflow Area=0.333 ac
Peak Elev=48.30'
Storage=2,203 cf

1.63 cfs

0.50 cfs

■ Inflow
■ Primary

## Summary for Link 100L: POA #100 - SW

Inflow Area =        1.723 ac,  14.18% Impervious,  Inflow Depth >   2.96"    for  10-year event
Inflow       =      3.74 cfs @   12.22 hrs,  Volume=            0.424 af
Primary     =      3.74 cfs @   12.22 hrs,  Volume=            0.424 af,  Atten= 0%,  Lag= 0.0 min

Primary outflow = Inflow, Time Span= 0.00-48.00 hrs, dt= 0.01 hrs

### Link 100L: POA #100 - SW

**Hydrograph**

## Summary for Link 200L: POA #200 - South

Inflow Area =      19.811 ac, 10.04% Impervious,  Inflow Depth =  2.73"   for  10-year event
Inflow     =     23.08 cfs @   12.12 hrs,  Volume=          4.509 af
Primary    =     23.08 cfs @   12.12 hrs,  Volume=          4.509 af,  Atten= 0%,  Lag= 0.0 min

Primary outflow = Inflow, Time Span= 0.00-48.00 hrs, dt= 0.01 hrs

### Link 200L: POA #200 - South

**Hydrograph**



Inflow Area=19.811 ac
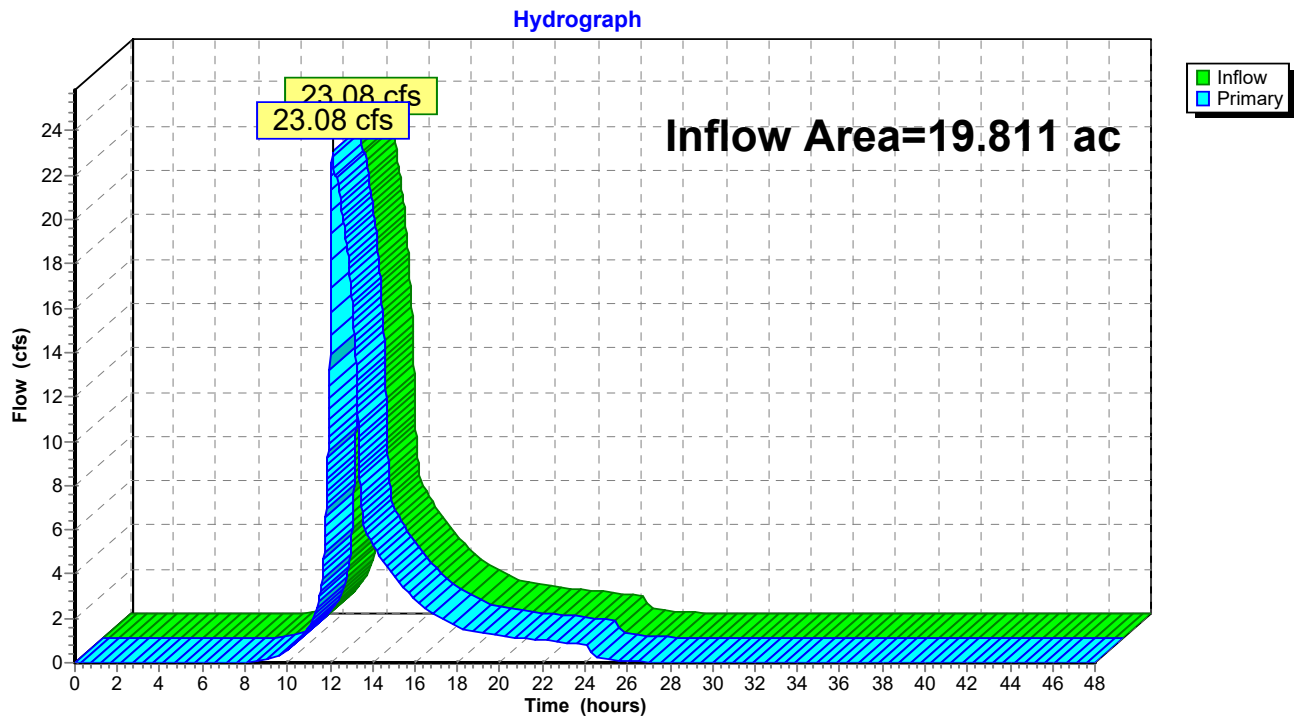
## Summary for Link 300L: POA #300 - SE

Inflow Area =          9.059 ac,  16.05% Impervious,  Inflow Depth >   2.63"    for  10-year event
Inflow     =      15.75 cfs @   12.24 hrs,  Volume=            1.987 af
Primary    =      15.75 cfs @   12.24 hrs,  Volume=            1.987 af,  Atten= 0%,  Lag= 0.0 min

Primary outflow = Inflow, Time Span= 0.00-48.00 hrs, dt= 0.01 hrs

## Link 300L: POA #300 - SE

**Hydrograph**

POST-DEVELOPMENT

2S
North Corner

2P
12" CPP

2R
Wetland Flow Path

2.1S
Central

2.1R
Wetland Flow Path

23R
Wetland Flow Path

3S
SE Corner

67S
Landscape

1S
West Corner

10S
Parking Lot

21S
Parking Lot

22R
Wetland Flow Path

62P
DMH #17-1

67P
CB #17

68P
DMH #16

31P
CB #8

22P
Bio #2

22S
To Bio #2

63P
CB #17-1-2

61P
CB #17-1-1

66P
YD #18

66S
Building

68S
Building

10P
Porous Pavement

11P
YD #3-1

11S
Island

20S
Building

40S
Building

40P
6" CPP

60S
Parking Lot

61S
Parking Lot

65P
YD #19

65S
Building

17P
Bio #1

18P
Bio #3

19P
YD #4

18P
CB #3

13P
YD #5

13P
YD #6

12P
YD #7

42S
Building

41S
Building

41P
YD #15

45S
Parking Lot

46S
Parking Lot

64P
YD #20

64S
Building

70S
Building

69S
To Pond

10R
Swale

17S
To Bio #1

16S
Island

15S
Building

14S
Building

13S
Building

12S
Building

42P
6" CPP

43P
10" CPP

45P
CB #13-2

46P
CB #13-1

63P
YD #21

63S
Building

69P
Bio #3

1P
15" RCP

30S
Roadside

30P
CB #10-2

2.1P
24" RCP

31P
DMH #10

31S
CB #10-1

31S
Roadside

44S
Roadside

44P
CB #14

47P
DMH #13

69R
Swale

70R
Woodland Flow Path

100L
POA #100 - SW

2.2R
Wetland Flow Path

48S
Roadside

48P
CB #12-2

50P
DMH #12

49P
CB #12-1

49S
Driveway

82S
Parking Lot

71R
Stream

2.2S
South of SQ Drive

80S
Building

80P
YD #24

83S
To Pond

72R
Stream

81S
Building

82P
6" CPP

83P
CB #23

83P
Bio #4

83R
Woodland Flow Path

73R
Stream

200L
POA #200 - South

300L
POA #300 - SE

Time span=0.00-48.00 hrs, dt=0.01 hrs, 4801 points
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN
Reach routing by Dyn-Stor-Ind method  -  Pond routing by Dyn-Stor-Ind method

**Subcatchment 1S: West Corner**
Runoff Area=65,016 sf  9.83% Impervious  Runoff Depth=4.09"
Flow Length=366'  Tc=9.8 min  CN=75  Runoff=6.29 cfs 0.508 af

**Subcatchment 2.1S: Central**
Runoff Area=445,535 sf  8.04% Impervious  Runoff Depth=3.87"
Flow Length=1,341'  Tc=15.8 min  CN=73  Runoff=34.43 cfs 3.303 af

**Subcatchment 2.2S: South of SQ Drive**
Runoff Area=102,088 sf  10.13% Impervious  Runoff Depth=4.30"
Flow Length=391'  Tc=6.0 min  CN=77  Runoff=11.79 cfs 0.840 af

**Subcatchment 2S: North Corner**
Runoff Area=284,221 sf  6.78% Impervious  Runoff Depth=3.77"
Tc=0.0 min  CN=72  Runoff=35.33 cfs 2.050 af

**Subcatchment 3S: SE Corner**
Runoff Area=308,423 sf  2.18% Impervious  Runoff Depth=3.35"
Flow Length=1,149'  Tc=15.9 min  CN=68  Runoff=20.46 cfs 1.979 af

**Subcatchment 10S: Parking Lot**
Runoff Area=10,178 sf  99.02% Impervious  Runoff Depth>6.65"
Tc=790.0 min  CN=98  Runoff=0.11 cfs 0.130 af

**Subcatchment 11S: Island**
Runoff Area=588 sf  65.82% Impervious  Runoff Depth=5.75"
Tc=6.0 min  CN=90  Runoff=0.09 cfs 0.006 af

**Subcatchment 12S: Building**
Runoff Area=1,878 sf  65.12% Impervious  Runoff Depth=5.75"
Tc=6.0 min  CN=90  Runoff=0.27 cfs 0.021 af

**Subcatchment 13S: Building**
Runoff Area=1,349 sf  73.83% Impervious  Runoff Depth=5.99"
Tc=6.0 min  CN=92  Runoff=0.20 cfs 0.015 af

**Subcatchment 14S: Building**
Runoff Area=1,022 sf  77.79% Impervious  Runoff Depth=6.10"
Tc=6.0 min  CN=93  Runoff=0.15 cfs 0.012 af

**Subcatchment 15S: Building**
Runoff Area=1,377 sf  43.21% Impervious  Runoff Depth=5.07"
Tc=6.0 min  CN=84  Runoff=0.18 cfs 0.013 af

**Subcatchment 16S: Island**
Runoff Area=928 sf  26.51% Impervious  Runoff Depth=4.63"
Tc=6.0 min  CN=80  Runoff=0.11 cfs 0.008 af

**Subcatchment 17S: To Bio #1**
Runoff Area=2,893 sf  0.28% Impervious  Runoff Depth=3.98"
Tc=6.0 min  CN=74  Runoff=0.31 cfs 0.022 af

**Subcatchment 20S: Building**
Runoff Area=9,167 sf  100.00% Impervious  Runoff Depth=6.69"
Tc=6.0 min  CN=98  Runoff=1.43 cfs 0.117 af

**Subcatchment 21S: Parking Lot**
Runoff Area=2,620 sf  100.00% Impervious  Runoff Depth=6.69"
Tc=6.0 min  CN=98  Runoff=0.41 cfs 0.034 af

**Subcatchment 22S: To Bio #2**
Runoff Area=3,961 sf  0.00% Impervious  Runoff Depth=3.98"
Tc=6.0 min  CN=74  Runoff=0.42 cfs 0.030 af

**Subcatchment 30S: Roadside**

Runoff Area=8,230 sf  53.10% Impervious  Runoff Depth=5.41"
Flow Length=204'  Tc=6.0 min  CN=87  Runoff=1.15 cfs  0.085 af

**Subcatchment 31S: Roadside**

Runoff Area=7,135 sf  71.11% Impervious  Runoff Depth=5.87"
Flow Length=143'  Tc=6.0 min  CN=91  Runoff=1.06 cfs  0.080 af

**Subcatchment 40S: Building**

Runoff Area=3,066 sf  100.00% Impervious  Runoff Depth=6.69"
Tc=6.0 min  CN=98  Runoff=0.48 cfs  0.039 af

**Subcatchment 41S: Building**

Runoff Area=2,120 sf  90.94% Impervious  Runoff Depth=6.45"
Tc=6.0 min  CN=96  Runoff=0.33 cfs  0.026 af

**Subcatchment 42S: Building**

Runoff Area=2,162 sf  100.00% Impervious  Runoff Depth=6.69"
Tc=6.0 min  CN=98  Runoff=0.34 cfs  0.028 af

**Subcatchment 44S: Roadside**

Runoff Area=4,663 sf  40.92% Impervious  Runoff Depth=5.07"
Tc=6.0 min  CN=84  Runoff=0.62 cfs  0.045 af

**Subcatchment 45S: Parking Lot**

Runoff Area=3,851 sf  71.88% Impervious  Runoff Depth=5.87"
Tc=6.0 min  CN=91  Runoff=0.57 cfs  0.043 af

**Subcatchment 46S: Parking Lot**

Runoff Area=4,489 sf  73.25% Impervious  Runoff Depth=5.99"
Tc=6.0 min  CN=92  Runoff=0.67 cfs  0.051 af

**Subcatchment 48S: Roadside**

Runoff Area=3,415 sf  55.67% Impervious  Runoff Depth=5.53"
Tc=6.0 min  CN=88  Runoff=0.49 cfs  0.036 af

**Subcatchment 49S: Driveway**

Runoff Area=3,652 sf  83.90% Impervious  Runoff Depth=6.10"
Tc=6.0 min  CN=93  Runoff=0.55 cfs  0.043 af

**Subcatchment 60S: Parking Lot**

Runoff Area=9,169 sf  78.19% Impervious  Runoff Depth=6.10"
Flow Length=116'  Tc=6.0 min  CN=93  Runoff=1.39 cfs  0.107 af

**Subcatchment 61S: Parking Lot**

Runoff Area=7,068 sf  91.98% Impervious  Runoff Depth=6.45"
Flow Length=111'  Tc=6.0 min  CN=96  Runoff=1.09 cfs  0.087 af

**Subcatchment 63S: Building**

Runoff Area=1,459 sf  65.52% Impervious  Runoff Depth=5.75"
Tc=6.0 min  CN=90  Runoff=0.21 cfs  0.016 af

**Subcatchment 64S: Building**

Runoff Area=1,506 sf  81.27% Impervious  Runoff Depth=6.22"
Tc=6.0 min  CN=94  Runoff=0.23 cfs  0.018 af

**Subcatchment 65S: Building**

Runoff Area=982 sf  80.86% Impervious  Runoff Depth=6.10"
Tc=6.0 min  CN=93  Runoff=0.15 cfs  0.011 af

**Subcatchment 66S: Building**

Runoff Area=1,478 sf  44.79% Impervious  Runoff Depth=4.85"
Tc=6.0 min  CN=82  Runoff=0.19 cfs  0.014 af

**Subcatchment 67S: Landscape**

Runoff Area=1,511 sf  10.32% Impervious  Runoff Depth=2.95"
Tc=6.0 min  CN=64  Runoff=0.12 cfs  0.009 af

**Subcatchment 68S: Building**

Runoff Area=1,370 sf  100.00% Impervious  Runoff Depth=6.69"
Tc=6.0 min  CN=98  Runoff=0.21 cfs  0.018 af

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**Subcatchment 69S: To Pond**
Runoff Area=12,794 sf   0.00% Impervious   Runoff Depth=3.46"
Tc=6.0 min   CN=69   Runoff=1.19 cfs  0.085 af

**Subcatchment 70S: Building**
Runoff Area=6,905 sf   100.00% Impervious   Runoff Depth=6.69"
Tc=6.0 min   CN=98   Runoff=1.08 cfs  0.088 af

**Subcatchment 80S: Building**
Runoff Area=1,982 sf   84.56% Impervious   Runoff Depth=6.22"
Tc=6.0 min   CN=94   Runoff=0.30 cfs  0.024 af

**Subcatchment 81S: Building**
Runoff Area=1,200 sf   100.00% Impervious   Runoff Depth=6.69"
Tc=6.0 min   CN=98   Runoff=0.19 cfs  0.015 af

**Subcatchment 82S: Parking Lot**
Runoff Area=8,819 sf   89.53% Impervious   Runoff Depth=6.34"
Flow Length=214'   Tc=6.0 min   CN=95   Runoff=1.35 cfs  0.107 af

**Subcatchment 83S: To Pond**
Runoff Area=2,507 sf   0.00% Impervious   Runoff Depth=3.98"
Tc=6.0 min   CN=74   Runoff=0.27 cfs  0.019 af

**Reach 2.1R: Wetland Flow Path**
Avg. Flow Depth=1.53'   Max Vel=2.91 fps   Inflow=31.17 cfs  2.050 af
n=0.040   L=344.0'   S=0.0075 '/'   Capacity=54.59 cfs   Outflow=29.25 cfs  2.050 af

**Reach 2.2R: Wetland Flow Path**
Avg. Flow Depth=0.86'   Max Vel=5.45 fps   Inflow=22.19 cfs  5.697 af
n=0.040   L=263.0'   S=0.0502 '/'   Capacity=141.18 cfs   Outflow=21.54 cfs  5.697 af

**Reach 2R: Wetland Flow Path**
Avg. Flow Depth=1.05'   Max Vel=5.74 fps   Inflow=31.29 cfs  2.050 af
n=0.040   L=151.0'   S=0.0446 '/'   Capacity=133.09 cfs   Outflow=31.17 cfs  2.050 af

**Reach 10R: Swale**
Avg. Flow Depth=0.13'   Max Vel=0.72 fps   Inflow=0.40 cfs  0.098 af
n=0.035   L=44.0'   S=0.0050 '/'   Capacity=16.22 cfs   Outflow=0.40 cfs  0.098 af

**Reach 22R: Wetland Flow Path**
Avg. Flow Depth=0.09'   Max Vel=1.11 fps   Inflow=1.15 cfs  0.180 af
n=0.040   L=211.0'   S=0.0245 '/'   Capacity=392.58 cfs   Outflow=1.09 cfs  0.180 af

**Reach 23R: Wetland Flow Path**
Avg. Flow Depth=1.25'   Max Vel=4.09 fps   Inflow=29.59 cfs  2.229 af
n=0.040   L=131.0'   S=0.0185 '/'   Capacity=85.86 cfs   Outflow=29.49 cfs  2.229 af

**Reach 69R: Swale**
Avg. Flow Depth=0.49'   Max Vel=1.36 fps   Inflow=3.63 cfs  0.740 af
n=0.069   L=17.0'   S=0.0147 '/'   Capacity=14.11 cfs   Outflow=3.63 cfs  0.740 af

**Reach 70R: Woodland Flow Path**
Avg. Flow Depth=0.40'   Max Vel=0.64 fps   Inflow=3.63 cfs  0.740 af
n=0.400   L=57.0'   S=0.1404 '/'   Capacity=21.20 cfs   Outflow=3.63 cfs  0.740 af

**Reach 71R: Stream**
Avg. Flow Depth=0.34'   Max Vel=3.47 fps   Inflow=3.63 cfs  0.740 af
n=0.040   L=80.0'   S=0.0554 '/'   Capacity=31.12 cfs   Outflow=3.63 cfs  0.740 af

**Reach 72R: Stream**
Avg. Flow Depth=0.35'   Max Vel=2.04 fps   Inflow=3.63 cfs  0.740 af
n=0.040   L=88.0'   S=0.0160 '/'   Capacity=25.40 cfs   Outflow=3.63 cfs  0.740 af

**Reach 73R: Stream**
Avg. Flow Depth=0.40'   Max Vel=2.18 fps   Inflow=4.49 cfs  0.904 af
n=0.040   L=309.0'   S=0.0160 '/'   Capacity=25.38 cfs   Outflow=4.47 cfs  0.904 af

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**Reach 83R: Woodland Flow Path**      Avg. Flow Depth=0.20'  Max Vel=0.36 fps  Inflow=0.97 cfs  0.164 af
n=0.400  L=122.0'  S=0.0950 '/'  Capacity=17.44 cfs  Outflow=0.86 cfs  0.164 af

**Pond 1P: 15" RCP**      Peak Elev=53.82'  Storage=1,539 cf  Inflow=6.63 cfs  0.606 af
15.0" Round Culvert  n=0.012  L=60.0'  S=0.0037 '/'  Outflow=4.75 cfs  0.606 af

**Pond 2.1P: 24" RCP**      Peak Elev=52.28'  Storage=49,734 cf  Inflow=51.33 cfs  5.532 af
24.0" Round Culvert  n=0.012  L=17.0'  S=0.0135 '/'  Outflow=21.90 cfs  5.532 af

**Pond 2P: 12" CPP**      Peak Elev=61.01'  Storage=13,034 cf  Inflow=35.33 cfs  2.050 af
Outflow=31.29 cfs  2.050 af

**Pond 10P: Porous Pavement**      Peak Elev=3.14'  Storage=2,501 cf  Inflow=0.11 cfs  0.130 af
Outflow=0.04 cfs  0.105 af

**Pond 11P: YD #3-1**      Peak Elev=58.23'  Inflow=0.09 cfs  0.006 af
6.0" Round Culvert  n=0.012  L=36.0'  S=0.0050 '/'  Outflow=0.09 cfs  0.006 af

**Pond 12P: YD #7**      Peak Elev=58.25'  Inflow=0.27 cfs  0.021 af
8.0" Round Culvert  n=0.012  L=52.0'  S=0.0050 '/'  Outflow=0.27 cfs  0.021 af

**Pond 13P: YD #6**      Peak Elev=58.24'  Inflow=0.48 cfs  0.036 af
10.0" Round Culvert  n=0.012  L=29.0'  S=0.0052 '/'  Outflow=0.48 cfs  0.036 af

**Pond 14P: YD #5**      Peak Elev=58.23'  Inflow=0.63 cfs  0.048 af
10.0" Round Culvert  n=0.012  L=20.0'  S=0.0050 '/'  Outflow=0.63 cfs  0.048 af

**Pond 15P: YD #4**      Peak Elev=58.23'  Inflow=0.81 cfs  0.061 af
12.0" Round Culvert  n=0.012  L=46.0'  S=0.0050 '/'  Outflow=0.81 cfs  0.061 af

**Pond 16P: CB #3**      Peak Elev=58.23'  Inflow=1.02 cfs  0.076 af
12.0" Round Culvert  n=0.012  L=45.0'  S=0.0049 '/'  Outflow=1.02 cfs  0.076 af

**Pond 17P: Bio #1**      Peak Elev=58.22'  Storage=1,786 cf  Inflow=1.32 cfs  0.098 af
Outflow=0.40 cfs  0.098 af

**Pond 21P: CB #8**      Peak Elev=59.59'  Inflow=0.41 cfs  0.034 af
12.0" Round Culvert  n=0.012  L=22.0'  S=0.0050 '/'  Outflow=0.41 cfs  0.034 af

**Pond 22P: Bio #2**      Peak Elev=59.59'  Storage=3,011 cf  Inflow=2.26 cfs  0.181 af
Outflow=1.15 cfs  0.180 af

**Pond 30P: CB #10-2**      Peak Elev=53.21'  Inflow=1.15 cfs  0.085 af
12.0" Round Culvert  n=0.012  L=78.0'  S=0.0397 '/'  Outflow=1.15 cfs  0.085 af

**Pond 31P: CB #10-1**      Peak Elev=50.44'  Inflow=1.06 cfs  0.080 af
12.0" Round Culvert  n=0.012  L=2.0'  S=0.0250 '/'  Outflow=1.06 cfs  0.080 af

**Pond 32P: DMH #10**      Peak Elev=50.44'  Inflow=22.19 cfs  5.697 af
24.0" Round Culvert  n=0.012  L=57.0'  S=0.0135 '/'  Outflow=22.19 cfs  5.697 af

**Pond 40P: 6" CPP**      Peak Elev=54.86'  Inflow=0.48 cfs  0.039 af
6.0" Round Culvert  n=0.012  L=174.0'  S=0.0150 '/'  Outflow=0.48 cfs  0.039 af

**Pond 41P: YD #15**

Peak Elev=53.85'  Inflow=0.81 cfs  0.065 af
8.0" Round Culvert  n=0.012  L=47.0'  S=0.0149 '/'  Outflow=0.81 cfs  0.065 af

**Pond 42P: 6" CPP**

Peak Elev=54.05'  Inflow=0.34 cfs  0.028 af
6.0" Round Culvert  n=0.012  L=150.0'  S=0.0175 '/'  Outflow=0.34 cfs  0.028 af

**Pond 43P: 10" CPP**

Peak Elev=53.60'  Inflow=1.14 cfs  0.093 af
8.0" Round Culvert  n=0.012  L=33.0'  S=0.0148 '/'  Outflow=1.14 cfs  0.093 af

**Pond 44P: CB #14**

Peak Elev=53.17'  Inflow=1.77 cfs  0.138 af
12.0" Round Culvert  n=0.012  L=31.0'  S=0.0048 '/'  Outflow=1.77 cfs  0.138 af

**Pond 45P: CB #13-2**

Peak Elev=52.99'  Inflow=0.57 cfs  0.043 af
12.0" Round Culvert  n=0.012  L=22.0'  S=0.0245 '/'  Outflow=0.57 cfs  0.043 af

**Pond 46P: CB #13-1**

Peak Elev=53.00'  Inflow=0.67 cfs  0.051 af
12.0" Round Culvert  n=0.012  L=12.0'  S=0.0325 '/'  Outflow=0.67 cfs  0.051 af

**Pond 47P: DMH #13**

Peak Elev=52.97'  Inflow=3.01 cfs  0.233 af
12.0" Round Culvert  n=0.012  L=67.0'  S=0.0051 '/'  Outflow=3.01 cfs  0.233 af

**Pond 48P: CB #12-2**

Peak Elev=52.33'  Inflow=0.49 cfs  0.036 af
12.0" Round Culvert  n=0.012  L=6.0'  S=0.0050 '/'  Outflow=0.49 cfs  0.036 af

**Pond 49P: CB #12-1**

Peak Elev=52.33'  Inflow=0.55 cfs  0.043 af
12.0" Round Culvert  n=0.012  L=46.0'  S=0.0050 '/'  Outflow=0.55 cfs  0.043 af

**Pond 50P: DMH #12**

Peak Elev=52.32'  Inflow=4.05 cfs  0.312 af
15.0" Round Culvert  n=0.012  L=106.0'  S=0.0040 '/'  Outflow=4.05 cfs  0.312 af

**Pond 60P: CB #17-1-2**

Peak Elev=54.38'  Inflow=1.39 cfs  0.107 af
12.0" Round Culvert  n=0.012  L=21.0'  S=0.0052 '/'  Outflow=1.39 cfs  0.107 af

**Pond 61P: CB #17-1-1**

Peak Elev=54.34'  Inflow=1.09 cfs  0.087 af
12.0" Round Culvert  n=0.012  L=3.0'  S=0.0367 '/'  Outflow=1.09 cfs  0.087 af

**Pond 62P: DMH #17-1**

Peak Elev=54.26'  Inflow=2.48 cfs  0.194 af
12.0" Round Culvert  n=0.012  L=25.0'  S=0.0052 '/'  Outflow=2.48 cfs  0.194 af

**Pond 63P: YD #21**

Peak Elev=53.98'  Inflow=0.21 cfs  0.016 af
12.0" Round Culvert  n=0.012  L=49.0'  S=0.0049 '/'  Outflow=0.21 cfs  0.016 af

**Pond 64P: YD #20**

Peak Elev=53.97'  Inflow=0.44 cfs  0.034 af
10.0" Round Culvert  n=0.012  L=35.0'  S=0.0049 '/'  Outflow=0.44 cfs  0.034 af

**Pond 65P: YD #19**

Peak Elev=53.95'  Inflow=0.59 cfs  0.045 af
10.0" Round Culvert  n=0.012  L=42.0'  S=0.0050 '/'  Outflow=0.59 cfs  0.045 af

**Pond 66P: YD #18**

Peak Elev=53.91'  Inflow=0.78 cfs  0.059 af
12.0" Round Culvert  n=0.012  L=11.0'  S=0.0509 '/'  Outflow=0.78 cfs  0.059 af

**Pond 67P: CB #17**  Peak Elev=53.87'  Inflow=3.38 cfs  0.262 af
12.0" Round Culvert  n=0.012  L=74.0'  S=0.0050 '/'  Outflow=3.38 cfs  0.262 af

**Pond 68P: DMH #16**  Peak Elev=52.92'  Inflow=3.59 cfs  0.280 af
12.0" Round Culvert  n=0.012  L=90.0'  S=0.0110 '/'  Outflow=3.59 cfs  0.280 af

**Pond 69P: Bio #3**  Peak Elev=52.18'  Storage=13,667 cf  Inflow=9.90 cfs  0.764 af
Outflow=3.63 cfs  0.740 af

**Pond 80P: YD #24**  Peak Elev=48.78'  Inflow=0.30 cfs  0.024 af
6.0" Round Culvert  n=0.012  L=100.0'  S=0.0285 '/'  Outflow=0.30 cfs  0.024 af

**Pond 81P: 6" CPP**  Peak Elev=48.62'  Inflow=0.19 cfs  0.015 af
6.0" Round Culvert  n=0.012  L=85.0'  S=0.0200 '/'  Outflow=0.19 cfs  0.015 af

**Pond 82P: CB #23**  Peak Elev=48.60'  Inflow=1.54 cfs  0.122 af
12.0" Round Culvert  n=0.012  L=18.0'  S=0.0194 '/'  Outflow=1.54 cfs  0.122 af

**Pond 83P: Bio #4**  Peak Elev=48.56'  Storage=2,578 cf  Inflow=2.11 cfs  0.165 af
Outflow=0.97 cfs  0.164 af

**Link 100L: POA #100 - SW**  Inflow=4.75 cfs  0.606 af
Primary=4.75 cfs  0.606 af

**Link 200L: POA #200 - South**  Inflow=30.05 cfs  6.538 af
Primary=30.05 cfs  6.538 af

**Link 300L: POA #300 - SE**  Inflow=24.24 cfs  2.882 af
Primary=24.24 cfs  2.882 af

**Total Runoff Area = 30.826 ac   Runoff Volume = 10.183 af   Average Runoff Depth = 3.96"**
**87.29% Pervious = 26.907 ac    12.71% Impervious = 3.919 ac**
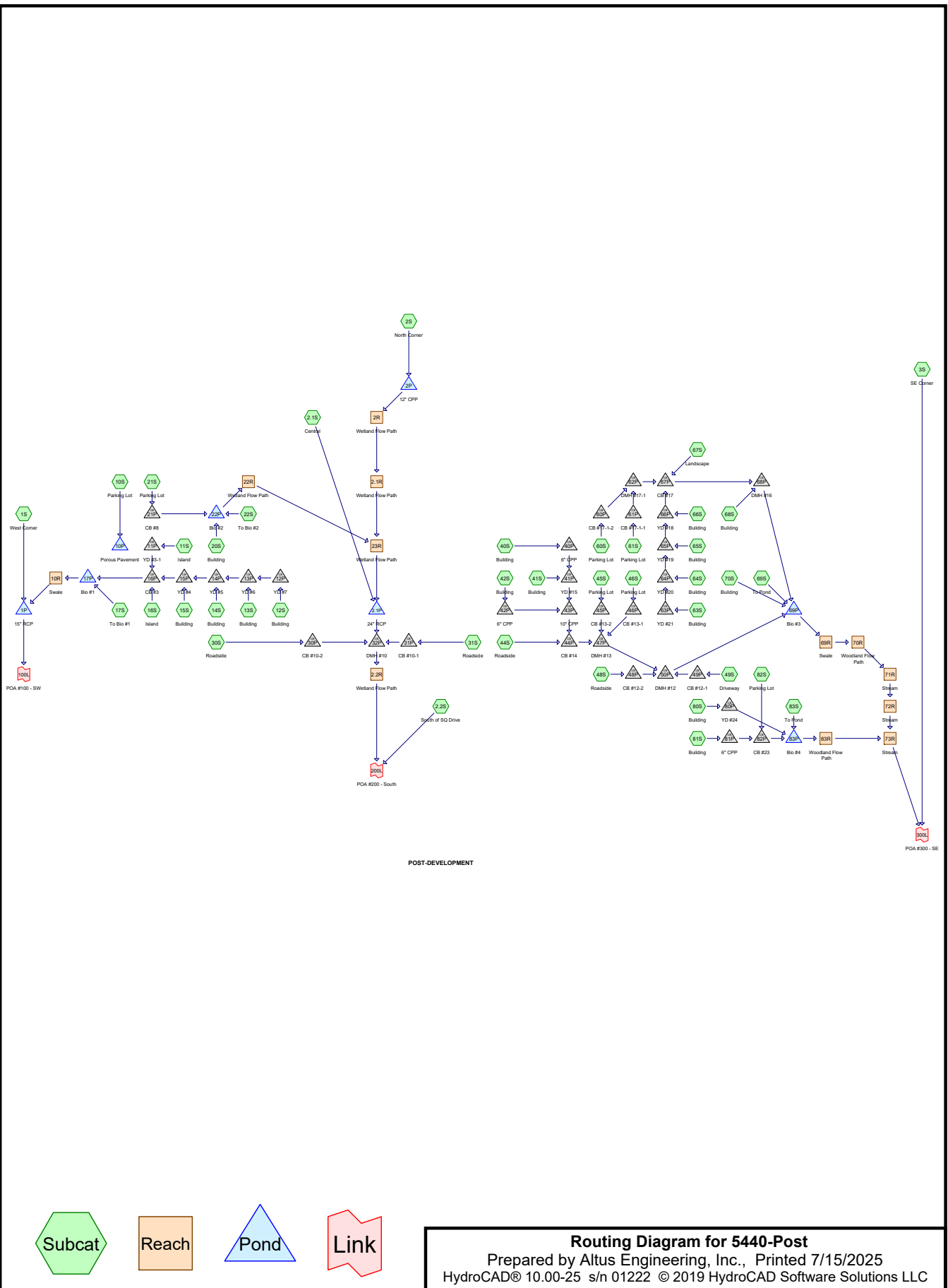
POST-DEVELOPMENT

Subcat    Reach    Pond    Link

## Summary for Pond 17P: Bio #1

[80] Warning: Exceeded Pond 16P by 0.84' @ 24.25 hrs (1.72 cfs 0.168 af)

| | | | | |
|---|---|---|---|---|
| Inflow Area = | 0.230 ac, | 42.35% Impervious, | Inflow Depth = 7.99" | for 100-year event |
| Inflow = | 2.03 cfs @ | 12.08 hrs, | Volume= 0.153 af | |
| Outflow = | 0.66 cfs @ | 12.38 hrs, | Volume= 0.153 af, | Atten= 67%, Lag= 17.7 min |
| Primary = | 0.66 cfs @ | 12.38 hrs, | Volume= 0.153 af | |

Routing by Dyn-Stor-Ind method, Time Span= 0.00-48.00 hrs, dt= 0.01 hrs
Starting Elev= 56.25'  Surf.Area= 487 sf  Storage= 37 cf
Peak Elev= 58.78' @ 12.38 hrs  Surf.Area= 1,664 sf  Storage= 2,627 cf  (2,591 cf above start)
Flood Elev= 59.25'  Surf.Area= 1,950 sf  Storage= 3,480 cf  (3,444 cf above start)

Plug-Flow detention time= 185.0 min calculated for 0.152 af (99% of inflow)
Center-of-Mass det. time= 176.0 min ( 957.2 - 781.2 )

| Volume | Invert | Avail.Storage | Storage Description |
|---|---|---|---|
| #1 | 54.75' | 3,480 cf | **Custom Stage Data (Conic)**Listed below (Recalc) |

| Elevation (feet) | Surf.Area (sq-ft) | Voids (%) | Inc.Store (cubic-feet) | Cum.Store (cubic-feet) | Wet.Area (sq-ft) |
|---|---|---|---|---|---|
| 54.75 | 487 | 0.0 | 0 | 0 | 487 |
| 56.25 | 487 | 5.0 | 37 | 37 | 604 |
| 57.00 | 774 | 100.0 | 469 | 505 | 899 |
| 58.00 | 1,239 | 100.0 | 997 | 1,503 | 1,377 |
| 59.00 | 1,797 | 100.0 | 1,509 | 3,012 | 1,952 |
| 59.25 | 1,950 | 100.0 | 468 | 3,480 | 2,110 |

| Device | Routing | Invert | Outlet Devices |
|---|---|---|---|
| #1 | Primary | 53.75' | **15.0" Round Culvert** L= 30.0'  CPP, square edge headwall,  Ke= 0.500 Inlet / Outlet Invert= 53.75' / 53.60'  S= 0.0050 '/'  Cc= 0.900 n= 0.012,  Flow Area= 1.23 sf |
| #2 | Device 1 | 53.75' | **4.0" Vert. Underdrain**  C= 0.600 |
| #3 | Device 2 | 56.25' | **2.500 in/hr Exfiltration throiugh Media over Wetted area above 56.25'** Excluded Wetted area = 604 sf  Phase-In= 0.01' |
| #4 | Device 1 | 57.35' | **4.0" Vert. Orifice/Grate**  C= 0.600 |
| #5 | Device 1 | 58.75' | **24.0" x 24.0" Horiz. Orifice/Grate**  C= 0.600 Limited to weir flow at low heads |

**Primary OutFlow** Max=0.66 cfs @ 12.38 hrs  HW=58.78'  TW=53.77'  (Dynamic Tailwater)
└─**1=Culvert** (Passes 0.66 cfs of 12.40 cfs potential flow)
  └─**2=Underdrain** (Passes 0.07 cfs of 0.93 cfs potential flow)
    └─**3=Exfiltration throiugh Media** (Exfiltration Controls 0.07 cfs)
  ├─**4=Orifice/Grate** (Orifice Controls 0.47 cfs @ 5.41 fps)
  └─**5=Orifice/Grate** (Weir Controls 0.12 cfs @ 0.54 fps)

## Summary for Pond 22P: Bio #2

[80] Warning: Exceeded Pond 21P by 0.75' @ 19.32 hrs (1.38 cfs 0.424 af)

| | | | | | |
|---|---|---|---|---|---|
| Inflow Area = | | 0.362 ac, | 74.85% Impervious, | Inflow Depth = 8.94" | for 100-year event |
| Inflow | = | 3.35 cfs @ 12.08 hrs, | Volume= | 0.269 af | |
| Outflow | = | 2.92 cfs @ 12.13 hrs, | Volume= | 0.268 af, | Atten= 13%, Lag= 2.7 min |
| Primary | = | 2.92 cfs @ 12.13 hrs, | Volume= | 0.268 af | |

Routing by Dyn-Stor-Ind method, Time Span= 0.00-48.00 hrs, dt= 0.01 hrs
Starting Elev= 57.75'  Surf.Area= 1,027 sf  Storage= 77 cf
Peak Elev= 59.70' @ 12.13 hrs  Surf.Area= 2,292 sf  Storage= 3,274 cf  (3,197 cf above start)
Flood Elev= 60.00'  Surf.Area= 2,511 sf  Storage= 3,983 cf  (3,906 cf above start)

Plug-Flow detention time= 168.1 min calculated for 0.266 af (99% of inflow)
Center-of-Mass det. time= 155.4 min ( 907.1 - 751.7 )

| Volume | Invert | Avail.Storage | Storage Description |
|---|---|---|---|
| #1 | 56.25' | 3,983 cf | **Custom Stage Data (Conic)**Listed below (Recalc) |

| Elevation (feet) | Surf.Area (sq-ft) | Voids (%) | Inc.Store (cubic-feet) | Cum.Store (cubic-feet) | Wet.Area (sq-ft) |
|---|---|---|---|---|---|
| 56.25 | 1,027 | 0.0 | 0 | 0 | 1,027 |
| 57.75 | 1,027 | 5.0 | 77 | 77 | 1,197 |
| 58.00 | 1,175 | 100.0 | 275 | 352 | 1,348 |
| 59.00 | 1,809 | 100.0 | 1,481 | 1,833 | 1,997 |
| 60.00 | 2,511 | 100.0 | 2,150 | 3,983 | 2,718 |

| Device | Routing | Invert | Outlet Devices |
|---|---|---|---|
| #1 | Primary | 55.25' | **15.0" Round Culvert**<br>L= 18.0'  CPP, square edge headwall, Ke= 0.500<br>Inlet / Outlet Invert= 55.25' / 55.16'  S= 0.0050 '/'  Cc= 0.900<br>n= 0.012, Flow Area= 1.23 sf |
| #2 | Device 1 | 55.25' | **4.0" Vert. Underdrain**  C= 0.600 |
| #3 | Device 2 | 57.75' | **2.500 in/hr Exfiltration throiugh Media over Wetted area above 57.75'**<br>Excluded Wetted area = 1,197 sf  Phase-In= 0.01' |
| #4 | Device 1 | 58.50' | **4.0" Vert. Orifice/Grate**  C= 0.600 |
| #5 | Device 1 | 59.50' | **24.0" x 24.0" Horiz. Orifice/Grate**  C= 0.600<br>Limited to weir flow at low heads |

**Primary OutFlow** Max=2.92 cfs @ 12.13 hrs  HW=59.70'  TW=55.31'  (Dynamic Tailwater)
└─**1=Culvert** (Passes 2.92 cfs of 11.56 cfs potential flow)
  ├─**2=Underdrain** (Passes 0.07 cfs of 0.87 cfs potential flow)
  │  └─**3=Exfiltration throiugh Media** (Exfiltration Controls 0.07 cfs)
  ├─**4=Orifice/Grate** (Orifice Controls 0.43 cfs @ 4.90 fps)
  └─**5=Orifice/Grate** (Weir Controls 2.42 cfs @ 1.48 fps)

## Summary for Pond 69P: Bio #3

[80] Warning: Exceeded Pond 50P by 1.72' @ 24.27 hrs (4.88 cfs 0.898 af)
[80] Warning: Exceeded Pond 68P by 0.63' @ 24.37 hrs (1.17 cfs 0.057 af)

Inflow Area = 1.645 ac, 63.94% Impervious, Inflow Depth = 8.47" for 100-year event
Inflow = 14.86 cfs @ 12.08 hrs, Volume= 1.162 af
Outflow = 9.90 cfs @ 12.17 hrs, Volume= 1.137 af, Atten= 33%, Lag= 5.2 min
Primary = 9.90 cfs @ 12.17 hrs, Volume= 1.137 af

Routing by Dyn-Stor-Ind method, Time Span= 0.00-48.00 hrs, dt= 0.01 hrs
Starting Elev= 48.00' Surf.Area= 1,706 sf Storage= 128 cf
Peak Elev= 52.71' @ 12.17 hrs Surf.Area= 5,687 sf Storage= 16,535 cf (16,407 cf above start)
Flood Elev= 53.00' Surf.Area= 6,019 sf Storage= 18,236 cf (18,109 cf above start)

Plug-Flow detention time= 183.9 min calculated for 1.134 af (98% of inflow)
Center-of-Mass det. time= 167.5 min ( 933.2 - 765.6 )

| Volume | Invert | Avail.Storage | Storage Description |
|--------|--------|---------------|---------------------|
| #1 | 46.50' | 18,236 cf | **Custom Stage Data (Conic)**Listed below (Recalc) |

| Elevation (feet) | Surf.Area (sq-ft) | Voids (%) | Inc.Store (cubic-feet) | Cum.Store (cubic-feet) | Wet.Area (sq-ft) |
|-----------------|-------------------|-----------|------------------------|------------------------|------------------|
| 46.50 | 1,706 | 0.0 | 0 | 0 | 1,706 |
| 48.00 | 1,706 | 5.0 | 128 | 128 | 1,926 |
| 49.00 | 2,381 | 100.0 | 2,034 | 2,162 | 2,619 |
| 50.00 | 3,056 | 100.0 | 2,711 | 4,874 | 3,319 |
| 51.00 | 3,935 | 100.0 | 3,486 | 8,360 | 4,223 |
| 52.00 | 4,918 | 100.0 | 4,417 | 12,777 | 5,233 |
| 53.00 | 6,019 | 100.0 | 5,459 | 18,236 | 6,365 |

| Device | Routing | Invert | Outlet Devices |
|--------|---------|--------|----------------|
| #1 | Primary | 45.50' | **18.0" Round Culvert** L= 50.0' CPP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 45.50' / 45.25' S= 0.0050 '/' Cc= 0.900 n= 0.012, Flow Area= 1.77 sf |
| #2 | Device 1 | 45.50' | **4.0" Vert. Underdrain** C= 0.600 |
| #3 | Device 2 | 48.00' | **2.400 in/hr Exfiltration through Media over Wetted area above 48.00'** Excluded Wetted area = 1,926 sf Phase-In= 0.01' |
| #4 | Device 1 | 50.00' | **4.0" W x 30.0" H Vert. Orifice/Grate** C= 0.600 |
| #5 | Device 1 | 52.50' | **48.0" x 48.0" Horiz. Orifice/Grate** C= 0.600 Limited to weir flow at low heads |

**Primary OutFlow** Max=9.89 cfs @ 12.17 hrs HW=52.71' TW=46.08' (Dynamic Tailwater)
└─**1=Culvert** (Passes 9.89 cfs of 21.62 cfs potential flow)
 ├─**2=Underdrain** (Passes 0.23 cfs of 1.08 cfs potential flow)
 │ └─**3=Exfiltration through Media** (Exfiltration Controls 0.23 cfs)
 ├─**4=Orifice/Grate** (Orifice Controls 4.67 cfs @ 5.60 fps)
 └─**5=Orifice/Grate** (Weir Controls 5.00 cfs @ 1.49 fps)

## Summary for Pond 83P: Bio #4

[80] Warning: Exceeded Pond 82P by 1.22' @ 24.13 hrs (3.22 cfs 0.357 af)

| | | | | |
|---|---|---|---|---|
| Inflow Area = | 0.333 ac, 74.25% Impervious, Inflow Depth = 8.89"  for 100-year event | | | |
| Inflow = | 3.12 cfs @ 12.08 hrs, Volume= | 0.247 af | | |
| Outflow = | 2.76 cfs @ 12.13 hrs, Volume= | 0.246 af, Atten= 11%, Lag= 2.5 min | | |
| Primary = | 2.76 cfs @ 12.13 hrs, Volume= | 0.246 af | | |

Routing by Dyn-Stor-Ind method, Time Span= 0.00-48.00 hrs, dt= 0.01 hrs
Starting Elev= 45.50'  Surf.Area= 315 sf  Storage= 24 cf
Peak Elev= 48.69' @ 12.13 hrs  Surf.Area= 1,539 sf  Storage= 2,771 cf  (2,747 cf above start)
Flood Elev= 49.00'  Surf.Area= 1,691 sf  Storage= 3,270 cf  (3,247 cf above start)

Plug-Flow detention time= 140.8 min calculated for 0.246 af (100% of inflow)
Center-of-Mass det. time= 136.3 min ( 895.4 - 759.1 )

| Volume | Invert | Avail.Storage | Storage Description | |
|---|---|---|---|---|
| #1 | 44.00' | 3,270 cf | **Custom Stage Data (Prismatic)** Listed below (Recalc) | |

| Elevation (feet) | Surf.Area (sq-ft) | Voids (%) | Inc.Store (cubic-feet) | Cum.Store (cubic-feet) |
|---|---|---|---|---|
| 44.00 | 315 | 0.0 | 0 | 0 |
| 45.50 | 315 | 5.0 | 24 | 24 |
| 46.00 | 451 | 100.0 | 192 | 215 |
| 47.00 | 785 | 100.0 | 618 | 833 |
| 48.00 | 1,199 | 100.0 | 992 | 1,825 |
| 49.00 | 1,691 | 100.0 | 1,445 | 3,270 |

| Device | Routing | Invert | Outlet Devices |
|---|---|---|---|
| #1 | Primary | 43.00' | **15.0" Round Culvert** L= 26.0' CPP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 43.00' / 42.85'  S= 0.0058 '/'  Cc= 0.900 n= 0.012, Flow Area= 1.23 sf |
| #2 | Device 1 | 43.00' | **4.0" Vert. Underdrain**  C= 0.600 |
| #3 | Device 2 | 45.50' | **2.500 in/hr Exfiltration through Media over Surface area above 45.50'** Excluded Surface area = 315 sf  Phase-In= 0.01' |
| #4 | Device 1 | 47.05' | **4.0" Vert. Orifice/Grate**  C= 0.600 |
| #5 | Device 1 | 48.50' | **24.0" x 24.0" Horiz. Orifice/Grate**  C= 0.600 Limited to weir flow at low heads |

**Primary OutFlow** Max=2.76 cfs @ 12.13 hrs  HW=48.69'  TW=43.05'  (Dynamic Tailwater)
└─**1=Culvert** (Passes 2.76 cfs of 13.30 cfs potential flow)
　└─**2=Underdrain** (Passes 0.07 cfs of 0.99 cfs potential flow)
　　└─**3=Exfiltration through Media** (Exfiltration Controls 0.07 cfs)
　├─**4=Orifice/Grate** (Orifice Controls 0.51 cfs @ 5.85 fps)
　└─**5=Orifice/Grate** (Weir Controls 2.18 cfs @ 1.43 fps)

# Section 5

# Precipitation Table

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# Extreme Precipitation Tables

## Northeast Regional Climate Center

*Data represents point estimates calculated from partial duration series. All precipitation amounts are displayed in inches.*

| Metadata for Point | |
|---|---|
| **Smoothing** | Yes |
| **State** | New Hampshire |
| **Location** | New Hampshire, United States |
| **Latitude** | 43.141 degrees North |
| **Longitude** | 70.907 degrees West |
| **Elevation** | 10 feet |
| **Date/Time** | Tue Apr 15 2025 15:34:24 GMT-0400 (Eastern Daylight Time) |

## Extreme Precipitation Estimates

| | 5min | 10min | 15min | 30min | 60min | 120min | | 1hr | 2hr | 3hr | 6hr | 12hr | 24hr | 48hr | | 1day | 2day | 4day | 7day | 10day | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 1yr | 0.26 | 0.40 | 0.50 | 0.65 | 0.81 | 1.03 | 1yr | 0.70 | 0.98 | 1.21 | 1.55 | 2.00 | 2.61 | | | 2.31 | 2.74 | 3.14 | 3.87 | 4.44 | 1yr |
| 2yr | 0.32 | 0.49 | 0.61 | 0.81 | 1.01 | 1.29 | 2yr | 0.88 | 1.17 | 1.50 | 1.91 | 2.45 | 3.14 | | | 2.78 | 3.35 | 3.85 | 4.58 | 5.21 | 2yr |
| 5yr | 0.37 | 0.57 | 0.72 | 0.96 | 1.23 | 1.58 | 5yr | 1.06 | 1.44 | 1.85 | 2.39 | 3.08 | 3.98 | | | 3.52 | 4.30 | 4.91 | 5.80 | 6.56 | 5yr |
| 10yr | 0.40 | 0.63 | 0.80 | 1.09 | 1.42 | 1.85 | 10yr | 1.22 | 1.69 | 2.18 | 2.83 | 3.67 | 4.76 | | | 4.21 | 5.19 | 5.91 | 6.93 | 7.81 | 10yr |
| 25yr | 0.46 | 0.74 | 0.94 | 1.29 | 1.72 | 2.27 | 25yr | 1.48 | 2.09 | 2.70 | 3.53 | 4.62 | 6.03 | | | 5.34 | 6.66 | 7.55 | 8.78 | 9.83 | 25yr |
| 50yr | 0.51 | 0.83 | 1.06 | 1.48 | 1.99 | 2.66 | 50yr | 1.72 | 2.46 | 3.18 | 4.19 | 5.51 | 7.22 | | | 6.39 | 8.05 | 9.09 | 10.51 | 11.72 | 50yr |
| 100yr | 0.58 | 0.93 | 1.20 | 1.70 | 2.31 | 3.12 | 100yr | 2.00 | 2.89 | 3.74 | 4.97 | 6.56 | 8.64 | | | 7.65 | 9.73 | 10.94 | 12.58 | 13.96 | 100yr |
| 200yr | 0.64 | 1.04 | 1.35 | 1.94 | 2.69 | 3.66 | 200yr | 2.32 | 3.40 | 4.42 | 5.90 | 7.83 | 10.35 | 12.24 | 200yr | 9.16 | 11.77 | 13.18 | 15.07 | 16.65 | 200yr |
| 500yr | 0.75 | 1.24 | 1.61 | 2.34 | 3.29 | 4.52 | 500yr | 2.84 | 4.22 | 5.49 | 7.39 | 9.88 | 13.15 | 15.74 | 500yr | 11.64 | 15.14 | 16.87 | 19.14 | 21.03 | 500yr |

*Red annotations over the 24hr column: +15%; 3.61; 5.47; 6.93; 8.30; 9.94*

## Lower Confidence Limits

| | 5min | 10min | 15min | 30min | 60min | 120min | | 1hr | 2hr | 3hr | 6hr | 12hr | 24hr | 48hr | | 1day | 2day | 4day | 7day | 10day | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 1yr | 0.24 | 0.37 | 0.45 | 0.60 | 0.74 | 0.90 | 1yr | 0.64 | 0.88 | 0.91 | 1.27 | 1.58 | 2.06 | 2.50 | 1yr | 1.82 | 2.41 | 2.90 | 3.27 | 4.00 | 1yr |
| 2yr | 0.31 | 0.49 | 0.60 | 0.81 | 1.00 | 1.18 | 2yr | 0.86 | 1.16 | 1.36 | 1.83 | 2.36 | 3.04 | 3.39 | 2yr | 2.69 | 3.26 | 3.74 | 4.46 | 5.05 | 2yr |
| 5yr | 0.35 | 0.54 | 0.67 | 0.91 | 1.16 | 1.40 | 5yr | 1.00 | 1.37 | 1.61 | 2.15 | 2.78 | 3.72 | 4.13 | 5yr | 3.29 | 3.98 | 4.60 | 5.43 | 6.14 | 5yr |
| 10yr | 0.38 | 0.59 | 0.73 | 1.02 | 1.32 | 1.60 | 10yr | 1.14 | 1.56 | 1.82 | 2.45 | 3.13 | 4.30 | 4.81 | 10yr | 3.80 | 4.63 | 5.34 | 6.29 | 7.07 | 10yr |
| 25yr | 0.44 | 0.66 | 0.83 | 1.18 | 1.55 | 1.91 | 25yr | 1.34 | 1.87 | 2.11 | 2.84 | 3.65 | 4.98 | 5.85 | 25yr | 4.41 | 5.63 | 6.53 | 7.66 | 8.54 | 25yr |
| 50yr | 0.48 | 0.73 | 0.91 | 1.31 | 1.76 | 2.18 | 50yr | 1.52 | 2.13 | 2.36 | 3.20 | 4.10 | 5.70 | 6.77 | 50yr | 5.05 | 6.51 | 7.60 | 8.87 | 9.83 | 50yr |
| 100yr | 0.54 | 0.81 | 1.02 | 1.47 | 2.02 | 2.50 | 100yr | 1.74 | 2.44 | 2.64 | 3.58 | 4.58 | 6.51 | 7.84 | 100yr | 5.76 | 7.54 | 8.86 | 10.29 | 11.30 | 100yr |
| 200yr | 0.60 | 0.90 | 1.14 | 1.65 | 2.29 | 2.86 | 200yr | 1.98 | 2.79 | 2.94 | 4.01 | 5.12 | 7.43 | 9.08 | 200yr | 6.57 | 8.73 | 10.33 | 11.94 | 13.02 | 200yr |
| 500yr | 0.70 | 1.04 | 1.33 | 1.94 | 2.75 | 3.44 | 500yr | 2.38 | 3.36 | 3.41 | 4.64 | 5.95 | 8.82 | 11.01 | 500yr | 7.80 | 10.59 | 12.66 | 14.55 | 15.64 | 500yr |

## Upper Confidence Limits

| | 5min | 10min | 15min | 30min | 60min | 120min | | 1hr | 2hr | 3hr | 6hr | 12hr | 24hr | 48hr | | 1day | 2day | 4day | 7day | 10day | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 1yr | 0.28 | 0.43 | 0.53 | 0.71 | 0.88 | 1.08 | 1yr | 0.76 | 1.05 | 1.24 | 1.75 | 2.22 | 2.86 | 3.05 | 1yr | 2.53 | 2.93 | 3.40 | 4.20 | 4.80 | 1yr |
| 2yr | 0.33 | 0.51 | 0.62 | 0.85 | 1.04 | 1.25 | 2yr | 0.90 | 1.22 | 1.47 | 1.96 | 2.51 | 3.28 | 3.59 | 2yr | 2.90 | 3.45 | 3.96 | 4.72 | 5.42 | 2yr |
| 5yr | 0.39 | 0.60 | 0.75 | 1.03 | 1.31 | 1.58 | 5yr | 1.13 | 1.55 | 1.86 | 2.50 | 3.20 | 4.24 | 4.79 | 5yr | 3.75 | 4.61 | 5.24 | 6.18 | 6.95 | 5yr |
| 10yr | 0.46 | 0.70 | 0.87 | 1.21 | 1.57 | 1.92 | 10yr | 1.35 | 1.88 | 2.23 | 3.05 | 3.86 | 5.22 | 5.97 | 10yr | 4.62 | 5.75 | 6.53 | 7.59 | 8.48 | 10yr |
| 25yr | 0.55 | 0.84 | 1.05 | 1.50 | 1.97 | 2.48 | 25yr | 1.70 | 2.42 | 2.88 | 3.97 | 4.95 | 7.11 | 8.00 | 25yr | 6.29 | 7.70 | 8.67 | 9.98 | 11.05 | 25yr |
| 50yr | 0.64 | 0.97 | 1.21 | 1.74 | 2.34 | 3.00 | 50yr | 2.02 | 2.93 | 3.49 | 4.85 | 6.01 | 8.81 | 10.00 | 50yr | 7.79 | 9.62 | 10.77 | 12.26 | 13.51 | 50yr |
| 100yr | 0.74 | 1.12 | 1.41 | 2.03 | 2.79 | 3.62 | 100yr | 2.41 | 3.54 | 4.24 | 5.93 | 7.31 | 10.91 | 12.50 | 100yr | 9.65 | 12.02 | 13.36 | 15.09 | 16.54 | 100yr |
| 200yr | 0.86 | 1.30 | 1.64 | 2.38 | 3.32 | 4.39 | 200yr | 2.86 | 4.29 | 5.15 | 7.26 | 8.87 | 13.55 | 15.65 | 200yr | 11.99 | 15.05 | 16.59 | 18.56 | 20.27 | 200yr |
| 500yr | 1.05 | 1.57 | 2.01 | 2.93 | 4.16 | 5.64 | 500yr | 3.59 | 5.52 | 6.65 | 9.52 | 11.49 | 18.09 | 21.05 | 500yr | 16.01 | 20.24 | 22.09 | 24.44 | 26.53 | 500yr |

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# Section 6

NRCS Soils Report
Site Specific Soil Survey
Geotechnical Report

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![USDA logo] **United States Department of Agriculture**

**NRCS**

Natural Resources Conservation Service

A product of the National Cooperative Soil Survey, a joint effort of the United States Department of Agriculture and other Federal agencies, State agencies including the Agricultural Experiment Stations, and local participants

# Custom Soil Resource Report for
# Strafford County, New Hampshire



April 15, 2025
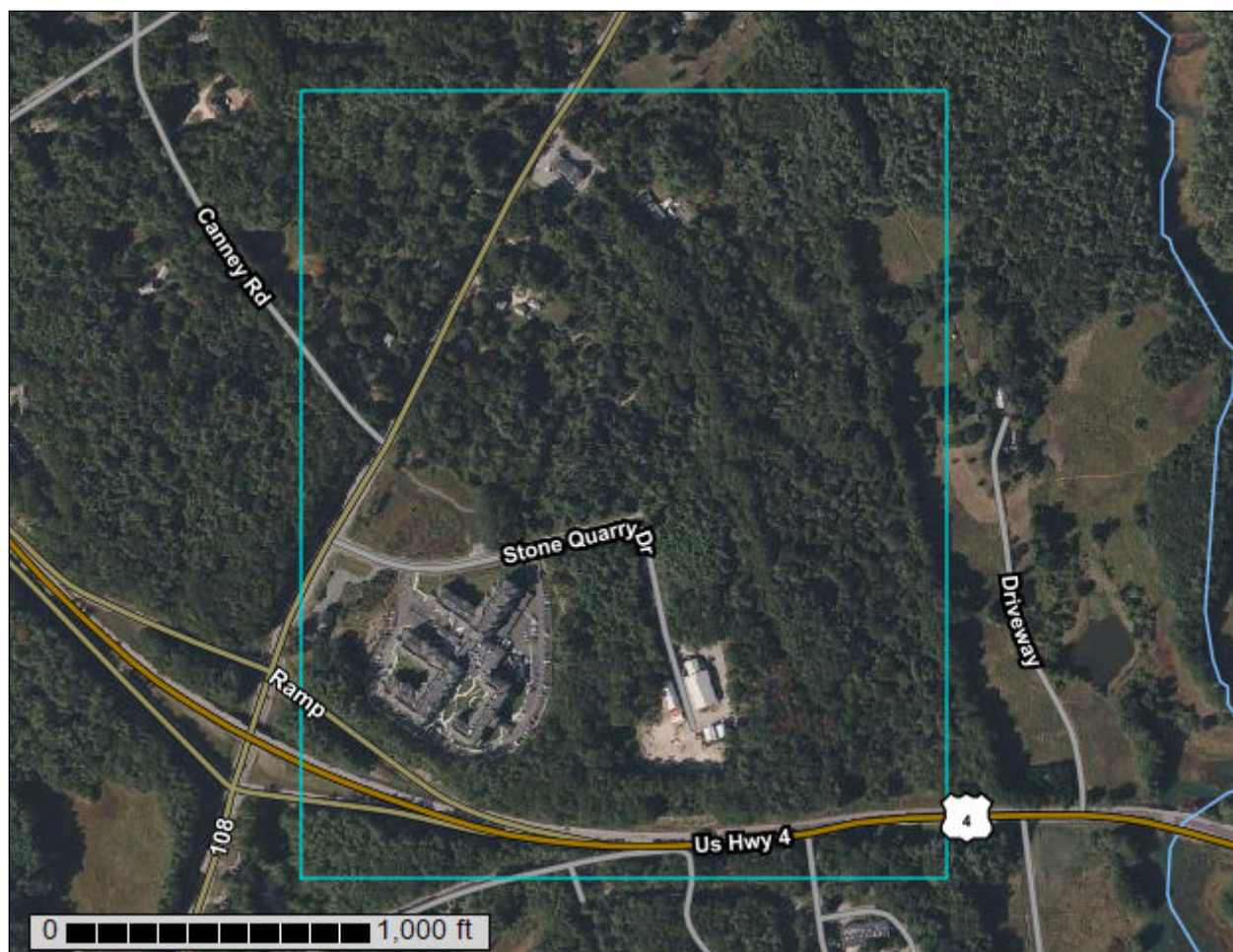
# Preface

Soil surveys contain information that affects land use planning in survey areas. They highlight soil limitations that affect various land uses and provide information about the properties of the soils in the survey areas. Soil surveys are designed for many different users, including farmers, ranchers, foresters, agronomists, urban planners, community officials, engineers, developers, builders, and home buyers. Also, conservationists, teachers, students, and specialists in recreation, waste disposal, and pollution control can use the surveys to help them understand, protect, or enhance the environment.

Various land use regulations of Federal, State, and local governments may impose special restrictions on land use or land treatment. Soil surveys identify soil properties that are used in making various land use or land treatment decisions. The information is intended to help the land users identify and reduce the effects of soil limitations on various land uses. The landowner or user is responsible for identifying and complying with existing laws and regulations.

Although soil survey information can be used for general farm, local, and wider area planning, onsite investigation is needed to supplement this information in some cases. Examples include soil quality assessments (http://www.nrcs.usda.gov/wps/portal/nrcs/main/soils/health/) and certain conservation and engineering applications. For more detailed information, contact your local USDA Service Center (https://offices.sc.egov.usda.gov/locator/app?agency=nrcs) or your NRCS State Soil Scientist (http://www.nrcs.usda.gov/wps/portal/nrcs/detail/soils/contactus/?cid=nrcs142p2_053951).

Great differences in soil properties can occur within short distances. Some soils are seasonally wet or subject to flooding. Some are too unstable to be used as a foundation for buildings or roads. Clayey or wet soils are poorly suited to use as septic tank absorption fields. A high water table makes a soil poorly suited to basements or underground installations.

The National Cooperative Soil Survey is a joint effort of the United States Department of Agriculture and other Federal agencies, State agencies including the Agricultural Experiment Stations, and local agencies. The Natural Resources Conservation Service (NRCS) has leadership for the Federal part of the National Cooperative Soil Survey.

Information about soils is updated periodically. Updated information is available through the NRCS Web Soil Survey, the site for official soil survey information.

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# Contents

# Soil Map

The soil map section includes the soil map for the defined area of interest, a list of soil map units on the map and extent of each map unit, and cartographic symbols displayed on the map. Also presented are various metadata about data used to produce the map, and a description of each soil map unit.

43° 8' 43" N

70° 54' 40" W

70° 54' 6" W

344600 344700 344800 344900 345000 345100 345200 345300

4778700 4778600 4778500 4778400 4778300 4778200 4778100 4778000 4777900 4777800 4777700

HcB
ScA
W
HcB
ScA
HcB
HdC
BzB
HcB
ScB
ScA
HcB
ScA
BzB
ScA
SfC
HcB
GlC
BzB
HcB
BzB
ScA
ScA
Ta
SfC

Dover Rd
108
Ramp
4

43° 8' 9" N

Soil Map may not be valid at this scale.

N

Map Scale: 1:5,030 if printed on A portrait (8.5" x 11") sheet.

Meters
0  50  100  200  300

Feet
0  200  400  800  1200

Map projection: Web Mercator   Corner coordinates: WGS84   Edge tics: UTM Zone 19N WGS84

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# MAP LEGEND

## MAP INFORMATION

**Area of Interest (AOI)**
Area of Interest (AOI)

**Soils**
Soil Map Unit Polygons
Soil Map Unit Lines
Soil Map Unit Points

**Special Point Features**
Blowout
Borrow Pit
Clay Spot
Closed Depression
Gravel Pit
Gravelly Spot
Landfill
Lava Flow
Marsh or swamp
Mine or Quarry
Miscellaneous Water
Perennial Water
Rock Outcrop
Saline Spot
Sandy Spot
Severely Eroded Spot
Sinkhole
Slide or Slip
Sodic Spot

Spoil Area
Stony Spot
Very Stony Spot
Wet Spot
Other

Special Line Features

**Water Features**
Streams and Canals

**Transportation**
Rails
Interstate Highways
US Routes
Major Roads
Local Roads

**Background**
Aerial Photography

The soil surveys that comprise your AOI were mapped at 1:20,000.

Warning: Soil Map may not be valid at this scale.

Enlargement of maps beyond the scale of mapping can cause misunderstanding of the detail of mapping and accuracy of soil line placement. The maps do not show the small areas of contrasting soils that could have been shown at a more detailed scale.

Please rely on the bar scale on each map sheet for map measurements.

Source of Map: Natural Resources Conservation Service
Web Soil Survey URL:
Coordinate System: Web Mercator (EPSG:3857)

Maps from the Web Soil Survey are based on the Web Mercator projection, which preserves direction and shape but distorts distance and area. A projection that preserves area, such as the Albers equal-area conic projection, should be used if more accurate calculations of distance or area are required.

This product is generated from the USDA-NRCS certified data as of the version date(s) listed below.

Soil Survey Area: Strafford County, New Hampshire
Survey Area Data: Version 25, Sep 3, 2024

Soil map units are labeled (as space allows) for map scales 1:50,000 or larger.

Date(s) aerial images were photographed: Jun 19, 2020—Sep 20, 2020

The orthophoto or other base map on which the soil lines were compiled and digitized probably differs from the background imagery displayed on these maps. As a result, some minor shifting of map unit boundaries may be evident.

# Map Unit Legend

| Map Unit Symbol | Map Unit Name | Acres in AOI | Percent of AOI |
|---|---|---|---|
| BzB | Buxton silt loam, 3 to 8 percent slopes | 45.4 | 35.7% |
| GlC | Gloucester fine sandy loam, 8 to 15 percent slopes | 0.9 | 0.7% |
| HcB | Hollis-Charlton fine sandy loams, 3 to 8 percent slopes | 36.0 | 28.3% |
| HdC | Hollis-Charlton very rocky fine sandy loams, 8 to 15 percent slopes | 0.7 | 0.6% |
| ScA | Scantic silt loam, 0 to 3 percent slopes | 36.3 | 28.5% |
| ScB | Scantic silt loam, 3 to 8 percent slopes | 3.0 | 2.3% |
| SfC | Suffield silt loam, 8 to 15 percent slopes | 4.2 | 3.3% |
| Ta | Tidal marsh | 0.0 | 0.0% |
| W | Water | 0.8 | 0.6% |
| **Totals for Area of Interest** | | **127.3** | **100.0%** |

# Map Unit Descriptions

The map units delineated on the detailed soil maps in a soil survey represent the soils or miscellaneous areas in the survey area. The map unit descriptions, along with the maps, can be used to determine the composition and properties of a unit.

A map unit delineation on a soil map represents an area dominated by one or more major kinds of soil or miscellaneous areas. A map unit is identified and named according to the taxonomic classification of the dominant soils. Within a taxonomic class there are precisely defined limits for the properties of the soils. On the landscape, however, the soils are natural phenomena, and they have the characteristic variability of all natural phenomena. Thus, the range of some observed properties may extend beyond the limits defined for a taxonomic class. Areas of soils of a single taxonomic class rarely, if ever, can be mapped without including areas of other taxonomic classes. Consequently, every map unit is made up of the soils or miscellaneous areas for which it is named and some minor components that belong to taxonomic classes other than those of the major soils.

Most minor soils have properties similar to those of the dominant soil or soils in the map unit, and thus they do not affect use and management. These are called noncontrasting, or similar, components. They may or may not be mentioned in a particular map unit description. Other minor components, however, have properties and behavioral characteristics divergent enough to affect use or to require different management. These are called contrasting, or dissimilar, components. They generally are in small areas and could not be mapped separately because of the

scale used. Some small areas of strongly contrasting soils or miscellaneous areas are identified by a special symbol on the maps. If included in the database for a given area, the contrasting minor components are identified in the map unit descriptions along with some characteristics of each. A few areas of minor components may not have been observed, and consequently they are not mentioned in the descriptions, especially where the pattern was so complex that it was impractical to make enough observations to identify all the soils and miscellaneous areas on the landscape.

The presence of minor components in a map unit in no way diminishes the usefulness or accuracy of the data. The objective of mapping is not to delineate pure taxonomic classes but rather to separate the landscape into landforms or landform segments that have similar use and management requirements. The delineation of such segments on the map provides sufficient information for the development of resource plans. If intensive use of small areas is planned, however, onsite investigation is needed to define and locate the soils and miscellaneous areas.

An identifying symbol precedes the map unit name in the map unit descriptions. Each description includes general facts about the unit and gives important soil properties and qualities.

Soils that have profiles that are almost alike make up a *soil series*. Except for differences in texture of the surface layer, all the soils of a series have major horizons that are similar in composition, thickness, and arrangement.

Soils of one series can differ in texture of the surface layer, slope, stoniness, salinity, degree of erosion, and other characteristics that affect their use. On the basis of such differences, a soil series is divided into *soil phases*. Most of the areas shown on the detailed soil maps are phases of soil series. The name of a soil phase commonly indicates a feature that affects use or management. For example, Alpha silt loam, 0 to 2 percent slopes, is a phase of the Alpha series.

Some map units are made up of two or more major soils or miscellaneous areas. These map units are complexes, associations, or undifferentiated groups.

A *complex* consists of two or more soils or miscellaneous areas in such an intricate pattern or in such small areas that they cannot be shown separately on the maps. The pattern and proportion of the soils or miscellaneous areas are somewhat similar in all areas. Alpha-Beta complex, 0 to 6 percent slopes, is an example.

An *association* is made up of two or more geographically associated soils or miscellaneous areas that are shown as one unit on the maps. Because of present or anticipated uses of the map units in the survey area, it was not considered practical or necessary to map the soils or miscellaneous areas separately. The pattern and relative proportion of the soils or miscellaneous areas are somewhat similar. Alpha-Beta association, 0 to 2 percent slopes, is an example.

An *undifferentiated group* is made up of two or more soils or miscellaneous areas that could be mapped individually but are mapped as one unit because similar interpretations can be made for use and management. The pattern and proportion of the soils or miscellaneous areas in a mapped area are not uniform. An area can be made up of only one of the major soils or miscellaneous areas, or it can be made up of all of them. Alpha and Beta soils, 0 to 2 percent slopes, is an example.

Some surveys include *miscellaneous areas*. Such areas have little or no soil material and support little or no vegetation. Rock outcrop is an example.

# Strafford County, New Hampshire

## BzB—Buxton silt loam, 3 to 8 percent slopes

### Map Unit Setting

*National map unit symbol:* 9d6p
*Elevation:* 0 to 260 feet
*Mean annual precipitation:* 36 to 71 inches
*Mean annual air temperature:* 39 to 55 degrees F
*Frost-free period:* 140 to 240 days
*Farmland classification:* All areas are prime farmland

### Map Unit Composition

*Buxton and similar soils:* 85 percent
*Minor components:* 15 percent
*Estimates are based on observations, descriptions, and transects of the mapunit.*

### Description of Buxton

#### Setting

*Parent material:* Glaciomarine

#### Typical profile

*H1 - 0 to 10 inches:* silt loam
*H2 - 10 to 28 inches:* silty clay loam
*H3 - 28 to 43 inches:* silty clay

#### Properties and qualities

*Slope:* 3 to 8 percent
*Depth to restrictive feature:* More than 80 inches
*Drainage class:* Moderately well drained
*Runoff class:* Very high
*Capacity of the most limiting layer to transmit water (Ksat):* Moderately low to moderately high (0.06 to 0.20 in/hr)
*Depth to water table:* About 12 to 24 inches
*Frequency of flooding:* None
*Frequency of ponding:* None
*Available water supply, 0 to 60 inches:* Moderate (about 7.5 inches)

#### Interpretive groups

*Land capability classification (irrigated):* None specified
*Land capability classification (nonirrigated):* 2e
*Hydrologic Soil Group:* C/D
*Ecological site:* F145XY006CT - Semi-Rich Moist Lake Plain
*Hydric soil rating:* No

### Minor Components

#### Elmwood

*Percent of map unit:* 10 percent
*Hydric soil rating:* No

#### Not named

*Percent of map unit:* 5 percent
*Hydric soil rating:* No

## GIC—Gloucester fine sandy loam, 8 to 15 percent slopes

### Map Unit Setting
*National map unit symbol:* 9d74
*Elevation:* 20 to 970 feet
*Mean annual precipitation:* 36 to 71 inches
*Mean annual air temperature:* 39 to 55 degrees F
*Frost-free period:* 140 to 240 days
*Farmland classification:* Not prime farmland

### Map Unit Composition
*Gloucester and similar soils:* 85 percent
*Minor components:* 15 percent
*Estimates are based on observations, descriptions, and transects of the mapunit.*

### Description of Gloucester

#### Setting
*Parent material:* Till

#### Typical profile
*H1 - 0 to 14 inches:* fine sandy loam
*H2 - 14 to 28 inches:* very gravelly loamy sand
*H3 - 28 to 40 inches:* very gravelly coarse sand

#### Properties and qualities
*Slope:* 8 to 15 percent
*Depth to restrictive feature:* More than 80 inches
*Drainage class:* Somewhat excessively drained
*Runoff class:* Very low
*Capacity of the most limiting layer to transmit water (Ksat):* High to very high (6.00 to 20.00 in/hr)
*Depth to water table:* More than 80 inches
*Frequency of flooding:* None
*Frequency of ponding:* None
*Available water supply, 0 to 60 inches:* Low (about 3.5 inches)

#### Interpretive groups
*Land capability classification (irrigated):* None specified
*Land capability classification (nonirrigated):* 3e
*Hydrologic Soil Group:* A
*Ecological site:* F144AY032NH - Dry Till Uplands
*Hydric soil rating:* No

### Minor Components

#### Not named pan
*Percent of map unit:* 5 percent
*Hydric soil rating:* No

**Hollis**

*Percent of map unit:* 5 percent
*Hydric soil rating:* No

**Acton**

*Percent of map unit:* 5 percent
*Hydric soil rating:* No

## HcB—Hollis-Charlton fine sandy loams, 3 to 8 percent slopes

### Map Unit Setting

*National map unit symbol:* 9d7j
*Elevation:* 0 to 1,020 feet
*Mean annual precipitation:* 36 to 71 inches
*Mean annual air temperature:* 39 to 55 degrees F
*Frost-free period:* 120 to 240 days
*Farmland classification:* Farmland of local importance

### Map Unit Composition

*Hollis and similar soils:* 55 percent
*Charlton and similar soils:* 35 percent
*Minor components:* 10 percent
*Estimates are based on observations, descriptions, and transects of the mapunit.*

### Description of Hollis

#### Setting

*Parent material:* Till

#### Typical profile

*H1 - 0 to 14 inches:* fine sandy loam
*H2 - 14 to 18 inches:* bedrock

#### Properties and qualities

*Slope:* 3 to 8 percent
*Depth to restrictive feature:* 10 to 20 inches to lithic bedrock
*Drainage class:* Well drained
*Runoff class:* Very high
*Capacity of the most limiting layer to transmit water (Ksat):* Moderately high to high (0.60 to 6.00 in/hr)
*Depth to water table:* More than 80 inches
*Frequency of flooding:* None
*Frequency of ponding:* None
*Available water supply, 0 to 60 inches:* Very low (about 2.3 inches)

#### Interpretive groups

*Land capability classification (irrigated):* None specified
*Land capability classification (nonirrigated):* 3e
*Hydrologic Soil Group:* D
*Ecological site:* F144AY033MA - Shallow Dry Till Uplands
*Hydric soil rating:* No

**Description of Charlton**

### Setting

*Parent material:* Till

### Typical profile

*H1 - 0 to 13 inches:* fine sandy loam
*H2 - 13 to 36 inches:* fine sandy loam
*H3 - 36 to 40 inches:* gravelly loamy sand

### Properties and qualities

*Slope:* 3 to 8 percent
*Depth to restrictive feature:* More than 80 inches
*Drainage class:* Well drained
*Runoff class:* Low
*Capacity of the most limiting layer to transmit water (Ksat):* High (2.00 to 6.00 in/hr)
*Depth to water table:* More than 80 inches
*Frequency of flooding:* None
*Frequency of ponding:* None
*Available water supply, 0 to 60 inches:* Low (about 5.2 inches)

### Interpretive groups

*Land capability classification (irrigated):* None specified
*Land capability classification (nonirrigated):* 2e
*Hydrologic Soil Group:* A
*Ecological site:* F144AY034CT - Well Drained Till Uplands
*Hydric soil rating:* No

## Minor Components

### Not named

*Percent of map unit:* 5 percent
*Hydric soil rating:* No

### Buxton

*Percent of map unit:* 5 percent
*Hydric soil rating:* No

# HdC—Hollis-Charlton very rocky fine sandy loams, 8 to 15 percent slopes

## Map Unit Setting

*National map unit symbol:* 9d7n
*Elevation:* 0 to 1,200 feet
*Mean annual precipitation:* 36 to 71 inches
*Mean annual air temperature:* 39 to 55 degrees F
*Frost-free period:* 120 to 240 days
*Farmland classification:* Not prime farmland

**Map Unit Composition**

*Hollis and similar soils:* 40 percent
*Charlton and similar soils:* 30 percent
*Minor components:* 30 percent
*Estimates are based on observations, descriptions, and transects of the mapunit.*

## Description of Hollis

### Setting

*Parent material:* Till

### Typical profile

*H1 - 0 to 14 inches:* very stony fine sandy loam
*H2 - 14 to 18 inches:* bedrock

### Properties and qualities

*Slope:* 8 to 15 percent
*Surface area covered with cobbles, stones or boulders:* 1.6 percent
*Depth to restrictive feature:* 10 to 20 inches to lithic bedrock
*Drainage class:* Well drained
*Runoff class:* Very high
*Capacity of the most limiting layer to transmit water (Ksat):* Moderately high to high (0.60 to 6.00 in/hr)
*Depth to water table:* More than 80 inches
*Frequency of flooding:* None
*Frequency of ponding:* None
*Available water supply, 0 to 60 inches:* Very low (about 2.0 inches)

### Interpretive groups

*Land capability classification (irrigated):* None specified
*Land capability classification (nonirrigated):* 6s
*Hydrologic Soil Group:* D
*Ecological site:* F144AY033MA - Shallow Dry Till Uplands
*Hydric soil rating:* No

## Description of Charlton

### Setting

*Parent material:* Till

### Typical profile

*H1 - 0 to 13 inches:* very stony fine sandy loam
*H2 - 13 to 36 inches:* fine sandy loam
*H3 - 36 to 40 inches:* gravelly loamy sand

### Properties and qualities

*Slope:* 8 to 15 percent
*Surface area covered with cobbles, stones or boulders:* 1.6 percent
*Depth to restrictive feature:* More than 80 inches
*Drainage class:* Well drained
*Runoff class:* Low
*Capacity of the most limiting layer to transmit water (Ksat):* High (2.00 to 6.00 in/hr)
*Depth to water table:* More than 80 inches
*Frequency of flooding:* None
*Frequency of ponding:* None
*Available water supply, 0 to 60 inches:* Low (about 5.4 inches)

**Interpretive groups**

*Land capability classification (irrigated):* None specified

*Land capability classification (nonirrigated):* 6s

*Hydrologic Soil Group:* A

*Ecological site:* F144AY034CT - Well Drained Till Uplands

*Hydric soil rating:* No

## Minor Components

### Rock outcrop

*Percent of map unit:* 10 percent

*Hydric soil rating:* No

### Not named

*Percent of map unit:* 10 percent

*Hydric soil rating:* No

### Woodbridge

*Percent of map unit:* 5 percent

*Hydric soil rating:* No

### Sutton

*Percent of map unit:* 5 percent

*Hydric soil rating:* No

## ScA—Scantic silt loam, 0 to 3 percent slopes

### Map Unit Setting

*National map unit symbol:* 9d8s

*Elevation:* 0 to 260 feet

*Mean annual precipitation:* 36 to 71 inches

*Mean annual air temperature:* 39 to 55 degrees F

*Frost-free period:* 140 to 240 days

*Farmland classification:* Farmland of local importance

### Map Unit Composition

*Scantic and similar soils:* 85 percent

*Minor components:* 15 percent

*Estimates are based on observations, descriptions, and transects of the mapunit.*

### Description of Scantic

#### Setting

*Landform:* Marine terraces

#### Typical profile

*H1 - 0 to 13 inches:* silt loam

*H2 - 13 to 23 inches:* silty clay loam

*H3 - 23 to 40 inches:* silty clay

**Properties and qualities**

*Slope:* 0 to 3 percent

*Depth to restrictive feature:* More than 80 inches

*Drainage class:* Poorly drained

*Runoff class:* Medium

*Capacity of the most limiting layer to transmit water (Ksat):* Very low to moderately high (0.00 to 0.20 in/hr)

*Depth to water table:* About 0 to 12 inches

*Frequency of flooding:* None

*Frequency of ponding:* None

*Available water supply, 0 to 60 inches:* Moderate (about 6.4 inches)

**Interpretive groups**

*Land capability classification (irrigated):* None specified

*Land capability classification (nonirrigated):* 4w

*Hydrologic Soil Group:* C/D

*Ecological site:* F144AY019NH - Wet Lake Plain

*Hydric soil rating:* Yes

**Minor Components**

**Swanton**

*Percent of map unit:* 5 percent

*Landform:* Marine terraces

*Hydric soil rating:* Yes

**Not named wet**

*Percent of map unit:* 5 percent

*Landform:* Marine terraces

*Hydric soil rating:* Yes

**Biddeford**

*Percent of map unit:* 5 percent

*Landform:* Marine terraces

*Hydric soil rating:* Yes

## ScB—Scantic silt loam, 3 to 8 percent slopes

**Map Unit Setting**

*National map unit symbol:* 9d8t

*Elevation:* 0 to 260 feet

*Mean annual precipitation:* 36 to 71 inches

*Mean annual air temperature:* 39 to 55 degrees F

*Frost-free period:* 140 to 240 days

*Farmland classification:* Farmland of local importance

**Map Unit Composition**

*Scantic and similar soils:* 85 percent

*Minor components:* 15 percent

*Estimates are based on observations, descriptions, and transects of the mapunit.*

**Description of Scantic**

**Setting**

*Landform:* Marine terraces

**Typical profile**

*H1 - 0 to 13 inches:* silt loam
*H2 - 13 to 23 inches:* silty clay loam
*H3 - 23 to 40 inches:* silty clay

**Properties and qualities**

*Slope:* 3 to 8 percent
*Depth to restrictive feature:* More than 80 inches
*Drainage class:* Poorly drained
*Runoff class:* High
*Capacity of the most limiting layer to transmit water (Ksat):* Very low to moderately high (0.00 to 0.20 in/hr)
*Depth to water table:* About 0 to 12 inches
*Frequency of flooding:* None
*Frequency of ponding:* None
*Available water supply, 0 to 60 inches:* Moderate (about 6.4 inches)

**Interpretive groups**

*Land capability classification (irrigated):* None specified
*Land capability classification (nonirrigated):* 4w
*Hydrologic Soil Group:* C/D
*Ecological site:* F144AY019NH - Wet Lake Plain
*Hydric soil rating:* Yes

**Minor Components**

**Swanton**

*Percent of map unit:* 5 percent
*Landform:* Marine terraces
*Hydric soil rating:* Yes

**Not named wet**

*Percent of map unit:* 5 percent
*Landform:* Marine terraces
*Hydric soil rating:* Yes

**Buxton**

*Percent of map unit:* 5 percent
*Hydric soil rating:* No

## SfC—Suffield silt loam, 8 to 15 percent slopes

**Map Unit Setting**

*National map unit symbol:* 9d8v
*Elevation:* 0 to 250 feet
*Mean annual precipitation:* 36 to 71 inches

*Mean annual air temperature:* 39 to 55 degrees F
*Frost-free period:* 140 to 240 days
*Farmland classification:* Farmland of statewide importance

## Map Unit Composition

*Suffield and similar soils:* 85 percent
*Minor components:* 15 percent
*Estimates are based on observations, descriptions, and transects of the mapunit.*

## Description of Suffield

### Typical profile

*H1 - 0 to 19 inches:* silt loam
*H2 - 19 to 28 inches:* silt loam
*H3 - 28 to 41 inches:* silty clay

### Properties and qualities

*Slope:* 8 to 15 percent
*Depth to restrictive feature:* More than 80 inches
*Drainage class:* Well drained
*Runoff class:* High
*Capacity of the most limiting layer to transmit water (Ksat):* Very low to moderately high (0.00 to 0.20 in/hr)
*Depth to water table:* More than 80 inches
*Frequency of flooding:* None
*Frequency of ponding:* None
*Available water supply, 0 to 60 inches:* Moderate (about 7.4 inches)

### Interpretive groups

*Land capability classification (irrigated):* None specified
*Land capability classification (nonirrigated):* 3e
*Hydrologic Soil Group:* C
*Ecological site:* F144AY017NH - Well Drained Lake Plain
*Hydric soil rating:* No

## Minor Components

### Not named

*Percent of map unit:* 9 percent
*Hydric soil rating:* No

### Buxton

*Percent of map unit:* 5 percent
*Hydric soil rating:* No

### Rock outcrop

*Percent of map unit:* 1 percent
*Hydric soil rating:* No

## Ta—Tidal marsh

### Map Unit Setting

*National map unit symbol:* 9d92
*Mean annual precipitation:* 36 to 71 inches
*Mean annual air temperature:* 39 to 55 degrees F
*Frost-free period:* 140 to 240 days
*Farmland classification:* Not prime farmland

### Map Unit Composition

*Tidal marsh:* 98 percent
*Minor components:* 2 percent
*Estimates are based on observations, descriptions, and transects of the mapunit.*

### Description of Tidal Marsh

#### Setting

*Landform:* Marshes

#### Typical profile

*H1 - 0 to 12 inches:* peat
*H2 - 12 to 46 inches:* mucky peat
*H3 - 46 to 50 inches:* silt loam
*H4 - 50 to 60 inches:* loamy sand

#### Properties and qualities

*Slope:* 0 to 1 percent
*Drainage class:* Very poorly drained
*Capacity of the most limiting layer to transmit water (Ksat):* Moderately high to very high (0.60 to 20.00 in/hr)
*Depth to water table:* About 0 inches
*Frequency of flooding:* Frequent
*Frequency of ponding:* Frequent
*Maximum salinity:* Very slightly saline to strongly saline (2.0 to 32.0 mmhos/cm)
*Available water supply, 0 to 60 inches:* Very high (about 14.0 inches)

#### Interpretive groups

*Land capability classification (irrigated):* None specified
*Land capability classification (nonirrigated):* 8w
*Hydric soil rating:* Yes

### Minor Components

#### Rock outcrop

*Percent of map unit:* 2 percent
*Hydric soil rating:* No

## W—Water

### Map Unit Composition
*Water (less than 40 acres):* 100 percent
*Estimates are based on observations, descriptions, and transects of the mapunit.*

# Michael Cuomo, Soil Scientist
6 York Pond Road, York, Maine 03909
207 363 4532
mcuomosoil@gmail.com

Erik Saari, Vice President
Altus Engineering, Inc.
133 Court Street
Portsmouth, NH 03801


24 February 2024


Dear Mr. Saari;


This report is in reference to the 22.5 acre undeveloped parcel
located north of Stone Quarry Drive and east of Route 108 in Durham,
NH. This is identified by the town as map 209, lot 33 and is owned
by Riverwoods, Durham. A Site Specific Soil Map was prepared for
this property in February 2024 to assist you in planning and
permitting a residential development served by municipal sewer and
water service. There were a few patches of thin snow and the
wetlands were mostly iced over when this work was done.


This report is a component of the Site Specific Soil Survey and must
be submitted with it for regulatory review. The both comply with
*'Site Specific Soil Mapping Standards for New Hampshire and
Vermont'*, SSSNNE Special Publication No.3 version 7.0, July 2021.


The Soil Survey is comprised of two components: a soil map and this
report. The soil map is made by traversing the property and
observing the soil at locations thought to be representative of the
landform. Because soil is highly variable, it is not possible to
represent every soil variation on a soil map. The soil map is a
simplified two-dimensional interpretation of the complex three
dimensional soil-landscape relationship. Standards allow for
inclusions of soils other than those named in the soil map unit
label, so long as dissimilar inclusions do not exceed 25% of the map
unit. Boundaries between different soils are shown as lines on the
soil map, but are generally diffuse transition zones.

Soil names were selected using best fit with soils already researched in detail and listed in the *'New Hampshire State-Wide Numerical Soils Legend'* issued in 2011 by the USDA Natural Resource Conservation Service. The map unit design and the interpretations of soil properties in this report are specific to this site and were selected considering the proposed use. Therefore, the interpretations and limitation information in this report may be insufficient for some other uses. Hydrologic soil groups were assigned using *'KSAT Values for New Hampshire Soils'* SSSNNE Special Publication No. 5, September 2009.

Twenty eight test pits were dug with an excavator and are the primary basis of this soil survey. Other soil observations were made with a soil auger, and two were recorded in detail to document the wetland soils. The test pit data and soil observations are attached at the rear of this report. Eight soil types were identified on this property and are described below. The regulated wetland boundaries were previously flagged and have been survey located.

Map Unit: 29
Soil Name: Woodbridge
Drainage class: moderately well drained.
Parent material: basal till.
Texture range: fine sandy loam and sandy loam.
Described in: test pit MC6.
Landscape position: upland sideslopes.
Landform: gently rolling to steep.
Slope range: 1 to 25%.
Bedrock class: very deep (more than 60").
Hydrologic group: C.
Flood hazard: none.
Inclusions: test pit MC12 is a non limiting inclusion in which the
    firm subsoil occurs deeper than is typical.
Use and management: land uses are slightly limited by the
    presence of basal till, which causes the ground water to
    perch after rain events and snow melt. This limitation can
    be overcome by appropriate grading and drainage.

Map Unit: 32
Soil Name: Boxford
Drainage class: moderately well drained.
Parent material: marine.
Texture range: silt loam over silty clay loam.
Described in: test pit MC10.
Landscape position: gently rolling uplands.
Landform: terraces.
Slope range: 1 to 15%.

Bedrock class: very deep (more than 60").
Hydrologic group: C.
Flood hazard: none.
Inclusions: test pit MC2 is a limiting inclusion of Boxford-like
    soils with bedrock between 48 and 60 inches deep. Test pit MC4
    is a non-limiting inclusion of Boxford-like soils underlain by
    glacial till.
Use and management: land uses are limited by seasonal wetness
    close to the surface. These are not wetland soils and may be
    drained or filled to overcome this limitation. Boxford soils
    are highly erodible and difficult to revegetate. These soils
    have low bearing strength when saturated.


Map Unit: 33
Soil Name: Scitico
Drainage class: poorly drained.
Parent material: marine.
Texture range: silt loam over silty clay loam.
Described in: soil observation A.
Landscape position: nearly level to gently sloping wetlands.
Landform: glacial deltas, bays.
Slope range: 1 to 8%.
Bedrock class: very deep (more than 60").
Hydrologic group: C.
Flood hazard: undefined flood hazard may exist along small stream
    channels.
Inclusions: Scitico map units include small stream channels, which
    are limiting inclusions. Scitico map units include small areas
    with stony and bouldery surface layers, which is not typical.
    Limited historical ditching and filling for trails has occurred.
Use and management: land uses are limited by frequent saturation
    to the surface, low bearing strength, and fine textures, which
    makes it difficult to work the soil when wet. These are
    regulated wetlands and may be not be drained or filled without
    permits.


Map Unit: 42
Soil Name: Canton
Drainage class: well drained.
Parent material: loose glacial till.
Texture range: fine sandy loam over loamy sand.
Described in: test pit MC1.
Landscape position: upland.
Landform: ground moraine.
Slope range: 1-15%.
Bedrock class: very deep (more than 60").
Hydrologic group: B.
Flood hazard: none.
Inclusions: none observed.
Use and management: this soil presents no limitations to
    development.

Map_Unit: 85
Soil Name: Hollis
Drainage class: somewhat excessively drained.
Parent material: loose glacial till.
Texture range: fine sandy loam.
Described in: test pit MC15.
Landscape position: rolling upland.
Landform: scoured ridges.
Slope range: 8 to 25%.
Bedrock class: shallow (10-20").
Hydrologic group: D.
Flood hazard: none.
Inclusions: bedrock outcroppings are found in this map unit and are
    a limiting inclusion.
Use and management: land uses are limited by bedrock 0 to 20
    inches from the soil surface, which can be overcome by
    blasting and filling.


Map_Unit: 89
Soil Name: Chatfield
Drainage class: well drained.
Parent material: loose glacial till.
Texture range: fine sandy loam.
Described in: test pit MC8.
Landscape position: upland.
Landform: scoured ridges.
Slope range: 1 to 8%.
Bedrock class: moderately deep (20-40").
Hydrologic group: B.
Flood hazard: none.
Inclusions: none noted.
Use and management: land uses are limited by bedrock 20 to 40
    inches from the soil surface, which can be overcome by
    blasting and filling.


Map_Unit: 134
Soil Name: Maybid
Drainage class: very poorly drained.
Parent material: marine.
Texture range: silt loam over silty clay loam.
Described in: soil observation B.
Landscape position: lowland wetlands.
Landform: deltas, bays.
Slope range: 0 to 1%.
Bedrock class: very deep (more than 60").
Hydrologic group: D.
Flood hazard: undefined flood hazard may exist.
Inclusions: none noted.

Use and management: Land uses are very limited by long periods of
    saturation to the surface, low bearing strength, and fine
    soil texture. These are regulated wetlands and may be not
    be drained or filled without permits.

Map Unit: 953
Soil Name: Boxford SPD
The Boxford SPD (SPD for 'somewhat poorly drained') is very similar
    to the Boxford soils, which are moderately well drained.
Drainage class: somewhat poorly drained.
Parent material: marine.
Texture range: silt loam over silty clay loam.
Described in: test pit MC3.
Landscape position: lowland.
Landform: terrace.
Slope range: 1 to more than 25%.
Bedrock class: very deep (more than 60").
Hydrologic group: C.
Flood hazard: none.
Inclusions: test pits MC17 and MC27 are Boxford SPD non-limiting
    variants which are underlain by firm glacial till. Test pit MC26
    found bedrock between 48 and 60 inches, which is limiting for
    some land uses.

    Test pits MC22, MC23, and MC24 show a non-limiting inclusion
    with a thin layer of fill over subsoils typical to
    Boxford SPD and Boxford soils. This inclusion appears widespread
    in the south west corner of the property, but could not be
    accurately separated as a map unit. It was included in the
    Boxford SPD because it is also somewhat poorly drained. Other
    areas of Boxford SPD map units are covered with debris from past
    human occupation, such as broken concrete and brick piles.

Use and management: land uses are limited by seasonal wetness
    close to the surface. These are not wetland soils and may be
    drained or filled to overcome this limitation. Boxford SPD soils
    are highly erodible and difficult to revegetate. These soils
    have low bearing strength when saturated.

Please call if you have questions regarding this work.

Sincerely,

Michael Cuomo
NH Certified Soil Scientist #6
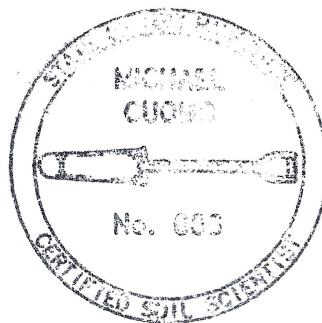
**The following must appear on the soil map**


<u>Site Specific Soil Map Legend</u>

| MAP SYMBOL | SOIL NAME | HYDROLOGIC SOIL GROUP | DRAINAGE CLASS |
|---|---|---|---|
| 29 | Woodbridge | C | moderately well drained |
| 32 | Boxford | C | moderately well drained |
| 33 | Scitico | C | poorly drained |
| 42 | Canton | B | well drained |
| 85 | Hollis | D | somewhat excessively drained |
| 89 | Chatfield | B | well drained |
| 134 | Maybid | D | very poorly drained |
| 953 | Boxford SPD | C | somewhat poorly drained |

The letter at the end of the soil map unit label is the slope class.
This represents the predominant slope of the map unit.

Slope Class
A      0-1%
B      1-8%
C      8-15%
D      15-25%
E      +25%

This map is within the technical standards of the National Cooperative Soil Survey. It is a special purpose product intended for development planning and engineering interpretations. It was produced by a professional soil scientist, and is not a product of the USDA Natural Resources Conservation Service. There is a report that accompanies this map.


Michael Cuomo
NH Cert. Soil Scientist #6
February 2024

**Michael Cuomo, Soil Scientist**
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207 363 4532
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**TEST PIT DATA**

Client:      Altus Engineering
Location:    Stone Quarry Drive, Durham, NH
Date:        12 and 14 February 2024

Test Pit Number: MC1
<u>Depth</u>          <u>Description</u>
3"         Forest litter.
0-8"       Dark brown (10YR 3/3) fine sandy loam, granular, friable.
8-18"      Brownish yellow (10YR 6/6) fine sandy loam, blocky,
           friable.
18-60"     Light yellowish brown (2.5Y 6/3) loamy sand, blocky,
           friable.
Depth to Seasonal High Water Table: none
Observed water: none
Depth to bedrock: none
Soil name: Canton

Test Pit Number: MC2
<u>Depth</u>          <u>Description</u>
2"         Forest litter.
0-10"      Dark yellowish brown (10YR 3/4) silt loam, granular,
           friable.
10-15"     Yellowish brown (10YR 5/6) silt loam, blocky, friable.
15-24"     Olive brown (2.5Y 4/3) silt loam, blocky, friable, redox.
24-50      Olive (5Y 4/3) silty clay loam, massive, firm, redox.
50"+       Bedrock.
Depth to Seasonal High Water Table: 15"
Observed water: none
Depth to bedrock: 50"
Soil name: Boxford variant

Test Pit Number: MC3
<u>Depth</u>          <u>Description</u>
3"         Forest litter.
0-8"       Dark olive brown (2.5Y 3/3) silt loam, granular, friable.
8-10"      Light olive brown (2.5Y 5/4) silt loam, blocky, friable.
10-14"     Light yellowish brown (2.5Y 6/4) silt loam, blocky,
           friable, redox.
14-54      Olive (5Y 5/3) silty clay loam, massive, firm, redox.
Depth to Seasonal High Water Table: 10"
Observed water: 12"
Depth to bedrock: none
Soil name: Boxford SPD
Percolation test: 22 minutes/inch at 9" depth

```
Test Pit Number: MC4
Depth          Description
2"             Forest litter.
0-8"           Dark brown (10YR 3/3) silt loam, granular, friable.
8-15"          Yellowish brown (10YR 5/6) silt loam, blocky, friable.
15-19"         Light olive brown (2.5Y 5/4) silt loam, blocky, friable,
               redox.
19-40"         Grayish brown (5Y 5/2) silty clay loam, massive, firm,
               redox.
40-60"         Olive brown (2.5Y 4/4) stony fine sandy loam, massive,
               friable, redox.
Depth to Seasonal High Water Table: 15"
Observed water: 18"
Depth to bedrock: none
Soil name: Boxford variant


Test Pit Number: MC5
Depth          Description
3"             Forest litter.
0-7"           Dark brown (10YR 3/3) fine sandy loam, granular, friable.
7-12"          Brownish yellow (10YR 6/6) fine sandy loam, blocky,
               friable.
12-24"         Light olive brown (2.5Y 5/6) loamy sand, blocky, friable.
24-60"         Light yellowish brown (2.5Y 6/3) loamy sand, blocky,
               friable.
Depth to Seasonal High Water Table: none
Observed water: none
Depth to bedrock: none
Soil name: Canton


Test Pit Number: MC6
Depth          Description
3"             Forest litter.
0-8"           Dark brown (10YR 3/3) stony fine sandy loam, granular,
               friable.
8-16"          Yellowish brown (10YR 5/4) stony fine sandy loam, blocky,
               friable.
16-21"         Yellowish brown (10YR 5/6) stony sandy loam, blocky,
               friable.
21-55"         Light olive brown (2.5Y 5/4) stony sandy loam, massive,
               firm, redox.
Depth to Seasonal High Water Table: 21"
Observed water: 50"
Depth to bedrock: none
Soil name: Woodbridge
```

```
Test Pit Number: MC7
Depth          Description
1"          Forest litter.
0-9"        Very dark grayish brown (2.5Y 3/2) silt loam, granular,
            friable.
9-12"       Light olive brown (2.5Y 5/4) silt loam, blocky, friable.
12-16"      Light yellowish brown (2.5Y 6/3) silt loam, blocky,
            friable, redox.
16-60       Olive gray (5Y 5/2) silty clay loam, massive, firm, redox.
Depth to Seasonal High Water Table: 12"
Observed water: none
Depth to bedrock: none
Soil name: Boxford SPD


Test Pit Number: MC8
Depth          Description
3"          Forest litter.
0-8"        Very dark brown (10YR 2/2) fine sandy loam, granular,
            friable.
8-25"       Dark yellowish brown (10YR 4/6) stony fine sandy loam,
            blocky, friable.
25-30"      Light yellowish brown (2.5Y 6/4) stony fine sandy loam,
            blocky, friable.
Depth to Seasonal High Water Table: none
Observed water: none
Depth to bedrock: 30"
Soil name: Chatfield
Percolation test: 10 minutes/inch at 16" depth


Test Pit Number: MC9
Depth          Description
2"          Forest litter.
0-6"        Dark brown (10YR 3/3) stony fine sandy loam, granular,
            friable.
6-21"       Brownish yellow (10YR 6/6) stony fine sandy loam, blocky,
            friable.
21-55"      Light yellowish brown (2.5Y 6/4) loamy sand, blocky,
            friable.
Depth to Seasonal High Water Table: none
Observed water: none
Depth to bedrock: none
Soil name: Canton
```

```
Test Pit Number: MC10
Depth          Description
0-14"     Very dark grayish brown (10YR 3/2) silt loam, granular,
          friable.
14-20"    Yellowish brown (10YR 5/6) silt loam, blocky, friable.
20-25"    Light olive brown (2.5Y 5/4) silt loam, blocky, friable,
          redox.
25-56"    Olive (5Y 4/3) silty clay loam, massive, firm, redox.
Depth to Seasonal High Water Table: 20"
Observed water: 25"
Depth to bedrock: none
Soil name: Boxford

Test Pit Number: MC11
Depth          Description
1"        Forest litter.
0-8"      Very dark grayish brown (2.5Y 3/2) silt loam, granular,
          friable.
8-10"     Light olive brown (2.5Y 5/4) silt loam, blocky, friable.
10-17"    Light yellowish brown (2.5Y 6/3) silt loam, blocky,
          friable, redox.
17-60"    Olive (5Y 5/3) silty clay loam, massive, firm, redox.
Depth to Seasonal High Water Table: 10"
Observed water: none
Depth to bedrock: none
Soil name: Boxford SPD

Test Pit Number: MC12
Depth          Description
2"        Forest litter.
0-14"     Very dark brown (10YR 2/2) fine sandy loam, granular,
          friable.
14-28"    Yellowish brown (10YR 5/6) fine sandy loam, blocky,
          friable.
28-44"    Olive brown (2.5Y 4/4) stony fine sandy loam, blocky,
          friable, redox.
44-60"    Olive brown (2.5Y 4/3) stony fine sandy loam, massive,
          firm, redox.
Depth to Seasonal High Water Table: 28"
Observed water: 40"
Depth to bedrock: none
Soil name: Woodbridge variant
```

```
Test Pit Number: MC13
Depth          Description
2"        Forest litter.
0-9"      Very dark grayish brown (10YR 3/2) stony fine sandy loam,
          granular, friable.
9-16"     Dark yellowish brown (10YR 4/6) stony fine sandy loam,
          blocky, friable.
16-24"    Light yellowish brown (2.5Y 6/4) stony fine sandy loam,
          blocky, friable, redox.
24-60"    Olive brown (2.5Y 4/4) stony sandy loam, massive, firm,
          redox.
Depth to Seasonal High Water Table: 16"
Observed water: 24"
Depth to bedrock: none
Soil name: Woodbridge
Percolation test: 12 minutes/inch at 15" depth


Test Pit Number: MC14
Depth          Description
1"        Forest litter.
0-9"      Very dark grayish brown (2.5Y 3/2) silt loam, granular,
          friable.
9-12"     Light olive brown (2.5Y 5/4) silt loam, blocky, friable,
          redox.
12-20"    Olive brown (2.5Y 4/3) silt loam, blocky, firm, redox.
20-60"    Olive gray (5Y 5/2) silty clay loam, massive, firm, redox.
Depth to Seasonal High Water Table: 9"
Observed water: 18"
Depth to bedrock: none
Soil name: Boxford SPD


Test Pit Number: MC15
Depth          Description
1"        Forest litter.
0-8"      Very dark grayish brown (10YR 3/2) bouldery fine sandy
          loam, granular, friable.
8-20"     Yellowish brown (10YR 5/6) bouldery fine sandy loam,
          blocky, friable.
20"+      Bedrock.
Depth to Seasonal High Water Table: none
Observed water: none
Depth to bedrock: 20"
Soil name: Hollis
```

```
Test Pit Number: MC16
Depth          Description
1"        Forest litter.
0-8"      Very dark grayish brown (2.5Y 3/2) silt loam, granular,
          friable.
8-12"     Light olive brown (2.5Y 5/4) silt loam, blocky, friable.
12-16"    Olive brown (2.5Y 4/4) silt loam, blocky, friable, redox.
16-60"    Olive gray (5Y 5/2) silty clay loam, massive, firm, redox.
Depth to Seasonal High Water Table: 12"
Observed water: none
Depth to bedrock: none
Soil name: Boxford SPD

Test Pit Number: MC17
Depth          Description
1"        Forest litter.
0-9"      Dark brown (10YR 3/3) silt loam, granular, friable.
9-11"     Light olive brown (2.5Y 5/4) silt loam, blocky, friable.
11-13"    Olive brown (2.5Y 4/4) silt loam, blocky, friable, redox.
13-32"    Olive gray (5Y 5/2) silty clay loam, massive, firm, redox.
32-60"    Olive brown (2.5Y 4/4) stony fine sandy loam, massive,
          firm, redox.
Depth to Seasonal High Water Table: 11"
Observed water: 34"
Depth to bedrock: none
Soil name: Boxford SPD variant

Test Pit Number: MC18
Depth          Description
2"        Forest litter.
0-9"      Dark brown (10YR 3/3) fine sandy loam, granular, friable.
9-24"     Yellowish brown (10YR 5/6) fine sandy loam, blocky,
          friable.
24-66"    Light olive brown (2.5Y 5/4) stony fine sandy loam, blocky,
          friable, redox.
Depth to Seasonal High Water Table: 24"
Observed water: none
Depth to bedrock: none
Soil name: Woodbridge
```

```
Test Pit Number: MC19
Depth          Description
0-11"    Very dark grayish brown (10YR 3/2) very fine sandy loam,
         granular, friable.
11-19"   Strong brown (7.5YR 5/6) very fine sandy loam, blocky,
         friable.
19-22"   Light olive brown (2.5Y 5/4) silt loam, blocky, friable,
         redox.
22-56"   Olive (5Y 4/4) silty clay loam, massive, firm, redox.
Depth to Seasonal High Water Table: 19"
Observed water: 50"
Depth to bedrock: none
Soil name: Boxford

Test Pit Number: MC20
Depth          Description
1"       Forest litter.
0-9"     Very dark grayish brown (10YR 3/2) silt loam, granular,
         friable.
9-11"    Olive brown (2.5Y 4/4) silt loam, blocky, friable, redox.
11-18"   Grayish brown (2.5Y 5/2) silt loam, blocky, friable, redox.
18-60"   Olive gray (5Y 5/2) silty clay loam, massive, firm, redox.
Depth to Seasonal High Water Table: 9"
Observed water: 30"
Depth to bedrock: none
Soil name: Boxford SPD

Test Pit Number: MC21
Depth          Description
1"       Forest litter.
0-6"     Dark brown (10YR 3/3) silt loam, granular, friable.
6-11"    Light olive brown (2.5Y 5/4) silt loam, blocky, friable.
11-16"   Grayish brown (2.5Y 5/2) silt loam, blocky, friable, redox.
16-55"   Olive (5Y 4/3) silty clay loam, massive, firm, redox.
Depth to Seasonal High Water Table: 11"
Observed water: 20"
Depth to bedrock: none
Soil name: Boxford SPD
Percolation test: 58 minutes/inch at 10" depth
```

Test Pit Number: MC22
Depth          Description
0-6"      Dark olive brown (2.5Y 3/3) fine sandy loam fill, massive,
          friable.
6-15"     Light yellowish brown (2.5Y 6/3) gravelly loamy sand fill,
          massive, friable.
15-24"    Dark grayish brown (2.5Y 4/2) silt loam, blocky, friable,
          redox.
24-55"    Olive (5Y 4/4) silty clay loam, massive, firm, redox.
Depth to Seasonal High Water Table: 15"
Observed water: none
Depth to bedrock: none
Soil name: Excavated and filled over Boxford or Boxford SPD

Test Pit Number: MC23
Depth          Description
0-8"      Dark brown (10YR 3/3) fine sandy loam fill, granular,
          friable.
8-12"     Light yellowish brown (2.5Y 6/3) gravelly loamy sand fill,
          massive, friable.
12-20"    Light yellowish brown (2.5Y 6/4) silty clay loam, blocky,
          firm, redox.
20-58"    Olive (5Y 4/4) silty clay loam, massive, firm, redox.
Depth to Seasonal High Water Table: 12"
Observed water: none
Depth to bedrock: none
Soil name: Excavated and filled over Boxford or Boxford SPD

Test Pit Number: MC24
Depth          Description
0-7"      Very dark grayish brown (10YR 3/2) fine sandy loam fill,
          granular, friable.
7-14"     Light yellowish brown (2.5Y 6/3) gravelly loamy sand fill,
          massive, friable.
14-16"    Very dark grayish brown (10YR 3/2) silt loam, massive,
          friable.
16-19"    Light olive brown (2.5Y 5/3) silt loam, blocky, friable,
          redox.
19-60"    Olive (5Y 4/4) silty clay loam, massive, firm, redox.
Depth to Seasonal High Water Table: 16"
Observed water: none
Depth to bedrock: none
Soil name: Excavated and filled over Boxford or Boxford SPD

```
Test Pit Number: MC25
Depth          Description
2"          Forest litter.
0-9"        Dark brown (10YR 3/3) stony fine sandy loam, granular,
            friable.
9-24"       Dark yellowish brown (10YR 4/6) stony fine sandy loam,
            blocky, friable.
24-40"      Light yellowish brown (10YR 6/4) stony loamy sand, blocky,
            friable.
40-60"      Pale brown (2.5Y 7/3) stony loamy sand, massive, friable.
Depth to Seasonal High Water Table: none
Observed water: none
Depth to bedrock: none
Soil name: Canton


Test Pit Number: MC26
Depth          Description
1"          Forest litter.
0-14"       Very dark grayish brown (2.5Y 3/2) silt loam, granular,
            friable.
14-19"      Light olive brown (2.5Y 5/4) silt loam, blocky, friable,
            redox.
19-30"      Olive brown (2.5Y 4/4) silty clay loam, blocky, firm,
            redox.
30-50"      Olive brown (2.5Y 4/3) stony fine sandy loam, massive,
            firm, redox.
50"+        Bedrock
Depth to Seasonal High Water Table: 14"
Observed water: 36"
Depth to bedrock: 50"
Soil name: Boxford SPD variant


Test Pit Number: MC27
Depth          Description
1"          Forest litter
0-10"       Very dark grayish brown (10YR 3/2) silt loam, granular,
            friable.
10-20"      Yellowish brown (10YR 5/6) silt loam, blocky, friable.
20-30"      Light olive brown (2.5Y 5/3) silty clay loam, massive,
            firm, redox.
30-50"      Light olive brown (2.5Y 5/4) stony fine sandy loam,
            massive, firm, redox.
50"+        Bedrock.
Depth to Seasonal High Water Table: 20"
Observed water: none
Depth to bedrock: 50"
Soil name: Boxford variant
```

```
Test Pit Number: MC28
Depth          Description
1"        Forest litter.
0-6"      Very dark grayish brown (2.5Y 3/2) silt loam, granular,
          friable.
6-8"      Light olive brown (2.5Y 5/4) silt loam, blocky, friable.
8-11"     Grayish brown (2.5Y 5/2) silt loam, blocky, friable, redox.
11-60"    Olive (5Y 4/3) silty clay loam, blocky, firm, redox.
Depth to Seasonal High Water Table: 8"
Observed water: 30"
Depth to bedrock: none
Soil name: Boxford SPD


Soil Observation A (with hand tools)
Depth          Description
1"        Forest litter.
0-10"     Dark olive brown (2.5Y 3/3) silt loam, granular,
          friable, redox.
10-14"    Light brownish gray (2.5Y 6/2) silt loam, blocky, friable,
          redox.
14-19"    Olive brown (2.5Y 4/3) silt loam, blocky, friable, redox.
19-40"    Olive (5Y 4/3) silty clay loam, blocky, firm, redox.
Depth to Seasonal High Water Table: surface
Observed water: 12"
Depth to bedrock: none
Soil name: Scitico


Soil Observation B (with hand tools)
Depth          Description
1"        Forest litter.
0-6"      Black (2.5Y 2/1) silt loam, granular, friable, redox.
6-10"     Light brownish gray (2.5Y 6/2) silt loam, blocky, friable,
          redox.
10-15"    Dark grayish brown (2.5Y 4/2) silt loam, blocky, friable,
          redox.
15-20"    Olive gray (5Y 5/2) silt loam, blocky, firm, redox.
20-40"    Olive (5Y 4/3) silty clay loam, blocky, firm, redox.
Depth to Seasonal High Water Table: surface
Observed water: 9"
Depth to bedrock: none
Soil name: Maybid
```

see correction sheet

TEST PIT "MC#"

THIS SHOWS THE CORRECT CONFIGURATION OF THIS MAP UNIT
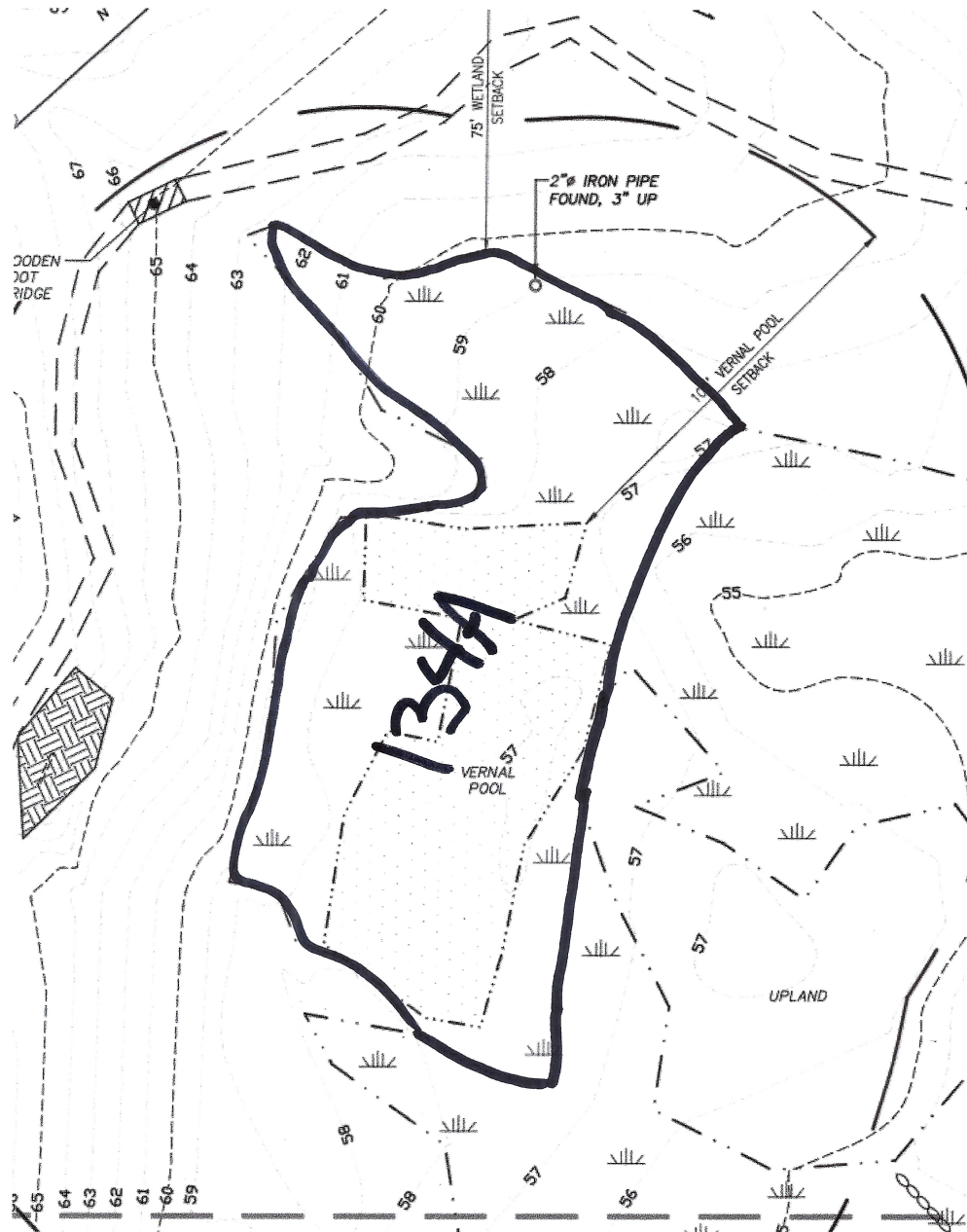
134A

**Michael Cuomo, Soil Scientist**
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mcuomosoil@gmail.com

TEST PIT DATA

Client: Altus Engineering
Location: Stone Quarry Drive, Durham, NH
Date: 12 June 2025

**Test Pit Number: A1**

| Depth | Description |
|---|---|
| 0-9" | Dark brown (10YR 3/3) silt loam, granular, friable. |
| 9-12" | Light olive brown (2.5Y 5/4) silt loam, blocky, friable. |
| 12-19" | Light olive brown (2.5Y 5/3) silt loam, blocky, friable, redox. |
| 19-75" | Olive (5Y 4/3) silty clay loam, massive, firm, redox. |

Depth to Seasonal High Water Table: 12"
Depth to Bedrock: none
Observed Water: none
Estimated percolation rate: 60 min./inch

**Test Pit Number: A2**

| Depth | Description |
|---|---|
| 0-15" | Very dark grayish brown (10YR 3/2) very fine sandy loam, granular, friable. |
| 15-17" | Reddish yellow (7.5YR 6/6) very fine sandy loam, blocky, friable. |
| 17-25" | Light olive brown (2.5Y 5/4) very fine sandy loam, blocky, friable, redox. |
| 25-80" | Olive (5Y 4/4) silt loam, massive, firm, redox. |

Depth to Seasonal High Water Table: 17"
Depth to Bedrock: none
Observed Water: 20"
Estimated percolation rate: 60 min./inch

**Test Pit Number: A3**

| Depth | Description |
|---|---|
| 0-9" | Dark olive brown (2.5Y 3/3) silt loam, granular, friable. |
| 9-14" | Light olive brown (2.5Y 5/4) silt loam, blocky, friable. |
| 14-24" | Olive (5Y 4/4) silt loam, blocky, friable, redox. |
| 24-60" | Olive (5Y 4/3) silty clay loam, massive, firm, redox. |

Depth to Seasonal High Water Table: 14"
Depth to Bedrock: none
Observed Water: none
Estimated percolation rate: 60 min./inch

**Test Pit Number: A4**

| Depth | Description |
|---|---|
| 0-10" | Very dark grayish brown (2.5Y 3/2) silt loam fill, granular, friable. |
| 10-14" | Light yellowish brown (2.5Y 6/4) loamy sand fill, massive, friable. |
| 14-16" | Very dark grayish brown (2.5Y 3/2) silt loam, granular, friable, redox. |
| 16-20" | Olive gray (5Y 5/2) silt loam, blocky, friable, redox. |
| 20-66" | Olive (5Y 4/3) silty clay loam, massive, firm, redox. |

Depth to Seasonal High Water Table: 14"
Depth to Bedrock: none
Observed Water: 55"
Estimated percolation rate: 60 min./inch

**Test Pit Number: A5**

| Depth | Description |
|---|---|
| 0-8" | Very dark grayish brown (10YR 3/3) silt loam, granular, friable. |
| 8-12" | Light olive brown (2.5Y 5/4) silt loam, blocky, friable. |
| 12-19" | Light olive brown (2.5Y 5/3) silt loam, blocky, friable, redox. |
| 19-48" | Olive (5Y 4/3) silty clay loam, massive, firm, redox. |
| 48-72" | Olive brown (2.5Y 4/4) stony fine sandy loam, massive, friable, redox. |
| 72-86" | Olive brown (2.5Y 4/4) stony loamy sand, massive, friable, redox. |

Depth to Seasonal High Water Table: 12"
Depth to Bedrock: none
Observed Water: 60"
Estimated percolation rate: 60 min./inch

**Test Pit Number: A6**

Depth | Description
--- | ---
0-9" | Very dark grayish brown (10YR 3/3) fine sandy loam, granular, friable.
9-16" | Brownish yellow (10YR 6/6) fine sandy loam, blocky, friable.
16-84" | Light yellowish brown (2.5Y 6/4) loamy sand, blocky, friable.
84-96" | Light olive brown (2.5Y 5/4) loamy sand, blocky, friable, redox.

Depth to Seasonal High Water Table: 84"

Depth to Bedrock: none

Observed Water: none

Estimated percolation rate: 4 to 6 min./inch

# Section 7

# BMP and Riprap Sizing Calculations

ALTUS
ENGINEERING

# FILTRATION PRACTICE DESIGN CRITERIA
## (Env-Wq 1508.08)

**Type/Node Name:** <u>Bioretention Pond #1 (HydroCAD Node #17P)</u>

*Enter the type of filtration practice (e.g., bioretention system) and the node name in the drainage analysis, if applicable.*

| | | | |
|---|---|---|---|
| x | | Check if you reviewed the restrictions on unlined systems outlined in Env-Wq 1508.08(a). | |
| 0.23 | ac | A = Area draining to the practice | |
| 0.10 | ac | $A_I$ = Impervious area draining to the practice | |
| 0.42 | decimal | I = Percent impervious area draining to the practice, in decimal form | |
| 0.43 | unitless | Rv = Runoff coefficient = 0.05 + (0.9 x I) | |
| 0.10 | ac-in | WQV= 1" x Rv x A | |
| 359 | cf | WQV conversion (ac-in x 43,560 sf/ac x 1ft/12") | |
| 90 | cf | 25% x WQV (check calc for sediment forebay volume) | |
| 269 | cf | 75% x WQV (check calc for surface sand filter volume) | |
| CB | | Method of Pretreatment? (not required for clean or roof runoff) | |
| | cf | $V_{SED}$ = Sediment forebay volume, if used for pretreatment | $\geq$ 25%WQV |
| Calculate time to drain if system IS NOT underdrained: | | | |
| | sf | $A_{SA}$ = Surface area of the practice | |
| | iph | $Ksat_{DESIGN}$ = Design infiltration rate[1] | |
| | | If Ksat (prior to factor of safety) is < 0.50 iph, has an underdrain been provided? | |
| | Yes/No | (Use the calculations below) | |
| - | hours | $T_{DRAIN}$ = Drain time = V / ($A_{SA}$ * $I_{DESIGN}$) | $\leq$ 72-hrs |
| Calculate time to drain if system IS underdrained: | | | |
| 56.80 | ft | $E_{WQV}$ = Elevation of WQV (attach stage-storage table) | |
| 0.01 | cfs | $Q_{WQV}$ = Discharge at the $E_{WQV}$ (attach stage-discharge table) | |
| 19.92 | hours | $T_{DRAIN}$ = Drain time = 2WQV/$Q_{WQV}$ | $\leq$ 72-hrs |
| 54.75 | feet | $E_{FC}$ = Elevation of the bottom of the filter course material[2] | |
| 53.75 | feet | $E_{UD}$ = Invert elevation of the underdrain (UD), if applicable | |
| 57.00 | feet | $E_{SHWT}$ = Elevation of SHWT (if none found, enter the lowest elevation of the test pit) | |
| 51.75 | feet | $E_{ROCK}$ = Elevation of bedrock (if none found, enter the lowest elevation of the test pit) | |
| 1.00 | feet | $D_{FC\ to\ UD}$ = Depth to UD from the bottom of the filter course | $\geq$ 1' |
| 3.00 | feet | $D_{FC\ to\ ROCK}$ = Depth to bedrock from the bottom of the filter course | $\geq$ 1' |
| (2.25) | feet | $D_{FC\ to\ SHWT}$ = Depth to SHWT from the bottom of the filter course | $\geq$ 1' |
| 58.50 | ft | Peak elevation of the 50-year storm event (infiltration can be used in analysis) | |
| 59.25 | ft | Elevation of the top of the practice | |
| YES | | 50 peak elevation $\leq$ Elevation of the top of the practice | $\leftarrow$ yes |
| **If a surface sand filter or underground sand filter is proposed:** | | | |
| YES | ac | Drainage Area check. | < 10 ac |
| | cf | V = Volume of storage[3] (attach a stage-storage table) | $\geq$ 75%WQV |
| | inches | $D_{FC}$ = Filter course thickness | 18", or 24" if within GPA |
| Sheet | | Note what sheet in the plan set contains the filter course specification. | |
| | Yes/No | Access grate provided? | $\leftarrow$ yes |

| | | If a bioretention area is proposed: | |
|---|---|---|---|
| YES | ac | Drainage Area no larger than 5 ac? | ← yes |
| 1,054 | cf | V = Volume of storage[3] (attach a stage-storage table) | $\geq$ **WQV** |
| 18.0 | inches | $D_{FC}$ = Filter course thickness | **18", or 24" if within GPA** |
| Sheet | C-15 | Note what sheet in the plan set contains the filter course specification | |
| 3.0 | :1 | Pond side slopes | $\geq$ **3:1** |
| Sheet | L1 & L2 | Note what sheet in the plan set contains the planting plans and surface cover | |
| | | **If porous pavement is proposed:** | |
| | | Type of pavement proposed (Concrete? Asphalt? Pavers? Etc.) | |
| | acres | $A_{SA}$ = Surface area of the pervious pavement | |
| | :1 | Ratio of the contributing area to the pervious surface area | **$\leq$ 5:1** |
| | inches | $D_{FC}$ = Filter course thickness | **12", or 18" if within GPA mod. 304.1 (see** |
| Sheet | C-14 | Note what sheet in the plan set contains the filter course spec. | **spec)** |

1. Rate of the limiting layer (either the filter course or the underlying soil). $Ksat_{design}$ includes factor of safey. See Env-Wq 1504.14 for guidance on determining the infiltration rate.

2. See lines 34, 40 and 48 for required depths of filter media.

3. Volume without depending on infiltration. The volume includes the storage above the filter (but below the invert of the outlet stucture, if any), the filter media voids, and the pretreatment area. The storage above the filter media shall not include the volume above the outlet structure, if any.

Designer's Notes:

System is lined, SHWT not relevant

## Stage-Area-Storage for Pond 17P: Bio #1

| Elevation (feet) | Surface (sq-ft) | Wetted (sq-ft) | Storage (cubic-feet) | |
|---|---|---|---|---|
| 54.75 | 487 | 487 | 0 | |
| 54.85 | 487 | 495 | 2 | |
| 54.95 | 487 | 503 | 5 | |
| 55.05 | 487 | 510 | 7 | |
| 55.15 | 487 | 518 | 10 | |
| 55.25 | 487 | 526 | 12 | |
| 55.35 | 487 | 534 | 15 | |
| 55.45 | 487 | 542 | 17 | |
| 55.55 | 487 | 550 | 19 | |
| 55.65 | 487 | 557 | 22 | |
| 55.75 | 487 | 565 | 24 | |
| 55.85 | 487 | 573 | 27 | |
| 55.95 | 487 | 581 | 29 | |
| 56.05 | 487 | 589 | 32 | |
| 56.15 | 487 | 597 | 34 | |
| 56.25 | 487 | 604 | 37 | |
| 56.35 | 521 | 640 | 87 | |
| 56.45 | 557 | 676 | 141 | |
| 56.55 | 594 | 714 | 198 | |
| 56.65 | 632 | 753 | 260 | |
| 56.75 | 671 | 793 | 325 | |
| 56.85 | 711 | 835 | 394 | WQV = 359 cf  Ewqv = 56.80 |
| 56.95 | 753 | 877 | 467 | |
| 57.05 | 795 | 920 | 544 | |
| 57.15 | 837 | 964 | 626 | |
| 57.25 | 880 | 1,008 | 712 | |
| 57.35 | 924 | 1,054 | 802 | Available WQV=1,054cf |
| 57.45 | 970 | 1,100 | 897 | |
| 57.55 | 1,016 | 1,148 | 996 | |
| 57.65 | 1,064 | 1,197 | 1,100 | |
| 57.75 | 1,113 | 1,247 | 1,209 | |
| 57.85 | 1,162 | 1,298 | 1,323 | |
| 57.95 | 1,213 | 1,351 | 1,441 | |
| 58.05 | 1,264 | 1,403 | 1,565 | |
| 58.15 | 1,316 | 1,457 | 1,694 | |
| 58.25 | 1,369 | 1,511 | 1,829 | |
| 58.35 | 1,423 | 1,566 | 1,968 | |
| 58.45 | 1,477 | 1,623 | 2,113 | |
| 58.55 | 1,533 | 1,680 | 2,264 | |
| 58.65 | 1,590 | 1,739 | 2,420 | |
| 58.75 | 1,648 | 1,798 | 2,582 | |
| 58.85 | 1,707 | 1,859 | 2,749 | |
| 58.95 | 1,767 | 1,921 | 2,923 | |
| 59.05 | 1,827 | 1,983 | 3,103 | |
| 59.15 | 1,888 | 2,046 | 3,288 | |
| 59.25 | **1,950** | **2,110** | **3,480** | |

## Stage-Discharge for Pond 17P: Bio #1

| Elevation (feet) | Primary (cfs) | Elevation (feet) | Primary (cfs) |
|---|---|---|---|
| 54.75 | 0.00 | 57.40 | 0.03 |
| 54.80 | 0.00 | 57.45 | 0.05 |
| 54.85 | 0.00 | 57.50 | 0.08 |
| 54.90 | 0.00 | 57.55 | 0.11 |
| 54.95 | 0.00 | 57.60 | 0.15 |
| 55.00 | 0.00 | 57.65 | 0.19 |
| 55.05 | 0.00 | 57.70 | 0.22 |
| 55.10 | 0.00 | 57.75 | 0.24 |
| 55.15 | 0.00 | 57.80 | 0.26 |
| 55.20 | 0.00 | 57.85 | 0.28 |
| 55.25 | 0.00 | 57.90 | 0.30 |
| 55.30 | 0.00 | 57.95 | 0.32 |
| 55.35 | 0.00 | 58.00 | 0.34 |
| 55.40 | 0.00 | 58.05 | 0.35 |
| 55.45 | 0.00 | 58.10 | 0.37 |
| 55.50 | 0.00 | 58.15 | 0.38 |
| 55.55 | 0.00 | 58.20 | 0.40 |
| 55.60 | 0.00 | 58.25 | 0.41 |
| 55.65 | 0.00 | 58.30 | 0.43 |
| 55.70 | 0.00 | 58.35 | 0.44 |
| 55.75 | 0.00 | 58.40 | 0.45 |
| 55.80 | 0.00 | 58.45 | 0.46 |
| 55.85 | 0.00 | 58.50 | 0.48 |
| 55.90 | 0.00 | 58.55 | 0.49 |
| 55.95 | 0.00 | 58.60 | 0.50 |
| 56.00 | 0.00 | 58.65 | 0.51 |
| 56.05 | 0.00 | 58.70 | 0.52 |
| 56.10 | 0.00 | 58.75 | 0.54 |
| 56.15 | 0.00 | 58.80 | 0.84 |
| 56.20 | 0.00 | 58.85 | 1.39 |
| 56.25 | 0.00 | 58.90 | 2.09 |
| 56.30 | 0.00 | 58.95 | 2.92 |
| 56.35 | 0.00 | 59.00 | 3.86 |
| 56.40 | 0.00 | 59.05 | 4.90 |
| 56.45 | 0.00 | 59.10 | 6.03 |
| 56.50 | 0.01 | 59.15 | 7.24 |
| 56.55 | 0.01 | 59.20 | 8.53 |
| 56.60 | 0.01 | 59.25 | **9.89** |
| 56.65 | 0.01 | | |
| 56.70 | 0.01 | | |
| 56.75 | 0.01 | | |
| 56.80 | 0.01 | Qwqv = 0.01cfs | |
| 56.85 | 0.01 | | |
| 56.90 | 0.01 | | |
| 56.95 | 0.02 | | |
| 57.00 | 0.02 | | |
| 57.05 | 0.02 | | |
| 57.10 | 0.02 | | |
| 57.15 | 0.02 | | |
| 57.20 | 0.02 | | |
| 57.25 | 0.02 | | |
| 57.30 | 0.02 | | |
| 57.35 | 0.03 | | |

# FILTRATION PRACTICE DESIGN CRITERIA
## (Env-Wq 1508.08)

**Type/Node Name:**      **Bioretention Pond #2 (HydroCAD Node #22P)**

*Enter the type of filtration practice (e.g., bioretention system) and the node name in the drainage analysis, if applicable.*

| Value | Unit | Description | Criteria |
|---|---|---|---|
| x | | Check if you reviewed the restrictions on unlined systems outlined in Env-Wq 1508.08(a). | |
| 0.36 | ac | A = Area draining to the practice | |
| 0.27 | ac | $A_I$ = Impervious area draining to the practice | |
| 0.75 | decimal | I = Percent impervious area draining to the practice, in decimal form | |
| 0.73 | unitless | Rv = Runoff coefficient = 0.05 + (0.9 x I) | |
| 0.26 | ac-in | WQV= 1" x Rv x A | |
| 947 | cf | WQV conversion (ac-in x 43,560 sf/ac x 1ft/12") | |
| 237 | cf | 25% x WQV (check calc for sediment forebay volume) | |
| 711 | cf | 75% x WQV (check calc for surface sand filter volume) | |
| CB | | Method of Pretreatment? (not required for clean or roof runoff) | |
| | cf | $V_{SED}$ = Sediment forebay volume, if used for pretreatment | $\geq$ 25%WQV |
| **Calculate time to drain if system IS NOT underdrained:** | | | |
| | sf | $A_{SA}$ = Surface area of the practice | |
| | iph | $Ksat_{DESIGN}$ = Design infiltration rate[1] | |
| | | If Ksat (prior to factor of safety) is < 0.50 iph, has an underdrain been provided? | |
| | Yes/No | (Use the calculations below) | |
| - | hours | $T_{DRAIN}$ = Drain time = V / ($A_{SA}$ * $I_{DESIGN}$) | $\leq$ 72-hrs |
| **Calculate time to drain if system IS underdrained:** | | | |
| 58.45 | ft | $E_{WQV}$ = Elevation of WQV (attach stage-storage table) | |
| 0.02 | cfs | $Q_{WQV}$ = Discharge at the $E_{WQV}$ (attach stage-discharge table) | |
| 26.32 | hours | $T_{DRAIN}$ = Drain time = 2WQV/$Q_{WQV}$ | $\leq$ 72-hrs |
| 56.25 | feet | $E_{FC}$ = Elevation of the bottom of the filter course material[2] | |
| 55.25 | feet | $E_{UD}$ = Invert elevation of the underdrain (UD), if applicable | |
| 55.08 | feet | $E_{SHWT}$ = Elevation of SHWT (if none found, enter the lowest elevation of the test pit) | |
| 50.75 | feet | $E_{ROCK}$ = Elevation of bedrock (if none found, enter the lowest elevation of the test pit) | |
| 1.00 | feet | $D_{FC\ to\ UD}$ = Depth to UD from the bottom of the filter course | $\geq$ 1' |
| 5.50 | feet | $D_{FC\ to\ ROCK}$ = Depth to bedrock from the bottom of the filter course | $\geq$ 1' |
| 1.17 | feet | $D_{FC\ to\ SHWT}$ = Depth to SHWT from the bottom of the filter course | $\geq$ 1' |
| 59.65 | ft | Peak elevation of the 50-year storm event (infiltration can be used in analysis) | |
| 60.00 | ft | Elevation of the top of the practice | |
| YES | | 50 peak elevation $\leq$ Elevation of the top of the practice | $\leftarrow$ yes |
| **If a surface sand filter or underground sand filter is proposed:** | | | |
| YES | ac | Drainage Area check. | < 10 ac |
| | cf | V = Volume of storage[3] (attach a stage-storage table) | $\geq$ 75%WQV |
| | inches | $D_{FC}$ = Filter course thickness | 18", or 24" if within GPA |
| Sheet | | Note what sheet in the plan set contains the filter course specification. | |
| | Yes/No | Access grate provided? | $\leftarrow$ yes |

| | | | |
|---|---|---|---|
| **If a bioretention area is proposed:** | | | |
| YES | ac | Drainage Area no larger than 5 ac? | ← yes |
| 1,000 | cf | V = Volume of storage[3] (attach a stage-storage table) | $\geq$ **WQV** |
| 18.0 | inches | $D_{FC}$ = Filter course thickness | **18", or 24" if within GPA** |
| Sheet | C-15 | Note what sheet in the plan set contains the filter course specification | |
| 3.0 | :1 | Pond side slopes | $\geq$ **3:1** |
| Sheet | L1 & L2 | Note what sheet in the plan set contains the planting plans and surface cover | |
| **If porous pavement is proposed:** | | | |
| | | Type of pavement proposed (Concrete? Asphalt? Pavers? Etc.) | |
| | acres | $A_{SA}$ = Surface area of the pervious pavement | |
| | :1 | Ratio of the contributing area to the pervious surface area | $\leq$ **5:1** |
| | inches | $D_{FC}$ = Filter course thickness | **12", or 18" if within GPA mod. 304.1 (see** |
| Sheet | | Note what sheet in the plan set contains the filter course spec. | **spec)** |

1. Rate of the limiting layer (either the filter course or the underlying soil). $Ksat_{design}$ includes factor of safey. See Env-Wq 1504.14 for guidance on determining the infiltration rate.

2. See lines 34, 40 and 48 for required depths of filter media.

3. Volume without depending on infiltration. The volume includes the storage above the filter (but below the invert of the outlet stucture, if any), the filter media voids, and the pretreatment area. The storage above the filter media shall not include the volume above the outlet structure, if any.

Designer's Notes: _____

## Stage-Area-Storage for Pond 22P: Bio #2

| Elevation (feet) | Surface (sq-ft) | Wetted (sq-ft) | Storage (cubic-feet) |
|---|---|---|---|
| 56.25 | 1,027 | 1,027 | 0 |
| 56.35 | 1,027 | 1,038 | 5 |
| 56.45 | 1,027 | 1,050 | 10 |
| 56.55 | 1,027 | 1,061 | 15 |
| 56.65 | 1,027 | 1,072 | 21 |
| 56.75 | 1,027 | 1,084 | 26 |
| 56.85 | 1,027 | 1,095 | 31 |
| 56.95 | 1,027 | 1,107 | 36 |
| 57.05 | 1,027 | 1,118 | 41 |
| 57.15 | 1,027 | 1,129 | 46 |
| 57.25 | 1,027 | 1,141 | 51 |
| 57.35 | 1,027 | 1,152 | 56 |
| 57.45 | 1,027 | 1,163 | 62 |
| 57.55 | 1,027 | 1,175 | 67 |
| 57.65 | 1,027 | 1,186 | 72 |
| 57.75 | 1,027 | 1,197 | 77 |
| 57.85 | 1,085 | 1,257 | 183 |
| 57.95 | 1,145 | 1,317 | 294 |
| 58.05 | 1,203 | 1,377 | 412 |
| 58.15 | 1,261 | 1,437 | 535 |
| 58.25 | 1,321 | 1,497 | 664 |
| 58.35 | 1,381 | 1,559 | 799 |
| 58.45 | 1,443 | 1,623 | 940 |
| 58.55 | 1,507 | 1,688 | 1,088 |
| 58.65 | 1,572 | 1,754 | 1,242 |
| 58.75 | 1,638 | 1,822 | 1,402 |
| 58.85 | 1,705 | 1,891 | 1,569 |
| 58.95 | 1,774 | 1,961 | 1,743 |
| 59.05 | 1,841 | 2,030 | 1,924 |
| 59.15 | 1,907 | 2,097 | 2,111 |
| 59.25 | 1,974 | 2,166 | 2,305 |
| 59.35 | 2,042 | 2,236 | 2,506 |
| 59.45 | 2,111 | 2,307 | 2,714 |
| 59.55 | 2,181 | 2,379 | 2,928 |
| 59.65 | 2,252 | 2,452 | 3,150 |
| 59.75 | 2,325 | 2,526 | 3,379 |
| 59.85 | 2,398 | 2,602 | 3,615 |
| 59.95 | **2,473** | **2,679** | **3,859** |

WQV = 947 cf
Ewqv = 58.45
Lowest Outlet = 58.50
Available WQV = 1,000 cf

## Stage-Discharge for Pond 22P: Bio #2

| Elevation (feet) | Primary (cfs) | Elevation (feet) | Primary (cfs) | Elevation (feet) | Primary (cfs) | Elevation (feet) | Primary (cfs) |
|---|---|---|---|---|---|---|---|
| 56.25 | 0.00 | 57.31 | 0.00 | 58.37 | 0.02 | 59.43 | 0.43 |
| 56.27 | 0.00 | 57.33 | 0.00 | 58.39 | 0.02 | 59.45 | 0.44 |
| 56.29 | 0.00 | 57.35 | 0.00 | 58.41 | 0.02 | 59.47 | 0.44 |
| 56.31 | 0.00 | 57.37 | 0.00 | 58.43 | 0.02 | 59.49 | 0.45 |
| 56.33 | 0.00 | 57.39 | 0.00 | 58.45 | 0.02 | Qwqv = 0.02 cfs | |
| 56.35 | 0.00 | 57.41 | 0.00 | 58.47 | 0.03 | | |
| 56.37 | 0.00 | 57.43 | 0.00 | 58.49 | 0.03 | 59.55 | 0.76 |
| 56.39 | 0.00 | 57.45 | 0.00 | 58.51 | 0.03 | 59.57 | 0.95 |
| 56.41 | 0.00 | 57.47 | 0.00 | 58.53 | 0.03 | 59.59 | 1.18 |
| 56.43 | 0.00 | 57.49 | 0.00 | 58.55 | 0.03 | 59.61 | 1.43 |
| 56.45 | 0.00 | 57.51 | 0.00 | 58.57 | 0.04 | 59.63 | 1.71 |
| 56.47 | 0.00 | 57.53 | 0.00 | 58.59 | 0.05 | 59.65 | 2.01 |
| 56.49 | 0.00 | 57.55 | 0.00 | 58.61 | 0.06 | 59.67 | 2.33 |
| 56.51 | 0.00 | 57.57 | 0.00 | 58.63 | 0.07 | 59.69 | 2.67 |
| 56.53 | 0.00 | 57.59 | 0.00 | 58.65 | 0.08 | 59.71 | 3.02 |
| 56.55 | 0.00 | 57.61 | 0.00 | 58.67 | 0.10 | 59.73 | 3.39 |
| 56.57 | 0.00 | 57.63 | 0.00 | 58.69 | 0.11 | 59.75 | 3.78 |
| 56.59 | 0.00 | 57.65 | 0.00 | 58.71 | 0.12 | 59.77 | 4.19 |
| 56.61 | 0.00 | 57.67 | 0.00 | 58.73 | 0.14 | 59.79 | 4.61 |
| 56.63 | 0.00 | 57.69 | 0.00 | 58.75 | 0.16 | 59.81 | 5.04 |
| 56.65 | 0.00 | 57.71 | 0.00 | 58.77 | 0.17 | 59.83 | 5.49 |
| 56.67 | 0.00 | 57.73 | 0.00 | 58.79 | 0.19 | 59.85 | 5.96 |
| 56.69 | 0.00 | 57.75 | 0.00 | 58.81 | 0.20 | 59.87 | 6.43 |
| 56.71 | 0.00 | 57.77 | 0.00 | 58.83 | 0.21 | 59.89 | 6.92 |
| 56.73 | 0.00 | 57.79 | 0.00 | 58.85 | 0.22 | 59.91 | 7.42 |
| 56.75 | 0.00 | 57.81 | 0.00 | 58.87 | 0.23 | 59.93 | 7.93 |
| 56.77 | 0.00 | 57.83 | 0.00 | 58.89 | 0.24 | 59.95 | 8.46 |
| 56.79 | 0.00 | 57.85 | 0.00 | 58.91 | 0.25 | 59.97 | 9.00 |
| 56.81 | 0.00 | 57.87 | 0.00 | 58.93 | 0.26 | 59.99 | **9.54** |
| 56.83 | 0.00 | 57.89 | 0.00 | 58.95 | 0.27 | | |
| 56.85 | 0.00 | 57.91 | 0.01 | 58.97 | 0.28 | | |
| 56.87 | 0.00 | 57.93 | 0.01 | 58.99 | 0.28 | | |
| 56.89 | 0.00 | 57.95 | 0.01 | 59.01 | 0.29 | | |
| 56.91 | 0.00 | 57.97 | 0.01 | 59.03 | 0.30 | | |
| 56.93 | 0.00 | 57.99 | 0.01 | 59.05 | 0.31 | | |
| 56.95 | 0.00 | 58.01 | 0.01 | 59.07 | 0.32 | | |
| 56.97 | 0.00 | 58.03 | 0.01 | 59.09 | 0.32 | | |
| 56.99 | 0.00 | 58.05 | 0.01 | 59.11 | 0.33 | | |
| 57.01 | 0.00 | 58.07 | 0.01 | 59.13 | 0.34 | | |
| 57.03 | 0.00 | 58.09 | 0.01 | 59.15 | 0.34 | | |
| 57.05 | 0.00 | 58.11 | 0.01 | 59.17 | 0.35 | | |
| 57.07 | 0.00 | 58.13 | 0.01 | 59.19 | 0.36 | | |
| 57.09 | 0.00 | 58.15 | 0.01 | 59.21 | 0.36 | | |
| 57.11 | 0.00 | 58.17 | 0.01 | 59.23 | 0.37 | | |
| 57.13 | 0.00 | 58.19 | 0.02 | 59.25 | 0.38 | | |
| 57.15 | 0.00 | 58.21 | 0.02 | 59.27 | 0.38 | | |
| 57.17 | 0.00 | 58.23 | 0.02 | 59.29 | 0.39 | | |
| 57.19 | 0.00 | 58.25 | 0.02 | 59.31 | 0.40 | | |
| 57.21 | 0.00 | 58.27 | 0.02 | 59.33 | 0.40 | | |
| 57.23 | 0.00 | 58.29 | 0.02 | 59.35 | 0.41 | | |
| 57.25 | 0.00 | 58.31 | 0.02 | 59.37 | 0.41 | | |
| 57.27 | 0.00 | 58.33 | 0.02 | 59.39 | 0.42 | | |
| 57.29 | 0.00 | 58.35 | 0.02 | 59.41 | 0.42 | | |

# FILTRATION PRACTICE DESIGN CRITERIA
## (Env-Wq 1508.08)

**Type/Node Name:** _____ **Bioretention Pond #3 (HydroCAD Node #69P)** _____

*Enter the type of filtration practice (e.g., bioretention system) and the node name in the drainage analysis, if applicable.*

| | | | |
|---|---|---|---|
| x | | Check if you reviewed the restrictions on unlined systems outlined in Env-Wq 1508.08(a). | |
| 1.65 | ac | A = Area draining to the practice | |
| 1.05 | ac | $A_I$ = Impervious area draining to the practice | |
| 0.64 | decimal | I = Percent impervious area draining to the practice, in decimal form | |
| 0.62 | unitless | Rv = Runoff coefficient = 0.05 + (0.9 x I) | |
| 1.03 | ac-in | WQV= 1" x Rv x A | |
| 3,729 | cf | WQV conversion (ac-in x 43,560 sf/ac x 1ft/12") | |
| 932 | cf | 25% x WQV (check calc for sediment forebay volume) | |
| 2,797 | cf | 75% x WQV (check calc for surface sand filter volume) | |
| CB | | Method of Pretreatment? (not required for clean or roof runoff) | |
| | cf | $V_{SED}$ = Sediment forebay volume, if used for pretreatment | $\geq$ 25%WQV |
| **Calculate time to drain if system IS NOT underdrained:** | | | |
| | sf | $A_{SA}$ = Surface area of the practice | |
| | iph | $Ksat_{DESIGN}$ = Design infiltration rate[1] | |
| | | If Ksat (prior to factor of safety) is < 0.50 iph, has an underdrain been provided? | |
| | Yes/No | (Use the calculations below) | |
| - | hours | $T_{DRAIN}$ = Drain time = V / ($A_{SA}$ * $I_{DESIGN}$) | $\leq$ 72-hrs |
| **Calculate time to drain if system IS underdrained:** | | | |
| 49.64 | ft | $E_{WQV}$ = Elevation of WQV (attach stage-storage table) | |
| 0.06 | cfs | $Q_{WQV}$ = Discharge at the $E_{WQV}$ (attach stage-discharge table) | |
| 34.53 | hours | $T_{DRAIN}$ = Drain time = 2WQV/$Q_{WQV}$ | $\leq$ 72-hrs |
| 46.50 | feet | $E_{FC}$ = Elevation of the bottom of the filter course material[2] | |
| 45.50 | feet | $E_{UD}$ = Invert elevation of the underdrain (UD), if applicable | |
| 49.50 | feet | $E_{SHWT}$ = Elevation of SHWT (if none found, enter the lowest elevation of the test pit) | |
| 48.50 | feet | $E_{ROCK}$ = Elevation of bedrock (if none found, enter the lowest elevation of the test pit) | |
| 1.00 | feet | $D_{FC\ to\ UD}$ = Depth to UD from the bottom of the filter course | $\geq$ 1' |
| (2.00) | feet | $D_{FC\ to\ ROCK}$ = Depth to bedrock from the bottom of the filter course | $\geq$ 1' |
| (3.00) | feet | $D_{FC\ to\ SHWT}$ = Depth to SHWT from the bottom of the filter course | $\geq$ 1' |
| 52.55 | ft | Peak elevation of the 50-year storm event (infiltration can be used in analysis) | |
| 53.00 | ft | Elevation of the top of the practice | |
| YES | | 50 peak elevation $\leq$ Elevation of the top of the practice | ← yes |
| **If a surface sand filter or underground sand filter is proposed:** | | | |
| YES | ac | Drainage Area check. | < 10 ac |
| | cf | V = Volume of storage[3] (attach a stage-storage table) | $\geq$ 75%WQV |
| | inches | $D_{FC}$ = Filter course thickness | 18", or 24" if within GPA |
| Sheet | | Note what sheet in the plan set contains the filter course specification. | |
| | Yes/No | Access grate provided? | ← yes |

| | | | |
|---|---|---|---|
| **If a bioretention area is proposed:** | | | |
| YES | ac | Drainage Area no larger than 5 ac? | ← yes |
| 4,799 | cf | V = Volume of storage[3] (attach a stage-storage table) | ≥ WQV |
| 18.0 | inches | $D_{FC}$ = Filter course thickness | 18", or 24" if within GPA |
| Sheet | C-15 | Note what sheet in the plan set contains the filter course specification | |
| 3.0 | :1 | Pond side slopes | ≥ 3:1 |
| Sheet | L1 & L2 | Note what sheet in the plan set contains the planting plans and surface cover | |
| **If porous pavement is proposed:** | | | |
| | | Type of pavement proposed (Concrete? Asphalt? Pavers? Etc.) | |
| | acres | $A_{SA}$ = Surface area of the pervious pavement | |
| | :1 | Ratio of the contributing area to the pervious surface area | ≤ 5:1 |
| | inches | $D_{FC}$ = Filter course thickness | 12", or 18" if within GPA mod. 304.1 (see |
| Sheet | | Note what sheet in the plan set contains the filter course spec. | spec) |

1. Rate of the limiting layer (either the filter course or the underlying soil). $Ksat_{design}$ includes factor of safey. See Env-Wq 1504.14 for guidance on determining the infiltration rate.

2. See lines 34, 40 and 48 for required depths of filter media.

3. Volume without depending on infiltration. The volume includes the storage above the filter (but below the invert of the outlet stucture, if any), the filter media voids, and the pretreatment area. The storage above the filter media shall not include the volume above the outlet structure, if any.


Designer's Notes: _____

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## Stage-Area-Storage for Pond 69P: Bio #3

| Elevation (feet) | Surface (sq-ft) | Wetted (sq-ft) | Storage (cubic-feet) |
|---|---|---|---|
| 46.50 | 1,678 | 1,678 | 0 |
| 46.70 | 1,678 | 1,707 | 17 |
| 46.90 | 1,678 | 1,736 | 34 |
| 47.10 | 1,678 | 1,765 | 50 |
| 47.30 | 1,678 | 1,794 | 67 |
| 47.50 | 1,678 | 1,823 | 84 |
| 47.70 | 1,678 | 1,852 | 101 |
| 47.90 | 1,678 | 1,881 | 117 |
| 48.10 | 1,737 | 1,957 | 297 |
| 48.30 | 1,859 | 2,082 | 656 |
| 48.50 | 1,985 | 2,212 | 1,040 |
| 48.70 | 2,114 | 2,345 | 1,450 |
| 48.90 | 2,248 | 2,483 | 1,887 |
| 49.10 | 2,387 | 2,626 | 2,350 |
| 49.30 | 2,531 | 2,775 | 2,842 |
| 49.50 | 2,679 | 2,927 | 3,363 |
| 49.70 | 2,832 | 3,084 | 3,914 |
| 49.90 | 2,988 | 3,245 | 4,496 |
| 50.10 | 3,150 | 3,411 | 5,109 |
| 50.30 | 3,317 | 3,583 | 5,756 |
| 50.50 | 3,488 | 3,759 | 6,436 |
| 50.70 | 3,664 | 3,940 | 7,151 |
| 50.90 | 3,843 | 4,125 | 7,902 |
| 51.10 | 4,028 | 4,315 | 8,689 |
| 51.30 | 4,218 | 4,510 | 9,514 |
| 51.50 | 4,413 | 4,710 | 10,377 |
| 51.70 | 4,612 | 4,915 | 11,279 |
| 51.90 | 4,815 | 5,124 | 12,222 |
| 52.10 | 5,023 | 5,338 | 13,205 |
| 52.30 | 5,237 | 5,557 | 14,231 |
| 52.50 | 5,455 | 5,781 | 15,300 |
| 52.70 | 5,677 | 6,010 | 16,413 |
| 52.90 | **5,904** | **6,243** | **17,572** |

WQV = 3,729 cf
Ewqv = 49.64

Lowest Outlet = 50.00
Available WQV = 4,799 cf

## Stage-Discharge for Pond 69P: Bio #3

| Elevation (feet) | Primary (cfs) | Elevation (feet) | Primary (cfs) | Elevation (feet) | Primary (cfs) | Elevation (feet) | Primary (cfs) |
|---|---|---|---|---|---|---|---|
| 46.50 | 0.00 | 48.62 | 0.02 | 50.74 | 0.80 | 52.86 | 16.48 |
| 46.54 | 0.00 | 48.66 | 0.02 | 50.78 | 0.85 | 52.90 | 18.49 |
| 46.58 | 0.00 | 48.70 | 0.02 | 50.82 | 0.91 | 52.94 | 20.60 |
| 46.62 | 0.00 | 48.74 | 0.03 | 50.86 | 0.98 | 52.98 | **22.07** |
| 46.66 | 0.00 | 48.78 | 0.03 | 50.90 | 1.04 | | |
| 46.70 | 0.00 | 48.82 | 0.03 | 50.94 | 1.10 | | |
| 46.74 | 0.00 | 48.86 | 0.03 | 50.98 | 1.17 | | |
| 46.78 | 0.00 | 48.90 | 0.03 | 51.02 | 1.23 | | |
| 46.82 | 0.00 | 48.94 | 0.03 | 51.06 | 1.30 | | |
| 46.86 | 0.00 | 48.98 | 0.04 | 51.10 | 1.37 | | |
| 46.90 | 0.00 | 49.02 | 0.04 | 51.14 | 1.44 | | |
| 46.94 | 0.00 | 49.06 | 0.04 | 51.18 | 1.51 | | |
| 46.98 | 0.00 | 49.10 | 0.04 | 51.22 | 1.58 | | |
| 47.02 | 0.00 | 49.14 | 0.04 | 51.26 | 1.66 | | |
| 47.06 | 0.00 | 49.18 | 0.04 | 51.30 | 1.73 | | |
| 47.10 | 0.00 | 49.22 | 0.05 | 51.34 | 1.81 | | |
| 47.14 | 0.00 | 49.26 | 0.05 | 51.38 | 1.88 | | |
| 47.18 | 0.00 | 49.30 | 0.05 | 51.42 | 1.96 | | |
| 47.22 | 0.00 | 49.34 | 0.05 | 51.46 | 2.04 | | |
| 47.26 | 0.00 | 49.38 | 0.05 | 51.50 | 2.12 | | |
| 47.30 | 0.00 | 49.42 | 0.05 | 51.54 | 2.20 | | |
| 47.34 | 0.00 | 49.46 | 0.06 | 51.58 | 2.29 | | |
| 47.38 | 0.00 | 49.50 | 0.06 | 51.62 | 2.37 | | |
| 47.42 | 0.00 | 49.54 | 0.06 | 51.66 | 2.45 | | |
| 47.46 | 0.00 | 49.58 | 0.06 | 51.70 | 2.54 | | |
| 47.50 | 0.00 | 49.62 | 0.06 | 51.74 | 2.63 | | |
| 47.54 | 0.00 | 49.66 | 0.06 | _Qwqv = 0.06 cfs_ | 2.71 | | |
| 47.58 | 0.00 | 49.70 | 0.07 | 51.82 | 2.80 | | |
| 47.62 | 0.00 | 49.74 | 0.07 | 51.86 | 2.89 | | |
| 47.66 | 0.00 | 49.78 | 0.07 | 51.90 | 2.98 | | |
| 47.70 | 0.00 | 49.82 | 0.07 | 51.94 | 3.07 | | |
| 47.74 | 0.00 | 49.86 | 0.07 | 51.98 | 3.17 | | |
| 47.78 | 0.00 | 49.90 | 0.07 | 52.02 | 3.26 | | |
| 47.82 | 0.00 | 49.94 | 0.08 | 52.06 | 3.35 | | |
| 47.86 | 0.00 | 49.98 | 0.08 | 52.10 | 3.45 | | |
| 47.90 | 0.00 | 50.02 | 0.08 | 52.14 | 3.54 | | |
| 47.94 | 0.00 | 50.06 | 0.10 | 52.18 | 3.64 | | |
| 47.98 | 0.00 | 50.10 | 0.12 | 52.22 | 3.74 | | |
| 48.02 | 0.00 | 50.14 | 0.14 | 52.26 | 3.84 | | |
| 48.06 | 0.00 | 50.18 | 0.17 | 52.30 | 3.94 | | |
| 48.10 | 0.00 | 50.22 | 0.20 | 52.34 | 4.04 | | |
| 48.14 | 0.00 | 50.26 | 0.23 | 52.38 | 4.14 | | |
| 48.18 | 0.01 | 50.30 | 0.27 | 52.42 | 4.24 | | |
| 48.22 | 0.01 | 50.34 | 0.31 | 52.46 | 4.34 | | |
| 48.26 | 0.01 | 50.38 | 0.35 | 52.50 | 4.45 | | |
| 48.30 | 0.01 | 50.42 | 0.39 | 52.54 | 4.96 | | |
| 48.34 | 0.01 | 50.46 | 0.44 | 52.58 | 5.81 | | |
| 48.38 | 0.01 | 50.50 | 0.48 | 52.62 | 6.89 | | |
| 48.42 | 0.01 | 50.54 | 0.53 | 52.66 | 8.15 | | |
| 48.46 | 0.02 | 50.58 | 0.58 | 52.70 | 9.56 | | |
| 48.50 | 0.02 | 50.62 | 0.63 | 52.74 | 11.11 | | |
| 48.54 | 0.02 | 50.66 | 0.69 | 52.78 | 12.79 | | |
| 48.58 | 0.02 | 50.70 | 0.74 | 52.82 | 14.58 | | |

Qwqv = 0.06 cfs

# FILTRATION PRACTICE DESIGN CRITERIA
## (Env-Wq 1508.08)

**Type/Node Name:**                           **Bioretention Pond #4 (HydroCAD Node #83P)**

*Enter the type of filtration practice (e.g., bioretention system) and the node name in the drainage analysis, if applicable.*

| Value | Unit | Description | Criteria |
|---|---|---|---|
| x | | Check if you reviewed the restrictions on unlined systems outlined in Env-Wq 1508.08(a). | |
| 0.33 | ac | A = Area draining to the practice | |
| 0.24 | ac | $A_I$ = Impervious area draining to the practice | |
| 0.73 | decimal | I = Percent impervious area draining to the practice, in decimal form | |
| 0.70 | unitless | Rv = Runoff coefficient = 0.05 + (0.9 x I) | |
| 0.23 | ac-in | WQV= 1" x Rv x A | |
| 844 | cf | WQV conversion (ac-in x 43,560 sf/ac x 1ft/12") | |
| 211 | cf | 25% x WQV (check calc for sediment forebay volume) | |
| 633 | cf | 75% x WQV (check calc for surface sand filter volume) | |
| CB | | Method of Pretreatment? (not required for clean or roof runoff) | |
| | cf | $V_{SED}$ = Sediment forebay volume, if used for pretreatment | $\geq$ 25%WQV |
| **Calculate time to drain if system IS NOT underdrained:** | | | |
| | sf | $A_{SA}$ = Surface area of the practice | |
| | iph | $Ksat_{DESIGN}$ = Design infiltration rate[1] | |
| | | If Ksat (prior to factor of safety) is < 0.50 iph, has an underdrain been provided? | |
| | Yes/No | (Use the calculations below) | |
| - | hours | $T_{DRAIN}$ = Drain time = V / ($A_{SA}$ * $I_{DESIGN}$) | $\leq$ 72-hrs |
| **Calculate time to drain if system IS underdrained:** | | | |
| 47.00 | ft | $E_{WQV}$ = Elevation of WQV (attach stage-storage table) | |
| 0.03 | cfs | $Q_{WQV}$ = Discharge at the $E_{WQV}$ (attach stage-discharge table) | |
| 15.63 | hours | $T_{DRAIN}$ = Drain time = 2WQV/$Q_{WQV}$ | $\leq$ 72-hrs |
| 44.00 | feet | $E_{FC}$ = Elevation of the bottom of the filter course material[2] | |
| 43.00 | feet | $E_{UD}$ = Invert elevation of the underdrain (UD), if applicable | |
| 43.75 | feet | $E_{SHWT}$ = Elevation of SHWT (if none found, enter the lowest elevation of the test pit) | |
| 37.58 | feet | $E_{ROCK}$ = Elevation of bedrock (if none found, enter the lowest elevation of the test pit) | |
| 1.00 | feet | $D_{FC\ to\ UD}$ = Depth to UD from the bottom of the filter course | $\geq$ 1' |
| 6.42 | feet | $D_{FC\ to\ ROCK}$ = Depth to bedrock from the bottom of the filter course | $\geq$ 1' |
| 0.25 | feet | $D_{FC\ to\ SHWT}$ = Depth to SHWT from the bottom of the filter course | $\geq$ 1' |
| 48.63 | ft | Peak elevation of the 50-year storm event (infiltration can be used in analysis) | |
| 49.00 | ft | Elevation of the top of the practice | |
| YES | | 50 peak elevation $\leq$ Elevation of the top of the practice | $\leftarrow$ yes |
| **If a surface sand filter or underground sand filter is proposed:** | | | |
| YES | ac | Drainage Area check. | < 10 ac |
| 833 | cf | V = Volume of storage[3] (attach a stage-storage table) | $\geq$ 75%WQV |
| | inches | $D_{FC}$ = Filter course thickness | 18", or 24" if within GPA |
| Sheet | | Note what sheet in the plan set contains the filter course specification. | |
| | Yes/No | Access grate provided? | $\leftarrow$ yes |

| | | **If a bioretention area is proposed:** | | |
|---|---|---|---|---|
| YES | ac | Drainage Area no larger than 5 ac? | | ← yes |
| 873 | cf | V = Volume of storage[3] (attach a stage-storage table) | | $\geq$ **WQV** |
| 18.0 | inches | $D_{FC}$ = Filter course thickness | | **18", or 24" if within GPA** |
| Sheet | C-15 | Note what sheet in the plan set contains the filter course specification | | |
| 3.0 | :1 | Pond side slopes | | $\geq$ **3:1** |
| Sheet | L1 & L2 | Note what sheet in the plan set contains the planting plans and surface cover | | |

**If porous pavement is proposed:**

| | | | | |
|---|---|---|---|---|
| | | Type of pavement proposed (Concrete? Asphalt? Pavers? Etc.) | | |
| | acres | $A_{SA}$ = Surface area of the pervious pavement | | |
| | :1 | Ratio of the contributing area to the pervious surface area | | $\leq$ **5:1** |
| | inches | $D_{FC}$ = Filter course thickness | | **12", or 18" if within GPA mod. 304.1 (see** |
| Sheet | | Note what sheet in the plan set contains the filter course spec. | | **spec)** |

1. Rate of the limiting layer (either the filter course or the underlying soil). $Ksat_{design}$ includes factor of safey. See Env-Wq 1504.14 for guidance on determining the infiltration rate.

2. See lines 34, 40 and 48 for required depths of filter media.

3. Volume without depending on infiltration. The volume includes the storage above the filter (but below the invert of the outlet stucture, if any), the filter media voids, and the pretreatment area. The storage above the filter media shall not include the volume above the outlet structure, if any.

Designer's Notes: _____

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## Stage-Area-Storage for Pond 83P: Bio #4

| Elevation (feet) | Surface (sq-ft) | Storage (cubic-feet) | Elevation (feet) | Surface (sq-ft) | Storage (cubic-feet) |
|---|---|---|---|---|---|
| 44.00 | 315 | 0 | 46.65 | 668 | 579 |
| 44.05 | 315 | 1 | 46.70 | 685 | 613 |
| 44.10 | 315 | 2 | 46.75 | 702 | 647 |
| 44.15 | 315 | 2 | 46.80 | 718 | 683 |
| 44.20 | 315 | 3 | 46.85 | 735 | 719 |
| 44.25 | 315 | 4 | 46.90 | 752 | 756 |
| 44.30 | 315 | 5 | 46.95 | 768 | 794 |
| 44.35 | 315 | 6 | 47.00 | 785 | 833 |
| 44.40 | 315 | 6 | 47.05 | 806 | 873 |
| 44.45 | 315 | 7 | 47.10 | 826 | 914 |
| 44.50 | 315 | 8 | 47.15 | 847 | 956 |
| 44.55 | 315 | 9 | 47.20 | 868 | 998 |
| 44.60 | 315 | 9 | 47.25 | 889 | 1,042 |
| 44.65 | 315 | 10 | 47.30 | 909 | 1,087 |
| 44.70 | 315 | 11 | 47.35 | 930 | 1,133 |
| 44.75 | 315 | 12 | 47.40 | 951 | 1,180 |
| 44.80 | 315 | 13 | 47.45 | 971 | 1,228 |
| 44.85 | 315 | 13 | 47.50 | 992 | 1,277 |
| 44.90 | 315 | 14 | 47.55 | 1,013 | 1,327 |
| 44.95 | 315 | 15 | 47.60 | 1,033 | 1,379 |
| 45.00 | 315 | 16 | 47.65 | 1,054 | 1,431 |
| 45.05 | 315 | 17 | 47.70 | 1,075 | 1,484 |
| 45.10 | 315 | 17 | 47.75 | 1,096 | 1,538 |
| 45.15 | 315 | 18 | 47.80 | 1,116 | 1,594 |
| 45.20 | 315 | 19 | 47.85 | 1,137 | 1,650 |
| 45.25 | 315 | 20 | 47.90 | 1,158 | 1,707 |
| 45.30 | 315 | 20 | 47.95 | 1,178 | 1,766 |
| 45.35 | 315 | 21 | 48.00 | 1,199 | 1,825 |
| 45.40 | 315 | 22 | 48.05 | 1,224 | 1,886 |
| 45.45 | 315 | 23 | 48.10 | 1,248 | 1,947 |
| 45.50 | 315 | 24 | 48.15 | 1,273 | 2,011 |
| 45.55 | 329 | 40 | 48.20 | 1,297 | 2,075 |
| 45.60 | 342 | 56 | 48.25 | 1,322 | 2,140 |
| 45.65 | 356 | 74 | 48.30 | 1,347 | 2,207 |
| 45.70 | 369 | 92 | 48.35 | 1,371 | 2,275 |
| 45.75 | 383 | 111 | 48.40 | 1,396 | 2,344 |
| 45.80 | 397 | 130 | 48.45 | 1,420 | 2,414 |
| 45.85 | 410 | 151 | 48.50 | 1,445 | 2,486 |
| 45.90 | 424 | 171 | 48.55 | 1,470 | 2,559 |
| 45.95 | 437 | 193 | 48.60 | 1,494 | 2,633 |
| 46.00 | 451 | 215 | 48.65 | 1,519 | 2,708 |
| 46.05 | 468 | 238 | 48.70 | 1,543 | 2,785 |
| 46.10 | 484 | 262 | 48.75 | 1,568 | 2,863 |
| 46.15 | 501 | 287 | 48.80 | 1,593 | 2,942 |
| 46.20 | 518 | 312 | 48.85 | 1,617 | 3,022 |
| 46.25 | 535 | 338 | 48.90 | 1,642 | 3,103 |
| 46.30 | 551 | 365 | 48.95 | 1,666 | 3,186 |
| 46.35 | 568 | 393 | 49.00 | **1,691** | **3,270** |
| 46.40 | 585 | 422 | | | |
| 46.45 | 601 | 452 | | | |
| 46.50 | 618 | 482 | | | |
| 46.55 | 635 | 514 | | | |
| 46.60 | 651 | 546 | | | |

WQV = 844 cf
Ewqv = 47.00

Lowest Outlet = 47.05
Available WQV = 873 cf

## Stage-Discharge for Pond 83P: Bio #4

| Elevation (feet) | Primary (cfs) | Elevation (feet) | Primary (cfs) |
|---|---|---|---|
| 44.00 | 0.00 | 46.65 | 0.02 |
| 44.05 | 0.00 | 46.70 | 0.02 |
| 44.10 | 0.00 | 46.75 | 0.02 |
| 44.15 | 0.00 | 46.80 | 0.02 |
| 44.20 | 0.00 | 46.85 | 0.02 |
| 44.25 | 0.00 | 46.90 | 0.03 |
| 44.30 | 0.00 | 46.95 | 0.03 |
| 44.35 | 0.00 | 47.00 | 0.03 |
| 44.40 | 0.00 | 47.05 | 0.03 |
| 44.45 | 0.00 | 47.10 | 0.04 |
| 44.50 | 0.00 | 47.15 | 0.05 |
| 44.55 | 0.00 | 47.20 | 0.08 |
| 44.60 | 0.00 | 47.25 | 0.12 |
| 44.65 | 0.00 | 47.30 | 0.15 |
| 44.70 | 0.00 | 47.35 | 0.19 |
| 44.75 | 0.00 | 47.40 | 0.22 |
| 44.80 | 0.00 | 47.45 | 0.24 |
| 44.85 | 0.00 | 47.50 | 0.26 |
| 44.90 | 0.00 | 47.55 | 0.28 |
| 44.95 | 0.00 | 47.60 | 0.30 |
| 45.00 | 0.00 | 47.65 | 0.32 |
| 45.05 | 0.00 | 47.70 | 0.34 |
| 45.10 | 0.00 | 47.75 | 0.35 |
| 45.15 | 0.00 | 47.80 | 0.37 |
| 45.20 | 0.00 | 47.85 | 0.38 |
| 45.25 | 0.00 | 47.90 | 0.40 |
| 45.30 | 0.00 | 47.95 | 0.41 |
| 45.35 | 0.00 | 48.00 | 0.42 |
| 45.40 | 0.00 | 48.05 | 0.44 |
| 45.45 | 0.00 | 48.10 | 0.45 |
| 45.50 | 0.00 | 48.15 | 0.46 |
| 45.55 | 0.00 | 48.20 | 0.47 |
| 45.60 | 0.00 | 48.25 | 0.49 |
| 45.65 | 0.00 | 48.30 | 0.50 |
| 45.70 | 0.00 | 48.35 | 0.51 |
| 45.75 | 0.00 | 48.40 | 0.52 |
| 45.80 | 0.00 | 48.45 | 0.53 |
| 45.85 | 0.01 | 48.50 | 0.54 |
| 45.90 | 0.01 | 48.55 | 0.84 |
| 45.95 | 0.01 | 48.60 | 1.39 |
| 46.00 | 0.01 | 48.65 | 2.09 |
| 46.05 | 0.01 | 48.70 | 2.92 |
| 46.10 | 0.01 | 48.75 | 3.86 |
| 46.15 | 0.01 | 48.80 | 4.90 |
| 46.20 | 0.01 | 48.85 | 6.03 |
| 46.25 | 0.01 | 48.90 | 7.24 |
| 46.30 | 0.01 | 48.95 | 8.53 |
| 46.35 | 0.01 | 49.00 | **9.89** |
| 46.40 | 0.02 | | |
| 46.45 | 0.02 | | |
| 46.50 | 0.02 | | |
| 46.55 | 0.02 | | |
| 46.60 | 0.02 | | |

Qwqv = 0.03 cfs (at elevation 47.00)

### Stage-Area-Storage for Pond 10P: Porous Pavement

| Elevation (feet) | Surface (sq-ft) | Wetted (sq-ft) | Storage (cubic-feet) |
|---|---|---|---|
| 0.00 | **2,761** | 2,761 | 0 |
| 0.10 | 2,761 | 2,780 | 110 |
| 0.20 | 2,761 | 2,798 | 221 |
| 0.30 | 2,761 | 2,817 | 331 |
| 0.40 | 2,761 | 2,836 | 442 |
| 0.50 | 2,761 | 2,854 | 552 |
| 0.60 | 2,761 | 2,873 | 663 |
| 0.70 | 2,761 | 2,891 | 773 |
| 0.80 | 2,761 | 2,910 | 884 |
| 0.90 | 2,761 | 2,929 | 994 |
| 1.00 | 2,761 | 2,947 | 1,104 |
| 1.10 | 2,761 | 2,966 | 1,215 |
| 1.20 | 2,761 | 2,985 | 1,325 |
| 1.30 | 2,761 | 3,003 | 1,436 |
| 1.40 | 2,761 | 3,022 | 1,546 |
| 1.50 | 2,761 | 3,040 | 1,657 |
| 1.60 | 2,761 | 3,059 | 1,670 |
| 1.70 | 2,761 | 3,078 | 1,684 |
| 1.80 | 2,761 | 3,096 | 1,698 |
| 1.90 | 2,761 | 3,115 | 1,712 |
| 2.00 | 2,761 | 3,134 | 1,726 |
| 2.10 | 2,761 | 3,152 | 1,739 |
| 2.20 | 2,761 | 3,171 | 1,753 |
| 2.30 | 2,761 | 3,189 | 1,767 |
| 2.40 | 2,761 | 3,208 | 1,781 |
| 2.50 | 2,761 | 3,227 | 1,795 |
| 2.60 | 2,761 | 3,245 | 1,905 |
| 2.70 | 2,761 | 3,264 | 2,016 |
| 2.80 | 2,761 | 3,283 | 2,126 |
| 2.90 | 2,761 | 3,301 | 2,236 |
| 3.00 | 2,761 | 3,320 | 2,347 |
| 3.10 | 2,761 | 3,338 | 2,457 |
| 3.20 | 2,761 | 3,357 | 2,559 |
| 3.30 | 2,761 | 3,376 | 2,642 |
| 3.40 | 2,761 | 3,394 | 2,725 |
| 3.50 | 2,761 | **3,413** | **2,808** |

# FILTRATION PRACTICE DESIGN CRITERIA
## (Env-Wq 1508.08)

**Type/Node Name:** _____ Porous Pavement (HydroCAD Node #10P) _____

*Enter the type of filtration practice (e.g., bioretention system) and the node name in the drainage analysis, if applicable.*

| | | | |
|---|---|---|---|
| x | | Check if you reviewed the restrictions on unlined systems outlined in Env-Wq 1508.08(a). | |
| 0.23 | ac | A = Area draining to the practice | |
| 0.23 | ac | $A_I$ = Impervious area draining to the practice | |
| 0.99 | decimal | I = Percent impervious area draining to the practice, in decimal form | |
| 0.94 | unitless | Rv = Runoff coefficient = 0.05 + (0.9 x I) | |
| 0.22 | ac-in | WQV= 1" x Rv x A | |
| 800 | cf | WQV conversion (ac-in x 43,560 sf/ac x 1ft/12") | |
| 200 | cf | 25% x WQV (check calc for sediment forebay volume) | |
| 600 | cf | 75% x WQV (check calc for surface sand filter volume) | |
| CB | | Method of Pretreatment? (not required for clean or roof runoff) | |
| | cf | $V_{SED}$ = Sediment forebay volume, if used for pretreatment | **≥ 25%WQV** |
| Calculate time to drain if system IS NOT underdrained: | | | |
| 2,761 | sf | $A_{SA}$ = Surface area of the practice | |
| 0.50 | iph | $Ksat_{DESIGN}$ = Design infiltration rate[1] | |
| | | If Ksat (prior to factor of safety) is < 0.50 iph, has an underdrain been provided? | |
| | Yes/No | (Use the calculations below) | |
| 7.0 | hours | $T_{DRAIN}$ = Drain time = V / ($A_{SA}$ * $I_{DESIGN}$) | **≤ 72-hrs** |
| Calculate time to drain if system IS underdrained: | | | |
| | ft | $E_{WQV}$ = Elevation of WQV (attach stage-storage table) | |
| | cfs | $Q_{WQV}$ = Discharge at the $E_{WQV}$ (attach stage-discharge table) | |
| - | hours | $T_{DRAIN}$ = Drain time = 2WQV/$Q_{WQV}$ | **≤ 72-hrs** |
| | feet | $E_{FC}$ = Elevation of the bottom of the filter course material[2] | |
| | feet | $E_{UD}$ = Invert elevation of the underdrain (UD), if applicable | |
| | feet | $E_{SHWT}$ = Elevation of SHWT (if none found, enter the lowest elevation of the test pit) | |
| | feet | $E_{ROCK}$ = Elevation of bedrock (if none found, enter the lowest elevation of the test pit) | |
| - | feet | $D_{FC\ to\ UD}$ = Depth to UD from the bottom of the filter course | **≥ 1'** |
| - | feet | $D_{FC\ to\ ROCK}$ = Depth to bedrock from the bottom of the filter course | **≥ 1'** |
| - | feet | $D_{FC\ to\ SHWT}$ = Depth to SHWT from the bottom of the filter course | **≥ 1'** |
| | ft | Peak elevation of the 50-year storm event (infiltration can be used in analysis) | |
| | ft | Elevation of the top of the practice | |
| - | | 50 peak elevation ≤ Elevation of the top of the practice | **← yes** |
| **If a surface sand filter or underground sand filter is proposed:** | | | |
| YES | ac | Drainage Area check. | **< 10 ac** |
| | cf | V = Volume of storage[3] (attach a stage-storage table) | **≥ 75%WQV** |
| | inches | $D_{FC}$ = Filter course thickness | **18", or 24" if within GPA** |
| Sheet | _____ | Note what sheet in the plan set contains the filter course specification. | |
| | Yes/No | Access grate provided? | **← yes** |

| | | | | |
|---|---|---|---|---|
| **If a bioretention area is proposed:** | | | | |
| YES | ac | Drainage Area no larger than 5 ac? | | ← yes |
| | cf | V = Volume of storage[3] (attach a stage-storage table) | | $\geq$ **WQV** |
| | inches | $D_{FC}$ = Filter course thickness | | **18", or 24" if within GPA** |
| Sheet | | Note what sheet in the plan set contains the filter course specification | | |
| | :1 | Pond side slopes | | $\geq$ **3:1** |
| Sheet | | Note what sheet in the plan set contains the planting plans and surface cover | | |
| **If porous pavement is proposed:** | | | | |
| Asphalt | | Type of pavement proposed (Concrete? Asphalt? Pavers? Etc.) | | |
| 0.1 | acres | $A_{SA}$ = Surface area of the pervious pavement | | |
| 3.9 | :1 | Ratio of the contributing area to the pervious surface area | | $\leq$ **5:1** |
| 12.0 | inches | $D_{FC}$ = Filter course thickness | | **12", or 18" if within GPA mod. 304.1 (see** |
| Sheet | C-15 | Note what sheet in the plan set contains the filter course spec. | | **spec)** |

1. Rate of the limiting layer (either the filter course or the underlying soil). $Ksat_{design}$ includes factor of safey. See Env-Wq 1504.14 for guidance on determining the infiltration rate.

2. See lines 34, 40 and 48 for required depths of filter media.

3. Volume without depending on infiltration. The volume includes the storage above the filter (but below the invert of the outlet stucture, if any), the filter media voids, and the pretreatment area. The storage above the filter media shall not include the volume above the outlet structure, if any.

Designer's Notes:

2,808 cf storage provided

# GROUNDWATER RECHARGE VOLUME (GRV)
## (Env-Wq 1504.12)

| | | | |
|---|---|---|---|
| | ac | Area of HSG A soil that was replaced by impervious cover | 0.40" |
| 0.11 | ac | Area of HSG B soil that was replaced by impervious cover | 0.25" |
| 1.68 | ac | Area of HSG C soil that was replaced by impervious cover | 0.10" |
| 0.01 | ac | Area of HSG D soil or impervious cover that was replaced by impervious cover | 0.0" |
| 0.11 | inches | Rd = Weighted groundwater recharge depth | |
| 0.1965 | ac-in | GRV = AI * Rd | |
| 713 | cf | GRV conversion (ac-in x 43,560 sf/ac x 1ft/12") | |
| | Y | Is a stage-storage table attached showing that the GRV can be stored below the lowest invert of the outlet structure (if applicable)? Multiple stormwater control measures may be used to meet the GRV requirements. | |

**Provide calculations/discussion below showing that the project meets the groundwater recharge requirements (Env-Wq 1507.04):**

2,808 cf provided in porous pavement (Town requires 2,757 cf)

**Water Quaity Volume Calculations**

Town of Durham, New Hampshire

Project #:     5540
Date:     5/8/2025

| HSG | Area (ac) | Ratio | WQV | | |
|-----|-----------|-------|-----|---|---|
| A | 0.00 | 1 | 0.000 | in | GRV |
| B | 0.11 | 0.75 | 0.085 | in | GRV |
| C | 1.68 | 0.4 | 0.673 | in | GRV |
| D | 0.01 | 0.16 | 0.002 | in | GRV |
| | | | 0.760 | ac-in | Total GRV = Al*Rd |
| | | | 2757.93 | cf | GRV Conversion (ac-in x 43560sf/ac x 1'/12") |
| | | | 0.063 | af | |

2,808 cf (0.064 cf) storage provided in porous pavement

# RIPRAP CALCULATIONS

## Location: Bio #1, 15" Culvert (HydroCAD Pond #17P)

Project:    5440          Date: 6/25/2025          By: EBS

| La | Apron Length, Ft. | Calculated |
|----|-------------------|------------|
| **Tw** | **Tailwater, Ft.** | **0.2** |
| **Q** | **Flow, 10 Yr Storm, CFS** | **0.73** |
| D50 | Median Stone Dia., Ft. | Calculated |
| D | Depth of Stone, In | Calculated |
| **Do** | **Pipe Diameter, Ft** | **1.25** |
| W1 | Width @ Start, Ft. | Calculated |
| W2 | Width @ End, Ft | Calculated |
| **W** | **Width of Channel** | **4** |

W1:

$\qquad$ 3(Do)= $\qquad$ 3.75 Ft.

| **Width @ Start:** | **4 Ft.** |
|---|---|

D50: $\dfrac{0.02(Q)^{4/3}}{Tw(Do)}$ $\qquad$ D50= $\qquad$ 0.05 Ft.

$\qquad$ or $\qquad$ 0.6 In.

| **Median Stone Size:** | **6 In.** |
|---|---|

D: 2.25*D50

| **Depth of Riprap:** | **14 In.** |
|---|---|

La:  If Tw<= Do/2: $\qquad$ Do/2= $\qquad$ 0.625 Ft.

$\qquad$ La=1.8Q/Do$^{3/2}$ + 7Do $\qquad$ Tw= $\qquad$ 0.2 Ft.

and $\qquad$ W2=width of channel

$\qquad$ or

$\qquad$ W2=3Do+La

If Tw>Do/2:

$\qquad$ La=3Q/Do$^{3/2}$ + 7Do

and $\qquad$ W2=width of channel

$\qquad$ or

$\qquad$ W2=3Do+0.4La

| **Length of Apron:** | **10 Ft.** |
|---|---|
| **Width @ End:** | **4 Ft.** |

# RIPRAP CALCULATIONS

## Location: Bio #2, 15" Culvert (HydroCAD Pond #22P)

Project:   5440          Date: 6/25/2025          By: EBS

| La | Apron Length, Ft. | Calculated |
|----|-------------------|------------|
| **Tw** | **Tailwater, Ft.** | **0.1** |
| **Q** | **Flow, 10 Yr Storm, CFS** | **0.37** |
| D50 | Median Stone Dia., Ft. | Calculated |
| D | Depth of Stone, In | Calculated |
| **Do** | **Pipe Diameter, Ft** | **1.25** |
| W1 | Width @ Start, Ft. | Calculated |
| W2 | Width @ End, Ft | Calculated |
| **W** | **Width of Channel** | **4** |

W1:

$3(Do)=$          3.75 Ft.

| **Width @ Start:** | **4 Ft.** |
|---|---|

D50:   $\dfrac{0.02(Q)^{4/3}}{Tw(Do)}$          D50= 0.09 Ft.

                              or          1.0 In.

| **Median Stone Size:** | **6 In.** |
|---|---|

D:     2.25*D50

| **Depth of Riprap:** | **14 In.** |
|---|---|

La:    If Tw<= Do/2:          Do/2=   0.625 Ft.

              $La=1.8Q/Do^{3/2} + 7Do$          Tw=   0.05 Ft.

       and    W2=width of channel
                     or
              W2=3Do+La

       If Tw>Do/2:

              $La=3Q/Do^{3/2} + 7Do$
       and    W2=width of channel

                     or

              W2=3Do+0.4La

| **Length of Apron:** | **10 Ft.** |
|---|---|
| **Width @ End:** | **4 Ft.** |

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# RIPRAP CALCULATIONS

## Location: DMH #12, 15" Culvert (HydroCAD Pond #50P)

Project:  5440          Date: 6/25/2025          By: EBS

| La | Apron Length, Ft. | Calculated |
|----|-------------------|------------|
| **Tw** | **Tailwater, Ft.** | **3.2** |
| **Q** | **Flow, 10 Yr Storm, CFS** | **3.11** |
| D50 | Median Stone Dia., Ft. | Calculated |
| D | Depth of Stone, In | Calculated |
| **Do** | **Pipe Diameter, Ft** | **1.25** |
| W1 | Width @ Start, Ft. | Calculated |
| W2 | Width @ End, Ft | Calculated |
| **W** | **Width of Channel** | **4** |

W1:

$3(Do)=$ 3.75 Ft.

| **Width @ Start:** | **4 Ft.** |
|---|---|

D50:  $\dfrac{0.02(Q)^{4/3}}{Tw(Do)}$          D50= 0.02 Ft.

or          0.3 In.

| **Median Stone Size:** | **6 In.** |
|---|---|

D:  $2.25*D50$

| **Depth of Riprap:** | **14 In.** |
|---|---|

La:  If Tw<= Do/2:          Do/2= 0.625 Ft.

$La=1.8Q/Do^{3/2} + 7Do$          Tw= 3.15 Ft.

and          W2=width of channel
                  or
          W2=3Do+La

If Tw>Do/2:

$La=3Q/Do^{3/2} + 7Do$
and          W2=width of channel
                  or
          W2=3Do+0.4La

| **Length of Apron:** | **16 Ft.** |
|---|---|
| **Width @ End:** | **4 Ft.** |

# RIPRAP CALCULATIONS

## Location: Bio #3, 18" Culvert (HydroCAD Pond #69P)

Project:    5440          Date: 6/25/2025          By: EBS

| La | Apron Length, Ft. | Calculated |
|---|---|---|
| **Tw** | **Tailwater, Ft.** | **0.1** |
| **Q** | **Flow, 10 Yr Storm, CFS** | **2.47** |
| D50 | Median Stone Dia., Ft. | Calculated |
| D | Depth of Stone, In | Calculated |
| **Do** | **Pipe Diameter, Ft** | **1.50** |
| W1 | Width @ Start, Ft. | Calculated |
| W2 | Width @ End, Ft | Calculated |
| **W** | **Width of Channel** | **4** |

W1:

$3(Do)=$                                   4.5 Ft.

| **Width @ Start:** | **5 Ft.** |
|---|---|

D50:        $\dfrac{0.02(Q)^{4/3}}{Tw(Do)}$                    D50=        0.44 Ft.

or        5.3 In.

| **Median Stone Size:** | **6 In.** |
|---|---|

D:        $2.25*D50$

| **Depth of Riprap:** | **14 In.** |
|---|---|

La:        If Tw<= Do/2:                    Do/2=        0.75 Ft.

$La=1.8Q/Do^{3/2} + 7Do$                    Tw=        0.1 Ft.

and        W2=width of channel

or

W2=3Do+La

If Tw>Do/2:

$La=3Q/Do^{3/2} + 7Do$

and        W2=width of channel

or

W2=3Do+0.4La

| **Length of Apron:** | **13 Ft.** |
|---|---|
| **Width @ End:** | **4 Ft.** |

# RIPRAP CALCULATIONS

## Location: Bio #4, 15" Culvert (HydroCAD Pond #83P)

Project:  5440          Date: 6/25/2025          By: EBS

| La | Apron Length, Ft. | Calculated |
|----|-------------------|------------|
| **Tw** | **Tailwater, Ft.** | **0.1** |
| **Q** | **Flow, 10 Yr Storm, CFS** | **0.46** |
| D50 | Median Stone Dia., Ft. | Calculated |
| D | Depth of Stone, In | Calculated |
| **Do** | **Pipe Diameter, Ft** | **1.25** |
| W1 | Width @ Start, Ft. | Calculated |
| W2 | Width @ End, Ft | Calculated |
| **W** | **Width of Channel** | **4** |

W1:

$3(Do)=$                          3.75 Ft.

| **Width @ Start:** | **4 Ft.** |
|---|---|

D50:  $\dfrac{0.02(Q)^{4/3}}{Tw(Do)}$          D50=     0.06 Ft.

                                         or       0.7 In.

| **Median Stone Size:** | **6 In.** |
|---|---|

D:  2.25*D50

| **Depth of Riprap:** | **14 In.** |
|---|---|

La:  If Tw<= Do/2:          Do/2=     0.625 Ft.

        $La=1.8Q/Do^{3/2} + 7Do$          Tw=      0.1 Ft.

  and  W2=width of channel
              or
        W2=3Do+La

      If Tw>Do/2:

        $La=3Q/Do^{3/2} + 7Do$
  and  W2=width of channel
              or
        W2=3Do+0.4La

| **Length of Apron:** | **10 Ft.** |
|---|---|
| **Width @ End:** | **4 Ft.** |

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# LEVEL SPREADER CALCULATIONS

## Location: Bio #3 Outfall (Reach #70R)

Project:    5440             Date: 6/25/2025          By: EBS

Based on Maine Volume III BMP's Technical Design Manual

Level Spreader Length based on 10-Year 24-Hour storm at 0.25 cfs per foot.

10-Year Peak Rate:                 2.47 cfs

**Required Length:                 9.88 feet**

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# LEVEL SPREADER CALCULATIONS

## Location: Bio #4 Outfall (Reach #83R)

Project:    5440            Date: 6/25/2025            By: EBS

Based on Maine Volume III BMP's Technical Design Manual

Level Spreader Length based on 10-Year 24-Hour storm at 0.25 cfs per foot.


10-Year Peak Rate:                    0.49 cfs

**Required Length:**              **1.96 feet**



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# Section 8

Stormwater Operations & Maintenance Plan
Inspection Form
Stormwater Management Plan

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# STORMWATER INSPECTION AND MAINTENANCE MANUAL

## RiverWoods Phase II
### Assessor's Map 209, Lot 33

**OWNER:**
**RiverWoods Company at Durham**
**14 Stone Quarry Drive**
**Durham, NH 03824**

Proper inspection, maintenance, and repair are key elements in maintaining a successful stormwater management program on a developed property. Routine inspections ensure permit compliance and reduce the potential for deterioration of infrastructure or reduced water quality. The following responsible parties shall be in charge of managing the stormwater facilities:

### RESPONSIBLE PARTIES:

*Owner*:    RiverWoods Durham                                    (603) 590-4001
                Name                    Company                        Phone


**Inspection:**    RiverWoods Durham                            (603) 590-4001
                Name                    Company                        Phone


**Maintenance:** RiverWoods Durham                            (603) 590-4001
                Name                    Company                        Phone

### NOTES:

*Written inspection forms and maintenance logs shall be completed yearly by a qualified inspector retained the owner or assigns on or before January 31st of each year and a copy retained at the site's business office.*

*Photographs of each stormwater BMP are to be taken at each inspection and submitted with the annual inspection reports.*

*Inspection and maintenance responsibilities shall transfer to any future property owner(s).*

*This manual shall be updated as needed to reflect any changes related to any transfer of ownership and/or any delegation of inspection and maintenance responsibilities to another entity*

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## BIORETENTION PONDS (AKA RAINGARDENS)

*Function* – Bioretention ponds provide treatment to runoff prior to directing it to stormwater systems by filtering sediment and suspended solids, trapping them in the bottom of the garden and in the filter media itself. Additional treatment is provided by the native water-tolerant vegetation which removes nutrients and other pollutants through bio-uptake. Stormwater detention and infiltration can also be provided as the filtering process slows runoff, decreases the peak rate of discharge and promotes groundwater recharge.

Bioretention ponds shall be managed (Per AGR 3800 and RSA 430:53) to: prevent and control the spread of invasive plant, insect, and fungal species; minimize the adverse environmental and economic effects invasive species cause to agriculture, forests, wetlands, wildlife, and other natural resources of the state; and protect the public from potential health problems attributed to certain invasive species.

> *Maintenance*
> - Inspect annually and after significant rainfall events.
> - If a raingarden does not completely drain within 72-hours following a rainfall event, then a qualified professional shall be retained to assess the condition of the facility to determine measures required to restore its filtration and/or infiltration function(s), including but not limited to removal of accumulated sediments and/or replacement or reconstruction of the filter media. Filter media shall be replaced with material matching the specification on the design drawings or the NHDES Stormwater Manual.
> - Replace any riprap dislodged from spillways, inlets and outlets.
> - Remove any obstructions, litter and accumulated sediment or debris as warranted but no less than once a year.
> - Mowing of any grassed area in or adjacent to a raingarden, including its berm, shall be performed at least twice per year (when areas are not inundated) to keep the vegetation in vigorous condition. The cut grass shall be removed to prevent the decaying organic litter from clogging the filter media or choking other vegetation.
> - Select vegetation should be maintained in healthy condition. This may include pruning, removal and replacement of dead or diseased vegetation.
> - Remove any invasive species, Per AGR 3800 and RSA 430:53.
> - Remove any hard wood growth from raingardens.

## CULVERTS AND DRAINAGE PIPES

*Function* – Culverts and drainage pipes convey stormwater away from buildings, walkways, and parking areas and to surface waters or closed drainage systems.

> *Maintenance*
> - Culverts and drainage pipes shall be inspected semi-annually, or more often as needed, for accumulation of debris and structural integrity. Leaves and other debris shall be removed from the inlet and outlet to insure the functionality of drainage structures. Debris shall be disposed of on site where it will not concentrate back at the drainage structures or at a solid waste disposal facility.
> - Riprap Areas - Culvert outlets and inlets shall be inspected during annual maintenance and operations for erosion and scour. If scour or creek erosion is identified, the outlet owner shall take appropriate means to prevent further erosion. Increased lengths of riprap may require a NHDES Permit and/or local permit.

## DEEP SUMP CATCH BASINS

*Function* – Catch basins collect stormwater, primarily from paved surfaces and roofs.  Stormwater from paved areas often contains sediment and contaminants.  Catch basin sumps serve to trap sediment, trace metals, nutrients and debris.  Hooded catch basins trap hydrocarbons and floating debris.

*Maintenance*

- Remove leaves and debris from structure grates on an as-needed basis.
- Sumps shall be inspected and cleaned annually and any removed sediment and debris shall be disposed of at a solid waste disposal facility.

## RIP RAP OUTLETS, SWALES, LEVEL SPREADERS AND BUFFERS

*Function* – Rip rap outlets slow the velocity of runoff, minimizing erosion and maximizing the treatment capabilities of associated buffers.  Vegetated buffers, either forested or meadow, slow runoff which promotes and reduces peak rates of runoff.  The reduced velocities and the presence of vegetation encourage the filtration of sediment and the limited bio-uptake of nutrients.

*Maintenance*

- Inspect riprap, level spreaders and buffers at least annually for signs of erosion, sediment buildup, or vegetation loss.
- Inspect level for signs of condensed flows.  Level spreader and rip rap shall be maintained to disperse flows evenly over level spreader.
- If a meadow buffer, provide periodic mowing as needed to maintain a healthy stand of herbaceous vegetation.
- If a forested buffer, then the buffer should be maintained in an undisturbed condition, unless erosion occurs.
- If erosion of the buffer (forested or meadow) occurs, eroded areas should be repaired and replanted with vegetation similar to the remaining buffer. Corrective action should include eliminating the source of the erosion problem and may require retrofit or reconstruction of the level spreader.
- Remove debris and accumulated sediment and dispose of properly.

## LANDSCAPED AREAS - FERTILIZER MANAGEMENT

*Function* – Fertilizer management involves controlling the rate, timing and method of fertilizer application so that the nutrients are taken up by the plants thereby reducing the chance of polluting the surface and ground waters.  Fertilizer management can be effective in reducing the amounts of phosphorus and nitrogen in runoff from landscaped areas, particularly lawns.

*Maintenance*

- Have the soil tested by your landscaper or local Soil Conservation Service for nutrient requirements and follow the recommendations.
- Do not apply fertilizer to frozen ground.
- Clean up any fertilizer spills.
- Do not allow fertilizer to be broadcast into water bodies.
- When fertilizing a lawn, water thoroughly, but do not create a situation where water runs off the surface of the lawn.

## LANDSCAPED AREAS - LITTER CONTROL

*Function* – Landscaped areas tend to filter debris and contaminates that may block drainage systems and pollute the surface and ground waters.

> *Maintenance*
> - Litter Control and lawn maintenance involves removing litter such as trash, leaves, lawn clippings, pet wastes, oil and chemicals from streets, parking lots, and lawns before materials are transported into surface waters.
> - Litter control shall be implemented as part of the grounds maintenance program.

## VEGETATIVE SWALES

*Function* – Vegetative swales filter sediment from stormwater, promote infiltration, and the uptake of contaminates.  They are designed to treat runoff and dispose of it safely into the natural drainage system.

> *Maintenance*
> - Timely maintenance is important to keep a swale in good working condition. Mowing of grassed swales shall be monthly to keep the vegetation in vigorous condition.  The cut vegetation shall be removed to prevent the decaying organic litter from adding pollutants to the discharge from the swale.
> - Fertilizing shall be bi-annual or as recommended from soil testing.
> - Inspect swales following significant rainfall events.
> - Woody vegetation shall not be allowed to become established in the swales or rock riprap outlet protection and if present shall be removed.
> - Accumulated debris disrupts flow and leads to clogging and erosion.  Remove debris and litter as necessary.
> - Inspect for eroded areas.  Determine cause of erosion and correct deficiency as required.  Monitor repaired areas.

## POROUS PAVEMENT

*Function* – Porous pavement is designed to capture rainwater runoff containing suspended solids, nutrients and pollutants. Proper maintenance of porous pavement is crucial for ensuring its longevity and functionality to infiltrate runoff.

*Maintenance*

- Signs shall be installed indicating the location of porous pavement and the special maintenance required.
- New porous pavement shall be inspected several times in the first month after construction and at least annually thereafter.  Inspections shall be conducted after major storms to check for surface ponding that might indicate possible clogging.
- Inspect annually for pavement deterioration or spalling.
- Vacuum sweeping shall be performed 2-4 times a year.  Power washing may be required prior to vacuum sweeping to dislodge trapped particles.
- Sand and abrasives shall not be used for winter maintenance, as they will clog the pores; de-icing materials shall be used instead.
- Never reseal or repave with impermeable materials.  If the porous pavement is damaged, it can be repaired using conventional, non-porous patching mixes as long as the cumulative area repaired does not exceed 10 percent of the paved area.

## CONTROL OF INVASIVE PLANTS

*Function* – Invasive plants are introduced, alien, or non-native plants, which have been moved by people from their native habitat to a new area.  Some exotic plants are imported for human use such as landscaping, erosion control, or food crops.  They also can arrive as "hitchhikers" among shipments of other plants, seeds, packing materials, or fresh produce.  Some exotic plants become invasive and cause harm by:

- becoming weedy and overgrown;
- killing established shade trees;
- obstructing pipes and drainage systems;
- forming dense beds in water;
- lowering water levels in lakes, streams, and wetlands;
- destroying natural communities;
- promoting erosion on stream banks and hillsides; and
- resisting control except by hazardous chemical.

*Maintenance*

During maintenance activities, check for the presence of invasive plants and remove in a safe manner as described in the attached "Methods for Disposing Non-Native Invasive Plants" prepared by the UNH Cooperative Extension.

## STREET/PARKING LOT SWEEPING (NON-POROUS PAVEMENT)

*Function* – Parking lots accumulate sand and debris.  Street sweeping removes the sand and debris, which lowers transport of sediment and pollutants the stormwater systems and into the environment.

*Maintenance*

- A regular periodic cleaning schedule is recommended.  The more frequent, the greater the sediment and pollutant removal.  Regular cleaning of paved areas reduces the frequency of cleaning catch basins and drainage systems.  It is recommended that the parking lots and access ways shall be swept at least once a month during winter months.

## GENERAL CLEAN UP

- Upon completion of the project, the contractor shall remove all temporary stormwater structures (i.e., temporary stone check dams, silt fence, temporary diversion swales, catch basin inlet filter, etc.).  Any sediment deposits remaining in place after the silt fence or filter barrier is no longer required shall be dressed to conform to the existing grade, prepared, and seeded.  Remove any sediment in catch basins and clean drain pipes that may have accumulated during construction.
- Once in operation, all paved areas of the site should be swept at least once annually at the end of winter/early spring prior to significant spring rains.

## APPPENDIX

A.  Stormwater System Operations and Maintenance Report
B.  Site Grading and Drainage Plan

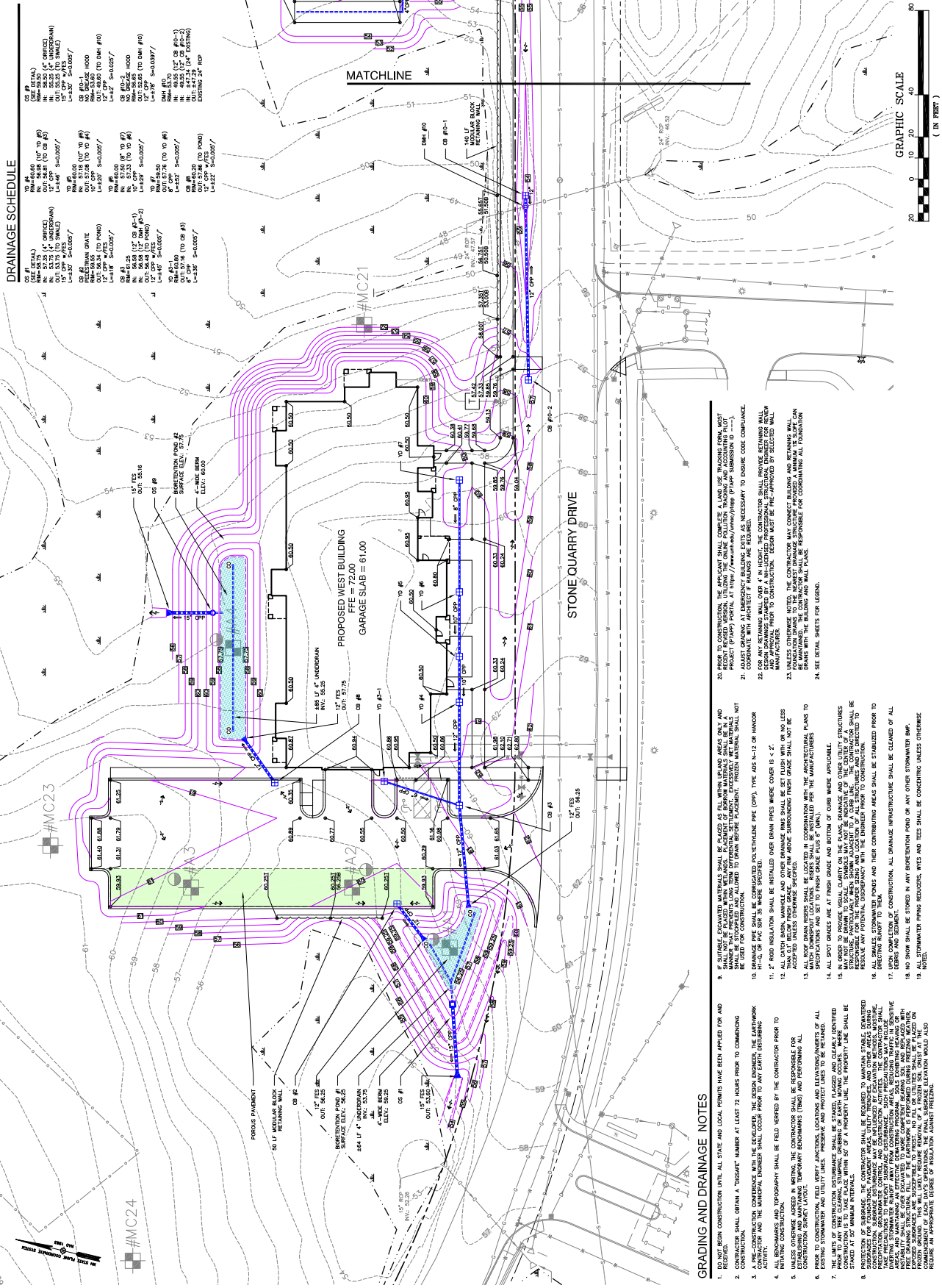# STORM WATER SYSTEM OPERATION AND MAINTENANCE REPORT

| General Information | |
|---|---|
| **Project Name** | |
| **Owner** | |
| **Inspector's Name(s)** | |
| **Inspector's Contact Information** | |
| **Date of Inspection** | **Start Time:**           **End Time:** |

**Type of Inspection:**
☐ Annual Report     ☐ Post-storm event     ☐ Due to a discharge of significant amounts of sediment

**Notes:**

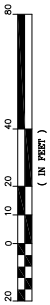| General Site Questions and Discharges of Significant Amounts of Sediment | | |
|---|---|---|
| **Subject** | **Status** | **Notes** |
| *A discharge of significant amounts of sediment may be indicated by (but is not limited to) observations of the following. Note whether any are observed during this inspection:* | | *Notes/ Action taken:* |
| 1  Do the current site conditions reflect the attached site plan? | ☐Yes ☐No | |
| 2  Is the site permanently stabilized, temporary erosion and sediment controls are removed, and stormwater discharges from construction activity are eliminated? | ☐Yes ☐No | |
| 3  Is there evidence of the discharge of significant amounts of sediment to surface waters, or conveyance systems leading to surface waters? | ☐Yes ☐No | |

| Permit Coverage and Plans | | | | |
|---|---|---|---|---|
| **#** | **BMP/Facility** | **Inspected** | **Corrective Action Needed and Notes** | **Date Corrected** |
| | Catch Basins and Yard Drains | ☐Yes ☐No | | |
| | Drainage Pipes | ☐Yes ☐No | | |
| | Porous Pavement | ☐Yes ☐No | | |
| | Riprap Aprons | ☐Yes ☐No | | |
| | Site Vegetation | ☐Yes ☐No | | |
| | Bioretention Ponds | ☐Yes ☐No | | |
| | | ☐Yes ☐No | | |
| | | ☐Yes ☐No | | |

## DRAINAGE SCHEDULE

(Drainage structure schedule with multiple catch basins, yard drains, outlet structures, drain manholes, flared end sections and associated rim/invert elevations — partially legible.)

## GRADING AND DRAINAGE NOTES

(Numbered construction notes 1 through 24, partially legible, covering construction procedures, benchmarks, insulation, drainage pipe, catch basins, roof drains, spot grades, swales, retaining walls, and stormwater BMP requirements.)

MATCHLINE

PROPOSED WEST BUILDING
FFE = 72.00
GARAGE SLAB = 61.00

STONE QUARRY DRIVE

GRAPHIC SCALE
( IN FEET )

P5440

NOT FOR CONSTRUCTION

ISSUED FOR: REVIEW
ISSUE DATE: JULY 23, 2025

REVISIONS
NO. DESCRIPTION
0 REVIEW

DRAWN BY: EBS
APPROVED BY: EBS
DRAWING FILE: 5440-SITE.dwg

BY DATE
EBS 06/23/25

SCALE: 24" X 36": 1" = 20'
11"X 17": 1" = NTS

OWNER:
RIVERWOODS DURHAM
14 STONE QUARRY DRIVE
DURHAM, NH 03824

APPLICANT:
RIVERWOODS DURHAM
14 STONE QUARRY DRIVE
DURHAM, NH 03824

PROJECT:
RIVERWOODS
DURHAM PHASE II
TAX MAP 209 LOT 33
STONE QUARRY DRIVE
& DOVER ROAD (NH 108)
DURHAM, NH

TITLE:
STORMWATER
MANAGEMENT PLAN

SHEET NUMBER:
# C-6.2

GRAPHIC SCALE
20 0 20 40 80
( IN FEET )

MATCHLINE

STONE QUARRY DRIVE

MATCHLINE

DRAINAGE SCHEDULE

PROPOSED EAST BUILDING
FFE = 68.00
GARAGE SLAB = 57.00

PROPOSED GARAGE
FFE = 52.75

PROPOSED COMMUNITY CENTER
FFE = 57.00

BIORETENTION POND #3
SURFACE ELEV. 48.00

BIORETENTION POND #4
ELEV. 49.00
SURFACE ELEV. 45.50
±35 LF 4" UNDERDRAIN
INV. 43.00

4' WIDE BERM
ELEV. 45.50

4' WIDE BERM
ELEV. 45.00

CUSTOM HEADWALL/
RETAINING WALL
12" OUT: 48.50

HEADWALL
15" OUT: 48.00

15" FES
OUT: 42.85

6" FES
OUT: 45.50

12" FES
OUT: 45.50

18" FES
OUT: 45.25

PEDESTRIAN GRATE

MC4

MC2

MC6

# Section 9

## Watershed Plans

Pre-Development Drainage Plan
Pre-Development Soils Plan
Post-Development Drainage Plan
Post-Development Soils Plan

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## GRAPHIC SCALE

60  0  30  60  120  240

( IN FEET )

## LEGEND

| | |
|---|---|
| ———— | PROPERTY LINE |
| ----- 60 ----- | EXISTING CONTOUR |
| —— 60 —— | PROPOSED CONTOUR |
| ▬▬▬▬ | WATERSHED BOUNDARY |
| →—→—→ | Tc PATH |
| →—→—→ | REACH PATH |
| ←↑→ | PROPOSED GROUND SLOPE DIRECTION |
| ▪▪▪▪▪ | SOIL BOUNDARY |
| 299B | SOIL DESIGNATION |
| | SOILS — HSG A |
| | SOILS — HSG B |
| | SOILS — HSG C |
| | SOILS — HSG D |
| | SOILS — IMPERVIOUS |
| | SOILS — WATER |

⬡ 1  △ 1  ☐ 1   SUBCATCHMENT/POND/REACH

☐ POA   POINT OF ANALYSIS

NH STATE PLANE COORDINATE SYSTEM
NAD 1983

POA 100

POA 200

POA 300

NOT FOR CONSTRUCTION

ISSUED FOR:
REVIEW

ISSUE DATE:
JULY 23, 2025

REVISIONS
NO. DESCRIPTION          BY    DATE
0   REVIEW               EBS  06/23/25

DRAWN BY: _____ EBS
APPROVED BY: _____ EBS
DRAWING FILE: _____ 5440-SITE.dwg

SCALE:
24" x 36" - 1" = 60'
11" x 17" - 1" = NTS

OWNER:
RIVERWOODS DURHAM
14 STONE QUARRY DRIVE
DURHAM, NH 03824

APPLICANT:
RIVERWOODS DURHAM
14 STONE QUARRY DRIVE
DURHAM, NH 03824

PROJECT:
RIVERWOODS
DURHAM PHASE II
TAX MAP 209 LOT 33
STONE QUARRY DRIVE
& DOVER ROAD (NH 108)
DURHAM, NH

TITLE:
PRE-DEVELOPMENT
WATERSHED PLAN

SHEET NUMBER:
WS-1.1

P5440

## GRAPHIC SCALE

60  0  30  60  120  240

( IN FEET )

## LEGEND

| | |
|---|---|
| ———— | PROPERTY LINE |
| - - - 60 - - - | EXISTING CONTOUR |
| —60— | PROPOSED CONTOUR |
| ▬▬▬ | WATERSHED BOUNDARY |
| ⟶⟶⟶ | Tc PATH |
| ⟶⟶⟶ | REACH PATH |
| ← | PROPOSED GROUND SLOPE DIRECTION |
| ▪▪▪▪▪ | SOIL BOUNDARY |
| 299B | SOIL DESIGNATION |
| | SOILS – HSG A |
| | SOILS – HSG B |
| | SOILS – HSG C |
| | SOILS – HSG D |
| | SOILS – IMPERVIOUS |
| | SOILS – WATER |

⬡1  △1  ▢1   SUBCATCHMENT/POND/REACH

▢POA   POINT OF ANALYSIS

NH STATE PLANE COORDINATE SYSTEM
NAD 1983

NOT FOR CONSTRUCTION

ISSUED FOR:

REVIEW

ISSUE DATE:

JULY 23, 2025

REVISIONS
| NO. | DESCRIPTION | BY | DATE |
|---|---|---|---|
| 0 | REVIEW | EBS | 06/23/25 |

DRAWN BY: _____ EBS
APPROVED BY: _____ EBS
DRAWING FILE: _____ 5440-SITE.dwg

SCALE:
24" x 36" - 1" = 60'
11" x 17" - 1" = NTS

OWNER:
RIVERWOODS DURHAM
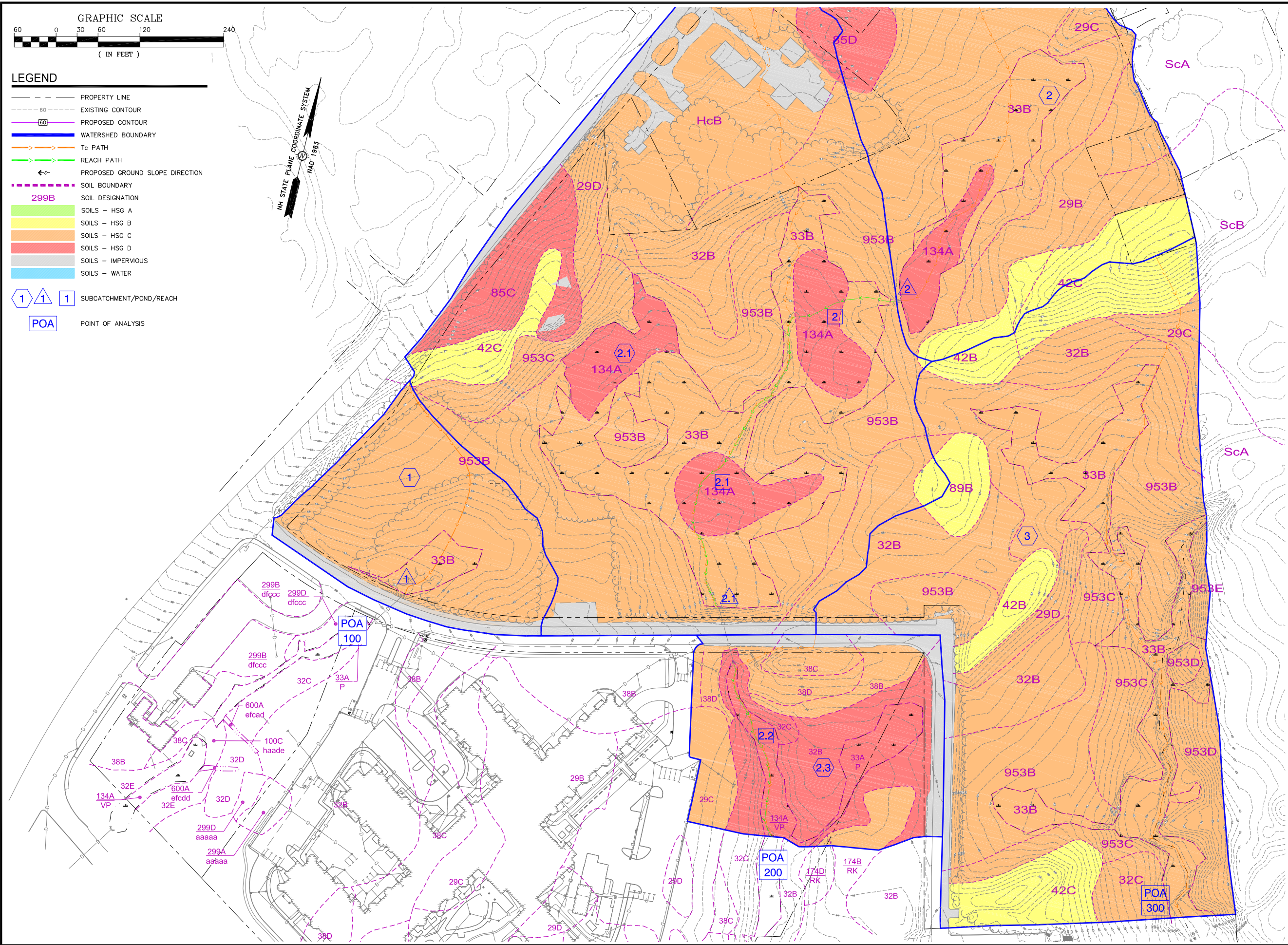14 STONE QUARRY DRIVE
DURHAM, NH 03824

APPLICANT:
RIVERWOODS DURHAM
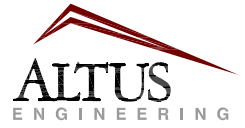14 STONE QUARRY DRIVE
DURHAM, NH 03824

PROJECT:

**RIVERWOODS DURHAM PHASE II**

TAX MAP 209 LOT 33
STONE QUARRY DRIVE
& DOVER ROAD (NH 108)
DURHAM, NH

TITLE:

PRE-DEVELOPMENT WATERSHED AND SOILS PLAN

SHEET NUMBER:

**WS-1.2**

P5440

Soil designations visible on plan: 29C, ScA, 33B, 29B, ScB, HcB, 29D, 953B, 134A, 42C, 32B, 85C, 42C, 953C, 2, 2.1, 134A, 953B, 33B, 89B, 3, 953B, 953E, 32B, 953C, 33B, 953D, 953B, 33B, 42B, 29D, 953C, 953D, 299B dfccc, 299D dfccc, POA 100, 299B dfccc, 32C, 33A P, 38B, 600A efcad, 100C haade, 38C, 38B, 32D, 32D, 134A VP, 600A efcdd, 32E, 299D aaaaa, 299A aaaaa, 29B, 29C, 38C, 32B, 38D, 38C, 29C, 29D, 2.2, 38C, 38D, 32C, 32B, 33A P, 2.3, 138D, 29C, 134A VP, POA 200, 174D RK, 174B RK, 32C, 32B, 953B, 33B, 32B, 42C, 32C, POA 300

NH STATE PLANE COORDINATE SYSTEM
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JULY 23, 2025

REVISIONS
NO.  DESCRIPTION              BY    DATE
0    REVIEW                   EBS   06/23/25

DRAWN BY: _____ EBS
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DRAWING FILE: _____ 5440-SITE.dwg

SCALE:
24" x 36" - 1" = 60'
11" x 17" - 1" = NTS

OWNER:
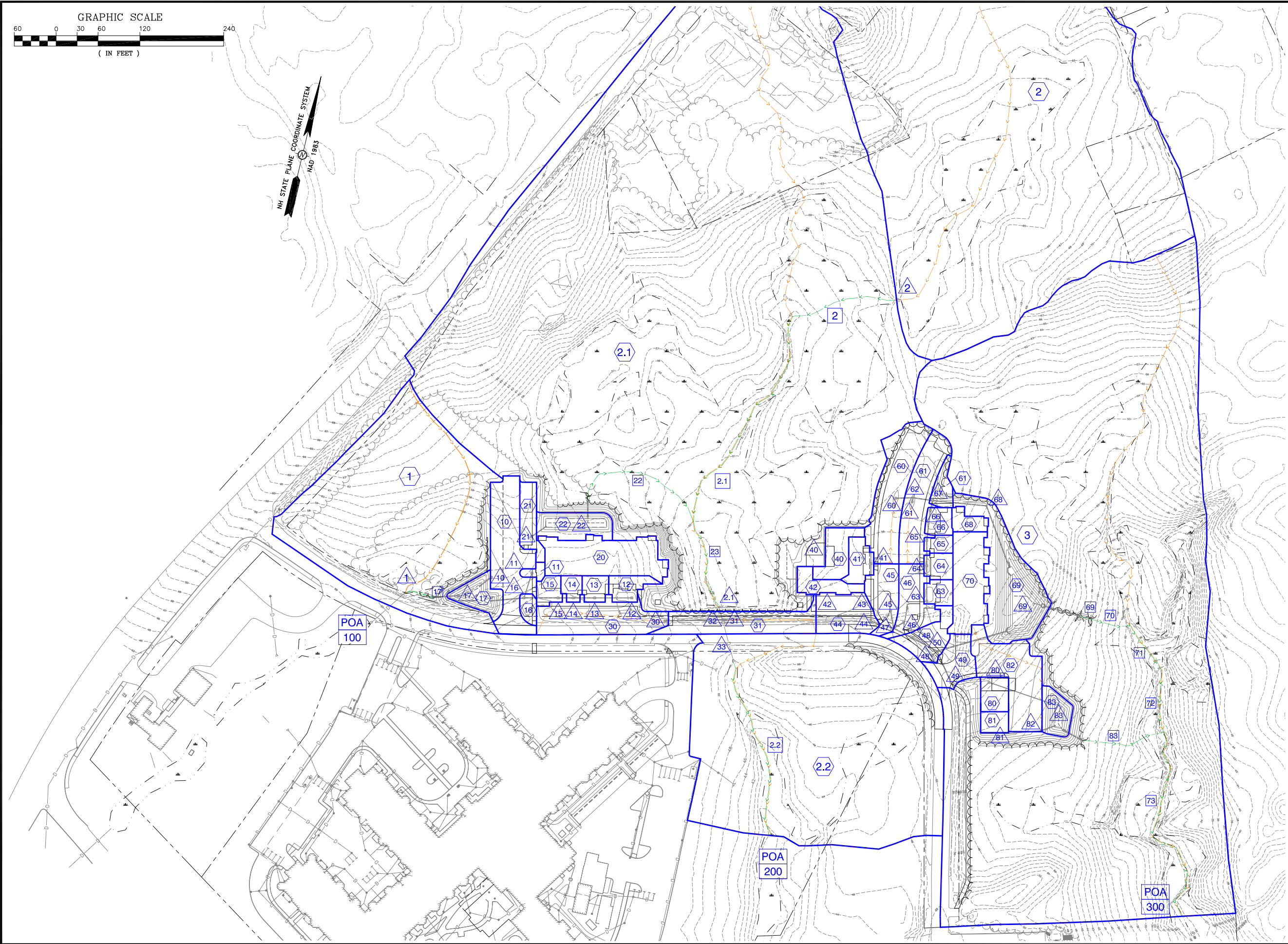RIVERWOODS DURHAM
14 STONE QUARRY DRIVE
DURHAM, NH 03824

APPLICANT:
RIVERWOODS DURHAM
14 STONE QUARRY DRIVE
DURHAM, NH 03824

PROJECT:

**RIVERWOODS
DURHAM PHASE II**

TAX MAP 209 LOT 33
STONE QUARRY DRIVE
& DOVER ROAD (NH 108)
DURHAM, NH

TITLE:

**POST-DEVELOPMENT
WATERSHED PLAN**

SHEET NUMBER:

**WS-2.1**

P5440

GRAPHIC SCALE

60    0    30    60    120         240

( IN FEET )

NH STATE PLANE COORDINATE SYSTEM
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REVIEW

ISSUE DATE:
JULY 23, 2025

REVISIONS
NO. DESCRIPTION          BY    DATE
0    REVIEW              EBS   06/23/25

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DRAWING FILE: _____ 5440-SITE.dwg

SCALE:
24" x 36" - 1" = 60'
11" x 17" - 1" = NTS

OWNER:
RIVERWOODS DURHAM
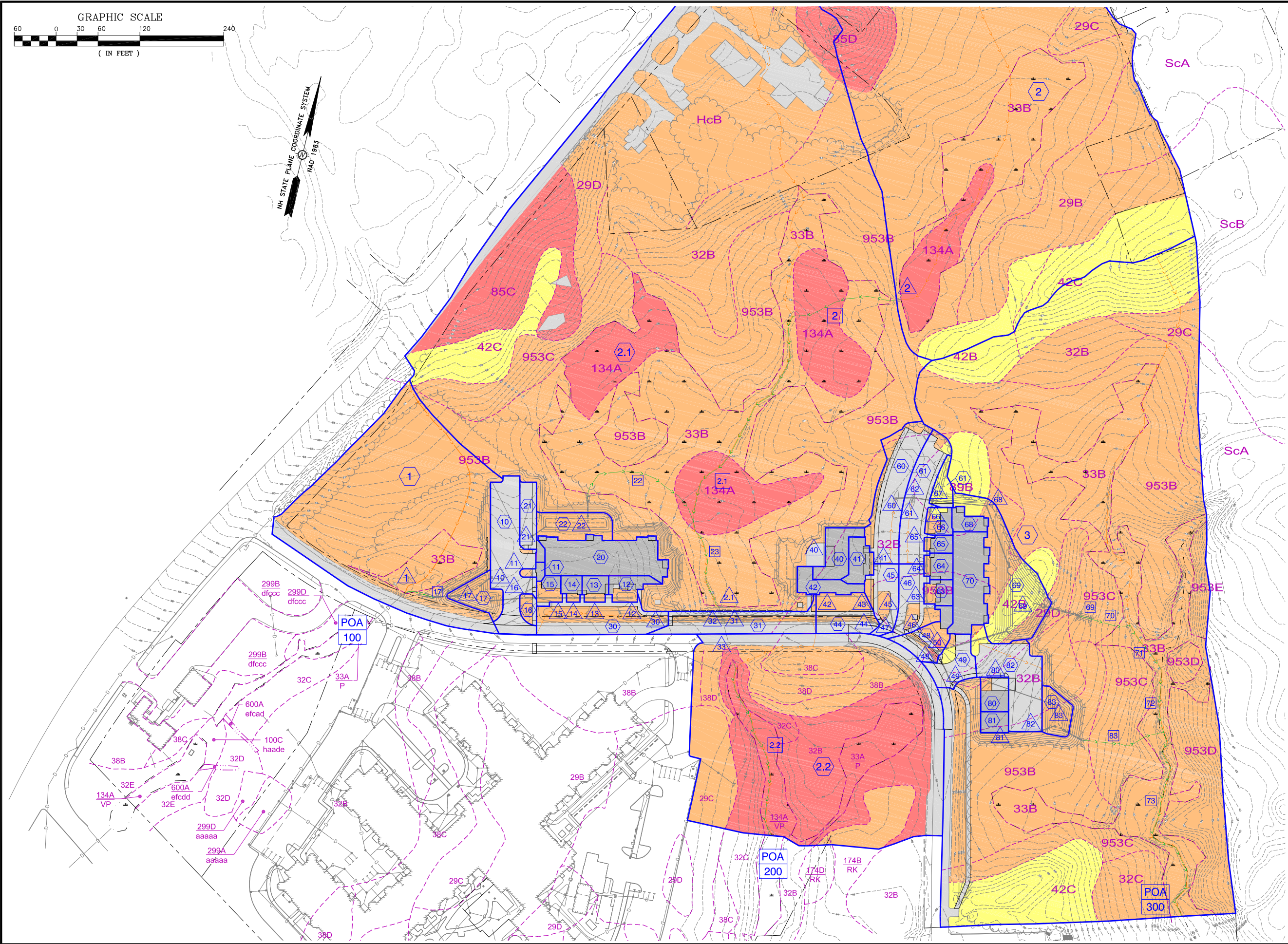14 STONE QUARRY DRIVE
DURHAM, NH 03824

APPLICANT:
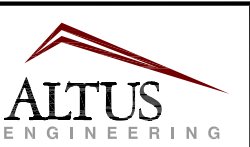RIVERWOODS DURHAM
14 STONE QUARRY DRIVE
DURHAM, NH 03824

PROJECT:
**RIVERWOODS DURHAM PHASE II**
TAX MAP 209 LOT 33
STONE QUARRY DRIVE
& DOVER ROAD (NH 108)
DURHAM, NH

TITLE:
**POST-DEVELOPMENT WATERSHED AND SOILS PLAN**

SHEET NUMBER:
**WS-2.2**

P5440

Soil/label annotations on plan:

29C, ScA, 2, 33B, 29B, ScB, 35D, HcB, 29D, 32B, 33B, 953B, 134A, 29B, 85C, 42C, 953B, 953C, 134A, 42C, 42B, 32B, 29C, 2.1, 134A, 953B, 33B, 134A, 953B, 2.1, 134A, 953B, 33B, 953B, ScA, 22, 60, 61, 61, 89B, 62, 68, 60, 61, 66, 68, 65, 66, 3, 40, 32B, 65, 64, 64, 70, 20, 11, 40, 41, 41, 45, 64, 46, 953B, 69, 953C, 953E, 10, 21, 22, 22, 63, 42C, 2D, 70, 953C, 33B, 953D, 21, 42, 23, 45, 2.1, 44, 44, 48, 49, 80, 82, 32B, 953C, 10, 16, 15, 14, 13, 12, 30, 32, 31, 31, 43, 50, 49, 80, 83, 72, 17, 17, 15, 14, 13, 30, 33, 81, 82, 83, 83, 953D, 38C, 38B, 138D, 38D, 38B, 80, 81, 82, 83, POA 100, 299B dfccc, 299D dfccc, 299B dfccc, 32C, 33A P, 38B, 32C, 2.2, 32B, 33A P, 953B, 33B, 953C, 600A efcad, 100C haade, 38C, 32D, 32D, 134A VP, 2.2, 29B, 73, 42C, 32C, 134A VP, 600A efcdd, 32E, 299D aaaaa, 29C, 32E, 32D, 32B, 299A aaaaa, 299D aaaaa, POA 200, 174B RK, 174D RK, 38C, POA 300, 38B, 29C, 29D, 32B, 38C, 29D