



**Kousidis Engineering, LLC**  
Land Development Consultants & Site Design

# **DRAINAGE ANALYSIS**

**LOCATED AT  
589 BEDFORD STREET  
STAMFORD, CONNECTICUT**

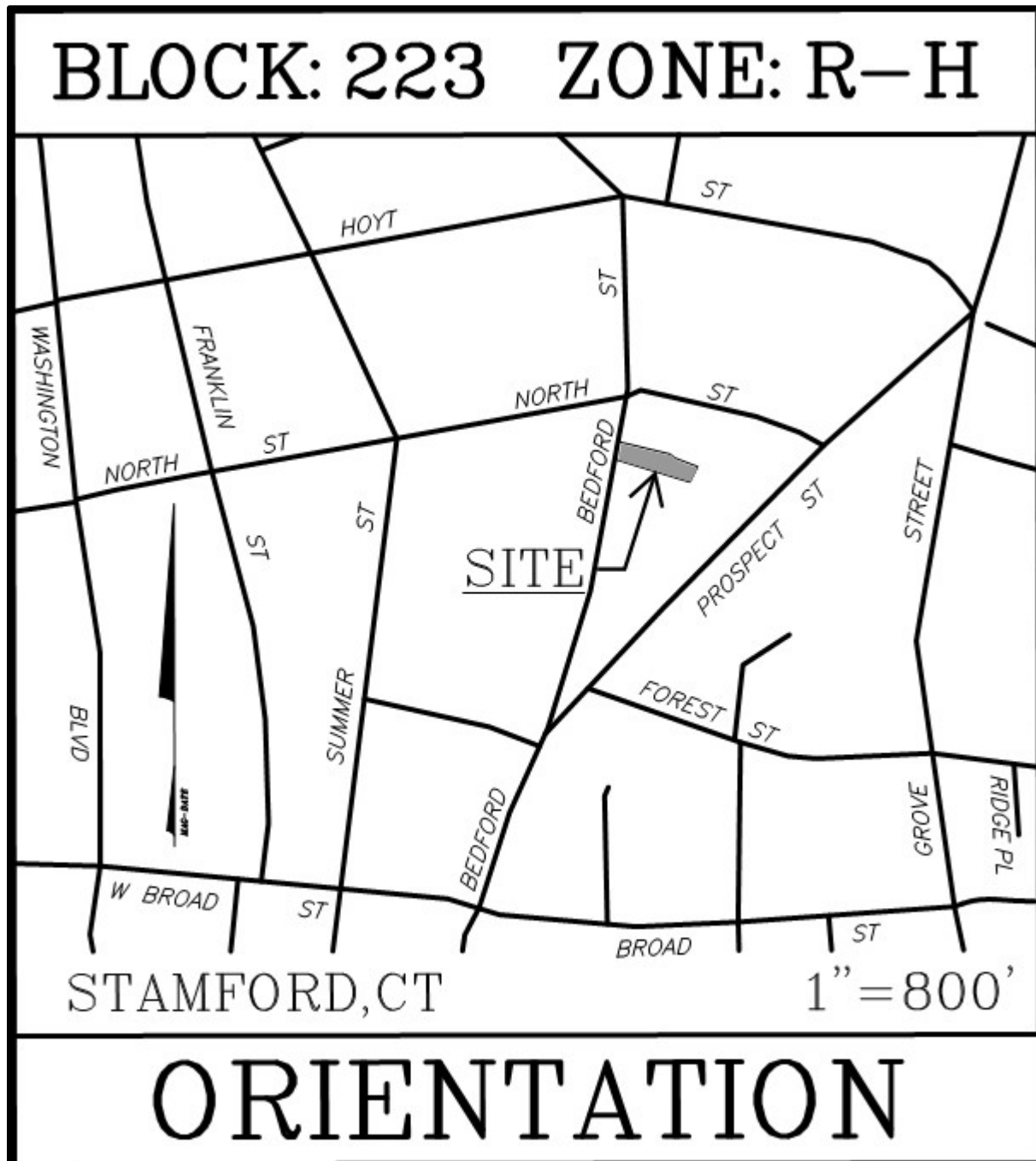
**PREPARED FOR  
BEDFORD PROPERTIES, LLC**

**March 08, 2023**

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**Jim Kousidis, P.E.**  
CT License No. 26830

## Site Vicinity Map



## 1. EXISTING CONDITIONS

This 11,807-sq. ft. residential property is currently developed with a parking lot. Test pits at the site indicate highly pervious soils that are adequate to accept a subsurface storm drain system. The topography of the property slopes to the south and east. According to the Web Soil Survey website (map and soil table attached) the soils in the subject area consist of Urban land, a fair-drained soil with a Hydrologic Soil Group "D".

## 2. PROPOSED CONDITIONS

A new development is being proposed for the subject property. The owner is proposing to demolish the existing parking lot and construct a new multi-family residence with a parking garage below, and a new driveway, with associated site improvements. The total proposed impervious surface is 9,650-sq.ft. A stormwater retention system will be installed to satisfy the City of Stamford's requirements of zero increase in runoff rate for the 24-hour, type III rainfall, 1 through 50-year storm events. The new roof area and the catch basin drains must be directed to the proposed retention systems as depicted on the Site Development Plan provided by Kousidis Engineering, LLC dated 03/08/2023.

## 3. DRAINAGE

According to Section 2.4 of the City of Stamford Stormwater Drainage Manual, there are no required water quality volume concerns for the subject property, as the total area of disturbance is less than ½ an acre. However, a stormwater treatment system has been proposed to provide water quality prior to discharge to the City of Stamford Drainage System. The design considerations for the property are to control the peak flow rate of stormwater for the 1 through 50-year storm events. For all watersheds, the peak flow rate is equivalent to or below the flow rate when compared to existing conditions.

Under proposed conditions, the entire site will maintain historic flow patterns as depicted in the attached watershed maps. Refer to the following table for a summary of all existing vs. proposed peak stormwater flow rates and volumes. For all watersheds, the proposed flow rate is below or equivalent to the existing flow.

**EXISTING vs PROPOSED CONDITIONS DRAINAGE SUMMARY TABLE**  
**Peak Flows (cfs) & Runoff Volumes (cf)**

| Description | POC | Flow/Volume   | Existing | Proposed | $\Delta$ | $\Delta\%$ |
|-------------|-----|---------------|----------|----------|----------|------------|
| 1 yr        | 1   | $Q(ft^3/sec)$ | 0.15     | 0.15     | 0.00     | 0%         |
|             |     | $V(ft^3)$     | 516      | 993      | 477      | 92%        |
| 2 yr        | 1   | $Q(ft^3/sec)$ | 0.21     | 0.19     | -0.02    | -10%       |
|             |     | $V(ft^3)$     | 739      | 1,326    | 587      | 79%        |
| 5 yr        | 1   | $Q(ft^3/sec)$ | 0.26     | 0.22     | -0.04    | -15%       |
|             |     | $V(ft^3)$     | 939      | 1,620    | 681      | 73%        |
| 10 yr       | 1   | $Q(ft^3/sec)$ | 0.32     | 0.25     | -0.07    | -22%       |
|             |     | $V(ft^3)$     | 1,170    | 1,957    | 787      | 67%        |
| 25 yr       | 1   | $Q(ft^3/sec)$ | 0.42     | 0.38     | -0.04    | -10%       |
|             |     | $V(ft^3)$     | 1,581    | 2,549    | 968      | 61%        |
| 50 yr       | 1   | $Q(ft^3/sec)$ | 0.49     | 0.47     | -0.02    | -4%        |
|             |     | $V(ft^3)$     | 1,847    | 2,930    | 1,083    | 59%        |

| Description | POC | Flow/Volume   | Existing | Proposed | $\Delta$ | $\Delta\%$ |
|-------------|-----|---------------|----------|----------|----------|------------|
| 1 yr        | 2   | $Q(ft^3/sec)$ | 0.46     | 0.35     | -0.11    | -24%       |
|             |     | $V(ft^3)$     | 1,507    | 836      | -671     | -45%       |
| 2 yr        | 2   | $Q(ft^3/sec)$ | 0.60     | 0.41     | -0.19    | -32%       |
|             |     | $V(ft^3)$     | 2,028    | 1,253    | -775     | -38%       |
| 5 yr        | 2   | $Q(ft^3/sec)$ | 0.73     | 0.50     | -0.23    | -32%       |
|             |     | $V(ft^3)$     | 2,486    | 1,628    | -858     | -35%       |
| 10 yr       | 2   | $Q(ft^3/sec)$ | 0.87     | 0.61     | -0.26    | -30%       |
|             |     | $V(ft^3)$     | 3,009    | 2,059    | -950     | -32%       |
| 25 yr       | 2   | $Q(ft^3/sec)$ | 1.12     | 0.80     | -0.32    | -29%       |
|             |     | $V(ft^3)$     | 3,927    | 2,817    | -1,110   | -28%       |
| 50 yr       | 2   | $Q(ft^3/sec)$ | 1.27     | 0.91     | -0.36    | -28%       |
|             |     | $V(ft^3)$     | 4,517    | 3,306    | -1,211   | -27%       |

| Description | POC | Flow/Volume   | Existing | Proposed | $\Delta$ | $\Delta\%$ |
|-------------|-----|---------------|----------|----------|----------|------------|
| 1 yr        | 3   | $Q(ft^3/sec)$ | 0.01     | 0.00     | -0.01    | -100%      |
|             |     | $V(ft^3)$     | 41       | 10       | -31      | -76%       |
| 2 yr        | 3   | $Q(ft^3/sec)$ | 0.02     | 0.01     | -0.01    | -50%       |
|             |     | $V(ft^3)$     | 59       | 16       | -43      | -73%       |
| 5 yr        | 3   | $Q(ft^3/sec)$ | 0.03     | 0.01     | -0.02    | -67%       |
|             |     | $V(ft^3)$     | 75       | 22       | -53      | -71%       |
| 10 yr       | 3   | $Q(ft^3/sec)$ | 0.03     | 0.01     | -0.02    | -67%       |
|             |     | $V(ft^3)$     | 93       | 28       | -65      | -70%       |
| 25 yr       | 3   | $Q(ft^3/sec)$ | 0.04     | 0.01     | -0.03    | -75%       |
|             |     | $V(ft^3)$     | 126      | 40       | -86      | -68%       |
| 50 yr       | 3   | $Q(ft^3/sec)$ | 0.05     | 0.02     | -0.03    | -60%       |
|             |     | $V(ft^3)$     | 147      | 48       | -99      | -67%       |

For watershed #1, the proposed peak flow rate is below the existing conditions peak flow rate for the 1 through 50-year storm events. A Vortech Model 1000 has been proposed to provide water quality treatment of stormwater, prior to discharge to the City of Stamford Stormwater Drainage System.

Under existing conditions, watershed #2 flows to a natural depression that has been created by the building on the property line to the east, a higher grade to the northeast, and the retaining wall associated with the neighboring development to the southeast, which then overflows over the retaining wall on the southeastern property. To mitigate adverse impacts to the neighboring properties, the flow rates and volumes have been decreased for watershed #2 under proposed conditions, and the natural depression remains with a stormwater detention system to collect additional runoff prior to discharging over the retaining wall at the neighboring property as is has under historic conditions.

Watershed #3 is proposed to decrease under proposed conditions, thus no stormwater mitigations measures are necessary.

#### **4. CONCLUSION**

The proposed development will increase the amount of impervious area to this site, resulting in higher peak runoff rates. However, with the installation of the proposed stormwater retention systems, the original flow patterns will be maintained and there will be no increase in peak runoff rate up to the 50-year storm event. In addition to controlling stormwater peak runoff, the proposed design incorporates stormwater treatment to control pollution and provide groundwater recharge capacity. The implementation of these techniques and the overall site design layout will result in a finished project that will minimize sediment and erosion impacts during construction and will have no adverse impacts to adjoining properties upon completion. Based on the above information, the proposed improvements are designed in accordance with the City of Stamford Stormwater Drainage Manual and will not adversely impact adjacent or downstream properties or City-owned drainage facilities.

### **Conveyance Calculations**

For the **6" PVC** Pipes @ a minimum 0.5% Slope, the maximum flow does not exceed 0.40 cfs under the 100-year storm event from the driveway area. Utilizing the Manning's Equation, the capacity of the 6" pvc pipe at full gravity flow is 0.468 cfs:

$$Q = (0.463/n)(d)^{2.667}(S)^{0.5} = (0.463/0.011)(0.50)^{2.667}(0.005)^{0.5}$$
$$Q = 42.09 * 0.1571 * 0.0707 = \mathbf{0.468 \text{ cfs} > 0.40 \text{ cfs}}$$

For the **4" PVC** Pipes @ a minimum 1% Slope the maximum flow does not exceed 0.20 cfs under the 100-year storm event from the roof area. Utilizing the Manning's Equation, the capacity of the 4" pipe at full gravity flow is 0.665 cfs:

$$Q = (0.463/n)(d)^{2.667}(S)^{0.5} = (0.463/0.011)(0.33)^{2.667}(0.005)^{0.5}$$
$$Q = 42.09 * 0.052 * 0.01 = \mathbf{0.219 \text{ cfs} > 0.20 \text{ cfs}}$$

All proposed pipe flows are below the maximum conveyance capabilities of the pipe.

EXISTING DRAINAGE CONDITIONS

EXHIBIT "A"

589 BEDFORD STREET, STAMFORD, CT

PREPARED FOR

BEDFORD PROPERTIES, LLC



KOUSIDIS ENGINEERING, LLC

Land Development Consultants and Site Design

10-B First Street, Norwalk, CT 06855

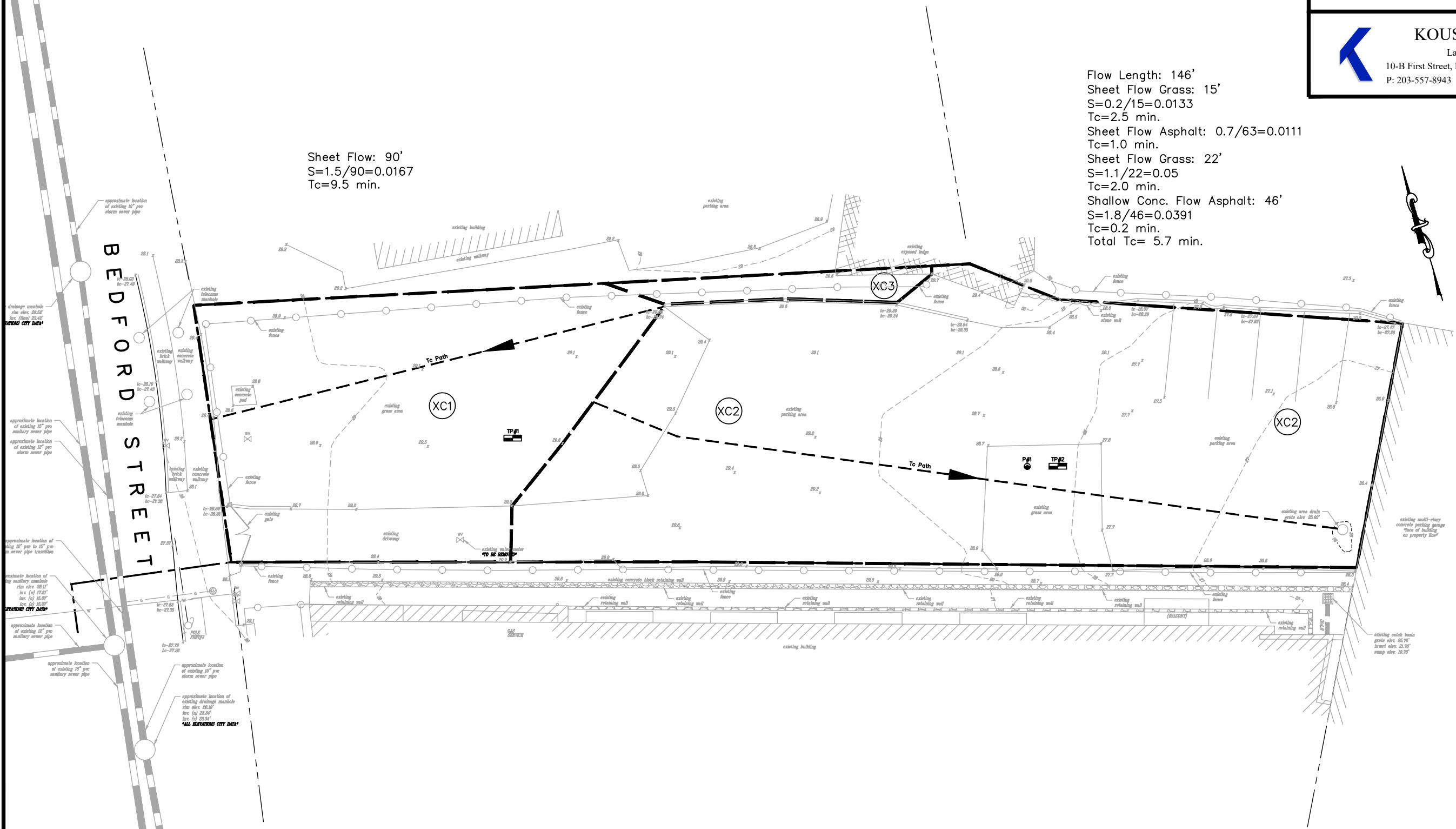
E: jim@kousidisengineering.com

P: 203-557-8943 F: 203-557-8944

Web: www.kousidisengineering.com

Flow Length: 146'  
Sheet Flow Grass: 15'  
 $S=0.2/15=0.0133$   
 $T_c=2.5$  min.  
Sheet Flow Asphalt:  $0.7/63=0.0111$   
 $T_c=1.0$  min.  
Sheet Flow Grass: 22'  
 $S=1.1/22=0.05$   
 $T_c=2.0$  min.  
Shallow Conc. Flow Asphalt: 46'  
 $S=1.8/46=0.0391$   
 $T_c=0.2$  min.  
Total  $T_c=5.7$  min.

Sheet Flow: 90'  
 $S=1.5/90=0.0167$   
 $T_c=9.5$  min.



SCALE:

1" = 20'

PROPOSED DRAINAGE CONDITIONS

EXHIBIT "B"

589 BEDFORD STREET, STAMFORD, CT

PREPARED FOR

BEDFORD PROPERTIES, LLC



KOUSIDIS ENGINEERING, LLC

Land Development Consultants and Site Design

10-B First Street, Norwalk, CT 06855

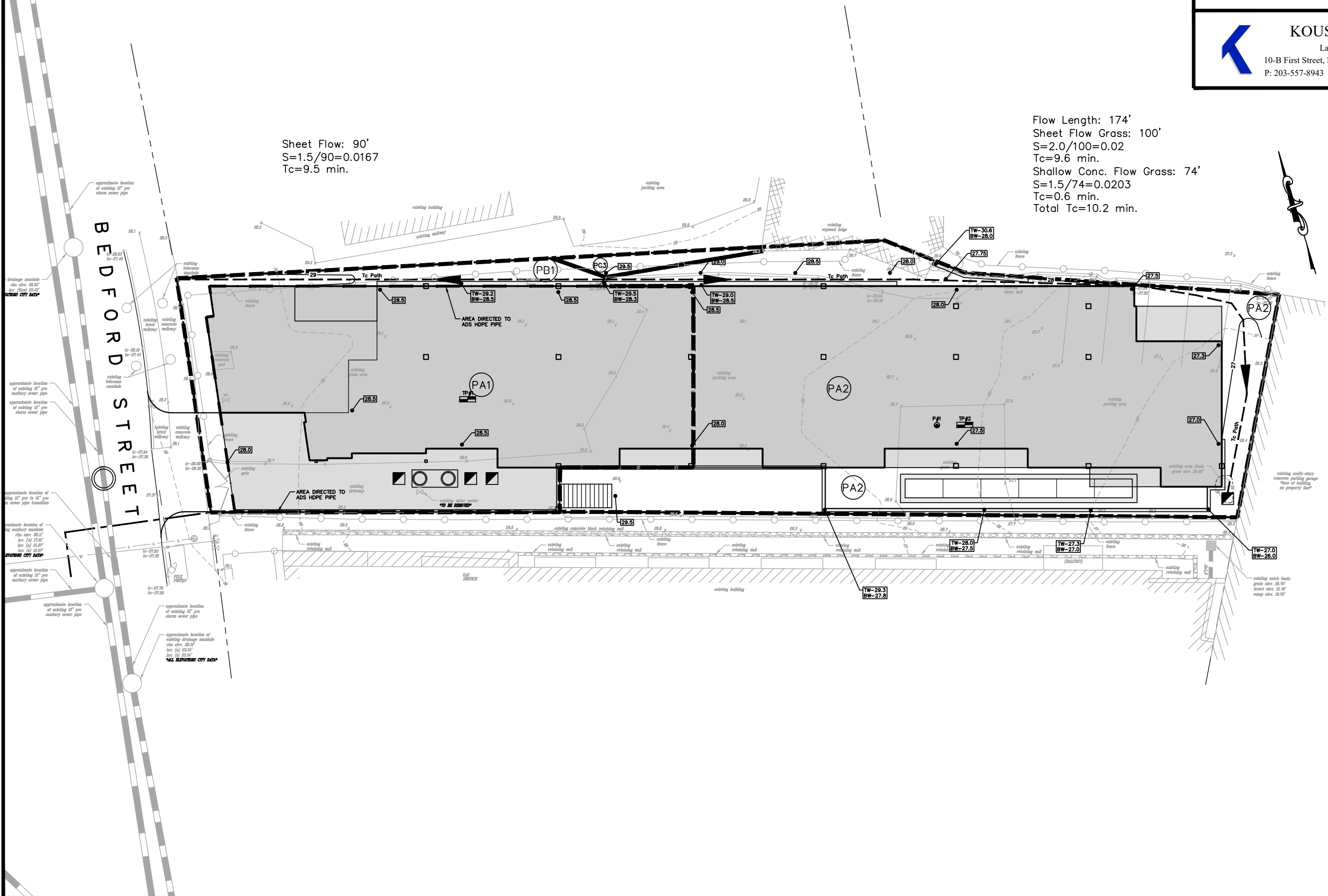
E: jim@kousidisengineering.com

P: 203-557-8943 F: 203-557-8944

Web: www.kousidisengineering.com

Sheet Flow: 90'  
 $S=1.5/90=0.0167$   
 $T_c=9.5$  min.

Flow Length: 174'  
Sheet Flow Grass: 100'  
 $S=2.0/100=0.02$   
 $T_c=9.6$  min.  
Shallow Conc. Flow Grass: 74'  
 $S=1.5/74=0.0203$   
 $T_c=0.6$  min.  
Total  $T_c=10.2$  min.



SCALE:

1" = 20'



Existing Conditions  
Runoff Watershed #1



Impervious Area #1 to  
Detention System 1



Proposed Bypass Area  
Watershed #1



24" ADS HDPE Pipe



Overall Runoff  
Watershed #1



Existing Conditions  
Runoff Watershed #3



Existing Runoff to  
Natural Depression  
Watershed #2



Existing Depression  
Watershed #2



Proposed Conditions  
Runoff Watershed #3



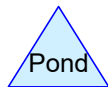
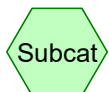
Impervious Area #2 to  
Detention System 2



24" High precast  
Concrete Galleries



Proposed Depression  
Watershed #2



**Routing Diagram for 589BedfordSt(01-10-23)\_Exist&PropConditions**

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**589BedfordSt(01-10-23)\_Exist&PropConditions***Type III 24-hr 1 yr Rainfall=2.70"*

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Time span=0.00-24.00 hrs, dt=0.05 hrs, 481 points  
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN  
Reach routing by Stor-Ind+Trans method - Pond routing by Stor-Ind method

**Subcatchment PA1: Impervious Area #1 to** Runoff Area=4,600 sf 100.00% Impervious Runoff Depth>2.47"  
Tc=6.0 min CN=98 Runoff=0.27 cfs 946 cf

**Subcatchment PA2: Impervious Area #2 to** Runoff Area=6,574 sf 77.78% Impervious Runoff Depth>2.06"  
Flow Length=174' Tc=10.2 min CN=94 Runoff=0.30 cfs 1,127 cf

**Subcatchment PB1: Proposed Bypass Area** Runoff Area=516 sf 24.22% Impervious Runoff Depth>1.27"  
Flow Length=91' Slope=0.0165 '/' Tc=9.7 min CN=84 Runoff=0.02 cfs 55 cf

**Subcatchment PC3: Proposed Conditions** Runoff Area=117 sf 0.00% Impervious Runoff Depth>1.03"  
Tc=3.0 min CN=80 Runoff=0.00 cfs 10 cf

**Subcatchment XC1: Existing Conditions** Runoff Area=3,628 sf 16.10% Impervious Runoff Depth>1.71"  
Flow Length=90' Slope=0.0167 '/' Tc=9.5 min CN=90 Runoff=0.15 cfs 516 cf

**Subcatchment XC2: Existing Runoff to** Runoff Area=7,891 sf 83.56% Impervious Runoff Depth>2.36"  
Flow Length=146' Tc=5.7 min CN=97 Runoff=0.46 cfs 1,552 cf

**Subcatchment XC3: Existing Conditions** Runoff Area=288 sf 7.64% Impervious Runoff Depth>1.71"  
Tc=3.0 min CN=90 Runoff=0.01 cfs 41 cf

**Pond DB1: 24" ADS HDPE Pipe** Peak Elev=24.82' Storage=142 cf Inflow=0.27 cfs 946 cf  
Primary=0.14 cfs 938 cf Secondary=0.00 cfs 0 cf Outflow=0.14 cfs 938 cf

**Pond DB2: 24" High precast Concrete Galleries** Peak Elev=26.06' Storage=280 cf Inflow=0.30 cfs 1,127 cf  
Outflow=0.41 cfs 854 cf

**Pond PD2: Proposed Depression Watershed #2** Peak Elev=26.45' Storage=23 cf Inflow=0.41 cfs 854 cf  
Outflow=0.35 cfs 836 cf

**Pond XD2: Existing Depression Watershed #2** Peak Elev=26.46' Storage=57 cf Inflow=0.46 cfs 1,552 cf  
Outflow=0.46 cfs 1,507 cf

**Link OR1: Overall Runoff Watershed #1** Inflow=0.15 cfs 993 cf  
Primary=0.15 cfs 993 cf

### Summary for Subcatchment PA1: Impervious Area #1 to Detention System 1

Runoff = 0.27 cfs @ 12.09 hrs, Volume= 946 cf, Depth> 2.47"

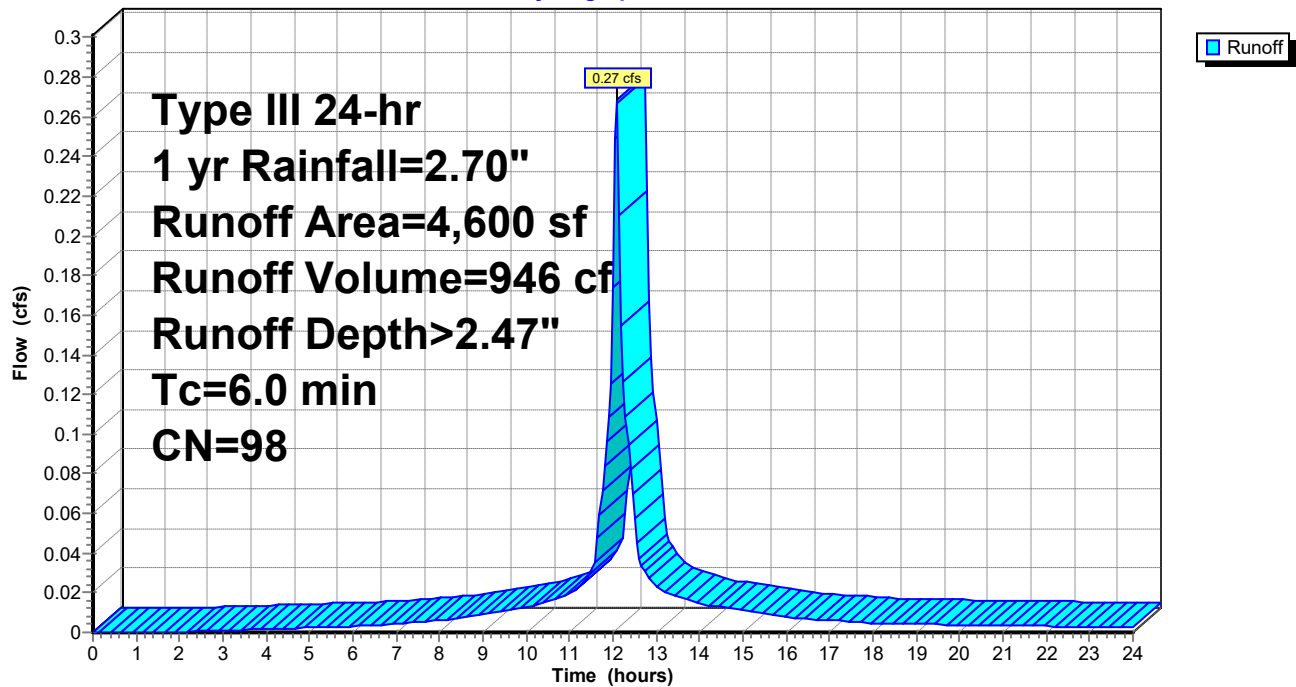
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs  
Type III 24-hr 1 yr Rainfall=2.70"

|   | Area (sf) | CN | Description             |
|---|-----------|----|-------------------------|
| * | 4,600     | 98 | Building                |
|   | 4,600     |    | 100.00% Impervious Area |

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

### Subcatchment PA1: Impervious Area #1 to Detention System 1

Hydrograph



**589BedfordSt(01-10-23)\_Exist&PropConditions**

Type III 24-hr 1 yr Rainfall=2.70"

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**Summary for Subcatchment PA2: Impervious Area #2 to Detention System 2**

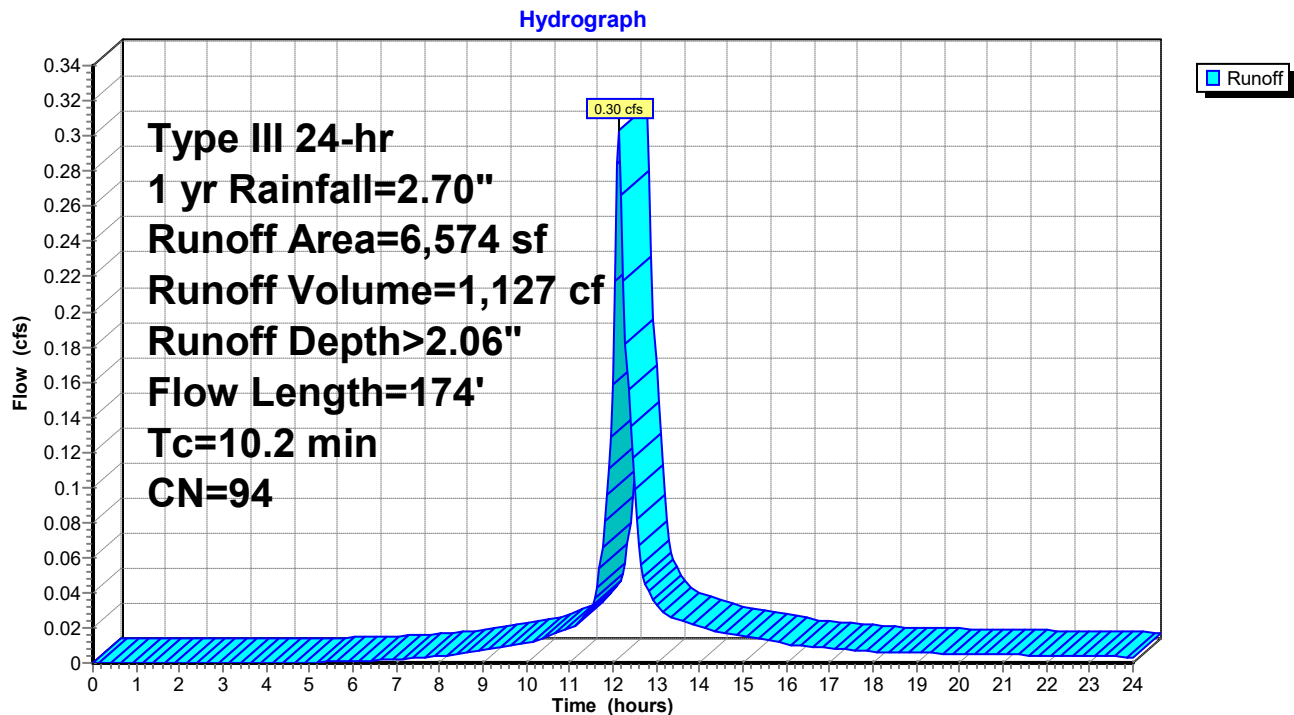
Runoff = 0.30 cfs @ 12.14 hrs, Volume= 1,127 cf, Depth&gt; 2.06"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs  
Type III 24-hr 1 yr Rainfall=2.70"

| Area (sf) | CN | Description                   |
|-----------|----|-------------------------------|
| * 4,400   | 98 | Building                      |
| * 625     | 98 | Driveway                      |
| * 88      | 98 | Ledge                         |
| 1,461     | 80 | >75% Grass cover, Good, HSG D |
| 6,574     | 94 | Weighted Average              |
| 1,461     |    | 22.22% Pervious Area          |
| 5,113     |    | 77.78% Impervious Area        |

| Tc (min) | Length (feet) | Slope (ft/ft) | Velocity (ft/sec) | Capacity (cfs) | Description  |
|----------|---------------|---------------|-------------------|----------------|--|
| 9.6      | 100           | 0.0200        | 0.17              |                | <b>Sheet Flow, Sheet Flow Grass</b><br>Grass: Short n= 0.150 P2= 3.30"                             |
| 0.6      | 74            | 0.0203        | 2.14              |                | <b>Shallow Concentrated Flow, Shallow Concentrated Flow Grass</b><br>Grassed Waterway Kv= 15.0 fps |
| 10.2     | 174           | Total         |                   |                |  |

**Subcatchment PA2: Impervious Area #2 to Detention System 2**

### Summary for Subcatchment PB1: Proposed Bypass Area Watershed #1

Runoff = 0.02 cfs @ 12.14 hrs, Volume= 55 cf, Depth> 1.27"

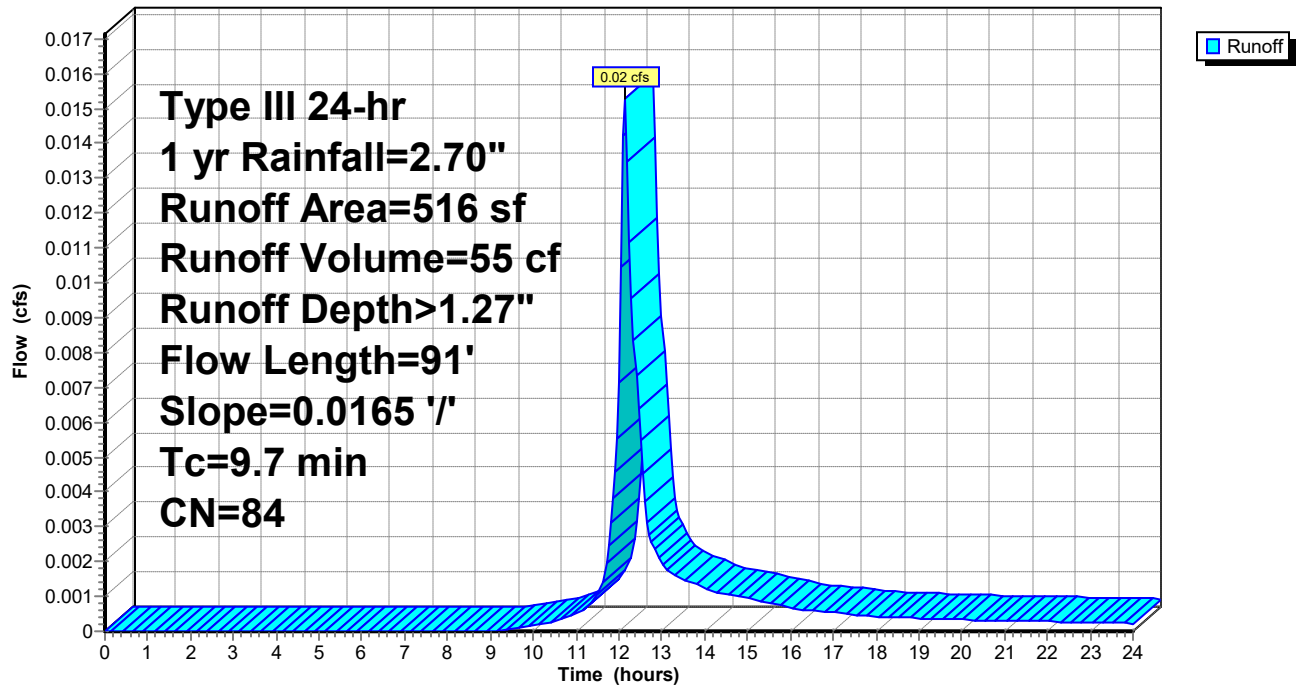
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs  
Type III 24-hr 1 yr Rainfall=2.70"

| Area (sf) | CN | Description                   |
|-----------|----|-------------------------------|
| 391       | 80 | >75% Grass cover, Good, HSG D |
| * 125     | 98 | Driveway                      |
| 516       | 84 | Weighted Average              |
| 391       |    | 75.78% Pervious Area          |
| 125       |    | 24.22% Impervious Area        |

| Tc (min) | Length (feet) | Slope (ft/ft) | Velocity (ft/sec) | Capacity (cfs) | Description                     |
|----------|---------------|---------------|-------------------|----------------|---------------------------------|
| 9.7      | 91            | 0.0165        | 0.16              |                | Sheet Flow, Sheet Flow Grass    |
|          |               |               |                   |                | Grass: Short n= 0.150 P2= 3.30" |

### Subcatchment PB1: Proposed Bypass Area Watershed #1

Hydrograph



### Summary for Subcatchment PC3: Proposed Conditions Runoff Watershed #3

Runoff = 0.00 cfs @ 12.05 hrs, Volume= 10 cf, Depth> 1.03"

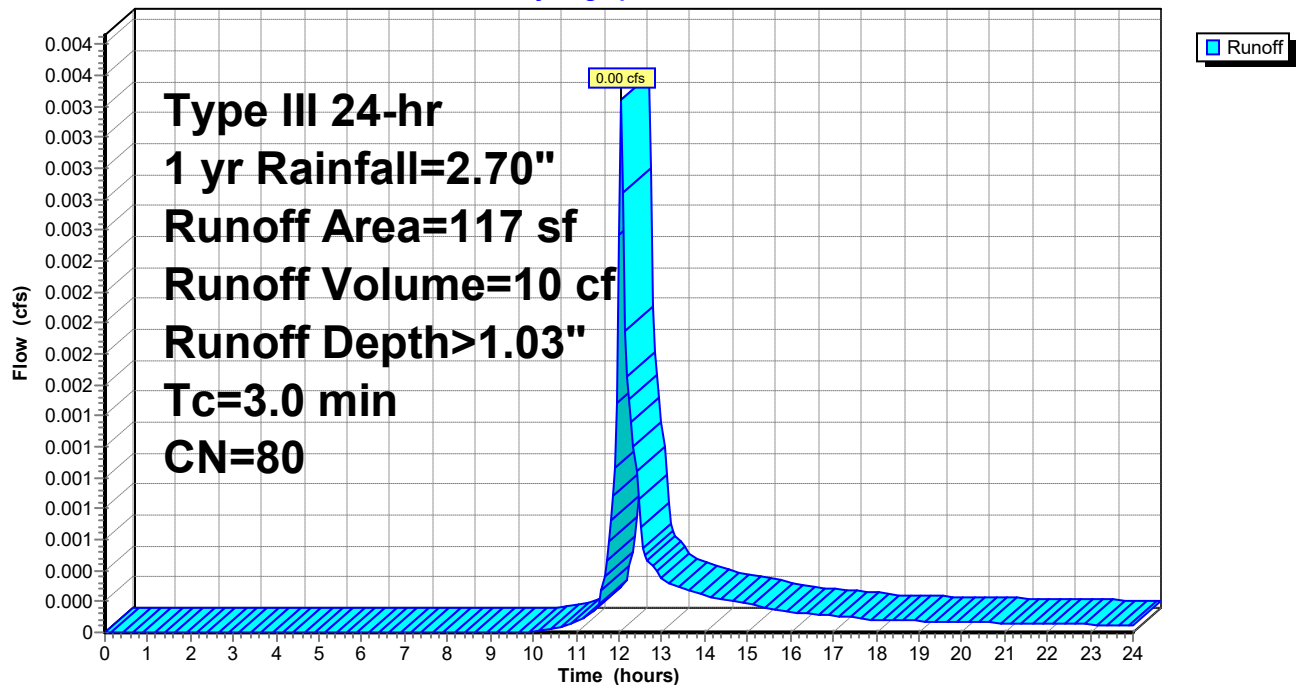
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs  
Type III 24-hr 1 yr Rainfall=2.70"

| Area (sf) | CN | Description                   |
|-----------|----|-------------------------------|
| 117       | 80 | >75% Grass cover, Good, HSG D |
| 117       |    | 100.00% Pervious Area         |

| Tc<br>(min) | Length<br>(feet) | Slope<br>(ft/ft) | Velocity<br>(ft/sec) | Capacity<br>(cfs) | Description                |
|-------------|------------------|------------------|----------------------|-------------------|----------------------------|
| 3.0         |                  |                  |                      |                   | Direct Entry, Grassed Area |

### Subcatchment PC3: Proposed Conditions Runoff Watershed #3

Hydrograph



**589BedfordSt(01-10-23)\_Exist&PropConditions**

Type III 24-hr 1 yr Rainfall=2.70"

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**Summary for Subcatchment XC1: Existing Conditions Runoff Watershed #1**

Runoff = 0.15 cfs @ 12.14 hrs, Volume= 516 cf, Depth&gt; 1.71"

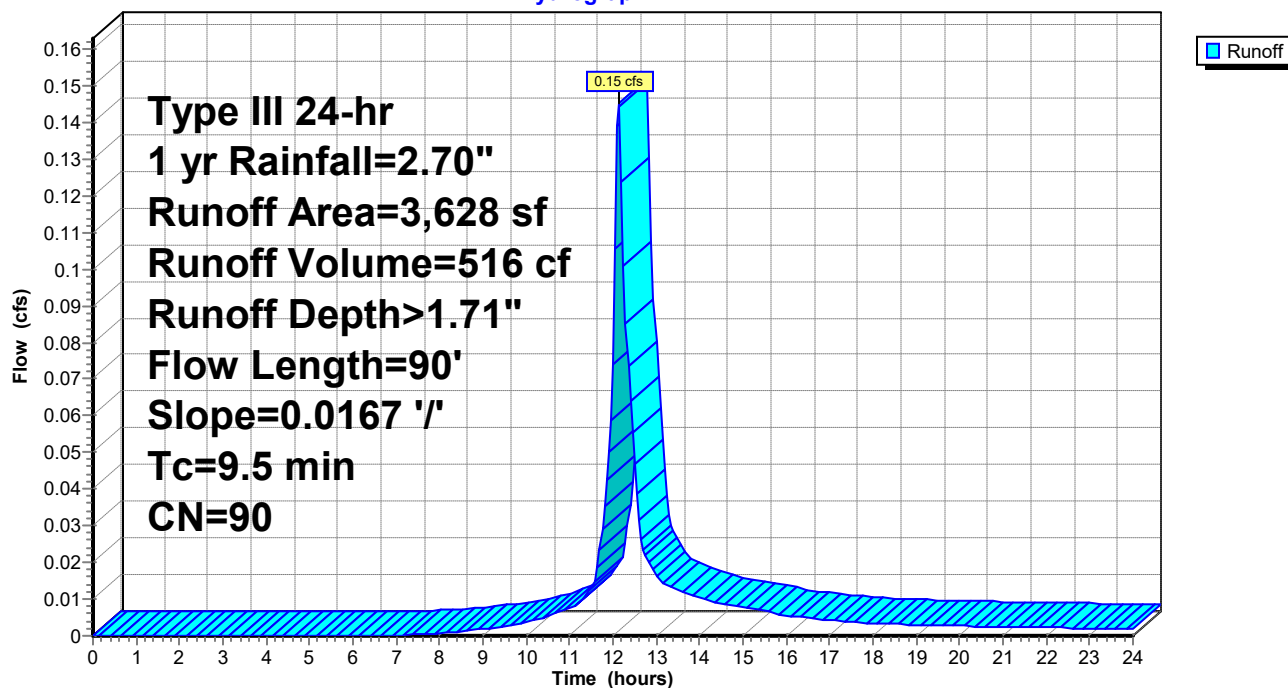
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs  
Type III 24-hr 1 yr Rainfall=2.70"

|   | Area (sf) | CN | Description                   |
|---|-----------|----|-------------------------------|
| * | 568       | 98 | Driveway                      |
| * | 16        | 98 | Concrete Pad                  |
|   | 3,044     | 89 | <50% Grass cover, Poor, HSG D |
|   | 3,628     | 90 | Weighted Average              |
|   | 3,044     |    | 83.90% Pervious Area          |
|   | 584       |    | 16.10% Impervious Area        |

| Tc<br>(min) | Length<br>(feet) | Slope<br>(ft/ft) | Velocity<br>(ft/sec) | Capacity<br>(cfs) | Description   |
|-------------|------------------|------------------|----------------------|-------------------|---|
| 9.5         | 90               | 0.0167           | 0.16                 |                   | Sheet Flow, Sheet Flow Grass<br>Grass: Short n= 0.150 P2= 3.30" |

**Subcatchment XC1: Existing Conditions Runoff Watershed #1**

Hydrograph



**589BedfordSt(01-10-23)\_Exist&PropConditions**

Type III 24-hr 1 yr Rainfall=2.70"

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**Summary for Subcatchment XC2: Existing Runoff to Natural Depression Watershed #2**

Runoff = 0.46 cfs @ 12.08 hrs, Volume= 1,552 cf, Depth&gt; 2.36"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs  
Type III 24-hr 1 yr Rainfall=2.70"

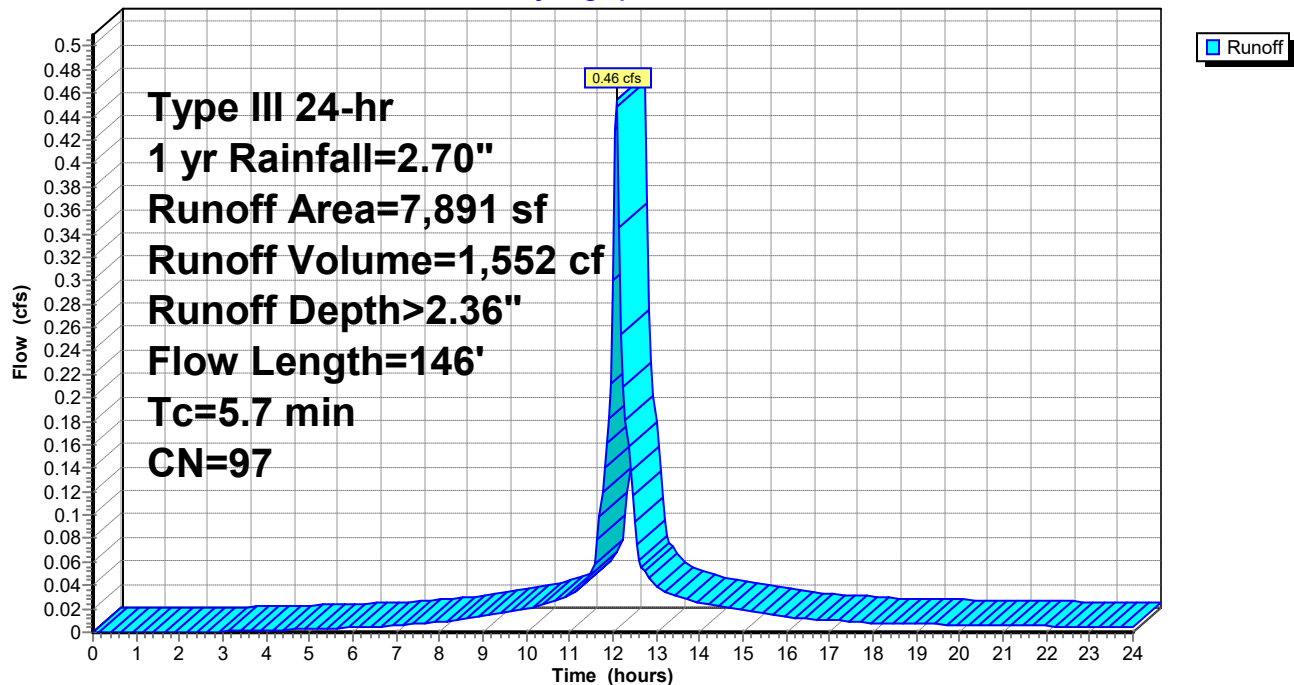
|   | Area (sf) | CN | Description                   |
|---|-----------|----|-------------------------------|
| * | 6,528     | 98 | Driveway                      |
| * | 66        | 98 | Ledge                         |
|   | 1,297     | 89 | <50% Grass cover, Poor, HSG D |
|   | 7,891     | 97 | Weighted Average              |
|   | 1,297     |    | 16.44% Pervious Area          |
|   | 6,594     |    | 83.56% Impervious Area        |

| Tc (min) | Length (feet) | Slope (ft/ft) | Velocity (ft/sec) | Capacity (cfs) | Description  |
|----------|---------------|---------------|-------------------|----------------|--|
| 2.5      | 15            | 0.0133        | 0.10              |                | <b>Sheet Flow, Sheet Flow Grass</b><br>Grass: Short n= 0.150 P2= 3.30"               |
| 1.0      | 63            | 0.0111        | 1.01              |                | <b>Sheet Flow, Sheet Flow Asphalt</b><br>Smooth surfaces n= 0.011 P2= 3.30"          |
| 2.0      | 22            | 0.0500        | 0.18              |                | <b>Sheet Flow, Sheet Flow Grass</b><br>Grass: Short n= 0.150 P2= 3.30"               |
| 0.2      | 46            | 0.0391        | 4.01              |                | <b>Shallow Concentrated Flow, Shallow Concentrated Asphalt</b><br>Paved Kv= 20.3 fps |
| 5.7      | 146           | Total         |                   |                |  |

**Subcatchment XC2: Existing Runoff to Natural Depression Watershed #2**

Hydrograph



### Summary for Subcatchment XC3: Existing Conditions Runoff Watershed #3

Runoff = 0.01 cfs @ 12.05 hrs, Volume= 41 cf, Depth> 1.71"

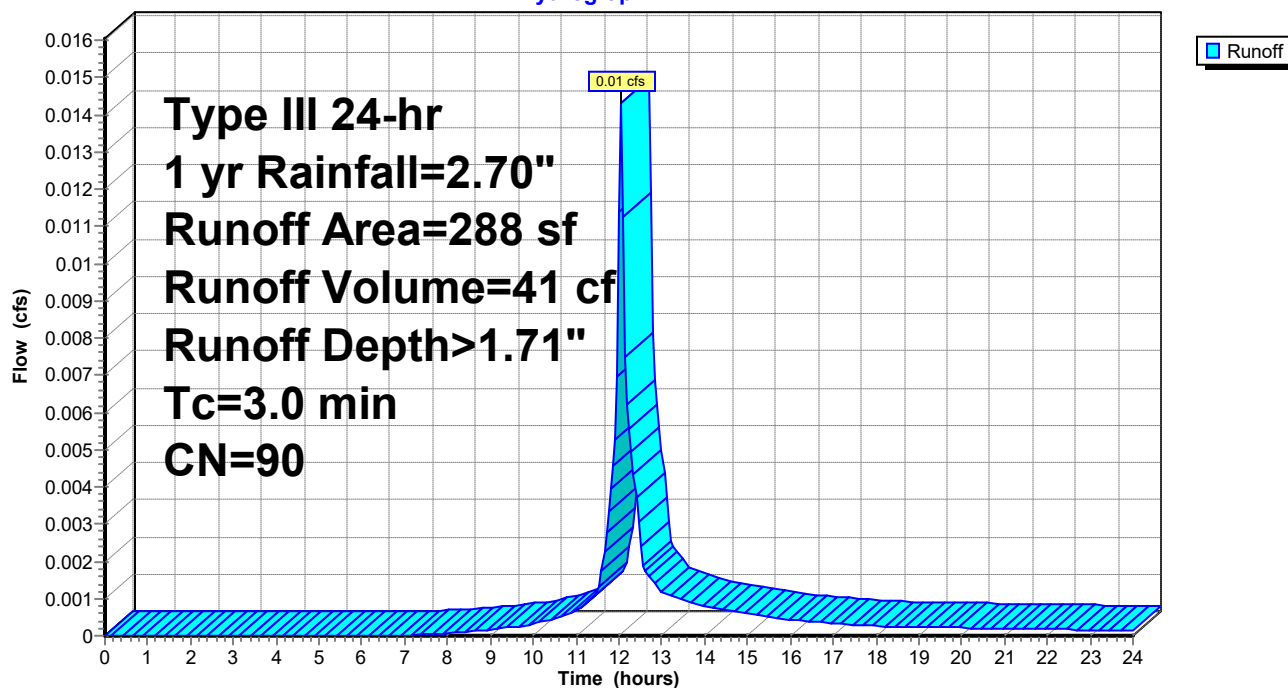
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs  
Type III 24-hr 1 yr Rainfall=2.70"

| Area (sf) | CN | Description                   |
|-----------|----|-------------------------------|
| * 22      | 98 | Ledge                         |
| 266       | 89 | <50% Grass cover, Poor, HSG D |
| 288       | 90 | Weighted Average              |
| 266       |    | 92.36% Pervious Area          |
| 22        |    | 7.64% Impervious Area         |

| Tc (min) | Length (feet) | Slope (ft/ft) | Velocity (ft/sec) | Capacity (cfs) | Description                |
|----------|---------------|---------------|-------------------|----------------|----------------------------|
| 3.0      |               |               |                   |                | Direct Entry, Grassed Area |

### Subcatchment XC3: Existing Conditions Runoff Watershed #3

Hydrograph





**589BedfordSt(01-10-23)\_Exist&PropConditions**

Type III 24-hr 1 yr Rainfall=2.70"

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**Summary for Pond DB1: 24" ADS HDPE Pipe**

Inflow Area = 4,600 sf, 100.00% Impervious, Inflow Depth > 2.47" for 1 yr event  
 Inflow = 0.27 cfs @ 12.09 hrs, Volume= 946 cf  
 Outflow = 0.14 cfs @ 12.22 hrs, Volume= 938 cf, Atten= 48%, Lag= 8.3 min  
 Primary = 0.14 cfs @ 12.22 hrs, Volume= 938 cf  
 Secondary = 0.00 cfs @ 0.00 hrs, Volume= 0 cf

Routing by Stor-Ind method, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs  
 Peak Elev= 24.82' @ 12.22 hrs Surf.Area= 283 sf Storage= 142 cf

Plug-Flow detention time= 16.4 min calculated for 936 cf (99% of inflow)  
 Center-of-Mass det. time= 11.0 min ( 770.6 - 759.7 )

| Volume | Invert | Avail.Storage | Storage Description  |
|--------|--------|---------------|--|
| #1     | 24.00' | 465 cf        | <b>ADS N-12 24" @ 150.00' L</b><br>Inside= 23.8"W x 23.8"H => 3.10 sf x 150.00'L = 465.0 cf<br>Outside= 28.0"W x 28.0"H => 3.92 sf x 150.00'L = 588.2 cf |
| #2     | 22.00' | 28 cf         | <b>2.00'W x 2.00'L x 7.00'H Yard Drain</b>   |
|        |        | 493 cf        | Total Available Storage  |

| Device | Routing   | Invert | Outlet Devices  |
|--------|-----------|--------|---|
| #1     | Secondary | 28.50' | <b>8.0' long Sharp-Crested Rectangular Weir</b> 2 End Contraction(s)        |
| #2     | Primary   | 26.00' | <b>8.0" Horiz. Orifice/Grate</b> C= 0.600 Limited to weir flow at low heads |
| #3     | Primary   | 25.50' | <b>3.0" Vert. Orifice/Grate</b> C= 0.600                                    |
| #4     | Primary   | 24.50' | <b>2.0" Vert. Orifice/Grate</b> C= 0.600                                    |
| #5     | Primary   | 24.00' | <b>2.0" Vert. Orifice/Grate</b> C= 0.600                                    |

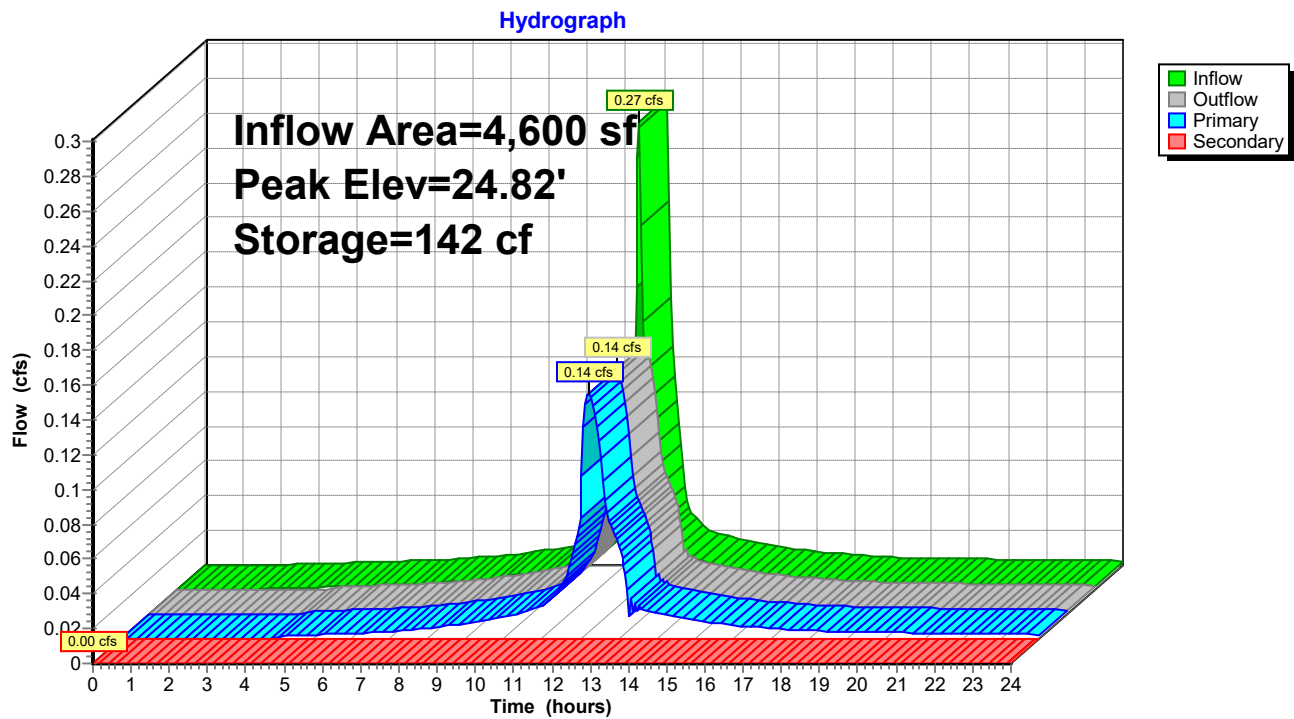
**Primary OutFlow** Max=0.14 cfs @ 12.22 hrs HW=24.81' (Free Discharge)

↑ **2=Orifice/Grate** ( Controls 0.00 cfs)  
 — **3=Orifice/Grate** ( Controls 0.00 cfs)  
 — **4=Orifice/Grate** (Orifice Controls 0.05 cfs @ 2.32 fps)  
 — **5=Orifice/Grate** (Orifice Controls 0.09 cfs @ 4.12 fps)

**Secondary OutFlow** Max=0.00 cfs @ 0.00 hrs HW=22.00' (Free Discharge)

↑ **1=Sharp-Crested Rectangular Weir** ( Controls 0.00 cfs)

Pond DB1: 24" ADS HDPE Pipe



**589BedfordSt(01-10-23)\_Exist&PropConditions**

Type III 24-hr 1 yr Rainfall=2.70"

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**Stage-Area-Storage for Pond DB1: 24" ADS HDPE Pipe**

| Elevation<br>(feet) | Storage<br>(cubic-feet) | Elevation<br>(feet) | Storage<br>(cubic-feet) |
|---------------------|-------------------------|---------------------|-------------------------|
| 22.00               | 0                       | 27.20               | 486                     |
| 22.10               | 0                       | 27.30               | 486                     |
| 22.20               | 1                       | 27.40               | 487                     |
| 22.30               | 1                       | 27.50               | 487                     |
| 22.40               | 2                       | 27.60               | 487                     |
| 22.50               | 2                       | 27.70               | 488                     |
| 22.60               | 2                       | 27.80               | 488                     |
| 22.70               | 3                       | 27.90               | 489                     |
| 22.80               | 3                       | 28.00               | 489                     |
| 22.90               | 4                       | 28.10               | 489                     |
| 23.00               | 4                       | 28.20               | 490                     |
| 23.10               | 4                       | 28.30               | 490                     |
| 23.20               | 5                       | 28.40               | 491                     |
| 23.30               | 5                       | 28.50               | 491                     |
| 23.40               | 6                       | 28.60               | 491                     |
| 23.50               | 6                       | 28.70               | 492                     |
| 23.60               | 6                       | 28.80               | 492                     |
| 23.70               | 7                       | 28.90               | 493                     |
| 23.80               | 7                       | 29.00               | <b>493</b>              |
| 23.90               | 8                       |                     |                         |
| 24.00               | 8                       |                     |                         |
| 24.10               | 8                       |                     |                         |
| 24.20               | 10                      |                     |                         |
| 24.30               | 22                      |                     |                         |
| 24.40               | 39                      |                     |                         |
| 24.50               | 60                      |                     |                         |
| 24.60               | 84                      |                     |                         |
| 24.70               | 110                     |                     |                         |
| 24.80               | 137                     |                     |                         |
| 24.90               | 166                     |                     |                         |
| 25.00               | 195                     |                     |                         |
| 25.10               | 225                     |                     |                         |
| 25.20               | 255                     |                     |                         |
| 25.30               | 285                     |                     |                         |
| 25.40               | 315                     |                     |                         |
| 25.50               | 344                     |                     |                         |
| 25.60               | 372                     |                     |                         |
| 25.70               | 398                     |                     |                         |
| 25.80               | 423                     |                     |                         |
| 25.90               | 445                     |                     |                         |
| 26.00               | 463                     |                     |                         |
| 26.10               | 477                     |                     |                         |
| 26.20               | 482                     |                     |                         |
| 26.30               | 482                     |                     |                         |
| 26.40               | 483                     |                     |                         |
| 26.50               | 483                     |                     |                         |
| 26.60               | 483                     |                     |                         |
| 26.70               | 484                     |                     |                         |
| 26.80               | 484                     |                     |                         |
| 26.90               | 485                     |                     |                         |
| 27.00               | 485                     |                     |                         |
| 27.10               | 485                     |                     |                         |

### Summary for Pond DB2: 24" High precast Concrete Galleries

Inflow Area = 6,574 sf, 77.78% Impervious, Inflow Depth > 2.06" for 1 yr event  
 Inflow = 0.30 cfs @ 12.14 hrs, Volume= 1,127 cf  
 Outflow = 0.41 cfs @ 12.10 hrs, Volume= 854 cf, Atten= 0%, Lag= 0.0 min  
 Primary = 0.41 cfs @ 12.10 hrs, Volume= 854 cf

Routing by Stor-Ind method, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs  
 Peak Elev= 26.06' @ 12.11 hrs Surf.Area= 4 sf Storage= 280 cf

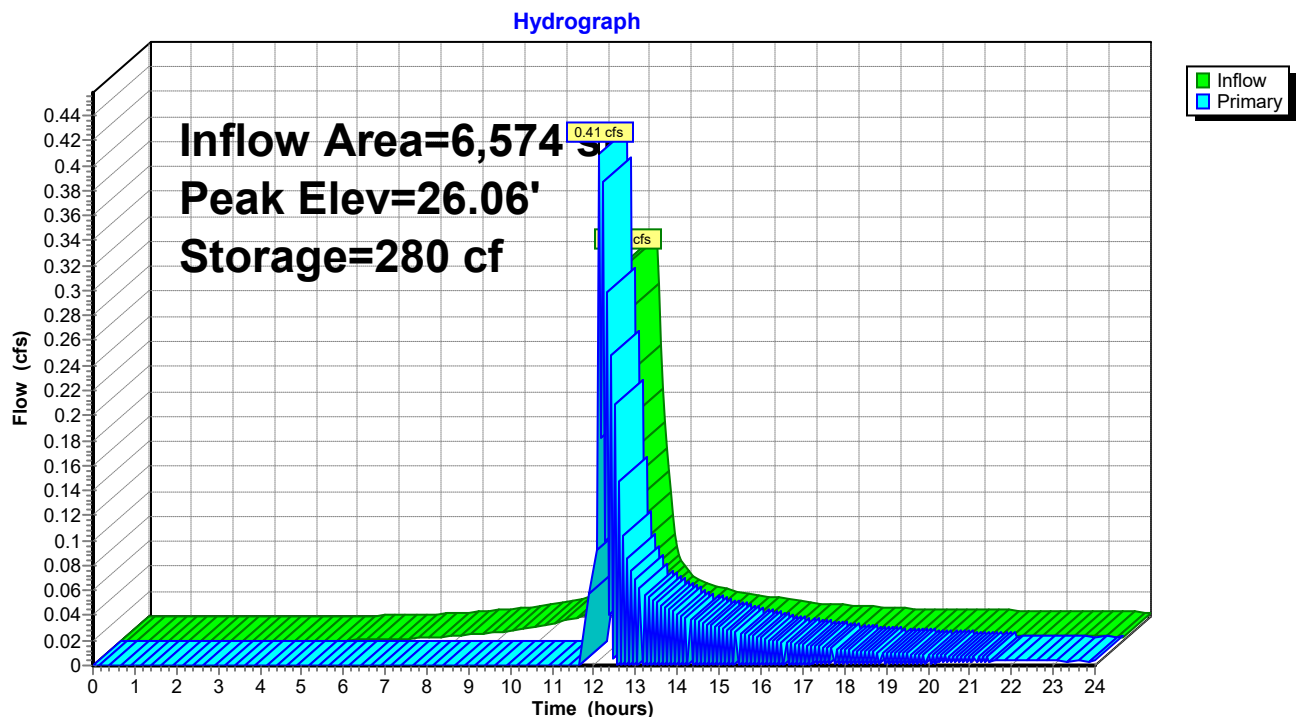
Plug-Flow detention time= 132.9 min calculated for 853 cf (76% of inflow)  
 Center-of-Mass det. time= 51.5 min ( 847.3 - 795.8 )

| Volume | Invert | Avail.Storage | Storage Description   |
|--------|--------|---------------|---|
| #1     | 24.00' | 272 cf        | <b>Concrete Galley 4x8x2 x 6</b><br>Inside= 42.0"W x 21.0"H => 6.04 sf x 7.50'L = 45.3 cf<br>Outside= 48.0"W x 24.0"H => 7.92 sf x 8.00'L = 63.4 cf |
| #2     | 24.00' | 20 cf         | <b>2.00'W x 2.00'L x 5.00'H Yard Drain</b>  |
|        |        | 292 cf        | Total Available Storage   |

| Device | Routing | Invert | Outlet Devices   |
|--------|---------|--------|--|
| #1     | Primary | 26.00' | <b>8.0' long Sharp-Crested Rectangular Weir</b> 2 End Contraction(s) |

**Primary OutFlow** Max=0.37 cfs @ 12.10 hrs HW=26.06' (Free Discharge)  
 ↑1=Sharp-Crested Rectangular Weir (Weir Controls 0.37 cfs @ 0.79 fps)

### Pond DB2: 24" High precast Concrete Galleries



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**Stage-Area-Storage for Pond DB2: 24" High precast Concrete Galleries**

| Elevation<br>(feet) | Storage<br>(cubic-feet) | Elevation<br>(feet) | Storage<br>(cubic-feet) |
|---------------------|-------------------------|---------------------|-------------------------|
| 24.00               | 0                       | 26.60               | 282                     |
| 24.05               | 8                       | 26.65               | 282                     |
| 24.10               | 16                      | 26.70               | 283                     |
| 24.15               | 24                      | 26.75               | 283                     |
| 24.20               | 32                      | 26.80               | 283                     |
| 24.25               | 40                      | 26.85               | 283                     |
| 24.30               | 48                      | 26.90               | 283                     |
| 24.35               | 57                      | 26.95               | 284                     |
| 24.40               | 65                      | 27.00               | 284                     |
| 24.45               | 73                      | 27.05               | 284                     |
| 24.50               | 81                      | 27.10               | 284                     |
| 24.55               | 89                      | 27.15               | 284                     |
| 24.60               | 97                      | 27.20               | 285                     |
| 24.65               | 105                     | 27.25               | 285                     |
| 24.70               | 113                     | 27.30               | 285                     |
| 24.75               | 121                     | 27.35               | 285                     |
| 24.80               | 129                     | 27.40               | 285                     |
| 24.85               | 137                     | 27.45               | 286                     |
| 24.90               | 145                     | 27.50               | 286                     |
| 24.95               | 153                     | 27.55               | 286                     |
| 25.00               | 162                     | 27.60               | 286                     |
| 25.05               | 170                     | 27.65               | 286                     |
| 25.10               | 178                     | 27.70               | 287                     |
| 25.15               | 186                     | 27.75               | 287                     |
| 25.20               | 194                     | 27.80               | 287                     |
| 25.25               | 202                     | 27.85               | 287                     |
| 25.30               | 210                     | 27.90               | 287                     |
| 25.35               | 218                     | 27.95               | 288                     |
| 25.40               | 226                     | 28.00               | 288                     |
| 25.45               | 234                     | 28.05               | 288                     |
| 25.50               | 242                     | 28.10               | 288                     |
| 25.55               | 250                     | 28.15               | 288                     |
| 25.60               | 258                     | 28.20               | 289                     |
| 25.65               | 265                     | 28.25               | 289                     |
| 25.70               | 272                     | 28.30               | 289                     |
| 25.75               | 279                     | 28.35               | 289                     |
| 25.80               | 279                     | 28.40               | 289                     |
| 25.85               | 279                     | 28.45               | 290                     |
| 25.90               | 279                     | 28.50               | 290                     |
| 25.95               | 280                     | 28.55               | 290                     |
| 26.00               | 280                     | 28.60               | 290                     |
| 26.05               | 280                     | 28.65               | 290                     |
| 26.10               | 280                     | 28.70               | 291                     |
| 26.15               | 280                     | 28.75               | 291                     |
| 26.20               | 281                     | 28.80               | 291                     |
| 26.25               | 281                     | 28.85               | 291                     |
| 26.30               | 281                     | 28.90               | 291                     |
| 26.35               | 281                     | 28.95               | 292                     |
| 26.40               | 281                     | 29.00               | <b>292</b>              |
| 26.45               | 282                     |                     |                         |
| 26.50               | 282                     |                     |                         |
| 26.55               | 282                     |                     |                         |

### Summary for Pond PD2: Proposed Depression Watershed #2

Inflow Area = 6,574 sf, 77.78% Impervious, Inflow Depth > 1.56" for 1 yr event  
 Inflow = 0.41 cfs @ 12.10 hrs, Volume= 854 cf  
 Outflow = 0.35 cfs @ 12.15 hrs, Volume= 836 cf, Atten= 15%, Lag= 2.8 min  
 Primary = 0.35 cfs @ 12.15 hrs, Volume= 836 cf

Routing by Stor-Ind method, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs  
 Peak Elev= 26.45' @ 12.15 hrs Surf.Area= 100 sf Storage= 23 cf

Plug-Flow detention time= 14.8 min calculated for 835 cf (98% of inflow)  
 Center-of-Mass det. time= 3.0 min ( 850.3 - 847.3 )

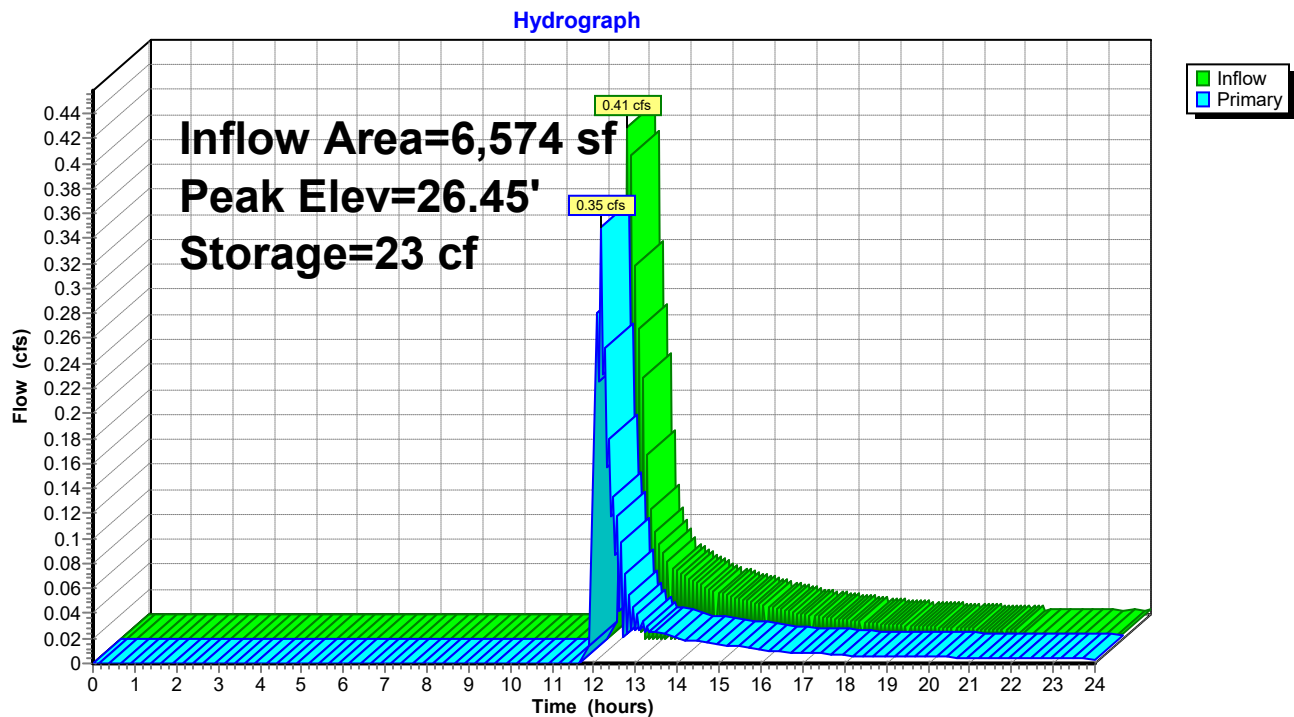
| Volume | Invert | Avail.Storage | Storage Description  |
|--------|--------|---------------|--|
| #1     | 26.00' | 361 cf        | <b>Existing Depression (Prismatic)</b> Listed below (Recalc) |

| Elevation<br>(feet) | Surf.Area<br>(sq-ft) | Inc.Store<br>(cubic-feet) | Cum.Store<br>(cubic-feet) |
|---------------------|----------------------|---------------------------|---------------------------|
| 26.00               | 0                    | 0                         | 0                         |
| 26.50               | 112                  | 28                        | 28                        |
| 27.00               | 1,221                | 333                       | 361                       |

| Device | Routing | Invert | Outlet Devices  |
|--------|---------|--------|---|
| #1     | Primary | 26.40' | <b>10.0' long Sharp-Crested Rectangular Weir</b> 2 End Contraction(s) |

**Primary OutFlow** Max=0.35 cfs @ 12.15 hrs HW=26.45' (Free Discharge)  
 ↑1=Sharp-Crested Rectangular Weir (Weir Controls 0.35 cfs @ 0.72 fps)

Pond PD2: Proposed Depression Watershed #2



**589BedfordSt(01-10-23)\_Exist&PropConditions**

Type III 24-hr 1 yr Rainfall=2.70"

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**Stage-Area-Storage for Pond PD2: Proposed Depression Watershed #2**

| Elevation<br>(feet) | Surface<br>(sq-ft) | Storage<br>(cubic-feet) | Elevation<br>(feet) | Surface<br>(sq-ft) | Storage<br>(cubic-feet) |
|---------------------|--------------------|-------------------------|---------------------|--------------------|-------------------------|
| 26.00               | 0                  | 0                       | 26.52               | 156                | 31                      |
| 26.01               | 2                  | 0                       | 26.53               | 179                | 32                      |
| 26.02               | 4                  | 0                       | 26.54               | 201                | 34                      |
| 26.03               | 7                  | 0                       | 26.55               | 223                | 36                      |
| 26.04               | 9                  | 0                       | 26.56               | 245                | 39                      |
| 26.05               | 11                 | 0                       | 26.57               | 267                | 41                      |
| 26.06               | 13                 | 0                       | 26.58               | 289                | 44                      |
| 26.07               | 16                 | 1                       | 26.59               | 312                | 47                      |
| 26.08               | 18                 | 1                       | 26.60               | 334                | 50                      |
| 26.09               | 20                 | 1                       | 26.61               | 356                | 54                      |
| 26.10               | 22                 | 1                       | 26.62               | 378                | 57                      |
| 26.11               | 25                 | 1                       | 26.63               | 400                | 61                      |
| 26.12               | 27                 | 2                       | 26.64               | 423                | 65                      |
| 26.13               | 29                 | 2                       | 26.65               | 445                | 70                      |
| 26.14               | 31                 | 2                       | 26.66               | 467                | 74                      |
| 26.15               | 34                 | 3                       | 26.67               | 489                | 79                      |
| 26.16               | 36                 | 3                       | 26.68               | 511                | 84                      |
| 26.17               | 38                 | 3                       | 26.69               | 533                | 89                      |
| 26.18               | 40                 | 4                       | 26.70               | 556                | 95                      |
| 26.19               | 43                 | 4                       | 26.71               | 578                | 100                     |
| 26.20               | 45                 | 4                       | 26.72               | 600                | 106                     |
| 26.21               | 47                 | 5                       | 26.73               | 622                | 112                     |
| 26.22               | 49                 | 5                       | 26.74               | 644                | 119                     |
| 26.23               | 52                 | 6                       | 26.75               | 667                | 125                     |
| 26.24               | 54                 | 6                       | 26.76               | 689                | 132                     |
| 26.25               | 56                 | 7                       | 26.77               | 711                | 139                     |
| 26.26               | 58                 | 8                       | 26.78               | 733                | 146                     |
| 26.27               | 60                 | 8                       | 26.79               | 755                | 154                     |
| 26.28               | 63                 | 9                       | 26.80               | 777                | 161                     |
| 26.29               | 65                 | 9                       | 26.81               | 800                | 169                     |
| 26.30               | 67                 | 10                      | 26.82               | 822                | 177                     |
| 26.31               | 69                 | 11                      | 26.83               | 844                | 186                     |
| 26.32               | 72                 | 11                      | 26.84               | 866                | 194                     |
| 26.33               | 74                 | 12                      | 26.85               | 888                | 203                     |
| 26.34               | 76                 | 13                      | 26.86               | 910                | 212                     |
| 26.35               | 78                 | 14                      | 26.87               | 933                | 221                     |
| 26.36               | 81                 | 15                      | 26.88               | 955                | 231                     |
| 26.37               | 83                 | 15                      | 26.89               | 977                | 240                     |
| 26.38               | 85                 | 16                      | 26.90               | 999                | 250                     |
| 26.39               | 87                 | 17                      | 26.91               | 1,021              | 260                     |
| 26.40               | 90                 | 18                      | 26.92               | 1,044              | 271                     |
| 26.41               | 92                 | 19                      | 26.93               | 1,066              | 281                     |
| 26.42               | 94                 | 20                      | 26.94               | 1,088              | 292                     |
| 26.43               | 96                 | 21                      | 26.95               | 1,110              | 303                     |
| 26.44               | 99                 | 22                      | 26.96               | 1,132              | 314                     |
| 26.45               | 101                | 23                      | 26.97               | 1,154              | 326                     |
| 26.46               | 103                | 24                      | 26.98               | 1,177              | 337                     |
| 26.47               | 105                | 25                      | 26.99               | 1,199              | 349                     |
| 26.48               | 108                | 26                      | 27.00               | <b>1,221</b>       | <b>361</b>              |
| 26.49               | 110                | 27                      |                     |                    |                         |
| 26.50               | 112                | 28                      |                     |                    |                         |
| 26.51               | 134                | 29                      |                     |                    |                         |



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Type III 24-hr 1 yr Rainfall=2.70"

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**Summary for Pond XD2: Existing Depression Watershed #2**

Inflow Area = 7,891 sf, 83.56% Impervious, Inflow Depth > 2.36" for 1 yr event  
 Inflow = 0.46 cfs @ 12.08 hrs, Volume= 1,552 cf  
 Outflow = 0.46 cfs @ 12.09 hrs, Volume= 1,507 cf, Atten= 0%, Lag= 0.4 min  
 Primary = 0.46 cfs @ 12.09 hrs, Volume= 1,507 cf

Routing by Stor-Ind method, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs  
 Peak Elev= 26.46' @ 12.09 hrs Surf.Area= 228 sf Storage= 57 cf

Plug-Flow detention time= 30.8 min calculated for 1,507 cf (97% of inflow)  
 Center-of-Mass det. time= 13.5 min ( 783.3 - 769.8 )

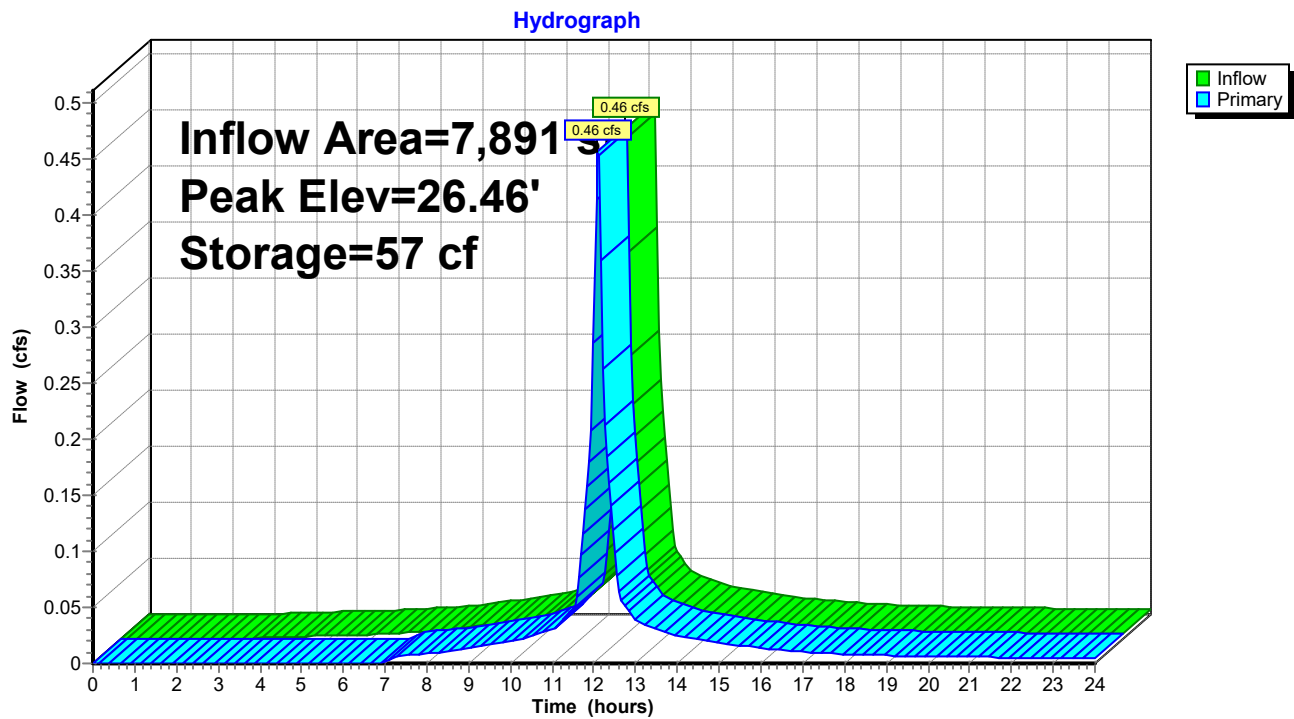
| Volume | Invert | Avail.Storage | Storage Description  |
|--------|--------|---------------|--|
| #1     | 25.92' | 365 cf        | <b>Existing Depression (Prismatic)</b> Listed below (Recalc) |

| Elevation<br>(feet) | Surf.Area<br>(sq-ft) | Inc.Store<br>(cubic-feet) | Cum.Store<br>(cubic-feet) |
|---------------------|----------------------|---------------------------|---------------------------|
| 25.92               | 0                    | 0                         | 0                         |
| 26.00               | 17                   | 1                         | 1                         |
| 26.50               | 247                  | 66                        | 67                        |
| 27.00               | 948                  | 299                       | 365                       |

| Device | Routing | Invert | Outlet Devices  |
|--------|---------|--------|---|
| #1     | Primary | 26.40' | <b>10.0' long Sharp-Crested Rectangular Weir</b> 2 End Contraction(s) |

**Primary OutFlow** Max=0.44 cfs @ 12.09 hrs HW=26.46' (Free Discharge)  
 ↑ **1=Sharp-Crested Rectangular Weir** (Weir Controls 0.44 cfs @ 0.78 fps)

Pond XD2: Existing Depression Watershed #2



**589BedfordSt(01-10-23)\_Exist&PropConditions***Type III 24-hr 1 yr Rainfall=2.70"*

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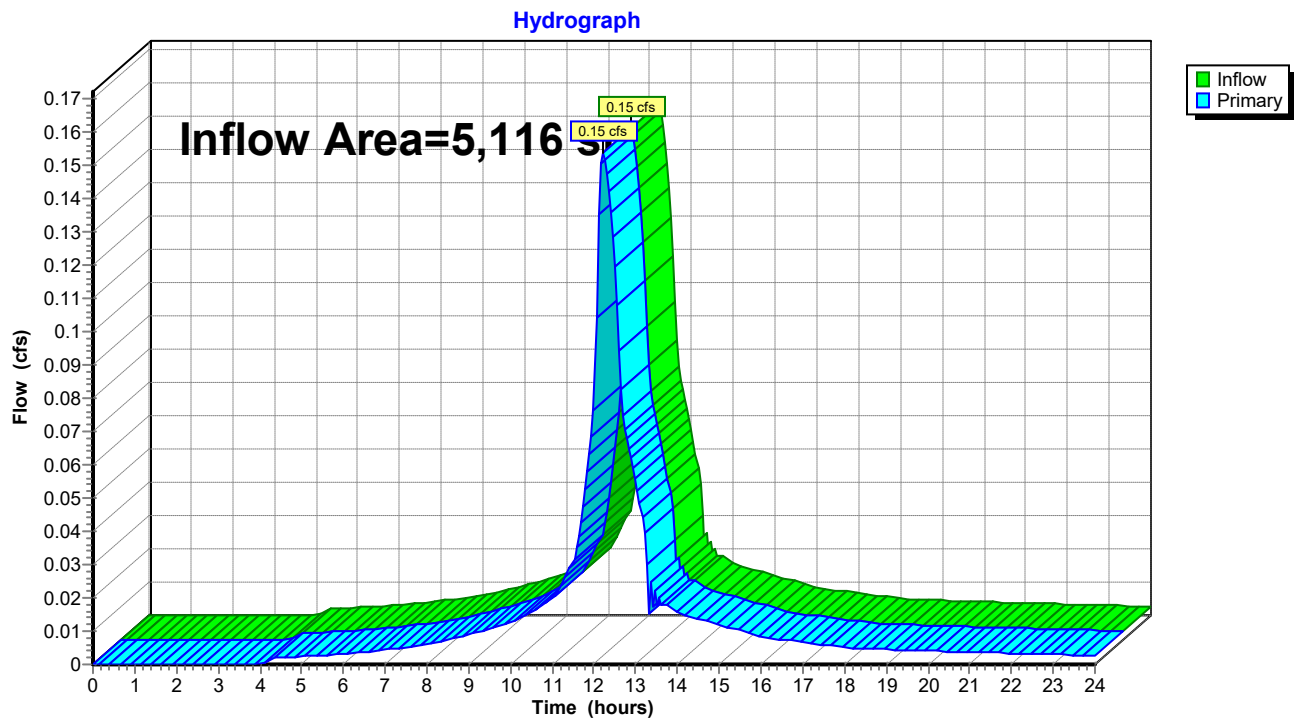
**Stage-Area-Storage for Pond XD2: Existing Depression Watershed #2**

| Elevation<br>(feet) | Surface<br>(sq-ft) | Storage<br>(cubic-feet) | Elevation<br>(feet) | Surface<br>(sq-ft) | Storage<br>(cubic-feet) |
|---------------------|--------------------|-------------------------|---------------------|--------------------|-------------------------|
| 25.92               | 0                  | 0                       | 26.96               | 892                | 329                     |
| 25.94               | 4                  | 0                       | 26.98               | 920                | 347                     |
| 25.96               | 9                  | 0                       | 27.00               | <b>948</b>         | <b>365</b>              |
| 25.98               | 13                 | 0                       |                     |                    |                         |
| 26.00               | 17                 | 1                       |                     |                    |                         |
| 26.02               | 26                 | 1                       |                     |                    |                         |
| 26.04               | 35                 | 2                       |                     |                    |                         |
| 26.06               | 45                 | 3                       |                     |                    |                         |
| 26.08               | 54                 | 4                       |                     |                    |                         |
| 26.10               | 63                 | 5                       |                     |                    |                         |
| 26.12               | 72                 | 6                       |                     |                    |                         |
| 26.14               | 81                 | 8                       |                     |                    |                         |
| 26.16               | 91                 | 9                       |                     |                    |                         |
| 26.18               | 100                | 11                      |                     |                    |                         |
| 26.20               | 109                | 13                      |                     |                    |                         |
| 26.22               | 118                | 16                      |                     |                    |                         |
| 26.24               | 127                | 18                      |                     |                    |                         |
| 26.26               | 137                | 21                      |                     |                    |                         |
| 26.28               | 146                | 23                      |                     |                    |                         |
| 26.30               | 155                | 26                      |                     |                    |                         |
| 26.32               | 164                | 30                      |                     |                    |                         |
| 26.34               | 173                | 33                      |                     |                    |                         |
| 26.36               | 183                | 37                      |                     |                    |                         |
| 26.38               | 192                | 40                      |                     |                    |                         |
| 26.40               | 201                | 44                      |                     |                    |                         |
| 26.42               | 210                | 48                      |                     |                    |                         |
| 26.44               | 219                | 53                      |                     |                    |                         |
| 26.46               | 229                | 57                      |                     |                    |                         |
| 26.48               | 238                | 62                      |                     |                    |                         |
| 26.50               | 247                | 67                      |                     |                    |                         |
| 26.52               | 275                | 72                      |                     |                    |                         |
| 26.54               | 303                | 78                      |                     |                    |                         |
| 26.56               | 331                | 84                      |                     |                    |                         |
| 26.58               | 359                | 91                      |                     |                    |                         |
| 26.60               | 387                | 98                      |                     |                    |                         |
| 26.62               | 415                | 106                     |                     |                    |                         |
| 26.64               | 443                | 115                     |                     |                    |                         |
| 26.66               | 471                | 124                     |                     |                    |                         |
| 26.68               | 499                | 134                     |                     |                    |                         |
| 26.70               | 527                | 144                     |                     |                    |                         |
| 26.72               | 555                | 155                     |                     |                    |                         |
| 26.74               | 583                | 166                     |                     |                    |                         |
| 26.76               | 612                | 178                     |                     |                    |                         |
| 26.78               | 640                | 191                     |                     |                    |                         |
| 26.80               | 668                | 204                     |                     |                    |                         |
| 26.82               | 696                | 218                     |                     |                    |                         |
| 26.84               | 724                | 232                     |                     |                    |                         |
| 26.86               | 752                | 246                     |                     |                    |                         |
| 26.88               | 780                | 262                     |                     |                    |                         |
| 26.90               | 808                | 278                     |                     |                    |                         |
| 26.92               | 836                | 294                     |                     |                    |                         |
| 26.94               | 864                | 311                     |                     |                    |                         |

**Summary for Link OR1: Overall Runoff Watershed #1**

Inflow Area = 5,116 sf, 92.36% Impervious, Inflow Depth > 2.33" for 1 yr event  
Inflow = 0.15 cfs @ 12.20 hrs, Volume= 993 cf  
Primary = 0.15 cfs @ 12.20 hrs, Volume= 993 cf, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs

**Link OR1: Overall Runoff Watershed #1**

**589BedfordSt(01-10-23)\_Exist&PropConditions**

Type III 24-hr 2 yr Rainfall=3.50"

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Time span=0.00-24.00 hrs, dt=0.05 hrs, 481 points  
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN  
Reach routing by Stor-Ind+Trans method - Pond routing by Stor-Ind method

**Subcatchment PA1: Impervious Area #1 to** Runoff Area=4,600 sf 100.00% Impervious Runoff Depth>3.26"  
Tc=6.0 min CN=98 Runoff=0.35 cfs 1,251 cf

**Subcatchment PA2: Impervious Area #2 to** Runoff Area=6,574 sf 77.78% Impervious Runoff Depth>2.83"  
Flow Length=174' Tc=10.2 min CN=94 Runoff=0.41 cfs 1,551 cf

**Subcatchment PB1: Proposed Bypass Area** Runoff Area=516 sf 24.22% Impervious Runoff Depth>1.93"  
Flow Length=91' Slope=0.0165 '/' Tc=9.7 min CN=84 Runoff=0.02 cfs 83 cf

**Subcatchment PC3: Proposed Conditions** Runoff Area=117 sf 0.00% Impervious Runoff Depth>1.64"  
Tc=3.0 min CN=80 Runoff=0.01 cfs 16 cf

**Subcatchment XC1: Existing Conditions** Runoff Area=3,628 sf 16.10% Impervious Runoff Depth>2.44"  
Flow Length=90' Slope=0.0167 '/' Tc=9.5 min CN=90 Runoff=0.21 cfs 739 cf

**Subcatchment XC2: Existing Runoff to** Runoff Area=7,891 sf 83.56% Impervious Runoff Depth>3.15"  
Flow Length=146' Tc=5.7 min CN=97 Runoff=0.60 cfs 2,073 cf

**Subcatchment XC3: Existing Conditions** Runoff Area=288 sf 7.64% Impervious Runoff Depth>2.45"  
Tc=3.0 min CN=90 Runoff=0.02 cfs 59 cf

**Pond DB1: 24" ADS HDPE Pipe** Peak Elev=25.02' Storage=200 cf Inflow=0.35 cfs 1,251 cf  
Primary=0.17 cfs 1,243 cf Secondary=0.00 cfs 0 cf Outflow=0.17 cfs 1,243 cf

**Pond DB2: 24" High precast Concrete Galleries** Peak Elev=26.06' Storage=280 cf Inflow=0.41 cfs 1,551 cf  
Outflow=0.40 cfs 1,272 cf

**Pond PD2: Proposed Depression Watershed #2** Peak Elev=26.45' Storage=23 cf Inflow=0.40 cfs 1,272 cf  
Outflow=0.41 cfs 1,253 cf

**Pond XD2: Existing Depression Watershed #2** Peak Elev=26.47' Storage=59 cf Inflow=0.60 cfs 2,073 cf  
Outflow=0.60 cfs 2,028 cf

**Link OR1: Overall Runoff Watershed #1** Inflow=0.19 cfs 1,326 cf  
Primary=0.19 cfs 1,326 cf

**589BedfordSt(01-10-23)\_Exist&PropConditions***Type III 24-hr 5 yr Rainfall=4.20"*

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Time span=0.00-24.00 hrs, dt=0.05 hrs, 481 points  
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN  
Reach routing by Stor-Ind+Trans method - Pond routing by Stor-Ind method

**Subcatchment PA1: Impervious Area #1 to** Runoff Area=4,600 sf 100.00% Impervious Runoff Depth>3.96"  
Tc=6.0 min CN=98 Runoff=0.42 cfs 1,519 cf

**Subcatchment PA2: Impervious Area #2 to** Runoff Area=6,574 sf 77.78% Impervious Runoff Depth>3.52"  
Flow Length=174' Tc=10.2 min CN=94 Runoff=0.50 cfs 1,926 cf

**Subcatchment PB1: Proposed Bypass Area** Runoff Area=516 sf 24.22% Impervious Runoff Depth>2.54"  
Flow Length=91' Slope=0.0165 '/' Tc=9.7 min CN=84 Runoff=0.03 cfs 109 cf

**Subcatchment PC3: Proposed Conditions** Runoff Area=117 sf 0.00% Impervious Runoff Depth>2.21"  
Tc=3.0 min CN=80 Runoff=0.01 cfs 22 cf

**Subcatchment XC1: Existing Conditions** Runoff Area=3,628 sf 16.10% Impervious Runoff Depth>3.11"  
Flow Length=90' Slope=0.0167 '/' Tc=9.5 min CN=90 Runoff=0.26 cfs 939 cf

**Subcatchment XC2: Existing Runoff to** Runoff Area=7,891 sf 83.56% Impervious Runoff Depth>3.85"  
Flow Length=146' Tc=5.7 min CN=97 Runoff=0.72 cfs 2,530 cf

**Subcatchment XC3: Existing Conditions** Runoff Area=288 sf 7.64% Impervious Runoff Depth>3.11"  
Tc=3.0 min CN=90 Runoff=0.03 cfs 75 cf

**Pond DB1: 24" ADS HDPE Pipe** Peak Elev=25.20' Storage=254 cf Inflow=0.42 cfs 1,519 cf  
Primary=0.19 cfs 1,511 cf Secondary=0.00 cfs 0 cf Outflow=0.19 cfs 1,511 cf

**Pond DB2: 24" High precast Concrete Galleries** Peak Elev=26.07' Storage=280 cf Inflow=0.50 cfs 1,926 cf  
Outflow=0.51 cfs 1,646 cf

**Pond PD2: Proposed Depression Watershed #2** Peak Elev=26.46' Storage=24 cf Inflow=0.51 cfs 1,646 cf  
Outflow=0.50 cfs 1,628 cf

**Pond XD2: Existing Depression Watershed #2** Peak Elev=26.48' Storage=62 cf Inflow=0.72 cfs 2,530 cf  
Outflow=0.73 cfs 2,486 cf

**Link OR1: Overall Runoff Watershed #1** Inflow=0.22 cfs 1,620 cf  
Primary=0.22 cfs 1,620 cf

**589BedfordSt(01-10-23)\_Exist&PropConditions**

Type III 24-hr 10 yr Rainfall=5.00"

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Time span=0.00-24.00 hrs, dt=0.05 hrs, 481 points  
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN  
Reach routing by Stor-Ind+Trans method - Pond routing by Stor-Ind method

**Subcatchment PA1: Impervious Area #1 to** Runoff Area=4,600 sf 100.00% Impervious Runoff Depth>4.76"  
Tc=6.0 min CN=98 Runoff=0.50 cfs 1,825 cf

**Subcatchment PA2: Impervious Area #2 to** Runoff Area=6,574 sf 77.78% Impervious Runoff Depth>4.30"  
Flow Length=174' Tc=10.2 min CN=94 Runoff=0.61 cfs 2,357 cf

**Subcatchment PB1: Proposed Bypass Area** Runoff Area=516 sf 24.22% Impervious Runoff Depth>3.27"  
Flow Length=91' Slope=0.0165 '/' Tc=9.7 min CN=84 Runoff=0.04 cfs 140 cf

**Subcatchment PC3: Proposed Conditions** Runoff Area=117 sf 0.00% Impervious Runoff Depth>2.89"  
Tc=3.0 min CN=80 Runoff=0.01 cfs 28 cf

**Subcatchment XC1: Existing Conditions** Runoff Area=3,628 sf 16.10% Impervious Runoff Depth>3.87"  
Flow Length=90' Slope=0.0167 '/' Tc=9.5 min CN=90 Runoff=0.32 cfs 1,170 cf

**Subcatchment XC2: Existing Runoff to** Runoff Area=7,891 sf 83.56% Impervious Runoff Depth>4.64"  
Flow Length=146' Tc=5.7 min CN=97 Runoff=0.86 cfs 3,054 cf

**Subcatchment XC3: Existing Conditions** Runoff Area=288 sf 7.64% Impervious Runoff Depth>3.88"  
Tc=3.0 min CN=90 Runoff=0.03 cfs 93 cf

**Pond DB1: 24" ADS HDPE Pipe** Peak Elev=25.42' Storage=321 cf Inflow=0.50 cfs 1,825 cf  
Primary=0.22 cfs 1,817 cf Secondary=0.00 cfs 0 cf Outflow=0.22 cfs 1,817 cf

**Pond DB2: 24" High precast Concrete Galleries** Peak Elev=26.08' Storage=280 cf Inflow=0.61 cfs 2,357 cf  
Outflow=0.63 cfs 2,077 cf

**Pond PD2: Proposed Depression Watershed #2** Peak Elev=26.47' Storage=25 cf Inflow=0.63 cfs 2,077 cf  
Outflow=0.61 cfs 2,059 cf

**Pond XD2: Existing Depression Watershed #2** Peak Elev=26.49' Storage=64 cf Inflow=0.86 cfs 3,054 cf  
Outflow=0.87 cfs 3,009 cf

**Link OR1: Overall Runoff Watershed #1** Inflow=0.25 cfs 1,957 cf  
Primary=0.25 cfs 1,957 cf

**589BedfordSt(01-10-23)\_Exist&PropConditions**

Type III 24-hr 25 yr Rainfall=6.40"

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Time span=0.00-24.00 hrs, dt=0.05 hrs, 481 points  
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN  
Reach routing by Stor-Ind+Trans method - Pond routing by Stor-Ind method

**Subcatchment PA1: Impervious Area #1 to** Runoff Area=4,600 sf 100.00% Impervious Runoff Depth>6.16"  
Tc=6.0 min CN=98 Runoff=0.65 cfs 2,360 cf

**Subcatchment PA2: Impervious Area #2 to** Runoff Area=6,574 sf 77.78% Impervious Runoff Depth>5.69"  
Flow Length=174' Tc=10.2 min CN=94 Runoff=0.79 cfs 3,115 cf

**Subcatchment PB1: Proposed Bypass Area** Runoff Area=516 sf 24.22% Impervious Runoff Depth>4.57"  
Flow Length=91' Slope=0.0165 '/' Tc=9.7 min CN=84 Runoff=0.05 cfs 196 cf

**Subcatchment PC3: Proposed Conditions** Runoff Area=117 sf 0.00% Impervious Runoff Depth>4.14"  
Tc=3.0 min CN=80 Runoff=0.01 cfs 40 cf

**Subcatchment XC1: Existing Conditions** Runoff Area=3,628 sf 16.10% Impervious Runoff Depth>5.23"  
Flow Length=90' Slope=0.0167 '/' Tc=9.5 min CN=90 Runoff=0.42 cfs 1,581 cf

**Subcatchment XC2: Existing Runoff to** Runoff Area=7,891 sf 83.56% Impervious Runoff Depth>6.04"  
Flow Length=146' Tc=5.7 min CN=97 Runoff=1.11 cfs 3,972 cf

**Subcatchment XC3: Existing Conditions** Runoff Area=288 sf 7.64% Impervious Runoff Depth>5.23"  
Tc=3.0 min CN=90 Runoff=0.04 cfs 126 cf

**Pond DB1: 24" ADS HDPE Pipe** Peak Elev=25.76' Storage=412 cf Inflow=0.65 cfs 2,360 cf  
Primary=0.33 cfs 2,352 cf Secondary=0.00 cfs 0 cf Outflow=0.33 cfs 2,352 cf

**Pond DB2: 24" High precast Concrete Galleries** Peak Elev=26.10' Storage=280 cf Inflow=0.79 cfs 3,115 cf  
Outflow=0.78 cfs 2,835 cf

**Pond PD2: Proposed Depression Watershed #2** Peak Elev=26.48' Storage=26 cf Inflow=0.78 cfs 2,835 cf  
Outflow=0.80 cfs 2,817 cf

**Pond XD2: Existing Depression Watershed #2** Peak Elev=26.51' Storage=68 cf Inflow=1.11 cfs 3,972 cf  
Outflow=1.12 cfs 3,927 cf

**Link OR1: Overall Runoff Watershed #1** Inflow=0.38 cfs 2,549 cf  
Primary=0.38 cfs 2,549 cf



**589BedfordSt(01-10-23)\_Exist&PropConditions**

Type III 24-hr 50 yr Rainfall=7.30"

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Time span=0.00-24.00 hrs, dt=0.05 hrs, 481 points  
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN  
Reach routing by Stor-Ind+Trans method - Pond routing by Stor-Ind method

**Subcatchment PA1: Impervious Area #1 to** Runoff Area=4,600 sf 100.00% Impervious Runoff Depth>7.06"  
Tc=6.0 min CN=98 Runoff=0.74 cfs 2,705 cf

**Subcatchment PA2: Impervious Area #2 to** Runoff Area=6,574 sf 77.78% Impervious Runoff Depth>6.58"  
Flow Length=174' Tc=10.2 min CN=94 Runoff=0.91 cfs 3,604 cf

**Subcatchment PB1: Proposed Bypass Area** Runoff Area=516 sf 24.22% Impervious Runoff Depth>5.42"  
Flow Length=91' Slope=0.0165 '/' Tc=9.7 min CN=84 Runoff=0.06 cfs 233 cf

**Subcatchment PC3: Proposed Conditions** Runoff Area=117 sf 0.00% Impervious Runoff Depth>4.97"  
Tc=3.0 min CN=80 Runoff=0.02 cfs 48 cf

**Subcatchment XC1: Existing Conditions** Runoff Area=3,628 sf 16.10% Impervious Runoff Depth>6.11"  
Flow Length=90' Slope=0.0167 '/' Tc=9.5 min CN=90 Runoff=0.49 cfs 1,847 cf

**Subcatchment XC2: Existing Runoff to** Runoff Area=7,891 sf 83.56% Impervious Runoff Depth>6.94"  
Flow Length=146' Tc=5.7 min CN=97 Runoff=1.27 cfs 4,562 cf

**Subcatchment XC3: Existing Conditions** Runoff Area=288 sf 7.64% Impervious Runoff Depth>6.12"  
Tc=3.0 min CN=90 Runoff=0.05 cfs 147 cf

**Pond DB1: 24" ADS HDPE Pipe** Peak Elev=25.99' Storage=462 cf Inflow=0.74 cfs 2,705 cf  
Primary=0.41 cfs 2,697 cf Secondary=0.00 cfs 0 cf Outflow=0.41 cfs 2,697 cf

**Pond DB2: 24" High precast Concrete Galleries** Peak Elev=26.11' Storage=280 cf Inflow=0.91 cfs 3,604 cf  
Outflow=0.90 cfs 3,324 cf

**Pond PD2: Proposed Depression Watershed #2** Peak Elev=26.49' Storage=27 cf Inflow=0.90 cfs 3,324 cf  
Outflow=0.91 cfs 3,306 cf

**Pond XD2: Existing Depression Watershed #2** Peak Elev=26.52' Storage=71 cf Inflow=1.27 cfs 4,562 cf  
Outflow=1.27 cfs 4,517 cf

**Link OR1: Overall Runoff Watershed #1** Inflow=0.47 cfs 2,930 cf  
Primary=0.47 cfs 2,930 cf

Directly Connected Impervious Area Tracking Worksheet  
City of Stamford Drainage Manual



**Note to user: complete all cells of this color only, as indicated by section headings**

**Part 1: General Information (All Projects)**

|                       |                         |
|-----------------------|-------------------------|
| Project Name          | 589 Bedford             |
| Project Address       | 589 Bedford Street      |
| Project Applicant     | Bedford Properties, LLC |
| Title of Plan         | Site Development Plan   |
| Revision Date of Plan | 8-Mar-23                |
| Tax Account Number    | 001-4057                |

**Part 2: Project Details (All Projects)**

|   |   |                 |
|---|---|-----------------|
| 1. What type of development is this? (choose from dropdown)   | Redevelopment                                 |                 |
| 2. What is the total area of the project site?  | 11,807  | ft <sup>2</sup> |
| 3. What is the total area of land disturbance for this project?   | 11,807  | ft <sup>2</sup> |
| 4. Does project site drain to High Quality Waters, a Direct Waterfront, or within 500 ft. of Tidal Wetlands? (Yes/No) | No  |                 |
| Does Standard 1 apply based on information above?   | No, You Are Done. Do NOT do Parts 3, 4, and 5 |                 |

**Part 3: Water Quality Target Total (Only for Standard 1 Projects)**

|   |     |                 |
|---|-----|-----------------|
| 5. What is the <u>current</u> (pre-development) <b>DCIA</b> for the site?   |     | ft <sup>2</sup> |
| 6. Will the proposed development increase <b>DCIA</b> (without consideration of proposed stormwater management)? (Yes/No) | Yes |                 |
| 7. What is the <u>proposed-development</u> <b>total impervious area</b> for the site?                                     |     | ft <sup>2</sup> |
| Water Quality Volume (WQV)  | N/A | ft <sup>3</sup> |
| Standard 1 requirement  | N/A |                 |
| Required treatment/retention volume   | N/A | ft <sup>3</sup> |
| Provided treatment/retention volume for proposed development  |     | ft <sup>3</sup> |

**Part 4: Proposed DCIA Tracking (Only for Standard 1 Projects)**


|  |  |                 |
|--|--|-----------------|
| <u>Pre-development</u> <b>total impervious area</b>                          |  | ft <sup>2</sup> |
| <u>Current</u> <b>DCIA</b>   |  | ft <sup>2</sup> |
| <u>Proposed-development</u> <b>total impervious area</b>                     |  | ft <sup>2</sup> |
| <u>Proposed-development</u> <b>DCIA</b> (after stormwater management)        |  | ft <sup>2</sup> |
| Net change in <b>DCIA</b> from <u>current</u> to <u>proposed-development</u> |  | ft <sup>2</sup> |

**Part 5: Post-Development (As-Built Certified) DCIA Tracking (Only for Standard 1 Projects)**

|  |  |                 |
|--|--|-----------------|
| <u>Post-development</u> (per as-built) <b>total impervious area</b>              |  | ft <sup>2</sup> |
| <u>Post-development</u> (per as-built) <b>DCIA</b> (after stormwater management) |  | ft <sup>2</sup> |
| Net change in <b>DCIA</b> from <u>current</u> to <u>post-development</u>         |  | ft <sup>2</sup> |

**Certification Statement**

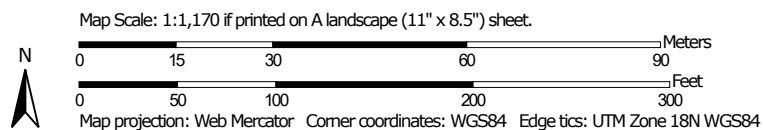
I hereby certify that the information contained in this worksheet is true and correct.

Engineer's Signature J. Herito ate 03/08/2023 Engineer's Seal 

# Hydrologic Soil Group—State of Connecticut (589 Bedford Street WSS)



Soil Map may not be valid at this scale.



Natural Resources  
Conservation Service

Web Soil Survey  
National Cooperative Soil Survey

3/7/2023  
Page 1 of 4

## Hydrologic Soil Group

| Map unit symbol                    | Map unit name | Rating | Acres in AOI | Percent of AOI |
|------------------------------------|---------------|--------|--------------|----------------|
| 307                                | Urban land    | D      | 6.6          | 100.0%         |
| <b>Totals for Area of Interest</b> |               |        | <b>6.6</b>   | <b>100.0%</b>  |

## Description

Hydrologic soil groups are based on estimates of runoff potential. Soils are assigned to one of four groups according to the rate of water infiltration when the soils are not protected by vegetation, are thoroughly wet, and receive precipitation from long-duration storms.

The soils in the United States are assigned to four groups (A, B, C, and D) and three dual classes (A/D, B/D, and C/D). The groups are defined as follows:

Group A. Soils having a high infiltration rate (low runoff potential) when thoroughly wet. These consist mainly of deep, well drained to excessively drained sands or gravelly sands. These soils have a high rate of water transmission.

Group B. Soils having a moderate infiltration rate when thoroughly wet. These consist chiefly of moderately deep or deep, moderately well drained or well drained soils that have moderately fine texture to moderately coarse texture. These soils have a moderate rate of water transmission.

Group C. Soils having a slow infiltration rate when thoroughly wet. These consist chiefly of soils having a layer that impedes the downward movement of water or soils of moderately fine texture or fine texture. These soils have a slow rate of water transmission.

Group D. Soils having a very slow infiltration rate (high runoff potential) when thoroughly wet. These consist chiefly of clays that have a high shrink-swell potential, soils that have a high water table, soils that have a claypan or clay layer at or near the surface, and soils that are shallow over nearly impervious material. These soils have a very slow rate of water transmission.

If a soil is assigned to a dual hydrologic group (A/D, B/D, or C/D), the first letter is for drained areas and the second is for undrained areas. Only the soils that in their natural condition are in group D are assigned to dual classes.

## Rating Options

*Aggregation Method:* Dominant Condition

*Component Percent Cutoff:* None Specified