

# **STORMWATER DRAINAGE DESIGN REPORT**

For:

**NORTH AMHERST FIRE HALL  
2200 Tonawanda Creek Road  
Amherst, New York 14228  
T3 Job # 26-020**

July 13, 2026



## **studio T3**

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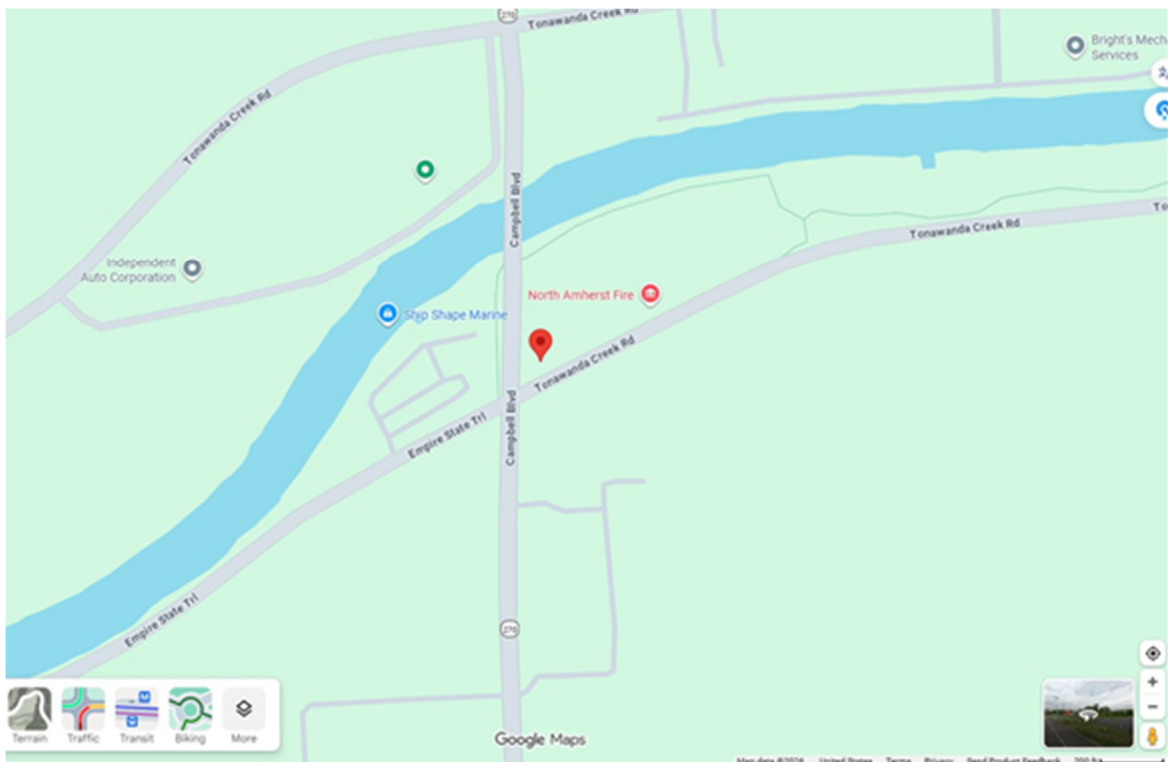
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### **Stormwater Management Summary:**

The proposed development is a new one-story 4,800-square-foot fire apparatus storage building for accessory use adjacent to the existing fire hall (North Amherst). Adjacent driveway and parking lot construction, site re-grading, utility connections, drainage structures, landscaping, and temporary and permanent erosion control devices shall also be added. The 10.49-acre parcel is zoned "CF" (Community Facilities) and is located at the northeastern corner of the intersection of Tonawanda Creek Road and Campbell Boulevard in the Town of Amherst, New York (see Site Location Map below). This design report is intended to be submitted with Site Plan drawings entitled "North Amherst Fire Hall" as prepared by Studio T3 Engineering, PLLC.

The proposed site drainage plan includes the addition of new catch basins, new roof drains, new storm sewers, new landscaping, and a new grass detention basin. These have been designed in order to:

- Efficiently collect runoff from impervious areas and discharge it quickly to alleviate the threat of flooding and nuisance insects;
- Minimize erosion and sedimentation on the proposed site to prevent degradation of water quality in downstream waters receiving discharged runoff;
- Reduce the peak rate of stormwater runoff discharging from the proposed site so that it is less than or equal to the rate of runoff discharging from the existing site



**SITE LOCATION MAP**

### **Town of Amherst Criteria**

- **Reduce 25-year peak outflow from post-developed site to be less than or equal to the 10-year peak outflow from the pre-developed site**
- 10-year peak outflow from pre-developed site = 6.79 CFS
- 25- year peak outflow from post-developed site = **4.03 CFS**
  
- **Provide enough detention volume on site to meet the above criteria**
- Minimum required detention volume = 5,000 cubic feet (0.11 acre-feet)
- Actual detention volume provided = **13,742 cubic feet (0.32 acre-feet)**

### **Existing Site Conditions**

The project area is partially developed and can be considered to be one (1) single drainage area based on existing site topography (see Existing Drainage Plan on page 6). The existing site area consists of an existing asphalt parking lot with an adjacent baseball field. The remaining portion of the site area is undeveloped consisting of grass ground cover and meadow vegetation with some trees.

The Federal Insurance Rate Map for the Town of Amherst, Erie County, New York prepared by the Federal and State Wetland Maps shows that no portions of the project site area are located within state or federal wetland areas.

The Erie County Soil Survey lists 100% of the site area as having Teal Silt Loam (Te) soil rated Type D based on the classification system of the U.S.D.A. Natural Resources Conservation Service. Soil boring samples show bedrock elevations approximately 50 feet below existing grade and evidence of high groundwater table depths approximately 15 feet below existing grade on average (see Geotechnical Report by Empire Geo Services, Inc. dated October 31, 2005 and identified as Project No. BE-05-236).

Descriptions, peak runoff, and discharge points of each of the drainage subareas on the existing site are summarized below:

|                                              |            |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
|----------------------------------------------|------------|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|
| <b>EXISTING SITE</b>                         |            |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| TRIBUTARY AREA                               |            |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| AREA                                         | 2.08 ACRES |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| % OF TDA                                     | 100%       |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| % OFFSITE/ONSITE                             | NONE       |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| DEVELOPED OR UNDEVELOPED                     |            |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| DESCRIPTION OF GROUND COVERS                 |            |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| IMPERVIOUS AREA AND %                        |            |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| RUNOFF FLOW PATTERN AND DIRECTION            |            |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| AVERAGE DROP AND SLOPE                       |            |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| C                                            | 0.40       |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| CN                                           | 85         |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| Tc                                           | 8.5 MIN    |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| PEAK RUNOFF FLOW RATE                        |            |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| PEAK RUNOFF VOLUME                           |            |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| FREQ/DEPTH/DURATION AND TYPE OF DESIGN STORM |            |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| RAINFALL DEPTH:                              |            |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| TIE IN POINT                                 |            |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| DRAINAGE DISCHARGES TO                       |            |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| OVERLAND, PIPE, OR DITCH                     |            |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |

### **Existing Drainage Summary**

The entire project area is below the 100-year floodplain. As part of the site plan review, a Floodplain Construction Permit shall be required and applied for from the Town of Amherst Engineering Department.

### **Proposed Site Conditions**

The project site area shall be cleared, grubbed, and re-graded. The existing asphalt surface shall be stripped and the subbase course raised and compacted. A new 4,800 square foot one-story fire apparatus storage building shall be constructed adjacent to the expanded parking lot addition. New site landscaping, and all necessary grading, utility, and drainage connections shall also be added to service the new facility. The existing driveway shall be maintained for ingress and egress.

The proposed drainage plan can be divided into eight (8) separate drainage subareas based on proposed site topography (see Proposed Drainage Plan on page 8). All of the 7 drainage subareas shall be tributary to the existing ditch along Tonawanda Creek Road south of the site. Descriptions, peak runoff, and discharge points of each of the drainage subareas on the existing site are summarized below:

|                                                     |                                                            |  |  |                                       |                |  |  |  |  |
|-----------------------------------------------------|------------------------------------------------------------|--|--|---------------------------------------|----------------|--|--|--|--|
| <b>PROPOSED SITE</b>                                |                                                            |  |  |                                       |                |  |  |  |  |
| <b>TRIBUTARY AREA</b>                               |                                                            |  |  |                                       |                |  |  |  |  |
| <b>AREA</b>                                         | 2.08 ACRES                                                 |  |  |                                       |                |  |  |  |  |
| <b>% OF TDA</b>                                     | 100%                                                       |  |  |                                       |                |  |  |  |  |
| <b>% OFFSITE/ONSITE</b>                             | NONE                                                       |  |  |                                       |                |  |  |  |  |
| <b>DEVELOPED OR UNDEVELOPED</b>                     | PARTIALLY DEVELOPED                                        |  |  |                                       |                |  |  |  |  |
| <b>DESCRIPTION OF GROUND COVERS</b>                 | NEW BLDG ADDITION, PARKING LOT, HALF OF ROAD, GRASS FIELDS |  |  |                                       |                |  |  |  |  |
| <b>IMPERVIOUS AREA AND %</b>                        | 0.70 AC. (34%)                                             |  |  |                                       |                |  |  |  |  |
| <b>RUNOFF FLOW PATTERN AND DIRECTION</b>            | NORTHWEST TO SOUTHEAST                                     |  |  |                                       |                |  |  |  |  |
| <b>AVERAGE DROP AND SLOPE</b>                       | 2.06% AVERAGE SLOPE                                        |  |  |                                       |                |  |  |  |  |
| <b>C</b>                                            | 0.47                                                       |  |  |                                       |                |  |  |  |  |
| <b>CN</b>                                           | 86                                                         |  |  |                                       |                |  |  |  |  |
| <b>Tc</b>                                           | 7.4 MIN                                                    |  |  |                                       |                |  |  |  |  |
| <b>PEAK RUNOFF FLOW RATE</b>                        | 9.63 CFS                                                   |  |  | <b>DETAINED PEAK RUNOFF FLOW RATE</b> | 4.03 CFS       |  |  |  |  |
| <b>PEAK RUNOFF VOLUME</b>                           | 20,255 CU. FT.                                             |  |  | <b>DETAINED PEAK RUNOFF VOLUME</b>    | 20,125 CU. FT. |  |  |  |  |
| <b>FREQ/DEPTH/DURATION AND TYPE OF DESIGN STORM</b> | 25-YR / 24-HR                                              |  |  |                                       |                |  |  |  |  |
| <b>RAINFALL DEPTH:</b>                              | 4.15 INCHES                                                |  |  |                                       |                |  |  |  |  |
| <b>TIE IN POINT</b>                                 | NEW CATCH BASINS TO NEW DETENTION BASIN                    |  |  |                                       |                |  |  |  |  |
| <b>DRAINAGE DISCHARGES TO</b>                       | EXISTING DITCH NEAR RIGHT OF WAY                           |  |  |                                       |                |  |  |  |  |
| <b>OVERLAND, PIPE, OR DITCH</b>                     | OVERLAND AND PIPE                                          |  |  |                                       |                |  |  |  |  |

### **Proposed Drainage Summary**

The site shall be graded to drain all surface rainwater runoff from the new paved areas into a new storm sewer system via new catch basins within the new parking lot. All rainwater runoff from the roof of the new building shall drain to the new storm sewer system via external downspouts. The new storm sewer system shall convey all stormwater runoff to a new detention basin located along the eastern side of the new parking lot. A new oil-water separator shall treat truck runoff from the floor drains within the building before it discharges. Due to the absence of public sanitary sewers the treated oily-waste shall discharge to the new detention basin.

During the 25-year storm event it is estimated that the peak runoff rate from the site shall be approximately 4.03 CFS. This shall be 2.76 CFS (41%) less than the peak runoff rate under existing conditions during a 10-year storm (6.79 CFS). Therefore, the detention basin shall reduce the peak runoff rate to an acceptable peak flow as required by the Town of Amherst. None of the future site area shall discharge stormwater runoff to adjacent residential parcels. Therefore, the off-site impact from this development on the adjacent storm sewer system shall be negligible.

### **Operation & Maintenance**

Regular maintenance of the detention basin shall be the responsibility of the property owner to ensure that:

- The outlet pipe is kept free of debris and sediment
- The grass along the side slopes of the detention basin is regularly mowed and maintained.
- If non-mow vegetation is used instead of grass along the bottom and side slopes of the detention basin it shall be regularly weeded and maintained.

### **Design Procedures**

Calculations were based on the following:

- Concentration times were calculated using the SCS Lag Method
- The peak runoff rates for the existing site were calculated by the N.R.C.S. TR-20 Unit Hydrograph Method, assuming a 24-hour 10-year design storm which discharges a total of 3.44 inches of rainfall. A Type II storm distribution was assumed.
- The peak runoff rates for the existing site were calculated by the N.R.C.S. TR-20 Unit Hydrograph Method, assuming a 24-hour 25-year design storm which

discharges a total of 4.15 inches of rainfall. A Type II storm distribution was assumed.

- The storm sewers were sized and sloped using the Bernoulli Energy Equation and the Rational Method assuming a 10-year storm frequency
- The detention area elevation-volume relationship was calculated by average contour area
- The detention basin elevation-discharge relationship was calculated using the inlet/outlet control equations given in HDS-5 (F.H.W.A.).
- Runoff was routed through the detention basins using the Storage Indication Method

Drainage calculations are given starting on page 9.

**Stormwater Pollution Prevention:**

In order to prevent contamination and degradation of downstream water bodies being discharged into, the contractor shall maintain adequate soil erosion and sedimentation control measures throughout construction as shown on the Erosion Control in the design drawing set. All erosion control procedures shall comply with Town of Amherst requirements. Temporary sedimentation and erosion control devices include temporary catch basin inlet protection during construction. Vegetation stabilization measures shall be implemented within 24 hours of final grading and seeding operations. Turf reinforcement mat shall also be added. Landscaping and seeding, sodding, or hydroseeding operations shall begin as soon as final grade is established in order to minimize or eliminate the exposure of loose soil particles to rain and wind erosion. The contractor shall ensure the site is graded such that stormwater runoff is directed to the sedimentation and erosion control devices throughout all phases of the construction. Each device shall also be inspected and maintained after rainstorms and on a daily basis. All sedimentation and erosion control devices shall remain in place until sufficient vegetation is established to prevent soil particle migration. Any temporary stockpiles shall not block drainage flows during construction. The perimeter of all stockpile bases shall be protected with silt fencing. Stockpiles should also not be located near slopes, roadways, or drainage structures if possible. Any dewatering operations shall discharge directly into a sediment filter structure or basin. All catch basin sumps shall be cleaned out and soil sediments shall be deposited at lawn areas before seeding operations begin. While sod is not required it is recommended. If sod is not used it is recommended that all lawn areas be hydroseeded and hydromulched, else burlap mesh shall be used on slope embankments steep enough to temporarily impede the establishment of lawn areas.

The contractor shall also obtain all necessary clearing, stripping, and debris disposal permits before beginning any excavation or construction on site. Methods of dust control shall also be employed as necessary. The Town of Amherst Plumbing Inspector shall inspect all storm drainage systems. The Town of Amherst Engineering Department shall approve these calculations and plans before a building permit can be issued. Since the total area of disturbance is less than one (1) acre, a SPDES Permit GP-0-25-001 for Stormwater Discharge During Construction Activities shall not be required by the New York State Department of Environmental Conservation (NYSDEC).





| DRAINAGE AREA SUMMARY / CALCULATIONS |      |                         |             |             |             |                |                |                |
|--------------------------------------|------|-------------------------|-------------|-------------|-------------|----------------|----------------|----------------|
| EXISTING                             |      |                         |             |             |             |                |                |                |
| TRIB AREA                            | C    | CN                      | AREA (AC)   | PERV        | IMP.        | % IMP.         | C x A          | CN x A         |
| OUTLET                               | 0.40 | 85                      | 2.08        | 1.56        | 0.52        | 25%            | 0.832          | 176.8          |
|                                      |      | <b>TOTAL</b>            | <b>2.08</b> | <b>1.56</b> | <b>0.52</b> | <b>25%</b>     | <b>0.832</b>   | <b>176.8</b>   |
|                                      |      |                         |             |             |             | <b>AVERAGE</b> | <b>0.40</b>    | <b>85</b>      |
| EXISTING                             |      |                         |             |             |             |                |                |                |
| NON-TRIB AREA                        | C    | CN                      | AREA (AC)   | PERV        | IMP.        | % IMP.         | C x A          | CN x A         |
| ADJ PARCELS                          | 0.39 | 84                      | 0           | 0           | 0           | #DIV/0!        | 0              | 0              |
| vice.                                |      | <b>TOTAL</b>            | <b>0.00</b> | <b>0.00</b> | <b>0.00</b> | <b>#DIV/0!</b> | <b>0.00</b>    | <b>0</b>       |
|                                      |      |                         |             |             |             | <b>AVERAGE</b> | <b>#DIV/0!</b> | <b>#DIV/0!</b> |
|                                      |      |                         | <b>AREA</b> | <b>PERV</b> | <b>IMP.</b> | <b>% IMP.</b>  |                |                |
|                                      |      | <b>TOTAL DRAINAGE =</b> | <b>2.08</b> | <b>1.56</b> | <b>0.52</b> | <b>25%</b>     |                |                |
| PROPOSED                             |      |                         |             |             |             |                |                |                |
| TRIB AREA                            | C    | CN                      | AREA (AC)   | PERV        | IMP.        | % IMP.         | C x A          | CN x A         |
| ROOF                                 | 0.95 | 98                      | 0.11        | 0           | 0.11        | 100%           | 0.1045         | 10.78          |
| POND                                 | 0.31 | 82                      | 1.53        | 1.34        | 0.19        | 12%            | 0.4743         | 125.46         |
| CB3                                  | 0.87 | 96                      | 0.09        | 0.01        | 0.08        | 89%            | 0.0783         | 8.64           |
| CB2                                  | 0.95 | 98                      | 0.06        | 0           | 0.06        | 100%           | 0.057          | 5.88           |
| CB1                                  | 0.87 | 96                      | 0.09        | 0.01        | 0.08        | 89%            | 0.0783         | 8.64           |
| CB6                                  | 0.86 | 96                      | 0.08        | 0.01        | 0.07        | 88%            | 0.0688         | 7.68           |
| CB5                                  | 0.95 | 98                      | 0.04        | 0           | 0.04        | 100%           | 0.038          | 3.92           |
| CB4                                  | 0.86 | 96                      | 0.08        | 0.01        | 0.07        | 88%            | 0.0688         | 7.68           |
|                                      |      | <b>TOTAL</b>            | <b>2.08</b> | <b>1.38</b> | <b>0.70</b> | <b>34%</b>     | <b>0.968</b>   | <b>178.68</b>  |
|                                      |      |                         |             |             |             | <b>AVERAGE</b> | <b>0.47</b>    | <b>86</b>      |
| PROPOSED                             |      |                         |             |             |             |                |                |                |
| NON-TRIB AREA                        | C    | CN                      | AREA (AC)   | PERV        | IMP.        | % IMP.         | C x A          | CN x A         |
| OUTLET                               | 0.48 | 86                      | 0           | 0           | 0           | #DIV/0!        | 0              | 0              |
|                                      |      | <b>TOTAL</b>            | <b>0.00</b> | <b>0.00</b> | <b>0.00</b> | <b>#DIV/0!</b> | <b>0.00</b>    | <b>0</b>       |
|                                      |      |                         |             |             |             | <b>AVERAGE</b> | <b>#DIV/0!</b> | <b>#DIV/0!</b> |
|                                      |      |                         | <b>AREA</b> | <b>PERV</b> | <b>IMP.</b> | <b>% IMP.</b>  |                |                |
|                                      |      | <b>TOTAL DRAINAGE =</b> | <b>2.08</b> | <b>1.38</b> | <b>0.70</b> | <b>34%</b>     |                |                |

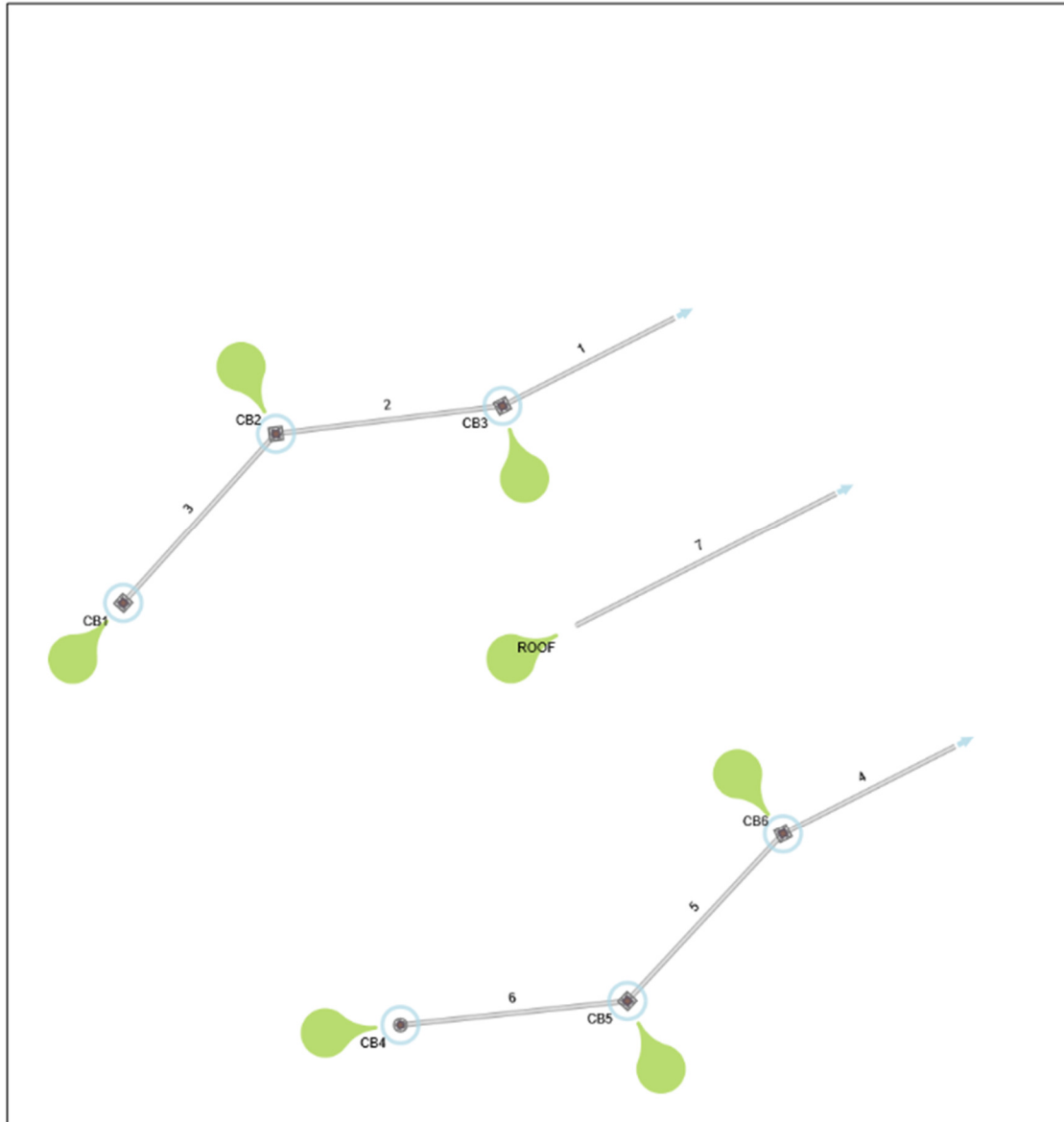
| <b><u>TIME OF CONCENTRATION CALCULATIONS</u></b> |          |                                          |          |        |                   |                       |  |
|--------------------------------------------------|----------|------------------------------------------|----------|--------|-------------------|-----------------------|--|
| SCS LAG METHOD                                   |          |                                          |          |        |                   |                       |  |
| EXISTING TRIBUTARY AREA                          |          |                                          |          |        |                   |                       |  |
| T <sub>c</sub> =                                 | 1.67 x   | $L^{0.8} (S+1)^{0.7}$                    | 0.142286 | HRS OR | <b><u>8.5</u></b> | <b><u>MINUTES</u></b> |  |
|                                                  |          | $1900Y^{0.5}$                            |          |        |                   |                       |  |
| A =                                              | 2.08     | AC                                       |          |        |                   |                       |  |
| L =                                              | 324      | FT (MAX HYDRAULIC LENGTH = 209 x A ^0.6) |          |        |                   |                       |  |
| CN =                                             | 85       |                                          |          |        |                   |                       |  |
| S =                                              | 1.764706 |                                          |          |        |                   |                       |  |
| Y =                                              | 1.65     | % (AVERAGE SLOPE)                        |          |        |                   |                       |  |
| PROPOSED TRIBUTARY AREA                          |          |                                          |          |        |                   |                       |  |
| T <sub>c</sub> =                                 | 1.67 x   | $L^{0.8} (S+1)^{0.7}$                    | 0.122898 | HRS OR | <b><u>7.4</u></b> | <b><u>MINUTES</u></b> |  |
|                                                  |          | $1900Y^{0.5}$                            |          |        |                   |                       |  |
| A =                                              | 2.08     | AC                                       |          |        |                   |                       |  |
| L =                                              | 324      | FT (MAX HYDRAULIC LENGTH = 209 x A ^0.6) |          |        |                   |                       |  |
| CN =                                             | 86       |                                          |          |        |                   |                       |  |
| S =                                              | 1.627907 |                                          |          |        |                   |                       |  |
| Y =                                              | 2.06     | % (AVERAGE SLOPE)                        |          |        |                   |                       |  |

# Plan View

Stormwater Studio 2026 v 3.0.0.42

Project Name: Enter Project Name...

07-08-2026



# Storm Sewer Tabulation

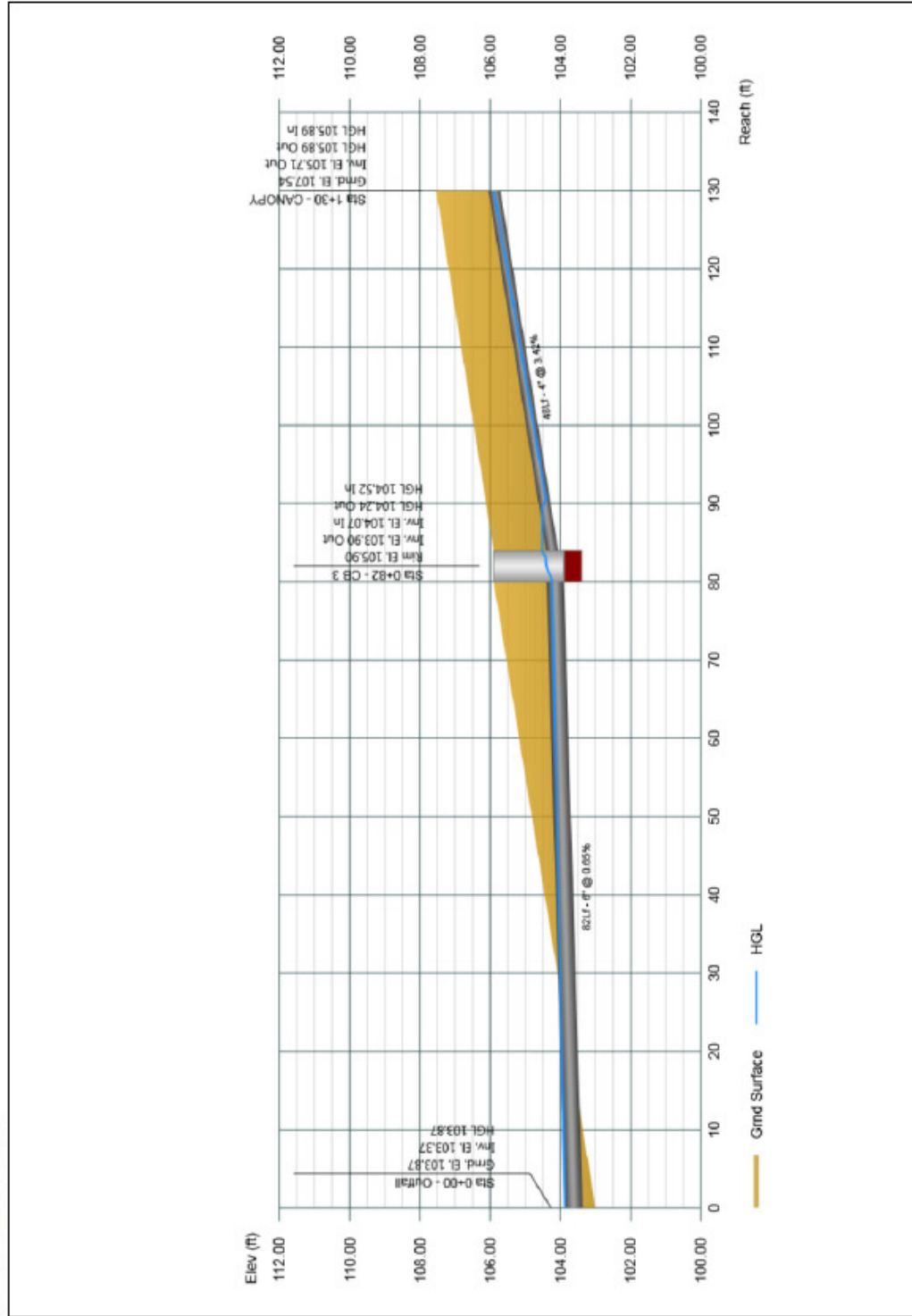
Stormwater Studio 2026 v 3.0.0.42

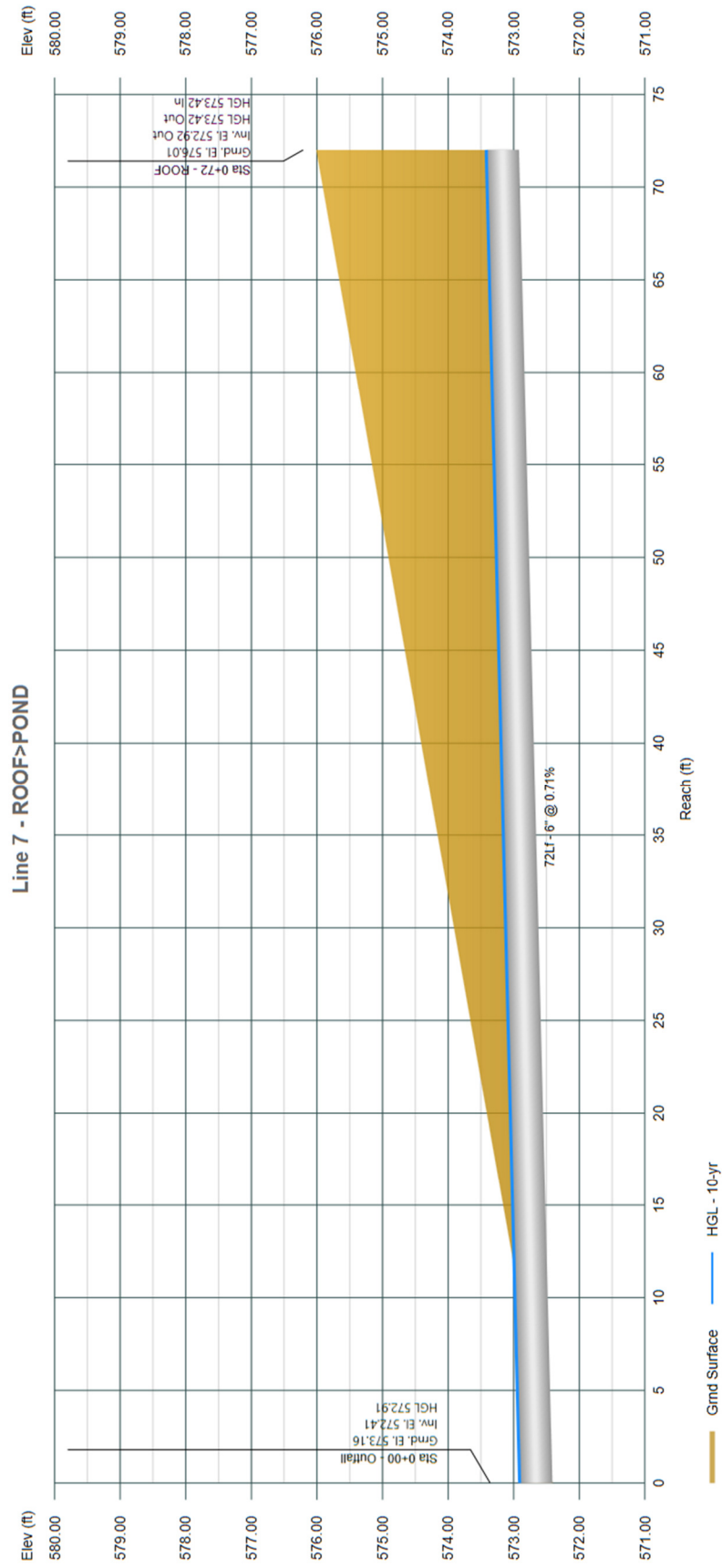
Project Name: Enter Project Name...  
07-08-2026

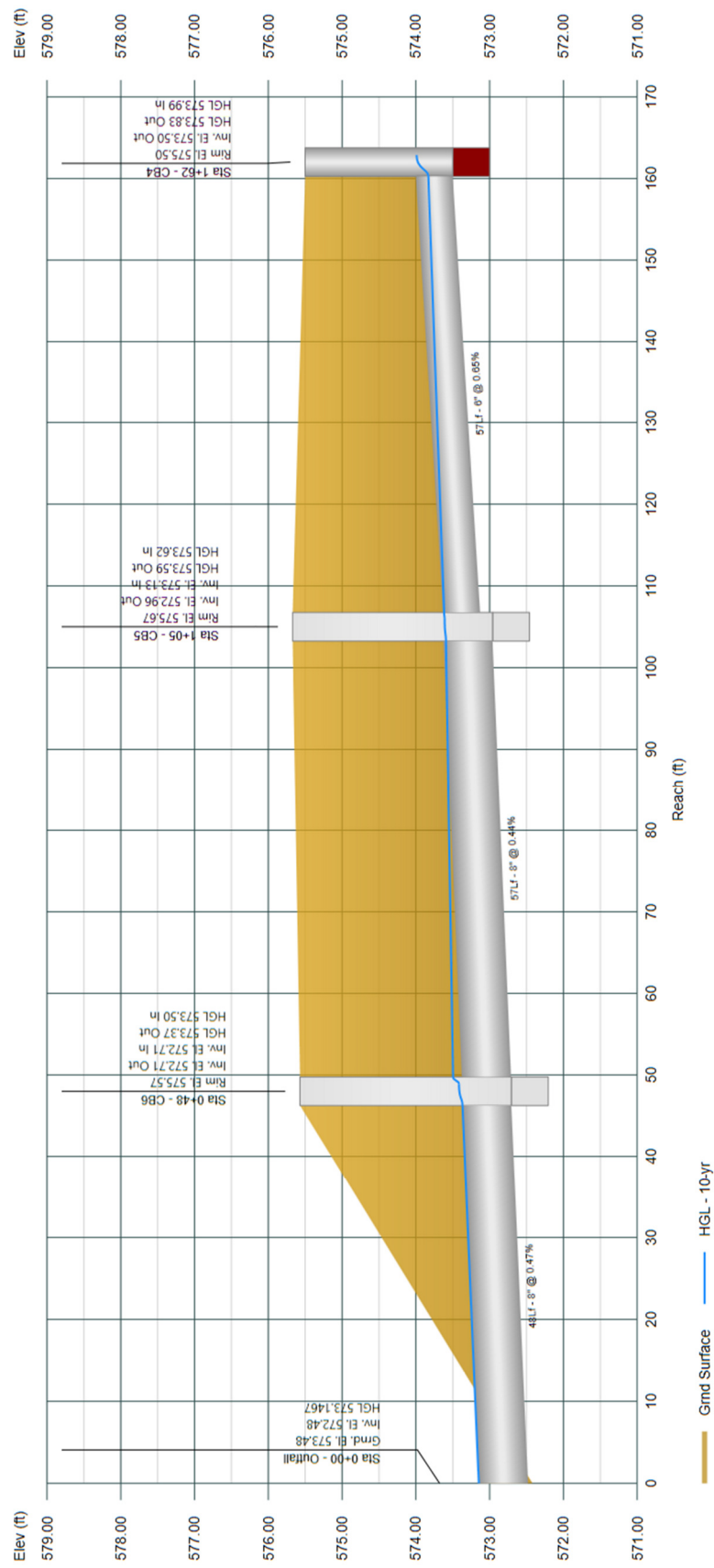
| Line ID   | Length<br>(ft) | Drng Area    |               | Rational | C x A |       | Tc             |               | Intensity<br>(in/hr) | Total Q<br>(cfs) | Capacity<br>(cfs) | Velocity<br>(ft/s) | Line         |              | Invert Elev |            | HGL Elev   |            | Surface Elev |            | Line No |
|-----------|----------------|--------------|---------------|----------|-------|-------|----------------|---------------|----------------------|------------------|-------------------|--------------------|--------------|--------------|-------------|------------|------------|------------|--------------|------------|---------|
|           |                | Incr<br>(ac) | Total<br>(ac) |          | Incr  | Total | Inlet<br>(min) | Syst<br>(min) |                      |                  |                   |                    | Size<br>(in) | Slope<br>(%) | Up<br>(ft)  | Dn<br>(ft) | Up<br>(ft) | Dn<br>(ft) | Up<br>(ft)   | Dn<br>(ft) |         |
| CB3>OUT   | 48.00          | 0.090        | 0.240         | 0.87     | 0.08  | 0.21  | 5.0            | 5.68          | 5.16                 | 1.10             | 1.08              | 3.16               | 8            | 0.69         | 572.74      | 572.41     | 573.40     | 573.08     | 575.53       | 573.00     | 1       |
| CB2>CB3   | 57.00          | 0.080        | 0.150         | 0.95     | 0.06  | 0.14  | 5.0            | 5.34          | 5.27                 | 0.71             | 0.87              | 2.04               | 8            | 0.44         | 572.99      | 572.74     | 573.75     | 573.58     | 575.64       | 575.53     | 2       |
| CB1>CB2   | 57.00          | 0.090        | 0.090         | 0.87     | 0.08  | 0.08  | 5.0            | 5.00          | 5.38                 | 0.42             | 0.49              | 2.15               | 8            | 0.65         | 573.53      | 573.16     | 574.03     | 573.80     | 575.53       | 575.64     | 3       |
| CB6>OUT   | 48.00          | 0.080        | 0.200         | 0.88     | 0.07  | 0.18  | 5.0            | 5.71          | 5.15                 | 0.90             | 0.90              | 2.59               | 8            | 0.47         | 572.71      | 572.48     | 573.37     | 573.15     | 575.57       | 571.42     | 4       |
| CB5>CB6   | 57.00          | 0.040        | 0.120         | 0.95     | 0.04  | 0.11  | 5.0            | 5.35          | 5.26                 | 0.56             | 0.87              | 1.63               | 8            | 0.44         | 572.96      | 572.71     | 573.59     | 573.50     | 575.67       | 575.57     | 5       |
| CB4>CB5   | 57.00          | 0.080        | 0.080         | 0.88     | 0.07  | 0.07  | 5.0            | 5.00          | 5.38                 | 0.37             | 0.49              | 2.29               | 8            | 0.65         | 573.50      | 573.13     | 573.83     | 573.62     | 575.50       | 575.67     | 6       |
| ROOF>POND | 72.00          | 0.110        | 0.110         | 0.95     | 0.10  | 0.10  | 5.0            | 5.00          | 5.38                 | 0.56             | 0.56              | 2.87               | 8            | 0.71         | 572.92      | 572.41     | 573.42     | 572.91     | 576.01       | 572.41     | 7       |

Notes: IDF File = WNY.idf, Return Period = 10-ys.

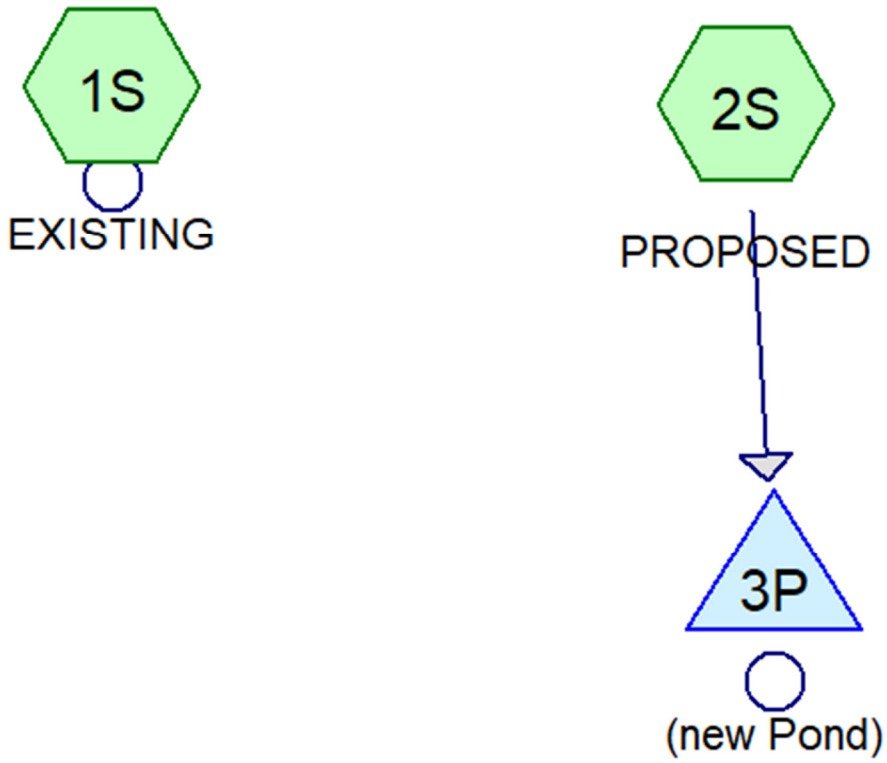
Project File: STORM-SEWERS.sws



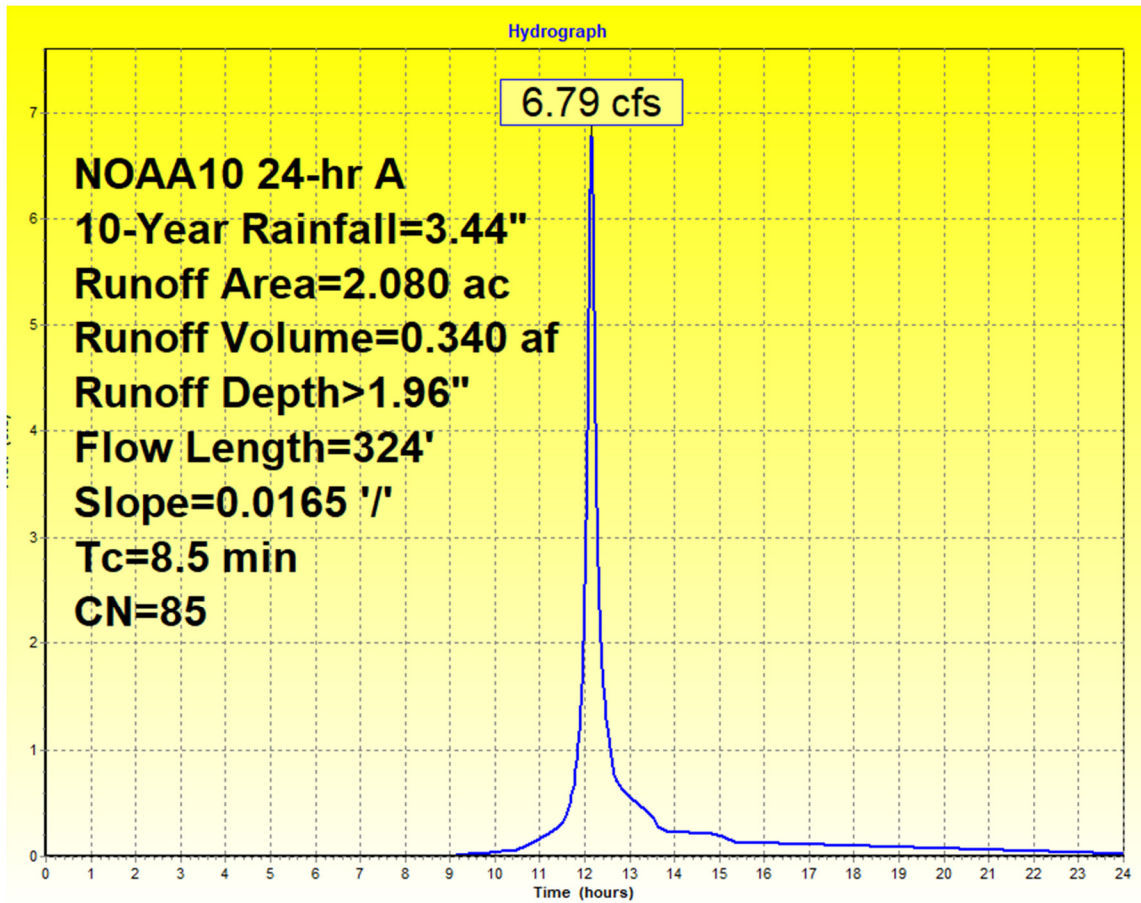




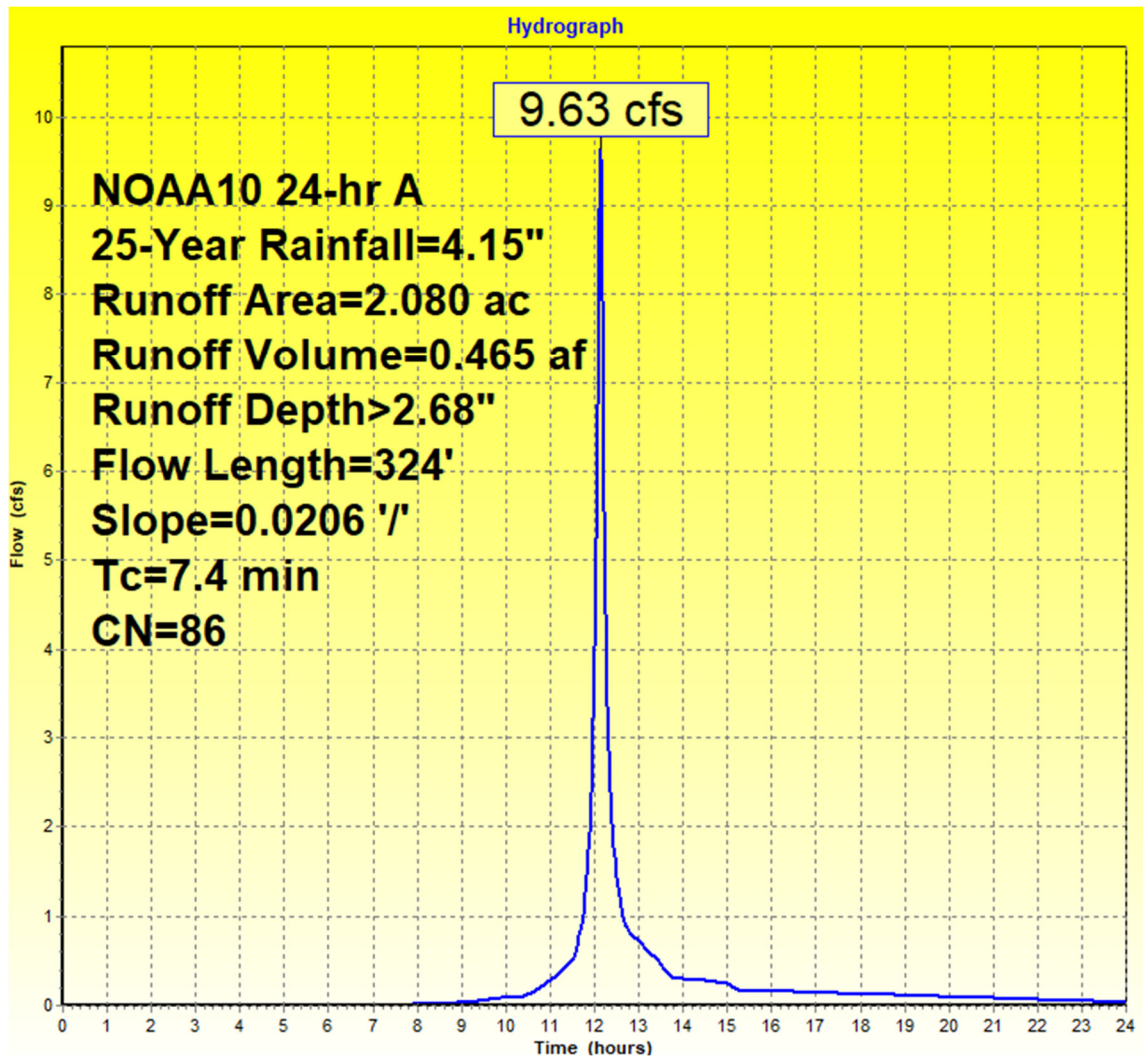
**HYDROCAD DIAGRAM**



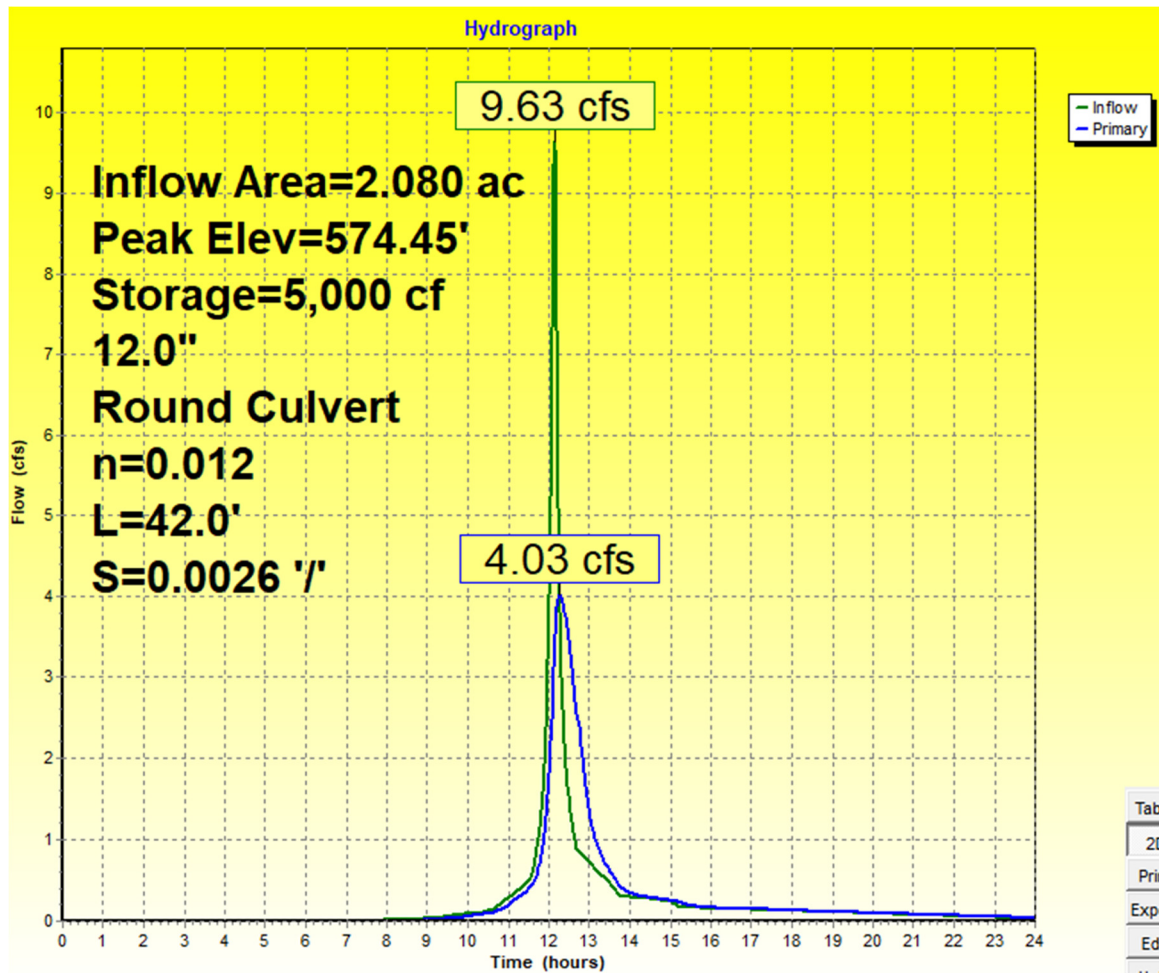
# 10-YEAR PRE-DEVELOPED HYDROGRAPH (EXISTING CONDITIONS)



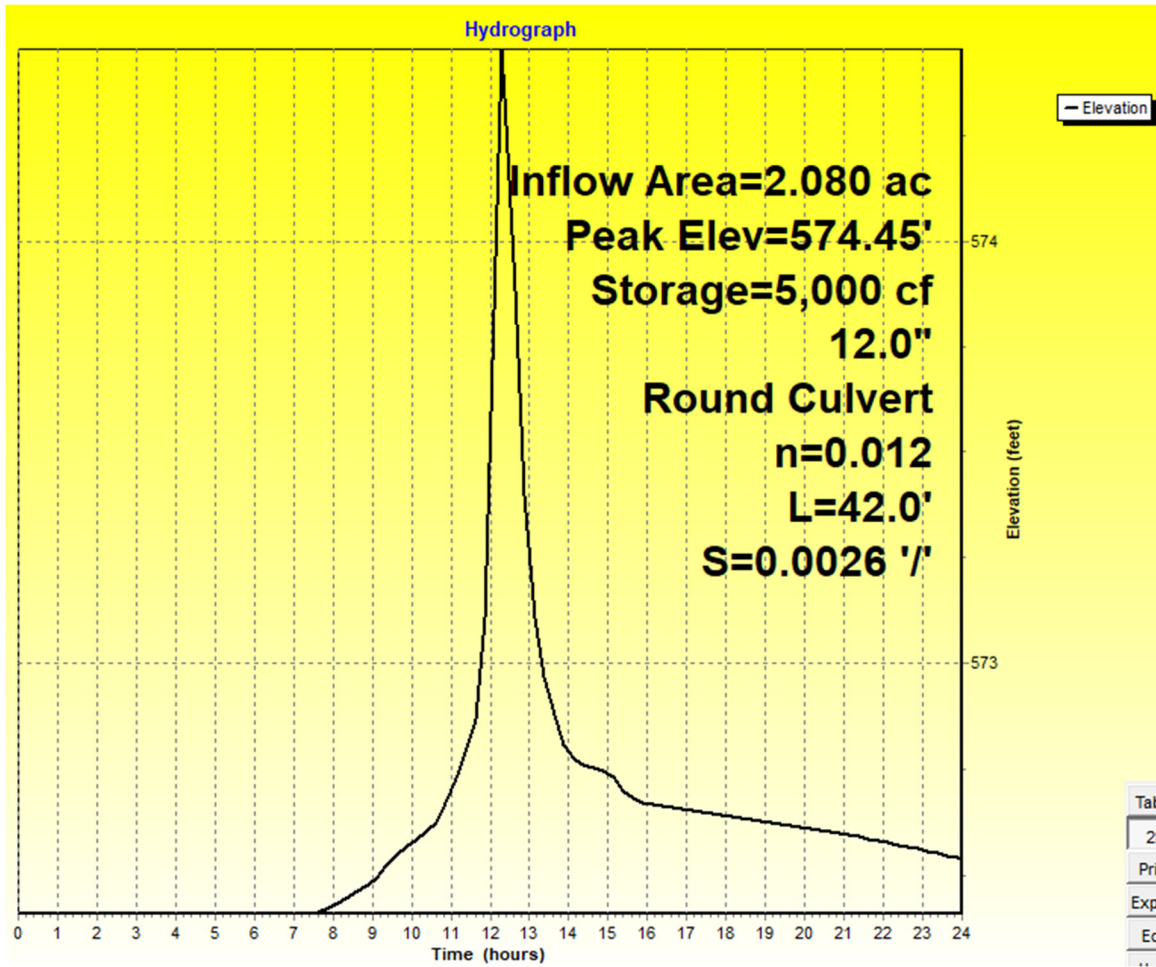
## 25-YEAR POST-DEVELOPED HYDROGRAPH (PROPOSED CONDITIONS)



## 25-YEAR POST-DEVELOPED HYDROGRAPH (ROUTED THRU DETENTION)



## 25-YEAR WATER SURFACE ELEVATION (DETENTION BASIN)



## DETENTION BASIN CALCULATION SUMMARY

Inflow Area = 2.080 ac, 33.65% Impervious, Inflow Depth > 2.68" for 25-Year event  
 Inflow = 9.63 cfs @ 12.15 hrs, Volume= 0.465 af  
 Outflow = 4.03 cfs @ 12.27 hrs, Volume= 0.462 af, Atten= 58%, Lag= 7.6 min  
 Primary = 4.03 cfs @ 12.27 hrs, Volume= 0.462 af

Routing by Stor-Ind method, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs  
 Peak Elev= 574.45' @ 12.27 hrs Surf.Area= 4,149 sf Storage= 5,000 cf

Plug-Flow detention time= 21.1 min calculated for 0.462 af (99% of inflow)  
 Center-of-Mass det. time= 17.3 min ( 817.5 - 800.2 )

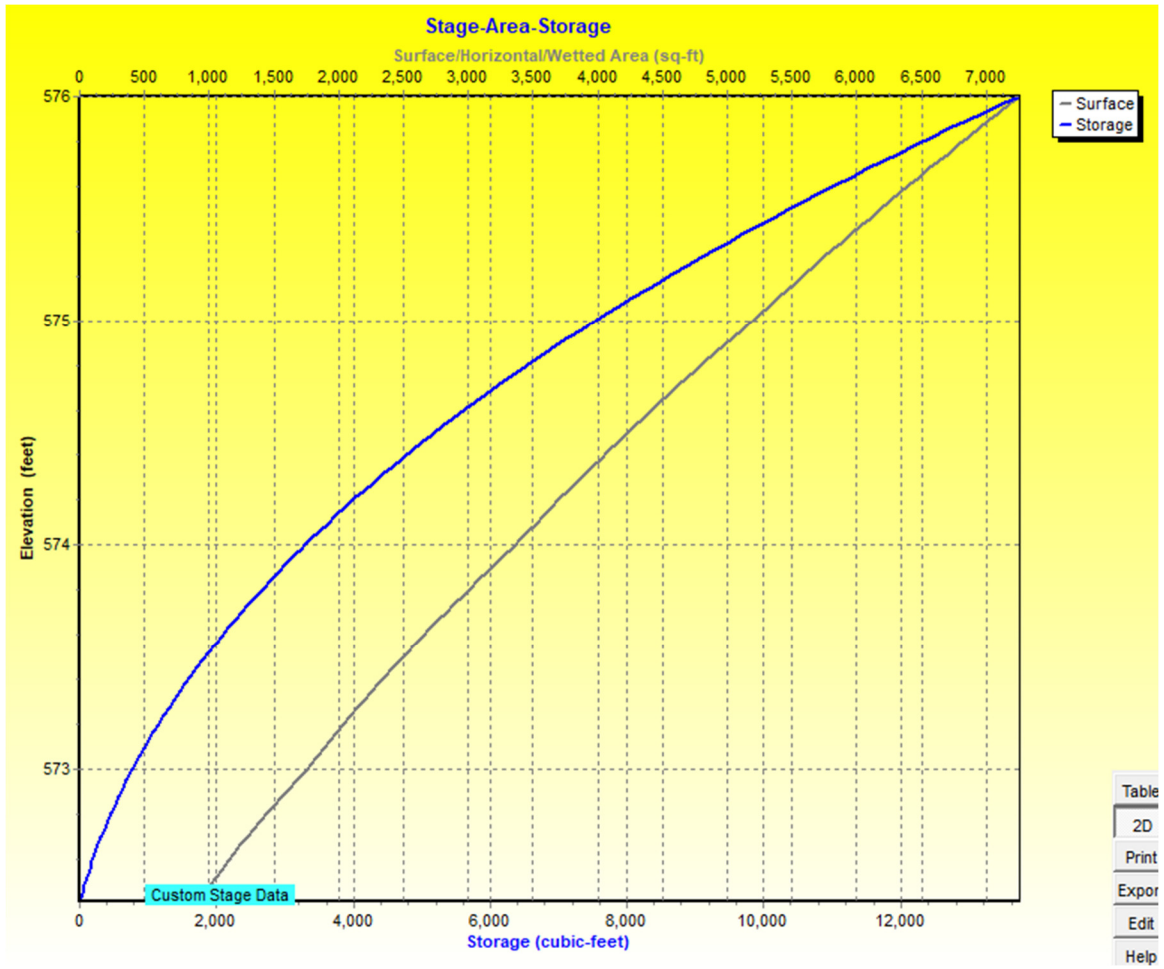
| Volume | Invert  | Avail.Storage | Storage Description                                        |
|--------|---------|---------------|------------------------------------------------------------|
| #1     | 572.41' | 13,742 cf     | <b>Custom Stage Data (Irregular)</b> Listed below (Recalc) |

| Elevation<br>(feet) | Surf.Area<br>(sq-ft) | Perim.<br>(feet) | Inc.Store<br>(cubic-feet) | Cum.Store<br>(cubic-feet) | Wet.Area<br>(sq-ft) |
|---------------------|----------------------|------------------|---------------------------|---------------------------|---------------------|
| 572.41              | 917                  | 227.0            | 0                         | 0                         | 917                 |
| 573.00              | 1,759                | 249.0            | 776                       | 776                       | 1,762               |
| 574.00              | 3,365                | 287.0            | 2,519                     | 3,295                     | 3,405               |
| 575.00              | 5,198                | 324.0            | 4,248                     | 7,543                     | 5,230               |
| 576.00              | 7,257                | 362.0            | 6,199                     | 13,742                    | 7,332               |

| Device | Routing | Invert  | Outlet Devices                                                                                                                                                                            |
|--------|---------|---------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| #1     | Primary | 572.41' | <b>12.0" Round 12" OUTLET</b><br>L= 42.0' CPP, mitered to conform to fill, Ke= 0.700<br>Inlet / Outlet Invert= 572.41' / 572.30' S= 0.0026 ' /' Cc= 0.900<br>n= 0.012, Flow Area= 0.79 sf |

**Primary OutFlow** Max=4.03 cfs @ 12.27 hrs HW=574.45' (Free Discharge)  
**1=12" OUTLET** (Barrel Controls 4.03 cfs @ 5.13 fps)

## DETENTION BASIN ELEVATION vs. STORAGE CURVE



**DETENTION BASIN ELEVATION vs. DISCHARGE CURVE**

