# Town Comment Response Package submittal
August 28, 2020

# "Two Penguin Properties"
## at
## 14 Hill Way
## Cape Elizabeth, Maine

Prepared for: Two Penguin Properties, LLC

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***Town of Cape Elizabeth***

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August 26, 2020

Town of Cape Elizabeth Planning Board
Attn: Maureen O'Meara, Town Planner
320 Ocean House Road
PO Box 6260
Cape Elizabeth, ME 04107

Subject: 14 Hill Way Site Plan & Minor Subdivision Amendment – Response to 2020-08-12 Comments

Dear Ms. O'Meara,

Main-Land has received a memorandum of initial technical review on the Site Plan & Minor Subdivision Amendment application for Two Penguin Properties. LLC from the Town Engineer, Stephen Harding. We appreciate the thorough review. Of note, the Applicant has elected to change the use of this building following the previous Planning Board Meeting. The upper two floors will remain residential while the lower floor will be utilized as a Short-Term Rental Unit.

The following letter is intended to address Staff review comments. It is organized with the reviewer comments followed by Main-Land's response in italics on behalf of the Applicant. In addition to engineer comments this letter also addresses other issues that have been raised since the previous submittal.

**General Engineering Comments:**

1. Section 5 "Utilities" in the application package includes a June 16, 2020 email from the former Public Works Director, Robert Malley, indicating the Town's capacity for solid waste disposal. In the email, Mr. Malley indicates that the Public Works Department has jurisdiction over the sanitary sewer connection. The designer should coordinate the proposed sanitary sewer design and connection with the Public Works Department. The designer should provide an estimated daily flow from the development based on Maine Subsurface Disposal Rules and request a capacity determination from the Town.

   *Main-Land has been in contact with Cape Elizabeth's Public Works Director, Jay Reynolds who has accepted the service with the exception that the applicant needs to verify the existing sewer manhole has a drop connection and install one if it doesn't. The utilities plan has been updated to reflect this request. An estimated daily flow of 480 GPD has been sent to Steve Harding to review.*

2. Section 5 "Utilities" in the application package includes a July 23, 2020 letter from the Portland Water District indicating that the District can serve the proposed project. The letter includes several Conditions of Service that should be included in the final design of the water system.

   *PWD Conditions of Service were added to the Utility Plan.*

3. The designer has noted that the review of the fire suppression system is in progress. The designer should provide confirmation from the jurisdiction that the proposed design is acceptable.

   *As the building first floor use has been redefined as short-term rental, and as the character of the building use is residential in nature, the Applicant has eliminated the fire suppression water service and building sprinkler system. This is according to Town CEO recommendations.*

4. As part of the proposed development, the applicant is seeking a waiver from the Town's off-street parking requirements specified in Section 19-7-8 of the Zoning Ordinance. The designer notes that 7 spaces are required for a "non-medical office building". However, we note that 8 spaces would be required to meet the ordinance (1,920 SF / 250 = 7.7 = 8 spaces).

   *With the proposed first floor use being short term rental, 4 parking spots are required per Town ordinance. A total of 5 parking spots will be provided, three driveway/parking and two garage spaces.*

**Existing Conditions and Demolition Plan Comments (Sheet C1.1):**

1. The Existing Conditions and Demolition Plan, C1.1, indicates that the pavement around an existing catch basin on Scott Dyer Road is to be removed and presumably repaired. As Scott Dyer Road is currently scheduled to be paved in September of 2020, the pavement around this catch basin cannot be disturbed and the removal of a concrete walk panel and coring of the underdrain connection into the catch basin should be done in a manner as to not impact the new surface pavement. A note to that effect should be added to the plans.

   *Applicant is aware of the pave schedule for Scott Dyer Road. A note regarding this issue has been added to this plan.*

2. This plan also contains a note that that granite curb should be removed and stockpiled during the water installation work in Hill Way. We believe that the curbing in that section of Hill Way is slip form concrete so the section of curb will need to be removed and replaced.

   *This was confirmed and the note has been corrected.*

**Site Plan Comments (Sheet C2.1)**

1. The designer should provide a van accessible parking space per Section 19-7-8 "Off Street Parking", Part C.

   *As the building use has been altered, van accessibility is not necessary.*

2. It appears that the entrance adjacent to the parking area leads directly to a stairwell. Accordingly, an accessible route should be provided to the front entrance.

   *The Short-Term Rental can be accessed through the stairs adjacent to parking and garage or down the driveway onto the sidewalk where the path can be accessed.*

3. Architectural drawings indicate an exterior door on the west side of the ground floor. The designer should confirm if pedestrian access from the site is needed to this entry.

*Access to/from the lawn is acceptable to the Applicant.*

4. Since the proposed parking area will be mixed-use, serving both residential units and office space, we recommend increasing the access drive width to accommodate two-way traffic.

   *As the building use has been altered, the Applicant proposes that a more narrow driveway entrance is sufficient for the character of the use.*

5. Parking spaces will need to be striped in accordance with Section 19-7-8 (C). The plan should indicate that spaces will be striped on the site plan and add dimensions for the parking space widths. Additionally, one parking stall is shown immediately in front of a new walkway. Consider modifying stall or walkway location, if possible.

   *As the building use has been altered, the parking configuration has changed. There is no longer a parking stall immediately in front of a new walkway. A note regarding striping has been added.*

6. One parking stall is shown partially on a structural concrete slab. The designer should consider modifying stall location or indicating an asphalt overlay atop the concrete slab within the stall.

   *An asphalt overlay has been added to the concrete slab detail.*

7. There are a few short segments of dripline filters immediately behind the retaining walls. The designer should consider including a special detail at these locations to prevent concentrated water behind the retaining wall.

   *Inverts showing positive drainage have been added to the Utility Plan.*

8. The concrete structural slab detail shown on C9.2 indicates that the transition slab is offset from the building face but is shown adjacent to the entry on the site plan. The designer should clarify this situation.

   *Concrete Structural Slab Detail has been updated to match situation.*

**Grading Comments (Sheet C2.2):**

1. Additional spot grades should be added to the grading plan in locations including adjacent to the proposed building, along the property need where grades tie-in, and where proposed work abuts existing features. Top of wall and bottom of wall elevations should also be added to the retaining walls.

   *Additional spot grades have been added to the Grading Plan.*

2. The bottom of step elevation (B.O.S.) is shown as the same elevation as the 1st Finish Floor Elevation. Additional spot grades are needed to clarify grading and runoff conveyance.

   *Additional spot grades have been added to the Grading Plan to indicate runoff flow toward the proposed rain garden.*

3. The rain garden limits on the grading plan should be called out for clarity and indicate the bottom

surface elevations of rain gardens.

*Rain garden limits and bottom surface elevations have been added to the Grading Plan.*

4. Proposed grades on the building side of Rain Garden 2 (towards Dripline Filter 2) will likely be in excess of Elevation 97.5 to promote drainage away from the building. The designer should confirm that this elevation would be acceptable with the 1st Finish Floor Elevation (EL=98) to provide adequate reveal along the foundation wall.
5. *Finish first floor elevation has been revised creating a 6" concrete reveal. Note on Grading Plan has been updated.*

**Utility Comments (Sheet C2.3):**

1. The designer should add storm drain structure information (i.e., rim elevations, invert elevations) to existing and proposed drainage structures. Storm drain and underdrain pipe sizes, material lengths, and slopes should be included as well.

   *These items have been added to the Utility Plan.*

2. We recommend showing the rain garden limits on the utility plan for clarity.

   *Rain garden limits have been added to the Utility Plan.*

3. The designer should add invert elevations to the foundation drain systems to ensure that the system works with adequate slopes. The 1st Finish Floor Elevation is 98 with the foundation drain located at a depth below that elevation. It appears that this will make it difficult to discharge to some of the locations indicated so it is important to confirm the design intent with actual design invert information.

   *Foundation underdrain to be set 6" below foundation with positive drainage and all drains will connect around the house and run to the proposed type-f catch basin for outlet.*

4. The designer should also add invert elevations to the rain garden underdrains to confirm adequate pipe slopes to the downstream connections.

   *Inverts of rain garden underdrains have been added to the Utility Plan.*

5. It appears that the proposed invert in connection to the south catch basin (EL=98.00) is lower than the existing invert out (EL=98.12).

   *This has been corrected and updated on the Utility Plan.*

6. We believe that the existing storm drain shown along the curb line of the east side of Hill Way does not actually exist and was part of a preliminary design that was ultimately not installed. The designer should confirm this understanding as if this storm drain pipe were to exist there might likely be a conflict with the new storm drain connection from Lot 3 into the catch basin located in the southerly drive to Lot 1 which would require that the drainage structure be removed and replaced with a larger structure.

*This detail has been confirmed with the Applicant. Two drain manholes and associated stormdrain have now been proposed to connect into the Town's catch basin on Hill Way, in between the two 8-10 Hill Way entrances. These details are shown on the Utility Plan and new Partial Plan.*

7. As it is difficult to determine from the current information presented on the plan, the designer should determine the storm drain/water line crossing elevations to confirm clearance prior to installation and to determine whether test pits would be required to confirm existing waterline elevations.

   *These crossing have been verified based on Sebago Technics CAD Drawings for the Hill Way water main improvements. A note regarding use of test pits to confirm underground utilities exists on the Utility Plan.*

8. A new storm drain is proposed to be installed under a future retaining wall on the west side of the proposed building. The designer should consider whether a pipe sleeve, poured concrete, or other provisions should be applied to ensure the integrity of the storm drain and the retaining wall.

   *A note regarding encasing the stormdrain pipe in concrete has been added to the Utility Plan.*

9. Per the Chapter 25 "Stormwater" Ordinance, easements shall be provided to the Town for access and maintenance of stormwater infrastructure.

   *Easements have been added to the Subdivision Plan prepared by Owen Haskell, Inc.*

10. Easements should also be provided to Lot 3 for the storm drain crossing on Lot 2 and on Lot 1.

    *The proposed storm drain runs from Lot 3, across a small portion of Lot 2, then within Town right of way to its point of connection to Town storm drain. An easement for the crossing of Lot 2 has been added to the Subdivision Plan prepared by Owen Haskell, Inc.*

11. An easement should also be provided for the underdrain pipe location and tie in on Lot 2.

    *Easements have been added to the Subdivision Plan prepared by Owen Haskell, Inc.*

12. The PWD typically requires 10-foot separation between water and sewer lines. The designer should implement that standard in utility design development, where practicable.

    *The sewer line configuration has been altered to conform to PWD standard.*

13. Invert information for the proposed sewer force main should be added to the plan.

    *Invert of proposed sewer force main will be determined by lift station manufacturer and contractor. Test pit verifying the elevation of existing sewer stub will be required. Rim elevation of lift station has been added.*

14. There appears to be a conflict between the sewer lift station and the fire protection water service.

    *This is been corrected and updated on the Utility Plan.*

**Detail Comments:**

1. We recommend adding the following details:
    a. Paver walkway
    b. Cedar Fence
    c. Granite slab/landscape step
    d. Storm drain outlet apron
    e. Sewer connection to existing force main
    f. Asphalt transition detail where new asphalt pavement abuts existing asphalt pavement

    *Paver walkway, granite landscape step, storm drain outlet apron and asphalt transition details have been included in the Detail Sheets. This result a new detail sheet was created, Sheet C9.4. We felt pertinent to allow contractor means and methods on fence installation in lieu of detail. A note about mechanical connection for sewer service has been added to the Utility Plan.*

2. Proposed bituminous pavement within the Town right of way should match existing thickness or meet applicable Town standards, whichever is more stringent.

    *To prevent differential heaving/settling the Applicant proposes to match existing bituminous pavement depth. Note has been added to Typical Details.*

3. Material specification for the gravel materials in the details should be designated per Maine Department of Transportation specifications. Pavement materials should also be called out per mix designation and geotextile fabric products should also be specified.

    *Maine DOT material specification references have been added to the Typical Details.*

4. Proposed granite curbing within the Town right of way should meet applicable Town Standards.

    *Note has been added to the Site Plan.*

5. Invert elevations, float, and pump information should be added to the lift station detail on C9.2.

    *Inverts, float, and pump information of proposed sewer force main will be determined by lift station manufacturer and contractor. Rim elevation has been added.*

6. Notes should be added to the retaining wall detail indicating that shop drawings and supporting calculations stamped by a qualified professional engineer shall be provided to the Engineer of Record prior to construction. A description of the retaining wall should be added to the plans along with a product material specification.

    *Note has been added to Retaining Wall Detail and a note regarding type of material has been added to the Site Plan.*

7. Note 1 of the dripline filter details indicates the reservoir course shall be at least 18 inches thick. However, the detail callouts indicate varying depths less than this thickness. The note or dimensions should be adjusted accordingly.

    *The Dripline Filter Detail has been updated.*

**Stormwater Plan Comments:**

1. Per Section 25-1-4 (b), add existing and proposed impervious surface quantities to the Post-Development Plan.

   *Existing and proposed impervious area was added to the Post-Development Plan.*

2. Show and label the dripline filters on the Post Development Plan.

   *Dripline filters have been added and labeled on the Post-Development Plan.*

3. Add proposed contour labels to Post-Development plan.

   *Proposed contour labels have been added to Post-Development Plan.*

4. It appears that the time of concentration (Tc) for sub catchment 1.1B has a segment of sheet flow incorrectly labeled.

   *This label has been corrected on the Post-Development Plan.*

5. Confirm that the eastern boundary considers all off-site flow from the adjacent property to WAP A.

   *This subcatchment line has been adjusted slightly. Areas in HydroCAD have been adjusted accordingly.*

**HydroCAD Model & Calculations:**

1. It appears that some impervious area is not accounted for within the area descriptions for proposed sub catchments 1.1A, 1.1C and 1.2B.

   *Small portions of pathway have been added to these subcatchment areas.*

2. Dripline Filter 2 reaches a peak elevation of 97.91 in the 25-year storm event. Since the 1st FFE is 98, we assume that the dripline will overtop and flow towards Rain Garden 2. Accordingly, we recommend re-routing the dripline overflow (modeled as a weir in HydroCAD) to Rain Garden 2.

   *The dripline filter #2 overflow has been re-routed to Rain Garden 2.*

3. Dripline Filter 3 is modeled up to EL 108, but it appears that proposed grades are equal to or less than EL 107 on that side of the building. Verify and adjust model accordingly.

   *The grades in HydroCAD have been corrected in dripline filter #3.*

4. Dripline Filter 3 reaches a peak elevation of 107.85 in the 25-year storm event. It appears that proposed grades are equal to or less than EL 107 on that side of the building, meaning the dripline filter will overtop. There is a swale proposed on the adjacent lot, but the designer should confirm that the overflow conditions will not impact the neighboring property to the north. Additional drainage infrastructure may need to be installed on the north side of the site to account for the overflow condition and prevent impacts to the abutting property.

*Elevation of dripline filter 3 has been corrected in HydroCAD to match the proposed grading. The peak elevation in the 25-year storm event is less than the proposed grade.*

5. Rain Garden 1 reaches a peak elevation of 103.58 in the 2-year storm event. Additional spot grades should be added to demonstrate that the rain garden does not overflow to Scott Dyer Road. If overflow is expected, we recommend modeling the overflow as a secondary device in order to analyze the impacts to drainage system within Scott Dyer Road.

   *The stormwater model areas have been updated slightly. The Rain Garden 1 overflow has been remodeled to discharge into the catch basin grate. There is still an overflow of 0.2 CFS but it is still a low quantity of discharge in comparison. Overall WAP B Post-Development stormwater is still less than Pre-Development.*

6. The peak water elevation in Rain Garden 1 exceeds its storage capacity and will overflow to Scott Dyer Road in the 25-year event. We recommend providing a means for overflow and re-analyzing the impacts to the drainage system within Scott Dyer Road to ensure that the overflow condition does not affect downstream infrastructure and peak flow rates can still be reduced.

   *The overflow has been re-analyzed and re-modeled in HydroCAD.*

7. Provide supporting calculations that the rain gardens will meet the recommend treatment volumes indicated in MDEP CH 500 standards (i.e., 1-inch x impervious surface areas and 0.4-inches times the landscaped areas). Ponded depths should not exceed 6-inches for the treatment volumes. Calculations should also show drain times for the WQV event.

   *Attached are the sizing calculations for both rain gardens. Our storage depths are 6-inch of ponding above the filter layer and 6-inch within the filter media as described in DEP's BMP.*

8. Please adjust scale of hydrographs in HydroCAD report to show the entire drain down time for the proposed rain gardens.

   *HyrdoCAD reports have been extended to 48 hours.*

Additional comments to address:

- Per the 14 Hill Way Staff Memo on August 18th

  > "In addition, the subdivision amendment will result in the removal of a parking space on lot 2 and this space must be replaced. Three of the four spaces required for lot 2 are located on lot 1, so the applicant could request that the Planning Board allow one more shared space on lot 1 for the benefit of lot 2. It will be challenging to accommodate these adjustments on the site.
  >
  > *As the building use has been altered to be a Short Term Rental, only 4 parking spots are now required per Town Ordinance. A total of 5 parking spots will be provided. As detailed in project description letter the original parking proposal for 8-10 Hill Way only accounted for 1 parking space on Lot 2. While the configuration has changed there is still 1 parking space provided. Remaining spaces to continue to be shared between Lots 1&2.*

- Solid Waste. The applicant is proposing to meet solid waste disposal needs by utilizing the dumpster located on lot 1. A "solid waste" easement will be needed to allow the owners of lot 3 to dispose of solid waste on lot 1.

  *Easement encumbering Lot 1 for the benefit of Lot 3 for the use of solid waste facilities is best done as a recorded document rather than plan element. Applicant suggests a condition of approval for execution and recording of said easement.*

  - The applicant is proposing a landscape buffer on the Hill Way and Scott Dyer Rd sides of the property. This landscaping should be moved out of the right-of-way and onto the lot.

    *Landscaping items have been relocated to within the subject property. The proposed Sugar Maple was replaced with a Kentucky Coffee Tree. These changes are shown on the Landscaping Plan.*

  - Two retaining walls are proposed to create the grade changes needed to count the ground floor as the first floor and meet the nonresidential use requirement. The plans include notes that the walls will be "by others." The note needs to be removed.

    *This note has been removed from the drawing.*

Per the comments above, please find the following revised plans and documents, included in this response submission.

- Revised Full Plan Set
- Revised Stormwater Narrative
- Revised Pre & Post – Development HydroCAD
- Rain Garden Sizing Calculations
- 50% Above Grade Calculations

The Applicant looks forward to working expeditiously with Town Staff and formally requests an expedited review process due to distressed construction timeframe. The Applicant respectfully seeks to make up review process time, delayed due to the public notice oversight.

Sincerely,

Main-Land Development Consultants, Inc.

Richard W. Dunton, P.E.

**Stormwater Control Plan**

14 Hill Way
Cape Elizabeth, Maine

Prepared by:

MAIN-LAND DEVELOPMENT CONSULTANTS, INC.
P.O. Box Q, Livermore Falls, Maine

August 26, 2020

*Site Description & Project Overview*

The subject property is located at 14 Hill Way in Cape Elizabeth, Maine. This lot was previously subdivided into three parcels. The applicant has developed the other two lots within the subdivision. This undeveloped lot of 0.32 acres sits at the intersection of Hill Way and Scott Dyer Road. It currently has a portion of a paved drive, but the majority of the area is undeveloped and grassed.

The existing site is relatively flat, with a gentle slope towards the Scott Dyer Road and Hill way intersection. According to National Resources Conservation Service the entire site is Hydrologic Soil Group D, which is typically associated with poorly draining soils. Surrounding stormwater infrastructure includes a Town owned shallow catch basin on Scott Dyer, located about halfway up the adjacent property line. Another catch basin is in the Lot 1 entrance, owned by the applicant. This catch basin however does discharge into Town infrastructure on Hill Way.

The project proposes a new building that serves as a commercial short-term rental on the 1st floor and a residence occupying the top two floors. Associated parking, walkways, and stormwater control is also proposed development. The project proposes to eliminate 0.02 acres of existing pavement. It will create 0.07 acres of roof area and 0.08 acres of new pavement, paver and gravel walkways. The net impervious area totals 0.13 acres (5,663 sf). The remainder of the parcel is a mix of grass, mulch, and planted landscaping, modeled as grassed lawn to be conservative. These new site features are shown on C2.1 Site Plan.

Lots 1 and 2 of the subdivision created 35,850 sf of new impervious area. Combined with the impervious area proposed in this development of Lot 3, the subdivision totals 41,513 sf, beneath the 43,560 sf thresholds set by Maine DEP for Stormwater Management Law and Cape Elizabeth Chapter 25 Storm Water.

Since the stormwater management plan for the other two lots has been approved by both the Town of Cape Elizabeth and Maine DEP (permit by rule), this stormwater management plan evaluates the treatment and control of run-off on Lot 3 independently and provides full treatment and flow attenuation. As such, downstream impacts are

minimized.

These additions of impervious and developed area require a stormwater management plan to meet Town of Cape Elizabeth standards. A Maine DEP Stormwater Permit by Rule is also required and has been obtained.

*Stormwater Management*

The purpose of a stormwater management plan is to ensure that stormwater leaving the development does not have a significant adverse impact on receiving waterbodies or adjacent properties. The Town of Cape Elizabeth Ordinance states that "The purpose of this Ordinance is to require the disposal of storm water on the land at the site of development through the wise use of the natural features of the site and to regulate storm water and non-storm water Discharges to the Town Storm Water Runoff System as required by federal and state law. Storm water and non-storm water shall be deposed of in a manner so that it does not pose dangers of flooding, soil erosion, pollution of receiving waters, or otherwise constitute a threat to public health, safety or welfare."

To determine stormwater quantity and quality control, the site was modeled in the pre-development and post-development condition, in order to show that stormwater run-off rates do not increase. To compare flow rates during these conditions, Main-Land identified three watershed analysis points (WAP A through WAP C) where stormwater runoff leaves the subject parcel.

The following is a description of the areas flowing to each WAP in the pre- and post-development conditions. HydroCAD version 10.0, was used to model both conditions. As described below the proposed stormwater flows leaving the project site are less than the existing. Following the descriptions, a table summarizing pre and post development flowrates is included. D1.1 Pre-Development and D2.1 Post-Development Plan show these WAP's and their associated flow paths.

*WAP A*

Watershed Analysis Point A is located on the north west corner of the parcel. The run-off in the pre-development condition flows across from the high divide of the parcel to the adjacent lot to the west and to the north. The northerly adjacent lot is owned by the applicant. The area contains grass, pavement and a gravel path.

In the post-development condition, Main-Land proposes a ditch on the lower side of the parking area to capture some of the areas runoff to redirect toward WAP B for treatment. This also reduces runoff to the western adjacent property. A section of roof is included in WAP A. The roof is treated by a dripline filter along the north western side of the proposed building and discharges into a new rip-rap apron behind farmhouse.

*WAP B*

Watershed Analysis Point B is located at the existing catch basin on Scott Dyer Road. The area contains the other portion of the paved drive and grass.

In the post-development model, the majority of the pavement proposed for driveway and parking is drained to a raingarden (RG1). This planted raingarden is located in the south western corner of the parcel and is considered subcatchment 1.1B. As the water filters through the designed layers within the raingarden it is being treated. A four-inch underdrain will then collect the water and direct it to the catch basin on Scott Dyer Road. Subcatchment 1.3B contains a small portion of the roof on the south eastern side of the building. Again, it travels through a dripline filter and connects into the underdrain system before it enters the catch basin. The remaining area contains (subcatchment 1.2B) and is collected at the same catch basin through the grate. While there is a small amount of pavement run-off that is untreated in this subcatchment, the area is smaller than in the existing condition.

*WAP C*

Watershed Analysis Point C is located at the catch basin in the Lot 1 (Cape Integrated Health) entrance. The area is entirely grassed.

In the post-development model, this subcatchment gains largest portion of the roof area. Due to the shallowness of the catch basin on Scott Dyer Road, the underdrain in the dripline filter treating that portion of roof is proposed to discharge into WAP C.

With the amount of excavation required to make the lower level accessible, a downward slope between two retaining walls was required, causing run off to flow into the center of the lot rather than to the street, as in the existing condition. The water that is bound between these two walls and the slope will be graded to collect at another rain garden (RG2). This will not only treat a large portion of lawn area it will also decrease the flow. Any overflow will be controlled by a pond outlet structure in the rain garden. The underdrain will discharge to the new twelve-inch stormdrain via the Type F catch basin outlet structure.

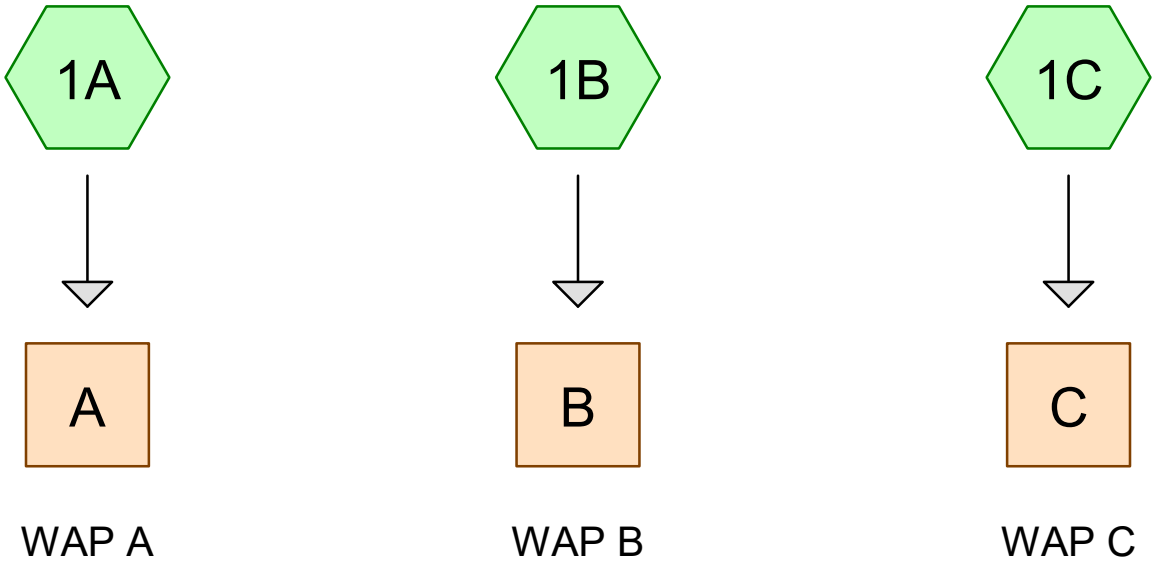
*Conclusion*

To evaluate stormwater quantity, the pre- and post- development stormwater flow rates were compared at WAP A during the 2-year and 25-year storm event. As shown in the table below there is no increase in peak flowrate between each condition in any WAP.

| Storm-Event | WAP | Pre-Development | Post-Development | Change |
|---|---|---|---|---|
| 2-Year | A | 0.09 CFS | 0.07 CFS | -0.02 |
| | B | 0.23 CFS | 0.10 CFS | -0.13 |
| | C | 0.15 CFS | 0.09 CFS | -0.06 |
| 25-Year | A | 0.23 CFS | 0.20 CFS | -0.03 |
| | B | 0.61 CFS | 0.50 CFS | -0.11 |
| | C | 0.41 CFS | 0.30 CFS | -0.11 |

Although the roof drains to three subcatchments, following the roofs pitches and angles,

the entirety is shown being treated by dripline filters. The majority of the new pavement is also being treated by the proposed raingarden. Overall, the majority of stormwater is being treated and there is no increase in stormwater flow rate leaving the site. As such, the proposed stormwater management strategy meets Town of Cape Elizabeth's standards.




Subcat Reach Pond Link

**Routing Diagram for Pre**
Prepared by Main-Land Development, Printed 8/26/2020
HydroCAD® 10.00-24 s/n 01625 © 2018 HydroCAD Software Solutions LLC

## Area Listing (all nodes)

| Area (acres) | CN | Description (subcatchment-numbers) |
|---|---|---|
| 0.300 | 80 | >75% Grass cover, Good, HSG D (1A, 1B, 1C) |
| 0.020 | 98 | Paved parking, HSG D (1A, 1B) |

## Soil Listing (all nodes)

| Area (acres) | Soil Group | Subcatchment Numbers |
|---|---|---|
| 0.000 | HSG A | |
| 0.000 | HSG B | |
| 0.000 | HSG C | |
| 0.320 | HSG D | 1A, 1B, 1C |
| 0.000 | Other | |

## Ground Covers (all nodes)

| HSG-A (acres) | HSG-B (acres) | HSG-C (acres) | HSG-D (acres) | Other (acres) | Total (acres) | Ground Cover | Subcatchment Numbers |
|---|---|---|---|---|---|---|---|
| 0.000 | 0.000 | 0.000 | 0.300 | 0.000 | 0.300 | >75% Grass cover, Good | 1A, 1B, 1C |
| 0.000 | 0.000 | 0.000 | 0.020 | 0.000 | 0.020 | Paved parking | 1A, 1B |

Time span=5.00-48.00 hrs, dt=0.05 hrs, 861 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 1A:** Runoff Area=0.050 ac 20.00% Impervious Runoff Depth=1.60"
Flow Length=50' Slope=0.0200 '/' Tc=5.7 min CN=84 Runoff=0.09 cfs 0.007 af

**Subcatchment 1B:** Runoff Area=0.160 ac 6.25% Impervious Runoff Depth=1.39"
Flow Length=102' Slope=0.0250 '/' Tc=9.3 min CN=81 Runoff=0.23 cfs 0.019 af

**Subcatchment 1C:** Runoff Area=0.110 ac 0.00% Impervious Runoff Depth=1.33"
Flow Length=107' Slope=0.0280 '/' Tc=9.2 min CN=80 Runoff=0.15 cfs 0.012 af

**Reach A: WAP A** Inflow=0.09 cfs 0.007 af
Outflow=0.09 cfs 0.007 af

**Reach B: WAP B** Inflow=0.23 cfs 0.019 af
Outflow=0.23 cfs 0.019 af

**Reach C: WAP C** Inflow=0.15 cfs 0.012 af
Outflow=0.15 cfs 0.012 af

## Summary for Subcatchment 1A:

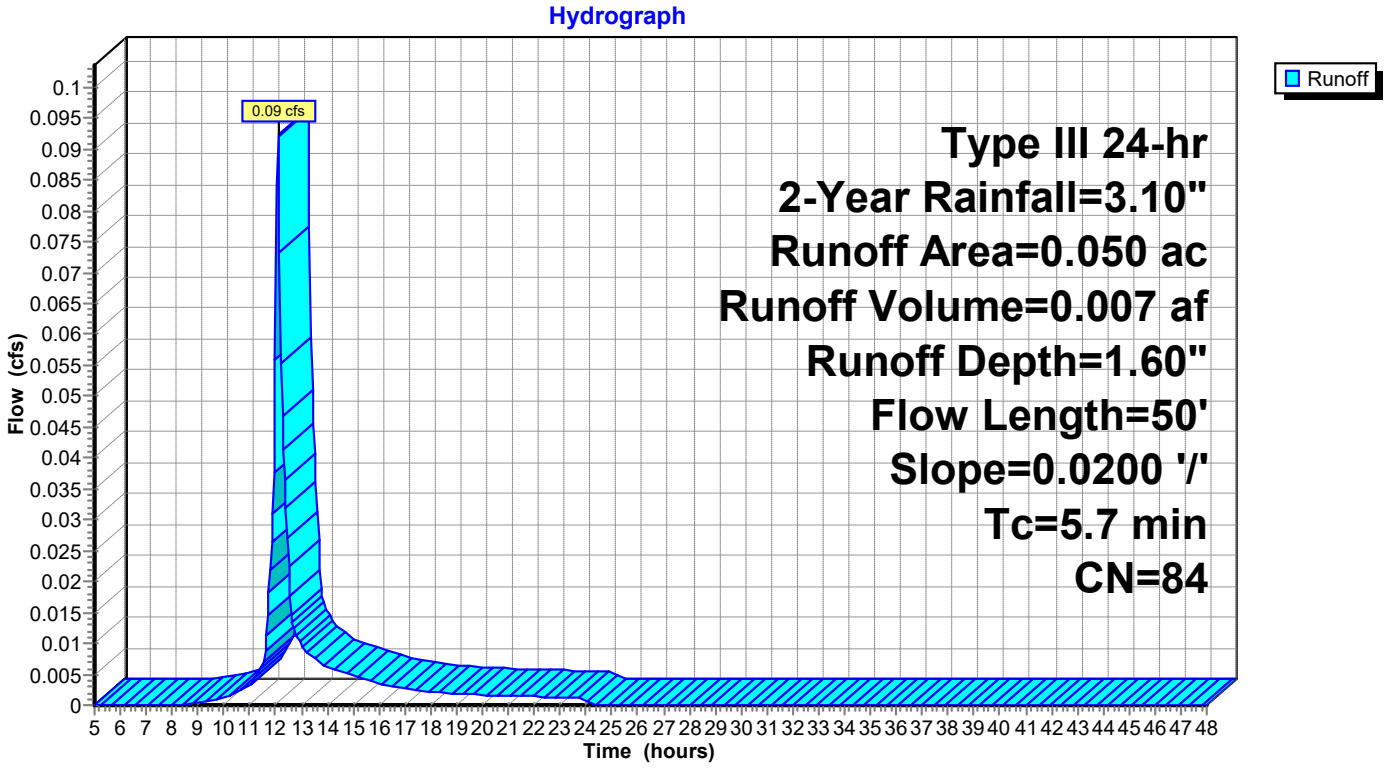
Runoff = 0.09 cfs @ 12.09 hrs, Volume= 0.007 af, Depth= 1.60"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 5.00-48.00 hrs, dt= 0.05 hrs
Type III 24-hr 2-Year Rainfall=3.10"

| Area (ac) | CN | Description |
|---|---|---|
| 0.040 | 80 | >75% Grass cover, Good, HSG D |
| 0.010 | 98 | Paved parking, HSG D |
| 0.050 | 84 | Weighted Average |
| 0.040 | | 80.00% Pervious Area |
| 0.010 | | 20.00% Impervious Area |

| Tc (min) | Length (feet) | Slope (ft/ft) | Velocity (ft/sec) | Capacity (cfs) | Description |
|---|---|---|---|---|---|
| 5.7 | 50 | 0.0200 | 0.15 | | **Sheet Flow,** Grass: Short n= 0.150 P2= 3.10" |

## Subcatchment 1A:



## Summary for Subcatchment 1B:

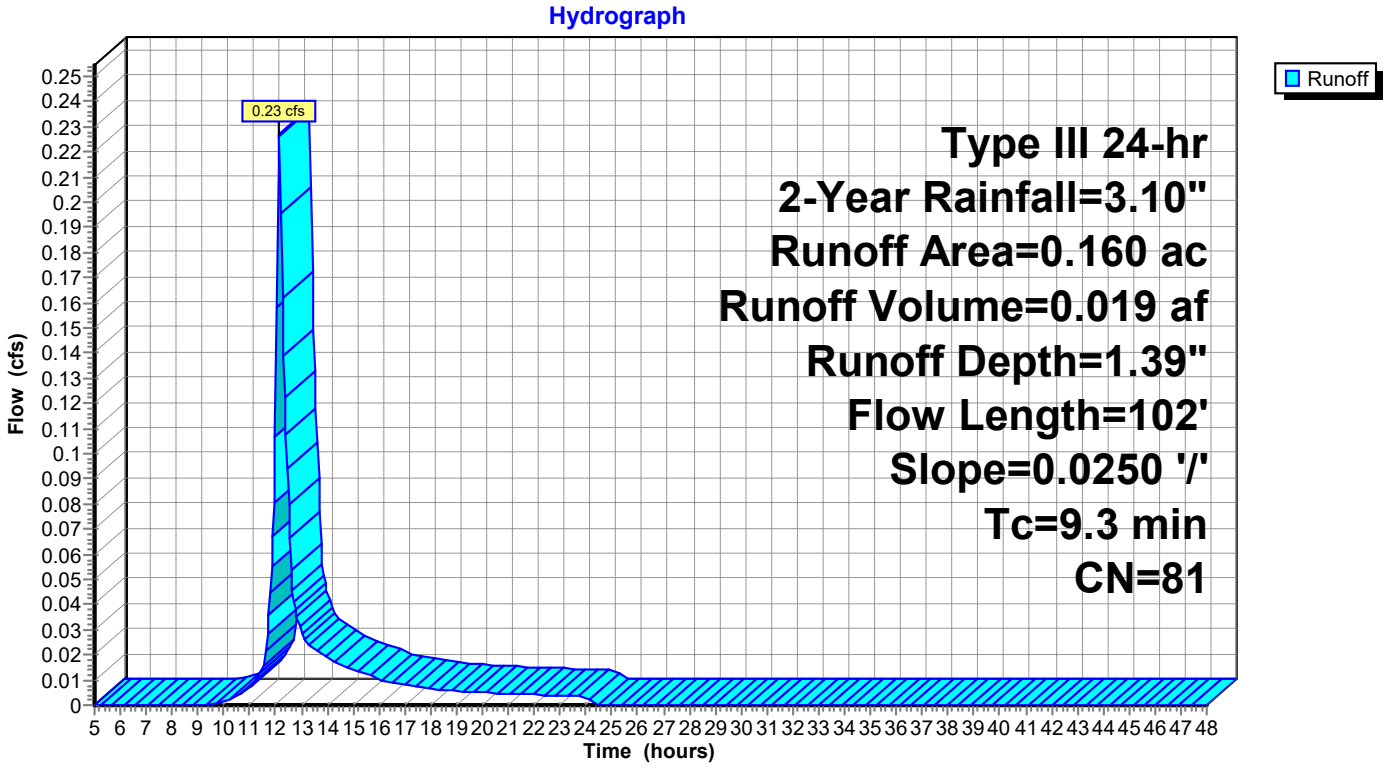
Runoff = 0.23 cfs @ 12.14 hrs, Volume= 0.019 af, Depth= 1.39"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 5.00-48.00 hrs, dt= 0.05 hrs
Type III 24-hr 2-Year Rainfall=3.10"

| Area (ac) | CN | Description |
|---|---|---|
| 0.150 | 80 | >75% Grass cover, Good, HSG D |
| 0.010 | 98 | Paved parking, HSG D |
| 0.160 | 81 | Weighted Average |
| 0.150 | | 93.75% Pervious Area |
| 0.010 | | 6.25% Impervious Area |

| Tc (min) | Length (feet) | Slope (ft/ft) | Velocity (ft/sec) | Capacity (cfs) | Description |
|---|---|---|---|---|---|
| 9.3 | 102 | 0.0250 | 0.18 | | **Sheet Flow,** Grass: Short n= 0.150 P2= 3.10" |

## Subcatchment 1B:



## Summary for Subcatchment 1C:

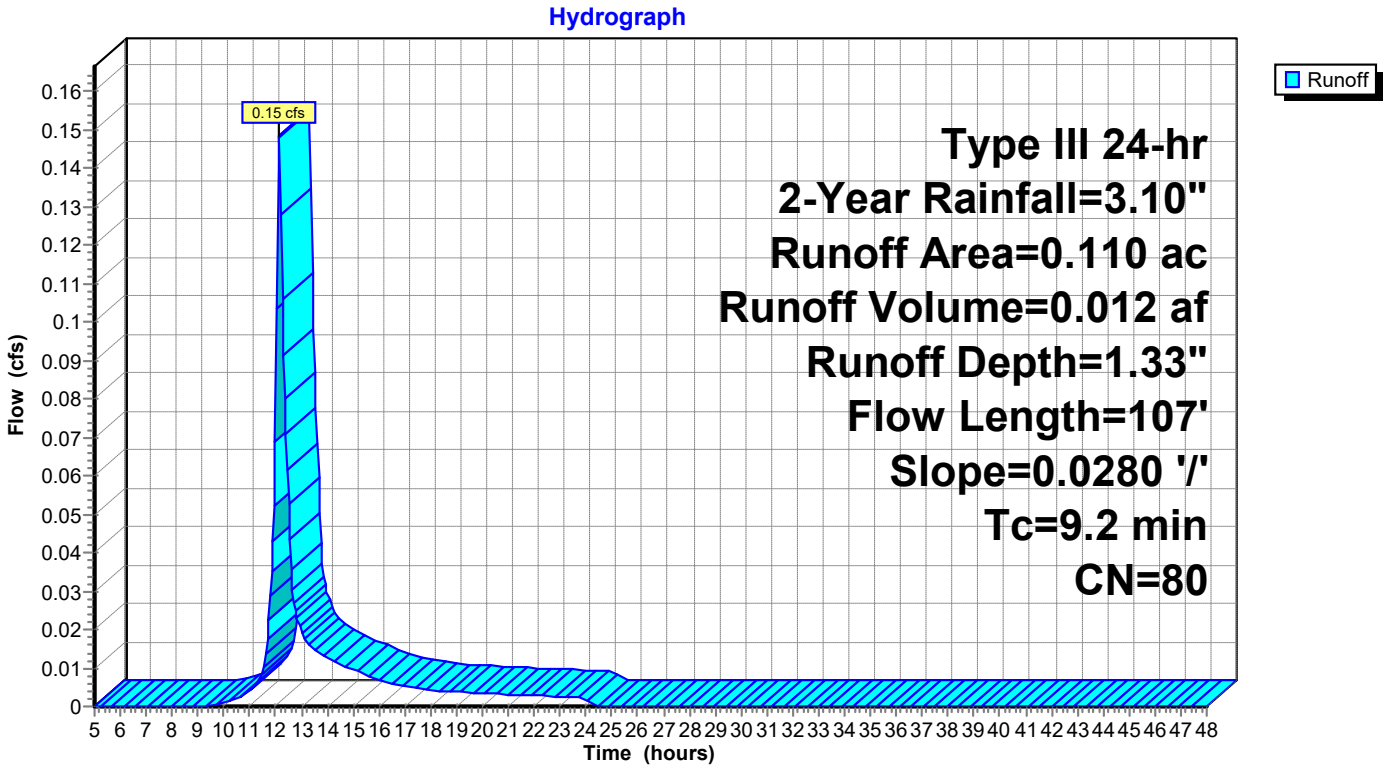
Runoff = 0.15 cfs @ 12.14 hrs, Volume= 0.012 af, Depth= 1.33"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 5.00-48.00 hrs, dt= 0.05 hrs
Type III 24-hr 2-Year Rainfall=3.10"

| Area (ac) | CN | Description |
|---|---|---|
| 0.110 | 80 | >75% Grass cover, Good, HSG D |
| 0.110 | | 100.00% Pervious Area |

| Tc (min) | Length (feet) | Slope (ft/ft) | Velocity (ft/sec) | Capacity (cfs) | Description |
|---|---|---|---|---|---|
| 9.2 | 107 | 0.0280 | 0.19 | | **Sheet Flow,** Grass: Short n= 0.150 P2= 3.10" |

## Subcatchment 1C:

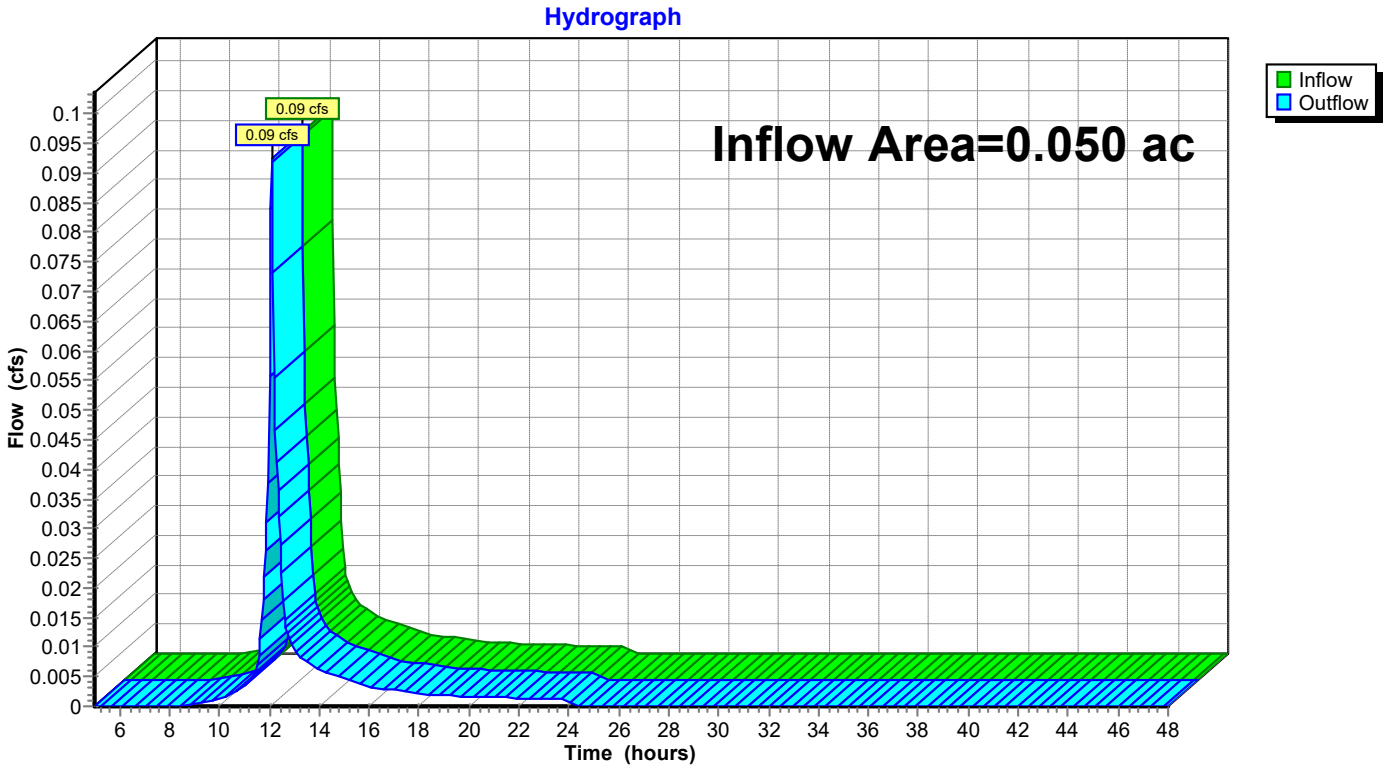


## Summary for Reach A: WAP A

Inflow Area = 0.050 ac, 20.00% Impervious, Inflow Depth = 1.60" for 2-Year event
Inflow = 0.09 cfs @ 12.09 hrs, Volume= 0.007 af
Outflow = 0.09 cfs @ 12.09 hrs, Volume= 0.007 af, Atten= 0%, Lag= 0.0 min

Routing by Stor-Ind+Trans method, Time Span= 5.00-48.00 hrs, dt= 0.05 hrs

### Reach A: WAP A

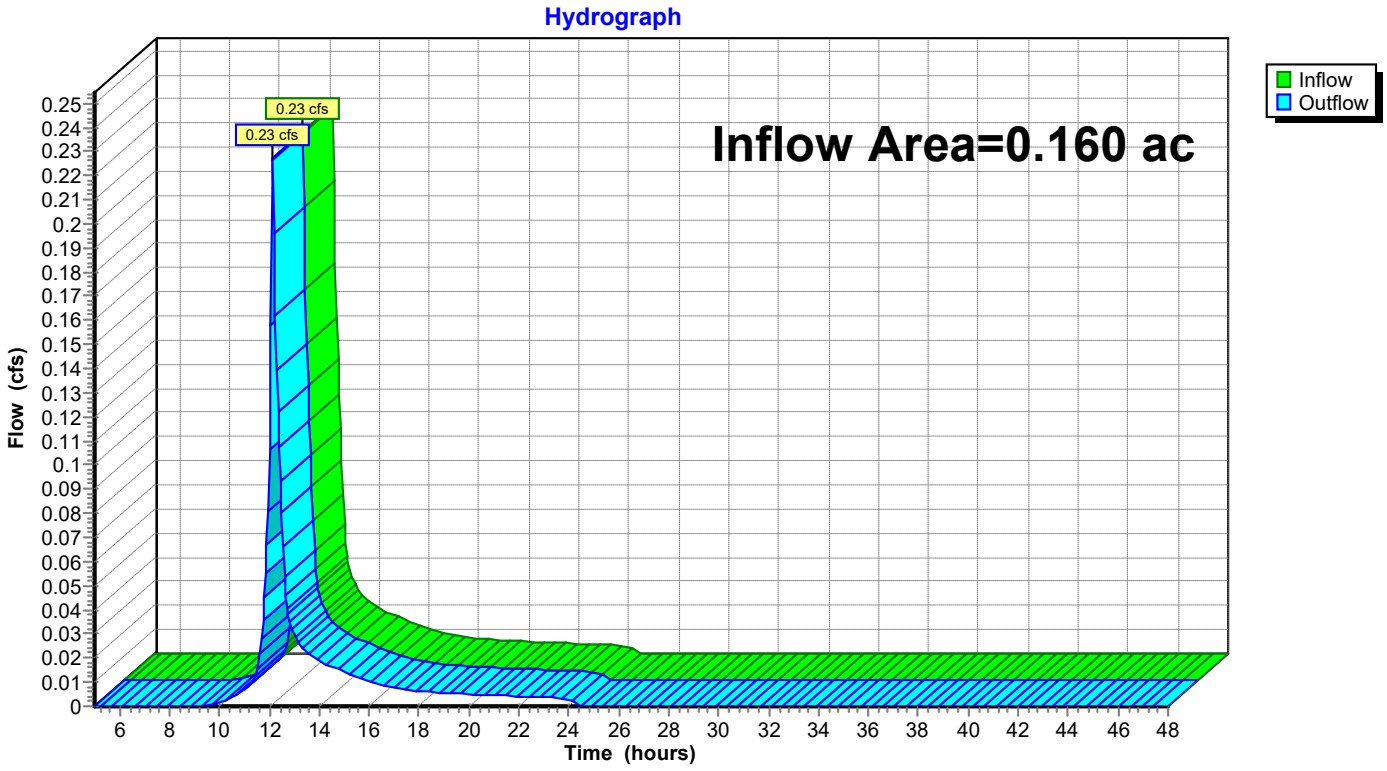


## Summary for Reach B: WAP B

Inflow Area = 0.160 ac, 6.25% Impervious, Inflow Depth = 1.39" for 2-Year event
Inflow = 0.23 cfs @ 12.14 hrs, Volume= 0.019 af
Outflow = 0.23 cfs @ 12.14 hrs, Volume= 0.019 af, Atten= 0%, Lag= 0.0 min

Routing by Stor-Ind+Trans method, Time Span= 5.00-48.00 hrs, dt= 0.05 hrs

## Reach B: WAP B

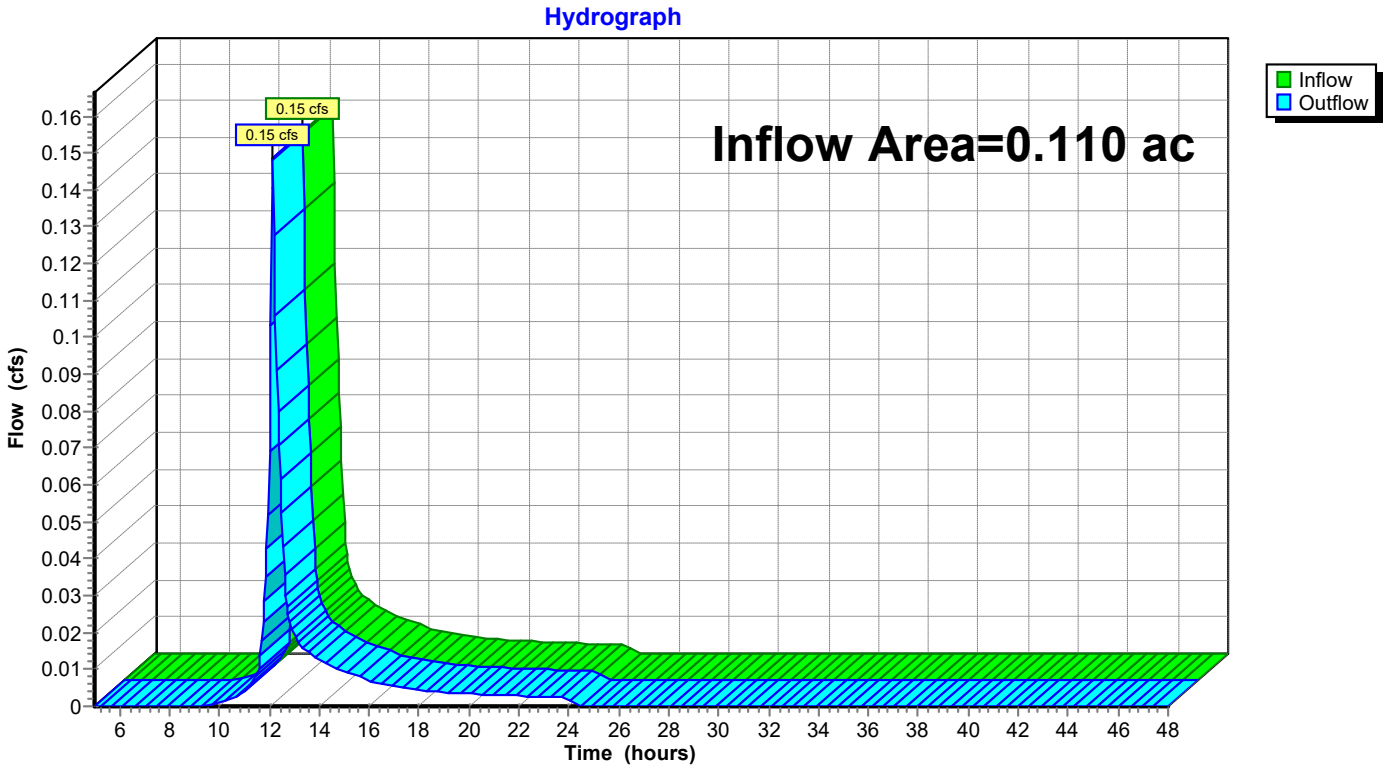


## Summary for Reach C: WAP C

Inflow Area = 0.110 ac, 0.00% Impervious, Inflow Depth = 1.33" for 2-Year event
Inflow = 0.15 cfs @ 12.14 hrs, Volume= 0.012 af
Outflow = 0.15 cfs @ 12.14 hrs, Volume= 0.012 af, Atten= 0%, Lag= 0.0 min

Routing by Stor-Ind+Trans method, Time Span= 5.00-48.00 hrs, dt= 0.05 hrs

## Reach C: WAP C



Time span=5.00-48.00 hrs, dt=0.05 hrs, 861 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 1A:** Runoff Area=0.050 ac 20.00% Impervious Runoff Depth=4.01"
Flow Length=50' Slope=0.0200 '/' Tc=5.7 min CN=84 Runoff=0.23 cfs 0.017 af

**Subcatchment 1B:** Runoff Area=0.160 ac 6.25% Impervious Runoff Depth=3.70"
Flow Length=102' Slope=0.0250 '/' Tc=9.3 min CN=81 Runoff=0.61 cfs 0.049 af

**Subcatchment 1C:** Runoff Area=0.110 ac 0.00% Impervious Runoff Depth=3.60"
Flow Length=107' Slope=0.0280 '/' Tc=9.2 min CN=80 Runoff=0.41 cfs 0.033 af

**Reach A: WAP A** Inflow=0.23 cfs 0.017 af
Outflow=0.23 cfs 0.017 af

**Reach B: WAP B** Inflow=0.61 cfs 0.049 af
Outflow=0.61 cfs 0.049 af

**Reach C: WAP C** Inflow=0.41 cfs 0.033 af
Outflow=0.41 cfs 0.033 af

## Summary for Subcatchment 1A:

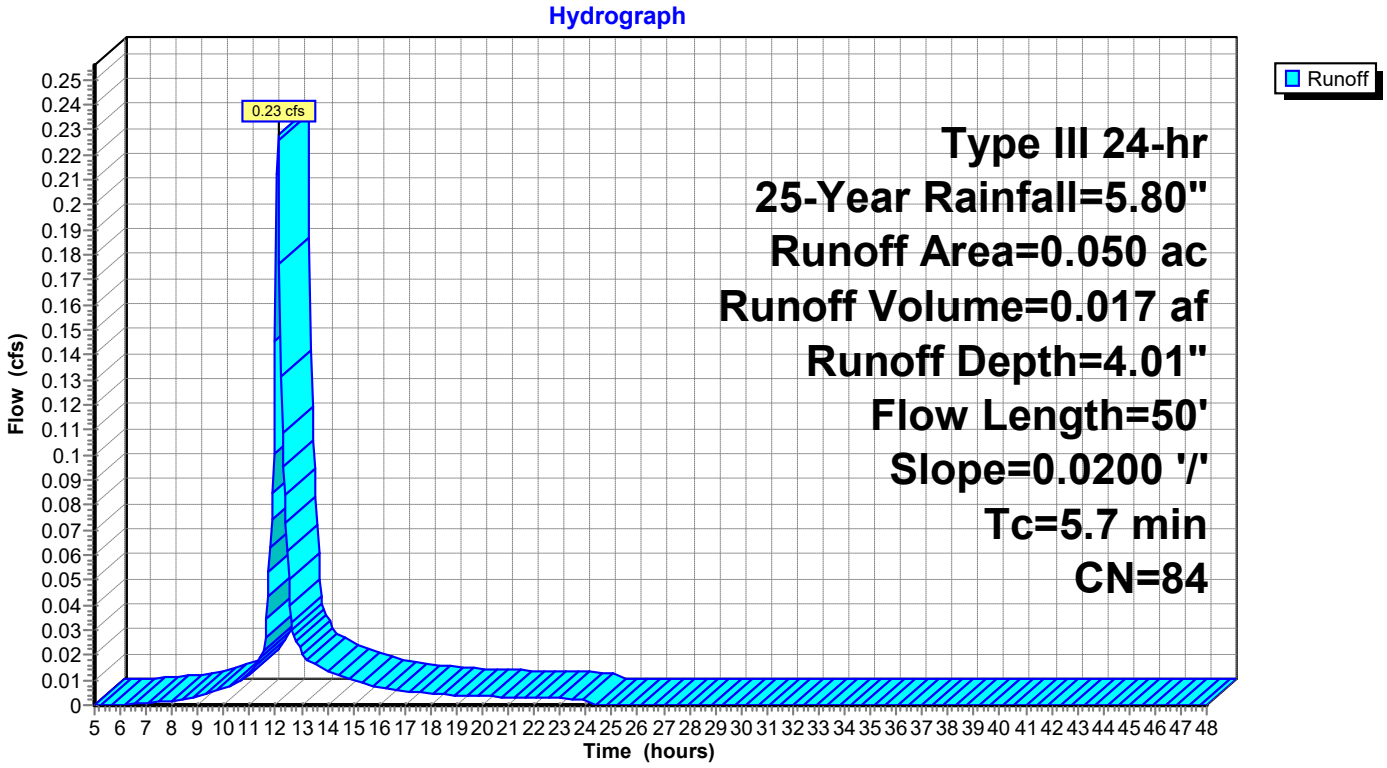
Runoff = 0.23 cfs @ 12.09 hrs, Volume= 0.017 af, Depth= 4.01"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 5.00-48.00 hrs, dt= 0.05 hrs
Type III 24-hr 25-Year Rainfall=5.80"

| Area (ac) | CN | Description |
|---|---|---|
| 0.040 | 80 | >75% Grass cover, Good, HSG D |
| 0.010 | 98 | Paved parking, HSG D |
| 0.050 | 84 | Weighted Average |
| 0.040 | | 80.00% Pervious Area |
| 0.010 | | 20.00% Impervious Area |

| Tc (min) | Length (feet) | Slope (ft/ft) | Velocity (ft/sec) | Capacity (cfs) | Description |
|---|---|---|---|---|---|
| 5.7 | 50 | 0.0200 | 0.15 | | **Sheet Flow,** Grass: Short n= 0.150 P2= 3.10" |

## Subcatchment 1A:



## Summary for Subcatchment 1B:

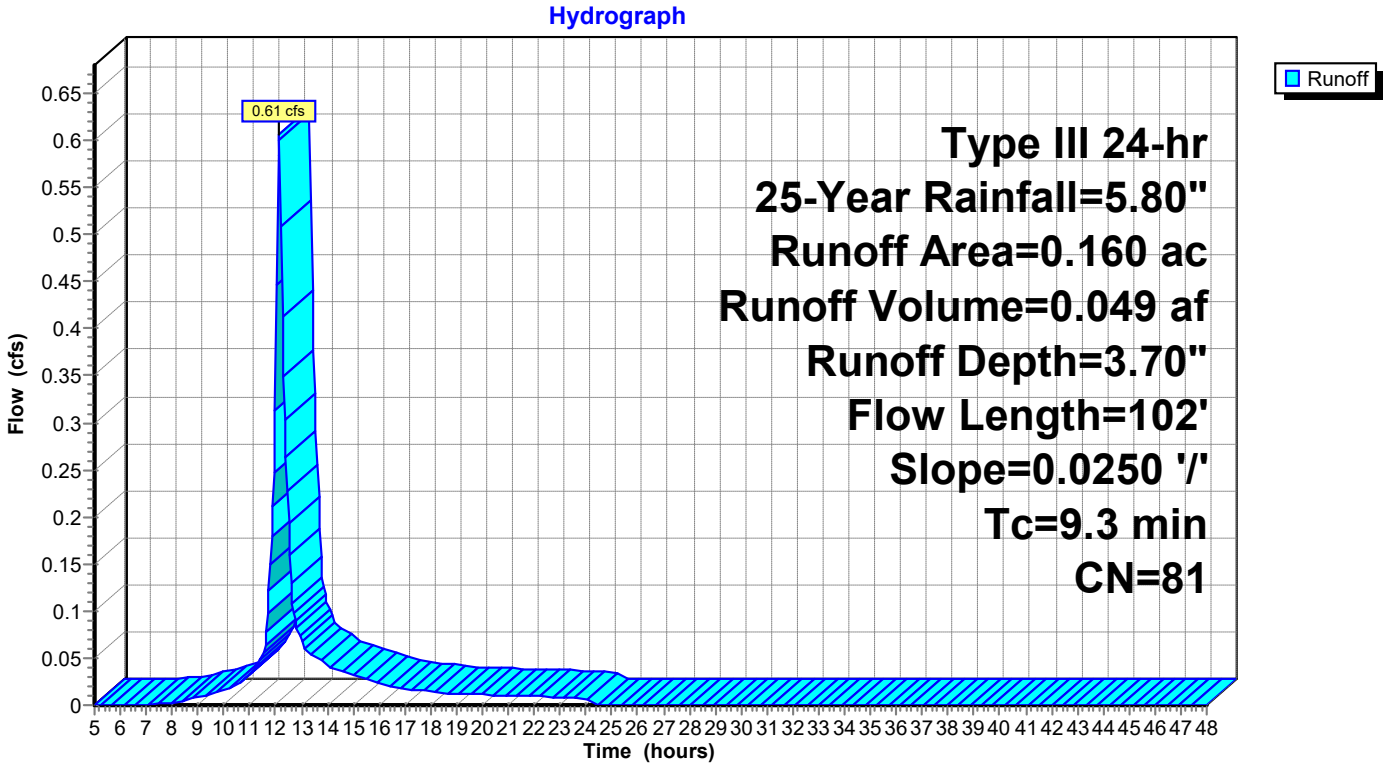
Runoff = 0.61 cfs @ 12.13 hrs, Volume= 0.049 af, Depth= 3.70"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 5.00-48.00 hrs, dt= 0.05 hrs
Type III 24-hr 25-Year Rainfall=5.80"

| Area (ac) | CN | Description |
|---|---|---|
| 0.150 | 80 | >75% Grass cover, Good, HSG D |
| 0.010 | 98 | Paved parking, HSG D |
| 0.160 | 81 | Weighted Average |
| 0.150 | | 93.75% Pervious Area |
| 0.010 | | 6.25% Impervious Area |

| Tc (min) | Length (feet) | Slope (ft/ft) | Velocity (ft/sec) | Capacity (cfs) | Description |
|---|---|---|---|---|---|
| 9.3 | 102 | 0.0250 | 0.18 | | **Sheet Flow,** Grass: Short n= 0.150 P2= 3.10" |

## Subcatchment 1B:



## Summary for Subcatchment 1C:

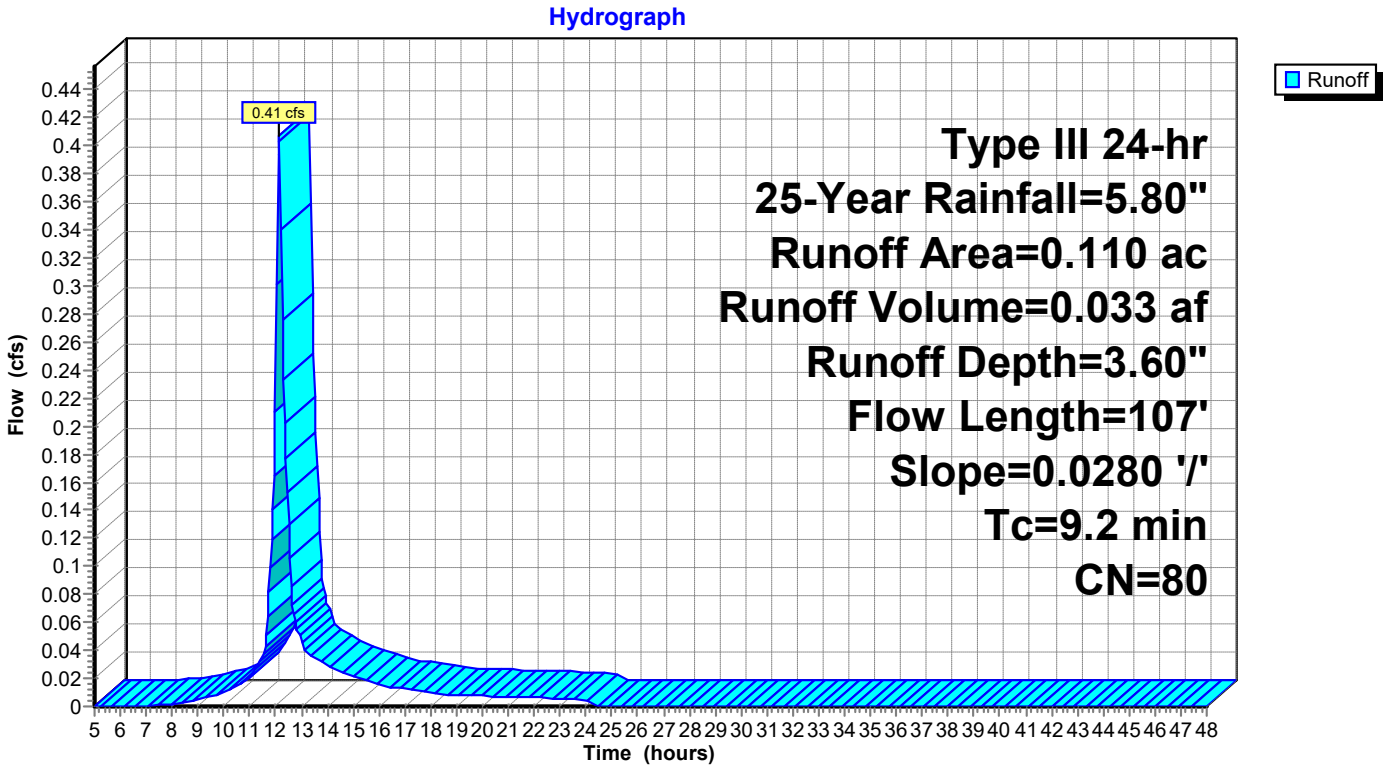
Runoff = 0.41 cfs @ 12.13 hrs, Volume= 0.033 af, Depth= 3.60"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 5.00-48.00 hrs, dt= 0.05 hrs
Type III 24-hr 25-Year Rainfall=5.80"

| Area (ac) | CN | Description |
|---|---|---|
| 0.110 | 80 | >75% Grass cover, Good, HSG D |
| 0.110 | | 100.00% Pervious Area |

| Tc (min) | Length (feet) | Slope (ft/ft) | Velocity (ft/sec) | Capacity (cfs) | Description |
|---|---|---|---|---|---|
| 9.2 | 107 | 0.0280 | 0.19 | | **Sheet Flow,** Grass: Short n= 0.150 P2= 3.10" |

## Subcatchment 1C:

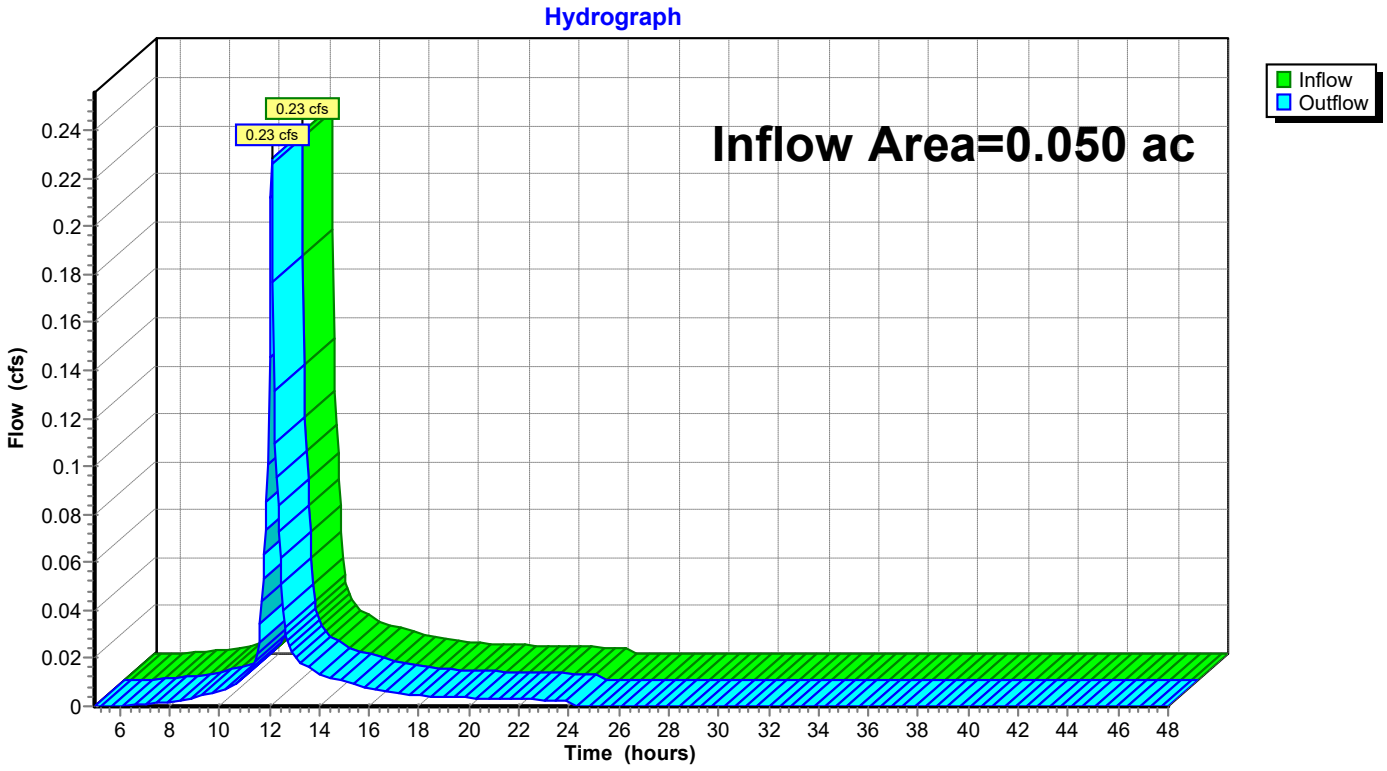


## Summary for Reach A: WAP A

Inflow Area = 0.050 ac, 20.00% Impervious, Inflow Depth = 4.01" for 25-Year event
Inflow = 0.23 cfs @ 12.09 hrs, Volume= 0.017 af
Outflow = 0.23 cfs @ 12.09 hrs, Volume= 0.017 af, Atten= 0%, Lag= 0.0 min

Routing by Stor-Ind+Trans method, Time Span= 5.00-48.00 hrs, dt= 0.05 hrs

### Reach A: WAP A

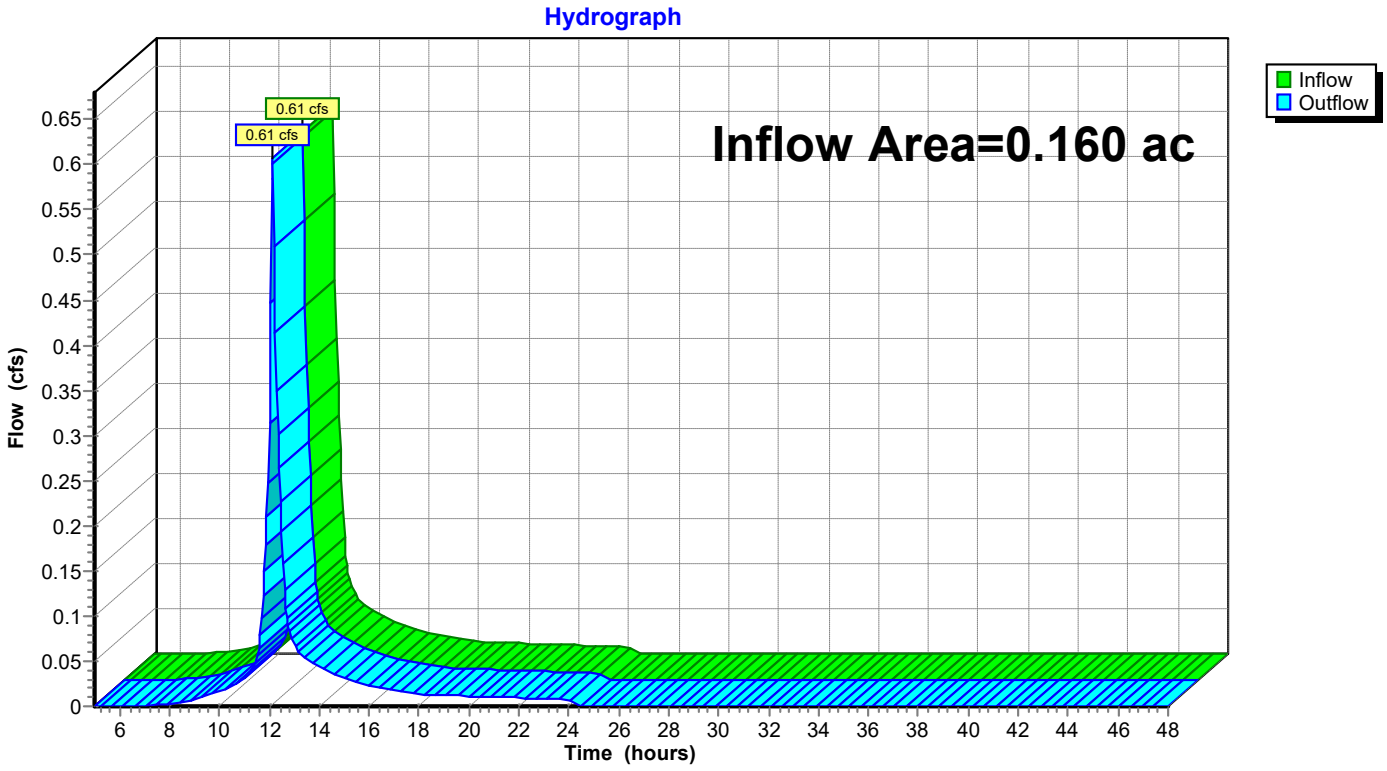


## Summary for Reach B: WAP B

Inflow Area = 0.160 ac, 6.25% Impervious, Inflow Depth = 3.70" for 25-Year event
Inflow = 0.61 cfs @ 12.13 hrs, Volume= 0.049 af
Outflow = 0.61 cfs @ 12.13 hrs, Volume= 0.049 af, Atten= 0%, Lag= 0.0 min

Routing by Stor-Ind+Trans method, Time Span= 5.00-48.00 hrs, dt= 0.05 hrs

## Reach B: WAP B

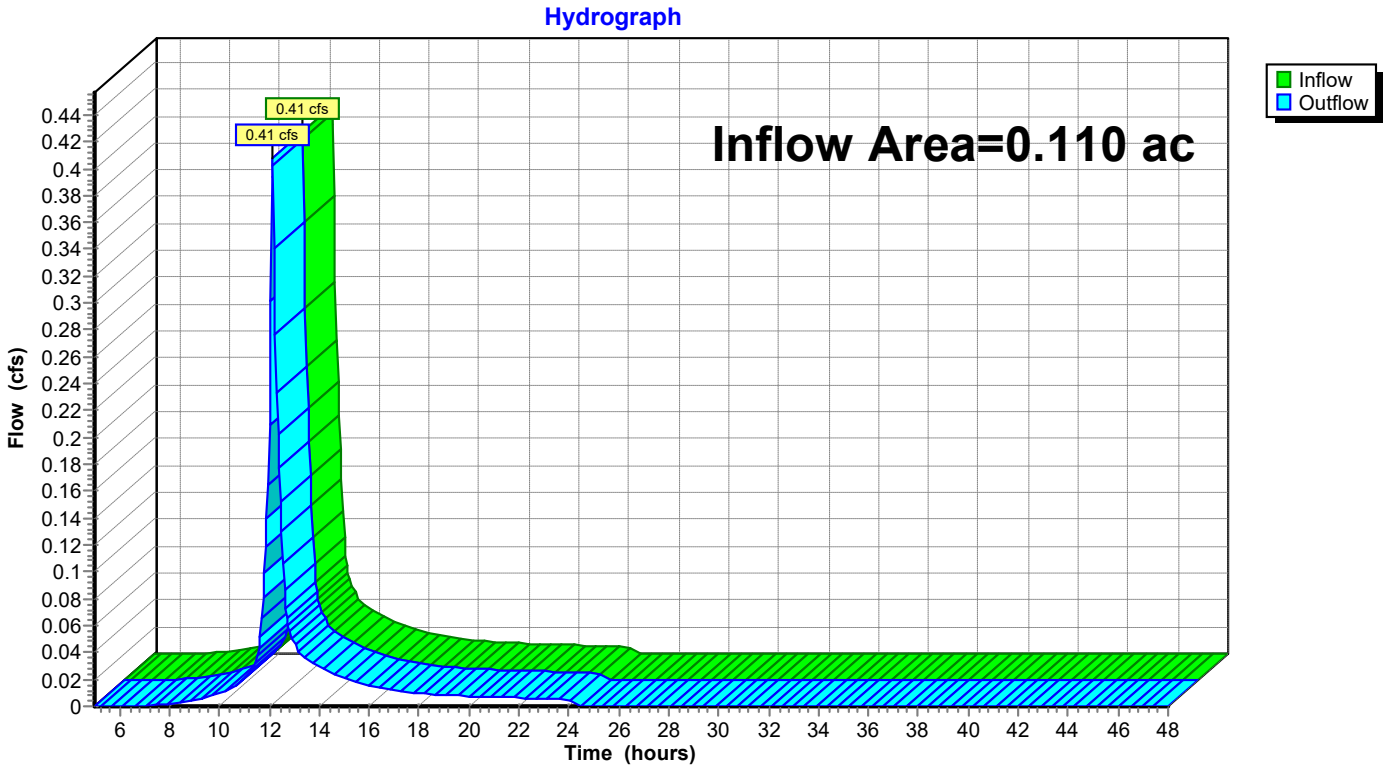


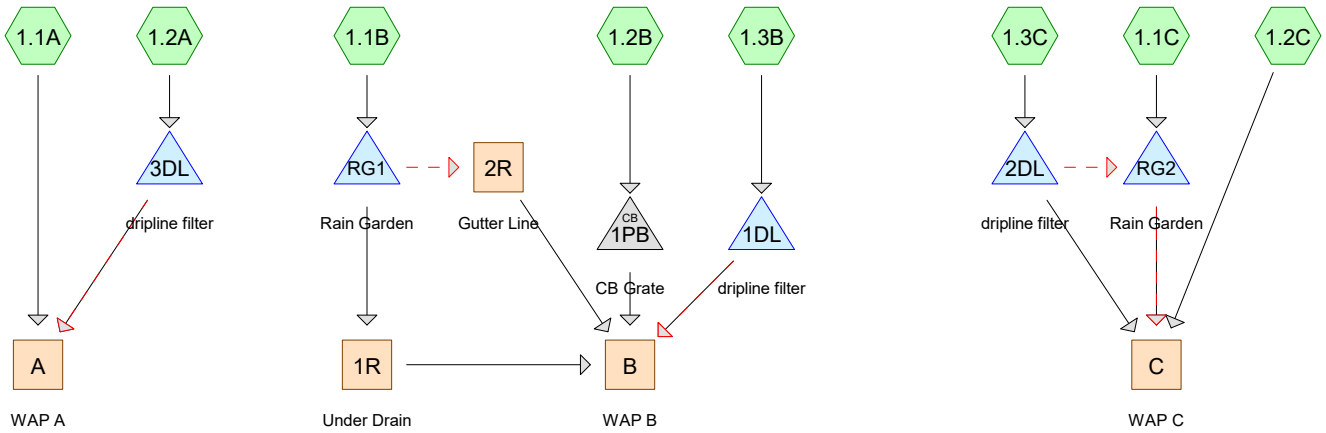
## Summary for Reach C: WAP C

Inflow Area = 0.110 ac, 0.00% Impervious, Inflow Depth = 3.60" for 25-Year event
Inflow = 0.41 cfs @ 12.13 hrs, Volume= 0.033 af
Outflow = 0.41 cfs @ 12.13 hrs, Volume= 0.033 af, Atten= 0%, Lag= 0.0 min

Routing by Stor-Ind+Trans method, Time Span= 5.00-48.00 hrs, dt= 0.05 hrs

## Reach C: WAP C






Subcat Reach Pond Link

**Routing Diagram for Post**
Prepared by Main-Land Development, Printed 8/26/2020
HydroCAD® 10.00-24 s/n 01625 © 2018 HydroCAD Software Solutions LLC

## Area Listing (all nodes)

| Area (acres) | CN | Description (subcatchment-numbers) |
|---|---|---|
| 0.180 | 80 | >75% Grass cover, Good, HSG D (1.1A, 1.1B, 1.1C, 1.2A, 1.2B, 1.2C, 1.3C) |
| 0.052 | 98 | Paved parking, HSG D (1.1B, 1.1C) |
| 0.005 | 98 | Pavement & Walk (1.2B) |
| 0.080 | 98 | Roof (1.2A, 1.3B, 1.3C) |

## Soil Listing (all nodes)

| Area (acres) | Soil Group | Subcatchment Numbers |
|---|---|---|
| 0.000 | HSG A | |
| 0.000 | HSG B | |
| 0.000 | HSG C | |
| 0.232 | HSG D | 1.1A, 1.1B, 1.1C, 1.2A, 1.2B, 1.2C, 1.3C |
| 0.085 | Other | 1.2A, 1.2B, 1.3B, 1.3C |

## Ground Covers (all nodes)

| HSG-A (acres) | HSG-B (acres) | HSG-C (acres) | HSG-D (acres) | Other (acres) | Total (acres) | Ground Cover | Subcatchment Numbers |
|---|---|---|---|---|---|---|---|
| 0.000 | 0.000 | 0.000 | 0.180 | 0.000 | 0.180 | >75% Grass cover, Good | 1.1A, 1.1B, 1.1C, 1.2A, 1.2B, 1.2C, 1.3C |
| 0.000 | 0.000 | 0.000 | 0.052 | 0.000 | 0.052 | Paved parking | 1.1B, 1.1C |
| 0.000 | 0.000 | 0.000 | 0.000 | 0.005 | 0.005 | Pavement & Walk | 1.2B |
| 0.000 | 0.000 | 0.000 | 0.000 | 0.080 | 0.080 | Roof | 1.2A, 1.3B, 1.3C |

## Pipe Listing (all nodes)

| Line# | Node Number | In-Invert (feet) | Out-Invert (feet) | Length (feet) | Slope (ft/ft) | n | Diam/Width (inches) | Height (inches) | Inside-Fill (inches) |
|---|---|---|---|---|---|---|---|---|---|
| 1 | 1R | 100.20 | 99.00 | 70.0 | 0.0171 | 0.010 | 4.0 | 0.0 | 0.0 |

Time span=5.00-48.00 hrs, dt=0.05 hrs, 861 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 1.1A:** Runoff Area=0.020 ac 0.00% Impervious Runoff Depth=1.33"
Flow Length=19' Slope=0.0900 '/' Tc=1.4 min CN=80 Runoff=0.03 cfs 0.002 af

**Subcatchment 1.1B:** Runoff Area=0.070 ac 71.43% Impervious Runoff Depth>2.35"
Flow Length=79' Slope=0.0600 '/' Tc=0.5 min CN=93 Runoff=0.21 cfs 0.014 af

**Subcatchment 1.1C:** Runoff Area=0.082 ac 2.44% Impervious Runoff Depth=1.33"
Flow Length=54' Slope=0.0080 '/' Tc=8.8 min CN=80 Runoff=0.11 cfs 0.009 af

**Subcatchment 1.2A:** Runoff Area=0.050 ac 60.00% Impervious Runoff Depth=2.16"
Flow Length=13' Slope=0.3300 '/' Tc=0.1 min CN=91 Runoff=0.14 cfs 0.009 af

**Subcatchment 1.2B:** Runoff Area=0.015 ac 33.33% Impervious Runoff Depth=1.75"
Flow Length=42' Slope=0.0700 '/' Tc=3.0 min CN=86 Runoff=0.03 cfs 0.002 af

**Subcatchment 1.2C:** Runoff Area=0.020 ac 0.00% Impervious Runoff Depth=1.33"
Flow Length=38' Slope=0.0500 '/' Tc=3.2 min CN=80 Runoff=0.03 cfs 0.002 af

**Subcatchment 1.3B:** Runoff Area=0.010 ac 100.00% Impervious Runoff Depth>2.81"
Flow Length=13' Slope=0.3300 '/' Tc=0.1 min CN=98 Runoff=0.03 cfs 0.002 af

**Subcatchment 1.3C:** Runoff Area=0.050 ac 80.00% Impervious Runoff Depth>2.44"
Flow Length=22' Slope=0.3300 '/' Tc=0.1 min CN=94 Runoff=0.16 cfs 0.010 af

**Reach 1R: Under Drain** Avg. Flow Depth=0.05' Max Vel=1.92 fps Inflow=0.02 cfs 0.012 af
4.0" Round Pipe n=0.010 L=70.0' S=0.0171 '/' Capacity=0.32 cfs Outflow=0.02 cfs 0.012 af

**Reach 2R: Gutter Line** Avg. Flow Depth=0.05' Max Vel=1.23 fps Inflow=0.07 cfs 0.001 af
n=0.016 L=60.0' S=0.0280 '/' Capacity=38.04 cfs Outflow=0.06 cfs 0.001 af

**Reach A: WAP A** Inflow=0.07 cfs 0.011 af
Outflow=0.07 cfs 0.011 af

**Reach B: WAP B** Inflow=0.10 cfs 0.018 af
Outflow=0.10 cfs 0.018 af

**Reach C: WAP C** Inflow=0.09 cfs 0.021 af
Outflow=0.09 cfs 0.021 af

**Pond 1DL: dripline filter** Peak Elev=105.21' Storage=23 cf Inflow=0.03 cfs 0.002 af
Primary=0.01 cfs 0.002 af Secondary=0.00 cfs 0.000 af Outflow=0.01 cfs 0.002 af

**Pond 1PB: CB Grate** Peak Elev=101.43' Inflow=0.03 cfs 0.002 af
Outflow=0.03 cfs 0.002 af

**Pond 2DL: dripline filter** Peak Elev=97.66' Storage=115 cf Inflow=0.16 cfs 0.010 af
Primary=0.04 cfs 0.010 af Secondary=0.00 cfs 0.000 af Outflow=0.04 cfs 0.010 af

**Pond 3DL: dripline filter** Peak Elev=104.95' Storage=99 cf Inflow=0.14 cfs 0.009 af
Primary=0.03 cfs 0.009 af Secondary=0.00 cfs 0.000 af Outflow=0.03 cfs 0.009 af

**Pond RG1: Rain Garden**

Peak Elev=103.12' Storage=180 cf Inflow=0.21 cfs 0.014 af
Primary=0.02 cfs 0.012 af Secondary=0.07 cfs 0.001 af Outflow=0.09 cfs 0.014 af

**Pond RG2: Rain Garden**

Peak Elev=96.88' Storage=129 cf Inflow=0.11 cfs 0.009 af
Primary=0.02 cfs 0.009 af Secondary=0.00 cfs 0.000 af Outflow=0.02 cfs 0.009 af

## Summary for Subcatchment 1.1A:

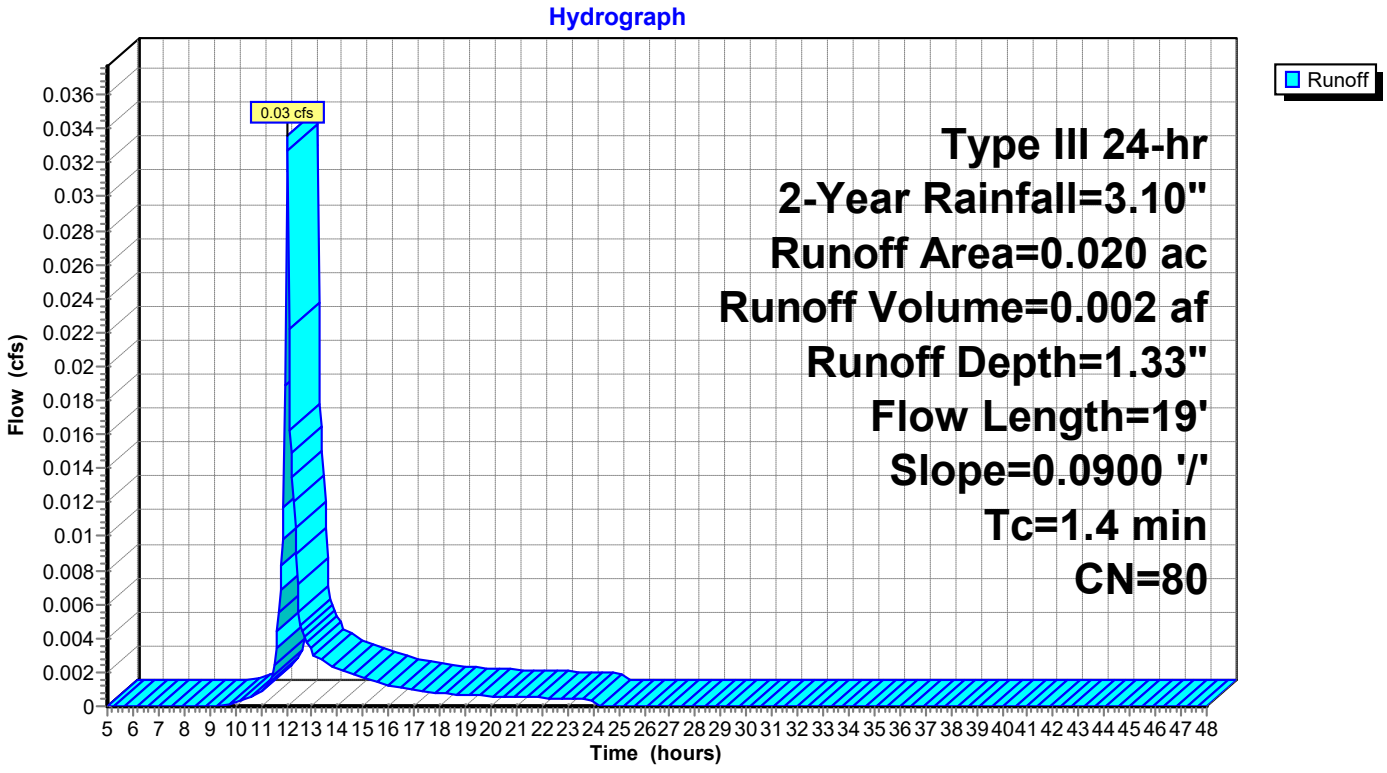
Runoff = 0.03 cfs @ 12.03 hrs, Volume= 0.002 af, Depth= 1.33"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 5.00-48.00 hrs, dt= 0.05 hrs
Type III 24-hr 2-Year Rainfall=3.10"

| Area (ac) | CN | Description |
|---|---|---|
| 0.020 | 80 | >75% Grass cover, Good, HSG D |
| 0.000 | 96 | Gravel surface, HSG D |
| 0.020 | 80 | Weighted Average |
| 0.020 | | 100.00% Pervious Area |

| Tc (min) | Length (feet) | Slope (ft/ft) | Velocity (ft/sec) | Capacity (cfs) | Description |
|---|---|---|---|---|---|
| 1.4 | 19 | 0.0900 | 0.22 | | **Sheet Flow,** Grass: Short n= 0.150 P2= 3.10" |

## Subcatchment 1.1A:



## Summary for Subcatchment 1.1B:

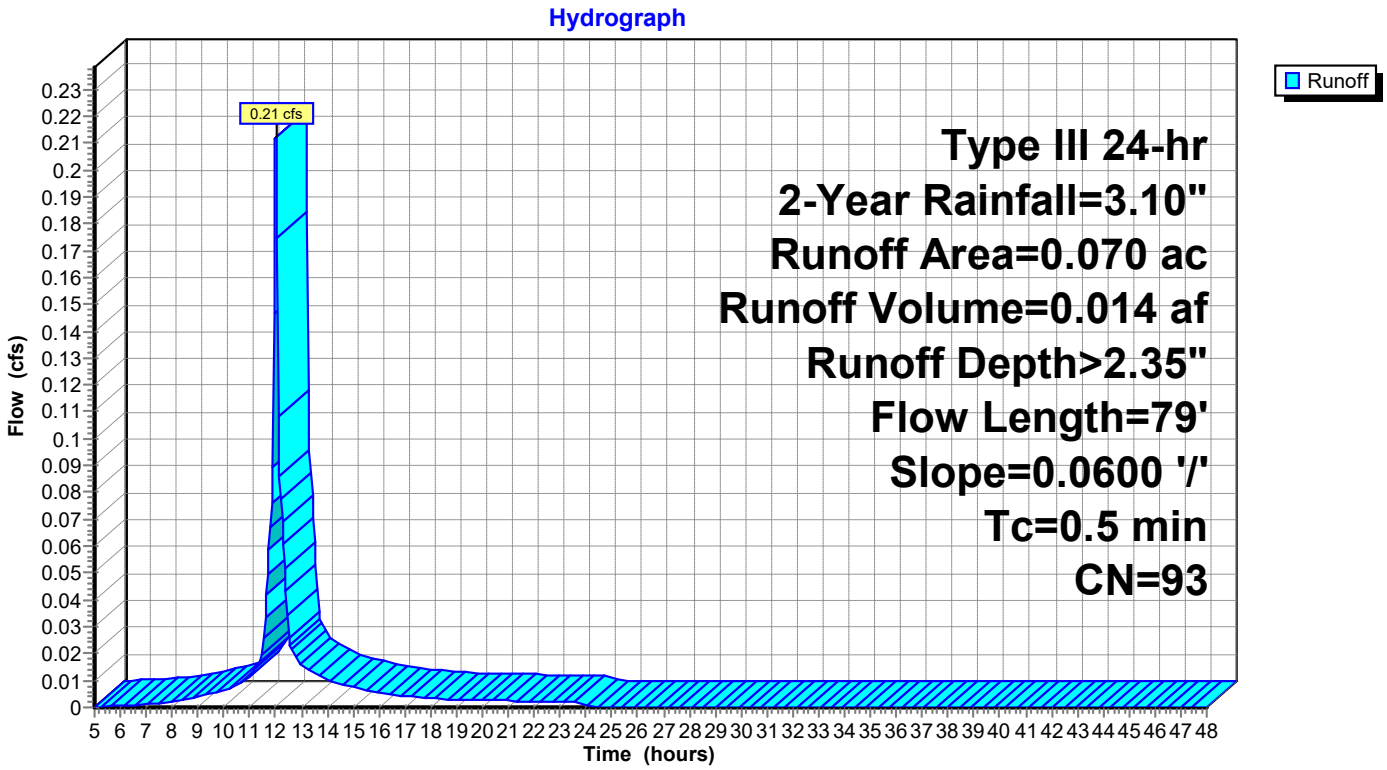
Runoff = 0.21 cfs @ 12.01 hrs, Volume= 0.014 af, Depth> 2.35"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 5.00-48.00 hrs, dt= 0.05 hrs
Type III 24-hr 2-Year Rainfall=3.10"

| Area (ac) | CN | Description |
|---|---|---|
| 0.020 | 80 | >75% Grass cover, Good, HSG D |
| 0.050 | 98 | Paved parking, HSG D |
| 0.070 | 93 | Weighted Average |
| 0.020 | | 28.57% Pervious Area |
| 0.050 | | 71.43% Impervious Area |

| Tc (min) | Length (feet) | Slope (ft/ft) | Velocity (ft/sec) | Capacity (cfs) | Description |
|---|---|---|---|---|---|
| 0.4 | 43 | 0.0600 | 1.77 | | **Sheet Flow,** Smooth surfaces n= 0.011 P2= 3.10" |
| 0.1 | 36 | 0.0600 | 7.26 | 4.84 | **Parabolic Channel,** W=2.00' D=0.50' Area=0.7 sf Perim=2.3' n= 0.022 Earth, clean & straight |
| 0.5 | 79 | Total | | | |

## Subcatchment 1.1B:



## Summary for Subcatchment 1.1C:

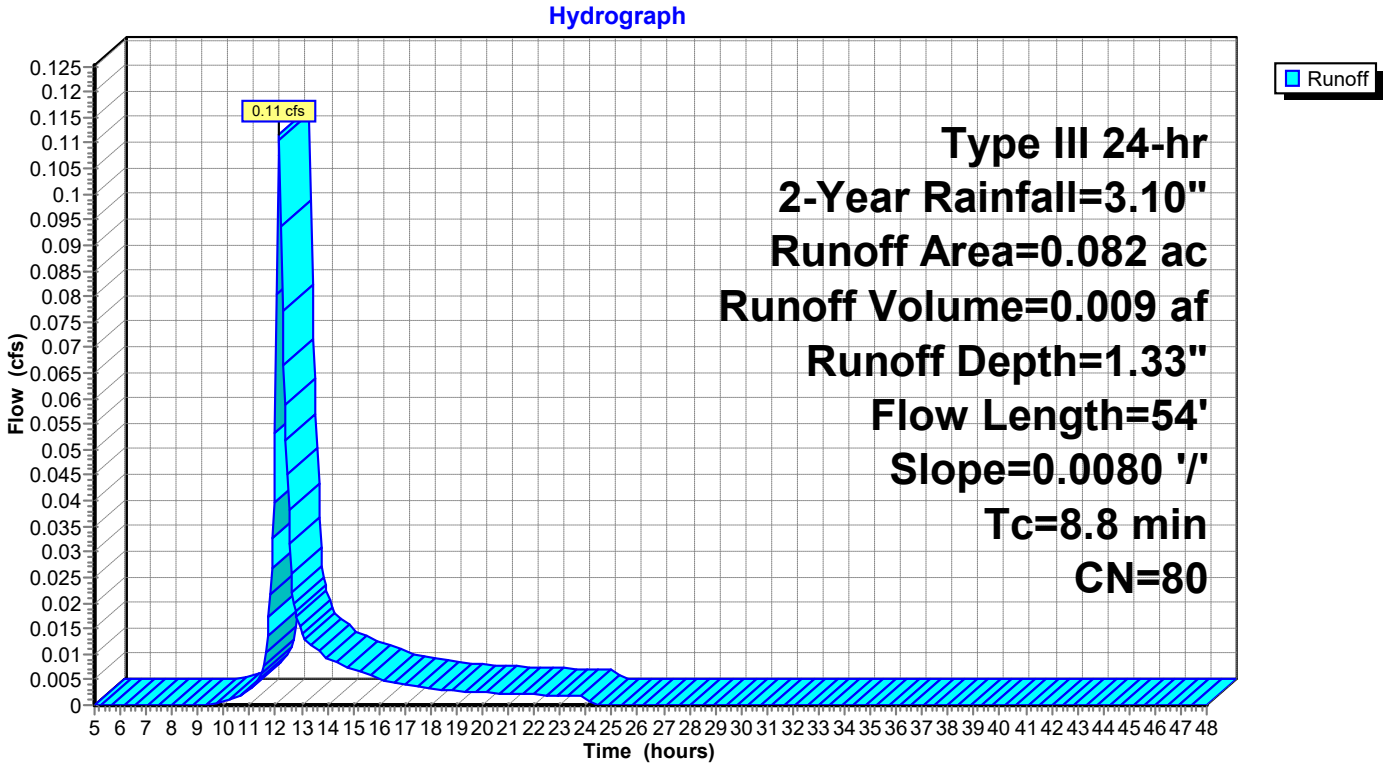
Runoff = 0.11 cfs @ 12.13 hrs, Volume= 0.009 af, Depth= 1.33"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 5.00-48.00 hrs, dt= 0.05 hrs
Type III 24-hr 2-Year Rainfall=3.10"

| Area (ac) | CN | Description |
|---|---|---|
| 0.080 | 80 | >75% Grass cover, Good, HSG D |
| 0.002 | 98 | Paved parking, HSG D |
| 0.082 | 80 | Weighted Average |
| 0.080 | | 97.56% Pervious Area |
| 0.002 | | 2.44% Impervious Area |

| Tc (min) | Length (feet) | Slope (ft/ft) | Velocity (ft/sec) | Capacity (cfs) | Description |
|---|---|---|---|---|---|
| 8.8 | 54 | 0.0080 | 0.10 | | **Sheet Flow,** Grass: Short n= 0.150 P2= 3.10" |

## Subcatchment 1.1C:



## Summary for Subcatchment 1.2A:

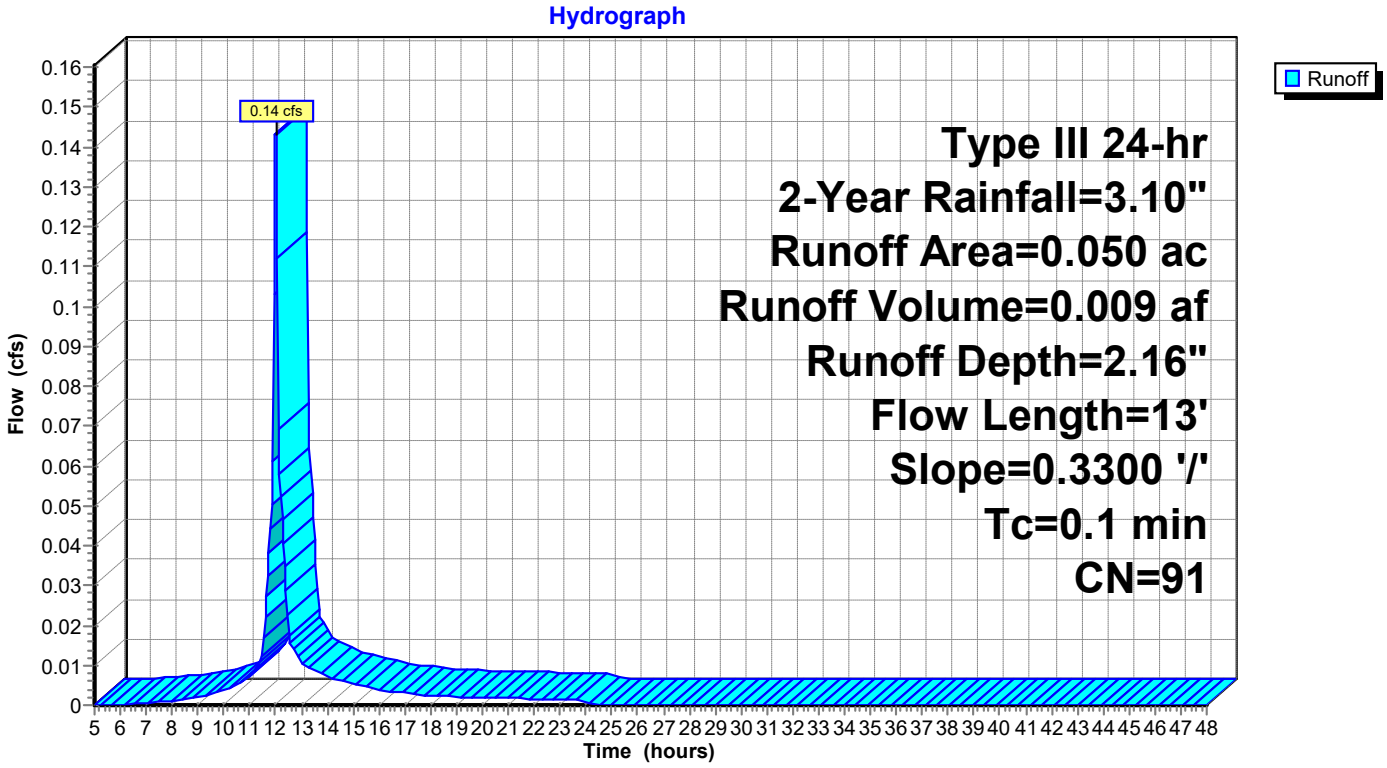
Runoff = 0.14 cfs @ 12.00 hrs, Volume= 0.009 af, Depth= 2.16"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 5.00-48.00 hrs, dt= 0.05 hrs
Type III 24-hr 2-Year Rainfall=3.10"

| | Area (ac) | CN | Description |
|---|---|---|---|
| * | 0.030 | 98 | Roof |
| | 0.020 | 80 | >75% Grass cover, Good, HSG D |
| | 0.050 | 91 | Weighted Average |
| | 0.020 | | 40.00% Pervious Area |
| | 0.030 | | 60.00% Impervious Area |

| Tc (min) | Length (feet) | Slope (ft/ft) | Velocity (ft/sec) | Capacity (cfs) | Description |
|---|---|---|---|---|---|
| 0.1 | 13 | 0.3300 | 2.76 | | **Sheet Flow,** Smooth surfaces n= 0.011 P2= 3.10" |

## Subcatchment 1.2A:



## Summary for Subcatchment 1.2B:

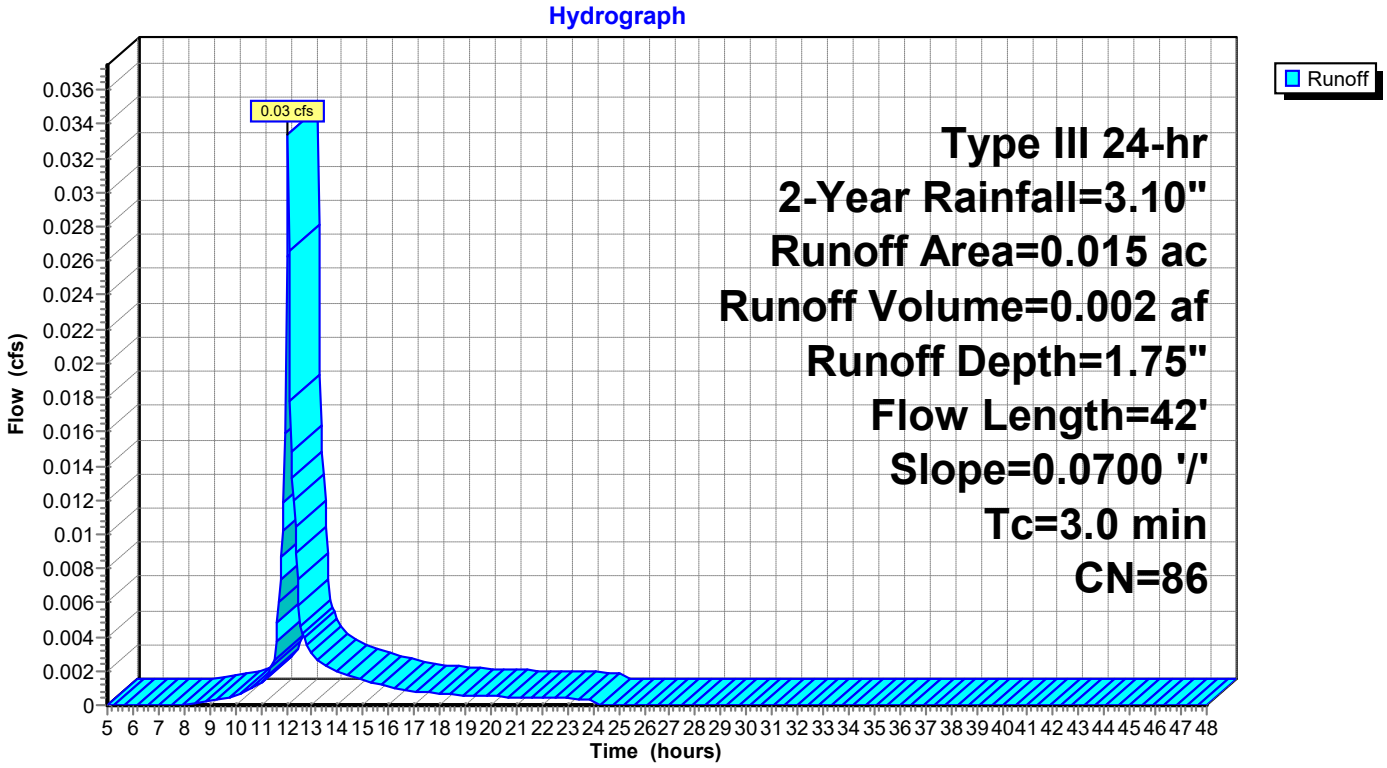
Runoff = 0.03 cfs @ 12.05 hrs, Volume= 0.002 af, Depth= 1.75"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 5.00-48.00 hrs, dt= 0.05 hrs
Type III 24-hr 2-Year Rainfall=3.10"

| | Area (ac) | CN | Description |
|---|---|---|---|
| | 0.010 | 80 | >75% Grass cover, Good, HSG D |
| * | 0.005 | 98 | Pavement & Walk |
| | 0.015 | 86 | Weighted Average |
| | 0.010 | | 66.67% Pervious Area |
| | 0.005 | | 33.33% Impervious Area |

| Tc (min) | Length (feet) | Slope (ft/ft) | Velocity (ft/sec) | Capacity (cfs) | Description |
|---|---|---|---|---|---|
| 3.0 | 42 | 0.0700 | 0.23 | | **Sheet Flow,** Grass: Short n= 0.150 P2= 3.10" |

## Subcatchment 1.2B:



## Summary for Subcatchment 1.2C:

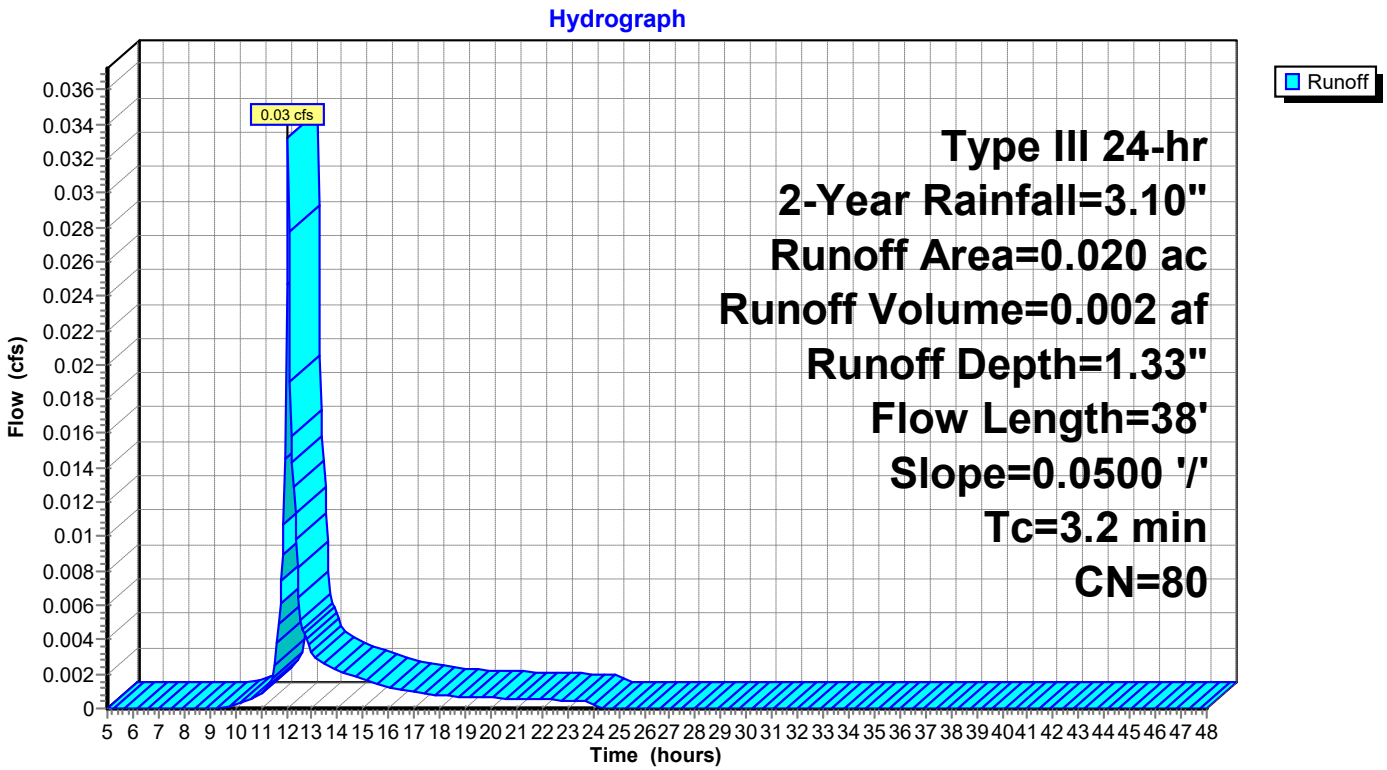
Runoff = 0.03 cfs @ 12.06 hrs, Volume= 0.002 af, Depth= 1.33"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 5.00-48.00 hrs, dt= 0.05 hrs
Type III 24-hr 2-Year Rainfall=3.10"

| Area (ac) | CN | Description |
|---|---|---|
| 0.020 | 80 | >75% Grass cover, Good, HSG D |
| 0.020 | | 100.00% Pervious Area |

| Tc (min) | Length (feet) | Slope (ft/ft) | Velocity (ft/sec) | Capacity (cfs) | Description |
|---|---|---|---|---|---|
| 3.2 | 38 | 0.0500 | 0.20 | | **Sheet Flow,** Grass: Short n= 0.150 P2= 3.10" |

## Subcatchment 1.2C:



## Summary for Subcatchment 1.3B:

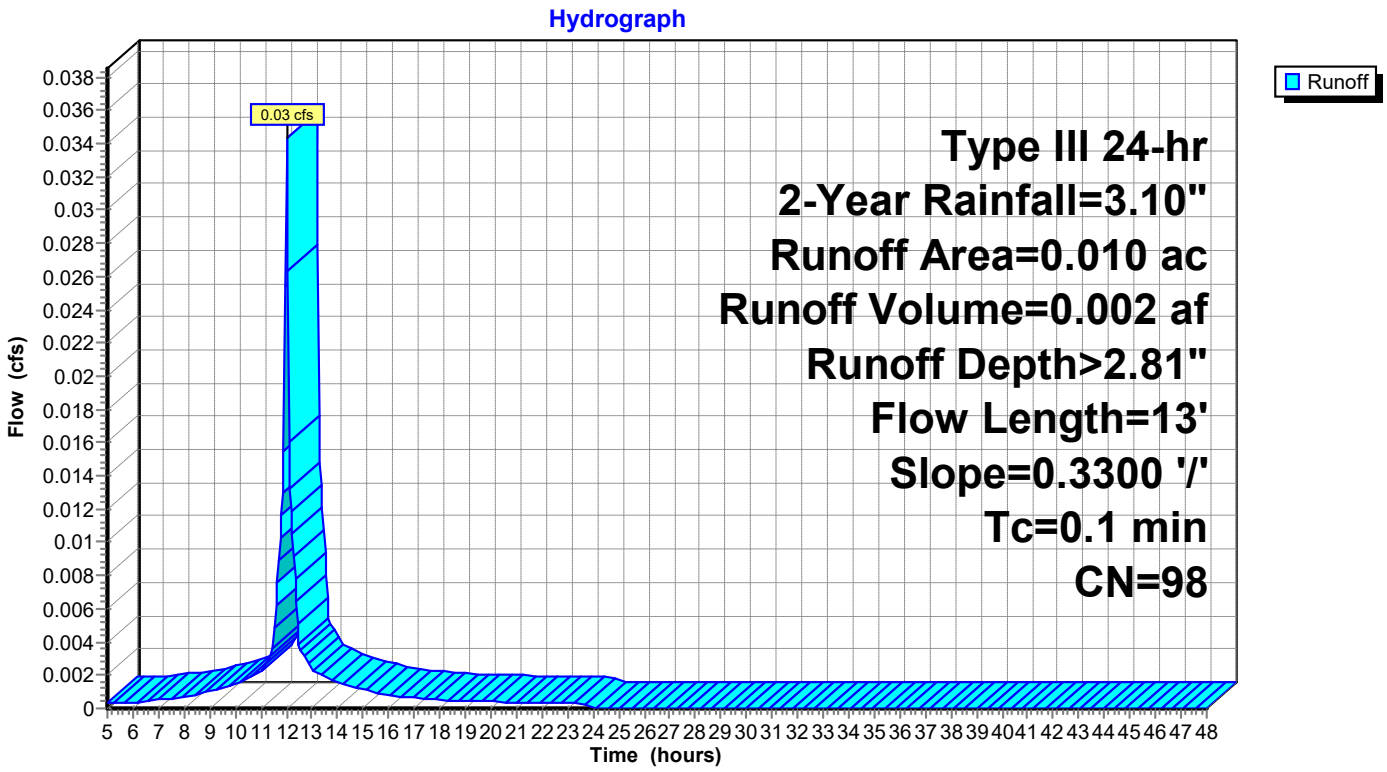
Runoff = 0.03 cfs @ 12.00 hrs, Volume= 0.002 af, Depth> 2.81"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 5.00-48.00 hrs, dt= 0.05 hrs
Type III 24-hr 2-Year Rainfall=3.10"

| | Area (ac) | CN | Description |
|---|---|---|---|
| * | 0.010 | 98 | Roof |
| | 0.010 | | 100.00% Impervious Area |

| Tc (min) | Length (feet) | Slope (ft/ft) | Velocity (ft/sec) | Capacity (cfs) | Description |
|---|---|---|---|---|---|
| 0.1 | 13 | 0.3300 | 2.76 | | **Sheet Flow,** Smooth surfaces n= 0.011 P2= 3.10" |

## Subcatchment 1.3B:



## Summary for Subcatchment 1.3C:

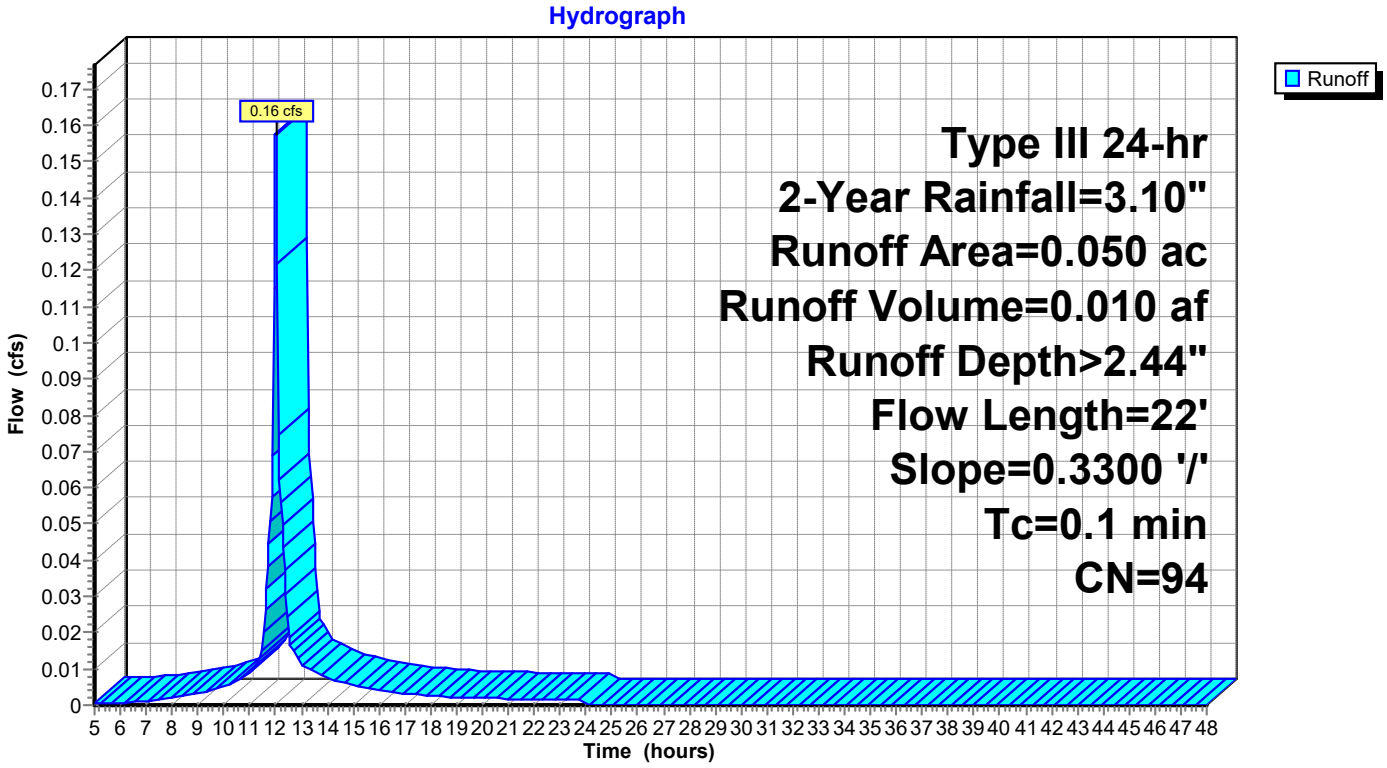
Runoff = 0.16 cfs @ 12.00 hrs, Volume= 0.010 af, Depth> 2.44"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 5.00-48.00 hrs, dt= 0.05 hrs
Type III 24-hr 2-Year Rainfall=3.10"

| | Area (ac) | CN | Description |
|---|---|---|---|
| * | 0.040 | 98 | Roof |
| | 0.010 | 80 | >75% Grass cover, Good, HSG D |
| | 0.050 | 94 | Weighted Average |
| | 0.010 | | 20.00% Pervious Area |
| | 0.040 | | 80.00% Impervious Area |

| Tc (min) | Length (feet) | Slope (ft/ft) | Velocity (ft/sec) | Capacity (cfs) | Description |
|---|---|---|---|---|---|
| 0.1 | 22 | 0.3300 | 3.07 | | **Sheet Flow,** Smooth surfaces n= 0.011 P2= 3.10" |

## Subcatchment 1.3C:



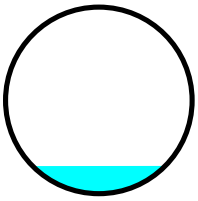
## Summary for Reach 1R: Under Drain

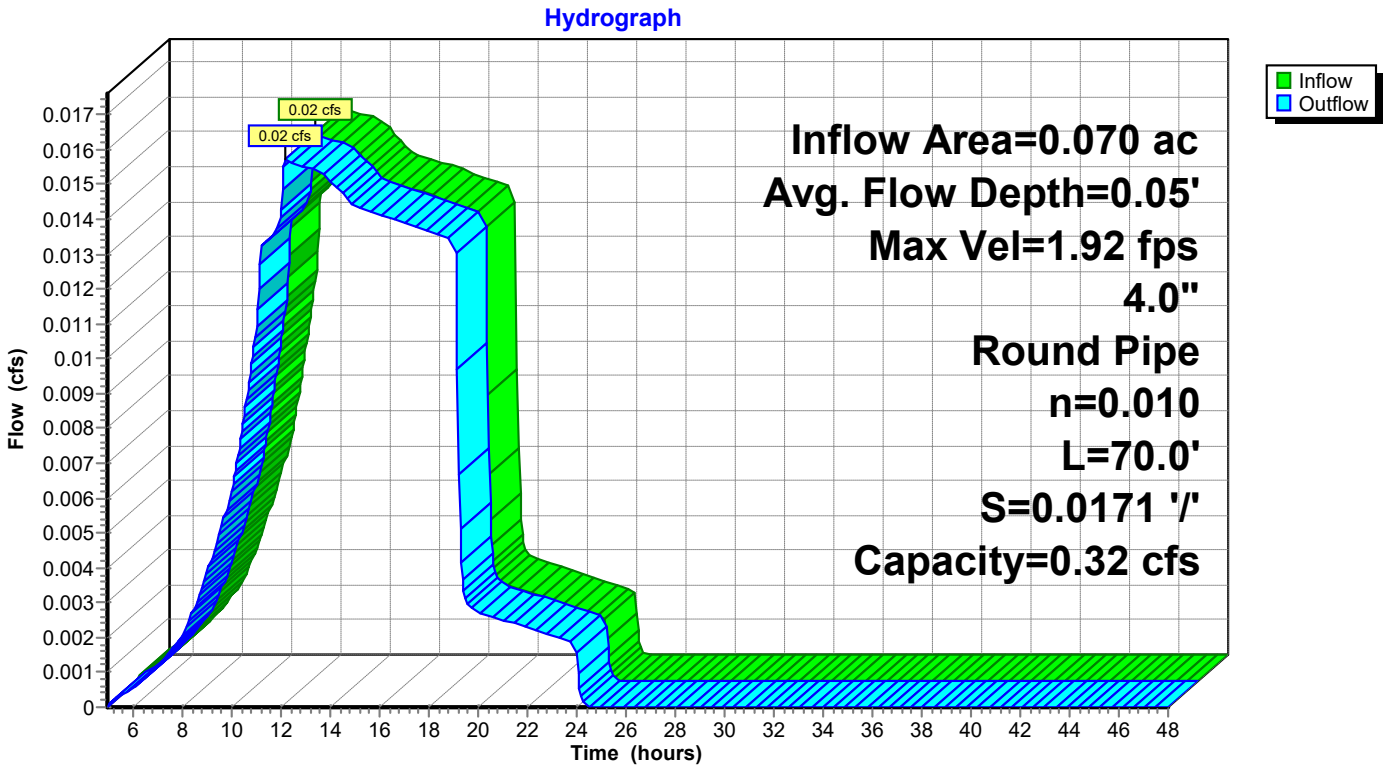
Inflow Area = 0.070 ac, 71.43% Impervious, Inflow Depth > 2.09" for 2-Year event
Inflow = 0.02 cfs @ 12.21 hrs, Volume= 0.012 af
Outflow = 0.02 cfs @ 12.25 hrs, Volume= 0.012 af, Atten= 0%, Lag= 2.0 min

Routing by Stor-Ind+Trans method, Time Span= 5.00-48.00 hrs, dt= 0.05 hrs
Max. Velocity= 1.92 fps, Min. Travel Time= 0.6 min
Avg. Velocity = 1.40 fps, Avg. Travel Time= 0.8 min

Peak Storage= 1 cf @ 12.23 hrs
Average Depth at Peak Storage= 0.05'
Bank-Full Depth= 0.33' Flow Area= 0.1 sf, Capacity= 0.32 cfs

4.0" Round Pipe
n= 0.010 PVC, smooth interior
Length= 70.0' Slope= 0.0171 '/'
Inlet Invert= 100.20', Outlet Invert= 99.00'





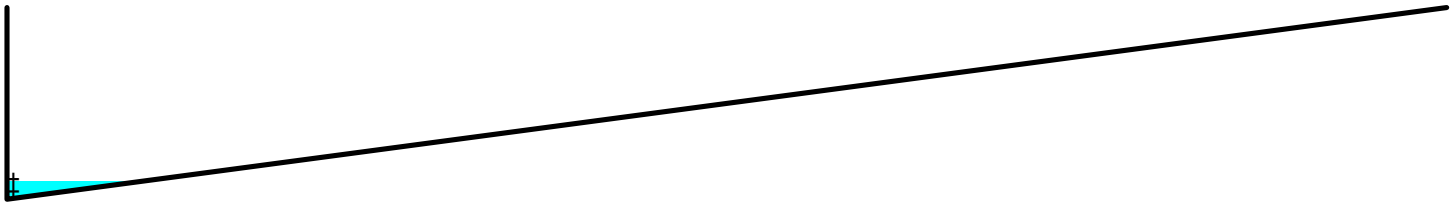
## Summary for Reach 2R: Gutter Line

Inflow = 0.07 cfs @ 12.21 hrs, Volume= 0.001 af
Outflow = 0.06 cfs @ 12.25 hrs, Volume= 0.001 af, Atten= 12%, Lag= 2.3 min

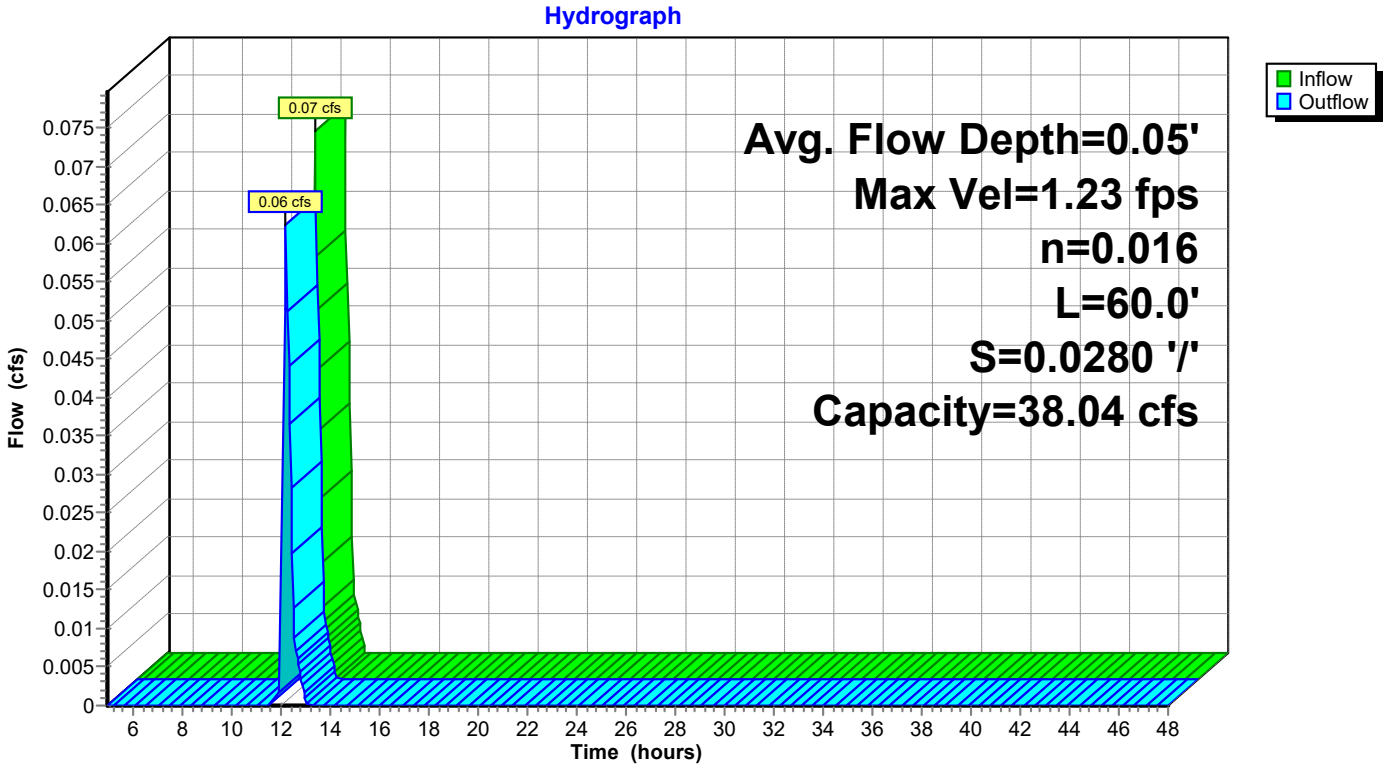
Routing by Stor-Ind+Trans method, Time Span= 5.00-48.00 hrs, dt= 0.05 hrs
Max. Velocity= 1.23 fps, Min. Travel Time= 0.8 min
Avg. Velocity = 0.77 fps, Avg. Travel Time= 1.3 min

Peak Storage= 3 cf @ 12.22 hrs
Average Depth at Peak Storage= 0.05'
Bank-Full Depth= 0.50' Flow Area= 6.3 sf, Capacity= 38.04 cfs

0.00' x 0.50' deep channel, n= 0.016 Asphalt, rough
Side Slope Z-value= 0.0 50.0 '/' Top Width= 25.00'
Length= 60.0' Slope= 0.0280 '/'
Inlet Invert= 103.10', Outlet Invert= 101.42'



## Reach 2R: Gutter Line

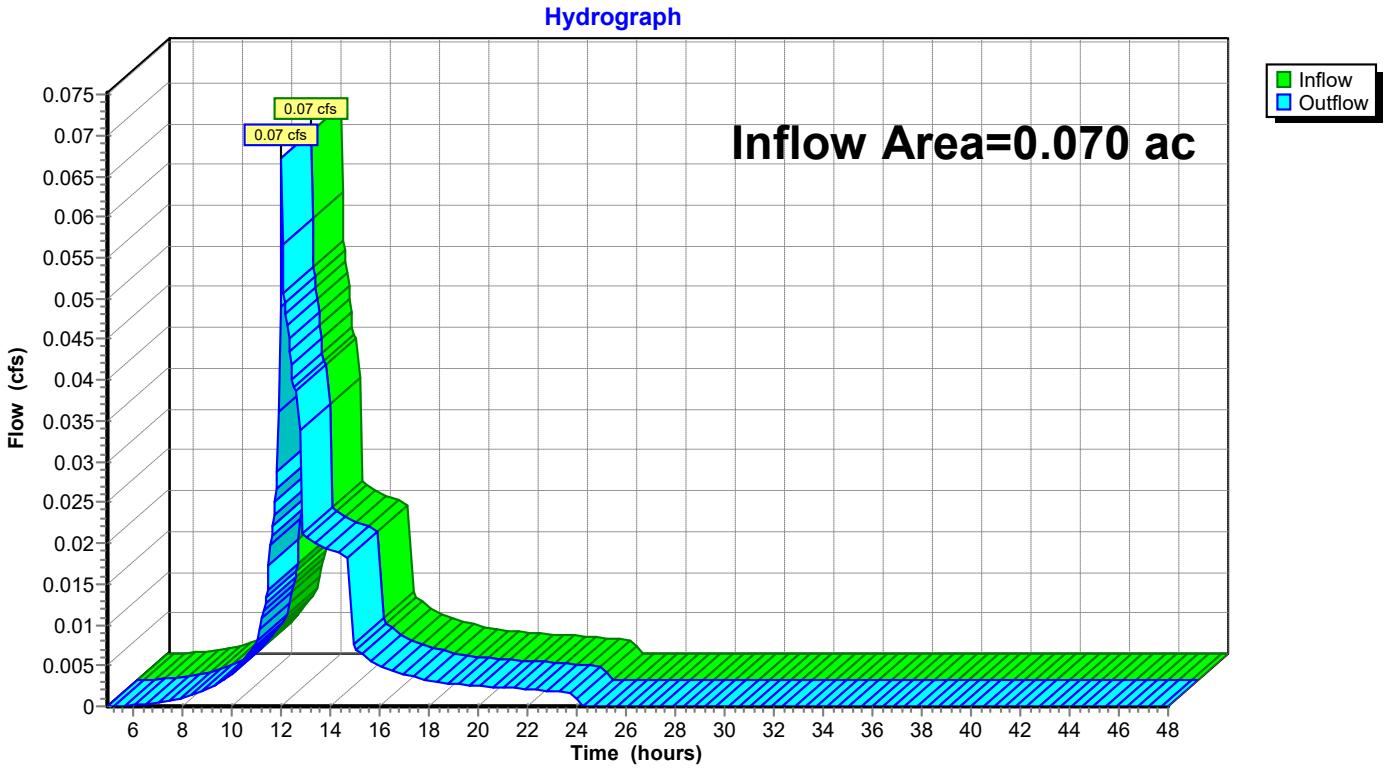


## Summary for Reach A: WAP A

Inflow Area = 0.070 ac, 42.86% Impervious, Inflow Depth = 1.92" for 2-Year event
Inflow = 0.07 cfs @ 12.06 hrs, Volume= 0.011 af
Outflow = 0.07 cfs @ 12.06 hrs, Volume= 0.011 af, Atten= 0%, Lag= 0.0 min

Routing by Stor-Ind+Trans method, Time Span= 5.00-48.00 hrs, dt= 0.05 hrs

### Reach A: WAP A

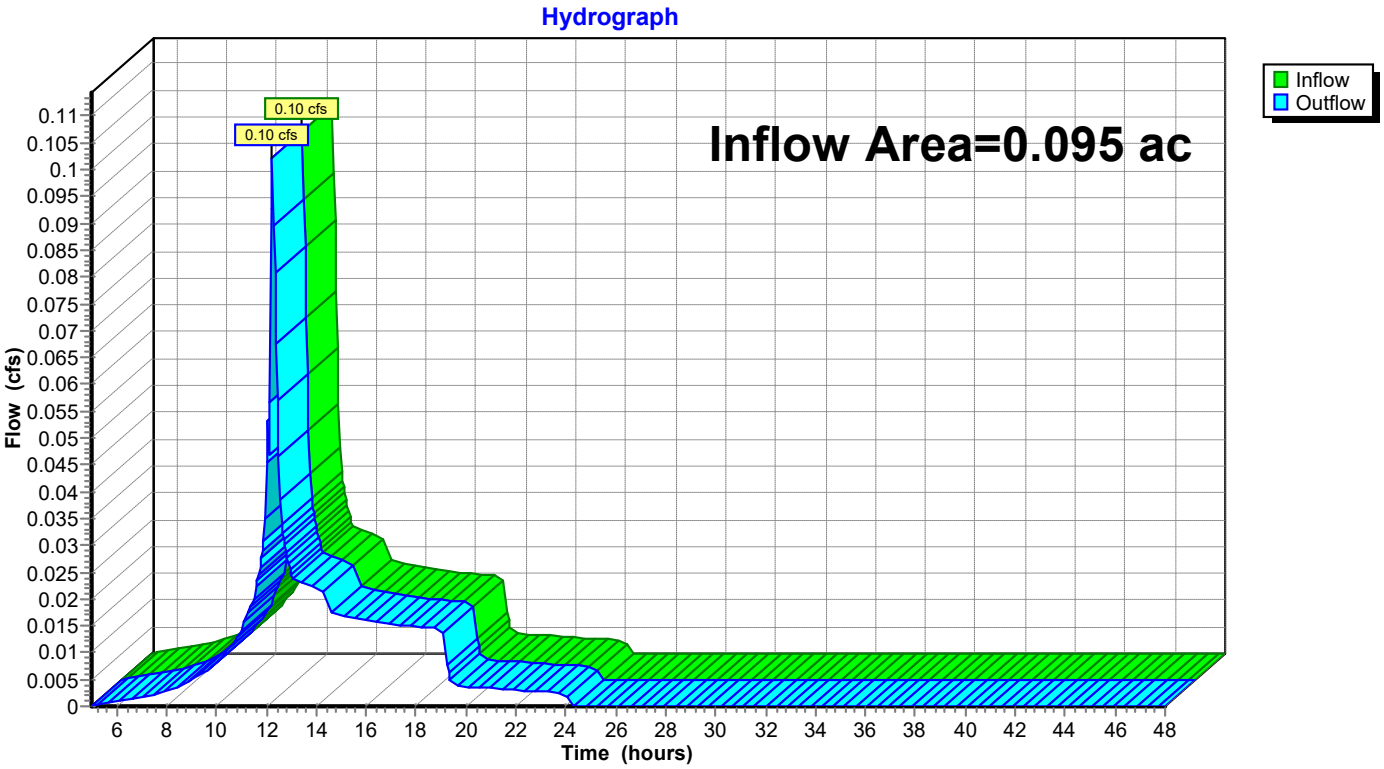


## Summary for Reach B: WAP B

Inflow Area = 0.095 ac, 68.42% Impervious, Inflow Depth > 2.30" for 2-Year event
Inflow = 0.10 cfs @ 12.25 hrs, Volume= 0.018 af
Outflow = 0.10 cfs @ 12.25 hrs, Volume= 0.018 af, Atten= 0%, Lag= 0.0 min

Routing by Stor-Ind+Trans method, Time Span= 5.00-48.00 hrs, dt= 0.05 hrs

### Reach B: WAP B

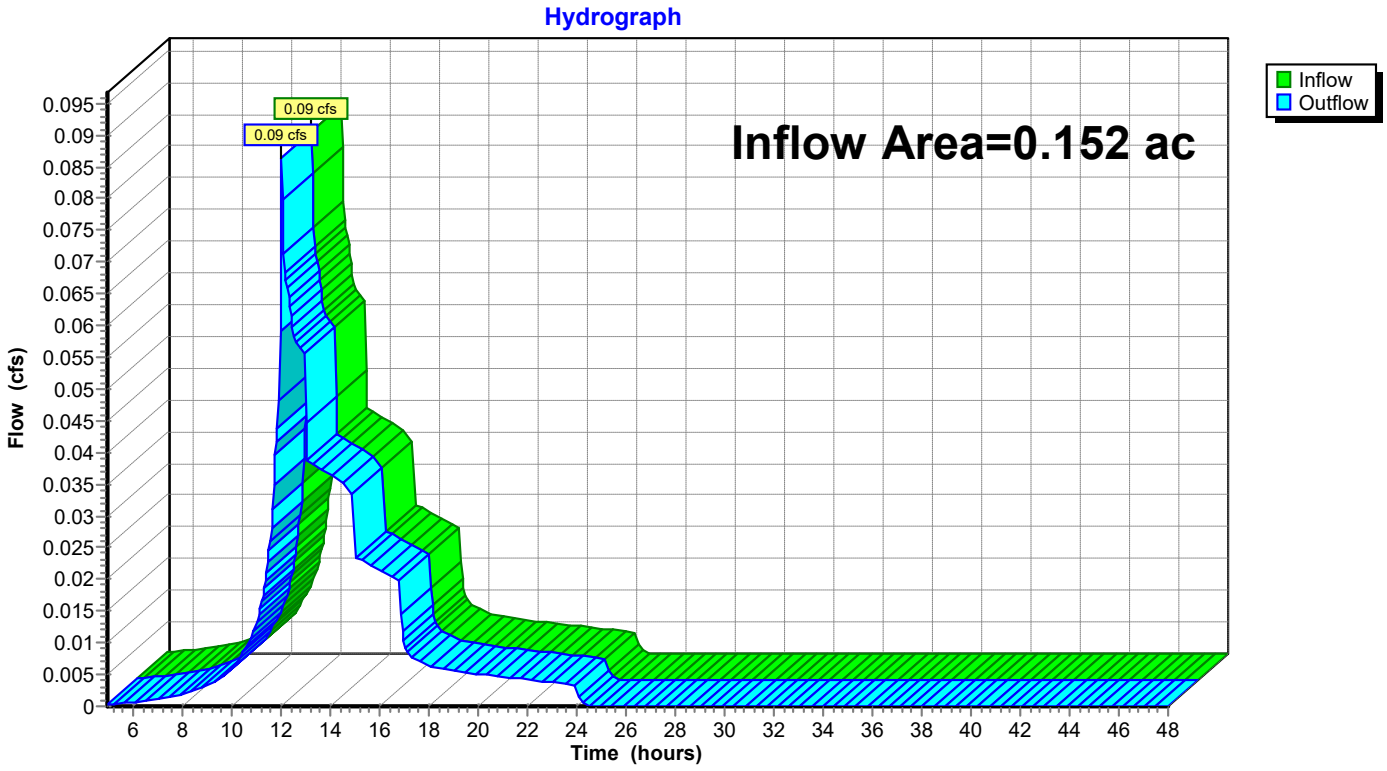


## Summary for Reach C: WAP C

Inflow Area = 0.152 ac, 27.63% Impervious, Inflow Depth > 1.69" for 2-Year event
Inflow = 0.09 cfs @ 12.07 hrs, Volume= 0.021 af
Outflow = 0.09 cfs @ 12.07 hrs, Volume= 0.021 af, Atten= 0%, Lag= 0.0 min

Routing by Stor-Ind+Trans method, Time Span= 5.00-48.00 hrs, dt= 0.05 hrs

### Reach C: WAP C



## Summary for Pond 1DL: dripline filter

Inflow Area = 0.010 ac,100.00% Impervious, Inflow Depth > 2.81" for 2-Year event
Inflow = 0.03 cfs @ 12.00 hrs, Volume= 0.002 af
Outflow = 0.01 cfs @ 12.25 hrs, Volume= 0.002 af, Atten= 69%, Lag= 14.9 min
Primary = 0.01 cfs @ 12.25 hrs, Volume= 0.002 af
Secondary = 0.00 cfs @ 5.00 hrs, Volume= 0.000 af

Routing by Stor-Ind method, Time Span= 5.00-48.00 hrs, dt= 0.05 hrs
Peak Elev= 105.21' @ 12.25 hrs Surf.Area= 220 sf Storage= 23 cf

Plug-Flow detention time= 20.9 min calculated for 0.002 af (100% of inflow)
Center-of-Mass det. time= 20.8 min ( 782.3 - 761.5 )

| Volume | Invert | Avail.Storage | Storage Description |
|---|---|---|---|
| #1 | 105.20' | 35 cf | **Custom Stage Data (Prismatic)** Listed below (Recalc)<br>88 cf Overall x 40.0% Voids |
| #2 | 104.20' | 22 cf | **Custom Stage Data (Prismatic)** Listed below (Recalc)<br>110 cf Overall x 20.0% Voids |
| | | 57 cf | Total Available Storage |

| Elevation (feet) | Surf.Area (sq-ft) | Inc.Store (cubic-feet) | Cum.Store (cubic-feet) |
|---|---|---|---|
| 105.20 | 110 | 0 | 0 |
| 106.00 | 110 | 88 | 88 |

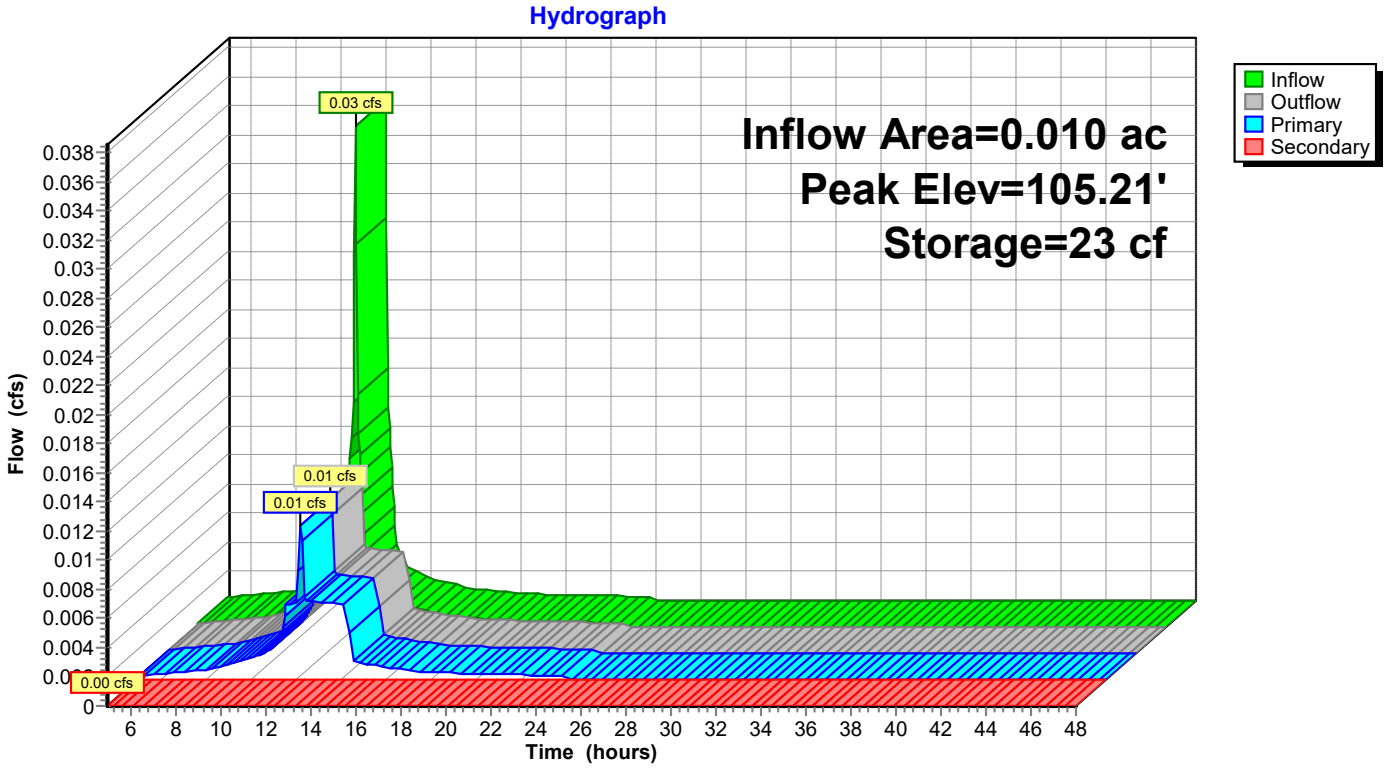
| Elevation (feet) | Surf.Area (sq-ft) | Inc.Store (cubic-feet) | Cum.Store (cubic-feet) |
|---|---|---|---|
| 104.20 | 110 | 0 | 0 |
| 105.20 | 110 | 110 | 110 |

| Device | Routing | Invert | Outlet Devices |
|---|---|---|---|
| #1 | Primary | 104.20' | **2.000 in/hr Exfiltration over Surface area above 103.87'** Conductivity to Groundwater Elevation = 90.00'<br>Excluded Surface area = 0 sf |
| #2 | Secondary | 105.90' | **26.5' long x 15.0' breadth Broad-Crested Rectangular Weir**<br>Head (feet) 0.20 0.40 0.60 0.80 1.00 1.20 1.40 1.60<br>Coef. (English) 2.68 2.70 2.70 2.64 2.63 2.64 2.64 2.63 |

**Primary OutFlow** Max=0.01 cfs @ 12.25 hrs HW=105.21' (Free Discharge)
**1=Exfiltration** ( Controls 0.01 cfs)

**Secondary OutFlow** Max=0.00 cfs @ 5.00 hrs HW=104.20' (Free Discharge)
**2=Broad-Crested Rectangular Weir** ( Controls 0.00 cfs)

## Pond 1DL: dripline filter



## Summary for Pond 1PB: CB Grate

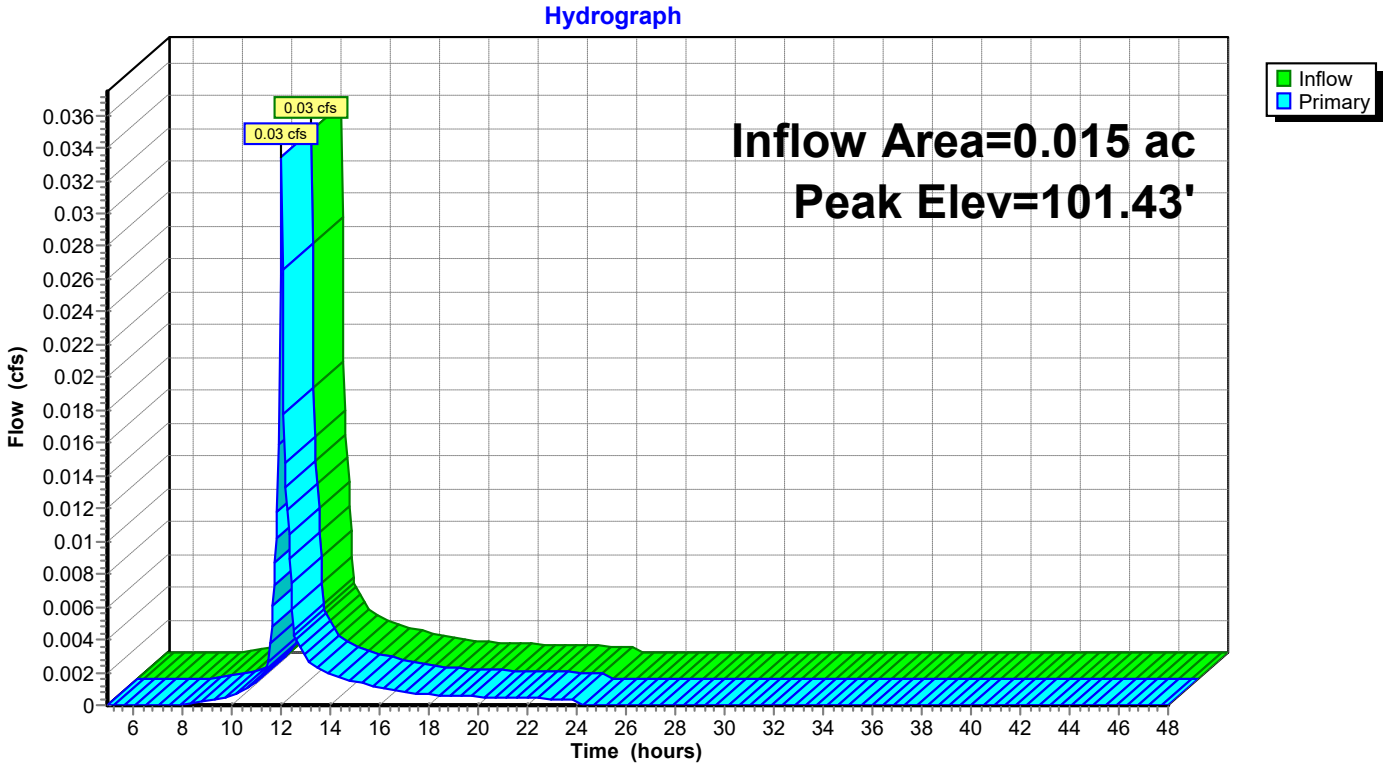
Inflow Area = 0.015 ac, 33.33% Impervious, Inflow Depth = 1.75" for 2-Year event
Inflow = 0.03 cfs @ 12.05 hrs, Volume= 0.002 af
Outflow = 0.03 cfs @ 12.05 hrs, Volume= 0.002 af, Atten= 0%, Lag= 0.0 min
Primary = 0.03 cfs @ 12.05 hrs, Volume= 0.002 af

Routing by Stor-Ind method, Time Span= 5.00-48.00 hrs, dt= 0.05 hrs
Peak Elev= 101.43' @ 12.05 hrs

| Device | Routing | Invert | Outlet Devices |
|---|---|---|---|
| #1 | Primary | 101.42' | **24.0" Horiz. Orifice/Grate** C= 0.600 Limited to weir flow at low heads |

**Primary OutFlow** Max=0.03 cfs @ 12.05 hrs HW=101.43' (Free Discharge)
└**1=Orifice/Grate** (Weir Controls 0.03 cfs @ 0.38 fps)

## Pond 1PB: CB Grate



## Summary for Pond 2DL: dripline filter

Inflow Area = 0.050 ac, 80.00% Impervious, Inflow Depth > 2.44" for 2-Year event
Inflow = 0.16 cfs @ 12.00 hrs, Volume= 0.010 af
Outflow = 0.04 cfs @ 12.36 hrs, Volume= 0.010 af, Atten= 77%, Lag= 21.2 min
Primary = 0.04 cfs @ 12.36 hrs, Volume= 0.010 af
Secondary = 0.00 cfs @ 5.00 hrs, Volume= 0.000 af

Routing by Stor-Ind method, Time Span= 5.00-48.00 hrs, dt= 0.05 hrs
Peak Elev= 97.66' @ 12.36 hrs Surf.Area= 696 sf Storage= 115 cf

Plug-Flow detention time= 25.1 min calculated for 0.010 af (100% of inflow)
Center-of-Mass det. time= 25.1 min ( 808.4 - 783.4 )

| Volume | Invert | Avail.Storage | Storage Description |
|---|---|---|---|
| #1 | 97.33' | 93 cf | **Custom Stage Data (Prismatic)** Listed below (Recalc)<br>233 cf Overall x 40.0% Voids |
| #2 | 96.33' | 70 cf | **Custom Stage Data (Prismatic)** Listed below (Recalc)<br>348 cf Overall x 20.0% Voids |
| | | 163 cf | Total Available Storage |

| Elevation (feet) | Surf.Area (sq-ft) | Inc.Store (cubic-feet) | Cum.Store (cubic-feet) |
|---|---|---|---|
| 97.33 | 348 | 0 | 0 |
| 98.00 | 348 | 233 | 233 |

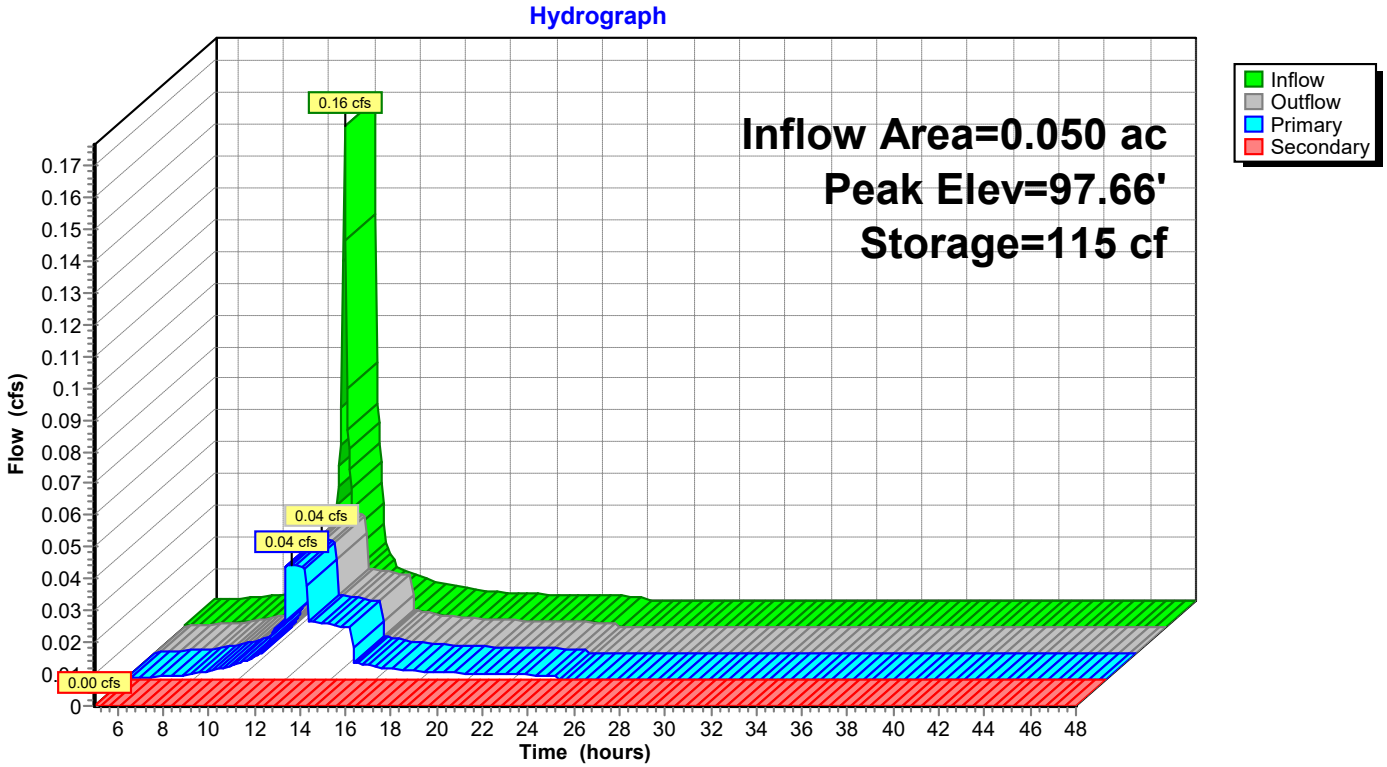
| Elevation (feet) | Surf.Area (sq-ft) | Inc.Store (cubic-feet) | Cum.Store (cubic-feet) |
|---|---|---|---|
| 96.33 | 348 | 0 | 0 |
| 97.33 | 348 | 348 | 348 |

| Device | Routing | Invert | Outlet Devices |
|---|---|---|---|
| #1 | Primary | 96.33' | **2.000 in/hr Exfiltration over Surface area above 96.00'** Conductivity to Groundwater Elevation = 90.00'<br>Excluded Surface area = 0 sf |
| #2 | Secondary | 97.90' | **134.0' long x 18.0' breadth Broad-Crested Rectangular Weir**<br>Head (feet) 0.20 0.40 0.60 0.80 1.00 1.20 1.40 1.60<br>Coef. (English) 2.68 2.70 2.70 2.64 2.63 2.64 2.64 2.63 |

**Primary OutFlow** Max=0.04 cfs @ 12.36 hrs HW=97.66' (Free Discharge)
↑**1=Exfiltration** ( Controls 0.04 cfs)

**Secondary OutFlow** Max=0.00 cfs @ 5.00 hrs HW=96.33' (Free Discharge)
↑**2=Broad-Crested Rectangular Weir** ( Controls 0.00 cfs)

## Pond 2DL: dripline filter



## Summary for Pond 3DL: dripline filter

Inflow Area = 0.050 ac, 60.00% Impervious, Inflow Depth = 2.16" for 2-Year event
Inflow = 0.14 cfs @ 12.00 hrs, Volume= 0.009 af
Outflow = 0.03 cfs @ 12.35 hrs, Volume= 0.009 af, Atten= 76%, Lag= 20.9 min
Primary = 0.03 cfs @ 12.35 hrs, Volume= 0.009 af
Secondary = 0.00 cfs @ 5.00 hrs, Volume= 0.000 af

Routing by Stor-Ind method, Time Span= 5.00-48.00 hrs, dt= 0.05 hrs
Peak Elev= 104.95' @ 12.35 hrs Surf.Area= 712 sf Storage= 99 cf

Plug-Flow detention time= 25.2 min calculated for 0.009 af (100% of inflow)
Center-of-Mass det. time= 25.2 min ( 823.3 - 798.2 )

| Volume | Invert | Avail.Storage | Storage Description |
|---|---|---|---|
| #1 | 104.75' | 178 cf | **Custom Stage Data (Prismatic)** Listed below (Recalc)<br>445 cf Overall x 40.0% Voids |
| #2 | 103.75' | 71 cf | **Custom Stage Data (Prismatic)** Listed below (Recalc)<br>356 cf Overall x 20.0% Voids |
| | | 249 cf | Total Available Storage |

| Elevation (feet) | Surf.Area (sq-ft) | Inc.Store (cubic-feet) | Cum.Store (cubic-feet) |
|---|---|---|---|
| 104.75 | 356 | 0 | 0 |
| 106.00 | 356 | 445 | 445 |

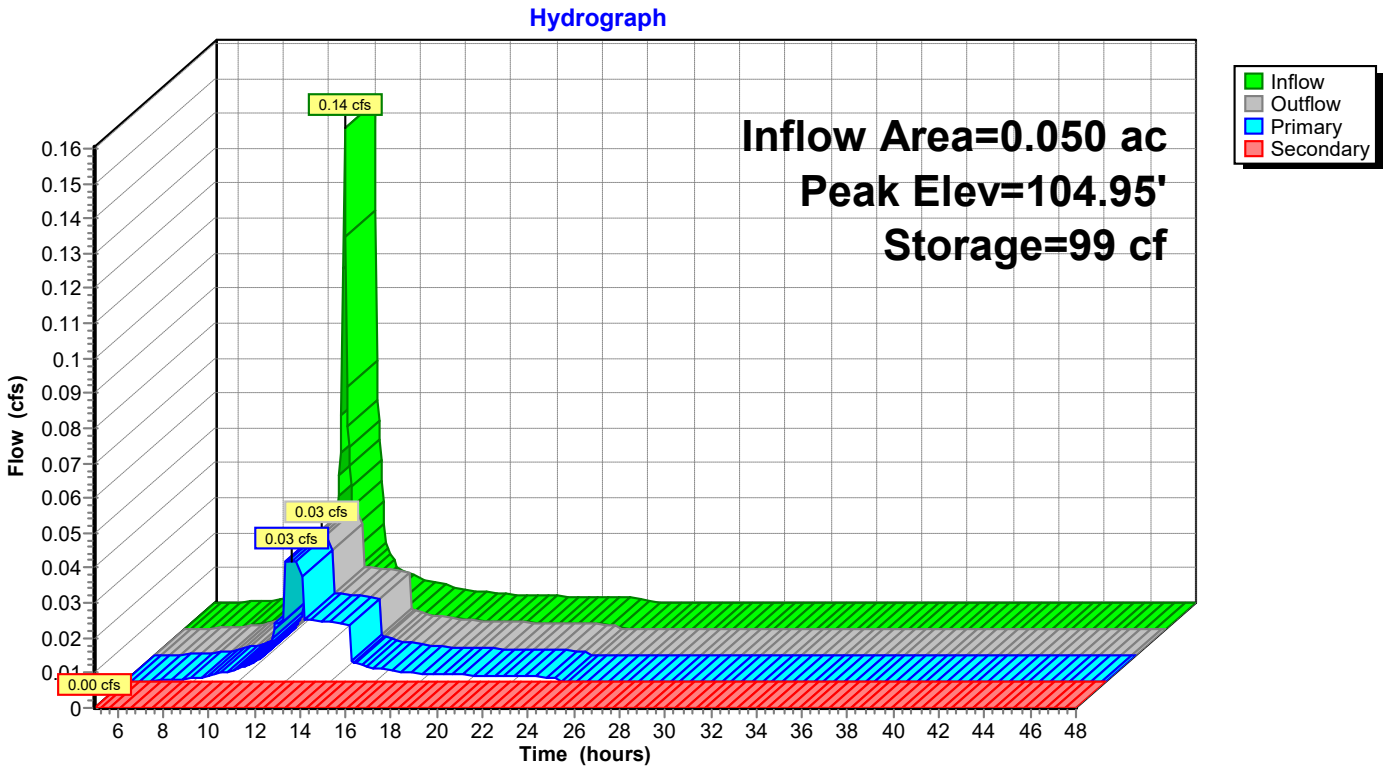
| Elevation (feet) | Surf.Area (sq-ft) | Inc.Store (cubic-feet) | Cum.Store (cubic-feet) |
|---|---|---|---|
| 103.75 | 356 | 0 | 0 |
| 104.75 | 356 | 356 | 356 |

| Device | Routing | Invert | Outlet Devices |
|---|---|---|---|
| #1 | Primary | 103.75' | **2.000 in/hr Exfiltration over Surface area above 103.42'** Conductivity to Groundwater Elevation = 90.00'<br>Excluded Surface area = 0 sf |
| #2 | Secondary | 105.90' | **93.0' long x 20.0' breadth Broad-Crested Rectangular Weir**<br>Head (feet) 0.20 0.40 0.60 0.80 1.00 1.20 1.40 1.60<br>Coef. (English) 2.68 2.70 2.70 2.64 2.63 2.64 2.64 2.63 |

**Primary OutFlow** Max=0.03 cfs @ 12.35 hrs HW=104.95' (Free Discharge)
↑**1=Exfiltration** ( Controls 0.03 cfs)

**Secondary OutFlow** Max=0.00 cfs @ 5.00 hrs HW=103.75' (Free Discharge)
↑**2=Broad-Crested Rectangular Weir** ( Controls 0.00 cfs)

## Pond 3DL: dripline filter



## Summary for Pond RG1: Rain Garden

Inflow Area = 0.070 ac, 71.43% Impervious, Inflow Depth > 2.35" for 2-Year event
Inflow = 0.21 cfs @ 12.01 hrs, Volume= 0.014 af
Outflow = 0.09 cfs @ 12.21 hrs, Volume= 0.014 af, Atten= 59%, Lag= 12.2 min
Primary = 0.02 cfs @ 12.21 hrs, Volume= 0.012 af
Secondary = 0.07 cfs @ 12.21 hrs, Volume= 0.001 af

Routing by Stor-Ind method, Time Span= 5.00-48.00 hrs, dt= 0.05 hrs
Peak Elev= 103.12' @ 12.21 hrs Surf.Area= 312 sf Storage= 180 cf

Plug-Flow detention time= 85.6 min calculated for 0.014 af (100% of inflow)
Center-of-Mass det. time= 85.5 min ( 874.3 - 788.8 )

| Volume | Invert | Avail.Storage | Storage Description |
|---|---|---|---|
| #1 | 102.50' | 510 cf | **Custom Stage Data (Prismatic)** Listed below (Recalc) |

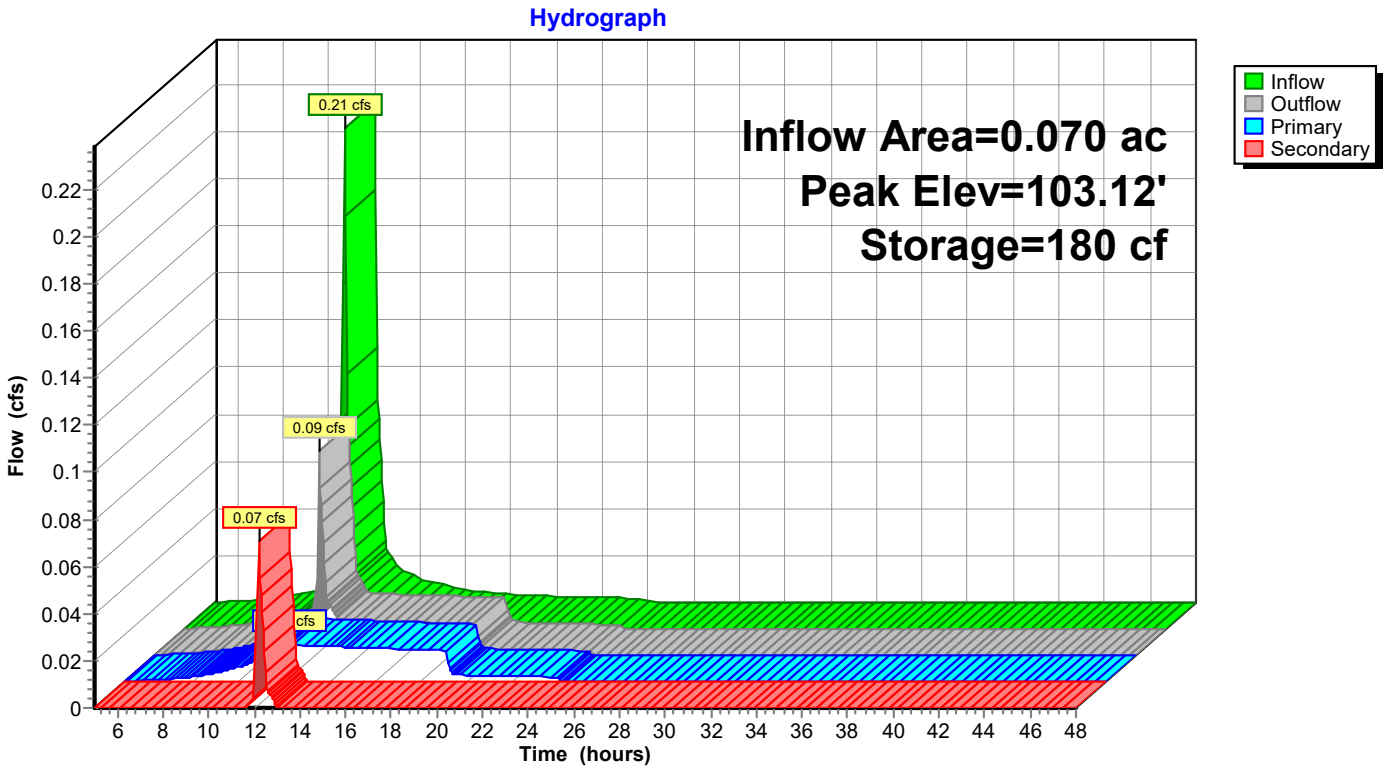
| Elevation (feet) | Surf.Area (sq-ft) | Inc.Store (cubic-feet) | Cum.Store (cubic-feet) |
|---|---|---|---|
| 102.50 | 288 | 0 | 0 |
| 103.00 | 288 | 144 | 144 |
| 103.50 | 388 | 169 | 313 |
| 104.00 | 400 | 197 | 510 |

| Device | Routing | Invert | Outlet Devices |
|---|---|---|---|
| #1 | Primary | 102.50' | **2.000 in/hr Exfiltration over Surface area above 100.20'** Conductivity to Groundwater Elevation = 96.00'<br>Excluded Surface area = 0 sf |
| #2 | Secondary | 103.10' | **10.0' long x 10.0' breadth Broad-Crested Rectangular Weir**<br>Head (feet) 0.20 0.40 0.60 0.80 1.00 1.20 1.40 1.60<br>Coef. (English) 2.49 2.56 2.70 2.69 2.68 2.69 2.67 2.64 |

**Primary OutFlow** Max=0.02 cfs @ 12.21 hrs HW=103.12' (Free Discharge)
**1=Exfiltration** ( Controls 0.02 cfs)

**Secondary OutFlow** Max=0.06 cfs @ 12.21 hrs HW=103.12' (Free Discharge)
**2=Broad-Crested Rectangular Weir** (Weir Controls 0.06 cfs @ 0.34 fps)

## Pond RG1: Rain Garden



## Summary for Pond RG2: Rain Garden

Inflow Area = 0.082 ac, 2.44% Impervious, Inflow Depth = 1.33" for 2-Year event
Inflow = 0.11 cfs @ 12.13 hrs, Volume= 0.009 af
Outflow = 0.02 cfs @ 12.83 hrs, Volume= 0.009 af, Atten= 85%, Lag= 41.7 min
Primary = 0.02 cfs @ 12.83 hrs, Volume= 0.009 af
Secondary = 0.00 cfs @ 5.00 hrs, Volume= 0.000 af

Routing by Stor-Ind method, Time Span= 5.00-48.00 hrs, dt= 0.05 hrs
Peak Elev= 96.88' @ 12.83 hrs Surf.Area= 340 sf Storage= 129 cf

Plug-Flow detention time= 61.3 min calculated for 0.009 af (100% of inflow)
Center-of-Mass det. time= 61.2 min ( 908.2 - 847.0 )

| Volume | Invert | Avail.Storage | Storage Description |
|---|---|---|---|
| #1 | 96.50' | 780 cf | **Custom Stage Data (Prismatic)** Listed below (Recalc) |

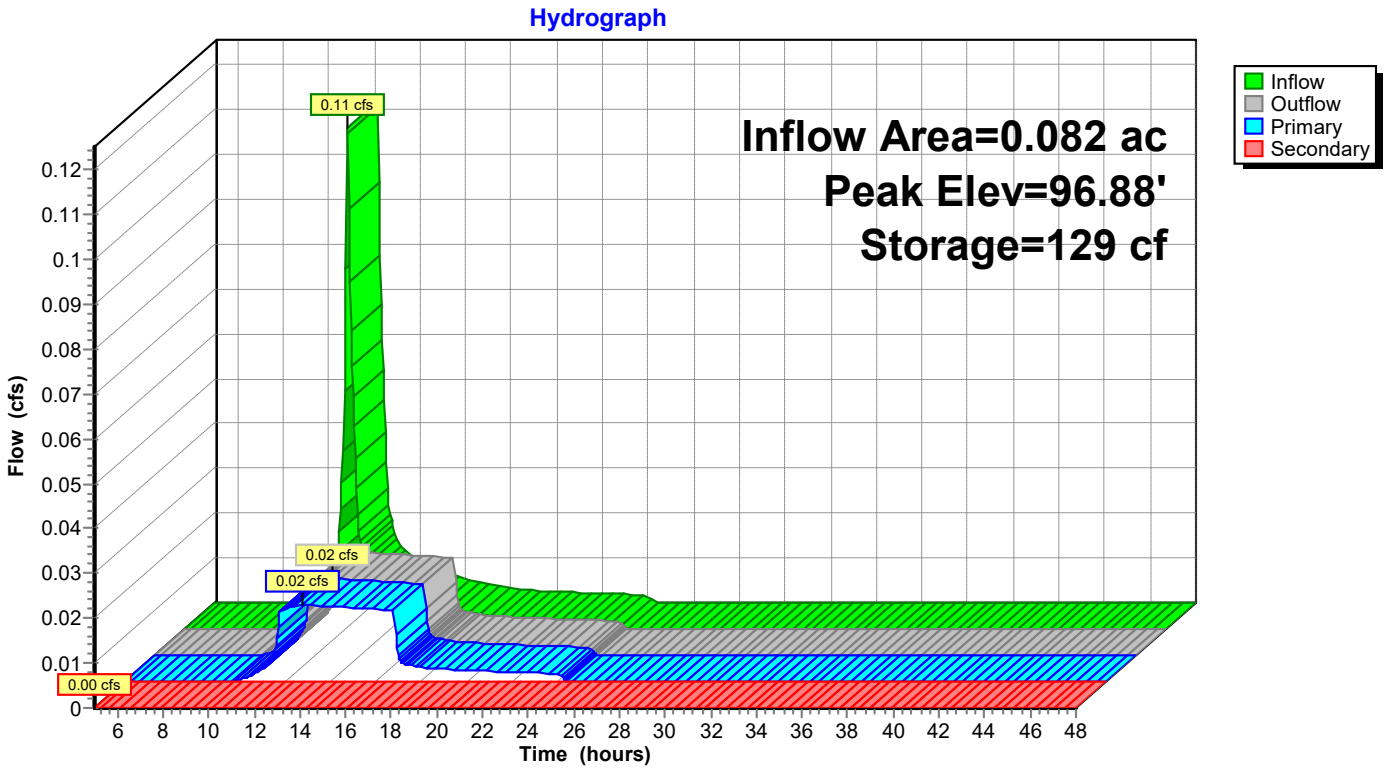
| Elevation (feet) | Surf.Area (sq-ft) | Inc.Store (cubic-feet) | Cum.Store (cubic-feet) |
|---|---|---|---|
| 96.50 | 340 | 0 | 0 |
| 97.00 | 340 | 170 | 170 |
| 97.50 | 550 | 223 | 393 |
| 98.00 | 1,000 | 388 | 780 |

| Device | Routing | Invert | Outlet Devices |
|---|---|---|---|
| #1 | Primary | 96.50' | **2.000 in/hr Exfiltration over Surface area above 94.66'** Conductivity to Groundwater Elevation = 92.00' Excluded Surface area = 0 sf |
| #2 | Secondary | 97.50' | **12.0" Horiz. Orifice/Grate** C= 0.600 Limited to weir flow at low heads |

**Primary OutFlow** Max=0.02 cfs @ 12.83 hrs HW=96.88' (Free Discharge)
└**1=Exfiltration** ( Controls 0.02 cfs)

**Secondary OutFlow** Max=0.00 cfs @ 5.00 hrs HW=96.50' (Free Discharge)
└**2=Orifice/Grate** ( Controls 0.00 cfs)

## Pond RG2: Rain Garden



Time span=5.00-48.00 hrs, dt=0.05 hrs, 861 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 1.1A:** Runoff Area=0.020 ac 0.00% Impervious Runoff Depth=3.60"
Flow Length=19' Slope=0.0900 '/' Tc=1.4 min CN=80 Runoff=0.09 cfs 0.006 af

**Subcatchment 1.1B:** Runoff Area=0.070 ac 71.43% Impervious Runoff Depth>4.95"
Flow Length=79' Slope=0.0600 '/' Tc=0.5 min CN=93 Runoff=0.43 cfs 0.029 af

**Subcatchment 1.1C:** Runoff Area=0.082 ac 2.44% Impervious Runoff Depth=3.60"
Flow Length=54' Slope=0.0080 '/' Tc=8.8 min CN=80 Runoff=0.31 cfs 0.025 af

**Subcatchment 1.2A:** Runoff Area=0.050 ac 60.00% Impervious Runoff Depth>4.75"
Flow Length=13' Slope=0.3300 '/' Tc=0.1 min CN=91 Runoff=0.30 cfs 0.020 af

**Subcatchment 1.2B:** Runoff Area=0.015 ac 33.33% Impervious Runoff Depth>4.22"
Flow Length=42' Slope=0.0700 '/' Tc=3.0 min CN=86 Runoff=0.08 cfs 0.005 af

**Subcatchment 1.2C:** Runoff Area=0.020 ac 0.00% Impervious Runoff Depth=3.60"
Flow Length=38' Slope=0.0500 '/' Tc=3.2 min CN=80 Runoff=0.09 cfs 0.006 af

**Subcatchment 1.3B:** Runoff Area=0.010 ac 100.00% Impervious Runoff Depth>5.40"
Flow Length=13' Slope=0.3300 '/' Tc=0.1 min CN=98 Runoff=0.07 cfs 0.004 af

**Subcatchment 1.3C:** Runoff Area=0.050 ac 80.00% Impervious Runoff Depth>5.05"
Flow Length=22' Slope=0.3300 '/' Tc=0.1 min CN=94 Runoff=0.31 cfs 0.021 af

**Reach 1R: Under Drain** Avg. Flow Depth=0.05' Max Vel=1.94 fps Inflow=0.02 cfs 0.018 af
4.0" Round Pipe n=0.010 L=70.0' S=0.0171 '/' Capacity=0.32 cfs Outflow=0.02 cfs 0.018 af

**Reach 2R: Gutter Line** Avg. Flow Depth=0.09' Max Vel=1.94 fps Inflow=0.41 cfs 0.011 af
n=0.016 L=60.0' S=0.0280 '/' Capacity=38.04 cfs Outflow=0.39 cfs 0.011 af

**Reach A: WAP A** Inflow=0.20 cfs 0.026 af
Outflow=0.20 cfs 0.026 af

**Reach B: WAP B** Inflow=0.50 cfs 0.039 af
Outflow=0.50 cfs 0.039 af

**Reach C: WAP C** Inflow=0.30 cfs 0.052 af
Outflow=0.30 cfs 0.052 af

**Pond 1DL: dripline filter** Peak Elev=105.90' Storage=53 cf Inflow=0.07 cfs 0.004 af
Primary=0.01 cfs 0.004 af Secondary=0.01 cfs 0.000 af Outflow=0.02 cfs 0.004 af

**Pond 1PB: CB Grate** Peak Elev=101.44' Inflow=0.08 cfs 0.005 af
Outflow=0.08 cfs 0.005 af

**Pond 2DL: dripline filter** Peak Elev=97.91' Storage=150 cf Inflow=0.31 cfs 0.021 af
Primary=0.04 cfs 0.017 af Secondary=0.28 cfs 0.004 af Outflow=0.32 cfs 0.021 af

**Pond 3DL: dripline filter** Peak Elev=105.90' Storage=236 cf Inflow=0.30 cfs 0.020 af
Primary=0.04 cfs 0.018 af Secondary=0.12 cfs 0.001 af Outflow=0.16 cfs 0.020 af

**Pond RG1: Rain Garden**

Peak Elev=103.16' Storage=194 cf Inflow=0.43 cfs 0.029 af
Primary=0.02 cfs 0.018 af Secondary=0.41 cfs 0.011 af Outflow=0.42 cfs 0.029 af

**Pond RG2: Rain Garden**

Peak Elev=97.57' Storage=435 cf Inflow=0.46 cfs 0.028 af
Primary=0.03 cfs 0.023 af Secondary=0.20 cfs 0.005 af Outflow=0.23 cfs 0.028 af

## Summary for Subcatchment 1.1A:

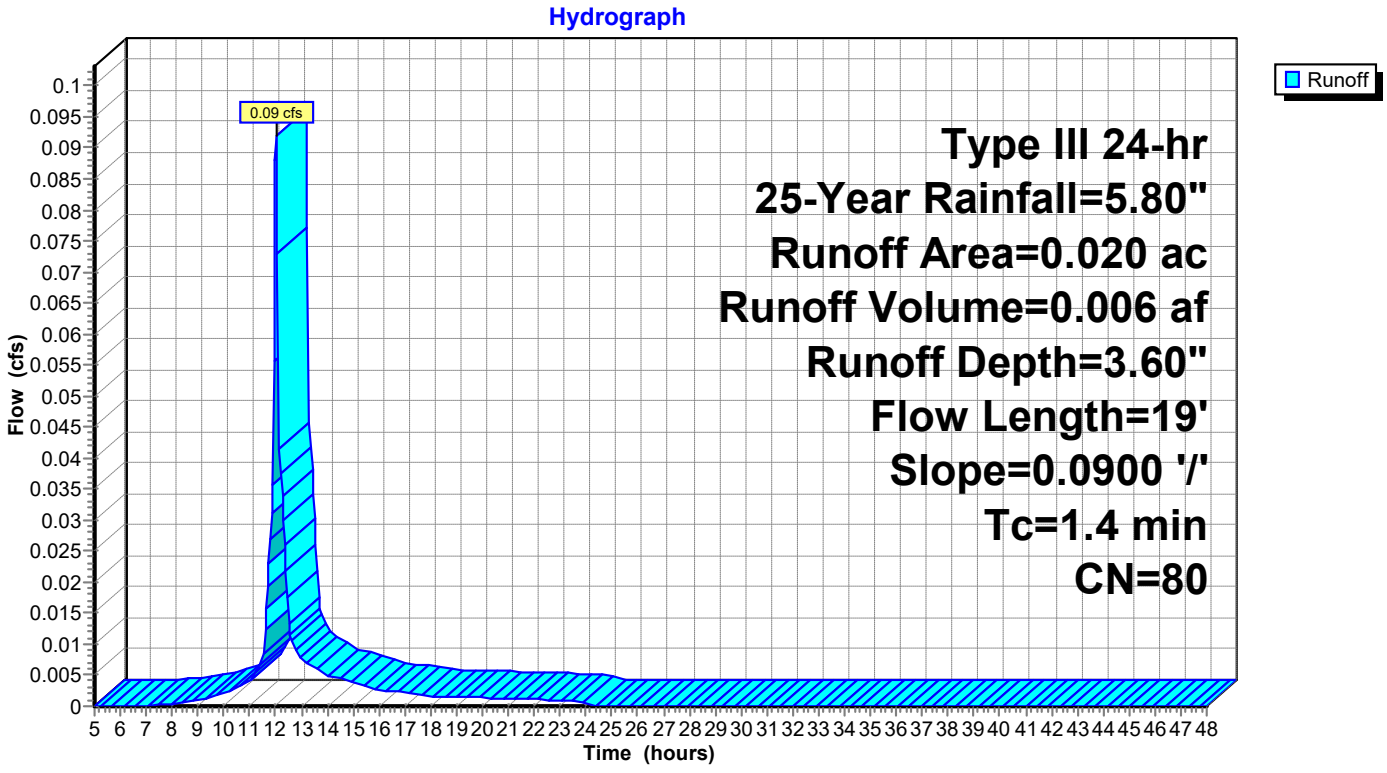
Runoff = 0.09 cfs @ 12.02 hrs, Volume= 0.006 af, Depth= 3.60"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 5.00-48.00 hrs, dt= 0.05 hrs
Type III 24-hr 25-Year Rainfall=5.80"

| Area (ac) | CN | Description |
|---|---|---|
| 0.020 | 80 | >75% Grass cover, Good, HSG D |
| 0.000 | 96 | Gravel surface, HSG D |
| 0.020 | 80 | Weighted Average |
| 0.020 | | 100.00% Pervious Area |

| Tc (min) | Length (feet) | Slope (ft/ft) | Velocity (ft/sec) | Capacity (cfs) | Description |
|---|---|---|---|---|---|
| 1.4 | 19 | 0.0900 | 0.22 | | **Sheet Flow,** Grass: Short n= 0.150 P2= 3.10" |

## Subcatchment 1.1A:



## Summary for Subcatchment 1.1B:

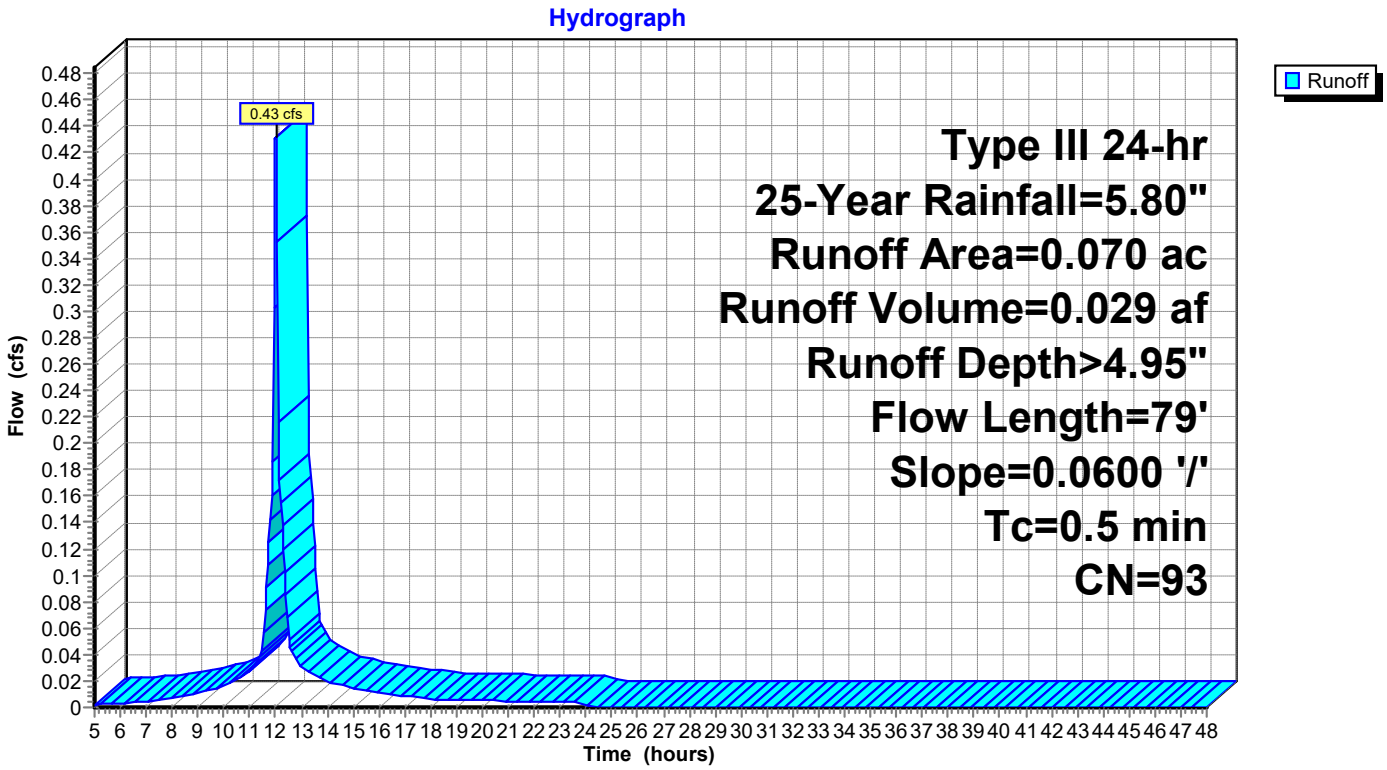
Runoff = 0.43 cfs @ 12.01 hrs, Volume= 0.029 af, Depth> 4.95"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 5.00-48.00 hrs, dt= 0.05 hrs
Type III 24-hr 25-Year Rainfall=5.80"

| Area (ac) | CN | Description |
|---|---|---|
| 0.020 | 80 | >75% Grass cover, Good, HSG D |
| 0.050 | 98 | Paved parking, HSG D |
| 0.070 | 93 | Weighted Average |
| 0.020 | | 28.57% Pervious Area |
| 0.050 | | 71.43% Impervious Area |

| Tc (min) | Length (feet) | Slope (ft/ft) | Velocity (ft/sec) | Capacity (cfs) | Description |
|---|---|---|---|---|---|
| 0.4 | 43 | 0.0600 | 1.77 | | **Sheet Flow,** Smooth surfaces n= 0.011 P2= 3.10" |
| 0.1 | 36 | 0.0600 | 7.26 | 4.84 | **Parabolic Channel,** W=2.00' D=0.50' Area=0.7 sf Perim=2.3' n= 0.022 Earth, clean & straight |
| 0.5 | 79 | Total | | | |

## Subcatchment 1.1B:



## Summary for Subcatchment 1.1C:

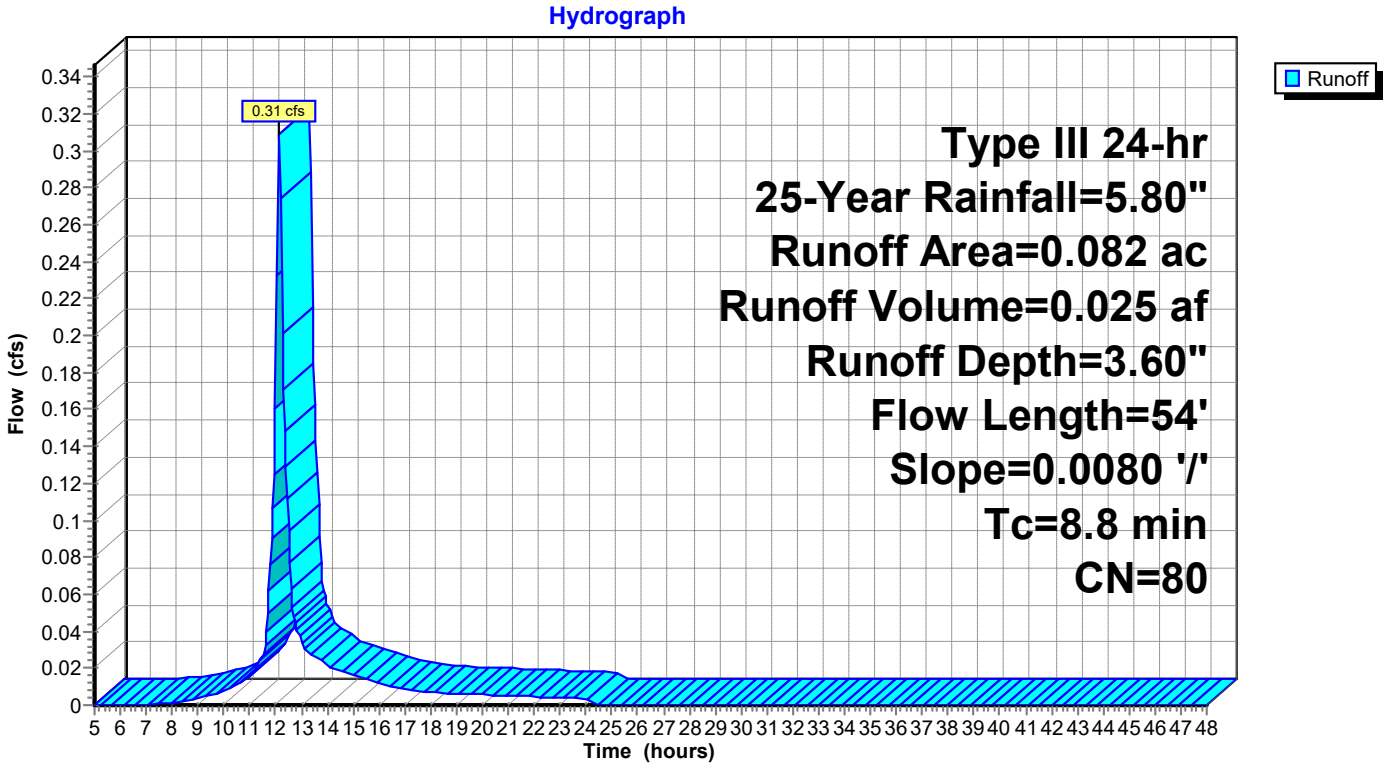
Runoff = 0.31 cfs @ 12.12 hrs, Volume= 0.025 af, Depth= 3.60"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 5.00-48.00 hrs, dt= 0.05 hrs
Type III 24-hr 25-Year Rainfall=5.80"

| Area (ac) | CN | Description |
|---|---|---|
| 0.080 | 80 | >75% Grass cover, Good, HSG D |
| 0.002 | 98 | Paved parking, HSG D |
| 0.082 | 80 | Weighted Average |
| 0.080 | | 97.56% Pervious Area |
| 0.002 | | 2.44% Impervious Area |

| Tc (min) | Length (feet) | Slope (ft/ft) | Velocity (ft/sec) | Capacity (cfs) | Description |
|---|---|---|---|---|---|
| 8.8 | 54 | 0.0080 | 0.10 | | **Sheet Flow,** Grass: Short n= 0.150 P2= 3.10" |

## Subcatchment 1.1C:



## Summary for Subcatchment 1.2A:

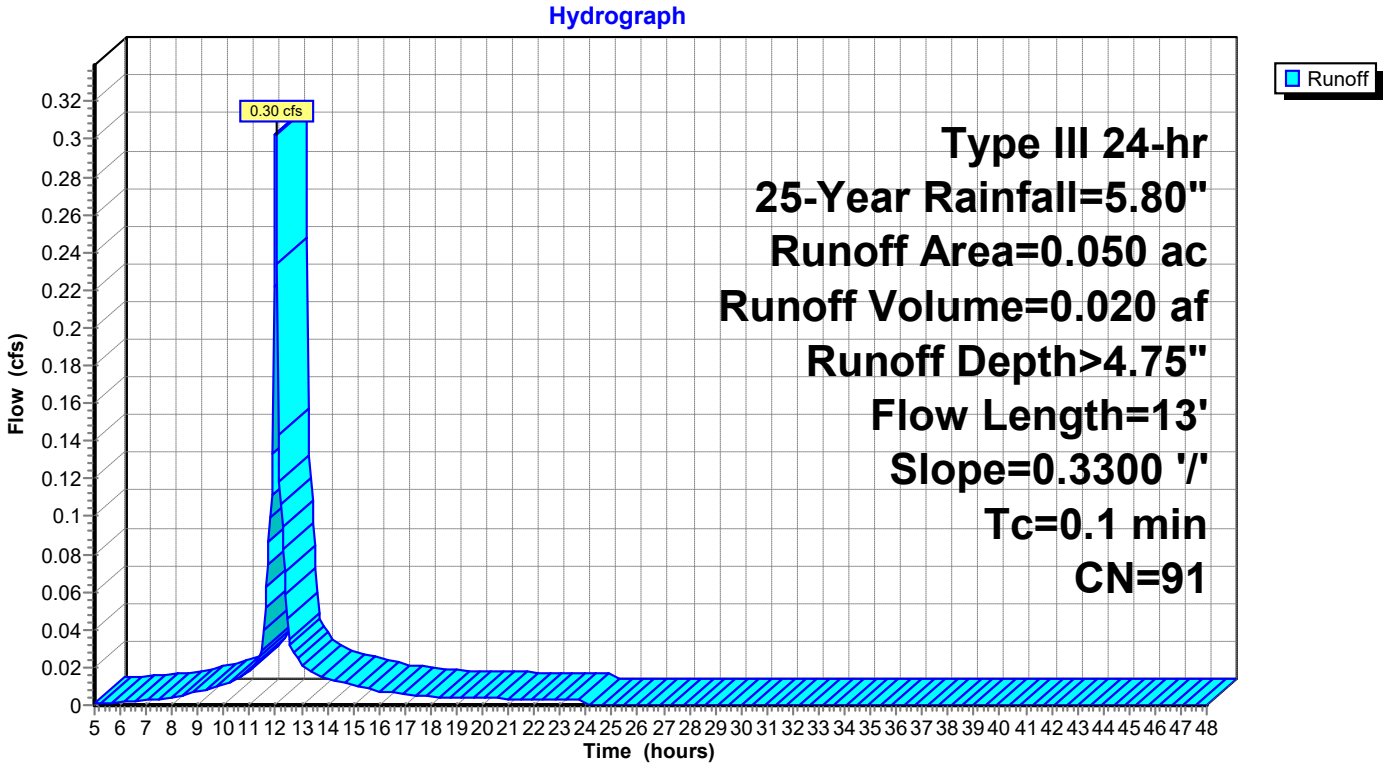
Runoff = 0.30 cfs @ 12.00 hrs, Volume= 0.020 af, Depth> 4.75"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 5.00-48.00 hrs, dt= 0.05 hrs
Type III 24-hr 25-Year Rainfall=5.80"

| | Area (ac) | CN | Description |
|---|---|---|---|
| * | 0.030 | 98 | Roof |
| | 0.020 | 80 | >75% Grass cover, Good, HSG D |
| | 0.050 | 91 | Weighted Average |
| | 0.020 | | 40.00% Pervious Area |
| | 0.030 | | 60.00% Impervious Area |

| Tc (min) | Length (feet) | Slope (ft/ft) | Velocity (ft/sec) | Capacity (cfs) | Description |
|---|---|---|---|---|---|
| 0.1 | 13 | 0.3300 | 2.76 | | **Sheet Flow,** Smooth surfaces n= 0.011 P2= 3.10" |

## Subcatchment 1.2A:



## Summary for Subcatchment 1.2B:

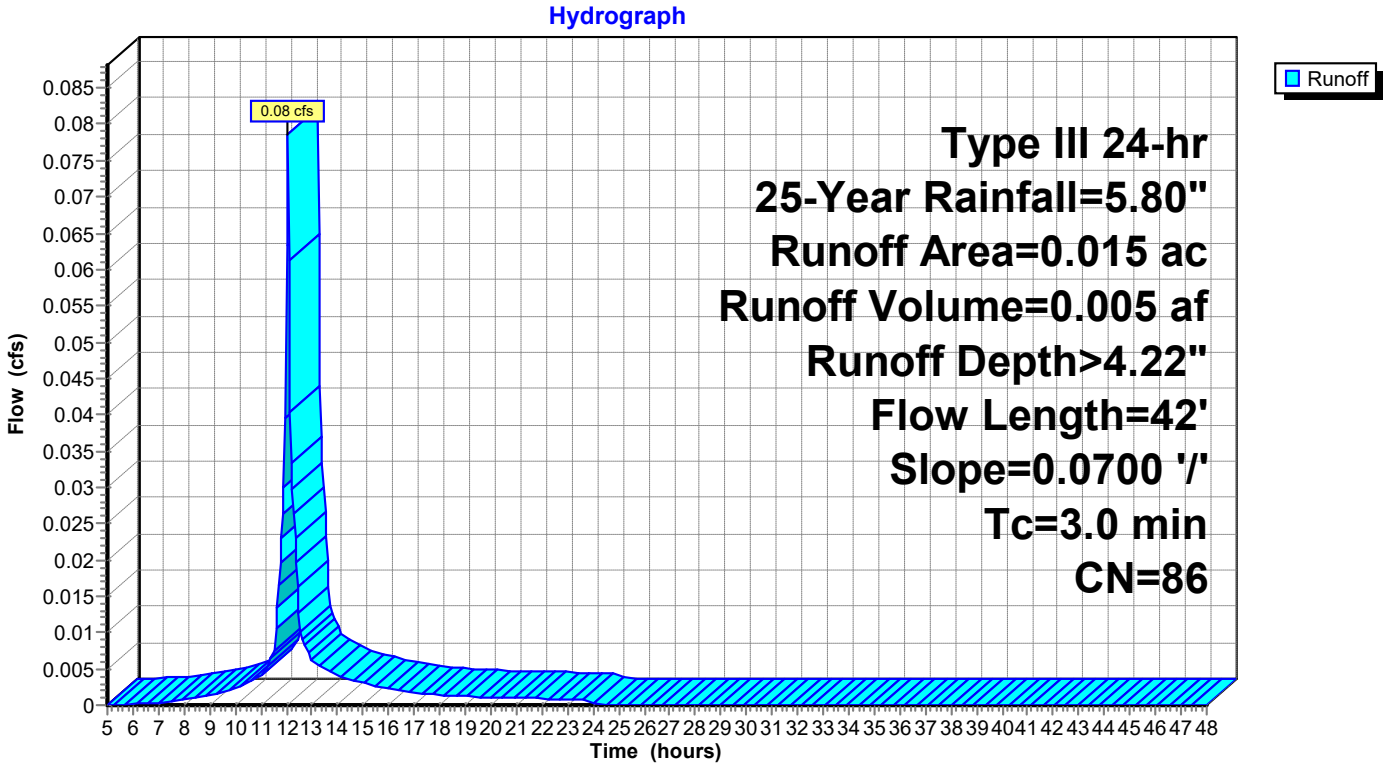
Runoff = 0.08 cfs @ 12.05 hrs, Volume= 0.005 af, Depth> 4.22"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 5.00-48.00 hrs, dt= 0.05 hrs
Type III 24-hr 25-Year Rainfall=5.80"

| | Area (ac) | CN | Description |
|---|---|---|---|
| | 0.010 | 80 | >75% Grass cover, Good, HSG D |
| * | 0.005 | 98 | Pavement & Walk |
| | 0.015 | 86 | Weighted Average |
| | 0.010 | | 66.67% Pervious Area |
| | 0.005 | | 33.33% Impervious Area |

| Tc (min) | Length (feet) | Slope (ft/ft) | Velocity (ft/sec) | Capacity (cfs) | Description |
|---|---|---|---|---|---|
| 3.0 | 42 | 0.0700 | 0.23 | | **Sheet Flow,** Grass: Short n= 0.150 P2= 3.10" |

## Subcatchment 1.2B:



## Summary for Subcatchment 1.2C:

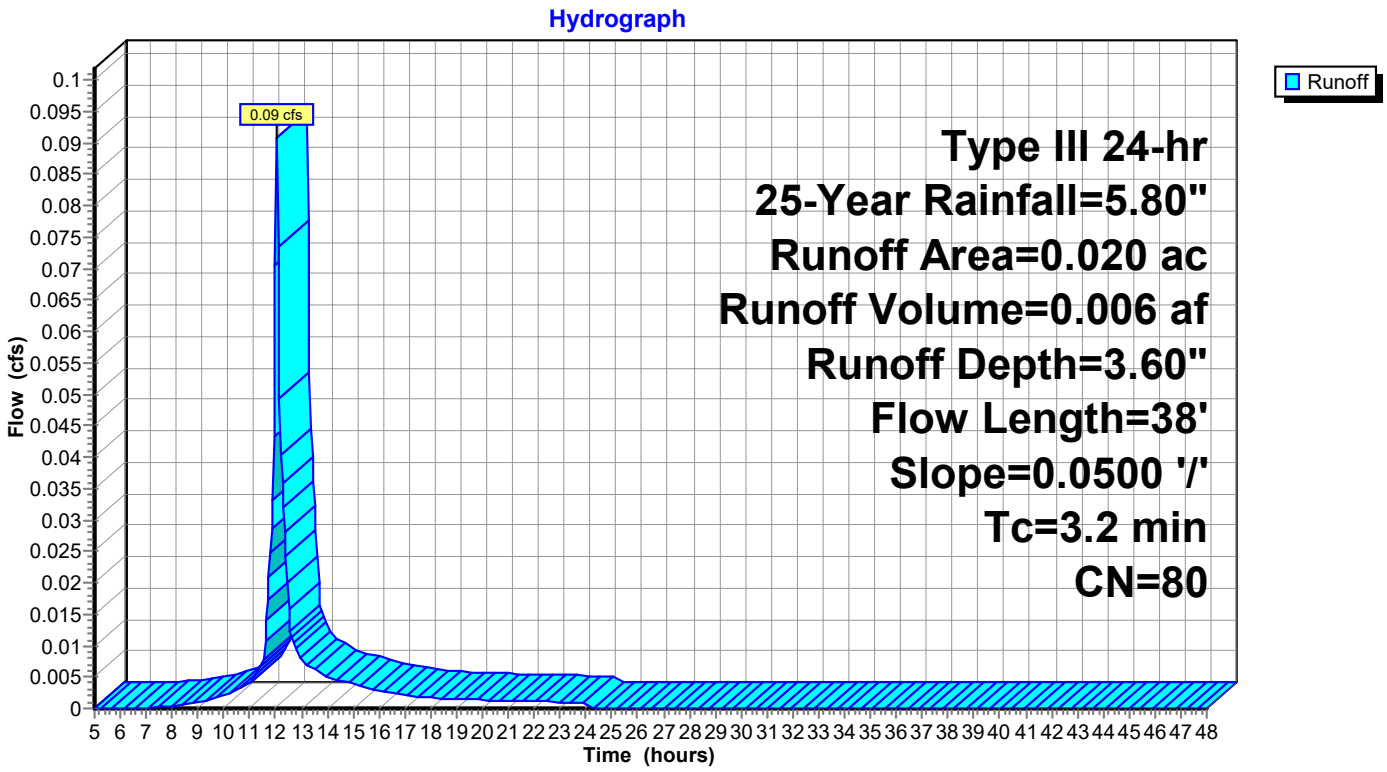
Runoff = 0.09 cfs @ 12.05 hrs, Volume= 0.006 af, Depth= 3.60"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 5.00-48.00 hrs, dt= 0.05 hrs
Type III 24-hr 25-Year Rainfall=5.80"

| Area (ac) | CN | Description |
|---|---|---|
| 0.020 | 80 | >75% Grass cover, Good, HSG D |
| 0.020 | | 100.00% Pervious Area |

| Tc (min) | Length (feet) | Slope (ft/ft) | Velocity (ft/sec) | Capacity (cfs) | Description |
|---|---|---|---|---|---|
| 3.2 | 38 | 0.0500 | 0.20 | | **Sheet Flow,** Grass: Short n= 0.150 P2= 3.10" |

## Subcatchment 1.2C:



## Summary for Subcatchment 1.3B:

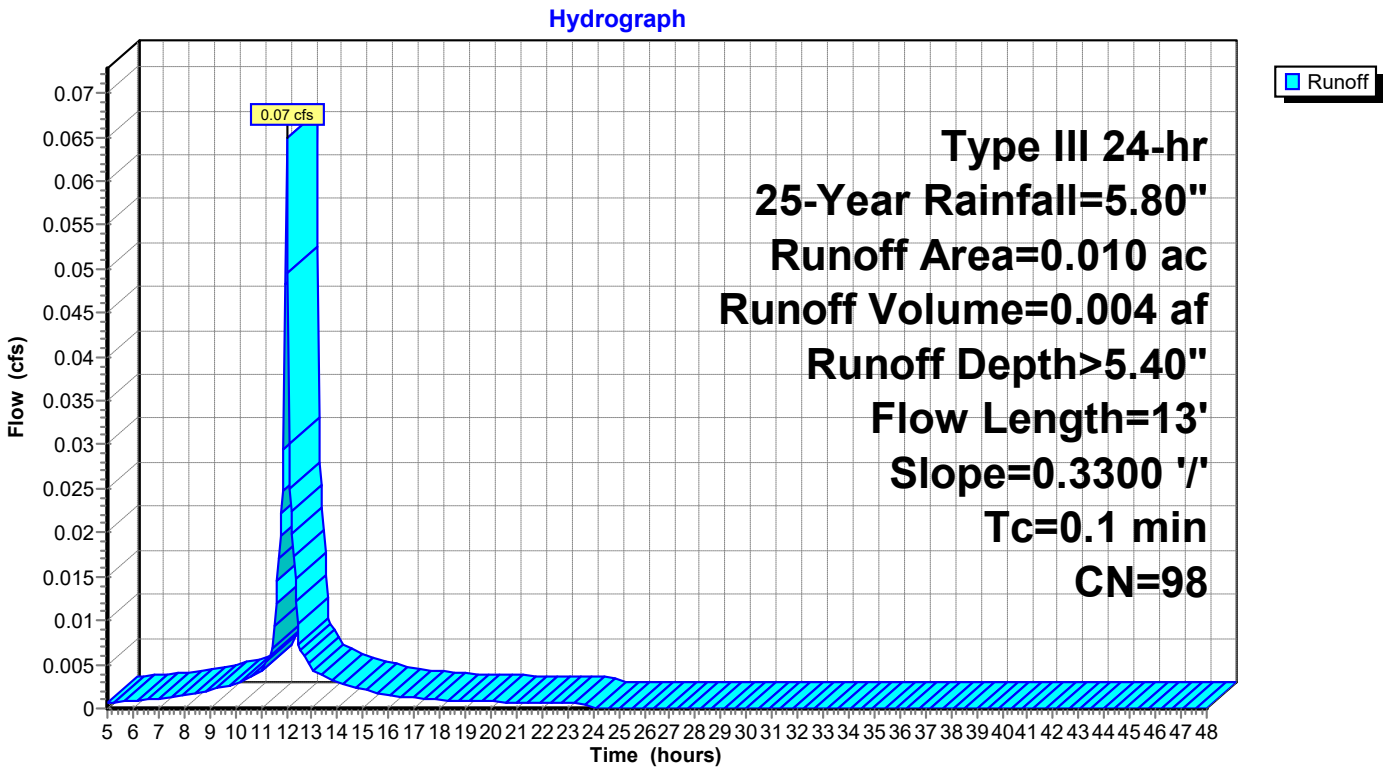
Runoff = 0.07 cfs @ 12.00 hrs, Volume= 0.004 af, Depth> 5.40"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 5.00-48.00 hrs, dt= 0.05 hrs
Type III 24-hr 25-Year Rainfall=5.80"

| | Area (ac) | CN | Description |
|---|---|---|---|
| * | 0.010 | 98 | Roof |
| | 0.010 | | 100.00% Impervious Area |

| Tc (min) | Length (feet) | Slope (ft/ft) | Velocity (ft/sec) | Capacity (cfs) | Description |
|---|---|---|---|---|---|
| 0.1 | 13 | 0.3300 | 2.76 | | **Sheet Flow,** Smooth surfaces n= 0.011 P2= 3.10" |

## Subcatchment 1.3B:



## Summary for Subcatchment 1.3C:

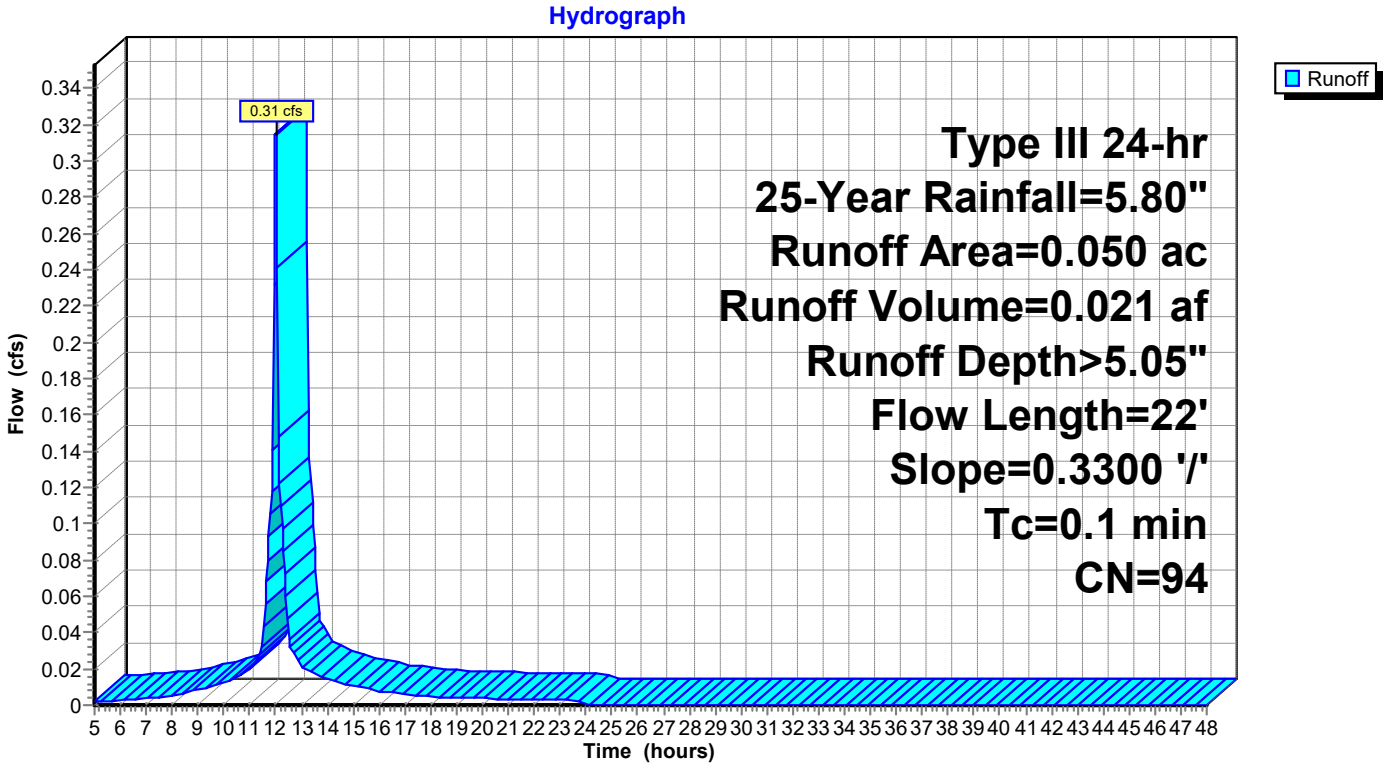
Runoff = 0.31 cfs @ 12.00 hrs, Volume= 0.021 af, Depth> 5.05"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 5.00-48.00 hrs, dt= 0.05 hrs
Type III 24-hr 25-Year Rainfall=5.80"

| | Area (ac) | CN | Description |
|---|---|---|---|
| * | 0.040 | 98 | Roof |
| | 0.010 | 80 | >75% Grass cover, Good, HSG D |
| | 0.050 | 94 | Weighted Average |
| | 0.010 | | 20.00% Pervious Area |
| | 0.040 | | 80.00% Impervious Area |

| Tc (min) | Length (feet) | Slope (ft/ft) | Velocity (ft/sec) | Capacity (cfs) | Description |
|---|---|---|---|---|---|
| 0.1 | 22 | 0.3300 | 3.07 | | **Sheet Flow,** Smooth surfaces n= 0.011 P2= 3.10" |

## Subcatchment 1.3C:



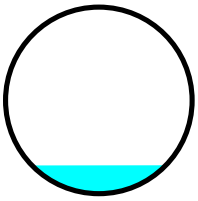
## Summary for Reach 1R: Under Drain

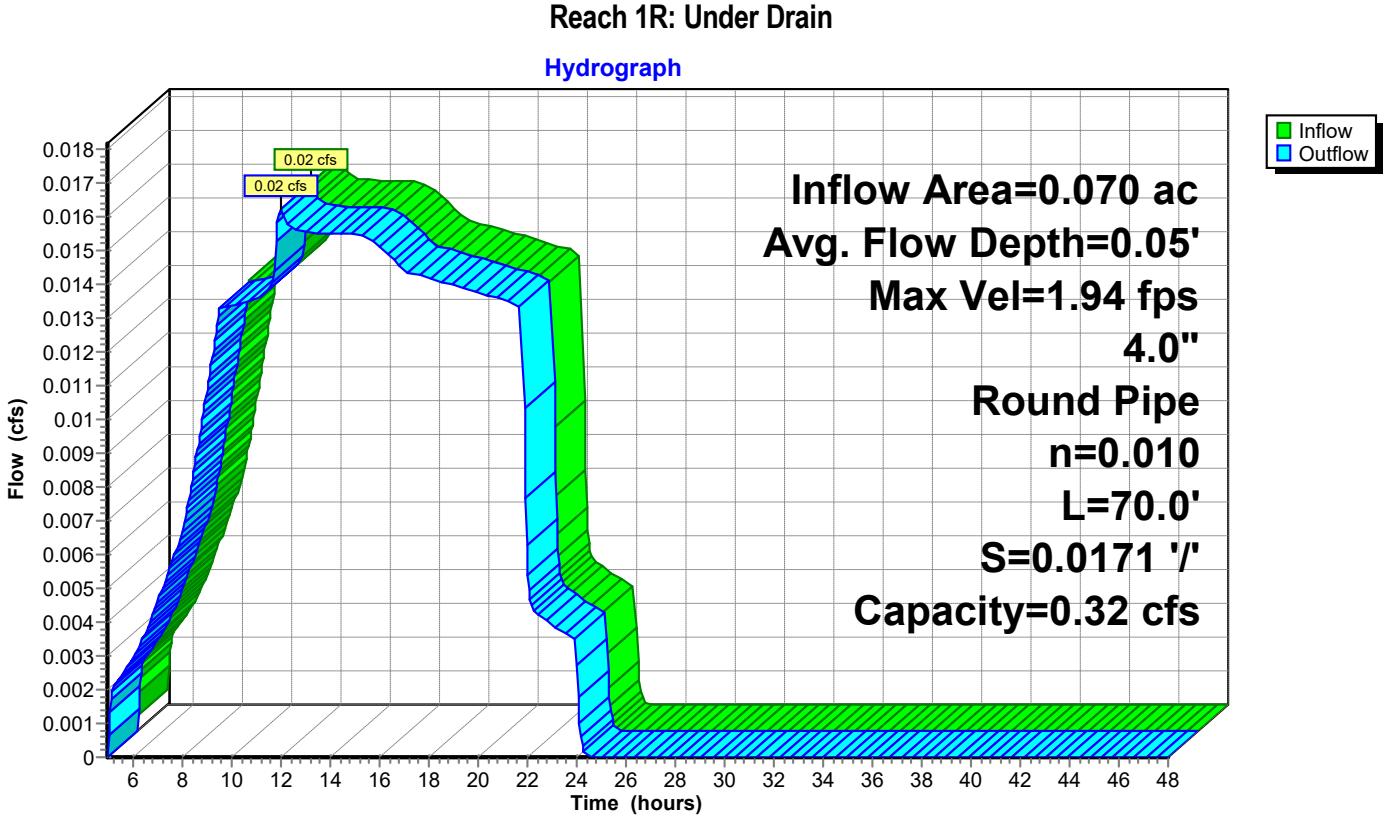
Inflow Area = 0.070 ac, 71.43% Impervious, Inflow Depth > 3.04" for 25-Year event
Inflow = 0.02 cfs @ 12.02 hrs, Volume= 0.018 af
Outflow = 0.02 cfs @ 12.04 hrs, Volume= 0.018 af, Atten= 0%, Lag= 1.3 min

Routing by Stor-Ind+Trans method, Time Span= 5.00-48.00 hrs, dt= 0.05 hrs
Max. Velocity= 1.94 fps, Min. Travel Time= 0.6 min
Avg. Velocity = 1.66 fps, Avg. Travel Time= 0.7 min

Peak Storage= 1 cf @ 12.03 hrs
Average Depth at Peak Storage= 0.05'
Bank-Full Depth= 0.33' Flow Area= 0.1 sf, Capacity= 0.32 cfs

4.0" Round Pipe
n= 0.010 PVC, smooth interior
Length= 70.0' Slope= 0.0171 '/'
Inlet Invert= 100.20', Outlet Invert= 99.00'





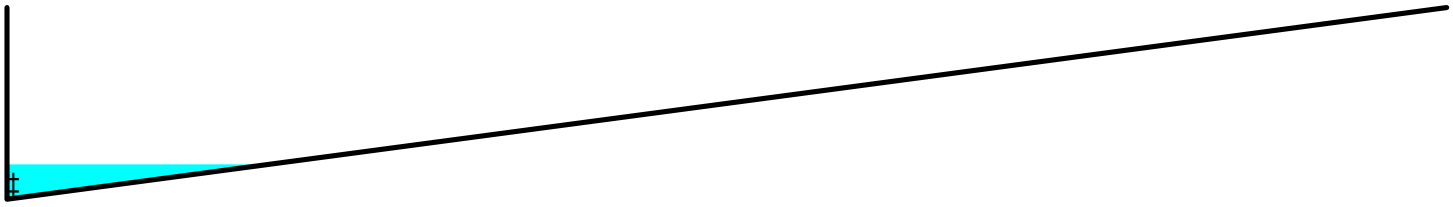
## Summary for Reach 2R: Gutter Line

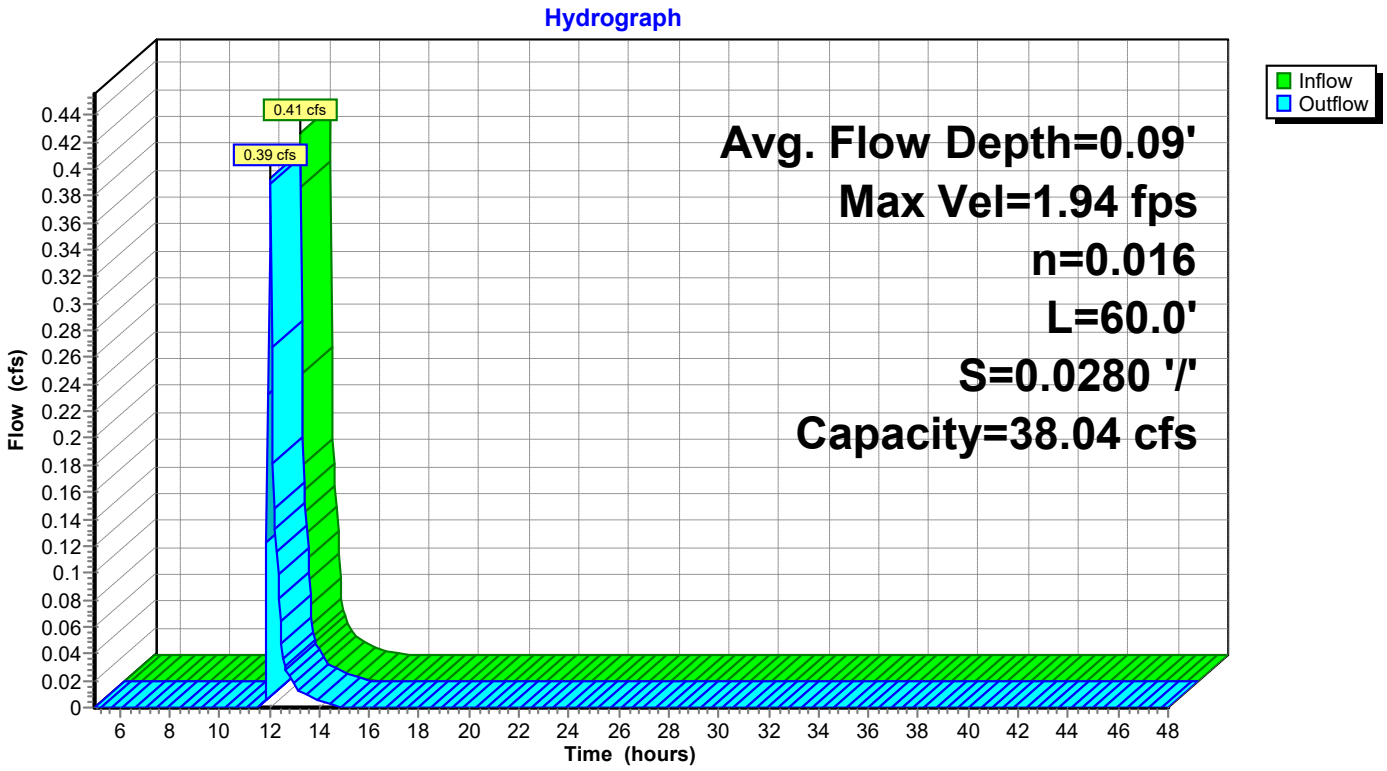
Inflow = 0.41 cfs @ 12.02 hrs, Volume= 0.011 af
Outflow = 0.39 cfs @ 12.04 hrs, Volume= 0.011 af, Atten= 4%, Lag= 1.4 min

Routing by Stor-Ind+Trans method, Time Span= 5.00-48.00 hrs, dt= 0.05 hrs
Max. Velocity= 1.94 fps, Min. Travel Time= 0.5 min
Avg. Velocity = 0.87 fps, Avg. Travel Time= 1.2 min

Peak Storage= 12 cf @ 12.03 hrs
Average Depth at Peak Storage= 0.09'
Bank-Full Depth= 0.50' Flow Area= 6.3 sf, Capacity= 38.04 cfs

0.00' x 0.50' deep channel, n= 0.016 Asphalt, rough
Side Slope Z-value= 0.0 50.0 '/' Top Width= 25.00'
Length= 60.0' Slope= 0.0280 '/'
Inlet Invert= 103.10', Outlet Invert= 101.42'



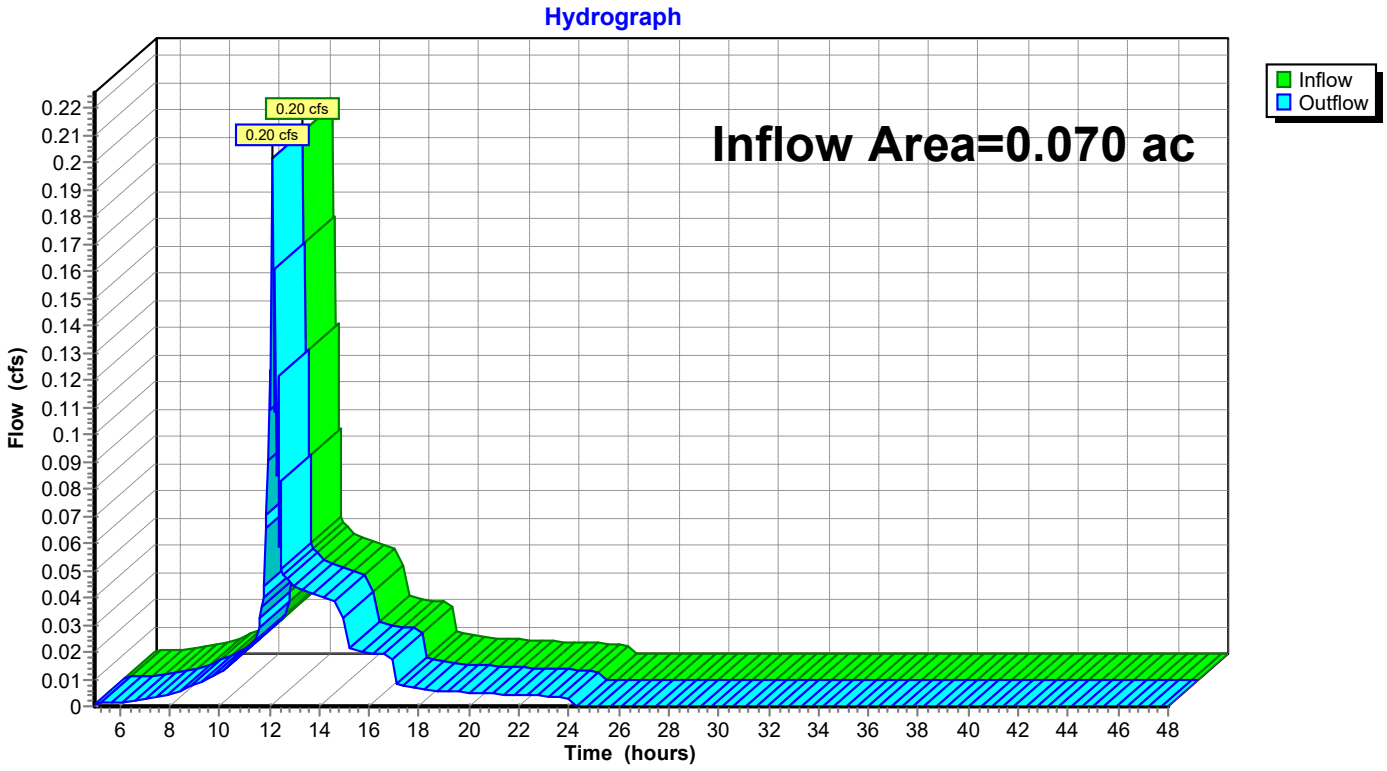


## Summary for Reach A: WAP A

Inflow Area = 0.070 ac, 42.86% Impervious, Inflow Depth > 4.42" for 25-Year event
Inflow = 0.20 cfs @ 12.15 hrs, Volume= 0.026 af
Outflow = 0.20 cfs @ 12.15 hrs, Volume= 0.026 af, Atten= 0%, Lag= 0.0 min

Routing by Stor-Ind+Trans method, Time Span= 5.00-48.00 hrs, dt= 0.05 hrs

### Reach A: WAP A

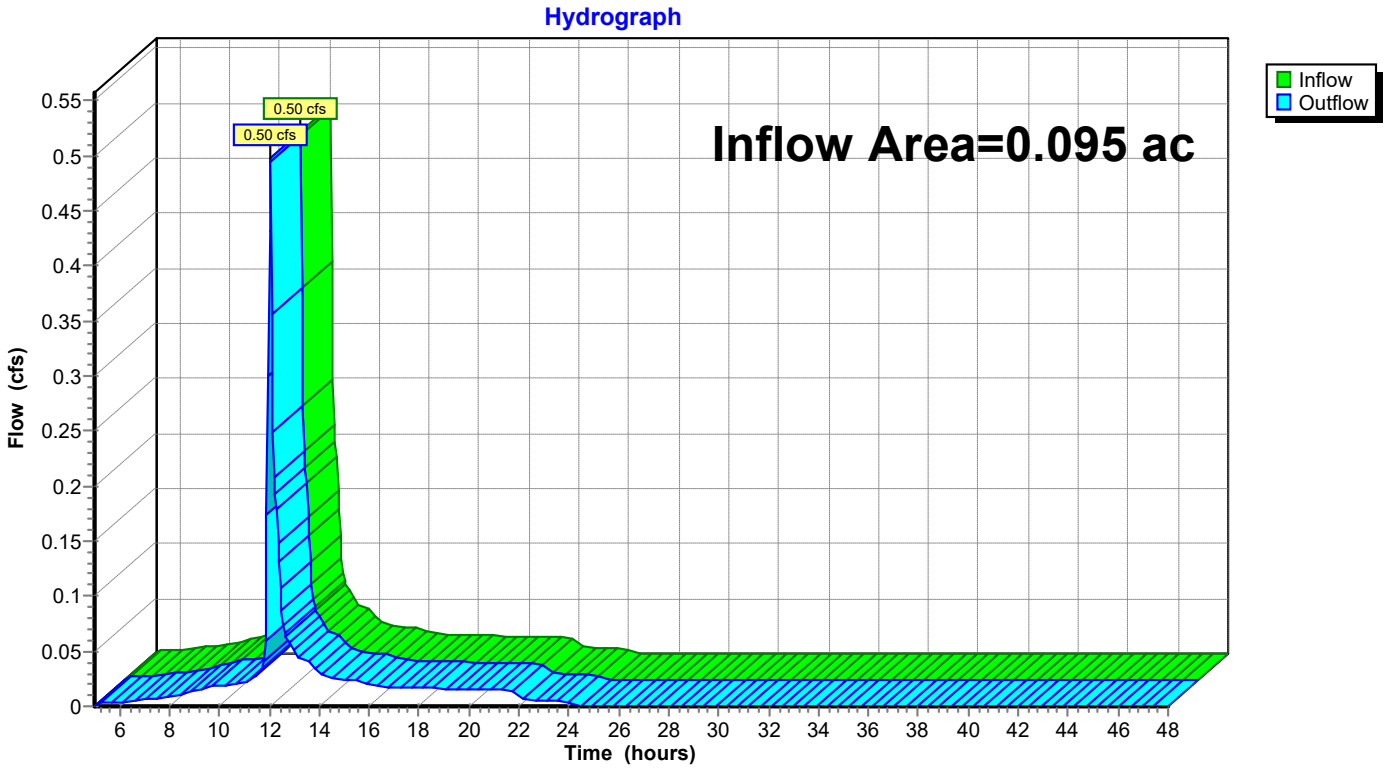


## Summary for Reach B: WAP B

Inflow Area = 0.095 ac, 68.42% Impervious, Inflow Depth > 4.88" for 25-Year event
Inflow = 0.50 cfs @ 12.04 hrs, Volume= 0.039 af
Outflow = 0.50 cfs @ 12.04 hrs, Volume= 0.039 af, Atten= 0%, Lag= 0.0 min

Routing by Stor-Ind+Trans method, Time Span= 5.00-48.00 hrs, dt= 0.05 hrs

### Reach B: WAP B

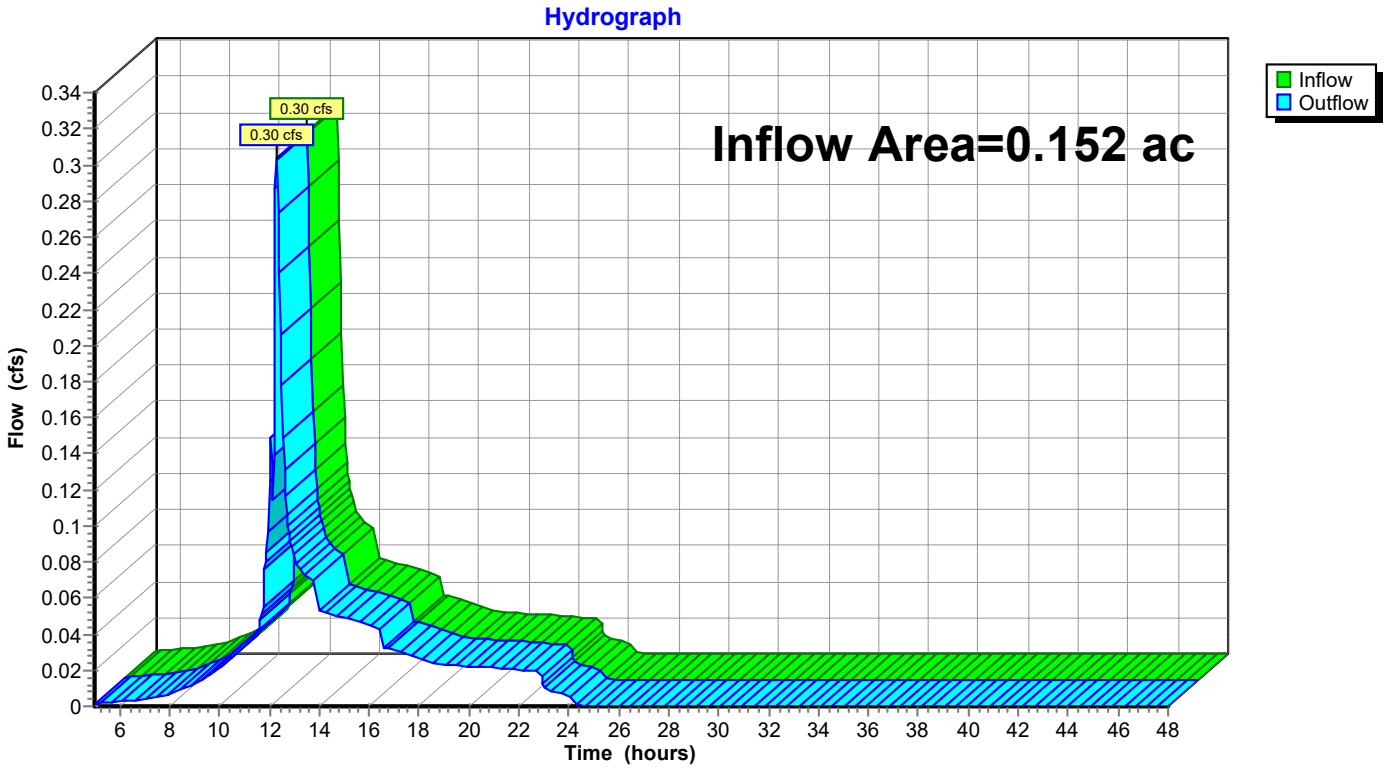


## Summary for Reach C: WAP C

Inflow Area = 0.152 ac, 27.63% Impervious, Inflow Depth > 4.08" for 25-Year event
Inflow = 0.30 cfs @ 12.29 hrs, Volume= 0.052 af
Outflow = 0.30 cfs @ 12.29 hrs, Volume= 0.052 af, Atten= 0%, Lag= 0.0 min

Routing by Stor-Ind+Trans method, Time Span= 5.00-48.00 hrs, dt= 0.05 hrs

### Reach C: WAP C



## Summary for Pond 1DL: dripline filter

Inflow Area = 0.010 ac,100.00% Impervious, Inflow Depth > 5.40" for 25-Year event
Inflow = 0.07 cfs @ 12.00 hrs, Volume= 0.004 af
Outflow = 0.02 cfs @ 12.29 hrs, Volume= 0.004 af, Atten= 67%, Lag= 17.6 min
Primary = 0.01 cfs @ 12.30 hrs, Volume= 0.004 af
Secondary = 0.01 cfs @ 12.29 hrs, Volume= 0.000 af

Routing by Stor-Ind method, Time Span= 5.00-48.00 hrs, dt= 0.05 hrs
Peak Elev= 105.90' @ 12.30 hrs Surf.Area= 220 sf Storage= 53 cf

Plug-Flow detention time= 32.4 min calculated for 0.004 af (100% of inflow)
Center-of-Mass det. time= 32.2 min ( 788.9 - 756.7 )

| Volume | Invert | Avail.Storage | Storage Description |
|---|---|---|---|
| #1 | 105.20' | 35 cf | **Custom Stage Data (Prismatic)** Listed below (Recalc)<br>88 cf Overall x 40.0% Voids |
| #2 | 104.20' | 22 cf | **Custom Stage Data (Prismatic)** Listed below (Recalc)<br>110 cf Overall x 20.0% Voids |
| | | 57 cf | Total Available Storage |

| Elevation (feet) | Surf.Area (sq-ft) | Inc.Store (cubic-feet) | Cum.Store (cubic-feet) |
|---|---|---|---|
| 105.20 | 110 | 0 | 0 |
| 106.00 | 110 | 88 | 88 |

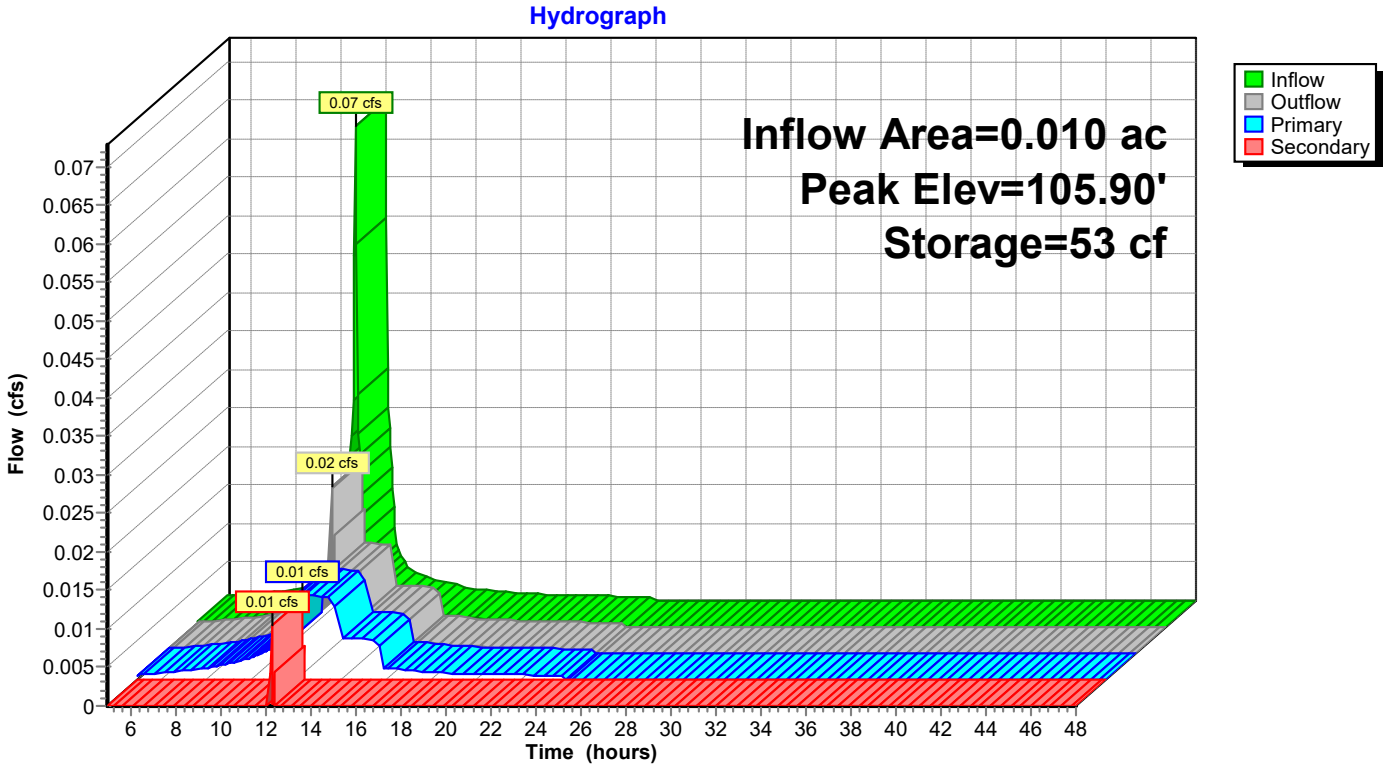
| Elevation (feet) | Surf.Area (sq-ft) | Inc.Store (cubic-feet) | Cum.Store (cubic-feet) |
|---|---|---|---|
| 104.20 | 110 | 0 | 0 |
| 105.20 | 110 | 110 | 110 |

| Device | Routing | Invert | Outlet Devices |
|---|---|---|---|
| #1 | Primary | 104.20' | **2.000 in/hr Exfiltration over Surface area above 103.87'** Conductivity to Groundwater Elevation = 90.00'<br>Excluded Surface area = 0 sf |
| #2 | Secondary | 105.90' | **26.5' long x 15.0' breadth Broad-Crested Rectangular Weir**<br>Head (feet) 0.20 0.40 0.60 0.80 1.00 1.20 1.40 1.60<br>Coef. (English) 2.68 2.70 2.70 2.64 2.63 2.64 2.64 2.63 |

**Primary OutFlow** Max=0.01 cfs @ 12.30 hrs HW=105.90' (Free Discharge)
**1=Exfiltration** ( Controls 0.01 cfs)

**Secondary OutFlow** Max=0.00 cfs @ 12.29 hrs HW=105.90' (Free Discharge)
**2=Broad-Crested Rectangular Weir** (Weir Controls 0.00 cfs @ 0.10 fps)

## Pond 1DL: dripline filter



## Summary for Pond 1PB: CB Grate

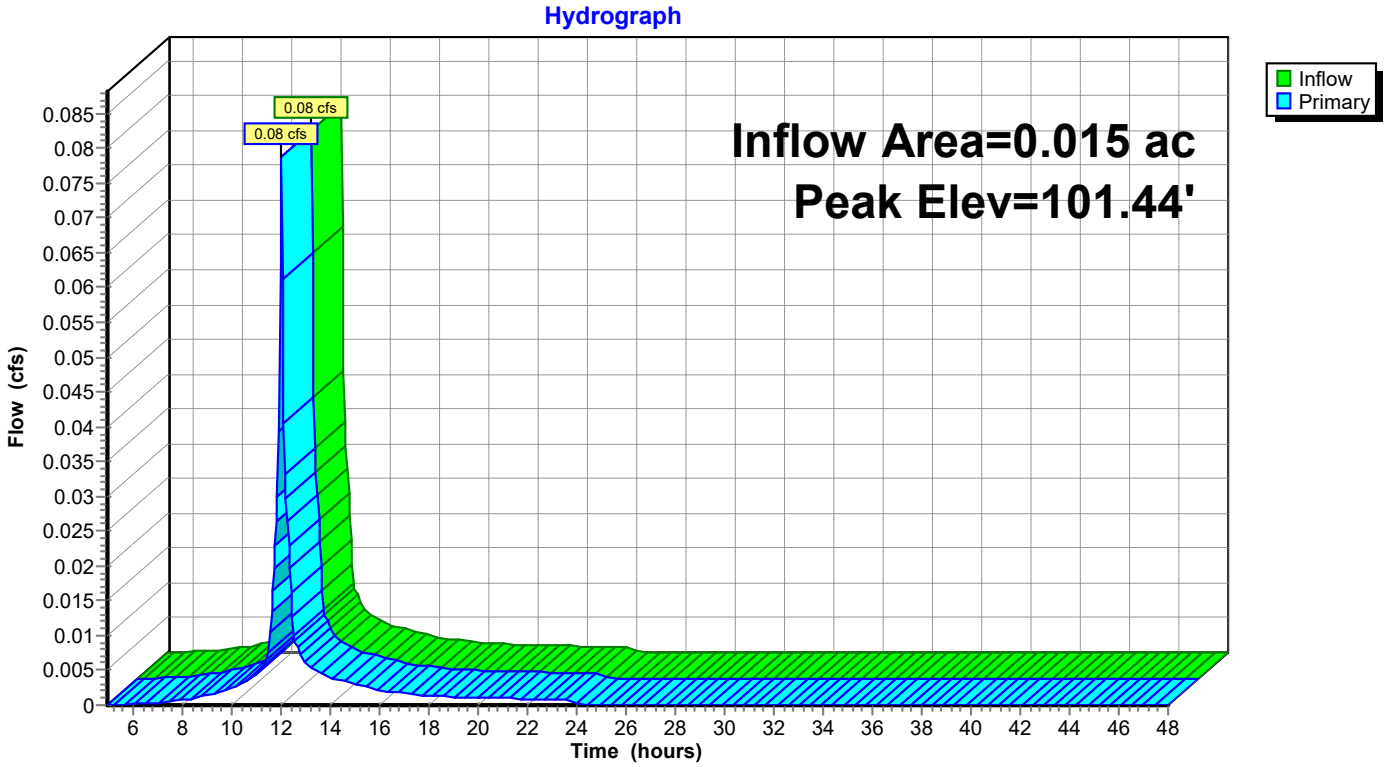
Inflow Area = 0.015 ac, 33.33% Impervious, Inflow Depth > 4.22" for 25-Year event
Inflow = 0.08 cfs @ 12.05 hrs, Volume= 0.005 af
Outflow = 0.08 cfs @ 12.05 hrs, Volume= 0.005 af, Atten= 0%, Lag= 0.0 min
Primary = 0.08 cfs @ 12.05 hrs, Volume= 0.005 af

Routing by Stor-Ind method, Time Span= 5.00-48.00 hrs, dt= 0.05 hrs
Peak Elev= 101.44' @ 12.05 hrs

| Device | Routing | Invert | Outlet Devices |
|---|---|---|---|
| #1 | Primary | 101.42' | **24.0" Horiz. Orifice/Grate** C= 0.600 Limited to weir flow at low heads |

**Primary OutFlow** Max=0.08 cfs @ 12.05 hrs HW=101.44' (Free Discharge)
└**1=Orifice/Grate** (Weir Controls 0.08 cfs @ 0.51 fps)

## Pond 1PB: CB Grate



## Summary for Pond 2DL: dripline filter

Inflow Area = 0.050 ac, 80.00% Impervious, Inflow Depth > 5.05" for 25-Year event
Inflow = 0.31 cfs @ 12.00 hrs, Volume= 0.021 af
Outflow = 0.32 cfs @ 12.02 hrs, Volume= 0.021 af, Atten= 0%, Lag= 1.1 min
Primary = 0.04 cfs @ 12.00 hrs, Volume= 0.017 af
Secondary = 0.28 cfs @ 12.02 hrs, Volume= 0.004 af

Routing by Stor-Ind method, Time Span= 5.00-48.00 hrs, dt= 0.05 hrs
Peak Elev= 97.91' @ 12.00 hrs Surf.Area= 696 sf Storage= 150 cf

Plug-Flow detention time= 25.2 min calculated for 0.021 af (100% of inflow)
Center-of-Mass det. time= 25.1 min ( 793.9 - 768.8 )

| Volume | Invert | Avail.Storage | Storage Description |
|---|---|---|---|
| #1 | 97.33' | 93 cf | **Custom Stage Data (Prismatic)** Listed below (Recalc)<br>233 cf Overall x 40.0% Voids |
| #2 | 96.33' | 70 cf | **Custom Stage Data (Prismatic)** Listed below (Recalc)<br>348 cf Overall x 20.0% Voids |
| | | 163 cf | Total Available Storage |

| Elevation (feet) | Surf.Area (sq-ft) | Inc.Store (cubic-feet) | Cum.Store (cubic-feet) |
|---|---|---|---|
| 97.33 | 348 | 0 | 0 |
| 98.00 | 348 | 233 | 233 |

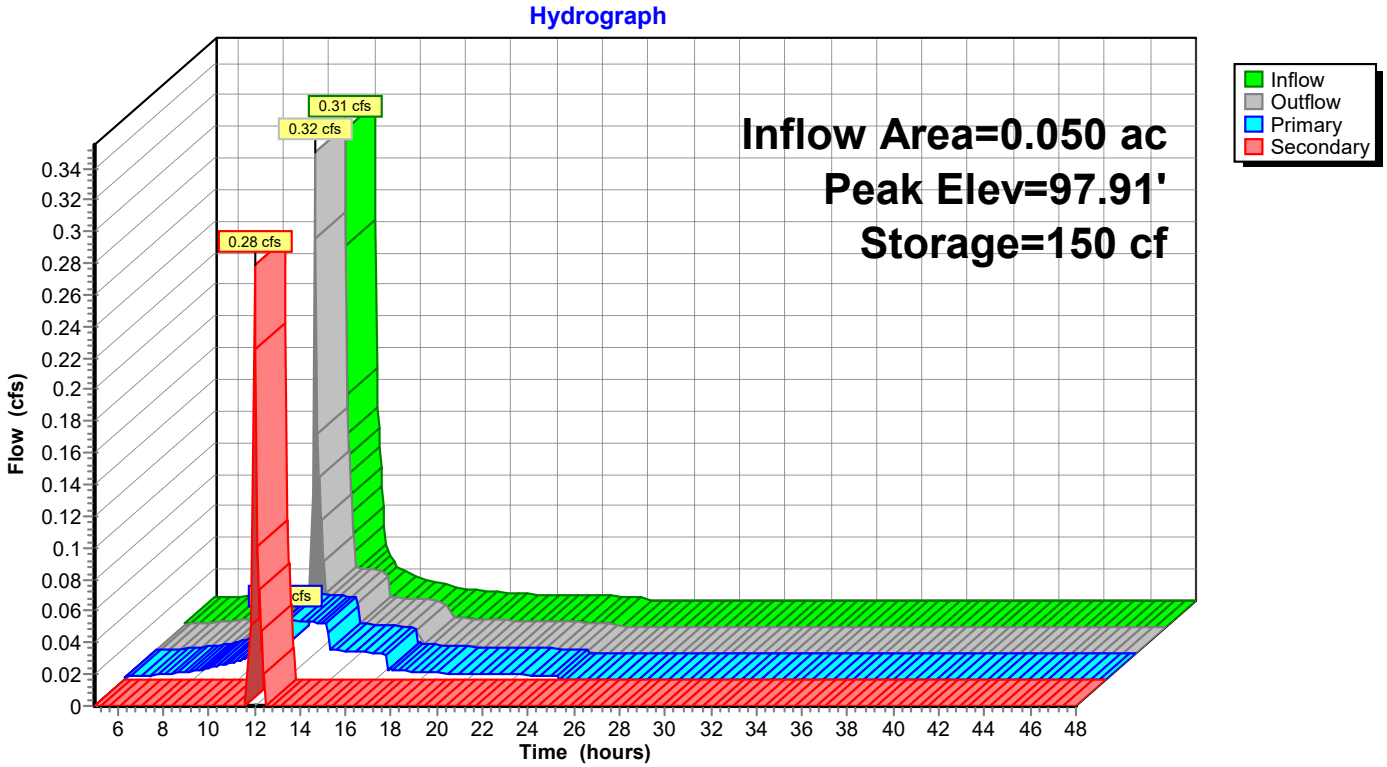
| Elevation (feet) | Surf.Area (sq-ft) | Inc.Store (cubic-feet) | Cum.Store (cubic-feet) |
|---|---|---|---|
| 96.33 | 348 | 0 | 0 |
| 97.33 | 348 | 348 | 348 |

| Device | Routing | Invert | Outlet Devices |
|---|---|---|---|
| #1 | Primary | 96.33' | **2.000 in/hr Exfiltration over Surface area above 96.00'** Conductivity to Groundwater Elevation = 90.00'<br>Excluded Surface area = 0 sf |
| #2 | Secondary | 97.90' | **134.0' long x 18.0' breadth Broad-Crested Rectangular Weir**<br>Head (feet) 0.20 0.40 0.60 0.80 1.00 1.20 1.40 1.60<br>Coef. (English) 2.68 2.70 2.70 2.64 2.63 2.64 2.64 2.63 |

**Primary OutFlow** Max=0.04 cfs @ 12.00 hrs HW=97.91' (Free Discharge)
↑**1=Exfiltration** ( Controls 0.04 cfs)

**Secondary OutFlow** Max=0.14 cfs @ 12.02 hrs HW=97.91' (Free Discharge)
↑**2=Broad-Crested Rectangular Weir** (Weir Controls 0.14 cfs @ 0.20 fps)

## Pond 2DL: dripline filter



## Summary for Pond 3DL: dripline filter

Inflow Area = 0.050 ac, 60.00% Impervious, Inflow Depth > 4.75" for 25-Year event
Inflow = 0.30 cfs @ 12.00 hrs, Volume= 0.020 af
Outflow = 0.16 cfs @ 12.15 hrs, Volume= 0.020 af, Atten= 47%, Lag= 9.1 min
Primary = 0.04 cfs @ 12.15 hrs, Volume= 0.018 af
Secondary = 0.12 cfs @ 12.15 hrs, Volume= 0.001 af

Routing by Stor-Ind method, Time Span= 5.00-48.00 hrs, dt= 0.05 hrs
Peak Elev= 105.90' @ 12.15 hrs Surf.Area= 712 sf Storage= 236 cf

Plug-Flow detention time= 44.2 min calculated for 0.020 af (100% of inflow)
Center-of-Mass det. time= 44.2 min ( 822.4 - 778.2 )

| Volume | Invert | Avail.Storage | Storage Description |
|---|---|---|---|
| #1 | 104.75' | 178 cf | **Custom Stage Data (Prismatic)** Listed below (Recalc)<br>445 cf Overall x 40.0% Voids |
| #2 | 103.75' | 71 cf | **Custom Stage Data (Prismatic)** Listed below (Recalc)<br>356 cf Overall x 20.0% Voids |
| | | 249 cf | Total Available Storage |

| Elevation (feet) | Surf.Area (sq-ft) | Inc.Store (cubic-feet) | Cum.Store (cubic-feet) |
|---|---|---|---|
| 104.75 | 356 | 0 | 0 |
| 106.00 | 356 | 445 | 445 |

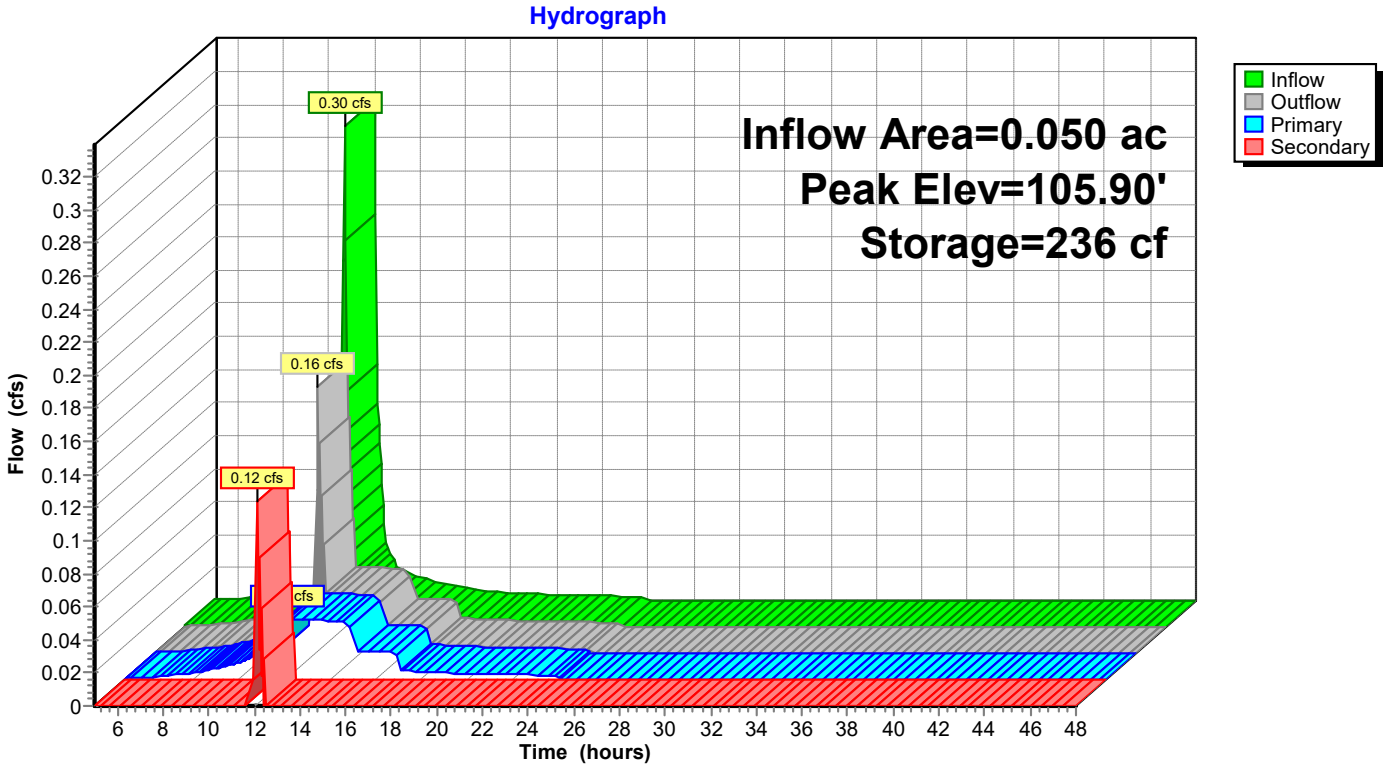
| Elevation (feet) | Surf.Area (sq-ft) | Inc.Store (cubic-feet) | Cum.Store (cubic-feet) |
|---|---|---|---|
| 103.75 | 356 | 0 | 0 |
| 104.75 | 356 | 356 | 356 |

| Device | Routing | Invert | Outlet Devices |
|---|---|---|---|
| #1 | Primary | 103.75' | **2.000 in/hr Exfiltration over Surface area above 103.42'** Conductivity to Groundwater Elevation = 90.00'<br>Excluded Surface area = 0 sf |
| #2 | Secondary | 105.90' | **93.0' long x 20.0' breadth Broad-Crested Rectangular Weir**<br>Head (feet) 0.20 0.40 0.60 0.80 1.00 1.20 1.40 1.60<br>Coef. (English) 2.68 2.70 2.70 2.64 2.63 2.64 2.64 2.63 |

**Primary OutFlow** Max=0.04 cfs @ 12.15 hrs HW=105.90' (Free Discharge)
↑**1=Exfiltration** ( Controls 0.04 cfs)

**Secondary OutFlow** Max=0.08 cfs @ 12.15 hrs HW=105.90' (Free Discharge)
↑**2=Broad-Crested Rectangular Weir** (Weir Controls 0.08 cfs @ 0.18 fps)

## Pond 3DL: dripline filter



## Summary for Pond RG1: Rain Garden

Inflow Area = 0.070 ac, 71.43% Impervious, Inflow Depth > 4.95" for 25-Year event
Inflow = 0.43 cfs @ 12.01 hrs, Volume= 0.029 af
Outflow = 0.42 cfs @ 12.02 hrs, Volume= 0.029 af, Atten= 2%, Lag= 0.6 min
Primary = 0.02 cfs @ 12.02 hrs, Volume= 0.018 af
Secondary = 0.41 cfs @ 12.02 hrs, Volume= 0.011 af

Routing by Stor-Ind method, Time Span= 5.00-48.00 hrs, dt= 0.05 hrs
Peak Elev= 103.16' @ 12.02 hrs Surf.Area= 321 sf Storage= 194 cf

Plug-Flow detention time= 64.9 min calculated for 0.029 af (100% of inflow)
Center-of-Mass det. time= 64.7 min ( 837.1 - 772.3 )

| Volume | Invert | Avail.Storage | Storage Description |
|---|---|---|---|
| #1 | 102.50' | 510 cf | **Custom Stage Data (Prismatic)** Listed below (Recalc) |

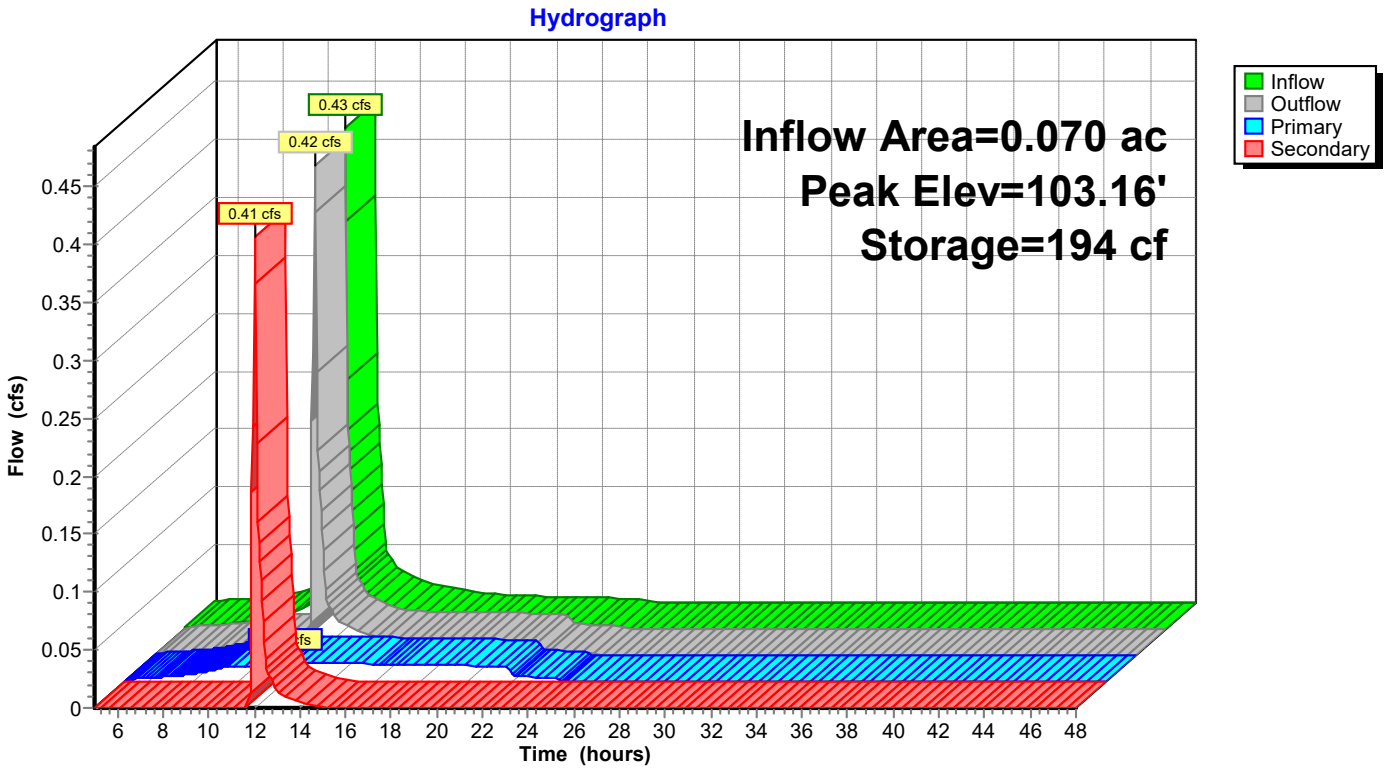
| Elevation (feet) | Surf.Area (sq-ft) | Inc.Store (cubic-feet) | Cum.Store (cubic-feet) |
|---|---|---|---|
| 102.50 | 288 | 0 | 0 |
| 103.00 | 288 | 144 | 144 |
| 103.50 | 388 | 169 | 313 |
| 104.00 | 400 | 197 | 510 |

| Device | Routing | Invert | Outlet Devices |
|---|---|---|---|
| #1 | Primary | 102.50' | **2.000 in/hr Exfiltration over Surface area above 100.20'** Conductivity to Groundwater Elevation = 96.00'<br>Excluded Surface area = 0 sf |
| #2 | Secondary | 103.10' | **10.0' long x 10.0' breadth Broad-Crested Rectangular Weir**<br>Head (feet) 0.20 0.40 0.60 0.80 1.00 1.20 1.40 1.60<br>Coef. (English) 2.49 2.56 2.70 2.69 2.68 2.69 2.67 2.64 |

**Primary OutFlow** Max=0.02 cfs @ 12.02 hrs HW=103.16' (Free Discharge)
**1=Exfiltration** ( Controls 0.02 cfs)

**Secondary OutFlow** Max=0.39 cfs @ 12.02 hrs HW=103.16' (Free Discharge)
**2=Broad-Crested Rectangular Weir** (Weir Controls 0.39 cfs @ 0.62 fps)

## Pond RG1: Rain Garden



## Summary for Pond RG2: Rain Garden

Inflow Area = 0.082 ac, 2.44% Impervious, Inflow Depth = 4.16" for 25-Year event
Inflow = 0.46 cfs @ 12.04 hrs, Volume= 0.028 af
Outflow = 0.23 cfs @ 12.30 hrs, Volume= 0.028 af, Atten= 49%, Lag= 15.2 min
Primary = 0.03 cfs @ 12.30 hrs, Volume= 0.023 af
Secondary = 0.20 cfs @ 12.30 hrs, Volume= 0.005 af

Routing by Stor-Ind method, Time Span= 5.00-48.00 hrs, dt= 0.05 hrs
Peak Elev= 97.57' @ 12.30 hrs Surf.Area= 615 sf Storage= 435 cf

Plug-Flow detention time= 122.5 min calculated for 0.028 af (100% of inflow)
Center-of-Mass det. time= 122.3 min ( 928.2 - 805.9 )

| Volume | Invert | Avail.Storage | Storage Description |
|---|---|---|---|
| #1 | 96.50' | 780 cf | **Custom Stage Data (Prismatic)** Listed below (Recalc) |

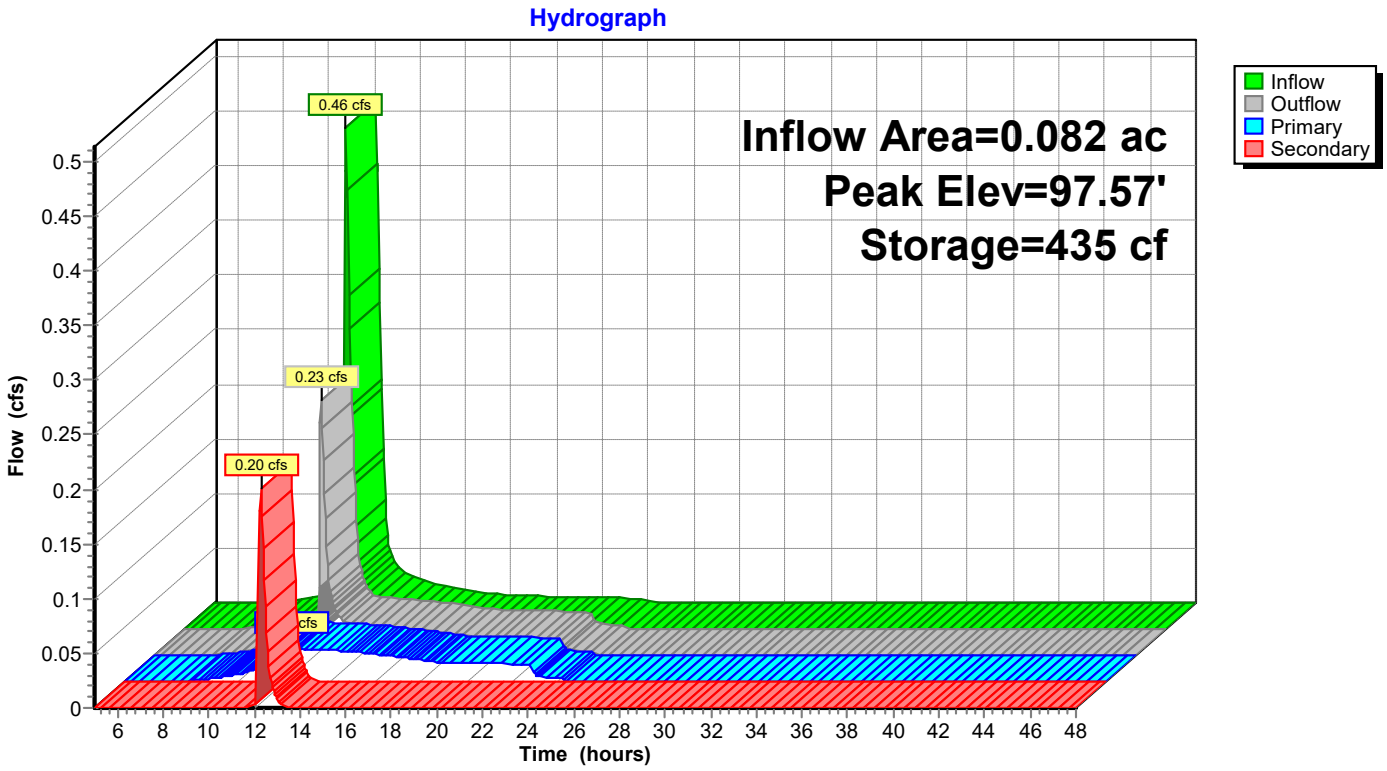
| Elevation (feet) | Surf.Area (sq-ft) | Inc.Store (cubic-feet) | Cum.Store (cubic-feet) |
|---|---|---|---|
| 96.50 | 340 | 0 | 0 |
| 97.00 | 340 | 170 | 170 |
| 97.50 | 550 | 223 | 393 |
| 98.00 | 1,000 | 388 | 780 |

| Device | Routing | Invert | Outlet Devices |
|---|---|---|---|
| #1 | Primary | 96.50' | **2.000 in/hr Exfiltration over Surface area above 94.66'** Conductivity to Groundwater Elevation = 92.00' Excluded Surface area = 0 sf |
| #2 | Secondary | 97.50' | **12.0" Horiz. Orifice/Grate** C= 0.600 Limited to weir flow at low heads |

**Primary OutFlow** Max=0.03 cfs @ 12.30 hrs HW=97.57' (Free Discharge)
└**1=Exfiltration** ( Controls 0.03 cfs)

**Secondary OutFlow** Max=0.20 cfs @ 12.30 hrs HW=97.57' (Free Discharge)
└**2=Orifice/Grate** (Weir Controls 0.20 cfs @ 0.88 fps)

## Pond RG2: Rain Garden



**WORKSHEET FOR EVALUATING STORMWATER BMP's**

14 Hill Way

## FILTER DESIGNS

## Rain Garden 2

| Channel Protection Volume | acres: | | |
|---|---|---|---|
| Impervious Area | 0.00 | 1" Volume= | 0 cf |
| Developed non-impervious area | 0.08 | 0.4" Volume= | 116 cf |
| | | Total Volume= | **116** cf |

| Area Sizing | Planted | |
|---|---|---|
| 7% of the Impervious Area | 0 | sq. ft |
| 3% of the Developed non-impervious Area | 105 | sq. ft |
| Total surface area of the filter media top: | **105** | square feet |

| Sediment Forebay | | |
|---|---|---|
| Impervious area to be sanded: | 0 | acres |
| Sand Application Rate, per storm | 500 | lbs per acre |
| Sand Desity, +/- | 90 | pcf |
| Number of Storms | 10 | annually |
| Forebay Size | **0** | cf |

| | | |
|---|---|---|
| Designed Volume: | 393 | cf |
| Designed Filter Area: | 340 | sf |

**WORKSHEET FOR EVALUATING STORMWATER BMP's**

14 Hill Way

## FILTER DESIGNS

## Rain Garden 1

| Channel Protection Volume | acres: | | |
|---|---|---|---|
| Impervious Area | 0.05 | 1" Volume= | 181 cf |
| Developed non-impervious area | 0.02 | 0.4" Volume= | 29 cf |
| | | Total Volume= | **211** cf |

| Area Sizing | Planted | |
|---|---|---|
| 7% of the Impervious Area | 152 | sq. ft |
| 3% of the Developed non-impervious Area | 26 | sq. ft |
| Total surface area of the filter media top: | **179** | square feet |

| Sediment Forebay | | |
|---|---|---|
| Impervious area to be sanded: | 0.05 | acres |
| Sand Application Rate, per storm | 500 | lbs per acre |
| Sand Desity, +/- | 90 | pcf |
| Number of Storms | 10 | annually |
| Forebay Size | **3** | cf |

| | | |
|---|---|---|
| Designed Volume: | 313 | cf |
| Designed Filter Area: | 288 | sf |

14 Hill Way Average Adjacent Grade Calculation
8/21/2020

Segments start at front corner of garage and continue clockwise:

| Start Elev. | End Elev. | Avg. Elev. | Seg. Dist | Elev x Dist |
|---|---|---|---|---|
| 107.0 | 106.2 | 106.6 | 16.3 | 1740.8 |
| 98.0 | 98.0 | 98.0 | 63.6 | 6232.8 |
| 98.0 | 98.0 | 98.0 | 65.1 | 6381.8 |
| 106.2 | 106.2 | 106.2 | 66.5 | 7062.3 |
| 106.2 | 107.0 | 106.6 | 21.3 | 2273.8 |
| 107.0 | 107.0 | 107.0 | 30.7 | 3281.7 |
| | | | 263.55 | 26973.1 |
| | | Avg. Adjacent Grade | | 102.3 |

| | |
|---|---|
| 1st Floor Finished | 98.6 |
| Garage Slab | 107 |
| Main Floor Finished | 109 |