

## ***Stormwater Calculations***

**41 Portsmouth Ave LLC  
41 Portsmouth Avenue (Site)  
Stratham, NH 03885**

**January 22, 2025**

**Revised: June, 17, 2026**

Prepared For: 41 Portsmouth Avenue LLC  
151 Portsmouth Avenue  
Exeter, NH 03833

Prepared By: Emanuel Engineering, Inc.  
100 Griffin Road, Unit C  
Portsmouth, NH 03801  
EEI Project # 25-1001



---

Bruce Scamman, PE  
Emanuel Engineering

*Civil & Structural Consultants | Land Planners*



## Table of Contents

1. Stormwater Narrative
2. Extreme precipitation tables
3. Pre-Development Drainage Areas
4. Post-Development (Phase I) Drainage Areas
5. Post-Development (Phase II) Drainage Areas
6. Summary table of the peak discharge rates & volumes
7. USDA Web Soil Survey Map with project's watershed outlined
8. Groundwater Recharge Volume Calculations
9. BMP Worksheets (one worksheet for each treatment system)
10. Riprap apron calculations
11. SW1 – Predevelopment Subcatchments
12. Pre-development drainage analysis
  - a. Drainage diagram
  - b. Project Notes & Rainfall Events Listing
  - c. Area Listing and Soil Listing
  - d. Ground Cover and Pipe Listing
  - e. Full summary of the 10-year storm event
  - f. Water Quality Volume (1 inch storm event),
  - g. 2-year,
  - h. 10-year,
  - i. 25-year, and
  - j. 50-year
13. SW2 – Postdevelopment (Phase I) Subcatchments
14. Post-development (Phase I) drainage analysis
  - a. Drainage diagram
  - b. Project Notes & Rainfall Events Listing
  - c. Area Listing and Soil Listing
  - d. Ground Cover and Pipe Listing
  - e. Full summary of the 10-year storm event
  - f. Water Quality Volume (1 inch storm event),
  - g. 2-year,
  - h. 10-year,
  - i. 25-year, and
  - j. 50-year
15. SW3 – Postdevelopment (Phase II) Subcatchments
16. Post-development (Phase II) drainage analysis
  - a. Drainage diagram
  - b. Project Notes & Rainfall Events Listing
  - c. Area Listing and Soil Listing
  - d. Ground Cover and Pipe Listing
  - e. Full summary of the 10-year storm event
  - f. Water Quality Volume (1 inch storm event),
  - g. 2-year,
  - h. 10-year,
  - i. 25-year, and
  - j. 50-year
17. Site Specific Soil Survey report



## **EXISTING CONDITIONS**

The 41 Portsmouth Ave LLC site is shown on Stratham Tax Map 9 Lot 4 and is located at 41 Portsmouth Avenue in Stratham, New Hampshire. The existing lot has an area of 8.27 acres. The site is currently a vacant lot with a shared access driveway that extends from Portsmouth Avenue to River Road. The intent of this project is to develop the site into a car dealership. The parcel is bounded northerly by AutoFair-Nissan, easterly by Portsmouth Avenue, southerly by River Road, and westerly by a residential house lot and conservation land (agricultural use) of Douglas Scamman Jr.

This site was previously home to Scamman's dairy farm milking operations, which included a barn, access drive, feed and manure storage, associated improvements, pasture, and cultivated fields. Most of these features were removed during the construction of the access road between Tax Map 9 Lots 4 and 5. As part of the site development approved in 2014, a significant portion of the lot was regraded and leveled, with gravel placed and drainage structures and stormwater basins installed. We believe this work was completed around 2017 or 2018. The existing analyzed impervious cover is approximately 12.19 percent, which includes a small amount of area within the right-of-way in addition to the lot itself.

The pre-development condition analyzed in the drainage study reflects the state of the site as it existed in 2015, prior to the improvements made in 2017 or 2018. This approach is consistent with the NHDES Alteration of Terrain permitting requirement that existing conditions be based on how the site existed ten years prior to the application.

Wetlands were initially delineated in the northwest corner of the lot by James Gove of Gove Environmental Services, Inc. on April 1, 2014. On May 22, 2025, the wetlands were re-evaluated by James Gove. Site soils were initially delineated by Lindsay Byboth of Gove Environmental Services, Inc. (GES) on August 8, 2013 and revised by James Gove on April 1, 2014. The site-specific soils mapping, HISS map, and wetland delineation plans have been re-stamped by James Gove. Because this project is part of a common plan of development occurring over a period exceeding 10 years, the stormwater management design is based on the original pre-alteration conditions, reflecting the soils and wetland resources as delineated in 2014. The majority of soil materials on the site are hydrologic soil group C with some areas of hydrologic soil group B. The report of the wetland evaluation and the hydrologic soil group classification prepared by GES are attached.

## **PROPOSED DEVELOPMENT**

The proposed site improvements include construction of a new 29,600 square foot automotive dealership building footprint, along with a well, septic system, and associated utilities to service the development. The project also includes approximately 151,335 square feet of new pavement for vehicle display, customer, employee, service, and storage parking. Two retaining walls are

proposed, one to the south of the main parking lot and another larger wall for the vehicle storage parking area at the rear of the site. Stormwater will be managed by six bioretention systems (bio ponds) designed to pre-treat, retain, treat, and exfiltrate runoff into the groundwater table where possible. In addition, 13,420 square feet of porous pavement is proposed. Stormwater treatment systems vary in size based on the contributing inflow areas. Upon completion, approximately 59.02 percent of the analyzed site, including the lot itself and a small portion within the adjacent rights of way, will consist of impervious surfaces.

The project is proposed to be constructed in two phases. Phase I includes the majority of the automotive dealership building, the associated customer, employee, and service parking, and the supporting infrastructure required to operate the dealership. Phase II restores elements of the original approved proposal and is divided into three independent groups that may be constructed in any order: Phase IIA, the additional vehicle storage and parking area and associated drainage improvements located west of the interior access road; Phase IIB, a potential building addition for wash and prep bays; and Phase IIC, a potential building addition for an enclosed customer new-vehicle delivery area. The full build-out condition described in the Post-Development Runoff section below reflects the completion of both Phase I and Phase II. Upon completion of Phase I, the analyzed impervious area is approximately 51.71 percent, with a building footprint of 25,600 square feet. Upon completion of Phase II (full build-out), the analyzed impervious area is approximately 59.02 percent, with a building footprint of 29,600 square feet. The differences in the Phase I drainage analysis are described in the Phase I Post-Development Runoff subsection.

### **DRAINAGE ANALYSIS AND DESIGN**

The purpose of the drainage analysis is two-fold:

- The first is to analyze the pre-development runoff flows through the site.
- The second purpose is to evaluate the impact of the proposed development on drainage patterns and flows.

The goal of the drainage design is to:

- Design a storm water and treatment system to adequately handle the post-development runoff peak and volume.
- Minimize or eliminate erosion and sedimentation during construction and after development.

### **METHOD**

The storm water runoff analysis for the site was based on the Town of Stratham regulations which require a 2-year, 10-year, and 25-year 24-hour storm events to be modeled. NHDES also require a 50-year 24-hour storm event to be modeled. Additionally, the 1” water quality storm was also monitored.

Due to this project being in a coastal / Great Bay community, per Env-Wq 1503.08 (i), a 15% increase was added to all extreme precipitation estimates to account for projected storm surge, sea-level rise, and precipitation events.

The rainfall data and curves for extreme precipitation in New England utilized for this analysis was provided by the Northeast Regional Climate Center (NRCC) via the data and products request at the NRCC website (<http://precip.eas.cornell.edu/>). This data was obtained for the street address of the site design and downloaded as “site specific” rainfall curves for the HydroCAD software for the required 24-hour storm events.

The analysis was performed as required by the State of New Hampshire Department of Environmental Services using the U.S. Soil Conservation Service’s TR-20 runoff procedure from which the TR-55 method was developed. As described in the TR-55 manual it is a “...procedure to calculate storm runoff, peak rate of discharge, hydrographs and storage volumes required for floodwater reservoirs. The model begins with a rainfall amount uniformly imposed on the watershed over a specified time distribution. Mass rainfall is converted to mass runoff by using a runoff curve number (CN). CN is based on soils, plant cover, amount of impervious area, interception, and surface storage. Runoff is then transformed into a hydrograph (a graph showing the properties of runoff flow with respect to time)<sup>1</sup> by using the unit hydrograph theory (a given one-day rainfall produces a 1-inch depth of runoff over the given drainage area) and routing procedures that depend on runoff travel time through segments of the watershed” (subcatchments).

All modeling was completed using HydroCAD software. HydroCAD applies a S1 (3-point) smoothing factor to the IDF storm curves. This is a 3-point smoothing algorithm in order to compensate for irregularities that are often present in the IDF curve. This procedure preserves the 5-minute, 1-hour, and 24-hour intensities, but uses a log-log interpolation for all intermediate intensities. If the Storm Duration is different than 24-hours, the intensity for the specified duration is preserved in addition to the three standard durations. This is shown on the top right of the drainage analysis. An example is shown as “...24-hr S1 2-yr (+15%) Rainfall=3.70”. This identifier reflects the software’s interpolation procedure only and does not represent a rainfall temporal distribution or modeling assumption.

### **Explanation of Two-Pond Node HydroCAD Approach for the Proposed Bioretention Swale/Basin**

For this bioretention swale/basin design, we used a two-pond node HydroCAD setup because it most accurately represents the two hydraulically distinct zones of the system:

1. the surface swale, and

---

<sup>1</sup>Introduction to Hydrology, Viessman ET. Al. Second Edition, 1972 New York, IEP.

2. the subsurface bioretention media and stone reservoir layer (which includes the continuous underdrain).

### **1. Open Swale Node (Surface Layer)**

The upper pond node represents the open swale, which is everything above the bioretention media. This zone is modeled with a 100% void ratio because it is open air and functions as surface storage. This node tracks only the stormwater that is actually on the surface. It has two outlets:

- Primary: vertical flow through the bioretention soil media (the treatment pathway).
- Secondary: the 30” grated overflow dome in the catch basin located within the swale or basin.

For smaller storms, the Water Quality Volume (WQV) is treated exclusively through the bioretention media. Only during larger events do water levels rise high enough to activate the catch basin knockouts. Importantly, both outlets from the open-swale node (the vertical flow through the media and the overflow dome) are routed directly into the subsurface node, since all water leaving the surface enters the bioretention media/reservoir layer before ultimately discharging through the underdrain.

### **2. Subsurface Node (Bioretention Media + Stone Reservoir)**

The lower pond node represents the bioretention soil media and the stone reservoir layer beneath it, modeled with 30% and 40% void ratios for the filter layer and stone layer, respectively. The sides of the system is lined with Mirafi 140N fabric, to allow for infiltration and groundwater recharge while maintaining the horizontal segregation of the layers. Due to the known SHWT’s throughout the site, only bioretention basin ‘F’ will be able to infiltrate and recharge the groundwater. All stormwater arriving in this subsurface zone is hydraulically connected and regulated by the continuous 6-inch underdrain beneath the reservoir layer. The subsurface node has two outlets:

- Primary: the 6-inch underdrain discharging downstream from the catch basin.
- Secondary: Exfiltration into the groundwater.

Because the underdrain runs through the entire reservoir layer and is directly tied into the catch basin, the water surface elevation inside the catch basin and within the reservoir layer equalize. Modeling them as a single subsurface node correctly represents this real-world behavior. Secondary: The stormwater traveling through the reservoir layer and passing the perforated underdrain can exfiltrate into the ground, recharging the groundwater table. This is only possible for bioretention basin “F”.

### **3. Why Two Nodes Are More Accurate Than a Single-Node Model Here**

Contributing areas such as upstream bioretention swales or basins and adjacent porous pavement discharge directly into the reservoir layer rather than onto the surface of the swale or basin. The

two-node approach allows these inflows to enter the subsurface node independently of surface swale conditions, which is exactly how the system functions in the field.

If this project were modeled using a single pond node, all inflows (including those intended to discharge directly into the reservoir layer) would be forced to accumulate until the water level reached the bottom of the bioretention media. HydroCAD would then require that water to “exfiltrate” downward through the media before reaching the underdrain. This does not reflect physical reality and would misrepresent both treatment pathways and hydrologic timing. The two-node setup avoids these inaccuracies, does not duplicate storage, and provides a clearer, more realistic representation of how surface and subsurface hydraulics interact within the bioretention basin/swale.

### **PRE-DEVELOPMENT RUNOFF**

The pre-development work site was modeled as a 9.14-acre area consisting of Stratham Tax Map 9 Lot 4, along with portions of the adjacent rights of way along Portsmouth Avenue (Route 108) and River Road. Stormwater modeling and calculations were performed for this area, which was divided into six separate subcatchment areas to more accurately represent stormwater flows. These subcatchments, labeled 200S, 201S, 202S, 203S, 204S, and 205S, are shown on sheet SW1 included in this report.

Subcatchment 200S represents the southwest corner of the lot, which includes a portion of the access driveway and adjacent grass area to the west. Stormwater from this subcatchment flows south along the swale west of the access driveway, then west along River Road (Link RR). This subcatchment was modeled with grass and pavement cover.

Subcatchment 201S covers the agricultural land on the western edge of the property, as well as a portion of the existing paved access road intersecting River Road. Stormwater flows down the hill on the western edge of the property directly into the wetlands of Stratham Tax Map 8 Lot 64 (Link 8-64). This subcatchment was modeled with grass, agricultural, and pavement cover.

Subcatchment 202S includes the northern portion of the lot, comprised of earthen stockpiles, grassed areas, a large portion of the paved access driveway, and a small segment of Portsmouth Avenue. Stormwater flows within the swale along the access driveway, through a 30-inch diameter HDPE pipe (Pond 104P), beneath the paved access driveway, into the stormwater structures on the adjacent property (Stratham Tax Map 9 Lot 5) to the north (Link 9-5). This subcatchment was modeled with grass and pavement cover.

Subcatchment 203S encompasses the southeast portion of the property, including earthen stockpiles, and segments of Portsmouth Avenue and River Road. Stormwater from this subcatchment drains into the eastern catch basin south of the lot (Pond 256P), then flows through a 12-inch HDPE pipe into the adjacent western catch basin (Pond 257P), before daylighting into a low-lying area along River Road (Pond 258P). From there stormwater flows south beneath River

Road through a 24-inch HDPE pipe to Stratham Tax Map 9 Lot 2 (Link 9-2). This subcatchment was modeled with grass and pavement cover.

Subcatchment 204S covers the south-central portion of the property, including earthen stockpiles and a section of River Road. Stormwater drains into the western catch basin south of the lot (Pond 257P), then into the same low-lying area along River Road (Pond 258P), through a 24-inch HDPE pipe beneath River Road to Stratham Tax Map 9 Lot 2 (Link 9-2). This subcatchment was modeled with grass and pavement cover.

Subcatchment 205S represents the southwest portion of the lot, including grass areas, and sections of River Road and the paved access driveway. Stormwater flows directly through the 24-inch HDPE pipe (Pond 258P) beneath River Road to Stratham Tax Map 9 Lot 2 (Link 9-2). This subcatchment was modeled with grass and pavement cover.

The stormwater calculations were modeled with good grass cover, small grain agricultural land, and impervious paved parking. Wetland areas were modeled with their respective Site Specific Soil Survey and cover type. The attached HydroCAD worksheets outline specific details on the flows, volumes, times, and flow conditions.

### **POST-DEVELOPMENT RUNOFF**

The post-development analysis below describes the full build-out condition of the site, reflecting the completion of both Phase I and Phase II. The differences applicable to the Phase I condition are described in the Phase I Post-Development Runoff subsection that follows.

The 9.14-acre post-development site, encompassing Stratham Tax Map 9 Lot 4 and portions of the adjacent Portsmouth Avenue (Route 108) and River Road rights-of-way, was modeled with 18 subcatchment areas. These subcatchments include 200S, 201S-A, 201S-B, 202S, 203S, 204S-A, 204S-B, 205S, 206S, 207S, 208S, 209S, 210S, 211S, 212S-A, 212S-B, 213S, and 214S.

The primary stormwater management design intent is for all stormwater from newly constructed paved surfaces on the site to be treated. This will be achieved through a combination of bioretention systems and porous pavement, both adhering to the design guidelines published in the NHDES Stormwater Manual, Volume 2, Revision 1. Bioretention systems are filtration Best Management Practices (BMPs) designed to collect and filter moderate amounts of stormwater runoff using conditioned planting soil beds, gravel beds, and vegetation within shallow depressions. These systems have been designed with underdrains to collect treated water and convey it to discharge, or to infiltrate the treated water directly to the subsoil. Similarly, porous pavement allows stormwater to infiltrate directly through its surface, reducing runoff volume and typically promoting groundwater recharge. In this scenario, infiltration is not possible due to the SHWT. Both bioretention cells and porous pavement are effective in reducing sediment, nutrients, oil and grease, and trace metals in stormwater runoff.

The design intent for stormwater pre-treatment includes the incorporation of sediment forebays to reduce sediment loads before stormwater enters the main treatment area of each bioretention basin. These forebays are constructed using 2-inch diameter riprap, formed into berms sloped at a 2:1 ratio. The riprap berms create small impoundment areas that dissipate the energy of incoming runoff and provide settling zones for coarse sediment. Depending on the specific bioretention basin, the forebay berms range in height from 10 to 15 inches. This sizing ensures adequate volume to capture at least 25 percent of the required Water Quality Volume (WQV), in accordance with NHDES guidance. The forebays are located at the base of the contributing slope, along the surface grade at the inlet of each bioretention system. Construction details and dimensions for each forebay are provided on Sheets D7 through D9 of the plan set.

Proposed stormwater improvements include several bioretention basins and an area of porous pavement. Specifically, these are designated as bioretention basin “A” (Pond 251PA & B), bioretention basin “B” (Pond 259PA & B), bioretention basin “C” (Pond 253PA & B), bioretention basin “D” (Pond 254PA & B), bioretention basin “E” (Pond 255PA & B), bioretention basin “F” (Pond 250P A & B), and porous pavement “A” (Pond 253P-C). The bioretention systems (bio-ponds) are designed to pre-treat, retain, treat, and discharge to one of four areas. Due to site conditions, bioretention basin “F” is the only BMP able to infiltrate site stormwater into the groundwater table thus recharging it. Similarly, the porous pavement areas are intended to capture stormwater runoff directly at the surface, allowing it to filter through the permeable material and discharge to a drainage structure, thereby reducing surface runoff. Both Bio Pond C (pond 253P-A) and Porous Pavement A (pond 253P-C) discharge to the subsurface node, pond 253P-B. This routing configuration is required because the total section depth of the porous pavement system exceeds the base elevation of the surface ponding layer of Bio Pond C. As a result, the porous pavement underdrain connects directly to the subsurface storage layer of Bio Pond C rather than to the surface ponding layer.

Subcatchment 200S represents the southwest corner of the lot, which includes a portion of the access driveway and adjacent grass area to the west. Stormwater from this subcatchment flows south along the swale west of the access driveway, then west along River Road (Link RR). This subcatchment was modeled with grass and pavement cover.

Subcatchment 201S-A represents the western portion of the lot, situated west of the existing access road and excluding the proposed vehicle storage area. A small part of this subcatchment also includes the existing access road. Stormwater generally flows west down the hill along the property’s western edge, discharging directly into the wetlands of Stratham Tax Map 8 Lot 64 (Link 8-64). This subcatchment was modeled with grass and pavement cover.

Subcatchment 201S-B encompasses the proposed vehicle storage area west of the existing access road, as well as the land strip between the access road and the storage lot. Stormwater from this subcatchment generally flows east into bioretention basin “F” (Pond 250P-A & B). Within the basin, stormwater infiltrates through the bioretention media into a stone reservoir layer, promoting

groundwater recharge. If the reservoir layer reaches capacity, a 6-inch perforated underdrain directs excess stormwater to a catch basin within the bioretention system. From there, a 12-inch HDPE pipe carries it to the hillside, where it flows west along the property's western edge and discharges directly into the wetlands of Stratham Tax Map 8 Lot 64 (Link 8-64). During larger storm events (exceeding the WQV), when the bioretention media can't infiltrate all the stormwater, runoff backs up within the open basin and flows directly into the aforementioned catch basin via a 30-inch domed grate. This subcatchment was modeled with grass and pavement cover.

Subcatchment 202S represents the area north of bioretention basin "A", located east of the existing access road and west of the proposed parking. Stormwater from this subcatchment flows into a catch basin (Pond 252P), then through an 18-inch HDPE pipe to catch basin 104P (Pond 104P). From there, it continues beneath the paved access drive and into the stormwater management structures of Tax Map 9 Lot 5 to the north (Link 9-5). This subcatchment was modeled with both grass and pavement cover.

Subcatchment 203S models the land near the west entrance to the dealership, incorporating a portion of the access road and the adjacent grassed area. Runoff from this subcatchment flows directly into the 30-inch HDPE pipe below the paved access drive (Pond 104P), then into the stormwater management structures of the lot to the north (Link 9-5). This subcatchment was modeled with pavement and grass cover.

Subcatchment 204S-A encompasses the parking lot north of the proposed building, along with the eastern entrances to both the service drive-through and the overall site from the access driveway. Runoff from this area generally flows west into the porous pavement section north of the building (Pond 253P-C). Here, stormwater immediately infiltrates through the porous pavement and a filter layer into the stone reservoir below, where it will discharge via a series of 6-inch perforated underdrains to the catch basin within bioretention system "C" (Pond 253P-B). From there, a 12-inch HDPE pipe carries the flow to catch basin 104P (Pond 104P), continuing beneath the paved access drive and into the stormwater management structures of Tax Map 9 Lot 5 to the north (Link 9-5). In the event the porous pavement becomes clogged, the area is graded to direct stormwater directly into bioretention basin "C" (Pond 253P-A). This subcatchment was modeled with both grass and pavement cover.

Subcatchment 204S-B represents the landscape island north of the proposed building and a section of the access driveway. Stormwater from this area flows into bioretention basin "C" (Pond 253P-A & B). Within the basin, stormwater infiltrates through the bioretention media into a stone reservoir layer, a 6-inch perforated underdrain will direct stormwater to a catch basin within the bioretention system. From there, a 12-inch HDPE pipe carries the flow to catch basin 104P (Pond 104P), where it continues beneath the paved access drive and into the stormwater management structures of Tax Map 9 Lot 5 to the north (Link 9-5). During larger storm events (exceeding 10-year storm events), when the bioretention media can't infiltrate all the stormwater, runoff backs

up within the open basin and flows directly into the aforementioned catch basin via a 30-inch domed grate. This subcatchment was modeled with both grass and pavement cover.

Subcatchment 205S models the land in the northeast corner of the lot. This includes a portion of the eastern landscaping, the parking lot, the access driveway entrance from Portsmouth Avenue, and a segment of Portsmouth Avenue itself. Runoff from this area flows into bioretention basin “D” (Pond 254P-A & B). Within basin “D,” stormwater infiltrates through the bioretention media into a stone reservoir layer, a 6-inch perforated underdrain directs stormwater to the reservoir layer of bioretention basin “E” (Pond 255P-B). During larger storm events (exceeding 10-year storm events), stormwater flows over the berm between bioretention “D” and “E”, and flows into the top layer of bioretention basin “E” (Pond 255P-A). Within the basin “E” stone reservoir layer, a 6-inch perforated underdrain conveys the stormwater to a catch basin within that basin. From there, an 18-inch HDPE pipe directs stormwater to the proposed catch basin southeast of the proposed building (Pond 262P). A 24-inch HDPE pipe then conveys it to another proposed catch basin near the southwest corner of the proposed building (Pond 263P). Finally, stormwater outlets via a 24-inch HDPE pipe into a low area just north of River Road (Pond 258P). It then enters a catch basin in this area and flows under River Road via a 24-inch HDPE pipe to Stratham Tax Map 9 Lot 2 (Link 9-2). This subcatchment was modeled with both grass and pavement cover.

Subcatchment 206S covers the area east of the proposed building and a small section to its south. It includes parts of the paved surfaces south and east of the building, a portion of the eastern landscaping, and a segment of Portsmouth Avenue. Stormwater from this subcatchment flows into bioretention basin “E” (Pond 255P-A & B). Here, it infiltrates through the bioretention media into a stone reservoir layer, where a 6-inch perforated underdrain directs stormwater to a catch basin within the system. From there, an 18-inch HDPE pipe carries stormwater to the proposed catch basin southeast of the proposed building (Pond 262P). A 24-inch HDPE pipe then conveys it to another proposed catch basin near the southwest corner of the building (Pond 263P). Finally, stormwater exits via a 24-inch HDPE pipe into a low area just north of River Road (Pond 258P). It then enters a catch basin in this area and flows under River Road via a 24-inch HDPE pipe to Stratham Tax Map 9 Lot 2 (Link 9-2). During larger storm events (exceeding 10-year storms), if the bioretention media cannot infiltrate all the stormwater, runoff will back up within the open basin and flow directly into the aforementioned catch basin via a 30-inch domed grate. This subcatchment was modeled with both grass and pavement cover.

Subcatchments 207S, 208S, and 209S model the grassland along River Road and a portion of River Road itself. Runoff generally flows west through a series of existing catch basins. Specifically, stormwater from Subcatchment 207S flows through catch basins 256P (Pond 256P) into catch basin 257P (Pond 257P), and then into the low area north of River Road (Pond 258P) via 12-inch diameter concrete pipes. Subcatchment 208S flows into catch basin 257P (Pond 257P) and subsequently into the low area north of River Road (Pond 258P) through a 12-inch diameter concrete pipe. Meanwhile, Subcatchment 209S sheet flows directly into the low area north of River Road (Pond 258P). For all these subcatchments, stormwater entering Pond 258P then proceeds

into a catch basin within that area. From there, a 24-inch HDPE pipe carries the flow under River Road to Stratham Tax Map 9 Lot 2 (Link 9-2). These subcatchments were all modeled with grass and pavement cover.

Subcatchment 210S includes the proposed parking lot situated between proposed bioretention basins “A” and “B”, the grassy area between this pavement and the access driveway, and a portion of the access driveway itself. Stormwater from this area flows into bioretention basin “A” (Pond 251P-A&B). Within the basin, stormwater infiltrates through the bioretention media into a stone reservoir layer, where a 6-inch perforated underdrain directs excess stormwater to a catch basin within the bioretention system. Bioretention basins “A” subsurface is within the identified SHWT, infiltration to groundwater will not be possible. From there, stormwater flows via a 12-inch HDPE pipe to the low area just north of River Road (Pond 258P). It then enters a catch basin in this area and continues under River Road via a 24-inch HDPE pipe to Stratham Tax Map 9 Lot 2 (Link 9-2). During larger storm events (exceeding 10-year storms), when the bioretention media cannot infiltrate all the stormwater, runoff backs up within the open basin and flows directly into the aforementioned catch basin within the bioretention basin via a 30-inch domed grate. This subcatchment was modeled with both grass and pavement cover.

Subcatchment 211S represents the proposed pavement located between the new building and bioretention basin “B,” as well as the basin itself. Runoff generally sheet flows west into bioretention basin “B” (Pond 259P-A&B). Though split into two different sections, this basin maintains free flow between them via a 12-inch HDPE pipe installed at the surface’s base. Once in the basin, stormwater infiltrates through the bioretention media into an underlying stone reservoir layer, a 6-inch perforated underdrain directs stormwater to a catch basin within the bioretention system. From there, an 18-inch HDPE pipe carries the stormwater to the catch basin on the northwest portion of the site (Pond 104P). The flow then continues under the existing access road via a 30-inch HDPE pipe and into the stormwater management structures of Tax Map 9 Lot 5 to the north (Link 9-5). During larger storm events (exceeding 10-year storms), if the bioretention media cannot infiltrate all the stormwater, runoff will back up within the open basin and flow directly into the aforementioned catch basin via a 30-inch domed grate. This subcatchment was modeled with both grass and pavement cover.

Subcatchment 212S-A models the western half of the proposed building on the lot. Stormwater runs through the roof drains and is piped into the top surface of bioretention basin “B” (Pond 259P-A&B). Once in the basin, stormwater infiltrates through the bioretention media into an underlying stone reservoir layer. Should this reservoir reach capacity, a 6-inch perforated underdrain directs excess stormwater to a catch basin within the bioretention system. From there, an 18-inch HDPE pipe carries the stormwater to the catch basin on the northwest portion of the site (Pond 104P). The flow then continues under the existing access road via a 30-inch HDPE pipe and into the stormwater management structures of Tax Map 9 Lot 5 to the north (Link 9-5). During larger storm events (exceeding 10-year storms), if the bioretention media cannot infiltrate all the stormwater,

runoff will back up within the open basin and flow directly into the aforementioned catch basin via a 30-inch domed grate. This subcatchment was modeled as a building footprint.

Subcatchment 212S-B models the eastern half of the proposed building. Stormwater from the roof drains is piped into the catch basin at the building's northeast corner (Pond 213P). From there, a 12-inch HDPE pipe directs the flow to the proposed catch basin southeast of the building (Pond 262P). A 24-inch HDPE pipe then conveys it to another proposed catch basin near the building's southwest corner (Pond 263P). Finally, stormwater exits via a 24-inch HDPE pipe into a low area just north of River Road (Pond 258P). It then enters a catch basin in this area and flows under River Road via a 24-inch HDPE pipe to Stratham Tax Map 9 Lot 2 (Link 9-2). This subcatchment was modeled as a building footprint.

Subcatchments 213S and 214S represent the curbed landscape and display areas connected to the building's northeast and southeast corners, respectively. Runoff from these areas has been modeled to flow into separate landscape catch basins, ultimately directing stormwater to Stratham Tax Map 9 Lot 2. Specifically, stormwater from Subcatchment 213S flows into catch basin 213P (Pond 213P). From there, a 12-inch HDPE pipe directs the flow to the proposed catch basin southeast of the building (Pond 262P). Subcatchment 214S flows similarly but directly into Pond 262P, bypassing Pond 213P. From Pond 262P, a 24-inch HDPE pipe then conveys the stormwater to another proposed catch basin near the building's southwest corner (Pond 263P). Finally, stormwater exits via a 24-inch HDPE pipe into a low area just north of River Road (Pond 258P). It then enters a catch basin in this area and flows under River Road via a 24-inch HDPE pipe to Stratham Tax Map 9 Lot 2 (Link 9-2). These subcatchments were modeled with grass and pavement cover.

The storm water calculations for the proposed site were modeled with good grass cover, impervious paved lot parking, and roof cover. The HydroCAD worksheets outline specific details on the flows and flow conditions.

For exfiltration under the bioretention basin F, the lowest Ksat-low values for the corresponding soil were used with a safety factor of two, per Env-Wq 1504.14.c.

Infiltration through the engineered bioretention media was modeled separately using a rate of 10 inches per hour, which reflects infiltration through the soil media layer rather than the underlying native soils. This rate has been directly chosen by a member of NHDES AoT Bureau.

The proposed development on the site increased the impervious area by approximately 186,526 square feet from predevelopment.

The full build-out condition described in this section was reviewed and accepted by the NHDES Alteration of Terrain Bureau under permit AoT-3056, issued May 7, 2026.

## **PHASE I POST-DEVELOPMENT RUNOFF**

The post-development analysis presented above reflects the full build-out condition of the site, which corresponds to the completion of Phase II. Because Phase I represents an interim condition in which certain elements of the full build-out are not yet constructed, the Phase I drainage analysis differs from the full build-out analysis in the limited respects described below. All other subcatchments, drainage structures, flow paths, treatment systems, and discharge points remain as described in the Post-Development Runoff section. The Phase I condition was analyzed for a building footprint of 25,600 square feet and an analyzed impervious area of approximately 51.71 percent.

The additional vehicle storage and parking area west of the interior access road, together with its associated drainage improvements (including bioretention basin “F”), is part of Phase IIA and is not constructed under Phase I. Accordingly, the western portion of the site is not subdivided into Subcatchments 201S-A and 201S-B in the Phase I analysis. Instead, this area is modeled as a single subcatchment, 201S, consistent with the pre-development condition described in the Pre-Development Runoff section, with the exception that the agricultural area is slightly reduced and replaced with grass cover. Stormwater from Subcatchment 201S flows down the hill along the western edge of the property and discharges directly into the wetlands of Stratham Tax Map 8 Lot 64 (Link 8-64), as it does in the pre-development condition. This subcatchment was modeled with grass, agricultural, and pavement cover.

In addition, because the dealership building is not constructed to its full footprint under Phase I, the building subcatchments 212S-A and 212S-B are reduced in area relative to the full build-out condition. The paved and landscaped area that is no longer attributable to the building footprint under Phase I is instead picked up by the adjacent subcatchments 206S and 211S, which absorb this area. The drainage routing, treatment systems, and discharge points for subcatchments 206S, 211S, 212S-A, and 212S-B otherwise remain as described in the Post-Development Runoff section.

With the exception of the differences described above, the Phase I post-development drainage analysis is identical to the full build-out (Phase II) analysis described in the Post-Development Runoff section.

## **SUMMARY OF RESULTS**

The 1-inch, 2-year, 25-year, and 50-year twenty four-hour storm events have been modeled to verify the operability of the storm water management system, to meet state and local regulations, and to ensure adequate freeboard on the storm water management structures.

For both the Phase I and the full build-out (Phase II) conditions, HydroCAD stormwater flow calculations show a net decrease in peak flows leaving the site for 2, 10, 25, and 50 year, 24-hour

storm events. The following Channel Protection Requirements are satisfied for a 2-year, 24-hour storm:

Link 8-64: Satisfies Env-Wq 1507.05 (b) (1) a.

Link 9-2: Satisfies Env-Wq 1507.05 (b) (2)

Link 9-5: Satisfies Env-Wq 1507.05 (b) (1) b.

Link RR (River Road): Satisfies Env-Wq 1507.05 (b) (1) a.

The storm water flow summaries are detailed in the HydroCAD calculations showing the net increase or decrease in runoff by point of discharge. Each point has been subtotaled to compare the pre-development and post-development discharges from the same geographical areas of the parcel and shown on the Stormwater Summary sheet as Link 8-64 (wetlands to the northwest), Link 9-5 (30-inch HDPE pipe flowing north under the existing access road), Link 9-2 (24-inch HDPE pipe flowing south under River Road), and Link RR (flowing west along River Road).

# Extreme Precipitation Tables

## Northeast Regional Climate Center

Data represents point estimates calculated from partial duration series. All precipitation amounts are displayed in inches.

| Metadata for Point |   |
|--------------------|---|
| Smoothing          | No  |
| State              |   |
| Location           |   |
| Latitude           | 43.004 degrees North                                      |
| Longitude          | 70.921 degrees West                                       |
| Elevation          | 20 feet   |
| Date/Time          | Tue Jan 21 2025 23:35:00 GMT-0500 (Eastern Standard Time) |

### Extreme Precipitation Estimates

|       | 5min | 10min | 15min | 30min | 60min | 120min |       | 1hr  | 2hr  | 3hr  | 6hr  | 12hr | 24hr  | 48hr  |       | 1day  | 2day  | 4day  | 7day  | 10day |       |
|-------|------|-------|-------|-------|-------|--------|-------|------|------|------|------|------|-------|-------|-------|-------|-------|-------|-------|-------|-------|
| 1yr   | 0.26 | 0.41  | 0.50  | 0.67  | 0.82  | 1.01   | 1yr   | 0.71 | 0.99 | 1.14 | 1.57 | 2.01 | 2.68  | 2.91  | 1yr   | 2.37  | 2.80  | 3.21  | 3.92  | 4.55  | 1yr   |
| 2yr   | 0.32 | 0.50  | 0.61  | 0.83  | 1.02  | 1.21   | 2yr   | 0.88 | 1.18 | 1.39 | 1.86 | 2.39 | 3.22  | 3.57  | 2yr   | 2.85  | 3.43  | 3.94  | 4.68  | 5.33  | 2yr   |
| 5yr   | 0.37 | 0.58  | 0.72  | 0.98  | 1.25  | 1.50   | 5yr   | 1.08 | 1.47 | 1.73 | 2.30 | 2.94 | 4.09  | 4.59  | 5yr   | 3.62  | 4.41  | 5.05  | 5.96  | 6.74  | 5yr   |
| 10yr  | 0.42 | 0.65  | 0.81  | 1.12  | 1.45  | 1.76   | 10yr  | 1.25 | 1.72 | 2.04 | 2.71 | 3.43 | 4.90  | 5.55  | 10yr  | 4.34  | 5.34  | 6.09  | 7.17  | 8.05  | 10yr  |
| 25yr  | 0.50 | 0.76  | 0.95  | 1.35  | 1.78  | 2.19   | 25yr  | 1.54 | 2.14 | 2.53 | 3.36 | 4.21 | 6.23  | 7.14  | 25yr  | 5.52  | 6.87  | 7.80  | 9.14  | 10.18 | 25yr  |
| 50yr  | 0.57 | 0.86  | 1.08  | 1.55  | 2.08  | 2.59   | 50yr  | 1.80 | 2.53 | 2.98 | 3.96 | 4.93 | 7.48  | 8.65  | 50yr  | 6.62  | 8.32  | 9.42  | 11.00 | 12.18 | 50yr  |
| 100yr | 0.65 | 0.98  | 1.23  | 1.77  | 2.43  | 3.05   | 100yr | 2.10 | 2.98 | 3.51 | 4.66 | 5.76 | 8.97  | 10.47 | 100yr | 7.94  | 10.07 | 11.37 | 13.24 | 14.57 | 100yr |
| 200yr | 0.74 | 1.11  | 1.41  | 2.04  | 2.84  | 3.61   | 200yr | 2.45 | 3.52 | 4.14 | 5.50 | 6.74 | 10.77 | 12.69 | 200yr | 9.53  | 12.20 | 13.73 | 15.94 | 17.43 | 200yr |
| 500yr | 0.89 | 1.32  | 1.70  | 2.46  | 3.50  | 4.49   | 500yr | 3.02 | 4.39 | 5.16 | 6.84 | 8.31 | 13.72 | 16.35 | 500yr | 12.15 | 15.72 | 17.63 | 20.38 | 22.12 | 500yr |

### Lower Confidence Limits

|       | 5min | 10min | 15min | 30min | 60min | 120min |       | 1hr  | 2hr  | 3hr  | 6hr  | 12hr | 24hr | 48hr  |       | 1day | 2day  | 4day  | 7day  | 10day |       |
|-------|------|-------|-------|-------|-------|--------|-------|------|------|------|------|------|------|-------|-------|------|-------|-------|-------|-------|-------|
| 1yr   | 0.24 | 0.37  | 0.45  | 0.60  | 0.74  | 0.89   | 1yr   | 0.64 | 0.87 | 0.94 | 1.27 | 1.57 | 2.24 | 2.55  | 1yr   | 1.98 | 2.45  | 2.89  | 3.33  | 3.96  | 1yr   |
| 2yr   | 0.32 | 0.49  | 0.60  | 0.81  | 1.00  | 1.19   | 2yr   | 0.87 | 1.16 | 1.37 | 1.82 | 2.34 | 3.09 | 3.50  | 2yr   | 2.74 | 3.37  | 3.86  | 4.58  | 5.10  | 2yr   |
| 5yr   | 0.35 | 0.55  | 0.68  | 0.93  | 1.18  | 1.41   | 5yr   | 1.02 | 1.38 | 1.62 | 2.13 | 2.74 | 3.84 | 4.29  | 5yr   | 3.39 | 4.13  | 4.74  | 5.61  | 6.35  | 5yr   |
| 10yr  | 0.39 | 0.60  | 0.75  | 1.04  | 1.35  | 1.62   | 10yr  | 1.16 | 1.58 | 1.82 | 2.41 | 3.08 | 4.43 | 5.00  | 10yr  | 3.92 | 4.81  | 5.53  | 6.51  | 7.32  | 10yr  |
| 25yr  | 0.45 | 0.69  | 0.85  | 1.22  | 1.60  | 1.94   | 25yr  | 1.38 | 1.89 | 2.11 | 2.79 | 3.58 | 4.82 | 6.11  | 25yr  | 4.27 | 5.88  | 6.76  | 7.91  | 8.85  | 25yr  |
| 50yr  | 0.50 | 0.76  | 0.95  | 1.36  | 1.83  | 2.22   | 50yr  | 1.58 | 2.17 | 2.36 | 3.12 | 4.01 | 5.45 | 7.10  | 50yr  | 4.82 | 6.83  | 7.88  | 9.17  | 10.22 | 50yr  |
| 100yr | 0.56 | 0.85  | 1.06  | 1.53  | 2.10  | 2.55   | 100yr | 1.81 | 2.49 | 2.64 | 3.49 | 4.47 | 6.13 | 8.25  | 100yr | 5.43 | 7.93  | 9.17  | 10.60 | 11.75 | 100yr |
| 200yr | 0.62 | 0.94  | 1.19  | 1.72  | 2.40  | 2.92   | 200yr | 2.08 | 2.85 | 2.95 | 3.88 | 4.99 | 6.87 | 9.58  | 200yr | 6.08 | 9.22  | 10.68 | 12.24 | 13.55 | 200yr |
| 500yr | 0.73 | 1.09  | 1.40  | 2.04  | 2.90  | 3.52   | 500yr | 2.50 | 3.44 | 3.42 | 4.47 | 5.78 | 7.97 | 11.67 | 500yr | 7.05 | 11.22 | 13.07 | 14.77 | 16.32 | 500yr |

### Upper Confidence Limits

|       | 5min | 10min | 15min | 30min | 60min | 120min |       | 1hr  | 2hr  | 3hr  | 6hr  | 12hr  | 24hr  | 48hr  |       | 1day  | 2day  | 4day  | 7day  | 10day |       |
|-------|------|-------|-------|-------|-------|--------|-------|------|------|------|------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|
| 1yr   | 0.28 | 0.44  | 0.53  | 0.72  | 0.88  | 1.08   | 1yr   | 0.76 | 1.06 | 1.26 | 1.72 | 2.18  | 2.98  | 3.08  | 1yr   | 2.64  | 2.97  | 3.59  | 4.32  | 5.03  | 1yr   |
| 2yr   | 0.33 | 0.51  | 0.63  | 0.86  | 1.05  | 1.26   | 2yr   | 0.91 | 1.23 | 1.48 | 1.95 | 2.49  | 3.42  | 3.65  | 2yr   | 3.03  | 3.51  | 4.04  | 4.83  | 5.65  | 2yr   |
| 5yr   | 0.40 | 0.62  | 0.77  | 1.05  | 1.34  | 1.61   | 5yr   | 1.15 | 1.57 | 1.87 | 2.49 | 3.18  | 4.35  | 4.89  | 5yr   | 3.85  | 4.70  | 5.37  | 6.34  | 7.13  | 5yr   |
| 10yr  | 0.47 | 0.72  | 0.90  | 1.25  | 1.62  | 1.96   | 10yr  | 1.40 | 1.92 | 2.26 | 3.04 | 3.83  | 5.40  | 6.11  | 10yr  | 4.78  | 5.87  | 6.71  | 7.85  | 8.75  | 10yr  |
| 25yr  | 0.58 | 0.88  | 1.10  | 1.57  | 2.06  | 2.55   | 25yr  | 1.78 | 2.49 | 2.92 | 3.95 | 4.93  | 7.72  | 8.21  | 25yr  | 6.83  | 7.90  | 8.96  | 10.46 | 11.50 | 25yr  |
| 50yr  | 0.68 | 1.03  | 1.28  | 1.84  | 2.48  | 3.09   | 50yr  | 2.14 | 3.03 | 3.55 | 4.82 | 5.98  | 9.67  | 10.29 | 50yr  | 8.56  | 9.89  | 11.20 | 13.00 | 14.13 | 50yr  |
| 100yr | 0.79 | 1.20  | 1.50  | 2.17  | 2.98  | 3.76   | 100yr | 2.57 | 3.67 | 4.32 | 5.90 | 7.27  | 12.12 | 12.89 | 100yr | 10.73 | 12.39 | 13.96 | 16.20 | 17.38 | 100yr |
| 200yr | 0.93 | 1.40  | 1.77  | 2.57  | 3.58  | 4.58   | 200yr | 3.09 | 4.48 | 5.26 | 7.23 | 8.82  | 15.24 | 16.18 | 200yr | 13.48 | 15.55 | 17.45 | 20.17 | 21.40 | 200yr |
| 500yr | 1.15 | 1.71  | 2.21  | 3.20  | 4.56  | 5.93   | 500yr | 3.93 | 5.79 | 6.83 | 9.47 | 11.43 | 20.63 | 21.83 | 500yr | 18.26 | 20.99 | 23.40 | 27.01 | 28.22 | 500yr |

# STORMWATER ANALYSIS AREA WORKSHEET

**EMANUEL ENGINEERING INC.**

JOB: 25-1001  
 DATE: 3/24/2026  
 ENGINEER: JJM

## PRE-DEVELOPMENT DRAINAGE AREAS (ALL AREAS IN SQUARE FEET)

| SOIL TYPE    | CN # | SOIL GROUP | SUBCAT 200S Area | SUBCAT 201S Area | SUBCAT 202S Area | SUBCAT 203S Area | SUBCAT 204S Area | SUBCAT 205S Area         | Total Area     |
|--------------|------|------------|------------------|------------------|------------------|------------------|------------------|--------------------------|----------------|
| Grass        | 61   | B          | 2,817            | 35,743           | 0                | 0                | 0                | 0                        | <b>38,560</b>  |
| Grass        | 74   | C          | 0                | 17,583           | 60,181           | 87,512           | 13,369           | 91,874                   | <b>270,519</b> |
| Agricultural | 72   | B          | 0                | 36,498           | 0                | 0                | 0                | 0                        | <b>36,498</b>  |
| Agricultural | 80   | C          | 0                | 4,186            | 0                | 0                | 0                | 0                        | <b>4,186</b>   |
|              |      |            |                  |                  |                  |                  |                  |                          |                |
| Impervious   | 98   | B          | 2,698            | 4,234            | 0                | 0                | 0                | 0                        | <b>6,932</b>   |
| Impervious   | 98   | C          | 0                | 0                | 15,655           | 14,502           | 1,967            | 9,517                    | <b>41,641</b>  |
|              |      |            | <b>5,515</b>     | <b>98,244</b>    | <b>75,836</b>    | <b>102,014</b>   | <b>15,336</b>    | <b>101,391</b>           | <b>398,336</b> |
|              |      |            |                  |                  |                  |                  |                  | <b>Total Impervious:</b> | <b>48,573</b>  |
|              |      |            |                  |                  |                  |                  |                  | <b>% Impervious:</b>     | <b>12.19</b>   |

# STORMWATER ANALYSIS AREA WORKSHEET

EMANUEL ENGINEERING INC.

JOB: 25-1001  
 DATE: 3/24/2026  
 ENGINEER: JJM

## POST-DEVELOPMENT (PHASE I) DRAINAGE AREAS (ALL AREAS IN SQUARE FEET)

| SOIL TYPE    | CN # | SOIL GROUP | SUBCAT 200S Area | SUBCAT 201S Area | SUBCAT 202S Area | SUBCAT 203S Area | SUBCAT 204S-A Area | SUBCAT 204S-B Area | SUBCAT 205S Area | SUBCAT 206S Area | SUBCAT 207S Area | SUBCAT 208S Area | SUBCAT 209S Area | SUBCAT 210S Area | SUBCAT 211S Area | SUBCAT 212S-A Area | SUBCAT 212S-B Area | SUBCAT 213S Area | SUBCAT 214S Area          | Total Area     |                |
|--------------|------|------------|------------------|------------------|------------------|------------------|--------------------|--------------------|------------------|------------------|------------------|------------------|------------------|------------------|------------------|--------------------|--------------------|------------------|---------------------------|----------------|----------------|
| Grass        | 61   | B          | 2,817            | 38,273           | 0                | 0                | 0                  | 0                  | 0                | 0                | 0                | 0                | 0                | 0                | 0                | 0                  | 0                  | 0                | 0                         | 0              | 41,090         |
| Grass        | 74   | C          | 0                | 17,612           | 3,984            | 4,493            | 1,645              | 3,795              | 8,746            | 9,345            | 12,184           | 4,138            | 14,055           | 20,505           | 10,597           | 0                  | 0                  | 305              | 1,695                     | 0              | 113,099        |
| Agricultural | 72   | B          | 0                | 33,968           | 0                | 0                | 0                  | 0                  | 0                | 0                | 0                | 0                | 0                | 0                | 0                | 0                  | 0                  | 0                | 0                         | 0              | 33,968         |
| Agricultural | 80   | C          | 0                | 4,186            | 0                | 0                | 0                  | 0                  | 0                | 0                | 0                | 0                | 0                | 0                | 0                | 0                  | 0                  | 0                | 0                         | 0              | 4,186          |
| Impervious   | 98   | B          | 2,698            | 4,234            | 0                | 0                | 0                  | 0                  | 0                | 0                | 0                | 0                | 0                | 0                | 0                | 0                  | 0                  | 0                | 0                         | 0              | 6,932          |
| Impervious   | 98   | C          | 0                | 0                | 1,483            | 5,915            | 22,200             | 2,295              | 15,366           | 35,455           | 5,165            | 1,087            | 3,245            | 47,315           | 31,285           | 11,610             | 14,005             | 950              | 1,685                     | 0              | 199,061        |
|              |      |            | <b>5,515</b>     | <b>98,273</b>    | <b>5,467</b>     | <b>10,408</b>    | <b>23,845</b>      | <b>6,090</b>       | <b>24,112</b>    | <b>44,800</b>    | <b>17,349</b>    | <b>5,225</b>     | <b>17,300</b>    | <b>67,820</b>    | <b>41,882</b>    | <b>11,610</b>      | <b>14,005</b>      | <b>1,255</b>     | <b>3,380</b>              | <b>0</b>       | <b>398,336</b> |
|              |      |            |                  |                  |                  |                  |                    |                    |                  |                  |                  |                  |                  |                  |                  |                    |                    |                  | <b>Total Impervious:</b>  | <b>205,993</b> |                |
|              |      |            |                  |                  |                  |                  |                    |                    |                  |                  |                  |                  |                  |                  |                  |                    |                    |                  | <b>Percent Impervious</b> | <b>51.71</b>   |                |

# STORMWATER ANALYSIS AREA WORKSHEET

EMANUEL ENGINEERING INC.

JOB: 25-1001

DATE: 3/24/2026

ENGINEER: JJM

## POST-DEVELOPMENT (PHASE II) DRAINAGE AREAS (ALL AREAS IN SQUARE FEET)

| SOIL TYPE  | CN # | SOIL GROUP | SUBCAT 200S Area | SUBCAT 201S-A Area | SUBCAT 201S-B Area | SUBCAT 202S Area | SUBCAT 203S Area | SUBCAT 204S-A Area | SUBCAT 204S-B Area | SUBCAT 205S Area | SUBCAT 206S Area | SUBCAT 207S Area | SUBCAT 208S Area | SUBCAT 209S Area | SUBCAT 210S Area | SUBCAT 211S Area | SUBCAT 212S-A Area | SUBCAT 212S-B Area | SUBCAT 213S Area | SUBCAT 214S Area          | Total Area     |        |
|------------|------|------------|------------------|--------------------|--------------------|------------------|------------------|--------------------|--------------------|------------------|------------------|------------------|------------------|------------------|------------------|------------------|--------------------|--------------------|------------------|---------------------------|----------------|--------|
| Grass      | 61   | B          | 2,817            | 35,165             | 7,970              | 0                | 0                | 0                  | 0                  | 0                | 0                | 0                | 0                | 0                | 0                | 0                | 0                  | 0                  | 0                | 0                         | 0              | 45,952 |
| Grass      | 74   | C          | 0                | 21,798             | 0                  | 3,984            | 4,493            | 1,645              | 3,795              | 8,746            | 9,345            | 12,184           | 4,138            | 14,055           | 20,505           | 10,597           | 0                  | 0                  | 305              | 1,695                     | 117,285        |        |
| Impervious | 98   | B          | 2,698            | 1,225              | 32,115             | 0                | 0                | 0                  | 0                  | 0                | 0                | 0                | 0                | 0                | 0                | 0                | 0                  | 0                  | 0                | 0                         | 0              | 36,038 |
| Impervious | 98   | C          | 0                | 0                  | 0                  | 1,483            | 5,915            | 22,200             | 2,295              | 15,366           | 34,605           | 5,165            | 1,087            | 3,245            | 47,315           | 28,180           | 14,525             | 15,045             | 950              | 1,685                     | 199,061        |        |
|            |      |            | <b>5,515</b>     | <b>58,188</b>      | <b>40,085</b>      | <b>5,467</b>     | <b>10,408</b>    | <b>23,845</b>      | <b>6,090</b>       | <b>24,112</b>    | <b>43,950</b>    | <b>17,349</b>    | <b>5,225</b>     | <b>17,300</b>    | <b>67,820</b>    | <b>38,777</b>    | <b>14,525</b>      | <b>15,045</b>      | <b>1,255</b>     | <b>3,380</b>              | <b>398,336</b> |        |
|            |      |            |                  |                    |                    |                  |                  |                    |                    |                  |                  |                  |                  |                  |                  |                  |                    |                    |                  | <b>Total Impervious:</b>  | <b>235,099</b> |        |
|            |      |            |                  |                    |                    |                  |                  |                    |                    |                  |                  |                  |                  |                  |                  |                  |                    |                    |                  | <b>Percent Impervious</b> | <b>59.02</b>   |        |

# STORMWATER/DRAINAGE SUMMARY

EMANUEL ENGINEERING, INC.

JOB: 25-1001 41 PORTSMOUTH AVENUE STRATHAM

DATE: 6/16/2026

ENGINEER: JJM

AREAS TAKEN FROM EXISTING CONDITIONS & PROPOSED GRADING

PEAK FLOWS FROM HYDROCAD

| Subcatchment<br>Area/Drainage Structure | 1-Inch Storm<br>1.00" |                  |                   | 2-Year Storm<br>3.22"(+15%) = 3.70" |                  |                   | 10-Year Storm<br>4.90"(+15%) = 5.63" |                  |                   | 25-Year Storm<br>6.23"(+15%) = 7.16" |                  |                   | 50-Year Storm<br>7.48"(+15%) = 8.60" |                  |                   |
|---|-----------------------|------------------|-------------------|-------------------------------------|------------------|-------------------|--------------------------------------|------------------|-------------------|--------------------------------------|------------------|-------------------|--------------------------------------|------------------|-------------------|
|   | Pre<br>(CFS)          | Phase I<br>(CFS) | Phase II<br>(CFS) | Pre<br>(CFS)                        | Phase I<br>(CFS) | Phase II<br>(CFS) | Pre<br>(CFS)                         | Phase I<br>(CFS) | Phase II<br>(CFS) | Pre<br>(CFS)                         | Phase I<br>(CFS) | Phase II<br>(CFS) | Pre<br>(CFS)                         | Phase I<br>(CFS) | Phase II<br>(CFS) |
| Link 8 - 64                             | 0.00                  | 0.00             | 0.00              | 2.38                                | 2.38             | 1.40              | 5.00                                 | 5.00             | 3.35              | 7.13                                 | 7.13             | 4.72              | 9.07                                 | 9.07             | 5.97              |
| Link 9 - 2                              | 0.02                  | 0.04             | 0.05              | 6.40                                | 3.10             | 3.11              | 8.82                                 | 4.67             | 4.65              | 10.51                                | 6.75             | 6.73              | 11.81                                | 8.89             | 8.85              |
| Link 9 - 5                              | 0.02                  | 0.67             | 0.65              | 2.46                                | 1.83             | 1.83              | 4.31                                 | 2.34             | 2.34              | 5.74                                 | 2.74             | 2.74              | 7.01                                 | 3.12             | 3.12              |
| Link RR (River Road)                    | 0.00                  | 0.00             | 0.00              | 0.24                                | 0.24             | 0.24              | 0.41                                 | 0.41             | 0.41              | 0.55                                 | 0.55             | 0.55              | 0.67                                 | 0.67             | 0.67              |
| <b>FLOW TOTALS (CFS)</b>                | 0.04                  |                  | 0.70              | 11.48                               |                  | 6.58              | 18.54                                |                  | 10.75             | 23.93                                |                  | 14.74             | 28.56                                |                  | 18.61             |
| <b>Net Increase/(Decrease)</b>          |                       |                  | 0.66              |                                     |                  | -4.90             |                                      |                  | -7.79             |                                      |                  | -9.19             |                                      |                  | -9.95             |

## VOLUMES FROM HYDROCAD

| Subcatchment<br>Area/Drainage Structure | 1-Inch Storm<br>1.00" |                  |                   | 2-Year Storm<br>3.22"(+15%) = 3.70" |                  |                   | 10-Year Storm<br>4.90"(+15%) = 5.63" |                  |                   | 25-Year Storm<br>6.23"(+15%) = 7.16" |                  |                   | 50-Year Storm<br>7.48"(+15%) = 8.60" |                  |                   |
|---|-----------------------|------------------|-------------------|-------------------------------------|------------------|-------------------|--------------------------------------|------------------|-------------------|--------------------------------------|------------------|-------------------|--------------------------------------|------------------|-------------------|
|   | Pre<br>(AF)           | Phase I<br>(CFS) | Phase II<br>(CFS) | Pre<br>(AF)                         | Phase I<br>(CFS) | Phase II<br>(CFS) | Pre<br>(AF)                          | Phase I<br>(CFS) | Phase II<br>(CFS) | Pre<br>(AF)                          | Phase I<br>(CFS) | Phase II<br>(CFS) | Pre<br>(AF)                          | Phase I<br>(CFS) | Phase II<br>(CFS) |
| Link 8 - 64                             | 0.001                 | 0.001            | 0.000             | 0.213                               | 0.213            | 0.186             | 0.473                                | 0.473            | 0.437             | 0.705                                | 0.705            | 0.672             | 0.937                                | 0.937            | 0.906             |
| Link 9 - 2                              | 0.016                 | 0.028            | 0.029             | 0.646                               | 0.873            | 0.875             | 1.301                                | 1.555            | 1.558             | 1.864                                | 2.108            | 2.111             | 2.413                                | 2.633            | 2.637             |
| Link 9 - 5                              | 0.010                 | 0.060            | 0.059             | 0.250                               | 0.515            | 0.511             | 0.486                                | 0.870            | 0.864             | 0.686                                | 1.154            | 1.148             | 0.880                                | 1.424            | 1.417             |
| Link RR (River Road)                    | 0.001                 | 0.001            | 0.001             | 0.018                               | 0.018            | 0.018             | 0.035                                | 0.035            | 0.035             | 0.050                                | 0.050            | 0.050             | 0.064                                | 0.064            | 0.064             |
| <b>FLOW TOTALS (CFS)</b>                | 0.028                 |                  | 0.089             | 1.127                               |                  | 1.590             | 2.295                                |                  | 2.894             | 3.305                                |                  | 3.981             | 4.294                                |                  | 5.024             |
| <b>Net Increase/(Decrease)</b>          |                       |                  | 0.06              |                                     |                  | 0.46              |                                      |                  | 0.60              |                                      |                  | 0.68              |                                      |                  | 0.73              |

Note: Per Env-Wq 1503.08(l), Rainfall data has been increased by 15%.



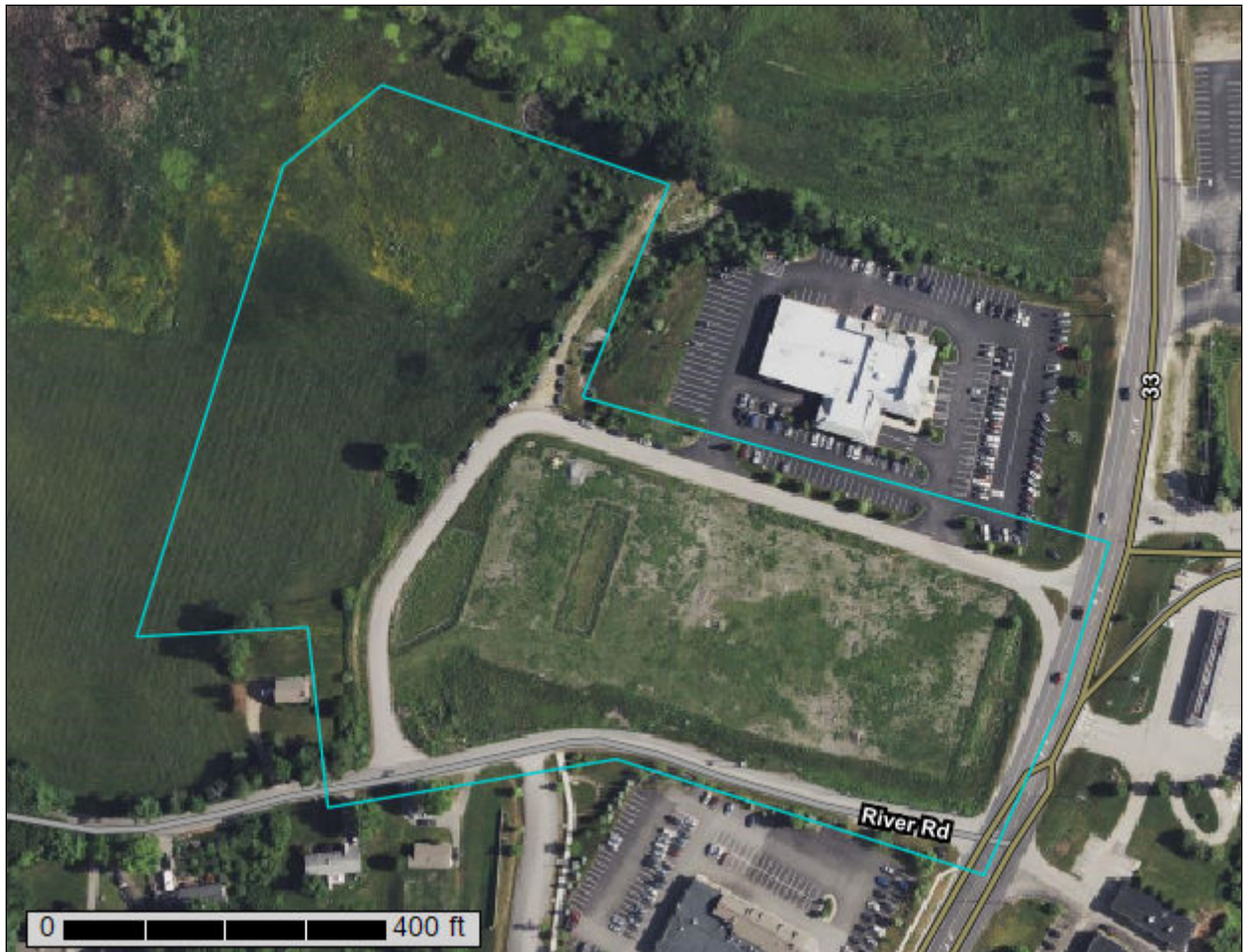
United States  
Department of  
Agriculture

**NRCS**

Natural  
Resources  
Conservation  
Service

A product of the National  
Cooperative Soil Survey,  
a joint effort of the United  
States Department of  
Agriculture and other  
Federal agencies, State  
agencies including the  
Agricultural Experiment  
Stations, and local  
participants

# Custom Soil Resource Report for Rockingham County, New Hampshire



August 27, 2025

# Preface

---

Soil surveys contain information that affects land use planning in survey areas. They highlight soil limitations that affect various land uses and provide information about the properties of the soils in the survey areas. Soil surveys are designed for many different users, including farmers, ranchers, foresters, agronomists, urban planners, community officials, engineers, developers, builders, and home buyers. Also, conservationists, teachers, students, and specialists in recreation, waste disposal, and pollution control can use the surveys to help them understand, protect, or enhance the environment.

Various land use regulations of Federal, State, and local governments may impose special restrictions on land use or land treatment. Soil surveys identify soil properties that are used in making various land use or land treatment decisions. The information is intended to help the land users identify and reduce the effects of soil limitations on various land uses. The landowner or user is responsible for identifying and complying with existing laws and regulations.

Although soil survey information can be used for general farm, local, and wider area planning, onsite investigation is needed to supplement this information in some cases. Examples include soil quality assessments (<http://www.nrcs.usda.gov/wps/portal/nrcs/main/soils/health/>) and certain conservation and engineering applications. For more detailed information, contact your local USDA Service Center (<https://offices.sc.egov.usda.gov/locator/app?agency=nrcs>) or your NRCS State Soil Scientist ([http://www.nrcs.usda.gov/wps/portal/nrcs/detail/soils/contactus/?cid=nrcs142p2\\_053951](http://www.nrcs.usda.gov/wps/portal/nrcs/detail/soils/contactus/?cid=nrcs142p2_053951)).

Great differences in soil properties can occur within short distances. Some soils are seasonally wet or subject to flooding. Some are too unstable to be used as a foundation for buildings or roads. Clayey or wet soils are poorly suited to use as septic tank absorption fields. A high water table makes a soil poorly suited to basements or underground installations.

The National Cooperative Soil Survey is a joint effort of the United States Department of Agriculture and other Federal agencies, State agencies including the Agricultural Experiment Stations, and local agencies. The Natural Resources Conservation Service (NRCS) has leadership for the Federal part of the National Cooperative Soil Survey.

Information about soils is updated periodically. Updated information is available through the NRCS Web Soil Survey, the site for official soil survey information.

The U.S. Department of Agriculture (USDA) prohibits discrimination in all its programs and activities on the basis of race, color, national origin, age, disability, and where applicable, sex, marital status, familial status, parental status, religion, sexual orientation, genetic information, political beliefs, reprisal, or because all or a part of an individual's income is derived from any public assistance program. (Not all prohibited bases apply to all programs.) Persons with disabilities who require

alternative means for communication of program information (Braille, large print, audiotape, etc.) should contact USDA's TARGET Center at (202) 720-2600 (voice and TDD). To file a complaint of discrimination, write to USDA, Director, Office of Civil Rights, 1400 Independence Avenue, S.W., Washington, D.C. 20250-9410 or call (800) 795-3272 (voice) or (202) 720-6382 (TDD). USDA is an equal opportunity provider and employer.

# Contents

---

|  |    |
|--|----|
| <b>Preface</b> .....   | 2  |
| <b>How Soil Surveys Are Made</b> .....                                   | 5  |
| <b>Soil Map</b> .....  | 8  |
| Soil Map.....  | 9  |
| Legend.....  | 10 |
| Map Unit Legend.....   | 11 |
| Map Unit Descriptions.....   | 11 |
| Rockingham County, New Hampshire.....                                    | 13 |
| 32B—Boxford silt loam, 3 to 8 percent slopes.....                        | 13 |
| 38B—Eldridge fine sandy loam, 3 to 8 percent slopes.....                 | 14 |
| 140B—Chatfield-Hollis-Canton complex, 0 to 8 percent slopes, rocky.....  | 15 |
| 140C—Chatfield-Hollis-Canton complex, 8 to 15 percent slopes, rocky..... | 18 |
| 538A—Squamscott fine sandy loam, 0 to 5 percent slopes.....              | 21 |
| <b>References</b> .....  | 23 |

# How Soil Surveys Are Made

---

Soil surveys are made to provide information about the soils and miscellaneous areas in a specific area. They include a description of the soils and miscellaneous areas and their location on the landscape and tables that show soil properties and limitations affecting various uses. Soil scientists observed the steepness, length, and shape of the slopes; the general pattern of drainage; the kinds of crops and native plants; and the kinds of bedrock. They observed and described many soil profiles. A soil profile is the sequence of natural layers, or horizons, in a soil. The profile extends from the surface down into the unconsolidated material in which the soil formed or from the surface down to bedrock. The unconsolidated material is devoid of roots and other living organisms and has not been changed by other biological activity.

Currently, soils are mapped according to the boundaries of major land resource areas (MLRAs). MLRAs are geographically associated land resource units that share common characteristics related to physiography, geology, climate, water resources, soils, biological resources, and land uses (USDA, 2006). Soil survey areas typically consist of parts of one or more MLRA.

The soils and miscellaneous areas in a survey area occur in an orderly pattern that is related to the geology, landforms, relief, climate, and natural vegetation of the area. Each kind of soil and miscellaneous area is associated with a particular kind of landform or with a segment of the landform. By observing the soils and miscellaneous areas in the survey area and relating their position to specific segments of the landform, a soil scientist develops a concept, or model, of how they were formed. Thus, during mapping, this model enables the soil scientist to predict with a considerable degree of accuracy the kind of soil or miscellaneous area at a specific location on the landscape.

Commonly, individual soils on the landscape merge into one another as their characteristics gradually change. To construct an accurate soil map, however, soil scientists must determine the boundaries between the soils. They can observe only a limited number of soil profiles. Nevertheless, these observations, supplemented by an understanding of the soil-vegetation-landscape relationship, are sufficient to verify predictions of the kinds of soil in an area and to determine the boundaries.

Soil scientists recorded the characteristics of the soil profiles that they studied. They noted soil color, texture, size and shape of soil aggregates, kind and amount of rock fragments, distribution of plant roots, reaction, and other features that enable them to identify soils. After describing the soils in the survey area and determining their properties, the soil scientists assigned the soils to taxonomic classes (units). Taxonomic classes are concepts. Each taxonomic class has a set of soil characteristics with precisely defined limits. The classes are used as a basis for comparison to classify soils systematically. Soil taxonomy, the system of taxonomic classification used in the United States, is based mainly on the kind and character of soil properties and the arrangement of horizons within the profile. After the soil

## Custom Soil Resource Report

scientists classified and named the soils in the survey area, they compared the individual soils with similar soils in the same taxonomic class in other areas so that they could confirm data and assemble additional data based on experience and research.

The objective of soil mapping is not to delineate pure map unit components; the objective is to separate the landscape into landforms or landform segments that have similar use and management requirements. Each map unit is defined by a unique combination of soil components and/or miscellaneous areas in predictable proportions. Some components may be highly contrasting to the other components of the map unit. The presence of minor components in a map unit in no way diminishes the usefulness or accuracy of the data. The delineation of such landforms and landform segments on the map provides sufficient information for the development of resource plans. If intensive use of small areas is planned, onsite investigation is needed to define and locate the soils and miscellaneous areas.

Soil scientists make many field observations in the process of producing a soil map. The frequency of observation is dependent upon several factors, including scale of mapping, intensity of mapping, design of map units, complexity of the landscape, and experience of the soil scientist. Observations are made to test and refine the soil-landscape model and predictions and to verify the classification of the soils at specific locations. Once the soil-landscape model is refined, a significantly smaller number of measurements of individual soil properties are made and recorded. These measurements may include field measurements, such as those for color, depth to bedrock, and texture, and laboratory measurements, such as those for content of sand, silt, clay, salt, and other components. Properties of each soil typically vary from one point to another across the landscape.

Observations for map unit components are aggregated to develop ranges of characteristics for the components. The aggregated values are presented. Direct measurements do not exist for every property presented for every map unit component. Values for some properties are estimated from combinations of other properties.

While a soil survey is in progress, samples of some of the soils in the area generally are collected for laboratory analyses and for engineering tests. Soil scientists interpret the data from these analyses and tests as well as the field-observed characteristics and the soil properties to determine the expected behavior of the soils under different uses. Interpretations for all of the soils are field tested through observation of the soils in different uses and under different levels of management. Some interpretations are modified to fit local conditions, and some new interpretations are developed to meet local needs. Data are assembled from other sources, such as research information, production records, and field experience of specialists. For example, data on crop yields under defined levels of management are assembled from farm records and from field or plot experiments on the same kinds of soil.

Predictions about soil behavior are based not only on soil properties but also on such variables as climate and biological activity. Soil conditions are predictable over long periods of time, but they are not predictable from year to year. For example, soil scientists can predict with a fairly high degree of accuracy that a given soil will have a high water table within certain depths in most years, but they cannot predict that a high water table will always be at a specific level in the soil on a specific date.

After soil scientists located and identified the significant natural bodies of soil in the survey area, they drew the boundaries of these bodies on aerial photographs and

## Custom Soil Resource Report

identified each as a specific map unit. Aerial photographs show trees, buildings, fields, roads, and rivers, all of which help in locating boundaries accurately.

# Soil Map

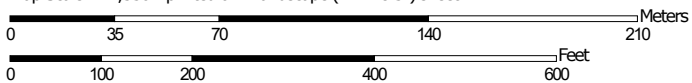
---

The soil map section includes the soil map for the defined area of interest, a list of soil map units on the map and extent of each map unit, and cartographic symbols displayed on the map. Also presented are various metadata about data used to produce the map, and a description of each soil map unit.

# Custom Soil Resource Report Soil Map




Map Scale: 1:2,530 if printed on A landscape (11" x 8.5") sheet.




Map projection: Web Mercator Corner coordinates: WGS84 Edge tics: UTM Zone 19N WGS84

### MAP LEGEND

**Area of Interest (AOI)**

 Area of Interest (AOI)




















**Soils**







 Soil Map Unit Polygons

 Soil Map Unit Lines


 Soil Map Unit Points

**Special Point Features**






-  Blowout
-  Borrow Pit
-  Clay Spot
-  Closed Depression
-  Gravel Pit
-  Gravelly Spot
-  Landfill
-  Lava Flow
-  Marsh or swamp
-  Mine or Quarry
-  Miscellaneous Water
-  Perennial Water
-  Rock Outcrop
-  Saline Spot
-  Sandy Spot
-  Severely Eroded Spot
-  Sinkhole
-  Slide or Slip
-  Sodic Spot

-  Spoil Area
-  Stony Spot
-  Very Stony Spot
-  Wet Spot
-  Other
-  Special Line Features


**Water Features**

 Streams and Canals

**Transportation**

-  Rails
-  Interstate Highways
-  US Routes
-  Major Roads
-  Local Roads

**Background**

 Aerial Photography

### MAP INFORMATION

The soil surveys that comprise your AOI were mapped at 1:24,000.

Warning: Soil Map may not be valid at this scale.

Enlargement of maps beyond the scale of mapping can cause misunderstanding of the detail of mapping and accuracy of soil line placement. The maps do not show the small areas of contrasting soils that could have been shown at a more detailed scale.

Please rely on the bar scale on each map sheet for map measurements.

Source of Map: Natural Resources Conservation Service  
 Web Soil Survey URL:  
 Coordinate System: Web Mercator (EPSG:3857)

Maps from the Web Soil Survey are based on the Web Mercator projection, which preserves direction and shape but distorts distance and area. A projection that preserves area, such as the Albers equal-area conic projection, should be used if more accurate calculations of distance or area are required.

This product is generated from the USDA-NRCS certified data as of the version date(s) listed below.

Soil Survey Area: Rockingham County, New Hampshire  
 Survey Area Data: Version 27, Sep 3, 2024

Soil map units are labeled (as space allows) for map scales 1:50,000 or larger.

Date(s) aerial images were photographed: May 22, 2022—Jun 5, 2022

The orthophoto or other base map on which the soil lines were compiled and digitized probably differs from the background imagery displayed on these maps. As a result, some minor shifting of map unit boundaries may be evident.

## Map Unit Legend

| Map Unit Symbol                    | Map Unit Name  | Acres in AOI | Percent of AOI |
|------------------------------------|--|--------------|----------------|
| 32B                                | Boxford silt loam, 3 to 8 percent slopes                       | 0.2          | 1.3%           |
| 38B                                | Eldridge fine sandy loam, 3 to 8 percent slopes                | 0.5          | 3.7%           |
| 140B                               | Chatfield-Hollis-Canton complex, 0 to 8 percent slopes, rocky  | 10.9         | 75.4%          |
| 140C                               | Chatfield-Hollis-Canton complex, 8 to 15 percent slopes, rocky | 1.8          | 12.1%          |
| 538A                               | Squamscott fine sandy loam, 0 to 5 percent slopes              | 1.1          | 7.4%           |
| <b>Totals for Area of Interest</b> |  | <b>14.5</b>  | <b>100.0%</b>  |

## Map Unit Descriptions

The map units delineated on the detailed soil maps in a soil survey represent the soils or miscellaneous areas in the survey area. The map unit descriptions, along with the maps, can be used to determine the composition and properties of a unit.

A map unit delineation on a soil map represents an area dominated by one or more major kinds of soil or miscellaneous areas. A map unit is identified and named according to the taxonomic classification of the dominant soils. Within a taxonomic class there are precisely defined limits for the properties of the soils. On the landscape, however, the soils are natural phenomena, and they have the characteristic variability of all natural phenomena. Thus, the range of some observed properties may extend beyond the limits defined for a taxonomic class. Areas of soils of a single taxonomic class rarely, if ever, can be mapped without including areas of other taxonomic classes. Consequently, every map unit is made up of the soils or miscellaneous areas for which it is named and some minor components that belong to taxonomic classes other than those of the major soils.

Most minor soils have properties similar to those of the dominant soil or soils in the map unit, and thus they do not affect use and management. These are called noncontrasting, or similar, components. They may or may not be mentioned in a particular map unit description. Other minor components, however, have properties and behavioral characteristics divergent enough to affect use or to require different management. These are called contrasting, or dissimilar, components. They generally are in small areas and could not be mapped separately because of the scale used. Some small areas of strongly contrasting soils or miscellaneous areas are identified by a special symbol on the maps. If included in the database for a given area, the contrasting minor components are identified in the map unit descriptions along with some characteristics of each. A few areas of minor components may not have been observed, and consequently they are not mentioned in the descriptions, especially where the pattern was so complex that it

## Custom Soil Resource Report

was impractical to make enough observations to identify all the soils and miscellaneous areas on the landscape.

The presence of minor components in a map unit in no way diminishes the usefulness or accuracy of the data. The objective of mapping is not to delineate pure taxonomic classes but rather to separate the landscape into landforms or landform segments that have similar use and management requirements. The delineation of such segments on the map provides sufficient information for the development of resource plans. If intensive use of small areas is planned, however, onsite investigation is needed to define and locate the soils and miscellaneous areas.

An identifying symbol precedes the map unit name in the map unit descriptions. Each description includes general facts about the unit and gives important soil properties and qualities.

Soils that have profiles that are almost alike make up a *soil series*. Except for differences in texture of the surface layer, all the soils of a series have major horizons that are similar in composition, thickness, and arrangement.

Soils of one series can differ in texture of the surface layer, slope, stoniness, salinity, degree of erosion, and other characteristics that affect their use. On the basis of such differences, a soil series is divided into *soil phases*. Most of the areas shown on the detailed soil maps are phases of soil series. The name of a soil phase commonly indicates a feature that affects use or management. For example, Alpha silt loam, 0 to 2 percent slopes, is a phase of the Alpha series.

Some map units are made up of two or more major soils or miscellaneous areas. These map units are complexes, associations, or undifferentiated groups.

A *complex* consists of two or more soils or miscellaneous areas in such an intricate pattern or in such small areas that they cannot be shown separately on the maps. The pattern and proportion of the soils or miscellaneous areas are somewhat similar in all areas. Alpha-Beta complex, 0 to 6 percent slopes, is an example.

An *association* is made up of two or more geographically associated soils or miscellaneous areas that are shown as one unit on the maps. Because of present or anticipated uses of the map units in the survey area, it was not considered practical or necessary to map the soils or miscellaneous areas separately. The pattern and relative proportion of the soils or miscellaneous areas are somewhat similar. Alpha-Beta association, 0 to 2 percent slopes, is an example.

An *undifferentiated group* is made up of two or more soils or miscellaneous areas that could be mapped individually but are mapped as one unit because similar interpretations can be made for use and management. The pattern and proportion of the soils or miscellaneous areas in a mapped area are not uniform. An area can be made up of only one of the major soils or miscellaneous areas, or it can be made up of all of them. Alpha and Beta soils, 0 to 2 percent slopes, is an example.

Some surveys include *miscellaneous areas*. Such areas have little or no soil material and support little or no vegetation. Rock outcrop is an example.

## Rockingham County, New Hampshire

### 32B—Boxford silt loam, 3 to 8 percent slopes

#### Map Unit Setting

*National map unit symbol:* 9cn4

*Elevation:* 0 to 1,000 feet

*Mean annual precipitation:* 30 to 55 inches

*Mean annual air temperature:* 45 to 54 degrees F

*Frost-free period:* 120 to 180 days

*Farmland classification:* Farmland of statewide importance

#### Map Unit Composition

*Boxford and similar soils:* 80 percent

*Minor components:* 20 percent

*Estimates are based on observations, descriptions, and transects of the mapunit.*

#### Description of Boxford

##### Setting

*Parent material:* Glaciomarine

##### Typical profile

*H1 - 0 to 2 inches:* silt loam

*H2 - 2 to 13 inches:* silt loam

*H3 - 13 to 23 inches:* silty clay loam

*H4 - 23 to 60 inches:* silty clay

##### Properties and qualities

*Slope:* 3 to 8 percent

*Depth to restrictive feature:* More than 80 inches

*Drainage class:* Moderately well drained

*Runoff class:* Very high

*Capacity of the most limiting layer to transmit water (Ksat):* Very low to moderately high (0.00 to 0.20 in/hr)

*Depth to water table:* About 12 to 36 inches

*Frequency of flooding:* None

*Frequency of ponding:* None

*Available water supply, 0 to 60 inches:* Moderate (about 8.7 inches)

##### Interpretive groups

*Land capability classification (irrigated):* None specified

*Land capability classification (nonirrigated):* 2e

*Hydrologic Soil Group:* D

*Ecological site:* F144AY018NY - Moist Lake Plain

*Hydric soil rating:* No

#### Minor Components

##### Eldridge

*Percent of map unit:* 10 percent

*Hydric soil rating:* No

##### Scitico

*Percent of map unit:* 10 percent

*Landform:* Marine terraces

## Custom Soil Resource Report

*Hydric soil rating:* Yes

### **38B—Eldridge fine sandy loam, 3 to 8 percent slopes**

#### **Map Unit Setting**

*National map unit symbol:* 9cnb  
*Elevation:* 90 to 1,000 feet  
*Mean annual precipitation:* 30 to 55 inches  
*Mean annual air temperature:* 45 to 54 degrees F  
*Frost-free period:* 120 to 180 days  
*Farmland classification:* All areas are prime farmland

#### **Map Unit Composition**

*Eldridge and similar soils:* 80 percent  
*Minor components:* 20 percent  
*Estimates are based on observations, descriptions, and transects of the mapunit.*

#### **Description of Eldridge**

##### **Setting**

*Parent material:* Outwash over glaciolacustrine

##### **Typical profile**

*H1 - 0 to 8 inches:* fine sandy loam  
*H2 - 8 to 23 inches:* loamy fine sand  
*H3 - 23 to 62 inches:* loamy very fine sand

##### **Properties and qualities**

*Slope:* 3 to 8 percent  
*Depth to restrictive feature:* More than 80 inches  
*Drainage class:* Moderately well drained  
*Runoff class:* Medium  
*Capacity of the most limiting layer to transmit water (Ksat):* Moderately low to moderately high (0.06 to 0.60 in/hr)  
*Depth to water table:* About 12 to 24 inches  
*Frequency of flooding:* None  
*Frequency of ponding:* None  
*Available water supply, 0 to 60 inches:* High (about 9.9 inches)

##### **Interpretive groups**

*Land capability classification (irrigated):* None specified  
*Land capability classification (nonirrigated):* 2w  
*Hydrologic Soil Group:* C/D  
*Ecological site:* F144AY027MA - Moist Sandy Outwash  
*Hydric soil rating:* No

#### **Minor Components**

##### **Boxford**

*Percent of map unit:* 5 percent  
*Hydric soil rating:* No

**Well drained inclusion**

*Percent of map unit: 5 percent*  
*Hydric soil rating: No*

**Squamscott**

*Percent of map unit: 5 percent*  
*Landform: Marine terraces*  
*Hydric soil rating: Yes*

**Scitico**

*Percent of map unit: 5 percent*  
*Landform: Marine terraces*  
*Hydric soil rating: Yes*

**140B—Chatfield-Hollis-Canton complex, 0 to 8 percent slopes, rocky**

**Map Unit Setting**

*National map unit symbol: 2w82m*  
*Elevation: 380 to 1,070 feet*  
*Mean annual precipitation: 36 to 71 inches*  
*Mean annual air temperature: 39 to 55 degrees F*  
*Frost-free period: 145 to 240 days*  
*Farmland classification: Not prime farmland*

**Map Unit Composition**

*Chatfield, very stony, and similar soils: 35 percent*  
*Canton, very stony, and similar soils: 25 percent*  
*Hollis, very stony, and similar soils: 25 percent*  
*Minor components: 15 percent*  
*Estimates are based on observations, descriptions, and transects of the mapunit.*

**Description of Chatfield, Very Stony**

**Setting**

*Landform: Ridges, hills*  
*Landform position (two-dimensional): Summit, shoulder, backslope*  
*Landform position (three-dimensional): Nose slope, side slope, crest*  
*Down-slope shape: Convex*  
*Across-slope shape: Linear, convex*  
*Parent material: Coarse-loamy melt-out till derived from granite, gneiss, and/or schist*

**Typical profile**

*O<sub>i</sub> - 0 to 1 inches: slightly decomposed plant material*  
*A - 1 to 2 inches: fine sandy loam*  
*B<sub>w</sub> - 2 to 30 inches: gravelly fine sandy loam*  
*2R - 30 to 40 inches: bedrock*

**Properties and qualities**

*Slope: 0 to 8 percent*  
*Surface area covered with cobbles, stones or boulders: 1.6 percent*

## Custom Soil Resource Report

*Depth to restrictive feature:* 20 to 41 inches to lithic bedrock  
*Drainage class:* Well drained  
*Runoff class:* High  
*Capacity of the most limiting layer to transmit water (Ksat):* Very low (0.00 to 0.00 in/hr)  
*Depth to water table:* More than 80 inches  
*Frequency of flooding:* None  
*Frequency of ponding:* None  
*Maximum salinity:* Nonsaline (0.0 to 1.9 mmhos/cm)  
*Available water supply, 0 to 60 inches:* Low (about 4.3 inches)

### Interpretive groups

*Land capability classification (irrigated):* None specified  
*Land capability classification (nonirrigated):* 6s  
*Hydrologic Soil Group:* B  
*Ecological site:* F144AY034CT - Well Drained Till Uplands  
*Hydric soil rating:* No

### Description of Canton, Very Stony

#### Setting

*Landform:* Moraines, hills, ridges  
*Landform position (two-dimensional):* Summit, shoulder, backslope  
*Landform position (three-dimensional):* Nose slope, side slope, crest  
*Down-slope shape:* Convex, linear  
*Across-slope shape:* Convex  
*Parent material:* Coarse-loamy over sandy melt-out till derived from gneiss, granite, and/or schist

#### Typical profile

*Oi - 0 to 2 inches:* slightly decomposed plant material  
*A - 2 to 5 inches:* fine sandy loam  
*Bw1 - 5 to 16 inches:* fine sandy loam  
*Bw2 - 16 to 22 inches:* gravelly fine sandy loam  
*2C - 22 to 67 inches:* gravelly loamy sand

#### Properties and qualities

*Slope:* 0 to 8 percent  
*Surface area covered with cobbles, stones or boulders:* 1.6 percent  
*Depth to restrictive feature:* 19 to 39 inches to strongly contrasting textural stratification  
*Drainage class:* Well drained  
*Runoff class:* Low  
*Capacity of the most limiting layer to transmit water (Ksat):* Moderately low to high (0.14 to 14.17 in/hr)  
*Depth to water table:* More than 80 inches  
*Frequency of flooding:* None  
*Frequency of ponding:* None  
*Maximum salinity:* Nonsaline (0.0 to 1.9 mmhos/cm)  
*Available water supply, 0 to 60 inches:* Low (about 3.4 inches)

#### Interpretive groups

*Land capability classification (irrigated):* None specified  
*Land capability classification (nonirrigated):* 6s  
*Hydrologic Soil Group:* B  
*Ecological site:* F144AY034CT - Well Drained Till Uplands  
*Hydric soil rating:* No

## Description of Hollis, Very Stony

### Setting

*Landform:* Ridges, hills

*Landform position (two-dimensional):* Summit, shoulder, backslope

*Landform position (three-dimensional):* Nose slope, side slope, crest

*Down-slope shape:* Convex

*Across-slope shape:* Linear, convex

*Parent material:* Coarse-loamy melt-out till derived from granite, gneiss, and/or schist

### Typical profile

*O<sub>i</sub> - 0 to 2 inches:* slightly decomposed plant material

*A - 2 to 7 inches:* gravelly fine sandy loam

*B<sub>w</sub> - 7 to 16 inches:* gravelly fine sandy loam

*2R - 16 to 26 inches:* bedrock

### Properties and qualities

*Slope:* 0 to 8 percent

*Surface area covered with cobbles, stones or boulders:* 1.6 percent

*Depth to restrictive feature:* 8 to 23 inches to lithic bedrock

*Drainage class:* Somewhat excessively drained

*Runoff class:* Very high

*Capacity of the most limiting layer to transmit water (K<sub>sat</sub>):* Very low (0.00 to 0.00 in/hr)

*Depth to water table:* More than 80 inches

*Frequency of flooding:* None

*Frequency of ponding:* None

*Maximum salinity:* Nonsaline (0.0 to 1.9 mmhos/cm)

*Available water supply, 0 to 60 inches:* Very low (about 2.7 inches)

### Interpretive groups

*Land capability classification (irrigated):* None specified

*Land capability classification (nonirrigated):* 6s

*Hydrologic Soil Group:* D

*Ecological site:* F144AY033MA - Shallow Dry Till Uplands

*Hydric soil rating:* No

## Minor Components

### Freetown

*Percent of map unit:* 5 percent

*Landform:* Marshes, depressions, bogs, kettles, swamps

*Down-slope shape:* Concave

*Across-slope shape:* Concave

*Hydric soil rating:* Yes

### Newfields, very stony

*Percent of map unit:* 5 percent

*Landform:* Ground moraines, hills, moraines

*Landform position (two-dimensional):* Footslope

*Landform position (three-dimensional):* Base slope

*Down-slope shape:* Linear

*Across-slope shape:* Concave

*Hydric soil rating:* No

**Walpole, very stony**

*Percent of map unit:* 3 percent

*Landform:* Deltas, depressions, outwash plains, depressions, outwash terraces

*Landform position (three-dimensional):* Tread

*Down-slope shape:* Concave

*Across-slope shape:* Concave

*Hydric soil rating:* Yes

**Rock outcrop**

*Percent of map unit:* 2 percent

*Landform:* Ridges, hills

*Hydric soil rating:* Unranked

**140C—Chatfield-Hollis-Canton complex, 8 to 15 percent slopes, rocky**

**Map Unit Setting**

*National map unit symbol:* 2w82s

*Elevation:* 0 to 980 feet

*Mean annual precipitation:* 36 to 71 inches

*Mean annual air temperature:* 39 to 55 degrees F

*Frost-free period:* 145 to 240 days

*Farmland classification:* Not prime farmland

**Map Unit Composition**

*Chatfield, very stony, and similar soils:* 35 percent

*Canton, very stony, and similar soils:* 25 percent

*Hollis, very stony, and similar soils:* 25 percent

*Minor components:* 15 percent

*Estimates are based on observations, descriptions, and transects of the mapunit.*

**Description of Chatfield, Very Stony**

**Setting**

*Landform:* Ridges, hills

*Landform position (two-dimensional):* Summit, shoulder, backslope

*Landform position (three-dimensional):* Nose slope, side slope, crest

*Down-slope shape:* Convex

*Across-slope shape:* Linear, convex

*Parent material:* Coarse-loamy melt-out till derived from granite, gneiss, and/or schist

**Typical profile**

*O<sub>i</sub> - 0 to 1 inches:* slightly decomposed plant material

*A - 1 to 2 inches:* fine sandy loam

*B<sub>w</sub> - 2 to 30 inches:* gravelly fine sandy loam

*2R - 30 to 40 inches:* bedrock

## Custom Soil Resource Report

### Properties and qualities

*Slope:* 8 to 15 percent  
*Surface area covered with cobbles, stones or boulders:* 1.6 percent  
*Depth to restrictive feature:* 20 to 41 inches to lithic bedrock  
*Drainage class:* Well drained  
*Runoff class:* High  
*Capacity of the most limiting layer to transmit water (Ksat):* Very low (0.00 to 0.00 in/hr)  
*Depth to water table:* More than 80 inches  
*Frequency of flooding:* None  
*Frequency of ponding:* None  
*Maximum salinity:* Nonsaline (0.0 to 1.9 mmhos/cm)  
*Available water supply, 0 to 60 inches:* Low (about 4.3 inches)

### Interpretive groups

*Land capability classification (irrigated):* None specified  
*Land capability classification (nonirrigated):* 6s  
*Hydrologic Soil Group:* B  
*Ecological site:* F144AY034CT - Well Drained Till Uplands  
*Hydric soil rating:* No

### Description of Hollis, Very Stony

#### Setting

*Landform:* Ridges, hills  
*Landform position (two-dimensional):* Summit, shoulder, backslope  
*Landform position (three-dimensional):* Nose slope, side slope, crest  
*Down-slope shape:* Convex  
*Across-slope shape:* Linear, convex  
*Parent material:* Coarse-loamy melt-out till derived from granite, gneiss, and/or schist

#### Typical profile

*O<sub>i</sub> - 0 to 2 inches:* slightly decomposed plant material  
*A - 2 to 7 inches:* gravelly fine sandy loam  
*B<sub>w</sub> - 7 to 16 inches:* gravelly fine sandy loam  
*2R - 16 to 26 inches:* bedrock

### Properties and qualities

*Slope:* 8 to 15 percent  
*Surface area covered with cobbles, stones or boulders:* 1.6 percent  
*Depth to restrictive feature:* 8 to 23 inches to lithic bedrock  
*Drainage class:* Somewhat excessively drained  
*Runoff class:* Very high  
*Capacity of the most limiting layer to transmit water (Ksat):* Very low (0.00 to 0.00 in/hr)  
*Depth to water table:* More than 80 inches  
*Frequency of flooding:* None  
*Frequency of ponding:* None  
*Maximum salinity:* Nonsaline (0.0 to 1.9 mmhos/cm)  
*Available water supply, 0 to 60 inches:* Very low (about 2.7 inches)

### Interpretive groups

*Land capability classification (irrigated):* None specified  
*Land capability classification (nonirrigated):* 6s  
*Hydrologic Soil Group:* D

## Custom Soil Resource Report

*Ecological site:* F144AY033MA - Shallow Dry Till Uplands  
*Hydric soil rating:* No

### Description of Canton, Very Stony

#### Setting

*Landform:* Moraines, hills, ridges  
*Landform position (two-dimensional):* Summit, shoulder, backslope  
*Landform position (three-dimensional):* Nose slope, side slope, crest  
*Down-slope shape:* Convex, linear  
*Across-slope shape:* Convex  
*Parent material:* Coarse-loamy over sandy melt-out till derived from gneiss, granite, and/or schist

#### Typical profile

*O<sub>i</sub> - 0 to 2 inches:* slightly decomposed plant material  
*A - 2 to 5 inches:* fine sandy loam  
*Bw<sub>1</sub> - 5 to 16 inches:* fine sandy loam  
*Bw<sub>2</sub> - 16 to 22 inches:* gravelly fine sandy loam  
*2C - 22 to 67 inches:* gravelly loamy sand

#### Properties and qualities

*Slope:* 8 to 15 percent  
*Surface area covered with cobbles, stones or boulders:* 1.6 percent  
*Depth to restrictive feature:* 19 to 39 inches to strongly contrasting textural stratification  
*Drainage class:* Well drained  
*Runoff class:* Low  
*Capacity of the most limiting layer to transmit water (K<sub>sat</sub>):* Moderately low to high (0.14 to 14.17 in/hr)  
*Depth to water table:* More than 80 inches  
*Frequency of flooding:* None  
*Frequency of ponding:* None  
*Maximum salinity:* Nonsaline (0.0 to 1.9 mmhos/cm)  
*Available water supply, 0 to 60 inches:* Low (about 3.4 inches)

#### Interpretive groups

*Land capability classification (irrigated):* None specified  
*Land capability classification (nonirrigated):* 6s  
*Hydrologic Soil Group:* B  
*Ecological site:* F144AY034CT - Well Drained Till Uplands  
*Hydric soil rating:* No

### Minor Components

#### Newfields, very stony

*Percent of map unit:* 5 percent  
*Landform:* Moraines, ground moraines, hills  
*Landform position (two-dimensional):* Footslope  
*Landform position (three-dimensional):* Base slope  
*Down-slope shape:* Linear  
*Across-slope shape:* Concave  
*Hydric soil rating:* No

#### Freetown

*Percent of map unit:* 5 percent  
*Landform:* Marshes, depressions, bogs, kettles, swamps

## Custom Soil Resource Report

*Down-slope shape:* Concave  
*Across-slope shape:* Concave  
*Hydric soil rating:* Yes

### **Scarboro, very stony**

*Percent of map unit:* 3 percent  
*Landform:* Depressions, outwash terraces, drainageways, outwash deltas  
*Landform position (three-dimensional):* Tread  
*Down-slope shape:* Concave  
*Across-slope shape:* Concave, linear  
*Hydric soil rating:* Yes

### **Rock outcrop**

*Percent of map unit:* 2 percent  
*Landform:* Ridges, hills  
*Hydric soil rating:* Unranked

## **538A—Squamscott fine sandy loam, 0 to 5 percent slopes**

### **Map Unit Setting**

*National map unit symbol:* 9cp9  
*Elevation:* 0 to 1,000 feet  
*Mean annual precipitation:* 30 to 55 inches  
*Mean annual air temperature:* 45 to 54 degrees F  
*Frost-free period:* 120 to 180 days  
*Farmland classification:* Farmland of local importance

### **Map Unit Composition**

*Squamscott and similar soils:* 85 percent  
*Minor components:* 15 percent  
*Estimates are based on observations, descriptions, and transects of the mapunit.*

### **Description of Squamscott**

#### **Setting**

*Landform:* Marine terraces

#### **Typical profile**

*H1 - 0 to 4 inches:* fine sandy loam  
*H2 - 4 to 12 inches:* loamy sand  
*H3 - 12 to 19 inches:* fine sand  
*H4 - 19 to 65 inches:* silt loam

#### **Properties and qualities**

*Slope:* 0 to 5 percent  
*Depth to restrictive feature:* More than 80 inches  
*Drainage class:* Poorly drained  
*Runoff class:* Medium

## Custom Soil Resource Report

*Capacity of the most limiting layer to transmit water (Ksat):* Moderately low to moderately high (0.06 to 0.60 in/hr)

*Depth to water table:* About 0 to 12 inches

*Frequency of flooding:* None

*Frequency of ponding:* None

*Available water supply, 0 to 60 inches:* High (about 9.6 inches)

### **Interpretive groups**

*Land capability classification (irrigated):* None specified

*Land capability classification (nonirrigated):* 4w

*Hydrologic Soil Group:* C/D

*Ecological site:* F144AY019NH - Wet Lake Plain

*Hydric soil rating:* Yes

### **Minor Components**

#### **Maybid**

*Percent of map unit:* 5 percent

*Landform:* Marine terraces

*Hydric soil rating:* Yes

#### **Scitico**

*Percent of map unit:* 5 percent

*Landform:* Marine terraces

*Hydric soil rating:* Yes

#### **Eldridge**

*Percent of map unit:* 5 percent

*Hydric soil rating:* No

# References

---

- American Association of State Highway and Transportation Officials (AASHTO). 2004. Standard specifications for transportation materials and methods of sampling and testing. 24th edition.
- American Society for Testing and Materials (ASTM). 2005. Standard classification of soils for engineering purposes. ASTM Standard D2487-00.
- Cowardin, L.M., V. Carter, F.C. Golet, and E.T. LaRoe. 1979. Classification of wetlands and deep-water habitats of the United States. U.S. Fish and Wildlife Service FWS/OBS-79/31.
- Federal Register. July 13, 1994. Changes in hydric soils of the United States.
- Federal Register. September 18, 2002. Hydric soils of the United States.
- Hurt, G.W., and L.M. Vasilas, editors. Version 6.0, 2006. Field indicators of hydric soils in the United States.
- National Research Council. 1995. Wetlands: Characteristics and boundaries.
- Soil Survey Division Staff. 1993. Soil survey manual. Soil Conservation Service. U.S. Department of Agriculture Handbook 18. [http://www.nrcs.usda.gov/wps/portal/nrcs/detail/national/soils/?cid=nrcs142p2\\_054262](http://www.nrcs.usda.gov/wps/portal/nrcs/detail/national/soils/?cid=nrcs142p2_054262)
- Soil Survey Staff. 1999. Soil taxonomy: A basic system of soil classification for making and interpreting soil surveys. 2nd edition. Natural Resources Conservation Service, U.S. Department of Agriculture Handbook 436. [http://www.nrcs.usda.gov/wps/portal/nrcs/detail/national/soils/?cid=nrcs142p2\\_053577](http://www.nrcs.usda.gov/wps/portal/nrcs/detail/national/soils/?cid=nrcs142p2_053577)
- Soil Survey Staff. 2010. Keys to soil taxonomy. 11th edition. U.S. Department of Agriculture, Natural Resources Conservation Service. [http://www.nrcs.usda.gov/wps/portal/nrcs/detail/national/soils/?cid=nrcs142p2\\_053580](http://www.nrcs.usda.gov/wps/portal/nrcs/detail/national/soils/?cid=nrcs142p2_053580)
- Tiner, R.W., Jr. 1985. Wetlands of Delaware. U.S. Fish and Wildlife Service and Delaware Department of Natural Resources and Environmental Control, Wetlands Section.
- United States Army Corps of Engineers, Environmental Laboratory. 1987. Corps of Engineers wetlands delineation manual. Waterways Experiment Station Technical Report Y-87-1.
- United States Department of Agriculture, Natural Resources Conservation Service. National forestry manual. [http://www.nrcs.usda.gov/wps/portal/nrcs/detail/soils/home/?cid=nrcs142p2\\_053374](http://www.nrcs.usda.gov/wps/portal/nrcs/detail/soils/home/?cid=nrcs142p2_053374)
- United States Department of Agriculture, Natural Resources Conservation Service. National range and pasture handbook. <http://www.nrcs.usda.gov/wps/portal/nrcs/detail/national/landuse/rangepasture/?cid=stelprdb1043084>

## Custom Soil Resource Report

United States Department of Agriculture, Natural Resources Conservation Service. National soil survey handbook, title 430-VI. [http://www.nrcs.usda.gov/wps/portal/nrcs/detail/soils/scientists/?cid=nrcs142p2\\_054242](http://www.nrcs.usda.gov/wps/portal/nrcs/detail/soils/scientists/?cid=nrcs142p2_054242)

United States Department of Agriculture, Natural Resources Conservation Service. 2006. Land resource regions and major land resource areas of the United States, the Caribbean, and the Pacific Basin. U.S. Department of Agriculture Handbook 296. [http://www.nrcs.usda.gov/wps/portal/nrcs/detail/national/soils/?cid=nrcs142p2\\_053624](http://www.nrcs.usda.gov/wps/portal/nrcs/detail/national/soils/?cid=nrcs142p2_053624)

United States Department of Agriculture, Soil Conservation Service. 1961. Land capability classification. U.S. Department of Agriculture Handbook 210. [http://www.nrcs.usda.gov/Internet/FSE\\_DOCUMENTS/nrcs142p2\\_052290.pdf](http://www.nrcs.usda.gov/Internet/FSE_DOCUMENTS/nrcs142p2_052290.pdf)



**Summary for Pond 250P-B: BIO-POND F SUBSURFACE**

Inflow Area = 0.920 ac, 80.12% Impervious, Inflow Depth = 2.15" for 1-yr (+15%) event  
 Inflow = 0.62 cfs @ 12.26 hrs, Volume= 0.165 af  
 Outflow = 0.59 cfs @ 12.85 hrs, Volume= 0.165 af, Atten= 6%, Lag= 35.3 min  
 Discarded = 0.09 cfs @ 10.43 hrs, Volume= 0.117 af  
 Primary = 0.50 cfs @ 12.85 hrs, Volume= 0.047 af  
 Routed to Link 8-64 : MAP 8 LOT 64

Routing by Dyn-Stor-Ind method, Time Span= 0.00-48.00 hrs, dt= 0.01 hrs / 2  
 Peak Elev= 80.60' @ 12.85 hrs Surf.Area= 4,000 sf Storage= 1,377 cf

Plug-Flow detention time= 67.5 min calculated for 0.165 af (100% of inflow)  
 Center-of-Mass det. time= 67.5 min ( 897.1 - 829.6 )

| Volume              | Invert               | Avail.Storage | Storage Description  |                           |
|---------------------|----------------------|---------------|--|---------------------------|
| #1                  | 79.74'               | 4,812 cf      | <b>Custom Stage Data (Prismatic)</b> Listed below (Recalc) |                           |
| Elevation<br>(feet) | Surf.Area<br>(sq-ft) | Voids<br>(%)  | Inc.Store<br>(cubic-feet)                                  | Cum.Store<br>(cubic-feet) |
| 79.74               | 4,000                | 0.0           | 0  | 0                         |
| 79.75               | 4,000                | 40.0          | 16   | 16                        |
| 81.24               | 4,000                | 40.0          | 2,384  | 2,400                     |
| 81.25               | 4,000                | 30.0          | 12   | 2,412                     |
| 83.25               | 4,000                | 30.0          | 2,400  | 4,812                     |

| Device | Routing   | Invert | Outlet Devices   |
|--------|-----------|--------|--|
| #1     | Discarded | 79.74' | <b>1.000 in/hr Exfiltration into Groundwater over Surface area</b><br>Phase-In= 0.01'  |
| #2     | Primary   | 80.25' | <b>12.0" Round 12" HDPE Pipe</b><br>L= 20.0' CPP, square edge headwall, Ke= 0.500<br>Inlet / Outlet Invert= 80.25' / 79.75' S= 0.0250 '/' Cc= 0.900<br>n= 0.010 PVC, smooth interior, Flow Area= 0.79 sf |

**Discarded OutFlow** Max=0.09 cfs @ 10.43 hrs HW=79.75' (Free Discharge)  
 ↑1=**Exfiltration into Groundwater** (Exfiltration Controls 0.09 cfs)

**Primary OutFlow** Max=0.50 cfs @ 12.85 hrs HW=80.60' TW=0.00' (Dynamic Tailwater)  
 ↑2=**12" HDPE Pipe** (Inlet Controls 0.50 cfs @ 2.02 fps)

FILTRATION PRACTICE DESIGN CRITERIA  
(Env-Wq 1508.08)

Type/Node Name: Bio-Pond A (Nodes 251P A&B)

Enter the type of filtration practice (e.g., bioretention system) and the node name in the drainage analysis, if applicable.

|   |          |   |                           |
|---|----------|---|---------------------------|
| Yes   |          | Check if you reviewed the restrictions on unlined systems outlined in Env-Wq 1508.08(a).  |                           |
| 1.56  | ac       | A = Area draining to the practice   |                           |
| 1.09  | ac       | A <sub>i</sub> = Impervious area draining to the practice   |                           |
| 0.70  | decimal  | I = Percent impervious area draining to the practice, in decimal form   |                           |
| 0.68  | unitless | R <sub>v</sub> = Runoff coefficient = 0.05 + (0.9 x I)  |                           |
| 1.06  | ac-in    | WQV = 1" x R <sub>v</sub> x A   |                           |
| 3,831   | cf       | WQV conversion (ac-in x 43,560 sf/ac x 1ft/12")   |                           |
| 958   | cf       | 25% x WQV (check calc for sediment forebay volume)  |                           |
| 2,873   | cf       | 75% x WQV (check calc for surface sand filter volume)   |                           |
| Stone Berm  |          | Method of Pretreatment? (not required for clean or roof runoff)   |                           |
| 1,152   | cf       | V <sub>SED</sub> = Sediment forebay volume, if used for pretreatment  | ≥ 25%WQV                  |
| Calculate time to drain if system IS NOT underdrained:                  |          |   |                           |
| 13,585  | sf       | A <sub>SA</sub> = Surface area of the practice  |                           |
| -   | iph      | K <sub>sat</sub> <sub>DESIGN</sub> = Design infiltration rate <sup>1</sup>  |                           |
|   |          | If K <sub>sat</sub> (prior to factor of safety) is < 0.50 iph, has an underdrain been provided?<br>(Use the calculations below) |                           |
| Yes   | Yes/No   |   |                           |
| -   | hours    | T <sub>DRAIN</sub> = Drain time = V / (A <sub>SA</sub> * I <sub>DESIGN</sub> )  | ≤ 72-hrs                  |
| Calculate time to drain if system IS underdrained:                      |          |   |                           |
| 82.95   | ft       | E <sub>WQV</sub> = Elevation of WQV (attach stage-storage table)  |                           |
| 3.60  | cfs      | Q <sub>WQV</sub> = Discharge at the E <sub>WQV</sub> (attach stage-discharge table)   |                           |
| 0.59  | hours    | T <sub>DRAIN</sub> = Drain time = 2WQV/Q <sub>WQV</sub>   | ≤ 72-hrs                  |
| 82.00   | feet     | E <sub>FC</sub> = Elevation of the bottom of the filter course material <sup>2</sup>  |                           |
| 81.00   | feet     | E <sub>UD</sub> = Invert elevation of the underdrain (UD), if applicable  |                           |
| 84.17   | feet     | E <sub>SHWT</sub> = Elevation of SHWT (if none found, enter the lowest elevation of the test pit)                               |                           |
| 81.50   | feet     | E <sub>ROCK</sub> = Elevation of bedrock (if none found, enter the lowest elevation of the test pit)                            |                           |
| 1.00  | feet     | D <sub>FC to UD</sub> = Depth to UD from the bottom of the filter course  | ≥ 1'                      |
| 0.50  | feet     | D <sub>FC to ROCK</sub> = Depth to bedrock from the bottom of the filter course   | ≥ 1'                      |
| (2.17)  | feet     | D <sub>FC to SHWT</sub> = Depth to SHWT from the bottom of the filter course  | ≥ 1'                      |
| 84.38   | ft       | Peak elevation of the 50-year storm event (infiltration can be used in analysis)  |                           |
| 85.73   | ft       | Elevation of the top of the practice  |                           |
| YES   |          | 50 peak elevation ≤ Elevation of the top of the practice  | ← yes                     |
| <b>If a surface sand filter or underground sand filter is proposed:</b> |          |   |                           |
| YES   | ac       | Drainage Area check.  | < 10 ac                   |
|   | cf       | V = Volume of storage <sup>3</sup> (attach a stage-storage table)   | ≥ 75%WQV                  |
|   | inches   | D <sub>FC</sub> = Filter course thickness   | 18", or 24" if within GPA |
| Sheet   |          | Note what sheet in the plan set contains the filter course specification.   |                           |
|   | Yes/No   | Access grate provided?  | ← yes                     |

**If a bioretention area is proposed:**

|        |         |   |                           |
|--------|---------|---|---------------------------|
| YES    | ac      | Drainage Area no larger than 5 ac?  | ← yes                     |
| 12,031 | cf      | $V = \text{Volume of storage}^3$ (attach a stage-storage table)               | ≥ WQV                     |
| 24.0   | inches  | $D_{FC} = \text{Filter course thickness}$                                     | 18", or 24" if within GPA |
| Sheet  | D7      | Note what sheet in the plan set contains the filter course specification      |                           |
| 3.0    | :1      | Pond side slopes  | > 3:1                     |
| Sheet  | L1 & L2 | Note what sheet in the plan set contains the planting plans and surface cover |                           |

**If porous pavement is proposed:**

|       |        |  |                           |
|-------|--------|--|---------------------------|
|       | acres  | Type of pavement proposed (Concrete? Asphalt? Pavers? Etc.)      |                           |
|       |        | $A_{SA} = \text{Surface area of the pervious pavement}$          |                           |
|       | :1     | Ratio of the contributing area to the pervious surface area      | ≤ 5:1                     |
|       | inches | $D_{FC} = \text{Filter course thickness}$                        | 12", or 18" if within GPA |
| Sheet |        | Note what sheet in the plan set contains the filter course spec. | mod. 304.1 (see spec)     |

1. Rate of the limiting layer (either the filter course or the underlying soil).  $K_{sat_{design}}$  includes factor of safety. See Env-Wq 1504.14 for guidance on determining the infiltration rate.
2. See lines 34, 40 and 48 for required depths of filter media.
3. Volume without depending on infiltration. The volume includes the storage above the filter (but below the invert of the outlet structure, if any), the filter media voids, and the pretreatment area. The storage above the filter media shall not include the volume above the outlet structure, if any.

Designer's Notes: \_\_\_\_\_

10" deep Stone Berm Cross Sectional Area = 1.74 sf  
 Stone Berm Length = 662.09 ft  
 Stone Berm Volume = 1.74 sf x 662.09 ft = 1,152 cf

E(WQV) Calculation:  
 Bottom of Filter Media Elv. = 82.00  
 Interpolated Storage Below 82.00 = 123 CF  
 WQV = 3,831 CF  
 Storage at E(WQV) = 123 CF + 3,831 CF = 3,954 CF  
 E(WQV) = 82.95 (3,994 CF)

**Stage-Area-Storage for Pond 251P-B: BIO-POND A SUBSURFACE**

| Elevation (feet) | Surface (sq-ft) | Storage (cubic-feet) |
|------------------|-----------------|----------------------|
| 80.99            | 13,585          | 0                    |
| 81.04            | 13,585          | 4                    |
| 81.09            | 13,585          | 8                    |
| 81.14            | 13,585          | 12                   |
| 81.19            | 13,585          | 16                   |
| 81.24            | 13,585          | 20                   |
| 81.29            | 13,585          | 24                   |
| 81.34            | 13,585          | 29                   |
| 81.39            | 13,585          | 33                   |
| 81.44            | 13,585          | 37                   |
| 81.49            | 13,585          | 41                   |
| 81.54            | 13,585          | 45                   |
| 81.59            | 13,585          | 49                   |
| 81.64            | 13,585          | 53                   |
| 81.69            | 13,585          | 57                   |
| 81.74            | 13,585          | 61                   |
| 81.79            | 13,585          | 65                   |
| 81.84            | 13,585          | 69                   |
| 81.89            | 13,585          | 73                   |
| 81.94            | 13,585          | 77                   |
| 81.99            | 13,585          | 82                   |
| 82.04            | 13,585          | 285                  |
| 82.09            | 13,585          | 489                  |
| 82.14            | 13,585          | 693                  |
| 82.19            | 13,585          | 897                  |
| 82.24            | 13,585          | 1,100                |
| 82.29            | 13,585          | 1,304                |
| 82.34            | 13,585          | 1,508                |
| 82.39            | 13,585          | 1,712                |
| 82.44            | 13,585          | 1,915                |
| 82.49            | 13,585          | 2,119                |
| 82.54            | 13,585          | 2,323                |
| 82.59            | 13,585          | 2,527                |
| 82.64            | 13,585          | 2,731                |
| 82.69            | 13,585          | 2,934                |
| 82.74            | 13,585          | 3,138                |
| 82.79            | 13,585          | 3,342                |
| 82.84            | 13,585          | 3,546                |
| 82.89            | 13,585          | 3,749                |
| 82.94            | 13,585          | 3,953                |
| 82.99            | 13,585          | 4,157                |
| 83.04            | 13,585          | 4,361                |
| 83.09            | 13,585          | 4,565                |
| 83.14            | 13,585          | 4,768                |
| 83.19            | 13,585          | 4,972                |
| 83.24            | 13,585          | 5,176                |
| 83.29            | 13,585          | 5,380                |
| 83.34            | 13,585          | 5,583                |
| 83.39            | 13,585          | 5,787                |
| 83.44            | 13,585          | 5,991                |
| 83.49            | 13,585          | 6,195                |
| 83.54            | 13,585          | 6,399                |

| Elevation (feet) | Surface (sq-ft) | Storage (cubic-feet) |
|------------------|-----------------|----------------------|
| 83.59            | 13,585          | 6,602                |
| 83.64            | 13,585          | 6,806                |
| 83.69            | 13,585          | 7,010                |
| 83.74            | 13,585          | 7,214                |
| 83.79            | 13,585          | 7,417                |
| 83.84            | 13,585          | 7,621                |
| 83.89            | 13,585          | 7,825                |
| 83.94            | 13,585          | 8,029                |
| 83.99            | 13,585          | <b>8,233</b>         |

Interpolated Volume at Bottom of Filter Course (ELV. 82.00) = 123 CF

Interpolated Volume E(WQV) (ELV. 82.95) = 3,994 CF

**Stage-Discharge for Pond 251P-B: BIO-POND A SUBSURFACE**

| Elevation<br>(feet) | Primary<br>(cfs) | Elevation<br>(feet) | Primary<br>(cfs) | Elevation<br>(feet) | Primary<br>(cfs) |
|---------------------|------------------|---------------------|------------------|---------------------|------------------|
| 80.99               | 0.00             | 82.03               | 2.11             | 83.07               | 3.74             |
| 81.01               | 0.00             | 82.05               | 2.16             | 83.09               | 3.76             |
| 81.03               | 0.00             | 82.07               | 2.21             | 83.11               | 3.79             |
| 81.05               | 0.01             | 82.09               | 2.26             | 83.13               | 3.81             |
| 81.07               | 0.01             | 82.11               | 2.31             | 83.15               | 3.83             |
| 81.09               | 0.02             | 82.13               | 2.36             | 83.17               | 3.86             |
| 81.11               | 0.03             | 82.15               | 2.40             | 83.19               | 3.88             |
| 81.13               | 0.05             | 82.17               | 2.44             | 83.21               | 3.90             |
| 81.15               | 0.07             | 82.19               | 2.48             | 83.23               | 3.93             |
| 81.17               | 0.08             | 82.21               | 2.52             | 83.25               | 3.95             |
| 81.19               | 0.11             | 82.23               | 2.55             | 83.27               | 3.97             |
| 81.21               | 0.13             | 82.25               | 2.58             | 83.29               | 3.99             |
| 81.23               | 0.15             | 82.27               | 2.60             | 83.31               | 4.02             |
| 81.25               | 0.18             | 82.29               | 2.62             | 83.33               | 4.04             |
| 81.27               | 0.21             | 82.31               | 2.63             | 83.35               | 4.06             |
| 81.29               | 0.24             | 82.33               | 2.61             | 83.37               | 4.08             |
| 81.31               | 0.27             | 82.35               | 2.62             | 83.39               | 4.10             |
| 81.33               | 0.31             | 82.37               | 2.66             | 83.41               | 4.13             |
| 81.35               | 0.35             | 82.39               | 2.71             | 83.43               | 4.15             |
| 81.37               | 0.38             | 82.41               | 2.75             | 83.45               | 4.17             |
| 81.39               | 0.42             | 82.43               | 2.79             | 83.47               | 4.19             |
| 81.41               | 0.46             | 82.45               | 2.83             | 83.49               | 4.21             |
| 81.43               | 0.51             | 82.47               | 2.87             | 83.51               | 4.23             |
| 81.45               | 0.55             | 82.49               | 2.91             | 83.53               | 4.25             |
| 81.47               | 0.59             | 82.51               | 2.95             | 83.55               | 4.27             |
| 81.49               | 0.64             | 82.53               | 2.99             | 83.57               | 4.30             |
| 81.51               | 0.69             | 82.55               | 3.03             | 83.59               | 4.32             |
| 81.53               | 0.74             | 82.57               | 3.06             | 83.61               | 4.34             |
| 81.55               | 0.79             | 82.59               | 3.10             | 83.63               | 4.36             |
| 81.57               | 0.84             | 82.61               | 3.14             | 83.65               | 4.38             |
| 81.59               | 0.89             | 82.63               | 3.17             | 83.67               | 4.40             |
| 81.61               | 0.94             | 82.65               | 3.20             | 83.69               | 4.42             |
| 81.63               | 0.99             | 82.67               | 3.23             | 83.71               | 4.44             |
| 81.65               | 1.05             | 82.69               | 3.26             | 83.73               | 4.46             |
| 81.67               | 1.10             | 82.71               | 3.28             | 83.75               | 4.48             |
| 81.69               | 1.16             | 82.73               | 3.31             | 83.77               | 4.50             |
| 81.71               | 1.21             | 82.75               | 3.34             | 83.79               | 4.52             |
| 81.73               | 1.27             | 82.77               | 3.36             | 83.81               | 4.54             |
| 81.75               | 1.32             | 82.79               | 3.39             | 83.83               | 4.56             |
| 81.77               | 1.38             | 82.81               | 3.42             | 83.85               | 4.58             |
| 81.79               | 1.44             | 82.83               | 3.44             | 83.87               | 4.60             |
| 81.81               | 1.49             | 82.85               | 3.47             | 83.89               | 4.62             |
| 81.83               | 1.55             | 82.87               | 3.49             | 83.91               | 4.63             |
| 81.85               | 1.61             | 82.89               | 3.52             | 83.93               | 4.65             |
| 81.87               | 1.67             | 82.91               | 3.55             | 83.95               | 4.67             |
| 81.89               | 1.72             | 82.93               | 3.57             | 83.97               | 4.69             |
| 81.91               | 1.78             | <b>82.95</b>        | <b>3.60</b>      | 83.99               | <b>4.71</b>      |
| 81.93               | 1.84             | 82.97               | 3.62             |                     |                  |
| 81.95               | 1.89             | 82.99               | 3.64             |                     |                  |
| 81.97               | 1.95             | 83.01               | 3.67             |                     |                  |
| 81.99               | 2.00             | 83.03               | 3.69             |                     |                  |
| 82.01               | 2.06             | 83.05               | 3.72             |                     |                  |

**FILTRATION PRACTICE DESIGN CRITERIA  
(Env-Wq 1508.08)**

Type/Node Name:

**Bio-Pond B (Nodes 259P A&B)**

Enter the type of filtration practice (e.g., bioretention system) and the node name in the drainage analysis, if applicable.

|   |          |   |                           |
|---|----------|---|---------------------------|
| Yes   |          | Check if you reviewed the restrictions on unlined systems outlined in Env-Wq 1508.08(a).  |                           |
| 1.22  | ac       | A = Area draining to the practice   |                           |
| 0.98  | ac       | A <sub>i</sub> = Impervious area draining to the practice   |                           |
| 0.80  | decimal  | I = Percent impervious area draining to the practice, in decimal form   |                           |
| 0.77  | unitless | R <sub>v</sub> = Runoff coefficient = 0.05 + (0.9 x I)  |                           |
| 0.94  | ac-in    | WQV = 1" x R <sub>v</sub> x A   |                           |
| 3,425   | cf       | WQV conversion (ac-in x 43,560 sf/ac x 1ft/12")   |                           |
| 856   | cf       | 25% x WQV (check calc for sediment forebay volume)  |                           |
| 2,569   | cf       | 75% x WQV (check calc for surface sand filter volume)   |                           |
| Stone Berm  |          | Method of Pretreatment? (not required for clean or roof runoff)   |                           |
| 1,027   | cf       | V <sub>SED</sub> = Sediment forebay volume, if used for pretreatment  | ≥ 25%WQV                  |
| Calculate time to drain if system IS NOT underdrained:                  |          |   |                           |
| 8,360   | sf       | A <sub>SA</sub> = Surface area of the practice  |                           |
| -   | iph      | K <sub>sat</sub> <sub>DESIGN</sub> = Design infiltration rate <sup>1</sup>  |                           |
| Yes   | Yes/No   | If K <sub>sat</sub> (prior to factor of safety) is < 0.50 iph, has an underdrain been provided?<br>(Use the calculations below) |                           |
| -   | hours    | T <sub>DRAIN</sub> = Drain time = V / (A <sub>SA</sub> * I <sub>DESIGN</sub> )  | ≤ 72-hrs                  |
| Calculate time to drain if system IS underdrained:                      |          |   |                           |
| 85.87   | ft       | E <sub>WQV</sub> = Elevation of WQV (attach stage-storage table)  |                           |
| 1.38  | cfs      | Q <sub>WQV</sub> = Discharge at the E <sub>WQV</sub> (attach stage-discharge table)   |                           |
| 1.38  | hours    | T <sub>DRAIN</sub> = Drain time = 2WQV/Q <sub>WQV</sub>   | ≤ 72-hrs                  |
| 84.50   | feet     | E <sub>FC</sub> = Elevation of the bottom of the filter course material <sup>2</sup>  |                           |
| 83.50   | feet     | E <sub>UD</sub> = Invert elevation of the underdrain (UD), if applicable  |                           |
| 86.50   | feet     | E <sub>SHWT</sub> = Elevation of SHWT (if none found, enter the lowest elevation of the test pit)                               |                           |
| 84.20   | feet     | E <sub>ROCK</sub> = Elevation of bedrock (if none found, enter the lowest elevation of the test pit)                            |                           |
| 1.00  | feet     | D <sub>FC to UD</sub> = Depth to UD from the bottom of the filter course  | ≥ 1'                      |
| 0.30  | feet     | D <sub>FC to ROCK</sub> = Depth to bedrock from the bottom of the filter course   | ≥ 1'                      |
| (2.00)  | feet     | D <sub>FC to SHWT</sub> = Depth to SHWT from the bottom of the filter course  | ≥ 1'                      |
| 87.57   | ft       | Peak elevation of the 50-year storm event (infiltration can be used in analysis)  |                           |
| 87.90   | ft       | Elevation of the top of the practice  |                           |
| YES   |          | 50 peak elevation ≤ Elevation of the top of the practice  | ← yes                     |
| <b>If a surface sand filter or underground sand filter is proposed:</b> |          |   |                           |
| YES   | ac       | Drainage Area check.  | < 10 ac                   |
|   | cf       | V = Volume of storage <sup>3</sup> (attach a stage-storage table)   | ≥ 75%WQV                  |
|   | inches   | D <sub>FC</sub> = Filter course thickness   | 18", or 24" if within GPA |
| Sheet   |          | Note what sheet in the plan set contains the filter course specification.   |                           |
| Yes/No  |          | Access grate provided?  | ← yes                     |

**If a bioretention area is proposed:**

|       |         |   |                           |
|-------|---------|---|---------------------------|
| YES   | ac      | Drainage Area no larger than 5 ac?  | ← yes                     |
| 5,343 | cf      | V = Volume of storage <sup>3</sup> (attach a stage-storage table)             | ≥ WQV                     |
| 24.0  | inches  | D <sub>FC</sub> = Filter course thickness                                     | 18", or 24" if within GPA |
| Sheet | D7      | Note what sheet in the plan set contains the filter course specification      |                           |
| 3.0   | :1      | Pond side slopes  | > 3:1                     |
| Sheet | L1 & L2 | Note what sheet in the plan set contains the planting plans and surface cover |                           |

**If porous pavement is proposed:**

|       |        |  |                           |
|-------|--------|--|---------------------------|
|       |        | Type of pavement proposed (Concrete? Asphalt? Pavers? Etc.)      |                           |
|       | acres  | A <sub>SA</sub> = Surface area of the pervious pavement          |                           |
|       | :1     | Ratio of the contributing area to the pervious surface area      | ≤ 5:1                     |
|       | inches | D <sub>FC</sub> = Filter course thickness                        | 12", or 18" if within GPA |
| Sheet |        | Note what sheet in the plan set contains the filter course spec. | mod. 304.1 (see spec)     |

1. Rate of the limiting layer (either the filter course or the underlying soil).  $K_{sat_{design}}$  includes factor of safety. See Env-Wq 1504.14 for guidance on determining the infiltration rate.
2. See lines 34, 40 and 48 for required depths of filter media.
3. Volume without depending on infiltration. The volume includes the storage above the filter (but below the invert of the outlet structure, if any), the filter media voids, and the pretreatment area. The storage above the filter media shall not include the volume above the outlet structure, if any.

Designer's Notes: \_\_\_\_\_

12" deep Stone Berm Cross Sectional Area = 2.50 sf  
 Stone Berm Length = 410.96 ft  
 Stone Berm Volume = 2.50 sf x 410.96 ft = 1,027 cf

E(WQV) Calculation:  
 Bottom of Filter Media Elv. = 84.50  
 Interpolated Storage Below 84.50 = 34 CF  
 WQV = 3,425 CF  
 Storage at E(WQV) = 34 CF + 3,425 CF = 3,459 CF  
 E(WQV) = 85.87 (3,470 CF)

**Stage-Area-Storage for Pond 259P-B: BIO-POND B SUBSURFACE**

| Elevation (feet) | Surface (sq-ft) | Storage (cubic-feet) | Elevation (feet) | Surface (sq-ft) | Storage (cubic-feet) |
|------------------|-----------------|----------------------|------------------|-----------------|----------------------|
| 83.49            | 8,360           | 0                    | 86.09            | 8,360           | 4,021                |
| 83.54            | 8,360           | 0                    | 86.14            | 8,360           | 4,147                |
| 83.59            | 8,360           | 1                    | 86.19            | 8,360           | 4,272                |
| 83.64            | 8,360           | 1                    | 86.24            | 8,360           | 4,397                |
| 83.69            | 8,360           | 2                    | 86.29            | 8,360           | 4,523                |
| 83.74            | 8,360           | 2                    | 86.34            | 8,360           | 4,648                |
| 83.79            | 8,360           | 3                    | 86.39            | 8,360           | 4,774                |
| 83.84            | 8,360           | 3                    | 86.44            | 8,360           | 4,899                |
| 83.89            | 8,360           | 3                    | 86.49            | 8,360           | 5,024                |
| 83.94            | 8,360           | 4                    |                  |                 |                      |
| 83.99            | 8,360           | 4                    |                  |                 |                      |
| 84.04            | 8,360           | 5                    |                  |                 |                      |
| 84.09            | 8,360           | 5                    |                  |                 |                      |
| 84.14            | 8,360           | 5                    |                  |                 |                      |
| 84.19            | 8,360           | 6                    |                  |                 |                      |
| 84.24            | 8,360           | 6                    |                  |                 |                      |
| 84.29            | 8,360           | 7                    |                  |                 |                      |
| 84.34            | 8,360           | 7                    |                  |                 |                      |
| 84.39            | 8,360           | 8                    |                  |                 |                      |
| 84.44            | 8,360           | 8                    |                  |                 |                      |
| 84.49            | 8,360           | 8                    |                  |                 |                      |
| 84.54            | 8,360           | 134                  |                  |                 |                      |
| 84.59            | 8,360           | 259                  |                  |                 |                      |
| 84.64            | 8,360           | 385                  |                  |                 |                      |
| 84.69            | 8,360           | 510                  |                  |                 |                      |
| 84.74            | 8,360           | 635                  |                  |                 |                      |
| 84.79            | 8,360           | 761                  |                  |                 |                      |
| 84.84            | 8,360           | 886                  |                  |                 |                      |
| 84.89            | 8,360           | 1,012                |                  |                 |                      |
| 84.94            | 8,360           | 1,137                |                  |                 |                      |
| 84.99            | 8,360           | 1,262                |                  |                 |                      |
| 85.04            | 8,360           | 1,388                |                  |                 |                      |
| 85.09            | 8,360           | 1,513                |                  |                 |                      |
| 85.14            | 8,360           | 1,639                |                  |                 |                      |
| 85.19            | 8,360           | 1,764                |                  |                 |                      |
| 85.24            | 8,360           | 1,889                |                  |                 |                      |
| 85.29            | 8,360           | 2,015                |                  |                 |                      |
| 85.34            | 8,360           | 2,140                |                  |                 |                      |
| 85.39            | 8,360           | 2,266                |                  |                 |                      |
| 85.44            | 8,360           | 2,391                |                  |                 |                      |
| 85.49            | 8,360           | 2,516                |                  |                 |                      |
| 85.54            | 8,360           | 2,642                |                  |                 |                      |
| 85.59            | 8,360           | 2,767                |                  |                 |                      |
| 85.64            | 8,360           | 2,893                |                  |                 |                      |
| 85.69            | 8,360           | 3,018                |                  |                 |                      |
| 85.74            | 8,360           | 3,143                |                  |                 |                      |
| 85.79            | 8,360           | 3,269                |                  |                 |                      |
| 85.84            | 8,360           | 3,394                |                  |                 |                      |
| 85.89            | 8,360           | 3,520                |                  |                 |                      |
| 85.94            | 8,360           | 3,645                |                  |                 |                      |
| 85.99            | 8,360           | 3,770                |                  |                 |                      |
| 86.04            | 8,360           | 3,896                |                  |                 |                      |

Interpolated Volume at Bottom of Filter Course (ELV. 84.50) = 34 CF

Interpolated Volume E(WQV) (ELV. 85.87) = 3,470 CF

**Stage-Discharge for Pond 259P-B: BIO-POND B SUBSURFACE**

| Elevation<br>(feet) | Primary<br>(cfs) | Elevation<br>(feet) | Primary<br>(cfs) | Elevation<br>(feet) | Primary<br>(cfs) |
|---------------------|------------------|---------------------|------------------|---------------------|------------------|
| 83.49               | 0.00             | 84.53               | 0.83             | 85.57               | 1.28             |
| 83.51               | 0.00             | 84.55               | 0.85             | 85.59               | 1.28             |
| 83.53               | 0.00             | 84.57               | 0.86             | 85.61               | 1.29             |
| 83.55               | 0.01             | 84.59               | 0.87             | 85.63               | 1.30             |
| 83.57               | 0.02             | 84.61               | 0.88             | 85.65               | 1.30             |
| 83.59               | 0.02             | 84.63               | 0.89             | 85.67               | 1.31             |
| 83.61               | 0.04             | 84.65               | 0.90             | 85.69               | 1.32             |
| 83.63               | 0.05             | 84.67               | 0.91             | 85.71               | 1.32             |
| 83.65               | 0.07             | 84.69               | 0.92             | 85.73               | 1.33             |
| 83.67               | 0.08             | 84.71               | 0.93             | 85.75               | 1.34             |
| 83.69               | 0.10             | 84.73               | 0.94             | 85.77               | 1.34             |
| 83.71               | 0.12             | 84.75               | 0.95             | 85.79               | 1.35             |
| 83.73               | 0.14             | 84.77               | 0.95             | 85.81               | 1.36             |
| 83.75               | 0.17             | 84.79               | 0.96             | 85.83               | 1.36             |
| 83.77               | 0.19             | 84.81               | 0.97             | 85.85               | 1.37             |
| 83.79               | 0.22             | 84.83               | 0.98             | <b>85.87</b>        | <b>1.38</b>      |
| 83.81               | 0.24             | 84.85               | 0.99             | 85.89               | 1.38             |
| 83.83               | 0.27             | 84.87               | 1.00             | 85.91               | 1.39             |
| 83.85               | 0.30             | 84.89               | 1.01             | 85.93               | 1.40             |
| 83.87               | 0.32             | 84.91               | 1.02             | 85.95               | 1.40             |
| 83.89               | 0.35             | 84.93               | 1.03             | 85.97               | 1.41             |
| 83.91               | 0.38             | 84.95               | 1.04             | 85.99               | 1.41             |
| 83.93               | 0.40             | 84.97               | 1.04             | 86.01               | 1.42             |
| 83.95               | 0.43             | 84.99               | 1.05             | 86.03               | 1.43             |
| 83.97               | 0.45             | 85.01               | 1.06             | 86.05               | 1.43             |
| 83.99               | 0.47             | 85.03               | 1.07             | 86.07               | 1.44             |
| 84.01               | 0.48             | 85.05               | 1.08             | 86.09               | 1.45             |
| 84.03               | 0.50             | 85.07               | 1.09             | 86.11               | 1.45             |
| 84.05               | 0.52             | 85.09               | 1.09             | 86.13               | 1.46             |
| 84.07               | 0.53             | 85.11               | 1.10             | 86.15               | 1.46             |
| 84.09               | 0.55             | 85.13               | 1.11             | 86.17               | 1.47             |
| 84.11               | 0.57             | 85.15               | 1.12             | 86.19               | 1.48             |
| 84.13               | 0.58             | 85.17               | 1.13             | 86.21               | 1.48             |
| 84.15               | 0.60             | 85.19               | 1.13             | 86.23               | 1.49             |
| 84.17               | 0.61             | 85.21               | 1.14             | 86.25               | 1.49             |
| 84.19               | 0.63             | 85.23               | 1.15             | 86.27               | 1.50             |
| 84.21               | 0.64             | 85.25               | 1.16             | 86.29               | 1.51             |
| 84.23               | 0.66             | 85.27               | 1.17             | 86.31               | 1.51             |
| 84.25               | 0.67             | 85.29               | 1.17             | 86.33               | 1.52             |
| 84.27               | 0.68             | 85.31               | 1.18             | 86.35               | 1.52             |
| 84.29               | 0.69             | 85.33               | 1.19             | 86.37               | 1.53             |
| 84.31               | 0.71             | 85.35               | 1.20             | 86.39               | 1.54             |
| 84.33               | 0.72             | 85.37               | 1.20             | 86.41               | 1.54             |
| 84.35               | 0.73             | 85.39               | 1.21             | 86.43               | 1.55             |
| 84.37               | 0.74             | 85.41               | 1.22             | 86.45               | 1.55             |
| 84.39               | 0.76             | 85.43               | 1.23             | 86.47               | 1.56             |
| 84.41               | 0.77             | 85.45               | 1.23             | 86.49               | <b>1.56</b>      |
| 84.43               | 0.78             | 85.47               | 1.24             |                     |                  |
| 84.45               | 0.79             | 85.49               | 1.25             |                     |                  |
| 84.47               | 0.80             | 85.51               | 1.25             |                     |                  |
| 84.49               | 0.81             | 85.53               | 1.26             |                     |                  |
| 84.51               | 0.82             | 85.55               | 1.27             |                     |                  |



**If a bioretention area is proposed:**

|       |         |   |                           |
|-------|---------|---|---------------------------|
| YES   | ac      | Drainage Area no larger than 5 ac?  | ← yes                     |
| 1,322 | cf      | $V = \text{Volume of storage}^3$ (attach a stage-storage table)               | ≥ WQV                     |
| 24.0  | inches  | $D_{FC} = \text{Filter course thickness}$                                     | 18", or 24" if within GPA |
| Sheet | D7      | Note what sheet in the plan set contains the filter course specification      |                           |
| 3.0   | :1      | Pond side slopes  | > 3:1                     |
| Sheet | L1 & L2 | Note what sheet in the plan set contains the planting plans and surface cover |                           |

**If porous pavement is proposed:**

|       |        |  |                           |
|-------|--------|--|---------------------------|
|       |        | Type of pavement proposed (Concrete? Asphalt? Pavers? Etc.)      |                           |
|       | acres  | $A_{SA} = \text{Surface area of the pervious pavement}$          |                           |
|       | :1     | Ratio of the contributing area to the pervious surface area      | ≤ 5:1                     |
|       | inches | $D_{FC} = \text{Filter course thickness}$                        | 12", or 18" if within GPA |
| Sheet |        | Note what sheet in the plan set contains the filter course spec. | mod. 304.1 (see spec)     |

1. Rate of the limiting layer (either the filter course or the underlying soil).  $K_{sat, design}$  includes factor of safety. See Env-Wq 1504.14 for guidance on determining the infiltration rate.
2. See lines 34, 40 and 48 for required depths of filter media.
3. Volume without depending on infiltration. The volume includes the storage above the filter (but below the invert of the outlet structure, if any), the filter media voids, and the pretreatment area. The storage above the filter media shall not include the volume above the outlet structure, if any.

Designer's Notes: \_\_\_\_\_

Pretreatment was not included for the proposed bioswale due to the minimal volume of runoff directed to it, most of which originates from pervious areas. The limited runoff from impervious surfaces is not expected to carry significant pollutant loads, and the bioswale itself provides sufficient treatment for the low-flow conditions anticipated.

E(WQV) Calculation:

Bottom of Filter Media Elv. = 85.50

Interpolated Storage Below 85.50 = 5 CF

WQV = 198 CF

Storage at E(WQV) = 5 CF + 198 CF = 203 CF

E(WQV) = 86.05 (205 CF)

**Stage-Area-Storage for Pond 253P-B: BIO-POND C SUBSURFACE**

| Elevation (feet) | Surface (sq-ft) | Storage (cubic-feet) | Elevation (feet) | Surface (sq-ft) | Storage (cubic-feet) |
|------------------|-----------------|----------------------|------------------|-----------------|----------------------|
| 84.49            | 1,130           | 0                    | 87.09            | 1,130           | 544                  |
| 84.54            | 1,130           | 0                    | 87.14            | 1,130           | 560                  |
| 84.59            | 1,130           | 0                    | 87.19            | 1,130           | 577                  |
| 84.64            | 1,130           | 0                    | 87.24            | 1,130           | 594                  |
| 84.69            | 1,130           | 0                    | 87.29            | 1,130           | 611                  |
| 84.74            | 1,130           | 0                    | 87.34            | 1,130           | 628                  |
| 84.79            | 1,130           | 0                    | 87.39            | 1,130           | 645                  |
| 84.84            | 1,130           | 0                    | 87.44            | 1,130           | 662                  |
| 84.89            | 1,130           | 0                    | 87.49            | <b>1,130</b>    | <b>679</b>           |
| 84.94            | 1,130           | 1                    |                  |                 |                      |
| 84.99            | 1,130           | 1                    |                  |                 |                      |
| 85.04            | 1,130           | 1                    |                  |                 |                      |
| 85.09            | 1,130           | 1                    |                  |                 |                      |
| 85.14            | 1,130           | 1                    |                  |                 |                      |
| 85.19            | 1,130           | 1                    |                  |                 |                      |
| 85.24            | 1,130           | 1                    |                  |                 |                      |
| 85.29            | 1,130           | 1                    |                  |                 |                      |
| 85.34            | 1,130           | 1                    |                  |                 |                      |
| 85.39            | 1,130           | 1                    |                  |                 |                      |
| 85.44            | 1,130           | 1                    |                  |                 |                      |
| <b>85.49</b>     | <b>1,130</b>    | <b>1</b>             |                  |                 |                      |
| <b>85.54</b>     | <b>1,130</b>    | <b>18</b>            |                  |                 |                      |
| 85.59            | 1,130           | 35                   |                  |                 |                      |
| 85.64            | 1,130           | 52                   |                  |                 |                      |
| 85.69            | 1,130           | 69                   |                  |                 |                      |
| 85.74            | 1,130           | 86                   |                  |                 |                      |
| 85.79            | 1,130           | 103                  |                  |                 |                      |
| 85.84            | 1,130           | 120                  |                  |                 |                      |
| 85.89            | 1,130           | 137                  |                  |                 |                      |
| 85.94            | 1,130           | 154                  |                  |                 |                      |
| 85.99            | 1,130           | 171                  |                  |                 |                      |
| <b>86.04</b>     | <b>1,130</b>    | <b>188</b>           |                  |                 |                      |
| <b>86.09</b>     | <b>1,130</b>    | <b>205</b>           |                  |                 |                      |
| 86.14            | 1,130           | 221                  |                  |                 |                      |
| 86.19            | 1,130           | 238                  |                  |                 |                      |
| 86.24            | 1,130           | 255                  |                  |                 |                      |
| 86.29            | 1,130           | 272                  |                  |                 |                      |
| 86.34            | 1,130           | 289                  |                  |                 |                      |
| 86.39            | 1,130           | 306                  |                  |                 |                      |
| 86.44            | 1,130           | 323                  |                  |                 |                      |
| 86.49            | 1,130           | 340                  |                  |                 |                      |
| 86.54            | 1,130           | 357                  |                  |                 |                      |
| 86.59            | 1,130           | 374                  |                  |                 |                      |
| 86.64            | 1,130           | 391                  |                  |                 |                      |
| 86.69            | 1,130           | 408                  |                  |                 |                      |
| 86.74            | 1,130           | 425                  |                  |                 |                      |
| 86.79            | 1,130           | 442                  |                  |                 |                      |
| 86.84            | 1,130           | 459                  |                  |                 |                      |
| 86.89            | 1,130           | 476                  |                  |                 |                      |
| 86.94            | 1,130           | 493                  |                  |                 |                      |
| 86.99            | 1,130           | 510                  |                  |                 |                      |
| 87.04            | 1,130           | 527                  |                  |                 |                      |

Interpolated Volume at Bottom of Filter Course (ELV. 85.50) = 5 CF

Interpolated Volume E(WQV) (ELV. 86.05) = 205 CF

**Stage-Discharge for Pond 253P-B: BIO-POND C SUBSURFACE**

| Elevation<br>(feet) | Primary<br>(cfs) | Elevation<br>(feet) | Primary<br>(cfs) | Elevation<br>(feet) | Primary<br>(cfs) |
|---------------------|------------------|---------------------|------------------|---------------------|------------------|
| 84.49               | 0.00             | 85.53               | 0.83             | 86.57               | 1.28             |
| 84.51               | 0.00             | 85.55               | 0.85             | 86.59               | 1.28             |
| 84.53               | 0.00             | 85.57               | 0.86             | 86.61               | 1.29             |
| 84.55               | 0.01             | 85.59               | 0.87             | 86.63               | 1.30             |
| 84.57               | 0.02             | 85.61               | 0.88             | 86.65               | 1.30             |
| 84.59               | 0.02             | 85.63               | 0.89             | 86.67               | 1.31             |
| 84.61               | 0.04             | 85.65               | 0.90             | 86.69               | 1.32             |
| 84.63               | 0.05             | 85.67               | 0.91             | 86.71               | 1.32             |
| 84.65               | 0.07             | 85.69               | 0.92             | 86.73               | 1.33             |
| 84.67               | 0.08             | 85.71               | 0.93             | 86.75               | 1.34             |
| 84.69               | 0.10             | 85.73               | 0.94             | 86.77               | 1.34             |
| 84.71               | 0.12             | 85.75               | 0.95             | 86.79               | 1.35             |
| 84.73               | 0.14             | 85.77               | 0.95             | 86.81               | 1.36             |
| 84.75               | 0.17             | 85.79               | 0.96             | 86.83               | 1.36             |
| 84.77               | 0.19             | 85.81               | 0.97             | 86.85               | 1.37             |
| 84.79               | 0.22             | 85.83               | 0.98             | 86.87               | 1.38             |
| 84.81               | 0.24             | 85.85               | 0.99             | 86.89               | 1.38             |
| 84.83               | 0.27             | 85.87               | 1.00             | 86.91               | 1.39             |
| 84.85               | 0.30             | 85.89               | 1.01             | 86.93               | 1.40             |
| 84.87               | 0.32             | 85.91               | 1.02             | 86.95               | 1.40             |
| 84.89               | 0.35             | 85.93               | 1.03             | 86.97               | 1.41             |
| 84.91               | 0.38             | 85.95               | 1.04             | 86.99               | 1.41             |
| 84.93               | 0.40             | 85.97               | 1.04             | 87.01               | 1.42             |
| 84.95               | 0.43             | 85.99               | 1.05             | 87.03               | 1.43             |
| 84.97               | 0.45             | 86.01               | 1.06             | 87.05               | 1.43             |
| 84.99               | 0.47             | 86.03               | 1.07             | 87.07               | 1.44             |
| 85.01               | 0.48             | <b>86.05</b>        | <b>1.08</b>      | 87.09               | 1.45             |
| 85.03               | 0.50             | 86.07               | 1.09             | 87.11               | 1.45             |
| 85.05               | 0.52             | 86.09               | 1.09             | 87.13               | 1.46             |
| 85.07               | 0.53             | 86.11               | 1.10             | 87.15               | 1.46             |
| 85.09               | 0.55             | 86.13               | 1.11             | 87.17               | 1.47             |
| 85.11               | 0.57             | 86.15               | 1.12             | 87.19               | 1.48             |
| 85.13               | 0.58             | 86.17               | 1.13             | 87.21               | 1.48             |
| 85.15               | 0.60             | 86.19               | 1.13             | 87.23               | 1.49             |
| 85.17               | 0.61             | 86.21               | 1.14             | 87.25               | 1.49             |
| 85.19               | 0.63             | 86.23               | 1.15             | 87.27               | 1.50             |
| 85.21               | 0.64             | 86.25               | 1.16             | 87.29               | 1.51             |
| 85.23               | 0.66             | 86.27               | 1.17             | 87.31               | 1.51             |
| 85.25               | 0.67             | 86.29               | 1.17             | 87.33               | 1.52             |
| 85.27               | 0.68             | 86.31               | 1.18             | 87.35               | 1.52             |
| 85.29               | 0.69             | 86.33               | 1.19             | 87.37               | 1.53             |
| 85.31               | 0.71             | 86.35               | 1.20             | 87.39               | 1.54             |
| 85.33               | 0.72             | 86.37               | 1.20             | 87.41               | 1.54             |
| 85.35               | 0.73             | 86.39               | 1.21             | 87.43               | 1.55             |
| 85.37               | 0.74             | 86.41               | 1.22             | 87.45               | 1.55             |
| 85.39               | 0.76             | 86.43               | 1.23             | 87.47               | 1.56             |
| 85.41               | 0.77             | 86.45               | 1.23             | 87.49               | <b>1.56</b>      |
| 85.43               | 0.78             | 86.47               | 1.24             |                     |                  |
| 85.45               | 0.79             | 86.49               | 1.25             |                     |                  |
| 85.47               | 0.80             | 86.51               | 1.25             |                     |                  |
| 85.49               | 0.81             | 86.53               | 1.26             |                     |                  |
| 85.51               | 0.82             | 86.55               | 1.27             |                     |                  |

**FILTRATION PRACTICE DESIGN CRITERIA  
(Env-Wq 1508.08)**

Type/Node Name:

**Bio-Pond D (Nodes 254P A&B)**

Enter the type of filtration practice (e.g., bioretention system) and the node name in the drainage analysis, if applicable.

|   |          |   |                           |
|---|----------|---|---------------------------|
| Yes   |          | Check if you reviewed the restrictions on unlined systems outlined in Env-Wq 1508.08(a).  |                           |
| 0.55  | ac       | A = Area draining to the practice   |                           |
| 0.35  | ac       | A <sub>I</sub> = Impervious area draining to the practice   |                           |
| 0.64  | decimal  | I = Percent impervious area draining to the practice, in decimal form   |                           |
| 0.62  | unitless | R <sub>v</sub> = Runoff coefficient = 0.05 + (0.9 x I)  |                           |
| 0.35  | ac-in    | WQV = 1" x R <sub>v</sub> x A   |                           |
| 1,253   | cf       | WQV conversion (ac-in x 43,560 sf/ac x 1ft/12")   |                           |
| 313   | cf       | 25% x WQV (check calc for sediment forebay volume)  |                           |
| 940   | cf       | 75% x WQV (check calc for surface sand filter volume)   |                           |
| Stone Berm  |          | Method of Pretreatment? (not required for clean or roof runoff)   |                           |
| 389   | cf       | V <sub>SED</sub> = Sediment forebay volume, if used for pretreatment  | ≥ 25%WQV                  |
| Calculate time to drain if system IS NOT underdrained:                  |          |   |                           |
| 3,475   | sf       | A <sub>SA</sub> = Surface area of the practice  |                           |
| -   | iph      | K <sub>sat</sub> <sub>DESIGN</sub> = Design infiltration rate <sup>1</sup>  |                           |
|   |          | If K <sub>sat</sub> (prior to factor of safety) is < 0.50 iph, has an underdrain been provided?<br>(Use the calculations below) |                           |
| Yes   | Yes/No   |   |                           |
| -   | hours    | T <sub>DRAIN</sub> = Drain time = V / (A <sub>SA</sub> * I <sub>DESIGN</sub> )  | ≤ 72-hrs                  |
| Calculate time to drain if system IS underdrained:                      |          |   |                           |
| 86.71   | ft       | E <sub>WQV</sub> = Elevation of WQV (attach stage-storage table)  |                           |
| 1.04  | cfs      | Q <sub>WQV</sub> = Discharge at the E <sub>WQV</sub> (attach stage-discharge table)   |                           |
| 0.67  | hours    | T <sub>DRAIN</sub> = Drain time = 2WQV/Q <sub>WQV</sub>   | ≤ 72-hrs                  |
| 85.50   | feet     | E <sub>FC</sub> = Elevation of the bottom of the filter course material <sup>2</sup>  |                           |
| 84.50   | feet     | E <sub>UD</sub> = Invert elevation of the underdrain (UD), if applicable  |                           |
| 91.00   | feet     | E <sub>SHWT</sub> = Elevation of SHWT (if none found, enter the lowest elevation of the test pit)                               |                           |
| 89.70   | feet     | E <sub>ROCK</sub> = Elevation of bedrock (if none found, enter the lowest elevation of the test pit)                            |                           |
| 1.00  | feet     | D <sub>FC to UD</sub> = Depth to UD from the bottom of the filter course  | ≥ 1'                      |
| (4.20)  | feet     | D <sub>FC to ROCK</sub> = Depth to bedrock from the bottom of the filter course   | ≥ 1'                      |
| (5.50)  | feet     | D <sub>FC to SHWT</sub> = Depth to SHWT from the bottom of the filter course  | ≥ 1'                      |
| 88.27   | ft       | Peak elevation of the 50-year storm event (infiltration can be used in analysis)  |                           |
| 88.90   | ft       | Elevation of the top of the practice  |                           |
| YES   |          | 50 peak elevation ≤ Elevation of the top of the practice  | ← yes                     |
| <b>If a surface sand filter or underground sand filter is proposed:</b> |          |   |                           |
| YES   | ac       | Drainage Area check.  | < 10 ac                   |
|   | cf       | V = Volume of storage <sup>3</sup> (attach a stage-storage table)   | ≥ 75%WQV                  |
|   | inches   | D <sub>FC</sub> = Filter course thickness   | 18", or 24" if within GPA |
| Sheet   |          | Note what sheet in the plan set contains the filter course specification.   |                           |
| Yes/No  |          | Access grate provided?  | ← yes                     |

**If a bioretention area is proposed:**

|       |         |   |                           |
|-------|---------|---|---------------------------|
| YES   | ac      | Drainage Area no larger than 5 ac?  | ← yes                     |
| 3,818 | cf      | V = Volume of storage <sup>3</sup> (attach a stage-storage table)             | ≥ WQV                     |
| 24.0  | inches  | D <sub>FC</sub> = Filter course thickness                                     | 18", or 24" if within GPA |
| Sheet | D8      | Note what sheet in the plan set contains the filter course specification      |                           |
| 3.0   | :1      | Pond side slopes  | > 3:1                     |
| Sheet | L1 & L2 | Note what sheet in the plan set contains the planting plans and surface cover |                           |

**If porous pavement is proposed:**

|       |        |  |                           |
|-------|--------|--|---------------------------|
|       | acres  | Type of pavement proposed (Concrete? Asphalt? Pavers? Etc.)      |                           |
|       |        | A <sub>SA</sub> = Surface area of the pervious pavement          |                           |
|       | :1     | Ratio of the contributing area to the pervious surface area      | ≤ 5:1                     |
|       | inches | D <sub>FC</sub> = Filter course thickness                        | 12", or 18" if within GPA |
| Sheet |        | Note what sheet in the plan set contains the filter course spec. | mod. 304.1 (see spec)     |

1. Rate of the limiting layer (either the filter course or the underlying soil).  $K_{sat_{design}}$  includes factor of safety. See Env-Wq 1504.14 for guidance on determining the infiltration rate.
2. See lines 34, 40 and 48 for required depths of filter media.
3. Volume without depending on infiltration. The volume includes the storage above the filter (but below the invert of the outlet structure, if any), the filter media voids, and the pretreatment area. The storage above the filter media shall not include the volume above the outlet structure, if any.

Designer's Notes: \_\_\_\_\_

10" deep Stone Berm Cross Sectional Area = 1.74 sf

Stone Berm Length = 223.64 ft

Stone Berm Volume = 1.74 sf x 223.64 ft = 389.13 cf

E(WQV) Calculation:

Bottom of Filter Media Elv. = 85.50

Interpolated Storage Below 85.50 = 18 CF

WQV = 1,253 CF

Storage at E(WQV) = 18 CF + 1,253 CF = 1,271 CF

E(WQV) = 86.71 (1,279 CF)

**Stage-Area-Storage for Pond 254P-B: BIO-POND D SUBSURFACE**

| Elevation (feet) | Surface (sq-ft) | Storage (cubic-feet) | Elevation (feet) | Surface (sq-ft) | Storage (cubic-feet) |
|------------------|-----------------|----------------------|------------------|-----------------|----------------------|
| 84.49            | 3,475           | 0                    | 87.09            | 3,475           | 1,675                |
| 84.54            | 3,475           | 0                    | 87.14            | 3,475           | 1,727                |
| 84.59            | 3,475           | 1                    | 87.19            | 3,475           | 1,779                |
| 84.64            | 3,475           | 1                    | 87.24            | 3,475           | 1,831                |
| 84.69            | 3,475           | 1                    | 87.29            | 3,475           | 1,883                |
| 84.74            | 3,475           | 2                    | 87.34            | 3,475           | 1,936                |
| 84.79            | 3,475           | 2                    | 87.39            | 3,475           | 1,988                |
| 84.84            | 3,475           | 2                    | 87.44            | 3,475           | 2,040                |
| 84.89            | 3,475           | 3                    | 87.49            | 3,475           | 2,092                |
| 84.94            | 3,475           | 3                    |                  |                 |                      |
| 84.99            | 3,475           | 3                    |                  |                 |                      |
| 85.04            | 3,475           | 4                    |                  |                 |                      |
| 85.09            | 3,475           | 4                    |                  |                 |                      |
| 85.14            | 3,475           | 5                    |                  |                 |                      |
| 85.19            | 3,475           | 5                    |                  |                 |                      |
| 85.24            | 3,475           | 5                    |                  |                 |                      |
| 85.29            | 3,475           | 6                    |                  |                 |                      |
| 85.34            | 3,475           | 6                    |                  |                 |                      |
| 85.39            | 3,475           | 6                    |                  |                 |                      |
| 85.44            | 3,475           | 7                    |                  |                 |                      |
| 85.49            | 3,475           | 7                    |                  |                 |                      |
| 85.54            | 3,475           | 59                   |                  |                 |                      |
| 85.59            | 3,475           | 111                  |                  |                 |                      |
| 85.64            | 3,475           | 163                  |                  |                 |                      |
| 85.69            | 3,475           | 215                  |                  |                 |                      |
| 85.74            | 3,475           | 268                  |                  |                 |                      |
| 85.79            | 3,475           | 320                  |                  |                 |                      |
| 85.84            | 3,475           | 372                  |                  |                 |                      |
| 85.89            | 3,475           | 424                  |                  |                 |                      |
| 85.94            | 3,475           | 476                  |                  |                 |                      |
| 85.99            | 3,475           | 528                  |                  |                 |                      |
| 86.04            | 3,475           | 580                  |                  |                 |                      |
| 86.09            | 3,475           | 632                  |                  |                 |                      |
| 86.14            | 3,475           | 685                  |                  |                 |                      |
| 86.19            | 3,475           | 737                  |                  |                 |                      |
| 86.24            | 3,475           | 789                  |                  |                 |                      |
| 86.29            | 3,475           | 841                  |                  |                 |                      |
| 86.34            | 3,475           | 893                  |                  |                 |                      |
| 86.39            | 3,475           | 945                  |                  |                 |                      |
| 86.44            | 3,475           | 997                  |                  |                 |                      |
| 86.49            | 3,475           | 1,049                |                  |                 |                      |
| 86.54            | 3,475           | 1,102                |                  |                 |                      |
| 86.59            | 3,475           | 1,154                |                  |                 |                      |
| 86.64            | 3,475           | 1,206                |                  |                 |                      |
| 86.69            | 3,475           | 1,258                |                  |                 |                      |
| 86.74            | 3,475           | 1,310                |                  |                 |                      |
| 86.79            | 3,475           | 1,362                |                  |                 |                      |
| 86.84            | 3,475           | 1,414                |                  |                 |                      |
| 86.89            | 3,475           | 1,466                |                  |                 |                      |
| 86.94            | 3,475           | 1,519                |                  |                 |                      |
| 86.99            | 3,475           | 1,571                |                  |                 |                      |
| 87.04            | 3,475           | 1,623                |                  |                 |                      |

Interpolated Volume at Bottom of Filter Course (ELV. 85.50) = 18 CF

Interpolated Volume E(WQV) (ELV. 86.71) = 1,279 CF

**Stage-Discharge for Pond 254P-B: BIO-POND D SUBSURFACE**

| Elevation<br>(feet) | Primary<br>(cfs) | Elevation<br>(feet) | Primary<br>(cfs) | Elevation<br>(feet) | Primary<br>(cfs) |
|---------------------|------------------|---------------------|------------------|---------------------|------------------|
| 84.49               | 0.00             | 85.53               | 0.66             | 86.57               | 1.01             |
| 84.51               | 0.00             | 85.55               | 0.67             | 86.59               | 1.01             |
| 84.53               | 0.00             | 85.57               | 0.68             | 86.61               | 1.02             |
| 84.55               | 0.01             | 85.59               | 0.68             | 86.63               | 1.02             |
| 84.57               | 0.01             | 85.61               | 0.69             | 86.65               | 1.03             |
| 84.59               | 0.02             | 85.63               | 0.70             | 86.67               | 1.03             |
| 84.61               | 0.03             | 85.65               | 0.71             | 86.69               | 1.04             |
| 84.63               | 0.04             | 85.67               | 0.72             | <b>86.71</b>        | <b>1.04</b>      |
| 84.65               | 0.05             | 85.69               | 0.72             | 86.73               | 1.05             |
| 84.67               | 0.07             | 85.71               | 0.73             | 86.75               | 1.06             |
| 84.69               | 0.08             | 85.73               | 0.74             | 86.77               | 1.06             |
| 84.71               | 0.10             | 85.75               | 0.75             | 86.79               | 1.06             |
| 84.73               | 0.11             | 85.77               | 0.75             | 86.81               | 1.07             |
| 84.75               | 0.13             | 85.79               | 0.76             | 86.83               | 1.07             |
| 84.77               | 0.15             | 85.81               | 0.77             | 86.85               | 1.08             |
| 84.79               | 0.17             | 85.83               | 0.78             | 86.87               | 1.08             |
| 84.81               | 0.19             | 85.85               | 0.78             | 86.89               | 1.08             |
| 84.83               | 0.21             | 85.87               | 0.79             | 86.91               | 1.09             |
| 84.85               | 0.23             | 85.89               | 0.80             | 86.93               | 1.09             |
| 84.87               | 0.25             | 85.91               | 0.80             | 86.95               | 1.09             |
| 84.89               | 0.28             | 85.93               | 0.81             | 86.97               | 1.10             |
| 84.91               | 0.30             | 85.95               | 0.82             | 86.99               | 1.10             |
| 84.93               | 0.32             | 85.97               | 0.82             | 87.01               | 1.11             |
| 84.95               | 0.34             | 85.99               | 0.83             | 87.03               | 1.11             |
| 84.97               | 0.35             | 86.01               | 0.84             | 87.05               | 1.11             |
| 84.99               | 0.37             | 86.03               | 0.84             | 87.07               | 1.12             |
| 85.01               | 0.38             | 86.05               | 0.85             | 87.09               | 1.12             |
| 85.03               | 0.39             | 86.07               | 0.86             | 87.11               | 1.12             |
| 85.05               | 0.41             | 86.09               | 0.86             | 87.13               | 1.13             |
| 85.07               | 0.42             | 86.11               | 0.87             | 87.15               | 1.13             |
| 85.09               | 0.44             | 86.13               | 0.88             | 87.17               | 1.13             |
| 85.11               | 0.45             | 86.15               | 0.88             | 87.19               | 1.14             |
| 85.13               | 0.46             | 86.17               | 0.89             | 87.21               | 1.14             |
| 85.15               | 0.47             | 86.19               | 0.90             | 87.23               | 1.15             |
| 85.17               | 0.48             | 86.21               | 0.90             | 87.25               | 1.15             |
| 85.19               | 0.50             | 86.23               | 0.91             | 87.27               | 1.15             |
| 85.21               | 0.51             | 86.25               | 0.91             | 87.29               | 1.16             |
| 85.23               | 0.52             | 86.27               | 0.92             | 87.31               | 1.16             |
| 85.25               | 0.53             | 86.29               | 0.93             | 87.33               | 1.16             |
| 85.27               | 0.54             | 86.31               | 0.93             | 87.35               | 1.17             |
| 85.29               | 0.55             | 86.33               | 0.94             | 87.37               | 1.17             |
| 85.31               | 0.56             | 86.35               | 0.94             | 87.39               | 1.17             |
| 85.33               | 0.57             | 86.37               | 0.95             | 87.41               | 1.18             |
| 85.35               | 0.58             | 86.39               | 0.96             | 87.43               | 1.18             |
| 85.37               | 0.59             | 86.41               | 0.96             | 87.45               | 1.18             |
| 85.39               | 0.60             | 86.43               | 0.97             | 87.47               | 1.19             |
| 85.41               | 0.61             | 86.45               | 0.97             | 87.49               | <b>1.19</b>      |
| 85.43               | 0.62             | 86.47               | 0.98             |                     |                  |
| 85.45               | 0.62             | 86.49               | 0.98             |                     |                  |
| 85.47               | 0.63             | 86.51               | 0.99             |                     |                  |
| 85.49               | 0.64             | 86.53               | 1.00             |                     |                  |
| 85.51               | 0.65             | 86.55               | 1.00             |                     |                  |



**If a bioretention area is proposed:**

|       |         |   |                           |
|-------|---------|---|---------------------------|
| YES   | ac      | Drainage Area no larger than 5 ac?  | ← yes                     |
| 2,980 | cf      | $V = \text{Volume of storage}^3$ (attach a stage-storage table)               | ≥ WQV                     |
| 24.0  | inches  | $D_{FC} = \text{Filter course thickness}$                                     | 18", or 24" if within GPA |
| Sheet | D8      | Note what sheet in the plan set contains the filter course specification      |                           |
| 3.0   | :1      | Pond side slopes  | > 3:1                     |
| Sheet | L1 & L2 | Note what sheet in the plan set contains the planting plans and surface cover |                           |

**If porous pavement is proposed:**

|       |        |  |                           |
|-------|--------|--|---------------------------|
|       |        | Type of pavement proposed (Concrete? Asphalt? Pavers? Etc.)      |                           |
|       | acres  | $A_{SA} = \text{Surface area of the pervious pavement}$          |                           |
|       | :1     | Ratio of the contributing area to the pervious surface area      | ≤ 5:1                     |
|       | inches | $D_{FC} = \text{Filter course thickness}$                        | 12", or 18" if within GPA |
| Sheet |        | Note what sheet in the plan set contains the filter course spec. | mod. 304.1 (see spec)     |

1. Rate of the limiting layer (either the filter course or the underlying soil).  $K_{sat, design}$  includes factor of safety. See Env-Wq 1504.14 for guidance on determining the infiltration rate.
2. See lines 34, 40 and 48 for required depths of filter media.
3. Volume without depending on infiltration. The volume includes the storage above the filter (but below the invert of the outlet structure, if any), the filter media voids, and the pretreatment area. The storage above the filter media shall not include the volume above the outlet structure, if any.

Designer's Notes: \_\_\_\_\_

12" deep Stone Berm with 12" flat bottom Cross Sectional Area = 3.47 sf

Stone Berm Length = 227.48 ft

Stone Berm Volume = 3.47 sf x 227.48 ft = 789.35 cf

E(WQV) Calculation:

Bottom of Filter Media Elv. = 84.50

Interpolated Storage Below 84.50 = 25 CF

WQV = 2,779 CF

Storage at E(WQV) = 25 CF + 2,779 CF = 2,804 CF

Storage at the top of the filter layer (Elv. 86.50) = 2,144 CF

Storage required above filter layer required for E(WQV) = 2,804 CF - 2,144 CF = 660 CF

E(WQV) = 86.73 (686 CF + 2,144 CF = 2,830 CF)

**PHASE II**

**FILTRATION PRACTICE DESIGN CRITERIA  
(Env-Wq 1508.08)**

Type/Node Name:

**Bio-Pond E (Nodes 255P A&B)**

Enter the type of filtration practice (e.g., bioretention system) and the node name in the drainage analysis, if applicable.

|   |          |   |                           |
|---|----------|---|---------------------------|
| Yes   |          | Check if you reviewed the restrictions on unlined systems outlined in Env-Wq 1508.08(a).  |                           |
| 1.01  | ac       | A = Area draining to the practice   |                           |
| 0.79  | ac       | A <sub>i</sub> = Impervious area draining to the practice   |                           |
| 0.79  | decimal  | I = Percent impervious area draining to the practice, in decimal form   |                           |
| 0.76  | unitless | R <sub>v</sub> = Runoff coefficient = 0.05 + (0.9 x I)  |                           |
| 0.77  | ac-in    | WQV = 1" x R <sub>v</sub> x A   |                           |
| 2,779   | cf       | WQV conversion (ac-in x 43,560 sf/ac x 1ft/12")   |                           |
| 695   | cf       | 25% x WQV (check calc for sediment forebay volume)  |                           |
| 2,084   | cf       | 75% x WQV (check calc for surface sand filter volume)   |                           |
| Stone Berm  |          | Method of Pretreatment? (not required for clean or roof runoff)   |                           |
| 789   | cf       | V <sub>SED</sub> = Sediment forebay volume, if used for pretreatment  | ≥ 25%WQV                  |
| Calculate time to drain if system IS NOT underdrained:                  |          |   |                           |
| 3,550   | sf       | A <sub>SA</sub> = Surface area of the practice  |                           |
| -   | iph      | K <sub>sat</sub> <sub>DESIGN</sub> = Design infiltration rate <sup>1</sup>  |                           |
|   |          | If K <sub>sat</sub> (prior to factor of safety) is < 0.50 iph, has an underdrain been provided?<br>(Use the calculations below) |                           |
| Yes   | Yes/No   |   |                           |
| -   | hours    | T <sub>DRAIN</sub> = Drain time = V / (A <sub>SA</sub> * I <sub>DESIGN</sub> )  | ≤ 72-hrs                  |
| Calculate time to drain if system IS underdrained:                      |          |   |                           |
| 86.73   | ft       | E <sub>WQV</sub> = Elevation of WQV (attach stage-storage table)  |                           |
| 0.60  | cfs      | Q <sub>WQV</sub> = Discharge at the E <sub>WQV</sub> (attach stage-discharge table)   |                           |
| 2.57  | hours    | T <sub>DRAIN</sub> = Drain time = 2WQV/Q <sub>WQV</sub>   | ≤ 72-hrs                  |
| 84.50   | feet     | E <sub>FC</sub> = Elevation of the bottom of the filter course material <sup>2</sup>  |                           |
| 83.50   | feet     | E <sub>UD</sub> = Invert elevation of the underdrain (UD), if applicable  |                           |
| 85.00   | feet     | E <sub>SHWT</sub> = Elevation of SHWT (if none found, enter the lowest elevation of the test pit)                               |                           |
| 83.90   | feet     | E <sub>ROCK</sub> = Elevation of bedrock (if none found, enter the lowest elevation of the test pit)                            |                           |
| 1.00  | feet     | D <sub>FC to UD</sub> = Depth to UD from the bottom of the filter course  | ≥ 1'                      |
| 0.60  | feet     | D <sub>FC to ROCK</sub> = Depth to bedrock from the bottom of the filter course   | ≥ 1'                      |
| (0.50)  | feet     | D <sub>FC to SHWT</sub> = Depth to SHWT from the bottom of the filter course  | ≥ 1'                      |
| 87.75   | ft       | Peak elevation of the 50-year storm event (infiltration can be used in analysis)  |                           |
| 88.00   | ft       | Elevation of the top of the practice  |                           |
| YES   |          | 50 peak elevation ≤ Elevation of the top of the practice  | ← yes                     |
| <b>If a surface sand filter or underground sand filter is proposed:</b> |          |   |                           |
| YES   | ac       | Drainage Area check.  | < 10 ac                   |
|   | cf       | V = Volume of storage <sup>3</sup> (attach a stage-storage table)   | ≥ 75%WQV                  |
|   | inches   | D <sub>FC</sub> = Filter course thickness   | 18", or 24" if within GPA |
| Sheet   |          | Note what sheet in the plan set contains the filter course specification.   |                           |
|   | Yes/No   | Access grate provided?  | ← yes                     |

**If a bioretention area is proposed:**

|       |         |   |                           |
|-------|---------|---|---------------------------|
| YES   | ac      | Drainage Area no larger than 5 ac?  | ← yes                     |
| 2,980 | cf      | $V = \text{Volume of storage}^3$ (attach a stage-storage table)               | ≥ WQV                     |
| 24.0  | inches  | $D_{FC} = \text{Filter course thickness}$                                     | 18", or 24" if within GPA |
| Sheet | D8      | Note what sheet in the plan set contains the filter course specification      |                           |
| 3.0   | :1      | Pond side slopes  | > 3:1                     |
| Sheet | L1 & L2 | Note what sheet in the plan set contains the planting plans and surface cover |                           |

**If porous pavement is proposed:**

|       |        |  |                           |
|-------|--------|--|---------------------------|
|       |        | Type of pavement proposed (Concrete? Asphalt? Pavers? Etc.)      |                           |
|       | acres  | $A_{SA} = \text{Surface area of the pervious pavement}$          |                           |
|       | :1     | Ratio of the contributing area to the pervious surface area      | ≤ 5:1                     |
|       | inches | $D_{FC} = \text{Filter course thickness}$                        | 12", or 18" if within GPA |
| Sheet |        | Note what sheet in the plan set contains the filter course spec. | mod. 304.1 (see spec)     |

1. Rate of the limiting layer (either the filter course or the underlying soil).  $K_{sat, design}$  includes factor of safety. See Env-Wq 1504.14 for guidance on determining the infiltration rate.
2. See lines 34, 40 and 48 for required depths of filter media.
3. Volume without depending on infiltration. The volume includes the storage above the filter (but below the invert of the outlet structure, if any), the filter media voids, and the pretreatment area. The storage above the filter media shall not include the volume above the outlet structure, if any.

Designer's Notes: \_\_\_\_\_

12" deep Stone Berm with 12" flat bottom Cross Sectional Area = 3.47 sf

Stone Berm Length = 227.48 ft

Stone Berm Volume = 3.47 sf x 227.48 ft = 789.35 cf

E(WQV) Calculation:

Bottom of Filter Media Elv. = 84.50

Interpolated Storage Below 84.50 = 25 CF

WQV = 2,779 CF

Storage at E(WQV) = 25 CF + 2,779 CF = 2,804 CF

Storage at the top of the filter layer (Elv. 86.50) = 2,144 CF

Storage required above filter layer required for E(WQV) = 2,804 CF - 2,144 CF = 660 CF

E(WQV) = 86.73 (686 CF + 2,144 CF = 2,830 CF)

**Stage-Area-Storage for Pond 255P-B: BIO-POND E SUBSURFACE**

| Elevation (feet) | Surface (sq-ft) | Storage (cubic-feet) | Elevation (feet) | Surface (sq-ft) | Storage (cubic-feet) |
|------------------|-----------------|----------------------|------------------|-----------------|----------------------|
| 83.49            | 3,550           | 0                    | 86.09            | 3,550           | 1,718                |
| 83.54            | 3,550           | 1                    | 86.14            | 3,550           | 1,771                |
| 83.59            | 3,550           | 1                    | 86.19            | 3,550           | 1,825                |
| 83.64            | 3,550           | 2                    | 86.24            | 3,550           | 1,878                |
| 83.69            | 3,550           | 3                    | 86.29            | 3,550           | 1,931                |
| 83.74            | 3,550           | 4                    | 86.34            | 3,550           | 1,984                |
| 83.79            | 3,550           | 4                    | 86.39            | 3,550           | 2,038                |
| 83.84            | 3,550           | 5                    | 86.44            | 3,550           | 2,091                |
| 83.89            | 3,550           | 6                    | 86.49            | 3,550           | 2,144                |
| 83.94            | 3,550           | 6                    |                  |                 |                      |
| 83.99            | 3,550           | 7                    |                  |                 |                      |
| 84.04            | 3,550           | 8                    |                  |                 |                      |
| 84.09            | 3,550           | 9                    |                  |                 |                      |
| 84.14            | 3,550           | 9                    |                  |                 |                      |
| 84.19            | 3,550           | 10                   |                  |                 |                      |
| 84.24            | 3,550           | 11                   |                  |                 |                      |
| 84.29            | 3,550           | 11                   |                  |                 |                      |
| 84.34            | 3,550           | 12                   |                  |                 |                      |
| 84.39            | 3,550           | 13                   |                  |                 |                      |
| 84.44            | 3,550           | 13                   |                  |                 |                      |
| 84.49            | 3,550           | 14                   |                  |                 |                      |
| 84.54            | 3,550           | 67                   |                  |                 |                      |
| 84.59            | 3,550           | 121                  |                  |                 |                      |
| 84.64            | 3,550           | 174                  |                  |                 |                      |
| 84.69            | 3,550           | 227                  |                  |                 |                      |
| 84.74            | 3,550           | 280                  |                  |                 |                      |
| 84.79            | 3,550           | 334                  |                  |                 |                      |
| 84.84            | 3,550           | 387                  |                  |                 |                      |
| 84.89            | 3,550           | 440                  |                  |                 |                      |
| 84.94            | 3,550           | 493                  |                  |                 |                      |
| 84.99            | 3,550           | 547                  |                  |                 |                      |
| 85.04            | 3,550           | 600                  |                  |                 |                      |
| 85.09            | 3,550           | 653                  |                  |                 |                      |
| 85.14            | 3,550           | 706                  |                  |                 |                      |
| 85.19            | 3,550           | 760                  |                  |                 |                      |
| 85.24            | 3,550           | 813                  |                  |                 |                      |
| 85.29            | 3,550           | 866                  |                  |                 |                      |
| 85.34            | 3,550           | 919                  |                  |                 |                      |
| 85.39            | 3,550           | 973                  |                  |                 |                      |
| 85.44            | 3,550           | 1,026                |                  |                 |                      |
| 85.49            | 3,550           | 1,079                |                  |                 |                      |
| 85.54            | 3,550           | 1,132                |                  |                 |                      |
| 85.59            | 3,550           | 1,186                |                  |                 |                      |
| 85.64            | 3,550           | 1,239                |                  |                 |                      |
| 85.69            | 3,550           | 1,292                |                  |                 |                      |
| 85.74            | 3,550           | 1,345                |                  |                 |                      |
| 85.79            | 3,550           | 1,399                |                  |                 |                      |
| 85.84            | 3,550           | 1,452                |                  |                 |                      |
| 85.89            | 3,550           | 1,505                |                  |                 |                      |
| 85.94            | 3,550           | 1,558                |                  |                 |                      |
| 85.99            | 3,550           | 1,612                |                  |                 |                      |
| 86.04            | 3,550           | 1,665                |                  |                 |                      |

Interpolated Volume at Bottom of Filter Course (ELV. 84.50) = 25 CF

**Stage-Area-Storage for Pond 255P-A: BIO-POND E PONDING LAYER**

| Elevation (feet) | Surface (sq-ft) | Storage (cubic-feet) | Elevation (feet) | Surface (sq-ft) | Storage (cubic-feet) |
|------------------|-----------------|----------------------|------------------|-----------------|----------------------|
| 86.50            | 2,445           | 0                    | 87.54            | 3,211           | 3,100                |
| 86.52            | 2,460           | 60                   | 87.56            | 3,226           | 3,159                |
| 86.54            | 2,474           | 119                  | 87.58            | 3,241           | 3,219                |
| 86.56            | 2,489           | 179                  | 87.60            | 3,255           | 3,278                |
| 86.58            | 2,504           | 238                  | 87.62            | 3,270           | 3,338                |
| 86.60            | 2,519           | 298                  | 87.64            | 3,285           | 3,398                |
| 86.62            | 2,533           | 358                  | 87.66            | 3,300           | 3,457                |
| 86.64            | 2,548           | 417                  | 87.68            | 3,314           | 3,517                |
| 86.66            | 2,563           | 477                  | 87.70            | 3,329           | 3,576                |
| 86.68            | 2,578           | 536                  | 87.72            | 3,344           | 3,636                |
| 86.70            | 2,592           | 596                  | 87.74            | 3,358           | 3,696                |
| <b>86.72</b>     | <b>2,607</b>    | <b>656</b>           | 87.76            | 3,373           | 3,755                |
| <b>86.74</b>     | <b>2,622</b>    | <b>715</b>           | 87.78            | 3,388           | 3,815                |
| 86.76            | 2,637           | 775                  | 87.80            | 3,403           | 3,874                |
| 86.78            | 2,651           | 835                  | 87.82            | 3,417           | 3,934                |
| 86.80            | 2,666           | 894                  | 87.84            | 3,432           | 3,994                |
| 86.82            | 2,681           | 954                  | 87.86            | 3,447           | 4,053                |
| 86.84            | 2,695           | 1,013                | 87.88            | 3,462           | 4,113                |
| 86.86            | 2,710           | 1,073                | 87.90            | 3,476           | 4,173                |
| 86.88            | 2,725           | 1,133                | 87.92            | 3,491           | 4,232                |
| 86.90            | 2,740           | 1,192                | 87.94            | 3,506           | 4,292                |
| 86.92            | 2,754           | 1,252                | 87.96            | 3,521           | 4,351                |
| 86.94            | 2,769           | 1,311                | 87.98            | 3,535           | 4,411                |
| 86.96            | 2,784           | 1,371                | 88.00            | <b>3,550</b>    | <b>4,471</b>         |
| 86.98            | 2,799           | 1,431                |                  |                 |                      |
| 87.00            | 2,813           | 1,490                |                  |                 |                      |
| 87.02            | 2,828           | 1,550                |                  |                 |                      |
| 87.04            | 2,843           | 1,609                |                  |                 |                      |
| 87.06            | 2,858           | 1,669                |                  |                 |                      |
| 87.08            | 2,872           | 1,729                |                  |                 |                      |
| 87.10            | 2,887           | 1,788                |                  |                 |                      |
| 87.12            | 2,902           | 1,848                |                  |                 |                      |
| 87.14            | 2,916           | 1,907                |                  |                 |                      |
| 87.16            | 2,931           | 1,967                |                  |                 |                      |
| 87.18            | 2,946           | 2,027                |                  |                 |                      |
| 87.20            | 2,961           | 2,086                |                  |                 |                      |
| 87.22            | 2,975           | 2,146                |                  |                 |                      |
| 87.24            | 2,990           | 2,205                |                  |                 |                      |
| 87.26            | 3,005           | 2,265                |                  |                 |                      |
| 87.28            | 3,020           | 2,325                |                  |                 |                      |
| 87.30            | 3,034           | 2,384                |                  |                 |                      |
| 87.32            | 3,049           | 2,444                |                  |                 |                      |
| 87.34            | 3,064           | 2,504                |                  |                 |                      |
| 87.36            | 3,079           | 2,563                |                  |                 |                      |
| 87.38            | 3,093           | 2,623                |                  |                 |                      |
| 87.40            | 3,108           | 2,682                |                  |                 |                      |
| 87.42            | 3,123           | 2,742                |                  |                 |                      |
| 87.44            | 3,137           | 2,802                |                  |                 |                      |
| 87.46            | 3,152           | 2,861                |                  |                 |                      |
| 87.48            | 3,167           | 2,921                |                  |                 |                      |
| 87.50            | 3,182           | 2,980                |                  |                 |                      |
| 87.52            | 3,196           | 3,040                |                  |                 |                      |

Interpolated Volume E(WQV) (ELV. 86.73) =  
 686 CF + 2144 CF = 2,830 CF

**Stage-Discharge for Pond 255P-A: BIO-POND E PONDING LAYER**

| Elevation<br>(feet) | Discharge<br>(cfs) | Primary<br>(cfs) | Secondary<br>(cfs) | Elevation<br>(feet) | Discharge<br>(cfs) | Primary<br>(cfs) | Secondary<br>(cfs) |
|---------------------|--------------------|------------------|--------------------|---------------------|--------------------|------------------|--------------------|
| 86.50               | 0.00               | 0.00             | 0.00               | 87.54               | 0.95               | 0.74             | 0.21               |
| 86.52               | 0.57               | 0.57             | 0.00               | 87.56               | 1.12               | 0.75             | 0.38               |
| 86.54               | 0.57               | 0.57             | 0.00               | 87.58               | 1.33               | 0.75             | 0.58               |
| 86.56               | 0.58               | 0.58             | 0.00               | 87.60               | 1.57               | 0.75             | 0.81               |
| 86.58               | 0.58               | 0.58             | 0.00               | 87.62               | 1.82               | 0.76             | 1.07               |
| 86.60               | 0.58               | 0.58             | 0.00               | 87.64               | 2.11               | 0.76             | 1.35               |
| 86.62               | 0.59               | 0.59             | 0.00               | 87.66               | 2.41               | 0.76             | 1.64               |
| 86.64               | 0.59               | 0.59             | 0.00               | 87.68               | 2.73               | 0.77             | 1.96               |
| 86.66               | 0.59               | 0.59             | 0.00               | 87.70               | 3.07               | 0.77             | 2.30               |
| 86.68               | 0.60               | 0.60             | 0.00               | 87.72               | 3.42               | 0.77             | 2.65               |
| 86.70               | 0.60               | 0.60             | 0.00               | 87.74               | 3.80               | 0.78             | 3.02               |
| <b>86.72</b>        | <b>0.60</b>        | <b>0.60</b>      | <b>0.00</b>        | 87.76               | 4.19               | 0.78             | 3.40               |
| <b>86.74</b>        | <b>0.61</b>        | <b>0.61</b>      | <b>0.00</b>        | 87.78               | 4.59               | 0.78             | 3.81               |
| 86.76               | 0.61               | 0.61             | 0.00               | 87.80               | 5.01               | 0.79             | 4.22               |
| 86.78               | 0.61               | 0.61             | 0.00               | 87.82               | 5.44               | 0.79             | 4.65               |
| 86.80               | 0.62               | 0.62             | 0.00               | 87.84               | 5.89               | 0.79             | 5.09               |
| 86.82               | 0.62               | 0.62             | 0.00               | 87.86               | 6.35               | 0.80             | 5.55               |
| 86.84               | 0.62               | 0.62             | 0.00               | 87.88               | 6.82               | 0.80             | 6.02               |
| 86.86               | 0.63               | 0.63             | 0.00               | 87.90               | 7.30               | 0.80             | 6.50               |
| 86.88               | 0.63               | 0.63             | 0.00               | 87.92               | 7.80               | 0.81             | 6.99               |
| 86.90               | 0.63               | 0.63             | 0.00               | 87.94               | 8.31               | 0.81             | 7.50               |
| 86.92               | 0.64               | 0.64             | 0.00               | 87.96               | 8.83               | 0.81             | 8.01               |
| 86.94               | 0.64               | 0.64             | 0.00               | 87.98               | 9.36               | 0.82             | 8.54               |
| 86.96               | 0.64               | 0.64             | 0.00               | 88.00               | <b>9.90</b>        | <b>0.82</b>      | <b>9.08</b>        |
| 86.98               | 0.65               | 0.65             | 0.00               |                     |                    |                  |                    |
| 87.00               | 0.65               | 0.65             | 0.00               |                     |                    |                  |                    |
| 87.02               | 0.65               | 0.65             | 0.00               |                     |                    |                  |                    |
| 87.04               | 0.66               | 0.66             | 0.00               |                     |                    |                  |                    |
| 87.06               | 0.66               | 0.66             | 0.00               |                     |                    |                  |                    |
| 87.08               | 0.66               | 0.66             | 0.00               |                     |                    |                  |                    |
| 87.10               | 0.67               | 0.67             | 0.00               |                     |                    |                  |                    |
| 87.12               | 0.67               | 0.67             | 0.00               |                     |                    |                  |                    |
| 87.14               | 0.68               | 0.68             | 0.00               |                     |                    |                  |                    |
| 87.16               | 0.68               | 0.68             | 0.00               |                     |                    |                  |                    |
| 87.18               | 0.68               | 0.68             | 0.00               |                     |                    |                  |                    |
| 87.20               | 0.69               | 0.69             | 0.00               |                     |                    |                  |                    |
| 87.22               | 0.69               | 0.69             | 0.00               |                     |                    |                  |                    |
| 87.24               | 0.69               | 0.69             | 0.00               |                     |                    |                  |                    |
| 87.26               | 0.70               | 0.70             | 0.00               |                     |                    |                  |                    |
| 87.28               | 0.70               | 0.70             | 0.00               |                     |                    |                  |                    |
| 87.30               | 0.70               | 0.70             | 0.00               |                     |                    |                  |                    |
| 87.32               | 0.71               | 0.71             | 0.00               |                     |                    |                  |                    |
| 87.34               | 0.71               | 0.71             | 0.00               |                     |                    |                  |                    |
| 87.36               | 0.71               | 0.71             | 0.00               |                     |                    |                  |                    |
| 87.38               | 0.72               | 0.72             | 0.00               |                     |                    |                  |                    |
| 87.40               | 0.72               | 0.72             | 0.00               |                     |                    |                  |                    |
| 87.42               | 0.72               | 0.72             | 0.00               |                     |                    |                  |                    |
| 87.44               | 0.73               | 0.73             | 0.00               |                     |                    |                  |                    |
| 87.46               | 0.73               | 0.73             | 0.00               |                     |                    |                  |                    |
| 87.48               | 0.73               | 0.73             | 0.00               |                     |                    |                  |                    |
| 87.50               | 0.74               | 0.74             | 0.00               |                     |                    |                  |                    |
| 87.52               | 0.81               | 0.74             | 0.07               |                     |                    |                  |                    |

## PHASE II

# FILTRATION PRACTICE DESIGN CRITERIA (Env-Wq 1508.08)

Type/Node Name: \_\_\_\_\_

**Bio-Pond F (Nodes 250P A&B)**

Enter the type of filtration practice (e.g., bioretention system) and the node name in the drainage analysis, if applicable.

|   |               |   |                           |
|---|---------------|---|---------------------------|
| <u>Yes</u>  |               | Check if you reviewed the restrictions on unlined systems outlined in Env-Wq 1508.08(a).  |                           |
| <u>0.92</u>   | ac            | A = Area draining to the practice   |                           |
| <u>0.74</u>   | ac            | A <sub>i</sub> = Impervious area draining to the practice   |                           |
| <u>0.80</u>   | decimal       | I = Percent impervious area draining to the practice, in decimal form   |                           |
| <u>0.77</u>   | unitless      | R <sub>v</sub> = Runoff coefficient = 0.05 + (0.9 x I)  |                           |
| <u>0.71</u>   | ac-in         | WQV = 1" x R <sub>v</sub> x A   |                           |
| <u>2,576</u>  | cf            | WQV conversion (ac-in x 43,560 sf/ac x 1ft/12")   |                           |
| <u>644</u>  | cf            | 25% x WQV (check calc for sediment forebay volume)  |                           |
| <u>1,932</u>  | cf            | 75% x WQV (check calc for surface sand filter volume)   |                           |
| <u>Stone Berm</u>   |               | Method of Pretreatment? (not required for clean or roof runoff)   |                           |
| <u>664</u>  | cf            | V <sub>SED</sub> = Sediment forebay volume, if used for pretreatment  | ≥ 25%WQV                  |
| <b>Calculate time to drain if system IS NOT underdrained:</b>           |               |   |                           |
| <u>4,000</u>  | sf            | A <sub>SA</sub> = Surface area of the practice  |                           |
| <u>1.00</u>   | iph           | K <sub>sat</sub> <sub>DESIGN</sub> = Design infiltration rate <sup>1</sup>  |                           |
| <u>Yes</u>  | <u>Yes/No</u> | If K <sub>sat</sub> (prior to factor of safety) is < 0.50 iph, has an underdrain been provided?<br>(Use the calculations below) |                           |
| <u>7.7</u>  | hours         | T <sub>DRAIN</sub> = Drain time = V / (A <sub>SA</sub> * I <sub>DESIGN</sub> )  | ≤ 72-hrs                  |
| <b>Calculate time to drain if system IS underdrained:</b>               |               |   |                           |
| <u>83.33</u>  | ft            | E <sub>WQV</sub> = Elevation of WQV (attach stage-storage table)  |                           |
| <u>0.58</u>   | cfs           | Q <sub>WQV</sub> = Discharge at the E <sub>WQV</sub> (attach stage-discharge table)   |                           |
| <u>2.47</u>   | hours         | T <sub>DRAIN</sub> = Drain time = 2WQV/Q <sub>WQV</sub>   | ≤ 72-hrs                  |
| <u>81.25</u>  | feet          | E <sub>FC</sub> = Elevation of the bottom of the filter course material <sup>2</sup>  |                           |
| <u>80.25</u>  | feet          | E <sub>UD</sub> = Invert elevation of the underdrain (UD), if applicable  |                           |
| <u>82.17</u>  | feet          | E <sub>SHWT</sub> = Elevation of SHWT (if none found, enter the lowest elevation of the test pit)                               |                           |
| <u>78.42</u>  | feet          | E <sub>ROCK</sub> = Elevation of bedrock (if none found, enter the lowest elevation of the test pit)                            |                           |
| <u>1.00</u>   | feet          | D <sub>FC to UD</sub> = Depth to UD from the bottom of the filter course  | ≥ 1'                      |
| <u>2.83</u>   | feet          | D <sub>FC to ROCK</sub> = Depth to bedrock from the bottom of the filter course   | ≥ 1'                      |
| <u>(0.92)</u>   | feet          | D <sub>FC to SHWT</sub> = Depth to SHWT from the bottom of the filter course  | ≥ 1'                      |
| <u>84.82</u>  | ft            | Peak elevation of the 50-year storm event (infiltration can be used in analysis)  |                           |
| <u>85.25</u>  | ft            | Elevation of the top of the practice  |                           |
| <u>YES</u>  |               | 50 peak elevation ≤ Elevation of the top of the practice  | ← yes                     |
| <b>If a surface sand filter or underground sand filter is proposed:</b> |               |   |                           |
| <u>YES</u>  | ac            | Drainage Area check.  | < 10 ac                   |
|   | cf            | V = Volume of storage <sup>3</sup> (attach a stage-storage table)   | ≥ 75%WQV                  |
|   | inches        | D <sub>FC</sub> = Filter course thickness   | 18", or 24" if within GPA |
| <u>Sheet</u>  |               | Note what sheet in the plan set contains the filter course specification.   |                           |
|   | Yes/No        | Access grate provided?  | ← yes                     |

|  |         |   |                           |
|--|---------|---|---------------------------|
| <b>If a bioretention area is proposed:</b> |         |   |                           |
| YES  | ac      | Drainage Area no larger than 5 ac?  | ← yes                     |
| 4,547                                      | cf      | V = Volume of storage <sup>3</sup> (attach a stage-storage table)             | ≥ WQV                     |
| 24.0                                       | inches  | D <sub>FC</sub> = Filter course thickness                                     | 18", or 24" if within GPA |
| Sheet                                      | D9      | Note what sheet in the plan set contains the filter course specification      |                           |
| 3.0  | :1      | Pond side slopes  | > 3:1                     |
| Sheet                                      | L1 & L2 | Note what sheet in the plan set contains the planting plans and surface cover |                           |
| <b>If porous pavement is proposed:</b>     |         |   |                           |
|  |         | Type of pavement proposed (Concrete? Asphalt? Pavers? Etc.)                   |                           |
|  | acres   | A <sub>SA</sub> = Surface area of the pervious pavement                       |                           |
|  | :1      | Ratio of the contributing area to the pervious surface area                   | ≤ 5:1                     |
|  | inches  | D <sub>FC</sub> = Filter course thickness                                     | 12", or 18" if within GPA |
| Sheet                                      |         | Note what sheet in the plan set contains the filter course spec.              | mod. 304.1 (see spec)     |

1. Rate of the limiting layer (either the filter course or the underlying soil).  $K_{sat, design}$  includes factor of safety. See Env-Wq 1504.14 for guidance on determining the infiltration rate.
2. See lines 34, 40 and 48 for required depths of filter media.
3. Volume without depending on infiltration. The volume includes the storage above the filter (but below the invert of the outlet structure, if any), the filter media voids, and the pretreatment area. The storage above the filter media shall not include the volume above the outlet structure, if any.

Designer's Notes: \_\_\_\_\_

13" deep Stone Berm Cross Sectional Area = 2.93 sf

Stone Berm Length = 226.76 ft

Stone Berm Volume = 2.93 sf x 226.76 ft = 664.41 cf

E(WQV) Calculation:

Bottom of Filter Media Elv. = 81.25

Interpolated Storage Below 81.25 = 2,412 CF

WQV = 2,576 CF

Storage at E(WQV) = 2,412CF + 2,576 CF = 4,988 CF

E(WQV) = 86.73 (686 CF + 2,144 CF = 2,830 CF)

Storage at the top of the filter layer (Elv. 83.25) = 4,800 CF

Storage required above filter layer required for E(WQV) = 4,988 CF - 4,800 CF = 188 CF

E(WQV) = 83.33 (198 CF + 4,800 CF = 4,998 CF)

**Stage-Area-Storage for Pond 250P-B: BIO-POND F SUBSURFACE**

| Elevation (feet) | Surface (sq-ft) | Storage (cubic-feet) | Elevation (feet) | Surface (sq-ft) | Storage (cubic-feet) |
|------------------|-----------------|----------------------|------------------|-----------------|----------------------|
| 79.74            | 4,000           | 0                    | 82.34            | 4,000           | 3,720                |
| 79.79            | 4,000           | 80                   | 82.39            | 4,000           | 3,780                |
| 79.84            | 4,000           | 160                  | 82.44            | 4,000           | 3,840                |
| 79.89            | 4,000           | 240                  | 82.49            | 4,000           | 3,900                |
| 79.94            | 4,000           | 320                  | 82.54            | 4,000           | 3,960                |
| 79.99            | 4,000           | 400                  | 82.59            | 4,000           | 4,020                |
| 80.04            | 4,000           | 480                  | 82.64            | 4,000           | 4,080                |
| 80.09            | 4,000           | 560                  | 82.69            | 4,000           | 4,140                |
| 80.14            | 4,000           | 640                  | 82.74            | 4,000           | 4,200                |
| 80.19            | 4,000           | 720                  | 82.79            | 4,000           | 4,260                |
| 80.24            | 4,000           | 800                  | 82.84            | 4,000           | 4,320                |
| 80.29            | 4,000           | 880                  | 82.89            | 4,000           | 4,380                |
| 80.34            | 4,000           | 960                  | 82.94            | 4,000           | 4,440                |
| 80.39            | 4,000           | 1,040                | 82.99            | 4,000           | 4,500                |
| 80.44            | 4,000           | 1,120                | 83.04            | 4,000           | 4,560                |
| 80.49            | 4,000           | 1,200                | 83.09            | 4,000           | 4,620                |
| 80.54            | 4,000           | 1,280                | 83.14            | 4,000           | 4,680                |
| 80.59            | 4,000           | 1,360                | 83.19            | 4,000           | 4,740                |
| 80.64            | 4,000           | 1,440                | <b>83.24</b>     | <b>4,000</b>    | <b>4,800</b>         |
| 80.69            | 4,000           | 1,520                |                  |                 |                      |
| 80.74            | 4,000           | 1,600                |                  |                 |                      |
| 80.79            | 4,000           | 1,680                |                  |                 |                      |
| 80.84            | 4,000           | 1,760                |                  |                 |                      |
| 80.89            | 4,000           | 1,840                |                  |                 |                      |
| 80.94            | 4,000           | 1,920                |                  |                 |                      |
| 80.99            | 4,000           | 2,000                |                  |                 |                      |
| 81.04            | 4,000           | 2,080                |                  |                 |                      |
| 81.09            | 4,000           | 2,160                |                  |                 |                      |
| 81.14            | 4,000           | 2,240                |                  |                 |                      |
| 81.19            | 4,000           | 2,320                |                  |                 |                      |
| <b>81.24</b>     | <b>4,000</b>    | <b>2,400</b>         |                  |                 |                      |
| <b>81.29</b>     | <b>4,000</b>    | <b>2,460</b>         |                  |                 |                      |
| 81.34            | 4,000           | 2,520                |                  |                 |                      |
| 81.39            | 4,000           | 2,580                |                  |                 |                      |
| 81.44            | 4,000           | 2,640                |                  |                 |                      |
| 81.49            | 4,000           | 2,700                |                  |                 |                      |
| 81.54            | 4,000           | 2,760                |                  |                 |                      |
| 81.59            | 4,000           | 2,820                |                  |                 |                      |
| 81.64            | 4,000           | 2,880                |                  |                 |                      |
| 81.69            | 4,000           | 2,940                |                  |                 |                      |
| 81.74            | 4,000           | 3,000                |                  |                 |                      |
| 81.79            | 4,000           | 3,060                |                  |                 |                      |
| 81.84            | 4,000           | 3,120                |                  |                 |                      |
| 81.89            | 4,000           | 3,180                |                  |                 |                      |
| 81.94            | 4,000           | 3,240                |                  |                 |                      |
| 81.99            | 4,000           | 3,300                |                  |                 |                      |
| 82.04            | 4,000           | 3,360                |                  |                 |                      |
| 82.09            | 4,000           | 3,420                |                  |                 |                      |
| 82.14            | 4,000           | 3,480                |                  |                 |                      |
| 82.19            | 4,000           | 3,540                |                  |                 |                      |
| 82.24            | 4,000           | 3,600                |                  |                 |                      |
| 82.29            | 4,000           | 3,660                |                  |                 |                      |

Interpolated Volume at Bottom of Filter Course (ELV. 81.25) = 2,412 CF

**Stage-Area-Storage for Pond 250P-A: BIO-POND F PONDING LAYER**

| Elevation (feet) | Surface (sq-ft) | Storage (cubic-feet) | Elevation (feet)  | Surface (sq-ft) | Storage (cubic-feet) |
|------------------|-----------------|----------------------|---|-----------------|----------------------|
| 83.25            | 2,450           | 0                    | 84.29   | 3,256           | 2,967                |
| 83.27            | 2,465           | 49                   | 84.31   | 3,272           | 3,032                |
| 83.29            | 2,481           | 99                   | 84.33   | 3,287           | 3,098                |
| 83.31            | 2,497           | 148                  |   |                 |                      |
| <b>83.33</b>     | <b>2,512</b>    | <b>198</b>           | Volume E(WQV) (ELV. 83.33) = 198 CF +<br>4800 CF = 4,998 CF |                 |                      |
| 83.35            | 2,527           | 249                  | 84.41   | 3,349           | 3,363                |
| 83.37            | 2,543           | 300                  | 84.43   | 3,365           | 3,431                |
| 83.39            | 2,559           | 351                  | 84.45   | 3,380           | 3,498                |
| 83.41            | 2,574           | 402                  | 84.47   | 3,395           | 3,566                |
| 83.43            | 2,590           | 454                  | 84.49   | 3,411           | 3,634                |
| 83.45            | 2,605           | 506                  | 84.51   | 3,427           | 3,702                |
| 83.47            | 2,620           | 558                  | 84.53   | 3,442           | 3,771                |
| 83.49            | 2,636           | 610                  | 84.55   | 3,457           | 3,840                |
| 83.51            | 2,652           | 663                  | 84.57   | 3,473           | 3,909                |
| 83.53            | 2,667           | 716                  | 84.59   | 3,489           | 3,979                |
| 83.55            | 2,682           | 770                  | 84.61   | 3,504           | 4,049                |
| 83.57            | 2,698           | 824                  | 84.63   | 3,519           | 4,119                |
| 83.59            | 2,714           | 878                  | 84.65   | 3,535           | 4,190                |
| 83.61            | 2,729           | 932                  | 84.67   | 3,551           | 4,260                |
| 83.63            | 2,744           | 987                  | 84.69   | 3,566           | 4,332                |
| 83.65            | 2,760           | 1,042                | 84.71   | 3,581           | 4,403                |
| 83.67            | 2,776           | 1,097                | 84.73   | 3,597           | 4,475                |
| 83.69            | 2,791           | 1,153                | 84.75   | 3,613           | 4,547                |
| 83.71            | 2,806           | 1,209                | 84.77   | 3,628           | 4,619                |
| 83.73            | 2,822           | 1,265                | 84.79   | 3,644           | 4,692                |
| 83.75            | 2,838           | 1,322                | 84.81   | 3,659           | 4,765                |
| 83.77            | 2,853           | 1,379                | 84.83   | 3,674           | 4,838                |
| 83.79            | 2,869           | 1,436                | 84.85   | 3,690           | 4,912                |
| 83.81            | 2,884           | 1,494                | 84.87   | 3,706           | 4,986                |
| 83.83            | 2,899           | 1,551                | 84.89   | 3,721           | 5,060                |
| 83.85            | 2,915           | 1,609                | 84.91   | 3,736           | 5,135                |
| 83.87            | 2,931           | 1,668                | 84.93   | 3,752           | 5,210                |
| 83.89            | 2,946           | 1,727                | 84.95   | 3,768           | 5,285                |
| 83.91            | 2,961           | 1,786                | 84.97   | 3,783           | 5,360                |
| 83.93            | 2,977           | 1,845                | 84.99   | 3,798           | 5,436                |
| 83.95            | 2,993           | 1,905                | 85.01   | 3,814           | 5,512                |
| 83.97            | 3,008           | 1,965                | 85.03   | 3,830           | 5,589                |
| 83.99            | 3,023           | 2,025                | 85.05   | 3,845           | 5,665                |
| 84.01            | 3,039           | 2,086                | 85.07   | 3,860           | 5,743                |
| 84.03            | 3,055           | 2,147                | 85.09   | 3,876           | 5,820                |
| 84.05            | 3,070           | 2,208                | 85.11   | 3,891           | 5,898                |
| 84.07            | 3,085           | 2,270                | 85.13   | 3,907           | 5,976                |
| 84.09            | 3,101           | 2,331                | 85.15   | 3,923           | 6,054                |
| 84.11            | 3,116           | 2,394                | 85.17   | 3,938           | 6,132                |
| 84.13            | 3,132           | 2,456                | 85.19   | 3,953           | 6,211                |
| 84.15            | 3,148           | 2,519                | 85.21   | 3,969           | 6,291                |
| 84.17            | 3,163           | 2,582                | 85.23   | 3,985           | 6,370                |
| 84.19            | 3,178           | 2,645                | 85.25   | <b>4,000</b>    | <b>6,450</b>         |
| 84.21            | 3,194           | 2,709                |   |                 |                      |
| 84.23            | 3,210           | 2,773                |   |                 |                      |
| 84.25            | 3,225           | 2,838                |   |                 |                      |
| 84.27            | 3,240           | 2,902                |   |                 |                      |

**Stage-Discharge for Pond 250P-A: BIO-POND F PONDING LAYER**

| Elevation (feet) | Discharge (cfs) | Primary (cfs) | Secondary (cfs) | Elevation (feet) | Discharge (cfs) | Primary (cfs) | Secondary (cfs) |
|------------------|-----------------|---------------|-----------------|------------------|-----------------|---------------|-----------------|
| 83.25            | 0.00            | 0.00          | 0.00            | 84.29            | 0.75            | 0.75          | 0.00            |
| 83.27            | 0.57            | 0.57          | 0.00            | 84.31            | 0.76            | 0.76          | 0.00            |
| 83.29            | 0.57            | 0.57          | 0.00            | 84.33            | 0.76            | 0.76          | 0.00            |
| 83.31            | 0.58            | 0.58          | 0.00            | 84.35            | 0.76            | 0.76          | 0.00            |
| <b>83.33</b>     | <b>0.58</b>     | <b>0.58</b>   | <b>0.00</b>     | 84.37            | 0.77            | 0.77          | 0.00            |
| 83.35            | 0.59            | 0.59          | 0.00            | 84.39            | 0.77            | 0.77          | 0.00            |
| 83.37            | 0.59            | 0.59          | 0.00            | 84.41            | 0.78            | 0.78          | 0.00            |
| 83.39            | 0.59            | 0.59          | 0.00            | 84.43            | 0.78            | 0.78          | 0.00            |
| 83.41            | 0.60            | 0.60          | 0.00            | 84.45            | 0.78            | 0.78          | 0.00            |
| 83.43            | 0.60            | 0.60          | 0.00            | 84.47            | 0.79            | 0.79          | 0.00            |
| 83.45            | 0.60            | 0.60          | 0.00            | 84.49            | 0.79            | 0.79          | 0.00            |
| 83.47            | 0.61            | 0.61          | 0.00            | 84.51            | 0.79            | 0.79          | 0.00            |
| 83.49            | 0.61            | 0.61          | 0.00            | 84.53            | 0.80            | 0.80          | 0.00            |
| 83.51            | 0.61            | 0.61          | 0.00            | 84.55            | 0.80            | 0.80          | 0.00            |
| 83.53            | 0.62            | 0.62          | 0.00            | 84.57            | 0.80            | 0.80          | 0.00            |
| 83.55            | 0.62            | 0.62          | 0.00            | 84.59            | 0.81            | 0.81          | 0.00            |
| 83.57            | 0.62            | 0.62          | 0.00            | 84.61            | 0.81            | 0.81          | 0.00            |
| 83.59            | 0.63            | 0.63          | 0.00            | 84.63            | 0.81            | 0.81          | 0.00            |
| 83.61            | 0.63            | 0.63          | 0.00            | 84.65            | 0.82            | 0.82          | 0.00            |
| 83.63            | 0.64            | 0.64          | 0.00            | 84.67            | 0.82            | 0.82          | 0.00            |
| 83.65            | 0.64            | 0.64          | 0.00            | 84.69            | 0.83            | 0.83          | 0.00            |
| 83.67            | 0.64            | 0.64          | 0.00            | 84.71            | 0.83            | 0.83          | 0.00            |
| 83.69            | 0.65            | 0.65          | 0.00            | 84.73            | 0.83            | 0.83          | 0.00            |
| 83.71            | 0.65            | 0.65          | 0.00            | 84.75            | 0.84            | 0.84          | 0.00            |
| 83.73            | 0.65            | 0.65          | 0.00            | 84.77            | 0.91            | 0.84          | 0.07            |
| 83.75            | 0.66            | 0.66          | 0.00            | 84.79            | 1.05            | 0.84          | 0.21            |
| 83.77            | 0.66            | 0.66          | 0.00            | 84.81            | 1.22            | 0.85          | 0.38            |
| 83.79            | 0.66            | 0.66          | 0.00            | 84.83            | 1.43            | 0.85          | 0.58            |
| 83.81            | 0.67            | 0.67          | 0.00            | 84.85            | 1.67            | 0.85          | 0.81            |
| 83.83            | 0.67            | 0.67          | 0.00            | 84.87            | 1.93            | 0.86          | 1.07            |
| 83.85            | 0.67            | 0.67          | 0.00            | 84.89            | 2.21            | 0.86          | 1.35            |
| 83.87            | 0.68            | 0.68          | 0.00            | 84.91            | 2.51            | 0.86          | 1.64            |
| 83.89            | 0.68            | 0.68          | 0.00            | 84.93            | 2.83            | 0.87          | 1.96            |
| 83.91            | 0.69            | 0.69          | 0.00            | 84.95            | 3.17            | 0.87          | 2.30            |
| 83.93            | 0.69            | 0.69          | 0.00            | 84.97            | 3.53            | 0.88          | 2.65            |
| 83.95            | 0.69            | 0.69          | 0.00            | 84.99            | 3.90            | 0.88          | 3.02            |
| 83.97            | 0.70            | 0.70          | 0.00            | 85.01            | 4.29            | 0.88          | 3.40            |
| 83.99            | 0.70            | 0.70          | 0.00            | 85.03            | 4.69            | 0.89          | 3.81            |
| 84.01            | 0.70            | 0.70          | 0.00            | 85.05            | 5.11            | 0.89          | 4.22            |
| 84.03            | 0.71            | 0.71          | 0.00            | 85.07            | 5.54            | 0.89          | 4.65            |
| 84.05            | 0.71            | 0.71          | 0.00            | 85.09            | 5.99            | 0.90          | 5.09            |
| 84.07            | 0.71            | 0.71          | 0.00            | 85.11            | 6.45            | 0.90          | 5.55            |
| 84.09            | 0.72            | 0.72          | 0.00            | 85.13            | 6.92            | 0.90          | 6.02            |
| 84.11            | 0.72            | 0.72          | 0.00            | 85.15            | 7.41            | 0.91          | 6.50            |
| 84.13            | 0.72            | 0.72          | 0.00            | 85.17            | 7.90            | 0.91          | 6.99            |
| 84.15            | 0.73            | 0.73          | 0.00            | 85.19            | 8.41            | 0.92          | 7.50            |
| 84.17            | 0.73            | 0.73          | 0.00            | 85.21            | 8.93            | 0.92          | 8.01            |
| 84.19            | 0.74            | 0.74          | 0.00            | 85.23            | 9.46            | 0.92          | 8.54            |
| 84.21            | 0.74            | 0.74          | 0.00            | 85.25            | <b>10.01</b>    | <b>0.93</b>   | <b>9.08</b>     |
| 84.23            | 0.74            | 0.74          | 0.00            |                  |                 |               |                 |
| 84.25            | 0.75            | 0.75          | 0.00            |                  |                 |               |                 |
| 84.27            | 0.75            | 0.75          | 0.00            |                  |                 |               |                 |



**If a bioretention area is proposed:**

|       |        |   |                           |
|-------|--------|---|---------------------------|
| YES   | ac     | Drainage Area no larger than 5 ac?  | ← yes                     |
|       | cf     | $V = \text{Volume of storage}^3$ (attach a stage-storage table)               | ≥ WQV                     |
|       | inches | $D_{FC} = \text{Filter course thickness}$                                     | 18", or 24" if within GPA |
| Sheet |        | Note what sheet in the plan set contains the filter course specification      |                           |
|       | :1     | Pond side slopes  | > 3:1                     |
| Sheet |        | Note what sheet in the plan set contains the planting plans and surface cover |                           |

**If porous pavement is proposed:**

|         |        |  |                           |
|---------|--------|--|---------------------------|
| Asphalt |        | Type of pavement proposed (Concrete? Asphalt? Pavers? Etc.)      |                           |
| 0.3     | acres  | $A_{SA} = \text{Surface area of the pervious pavement}$          |                           |
| 1.8     | :1     | Ratio of the contributing area to the pervious surface area      | ≤ 5:1                     |
| 24.0    | inches | $D_{FC} = \text{Filter course thickness}$                        | 12", or 18" if within GPA |
| Sheet   | D1A&D9 | Note what sheet in the plan set contains the filter course spec. | mod. 304.1 (see spec)     |

1. Rate of the limiting layer (either the filter course or the underlying soil).  $K_{sat_{design}}$  includes factor of safety. See Env-Wq 1504.14 for guidance on determining the infiltration rate.
2. See lines 34, 40 and 48 for required depths of filter media.
3. Volume without depending on infiltration. The volume includes the storage above the filter (but below the invert of the outlet structure, if any), the filter media voids, and the pretreatment area. The storage above the filter media shall not include the volume above the outlet structure, if any.

Designer's Notes: \_\_\_\_\_

\_\_\_\_\_  
 Pretreatment was not included for the porous pavement as runoff is minimal and enters via sheet flow from adjacent pavement, allowing direct infiltration and surface filtering.  
 \_\_\_\_\_

E(WQV) Calculation:

Bottom of Filter Media Elv. = 86.25  
 Interpolated Storage Below 86.25 = 6,325 CF  
 WQV = 1,773 CF  
 Storage at E(WQV) = 6,325 CF + 1,773 CF = 8,098 CF  
 E(WQV) = 86.69 (8,110 CF)

**Stage-Area-Storage for Pond 253P-C: POROUS PAVEMENT A**

| Elevation (feet) | Surface (sq-ft) | Storage (cubic-feet) | Elevation (feet) | Surface (sq-ft) | Storage (cubic-feet) |
|------------------|-----------------|----------------------|------------------|-----------------|----------------------|
| 85.07            | 13,450          | 0                    | 87.67            | 13,450          | 12,065               |
| 85.12            | 13,450          | 269                  | 87.72            | 13,450          | 12,266               |
| 85.17            | 13,450          | 538                  | 87.77            | 13,450          | 12,468               |
| 85.22            | 13,450          | 807                  | 87.82            | 13,450          | 12,670               |
| 85.27            | 13,450          | 1,076                | 87.87            | 13,450          | 12,872               |
| 85.32            | 13,450          | 1,345                | 87.92            | 13,450          | 13,073               |
| 85.37            | 13,450          | 1,614                | 87.97            | 13,450          | 13,275               |
| 85.42            | 13,450          | 1,883                | 88.02            | 13,450          | 13,477               |
| 85.47            | 13,450          | 2,152                | 88.07            | 13,450          | 13,679               |
| 85.52            | 13,450          | 2,421                | 88.12            | 13,450          | 13,880               |
| 85.57            | 13,450          | 2,690                | 88.17            | 13,450          | 14,082               |
| 85.62            | 13,450          | 2,959                | 88.22            | 13,450          | 14,284               |
| 85.67            | 13,450          | 3,228                | 88.27            | 13,450          | 14,486               |
| 85.72            | 13,450          | 3,497                | 88.32            | 13,450          | 14,687               |
| 85.77            | 13,450          | 3,766                | 88.37            | 13,450          | 14,889               |
| 85.82            | 13,450          | 4,035                | 88.42            | 13,450          | 15,091               |
| 85.87            | 13,450          | 4,304                | 88.47            | 13,450          | 15,293               |
| 85.92            | 13,450          | 4,573                | 88.52            | 13,450          | 15,494               |
| 85.97            | 13,450          | 4,842                | 88.57            | 13,450          | 15,696               |
| 86.02            | 13,450          | 5,111                | 88.62            | 13,450          | 15,898               |
| 86.07            | 13,450          | 5,380                | 88.67            | 13,450          | 16,100               |
| 86.12            | 13,450          | 5,649                | 88.72            | 13,450          | 16,301               |
| 86.17            | 13,450          | 5,918                | 88.77            | 13,450          | 16,503               |
| 86.22            | 13,450          | 6,187                | 88.82            | 13,450          | 16,705               |
| 86.27            | 13,450          | 6,416                | 88.87            | 13,450          | 16,907               |
| 86.32            | 13,450          | 6,617                | 88.92            | 13,450          | 17,108               |
| 86.37            | 13,450          | 6,819                | 88.97            | 13,450          | 17,310               |
| 86.42            | 13,450          | 7,021                |                  |                 |                      |
| 86.47            | 13,450          | 7,223                |                  |                 |                      |
| 86.52            | 13,450          | 7,424                |                  |                 |                      |
| 86.57            | 13,450          | 7,626                |                  |                 |                      |
| 86.62            | 13,450          | 7,828                |                  |                 |                      |
| 86.67            | 13,450          | 8,030                |                  |                 |                      |
| 86.72            | 13,450          | 8,231                |                  |                 |                      |
| 86.77            | 13,450          | 8,433                |                  |                 |                      |
| 86.82            | 13,450          | 8,635                |                  |                 |                      |
| 86.87            | 13,450          | 8,837                |                  |                 |                      |
| 86.92            | 13,450          | 9,038                |                  |                 |                      |
| 86.97            | 13,450          | 9,240                |                  |                 |                      |
| 87.02            | 13,450          | 9,442                |                  |                 |                      |
| 87.07            | 13,450          | 9,644                |                  |                 |                      |
| 87.12            | 13,450          | 9,845                |                  |                 |                      |
| 87.17            | 13,450          | 10,047               |                  |                 |                      |
| 87.22            | 13,450          | 10,249               |                  |                 |                      |
| 87.27            | 13,450          | 10,451               |                  |                 |                      |
| 87.32            | 13,450          | 10,652               |                  |                 |                      |
| 87.37            | 13,450          | 10,854               |                  |                 |                      |
| 87.42            | 13,450          | 11,056               |                  |                 |                      |
| 87.47            | 13,450          | 11,258               |                  |                 |                      |
| 87.52            | 13,450          | 11,459               |                  |                 |                      |
| 87.57            | 13,450          | 11,661               |                  |                 |                      |
| 87.62            | 13,450          | 11,863               |                  |                 |                      |

Interpolated Volume at Bottom of Filter Course (ELV. 86.25) = 6,325 CF

Interpolated Volume E(WQV) (ELV. 86.69) = 8,110 CF

**Stage-Discharge for Pond 253P-C: POROUS PAVEMENT A**

| Elevation<br>(feet) | Primary<br>(cfs) | Elevation<br>(feet) | Primary<br>(cfs) | Elevation<br>(feet) | Primary<br>(cfs) | Elevation<br>(feet) | Primary<br>(cfs) |
|---------------------|------------------|---------------------|------------------|---------------------|------------------|---------------------|------------------|
| 85.07               | 0.00             | 86.11               | 0.58             | 87.15               | 0.96             | 88.19               | 1.22             |
| 85.09               | 0.00             | 86.13               | 0.59             | 87.17               | 0.96             | 88.21               | 1.23             |
| 85.11               | 0.00             | 86.15               | 0.60             | 87.19               | 0.97             | 88.23               | 1.23             |
| 85.13               | 0.00             | 86.17               | 0.61             | 87.21               | 0.98             | 88.25               | 1.24             |
| 85.15               | 0.00             | 86.19               | 0.62             | 87.23               | 0.98             | 88.27               | 1.24             |
| 85.17               | 0.00             | 86.21               | 0.63             | 87.25               | 0.99             | 88.29               | 1.25             |
| 85.19               | 0.00             | 86.23               | 0.64             | 87.27               | 0.99             | 88.31               | 1.25             |
| 85.21               | 0.00             | 86.25               | 0.65             | 87.29               | 1.00             | 88.33               | 1.26             |
| 85.23               | 0.00             | 86.27               | 0.65             | 87.31               | 1.00             | 88.35               | 1.26             |
| 85.25               | 0.00             | 86.29               | 0.66             | 87.33               | 1.01             | 88.37               | 1.26             |
| 85.27               | 0.00             | 86.31               | 0.67             | 87.35               | 1.02             | 88.39               | 1.27             |
| 85.29               | 0.00             | 86.33               | 0.68             | 87.37               | 1.02             | 88.41               | 1.27             |
| 85.31               | 0.00             | 86.35               | 0.69             | 87.39               | 1.03             | 88.43               | 1.28             |
| 85.33               | 0.01             | 86.37               | 0.70             | 87.41               | 1.03             | 88.45               | 1.28             |
| 85.35               | 0.01             | 86.39               | 0.70             | 87.43               | 1.04             | 88.47               | 1.29             |
| 85.37               | 0.02             | 86.41               | 0.71             | 87.45               | 1.04             | 88.49               | 1.29             |
| 85.39               | 0.03             | 86.43               | 0.72             | 87.47               | 1.05             | 88.51               | 1.29             |
| 85.41               | 0.03             | 86.45               | 0.73             | 87.49               | 1.05             | 88.53               | 1.30             |
| 85.43               | 0.04             | 86.47               | 0.74             | 87.51               | 1.06             | 88.55               | 1.30             |
| 85.45               | 0.05             | 86.49               | 0.74             | 87.53               | 1.06             | 88.57               | 1.31             |
| 85.47               | 0.07             | 86.51               | 0.75             | 87.55               | 1.07             | 88.59               | 1.31             |
| 85.49               | 0.08             | 86.53               | 0.76             | 87.57               | 1.07             | 88.61               | 1.32             |
| 85.51               | 0.09             | 86.55               | 0.76             | 87.59               | 1.08             | 88.63               | 1.32             |
| 85.53               | 0.11             | 86.57               | 0.77             | 87.61               | 1.08             | 88.65               | 1.32             |
| 85.55               | 0.12             | 86.59               | 0.78             | 87.63               | 1.09             | 88.67               | 1.33             |
| 85.57               | 0.14             | 86.61               | 0.79             | 87.65               | 1.09             | 88.69               | 1.33             |
| 85.59               | 0.15             | 86.63               | 0.79             | 87.67               | 1.10             | 88.71               | 1.34             |
| 85.61               | 0.17             | 86.65               | 0.80             | 87.69               | 1.10             | 88.73               | 1.34             |
| 85.63               | 0.19             | 86.67               | 0.81             | 87.71               | 1.11             | 88.75               | 1.35             |
| 85.65               | 0.21             | <b>86.69</b>        | <b>0.81</b>      | 87.73               | 1.11             | 88.77               | 1.35             |
| 85.67               | 0.22             | 86.71               | 0.82             | 87.75               | 1.12             | 88.79               | 1.35             |
| 85.69               | 0.24             | 86.73               | 0.83             | 87.77               | 1.12             | 88.81               | 1.36             |
| 85.71               | 0.26             | 86.75               | 0.83             | 87.79               | 1.13             | 88.83               | 1.36             |
| 85.73               | 0.28             | 86.77               | 0.84             | 87.81               | 1.13             | 88.85               | 1.37             |
| 85.75               | 0.30             | 86.79               | 0.85             | 87.83               | 1.14             | 88.87               | 1.37             |
| 85.77               | 0.32             | 86.81               | 0.85             | 87.85               | 1.14             | 88.89               | 1.37             |
| 85.79               | 0.33             | 86.83               | 0.86             | 87.87               | 1.15             | 88.91               | 1.38             |
| 85.81               | 0.35             | 86.85               | 0.87             | 87.89               | 1.15             | 88.93               | 1.38             |
| 85.83               | 0.37             | 86.87               | 0.87             | 87.91               | 1.16             | 88.95               | 1.39             |
| 85.85               | 0.38             | 86.89               | 0.88             | 87.93               | 1.16             | 88.97               | 1.39             |
| 85.87               | 0.40             | 86.91               | 0.89             | 87.95               | 1.17             | 88.99               | <b>1.39</b>      |
| 85.89               | 0.41             | 86.93               | 0.89             | 87.97               | 1.17             |                     |                  |
| 85.91               | 0.42             | 86.95               | 0.90             | 87.99               | 1.18             |                     |                  |
| 85.93               | 0.43             | 86.97               | 0.90             | 88.01               | 1.18             |                     |                  |
| 85.95               | 0.46             | 86.99               | 0.91             | 88.03               | 1.19             |                     |                  |
| 85.97               | 0.48             | 87.01               | 0.92             | 88.05               | 1.19             |                     |                  |
| 85.99               | 0.50             | 87.03               | 0.92             | 88.07               | 1.20             |                     |                  |
| 86.01               | 0.52             | 87.05               | 0.93             | 88.09               | 1.20             |                     |                  |
| 86.03               | 0.54             | 87.07               | 0.94             | 88.11               | 1.21             |                     |                  |
| 86.05               | 0.55             | 87.09               | 0.94             | 88.13               | 1.21             |                     |                  |
| 86.07               | 0.56             | 87.11               | 0.95             | 88.15               | 1.22             |                     |                  |
| 86.09               | 0.57             | 87.13               | 0.95             | 88.17               | 1.22             |                     |                  |

# PIPE OUTLET PROTECTION APRON DESIGN & d<sub>50</sub> RIPRAP SIZING



Pipe 251P-B (Node 251P-B)

|                |  |              |           |
|----------------|--|--------------|-----------|
| PROJECT NAME : | 41 Portsmouth Avenue, Stratham, NH 03885 |              |           |
| PROJECT # :    | 25-1001                                  |              |           |
| BY :           | JJM                                      | CHECKED BY : | BDS       |
| DATE :         | 4/27/2026                                | DATE :       | 4/27/2026 |

## DOWNSTREAM CHANNEL (OR SPREADER) HYDRAULICS

|                             |         |             |
|-----------------------------|---------|-------------|
| Peak Discharge Required =   | 2.4     | cfs         |
| Channel Bottom Width =      | 3.0     | Feet        |
| Hydraulic Gradient =        | 0.01000 | Feet/Feet   |
| Left Side Slope =           | 3.0     | :1(h:v)     |
| Right Side Slope =          | 3.0     | :1(h:v)     |
| Depth of Flow =             | 0.900   | Feet        |
| Manning's "n" =             | 0.0130  |             |
| Area =                      | 5.13    | Square Feet |
| Wetted Perimeter =          | 8.69    | Feet        |
| Hydraulic Radius =          | 0.59    | Feet        |
| Top Width =                 | 8.40    | Feet        |
| Velocity =                  | 8.04    | Feet/Second |
| Peak Discharge Determined = | 41.3    | cfs         |

### La AND W CALCULATIONS:

|                                      |      |        |   |
|--------------------------------------|------|--------|---|
| Culvert Diameter (Do) =              | 12.0 | Inches | Assumes Channel Bottom at the Culvert Equals the Invert Outlet Elevation of the Pipe. If this is not the case, the calculations involving the Tailwater will have to be calculated by hand. |
| Tail Water Depth (TW)* =             | 0.20 | Feet   |   |
| Length of Apron (La) =               | 11   | Feet   |   |
| Width of Apron @ D.S End (W) =       | 14   | Feet   |   |
| Width of D.S. Apron if Channel (W) = | 3.0  | Feet   |   |

\*If outletting to flat area use TW depth = 0.2 x Do

### ROCK RIPRAP SIZE

|  |      |                      |      |        |
|--|------|----------------------|------|--------|
| d <sub>50</sub> =                                      | 0.32 | Feet or              | 3.83 | Inches |
| d <sub>50</sub> = (0.02 x Q <sup>4/3</sup> )/(TW x Do) |      | Use D50=6", 12" deep |      |        |

### ROCK RIPRAP GRADATION (TABLE 7-24 OF NHDES HANDBOOK)

| % of Weight Smaller Than The Given Size | Size of Stone in Inches |
|---|-------------------------|
| 100                                     | 5.8 to 7.7              |
| 85                                      | 5.0 to 6.9              |
| 50                                      | 3.8 to 5.8              |
| 15                                      | 1.2 to 1.9              |


Minimum Rock Riprap Blanket Thickness = 11.5 Inches  
Minimum Six inch Sand/Gravel Bedding or Geotextile Fabric Required Under All Rock Riprap

### FORMULAS USED (Reference NHDES HANDBOOK, Pages 7-114, 7-115)

Manning's Uniform Channel Flow -  $Q = (A \times 1.486 \times R^{(2/3)} \times S^{(1/2)}) / n$   
 Length of Apron (La) TW < Do/2 -  $La = (1.8 \times Q / Do^{1.5}) + 7 \times Do$   
 Length of Apron (La) TW >= Do/2 -  $La = 3.0 \times Q / Do^{1.5} + 7 \times Do$   
 Width of Apron @ D.S End TW < Do/2 -  $W = 3 \times Do + La$   
 Width of Apron @ D.S End TW >= Do/2 -  $W = 3 \times Do + 0.4 \times La$   
 Width of D.S. Apron if in Channel -  $W = \text{Channel Bottom Width}$   
 Width of Apron @ Culvert -  $Wc = 3 \times Do$

**PHASE I**

# PIPE OUTLET PROTECTION APRON DESIGN & d<sub>50</sub> RIPRAP SIZING

|   |  |
|---|--|
|  | <b>EMANUEL<br/>ENGINEERING, INC.</b><br><small>CIVIL &amp; STRUCTURAL CONSULTANTS</small><br>118 PORTSMOUTH AVE.<br>STRATHAM, NH 03885<br>Tel: (603) 772-4400<br>Fax: (603) 772-4487 |
|---|--|

Pipe 260P-A (Node 260P-A)

|                |  |              |           |
|----------------|--|--------------|-----------|
| PROJECT NAME : | 41 Portsmouth Avenue, Stratham, NH 03885 |              |           |
| PROJECT # :    | 25-1001                                  |              |           |
| BY :           | JJM                                      | CHECKED BY : | BDS       |
| DATE :         | 6/17/2026                                | DATE :       | 6/17/2026 |

**DOWNSTREAM CHANNEL (OR SPREADER) HYDRAULICS**

|                             |         |             |
|-----------------------------|---------|-------------|
| Peak Discharge Required =   | 1.5     | cfs         |
| Channel Bottom Width =      | 3.0     | Feet        |
| Hydraulic Gradient =        | 0.01000 | Feet/Feet   |
| Left Side Slope =           | 3.0     | :1(h:v)     |
| Right Side Slope =          | 3.0     | :1(h:v)     |
| Depth of Flow =             | 1.000   | Feet        |
| Manning's "n" =             | 0.0130  |             |
| Area =                      | 6.00    | Square Feet |
| Wetted Perimeter =          | 9.32    | Feet        |
| Hydraulic Radius =          | 0.64    | Feet        |
| Top Width =                 | 9.00    | Feet        |
| Velocity =                  | 8.52    | Feet/Second |
| Peak Discharge Determined = | 51.1    | cfs         |

**La AND W CALCULATIONS:**

|                                      |      |        |  |
|--------------------------------------|------|--------|--|
| Culvert Diameter (Do) =              | 12.0 | Inches | Assumes Channel Bottom at the<br>Culvert Equals the Invert Outlet<br>Elevation of the Pipe. If this is not<br>the case, the calculations involving<br>the Tailwater will have to be<br>calculated by hand. |
| Tail Water Depth (TW)* =             | 0.20 | Feet   |  |
| Length of Apron (La) =               | 10   | Feet   |  |
| Width of Apron @ D.S End (W) =       | 13   | Feet   |  |
| Width of D.S. Apron if Channel (W) = | 3.0  | Feet   |  |

\*If outletting to flat area use TW depth = 0.2 x Do

**ROCK RIPRAP SIZE**

|  |      |                      |      |        |
|--|------|----------------------|------|--------|
| d <sub>50</sub> =                                      | 0.17 | Feet or              | 2.02 | Inches |
| d <sub>50</sub> = (0.02 x Q <sup>4/3</sup> )/(TW x Do) |      | Use D50=6", 12" deep |      |        |

**ROCK RIPRAP GRADATION (TABLE 7-24 OF NHDES HANDBOOK)**

| % of Weight Smaller Than The Given Size | Size of Stone in Inches |
|---|-------------------------|
| 100                                     | 3.0 to 4.0              |
| 85                                      | 2.6 to 3.6              |
| 50                                      | 2.0 to 3.0              |
| 15                                      | 0.6 to 1.0              |

Minimum Rock Riprap Blanket Thickness = 6.1 Inches  
 Minimum Six inch Sand/Gravel Bedding or Geotextile Fabric Required Under All Rock Riprap

**FORMULAS USED (Reference NHDES HANDBOOK, Pages 7-114, 7-115)**

Manning's Uniform Channel Flow -  $Q = (A \times 1.486 \times R^{(2/3)} \times S^{(1/2)})/n$   
 Length of Apron (La) TW < Do/2 -  $La = (1.8 \times Q/Do^{1.5}) + 7 \times Do$   
 Length of Apron (La) TW >= Do/2 -  $La = 3.0 \times Q/Do^{1.5} + 7 \times Do$   
 Width of Apron @ D.S End TW < Do/2 -  $W = 3xDo + La$   
 Width of Apron @ D.S End TW >= Do/2 -  $W = 3xDo + 0.4 \times La$   
 Width of D.S. Apron if in Channel -  $W = \text{Channel Bottom Width}$   
 Width of Apron @ Culvert -  $Wc = 3 \times Do$

**PHASE I**

# PIPE OUTLET PROTECTION APRON DESIGN & d<sub>50</sub> RIPRAP SIZING



Pipe PDL263P (Node 263P)

PROJECT NAME : 41 Portsmouth Avenue, Stratham, NH 03885  
 PROJECT # : 25-1001  
 BY : JJM CHECKED BY : BDS  
 DATE : 6/17/2026 DATE : 6/17/2026

### DOWNSTREAM CHANNEL (OR SPREADER) HYDRAULICS

|                             |         |             |
|-----------------------------|---------|-------------|
| Peak Discharge Required =   | 3.9     | cfs         |
| Channel Bottom Width =      | 4.0     | Feet        |
| Hydraulic Gradient =        | 0.00630 | Feet/Feet   |
| Left Side Slope =           | 3.0     | :1(h:v)     |
| Right Side Slope =          | 3.0     | :1(h:v)     |
| Depth of Flow =             | 0.820   | Feet        |
| Manning's "n" =             | 0.0130  |             |
| Area =                      | 5.30    | Square Feet |
| Wetted Perimeter =          | 9.19    | Feet        |
| Hydraulic Radius =          | 0.58    | Feet        |
| Top Width =                 | 8.92    | Feet        |
| Velocity =                  | 6.29    | Feet/Second |
| Peak Discharge Determined = | 33.3    | cfs         |

### La AND W CALCULATIONS:

|                                      |      |        |   |
|--------------------------------------|------|--------|---|
| Culvert Diameter (Do) =              | 24.0 | Inches | Assumes Channel Bottom at the Culvert Equals the Invert Outlet Elevation of the Pipe. If this is not the case, the calculations involving the Tailwater will have to be calculated by hand. |
| Tail Water Depth (TW)* =             | 0.40 | Feet   |   |
| Length of Apron (La) =               | 16   | Feet   |   |
| Width of Apron @ D.S End (W) =       | 22   | Feet   |   |
| Width of D.S. Apron if Channel (W) = | 4.0  | Feet   |   |

\*If outletting to flat area use TW depth = 0.2 x Do

### ROCK RIPRAP SIZE

d<sub>50</sub> = 0.15 Feet or 1.84 Inches

d<sub>50</sub> = (0.02 x Q<sup>4/3</sup>)/(TW x Do) Use D50=5", 15" deep

### ROCK RIPRAP GRADATION (TABLE 7-24 OF NHDES HANDBOOK)

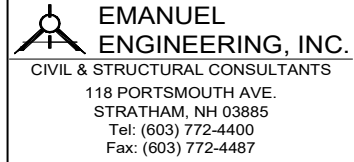
| % of Weight Smaller Than The Given Size | Size of Stone in Inches |
|---|-------------------------|
| 100                                     | 2.8 to 3.7              |
| 85                                      | 2.4 to 3.3              |
| 50                                      | 1.8 to 2.8              |
| 15                                      | 0.6 to 0.9              |

Minimum Rock Riprap Blanket Thickness = 6.0 Inches  
 Minimum Six inch Sand/Gravel Bedding or Geotextile Fabric Required Under All Rock Riprap

### FORMULAS USED (Reference NHDES HANDBOOK, Pages 7-114, 7-115)

Manning's Uniform Channel Flow -  $Q = (A \times 1.486 \times R^{(2/3)} \times S^{(1/2)})/n$   
 Length of Apron (La) TW < Do/2 -  $La = (1.8 \times Q/Do^{1.5}) + 7 \times Do$   
 Length of Apron (La) TW >= Do/2 -  $La = 3.0 \times Q/Do^{1.5} + 7 \times Do$   
 Width of Apron @ D.S End TW < Do/2 -  $W = 3xDo + La$   
 Width of Apron @ D.S End TW >= Do/2 -  $W = 3xDo + 0.4 \times La$   
 Width of D.S. Apron if in Channel -  $W = \text{Channel Bottom Width}$   
 Width of Apron @ Culvert -  $Wc = 3 \times Do$

# PIPE OUTLET PROTECTION APRON DESIGN & d<sub>50</sub> RIPRAP SIZING



Pipe 251P-B (Node 251P-B)

|                |  |              |           |
|----------------|--|--------------|-----------|
| PROJECT NAME : | 41 Portsmouth Avenue, Stratham, NH 03885 |              |           |
| PROJECT # :    | 25-1001                                  |              |           |
| BY :           | JJM                                      | CHECKED BY : | BDS       |
| DATE :         | 4/27/2026                                | DATE :       | 4/27/2026 |

## DOWNSTREAM CHANNEL (OR SPREADER) HYDRAULICS

|                             |         |             |
|-----------------------------|---------|-------------|
| Peak Discharge Required =   | 2.4     | cfs         |
| Channel Bottom Width =      | 3.0     | Feet        |
| Hydraulic Gradient =        | 0.01000 | Feet/Feet   |
| Left Side Slope =           | 3.0     | :1(h:v)     |
| Right Side Slope =          | 3.0     | :1(h:v)     |
| Depth of Flow =             | 0.900   | Feet        |
| Manning's "n" =             | 0.0130  |             |
| Area =                      | 5.13    | Square Feet |
| Wetted Perimeter =          | 8.69    | Feet        |
| Hydraulic Radius =          | 0.59    | Feet        |
| Top Width =                 | 8.40    | Feet        |
| Velocity =                  | 8.04    | Feet/Second |
| Peak Discharge Determined = | 41.3    | cfs         |

### La AND W CALCULATIONS:

|                                      |      |        |   |
|--------------------------------------|------|--------|---|
| Culvert Diameter (Do) =              | 12.0 | Inches | Assumes Channel Bottom at the Culvert Equals the Invert Outlet Elevation of the Pipe. If this is not the case, the calculations involving the Tailwater will have to be calculated by hand. |
| Tail Water Depth (TW)* =             | 0.20 | Feet   |   |
| Length of Apron (La) =               | 11   | Feet   |   |
| Width of Apron @ D.S End (W) =       | 14   | Feet   |   |
| Width of D.S. Apron if Channel (W) = | 3.0  | Feet   |   |

\*If outletting to flat area use TW depth = 0.2 x Do

### ROCK RIPRAP SIZE

|  |      |                      |      |        |
|--|------|----------------------|------|--------|
| d <sub>50</sub> =                                      | 0.32 | Feet or              | 3.83 | Inches |
| d <sub>50</sub> = (0.02 x Q <sup>4/3</sup> )/(TW x Do) |      | Use D50=6", 12" deep |      |        |

### ROCK RIPRAP GRADATION (TABLE 7-24 OF NHDES HANDBOOK)

| % of Weight Smaller Than The Given Size | Size of Stone in Inches |
|---|-------------------------|
| 100                                     | 5.8 to 7.7              |
| 85                                      | 5.0 to 6.9              |
| 50                                      | 3.8 to 5.8              |
| 15                                      | 1.2 to 1.9              |

Minimum Rock Riprap Blanket Thickness = 11.5 Inches  
Minimum Six inch Sand/Gravel Bedding or Geotextile Fabric Required Under All Rock Riprap

### FORMULAS USED (Reference NHDES HANDBOOK, Pages 7-114, 7-115)

Manning's Uniform Channel Flow -  $Q = (A \times 1.486 \times R^{(2/3)} \times S^{(1/2)}) / n$   
 Length of Apron (La) TW < Do/2 -  $La = (1.8 \times Q / Do^{1.5}) + 7 \times Do$   
 Length of Apron (La) TW >= Do/2 -  $La = 3.0 \times Q / Do^{1.5} + 7 \times Do$   
 Width of Apron @ D.S End TW < Do/2 -  $W = 3 \times Do + La$   
 Width of Apron @ D.S End TW >= Do/2 -  $W = 3 \times Do + 0.4 \times La$   
 Width of D.S. Apron if in Channel -  $W = \text{Channel Bottom Width}$   
 Width of Apron @ Culvert -  $Wc = 3 \times Do$

**PHASE II**

## PIPE OUTLET PROTECTION APRON DESIGN & d<sub>50</sub> RIPRAP SIZING

Pipe 250P (Node 250P-B)

|                |  |              |           |
|----------------|--|--------------|-----------|
| PROJECT NAME : | 41 Portsmouth Avenue, Stratham, NH 03885 |              |           |
| PROJECT # :    | 25-1001                                  |              |           |
| BY :           | JJM                                      | CHECKED BY : | BDS       |
| DATE :         | 3/24/2026                                | DATE :       | 3/24/2026 |

### DOWNSTREAM CHANNEL (OR SPREADER) HYDRAULICS

|                             |         |             |
|-----------------------------|---------|-------------|
| Peak Discharge Required =   | 0.7     | cfs         |
| Channel Bottom Width =      | 3.0     | Feet        |
| Hydraulic Gradient =        | 0.05000 | Feet/Feet   |
| Left Side Slope =           | 3.0     | :1(h:v)     |
| Right Side Slope =          | 3.0     | :1(h:v)     |
| Depth of Flow =             | 0.800   | Feet        |
| Manning's "n" =             | 0.0130  |             |
| Area =                      | 4.32    | Square Feet |
| Wetted Perimeter =          | 8.06    | Feet        |
| Hydraulic Radius =          | 0.54    | Feet        |
| Top Width =                 | 7.80    | Feet        |
| Velocity =                  | 16.87   | Feet/Second |
| Peak Discharge Determined = | 72.9    | cfs         |

### La AND W CALCULATIONS:

|                                      |      |        |   |
|--------------------------------------|------|--------|---|
| Culvert Diameter (Do) =              | 12.0 | Inches | Assumes Channel Bottom at the Culvert Equals the Invert Outlet Elevation of the Pipe. If this is not the case, the calculations involving the Tailwater will have to be calculated by hand. |
| Tail Water Depth (TW)* =             | 0.20 | Feet   |   |
| Length of Apron (La) =               | 8    | Feet   |   |
| Width of Apron @ D.S End (W) =       | 11   | Feet   |   |
| Width of D.S. Apron if Channel (W) = | 3.0  | Feet   |   |

\*If outletting to flat area use TW depth = 0.2 x Do

### ROCK RIPRAP SIZE

|  |      |                      |      |        |
|--|------|----------------------|------|--------|
| d <sub>50</sub> =                                      | 0.06 | Feet or              | 0.76 | Inches |
| d <sub>50</sub> = (0.02 x Q <sup>4/3</sup> )/(TW x Do) |      | Use D50=6", 12" deep |      |        |

### ROCK RIPRAP GRADATION (TABLE 7-24 OF NHDES HANDBOOK)

| % of Weight Smaller Than The Given Size | Size of Stone in Inches |
|---|-------------------------|
| 100                                     | 1.1 to 1.5              |
| 85                                      | 1.0 to 1.4              |
| 50                                      | 0.8 to 1.1              |
| 15                                      | 0.2 to 0.4              |

Minimum Rock Riprap Blanket Thickness = 6.0 Inches  
Minimum Six inch Sand/Gravel Bedding or Geotextile Fabric Required Under All Rock Riprap

### FORMULAS USED (Reference NHDES HANDBOOK, Pages 7-114, 7-115)

Manning's Uniform Channel Flow -  $Q = (A \times 1.486 \times R^{(2/3)} \times S^{(1/2)})/n$   
 Length of Apron (La) TW < Do/2 -  $La = (1.8 \times Q/Do^{1.5}) + 7 \times Do$   
 Length of Apron (La) TW >= Do/2 -  $La = 3.0 \times Q/Do^{1.5} + 7 \times Do$   
 Width of Apron @ D.S End TW < Do/2 -  $W = 3xDo + La$   
 Width of Apron @ D.S End TW >= Do/2 -  $W = 3xDo + 0.4 \times La$   
 Width of D.S. Apron if in Channel -  $W = \text{Channel Bottom Width}$   
 Width of Apron @ Culvert -  $Wc = 3 \times Do$

**PHASE II**

# PIPE OUTLET PROTECTION APRON DESIGN & $d_{50}$ RIPRAP SIZING

**EMANUEL  
ENGINEERING, INC.**  
CIVIL & STRUCTURAL CONSULTANTS  
118 PORTSMOUTH AVE.  
STRATHAM, NH 03885  
Tel: (603) 772-4400  
Fax: (603) 772-4487

Pipe 260P-A (Node 260P-A)

PROJECT NAME : 41 Portsmouth Avenue, Stratham, NH 03885  
 PROJECT # : 25-1001  
 BY : JJM CHECKED BY : BDS  
 DATE : 3/24/2026 DATE : 3/24/2026

### DOWNSTREAM CHANNEL (OR SPREADER) HYDRAULICS

|                             |         |             |
|-----------------------------|---------|-------------|
| Peak Discharge Required =   | 1.9     | cfs         |
| Channel Bottom Width =      | 3.0     | Feet        |
| Hydraulic Gradient =        | 0.01000 | Feet/Feet   |
| Left Side Slope =           | 3.0     | :1(h:v)     |
| Right Side Slope =          | 3.0     | :1(h:v)     |
| Depth of Flow =             | 1.000   | Feet        |
| Manning's "n" =             | 0.0130  |             |
| Area =                      | 6.00    | Square Feet |
| Wetted Perimeter =          | 9.32    | Feet        |
| Hydraulic Radius =          | 0.64    | Feet        |
| Top Width =                 | 9.00    | Feet        |
| Velocity =                  | 8.52    | Feet/Second |
| Peak Discharge Determined = | 51.1    | cfs         |

### La AND W CALCULATIONS:

|                                      |      |        |   |
|--------------------------------------|------|--------|---|
| Culvert Diameter (Do) =              | 12.0 | Inches | Assumes Channel Bottom at the Culvert Equals the Invert Outlet Elevation of the Pipe. If this is not the case, the calculations involving the Tailwater will have to be calculated by hand. |
| Tail Water Depth (TW)* =             | 0.20 | Feet   |   |
| Length of Apron (La) =               | 10   | Feet   |   |
| Width of Apron @ D.S End (W) =       | 13   | Feet   |   |
| Width of D.S. Apron if Channel (W) = | 3.0  | Feet   |   |

\*If outletting to flat area use TW depth = 0.2 x Do

### ROCK RIPRAP SIZE

$d_{50} =$  0.23 Feet or 2.73 Inches

$d_{50} = (0.02 \times Q^{4/3}) / (TW \times Do)$       Use D50=6", 12" deep

### ROCK RIPRAP GRADATION (TABLE 7-24 OF NHDES HANDBOOK)

| % of Weight Smaller Than The Given Size | Size of Stone in Inches |
|---|-------------------------|
| 100                                     | 4.1 to 5.5              |
| 85                                      | 3.5 to 4.9              |
| 50                                      | 2.7 to 4.1              |
| 15                                      | 0.8 to 1.4              |

Minimum Rock Riprap Blanket Thickness = 8.2 Inches

Minimum Six inch Sand/Gravel Bedding or Geotextile Fabric Required Under All Rock Riprap

### FORMULAS USED (Reference NHDES HANDBOOK, Pages 7-114, 7-115)

Manning's Uniform Channel Flow -  $Q = (A \times 1.486 \times R^{2/3} \times S^{1/2}) / n$   
 Length of Apron (La) TW < Do/2 -  $La = (1.8 \times Q / Do^{1.5}) + 7 \times Do$   
 Length of Apron (La) TW >= Do/2 -  $La = 3.0 \times Q / Do^{1.5} + 7 \times Do$   
 Width of Apron @ D.S End TW < Do/2 -  $W = 3 \times Do + La$   
 Width of Apron @ D.S End TW >= Do/2 -  $W = 3 \times Do + 0.4 \times La$   
 Width of D.S. Apron if in Channel -  $W = \text{Channel Bottom Width}$   
 Width of Apron @ Culvert -  $Wc = 3 \times Do$

# PIPE OUTLET PROTECTION APRON DESIGN & d<sub>50</sub> RIPRAP SIZING



Pipe PDL263P (Node 263P)

|                |  |              |           |
|----------------|--|--------------|-----------|
| PROJECT NAME : | 41 Portsmouth Avenue, Stratham, NH 03885 |              |           |
| PROJECT # :    | 25-1001                                  |              |           |
| BY :           | JJM                                      | CHECKED BY : | BDS       |
| DATE :         | 4/27/2026                                | DATE :       | 4/27/2026 |

### DOWNSTREAM CHANNEL (OR SPREADER) HYDRAULICS

|                             |         |             |
|-----------------------------|---------|-------------|
| Peak Discharge Required =   | 3.8     | cfs         |
| Channel Bottom Width =      | 4.0     | Feet        |
| Hydraulic Gradient =        | 0.00630 | Feet/Feet   |
| Left Side Slope =           | 3.0     | :1(h:v)     |
| Right Side Slope =          | 3.0     | :1(h:v)     |
| Depth of Flow =             | 0.820   | Feet        |
| Manning's "n" =             | 0.0130  |             |
| Area =                      | 5.30    | Square Feet |
| Wetted Perimeter =          | 9.19    | Feet        |
| Hydraulic Radius =          | 0.58    | Feet        |
| Top Width =                 | 8.92    | Feet        |
| Velocity =                  | 6.29    | Feet/Second |
| Peak Discharge Determined = | 33.3    | cfs         |

### La AND W CALCULATIONS:

|                                      |      |        |   |
|--------------------------------------|------|--------|---|
| Culvert Diameter (Do) =              | 24.0 | Inches | Assumes Channel Bottom at the Culvert Equals the Invert Outlet Elevation of the Pipe. If this is not the case, the calculations involving the Tailwater will have to be calculated by hand. |
| Tail Water Depth (TW)* =             | 0.40 | Feet   |   |
| Length of Apron (La) =               | 16   | Feet   |   |
| Width of Apron @ D.S End (W) =       | 22   | Feet   |   |
| Width of D.S. Apron if Channel (W) = | 4.0  | Feet   |   |

\*If outletting to flat area use TW depth = 0.2 x Do

### ROCK RIPRAP SIZE

|  |                   |  |         |                      |        |
|--|-------------------|--|---------|----------------------|--------|
|  | d <sub>50</sub> = | 0.15   | Feet or | 1.79                 | Inches |
|  |                   | d <sub>50</sub> = (0.02 x Q <sup>4/3</sup> )/(TW x Do) |         | Use D50=5", 15" deep |        |

### ROCK RIPRAP GRADATION (TABLE 7-24 OF NHDES HANDBOOK)

| % of Weight Smaller Than The Given Size | Size of Stone in Inches |
|---|-------------------------|
| 100                                     | 2.7 to 3.6              |
| 85                                      | 2.3 to 3.2              |
| 50                                      | 1.8 to 2.7              |
| 15                                      | 0.5 to 0.9              |

Minimum Rock Riprap Blanket Thickness = 6.0 Inches  
 Minimum Six inch Sand/Gravel Bedding or Geotextile Fabric Required Under All Rock Riprap

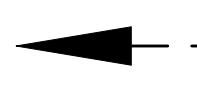



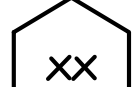
### FORMULAS USED (Reference NHDES HANDBOOK, Pages 7-114, 7-115)

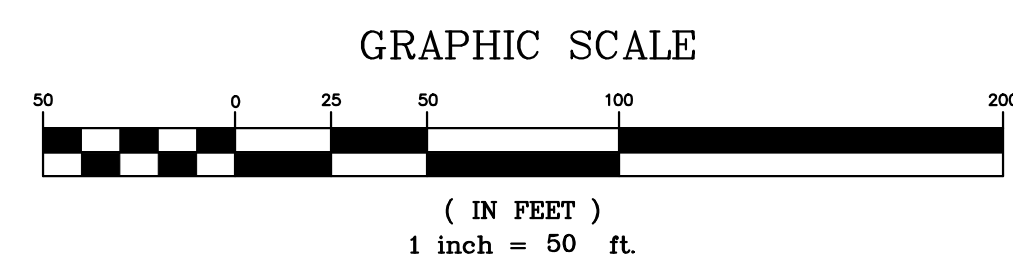
Manning's Uniform Channel Flow -  $Q = (A \times 1.486 \times R^{(2/3)} \times S^{(1/2)}) / n$   
 Length of Apron (La) TW < Do/2 -  $La = (1.8 \times Q / Do^{1.5}) + 7 \times Do$   
 Length of Apron (La) TW >= Do/2 -  $La = 3.0 \times Q / Do^{1.5} + 7 \times Do$   
 Width of Apron @ D.S End TW < Do/2 -  $W = 3 \times Do + La$   
 Width of Apron @ D.S End TW >= Do/2 -  $W = 3 \times Do + 0.4 \times La$   
 Width of D.S. Apron if in Channel -  $W = \text{Channel Bottom Width}$   
 Width of Apron @ Culvert -  $Wc = 3 \times Do$

**NOTES:**

- OWNER OF RECORD:  
TAX MAP 9, LOT 4  
41 PORTSMOUTH AVE LLC  
151 PORTSMOUTH AVENUE  
EXETER, NH 03833  
RCRD BK6613 P61241
- THE INTENT OF THIS PLAN IS TO CALCULATE PRE-DEVELOPMENT SUBCATCHMENT AREAS AND FLOW PATHS FOR MODELING VARIOUS STORM EVENTS IN PREPARATION FOR SITE IMPROVEMENTS.
- THE PREDEVELOPMENT CONDITIONS SHOWN HEREON, INCLUDING TOPOGRAPHY AND SOIL DATA, REPRESENT THE SITE AS SURVEYED FOR THE 2014 APPROVAL (AOT-0141) PRIOR TO SITE ALTERATION. THESE PRE-ALTERATION CONDITIONS ARE MODELED IN ACCORDANCE WITH AOT REQUIREMENTS THAT PREDEVELOPMENT REFLECT THE SITE AS IT EXISTED PRIOR TO DISTURBANCE, RATHER THAN PRESENT-DAY EXISTING CONDITIONS.
- PRE-DEVELOPMENT DRAINAGE AREA CALC'S:  
DRAINAGE ANALYSIS TOTAL AREA = 348,336 SF  
DRAINAGE ANALYSIS IMPERVIOUS = 48,573 SF  
DRAINAGE ANALYSIS % IMPERVIOUS = 12.14%

**LEGEND**

-  INDICATES FLOW PATH
-  INDICATES SUBCATCHMENT BOUNDARIES
-  INDICATES SUBCATCHMENT AREA LABEL
-  INDICATES POND LABEL
-  INDICATES LINK LABEL



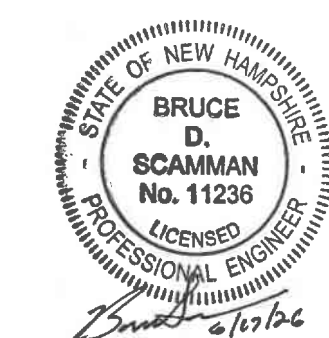
|            |                       |               |      |
|------------|-----------------------|---------------|------|
| 6          | JUN 17, 2026          | FOR APPROVAL  |      |
| 5          | MAR 24, 2026          | AOT REVISIONS |      |
| 1          | JAN 22, 2025          | FOR APPROVAL  |      |
| ISS. DATE: | DESCRIPTION OF ISSUE: |               | CHK. |
| DRAWN:     | JJM                   | DESIGN:       | JJM  |
| CHECKED:   | BDS                   | CHECKED:      | BDS  |



**CIVIL & STRUCTURAL CONSULTANTS, LAND PLANNERS**  
100 GRIFFIN ROAD, UNIT C, PORTSMOUTH, NH 03801  
603-772-4400 | EMAIL:ENGINEERING.COM © 2025

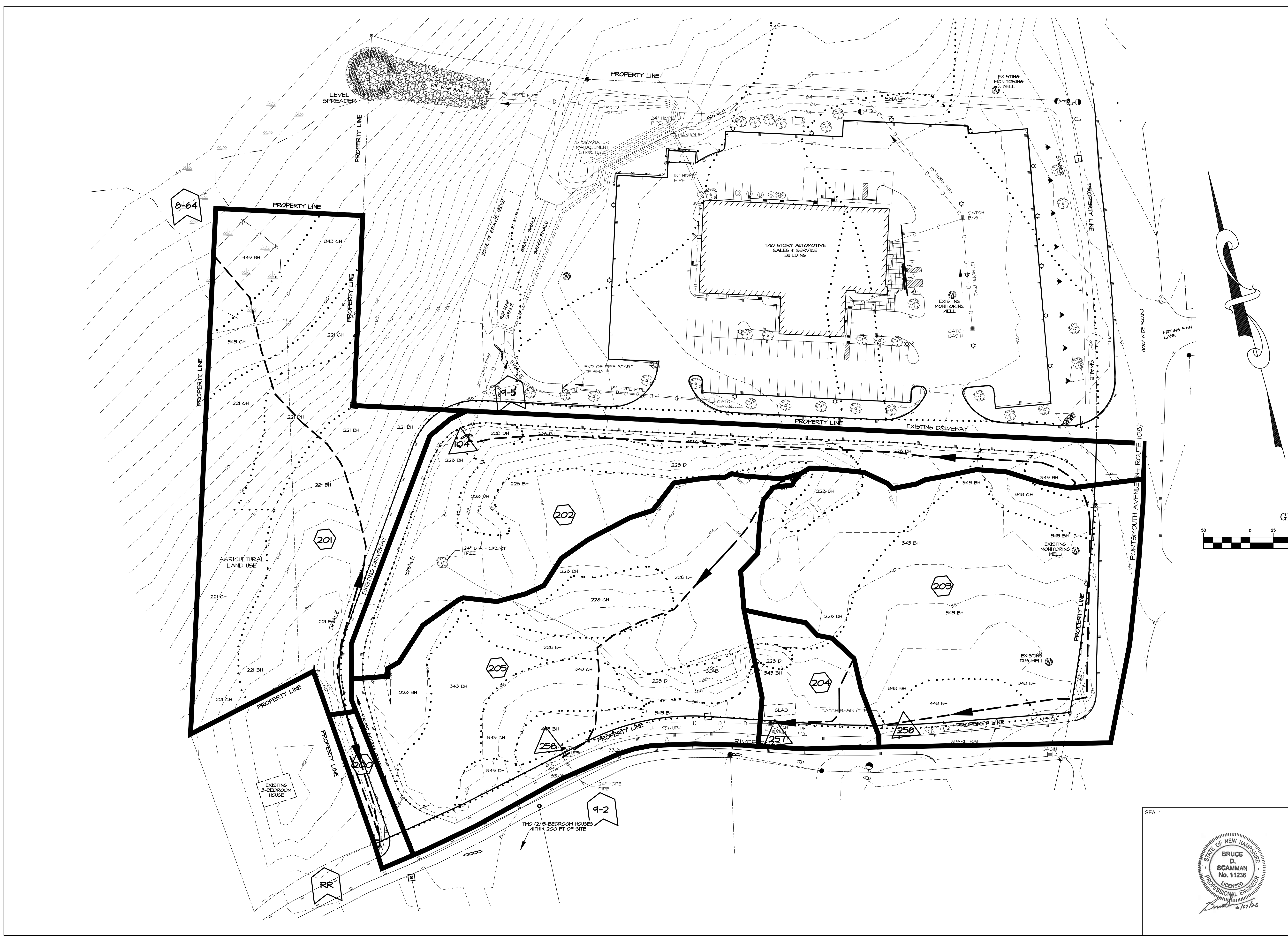
CLIENT:  
41 PORTSMOUTH AVE LLC  
151 PORTSMOUTH AVENUE  
EXETER, NH 03833

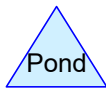
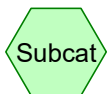
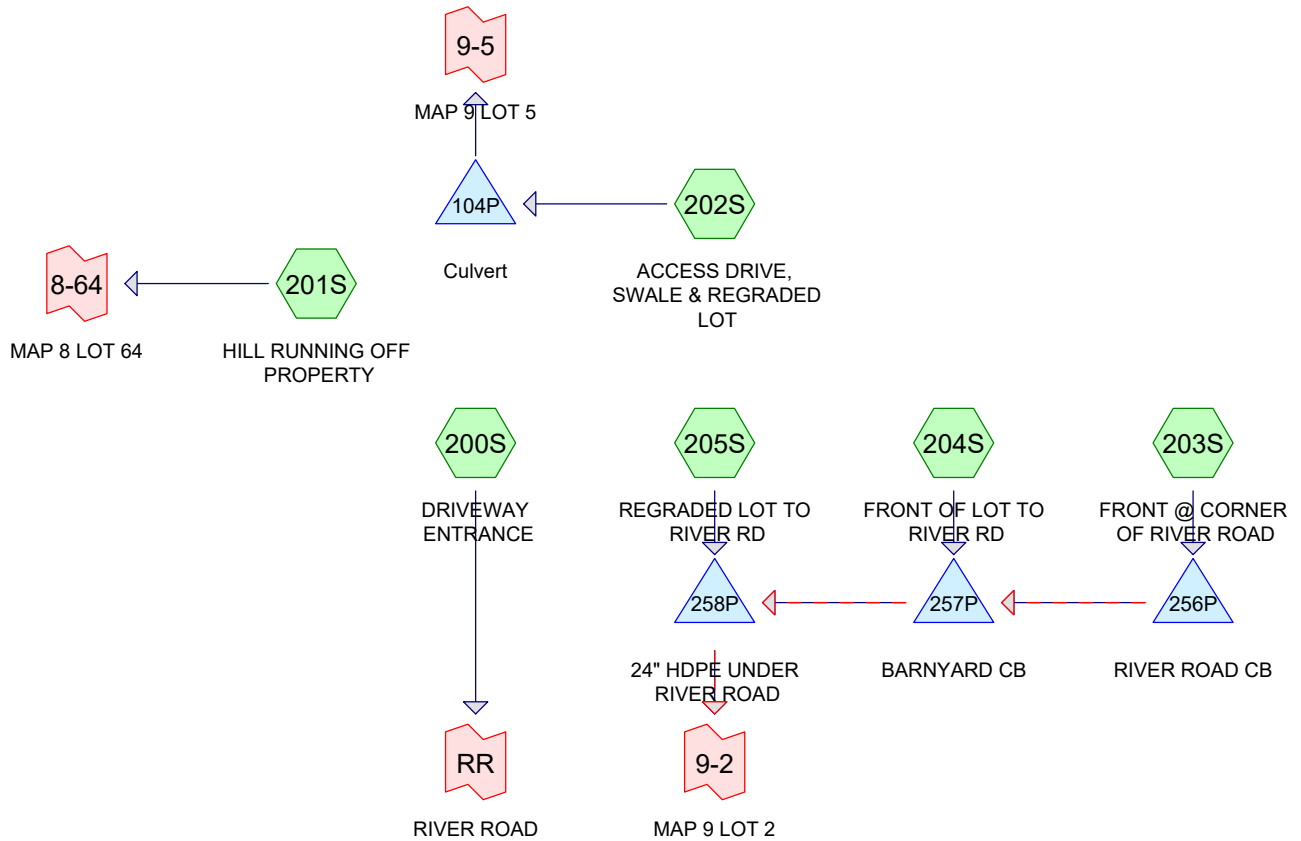
SEAL:



TITLE:  
**PRE-DEVELOPMENT DRAINAGE**  
FOR  
41 PORTSMOUTH AVE LLC  
41 PORTSMOUTH AVE (SITE)  
(STRATHAM TAX MAP 9 LOT 4)  
STRATHAM, NH 03885

|          |        |        |
|----------|--------|--------|
| PROJECT: | SCALE: | SHEET: |
| 25-1001  | 1"=50' | SW1    |





**Predevelopment 06-09-25**

Prepared by Emanuel Engineering

HydroCAD® 10.20-8a s/n 01104 © 2025 HydroCAD Software Solutions LLC

Printed 3/23/2026

Page 2

---

**Project Notes**

Copied 9 events from NH-Stratham 41 Portsmouth Ave 24-hr S1 storm

**Predevelopment 06-09-25**

Prepared by Emanuel Engineering

HydroCAD® 10.20-8a s/n 01104 © 2025 HydroCAD Software Solutions LLC

Printed 3/23/2026

Page 3

**Rainfall Events Listing (selected events)**

| Event# | Event Name   | Storm Type                             | Curve | Mode    | Duration (hours) | B/B | Depth (inches) | AM |
|--------|--------------|--|-------|---------|------------------|-----|----------------|----|
| 1      | 10-yr (+15%) | NH-Stratham 41 Portsmouth Ave 24-hr S1 | 10-yr | Default | 24.00            | 1   | 5.63           |    |

## Predevelopment 06-09-25

Prepared by Emanuel Engineering

HydroCAD® 10.20-8a s/n 01104 © 2025 HydroCAD Software Solutions LLC

Printed 3/23/2026

Page 4

### Area Listing (all nodes)

| Area<br>(acres) | CN        | Description<br>(subcatchment-numbers)                                     |
|-----------------|-----------|---|
| 0.885           | 61        | >75% Grass cover, Good, HSG B (200S, 201S)                                |
| 5.336           | 74        | >75% Grass cover, Good, HSG C (201S, 202S, 203S, 204S, 205S)              |
| 0.874           | 74        | >75% Grass cover, Good, HSG C (Updated From Gravel 12/30/25) (202S, 205S) |
| 0.159           | 98        | Paved parking, HSG B (200S, 201S)   |
| 0.956           | 98        | Paved parking, HSG C (202S, 203S, 204S, 205S)                             |
| 0.838           | 72        | Small grain, SR + CR, Good, HSG B (201S)                                  |
| 0.096           | 80        | Small grain, SR + CR, Good, HSG C (201S)                                  |
| <b>9.145</b>    | <b>76</b> | <b>TOTAL AREA</b>   |

**Predevelopment 06-09-25**

Prepared by Emanuel Engineering

HydroCAD® 10.20-8a s/n 01104 © 2025 HydroCAD Software Solutions LLC

Printed 3/23/2026

Page 5

**Soil Listing (all nodes)**

| Area<br>(acres) | Soil<br>Group | Subcatchment<br>Numbers      |
|-----------------|---------------|------------------------------|
| 0.000           | HSG A         |                              |
| 1.882           | HSG B         | 200S, 201S                   |
| 7.262           | HSG C         | 201S, 202S, 203S, 204S, 205S |
| 0.000           | HSG D         |                              |
| 0.000           | Other         |                              |
| <b>9.145</b>    |               | <b>TOTAL AREA</b>            |

**Predevelopment 06-09-25**

Prepared by Emanuel Engineering

HydroCAD® 10.20-8a s/n 01104 © 2025 HydroCAD Software Solutions LLC

Printed 3/23/2026

Page 6

**Ground Covers (all nodes)**

| HSG-A<br>(acres) | HSG-B<br>(acres) | HSG-C<br>(acres) | HSG-D<br>(acres) | Other<br>(acres) | Total<br>(acres) | Ground<br>Cover            | Subcatchment<br>Numbers                           |
|------------------|------------------|------------------|------------------|------------------|------------------|----------------------------|---|
| 0.000            | 0.885            | 6.210            | 0.000            | 0.000            | 7.095            | >75% Grass cover, Good     | 200S,<br>201S,<br>202S,<br>203S,<br>204S,<br>205S |
| 0.000            | 0.159            | 0.956            | 0.000            | 0.000            | 1.115            | Paved parking              | 200S,<br>201S,<br>202S,<br>203S,<br>204S,<br>205S |
| 0.000            | 0.838            | 0.096            | 0.000            | 0.000            | 0.934            | Small grain, SR + CR, Good | 201S  |
| <b>0.000</b>     | <b>1.882</b>     | <b>7.262</b>     | <b>0.000</b>     | <b>0.000</b>     | <b>9.145</b>     | <b>TOTAL AREA</b>          |   |

# Predevelopment 06-09-25

Prepared by Emanuel Engineering

HydroCAD® 10.20-8a s/n 01104 © 2025 HydroCAD Software Solutions LLC

Printed 3/23/2026

Page 7

## Pipe Listing (all nodes)

| Line# | Node Number | In-Invert (feet) | Out-Invert (feet) | Length (feet) | Slope (ft/ft) | n     | Width (inches) | Diam/Height (inches) | Inside-Fill (inches) | Node Name |
|-------|-------------|------------------|-------------------|---------------|---------------|-------|----------------|----------------------|----------------------|-----------|
| 1     | 104P        | 81.77            | 81.14             | 100.0         | 0.0063        | 0.013 | 0.0            | 30.0                 | 0.0                  |           |
| 2     | 256P        | 81.40            | 80.90             | 120.0         | 0.0042        | 0.011 | 0.0            | 12.0                 | 0.0                  |           |
| 3     | 257P        | 80.65            | 80.40             | 130.0         | 0.0019        | 0.011 | 0.0            | 12.0                 | 0.0                  |           |
| 4     | 258P        | 79.60            | 78.86             | 50.0          | 0.0148        | 0.013 | 0.0            | 24.0                 | 0.0                  |           |

Time span=0.00-36.00 hrs, dt=0.01 hrs, 3601 points x 2  
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN  
Reach routing by Dyn-Stor-Ind method - Pond routing by Dyn-Stor-Ind method

**Subcatchment200S: DRIVEWAY** Runoff Area=5,515 sf 48.92% Impervious Runoff Depth=3.35"  
Flow Length=192' Tc=6.0 min CN=79 Runoff=0.41 cfs 0.035 af

**Subcatchment201S: HILL RUNNING OFF** Runoff Area=98,244 sf 4.31% Impervious Runoff Depth=2.51"  
Flow Length=567' Tc=7.7 min CN=70 Runoff=5.00 cfs 0.473 af

**Subcatchment202S: ACCESS DRIVE,** Runoff Area=75,836 sf 20.64% Impervious Runoff Depth=3.35"  
Flow Length=675' Tc=12.4 min CN=79 Runoff=4.31 cfs 0.486 af

**Subcatchment203S: FRONT @ CORNER** Runoff Area=102,014 sf 14.22% Impervious Runoff Depth=3.16"  
Flow Length=90' Tc=6.0 min CN=77 Runoff=7.23 cfs 0.616 af

**Subcatchment204S: FRONT OF LOT TO** Runoff Area=15,336 sf 12.83% Impervious Runoff Depth=3.16"  
Flow Length=140' Tc=6.0 min CN=77 Runoff=1.09 cfs 0.093 af

**Subcatchment205S: REGRADED LOT TO** Runoff Area=101,391 sf 9.39% Impervious Runoff Depth=3.06"  
Flow Length=430' Tc=8.1 min CN=76 Runoff=6.27 cfs 0.594 af

**Pond 104P: Culvert** Peak Elev=82.66' Storage=27 cf Inflow=4.31 cfs 0.486 af  
30.0" Round Culvert n=0.013 L=100.0' S=0.0063 '/ Outflow=4.31 cfs 0.486 af

**Pond 256P: RIVER ROAD CB** Peak Elev=84.65' Storage=1,650 cf Inflow=7.23 cfs 0.616 af  
Primary=3.73 cfs 0.615 af Secondary=0.00 cfs 0.000 af Outflow=3.73 cfs 0.615 af

**Pond 257P: BARNYARDCB** Peak Elev=83.33' Storage=73 cf Inflow=4.35 cfs 0.708 af  
Primary=4.32 cfs 0.707 af Secondary=0.00 cfs 0.000 af Outflow=4.32 cfs 0.707 af

**Pond 258P: 24" HDPE UNDER RIVER ROAD** Peak Elev=81.16' Storage=2,679 cf Inflow=10.58 cfs 1.301 af  
Primary=8.82 cfs 1.301 af Secondary=0.00 cfs 0.000 af Outflow=8.82 cfs 1.301 af

**Link 8-64: MAP 8 LOT 64** Inflow=5.00 cfs 0.473 af  
Primary=5.00 cfs 0.473 af

**Link 9-2: MAP 9 LOT 2** Inflow=8.82 cfs 1.301 af  
Primary=8.82 cfs 1.301 af

**Link 9-5: MAP 9 LOT 5** Inflow=4.31 cfs 0.486 af  
Primary=4.31 cfs 0.486 af

**Link RR: RIVER ROAD** Inflow=0.41 cfs 0.035 af  
Primary=0.41 cfs 0.035 af

**Total Runoff Area = 9.145 ac Runoff Volume = 2.297 af Average Runoff Depth = 3.01"**  
**87.81% Pervious = 8.029 ac 12.19% Impervious = 1.115 ac**

**Summary for Subcatchment 200S: DRIVEWAY ENTRANCE**

Runoff = 0.41 cfs @ 12.04 hrs, Volume= 0.035 af, Depth= 3.35"  
 Routed to Link RR : RIVER ROAD

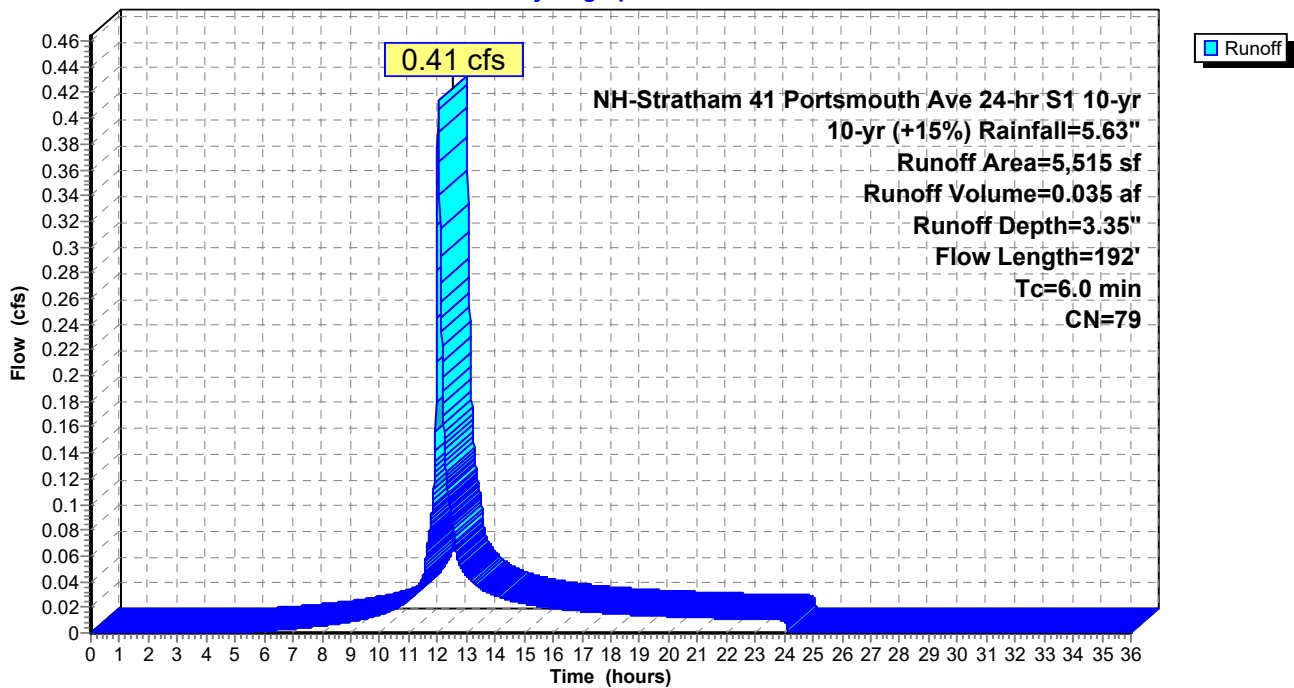
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-36.00 hrs, dt= 0.01 hrs  
 NH-Stratham 41 Portsmouth Ave 24-hr S1 10-yr 10-yr (+15%) Rainfall=5.63"

| Area (sf) | CN | Description                   |
|-----------|----|-------------------------------|
| 2,139     | 61 | >75% Grass cover, Good, HSG B |
| * 678     | 61 | >75% Grass cover, Good, HSG B |
| 2,698     | 98 | Paved parking, HSG B          |
| 5,515     | 79 | Weighted Average              |
| 2,817     |    | 51.08% Pervious Area          |
| 2,698     |    | 48.92% Impervious Area        |

| Tc (min) | Length (feet) | Slope (ft/ft) | Velocity (ft/sec) | Capacity (cfs) | Description  |
|----------|---------------|---------------|-------------------|----------------|--|
| 0.2      | 10            | 0.0200        | 0.85              |                | <b>Sheet Flow, Pavement to Swale</b><br>Smooth surfaces n= 0.011 P2= 3.10"     |
| 1.9      | 182           | 0.0110        | 1.57              |                | <b>Shallow Concentrated Flow, Grass Swale</b><br>Grassed Waterway Kv= 15.0 fps |
| 3.9      |               |               |                   |                | <b>Direct Entry, 6 minute minimum</b>  |
| 6.0      | 192           | Total         |                   |                |  |

**Subcatchment 200S: DRIVEWAY ENTRANCE**

Hydrograph



**Summary for Subcatchment 201S: HILL RUNNING OFF PROPERTY**

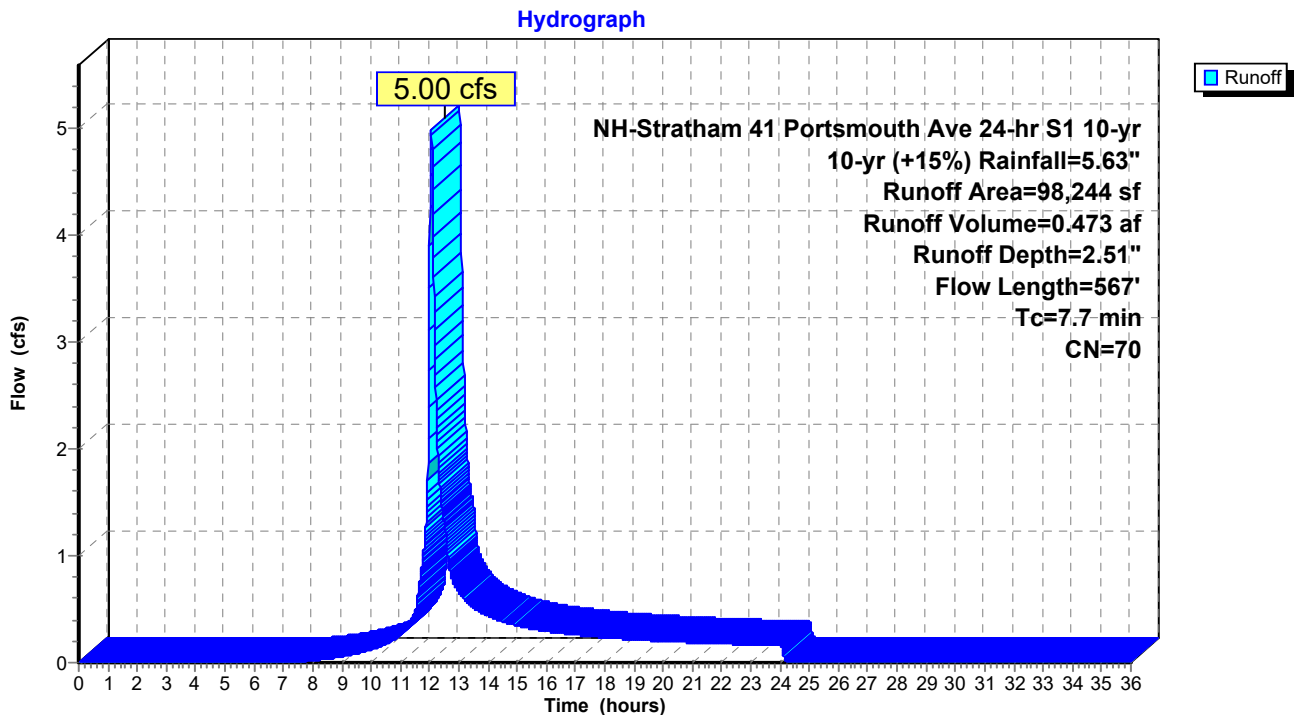
Runoff = 5.00 cfs @ 12.06 hrs, Volume= 0.473 af, Depth= 2.51"  
 Routed to Link 8-64 : MAP 8 LOT 64

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-36.00 hrs, dt= 0.01 hrs  
 NH-Stratham 41 Portsmouth Ave 24-hr S1 10-yr 10-yr (+15%) Rainfall=5.63"

| Area (sf) | CN | Description                       |
|-----------|----|-----------------------------------|
| 35,743    | 61 | >75% Grass cover, Good, HSG B     |
| 17,583    | 74 | >75% Grass cover, Good, HSG C     |
| 36,498    | 72 | Small grain, SR + CR, Good, HSG B |
| 4,186     | 80 | Small grain, SR + CR, Good, HSG C |
| 4,234     | 98 | Paved parking, HSG B              |
| 98,244    | 70 | Weighted Average                  |
| 94,010    |    | 95.69% Pervious Area              |
| 4,234     |    | 4.31% Impervious Area             |

| Tc (min) | Length (feet) | Slope (ft/ft) | Velocity (ft/sec) | Capacity (cfs) | Description   |
|----------|---------------|---------------|-------------------|----------------|---|
| 3.1      | 50            | 0.0900        | 0.27              |                | <b>Sheet Flow, Sheet Flow, Hill running off property</b><br>Grass: Short n= 0.150 P2= 3.10"                               |
| 4.6      | 517           | 0.0716        | 1.87              |                | <b>Shallow Concentrated Flow, Shallow Concentrated Flow, Hill running off property</b><br>Short Grass Pasture Kv= 7.0 fps |
| 7.7      | 567           | Total         |                   |                |   |

**Subcatchment 201S: HILL RUNNING OFF PROPERTY**



**Summary for Subcatchment 202S: ACCESS DRIVE, SWALE & REGRADED LOT**

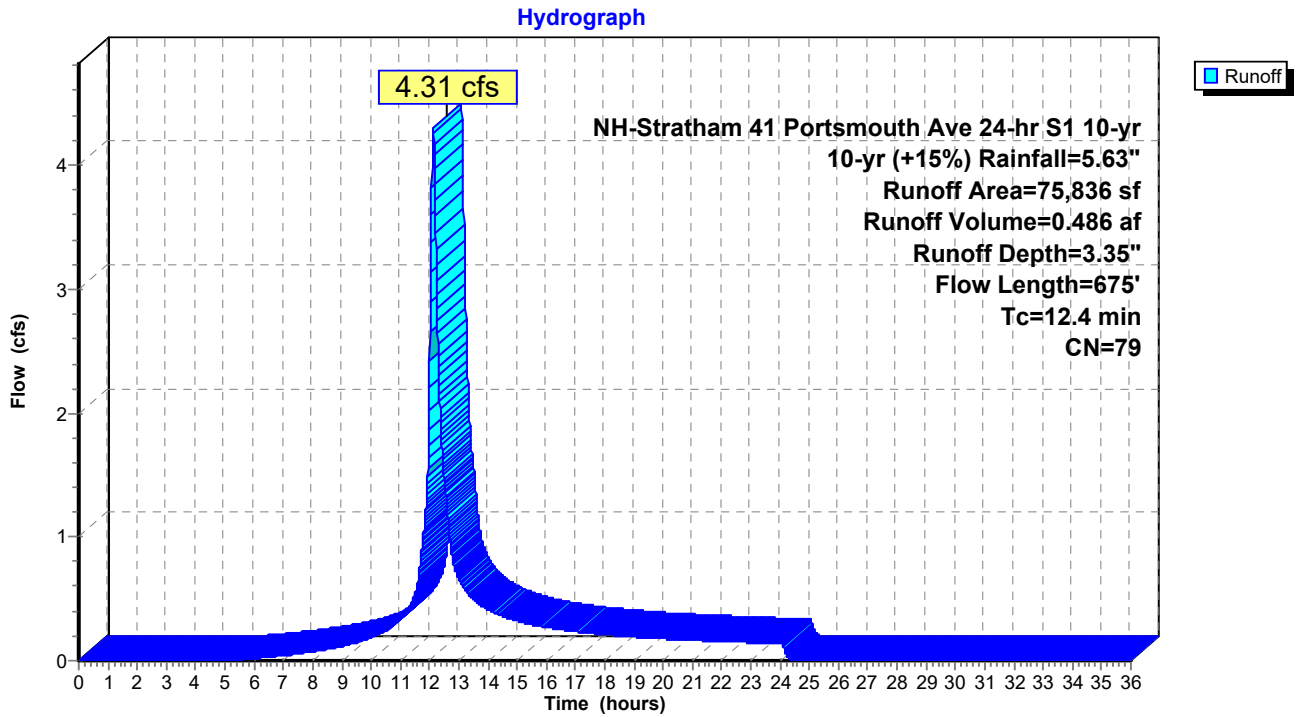
Runoff = 4.31 cfs @ 12.12 hrs, Volume= 0.486 af, Depth= 3.35"  
 Routed to Pond 104P : Culvert

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-36.00 hrs, dt= 0.01 hrs  
 NH-Stratham 41 Portsmouth Ave 24-hr S1 10-yr 10-yr (+15%) Rainfall=5.63"

| Area (sf) | CN | Description  |
|-----------|----|--|
| 15,655    | 98 | Paved parking, HSG C   |
| * 17,017  | 74 | >75% Grass cover, Good, HSG C (Updated From Gravel 12/30/25) |
| 43,164    | 74 | >75% Grass cover, Good, HSG C                                |
| 75,836    | 79 | Weighted Average   |
| 60,181    |    | 79.36% Pervious Area   |
| 15,655    |    | 20.64% Impervious Area                                       |

| Tc (min) | Length (feet) | Slope (ft/ft) | Velocity (ft/sec) | Capacity (cfs) | Description                             |
|----------|---------------|---------------|-------------------|----------------|---|
| 7.5      | 50            | 0.0100        | 0.11              |                | <b>Sheet Flow, Grass</b>                |
|          |               |               |                   |                | Grass: Short n= 0.150 P2= 3.10"         |
| 4.9      | 625           | 0.0200        | 2.12              |                | <b>Shallow Concentrated Flow, Grass</b> |
|          |               |               |                   |                | Grassed Waterway Kv= 15.0 fps           |
| 12.4     | 675           | Total         |                   |                |   |

**Subcatchment 202S: ACCESS DRIVE, SWALE & REGRADED LOT**



**Summary for Subcatchment 203S: FRONT @ CORNER OF RIVER ROAD**

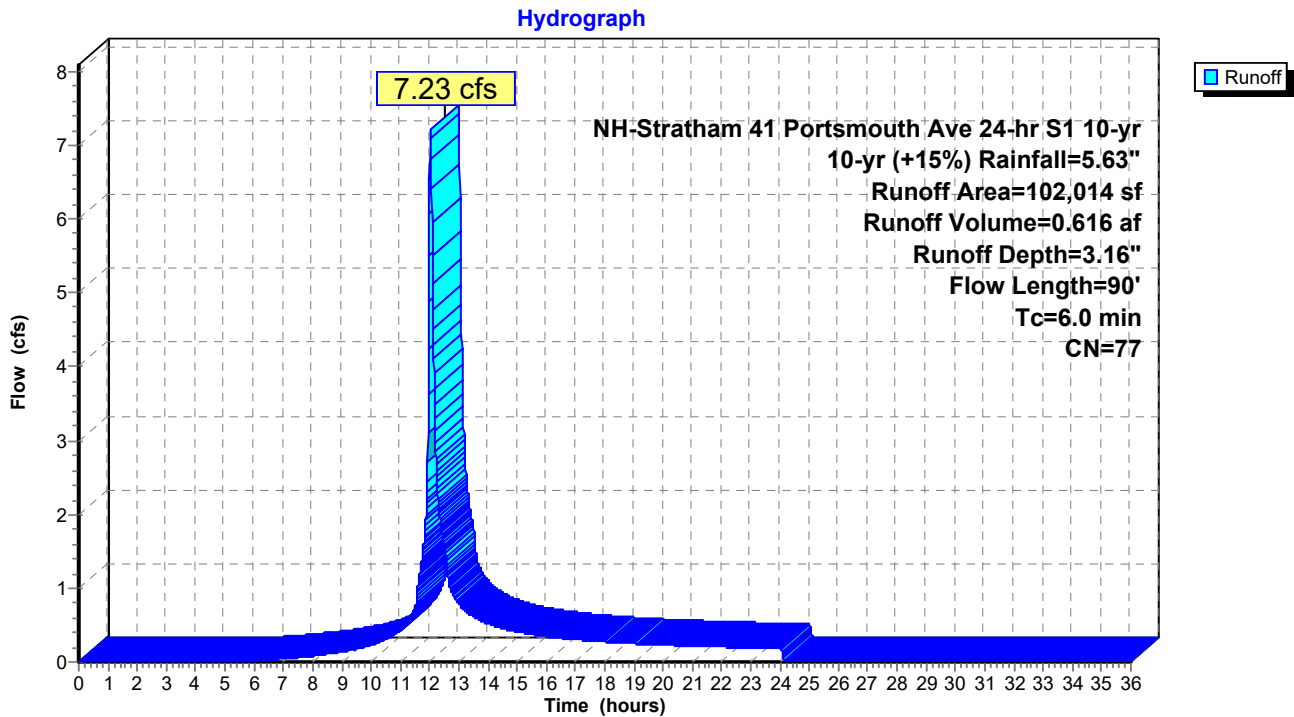
Runoff = 7.23 cfs @ 12.04 hrs, Volume= 0.616 af, Depth= 3.16"  
 Routed to Pond 256P : RIVER ROAD CB

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-36.00 hrs, dt= 0.01 hrs  
 NH-Stratham 41 Portsmouth Ave 24-hr S1 10-yr 10-yr (+15%) Rainfall=5.63"

| Area (sf) | CN | Description                   |
|-----------|----|-------------------------------|
| 86,620    | 74 | >75% Grass cover, Good, HSG C |
| * 892     | 74 | >75% Grass cover, Good, HSG C |
| 14,502    | 98 | Paved parking, HSG C          |
| 102,014   | 77 | Weighted Average              |
| 87,512    |    | 85.78% Pervious Area          |
| 14,502    |    | 14.22% Impervious Area        |

| Tc (min) | Length (feet) | Slope (ft/ft) | Velocity (ft/sec) | Capacity (cfs) | Description                             |
|----------|---------------|---------------|-------------------|----------------|---|
| 4.9      | 50            | 0.0300        | 0.17              |                | <b>Sheet Flow, Grass</b>                |
|          |               |               |                   |                | Grass: Short n= 0.150 P2= 3.10"         |
| 0.3      | 40            | 0.0200        | 2.12              |                | <b>Shallow Concentrated Flow, Grass</b> |
|          |               |               |                   |                | Grassed Waterway Kv= 15.0 fps           |
| 0.8      |               |               |                   |                | <b>Direct Entry, 6 minute minimum</b>   |
| 6.0      | 90            | Total         |                   |                |   |

**Subcatchment 203S: FRONT @ CORNER OF RIVER ROAD**



**Summary for Subcatchment 204S: FRONT OF LOT TO RIVER RD**

Runoff = 1.09 cfs @ 12.04 hrs, Volume= 0.093 af, Depth= 3.16"  
 Routed to Pond 257P : BARNYARD CB

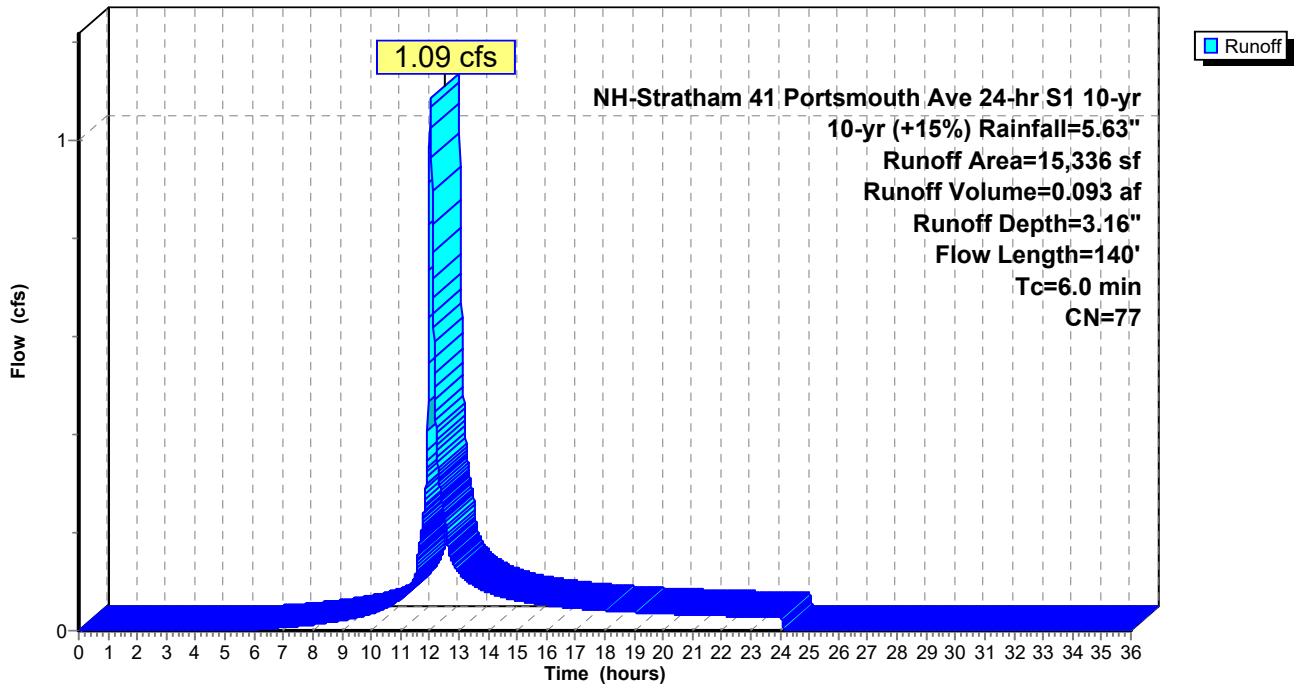
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-36.00 hrs, dt= 0.01 hrs  
 NH-Stratham 41 Portsmouth Ave 24-hr S1 10-yr 10-yr (+15%) Rainfall=5.63"

| Area (sf) | CN | Description                   |
|-----------|----|-------------------------------|
| 1,967     | 98 | Paved parking, HSG C          |
| 13,369    | 74 | >75% Grass cover, Good, HSG C |
| 15,336    | 77 | Weighted Average              |
| 13,369    |    | 87.17% Pervious Area          |
| 1,967     |    | 12.83% Impervious Area        |

| Tc (min) | Length (feet) | Slope (ft/ft) | Velocity (ft/sec) | Capacity (cfs) | Description  |
|----------|---------------|---------------|-------------------|----------------|--|
| 4.3      | 50            | 0.0400        | 0.19              |                | <b>Sheet Flow, Grass</b><br>Grass: Short n= 0.150 P2= 3.10"                |
| 1.2      | 90            | 0.0330        | 1.27              |                | <b>Shallow Concentrated Flow, Grass</b><br>Short Grass Pasture Kv= 7.0 fps |
| 0.5      |               |               |                   |                | <b>Direct Entry, 6 minute minimum</b>                                      |
| 6.0      | 140           | Total         |                   |                |  |

**Subcatchment 204S: FRONT OF LOT TO RIVER RD**

Hydrograph



**Summary for Subcatchment 205S: REGRADED LOT TO RIVER RD**

Runoff = 6.27 cfs @ 12.06 hrs, Volume= 0.594 af, Depth= 3.06"  
 Routed to Pond 258P : 24" HDPE UNDER RIVER ROAD

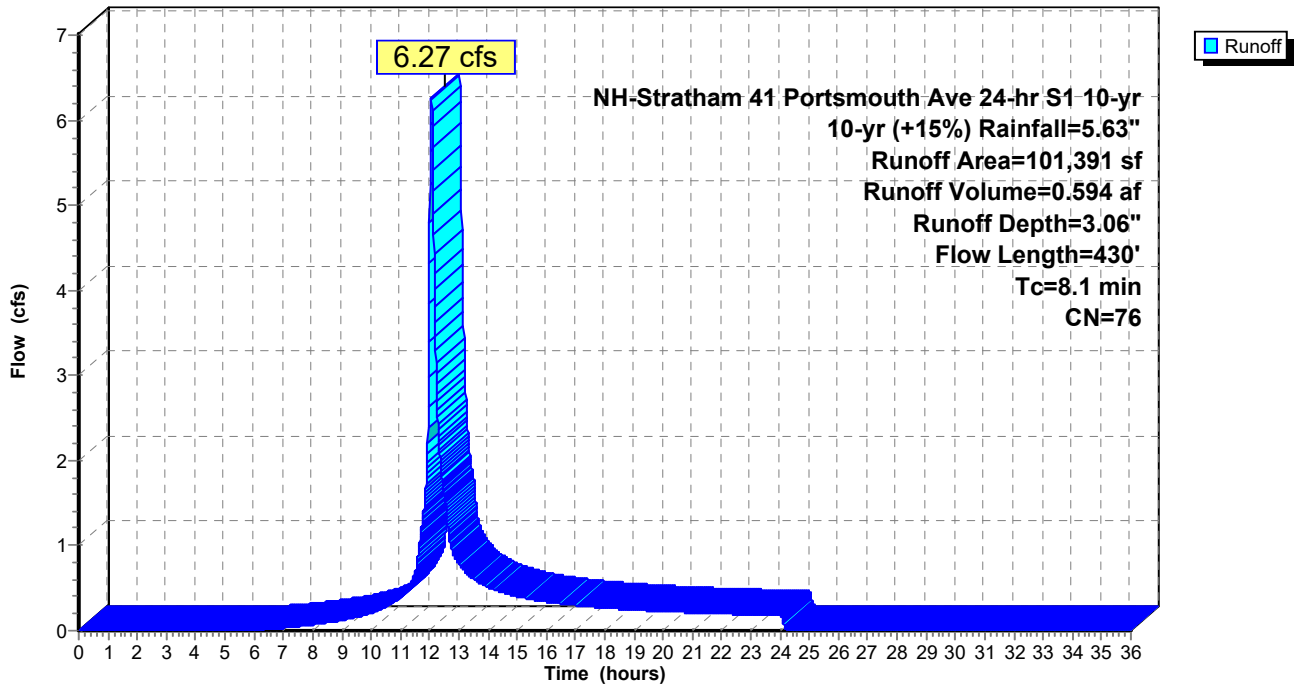
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-36.00 hrs, dt= 0.01 hrs  
 NH-Stratham 41 Portsmouth Ave 24-hr S1 10-yr 10-yr (+15%) Rainfall=5.63"

| Area (sf) | CN | Description  |
|-----------|----|--|
| 9,517     | 98 | Paved parking, HSG C   |
| * 21,065  | 74 | >75% Grass cover, Good, HSG C (Updated From Gravel 12/30/25) |
| 70,809    | 74 | >75% Grass cover, Good, HSG C                                |
| 101,391   | 76 | Weighted Average   |
| 91,874    |    | 90.61% Pervious Area   |
| 9,517     |    | 9.39% Impervious Area  |

| Tc (min) | Length (feet) | Slope (ft/ft) | Velocity (ft/sec) | Capacity (cfs) | Description                             |
|----------|---------------|---------------|-------------------|----------------|---|
| 3.7      | 50            | 0.0600        | 0.23              |                | <b>Sheet Flow, Grass</b>                |
|          |               |               |                   |                | Grass: Short n= 0.150 P2= 3.10"         |
| 4.4      | 380           | 0.0420        | 1.43              |                | <b>Shallow Concentrated Flow, Grass</b> |
|          |               |               |                   |                | Short Grass Pasture Kv= 7.0 fps         |
| 8.1      | 430           | Total         |                   |                |   |

**Subcatchment 205S: REGRADED LOT TO RIVER RD**

Hydrograph



**Summary for Pond 104P: Culvert**

[58] Hint: Peaked 1.16' above defined flood level

Inflow Area = 1.741 ac, 20.64% Impervious, Inflow Depth = 3.35" for 10-yr (+15%) event  
 Inflow = 4.31 cfs @ 12.12 hrs, Volume= 0.486 af  
 Outflow = 4.31 cfs @ 12.12 hrs, Volume= 0.486 af, Atten= 0%, Lag= 0.1 min  
 Primary = 4.31 cfs @ 12.12 hrs, Volume= 0.486 af  
 Routed to Link 9-5 : MAP 9 LOT 5

Routing by Dyn-Stor-Ind method, Time Span= 0.00-36.00 hrs, dt= 0.01 hrs / 2  
 Peak Elev= 82.66' @ 12.12 hrs Surf.Area= 59 sf Storage= 27 cf  
 Flood Elev= 81.50' Storage= 0 cf

Plug-Flow detention time= 0.3 min calculated for 0.486 af (100% of inflow)  
 Center-of-Mass det. time= 0.2 min ( 854.3 - 854.2 )

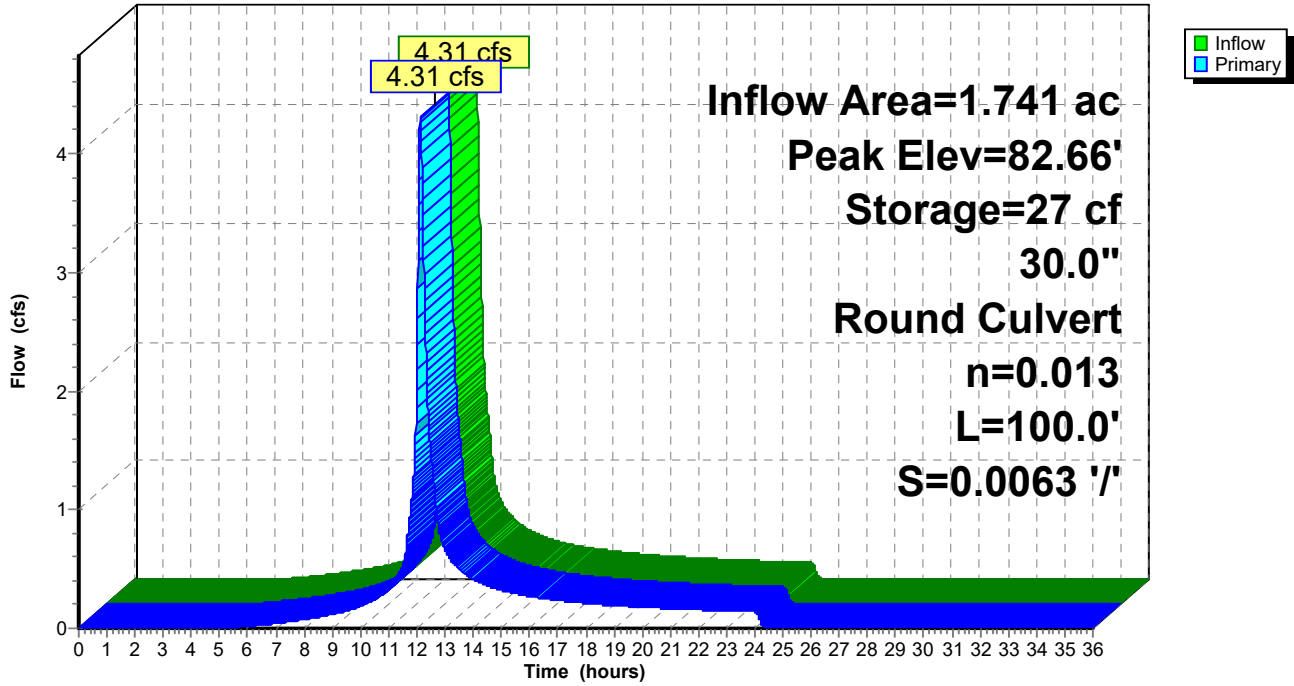
| Volume | Invert | Avail.Storage | Storage Description                                 |
|--------|--------|---------------|---|
| #1     | 81.71' | 858 cf        | <b>3.00'D x 4.00'H Vertical Cone/Cylinder Z=3.0</b> |

| Device | Routing | Invert | Outlet Devices  |
|--------|---------|--------|---|
| #1     | Primary | 81.77' | <b>30.0" Round Culvert</b> L= 100.0' Ke= 0.500<br>Inlet / Outlet Invert= 81.77' / 81.14' S= 0.0063 '/' Cc= 0.900<br>n= 0.013 Corrugated PE, smooth interior, Flow Area= 4.91 sf |

**Primary OutFlow** Max=4.31 cfs @ 12.12 hrs HW=82.66' TW=0.00' (Dynamic Tailwater)  
 ↑**1=Culvert** (Barrel Controls 4.31 cfs @ 4.11 fps)

### Pond 104P: Culvert

Hydrograph



**Summary for Pond 256P: RIVER ROAD CB**

[87] Warning: Oscillations may require smaller dt or Finer Routing (severity=9)

Inflow Area = 2.342 ac, 14.22% Impervious, Inflow Depth = 3.16" for 10-yr (+15%) event  
 Inflow = 7.23 cfs @ 12.04 hrs, Volume= 0.616 af  
 Outflow = 3.73 cfs @ 12.22 hrs, Volume= 0.615 af, Atten= 48%, Lag= 11.0 min  
 Primary = 3.73 cfs @ 12.22 hrs, Volume= 0.615 af  
 Routed to Pond 257P : BARNYARD CB  
 Secondary = 0.00 cfs @ 0.00 hrs, Volume= 0.000 af  
 Routed to Pond 257P : BARNYARD CB

Routing by Dyn-Stor-Ind method, Time Span= 0.00-36.00 hrs, dt= 0.01 hrs / 2  
 Peak Elev= 84.65' @ 12.16 hrs Surf.Area= 4,649 sf Storage= 1,650 cf  
 Flood Elev= 85.90' Surf.Area= 11,013 sf Storage= 11,455 cf

Plug-Flow detention time= 2.9 min calculated for 0.615 af (100% of inflow)  
 Center-of-Mass det. time= 2.0 min ( 857.5 - 855.5 )

| Volume | Invert | Avail.Storage | Storage Description  |
|--------|--------|---------------|--|
| #1     | 78.18' | 75 cf         | <b>4.00'D x 6.00'H Vertical Cone/Cylinder</b>              |
| #2     | 84.18' | 11,380 cf     | <b>Custom Stage Data (Prismatic)</b> Listed below (Recalc) |
|        |        | 11,455 cf     | Total Available Storage                                    |

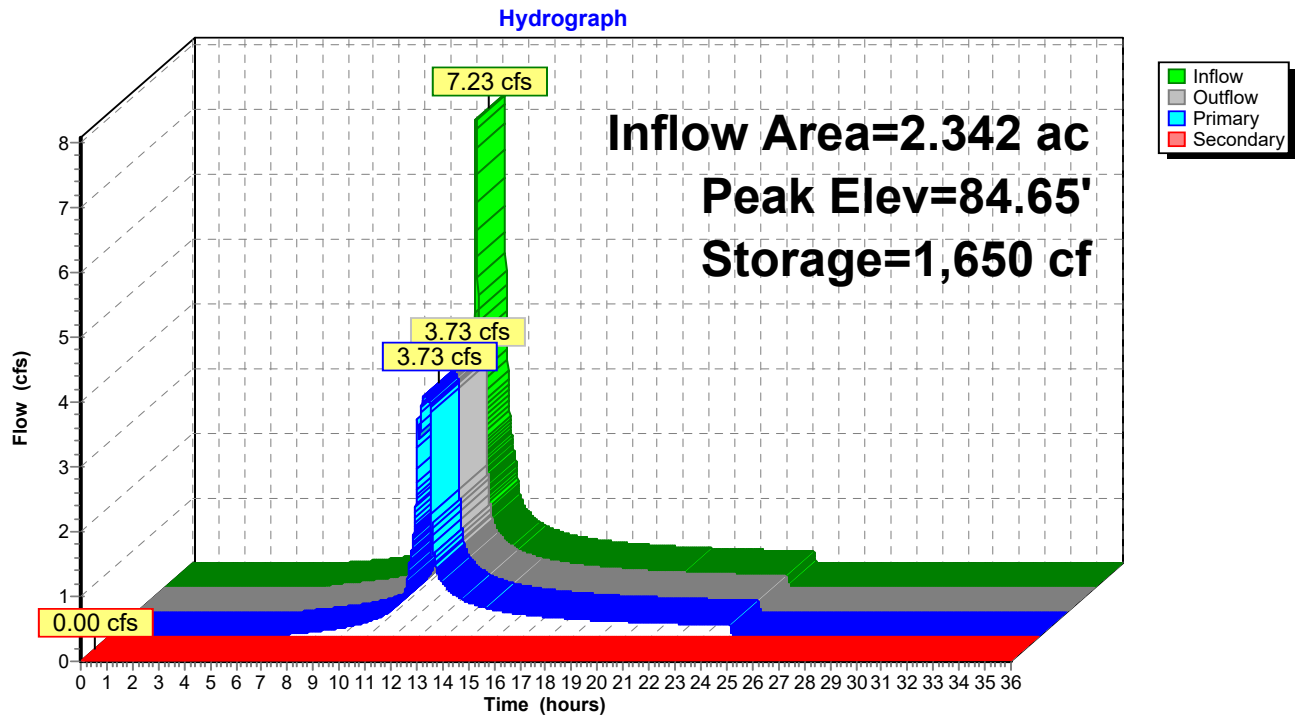
| Elevation (feet) | Surf.Area (sq-ft) | Inc.Store (cubic-feet) | Cum.Store (cubic-feet) |
|------------------|-------------------|------------------------|------------------------|
| 84.18            | 2,000             | 0                      | 0                      |
| 84.90            | 6,000             | 2,880                  | 2,880                  |
| 85.90            | 11,000            | 8,500                  | 11,380                 |

| Device | Routing   | Invert | Outlet Devices  |
|--------|-----------|--------|---|
| #1     | Primary   | 81.40' | <b>12.0" Round Culvert</b><br>L= 120.0' RCP, sq.cut end projecting, Ke= 0.500<br>Inlet / Outlet Invert= 81.40' / 80.90' S= 0.0042 ' / Cc= 0.900<br>n= 0.011 Concrete pipe, straight & clean, Flow Area= 0.79 sf |
| #2     | Secondary | 85.15' | <b>50.0' long x 120.0' breadth Broad-Crested Rectangular Weir</b><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=3.70 cfs @ 12.22 hrs HW=84.63' TW=83.18' (Dynamic Tailwater)  
 ↑1=Culvert (Outlet Controls 3.70 cfs @ 4.71 fps)

**Secondary OutFlow** Max=0.00 cfs @ 0.00 hrs HW=78.18' TW=77.56' (Dynamic Tailwater)  
 ↑2=Broad-Crested Rectangular Weir ( Controls 0.00 cfs)

### Pond 256P: RIVER ROAD CB



**Summary for Pond 257P: BARNYARD CB**

Inflow Area = 2.694 ac, 14.03% Impervious, Inflow Depth = 3.15" for 10-yr (+15%) event  
 Inflow = 4.35 cfs @ 12.08 hrs, Volume= 0.708 af  
 Outflow = 4.32 cfs @ 12.09 hrs, Volume= 0.707 af, Atten= 1%, Lag= 0.4 min  
 Primary = 4.32 cfs @ 12.09 hrs, Volume= 0.707 af  
 Routed to Pond 258P : 24" HDPE UNDER RIVER ROAD  
 Secondary = 0.00 cfs @ 0.00 hrs, Volume= 0.000 af  
 Routed to Pond 258P : 24" HDPE UNDER RIVER ROAD

Routing by Dyn-Stor-Ind method, Time Span= 0.00-36.00 hrs, dt= 0.01 hrs / 2  
 Peak Elev= 83.33' @ 12.09 hrs Surf.Area= 13 sf Storage= 73 cf  
 Flood Elev= 84.40' Surf.Area= 3,994 sf Storage= 1,256 cf

Plug-Flow detention time= 1.5 min calculated for 0.707 af (100% of inflow)  
 Center-of-Mass det. time= 0.8 min ( 858.0 - 857.3 )

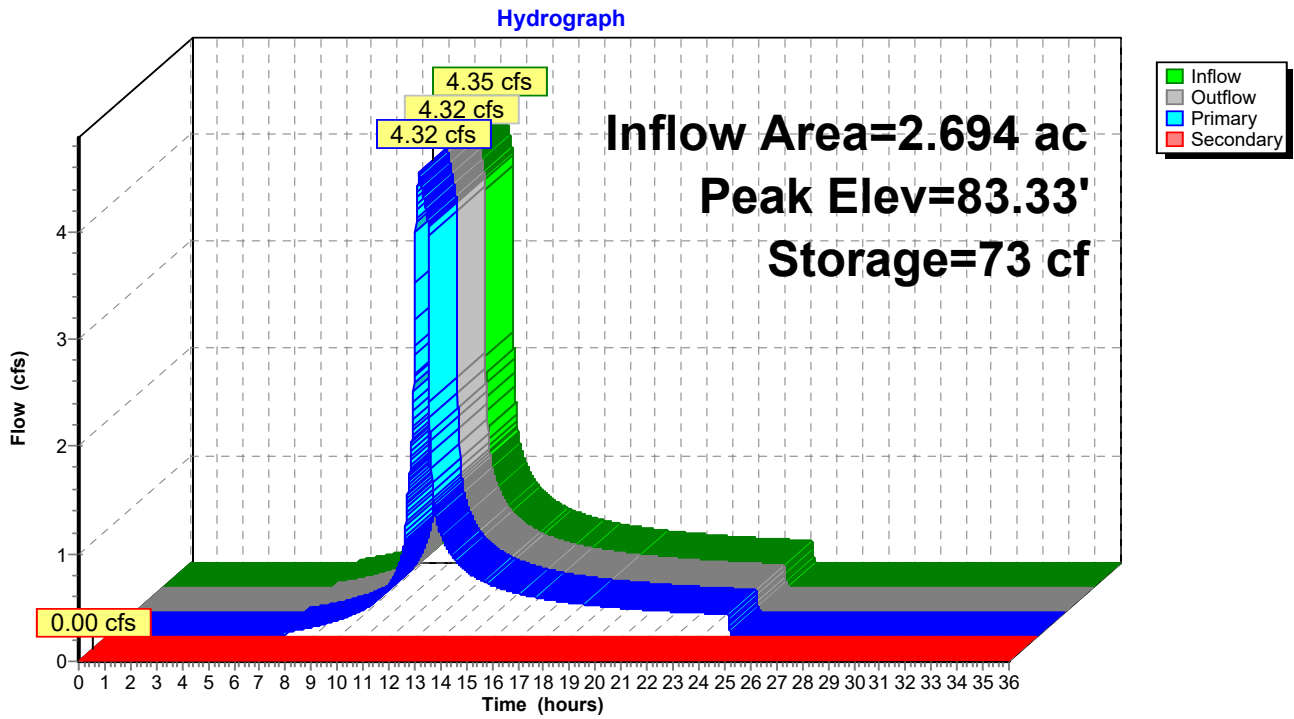
| Volume | Invert | Avail.Storage | Storage Description                                  |
|--------|--------|---------------|--|
| #1     | 77.56' | 75 cf         | <b>4.00'D x 6.00'H Vertical Cone/Cylinder</b>        |
| #2     | 83.56' | 1,939 cf      | <b>4.00'D x 1.00'H Vertical Cone/Cylinder Z=40.0</b> |
|        |        | 2,015 cf      | Total Available Storage                              |

| Device | Routing   | Invert | Outlet Devices  |
|--------|-----------|--------|---|
| #1     | Primary   | 80.65' | <b>12.0" Round Culvert</b><br>L= 130.0' RCP, groove end projecting, Ke= 0.200<br>Inlet / Outlet Invert= 80.65' / 80.40' S= 0.0019 '/' Cc= 0.900<br>n= 0.011 Concrete pipe, straight & clean, Flow Area= 0.79 sf |
| #2     | Secondary | 84.40' | <b>50.0' long x 120.0' breadth Broad-Crested Rectangular Weir</b><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=4.32 cfs @ 12.09 hrs HW=83.33' TW=81.11' (Dynamic Tailwater)  
 ↑1=Culvert (Barrel Controls 4.32 cfs @ 5.50 fps)

**Secondary OutFlow** Max=0.00 cfs @ 0.00 hrs HW=77.56' TW=79.40' (Dynamic Tailwater)  
 ↑2=Broad-Crested Rectangular Weir ( Controls 0.00 cfs)

### Pond 257P: BARNYARD CB



**Summary for Pond 258P: 24" HDPE UNDER RIVER ROAD**

Inflow Area = 5.022 ac, 11.88% Impervious, Inflow Depth = 3.11" for 10-yr (+15%) event  
 Inflow = 10.58 cfs @ 12.07 hrs, Volume= 1.301 af  
 Outflow = 8.82 cfs @ 12.14 hrs, Volume= 1.301 af, Atten= 17%, Lag= 4.7 min  
 Primary = 8.82 cfs @ 12.14 hrs, Volume= 1.301 af  
 Routed to Link 9-2 : MAP 9 LOT 2  
 Secondary = 0.00 cfs @ 0.00 hrs, Volume= 0.000 af  
 Routed to Link 9-2 : MAP 9 LOT 2

Routing by Dyn-Stor-Ind method, Time Span= 0.00-36.00 hrs, dt= 0.01 hrs / 2  
 Peak Elev= 81.16' @ 12.14 hrs Surf.Area= 3,066 sf Storage= 2,679 cf

Plug-Flow detention time= 5.6 min calculated for 1.301 af (100% of inflow)  
 Center-of-Mass det. time= 5.5 min ( 865.0 - 859.4 )

| Volume | Invert | Avail.Storage | Storage Description                               |
|--------|--------|---------------|---|
| #1     | 79.40' | 58,406 cf     | <b>Custom Stage Data (Prismatic)</b> Listed below |

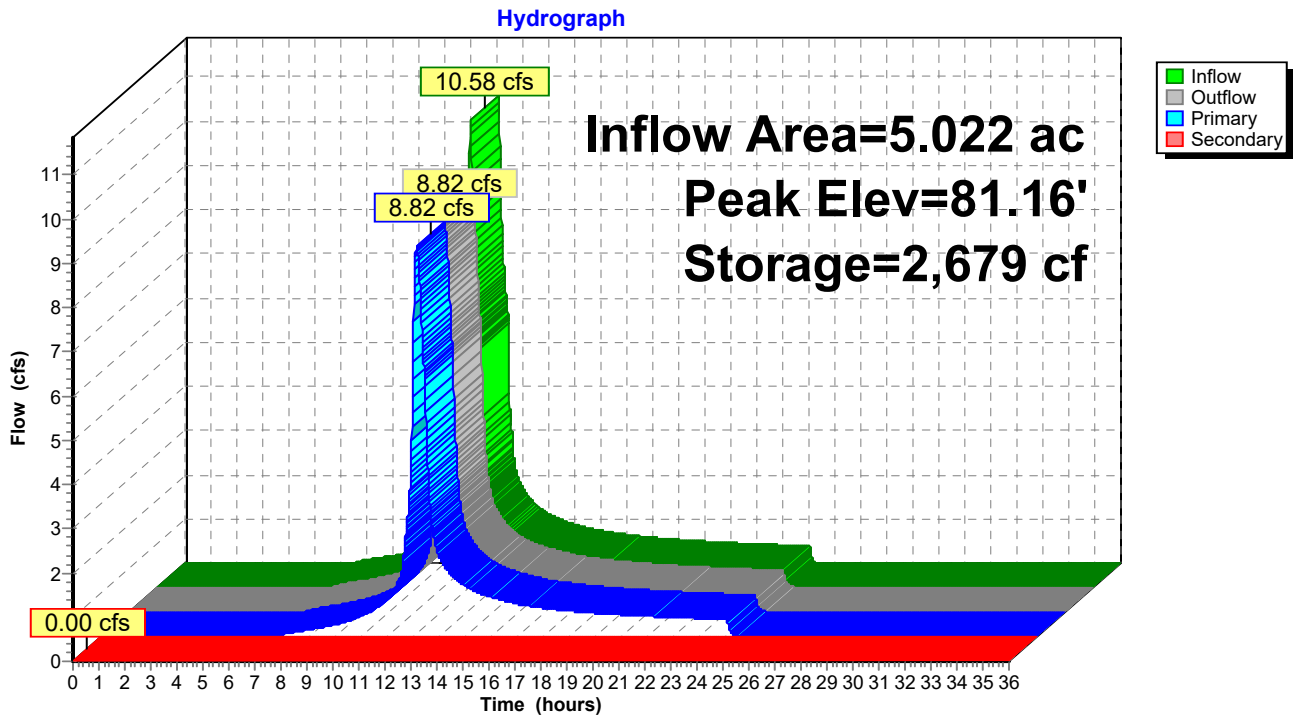
| Elevation (feet) | Surf.Area (sq-ft) | Inc.Store (cubic-feet) | Cum.Store (cubic-feet) |
|------------------|-------------------|------------------------|------------------------|
| 79.40            | 0                 | 0                      | 0                      |
| 79.60            | 53                | 5                      | 5                      |
| 80.00            | 1,000             | 211                    | 216                    |
| 81.00            | 2,700             | 1,850                  | 2,066                  |
| 82.00            | 5,000             | 3,850                  | 5,916                  |
| 83.00            | 8,990             | 6,995                  | 12,911                 |
| 84.00            | 16,000            | 12,495                 | 25,406                 |
| 85.00            | 50,000            | 33,000                 | 58,406                 |

| Device | Routing   | Invert | Outlet Devices  |
|--------|-----------|--------|---|
| #1     | Primary   | 79.60' | <b>24.0" Round Culvert</b><br>L= 50.0' CPP, projecting, no headwall, Ke= 0.900<br>Inlet / Outlet Invert= 79.60' / 78.86' S= 0.0148 '/' Cc= 0.900<br>n= 0.013 Corrugated PE, smooth interior, Flow Area= 3.14 sf |
| #2     | Secondary | 83.19' | <b>50.0' long x 22.0' breadth Broad-Crested Rectangular Weir</b><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=8.82 cfs @ 12.14 hrs HW=81.16' TW=0.00' (Dynamic Tailwater)  
 ↑1=Culvert (Inlet Controls 8.82 cfs @ 3.36 fps)

**Secondary OutFlow** Max=0.00 cfs @ 0.00 hrs HW=79.40' TW=0.00' (Dynamic Tailwater)  
 ↑2=Broad-Crested Rectangular Weir ( Controls 0.00 cfs)

### Pond 258P: 24" HDPE UNDER RIVER ROAD



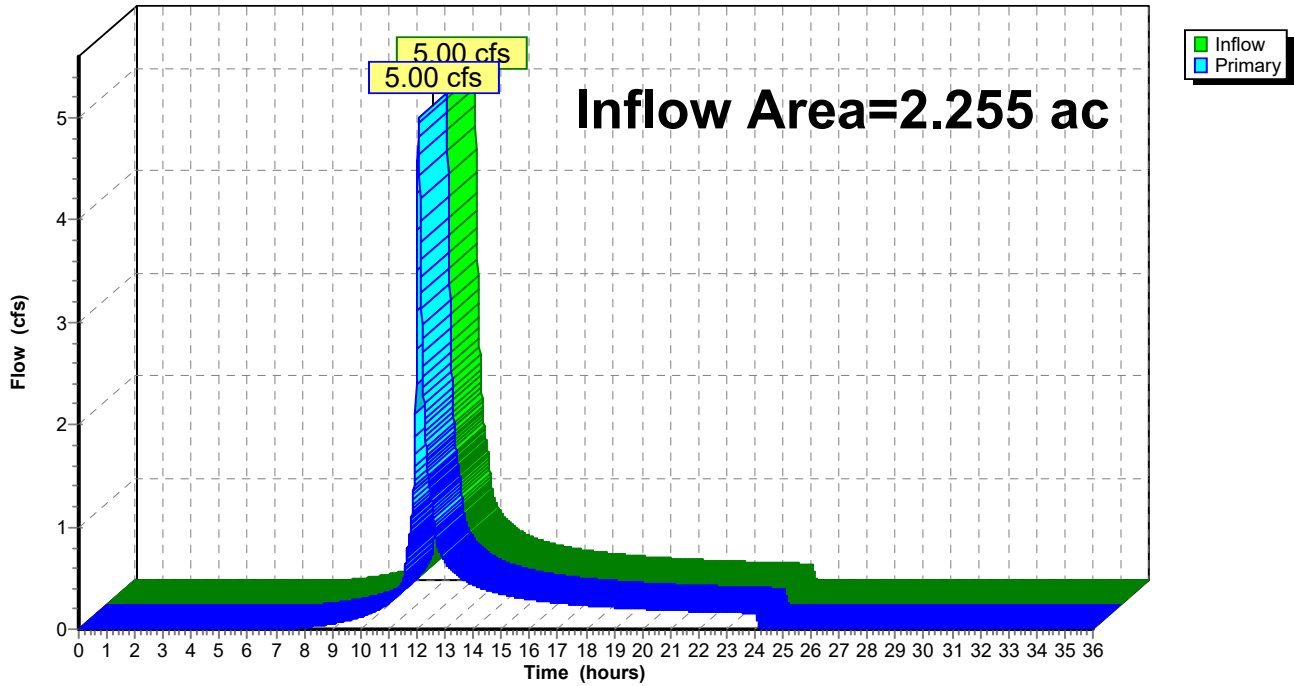
### Summary for Link 8-64: MAP 8 LOT 64

Inflow Area = 2.255 ac, 4.31% Impervious, Inflow Depth = 2.51" for 10-yr (+15%) event  
Inflow = 5.00 cfs @ 12.06 hrs, Volume= 0.473 af  
Primary = 5.00 cfs @ 12.06 hrs, Volume= 0.473 af, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 0.00-36.00 hrs, dt= 0.01 hrs

### Link 8-64: MAP 8 LOT 64

Hydrograph



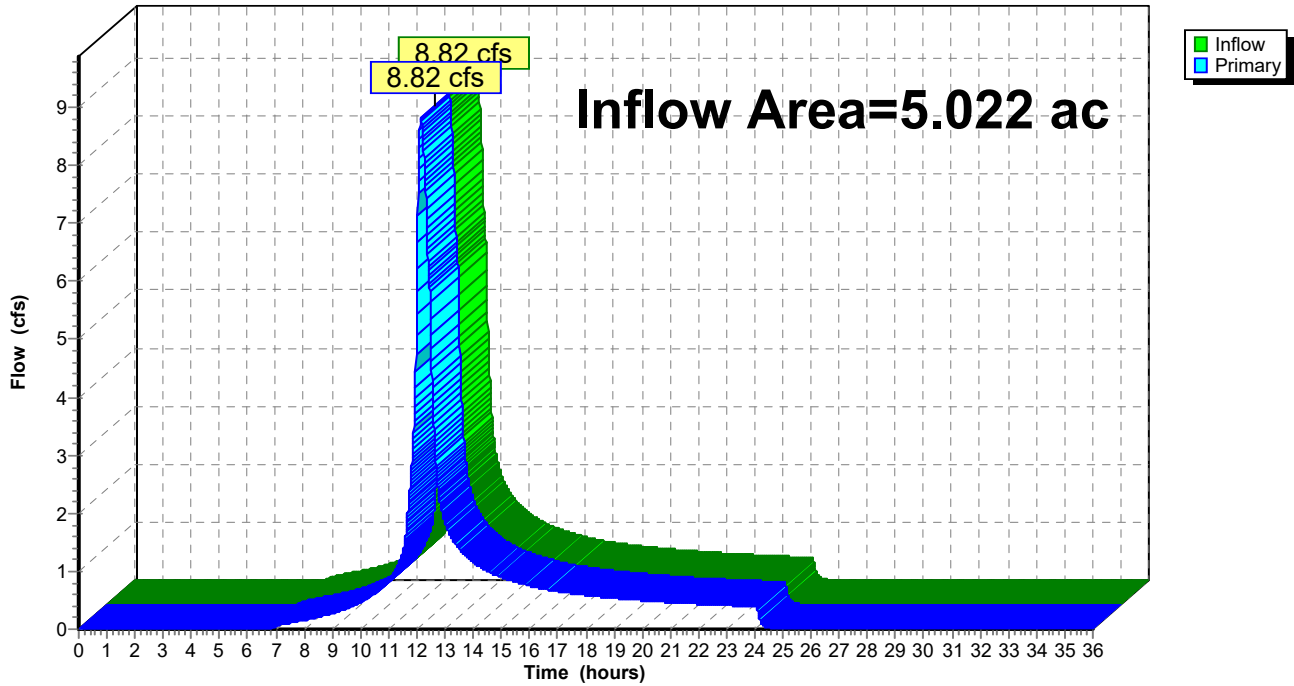
### Summary for Link 9-2: MAP 9 LOT 2

Inflow Area = 5.022 ac, 11.88% Impervious, Inflow Depth = 3.11" for 10-yr (+15%) event  
Inflow = 8.82 cfs @ 12.14 hrs, Volume= 1.301 af  
Primary = 8.82 cfs @ 12.14 hrs, Volume= 1.301 af, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 0.00-36.00 hrs, dt= 0.01 hrs

### Link 9-2: MAP 9 LOT 2

Hydrograph



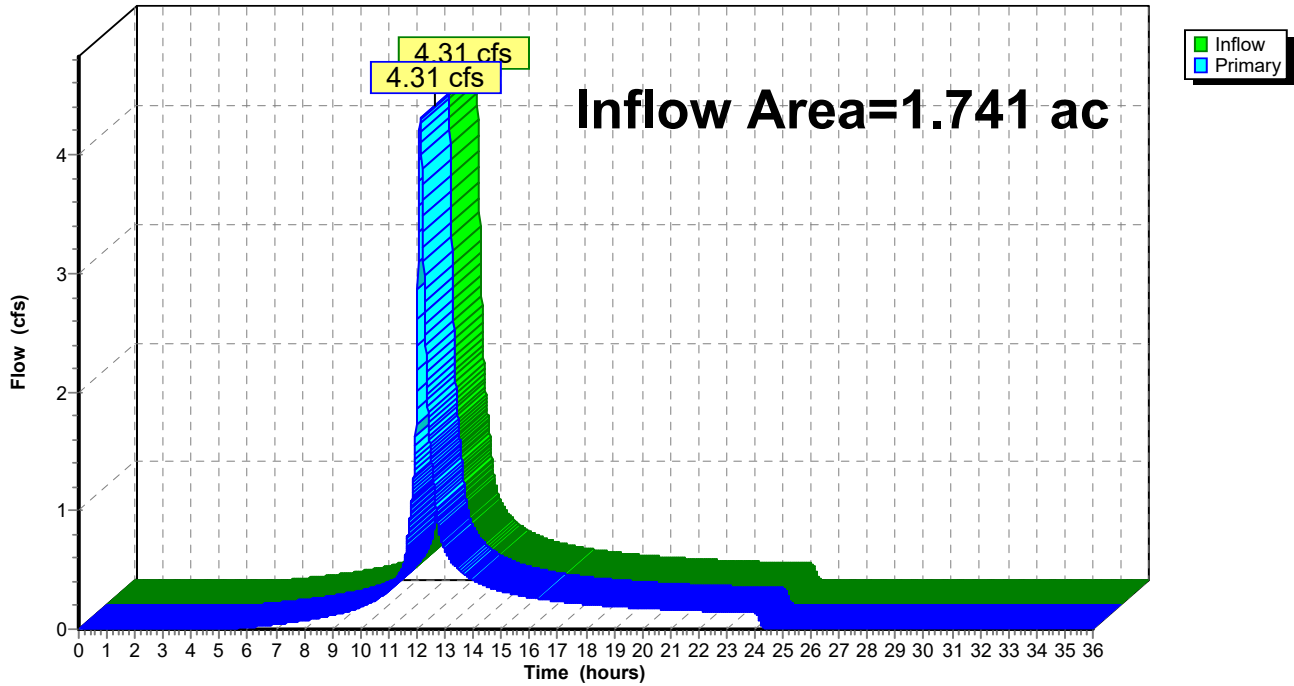
### Summary for Link 9-5: MAP 9 LOT 5

Inflow Area = 1.741 ac, 20.64% Impervious, Inflow Depth = 3.35" for 10-yr (+15%) event  
Inflow = 4.31 cfs @ 12.12 hrs, Volume= 0.486 af  
Primary = 4.31 cfs @ 12.12 hrs, Volume= 0.486 af, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 0.00-36.00 hrs, dt= 0.01 hrs

### Link 9-5: MAP 9 LOT 5

Hydrograph



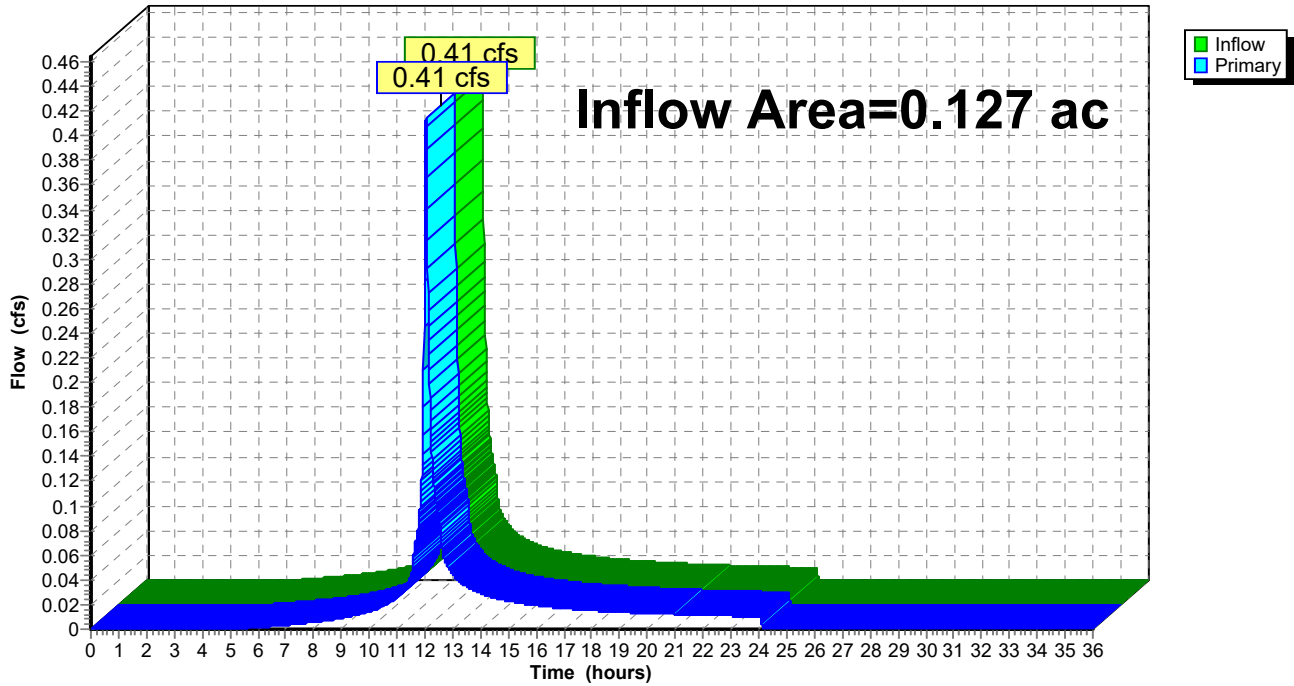
### Summary for Link RR: RIVER ROAD

Inflow Area = 0.127 ac, 48.92% Impervious, Inflow Depth = 3.35" for 10-yr (+15%) event  
Inflow = 0.41 cfs @ 12.04 hrs, Volume= 0.035 af  
Primary = 0.41 cfs @ 12.04 hrs, Volume= 0.035 af, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 0.00-36.00 hrs, dt= 0.01 hrs

### Link RR: RIVER ROAD

Hydrograph



Time span=0.00-36.00 hrs, dt=0.01 hrs, 3601 points x 2  
 Runoff by SCS TR-20 method, UH=SCS, Weighted-CN  
 Reach routing by Dyn-Stor-Ind method - Pond routing by Dyn-Stor-Ind method

**Subcatchment200S: DRIVEWAY** Runoff Area=5,515 sf 48.92% Impervious Runoff Depth=0.07"  
 Flow Length=192' Tc=6.0 min CN=79 Runoff=0.00 cfs 0.001 af

**Subcatchment201S: HILL RUNNING OFF** Runoff Area=98,244 sf 4.31% Impervious Runoff Depth=0.00"  
 Flow Length=567' Tc=7.7 min CN=70 Runoff=0.00 cfs 0.001 af

**Subcatchment202S: ACCESS DRIVE,** Runoff Area=75,836 sf 20.64% Impervious Runoff Depth=0.07"  
 Flow Length=675' Tc=12.4 min CN=79 Runoff=0.02 cfs 0.010 af

**Subcatchment203S: FRONT @ CORNER** Runoff Area=102,014 sf 14.22% Impervious Runoff Depth=0.05"  
 Flow Length=90' Tc=6.0 min CN=77 Runoff=0.01 cfs 0.009 af

**Subcatchment204S: FRONT OF LOT TO** Runoff Area=15,336 sf 12.83% Impervious Runoff Depth=0.05"  
 Flow Length=140' Tc=6.0 min CN=77 Runoff=0.00 cfs 0.001 af

**Subcatchment205S: REGRADED LOT TO** Runoff Area=101,391 sf 9.39% Impervious Runoff Depth=0.04"  
 Flow Length=430' Tc=8.1 min CN=76 Runoff=0.01 cfs 0.007 af

**Pond 104P: Culvert** Peak Elev=81.83' Storage=1 cf Inflow=0.02 cfs 0.010 af  
 30.0" Round Culvert n=0.013 L=100.0' S=0.0063 '/ Outflow=0.02 cfs 0.010 af

**Pond 256P: RIVER ROAD CB** Peak Elev=81.46' Storage=41 cf Inflow=0.01 cfs 0.009 af  
 Primary=0.01 cfs 0.008 af Secondary=0.00 cfs 0.000 af Outflow=0.01 cfs 0.008 af

**Pond 257P: BARNYARDCB** Peak Elev=80.73' Storage=40 cf Inflow=0.01 cfs 0.010 af  
 Primary=0.01 cfs 0.009 af Secondary=0.00 cfs 0.000 af Outflow=0.01 cfs 0.009 af

**Pond 258P: 24" HDPE UNDER RIVER ROAD** Peak Elev=79.66' Storage=39 cf Inflow=0.02 cfs 0.016 af  
 Primary=0.02 cfs 0.016 af Secondary=0.00 cfs 0.000 af Outflow=0.02 cfs 0.016 af

**Link 8-64: MAP 8 LOT 64** Inflow=0.00 cfs 0.001 af  
 Primary=0.00 cfs 0.001 af

**Link 9-2: MAP 9 LOT 2** Inflow=0.02 cfs 0.016 af  
 Primary=0.02 cfs 0.016 af

**Link 9-5: MAP 9 LOT 5** Inflow=0.02 cfs 0.010 af  
 Primary=0.02 cfs 0.010 af

**Link RR: RIVER ROAD** Inflow=0.00 cfs 0.001 af  
 Primary=0.00 cfs 0.001 af

**Total Runoff Area = 9.145 ac Runoff Volume = 0.030 af Average Runoff Depth = 0.04"**  
**87.81% Pervious = 8.029 ac 12.19% Impervious = 1.115 ac**

**Predevelopment 06-0 NH-Stratham 41 Portsmouth Ave 24-hr S1 2-yr 2-yr (+15%) Rainfall=3.70"**

Prepared by Emanuel Engineering

Printed 3/23/2026

HydroCAD® 10.20-8a s/n 01104 © 2025 HydroCAD Software Solutions LLC

Page 2

Time span=0.00-36.00 hrs, dt=0.01 hrs, 3601 points x 2  
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN  
Reach routing by Dyn-Stor-Ind method - Pond routing by Dyn-Stor-Ind method

**Subcatchment200S: DRIVEWAY** Runoff Area=5,515 sf 48.92% Impervious Runoff Depth=1.72"  
Flow Length=192' Tc=6.0 min CN=79 Runoff=0.24 cfs 0.018 af

**Subcatchment201S: HILL RUNNING OFF** Runoff Area=98,244 sf 4.31% Impervious Runoff Depth=1.13"  
Flow Length=567' Tc=7.7 min CN=70 Runoff=2.38 cfs 0.213 af

**Subcatchment202S: ACCESS DRIVE,** Runoff Area=75,836 sf 20.64% Impervious Runoff Depth=1.72"  
Flow Length=675' Tc=12.4 min CN=79 Runoff=2.46 cfs 0.250 af

**Subcatchment203S: FRONT @ CORNER** Runoff Area=102,014 sf 14.22% Impervious Runoff Depth=1.58"  
Flow Length=90' Tc=6.0 min CN=77 Runoff=4.06 cfs 0.308 af

**Subcatchment204S: FRONT OF LOT TO** Runoff Area=15,336 sf 12.83% Impervious Runoff Depth=1.58"  
Flow Length=140' Tc=6.0 min CN=77 Runoff=0.61 cfs 0.046 af

**Subcatchment205S: REGRADED LOT TO** Runoff Area=101,391 sf 9.39% Impervious Runoff Depth=1.51"  
Flow Length=430' Tc=8.1 min CN=76 Runoff=3.43 cfs 0.293 af

**Pond 104P: Culvert** Peak Elev=82.43' Storage=16 cf Inflow=2.46 cfs 0.250 af  
30.0" Round Culvert n=0.013 L=100.0' S=0.0063 '/ Outflow=2.46 cfs 0.250 af

**Pond 256P: RIVER ROAD CB** Peak Elev=84.24' Storage=205 cf Inflow=4.06 cfs 0.308 af  
Primary=3.49 cfs 0.308 af Secondary=0.00 cfs 0.000 af Outflow=3.49 cfs 0.308 af

**Pond 257P: BARNYARD CB** Peak Elev=83.02' Storage=69 cf Inflow=3.95 cfs 0.354 af  
Primary=3.95 cfs 0.353 af Secondary=0.00 cfs 0.000 af Outflow=3.95 cfs 0.353 af

**Pond 258P: 24" HDPE UNDER RIVER ROAD** Peak Elev=80.87' Storage=1,832 cf Inflow=7.37 cfs 0.646 af  
Primary=6.40 cfs 0.646 af Secondary=0.00 cfs 0.000 af Outflow=6.40 cfs 0.646 af

**Link 8-64: MAP 8 LOT 64** Inflow=2.38 cfs 0.213 af  
Primary=2.38 cfs 0.213 af

**Link 9-2: MAP 9 LOT 2** Inflow=6.40 cfs 0.646 af  
Primary=6.40 cfs 0.646 af

**Link 9-5: MAP 9 LOT 5** Inflow=2.46 cfs 0.250 af  
Primary=2.46 cfs 0.250 af

**Link RR: RIVER ROAD** Inflow=0.24 cfs 0.018 af  
Primary=0.24 cfs 0.018 af

**Total Runoff Area = 9.145 ac Runoff Volume = 1.129 af Average Runoff Depth = 1.48"**  
**87.81% Pervious = 8.029 ac 12.19% Impervious = 1.115 ac**

Time span=0.00-36.00 hrs, dt=0.01 hrs, 3601 points x 2  
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN  
Reach routing by Dyn-Stor-Ind method - Pond routing by Dyn-Stor-Ind method

**Subcatchment200S: DRIVEWAY** Runoff Area=5,515 sf 48.92% Impervious Runoff Depth=3.35"  
Flow Length=192' Tc=6.0 min CN=79 Runoff=0.41 cfs 0.035 af

**Subcatchment201S: HILL RUNNING OFF** Runoff Area=98,244 sf 4.31% Impervious Runoff Depth=2.51"  
Flow Length=567' Tc=7.7 min CN=70 Runoff=5.00 cfs 0.473 af

**Subcatchment202S: ACCESS DRIVE,** Runoff Area=75,836 sf 20.64% Impervious Runoff Depth=3.35"  
Flow Length=675' Tc=12.4 min CN=79 Runoff=4.31 cfs 0.486 af

**Subcatchment203S: FRONT @ CORNER** Runoff Area=102,014 sf 14.22% Impervious Runoff Depth=3.16"  
Flow Length=90' Tc=6.0 min CN=77 Runoff=7.23 cfs 0.616 af

**Subcatchment204S: FRONT OF LOT TO** Runoff Area=15,336 sf 12.83% Impervious Runoff Depth=3.16"  
Flow Length=140' Tc=6.0 min CN=77 Runoff=1.09 cfs 0.093 af

**Subcatchment205S: REGRADED LOT TO** Runoff Area=101,391 sf 9.39% Impervious Runoff Depth=3.06"  
Flow Length=430' Tc=8.1 min CN=76 Runoff=6.27 cfs 0.594 af

**Pond 104P: Culvert** Peak Elev=82.66' Storage=27 cf Inflow=4.31 cfs 0.486 af  
30.0" Round Culvert n=0.013 L=100.0' S=0.0063 '/ Outflow=4.31 cfs 0.486 af

**Pond 256P: RIVER ROAD CB** Peak Elev=84.65' Storage=1,650 cf Inflow=7.23 cfs 0.616 af  
Primary=3.73 cfs 0.615 af Secondary=0.00 cfs 0.000 af Outflow=3.73 cfs 0.615 af

**Pond 257P: BARNYARDCB** Peak Elev=83.33' Storage=73 cf Inflow=4.35 cfs 0.708 af  
Primary=4.32 cfs 0.707 af Secondary=0.00 cfs 0.000 af Outflow=4.32 cfs 0.707 af

**Pond 258P: 24" HDPE UNDER RIVER ROAD** Peak Elev=81.16' Storage=2,679 cf Inflow=10.58 cfs 1.301 af  
Primary=8.82 cfs 1.301 af Secondary=0.00 cfs 0.000 af Outflow=8.82 cfs 1.301 af

**Link 8-64: MAP 8 LOT 64** Inflow=5.00 cfs 0.473 af  
Primary=5.00 cfs 0.473 af

**Link 9-2: MAP 9 LOT 2** Inflow=8.82 cfs 1.301 af  
Primary=8.82 cfs 1.301 af

**Link 9-5: MAP 9 LOT 5** Inflow=4.31 cfs 0.486 af  
Primary=4.31 cfs 0.486 af

**Link RR: RIVER ROAD** Inflow=0.41 cfs 0.035 af  
Primary=0.41 cfs 0.035 af

**Total Runoff Area = 9.145 ac Runoff Volume = 2.297 af Average Runoff Depth = 3.01"**  
**87.81% Pervious = 8.029 ac 12.19% Impervious = 1.115 ac**

Time span=0.00-36.00 hrs, dt=0.01 hrs, 3601 points x 2  
 Runoff by SCS TR-20 method, UH=SCS, Weighted-CN  
 Reach routing by Dyn-Stor-Ind method - Pond routing by Dyn-Stor-Ind method

**Subcatchment200S: DRIVEWAY** Runoff Area=5,515 sf 48.92% Impervious Runoff Depth=4.73"  
 Flow Length=192' Tc=6.0 min CN=79 Runoff=0.55 cfs 0.050 af

**Subcatchment201S: HILL RUNNING OFF** Runoff Area=98,244 sf 4.31% Impervious Runoff Depth=3.75"  
 Flow Length=567' Tc=7.7 min CN=70 Runoff=7.13 cfs 0.705 af

**Subcatchment202S: ACCESS DRIVE,** Runoff Area=75,836 sf 20.64% Impervious Runoff Depth=4.73"  
 Flow Length=675' Tc=12.4 min CN=79 Runoff=5.74 cfs 0.686 af

**Subcatchment203S: FRONT @ CORNER** Runoff Area=102,014 sf 14.22% Impervious Runoff Depth=4.51"  
 Flow Length=90' Tc=6.0 min CN=77 Runoff=9.69 cfs 0.880 af

**Subcatchment204S: FRONT OF LOT TO** Runoff Area=15,336 sf 12.83% Impervious Runoff Depth=4.51"  
 Flow Length=140' Tc=6.0 min CN=77 Runoff=1.46 cfs 0.132 af

**Subcatchment205S: REGRADED LOT TO** Runoff Area=101,391 sf 9.39% Impervious Runoff Depth=4.40"  
 Flow Length=430' Tc=8.1 min CN=76 Runoff=8.50 cfs 0.853 af

**Pond 104P: Culvert** Peak Elev=82.81' Storage=37 cf Inflow=5.74 cfs 0.686 af  
 30.0" Round Culvert n=0.013 L=100.0' S=0.0063 '/ Outflow=5.74 cfs 0.686 af

**Pond 256P: RIVER ROAD CB** Peak Elev=84.95' Storage=3,272 cf Inflow=9.69 cfs 0.880 af  
 Primary=3.89 cfs 0.879 af Secondary=0.00 cfs 0.000 af Outflow=3.89 cfs 0.879 af

**Pond 257P: BARNYARDCB** Peak Elev=83.61' Storage=77 cf Inflow=4.62 cfs 1.012 af  
 Primary=4.61 cfs 1.011 af Secondary=0.00 cfs 0.000 af Outflow=4.61 cfs 1.011 af

**Pond 258P: 24" HDPE UNDER RIVER ROAD** Peak Elev=81.37' Storage=3,488 cf Inflow=13.11 cfs 1.864 af  
 Primary=10.51 cfs 1.864 af Secondary=0.00 cfs 0.000 af Outflow=10.51 cfs 1.864 af

**Link 8-64: MAP 8 LOT 64** Inflow=7.13 cfs 0.705 af  
 Primary=7.13 cfs 0.705 af

**Link 9-2: MAP 9 LOT 2** Inflow=10.51 cfs 1.864 af  
 Primary=10.51 cfs 1.864 af

**Link 9-5: MAP 9 LOT 5** Inflow=5.74 cfs 0.686 af  
 Primary=5.74 cfs 0.686 af

**Link RR: RIVER ROAD** Inflow=0.55 cfs 0.050 af  
 Primary=0.55 cfs 0.050 af

**Total Runoff Area = 9.145 ac Runoff Volume = 3.307 af Average Runoff Depth = 4.34"**  
**87.81% Pervious = 8.029 ac 12.19% Impervious = 1.115 ac**

Time span=0.00-36.00 hrs, dt=0.01 hrs, 3601 points x 2  
 Runoff by SCS TR-20 method, UH=SCS, Weighted-CN  
 Reach routing by Dyn-Stor-Ind method - Pond routing by Dyn-Stor-Ind method

**Subcatchment200S: DRIVEWAY** Runoff Area=5,515 sf 48.92% Impervious Runoff Depth=6.07"  
 Flow Length=192' Tc=6.0 min CN=79 Runoff=0.67 cfs 0.064 af

**Subcatchment201S: HILL RUNNING OFF** Runoff Area=98,244 sf 4.31% Impervious Runoff Depth=4.98"  
 Flow Length=567' Tc=7.7 min CN=70 Runoff=9.07 cfs 0.937 af

**Subcatchment202S: ACCESS DRIVE,** Runoff Area=75,836 sf 20.64% Impervious Runoff Depth=6.07"  
 Flow Length=675' Tc=12.4 min CN=79 Runoff=7.01 cfs 0.880 af

**Subcatchment203S: FRONT @ CORNER** Runoff Area=102,014 sf 14.22% Impervious Runoff Depth=5.83"  
 Flow Length=90' Tc=6.0 min CN=77 Runoff=11.87 cfs 1.137 af

**Subcatchment204S: FRONT OF LOT TO** Runoff Area=15,336 sf 12.83% Impervious Runoff Depth=5.83"  
 Flow Length=140' Tc=6.0 min CN=77 Runoff=1.79 cfs 0.171 af

**Subcatchment205S: REGRADED LOT TO** Runoff Area=101,391 sf 9.39% Impervious Runoff Depth=5.71"  
 Flow Length=430' Tc=8.1 min CN=76 Runoff=10.49 cfs 1.107 af

**Pond 104P: Culvert** Peak Elev=82.93' Storage=47 cf Inflow=7.01 cfs 0.880 af  
 30.0" Round Culvert n=0.013 L=100.0' S=0.0063 '/ Outflow=7.01 cfs 0.880 af

**Pond 256P: RIVER ROAD CB** Peak Elev=85.19' Storage=4,909 cf Inflow=11.87 cfs 1.137 af  
 Primary=4.15 cfs 1.123 af Secondary=1.09 cfs 0.013 af Outflow=4.54 cfs 1.136 af

**Pond 257P: BARNYARDCB** Peak Elev=83.97' Storage=238 cf Inflow=5.26 cfs 1.307 af  
 Primary=4.96 cfs 1.306 af Secondary=0.00 cfs 0.000 af Outflow=4.96 cfs 1.306 af

**Pond 258P: 24" HDPE UNDER RIVER ROAD** Peak Elev=81.57' Storage=4,258 cf Inflow=15.28 cfs 2.413 af  
 Primary=11.81 cfs 2.413 af Secondary=0.00 cfs 0.000 af Outflow=11.81 cfs 2.413 af

**Link 8-64: MAP 8 LOT 64** Inflow=9.07 cfs 0.937 af  
 Primary=9.07 cfs 0.937 af

**Link 9-2: MAP 9 LOT 2** Inflow=11.81 cfs 2.413 af  
 Primary=11.81 cfs 2.413 af

**Link 9-5: MAP 9 LOT 5** Inflow=7.01 cfs 0.880 af  
 Primary=7.01 cfs 0.880 af






**Link RR: RIVER ROAD** Inflow=0.67 cfs 0.064 af  
 Primary=0.67 cfs 0.064 af

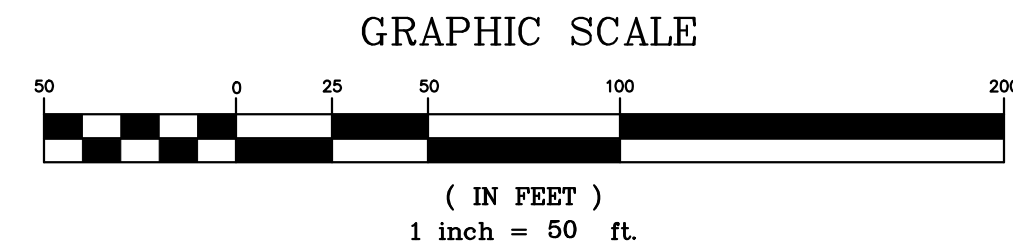
**Total Runoff Area = 9.145 ac Runoff Volume = 4.296 af Average Runoff Depth = 5.64"**  
**87.81% Pervious = 8.029 ac 12.19% Impervious = 1.115 ac**

**NOTES:**

- OWNER OF RECORD:  
TAX MAP 9, LOT 4  
41 PORTSMOUTH AVE LLC  
151 PORTSMOUTH AVENUE  
EXETER, NH 03833  
RCRD BK6613 PG1241
- THE INTENT OF THIS PLAN IS TO CALCULATE POST-DEVELOPMENT SUBCATCHMENT AREAS AND FLOW PATHS FOR MODELING VARIOUS STORM EVENTS IN PREPARATION FOR PHASE I SITE IMPROVEMENTS.
- SUBCATCHMENT 204A FLOWS INTO A POROUS PAVEMENT AREA, THEREFORE FLOW PATHS ARE NOT SHOWN. A RECOMMENDED TIME OF CONCENTRATION BY NHDES-AOT WAS USED FOR THE POROUS PAVEMENT LAYER.
- POST-DEVELOPMENT (PHASE I) DRAINAGE AREA CALC:  
DRAINAGE ANALYSIS TOTAL AREA = 348,336 SF  
DRAINAGE ANALYSIS IMPERVIOUS = 205,943 SF  
DRAINAGE ANALYSIS % IMPERVIOUS = 51.71%

**LEGEND**

-  INDICATES FLOW PATH
-  INDICATES SUBCATCHMENT BOUNDARIES
-  INDICATES SUBCATCHMENT AREA LABEL
-  INDICATES POND LABEL
-  INDICATES LINK LABEL



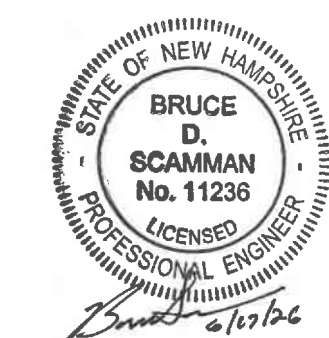
|            |                       |               |      |
|------------|-----------------------|---------------|------|
| 7          | JUN 17, 2026          | FOR APPROVAL  |      |
| 6          | MAR 24, 2026          | AOT REVISIONS |      |
| 1          | JAN 22, 2025          | FOR APPROVAL  |      |
| ISS. DATE: | DESCRIPTION OF ISSUE: |               | CHK. |
| DRAWN:     | JJM                   | DESIGN:       | JJM  |
| CHECKED:   | BDS                   | CHECKED:      | BDS  |



100 GRIFFIN ROAD, UNIT C, PORTSMOUTH, NH 03801  
603-772-4400 | EMAIL@ENGINEERING.COM © 2025

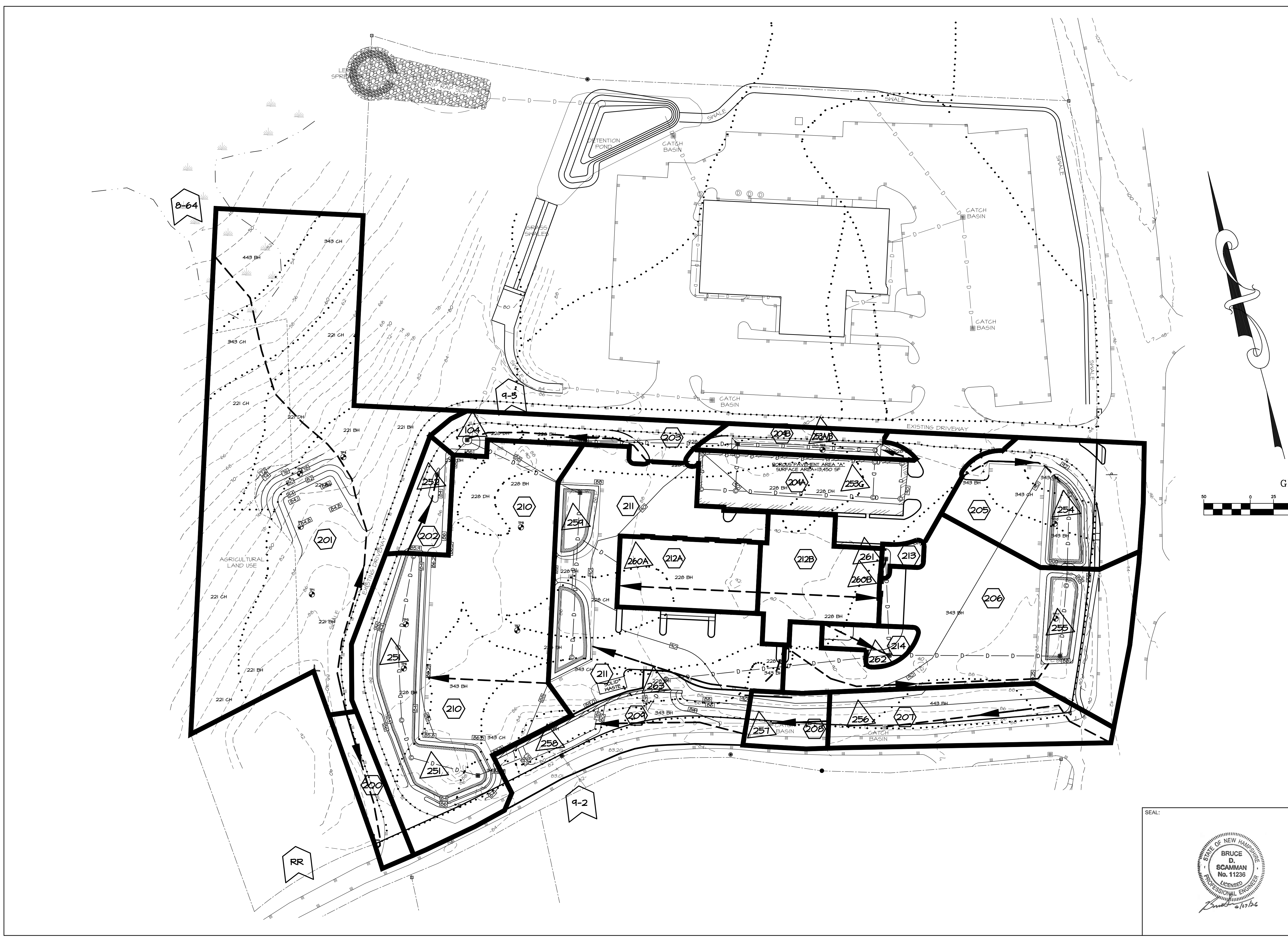
CLIENT:  
41 PORTSMOUTH AVE LLC  
151 PORTSMOUTH AVENUE  
EXETER, NH 03833

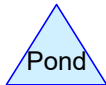
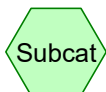
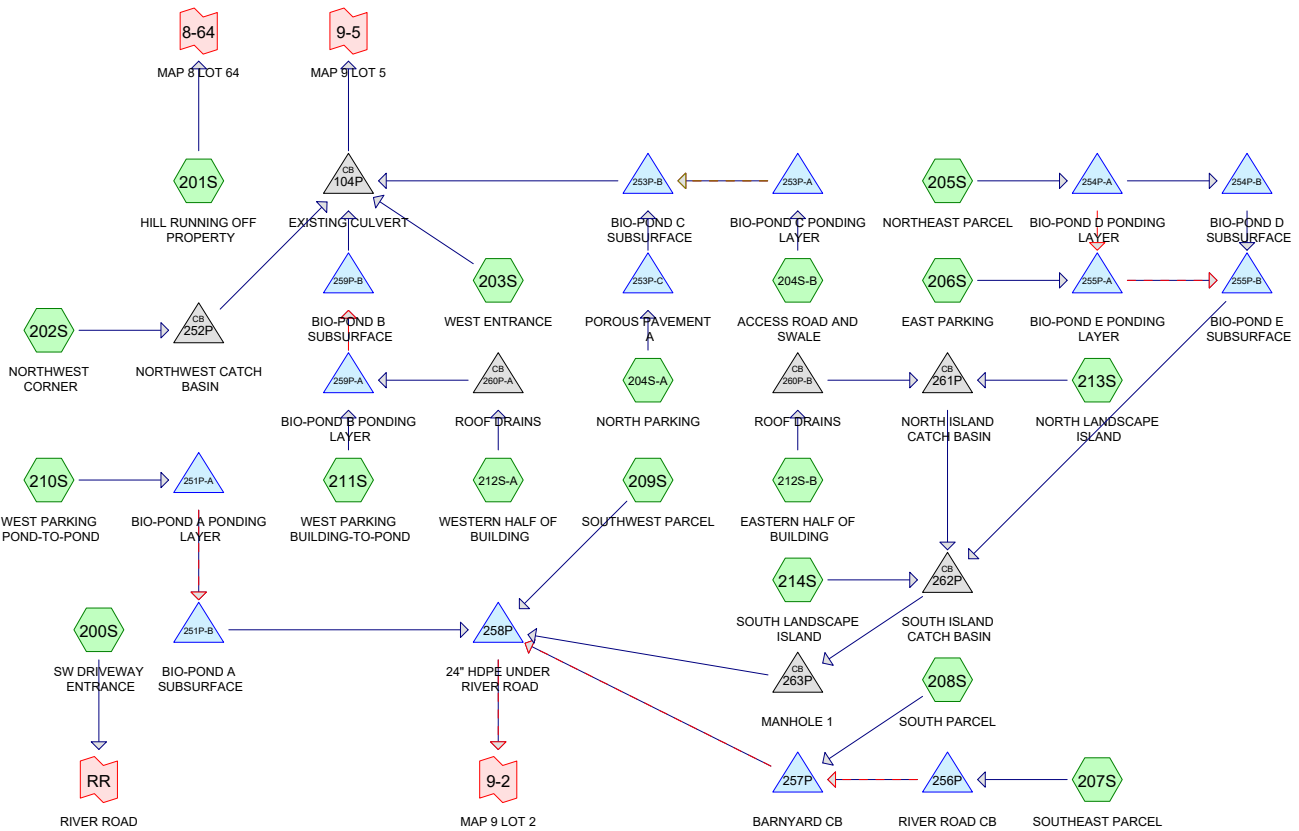
SEAL:



TITLE:  
**POST-DEVELOPMENT DRAINAGE (PHASE I)**  
FOR  
41 PORTSMOUTH AVE LLC  
41 PORTSMOUTH AVE (SITE)  
(STRATHAM TAX MAP 9 LOT 4)  
STRATHAM, NH 03885

|          |        |        |
|----------|--------|--------|
| PROJECT: | SCALE: | SHEET: |
| 25-1001  | 1"=50' | SW2    |





**Routing Diagram for Postdevelopment (Phase I) 06-16-26**  
 Prepared by Emanuel Engineering, Printed 6/17/2026  
 HydroCAD® 10.20-9a s/n 01104 © 2026 HydroCAD Software Solutions LLC

**Postdevelopment (Phase I) 06-16-26**

Prepared by Emanuel Engineering

HydroCAD® 10.20-9a s/n 01104 © 2026 HydroCAD Software Solutions LLC

Printed 6/17/2026

Page 2

---

**Project Notes**

Copied 9 events from NH-Stratham 41 Portsmouth Ave 24-hr S1 storm

**Postdevelopment (Phase I) 06-16-26**

Prepared by Emanuel Engineering

HydroCAD® 10.20-9a s/n 01104 © 2026 HydroCAD Software Solutions LLC

Printed 6/17/2026

Page 3

**Rainfall Events Listing (selected events)**

| Event# | Event Name   | Storm Type                             | Curve | Mode    | Duration (hours) | B/B | Depth (inches) | AM |
|--------|--------------|--|-------|---------|------------------|-----|----------------|----|
| 1      | 10-yr (+15%) | NH-Stratham 41 Portsmouth Ave 24-hr S1 | 10-yr | Default | 24.00            | 1   | 5.63           |    |

**Postdevelopment (Phase I) 06-16-26**

Prepared by Emanuel Engineering

HydroCAD® 10.20-9a s/n 01104 © 2026 HydroCAD Software Solutions LLC

Printed 6/17/2026

Page 4

**Area Listing (all nodes)**

| Area<br>(acres) | CN        | Description<br>(subcatchment-numbers)  |
|-----------------|-----------|--|
| 0.943           | 61        | >75% Grass cover, Good, HSG B (200S, 201S)   |
| 2.596           | 74        | >75% Grass cover, Good, HSG C (201S, 202S, 203S, 204S-A, 204S-B, 205S, 206S, 207S, 208S, 209S, 210S, 211S, 213S, 214S) |
| 0.159           | 98        | Paved parking, HSG B (200S, 201S)  |
| 3.982           | 98        | Paved parking, HSG C (202S, 203S, 204S-A, 204S-B, 205S, 206S, 207S, 208S, 209S, 210S, 211S, 213S, 214S)                |
| 0.588           | 98        | Roofs, HSG C (212S-A, 212S-B)  |
| 0.780           | 72        | Small grain, SR + CR, Good, HSG B (201S)   |
| 0.096           | 80        | Small grain, SR + CR, Good, HSG C (201S)   |
| <b>9.145</b>    | <b>85</b> | <b>TOTAL AREA</b>  |

**Postdevelopment (Phase I) 06-16-26**

Prepared by Emanuel Engineering

HydroCAD® 10.20-9a s/n 01104 © 2026 HydroCAD Software Solutions LLC

Printed 6/17/2026

Page 5

**Soil Listing (all nodes)**

| Area<br>(acres) | Soil<br>Group | Subcatchment<br>Numbers   |
|-----------------|---------------|---|
| 0.000           | HSG A         |   |
| 1.882           | HSG B         | 200S, 201S  |
| 7.262           | HSG C         | 201S, 202S, 203S, 204S-A, 204S-B, 205S, 206S, 207S, 208S, 209S, 210S,<br>211S, 212S-A, 212S-B, 213S, 214S |
| 0.000           | HSG D         |   |
| 0.000           | Other         |   |
| <b>9.145</b>    |               | <b>TOTAL AREA</b>   |

**Postdevelopment (Phase I) 06-16-26**

Prepared by Emanuel Engineering

HydroCAD® 10.20-9a s/n 01104 © 2026 HydroCAD Software Solutions LLC

Printed 6/17/2026

Page 6

**Ground Covers (all nodes)**

| HSG-A<br>(acres) | HSG-B<br>(acres) | HSG-C<br>(acres) | HSG-D<br>(acres) | Other<br>(acres) | Total<br>(acres) | Ground<br>Cover        | Subcatchment<br>Numbers  |
|------------------|------------------|------------------|------------------|------------------|------------------|------------------------|--|
| 0.000            | 0.943            | 2.596            | 0.000            | 0.000            | 3.540            | >75% Grass cover, Good | 200S,<br>201S,<br>202S,<br>203S,<br>204S-A,<br>204S-B,<br>205S,<br>206S,<br>207S,<br>208S,<br>209S,<br>210S,<br>211S,<br>213S,<br>214S |
| 0.000            | 0.159            | 3.982            | 0.000            | 0.000            | 4.141            | Paved parking          | 200S,<br>201S,<br>202S,<br>203S,<br>204S-A,<br>204S-B,<br>205S,<br>206S,<br>207S,  |

**Postdevelopment (Phase I) 06-16-26**

Prepared by Emanuel Engineering

HydroCAD® 10.20-9a s/n 01104 © 2026 HydroCAD Software Solutions LLC

Printed 6/17/2026

Page 7

**Ground Covers (all nodes) (continued)**

| HSG-A<br>(acres) | HSG-B<br>(acres) | HSG-C<br>(acres) | HSG-D<br>(acres) | Other<br>(acres) | Total<br>(acres) | Ground<br>Cover            | Subcatchment<br>Numbers   |
|------------------|------------------|------------------|------------------|------------------|------------------|----------------------------|---------------------------|
| 0.000            | 0.000            | 0.588            | 0.000            | 0.000            | 0.588            | Roofs                      | 212S-<br>A,<br>212S-<br>B |
| 0.000            | 0.780            | 0.096            | 0.000            | 0.000            | 0.876            | Small grain, SR + CR, Good | 201S                      |
| <b>0.000</b>     | <b>1.882</b>     | <b>7.262</b>     | <b>0.000</b>     | <b>0.000</b>     | <b>9.145</b>     | <b>TOTAL AREA</b>          |                           |

**Postdevelopment (Phase I) 06-16-26**

Prepared by Emanuel Engineering

Printed 6/17/2026

HydroCAD® 10.20-9a s/n 01104 © 2026 HydroCAD Software Solutions LLC

Page 8

**Pipe Listing (all nodes)**

| Line# | Node Number | In-Invert (feet) | Out-Invert (feet) | Length (feet) | Slope (ft/ft) | n     | Width (inches) | Diam/Height (inches) | Inside-Fill (inches) | Node Name |
|-------|-------------|------------------|-------------------|---------------|---------------|-------|----------------|----------------------|----------------------|-----------|
| 1     | 104P        | 81.77            | 81.14             | 100.0         | 0.0063        | 0.013 | 0.0            | 30.0                 | 0.0                  |           |
| 2     | 251P-B      | 81.00            | 80.75             | 50.0          | 0.0050        | 0.013 | 0.0            | 12.0                 | 0.0                  |           |
| 3     | 252P        | 82.18            | 81.96             | 45.0          | 0.0049        | 0.013 | 0.0            | 18.0                 | 0.0                  |           |
| 4     | 253P-B      | 82.55            | 81.80             | 285.0         | 0.0026        | 0.013 | 0.0            | 12.0                 | 0.0                  |           |
| 5     | 253P-C      | 85.25            | 85.25             | 10.0          | 0.0000        | 0.010 | 0.0            | 6.0                  | 0.0                  |           |
| 6     | 254P-B      | 84.50            | 83.50             | 90.0          | 0.0111        | 0.010 | 0.0            | 6.0                  | 0.0                  |           |
| 7     | 255P-B      | 83.50            | 83.06             | 178.0         | 0.0025        | 0.013 | 0.0            | 18.0                 | 0.0                  |           |
| 8     | 256P        | 81.40            | 80.90             | 120.0         | 0.0042        | 0.011 | 0.0            | 12.0                 | 0.0                  |           |
| 9     | 257P        | 80.65            | 80.40             | 130.0         | 0.0019        | 0.011 | 0.0            | 12.0                 | 0.0                  |           |
| 10    | 258P        | 79.60            | 78.86             | 50.0          | 0.0148        | 0.013 | 0.0            | 24.0                 | 0.0                  |           |
| 11    | 259P-B      | 83.40            | 81.78             | 125.0         | 0.0130        | 0.013 | 0.0            | 18.0                 | 0.0                  |           |
| 12    | 260P-A      | 88.00            | 87.90             | 35.0          | 0.0029        | 0.013 | 0.0            | 12.0                 | 0.0                  |           |
| 13    | 260P-B      | 84.60            | 84.50             | 5.0           | 0.0200        | 0.013 | 0.0            | 12.0                 | 0.0                  |           |
| 14    | 261P        | 84.00            | 83.47             | 105.0         | 0.0050        | 0.013 | 0.0            | 12.0                 | 0.0                  |           |
| 15    | 262P        | 82.96            | 82.34             | 250.0         | 0.0025        | 0.013 | 0.0            | 24.0                 | 0.0                  |           |
| 16    | 263P        | 82.00            | 81.75             | 40.0          | 0.0063        | 0.013 | 0.0            | 24.0                 | 0.0                  |           |

**Postdevelopment ( NH-Stratham 41 Portsmouth Ave 24-hr S1 10-yr 10-yr (+15%) Rainfall=5.63"**

Prepared by Emanuel Engineering

Printed 6/17/2026

HydroCAD® 10.20-9a s/n 01104 © 2026 HydroCAD Software Solutions LLC

Page 9

Time span=0.00-48.00 hrs, dt=0.01 hrs, 4801 points x 2  
 Runoff by SCS TR-20 method, UH=SCS, Weighted-CN  
 Reach routing by Dyn-Stor-Ind method - Pond routing by Dyn-Stor-Ind method

|   |  |
|---|--|
| <b>Subcatchment200S: SW DRIVEWAY</b>      | Runoff Area=5,515 sf 48.92% Impervious Runoff Depth=3.35"<br>Flow Length=192' Tc=6.0 min CN=79 Runoff=0.41 cfs 0.035 af                    |
| <b>Subcatchment201S: HILL RUNNING OFF</b> | Runoff Area=98,273 sf 4.31% Impervious Runoff Depth=2.51"<br>Flow Length=567' Tc=7.7 min CN=70 Runoff=5.00 cfs 0.473 af                    |
| <b>Subcatchment202S: NORTHWEST</b>        | Runoff Area=5,467 sf 27.13% Impervious Runoff Depth=3.55"<br>Flow Length=77' Slope=0.0270 '/' Tc=6.0 min CN=81 Runoff=0.43 cfs 0.037 af    |
| <b>Subcatchment203S: WEST ENTRANCE</b>    | Runoff Area=10,408 sf 56.83% Impervious Runoff Depth=4.27"<br>Flow Length=206' Slope=0.0200 '/' Tc=8.3 min CN=88 Runoff=0.87 cfs 0.085 af  |
| <b>Subcatchment204S-A: NORTH PARKING</b>  | Runoff Area=23,845 sf 93.10% Impervious Runoff Depth=5.16"<br>Tc=222.0 min CN=96 Runoff=0.41 cfs 0.235 af                                  |
| <b>Subcatchment204S-B: ACCESSROAD</b>     | Runoff Area=6,090 sf 37.68% Impervious Runoff Depth=3.75"<br>Flow Length=40' Slope=0.0100 '/' Tc=6.3 min CN=83 Runoff=0.50 cfs 0.044 af    |
| <b>Subcatchment205S: NORTHEAST</b>        | Runoff Area=24,112 sf 63.73% Impervious Runoff Depth=4.38"<br>Flow Length=118' Tc=8.3 min CN=89 Runoff=2.05 cfs 0.202 af                   |
| <b>Subcatchment206S: EAST PARKING</b>     | Runoff Area=44,800 sf 79.14% Impervious Runoff Depth=4.82"<br>Flow Length=276' Slope=0.0127 '/' Tc=6.0 min CN=93 Runoff=4.55 cfs 0.413 af  |
| <b>Subcatchment207S: SOUTHEASTPARCEL</b>  | Runoff Area=17,349 sf 29.77% Impervious Runoff Depth=3.55"<br>Flow Length=257' Tc=6.0 min CN=81 Runoff=1.38 cfs 0.118 af                   |
| <b>Subcatchment208S: SOUTH PARCEL</b>     | Runoff Area=5,225 sf 20.80% Impervious Runoff Depth=3.35"<br>Flow Length=110' Tc=6.0 min CN=79 Runoff=0.39 cfs 0.033 af                    |
| <b>Subcatchment209S: SOUTHWEST</b>        | Runoff Area=17,300 sf 18.76% Impervious Runoff Depth=3.35"<br>Flow Length=279' Tc=11.1 min CN=79 Runoff=1.03 cfs 0.111 af                  |
| <b>Subcatchment210S: WEST PARKING</b>     | Runoff Area=67,820 sf 69.77% Impervious Runoff Depth=4.60"<br>Flow Length=130' Slope=0.0100 '/' Tc=6.0 min CN=91 Runoff=6.68 cfs 0.596 af  |
| <b>Subcatchment211S: WEST PARKING</b>     | Runoff Area=41,882 sf 74.70% Impervious Runoff Depth=4.71"<br>Flow Length=210' Slope=0.0150 '/' Tc=6.0 min CN=92 Runoff=4.19 cfs 0.377 af  |
| <b>Subcatchment212S-A: WESTERN HALF</b>   | Runoff Area=11,610 sf 100.00% Impervious Runoff Depth=5.39"<br>Flow Length=150' Slope=0.0100 '/' Tc=6.0 min CN=98 Runoff=1.24 cfs 0.120 af |
| <b>Subcatchment212S-B: EASTERNHALF</b>    | Runoff Area=14,005 sf 100.00% Impervious Runoff Depth=5.39"<br>Flow Length=130' Slope=0.0100 '/' Tc=6.0 min CN=98 Runoff=1.49 cfs 0.144 af |
| <b>Subcatchment213S: NORTH LANDSCAPE</b>  | Runoff Area=1,255 sf 75.70% Impervious Runoff Depth=4.71"<br>Flow Length=20' Slope=0.0100 '/' Tc=6.0 min CN=92 Runoff=0.13 cfs 0.011 af    |

**Postdevelopment ( NH-Stratham 41 Portsmouth Ave 24-hr S1 10-yr 10-yr (+15%) Rainfall=5.63"**

Prepared by Emanuel Engineering

Printed 6/17/2026

HydroCAD® 10.20-9a s/n 01104 © 2026 HydroCAD Software Solutions LLC

Page 10

**Subcatchment214S: SOUTH LANDSCAPE** Runoff Area=3,380 sf 49.85% Impervious Runoff Depth=4.06"  
Flow Length=75' Slope=0.0100 '/' Tc=6.1 min CN=86 Runoff=0.30 cfs 0.026 af

**Pond 104P: EXISTING CULVERT** Peak Elev=82.41' Inflow=2.34 cfs 0.870 af  
30.0" Round Culvert n=0.013 L=100.0' S=0.0063 '/' Outflow=2.34 cfs 0.870 af

**Pond 251P-A: BIO-POND A PONDING LAYER** Peak Elev=84.17' Storage=2,103 cf Inflow=6.68 cfs 0.596 af  
Primary=2.52 cfs 0.596 af Secondary=0.00 cfs 0.000 af Outflow=2.52 cfs 0.596 af

**Pond 251P-B: BIO-POND A SUBSURFACE** Peak Elev=82.62' Storage=2,648 cf Inflow=2.52 cfs 0.596 af  
12.0" Round Culvert n=0.013 L=50.0' S=0.0050 '/' Outflow=2.12 cfs 0.596 af

**Pond 252P: NORTHWEST CATCH BASIN** Peak Elev=82.59' Inflow=0.43 cfs 0.037 af  
18.0" Round Culvert n=0.013 L=45.0' S=0.0049 '/' Outflow=0.43 cfs 0.037 af

**Pond 253P-A: BIO-POND C PONDING LAYER** Peak Elev=87.64' Storage=186 cf Inflow=0.50 cfs 0.044 af  
Primary=0.18 cfs 0.044 af Secondary=0.00 cfs 0.000 af Outflow=0.18 cfs 0.044 af

**Pond 253P-B: BIO-POND C SUBSURFACE** Peak Elev=84.87' Storage=0 cf Inflow=0.33 cfs 0.251 af  
Outflow=0.33 cfs 0.251 af

**Pond 253P-C: POROUS PAVEMENT A** Peak Elev=85.76' Storage=3,693 cf Inflow=0.41 cfs 0.235 af  
6.0" Round Culvert n=0.010 L=10.0' S=0.0000 '/' Outflow=0.30 cfs 0.207 af

**Pond 254P-A: BIO-POND D PONDING LAYER** Peak Elev=87.86' Storage=1,048 cf Inflow=2.05 cfs 0.202 af  
Primary=0.62 cfs 0.202 af Secondary=0.00 cfs 0.000 af Outflow=0.62 cfs 0.202 af

**Pond 254P-B: BIO-POND D SUBSURFACE** Peak Elev=85.44' Storage=7 cf Inflow=0.62 cfs 0.202 af  
6.0" Round Culvert n=0.010 L=90.0' S=0.0111 '/' Outflow=0.62 cfs 0.202 af

**Pond 255P-A: BIO-POND E PONDING LAYER** Peak Elev=87.56' Storage=3,173 cf Inflow=4.55 cfs 0.413 af  
Primary=0.75 cfs 0.402 af Secondary=0.42 cfs 0.010 af Outflow=1.17 cfs 0.413 af

**Pond 255P-B: BIO-POND E SUBSURFACE** Peak Elev=84.35' Storage=12 cf Inflow=1.79 cfs 0.615 af  
18.0" Round Culvert n=0.013 L=178.0' S=0.0025 '/' Outflow=1.79 cfs 0.615 af

**Pond 256P: RIVER ROAD CB** Peak Elev=82.45' Storage=54 cf Inflow=1.38 cfs 0.118 af  
Primary=1.37 cfs 0.117 af Secondary=0.00 cfs 0.000 af Outflow=1.37 cfs 0.117 af

**Pond 257P: BARNYARD CB** Peak Elev=82.26' Storage=59 cf Inflow=1.77 cfs 0.150 af  
Primary=1.75 cfs 0.149 af Secondary=0.00 cfs 0.000 af Outflow=1.75 cfs 0.149 af

**Pond 258P: 24" HDPE UNDER RIVER ROAD** Peak Elev=82.14' Storage=13,954 cf Inflow=6.99 cfs 1.653 af  
Primary=4.67 cfs 1.555 af Secondary=0.00 cfs 0.000 af Outflow=4.67 cfs 1.555 af

**Pond 259P-A: BIO-POND B PONDING LAYER** Peak Elev=87.09' Storage=3,170 cf Inflow=5.43 cfs 0.497 af  
Primary=1.19 cfs 0.497 af Secondary=0.00 cfs 0.000 af Outflow=1.19 cfs 0.497 af

**Pond 259P-B: BIO-POND B SUBSURFACE** Peak Elev=84.96' Storage=1,182 cf Inflow=1.19 cfs 0.497 af  
Outflow=1.04 cfs 0.497 af

**Postdevelopment ( NH-Stratham 41 Portsmouth Ave 24-hr S1 10-yr 10-yr (+15%) Rainfall=5.63"**

Prepared by Emanuel Engineering

Printed 6/17/2026

HydroCAD® 10.20-9a s/n 01104 © 2026 HydroCAD Software Solutions LLC

Page 11

|   |                      |                      |              |
|---|----------------------|----------------------|--------------|
| <b>Pond 260P-A: ROOF DRAINS</b>                       | Peak Elev=88.78'     | Inflow=1.24 cfs      | 0.120 af     |
| 12.0" Round Culvert n=0.013 L=35.0' S=0.0029 1/'      |                      | Outflow=1.24 cfs     | 0.120 af     |
| <br><b>Pond 260P-B: ROOF DRAINS</b>                   | <br>Peak Elev=85.39' | <br>Inflow=1.49 cfs  | <br>0.144 af |
| <br>12.0" Round Culvert n=0.013 L=5.0' S=0.0200 1/'   |                      | <br>Outflow=1.49 cfs | <br>0.144 af |
| <br><b>Pond 261P: NORTH ISLAND CATCHBASIN</b>         | <br>Peak Elev=84.82' | <br>Inflow=1.62 cfs  | <br>0.156 af |
| <br>12.0" Round Culvert n=0.013 L=105.0' S=0.0050 1/' |                      | <br>Outflow=1.62 cfs | <br>0.156 af |
| <br><b>Pond 262P: SOUTH ISLAND CATCHBASIN</b>         | <br>Peak Elev=83.94' | <br>Inflow=3.16 cfs  | <br>0.797 af |
| <br>24.0" Round Culvert n=0.013 L=250.0' S=0.0025 1/' |                      | <br>Outflow=3.16 cfs | <br>0.797 af |
| <br><b>Pond 263P: MANHOLE 1</b>                       | <br>Peak Elev=82.90' | <br>Inflow=3.16 cfs  | <br>0.797 af |
| <br>24.0" Round Culvert n=0.013 L=40.0' S=0.0063 1/'  |                      | <br>Outflow=3.16 cfs | <br>0.797 af |
| <br><b>Link 8-64: MAP 8 LOT 64</b>                    |                      | <br>Inflow=5.00 cfs  | <br>0.473 af |
|   |                      | Primary=5.00 cfs     | 0.473 af     |
| <br><b>Link 9-2: MAP 9 LOT 2</b>                      |                      | <br>Inflow=4.67 cfs  | <br>1.555 af |
|   |                      | Primary=4.67 cfs     | 1.555 af     |
| <br><b>Link 9-5: MAP 9 LOT 5</b>                      |                      | <br>Inflow=2.34 cfs  | <br>0.870 af |
|   |                      | Primary=2.34 cfs     | 0.870 af     |
| <br><b>Link RR: RIVER ROAD</b>                        |                      | <br>Inflow=0.41 cfs  | <br>0.035 af |
|   |                      | Primary=0.41 cfs     | 0.035 af     |

**Total Runoff Area = 9.145 ac   Runoff Volume = 3.061 af   Average Runoff Depth = 4.02"**  
**48.29% Pervious = 4.416 ac   51.71% Impervious = 4.729 ac**

**Summary for Subcatchment 200S: SW DRIVEWAY ENTRANCE**

Runoff = 0.41 cfs @ 12.04 hrs, Volume= 0.035 af, Depth= 3.35"  
 Routed to Link RR : RIVER ROAD

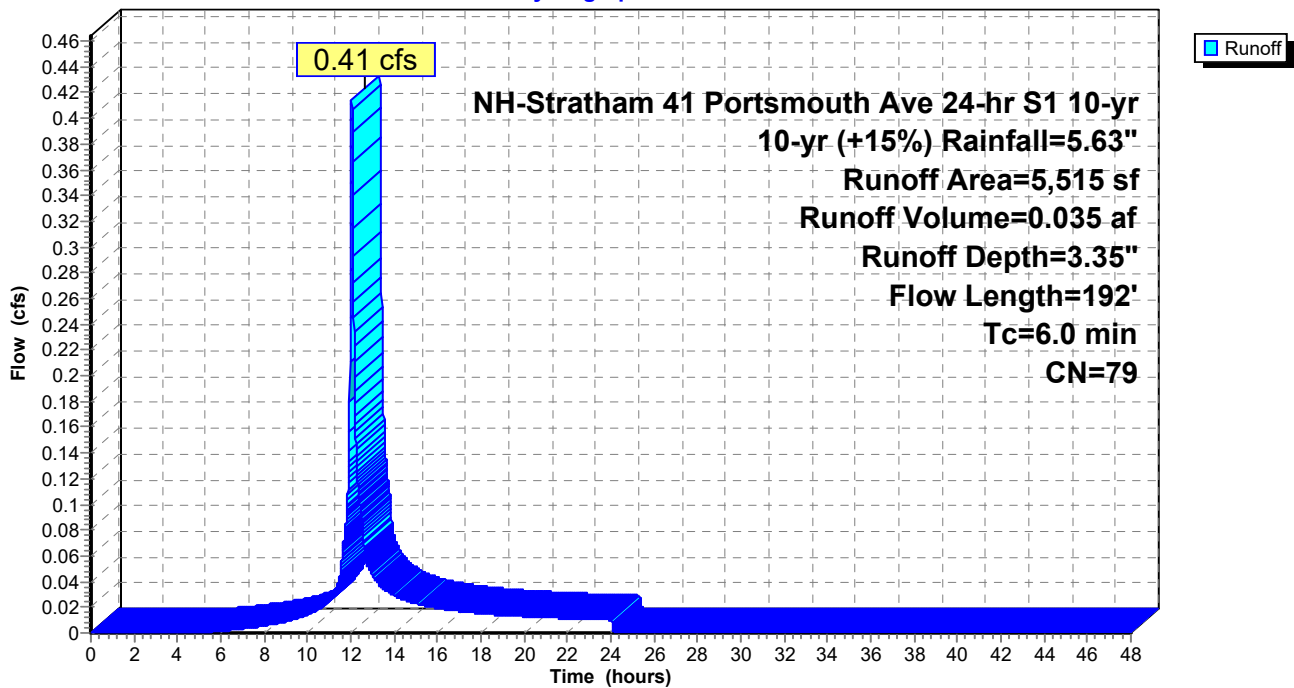
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-48.00 hrs, dt= 0.01 hrs  
 NH-Stratham 41 Portsmouth Ave 24-hr S1 10-yr 10-yr (+15%) Rainfall=5.63"

| Area (sf) | CN | Description                   |
|-----------|----|-------------------------------|
| 2,139     | 61 | >75% Grass cover, Good, HSG B |
| * 678     | 61 | >75% Grass cover, Good, HSG B |
| 2,698     | 98 | Paved parking, HSG B          |
| 5,515     | 79 | Weighted Average              |
| 2,817     |    | 51.08% Pervious Area          |
| 2,698     |    | 48.92% Impervious Area        |

| Tc (min) | Length (feet) | Slope (ft/ft) | Velocity (ft/sec) | Capacity (cfs) | Description  |
|----------|---------------|---------------|-------------------|----------------|--|
| 0.2      | 10            | 0.0200        | 0.85              |                | <b>Sheet Flow, Pavement to Swale</b><br>Smooth surfaces n= 0.011 P2= 3.10"     |
| 1.9      | 182           | 0.0110        | 1.57              |                | <b>Shallow Concentrated Flow, Grass Swale</b><br>Grassed Waterway Kv= 15.0 fps |
| 3.9      |               |               |                   |                | <b>Direct Entry, 6 minute min.</b>   |
| 6.0      | 192           | Total         |                   |                |  |

**Subcatchment 200S: SW DRIVEWAY ENTRANCE**

Hydrograph



**Summary for Subcatchment 201S: HILL RUNNING OFF PROPERTY**

Runoff = 5.00 cfs @ 12.06 hrs, Volume= 0.473 af, Depth= 2.51"  
 Routed to Link 8-64 : MAP 8 LOT 64

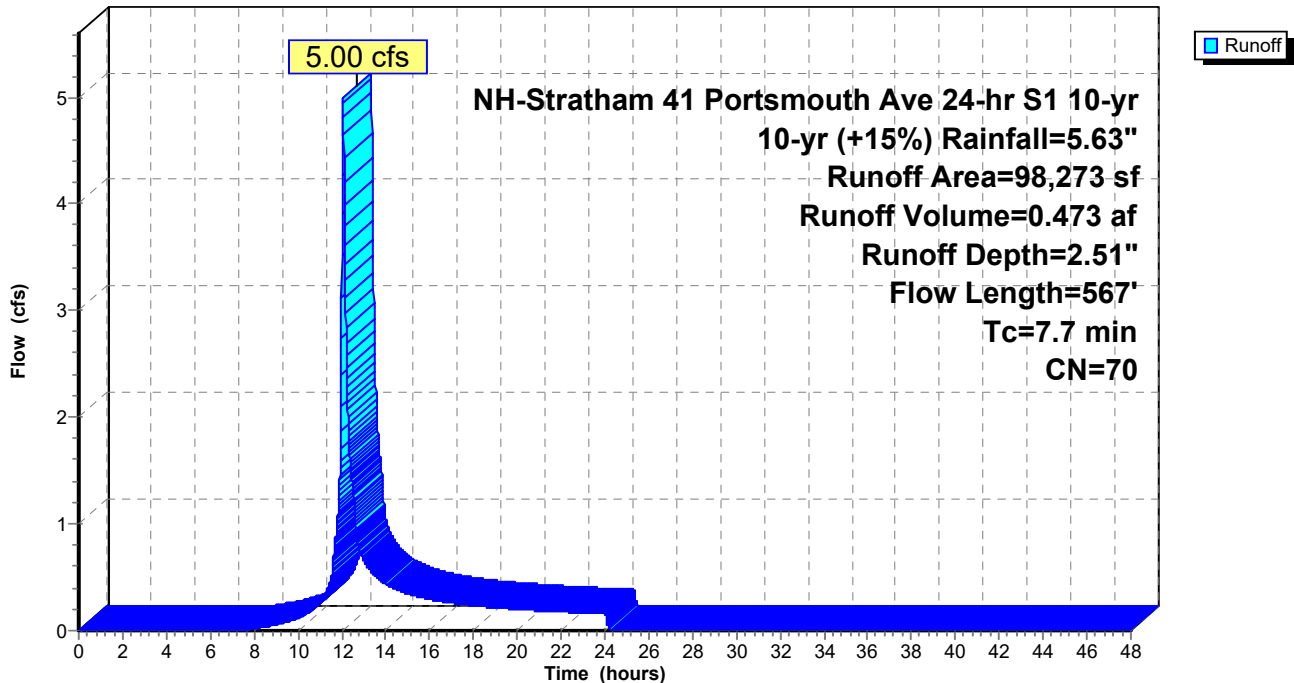
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-48.00 hrs, dt= 0.01 hrs  
 NH-Stratham 41 Portsmouth Ave 24-hr S1 10-yr 10-yr (+15%) Rainfall=5.63"

| Area (sf) | CN | Description                       |
|-----------|----|-----------------------------------|
| 38,273    | 61 | >75% Grass cover, Good, HSG B     |
| 17,612    | 74 | >75% Grass cover, Good, HSG C     |
| 33,968    | 72 | Small grain, SR + CR, Good, HSG B |
| 4,186     | 80 | Small grain, SR + CR, Good, HSG C |
| 4,234     | 98 | Paved parking, HSG B              |
| 98,273    | 70 | Weighted Average                  |
| 94,039    |    | 95.69% Pervious Area              |
| 4,234     |    | 4.31% Impervious Area             |

| Tc (min) | Length (feet) | Slope (ft/ft) | Velocity (ft/sec) | Capacity (cfs) | Description   |
|----------|---------------|---------------|-------------------|----------------|---|
| 3.1      | 50            | 0.0900        | 0.27              |                | <b>Sheet Flow, Sheet Flow, Hill running off property</b><br>Grass: Short n= 0.150 P2= 3.10"                               |
| 4.6      | 517           | 0.0716        | 1.87              |                | <b>Shallow Concentrated Flow, Shallow Concentrated Flow, Hill running off property</b><br>Short Grass Pasture Kv= 7.0 fps |
| 7.7      | 567           | Total         |                   |                |   |

**Subcatchment 201S: HILL RUNNING OFF PROPERTY**

Hydrograph



**Postdevelopment ( NH-Stratham 41 Portsmouth Ave 24-hr S1 10-yr 10-yr (+15%) Rainfall=5.63"**

Prepared by Emanuel Engineering

Printed 6/17/2026

HydroCAD® 10.20-9a s/n 01104 © 2026 HydroCAD Software Solutions LLC

Page 14

**Summary for Subcatchment 202S: NORTHWEST CORNER**

Runoff = 0.43 cfs @ 12.04 hrs, Volume= 0.037 af, Depth= 3.55"

Routed to Pond 252P : NORTHWEST CATCH BASIN

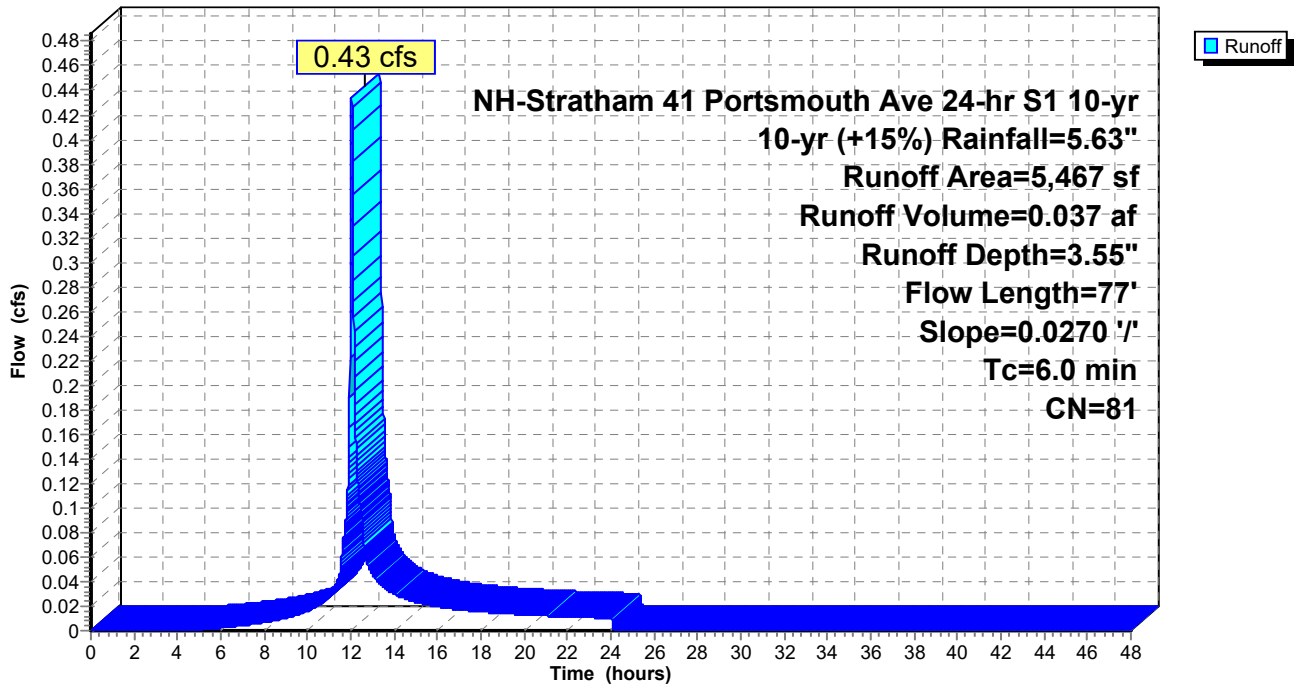
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-48.00 hrs, dt= 0.01 hrs  
 NH-Stratham 41 Portsmouth Ave 24-hr S1 10-yr 10-yr (+15%) Rainfall=5.63"

| Area (sf) | CN | Description                   |
|-----------|----|-------------------------------|
| 3,984     | 74 | >75% Grass cover, Good, HSG C |
| 1,483     | 98 | Paved parking, HSG C          |
| 5,467     | 81 | Weighted Average              |
| 3,984     |    | 72.87% Pervious Area          |
| 1,483     |    | 27.13% Impervious Area        |

| Tc (min) | Length (feet) | Slope (ft/ft) | Velocity (ft/sec) | Capacity (cfs) | Description                             |
|----------|---------------|---------------|-------------------|----------------|---|
| 5.1      | 50            | 0.0270        | 0.16              |                | <b>Sheet Flow, Grass</b>                |
| 0.4      | 27            | 0.0270        | 1.15              |                | <b>Shallow Concentrated Flow, Grass</b> |
| 0.5      |               |               |                   |                | Short Grass Pasture Kv= 7.0 fps         |
|          |               |               |                   |                | <b>Direct Entry, 6 min minimum</b>      |
| 6.0      | 77            | Total         |                   |                |   |

**Subcatchment 202S: NORTHWEST CORNER**

Hydrograph



**Summary for Subcatchment 203S: WEST ENTRANCE**

Runoff = 0.87 cfs @ 12.06 hrs, Volume= 0.085 af, Depth= 4.27"  
 Routed to Pond 104P : EXISTING CULVERT

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-48.00 hrs, dt= 0.01 hrs  
 NH-Stratham 41 Portsmouth Ave 24-hr S1 10-yr 10-yr (+15%) Rainfall=5.63"

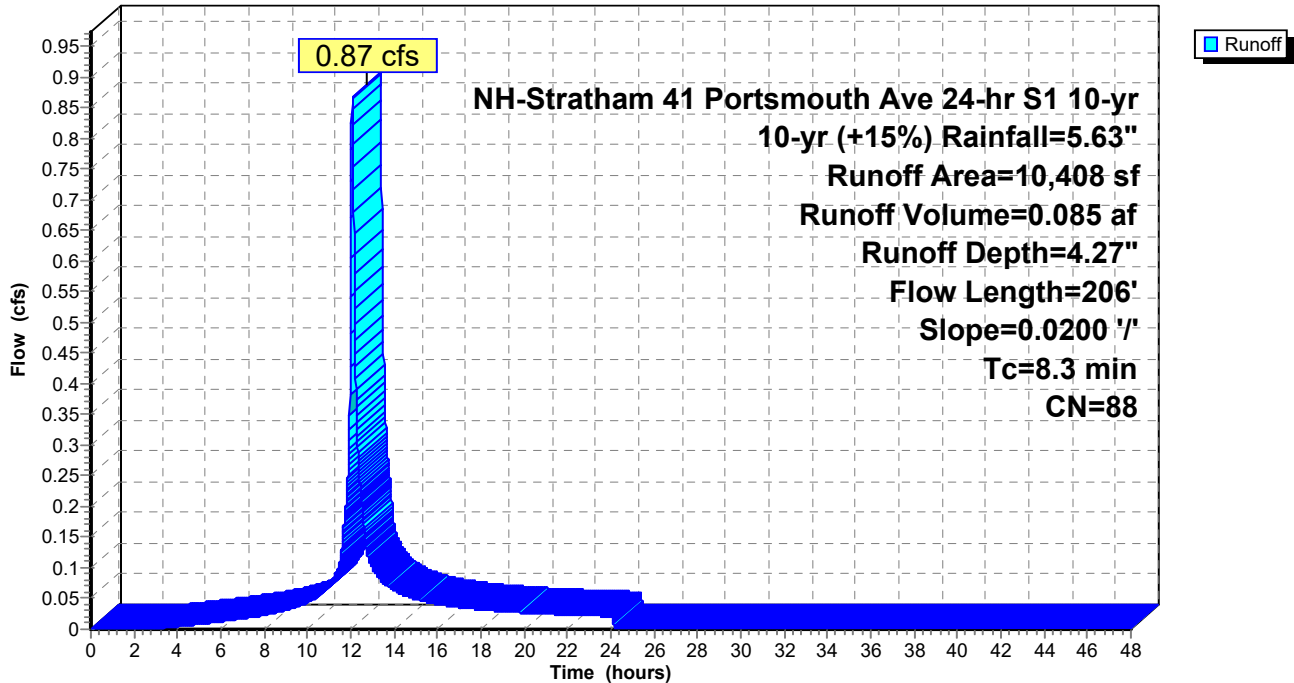
| Area (sf) | CN | Description                   |
|-----------|----|-------------------------------|
| 4,493     | 74 | >75% Grass cover, Good, HSG C |
| 5,915     | 98 | Paved parking, HSG C          |
| 10,408    | 88 | Weighted Average              |
| 4,493     |    | 43.17% Pervious Area          |
| 5,915     |    | 56.83% Impervious Area        |

| Tc (min) | Length (feet) | Slope (ft/ft) | Velocity (ft/sec) | Capacity (cfs) | Description                             |
|----------|---------------|---------------|-------------------|----------------|---|
| 5.7      | 50            | 0.0200        | 0.15              |                | <b>Sheet Flow, Grass</b>                |
| 2.6      | 156           | 0.0200        | 0.99              |                | <b>Shallow Concentrated Flow, Grass</b> |
|          |               |               |                   |                | Short Grass Pasture Kv= 7.0 fps         |
| 8.3      | 206           | Total         |                   |                |   |

**Subcatchment 203S: WEST ENTRANCE**

Hydrograph



**Postdevelopment ( NH-Stratham 41 Portsmouth Ave 24-hr S1 10-yr 10-yr (+15%) Rainfall=5.63"**

Prepared by Emanuel Engineering

Printed 6/17/2026

HydroCAD® 10.20-9a s/n 01104 © 2026 HydroCAD Software Solutions LLC

Page 16

**Summary for Subcatchment 204S-A: NORTH PARKING**

Runoff = 0.41 cfs @ 14.80 hrs, Volume= 0.235 af, Depth= 5.16"

Routed to Pond 253P-C : POROUS PAVEMENT A

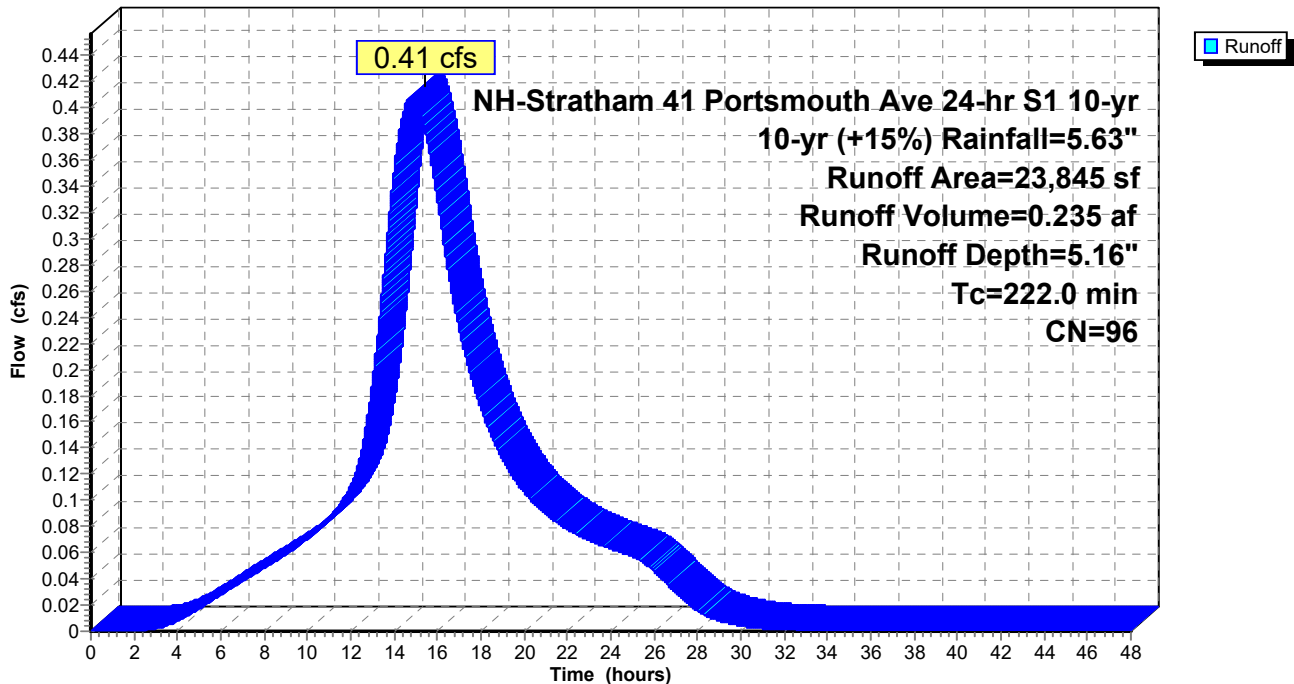
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-48.00 hrs, dt= 0.01 hrs  
 NH-Stratham 41 Portsmouth Ave 24-hr S1 10-yr 10-yr (+15%) Rainfall=5.63"

| Area (sf) | CN | Description                   |
|-----------|----|-------------------------------|
| 1,645     | 74 | >75% Grass cover, Good, HSG C |
| 22,200    | 98 | Paved parking, HSG C          |
| 23,845    | 96 | Weighted Average              |
| 1,645     |    | 6.90% Pervious Area           |
| 22,200    |    | 93.10% Impervious Area        |

| Tc (min) | Length (feet) | Slope (ft/ft) | Velocity (ft/sec) | Capacity (cfs) | Description   |
|----------|---------------|---------------|-------------------|----------------|---|
| 216.0    |               |               |                   |                | Direct Entry, Infiltration through Porous Pavement Layers |
| 6.0      |               |               |                   |                | Direct Entry, 6 minute runoff                             |
| 222.0    | 0             | Total         |                   |                |   |

**Subcatchment 204S-A: NORTH PARKING**

Hydrograph



**Summary for Subcatchment 204S-B: ACCESS ROAD AND SWALE**

Runoff = 0.50 cfs @ 12.04 hrs, Volume= 0.044 af, Depth= 3.75"  
 Routed to Pond 253P-A : BIO-POND C PONDING LAYER

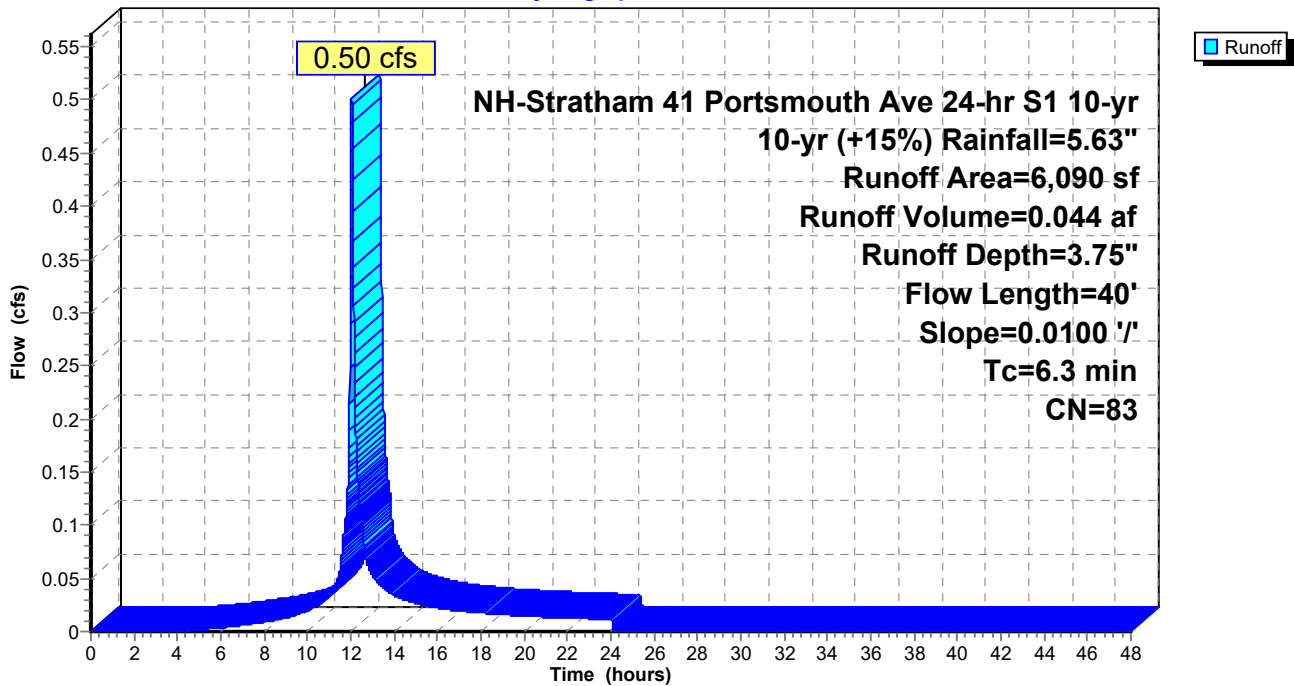
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-48.00 hrs, dt= 0.01 hrs  
 NH-Stratham 41 Portsmouth Ave 24-hr S1 10-yr 10-yr (+15%) Rainfall=5.63"

| Area (sf) | CN | Description                   |
|-----------|----|-------------------------------|
| 3,795     | 74 | >75% Grass cover, Good, HSG C |
| 2,295     | 98 | Paved parking, HSG C          |
| 6,090     | 83 | Weighted Average              |
| 3,795     |    | 62.32% Pervious Area          |
| 2,295     |    | 37.68% Impervious Area        |

| Tc (min) | Length (feet) | Slope (ft/ft) | Velocity (ft/sec) | Capacity (cfs) | Description   |
|----------|---------------|---------------|-------------------|----------------|---|
| 6.3      | 40            | 0.0100        | 0.11              |                | <b>Sheet Flow, Grass</b><br>Grass: Short n= 0.150 P2= 3.10" |

**Subcatchment 204S-B: ACCESS ROAD AND SWALE**

Hydrograph



**Summary for Subcatchment 205S: NORTHEAST PARCEL**

Runoff = 2.05 cfs @ 12.06 hrs, Volume= 0.202 af, Depth= 4.38"  
 Routed to Pond 254P-A : BIO-POND D PONDING LAYER

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-48.00 hrs, dt= 0.01 hrs  
 NH-Stratham 41 Portsmouth Ave 24-hr S1 10-yr 10-yr (+15%) Rainfall=5.63"

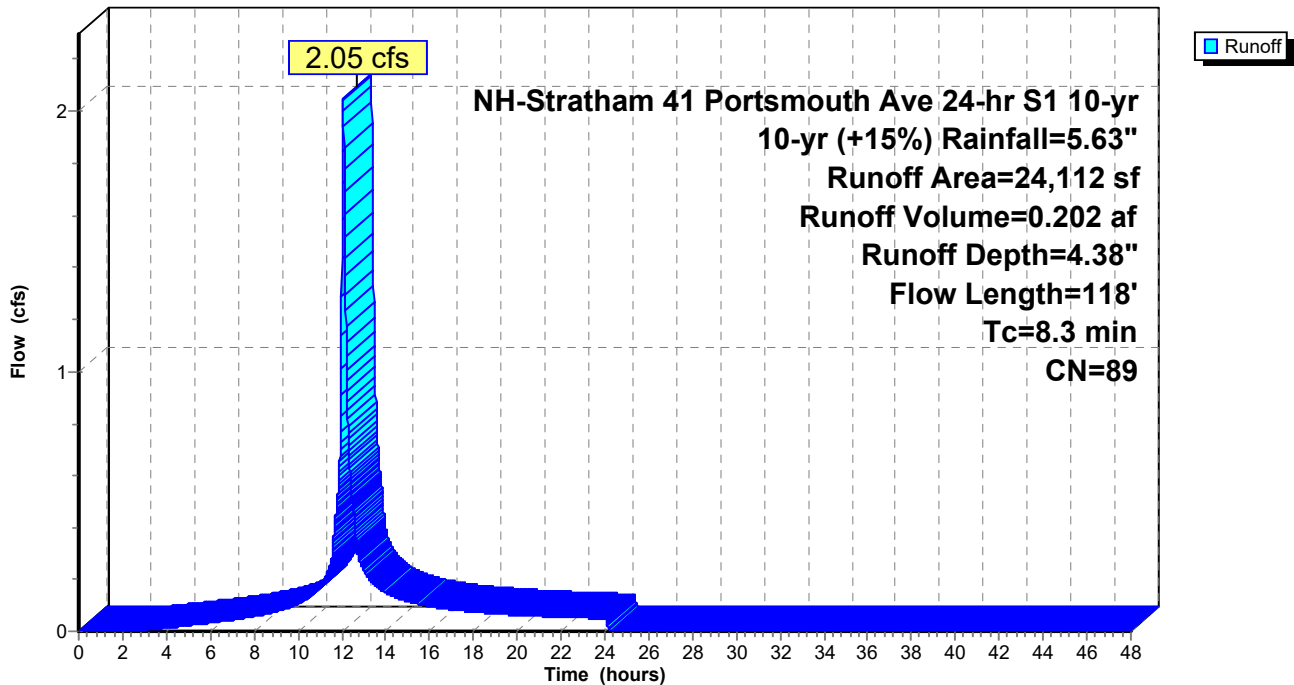
| Area (sf) | CN | Description                   |
|-----------|----|-------------------------------|
| 8,746     | 74 | >75% Grass cover, Good, HSG C |
| 15,366    | 98 | Paved parking, HSG C          |
| 24,112    | 89 | Weighted Average              |
| 8,746     |    | 36.27% Pervious Area          |
| 15,366    |    | 63.73% Impervious Area        |

| Tc (min) | Length (feet) | Slope (ft/ft) | Velocity (ft/sec) | Capacity (cfs) | Description                             |
|----------|---------------|---------------|-------------------|----------------|---|
| 7.5      | 50            | 0.0100        | 0.11              |                | <b>Sheet Flow, Grass</b>                |
| 0.8      | 68            | 0.0368        | 1.34              |                | <b>Shallow Concentrated Flow, Grass</b> |
|          |               |               |                   |                | Short Grass Pasture Kv= 7.0 fps         |
| 8.3      | 118           | Total         |                   |                |   |

**Subcatchment 205S: NORTHEAST PARCEL**

Hydrograph



**Summary for Subcatchment 206S: EAST PARKING**

Runoff = 4.55 cfs @ 12.04 hrs, Volume= 0.413 af, Depth= 4.82"  
 Routed to Pond 255P-A : BIO-POND E PONDING LAYER

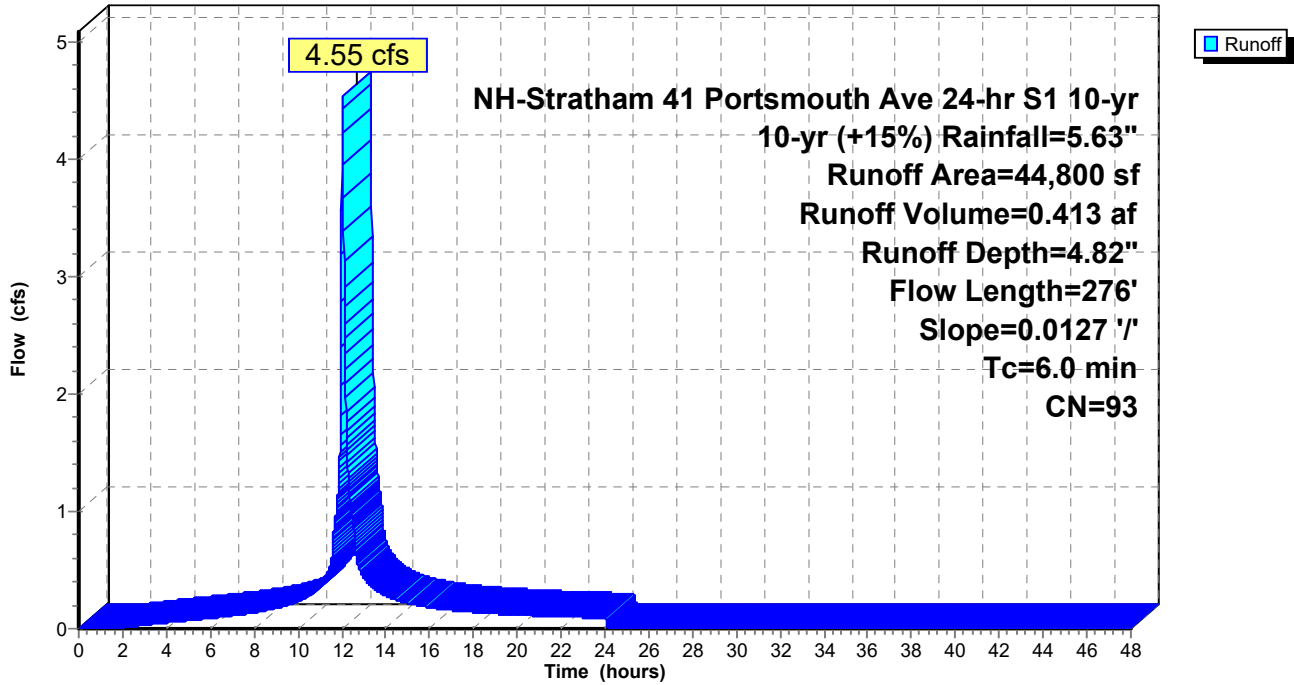
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-48.00 hrs, dt= 0.01 hrs  
 NH-Stratham 41 Portsmouth Ave 24-hr S1 10-yr 10-yr (+15%) Rainfall=5.63"

| Area (sf) | CN | Description                   |
|-----------|----|-------------------------------|
| 9,345     | 74 | >75% Grass cover, Good, HSG C |
| 35,455    | 98 | Paved parking, HSG C          |
| 44,800    | 93 | Weighted Average              |
| 9,345     |    | 20.86% Pervious Area          |
| 35,455    |    | 79.14% Impervious Area        |

| Tc (min) | Length (feet) | Slope (ft/ft) | Velocity (ft/sec) | Capacity (cfs) | Description   |
|----------|---------------|---------------|-------------------|----------------|---|
| 0.8      | 50            | 0.0127        | 0.98              |                | <b>Sheet Flow, Pavement</b><br>Smooth surfaces n= 0.011 P2= 3.10" |
| 1.6      | 226           | 0.0127        | 2.29              |                | <b>Shallow Concentrated Flow, Pavement</b><br>Paved Kv= 20.3 fps  |
| 3.6      |               |               |                   |                | <b>Direct Entry, 6 minute min.</b>                                |
| 6.0      | 276           | Total         |                   |                |   |

**Subcatchment 206S: EAST PARKING**

Hydrograph



**Summary for Subcatchment 207S: SOUTHEAST PARCEL**

Runoff = 1.38 cfs @ 12.04 hrs, Volume= 0.118 af, Depth= 3.55"  
 Routed to Pond 256P : RIVER ROAD CB

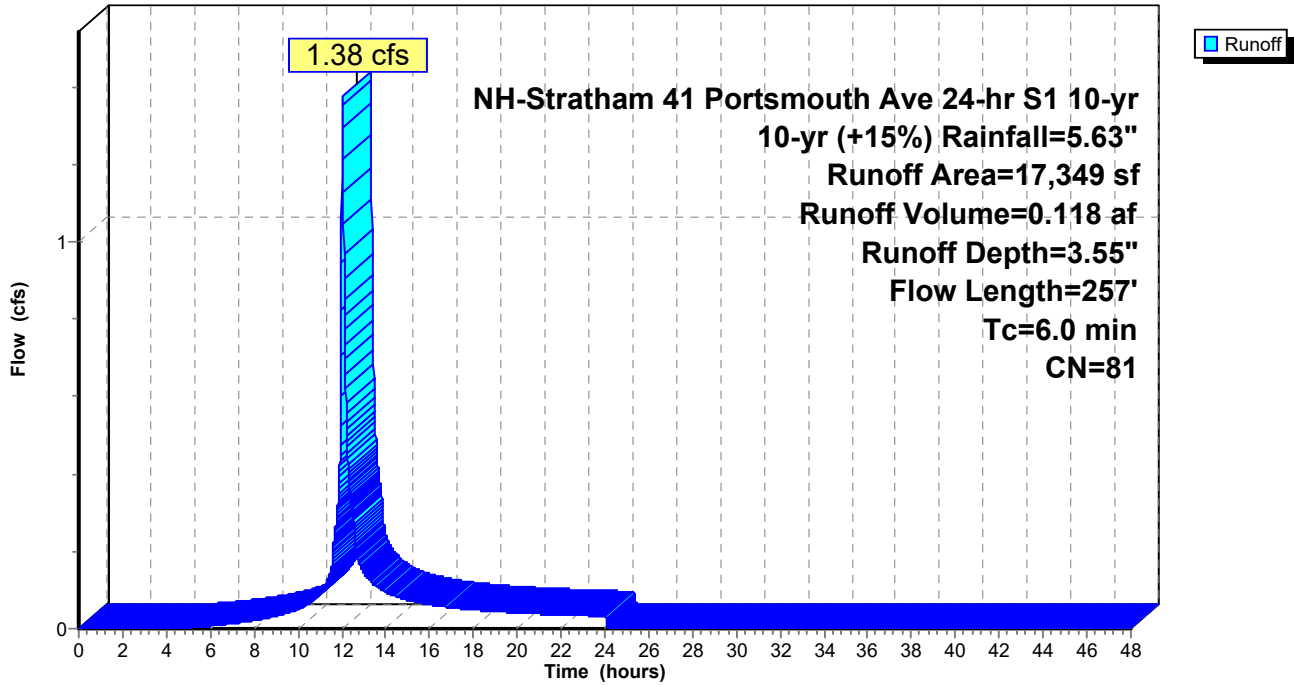
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-48.00 hrs, dt= 0.01 hrs  
 NH-Stratham 41 Portsmouth Ave 24-hr S1 10-yr 10-yr (+15%) Rainfall=5.63"

| Area (sf) | CN | Description                   |
|-----------|----|-------------------------------|
| 12,184    | 74 | >75% Grass cover, Good, HSG C |
| 5,165     | 98 | Paved parking, HSG C          |
| 17,349    | 81 | Weighted Average              |
| 12,184    |    | 70.23% Pervious Area          |
| 5,165     |    | 29.77% Impervious Area        |

| Tc (min) | Length (feet) | Slope (ft/ft) | Velocity (ft/sec) | Capacity (cfs) | Description  |
|----------|---------------|---------------|-------------------|----------------|--|
| 0.7      | 50            | 0.0200        | 1.18              |                | <b>Sheet Flow, Pavement</b><br>Smooth surfaces n= 0.011 P2= 3.10"          |
| 2.9      | 207           | 0.0280        | 1.17              |                | <b>Shallow Concentrated Flow, Grass</b><br>Short Grass Pasture Kv= 7.0 fps |
| 2.4      |               |               |                   |                | <b>Direct Entry, 6 minute min.</b>   |
| 6.0      | 257           | Total         |                   |                |  |

**Subcatchment 207S: SOUTHEAST PARCEL**

Hydrograph



**Postdevelopment ( NH-Stratham 41 Portsmouth Ave 24-hr S1 10-yr 10-yr (+15%) Rainfall=5.63"**

Prepared by Emanuel Engineering

Printed 6/17/2026

HydroCAD® 10.20-9a s/n 01104 © 2026 HydroCAD Software Solutions LLC

Page 21

**Summary for Subcatchment 208S: SOUTH PARCEL**

Runoff = 0.39 cfs @ 12.04 hrs, Volume= 0.033 af, Depth= 3.35"  
 Routed to Pond 257P : BARNYARD CB

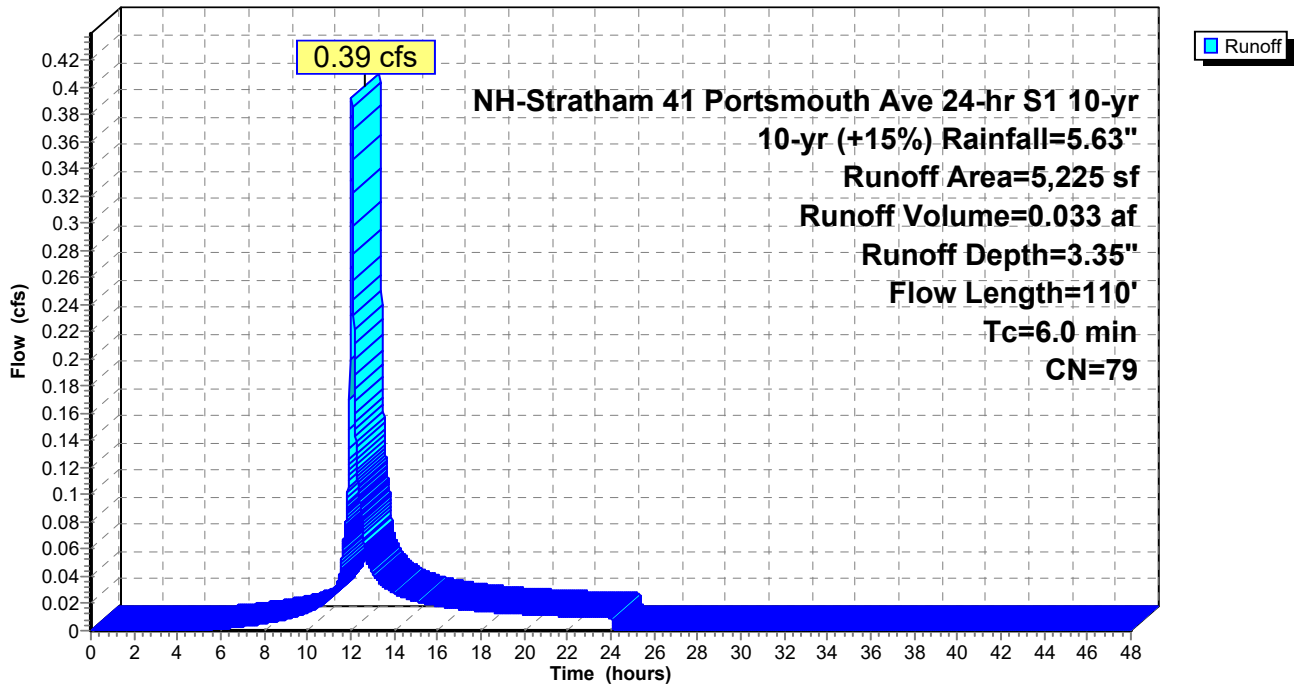
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-48.00 hrs, dt= 0.01 hrs  
 NH-Stratham 41 Portsmouth Ave 24-hr S1 10-yr 10-yr (+15%) Rainfall=5.63"

| Area (sf) | CN | Description                   |
|-----------|----|-------------------------------|
| 4,138     | 74 | >75% Grass cover, Good, HSG C |
| 1,087     | 98 | Paved parking, HSG C          |
| 5,225     | 79 | Weighted Average              |
| 4,138     |    | 79.20% Pervious Area          |
| 1,087     |    | 20.80% Impervious Area        |

| Tc (min) | Length (feet) | Slope (ft/ft) | Velocity (ft/sec) | Capacity (cfs) | Description                             |
|----------|---------------|---------------|-------------------|----------------|---|
| 1.9      | 50            | 0.3000        | 0.43              |                | <b>Sheet Flow, Grass</b>                |
| 0.9      | 60            | 0.0250        | 1.11              |                | <b>Shallow Concentrated Flow, Grass</b> |
| 3.2      |               |               |                   |                | Short Grass Pasture Kv= 7.0 fps         |
| 6.0      | 110           | Total         |                   |                | <b>Direct Entry, 6 minute min.</b>      |

**Subcatchment 208S: SOUTH PARCEL**

Hydrograph



**Summary for Subcatchment 209S: SOUTHWEST PARCEL**

Runoff = 1.03 cfs @ 12.10 hrs, Volume= 0.111 af, Depth= 3.35"  
 Routed to Pond 258P : 24" HDPE UNDER RIVER ROAD

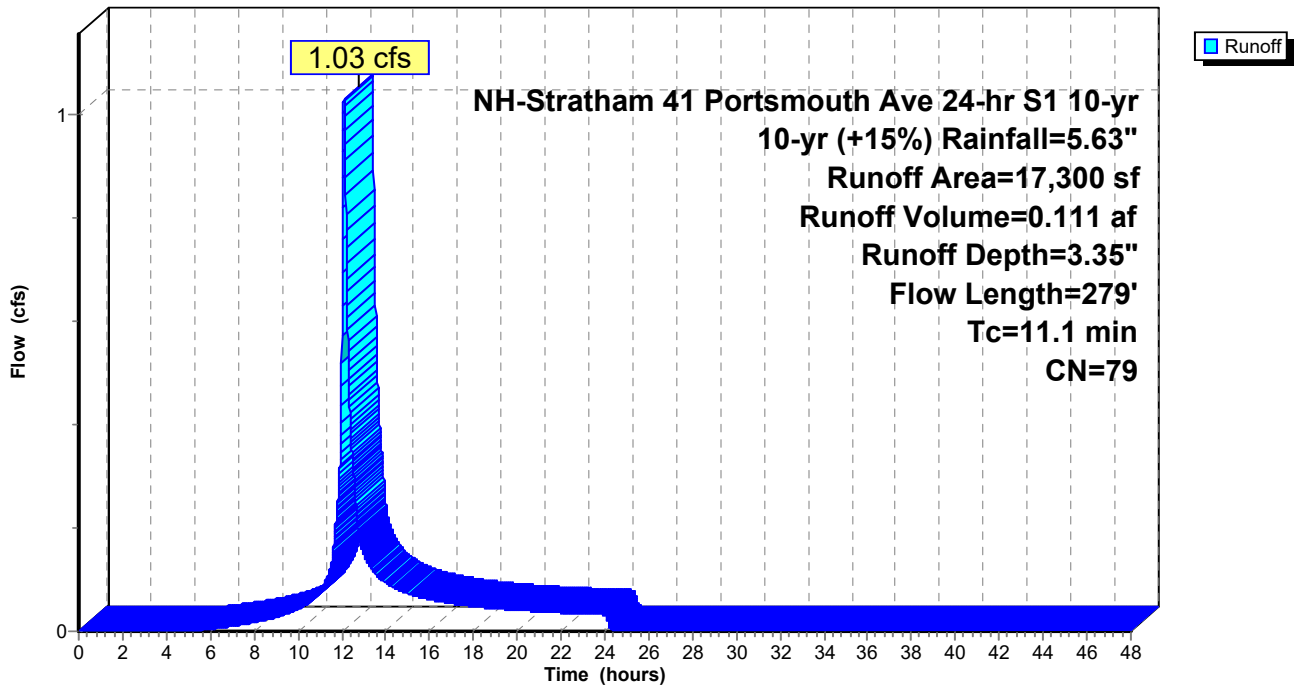
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-48.00 hrs, dt= 0.01 hrs  
 NH-Stratham 41 Portsmouth Ave 24-hr S1 10-yr 10-yr (+15%) Rainfall=5.63"

| Area (sf) | CN | Description                   |
|-----------|----|-------------------------------|
| 14,055    | 74 | >75% Grass cover, Good, HSG C |
| 3,245     | 98 | Paved parking, HSG C          |
| 17,300    | 79 | Weighted Average              |
| 14,055    |    | 81.24% Pervious Area          |
| 3,245     |    | 18.76% Impervious Area        |

| Tc (min) | Length (feet) | Slope (ft/ft) | Velocity (ft/sec) | Capacity (cfs) | Description                             |
|----------|---------------|---------------|-------------------|----------------|---|
| 8.4      | 115           | 0.0400        | 0.23              |                | <b>Sheet Flow, Grass</b>                |
| 2.7      | 164           | 0.0213        | 1.02              |                | <b>Shallow Concentrated Flow, Grass</b> |
|          |               |               |                   |                | Short Grass Pasture Kv= 7.0 fps         |
| 11.1     | 279           | Total         |                   |                |   |

**Subcatchment 209S: SOUTHWEST PARCEL**

Hydrograph



**Summary for Subcatchment 210S: WEST PARKING POND-TO-POND**

Runoff = 6.68 cfs @ 12.04 hrs, Volume= 0.596 af, Depth= 4.60"  
 Routed to Pond 251P-A : BIO-POND A PONDING LAYER

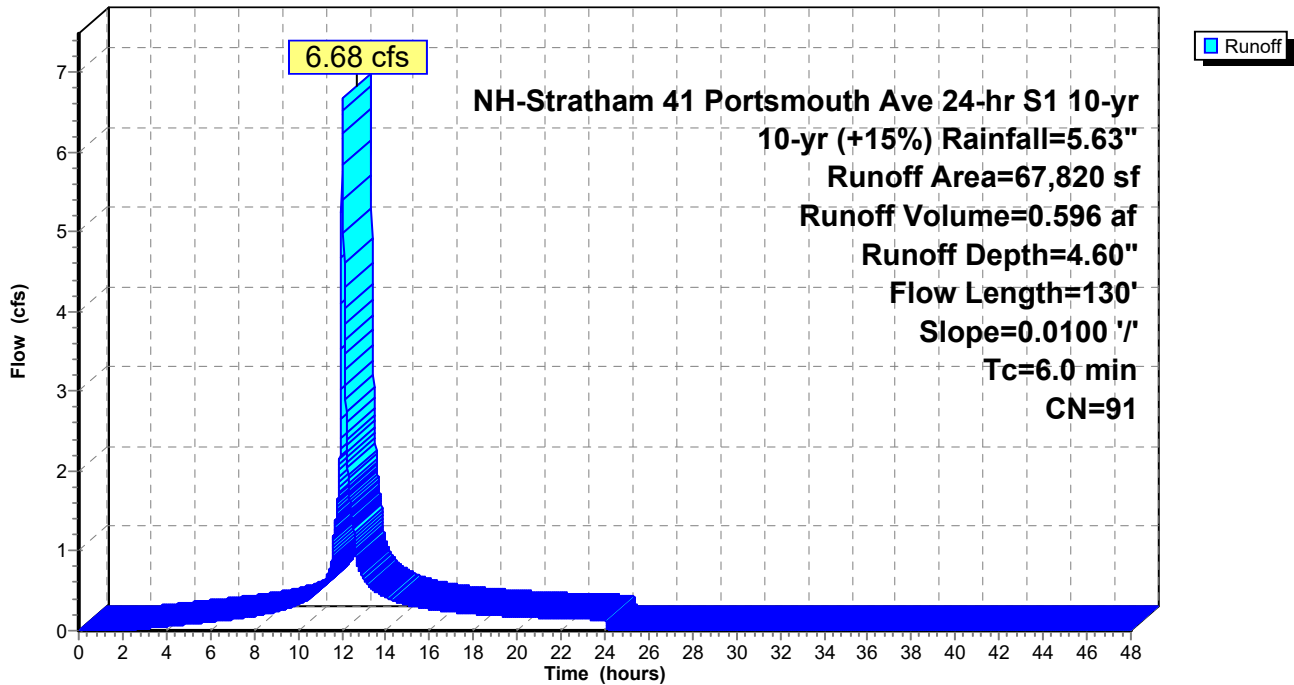
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-48.00 hrs, dt= 0.01 hrs  
 NH-Stratham 41 Portsmouth Ave 24-hr S1 10-yr 10-yr (+15%) Rainfall=5.63"

| Area (sf) | CN | Description                   |
|-----------|----|-------------------------------|
| 20,505    | 74 | >75% Grass cover, Good, HSG C |
| 47,315    | 98 | Paved parking, HSG C          |
| 67,820    | 91 | Weighted Average              |
| 20,505    |    | 30.23% Pervious Area          |
| 47,315    |    | 69.77% Impervious Area        |

| Tc (min) | Length (feet) | Slope (ft/ft) | Velocity (ft/sec) | Capacity (cfs) | Description   |
|----------|---------------|---------------|-------------------|----------------|---|
| 0.9      | 50            | 0.0100        | 0.89              |                | <b>Sheet Flow, Pavement</b><br>Smooth surfaces n= 0.011 P2= 3.10" |
| 0.7      | 80            | 0.0100        | 2.03              |                | <b>Shallow Concentrated Flow, Pavement</b><br>Paved Kv= 20.3 fps  |
| 4.4      |               |               |                   |                | <b>Direct Entry, 6 minute min.</b>                                |
| 6.0      | 130           | Total         |                   |                |   |

**Subcatchment 210S: WEST PARKING POND-TO-POND**

Hydrograph



**Summary for Subcatchment 211S: WEST PARKING BUILDING-TO-POND**

Runoff = 4.19 cfs @ 12.04 hrs, Volume= 0.377 af, Depth= 4.71"  
 Routed to Pond 259P-A : BIO-POND B PONDING LAYER

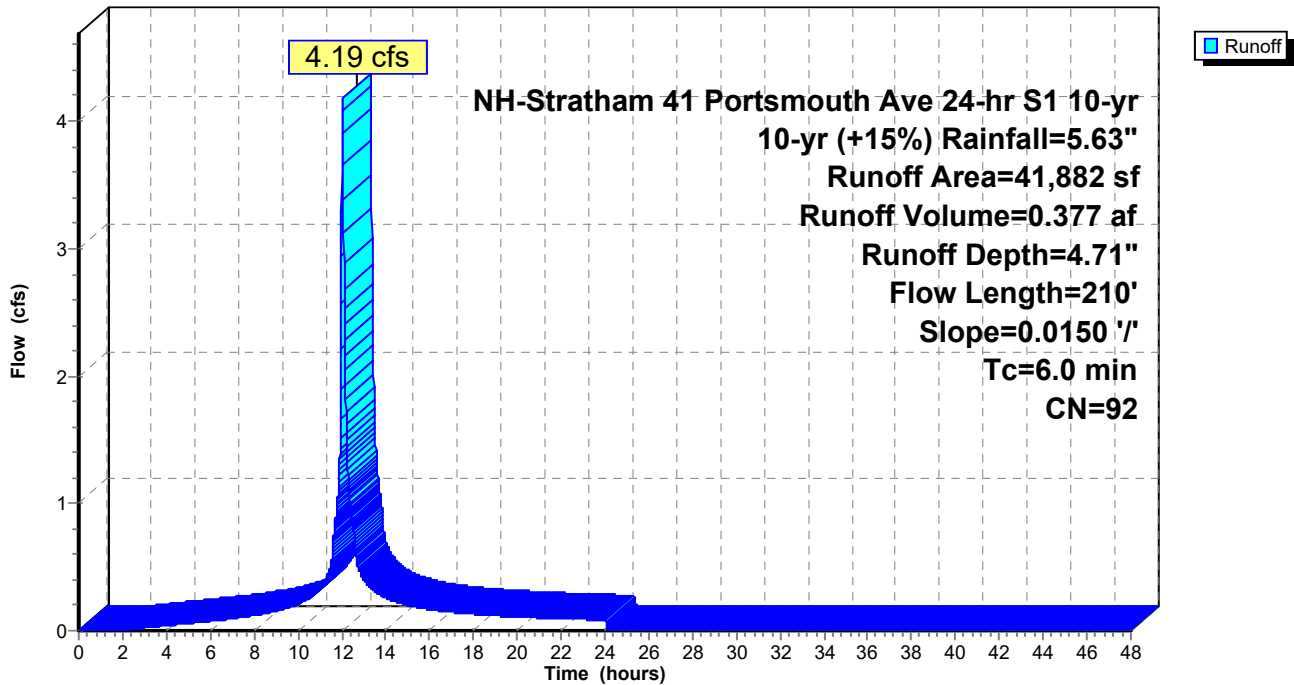
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-48.00 hrs, dt= 0.01 hrs  
 NH-Stratham 41 Portsmouth Ave 24-hr S1 10-yr 10-yr (+15%) Rainfall=5.63"

| Area (sf) | CN | Description                   |
|-----------|----|-------------------------------|
| 10,597    | 74 | >75% Grass cover, Good, HSG C |
| 31,285    | 98 | Paved parking, HSG C          |
| 41,882    | 92 | Weighted Average              |
| 10,597    |    | 25.30% Pervious Area          |
| 31,285    |    | 74.70% Impervious Area        |

| Tc (min) | Length (feet) | Slope (ft/ft) | Velocity (ft/sec) | Capacity (cfs) | Description   |
|----------|---------------|---------------|-------------------|----------------|---|
| 0.8      | 50            | 0.0150        | 1.05              |                | <b>Sheet Flow, Pavement</b><br>Smooth surfaces n= 0.011 P2= 3.10" |
| 1.1      | 160           | 0.0150        | 2.49              |                | <b>Shallow Concentrated Flow, Pavement</b><br>Paved Kv= 20.3 fps  |
| 4.1      |               |               |                   |                | <b>Direct Entry, 6 minute min.</b>                                |
| 6.0      | 210           | Total         |                   |                |   |

**Subcatchment 211S: WEST PARKING BUILDING-TO-POND**

Hydrograph



**Summary for Subcatchment 212S-A: WESTERN HALF OF BUILDING**

Runoff = 1.24 cfs @ 12.04 hrs, Volume= 0.120 af, Depth= 5.39"  
 Routed to Pond 260P-A : ROOF DRAINS

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-48.00 hrs, dt= 0.01 hrs  
 NH-Stratham 41 Portsmouth Ave 24-hr S1 10-yr 10-yr (+15%) Rainfall=5.63"

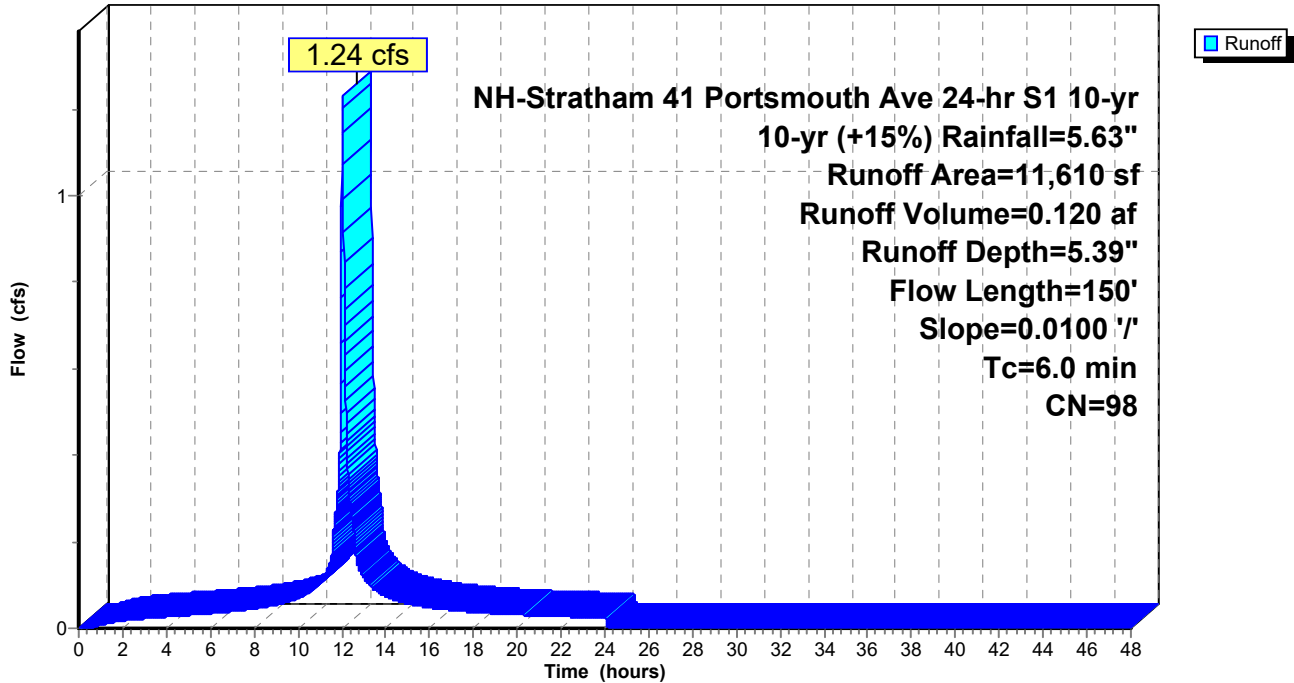
| Area (sf) | CN | Description             |
|-----------|----|-------------------------|
| 11,610    | 98 | Roofs, HSG C            |
| 11,610    |    | 100.00% Impervious Area |

| Tc (min) | Length (feet) | Slope (ft/ft) | Velocity (ft/sec) | Capacity (cfs) | Description                        |
|----------|---------------|---------------|-------------------|----------------|------------------------------------|
| 2.2      | 150           | 0.0100        | 1.11              |                | <b>Sheet Flow, Roof</b>            |
|          |               |               |                   |                | Smooth surfaces n= 0.011 P2= 3.10" |
| 3.8      |               |               |                   |                | <b>Direct Entry, 6 minute min.</b> |
| 6.0      | 150           | Total         |                   |                |                                    |

**Subcatchment 212S-A: WESTERN HALF OF BUILDING**

Hydrograph



**Summary for Subcatchment 212S-B: EASTERN HALF OF BUILDING**

Runoff = 1.49 cfs @ 12.04 hrs, Volume= 0.144 af, Depth= 5.39"  
 Routed to Pond 260P-B : ROOF DRAINS

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-48.00 hrs, dt= 0.01 hrs  
 NH-Stratham 41 Portsmouth Ave 24-hr S1 10-yr 10-yr (+15%) Rainfall=5.63"

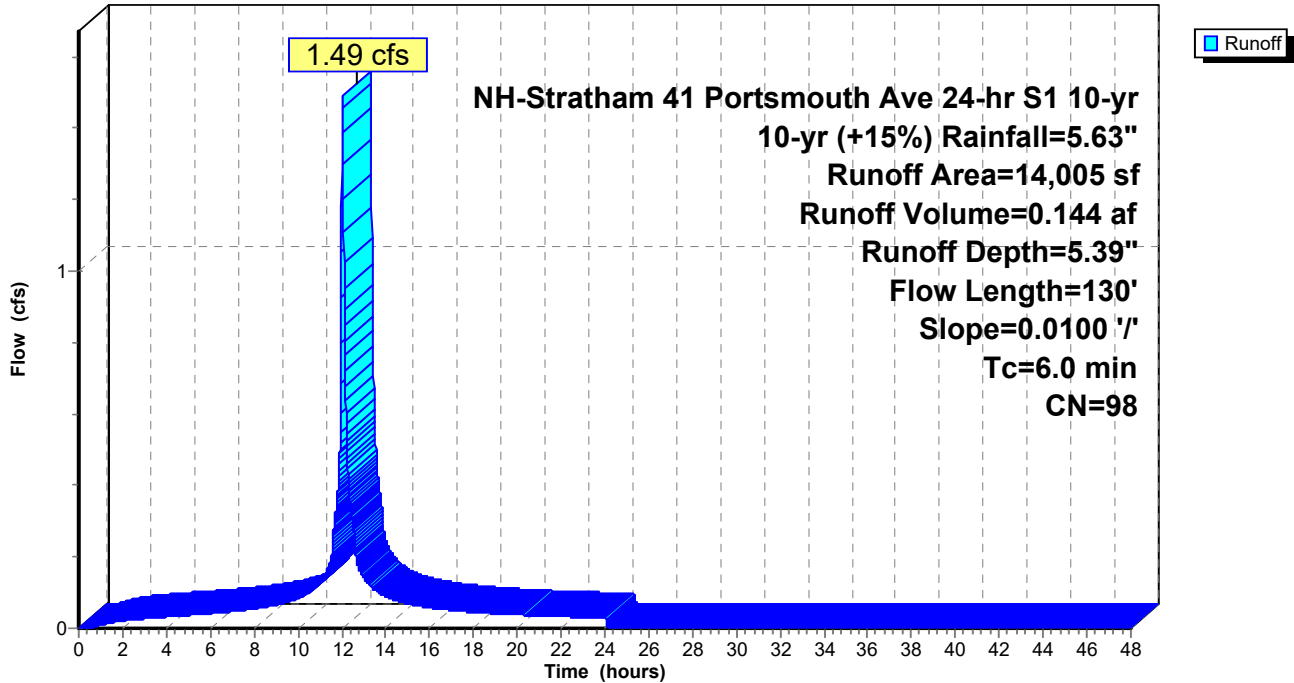
| Area (sf) | CN | Description             |
|-----------|----|-------------------------|
| 14,005    | 98 | Roofs, HSG C            |
| 14,005    |    | 100.00% Impervious Area |

| Tc (min) | Length (feet) | Slope (ft/ft) | Velocity (ft/sec) | Capacity (cfs) | Description                        |
|----------|---------------|---------------|-------------------|----------------|------------------------------------|
| 2.0      | 130           | 0.0100        | 1.08              |                | <b>Sheet Flow, Roof</b>            |
|          |               |               |                   |                | Smooth surfaces n= 0.011 P2= 3.10" |
| 4.0      |               |               |                   |                | <b>Direct Entry, 6 minute min.</b> |
| 6.0      | 130           | Total         |                   |                |                                    |

**Subcatchment 212S-B: EASTERN HALF OF BUILDING**

Hydrograph



**Summary for Subcatchment 213S: NORTH LANDSCAPE ISLAND**

Runoff = 0.13 cfs @ 12.04 hrs, Volume= 0.011 af, Depth= 4.71"  
 Routed to Pond 261P : NORTH ISLAND CATCH BASIN

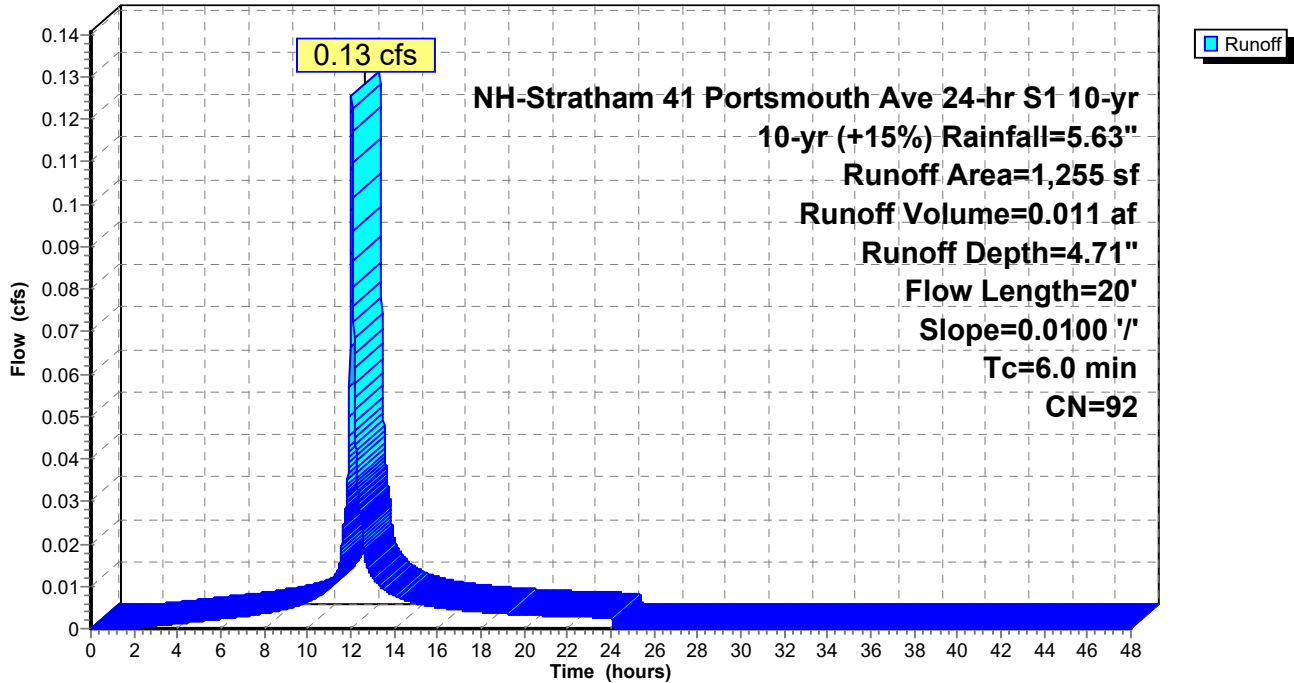
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-48.00 hrs, dt= 0.01 hrs  
 NH-Stratham 41 Portsmouth Ave 24-hr S1 10-yr 10-yr (+15%) Rainfall=5.63"

| Area (sf) | CN | Description                   |
|-----------|----|-------------------------------|
| 305       | 74 | >75% Grass cover, Good, HSG C |
| 950       | 98 | Paved parking, HSG C          |
| 1,255     | 92 | Weighted Average              |
| 305       |    | 24.30% Pervious Area          |
| 950       |    | 75.70% Impervious Area        |

| Tc (min) | Length (feet) | Slope (ft/ft) | Velocity (ft/sec) | Capacity (cfs) | Description                        |
|----------|---------------|---------------|-------------------|----------------|------------------------------------|
| 3.6      | 20            | 0.0100        | 0.09              |                | <b>Sheet Flow, Grass</b>           |
|          |               |               |                   |                | Grass: Short n= 0.150 P2= 3.10"    |
| 2.4      |               |               |                   |                | <b>Direct Entry, 6 minute min.</b> |
| 6.0      | 20            | Total         |                   |                |                                    |

**Subcatchment 213S: NORTH LANDSCAPE ISLAND**

Hydrograph



**Summary for Subcatchment 214S: SOUTH LANDSCAPE ISLAND**

Runoff = 0.30 cfs @ 12.04 hrs, Volume= 0.026 af, Depth= 4.06"  
 Routed to Pond 262P : SOUTH ISLAND CATCH BASIN

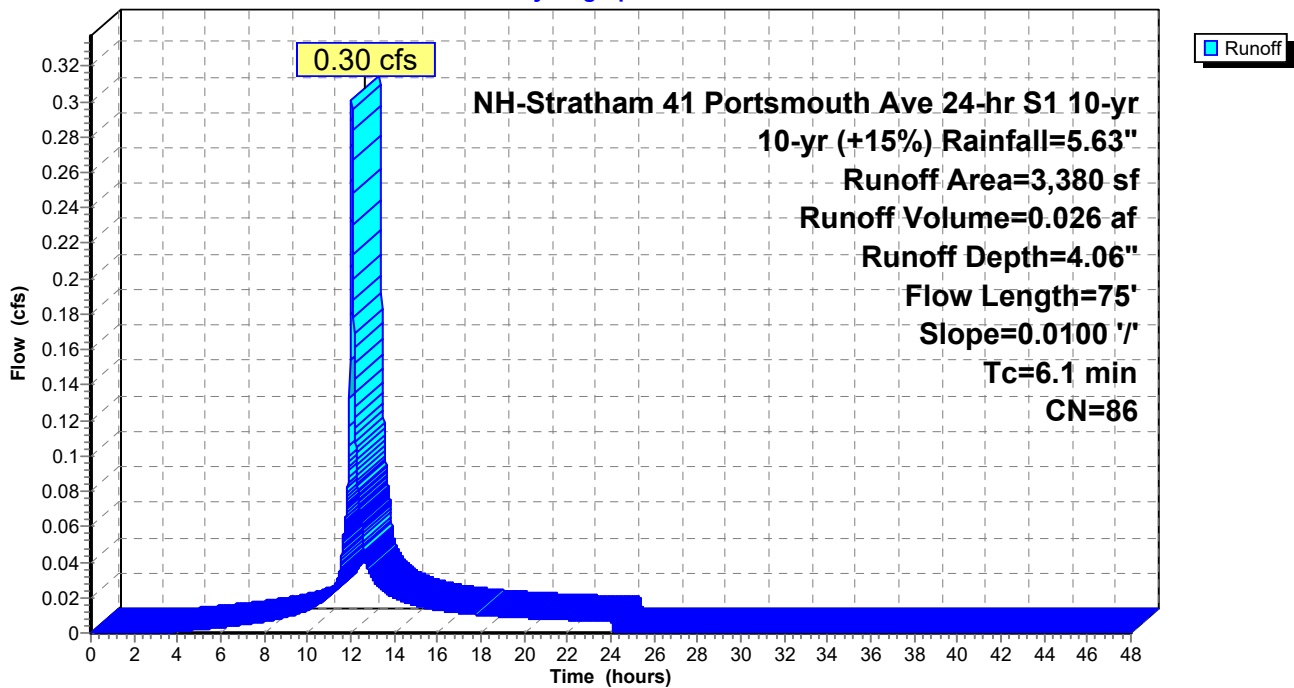
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-48.00 hrs, dt= 0.01 hrs  
 NH-Stratham 41 Portsmouth Ave 24-hr S1 10-yr 10-yr (+15%) Rainfall=5.63"

| Area (sf) | CN | Description                   |
|-----------|----|-------------------------------|
| 1,695     | 74 | >75% Grass cover, Good, HSG C |
| 1,685     | 98 | Paved parking, HSG C          |
| 3,380     | 86 | Weighted Average              |
| 1,695     |    | 50.15% Pervious Area          |
| 1,685     |    | 49.85% Impervious Area        |

| Tc (min) | Length (feet) | Slope (ft/ft) | Velocity (ft/sec) | Capacity (cfs) | Description  |
|----------|---------------|---------------|-------------------|----------------|--|
| 5.7      | 35            | 0.0100        | 0.10              |                | <b>Sheet Flow, Grass</b><br>Grass: Short n= 0.150 P2= 3.10"                |
| 0.2      | 30            | 0.0100        | 2.03              |                | <b>Shallow Concentrated Flow, Concrete</b><br>Paved Kv= 20.3 fps           |
| 0.2      | 10            | 0.0100        | 0.70              |                | <b>Shallow Concentrated Flow, Grass</b><br>Short Grass Pasture Kv= 7.0 fps |
| 6.1      | 75            | Total         |                   |                |  |

**Subcatchment 214S: SOUTH LANDSCAPE ISLAND**

Hydrograph



**Summary for Pond 104P: EXISTING CULVERT**

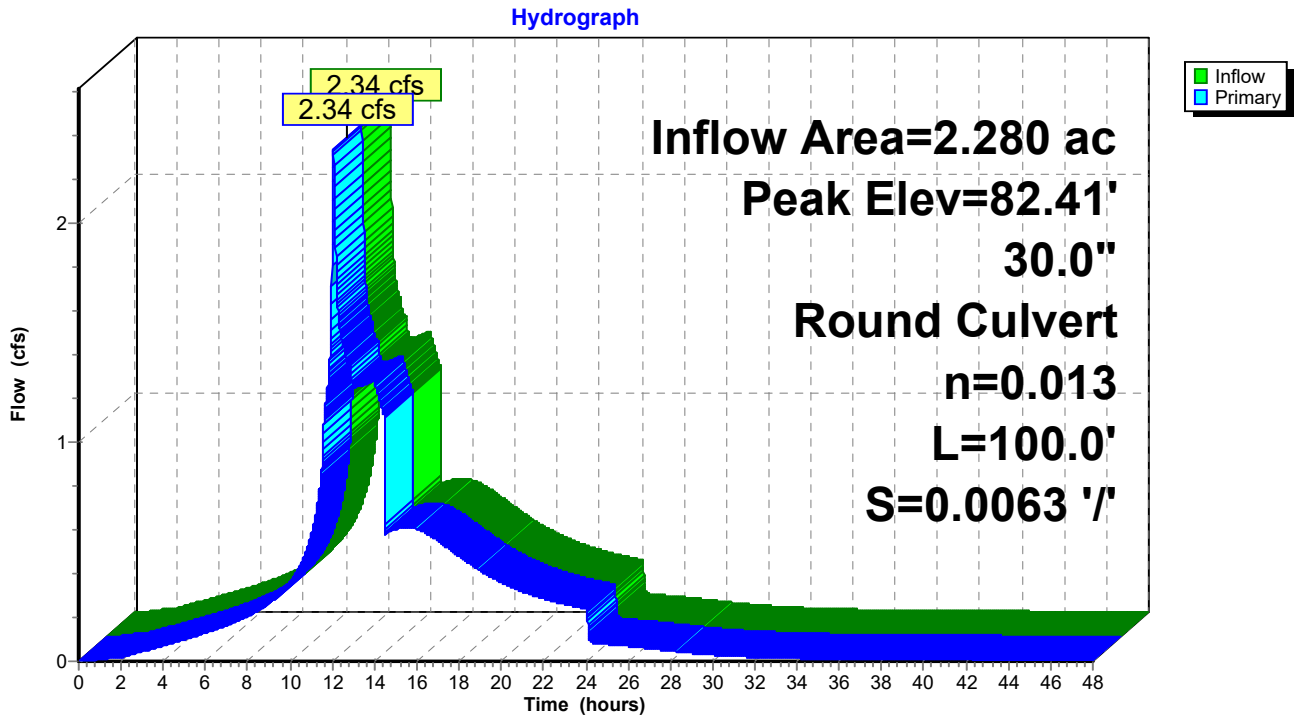
Inflow Area = 2.280 ac, 75.31% Impervious, Inflow Depth > 4.58" for 10-yr (+15%) event  
 Inflow = 2.34 cfs @ 12.05 hrs, Volume= 0.870 af  
 Outflow = 2.34 cfs @ 12.05 hrs, Volume= 0.870 af, Atten= 0%, Lag= 0.0 min  
 Primary = 2.34 cfs @ 12.05 hrs, Volume= 0.870 af  
 Routed to Link 9-5 : MAP 9 LOT 5

Routing by Dyn-Stor-Ind method, Time Span= 0.00-48.00 hrs, dt= 0.01 hrs / 2  
 Peak Elev= 82.41' @ 12.05 hrs  
 Flood Elev= 85.50'

| Device # | Routing | Invert | Outlet Devices   |
|----------|---------|--------|--|
| 1        | Primary | 81.77' | <b>30.0" Round Existing Culvert</b> L= 100.0' Ke= 0.500<br>Inlet / Outlet Invert= 81.77' / 81.14' S= 0.0063 '/' Cc= 0.900<br>n= 0.013 Corrugated PE, smooth interior, Flow Area= 4.91 sf |

**Primary OutFlow** Max=2.33 cfs @ 12.05 hrs HW=82.41' TW=0.00' (Dynamic Tailwater)  
 ↳1=Existing Culvert (Barrel Controls 2.33 cfs @ 3.54 fps)

**Pond 104P: EXISTING CULVERT**



**Postdevelopment ( NH-Stratham 41 Portsmouth Ave 24-hr S1 10-yr 10-yr (+15%) Rainfall=5.63"**

Prepared by Emanuel Engineering

Printed 6/17/2026

HydroCAD® 10.20-9a s/n 01104 © 2026 HydroCAD Software Solutions LLC

Page 30

**Summary for Pond 251P-A: BIO-POND A PONDING LAYER**

Inflow Area = 1.557 ac, 69.77% Impervious, Inflow Depth = 4.60" for 10-yr (+15%) event  
 Inflow = 6.68 cfs @ 12.04 hrs, Volume= 0.596 af  
 Outflow = 2.52 cfs @ 12.21 hrs, Volume= 0.596 af, Atten= 62%, Lag= 10.3 min  
 Primary = 2.52 cfs @ 12.21 hrs, Volume= 0.596 af  
     Routed to Pond 251P-B : BIO-POND A SUBSURFACE  
 Secondary = 0.00 cfs @ 0.00 hrs, Volume= 0.000 af  
     Routed to Pond 251P-B : BIO-POND A SUBSURFACE

Routing by Dyn-Stor-Ind method, Time Span= 0.00-48.00 hrs, dt= 0.01 hrs / 2  
 Peak Elev= 84.17' @ 12.21 hrs Surf.Area= 10,897 sf Storage= 2,103 cf  
 Flood Elev= 85.73' Surf.Area= 13,585 sf Storage= 18,047 cf

Plug-Flow detention time= 3.0 min calculated for 0.596 af (100% of inflow)  
 Center-of-Mass det. time= 3.0 min ( 799.1 - 796.1 )

| Volume              | Invert               | Avail.Storage             | Storage Description                                   |                     |
|---------------------|----------------------|---------------------------|---|---------------------|
| #1                  | 84.00'               | 18,047 cf                 | <b>Bioretention Ponding Area (Conic)</b> listed below |                     |
| <hr/>               |                      |                           |   |                     |
| Elevation<br>(feet) | Surf.Area<br>(sq-ft) | Inc.Store<br>(cubic-feet) | Cum.Store<br>(cubic-feet)                             | Wet.Area<br>(sq-ft) |
| 84.00               | 10,542               | 0                         | 0   | 10,542              |
| 85.50               | 13,585               | 18,047                    | 18,047  | 13,640              |

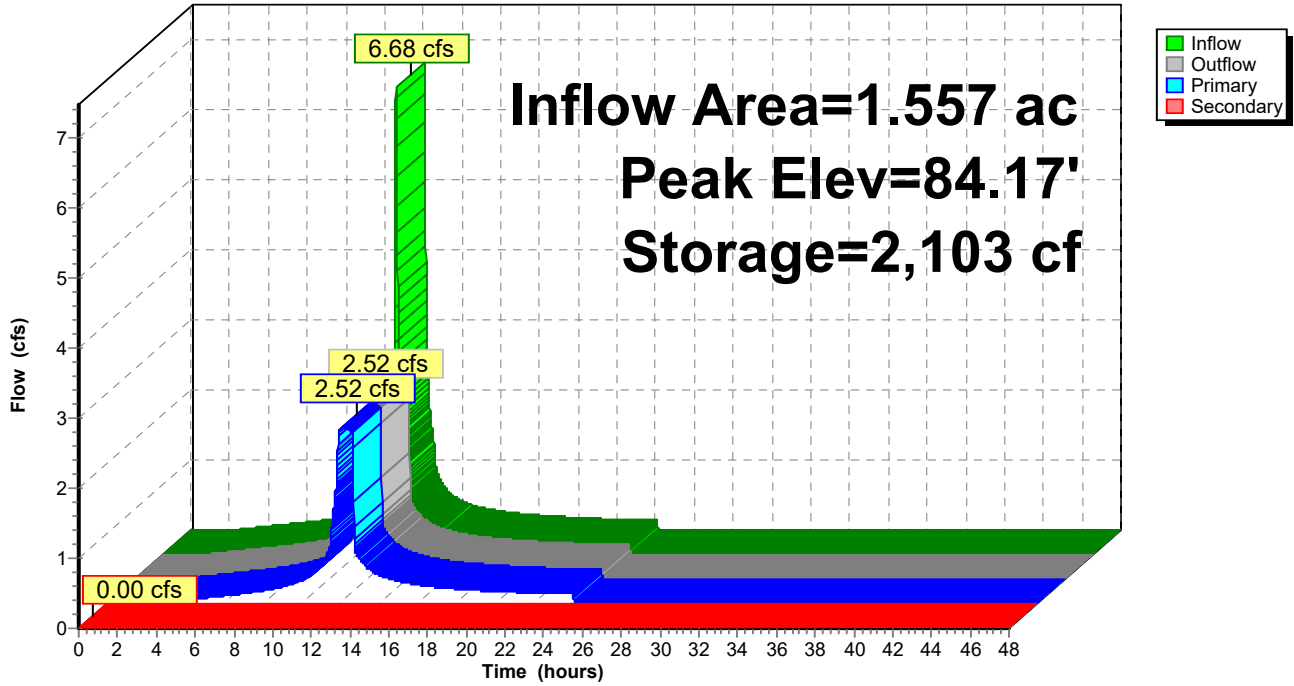
| Device | Routing   | Invert | Outlet Devices   |
|--------|-----------|--------|--|
| #1     | Primary   | 84.00' | <b>10.000 in/hr Exfiltration through Bioretention Mix over Surface area</b><br>Phase-In= 0.01' |
| #2     | Secondary | 85.00' | <b>30.0" Horiz. 30" Diameter Domed Grate</b> C= 0.600<br>Limited to weir flow at low heads     |

**Primary OutFlow** Max=2.52 cfs @ 12.21 hrs HW=84.17' TW=82.29' (Dynamic Tailwater)  
 ↑1=Exfiltration through Bioretention Mix(Exfiltration Controls 2.52 cfs)

**Secondary OutFlow** Max=0.00 cfs @ 0.00 hrs HW=84.00' TW=80.99' (Dynamic Tailwater)  
 ↑2=30" Diameter Domed Grate ( Controls 0.00 cfs)

Pond 251P-A: BIO-POND A PONDING LAYER

Hydrograph



**Postdevelopment ( NH-Stratham 41 Portsmouth Ave 24-hr S1 10-yr 10-yr (+15%) Rainfall=5.63"**

Prepared by Emanuel Engineering

Printed 6/17/2026

HydroCAD® 10.20-9a s/n 01104 © 2026 HydroCAD Software Solutions LLC

Page 32

**Summary for Pond 251P-B: BIO-POND A SUBSURFACE**

[87] Warning: Oscillations may require smaller dt or Finer Routing (severity=1)

Inflow Area = 1.557 ac, 69.77% Impervious, Inflow Depth = 4.60" for 10-yr (+15%) event  
 Inflow = 2.52 cfs @ 12.21 hrs, Volume= 0.596 af  
 Outflow = 2.12 cfs @ 12.73 hrs, Volume= 0.596 af, Atten= 16%, Lag= 31.5 min  
 Primary = 2.12 cfs @ 12.73 hrs, Volume= 0.596 af  
 Routed to Pond 258P : 24" HDPE UNDER RIVER ROAD

Routing by Dyn-Stor-Ind method, Time Span= 0.00-48.00 hrs, dt= 0.01 hrs / 2  
 Peak Elev= 82.62' @ 12.73 hrs Surf.Area= 13,585 sf Storage= 2,648 cf

Plug-Flow detention time= 6.6 min calculated for 0.596 af (100% of inflow)  
 Center-of-Mass det. time= 6.5 min ( 805.7 - 799.1 )

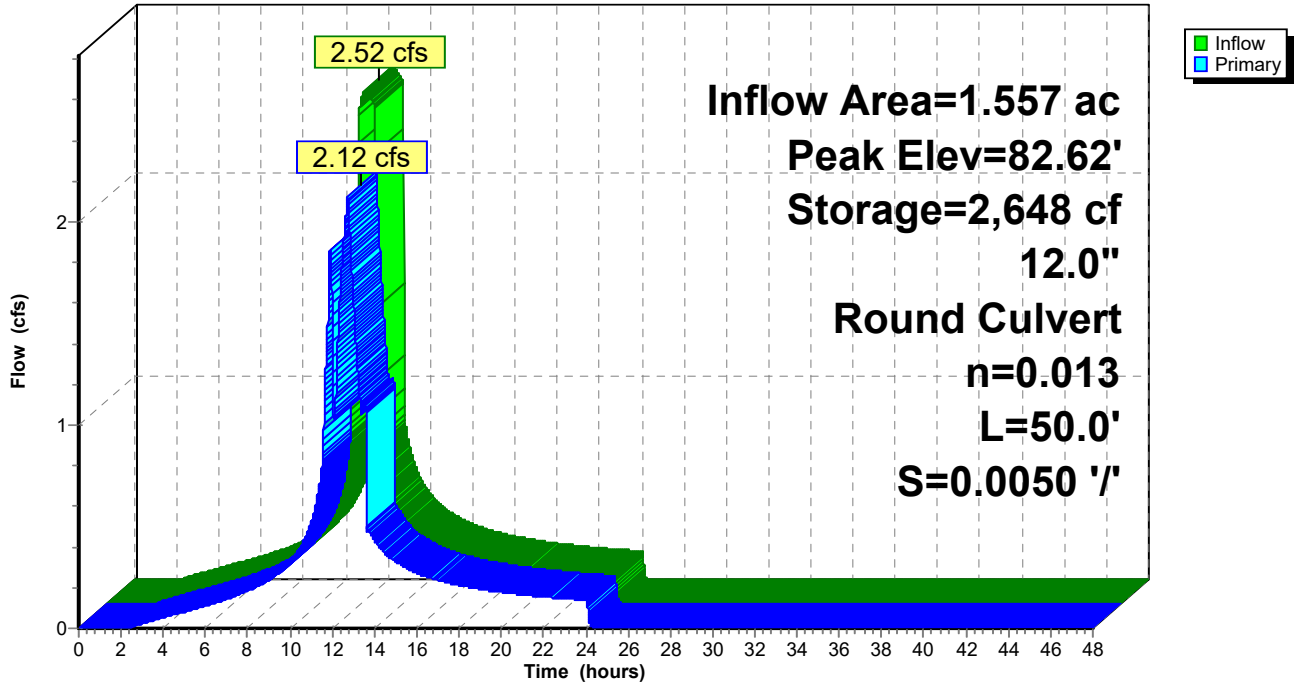
| Volume           | Invert            | Avail.Storage | Storage Description  |                        |                  |  |
|------------------|-------------------|---------------|--|------------------------|------------------|--|
| #1               | 80.99'            | 8,273 cf      | <b>Bioretention Mix and Stone Storage (Conic)</b> listed below |                        |                  |  |
| Elevation (feet) | Surf.Area (sq-ft) | Voids (%)     | Inc.Store (cubic-feet)   | Cum.Store (cubic-feet) | Wet.Area (sq-ft) |  |
| 80.99            | 13,585            | 0.0           | 0  | 0                      | 13,585           |  |
| 81.00            | 13,585            | 0.6           | 1  | 1                      | 13,589           |  |
| 81.99            | 13,585            | 0.6           | 81   | 82                     | 13,998           |  |
| 82.00            | 13,585            | 30.0          | 41   | 122                    | 14,002           |  |
| 84.00            | 13,585            | 30.0          | 8,151  | 8,273                  | 14,829           |  |

| Device | Routing | Invert | Outlet Devices   |
|--------|---------|--------|--|
| #1     | Primary | 81.00' | <b>12.0" Round 12" HDPE Pipe</b><br>L= 50.0' CPP, projecting, no headwall, Ke= 0.900<br>Inlet / Outlet Invert= 81.00' / 80.75' S= 0.0050 '/ Cc= 0.900<br>n= 0.013 Corrugated PE, smooth interior, Flow Area= 0.79 sf |

**Primary OutFlow** Max=2.12 cfs @ 12.73 hrs HW=82.62' TW=82.11' (Dynamic Tailwater)  
 ↑1=12" HDPE Pipe (Inlet Controls 2.12 cfs @ 2.70 fps)

Pond 251P-B: BIO-POND A SUBSURFACE

Hydrograph



**Summary for Pond 252P: NORTHWEST CATCH BASIN**

Inflow Area = 0.126 ac, 27.13% Impervious, Inflow Depth = 3.55" for 10-yr (+15%) event  
 Inflow = 0.43 cfs @ 12.04 hrs, Volume= 0.037 af  
 Outflow = 0.43 cfs @ 12.04 hrs, Volume= 0.037 af, Atten= 0%, Lag= 0.0 min  
 Primary = 0.43 cfs @ 12.04 hrs, Volume= 0.037 af  
 Routed to Pond 104P : EXISTING CULVERT

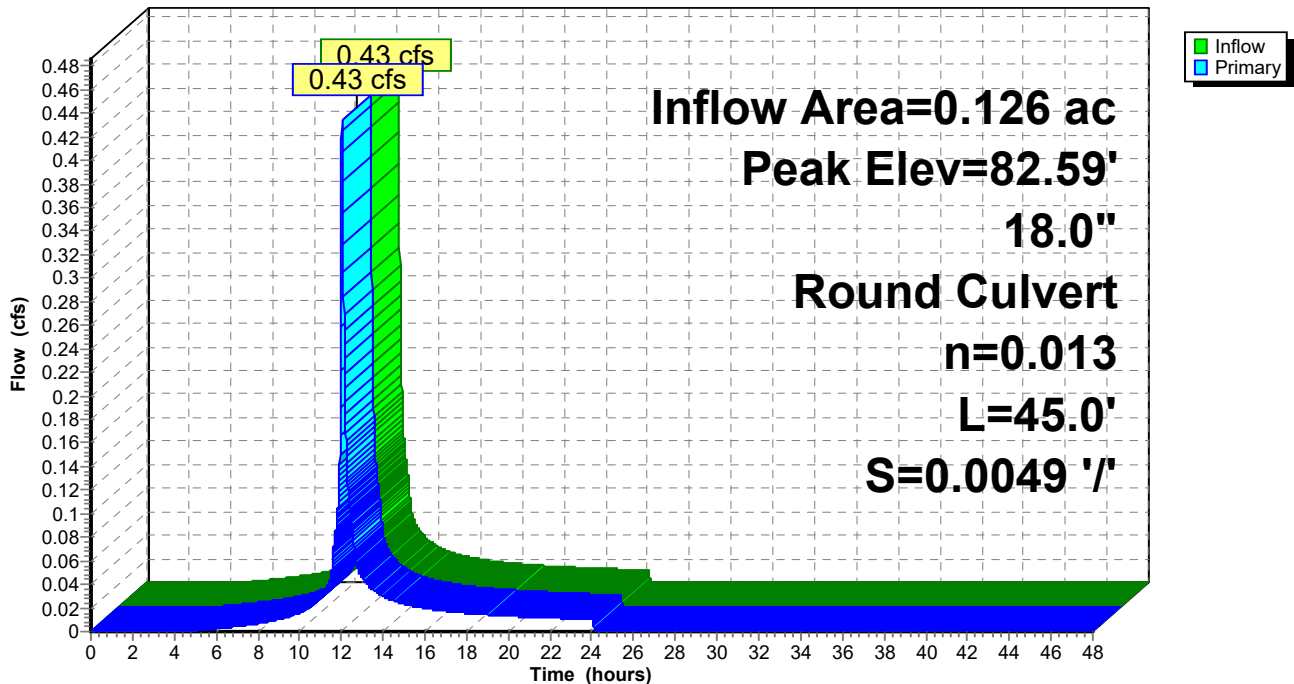
Routing by Dyn-Stor-Ind method, Time Span= 0.00-48.00 hrs, dt= 0.01 hrs / 2  
 Peak Elev= 82.59' @ 12.04 hrs  
 Flood Elev= 83.50'

| Device # | Routing | Invert | Outlet Devices  |
|----------|---------|--------|---|
| 1        | Primary | 82.18' | <b>18.0" Round 18" HDPE Pipe</b><br>L= 45.0' CPP, projecting, no headwall, Ke= 0.900<br>Inlet / Outlet Invert= 82.18' / 81.96' S= 0.0049 '/' Cc= 0.900<br>n= 0.013 Corrugated PE, smooth interior, Flow Area= 1.77 sf |

Primary OutFlow Max=0.43 cfs @ 12.04 hrs HW=82.58' TW=82.41' (Dynamic Tailwater)  
 1=18" HDPE Pipe (Outlet Controls 0.43 cfs @ 1.69 fps)

**Pond 252P: NORTHWEST CATCH BASIN**

Hydrograph



**Postdevelopment ( NH-Stratham 41 Portsmouth Ave 24-hr S1 10-yr 10-yr (+15%) Rainfall=5.63"**

Prepared by Emanuel Engineering

Printed 6/17/2026

HydroCAD® 10.20-9a s/n 01104 © 2026 HydroCAD Software Solutions LLC

Page 35

**Summary for Pond 253P-A: BIO-POND C PONDING LAYER**

Inflow Area = 0.140 ac, 37.68% Impervious, Inflow Depth = 3.75" for 10-yr (+15%) event  
 Inflow = 0.50 cfs @ 12.04 hrs, Volume= 0.044 af  
 Outflow = 0.18 cfs @ 12.24 hrs, Volume= 0.044 af, Atten= 64%, Lag= 11.7 min  
 Primary = 0.18 cfs @ 12.24 hrs, Volume= 0.044 af  
     Routed to Pond 253P-B : BIO-POND C SUBSURFACE  
 Secondary = 0.00 cfs @ 0.00 hrs, Volume= 0.000 af  
     Routed to Pond 253P-B : BIO-POND C SUBSURFACE

Routing by Dyn-Stor-Ind method, Time Span= 0.00-48.00 hrs, dt= 0.01 hrs / 2  
 Peak Elev= 87.64' @ 12.24 hrs Surf.Area= 790 sf Storage= 186 cf  
 Flood Elev= 89.00' Surf.Area= 2,135 sf Storage= 1,982 cf

Plug-Flow detention time= 4.6 min calculated for 0.044 af (100% of inflow)  
 Center-of-Mass det. time= 4.6 min ( 837.6 - 833.1 )

| Volume | Invert | Avail.Storage | Storage Description                               |
|--------|--------|---------------|---|
| #1     | 87.50' | 1,982 cf      | <b>Bioswale Ponding Area (Conic)</b> listed below |

| Elevation<br>(feet) | Surf.Area<br>(sq-ft) | Inc.Store<br>(cubic-feet) | Cum.Store<br>(cubic-feet) | Wet.Area<br>(sq-ft) |
|---------------------|----------------------|---------------------------|---------------------------|---------------------|
| 87.50               | 651                  | 0                         | 0                         | 651                 |
| 89.00               | 2,135                | 1,982                     | 1,982                     | 2,147               |

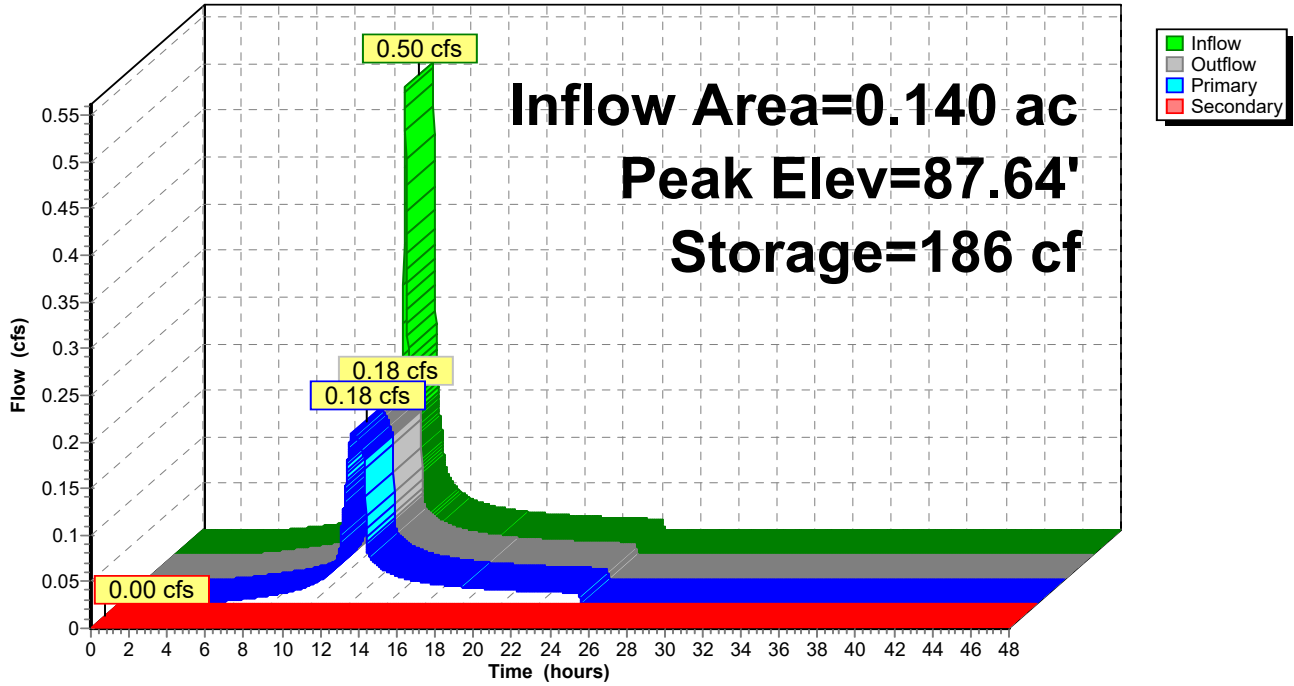
| Device | Routing   | Invert | Outlet Devices   |
|--------|-----------|--------|--|
| #1     | Primary   | 87.50' | <b>10.000 in/hr Exfiltration through Bioretention Layer over Surface area</b><br>Phase-In= 0.01' |
| #2     | Secondary | 88.50' | <b>30.0" Horiz. 30" Dia. Domed Grate</b> C= 0.600<br>Limited to weir flow at low heads           |

**Primary OutFlow** Max=0.18 cfs @ 12.24 hrs HW=87.64' TW=84.78' (Dynamic Tailwater)  
 ↑1=Exfiltration through Bioretention Layer(Exfiltration Controls 0.18 cfs)

**Secondary OutFlow** Max=0.00 cfs @ 0.00 hrs HW=87.50' TW=84.49' (Dynamic Tailwater)  
 ↑2=30" Dia. Domed Grate ( Controls 0.00 cfs)

### Pond 253P-A: BIO-POND C PONDING LAYER

Hydrograph



**Postdevelopment ( NH-Stratham 41 Portsmouth Ave 24-hr S1 10-yr 10-yr (+15%) Rainfall=5.63"**

Prepared by Emanuel Engineering

Printed 6/17/2026

HydroCAD® 10.20-9a s/n 01104 © 2026 HydroCAD Software Solutions LLC

Page 37

**Summary for Pond 253P-B: BIO-POND C SUBSURFACE**

Inflow Area = 0.687 ac, 81.83% Impervious, Inflow Depth > 4.38" for 10-yr (+15%) event  
 Inflow = 0.33 cfs @ 16.17 hrs, Volume= 0.251 af  
 Outflow = 0.33 cfs @ 16.17 hrs, Volume= 0.251 af, Atten= 0%, Lag= 0.0 min  
 Primary = 0.33 cfs @ 16.17 hrs, Volume= 0.251 af  
 Routed to Pond 104P : EXISTING CULVERT

Routing by Dyn-Stor-Ind method, Time Span= 0.00-48.00 hrs, dt= 0.01 hrs / 2  
 Peak Elev= 84.87' @ 16.17 hrs Surf.Area= 1,130 sf Storage= 0 cf

Plug-Flow detention time= 0.0 min calculated for 0.251 af (100% of inflow)  
 Center-of-Mass det. time= 0.0 min ( 1,143.1 - 1,143.0 )

| Volume           | Invert            | Avail.Storage | Storage Description  |                        |                  |  |
|------------------|-------------------|---------------|--|------------------------|------------------|--|
| #1               | 84.49'            | 683 cf        | <b>Bioretention Soil Mix (Pyramidal)</b> Listed below (Recalc) |                        |                  |  |
| Elevation (feet) | Surf.Area (sq-ft) | Voids (%)     | Inc.Store (cubic-feet)   | Cum.Store (cubic-feet) | Wet.Area (sq-ft) |  |
| 84.49            | 1,130             | 0.0           | 0  | 0                      | 1,130            |  |
| 84.50            | 1,130             | 0.1           | 0  | 0                      | 1,131            |  |
| 85.49            | 1,130             | 0.1           | 1  | 1                      | 1,264            |  |
| 85.50            | 1,130             | 30.0          | 3  | 5                      | 1,266            |  |
| 87.50            | 1,130             | 30.0          | 678  | 683                    | 1,535            |  |

| Device | Routing  | Invert | Outlet Devices   |
|--------|----------|--------|--|
| #1     | Primary  | 82.55' | <b>12.0" Round 12" HDPE Pipe</b><br>L= 285.0' CPP, projecting, no headwall, Ke= 0.900<br>Inlet / Outlet Invert= 82.55' / 81.80' S= 0.0026 '/' Cc= 0.900<br>n= 0.013 Corrugated PE, smooth interior, Flow Area= 0.79 sf |
| #2     | Device 1 | 84.50' | <b>6.0" Vert. 6" Diameter Underdrain Entrance into CB</b> C= 0.600<br>Limited to weir flow at low heads  |

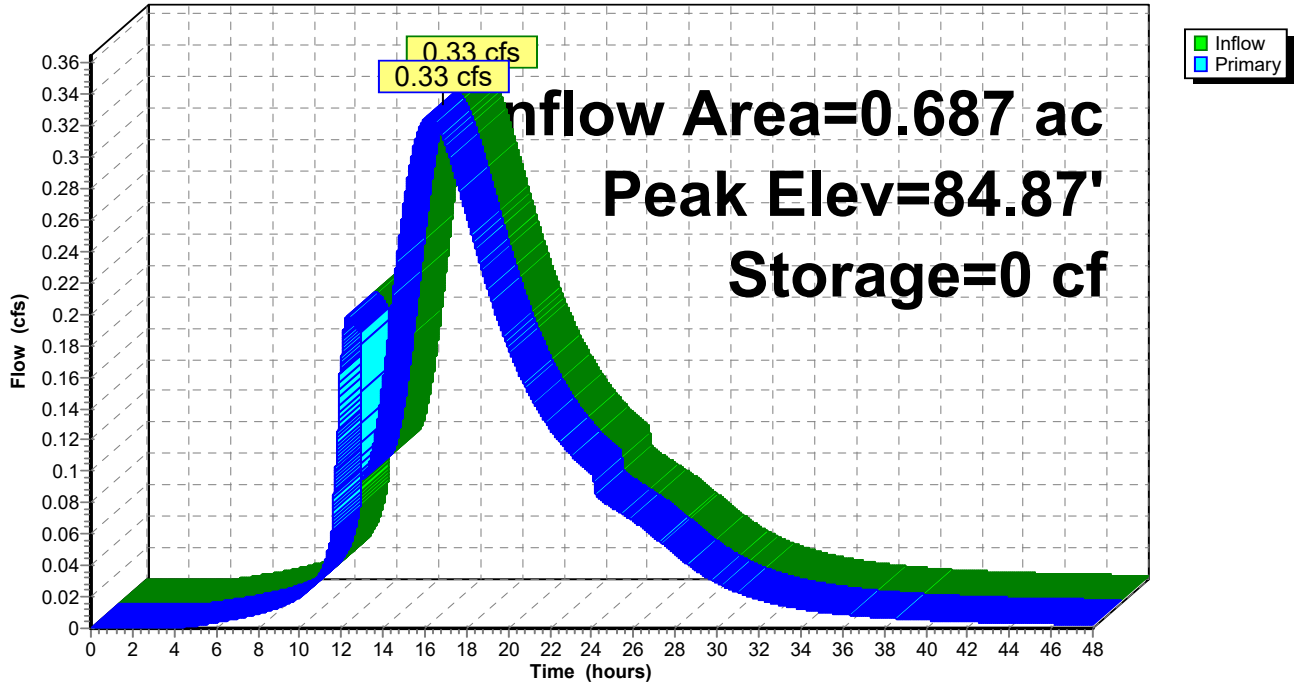
**Primary OutFlow** Max=0.33 cfs @ 16.17 hrs HW=84.87' TW=82.09' (Dynamic Tailwater)

↑ **1=12" HDPE Pipe** (Passes 0.33 cfs of 2.75 cfs potential flow)

↑ **2=6" Diameter Underdrain Entrance into CB**(Orifice Controls 0.33 cfs @ 2.08 fps)

Pond 253P-B: BIO-POND C SUBSURFACE

Hydrograph



**Postdevelopment ( NH-Stratham 41 Portsmouth Ave 24-hr S1 10-yr 10-yr (+15%) Rainfall=5.63"**

Prepared by Emanuel Engineering

Printed 6/17/2026

HydroCAD® 10.20-9a s/n 01104 © 2026 HydroCAD Software Solutions LLC

Page 39

**Summary for Pond 253P-C: POROUS PAVEMENT A**

Inflow Area = 0.547 ac, 93.10% Impervious, Inflow Depth = 5.16" for 10-yr (+15%) event  
 Inflow = 0.41 cfs @ 14.80 hrs, Volume= 0.235 af  
 Outflow = 0.30 cfs @ 16.22 hrs, Volume= 0.207 af, Atten= 25%, Lag= 85.2 min  
 Primary = 0.30 cfs @ 16.22 hrs, Volume= 0.207 af  
 Routed to Pond 253P-B : BIO-POND C SUBSURFACE

Routing by Dyn-Stor-Ind method, Time Span= 0.00-48.00 hrs, dt= 0.01 hrs / 2  
 Peak Elev= 85.76' @ 16.22 hrs Surf.Area= 13,450 sf Storage= 3,693 cf

Plug-Flow detention time= 312.2 min calculated for 0.207 af (88% of inflow)  
 Center-of-Mass det. time= 241.8 min ( 1,207.5 - 965.6 )

| Volume | Invert | Avail.Storage | Storage Description                                      |
|--------|--------|---------------|--|
| #1     | 85.07' | 17,431 cf     | <b>Porous Pavement (Prismatic)</b> Listed below (Recalc) |

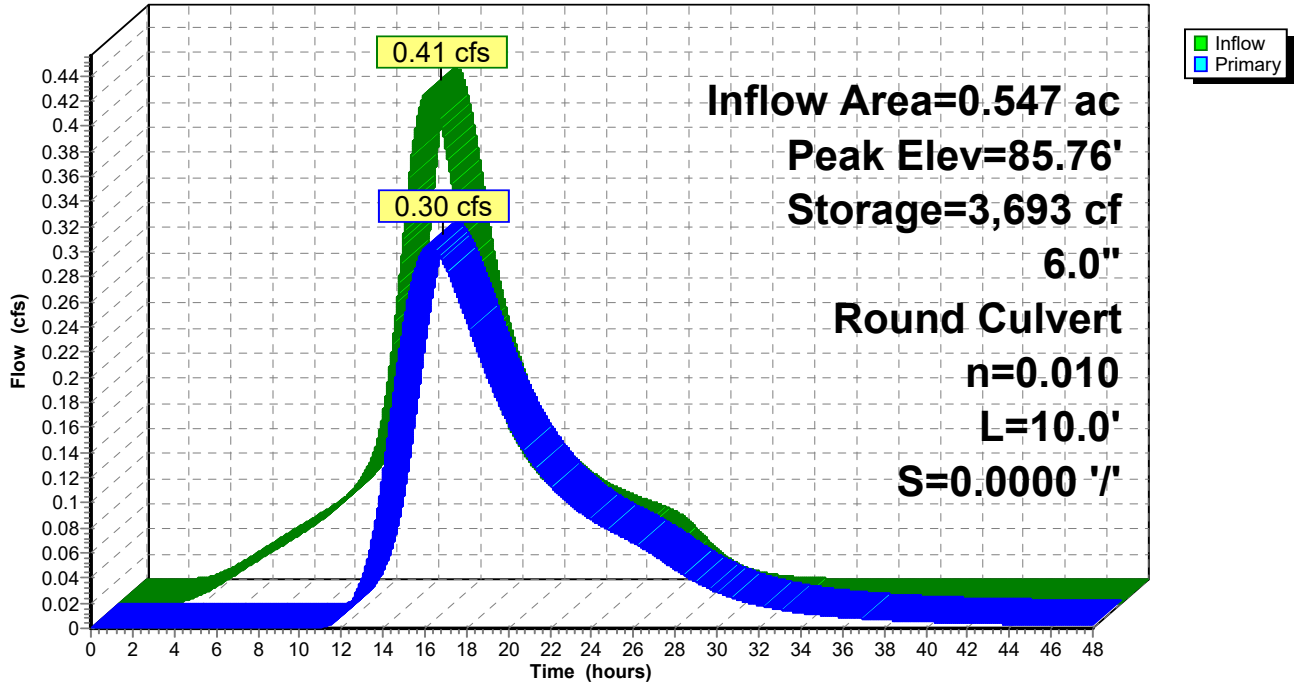
| Elevation<br>(feet) | Surf.Area<br>(sq-ft) | Voids<br>(%) | Inc.Store<br>(cubic-feet) | Cum.Store<br>(cubic-feet) |
|---------------------|----------------------|--------------|---------------------------|---------------------------|
| 85.07               | 13,450               | 0.0          | 0                         | 0                         |
| 85.08               | 13,450               | 40.0         | 54                        | 54                        |
| 86.24               | 13,450               | 40.0         | 6,241                     | 6,295                     |
| 86.25               | 13,450               | 30.0         | 40                        | 6,335                     |
| 89.00               | 13,450               | 30.0         | 11,096                    | 17,431                    |

| Device | Routing | Invert | Outlet Devices   |
|--------|---------|--------|--|
| #1     | Primary | 85.25' | <b>6.0" Round 6" SDR-35 Underdrain</b><br>L= 10.0' CPP, projecting, no headwall, Ke= 0.900<br>Inlet / Outlet Invert= 85.25' / 85.25' S= 0.0000 '/ Cc= 0.900<br>n= 0.010 PVC, smooth interior, Flow Area= 0.20 sf |

**Primary OutFlow** Max=0.30 cfs @ 16.22 hrs HW=85.76' TW=84.87' (Dynamic Tailwater)  
 ↑1=6" SDR-35 Underdrain (Barrel Controls 0.30 cfs @ 1.90 fps)

### Pond 253P-C: POROUS PAVEMENT A

Hydrograph



**Postdevelopment ( NH-Stratham 41 Portsmouth Ave 24-hr S1 10-yr 10-yr (+15%) Rainfall=5.63"**

Prepared by Emanuel Engineering

Printed 6/17/2026

HydroCAD® 10.20-9a s/n 01104 © 2026 HydroCAD Software Solutions LLC

Page 41

**Summary for Pond 254P-A: BIO-POND D PONDING LAYER**

Inflow Area = 0.554 ac, 63.73% Impervious, Inflow Depth = 4.38" for 10-yr (+15%) event  
 Inflow = 2.05 cfs @ 12.06 hrs, Volume= 0.202 af  
 Outflow = 0.62 cfs @ 12.37 hrs, Volume= 0.202 af, Atten= 70%, Lag= 18.1 min  
 Primary = 0.62 cfs @ 12.37 hrs, Volume= 0.202 af  
     Routed to Pond 254P-B : BIO-POND D SUBSURFACE  
 Secondary = 0.00 cfs @ 0.00 hrs, Volume= 0.000 af  
     Routed to Pond 255P-A : BIO-POND E PONDING LAYER

Routing by Dyn-Stor-Ind method, Time Span= 0.00-48.00 hrs, dt= 0.01 hrs / 2  
 Peak Elev= 87.86' @ 12.37 hrs Surf.Area= 2,679 sf Storage= 1,048 cf  
 Flood Elev= 88.90' Surf.Area= 3,405 sf Storage= 4,112 cf

Plug-Flow detention time= 6.8 min calculated for 0.202 af (100% of inflow)  
 Center-of-Mass det. time= 6.8 min ( 815.3 - 808.5 )

| Volume              | Invert               | Avail.Storage             | Storage Description                                   |                     |
|---------------------|----------------------|---------------------------|---|---------------------|
| #1                  | 87.50'               | 4,405 cf                  | <b>Bioretention Ponding Area (Conic)</b> listed below |                     |
| <hr/>               |                      |                           |   |                     |
| Elevation<br>(feet) | Surf.Area<br>(sq-ft) | Inc.Store<br>(cubic-feet) | Cum.Store<br>(cubic-feet)                             | Wet.Area<br>(sq-ft) |
| 87.50               | 2,430                | 0                         | 0   | 2,430               |
| 89.00               | 3,475                | 4,405                     | 4,405   | 3,514               |

| Device | Routing   | Invert | Outlet Devices   |
|--------|-----------|--------|--|
| #1     | Primary   | 87.50' | <b>10.000 in/hr Exfiltration through Bioretention Media over Surface area</b><br>Phase-In= 0.01'   |
| #2     | Secondary | 88.80' | <b>20.0' long x 11.0' breadth Broad-Crested Rectangular Weir</b><br>Head (feet) 0.20 0.40 0.60 0.80 1.00 1.20 1.40 1.60<br>Coef. (English) 2.53 2.59 2.70 2.68 2.67 2.68 2.66 2.64 |

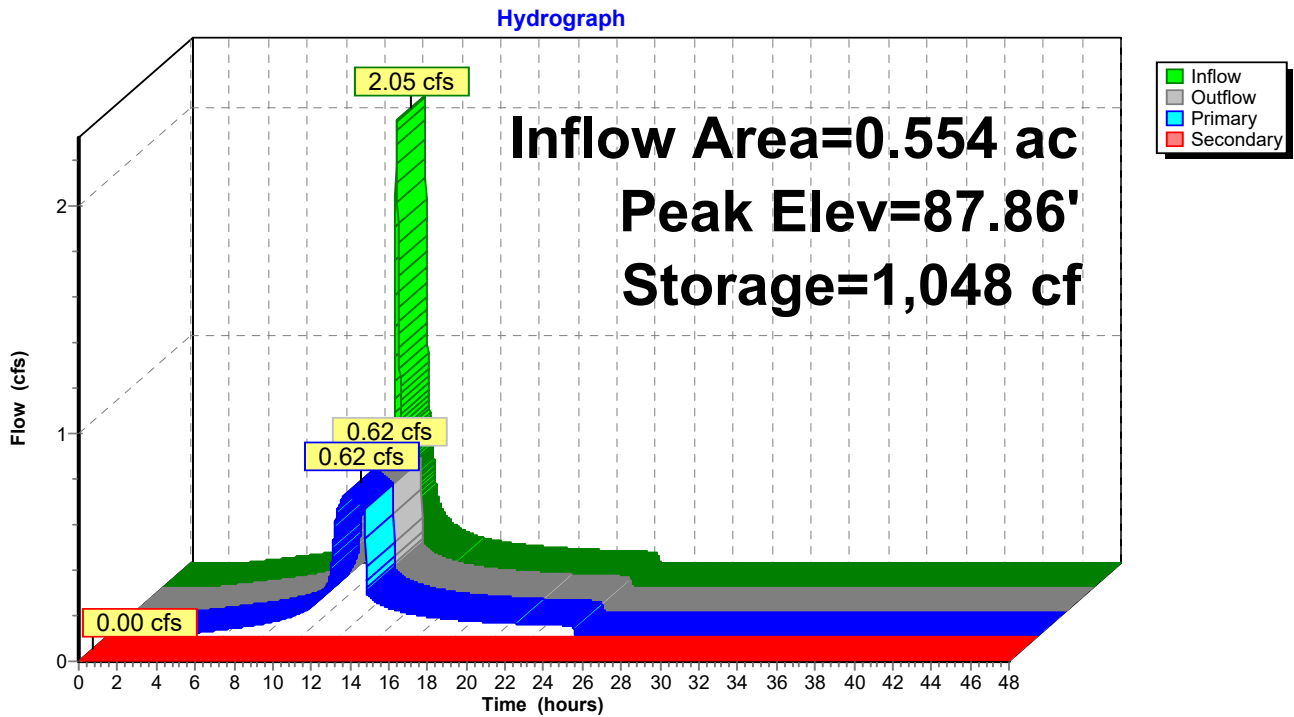
**Primary OutFlow** Max=0.62 cfs @ 12.37 hrs HW=87.86' TW=85.44' (Dynamic Tailwater)

↑1=**Exfiltration through Bioretention Media**(Exfiltration Controls 0.62 cfs)

**Secondary OutFlow** Max=0.00 cfs @ 0.00 hrs HW=87.50' TW=86.50' (Dynamic Tailwater)

↑2=**Broad-Crested Rectangular Weir**( Controls 0.00 cfs)

### Pond 254P-A: BIO-POND D PONDING LAYER



**Postdevelopment ( NH-Stratham 41 Portsmouth Ave 24-hr S1 10-yr 10-yr (+15%) Rainfall=5.63"**

Prepared by Emanuel Engineering

Printed 6/17/2026

HydroCAD® 10.20-9a s/n 01104 © 2026 HydroCAD Software Solutions LLC

Page 43

**Summary for Pond 254P-B: BIO-POND D SUBSURFACE**

Inflow Area = 0.554 ac, 63.73% Impervious, Inflow Depth = 4.38" for 10-yr (+15%) event  
 Inflow = 0.62 cfs @ 12.37 hrs, Volume= 0.202 af  
 Outflow = 0.62 cfs @ 12.37 hrs, Volume= 0.202 af, Atten= 0%, Lag= 0.3 min  
 Primary = 0.62 cfs @ 12.37 hrs, Volume= 0.202 af  
 Routed to Pond 255P-B : BIO-POND E SUBSURFACE

Routing by Dyn-Stor-Ind method, Time Span= 0.00-48.00 hrs, dt= 0.01 hrs / 2  
 Peak Elev= 85.44' @ 12.37 hrs Surf.Area= 3,475 sf Storage= 7 cf

Plug-Flow detention time= 0.4 min calculated for 0.202 af (100% of inflow)  
 Center-of-Mass det. time= 0.2 min ( 815.6 - 815.3 )

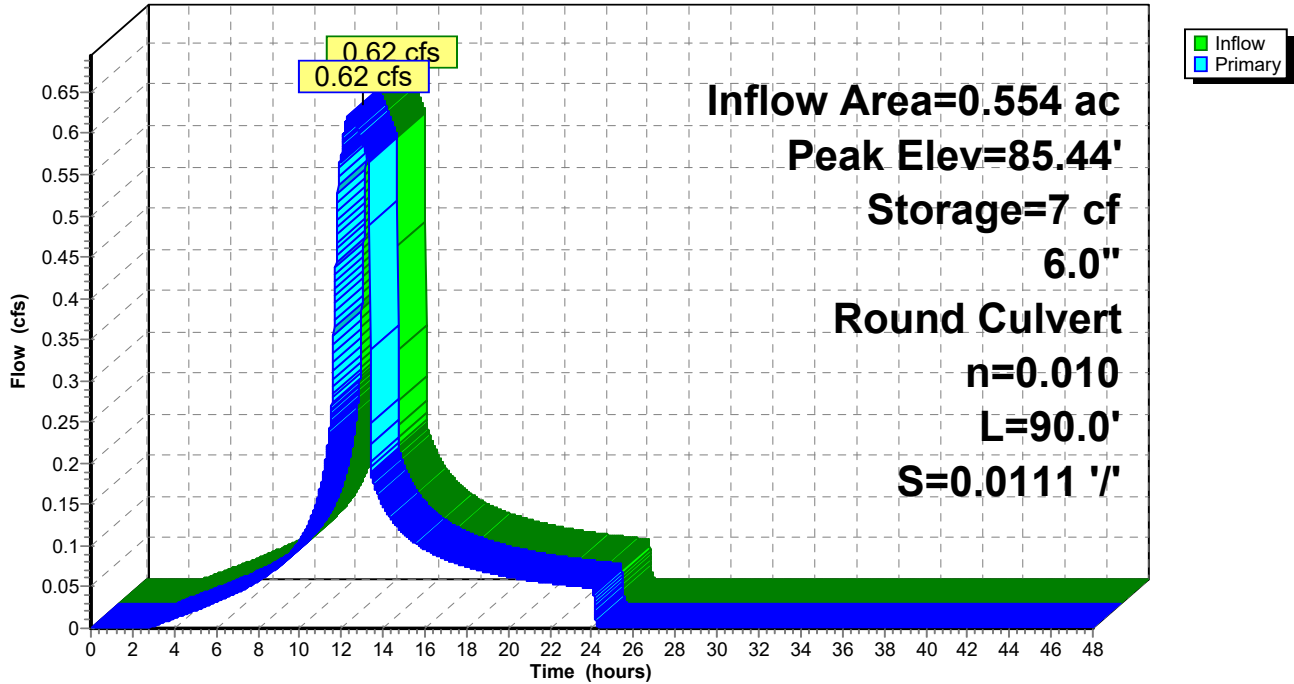
| Volume              | Invert               | Avail.Storage | Storage Description  |                           |                     |  |
|---------------------|----------------------|---------------|--|---------------------------|---------------------|--|
| #1                  | 84.49'               | 2,102 cf      | <b>Bioretention Mix and Stone Storage (Conic)</b> listed below |                           |                     |  |
| Elevation<br>(feet) | Surf.Area<br>(sq-ft) | Voids<br>(%)  | Inc.Store<br>(cubic-feet)                                      | Cum.Store<br>(cubic-feet) | Wet.Area<br>(sq-ft) |  |
| 84.49               | 3,475                | 0.0           | 0  | 0                         | 3,475               |  |
| 84.50               | 3,475                | 0.2           | 0  | 0                         | 3,477               |  |
| 85.49               | 3,475                | 0.2           | 7  | 7                         | 3,684               |  |
| 85.50               | 3,475                | 30.0          | 10   | 17                        | 3,686               |  |
| 87.50               | 3,475                | 30.0          | 2,085  | 2,102                     | 4,104               |  |

| Device | Routing | Invert | Outlet Devices  |
|--------|---------|--------|---|
| #1     | Primary | 84.50' | <b>6.0" Round 6" SDR-35 Pipe</b><br>L= 90.0' CPP, projecting, no headwall, Ke= 0.900<br>Inlet / Outlet Invert= 84.50' / 83.50' S= 0.0111 ' / Cc= 0.900<br>n= 0.010 PVC, smooth interior, Flow Area= 0.20 sf |

**Primary OutFlow** Max=0.62 cfs @ 12.37 hrs HW=85.44' TW=84.34' (Dynamic Tailwater)  
 ↑1=6" SDR-35 Pipe (Inlet Controls 0.62 cfs @ 3.16 fps)

### Pond 254P-B: BIO-POND D SUBSURFACE

Hydrograph



**Summary for Pond 255P-A: BIO-POND E PONDING LAYER**

Inflow Area = 1.028 ac, 79.14% Impervious, Inflow Depth = 4.82" for 10-yr (+15%) event  
 Inflow = 4.55 cfs @ 12.04 hrs, Volume= 0.413 af  
 Outflow = 1.17 cfs @ 12.33 hrs, Volume= 0.413 af, Atten= 74%, Lag= 17.8 min  
 Primary = 0.75 cfs @ 12.33 hrs, Volume= 0.402 af  
     Routed to Pond 255P-B : BIO-POND E SUBSURFACE  
 Secondary = 0.42 cfs @ 12.33 hrs, Volume= 0.010 af  
     Routed to Pond 255P-B : BIO-POND E SUBSURFACE

Routing by Dyn-Stor-Ind method, Time Span= 0.00-48.00 hrs, dt= 0.01 hrs / 2  
 Peak Elev= 87.56' @ 12.33 hrs Surf.Area= 3,229 sf Storage= 3,173 cf  
 Flood Elev= 88.00' Surf.Area= 3,550 sf Storage= 4,471 cf

Plug-Flow detention time= 20.6 min calculated for 0.413 af (100% of inflow)  
 Center-of-Mass det. time= 20.5 min ( 805.4 - 784.8 )

| Volume | Invert | Avail.Storage | Storage Description                                   |
|--------|--------|---------------|---|
| #1     | 86.50' | 4,471 cf      | <b>Bioretention Ponding Area (Conic)</b> listed below |

| Elevation (feet) | Surf.Area (sq-ft) | Inc.Store (cubic-feet) | Cum.Store (cubic-feet) | Wet.Area (sq-ft) |
|------------------|-------------------|------------------------|------------------------|------------------|
| 86.50            | 2,445             | 0                      | 0                      | 2,445            |
| 88.00            | 3,550             | 4,471                  | 4,471                  | 3,587            |

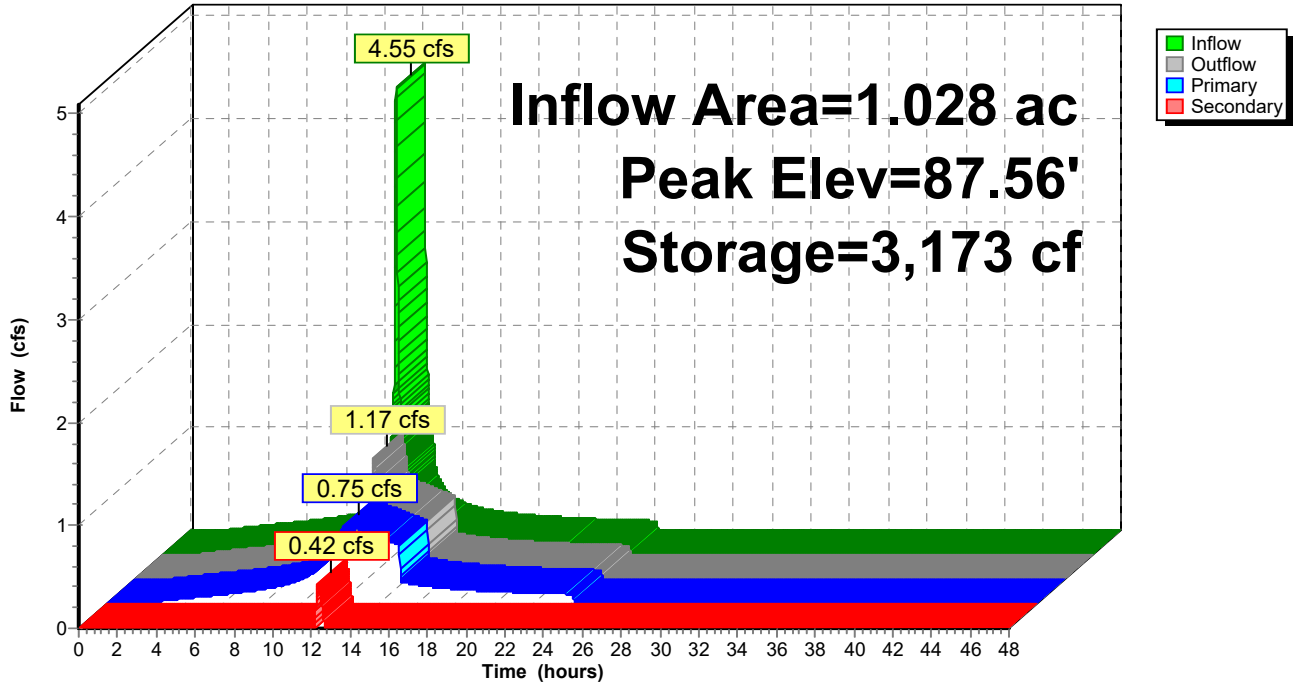
| Device | Routing   | Invert | Outlet Devices   |
|--------|-----------|--------|--|
| #1     | Primary   | 86.50' | <b>10.000 in/hr Exfiltration through Bioretention Media over Surface area</b><br>Phase-In= 0.01' |
| #2     | Secondary | 87.50' | <b>30.0" Horiz. Orifice/Grate</b> C= 0.600<br>Limited to weir flow at low heads                  |

**Primary OutFlow** Max=0.75 cfs @ 12.33 hrs HW=87.56' TW=84.34' (Dynamic Tailwater)  
 ↑1=Exfiltration through Bioretention Media(Exfiltration Controls 0.75 cfs)

**Secondary OutFlow** Max=0.42 cfs @ 12.33 hrs HW=87.56' TW=84.34' (Dynamic Tailwater)  
 ↑2=Orifice/Grate (Weir Controls 0.42 cfs @ 0.83 fps)

Pond 255P-A: BIO-POND E PONDING LAYER

Hydrograph



**Postdevelopment ( NH-Stratham 41 Portsmouth Ave 24-hr S1 10-yr 10-yr (+15%) Rainfall=5.63"**

Prepared by Emanuel Engineering

Printed 6/17/2026

HydroCAD® 10.20-9a s/n 01104 © 2026 HydroCAD Software Solutions LLC

Page 47

**Summary for Pond 255P-B: BIO-POND E SUBSURFACE**

Inflow Area = 1.582 ac, 73.75% Impervious, Inflow Depth = 4.66" for 10-yr (+15%) event  
 Inflow = 1.79 cfs @ 12.33 hrs, Volume= 0.615 af  
 Outflow = 1.79 cfs @ 12.33 hrs, Volume= 0.615 af, Atten= 0%, Lag= 0.1 min  
 Primary = 1.79 cfs @ 12.33 hrs, Volume= 0.615 af  
 Routed to Pond 262P : SOUTH ISLAND CATCH BASIN

Routing by Dyn-Stor-Ind method, Time Span= 0.00-48.00 hrs, dt= 0.01 hrs / 2  
 Peak Elev= 84.35' @ 12.33 hrs Surf.Area= 3,550 sf Storage= 12 cf

Plug-Flow detention time= 0.2 min calculated for 0.615 af (100% of inflow)  
 Center-of-Mass det. time= 0.2 min ( 808.9 - 808.7 )

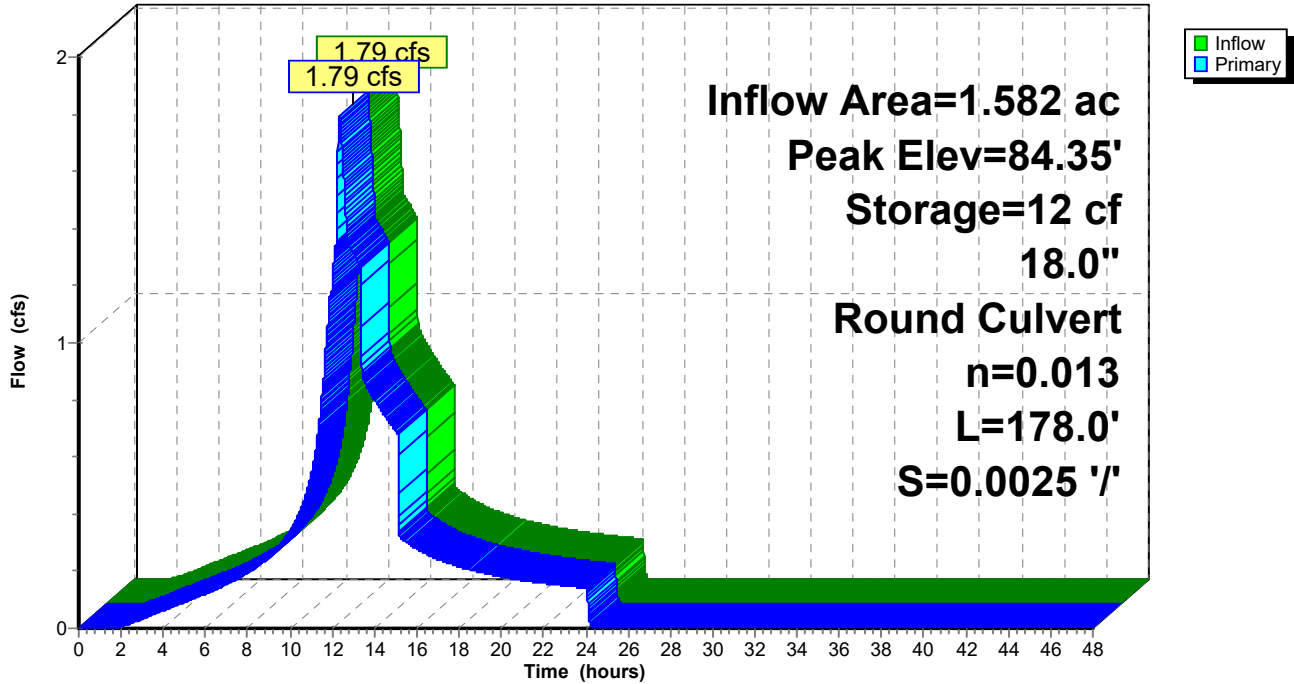
| Volume              | Invert               | Avail.Storage | Storage Description  |                           |                     |  |
|---------------------|----------------------|---------------|--|---------------------------|---------------------|--|
| #1                  | 83.49'               | 2,155 cf      | <b>Bioretention Mix and Stone Storage (Pyramidal)</b> listed below |                           |                     |  |
| Elevation<br>(feet) | Surf.Area<br>(sq-ft) | Voids<br>(%)  | Inc.Store<br>(cubic-feet)  | Cum.Store<br>(cubic-feet) | Wet.Area<br>(sq-ft) |  |
| 83.49               | 3,550                | 0.0           | 0  | 0                         | 3,550               |  |
| 83.50               | 3,550                | 0.4           | 0  | 0                         | 3,552               |  |
| 84.49               | 3,550                | 0.4           | 14   | 14                        | 3,788               |  |
| 84.50               | 3,550                | 30.0          | 11   | 25                        | 3,791               |  |
| 86.50               | 3,550                | 30.0          | 2,130  | 2,155                     | 4,267               |  |

| Device | Routing | Invert | Outlet Devices   |
|--------|---------|--------|--|
| #1     | Primary | 83.50' | <b>18.0" Round 18" HDPE Pipe</b><br>L= 178.0' CPP, projecting, no headwall, Ke= 0.900<br>Inlet / Outlet Invert= 83.50' / 83.06' S= 0.0025 ' / Cc= 0.900<br>n= 0.013 Corrugated PE, smooth interior, Flow Area= 1.77 sf |

**Primary OutFlow** Max=1.79 cfs @ 12.33 hrs HW=84.34' TW=83.78' (Dynamic Tailwater)  
 ↑ **18" HDPE Pipe** (Outlet Controls 1.79 cfs @ 2.52 fps)

**Pond 255P-B: BIO-POND E SUBSURFACE**

Hydrograph



**Postdevelopment ( NH-Stratham 41 Portsmouth Ave 24-hr S1 10-yr 10-yr (+15%) Rainfall=5.63"**

Prepared by Emanuel Engineering

Printed 6/17/2026

HydroCAD® 10.20-9a s/n 01104 © 2026 HydroCAD Software Solutions LLC

Page 49

**Summary for Pond 256P: RIVER ROAD CB**

Inflow Area = 0.398 ac, 29.77% Impervious, Inflow Depth = 3.55" for 10-yr (+15%) event  
 Inflow = 1.38 cfs @ 12.04 hrs, Volume= 0.118 af  
 Outflow = 1.37 cfs @ 12.04 hrs, Volume= 0.117 af, Atten= 0%, Lag= 0.1 min  
 Primary = 1.37 cfs @ 12.04 hrs, Volume= 0.117 af  
     Routed to Pond 257P : BARNYARD CB  
 Secondary = 0.00 cfs @ 0.00 hrs, Volume= 0.000 af  
     Routed to Pond 257P : BARNYARD CB

Routing by Dyn-Stor-Ind method, Time Span= 0.00-48.00 hrs, dt= 0.01 hrs / 2  
 Peak Elev= 82.45' @ 12.05 hrs Surf.Area= 13 sf Storage= 54 cf  
 Flood Elev= 85.00' Surf.Area= 2,013 sf Storage= 682 cf

Plug-Flow detention time= 9.1 min calculated for 0.117 af (99% of inflow)  
 Center-of-Mass det. time= 4.3 min ( 845.0 - 840.6 )

| Volume | Invert | Avail.Storage | Storage Description                                    |
|--------|--------|---------------|--|
| #1     | 78.18' | 75 cf         | <b>4.00'D x 6.00'H Vertical Cone/Cylinder</b>          |
| #2     | 84.18' | 3,994 cf      | <b>Custom Stage Data (Conic) Listed below (Recalc)</b> |
|        |        | 4,070 cf      | Total Available Storage                                |

| Elevation<br>(feet) | Surf.Area<br>(sq-ft) | Inc.Store<br>(cubic-feet) | Cum.Store<br>(cubic-feet) | Wet.Area<br>(sq-ft) |
|---------------------|----------------------|---------------------------|---------------------------|---------------------|
| 84.18               | 20                   | 0                         | 0                         | 20                  |
| 85.00               | 2,000                | 607                       | 607                       | 2,001               |
| 86.00               | 5,000                | 3,387                     | 3,994                     | 5,008               |

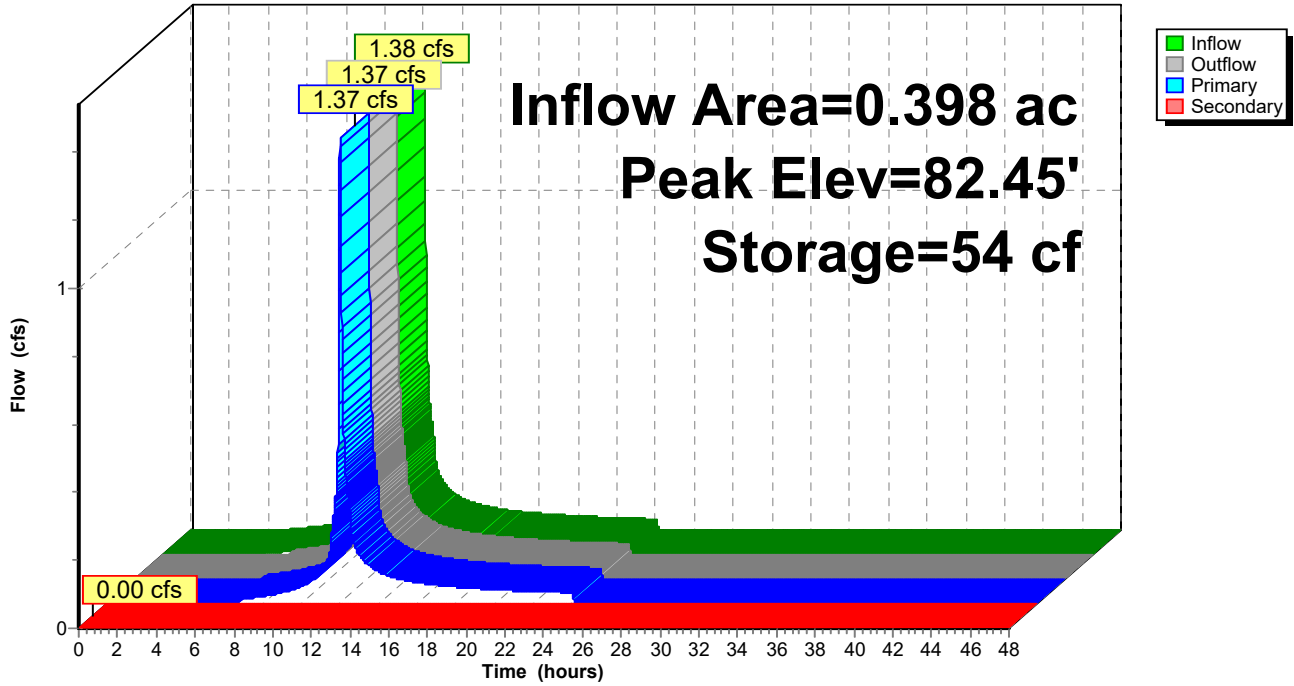
| Device | Routing   | Invert | Outlet Devices  |
|--------|-----------|--------|---|
| #1     | Primary   | 81.40' | <b>12.0" Round 12" Concrete Pipe</b><br>L= 120.0' RCP, sq.cut end projecting, Ke= 0.500<br>Inlet / Outlet Invert= 81.40' / 80.90' S= 0.0042 ' S= 0.0042 ' Cc= 0.900<br>n= 0.011 Concrete pipe, straight & clean, Flow Area= 0.79 sf |
| #2     | Secondary | 85.15' | <b>50.0' long x 120.0' breadth Broad-Crested Rectangular Weir</b><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=1.30 cfs @ 12.04 hrs HW=82.44' TW=82.22' (Dynamic Tailwater)  
 ↑1=12" Concrete Pipe (Outlet Controls 1.30 cfs @ 1.98 fps)

**Secondary OutFlow** Max=0.00 cfs @ 0.00 hrs HW=78.18' TW=77.56' (Dynamic Tailwater)  
 ↑2=Broad-Crested Rectangular Weir ( Controls 0.00 cfs)

Pond 256P: RIVER ROAD CB

Hydrograph



**Postdevelopment ( NH-Stratham 41 Portsmouth Ave 24-hr S1 10-yr 10-yr (+15%) Rainfall=5.63"**

Prepared by Emanuel Engineering

Printed 6/17/2026

HydroCAD® 10.20-9a s/n 01104 © 2026 HydroCAD Software Solutions LLC

Page 51

**Summary for Pond 257P: BARNYARD CB**

Inflow Area = 0.518 ac, 27.70% Impervious, Inflow Depth = 3.48" for 10-yr (+15%) event  
 Inflow = 1.77 cfs @ 12.04 hrs, Volume= 0.150 af  
 Outflow = 1.75 cfs @ 12.04 hrs, Volume= 0.149 af, Atten= 1%, Lag= 0.1 min  
 Primary = 1.75 cfs @ 12.04 hrs, Volume= 0.149 af  
     Routed to Pond 258P : 24" HDPE UNDER RIVER ROAD  
 Secondary = 0.00 cfs @ 0.00 hrs, Volume= 0.000 af  
     Routed to Pond 258P : 24" HDPE UNDER RIVER ROAD

Routing by Dyn-Stor-Ind method, Time Span= 0.00-48.00 hrs, dt= 0.01 hrs / 2  
 Peak Elev= 82.26' @ 12.06 hrs Surf.Area= 13 sf Storage= 59 cf  
 Flood Elev= 84.00' Surf.Area= 213 sf Storage= 117 cf

Plug-Flow detention time= 7.0 min calculated for 0.149 af (99% of inflow)  
 Center-of-Mass det. time= 3.4 min ( 849.1 - 845.7 )

| Volume | Invert | Avail.Storage | Storage Description                                    |
|--------|--------|---------------|--|
| #1     | 77.56' | 75 cf         | <b>4.00'D x 6.00'H Vertical Cone/Cylinder</b>          |
| #2     | 83.56' | 850 cf        | <b>Custom Stage Data (Conic) Listed below (Recalc)</b> |
|        |        | 925 cf        | Total Available Storage                                |

| Elevation<br>(feet) | Surf.Area<br>(sq-ft) | Inc.Store<br>(cubic-feet) | Cum.Store<br>(cubic-feet) | Wet.Area<br>(sq-ft) |
|---------------------|----------------------|---------------------------|---------------------------|---------------------|
| 83.56               | 20                   | 0                         | 0                         | 20                  |
| 84.00               | 200                  | 42                        | 42                        | 201                 |
| 85.00               | 1,650                | 808                       | 850                       | 1,654               |

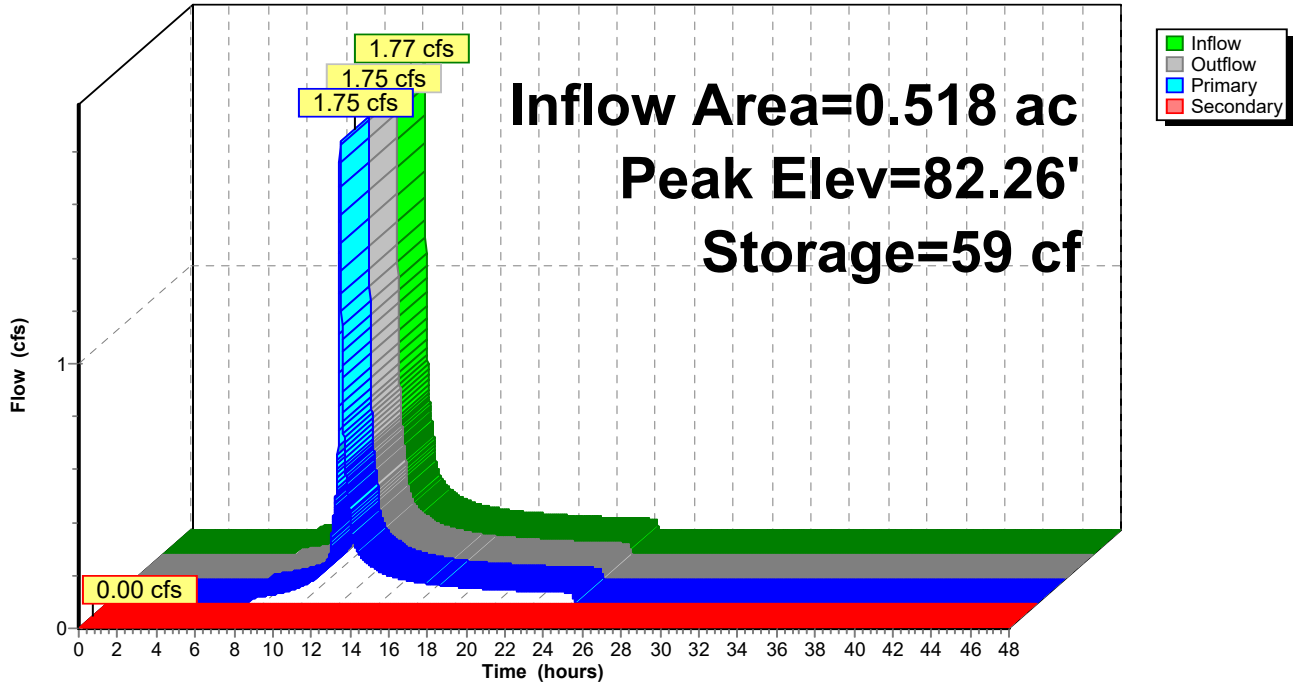
| Device | Routing   | Invert | Outlet Devices  |
|--------|-----------|--------|---|
| #1     | Primary   | 80.65' | <b>12.0" Round 12" Concrete Pipe</b><br>L= 130.0' RCP, groove end projecting, Ke= 0.200<br>Inlet / Outlet Invert= 80.65' / 80.40' S= 0.0019 ' / S= 0.0019 ' Cc= 0.900<br>n= 0.011 Concrete pipe, straight & clean, Flow Area= 0.79 sf |
| #2     | Secondary | 84.40' | <b>50.0' long x 120.0' breadth Broad-Crested Rectangular Weir</b><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=1.75 cfs @ 12.04 hrs HW=82.22' TW=81.91' (Dynamic Tailwater)  
 ↑1=12" Concrete Pipe (Outlet Controls 1.75 cfs @ 2.23 fps)

**Secondary OutFlow** Max=0.00 cfs @ 0.00 hrs HW=77.56' TW=78.00' (Dynamic Tailwater)  
 ↑2=Broad-Crested Rectangular Weir ( Controls 0.00 cfs)

Pond 257P: BARNYARD CB

Hydrograph



**Postdevelopment ( NH-Stratham 41 Portsmouth Ave 24-hr S1 10-yr 10-yr (+15%) Rainfall=5.63"**

Prepared by Emanuel Engineering

Printed 6/17/2026

HydroCAD® 10.20-9a s/n 01104 © 2026 HydroCAD Software Solutions LLC

Page 53

**Summary for Pond 258P: 24" HDPE UNDER RIVER ROAD**

Inflow Area = 4.482 ac, 63.65% Impervious, Inflow Depth = 4.43" for 10-yr (+15%) event  
 Inflow = 6.99 cfs @ 12.04 hrs, Volume= 1.653 af  
 Outflow = 4.67 cfs @ 12.42 hrs, Volume= 1.555 af, Atten= 33%, Lag= 23.2 min  
 Primary = 4.67 cfs @ 12.42 hrs, Volume= 1.555 af  
     Routed to Link 9-2 : MAP 9 LOT 2  
 Secondary = 0.00 cfs @ 0.00 hrs, Volume= 0.000 af  
     Routed to Link 9-2 : MAP 9 LOT 2

Routing by Dyn-Stor-Ind method, Time Span= 0.00-48.00 hrs, dt= 0.01 hrs / 2  
 Peak Elev= 82.14' @ 12.42 hrs Surf.Area= 6,696 sf Storage= 13,954 cf  
 Flood Elev= 83.19' Surf.Area= 8,550 sf Storage= 20,377 cf

Plug-Flow detention time= 128.4 min calculated for 1.554 af (94% of inflow)  
 Center-of-Mass det. time= 93.7 min ( 902.8 - 809.1 )

| Volume              | Invert               | Avail.Storage             | Storage Description                           |                     |
|---------------------|----------------------|---------------------------|---|---------------------|
| #1                  | 78.00'               | 20,377 cf                 | <b>Custom Stage Data (Conic)</b> Listed below |                     |
| Elevation<br>(feet) | Surf.Area<br>(sq-ft) | Inc.Store<br>(cubic-feet) | Cum.Store<br>(cubic-feet)                     | Wet.Area<br>(sq-ft) |
| 78.00               | 1,645                | 0                         | 0   | 1,645               |
| 80.00               | 2,600                | 4,209                     | 4,209   | 2,654               |
| 82.00               | 6,400                | 8,719                     | 12,928  | 6,482               |
| 83.00               | 8,550                | 7,449                     | 20,377  | 8,654               |

| Device | Routing   | Invert | Outlet Devices   |
|--------|-----------|--------|--|
| #1     | Primary   | 79.60' | <b>24.0" Round 24" HDPE Pipe</b><br>L= 50.0' CPP, projecting, no headwall, Ke= 0.900<br>Inlet / Outlet Invert= 79.60' / 78.86' S= 0.0148 '/ Cc= 0.900<br>n= 0.013 Corrugated PE, smooth interior, Flow Area= 3.14 sf |
| #2     | Secondary | 82.99' | <b>50.0' long x 22.0' breadth Broad-Crested Rectangular Weir</b><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                                   |
| #3     | Device 1  | 82.00' | <b>30.0" Horiz. Orifice/Grate</b> C= 0.600<br>Limited to weir flow at low heads  |
| #4     | Device 1  | 80.00' | <b>4.0" Vert. Orifice/Grate</b> C= 0.600 Limited to weir flow at low heads   |
| #5     | Device 1  | 80.50' | <b>4.0" Vert. Orifice/Grate X 3.00</b> C= 0.600<br>Limited to weir flow at low heads   |
| #6     | Device 1  | 81.00' | <b>4.0" Vert. Orifice/Grate X 3.00</b> C= 0.600<br>Limited to weir flow at low heads   |

**Postdevelopment ( NH-Stratham 41 Portsmouth Ave 24-hr S1 10-yr 10-yr (+15%) Rainfall=5.63"**

Prepared by Emanuel Engineering

Printed 6/17/2026

HydroCAD® 10.20-9a s/n 01104 © 2026 HydroCAD Software Solutions LLC

Page 54

**Primary OutFlow** Max=4.67 cfs @ 12.42 hrs HW=82.14' TW=0.00' (Dynamic Tailwater)

↳ **1=24" HDPE Pipe** (Passes 4.67 cfs of 14.81 cfs potential flow)

↳ **3=Orifice/Grate** (Weir Controls 1.31 cfs @ 1.21 fps)

↳ **4=Orifice/Grate** (Orifice Controls 0.59 cfs @ 6.76 fps)

↳ **5=Orifice/Grate** (Orifice Controls 1.53 cfs @ 5.84 fps)

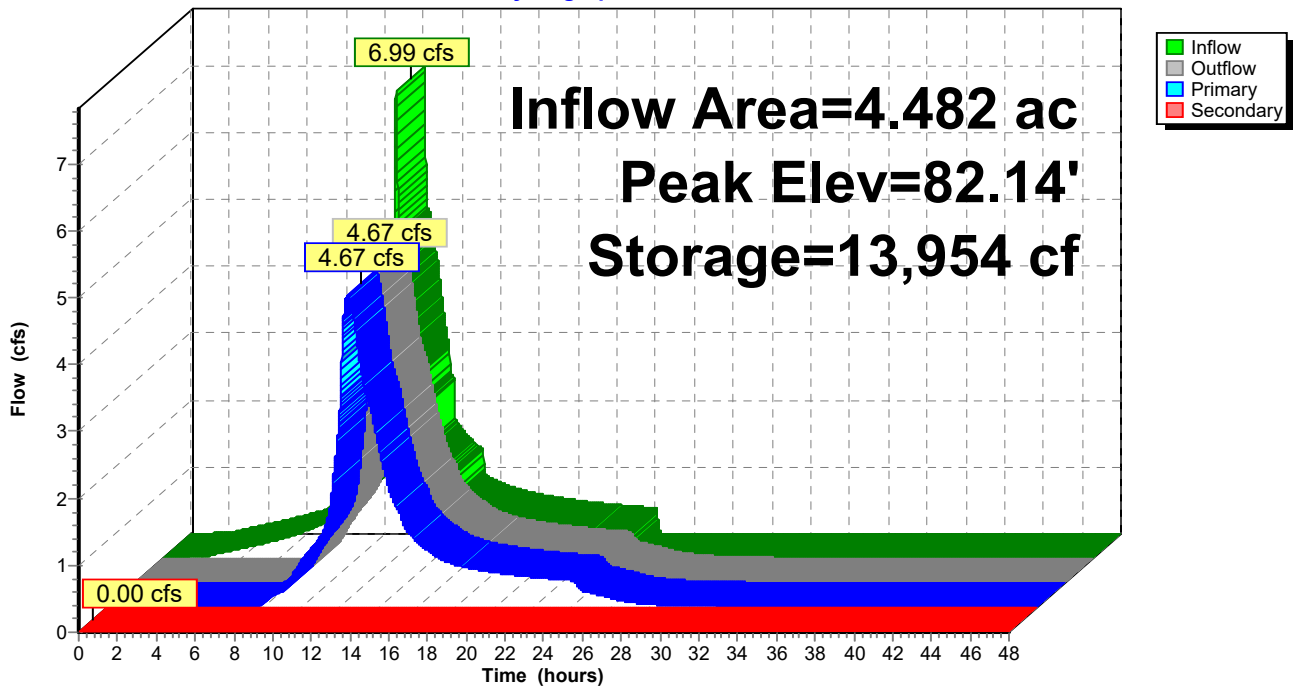
↳ **6=Orifice/Grate** (Orifice Controls 1.24 cfs @ 4.74 fps)

**Secondary OutFlow** Max=0.00 cfs @ 0.00 hrs HW=78.00' TW=0.00' (Dynamic Tailwater)

↳ **2=Broad-Crested Rectangular Weir** ( Controls 0.00 cfs)

**Pond 258P: 24" HDPE UNDER RIVER ROAD**

Hydrograph



**Postdevelopment ( NH-Stratham 41 Portsmouth Ave 24-hr S1 10-yr 10-yr (+15%) Rainfall=5.63"**

Prepared by Emanuel Engineering

Printed 6/17/2026

HydroCAD® 10.20-9a s/n 01104 © 2026 HydroCAD Software Solutions LLC

Page 55

**Summary for Pond 259P-A: BIO-POND B PONDING LAYER**

Inflow Area = 1.228 ac, 80.19% Impervious, Inflow Depth = 4.85" for 10-yr (+15%) event  
 Inflow = 5.43 cfs @ 12.04 hrs, Volume= 0.497 af  
 Outflow = 1.19 cfs @ 12.43 hrs, Volume= 0.497 af, Atten= 78%, Lag= 23.4 min  
 Primary = 1.19 cfs @ 12.43 hrs, Volume= 0.497 af  
     Routed to Pond 259P-B : BIO-POND B SUBSURFACE  
 Secondary = 0.00 cfs @ 0.00 hrs, Volume= 0.000 af  
     Routed to Pond 259P-B : BIO-POND B SUBSURFACE

Routing by Dyn-Stor-Ind method, Time Span= 0.00-48.00 hrs, dt= 0.01 hrs / 2  
 Peak Elev= 87.09' @ 12.43 hrs Surf.Area= 5,130 sf Storage= 3,170 cf  
 Flood Elev= 87.90' Surf.Area= 6,202 sf Storage= 7,465 cf

Plug-Flow detention time= 11.5 min calculated for 0.497 af (100% of inflow)  
 Center-of-Mass det. time= 11.5 min ( 791.8 - 780.3 )

| Volume | Invert | Avail.Storage | Storage Description                                       |
|--------|--------|---------------|---|
| #1     | 86.50' | 7,961 cf      | <b>Ponding Layer of Bioretention (Conic)</b> listed below |
| #2     | 86.50' | 35 cf         | <b>12.0" Round 12" HDPE Pipe</b> -Impervious<br>L= 45.0'  |
|        |        | 7,996 cf      | Total Available Storage                                   |

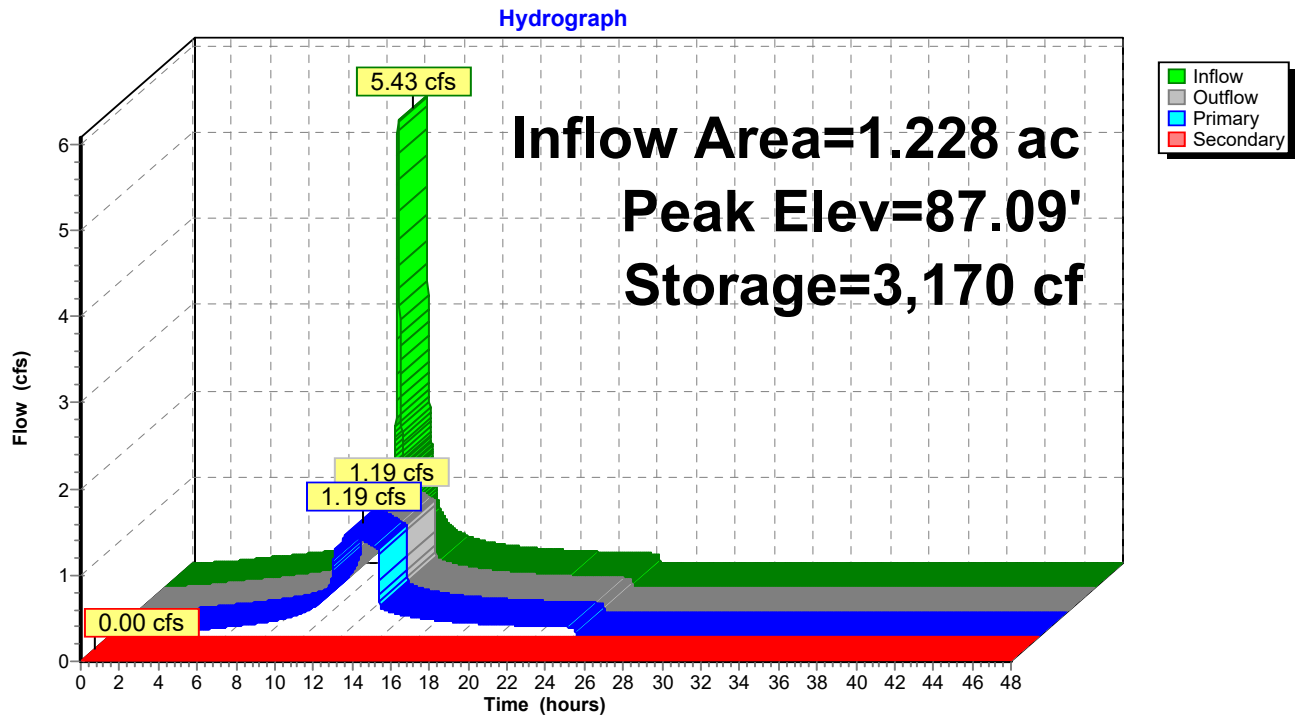
| Elevation<br>(feet) | Surf.Area<br>(sq-ft) | Inc.Store<br>(cubic-feet) | Cum.Store<br>(cubic-feet) | Wet.Area<br>(sq-ft) |
|---------------------|----------------------|---------------------------|---------------------------|---------------------|
| 86.50               | 4,342                | 0                         | 0                         | 4,342               |
| 88.00               | 6,335                | 7,961                     | 7,961                     | 6,372               |

| Device | Routing   | Invert | Outlet Devices   |
|--------|-----------|--------|--|
| #1     | Primary   | 86.50' | <b>10.000 in/hr Exfiltration through Bioretention Layer over Surface area</b><br>Phase-In= 0.01' |
| #2     | Secondary | 87.50' | <b>30.0" Horiz. Orifice/Grate</b> C= 0.600<br>Limited to weir flow at low heads                  |

**Primary OutFlow** Max=1.19 cfs @ 12.43 hrs HW=87.09' TW=84.74' (Dynamic Tailwater)  
 ↑1=Exfiltration through Bioretention Layer(Exfiltration Controls 1.19 cfs)

**Secondary OutFlow** Max=0.00 cfs @ 0.00 hrs HW=86.50' TW=83.49' (Dynamic Tailwater)  
 ↑2=Orifice/Grate ( Controls 0.00 cfs)

Pond 259P-A: BIO-POND B PONDING LAYER



**Postdevelopment ( NH-Stratham 41 Portsmouth Ave 24-hr S1 10-yr 10-yr (+15%) Rainfall=5.63"**

Prepared by Emanuel Engineering

Printed 6/17/2026

HydroCAD® 10.20-9a s/n 01104 © 2026 HydroCAD Software Solutions LLC

Page 57

**Summary for Pond 259P-B: BIO-POND B SUBSURFACE**

Inflow Area = 1.228 ac, 80.19% Impervious, Inflow Depth = 4.85" for 10-yr (+15%) event  
 Inflow = 1.19 cfs @ 12.43 hrs, Volume= 0.497 af  
 Outflow = 1.04 cfs @ 13.73 hrs, Volume= 0.497 af, Atten= 12%, Lag= 78.0 min  
 Primary = 1.04 cfs @ 13.73 hrs, Volume= 0.497 af  
 Routed to Pond 104P : EXISTING CULVERT

Routing by Dyn-Stor-Ind method, Time Span= 0.00-48.00 hrs, dt= 0.01 hrs / 2  
 Peak Elev= 84.96' @ 13.73 hrs Surf.Area= 8,360 sf Storage= 1,182 cf

Plug-Flow detention time= 6.0 min calculated for 0.497 af (100% of inflow)  
 Center-of-Mass det. time= 6.0 min ( 797.9 - 791.8 )

| Volume           | Invert            | Avail.Storage | Storage Description  |                        |                  |  |
|------------------|-------------------|---------------|--|------------------------|------------------|--|
| #1               | 83.49'            | 5,049 cf      | <b>Bioretention Subsurface Layers (Pyramidal)</b> listed below |                        |                  |  |
| Elevation (feet) | Surf.Area (sq-ft) | Voids (%)     | Inc.Store (cubic-feet)   | Cum.Store (cubic-feet) | Wet.Area (sq-ft) |  |
| 83.49            | 8,360             | 0.0           | 0  | 0                      | 8,360            |  |
| 83.50            | 8,360             | 0.1           | 0  | 0                      | 8,364            |  |
| 84.49            | 8,360             | 0.1           | 8  | 8                      | 8,726            |  |
| 84.50            | 8,360             | 30.0          | 25   | 33                     | 8,729            |  |
| 86.50            | 8,360             | 30.0          | 5,016  | 5,049                  | 9,461            |  |

| Device | Routing  | Invert | Outlet Devices  |
|--------|----------|--------|---|
| #1     | Primary  | 83.40' | <b>18.0" Round 18" HDPE Pipe</b><br>L= 125.0' CPP, projecting, no headwall, Ke= 0.900<br>Inlet / Outlet Invert= 83.40' / 81.78' S= 0.0130 '/ Cc= 0.900<br>n= 0.013 Corrugated PE, smooth interior, Flow Area= 1.77 sf |
| #2     | Device 1 | 83.50' | <b>6.0" Vert. 6" Diameter Underdrain Entrance into CB</b> C= 0.600<br>Limited to weir flow at low heads   |

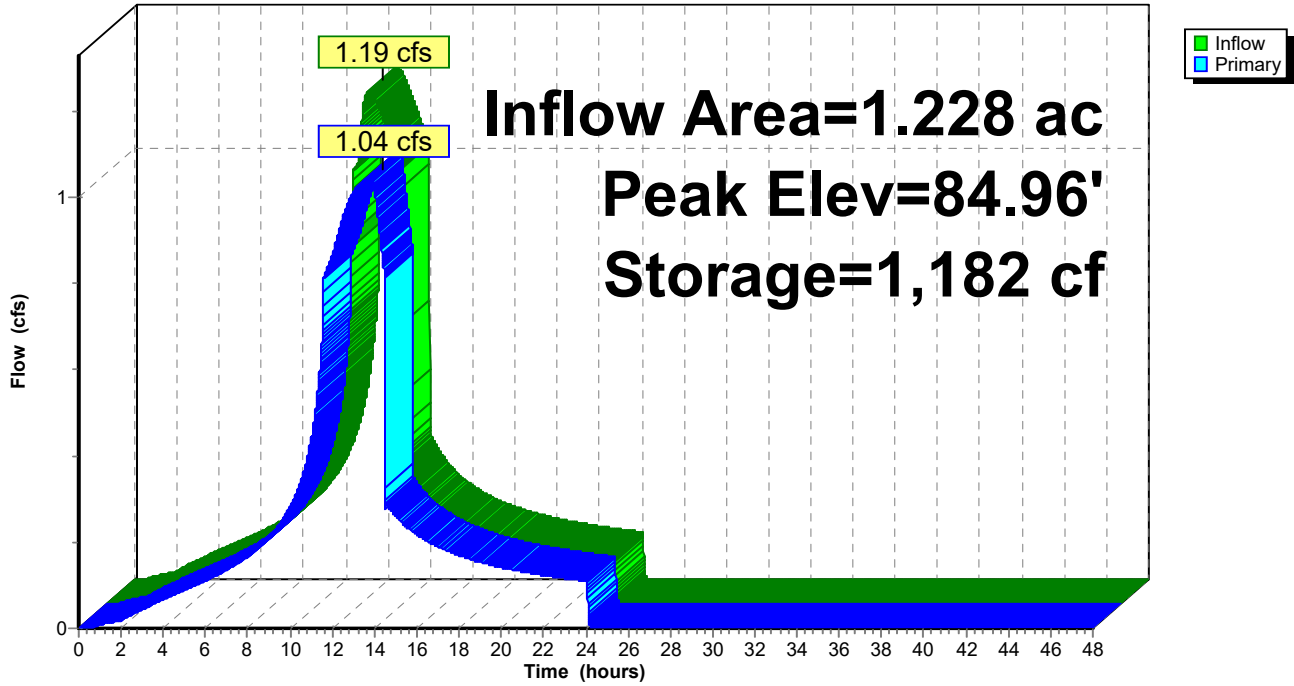
**Primary OutFlow** Max=1.04 cfs @ 13.73 hrs HW=84.96' TW=82.24' (Dynamic Tailwater)

↑ **1=18" HDPE Pipe** (Passes 1.04 cfs of 6.04 cfs potential flow)

↑ **2=6" Diameter Underdrain Entrance into CB**(Orifice Controls 1.04 cfs @ 5.29 fps)

Pond 259P-B: BIO-POND B SUBSURFACE

Hydrograph



**Summary for Pond 260P-A: ROOF DRAINS**

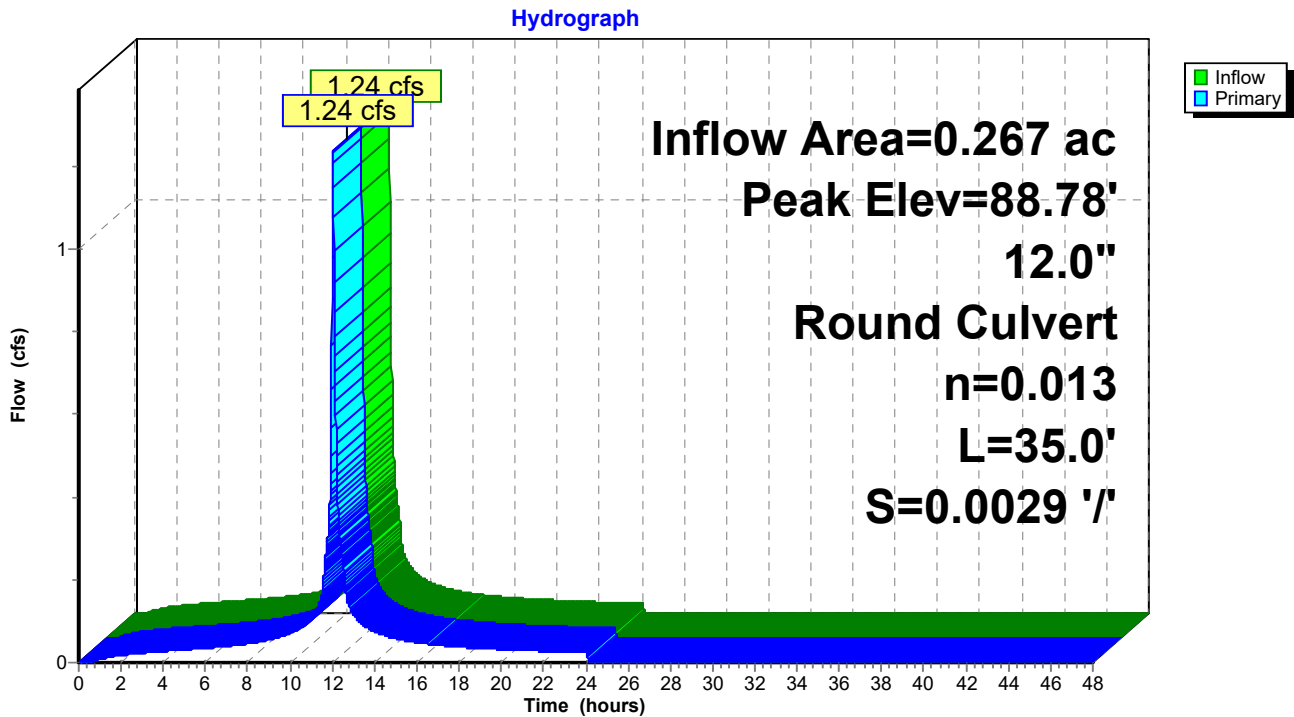
Inflow Area = 0.267 ac, 100.00% Impervious, Inflow Depth = 5.39" for 10-yr (+15%) event  
 Inflow = 1.24 cfs @ 12.04 hrs, Volume= 0.120 af  
 Outflow = 1.24 cfs @ 12.04 hrs, Volume= 0.120 af, Atten= 0%, Lag= 0.0 min  
 Primary = 1.24 cfs @ 12.04 hrs, Volume= 0.120 af  
 Routed to Pond 259P-A : BIO-POND B PONDING LAYER

Routing by Dyn-Stor-Ind method, Time Span= 0.00-48.00 hrs, dt= 0.01 hrs / 2  
 Peak Elev= 88.78' @ 12.04 hrs  
 Flood Elev= 91.50'

| Device # | Routing | Invert | Outlet Devices   |
|----------|---------|--------|--|
| #1       | Primary | 88.00' | <b>12.0" Round 12" Dia. Roof Drain</b><br>L= 35.0' CPP, projecting, no headwall, Ke= 0.900<br>Inlet / Outlet Invert= 88.00' / 87.90' S= 0.0029 '/ Cc= 0.900<br>n= 0.013 Corrugated PE, smooth interior, Flow Area= 0.79 sf |

**Primary OutFlow** Max=1.23 cfs @ 12.04 hrs HW=88.78' TW=86.77' (Dynamic Tailwater)  
 ↳ 1=12" Dia. Roof Drain (Barrel Controls 1.23 cfs @ 2.57 fps)

**Pond 260P-A: ROOF DRAINS**



**Summary for Pond 260P-B: ROOF DRAINS**

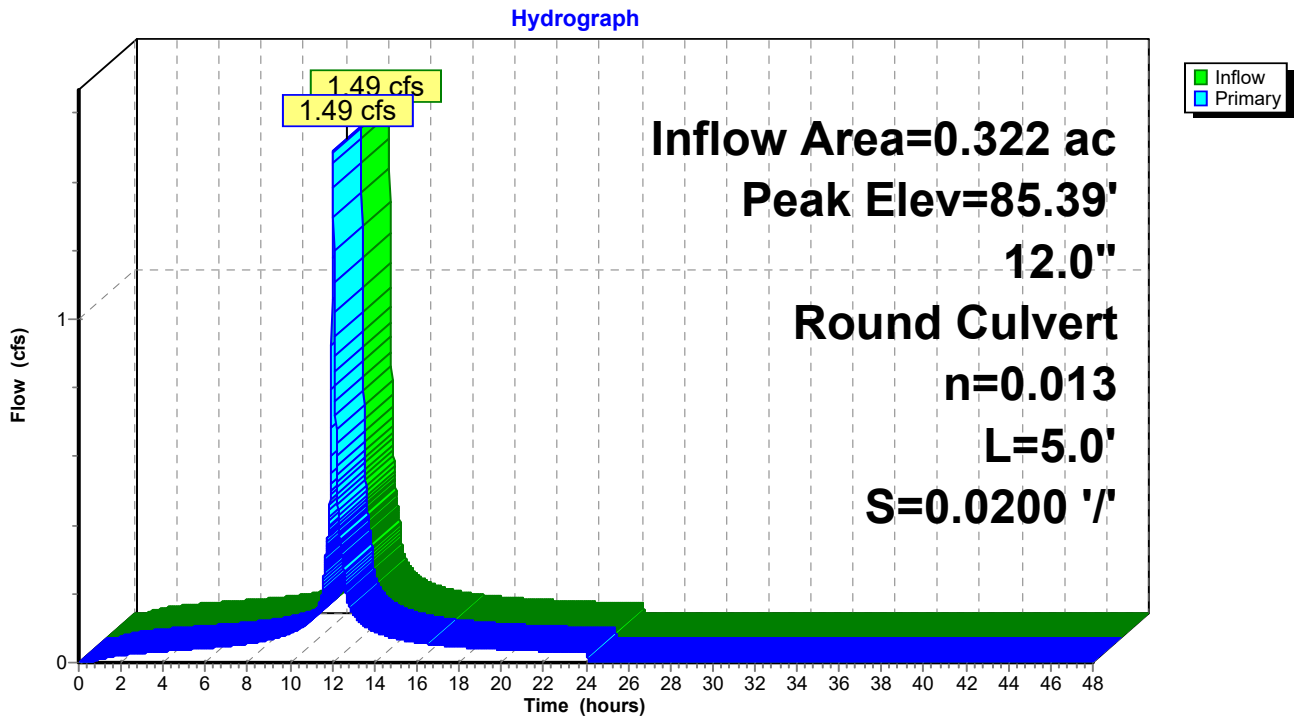
Inflow Area = 0.322 ac, 100.00% Impervious, Inflow Depth = 5.39" for 10-yr (+15%) event  
 Inflow = 1.49 cfs @ 12.04 hrs, Volume= 0.144 af  
 Outflow = 1.49 cfs @ 12.04 hrs, Volume= 0.144 af, Atten= 0%, Lag= 0.0 min  
 Primary = 1.49 cfs @ 12.04 hrs, Volume= 0.144 af  
 Routed to Pond 261P : NORTH ISLAND CATCH BASIN

Routing by Dyn-Stor-Ind method, Time Span= 0.00-48.00 hrs, dt= 0.01 hrs / 2  
 Peak Elev= 85.39' @ 12.04 hrs  
 Flood Elev= 91.50'

| Device # | Routing | Invert | Outlet Devices  |
|----------|---------|--------|---|
| #1       | Primary | 84.60' | <b>12.0" Round 12" Dia. Roof Drain</b><br>L= 5.0' CPP, projecting, no headwall, Ke= 0.900<br>Inlet / Outlet Invert= 84.60' / 84.50' S= 0.0200 '/ Cc= 0.900<br>n= 0.013 Corrugated PE, smooth interior, Flow Area= 0.79 sf |

**Primary OutFlow** Max=1.49 cfs @ 12.04 hrs HW=85.39' TW=84.82' (Dynamic Tailwater)  
 ↳ 12" Dia. Roof Drain (Barrel Controls 1.49 cfs @ 3.07 fps)

**Pond 260P-B: ROOF DRAINS**



**Summary for Pond 261P: NORTH ISLAND CATCH BASIN**

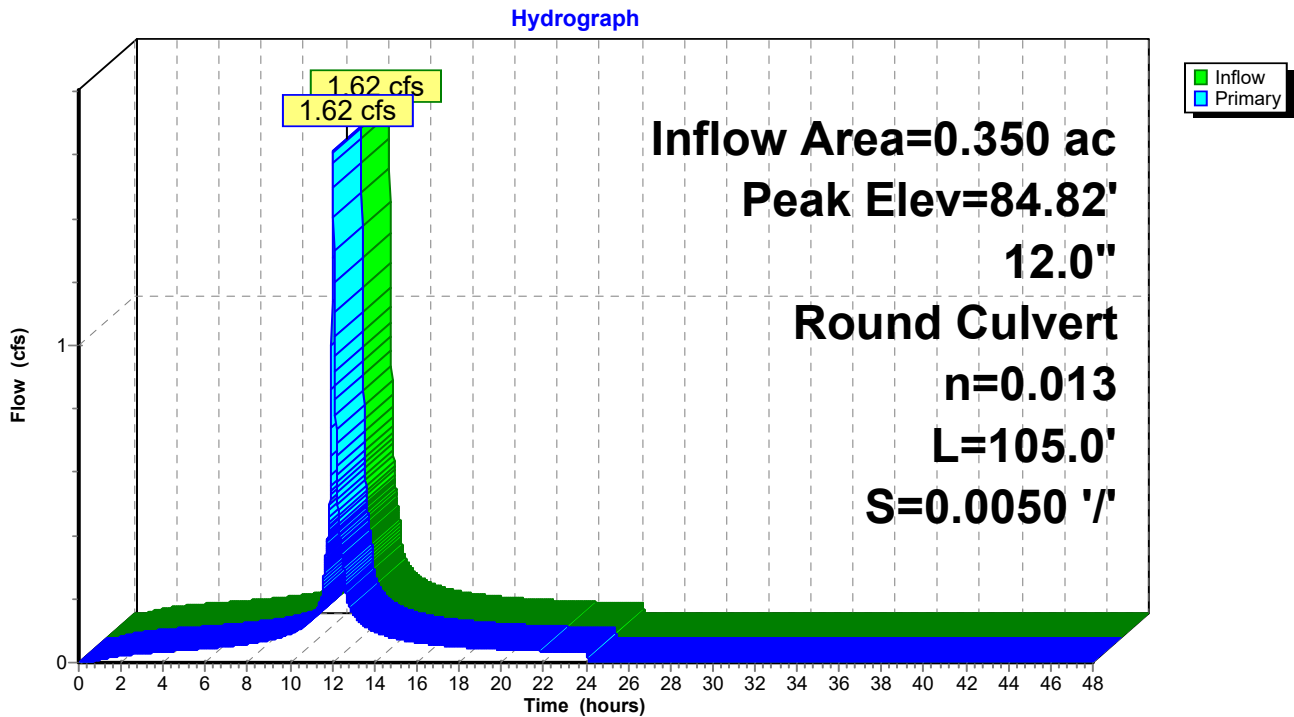
Inflow Area = 0.350 ac, 98.00% Impervious, Inflow Depth = 5.34" for 10-yr (+15%) event  
 Inflow = 1.62 cfs @ 12.04 hrs, Volume= 0.156 af  
 Outflow = 1.62 cfs @ 12.04 hrs, Volume= 0.156 af, Atten= 0%, Lag= 0.0 min  
 Primary = 1.62 cfs @ 12.04 hrs, Volume= 0.156 af  
 Routed to Pond 262P : SOUTH ISLAND CATCH BASIN

Routing by Dyn-Stor-Ind method, Time Span= 0.00-48.00 hrs, dt= 0.01 hrs / 2  
 Peak Elev= 84.82' @ 12.04 hrs  
 Flood Elev= 90.50'

| Device #1 | Routing | Invert | Outlet Devices  |
|-----------|---------|--------|---|
|           | Primary | 84.00' | <b>12.0" Round 12" HDPE Pipe</b><br>L= 105.0' CPP, projecting, no headwall, Ke= 0.900<br>Inlet / Outlet Invert= 84.00' / 83.47' S= 0.0050 '/ Cc= 0.900<br>n= 0.013 Corrugated PE, smooth interior, Flow Area= 0.79 sf |

**Primary OutFlow** Max=1.61 cfs @ 12.04 hrs HW=84.82' TW=83.94' (Dynamic Tailwater)  
 ↳ 1=12" HDPE Pipe (Barrel Controls 1.61 cfs @ 3.17 fps)

**Pond 261P: NORTH ISLAND CATCH BASIN**



**Summary for Pond 262P: SOUTH ISLAND CATCH BASIN**

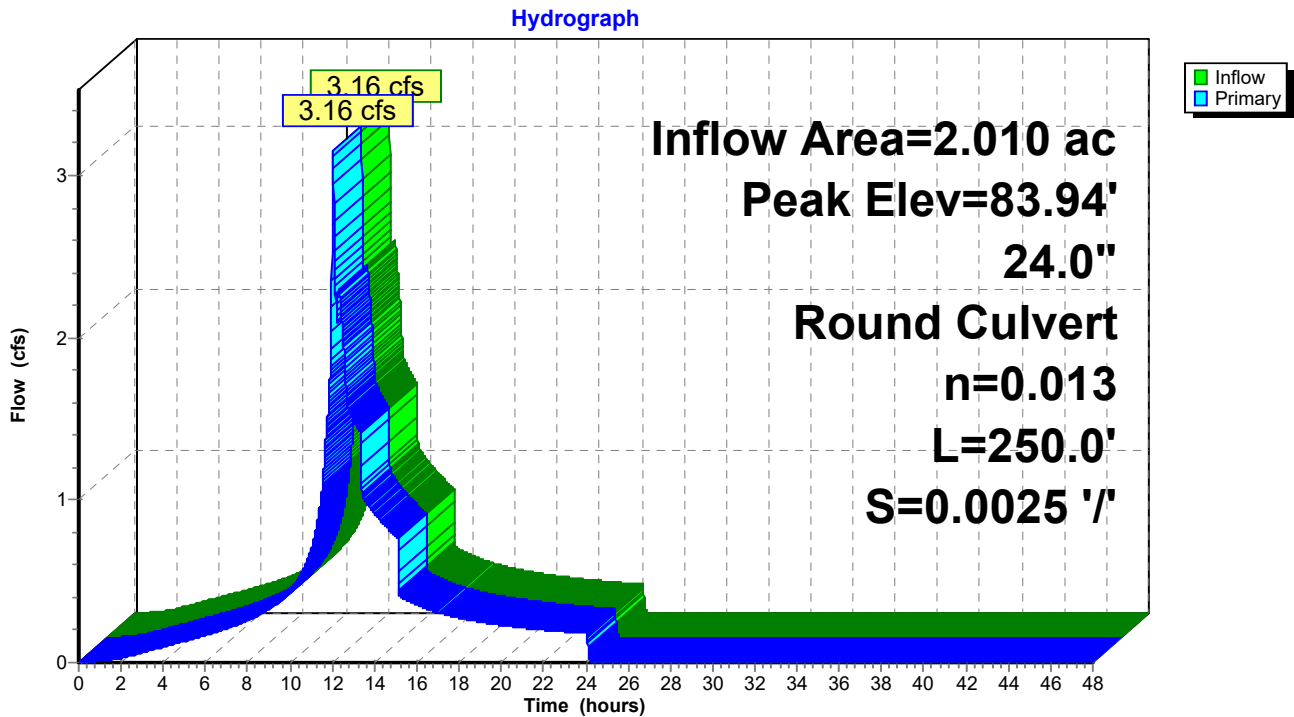
Inflow Area = 2.010 ac, 77.05% Impervious, Inflow Depth = 4.76" for 10-yr (+15%) event  
 Inflow = 3.16 cfs @ 12.04 hrs, Volume= 0.797 af  
 Outflow = 3.16 cfs @ 12.04 hrs, Volume= 0.797 af, Atten= 0%, Lag= 0.0 min  
 Primary = 3.16 cfs @ 12.04 hrs, Volume= 0.797 af  
 Routed to Pond 263P : MANHOLE 1

Routing by Dyn-Stor-Ind method, Time Span= 0.00-48.00 hrs, dt= 0.01 hrs / 2  
 Peak Elev= 83.94' @ 12.04 hrs  
 Flood Elev= 90.75'

| Device # | Routing | Invert | Outlet Devices  |
|----------|---------|--------|---|
| #1       | Primary | 82.96' | <b>24.0" Round 24" HDPE Pipe</b><br>L= 250.0' CPP, projecting, no headwall, Ke= 0.900<br>Inlet / Outlet Invert= 82.96' / 82.34' S= 0.0025 '/ Cc= 0.900<br>n= 0.013 Corrugated PE, smooth interior, Flow Area= 3.14 sf |

**Primary OutFlow** Max=3.15 cfs @ 12.04 hrs HW=83.94' TW=82.90' (Dynamic Tailwater)  
 ↳1=24" HDPE Pipe (Barrel Controls 3.15 cfs @ 3.02 fps)

**Pond 262P: SOUTH ISLAND CATCH BASIN**



**Summary for Pond 263P: MANHOLE 1**

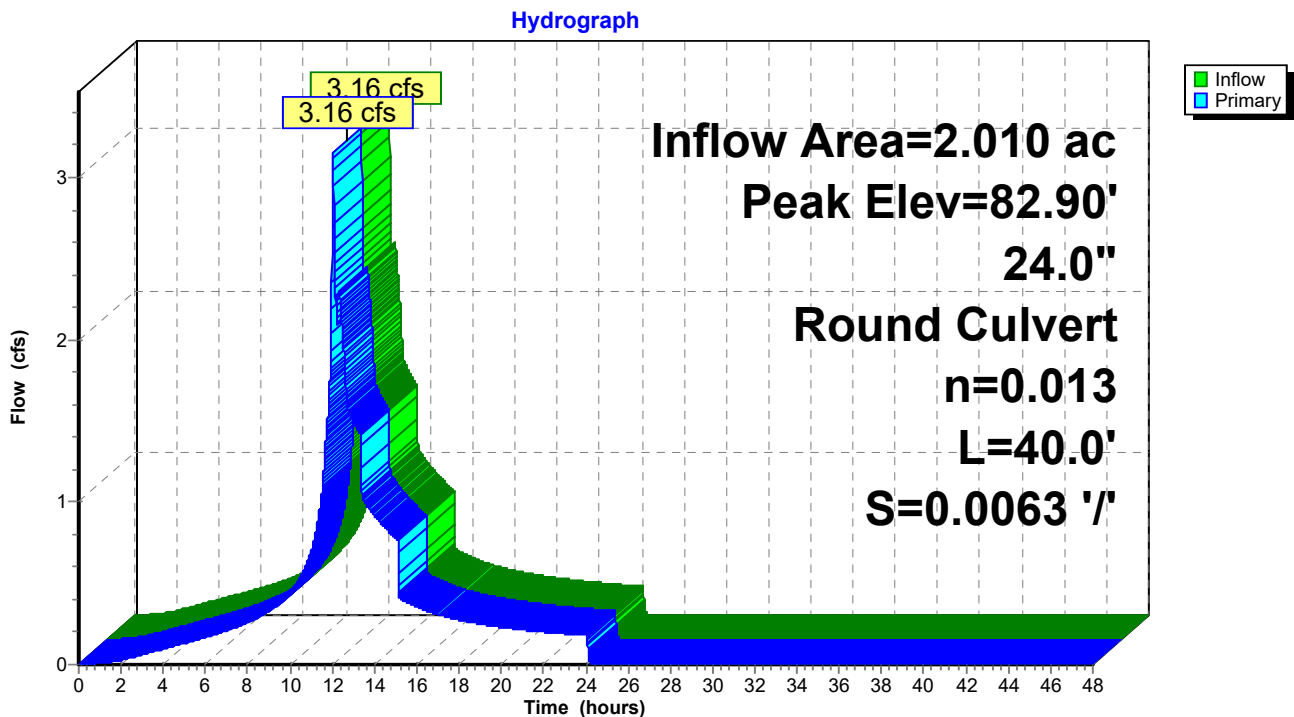
Inflow Area = 2.010 ac, 77.05% Impervious, Inflow Depth = 4.76" for 10-yr (+15%) event  
 Inflow = 3.16 cfs @ 12.04 hrs, Volume= 0.797 af  
 Outflow = 3.16 cfs @ 12.04 hrs, Volume= 0.797 af, Atten= 0%, Lag= 0.0 min  
 Primary = 3.16 cfs @ 12.04 hrs, Volume= 0.797 af  
 Routed to Pond 258P : 24" HDPE UNDER RIVER ROAD

Routing by Dyn-Stor-Ind method, Time Span= 0.00-48.00 hrs, dt= 0.01 hrs / 2  
 Peak Elev= 82.90' @ 12.04 hrs  
 Flood Elev= 89.00'

| Device # | Routing | Invert | Outlet Devices   |
|----------|---------|--------|--|
| #1       | Primary | 82.00' | <b>24.0" Round 24" HDPE Pipe</b><br>L= 40.0' CPP, projecting, no headwall, Ke= 0.900<br>Inlet / Outlet Invert= 82.00' / 81.75' S= 0.0063 '/ Cc= 0.900<br>n= 0.013 Corrugated PE, smooth interior, Flow Area= 3.14 sf |

**Primary OutFlow** Max=3.15 cfs @ 12.04 hrs HW=82.90' TW=81.90' (Dynamic Tailwater)  
 ↳ 1=24" HDPE Pipe (Barrel Controls 3.15 cfs @ 3.40 fps)

**Pond 263P: MANHOLE 1**



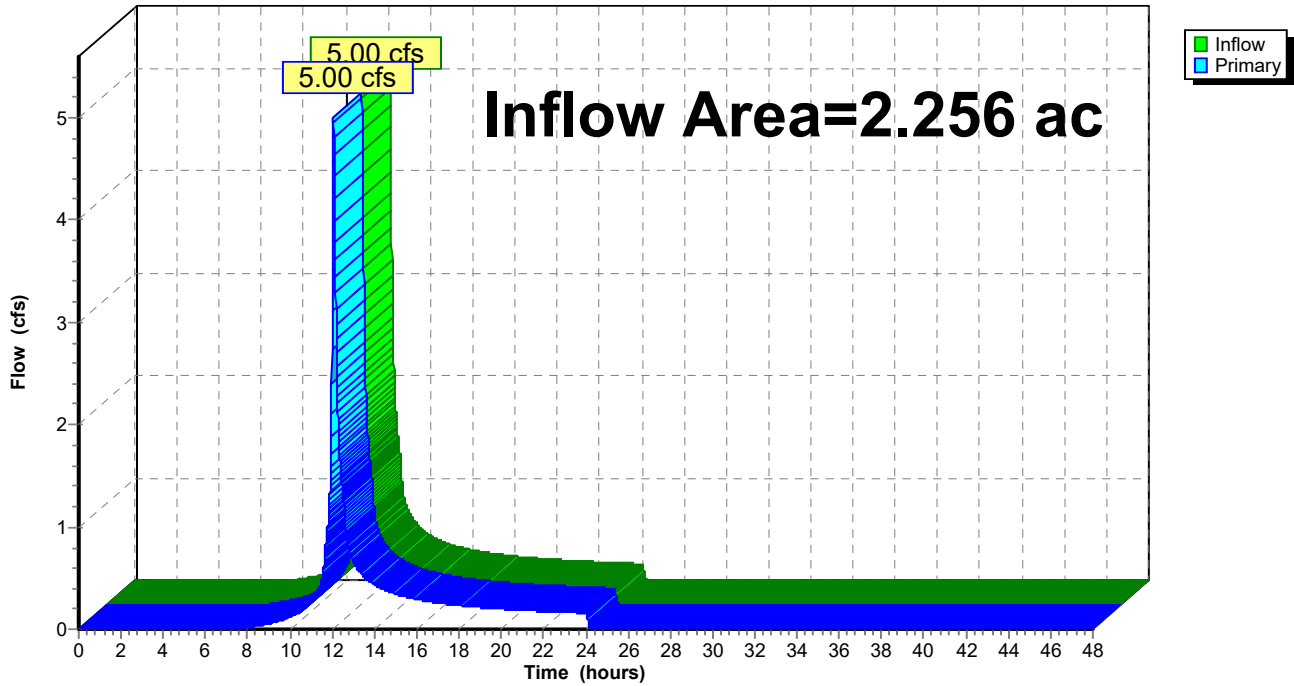
### Summary for Link 8-64: MAP 8 LOT 64

Inflow Area = 2.256 ac, 4.31% Impervious, Inflow Depth = 2.51" for 10-yr (+15%) event  
Inflow = 5.00 cfs @ 12.06 hrs, Volume= 0.473 af  
Primary = 5.00 cfs @ 12.06 hrs, Volume= 0.473 af, Atten= 0%, Lag= 0.0 min

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

### Link 8-64: MAP 8 LOT 64

Hydrograph



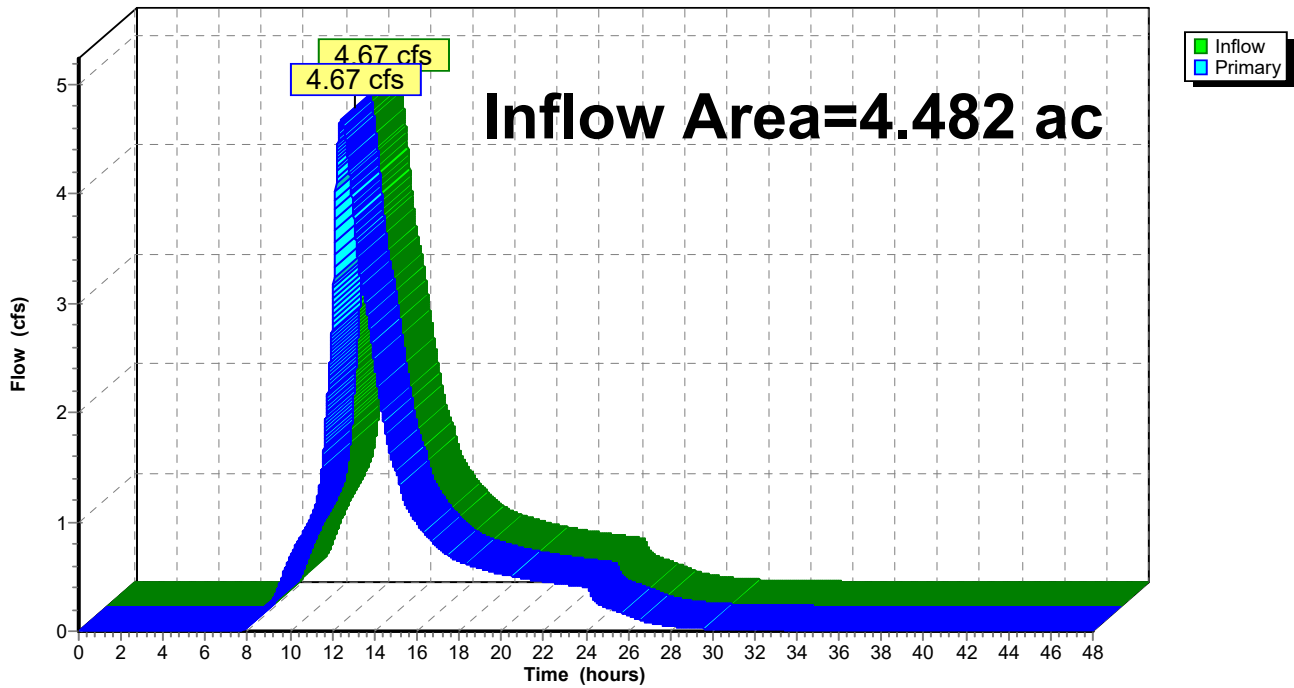
**Summary for Link 9-2: MAP 9 LOT 2**

Inflow Area = 4.482 ac, 63.65% Impervious, Inflow Depth > 4.16" for 10-yr (+15%) event  
 Inflow = 4.67 cfs @ 12.42 hrs, Volume= 1.555 af  
 Primary = 4.67 cfs @ 12.42 hrs, Volume= 1.555 af, Atten= 0%, Lag= 0.0 min

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

**Link 9-2: MAP 9 LOT 2**

Hydrograph



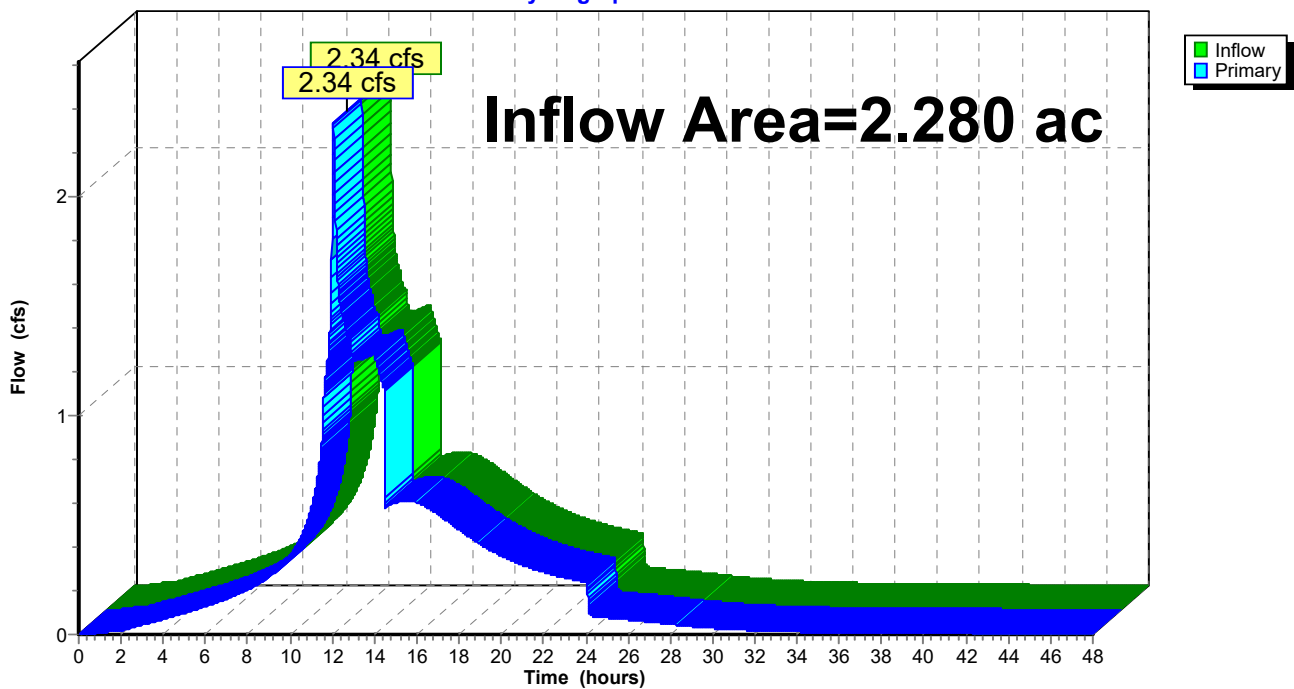
**Summary for Link 9-5: MAP 9 LOT 5**

Inflow Area = 2.280 ac, 75.31% Impervious, Inflow Depth > 4.58" for 10-yr (+15%) event  
 Inflow = 2.34 cfs @ 12.05 hrs, Volume= 0.870 af  
 Primary = 2.34 cfs @ 12.05 hrs, Volume= 0.870 af, Atten= 0%, Lag= 0.0 min  
 Routed to nonexistent node 105P

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

**Link 9-5: MAP 9 LOT 5**

Hydrograph



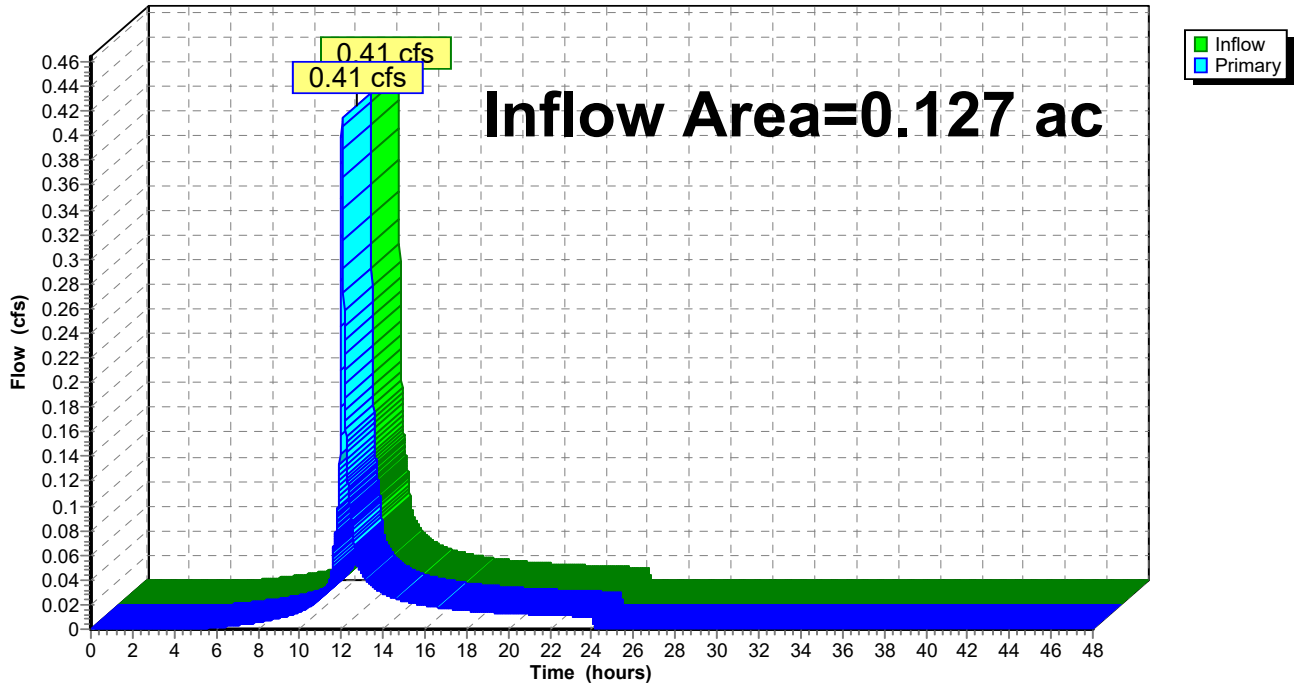
### Summary for Link RR: RIVER ROAD

Inflow Area = 0.127 ac, 48.92% Impervious, Inflow Depth = 3.35" for 10-yr (+15%) event  
Inflow = 0.41 cfs @ 12.04 hrs, Volume= 0.035 af  
Primary = 0.41 cfs @ 12.04 hrs, Volume= 0.035 af, Atten= 0%, Lag= 0.0 min

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

### Link RR: RIVER ROAD

Hydrograph



**Postdevelopment (Phase INH-Stratham 41 Portsmouth Ave 24-hr S1 1-yr 1-inch Rainfall=1.00"**

Prepared by Emanuel Engineering

Printed 6/17/2026

HydroCAD® 10.20-9a s/n 01104 © 2026 HydroCAD Software Solutions LLC

Page 1

Time span=0.00-48.00 hrs, dt=0.01 hrs, 4801 points x 2  
 Runoff by SCS TR-20 method, UH=SCS, Weighted-CN  
 Reach routing by Dyn-Stor-Ind method - Pond routing by Dyn-Stor-Ind method

|   |  |
|---|--|
| <b>Subcatchment200S: SW DRIVEWAY</b>      | Runoff Area=5,515 sf 48.92% Impervious Runoff Depth=0.07"<br>Flow Length=192' Tc=6.0 min CN=79 Runoff=0.00 cfs 0.001 af                    |
| <b>Subcatchment201S: HILL RUNNING OFF</b> | Runoff Area=98,273 sf 4.31% Impervious Runoff Depth=0.00"<br>Flow Length=567' Tc=7.7 min CN=70 Runoff=0.00 cfs 0.001 af                    |
| <b>Subcatchment202S: NORTHWEST</b>        | Runoff Area=5,467 sf 27.13% Impervious Runoff Depth=0.10"<br>Flow Length=77' Slope=0.0270 '/' Tc=6.0 min CN=81 Runoff=0.00 cfs 0.001 af    |
| <b>Subcatchment203S: WEST ENTRANCE</b>    | Runoff Area=10,408 sf 56.83% Impervious Runoff Depth=0.25"<br>Flow Length=206' Slope=0.0200 '/' Tc=8.3 min CN=88 Runoff=0.05 cfs 0.005 af  |
| <b>Subcatchment204S-A: NORTH PARKING</b>  | Runoff Area=23,845 sf 93.10% Impervious Runoff Depth=0.63"<br>Tc=222.0 min CN=96 Runoff=0.05 cfs 0.029 af                                  |
| <b>Subcatchment204S-B: ACCESSROAD</b>     | Runoff Area=6,090 sf 37.68% Impervious Runoff Depth=0.13"<br>Flow Length=40' Slope=0.0100 '/' Tc=6.3 min CN=83 Runoff=0.01 cfs 0.002 af    |
| <b>Subcatchment205S: NORTHEAST</b>        | Runoff Area=24,112 sf 63.73% Impervious Runoff Depth=0.28"<br>Flow Length=118' Tc=8.3 min CN=89 Runoff=0.14 cfs 0.013 af                   |
| <b>Subcatchment206S: EAST PARKING</b>     | Runoff Area=44,800 sf 79.14% Impervious Runoff Depth=0.45"<br>Flow Length=276' Slope=0.0127 '/' Tc=6.0 min CN=93 Runoff=0.50 cfs 0.039 af  |
| <b>Subcatchment207S: SOUTHEASTPARCEL</b>  | Runoff Area=17,349 sf 29.77% Impervious Runoff Depth=0.10"<br>Flow Length=257' Tc=6.0 min CN=81 Runoff=0.01 cfs 0.003 af                   |
| <b>Subcatchment208S: SOUTH PARCEL</b>     | Runoff Area=5,225 sf 20.80% Impervious Runoff Depth=0.07"<br>Flow Length=110' Tc=6.0 min CN=79 Runoff=0.00 cfs 0.001 af                    |
| <b>Subcatchment209S: SOUTHWEST</b>        | Runoff Area=17,300 sf 18.76% Impervious Runoff Depth=0.07"<br>Flow Length=279' Tc=11.1 min CN=79 Runoff=0.00 cfs 0.002 af                  |
| <b>Subcatchment210S: WEST PARKING</b>     | Runoff Area=67,820 sf 69.77% Impervious Runoff Depth=0.36"<br>Flow Length=130' Slope=0.0100 '/' Tc=6.0 min CN=91 Runoff=0.58 cfs 0.047 af  |
| <b>Subcatchment211S: WEST PARKING</b>     | Runoff Area=41,882 sf 74.70% Impervious Runoff Depth=0.40"<br>Flow Length=210' Slope=0.0150 '/' Tc=6.0 min CN=92 Runoff=0.41 cfs 0.032 af  |
| <b>Subcatchment212S-A: WESTERN HALF</b>   | Runoff Area=11,610 sf 100.00% Impervious Runoff Depth=0.79"<br>Flow Length=150' Slope=0.0100 '/' Tc=6.0 min CN=98 Runoff=0.22 cfs 0.018 af |
| <b>Subcatchment212S-B: EASTERNHALF</b>    | Runoff Area=14,005 sf 100.00% Impervious Runoff Depth=0.79"<br>Flow Length=130' Slope=0.0100 '/' Tc=6.0 min CN=98 Runoff=0.27 cfs 0.021 af |
| <b>Subcatchment213S: NORTH LANDSCAPE</b>  | Runoff Area=1,255 sf 75.70% Impervious Runoff Depth=0.40"<br>Flow Length=20' Slope=0.0100 '/' Tc=6.0 min CN=92 Runoff=0.01 cfs 0.001 af    |

**Postdevelopment (Phase INH-Stratham 41 Portsmouth Ave 24-hr S1 1-yr 1-inch Rainfall=1.00"**

Prepared by Emanuel Engineering

Printed 6/17/2026

HydroCAD® 10.20-9a s/n 01104 © 2026 HydroCAD Software Solutions LLC

Page 2

**Subcatchment214S: SOUTH LANDSCAPE** Runoff Area=3,380 sf 49.85% Impervious Runoff Depth=0.20"  
Flow Length=75' Slope=0.0100 '/ S=0.0063 '/ Tc=6.1 min CN=86 Runoff=0.01 cfs 0.001 af

**Pond 104P: EXISTING CULVERT** Peak Elev=82.11' Inflow=0.67 cfs 0.060 af  
30.0" Round Culvert n=0.013 L=100.0' S=0.0063 '/ Outflow=0.67 cfs 0.060 af

**Pond 251P-A: BIO-POND A PONDING LAYER** Peak Elev=84.00' Storage=28 cf Inflow=0.58 cfs 0.047 af  
Primary=0.57 cfs 0.047 af Secondary=0.00 cfs 0.000 af Outflow=0.57 cfs 0.047 af

**Pond 251P-B: BIO-POND A SUBSURFACE** Peak Elev=81.45' Storage=38 cf Inflow=0.57 cfs 0.047 af  
12.0" Round Culvert n=0.013 L=50.0' S=0.0050 '/ Outflow=0.56 cfs 0.047 af

**Pond 252P: NORTHWEST CATCH BASIN** Peak Elev=82.22' Inflow=0.00 cfs 0.001 af  
18.0" Round Culvert n=0.013 L=45.0' S=0.0049 '/ Outflow=0.00 cfs 0.001 af

**Pond 253P-A: BIO-POND C PONDING LAYER** Peak Elev=87.50' Storage=1 cf Inflow=0.01 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 253P-B: BIO-POND C SUBSURFACE** Peak Elev=84.55' Storage=0 cf Inflow=0.01 cfs 0.004 af  
Outflow=0.01 cfs 0.004 af

**Pond 253P-C: POROUS PAVEMENT A** Peak Elev=85.30' Storage=1,214 cf Inflow=0.05 cfs 0.029 af  
6.0" Round Culvert n=0.010 L=10.0' S=0.0000 '/ Outflow=0.00 cfs 0.003 af

**Pond 254P-A: BIO-POND D PONDING LAYER** Peak Elev=87.50' Storage=7 cf Inflow=0.14 cfs 0.013 af  
Primary=0.13 cfs 0.013 af Secondary=0.00 cfs 0.000 af Outflow=0.13 cfs 0.013 af

**Pond 254P-B: BIO-POND D SUBSURFACE** Peak Elev=84.75' Storage=2 cf Inflow=0.13 cfs 0.013 af  
6.0" Round Culvert n=0.010 L=90.0' S=0.0111 '/ Outflow=0.13 cfs 0.013 af

**Pond 255P-A: BIO-POND E PONDING LAYER** Peak Elev=86.51' Storage=25 cf Inflow=0.50 cfs 0.039 af  
Primary=0.49 cfs 0.039 af Secondary=0.00 cfs 0.000 af Outflow=0.49 cfs 0.039 af

**Pond 255P-B: BIO-POND E SUBSURFACE** Peak Elev=83.97' Storage=7 cf Inflow=0.61 cfs 0.052 af  
18.0" Round Culvert n=0.013 L=178.0' S=0.0025 '/ Outflow=0.61 cfs 0.052 af

**Pond 256P: RIVER ROAD CB** Peak Elev=81.44' Storage=41 cf Inflow=0.01 cfs 0.003 af  
Primary=0.00 cfs 0.002 af Secondary=0.00 cfs 0.000 af Outflow=0.00 cfs 0.002 af

**Pond 257P: BARNYARD CB** Peak Elev=80.69' Storage=39 cf Inflow=0.01 cfs 0.003 af  
Primary=0.00 cfs 0.002 af Secondary=0.00 cfs 0.000 af Outflow=0.00 cfs 0.002 af

**Pond 258P: 24" HDPE UNDER RIVER ROAD** Peak Elev=80.14' Storage=4,821 cf Inflow=1.44 cfs 0.126 af  
Primary=0.04 cfs 0.028 af Secondary=0.00 cfs 0.000 af Outflow=0.04 cfs 0.028 af

**Pond 259P-A: BIO-POND B PONDING LAYER** Peak Elev=86.51' Storage=32 cf Inflow=0.63 cfs 0.050 af  
Primary=0.62 cfs 0.050 af Secondary=0.00 cfs 0.000 af Outflow=0.62 cfs 0.050 af

**Pond 259P-B: BIO-POND B SUBSURFACE** Peak Elev=84.17' Storage=6 cf Inflow=0.62 cfs 0.050 af  
Outflow=0.61 cfs 0.050 af

**Postdevelopment (Phase INH-Stratham 41 Portsmouth Ave 24-hr S1 1-yr 1-inch Rainfall=1.00"**

Prepared by Emanuel Engineering

Printed 6/17/2026

HydroCAD® 10.20-9a s/n 01104 © 2026 HydroCAD Software Solutions LLC

Page 3

|   |  |
|---|--|
| <b>Pond 260P-A: ROOF DRAINS</b>           | Peak Elev=88.31' Inflow=0.22 cfs 0.018 af                                  |
|   | 12.0" Round Culvert n=0.013 L=35.0' S=0.0029 '/ Outflow=0.22 cfs 0.018 af  |
| <b>Pond 260P-B: ROOF DRAINS</b>           | Peak Elev=84.89' Inflow=0.27 cfs 0.021 af                                  |
|   | 12.0" Round Culvert n=0.013 L=5.0' S=0.0200 '/ Outflow=0.27 cfs 0.021 af   |
| <b>Pond 261P: NORTH ISLAND CATCHBASIN</b> | Peak Elev=84.31' Inflow=0.28 cfs 0.022 af                                  |
|   | 12.0" Round Culvert n=0.013 L=105.0' S=0.0050 '/ Outflow=0.28 cfs 0.022 af |
| <b>Pond 262P: SOUTH ISLAND CATCHBASIN</b> | Peak Elev=83.47' Inflow=0.89 cfs 0.075 af                                  |
|   | 24.0" Round Culvert n=0.013 L=250.0' S=0.0025 '/ Outflow=0.89 cfs 0.075 af |
| <b>Pond 263P: MANHOLE 1</b>               | Peak Elev=82.45' Inflow=0.89 cfs 0.075 af                                  |
|   | 24.0" Round Culvert n=0.013 L=40.0' S=0.0063 '/ Outflow=0.89 cfs 0.075 af  |
| <b>Link 8-64: MAP 8 LOT 64</b>            | Inflow=0.00 cfs 0.001 af   |
|   | Primary=0.00 cfs 0.001 af  |
| <b>Link 9-2: MAP 9 LOT 2</b>              | Inflow=0.04 cfs 0.028 af   |
|   | Primary=0.04 cfs 0.028 af  |
| <b>Link 9-5: MAP 9 LOT 5</b>              | Inflow=0.67 cfs 0.060 af   |
|   | Primary=0.67 cfs 0.060 af  |
| <b>Link RR: RIVER ROAD</b>                | Inflow=0.00 cfs 0.001 af   |
|   | Primary=0.00 cfs 0.001 af  |

**Total Runoff Area = 9.145 ac Runoff Volume = 0.216 af Average Runoff Depth = 0.28"**  
**48.29% Pervious = 4.416 ac 51.71% Impervious = 4.729 ac**

**Postdevelopment (P NH-Stratham 41 Portsmouth Ave 24-hr S1 2-yr 2-yr (+15%) Rainfall=3.70"**

Prepared by Emanuel Engineering

Printed 6/17/2026

HydroCAD® 10.20-9a s/n 01104 © 2026 HydroCAD Software Solutions LLC

Page 4

Time span=0.00-48.00 hrs, dt=0.01 hrs, 4801 points x 2  
 Runoff by SCS TR-20 method, UH=SCS, Weighted-CN  
 Reach routing by Dyn-Stor-Ind method - Pond routing by Dyn-Stor-Ind method

|   |  |
|---|--|
| <b>Subcatchment200S: SW DRIVEWAY</b>      | Runoff Area=5,515 sf 48.92% Impervious Runoff Depth=1.72"<br>Flow Length=192' Tc=6.0 min CN=79 Runoff=0.24 cfs 0.018 af                    |
| <b>Subcatchment201S: HILL RUNNING OFF</b> | Runoff Area=98,273 sf 4.31% Impervious Runoff Depth=1.13"<br>Flow Length=567' Tc=7.7 min CN=70 Runoff=2.38 cfs 0.213 af                    |
| <b>Subcatchment202S: NORTHWEST</b>        | Runoff Area=5,467 sf 27.13% Impervious Runoff Depth=1.87"<br>Flow Length=77' Slope=0.0270 '/' Tc=6.0 min CN=81 Runoff=0.26 cfs 0.020 af    |
| <b>Subcatchment203S: WEST ENTRANCE</b>    | Runoff Area=10,408 sf 56.83% Impervious Runoff Depth=2.45"<br>Flow Length=206' Slope=0.0200 '/' Tc=8.3 min CN=88 Runoff=0.58 cfs 0.049 af  |
| <b>Subcatchment204S-A: NORTH PARKING</b>  | Runoff Area=23,845 sf 93.10% Impervious Runoff Depth=3.24"<br>Tc=222.0 min CN=96 Runoff=0.27 cfs 0.148 af                                  |
| <b>Subcatchment204S-B: ACCESSROAD</b>     | Runoff Area=6,090 sf 37.68% Impervious Runoff Depth=2.03"<br>Flow Length=40' Slope=0.0100 '/' Tc=6.3 min CN=83 Runoff=0.31 cfs 0.024 af    |
| <b>Subcatchment205S: NORTHEAST</b>        | Runoff Area=24,112 sf 63.73% Impervious Runoff Depth=2.54"<br>Flow Length=118' Tc=8.3 min CN=89 Runoff=1.39 cfs 0.117 af                   |
| <b>Subcatchment206S: EAST PARKING</b>     | Runoff Area=44,800 sf 79.14% Impervious Runoff Depth=2.93"<br>Flow Length=276' Slope=0.0127 '/' Tc=6.0 min CN=93 Runoff=3.25 cfs 0.251 af  |
| <b>Subcatchment207S: SOUTHEASTPARCEL</b>  | Runoff Area=17,349 sf 29.77% Impervious Runoff Depth=1.87"<br>Flow Length=257' Tc=6.0 min CN=81 Runoff=0.83 cfs 0.062 af                   |
| <b>Subcatchment208S: SOUTH PARCEL</b>     | Runoff Area=5,225 sf 20.80% Impervious Runoff Depth=1.72"<br>Flow Length=110' Tc=6.0 min CN=79 Runoff=0.23 cfs 0.017 af                    |
| <b>Subcatchment209S: SOUTHWEST</b>        | Runoff Area=17,300 sf 18.76% Impervious Runoff Depth=1.72"<br>Flow Length=279' Tc=11.1 min CN=79 Runoff=0.59 cfs 0.057 af                  |
| <b>Subcatchment210S: WEST PARKING</b>     | Runoff Area=67,820 sf 69.77% Impervious Runoff Depth=2.73"<br>Flow Length=130' Slope=0.0100 '/' Tc=6.0 min CN=91 Runoff=4.66 cfs 0.354 af  |
| <b>Subcatchment211S: WEST PARKING</b>     | Runoff Area=41,882 sf 74.70% Impervious Runoff Depth=2.83"<br>Flow Length=210' Slope=0.0150 '/' Tc=6.0 min CN=92 Runoff=2.96 cfs 0.227 af  |
| <b>Subcatchment212S-A: WESTERN HALF</b>   | Runoff Area=11,610 sf 100.00% Impervious Runoff Depth=3.47"<br>Flow Length=150' Slope=0.0100 '/' Tc=6.0 min CN=98 Runoff=0.92 cfs 0.077 af |
| <b>Subcatchment212S-B: EASTERNHALF</b>    | Runoff Area=14,005 sf 100.00% Impervious Runoff Depth=3.47"<br>Flow Length=130' Slope=0.0100 '/' Tc=6.0 min CN=98 Runoff=1.11 cfs 0.093 af |
| <b>Subcatchment213S: NORTH LANDSCAPE</b>  | Runoff Area=1,255 sf 75.70% Impervious Runoff Depth=2.83"<br>Flow Length=20' Slope=0.0100 '/' Tc=6.0 min CN=92 Runoff=0.09 cfs 0.007 af    |

**Postdevelopment (P NH-Stratham 41 Portsmouth Ave 24-hr S1 2-yr 2-yr (+15%) Rainfall=3.70"**

Prepared by Emanuel Engineering

Printed 6/17/2026

HydroCAD® 10.20-9a s/n 01104 © 2026 HydroCAD Software Solutions LLC

Page 5

**Subcatchment214S: SOUTH LANDSCAPE** Runoff Area=3,380 sf 49.85% Impervious Runoff Depth=2.28"  
Flow Length=75' Slope=0.0100 '/' Tc=6.1 min CN=86 Runoff=0.20 cfs 0.015 af

**Pond 104P: EXISTING CULVERT** Peak Elev=82.33' Inflow=1.83 cfs 0.515 af  
30.0" Round Culvert n=0.013 L=100.0' S=0.0063 '/' Outflow=1.83 cfs 0.515 af

**Pond 251P-A: BIO-POND A PONDING LAYER** Peak Elev=84.07' Storage=870 cf Inflow=4.66 cfs 0.354 af  
Primary=2.47 cfs 0.354 af Secondary=0.00 cfs 0.000 af Outflow=2.47 cfs 0.354 af

**Pond 251P-B: BIO-POND A SUBSURFACE** Peak Elev=82.21' Storage=960 cf Inflow=2.47 cfs 0.354 af  
12.0" Round Culvert n=0.013 L=50.0' S=0.0050 '/' Outflow=2.10 cfs 0.354 af

**Pond 252P: NORTHWEST CATCH BASIN** Peak Elev=82.49' Inflow=0.26 cfs 0.020 af  
18.0" Round Culvert n=0.013 L=45.0' S=0.0049 '/' Outflow=0.26 cfs 0.020 af

**Pond 253P-A: BIO-POND C PONDING LAYER** Peak Elev=87.55' Storage=69 cf Inflow=0.31 cfs 0.024 af  
Primary=0.16 cfs 0.024 af Secondary=0.00 cfs 0.000 af Outflow=0.16 cfs 0.024 af

**Pond 253P-B: BIO-POND C SUBSURFACE** Peak Elev=84.76' Storage=0 cf Inflow=0.18 cfs 0.143 af  
Outflow=0.18 cfs 0.143 af

**Pond 253P-C: POROUS PAVEMENT A** Peak Elev=85.61' Storage=2,900 cf Inflow=0.27 cfs 0.148 af  
6.0" Round Culvert n=0.010 L=10.0' S=0.0000 '/' Outflow=0.17 cfs 0.120 af

**Pond 254P-A: BIO-POND D PONDING LAYER** Peak Elev=87.65' Storage=448 cf Inflow=1.39 cfs 0.117 af  
Primary=0.59 cfs 0.117 af Secondary=0.00 cfs 0.000 af Outflow=0.59 cfs 0.117 af

**Pond 254P-B: BIO-POND D SUBSURFACE** Peak Elev=85.37' Storage=6 cf Inflow=0.59 cfs 0.117 af  
6.0" Round Culvert n=0.010 L=90.0' S=0.0111 '/' Outflow=0.59 cfs 0.117 af

**Pond 255P-A: BIO-POND E PONDING LAYER** Peak Elev=87.10' Storage=1,796 cf Inflow=3.25 cfs 0.251 af  
Primary=0.67 cfs 0.251 af Secondary=0.00 cfs 0.000 af Outflow=0.67 cfs 0.251 af

**Pond 255P-B: BIO-POND E SUBSURFACE** Peak Elev=84.23' Storage=11 cf Inflow=1.25 cfs 0.368 af  
18.0" Round Culvert n=0.013 L=178.0' S=0.0025 '/' Outflow=1.25 cfs 0.368 af

**Pond 256P: RIVER ROAD CB** Peak Elev=81.99' Storage=48 cf Inflow=0.83 cfs 0.062 af  
Primary=0.83 cfs 0.061 af Secondary=0.00 cfs 0.000 af Outflow=0.83 cfs 0.061 af

**Pond 257P: BARNYARD CB** Peak Elev=81.95' Storage=55 cf Inflow=1.06 cfs 0.078 af  
Primary=1.05 cfs 0.078 af Secondary=0.00 cfs 0.000 af Outflow=1.05 cfs 0.078 af

**Pond 258P: 24" HDPE UNDER RIVER ROAD** Peak Elev=81.94' Storage=12,682 cf Inflow=6.16 cfs 0.971 af  
Primary=3.10 cfs 0.873 af Secondary=0.00 cfs 0.000 af Outflow=3.10 cfs 0.873 af

**Pond 259P-A: BIO-POND B PONDING LAYER** Peak Elev=86.80' Storage=1,580 cf Inflow=3.89 cfs 0.304 af  
Primary=1.10 cfs 0.304 af Secondary=0.00 cfs 0.000 af Outflow=1.10 cfs 0.304 af

**Pond 259P-B: BIO-POND B SUBSURFACE** Peak Elev=84.77' Storage=717 cf Inflow=1.10 cfs 0.304 af  
Outflow=0.96 cfs 0.304 af

**Postdevelopment (P NH-Stratham 41 Portsmouth Ave 24-hr S1 2-yr 2-yr (+15%) Rainfall=3.70"**

Prepared by Emanuel Engineering

Printed 6/17/2026

HydroCAD® 10.20-9a s/n 01104 © 2026 HydroCAD Software Solutions LLC

Page 6

|  |                      |                      |              |
|--|----------------------|----------------------|--------------|
| <b>Pond 260P-A: ROOF DRAINS</b>                      | Peak Elev=88.66'     | Inflow=0.92 cfs      | 0.077 af     |
| 12.0" Round Culvert n=0.013 L=35.0' S=0.0029 '/      |                      | Outflow=0.92 cfs     | 0.077 af     |
| <br><b>Pond 260P-B: ROOF DRAINS</b>                  | <br>Peak Elev=85.26' | <br>Inflow=1.11 cfs  | <br>0.093 af |
| <br>12.0" Round Culvert n=0.013 L=5.0' S=0.0200 '/   |                      | <br>Outflow=1.11 cfs | <br>0.093 af |
| <br><b>Pond 261P: NORTH ISLAND CATCHBASIN</b>        | <br>Peak Elev=84.68' | <br>Inflow=1.20 cfs  | <br>0.100 af |
| <br>12.0" Round Culvert n=0.013 L=105.0' S=0.0050 '/ |                      | <br>Outflow=1.20 cfs | <br>0.100 af |
| <br><b>Pond 262P: SOUTH ISLAND CATCHBASIN</b>        | <br>Peak Elev=83.84' | <br>Inflow=2.58 cfs  | <br>0.483 af |
| <br>24.0" Round Culvert n=0.013 L=250.0' S=0.0025 '/ |                      | <br>Outflow=2.58 cfs | <br>0.483 af |
| <br><b>Pond 263P: MANHOLE 1</b>                      | <br>Peak Elev=82.80' | <br>Inflow=2.58 cfs  | <br>0.483 af |
| <br>24.0" Round Culvert n=0.013 L=40.0' S=0.0063 '/  |                      | <br>Outflow=2.58 cfs | <br>0.483 af |
| <br><b>Link 8-64: MAP 8 LOT 64</b>                   |                      | <br>Inflow=2.38 cfs  | <br>0.213 af |
|  |                      | <br>Primary=2.38 cfs | <br>0.213 af |
| <br><b>Link 9-2: MAP 9 LOT 2</b>                     |                      | <br>Inflow=3.10 cfs  | <br>0.873 af |
|  |                      | <br>Primary=3.10 cfs | <br>0.873 af |
| <br><b>Link 9-5: MAP 9 LOT 5</b>                     |                      | <br>Inflow=1.83 cfs  | <br>0.515 af |
|  |                      | <br>Primary=1.83 cfs | <br>0.515 af |
| <br><b>Link RR: RIVER ROAD</b>                       |                      | <br>Inflow=0.24 cfs  | <br>0.018 af |
|  |                      | <br>Primary=0.24 cfs | <br>0.018 af |

**Total Runoff Area = 9.145 ac   Runoff Volume = 1.748 af   Average Runoff Depth = 2.29"**  
**48.29% Pervious = 4.416 ac   51.71% Impervious = 4.729 ac**

**Postdevelopment ( NH-Stratham 41 Portsmouth Ave 24-hr S1 10-yr 10-yr (+15%) Rainfall=5.63"**

Prepared by Emanuel Engineering

Printed 6/17/2026

HydroCAD® 10.20-9a s/n 01104 © 2026 HydroCAD Software Solutions LLC

Page 7

Time span=0.00-48.00 hrs, dt=0.01 hrs, 4801 points x 2  
 Runoff by SCS TR-20 method, UH=SCS, Weighted-CN  
 Reach routing by Dyn-Stor-Ind method - Pond routing by Dyn-Stor-Ind method

|   |  |
|---|--|
| <b>Subcatchment200S: SW DRIVEWAY</b>      | Runoff Area=5,515 sf 48.92% Impervious Runoff Depth=3.35"<br>Flow Length=192' Tc=6.0 min CN=79 Runoff=0.41 cfs 0.035 af                    |
| <b>Subcatchment201S: HILL RUNNING OFF</b> | Runoff Area=98,273 sf 4.31% Impervious Runoff Depth=2.51"<br>Flow Length=567' Tc=7.7 min CN=70 Runoff=5.00 cfs 0.473 af                    |
| <b>Subcatchment202S: NORTHWEST</b>        | Runoff Area=5,467 sf 27.13% Impervious Runoff Depth=3.55"<br>Flow Length=77' Slope=0.0270 '/' Tc=6.0 min CN=81 Runoff=0.43 cfs 0.037 af    |
| <b>Subcatchment203S: WEST ENTRANCE</b>    | Runoff Area=10,408 sf 56.83% Impervious Runoff Depth=4.27"<br>Flow Length=206' Slope=0.0200 '/' Tc=8.3 min CN=88 Runoff=0.87 cfs 0.085 af  |
| <b>Subcatchment204S-A: NORTH PARKING</b>  | Runoff Area=23,845 sf 93.10% Impervious Runoff Depth=5.16"<br>Tc=222.0 min CN=96 Runoff=0.41 cfs 0.235 af                                  |
| <b>Subcatchment204S-B: ACCESSROAD</b>     | Runoff Area=6,090 sf 37.68% Impervious Runoff Depth=3.75"<br>Flow Length=40' Slope=0.0100 '/' Tc=6.3 min CN=83 Runoff=0.50 cfs 0.044 af    |
| <b>Subcatchment205S: NORTHEAST</b>        | Runoff Area=24,112 sf 63.73% Impervious Runoff Depth=4.38"<br>Flow Length=118' Tc=8.3 min CN=89 Runoff=2.05 cfs 0.202 af                   |
| <b>Subcatchment206S: EAST PARKING</b>     | Runoff Area=44,800 sf 79.14% Impervious Runoff Depth=4.82"<br>Flow Length=276' Slope=0.0127 '/' Tc=6.0 min CN=93 Runoff=4.55 cfs 0.413 af  |
| <b>Subcatchment207S: SOUTHEAST PARCEL</b> | Runoff Area=17,349 sf 29.77% Impervious Runoff Depth=3.55"<br>Flow Length=257' Tc=6.0 min CN=81 Runoff=1.38 cfs 0.118 af                   |
| <b>Subcatchment208S: SOUTH PARCEL</b>     | Runoff Area=5,225 sf 20.80% Impervious Runoff Depth=3.35"<br>Flow Length=110' Tc=6.0 min CN=79 Runoff=0.39 cfs 0.033 af                    |
| <b>Subcatchment209S: SOUTHWEST</b>        | Runoff Area=17,300 sf 18.76% Impervious Runoff Depth=3.35"<br>Flow Length=279' Tc=11.1 min CN=79 Runoff=1.03 cfs 0.111 af                  |
| <b>Subcatchment210S: WEST PARKING</b>     | Runoff Area=67,820 sf 69.77% Impervious Runoff Depth=4.60"<br>Flow Length=130' Slope=0.0100 '/' Tc=6.0 min CN=91 Runoff=6.68 cfs 0.596 af  |
| <b>Subcatchment211S: WEST PARKING</b>     | Runoff Area=41,882 sf 74.70% Impervious Runoff Depth=4.71"<br>Flow Length=210' Slope=0.0150 '/' Tc=6.0 min CN=92 Runoff=4.19 cfs 0.377 af  |
| <b>Subcatchment212S-A: WESTERN HALF</b>   | Runoff Area=11,610 sf 100.00% Impervious Runoff Depth=5.39"<br>Flow Length=150' Slope=0.0100 '/' Tc=6.0 min CN=98 Runoff=1.24 cfs 0.120 af |
| <b>Subcatchment212S-B: EASTERN HALF</b>   | Runoff Area=14,005 sf 100.00% Impervious Runoff Depth=5.39"<br>Flow Length=130' Slope=0.0100 '/' Tc=6.0 min CN=98 Runoff=1.49 cfs 0.144 af |
| <b>Subcatchment213S: NORTH LANDSCAPE</b>  | Runoff Area=1,255 sf 75.70% Impervious Runoff Depth=4.71"<br>Flow Length=20' Slope=0.0100 '/' Tc=6.0 min CN=92 Runoff=0.13 cfs 0.011 af    |

**Postdevelopment ( NH-Stratham 41 Portsmouth Ave 24-hr S1 10-yr 10-yr (+15%) Rainfall=5.63"**

Prepared by Emanuel Engineering

Printed 6/17/2026

HydroCAD® 10.20-9a s/n 01104 © 2026 HydroCAD Software Solutions LLC

Page 8

**Subcatchment214S: SOUTH LANDSCAPE** Runoff Area=3,380 sf 49.85% Impervious Runoff Depth=4.06"  
Flow Length=75' Slope=0.0100 '/' Tc=6.1 min CN=86 Runoff=0.30 cfs 0.026 af

**Pond 104P: EXISTING CULVERT** Peak Elev=82.41' Inflow=2.34 cfs 0.870 af  
30.0" Round Culvert n=0.013 L=100.0' S=0.0063 '/' Outflow=2.34 cfs 0.870 af

**Pond 251P-A: BIO-POND A PONDING LAYER** Peak Elev=84.17' Storage=2,103 cf Inflow=6.68 cfs 0.596 af  
Primary=2.52 cfs 0.596 af Secondary=0.00 cfs 0.000 af Outflow=2.52 cfs 0.596 af

**Pond 251P-B: BIO-POND A SUBSURFACE** Peak Elev=82.62' Storage=2,648 cf Inflow=2.52 cfs 0.596 af  
12.0" Round Culvert n=0.013 L=50.0' S=0.0050 '/' Outflow=2.12 cfs 0.596 af

**Pond 252P: NORTHWEST CATCH BASIN** Peak Elev=82.59' Inflow=0.43 cfs 0.037 af  
18.0" Round Culvert n=0.013 L=45.0' S=0.0049 '/' Outflow=0.43 cfs 0.037 af

**Pond 253P-A: BIO-POND C PONDING LAYER** Peak Elev=87.64' Storage=186 cf Inflow=0.50 cfs 0.044 af  
Primary=0.18 cfs 0.044 af Secondary=0.00 cfs 0.000 af Outflow=0.18 cfs 0.044 af

**Pond 253P-B: BIO-POND C SUBSURFACE** Peak Elev=84.87' Storage=0 cf Inflow=0.33 cfs 0.251 af  
Outflow=0.33 cfs 0.251 af

**Pond 253P-C: POROUS PAVEMENT A** Peak Elev=85.76' Storage=3,693 cf Inflow=0.41 cfs 0.235 af  
6.0" Round Culvert n=0.010 L=10.0' S=0.0000 '/' Outflow=0.30 cfs 0.207 af

**Pond 254P-A: BIO-POND D PONDING LAYER** Peak Elev=87.86' Storage=1,048 cf Inflow=2.05 cfs 0.202 af  
Primary=0.62 cfs 0.202 af Secondary=0.00 cfs 0.000 af Outflow=0.62 cfs 0.202 af

**Pond 254P-B: BIO-POND D SUBSURFACE** Peak Elev=85.44' Storage=7 cf Inflow=0.62 cfs 0.202 af  
6.0" Round Culvert n=0.010 L=90.0' S=0.0111 '/' Outflow=0.62 cfs 0.202 af

**Pond 255P-A: BIO-POND E PONDING LAYER** Peak Elev=87.56' Storage=3,173 cf Inflow=4.55 cfs 0.413 af  
Primary=0.75 cfs 0.402 af Secondary=0.42 cfs 0.010 af Outflow=1.17 cfs 0.413 af

**Pond 255P-B: BIO-POND E SUBSURFACE** Peak Elev=84.35' Storage=12 cf Inflow=1.79 cfs 0.615 af  
18.0" Round Culvert n=0.013 L=178.0' S=0.0025 '/' Outflow=1.79 cfs 0.615 af

**Pond 256P: RIVER ROAD CB** Peak Elev=82.45' Storage=54 cf Inflow=1.38 cfs 0.118 af  
Primary=1.37 cfs 0.117 af Secondary=0.00 cfs 0.000 af Outflow=1.37 cfs 0.117 af

**Pond 257P: BARNYARD CB** Peak Elev=82.26' Storage=59 cf Inflow=1.77 cfs 0.150 af  
Primary=1.75 cfs 0.149 af Secondary=0.00 cfs 0.000 af Outflow=1.75 cfs 0.149 af

**Pond 258P: 24" HDPE UNDER RIVER ROAD** Peak Elev=82.14' Storage=13,954 cf Inflow=6.99 cfs 1.653 af  
Primary=4.67 cfs 1.555 af Secondary=0.00 cfs 0.000 af Outflow=4.67 cfs 1.555 af

**Pond 259P-A: BIO-POND B PONDING LAYER** Peak Elev=87.09' Storage=3,170 cf Inflow=5.43 cfs 0.497 af  
Primary=1.19 cfs 0.497 af Secondary=0.00 cfs 0.000 af Outflow=1.19 cfs 0.497 af

**Pond 259P-B: BIO-POND B SUBSURFACE** Peak Elev=84.96' Storage=1,182 cf Inflow=1.19 cfs 0.497 af  
Outflow=1.04 cfs 0.497 af

**Postdevelopment ( NH-Stratham 41 Portsmouth Ave 24-hr S1 10-yr 10-yr (+15%) Rainfall=5.63"**

Prepared by Emanuel Engineering

Printed 6/17/2026

HydroCAD® 10.20-9a s/n 01104 © 2026 HydroCAD Software Solutions LLC

Page 9

|   |                      |                      |              |
|---|----------------------|----------------------|--------------|
| <b>Pond 260P-A: ROOF DRAINS</b>                       | Peak Elev=88.78'     | Inflow=1.24 cfs      | 0.120 af     |
| 12.0" Round Culvert n=0.013 L=35.0' S=0.0029 '/'      |                      | Outflow=1.24 cfs     | 0.120 af     |
| <br><b>Pond 260P-B: ROOF DRAINS</b>                   | <br>Peak Elev=85.39' | <br>Inflow=1.49 cfs  | <br>0.144 af |
| <br>12.0" Round Culvert n=0.013 L=5.0' S=0.0200 '/'   |                      | <br>Outflow=1.49 cfs | <br>0.144 af |
| <br><b>Pond 261P: NORTH ISLAND CATCHBASIN</b>         | <br>Peak Elev=84.82' | <br>Inflow=1.62 cfs  | <br>0.156 af |
| <br>12.0" Round Culvert n=0.013 L=105.0' S=0.0050 '/' |                      | <br>Outflow=1.62 cfs | <br>0.156 af |
| <br><b>Pond 262P: SOUTH ISLAND CATCHBASIN</b>         | <br>Peak Elev=83.94' | <br>Inflow=3.16 cfs  | <br>0.797 af |
| <br>24.0" Round Culvert n=0.013 L=250.0' S=0.0025 '/' |                      | <br>Outflow=3.16 cfs | <br>0.797 af |
| <br><b>Pond 263P: MANHOLE 1</b>                       | <br>Peak Elev=82.90' | <br>Inflow=3.16 cfs  | <br>0.797 af |
| <br>24.0" Round Culvert n=0.013 L=40.0' S=0.0063 '/'  |                      | <br>Outflow=3.16 cfs | <br>0.797 af |
| <br><b>Link 8-64: MAP 8 LOT 64</b>                    |                      | <br>Inflow=5.00 cfs  | <br>0.473 af |
|   |                      | Primary=5.00 cfs     | 0.473 af     |
| <br><b>Link 9-2: MAP 9 LOT 2</b>                      |                      | <br>Inflow=4.67 cfs  | <br>1.555 af |
|   |                      | Primary=4.67 cfs     | 1.555 af     |
| <br><b>Link 9-5: MAP 9 LOT 5</b>                      |                      | <br>Inflow=2.34 cfs  | <br>0.870 af |
|   |                      | Primary=2.34 cfs     | 0.870 af     |
| <br><b>Link RR: RIVER ROAD</b>                        |                      | <br>Inflow=0.41 cfs  | <br>0.035 af |
|   |                      | Primary=0.41 cfs     | 0.035 af     |

**Total Runoff Area = 9.145 ac   Runoff Volume = 3.061 af   Average Runoff Depth = 4.02"**  
**48.29% Pervious = 4.416 ac   51.71% Impervious = 4.729 ac**

**Postdevelopment ( NH-Stratham 41 Portsmouth Ave 24-hr S1 25-yr 25-yr (+15%) Rainfall=7.16"**

Prepared by Emanuel Engineering

Printed 6/17/2026

HydroCAD® 10.20-9a s/n 01104 © 2026 HydroCAD Software Solutions LLC

Page 10

Time span=0.00-48.00 hrs, dt=0.01 hrs, 4801 points x 2  
 Runoff by SCS TR-20 method, UH=SCS, Weighted-CN  
 Reach routing by Dyn-Stor-Ind method - Pond routing by Dyn-Stor-Ind method

|   |  |
|---|--|
| <b>Subcatchment200S: SW DRIVEWAY</b>      | Runoff Area=5,515 sf 48.92% Impervious Runoff Depth=4.73"<br>Flow Length=192' Tc=6.0 min CN=79 Runoff=0.55 cfs 0.050 af                    |
| <b>Subcatchment201S: HILL RUNNING OFF</b> | Runoff Area=98,273 sf 4.31% Impervious Runoff Depth=3.75"<br>Flow Length=567' Tc=7.7 min CN=70 Runoff=7.13 cfs 0.705 af                    |
| <b>Subcatchment202S: NORTHWEST</b>        | Runoff Area=5,467 sf 27.13% Impervious Runoff Depth=4.95"<br>Flow Length=77' Slope=0.0270 '/' Tc=6.0 min CN=81 Runoff=0.57 cfs 0.052 af    |
| <b>Subcatchment203S: WEST ENTRANCE</b>    | Runoff Area=10,408 sf 56.83% Impervious Runoff Depth=5.75"<br>Flow Length=206' Slope=0.0200 '/' Tc=8.3 min CN=88 Runoff=1.09 cfs 0.114 af  |
| <b>Subcatchment204S-A: NORTH PARKING</b>  | Runoff Area=23,845 sf 93.10% Impervious Runoff Depth=6.68"<br>Tc=222.0 min CN=96 Runoff=0.51 cfs 0.305 af                                  |
| <b>Subcatchment204S-B: ACCESSROAD</b>     | Runoff Area=6,090 sf 37.68% Impervious Runoff Depth=5.18"<br>Flow Length=40' Slope=0.0100 '/' Tc=6.3 min CN=83 Runoff=0.65 cfs 0.060 af    |
| <b>Subcatchment205S: NORTHEAST</b>        | Runoff Area=24,112 sf 63.73% Impervious Runoff Depth=5.86"<br>Flow Length=118' Tc=8.3 min CN=89 Runoff=2.55 cfs 0.271 af                   |
| <b>Subcatchment206S: EAST PARKING</b>     | Runoff Area=44,800 sf 79.14% Impervious Runoff Depth=6.33"<br>Flow Length=276' Slope=0.0127 '/' Tc=6.0 min CN=93 Runoff=5.54 cfs 0.542 af  |
| <b>Subcatchment207S: SOUTHEAST PARCEL</b> | Runoff Area=17,349 sf 29.77% Impervious Runoff Depth=4.95"<br>Flow Length=257' Tc=6.0 min CN=81 Runoff=1.80 cfs 0.164 af                   |
| <b>Subcatchment208S: SOUTH PARCEL</b>     | Runoff Area=5,225 sf 20.80% Impervious Runoff Depth=4.73"<br>Flow Length=110' Tc=6.0 min CN=79 Runoff=0.52 cfs 0.047 af                    |
| <b>Subcatchment209S: SOUTHWEST</b>        | Runoff Area=17,300 sf 18.76% Impervious Runoff Depth=4.73"<br>Flow Length=279' Tc=11.1 min CN=79 Runoff=1.37 cfs 0.157 af                  |
| <b>Subcatchment210S: WEST PARKING</b>     | Runoff Area=67,820 sf 69.77% Impervious Runoff Depth=6.10"<br>Flow Length=130' Slope=0.0100 '/' Tc=6.0 min CN=91 Runoff=8.21 cfs 0.791 af  |
| <b>Subcatchment211S: WEST PARKING</b>     | Runoff Area=41,882 sf 74.70% Impervious Runoff Depth=6.21"<br>Flow Length=210' Slope=0.0150 '/' Tc=6.0 min CN=92 Runoff=5.13 cfs 0.498 af  |
| <b>Subcatchment212S-A: WESTERN HALF</b>   | Runoff Area=11,610 sf 100.00% Impervious Runoff Depth=6.92"<br>Flow Length=150' Slope=0.0100 '/' Tc=6.0 min CN=98 Runoff=1.48 cfs 0.154 af |
| <b>Subcatchment212S-B: EASTERN HALF</b>   | Runoff Area=14,005 sf 100.00% Impervious Runoff Depth=6.92"<br>Flow Length=130' Slope=0.0100 '/' Tc=6.0 min CN=98 Runoff=1.79 cfs 0.185 af |
| <b>Subcatchment213S: NORTH LANDSCAPE</b>  | Runoff Area=1,255 sf 75.70% Impervious Runoff Depth=6.21"<br>Flow Length=20' Slope=0.0100 '/' Tc=6.0 min CN=92 Runoff=0.15 cfs 0.015 af    |

**Postdevelopment ( NH-Stratham 41 Portsmouth Ave 24-hr S1 25-yr 25-yr (+15%) Rainfall=7.16"**

Prepared by Emanuel Engineering

Printed 6/17/2026

HydroCAD® 10.20-9a s/n 01104 © 2026 HydroCAD Software Solutions LLC

Page 11

**Subcatchment214S: SOUTH LANDSCAPE** Runoff Area=3,380 sf 49.85% Impervious Runoff Depth=5.52"  
Flow Length=75' Slope=0.0100 '/' Tc=6.1 min CN=86 Runoff=0.38 cfs 0.036 af

**Pond 104P: EXISTING CULVERT** Peak Elev=82.47' Inflow=2.74 cfs 1.154 af  
30.0" Round Culvert n=0.013 L=100.0' S=0.0063 '/' Outflow=2.74 cfs 1.154 af

**Pond 251P-A: BIO-POND A PONDING LAYER** Peak Elev=84.27' Storage=3,290 cf Inflow=8.21 cfs 0.791 af  
Primary=2.57 cfs 0.791 af Secondary=0.00 cfs 0.000 af Outflow=2.57 cfs 0.791 af

**Pond 251P-B: BIO-POND A SUBSURFACE** Peak Elev=82.77' Storage=3,264 cf Inflow=2.57 cfs 0.791 af  
12.0" Round Culvert n=0.013 L=50.0' S=0.0050 '/' Outflow=2.39 cfs 0.791 af

**Pond 252P: NORTHWEST CATCH BASIN** Peak Elev=82.65' Inflow=0.57 cfs 0.052 af  
18.0" Round Culvert n=0.013 L=45.0' S=0.0049 '/' Outflow=0.57 cfs 0.052 af

**Pond 253P-A: BIO-POND C PONDING LAYER** Peak Elev=87.73' Storage=300 cf Inflow=0.65 cfs 0.060 af  
Primary=0.20 cfs 0.060 af Secondary=0.00 cfs 0.000 af Outflow=0.20 cfs 0.060 af

**Pond 253P-B: BIO-POND C SUBSURFACE** Peak Elev=84.95' Storage=1 cf Inflow=0.42 cfs 0.337 af  
Outflow=0.42 cfs 0.337 af

**Pond 253P-C: POROUS PAVEMENT A** Peak Elev=85.86' Storage=4,253 cf Inflow=0.51 cfs 0.305 af  
6.0" Round Culvert n=0.010 L=10.0' S=0.0000 '/' Outflow=0.39 cfs 0.276 af

**Pond 254P-A: BIO-POND D PONDING LAYER** Peak Elev=88.06' Storage=1,644 cf Inflow=2.55 cfs 0.271 af  
Primary=0.65 cfs 0.271 af Secondary=0.00 cfs 0.000 af Outflow=0.65 cfs 0.271 af

**Pond 254P-B: BIO-POND D SUBSURFACE** Peak Elev=85.52' Storage=41 cf Inflow=0.65 cfs 0.271 af  
6.0" Round Culvert n=0.010 L=90.0' S=0.0111 '/' Outflow=0.66 cfs 0.271 af

**Pond 255P-A: BIO-POND E PONDING LAYER** Peak Elev=87.68' Storage=3,503 cf Inflow=5.54 cfs 0.542 af  
Primary=0.77 cfs 0.496 af Secondary=1.89 cfs 0.046 af Outflow=2.65 cfs 0.542 af

**Pond 255P-B: BIO-POND E SUBSURFACE** Peak Elev=84.65' Storage=190 cf Inflow=3.25 cfs 0.813 af  
18.0" Round Culvert n=0.013 L=178.0' S=0.0025 '/' Outflow=3.01 cfs 0.813 af

**Pond 256P: RIVER ROAD CB** Peak Elev=82.97' Storage=60 cf Inflow=1.80 cfs 0.164 af  
Primary=1.79 cfs 0.163 af Secondary=0.00 cfs 0.000 af Outflow=1.79 cfs 0.163 af

**Pond 257P: BARNYARD CB** Peak Elev=82.65' Storage=64 cf Inflow=2.31 cfs 0.211 af  
Primary=2.30 cfs 0.210 af Secondary=0.00 cfs 0.000 af Outflow=2.30 cfs 0.210 af

**Pond 258P: 24" HDPE UNDER RIVER ROAD** Peak Elev=82.25' Storage=14,803 cf Inflow=8.06 cfs 2.206 af  
Primary=6.75 cfs 2.108 af Secondary=0.00 cfs 0.000 af Outflow=6.75 cfs 2.108 af

**Pond 259P-A: BIO-POND B PONDING LAYER** Peak Elev=87.37' Storage=4,674 cf Inflow=6.61 cfs 0.652 af  
Primary=1.27 cfs 0.652 af Secondary=0.00 cfs 0.000 af Outflow=1.27 cfs 0.652 af

**Pond 259P-B: BIO-POND B SUBSURFACE** Peak Elev=85.11' Storage=1,575 cf Inflow=1.27 cfs 0.652 af  
Outflow=1.10 cfs 0.652 af

**Postdevelopment ( NH-Stratham 41 Portsmouth Ave 24-hr S1 25-yr 25-yr (+15%) Rainfall=7.16"**

Prepared by Emanuel Engineering

Printed 6/17/2026

HydroCAD® 10.20-9a s/n 01104 © 2026 HydroCAD Software Solutions LLC

Page 12

|   |                      |                      |              |
|---|----------------------|----------------------|--------------|
| <b>Pond 260P-A: ROOF DRAINS</b>                       | Peak Elev=88.88'     | Inflow=1.48 cfs      | 0.154 af     |
| 12.0" Round Culvert n=0.013 L=35.0' S=0.0029 '/'      |                      | Outflow=1.48 cfs     | 0.154 af     |
| <br><b>Pond 260P-B: ROOF DRAINS</b>                   | <br>Peak Elev=85.49' | <br>Inflow=1.79 cfs  | <br>0.185 af |
| <br>12.0" Round Culvert n=0.013 L=5.0' S=0.0200 '/'   |                      | <br>Outflow=1.79 cfs | <br>0.185 af |
| <br><b>Pond 261P: NORTH ISLAND CATCHBASIN</b>         | <br>Peak Elev=84.94' | <br>Inflow=1.94 cfs  | <br>0.200 af |
| <br>12.0" Round Culvert n=0.013 L=105.0' S=0.0050 '/' |                      | <br>Outflow=1.94 cfs | <br>0.200 af |
| <br><b>Pond 262P: SOUTH ISLAND CATCHBASIN</b>         | <br>Peak Elev=84.06' | <br>Inflow=3.90 cfs  | <br>1.049 af |
| <br>24.0" Round Culvert n=0.013 L=250.0' S=0.0025 '/' |                      | <br>Outflow=3.90 cfs | <br>1.049 af |
| <br><b>Pond 263P: MANHOLE 1</b>                       | <br>Peak Elev=83.01' | <br>Inflow=3.90 cfs  | <br>1.049 af |
| <br>24.0" Round Culvert n=0.013 L=40.0' S=0.0063 '/'  |                      | <br>Outflow=3.90 cfs | <br>1.049 af |
| <br><b>Link 8-64: MAP 8 LOT 64</b>                    |                      | <br>Inflow=7.13 cfs  | <br>0.705 af |
|   |                      | <br>Primary=7.13 cfs | <br>0.705 af |
| <br><b>Link 9-2: MAP 9 LOT 2</b>                      |                      | <br>Inflow=6.75 cfs  | <br>2.108 af |
|   |                      | <br>Primary=6.75 cfs | <br>2.108 af |
| <br><b>Link 9-5: MAP 9 LOT 5</b>                      |                      | <br>Inflow=2.74 cfs  | <br>1.154 af |
|   |                      | <br>Primary=2.74 cfs | <br>1.154 af |
| <br><b>Link RR: RIVER ROAD</b>                        |                      | <br>Inflow=0.55 cfs  | <br>0.050 af |
|   |                      | <br>Primary=0.55 cfs | <br>0.050 af |

**Total Runoff Area = 9.145 ac   Runoff Volume = 4.147 af   Average Runoff Depth = 5.44"**  
**48.29% Pervious = 4.416 ac   51.71% Impervious = 4.729 ac**

**Postdevelopment ( NH-Stratham 41 Portsmouth Ave 24-hr S1 50-yr 50-yr (+15%) Rainfall=8.60"**

Prepared by Emanuel Engineering

Printed 6/17/2026

HydroCAD® 10.20-9a s/n 01104 © 2026 HydroCAD Software Solutions LLC

Page 13

Time span=0.00-48.00 hrs, dt=0.01 hrs, 4801 points x 2  
 Runoff by SCS TR-20 method, UH=SCS, Weighted-CN  
 Reach routing by Dyn-Stor-Ind method - Pond routing by Dyn-Stor-Ind method

|   |  |
|---|--|
| <b>Subcatchment200S: SW DRIVEWAY</b>      | Runoff Area=5,515 sf 48.92% Impervious Runoff Depth=6.07"<br>Flow Length=192' Tc=6.0 min CN=79 Runoff=0.67 cfs 0.064 af                    |
| <b>Subcatchment201S: HILL RUNNING OFF</b> | Runoff Area=98,273 sf 4.31% Impervious Runoff Depth=4.98"<br>Flow Length=567' Tc=7.7 min CN=70 Runoff=9.07 cfs 0.937 af                    |
| <b>Subcatchment202S: NORTHWEST</b>        | Runoff Area=5,467 sf 27.13% Impervious Runoff Depth=6.31"<br>Flow Length=77' Slope=0.0270 '/' Tc=6.0 min CN=81 Runoff=0.68 cfs 0.066 af    |
| <b>Subcatchment203S: WEST ENTRANCE</b>    | Runoff Area=10,408 sf 56.83% Impervious Runoff Depth=7.16"<br>Flow Length=206' Slope=0.0200 '/' Tc=8.3 min CN=88 Runoff=1.28 cfs 0.142 af  |
| <b>Subcatchment204S-A: NORTH PARKING</b>  | Runoff Area=23,845 sf 93.10% Impervious Runoff Depth=8.12"<br>Tc=222.0 min CN=96 Runoff=0.61 cfs 0.370 af                                  |
| <b>Subcatchment204S-B: ACCESSROAD</b>     | Runoff Area=6,090 sf 37.68% Impervious Runoff Depth=6.55"<br>Flow Length=40' Slope=0.0100 '/' Tc=6.3 min CN=83 Runoff=0.77 cfs 0.076 af    |
| <b>Subcatchment205S: NORTHEAST</b>        | Runoff Area=24,112 sf 63.73% Impervious Runoff Depth=7.28"<br>Flow Length=118' Tc=8.3 min CN=89 Runoff=2.99 cfs 0.336 af                   |
| <b>Subcatchment206S: EAST PARKING</b>     | Runoff Area=44,800 sf 79.14% Impervious Runoff Depth=7.76"<br>Flow Length=276' Slope=0.0127 '/' Tc=6.0 min CN=93 Runoff=6.40 cfs 0.665 af  |
| <b>Subcatchment207S: SOUTHEASTPARCEL</b>  | Runoff Area=17,349 sf 29.77% Impervious Runoff Depth=6.31"<br>Flow Length=257' Tc=6.0 min CN=81 Runoff=2.16 cfs 0.209 af                   |
| <b>Subcatchment208S: SOUTH PARCEL</b>     | Runoff Area=5,225 sf 20.80% Impervious Runoff Depth=6.07"<br>Flow Length=110' Tc=6.0 min CN=79 Runoff=0.63 cfs 0.061 af                    |
| <b>Subcatchment209S: SOUTHWEST</b>        | Runoff Area=17,300 sf 18.76% Impervious Runoff Depth=6.07"<br>Flow Length=279' Tc=11.1 min CN=79 Runoff=1.67 cfs 0.201 af                  |
| <b>Subcatchment210S: WEST PARKING</b>     | Runoff Area=67,820 sf 69.77% Impervious Runoff Depth=7.52"<br>Flow Length=130' Slope=0.0100 '/' Tc=6.0 min CN=91 Runoff=9.54 cfs 0.975 af  |
| <b>Subcatchment211S: WEST PARKING</b>     | Runoff Area=41,882 sf 74.70% Impervious Runoff Depth=7.64"<br>Flow Length=210' Slope=0.0150 '/' Tc=6.0 min CN=92 Runoff=5.94 cfs 0.612 af  |
| <b>Subcatchment212S-A: WESTERN HALF</b>   | Runoff Area=11,610 sf 100.00% Impervious Runoff Depth=8.36"<br>Flow Length=150' Slope=0.0100 '/' Tc=6.0 min CN=98 Runoff=1.70 cfs 0.186 af |
| <b>Subcatchment212S-B: EASTERNHALF</b>    | Runoff Area=14,005 sf 100.00% Impervious Runoff Depth=8.36"<br>Flow Length=130' Slope=0.0100 '/' Tc=6.0 min CN=98 Runoff=2.05 cfs 0.224 af |
| <b>Subcatchment213S: NORTH LANDSCAPE</b>  | Runoff Area=1,255 sf 75.70% Impervious Runoff Depth=7.64"<br>Flow Length=20' Slope=0.0100 '/' Tc=6.0 min CN=92 Runoff=0.18 cfs 0.018 af    |

**Postdevelopment (NH-Stratham 41 Portsmouth Ave 24-hr S1 50-yr 50-yr (+15%) Rainfall=8.60"**

Prepared by Emanuel Engineering

Printed 6/17/2026

HydroCAD® 10.20-9a s/n 01104 © 2026 HydroCAD Software Solutions LLC

Page 14

**Subcatchment214S: SOUTH LANDSCAPE** Runoff Area=3,380 sf 49.85% Impervious Runoff Depth=6.91"  
Flow Length=75' Slope=0.0100 '/' Tc=6.1 min CN=86 Runoff=0.45 cfs 0.045 af

**Pond 104P: EXISTING CULVERT** Peak Elev=82.52' Inflow=3.12 cfs 1.424 af  
30.0" Round Culvert n=0.013 L=100.0' S=0.0063 '/' Outflow=3.12 cfs 1.424 af

**Pond 251P-A: BIO-POND A PONDING LAYER** Peak Elev=84.38' Storage=4,560 cf Inflow=9.54 cfs 0.975 af  
Primary=2.62 cfs 0.975 af Secondary=0.00 cfs 0.000 af Outflow=2.62 cfs 0.975 af

**Pond 251P-B: BIO-POND A SUBSURFACE** Peak Elev=82.85' Storage=3,602 cf Inflow=2.62 cfs 0.975 af  
12.0" Round Culvert n=0.013 L=50.0' S=0.0050 '/' Outflow=2.51 cfs 0.975 af

**Pond 252P: NORTHWEST CATCH BASIN** Peak Elev=82.70' Inflow=0.68 cfs 0.066 af  
18.0" Round Culvert n=0.013 L=45.0' S=0.0049 '/' Outflow=0.68 cfs 0.066 af

**Pond 253P-A: BIO-POND C PONDING LAYER** Peak Elev=87.82' Storage=419 cf Inflow=0.77 cfs 0.076 af  
Primary=0.22 cfs 0.076 af Secondary=0.00 cfs 0.000 af Outflow=0.22 cfs 0.076 af

**Pond 253P-B: BIO-POND C SUBSURFACE** Peak Elev=85.04' Storage=1 cf Inflow=0.51 cfs 0.418 af  
Outflow=0.51 cfs 0.418 af

**Pond 253P-C: POROUS PAVEMENT A** Peak Elev=85.96' Storage=4,791 cf Inflow=0.61 cfs 0.370 af  
6.0" Round Culvert n=0.010 L=10.0' S=0.0000 '/' Outflow=0.47 cfs 0.342 af

**Pond 254P-A: BIO-POND D PONDING LAYER** Peak Elev=88.27' Storage=2,265 cf Inflow=2.99 cfs 0.336 af  
Primary=0.69 cfs 0.336 af Secondary=0.00 cfs 0.000 af Outflow=0.69 cfs 0.336 af

**Pond 254P-B: BIO-POND D SUBSURFACE** Peak Elev=85.62' Storage=142 cf Inflow=0.69 cfs 0.336 af  
6.0" Round Culvert n=0.010 L=90.0' S=0.0111 '/' Outflow=0.70 cfs 0.336 af

**Pond 255P-A: BIO-POND E PONDING LAYER** Peak Elev=87.76' Storage=3,764 cf Inflow=6.40 cfs 0.665 af  
Primary=0.78 cfs 0.581 af Secondary=3.46 cfs 0.083 af Outflow=4.24 cfs 0.665 af

**Pond 255P-B: BIO-POND E SUBSURFACE** Peak Elev=84.94' Storage=495 cf Inflow=4.77 cfs 1.001 af  
18.0" Round Culvert n=0.013 L=178.0' S=0.0025 '/' Outflow=4.20 cfs 1.001 af

**Pond 256P: RIVER ROAD CB** Peak Elev=83.48' Storage=67 cf Inflow=2.16 cfs 0.209 af  
Primary=2.15 cfs 0.209 af Secondary=0.00 cfs 0.000 af Outflow=2.15 cfs 0.209 af

**Pond 257P: BARNYARD CB** Peak Elev=83.00' Storage=68 cf Inflow=2.78 cfs 0.269 af  
Primary=2.77 cfs 0.268 af Secondary=0.00 cfs 0.000 af Outflow=2.77 cfs 0.268 af

**Pond 258P: 24" HDPE UNDER RIVER ROAD** Peak Elev=82.35' Storage=15,517 cf Inflow=9.89 cfs 2.732 af  
Primary=8.89 cfs 2.633 af Secondary=0.00 cfs 0.000 af Outflow=8.89 cfs 2.633 af

**Pond 259P-A: BIO-POND B PONDING LAYER** Peak Elev=87.57' Storage=5,729 cf Inflow=7.64 cfs 0.798 af  
Primary=1.34 cfs 0.784 af Secondary=0.50 cfs 0.014 af Outflow=1.84 cfs 0.798 af

**Pond 259P-B: BIO-POND B SUBSURFACE** Peak Elev=85.34' Storage=2,132 cf Inflow=1.84 cfs 0.798 af  
Outflow=1.19 cfs 0.798 af

**Postdevelopment ( NH-Stratham 41 Portsmouth Ave 24-hr S1 50-yr 50-yr (+15%) Rainfall=8.60"**

Prepared by Emanuel Engineering

Printed 6/17/2026

HydroCAD® 10.20-9a s/n 01104 © 2026 HydroCAD Software Solutions LLC

Page 15





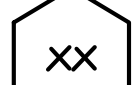
|   |                     |                  |                               |
|---|---------------------|------------------|-------------------------------|
| <b>Pond 260P-A: ROOF DRAINS</b>           | Peak Elev=88.96'    | Inflow=1.70 cfs  | 0.186 af                      |
|   | 12.0" Round Culvert | n=0.013 L=35.0'  | S=0.0029 1/' Outflow=1.70 cfs |
|   |                     |                  | 0.186 af                      |
| <b>Pond 260P-B: ROOF DRAINS</b>           | Peak Elev=85.58'    | Inflow=2.05 cfs  | 0.224 af                      |
|   | 12.0" Round Culvert | n=0.013 L=5.0'   | S=0.0200 1/' Outflow=2.05 cfs |
|   |                     |                  | 0.224 af                      |
| <b>Pond 261P: NORTH ISLAND CATCHBASIN</b> | Peak Elev=85.06'    | Inflow=2.22 cfs  | 0.242 af                      |
|   | 12.0" Round Culvert | n=0.013 L=105.0' | S=0.0050 1/' Outflow=2.22 cfs |
|   |                     |                  | 0.242 af                      |
| <b>Pond 262P: SOUTH ISLAND CATCHBASIN</b> | Peak Elev=84.30'    | Inflow=5.52 cfs  | 1.288 af                      |
|   | 24.0" Round Culvert | n=0.013 L=250.0' | S=0.0025 1/' Outflow=5.52 cfs |
|   |                     |                  | 1.288 af                      |
| <b>Pond 263P: MANHOLE 1</b>               | Peak Elev=83.24'    | Inflow=5.52 cfs  | 1.288 af                      |
|   | 24.0" Round Culvert | n=0.013 L=40.0'  | S=0.0063 1/' Outflow=5.52 cfs |
|   |                     |                  | 1.288 af                      |
| <b>Link 8-64: MAP 8 LOT 64</b>            |                     | Inflow=9.07 cfs  | 0.937 af                      |
|   |                     | Primary=9.07 cfs | 0.937 af                      |
| <b>Link 9-2: MAP 9 LOT 2</b>              |                     | Inflow=8.89 cfs  | 2.633 af                      |
|   |                     | Primary=8.89 cfs | 2.633 af                      |
| <b>Link 9-5: MAP 9 LOT 5</b>              |                     | Inflow=3.12 cfs  | 1.424 af                      |
|   |                     | Primary=3.12 cfs | 1.424 af                      |
| <b>Link RR: RIVER ROAD</b>                |                     | Inflow=0.67 cfs  | 0.064 af                      |
|   |                     | Primary=0.67 cfs | 0.064 af                      |

**Total Runoff Area = 9.145 ac   Runoff Volume = 5.188 af   Average Runoff Depth = 6.81"**  
**48.29% Pervious = 4.416 ac   51.71% Impervious = 4.729 ac**

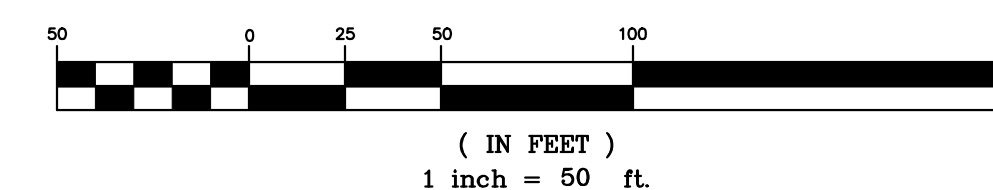
**NOTES:**

- OWNER OF RECORD:  
TAX MAP 9, LOT 4  
41 PORTSMOUTH AVE LLC  
151 PORTSMOUTH AVENUE  
EXETER, NH 03833  
RCRD BK6613 P61241
- THE INTENT OF THIS PLAN IS TO CALCULATE POST-DEVELOPMENT SUBCATCHMENT AREAS AND FLOW PATHS FOR MODELING VARIOUS STORM EVENTS IN PREPARATION FOR PHASE II SITE IMPROVEMENTS.
- SUBCATCHMENT 204A FLOWS INTO A POROUS PAVEMENT AREA, THEREFORE FLOW PATHS ARE NOT SHOWN. A RECOMMENDED TIME OF CONCENTRATION BY NHDES-AOT WAS USED FOR THE POROUS PAVEMENT LAYER.
- POST-DEVELOPMENT (PHASE II) DRAINAGE AREA CALCS:  
DRAINAGE ANALYSIS TOTAL AREA = 348,336 SF  
DRAINAGE ANALYSIS IMPERVIOUS = 235,049 SF  
DRAINAGE ANALYSIS % IMPERVIOUS = 54.02%

**LEGEND**

-  INDICATES FLOW PATH
-  INDICATES SUBCATCHMENT BOUNDARIES
-  INDICATES SUBCATCHMENT AREA LABEL
-  INDICATES POND LABEL
-  INDICATES LINK LABEL

**GRAPHIC SCALE**



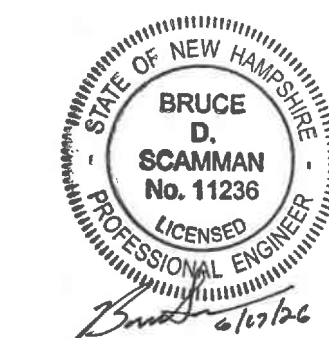
|            |              |                       |      |
|------------|--------------|-----------------------|------|
| 1          | JUN 17, 2026 | FOR APPROVAL          |      |
| ISS. DATE: |              | DESCRIPTION OF ISSUE: | CHK. |
| DRAWN:     | JJM          | DESIGN:               | JJM  |
| CHECKED:   | BDS          | CHECKED:              | BDS  |



CIVIL & STRUCTURAL CONSULTANTS, LAND PLANNERS  
100 GRIFFIN ROAD, UNIT C, PORTSMOUTH, NH 03801  
603-772-4400 | EMAIL:ENGINEERING.COM © 2025

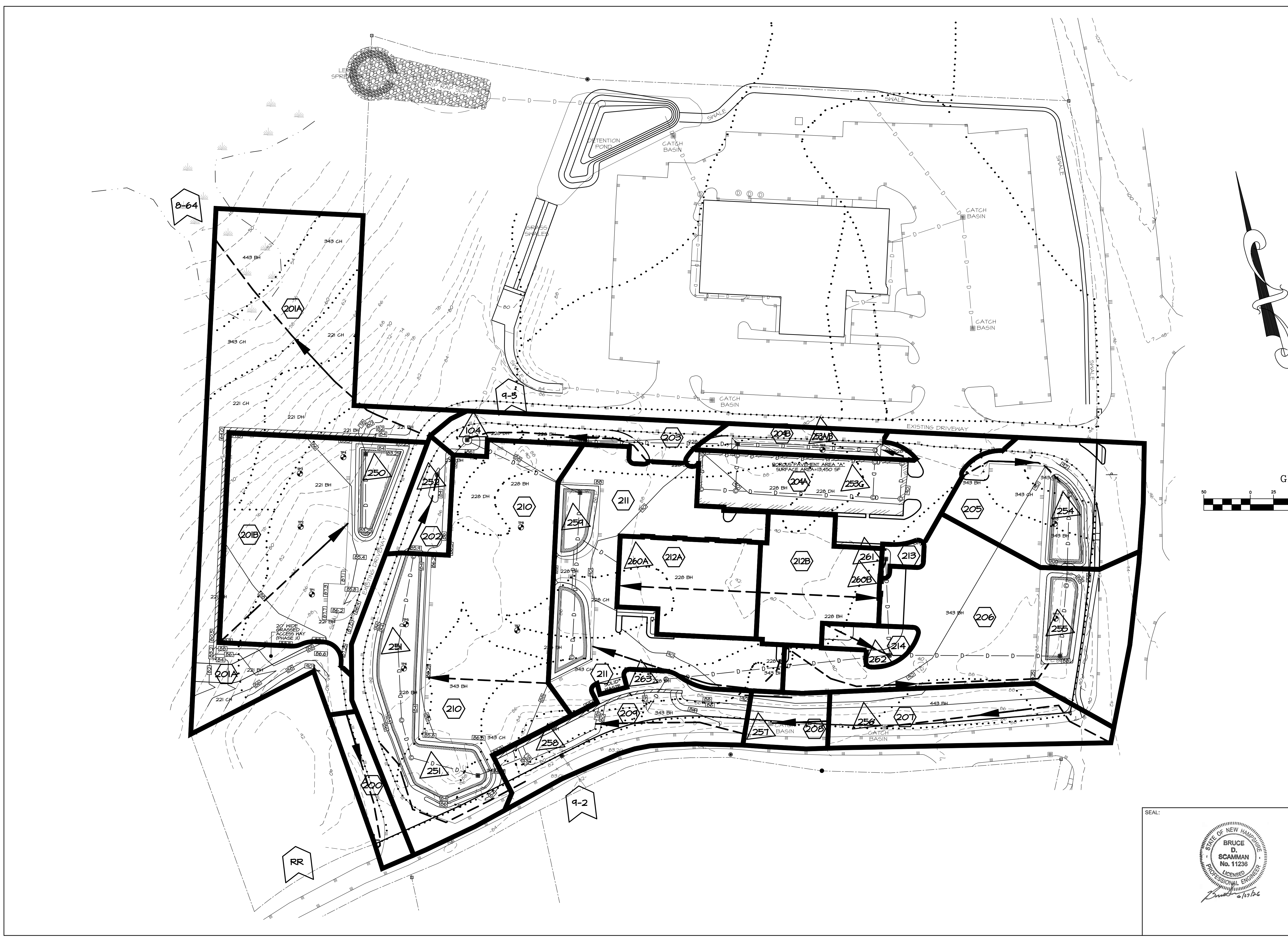
CLIENT:  
41 PORTSMOUTH AVE LLC  
151 PORTSMOUTH AVENUE  
EXETER, NH 03833

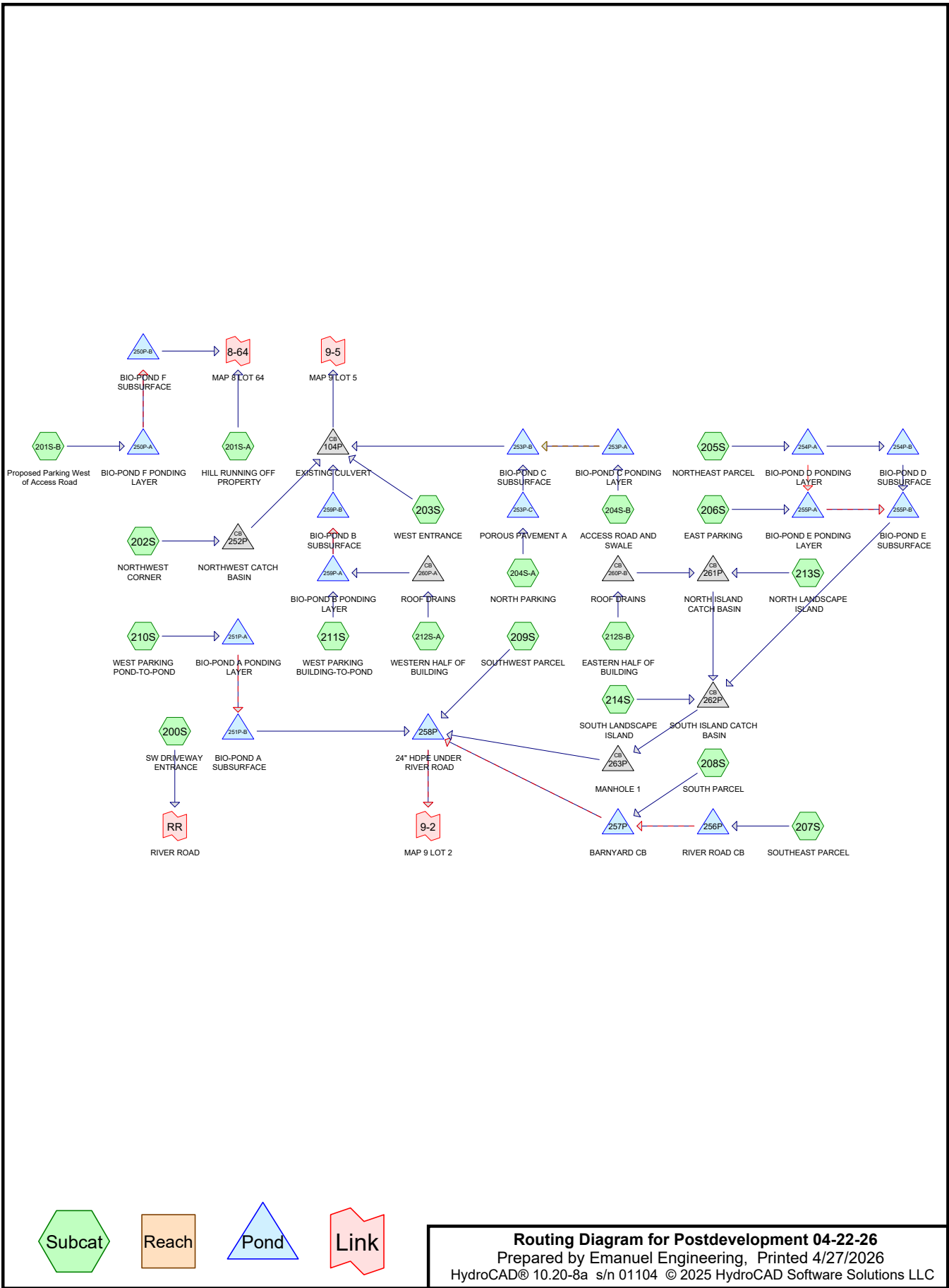
SEAL:



TITLE:  
**POST-DEVELOPMENT DRAINAGE (PHASE II)**  
FOR  
41 PORTSMOUTH AVE LLC  
41 PORTSMOUTH AVE (SITE)  
(STRATHAM TAX MAP 9 LOT 4)  
STRATHAM, NH 03885

|          |        |        |
|----------|--------|--------|
| PROJECT: | SCALE: | SHEET: |
| 25-1001  | 1"=50' | SW3    |





**Postdevelopment 04-22-26**

Prepared by Emanuel Engineering

HydroCAD® 10.20-8a s/n 01104 © 2025 HydroCAD Software Solutions LLC

Printed 4/27/2026

Page 139

---

**Project Notes**

Copied 9 events from NH-Stratham 41 Portsmouth Ave 24-hr S1 storm

**Postdevelopment 04-22-26**

Prepared by Emanuel Engineering

HydroCAD® 10.20-8a s/n 01104 © 2025 HydroCAD Software Solutions LLC

Printed 4/27/2026

Page 140

**Rainfall Events Listing (selected events)**

| Event# | Event Name   | Storm Type                             | Curve | Mode    | Duration (hours) | B/B | Depth (inches) | AM |
|--------|--------------|--|-------|---------|------------------|-----|----------------|----|
| 1      | 10-yr (+15%) | NH-Stratham 41 Portsmouth Ave 24-hr S1 | 10-yr | Default | 24.00            | 1   | 5.63           |    |

**Postdevelopment 04-22-26**

Prepared by Emanuel Engineering

HydroCAD® 10.20-8a s/n 01104 © 2025 HydroCAD Software Solutions LLC

Printed 4/27/2026

Page 141

**Area Listing (all nodes)**

| Area<br>(acres) | CN        | Description<br>(subcatchment-numbers)  |
|-----------------|-----------|--|
| 1.055           | 61        | >75% Grass cover, Good, HSG B (200S, 201S-A, 201S-B)   |
| 2.692           | 74        | >75% Grass cover, Good, HSG C (201S-A, 202S, 203S, 204S-A, 204S-B, 205S, 206S, 207S, 208S, 209S, 210S, 211S, 213S, 214S) |
| 0.827           | 98        | Paved parking, HSG B (200S, 201S-A, 201S-B)  |
| 3.891           | 98        | Paved parking, HSG C (202S, 203S, 204S-A, 204S-B, 205S, 206S, 207S, 208S, 209S, 210S, 211S, 213S, 214S)                  |
| 0.679           | 98        | Roofs, HSG C (212S-A, 212S-B)  |
| <b>9.145</b>    | <b>87</b> | <b>TOTAL AREA</b>  |

**Postdevelopment 04-22-26**

Prepared by Emanuel Engineering

HydroCAD® 10.20-8a s/n 01104 © 2025 HydroCAD Software Solutions LLC

Printed 4/27/2026

Page 142

**Soil Listing (all nodes)**

| Area<br>(acres) | Soil<br>Group | Subcatchment<br>Numbers  |
|-----------------|---------------|--|
| 0.000           | HSG A         |  |
| 1.882           | HSG B         | 200S, 201S-A, 201S-B   |
| 7.262           | HSG C         | 201S-A, 202S, 203S, 204S-A, 204S-B, 205S, 206S, 207S, 208S, 209S, 210S, 211S, 212S-A, 212S-B, 213S, 214S |
| 0.000           | HSG D         |  |
| 0.000           | Other         |  |
| <b>9.145</b>    |               | <b>TOTAL AREA</b>  |

**Postdevelopment 04-22-26**

Prepared by Emanuel Engineering

HydroCAD® 10.20-8a s/n 01104 © 2025 HydroCAD Software Solutions LLC

Printed 4/27/2026

Page 143

**Ground Covers (all nodes)**

| HSG-A<br>(acres) | HSG-B<br>(acres) | HSG-C<br>(acres) | HSG-D<br>(acres) | Other<br>(acres) | Total<br>(acres) | Ground<br>Cover        | Subcatchment<br>Numbers   |
|------------------|------------------|------------------|------------------|------------------|------------------|------------------------|---|
| 0.000            | 1.055            | 2.692            | 0.000            | 0.000            | 3.747            | >75% Grass cover, Good | 200S,<br>201S-A,<br>201S-B,<br>202S,<br>203S,<br>204S-A,<br>204S-B,<br>205S,<br>206S,<br>207S,<br>208S,<br>209S,<br>210S,<br>211S,<br>213S,<br>214S |
| 0.000            | 0.827            | 3.891            | 0.000            | 0.000            | 4.718            | Paved parking          | 200S,<br>201S-A,<br>201S-B,<br>202S,<br>203S,<br>204S-A,<br>204S-B,<br>205S,<br>206S,<br>207S,<br>208S,<br>209S,<br>210S,<br>211S,<br>213S,<br>214S |
| 0.000            | 0.000            | 0.679            | 0.000            | 0.000            | 0.679            | Roofs                  | 212S-A,<br>212S-B   |
| <b>0.000</b>     | <b>1.882</b>     | <b>7.262</b>     | <b>0.000</b>     | <b>0.000</b>     | <b>9.145</b>     | <b>TOTAL AREA</b>      |   |

**Postdevelopment 04-22-26**

Prepared by Emanuel Engineering

HydroCAD® 10.20-8a s/n 01104 © 2025 HydroCAD Software Solutions LLC

Printed 4/27/2026

Page 144

**Pipe Listing (all nodes)**

| Line# | Node Number | In-Invert (feet) | Out-Invert (feet) | Length (feet) | Slope (ft/ft) | n     | Width (inches) | Diam/Height (inches) | Inside-Fill (inches) | Node Name |
|-------|-------------|------------------|-------------------|---------------|---------------|-------|----------------|----------------------|----------------------|-----------|
| 1     | 104P        | 81.77            | 81.14             | 100.0         | 0.0063        | 0.013 | 0.0            | 30.0                 | 0.0                  |           |
| 2     | 250P-B      | 80.25            | 79.75             | 20.0          | 0.0250        | 0.010 | 0.0            | 12.0                 | 0.0                  |           |
| 3     | 251P-B      | 81.00            | 80.75             | 50.0          | 0.0050        | 0.013 | 0.0            | 12.0                 | 0.0                  |           |
| 4     | 252P        | 82.18            | 81.96             | 45.0          | 0.0049        | 0.013 | 0.0            | 18.0                 | 0.0                  |           |
| 5     | 253P-B      | 82.55            | 81.80             | 285.0         | 0.0026        | 0.013 | 0.0            | 12.0                 | 0.0                  |           |
| 6     | 253P-C      | 85.25            | 85.25             | 10.0          | 0.0000        | 0.010 | 0.0            | 6.0                  | 0.0                  |           |
| 7     | 254P-B      | 84.50            | 83.50             | 90.0          | 0.0111        | 0.010 | 0.0            | 6.0                  | 0.0                  |           |
| 8     | 255P-B      | 83.50            | 83.06             | 178.0         | 0.0025        | 0.013 | 0.0            | 18.0                 | 0.0                  |           |
| 9     | 256P        | 81.40            | 80.90             | 120.0         | 0.0042        | 0.011 | 0.0            | 12.0                 | 0.0                  |           |
| 10    | 257P        | 80.65            | 80.40             | 130.0         | 0.0019        | 0.011 | 0.0            | 12.0                 | 0.0                  |           |
| 11    | 258P        | 79.60            | 78.86             | 50.0          | 0.0148        | 0.013 | 0.0            | 24.0                 | 0.0                  |           |
| 12    | 259P-B      | 83.40            | 81.78             | 125.0         | 0.0130        | 0.013 | 0.0            | 18.0                 | 0.0                  |           |
| 13    | 260P-A      | 88.00            | 87.90             | 35.0          | 0.0029        | 0.013 | 0.0            | 12.0                 | 0.0                  |           |
| 14    | 260P-B      | 84.60            | 84.50             | 5.0           | 0.0200        | 0.013 | 0.0            | 12.0                 | 0.0                  |           |
| 15    | 261P        | 84.00            | 83.47             | 105.0         | 0.0050        | 0.013 | 0.0            | 12.0                 | 0.0                  |           |
| 16    | 262P        | 82.96            | 82.34             | 250.0         | 0.0025        | 0.013 | 0.0            | 24.0                 | 0.0                  |           |
| 17    | 263P        | 82.00            | 81.75             | 40.0          | 0.0063        | 0.013 | 0.0            | 24.0                 | 0.0                  |           |



**Postdevelopment 0NH-Stratham 41 Portsmouth Ave 24-hr S1 10-yr 10-yr (+15%) Rainfall=5.63"**

Prepared by Emanuel Engineering

Printed 4/27/2026

HydroCAD® 10.20-8a s/n 01104 © 2025 HydroCAD Software Solutions LLC

Page 146

**Subcatchment213S: NORTH LANDSCAPE** Runoff Area=1,255 sf 75.70% Impervious Runoff Depth=4.71"  
Flow Length=20' Slope=0.0100 '/' Tc=6.0 min CN=92 Runoff=0.13 cfs 0.011 af

**Subcatchment214S: SOUTH LANDSCAPE** Runoff Area=3,380 sf 49.85% Impervious Runoff Depth=4.06"  
Flow Length=75' Slope=0.0100 '/' Tc=6.1 min CN=86 Runoff=0.30 cfs 0.026 af

**Pond 104P: EXISTING CULVERT** Peak Elev=82.41' Inflow=2.34 cfs 0.864 af  
30.0" Round Culvert n=0.013 L=100.0' S=0.0063 '/' Outflow=2.34 cfs 0.864 af

**Pond 250P-A: BIO-POND F PONDING LAYER** Peak Elev=84.22' Storage=2,742 cf Inflow=3.95 cfs 0.352 af  
Primary=0.74 cfs 0.352 af Secondary=0.00 cfs 0.000 af Outflow=0.74 cfs 0.352 af

**Pond 250P-B: BIO-POND F SUBSURFACE** Peak Elev=80.65' Storage=1,462 cf Inflow=0.74 cfs 0.352 af  
Discarded=0.09 cfs 0.166 af Primary=0.64 cfs 0.186 af Outflow=0.74 cfs 0.352 af

**Pond 251P-A: BIO-POND A PONDING LAYER** Peak Elev=84.17' Storage=2,103 cf Inflow=6.68 cfs 0.596 af  
Primary=2.52 cfs 0.596 af Secondary=0.00 cfs 0.000 af Outflow=2.52 cfs 0.596 af

**Pond 251P-B: BIO-POND A SUBSURFACE** Peak Elev=82.62' Storage=2,652 cf Inflow=2.52 cfs 0.596 af  
12.0" Round Culvert n=0.013 L=50.0' S=0.0050 '/' Outflow=2.12 cfs 0.596 af

**Pond 252P: NORTHWEST CATCH BASIN** Peak Elev=82.59' Inflow=0.43 cfs 0.037 af  
18.0" Round Culvert n=0.013 L=45.0' S=0.0049 '/' Outflow=0.43 cfs 0.037 af

**Pond 253P-A: BIO-POND C PONDING LAYER** Peak Elev=87.64' Storage=186 cf Inflow=0.50 cfs 0.044 af  
Primary=0.18 cfs 0.044 af Secondary=0.00 cfs 0.000 af Outflow=0.18 cfs 0.044 af

**Pond 253P-B: BIO-POND C SUBSURFACE** Peak Elev=84.87' Storage=0 cf Inflow=0.33 cfs 0.251 af  
Outflow=0.33 cfs 0.251 af

**Pond 253P-C: POROUS PAVEMENT A** Peak Elev=85.76' Storage=3,693 cf Inflow=0.41 cfs 0.235 af  
6.0" Round Culvert n=0.010 L=10.0' S=0.0000 '/' Outflow=0.30 cfs 0.207 af

**Pond 254P-A: BIO-POND D PONDING LAYER** Peak Elev=87.86' Storage=1,048 cf Inflow=2.05 cfs 0.202 af  
Primary=0.62 cfs 0.202 af Secondary=0.00 cfs 0.000 af Outflow=0.62 cfs 0.202 af

**Pond 254P-B: BIO-POND D SUBSURFACE** Peak Elev=85.44' Storage=7 cf Inflow=0.62 cfs 0.202 af  
6.0" Round Culvert n=0.010 L=90.0' S=0.0111 '/' Outflow=0.62 cfs 0.202 af

**Pond 255P-A: BIO-POND E PONDING LAYER** Peak Elev=87.56' Storage=3,146 cf Inflow=4.46 cfs 0.405 af  
Primary=0.75 cfs 0.397 af Secondary=0.34 cfs 0.008 af Outflow=1.08 cfs 0.405 af

**Pond 255P-B: BIO-POND E SUBSURFACE** Peak Elev=84.32' Storage=12 cf Inflow=1.70 cfs 0.607 af  
18.0" Round Culvert n=0.013 L=178.0' S=0.0025 '/' Outflow=1.70 cfs 0.607 af

**Pond 256P: RIVER ROAD CB** Peak Elev=82.46' Storage=54 cf Inflow=1.38 cfs 0.118 af  
Primary=1.37 cfs 0.117 af Secondary=0.00 cfs 0.000 af Outflow=1.37 cfs 0.117 af

**Pond 257P: BARNYARD CB** Peak Elev=82.27' Storage=59 cf Inflow=1.76 cfs 0.150 af  
Primary=1.75 cfs 0.149 af Secondary=0.00 cfs 0.000 af Outflow=1.75 cfs 0.149 af

**Postdevelopment 0NH-Stratham 41 Portsmouth Ave 24-hr S1 10-yr 10-yr (+15%) Rainfall=5.63"**

Prepared by Emanuel Engineering

Printed 4/27/2026

HydroCAD® 10.20-8a s/n 01104 © 2025 HydroCAD Software Solutions LLC

Page 147

**Pond 258P: 24" HDPE UNDER RIVER ROAD** Peak Elev=82.14' Storage=13,941 cf Inflow=7.07 cfs 1.656 af  
 Primary=4.65 cfs 1.558 af Secondary=0.00 cfs 0.000 af Outflow=4.65 cfs 1.558 af

**Pond 259P-A: BIO-POND B PONDING LAYER** Peak Elev=87.08' Storage=3,106 cf Inflow=5.37 cfs 0.491 af  
 Primary=1.18 cfs 0.491 af Secondary=0.00 cfs 0.000 af Outflow=1.18 cfs 0.491 af

**Pond 259P-B: BIO-POND B SUBSURFACE** Peak Elev=84.95' Storage=1,167 cf Inflow=1.18 cfs 0.491 af  
 Outflow=1.04 cfs 0.491 af

**Pond 260P-A: ROOF DRAINS** Peak Elev=88.90' Inflow=1.55 cfs 0.150 af  
 12.0" Round Culvert n=0.013 L=35.0' S=0.0029 '/ Outflow=1.55 cfs 0.150 af

**Pond 260P-B: ROOF DRAINS** Peak Elev=85.43' Inflow=1.60 cfs 0.155 af  
 12.0" Round Culvert n=0.013 L=5.0' S=0.0200 '/ Outflow=1.60 cfs 0.155 af

**Pond 261P: NORTH ISLAND CATCHBASIN** Peak Elev=84.86' Inflow=1.73 cfs 0.167 af  
 12.0" Round Culvert n=0.013 L=105.0' S=0.0050 '/ Outflow=1.73 cfs 0.167 af

**Pond 262P: SOUTH ISLAND CATCHBASIN** Peak Elev=83.96' Inflow=3.26 cfs 0.800 af  
 24.0" Round Culvert n=0.013 L=250.0' S=0.0025 '/ Outflow=3.26 cfs 0.800 af

**Pond 263P: MANHOLE 1** Peak Elev=82.91' Inflow=3.26 cfs 0.800 af  
 24.0" Round Culvert n=0.013 L=40.0' S=0.0063 '/ Outflow=3.26 cfs 0.800 af

**Link 8-64: MAP 8 LOT 64** Inflow=3.35 cfs 0.437 af  
 Primary=3.35 cfs 0.437 af

**Link 9-2: MAP 9 LOT 2** Inflow=4.65 cfs 1.558 af  
 Primary=4.65 cfs 1.558 af

**Link 9-5: MAP 9 LOT 5** Inflow=2.34 cfs 0.864 af  
 Primary=2.34 cfs 0.864 af

**Link RR: RIVER ROAD** Inflow=0.41 cfs 0.035 af  
 Primary=0.41 cfs 0.035 af

**Total Runoff Area = 9.145 ac Runoff Volume = 3.189 af Average Runoff Depth = 4.18"**  
**40.98% Pervious = 3.747 ac 59.02% Impervious = 5.397 ac**

**Summary for Subcatchment 200S: SW DRIVEWAY ENTRANCE**

Runoff = 0.41 cfs @ 12.04 hrs, Volume= 0.035 af, Depth= 3.35"  
 Routed to Link RR : RIVER ROAD

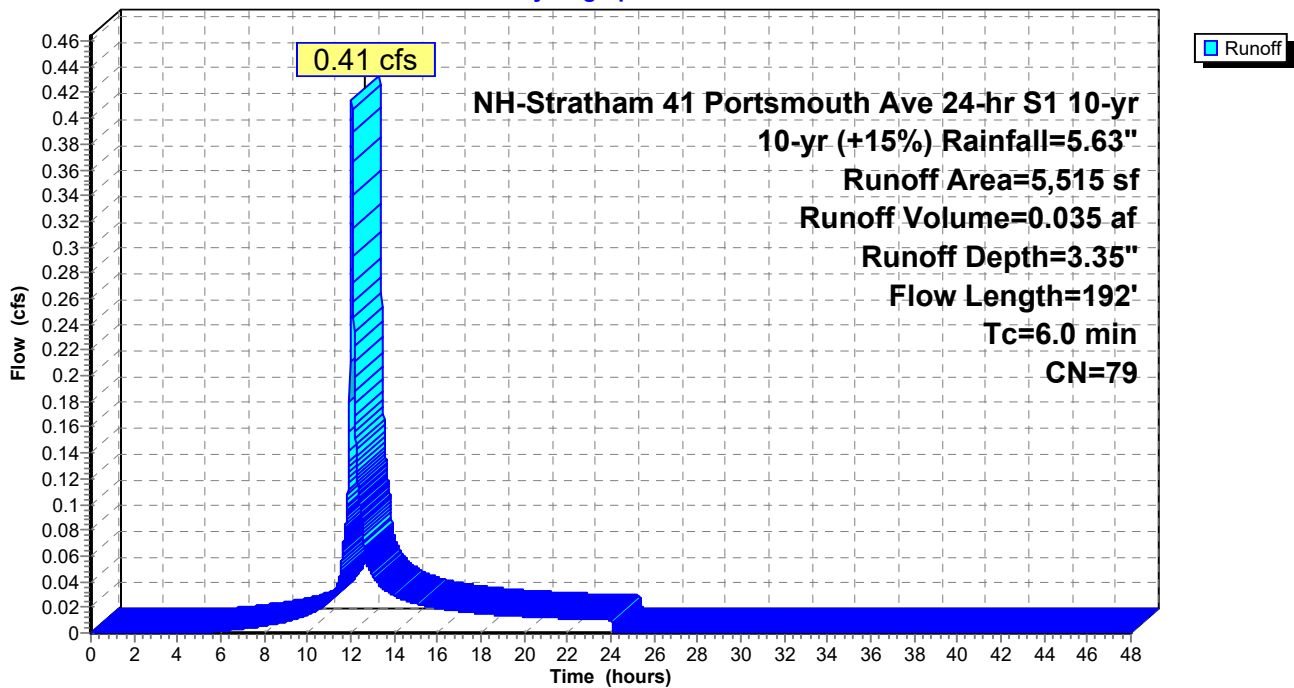
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-48.00 hrs, dt= 0.01 hrs  
 NH-Stratham 41 Portsmouth Ave 24-hr S1 10-yr 10-yr (+15%) Rainfall=5.63"

| Area (sf) | CN | Description                   |
|-----------|----|-------------------------------|
| 2,139     | 61 | >75% Grass cover, Good, HSG B |
| * 678     | 61 | >75% Grass cover, Good, HSG B |
| 2,698     | 98 | Paved parking, HSG B          |
| 5,515     | 79 | Weighted Average              |
| 2,817     |    | 51.08% Pervious Area          |
| 2,698     |    | 48.92% Impervious Area        |

| Tc (min) | Length (feet) | Slope (ft/ft) | Velocity (ft/sec) | Capacity (cfs) | Description  |
|----------|---------------|---------------|-------------------|----------------|--|
| 0.2      | 10            | 0.0200        | 0.85              |                | <b>Sheet Flow, Pavement to Swale</b><br>Smooth surfaces n= 0.011 P2= 3.10"     |
| 1.9      | 182           | 0.0110        | 1.57              |                | <b>Shallow Concentrated Flow, Grass Swale</b><br>Grassed Waterway Kv= 15.0 fps |
| 3.9      |               |               |                   |                | <b>Direct Entry, 6 minute min.</b>   |
| 6.0      | 192           | Total         |                   |                |  |

**Subcatchment 200S: SW DRIVEWAY ENTRANCE**

Hydrograph



**Summary for Subcatchment 201S-A: HILL RUNNING OFF PROPERTY**

Runoff = 2.86 cfs @ 12.04 hrs, Volume= 0.251 af, Depth= 2.25"  
 Routed to Link 8-64 : MAP 8 LOT 64

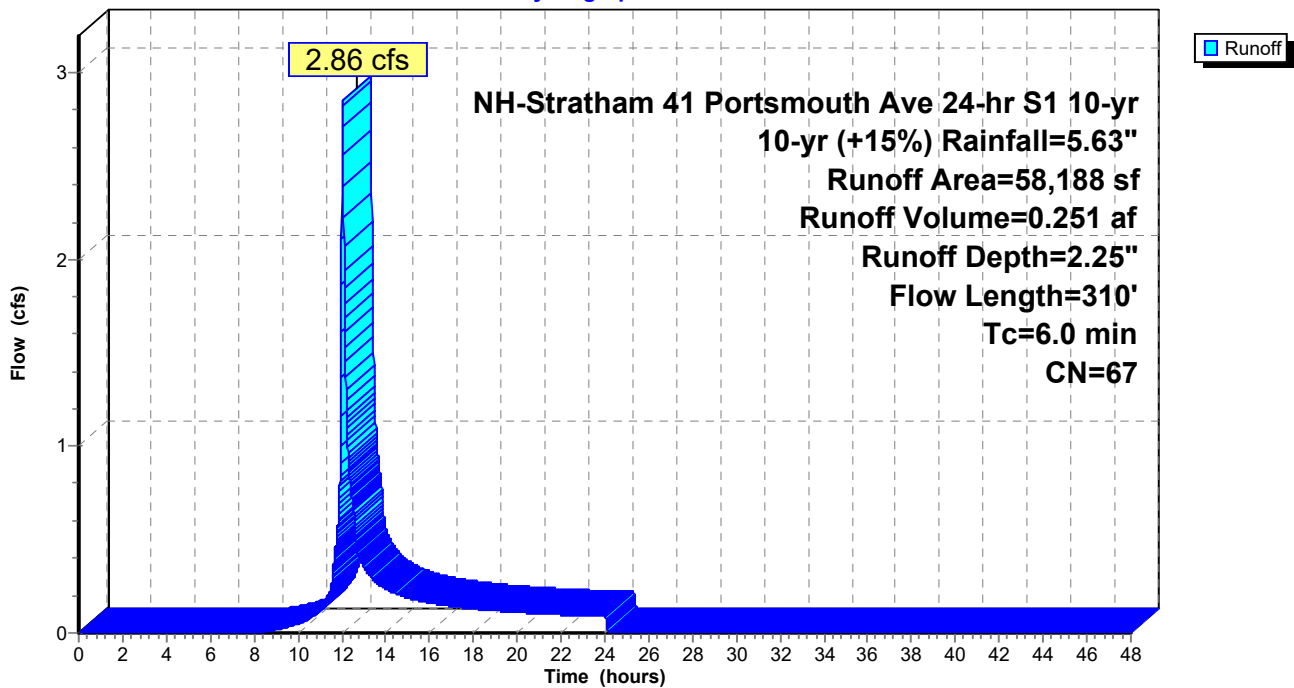
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-48.00 hrs, dt= 0.01 hrs  
 NH-Stratham 41 Portsmouth Ave 24-hr S1 10-yr 10-yr (+15%) Rainfall=5.63"

| Area (sf) | CN | Description                   |
|-----------|----|-------------------------------|
| 35,165    | 61 | >75% Grass cover, Good, HSG B |
| 21,798    | 74 | >75% Grass cover, Good, HSG C |
| 1,225     | 98 | Paved parking, HSG B          |
| 58,188    | 67 | Weighted Average              |
| 56,963    |    | 97.89% Pervious Area          |
| 1,225     |    | 2.11% Impervious Area         |

| Tc (min) | Length (feet) | Slope (ft/ft) | Velocity (ft/sec) | Capacity (cfs) | Description   |
|----------|---------------|---------------|-------------------|----------------|---|
| 2.6      | 50            | 0.1500        | 0.33              |                | <b>Sheet Flow, Sheet Flow, Hill running off property</b><br>Grass: Short n= 0.150 P2= 3.10"                               |
| 2.0      | 260           | 0.1000        | 2.21              |                | <b>Shallow Concentrated Flow, Shallow Concentrated Flow, Hill running off property</b><br>Short Grass Pasture Kv= 7.0 fps |
| 1.4      |               |               |                   |                | <b>Direct Entry, 6 minute min.</b>  |
| 6.0      | 310           | Total         |                   |                |   |

**Subcatchment 201S-A: HILL RUNNING OFF PROPERTY**

Hydrograph



**Summary for Subcatchment 201S-B: Proposed Parking West of Access Road**

Runoff = 3.95 cfs @ 12.04 hrs, Volume= 0.352 af, Depth= 4.60"  
 Routed to Pond 250P-A : BIO-POND F PONDING LAYER

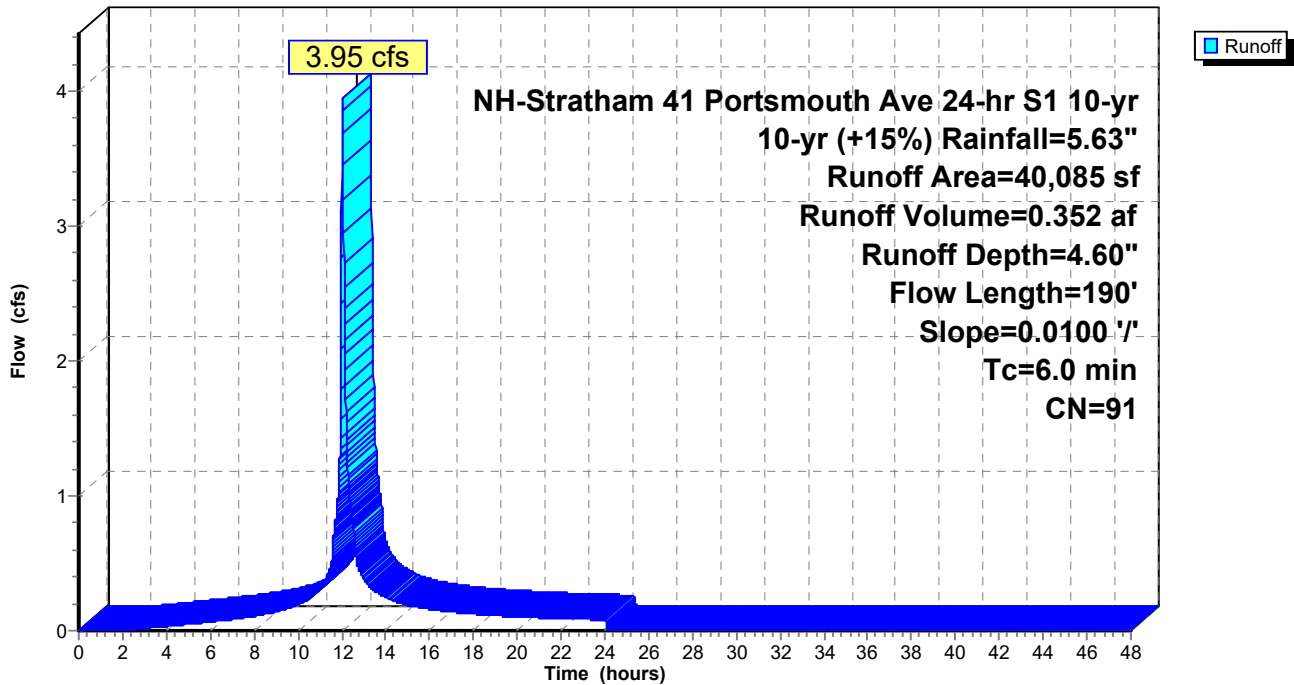
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-48.00 hrs, dt= 0.01 hrs  
 NH-Stratham 41 Portsmouth Ave 24-hr S1 10-yr 10-yr (+15%) Rainfall=5.63"

| Area (sf) | CN | Description                   |
|-----------|----|-------------------------------|
| 7,970     | 61 | >75% Grass cover, Good, HSG B |
| 32,115    | 98 | Paved parking, HSG B          |
| 40,085    | 91 | Weighted Average              |
| 7,970     |    | 19.88% Pervious Area          |
| 32,115    |    | 80.12% Impervious Area        |

| Tc (min) | Length (feet) | Slope (ft/ft) | Velocity (ft/sec) | Capacity (cfs) | Description   |
|----------|---------------|---------------|-------------------|----------------|---|
| 0.9      | 50            | 0.0100        | 0.89              |                | <b>Sheet Flow, Pavement</b><br>Smooth surfaces n= 0.011 P2= 3.10" |
| 1.1      | 140           | 0.0100        | 2.03              |                | <b>Shallow Concentrated Flow, Pavement</b><br>Paved Kv= 20.3 fps  |
| 4.0      |               |               |                   |                | <b>Direct Entry, 6 Minute Minimum</b>                             |
| 6.0      | 190           | Total         |                   |                |   |

**Subcatchment 201S-B: Proposed Parking West of Access Road**

Hydrograph



**Summary for Subcatchment 202S: NORTHWEST CORNER**

Runoff = 0.43 cfs @ 12.04 hrs, Volume= 0.037 af, Depth= 3.55"  
 Routed to Pond 252P : NORTHWEST CATCH BASIN

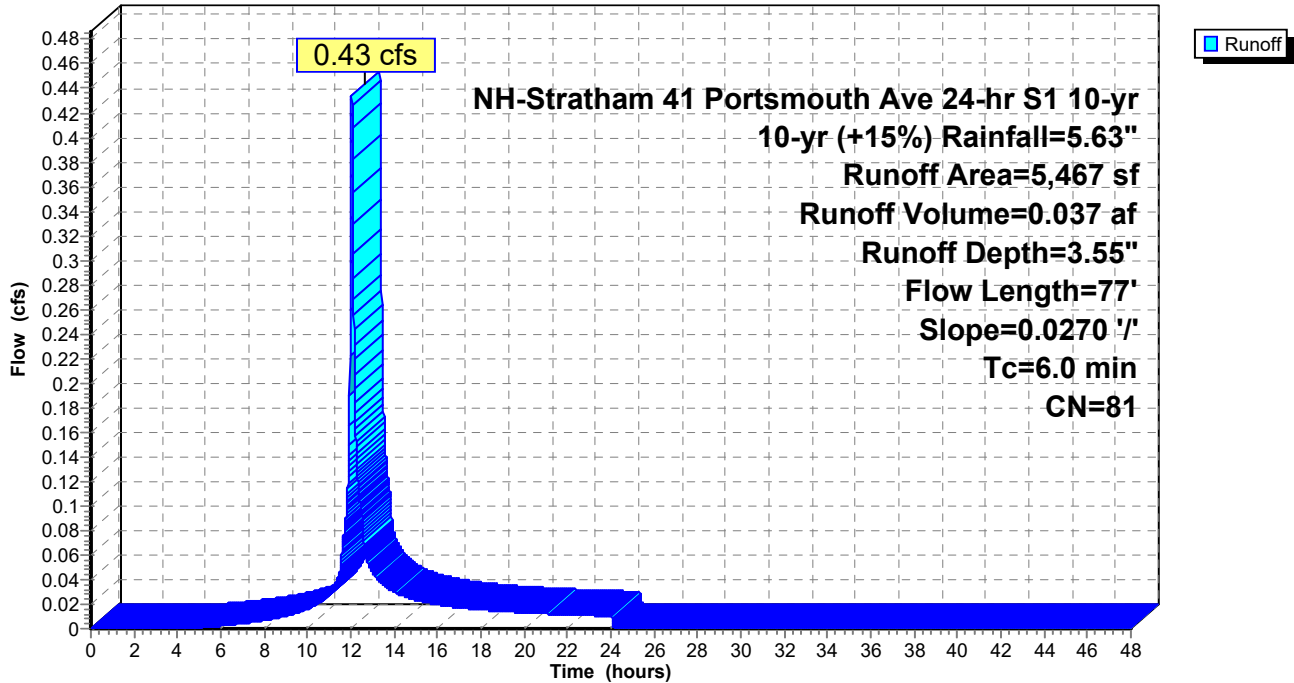
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-48.00 hrs, dt= 0.01 hrs  
 NH-Stratham 41 Portsmouth Ave 24-hr S1 10-yr 10-yr (+15%) Rainfall=5.63"

| Area (sf) | CN | Description                   |
|-----------|----|-------------------------------|
| 3,984     | 74 | >75% Grass cover, Good, HSG C |
| 1,483     | 98 | Paved parking, HSG C          |
| 5,467     | 81 | Weighted Average              |
| 3,984     |    | 72.87% Pervious Area          |
| 1,483     |    | 27.13% Impervious Area        |

| Tc (min) | Length (feet) | Slope (ft/ft) | Velocity (ft/sec) | Capacity (cfs) | Description  |
|----------|---------------|---------------|-------------------|----------------|--|
| 5.1      | 50            | 0.0270        | 0.16              |                | <b>Sheet Flow, Grass</b><br>Grass: Short n= 0.150 P2= 3.10"                |
| 0.4      | 27            | 0.0270        | 1.15              |                | <b>Shallow Concentrated Flow, Grass</b><br>Short Grass Pasture Kv= 7.0 fps |
| 0.5      |               |               |                   |                | <b>Direct Entry, 6 min minimum</b>   |
| 6.0      | 77            | Total         |                   |                |  |

**Subcatchment 202S: NORTHWEST CORNER**

Hydrograph



**Summary for Subcatchment 203S: WEST ENTRANCE**

Runoff = 0.87 cfs @ 12.06 hrs, Volume= 0.085 af, Depth= 4.27"  
 Routed to Pond 104P : EXISTING CULVERT

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-48.00 hrs, dt= 0.01 hrs  
 NH-Stratham 41 Portsmouth Ave 24-hr S1 10-yr 10-yr (+15%) Rainfall=5.63"

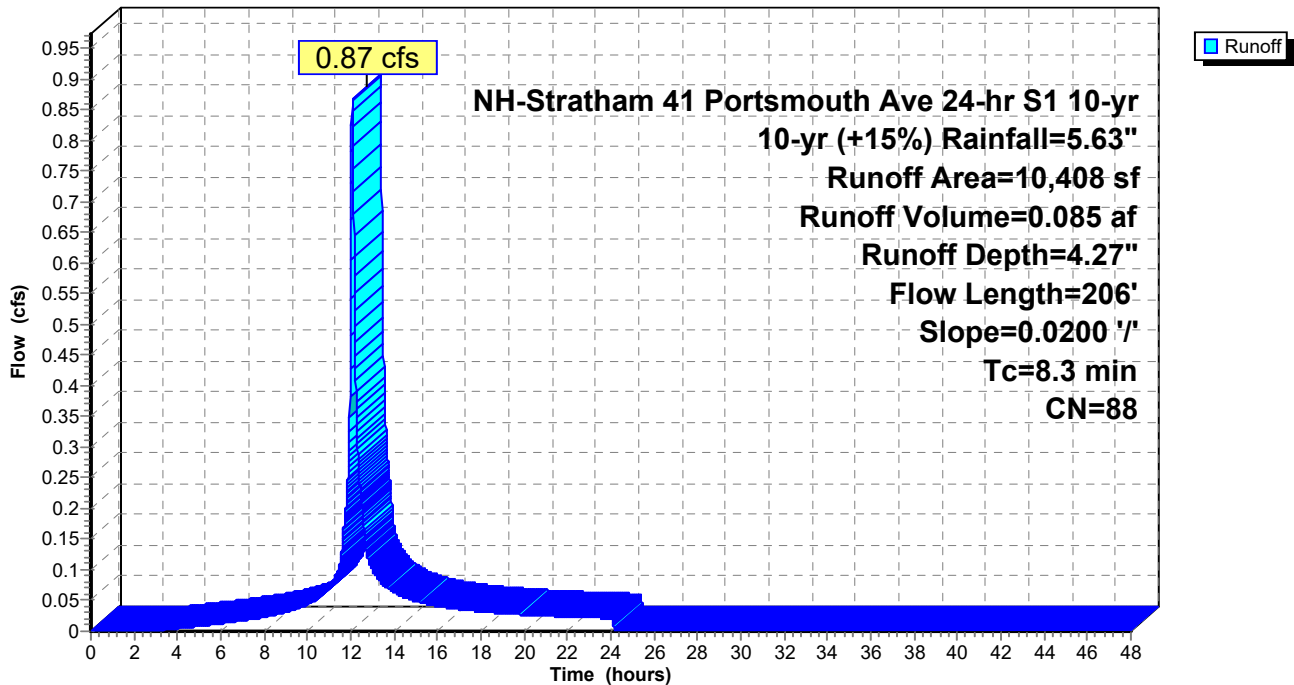
| Area (sf) | CN | Description                   |
|-----------|----|-------------------------------|
| 4,493     | 74 | >75% Grass cover, Good, HSG C |
| 5,915     | 98 | Paved parking, HSG C          |
| 10,408    | 88 | Weighted Average              |
| 4,493     |    | 43.17% Pervious Area          |
| 5,915     |    | 56.83% Impervious Area        |

| Tc (min) | Length (feet) | Slope (ft/ft) | Velocity (ft/sec) | Capacity (cfs) | Description  |
|----------|---------------|---------------|-------------------|----------------|--|
| 5.7      | 50            | 0.0200        | 0.15              |                | <b>Sheet Flow, Grass</b><br>Grass: Short n= 0.150 P2= 3.10"                |
| 2.6      | 156           | 0.0200        | 0.99              |                | <b>Shallow Concentrated Flow, Grass</b><br>Short Grass Pasture Kv= 7.0 fps |
| 8.3      | 206           | Total         |                   |                |  |

**Subcatchment 203S: WEST ENTRANCE**

Hydrograph



**Summary for Subcatchment 204S-A: NORTH PARKING**

Runoff = 0.41 cfs @ 14.80 hrs, Volume= 0.235 af, Depth= 5.16"  
 Routed to Pond 253P-C : POROUS PAVEMENT A

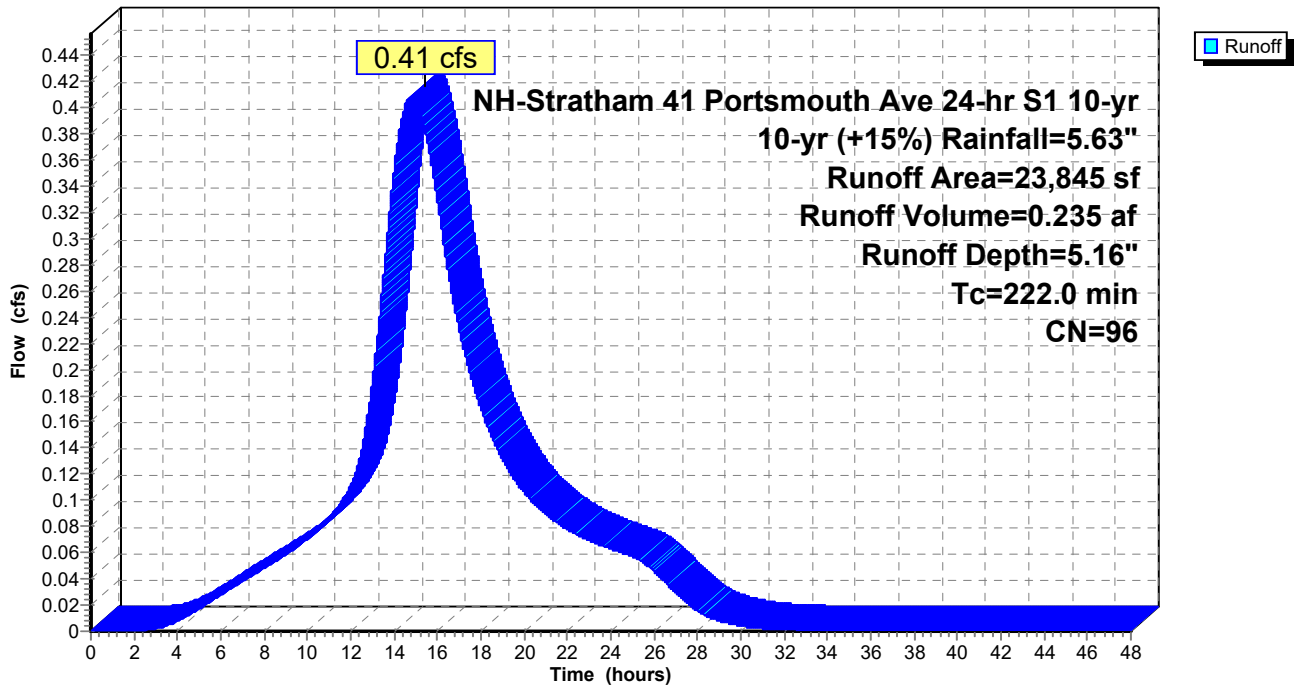
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-48.00 hrs, dt= 0.01 hrs  
 NH-Stratham 41 Portsmouth Ave 24-hr S1 10-yr 10-yr (+15%) Rainfall=5.63"

| Area (sf) | CN | Description                   |
|-----------|----|-------------------------------|
| 1,645     | 74 | >75% Grass cover, Good, HSG C |
| 22,200    | 98 | Paved parking, HSG C          |
| 23,845    | 96 | Weighted Average              |
| 1,645     |    | 6.90% Pervious Area           |
| 22,200    |    | 93.10% Impervious Area        |

| Tc (min) | Length (feet) | Slope (ft/ft) | Velocity (ft/sec) | Capacity (cfs) | Description   |
|----------|---------------|---------------|-------------------|----------------|---|
| 216.0    |               |               |                   |                | Direct Entry, Infiltration through Porous Pavement Layers |
| 6.0      |               |               |                   |                | Direct Entry, 6 minute runoff                             |
| 222.0    | 0             | Total         |                   |                |   |

**Subcatchment 204S-A: NORTH PARKING**

Hydrograph



**Summary for Subcatchment 204S-B: ACCESS ROAD AND SWALE**

Runoff = 0.50 cfs @ 12.04 hrs, Volume= 0.044 af, Depth= 3.75"  
 Routed to Pond 253P-A : BIO-POND C PONDING LAYER

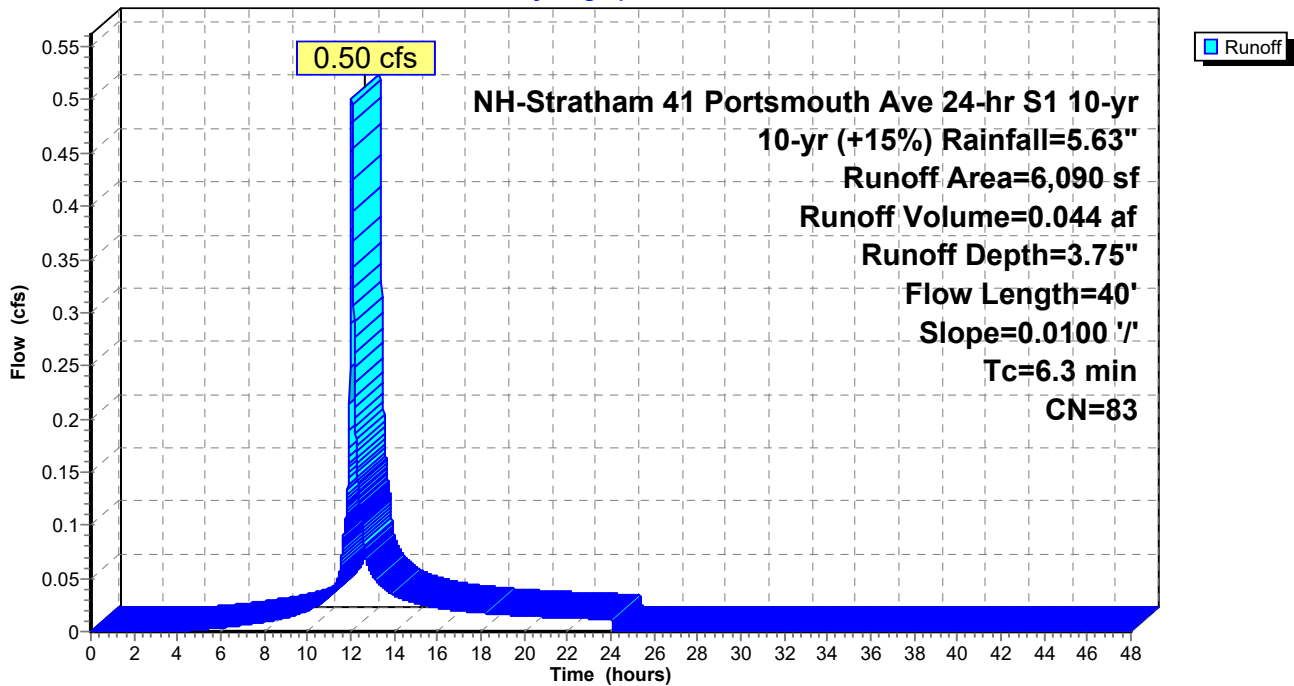
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-48.00 hrs, dt= 0.01 hrs  
 NH-Stratham 41 Portsmouth Ave 24-hr S1 10-yr 10-yr (+15%) Rainfall=5.63"

| Area (sf) | CN | Description                   |
|-----------|----|-------------------------------|
| 3,795     | 74 | >75% Grass cover, Good, HSG C |
| 2,295     | 98 | Paved parking, HSG C          |
| 6,090     | 83 | Weighted Average              |
| 3,795     |    | 62.32% Pervious Area          |
| 2,295     |    | 37.68% Impervious Area        |

| Tc (min) | Length (feet) | Slope (ft/ft) | Velocity (ft/sec) | Capacity (cfs) | Description   |
|----------|---------------|---------------|-------------------|----------------|---|
| 6.3      | 40            | 0.0100        | 0.11              |                | <b>Sheet Flow, Grass</b><br>Grass: Short n= 0.150 P2= 3.10" |

**Subcatchment 204S-B: ACCESS ROAD AND SWALE**

Hydrograph



**Summary for Subcatchment 205S: NORTHEAST PARCEL**

Runoff = 2.05 cfs @ 12.06 hrs, Volume= 0.202 af, Depth= 4.38"  
 Routed to Pond 254P-A : BIO-POND D PONDING LAYER

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-48.00 hrs, dt= 0.01 hrs  
 NH-Stratham 41 Portsmouth Ave 24-hr S1 10-yr 10-yr (+15%) Rainfall=5.63"

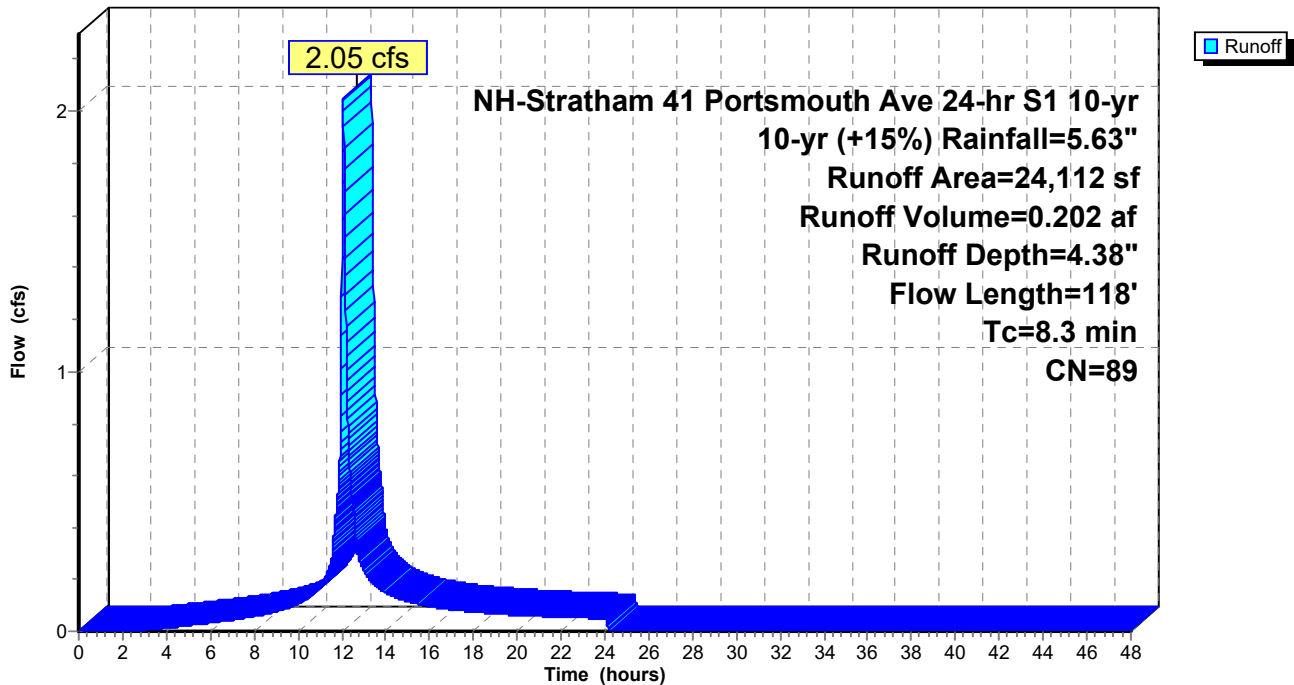
| Area (sf) | CN | Description                   |
|-----------|----|-------------------------------|
| 8,746     | 74 | >75% Grass cover, Good, HSG C |
| 15,366    | 98 | Paved parking, HSG C          |
| 24,112    | 89 | Weighted Average              |
| 8,746     |    | 36.27% Pervious Area          |
| 15,366    |    | 63.73% Impervious Area        |

| Tc (min) | Length (feet) | Slope (ft/ft) | Velocity (ft/sec) | Capacity (cfs) | Description  |
|----------|---------------|---------------|-------------------|----------------|--|
| 7.5      | 50            | 0.0100        | 0.11              |                | <b>Sheet Flow, Grass</b><br>Grass: Short n= 0.150 P2= 3.10"                |
| 0.8      | 68            | 0.0368        | 1.34              |                | <b>Shallow Concentrated Flow, Grass</b><br>Short Grass Pasture Kv= 7.0 fps |
| 8.3      | 118           | Total         |                   |                |  |

**Subcatchment 205S: NORTHEAST PARCEL**

Hydrograph



**Summary for Subcatchment 206S: EAST PARKING**

Runoff = 4.46 cfs @ 12.04 hrs, Volume= 0.405 af, Depth= 4.82"  
 Routed to Pond 255P-A : BIO-POND E PONDING LAYER

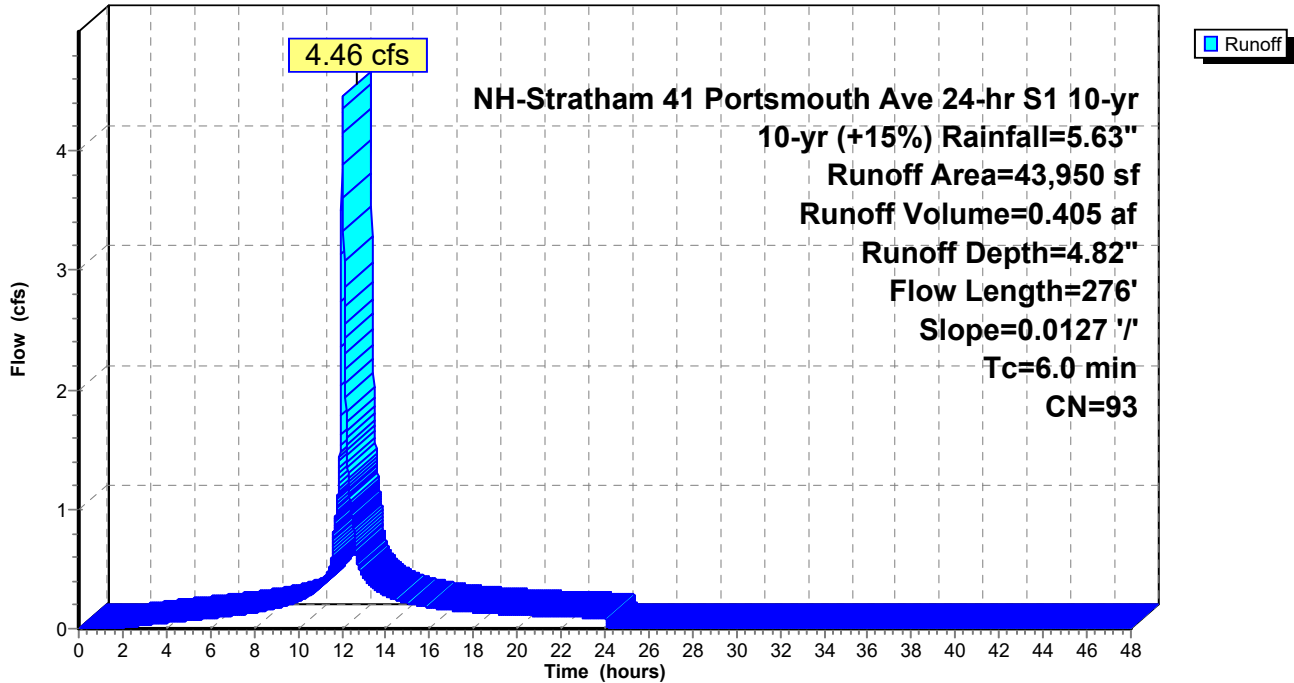
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-48.00 hrs, dt= 0.01 hrs  
 NH-Stratham 41 Portsmouth Ave 24-hr S1 10-yr 10-yr (+15%) Rainfall=5.63"

| Area (sf) | CN | Description                   |
|-----------|----|-------------------------------|
| 9,345     | 74 | >75% Grass cover, Good, HSG C |
| 34,605    | 98 | Paved parking, HSG C          |
| 43,950    | 93 | Weighted Average              |
| 9,345     |    | 21.26% Pervious Area          |
| 34,605    |    | 78.74% Impervious Area        |

| Tc (min) | Length (feet) | Slope (ft/ft) | Velocity (ft/sec) | Capacity (cfs) | Description   |
|----------|---------------|---------------|-------------------|----------------|---|
| 0.8      | 50            | 0.0127        | 0.98              |                | <b>Sheet Flow, Pavement</b><br>Smooth surfaces n= 0.011 P2= 3.10" |
| 1.6      | 226           | 0.0127        | 2.29              |                | <b>Shallow Concentrated Flow, Pavement</b><br>Paved Kv= 20.3 fps  |
| 3.6      |               |               |                   |                | <b>Direct Entry, 6 minute min.</b>                                |
| 6.0      | 276           | Total         |                   |                |   |

**Subcatchment 206S: EAST PARKING**

Hydrograph



**Summary for Subcatchment 207S: SOUTHEAST PARCEL**

Runoff = 1.38 cfs @ 12.04 hrs, Volume= 0.118 af, Depth= 3.55"  
 Routed to Pond 256P : RIVER ROAD CB

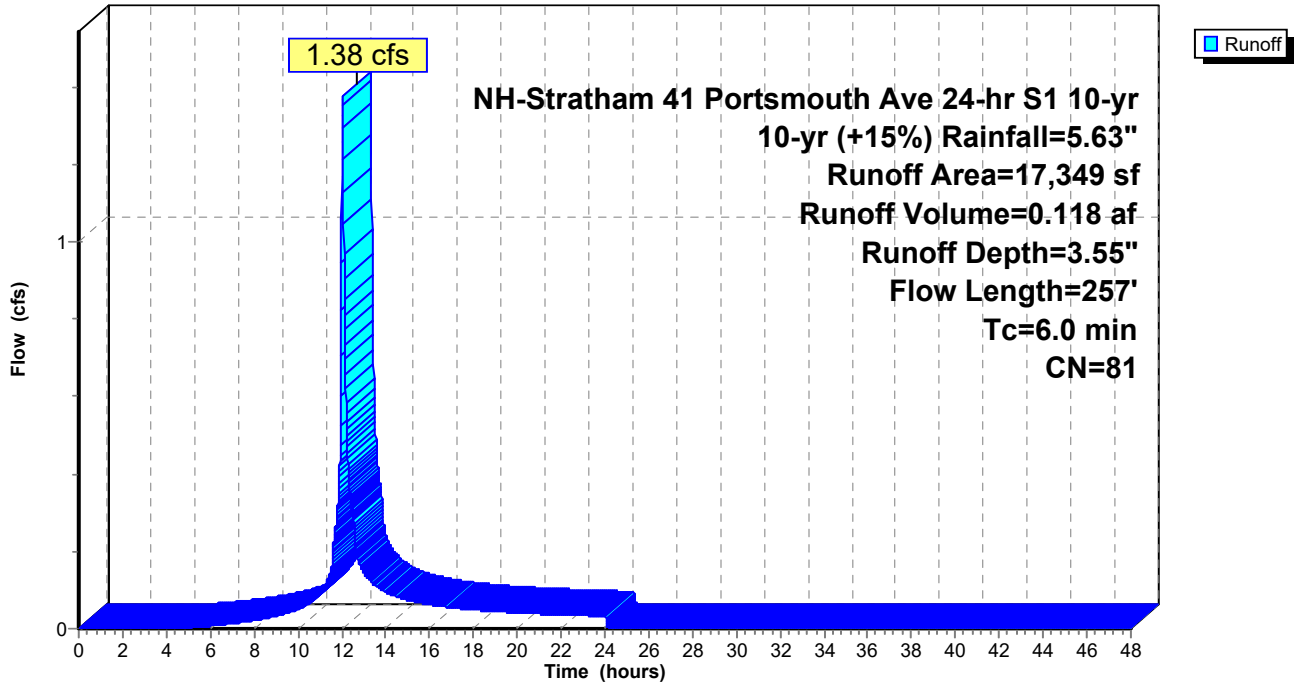
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-48.00 hrs, dt= 0.01 hrs  
 NH-Stratham 41 Portsmouth Ave 24-hr S1 10-yr 10-yr (+15%) Rainfall=5.63"

| Area (sf) | CN | Description                   |
|-----------|----|-------------------------------|
| 12,184    | 74 | >75% Grass cover, Good, HSG C |
| 5,165     | 98 | Paved parking, HSG C          |
| 17,349    | 81 | Weighted Average              |
| 12,184    |    | 70.23% Pervious Area          |
| 5,165     |    | 29.77% Impervious Area        |

| Tc (min) | Length (feet) | Slope (ft/ft) | Velocity (ft/sec) | Capacity (cfs) | Description  |
|----------|---------------|---------------|-------------------|----------------|--|
| 0.7      | 50            | 0.0200        | 1.18              |                | <b>Sheet Flow, Pavement</b><br>Smooth surfaces n= 0.011 P2= 3.10"          |
| 2.9      | 207           | 0.0280        | 1.17              |                | <b>Shallow Concentrated Flow, Grass</b><br>Short Grass Pasture Kv= 7.0 fps |
| 2.4      |               |               |                   |                | <b>Direct Entry, 6 minute min.</b>   |
| 6.0      | 257           | Total         |                   |                |  |

**Subcatchment 207S: SOUTHEAST PARCEL**

Hydrograph



**Summary for Subcatchment 208S: SOUTH PARCEL**

Runoff = 0.39 cfs @ 12.04 hrs, Volume= 0.033 af, Depth= 3.35"  
 Routed to Pond 257P : BARNYARD CB

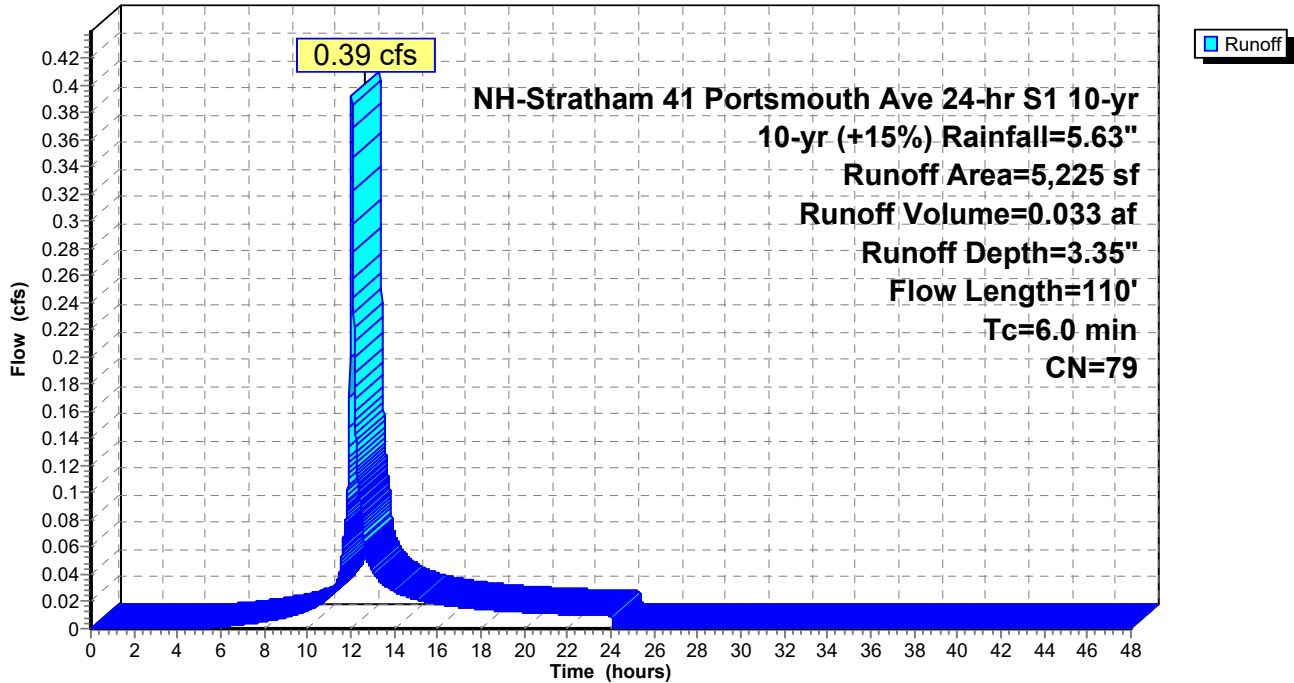
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-48.00 hrs, dt= 0.01 hrs  
 NH-Stratham 41 Portsmouth Ave 24-hr S1 10-yr 10-yr (+15%) Rainfall=5.63"

| Area (sf) | CN | Description                   |
|-----------|----|-------------------------------|
| 4,138     | 74 | >75% Grass cover, Good, HSG C |
| 1,087     | 98 | Paved parking, HSG C          |
| 5,225     | 79 | Weighted Average              |
| 4,138     |    | 79.20% Pervious Area          |
| 1,087     |    | 20.80% Impervious Area        |

| Tc (min) | Length (feet) | Slope (ft/ft) | Velocity (ft/sec) | Capacity (cfs) | Description  |
|----------|---------------|---------------|-------------------|----------------|--|
| 1.9      | 50            | 0.3000        | 0.43              |                | <b>Sheet Flow, Grass</b><br>Grass: Short n= 0.150 P2= 3.10"                |
| 0.9      | 60            | 0.0250        | 1.11              |                | <b>Shallow Concentrated Flow, Grass</b><br>Short Grass Pasture Kv= 7.0 fps |
| 3.2      |               |               |                   |                | <b>Direct Entry, 6 minute min.</b>   |
| 6.0      | 110           | Total         |                   |                |  |

**Subcatchment 208S: SOUTH PARCEL**

Hydrograph



**Summary for Subcatchment 209S: SOUTHWEST PARCEL**

Runoff = 1.03 cfs @ 12.10 hrs, Volume= 0.111 af, Depth= 3.35"  
 Routed to Pond 258P : 24" HDPE UNDER RIVER ROAD

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-48.00 hrs, dt= 0.01 hrs  
 NH-Stratham 41 Portsmouth Ave 24-hr S1 10-yr 10-yr (+15%) Rainfall=5.63"

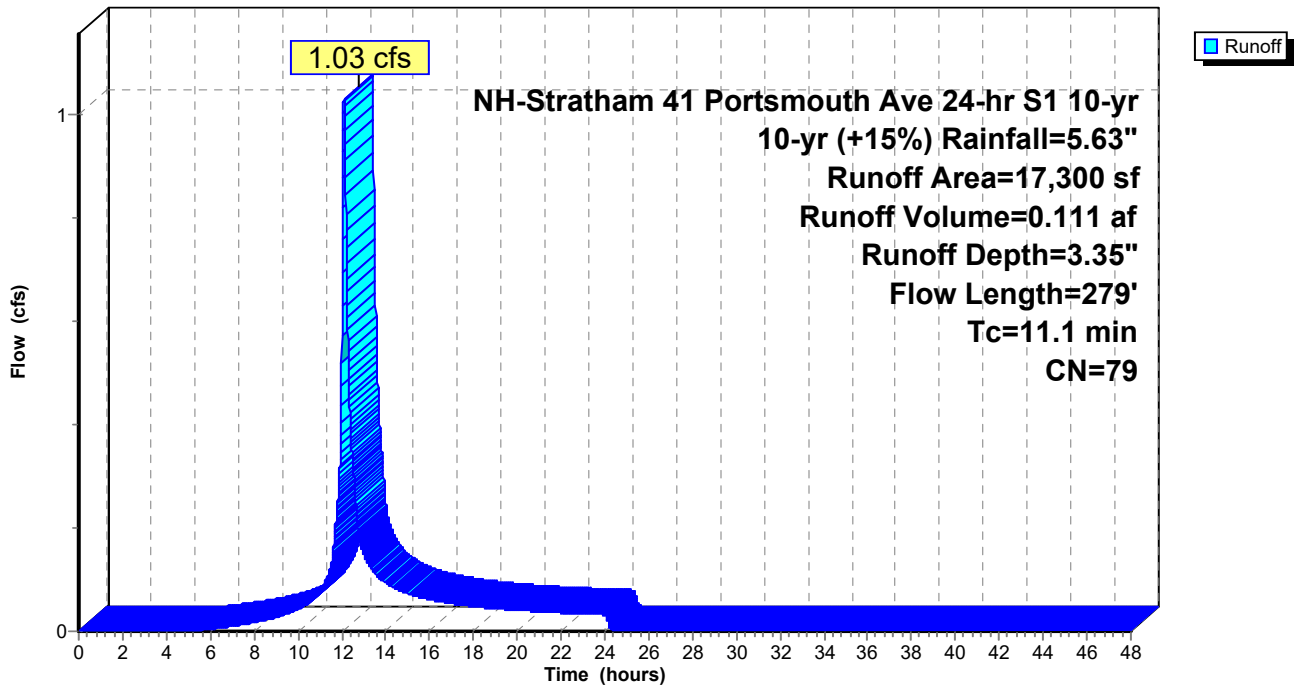
| Area (sf) | CN | Description                   |
|-----------|----|-------------------------------|
| 14,055    | 74 | >75% Grass cover, Good, HSG C |
| 3,245     | 98 | Paved parking, HSG C          |
| 17,300    | 79 | Weighted Average              |
| 14,055    |    | 81.24% Pervious Area          |
| 3,245     |    | 18.76% Impervious Area        |

| Tc (min) | Length (feet) | Slope (ft/ft) | Velocity (ft/sec) | Capacity (cfs) | Description                             |
|----------|---------------|---------------|-------------------|----------------|---|
| 8.4      | 115           | 0.0400        | 0.23              |                | <b>Sheet Flow, Grass</b>                |
| 2.7      | 164           | 0.0213        | 1.02              |                | <b>Shallow Concentrated Flow, Grass</b> |
|          |               |               |                   |                | Short Grass Pasture Kv= 7.0 fps         |
| 11.1     | 279           | Total         |                   |                |   |

**Subcatchment 209S: SOUTHWEST PARCEL**

Hydrograph



**Summary for Subcatchment 210S: WEST PARKING POND-TO-POND**

Runoff = 6.68 cfs @ 12.04 hrs, Volume= 0.596 af, Depth= 4.60"  
 Routed to Pond 251P-A : BIO-POND A PONDING LAYER

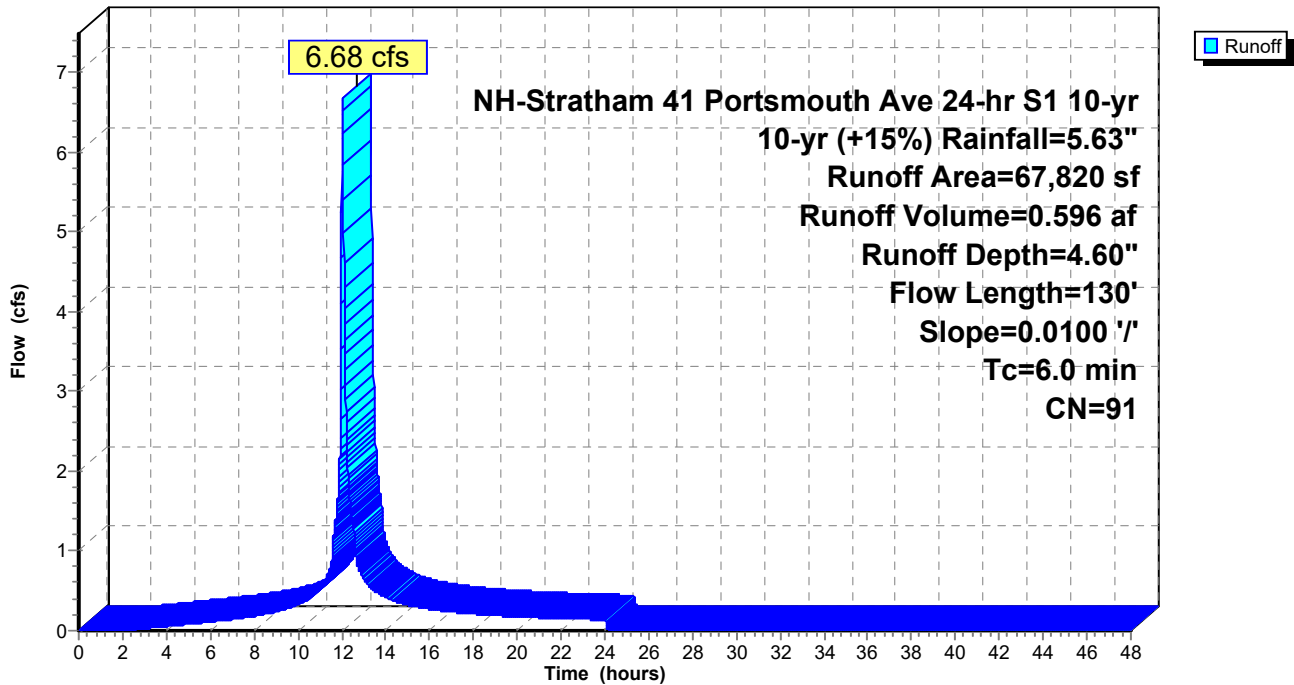
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-48.00 hrs, dt= 0.01 hrs  
 NH-Stratham 41 Portsmouth Ave 24-hr S1 10-yr 10-yr (+15%) Rainfall=5.63"

| Area (sf) | CN | Description                   |
|-----------|----|-------------------------------|
| 20,505    | 74 | >75% Grass cover, Good, HSG C |
| 47,315    | 98 | Paved parking, HSG C          |
| 67,820    | 91 | Weighted Average              |
| 20,505    |    | 30.23% Pervious Area          |
| 47,315    |    | 69.77% Impervious Area        |

| Tc (min) | Length (feet) | Slope (ft/ft) | Velocity (ft/sec) | Capacity (cfs) | Description   |
|----------|---------------|---------------|-------------------|----------------|---|
| 0.9      | 50            | 0.0100        | 0.89              |                | <b>Sheet Flow, Pavement</b><br>Smooth surfaces n= 0.011 P2= 3.10" |
| 0.7      | 80            | 0.0100        | 2.03              |                | <b>Shallow Concentrated Flow, Pavement</b><br>Paved Kv= 20.3 fps  |
| 4.4      |               |               |                   |                | <b>Direct Entry, 6 minute min.</b>                                |
| 6.0      | 130           | Total         |                   |                |   |

**Subcatchment 210S: WEST PARKING POND-TO-POND**

Hydrograph



**Summary for Subcatchment 211S: WEST PARKING BUILDING-TO-POND**

Runoff = 3.82 cfs @ 12.04 hrs, Volume= 0.341 af, Depth= 4.60"  
 Routed to Pond 259P-A : BIO-POND B PONDING LAYER

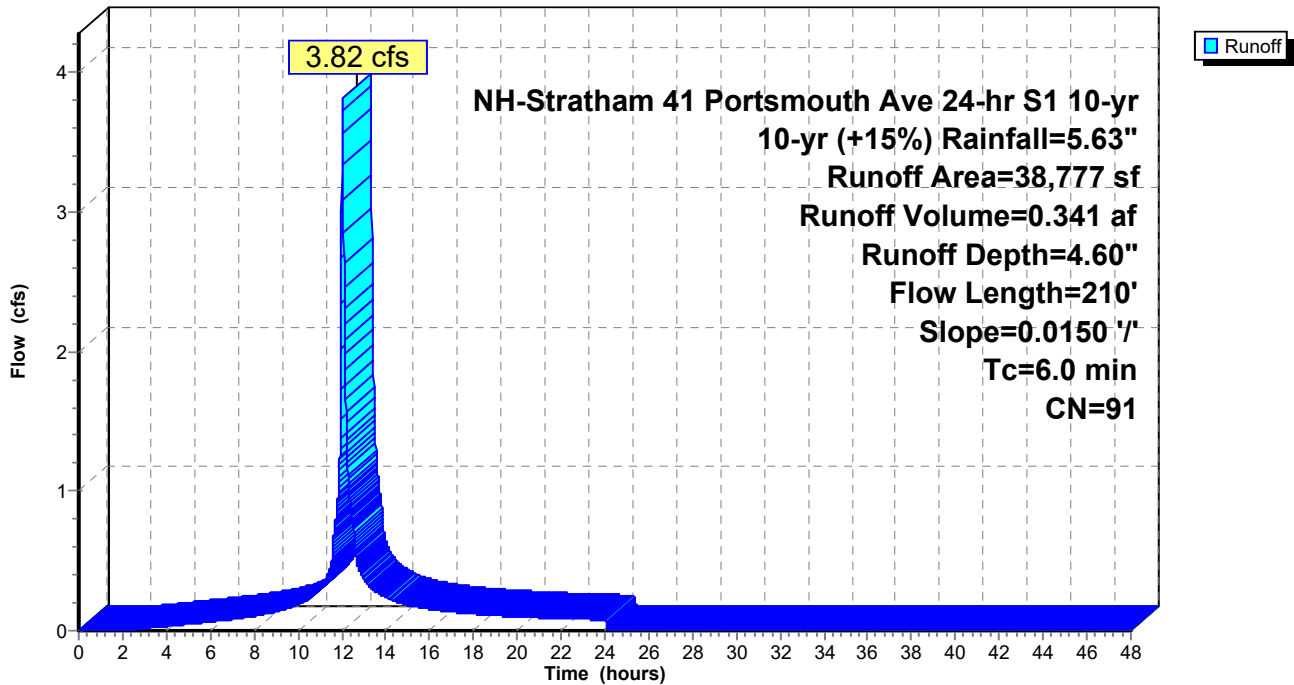
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-48.00 hrs, dt= 0.01 hrs  
 NH-Stratham 41 Portsmouth Ave 24-hr S1 10-yr 10-yr (+15%) Rainfall=5.63"

| Area (sf) | CN | Description                   |
|-----------|----|-------------------------------|
| 10,597    | 74 | >75% Grass cover, Good, HSG C |
| 28,180    | 98 | Paved parking, HSG C          |
| 38,777    | 91 | Weighted Average              |
| 10,597    |    | 27.33% Pervious Area          |
| 28,180    |    | 72.67% Impervious Area        |

| Tc (min) | Length (feet) | Slope (ft/ft) | Velocity (ft/sec) | Capacity (cfs) | Description   |
|----------|---------------|---------------|-------------------|----------------|---|
| 0.8      | 50            | 0.0150        | 1.05              |                | <b>Sheet Flow, Pavement</b><br>Smooth surfaces n= 0.011 P2= 3.10" |
| 1.1      | 160           | 0.0150        | 2.49              |                | <b>Shallow Concentrated Flow, Pavement</b><br>Paved Kv= 20.3 fps  |
| 4.1      |               |               |                   |                | <b>Direct Entry, 6 minute min.</b>                                |
| 6.0      | 210           | Total         |                   |                |   |

**Subcatchment 211S: WEST PARKING BUILDING-TO-POND**

Hydrograph



**Summary for Subcatchment 212S-A: WESTERN HALF OF BUILDING**

Runoff = 1.55 cfs @ 12.04 hrs, Volume= 0.150 af, Depth= 5.39"  
 Routed to Pond 260P-A : ROOF DRAINS

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-48.00 hrs, dt= 0.01 hrs  
 NH-Stratham 41 Portsmouth Ave 24-hr S1 10-yr 10-yr (+15%) Rainfall=5.63"

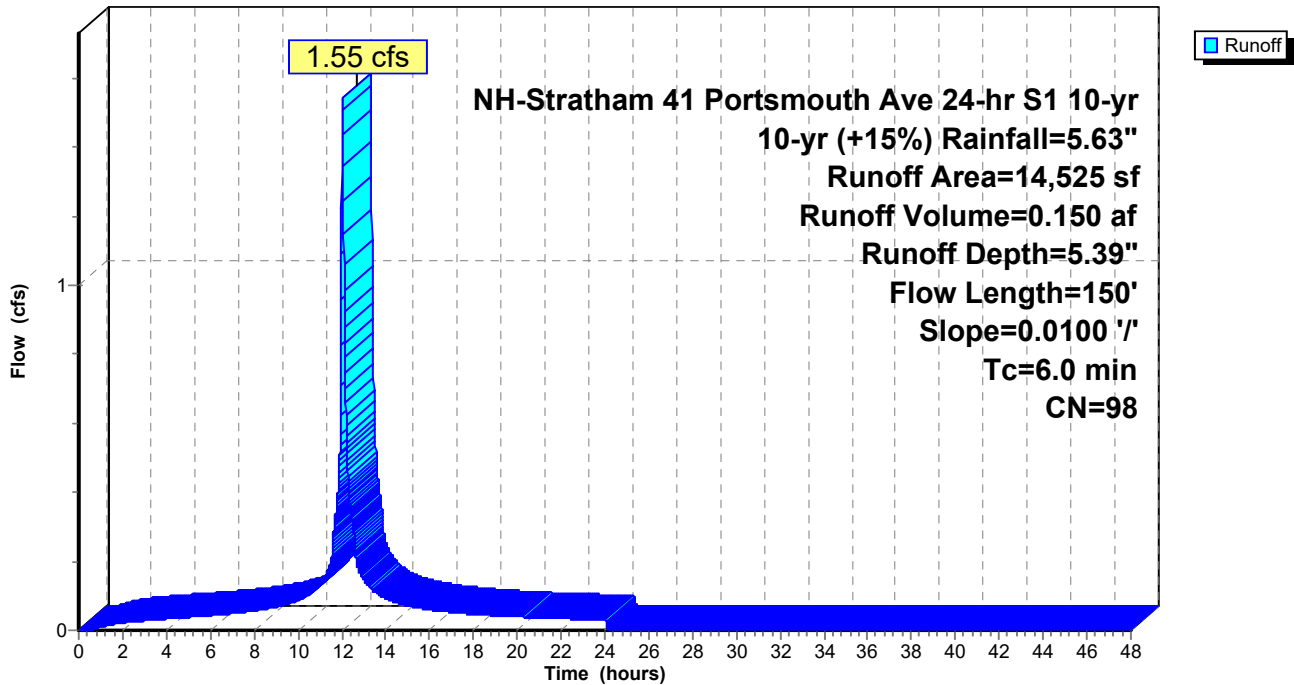
| Area (sf) | CN | Description             |
|-----------|----|-------------------------|
| 14,525    | 98 | Roofs, HSG C            |
| 14,525    |    | 100.00% Impervious Area |

| Tc (min) | Length (feet) | Slope (ft/ft) | Velocity (ft/sec) | Capacity (cfs) | Description                        |
|----------|---------------|---------------|-------------------|----------------|------------------------------------|
| 2.2      | 150           | 0.0100        | 1.11              |                | <b>Sheet Flow, Roof</b>            |
|          |               |               |                   |                | Smooth surfaces n= 0.011 P2= 3.10" |
| 3.8      |               |               |                   |                | <b>Direct Entry, 6 minute min.</b> |
| 6.0      | 150           | Total         |                   |                |                                    |

**Subcatchment 212S-A: WESTERN HALF OF BUILDING**

Hydrograph



**Summary for Subcatchment 212S-B: EASTERN HALF OF BUILDING**

Runoff = 1.60 cfs @ 12.04 hrs, Volume= 0.155 af, Depth= 5.39"  
 Routed to Pond 260P-B : ROOF DRAINS

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-48.00 hrs, dt= 0.01 hrs  
 NH-Stratham 41 Portsmouth Ave 24-hr S1 10-yr 10-yr (+15%) Rainfall=5.63"

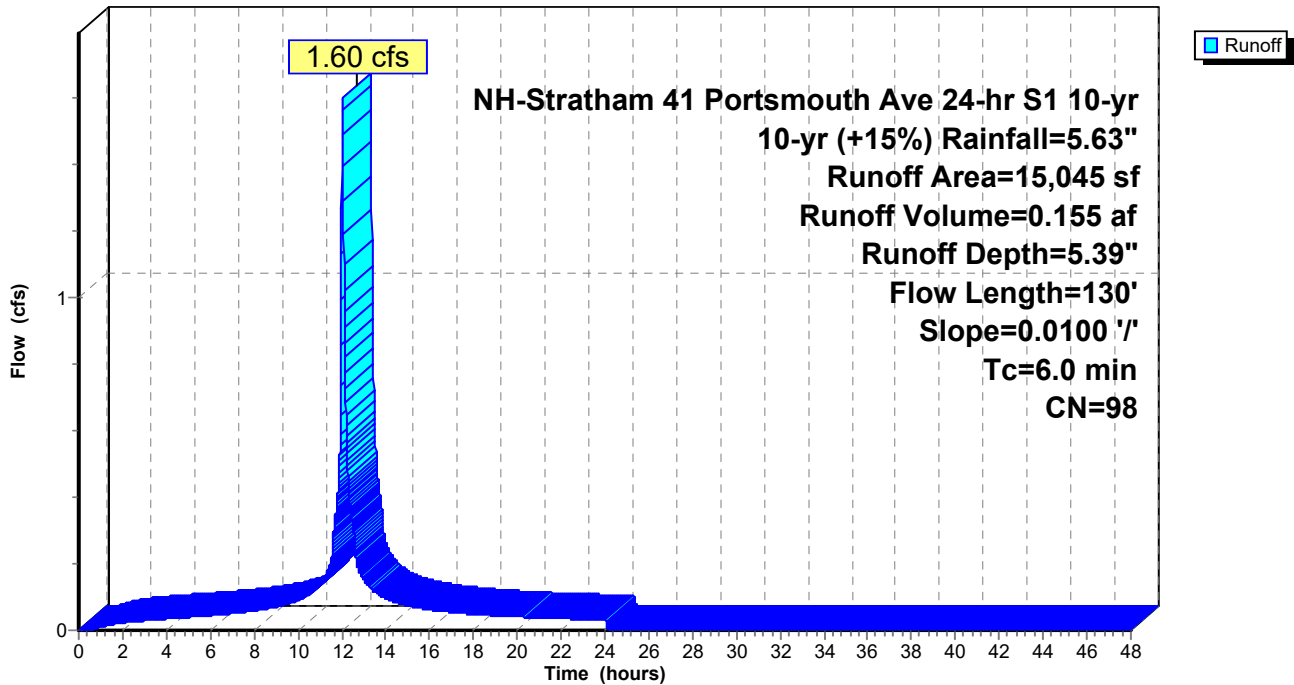
| Area (sf) | CN | Description             |
|-----------|----|-------------------------|
| 15,045    | 98 | Roofs, HSG C            |
| 15,045    |    | 100.00% Impervious Area |

| Tc (min) | Length (feet) | Slope (ft/ft) | Velocity (ft/sec) | Capacity (cfs) | Description                        |
|----------|---------------|---------------|-------------------|----------------|------------------------------------|
| 2.0      | 130           | 0.0100        | 1.08              |                | <b>Sheet Flow, Roof</b>            |
|          |               |               |                   |                | Smooth surfaces n= 0.011 P2= 3.10" |
| 4.0      |               |               |                   |                | <b>Direct Entry, 6 minute min.</b> |
| 6.0      | 130           | Total         |                   |                |                                    |

**Subcatchment 212S-B: EASTERN HALF OF BUILDING**

Hydrograph



**Summary for Subcatchment 213S: NORTH LANDSCAPE ISLAND**

Runoff = 0.13 cfs @ 12.04 hrs, Volume= 0.011 af, Depth= 4.71"  
 Routed to Pond 261P : NORTH ISLAND CATCH BASIN

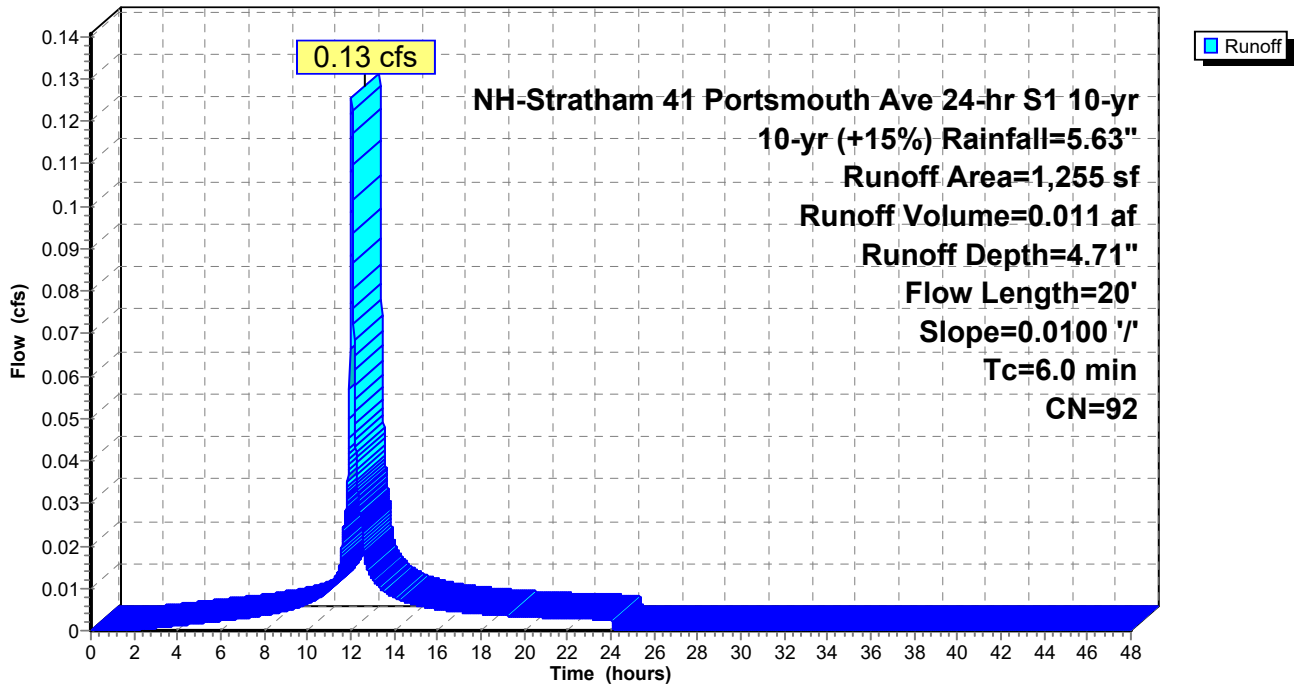
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-48.00 hrs, dt= 0.01 hrs  
 NH-Stratham 41 Portsmouth Ave 24-hr S1 10-yr 10-yr (+15%) Rainfall=5.63"

| Area (sf) | CN | Description                   |
|-----------|----|-------------------------------|
| 305       | 74 | >75% Grass cover, Good, HSG C |
| 950       | 98 | Paved parking, HSG C          |
| 1,255     | 92 | Weighted Average              |
| 305       |    | 24.30% Pervious Area          |
| 950       |    | 75.70% Impervious Area        |

| Tc (min) | Length (feet) | Slope (ft/ft) | Velocity (ft/sec) | Capacity (cfs) | Description                        |
|----------|---------------|---------------|-------------------|----------------|------------------------------------|
| 3.6      | 20            | 0.0100        | 0.09              |                | <b>Sheet Flow, Grass</b>           |
|          |               |               |                   |                | Grass: Short n= 0.150 P2= 3.10"    |
| 2.4      |               |               |                   |                | <b>Direct Entry, 6 minute min.</b> |
| 6.0      | 20            | Total         |                   |                |                                    |

**Subcatchment 213S: NORTH LANDSCAPE ISLAND**

Hydrograph



**Summary for Subcatchment 214S: SOUTH LANDSCAPE ISLAND**

Runoff = 0.30 cfs @ 12.04 hrs, Volume= 0.026 af, Depth= 4.06"  
 Routed to Pond 262P : SOUTH ISLAND CATCH BASIN

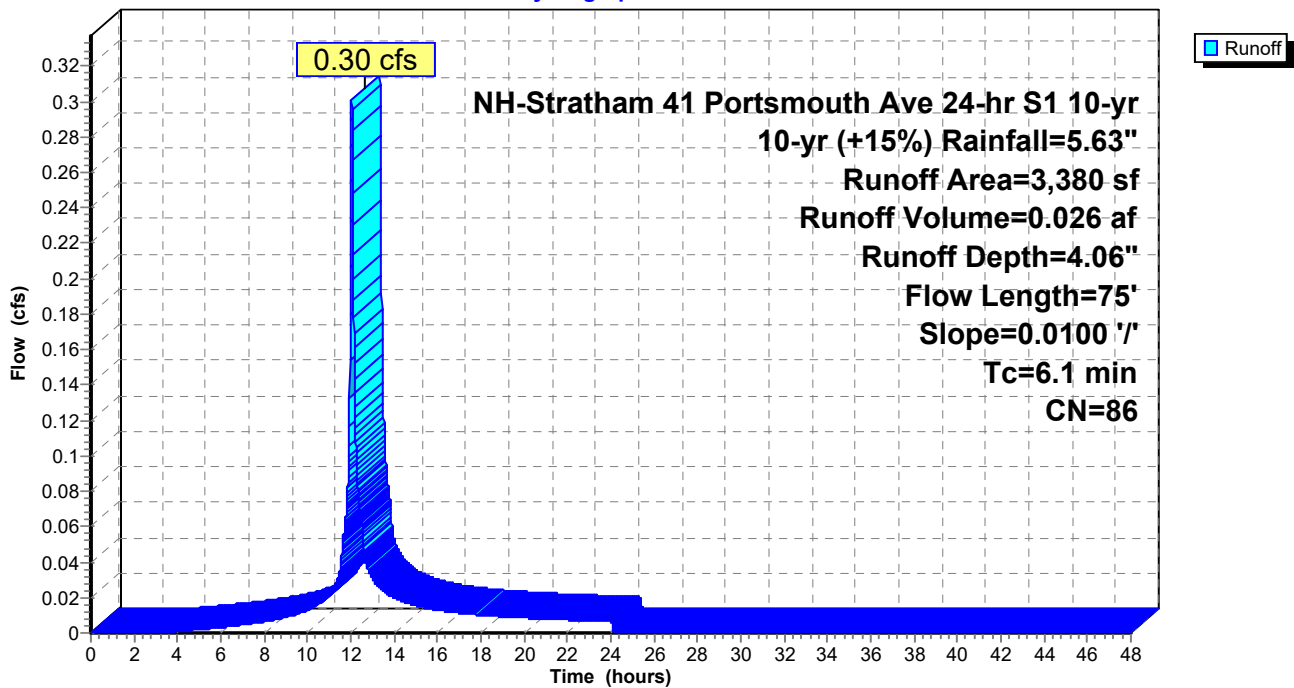
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-48.00 hrs, dt= 0.01 hrs  
 NH-Stratham 41 Portsmouth Ave 24-hr S1 10-yr 10-yr (+15%) Rainfall=5.63"

| Area (sf) | CN | Description                   |
|-----------|----|-------------------------------|
| 1,695     | 74 | >75% Grass cover, Good, HSG C |
| 1,685     | 98 | Paved parking, HSG C          |
| 3,380     | 86 | Weighted Average              |
| 1,695     |    | 50.15% Pervious Area          |
| 1,685     |    | 49.85% Impervious Area        |

| Tc (min) | Length (feet) | Slope (ft/ft) | Velocity (ft/sec) | Capacity (cfs) | Description  |
|----------|---------------|---------------|-------------------|----------------|--|
| 5.7      | 35            | 0.0100        | 0.10              |                | <b>Sheet Flow, Grass</b><br>Grass: Short n= 0.150 P2= 3.10"                |
| 0.2      | 30            | 0.0100        | 2.03              |                | <b>Shallow Concentrated Flow, Concrete</b><br>Paved Kv= 20.3 fps           |
| 0.2      | 10            | 0.0100        | 0.70              |                | <b>Shallow Concentrated Flow, Grass</b><br>Short Grass Pasture Kv= 7.0 fps |
| 6.1      | 75            | Total         |                   |                |  |

**Subcatchment 214S: SOUTH LANDSCAPE ISLAND**

Hydrograph



**Summary for Pond 104P: EXISTING CULVERT**

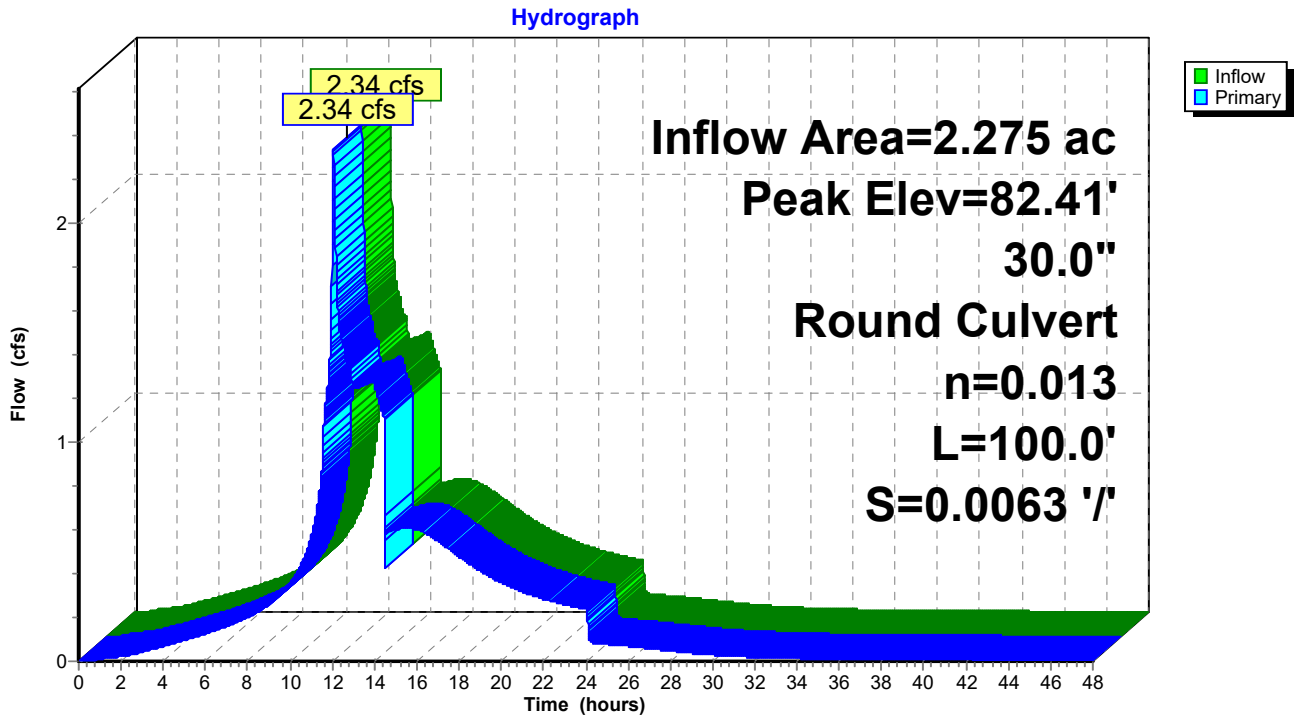
Inflow Area = 2.275 ac, 75.27% Impervious, Inflow Depth > 4.55" for 10-yr (+15%) event  
 Inflow = 2.34 cfs @ 12.05 hrs, Volume= 0.864 af  
 Outflow = 2.34 cfs @ 12.05 hrs, Volume= 0.864 af, Atten= 0%, Lag= 0.0 min  
 Primary = 2.34 cfs @ 12.05 hrs, Volume= 0.864 af  
 Routed to Link 9-5 : MAP 9 LOT 5

Routing by Dyn-Stor-Ind method, Time Span= 0.00-48.00 hrs, dt= 0.01 hrs / 2  
 Peak Elev= 82.41' @ 12.05 hrs  
 Flood Elev= 85.50'

| Device # | Routing | Invert | Outlet Devices   |
|----------|---------|--------|--|
| #1       | Primary | 81.77' | <b>30.0" Round Existing Culvert</b> L= 100.0' Ke= 0.500<br>Inlet / Outlet Invert= 81.77' / 81.14' S= 0.0063 '/' Cc= 0.900<br>n= 0.013 Corrugated PE, smooth interior, Flow Area= 4.91 sf |

Primary OutFlow Max=2.33 cfs @ 12.05 hrs HW=82.41' TW=0.00' (Dynamic Tailwater)  
 ↑1=Existing Culvert (Barrel Controls 2.33 cfs @ 3.54 fps)

**Pond 104P: EXISTING CULVERT**



**Postdevelopment 0NH-Stratham 41 Portsmouth Ave 24-hr S1 10-yr 10-yr (+15%) Rainfall=5.63"**

Prepared by Emanuel Engineering

Printed 4/27/2026

HydroCAD® 10.20-8a s/n 01104 © 2025 HydroCAD Software Solutions LLC

Page 167

**Summary for Pond 250P-A: BIO-POND F PONDING LAYER**

Inflow Area = 0.920 ac, 80.12% Impervious, Inflow Depth = 4.60" for 10-yr (+15%) event  
 Inflow = 3.95 cfs @ 12.04 hrs, Volume= 0.352 af  
 Outflow = 0.74 cfs @ 12.54 hrs, Volume= 0.352 af, Atten= 81%, Lag= 30.4 min  
 Primary = 0.74 cfs @ 12.54 hrs, Volume= 0.352 af  
     Routed to Pond 250P-B : BIO-POND F SUBSURFACE  
 Secondary = 0.00 cfs @ 0.00 hrs, Volume= 0.000 af  
     Routed to Pond 250P-B : BIO-POND F SUBSURFACE

Routing by Dyn-Stor-Ind method, Time Span= 0.00-48.00 hrs, dt= 0.01 hrs / 2  
 Peak Elev= 84.22' @ 12.54 hrs Surf.Area= 3,202 sf Storage= 2,742 cf  
 Flood Elev= 85.25' Surf.Area= 4,000 sf Storage= 6,450 cf

Plug-Flow detention time= 18.3 min calculated for 0.352 af (100% of inflow)  
 Center-of-Mass det. time= 18.3 min ( 814.4 - 796.1 )

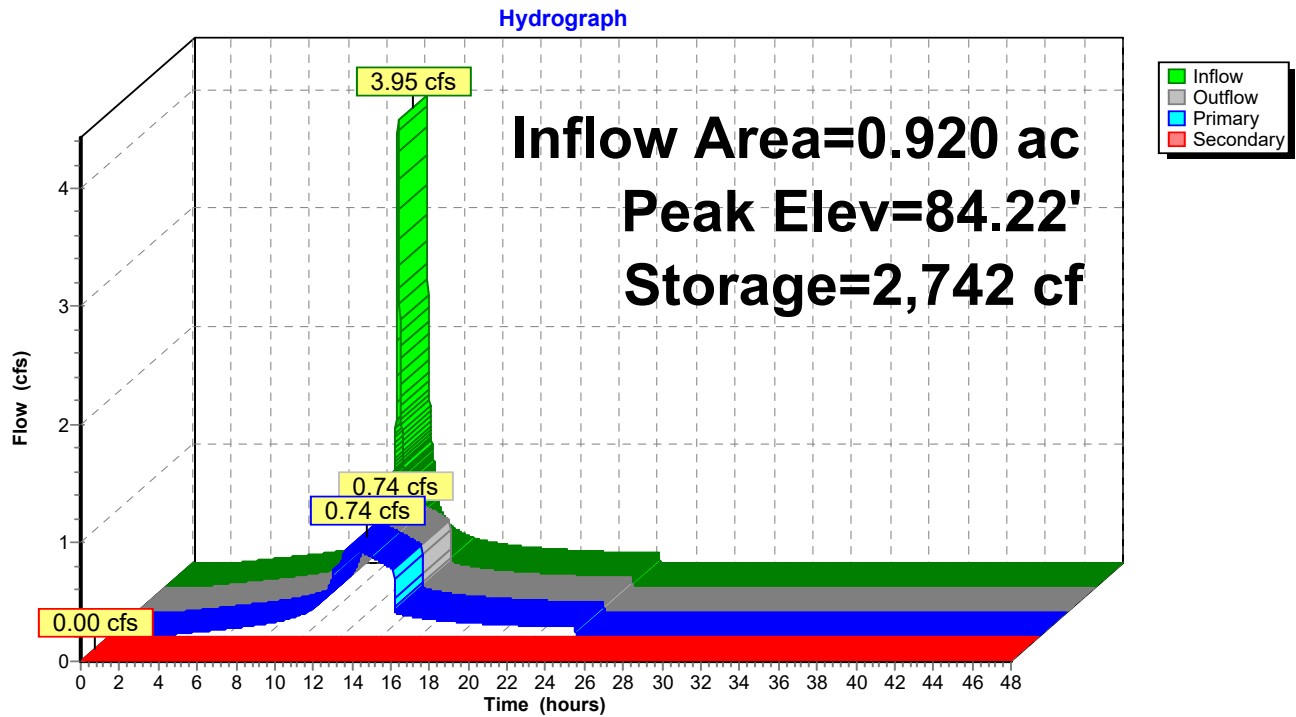
| Volume           | Invert            | Avail.Storage          | Storage Description  |
|------------------|-------------------|------------------------|--|
| #1               | 83.25'            | 6,450 cf               | <b>Bioretention Ponding Area (Prismatic)</b> , listed below (Recalc) |
| Elevation (feet) | Surf.Area (sq-ft) | Inc.Store (cubic-feet) | Cum.Store (cubic-feet)   |
| 83.25            | 2,450             | 0                      | 0  |
| 85.25            | 4,000             | 6,450                  | 6,450  |

| Device | Routing   | Invert | Outlet Devices   |
|--------|-----------|--------|--|
| #1     | Primary   | 83.25' | <b>10.000 in/hr Exfiltration through Bioretention Media over Surface area</b><br>Phase-In= 0.01' |
| #2     | Secondary | 84.75' | <b>30.0" Horiz. 30" Diameter Domed Grate</b> C= 0.600<br>Limited to weir flow at low heads       |

**Primary OutFlow** Max=0.74 cfs @ 12.54 hrs HW=84.22' TW=80.65' (Dynamic Tailwater)  
 ↑1=Exfiltration through Bioretention Media(Exfiltration Controls 0.74 cfs)

**Secondary OutFlow** Max=0.00 cfs @ 0.00 hrs HW=83.25' TW=79.74' (Dynamic Tailwater)  
 ↑2=30" Diameter Domed Grate ( Controls 0.00 cfs)

Pond 250P-A: BIO-POND F PONDING LAYER



**Postdevelopment 0NH-Stratham 41 Portsmouth Ave 24-hr S1 10-yr 10-yr (+15%) Rainfall=5.63"**

Prepared by Emanuel Engineering

Printed 4/27/2026

HydroCAD® 10.20-8a s/n 01104 © 2025 HydroCAD Software Solutions LLC

Page 169

**Summary for Pond 250P-B: BIO-POND F SUBSURFACE**

Inflow Area = 0.920 ac, 80.12% Impervious, Inflow Depth = 4.60" for 10-yr (+15%) event  
 Inflow = 0.74 cfs @ 12.54 hrs, Volume= 0.352 af  
 Outflow = 0.74 cfs @ 12.71 hrs, Volume= 0.352 af, Atten= 1%, Lag= 10.1 min  
 Discarded = 0.09 cfs @ 7.35 hrs, Volume= 0.166 af  
 Primary = 0.64 cfs @ 12.71 hrs, Volume= 0.186 af  
 Routed to Link 8-64 : MAP 8 LOT 64

Routing by Dyn-Stor-Ind method, Time Span= 0.00-48.00 hrs, dt= 0.01 hrs / 2  
 Peak Elev= 80.65' @ 12.71 hrs Surf.Area= 4,000 sf Storage= 1,462 cf

Plug-Flow detention time= 62.6 min calculated for 0.352 af (100% of inflow)  
 Center-of-Mass det. time= 62.6 min ( 877.0 - 814.4 )

| Volume              | Invert               | Avail.Storage | Storage Description  |                           |
|---------------------|----------------------|---------------|--|---------------------------|
| #1                  | 79.74'               | 4,812 cf      | <b>Custom Stage Data (Prismatic)</b> Listed below (Recalc) |                           |
| Elevation<br>(feet) | Surf.Area<br>(sq-ft) | Voids<br>(%)  | Inc.Store<br>(cubic-feet)                                  | Cum.Store<br>(cubic-feet) |
| 79.74               | 4,000                | 0.0           | 0  | 0                         |
| 79.75               | 4,000                | 40.0          | 16   | 16                        |
| 81.24               | 4,000                | 40.0          | 2,384  | 2,400                     |
| 81.25               | 4,000                | 30.0          | 12   | 2,412                     |
| 83.25               | 4,000                | 30.0          | 2,400  | 4,812                     |

| Device | Routing   | Invert | Outlet Devices  |
|--------|-----------|--------|---|
| #1     | Discarded | 79.74' | <b>1.000 in/hr Exfiltration into Groundwater over Surface area</b><br>Phase-In= 0.01'   |
| #2     | Primary   | 80.25' | <b>12.0" Round 12" HDPE Pipe</b><br>L= 20.0' CPP, square edge headwall, Ke= 0.500<br>Inlet / Outlet Invert= 80.25' / 79.75' S= 0.0250 '/ Cc= 0.900<br>n= 0.010 PVC, smooth interior, Flow Area= 0.79 sf |

**Discarded OutFlow** Max=0.09 cfs @ 7.35 hrs HW=79.75' (Free Discharge)

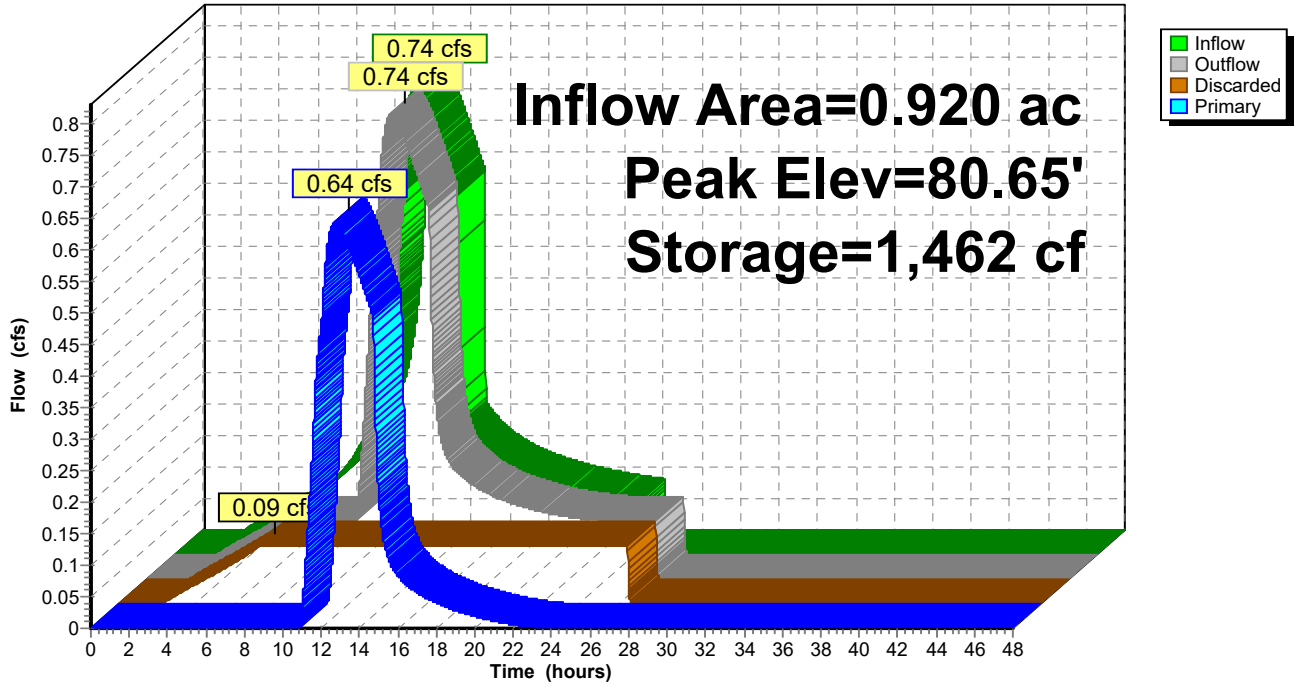
↑1=Exfiltration into Groundwater (Exfiltration Controls 0.09 cfs)

**Primary OutFlow** Max=0.64 cfs @ 12.71 hrs HW=80.65' TW=0.00' (Dynamic Tailwater)

↑2=12" HDPE Pipe (Inlet Controls 0.64 cfs @ 2.16 fps)

Pond 250P-B: BIO-POND F SUBSURFACE

Hydrograph



**Postdevelopment 0NH-Stratham 41 Portsmouth Ave 24-hr S1 10-yr 10-yr (+15%) Rainfall=5.63"**

Prepared by Emanuel Engineering

Printed 4/27/2026

HydroCAD® 10.20-8a s/n 01104 © 2025 HydroCAD Software Solutions LLC

Page 171

**Summary for Pond 251P-A: BIO-POND A PONDING LAYER**

Inflow Area = 1.557 ac, 69.77% Impervious, Inflow Depth = 4.60" for 10-yr (+15%) event  
 Inflow = 6.68 cfs @ 12.04 hrs, Volume= 0.596 af  
 Outflow = 2.52 cfs @ 12.21 hrs, Volume= 0.596 af, Atten= 62%, Lag= 10.3 min  
 Primary = 2.52 cfs @ 12.21 hrs, Volume= 0.596 af  
     Routed to Pond 251P-B : BIO-POND A SUBSURFACE  
 Secondary = 0.00 cfs @ 0.00 hrs, Volume= 0.000 af  
     Routed to Pond 251P-B : BIO-POND A SUBSURFACE

Routing by Dyn-Stor-Ind method, Time Span= 0.00-48.00 hrs, dt= 0.01 hrs / 2  
 Peak Elev= 84.17' @ 12.21 hrs Surf.Area= 10,897 sf Storage= 2,103 cf  
 Flood Elev= 85.73' Surf.Area= 13,585 sf Storage= 18,047 cf

Plug-Flow detention time= 3.0 min calculated for 0.596 af (100% of inflow)  
 Center-of-Mass det. time= 3.0 min ( 799.1 - 796.1 )

| Volume | Invert | Avail.Storage | Storage Description                                   |
|--------|--------|---------------|---|
| #1     | 84.00' | 18,047 cf     | <b>Bioretention Ponding Area (Conic)</b> listed below |

| Elevation<br>(feet) | Surf.Area<br>(sq-ft) | Inc.Store<br>(cubic-feet) | Cum.Store<br>(cubic-feet) | Wet.Area<br>(sq-ft) |
|---------------------|----------------------|---------------------------|---------------------------|---------------------|
| 84.00               | 10,542               | 0                         | 0                         | 10,542              |
| 85.50               | 13,585               | 18,047                    | 18,047                    | 13,640              |

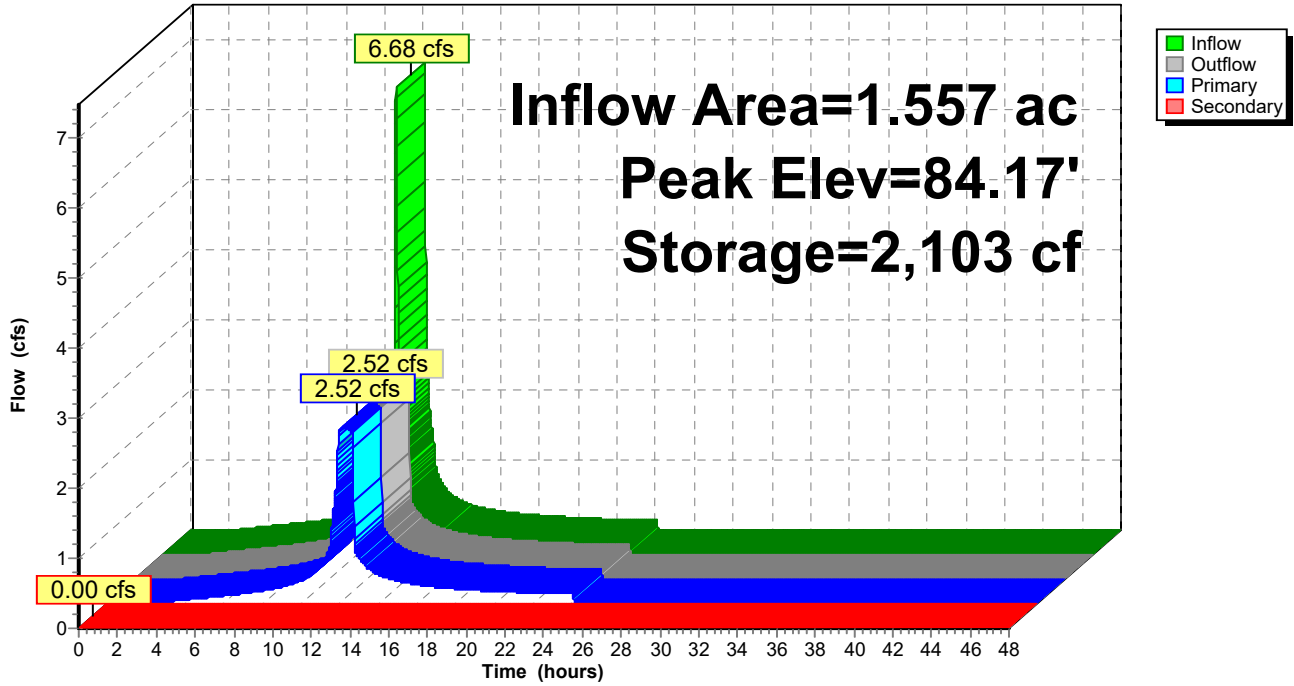
| Device | Routing   | Invert | Outlet Devices   |
|--------|-----------|--------|--|
| #1     | Primary   | 84.00' | <b>10.000 in/hr Exfiltration through Bioretention Mix over Surface area</b><br>Phase-In= 0.01' |
| #2     | Secondary | 85.00' | <b>30.0" Horiz. 30" Diameter Domed Grate</b> C= 0.600<br>Limited to weir flow at low heads     |

**Primary OutFlow** Max=2.52 cfs @ 12.21 hrs HW=84.17' TW=82.30' (Dynamic Tailwater)  
 ↑1=Exfiltration through Bioretention Mix(Exfiltration Controls 2.52 cfs)

**Secondary OutFlow** Max=0.00 cfs @ 0.00 hrs HW=84.00' TW=80.99' (Dynamic Tailwater)  
 ↑2=30" Diameter Domed Grate ( Controls 0.00 cfs)

Pond 251P-A: BIO-POND A PONDING LAYER

Hydrograph



### Summary for Pond 251P-B: BIO-POND A SUBSURFACE

[87] Warning: Oscillations may require smaller dt or Finer Routing (severity=1)

Inflow Area = 1.557 ac, 69.77% Impervious, Inflow Depth = 4.60" for 10-yr (+15%) event  
 Inflow = 2.52 cfs @ 12.21 hrs, Volume= 0.596 af  
 Outflow = 2.12 cfs @ 12.73 hrs, Volume= 0.596 af, Atten= 16%, Lag= 31.5 min  
 Primary = 2.12 cfs @ 12.73 hrs, Volume= 0.596 af  
 Routed to Pond 258P : 24" HDPE UNDER RIVER ROAD

Routing by Dyn-Stor-Ind method, Time Span= 0.00-48.00 hrs, dt= 0.01 hrs / 2  
 Peak Elev= 82.62' @ 12.73 hrs Surf.Area= 13,585 sf Storage= 2,652 cf

Plug-Flow detention time= 6.7 min calculated for 0.596 af (100% of inflow)  
 Center-of-Mass det. time= 6.6 min ( 805.7 - 799.1 )

| Volume | Invert | Avail.Storage | Storage Description  |
|--------|--------|---------------|--|
| #1     | 80.99' | 8,273 cf      | <b>Bioretention Mix and Stone Storage (Conic)</b> listed below |

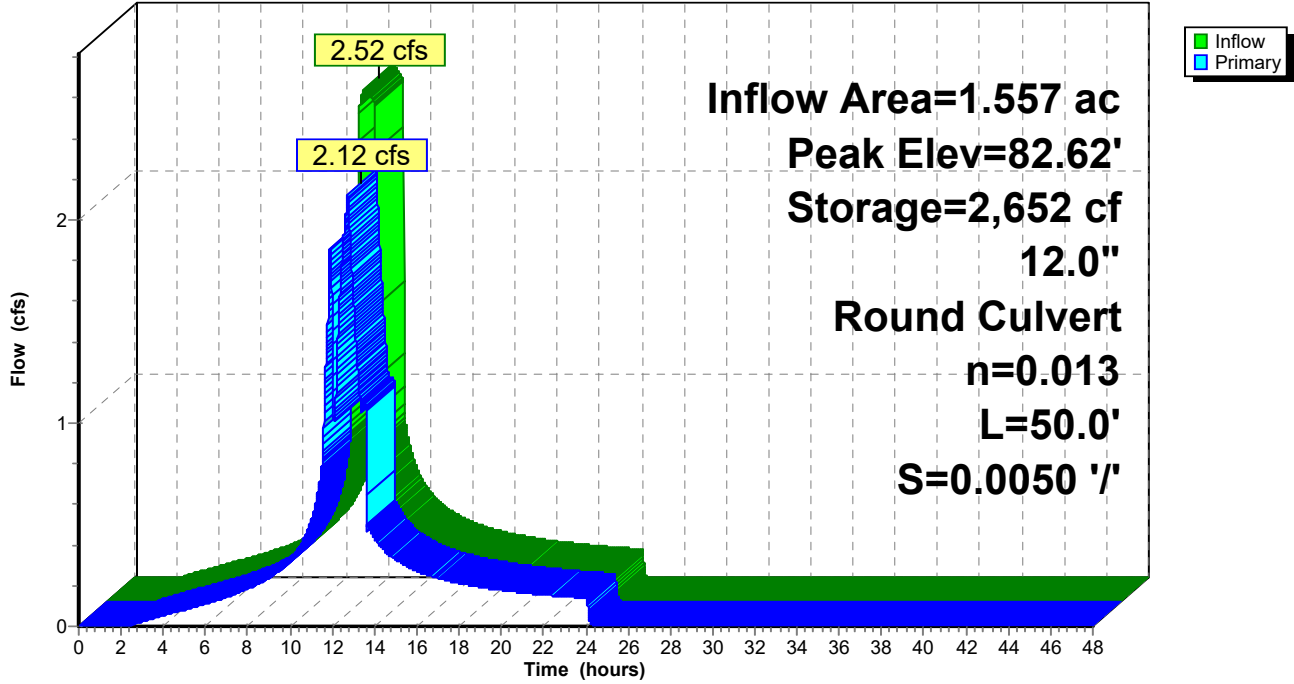
| Elevation<br>(feet) | Surf.Area<br>(sq-ft) | Voids<br>(%) | Inc.Store<br>(cubic-feet) | Cum.Store<br>(cubic-feet) | Wet.Area<br>(sq-ft) |
|---------------------|----------------------|--------------|---------------------------|---------------------------|---------------------|
| 80.99               | 13,585               | 0.0          | 0                         | 0                         | 13,585              |
| 81.00               | 13,585               | 0.6          | 1                         | 1                         | 13,589              |
| 81.99               | 13,585               | 0.6          | 81                        | 82                        | 13,998              |
| 82.00               | 13,585               | 30.0         | 41                        | 122                       | 14,002              |
| 84.00               | 13,585               | 30.0         | 8,151                     | 8,273                     | 14,829              |

| Device | Routing | Invert | Outlet Devices   |
|--------|---------|--------|--|
| #1     | Primary | 81.00' | <b>12.0" Round 12" HDPE Pipe</b><br>L= 50.0' CPP, projecting, no headwall, Ke= 0.900<br>Inlet / Outlet Invert= 81.00' / 80.75' S= 0.0050 '/ Cc= 0.900<br>n= 0.013 Corrugated PE, smooth interior, Flow Area= 0.79 sf |

**Primary OutFlow** Max=2.12 cfs @ 12.73 hrs HW=82.62' TW=82.12' (Dynamic Tailwater)  
 ↑1=12" HDPE Pipe (Inlet Controls 2.12 cfs @ 2.70 fps)

**Pond 251P-B: BIO-POND A SUBSURFACE**

Hydrograph



### Summary for Pond 252P: NORTHWEST CATCH BASIN

Inflow Area = 0.126 ac, 27.13% Impervious, Inflow Depth = 3.55" for 10-yr (+15%) event  
 Inflow = 0.43 cfs @ 12.04 hrs, Volume= 0.037 af  
 Outflow = 0.43 cfs @ 12.04 hrs, Volume= 0.037 af, Atten= 0%, Lag= 0.0 min  
 Primary = 0.43 cfs @ 12.04 hrs, Volume= 0.037 af  
 Routed to Pond 104P : EXISTING CULVERT

Routing by Dyn-Stor-Ind method, Time Span= 0.00-48.00 hrs, dt= 0.01 hrs / 2

Peak Elev= 82.59' @ 12.04 hrs

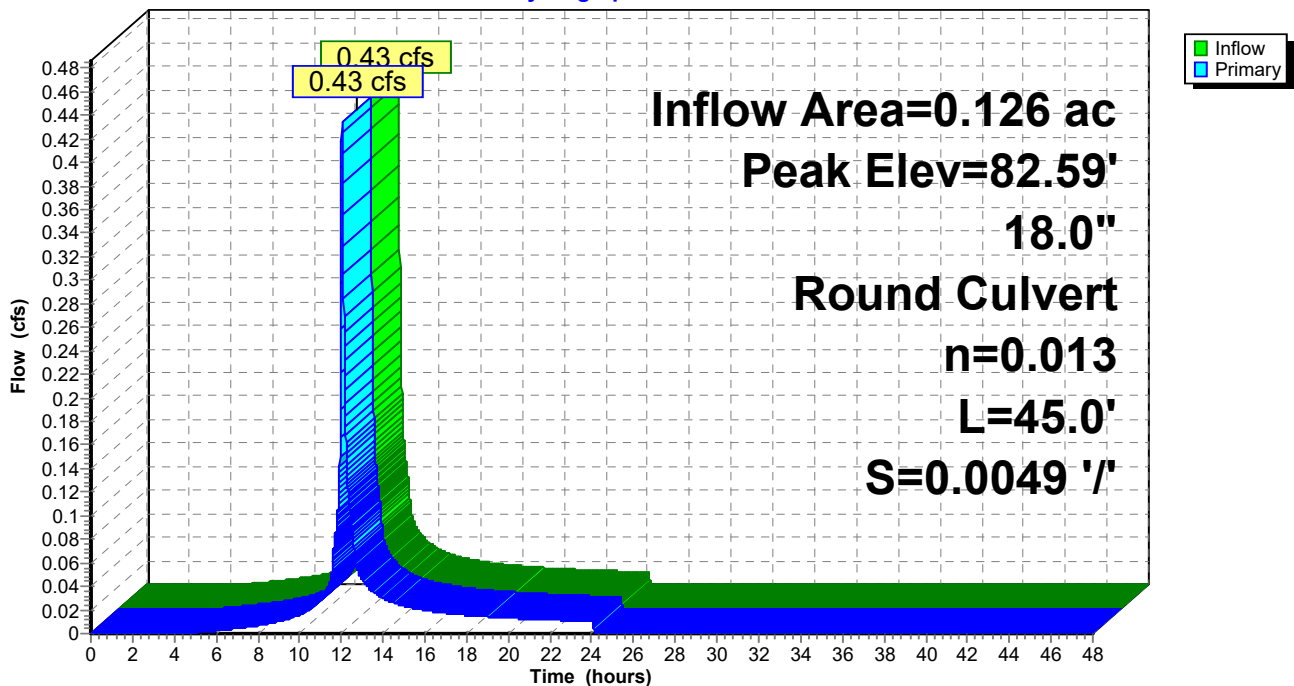
Flood Elev= 83.50'

| Device # | Routing | Invert | Outlet Devices  |
|----------|---------|--------|---|
| #1       | Primary | 82.18' | <b>18.0" Round 18" HDPE Pipe</b><br>L= 45.0' CPP, projecting, no headwall, Ke= 0.900<br>Inlet / Outlet Invert= 82.18' / 81.96' S= 0.0049 '/' Cc= 0.900<br>n= 0.013 Corrugated PE, smooth interior, Flow Area= 1.77 sf |

Primary OutFlow Max=0.43 cfs @ 12.04 hrs HW=82.58' TW=82.40' (Dynamic Tailwater)  
 ↑1=18" HDPE Pipe (Outlet Controls 0.43 cfs @ 1.69 fps)

### Pond 252P: NORTHWEST CATCH BASIN

Hydrograph



**Postdevelopment 0NH-Stratham 41 Portsmouth Ave 24-hr S1 10-yr 10-yr (+15%) Rainfall=5.63"**

Prepared by Emanuel Engineering

Printed 4/27/2026

HydroCAD® 10.20-8a s/n 01104 © 2025 HydroCAD Software Solutions LLC

Page 176

**Summary for Pond 253P-A: BIO-POND C PONDING LAYER**

Inflow Area = 0.140 ac, 37.68% Impervious, Inflow Depth = 3.75" for 10-yr (+15%) event  
 Inflow = 0.50 cfs @ 12.04 hrs, Volume= 0.044 af  
 Outflow = 0.18 cfs @ 12.24 hrs, Volume= 0.044 af, Atten= 64%, Lag= 11.7 min  
 Primary = 0.18 cfs @ 12.24 hrs, Volume= 0.044 af  
     Routed to Pond 253P-B : BIO-POND C SUBSURFACE  
 Secondary = 0.00 cfs @ 0.00 hrs, Volume= 0.000 af  
     Routed to Pond 253P-B : BIO-POND C SUBSURFACE

Routing by Dyn-Stor-Ind method, Time Span= 0.00-48.00 hrs, dt= 0.01 hrs / 2  
 Peak Elev= 87.64' @ 12.24 hrs Surf.Area= 790 sf Storage= 186 cf  
 Flood Elev= 89.00' Surf.Area= 2,135 sf Storage= 1,982 cf

Plug-Flow detention time= 4.6 min calculated for 0.044 af (100% of inflow)  
 Center-of-Mass det. time= 4.6 min ( 837.6 - 833.1 )

| Volume | Invert | Avail.Storage | Storage Description                               |
|--------|--------|---------------|---|
| #1     | 87.50' | 1,982 cf      | <b>Bioswale Ponding Area (Conic)</b> listed below |

| Elevation<br>(feet) | Surf.Area<br>(sq-ft) | Inc.Store<br>(cubic-feet) | Cum.Store<br>(cubic-feet) | Wet.Area<br>(sq-ft) |
|---------------------|----------------------|---------------------------|---------------------------|---------------------|
| 87.50               | 651                  | 0                         | 0                         | 651                 |
| 89.00               | 2,135                | 1,982                     | 1,982                     | 2,147               |

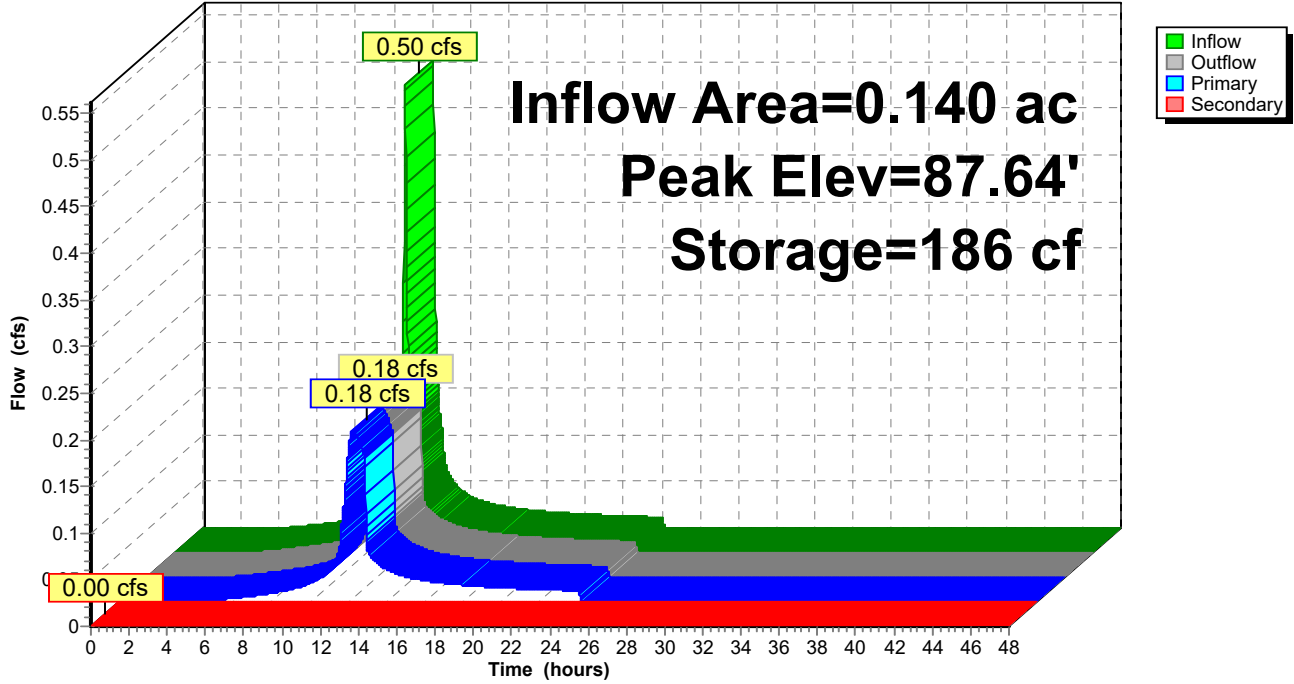
| Device | Routing   | Invert | Outlet Devices   |
|--------|-----------|--------|--|
| #1     | Primary   | 87.50' | <b>10.000 in/hr Exfiltration through Bioretention Layer over Surface area</b><br>Phase-In= 0.01' |
| #2     | Secondary | 88.50' | <b>30.0" Horiz. 30" Dia. Domed Grate</b> C= 0.600<br>Limited to weir flow at low heads           |

**Primary OutFlow** Max=0.18 cfs @ 12.24 hrs HW=87.64' TW=84.78' (Dynamic Tailwater)  
 ↑1=Exfiltration through Bioretention Layer(Exfiltration Controls 0.18 cfs)

**Secondary OutFlow** Max=0.00 cfs @ 0.00 hrs HW=87.50' TW=84.49' (Dynamic Tailwater)  
 ↑2=30" Dia. Domed Grate ( Controls 0.00 cfs)

Pond 253P-A: BIO-POND C PONDING LAYER

Hydrograph



**Postdevelopment 0NH-Stratham 41 Portsmouth Ave 24-hr S1 10-yr 10-yr (+15%) Rainfall=5.63"**

Prepared by Emanuel Engineering

Printed 4/27/2026

HydroCAD® 10.20-8a s/n 01104 © 2025 HydroCAD Software Solutions LLC

Page 178

**Summary for Pond 253P-B: BIO-POND C SUBSURFACE**

Inflow Area = 0.687 ac, 81.83% Impervious, Inflow Depth > 4.38" for 10-yr (+15%) event  
 Inflow = 0.33 cfs @ 16.17 hrs, Volume= 0.251 af  
 Outflow = 0.33 cfs @ 16.17 hrs, Volume= 0.251 af, Atten= 0%, Lag= 0.0 min  
 Primary = 0.33 cfs @ 16.17 hrs, Volume= 0.251 af  
 Routed to Pond 104P : EXISTING CULVERT

Routing by Dyn-Stor-Ind method, Time Span= 0.00-48.00 hrs, dt= 0.01 hrs / 2  
 Peak Elev= 84.87' @ 16.17 hrs Surf.Area= 1,130 sf Storage= 0 cf

Plug-Flow detention time= 0.0 min calculated for 0.251 af (100% of inflow)  
 Center-of-Mass det. time= 0.0 min ( 1,143.1 - 1,143.0 )

| Volume           | Invert            | Avail.Storage | Storage Description  |                        |                  |  |
|------------------|-------------------|---------------|--|------------------------|------------------|--|
| #1               | 84.49'            | 683 cf        | <b>Bioretention Soil Mix (Pyramidal)</b> Listed below (Recalc) |                        |                  |  |
| Elevation (feet) | Surf.Area (sq-ft) | Voids (%)     | Inc.Store (cubic-feet)   | Cum.Store (cubic-feet) | Wet.Area (sq-ft) |  |
| 84.49            | 1,130             | 0.0           | 0  | 0                      | 1,130            |  |
| 84.50            | 1,130             | 0.1           | 0  | 0                      | 1,131            |  |
| 85.49            | 1,130             | 0.1           | 1  | 1                      | 1,264            |  |
| 85.50            | 1,130             | 30.0          | 3  | 5                      | 1,266            |  |
| 87.50            | 1,130             | 30.0          | 678  | 683                    | 1,535            |  |

| Device | Routing  | Invert | Outlet Devices   |
|--------|----------|--------|--|
| #1     | Primary  | 82.55' | <b>12.0" Round 12" HDPE Pipe</b><br>L= 285.0' CPP, projecting, no headwall, Ke= 0.900<br>Inlet / Outlet Invert= 82.55' / 81.80' S= 0.0026 '/' Cc= 0.900<br>n= 0.013 Corrugated PE, smooth interior, Flow Area= 0.79 sf |
| #2     | Device 1 | 84.50' | <b>6.0" Vert. 6" Diameter Underdrain Entrance into CB</b> C= 0.600<br>Limited to weir flow at low heads  |

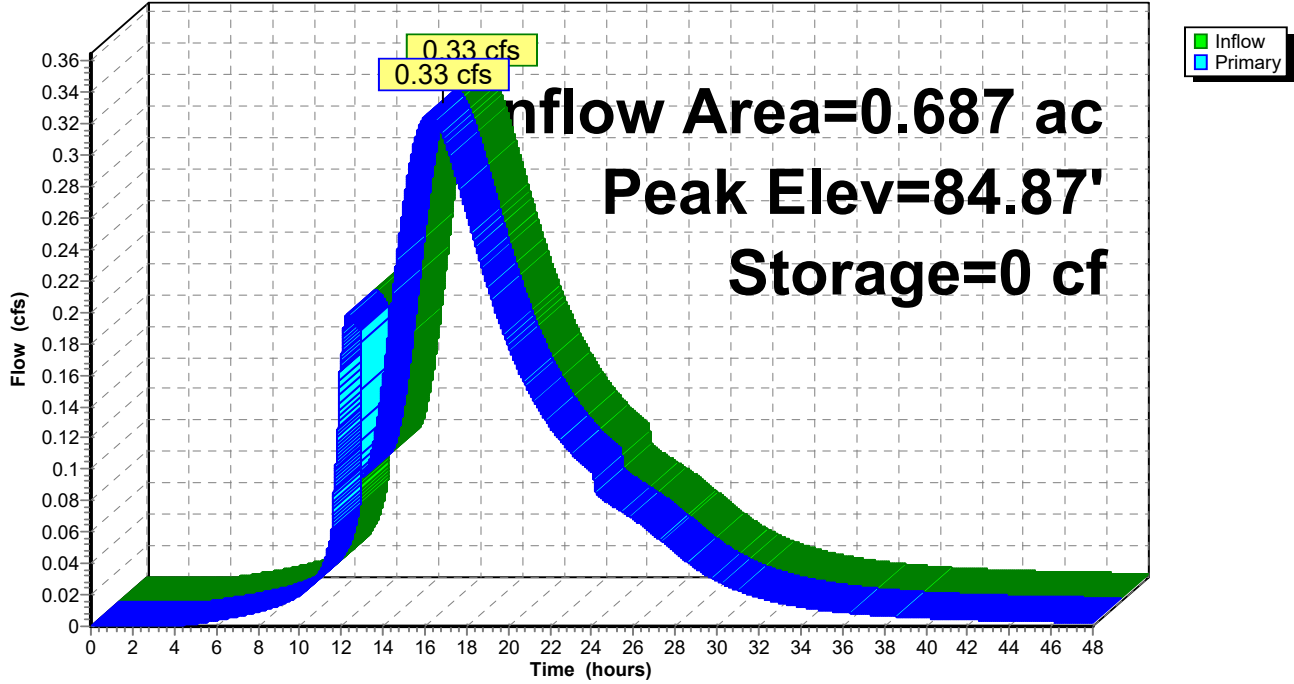
**Primary OutFlow** Max=0.33 cfs @ 16.17 hrs HW=84.87' TW=82.09' (Dynamic Tailwater)

↑ **1=12" HDPE Pipe** (Passes 0.33 cfs of 2.75 cfs potential flow)

↑ **2=6" Diameter Underdrain Entrance into CB**(Orifice Controls 0.33 cfs @ 2.08 fps)

Pond 253P-B: BIO-POND C SUBSURFACE

Hydrograph



**Postdevelopment 0NH-Stratham 41 Portsmouth Ave 24-hr S1 10-yr 10-yr (+15%) Rainfall=5.63"**

Prepared by Emanuel Engineering

Printed 4/27/2026

HydroCAD® 10.20-8a s/n 01104 © 2025 HydroCAD Software Solutions LLC

Page 180

**Summary for Pond 253P-C: POROUS PAVEMENT A**

Inflow Area = 0.547 ac, 93.10% Impervious, Inflow Depth = 5.16" for 10-yr (+15%) event  
 Inflow = 0.41 cfs @ 14.80 hrs, Volume= 0.235 af  
 Outflow = 0.30 cfs @ 16.22 hrs, Volume= 0.207 af, Atten= 25%, Lag= 85.2 min  
 Primary = 0.30 cfs @ 16.22 hrs, Volume= 0.207 af  
 Routed to Pond 253P-B : BIO-POND C SUBSURFACE

Routing by Dyn-Stor-Ind method, Time Span= 0.00-48.00 hrs, dt= 0.01 hrs / 2  
 Peak Elev= 85.76' @ 16.22 hrs Surf.Area= 13,450 sf Storage= 3,693 cf

Plug-Flow detention time= 312.2 min calculated for 0.207 af (88% of inflow)  
 Center-of-Mass det. time= 241.8 min ( 1,207.5 - 965.6 )

| Volume | Invert | Avail.Storage | Storage Description                                      |
|--------|--------|---------------|--|
| #1     | 85.07' | 17,431 cf     | <b>Porous Pavement (Prismatic)</b> Listed below (Recalc) |

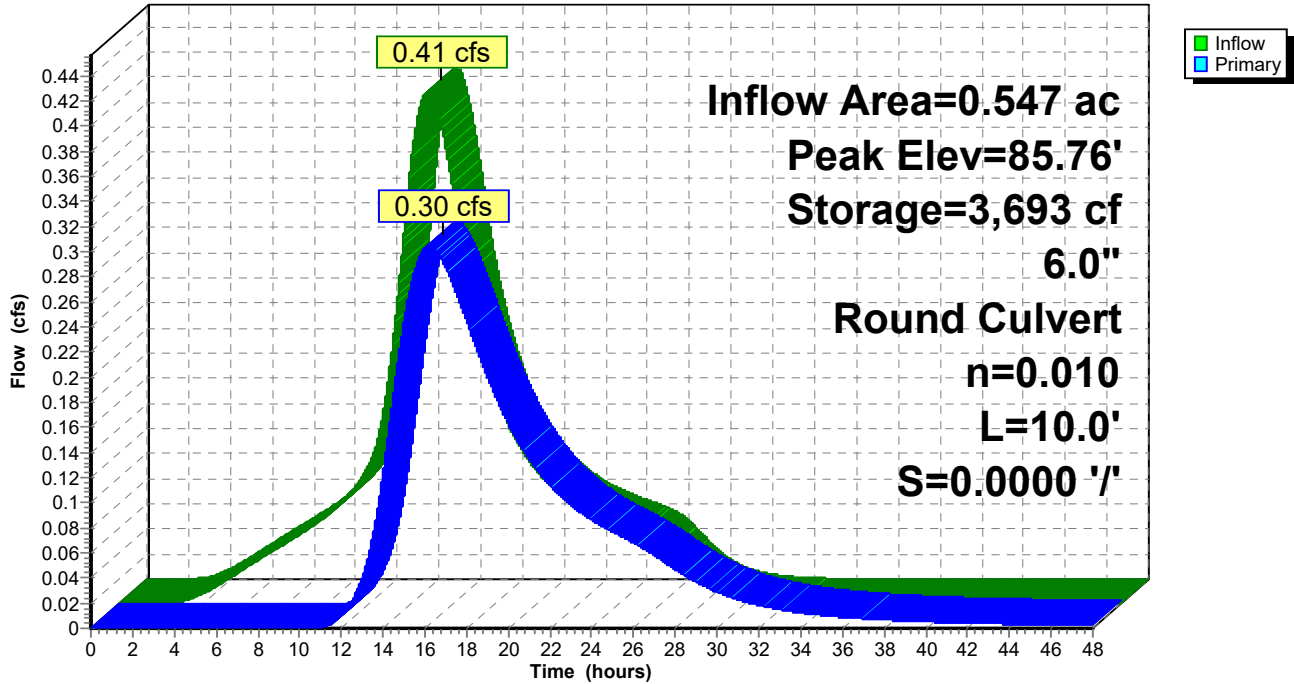
| Elevation<br>(feet) | Surf.Area<br>(sq-ft) | Voids<br>(%) | Inc.Store<br>(cubic-feet) | Cum.Store<br>(cubic-feet) |
|---------------------|----------------------|--------------|---------------------------|---------------------------|
| 85.07               | 13,450               | 0.0          | 0                         | 0                         |
| 85.08               | 13,450               | 40.0         | 54                        | 54                        |
| 86.24               | 13,450               | 40.0         | 6,241                     | 6,295                     |
| 86.25               | 13,450               | 30.0         | 40                        | 6,335                     |
| 89.00               | 13,450               | 30.0         | 11,096                    | 17,431                    |

| Device | Routing | Invert | Outlet Devices   |
|--------|---------|--------|--|
| #1     | Primary | 85.25' | <b>6.0" Round 6" SDR-35 Underdrain</b><br>L= 10.0' CPP, projecting, no headwall, Ke= 0.900<br>Inlet / Outlet Invert= 85.25' / 85.25' S= 0.0000 '/ Cc= 0.900<br>n= 0.010 PVC, smooth interior, Flow Area= 0.20 sf |

**Primary OutFlow** Max=0.30 cfs @ 16.22 hrs HW=85.76' TW=84.87' (Dynamic Tailwater)  
 ↑1=6" SDR-35 Underdrain (Barrel Controls 0.30 cfs @ 1.90 fps)

### Pond 253P-C: POROUS PAVEMENT A

Hydrograph



**Summary for Pond 254P-A: BIO-POND D PONDING LAYER**

Inflow Area = 0.554 ac, 63.73% Impervious, Inflow Depth = 4.38" for 10-yr (+15%) event  
 Inflow = 2.05 cfs @ 12.06 hrs, Volume= 0.202 af  
 Outflow = 0.62 cfs @ 12.37 hrs, Volume= 0.202 af, Atten= 70%, Lag= 18.1 min  
 Primary = 0.62 cfs @ 12.37 hrs, Volume= 0.202 af  
     Routed to Pond 254P-B : BIO-POND D SUBSURFACE  
 Secondary = 0.00 cfs @ 0.00 hrs, Volume= 0.000 af  
     Routed to Pond 255P-A : BIO-POND E PONDING LAYER

Routing by Dyn-Stor-Ind method, Time Span= 0.00-48.00 hrs, dt= 0.01 hrs / 2  
 Peak Elev= 87.86' @ 12.37 hrs Surf.Area= 2,679 sf Storage= 1,048 cf  
 Flood Elev= 88.90' Surf.Area= 3,405 sf Storage= 4,112 cf

Plug-Flow detention time= 6.8 min calculated for 0.202 af (100% of inflow)  
 Center-of-Mass det. time= 6.8 min ( 815.3 - 808.5 )

| Volume | Invert | Avail.Storage | Storage Description                                   |
|--------|--------|---------------|---|
| #1     | 87.50' | 4,405 cf      | <b>Bioretention Ponding Area (Conic)</b> listed below |

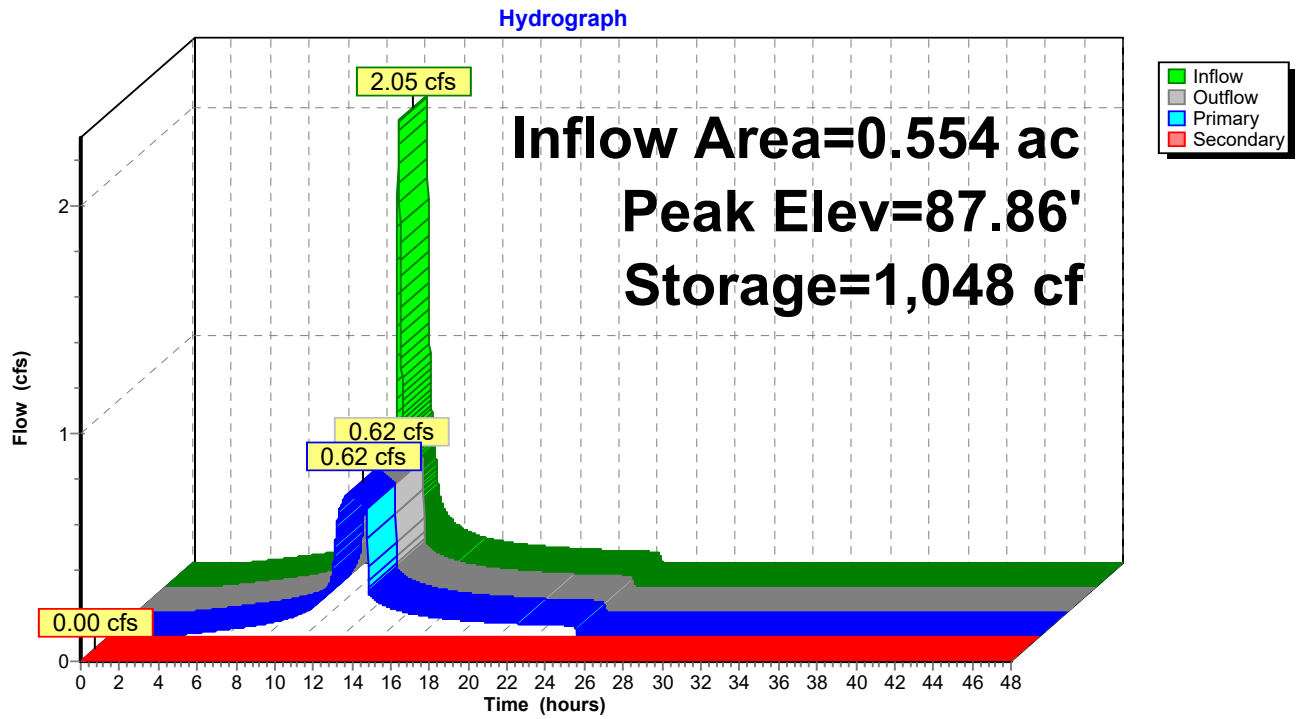
| Elevation (feet) | Surf.Area (sq-ft) | Inc.Store (cubic-feet) | Cum.Store (cubic-feet) | Wet.Area (sq-ft) |
|------------------|-------------------|------------------------|------------------------|------------------|
| 87.50            | 2,430             | 0                      | 0                      | 2,430            |
| 89.00            | 3,475             | 4,405                  | 4,405                  | 3,514            |

| Device | Routing   | Invert | Outlet Devices   |
|--------|-----------|--------|--|
| #1     | Primary   | 87.50' | <b>10.000 in/hr Exfiltration through Bioretention Media over Surface area</b><br>Phase-In= 0.01'   |
| #2     | Secondary | 88.80' | <b>20.0' long x 11.0' breadth Broad-Crested Rectangular Weir</b><br>Head (feet) 0.20 0.40 0.60 0.80 1.00 1.20 1.40 1.60<br>Coef. (English) 2.53 2.59 2.70 2.68 2.67 2.68 2.66 2.64 |

**Primary OutFlow** Max=0.62 cfs @ 12.37 hrs HW=87.86' TW=85.44' (Dynamic Tailwater)  
 ↑1=Exfiltration through Bioretention Media(Exfiltration Controls 0.62 cfs)

**Secondary OutFlow** Max=0.00 cfs @ 0.00 hrs HW=87.50' TW=86.50' (Dynamic Tailwater)  
 ↑2=Broad-Crested Rectangular Weir( Controls 0.00 cfs)

Pond 254P-A: BIO-POND D PONDING LAYER



**Postdevelopment 0NH-Stratham 41 Portsmouth Ave 24-hr S1 10-yr 10-yr (+15%) Rainfall=5.63"**

Prepared by Emanuel Engineering

Printed 4/27/2026

HydroCAD® 10.20-8a s/n 01104 © 2025 HydroCAD Software Solutions LLC

Page 184

**Summary for Pond 254P-B: BIO-POND D SUBSURFACE**

Inflow Area = 0.554 ac, 63.73% Impervious, Inflow Depth = 4.38" for 10-yr (+15%) event  
 Inflow = 0.62 cfs @ 12.37 hrs, Volume= 0.202 af  
 Outflow = 0.62 cfs @ 12.37 hrs, Volume= 0.202 af, Atten= 0%, Lag= 0.3 min  
 Primary = 0.62 cfs @ 12.37 hrs, Volume= 0.202 af  
 Routed to Pond 255P-B : BIO-POND E SUBSURFACE

Routing by Dyn-Stor-Ind method, Time Span= 0.00-48.00 hrs, dt= 0.01 hrs / 2  
 Peak Elev= 85.44' @ 12.37 hrs Surf.Area= 3,475 sf Storage= 7 cf

Plug-Flow detention time= 0.4 min calculated for 0.202 af (100% of inflow)  
 Center-of-Mass det. time= 0.2 min ( 815.6 - 815.3 )

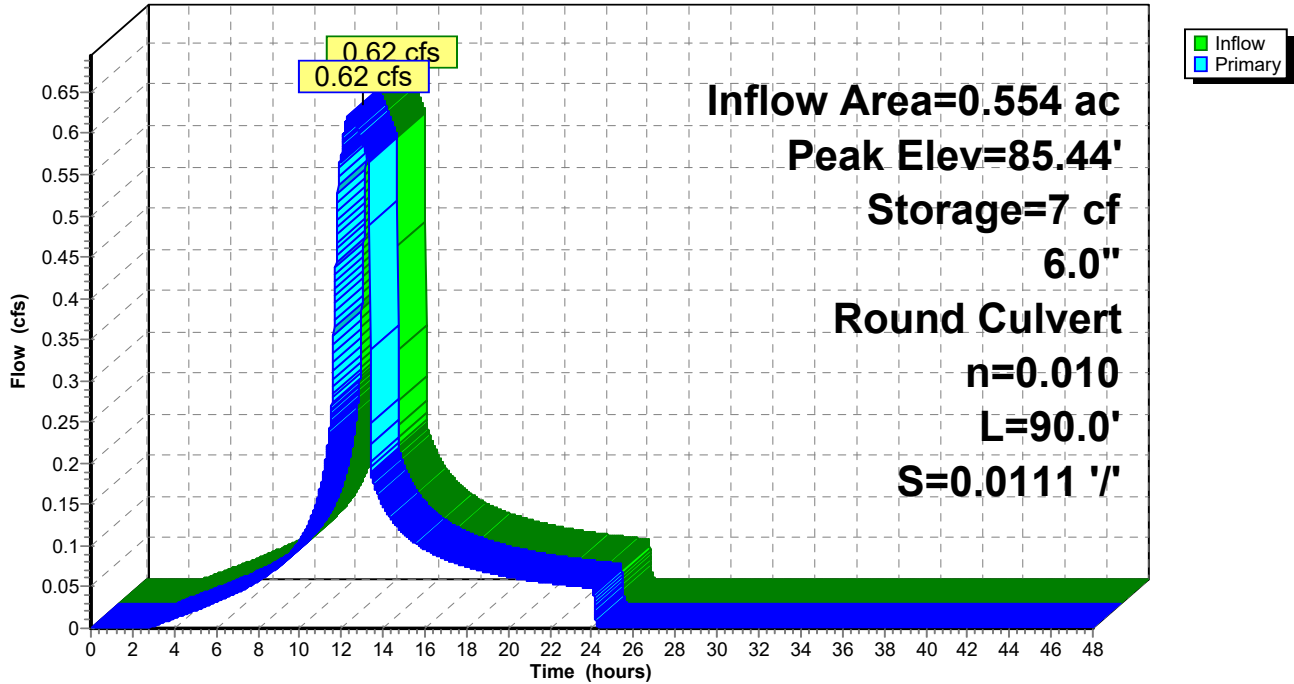
| Volume              | Invert               | Avail.Storage | Storage Description  |                           |                     |  |
|---------------------|----------------------|---------------|--|---------------------------|---------------------|--|
| #1                  | 84.49'               | 2,102 cf      | <b>Bioretention Mix and Stone Storage (Conic)</b> listed below |                           |                     |  |
| Elevation<br>(feet) | Surf.Area<br>(sq-ft) | Voids<br>(%)  | Inc.Store<br>(cubic-feet)                                      | Cum.Store<br>(cubic-feet) | Wet.Area<br>(sq-ft) |  |
| 84.49               | 3,475                | 0.0           | 0  | 0                         | 3,475               |  |
| 84.50               | 3,475                | 0.2           | 0  | 0                         | 3,477               |  |
| 85.49               | 3,475                | 0.2           | 7  | 7                         | 3,684               |  |
| 85.50               | 3,475                | 30.0          | 10   | 17                        | 3,686               |  |
| 87.50               | 3,475                | 30.0          | 2,085  | 2,102                     | 4,104               |  |

| Device | Routing | Invert | Outlet Devices  |
|--------|---------|--------|---|
| #1     | Primary | 84.50' | <b>6.0" Round 6" SDR-35 Pipe</b><br>L= 90.0' CPP, projecting, no headwall, Ke= 0.900<br>Inlet / Outlet Invert= 84.50' / 83.50' S= 0.0111 ' / Cc= 0.900<br>n= 0.010 PVC, smooth interior, Flow Area= 0.20 sf |

**Primary OutFlow** Max=0.62 cfs @ 12.37 hrs HW=85.44' TW=84.32' (Dynamic Tailwater)  
 ↑1=6" SDR-35 Pipe (Inlet Controls 0.62 cfs @ 3.16 fps)

### Pond 254P-B: BIO-POND D SUBSURFACE

Hydrograph



**Summary for Pond 255P-A: BIO-POND E PONDING LAYER**

Inflow Area = 1.009 ac, 78.74% Impervious, Inflow Depth = 4.82" for 10-yr (+15%) event  
 Inflow = 4.46 cfs @ 12.04 hrs, Volume= 0.405 af  
 Outflow = 1.08 cfs @ 12.36 hrs, Volume= 0.405 af, Atten= 76%, Lag= 19.7 min  
 Primary = 0.75 cfs @ 12.36 hrs, Volume= 0.397 af  
     Routed to Pond 255P-B : BIO-POND E SUBSURFACE  
 Secondary = 0.34 cfs @ 12.36 hrs, Volume= 0.008 af  
     Routed to Pond 255P-B : BIO-POND E SUBSURFACE

Routing by Dyn-Stor-Ind method, Time Span= 0.00-48.00 hrs, dt= 0.01 hrs / 2  
 Peak Elev= 87.56' @ 12.36 hrs Surf.Area= 3,223 sf Storage= 3,146 cf  
 Flood Elev= 88.00' Surf.Area= 3,550 sf Storage= 4,471 cf

Plug-Flow detention time= 20.6 min calculated for 0.405 af (100% of inflow)  
 Center-of-Mass det. time= 20.6 min ( 805.4 - 784.8 )

| Volume | Invert | Avail.Storage | Storage Description                                   |
|--------|--------|---------------|---|
| #1     | 86.50' | 4,471 cf      | <b>Bioretention Ponding Area (Conic)</b> listed below |

| Elevation<br>(feet) | Surf.Area<br>(sq-ft) | Inc.Store<br>(cubic-feet) | Cum.Store<br>(cubic-feet) | Wet.Area<br>(sq-ft) |
|---------------------|----------------------|---------------------------|---------------------------|---------------------|
| 86.50               | 2,445                | 0                         | 0                         | 2,445               |
| 88.00               | 3,550                | 4,471                     | 4,471                     | 3,587               |

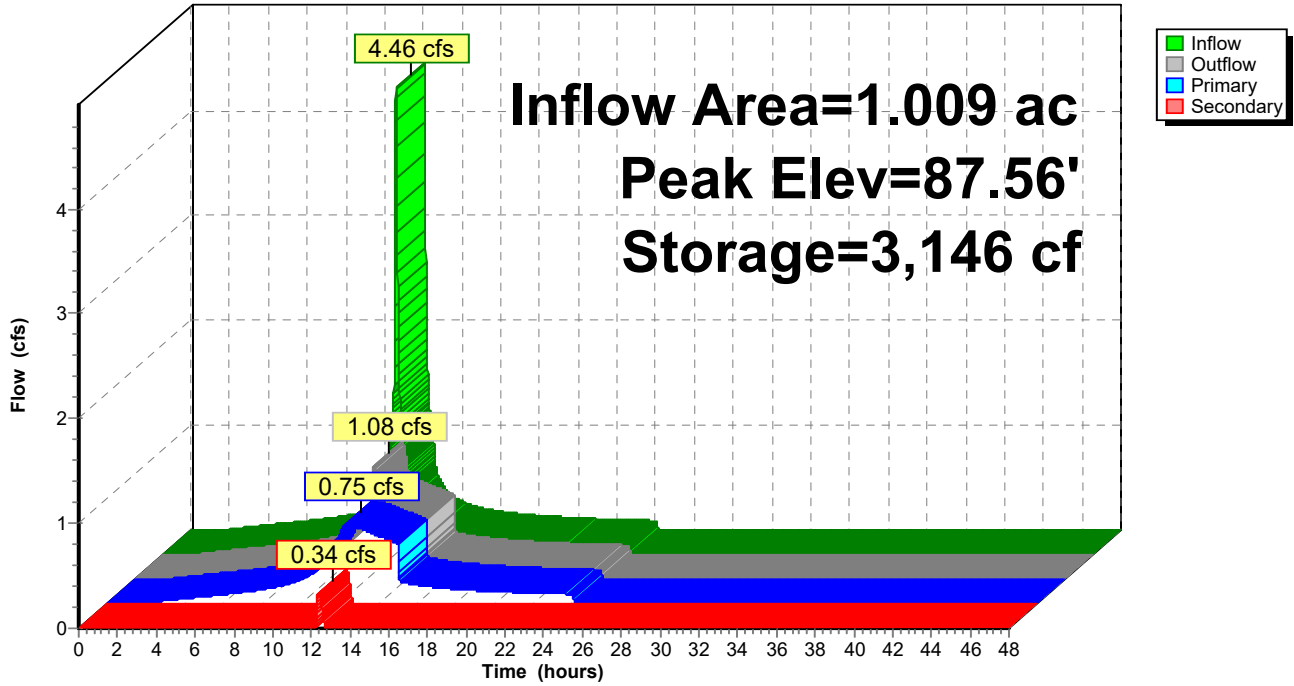
| Device | Routing   | Invert | Outlet Devices   |
|--------|-----------|--------|--|
| #1     | Primary   | 86.50' | <b>10.000 in/hr Exfiltration through Bioretention Media over Surface area</b><br>Phase-In= 0.01' |
| #2     | Secondary | 87.50' | <b>30.0" Horiz. Orifice/Grate</b> C= 0.600<br>Limited to weir flow at low heads                  |

**Primary OutFlow** Max=0.75 cfs @ 12.36 hrs HW=87.56' TW=84.32' (Dynamic Tailwater)  
 ↑1=Exfiltration through Bioretention Media(Exfiltration Controls 0.75 cfs)

**Secondary OutFlow** Max=0.34 cfs @ 12.36 hrs HW=87.56' TW=84.32' (Dynamic Tailwater)  
 ↑2=Orifice/Grate (Weir Controls 0.34 cfs @ 0.77 fps)

### Pond 255P-A: BIO-POND E PONDING LAYER

Hydrograph



**Postdevelopment 0NH-Stratham 41 Portsmouth Ave 24-hr S1 10-yr 10-yr (+15%) Rainfall=5.63"**

Prepared by Emanuel Engineering

Printed 4/27/2026

HydroCAD® 10.20-8a s/n 01104 © 2025 HydroCAD Software Solutions LLC

Page 188

**Summary for Pond 255P-B: BIO-POND E SUBSURFACE**

Inflow Area = 1.562 ac, 73.42% Impervious, Inflow Depth = 4.66" for 10-yr (+15%) event  
 Inflow = 1.70 cfs @ 12.36 hrs, Volume= 0.607 af  
 Outflow = 1.70 cfs @ 12.37 hrs, Volume= 0.607 af, Atten= 0%, Lag= 0.1 min  
 Primary = 1.70 cfs @ 12.37 hrs, Volume= 0.607 af  
 Routed to Pond 262P : SOUTH ISLAND CATCH BASIN

Routing by Dyn-Stor-Ind method, Time Span= 0.00-48.00 hrs, dt= 0.01 hrs / 2  
 Peak Elev= 84.32' @ 12.36 hrs Surf.Area= 3,550 sf Storage= 12 cf

Plug-Flow detention time= 0.4 min calculated for 0.607 af (100% of inflow)  
 Center-of-Mass det. time= 0.2 min ( 809.0 - 808.8 )

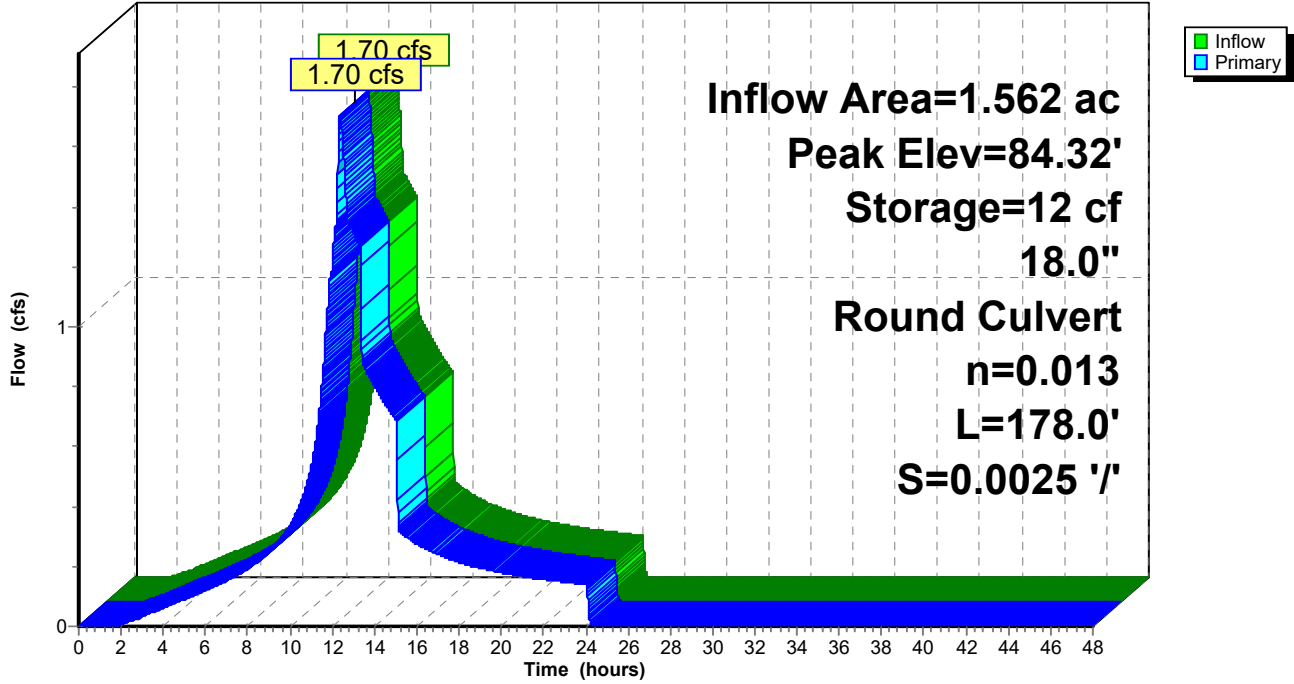
| Volume              | Invert               | Avail.Storage | Storage Description  |                           |                     |  |
|---------------------|----------------------|---------------|--|---------------------------|---------------------|--|
| #1                  | 83.49'               | 2,155 cf      | <b>Bioretention Mix and Stone Storage (Pyramidal)</b> listed below |                           |                     |  |
| Elevation<br>(feet) | Surf.Area<br>(sq-ft) | Voids<br>(%)  | Inc.Store<br>(cubic-feet)  | Cum.Store<br>(cubic-feet) | Wet.Area<br>(sq-ft) |  |
| 83.49               | 3,550                | 0.0           | 0  | 0                         | 3,550               |  |
| 83.50               | 3,550                | 0.4           | 0  | 0                         | 3,552               |  |
| 84.49               | 3,550                | 0.4           | 14   | 14                        | 3,788               |  |
| 84.50               | 3,550                | 30.0          | 11   | 25                        | 3,791               |  |
| 86.50               | 3,550                | 30.0          | 2,130  | 2,155                     | 4,267               |  |

| Device | Routing | Invert | Outlet Devices   |
|--------|---------|--------|--|
| #1     | Primary | 83.50' | <b>18.0" Round 18" HDPE Pipe</b><br>L= 178.0' CPP, projecting, no headwall, Ke= 0.900<br>Inlet / Outlet Invert= 83.50' / 83.06' S= 0.0025 ' / Cc= 0.900<br>n= 0.013 Corrugated PE, smooth interior, Flow Area= 1.77 sf |

**Primary OutFlow** Max=1.70 cfs @ 12.37 hrs HW=84.32' TW=83.76' (Dynamic Tailwater)  
 ↑ **1=18" HDPE Pipe** (Outlet Controls 1.70 cfs @ 2.49 fps)

**Pond 255P-B: BIO-POND E SUBSURFACE**

Hydrograph



**Postdevelopment 0NH-Stratham 41 Portsmouth Ave 24-hr S1 10-yr 10-yr (+15%) Rainfall=5.63"**

Prepared by Emanuel Engineering

Printed 4/27/2026

HydroCAD® 10.20-8a s/n 01104 © 2025 HydroCAD Software Solutions LLC

Page 190

**Summary for Pond 256P: RIVER ROAD CB**

Inflow Area = 0.398 ac, 29.77% Impervious, Inflow Depth = 3.55" for 10-yr (+15%) event  
 Inflow = 1.38 cfs @ 12.04 hrs, Volume= 0.118 af  
 Outflow = 1.37 cfs @ 12.04 hrs, Volume= 0.117 af, Atten= 0%, Lag= 0.1 min  
 Primary = 1.37 cfs @ 12.04 hrs, Volume= 0.117 af  
     Routed to Pond 257P : BARNYARD CB  
 Secondary = 0.00 cfs @ 0.00 hrs, Volume= 0.000 af  
     Routed to Pond 257P : BARNYARD CB

Routing by Dyn-Stor-Ind method, Time Span= 0.00-48.00 hrs, dt= 0.01 hrs / 2  
 Peak Elev= 82.46' @ 12.05 hrs Surf.Area= 13 sf Storage= 54 cf  
 Flood Elev= 85.00' Surf.Area= 2,013 sf Storage= 682 cf

Plug-Flow detention time= 9.0 min calculated for 0.117 af (99% of inflow)  
 Center-of-Mass det. time= 4.3 min ( 845.0 - 840.6 )

| Volume | Invert | Avail.Storage | Storage Description                                    |
|--------|--------|---------------|--|
| #1     | 78.18' | 75 cf         | <b>4.00'D x 6.00'H Vertical Cone/Cylinder</b>          |
| #2     | 84.18' | 3,994 cf      | <b>Custom Stage Data (Conic) Listed below (Recalc)</b> |
|        |        | 4,070 cf      | Total Available Storage                                |

| Elevation<br>(feet) | Surf.Area<br>(sq-ft) | Inc.Store<br>(cubic-feet) | Cum.Store<br>(cubic-feet) | Wet.Area<br>(sq-ft) |
|---------------------|----------------------|---------------------------|---------------------------|---------------------|
| 84.18               | 20                   | 0                         | 0                         | 20                  |
| 85.00               | 2,000                | 607                       | 607                       | 2,001               |
| 86.00               | 5,000                | 3,387                     | 3,994                     | 5,008               |

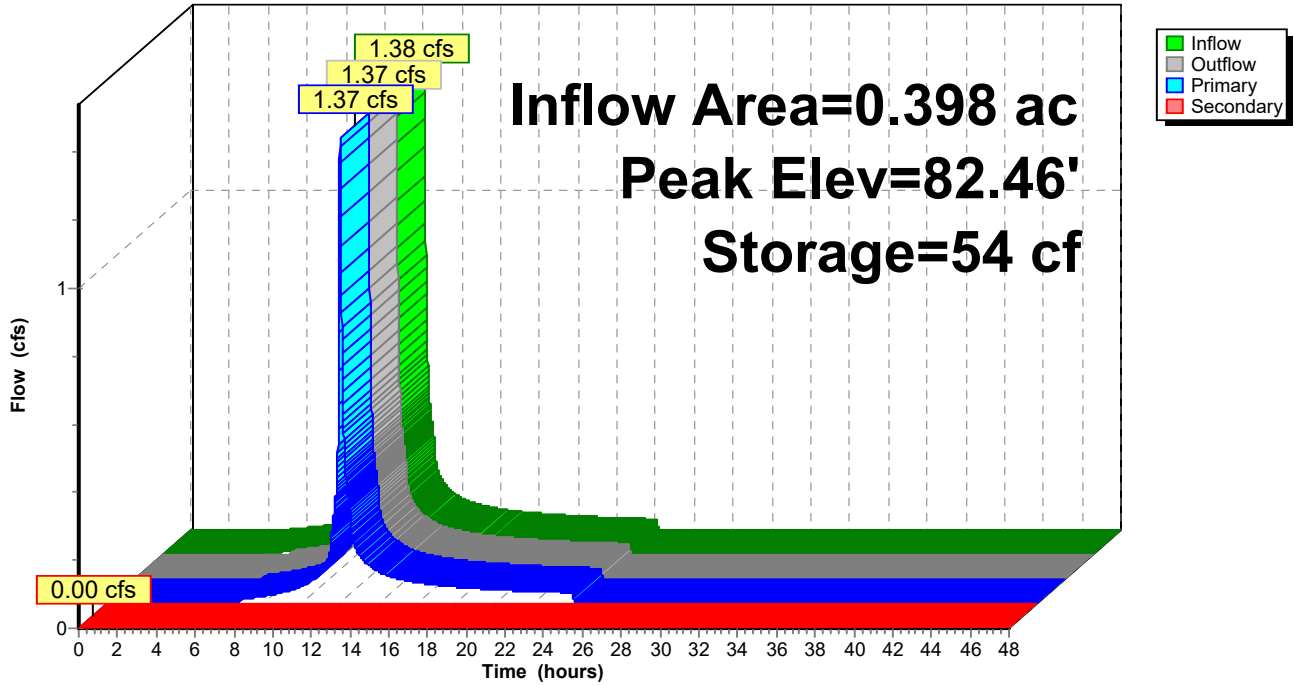
| Device | Routing   | Invert | Outlet Devices  |
|--------|-----------|--------|---|
| #1     | Primary   | 81.40' | <b>12.0" Round 12" Concrete Pipe</b><br>L= 120.0' RCP, sq.cut end projecting, Ke= 0.500<br>Inlet / Outlet Invert= 81.40' / 80.90' S= 0.0042 ' S= 0.0042 ' Cc= 0.900<br>n= 0.011 Concrete pipe, straight & clean, Flow Area= 0.79 sf |
| #2     | Secondary | 85.15' | <b>50.0' long x 120.0' breadth Broad-Crested Rectangular Weir</b><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=1.30 cfs @ 12.04 hrs HW=82.45' TW=82.23' (Dynamic Tailwater)  
 ↑1=12" Concrete Pipe (Outlet Controls 1.30 cfs @ 1.96 fps)

**Secondary OutFlow** Max=0.00 cfs @ 0.00 hrs HW=78.18' TW=77.56' (Dynamic Tailwater)  
 ↑2=Broad-Crested Rectangular Weir ( Controls 0.00 cfs)

Pond 256P: RIVER ROAD CB

Hydrograph



**Postdevelopment 0NH-Stratham 41 Portsmouth Ave 24-hr S1 10-yr 10-yr (+15%) Rainfall=5.63"**

Prepared by Emanuel Engineering

Printed 4/27/2026

HydroCAD® 10.20-8a s/n 01104 © 2025 HydroCAD Software Solutions LLC

Page 192

**Summary for Pond 257P: BARNYARD CB**

Inflow Area = 0.518 ac, 27.70% Impervious, Inflow Depth = 3.48" for 10-yr (+15%) event  
 Inflow = 1.76 cfs @ 12.04 hrs, Volume= 0.150 af  
 Outflow = 1.75 cfs @ 12.04 hrs, Volume= 0.149 af, Atten= 1%, Lag= 0.1 min  
 Primary = 1.75 cfs @ 12.04 hrs, Volume= 0.149 af  
     Routed to Pond 258P : 24" HDPE UNDER RIVER ROAD  
 Secondary = 0.00 cfs @ 0.00 hrs, Volume= 0.000 af  
     Routed to Pond 258P : 24" HDPE UNDER RIVER ROAD

Routing by Dyn-Stor-Ind method, Time Span= 0.00-48.00 hrs, dt= 0.01 hrs / 2  
 Peak Elev= 82.27' @ 12.06 hrs Surf.Area= 13 sf Storage= 59 cf  
 Flood Elev= 84.00' Surf.Area= 213 sf Storage= 117 cf

Plug-Flow detention time= 7.0 min calculated for 0.149 af (99% of inflow)  
 Center-of-Mass det. time= 3.4 min ( 849.1 - 845.7 )

| Volume | Invert | Avail.Storage | Storage Description                                    |
|--------|--------|---------------|--|
| #1     | 77.56' | 75 cf         | <b>4.00'D x 6.00'H Vertical Cone/Cylinder</b>          |
| #2     | 83.56' | 850 cf        | <b>Custom Stage Data (Conic) Listed below (Recalc)</b> |
|        |        | 925 cf        | Total Available Storage                                |

| Elevation<br>(feet) | Surf.Area<br>(sq-ft) | Inc.Store<br>(cubic-feet) | Cum.Store<br>(cubic-feet) | Wet.Area<br>(sq-ft) |
|---------------------|----------------------|---------------------------|---------------------------|---------------------|
| 83.56               | 20                   | 0                         | 0                         | 20                  |
| 84.00               | 200                  | 42                        | 42                        | 201                 |
| 85.00               | 1,650                | 808                       | 850                       | 1,654               |

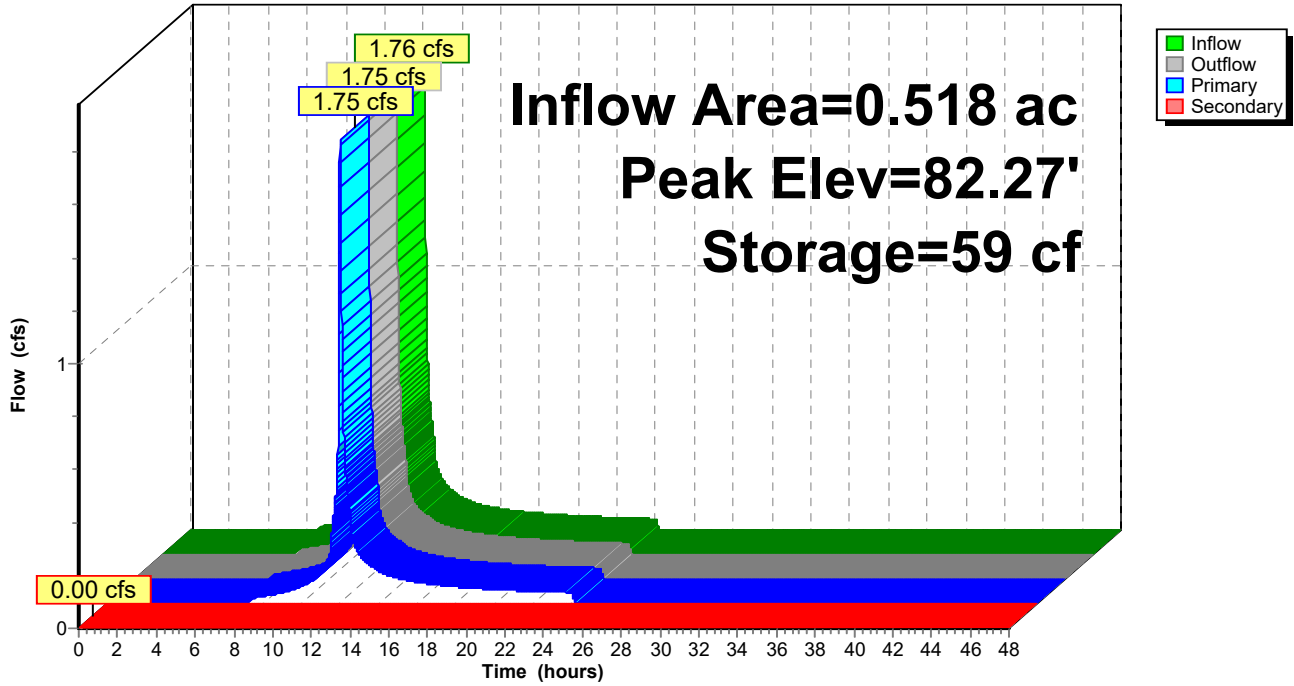
| Device | Routing   | Invert | Outlet Devices  |
|--------|-----------|--------|---|
| #1     | Primary   | 80.65' | <b>12.0" Round 12" Concrete Pipe</b><br>L= 130.0' RCP, groove end projecting, Ke= 0.200<br>Inlet / Outlet Invert= 80.65' / 80.40' S= 0.0019 '/' Cc= 0.900<br>n= 0.011 Concrete pipe, straight & clean, Flow Area= 0.79 sf |
| #2     | Secondary | 84.40' | <b>50.0' long x 120.0' breadth Broad-Crested Rectangular Weir</b><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=1.75 cfs @ 12.04 hrs HW=82.23' TW=81.92' (Dynamic Tailwater)  
 ↑1=12" Concrete Pipe (Outlet Controls 1.75 cfs @ 2.23 fps)

**Secondary OutFlow** Max=0.00 cfs @ 0.00 hrs HW=77.56' TW=78.00' (Dynamic Tailwater)  
 ↑2=Broad-Crested Rectangular Weir ( Controls 0.00 cfs)

Pond 257P: BARNYARD CB

Hydrograph



**Postdevelopment 0NH-Stratham 41 Portsmouth Ave 24-hr S1 10-yr 10-yr (+15%) Rainfall=5.63"**

Prepared by Emanuel Engineering

Printed 4/27/2026

HydroCAD® 10.20-8a s/n 01104 © 2025 HydroCAD Software Solutions LLC

Page 194

**Summary for Pond 258P: 24" HDPE UNDER RIVER ROAD**

Inflow Area = 4.487 ac, 63.68% Impervious, Inflow Depth = 4.43" for 10-yr (+15%) event  
 Inflow = 7.07 cfs @ 12.04 hrs, Volume= 1.656 af  
 Outflow = 4.65 cfs @ 12.44 hrs, Volume= 1.558 af, Atten= 34%, Lag= 24.1 min  
 Primary = 4.65 cfs @ 12.44 hrs, Volume= 1.558 af  
 Routed to Link 9-2 : MAP 9 LOT 2  
 Secondary = 0.00 cfs @ 0.00 hrs, Volume= 0.000 af  
 Routed to Link 9-2 : MAP 9 LOT 2

Routing by Dyn-Stor-Ind method, Time Span= 0.00-48.00 hrs, dt= 0.01 hrs / 2  
 Peak Elev= 82.14' @ 12.44 hrs Surf.Area= 6,692 sf Storage= 13,941 cf  
 Flood Elev= 83.19' Surf.Area= 8,550 sf Storage= 20,377 cf

Plug-Flow detention time= 128.4 min calculated for 1.557 af (94% of inflow)  
 Center-of-Mass det. time= 93.7 min ( 902.4 - 808.7 )

| Volume           | Invert            | Avail.Storage          | Storage Description                           |                  |  |
|------------------|-------------------|------------------------|---|------------------|--|
| #1               | 78.00'            | 20,377 cf              | <b>Custom Stage Data (Conic)</b> Listed below |                  |  |
| Elevation (feet) | Surf.Area (sq-ft) | Inc.Store (cubic-feet) | Cum.Store (cubic-feet)                        | Wet.Area (sq-ft) |  |
| 78.00            | 1,645             | 0                      | 0   | 1,645            |  |
| 80.00            | 2,600             | 4,209                  | 4,209   | 2,654            |  |
| 82.00            | 6,400             | 8,719                  | 12,928  | 6,482            |  |
| 83.00            | 8,550             | 7,449                  | 20,377  | 8,654            |  |

| Device | Routing   | Invert | Outlet Devices  |  |
|--------|-----------|--------|---|--|
| #1     | Primary   | 79.60' | <b>24.0" Round 24" HDPE Pipe</b><br>L= 50.0' CPP, projecting, no headwall, Ke= 0.900<br>Inlet / Outlet Invert= 79.60' / 78.86' S= 0.0148 '/' Cc= 0.900<br>n= 0.013 Corrugated PE, smooth interior, Flow Area= 3.14 sf |  |
| #2     | Secondary | 82.99' | <b>50.0' long x 22.0' breadth Broad-Crested Rectangular Weir</b><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                                    |  |
| #3     | Device 1  | 82.00' | <b>30.0" Horiz. Orifice/Grate</b> C= 0.600<br>Limited to weir flow at low heads   |  |
| #4     | Device 1  | 80.00' | <b>4.0" Vert. Orifice/Grate</b> C= 0.600 Limited to weir flow at low heads  |  |
| #5     | Device 1  | 80.50' | <b>4.0" Vert. Orifice/Grate X 3.00</b> C= 0.600<br>Limited to weir flow at low heads  |  |
| #6     | Device 1  | 81.00' | <b>4.0" Vert. Orifice/Grate X 3.00</b> C= 0.600<br>Limited to weir flow at low heads  |  |

**Primary OutFlow** Max=4.65 cfs @ 12.44 hrs HW=82.14' TW=0.00' (Dynamic Tailwater)

1=24" HDPE Pipe (Passes 4.65 cfs of 14.80 cfs potential flow)

3=Orifice/Grate (Weir Controls 1.29 cfs @ 1.21 fps)

4=Orifice/Grate (Orifice Controls 0.59 cfs @ 6.76 fps)

5=Orifice/Grate (Orifice Controls 1.53 cfs @ 5.84 fps)

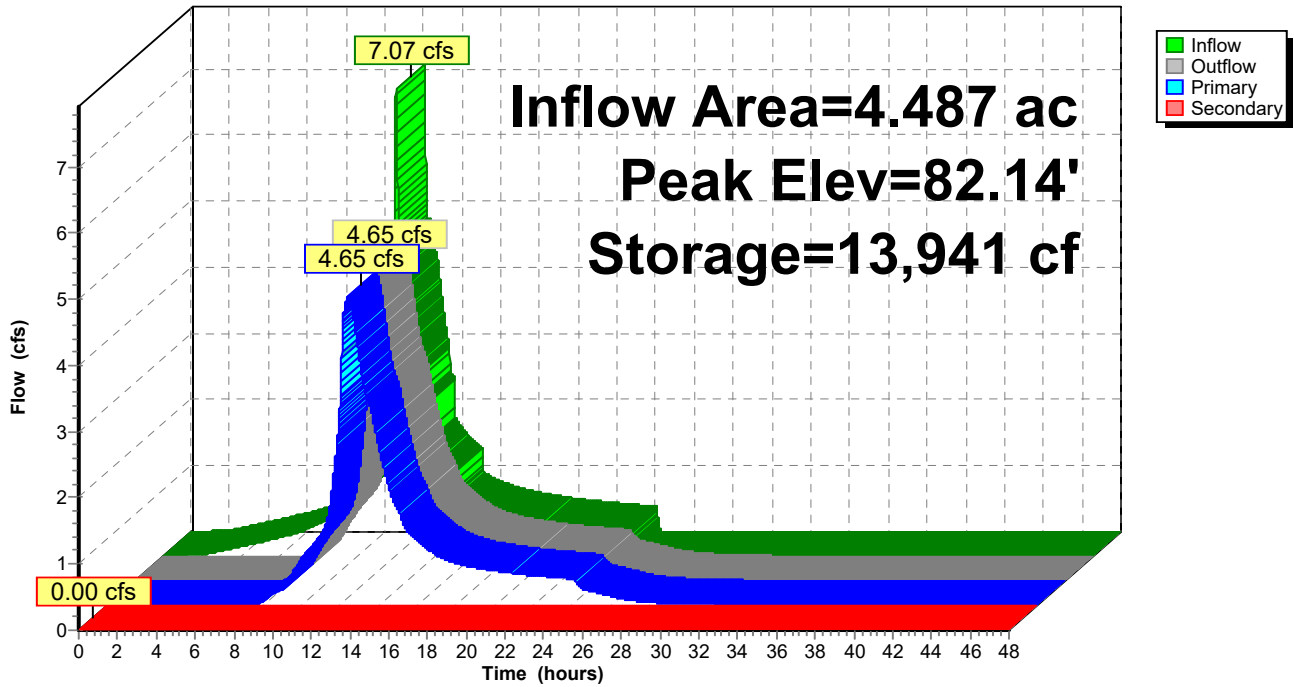
6=Orifice/Grate (Orifice Controls 1.24 cfs @ 4.74 fps)

**Secondary OutFlow** Max=0.00 cfs @ 0.00 hrs HW=78.00' TW=0.00' (Dynamic Tailwater)

2=Broad-Crested Rectangular Weir (Controls 0.00 cfs)

**Pond 258P: 24" HDPE UNDER RIVER ROAD**

Hydrograph



**Postdevelopment 0NH-Stratham 41 Portsmouth Ave 24-hr S1 10-yr 10-yr (+15%) Rainfall=5.63"**

Prepared by Emanuel Engineering

Printed 4/27/2026

HydroCAD® 10.20-8a s/n 01104 © 2025 HydroCAD Software Solutions LLC

Page 196

**Summary for Pond 259P-A: BIO-POND B PONDING LAYER**

Inflow Area = 1.224 ac, 80.12% Impervious, Inflow Depth = 4.81" for 10-yr (+15%) event  
 Inflow = 5.37 cfs @ 12.04 hrs, Volume= 0.491 af  
 Outflow = 1.18 cfs @ 12.42 hrs, Volume= 0.491 af, Atten= 78%, Lag= 23.1 min  
 Primary = 1.18 cfs @ 12.42 hrs, Volume= 0.491 af  
     Routed to Pond 259P-B : BIO-POND B SUBSURFACE  
 Secondary = 0.00 cfs @ 0.00 hrs, Volume= 0.000 af  
     Routed to Pond 259P-B : BIO-POND B SUBSURFACE

Routing by Dyn-Stor-Ind method, Time Span= 0.00-48.00 hrs, dt= 0.01 hrs / 2  
 Peak Elev= 87.08' @ 12.42 hrs Surf.Area= 5,114 sf Storage= 3,106 cf  
 Flood Elev= 87.90' Surf.Area= 6,202 sf Storage= 7,465 cf

Plug-Flow detention time= 11.3 min calculated for 0.491 af (100% of inflow)  
 Center-of-Mass det. time= 11.3 min ( 792.7 - 781.4 )

| Volume | Invert | Avail.Storage | Storage Description                                       |
|--------|--------|---------------|---|
| #1     | 86.50' | 7,961 cf      | <b>Ponding Layer of Bioretention (Conic)</b> listed below |
| #2     | 86.50' | 35 cf         | <b>12.0" Round 12" HDPE Pipe</b> -Impervious<br>L= 45.0'  |
|        |        | 7,996 cf      | Total Available Storage                                   |

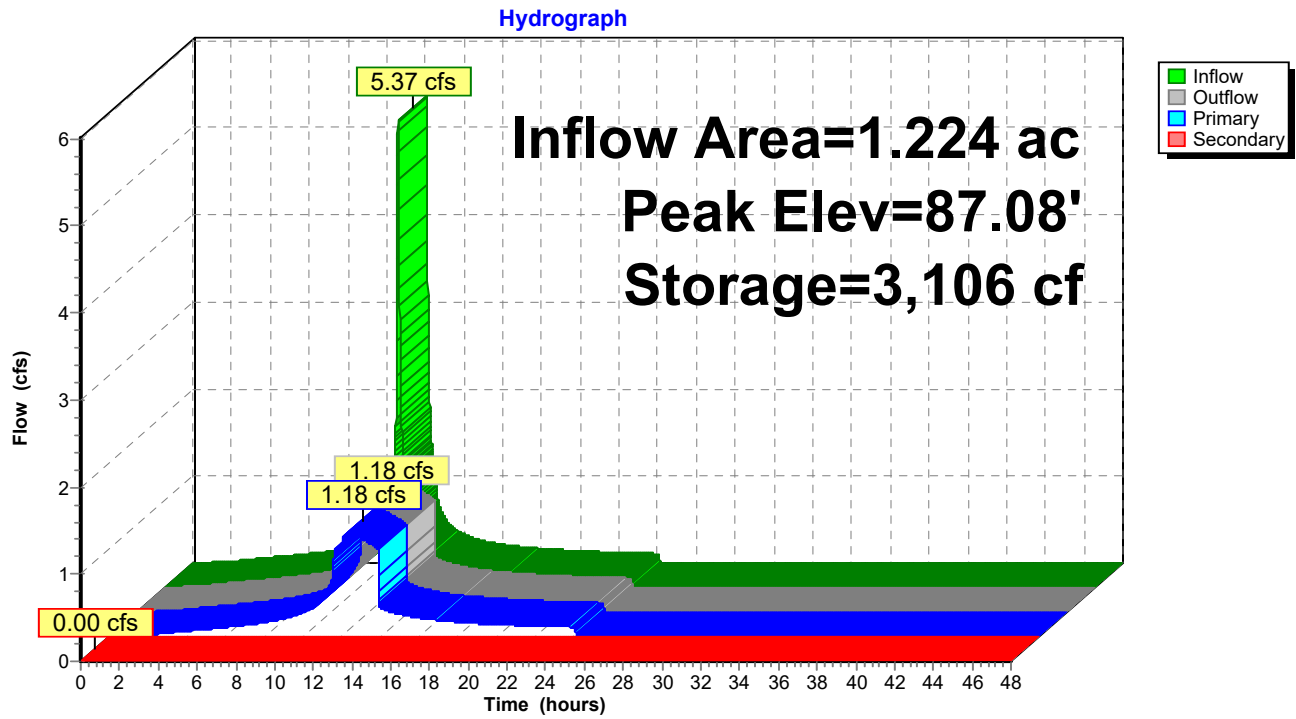
| Elevation<br>(feet) | Surf.Area<br>(sq-ft) | Inc.Store<br>(cubic-feet) | Cum.Store<br>(cubic-feet) | Wet.Area<br>(sq-ft) |
|---------------------|----------------------|---------------------------|---------------------------|---------------------|
| 86.50               | 4,342                | 0                         | 0                         | 4,342               |
| 88.00               | 6,335                | 7,961                     | 7,961                     | 6,372               |

| Device | Routing   | Invert | Outlet Devices   |
|--------|-----------|--------|--|
| #1     | Primary   | 86.50' | <b>10.000 in/hr Exfiltration through Bioretention Layer over Surface area</b><br>Phase-In= 0.01' |
| #2     | Secondary | 87.50' | <b>30.0" Horiz. Orifice/Grate</b> C= 0.600<br>Limited to weir flow at low heads                  |

**Primary OutFlow** Max=1.18 cfs @ 12.42 hrs HW=87.08' TW=84.74' (Dynamic Tailwater)  
 ↑1=**Exfiltration through Bioretention Layer**(Exfiltration Controls 1.18 cfs)

**Secondary OutFlow** Max=0.00 cfs @ 0.00 hrs HW=86.50' TW=83.49' (Dynamic Tailwater)  
 ↑2=**Orifice/Grate** ( Controls 0.00 cfs)

Pond 259P-A: BIO-POND B PONDING LAYER



**Summary for Pond 259P-B: BIO-POND B SUBSURFACE**

[87] Warning: Oscillations may require smaller dt or Finer Routing (severity=1)

Inflow Area = 1.224 ac, 80.12% Impervious, Inflow Depth = 4.81" for 10-yr (+15%) event  
 Inflow = 1.18 cfs @ 12.42 hrs, Volume= 0.491 af  
 Outflow = 1.04 cfs @ 13.72 hrs, Volume= 0.491 af, Atten= 12%, Lag= 77.8 min  
 Primary = 1.04 cfs @ 13.72 hrs, Volume= 0.491 af  
 Routed to Pond 104P : EXISTING CULVERT

Routing by Dyn-Stor-Ind method, Time Span= 0.00-48.00 hrs, dt= 0.01 hrs / 2  
 Peak Elev= 84.95' @ 13.72 hrs Surf.Area= 8,360 sf Storage= 1,167 cf

Plug-Flow detention time= (not calculated: outflow precedes inflow)  
 Center-of-Mass det. time= 5.9 min ( 798.6 - 792.7 )

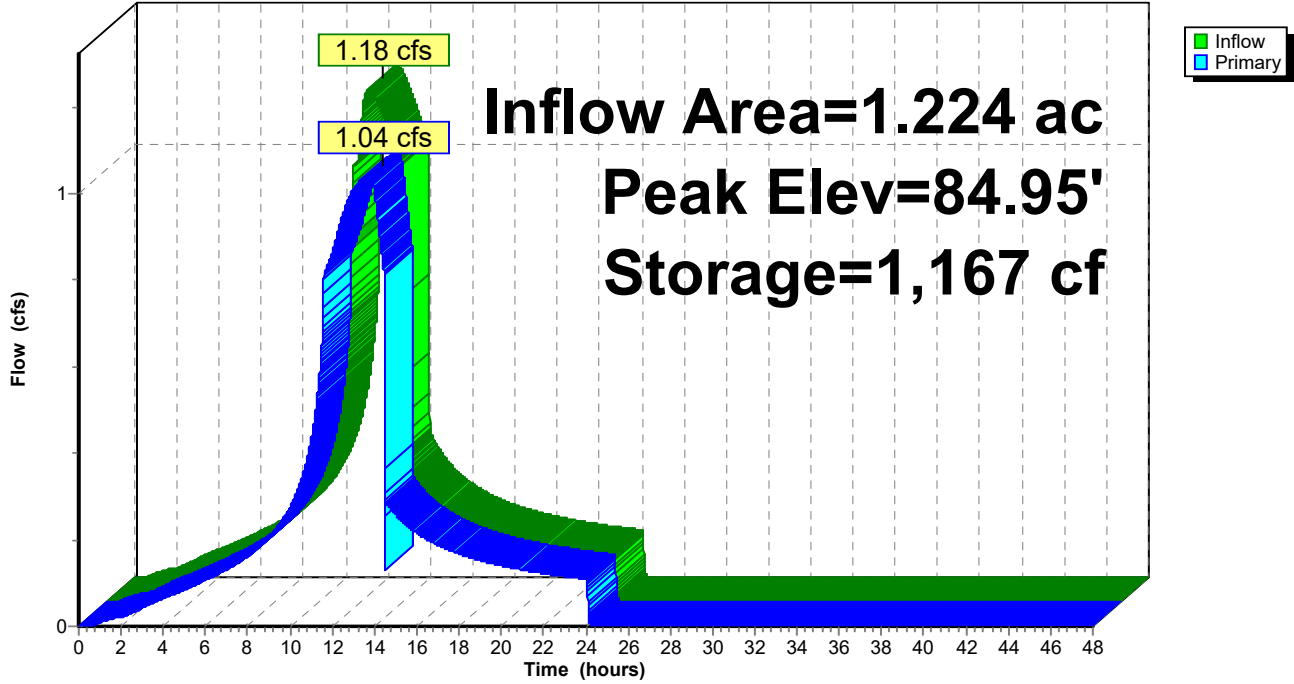
| Volume              | Invert               | Avail.Storage | Storage Description  |                           |                     |  |
|---------------------|----------------------|---------------|--|---------------------------|---------------------|--|
| #1                  | 83.49'               | 5,049 cf      | <b>Bioretention Subsurface Layers (Pyramidal)</b> listed below |                           |                     |  |
| Elevation<br>(feet) | Surf.Area<br>(sq-ft) | Voids<br>(%)  | Inc.Store<br>(cubic-feet)                                      | Cum.Store<br>(cubic-feet) | Wet.Area<br>(sq-ft) |  |
| 83.49               | 8,360                | 0.0           | 0  | 0                         | 8,360               |  |
| 83.50               | 8,360                | 0.1           | 0  | 0                         | 8,364               |  |
| 84.49               | 8,360                | 0.1           | 8  | 8                         | 8,726               |  |
| 84.50               | 8,360                | 30.0          | 25   | 33                        | 8,729               |  |
| 86.50               | 8,360                | 30.0          | 5,016  | 5,049                     | 9,461               |  |

| Device | Routing  | Invert | Outlet Devices   |
|--------|----------|--------|--|
| #1     | Primary  | 83.40' | <b>18.0" Round 18" HDPE Pipe</b><br>L= 125.0' CPP, projecting, no headwall, Ke= 0.900<br>Inlet / Outlet Invert= 83.40' / 81.78' S= 0.0130 ' / Cc= 0.900<br>n= 0.013 Corrugated PE, smooth interior, Flow Area= 1.77 sf |
| #2     | Device 1 | 83.50' | <b>6.0" Vert. 6" Diameter Underdrain Entrance into CB</b> C= 0.600<br>Limited to weir flow at low heads  |

**Primary OutFlow** Max=1.04 cfs @ 13.72 hrs HW=84.95' TW=82.24' (Dynamic Tailwater)  
 ↑ **1=18" HDPE Pipe** (Passes 1.04 cfs of 6.02 cfs potential flow)  
 ↑ **2=6" Diameter Underdrain Entrance into CB**(Orifice Controls 1.04 cfs @ 5.28 fps)

**Pond 259P-B: BIO-POND B SUBSURFACE**

Hydrograph



**Summary for Pond 260P-A: ROOF DRAINS**

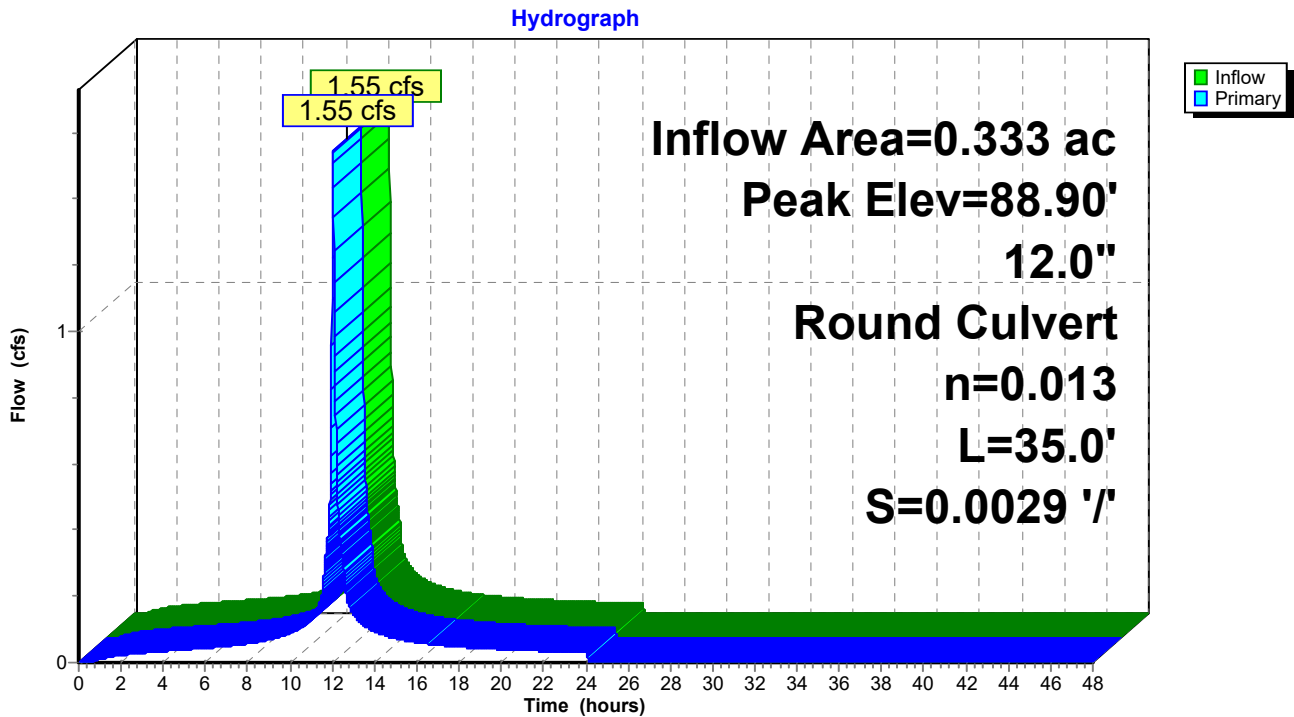
Inflow Area = 0.333 ac, 100.00% Impervious, Inflow Depth = 5.39" for 10-yr (+15%) event  
 Inflow = 1.55 cfs @ 12.04 hrs, Volume= 0.150 af  
 Outflow = 1.55 cfs @ 12.04 hrs, Volume= 0.150 af, Atten= 0%, Lag= 0.0 min  
 Primary = 1.55 cfs @ 12.04 hrs, Volume= 0.150 af  
 Routed to Pond 259P-A : BIO-POND B PONDING LAYER

Routing by Dyn-Stor-Ind method, Time Span= 0.00-48.00 hrs, dt= 0.01 hrs / 2  
 Peak Elev= 88.90' @ 12.04 hrs  
 Flood Elev= 91.50'

| Device # | Routing | Invert | Outlet Devices   |
|----------|---------|--------|--|
| #1       | Primary | 88.00' | <b>12.0" Round 12" Dia. Roof Drain</b><br>L= 35.0' CPP, projecting, no headwall, Ke= 0.900<br>Inlet / Outlet Invert= 88.00' / 87.90' S= 0.0029 '/ Cc= 0.900<br>n= 0.013 Corrugated PE, smooth interior, Flow Area= 0.79 sf |

Primary OutFlow Max=1.54 cfs @ 12.04 hrs HW=88.90' TW=86.77' (Dynamic Tailwater)  
 ↳ 12" Dia. Roof Drain (Barrel Controls 1.54 cfs @ 2.74 fps)

**Pond 260P-A: ROOF DRAINS**



**Summary for Pond 260P-B: ROOF DRAINS**

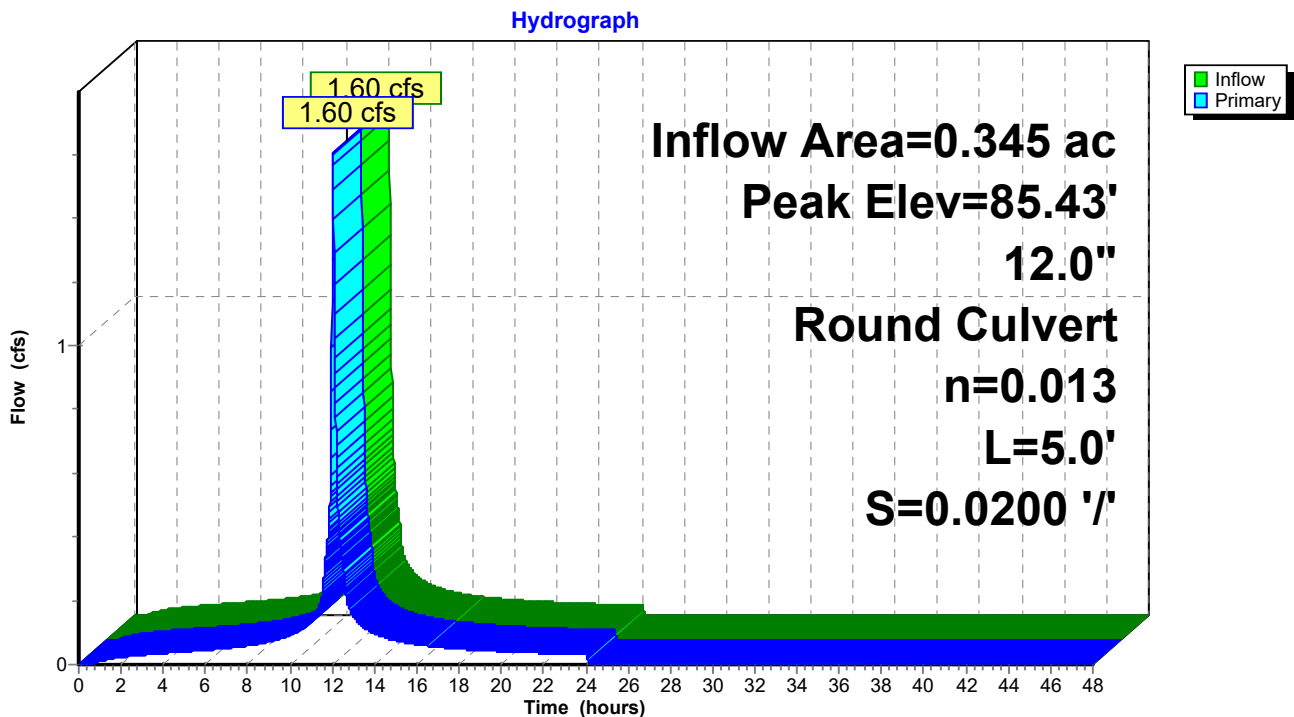
Inflow Area = 0.345 ac, 100.00% Impervious, Inflow Depth = 5.39" for 10-yr (+15%) event  
 Inflow = 1.60 cfs @ 12.04 hrs, Volume= 0.155 af  
 Outflow = 1.60 cfs @ 12.04 hrs, Volume= 0.155 af, Atten= 0%, Lag= 0.0 min  
 Primary = 1.60 cfs @ 12.04 hrs, Volume= 0.155 af  
 Routed to Pond 261P : NORTH ISLAND CATCH BASIN

Routing by Dyn-Stor-Ind method, Time Span= 0.00-48.00 hrs, dt= 0.01 hrs / 2  
 Peak Elev= 85.43' @ 12.04 hrs  
 Flood Elev= 91.50'

| Device #1 | Routing | Invert | Outlet Devices  |
|-----------|---------|--------|---|
|           | Primary | 84.60' | <b>12.0" Round 12" Dia. Roof Drain</b><br>L= 5.0' CPP, projecting, no headwall, Ke= 0.900<br>Inlet / Outlet Invert= 84.60' / 84.50' S= 0.0200 '/ Cc= 0.900<br>n= 0.013 Corrugated PE, smooth interior, Flow Area= 0.79 sf |

**Primary OutFlow** Max=1.60 cfs @ 12.04 hrs HW=85.43' TW=84.86' (Dynamic Tailwater)  
 ↳ 1=12" Dia. Roof Drain (Barrel Controls 1.60 cfs @ 3.12 fps)

**Pond 260P-B: ROOF DRAINS**



**Summary for Pond 261P: NORTH ISLAND CATCH BASIN**

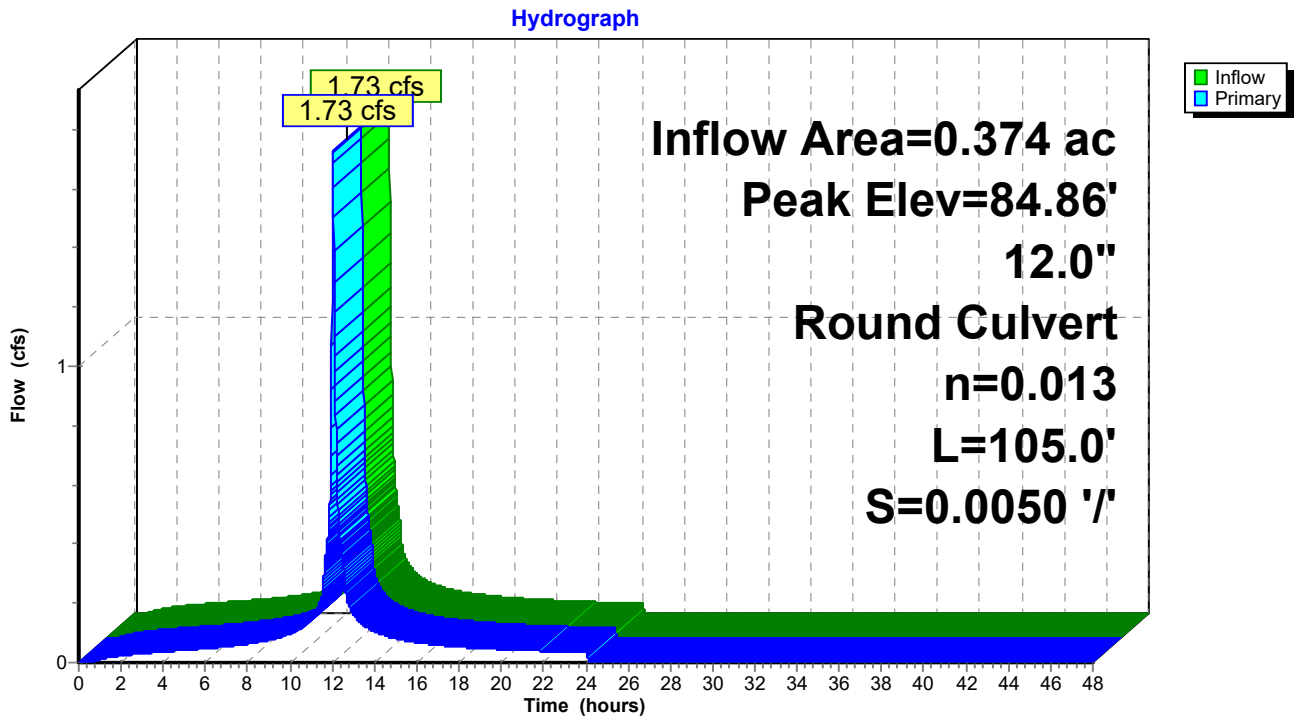
Inflow Area = 0.374 ac, 98.13% Impervious, Inflow Depth = 5.34" for 10-yr (+15%) event  
 Inflow = 1.73 cfs @ 12.04 hrs, Volume= 0.167 af  
 Outflow = 1.73 cfs @ 12.04 hrs, Volume= 0.167 af, Atten= 0%, Lag= 0.0 min  
 Primary = 1.73 cfs @ 12.04 hrs, Volume= 0.167 af  
 Routed to Pond 262P : SOUTH ISLAND CATCH BASIN

Routing by Dyn-Stor-Ind method, Time Span= 0.00-48.00 hrs, dt= 0.01 hrs / 2  
 Peak Elev= 84.86' @ 12.04 hrs  
 Flood Elev= 90.50'

| Device # | Routing | Invert | Outlet Devices  |
|----------|---------|--------|---|
| 1        | Primary | 84.00' | <b>12.0" Round 12" HDPE Pipe</b><br>L= 105.0' CPP, projecting, no headwall, Ke= 0.900<br>Inlet / Outlet Invert= 84.00' / 83.47' S= 0.0050 '/ Cc= 0.900<br>n= 0.013 Corrugated PE, smooth interior, Flow Area= 0.79 sf |

Primary OutFlow Max=1.72 cfs @ 12.04 hrs HW=84.86' TW=83.95' (Dynamic Tailwater)  
 ↳ 1=12" HDPE Pipe (Barrel Controls 1.72 cfs @ 3.21 fps)

**Pond 261P: NORTH ISLAND CATCH BASIN**



**Summary for Pond 262P: SOUTH ISLAND CATCH BASIN**

Inflow Area = 2.014 ac, 77.10% Impervious, Inflow Depth = 4.76" for 10-yr (+15%) event  
 Inflow = 3.26 cfs @ 12.04 hrs, Volume= 0.800 af  
 Outflow = 3.26 cfs @ 12.04 hrs, Volume= 0.800 af, Atten= 0%, Lag= 0.0 min  
 Primary = 3.26 cfs @ 12.04 hrs, Volume= 0.800 af  
 Routed to Pond 263P : MANHOLE 1

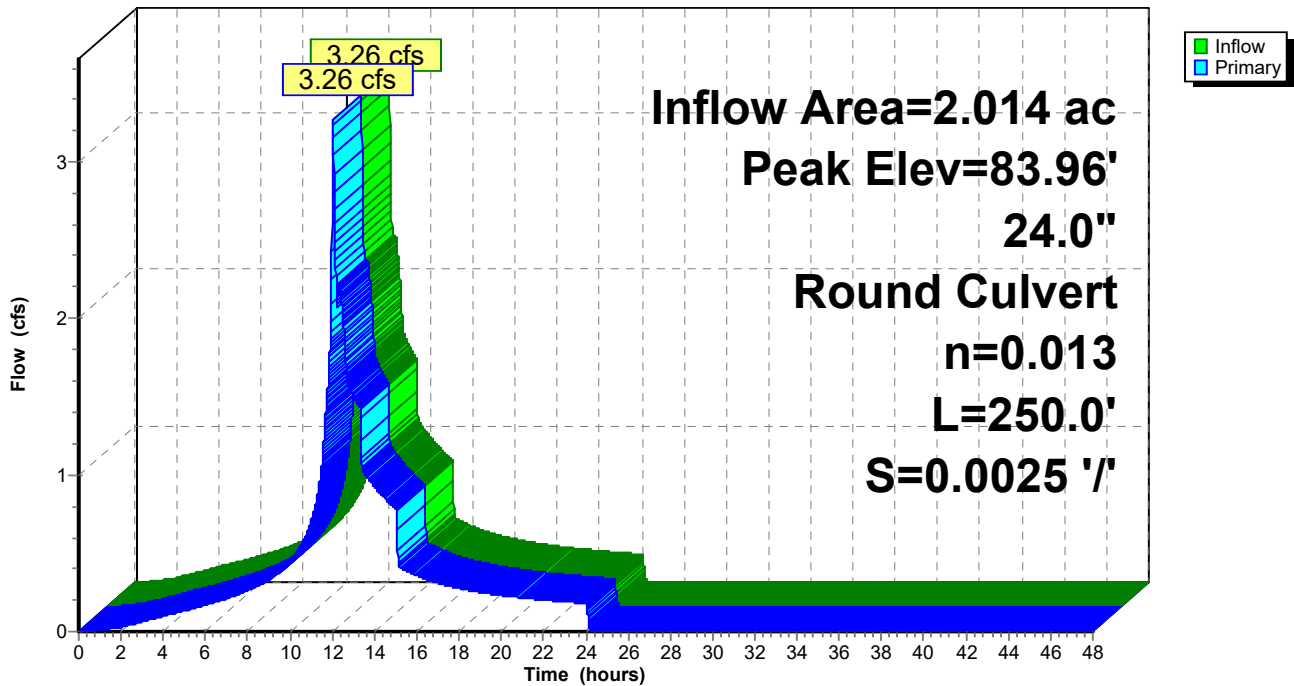
Routing by Dyn-Stor-Ind method, Time Span= 0.00-48.00 hrs, dt= 0.01 hrs / 2  
 Peak Elev= 83.96' @ 12.04 hrs  
 Flood Elev= 90.75'

| Device # | Routing | Invert | Outlet Devices  |
|----------|---------|--------|---|
| #1       | Primary | 82.96' | <b>24.0" Round 24" HDPE Pipe</b><br>L= 250.0' CPP, projecting, no headwall, Ke= 0.900<br>Inlet / Outlet Invert= 82.96' / 82.34' S= 0.0025 '/ Cc= 0.900<br>n= 0.013 Corrugated PE, smooth interior, Flow Area= 3.14 sf |

**Primary OutFlow** Max=3.26 cfs @ 12.04 hrs HW=83.95' TW=82.91' (Dynamic Tailwater)  
 ↳ 1=24" HDPE Pipe (Barrel Controls 3.26 cfs @ 3.05 fps)

**Pond 262P: SOUTH ISLAND CATCH BASIN**

Hydrograph



**Summary for Pond 263P: MANHOLE 1**

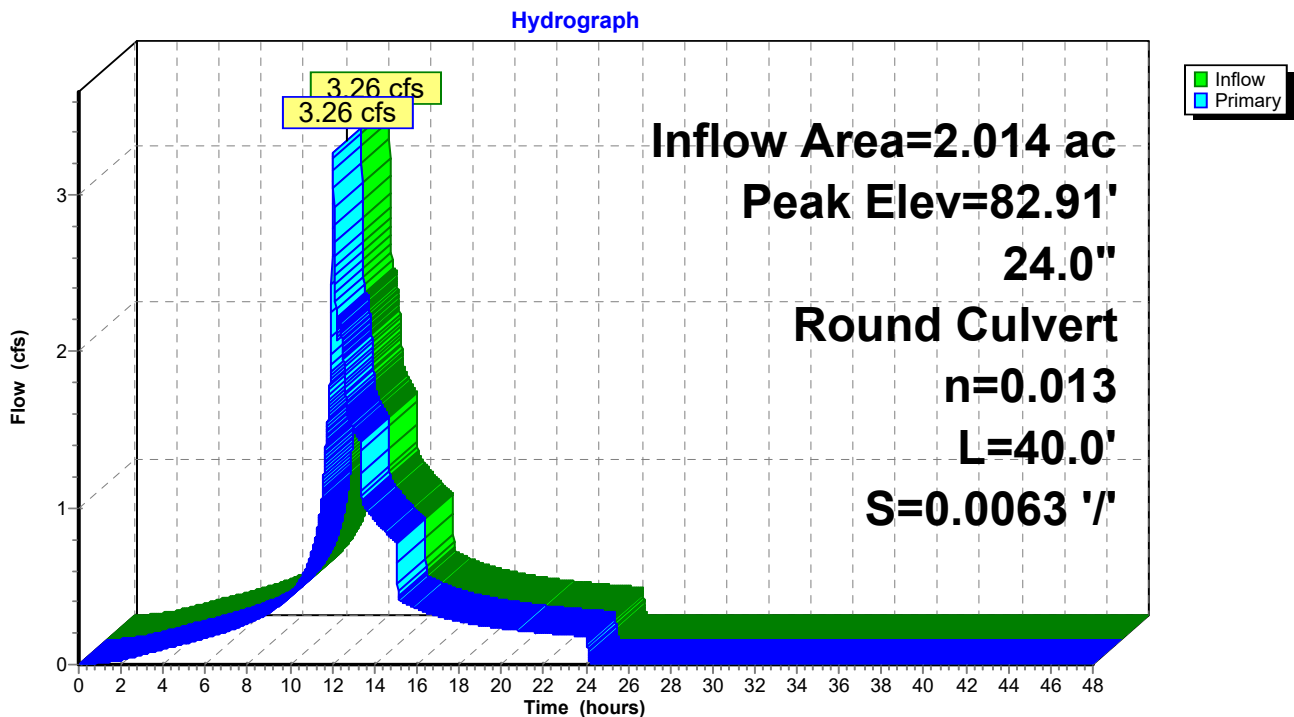
Inflow Area = 2.014 ac, 77.10% Impervious, Inflow Depth = 4.76" for 10-yr (+15%) event  
 Inflow = 3.26 cfs @ 12.04 hrs, Volume= 0.800 af  
 Outflow = 3.26 cfs @ 12.04 hrs, Volume= 0.800 af, Atten= 0%, Lag= 0.0 min  
 Primary = 3.26 cfs @ 12.04 hrs, Volume= 0.800 af  
 Routed to Pond 258P : 24" HDPE UNDER RIVER ROAD

Routing by Dyn-Stor-Ind method, Time Span= 0.00-48.00 hrs, dt= 0.01 hrs / 2  
 Peak Elev= 82.91' @ 12.04 hrs  
 Flood Elev= 89.00'

| Device # | Routing | Invert | Outlet Devices   |
|----------|---------|--------|--|
| #1       | Primary | 82.00' | <b>24.0" Round 24" HDPE Pipe</b><br>L= 40.0' CPP, projecting, no headwall, Ke= 0.900<br>Inlet / Outlet Invert= 82.00' / 81.75' S= 0.0063 '/ Cc= 0.900<br>n= 0.013 Corrugated PE, smooth interior, Flow Area= 3.14 sf |

**Primary OutFlow** Max=3.26 cfs @ 12.04 hrs HW=82.91' TW=81.91' (Dynamic Tailwater)  
 ↳ 1=24" HDPE Pipe (Barrel Controls 3.26 cfs @ 3.43 fps)

**Pond 263P: MANHOLE 1**



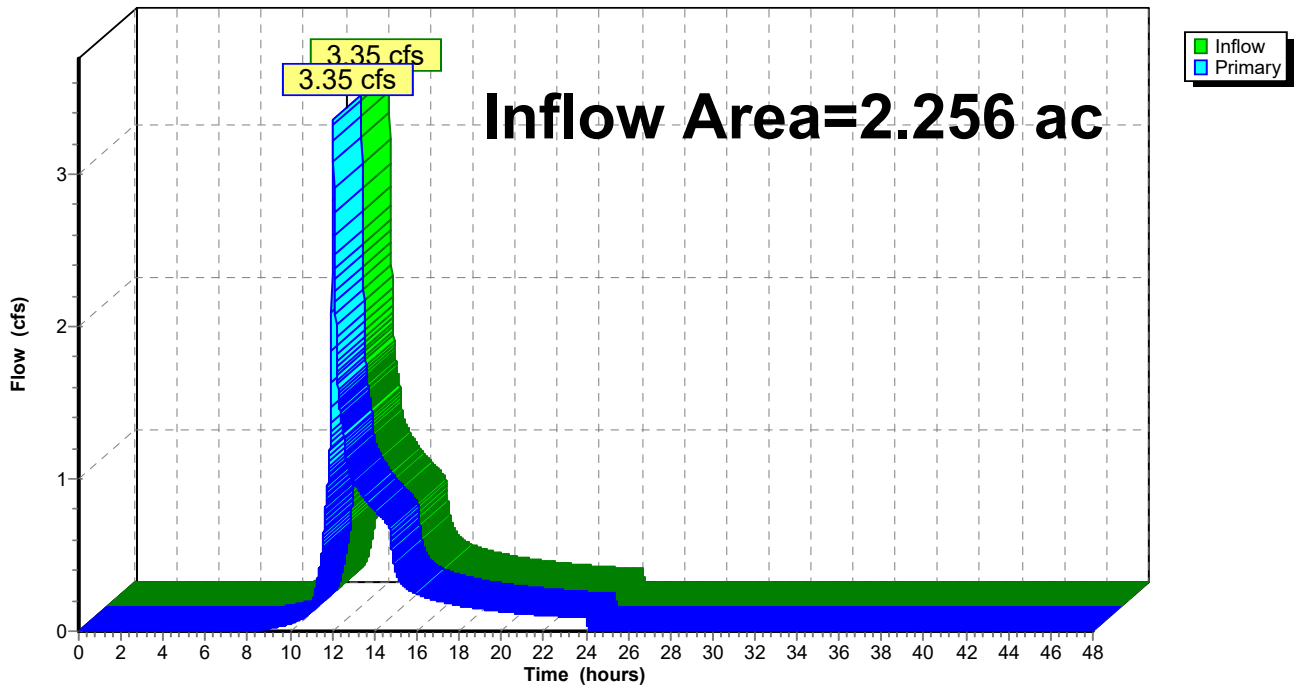
### Summary for Link 8-64: MAP 8 LOT 64

Inflow Area = 2.256 ac, 33.93% Impervious, Inflow Depth = 2.33" for 10-yr (+15%) event  
Inflow = 3.35 cfs @ 12.04 hrs, Volume= 0.437 af  
Primary = 3.35 cfs @ 12.04 hrs, Volume= 0.437 af, Atten= 0%, Lag= 0.0 min

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

### Link 8-64: MAP 8 LOT 64

Hydrograph



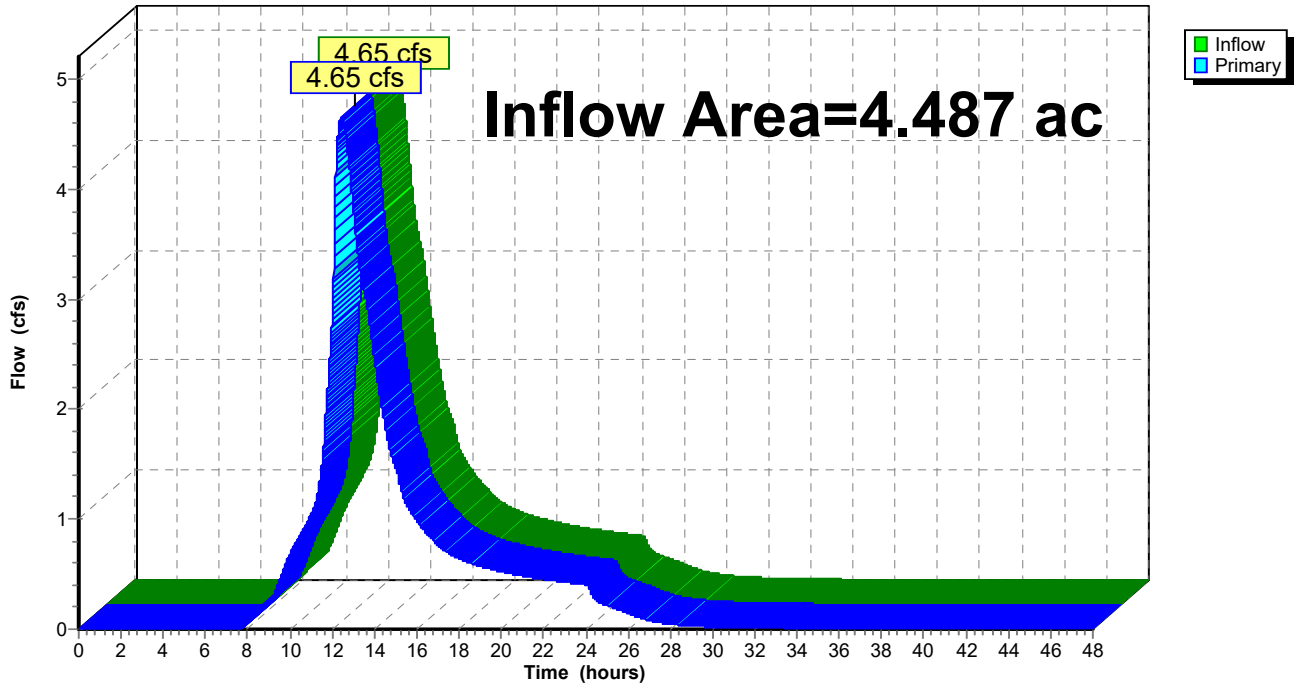
### Summary for Link 9-2: MAP 9 LOT 2

Inflow Area = 4.487 ac, 63.68% Impervious, Inflow Depth > 4.17" for 10-yr (+15%) event  
Inflow = 4.65 cfs @ 12.44 hrs, Volume= 1.558 af  
Primary = 4.65 cfs @ 12.44 hrs, Volume= 1.558 af, Atten= 0%, Lag= 0.0 min

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

### Link 9-2: MAP 9 LOT 2

Hydrograph



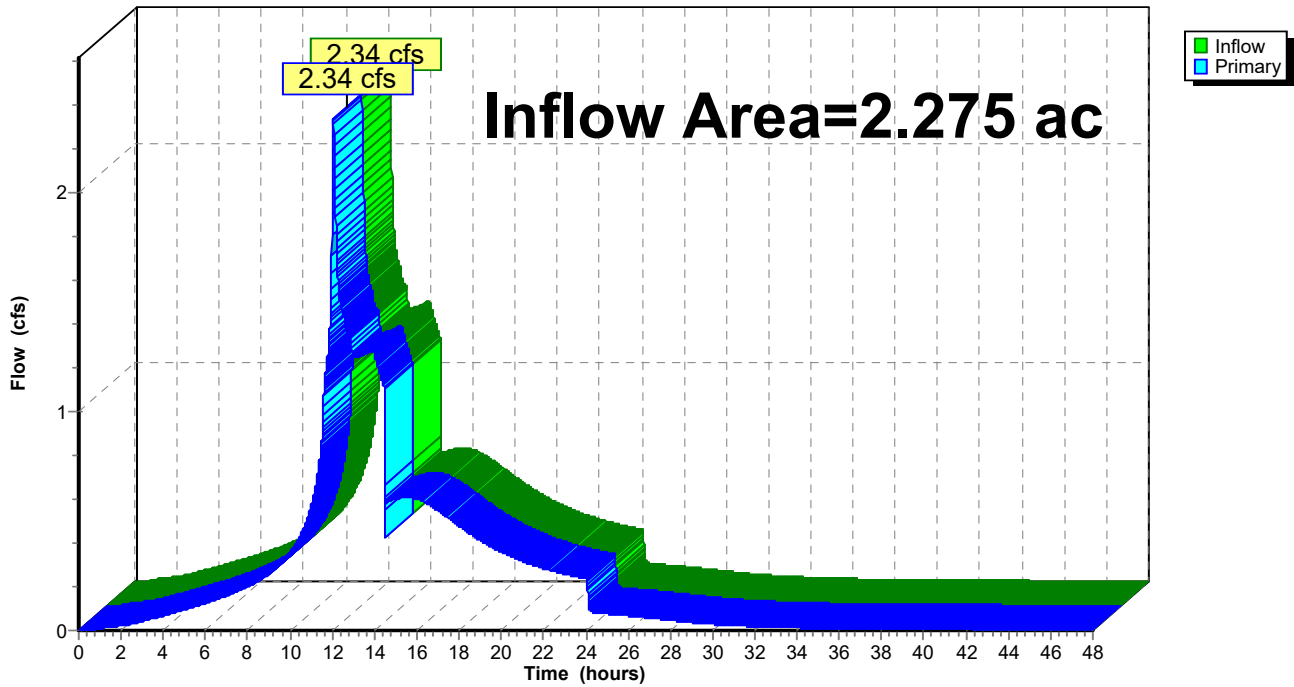
### Summary for Link 9-5: MAP 9 LOT 5

Inflow Area = 2.275 ac, 75.27% Impervious, Inflow Depth > 4.55" for 10-yr (+15%) event  
Inflow = 2.34 cfs @ 12.05 hrs, Volume= 0.864 af  
Primary = 2.34 cfs @ 12.05 hrs, Volume= 0.864 af, Atten= 0%, Lag= 0.0 min  
Routed to nonexistent node 105P

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

### Link 9-5: MAP 9 LOT 5

Hydrograph



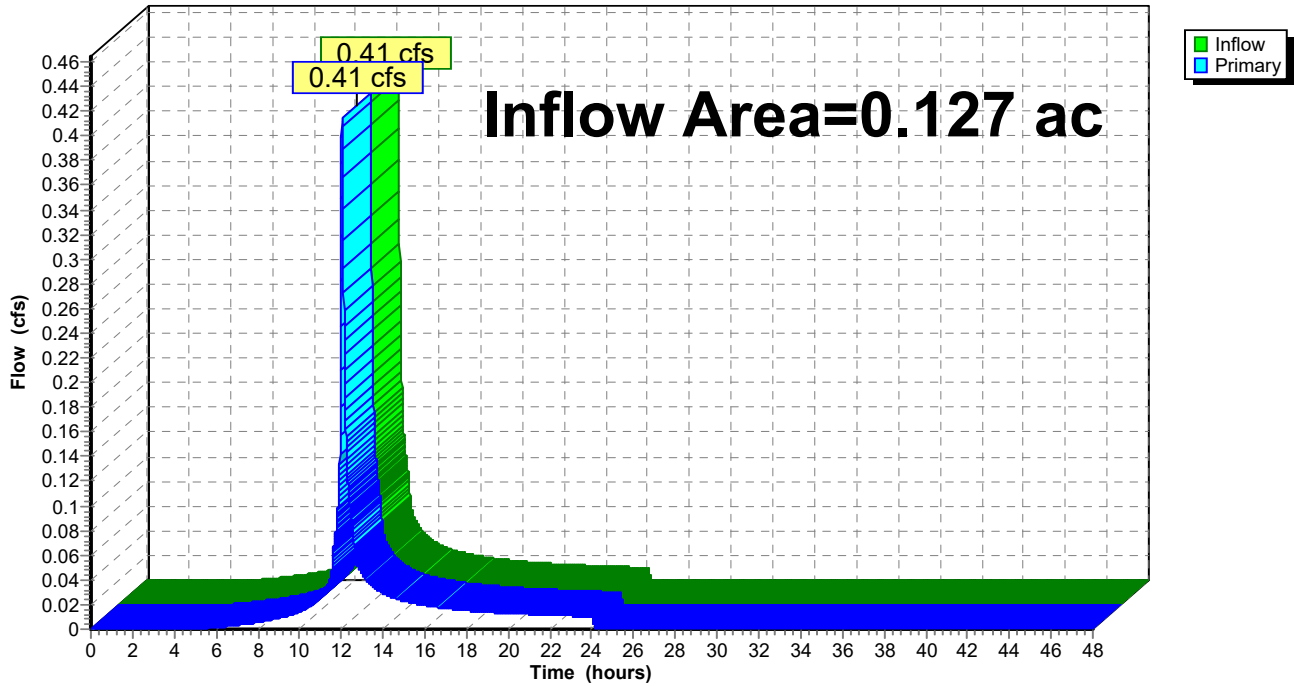
### Summary for Link RR: RIVER ROAD

Inflow Area = 0.127 ac, 48.92% Impervious, Inflow Depth = 3.35" for 10-yr (+15%) event  
Inflow = 0.41 cfs @ 12.04 hrs, Volume= 0.035 af  
Primary = 0.41 cfs @ 12.04 hrs, Volume= 0.035 af, Atten= 0%, Lag= 0.0 min

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

### Link RR: RIVER ROAD

Hydrograph



**Postdevelopment 04-22-2 NH-Stratham 41 Portsmouth Ave 24-hr S1 1-yr 1-inch Rainfall=1.00"**

Prepared by Emanuel Engineering

Printed 4/27/2026

HydroCAD® 10.20-8a s/n 01104 © 2025 HydroCAD Software Solutions LLC

Page 209

Time span=0.00-48.00 hrs, dt=0.01 hrs, 4801 points x 2  
 Runoff by SCS TR-20 method, UH=SCS, Weighted-CN  
 Reach routing by Dyn-Stor-Ind method - Pond routing by Dyn-Stor-Ind method

|   |  |
|---|--|
| <b>Subcatchment200S: SW DRIVEWAY</b>        | Runoff Area=5,515 sf 48.92% Impervious Runoff Depth=0.07"<br>Flow Length=192' Tc=6.0 min CN=79 Runoff=0.00 cfs 0.001 af                    |
| <b>Subcatchment201S-A: HILL RUNNING OFF</b> | Runoff Area=58,188 sf 2.11% Impervious Runoff Depth=0.00"<br>Flow Length=310' Tc=6.0 min CN=67 Runoff=0.00 cfs 0.000 af                    |
| <b>Subcatchment201S-B: Proposed Parking</b> | Runoff Area=40,085 sf 80.12% Impervious Runoff Depth=0.36"<br>Flow Length=190' Slope=0.0100 '/' Tc=6.0 min CN=91 Runoff=0.34 cfs 0.028 af  |
| <b>Subcatchment202S: NORTHWEST</b>          | Runoff Area=5,467 sf 27.13% Impervious Runoff Depth=0.10"<br>Flow Length=77' Slope=0.0270 '/' Tc=6.0 min CN=81 Runoff=0.00 cfs 0.001 af    |
| <b>Subcatchment203S: WEST ENTRANCE</b>      | Runoff Area=10,408 sf 56.83% Impervious Runoff Depth=0.25"<br>Flow Length=206' Slope=0.0200 '/' Tc=8.3 min CN=88 Runoff=0.05 cfs 0.005 af  |
| <b>Subcatchment204S-A: NORTH PARKING</b>    | Runoff Area=23,845 sf 93.10% Impervious Runoff Depth=0.63"<br>Tc=222.0 min CN=96 Runoff=0.05 cfs 0.029 af                                  |
| <b>Subcatchment204S-B: ACCESSROAD</b>       | Runoff Area=6,090 sf 37.68% Impervious Runoff Depth=0.13"<br>Flow Length=40' Slope=0.0100 '/' Tc=6.3 min CN=83 Runoff=0.01 cfs 0.002 af    |
| <b>Subcatchment205S: NORTHEAST</b>          | Runoff Area=24,112 sf 63.73% Impervious Runoff Depth=0.28"<br>Flow Length=118' Tc=8.3 min CN=89 Runoff=0.14 cfs 0.013 af                   |
| <b>Subcatchment206S: EAST PARKING</b>       | Runoff Area=43,950 sf 78.74% Impervious Runoff Depth=0.45"<br>Flow Length=276' Slope=0.0127 '/' Tc=6.0 min CN=93 Runoff=0.49 cfs 0.038 af  |
| <b>Subcatchment207S: SOUTHEAST PARCEL</b>   | Runoff Area=17,349 sf 29.77% Impervious Runoff Depth=0.10"<br>Flow Length=257' Tc=6.0 min CN=81 Runoff=0.01 cfs 0.003 af                   |
| <b>Subcatchment208S: SOUTH PARCEL</b>       | Runoff Area=5,225 sf 20.80% Impervious Runoff Depth=0.07"<br>Flow Length=110' Tc=6.0 min CN=79 Runoff=0.00 cfs 0.001 af                    |
| <b>Subcatchment209S: SOUTHWEST</b>          | Runoff Area=17,300 sf 18.76% Impervious Runoff Depth=0.07"<br>Flow Length=279' Tc=11.1 min CN=79 Runoff=0.00 cfs 0.002 af                  |
| <b>Subcatchment210S: WEST PARKING</b>       | Runoff Area=67,820 sf 69.77% Impervious Runoff Depth=0.36"<br>Flow Length=130' Slope=0.0100 '/' Tc=6.0 min CN=91 Runoff=0.58 cfs 0.047 af  |
| <b>Subcatchment211S: WEST PARKING</b>       | Runoff Area=38,777 sf 72.67% Impervious Runoff Depth=0.36"<br>Flow Length=210' Slope=0.0150 '/' Tc=6.0 min CN=91 Runoff=0.33 cfs 0.027 af  |
| <b>Subcatchment212S-A: WESTERN HALF</b>     | Runoff Area=14,525 sf 100.00% Impervious Runoff Depth=0.79"<br>Flow Length=150' Slope=0.0100 '/' Tc=6.0 min CN=98 Runoff=0.28 cfs 0.022 af |
| <b>Subcatchment212S-B: EASTERN HALF</b>     | Runoff Area=15,045 sf 100.00% Impervious Runoff Depth=0.79"<br>Flow Length=130' Slope=0.0100 '/' Tc=6.0 min CN=98 Runoff=0.29 cfs 0.023 af |

**Postdevelopment 04-22-2 NH-Stratham 41 Portsmouth Ave 24-hr S1 1-yr 1-inch Rainfall=1.00"**

Prepared by Emanuel Engineering

Printed 4/27/2026

HydroCAD® 10.20-8a s/n 01104 © 2025 HydroCAD Software Solutions LLC

Page 210

**Subcatchment213S: NORTH LANDSCAPE** Runoff Area=1,255 sf 75.70% Impervious Runoff Depth=0.40"  
Flow Length=20' Slope=0.0100 '/' Tc=6.0 min CN=92 Runoff=0.01 cfs 0.001 af

**Subcatchment214S: SOUTH LANDSCAPE** Runoff Area=3,380 sf 49.85% Impervious Runoff Depth=0.20"  
Flow Length=75' Slope=0.0100 '/' Tc=6.1 min CN=86 Runoff=0.01 cfs 0.001 af

**Pond 104P: EXISTING CULVERT** Peak Elev=82.11' Inflow=0.65 cfs 0.059 af  
30.0" Round Culvert n=0.013 L=100.0' S=0.0063 '/' Outflow=0.65 cfs 0.059 af

**Pond 250P-A: BIO-POND F PONDING LAYER** Peak Elev=83.26' Storage=15 cf Inflow=0.34 cfs 0.028 af  
Primary=0.34 cfs 0.028 af Secondary=0.00 cfs 0.000 af Outflow=0.34 cfs 0.028 af

**Pond 250P-B: BIO-POND F SUBSURFACE** Peak Elev=79.84' Storage=156 cf Inflow=0.34 cfs 0.028 af  
Discarded=0.09 cfs 0.028 af Primary=0.00 cfs 0.000 af Outflow=0.09 cfs 0.028 af

**Pond 251P-A: BIO-POND A PONDING LAYER** Peak Elev=84.00' Storage=28 cf Inflow=0.58 cfs 0.047 af  
Primary=0.57 cfs 0.047 af Secondary=0.00 cfs 0.000 af Outflow=0.57 cfs 0.047 af

**Pond 251P-B: BIO-POND A SUBSURFACE** Peak Elev=81.45' Storage=38 cf Inflow=0.57 cfs 0.047 af  
12.0" Round Culvert n=0.013 L=50.0' S=0.0050 '/' Outflow=0.56 cfs 0.047 af

**Pond 252P: NORTHWEST CATCH BASIN** Peak Elev=82.22' Inflow=0.00 cfs 0.001 af  
18.0" Round Culvert n=0.013 L=45.0' S=0.0049 '/' Outflow=0.00 cfs 0.001 af

**Pond 253P-A: BIO-POND C PONDING LAYER** Peak Elev=87.50' Storage=1 cf Inflow=0.01 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 253P-B: BIO-POND C SUBSURFACE** Peak Elev=84.55' Storage=0 cf Inflow=0.01 cfs 0.004 af  
Outflow=0.01 cfs 0.004 af

**Pond 253P-C: POROUS PAVEMENT A** Peak Elev=85.30' Storage=1,214 cf Inflow=0.05 cfs 0.029 af  
6.0" Round Culvert n=0.010 L=10.0' S=0.0000 '/' Outflow=0.00 cfs 0.003 af

**Pond 254P-A: BIO-POND D PONDING LAYER** Peak Elev=87.50' Storage=7 cf Inflow=0.14 cfs 0.013 af  
Primary=0.13 cfs 0.013 af Secondary=0.00 cfs 0.000 af Outflow=0.13 cfs 0.013 af

**Pond 254P-B: BIO-POND D SUBSURFACE** Peak Elev=84.75' Storage=2 cf Inflow=0.13 cfs 0.013 af  
6.0" Round Culvert n=0.010 L=90.0' S=0.0111 '/' Outflow=0.13 cfs 0.013 af

**Pond 255P-A: BIO-POND E PONDING LAYER** Peak Elev=86.51' Storage=25 cf Inflow=0.49 cfs 0.038 af  
Primary=0.48 cfs 0.038 af Secondary=0.00 cfs 0.000 af Outflow=0.48 cfs 0.038 af

**Pond 255P-B: BIO-POND E SUBSURFACE** Peak Elev=83.97' Storage=7 cf Inflow=0.60 cfs 0.051 af  
18.0" Round Culvert n=0.013 L=178.0' S=0.0025 '/' Outflow=0.60 cfs 0.051 af

**Pond 256P: RIVER ROAD CB** Peak Elev=81.44' Storage=41 cf Inflow=0.01 cfs 0.003 af  
Primary=0.00 cfs 0.002 af Secondary=0.00 cfs 0.000 af Outflow=0.00 cfs 0.002 af

**Pond 257P: BARNYARD CB** Peak Elev=80.69' Storage=39 cf Inflow=0.01 cfs 0.003 af  
Primary=0.00 cfs 0.002 af Secondary=0.00 cfs 0.000 af Outflow=0.00 cfs 0.002 af

**Postdevelopment 04-22-2 NH-Stratham 41 Portsmouth Ave 24-hr S1 1-yr 1-inch Rainfall=1.00"**

Prepared by Emanuel Engineering

Printed 4/27/2026

HydroCAD® 10.20-8a s/n 01104 © 2025 HydroCAD Software Solutions LLC

Page 211

**Pond 258P: 24" HDPE UNDER RIVER ROAD** Peak Elev=80.14' Storage=4,825 cf Inflow=1.45 cfs 0.127 af  
 Primary=0.05 cfs 0.029 af Secondary=0.00 cfs 0.000 af Outflow=0.05 cfs 0.029 af

**Pond 259P-A: BIO-POND B PONDING LAYER** Peak Elev=86.51' Storage=31 cf Inflow=0.61 cfs 0.049 af  
 Primary=0.59 cfs 0.049 af Secondary=0.00 cfs 0.000 af Outflow=0.59 cfs 0.049 af

**Pond 259P-B: BIO-POND B SUBSURFACE** Peak Elev=84.14' Storage=5 cf Inflow=0.59 cfs 0.049 af  
 Outflow=0.59 cfs 0.049 af

**Pond 260P-A: ROOF DRAINS** Peak Elev=88.35' Inflow=0.28 cfs 0.022 af  
 12.0" Round Culvert n=0.013 L=35.0' S=0.0029 '/ Outflow=0.28 cfs 0.022 af

**Pond 260P-B: ROOF DRAINS** Peak Elev=84.90' Inflow=0.29 cfs 0.023 af  
 12.0" Round Culvert n=0.013 L=5.0' S=0.0200 '/ Outflow=0.29 cfs 0.023 af

**Pond 261P: NORTH ISLAND CATCHBASIN** Peak Elev=84.32' Inflow=0.30 cfs 0.024 af  
 12.0" Round Culvert n=0.013 L=105.0' S=0.0050 '/ Outflow=0.30 cfs 0.024 af

**Pond 262P: SOUTH ISLAND CATCHBASIN** Peak Elev=83.47' Inflow=0.90 cfs 0.076 af  
 24.0" Round Culvert n=0.013 L=250.0' S=0.0025 '/ Outflow=0.90 cfs 0.076 af

**Pond 263P: MANHOLE 1** Peak Elev=82.45' Inflow=0.90 cfs 0.076 af  
 24.0" Round Culvert n=0.013 L=40.0' S=0.0063 '/ Outflow=0.90 cfs 0.076 af

**Link 8-64: MAP 8 LOT 64** Inflow=0.00 cfs 0.000 af  
 Primary=0.00 cfs 0.000 af

**Link 9-2: MAP 9 LOT 2** Inflow=0.05 cfs 0.029 af  
 Primary=0.05 cfs 0.029 af

**Link 9-5: MAP 9 LOT 5** Inflow=0.65 cfs 0.059 af  
 Primary=0.65 cfs 0.059 af

**Link RR: RIVER ROAD** Inflow=0.00 cfs 0.001 af  
 Primary=0.00 cfs 0.001 af

**Total Runoff Area = 9.145 ac Runoff Volume = 0.242 af Average Runoff Depth = 0.32"**  
**40.98% Pervious = 3.747 ac 59.02% Impervious = 5.397 ac**



**Postdevelopment 04-NH-Stratham 41 Portsmouth Ave 24-hr S1 2-yr 2-yr (+15%) Rainfall=3.70"**

Prepared by Emanuel Engineering

Printed 4/27/2026

HydroCAD® 10.20-8a s/n 01104 © 2025 HydroCAD Software Solutions LLC

Page 213

**Subcatchment213S: NORTH LANDSCAPE** Runoff Area=1,255 sf 75.70% Impervious Runoff Depth=2.83"  
Flow Length=20' Slope=0.0100 '/' Tc=6.0 min CN=92 Runoff=0.09 cfs 0.007 af

**Subcatchment214S: SOUTH LANDSCAPE** Runoff Area=3,380 sf 49.85% Impervious Runoff Depth=2.28"  
Flow Length=75' Slope=0.0100 '/' Tc=6.1 min CN=86 Runoff=0.20 cfs 0.015 af

**Pond 104P: EXISTING CULVERT** Peak Elev=82.33' Inflow=1.83 cfs 0.511 af  
30.0" Round Culvert n=0.013 L=100.0' S=0.0063 '/' Outflow=1.83 cfs 0.511 af

**Pond 250P-A: BIO-POND F PONDING LAYER** Peak Elev=83.75' Storage=1,325 cf Inflow=2.76 cfs 0.209 af  
Primary=0.66 cfs 0.209 af Secondary=0.00 cfs 0.000 af Outflow=0.66 cfs 0.209 af

**Pond 250P-B: BIO-POND F SUBSURFACE** Peak Elev=80.62' Storage=1,407 cf Inflow=0.66 cfs 0.209 af  
Discarded=0.09 cfs 0.131 af Primary=0.55 cfs 0.079 af Outflow=0.64 cfs 0.209 af

**Pond 251P-A: BIO-POND A PONDING LAYER** Peak Elev=84.07' Storage=870 cf Inflow=4.66 cfs 0.354 af  
Primary=2.47 cfs 0.354 af Secondary=0.00 cfs 0.000 af Outflow=2.47 cfs 0.354 af

**Pond 251P-B: BIO-POND A SUBSURFACE** Peak Elev=82.21' Storage=980 cf Inflow=2.47 cfs 0.354 af  
12.0" Round Culvert n=0.013 L=50.0' S=0.0050 '/' Outflow=2.10 cfs 0.354 af

**Pond 252P: NORTHWEST CATCH BASIN** Peak Elev=82.49' Inflow=0.26 cfs 0.020 af  
18.0" Round Culvert n=0.013 L=45.0' S=0.0049 '/' Outflow=0.26 cfs 0.020 af

**Pond 253P-A: BIO-POND C PONDING LAYER** Peak Elev=87.55' Storage=69 cf Inflow=0.31 cfs 0.024 af  
Primary=0.16 cfs 0.024 af Secondary=0.00 cfs 0.000 af Outflow=0.16 cfs 0.024 af

**Pond 253P-B: BIO-POND C SUBSURFACE** Peak Elev=84.76' Storage=0 cf Inflow=0.18 cfs 0.143 af  
Outflow=0.18 cfs 0.143 af

**Pond 253P-C: POROUS PAVEMENT A** Peak Elev=85.61' Storage=2,900 cf Inflow=0.27 cfs 0.148 af  
6.0" Round Culvert n=0.010 L=10.0' S=0.0000 '/' Outflow=0.17 cfs 0.120 af

**Pond 254P-A: BIO-POND D PONDING LAYER** Peak Elev=87.65' Storage=448 cf Inflow=1.39 cfs 0.117 af  
Primary=0.59 cfs 0.117 af Secondary=0.00 cfs 0.000 af Outflow=0.59 cfs 0.117 af

**Pond 254P-B: BIO-POND D SUBSURFACE** Peak Elev=85.37' Storage=6 cf Inflow=0.59 cfs 0.117 af  
6.0" Round Culvert n=0.010 L=90.0' S=0.0111 '/' Outflow=0.59 cfs 0.117 af

**Pond 255P-A: BIO-POND E PONDING LAYER** Peak Elev=87.08' Storage=1,738 cf Inflow=3.19 cfs 0.246 af  
Primary=0.67 cfs 0.246 af Secondary=0.00 cfs 0.000 af Outflow=0.67 cfs 0.246 af

**Pond 255P-B: BIO-POND E SUBSURFACE** Peak Elev=84.24' Storage=11 cf Inflow=1.25 cfs 0.364 af  
18.0" Round Culvert n=0.013 L=178.0' S=0.0025 '/' Outflow=1.25 cfs 0.364 af

**Pond 256P: RIVER ROAD CB** Peak Elev=81.99' Storage=48 cf Inflow=0.83 cfs 0.062 af  
Primary=0.83 cfs 0.061 af Secondary=0.00 cfs 0.000 af Outflow=0.83 cfs 0.061 af

**Pond 257P: BARNYARD CB** Peak Elev=81.96' Storage=55 cf Inflow=1.06 cfs 0.078 af  
Primary=1.05 cfs 0.078 af Secondary=0.00 cfs 0.000 af Outflow=1.05 cfs 0.078 af

**Postdevelopment 04-NH-Stratham 41 Portsmouth Ave 24-hr S1 2-yr 2-yr (+15%) Rainfall=3.70"**

Prepared by Emanuel Engineering

Printed 4/27/2026

HydroCAD® 10.20-8a s/n 01104 © 2025 HydroCAD Software Solutions LLC

Page 214

**Pond 258P: 24" HDPE UNDER RIVER ROAD** Peak Elev=81.95' Storage=12,716 cf Inflow=6.24 cfs 0.974 af  
 Primary=3.11 cfs 0.875 af Secondary=0.00 cfs 0.000 af Outflow=3.11 cfs 0.875 af

**Pond 259P-A: BIO-POND B PONDING LAYER** Peak Elev=86.79' Storage=1,533 cf Inflow=3.82 cfs 0.299 af  
 Primary=1.09 cfs 0.299 af Secondary=0.00 cfs 0.000 af Outflow=1.09 cfs 0.299 af

**Pond 259P-B: BIO-POND B SUBSURFACE** Peak Elev=84.77' Storage=702 cf Inflow=1.09 cfs 0.299 af  
 Outflow=0.95 cfs 0.299 af

**Pond 260P-A: ROOF DRAINS** Peak Elev=88.75' Inflow=1.16 cfs 0.096 af  
 12.0" Round Culvert n=0.013 L=35.0' S=0.0029 '/ Outflow=1.16 cfs 0.096 af

**Pond 260P-B: ROOF DRAINS** Peak Elev=85.29' Inflow=1.20 cfs 0.100 af  
 12.0" Round Culvert n=0.013 L=5.0' S=0.0200 '/ Outflow=1.20 cfs 0.100 af

**Pond 261P: NORTH ISLAND CATCHBASIN** Peak Elev=84.71' Inflow=1.29 cfs 0.107 af  
 12.0" Round Culvert n=0.013 L=105.0' S=0.0050 '/ Outflow=1.29 cfs 0.107 af

**Pond 262P: SOUTH ISLAND CATCHBASIN** Peak Elev=83.85' Inflow=2.66 cfs 0.485 af  
 24.0" Round Culvert n=0.013 L=250.0' S=0.0025 '/ Outflow=2.66 cfs 0.485 af

**Pond 263P: MANHOLE 1** Peak Elev=82.81' Inflow=2.66 cfs 0.485 af  
 24.0" Round Culvert n=0.013 L=40.0' S=0.0063 '/ Outflow=2.66 cfs 0.485 af

**Link 8-64: MAP 8 LOT 64** Inflow=1.40 cfs 0.186 af  
 Primary=1.40 cfs 0.186 af

**Link 9-2: MAP 9 LOT 2** Inflow=3.11 cfs 0.875 af  
 Primary=3.11 cfs 0.875 af

**Link 9-5: MAP 9 LOT 5** Inflow=1.83 cfs 0.511 af  
 Primary=1.83 cfs 0.511 af

**Link RR: RIVER ROAD** Inflow=0.24 cfs 0.018 af  
 Primary=0.24 cfs 0.018 af

**Total Runoff Area = 9.145 ac Runoff Volume = 1.849 af Average Runoff Depth = 2.43"**  
**40.98% Pervious = 3.747 ac 59.02% Impervious = 5.397 ac**



**Postdevelopment 0NH-Stratham 41 Portsmouth Ave 24-hr S1 10-yr 10-yr (+15%) Rainfall=5.63"**

Prepared by Emanuel Engineering

Printed 4/27/2026

HydroCAD® 10.20-8a s/n 01104 © 2025 HydroCAD Software Solutions LLC

Page 216

**Subcatchment213S: NORTH LANDSCAPE** Runoff Area=1,255 sf 75.70% Impervious Runoff Depth=4.71"  
Flow Length=20' Slope=0.0100 '/' Tc=6.0 min CN=92 Runoff=0.13 cfs 0.011 af

**Subcatchment214S: SOUTH LANDSCAPE** Runoff Area=3,380 sf 49.85% Impervious Runoff Depth=4.06"  
Flow Length=75' Slope=0.0100 '/' Tc=6.1 min CN=86 Runoff=0.30 cfs 0.026 af

**Pond 104P: EXISTING CULVERT** Peak Elev=82.41' Inflow=2.34 cfs 0.864 af  
30.0" Round Culvert n=0.013 L=100.0' S=0.0063 '/' Outflow=2.34 cfs 0.864 af

**Pond 250P-A: BIO-POND F PONDING LAYER** Peak Elev=84.22' Storage=2,742 cf Inflow=3.95 cfs 0.352 af  
Primary=0.74 cfs 0.352 af Secondary=0.00 cfs 0.000 af Outflow=0.74 cfs 0.352 af

**Pond 250P-B: BIO-POND F SUBSURFACE** Peak Elev=80.65' Storage=1,462 cf Inflow=0.74 cfs 0.352 af  
Discarded=0.09 cfs 0.166 af Primary=0.64 cfs 0.186 af Outflow=0.74 cfs 0.352 af

**Pond 251P-A: BIO-POND A PONDING LAYER** Peak Elev=84.17' Storage=2,103 cf Inflow=6.68 cfs 0.596 af  
Primary=2.52 cfs 0.596 af Secondary=0.00 cfs 0.000 af Outflow=2.52 cfs 0.596 af

**Pond 251P-B: BIO-POND A SUBSURFACE** Peak Elev=82.62' Storage=2,652 cf Inflow=2.52 cfs 0.596 af  
12.0" Round Culvert n=0.013 L=50.0' S=0.0050 '/' Outflow=2.12 cfs 0.596 af

**Pond 252P: NORTHWEST CATCH BASIN** Peak Elev=82.59' Inflow=0.43 cfs 0.037 af  
18.0" Round Culvert n=0.013 L=45.0' S=0.0049 '/' Outflow=0.43 cfs 0.037 af

**Pond 253P-A: BIO-POND C PONDING LAYER** Peak Elev=87.64' Storage=186 cf Inflow=0.50 cfs 0.044 af  
Primary=0.18 cfs 0.044 af Secondary=0.00 cfs 0.000 af Outflow=0.18 cfs 0.044 af

**Pond 253P-B: BIO-POND C SUBSURFACE** Peak Elev=84.87' Storage=0 cf Inflow=0.33 cfs 0.251 af  
Outflow=0.33 cfs 0.251 af

**Pond 253P-C: POROUS PAVEMENT A** Peak Elev=85.76' Storage=3,693 cf Inflow=0.41 cfs 0.235 af  
6.0" Round Culvert n=0.010 L=10.0' S=0.0000 '/' Outflow=0.30 cfs 0.207 af

**Pond 254P-A: BIO-POND D PONDING LAYER** Peak Elev=87.86' Storage=1,048 cf Inflow=2.05 cfs 0.202 af  
Primary=0.62 cfs 0.202 af Secondary=0.00 cfs 0.000 af Outflow=0.62 cfs 0.202 af

**Pond 254P-B: BIO-POND D SUBSURFACE** Peak Elev=85.44' Storage=7 cf Inflow=0.62 cfs 0.202 af  
6.0" Round Culvert n=0.010 L=90.0' S=0.0111 '/' Outflow=0.62 cfs 0.202 af

**Pond 255P-A: BIO-POND E PONDING LAYER** Peak Elev=87.56' Storage=3,146 cf Inflow=4.46 cfs 0.405 af  
Primary=0.75 cfs 0.397 af Secondary=0.34 cfs 0.008 af Outflow=1.08 cfs 0.405 af

**Pond 255P-B: BIO-POND E SUBSURFACE** Peak Elev=84.32' Storage=12 cf Inflow=1.70 cfs 0.607 af  
18.0" Round Culvert n=0.013 L=178.0' S=0.0025 '/' Outflow=1.70 cfs 0.607 af

**Pond 256P: RIVER ROAD CB** Peak Elev=82.46' Storage=54 cf Inflow=1.38 cfs 0.118 af  
Primary=1.37 cfs 0.117 af Secondary=0.00 cfs 0.000 af Outflow=1.37 cfs 0.117 af

**Pond 257P: BARNYARD CB** Peak Elev=82.27' Storage=59 cf Inflow=1.76 cfs 0.150 af  
Primary=1.75 cfs 0.149 af Secondary=0.00 cfs 0.000 af Outflow=1.75 cfs 0.149 af

**Postdevelopment 0NH-Stratham 41 Portsmouth Ave 24-hr S1 10-yr 10-yr (+15%) Rainfall=5.63"**

Prepared by Emanuel Engineering

Printed 4/27/2026

HydroCAD® 10.20-8a s/n 01104 © 2025 HydroCAD Software Solutions LLC

Page 217

**Pond 258P: 24" HDPE UNDER RIVER ROAD** Peak Elev=82.14' Storage=13,941 cf Inflow=7.07 cfs 1.656 af  
 Primary=4.65 cfs 1.558 af Secondary=0.00 cfs 0.000 af Outflow=4.65 cfs 1.558 af

**Pond 259P-A: BIO-POND B PONDING LAYER** Peak Elev=87.08' Storage=3,106 cf Inflow=5.37 cfs 0.491 af  
 Primary=1.18 cfs 0.491 af Secondary=0.00 cfs 0.000 af Outflow=1.18 cfs 0.491 af

**Pond 259P-B: BIO-POND B SUBSURFACE** Peak Elev=84.95' Storage=1,167 cf Inflow=1.18 cfs 0.491 af  
 Outflow=1.04 cfs 0.491 af

**Pond 260P-A: ROOF DRAINS** Peak Elev=88.90' Inflow=1.55 cfs 0.150 af  
 12.0" Round Culvert n=0.013 L=35.0' S=0.0029 '/ Outflow=1.55 cfs 0.150 af

**Pond 260P-B: ROOF DRAINS** Peak Elev=85.43' Inflow=1.60 cfs 0.155 af  
 12.0" Round Culvert n=0.013 L=5.0' S=0.0200 '/ Outflow=1.60 cfs 0.155 af

**Pond 261P: NORTH ISLAND CATCHBASIN** Peak Elev=84.86' Inflow=1.73 cfs 0.167 af  
 12.0" Round Culvert n=0.013 L=105.0' S=0.0050 '/ Outflow=1.73 cfs 0.167 af

**Pond 262P: SOUTH ISLAND CATCHBASIN** Peak Elev=83.96' Inflow=3.26 cfs 0.800 af  
 24.0" Round Culvert n=0.013 L=250.0' S=0.0025 '/ Outflow=3.26 cfs 0.800 af

**Pond 263P: MANHOLE 1** Peak Elev=82.91' Inflow=3.26 cfs 0.800 af  
 24.0" Round Culvert n=0.013 L=40.0' S=0.0063 '/ Outflow=3.26 cfs 0.800 af

**Link 8-64: MAP 8 LOT 64** Inflow=3.35 cfs 0.437 af  
 Primary=3.35 cfs 0.437 af

**Link 9-2: MAP 9 LOT 2** Inflow=4.65 cfs 1.558 af  
 Primary=4.65 cfs 1.558 af

**Link 9-5: MAP 9 LOT 5** Inflow=2.34 cfs 0.864 af  
 Primary=2.34 cfs 0.864 af

**Link RR: RIVER ROAD** Inflow=0.41 cfs 0.035 af  
 Primary=0.41 cfs 0.035 af

**Total Runoff Area = 9.145 ac Runoff Volume = 3.189 af Average Runoff Depth = 4.18"**  
**40.98% Pervious = 3.747 ac 59.02% Impervious = 5.397 ac**

**Postdevelopment 0NH-Stratham 41 Portsmouth Ave 24-hr S1 25-yr 25-yr (+15%) Rainfall=7.16"**

Prepared by Emanuel Engineering

Printed 4/27/2026

HydroCAD® 10.20-8a s/n 01104 © 2025 HydroCAD Software Solutions LLC

Page 218

Time span=0.00-48.00 hrs, dt=0.01 hrs, 4801 points x 2  
 Runoff by SCS TR-20 method, UH=SCS, Weighted-CN  
 Reach routing by Dyn-Stor-Ind method - Pond routing by Dyn-Stor-Ind method

|   |  |
|---|--|
| <b>Subcatchment200S: SW DRIVEWAY</b>        | Runoff Area=5,515 sf 48.92% Impervious Runoff Depth=4.73"<br>Flow Length=192' Tc=6.0 min CN=79 Runoff=0.55 cfs 0.050 af                    |
| <b>Subcatchment201S-A: HILL RUNNING OFF</b> | Runoff Area=58,188 sf 2.11% Impervious Runoff Depth=3.44"<br>Flow Length=310' Tc=6.0 min CN=67 Runoff=4.19 cfs 0.382 af                    |
| <b>Subcatchment201S-B: Proposed Parking</b> | Runoff Area=40,085 sf 80.12% Impervious Runoff Depth=6.10"<br>Flow Length=190' Slope=0.0100 '/' Tc=6.0 min CN=91 Runoff=4.85 cfs 0.467 af  |
| <b>Subcatchment202S: NORTHWEST</b>          | Runoff Area=5,467 sf 27.13% Impervious Runoff Depth=4.95"<br>Flow Length=77' Slope=0.0270 '/' Tc=6.0 min CN=81 Runoff=0.57 cfs 0.052 af    |
| <b>Subcatchment203S: WEST ENTRANCE</b>      | Runoff Area=10,408 sf 56.83% Impervious Runoff Depth=5.75"<br>Flow Length=206' Slope=0.0200 '/' Tc=8.3 min CN=88 Runoff=1.09 cfs 0.114 af  |
| <b>Subcatchment204S-A: NORTH PARKING</b>    | Runoff Area=23,845 sf 93.10% Impervious Runoff Depth=6.68"<br>Tc=222.0 min CN=96 Runoff=0.51 cfs 0.305 af                                  |
| <b>Subcatchment204S-B: ACCESSROAD</b>       | Runoff Area=6,090 sf 37.68% Impervious Runoff Depth=5.18"<br>Flow Length=40' Slope=0.0100 '/' Tc=6.3 min CN=83 Runoff=0.65 cfs 0.060 af    |
| <b>Subcatchment205S: NORTHEAST</b>          | Runoff Area=24,112 sf 63.73% Impervious Runoff Depth=5.86"<br>Flow Length=118' Tc=8.3 min CN=89 Runoff=2.55 cfs 0.271 af                   |
| <b>Subcatchment206S: EAST PARKING</b>       | Runoff Area=43,950 sf 78.74% Impervious Runoff Depth=6.33"<br>Flow Length=276' Slope=0.0127 '/' Tc=6.0 min CN=93 Runoff=5.43 cfs 0.532 af  |
| <b>Subcatchment207S: SOUTHEAST PARCEL</b>   | Runoff Area=17,349 sf 29.77% Impervious Runoff Depth=4.95"<br>Flow Length=257' Tc=6.0 min CN=81 Runoff=1.80 cfs 0.164 af                   |
| <b>Subcatchment208S: SOUTH PARCEL</b>       | Runoff Area=5,225 sf 20.80% Impervious Runoff Depth=4.73"<br>Flow Length=110' Tc=6.0 min CN=79 Runoff=0.52 cfs 0.047 af                    |
| <b>Subcatchment209S: SOUTHWEST</b>          | Runoff Area=17,300 sf 18.76% Impervious Runoff Depth=4.73"<br>Flow Length=279' Tc=11.1 min CN=79 Runoff=1.37 cfs 0.157 af                  |
| <b>Subcatchment210S: WEST PARKING</b>       | Runoff Area=67,820 sf 69.77% Impervious Runoff Depth=6.10"<br>Flow Length=130' Slope=0.0100 '/' Tc=6.0 min CN=91 Runoff=8.21 cfs 0.791 af  |
| <b>Subcatchment211S: WEST PARKING</b>       | Runoff Area=38,777 sf 72.67% Impervious Runoff Depth=6.10"<br>Flow Length=210' Slope=0.0150 '/' Tc=6.0 min CN=91 Runoff=4.70 cfs 0.452 af  |
| <b>Subcatchment212S-A: WESTERN HALF</b>     | Runoff Area=14,525 sf 100.00% Impervious Runoff Depth=6.92"<br>Flow Length=150' Slope=0.0100 '/' Tc=6.0 min CN=98 Runoff=1.85 cfs 0.192 af |
| <b>Subcatchment212S-B: EASTERN HALF</b>     | Runoff Area=15,045 sf 100.00% Impervious Runoff Depth=6.92"<br>Flow Length=130' Slope=0.0100 '/' Tc=6.0 min CN=98 Runoff=1.92 cfs 0.199 af |

**Postdevelopment 0NH-Stratham 41 Portsmouth Ave 24-hr S1 25-yr 25-yr (+15%) Rainfall=7.16"**

Prepared by Emanuel Engineering

Printed 4/27/2026

HydroCAD® 10.20-8a s/n 01104 © 2025 HydroCAD Software Solutions LLC

Page 219

**Subcatchment213S: NORTH LANDSCAPE** Runoff Area=1,255 sf 75.70% Impervious Runoff Depth=6.21"  
Flow Length=20' Slope=0.0100 '/' Tc=6.0 min CN=92 Runoff=0.15 cfs 0.015 af

**Subcatchment214S: SOUTH LANDSCAPE** Runoff Area=3,380 sf 49.85% Impervious Runoff Depth=5.52"  
Flow Length=75' Slope=0.0100 '/' Tc=6.1 min CN=86 Runoff=0.38 cfs 0.036 af

**Pond 104P: EXISTING CULVERT** Peak Elev=82.47' Inflow=2.74 cfs 1.148 af  
30.0" Round Culvert n=0.013 L=100.0' S=0.0063 '/' Outflow=2.74 cfs 1.148 af

**Pond 250P-A: BIO-POND F PONDING LAYER** Peak Elev=84.59' Storage=3,975 cf Inflow=4.85 cfs 0.467 af  
Primary=0.81 cfs 0.467 af Secondary=0.00 cfs 0.000 af Outflow=0.81 cfs 0.467 af

**Pond 250P-B: BIO-POND F SUBSURFACE** Peak Elev=80.68' Storage=1,498 cf Inflow=0.81 cfs 0.467 af  
Discarded=0.09 cfs 0.178 af Primary=0.71 cfs 0.289 af Outflow=0.80 cfs 0.467 af

**Pond 251P-A: BIO-POND A PONDING LAYER** Peak Elev=84.27' Storage=3,290 cf Inflow=8.21 cfs 0.791 af  
Primary=2.57 cfs 0.791 af Secondary=0.00 cfs 0.000 af Outflow=2.57 cfs 0.791 af

**Pond 251P-B: BIO-POND A SUBSURFACE** Peak Elev=82.77' Storage=3,267 cf Inflow=2.57 cfs 0.791 af  
12.0" Round Culvert n=0.013 L=50.0' S=0.0050 '/' Outflow=2.39 cfs 0.791 af

**Pond 252P: NORTHWEST CATCH BASIN** Peak Elev=82.65' Inflow=0.57 cfs 0.052 af  
18.0" Round Culvert n=0.013 L=45.0' S=0.0049 '/' Outflow=0.57 cfs 0.052 af

**Pond 253P-A: BIO-POND C PONDING LAYER** Peak Elev=87.73' Storage=300 cf Inflow=0.65 cfs 0.060 af  
Primary=0.20 cfs 0.060 af Secondary=0.00 cfs 0.000 af Outflow=0.20 cfs 0.060 af

**Pond 253P-B: BIO-POND C SUBSURFACE** Peak Elev=84.95' Storage=1 cf Inflow=0.42 cfs 0.337 af  
Outflow=0.42 cfs 0.337 af

**Pond 253P-C: POROUS PAVEMENT A** Peak Elev=85.86' Storage=4,253 cf Inflow=0.51 cfs 0.305 af  
6.0" Round Culvert n=0.010 L=10.0' S=0.0000 '/' Outflow=0.39 cfs 0.276 af

**Pond 254P-A: BIO-POND D PONDING LAYER** Peak Elev=88.06' Storage=1,644 cf Inflow=2.55 cfs 0.271 af  
Primary=0.65 cfs 0.271 af Secondary=0.00 cfs 0.000 af Outflow=0.65 cfs 0.271 af

**Pond 254P-B: BIO-POND D SUBSURFACE** Peak Elev=85.52' Storage=36 cf Inflow=0.65 cfs 0.271 af  
6.0" Round Culvert n=0.010 L=90.0' S=0.0111 '/' Outflow=0.65 cfs 0.271 af

**Pond 255P-A: BIO-POND E PONDING LAYER** Peak Elev=87.67' Storage=3,474 cf Inflow=5.43 cfs 0.532 af  
Primary=0.76 cfs 0.490 af Secondary=1.73 cfs 0.043 af Outflow=2.50 cfs 0.532 af

**Pond 255P-B: BIO-POND E SUBSURFACE** Peak Elev=84.63' Storage=164 cf Inflow=3.10 cfs 0.803 af  
18.0" Round Culvert n=0.013 L=178.0' S=0.0025 '/' Outflow=2.89 cfs 0.803 af

**Pond 256P: RIVER ROAD CB** Peak Elev=82.98' Storage=60 cf Inflow=1.80 cfs 0.164 af  
Primary=1.79 cfs 0.163 af Secondary=0.00 cfs 0.000 af Outflow=1.79 cfs 0.163 af

**Pond 257P: BARNYARD CB** Peak Elev=82.66' Storage=64 cf Inflow=2.31 cfs 0.211 af  
Primary=2.30 cfs 0.210 af Secondary=0.00 cfs 0.000 af Outflow=2.30 cfs 0.210 af

**Postdevelopment 0NH-Stratham 41 Portsmouth Ave 24-hr S1 25-yr 25-yr (+15%) Rainfall=7.16"**

Prepared by Emanuel Engineering

Printed 4/27/2026

HydroCAD® 10.20-8a s/n 01104 © 2025 HydroCAD Software Solutions LLC

Page 220

**Pond 258P: 24" HDPE UNDER RIVER ROAD** Peak Elev=82.25' Storage=14,795 cf Inflow=8.18 cfs 2.210 af  
 Primary=6.73 cfs 2.111 af Secondary=0.00 cfs 0.000 af Outflow=6.73 cfs 2.111 af

**Pond 259P-A: BIO-POND B PONDING LAYER** Peak Elev=87.36' Storage=4,603 cf Inflow=6.55 cfs 0.645 af  
 Primary=1.27 cfs 0.645 af Secondary=0.00 cfs 0.000 af Outflow=1.27 cfs 0.645 af

**Pond 259P-B: BIO-POND B SUBSURFACE** Peak Elev=85.11' Storage=1,557 cf Inflow=1.27 cfs 0.645 af  
 Outflow=1.10 cfs 0.645 af

**Pond 260P-A: ROOF DRAINS** Peak Elev=89.02' Inflow=1.85 cfs 0.192 af  
 12.0" Round Culvert n=0.013 L=35.0' S=0.0029 '/ Outflow=1.85 cfs 0.192 af

**Pond 260P-B: ROOF DRAINS** Peak Elev=85.54' Inflow=1.92 cfs 0.199 af  
 12.0" Round Culvert n=0.013 L=5.0' S=0.0200 '/ Outflow=1.92 cfs 0.199 af

**Pond 261P: NORTH ISLAND CATCHBASIN** Peak Elev=84.98' Inflow=2.07 cfs 0.214 af  
 12.0" Round Culvert n=0.013 L=105.0' S=0.0050 '/ Outflow=2.07 cfs 0.214 af

**Pond 262P: SOUTH ISLAND CATCHBASIN** Peak Elev=84.04' Inflow=3.81 cfs 1.053 af  
 24.0" Round Culvert n=0.013 L=250.0' S=0.0025 '/ Outflow=3.81 cfs 1.053 af

**Pond 263P: MANHOLE 1** Peak Elev=83.00' Inflow=3.81 cfs 1.053 af  
 24.0" Round Culvert n=0.013 L=40.0' S=0.0063 '/ Outflow=3.81 cfs 1.053 af

**Link 8-64: MAP 8 LOT 64** Inflow=4.72 cfs 0.672 af  
 Primary=4.72 cfs 0.672 af

**Link 9-2: MAP 9 LOT 2** Inflow=6.73 cfs 2.111 af  
 Primary=6.73 cfs 2.111 af

**Link 9-5: MAP 9 LOT 5** Inflow=2.74 cfs 1.148 af  
 Primary=2.74 cfs 1.148 af

**Link RR: RIVER ROAD** Inflow=0.55 cfs 0.050 af  
 Primary=0.55 cfs 0.050 af

**Total Runoff Area = 9.145 ac Runoff Volume = 4.288 af Average Runoff Depth = 5.63"**  
**40.98% Pervious = 3.747 ac 59.02% Impervious = 5.397 ac**

**Postdevelopment 0NH-Stratham 41 Portsmouth Ave 24-hr S1 50-yr 50-yr (+15%) Rainfall=8.60"**

Prepared by Emanuel Engineering

Printed 4/27/2026

HydroCAD® 10.20-8a s/n 01104 © 2025 HydroCAD Software Solutions LLC

Page 221

Time span=0.00-48.00 hrs, dt=0.01 hrs, 4801 points x 2  
 Runoff by SCS TR-20 method, UH=SCS, Weighted-CN  
 Reach routing by Dyn-Stor-Ind method - Pond routing by Dyn-Stor-Ind method

|   |  |
|---|--|
| <b>Subcatchment200S: SW DRIVEWAY</b>        | Runoff Area=5,515 sf 48.92% Impervious Runoff Depth=6.07"<br>Flow Length=192' Tc=6.0 min CN=79 Runoff=0.67 cfs 0.064 af                    |
| <b>Subcatchment201S-A: HILL RUNNING OFF</b> | Runoff Area=58,188 sf 2.11% Impervious Runoff Depth=4.62"<br>Flow Length=310' Tc=6.0 min CN=67 Runoff=5.41 cfs 0.515 af                    |
| <b>Subcatchment201S-B: Proposed Parking</b> | Runoff Area=40,085 sf 80.12% Impervious Runoff Depth=7.52"<br>Flow Length=190' Slope=0.0100 '/' Tc=6.0 min CN=91 Runoff=5.64 cfs 0.576 af  |
| <b>Subcatchment202S: NORTHWEST</b>          | Runoff Area=5,467 sf 27.13% Impervious Runoff Depth=6.31"<br>Flow Length=77' Slope=0.0270 '/' Tc=6.0 min CN=81 Runoff=0.68 cfs 0.066 af    |
| <b>Subcatchment203S: WEST ENTRANCE</b>      | Runoff Area=10,408 sf 56.83% Impervious Runoff Depth=7.16"<br>Flow Length=206' Slope=0.0200 '/' Tc=8.3 min CN=88 Runoff=1.28 cfs 0.142 af  |
| <b>Subcatchment204S-A: NORTH PARKING</b>    | Runoff Area=23,845 sf 93.10% Impervious Runoff Depth=8.12"<br>Tc=222.0 min CN=96 Runoff=0.61 cfs 0.370 af                                  |
| <b>Subcatchment204S-B: ACCESSROAD</b>       | Runoff Area=6,090 sf 37.68% Impervious Runoff Depth=6.55"<br>Flow Length=40' Slope=0.0100 '/' Tc=6.3 min CN=83 Runoff=0.77 cfs 0.076 af    |
| <b>Subcatchment205S: NORTHEAST</b>          | Runoff Area=24,112 sf 63.73% Impervious Runoff Depth=7.28"<br>Flow Length=118' Tc=8.3 min CN=89 Runoff=2.99 cfs 0.336 af                   |
| <b>Subcatchment206S: EAST PARKING</b>       | Runoff Area=43,950 sf 78.74% Impervious Runoff Depth=7.76"<br>Flow Length=276' Slope=0.0127 '/' Tc=6.0 min CN=93 Runoff=6.28 cfs 0.652 af  |
| <b>Subcatchment207S: SOUTHEAST PARCEL</b>   | Runoff Area=17,349 sf 29.77% Impervious Runoff Depth=6.31"<br>Flow Length=257' Tc=6.0 min CN=81 Runoff=2.16 cfs 0.209 af                   |
| <b>Subcatchment208S: SOUTH PARCEL</b>       | Runoff Area=5,225 sf 20.80% Impervious Runoff Depth=6.07"<br>Flow Length=110' Tc=6.0 min CN=79 Runoff=0.63 cfs 0.061 af                    |
| <b>Subcatchment209S: SOUTHWEST</b>          | Runoff Area=17,300 sf 18.76% Impervious Runoff Depth=6.07"<br>Flow Length=279' Tc=11.1 min CN=79 Runoff=1.67 cfs 0.201 af                  |
| <b>Subcatchment210S: WEST PARKING</b>       | Runoff Area=67,820 sf 69.77% Impervious Runoff Depth=7.52"<br>Flow Length=130' Slope=0.0100 '/' Tc=6.0 min CN=91 Runoff=9.54 cfs 0.975 af  |
| <b>Subcatchment211S: WEST PARKING</b>       | Runoff Area=38,777 sf 72.67% Impervious Runoff Depth=7.52"<br>Flow Length=210' Slope=0.0150 '/' Tc=6.0 min CN=91 Runoff=5.46 cfs 0.558 af  |
| <b>Subcatchment212S-A: WESTERN HALF</b>     | Runoff Area=14,525 sf 100.00% Impervious Runoff Depth=8.36"<br>Flow Length=150' Slope=0.0100 '/' Tc=6.0 min CN=98 Runoff=2.12 cfs 0.232 af |
| <b>Subcatchment212S-B: EASTERN HALF</b>     | Runoff Area=15,045 sf 100.00% Impervious Runoff Depth=8.36"<br>Flow Length=130' Slope=0.0100 '/' Tc=6.0 min CN=98 Runoff=2.20 cfs 0.241 af |

**Postdevelopment 0NH-Stratham 41 Portsmouth Ave 24-hr S1 50-yr 50-yr (+15%) Rainfall=8.60"**

Prepared by Emanuel Engineering

Printed 4/27/2026

HydroCAD® 10.20-8a s/n 01104 © 2025 HydroCAD Software Solutions LLC

Page 222

**Subcatchment213S: NORTH LANDSCAPE** Runoff Area=1,255 sf 75.70% Impervious Runoff Depth=7.64"  
Flow Length=20' Slope=0.0100 '/' Tc=6.0 min CN=92 Runoff=0.18 cfs 0.018 af

**Subcatchment214S: SOUTH LANDSCAPE** Runoff Area=3,380 sf 49.85% Impervious Runoff Depth=6.91"  
Flow Length=75' Slope=0.0100 '/' Tc=6.1 min CN=86 Runoff=0.45 cfs 0.045 af

**Pond 104P: EXISTING CULVERT** Peak Elev=82.52' Inflow=3.12 cfs 1.417 af  
30.0" Round Culvert n=0.013 L=100.0' S=0.0063 '/' Outflow=3.12 cfs 1.417 af

**Pond 250P-A: BIO-POND F PONDING LAYER** Peak Elev=84.82' Storage=4,802 cf Inflow=5.64 cfs 0.576 af  
Primary=0.85 cfs 0.563 af Secondary=0.48 cfs 0.013 af Outflow=1.32 cfs 0.576 af

**Pond 250P-B: BIO-POND F SUBSURFACE** Peak Elev=80.80' Storage=1,698 cf Inflow=1.32 cfs 0.576 af  
Discarded=0.09 cfs 0.185 af Primary=1.12 cfs 0.391 af Outflow=1.22 cfs 0.576 af

**Pond 251P-A: BIO-POND A PONDING LAYER** Peak Elev=84.38' Storage=4,560 cf Inflow=9.54 cfs 0.975 af  
Primary=2.62 cfs 0.975 af Secondary=0.00 cfs 0.000 af Outflow=2.62 cfs 0.975 af

**Pond 251P-B: BIO-POND A SUBSURFACE** Peak Elev=82.85' Storage=3,605 cf Inflow=2.62 cfs 0.975 af  
12.0" Round Culvert n=0.013 L=50.0' S=0.0050 '/' Outflow=2.51 cfs 0.975 af

**Pond 252P: NORTHWEST CATCH BASIN** Peak Elev=82.70' Inflow=0.68 cfs 0.066 af  
18.0" Round Culvert n=0.013 L=45.0' S=0.0049 '/' Outflow=0.68 cfs 0.066 af

**Pond 253P-A: BIO-POND C PONDING LAYER** Peak Elev=87.82' Storage=419 cf Inflow=0.77 cfs 0.076 af  
Primary=0.22 cfs 0.076 af Secondary=0.00 cfs 0.000 af Outflow=0.22 cfs 0.076 af

**Pond 253P-B: BIO-POND C SUBSURFACE** Peak Elev=85.04' Storage=1 cf Inflow=0.51 cfs 0.418 af  
Outflow=0.51 cfs 0.418 af

**Pond 253P-C: POROUS PAVEMENT A** Peak Elev=85.96' Storage=4,791 cf Inflow=0.61 cfs 0.370 af  
6.0" Round Culvert n=0.010 L=10.0' S=0.0000 '/' Outflow=0.47 cfs 0.342 af

**Pond 254P-A: BIO-POND D PONDING LAYER** Peak Elev=88.27' Storage=2,265 cf Inflow=2.99 cfs 0.336 af  
Primary=0.69 cfs 0.336 af Secondary=0.00 cfs 0.000 af Outflow=0.69 cfs 0.336 af

**Pond 254P-B: BIO-POND D SUBSURFACE** Peak Elev=85.61' Storage=135 cf Inflow=0.69 cfs 0.336 af  
6.0" Round Culvert n=0.010 L=90.0' S=0.0111 '/' Outflow=0.69 cfs 0.336 af

**Pond 255P-A: BIO-POND E PONDING LAYER** Peak Elev=87.75' Storage=3,732 cf Inflow=6.28 cfs 0.652 af  
Primary=0.78 cfs 0.574 af Secondary=3.25 cfs 0.079 af Outflow=4.03 cfs 0.652 af

**Pond 255P-B: BIO-POND E SUBSURFACE** Peak Elev=84.91' Storage=463 cf Inflow=4.56 cfs 0.988 af  
18.0" Round Culvert n=0.013 L=178.0' S=0.0025 '/' Outflow=4.06 cfs 0.988 af

**Pond 256P: RIVER ROAD CB** Peak Elev=83.49' Storage=67 cf Inflow=2.16 cfs 0.209 af  
Primary=2.15 cfs 0.209 af Secondary=0.00 cfs 0.000 af Outflow=2.15 cfs 0.209 af

**Pond 257P: BARNYARD CB** Peak Elev=83.01' Storage=68 cf Inflow=2.78 cfs 0.269 af  
Primary=2.77 cfs 0.268 af Secondary=0.00 cfs 0.000 af Outflow=2.77 cfs 0.268 af

**Postdevelopment 0NH-Stratham 41 Portsmouth Ave 24-hr S1 50-yr 50-yr (+15%) Rainfall=8.60"**

Prepared by Emanuel Engineering

Printed 4/27/2026

HydroCAD® 10.20-8a s/n 01104 © 2025 HydroCAD Software Solutions LLC

Page 223

**Pond 258P: 24" HDPE UNDER RIVER ROAD** Peak Elev=82.35' Storage=15,506 cf Inflow=9.88 cfs 2.736 af  
 Primary=8.85 cfs 2.637 af Secondary=0.00 cfs 0.000 af Outflow=8.85 cfs 2.637 af

**Pond 259P-A: BIO-POND B PONDING LAYER** Peak Elev=87.57' Storage=5,703 cf Inflow=7.58 cfs 0.790 af  
 Primary=1.33 cfs 0.778 af Secondary=0.45 cfs 0.012 af Outflow=1.79 cfs 0.790 af

**Pond 259P-B: BIO-POND B SUBSURFACE** Peak Elev=85.32' Storage=2,092 cf Inflow=1.79 cfs 0.790 af  
 Outflow=1.18 cfs 0.790 af

**Pond 260P-A: ROOF DRAINS** Peak Elev=89.13' Inflow=2.12 cfs 0.232 af  
 12.0" Round Culvert n=0.013 L=35.0' S=0.0029 '/ Outflow=2.12 cfs 0.232 af

**Pond 260P-B: ROOF DRAINS** Peak Elev=85.68' Inflow=2.20 cfs 0.241 af  
 12.0" Round Culvert n=0.013 L=5.0' S=0.0200 '/ Outflow=2.20 cfs 0.241 af

**Pond 261P: NORTH ISLAND CATCHBASIN** Peak Elev=85.13' Inflow=2.38 cfs 0.259 af  
 12.0" Round Culvert n=0.013 L=105.0' S=0.0050 '/ Outflow=2.38 cfs 0.259 af

**Pond 262P: SOUTH ISLAND CATCHBASIN** Peak Elev=84.28' Inflow=5.42 cfs 1.292 af  
 24.0" Round Culvert n=0.013 L=250.0' S=0.0025 '/ Outflow=5.42 cfs 1.292 af

**Pond 263P: MANHOLE 1** Peak Elev=83.23' Inflow=5.42 cfs 1.292 af  
 24.0" Round Culvert n=0.013 L=40.0' S=0.0063 '/ Outflow=5.42 cfs 1.292 af

**Link 8-64: MAP 8 LOT 64** Inflow=5.97 cfs 0.906 af  
 Primary=5.97 cfs 0.906 af

**Link 9-2: MAP 9 LOT 2** Inflow=8.85 cfs 2.637 af  
 Primary=8.85 cfs 2.637 af

**Link 9-5: MAP 9 LOT 5** Inflow=3.12 cfs 1.417 af  
 Primary=3.12 cfs 1.417 af

**Link RR: RIVER ROAD** Inflow=0.67 cfs 0.064 af  
 Primary=0.67 cfs 0.064 af

**Total Runoff Area = 9.145 ac Runoff Volume = 5.338 af Average Runoff Depth = 7.01"**  
**40.98% Pervious = 3.747 ac 59.02% Impervious = 5.397 ac**



GOVE ENVIRONMENTAL SERVICES, INC.

SITE-SPECIFIC SOIL SURVEY and HIGH INTENSITY SOIL MAPPING  
REPORT

AUTOFAIR REALTY II, LLC  
[GES PROJECT NO. 2013067]

1. MAPPING STANDARDS

Site-specific Soil Survey (SSSM):

This map product is within the technical standards of the National Cooperative Soil Survey. It is a special purpose product, intended for infiltration requirements by the NH DES Alteration of Terrain Bureau. It was produced by a professional soil scientist, and is not a product of the USDA Natural Resources Conservation Service. There is a report that accompanies this map.

The site specific soil survey was produced April 1, 2014, and was prepared by James P. Gove, CSS # 004, Gove Environmental Services, Inc.

Soils were identified with the New Hampshire State-wide Numerical Soils Legend, USDA NRCS, Durham, NH. Issue # 10, January 2011.

High Intensity Soil Mapping (HISS):

This soil map was prepared by a professional soil scientist and meets the technical standards of the SSSNNE Publication No. 1, High Intensity Soil Maps for NH, April 2008.

Soils were identified using the Key to Soil Types.

Soil mapping was performed by James Gove, CSS # 004, April 1, 2014.

Original HISS was prepared in August, 2013, by Lindsay Byboth, Soil Scientist Apprentice, and updated on April 1, 2014.

2. DATE SOIL MAPS PRODUCED

HISS – August 2013, revised April 2014

SSSM – April 2014

3. GEOGRAPHIC LOCATION AND SIZE OF SITE

Tax Map 9, Lot 4, Stratham, New Hampshire. Approximately 8 acres.

4. PURPOSE OF THE SOIL MAP

The preparation of this map was requested by Emanuel Engineering. The purpose was to meet the subdivision requirements of the Town of Stratham (HISS) and for NH DES Alteration of Terrain Bureau (SSSM).

5. SOIL IDENTIFICATION LEGEND

| NRCS SYMBOL | SOIL TAXONOMIC NAME | HISS SOIL SYMBOL |
|-------------|---------------------|------------------|
| 38          | Eldridge            | 343 and 443      |
| 460         | Pennichuck          | 228              |
| 42          | Canton              | 221              |



## 6. SOIL MAP UNIT DESCRIPTIONS

Slopes for all soils are mapped as follows:

0-8 % = B slopes

8-15% = C slopes

15-25% = D slopes

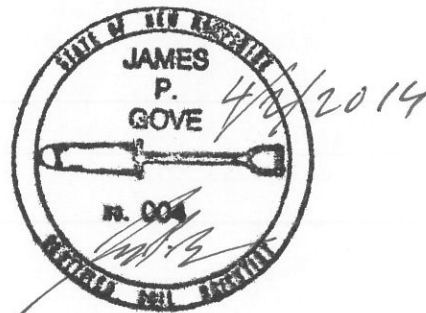
Eldridge is formed over silt and clay deposits, with typically a subsoil of sandy loam or loamy sand. The drainage can range from somewhat poorly to moderately well. It is found on the toe slopes, valleys and depression areas. For the SSSM, this soil is identified as 38, followed by the slope range. In the case of this project, non-limiting inclusions are Newfields, Elmridge, and Udorthents. Non-limiting inclusions are 45%. Limiting inclusions are Squamscott and Scitico, and make up less than 5%. For the HISS map, this soil is identified as either 343 or 443.

Pennichuck is formed over rippable, weathered and un-weathered phyllite bedrock. The depth to bedrock is typically moderately deep, but can vary greatly, as does the depth of rippable bedrock of the more un-weathered phyllite. The soil drainage class is well drained. It is found on hill tops and hill sides. For the SSSM, this soil is identified as 460. In the case of this property, the non-limiting inclusions are Canton, Chatfield, and Udorthents. No-limiting inclusions are 45%. Limiting inclusions are Eldridge or Elmridge, and make up less than 10%. For the HISS map, the soil is identified as 460.

Canton is formed in deep glacial till of loamy and loamy sand textures. The soil drainage class is well drained. It is found on hill tops and hill sides. For the SSSM, this soil is identified as 42. Non-limiting inclusions are Charlton and Hoosic, and make up 10% of the map units. Limiting inclusions are Newfields, Chatfield and Pennichuck, and make up 10% of the map units. For the HISS map, this soil is identified as 221.

RESPONSIBLE SOIL SCIENTIST

James P. Gove, C.S.S. # 004



7. OTHER DISTINGUISHING FEATURES OF SITE

For the NH DES Alteration of Terrain Bureau, the following are the estimated Ksat low for the C horizons of the soils mapped on site:

|            |      |
|------------|------|
| Eldridge   | 0.06 |
| Pennichuck | 0.6  |
| Canton     | 6.0  |

8. MAXIMUM SIZE OF LIMITING INCLUSIONS

10%

9. SPECIAL FEATURE SYMBOLS

A wet spot symbol was utilized for both the SSSM and the HISS in the extreme northwestern property corner of the site. This is an extremely small area of disturbed soil that appears to have some hydric soil characteristics. This area is identified on both the SSSM and the HISS map.



**TEST PIT LOGS & SOIL DATA**

AUTOFAR REALTY II, LLC 41 PORTSMOUTH AVENUE, STRATHAM, NH  
EEI PROJECT 13-041

PERFORMED ON SEPTEMBER 22 2004 BY JAMES SHEPARD OF  
NH SOIL CONSULTANTS, INC. AND BRUCE SCAMMAN OF EMANUEL  
ENGINEERING, INC., WITNESSED BY MIKE CUOMO OF RCCD.

**TEST PIT #1**  
ESHNT 22', TERMINATED 48", NO REFUSAL, NO OBSERVED WATER,  
ROOTS NONE OBSERVED, 0-6" IOYR3/3, SANDY LOAM, GRANULAR,  
FRIABLE, 6-22" IOYR4/3, FINE SANDY LOAM, GRANULAR, FRIABLE,  
22-48" IOYR4/2, FINE SANDY LOAM, MASSIVE, FRIABLE, MOTTLES  
COMMON.

**TEST PIT #2**  
ESHNT NONE TERMINATED 45", REFUSAL 40", NO OBSERVED  
WATER, ROOTS NONE OBSERVED, 0-8" IOYR3/3, SANDY LOAM,  
GRANULAR, FRIABLE, 8-40" IOYR4/6, FINE SANDY LOAM,  
GRANULAR, FRIABLE, 40-45" RIPPABLE BEDROCK.

**TEST PIT #3**  
ESHNT NONE, TERMINATED 40", REFUSAL 36", NO OBSERVED  
WATER, ROOTS NONE OBSERVED, 0-10" IOYR3/3, SANDY LOAM,  
GRANULAR, FRIABLE, 10-36" IOYR4/6, SANDY LOAM, GRANULAR,  
FRIABLE, 36-40" RIPPABLE BEDROCK.

**TEST PIT #4**  
ESHNT 28', TERMINATED 64", NO REFUSAL, NO OBSERVED WATER,  
ROOTS NONE OBSERVED, 0-8" IOYR3/3, SANDY LOAM, GRANULAR,  
FRIABLE, 8-28" IOYR4/6, FINE SANDY LOAM, GRANULAR, FRIABLE,  
28-64" IOYR5/3, FINE SANDY LOAM, MASSIVE, FRIABLE, MOTTLES  
COMMON.

**TEST PIT #5**  
ESHNT 40', TERMINATED 64", NO REFUSAL, NO OBSERVED WATER,  
ROOTS NONE OBSERVED, 0-40" MIXED, 40-64" IOYR5/3, FINE  
SANDY LOAM, MOTTLES COMMON.

**TEST PIT #6**  
ESHNT 36', TERMINATED 65", NO REFUSAL, NO OBSERVED WATER,  
ROOTS NONE OBSERVED, 0-20" IOYR3/3, SANDY LOAM,  
GRANULAR, FRIABLE, 20-36" IOYR4/6, SANDY LOAM, GRANULAR,  
FRIABLE, 36-42" IOYR5/3, VERY FINE SANDY LOAM, MASSIVE,  
FRIABLE, MOTTLES COMMON, 42-65" IOYR5/3, VERY FINE SANDY  
LOAM, MASSIVE, FIRM, MOTTLES COMMON.

**TEST PIT #7**  
ESHNT 36', TERMINATED 60", NO REFUSAL, NO OBSERVED WATER,  
ROOTS NONE OBSERVED, 0-12" IOYR3/3, SANDY LOAM, GRANULAR,  
FRIABLE, 12-36" IOYR4/6, FINE SANDY LOAM, GRANULAR, FRIABLE,  
36-60" IOYR5/3, FINE SANDY LOAM, MASSIVE, FIRM, MOTTLES  
COMMON.

**TEST PIT #8**  
ESHNT 30', TERMINATED 64", NO REFUSAL, NO OBSERVED WATER,  
ROOTS NONE OBSERVED, 0-22" IOYR3/3, SANDY LOAM,  
GRANULAR, FRIABLE, 22-40" IOYR4/6, SANDY LOAM, GRANULAR,  
FRIABLE, 40-64" IOYR5/3, FINE SANDY LOAM, FLATY, FIRM,  
MOTTLES COMMON.

**TEST PIT #9**  
ESHNT 30', TERMINATED 65", NO REFUSAL, NO OBSERVED WATER,  
ROOTS NONE OBSERVED, 0-12" IOYR3/3, SANDY LOAM, GRANULAR,  
FRIABLE, 12-30" IOYR4/6, SANDY LOAM, GRANULAR, FRIABLE,  
30-65" IOYR5/3, FINE SANDY LOAM, MASSIVE, FIRM, MOTTLES  
COMMON.

**TEST PIT #10**  
ESHNT NONE, TERMINATED 24", REFUSAL 24", NO OBSERVED  
WATER, ROOTS NONE OBSERVED, BEDROCK AT 24"

PERFORMED ON JANUARY 4, 2012 BY BRUCE SCAMMAN OF  
EMANUEL ENGINEERING, INC., WITNESSED BY MIKE CUOMO OF RCCD.

**TEST PIT #12-5**  
ESHNT 28', TERMINATED 64", NO REFUSAL, NO OBSERVED WATER,  
0-18" IOYR3/2, LOAM, GRANULAR, FRIABLE, 18-40" IOYR5/6, FINE  
SANDY LOAM, GRANULAR, FRIABLE, 40-64" 2.5Y5/4, SILTY LOAM,  
BLOCKY, FIRM, MOTTLES COMMON.

**TEST PIT #12-6**  
ESHNT 40', TERMINATED 72", NO REFUSAL, NO OBSERVED WATER,  
0-14" IOYR3/2, LOAM, GRANULAR, FRIABLE, 14-28" IOYR5/6, FINE  
SANDY LOAM, GRANULAR, FRIABLE, 28-36" 2.5Y5/4, GRAVELLY  
SANDY LOAM, BLOCKY, FIRM, MOTTLES COMMON, 36-72" 2.5Y5/4,  
SILTY LOAM, BLOCKY, FIRM, MOTTLES COMMON.

PERFORMED ON JULY 3, 2013 BY LINDSAY BYBOTH OF GOVE  
ENVIRONMENTAL SERVICES AND BRUCE SCAMMAN OF EMANUEL  
ENGINEERING, INC., WITNESSED BY MIKE CUOMO OF RCCD.

**TEST PIT #13-1**  
ESHNT 44', TERMINATED 62", NO REFUSAL, NO OBSERVED WATER,  
ROOTS 24", 0-7" IOYR3/3, FINE SANDY LOAM, GRANULAR,  
FRIABLE, 7-30" IOYR5/6, VERY STONY FINE SANDY LOAM,  
GRANULAR, FRIABLE, 30-44" IOYR5/6, VERY STONY FINE SANDY  
LOAM, GRANULAR, FRIABLE, 44-62" IOYR5/3, FINE SANDY LOAM,  
GRANULAR, FRIABLE, MOTTLES COMMON.

**TEST PIT #13-2**  
ESHNT 44', TERMINATED 66", NO REFUSAL, NO OBSERVED WATER,  
ROOTS 21", 0-7" IOYR3/3, FINE SANDY LOAM, GRANULAR, FRIABLE,  
7-26" IOYR5/6, VERY STONY FINE SANDY LOAM, GRANULAR,  
FRIABLE, 26-44" 2.5Y5/3, VERY STONY FINE SANDY LOAM,  
GRANULAR, FRIABLE, 44-62" 2.5Y5/3, STONY FINE SANDY LOAM,  
GRANULAR, FRIABLE, MOTTLES COMMON.

**TEST PIT #13-3**  
ESHNT 44', TERMINATED 70", NO REFUSAL, NO OBSERVED WATER,  
ROOTS 12", 0-12" IOYR3/2, FINE SANDY LOAM, GRANULAR,  
FRIABLE, 12-26" IOYR5/6, FINE SANDY LOAM, GRANULAR, FRIABLE,  
26-44" IOYR5/6, VERY STONY FINE SANDY LOAM, GRANULAR,  
FRIABLE, 44-70" IOYR5/6, VERY STONY FINE SANDY LOAM,  
GRANULAR, FRIABLE, MOTTLES COMMON.

**TEST PIT #13-4 FAILED**  
ESHNT 22', TERMINATED 67", NO REFUSAL, NO OBSERVED WATER,  
NO OBSERVED ROOTS, 0-7", FINE SANDY LOAM, GRANULAR, FRIABLE,  
7-22" FINE SANDY LOAM, GRANULAR, FRIABLE, 22-39" SILT, BLOCKY, FRIABLE,  
MOTTLES COMMON, 39-67", SILT CLAY, MASSIVE, FIRM.

**TEST PIT #13-5**  
ESHNT 41', TERMINATED 60", NO REFUSAL, NO OBSERVED WATER,  
NO OBSERVED ROOTS, 0-20" IOYR3/2, LOAM, GRANULAR,  
FRIABLE, 20-30" IOYR5/3, FINE SANDY LOAM, GRANULAR,  
FRIABLE, 30-41" IOYR5/6, FINE SANDY LOAM, GRANULAR, FRIABLE,  
41-60", 2.5Y5/3, SILT CLAY, MASSIVE, FIRM, MOTTLES COMMON.

**TEST PIT #13-6**  
ESHNT 41', TERMINATED 62", NO REFUSAL, NO OBSERVED WATER,  
NO OBSERVED ROOTS, 0-17" IOYR3/2, FINE SANDY LOAM,  
GRANULAR, FRIABLE, 17-26" IOYR3/2, SAND, GRANULAR, FRIABLE,  
26-41" IOYR5/6, FINE SANDY LOAM, GRANULAR, FRIABLE, 41-62",  
FINE SANDY LOAM, GRANULAR, FRIABLE, MOTTLES COMMON.

**TEST PIT #13-7**  
ESHNT 32', TERMINATED 60", NO REFUSAL, NO OBSERVED WATER,  
ROOTS 32", 0-16" IOYR3/2, SAND, GRANULAR, FRIABLE, 16-24"  
IOYR5/6, FINE SANDY LOAM, GRANULAR, FRIABLE, 24-32" IOYR5/4,  
FINE SANDY LOAM, GRANULAR, FRIABLE, 32-60", FINE SANDY  
LOAM, GRANULAR, FRIABLE, MOTTLES COMMON.

**TEST PIT #13-8**  
NO ESHNT, TERMINATED 32", REFUSAL 32", NO OBSERVED WATER,  
NO OBSERVED ROOTS, 0-6" IOYR3/3, LOAM, GRANULAR, FRIABLE,  
6-32" IOYR5/6, VERY STONY FINE SANDY LOAM, GRANULAR,  
FRIABLE.

**TEST PIT #13-9**  
NO ESHNT, TERMINATED 32", REFUSAL 32", NO OBSERVED WATER,  
NO OBSERVED ROOTS, 0-3" IOYR3/3, LOAM, GRANULAR, FRIABLE,  
3-32" IOYR5/6, SILTY CLAY, BLOCKY, FRIABLE.

**TEST PIT #13-10**  
ESHNT 21', TERMINATED 42", NO REFUSAL, NO OBSERVED WATER,  
ROOTS NONE OBSERVED, 0-11" IOYR5/3, FINE SANDY LOAM,  
GRANULAR, FRIABLE, 11-21" IOYR5/3, SILT CLAY, BLOCKY, FIRM,  
21-40" IOYR5/6, FINE SANDY LOAM, GRANULAR, FRIABLE,  
MOTTLES COMMON, 40-42" IOYR5/3, VERY STONY SILTY CLAY,  
BLOCKY, FIRM, MOTTLES COMMON.

**TEST PIT #13-11**  
ESHNT 26', TERMINATED 40", NO REFUSAL, NO OBSERVED WATER,  
ROOTS 22", 0-11" IOYR3/3, LOAM, GRANULAR, FRIABLE, 11-22"  
IOYR3/2, FINE SANDY LOAM, GRANULAR, FRIABLE, 22-26" IOYR5/6,  
FINE SANDY LOAM, GRANULAR, FRIABLE, 26-35" IOYR5/2, SILTY  
CLAY, BLOCKY, FIRM, MOTTLES COMMON, 35-40" 2.5Y5/2, SILTY  
CLAY, MASSIVE, FIRM, MOTTLES COMMON.

**SITE IDENTIFICATION LEGEND**

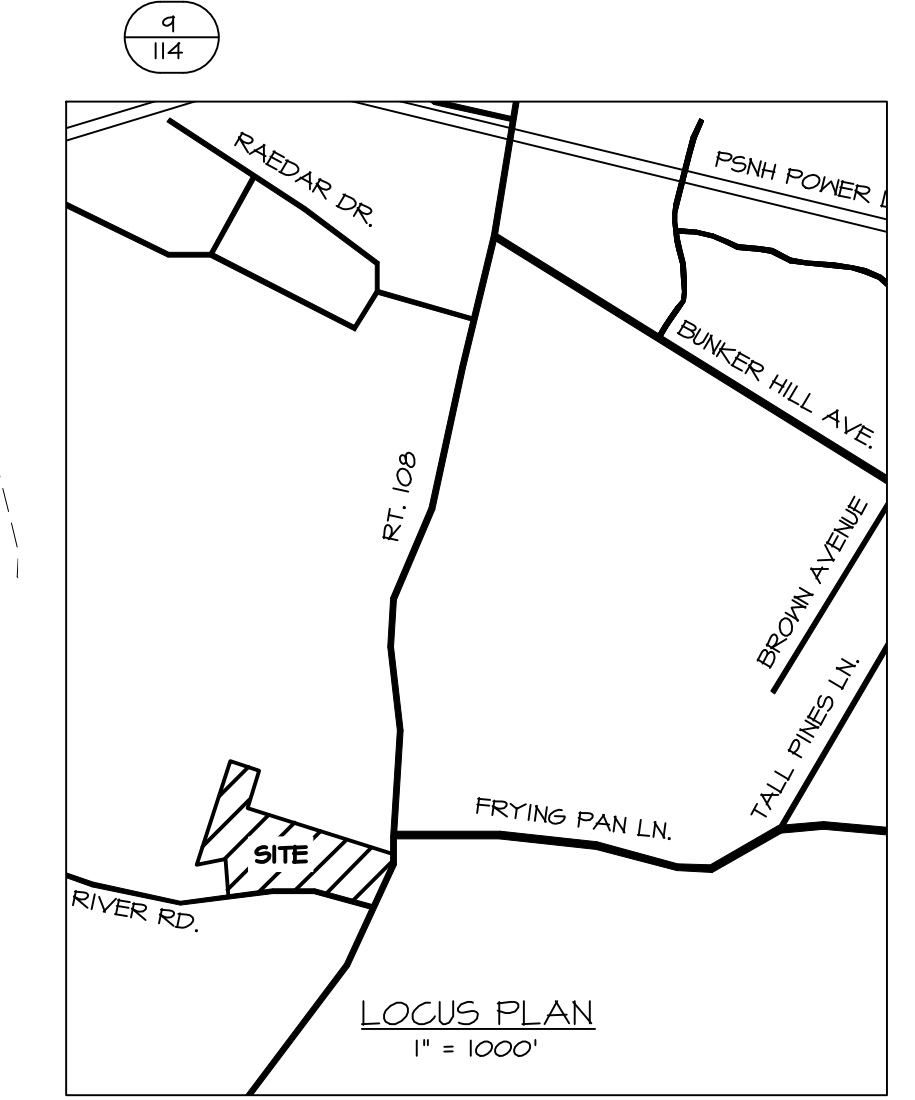
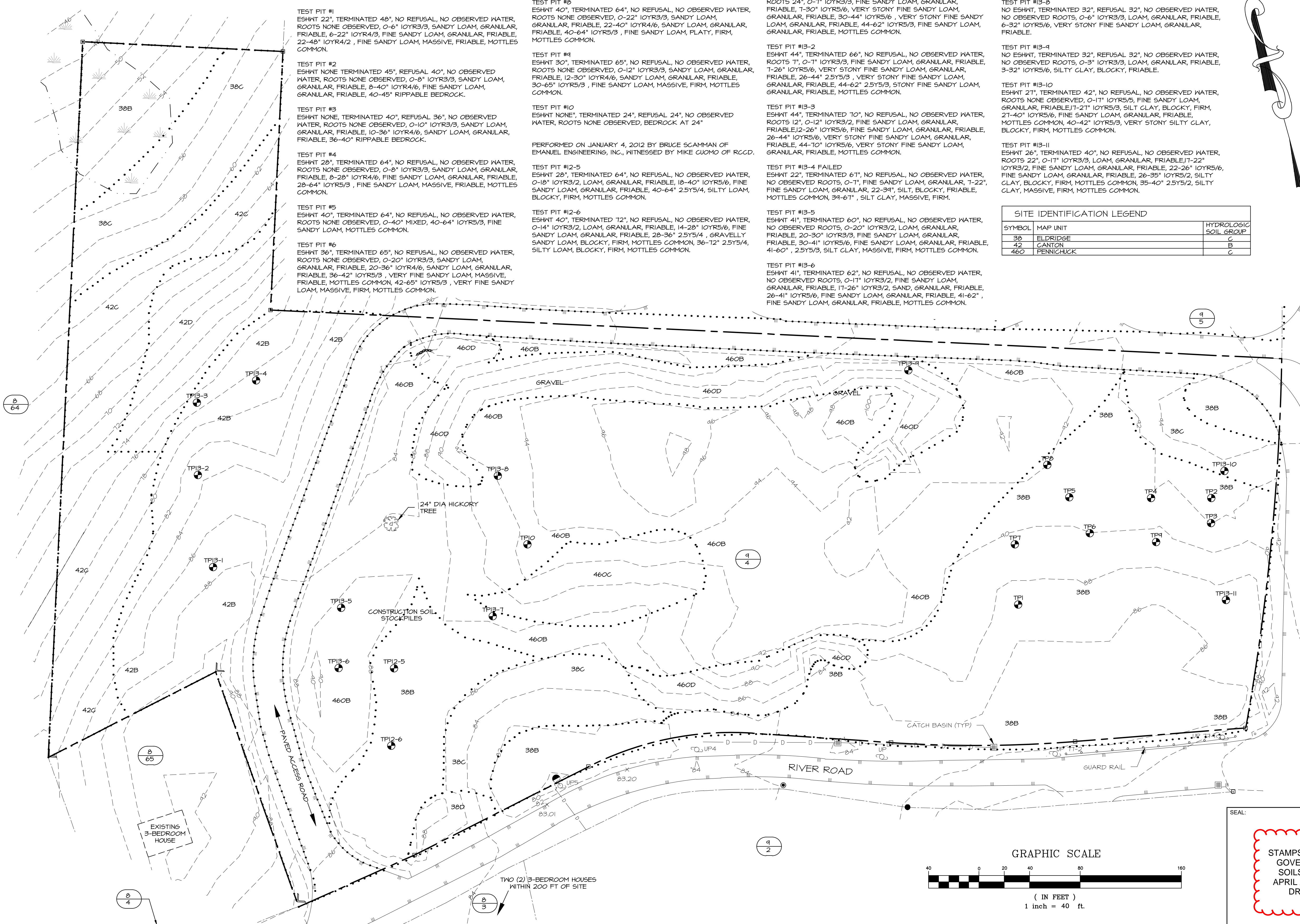
| SYMBOL | MAP UNIT   | HYDROLOGIC SOIL GROUP |
|--------|------------|-----------------------|
| 3B     | ELDRIDGE   | C                     |
| 42     | CANTON     | B                     |
| 46C    | FENNICHUCK | C                     |

**NOTES:**

- OWNER OF RECORD:  
TAX MAP 9, LOT 4  
41 PORTSMOUTH AVE LLC  
151 PORTSMOUTH AVENUE  
EXETER, NH 03833  
RCCD #56915 P91241
- THE INTENT OF THIS PLAN IS TO DELINEATE SOIL TYPES AND SHOW  
TOPOGRAPHY OF STRATHAM TAX MAP 9 LOT 4 FOR A NHDES AOT PERMIT  
APPLICATION.
- SEE EEI DRAWING SET COVER SHEET FOR PROJECT GENERAL NOTES.
- THE SITE SPECIFIC SOIL SURVEY WAS PRODUCED APRIL 1, 2014, AND WAS  
PREPARED BY JAMES P. GOVE, GSS # 004, GOVE ENVIRONMENTAL  
SERVICES, INC.
- SOILS WERE IDENTIFIED WITH THE NEW HAMPSHIRE STATE-WIDE NUMERICAL  
SOILS LEGEND, USDA NRCS, DURHAM, NH, ISSUE # 10, JANUARY 2011. THIS  
MAP PRODUCT IS WITHIN THE TECHNICAL STANDARDS OF THE NATIONAL  
COOPERATIVE SOIL SURVEY. IT IS A SPECIAL PURPOSE PRODUCT,  
INTENDED FOR INFILTRATION REQUIREMENTS BY THE NH DES ALTERATION  
OF TERRAIN BUREAU. IT WAS PRODUCED BY A PROFESSIONAL SOIL  
SCIENTIST, AND IS NOT A PRODUCT OF THE USDA NATURAL RESOURCES  
CONSERVATION SERVICE. THERE IS A REPORT THAT ACCOMPANIES THIS MAP.
- DRAINAGE CALCULATIONS ARE BASED OFF OF PRE-ALTERATION  
CONDITIONS AND REFLECTS THE SOIL DELINEATION FROM 2014 AS SEEN  
ON THIS SHEET.

**WETLAND MAPPING STANDARDS:**

- REGIONAL SUPPLEMENT TO THE CORPS OF ENGINEERS WETLAND  
DELINEATION MANUAL: NORTH-CENTRAL AND NORTHEAST REGION, (VERSION  
2.0) JANUARY 2012, U.S. ARMY CORPS OF ENGINEERS.
- FIELD INDICATORS OF HYDRIC SOILS IN THE UNITED STATES, A GUIDE FOR  
IDENTIFYING AND DELINEATING HYDRIC SOILS, VERSION 9.2, UNITED STATES  
DEPARTMENT OF AGRICULTURE (2010).
- NORTH AMERICAN DIGITAL FLORA: NATIONAL WETLAND PLANT LIST,  
VERSION 2.1 (2004).
- CLASSIFICATION OF WETLANDS AND DEEPWATER HABITATS OF THE UNITED  
STATES, USFW MANUAL FWS/OBS-74/3 (1974).



| REV | DATE         | DESCRIPTION   | CHK. |
|-----|--------------|---------------|------|
| 4   | MAR 24, 2026 | AOI REVISIONS |      |
| 3   | AUG 8, 2025  | FOR APPROVAL  |      |
| 1   | JAN 22, 2025 | FOR APPROVAL  |      |

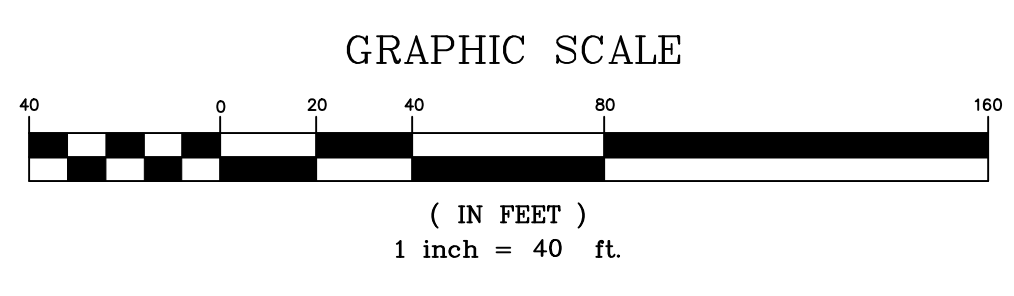
**EEI**  
CIVIL & STRUCTURAL CONSULTANTS, LAND PLANNERS  
100 GRIFFIN ROAD, UNIT C, PORTSMOUTH, NH 03801  
603-772-4400 | EMANUELENGINEERING.COM © 2025

CLIENT:  
41 PORTSMOUTH AVE LLC  
151 PORTSMOUTH AVENUE  
EXETER, NH 03833

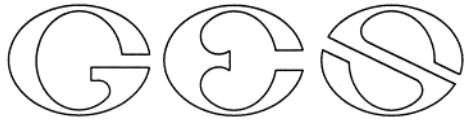
TITLE:  
**SITE-SPECIFIC SOIL &  
TOPOGRAPHY PLAN (2014)**  
FOR  
41 PORTSMOUTH AVE LLC  
41 PORTSMOUTH AVE (SITE)  
(STRATHAM TAX MAP 9 LOT 4)  
STRATHAM, NH 03885

|          |        |        |
|----------|--------|--------|
| PROJECT: | SCALE: | SHEET: |
| 25-1001  | 1"=40' | C2.1a  |

STAMPS ARE PROVIDED ON  
GOVE ENVIRONMENTAL  
SOILS REPORT DATED  
APRIL 2, 2014 WITHIN THE  
DRAINAGE STUDY



SEAL:



GOVE ENVIRONMENTAL SERVICES, INC

**SITE-SPECIFIC SOIL SURVEY REPORT**

**For**

**41 Portsmouth Ave, Stratham, NH**

**By**

**GES, Inc.**

**Project # 2025041**

**Date: 05-22-2025**

**1. MAPPING STANDARDS**

*Site-Specific Soil Mapping Standards for New Hampshire and Vermont.* SSSNNE Special Publication No. 3, Version 7.0, July, 2021.

This map product is within the technical standards of the National Cooperative Soil Survey. It is a special purpose product, intended for infiltration requirements by the NH DES Alteration of Terrain Bureau. The soil map was produced by a professional soil scientist and is not a product of the USDA Natural Resources Conservation Service. This report accompanies the soil map.

The site-specific soil map (SSSM) was produced 05-22-2025; prepared by JP Gove, CSS #004, GES, Inc.

Soils were identified with the New Hampshire State-wide Numerical Soils Legend, USDA NRCS, Durham, NH. Issue # 10, January 2011.

Hydrologic Soil Group was determined using SSSNNE Special Publication No. 5, Ksat Values for New Hampshire Soils, September 2009.

High Intensity Soil Map symbols, based upon SSSNNE Special Publication 1, December 2017, were added to the Soil Legend.

Scale of soil map: Approximately 1" = 40"

Contours Interval: 2 feet

**2. LANDFORMS & EXISTING CONDITIONS:**

The site is located on a landform that is dominated by bedrock near the surface. Most of the site has been graded level and had detention basins and drainage structures installed. Bedrock shards cover the soil surface in the disturbed areas. The western edge of the site remains in a natural condition and is maintained as mowed fields.

**3. DATE SOIL MAP PRODUCED**

Date(s) of on-site field work: 05-21-2025 (Wetlands flagged earlier by JVA).

Date(s) of test pits: Multiple Dates from 2004 to 2013

Test pits recorded by: Emanuel Engineering, Inc.

**4. GEOGRAPHIC LOCATION AND SIZE OF SITE**

City or town where soil mapping was conducted: Stratham

Location: Tax Map 9, Lot 4

Size of area: Approximately 8 acres

Was the map for the entire lot? Yes

If no, where was the mapping conducted on the parcel: n/a

**5. PURPOSE OF THE SOIL MAP**

Was the map prepared to meet the requirement of Alteration of Terrain? Yes

If no, what was the purpose of the map? n/a

Who was the map prepared for? Emanuel Engineering, Inc.



**6. SOIL IDENTIFICATION LEGEND**

| Map Unit Symbol | Map Unit Name                  | HISS Symbol | Hydrologic Soil Group |
|-----------------|--------------------------------|-------------|-----------------------|
| 62              | Charlton fine sandy loam       | 221         | B                     |
| 38              | Eldridge fine sandy loam       | 343         | C                     |
| 538             | Squamscott fine sandy loam     | 543         | C                     |
| 550/ccebb       | Udorthents, bedrock substratum | 267         | B                     |

Supplemental Symbols: c = well drained, c = till, e = bedrock 20 to 60", b = moderate Ksat, b = HSG B

**SLOPE PHASE:**

|         |   |       |   |        |   |
|---------|---|-------|---|--------|---|
| 0-8%    | B | 8-15% | C | 15-25% | D |
| 25%-50% | E | 50%+  | F |        |   |

**7. NARRATIVE MAP UNIT DESCRIPTIONS**

SITE-SPECIFIC MAP UNIT: 62

CORRELATED SOIL SERIES: Charlton fine sandy loam

LANDSCAPE SETTING: Hilltop

CHARACTERISTIC SURFACE FEATURES: Smooth, grass land

DRAINAGE CLASS: Well drained

PARENT MATERIAL: Till

NATURE OF DISSIMILAR INCLUSIONS: Chatfield

ESTIMATED PERCENTAGE OF DISSIMILAR INCLUSIONS: 5%

SOIL PROFILE DESCRIPTIONS- horizon designation, depth, soil texture, Munsell color notation, Munsell color of redox features, soil structure, soil consistence, estimated coarse fragments, estimated seasonal high water table (ESHWT), observed water table (OBSWT), kind of water table (perched, apparent, or both), depth to lithic or paralithic contact:

A 0 to 7" 10YR3/3 fsl, gr, fr

B 7 to 44" 10YR4/6, fsl, gr, fr

C 44 to 62", 10YR5/3, fsl, om, fr, 5% redox 5YR5/6

ESHWT = 44", no OBSWT, perched water table, no lithic contact, 5% coarse fragments

SITE-SPECIFIC MAP UNIT: 38

CORRELATED SOIL SERIES: Eldridge fine sandy loam

LANDSCAPE SETTING: Hillside

CHARACTERISTIC SURFACE FEATURES: Smooth, grass land

DRAINAGE CLASS: Moderately well drained

PARENT MATERIAL: Loamy over marine

NATURE OF DISSIMILAR INCLUSIONS: Newfields

ESTIMATED PERCENTAGE OF DISSIMILAR INCLUSIONS: 5%



SOIL PROFILE DESCRIPTIONS- horizon designation, depth, soil texture , Munsell color notation, Munsell color of redox features, soil structure, soil consistence, estimated coarse fragments, estimated seasonal high water table (ESHWT), observed water table (OSWT), kind of water table (perched, apparent, or both), depth to lithic or paralithic contact:

A 0 to 7" 10YR3/2, fsl, gr, fr

B1 7 to 22" 10YR4/6, fsl, gr, fr

B2 22-39" 10YR5/3, si, om, fr

C 39 to 67" 2.5Y5/3, sicl, blk, fi, redox 5% 5YR5/6

ESHWT = 22", OSWT = none, perched water table, no lithic contact, 5% coarse fragments

SITE-SPECIFIC MAP UNIT: 538  
CORRELATED SOIL SERIES: Squamscott fine sandy loam  
LANDSCAPE SETTING: Hillside seep  
CHARACTERISTIC SURFACE FEATURES: Smooth, grass land  
DRAINAGE CLASS: Poorly drained  
PARENT MATERIAL: Loamy over marine  
NATURE OF DISSIMILAR INCLUSIONS: Scitico  
ESTIMATED PERCENTAGE OF DISSIMILAR INCLUSIONS: 5%

SOIL PROFILE DESCRIPTIONS- horizon designation, depth, soil texture, Munsell color notation, Munsell color of redox features, soil structure, soil consistence, estimated coarse fragments, estimated seasonal high water table (ESHWT), observed water table (OBSWT), kind of water table (perched, apparent, or both), depth to lithic or paralithic contact:

A 0 to 12" 10YR3/2, fsl, gr, fr

Bg 12 to 20" 2.5Y5/2, fsl, blk, fr, 5% redox 5YR5/6

Cg 20 to 30", 2.5Y5/2, sicl, blk, fi, 10% redox 5YR5/6

ESHWT = 0", OBSWT = none, perched water table, no lithic contact, 5% coarse fragments

SITE-SPECIFIC MAP UNIT: 550/ccebb  
CORRELATED SOIL SERIES: Udorthents, bedrock substratum  
LANDSCAPE SETTING: Graded flat hilltop  
CHARACTERISTIC SURFACE FEATURES: Bedrock shards, weeds, flat  
DRAINAGE CLASS: Well drained  
PARENT MATERIAL: Bedrock-controlled till  
NATURE OF DISSIMILAR INCLUSIONS: Charton  
ESTIMATED PERCENTAGE OF DISSIMILAR INCLUSIONS: 10%



SOIL PROFILE DESCRIPTIONS- horizon designation, depth, soil texture, Munsell color notation, Munsell color of redox features, soil structure, soil consistence, estimated coarse fragments, estimated seasonal high water table (ESHWT), observed water table (OBSWT), kind of water table (perched, apparent, or both), depth to lithic or paralithic contact:

A 0 to 3", 10YR3/3, vsfsl, gr, fr

B 3 to 32", 10YR5/6, vsfsl, gr, fr

R 32"

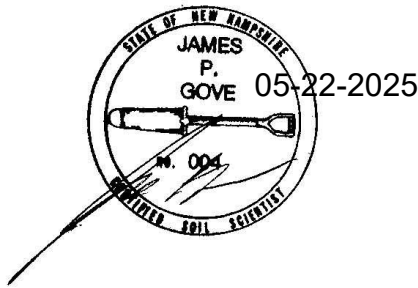
ESHWT = none, OBSWT = none, Lithic contact = 32", water table unknown, 15% coarse fragments

#### **8. RESPONSIBLE SOIL SCIENTIST**

Name: James Gove

Certified Soil Scientist Number: 004

#### **9. CERTIFIED SOIL SCIENTIST STAMP**



**TEST PIT LOGS & SOIL DATA**

AUTOFAR REALTY II, LLC 41 PORTSMOUTH AVENUE, STRATHAM, NH  
EEL PROJECT 13-041

PERFORMED ON SEPTEMBER 22 2004 BY JAMES SHEPARD OF  
NH SOIL CONSULTANTS, INC. AND BRUCE SCAMMAN OF EMANUEL  
ENGINEERING, INC., WITNESSED BY MIKE CUOMO OF RCCD.

**TEST PIT #1**  
ESHNT 22", TERMINATED 48", NO REFUSAL, NO OBSERVED WATER,  
ROOTS NONE OBSERVED, 0-6" IOYR3/3, SANDY LOAM, GRANULAR,  
FRIABLE, 6-22" IOYR4/3, FINE SANDY LOAM, GRANULAR, FRIABLE,  
22-48" IOYR4/2, FINE SANDY LOAM, MASSIVE, FRIABLE, MOTTLES  
COMMON.

**TEST PIT #2**  
ESHNT NONE TERMINATED 45", REFUSAL 40", NO OBSERVED  
WATER, ROOTS NONE OBSERVED, 0-8" IOYR3/3, SANDY LOAM,  
GRANULAR, FRIABLE, 8-40" IOYR4/6, FINE SANDY LOAM,  
GRANULAR, FRIABLE, 40-45" RIPPABLE BEDROCK.

**TEST PIT #3**  
ESHNT NONE, TERMINATED 40", REFUSAL 36", NO OBSERVED  
WATER, ROOTS NONE OBSERVED, 0-10" IOYR3/3, SANDY LOAM,  
GRANULAR, FRIABLE, 10-36" IOYR4/6, SANDY LOAM, GRANULAR,  
FRIABLE, 36-40" RIPPABLE BEDROCK.

**TEST PIT #4**  
ESHNT 28", TERMINATED 64", NO REFUSAL, NO OBSERVED WATER,  
ROOTS NONE OBSERVED, 0-8" IOYR3/3, SANDY LOAM, GRANULAR,  
FRIABLE, 8-28" IOYR4/6, FINE SANDY LOAM, GRANULAR, FRIABLE,  
28-64" IOYR5/3, FINE SANDY LOAM, MASSIVE, FRIABLE, MOTTLES  
COMMON.

**TEST PIT #5**  
ESHNT 40", TERMINATED 64", NO REFUSAL, NO OBSERVED WATER,  
ROOTS NONE OBSERVED, 0-40" MIXED, 40-64" IOYR5/3, FINE  
SANDY LOAM, MOTTLES COMMON.

**TEST PIT #6**  
ESHNT 36", TERMINATED 65", NO REFUSAL, NO OBSERVED WATER,  
ROOTS NONE OBSERVED, 0-20" IOYR3/3, SANDY LOAM,  
GRANULAR, FRIABLE, 20-36" IOYR4/6, SANDY LOAM, GRANULAR,  
FRIABLE, 36-42" IOYR5/3, VERY FINE SANDY LOAM, MASSIVE,  
FRIABLE, MOTTLES COMMON, 42-65" IOYR5/3, VERY FINE SANDY  
LOAM, MASSIVE, FIRM, MOTTLES COMMON.

**TEST PIT #7**  
ESHNT 36", TERMINATED 60", NO REFUSAL, NO OBSERVED WATER,  
ROOTS NONE OBSERVED, 0-12" IOYR3/3, SANDY LOAM, GRANULAR,  
FRIABLE, 12-36" IOYR4/6, FINE SANDY LOAM, GRANULAR, FRIABLE,  
36-60" IOYR5/3, FINE SANDY LOAM, MASSIVE, FIRM, MOTTLES  
COMMON.

**TEST PIT #8**  
ESHNT 40", TERMINATED 64", NO REFUSAL, NO OBSERVED WATER,  
ROOTS NONE OBSERVED, 0-22" IOYR3/3, SANDY LOAM,  
GRANULAR, FRIABLE, 22-40" IOYR4/6, SANDY LOAM, GRANULAR,  
FRIABLE, 40-64" IOYR5/3, FINE SANDY LOAM, FLATY, FIRM,  
MOTTLES COMMON.

**TEST PIT #9**  
ESHNT 30", TERMINATED 65", NO REFUSAL, NO OBSERVED WATER,  
ROOTS NONE OBSERVED, 0-12" IOYR3/3, SANDY LOAM, GRANULAR,  
FRIABLE, 12-30" IOYR4/6, SANDY LOAM, GRANULAR, FRIABLE,  
30-65" IOYR5/3, FINE SANDY LOAM, MASSIVE, FIRM, MOTTLES  
COMMON.

**TEST PIT #10**  
ESHNT NONE, TERMINATED 24", REFUSAL 24", NO OBSERVED  
WATER, ROOTS NONE OBSERVED, BEDROCK AT 24"

PERFORMED ON JANUARY 4, 2012 BY BRUCE SCAMMAN OF  
EMANUEL ENGINEERING, INC., WITNESSED BY MIKE CUOMO OF RCCD.

**TEST PIT #12-5**  
ESHNT 28", TERMINATED 64", NO REFUSAL, NO OBSERVED WATER,  
0-18" IOYR3/2, LOAM, GRANULAR, FRIABLE, 18-40" IOYR5/6, FINE  
SANDY LOAM, GRANULAR, FRIABLE, 40-64" 2.5Y5/4, SILTY LOAM,  
BLOCKY, FIRM, MOTTLES COMMON.

**TEST PIT #12-6**  
ESHNT 40", TERMINATED 72", NO REFUSAL, NO OBSERVED WATER,  
0-14" IOYR3/2, LOAM, GRANULAR, FRIABLE, 14-28" IOYR5/6, FINE  
SANDY LOAM, GRANULAR, FRIABLE, 28-36" 2.5Y5/4, GRAVELLY  
SANDY LOAM, BLOCKY, FIRM, MOTTLES COMMON, 36-72" 2.5Y5/4,  
SILTY LOAM, BLOCKY, FIRM, MOTTLES COMMON.

PERFORMED ON JULY 3, 2013 BY LINDSAY BYBOTH OF GOVE  
ENVIRONMENTAL SERVICES AND BRUCE SCAMMAN OF EMANUEL  
ENGINEERING, INC., WITNESSED BY MIKE CUOMO OF RCCD.

**TEST PIT #13-1**  
ESHNT 44", TERMINATED 62", NO REFUSAL, NO OBSERVED WATER,  
ROOTS 24", 0-7" IOYR3/3, FINE SANDY LOAM, GRANULAR,  
FRIABLE, 7-30" IOYR5/6, VERY STONY FINE SANDY LOAM,  
GRANULAR, FRIABLE, 30-44" IOYR5/6, VERY STONY FINE SANDY  
LOAM, GRANULAR, FRIABLE, 44-62" IOYR5/3, FINE SANDY LOAM,  
GRANULAR, FRIABLE, MOTTLES COMMON.

**TEST PIT #13-2**  
ESHNT 44", TERMINATED 66", NO REFUSAL, NO OBSERVED WATER,  
ROOTS 7", 0-7" IOYR3/3, FINE SANDY LOAM, GRANULAR, FRIABLE,  
7-26" IOYR5/6, VERY STONY FINE SANDY LOAM, GRANULAR,  
FRIABLE, 26-44" 2.5Y5/3, VERY STONY FINE SANDY LOAM,  
GRANULAR, FRIABLE, 44-62" 2.5Y5/3, STONY FINE SANDY LOAM,  
GRANULAR, FRIABLE, MOTTLES COMMON.

**TEST PIT #13-3**  
ESHNT 44", TERMINATED 70", NO REFUSAL, NO OBSERVED WATER,  
ROOTS 12", 0-12" IOYR3/2, FINE SANDY LOAM, GRANULAR,  
FRIABLE, 12-26" IOYR5/6, FINE SANDY LOAM, GRANULAR, FRIABLE,  
26-44" IOYR5/6, VERY STONY FINE SANDY LOAM, GRANULAR,  
FRIABLE, 44-70" IOYR5/6, VERY STONY FINE SANDY LOAM,  
GRANULAR, FRIABLE, MOTTLES COMMON.

**TEST PIT #13-4 FAILED**  
ESHNT 22", TERMINATED 67", NO REFUSAL, NO OBSERVED WATER,  
NO OBSERVED ROOTS, 0-7" FINE SANDY LOAM, GRANULAR, FRIABLE,  
7-22" FINE SANDY LOAM, GRANULAR, FRIABLE, 22-39" SILT, BLOCKY, FRIABLE,  
MOTTLES COMMON, 39-67" SILT CLAY, MASSIVE, FIRM.

**TEST PIT #13-5**  
ESHNT 44", TERMINATED 60", NO REFUSAL, NO OBSERVED WATER,  
NO OBSERVED ROOTS, 0-20" IOYR3/2, LOAM, GRANULAR,  
FRIABLE, 20-30" IOYR3/3, FINE SANDY LOAM, GRANULAR,  
FRIABLE, 30-41" IOYR5/6, FINE SANDY LOAM, GRANULAR, FRIABLE,  
41-60" 2.5Y5/3, SILT CLAY, MASSIVE, FIRM, MOTTLES COMMON.

**TEST PIT #13-6**  
ESHNT 41", TERMINATED 62", NO REFUSAL, NO OBSERVED WATER,  
NO OBSERVED ROOTS, 0-17" IOYR3/2, FINE SANDY LOAM,  
GRANULAR, FRIABLE, 17-26" IOYR3/2, SAND, GRANULAR, FRIABLE,  
26-41" IOYR5/6, FINE SANDY LOAM, GRANULAR, FRIABLE, 41-62"  
FINE SANDY LOAM, GRANULAR, FRIABLE, MOTTLES COMMON.

**TEST PIT #13-7**  
ESHNT 32", TERMINATED 60", NO REFUSAL, NO OBSERVED WATER,  
ROOTS 32", 0-16" IOYR3/2, SAND, GRANULAR, FRIABLE, 16-24"  
IOYR5/6, FINE SANDY LOAM, GRANULAR, FRIABLE, 24-32" IOYR5/4,  
FINE SANDY LOAM, GRANULAR, FRIABLE, 32-60" FINE SANDY  
LOAM, GRANULAR, FRIABLE, MOTTLES COMMON.

**TEST PIT #13-8**  
NO ESHNT, TERMINATED 32", REFUSAL 32", NO OBSERVED WATER,  
NO OBSERVED ROOTS, 0-6" IOYR3/3, LOAM, GRANULAR, FRIABLE,  
6-32" IOYR5/6, VERY STONY FINE SANDY LOAM, GRANULAR,  
FRIABLE.

**TEST PIT #13-9**  
NO ESHNT, TERMINATED 32", REFUSAL 32", NO OBSERVED WATER,  
NO OBSERVED ROOTS, 0-3" IOYR3/3, LOAM, GRANULAR, FRIABLE,  
3-32" IOYR5/6, SILTY CLAY, BLOCKY, FRIABLE.

**TEST PIT #13-10**  
ESHNT 27", TERMINATED 42", NO REFUSAL, NO OBSERVED WATER,  
ROOTS NONE OBSERVED, 0-11" IOYR5/3, FINE SANDY LOAM,  
GRANULAR, FRIABLE, 11-27" IOYR5/3, SILT CLAY, BLOCKY, FIRM,  
27-40" IOYR5/6, FINE SANDY LOAM, GRANULAR, FRIABLE,  
MOTTLES COMMON, 40-42" IOYR5/3, VERY STONY SILTY CLAY,  
BLOCKY, FIRM, MOTTLES COMMON.

**TEST PIT #13-11**  
ESHNT 26", TERMINATED 40", NO REFUSAL, NO OBSERVED WATER,  
ROOTS 22", 0-11" IOYR3/3, LOAM, GRANULAR, FRIABLE, 11-22"  
IOYR3/2, FINE SANDY LOAM, GRANULAR, FRIABLE, 22-26" IOYR5/6,  
FINE SANDY LOAM, GRANULAR, FRIABLE, 26-35" IOYR5/2, SILTY  
CLAY, BLOCKY, FIRM, MOTTLES COMMON, 35-40" 2.5Y5/2, SILTY  
CLAY, MASSIVE, FIRM, MOTTLES COMMON.

**SITE IDENTIFICATION LEGEND**

| SYMBOL    | MAP UNIT                       | HYDROLOGIC SOIL GROUP | HSS SYMBOL |
|-----------|--------------------------------|-----------------------|------------|
| 62        | CHARLSON FINE SANDY LOAM       | B                     | 221        |
| 38        | ELDRIDGE FINE SANDY LOAM       | C                     | 343        |
| 538       | SQUAMSCOTT FINE SANDY LOAM     | C                     | 543        |
| 550/ccebb | UDORTHENTS, BEDROCK SUBSTRATUM | B                     | 267        |

SUPPLEMENTAL SYMBOLS: c=WELL DRAINED, c=TILL, e=BEDROCK 20 TO 60",  
b = MODERATE KSAT, b=HSG B

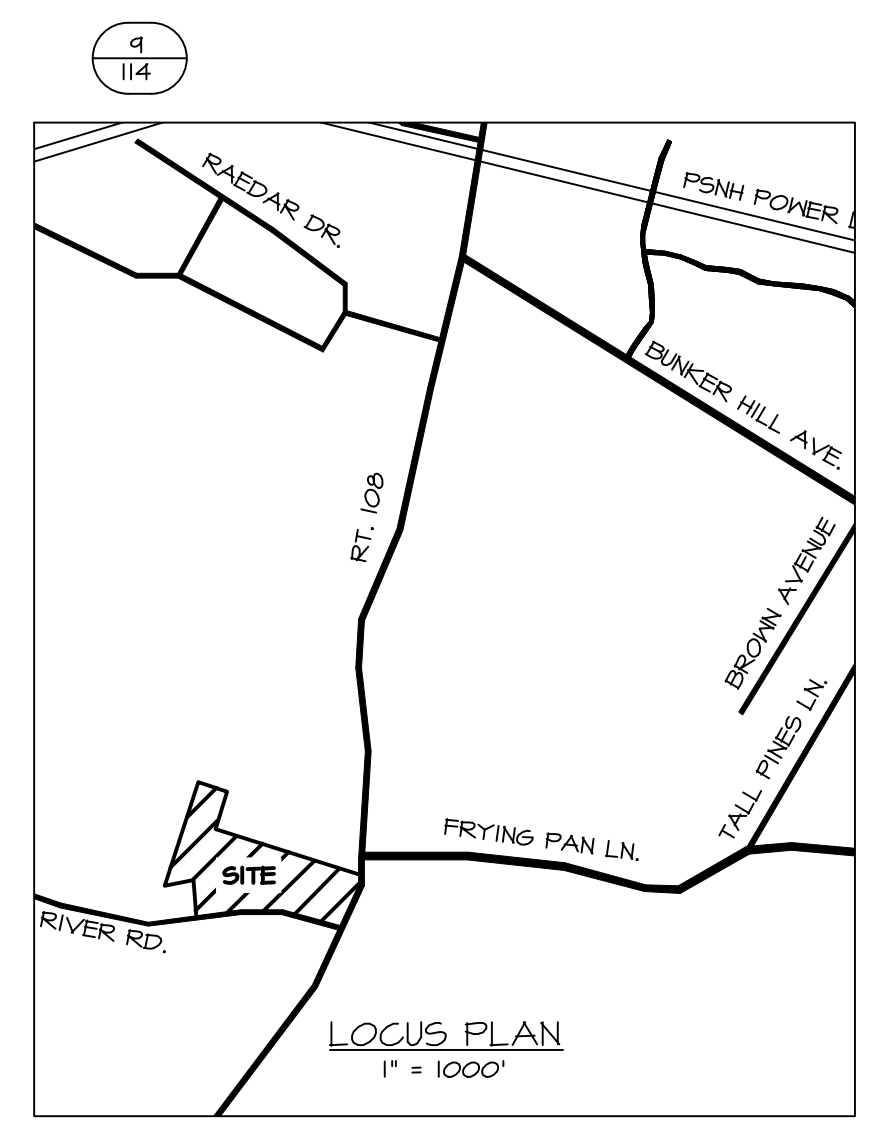
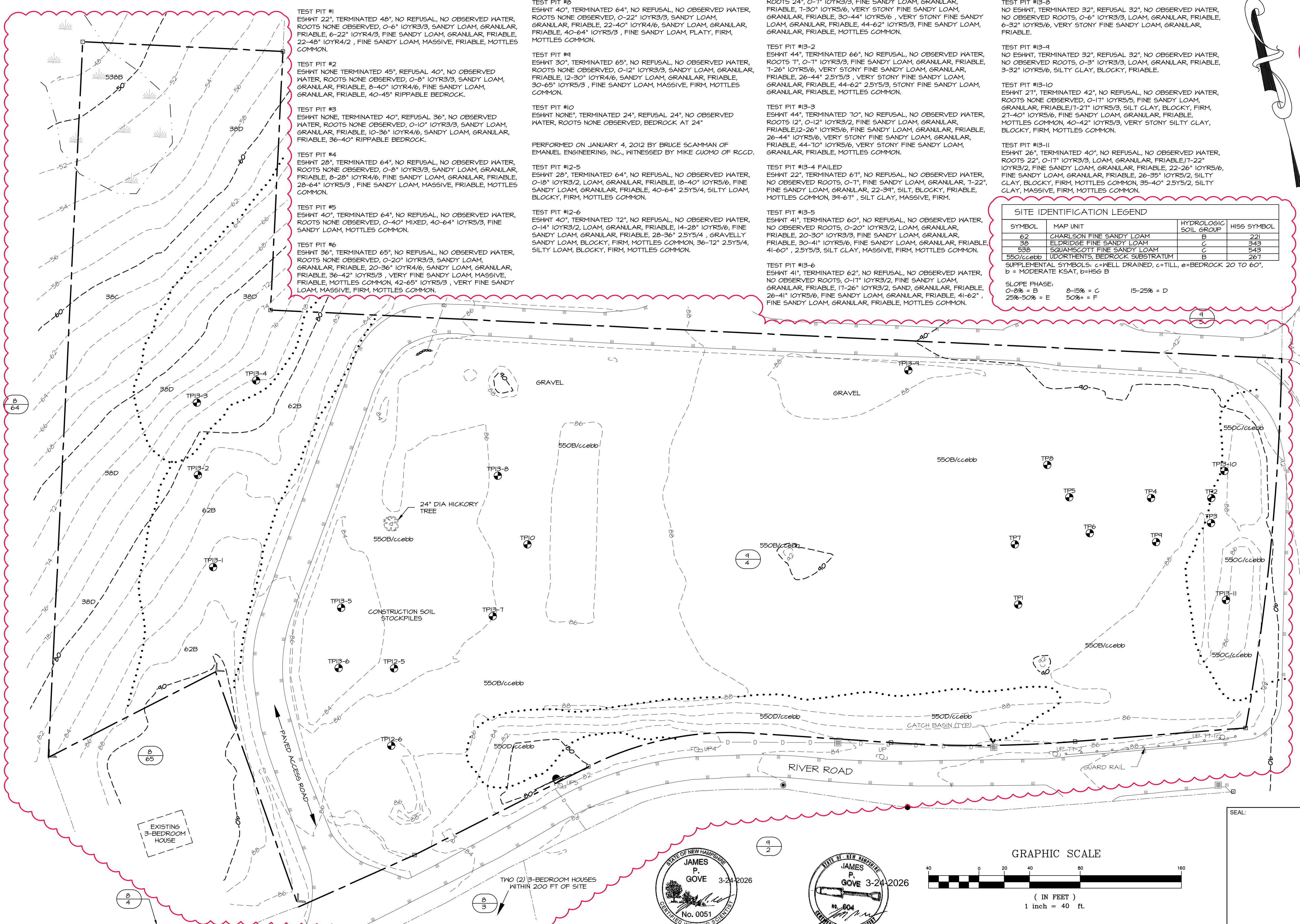
SLOPE PHASE:  
0-8% = B      8-15% = C      15-25% = D  
25%-50% = E      50%+ = F

**NOTES:**

- OWNER OF RECORD:  
TAX MAP 9 LOT 4  
41 PORTSMOUTH AVE LLC  
151 PORTSMOUTH AVENUE  
EXETER, NH 03833  
RCRD 156919 F91241
- THE INTENT OF THIS PLAN IS TO DELINEATE SOIL TYPES AND SHOW TOPOGRAPHY OF STRATHAM TAX MAP 9 LOT 4 FOR A NHDES AOT PERMIT APPLICATION.
- SEE EEL DRAWING SET COVER SHEET FOR PROJECT GENERAL NOTES.
- THE SITE SPECIFIC SOIL MAP WAS PRODUCED 09-22-2025, AND WAS PREPARED BY JAMES P. GOVE, GSS #004, GOVE ENVIRONMENTAL SERVICES, INC.
- SOILS WERE IDENTIFIED WITH THE NEW HAMPSHIRE STATE-WIDE NUMERICAL SOILS LEGEND, USDA NRCS, DURHAM, NH, ISSUE # 10, JANUARY 2011. THIS MAP PRODUCT IS WITHIN THE TECHNICAL STANDARDS OF THE NATIONAL COOPERATIVE SOIL SURVEY. IT IS A SPECIAL PURPOSE PRODUCT, INTENDED FOR INFILTRATION REQUIREMENTS BY THE NH DES ALTERATION OF TERRAIN BUREAU. IT WAS PRODUCED BY A PROFESSIONAL SOIL SCIENTIST, AND IS NOT A PRODUCT OF THE USDA NATURAL RESOURCES CONSERVATION SERVICE. THERE IS A REPORT THAT ACCOMPANIES THIS MAP.
- DRAINAGE CALCULATIONS ARE BASED OFF OF PRE-ALTERATION CONDITIONS AND REFLECTS THE SOIL DELINEATION FROM 2014 AS SEEN ON SHEET C2.1a.

**WETLAND MAPPING STANDARDS:**

- REGIONAL SUPPLEMENT TO THE CORPS OF ENGINEERS WETLAND DELINEATION MANUAL: NORTHCENTRAL AND NORTHEAST REGION, (VERSION 2.0) JANUARY 2012, U.S. ARMY CORPS OF ENGINEERS.
- FIELD INDICATORS OF HYDRIC SOILS IN THE UNITED STATES, A GUIDE FOR IDENTIFYING AND DELINEATING HYDRIC SOILS, VERSION 7.0, UNITED STATES DEPARTMENT OF AGRICULTURE (2010).
- NORTH AMERICAN DIGITAL FLORA: NATIONAL WETLAND PLANT LIST, VERSION 2.2.1 (2004).
- CLASSIFICATION OF WETLANDS AND DEEPWATER HABITATS OF THE UNITED STATES, USFWS MANUAL FWS/OBS-79/31 (1979).



| NO. | DATE         | DESCRIPTION   | CHK. |
|-----|--------------|---------------|------|
| 4   | MAR 24, 2026 | AoT REVISIONS |      |
| 3   | AUG 8, 2025  | FOR APPROVAL  |      |
| 1   | JAN 22, 2025 | FOR APPROVAL  |      |

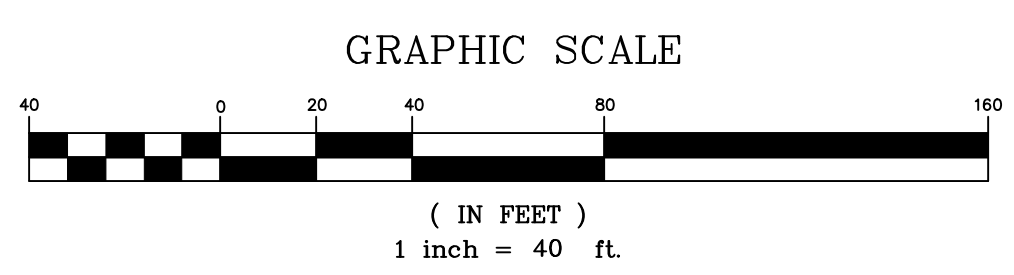
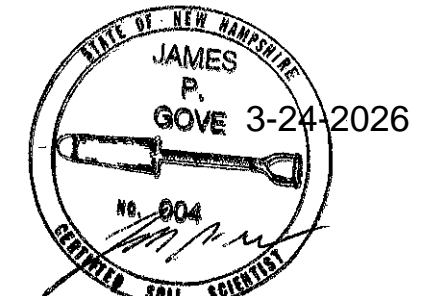
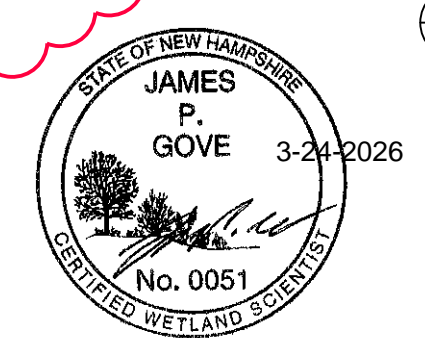
ISS. DATE:      DESCRIPTION OF ISSUE:      CHK.  
DRAWN: JJM      DESIGN: JJM  
CHECKED: BDS      CHECKED: BDS



CLIENT:  
41 PORTSMOUTH AVE LLC  
151 PORTSMOUTH AVENUE  
EXETER, NH 03833

TITLE:  
**SITE-SPECIFIC SOIL & TOPOGRAPHY PLAN (2025)**  
FOR  
41 PORTSMOUTH AVE LLC  
41 PORTSMOUTH AVE (SITE)  
(STRATHAM TAX MAP 9 LOT 4)  
STRATHAM, NH 03885

| PROJECT: | SCALE: | SHEET: |
|----------|--------|--------|
| 25-1001  | 1"=40' | C2.1b  |



SEAL: