



July 13, 2020

Mr. Eric Barber, P.E.  
City Engineer  
191 Cabot Street  
Beverly, MA 01915

**Subject: Stormwater Letter for Proposed  
Livingstone Avenue Improvements  
Beverly, MA 01915**

Dear Mr. Barber:

This stormwater management letter was prepared in support of the proposed definitive subdivision for improvements to Livingstone Avenue and the development of three adjacent parcels (Assessors Map 9 Lot 370, 371, & 372) in Beverly, MA. The project consists of improving approximately 280-feet of Livingstone Avenue and constructing two (2) new single-family residences.

According to the Massachusetts Department of Environmental Protection (MassDEP) Stormwater Management regulations, the proposed construction is exempt from MassDEP Stormwater Management requirements since the proposed development is a small residential subdivision (four or fewer lots).

#### **Existing Conditions**

The project site consists of three properties totaling approximately 0.71 acres. The parcels are vacant, containing mature woodlands and scrub vegetation. Livingstone Avenue, an unconstructed private way, exists to the north of these properties. An intermittent stream (drainage channel) and associated Inland Bank wetland resource area exists at the east side of the properties. No work is proposed within the 100-ft Buffer Zone to the wetland resource area. The project site is predominately surrounded by single-family residential properties. The topography of the site consists of gently sloping terrain, with a portion draining toward Livingstone Avenue a portion draining to the intermittent stream channel.

#### **Proposed Conditions**

The proposed project involves improving approximately 280-feet of Livingstone Avenue with a new 24-foot wide roadway with a 60-ft diameter cul-de-sac at the end and constructing two (2) new single-family residences with frontage on Livingstone Avenue. The proposed single-family residences are modest-sized dwellings with driveways, utilities, stormwater infiltration structures, and landscaping. A site plan showing the proposed development concept and stormwater management features has been provided separately.

The proposed stormwater management system is designed to dampen the rate of

flow from the proposed development and recharge the groundwater table. Stormwater from the proposed roadway will be directed into two separate underground infiltration fields beneath the pavement, each consisting of SC-740 plastic chambers. Stormwater runoff from the two proposed building roofs will be captured via gutters and downspouts and conveyed to smaller infiltration beds located on the individual lots.

Hydrologic modeling was conducted using a HydroCAD computer model. This model uses an approximation of Soil Conservation Service TR-20 methods to calculate runoff rates and volumes based on descriptions of land use, ground characteristics, and size.

The time of concentration ( $T_c$ ) for each subcatchment was calculated in HydroCAD using a combination of sheet flow and shallow concentrated flow. Sheet flow uses roughness coefficients (Manning's  $n$ ) and watercourse slope to calculate travel time of stormwater runoff for each subcatchment. The site was modeled using a maximum of 100-feet of sheet flow. The shallow concentrated flow method was used to determine the velocity factor along the flow path of the runoff and thereby derive a travel time. The time of concentration of each subcatchment is the combination of these travel times. A minimum time of concentration of 6 minutes was used for all subcatchments, for both existing and proposed conditions.

Type-III rainfall patterns were used as an input parameter to generate runoff. Hydrographs representing the total discharge from the site were generated for the 2-, 10-, 25-, and 100-year, 24-hour design storms. The results are summarized in Tables 1 and 2 below.

**Table 1 : Comparison of Pre-Development and Post-Development Peak Runoff Rates <sup>(1)</sup>**

Subcatchment	Storm Frequency			
	2-Year	10-Year	25-Year	100-Year
Pre-Development	0.70	1.31	1.73	2.25
Post-Development	0.67	1.20	1.55	2.18

1. Flow rates measured in cubic feet per second (cfs).

**Table 2 : Comparison of Pre-Development and Post Development Peak Runoff Volume <sup>(1)</sup>**

<u>Subcatchment</u>	Storm Frequency			
	2-Year	10-Year	25-Year	100-Year
Pre-Development	3,555	6,603	8,703	11,360
Post-Development	2,081	3,808	5,396	7,607

1. Volumes measured in cubic feet (cf).

The results demonstrate that the post-development storm discharges from the site will be less than the pre-development discharges for the all four design storms for both peak runoff rate and total volume.

**Construction Period Pollution Prevention and Erosion and Sediment Control**

The proposed project includes a comprehensive set of mitigation measures to protect the existing and surrounding sites from impacts due to construction. Prior to work commencing on-site, there will be a pre-construction conference with the contractor. The purpose of this meeting will be to coordinate the best methods for erosion and sedimentation control and other construction-related issues. The implementation of a comprehensive soil and erosion control plan will occur prior to any construction activities within the project area. In general, the following sequence of events will occur:

- Erosion and sedimentation control devices will be installed along the edge of the down-gradient side of the project area prior to construction as depicted on the site plan. In addition to providing for sedimentation deposition and reducing runoff during storm events, this barrier will limit the work area for the equipment operators.
- Erosion and sedimentation control devices will be inspected daily during periods of active construction and bi-weekly during the remainder of the construction period. Sediments will be removed from the barriers as soon as they reach a depth of 6-inches.
- Runoff from the site will be directed through sedimentation control barriers.
- During construction, disturbed areas will be kept to a minimum and vegetative stabilization of these areas will occur as soon as practicable.
- Temporary seeding, mulching, or other suitable stabilization measures will

be used to protect exposed critical areas should unprotected soils remain exposed for prolonged periods.

Construction activities shall be monitored on-site by the construction supervisor to ensure that the soil erosion and sediment control features are installed properly, maintained, and to evaluate the need for additional erosion control and/or stabilization measures. The inspector will perform the following tasks:

- Supervise the installation and maintenance of the soil erosion and sediment control features.
- Evaluate the need for additional soil erosion and sediment control features.
- Scheduled inspections of erosion control features, including construction entrance, haybales, and dust control.
- Supervise and monitor temporary and permanent stabilization activities.

**Summary**

The proposed drainage system will attenuate the peak rate of runoff for the 2-, 10-, 25-, and 100-year storm events, will recharge groundwater on-site and reduce the overall volume of stormwater runoff leaving the site. Proper construction and operation & maintenance of the proposed drainage system are critical to its long-term performance. To that end, an Operations and Maintenance Plan has been prepared and will be instituted.

We trust the above is satisfactory. Should you have any questions or require further information, please do not hesitate to contact us.

Very truly yours,  
**Griffin Engineering Group, LLC**

  
Robert H. Griffin, P.E.

Enclosures: HydroCAD Drainage Calculations;  
Operations and Maintenance Plan

Cc: Beverly Planning Board  
B. Marks

## Operation & Maintenance Plan.

System Owner: 7 Porter Terrace, LLC (or Successor)

Party Responsible for O&M: Drainage structures will be maintained by individual lot owners. This includes the catchbasins, subsurface infiltrations fields, and piping.

Access / Easements: Post-Construction: Utility easements will be granted as indicated on the Definitive Subdivision Plan.

*Note: The inspector should note that drainage pipes, treatment tanks and catchbasins often are considered "confined spaces" subject to strict OSHA standards regarding safe entry. Confined spaces present inherent hazards to workers. Only appropriately trained staff with appropriate safety equipment and monitors may enter confined spaces, and then only with a specific entry permit. Also, this work may pose hazards to workers, such as soft ground, flowing or standing water, snakes and rodents. Again, only appropriately trained staff with the necessary safety equipment should undertake such work.*

The drainage system is to be operated and maintained in accordance with the following:

### **Part I: Construction Phase Controls**

**Roadway Construction Phasing:** Construction shall proceed in the following sequence:

1. Install Erosion Controls downhill of work areas. Inspection and maintenance of these Erosion Controls is required throughout the project as detailed below.
2. Clear & Grub areas only as needed.
3. Bring road alignments to rough subgrade.
4. Install underground utilities and subsurface infiltration fields.
5. Fine grade road and install binder course of bituminous pavement.
6. Install final paving.

Throughout construction, haybales and siltation controls are to be placed around drain inlets and low points in the excavation to prevent silt from entering the drainage system. These controls are to be inspected daily and maintained throughout the duration of the construction phase. Whenever sediment depths accumulate to a depth of six-inches next to the barrier, the sediment is to be removed.

The contractor shall install non-woven geotextile fabric between the frame and grate of catchbasins during construction to capture sediment. The fabric shall be maintained and sediment removed as needed throughout construction.

**Home Construction Phasing:** Construction shall proceed in the following sequence.

1. Install Erosion Controls downhill of work areas. Inspection and maintenance of these Erosion Controls is required throughout the project as detailed below.
2. Clear & Grub lots only as needed.
3. Install construction entrance (rip rap apron) along street line. Install gravel drive for construction vehicles.
4. Excavate foundation hole and install foundation.
5. Backfill around the foundation, install building utilities, and rough grade site. Construct structure.
6. Install driveway and landscaping.

## **Part II: Post-Development Controls**

1). Inspections. Inspection of the drainage system components are to be performed by the System Owner during the first year of operation on a quarterly basis. The inspection frequency can be reduced after the first year to annual inspections provided that the quarterly inspections do not indicate the need for more frequent inspections. If more frequent inspections become appropriate at any time, they should be implemented. Inspections should be documented by taking necessary notes, measurements, photographs, and retaining service receipts. The following inspections are required of the system owner.

Roadway - Remove debris from the roadway as it accumulates, as part of normal site clean-up. Weekly patrolling for litter is recommended. Sand from ice control should be removed monthly via a street sweeper during the winter season. Significant oil leaks should be swept up and disposed of using oil-absorbent material as they are discovered. Any oil spills or leaks that reach the

catchbasins must be reported to the Massachusetts DEP oil spill hotline.

Catchbasins - Remove the grate or cover and visually inspect for corrosion and structural damage. Inspect pipe inlets and bottoms for signs of infiltration or inflow. The grate or cover and hoods on the catchbasins should be inspected on a quarterly basis during the first and year and semi-annual thereafter. Cleaning of the catchbasins should be done on a yearly basis and by a vacuum truck or clamshell. While cleaning, if a layer of oil is observed floating on the water surface, place an oil-absorbent pillow on the surface, allow to soak and remove. Repeat this process until the oil layer is removed. Alternatively, have the oil layer pumped out by a licensed disposal contractor and appropriately disposed of. The oil absorbent pillows must be drummed for disposal by a licensed disposal contractor.

Subsurface Infiltration Fields – Initially, inspect the infiltration fields after major storms to ensure proper function and stabilization. Record water levels over several days to check for the infiltration field performance. After the first year, inspect the infiltration field annually for silt buildup or clogging. A log of the sediment depth should be maintained. Measure the sediment depth through the inspection port within the isolator row or by accessing the upstream drain manhole and measure the depth within the invert to the isolator row. If sediment reaches a four-inch depth, the sediment is to be removed in accordance with the maintenance instructions provided by StormTech.

2). Snow Storage. The new roadway is designed with 24 feet of pavement and shoulder throughout. This should provide ample width to maintain reasonable travel lanes with snow cast along the edge of the roadway and reserve strip. Snow removal has not proven necessary in newly-constructed residential subdivisions in Beverly in recent years, with the possible exception of very limited clearing of snow banks at intersections to provide a path for adjoining sidewalks and to increased visibility. In these instances snow is usually moved less than 100 feet to a more convenient location.

**TABLE 1: Construction Phase Inspection and Maintenance Procedures**

<b>Control</b>	<b>Inspection Frequency (1)</b>	<b>Maintenance Procedure</b>
Construction Entrance	Weekly	a
Silt Fence	Weekly	a
Rip Rap	Weekly	a
Dust Control	Daily	b
Permanent Stabilization	Weekly	c

1. Inspection frequencies are a minimum. Site conditions may warrant more frequent review. All control shall be inspected after each storm event which exceeds 0.5 inches in 24-hours.
2. Maintenance Procedures shall be reviewed and revised as necessary to protect the environment.
  - a. Remove accumulated debris and replace as necessary.
  - b. Water or calcium chloride shall be utilized to prevent the generation of dust.
  - c. Disturbed areas shall either be paved or stabilized by permanent seeding.

Inspection forms are to be completed weekly and retained with project files.

**INSPECTION AND MAINTENANCE REPORT FORM**

TO BE COMPLETED EVERY 7 DAYS AND WITHIN 24 HOURS OF  
A RAINFALL EVENT OF 0.5 INCHES OR MORE

**INSPECTOR:** \_\_\_\_\_

**DATE:** \_\_\_\_\_

**INSPECTOR'S QUALIFICATIONS:**

\_\_\_\_\_

**DAYS SINCE LAST RAINFALL:** \_\_\_\_\_

**AMOUNT OF LAST RAINFALL:** \_\_\_\_\_ INCHES

**STABILIZATION MEASURES**

Project Area	Date Since Last Disturbed	Date of Next Disturbance	Stabilized? (Yes/No)	Stabilized With	Condition
North					
East					
South					
West					

**STABILIZATION REQUIRED:**

\_\_\_\_\_

**TO BE PERFORMED BY:** \_\_\_\_\_ **ON OR BEFORE** \_\_\_\_\_

# INSPECTION AND MAINTENANCE REPORT FORM

## STABILIZED CONSTRUCTION ENTRANCE

Does Sediment Get Tracked onto the Road?	Is the Gravel Clean or is it Filled with Sediment?	Does All Traffic Use the Stabilized Exit to Leave the Site?

MAINTENANCE REQUIRED FOR ENTRANCE:

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TO BE PERFORMED BY: \_\_\_\_\_ ON OR BEFORE \_\_\_\_\_

# INSPECTION AND MAINTENANCE REPORT FORM

## SILT FENCE or HAYBALES

Location	Depth of Sediment Build-Up	Sediment Need Removal?	Need Replacement?
Eastern Side			
Southern Side			
Western Side			
Northern Side			

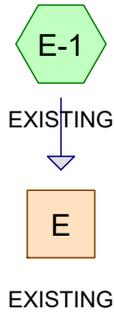
MAINTENANCE REQUIRED:

\_\_\_\_\_

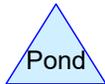
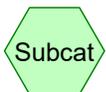
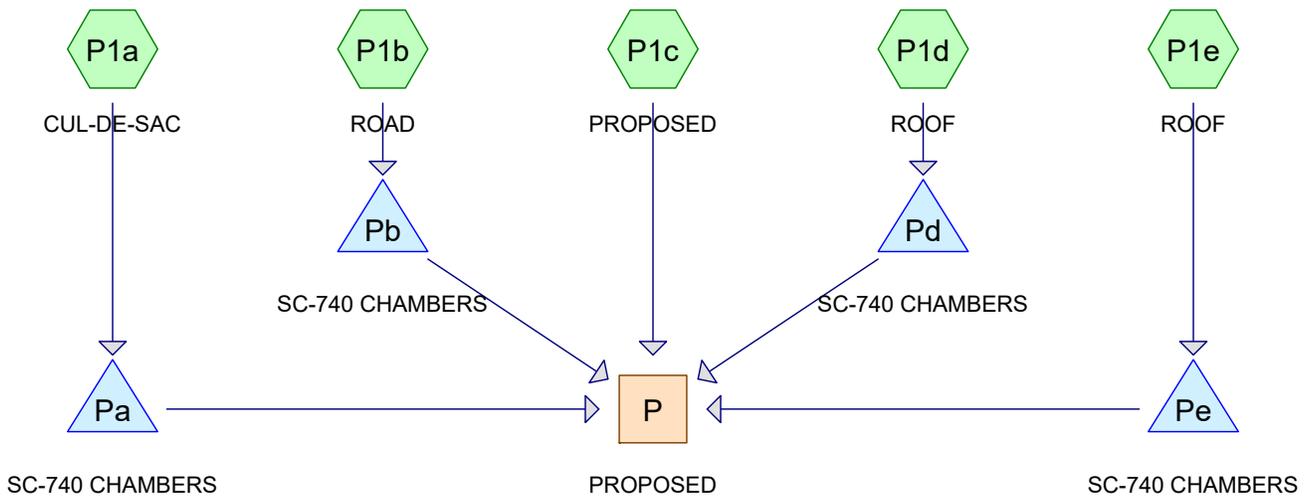
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TO BE PERFORMED BY: \_\_\_\_\_ ON OR BEFORE \_\_\_\_\_

**EXISTING**



**PROPOSED**



## 7PorterTerraceLLC-LivingstoneAveImprovements-July2020

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### Area Listing (selected nodes)

Area (sq-ft)	CN	Description (subcatchment-numbers)
3,148	84	50-75% Grass cover, Fair, HSG D (E-1)
16,927	80	>75% Grass cover, Good, HSG D (P1a, P1c)
1,920	98	Paved roads w/curbs & sewers, HSG D (P1c)
9,183	98	Pavement (P1a, P1b)
3,392	98	Roofs (P1d, P1e)
766	98	Sidewalk (P1a, P1b, P1c)
28,238	79	Woods, Fair, HSG D (E-1)
802	82	Woods/grass comb., Fair, HSG D (E-1)
<b>64,376</b>	<b>84</b>	<b>TOTAL AREA</b>

**Summary for Subcatchment E-1: EXISTING**

Runoff = 0.70 cfs @ 12.35 hrs, Volume= 3,555 cf, Depth= 1.33"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs  
Type III 24-hr 2-Year Rainfall=3.10"

Area (sf)	CN	Description
3,148	84	50-75% Grass cover, Fair, HSG D
802	82	Woods/grass comb., Fair, HSG D
28,238	79	Woods, Fair, HSG D
32,188	80	Weighted Average
32,188		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
21.8	100	0.0200	0.08		<b>Sheet Flow,</b> Woods: Light underbrush n= 0.400 P2= 3.10"
2.9	144	0.0280	0.84		<b>Shallow Concentrated Flow,</b> Woodland Kv= 5.0 fps
24.7	244	Total			

**Summary for Subcatchment P1a: CUL-DE-SAC**

Runoff = 0.51 cfs @ 12.09 hrs, Volume= 1,621 cf, Depth= 2.26"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs  
Type III 24-hr 2-Year Rainfall=3.10"

Area (sf)	CN	Description
* 5,595	98	Pavement
2,897	80	>75% Grass cover, Good, HSG D
* 130	98	Sidewalk
8,622	92	Weighted Average
2,897		33.60% Pervious Area
5,725		66.40% Impervious Area

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

**Summary for Subcatchment P1b: ROAD**

Runoff = 0.26 cfs @ 12.08 hrs, Volume= 914 cf, Depth= 2.87"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs  
Type III 24-hr 2-Year Rainfall=3.10"

**7PorterTerraceLLC-LivingstoneAveImprovements-Jul** Type III 24-hr 2-Year Rainfall=3.10"

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	Area (sf)	CN	Description
*	3,588	98	Pavement
*	236	98	Sidewalk
	3,824	98	Weighted Average
	3,824		100.00% Impervious Area

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

**Summary for Subcatchment P1c: PROPOSED**

Runoff = 0.67 cfs @ 12.09 hrs, Volume= 2,081 cf, Depth= 1.53"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs  
Type III 24-hr 2-Year Rainfall=3.10"

	Area (sf)	CN	Description
	14,030	80	>75% Grass cover, Good, HSG D
	1,920	98	Paved roads w/curbs & sewers, HSG D
*	400	98	Sidewalk
	16,350	83	Weighted Average
	14,030		85.81% Pervious Area
	2,320		14.19% Impervious Area

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

**Summary for Subcatchment P1d: ROOF**

Runoff = 0.12 cfs @ 12.08 hrs, Volume= 405 cf, Depth= 2.87"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs  
Type III 24-hr 2-Year Rainfall=3.10"

	Area (sf)	CN	Description
*	1,696	98	Roofs
	1,696		100.00% Impervious Area

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

**Summary for Subcatchment P1e: ROOF**

Runoff = 0.12 cfs @ 12.08 hrs, Volume= 405 cf, Depth= 2.87"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs  
Type III 24-hr 2-Year Rainfall=3.10"

Area (sf)	CN	Description
* 1,696	98	Roofs
1,696		100.00% Impervious Area

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

**Summary for Reach E: EXISTING**

Inflow Area = 32,188 sf, 0.00% Impervious, Inflow Depth = 1.33" for 2-Year event  
 Inflow = 0.70 cfs @ 12.35 hrs, Volume= 3,555 cf  
 Outflow = 0.70 cfs @ 12.35 hrs, Volume= 3,555 cf, Atten= 0%, Lag= 0.0 min

Routing by Dyn-Stor-Ind method, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs

**Summary for Reach P: PROPOSED**

Inflow Area = 32,188 sf, 47.41% Impervious, Inflow Depth = 0.78" for 2-Year event  
 Inflow = 0.67 cfs @ 12.09 hrs, Volume= 2,081 cf  
 Outflow = 0.67 cfs @ 12.09 hrs, Volume= 2,081 cf, Atten= 0%, Lag= 0.0 min

Routing by Dyn-Stor-Ind method, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs

**Summary for Pond Pa: SC-740 CHAMBERS**

Inflow Area = 8,622 sf, 66.40% Impervious, Inflow Depth = 2.26" for 2-Year event  
 Inflow = 0.51 cfs @ 12.09 hrs, Volume= 1,621 cf  
 Outflow = 0.04 cfs @ 11.58 hrs, Volume= 1,621 cf, Atten= 93%, Lag= 0.0 min  
 Discarded = 0.04 cfs @ 11.58 hrs, Volume= 1,621 cf  
 Primary = 0.00 cfs @ 0.00 hrs, Volume= 0 cf

Routing by Dyn-Stor-Ind method, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs  
 Peak Elev= 49.07' @ 13.45 hrs Surf.Area= 658 sf Storage= 668 cf  
 Flood Elev= 51.50' Surf.Area= 681 sf Storage= 1,368 cf

Plug-Flow detention time= 153.2 min calculated for 1,621 cf (100% of inflow)  
 Center-of-Mass det. time= 153.2 min ( 952.1 - 798.9 )

**7PorterTerraceLLC-LivingstoneAveImprovements-Jul** Type III 24-hr 2-Year Rainfall=3.10"

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Volume	Invert	Avail.Storage	Storage Description
#1A	47.50'	627 cf	<b>20.50'W x 32.10'L x 3.50'H Field A</b> 2,303 cf Overall - 735 cf Embedded = 1,568 cf x 40.0% Voids
#2A	48.00'	735 cf	<b>ADS_StormTech SC-740 +Cap x 16</b> Inside #1 Effective Size= 44.6"W x 30.0"H => 6.45 sf x 7.12'L = 45.9 cf Overall Size= 51.0"W x 30.0"H x 7.56'L with 0.44' Overlap 16 Chambers in 4 Rows
#3	51.00'	6 cf	<b>4.00'D x 0.50'H Vertical Cone/Cylinder</b>
#4	51.50'	113 cf	<b>Custom Stage Data (Prismatic)</b> Listed below (Recalc)
		1,481 cf	Total Available Storage

Storage Group A created with Chamber Wizard

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
51.50	10	0	0
51.55	100	3	3
51.75	1,000	110	113

Device	Routing	Invert	Outlet Devices
#1	Discarded	47.50'	<b>2.410 in/hr Exfiltration over Surface area</b> Phase-In= 0.01'
#2	Primary	51.50'	<b>2.0' long x 1.0' breadth Broad-Crested Rectangular Weir</b> Head (feet) 0.20 0.40 0.60 0.80 1.00 1.20 1.40 1.60 1.80 2.00 2.50 3.00 Coef. (English) 2.69 2.72 2.75 2.85 2.98 3.08 3.20 3.28 3.31 3.30 3.31 3.32

**Discarded OutFlow** Max=0.04 cfs @ 11.58 hrs HW=47.54' (Free Discharge)

↑1=**Exfiltration** (Exfiltration Controls 0.04 cfs)

**Primary OutFlow** Max=0.00 cfs @ 0.00 hrs HW=47.50' TW=0.00' (Dynamic Tailwater)

↑2=**Broad-Crested Rectangular Weir** ( Controls 0.00 cfs)

**Summary for Pond Pb: SC-740 CHAMBERS**

Inflow Area = 3,824 sf, 100.00% Impervious, Inflow Depth = 2.87" for 2-Year event  
 Inflow = 0.26 cfs @ 12.08 hrs, Volume= 914 cf  
 Outflow = 0.02 cfs @ 11.08 hrs, Volume= 914 cf, Atten= 94%, Lag= 0.0 min  
 Discarded = 0.02 cfs @ 11.08 hrs, Volume= 914 cf  
 Primary = 0.00 cfs @ 0.00 hrs, Volume= 0 cf

Routing by Dyn-Stor-Ind method, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs

Peak Elev= 46.72' @ 13.79 hrs Surf.Area= 275 sf Storage= 385 cf

Flood Elev= 48.50' Surf.Area= 297 sf Storage= 556 cf

Plug-Flow detention time= 200.6 min calculated for 914 cf (100% of inflow)

Center-of-Mass det. time= 200.6 min ( 957.7 - 757.1 )

**7PorterTerraceLLC-LivingstoneAveImprovements-Jul** Type III 24-hr 2-Year Rainfall=3.10"

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Volume	Invert	Avail.Storage	Storage Description
#1A	44.50'	274 cf	<b>11.00'W x 24.98'L x 3.50'H Field A</b> 962 cf Overall - 276 cf Embedded = 686 cf x 40.0% Voids
#2A	45.00'	276 cf	<b>ADS_StormTech SC-740 +Cap x 6</b> Inside #1 Effective Size= 44.6"W x 30.0"H => 6.45 sf x 7.12'L = 45.9 cf Overall Size= 51.0"W x 30.0"H x 7.56'L with 0.44' Overlap 6 Chambers in 2 Rows
#3	48.00'	6 cf	<b>4.00'D x 0.50'H Vertical Cone/Cylinder</b>
#4	48.50'	113 cf	<b>Custom Stage Data (Prismatic)</b> Listed below (Recalc)
		669 cf	Total Available Storage

Storage Group A created with Chamber Wizard

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
48.50	10	0	0
48.55	100	3	3
48.75	1,000	110	113

Device	Routing	Invert	Outlet Devices
#1	Discarded	44.50'	<b>2.410 in/hr Exfiltration over Surface area</b> Phase-In= 0.01'
#2	Primary	48.50'	<b>2.0' long x 1.0' breadth Broad-Crested Rectangular Weir</b> Head (feet) 0.20 0.40 0.60 0.80 1.00 1.20 1.40 1.60 1.80 2.00 2.50 3.00 Coef. (English) 2.69 2.72 2.75 2.85 2.98 3.08 3.20 3.28 3.31 3.30 3.31 3.32

**Discarded OutFlow** Max=0.02 cfs @ 11.08 hrs HW=44.54' (Free Discharge)

↑1=Exfiltration (Exfiltration Controls 0.02 cfs)

**Primary OutFlow** Max=0.00 cfs @ 0.00 hrs HW=44.50' TW=0.00' (Dynamic Tailwater)

↑2=Broad-Crested Rectangular Weir ( Controls 0.00 cfs)

**Summary for Pond Pd: SC-740 CHAMBERS**

Inflow Area = 1,696 sf, 100.00% Impervious, Inflow Depth = 2.87" for 2-Year event  
 Inflow = 0.12 cfs @ 12.08 hrs, Volume= 405 cf  
 Outflow = 0.01 cfs @ 11.65 hrs, Volume= 405 cf, Atten= 91%, Lag= 0.0 min  
 Discarded = 0.01 cfs @ 11.65 hrs, Volume= 405 cf  
 Primary = 0.00 cfs @ 0.00 hrs, Volume= 0 cf

Routing by Dyn-Stor-Ind method, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs  
 Peak Elev= 1.21' @ 12.90 hrs Surf.Area= 196 sf Storage= 139 cf

Plug-Flow detention time= 86.6 min calculated for 405 cf (100% of inflow)  
 Center-of-Mass det. time= 86.6 min ( 843.6 - 757.1 )

**7PorterTerraceLLC-LivingstoneAveImprovements-Jul** Type III 24-hr 2-Year Rainfall=3.10"

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Volume	Invert	Avail.Storage	Storage Description
#1A	0.00'	201 cf	<b>11.00'W x 17.86'L x 3.50'H Field A</b> 687 cf Overall - 184 cf Embedded = 504 cf x 40.0% Voids
#2A	0.50'	184 cf	<b>ADS_StormTech SC-740 +Cap</b> x 4 Inside #1 Effective Size= 44.6"W x 30.0"H => 6.45 sf x 7.12'L = 45.9 cf Overall Size= 51.0"W x 30.0"H x 7.56'L with 0.44' Overlap 4 Chambers in 2 Rows
#3	3.50'	0 cf	<b>0.50'D x 1.00'H Vertical Cone/Cylinder</b>
#4	4.50'	126 cf	<b>Custom Stage Data (Prismatic)</b> Listed below (Recalc) -Impervious
		512 cf	Total Available Storage

Storage Group A created with Chamber Wizard

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
4.50	10	0	0
4.75	1,000	126	126

Device	Routing	Invert	Outlet Devices
#1	Discarded	0.00'	<b>2.410 in/hr Exfiltration over Surface area</b> Phase-In= 0.01'
#2	Primary	4.50'	<b>6.0" Horiz. Orifice/Grate</b> C= 0.600 Limited to weir flow at low heads

**Discarded OutFlow** Max=0.01 cfs @ 11.65 hrs HW=0.05' (Free Discharge)

↑**1=Exfiltration** (Exfiltration Controls 0.01 cfs)

**Primary OutFlow** Max=0.00 cfs @ 0.00 hrs HW=0.00' TW=0.00' (Dynamic Tailwater)

↑**2=Orifice/Grate** ( Controls 0.00 cfs)

**Summary for Pond Pe: SC-740 CHAMBERS**

Inflow Area = 1,696 sf, 100.00% Impervious, Inflow Depth = 2.87" for 2-Year event  
 Inflow = 0.12 cfs @ 12.08 hrs, Volume= 405 cf  
 Outflow = 0.01 cfs @ 11.65 hrs, Volume= 405 cf, Atten= 91%, Lag= 0.0 min  
 Discarded = 0.01 cfs @ 11.65 hrs, Volume= 405 cf  
 Primary = 0.00 cfs @ 0.00 hrs, Volume= 0 cf

Routing by Dyn-Stor-Ind method, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs  
 Peak Elev= 1.21' @ 12.90 hrs Surf.Area= 196 sf Storage= 139 cf

Plug-Flow detention time= 86.6 min calculated for 405 cf (100% of inflow)  
 Center-of-Mass det. time= 86.6 min ( 843.6 - 757.1 )

**7PorterTerraceLLC-LivingstoneAveImprovements-Jul** Type III 24-hr 2-Year Rainfall=3.10"

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Volume	Invert	Avail.Storage	Storage Description
#1A	0.00'	201 cf	<b>11.00'W x 17.86'L x 3.50'H Field A</b> 687 cf Overall - 184 cf Embedded = 504 cf x 40.0% Voids
#2A	0.50'	184 cf	<b>ADS_StormTech SC-740 +Cap</b> x 4 Inside #1 Effective Size= 44.6"W x 30.0"H => 6.45 sf x 7.12'L = 45.9 cf Overall Size= 51.0"W x 30.0"H x 7.56'L with 0.44' Overlap 4 Chambers in 2 Rows
#3	3.50'	0 cf	<b>0.50'D x 1.00'H Vertical Cone/Cylinder</b>
#4	4.50'	126 cf	<b>Custom Stage Data (Prismatic)</b> Listed below (Recalc) -Impervious
		512 cf	Total Available Storage

Storage Group A created with Chamber Wizard

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
4.50	10	0	0
4.75	1,000	126	126

Device	Routing	Invert	Outlet Devices
#1	Discarded	0.00'	<b>2.410 in/hr Exfiltration over Surface area</b> Phase-In= 0.01'
#2	Primary	4.50'	<b>6.0" Horiz. Orifice/Grate</b> C= 0.600 Limited to weir flow at low heads

**Discarded OutFlow** Max=0.01 cfs @ 11.65 hrs HW=0.05' (Free Discharge)

↑**1=Exfiltration** (Exfiltration Controls 0.01 cfs)

**Primary OutFlow** Max=0.00 cfs @ 0.00 hrs HW=0.00' TW=0.00' (Dynamic Tailwater)

↑**2=Orifice/Grate** ( Controls 0.00 cfs)

**7PorterTerraceLLC-LivingstoneAveImprovements-Ju** Type III 24-hr 10-Year Rainfall=4.50"

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**Summary for Subcatchment E-1: EXISTING**

Runoff = 1.31 cfs @ 12.34 hrs, Volume= 6,603 cf, Depth= 2.46"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs  
Type III 24-hr 10-Year Rainfall=4.50"

Area (sf)	CN	Description
3,148	84	50-75% Grass cover, Fair, HSG D
802	82	Woods/grass comb., Fair, HSG D
28,238	79	Woods, Fair, HSG D
32,188	80	Weighted Average
32,188		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
21.8	100	0.0200	0.08		<b>Sheet Flow,</b> Woods: Light underbrush n= 0.400 P2= 3.10"
2.9	144	0.0280	0.84		<b>Shallow Concentrated Flow,</b> Woodland Kv= 5.0 fps
24.7	244	Total			

**Summary for Subcatchment P1a: CUL-DE-SAC**

Runoff = 0.80 cfs @ 12.08 hrs, Volume= 2,588 cf, Depth= 3.60"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs  
Type III 24-hr 10-Year Rainfall=4.50"

Area (sf)	CN	Description
* 5,595	98	Pavement
2,897	80	>75% Grass cover, Good, HSG D
* 130	98	Sidewalk
8,622	92	Weighted Average
2,897		33.60% Pervious Area
5,725		66.40% Impervious Area

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

**Summary for Subcatchment P1b: ROAD**

Runoff = 0.39 cfs @ 12.08 hrs, Volume= 1,359 cf, Depth= 4.26"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs  
Type III 24-hr 10-Year Rainfall=4.50"

**7PorterTerraceLLC-LivingstoneAveImprovements-Ju** Type III 24-hr 10-Year Rainfall=4.50"

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	Area (sf)	CN	Description
*	3,588	98	Pavement
*	236	98	Sidewalk
	3,824	98	Weighted Average
	3,824		100.00% Impervious Area

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

**Summary for Subcatchment P1c: PROPOSED**

Runoff = 1.20 cfs @ 12.09 hrs, Volume= 3,714 cf, Depth= 2.73"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs  
Type III 24-hr 10-Year Rainfall=4.50"

	Area (sf)	CN	Description
	14,030	80	>75% Grass cover, Good, HSG D
	1,920	98	Paved roads w/curbs & sewers, HSG D
*	400	98	Sidewalk
	16,350	83	Weighted Average
	14,030		85.81% Pervious Area
	2,320		14.19% Impervious Area

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

**Summary for Subcatchment P1d: ROOF**

Runoff = 0.17 cfs @ 12.08 hrs, Volume= 603 cf, Depth= 4.26"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs  
Type III 24-hr 10-Year Rainfall=4.50"

	Area (sf)	CN	Description
*	1,696	98	Roofs
	1,696		100.00% Impervious Area

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

**Summary for Subcatchment P1e: ROOF**

Runoff = 0.17 cfs @ 12.08 hrs, Volume= 603 cf, Depth= 4.26"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs  
Type III 24-hr 10-Year Rainfall=4.50"

Area (sf)	CN	Description
* 1,696	98	Roofs
1,696		100.00% Impervious Area

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

**Summary for Reach E: EXISTING**

Inflow Area = 32,188 sf, 0.00% Impervious, Inflow Depth = 2.46" for 10-Year event  
Inflow = 1.31 cfs @ 12.34 hrs, Volume= 6,603 cf  
Outflow = 1.31 cfs @ 12.34 hrs, Volume= 6,603 cf, Atten= 0%, Lag= 0.0 min

Routing by Dyn-Stor-Ind method, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs

**Summary for Reach P: PROPOSED**

Inflow Area = 32,188 sf, 47.41% Impervious, Inflow Depth = 1.42" for 10-Year event  
Inflow = 1.20 cfs @ 12.09 hrs, Volume= 3,808 cf  
Outflow = 1.20 cfs @ 12.09 hrs, Volume= 3,808 cf, Atten= 0%, Lag= 0.0 min

Routing by Dyn-Stor-Ind method, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs

**Summary for Pond Pa: SC-740 CHAMBERS**

Inflow Area = 8,622 sf, 66.40% Impervious, Inflow Depth = 3.60" for 10-Year event  
Inflow = 0.80 cfs @ 12.08 hrs, Volume= 2,588 cf  
Outflow = 0.04 cfs @ 10.92 hrs, Volume= 2,588 cf, Atten= 95%, Lag= 0.0 min  
Discarded = 0.04 cfs @ 10.92 hrs, Volume= 2,588 cf  
Primary = 0.00 cfs @ 0.00 hrs, Volume= 0 cf

Routing by Dyn-Stor-Ind method, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs  
Peak Elev= 50.64' @ 14.66 hrs Surf.Area= 658 sf Storage= 1,268 cf  
Flood Elev= 51.50' Surf.Area= 681 sf Storage= 1,368 cf

Plug-Flow detention time= 309.3 min calculated for 2,588 cf (100% of inflow)  
Center-of-Mass det. time= 309.3 min ( 1,095.3 - 786.1 )

# 7PorterTerraceLLC-LivingstoneAveImprovements-JuType III 24-hr 10-Year Rainfall=4.50"

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Volume	Invert	Avail.Storage	Storage Description
#1A	47.50'	627 cf	<b>20.50'W x 32.10'L x 3.50'H Field A</b> 2,303 cf Overall - 735 cf Embedded = 1,568 cf x 40.0% Voids
#2A	48.00'	735 cf	<b>ADS_StormTech SC-740 +Cap x 16</b> Inside #1 Effective Size= 44.6"W x 30.0"H => 6.45 sf x 7.12'L = 45.9 cf Overall Size= 51.0"W x 30.0"H x 7.56'L with 0.44' Overlap 16 Chambers in 4 Rows
#3	51.00'	6 cf	<b>4.00'D x 0.50'H Vertical Cone/Cylinder</b>
#4	51.50'	113 cf	<b>Custom Stage Data (Prismatic)</b> Listed below (Recalc)
		1,481 cf	Total Available Storage

Storage Group A created with Chamber Wizard

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
51.50	10	0	0
51.55	100	3	3
51.75	1,000	110	113

Device	Routing	Invert	Outlet Devices
#1	Discarded	47.50'	<b>2.410 in/hr Exfiltration over Surface area</b> Phase-In= 0.01'
#2	Primary	51.50'	<b>2.0' long x 1.0' breadth Broad-Crested Rectangular Weir</b> Head (feet) 0.20 0.40 0.60 0.80 1.00 1.20 1.40 1.60 1.80 2.00 2.50 3.00 Coef. (English) 2.69 2.72 2.75 2.85 2.98 3.08 3.20 3.28 3.31 3.30 3.31 3.32

**Discarded OutFlow** Max=0.04 cfs @ 10.92 hrs HW=47.54' (Free Discharge)

↑1=**Exfiltration** (Exfiltration Controls 0.04 cfs)

**Primary OutFlow** Max=0.00 cfs @ 0.00 hrs HW=47.50' TW=0.00' (Dynamic Tailwater)

↑2=**Broad-Crested Rectangular Weir** ( Controls 0.00 cfs)

## Summary for Pond Pb: SC-740 CHAMBERS

Inflow Area = 3,824 sf, 100.00% Impervious, Inflow Depth = 4.26" for 10-Year event  
 Inflow = 0.39 cfs @ 12.08 hrs, Volume= 1,359 cf  
 Outflow = 0.09 cfs @ 12.47 hrs, Volume= 1,359 cf, Atten= 76%, Lag= 23.0 min  
 Discarded = 0.02 cfs @ 12.47 hrs, Volume= 1,264 cf  
 Primary = 0.07 cfs @ 12.47 hrs, Volume= 94 cf

Routing by Dyn-Stor-Ind method, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs

Peak Elev= 48.55' @ 12.47 hrs Surf.Area= 408 sf Storage= 560 cf

Flood Elev= 48.50' Surf.Area= 297 sf Storage= 556 cf

Plug-Flow detention time= 279.1 min calculated for 1,359 cf (100% of inflow)

Center-of-Mass det. time= 279.1 min ( 1,028.9 - 749.8 )

**7PorterTerraceLLC-LivingstoneAveImprovements-JuType III 24-hr 10-Year Rainfall=4.50"**

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Volume	Invert	Avail.Storage	Storage Description
#1A	44.50'	274 cf	<b>11.00'W x 24.98'L x 3.50'H Field A</b> 962 cf Overall - 276 cf Embedded = 686 cf x 40.0% Voids
#2A	45.00'	276 cf	<b>ADS_StormTech SC-740 +Cap x 6</b> Inside #1 Effective Size= 44.6"W x 30.0"H => 6.45 sf x 7.12'L = 45.9 cf Overall Size= 51.0"W x 30.0"H x 7.56'L with 0.44' Overlap 6 Chambers in 2 Rows
#3	48.00'	6 cf	<b>4.00'D x 0.50'H Vertical Cone/Cylinder</b>
#4	48.50'	113 cf	<b>Custom Stage Data (Prismatic)</b> Listed below (Recalc)
		669 cf	Total Available Storage

Storage Group A created with Chamber Wizard

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
48.50	10	0	0
48.55	100	3	3
48.75	1,000	110	113

Device	Routing	Invert	Outlet Devices
#1	Discarded	44.50'	<b>2.410 in/hr Exfiltration over Surface area</b> Phase-In= 0.01'
#2	Primary	48.50'	<b>2.0' long x 1.0' breadth Broad-Crested Rectangular Weir</b> Head (feet) 0.20 0.40 0.60 0.80 1.00 1.20 1.40 1.60 1.80 2.00 2.50 3.00 Coef. (English) 2.69 2.72 2.75 2.85 2.98 3.08 3.20 3.28 3.31 3.30 3.31 3.32

**Discarded OutFlow** Max=0.02 cfs @ 12.47 hrs HW=48.55' (Free Discharge)

↑1=**Exfiltration** (Exfiltration Controls 0.02 cfs)

**Primary OutFlow** Max=0.07 cfs @ 12.47 hrs HW=48.55' TW=0.00' (Dynamic Tailwater)

↑2=**Broad-Crested Rectangular Weir** (Weir Controls 0.07 cfs @ 0.63 fps)

**Summary for Pond Pd: SC-740 CHAMBERS**

Inflow Area = 1,696 sf, 100.00% Impervious, Inflow Depth = 4.26" for 10-Year event  
 Inflow = 0.17 cfs @ 12.08 hrs, Volume= 603 cf  
 Outflow = 0.01 cfs @ 11.27 hrs, Volume= 603 cf, Atten= 94%, Lag= 0.0 min  
 Discarded = 0.01 cfs @ 11.27 hrs, Volume= 603 cf  
 Primary = 0.00 cfs @ 0.00 hrs, Volume= 0 cf

Routing by Dyn-Stor-Ind method, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs  
 Peak Elev= 1.98' @ 13.54 hrs Surf.Area= 196 sf Storage= 240 cf

Plug-Flow detention time= 166.8 min calculated for 603 cf (100% of inflow)  
 Center-of-Mass det. time= 166.7 min ( 916.6 - 749.8 )

**7PorterTerraceLLC-LivingstoneAveImprovements-JuType III 24-hr 10-Year Rainfall=4.50"**

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Volume	Invert	Avail.Storage	Storage Description
#1A	0.00'	201 cf	<b>11.00'W x 17.86'L x 3.50'H Field A</b> 687 cf Overall - 184 cf Embedded = 504 cf x 40.0% Voids
#2A	0.50'	184 cf	<b>ADS_StormTech SC-740 +Cap x 4</b> Inside #1 Effective Size= 44.6"W x 30.0"H => 6.45 sf x 7.12'L = 45.9 cf Overall Size= 51.0"W x 30.0"H x 7.56'L with 0.44' Overlap 4 Chambers in 2 Rows
#3	3.50'	0 cf	<b>0.50'D x 1.00'H Vertical Cone/Cylinder</b>
#4	4.50'	126 cf	<b>Custom Stage Data (Prismatic)</b> Listed below (Recalc) -Impervious
		512 cf	Total Available Storage

Storage Group A created with Chamber Wizard

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
4.50	10	0	0
4.75	1,000	126	126

Device	Routing	Invert	Outlet Devices
#1	Discarded	0.00'	<b>2.410 in/hr Exfiltration over Surface area</b> Phase-In= 0.01'
#2	Primary	4.50'	<b>6.0" Horiz. Orifice/Grate</b> C= 0.600 Limited to weir flow at low heads

**Discarded OutFlow** Max=0.01 cfs @ 11.27 hrs HW=0.05' (Free Discharge)

↑**1=Exfiltration** (Exfiltration Controls 0.01 cfs)

**Primary OutFlow** Max=0.00 cfs @ 0.00 hrs HW=0.00' TW=0.00' (Dynamic Tailwater)

↑**2=Orifice/Grate** ( Controls 0.00 cfs)

**Summary for Pond Pe: SC-740 CHAMBERS**

Inflow Area = 1,696 sf, 100.00% Impervious, Inflow Depth = 4.26" for 10-Year event  
 Inflow = 0.17 cfs @ 12.08 hrs, Volume= 603 cf  
 Outflow = 0.01 cfs @ 11.27 hrs, Volume= 603 cf, Atten= 94%, Lag= 0.0 min  
 Discarded = 0.01 cfs @ 11.27 hrs, Volume= 603 cf  
 Primary = 0.00 cfs @ 0.00 hrs, Volume= 0 cf

Routing by Dyn-Stor-Ind method, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs  
 Peak Elev= 1.98' @ 13.54 hrs Surf.Area= 196 sf Storage= 240 cf

Plug-Flow detention time= 166.8 min calculated for 603 cf (100% of inflow)  
 Center-of-Mass det. time= 166.7 min ( 916.6 - 749.8 )

**7PorterTerraceLLC-LivingstoneAveImprovements-Ju** Type III 24-hr 10-Year Rainfall=4.50"

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Volume	Invert	Avail.Storage	Storage Description
#1A	0.00'	201 cf	<b>11.00'W x 17.86'L x 3.50'H Field A</b> 687 cf Overall - 184 cf Embedded = 504 cf x 40.0% Voids
#2A	0.50'	184 cf	<b>ADS_StormTech SC-740 +Cap</b> x 4 Inside #1 Effective Size= 44.6"W x 30.0"H => 6.45 sf x 7.12'L = 45.9 cf Overall Size= 51.0"W x 30.0"H x 7.56'L with 0.44' Overlap 4 Chambers in 2 Rows
#3	3.50'	0 cf	<b>0.50'D x 1.00'H Vertical Cone/Cylinder</b>
#4	4.50'	126 cf	<b>Custom Stage Data (Prismatic)</b> Listed below (Recalc) -Impervious
		512 cf	Total Available Storage

Storage Group A created with Chamber Wizard

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
4.50	10	0	0
4.75	1,000	126	126

Device	Routing	Invert	Outlet Devices
#1	Discarded	0.00'	<b>2.410 in/hr Exfiltration over Surface area</b> Phase-In= 0.01'
#2	Primary	4.50'	<b>6.0" Horiz. Orifice/Grate</b> C= 0.600 Limited to weir flow at low heads

**Discarded OutFlow** Max=0.01 cfs @ 11.27 hrs HW=0.05' (Free Discharge)

↑**1=Exfiltration** (Exfiltration Controls 0.01 cfs)

**Primary OutFlow** Max=0.00 cfs @ 0.00 hrs HW=0.00' TW=0.00' (Dynamic Tailwater)

↑**2=Orifice/Grate** ( Controls 0.00 cfs)

**7PorterTerraceLLC-LivingstoneAveImprovements-Ju** Type III 24-hr 25-Year Rainfall=5.40"

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**Summary for Subcatchment E-1: EXISTING**

Runoff = 1.73 cfs @ 12.33 hrs, Volume= 8,703 cf, Depth= 3.24"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs  
Type III 24-hr 25-Year Rainfall=5.40"

Area (sf)	CN	Description
3,148	84	50-75% Grass cover, Fair, HSG D
802	82	Woods/grass comb., Fair, HSG D
28,238	79	Woods, Fair, HSG D
32,188	80	Weighted Average
32,188		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
21.8	100	0.0200	0.08		<b>Sheet Flow,</b> Woods: Light underbrush n= 0.400 P2= 3.10"
2.9	144	0.0280	0.84		<b>Shallow Concentrated Flow,</b> Woodland Kv= 5.0 fps
24.7	244	Total			

**Summary for Subcatchment P1a: CUL-DE-SAC**

Runoff = 0.98 cfs @ 12.08 hrs, Volume= 3,219 cf, Depth= 4.48"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs  
Type III 24-hr 25-Year Rainfall=5.40"

Area (sf)	CN	Description
* 5,595	98	Pavement
2,897	80	>75% Grass cover, Good, HSG D
* 130	98	Sidewalk
8,622	92	Weighted Average
2,897		33.60% Pervious Area
5,725		66.40% Impervious Area

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

**Summary for Subcatchment P1b: ROAD**

Runoff = 0.46 cfs @ 12.08 hrs, Volume= 1,645 cf, Depth= 5.16"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs  
Type III 24-hr 25-Year Rainfall=5.40"

**7PorterTerraceLLC-LivingstoneAveImprovements-Ju** Type III 24-hr 25-Year Rainfall=5.40"

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	Area (sf)	CN	Description
*	3,588	98	Pavement
*	236	98	Sidewalk
	3,824	98	Weighted Average
	3,824		100.00% Impervious Area

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

**Summary for Subcatchment P1c: PROPOSED**

Runoff = 1.55 cfs @ 12.09 hrs, Volume= 4,821 cf, Depth= 3.54"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs  
Type III 24-hr 25-Year Rainfall=5.40"

	Area (sf)	CN	Description
	14,030	80	>75% Grass cover, Good, HSG D
	1,920	98	Paved roads w/curbs & sewers, HSG D
*	400	98	Sidewalk
	16,350	83	Weighted Average
	14,030		85.81% Pervious Area
	2,320		14.19% Impervious Area

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

**Summary for Subcatchment P1d: ROOF**

Runoff = 0.21 cfs @ 12.08 hrs, Volume= 730 cf, Depth= 5.16"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs  
Type III 24-hr 25-Year Rainfall=5.40"

	Area (sf)	CN	Description
*	1,696	98	Roofs
	1,696		100.00% Impervious Area

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

**Summary for Subcatchment P1e: ROOF**

Runoff = 0.21 cfs @ 12.08 hrs, Volume= 730 cf, Depth= 5.16"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs  
Type III 24-hr 25-Year Rainfall=5.40"

Area (sf)	CN	Description
* 1,696	98	Roofs
1,696		100.00% Impervious Area

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

**Summary for Reach E: EXISTING**

Inflow Area = 32,188 sf, 0.00% Impervious, Inflow Depth = 3.24" for 25-Year event  
Inflow = 1.73 cfs @ 12.33 hrs, Volume= 8,703 cf  
Outflow = 1.73 cfs @ 12.33 hrs, Volume= 8,703 cf, Atten= 0%, Lag= 0.0 min

Routing by Dyn-Stor-Ind method, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs

**Summary for Reach P: PROPOSED**

Inflow Area = 32,188 sf, 47.41% Impervious, Inflow Depth = 2.01" for 25-Year event  
Inflow = 1.55 cfs @ 12.09 hrs, Volume= 5,396 cf  
Outflow = 1.55 cfs @ 12.09 hrs, Volume= 5,396 cf, Atten= 0%, Lag= 0.0 min

Routing by Dyn-Stor-Ind method, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs

**Summary for Pond Pa: SC-740 CHAMBERS**

Inflow Area = 8,622 sf, 66.40% Impervious, Inflow Depth = 4.48" for 25-Year event  
Inflow = 0.98 cfs @ 12.08 hrs, Volume= 3,219 cf  
Outflow = 0.22 cfs @ 12.49 hrs, Volume= 3,219 cf, Atten= 77%, Lag= 24.1 min  
Discarded = 0.06 cfs @ 12.49 hrs, Volume= 2,922 cf  
Primary = 0.17 cfs @ 12.49 hrs, Volume= 297 cf

Routing by Dyn-Stor-Ind method, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs  
Peak Elev= 51.60' @ 12.49 hrs Surf.Area= 988 sf Storage= 1,381 cf  
Flood Elev= 51.50' Surf.Area= 681 sf Storage= 1,368 cf

Plug-Flow detention time= 303.8 min calculated for 3,219 cf (100% of inflow)  
Center-of-Mass det. time= 303.8 min ( 1,084.1 - 780.3 )

# 7PorterTerraceLLC-LivingstoneAveImprovements-JuType III 24-hr 25-Year Rainfall=5.40"

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Volume	Invert	Avail.Storage	Storage Description
#1A	47.50'	627 cf	<b>20.50'W x 32.10'L x 3.50'H Field A</b> 2,303 cf Overall - 735 cf Embedded = 1,568 cf x 40.0% Voids
#2A	48.00'	735 cf	<b>ADS_StormTech SC-740 +Cap x 16</b> Inside #1 Effective Size= 44.6"W x 30.0"H => 6.45 sf x 7.12'L = 45.9 cf Overall Size= 51.0"W x 30.0"H x 7.56'L with 0.44' Overlap 16 Chambers in 4 Rows
#3	51.00'	6 cf	<b>4.00'D x 0.50'H Vertical Cone/Cylinder</b>
#4	51.50'	113 cf	<b>Custom Stage Data (Prismatic)</b> Listed below (Recalc)
		1,481 cf	Total Available Storage

Storage Group A created with Chamber Wizard

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
51.50	10	0	0
51.55	100	3	3
51.75	1,000	110	113

Device	Routing	Invert	Outlet Devices
#1	Discarded	47.50'	<b>2.410 in/hr Exfiltration over Surface area</b> Phase-In= 0.01'
#2	Primary	51.50'	<b>2.0' long x 1.0' breadth Broad-Crested Rectangular Weir</b> Head (feet) 0.20 0.40 0.60 0.80 1.00 1.20 1.40 1.60 1.80 2.00 2.50 3.00 Coef. (English) 2.69 2.72 2.75 2.85 2.98 3.08 3.20 3.28 3.31 3.30 3.31 3.32

**Discarded OutFlow** Max=0.06 cfs @ 12.49 hrs HW=51.60' (Free Discharge)

↑1=**Exfiltration** (Exfiltration Controls 0.06 cfs)

**Primary OutFlow** Max=0.17 cfs @ 12.49 hrs HW=51.60' TW=0.00' (Dynamic Tailwater)

↑2=**Broad-Crested Rectangular Weir** (Weir Controls 0.17 cfs @ 0.84 fps)

## Summary for Pond Pb: SC-740 CHAMBERS

Inflow Area =	3,824 sf, 100.00% Impervious,	Inflow Depth =	5.16" for 25-Year event
Inflow =	0.46 cfs @ 12.08 hrs,	Volume=	1,645 cf
Outflow =	0.22 cfs @ 12.24 hrs,	Volume=	1,645 cf, Atten= 53%, Lag= 9.6 min
Discarded =	0.04 cfs @ 12.24 hrs,	Volume=	1,367 cf
Primary =	0.18 cfs @ 12.24 hrs,	Volume=	278 cf

Routing by Dyn-Stor-Ind method, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs

Peak Elev= 48.60' @ 12.24 hrs Surf.Area= 632 sf Storage= 571 cf

Flood Elev= 48.50' Surf.Area= 297 sf Storage= 556 cf

Plug-Flow detention time= 249.8 min calculated for 1,645 cf (100% of inflow)

Center-of-Mass det. time= 249.8 min ( 996.6 - 746.8 )

**7PorterTerraceLLC-LivingstoneAveImprovements-JuType III 24-hr 25-Year Rainfall=5.40"**

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Volume	Invert	Avail.Storage	Storage Description
#1A	44.50'	274 cf	<b>11.00'W x 24.98'L x 3.50'H Field A</b> 962 cf Overall - 276 cf Embedded = 686 cf x 40.0% Voids
#2A	45.00'	276 cf	<b>ADS_StormTech SC-740 +Cap x 6</b> Inside #1 Effective Size= 44.6"W x 30.0"H => 6.45 sf x 7.12'L = 45.9 cf Overall Size= 51.0"W x 30.0"H x 7.56'L with 0.44' Overlap 6 Chambers in 2 Rows
#3	48.00'	6 cf	<b>4.00'D x 0.50'H Vertical Cone/Cylinder</b>
#4	48.50'	113 cf	<b>Custom Stage Data (Prismatic)</b> Listed below (Recalc)
		669 cf	Total Available Storage

Storage Group A created with Chamber Wizard

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
48.50	10	0	0
48.55	100	3	3
48.75	1,000	110	113

Device	Routing	Invert	Outlet Devices
#1	Discarded	44.50'	<b>2.410 in/hr Exfiltration over Surface area</b> Phase-In= 0.01'
#2	Primary	48.50'	<b>2.0' long x 1.0' breadth Broad-Crested Rectangular Weir</b> Head (feet) 0.20 0.40 0.60 0.80 1.00 1.20 1.40 1.60 1.80 2.00 2.50 3.00 Coef. (English) 2.69 2.72 2.75 2.85 2.98 3.08 3.20 3.28 3.31 3.30 3.31 3.32

**Discarded OutFlow** Max=0.04 cfs @ 12.24 hrs HW=48.60' (Free Discharge)

↑1=Exfiltration (Exfiltration Controls 0.04 cfs)

**Primary OutFlow** Max=0.18 cfs @ 12.24 hrs HW=48.60' TW=0.00' (Dynamic Tailwater)

↑2=Broad-Crested Rectangular Weir (Weir Controls 0.18 cfs @ 0.87 fps)

**Summary for Pond Pd: SC-740 CHAMBERS**

Inflow Area = 1,696 sf, 100.00% Impervious, Inflow Depth = 5.16" for 25-Year event  
 Inflow = 0.21 cfs @ 12.08 hrs, Volume= 730 cf  
 Outflow = 0.01 cfs @ 10.84 hrs, Volume= 730 cf, Atten= 95%, Lag= 0.0 min  
 Discarded = 0.01 cfs @ 10.84 hrs, Volume= 730 cf  
 Primary = 0.00 cfs @ 0.00 hrs, Volume= 0 cf

Routing by Dyn-Stor-Ind method, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs  
 Peak Elev= 2.64' @ 13.98 hrs Surf.Area= 196 sf Storage= 314 cf

Plug-Flow detention time= 228.7 min calculated for 730 cf (100% of inflow)  
 Center-of-Mass det. time= 228.7 min ( 975.4 - 746.8 )

**7PorterTerraceLLC-LivingstoneAveImprovements-JuType III 24-hr 25-Year Rainfall=5.40"**

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Volume	Invert	Avail.Storage	Storage Description
#1A	0.00'	201 cf	<b>11.00'W x 17.86'L x 3.50'H Field A</b> 687 cf Overall - 184 cf Embedded = 504 cf x 40.0% Voids
#2A	0.50'	184 cf	<b>ADS_StormTech SC-740 +Cap x 4</b> Inside #1 Effective Size= 44.6"W x 30.0"H => 6.45 sf x 7.12'L = 45.9 cf Overall Size= 51.0"W x 30.0"H x 7.56'L with 0.44' Overlap 4 Chambers in 2 Rows
#3	3.50'	0 cf	<b>0.50'D x 1.00'H Vertical Cone/Cylinder</b>
#4	4.50'	126 cf	<b>Custom Stage Data (Prismatic)</b> Listed below (Recalc) -Impervious
		512 cf	Total Available Storage

Storage Group A created with Chamber Wizard

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
4.50	10	0	0
4.75	1,000	126	126

Device	Routing	Invert	Outlet Devices
#1	Discarded	0.00'	<b>2.410 in/hr Exfiltration over Surface area</b> Phase-In= 0.01'
#2	Primary	4.50'	<b>6.0" Horiz. Orifice/Grate</b> C= 0.600 Limited to weir flow at low heads

**Discarded OutFlow** Max=0.01 cfs @ 10.84 hrs HW=0.05' (Free Discharge)

↑**1=Exfiltration** (Exfiltration Controls 0.01 cfs)

**Primary OutFlow** Max=0.00 cfs @ 0.00 hrs HW=0.00' TW=0.00' (Dynamic Tailwater)

↑**2=Orifice/Grate** ( Controls 0.00 cfs)

**Summary for Pond Pe: SC-740 CHAMBERS**

Inflow Area = 1,696 sf, 100.00% Impervious, Inflow Depth = 5.16" for 25-Year event  
 Inflow = 0.21 cfs @ 12.08 hrs, Volume= 730 cf  
 Outflow = 0.01 cfs @ 10.84 hrs, Volume= 730 cf, Atten= 95%, Lag= 0.0 min  
 Discarded = 0.01 cfs @ 10.84 hrs, Volume= 730 cf  
 Primary = 0.00 cfs @ 0.00 hrs, Volume= 0 cf

Routing by Dyn-Stor-Ind method, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs  
 Peak Elev= 2.64' @ 13.98 hrs Surf.Area= 196 sf Storage= 314 cf

Plug-Flow detention time= 228.7 min calculated for 730 cf (100% of inflow)  
 Center-of-Mass det. time= 228.7 min ( 975.4 - 746.8 )

**7PorterTerraceLLC-LivingstoneAveImprovements-Ju** Type III 24-hr 25-Year Rainfall=5.40"

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Volume	Invert	Avail.Storage	Storage Description
#1A	0.00'	201 cf	<b>11.00'W x 17.86'L x 3.50'H Field A</b> 687 cf Overall - 184 cf Embedded = 504 cf x 40.0% Voids
#2A	0.50'	184 cf	<b>ADS_StormTech SC-740 +Cap</b> x 4 Inside #1 Effective Size= 44.6"W x 30.0"H => 6.45 sf x 7.12'L = 45.9 cf Overall Size= 51.0"W x 30.0"H x 7.56'L with 0.44' Overlap 4 Chambers in 2 Rows
#3	3.50'	0 cf	<b>0.50'D x 1.00'H Vertical Cone/Cylinder</b>
#4	4.50'	126 cf	<b>Custom Stage Data (Prismatic)</b> Listed below (Recalc) -Impervious
		512 cf	Total Available Storage

Storage Group A created with Chamber Wizard

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
4.50	10	0	0
4.75	1,000	126	126

Device	Routing	Invert	Outlet Devices
#1	Discarded	0.00'	<b>2.410 in/hr Exfiltration over Surface area</b> Phase-In= 0.01'
#2	Primary	4.50'	<b>6.0" Horiz. Orifice/Grate</b> C= 0.600 Limited to weir flow at low heads

**Discarded OutFlow** Max=0.01 cfs @ 10.84 hrs HW=0.05' (Free Discharge)

↑**1=Exfiltration** (Exfiltration Controls 0.01 cfs)

**Primary OutFlow** Max=0.00 cfs @ 0.00 hrs HW=0.00' TW=0.00' (Dynamic Tailwater)

↑**2=Orifice/Grate** ( Controls 0.00 cfs)

**7PorterTerraceLLC-LivingstoneAveImprovements-JType III 24-hr 100-Year Rainfall=6.50"**

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**Summary for Subcatchment E-1: EXISTING**

Runoff = 2.25 cfs @ 12.33 hrs, Volume= 11,360 cf, Depth= 4.24"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs  
Type III 24-hr 100-Year Rainfall=6.50"

Area (sf)	CN	Description
3,148	84	50-75% Grass cover, Fair, HSG D
802	82	Woods/grass comb., Fair, HSG D
28,238	79	Woods, Fair, HSG D
32,188	80	Weighted Average
32,188		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
21.8	100	0.0200	0.08		<b>Sheet Flow,</b> Woods: Light underbrush n= 0.400 P2= 3.10"
2.9	144	0.0280	0.84		<b>Shallow Concentrated Flow,</b> Woodland Kv= 5.0 fps
24.7	244	Total			

**Summary for Subcatchment P1a: CUL-DE-SAC**

Runoff = 1.20 cfs @ 12.08 hrs, Volume= 3,996 cf, Depth= 5.56"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs  
Type III 24-hr 100-Year Rainfall=6.50"

Area (sf)	CN	Description
* 5,595	98	Pavement
2,897	80	>75% Grass cover, Good, HSG D
* 130	98	Sidewalk
8,622	92	Weighted Average
2,897		33.60% Pervious Area
5,725		66.40% Impervious Area

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

**Summary for Subcatchment P1b: ROAD**

Runoff = 0.56 cfs @ 12.08 hrs, Volume= 1,995 cf, Depth= 6.26"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs  
Type III 24-hr 100-Year Rainfall=6.50"

**7PorterTerraceLLC-LivingstoneAveImprovements-JType III 24-hr 100-Year Rainfall=6.50"**

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	Area (sf)	CN	Description
*	3,588	98	Pavement
*	236	98	Sidewalk
	3,824	98	Weighted Average
	3,824		100.00% Impervious Area

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

**Summary for Subcatchment P1c: PROPOSED**

Runoff = 1.97 cfs @ 12.09 hrs, Volume= 6,210 cf, Depth= 4.56"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs  
Type III 24-hr 100-Year Rainfall=6.50"

	Area (sf)	CN	Description
	14,030	80	>75% Grass cover, Good, HSG D
	1,920	98	Paved roads w/curbs & sewers, HSG D
*	400	98	Sidewalk
	16,350	83	Weighted Average
	14,030		85.81% Pervious Area
	2,320		14.19% Impervious Area

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

**Summary for Subcatchment P1d: ROOF**

Runoff = 0.25 cfs @ 12.08 hrs, Volume= 885 cf, Depth= 6.26"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs  
Type III 24-hr 100-Year Rainfall=6.50"

	Area (sf)	CN	Description
*	1,696	98	Roofs
	1,696		100.00% Impervious Area

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

**Summary for Subcatchment P1e: ROOF**

Runoff = 0.25 cfs @ 12.08 hrs, Volume= 885 cf, Depth= 6.26"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs  
Type III 24-hr 100-Year Rainfall=6.50"

Area (sf)	CN	Description
* 1,696	98	Roofs
1,696		100.00% Impervious Area

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

**Summary for Reach E: EXISTING**

Inflow Area = 32,188 sf, 0.00% Impervious, Inflow Depth = 4.24" for 100-Year event  
Inflow = 2.25 cfs @ 12.33 hrs, Volume= 11,360 cf  
Outflow = 2.25 cfs @ 12.33 hrs, Volume= 11,360 cf, Atten= 0%, Lag= 0.0 min

Routing by Dyn-Stor-Ind method, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs

**Summary for Reach P: PROPOSED**

Inflow Area = 32,188 sf, 47.41% Impervious, Inflow Depth = 2.84" for 100-Year event  
Inflow = 2.18 cfs @ 12.11 hrs, Volume= 7,607 cf  
Outflow = 2.18 cfs @ 12.11 hrs, Volume= 7,607 cf, Atten= 0%, Lag= 0.0 min

Routing by Dyn-Stor-Ind method, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs

**Summary for Pond Pa: SC-740 CHAMBERS**

Inflow Area = 8,622 sf, 66.40% Impervious, Inflow Depth = 5.56" for 100-Year event  
Inflow = 1.20 cfs @ 12.08 hrs, Volume= 3,996 cf  
Outflow = 0.53 cfs @ 12.27 hrs, Volume= 3,996 cf, Atten= 56%, Lag= 11.0 min  
Discarded = 0.08 cfs @ 12.27 hrs, Volume= 3,172 cf  
Primary = 0.45 cfs @ 12.27 hrs, Volume= 824 cf

Routing by Dyn-Stor-Ind method, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs  
Peak Elev= 51.69' @ 12.27 hrs Surf.Area= 1,405 sf Storage= 1,430 cf  
Flood Elev= 51.50' Surf.Area= 681 sf Storage= 1,368 cf

Plug-Flow detention time= 265.7 min calculated for 3,995 cf (100% of inflow)  
Center-of-Mass det. time= 265.7 min ( 1,040.5 - 774.8 )

**7PorterTerraceLLC-LivingstoneAveImprovements-JType III 24-hr 100-Year Rainfall=6.50"**

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Volume	Invert	Avail.Storage	Storage Description
#1A	47.50'	627 cf	<b>20.50'W x 32.10'L x 3.50'H Field A</b> 2,303 cf Overall - 735 cf Embedded = 1,568 cf x 40.0% Voids
#2A	48.00'	735 cf	<b>ADS_StormTech SC-740 +Cap x 16</b> Inside #1 Effective Size= 44.6"W x 30.0"H => 6.45 sf x 7.12'L = 45.9 cf Overall Size= 51.0"W x 30.0"H x 7.56'L with 0.44' Overlap 16 Chambers in 4 Rows
#3	51.00'	6 cf	<b>4.00'D x 0.50'H Vertical Cone/Cylinder</b>
#4	51.50'	113 cf	<b>Custom Stage Data (Prismatic)</b> Listed below (Recalc)
		1,481 cf	Total Available Storage

Storage Group A created with Chamber Wizard

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
51.50	10	0	0
51.55	100	3	3
51.75	1,000	110	113

Device	Routing	Invert	Outlet Devices
#1	Discarded	47.50'	<b>2.410 in/hr Exfiltration over Surface area</b> Phase-In= 0.01'
#2	Primary	51.50'	<b>2.0' long x 1.0' breadth Broad-Crested Rectangular Weir</b> Head (feet) 0.20 0.40 0.60 0.80 1.00 1.20 1.40 1.60 1.80 2.00 2.50 3.00 Coef. (English) 2.69 2.72 2.75 2.85 2.98 3.08 3.20 3.28 3.31 3.30 3.31 3.32

**Discarded OutFlow** Max=0.08 cfs @ 12.27 hrs HW=51.69' (Free Discharge)

↑1=**Exfiltration** (Exfiltration Controls 0.08 cfs)

**Primary OutFlow** Max=0.45 cfs @ 12.27 hrs HW=51.69' TW=0.00' (Dynamic Tailwater)

↑2=**Broad-Crested Rectangular Weir** (Weir Controls 0.45 cfs @ 1.18 fps)

**Summary for Pond Pb: SC-740 CHAMBERS**

Inflow Area = 3,824 sf, 100.00% Impervious, Inflow Depth = 6.26" for 100-Year event  
 Inflow = 0.56 cfs @ 12.08 hrs, Volume= 1,995 cf  
 Outflow = 0.41 cfs @ 12.15 hrs, Volume= 1,995 cf, Atten= 26%, Lag= 4.3 min  
 Discarded = 0.05 cfs @ 12.15 hrs, Volume= 1,478 cf  
 Primary = 0.36 cfs @ 12.15 hrs, Volume= 518 cf

Routing by Dyn-Stor-Ind method, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs

Peak Elev= 48.67' @ 12.15 hrs Surf.Area= 907 sf Storage= 601 cf

Flood Elev= 48.50' Surf.Area= 297 sf Storage= 556 cf

Plug-Flow detention time= 223.7 min calculated for 1,995 cf (100% of inflow)

Center-of-Mass det. time= 223.8 min ( 967.7 - 744.0 )

**7PorterTerraceLLC-LivingstoneAveImprovements-JType III 24-hr 100-Year Rainfall=6.50"**

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Volume	Invert	Avail.Storage	Storage Description
#1A	44.50'	274 cf	<b>11.00'W x 24.98'L x 3.50'H Field A</b> 962 cf Overall - 276 cf Embedded = 686 cf x 40.0% Voids
#2A	45.00'	276 cf	<b>ADS_StormTech SC-740 +Cap x 6</b> Inside #1 Effective Size= 44.6"W x 30.0"H => 6.45 sf x 7.12'L = 45.9 cf Overall Size= 51.0"W x 30.0"H x 7.56'L with 0.44' Overlap 6 Chambers in 2 Rows
#3	48.00'	6 cf	<b>4.00'D x 0.50'H Vertical Cone/Cylinder</b>
#4	48.50'	113 cf	<b>Custom Stage Data (Prismatic)</b> Listed below (Recalc)
		669 cf	Total Available Storage

Storage Group A created with Chamber Wizard

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
48.50	10	0	0
48.55	100	3	3
48.75	1,000	110	113

Device	Routing	Invert	Outlet Devices
#1	Discarded	44.50'	<b>2.410 in/hr Exfiltration over Surface area</b> Phase-In= 0.01'
#2	Primary	48.50'	<b>2.0' long x 1.0' breadth Broad-Crested Rectangular Weir</b> Head (feet) 0.20 0.40 0.60 0.80 1.00 1.20 1.40 1.60 1.80 2.00 2.50 3.00 Coef. (English) 2.69 2.72 2.75 2.85 2.98 3.08 3.20 3.28 3.31 3.30 3.31 3.32

**Discarded OutFlow** Max=0.05 cfs @ 12.15 hrs HW=48.67' (Free Discharge)

↑**1=Exfiltration** (Exfiltration Controls 0.05 cfs)

**Primary OutFlow** Max=0.36 cfs @ 12.15 hrs HW=48.67' TW=0.00' (Dynamic Tailwater)

↑**2=Broad-Crested Rectangular Weir** (Weir Controls 0.36 cfs @ 1.09 fps)

**Summary for Pond Pd: SC-740 CHAMBERS**

Inflow Area = 1,696 sf, 100.00% Impervious, Inflow Depth = 6.26" for 100-Year event  
 Inflow = 0.25 cfs @ 12.08 hrs, Volume= 885 cf  
 Outflow = 0.02 cfs @ 12.90 hrs, Volume= 885 cf, Atten= 91%, Lag= 48.8 min  
 Discarded = 0.01 cfs @ 12.83 hrs, Volume= 857 cf  
 Primary = 0.01 cfs @ 12.90 hrs, Volume= 28 cf

Routing by Dyn-Stor-Ind method, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs  
 Peak Elev= 4.52' @ 12.90 hrs Surf.Area= 197 sf Storage= 386 cf

Plug-Flow detention time= 280.0 min calculated for 885 cf (100% of inflow)  
 Center-of-Mass det. time= 280.0 min ( 1,024.0 - 744.0 )

**7PorterTerraceLLC-LivingstoneAveImprovements-JType III 24-hr 100-Year Rainfall=6.50"**

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Volume	Invert	Avail.Storage	Storage Description
#1A	0.00'	201 cf	<b>11.00'W x 17.86'L x 3.50'H Field A</b> 687 cf Overall - 184 cf Embedded = 504 cf x 40.0% Voids
#2A	0.50'	184 cf	<b>ADS_StormTech SC-740 +Cap x 4</b> Inside #1 Effective Size= 44.6"W x 30.0"H => 6.45 sf x 7.12'L = 45.9 cf Overall Size= 51.0"W x 30.0"H x 7.56'L with 0.44' Overlap 4 Chambers in 2 Rows
#3	3.50'	0 cf	<b>0.50'D x 1.00'H Vertical Cone/Cylinder</b>
#4	4.50'	126 cf	<b>Custom Stage Data (Prismatic)</b> Listed below (Recalc) -Impervious
		512 cf	Total Available Storage

Storage Group A created with Chamber Wizard

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
4.50	10	0	0
4.75	1,000	126	126

Device	Routing	Invert	Outlet Devices
#1	Discarded	0.00'	<b>2.410 in/hr Exfiltration over Surface area</b> Phase-In= 0.01'
#2	Primary	4.50'	<b>6.0" Horiz. Orifice/Grate</b> C= 0.600 Limited to weir flow at low heads

**Discarded OutFlow** Max=0.01 cfs @ 12.83 hrs HW=4.50' (Free Discharge)

↑**1=Exfiltration** (Exfiltration Controls 0.01 cfs)

**Primary OutFlow** Max=0.01 cfs @ 12.90 hrs HW=4.52' TW=0.00' (Dynamic Tailwater)

↑**2=Orifice/Grate** (Weir Controls 0.01 cfs @ 0.44 fps)

**Summary for Pond Pe: SC-740 CHAMBERS**

Inflow Area = 1,696 sf, 100.00% Impervious, Inflow Depth = 6.26" for 100-Year event  
 Inflow = 0.25 cfs @ 12.08 hrs, Volume= 885 cf  
 Outflow = 0.02 cfs @ 12.90 hrs, Volume= 885 cf, Atten= 91%, Lag= 48.8 min  
 Discarded = 0.01 cfs @ 12.83 hrs, Volume= 857 cf  
 Primary = 0.01 cfs @ 12.90 hrs, Volume= 28 cf

Routing by Dyn-Stor-Ind method, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs  
 Peak Elev= 4.52' @ 12.90 hrs Surf.Area= 197 sf Storage= 386 cf

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 Center-of-Mass det. time= 280.0 min ( 1,024.0 - 744.0 )

**7PorterTerraceLLC-LivingstoneAveImprovements-JType III 24-hr 100-Year Rainfall=6.50"**

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Device	Routing	Invert	Outlet Devices
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#2	Primary	4.50'	<b>6.0" Horiz. Orifice/Grate</b> C= 0.600 Limited to weir flow at low heads

**Discarded OutFlow** Max=0.01 cfs @ 12.83 hrs HW=4.50' (Free Discharge)

↑**1=Exfiltration** (Exfiltration Controls 0.01 cfs)

**Primary OutFlow** Max=0.01 cfs @ 12.90 hrs HW=4.52' TW=0.00' (Dynamic Tailwater)

↑**2=Orifice/Grate** (Weir Controls 0.01 cfs @ 0.44 fps)