



# GRAHAM ASSOCIATES, INC.

CIVIL ENGINEERS  
PROFESSIONAL SERVICES SINCE 1984

TWO CENTRAL STREET  
IPSWICH, MA 01938

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May 20, 2021

Town of Ipswich  
Planning Board  
25 Green Street  
Ipswich, MA 01938

Attn: Ethan Parsons  
Director of Planning and Development

*Re: Supplemental Information  
Special Permit Filing  
126-128 High Street  
H.L. Graham Project No. 19-1914*

Dear Board:

Attached please find revised plans and documents relative to the above referenced application. The documents attached are our response to Bob Puff's Drainage and Stormwater Management Review – Task 2 letter of May 10, 2021. The plans have been revised primarily in response to his review as well as some of the final comments from the Board.

Thank you.

Very truly yours,  
**H.L. GRAHAM ASSOCIATES, INC.**

H.L. Graham, P.E.  
President

HLG/gb

Enclosures

cc: Lou Rubino  
Robert E. Puff, Jr. P.E.

### Stormwater Management

1. Responses to concerns relative to Infiltration System 1 (IFS 1).
  - a. A mounding analysis for IFS 1 has been performed. It would be applicable for either IFS 1N or IFS 1S. The analysis indicates a mounding of a little over a foot still a foot beneath the stone bottom of IFS 1.
  - b. We have taken several steps with respect to the design of IFS 1 to address the flooding concern of the commercial component parking area during the more intense storm events.

We re-routed the proposed sanitary sewer line southerly adding two additional manholes at angle points to make room to expand IFS 1S.

We have added 11 chambers to IFS 1S. The total number of chambers now in IFS 1 has been increased from 35 to 46 (26 in IFS 1N and 20 in IFS 1S).

We have also added an additional 12" culvert pipe with an inlet at grade at the northwesterly corner of IFS 1N outletting at the same point as D11 and D34.

These revisions have reduced the peak flood elevations to El. 37.63 (10-year) and El. 38.23 (100-year).

The 10-year event peak flood elevation of El. 37.63 is now just 2" over CB 3. The 100-year event peak flood elevation of El. 38.23 would mean 9" over CB 3, 3" over contour 38 in the parking area extending to zero toward the southeasterly edges of the parking area.

We reviewed these figures with the Planning Board at their last meeting. Although they would prefer to see no water on the parking lot, they accepted the short-term condition as one which is a vast improvement over the existing conditions.

Lastly on this topic, the Board, and I believe Bob Puff, understands that it is the exiting condition of the elevation of the edge of the covered concrete walk (at El. 38.3±) which prevents us from improving on many aspects of the design. If we could raise the walk elevation we could increase the slope across the southeasterly corner of the parking area as well as push the limits of water on the area back toward CB 3 during the more intense events.

I recently had this discussion with the developer Lou Rubino and he intends to take a close look at this recommendation as he addresses the second phase of this project being significant improvements to the existing commercial building. His initial response was that he believed that the walk could be raised 6" or more.

- c. We revisited the computer model and were able to get a minimal discarded infiltration credit of 0.05 CFS.
- d. Bob Puff and I had some email correspondence on 5/11 and 5/12 concerning an alternate design(s), which might provide the 3' separation, required by the Zoning Bylaw.

As the Board now knows I met on 5/4 with the Water and Wastewater Subcommittee about this issue. After a lengthy discussion the subcommittee voted unanimously to recommend to the Select Board acceptance of the current 2' separation design over the 3' Zoning Bylaw requirement.

In addition, the issue was vetted with the Planning Board at their last meeting and they too indicated a willingness to accept the current design suggesting that they would much prefer the subsurface structure design over an open infiltration basin or bioretention basin. They also expressed a preference over the use of structural devices (catch basins and sediment and oil separators) over lengthy vegetated filter strips or open forebays in satisfying the required 44% pretreatment requirements.

Given the responses in 1.a., 1.b. and 1.d. above as well as the increase in sizing we have made to the two proposed sediment and oil separators (see 2. to follow) we question whether or not the reviewer feels we still need the "maximum extent practicable" relief under Standards 3 and 4 previously requested?

- 2. As recommended by the reviewer, we have had Shea Concrete provide details for increasing the capacity of WQI 1 from 1500-gallons to 2500-gallons and increasing the capacity of WQI 2 from 1500-gallons to 2000-gallons. Revised details have been added to the plans and the plans have been revised for WQI 1 to reflect the footprint size increase. We now calculate the pool storage in the first chamber as 115 C.F. for WQI 1 and 62 C.F. for WQI 2, which satisfies the Stormwater Handbook sizing requirements.
- 3. Numerous clean-outs have been added to the plans as recommended.
- 4. A trench dam has been specified on the plans where recommended.

### Site Grading and Drainage

1. As recommended, the plans now call for a 12" header and 8" feeders at IFS 2.
2. Contours 39 near CB 2 have been modified to address the flat grade near the project entrance. Contour 38 in the commercial component parking area has not been adjusted as this would extend/increase flooding depths further into the parking area. See other discussion at Stormwater Management 1.b. above. Raising the elevation of the covered concrete sidewalk in the developers second phase of this project (commercial building rehab) will allow us to increase grading in this parking area as well as pushing any ponding water toward the catch basin (CB 3).
3. We have made some minor modifications to elevations in the IFS 1 system whereby there is now a 27" difference between the invert and top of grate. In addition we have provided a partial detail on Sheet 4 of this pipe/catch basin (CB 3) connection.
- 4.a. Specifications for CB 2 have been added to the Drainage Date table on Sheet 3.
- 4.b. The recommended plan change has been made.
- 4.c. The pipe slope for D33 has been modified.
5. The detail referenced in 3. above shows the hood detail. In addition the Snout (12R and 18R) details have been added to Sheet 4. Also a note on Sheet 4 addresses the adjustments needed when there is minimal vertical clearance from the top of the hood to the bottom of the flat top slab.
6. Sheet 5 (the additional plan sheet added) now includes the CPPP Plan and Notes. The construction entrance(s) specs are addressed therein. The sediment and oil separator details are on this sheet as well as an image of a typical silt sack to be used at catch basins. A plan detail for the temporary erosion control (silt sock/wattle) has been added on Sheet 2.

### DEP Stormwater Management Items

1. Standard 3. The requested mounding analysis has been provided.
2. Standard 4. The sediment and oil separators (2,000 gal. and 2,500 gal.) have been added to the plan at WQI 2 and WQI 1 respectively as requested.



3. Standard 6. We have made another attempt at the wording in the LTPPP under the heading of "Spill prevention and response". That page is included herewith for consideration.
4. Standard 7. The question has been asked herein of the reviewer whether or not the "maximum extent practicable" relief is needed to meet Standards 3 and 4? We believe it may no longer be needed?
5. Standard 9. The revision requested has been made and a copy included herewith.
6. No response required.

Lastly, we are including the final run of the HydroCAD sheets which includes the revisions made and discussed herein to Pond 11P/IFS 1 and the referenced peak elevations for the 10-year and 100-year events.

- Infiltration Systems and Dry Wells

Inspection ports are provided at each infiltration system. Inspections of the stone base of the infiltration system through these ports should be performed twice a year. Any substantial accumulation of sediment over the stone base should be reported to the design engineer.

- Basin Outfalls

Inspect twice annually. Check free and clear of debris and sediment.

- Manholes and Piping

Manholes and piping shall be inspected annually in April to be sure inlet and outlet pipes are open and that the inside of the structure is clean and in sound structural condition.

The Owner shall maintain an Operation and Maintenance Log Form (attached), which shall include all dates, inspections, observations, maintenance, cleaning and operation activities.

The Operation and Maintenance Log shall be made available to the Town of Ipswich Planning Board upon request.

The Owner shall permit upon request and proper notification, the designated representative of Planning Board access to the premises for inspection of the Stormwater Management System and Owner's compliance with the Operation and Maintenance of the system.

The estimated initial operation and maintenance budget for the Stormwater Management System is \$7,500 annually.

Reference is made to the approved plans and documents of record at the Planning Department office and the office of the Design Engineer all of which are attached hereto for ease of reference. Reference is also made to any/all further as-built plans to be prepared and to be found at the same offices.





The Long Term Pollution Prevention Plan for the property located at 126 and 128 High Street, Ipswich, MA includes the following provisions:

- **Good housekeeping practices:** The property will be maintained in a neat and clean manner.
- **Maintenance of landscape areas:** Grassed areas will be regularly mowed during the Spring, Summer and Fall seasons. Grass clippings will be removed from the site and shall not be permitted to migrate to or near drainage catch basin grates.

Plantings shall be inspected in the Spring and Fall. Any dead or stressed plantings shall be promptly replaced subject to seasonal conditions.

Mulched areas shall be inspected in Spring and Fall with mulch supplemented or replaced on an as needed basis.

- **Street Sweeping Schedules:** November, March and April at minimum.
- **Vehicle washing controls:** Discouraged, but not restricted.
- **Requirements for storage and use of fertilizers, herbicides and pesticides:** There will be no storage of fertilizers, herbicides or pesticides on the premises. The use of fertilizers, herbicides and pesticides will be limited. A licensed professional applicator will administer the products only on as needed basis and using BMPs for each product applied.
- **Pet Waste Management:** Per Town ordinance pets shall be leashed at all times when outdoors. Pet waste shall be immediately picked up and properly disposed of. Pet waste shall never be disposed of at or near catch basin grates.
- **Provisions for solid waste management:** Trash pick-up will be handled on-site by a private disposal service.
- **Snow disposal and plowing plans:** Snow plowing will be contracted for by the Owner/Applicant. Snow will be stored in the areas depicted on the plan. In the event those areas are full, snow will be removed from the site.
- **Winter Road Salt and/or Sand use:** Sand use on the access drive and parking areas is prohibited. Use of salt and other deicing products will be limited.
- **Spill prevention and response:** Spills or unintended discharge of any hazardous liquids or materials shall be immediately reported to the Ipswich Fire Department and Ipswich Health Department. The Owners, Homeowners Association, and Commercial tenant managers shall take immediate action in support of direction given by the Town departments to mitigate such spills. To prevent any spilled materials from entering the drainage systems, such actions may include sealing downstream catch basins if and as directed, if not by, the Ipswich Fire Department. If the material has already entered the drainage system, such actions may include pumping of the catch basins and sediment and oil separators if and as directed by the Ipswich Fire Department.

This spreadsheet will calculate the height of a groundwater mound beneath a stormwater infiltration basin. Missouri Scientific Investigations Report 2010-5102 "Simulation of groundwater mounding beneath hypothetical stormwater infiltration basins"

The user must specify infiltration rate (R), specific yield (Sy), horizontal hydraulic conductivity (Kh), basin dimensions, thickness of the saturated zone (hi(0)), height of the water table if the bottom of the aquifer is the datum. For a rectangular basin, if the user wants the water-table changes perpendicular to the long side, specify x as the short dimension, y as the long dimension. If the user wants the values perpendicular to the short side, specify y as the short dimension, x as the long dimension. Cells highlighted in yellow are values that can be changed by the user. Cells highlighted in red are output values. Use the "Re-Calculate Now" button each time ANY of the user-specified inputs are changed otherwise necessary iteration values shown will be incorrect. Use consistent units for all input values (for example, feet and days)

use consistent units (e.g. feet & days or inches & hours)

**Input Values**

4.8200
0.230
48.00
11.000
13.000
1.000
20.000

R  
Sy  
K  
x  
y  
t  
hi(0)

Recharge (infiltration) rate (feet/day)  
Specific yield, Sy (dimensionless, between 0 and 1)  
Horizontal hydraulic conductivity, Kh (feet/day)\*  
1/2 length of basin (x direction, in feet)  
1/2 width of basin (y direction, in feet)  
duration of infiltration period (days)  
initial thickness of saturated zone (feet)

21.100
1.100

h(max)  
Δh(max)

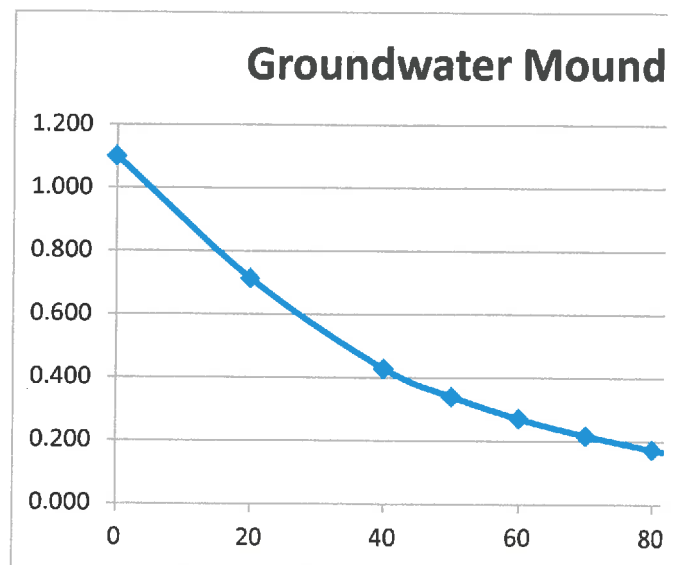
maximum thickness of saturated zone (beneath center of basin)  
maximum groundwater mounding (beneath center of basin at

Ground-water Mounding, in feet  
Distance from center of basin in x direction, in feet

1.100	0
0.714	20
0.429	40
0.340	50
0.272	60
0.218	70
0.174	80
0.140	90
0.112	100
0.071	120



**Re-Calculate Now**



**Disclaimer**



## DRAINAGE SUMMARY

### Peak Flow Rate (cfs)

<u>Storm Event</u>	<u>1-year</u>	<u>2-year</u>	<u>10-year</u>	<u>100-year</u>
Pre-Dev. (1S)	0.00	0.01	0.08	0.45
Post-Dev. (11R)	0.00	0.00	0.04	0.39
Pre-Dev. (2R)	1.13	1.60	3.40	8.04
Post-Dev. (12R)	0.00	0.00	0.42	4.94

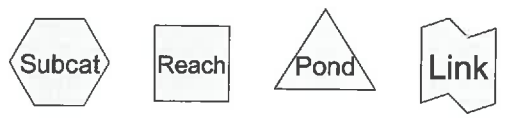
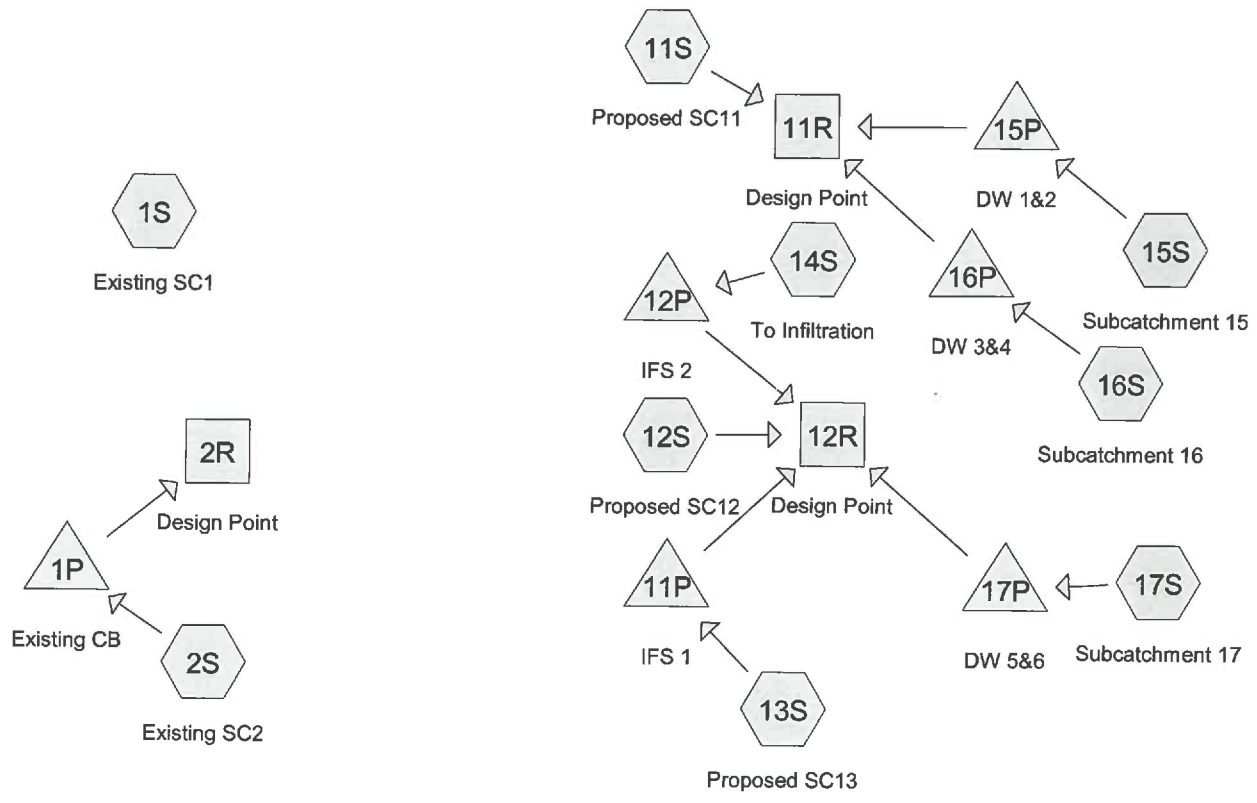
### Runoff Volume (acre-feet)

<u>Storm Event</u>	<u>1-year</u>	<u>2-year</u>	<u>10-year</u>	<u>100-year</u>
Pre-Dev. (1S)	0.001	0.002	0.008	0.032
Post-Dev. (11R)	0.000	0.001	0.005	0.038
Pre-Dev. (2R)	0.088	0.123	0.257	0.625
Post-Dev. (12R)	0.000	0.000	0.032	0.278

### Basin Summary (peak elev./outflow (cfs))

	<u>1-year</u>	<u>2-year</u>	<u>10-year</u>	<u>100-year</u>
Infiltration (11P)	34.5/0.0	35.0/0.0	37.6/0.4	38.2/3.4
Infiltration (12P)	37.4/0.0	37.6/0.0	38.9/0.0	39.7/1.4
Infiltration (15P)	36.7/0.0	36.9/0.0	37.7/0.0	40.0/0.1
Infiltration (16P)	36.7/0.0	36.9/0.0	37.7/0.0	40.0/0.1
Infiltration (17P)	36.7/0.0	36.9/0.0	37.7/0.0	40.0/0.1

24-hour Rainfall Values: 1-year storm = 2.7"      2-year storm = 3.2"  
 10-year storm = 4.9"      100-year storm = 9.0"



**Drainage Diagram for 126-128 High St.**  
 Prepared by H. L. Graham Associates, Inc., Printed 5/19/2021  
 HydroCAD® 9.10 s/n 01908 © 2010 HydroCAD Software Solutions LLC

**126-128 High St.**

Prepared by H. L. Graham Associates, Inc.

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*Type III 24-hr Rainfall=2.70"*

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Page 1

Time span=0.00-36.00 hrs, dt=0.01 hrs, 3601 points

Runoff by SCS TR-20 method, UH=SCS

Reach routing by Stor-Ind method - Pond routing by Stor-Ind method

<b>Subcatchment 1S: Existing SC1</b>	Runoff Area=5,387 sf 11.03% Impervious Runoff Depth=0.07" Tc=5.0 min CN=52 Runoff=0.00 cfs 0.001 af
<b>Subcatchment 2S: Existing SC2</b>	Runoff Area=51,964 sf 61.79% Impervious Runoff Depth=0.92" Tc=5.0 min CN=78 Runoff=1.28 cfs 0.092 af
<b>Subcatchment 11S: Proposed SC11</b>	Runoff Area=4,772 sf 0.00% Impervious Runoff Depth=0.03" Tc=5.0 min CN=48 Runoff=0.00 cfs 0.000 af
<b>Subcatchment 12S: Proposed SC12</b>	Runoff Area=4,456 sf 0.00% Impervious Runoff Depth=0.00" Tc=5.0 min CN=39 Runoff=0.00 cfs 0.000 af
<b>Subcatchment 13S: Proposed SC13</b>	Runoff Area=29,500 sf 52.13% Impervious Runoff Depth=0.55" Tc=5.0 min CN=70 Runoff=0.37 cfs 0.031 af
<b>Subcatchment 14S: To Infiltration</b>	Runoff Area=8,546 sf 80.10% Impervious Runoff Depth=1.41" Tc=5.0 min CN=86 Runoff=0.34 cfs 0.023 af
<b>Subcatchment 15S: Subcatchment 15</b>	Runoff Area=3,359 sf 53.59% Impervious Runoff Depth=0.59" Tc=5.0 min CN=71 Runoff=0.05 cfs 0.004 af
<b>Subcatchment 16S: Subcatchment 16</b>	Runoff Area=3,359 sf 53.59% Impervious Runoff Depth=0.59" Tc=5.0 min CN=71 Runoff=0.05 cfs 0.004 af
<b>Subcatchment 17S: Subcatchment 17</b>	Runoff Area=3,359 sf 53.59% Impervious Runoff Depth=0.59" Tc=5.0 min CN=71 Runoff=0.05 cfs 0.004 af
<b>Reach 2R: Design Point</b>	Inflow=1.13 cfs 0.088 af Outflow=1.13 cfs 0.088 af
<b>Reach 11R: Design Point</b>	Inflow=0.00 cfs 0.000 af Outflow=0.00 cfs 0.000 af
<b>Reach 12R: Design Point</b>	Inflow=0.00 cfs 0.000 af Outflow=0.00 cfs 0.000 af
<b>Pond 1P: Existing CB</b>	Peak Elev=37.20' Storage=397 cf Inflow=1.28 cfs 0.092 af Outflow=1.13 cfs 0.088 af
<b>Pond 11P: IFS 1</b>	Peak Elev=34.53' Storage=901 cf Inflow=0.37 cfs 0.031 af Discarded=0.01 cfs 0.021 af Primary=0.00 cfs 0.000 af Outflow=0.01 cfs 0.021 af
<b>Pond 12P: IFS 2</b>	Peak Elev=37.35' Storage=340 cf Inflow=0.34 cfs 0.023 af Discarded=0.04 cfs 0.023 af Primary=0.00 cfs 0.000 af Outflow=0.04 cfs 0.023 af
<b>Pond 15P: DW 1&amp;2</b>	Peak Elev=36.69' Storage=24 cf Inflow=0.05 cfs 0.004 af Discarded=0.02 cfs 0.004 af Primary=0.00 cfs 0.000 af Outflow=0.02 cfs 0.004 af

**126-128 High St.**

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*Type III 24-hr Rainfall=2.70"*

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**Pond 16P: DW 3&4**

Peak Elev=36.69' Storage=24 cf Inflow=0.05 cfs 0.004 af  
Discarded=0.02 cfs 0.004 af Primary=0.00 cfs 0.000 af Outflow=0.02 cfs 0.004 af

**Pond 17P: DW 5&6**

Peak Elev=36.69' Storage=24 cf Inflow=0.05 cfs 0.004 af  
Discarded=0.02 cfs 0.004 af Primary=0.00 cfs 0.000 af Outflow=0.02 cfs 0.004 af

**Total Runoff Area = 2.633 ac Runoff Volume = 0.158 af Average Runoff Depth = 0.72"**  
**47.40% Pervious = 1.248 ac 52.60% Impervious = 1.385 ac**

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

<b>Subcatchment 1S: Existing SC1</b>	Runoff Area=5,387 sf 11.03% Impervious Runoff Depth=0.17" Tc=5.0 min CN=52 Runoff=0.01 cfs 0.002 af
<b>Subcatchment 2S: Existing SC2</b>	Runoff Area=51,964 sf 61.79% Impervious Runoff Depth=1.27" Tc=5.0 min CN=78 Runoff=1.81 cfs 0.127 af
<b>Subcatchment 11S: Proposed SC11</b>	Runoff Area=4,772 sf 0.00% Impervious Runoff Depth=0.09" Tc=5.0 min CN=48 Runoff=0.00 cfs 0.001 af
<b>Subcatchment 12S: Proposed SC12</b>	Runoff Area=4,456 sf 0.00% Impervious Runoff Depth=0.00" Tc=5.0 min CN=39 Runoff=0.00 cfs 0.000 af
<b>Subcatchment 13S: Proposed SC13</b>	Runoff Area=29,500 sf 52.13% Impervious Runoff Depth=0.83" Tc=5.0 min CN=70 Runoff=0.61 cfs 0.047 af
<b>Subcatchment 14S: To Infiltration</b>	Runoff Area=8,546 sf 80.10% Impervious Runoff Depth=1.84" Tc=5.0 min CN=86 Runoff=0.44 cfs 0.030 af
<b>Subcatchment 15S: Subcatchment 15</b>	Runoff Area=3,359 sf 53.59% Impervious Runoff Depth=0.88" Tc=5.0 min CN=71 Runoff=0.07 cfs 0.006 af
<b>Subcatchment 16S: Subcatchment 16</b>	Runoff Area=3,359 sf 53.59% Impervious Runoff Depth=0.88" Tc=5.0 min CN=71 Runoff=0.07 cfs 0.006 af
<b>Subcatchment 17S: Subcatchment 17</b>	Runoff Area=3,359 sf 53.59% Impervious Runoff Depth=0.88" Tc=5.0 min CN=71 Runoff=0.07 cfs 0.006 af
<b>Reach 2R: Design Point</b>	Inflow=1.60 cfs 0.123 af Outflow=1.60 cfs 0.123 af
<b>Reach 11R: Design Point</b>	Inflow=0.00 cfs 0.001 af Outflow=0.00 cfs 0.001 af
<b>Reach 12R: Design Point</b>	Inflow=0.00 cfs 0.000 af Outflow=0.00 cfs 0.000 af
<b>Pond 1P: Existing CB</b>	Peak Elev=37.23' Storage=479 cf Inflow=1.81 cfs 0.127 af Outflow=1.60 cfs 0.123 af
<b>Pond 11P: IFS 1</b>	Peak Elev=35.02' Storage=1,373 cf Inflow=0.61 cfs 0.047 af Discarded=0.02 cfs 0.030 af Primary=0.00 cfs 0.000 af Outflow=0.02 cfs 0.030 af
<b>Pond 12P: IFS 2</b>	Peak Elev=37.63' Storage=497 cf Inflow=0.44 cfs 0.030 af Discarded=0.04 cfs 0.030 af Primary=0.00 cfs 0.000 af Outflow=0.04 cfs 0.030 af
<b>Pond 15P: DW 1&amp;2</b>	Peak Elev=36.94' Storage=55 cf Inflow=0.07 cfs 0.006 af Discarded=0.02 cfs 0.006 af Primary=0.00 cfs 0.000 af Outflow=0.02 cfs 0.006 af

**126-128 High St.**

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*Type III 24-hr Rainfall=3.20"*

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Page 2

**Pond 16P: DW 3&4**

Peak Elev=36.94' Storage=55 cf Inflow=0.07 cfs 0.006 af  
Discarded=0.02 cfs 0.006 af Primary=0.00 cfs 0.000 af Outflow=0.02 cfs 0.006 af

**Pond 17P: DW 5&6**

Peak Elev=36.94' Storage=55 cf Inflow=0.07 cfs 0.006 af  
Discarded=0.02 cfs 0.006 af Primary=0.00 cfs 0.000 af Outflow=0.02 cfs 0.006 af

**Total Runoff Area = 2.633 ac Runoff Volume = 0.223 af Average Runoff Depth = 1.02"**  
**47.40% Pervious = 1.248 ac 52.60% Impervious = 1.385 ac**

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

<b>Subcatchment 1S: Existing SC1</b>	Runoff Area=5,387 sf 11.03% Impervious Runoff Depth=0.76" Tc=5.0 min CN=52 Runoff=0.08 cfs 0.008 af
<b>Subcatchment 2S: Existing SC2</b>	Runoff Area=51,964 sf 61.79% Impervious Runoff Depth=2.63" Tc=5.0 min CN=78 Runoff=3.81 cfs 0.261 af
<b>Subcatchment 11S: Proposed SC11</b>	Runoff Area=4,772 sf 0.00% Impervious Runoff Depth=0.55" Tc=5.0 min CN=48 Runoff=0.04 cfs 0.005 af
<b>Subcatchment 12S: Proposed SC12</b>	Runoff Area=4,456 sf 0.00% Impervious Runoff Depth=0.18" Tc=5.0 min CN=39 Runoff=0.00 cfs 0.002 af
<b>Subcatchment 13S: Proposed SC13</b>	Runoff Area=29,500 sf 52.13% Impervious Runoff Depth=1.96" Tc=5.0 min CN=70 Runoff=1.58 cfs 0.111 af
<b>Subcatchment 14S: To Infiltration</b>	Runoff Area=8,546 sf 80.10% Impervious Runoff Depth=3.37" Tc=5.0 min CN=86 Runoff=0.79 cfs 0.055 af
<b>Subcatchment 15S: Subcatchment 15</b>	Runoff Area=3,359 sf 53.59% Impervious Runoff Depth=2.04" Tc=5.0 min CN=71 Runoff=0.19 cfs 0.013 af
<b>Subcatchment 16S: Subcatchment 16</b>	Runoff Area=3,359 sf 53.59% Impervious Runoff Depth=2.04" Tc=5.0 min CN=71 Runoff=0.19 cfs 0.013 af
<b>Subcatchment 17S: Subcatchment 17</b>	Runoff Area=3,359 sf 53.59% Impervious Runoff Depth=2.04" Tc=5.0 min CN=71 Runoff=0.19 cfs 0.013 af
<b>Reach 2R: Design Point</b>	Inflow=3.40 cfs 0.257 af Outflow=3.40 cfs 0.257 af
<b>Reach 11R: Design Point</b>	Inflow=0.04 cfs 0.005 af Outflow=0.04 cfs 0.005 af
<b>Reach 12R: Design Point</b>	Inflow=0.42 cfs 0.032 af Outflow=0.42 cfs 0.032 af
<b>Pond 1P: Existing CB</b>	Peak Elev=37.31' Storage=782 cf Inflow=3.81 cfs 0.261 af Outflow=3.40 cfs 0.257 af
<b>Pond 11P: IFS 1</b>	Peak Elev=37.63' Storage=2,058 cf Inflow=1.58 cfs 0.111 af Discarded=0.05 cfs 0.056 af Primary=0.41 cfs 0.031 af Outflow=0.46 cfs 0.086 af
<b>Pond 12P: IFS 2</b>	Peak Elev=38.93' Storage=1,150 cf Inflow=0.79 cfs 0.055 af Discarded=0.04 cfs 0.055 af Primary=0.00 cfs 0.000 af Outflow=0.04 cfs 0.055 af
<b>Pond 15P: DW 1&amp;2</b>	Peak Elev=37.70' Storage=215 cf Inflow=0.19 cfs 0.013 af Discarded=0.02 cfs 0.013 af Primary=0.00 cfs 0.000 af Outflow=0.02 cfs 0.013 af

**126-128 High St.**

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*Type III 24-hr Rainfall=4.90"*

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**Pond 16P: DW 3&4**

Peak Elev=37.70' Storage=215 cf Inflow=0.19 cfs 0.013 af  
Discarded=0.02 cfs 0.013 af Primary=0.00 cfs 0.000 af Outflow=0.02 cfs 0.013 af

**Pond 17P: DW 5&6**

Peak Elev=37.70' Storage=215 cf Inflow=0.19 cfs 0.013 af  
Discarded=0.02 cfs 0.013 af Primary=0.00 cfs 0.000 af Outflow=0.02 cfs 0.013 af

**Total Runoff Area = 2.633 ac Runoff Volume = 0.481 af Average Runoff Depth = 2.19"**  
**47.40% Pervious = 1.248 ac 52.60% Impervious = 1.385 ac**



Time span=0.00-36.00 hrs, dt=0.01 hrs, 3601 points

Runoff by SCS TR-20 method, UH=SCS

Reach routing by Stor-Ind method - Pond routing by Stor-Ind method

<b>Subcatchment 1S: Existing SC1</b>	Runoff Area=5,387 sf 11.03% Impervious Runoff Depth=3.12" Tc=5.0 min CN=52 Runoff=0.45 cfs 0.032 af
<b>Subcatchment 2S: Existing SC2</b>	Runoff Area=51,964 sf 61.79% Impervious Runoff Depth=6.32" Tc=5.0 min CN=78 Runoff=9.02 cfs 0.628 af
<b>Subcatchment 11S: Proposed SC11</b>	Runoff Area=4,772 sf 0.00% Impervious Runoff Depth=2.64" Tc=5.0 min CN=48 Runoff=0.33 cfs 0.024 af
<b>Subcatchment 12S: Proposed SC12</b>	Runoff Area=4,456 sf 0.00% Impervious Runoff Depth=1.60" Tc=5.0 min CN=39 Runoff=0.15 cfs 0.014 af
<b>Subcatchment 13S: Proposed SC13</b>	Runoff Area=29,500 sf 52.13% Impervious Runoff Depth=5.33" Tc=5.0 min CN=70 Runoff=4.39 cfs 0.301 af
<b>Subcatchment 14S: To Infiltration</b>	Runoff Area=8,546 sf 80.10% Impervious Runoff Depth=7.30" Tc=5.0 min CN=86 Runoff=1.66 cfs 0.119 af
<b>Subcatchment 15S: Subcatchment 15</b>	Runoff Area=3,359 sf 53.59% Impervious Runoff Depth=5.46" Tc=5.0 min CN=71 Runoff=0.51 cfs 0.035 af
<b>Subcatchment 16S: Subcatchment 16</b>	Runoff Area=3,359 sf 53.59% Impervious Runoff Depth=5.46" Tc=5.0 min CN=71 Runoff=0.51 cfs 0.035 af
<b>Subcatchment 17S: Subcatchment 17</b>	Runoff Area=3,359 sf 53.59% Impervious Runoff Depth=5.46" Tc=5.0 min CN=71 Runoff=0.51 cfs 0.035 af
<b>Reach 2R: Design Point</b>	Inflow=8.04 cfs 0.625 af Outflow=8.04 cfs 0.625 af
<b>Reach 11R: Design Point</b>	Inflow=0.39 cfs 0.038 af Outflow=0.39 cfs 0.038 af
<b>Reach 12R: Design Point</b>	Inflow=4.94 cfs 0.278 af Outflow=4.94 cfs 0.278 af
<b>Pond 1P: Existing CB</b>	Peak Elev=37.47' Storage=1,574 cf Inflow=9.02 cfs 0.628 af Outflow=8.04 cfs 0.625 af
<b>Pond 11P: IFS 1</b>	Peak Elev=38.23' Storage=2,796 cf Inflow=4.39 cfs 0.301 af Discarded=0.05 cfs 0.065 af Primary=3.42 cfs 0.211 af Outflow=3.47 cfs 0.276 af
<b>Pond 12P: IFS 2</b>	Peak Elev=39.72' Storage=1,418 cf Inflow=1.66 cfs 0.119 af Discarded=0.04 cfs 0.072 af Primary=1.39 cfs 0.047 af Outflow=1.43 cfs 0.119 af
<b>Pond 15P: DW 1&amp;2</b>	Peak Elev=39.97' Storage=599 cf Inflow=0.51 cfs 0.035 af Discarded=0.02 cfs 0.028 af Primary=0.13 cfs 0.007 af Outflow=0.15 cfs 0.035 af

**126-128 High St.**

*Type III 24-hr Rainfall=9.00"*

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**Pond 16P: DW 3&4**

Peak Elev=39.97' Storage=599 cf Inflow=0.51 cfs 0.035 af  
Discarded=0.02 cfs 0.028 af Primary=0.13 cfs 0.007 af Outflow=0.15 cfs 0.035 af

**Pond 17P: DW 5&6**

Peak Elev=39.96' Storage=597 cf Inflow=0.51 cfs 0.035 af  
Discarded=0.02 cfs 0.028 af Primary=0.14 cfs 0.007 af Outflow=0.15 cfs 0.035 af

**Total Runoff Area = 2.633 ac Runoff Volume = 1.224 af Average Runoff Depth = 5.58"**  
**47.40% Pervious = 1.248 ac 52.60% Impervious = 1.385 ac**

**126-128 High St.**

Type III 24-hr Rainfall=4.90"

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**Summary for Subcatchment 1S: Existing SC1**

Runoff = 0.08 cfs @ 12.10 hrs, Volume= 0.008 af, Depth= 0.76"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 0.00-36.00 hrs, dt= 0.01 hrs  
Type III 24-hr Rainfall=4.90"

Area (sf)	CN	Description
830	35	Brush, Fair, HSG A
594	98	Roofs, HSG A
3,963	49	50-75% Grass cover, Fair, HSG A
5,387	52	Weighted Average
4,793		88.97% Pervious Area
594		11.03% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
5.0					Direct Entry, Direct Entry

**Summary for Subcatchment 2S: Existing SC2**

Runoff = 3.81 cfs @ 12.08 hrs, Volume= 0.261 af, Depth= 2.63"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 0.00-36.00 hrs, dt= 0.01 hrs  
Type III 24-hr Rainfall=4.90"

Area (sf)	CN	Description
26,412	98	Paved parking, HSG A
5,698	98	Roofs, HSG A
15,056	49	50-75% Grass cover, Fair, HSG A
4,798	35	Brush, Fair, HSG A
51,964	78	Weighted Average
19,854		38.21% Pervious Area
32,110		61.79% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
5.0					Direct Entry, Direct Entry

**Summary for Subcatchment 11S: Proposed SC11**

Runoff = 0.04 cfs @ 12.12 hrs, Volume= 0.005 af, Depth= 0.55"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 0.00-36.00 hrs, dt= 0.01 hrs  
Type III 24-hr Rainfall=4.90"

**126-128 High St.**

Type III 24-hr Rainfall=4.90"

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Area (sf)	CN	Description
296	35	Brush, Fair, HSG A
4,476	49	50-75% Grass cover, Fair, HSG A
4,772	48	Weighted Average
4,772		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
5.0					Direct Entry, Direct Entry

**Summary for Subcatchment 12S: Proposed SC12**

Runoff = 0.00 cfs @ 12.48 hrs, Volume= 0.002 af, Depth= 0.18"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 0.00-36.00 hrs, dt= 0.01 hrs  
Type III 24-hr Rainfall=4.90"

Area (sf)	CN	Description
4,456	39	>75% Grass cover, Good, HSG A
4,456		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
5.0					Direct Entry, Direct Entry

**Summary for Subcatchment 13S: Proposed SC13**

Runoff = 1.58 cfs @ 12.08 hrs, Volume= 0.111 af, Depth= 1.96"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 0.00-36.00 hrs, dt= 0.01 hrs  
Type III 24-hr Rainfall=4.90"

Area (sf)	CN	Description
14,121	39	>75% Grass cover, Good, HSG A
9,295	98	Paved parking, HSG A
6,084	98	Roofs, HSG A
29,500	70	Weighted Average
14,121		47.87% Pervious Area
15,379		52.13% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
5.0					Direct Entry, Direct Entry

**Summary for Subcatchment 14S: To Infiltration**

Runoff = 0.79 cfs @ 12.07 hrs, Volume= 0.055 af, Depth= 3.37"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 0.00-36.00 hrs, dt= 0.01 hrs  
Type III 24-hr Rainfall=4.90"

Area (sf)	CN	Description
6,845	98	Paved parking, HSG A
1,701	39	>75% Grass cover, Good, HSG A
8,546	86	Weighted Average
1,701		19.90% Pervious Area
6,845		80.10% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
5.0					Direct Entry, Direct Entry

**Summary for Subcatchment 15S: Subcatchment 15**

Runoff = 0.19 cfs @ 12.08 hrs, Volume= 0.013 af, Depth= 2.04"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 0.00-36.00 hrs, dt= 0.01 hrs  
Type III 24-hr Rainfall=4.90"

Area (sf)	CN	Description
1,800	98	Roofs, HSG A
1,559	39	>75% Grass cover, Good, HSG A
3,359	71	Weighted Average
1,559		46.41% Pervious Area
1,800		53.59% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
5.0					Direct Entry, Direct Entry

**Summary for Subcatchment 16S: Subcatchment 16**

Runoff = 0.19 cfs @ 12.08 hrs, Volume= 0.013 af, Depth= 2.04"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 0.00-36.00 hrs, dt= 0.01 hrs  
Type III 24-hr Rainfall=4.90"

Area (sf)	CN	Description
1,800	98	Roofs, HSG A
1,559	39	>75% Grass cover, Good, HSG A
3,359	71	Weighted Average
1,559		46.41% Pervious Area
1,800		53.59% Impervious Area

**126-128 High St.**

Type III 24-hr Rainfall=4.90"

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Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
5.0					Direct Entry, Direct Entry

**Summary for Subcatchment 17S: Subcatchment 17**

Runoff = 0.19 cfs @ 12.08 hrs, Volume= 0.013 af, Depth= 2.04"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 0.00-36.00 hrs, dt= 0.01 hrs  
Type III 24-hr Rainfall=4.90"

Area (sf)	CN	Description
1,800	98	Roofs, HSG A
1,559	39	>75% Grass cover, Good, HSG A
3,359	71	Weighted Average
1,559		46.41% Pervious Area
1,800		53.59% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
5.0					Direct Entry, Direct Entry

**Summary for Reach 2R: Design Point**

[40] Hint: Not Described (Outflow=Inflow)

Inflow Area = 1.193 ac, 61.79% Impervious, Inflow Depth = 2.59"  
 Inflow = 3.40 cfs @ 12.11 hrs, Volume= 0.257 af  
 Outflow = 3.40 cfs @ 12.11 hrs, Volume= 0.257 af, Atten= 0%, Lag= 0.0 min

Routing by Stor-Ind method, Time Span= 0.00-36.00 hrs, dt= 0.01 hrs

**Summary for Reach 11R: Design Point**

[40] Hint: Not Described (Outflow=Inflow)

Inflow Area = 0.264 ac, 31.33% Impervious, Inflow Depth = 0.23"  
 Inflow = 0.04 cfs @ 12.12 hrs, Volume= 0.005 af  
 Outflow = 0.04 cfs @ 12.12 hrs, Volume= 0.005 af, Atten= 0%, Lag= 0.0 min

Routing by Stor-Ind method, Time Span= 0.00-36.00 hrs, dt= 0.01 hrs

**Summary for Reach 12R: Design Point**

[40] Hint: Not Described (Outflow=Inflow)

Inflow Area = 1.053 ac, 52.38% Impervious, Inflow Depth = 0.37"  
 Inflow = 0.42 cfs @ 12.45 hrs, Volume= 0.032 af  
 Outflow = 0.42 cfs @ 12.45 hrs, Volume= 0.032 af, Atten= 0%, Lag= 0.0 min

**126-128 High St.**

Type III 24-hr Rainfall=4.90"

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Routing by Stor-Ind method, Time Span= 0.00-36.00 hrs, dt= 0.01 hrs

**Summary for Pond 1P: Existing CB**

Inflow Area = 1.193 ac, 61.79% Impervious, Inflow Depth = 2.63"  
 Inflow = 3.81 cfs @ 12.08 hrs, Volume= 0.261 af  
 Outflow = 3.40 cfs @ 12.11 hrs, Volume= 0.257 af, Atten= 11%, Lag= 2.3 min  
 Primary = 3.40 cfs @ 12.11 hrs, Volume= 0.257 af

Routing by Stor-Ind method, Time Span= 0.00-36.00 hrs, dt= 0.01 hrs  
 Peak Elev= 37.31' @ 12.11 hrs Surf.Area= 4,119 sf Storage= 782 cf

Plug-Flow detention time= 16.7 min calculated for 0.257 af (99% of inflow)  
 Center-of-Mass det. time= 8.3 min ( 835.4 - 827.1 )

Volume	Invert	Avail.Storage	Storage Description
#1	36.80'	1,743 cf	<b>Custom Stage Data (Prismatic)</b> Listed below (Recalc)
Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
36.80	0	0	0
37.00	521	52	52
37.50	6,244	1,691	1,743

Device	Routing	Invert	Outlet Devices
#1	Primary	37.10'	<b>10.0' long Sharp-Crested Rectangular Weir</b> 2 End Contraction(s) 0.5' Crest Height

**Primary OutFlow** Max=3.40 cfs @ 12.11 hrs HW=37.31' (Free Discharge)  
 ↳ **1=Sharp-Crested Rectangular Weir** (Weir Controls 3.40 cfs @ 1.59 fps)

**Summary for Pond 11P: IFS 1**

Inflow Area = 0.677 ac, 52.13% Impervious, Inflow Depth = 1.96"  
 Inflow = 1.58 cfs @ 12.08 hrs, Volume= 0.111 af  
 Outflow = 0.46 cfs @ 12.45 hrs, Volume= 0.086 af, Atten= 71%, Lag= 22.4 min  
 Discarded = 0.05 cfs @ 12.37 hrs, Volume= 0.056 af  
 Primary = 0.41 cfs @ 12.45 hrs, Volume= 0.031 af

Routing by Stor-Ind method, Time Span= 0.00-36.00 hrs, dt= 0.01 hrs / 2  
 Peak Elev= 37.63' @ 12.45 hrs Surf.Area= 2,147 sf Storage= 2,058 cf

Plug-Flow detention time= 369.1 min calculated for 0.086 af (78% of inflow)  
 Center-of-Mass det. time= 283.9 min ( 1,131.7 - 847.8 )

**126-128 High St.**

Type III 24-hr Rainfall=4.90"

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Volume	Invert	Avail.Storage	Storage Description
#1	33.52'	1,278 cf	<b>18.17'W x 91.50'L x 2.33'H Prismaoid</b> 3,874 cf Overall - 678 cf Embedded = 3,196 cf x 40.0% Voids
#2	34.02'	678 cf	<b>StormTech SC-310</b> x 46 Inside #1 Effective Size= 28.9"W x 16.0"H => 2.07 sf x 7.12'L = 14.7 cf Overall Size= 34.0"W x 16.0"H x 7.56'L with 0.44' Overlap
#3	37.00'	5,661 cf	<b>Custom Stage Data (Conic)</b> Listed below (Recalc)
		7,617 cf	Total Available Storage

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)	Wet.Area (sq-ft)
37.00	0	0	0	0
38.00	1,233	411	411	1,235
39.00	10,857	5,250	5,661	10,862

Device	Routing	Invert	Outlet Devices
#1	Primary	37.32'	<b>12.0" Round Culvert</b> L= 60.0' CPP, projecting, no headwall, Ke= 0.900 Inlet / Outlet Invert= 37.32' / 37.00' S= 0.0053 ' Cc= 0.900 n= 0.013 Corrugated PE, smooth interior
#2	Primary	37.42'	<b>12.0" Round Culvert</b> L= 75.0' CPP, projecting, no headwall, Ke= 0.900 Inlet / Outlet Invert= 37.42' / 37.00' S= 0.0056 ' Cc= 0.900 n= 0.013
#3	Discarded	33.52'	<b>2.410 in/hr Exfiltration over Wetted area from 33.52' - 37.50'</b> Excluded Wetted area = 1,663 sf

**Discarded OutFlow** Max=0.05 cfs @ 12.37 hrs HW=37.53' (Free Discharge)

↳ **3=Exfiltration** (Exfiltration Controls 0.05 cfs)

**Primary OutFlow** Max=0.41 cfs @ 12.45 hrs HW=37.63' (Free Discharge)

↳ **1=Culvert** (Barrel Controls 0.28 cfs @ 2.04 fps)

↳ **2=Culvert** (Barrel Controls 0.13 cfs @ 1.71 fps)

**Summary for Pond 12P: IFS 2**

Inflow Area = 0.196 ac, 80.10% Impervious, Inflow Depth = 3.37"  
 Inflow = 0.79 cfs @ 12.07 hrs, Volume= 0.055 af  
 Outflow = 0.04 cfs @ 11.08 hrs, Volume= 0.055 af, Atten= 95%, Lag= 0.0 min  
 Discarded = 0.04 cfs @ 11.08 hrs, Volume= 0.055 af  
 Primary = 0.00 cfs @ 0.00 hrs, Volume= 0.000 af

Routing by Stor-Ind method, Time Span= 0.00-36.00 hrs, dt= 0.01 hrs / 3

Peak Elev= 38.93' @ 14.39 hrs Surf.Area= 715 sf Storage= 1,150 cf

Plug-Flow detention time= 268.4 min calculated for 0.055 af (100% of inflow)

Center-of-Mass det. time= 268.3 min ( 1,072.6 - 804.3 )



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Type III 24-hr Rainfall=4.90"

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Volume	Invert	Avail.Storage	Storage Description
#1	36.50'	670 cf	<b>11.00'W x 65.00'L x 3.50'H Prismaoid</b> 2,503 cf Overall - 827 cf Embedded = 1,676 cf x 40.0% Voids
#2	37.00'	827 cf	<b>StormTech SC-740</b> x 18 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
		1,497 cf	Total Available Storage

Device	Routing	Invert	Outlet Devices
#1	Primary	39.00'	<b>12.0" Round Culvert</b> L= 18.0' CPP, projecting, no headwall, Ke= 0.900 Inlet / Outlet Invert= 39.00' / 37.25' S= 0.0972 ' / Cc= 0.900 n= 0.013
#2	Discarded	36.50'	<b>2.410 in/hr Exfiltration over Surface area</b>

**Discarded OutFlow** Max=0.04 cfs @ 11.08 hrs HW=36.54' (Free Discharge)  
 ↳ **2=Exfiltration** (Exfiltration Controls 0.04 cfs)

**Primary OutFlow** Max=0.00 cfs @ 0.00 hrs HW=36.50' (Free Discharge)  
 ↳ **1=Culvert** ( Controls 0.00 cfs)

**Summary for Pond 15P: DW 1&2**

Inflow Area = 0.077 ac, 53.59% Impervious, Inflow Depth = 2.04"  
 Inflow = 0.19 cfs @ 12.08 hrs, Volume= 0.013 af  
 Outflow = 0.02 cfs @ 11.70 hrs, Volume= 0.013 af, Atten= 91%, Lag= 0.0 min  
 Discarded = 0.02 cfs @ 11.70 hrs, Volume= 0.013 af  
 Primary = 0.00 cfs @ 0.00 hrs, Volume= 0.000 af

Routing by Stor-Ind method, Time Span= 0.00-36.00 hrs, dt= 0.01 hrs / 3  
 Peak Elev= 37.70' @ 13.23 hrs Surf.Area= 313 sf Storage= 215 cf

Plug-Flow detention time= 111.9 min calculated for 0.013 af (100% of inflow)  
 Center-of-Mass det. time= 111.9 min ( 957.1 - 845.2 )

Volume	Invert	Avail.Storage	Storage Description
#1	36.50'	327 cf	<b>6.25'W x 50.00'L x 3.50'H Prismaoid</b> 1,094 cf Overall - 276 cf Embedded = 818 cf x 40.0% Voids
#2	37.00'	276 cf	<b>StormTech SC-740</b> x 6 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
		603 cf	Total Available Storage

Device	Routing	Invert	Outlet Devices
#1	Primary	39.70'	<b>6.0" Round Culvert</b> L= 5.0' CPP, projecting, no headwall, Ke= 0.900 Inlet / Outlet Invert= 39.70' / 39.65' S= 0.0100 ' / Cc= 0.900 n= 0.013
#2	Discarded	36.50'	<b>2.410 in/hr Exfiltration over Surface area</b>

**Discarded OutFlow** Max=0.02 cfs @ 11.70 hrs HW=36.54' (Free Discharge)  
 ↳2=Exfiltration (Exfiltration Controls 0.02 cfs)

**Primary OutFlow** Max=0.00 cfs @ 0.00 hrs HW=36.50' (Free Discharge)  
 ↳1=Culvert ( Controls 0.00 cfs)

**Summary for Pond 16P: DW 3&4**

Inflow Area = 0.077 ac, 53.59% Impervious, Inflow Depth = 2.04"  
 Inflow = 0.19 cfs @ 12.08 hrs, Volume= 0.013 af  
 Outflow = 0.02 cfs @ 11.70 hrs, Volume= 0.013 af, Atten= 91%, Lag= 0.0 min  
 Discarded = 0.02 cfs @ 11.70 hrs, Volume= 0.013 af  
 Primary = 0.00 cfs @ 0.00 hrs, Volume= 0.000 af

Routing by Stor-Ind method, Time Span= 0.00-36.00 hrs, dt= 0.01 hrs  
 Peak Elev= 37.70' @ 13.23 hrs Surf.Area= 313 sf Storage= 215 cf

Plug-Flow detention time= 111.9 min calculated for 0.013 af (100% of inflow)  
 Center-of-Mass det. time= 111.9 min ( 957.1 - 845.2 )

Volume	Invert	Avail.Storage	Storage Description
#1	36.50'	327 cf	<b>6.25'W x 50.00'L x 3.50'H Prismatic</b> 1,094 cf Overall - 276 cf Embedded = 818 cf x 40.0% Voids
#2	37.00'	276 cf	<b>StormTech SC-740</b> x 6 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
		603 cf	Total Available Storage

Device	Routing	Invert	Outlet Devices
#1	Primary	39.70'	<b>6.0" Round Culvert</b> L= 5.0' CPP, projecting, no headwall, Ke= 0.900 Inlet / Outlet Invert= 39.70' / 39.65' S= 0.0100 '/' Cc= 0.900 n= 0.013
#2	Discarded	36.50'	<b>2.410 in/hr Exfiltration over Surface area</b>

**Discarded OutFlow** Max=0.02 cfs @ 11.70 hrs HW=36.54' (Free Discharge)  
 ↳2=Exfiltration (Exfiltration Controls 0.02 cfs)

**Primary OutFlow** Max=0.00 cfs @ 0.00 hrs HW=36.50' (Free Discharge)  
 ↳1=Culvert ( Controls 0.00 cfs)

**Summary for Pond 17P: DW 5&6**

Inflow Area = 0.077 ac, 53.59% Impervious, Inflow Depth = 2.04"  
 Inflow = 0.19 cfs @ 12.08 hrs, Volume= 0.013 af  
 Outflow = 0.02 cfs @ 11.70 hrs, Volume= 0.013 af, Atten= 91%, Lag= 0.0 min  
 Discarded = 0.02 cfs @ 11.70 hrs, Volume= 0.013 af  
 Primary = 0.00 cfs @ 0.00 hrs, Volume= 0.000 af

Routing by Stor-Ind method, Time Span= 0.00-36.00 hrs, dt= 0.01 hrs / 3

**126-128 High St.**

Type III 24-hr Rainfall=4.90"

Prepared by H. L. Graham Associates, Inc.

Printed 5/19/2021

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Peak Elev= 37.70' @ 13.23 hrs Surf.Area= 313 sf Storage= 215 cf

Plug-Flow detention time= 111.9 min calculated for 0.013 af (100% of inflow)

Center-of-Mass det. time= 111.9 min ( 957.1 - 845.2 )

Volume	Invert	Avail.Storage	Storage Description
#1	36.50'	327 cf	<b>6.25'W x 50.00'L x 3.50'H Prismaoid</b> 1,094 cf Overall - 276 cf Embedded = 818 cf x 40.0% Voids
#2	37.00'	276 cf	<b>StormTech SC-740</b> x 6 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
		603 cf	Total Available Storage

Device	Routing	Invert	Outlet Devices
#1	Primary	39.70'	<b>6.0" Round Culvert</b> L= 150.0' CPP, projecting, no headwall, Ke= 0.900 Inlet / Outlet Invert= 39.70' / 37.35' S= 0.0157 '/ Cc= 0.900 n= 0.013
#2	Discarded	36.50'	<b>2.410 in/hr Exfiltration over Surface area</b>

**Discarded OutFlow** Max=0.02 cfs @ 11.70 hrs HW=36.54' (Free Discharge)  
 ↳ **2=Exfiltration** (Exfiltration Controls 0.02 cfs)

**Primary OutFlow** Max=0.00 cfs @ 0.00 hrs HW=36.50' (Free Discharge)  
 ↳ **1=Culvert** ( Controls 0.00 cfs)