PRELIMINARY
STORMWATER CALCULATIONS

Prepared For:

Woodscape Glen, LLC

4985 Battlecreek Rd SE, Suite 200

Salem, OR 97302

Project Location:

Woodscape Green North Subdivision

5205 Battle Creek Rd SE

Salem, OR 97306

Permit Number:

Prepared By:

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January 2022

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PROJECT OVERVIEW & DESCRIPTION

1.1 SIZE & LOCATION OF PROJECT

The proposed multifamily development project sits on 15-acres located at 5205 Battle Creek Rd SE in Salem, Oregon. Refer to the Civil Drawings for a site map of the project area.

1.2 BRIEF DESCRIPTION OF PROJECT SCOPE AND PROPOSED IMPROVEMENTS

The project scope is to subdivide the property into five lots and develop Lots 1 and 2 for multi-family housing consisting of several apartment buildings and community space. The project also includes public improvements along approximately 1,900 lineal feet of Battle Creek Rd SE. The project includes site preparation, construction of the facilities, and associated improvements. Lot 3 will consist of a vegetated swale. Lots 4 and 5 will be developed in the future.

1.3 DESCRIPTION OF SIZE OF WATERSHED DRAINING TO THE SITE

A drainage area of 15.55 acres from the project site drains to the proposed stormwater facilities including new public streets, Battle Creek Rd frontage, and future development from Lots 4 and 5 which are assumed to be developed with 65% impervious area. A small area (0.40 acres) of Salal Street and Foxhaven Drive will drain from the site undetained and untreated in addition to some of the new/replaced impervious improvements to Battle Creek Road (0.39 acres). Overdetention will be provided by the proposed stormwater facilities such that the overall site runoff does not exceed pre-developed conditions.

The project site also receives offsite runoff from approximately 44.73 acres of residential development from the south and west that will be conveyed through the proposed stormwater facilities for treatment. The existing stormwater facilities managing the offsite runoff were designed prior to the establishment of stormwater quality treatment standards in the City of Salem. Therefore, the 0.79 acres of untreated new/replaced impervious runoff from Salal Street, Foxhaven Drive, and the Battle Creek Road improvements are more than offset by the treatment of offsite runoff. Refer to the Basin Maps in Appendix A and the Civil Drawings for more details.

1.4 DESCRIPTION OF THE EXISTING SITE CONDITIONS, CONSTRAINTS, TREES & NATIVE VEGETATION, SENSITIVE AREAS & WATERWAYS

The existing site is predominately covered in grass with mature trees throughout. Refer to the Civil Drawings for the tree preservation plan. No other existing sensitive areas, waterways, etc. exist on-site.

1.5 SUMMARY OF GREEN STORMWATER INFRASTRUCTURE

Per Appendix 4E of the City of Salem (COS) Design Standards, a large project will be considered to have met the maximum extent feasible (MEF) requirement when the stormwater runoff from the total amount of new plus replaced impervious surfaces flows into an area set aside for GSI that is at least 10% of the total area of the new plus replaced impervious surfaces or at least 80% of all impervious area must be treated by GSI. The design implements GSI for 92% of the new plus replaced impervious area (9.65 acres of total 10.45 acres) and therefore meets MEF for GSI. See the Civil Drawings for more details. The project also provides treatment GSI for the 44.73 acres of developed offsite runoff draining to the site. The offsite runoff is currently managed by existing detention basins constructed in the 90's and early 2000's prior to the adoption of water quality treatment standards in the City of Salem.

1.6 REGULATORY PERMITS REQUIRED

A 1200-C permit from DEQ will be required since more than one acre is disturbed by the project. City of Salem permits are required. No other permits are required for this project.

1.7 100-YEAR EMERGENCY STORM ESCAPE ROUTES

Please refer to the Onsite Basin Map in Appendix A for emergency overflow routes.

METHODOLOGY

2.1 DEPTH TO GROUNDWATER

Nearby well logs indicate groundwater levels between 37 and 41 feet below ground surface (see Appendix E). Per the proposed stormwater design, drain rock in the stormwater facilities is designed to 6-feet below ground surface, conforming to the COS Design Standards requirement of 3 feet of separation from groundwater.

2.2 MAXIMUM INFILTRATION AND VEGETATIVE TREATMENT

Measured infiltration rates onsite ranged from 1.5 to 2.75 inches per hour per the Geotechnical Investigation. Design infiltration rates for each stormwater infiltration facility were determined based on the adjacent measured infiltration rate. Where measured infiltration rates exceeded 2.0 inches/hour, a maximum design soil infiltration rate of 2.0 inches/hour was used for calculations because the design infiltration rate of the GSI growing media is limited to 2.0 inches/hour per the COS Design standards. See Section 3 of this Report for the design infiltration rates used for each facility.

The proposed stormwater design will treat 92% of the new and replaced impervious surface with a vegetated swale, therefore GSI has been implemented to the maximum extent feasible.

2.3 SOIL INFORMATION

The pre-developed project site contains approximately 50% hydrologic soil group C soils and 50% group B soils. Refer to the NRCS Soils Report in Appendix B for more details.

2.4 HAZARDOUS MATERIAL

The owner is not aware of any hazardous material contamination onsite.

3.1 METHODS & SOFTWARE USED

HydroCAD modeling software was used to size the stormwater facilities. The Santa Barbara Unit Hydrograph Type 1A storm was used to model the required design storms. Per the City of Salem (COS) Design Standards the design storms used were the 1.38 inch, 24-hour (water quality storm), half the 2-year, 24-hour, the 10-year, 24-hour, the 25-year, 24-hour, and the 100-year, 24-hour storm events.

Table 1 | City of Salem 24-hour Design Storms

	24-Hour Rainfall Depths for Salem, OR						
Recurrence Interval, Years	WQ	2	5	10	25	50	100
24-Hour Depths, Inches	1.38	2.2	2.7	3.2	3.6	4.1	4.4

Source: City of Salem Administrative Rules Chapter 109 – Division 004 Appendix D

3.2 CURVE NUMBER AND TIME OF CONCENTRATION CALCULATIONS

Per the COS Design Standards, the pre-developed site is considered to be covered in a combination of woods and good-grass, which corresponds to a pre-developed curve number of 58 and 72 for hydrologic soil group B and C-rated soils, respectively.

The developed impervious areas were assigned a curve number of 98 which corresponds to paved/parking and roof areas. The pervious areas were assigned curve numbers of 61 and 74 which corresponds to open space with B and C-rated soils, respectively, per the City of Salem Design Standards.

The residential lot areas were assigned curve numbers of 85 and 90 which corresponds to 1/8 acre lots with B and C-rated soils, respectively.

Time of concentration (Tc) for the pre-developed conditions was calculated using sheet and shallow concentrated flow equations to be 55.8 minutes. See the Pre-Developed Basin Map in Appendix A for the flow path used and refer to the HydroCAD Summaries in Appendix C for calculations. A minimum time of concentration of 5 minutes is applied to the developed basins due to the minimum time-step used by the HydroCAD modeling software.

3.3 TREATMENT & FLOW CONTROL SIZING CALCULATIONS

The project site was analyzed as one basin for pre-developed conditions and two basins for developed stormwater runoff calculations. Five offsite basins also drain to the site. General basin characteristics of pre-developed and developed conditions and offsite basins are listed in Table 2 below. For more detail refer to the Basin Maps in Appendix A and the Civil Drawings.

Table 2 | General Basin Characteristics

Basin ID	Source (Roof/ Road/ Other)	Impervious Area (ac)	Pervious Area (ac)	Design Storms (cfs)				CN[1]
				½ 2 Yr	10 Yr	25 Yr	100 Yr	
Predeveloped Basin								
PD[2]	Native	-	16.34	0.12	0.63	0.90	1.73	76
Onsite Developed Basins								
Basin 1	Paved/ Roof/ Landscape	9.65	5.90	2.22	7.69	8.95	11.56	86
Basin 2A[3]	Paved	0.40	0	0.09	0.30	0.34	0.41	98
Basin 2B[3]	Paved	0.39	0	0.09	0.29	0.33	0.40	98
Total Developed		10.45	5.90	2.40	8.28	9.62	12.37	
Offsite Basins								
Basin 3	Paved/ Roof/ Landscape	3.23	1.22	0.71	2.53	2.91	3.69	92
Basin 4	Paved/ Roof/ Landscape	18.73	6.93	4.31	15.00	17.26	21.87	91
Basin 5	Native	0	10.79	0.03	0.83	1.17	1.95	72
Basin 6	Road/ Landscape	1.60	0.24	0.37	1.24	1.41	1.76	95
Basin 7	Paved/ Roof/ Landscape	1.5	0.49	0.37	1.22	1.40	1.76	92
Total Offsite		25.06	19.67	5.79	20.82	24.15	31.03	

[1] Area-weighted curve number (CN).
[2] PD = pre-developed site conditions (i.e., pre-developed release rates)
[3] Basins 2A and 2B are undetained developed drainage basins.

Basin 2B is undetained runoff from Battle Creek Rd and represents the undetained new/replaced impervious improvements in Battle Creek Rd (0.55 acres) in excess of the detained existing impervious area of Battle Creek Rd proposed for overlay (0.16 acres).

Runoff from the overlay area is not required to be treated per City Standards. The difference of 0.39 acres is used for the Basin 2B undetained area.

The following subsections provide summaries of the structures used to detain and treat stormwater runoff for the Onsite Developed Basins and Offsite Basins followed by an overall flow control summary for the project site and offsite drainage.

Onsite Developed Basins

A vegetated swale is proposed to provide water quality treatment for runoff from the onsite developed Basin 1 in addition to secondary treatment for the offsite residential development runoff draining to the project site. The swale is downstream of a proposed dry detention basin. Both the swale and detention basin are located west of the intersection of Foxhaven Dr and Battle Creek Rd. Refer to the Onsite Basin Map in Appendix C for details.

Table 3 compares the designed and allowable swale parameters during the water quality and conveyance storms. Per the Design Standards, a Manning's "n" of 0.25 was used to design treatment of the water quality storm. Refer to the Civil Drawings and HydroCAD calculations for more details.

Table 3 | Vegetated Swale Design

COS Design Standards		Foxhaven Swale
Criteria	Allowable	
Manning's n – Water Quality	0.25	0.25
Maximum Water Quality Flow Depth (ft)	0.33	0.33
Maximum Water Quality Flow Velocity (fps)	0.90	0.22
Min hydraulic Residence Time (min)	9	9.1
Manning's n – Conveyance (25-yr)	0.03	0.03
Max. Conveyance Flow Depth (ft)	1.0	0.43
Max. Conveyance Flow Velocity (fps)	3.0	2.15
Min Length (ft)	100	120
Side Slope (ft:ft)	3:1	3:1
Longitudinal Slope (%)	-	0.7
Bottom Width (ft)	-	8

The design meets or exceeds all the allowed values in Section 4.4 of the COS Design Standards.

A dry detention basin (Foxhaven Detention Basin) with drain rock for infiltration is proposed to control stormwater for the onsite and offsite runoff. Offsite runoff is also managed upstream by existing detention facilities prior to discharging to the project site. Discussion of offsite runoff management is provided in greater detail later in this Report. Stormwater release from the Foxhaven Detention Basin is controlled by a flow-control manhole. See Table 4 below for a summary of facility outlet sizing and release rates. The 25-year and 100-year storm is released by an overflow weir within the flow-control manhole. Refer to the Onsite Basin Map in Appendix A and the Civil Drawings for more details.

Table 4 | Foxhaven Detention Basin - Outlet Sizing and Release Rates

Outlet ID/ Storm Event	Orifice Size (in)	Orifice Elevation (ft)	Release Rate (cfs)	Peak WSE[1] (ft)	Emergency Overflow Elevation (ft)	Infiltration Rate (in/hr)
½ - 2 Year	4.6	369.0	0.40	369.53	374.0	2.0
WQ Event	-	-	0.64	370.33	374.0	2.0
10 Year	11.4	370.4	6.32	372.76	374.0	2.0
25 Year	60.0[2]	372.9	8.67	373.13	374.0	2.0
100 Year	-	-	16.72	373.57	374.0	2.0

[1] WSE = water surface elevation
[2] 25-year and 100-year storms controlled by 60-inch wide overflow weir.

A summary of detention basin geometry and required drain rock is provided in Table 5 below. Please note the Foxhaven Detention Basin requires drain rock with area equivalent to the 370-foot elevation contour to detain and control the design storms in conformance with COS standards.

Table 5 | Foxhaven Detention Basin w/ Drain Rock - Sizing Summary

Facility ID	Facility Elevations[1] (ft)		Facility Surface Area[1] (sf)		Required Drain Rock Surface Area (sf)	Depth of Drain Rock (in)
	Top	Bottom	Top	Bottom		
Foxhaven	374.0	369.0	12,330	6,740	7,930	21

[1] The top facility elevation and corresponding square footage area refer to the top of the 3:1 side slope. The bottom elevation and corresponding square footage area refer to the bottom of the 3:1 side slope.

Offsite Basins

The offsite drainage basins flow to several existing dry detention basins for stormwater management before discharging to the project site as described below. The detention basins were constructed in the 90's and early 2000's prior to the establishment of stormwater quality treatment standards in the City of Salem. Design information for the existing detention basins were collected from As-Built drawings on-file at the City and the topographic survey.

An existing dry detention basin at the terminus of Teal Dr (Teal Detention) on the subject property manages runoff for offsite Basin 3. This detention basin will be removed and Basin 3 runoff will drain to the proposed Foxhaven Detention Basin.

An existing dry detention basin at the northwest and northeast corners of Baxter Rd and Salal St (Baxter Detention) manages runoff from offsite Basins 4-7 and is owned by the City of Salem as part of the Woodscape Linear Park. The detention basin is split into an east half and west half by Salal St but is controlled by a single flow-control structure. It is proposed to reconstruct the detention basin at Baxter Rd into a combination rain garden for detention and water quality treatment.

An existing dry detention basin at the northwest corner of Vintage Ave and Monterey Dr (Vintage Detention) manages runoff from offsite Basin 7. The detention basin then discharges to Basin 4 where it passes through the existing Baxter Detention Basin.

Basin 5 is currently undeveloped. When Basin 5 develops in the future it is assumed to provide onsite treatment and detention to match pre-developed peak flows per COS design standards. Pre-developed runoff conditions for Basin 5 are analyzed and routed to the existing Baxter Detention Basin.

Table 6 below provides a summary of the existing detention basin designs. Refer to the Offsite Basin Map in Appendix C and the Civil Drawings for additional information.

Table 6 | Existing Detention Facilities Sizing

Detention Facility ID	Facility Elev.[2] (ft)		Facility Surface Area[1] (sf)		Orifice Size (in)	Orifice Elev. (ft)	Overflow Elev. (ft)
	Top	Bottom	Top	Bottom			
Teal	388.0	386.0	3,920	790	5.9	383.75	386.95
Baxter West/East	406.0	401.0	14,300/ 10,140[2]	2,250 / 1,820[2]	8.3	398.29	405.02
Vintage	436.0	432.5	3,720	1,160	3.7	431.31	435.0

[1] The top facility elevation and corresponding square footage area refer to the top of the side slope. The bottom elevation and corresponding square footage area refer to the bottom of the side slope.
[2] Surface area given for West half / East half of Baxter detention basin.

The existing detention basins were designed under prior design standards using the rational method for a single design storm. However, since the offsite runoff is proposed to drain to the proposed new detention and treatment facilities at Foxhaven Dr, the existing offsite detention facilties were modeled and analyzed in HydroCAD using the Santa Barbara Unit

Hydrograph Type 1A storm for the design storms required by the current COS Design Standards to establish existing runoff flow rates. The release rates and water surface elevations from the existing detention facilities are summarized in Table 7 below.

Table 7 | Existing Detention Facility Release Rates & Water Surface Elevations (WSE)

Facility ID[1]	Design Storm Release Rate (cfs)				Design Storm Peak WSE (ft)				Overflow Elev. (ft)
	½ 2-YR	10-YR	25-YR	100-YR	½ 2-YR	10-YR	25-YR	100-YR	
Teal	0.71	1.61	2.38	3.66	385.51	386.87	387.00	387.05	386.95
Baxter	3.24	4.58	4.58	13.36	401.50	404.71	405.17	405.47	405.02
Vintage	0.33	0.52	0.55	0.61	432.13	433.37	433.61	434.14	435.0

As mentioned above, it is proposed to reconstruct the existing Baxter Detention Basin to be a combination rain garden. The west half will be reconstructed and expanded to the north and the east half will be reconstructed within its existing footprint. The rain garden is sized to infiltrate the water quality storm event in 40 hours, which is less than the required 54 hours from the start of the event. Tables 8 and 9 below summarize the reconstructed facility design. Perforated underdrains will be installed in the Baxter Rain Garden drain rock layer. Please note the Baxter Rain Garden West and East require drain rock with area equivalent to the 402-foot elevation contour to detain and control the design storms in conformance with COS standards.

It should also be noted the infiltration rate of 1.5 inches/hour for preliminary design of the Baxter Reconstructed Rain Garden is determined from the nearest infiltration test performed by the Geotechnical Investigation, which was approximately 400-feet away from the Baxter detention basin. Infiltration tests were performed before the design decision to reconstruct the Baxter detention basin to be a rain garden. Additional infiltration tests are scheduled adjacent to the existing Baxter detention facility to confirm the infiltration rates.

Table 8 | Baxter Reconstructed Rain Garden - Sizing Summary

Facility ID[1]	Facility Elevations[2] (ft)		Facility Surface Area[2] (sf)		Required Drain Rock Surface Area (sf)	Depth of Drain Rock (in)
	Top	Bottom	Top	Bottom		
Baxter - West	406.0	401.0	22,960	11,910	13,800	45
Baxter - East	406.0	401.0	10,140	1,820	3,960	45

[1] The facility is a privately owned and maintained filtration rain garden.

[2] The top facility elevation and corresponding square footage area refer to the top of the side slope. The bottom elevation and corresponding square footage area refer to the bottom of the side slope.

Table 9 | Baxter Reconstructed Rain Garden - Outlet Sizing and Release Rates

Outlet ID/ Storm Event	Orifice Size (in)	Orifice Elevation (ft)	Release Rate (cfs)	Peak WSE[1] (ft)	Emergency Overflow Elevation (ft)	Infiltration Rate (in/hr)
½ - 2 Year	2.7	397.70	0.18	398.56	405.0	1.5
WQ Event	-	-	0.37	401.35	405.0	1.5
10 Year	9.0	401.60	3.75	403.97	405.0	1.5
25 Year	30.0[2]	404.00	5.53	404.32	405.0	1.5
100 Year	-	-	10.09	404.78	405.0	1.5

[1] WSE = water surface elevation
[2] 25-year and 100-year storms controlled by 30-inch wide weir cut from the internal baffle wall.

The HydroCAD modeled release rates and water surface elevations (WSE) shown in Table 9 assumes free-flow through the rain garden growing media. Release from the rain garden facilities can also be controlled by the filtration capacity of the growing media. To verify the entire WQ storm event is filtered through growing media for treatment, the rain garden hydraulics were also modeled at the facility surface with an assumed filtration rate of 2 in/hr per COS Design Standards. The surface test was calculated using Darcy's Law of hydraulic conductivity with the groundwater elevation set 1.5 feet below the surface to represent the 1.5 feet (18 inches) of growing media thickness per COS Design Standards. See the HydroCAD analysis in Appendix C for surface test calculations.

Table 10 | WQ Storm Surface Filtration Test Summary – Baxter Reconstructed Rain Garden

Facility ID	Facility Bottom Elevation (ft)	Max. Treatment Elevation[1] (ft)	WSE (ft)
Baxter	401.0	402.5	402.34

[1] Elevation at which water overtops type III catchbasin within rain garden and is directed to flow-control structure

Overall Flow Control Summary

The total allowable release rates are a combination of the pre-developed project site runoff and existing offsite developed runoff after detention. Table 11 below summarizes the individual release rates that combine to the total allowable releases.

Table 11 | Allowable Release Rates

Site Condition/ Detention Facility	Design Storm (cfs)			
	½ 2 Year	10 Year	25 Year	100 Year
Onsite Pre-Developed	0.12	0.63	0.90	1.73
Teal Detention	0.71	1.61	2.38	3.66
Baxter Detention	3.24	4.58	4.58	13.36
Vintage Detention	0.33	0.52	0.55	0.61
Total Allowable	3.91	6.51	8.90	17.24

[1] Totals do not sum to the addition of individual flows. This is due to the fact that the time of concentration and release timing vary. The totals are the combination of the basin hydrographs. Refer to Link 1L: Allowable/Existing Release in Appendix C.

The overall design release rates are summarized in Table 12 below.

Table 12 | Allowable vs. Design Release Rates

Site Condition/Facility ID	Design Storm (cfs)			
	½ 2 Year	10 Year	25 Year	100 Year
Foxhaven Detention	0.40	6.32	8.67	16.72
Baxter Reconstructed Rain Garden	0.18	3.75	5.53	10.09
Vintage Detention	0.33	0.52	0.55	0.61
Basin 2A (Onsite Undetained)	0.09	0.30	0.34	0.41
Basin 2B (Battle Crk Undetained)	0.09	0.29	0.33	0.40
Total Developed Release[1]	0.44	6.50	8.87	17.12
Allowed Release	3.91	6.51	8.90	17.24

[1] Totals may not sum to the addition of the individual flows. This is due to the fact that the release timing varies for each facility. Totals are the combination of hydrographs. Refer to Link: 2L-Developed Release in Appendix C.

3.4 CONVEYANCE CAPACITY CALCULATIONS

Per the COS Design Standards for drainage areas of 50-250 acres, the stormwater facilities were designed to convey the developed 25-year, 24-hour storm.

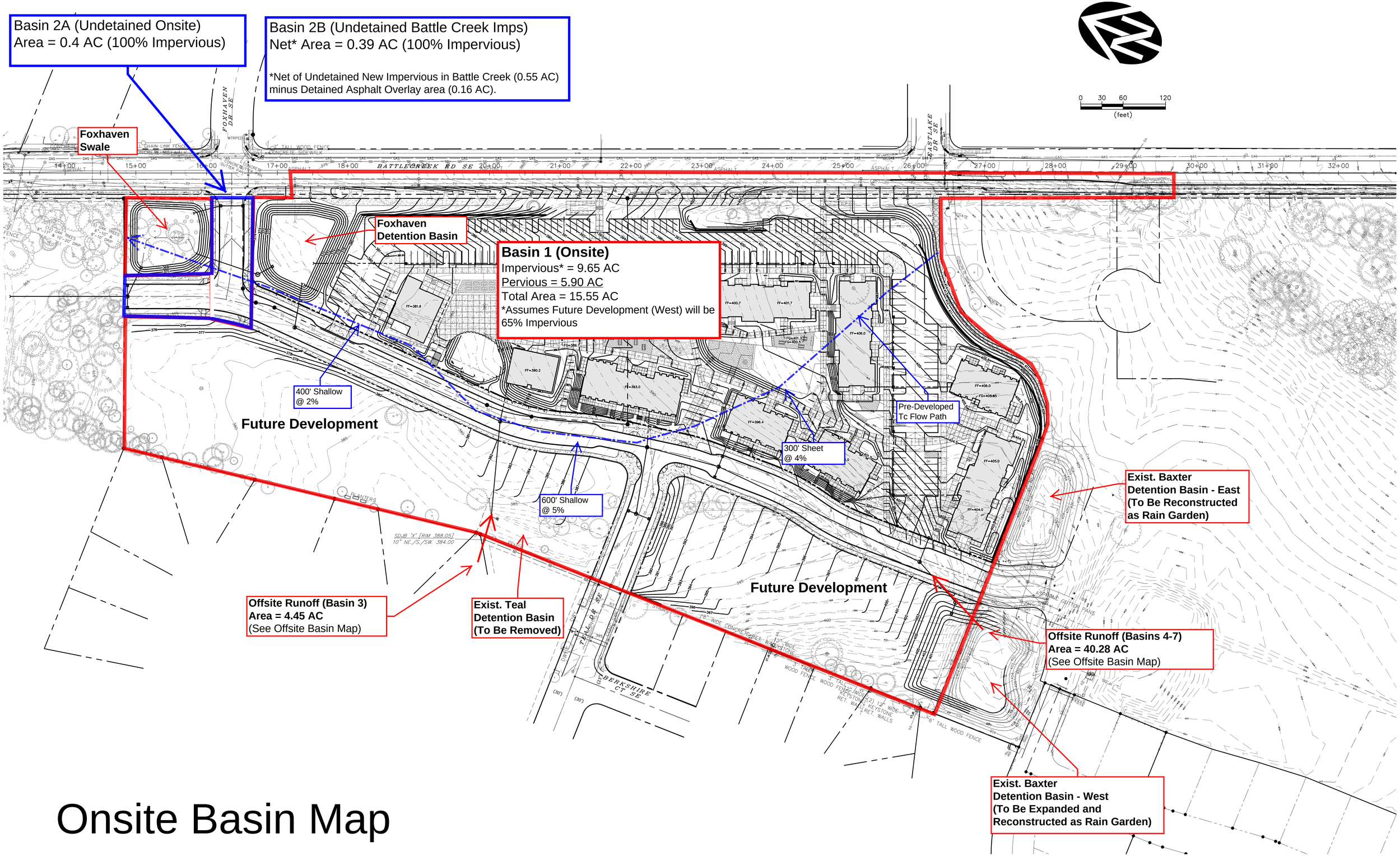
The proposed storm main in Salal St receives a peak flow of 15.15 cfs in the 25-year storm where it discharges to the Foxhaven detention basin. The proposed 24-inch pipe in Salal St has a full-flow capacity of 31.30 cfs using a slope of 1.9% and Manning's n of 0.013, which exceeds the peak flow to the storm main.

The 25-year event is released from the Foxhaven detention basin at a peak flow rate of 8.67 cfs. Stormwater runoff is conveyed from the Foxhaven detention basin and swale to an existing ditch north of the project site via 24-inch pipe. The 24-inch pipe has a full-flow capacity of 11.35 cfs using a slope of 0.25% and Manning's n of 0.013, which exceeds the peak flow released from the detention basin.

3.5 SUMMARY

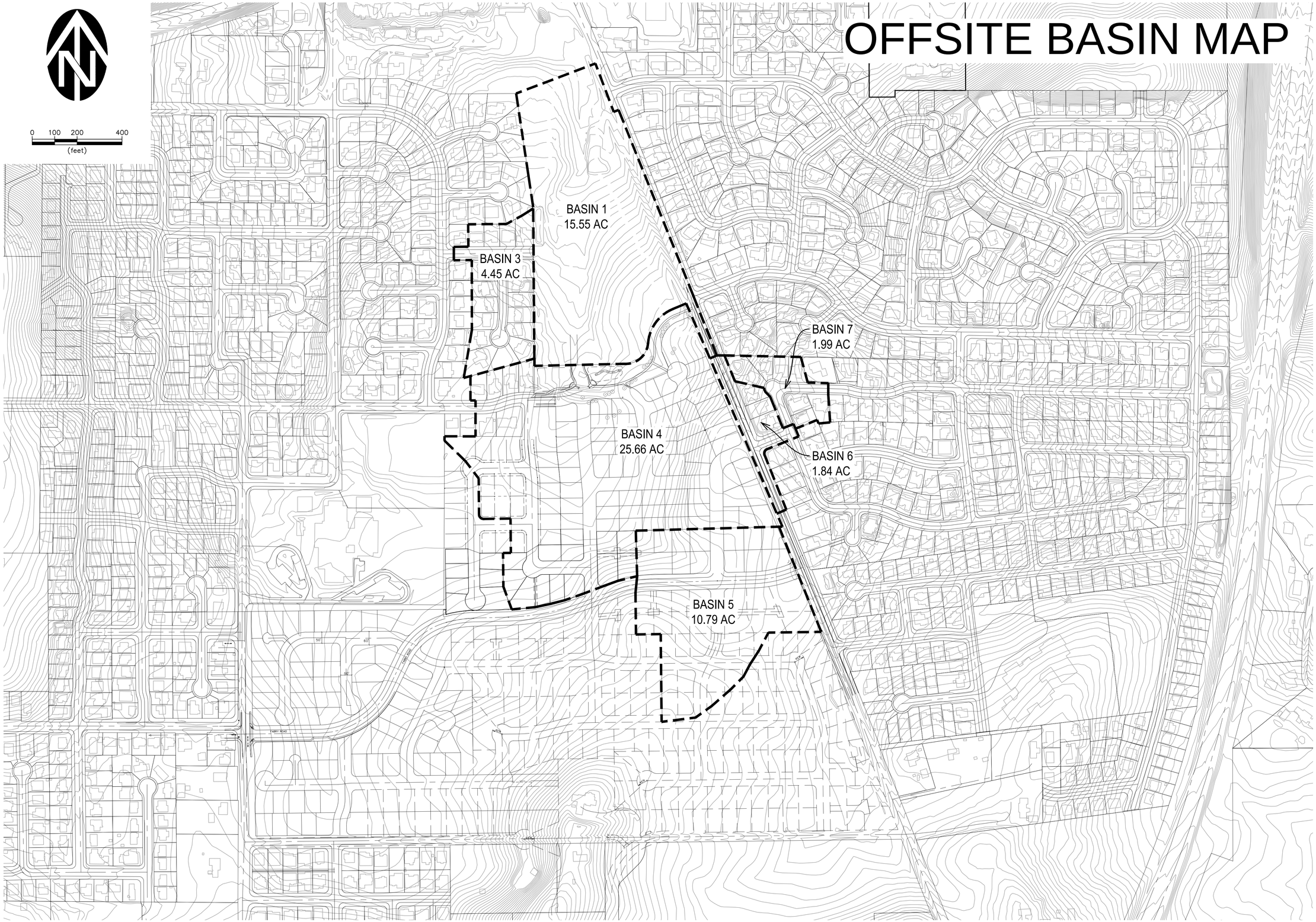
The stormwater system has been designed to release half the 2-year, 24-hour, the 10-year, 24-hour, 25-year, 24-hour, and the 100-year, 24-hour storm events at less than their respective pre-developed/existing rates. The proposed design also treats the water quality storm. Therefore, the project meets the flow control and treatment requirements as set forth in Administrative Rule 109 Division 004 - Stormwater System.

APPENDIX A
BASIN MAPS



Onsite Basin Map

OFFSITE BASIN MAP



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DESCRIPTION	BY
REVISIONS	

NO.	DATE
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IF NOT ONE INCH, ADJUST THIS SHEET, ADJUST SCALES ACCORDINGLY

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WOODSCAPE GLEN, LLC.
WOODSCAPE GREEN NORTH SUBDIVISION

BASIN MAP

DRAWING

JOB NUMBER
2152.1112.0

APPENDIX B
NRCS SOIL REPORT

Hydrologic Soil Group—Marion County Area, Oregon
(CDP & Offsite Drainage)

Map Scale: 1:5,190 if printed on A portrait (8.5" x 11") sheet.

N

Meters
0 50 100 200 300

Feet
0 250 500 1000 1500

Map projection: Web Mercator Corner coordinates: WGS84 Edge tics: UTM Zone 10N WGS84

MAP LEGEND

Area of Interest (AOI)

- Area of Interest (AOI)

Soils

Soil Rating Polygons

- A
- A/D
- B
- B/D
- C
- C/D
- D
- Not rated or not available

Soil Rating Lines

- A
- A/D
- B
- B/D
- C
- C/D
- D
- Not rated or not available

Soil Rating Points

- A
- A/D
- B
- B/D
- C
- C/D
- D
- Not rated or not available

Water Features

- Streams and Canals

Transportation

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

Background

- Aerial Photography

MAP INFORMATION

The soil surveys that comprise your AOI were mapped at 1:20,000.

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

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

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

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

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

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

Soil Survey Area: Marion County Area, Oregon
Survey Area Data: Version 19, Oct 27, 2021

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

Date(s) aerial images were photographed: Aug 1, 2018—Aug 31, 2018

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

Hydrologic Soil Group

Map unit symbol	Map unit name	Rating	Acres in AOI	Percent of AOI
NeB	Nekia silty clay loam, 2 to 7 percent slopes	C	35.8	58.6%
NeC	Nekia silty clay loam, 7 to 12 percent slopes	C	10.0	16.4%
SlB	Salkum silty clay loam, basin, 0 to 6 percent slopes	B	15.2	24.9%
Totals for Area of Interest			**61.1**	**100.0%**

Description

Hydrologic soil groups are based on estimates of runoff potential. Soils are assigned to one of four groups according to the rate of water infiltration when the soils are not protected by vegetation, are thoroughly wet, and receive precipitation from long-duration storms.

The soils in the United States are assigned to four groups (A, B, C, and D) and three dual classes (A/D, B/D, and C/D). The groups are defined as follows:

Group A. Soils having a high infiltration rate (low runoff potential) when thoroughly wet. These consist mainly of deep, well drained to excessively drained sands or gravelly sands. These soils have a high rate of water transmission.

Group B. Soils having a moderate infiltration rate when thoroughly wet. These consist chiefly of moderately deep or deep, moderately well drained or well drained soils that have moderately fine texture to moderately coarse texture. These soils have a moderate rate of water transmission.

Group C. Soils having a slow infiltration rate when thoroughly wet. These consist chiefly of soils having a layer that impedes the downward movement of water or soils of moderately fine texture or fine texture. These soils have a slow rate of water transmission.

Group D. Soils having a very slow infiltration rate (high runoff potential) when thoroughly wet. These consist chiefly of clays that have a high shrink-swell potential, soils that have a high water table, soils that have a claypan or clay layer at or near the surface, and soils that are shallow over nearly impervious material. These soils have a very slow rate of water transmission.

If a soil is assigned to a dual hydrologic group (A/D, B/D, or C/D), the first letter is for drained areas and the second is for undrained areas. Only the soils that in their natural condition are in group D are assigned to dual classes.

Rating Options

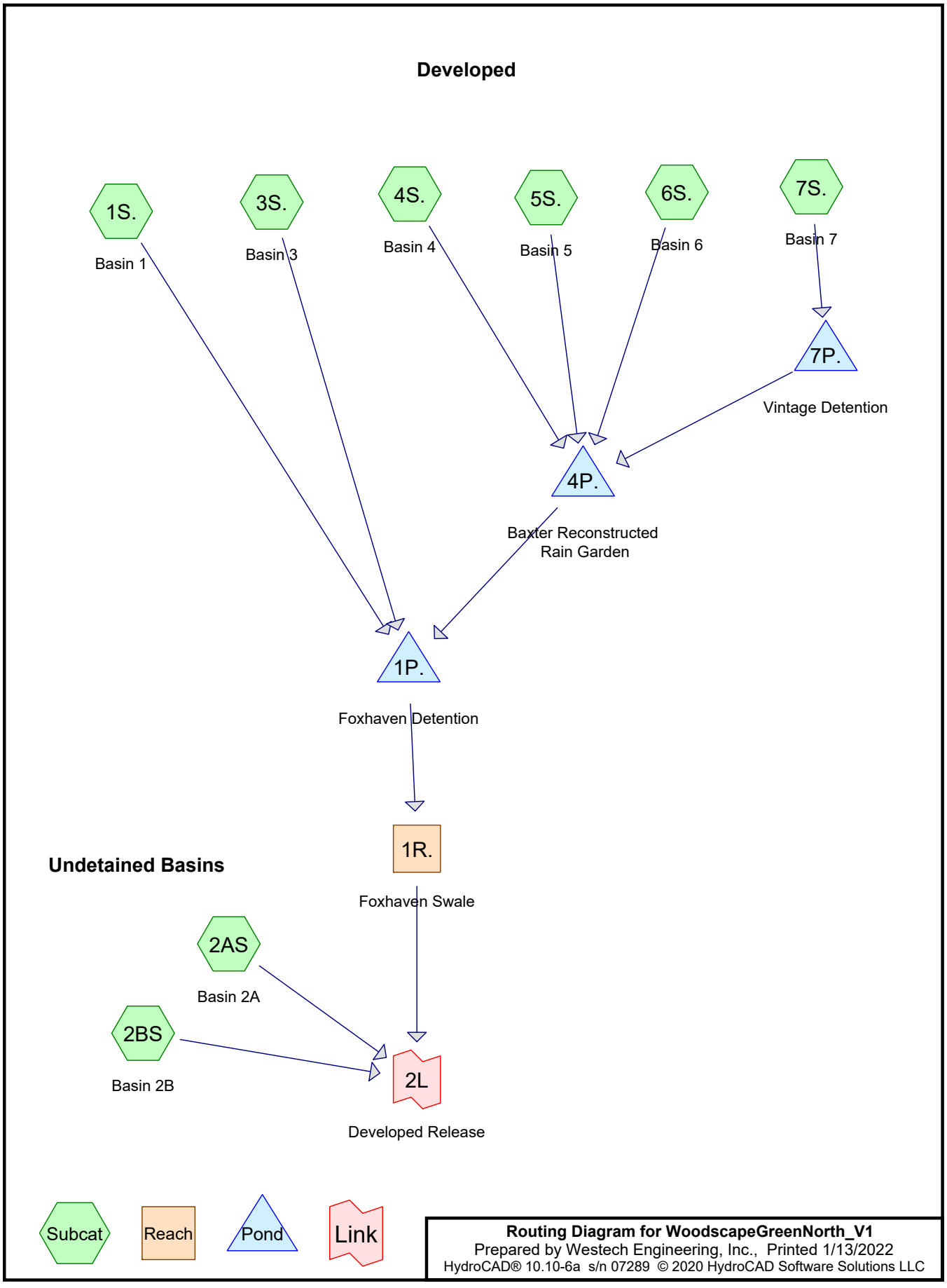
Aggregation Method: Dominant Condition

Component Percent Cutoff: None Specified

Tie-break Rule: Higher

APPENDIX C

HYDROCAD SUMMARIES



Routing Diagram for WoodscapeGreenNorth_V1
Prepared by Westech Engineering, Inc., Printed 1/13/2022

Summary for Subcatchment 1S.: Basin 1

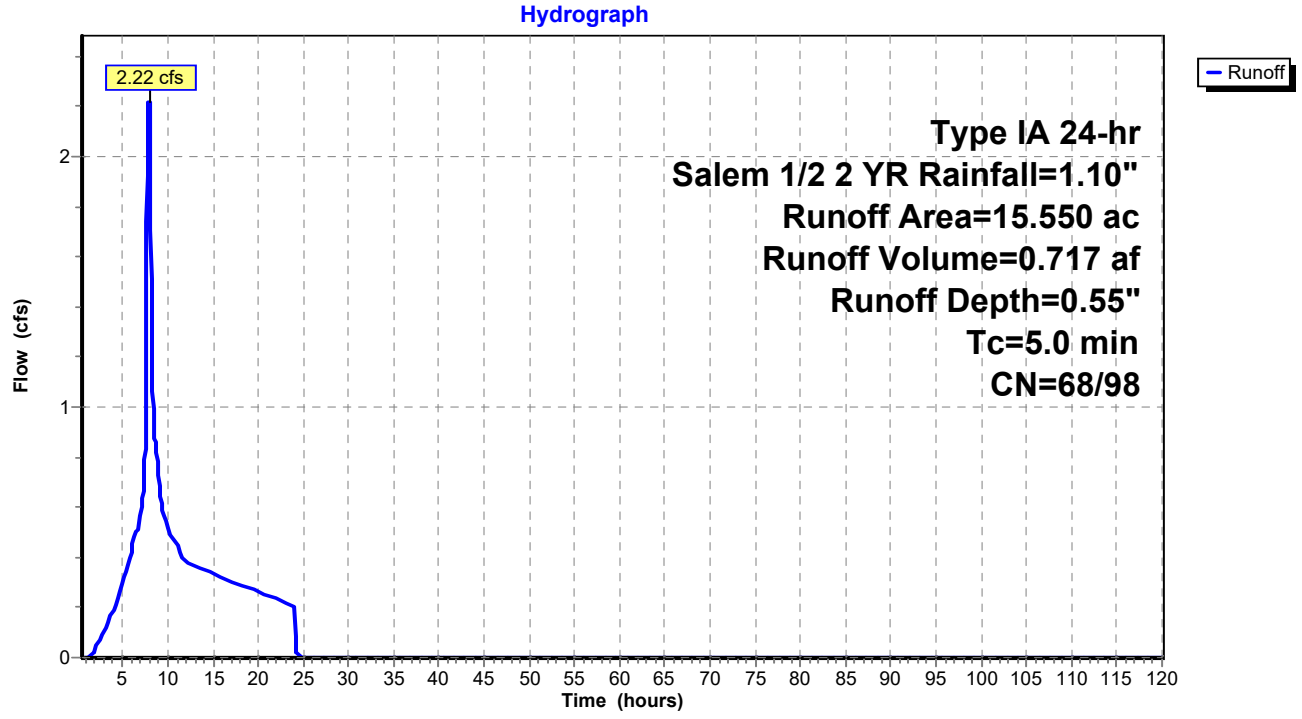
Runoff = 2.22 cfs @ 7.92 hrs, Volume= 0.717 af, Depth= 0.55"
Routed to Pond 1P. : Foxhaven Detention

Runoff by SBUH method, Split Pervious/Imperv., Time Span= 0.50-120.00 hrs, dt= 0.05 hrs
Type IA 24-hr Salem 1/2 2 YR Rainfall=1.10"

	Area (ac)	CN	Description
*	9.650	98	Paved/Roof, HSG C
	2.950	61	>75% Grass cover, Good, HSG B
	2.950	74	>75% Grass cover, Good, HSG C
	15.550	86	Weighted Average
	5.900		37.94% Pervious Area
	9.650		62.06% Impervious Area

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

Subcatchment 1S.: Basin 1



Summary for Subcatchment 2AS: Basin 2A

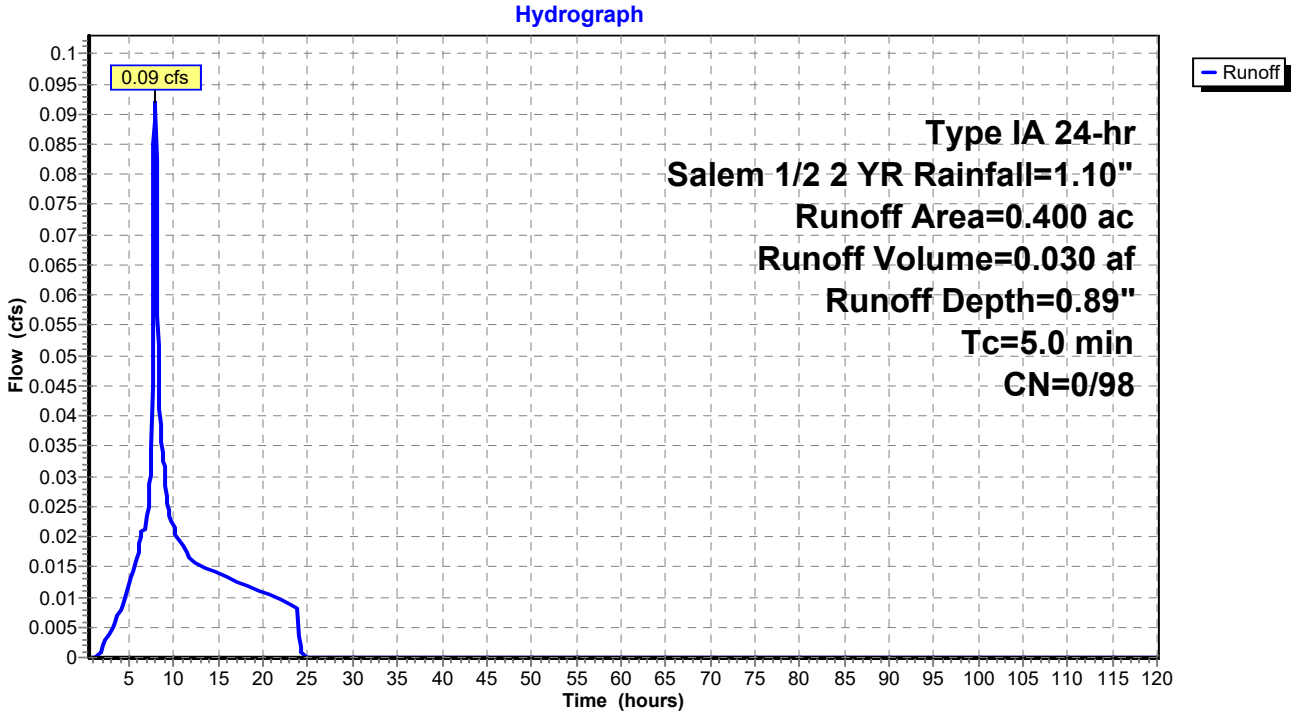
Runoff = 0.09 cfs @ 7.92 hrs, Volume= 0.030 af, Depth= 0.89"
Routed to Link 2L : Developed Release

Runoff by SBUH method, Split Pervious/Imperv., Time Span= 0.50-120.00 hrs, dt= 0.05 hrs
Type IA 24-hr Salem 1/2 2 YR Rainfall=1.10"

	Area (ac)	CN	Description
*	0.400	98	Paved/Roof, HSG C
	0.400		100.00% Impervious Area

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

Subcatchment 2AS: Basin 2A



Summary for Subcatchment 2BS: Basin 2B

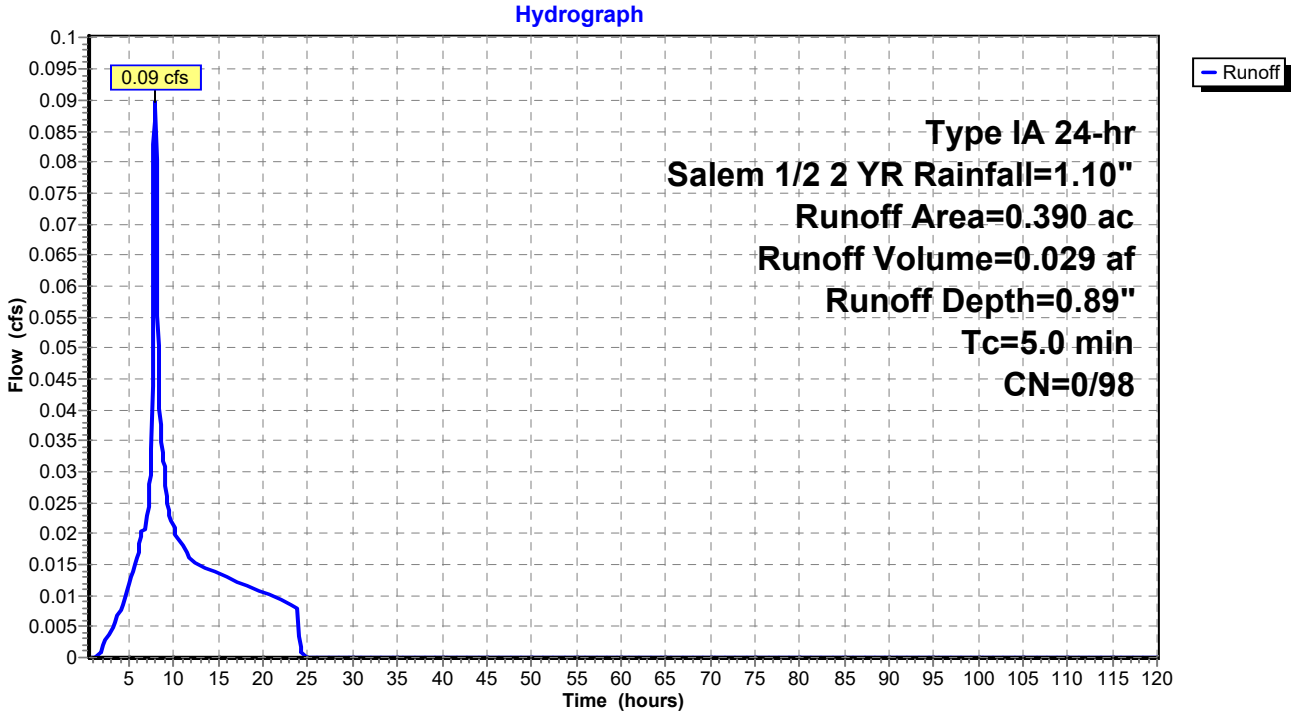
Runoff = 0.09 cfs @ 7.92 hrs, Volume= 0.029 af, Depth= 0.89"
Routed to Link 2L : Developed Release

Runoff by SBUH method, Split Pervious/Imperv., Time Span= 0.50-120.00 hrs, dt= 0.05 hrs
Type IA 24-hr Salem 1/2 2 YR Rainfall=1.10"

	Area (ac)	CN	Description
*	0.390	98	Paved roads w/curbs & sewers, HSG C
	0.390		100.00% Impervious Area

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

Subcatchment 2BS: Basin 2B



Summary for Subcatchment 3S.: Basin 3

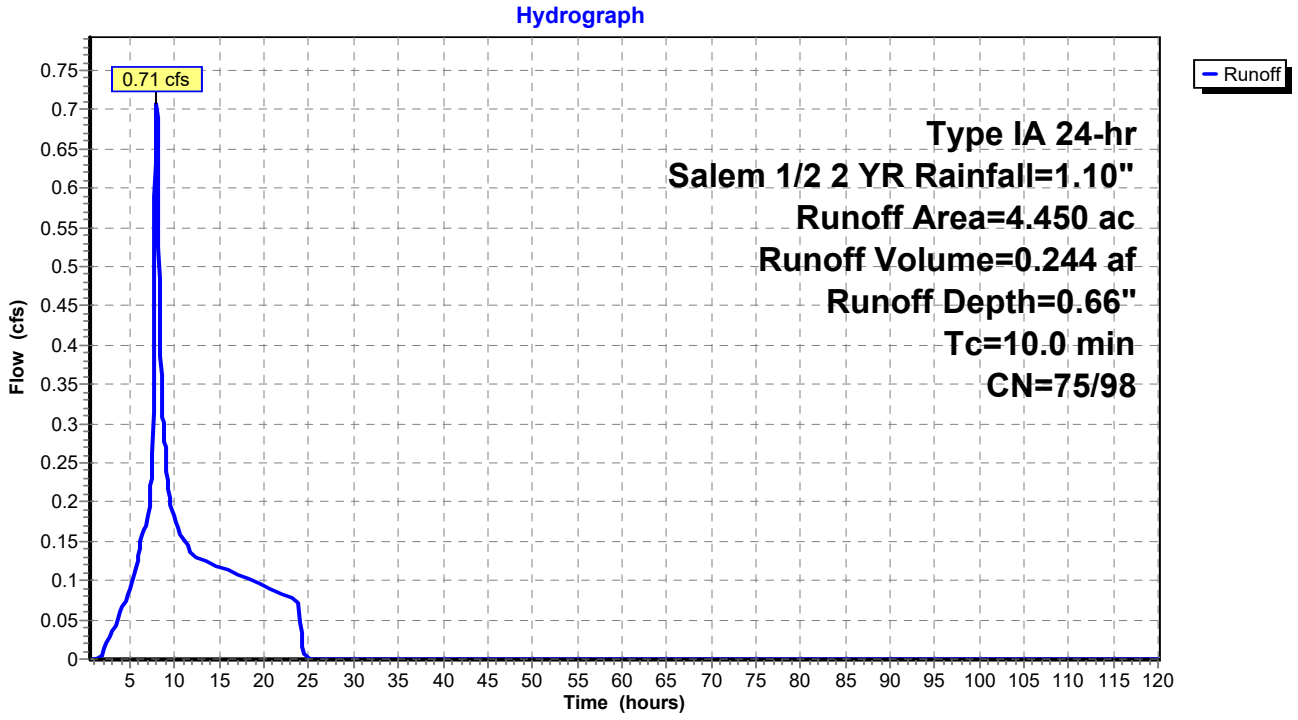
Runoff = 0.71 cfs @ 7.98 hrs, Volume= 0.244 af, Depth= 0.66"
Routed to Pond 1P. : Foxhaven Detention

Runoff by SBUH method, Split Pervious/Imperv., Time Span= 0.50-120.00 hrs, dt= 0.05 hrs
Type IA 24-hr Salem 1/2 2 YR Rainfall=1.10"

	Area (ac)	CN	Description
*	0.970	98	Paved roads w/curbs & sewers, HSG C
	3.480	90	1/8 acre lots, 65% imp, HSG C
	4.450	92	Weighted Average
	1.218		27.37% Pervious Area
	3.232		72.63% Impervious Area

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

Subcatchment 3S.: Basin 3



Summary for Subcatchment 4S.: Basin 4

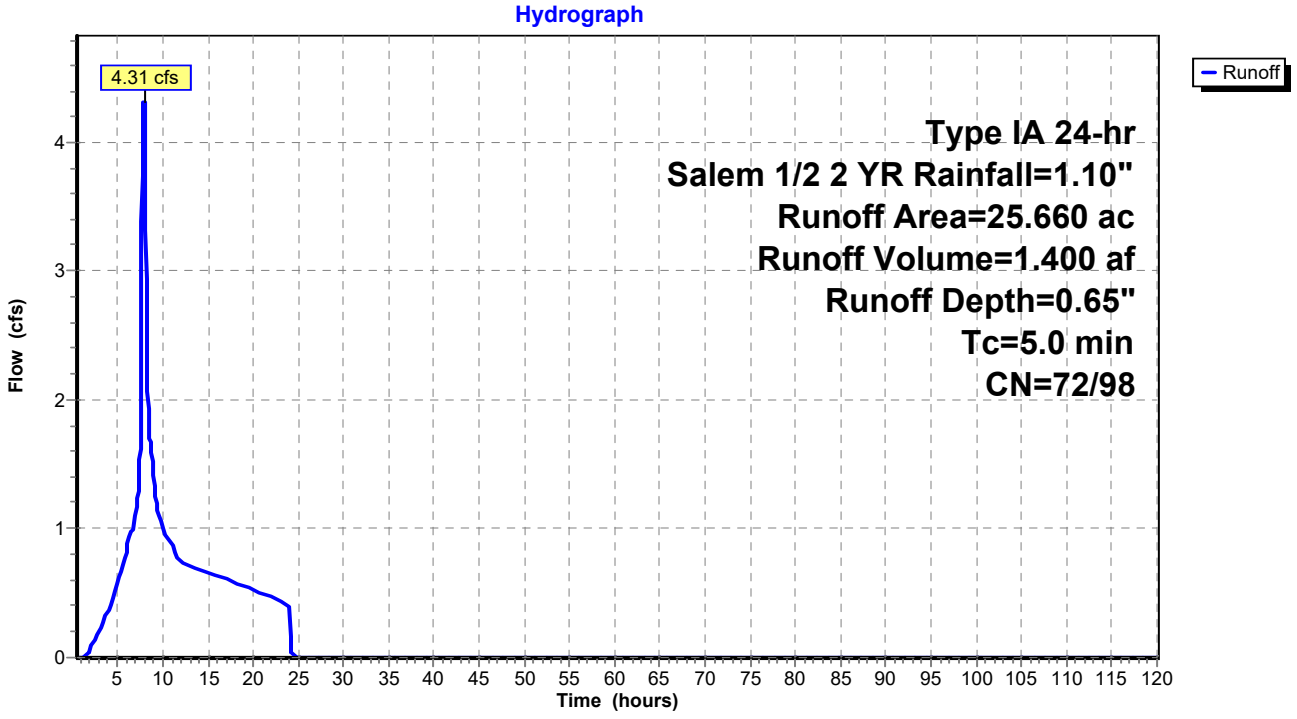
Runoff = 4.31 cfs @ 7.92 hrs, Volume= 1.400 af, Depth= 0.65"
Routed to Pond 4P. : Baxter Reconstructed Rain Garden

Runoff by SBUH method, Split Pervious/Imperv., Time Span= 0.50-120.00 hrs, dt= 0.05 hrs
Type IA 24-hr Salem 1/2 2 YR Rainfall=1.10"

	Area (ac)	CN	Description
*	5.860	98	Paved roads w/curbs & sewers, HSG C
	4.950	85	1/8 acre lots, 65% imp, HSG B
	14.850	90	1/8 acre lots, 65% imp, HSG C
	25.660	91	Weighted Average
	6.930		27.01% Pervious Area
	18.730		72.99% Impervious Area

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

Subcatchment 4S.: Basin 4



Summary for Subcatchment 5S.: Basin 5

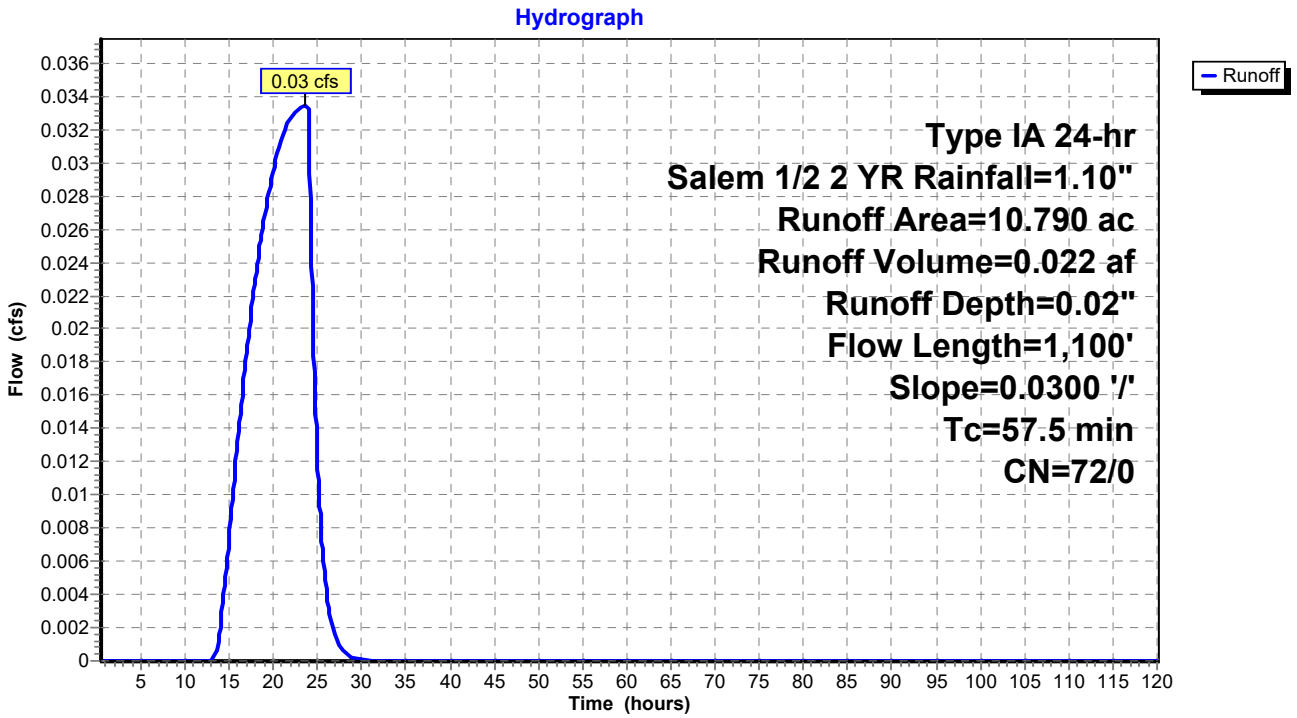
Runoff = 0.03 cfs @ 23.52 hrs, Volume= 0.022 af, Depth= 0.02"
Routed to Pond 4P. : Baxter Reconstructed Rain Garden

Runoff by SBUH method, Split Pervious/Imperv., Time Span= 0.50-120.00 hrs, dt= 0.05 hrs
Type IA 24-hr Salem 1/2 2 YR Rainfall=1.10"

Area (ac)	CN	Description
10.790	72	Woods/grass comb., Good, HSG C
10.790		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
42.1	300	0.0300	0.12		**Sheet Flow, Pre Developed** n= 0.300 P2= 2.20"
15.4	800	0.0300	0.87		**Shallow Concentrated Flow,** Woodland Kv= 5.0 fps
57.5	1,100	Total			

Subcatchment 5S.: Basin 5



Summary for Subcatchment 6S.: Basin 6

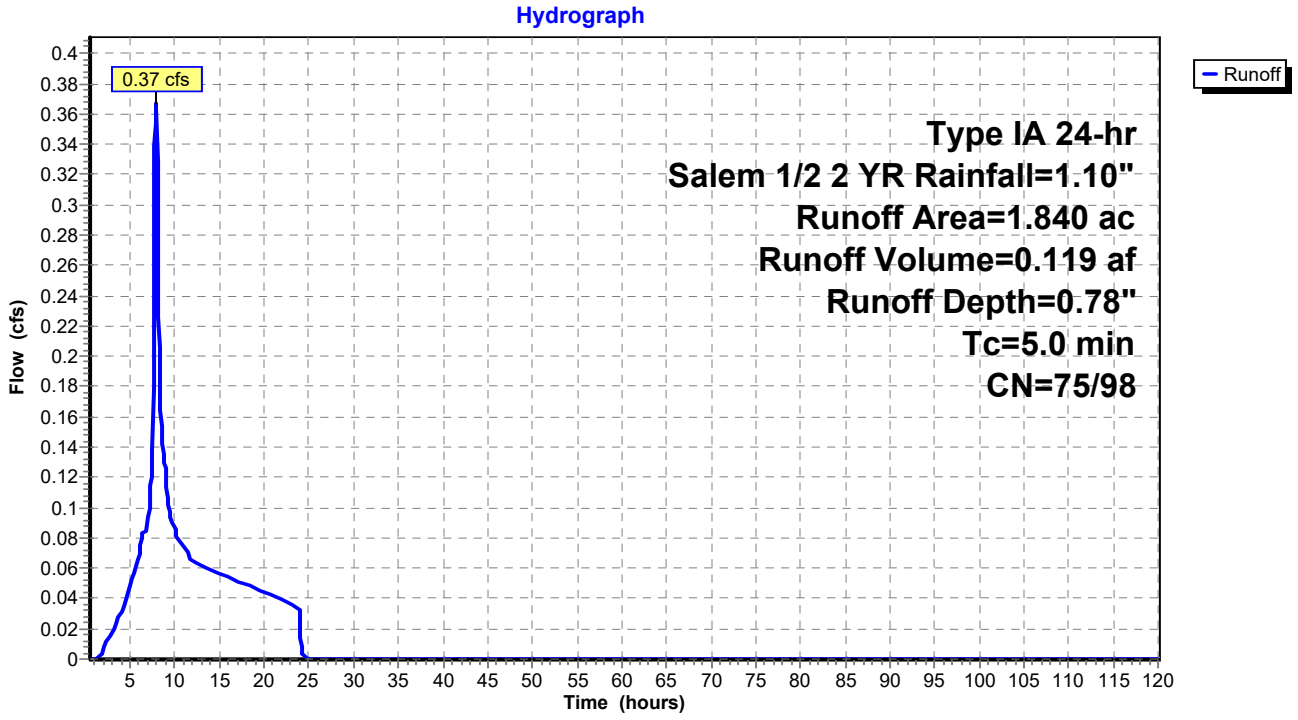
Runoff = 0.37 cfs @ 7.92 hrs, Volume= 0.119 af, Depth= 0.78"
Routed to Pond 4P. : Baxter Reconstructed Rain Garden

Runoff by SBUH method, Split Pervious/Imperv., Time Span= 0.50-120.00 hrs, dt= 0.05 hrs
Type IA 24-hr Salem 1/2 2 YR Rainfall=1.10"

	Area (ac)	CN	Description
*	1.140	98	Paved roads w/curbs & sewers, HSG C
	0.700	90	1/8 acre lots, 65% imp, HSG C
	1.840	95	Weighted Average
	0.245		13.32% Pervious Area
	1.595		86.68% Impervious Area

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

Subcatchment 6S.: Basin 6



Summary for Subcatchment 7S.: Basin 7

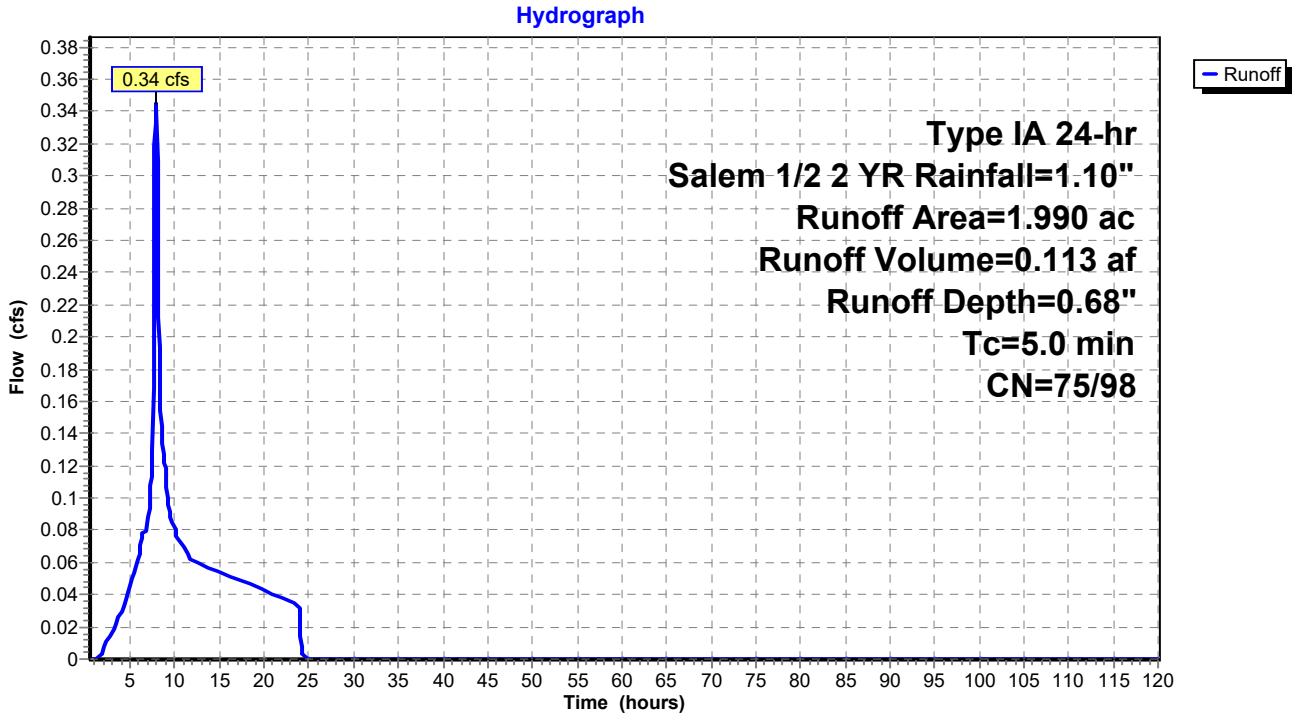
Runoff = 0.34 cfs @ 7.92 hrs, Volume= 0.113 af, Depth= 0.68"
Routed to Pond 7P. : Vintage Detention

Runoff by SBUH method, Split Pervious/Imperv., Time Span= 0.50-120.00 hrs, dt= 0.05 hrs
Type IA 24-hr Salem 1/2 2 YR Rainfall=1.10"

	Area (ac)	CN	Description
*	0.590	98	Paved roads w/curbs & sewers, HSG C
	1.400	90	1/8 acre lots, 65% imp, HSG C
	1.990	92	Weighted Average
	0.490		24.62% Pervious Area
	1.500		75.38% Impervious Area

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

Subcatchment 7S.: Basin 7



Summary for Subcatchment 1S.: Basin 1

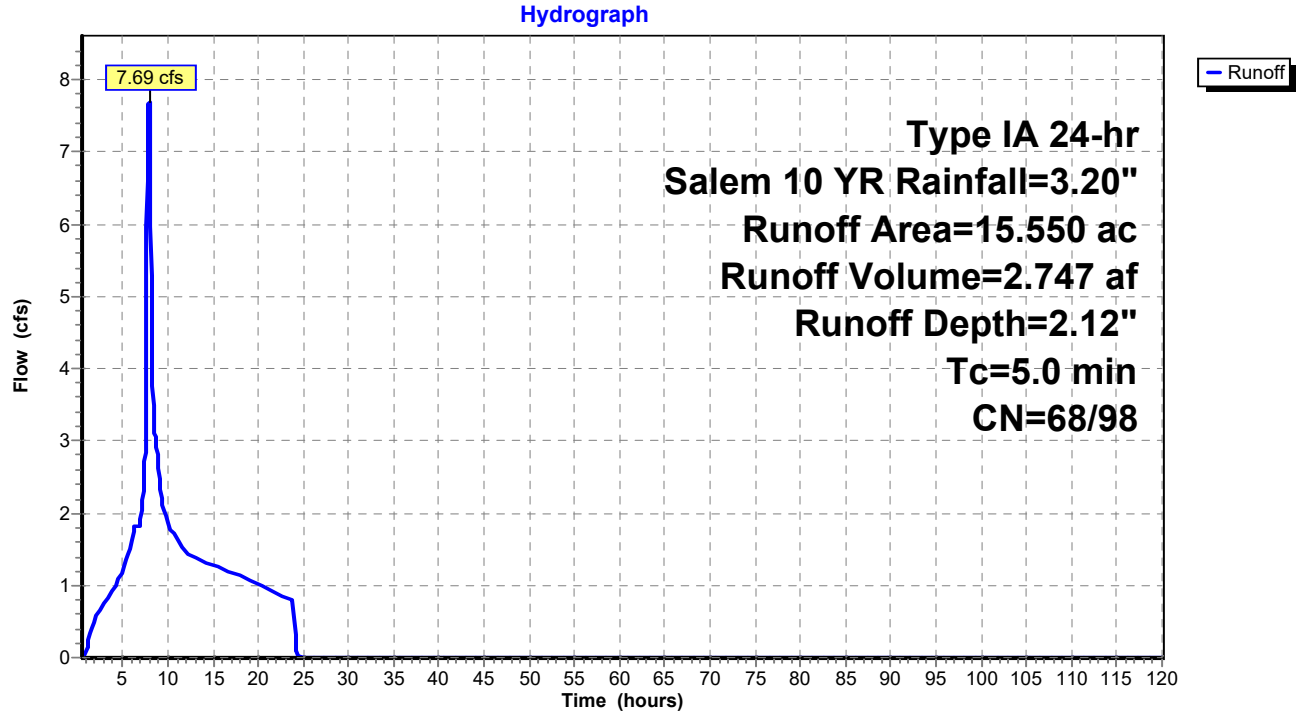
Runoff = 7.69 cfs @ 7.93 hrs, Volume= 2.747 af, Depth= 2.12"
Routed to Pond 1P. : Foxhaven Detention

Runoff by SBUH method, Split Pervious/Imperv., Time Span= 0.50-120.00 hrs, dt= 0.05 hrs
Type IA 24-hr Salem 10 YR Rainfall=3.20"

	Area (ac)	CN	Description
*	9.650	98	Paved/Roof, HSG C
	2.950	61	>75% Grass cover, Good, HSG B
	2.950	74	>75% Grass cover, Good, HSG C
	15.550	86	Weighted Average
	5.900		37.94% Pervious Area
	9.650		62.06% Impervious Area

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

Subcatchment 1S.: Basin 1



Summary for Subcatchment 2AS: Basin 2A

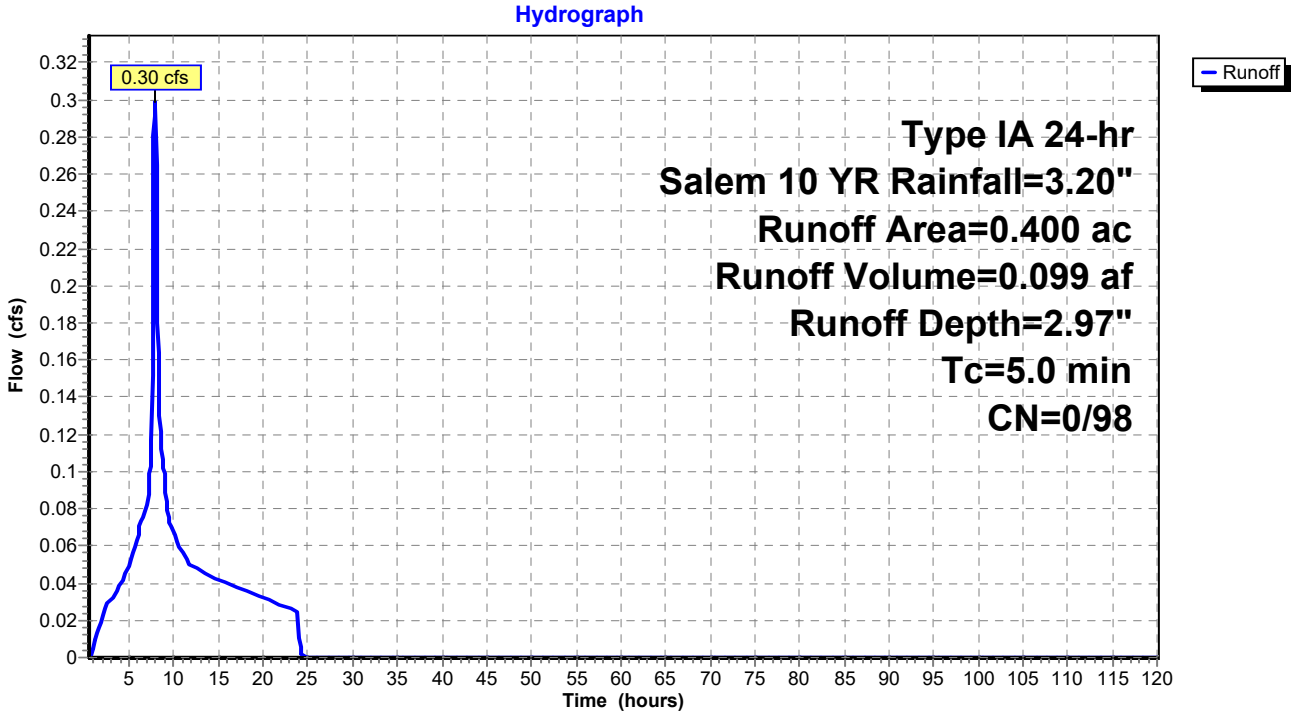
Runoff = 0.30 cfs @ 7.90 hrs, Volume= 0.099 af, Depth= 2.97"
Routed to Link 2L : Developed Release

Runoff by SBUH method, Split Pervious/Imperv., Time Span= 0.50-120.00 hrs, dt= 0.05 hrs
Type IA 24-hr Salem 10 YR Rainfall=3.20"

	Area (ac)	CN	Description
*	0.400	98	Paved/Roof, HSG C
	0.400		100.00% Impervious Area

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

Subcatchment 2AS: Basin 2A



Summary for Subcatchment 2BS: Basin 2B

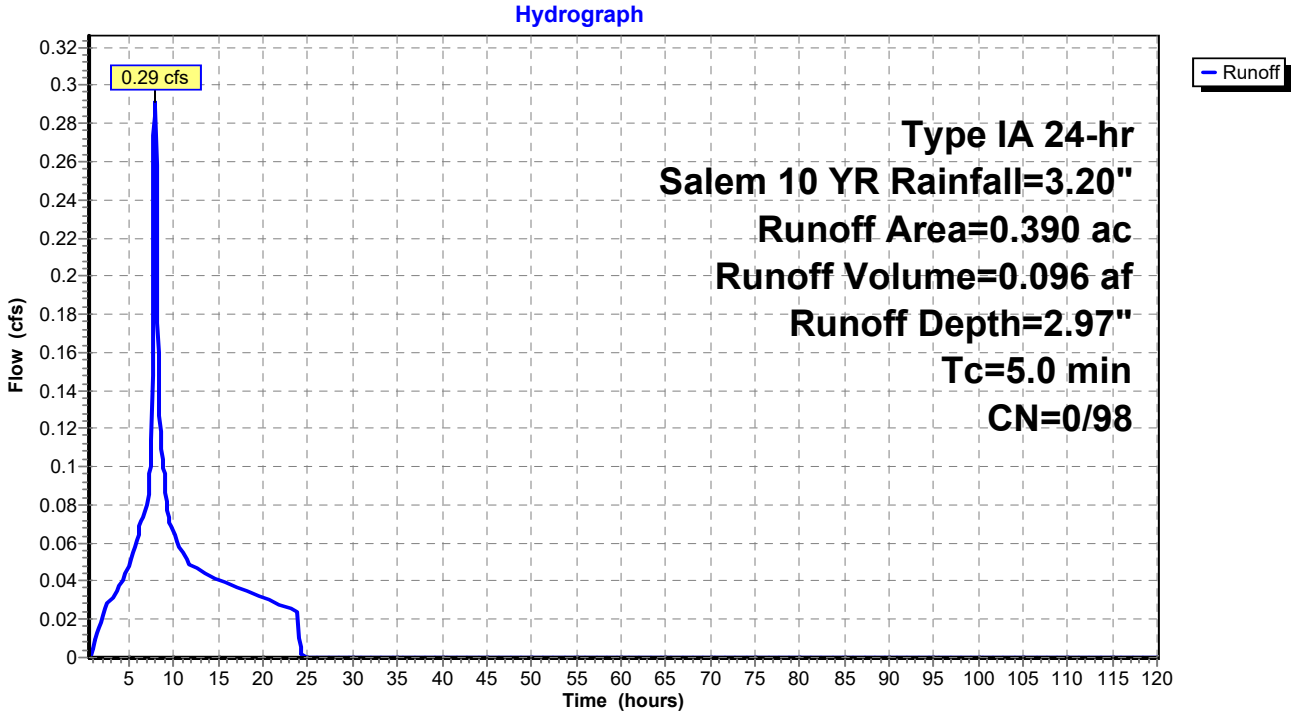
Runoff = 0.29 cfs @ 7.90 hrs, Volume= 0.096 af, Depth= 2.97"
Routed to Link 2L : Developed Release

Runoff by SBUH method, Split Pervious/Imperv., Time Span= 0.50-120.00 hrs, dt= 0.05 hrs
Type IA 24-hr Salem 10 YR Rainfall=3.20"

	Area (ac)	CN	Description
*	0.390	98	Paved roads w/curbs & sewers, HSG C
	0.390		100.00% Impervious Area

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

Subcatchment 2BS: Basin 2B



Summary for Subcatchment 3S.: Basin 3

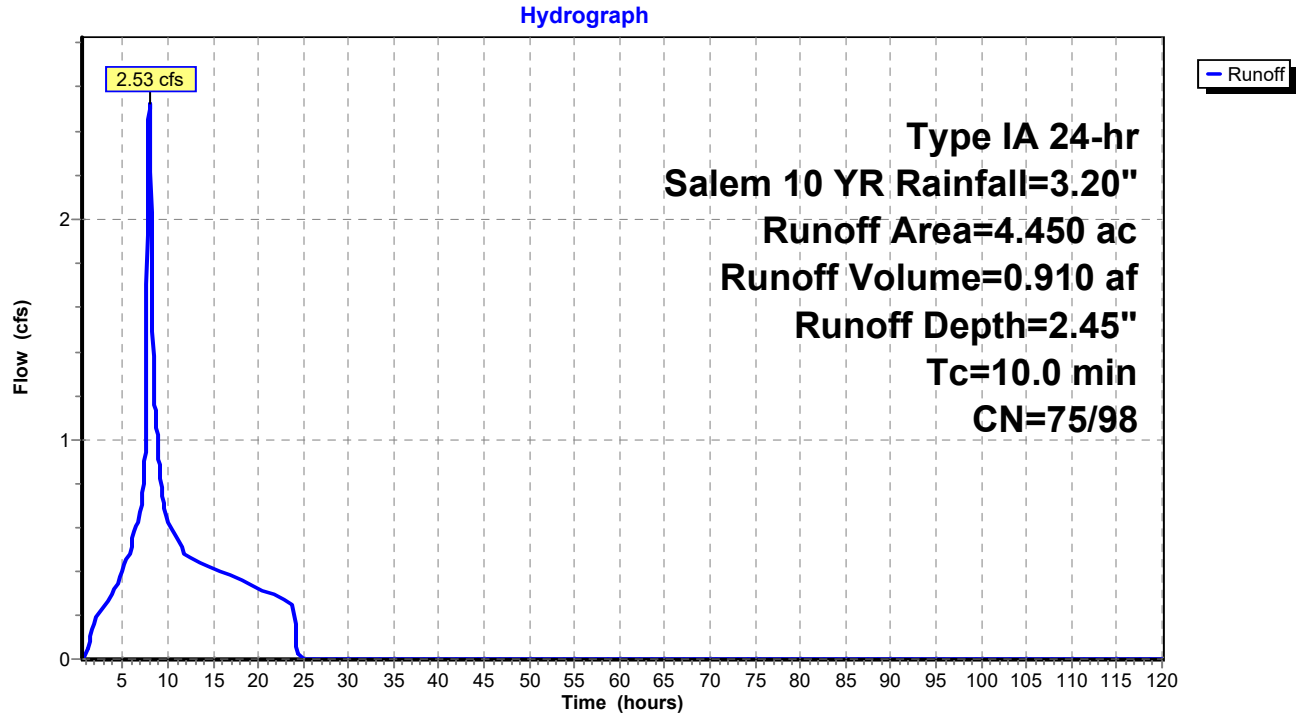
Runoff = 2.53 cfs @ 7.98 hrs, Volume= 0.910 af, Depth= 2.45"
Routed to Pond 1P. : Foxhaven Detention

Runoff by SBUH method, Split Pervious/Imperv., Time Span= 0.50-120.00 hrs, dt= 0.05 hrs
Type IA 24-hr Salem 10 YR Rainfall=3.20"

	Area (ac)	CN	Description
*	0.970	98	Paved roads w/curbs & sewers, HSG C
	3.480	90	1/8 acre lots, 65% imp, HSG C
	4.450	92	Weighted Average
	1.218		27.37% Pervious Area
	3.232		72.63% Impervious Area

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

Subcatchment 3S.: Basin 3



Summary for Subcatchment 4S.: Basin 4

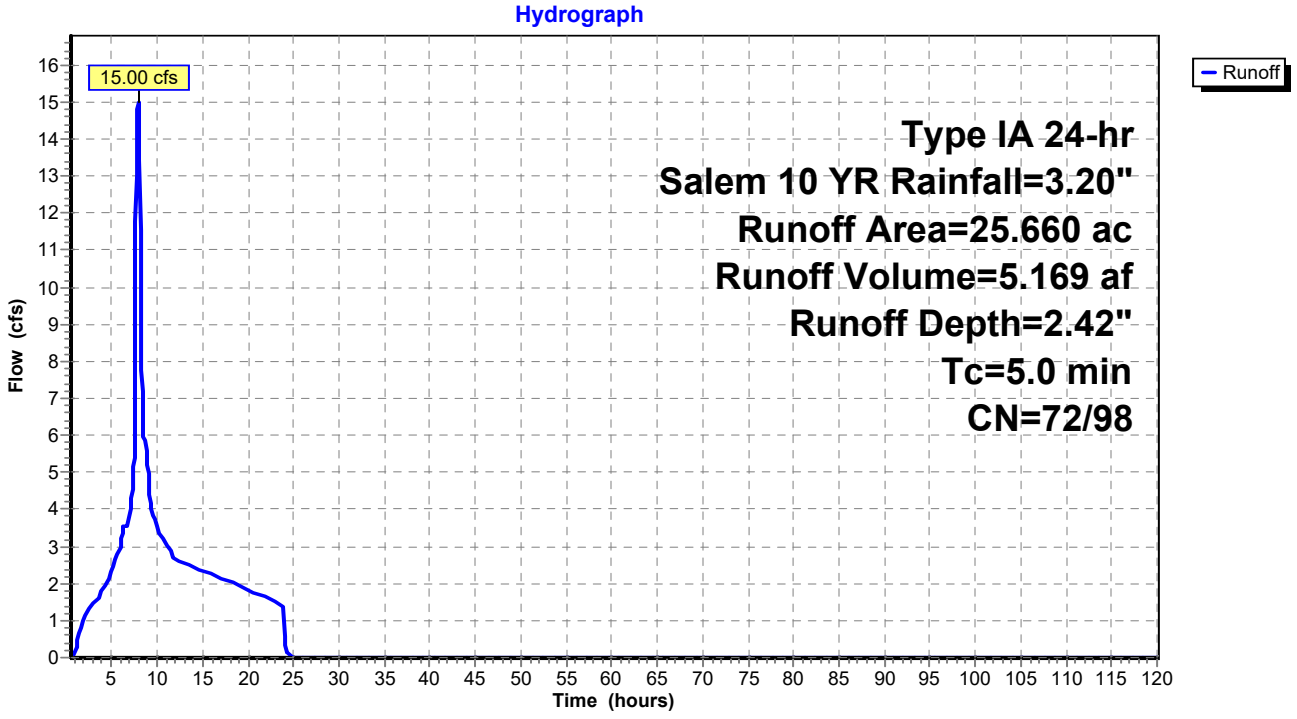
Runoff = 15.00 cfs @ 7.92 hrs, Volume= 5.169 af, Depth= 2.42"
Routed to Pond 4P. : Baxter Reconstructed Rain Garden

Runoff by SBUH method, Split Pervious/Imperv., Time Span= 0.50-120.00 hrs, dt= 0.05 hrs
Type IA 24-hr Salem 10 YR Rainfall=3.20"

	Area (ac)	CN	Description
*	5.860	98	Paved roads w/curbs & sewers, HSG C
	4.950	85	1/8 acre lots, 65% imp, HSG B
	14.850	90	1/8 acre lots, 65% imp, HSG C
	25.660	91	Weighted Average
	6.930		27.01% Pervious Area
	18.730		72.99% Impervious Area

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

Subcatchment 4S.: Basin 4



Summary for Subcatchment 5S.: Basin 5

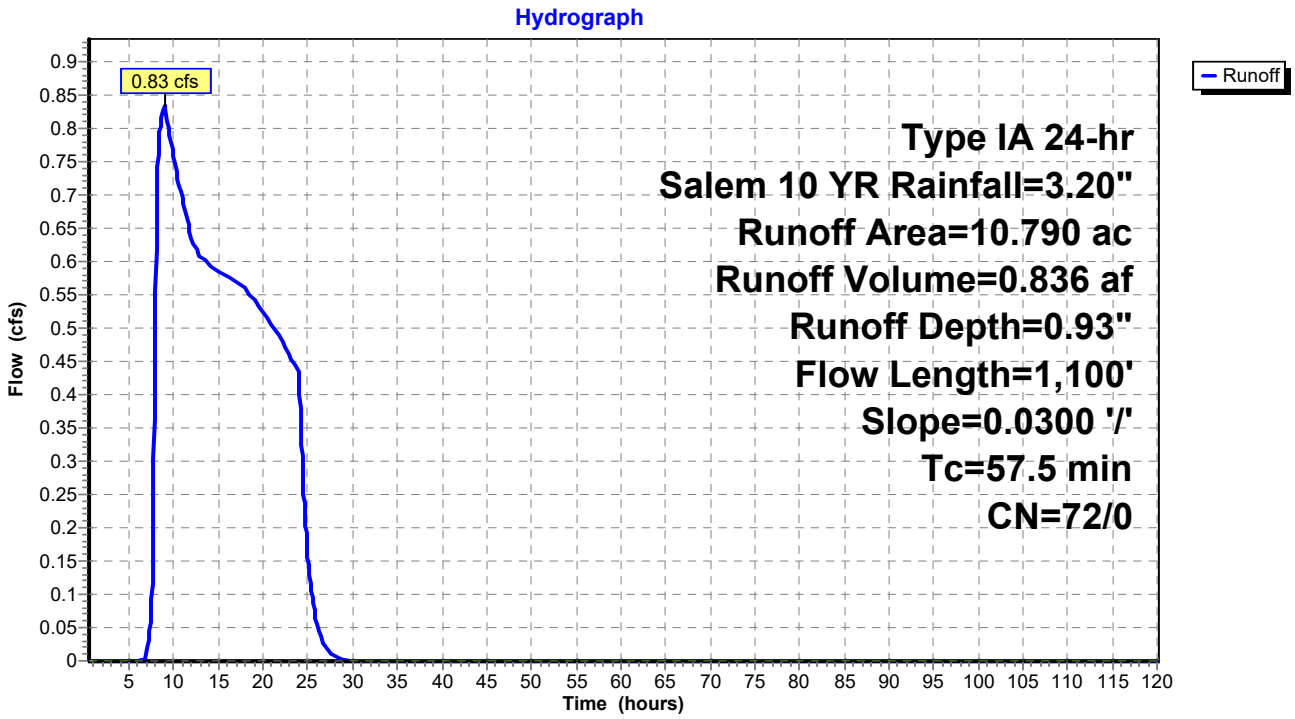
Runoff = 0.83 cfs @ 8.92 hrs, Volume= 0.836 af, Depth= 0.93"
Routed to Pond 4P. : Baxter Reconstructed Rain Garden

Runoff by SBUH method, Split Pervious/Imperv., Time Span= 0.50-120.00 hrs, dt= 0.05 hrs
Type IA 24-hr Salem 10 YR Rainfall=3.20"

Area (ac)	CN	Description
10.790	72	Woods/grass comb., Good, HSG C
10.790		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
42.1	300	0.0300	0.12		**Sheet Flow, Pre Developed** n= 0.300 P2= 2.20"
15.4	800	0.0300	0.87		**Shallow Concentrated Flow,** Woodland Kv= 5.0 fps
57.5	1,100	Total			

Subcatchment 5S.: Basin 5



Summary for Subcatchment 6S.: Basin 6

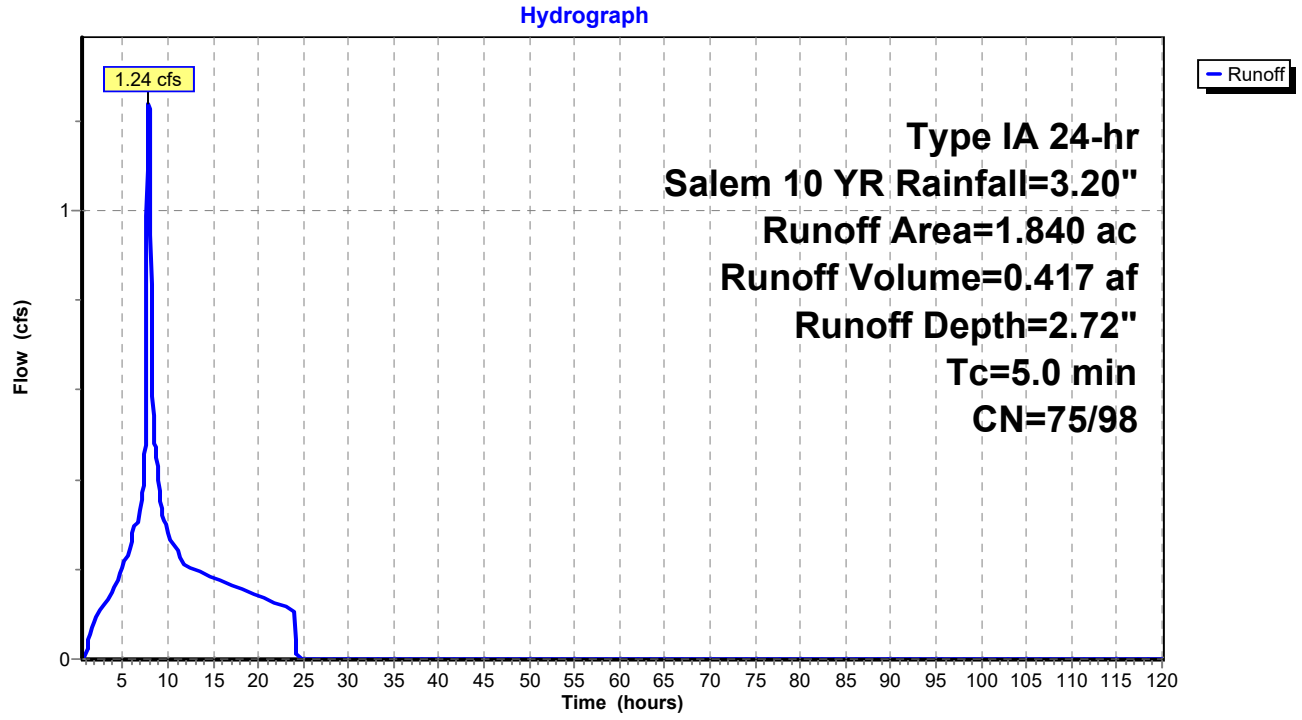
Runoff = 1.24 cfs @ 7.91 hrs, Volume= 0.417 af, Depth= 2.72"
Routed to Pond 4P. : Baxter Reconstructed Rain Garden

Runoff by SBUH method, Split Pervious/Imperv., Time Span= 0.50-120.00 hrs, dt= 0.05 hrs
Type IA 24-hr Salem 10 YR Rainfall=3.20"

	Area (ac)	CN	Description
*	1.140	98	Paved roads w/curbs & sewers, HSG C
	0.700	90	1/8 acre lots, 65% imp, HSG C
	1.840	95	Weighted Average
	0.245		13.32% Pervious Area
	1.595		86.68% Impervious Area

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

Subcatchment 6S.: Basin 6



Summary for Subcatchment 7S.: Basin 7

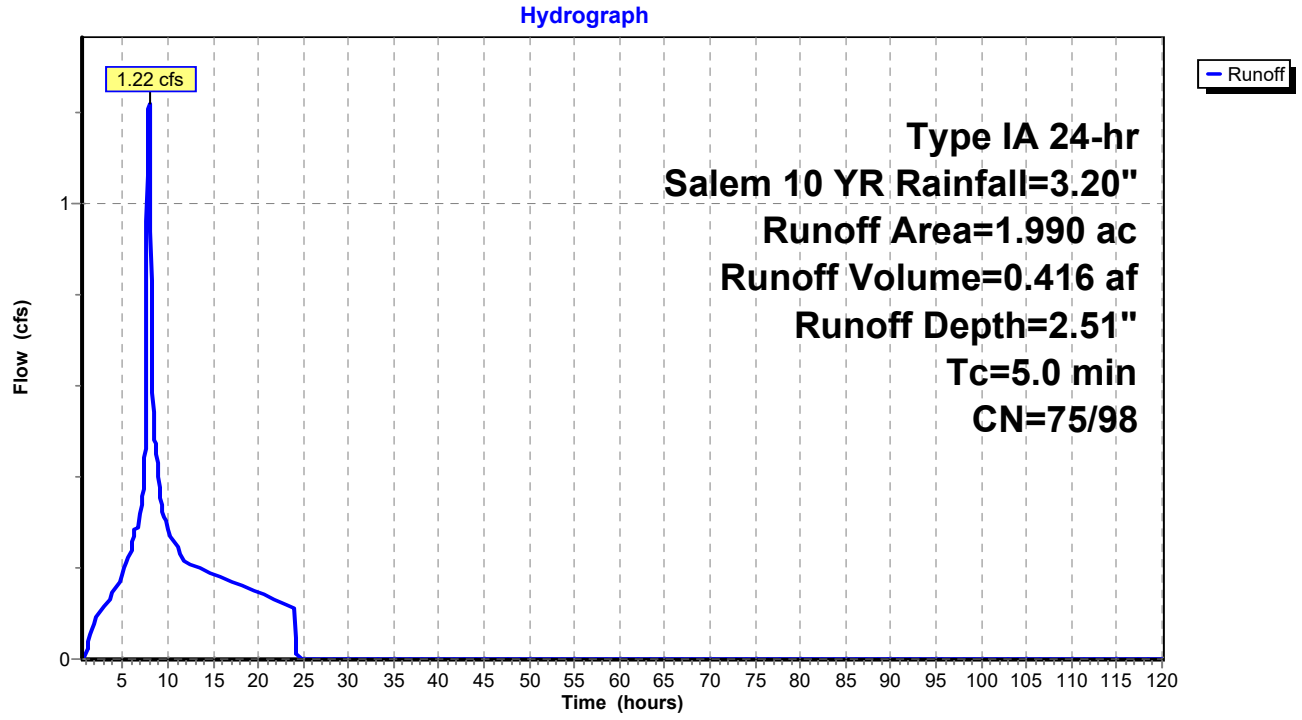
Runoff = 1.22 cfs @ 7.91 hrs, Volume= 0.416 af, Depth= 2.51"
Routed to Pond 7P. : Vintage Detention

Runoff by SBUH method, Split Pervious/Imperv., Time Span= 0.50-120.00 hrs, dt= 0.05 hrs
Type IA 24-hr Salem 10 YR Rainfall=3.20"

	Area (ac)	CN	Description
*	0.590	98	Paved roads w/curbs & sewers, HSG C
	1.400	90	1/8 acre lots, 65% imp, HSG C
	1.990	92	Weighted Average
	0.490		24.62% Pervious Area
	1.500		75.38% Impervious Area

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

Subcatchment 7S.: Basin 7



Summary for Subcatchment 1S.: Basin 1

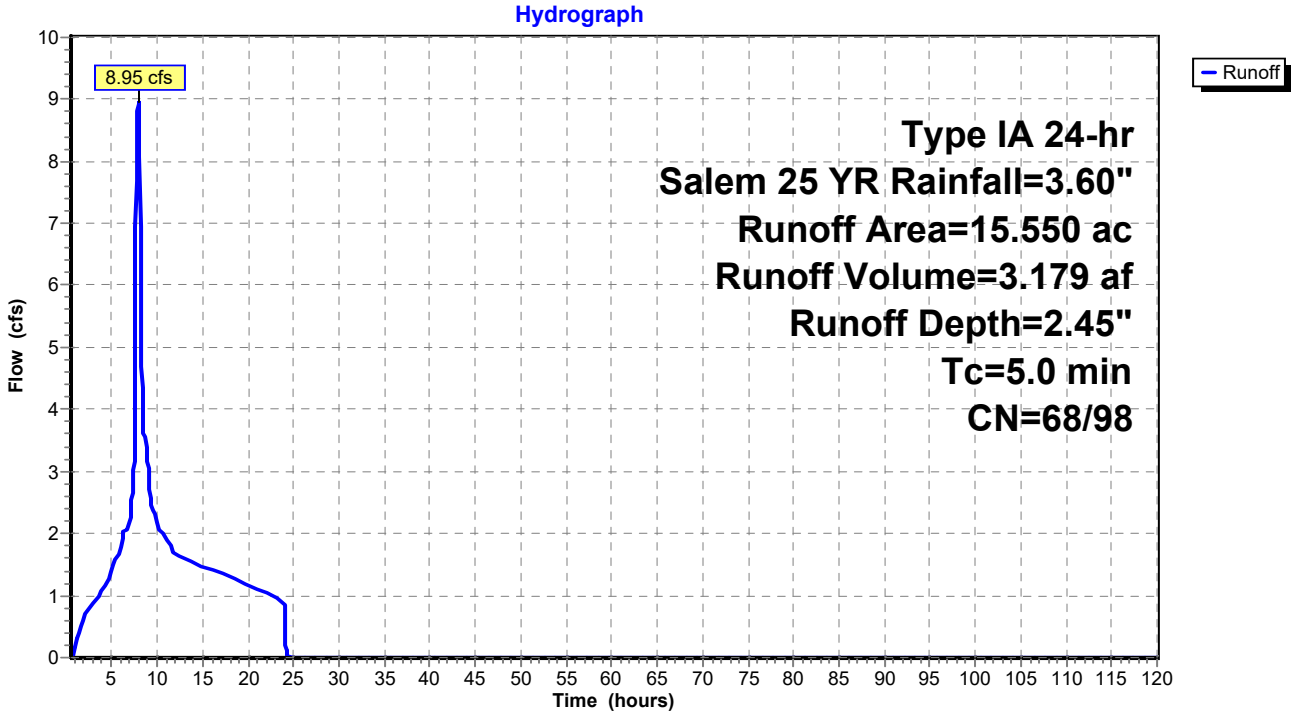
Runoff = 8.95 cfs @ 7.93 hrs, Volume= 3.179 af, Depth= 2.45"
Routed to Pond 1P. : Foxhaven Detention

Runoff by SBUH method, Split Pervious/Imperv., Time Span= 0.50-120.00 hrs, dt= 0.05 hrs
Type IA 24-hr Salem 25 YR Rainfall=3.60"

	Area (ac)	CN	Description
*	9.650	98	Paved/Roof, HSG C
	2.950	61	>75% Grass cover, Good, HSG B
	2.950	74	>75% Grass cover, Good, HSG C
	15.550	86	Weighted Average
	5.900		37.94% Pervious Area
	9.650		62.06% Impervious Area

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

Subcatchment 1S.: Basin 1



Summary for Subcatchment 2AS: Basin 2A

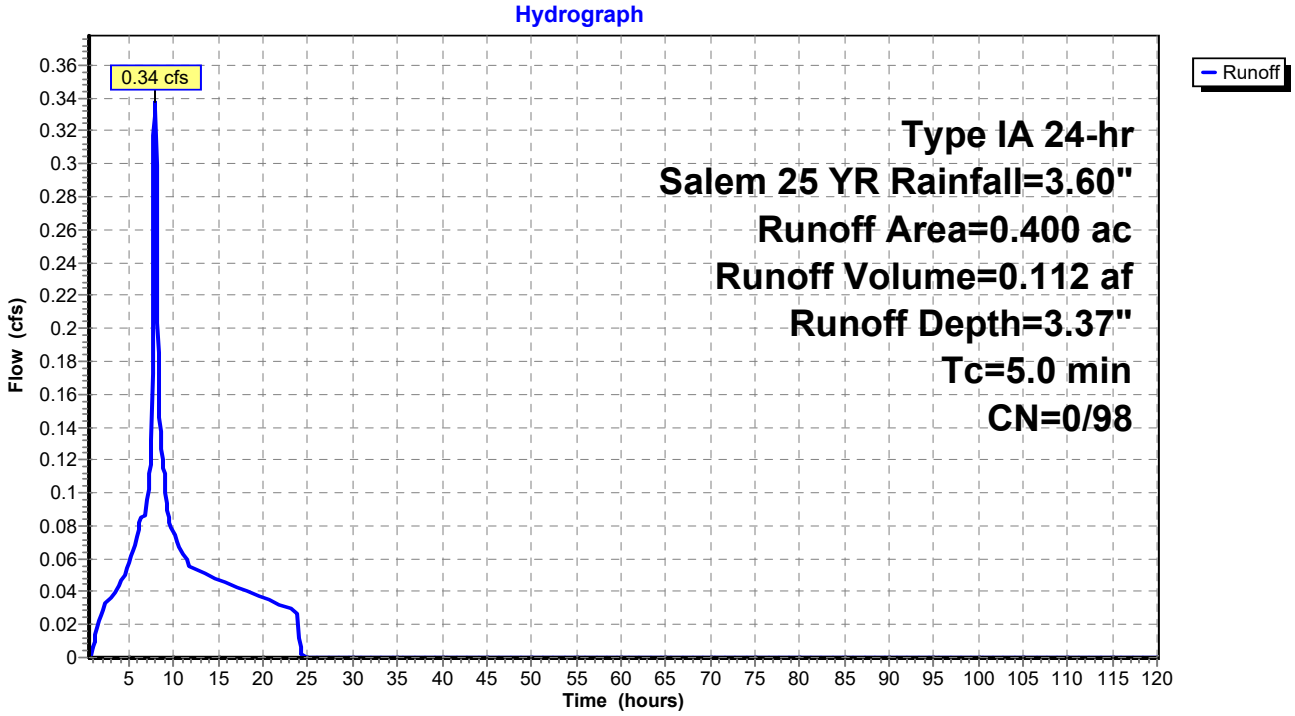
Runoff = 0.34 cfs @ 7.90 hrs, Volume= 0.112 af, Depth= 3.37"
Routed to Link 2L : Developed Release

Runoff by SBUH method, Split Pervious/Imperv., Time Span= 0.50-120.00 hrs, dt= 0.05 hrs
Type IA 24-hr Salem 25 YR Rainfall=3.60"

	Area (ac)	CN	Description
*	0.400	98	Paved/Roof, HSG C
	0.400		100.00% Impervious Area

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

Subcatchment 2AS: Basin 2A



Summary for Subcatchment 2BS: Basin 2B

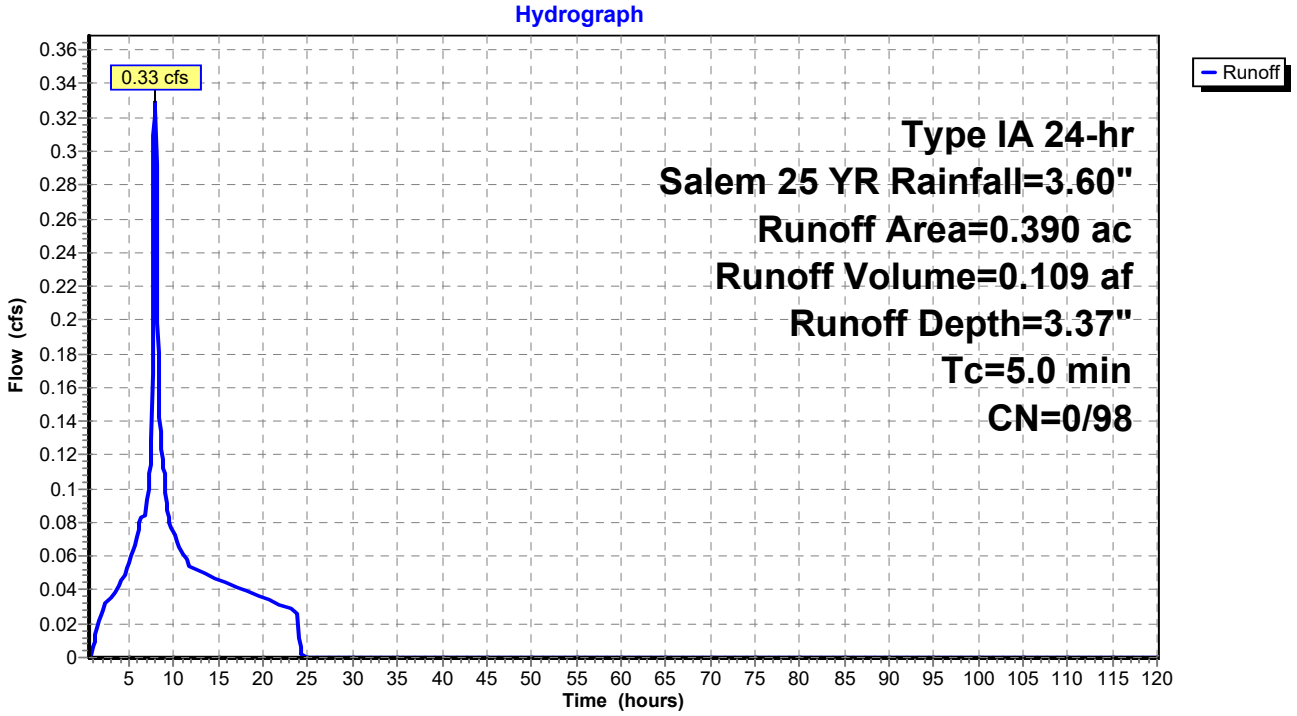
Runoff = 0.33 cfs @ 7.90 hrs, Volume= 0.109 af, Depth= 3.37"
Routed to Link 2L : Developed Release

Runoff by SBUH method, Split Pervious/Imperv., Time Span= 0.50-120.00 hrs, dt= 0.05 hrs
Type IA 24-hr Salem 25 YR Rainfall=3.60"

	Area (ac)	CN	Description
*	0.390	98	Paved roads w/curbs & sewers, HSG C
	0.390		100.00% Impervious Area

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

Subcatchment 2BS: Basin 2B



Summary for Subcatchment 3S.: Basin 3

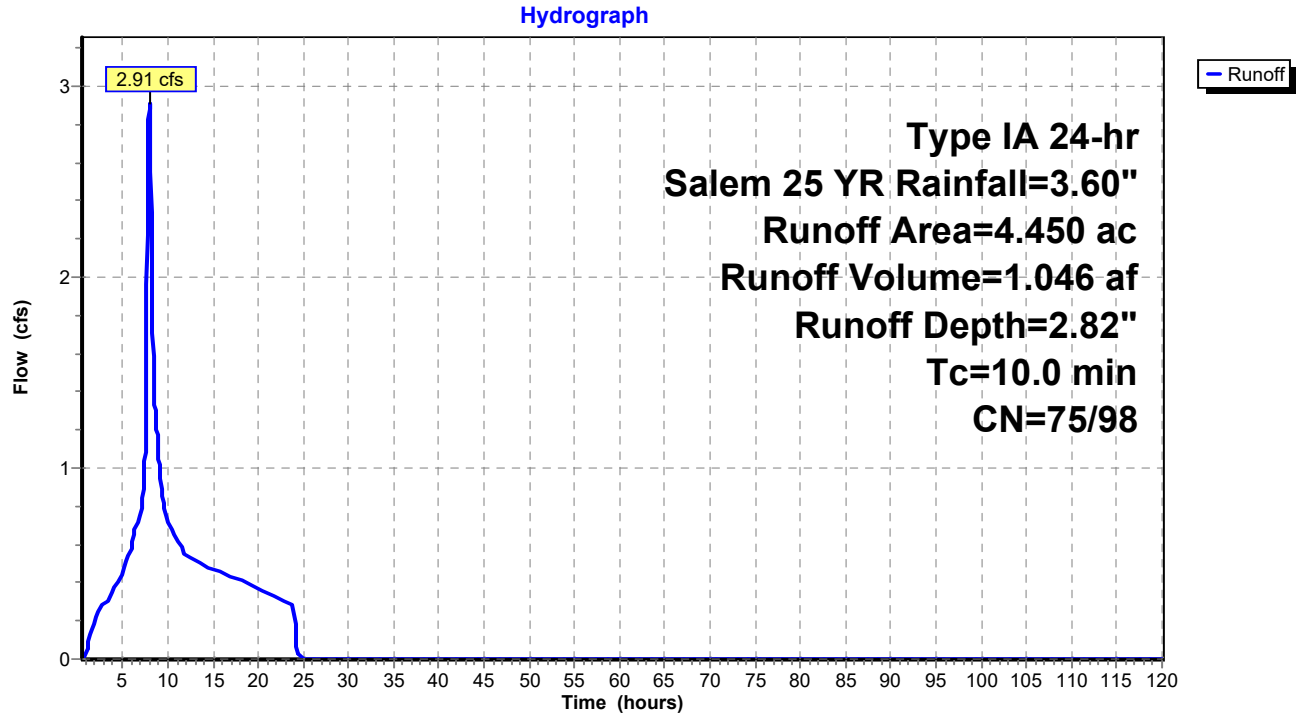
Runoff = 2.91 cfs @ 7.98 hrs, Volume= 1.046 af, Depth= 2.82"
Routed to Pond 1P. : Foxhaven Detention

Runoff by SBUH method, Split Pervious/Imperv., Time Span= 0.50-120.00 hrs, dt= 0.05 hrs
Type IA 24-hr Salem 25 YR Rainfall=3.60"

	Area (ac)	CN	Description
*	0.970	98	Paved roads w/curbs & sewers, HSG C
	3.480	90	1/8 acre lots, 65% imp, HSG C
	4.450	92	Weighted Average
	1.218		27.37% Pervious Area
	3.232		72.63% Impervious Area

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

Subcatchment 3S.: Basin 3



Summary for Subcatchment 4S.: Basin 4

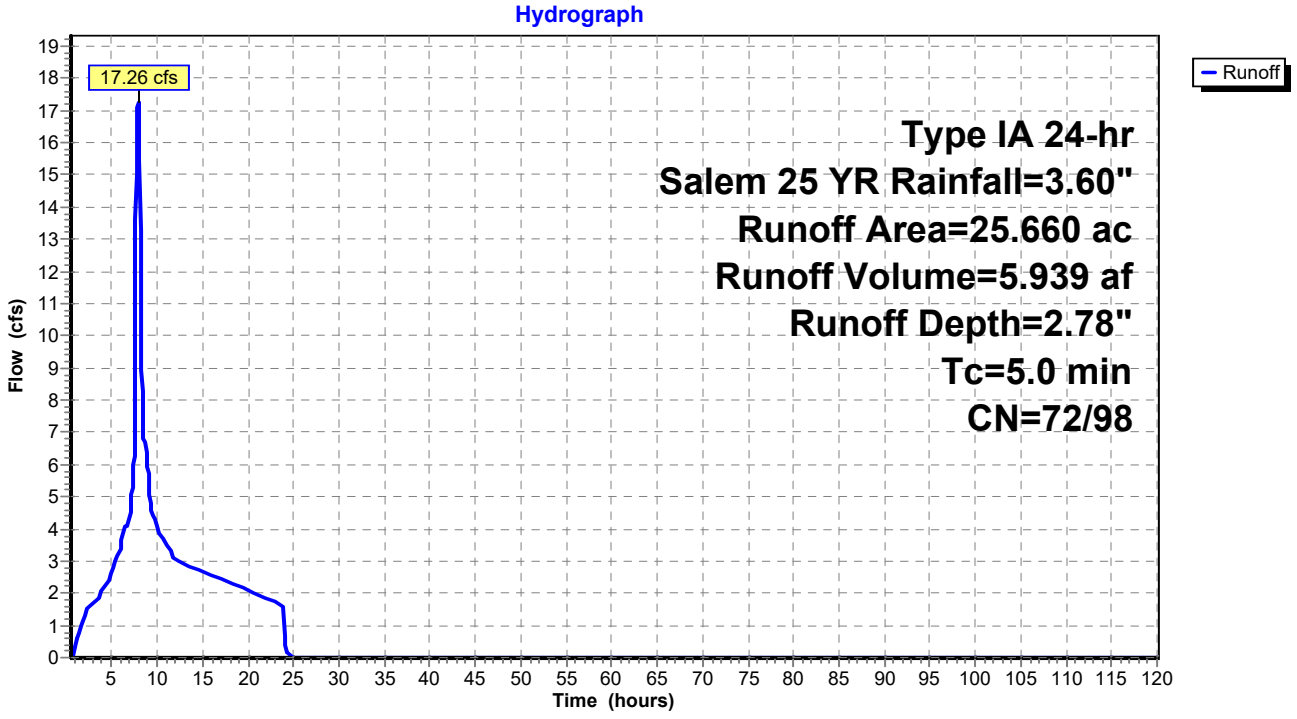
Runoff = 17.26 cfs @ 7.92 hrs, Volume= 5.939 af, Depth= 2.78"
Routed to Pond 4P. : Baxter Reconstructed Rain Garden

Runoff by SBUH method, Split Pervious/Imperv., Time Span= 0.50-120.00 hrs, dt= 0.05 hrs
Type IA 24-hr Salem 25 YR Rainfall=3.60"

	Area (ac)	CN	Description
*	5.860	98	Paved roads w/curbs & sewers, HSG C
	4.950	85	1/8 acre lots, 65% imp, HSG B
	14.850	90	1/8 acre lots, 65% imp, HSG C
	25.660	91	Weighted Average
	6.930		27.01% Pervious Area
	18.730		72.99% Impervious Area

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

Subcatchment 4S.: Basin 4



Summary for Subcatchment 5S.: Basin 5

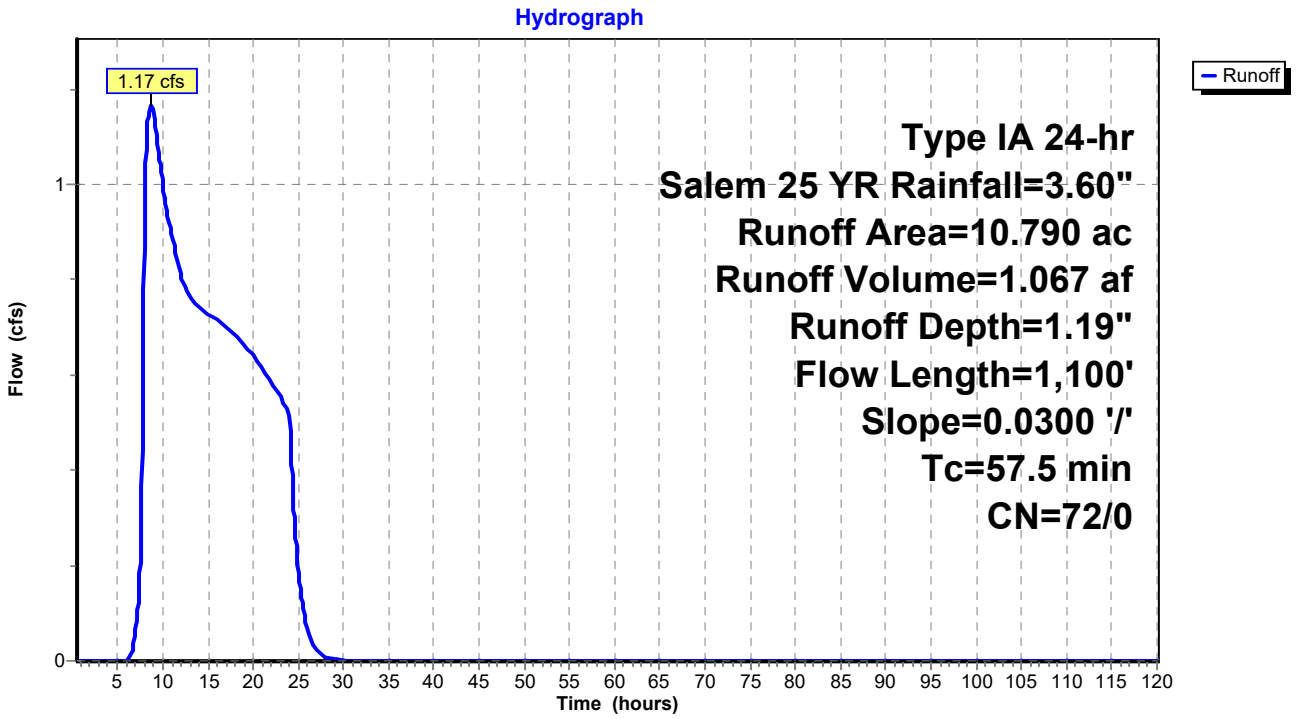
Runoff = 1.17 cfs @ 8.78 hrs, Volume= 1.067 af, Depth= 1.19"
Routed to Pond 4P. : Baxter Reconstructed Rain Garden

Runoff by SBUH method, Split Pervious/Imperv., Time Span= 0.50-120.00 hrs, dt= 0.05 hrs
Type IA 24-hr Salem 25 YR Rainfall=3.60"

Area (ac)	CN	Description
10.790	72	Woods/grass comb., Good, HSG C
10.790		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
42.1	300	0.0300	0.12		**Sheet Flow, Pre Developed** n= 0.300 P2= 2.20"
15.4	800	0.0300	0.87		**Shallow Concentrated Flow,** Woodland Kv= 5.0 fps
57.5	1,100	Total			

Subcatchment 5S.: Basin 5



Summary for Subcatchment 6S.: Basin 6

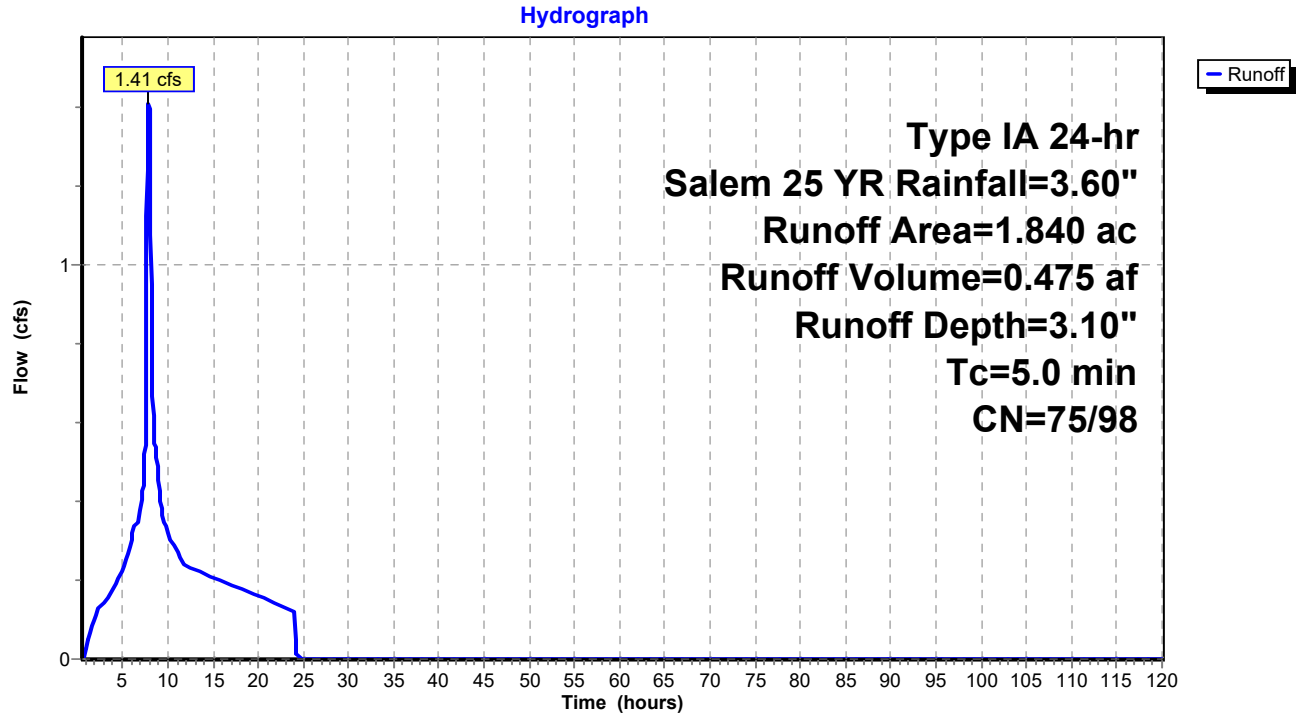
Runoff = 1.41 cfs @ 7.90 hrs, Volume= 0.475 af, Depth= 3.10"
Routed to Pond 4P. : Baxter Reconstructed Rain Garden

Runoff by SBUH method, Split Pervious/Imperv., Time Span= 0.50-120.00 hrs, dt= 0.05 hrs
Type IA 24-hr Salem 25 YR Rainfall=3.60"

	Area (ac)	CN	Description
*	1.140	98	Paved roads w/curbs & sewers, HSG C
	0.700	90	1/8 acre lots, 65% imp, HSG C
	1.840	95	Weighted Average
	0.245		13.32% Pervious Area
	1.595		86.68% Impervious Area

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

Subcatchment 6S.: Basin 6



Summary for Subcatchment 7S.: Basin 7

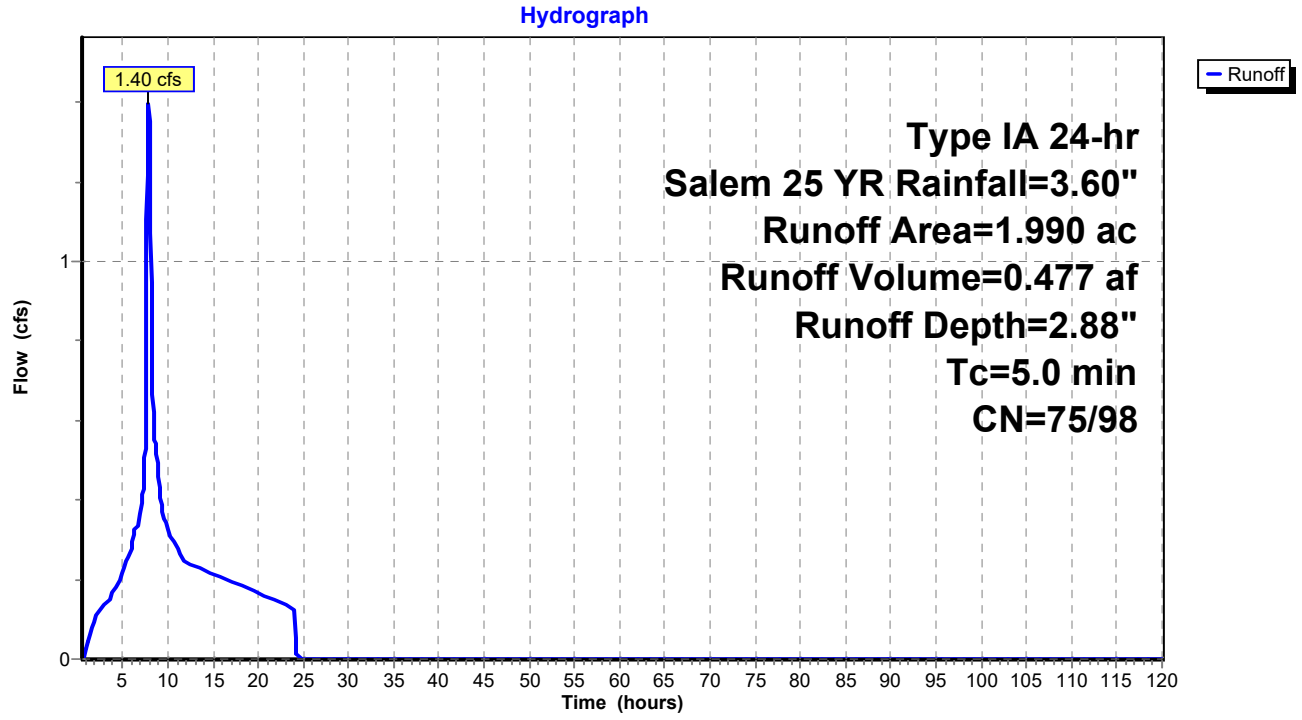
Runoff = 1.40 cfs @ 7.91 hrs, Volume= 0.477 af, Depth= 2.88"
Routed to Pond 7P. : Vintage Detention

Runoff by SBUH method, Split Pervious/Imperv., Time Span= 0.50-120.00 hrs, dt= 0.05 hrs
Type IA 24-hr Salem 25 YR Rainfall=3.60"

	Area (ac)	CN	Description
*	0.590	98	Paved roads w/curbs & sewers, HSG C
	1.400	90	1/8 acre lots, 65% imp, HSG C
	1.990	92	Weighted Average
	0.490		24.62% Pervious Area
	1.500		75.38% Impervious Area

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

Subcatchment 7S.: Basin 7



Summary for Subcatchment 1S.: Basin 1

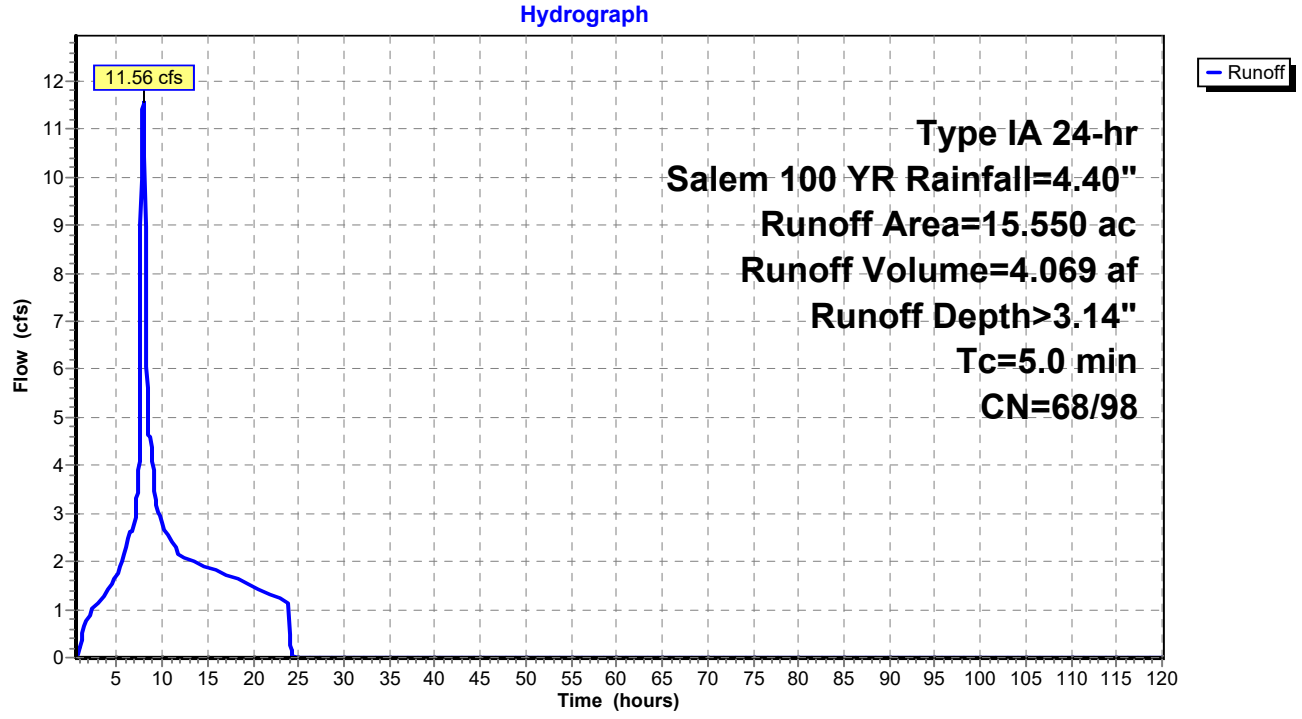
Runoff = 11.56 cfs @ 7.92 hrs, Volume= 4.069 af, Depth> 3.14"
Routed to Pond 1P. : Foxhaven Detention

Runoff by SBUH method, Split Pervious/Imperv., Time Span= 0.50-120.00 hrs, dt= 0.05 hrs
Type IA 24-hr Salem 100 YR Rainfall=4.40"

	Area (ac)	CN	Description
*	9.650	98	Paved/Roof, HSG C
	2.950	61	>75% Grass cover, Good, HSG B
	2.950	74	>75% Grass cover, Good, HSG C
	15.550	86	Weighted Average
	5.900		37.94% Pervious Area
	9.650		62.06% Impervious Area

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

Subcatchment 1S.: Basin 1



Summary for Subcatchment 2AS: Basin 2A

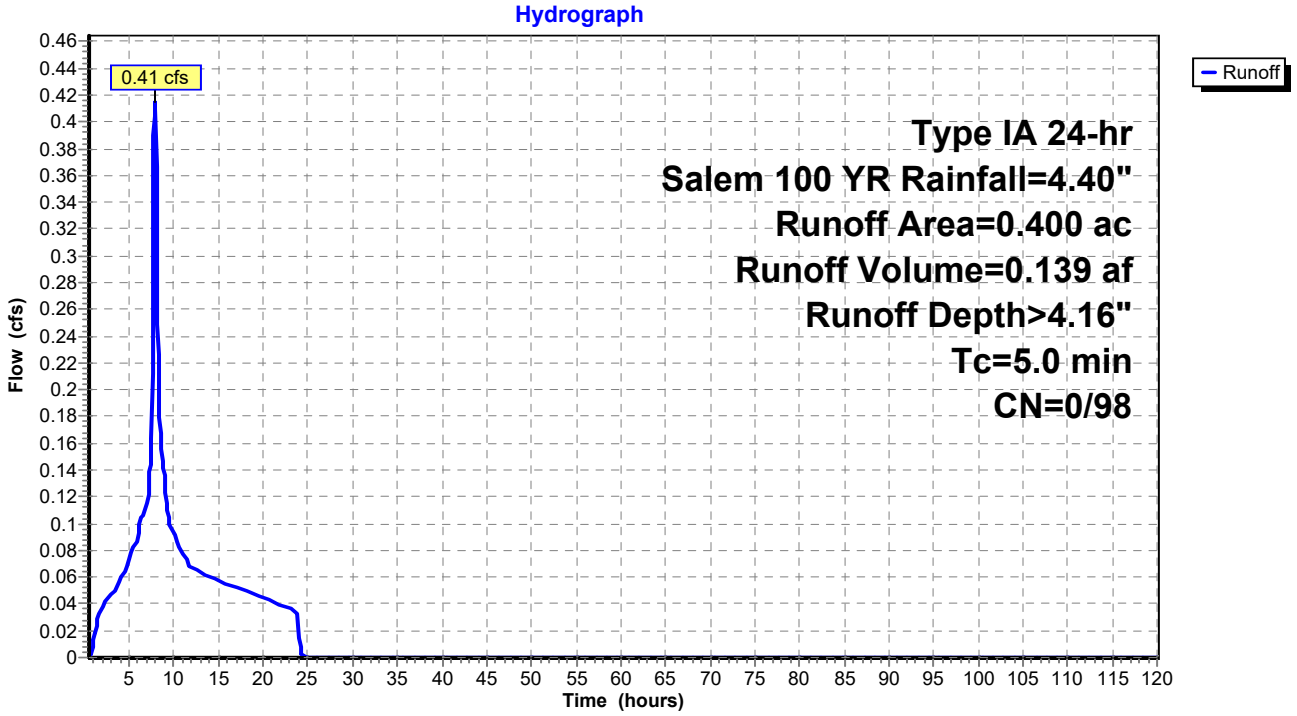
Runoff = 0.41 cfs @ 7.90 hrs, Volume= 0.139 af, Depth> 4.16"
Routed to Link 2L : Developed Release

Runoff by SBUH method, Split Pervious/Imperv., Time Span= 0.50-120.00 hrs, dt= 0.05 hrs
Type IA 24-hr Salem 100 YR Rainfall=4.40"

	Area (ac)	CN	Description
*	0.400	98	Paved/Roof, HSG C
	0.400		100.00% Impervious Area

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

Subcatchment 2AS: Basin 2A



Summary for Subcatchment 2BS: Basin 2B

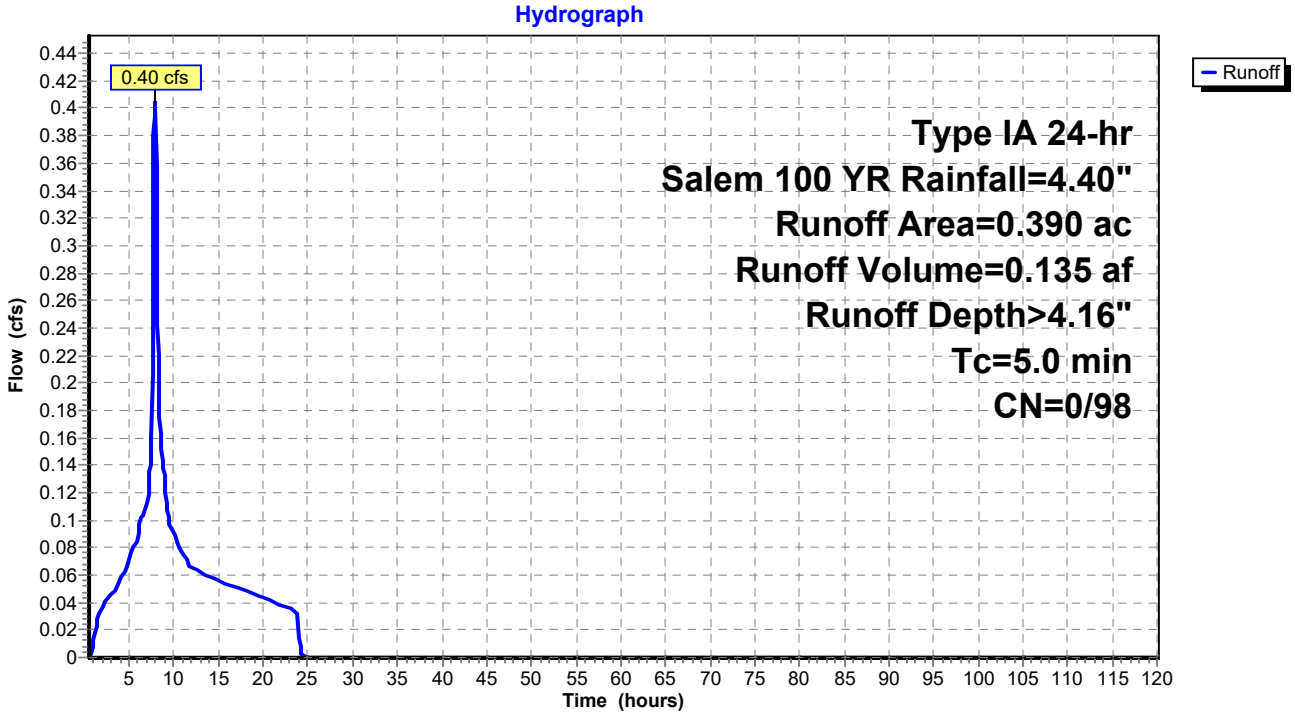
Runoff = 0.40 cfs @ 7.90 hrs, Volume= 0.135 af, Depth> 4.16"
Routed to Link 2L : Developed Release

Runoff by SBUH method, Split Pervious/Imperv., Time Span= 0.50-120.00 hrs, dt= 0.05 hrs
Type IA 24-hr Salem 100 YR Rainfall=4.40"

	Area (ac)	CN	Description
*	0.390	98	Paved roads w/curbs & sewers, HSG C
	0.390		100.00% Impervious Area

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

Subcatchment 2BS: Basin 2B



Summary for Subcatchment 3S.: Basin 3

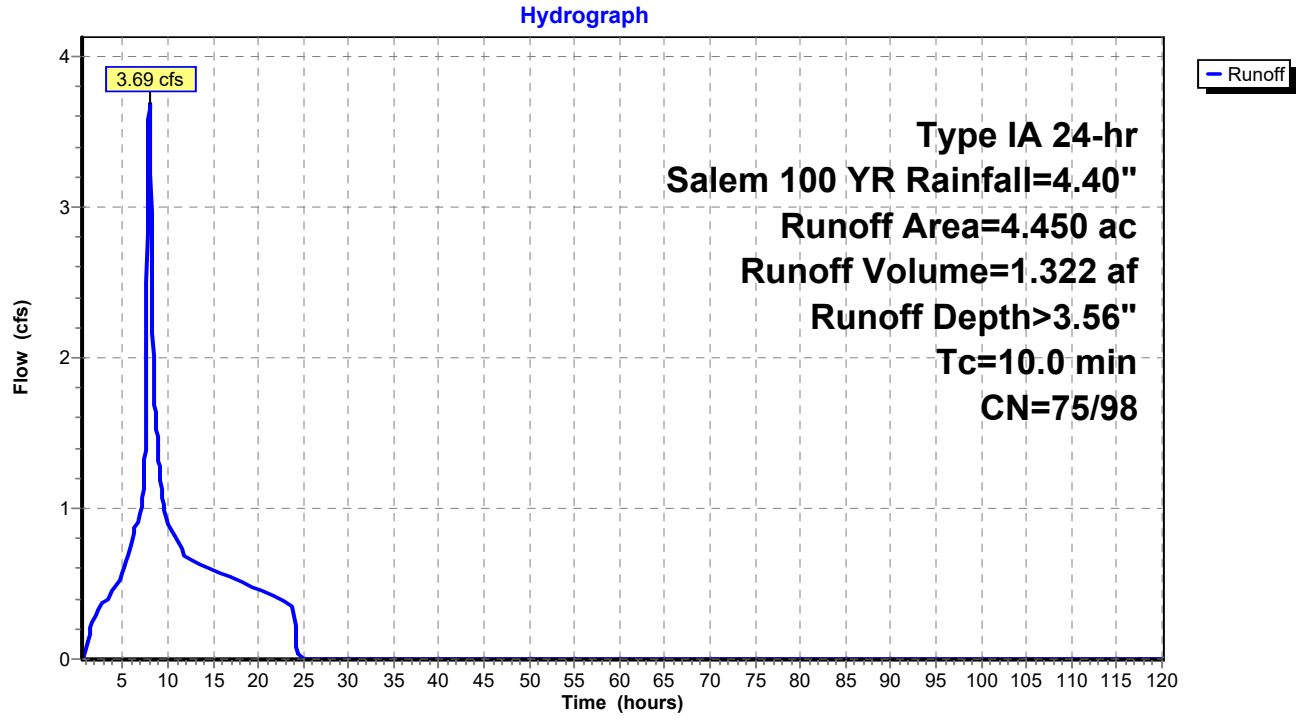
Runoff = 3.69 cfs @ 7.98 hrs, Volume= 1.322 af, Depth> 3.56"
Routed to Pond 1P. : Foxhaven Detention

Runoff by SBUH method, Split Pervious/Imperv., Time Span= 0.50-120.00 hrs, dt= 0.05 hrs
Type IA 24-hr Salem 100 YR Rainfall=4.40"

	Area (ac)	CN	Description
*	0.970	98	Paved roads w/curbs & sewers, HSG C
	3.480	90	1/8 acre lots, 65% imp, HSG C
	4.450	92	Weighted Average
	1.218		27.37% Pervious Area
	3.232		72.63% Impervious Area

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

Subcatchment 3S.: Basin 3



Summary for Subcatchment 4S.: Basin 4

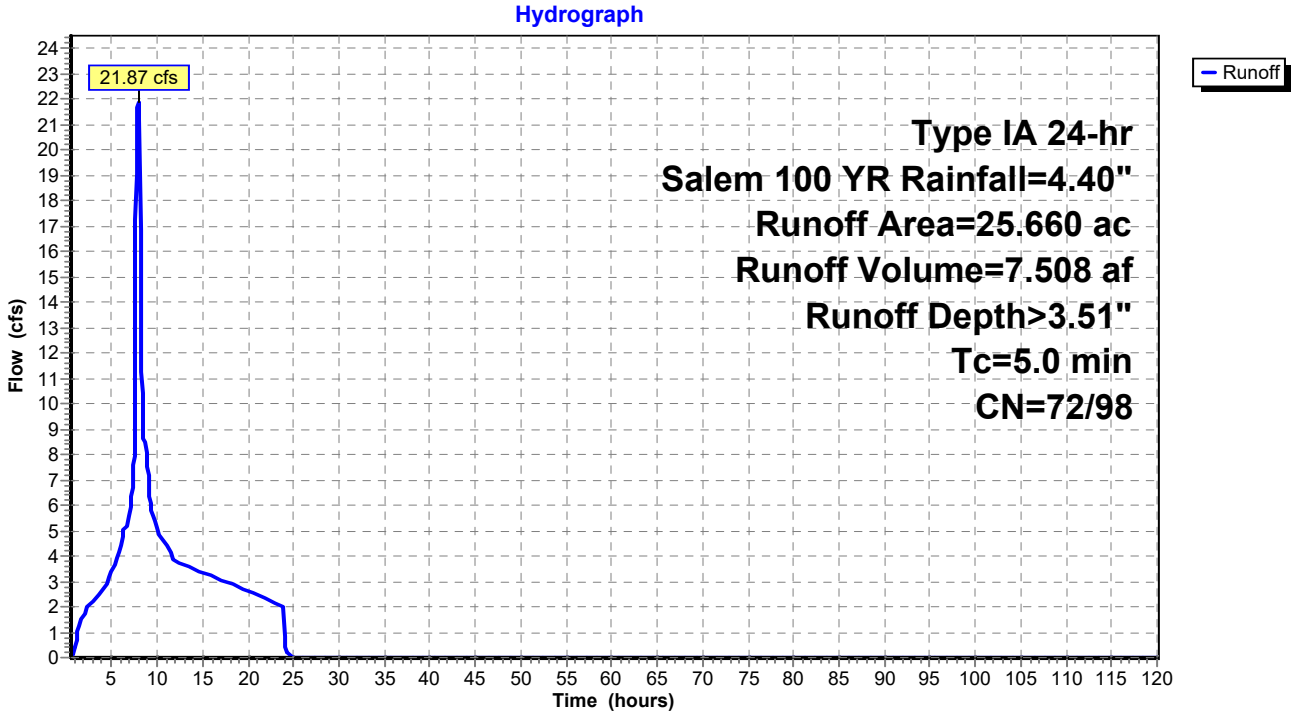
Runoff = 21.87 cfs @ 7.91 hrs, Volume= 7.508 af, Depth> 3.51"
Routed to Pond 4P. : Baxter Reconstructed Rain Garden

Runoff by SBUH method, Split Pervious/Imperv., Time Span= 0.50-120.00 hrs, dt= 0.05 hrs
Type IA 24-hr Salem 100 YR Rainfall=4.40"

	Area (ac)	CN	Description
*	5.860	98	Paved roads w/curbs & sewers, HSG C
	4.950	85	1/8 acre lots, 65% imp, HSG B
	14.850	90	1/8 acre lots, 65% imp, HSG C
	25.660	91	Weighted Average
	6.930		27.01% Pervious Area
	18.730		72.99% Impervious Area

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

Subcatchment 4S.: Basin 4



Summary for Subcatchment 5S.: Basin 5

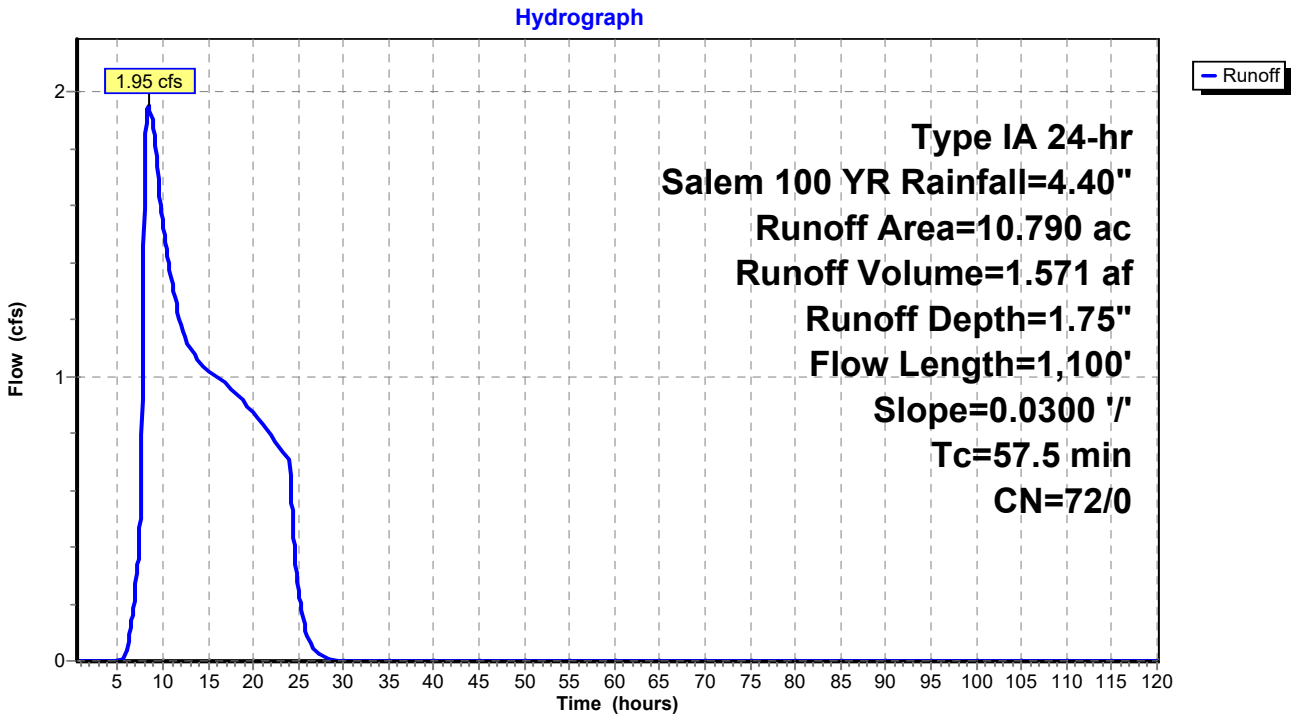
Runoff = 1.95 cfs @ 8.37 hrs, Volume= 1.571 af, Depth= 1.75"
Routed to Pond 4P. : Baxter Reconstructed Rain Garden

Runoff by SBUH method, Split Pervious/Imperv., Time Span= 0.50-120.00 hrs, dt= 0.05 hrs
Type IA 24-hr Salem 100 YR Rainfall=4.40"

Area (ac)	CN	Description
10.790	72	Woods/grass comb., Good, HSG C
10.790		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
42.1	300	0.0300	0.12		**Sheet Flow, Pre Developed** n= 0.300 P2= 2.20"
15.4	800	0.0300	0.87		**Shallow Concentrated Flow,** Woodland Kv= 5.0 fps
57.5	1,100	Total			

Subcatchment 5S.: Basin 5



Summary for Subcatchment 6S.: Basin 6

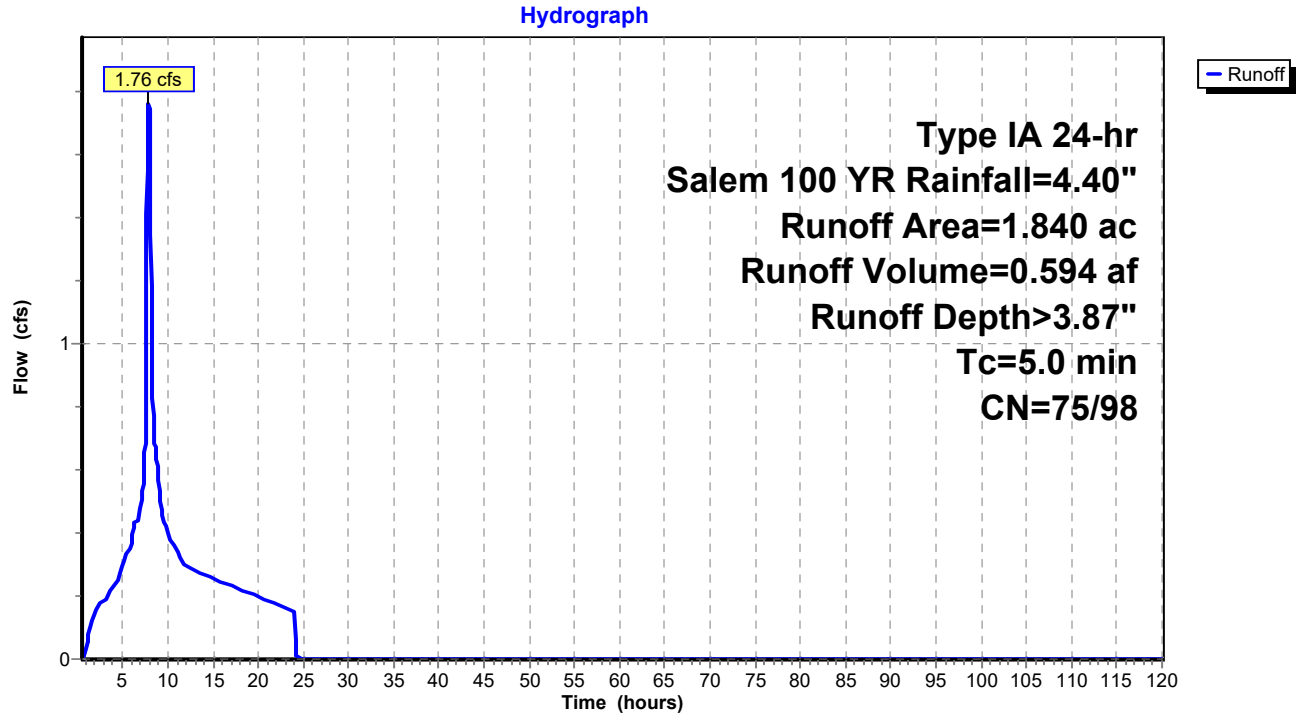
Runoff = 1.76 cfs @ 7.90 hrs, Volume= 0.594 af, Depth> 3.87"
Routed to Pond 4P. : Baxter Reconstructed Rain Garden

Runoff by SBUH method, Split Pervious/Imperv., Time Span= 0.50-120.00 hrs, dt= 0.05 hrs
Type IA 24-hr Salem 100 YR Rainfall=4.40"

	Area (ac)	CN	Description
*	1.140	98	Paved roads w/curbs & sewers, HSG C
	0.700	90	1/8 acre lots, 65% imp, HSG C
	1.840	95	Weighted Average
	0.245		13.32% Pervious Area
	1.595		86.68% Impervious Area

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

Subcatchment 6S.: Basin 6



Summary for Subcatchment 7S.: Basin 7

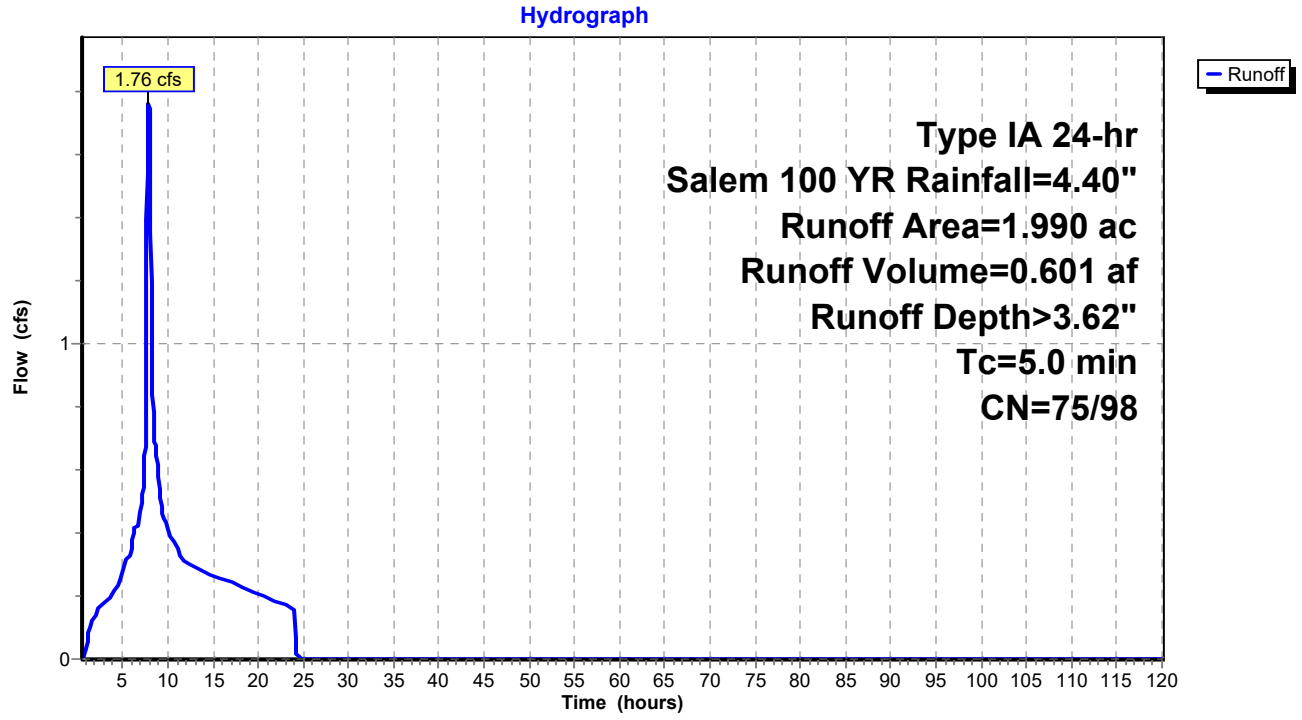
Runoff = 1.76 cfs @ 7.91 hrs, Volume= 0.601 af, Depth> 3.62"
Routed to Pond 7P. : Vintage Detention

Runoff by SBUH method, Split Pervious/Imperv., Time Span= 0.50-120.00 hrs, dt= 0.05 hrs
Type IA 24-hr Salem 100 YR Rainfall=4.40"

	Area (ac)	CN	Description
*	0.590	98	Paved roads w/curbs & sewers, HSG C
	1.400	90	1/8 acre lots, 65% imp, HSG C
	1.990	92	Weighted Average
	0.490		24.62% Pervious Area
	1.500		75.38% Impervious Area

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

Subcatchment 7S.: Basin 7



Summary for Subcatchment 1S.: Basin 1

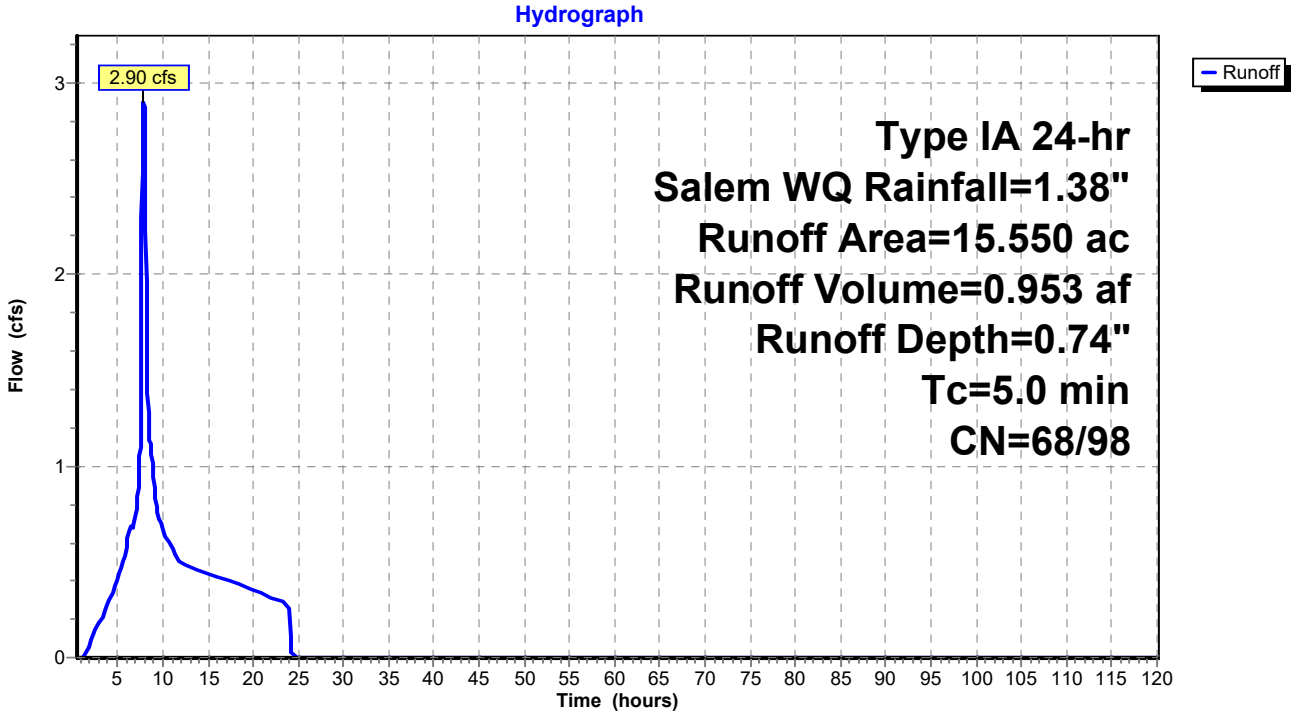
Runoff = 2.90 cfs @ 7.91 hrs, Volume= 0.953 af, Depth= 0.74"
Routed to Pond 1P. : Foxhaven Detention

Runoff by SBUH method, Split Pervious/Imperv., Time Span= 0.50-120.00 hrs, dt= 0.05 hrs
Type IA 24-hr Salem WQ Rainfall=1.38"

	Area (ac)	CN	Description
*	9.650	98	Paved/Roof, HSG C
	2.950	61	>75% Grass cover, Good, HSG B
	2.950	74	>75% Grass cover, Good, HSG C
	15.550	86	Weighted Average
	5.900		37.94% Pervious Area
	9.650		62.06% Impervious Area

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

Subcatchment 1S.: Basin 1



Summary for Subcatchment 2AS: Basin 2A

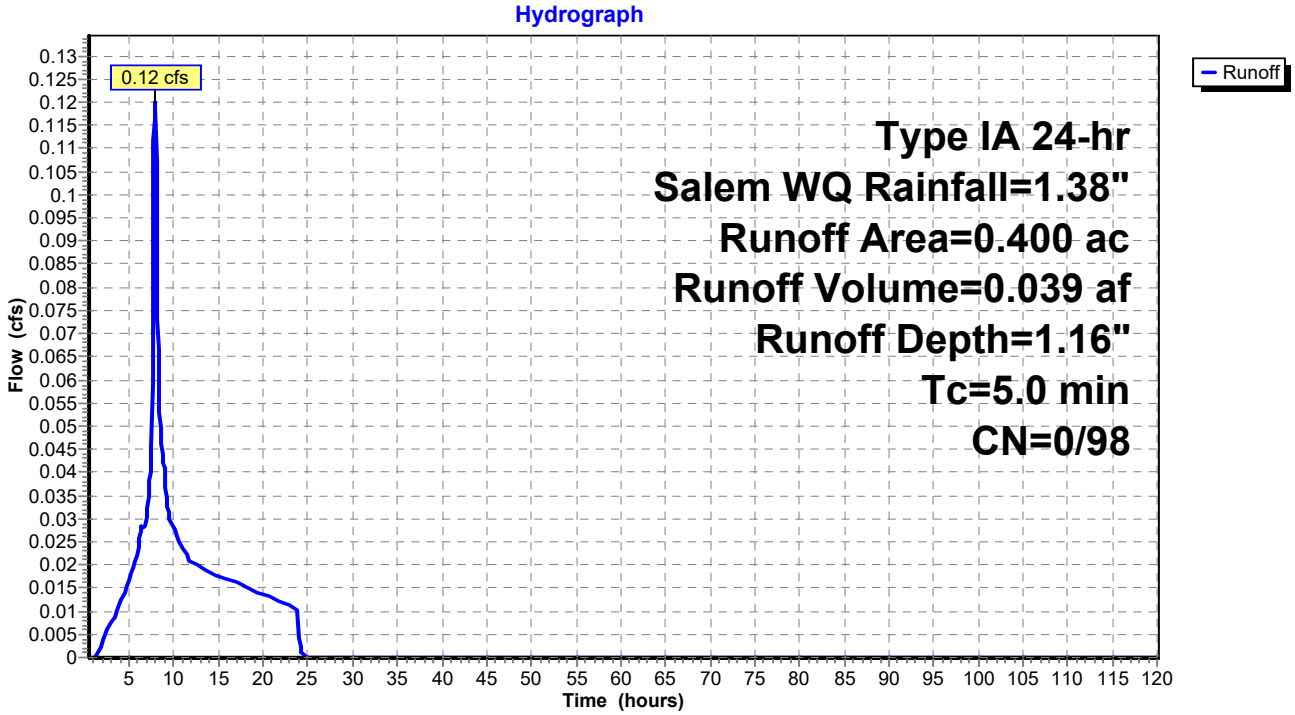
Runoff = 0.12 cfs @ 7.91 hrs, Volume= 0.039 af, Depth= 1.16"
Routed to Link 2L : Developed Release

Runoff by SBUH method, Split Pervious/Imperv., Time Span= 0.50-120.00 hrs, dt= 0.05 hrs
Type IA 24-hr Salem WQ Rainfall=1.38"

	Area (ac)	CN	Description
*	0.400	98	Paved/Roof, HSG C
	0.400		100.00% Impervious Area

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

Subcatchment 2AS: Basin 2A



Summary for Subcatchment 2BS: Basin 2B

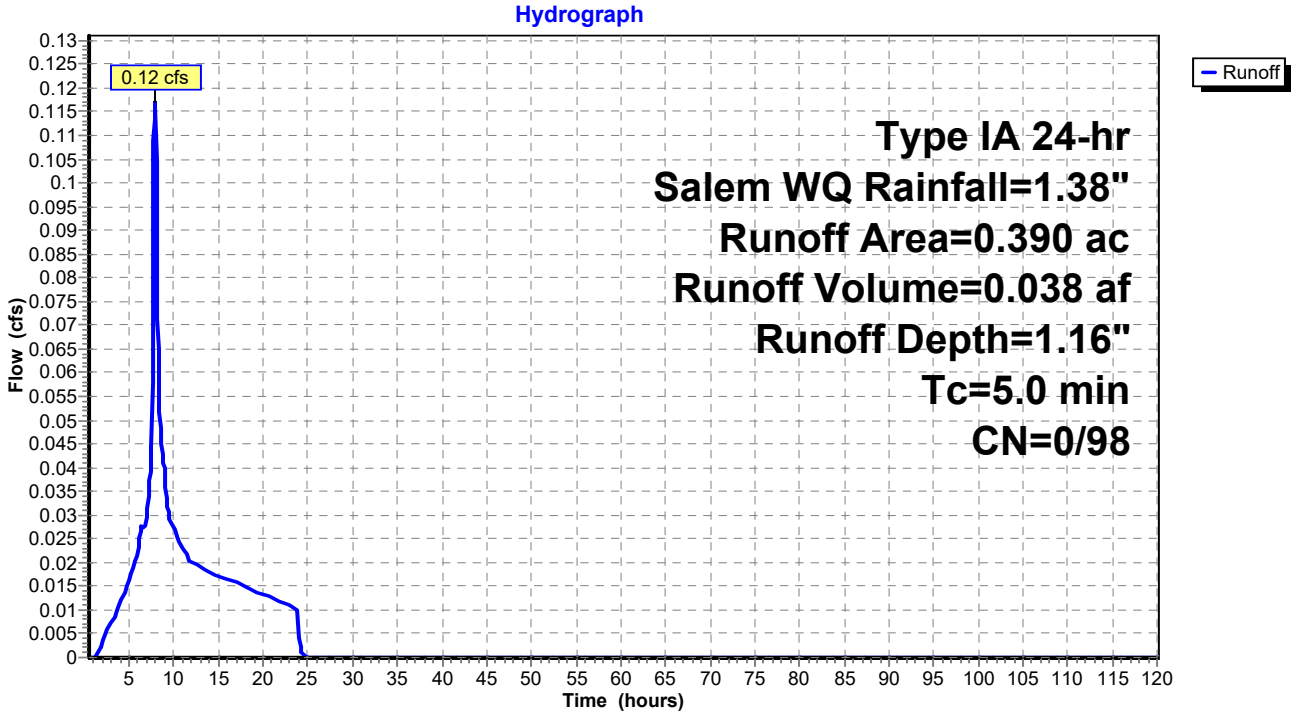
Runoff = 0.12 cfs @ 7.91 hrs, Volume= 0.038 af, Depth= 1.16"
Routed to Link 2L : Developed Release

Runoff by SBUH method, Split Pervious/Imperv., Time Span= 0.50-120.00 hrs, dt= 0.05 hrs
Type IA 24-hr Salem WQ Rainfall=1.38"

	Area (ac)	CN	Description
*	0.390	98	Paved roads w/curbs & sewers, HSG C
	0.390		100.00% Impervious Area

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

Subcatchment 2BS: Basin 2B



Summary for Subcatchment 3S.: Basin 3

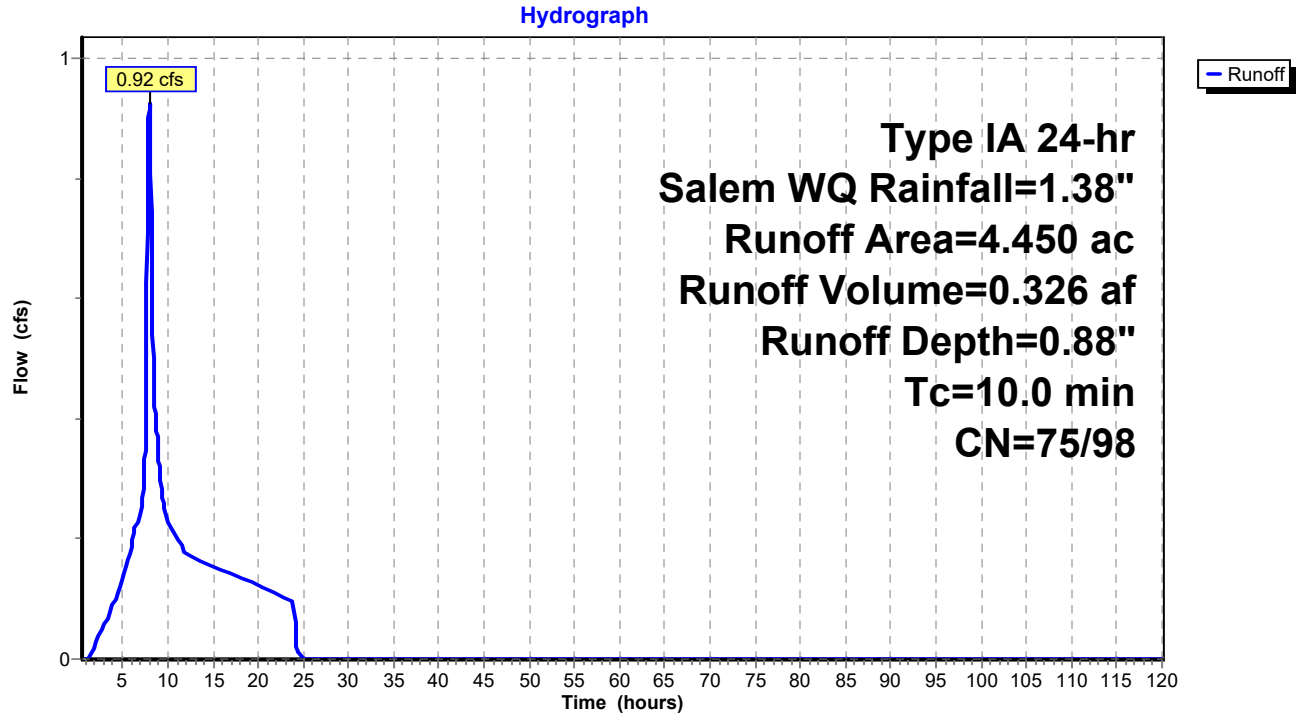
Runoff = 0.92 cfs @ 7.98 hrs, Volume= 0.326 af, Depth= 0.88"
Routed to Pond 1P. : Foxhaven Detention

Runoff by SBUH method, Split Pervious/Imperv., Time Span= 0.50-120.00 hrs, dt= 0.05 hrs
Type IA 24-hr Salem WQ Rainfall=1.38"

	Area (ac)	CN	Description
*	0.970	98	Paved roads w/curbs & sewers, HSG C
	3.480	90	1/8 acre lots, 65% imp, HSG C
	4.450	92	Weighted Average
	1.218		27.37% Pervious Area
	3.232		72.63% Impervious Area

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

Subcatchment 3S.: Basin 3



Summary for Subcatchment 4S.: Basin 4

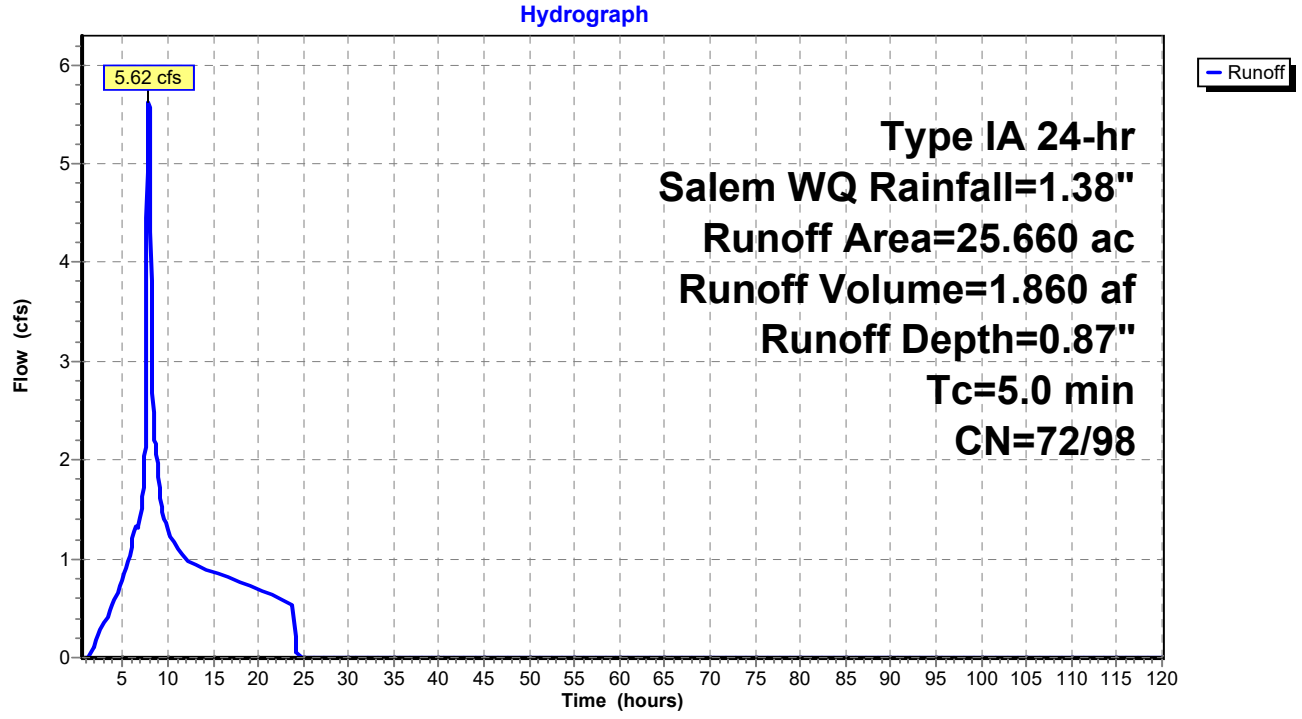
Runoff = 5.62 cfs @ 7.91 hrs, Volume= 1.860 af, Depth= 0.87"
Routed to Pond 4P. : Baxter Reconstructed Rain Garden

Runoff by SBUH method, Split Pervious/Imperv., Time Span= 0.50-120.00 hrs, dt= 0.05 hrs
Type IA 24-hr Salem WQ Rainfall=1.38"

	Area (ac)	CN	Description
*	5.860	98	Paved roads w/curbs & sewers, HSG C
	4.950	85	1/8 acre lots, 65% imp, HSG B
	14.850	90	1/8 acre lots, 65% imp, HSG C
	25.660	91	Weighted Average
	6.930		27.01% Pervious Area
	18.730		72.99% Impervious Area

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

Subcatchment 4S.: Basin 4



Summary for Subcatchment 5S.: Basin 5

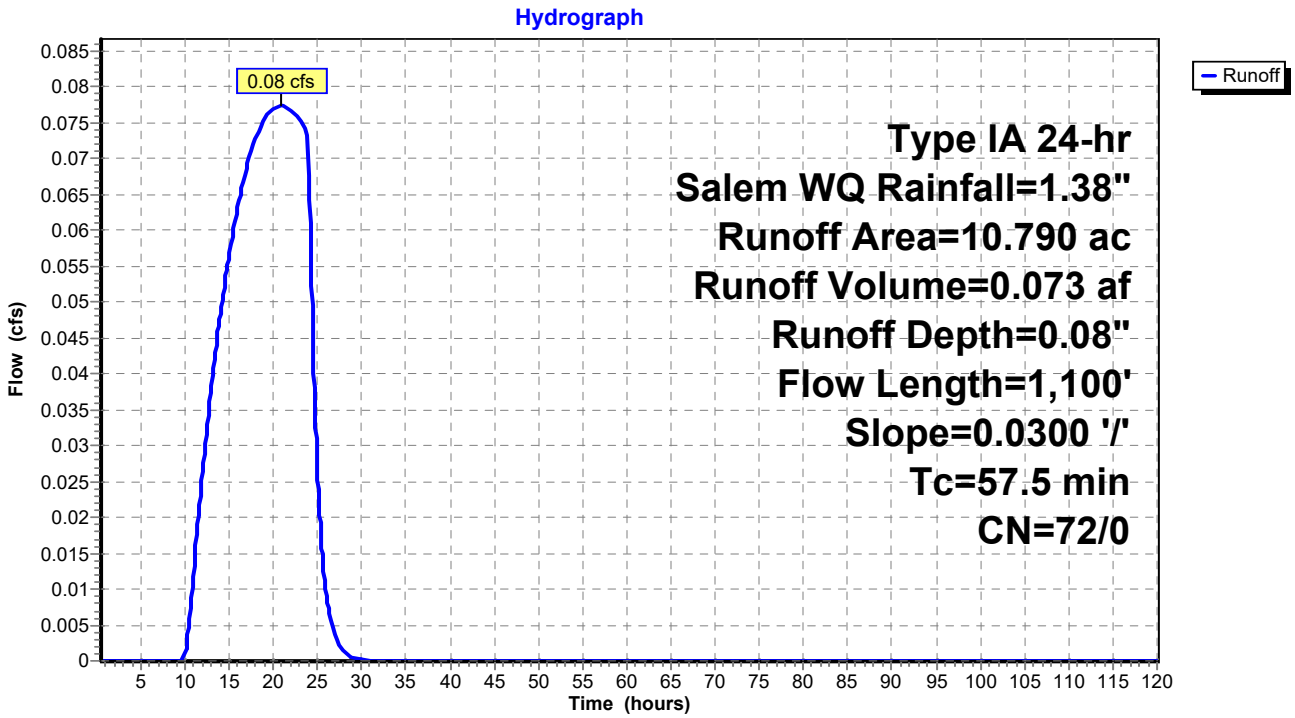
Runoff = 0.08 cfs @ 20.92 hrs, Volume= 0.073 af, Depth= 0.08"
Routed to Pond 4P. : Baxter Reconstructed Rain Garden

Runoff by SBUH method, Split Pervious/Imperv., Time Span= 0.50-120.00 hrs, dt= 0.05 hrs
Type IA 24-hr Salem WQ Rainfall=1.38"

Area (ac)	CN	Description
10.790	72	Woods/grass comb., Good, HSG C
10.790		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
42.1	300	0.0300	0.12		**Sheet Flow, Pre Developed** n= 0.300 P2= 2.20"
15.4	800	0.0300	0.87		**Shallow Concentrated Flow,** Woodland Kv= 5.0 fps
57.5	1,100	Total			

Subcatchment 5S.: Basin 5



Summary for Subcatchment 6S.: Basin 6

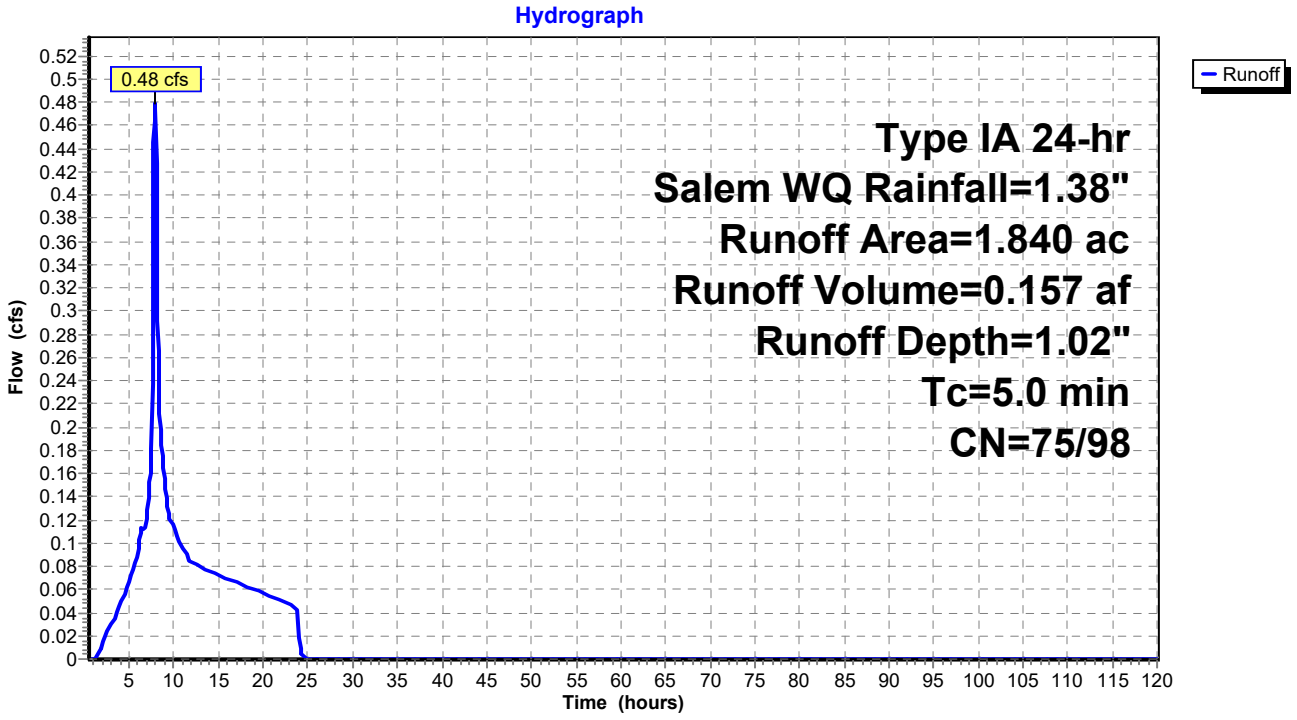
Runoff = 0.48 cfs @ 7.91 hrs, Volume= 0.157 af, Depth= 1.02"
Routed to Pond 4P. : Baxter Reconstructed Rain Garden

Runoff by SBUH method, Split Pervious/Imperv., Time Span= 0.50-120.00 hrs, dt= 0.05 hrs
Type IA 24-hr Salem WQ Rainfall=1.38"

	Area (ac)	CN	Description
*	1.140	98	Paved roads w/curbs & sewers, HSG C
	0.700	90	1/8 acre lots, 65% imp, HSG C
	1.840	95	Weighted Average
	0.245		13.32% Pervious Area
	1.595		86.68% Impervious Area

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

Subcatchment 6S.: Basin 6



Summary for Subcatchment 7S.: Basin 7

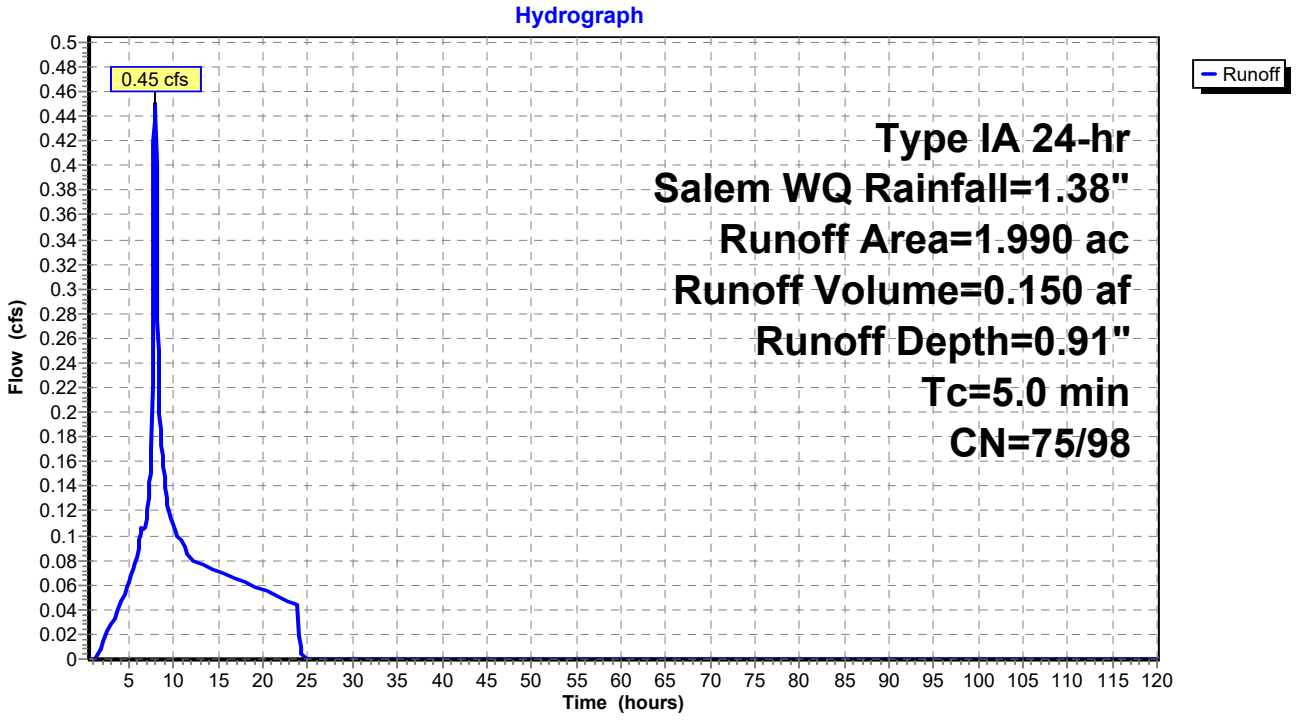
Runoff = 0.45 cfs @ 7.91 hrs, Volume= 0.150 af, Depth= 0.91"
Routed to Pond 7P. : Vintage Detention

Runoff by SBUH method, Split Pervious/Imperv., Time Span= 0.50-120.00 hrs, dt= 0.05 hrs
Type IA 24-hr Salem WQ Rainfall=1.38"

	Area (ac)	CN	Description
*	0.590	98	Paved roads w/curbs & sewers, HSG C
	1.400	90	1/8 acre lots, 65% imp, HSG C
	1.990	92	Weighted Average
	0.490		24.62% Pervious Area
	1.500		75.38% Impervious Area

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

Subcatchment 7S.: Basin 7



Summary for Pond 1P.: Foxhaven Detention

Inflow Area = 60.280 ac, 57.58% Impervious, Inflow Depth = 0.23" for Salem 1/2 2 YR event
Inflow = 2.91 cfs @ 7.94 hrs, Volume= 1.166 af
Outflow = 0.77 cfs @ 10.99 hrs, Volume= 1.166 af, Atten= 74%, Lag= 183.2 min
Discarded = 0.37 cfs @ 5.15 hrs, Volume= 0.784 af
Primary = 0.40 cfs @ 10.99 hrs, Volume= 0.382 af
Routed to Reach 1R. : Foxhaven Swale

Routing by Stor-Ind method, Time Span= 0.50-120.00 hrs, dt= 0.05 hrs
Peak Elev= 369.53' @ 10.99 hrs Surf.Area= 7,276 sf Storage= 10,073 cf

Plug-Flow detention time= 189.5 min calculated for 1.166 af (100% of inflow)
Center-of-Mass det. time= 189.5 min (950.5 - 761.0)

Volume	Invert	Avail.Storage	Storage Description
#1	365.50'	53,470 cf	**Detention Basin (Prismatic)**Listed below (Recalc)

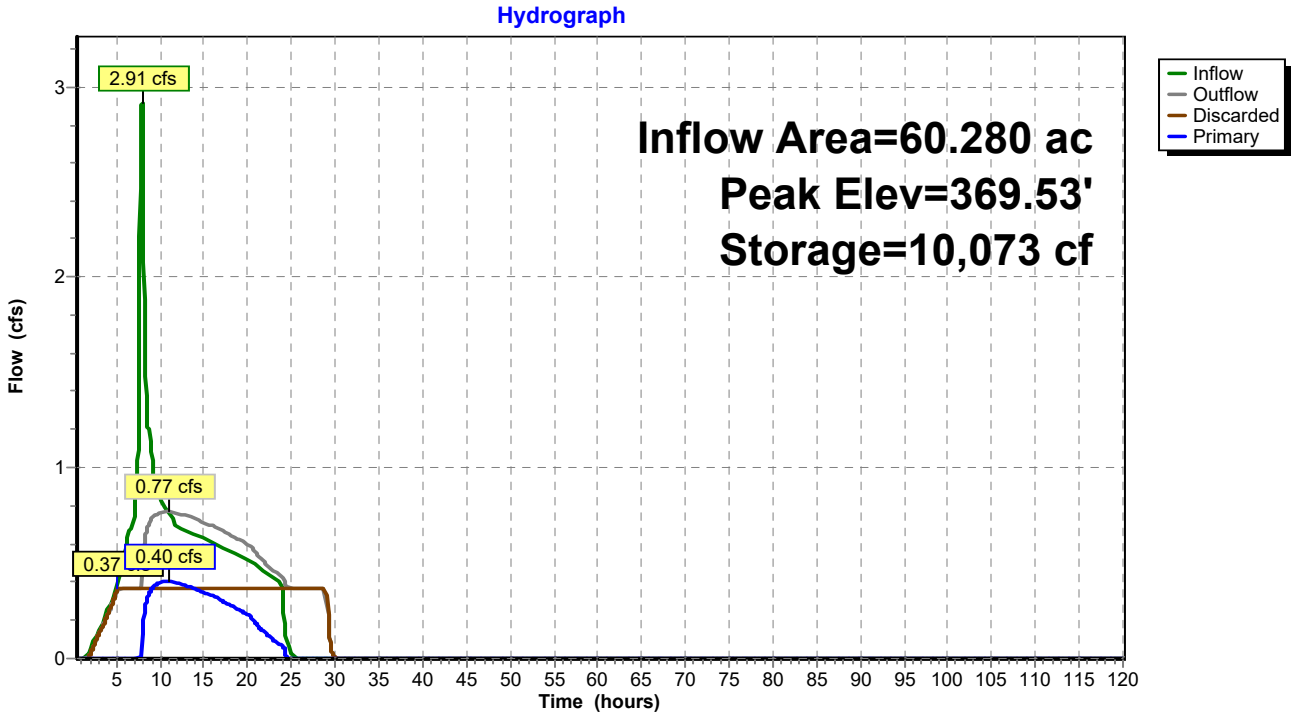
Elevation (feet)	Surf.Area (sq-ft)	Voids (%)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
365.50	7,930	0.0	0	0
367.50	7,930	40.0	6,344	6,344
369.00	6,740	0.1	11	6,355
370.00	7,750	100.0	7,245	13,600
371.00	8,810	100.0	8,280	21,880
372.00	9,920	100.0	9,365	31,245
373.00	11,100	100.0	10,510	41,755
374.00	12,330	100.0	11,715	53,470

Device	Routing	Invert	Outlet Devices
#1	Discarded	365.50'	**2.000 in/hr Exfiltration over Horizontal area**
#2	Primary	369.00'	**4.6" Horiz. Orifice** C= 0.600 Limited to weir flow at low heads
#3	Primary	370.40'	**11.4" Horiz. Orifice** C= 0.600 Limited to weir flow at low heads
#4	Primary	372.90'	**5.0' long Sharp-Crested Rectangular Weir** 2 End Contraction(s) 1.0' Crest Height

Discarded OutFlow Max=0.37 cfs @ 5.15 hrs HW=365.59' (Free Discharge)
└**1=Exfiltration** (Exfiltration Controls 0.37 cfs)

Primary OutFlow Max=0.40 cfs @ 10.99 hrs HW=369.53' (Free Discharge)
├**2=Orifice** (Orifice Controls 0.40 cfs @ 3.51 fps)
├**3=Orifice** (Controls 0.00 cfs)
└**4=Sharp-Crested Rectangular Weir** (Controls 0.00 cfs)

Pond 1P.: Foxhaven Detention



Summary for Pond 4P.: Baxter Reconstructed Rain Garden

Inflow Area = 40.280 ac, 54.18% Impervious, Inflow Depth = 0.49" for Salem 1/2 2 YR event
Inflow = 4.99 cfs @ 7.92 hrs, Volume= 1.655 af
Outflow = 0.79 cfs @ 13.79 hrs, Volume= 1.655 af, Atten= 84%, Lag= 352.1 min
Discarded = 0.62 cfs @ 5.20 hrs, Volume= 1.450 af
Primary = 0.18 cfs @ 13.79 hrs, Volume= 0.205 af
Routed to Pond 1P. : Foxhaven Detention

Routing by Stor-Ind method, Time Span= 0.50-120.00 hrs, dt= 0.05 hrs
Peak Elev= 398.56' @ 13.79 hrs Surf.Area= 17,760 sf Storage= 21,757 cf

Plug-Flow detention time= 337.8 min calculated for 1.654 af (100% of inflow)
Center-of-Mass det. time= 337.9 min (1,058.6 - 720.7)

Volume	Invert	Avail.Storage	Storage Description
#1	395.50'	107,904 cf	**West Pond (Prismatic)** Listed below (Recalc)
#2	395.50'	36,190 cf	**East Pond (Prismatic)** Listed below (Recalc)
		144,095 cf	Total Available Storage

Elevation (feet)	Surf.Area (sq-ft)	Voids (%)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
395.50	13,800	0.0	0	0
399.50	13,800	40.0	22,080	22,080
401.00	11,910	0.1	19	22,099
402.00	13,800	100.0	12,855	34,954
403.00	15,920	100.0	14,860	49,814
404.00	18,150	100.0	17,035	66,849
405.00	20,500	100.0	19,325	86,174
406.00	22,960	100.0	21,730	107,904

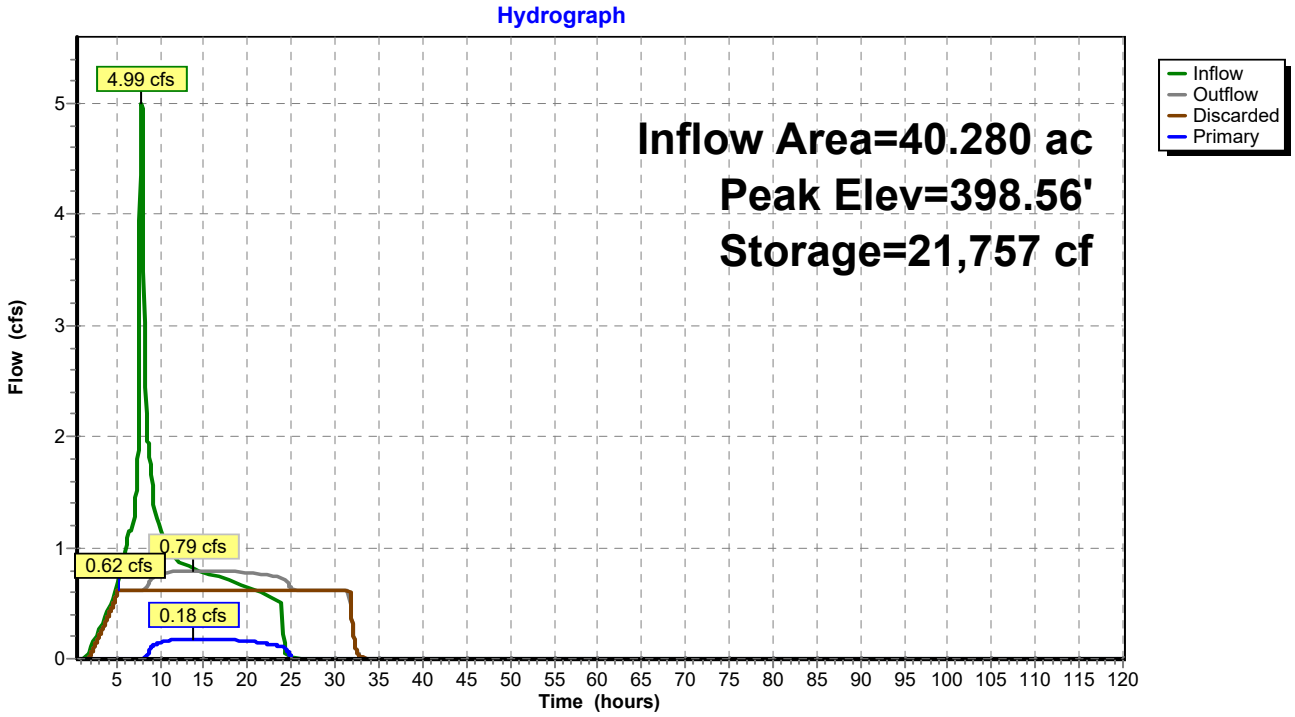
Elevation (feet)	Surf.Area (sq-ft)	Voids (%)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
395.50	3,960	0.0	0	0
399.50	3,960	40.0	6,336	6,336
401.00	1,820	0.1	4	6,340
402.00	3,960	100.0	2,890	9,230
403.00	5,190	100.0	4,575	13,805
404.00	6,560	100.0	5,875	19,680
405.00	8,160	100.0	7,360	27,040
406.00	10,140	100.0	9,150	36,190

Device	Routing	Invert	Outlet Devices
#1	Discarded	395.50'	**1.500 in/hr Exfiltration over Horizontal area**
#2	Primary	397.70'	**2.7" Horiz. Orifice** C= 0.600 Limited to weir flow at low heads
#3	Primary	401.60'	**9.0" Horiz. Orifice** C= 0.600 Limited to weir flow at low heads
#4	Primary	404.00'	**2.5' long Sharp-Crested Rectangular Weir** 2 End Contraction(s) 1.0' Crest Height

Discarded OutFlow Max=0.62 cfs @ 5.20 hrs HW=395.61' (Free Discharge)
└**1=Exfiltration** (Exfiltration Controls 0.62 cfs)

Primary OutFlow Max=0.18 cfs @ 13.79 hrs HW=398.56' (Free Discharge)
├**2=Orifice** (Orifice Controls 0.18 cfs @ 4.47 fps)
├**3=Orifice** (Controls 0.00 cfs)
└**4=Sharp-Crested Rectangular Weir** (Controls 0.00 cfs)

Pond 4P.: Baxter Reconstructed Rain Garden



Summary for Pond 7P.: Vintage Detention

Inflow Area = 1.990 ac, 75.38% Impervious, Inflow Depth = 0.68" for Salem 1/2 2 YR event
Inflow = 0.34 cfs @ 7.92 hrs, Volume= 0.113 af
Outflow = 0.33 cfs @ 8.02 hrs, Volume= 0.113 af, Atten= 5%, Lag= 6.2 min
Primary = 0.33 cfs @ 8.02 hrs, Volume= 0.113 af
Routed to Pond 4P. : Baxter Reconstructed Rain Garden

Routing by Stor-Ind method, Time Span= 0.50-120.00 hrs, dt= 0.05 hrs
Peak Elev= 432.13' @ 8.02 hrs Surf.Area= 308 sf Storage= 20 cf

Plug-Flow detention time= (not calculated: outflow precedes inflow)
Center-of-Mass det. time= 0.2 min (716.1 - 716.0)

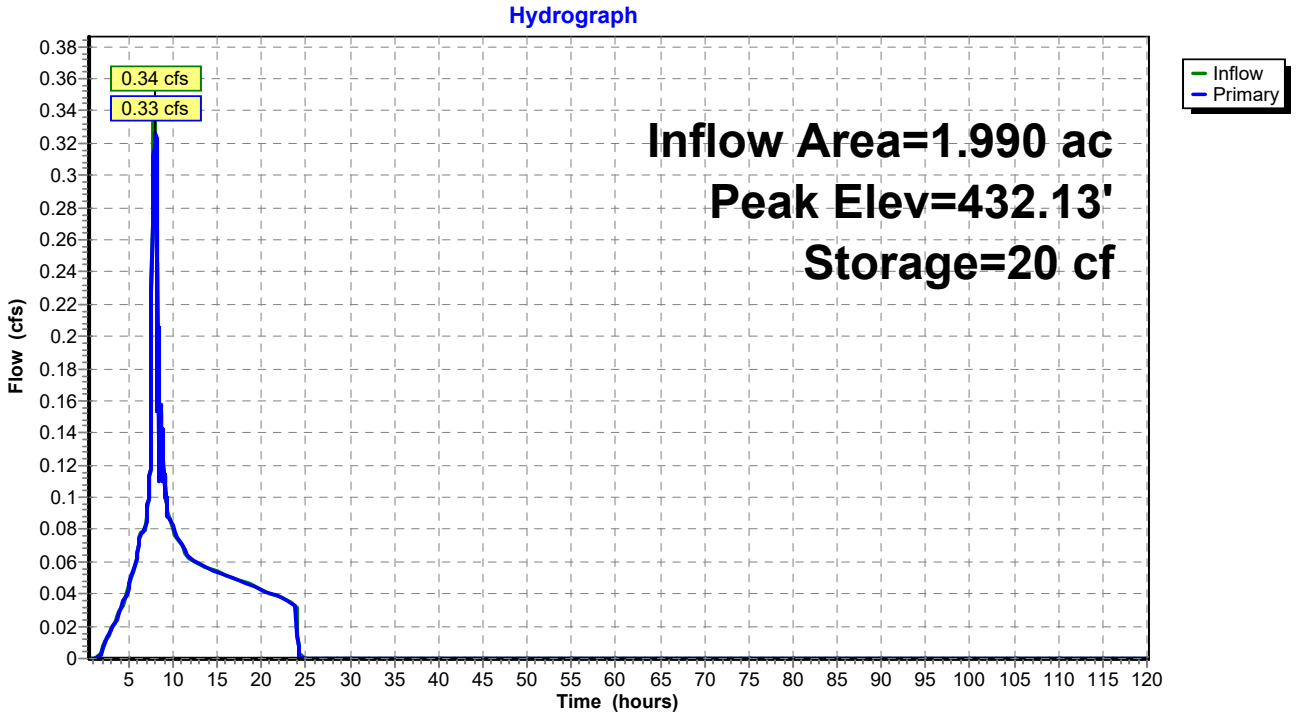
Volume	Invert	Avail.Storage	Storage Description
#1	432.00'	8,940 cf	**Custom Stage Data (Prismatic)**Listed below (Recalc)

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
432.00	0	0	0
432.50	1,160	290	290
434.00	2,320	2,610	2,900
436.00	3,720	6,040	8,940

Device	Routing	Invert	Outlet Devices
#1	Primary	431.31'	**3.7" Horiz. Orifice** C= 0.600 Limited to weir flow at low heads
#2	Primary	435.00'	**2.0' long x 0.5' breadth Overflow CB** Head (feet) 0.20 0.40 0.60 0.80 1.00 Coef. (English) 2.80 2.92 3.08 3.30 3.32

Primary OutFlow Max=0.33 cfs @ 8.02 hrs HW=432.13' (Free Discharge)
└**1=Orifice** (Orifice Controls 0.33 cfs @ 4.36 fps)
└**2=Overflow CB** (Controls 0.00 cfs)

Pond 7P.: Vintage Detention

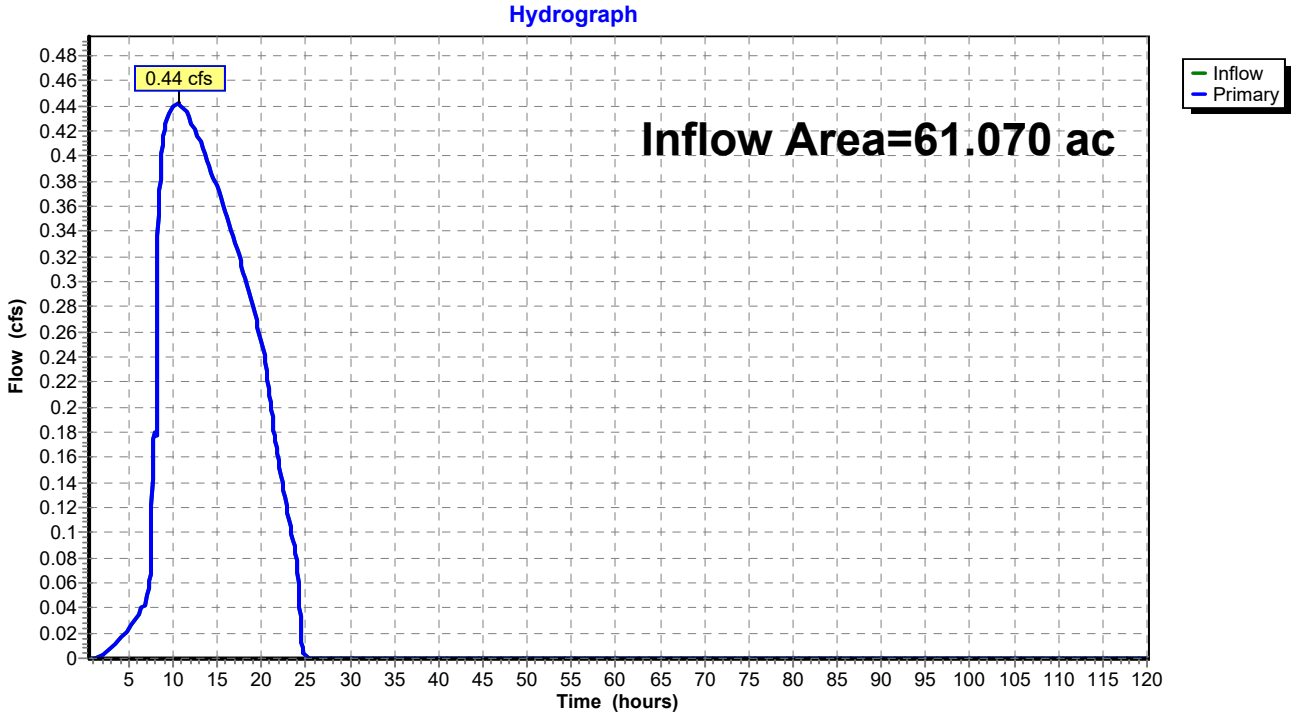


Summary for Link 2L: Developed Release

Inflow Area = 61.070 ac, 58.13% Impervious, Inflow Depth = 0.09" for Salem 1/2 2 YR event
Inflow = 0.44 cfs @ 10.71 hrs, Volume= 0.440 af
Primary = 0.44 cfs @ 10.71 hrs, Volume= 0.440 af, Atten= 0%, Lag= 0.0 min
Routed to nonexistent node 104P

Primary outflow = Inflow, Time Span= 0.50-120.00 hrs, dt= 0.05 hrs

Link 2L: Developed Release



Summary for Pond 1P.: Foxhaven Detention

Inflow Area = 60.280 ac, 57.58% Impervious, Inflow Depth = 1.66" for Salem 10 YR event
Inflow = 13.13 cfs @ 7.98 hrs, Volume= 8.317 af
Outflow = 6.82 cfs @ 9.17 hrs, Volume= 8.317 af, Atten= 48%, Lag= 71.3 min
Discarded = 0.50 cfs @ 9.17 hrs, Volume= 1.191 af
Primary = 6.32 cfs @ 9.17 hrs, Volume= 7.126 af
Routed to Reach 1R. : Foxhaven Swale

Routing by Stor-Ind method, Time Span= 0.50-120.00 hrs, dt= 0.05 hrs
Peak Elev= 372.76' @ 9.17 hrs Surf.Area= 10,819 sf Storage= 39,147 cf

Plug-Flow detention time= 105.9 min calculated for 8.317 af (100% of inflow)
Center-of-Mass det. time= 105.8 min (944.6 - 838.8)

Volume	Invert	Avail.Storage	Storage Description
#1	365.50'	53,470 cf	**Detention Basin (Prismatic)**Listed below (Recalc)

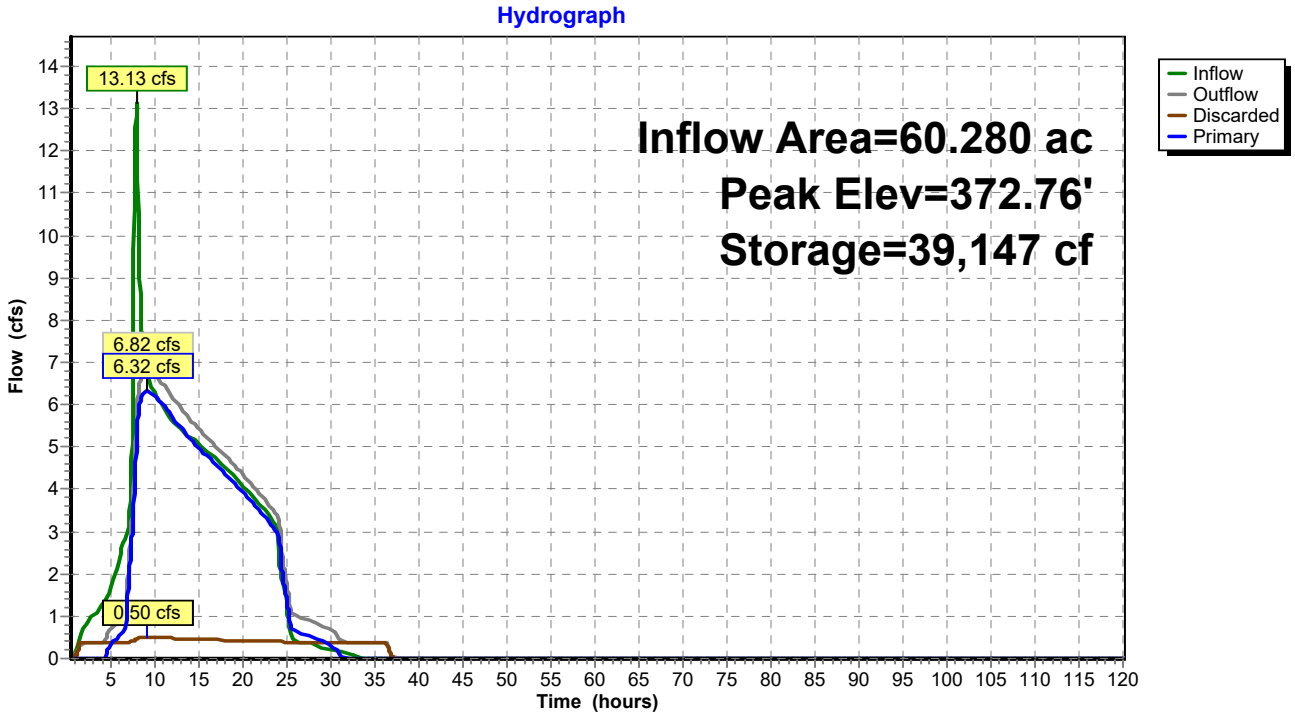
Elevation (feet)	Surf.Area (sq-ft)	Voids (%)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
365.50	7,930	0.0	0	0
367.50	7,930	40.0	6,344	6,344
369.00	6,740	0.1	11	6,355
370.00	7,750	100.0	7,245	13,600
371.00	8,810	100.0	8,280	21,880
372.00	9,920	100.0	9,365	31,245
373.00	11,100	100.0	10,510	41,755
374.00	12,330	100.0	11,715	53,470

Device	Routing	Invert	Outlet Devices
#1	Discarded	365.50'	**2.000 in/hr Exfiltration over Horizontal area**
#2	Primary	369.00'	**4.6" Horiz. Orifice** C= 0.600 Limited to weir flow at low heads
#3	Primary	370.40'	**11.4" Horiz. Orifice** C= 0.600 Limited to weir flow at low heads
#4	Primary	372.90'	**5.0' long Sharp-Crested Rectangular Weir** 2 End Contraction(s) 1.0' Crest Height

Discarded OutFlow Max=0.50 cfs @ 9.17 hrs HW=372.76' (Free Discharge)
└**1=Exfiltration** (Exfiltration Controls 0.50 cfs)

Primary OutFlow Max=6.32 cfs @ 9.17 hrs HW=372.76' (Free Discharge)
├**2=Orifice** (Orifice Controls 1.08 cfs @ 9.34 fps)
├**3=Orifice** (Orifice Controls 5.25 cfs @ 7.40 fps)
└**4=Sharp-Crested Rectangular Weir** (Controls 0.00 cfs)

Pond 1P.: Foxhaven Detention



Summary for Pond 4P.: Baxter Reconstructed Rain Garden

Inflow Area = 40.280 ac, 54.18% Impervious, Inflow Depth = 2.04" for Salem 10 YR event
Inflow = 17.23 cfs @ 7.93 hrs, Volume= 6.837 af
Outflow = 4.61 cfs @ 10.73 hrs, Volume= 6.837 af, Atten= 73%, Lag= 167.7 min
Discarded = 0.85 cfs @ 10.73 hrs, Volume= 2.177 af
Primary = 3.75 cfs @ 10.73 hrs, Volume= 4.660 af
Routed to Pond 1P. : Foxhaven Detention

Routing by Stor-Ind method, Time Span= 0.50-120.00 hrs, dt= 0.05 hrs
Peak Elev= 403.97' @ 10.73 hrs Surf.Area= 24,597 sf Storage= 85,753 cf

Plug-Flow detention time= (not calculated: outflow precedes inflow)
Center-of-Mass det. time= 312.6 min (1,030.7 - 718.2)

Volume	Invert	Avail.Storage	Storage Description
#1	395.50'	107,904 cf	**West Pond (Prismatic)**Listed below (Recalc)
#2	395.50'	36,190 cf	**East Pond (Prismatic)**Listed below (Recalc)
		144,095 cf	Total Available Storage

Elevation (feet)	Surf.Area (sq-ft)	Voids (%)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
395.50	13,800	0.0	0	0
399.50	13,800	40.0	22,080	22,080
401.00	11,910	0.1	19	22,099
402.00	13,800	100.0	12,855	34,954
403.00	15,920	100.0	14,860	49,814
404.00	18,150	100.0	17,035	66,849
405.00	20,500	100.0	19,325	86,174
406.00	22,960	100.0	21,730	107,904

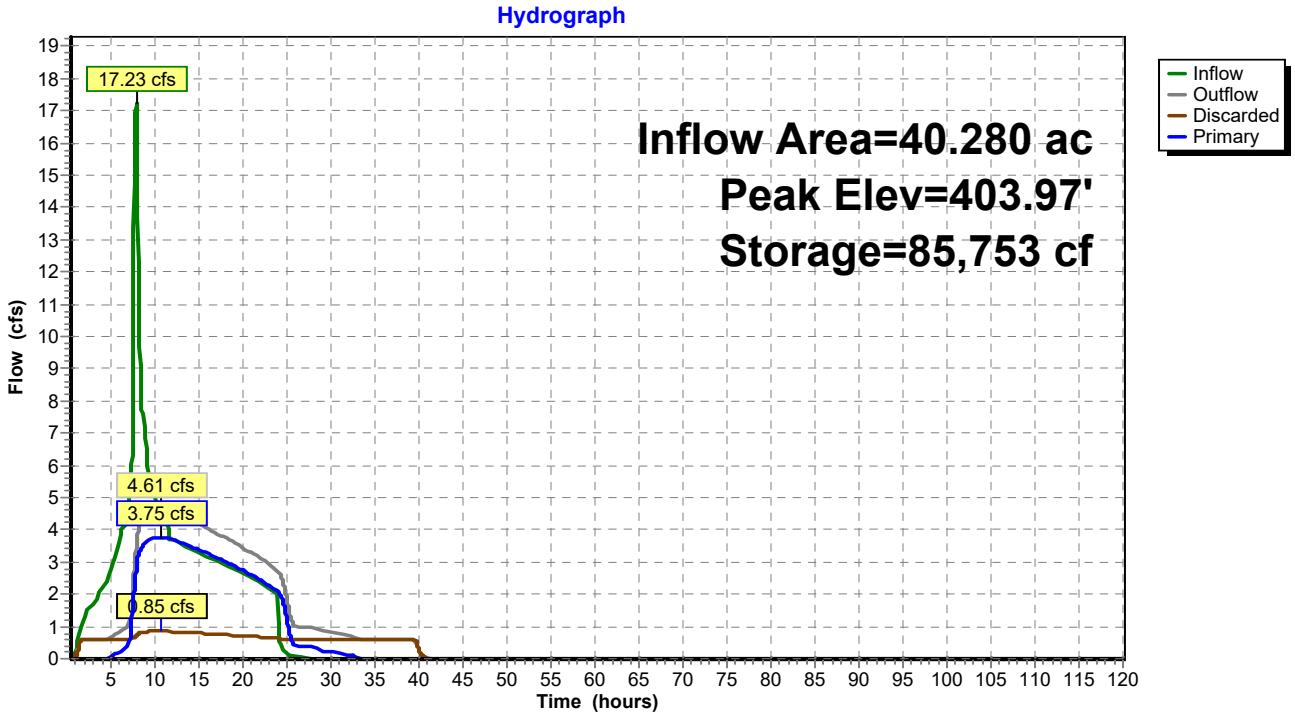
Elevation (feet)	Surf.Area (sq-ft)	Voids (%)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
395.50	3,960	0.0	0	0
399.50	3,960	40.0	6,336	6,336
401.00	1,820	0.1	4	6,340
402.00	3,960	100.0	2,890	9,230
403.00	5,190	100.0	4,575	13,805
404.00	6,560	100.0	5,875	19,680
405.00	8,160	100.0	7,360	27,040
406.00	10,140	100.0	9,150	36,190

Device	Routing	Invert	Outlet Devices
#1	Discarded	395.50'	**1.500 in/hr Exfiltration over Horizontal area**
#2	Primary	397.70'	**2.7" Horiz. Orifice** C= 0.600 Limited to weir flow at low heads
#3	Primary	401.60'	**9.0" Horiz. Orifice** C= 0.600 Limited to weir flow at low heads
#4	Primary	404.00'	**2.5' long Sharp-Crested Rectangular Weir** 2 End Contraction(s) 1.0' Crest Height

Discarded OutFlow Max=0.85 cfs @ 10.73 hrs HW=403.97' (Free Discharge)
└**1=Exfiltration** (Exfiltration Controls 0.85 cfs)

Primary OutFlow Max=3.75 cfs @ 10.73 hrs HW=403.97' (Free Discharge)
├**2=Orifice** (Orifice Controls 0.48 cfs @ 12.06 fps)
├**3=Orifice** (Orifice Controls 3.27 cfs @ 7.41 fps)
└**4=Sharp-Crested Rectangular Weir** (Controls 0.00 cfs)

Pond 4P.: Baxter Reconstructed Rain Garden



Summary for Pond 7P.: Vintage Detention

Inflow Area = 1.990 ac, 75.38% Impervious, Inflow Depth = 2.51" for Salem 10 YR event
Inflow = 1.22 cfs @ 7.91 hrs, Volume= 0.416 af
Outflow = 0.52 cfs @ 8.44 hrs, Volume= 0.416 af, Atten= 58%, Lag= 31.6 min
Primary = 0.52 cfs @ 8.44 hrs, Volume= 0.416 af
Routed to Pond 4P. : Baxter Reconstructed Rain Garden

Routing by Stor-Ind method, Time Span= 0.50-120.00 hrs, dt= 0.05 hrs
Peak Elev= 433.37' @ 8.44 hrs Surf.Area= 1,832 sf Storage= 1,591 cf

Plug-Flow detention time= (not calculated: outflow precedes inflow)
Center-of-Mass det. time= 12.2 min (699.1 - 686.9)

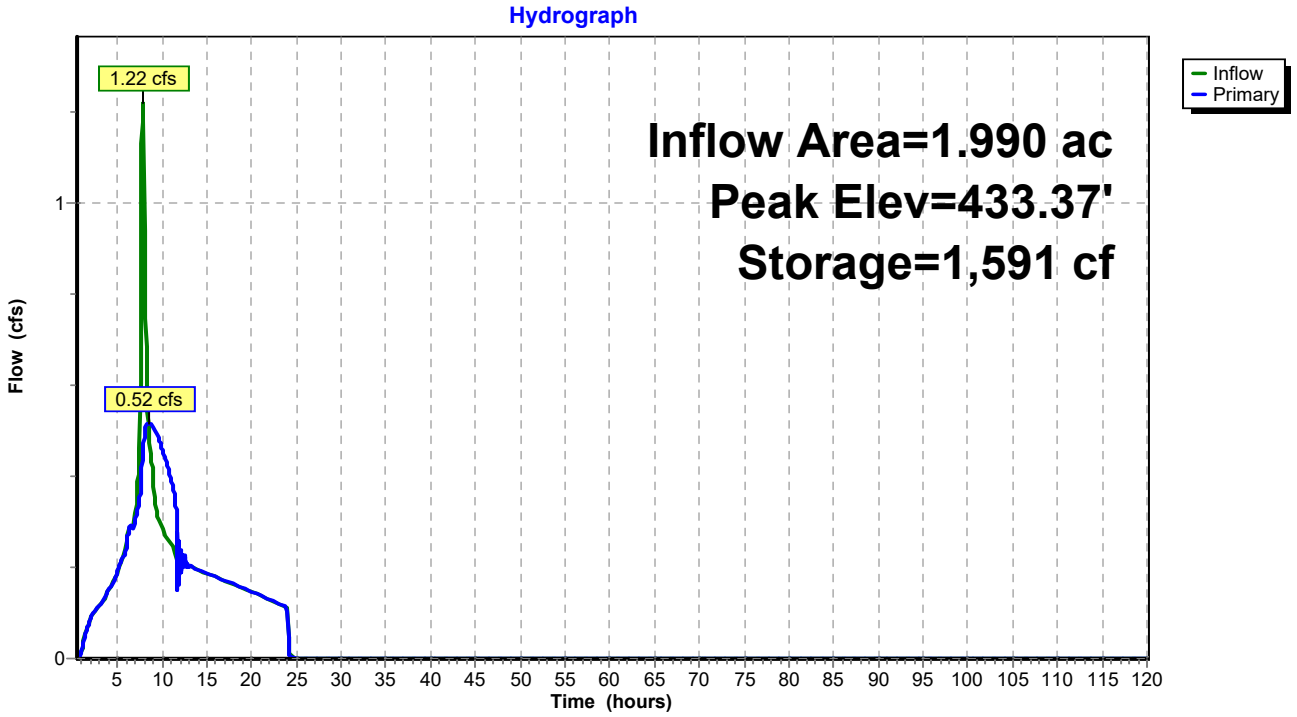
Volume	Invert	Avail.Storage	Storage Description
#1	432.00'	8,940 cf	**Custom Stage Data (Prismatic)**Listed below (Recalc)

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
432.00	0	0	0
432.50	1,160	290	290
434.00	2,320	2,610	2,900
436.00	3,720	6,040	8,940

Device	Routing	Invert	Outlet Devices
#1	Primary	431.31'	**3.7" Horiz. Orifice** C= 0.600 Limited to weir flow at low heads
#2	Primary	435.00'	**2.0' long x 0.5' breadth Overflow CB** Head (feet) 0.20 0.40 0.60 0.80 1.00 Coef. (English) 2.80 2.92 3.08 3.30 3.32

Primary OutFlow Max=0.52 cfs @ 8.44 hrs HW=433.37' (Free Discharge)
└**1=Orifice** (Orifice Controls 0.52 cfs @ 6.91 fps)
└**2=Overflow CB** (Controls 0.00 cfs)

Pond 7P.: Vintage Detention

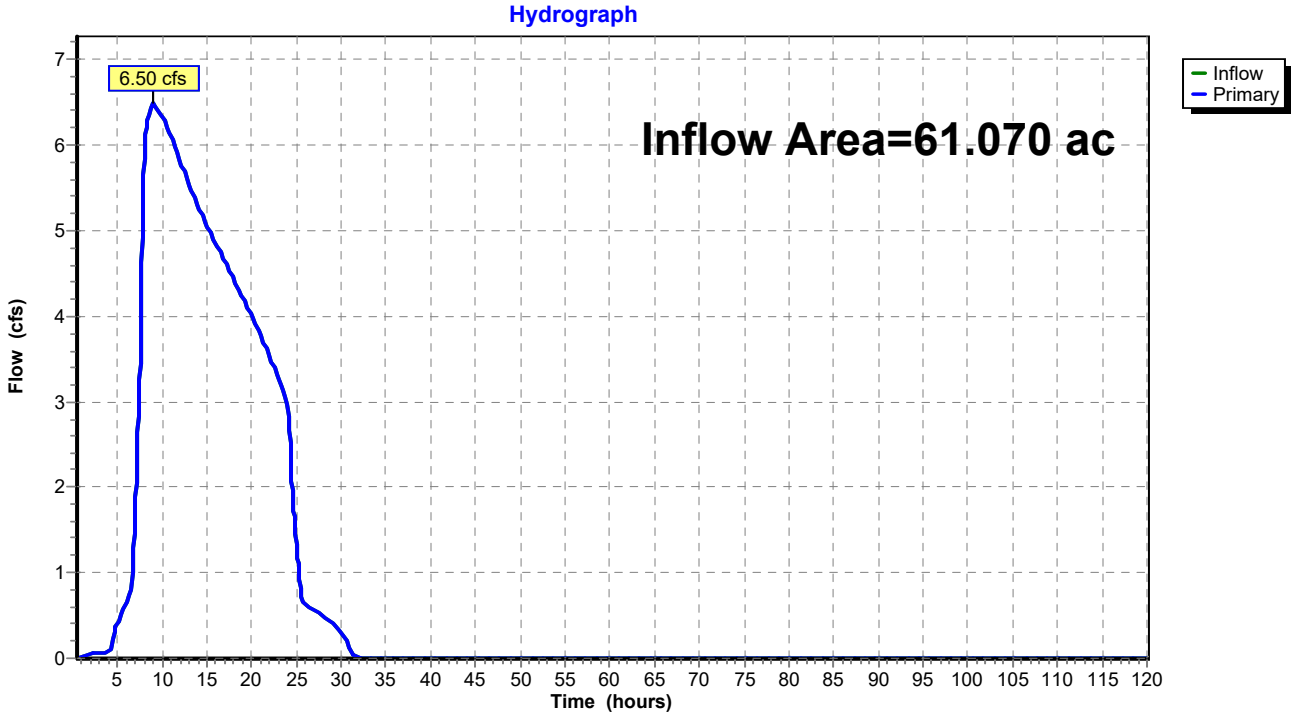


Summary for Link 2L: Developed Release

Inflow Area = 61.070 ac, 58.13% Impervious, Inflow Depth = 1.44" for Salem 10 YR event
Inflow = 6.50 cfs @ 9.02 hrs, Volume= 7.322 af
Primary = 6.50 cfs @ 9.02 hrs, Volume= 7.322 af, Atten= 0%, Lag= 0.0 min
Routed to nonexistent node 104P

Primary outflow = Inflow, Time Span= 0.50-120.00 hrs, dt= 0.05 hrs

Link 2L: Developed Release



Summary for Pond 1P.: Foxhaven Detention

Inflow Area = 60.280 ac, 57.58% Impervious, Inflow Depth = 1.97" for Salem 25 YR event
Inflow = 15.15 cfs @ 7.98 hrs, Volume= 9.897 af
Outflow = 9.20 cfs @ 9.07 hrs, Volume= 9.897 af, Atten= 39%, Lag= 65.6 min
Discarded = 0.52 cfs @ 9.07 hrs, Volume= 1.248 af
Primary = 8.67 cfs @ 9.07 hrs, Volume= 8.649 af
Routed to Reach 1R. : Foxhaven Swale

Routing by Stor-Ind method, Time Span= 0.50-120.00 hrs, dt= 0.05 hrs
Peak Elev= 373.13' @ 9.07 hrs Surf.Area= 11,265 sf Storage= 43,252 cf

Plug-Flow detention time= 101.7 min calculated for 9.893 af (100% of inflow)
Center-of-Mass det. time= 101.7 min (939.2 - 837.4)

Volume	Invert	Avail.Storage	Storage Description
#1	365.50'	53,470 cf	**Detention Basin (Prismatic)**Listed below (Recalc)

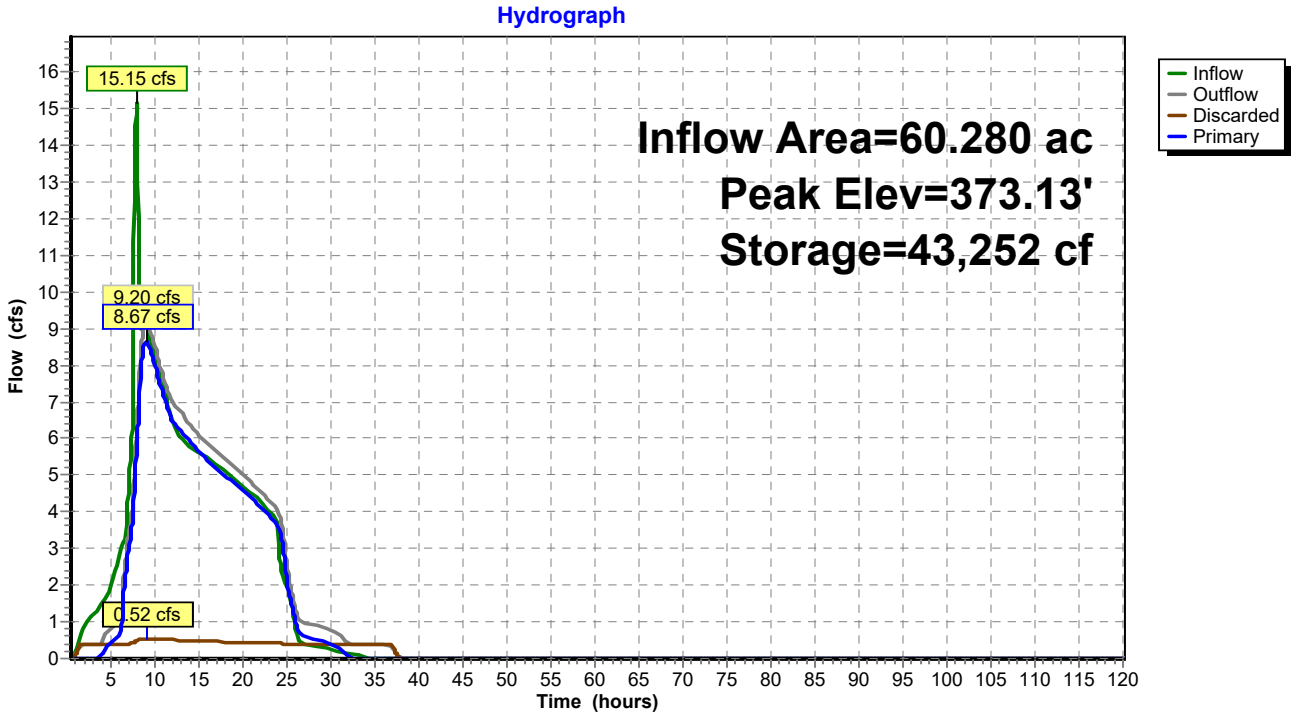
Elevation (feet)	Surf.Area (sq-ft)	Voids (%)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
365.50	7,930	0.0	0	0
367.50	7,930	40.0	6,344	6,344
369.00	6,740	0.1	11	6,355
370.00	7,750	100.0	7,245	13,600
371.00	8,810	100.0	8,280	21,880
372.00	9,920	100.0	9,365	31,245
373.00	11,100	100.0	10,510	41,755
374.00	12,330	100.0	11,715	53,470

Device	Routing	Invert	Outlet Devices
#1	Discarded	365.50'	**2.000 in/hr Exfiltration over Horizontal area**
#2	Primary	369.00'	**4.6" Horiz. Orifice** C= 0.600 Limited to weir flow at low heads
#3	Primary	370.40'	**11.4" Horiz. Orifice** C= 0.600 Limited to weir flow at low heads
#4	Primary	372.90'	**5.0' long Sharp-Crested Rectangular Weir** 2 End Contraction(s) 1.0' Crest Height

Discarded OutFlow Max=0.52 cfs @ 9.07 hrs HW=373.13' (Free Discharge)
└**1=Exfiltration** (Exfiltration Controls 0.52 cfs)

Primary OutFlow Max=8.66 cfs @ 9.07 hrs HW=373.13' (Free Discharge)
├**2=Orifice** (Orifice Controls 1.13 cfs @ 9.79 fps)
├**3=Orifice** (Orifice Controls 5.64 cfs @ 7.96 fps)
└**4=Sharp-Crested Rectangular Weir** (Weir Controls 1.88 cfs @ 1.63 fps)

Pond 1P.: Foxhaven Detention



Summary for Pond 4P.: Baxter Reconstructed Rain Garden

Inflow Area = 40.280 ac, 54.18% Impervious, Inflow Depth = 2.37" for Salem 25 YR event
Inflow = 19.98 cfs @ 7.94 hrs, Volume= 7.959 af
Outflow = 6.43 cfs @ 9.45 hrs, Volume= 7.959 af, Atten= 68%, Lag= 90.8 min
Discarded = 0.90 cfs @ 9.45 hrs, Volume= 2.286 af
Primary = 5.53 cfs @ 9.45 hrs, Volume= 5.672 af
Routed to Pond 1P. : Foxhaven Detention

Routing by Stor-Ind method, Time Span= 0.50-120.00 hrs, dt= 0.05 hrs
Peak Elev= 404.32' @ 9.45 hrs Surf.Area= 25,988 sf Storage= 94,731 cf

Plug-Flow detention time= 303.3 min calculated for 7.959 af (100% of inflow)
Center-of-Mass det. time= 303.5 min (1,020.5 - 717.0)

Volume	Invert	Avail.Storage	Storage Description
#1	395.50'	107,904 cf	**West Pond (Prismatic)**Listed below (Recalc)
#2	395.50'	36,190 cf	**East Pond (Prismatic)**Listed below (Recalc)
		144,095 cf	Total Available Storage

Elevation (feet)	Surf.Area (sq-ft)	Voids (%)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
395.50	13,800	0.0	0	0
399.50	13,800	40.0	22,080	22,080
401.00	11,910	0.1	19	22,099
402.00	13,800	100.0	12,855	34,954
403.00	15,920	100.0	14,860	49,814
404.00	18,150	100.0	17,035	66,849
405.00	20,500	100.0	19,325	86,174
406.00	22,960	100.0	21,730	107,904

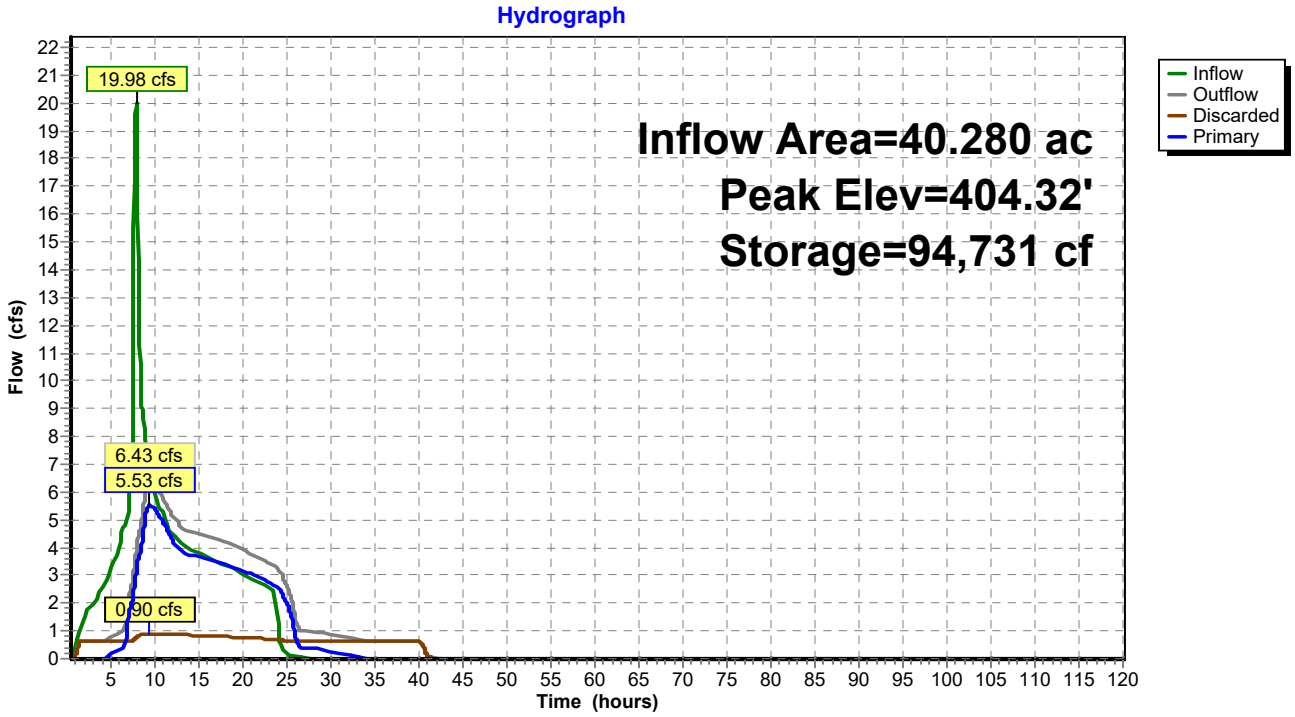
Elevation (feet)	Surf.Area (sq-ft)	Voids (%)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
395.50	3,960	0.0	0	0
399.50	3,960	40.0	6,336	6,336
401.00	1,820	0.1	4	6,340
402.00	3,960	100.0	2,890	9,230
403.00	5,190	100.0	4,575	13,805
404.00	6,560	100.0	5,875	19,680
405.00	8,160	100.0	7,360	27,040
406.00	10,140	100.0	9,150	36,190

Device	Routing	Invert	Outlet Devices
#1	Discarded	395.50'	**1.500 in/hr Exfiltration over Horizontal area**
#2	Primary	397.70'	**2.7" Horiz. Orifice** C= 0.600 Limited to weir flow at low heads
#3	Primary	401.60'	**9.0" Horiz. Orifice** C= 0.600 Limited to weir flow at low heads
#4	Primary	404.00'	**2.5' long Sharp-Crested Rectangular Weir** 2 End Contraction(s) 1.0' Crest Height

Discarded OutFlow Max=0.90 cfs @ 9.45 hrs HW=404.32' (Free Discharge)
└**1=Exfiltration** (Exfiltration Controls 0.90 cfs)

Primary OutFlow Max=5.53 cfs @ 9.45 hrs HW=404.32' (Free Discharge)
├**2=Orifice** (Orifice Controls 0.49 cfs @ 12.39 fps)
├**3=Orifice** (Orifice Controls 3.51 cfs @ 7.95 fps)
└**4=Sharp-Crested Rectangular Weir** (Weir Controls 1.52 cfs @ 1.93 fps)

Pond 4P.: Baxter Reconstructed Rain Garden



Summary for Pond 7P.: Vintage Detention

Inflow Area = 1.990 ac, 75.38% Impervious, Inflow Depth = 2.88" for Salem 25 YR event
Inflow = 1.40 cfs @ 7.91 hrs, Volume= 0.477 af
Outflow = 0.55 cfs @ 8.65 hrs, Volume= 0.477 af, Atten= 61%, Lag= 44.2 min
Primary = 0.55 cfs @ 8.65 hrs, Volume= 0.477 af
Routed to Pond 4P. : Baxter Reconstructed Rain Garden

Routing by Stor-Ind method, Time Span= 0.50-120.00 hrs, dt= 0.05 hrs
Peak Elev= 433.61' @ 8.65 hrs Surf.Area= 2,021 sf Storage= 2,061 cf

Plug-Flow detention time= 16.9 min calculated for 0.477 af (100% of inflow)
Center-of-Mass det. time= 16.9 min (701.2 - 684.3)

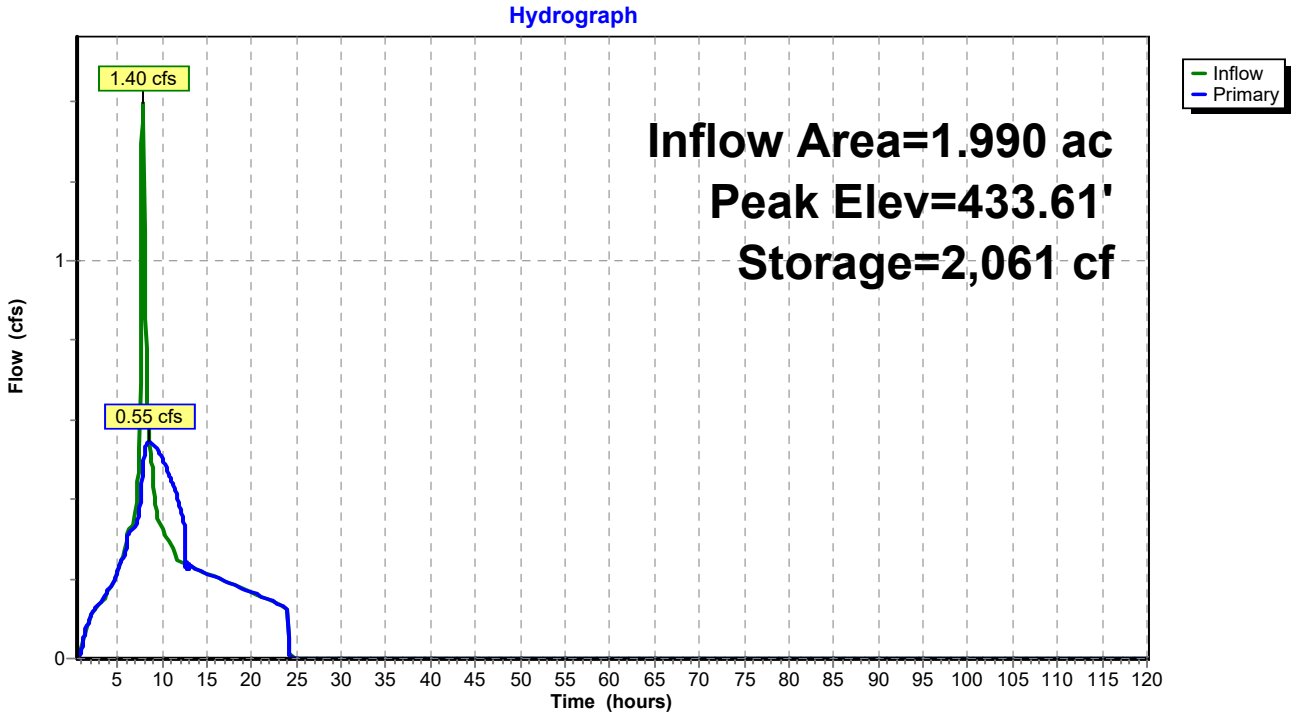
Volume	Invert	Avail.Storage	Storage Description
#1	432.00'	8,940 cf	**Custom Stage Data (Prismatic)**Listed below (Recalc)

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
432.00	0	0	0
432.50	1,160	290	290
434.00	2,320	2,610	2,900
436.00	3,720	6,040	8,940

Device	Routing	Invert	Outlet Devices
#1	Primary	431.31'	**3.7" Horiz. Orifice** C= 0.600 Limited to weir flow at low heads
#2	Primary	435.00'	**2.0' long x 0.5' breadth Overflow CB** Head (feet) 0.20 0.40 0.60 0.80 1.00 Coef. (English) 2.80 2.92 3.08 3.30 3.32

Primary OutFlow Max=0.55 cfs @ 8.65 hrs HW=433.61' (Free Discharge)
└**1=Orifice** (Orifice Controls 0.55 cfs @ 7.31 fps)
└**2=Overflow CB** (Controls 0.00 cfs)

Pond 7P.: Vintage Detention

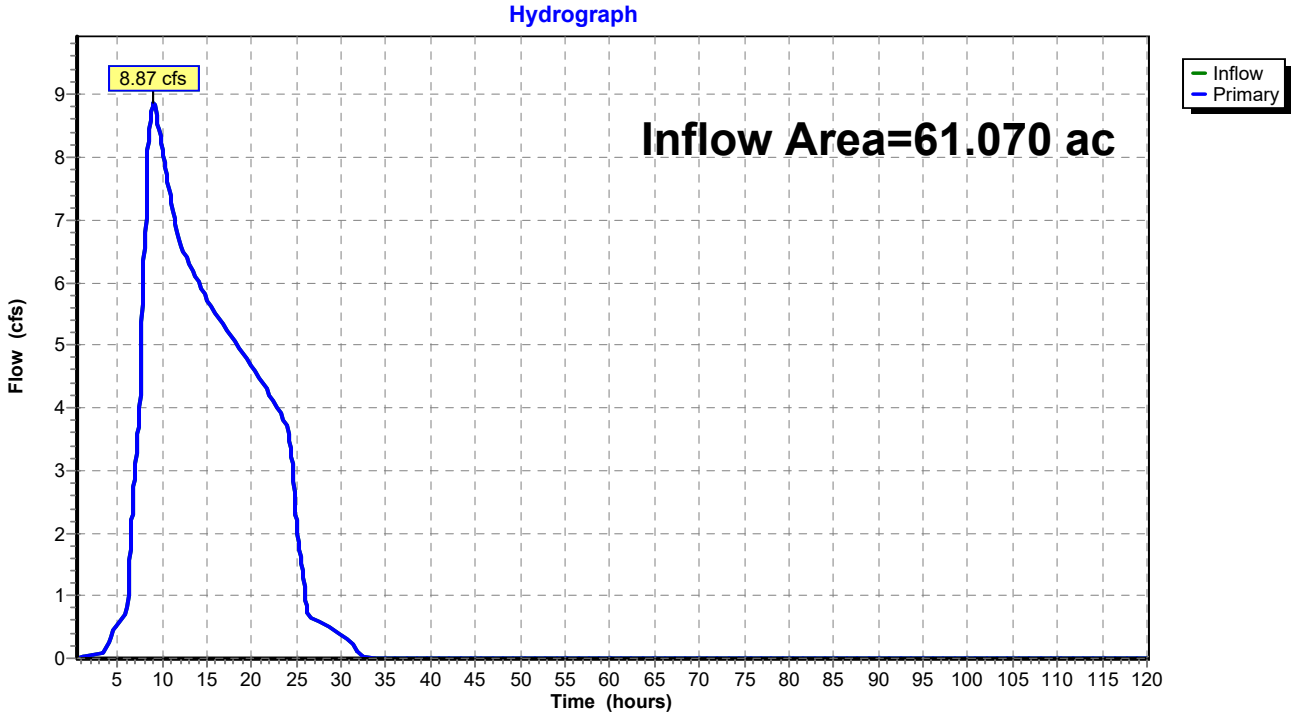


Summary for Link 2L: Developed Release

Inflow Area = 61.070 ac, 58.13% Impervious, Inflow Depth = 1.74" for Salem 25 YR event
Inflow = 8.87 cfs @ 9.05 hrs, Volume= 8.871 af
Primary = 8.87 cfs @ 9.05 hrs, Volume= 8.871 af, Atten= 0%, Lag= 0.0 min
Routed to nonexistent node 104P

Primary outflow = Inflow, Time Span= 0.50-120.00 hrs, dt= 0.05 hrs

Link 2L: Developed Release



Summary for Pond 1P.: Foxhaven Detention

Inflow Area = 60.280 ac, 57.58% Impervious, Inflow Depth > 2.63" for Salem 100 YR event
Inflow = 19.97 cfs @ 8.01 hrs, Volume= 13.213 af
Outflow = 17.27 cfs @ 8.32 hrs, Volume= 13.213 af, Atten= 14%, Lag= 18.2 min
Discarded = 0.55 cfs @ 8.32 hrs, Volume= 1.336 af
Primary = 16.72 cfs @ 8.32 hrs, Volume= 11.877 af
Routed to Reach 1R. : Foxhaven Swale

Routing by Stor-Ind method, Time Span= 0.50-120.00 hrs, dt= 0.05 hrs
Peak Elev= 373.57' @ 8.32 hrs Surf.Area= 11,802 sf Storage= 48,289 cf

Plug-Flow detention time= 90.4 min calculated for 13.213 af (100% of inflow)
Center-of-Mass det. time= 90.4 min (914.1 - 823.7)

Volume	Invert	Avail.Storage	Storage Description
#1	365.50'	53,470 cf	**Detention Basin (Prismatic)**Listed below (Recalc)

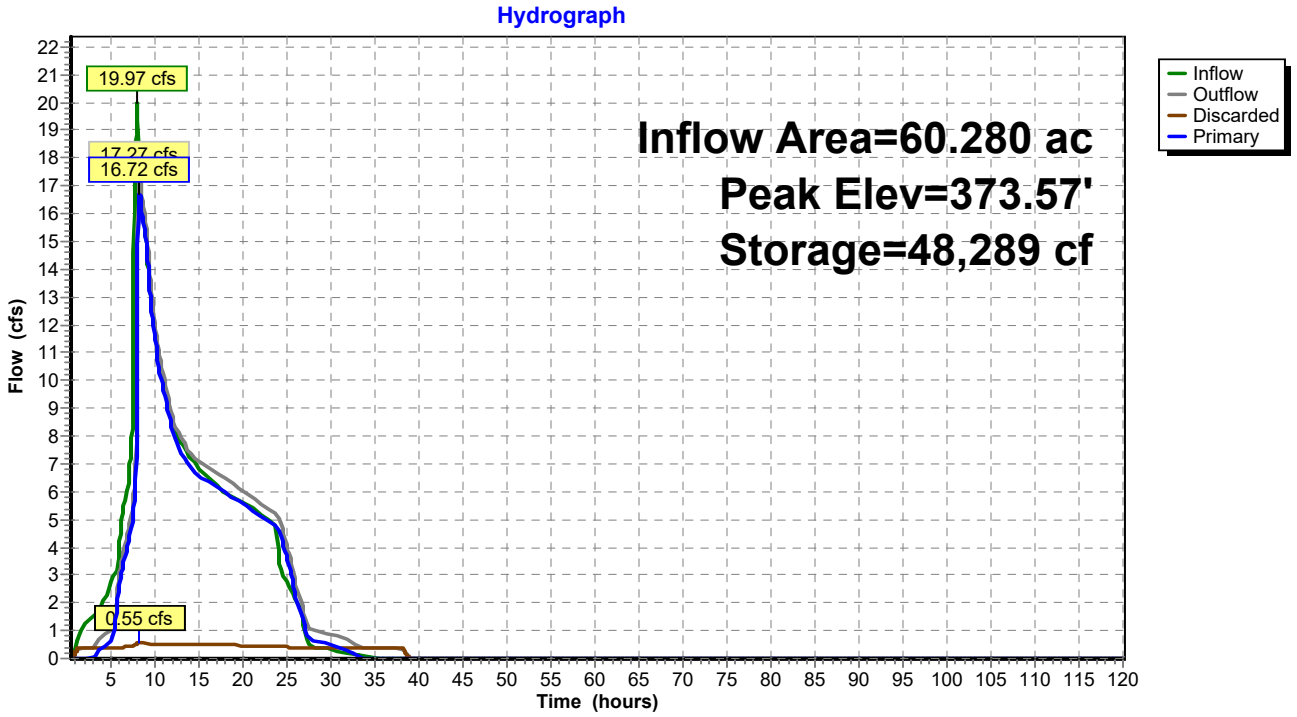
Elevation (feet)	Surf.Area (sq-ft)	Voids (%)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
365.50	7,930	0.0	0	0
367.50	7,930	40.0	6,344	6,344
369.00	6,740	0.1	11	6,355
370.00	7,750	100.0	7,245	13,600
371.00	8,810	100.0	8,280	21,880
372.00	9,920	100.0	9,365	31,245
373.00	11,100	100.0	10,510	41,755
374.00	12,330	100.0	11,715	53,470

Device	Routing	Invert	Outlet Devices
#1	Discarded	365.50'	**2.000 in/hr Exfiltration over Horizontal area**
#2	Primary	369.00'	**4.6" Horiz. Orifice** C= 0.600 Limited to weir flow at low heads
#3	Primary	370.40'	**11.4" Horiz. Orifice** C= 0.600 Limited to weir flow at low heads
#4	Primary	372.90'	**5.0' long Sharp-Crested Rectangular Weir** 2 End Contraction(s) 1.0' Crest Height

Discarded OutFlow Max=0.55 cfs @ 8.32 hrs HW=373.57' (Free Discharge)
└**1=Exfiltration** (Exfiltration Controls 0.55 cfs)

Primary OutFlow Max=16.71 cfs @ 8.32 hrs HW=373.57' (Free Discharge)
├**2=Orifice** (Orifice Controls 1.19 cfs @ 10.29 fps)
├**3=Orifice** (Orifice Controls 6.08 cfs @ 8.57 fps)
└**4=Sharp-Crested Rectangular Weir** (Weir Controls 9.44 cfs @ 2.90 fps)

Pond 1P.: Foxhaven Detention



Summary for Pond 4P.: Baxter Reconstructed Rain Garden

Inflow Area = 40.280 ac, 54.18% Impervious, Inflow Depth > 3.06" for Salem 100 YR event
Inflow = 25.69 cfs @ 7.94 hrs, Volume= 10.274 af
Outflow = 11.06 cfs @ 8.81 hrs, Volume= 10.274 af, Atten= 57%, Lag= 52.3 min
Discarded = 0.96 cfs @ 8.81 hrs, Volume= 2.452 af
Primary = 10.09 cfs @ 8.81 hrs, Volume= 7.822 af
Routed to Pond 1P. : Foxhaven Detention

Routing by Stor-Ind method, Time Span= 0.50-120.00 hrs, dt= 0.05 hrs
Peak Elev= 404.78' @ 8.81 hrs Surf.Area= 27,789 sf Storage= 106,992 cf

Plug-Flow detention time= 274.9 min calculated for 10.270 af (100% of inflow)
Center-of-Mass det. time= 275.2 min (990.0 - 714.8)

Volume	Invert	Avail.Storage	Storage Description
#1	395.50'	107,904 cf	**West Pond (Prismatic)**Listed below (Recalc)
#2	395.50'	36,190 cf	**East Pond (Prismatic)**Listed below (Recalc)
		144,095 cf	Total Available Storage

Elevation (feet)	Surf.Area (sq-ft)	Voids (%)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
395.50	13,800	0.0	0	0
399.50	13,800	40.0	22,080	22,080
401.00	11,910	0.1	19	22,099
402.00	13,800	100.0	12,855	34,954
403.00	15,920	100.0	14,860	49,814
404.00	18,150	100.0	17,035	66,849
405.00	20,500	100.0	19,325	86,174
406.00	22,960	100.0	21,730	107,904

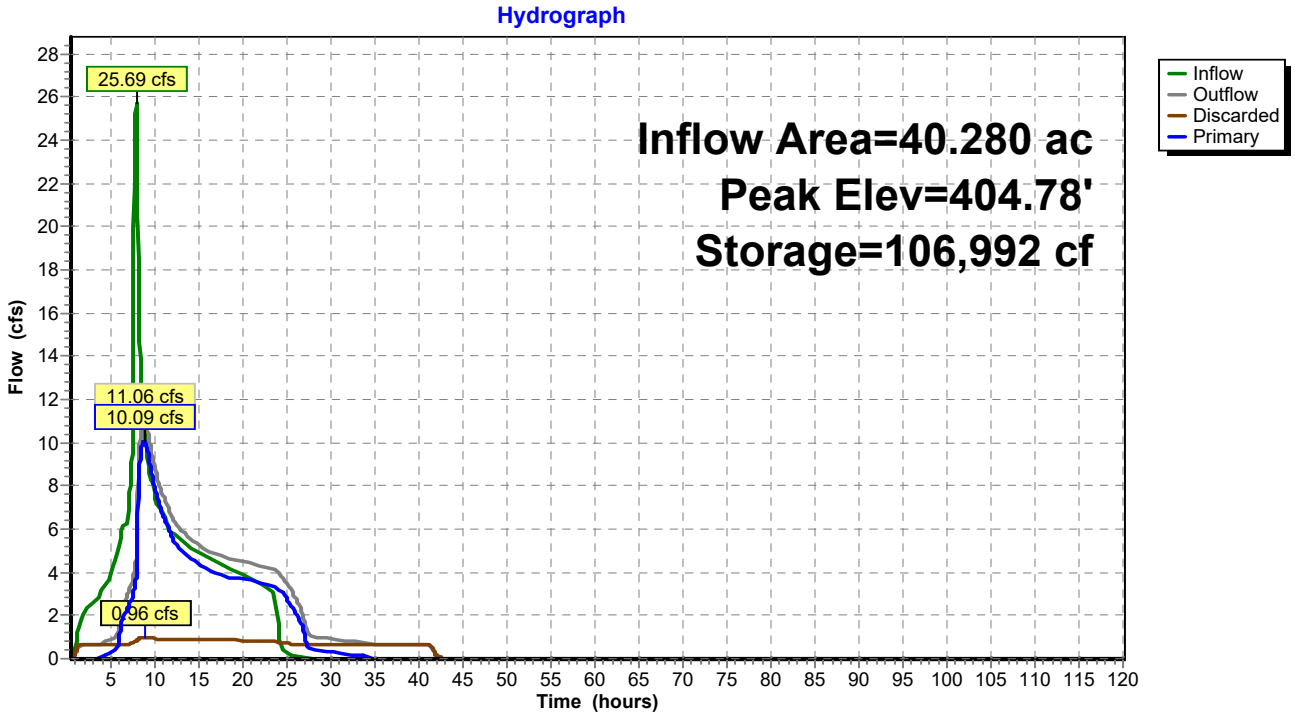
Elevation (feet)	Surf.Area (sq-ft)	Voids (%)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
395.50	3,960	0.0	0	0
399.50	3,960	40.0	6,336	6,336
401.00	1,820	0.1	4	6,340
402.00	3,960	100.0	2,890	9,230
403.00	5,190	100.0	4,575	13,805
404.00	6,560	100.0	5,875	19,680
405.00	8,160	100.0	7,360	27,040
406.00	10,140	100.0	9,150	36,190

Device	Routing	Invert	Outlet Devices
#1	Discarded	395.50'	**1.500 in/hr Exfiltration over Horizontal area**
#2	Primary	397.70'	**2.7" Horiz. Orifice** C= 0.600 Limited to weir flow at low heads
#3	Primary	401.60'	**9.0" Horiz. Orifice** C= 0.600 Limited to weir flow at low heads
#4	Primary	404.00'	**2.5' long Sharp-Crested Rectangular Weir** 2 End Contraction(s) 1.0' Crest Height

Discarded OutFlow Max=0.96 cfs @ 8.81 hrs HW=404.78' (Free Discharge)
└**1=Exfiltration** (Exfiltration Controls 0.96 cfs)

Primary OutFlow Max=10.08 cfs @ 8.81 hrs HW=404.78' (Free Discharge)
├**2=Orifice** (Orifice Controls 0.51 cfs @ 12.81 fps)
├**3=Orifice** (Orifice Controls 3.79 cfs @ 8.59 fps)
└**4=Sharp-Crested Rectangular Weir** (Weir Controls 5.78 cfs @ 3.16 fps)

Pond 4P.: Baxter Reconstructed Rain Garden



Summary for Pond 7P.: Vintage Detention

Inflow Area = 1.990 ac, 75.38% Impervious, Inflow Depth > 3.62" for Salem 100 YR event
Inflow = 1.76 cfs @ 7.91 hrs, Volume= 0.601 af
Outflow = 0.61 cfs @ 8.89 hrs, Volume= 0.601 af, Atten= 66%, Lag= 58.9 min
Primary = 0.61 cfs @ 8.89 hrs, Volume= 0.601 af
Routed to Pond 4P. : Baxter Reconstructed Rain Garden

Routing by Stor-Ind method, Time Span= 0.50-120.00 hrs, dt= 0.05 hrs
Peak Elev= 434.14' @ 8.89 hrs Surf.Area= 2,420 sf Storage= 3,238 cf

Plug-Flow detention time= 29.4 min calculated for 0.601 af (100% of inflow)
Center-of-Mass det. time= 29.4 min (709.4 - 680.0)

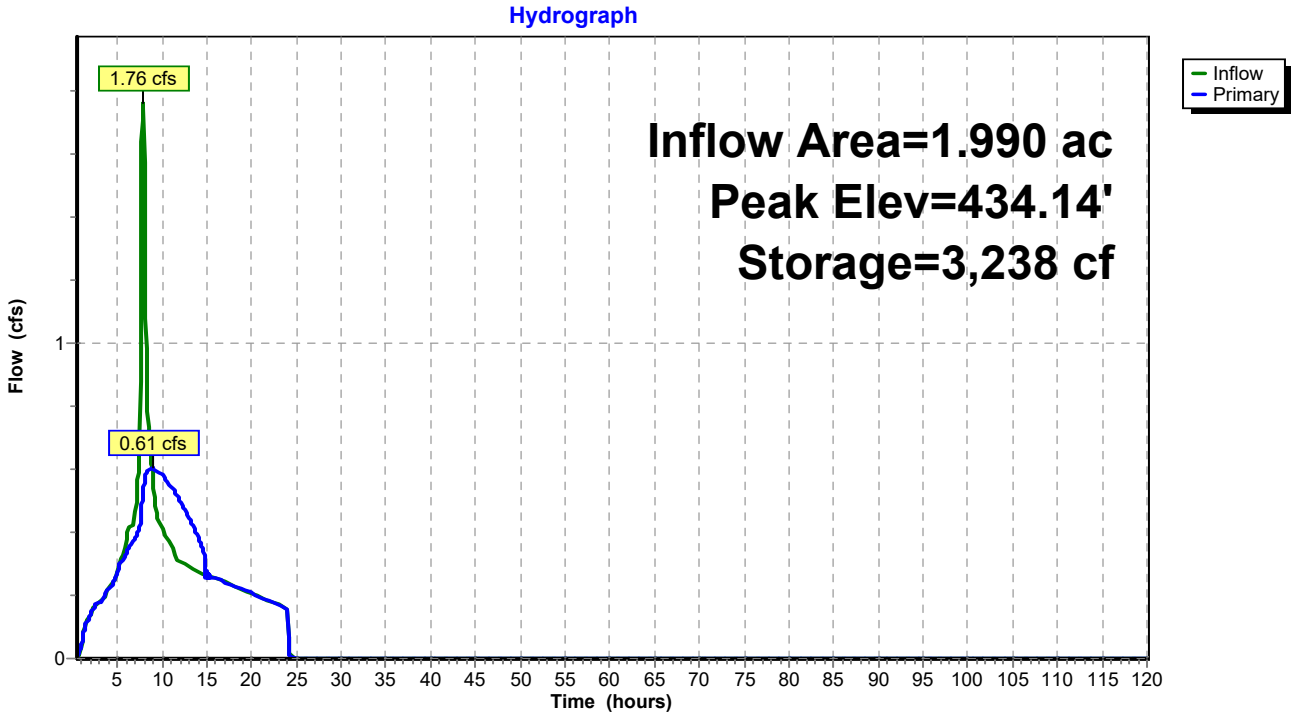
Volume	Invert	Avail.Storage	Storage Description
#1	432.00'	8,940 cf	**Custom Stage Data (Prismatic)**Listed below (Recalc)

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
432.00	0	0	0
432.50	1,160	290	290
434.00	2,320	2,610	2,900
436.00	3,720	6,040	8,940

Device	Routing	Invert	Outlet Devices
#1	Primary	431.31'	**3.7" Horiz. Orifice** C= 0.600 Limited to weir flow at low heads
#2	Primary	435.00'	**2.0' long x 0.5' breadth Overflow CB** Head (feet) 0.20 0.40 0.60 0.80 1.00 Coef. (English) 2.80 2.92 3.08 3.30 3.32

Primary OutFlow Max=0.61 cfs @ 8.89 hrs HW=434.14' (Free Discharge)
└**1=Orifice** (Orifice Controls 0.61 cfs @ 8.10 fps)
└**2=Overflow CB** (Controls 0.00 cfs)

Pond 7P.: Vintage Detention

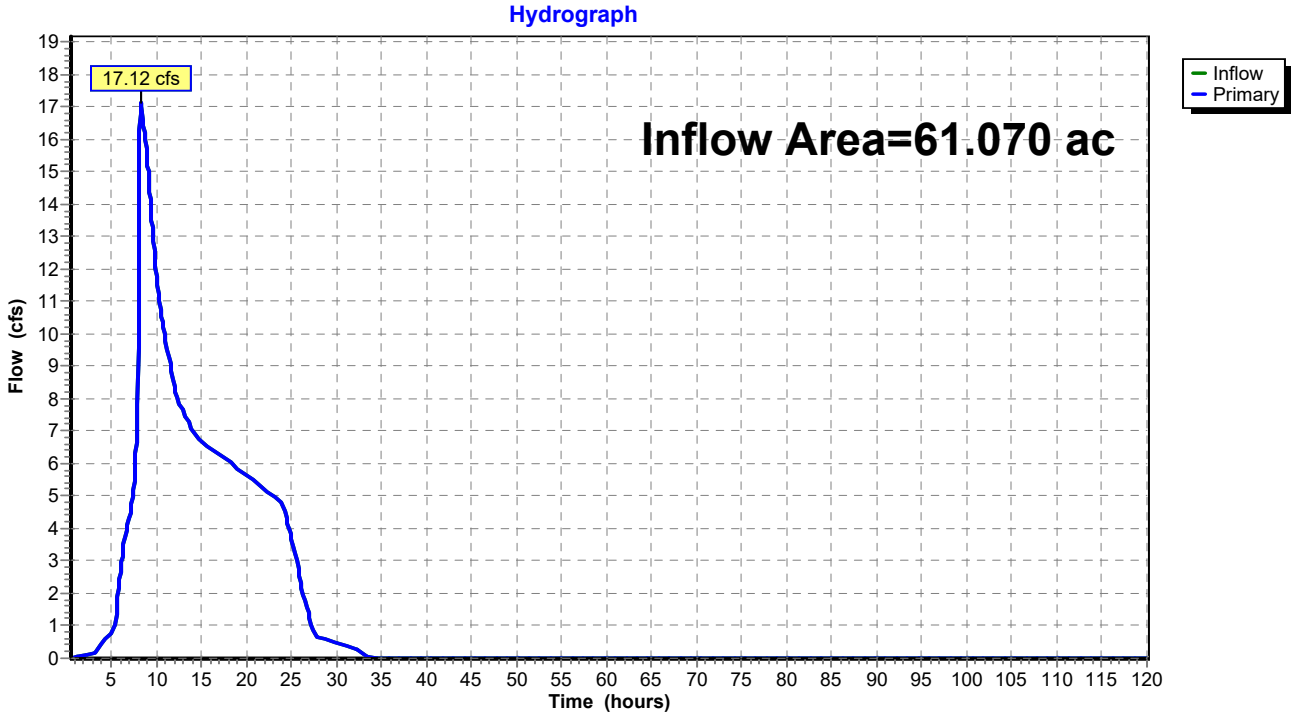


Summary for Link 2L: Developed Release

Inflow Area = 61.070 ac, 58.13% Impervious, Inflow Depth > 2.39" for Salem 100 YR event
Inflow = 17.12 cfs @ 8.31 hrs, Volume= 12.151 af
Primary = 17.12 cfs @ 8.31 hrs, Volume= 12.151 af, Atten= 0%, Lag= 0.0 min
Routed to nonexistent node 104P

Primary outflow = Inflow, Time Span= 0.50-120.00 hrs, dt= 0.05 hrs

Link 2L: Developed Release



Summary for Pond 1P.: Foxhaven Detention

Inflow Area = 60.280 ac, 57.58% Impervious, Inflow Depth = 0.36" for Salem WQ event
Inflow = 3.87 cfs @ 7.97 hrs, Volume= 1.817 af
Outflow = 1.02 cfs @ 12.63 hrs, Volume= 1.817 af, Atten= 74%, Lag= 279.7 min
Discarded = 0.37 cfs @ 12.63 hrs, Volume= 0.921 af
Primary = 0.64 cfs @ 12.63 hrs, Volume= 0.896 af
Routed to Reach 1R. : Foxhaven Swale

Routing by Stor-Ind method, Time Span= 0.50-120.00 hrs, dt= 0.05 hrs
Peak Elev= 370.33' @ 12.63 hrs Surf.Area= 8,098 sf Storage= 16,204 cf

Plug-Flow detention time= 227.9 min calculated for 1.816 af (100% of inflow)
Center-of-Mass det. time= 228.0 min (1,042.9 - 814.9)

Volume	Invert	Avail.Storage	Storage Description
#1	365.50'	53,470 cf	**Detention Basin (Prismatic)**Listed below (Recalc)

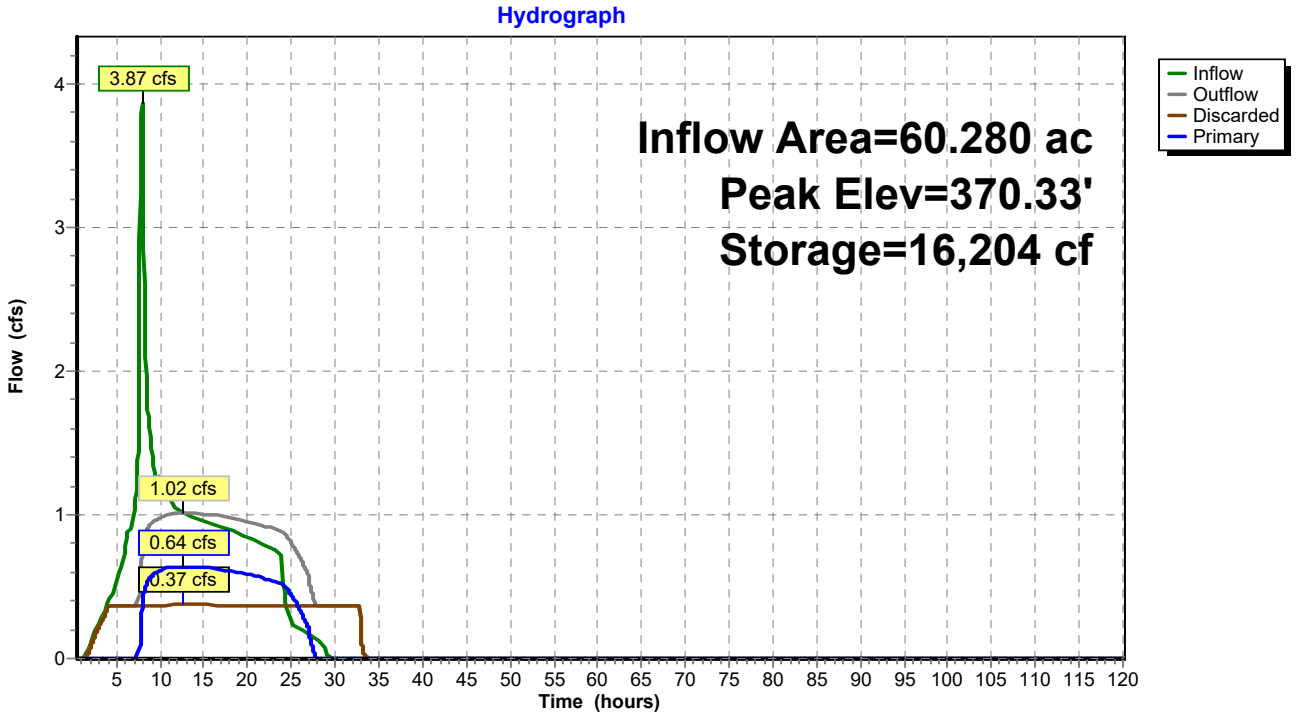
Elevation (feet)	Surf.Area (sq-ft)	Voids (%)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
365.50	7,930	0.0	0	0
367.50	7,930	40.0	6,344	6,344
369.00	6,740	0.1	11	6,355
370.00	7,750	100.0	7,245	13,600
371.00	8,810	100.0	8,280	21,880
372.00	9,920	100.0	9,365	31,245
373.00	11,100	100.0	10,510	41,755
374.00	12,330	100.0	11,715	53,470

Device	Routing	Invert	Outlet Devices
#1	Discarded	365.50'	**2.000 in/hr Exfiltration over Horizontal area**
#2	Primary	369.00'	**4.6" Horiz. Orifice** C= 0.600 Limited to weir flow at low heads
#3	Primary	370.40'	**11.4" Horiz. Orifice** C= 0.600 Limited to weir flow at low heads
#4	Primary	372.90'	**5.0' long Sharp-Crested Rectangular Weir** 2 End Contraction(s) 1.0' Crest Height

Discarded OutFlow Max=0.37 cfs @ 12.63 hrs HW=370.33' (Free Discharge)
└**1=Exfiltration** (Exfiltration Controls 0.37 cfs)

Primary OutFlow Max=0.64 cfs @ 12.63 hrs HW=370.33' (Free Discharge)
├**2=Orifice** (Orifice Controls 0.64 cfs @ 5.55 fps)
├**3=Orifice** (Controls 0.00 cfs)
└**4=Sharp-Crested Rectangular Weir** (Controls 0.00 cfs)

Pond 1P.: Foxhaven Detention



Summary for Pond 4P.: Baxter Reconstructed Rain Garden

Inflow Area = 40.280 ac, 54.18% Impervious, Inflow Depth = 0.67" for Salem WQ event
Inflow = 6.45 cfs @ 7.91 hrs, Volume= 2.240 af
Outflow = 0.98 cfs @ 17.47 hrs, Volume= 2.240 af, Atten= 85%, Lag= 573.5 min
Discarded = 0.62 cfs @ 4.20 hrs, Volume= 1.702 af
Primary = 0.37 cfs @ 17.47 hrs, Volume= 0.538 af
Routed to Pond 1P. : Foxhaven Detention

Routing by Stor-Ind method, Time Span= 0.50-120.00 hrs, dt= 0.05 hrs
Peak Elev= 401.35' @ 17.47 hrs Surf.Area= 15,128 sf Storage= 33,443 cf

Plug-Flow detention time= 427.0 min calculated for 2.240 af (100% of inflow)
Center-of-Mass det. time= 427.1 min (1,147.9 - 720.8)

Volume	Invert	Avail.Storage	Storage Description
#1	395.50'	107,904 cf	**West Pond (Prismatic)**Listed below (Recalc)
#2	395.50'	36,190 cf	**East Pond (Prismatic)**Listed below (Recalc)
		144,095 cf	Total Available Storage

Elevation (feet)	Surf.Area (sq-ft)	Voids (%)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
395.50	13,800	0.0	0	0
399.50	13,800	40.0	22,080	22,080
401.00	11,910	0.1	19	22,099
402.00	13,800	100.0	12,855	34,954
403.00	15,920	100.0	14,860	49,814
404.00	18,150	100.0	17,035	66,849
405.00	20,500	100.0	19,325	86,174
406.00	22,960	100.0	21,730	107,904

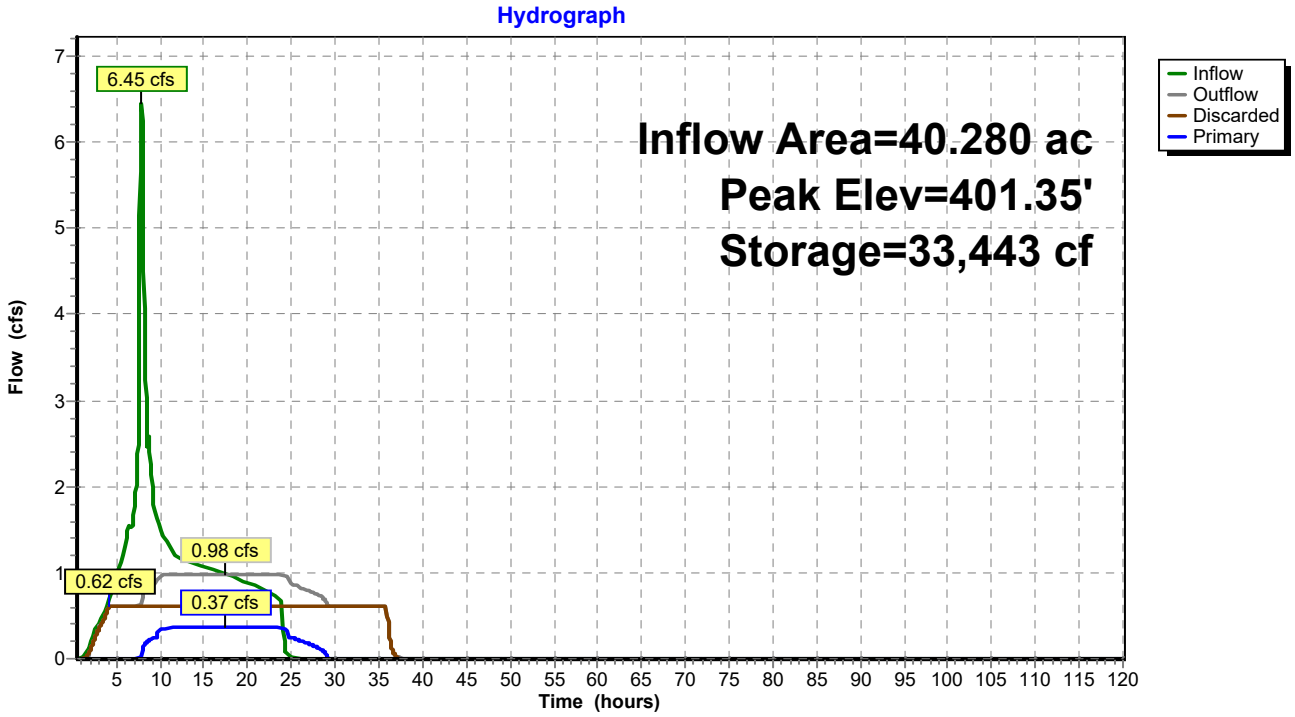
Elevation (feet)	Surf.Area (sq-ft)	Voids (%)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
395.50	3,960	0.0	0	0
399.50	3,960	40.0	6,336	6,336
401.00	1,820	0.1	4	6,340
402.00	3,960	100.0	2,890	9,230
403.00	5,190	100.0	4,575	13,805
404.00	6,560	100.0	5,875	19,680
405.00	8,160	100.0	7,360	27,040
406.00	10,140	100.0	9,150	36,190

Device	Routing	Invert	Outlet Devices
#1	Discarded	395.50'	**1.500 in/hr Exfiltration over Horizontal area**
#2	Primary	397.70'	**2.7" Horiz. Orifice** C= 0.600 Limited to weir flow at low heads
#3	Primary	401.60'	**9.0" Horiz. Orifice** C= 0.600 Limited to weir flow at low heads
#4	Primary	404.00'	**2.5' long Sharp-Crested Rectangular Weir** 2 End Contraction(s) 1.0' Crest Height

Discarded OutFlow Max=0.62 cfs @ 4.20 hrs HW=395.61' (Free Discharge)
└**1=Exfiltration** (Exfiltration Controls 0.62 cfs)

Primary OutFlow Max=0.37 cfs @ 17.47 hrs HW=401.35' (Free Discharge)
├**2=Orifice** (Orifice Controls 0.37 cfs @ 9.19 fps)
├**3=Orifice** (Controls 0.00 cfs)
└**4=Sharp-Crested Rectangular Weir** (Controls 0.00 cfs)

Pond 4P.: Baxter Reconstructed Rain Garden



Summary for Pond 7P.: Vintage Detention

Inflow Area = 1.990 ac, 75.38% Impervious, Inflow Depth = 0.91" for Salem WQ event
Inflow = 0.45 cfs @ 7.91 hrs, Volume= 0.150 af
Outflow = 0.36 cfs @ 8.09 hrs, Volume= 0.150 af, Atten= 19%, Lag= 10.5 min
Primary = 0.36 cfs @ 8.09 hrs, Volume= 0.150 af
Routed to Pond 4P. : Baxter Reconstructed Rain Garden

Routing by Stor-Ind method, Time Span= 0.50-120.00 hrs, dt= 0.05 hrs
Peak Elev= 432.33' @ 8.09 hrs Surf.Area= 769 sf Storage= 127 cf

Plug-Flow detention time= (not calculated: outflow precedes inflow)
Center-of-Mass det. time= 0.6 min (709.3 - 708.6)

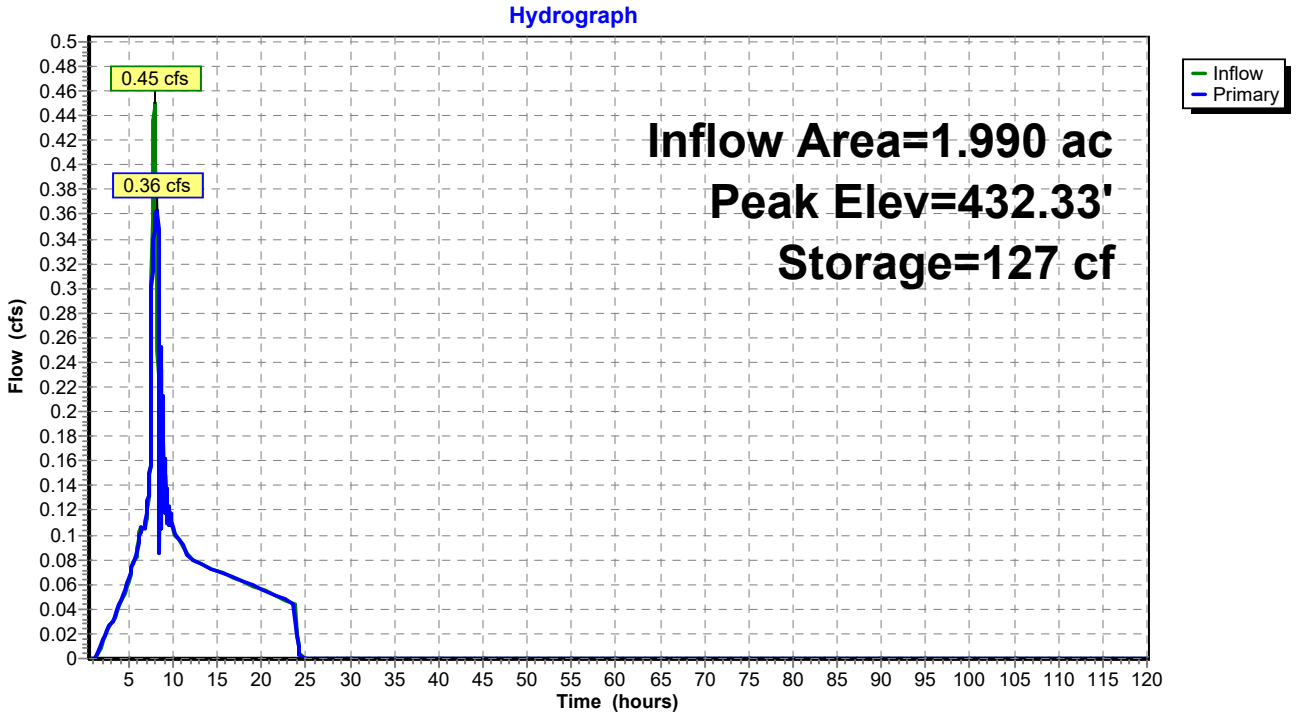
Volume	Invert	Avail.Storage	Storage Description
#1	432.00'	8,940 cf	**Custom Stage Data (Prismatic)**Listed below (Recalc)

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
432.00	0	0	0
432.50	1,160	290	290
434.00	2,320	2,610	2,900
436.00	3,720	6,040	8,940

Device	Routing	Invert	Outlet Devices
#1	Primary	431.31'	**3.7" Horiz. Orifice** C= 0.600 Limited to weir flow at low heads
#2	Primary	435.00'	**2.0' long x 0.5' breadth Overflow CB** Head (feet) 0.20 0.40 0.60 0.80 1.00 Coef. (English) 2.80 2.92 3.08 3.30 3.32

Primary OutFlow Max=0.36 cfs @ 8.09 hrs HW=432.33' (Free Discharge)
└**1=Orifice** (Orifice Controls 0.36 cfs @ 4.86 fps)
└**2=Overflow CB** (Controls 0.00 cfs)

Pond 7P.: Vintage Detention

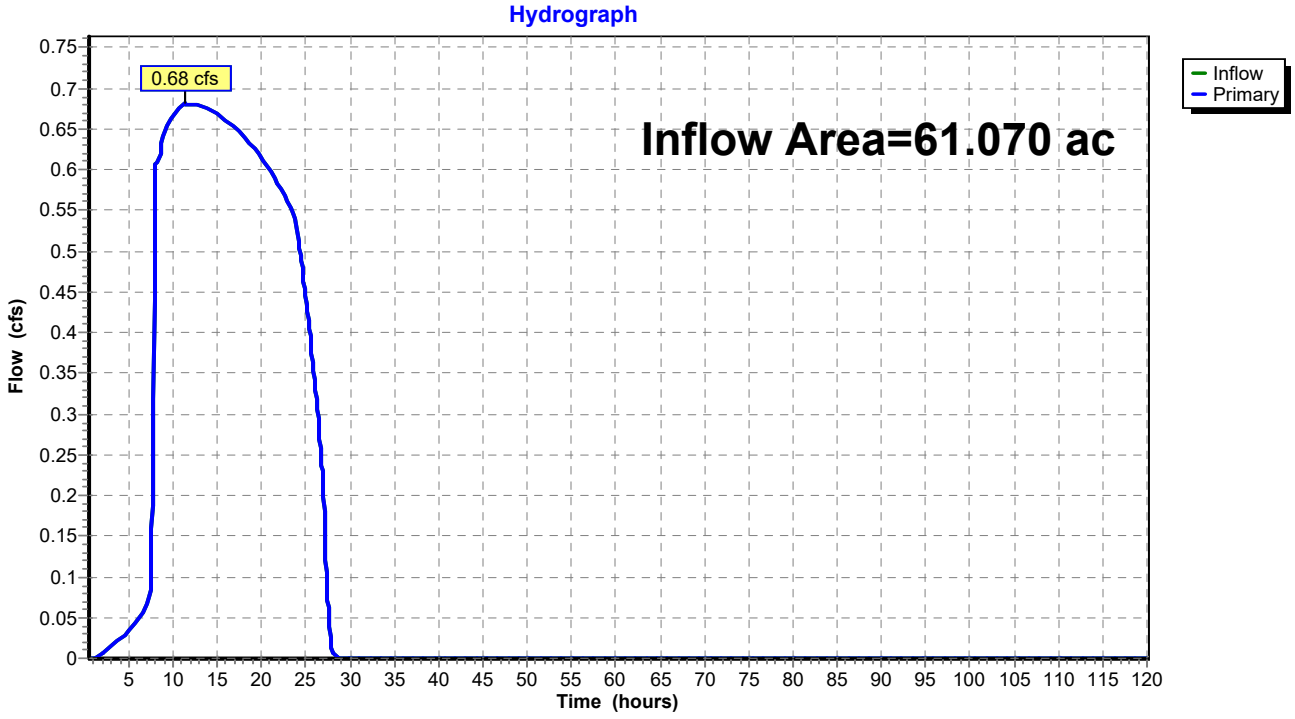


Summary for Link 2L: Developed Release

Inflow Area = 61.070 ac, 58.13% Impervious, Inflow Depth = 0.19" for Salem WQ event
Inflow = 0.68 cfs @ 11.41 hrs, Volume= 0.973 af
Primary = 0.68 cfs @ 11.41 hrs, Volume= 0.973 af, Atten= 0%, Lag= 0.0 min
Routed to nonexistent node 104P

Primary outflow = Inflow, Time Span= 0.50-120.00 hrs, dt= 0.05 hrs

Link 2L: Developed Release



Summary for Reach 1R.: Foxhaven Swale

Inflow Area = 60.280 ac, 57.58% Impervious, Inflow Depth = 0.18" for Salem WQ event
Inflow = 0.64 cfs @ 12.63 hrs, Volume= 0.896 af
Outflow = 0.64 cfs @ 12.72 hrs, Volume= 0.896 af, Atten= 0%, Lag= 5.6 min
Routed to Link 2L : Developed Release

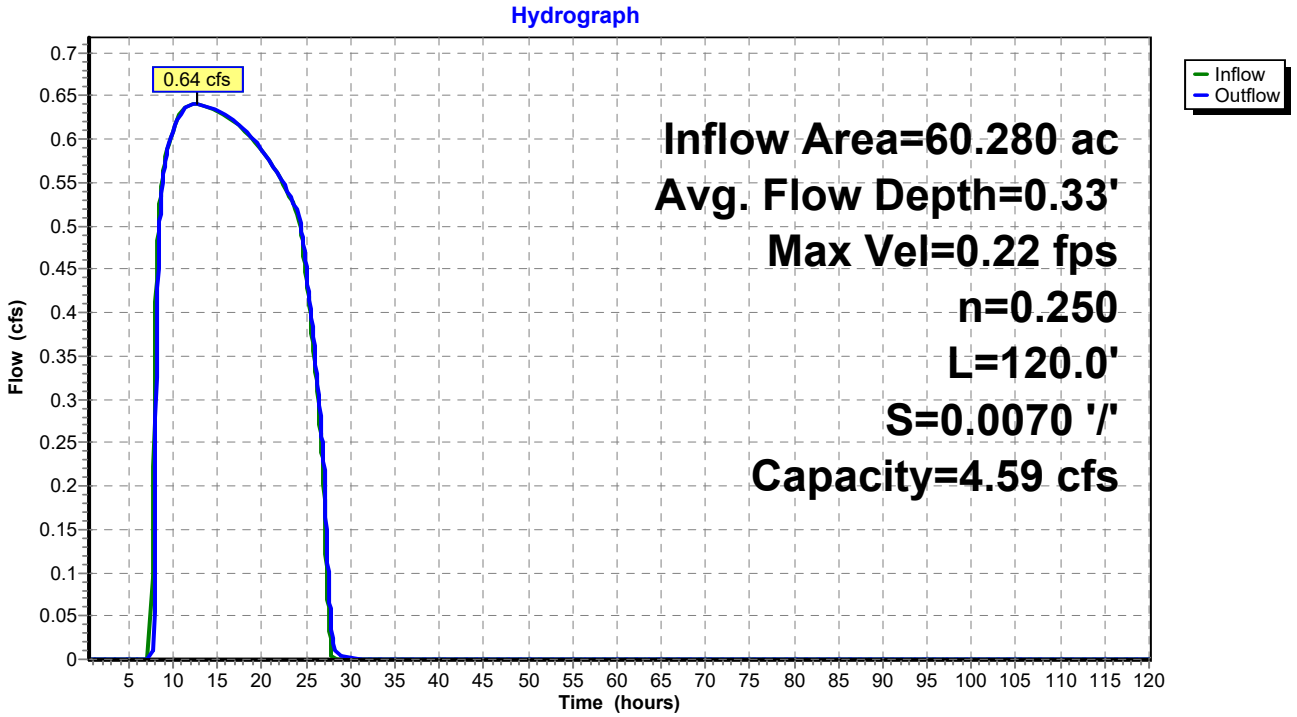
Routing by Stor-Ind method, Time Span= 0.50-120.00 hrs, dt= 0.05 hrs
Max. Velocity= 0.22 fps, Min. Travel Time= 9.2 min
Avg. Velocity = 0.14 fps, Avg. Travel Time= 14.4 min

Peak Storage= 352 cf @ 12.72 hrs
Average Depth at Peak Storage= 0.33' , Surface Width= 9.96'
Bank-Full Depth= 1.00' Flow Area= 11.0 sf, Capacity= 4.59 cfs

8.00' x 1.00' deep channel, n= 0.250
Side Slope Z-value= 3.0 '/' Top Width= 14.00'
Length= 120.0' Slope= 0.0070 '/'
Inlet Invert= 368.50', Outlet Invert= 367.66'

‡

Reach 1R.: Foxhaven Swale



Summary for Reach 1R.: Foxhaven Swale

Inflow Area = 60.280 ac, 57.58% Impervious, Inflow Depth = 1.72" for Salem 25 YR event
Inflow = 8.67 cfs @ 9.07 hrs, Volume= 8.649 af
Outflow = 8.67 cfs @ 9.08 hrs, Volume= 8.649 af, Atten= 0%, Lag= 0.6 min
Routed to Link 2L : Developed Release

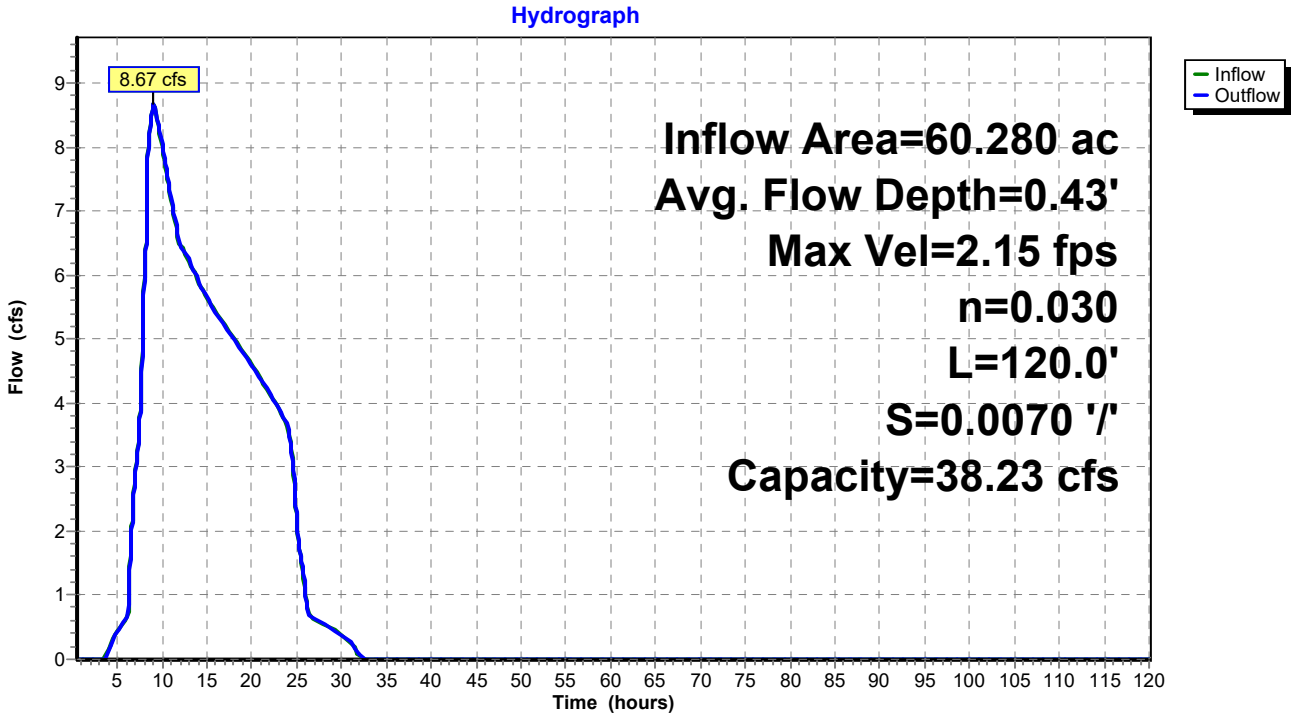
Routing by Stor-Ind method, Time Span= 0.50-120.00 hrs, dt= 0.05 hrs
Max. Velocity= 2.15 fps, Min. Travel Time= 0.9 min
Avg. Velocity = 1.39 fps, Avg. Travel Time= 1.4 min

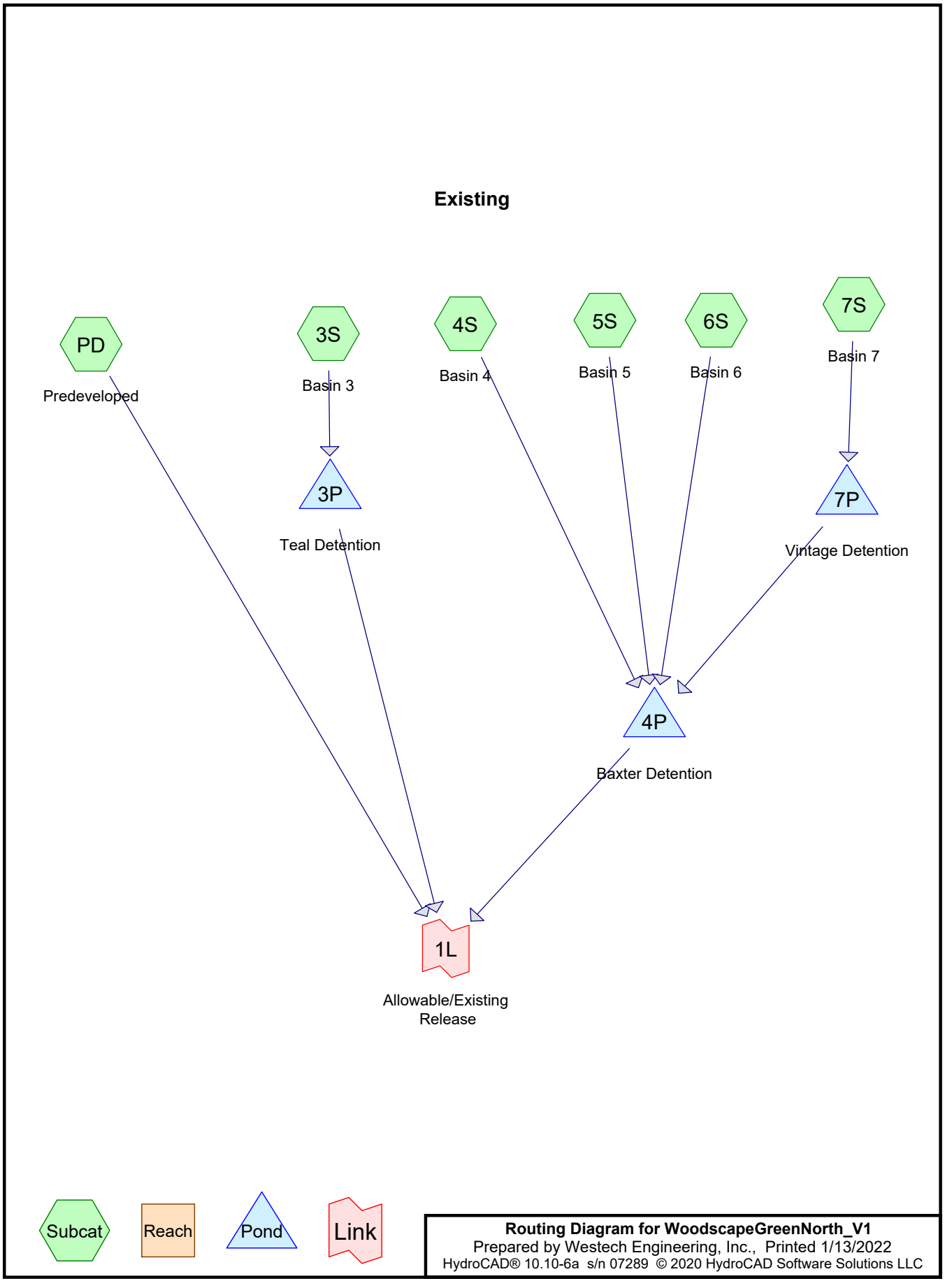
Peak Storage= 483 cf @ 9.08 hrs
Average Depth at Peak Storage= 0.43' , Surface Width= 10.60'
Bank-Full Depth= 1.00' Flow Area= 11.0 sf, Capacity= 38.23 cfs

8.00' x 1.00' deep channel, n= 0.030
Side Slope Z-value= 3.0 '/' Top Width= 14.00'
Length= 120.0' Slope= 0.0070 '/'
Inlet Invert= 368.50', Outlet Invert= 367.66'

‡

Reach 1R.: Foxhaven Swale




Existing
PD
Predeveloped
3S
Basin 3
4S
Basin 4
5S
Basin 5
6S
Basin 6
7S
Basin 7
3P
Teal Detention
7P
Vintage Detention
4P
Baxter Detention
1L
Allowable/Existing
Release
Subcat
Reach
Pond
Link
Routing Diagram for WoodscapeGreenNorth_V1
Prepared by Westech Engineering, Inc., Printed 1/13/2022
HydroCAD® 10.10-6a s/n 07289 © 2020 HydroCAD Software Solutions LLC

Summary for Subcatchment PD: Predeveloped

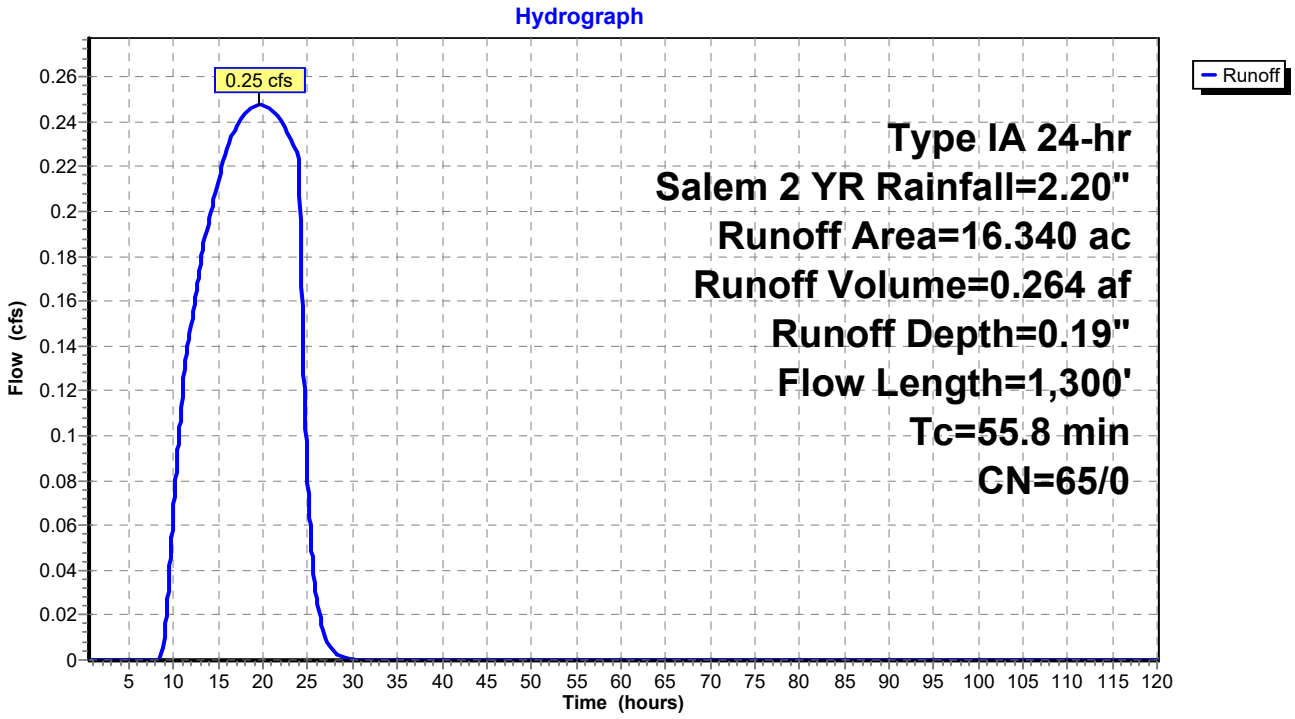
Runoff = 0.25 cfs @ 19.56 hrs, Volume= 0.264 af, Depth= 0.19"
Routed to Link 1L : Allowable/Existing Release

Runoff by SBUH method, Split Pervious/Imperv., Time Span= 0.50-120.00 hrs, dt= 0.05 hrs
Type IA 24-hr Salem 2 YR Rainfall=2.20"

Area (ac)	CN	Description
8.170	58	Woods/grass comb., Good, HSG B
8.170	72	Woods/grass comb., Good, HSG C
16.340	65	Weighted Average
16.340		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
37.5	300	0.0400	0.13		**Sheet Flow, Pre Developed** n= 0.300 P2= 2.20"
8.9	600	0.0500	1.12		**Shallow Concentrated Flow,** Woodland Kv= 5.0 fps
9.4	400	0.0200	0.71		**Shallow Concentrated Flow,** Woodland Kv= 5.0 fps
55.8	1,300	Total			

Subcatchment PD: Predeveloped



Summary for Subcatchment 3S: Basin 3

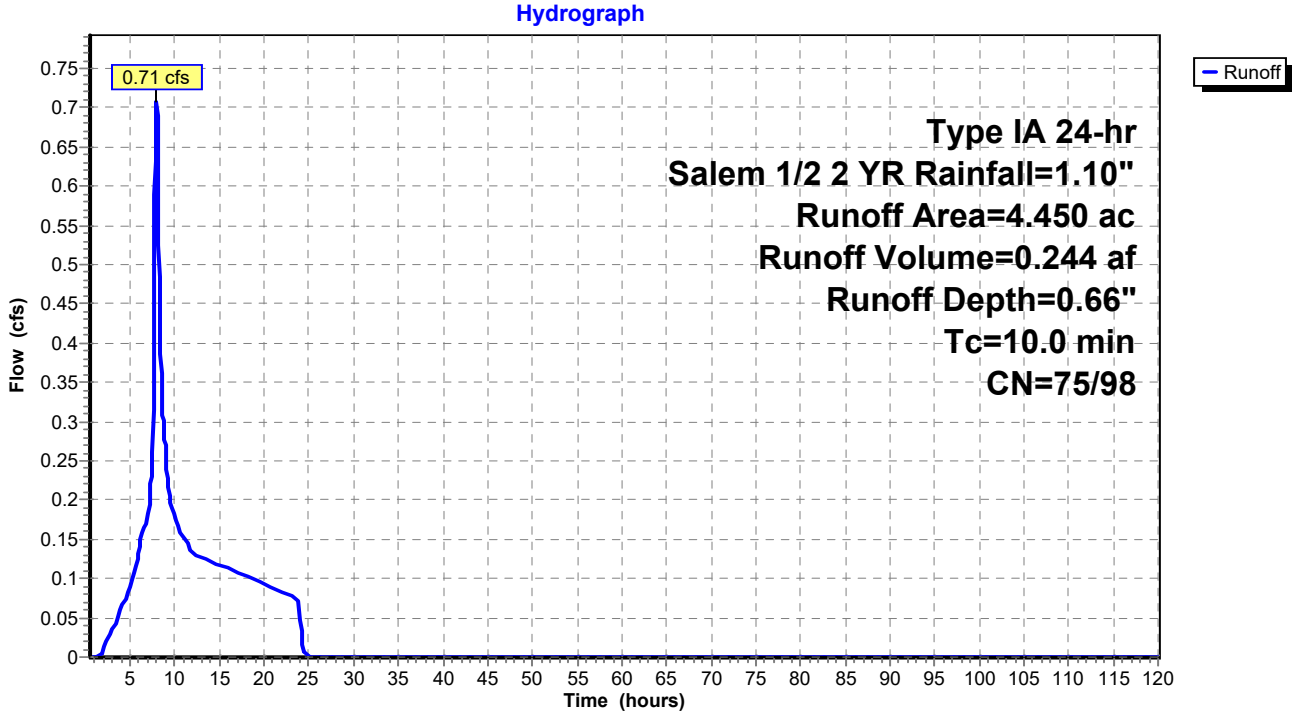
Runoff = 0.71 cfs @ 7.98 hrs, Volume= 0.244 af, Depth= 0.66"
Routed to Pond 3P : Teal Detention

Runoff by SBUH method, Split Pervious/Imperv., Time Span= 0.50-120.00 hrs, dt= 0.05 hrs
Type IA 24-hr Salem 1/2 2 YR Rainfall=1.10"

	Area (ac)	CN	Description
*	0.970	98	Paved roads w/curbs & sewers, HSG C
	3.480	90	1/8 acre lots, 65% imp, HSG C
	4.450	92	Weighted Average
	1.218		27.37% Pervious Area
	3.232		72.63% Impervious Area

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

Subcatchment 3S: Basin 3



Summary for Subcatchment 4S: Basin 4

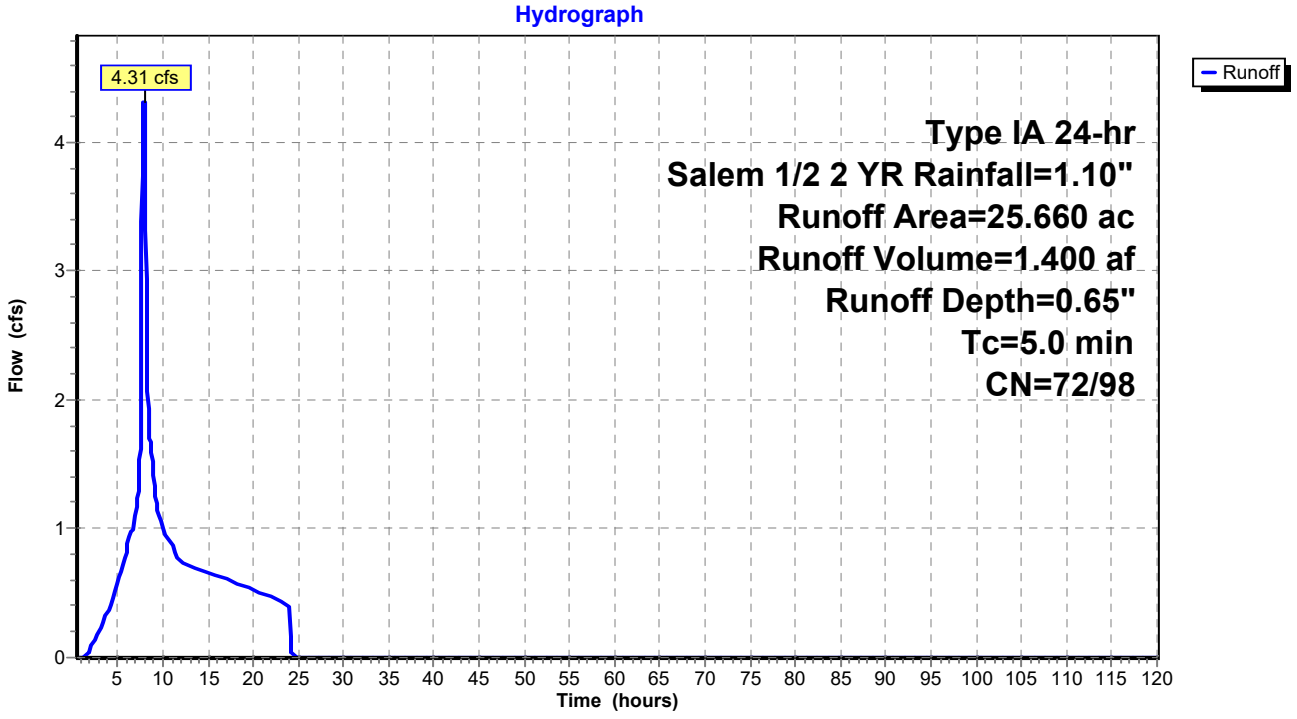
Runoff = 4.31 cfs @ 7.92 hrs, Volume= 1.400 af, Depth= 0.65"
Routed to Pond 4P : Baxter Detention

Runoff by SBUH method, Split Pervious/Imperv., Time Span= 0.50-120.00 hrs, dt= 0.05 hrs
Type IA 24-hr Salem 1/2 2 YR Rainfall=1.10"

	Area (ac)	CN	Description
*	5.860	98	Paved roads w/curbs & sewers, HSG C
	4.950	85	1/8 acre lots, 65% imp, HSG B
	14.850	90	1/8 acre lots, 65% imp, HSG C
	25.660	91	Weighted Average
	6.930		27.01% Pervious Area
	18.730		72.99% Impervious Area

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

Subcatchment 4S: Basin 4



Summary for Subcatchment 5S: Basin 5

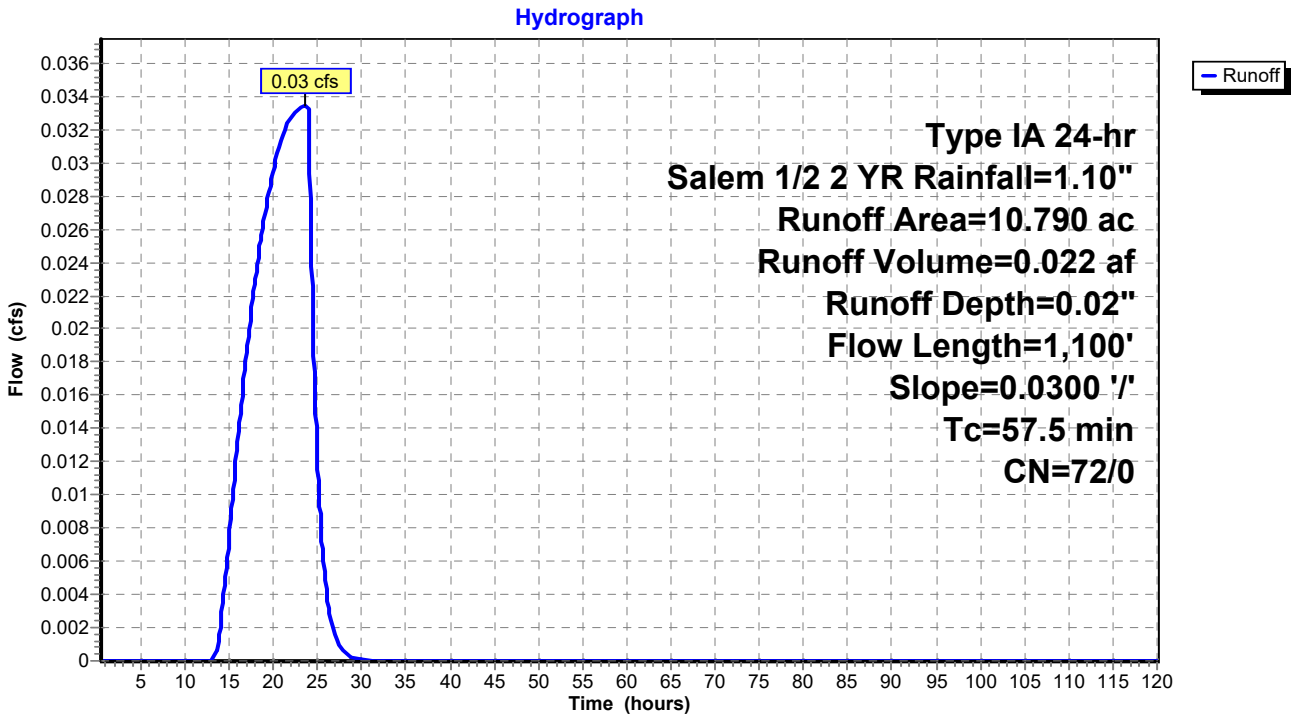
Runoff = 0.03 cfs @ 23.52 hrs, Volume= 0.022 af, Depth= 0.02"
Routed to Pond 4P : Baxter Detention

Runoff by SBUH method, Split Pervious/Imperv., Time Span= 0.50-120.00 hrs, dt= 0.05 hrs
Type IA 24-hr Salem 1/2 2 YR Rainfall=1.10"

Area (ac)	CN	Description
10.790	72	Woods/grass comb., Good, HSG C
10.790		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
42.1	300	0.0300	0.12		**Sheet Flow, Pre Developed** n= 0.300 P2= 2.20"
15.4	800	0.0300	0.87		**Shallow Concentrated Flow,** Woodland Kv= 5.0 fps
57.5	1,100	Total			

Subcatchment 5S: Basin 5



Summary for Subcatchment 6S: Basin 6

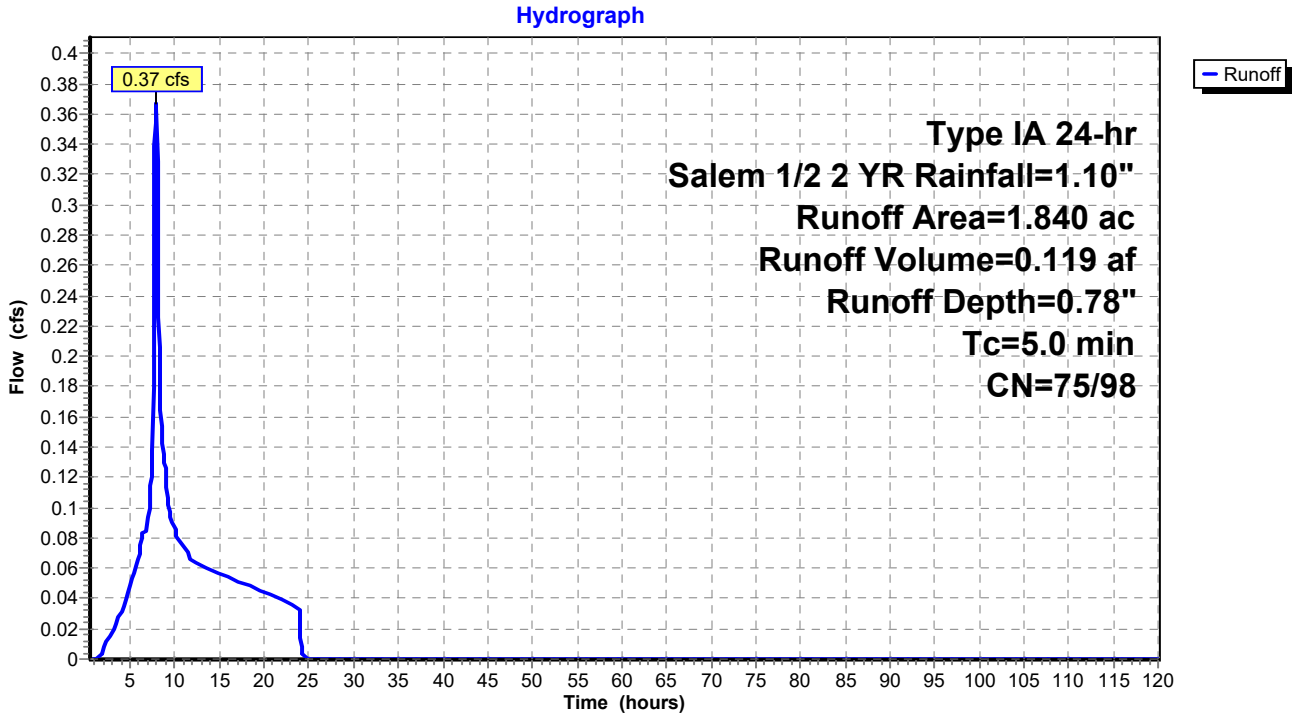
Runoff = 0.37 cfs @ 7.92 hrs, Volume= 0.119 af, Depth= 0.78"
Routed to Pond 4P : Baxter Detention

Runoff by SBUH method, Split Pervious/Imperv., Time Span= 0.50-120.00 hrs, dt= 0.05 hrs
Type IA 24-hr Salem 1/2 2 YR Rainfall=1.10"

	Area (ac)	CN	Description
*	1.140	98	Paved roads w/curbs & sewers, HSG C
	0.700	90	1/8 acre lots, 65% imp, HSG C
	1.840	95	Weighted Average
	0.245		13.32% Pervious Area
	1.595		86.68% Impervious Area

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

Subcatchment 6S: Basin 6



Summary for Subcatchment 7S: Basin 7

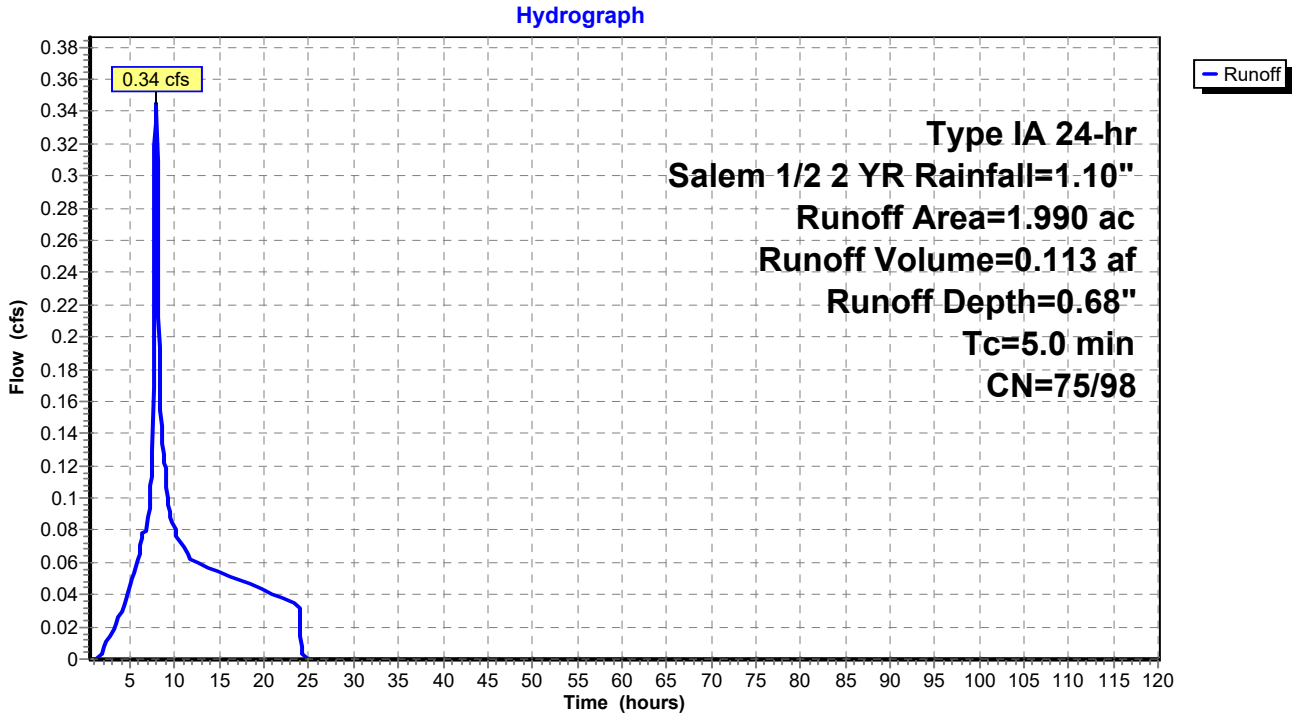
Runoff = 0.34 cfs @ 7.92 hrs, Volume= 0.113 af, Depth= 0.68"
Routed to Pond 7P : Vintage Detention

Runoff by SBUH method, Split Pervious/Imperv., Time Span= 0.50-120.00 hrs, dt= 0.05 hrs
Type IA 24-hr Salem 1/2 2 YR Rainfall=1.10"

	Area (ac)	CN	Description
*	0.590	98	Paved roads w/curbs & sewers, HSG C
	1.400	90	1/8 acre lots, 65% imp, HSG C
	1.990	92	Weighted Average
	0.490		24.62% Pervious Area
	1.500		75.38% Impervious Area

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

Subcatchment 7S: Basin 7



Summary for Subcatchment 3S: Basin 3

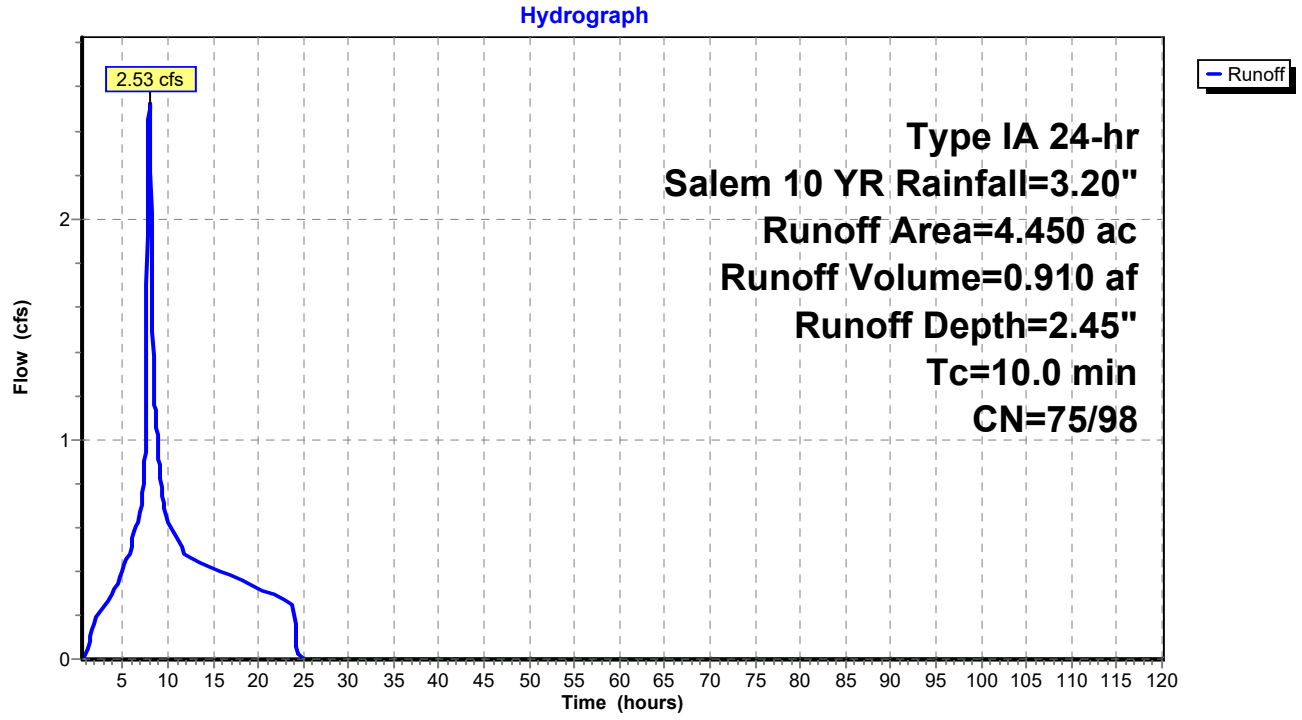
Runoff = 2.53 cfs @ 7.98 hrs, Volume= 0.910 af, Depth= 2.45"
Routed to Pond 3P : Teal Detention

Runoff by SBUH method, Split Pervious/Imperv., Time Span= 0.50-120.00 hrs, dt= 0.05 hrs
Type IA 24-hr Salem 10 YR Rainfall=3.20"

	Area (ac)	CN	Description
*	0.970	98	Paved roads w/curbs & sewers, HSG C
	3.480	90	1/8 acre lots, 65% imp, HSG C
	4.450	92	Weighted Average
	1.218		27.37% Pervious Area
	3.232		72.63% Impervious Area

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

Subcatchment 3S: Basin 3



Summary for Subcatchment 4S: Basin 4

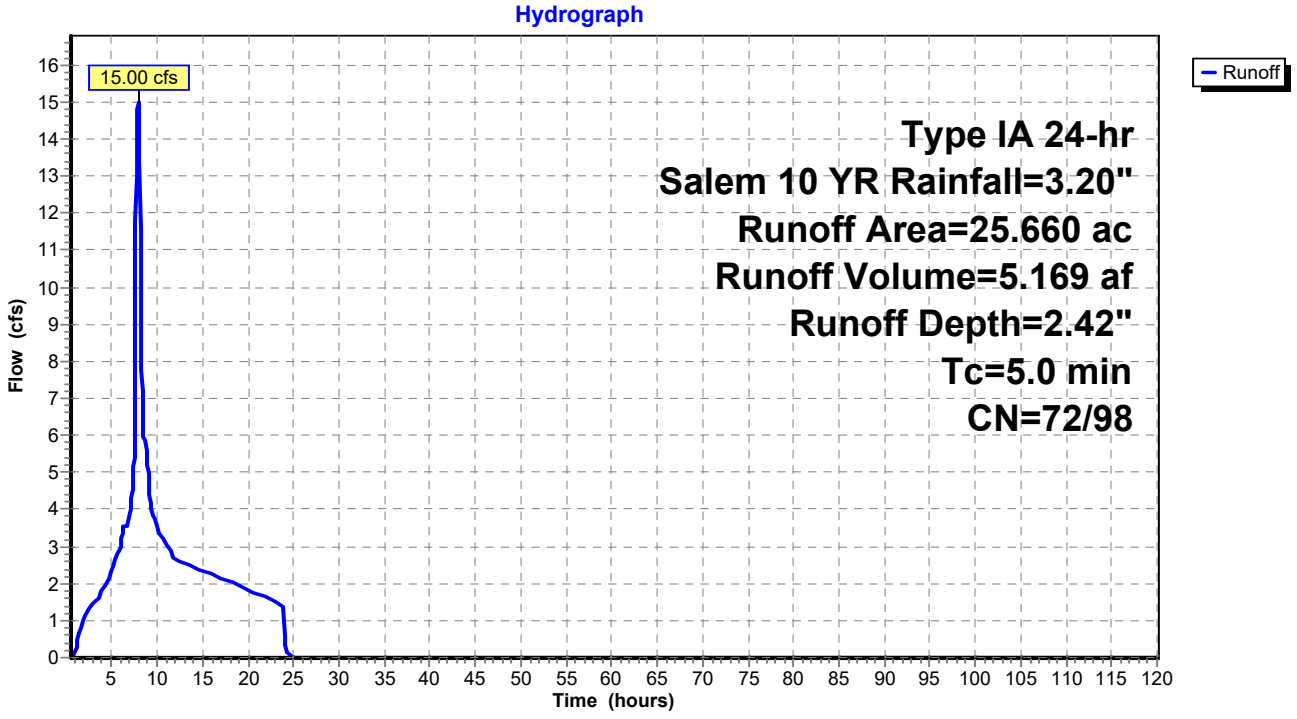
Runoff = 15.00 cfs @ 7.92 hrs, Volume= 5.169 af, Depth= 2.42"
Routed to Pond 4P : Baxter Detention

Runoff by SBUH method, Split Pervious/Imperv., Time Span= 0.50-120.00 hrs, dt= 0.05 hrs
Type IA 24-hr Salem 10 YR Rainfall=3.20"

	Area (ac)	CN	Description
*	5.860	98	Paved roads w/curbs & sewers, HSG C
	4.950	85	1/8 acre lots, 65% imp, HSG B
	14.850	90	1/8 acre lots, 65% imp, HSG C
	25.660	91	Weighted Average
	6.930		27.01% Pervious Area
	18.730		72.99% Impervious Area

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

Subcatchment 4S: Basin 4



Summary for Subcatchment 5S: Basin 5

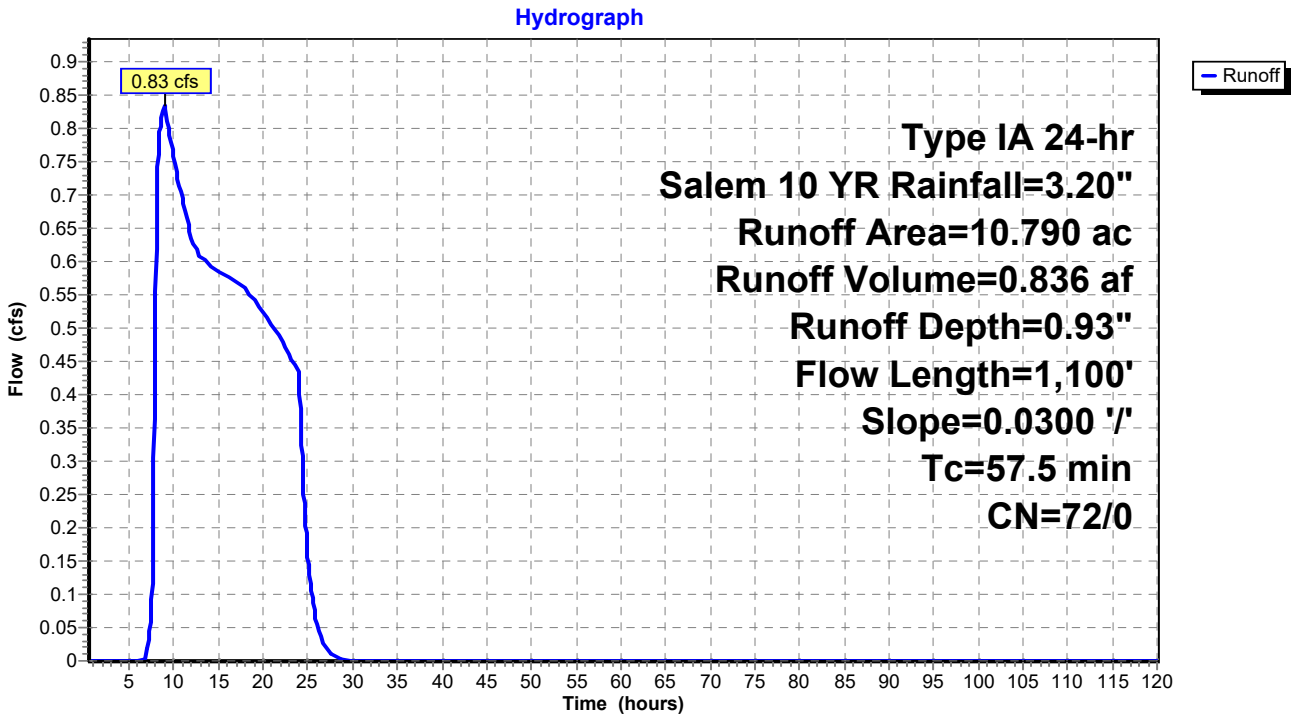
Runoff = 0.83 cfs @ 8.92 hrs, Volume= 0.836 af, Depth= 0.93"
Routed to Pond 4P : Baxter Detention

Runoff by SBUH method, Split Pervious/Imperv., Time Span= 0.50-120.00 hrs, dt= 0.05 hrs
Type IA 24-hr Salem 10 YR Rainfall=3.20"

Area (ac)	CN	Description
10.790	72	Woods/grass comb., Good, HSG C
10.790		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
42.1	300	0.0300	0.12		**Sheet Flow, Pre Developed** n= 0.300 P2= 2.20"
15.4	800	0.0300	0.87		**Shallow Concentrated Flow,** Woodland Kv= 5.0 fps
57.5	1,100	Total			

Subcatchment 5S: Basin 5



Summary for Subcatchment 6S: Basin 6

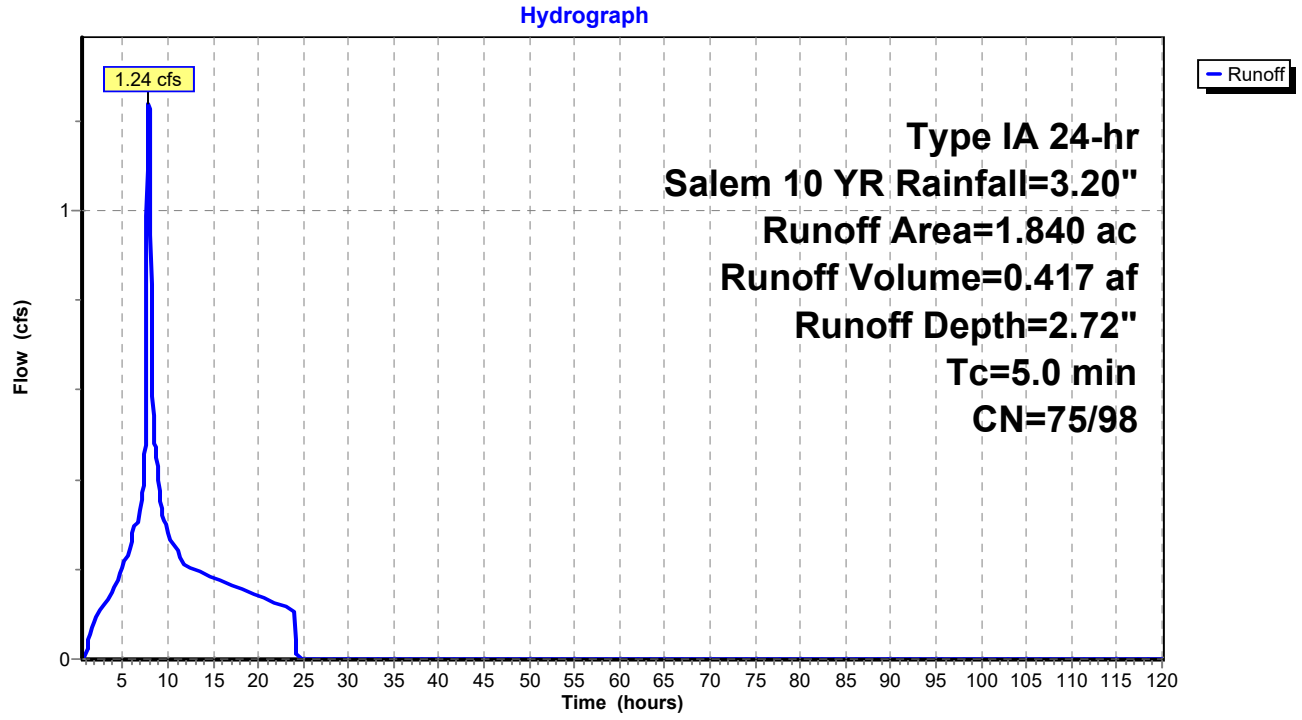
Runoff = 1.24 cfs @ 7.91 hrs, Volume= 0.417 af, Depth= 2.72"
Routed to Pond 4P : Baxter Detention

Runoff by SBUH method, Split Pervious/Imperv., Time Span= 0.50-120.00 hrs, dt= 0.05 hrs
Type IA 24-hr Salem 10 YR Rainfall=3.20"

	Area (ac)	CN	Description
*	1.140	98	Paved roads w/curbs & sewers, HSG C
	0.700	90	1/8 acre lots, 65% imp, HSG C
	1.840	95	Weighted Average
	0.245		13.32% Pervious Area
	1.595		86.68% Impervious Area

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

Subcatchment 6S: Basin 6



Summary for Subcatchment 7S: Basin 7

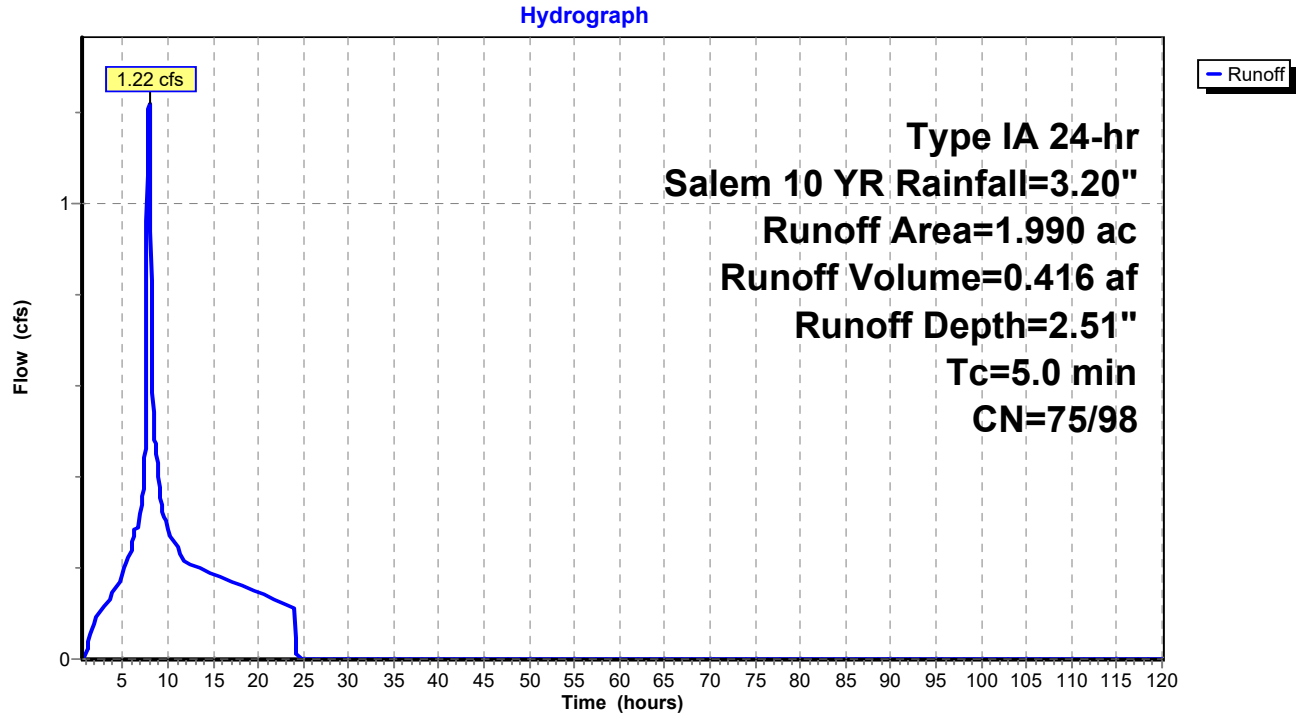
Runoff = 1.22 cfs @ 7.91 hrs, Volume= 0.416 af, Depth= 2.51"
Routed to Pond 7P : Vintage Detention

Runoff by SBUH method, Split Pervious/Imperv., Time Span= 0.50-120.00 hrs, dt= 0.05 hrs
Type IA 24-hr Salem 10 YR Rainfall=3.20"

	Area (ac)	CN	Description
*	0.590	98	Paved roads w/curbs & sewers, HSG C
	1.400	90	1/8 acre lots, 65% imp, HSG C
	1.990	92	Weighted Average
	0.490		24.62% Pervious Area
	1.500		75.38% Impervious Area

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

Subcatchment 7S: Basin 7



Summary for Subcatchment PD: Predeveloped

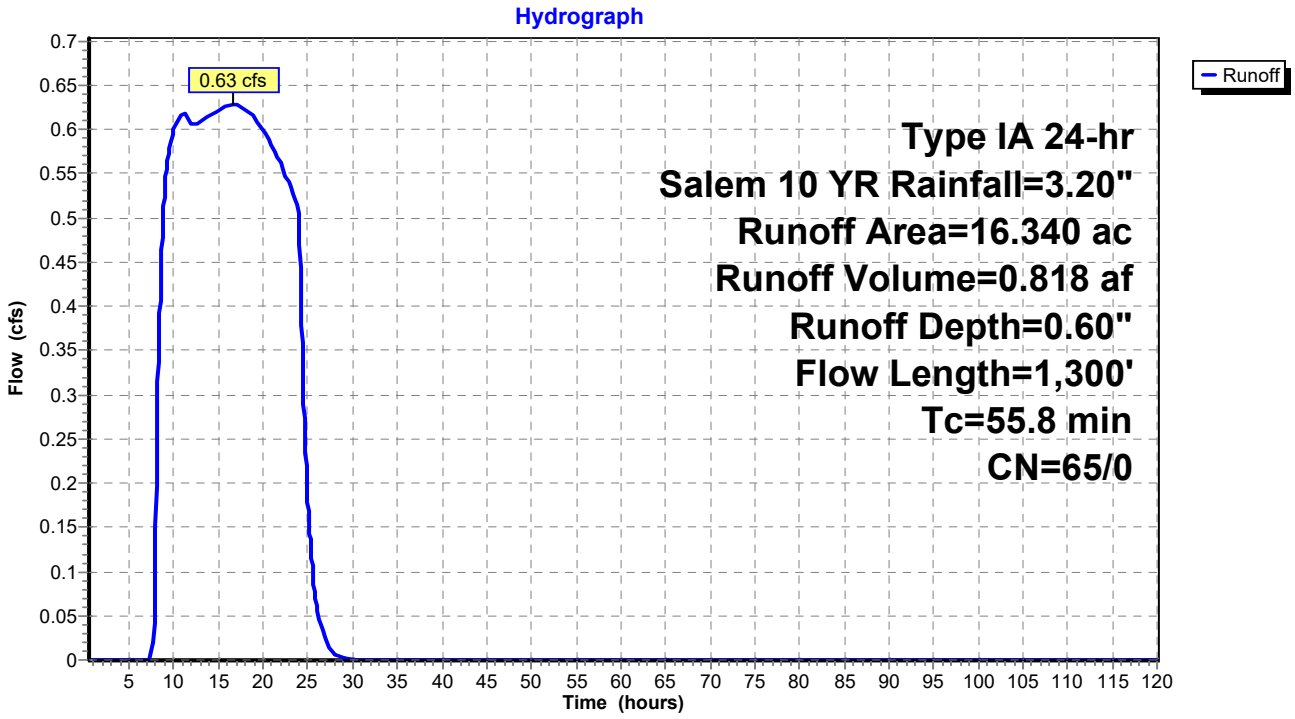
Runoff = 0.63 cfs @ 16.55 hrs, Volume= 0.818 af, Depth= 0.60"
Routed to Link 1L : Allowable/Existing Release

Runoff by SBUH method, Split Pervious/Imperv., Time Span= 0.50-120.00 hrs, dt= 0.05 hrs
Type IA 24-hr Salem 10 YR Rainfall=3.20"

Area (ac)	CN	Description
8.170	58	Woods/grass comb., Good, HSG B
8.170	72	Woods/grass comb., Good, HSG C
16.340	65	Weighted Average
16.340		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
37.5	300	0.0400	0.13		**Sheet Flow, Pre Developed** n= 0.300 P2= 2.20"
8.9	600	0.0500	1.12		**Shallow Concentrated Flow,** Woodland Kv= 5.0 fps
9.4	400	0.0200	0.71		**Shallow Concentrated Flow,** Woodland Kv= 5.0 fps
55.8	1,300	Total			

Subcatchment PD: Predeveloped



Summary for Subcatchment 3S: Basin 3

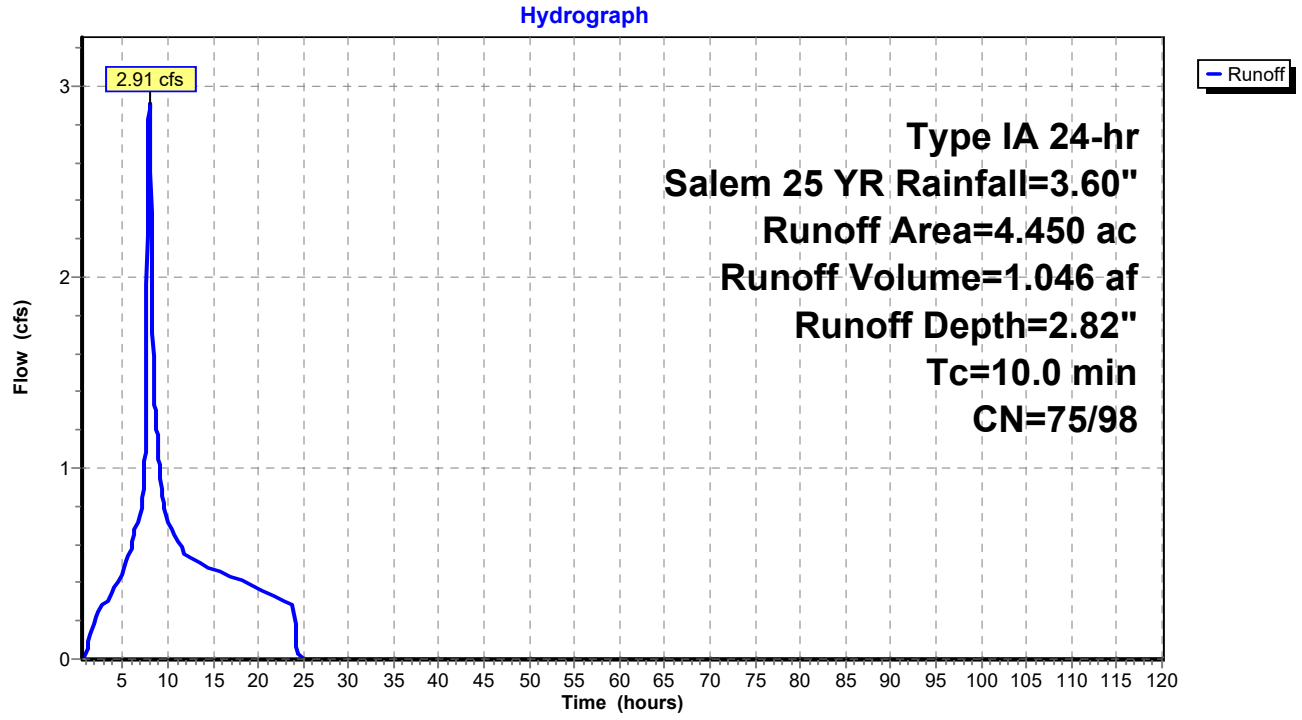
Runoff = 2.91 cfs @ 7.98 hrs, Volume= 1.046 af, Depth= 2.82"
Routed to Pond 3P : Teal Detention

Runoff by SBUH method, Split Pervious/Imperv., Time Span= 0.50-120.00 hrs, dt= 0.05 hrs
Type IA 24-hr Salem 25 YR Rainfall=3.60"

	Area (ac)	CN	Description
*	0.970	98	Paved roads w/curbs & sewers, HSG C
	3.480	90	1/8 acre lots, 65% imp, HSG C
	4.450	92	Weighted Average
	1.218		27.37% Pervious Area
	3.232		72.63% Impervious Area

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

Subcatchment 3S: Basin 3



Summary for Subcatchment 4S: Basin 4

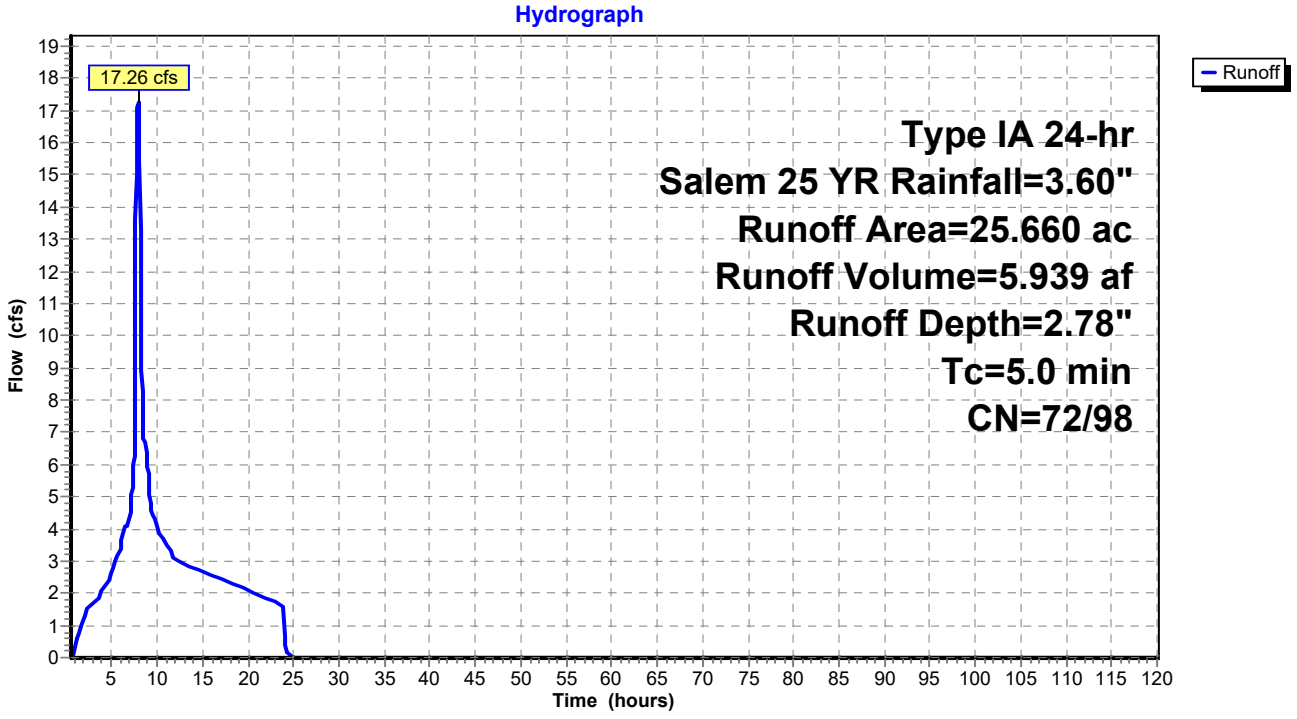
Runoff = 17.26 cfs @ 7.92 hrs, Volume= 5.939 af, Depth= 2.78"
Routed to Pond 4P : Baxter Detention

Runoff by SBUH method, Split Pervious/Imperv., Time Span= 0.50-120.00 hrs, dt= 0.05 hrs
Type IA 24-hr Salem 25 YR Rainfall=3.60"

	Area (ac)	CN	Description
*	5.860	98	Paved roads w/curbs & sewers, HSG C
	4.950	85	1/8 acre lots, 65% imp, HSG B
	14.850	90	1/8 acre lots, 65% imp, HSG C
	25.660	91	Weighted Average
	6.930		27.01% Pervious Area
	18.730		72.99% Impervious Area

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

Subcatchment 4S: Basin 4



Summary for Subcatchment 5S: Basin 5

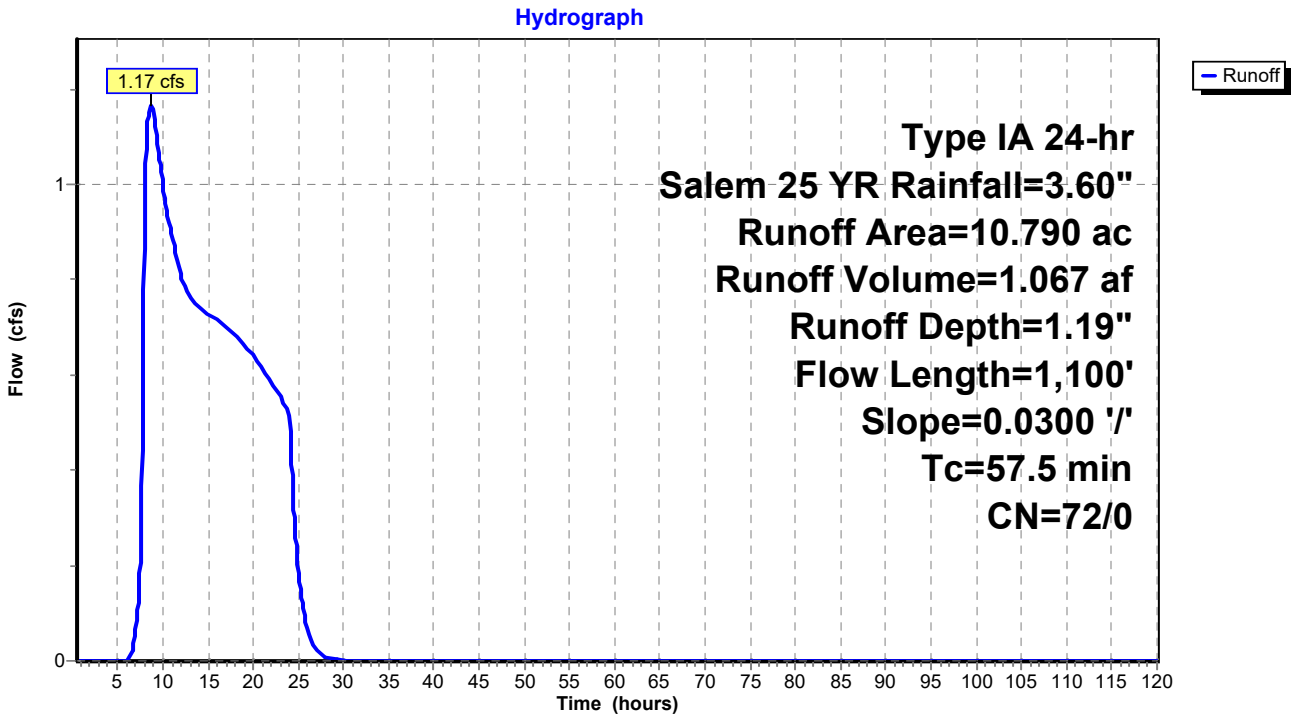
Runoff = 1.17 cfs @ 8.78 hrs, Volume= 1.067 af, Depth= 1.19"
Routed to Pond 4P : Baxter Detention

Runoff by SBUH method, Split Pervious/Imperv., Time Span= 0.50-120.00 hrs, dt= 0.05 hrs
Type IA 24-hr Salem 25 YR Rainfall=3.60"

Area (ac)	CN	Description
10.790	72	Woods/grass comb., Good, HSG C
10.790		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
42.1	300	0.0300	0.12		**Sheet Flow, Pre Developed** n= 0.300 P2= 2.20"
15.4	800	0.0300	0.87		**Shallow Concentrated Flow,** Woodland Kv= 5.0 fps
57.5	1,100	Total			

Subcatchment 5S: Basin 5



Summary for Subcatchment 6S: Basin 6

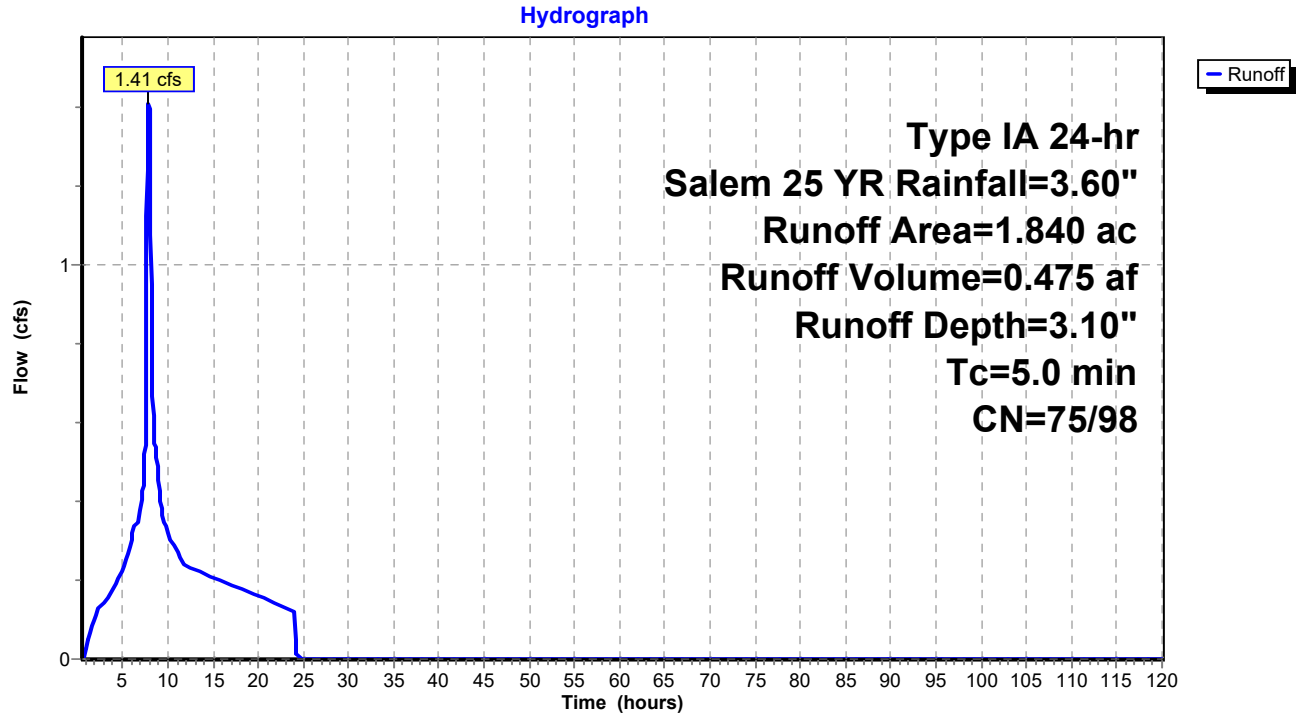
Runoff = 1.41 cfs @ 7.90 hrs, Volume= 0.475 af, Depth= 3.10"
Routed to Pond 4P : Baxter Detention

Runoff by SBUH method, Split Pervious/Imperv., Time Span= 0.50-120.00 hrs, dt= 0.05 hrs
Type IA 24-hr Salem 25 YR Rainfall=3.60"

	Area (ac)	CN	Description
*	1.140	98	Paved roads w/curbs & sewers, HSG C
	0.700	90	1/8 acre lots, 65% imp, HSG C
	1.840	95	Weighted Average
	0.245		13.32% Pervious Area
	1.595		86.68% Impervious Area

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

Subcatchment 6S: Basin 6



Summary for Subcatchment 7S: Basin 7

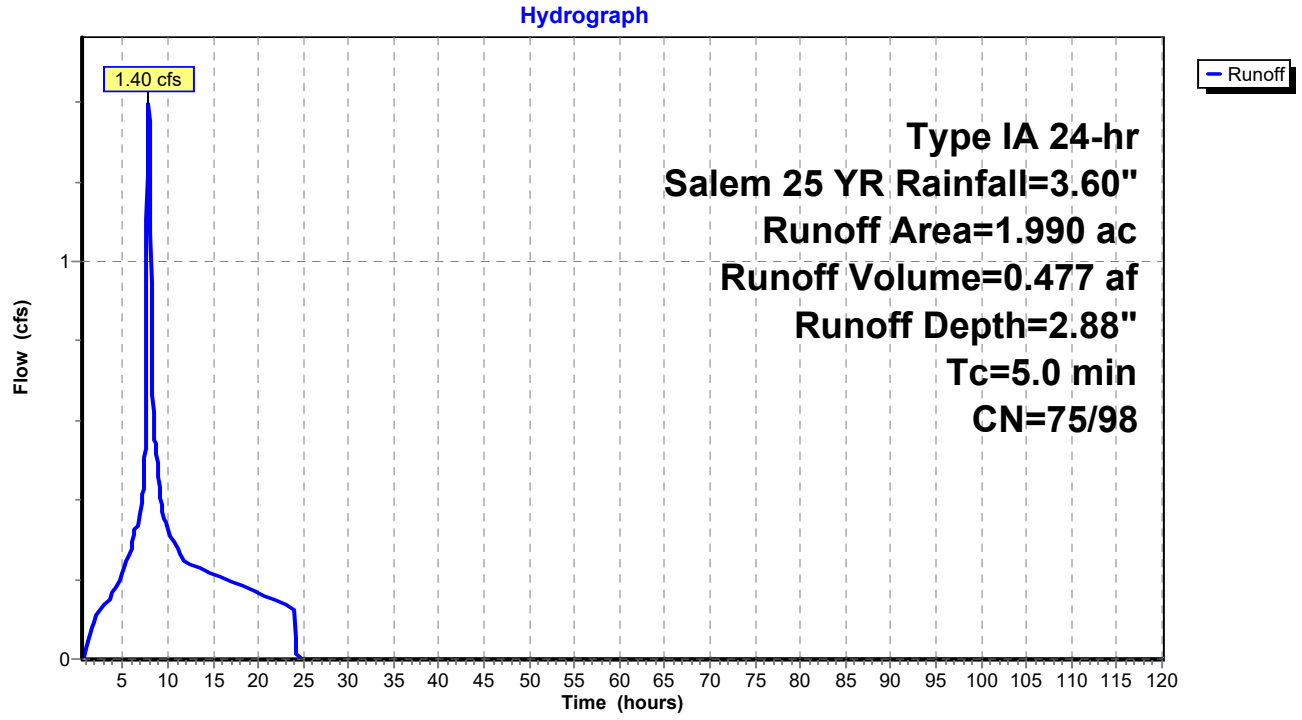
Runoff = 1.40 cfs @ 7.91 hrs, Volume= 0.477 af, Depth= 2.88"
Routed to Pond 7P : Vintage Detention

Runoff by SBUH method, Split Pervious/Imperv., Time Span= 0.50-120.00 hrs, dt= 0.05 hrs
Type IA 24-hr Salem 25 YR Rainfall=3.60"

	Area (ac)	CN	Description
*	0.590	98	Paved roads w/curbs & sewers, HSG C
	1.400	90	1/8 acre lots, 65% imp, HSG C
	1.990	92	Weighted Average
	0.490		24.62% Pervious Area
	1.500		75.38% Impervious Area

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

Subcatchment 7S: Basin 7



Summary for Subcatchment PD: Predeveloped

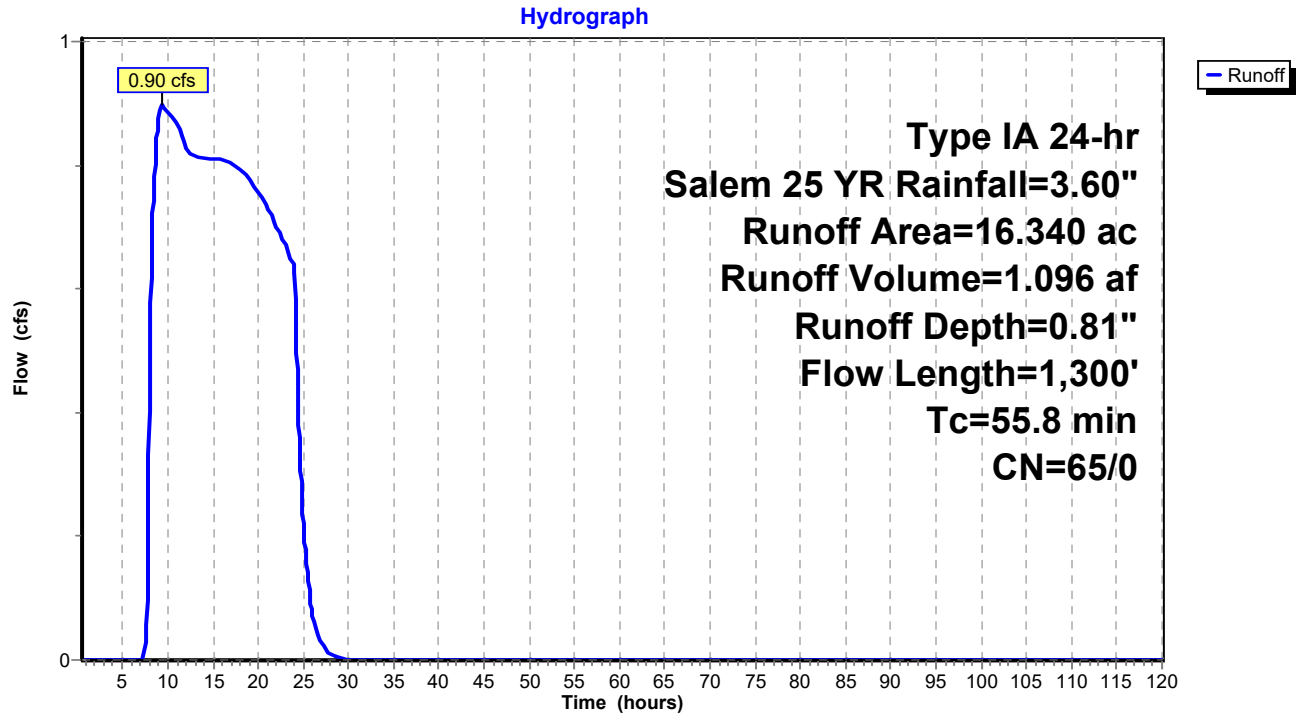
Runoff = 0.90 cfs @ 9.27 hrs, Volume= 1.096 af, Depth= 0.81"
Routed to Link 1L : Allowable/Existing Release

Runoff by SBUH method, Split Pervious/Imperv., Time Span= 0.50-120.00 hrs, dt= 0.05 hrs
Type IA 24-hr Salem 25 YR Rainfall=3.60"

Area (ac)	CN	Description
8.170	58	Woods/grass comb., Good, HSG B
8.170	72	Woods/grass comb., Good, HSG C
16.340	65	Weighted Average
16.340		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
37.5	300	0.0400	0.13		**Sheet Flow, Pre Developed** n= 0.300 P2= 2.20"
8.9	600	0.0500	1.12		**Shallow Concentrated Flow,** Woodland Kv= 5.0 fps
9.4	400	0.0200	0.71		**Shallow Concentrated Flow,** Woodland Kv= 5.0 fps
55.8	1,300	Total			

Subcatchment PD: Predeveloped



Summary for Subcatchment 3S: Basin 3

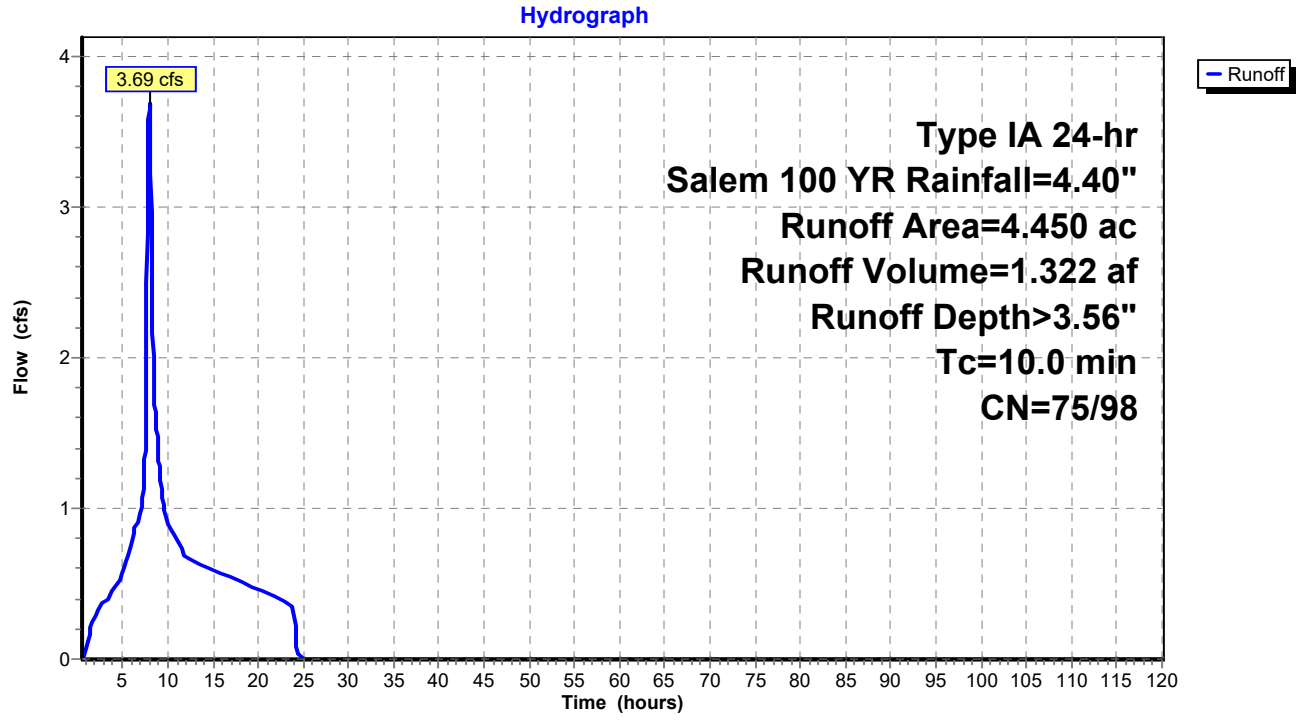
Runoff = 3.69 cfs @ 7.98 hrs, Volume= 1.322 af, Depth> 3.56"
Routed to Pond 3P : Teal Detention

Runoff by SBUH method, Split Pervious/Imperv., Time Span= 0.50-120.00 hrs, dt= 0.05 hrs
Type IA 24-hr Salem 100 YR Rainfall=4.40"

	Area (ac)	CN	Description
*	0.970	98	Paved roads w/curbs & sewers, HSG C
	3.480	90	1/8 acre lots, 65% imp, HSG C
	4.450	92	Weighted Average
	1.218		27.37% Pervious Area
	3.232		72.63% Impervious Area

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

Subcatchment 3S: Basin 3



Summary for Subcatchment 4S: Basin 4

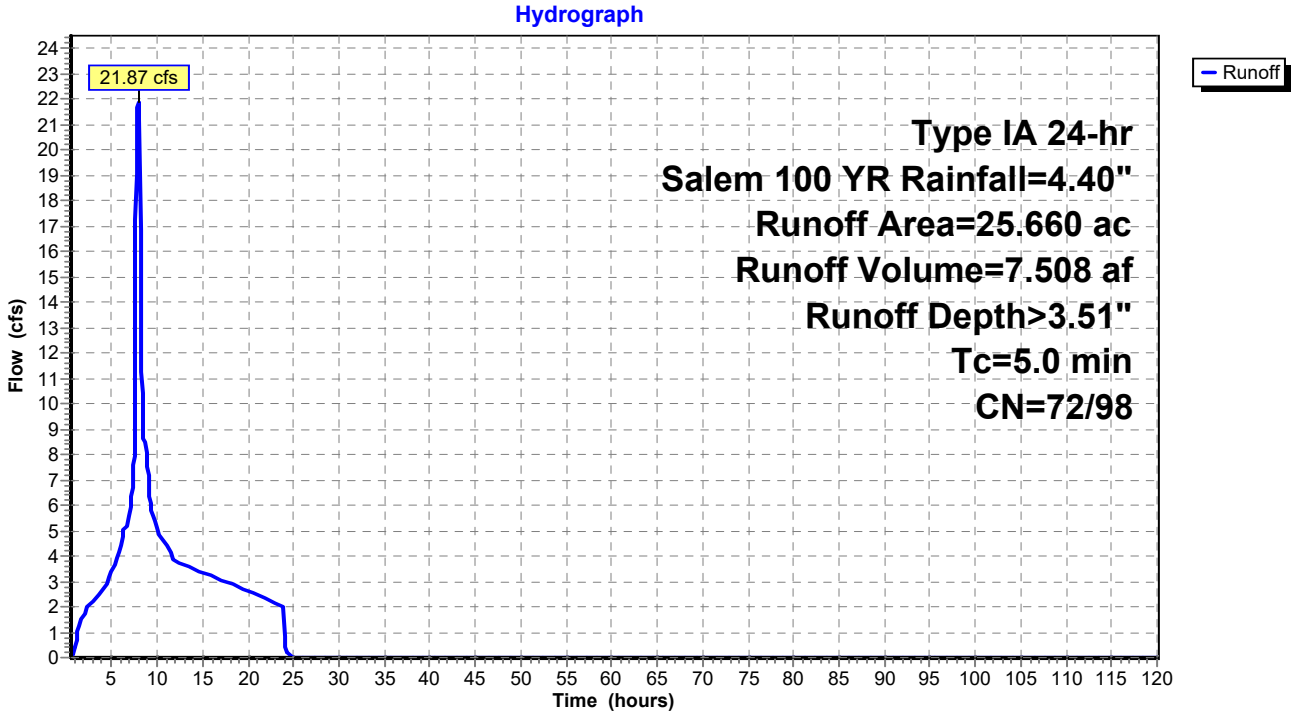
Runoff = 21.87 cfs @ 7.91 hrs, Volume= 7.508 af, Depth> 3.51"
Routed to Pond 4P : Baxter Detention

Runoff by SBUH method, Split Pervious/Imperv., Time Span= 0.50-120.00 hrs, dt= 0.05 hrs
Type IA 24-hr Salem 100 YR Rainfall=4.40"

	Area (ac)	CN	Description
*	5.860	98	Paved roads w/curbs & sewers, HSG C
	4.950	85	1/8 acre lots, 65% imp, HSG B
	14.850	90	1/8 acre lots, 65% imp, HSG C
	25.660	91	Weighted Average
	6.930		27.01% Pervious Area
	18.730		72.99% Impervious Area

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

Subcatchment 4S: Basin 4



Summary for Subcatchment 5S: Basin 5

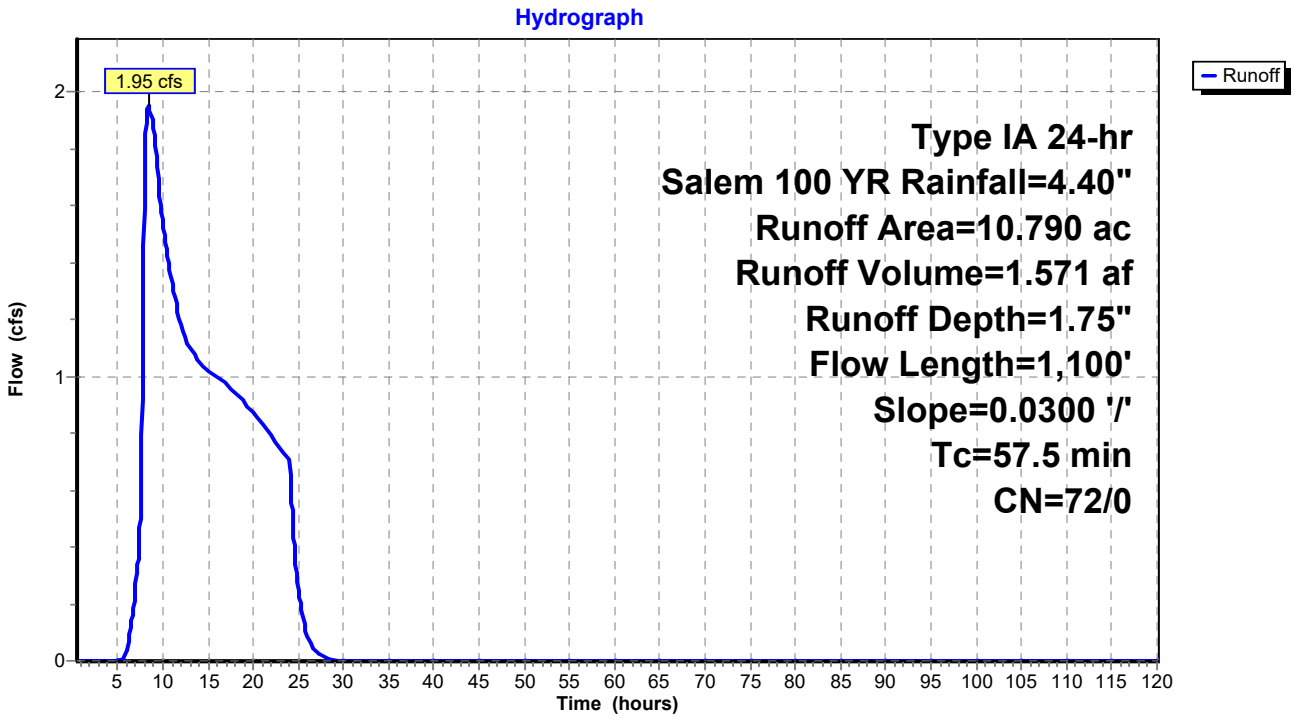
Runoff = 1.95 cfs @ 8.37 hrs, Volume= 1.571 af, Depth= 1.75"
Routed to Pond 4P : Baxter Detention

Runoff by SBUH method, Split Pervious/Imperv., Time Span= 0.50-120.00 hrs, dt= 0.05 hrs
Type IA 24-hr Salem 100 YR Rainfall=4.40"

Area (ac)	CN	Description
10.790	72	Woods/grass comb., Good, HSG C
10.790		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
42.1	300	0.0300	0.12		**Sheet Flow, Pre Developed** n= 0.300 P2= 2.20"
15.4	800	0.0300	0.87		**Shallow Concentrated Flow,** Woodland Kv= 5.0 fps
57.5	1,100	Total			

Subcatchment 5S: Basin 5



Summary for Subcatchment 6S: Basin 6

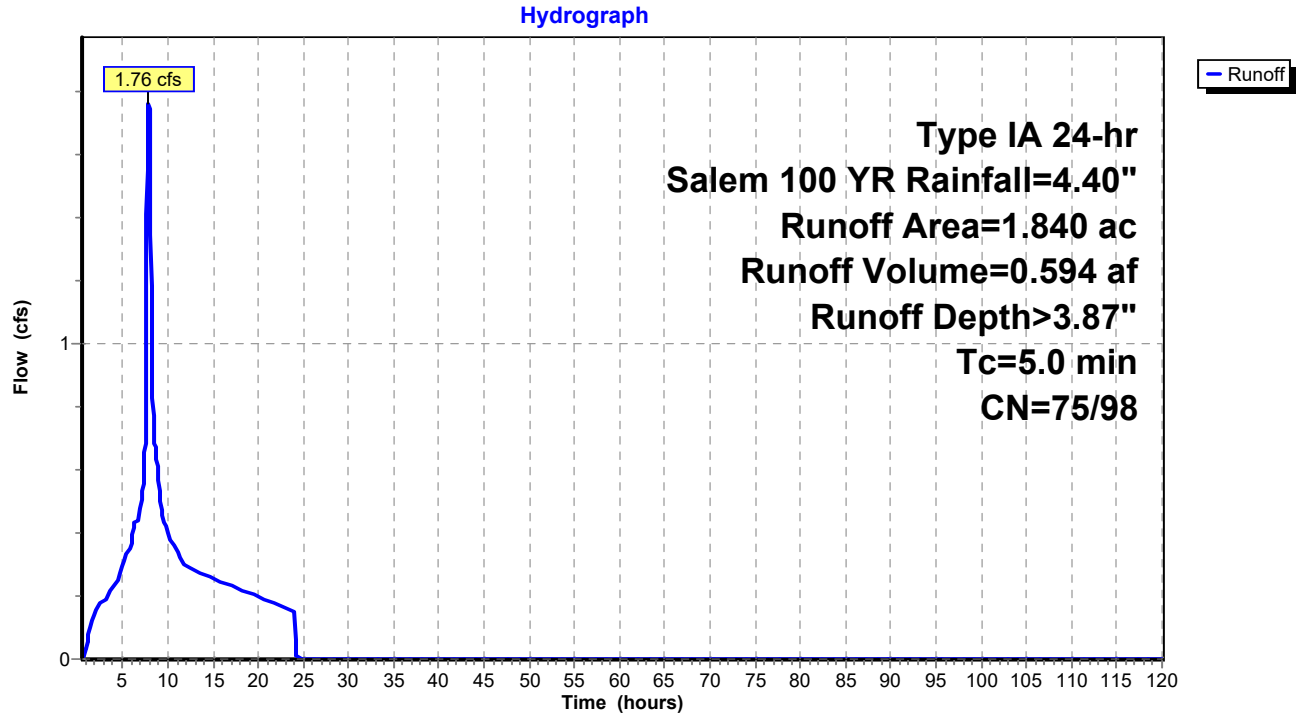
Runoff = 1.76 cfs @ 7.90 hrs, Volume= 0.594 af, Depth> 3.87"
Routed to Pond 4P : Baxter Detention

Runoff by SBUH method, Split Pervious/Imperv., Time Span= 0.50-120.00 hrs, dt= 0.05 hrs
Type IA 24-hr Salem 100 YR Rainfall=4.40"

	Area (ac)	CN	Description
*	1.140	98	Paved roads w/curbs & sewers, HSG C
	0.700	90	1/8 acre lots, 65% imp, HSG C
	1.840	95	Weighted Average
	0.245		13.32% Pervious Area
	1.595		86.68% Impervious Area

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

Subcatchment 6S: Basin 6



Summary for Subcatchment 7S: Basin 7

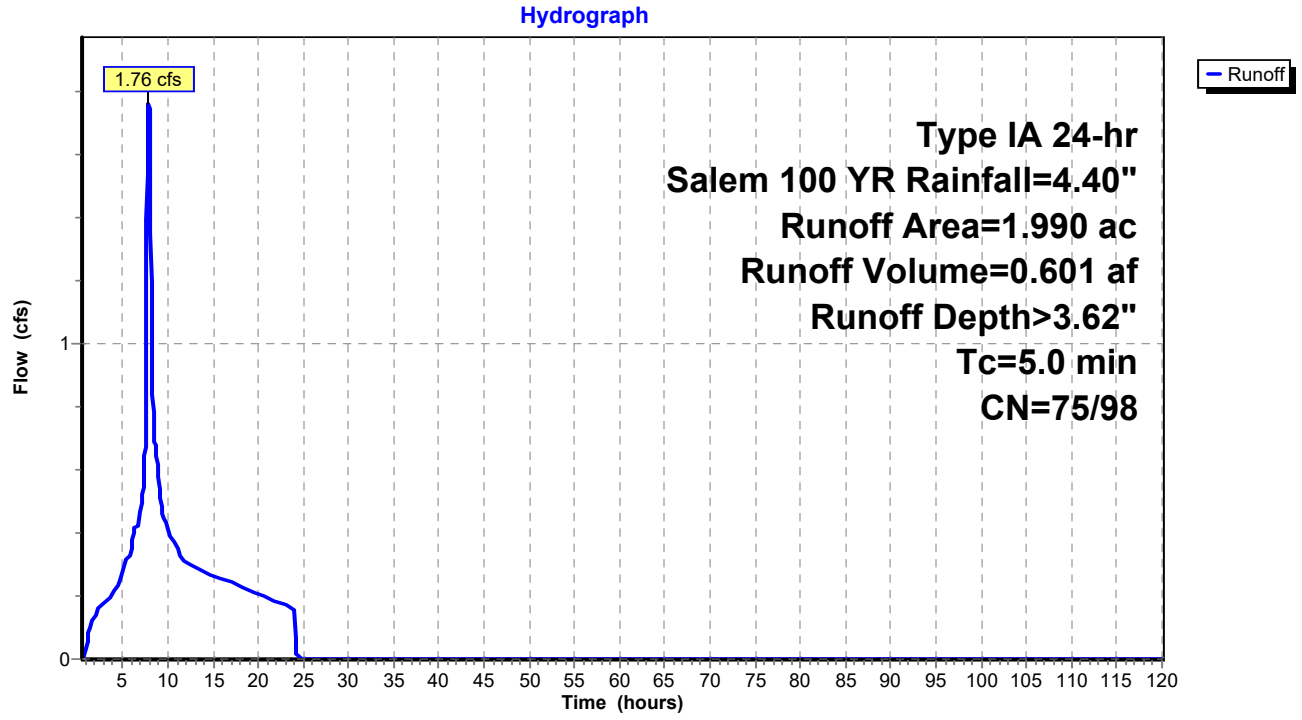
Runoff = 1.76 cfs @ 7.91 hrs, Volume= 0.601 af, Depth> 3.62"
Routed to Pond 7P : Vintage Detention

Runoff by SBUH method, Split Pervious/Imperv., Time Span= 0.50-120.00 hrs, dt= 0.05 hrs
Type IA 24-hr Salem 100 YR Rainfall=4.40"

	Area (ac)	CN	Description
*	0.590	98	Paved roads w/curbs & sewers, HSG C
	1.400	90	1/8 acre lots, 65% imp, HSG C
	1.990	92	Weighted Average
	0.490		24.62% Pervious Area
	1.500		75.38% Impervious Area

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

Subcatchment 7S: Basin 7



Summary for Subcatchment PD: Predeveloped

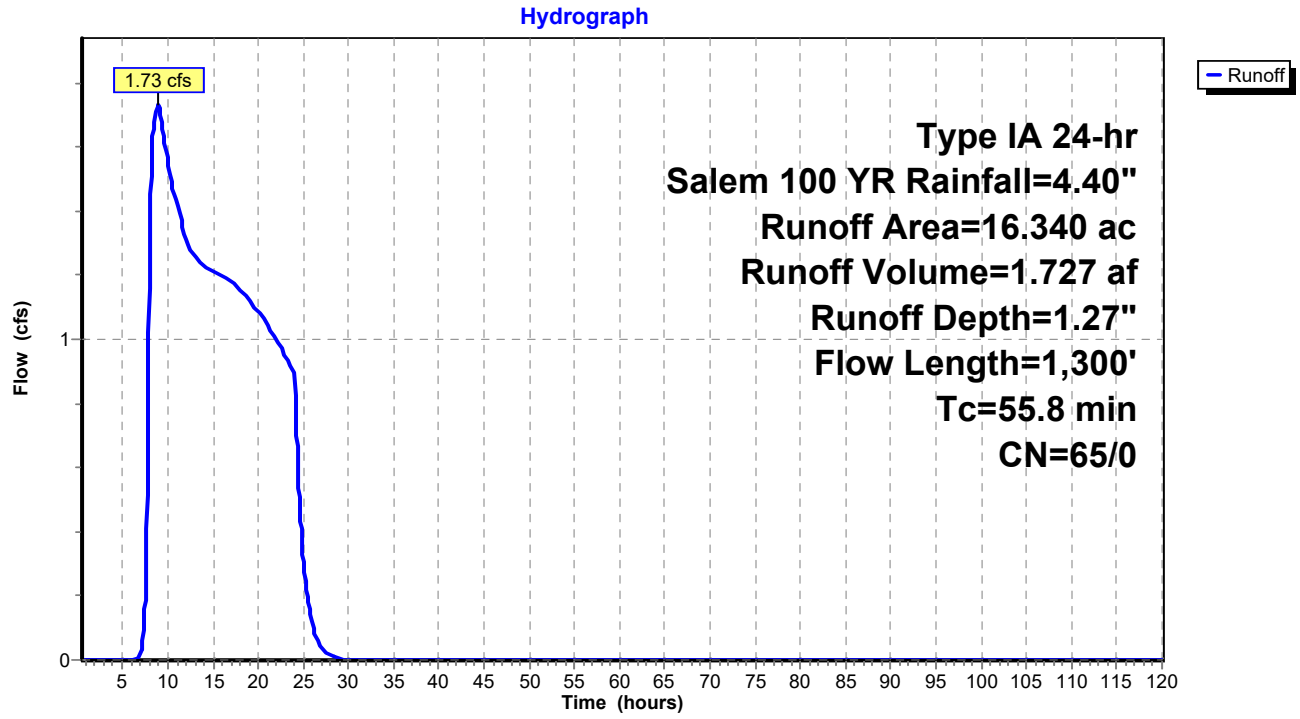
Runoff = 1.73 cfs @ 8.91 hrs, Volume= 1.727 af, Depth= 1.27"
Routed to Link 1L : Allowable/Existing Release

Runoff by SBUH method, Split Pervious/Imperv., Time Span= 0.50-120.00 hrs, dt= 0.05 hrs
Type IA 24-hr Salem 100 YR Rainfall=4.40"

Area (ac)	CN	Description
8.170	58	Woods/grass comb., Good, HSG B
8.170	72	Woods/grass comb., Good, HSG C
16.340	65	Weighted Average
16.340		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
37.5	300	0.0400	0.13		**Sheet Flow, Pre Developed** n= 0.300 P2= 2.20"
8.9	600	0.0500	1.12		**Shallow Concentrated Flow,** Woodland Kv= 5.0 fps
9.4	400	0.0200	0.71		**Shallow Concentrated Flow,** Woodland Kv= 5.0 fps
55.8	1,300	Total			

Subcatchment PD: Predeveloped



Summary for Pond 3P: Teal Detention

Inflow Area = 4.450 ac, 72.63% Impervious, Inflow Depth = 0.66" for Salem 1/2 2 YR event
Inflow = 0.71 cfs @ 7.98 hrs, Volume= 0.244 af
Outflow = 0.71 cfs @ 7.98 hrs, Volume= 0.244 af, Atten= 0%, Lag= 0.0 min
Primary = 0.71 cfs @ 7.98 hrs, Volume= 0.244 af
Routed to Link 1L : Allowable/Existing Release

Routing by Stor-Ind method, Time Span= 0.50-120.00 hrs, dt= 0.05 hrs / 2
Peak Elev= 385.51' @ 7.98 hrs Surf.Area= 23 sf Storage= 0 cf

Plug-Flow detention time= 0.0 min calculated for 0.244 af (100% of inflow)
Center-of-Mass det. time= 0.0 min (722.1 - 722.1)

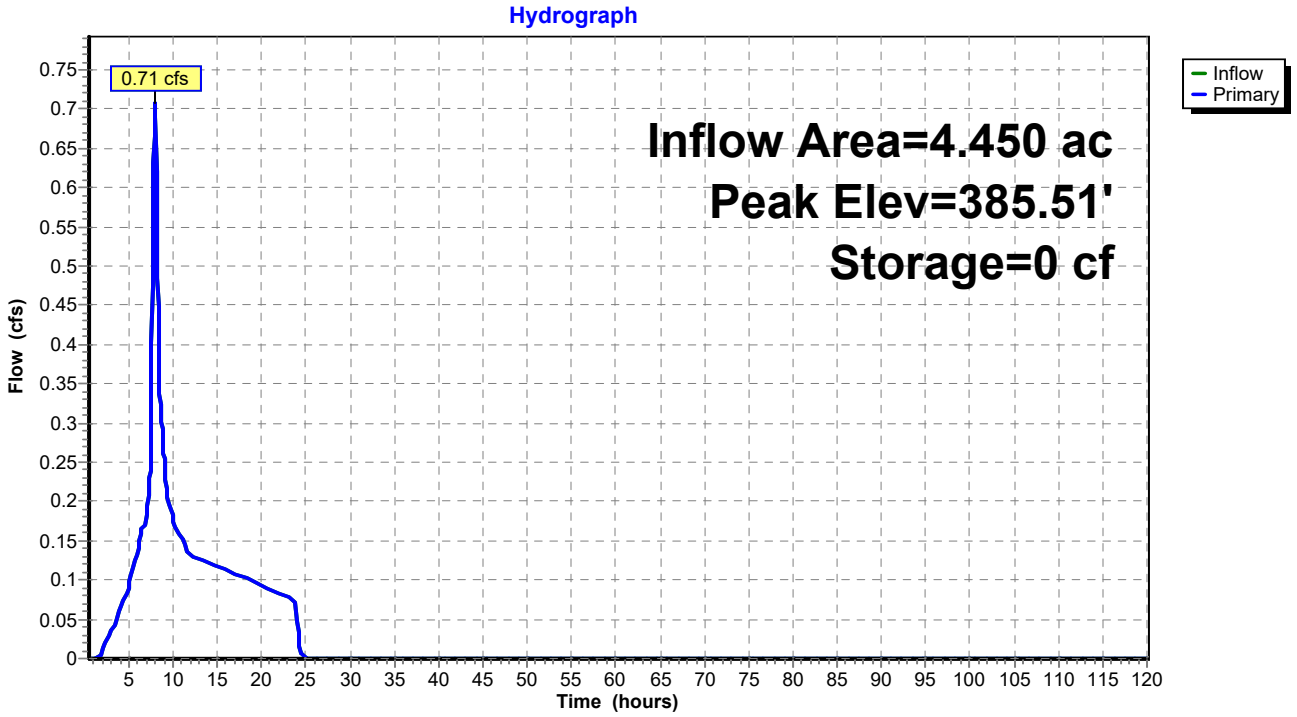
Volume	Invert	Avail.Storage	Storage Description
#1	385.50'	5,183 cf	**Pond (Prismatic)** Listed below (Recalc)

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
385.50	0	0	0
386.00	790	198	198
387.00	2,630	1,710	1,908
388.00	3,920	3,275	5,183

Device	Routing	Invert	Outlet Devices
#1	Primary	383.75'	**5.9" Horiz. Orifice** C= 0.600 Limited to weir flow at low heads
#2	Primary	386.95'	**24.0' long x 0.5' breadth Overflow** Head (feet) 0.20 0.40 0.60 0.80 1.00 Coef. (English) 2.80 2.92 3.08 3.30 3.32

Primary OutFlow Max=1.21 cfs @ 7.98 hrs HW=385.51' (Free Discharge)
1=Orifice (Orifice Controls 1.21 cfs @ 6.40 fps)
2=Overflow (Controls 0.00 cfs)

Pond 3P: Teal Detention



Summary for Pond 4P: Baxter Detention

Inflow Area = 40.280 ac, 54.18% Impervious, Inflow Depth = 0.49" for Salem 1/2 2 YR event
Inflow = 4.99 cfs @ 7.92 hrs, Volume= 1.655 af
Outflow = 3.24 cfs @ 8.18 hrs, Volume= 1.655 af, Atten= 35%, Lag= 15.5 min
Primary = 3.24 cfs @ 8.18 hrs, Volume= 1.655 af
Routed to Link 1L : Allowable/Existing Release

Routing by Stor-Ind method, Time Span= 0.50-120.00 hrs, dt= 0.05 hrs
Peak Elev= 401.50' @ 8.18 hrs Surf.Area= 7,580 sf Storage= 2,909 cf

Plug-Flow detention time= (not calculated: outflow precedes inflow)
Center-of-Mass det. time= 2.8 min (723.5 - 720.7)

Volume	Invert	Avail.Storage	Storage Description
#1	401.00'	46,475 cf	**West Pond (Prismatic)**Listed below (Recalc)
#2	401.00'	29,850 cf	**East Pond (Prismatic)**Listed below (Recalc)
		76,325 cf	Total Available Storage

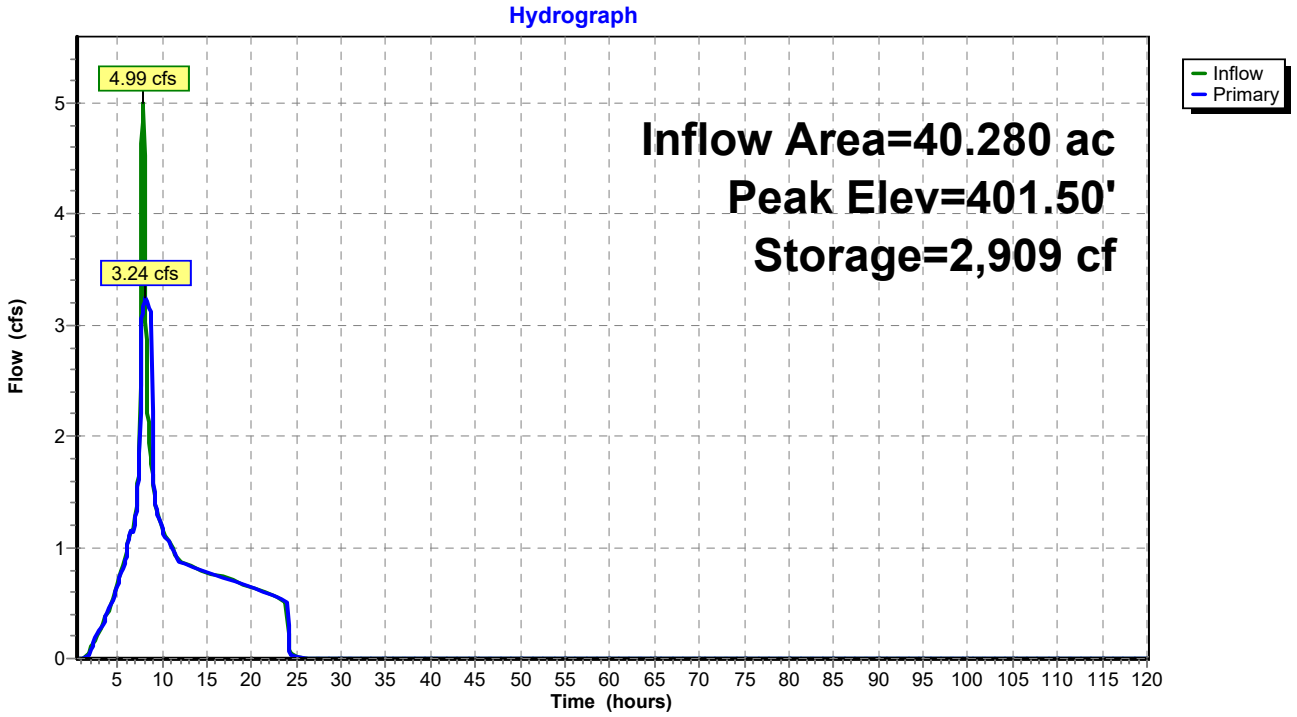
Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
401.00	2,250	0	0
402.00	7,140	4,695	4,695
403.00	8,720	7,930	12,625
404.00	10,340	9,530	22,155
405.00	12,000	11,170	33,325
406.00	14,300	13,150	46,475

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
401.00	1,820	0	0
402.00	3,960	2,890	2,890
403.00	5,190	4,575	7,465
404.00	6,560	5,875	13,340
405.00	8,160	7,360	20,700
406.00	10,140	9,150	29,850

Device	Routing	Invert	Outlet Devices
#1	Primary	398.29'	**8.3" Horiz. Orifice** C= 0.600 Limited to weir flow at low heads
#2	Primary	405.00'	**24.0" Horiz. O/F Riser** C= 0.600 Limited to weir flow at low heads
#3	Primary	405.02'	**2.0' long x 0.5' breadth Overflow CB** Head (feet) 0.20 0.40 0.60 0.80 1.00 Coef. (English) 2.80 2.92 3.08 3.30 3.32

Primary OutFlow Max=3.24 cfs @ 8.18 hrs HW=401.50' (Free Discharge)
- **1=Orifice** (Orifice Controls 3.24 cfs @ 8.62 fps)
- **2=O/F Riser** (Controls 0.00 cfs)
- **3=Overflow CB** (Controls 0.00 cfs)

Pond 4P: Baxter Detention



Summary for Pond 7P: Vintage Detention

Inflow Area = 1.990 ac, 75.38% Impervious, Inflow Depth = 0.68" for Salem 1/2 2 YR event
Inflow = 0.34 cfs @ 7.92 hrs, Volume= 0.113 af
Outflow = 0.33 cfs @ 8.02 hrs, Volume= 0.113 af, Atten= 5%, Lag= 6.2 min
Primary = 0.33 cfs @ 8.02 hrs, Volume= 0.113 af
Routed to Pond 4P : Baxter Detention

Routing by Stor-Ind method, Time Span= 0.50-120.00 hrs, dt= 0.05 hrs
Peak Elev= 432.13' @ 8.02 hrs Surf.Area= 308 sf Storage= 20 cf

Plug-Flow detention time= (not calculated: outflow precedes inflow)
Center-of-Mass det. time= 0.2 min (716.1 - 716.0)

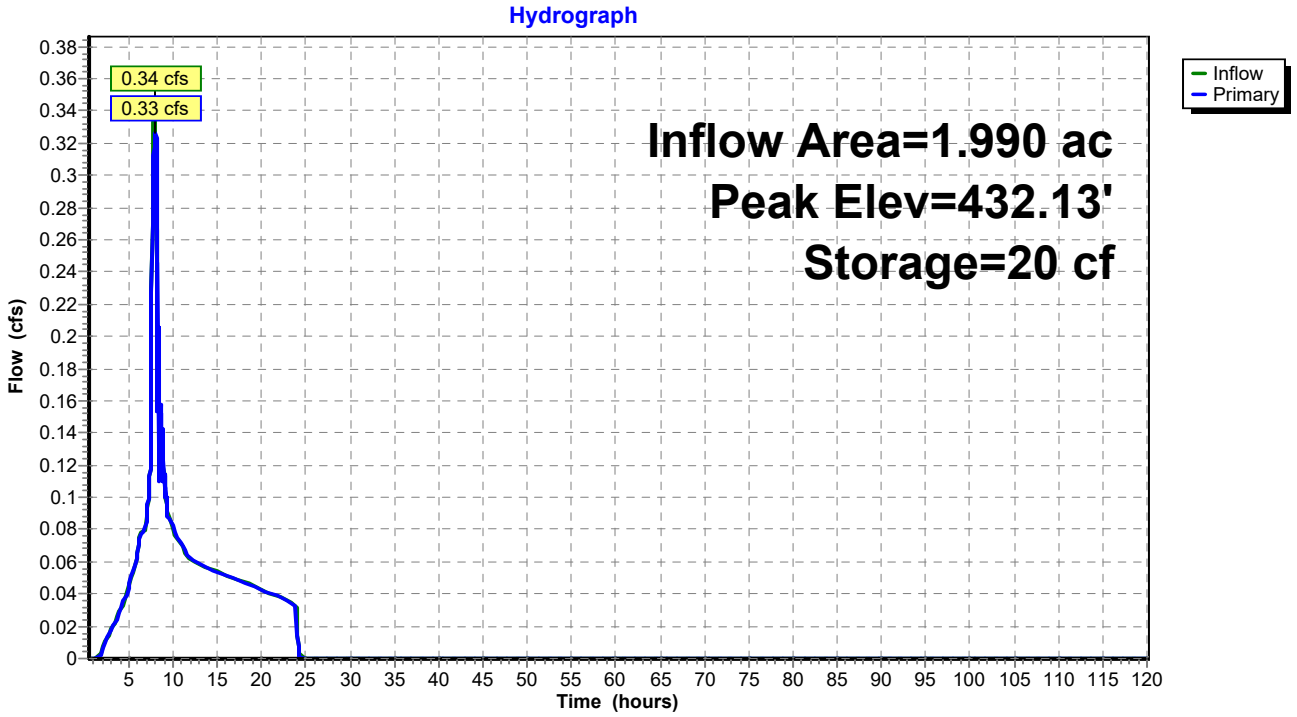
Volume	Invert	Avail.Storage	Storage Description
#1	432.00'	8,940 cf	**Custom Stage Data (Prismatic)**Listed below (Recalc)

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
432.00	0	0	0
432.50	1,160	290	290
434.00	2,320	2,610	2,900
436.00	3,720	6,040	8,940

Device	Routing	Invert	Outlet Devices
#1	Primary	431.31'	**3.7" Horiz. Orifice** C= 0.600 Limited to weir flow at low heads
#2	Primary	435.00'	**2.0' long x 0.5' breadth Overflow CB** Head (feet) 0.20 0.40 0.60 0.80 1.00 Coef. (English) 2.80 2.92 3.08 3.30 3.32

Primary OutFlow Max=0.33 cfs @ 8.02 hrs HW=432.13' (Free Discharge)
└**1=Orifice** (Orifice Controls 0.33 cfs @ 4.36 fps)
└**2=Overflow CB** (Controls 0.00 cfs)

Pond 7P: Vintage Detention

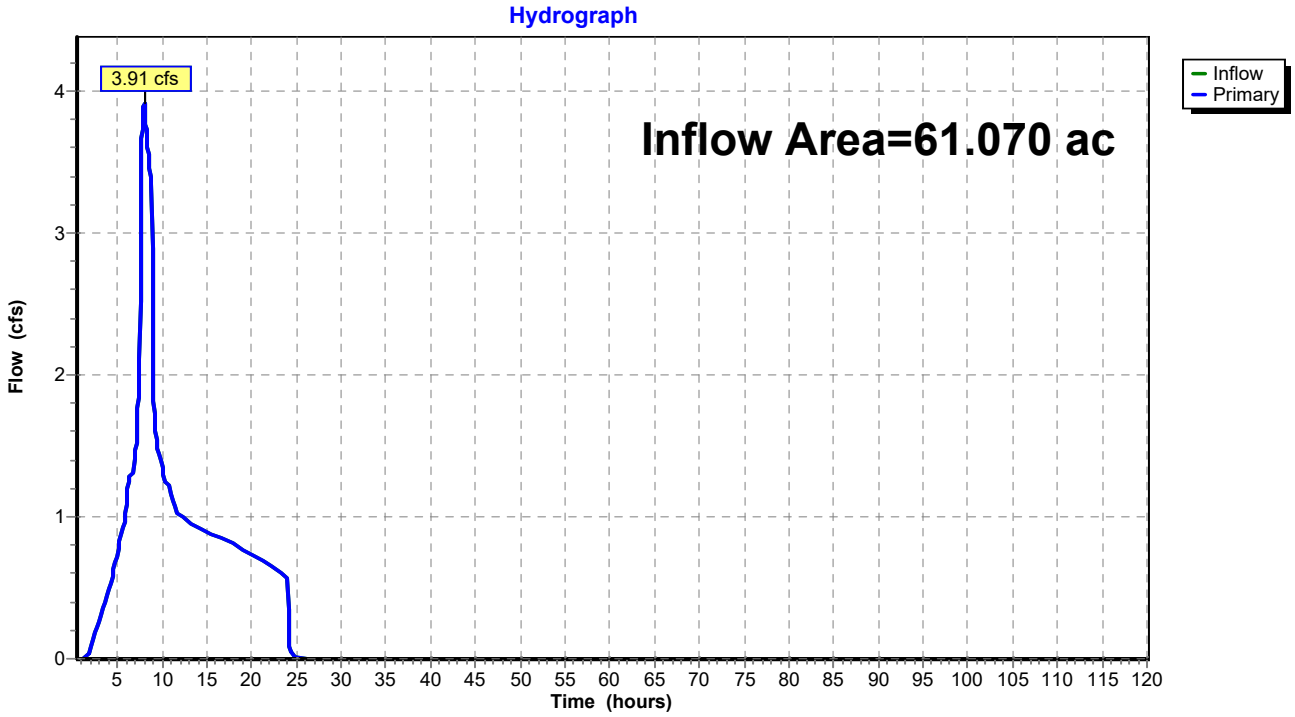


Summary for Link 1L: Allowable/Existing Release

Inflow Area = 61.070 ac, 41.03% Impervious, Inflow Depth = 0.37" for Salem 1/2 2 YR event
Inflow = 3.91 cfs @ 8.01 hrs, Volume= 1.899 af
Primary = 3.91 cfs @ 8.01 hrs, Volume= 1.899 af, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 0.50-120.00 hrs, dt= 0.05 hrs

Link 1L: Allowable/Existing Release



Summary for Pond 3P: Teal Detention

Inflow Area = 4.450 ac, 72.63% Impervious, Inflow Depth = 2.45" for Salem 10 YR event
Inflow = 2.53 cfs @ 7.98 hrs, Volume= 0.910 af
Outflow = 1.61 cfs @ 8.30 hrs, Volume= 0.873 af, Atten= 36%, Lag= 19.0 min
Primary = 1.61 cfs @ 8.30 hrs, Volume= 0.873 af
Routed to Link 1L : Allowable/Existing Release

Routing by Stor-Ind method, Time Span= 0.50-120.00 hrs, dt= 0.05 hrs / 2
Peak Elev= 386.87' @ 8.30 hrs Surf.Area= 2,390 sf Storage= 1,580 cf

Plug-Flow detention time= 34.5 min calculated for 0.873 af (96% of inflow)
Center-of-Mass det. time= 4.7 min (699.4 - 694.7)

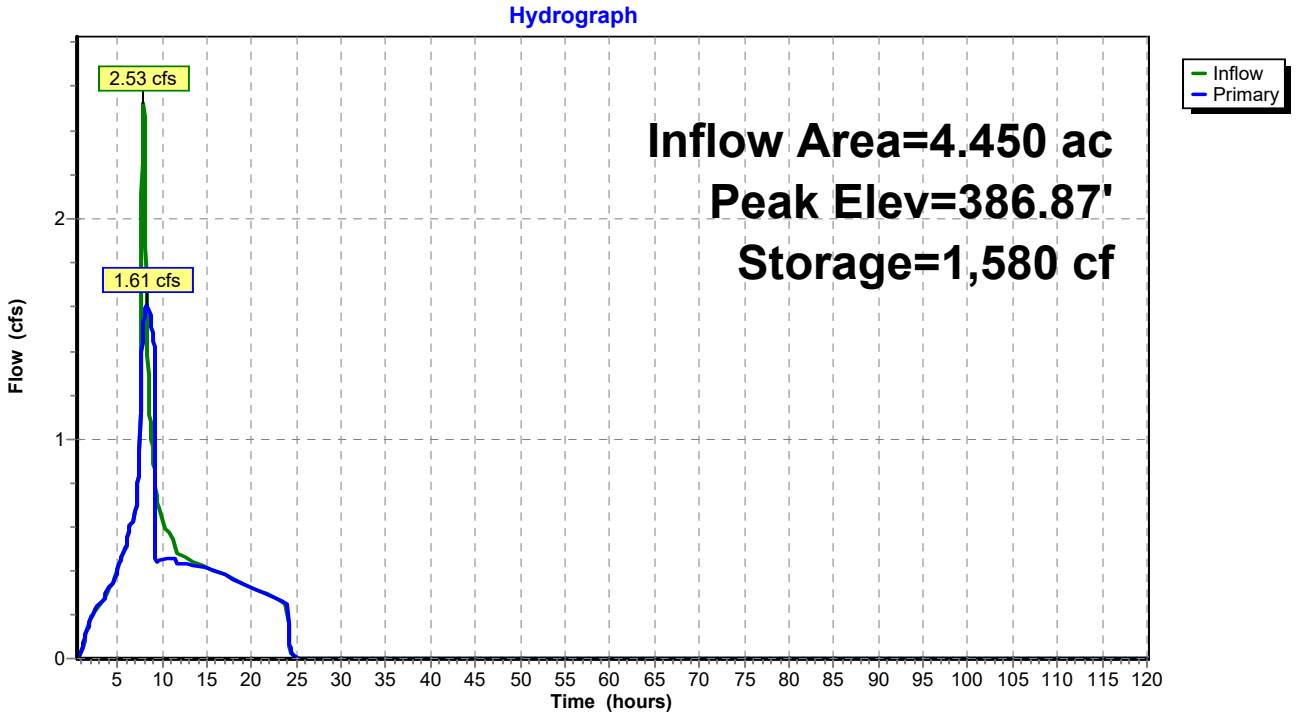
Volume	Invert	Avail.Storage	Storage Description
#1	385.50'	5,183 cf	**Pond (Prismatic)** Listed below (Recalc)

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
385.50	0	0	0
386.00	790	198	198
387.00	2,630	1,710	1,908
388.00	3,920	3,275	5,183

Device	Routing	Invert	Outlet Devices
#1	Primary	383.75'	**5.9" Horiz. Orifice** C= 0.600 Limited to weir flow at low heads
#2	Primary	386.95'	**24.0' long x 0.5' breadth Overflow** Head (feet) 0.20 0.40 0.60 0.80 1.00 Coef. (English) 2.80 2.92 3.08 3.30 3.32

Primary OutFlow Max=1.61 cfs @ 8.30 hrs HW=386.87' (Free Discharge)
1=Orifice (Orifice Controls 1.61 cfs @ 8.50 fps)
2=Overflow (Controls 0.00 cfs)

Pond 3P: Teal Detention



Summary for Pond 4P: Baxter Detention

Inflow Area = 40.280 ac, 54.18% Impervious, Inflow Depth = 2.04" for Salem 10 YR event
Inflow = 17.23 cfs @ 7.93 hrs, Volume= 6.837 af
Outflow = 4.58 cfs @ 10.77 hrs, Volume= 6.837 af, Atten= 73%, Lag= 170.2 min
Primary = 4.58 cfs @ 10.77 hrs, Volume= 6.837 af
Routed to Link 1L : Allowable/Existing Release

Routing by Stor-Ind method, Time Span= 0.50-120.00 hrs, dt= 0.05 hrs
Peak Elev= 404.71' @ 10.77 hrs Surf.Area= 19,220 sf Storage= 48,350 cf

Plug-Flow detention time= 96.9 min calculated for 6.834 af (100% of inflow)
Center-of-Mass det. time= 96.8 min (815.0 - 718.2)

Volume	Invert	Avail.Storage	Storage Description
#1	401.00'	46,475 cf	**West Pond (Prismatic)**Listed below (Recalc)
#2	401.00'	29,850 cf	**East Pond (Prismatic)**Listed below (Recalc)
		76,325 cf	Total Available Storage

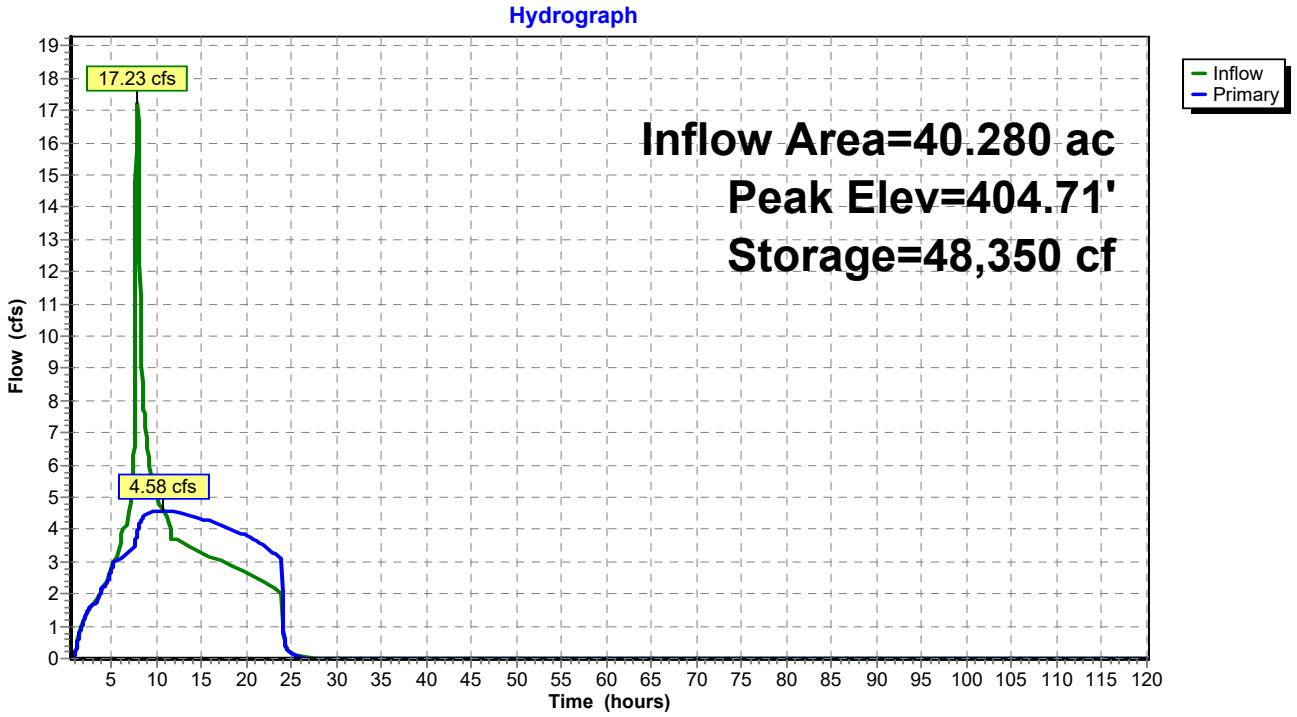
Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
401.00	2,250	0	0
402.00	7,140	4,695	4,695
403.00	8,720	7,930	12,625
404.00	10,340	9,530	22,155
405.00	12,000	11,170	33,325
406.00	14,300	13,150	46,475

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
401.00	1,820	0	0
402.00	3,960	2,890	2,890
403.00	5,190	4,575	7,465
404.00	6,560	5,875	13,340
405.00	8,160	7,360	20,700
406.00	10,140	9,150	29,850

Device	Routing	Invert	Outlet Devices
#1	Primary	398.29'	**8.3" Horiz. Orifice** C= 0.600 Limited to weir flow at low heads
#2	Primary	405.00'	**24.0" Horiz. O/F Riser** C= 0.600 Limited to weir flow at low heads
#3	Primary	405.02'	**2.0' long x 0.5' breadth Overflow CB** Head (feet) 0.20 0.40 0.60 0.80 1.00 Coef. (English) 2.80 2.92 3.08 3.30 3.32

Primary OutFlow Max=4.58 cfs @ 10.77 hrs HW=404.71' (Free Discharge)
- **1=Orifice** (Orifice Controls 4.58 cfs @ 12.20 fps)
- **2=O/F Riser** (Controls 0.00 cfs)
- **3=Overflow CB** (Controls 0.00 cfs)

Pond 4P: Baxter Detention



Summary for Pond 7P: Vintage Detention

Inflow Area = 1.990 ac, 75.38% Impervious, Inflow Depth = 2.51" for Salem 10 YR event
Inflow = 1.22 cfs @ 7.91 hrs, Volume= 0.416 af
Outflow = 0.52 cfs @ 8.44 hrs, Volume= 0.416 af, Atten= 58%, Lag= 31.6 min
Primary = 0.52 cfs @ 8.44 hrs, Volume= 0.416 af
Routed to Pond 4P : Baxter Detention

Routing by Stor-Ind method, Time Span= 0.50-120.00 hrs, dt= 0.05 hrs
Peak Elev= 433.37' @ 8.44 hrs Surf.Area= 1,832 sf Storage= 1,591 cf

Plug-Flow detention time= (not calculated: outflow precedes inflow)
Center-of-Mass det. time= 12.2 min (699.1 - 686.9)

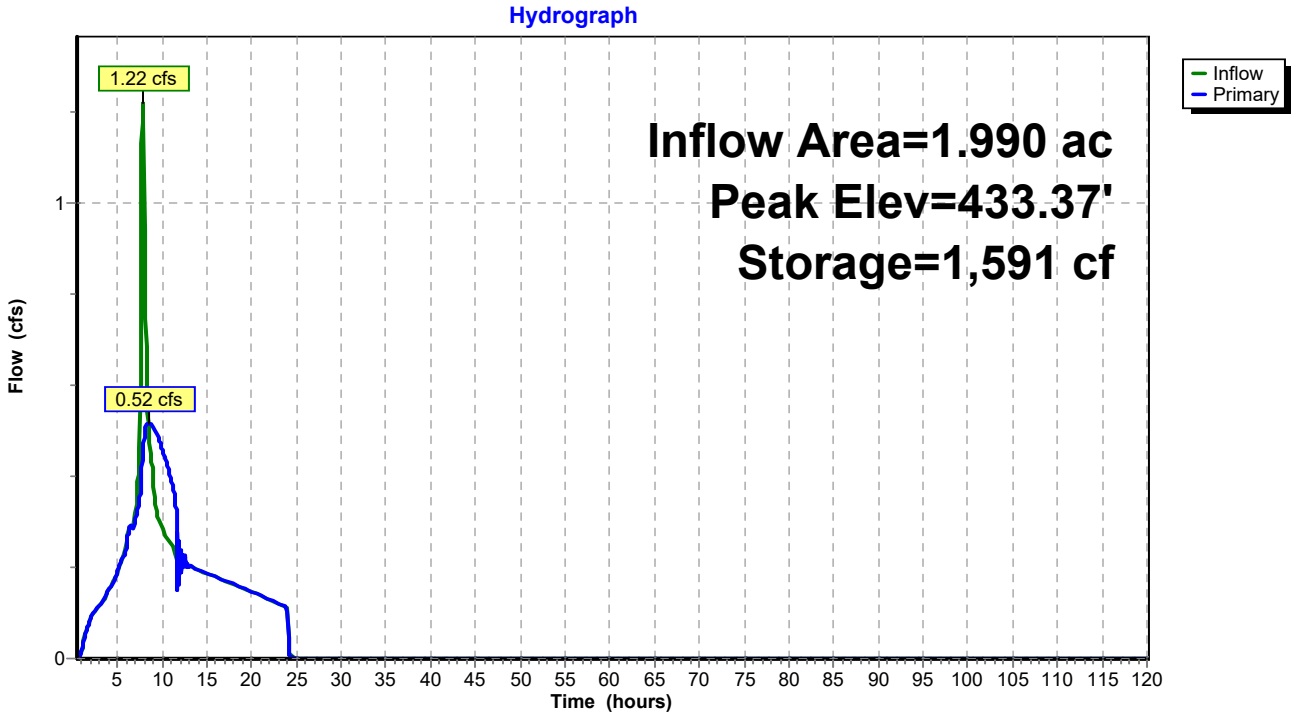
Volume	Invert	Avail.Storage	Storage Description
#1	432.00'	8,940 cf	**Custom Stage Data (Prismatic)**Listed below (Recalc)

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
432.00	0	0	0
432.50	1,160	290	290
434.00	2,320	2,610	2,900
436.00	3,720	6,040	8,940

Device	Routing	Invert	Outlet Devices
#1	Primary	431.31'	**3.7" Horiz. Orifice** C= 0.600 Limited to weir flow at low heads
#2	Primary	435.00'	**2.0' long x 0.5' breadth Overflow CB** Head (feet) 0.20 0.40 0.60 0.80 1.00 Coef. (English) 2.80 2.92 3.08 3.30 3.32

Primary OutFlow Max=0.52 cfs @ 8.44 hrs HW=433.37' (Free Discharge)
└**1=Orifice** (Orifice Controls 0.52 cfs @ 6.91 fps)
└**2=Overflow CB** (Controls 0.00 cfs)

Pond 7P: Vintage Detention

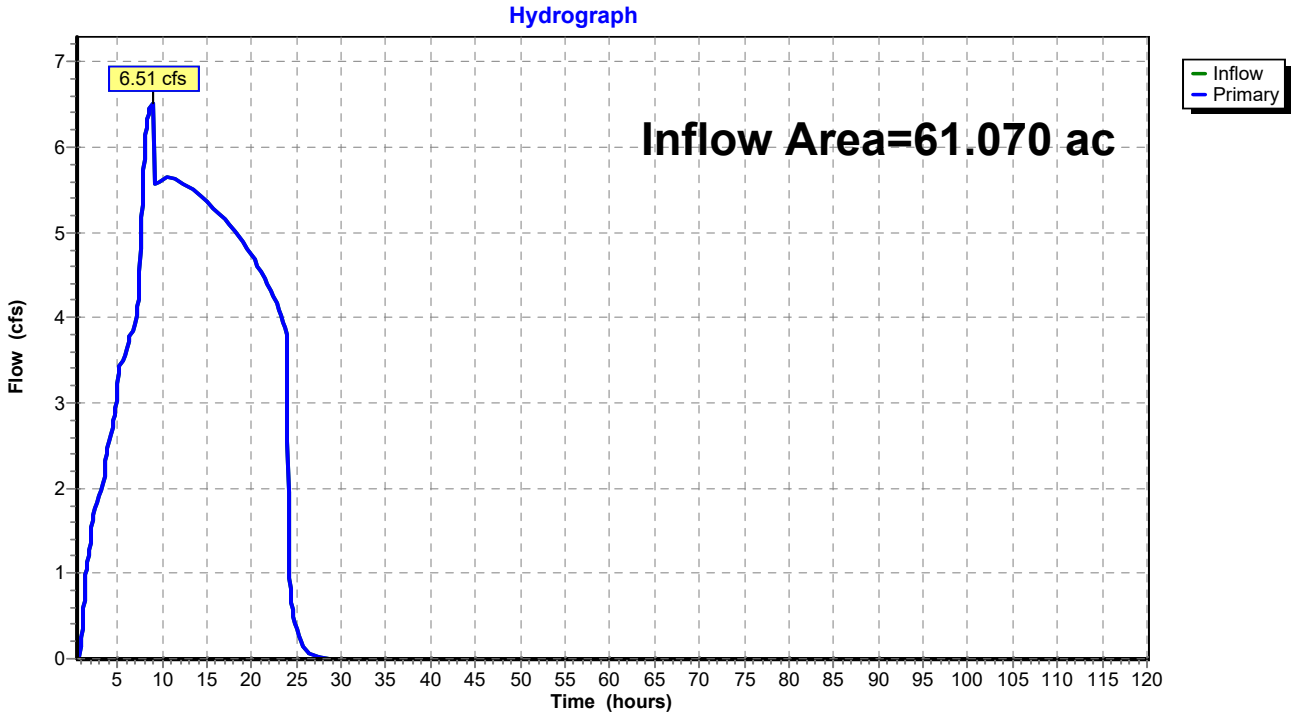


Summary for Link 1L: Allowable/Existing Release

Inflow Area = 61.070 ac, 41.03% Impervious, Inflow Depth = 1.68" for Salem 10 YR event
Inflow = 6.51 cfs @ 8.92 hrs, Volume= 8.528 af
Primary = 6.51 cfs @ 8.92 hrs, Volume= 8.528 af, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 0.50-120.00 hrs, dt= 0.05 hrs

Link 1L: Allowable/Existing Release



Summary for Pond 3P: Teal Detention

Inflow Area = 4.450 ac, 72.63% Impervious, Inflow Depth = 2.82" for Salem 25 YR event
Inflow = 2.91 cfs @ 7.98 hrs, Volume= 1.046 af
Outflow = 2.38 cfs @ 8.16 hrs, Volume= 1.040 af, Atten= 18%, Lag= 10.5 min
Primary = 2.38 cfs @ 8.16 hrs, Volume= 1.040 af
Routed to Link 1L : Allowable/Existing Release

Routing by Stor-Ind method, Time Span= 0.50-120.00 hrs, dt= 0.05 hrs / 2
Peak Elev= 387.00' @ 8.16 hrs Surf.Area= 2,628 sf Storage= 1,904 cf

Plug-Flow detention time= 7.5 min calculated for 1.040 af (99% of inflow)
Center-of-Mass det. time= 3.1 min (695.3 - 692.1)

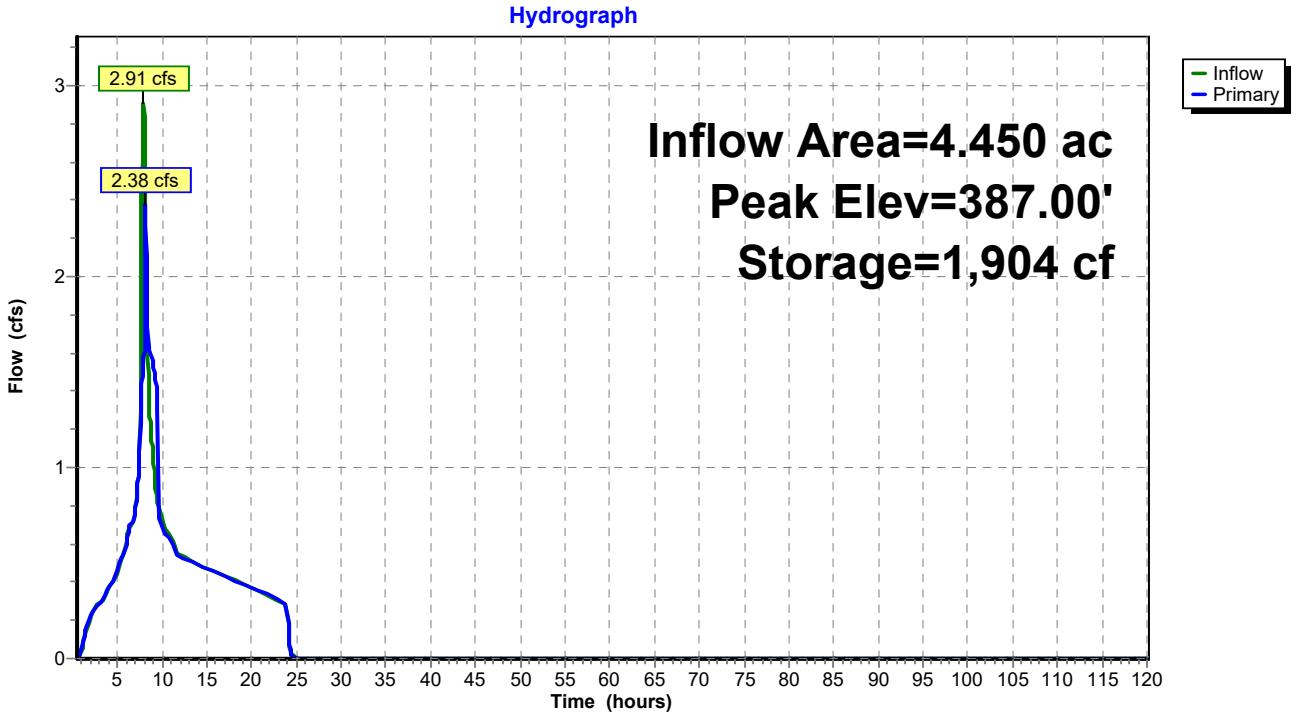
Volume	Invert	Avail.Storage	Storage Description
#1	385.50'	5,183 cf	**Pond (Prismatic)** Listed below (Recalc)

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
385.50	0	0	0
386.00	790	198	198
387.00	2,630	1,710	1,908
388.00	3,920	3,275	5,183

Device	Routing	Invert	Outlet Devices
#1	Primary	383.75'	**5.9" Horiz. Orifice** C= 0.600 Limited to weir flow at low heads
#2	Primary	386.95'	**24.0' long x 0.5' breadth Overflow** Head (feet) 0.20 0.40 0.60 0.80 1.00 Coef. (English) 2.80 2.92 3.08 3.30 3.32

Primary OutFlow Max=2.35 cfs @ 8.16 hrs HW=387.00' (Free Discharge)
└**1=Orifice** (Orifice Controls 1.65 cfs @ 8.68 fps)
└**2=Overflow** (Weir Controls 0.71 cfs @ 0.61 fps)

Pond 3P: Teal Detention



Summary for Pond 4P: Baxter Detention

Inflow Area = 40.280 ac, 54.18% Impervious, Inflow Depth = 2.37" for Salem 25 YR event
Inflow = 19.98 cfs @ 7.94 hrs, Volume= 7.959 af
Outflow = 6.58 cfs @ 9.38 hrs, Volume= 7.959 af, Atten= 67%, Lag= 86.5 min
Primary = 6.58 cfs @ 9.38 hrs, Volume= 7.959 af
Routed to Link 1L : Allowable/Existing Release

Routing by Stor-Ind method, Time Span= 0.50-120.00 hrs, dt= 0.05 hrs
Peak Elev= 405.17' @ 9.38 hrs Surf.Area= 20,902 sf Storage= 57,583 cf

Plug-Flow detention time= (not calculated: outflow precedes inflow)
Center-of-Mass det. time= 119.9 min (837.0 - 717.0)

Volume	Invert	Avail.Storage	Storage Description
#1	401.00'	46,475 cf	**West Pond (Prismatic)**Listed below (Recalc)
#2	401.00'	29,850 cf	**East Pond (Prismatic)**Listed below (Recalc)
		76,325 cf	Total Available Storage

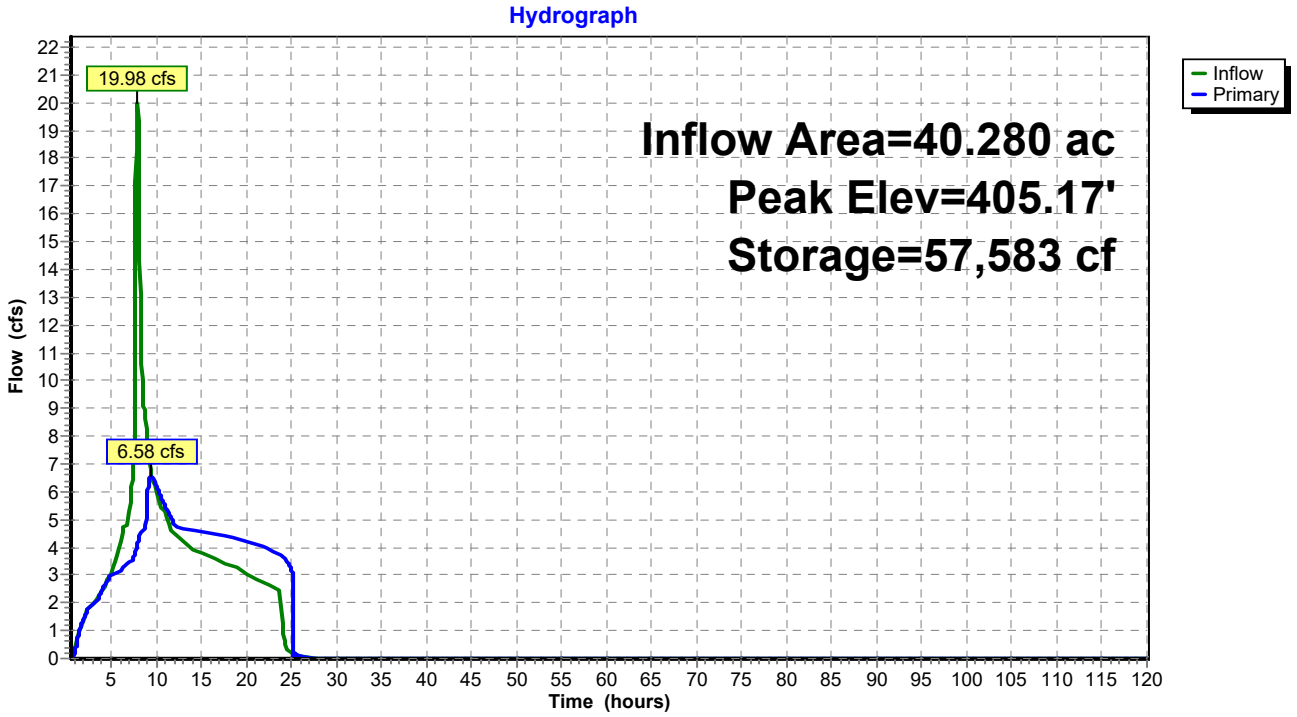
Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
401.00	2,250	0	0
402.00	7,140	4,695	4,695
403.00	8,720	7,930	12,625
404.00	10,340	9,530	22,155
405.00	12,000	11,170	33,325
406.00	14,300	13,150	46,475

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
401.00	1,820	0	0
402.00	3,960	2,890	2,890
403.00	5,190	4,575	7,465
404.00	6,560	5,875	13,340
405.00	8,160	7,360	20,700
406.00	10,140	9,150	29,850

Device	Routing	Invert	Outlet Devices
#1	Primary	398.29'	**8.3" Horiz. Orifice** C= 0.600 Limited to weir flow at low heads
#2	Primary	405.00'	**24.0" Horiz. O/F Riser** C= 0.600 Limited to weir flow at low heads
#3	Primary	405.02'	**2.0' long x 0.5' breadth Overflow CB** Head (feet) 0.20 0.40 0.60 0.80 1.00 Coef. (English) 2.80 2.92 3.08 3.30 3.32

Primary OutFlow Max=6.56 cfs @ 9.38 hrs HW=405.17' (Free Discharge)
- **1=Orifice** (Orifice Controls 4.75 cfs @ 12.63 fps)
- **2=O/F Riser** (Weir Controls 1.48 cfs @ 1.36 fps)
- **3=Overflow CB** (Weir Controls 0.34 cfs @ 1.10 fps)

Pond 4P: Baxter Detention



Summary for Pond 7P: Vintage Detention

Inflow Area = 1.990 ac, 75.38% Impervious, Inflow Depth = 2.88" for Salem 25 YR event
Inflow = 1.40 cfs @ 7.91 hrs, Volume= 0.477 af
Outflow = 0.55 cfs @ 8.65 hrs, Volume= 0.477 af, Atten= 61%, Lag= 44.2 min
Primary = 0.55 cfs @ 8.65 hrs, Volume= 0.477 af
Routed to Pond 4P : Baxter Detention

Routing by Stor-Ind method, Time Span= 0.50-120.00 hrs, dt= 0.05 hrs
Peak Elev= 433.61' @ 8.65 hrs Surf.Area= 2,021 sf Storage= 2,061 cf

Plug-Flow detention time= 16.9 min calculated for 0.477 af (100% of inflow)
Center-of-Mass det. time= 16.9 min (701.2 - 684.3)

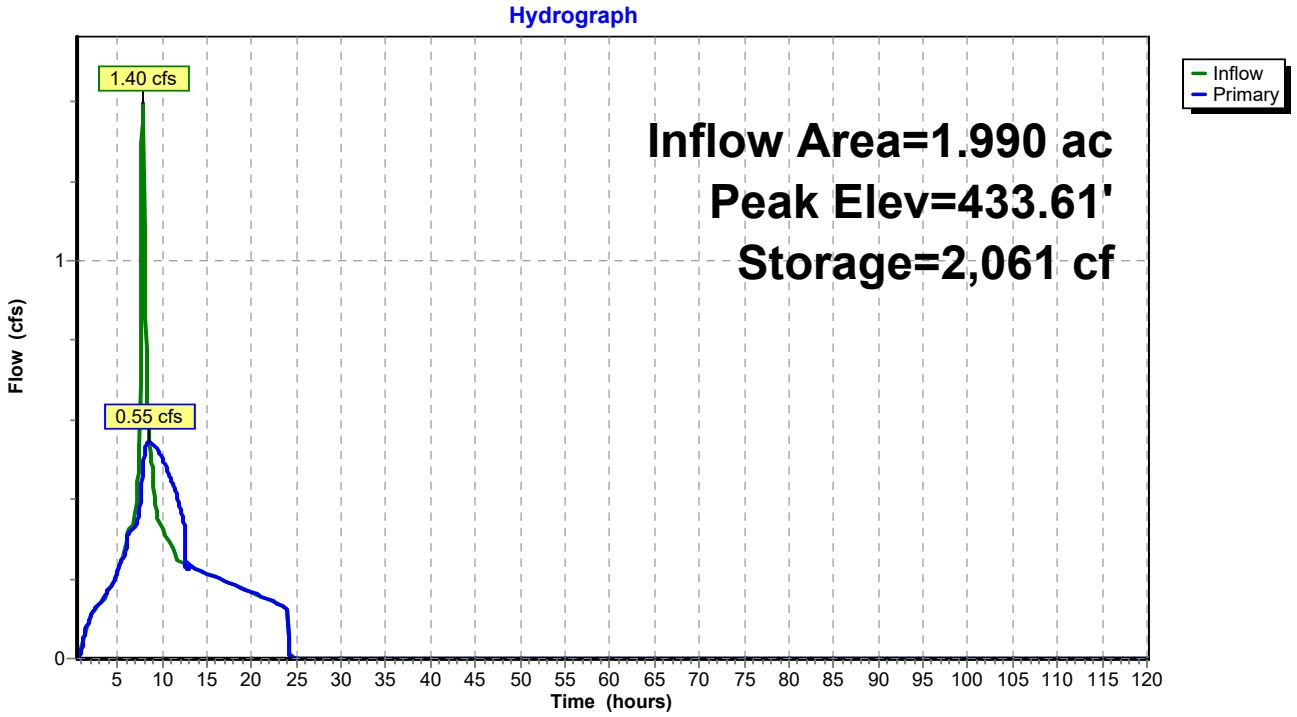
Volume	Invert	Avail.Storage	Storage Description
#1	432.00'	8,940 cf	**Custom Stage Data (Prismatic)**Listed below (Recalc)

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
432.00	0	0	0
432.50	1,160	290	290
434.00	2,320	2,610	2,900
436.00	3,720	6,040	8,940

Device	Routing	Invert	Outlet Devices
#1	Primary	431.31'	**3.7" Horiz. Orifice** C= 0.600 Limited to weir flow at low heads
#2	Primary	435.00'	**2.0' long x 0.5' breadth Overflow CB** Head (feet) 0.20 0.40 0.60 0.80 1.00 Coef. (English) 2.80 2.92 3.08 3.30 3.32

Primary OutFlow Max=0.55 cfs @ 8.65 hrs HW=433.61' (Free Discharge)
└**1=Orifice** (Orifice Controls 0.55 cfs @ 7.31 fps)
└**2=Overflow CB** (Controls 0.00 cfs)

Pond 7P: Vintage Detention

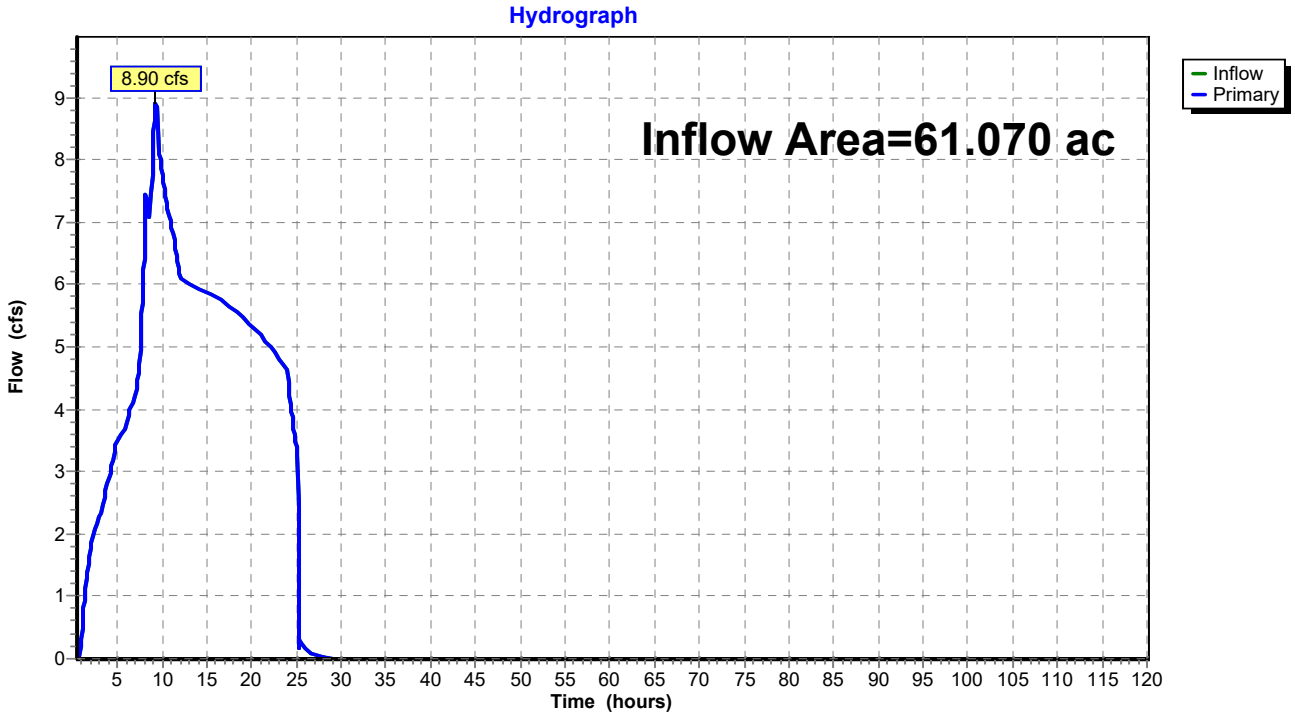


Summary for Link 1L: Allowable/Existing Release

Inflow Area = 61.070 ac, 41.03% Impervious, Inflow Depth > 1.98" for Salem 25 YR event
Inflow = 8.90 cfs @ 9.31 hrs, Volume= 10.096 af
Primary = 8.90 cfs @ 9.31 hrs, Volume= 10.096 af, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 0.50-120.00 hrs, dt= 0.05 hrs

Link 1L: Allowable/Existing Release



Summary for Pond 3P: Teal Detention

Inflow Area = 4.450 ac, 72.63% Impervious, Inflow Depth > 3.56" for Salem 100 YR event
Inflow = 3.69 cfs @ 7.98 hrs, Volume= 1.322 af
Outflow = 3.66 cfs @ 8.02 hrs, Volume= 1.327 af, Atten= 1%, Lag= 2.4 min
Primary = 3.66 cfs @ 8.02 hrs, Volume= 1.327 af
Routed to Link 1L : Allowable/Existing Release

Routing by Stor-Ind method, Time Span= 0.50-120.00 hrs, dt= 0.05 hrs / 2
Peak Elev= 387.05' @ 8.02 hrs Surf.Area= 2,689 sf Storage= 2,029 cf

Plug-Flow detention time= (not calculated: outflow precedes inflow)
Center-of-Mass det. time= 3.3 min (691.1 - 687.8)

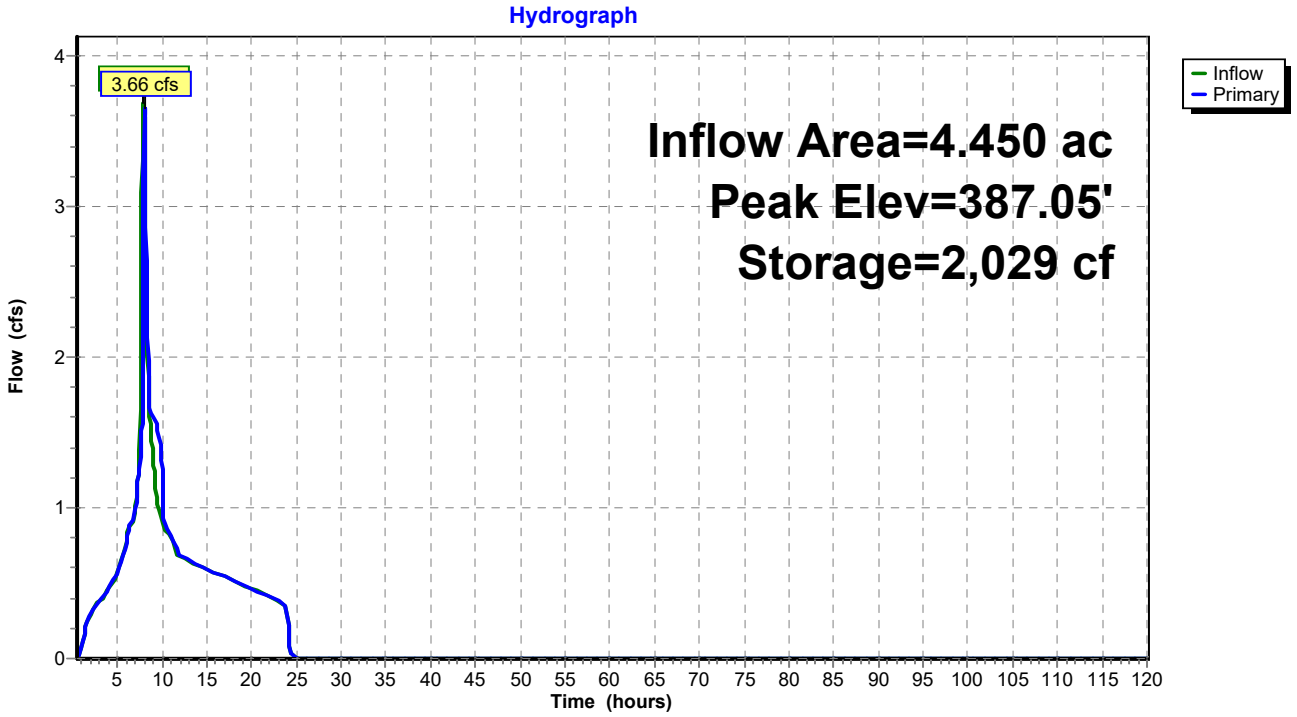
Volume	Invert	Avail.Storage	Storage Description
#1	385.50'	5,183 cf	**Pond (Prismatic)** Listed below (Recalc)

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
385.50	0	0	0
386.00	790	198	198
387.00	2,630	1,710	1,908
388.00	3,920	3,275	5,183

Device	Routing	Invert	Outlet Devices
#1	Primary	383.75'	**5.9" Horiz. Orifice** C= 0.600 Limited to weir flow at low heads
#2	Primary	386.95'	**24.0' long x 0.5' breadth Overflow** Head (feet) 0.20 0.40 0.60 0.80 1.00 Coef. (English) 2.80 2.92 3.08 3.30 3.32

Primary OutFlow Max=3.59 cfs @ 8.02 hrs HW=387.04' (Free Discharge)
└**1=Orifice** (Orifice Controls 1.66 cfs @ 8.74 fps)
└**2=Overflow** (Weir Controls 1.93 cfs @ 0.86 fps)

Pond 3P: Teal Detention



Summary for Pond 4P: Baxter Detention

Inflow Area = 40.280 ac, 54.18% Impervious, Inflow Depth > 3.06" for Salem 100 YR event
Inflow = 25.69 cfs @ 7.94 hrs, Volume= 10.274 af
Outflow = 13.36 cfs @ 8.38 hrs, Volume= 10.274 af, Atten= 48%, Lag= 26.8 min
Primary = 13.36 cfs @ 8.38 hrs, Volume= 10.274 af
Routed to Link 1L : Allowable/Existing Release

Routing by Stor-Ind method, Time Span= 0.50-120.00 hrs, dt= 0.05 hrs
Peak Elev= 405.47' @ 8.38 hrs Surf.Area= 22,186 sf Storage= 64,048 cf

Plug-Flow detention time= 125.3 min calculated for 10.270 af (100% of inflow)
Center-of-Mass det. time= 125.3 min (840.1 - 714.8)

Volume	Invert	Avail.Storage	Storage Description
#1	401.00'	46,475 cf	**West Pond (Prismatic)**Listed below (Recalc)
#2	401.00'	29,850 cf	**East Pond (Prismatic)**Listed below (Recalc)
		76,325 cf	Total Available Storage

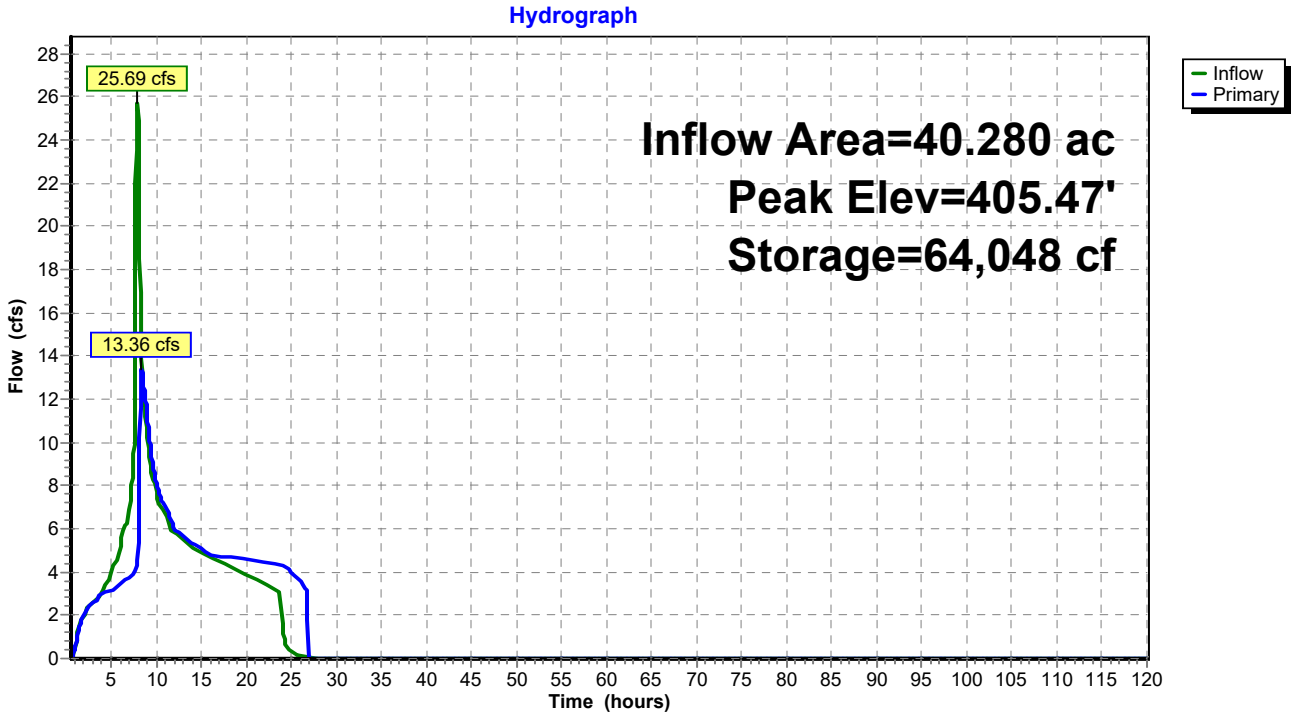
Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
401.00	2,250	0	0
402.00	7,140	4,695	4,695
403.00	8,720	7,930	12,625
404.00	10,340	9,530	22,155
405.00	12,000	11,170	33,325
406.00	14,300	13,150	46,475

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
401.00	1,820	0	0
402.00	3,960	2,890	2,890
403.00	5,190	4,575	7,465
404.00	6,560	5,875	13,340
405.00	8,160	7,360	20,700
406.00	10,140	9,150	29,850

Device	Routing	Invert	Outlet Devices
#1	Primary	398.29'	**8.3" Horiz. Orifice** C= 0.600 Limited to weir flow at low heads
#2	Primary	405.00'	**24.0" Horiz. O/F Riser** C= 0.600 Limited to weir flow at low heads
#3	Primary	405.02'	**2.0' long x 0.5' breadth Overflow CB** Head (feet) 0.20 0.40 0.60 0.80 1.00 Coef. (English) 2.80 2.92 3.08 3.30 3.32

Primary OutFlow Max=13.33 cfs @ 8.38 hrs HW=405.47' (Free Discharge)
- **1=Orifice** (Orifice Controls 4.85 cfs @ 12.90 fps)
- **2=O/F Riser** (Weir Controls 6.68 cfs @ 2.25 fps)
- **3=Overflow CB** (Weir Controls 1.81 cfs @ 1.99 fps)

Pond 4P: Baxter Detention



Summary for Pond 7P: Vintage Detention

Inflow Area = 1.990 ac, 75.38% Impervious, Inflow Depth > 3.62" for Salem 100 YR event
Inflow = 1.76 cfs @ 7.91 hrs, Volume= 0.601 af
Outflow = 0.61 cfs @ 8.89 hrs, Volume= 0.601 af, Atten= 66%, Lag= 58.9 min
Primary = 0.61 cfs @ 8.89 hrs, Volume= 0.601 af
Routed to Pond 4P : Baxter Detention

Routing by Stor-Ind method, Time Span= 0.50-120.00 hrs, dt= 0.05 hrs
Peak Elev= 434.14' @ 8.89 hrs Surf.Area= 2,420 sf Storage= 3,238 cf

Plug-Flow detention time= 29.4 min calculated for 0.601 af (100% of inflow)
Center-of-Mass det. time= 29.4 min (709.4 - 680.0)

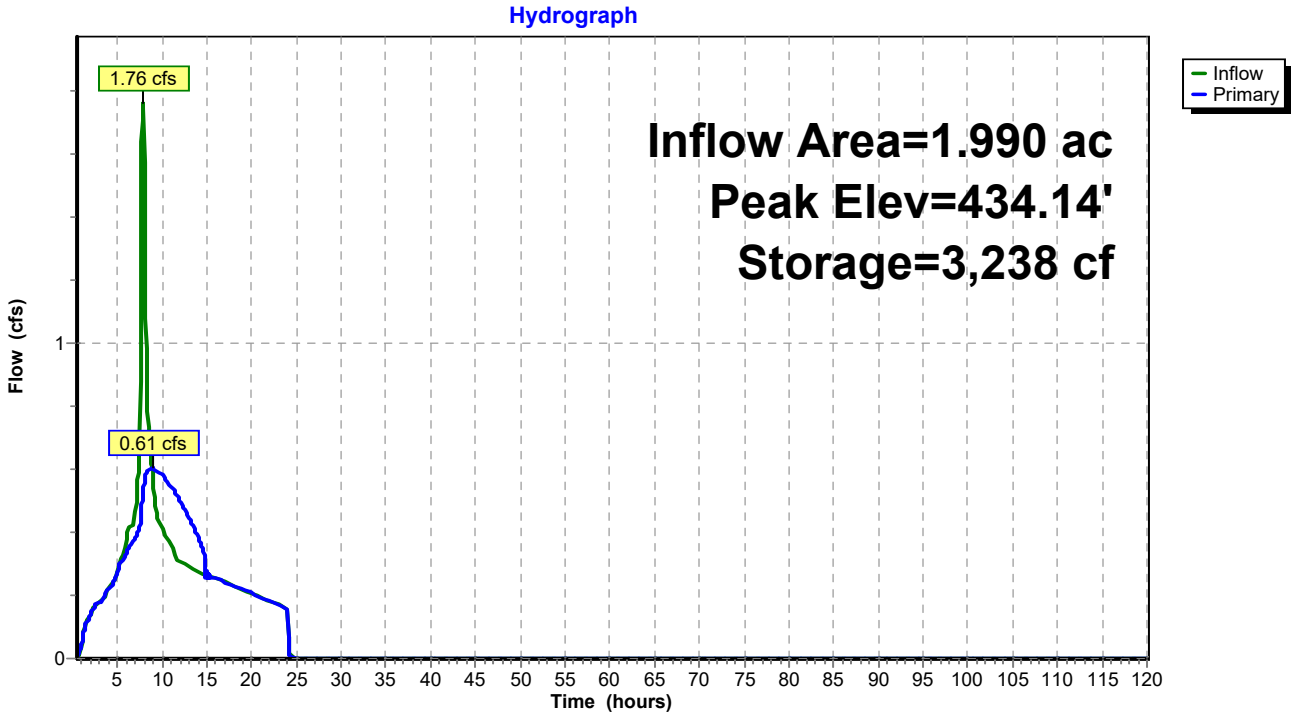
Volume	Invert	Avail.Storage	Storage Description
#1	432.00'	8,940 cf	**Custom Stage Data (Prismatic)**Listed below (Recalc)

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
432.00	0	0	0
432.50	1,160	290	290
434.00	2,320	2,610	2,900
436.00	3,720	6,040	8,940

Device	Routing	Invert	Outlet Devices
#1	Primary	431.31'	**3.7" Horiz. Orifice** C= 0.600 Limited to weir flow at low heads
#2	Primary	435.00'	**2.0' long x 0.5' breadth Overflow CB** Head (feet) 0.20 0.40 0.60 0.80 1.00 Coef. (English) 2.80 2.92 3.08 3.30 3.32

Primary OutFlow Max=0.61 cfs @ 8.89 hrs HW=434.14' (Free Discharge)
└**1=Orifice** (Orifice Controls 0.61 cfs @ 8.10 fps)
└**2=Overflow CB** (Controls 0.00 cfs)

Pond 7P: Vintage Detention

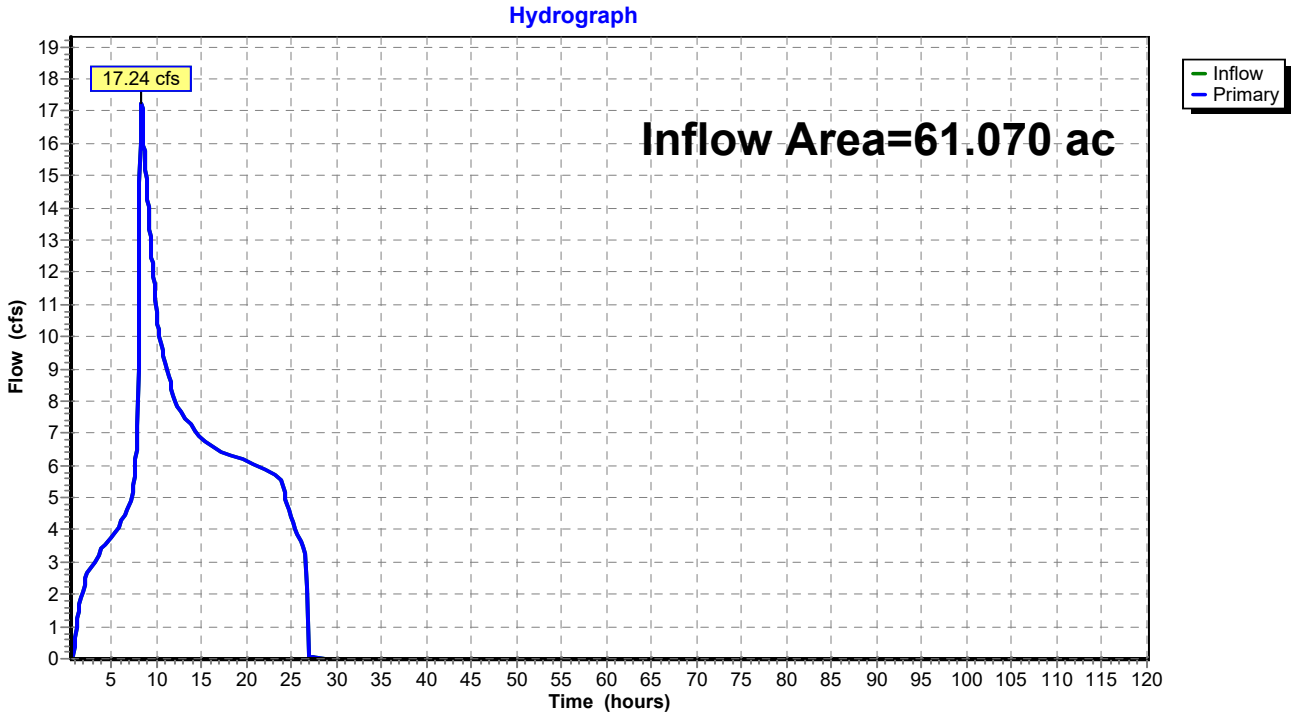


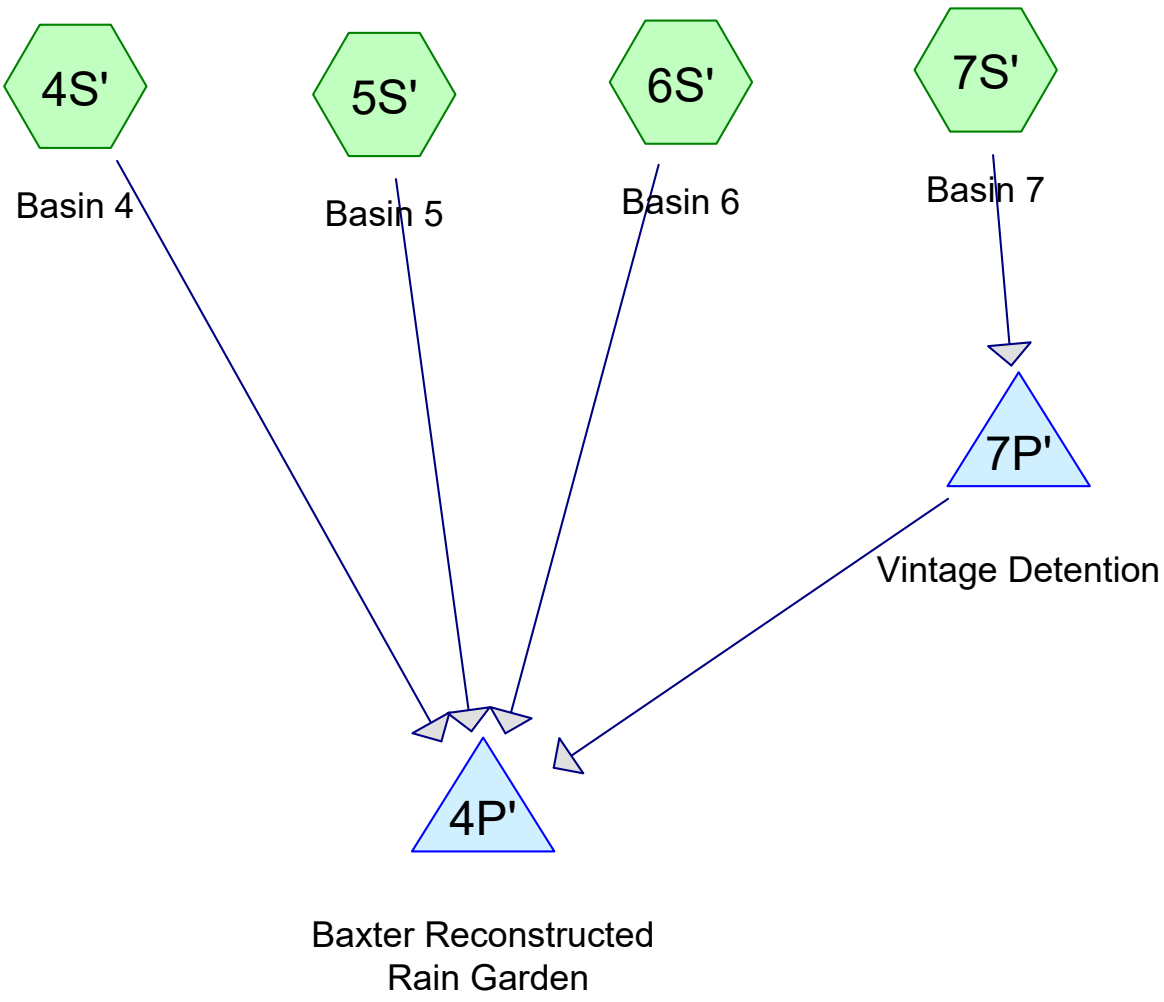
Summary for Link 1L: Allowable/Existing Release

Inflow Area = 61.070 ac, 41.03% Impervious, Inflow Depth > 2.62" for Salem 100 YR event
Inflow = 17.24 cfs @ 8.35 hrs, Volume= 13.328 af
Primary = 17.24 cfs @ 8.35 hrs, Volume= 13.328 af, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 0.50-120.00 hrs, dt= 0.05 hrs

Link 1L: Allowable/Existing Release





Subcat Reach Pond Link

Routing Diagram for WoodscapeGreenNorth_V1
Prepared by Westech Engineering, Inc., Printed 1/13/2022

Summary for Subcatchment 4S': Basin 4

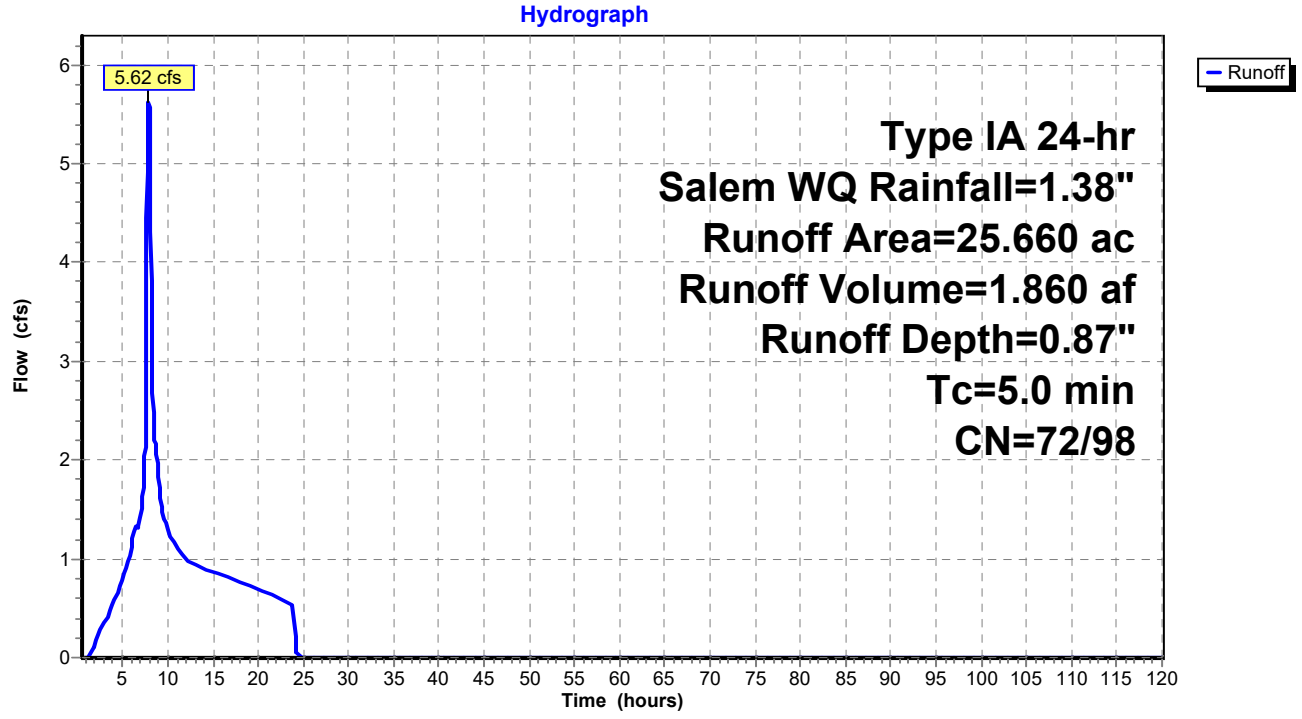
Runoff = 5.62 cfs @ 7.91 hrs, Volume= 1.860 af, Depth= 0.87"
Routed to Pond 4P' : Baxter Reconstructed Rain Garden

Runoff by SBUH method, Split Pervious/Imperv., Time Span= 0.50-120.00 hrs, dt= 0.05 hrs
Type IA 24-hr Salem WQ Rainfall=1.38"

	Area (ac)	CN	Description
*	5.860	98	Paved roads w/curbs & sewers, HSG C
	4.950	85	1/8 acre lots, 65% imp, HSG B
	14.850	90	1/8 acre lots, 65% imp, HSG C
	25.660	91	Weighted Average
	6.930		27.01% Pervious Area
	18.730		72.99% Impervious Area

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

Subcatchment 4S': Basin 4



Summary for Subcatchment 5S': Basin 5

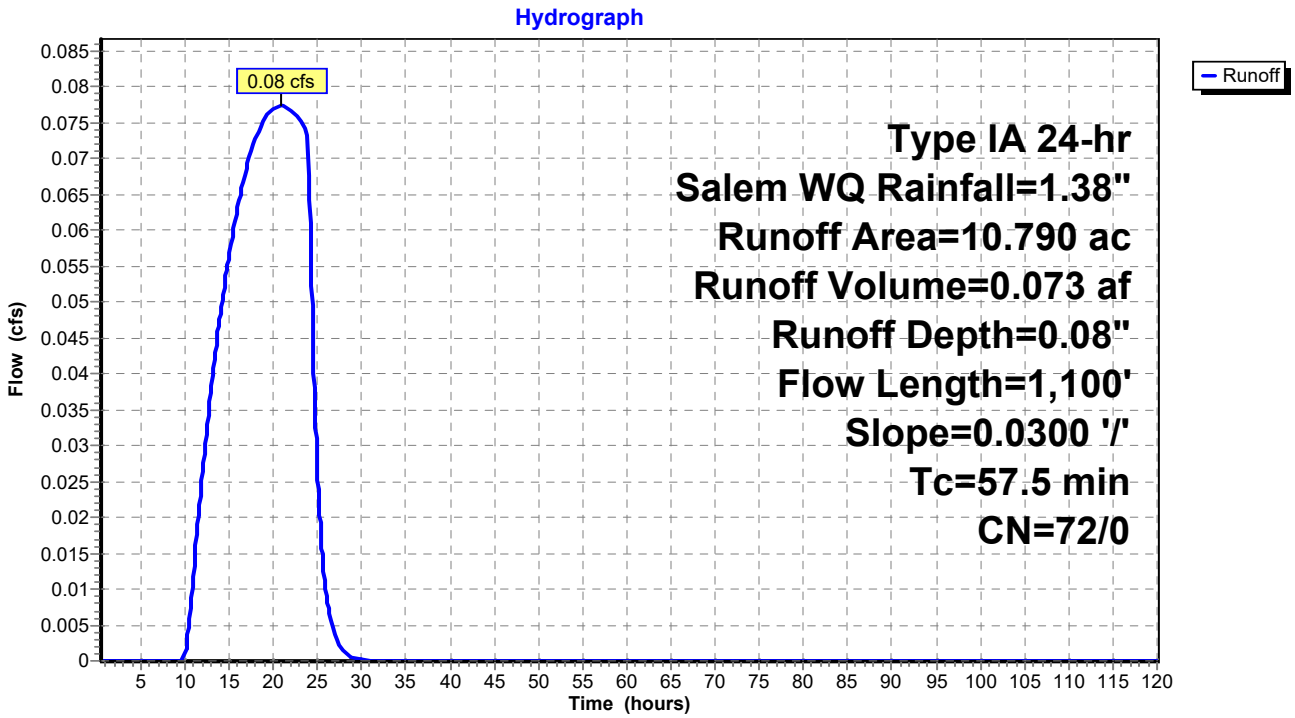
Runoff = 0.08 cfs @ 20.92 hrs, Volume= 0.073 af, Depth= 0.08"
Routed to Pond 4P' : Baxter Reconstructed Rain Garden

Runoff by SBUH method, Split Pervious/Imperv., Time Span= 0.50-120.00 hrs, dt= 0.05 hrs
Type IA 24-hr Salem WQ Rainfall=1.38"

Area (ac)	CN	Description
10.790	72	Woods/grass comb., Good, HSG C
10.790		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
42.1	300	0.0300	0.12		**Sheet Flow, Pre Developed** n= 0.300 P2= 2.20"
15.4	800	0.0300	0.87		**Shallow Concentrated Flow,** Woodland Kv= 5.0 fps
57.5	1,100	Total			

Subcatchment 5S': Basin 5



Summary for Subcatchment 6S': Basin 6

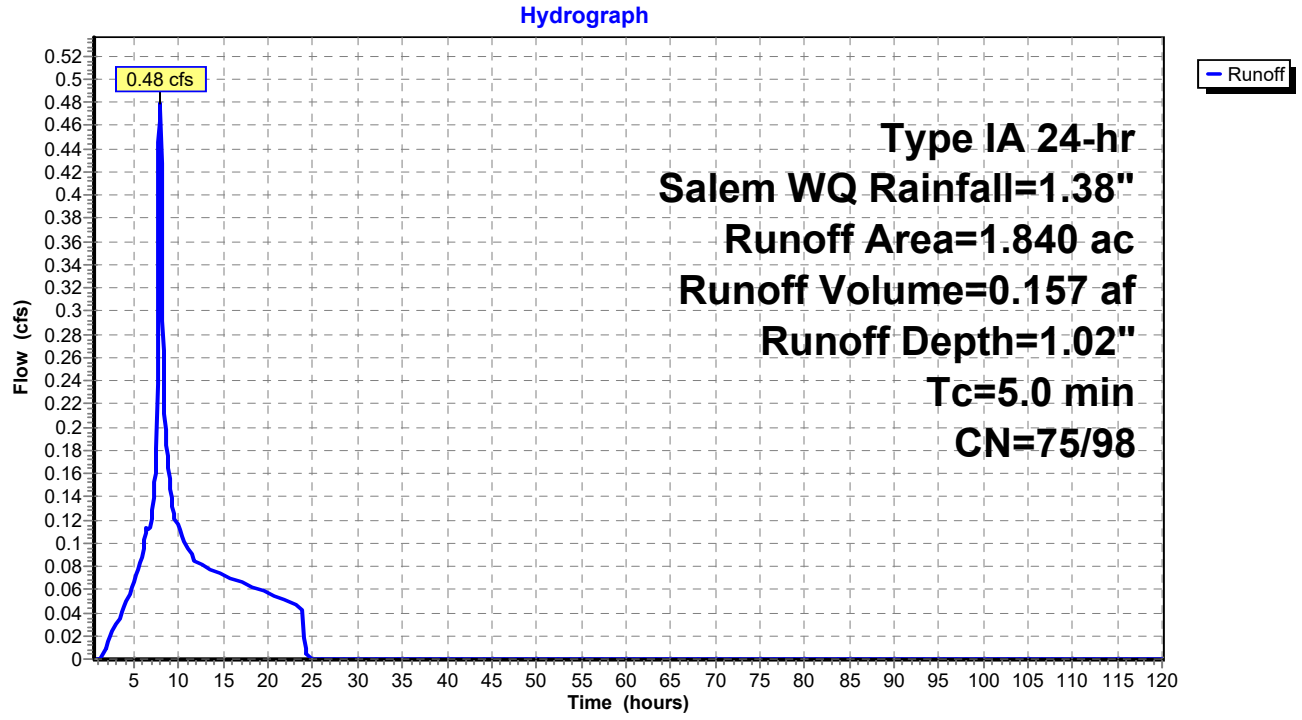
Runoff = 0.48 cfs @ 7.91 hrs, Volume= 0.157 af, Depth= 1.02"
Routed to Pond 4P' : Baxter Reconstructed Rain Garden

Runoff by SBUH method, Split Pervious/Imperv., Time Span= 0.50-120.00 hrs, dt= 0.05 hrs
Type IA 24-hr Salem WQ Rainfall=1.38"

	Area (ac)	CN	Description
*	1.140	98	Paved roads w/curbs & sewers, HSG C
	0.700	90	1/8 acre lots, 65% imp, HSG C
	1.840	95	Weighted Average
	0.245		13.32% Pervious Area
	1.595		86.68% Impervious Area

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

Subcatchment 6S': Basin 6



Summary for Subcatchment 7S': Basin 7

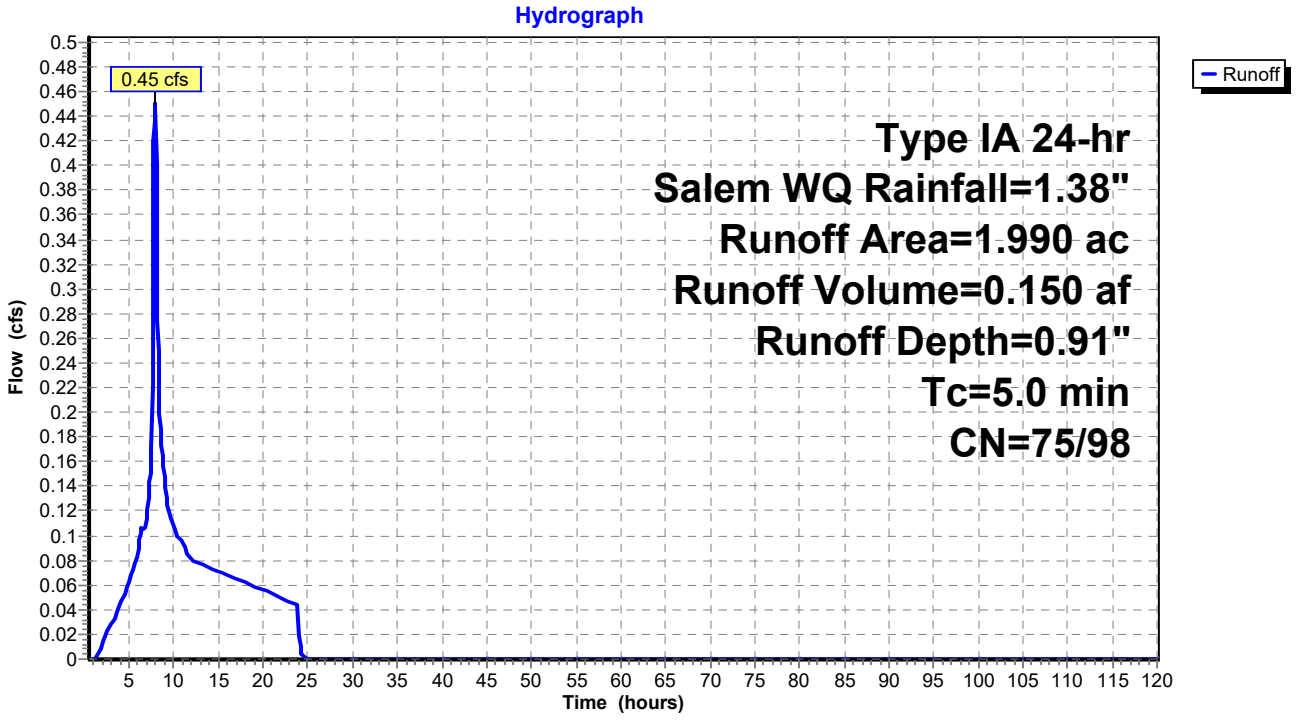
Runoff = 0.45 cfs @ 7.91 hrs, Volume= 0.150 af, Depth= 0.91"
Routed to Pond 7P' : Vintage Detention

Runoff by SBUH method, Split Pervious/Imperv., Time Span= 0.50-120.00 hrs, dt= 0.05 hrs
Type IA 24-hr Salem WQ Rainfall=1.38"

	Area (ac)	CN	Description
*	0.590	98	Paved roads w/curbs & sewers, HSG C
	1.400	90	1/8 acre lots, 65% imp, HSG C
	1.990	92	Weighted Average
	0.490		24.62% Pervious Area
	1.500		75.38% Impervious Area

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

Subcatchment 7S': Basin 7



Summary for Pond 4P': Baxter Reconstructed Rain Garden

Inflow Area = 40.280 ac, 54.18% Impervious, Inflow Depth = 0.67" for Salem WQ event
Inflow = 6.45 cfs @ 7.91 hrs, Volume= 2.240 af
Outflow = 1.53 cfs @ 9.99 hrs, Volume= 2.240 af, Atten= 76%, Lag= 124.3 min
Discarded = 1.53 cfs @ 9.99 hrs, Volume= 2.240 af
Primary = 0.00 cfs @ 0.50 hrs, Volume= 0.000 af

Routing by Stor-Ind method, Time Span= 0.50-120.00 hrs, dt= 0.05 hrs
Peak Elev= 402.34' @ 9.99 hrs Surf.Area= 18,901 sf Storage= 21,989 cf

Plug-Flow detention time= (not calculated: outflow precedes inflow)
Center-of-Mass det. time= 174.5 min (895.3 - 720.8)

Volume	Invert	Avail.Storage	Storage Description
#1	401.00'	85,805 cf	**West Pond (Prismatic)**Listed below (Recalc)
#2	401.00'	29,850 cf	**East Pond (Prismatic)**Listed below (Recalc)
		115,655 cf	Total Available Storage

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
401.00	11,910	0	0
402.00	13,800	12,855	12,855
403.00	15,920	14,860	27,715
404.00	18,150	17,035	44,750
405.00	20,500	19,325	64,075
406.00	22,960	21,730	85,805

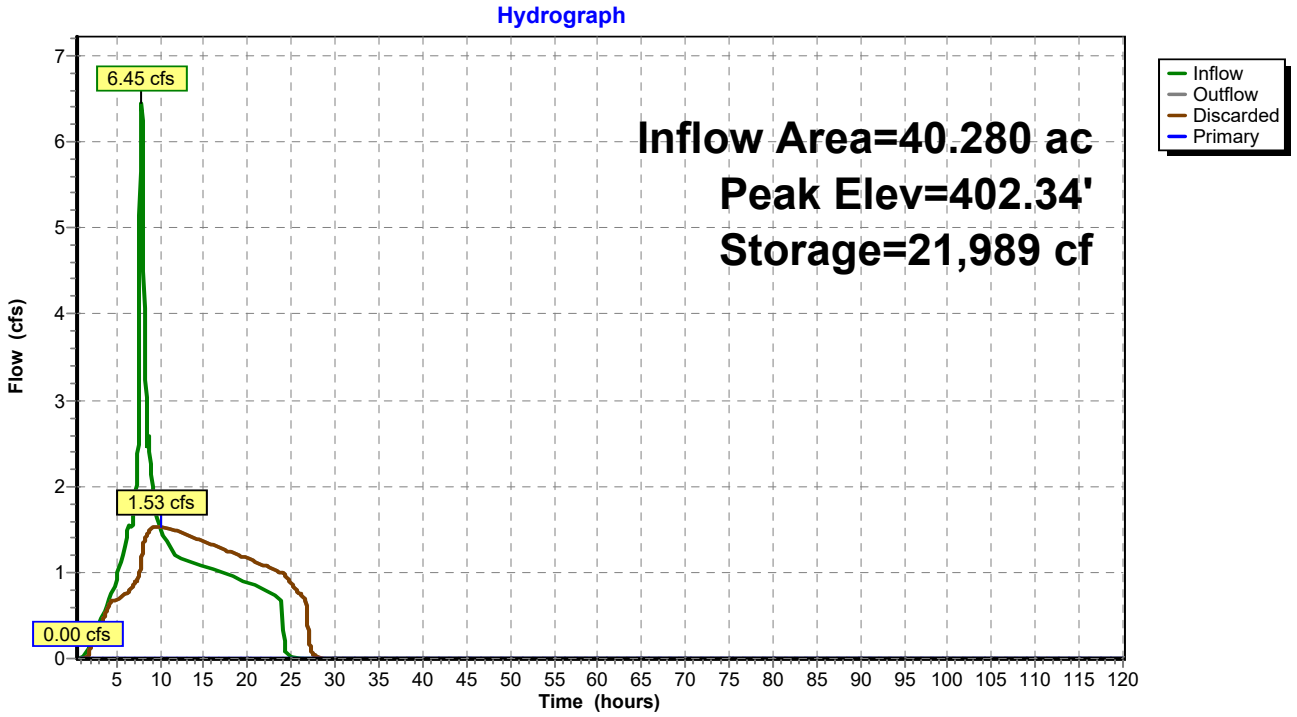
Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
401.00	1,820	0	0
402.00	3,960	2,890	2,890
403.00	5,190	4,575	7,465
404.00	6,560	5,875	13,340
405.00	8,160	7,360	20,700
406.00	10,140	9,150	29,850

Device	Routing	Invert	Outlet Devices
#1	Discarded	401.00'	**2.000 in/hr Exfiltration over Horizontal area** Conductivity to Groundwater Elevation = 399.50'
#2	Primary	405.02'	**2.0' long x 0.5' breadth Overflow CB** Head (feet) 0.20 0.40 0.60 0.80 1.00 Coef. (English) 2.80 2.92 3.08 3.30 3.32

Discarded OutFlow Max=1.53 cfs @ 9.99 hrs HW=402.34' (Free Discharge)
↑**1=Exfiltration** (Controls 1.53 cfs)

Primary OutFlow Max=0.00 cfs @ 0.50 hrs HW=401.00' (Free Discharge)
↑**2=Overflow CB** (Controls 0.00 cfs)

Pond 4P': Baxter Reconstructed Rain Garden



Summary for Pond 7P': Vintage Detention

Inflow Area = 1.990 ac, 75.38% Impervious, Inflow Depth = 0.91" for Salem WQ event
Inflow = 0.45 cfs @ 7.91 hrs, Volume= 0.150 af
Outflow = 0.36 cfs @ 8.09 hrs, Volume= 0.150 af, Atten= 19%, Lag= 10.5 min
Primary = 0.36 cfs @ 8.09 hrs, Volume= 0.150 af
Routed to Pond 4P' : Baxter Reconstructed Rain Garden

Routing by Stor-Ind method, Time Span= 0.50-120.00 hrs, dt= 0.05 hrs
Peak Elev= 432.33' @ 8.09 hrs Surf.Area= 769 sf Storage= 127 cf

Plug-Flow detention time= (not calculated: outflow precedes inflow)
Center-of-Mass det. time= 0.6 min (709.3 - 708.6)

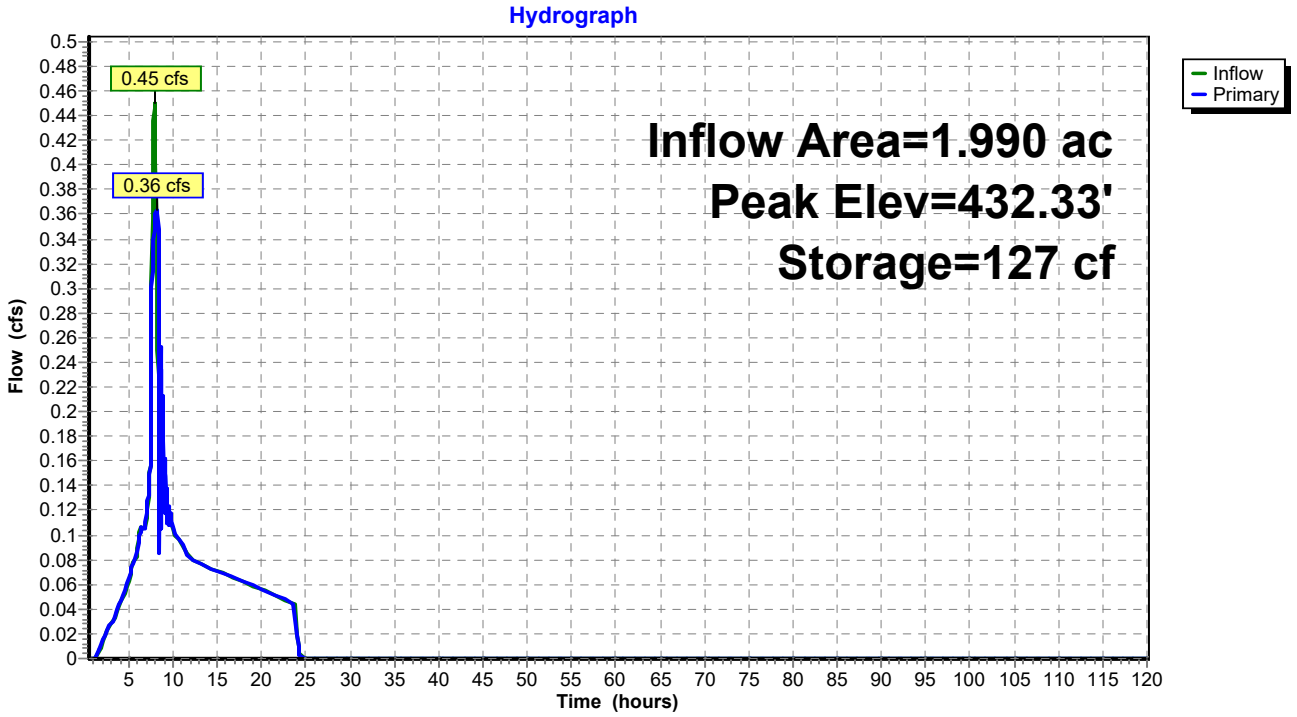
Volume	Invert	Avail.Storage	Storage Description
#1	432.00'	8,940 cf	**Custom Stage Data (Prismatic)**Listed below (Recalc)

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
432.00	0	0	0
432.50	1,160	290	290
434.00	2,320	2,610	2,900
436.00	3,720	6,040	8,940

Device	Routing	Invert	Outlet Devices
#1	Primary	431.31'	**3.7" Horiz. Orifice** C= 0.600 Limited to weir flow at low heads
#2	Primary	435.00'	**2.0' long x 0.5' breadth Overflow CB** Head (feet) 0.20 0.40 0.60 0.80 1.00 Coef. (English) 2.80 2.92 3.08 3.30 3.32

Primary OutFlow Max=0.36 cfs @ 8.09 hrs HW=432.33' (Free Discharge)
└**1=Orifice** (Orifice Controls 0.36 cfs @ 4.86 fps)
└**2=Overflow CB** (Controls 0.00 cfs)

Pond 7P': Vintage Detention



APPENDIX D

GEOTECHNICAL INVESTIGATION

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Revised December 16, 2021

Jessica Woodruff
Community Development Partners
126 NE Alberta Street, Suite 202
Portland, Oregon 97211

Re: Geotechnical Investigation **CGS Project No. 20-023**
Gateway Salem Development
Battle Creek Road SE
Salem, Oregon 97302

Ms. Woodruff,

Central Geotechnical Services, LLC (Central Geotech) is pleased to submit this Geotechnical Investigation Report for the proposed Gateway Salem Development at the Miller Site - Parcel 2 and 3 located in Salem, Oregon. The report was prepared in accordance with our Professional Services Agreement dated April 16, 2021.

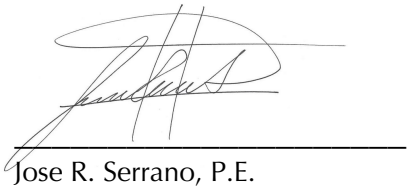
The scope of our work included:

- Review of published geologic mapping
- Site reconnaissance
- Subsurface exploration consisting of fourteen exploratory test pits and three infiltration tests.
- Preparation of a Geotechnical Investigation Report presenting our conclusions and recommendations for geotechnical design and construction with specific regard to:
  - Geologic hazards
  - Allowable soil bearing for foundations
  - Settlement estimates for foundations
  - Retaining walls
  - Storm water management
  - Fill compaction

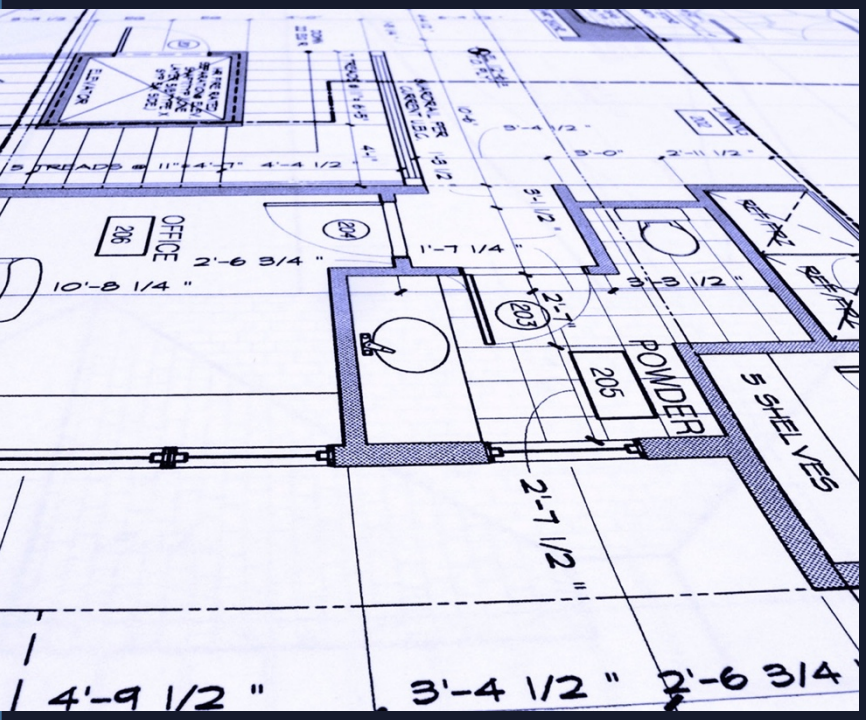
Thank you very much for the opportunity to work with you on this project. Please feel free to call our office with questions about this report.

Respectfully,

Central Geotechnical Services, LLC



Jose R. Serrano, P.E.
Associate Engineer



Geotechnical Investigation:

Gateway Salem Development
Miller Site – Parcel 2 & 3
Battle Creek Road
Salem, Oregon

Central Geotech Project No. 21-023

Prepared For:

Jessica Woodruff
Community Development Partners
126 NE Alberta Street, Suite 202
Portland, Oregon

Revised December 16, 2021

Submitted by:

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1.0 INTRODUCTION AND PURPOSE OF REPORT

The purpose of this Geotechnical Investigation Report is to engage with the owner/developer and provide technical insight and analysis for the project, based on various public data, local findings onsite, and experience.

After receiving direction from Mr. Randy Boehm of Urban Resources, Inc., Central Geotechnical Services (CGS) was requested to provide a Geotechnical Investigation, along with general recommendations for the design and construction of the proposed multi-family residential development in Salem, Oregon. Mr. Boehm and members of the project design team provided preliminary construction concept documents for us to review and geotechnical scope requirements for the project.

Our conclusions and recommendations cover topics such as investigative soils data, allowable soil bearing pressure, lateral pressures, compaction requirements, design and alteration of existing foundations, foundation placement, pavement, and seismic considerations.

This report is intended to facilitate the preliminary focus of future development and initiate the requirements for the design and permitting of the proposed development project.

1.1 Project Description

Mr. Boehm provided us with grading and drainage, and street plans prepared by Western Engineering Inc., dated March 2021. Mr. Boehm also provided us with a preliminary site plan prepared by Scott Edwards Architecture LLP, dated February 25, 2021.

Based on phone discussions and review of documentation sent by your office, we understand that Community Development Partners (CDP) intends to build ten multi-family residential buildings with outdoor space at the site. Associated improvements will include pavement for parking and driveways, new streets, underground utilities and storm water management facilities.

The project is in the preliminary planning stages such that only tentative building plans are available at this time. We understand that the buildings will be 1- to 4-stories tall with wood frame construction. Structural loading information for the buildings is not available at this time. We expect that the design and construction of the development will be governed by the provisions of the 2019 Oregon Structural Specialty Code (OSSC).

The preliminary grading plan shows excavation cuts of up to 3 feet deep and fills of up to 3 feet thick for construction of roadway embankments. We presume that the buildings will be constructed on excavated building pads and that thin fills will be placed in localized areas to construct private driveways and parking areas.

Underground utilities will be constructed in street right-of-ways. Three water quality facilities that will receive storm water runoff are planned adjacent to open space areas.

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2.0 INVESTIGATION SUMMARY

2.1 Site Location and Surface Conditions

The proposed development site is located off Battle Creek Road SE, about 1,100 feet southwest of Boone Road SE, in Salem, Oregon. The site is a 15.54-acre, polygon-shaped property that is made up of two contiguous lots identified as Marion County Tax Lots 083W140000118 and 083W140000300. A vicinity map of the site is shown in Figure 2-1, below.

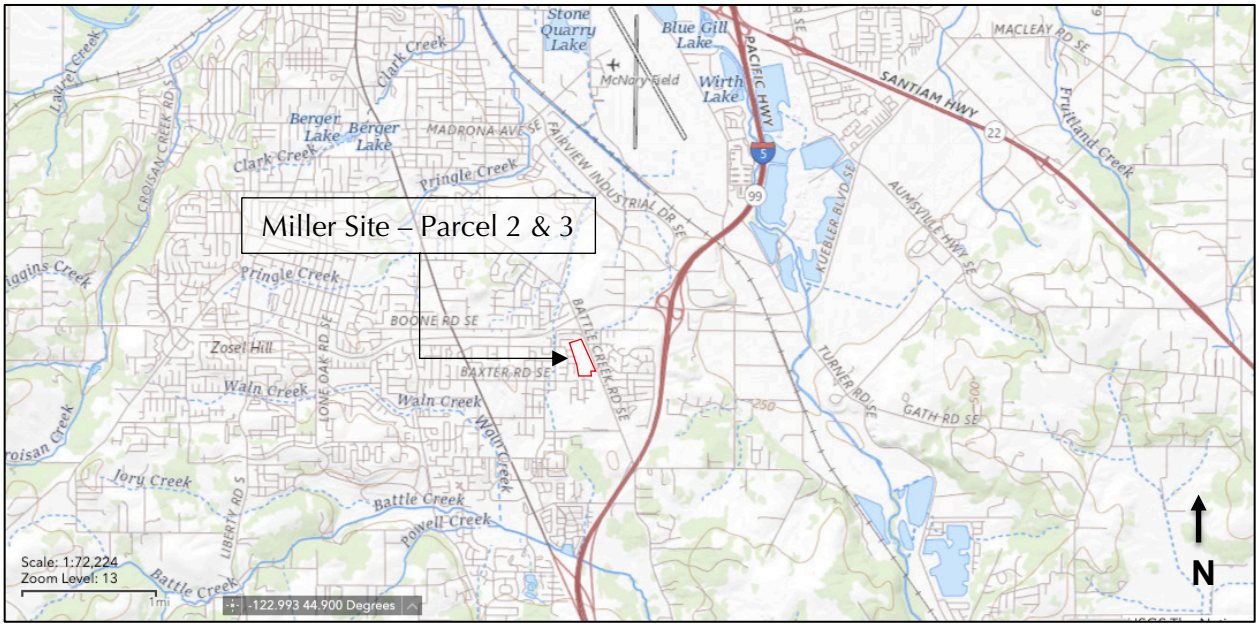

Figure 2-1: Vicinity map of project site (Source: USGS National Map)

The site is located on a broad drainage with gentle topography that inclines to the north. Slopes on the site are generally inclined at less than 10% grade. The elevation at the site ranges from about 367 feet above mean sea level at the northeast corner to about 412 feet at the southeast corner. At the time of our exploration, the site was mostly an open grass field.

The general topography in the site vicinity is shown in Figure 2-2, on the next page.

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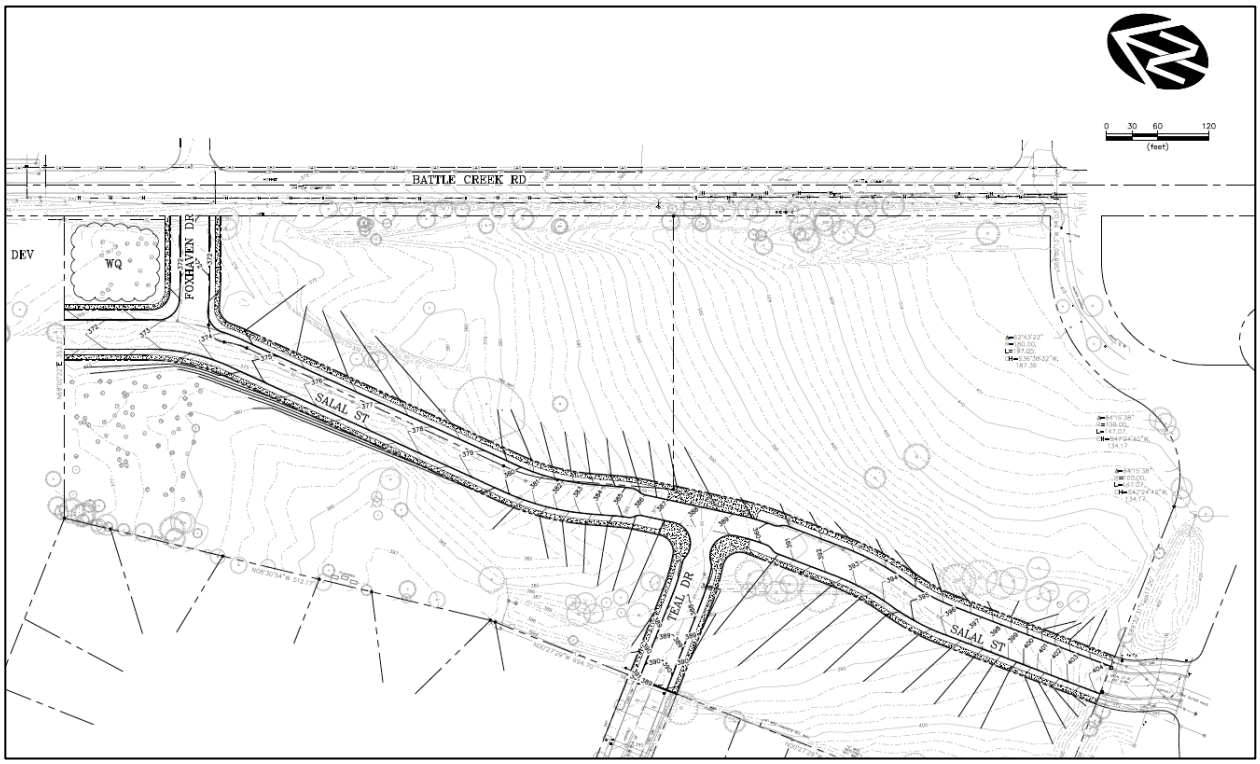

Figure 2-2: Topographic map of CDP Salem Gateway. Contour interval is 1-foot.
(Source: Overall Grading & Drainage Plan by Westech Engineering, Inc., dated March 2021)

2.2 Site Geology

The South Salem area is underlain by a thick and widespread sequence of basalt flows belonging to the Miocene age Columbia River Basalt Group, deposited 6 to 17 million years ago.[1] The basalt is a dense, finely-crystalline rock that is commonly fractured along blocky and columnar joints. The fractures formed as the lava cooled and contracted, and with subsequent tectonic deformation. Tectonic forces fractured, folded, uplifted and faulted the basalt to form broad hills with deeply-incised gullies.

Individual basalt flows range from 15 to 150 feet thick and are sometimes separated by thin interflow zones of sedimentary deposits or residual soil. The total thickness of the Columbia River Basalt Group in the site vicinity exceeds several hundred feet. Basalt at the ground surface is typically decomposed to a clayey silt with a distinctive, red-brown color, known as residual soil or laterite.

In the late Quaternary (80,000 to 10,000 years ago), the Columbia River Basin and Willamette Valley were repeatedly inundated by episodic glacial outburst floods, known as the Missoula Floods. The flood waters scoured the bedrock along river channels, and deposited gravel, silt, and sand up to several

[1] Walker, G.W., and Duncan, R.A., 1989 Geologic map of the Salem 1° by 2° Quadrangle, western Oregon: U.S. Geologic Survey Miscellaneous Investigations Series Map I-1893, scale 1:250,000.

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hundred feet thick at elevations below 400 feet[2]. Strong winds subsequently transported the silt as loess (wind-blown silt) onto slopes in upland areas above 400 feet. The last flooding event occurred at the end of the last glacial period about 9,000 to 10,000 years ago[3].

2.3 Seismic Setting

The Salem area is subject to seismic events stemming from three possible sources: the Cascadia Subduction Zone (CSZ) at the interface between the Juan de Fuca Plate and the North American Plate, intraslab faults within the Juan de Fuca Plate, and crustal faults in the North American Plate.

The CSZ is seismically active. Intraslab events with inland epicenters, such as the 6.8 MW Nisqually earthquake in 2001, have occurred on a frequent basis in the Puget Sound, contributing small to moderate magnitude ground motions in southern Washington. The maximum magnitude for a CSZ interface event is expected to be in the range of moment magnitude (M_W) 9.0 with a nearshore or offshore epicenter located about 45 miles west of the project site.

Inland crustal faults in the North American Plate are considered potentially active. Five moderate magnitude earthquakes attributed to crustal faults have occurred in the Portland-Vancouver-Salem metropolitan Area since 1877 including a 5.2 MW earthquake in 1962. Slip rates for the crustal faults are very low (i.e., less than about 0.2 mm per year) and no documented surface rupture has occurred in the last 10,000 years.

Quaternary age (last 1.6 million years) crustal faults inventoried in the USGS National Fault and Fold Database that lie within 10 miles of the is the Salem-Eola Hills Fault about 4.8 miles to the southwest, respectively, the Waldo and Turner and Mill Creek faults about 1.4 and 3.8 miles to the southeast.

The contribution of potential earthquake-induced ground motion from known sources, including the faults described above are provided by the seismic design parameters for the project site presented in the recommendations section of this report.

2.4 Geological Hazard Review

We reviewed comprehensive landslide inventory mapping of Oregon by the Oregon Department of Geology and Mineral Industries (DOGAMI) compiled from regional geologic mapping, LiDAR imagery, and other sources[4]. LiDAR imagery provides high-resolution digital elevations of the ground surface, revealing potential landslide features. Features identified from LiDAR imagery are validated with site reconnaissance and knowledge of the site geology.

[2] Madin, I., 1990, Earthquake-Hazard Geology Maps of the Portland Metropolitan Area, Oregon: Oregon Department of Geology and Mineral Industries Open File Report O-90-02, map scale 1:24,000.

[3] Waitt, R. B. Jr., 1985, Case for Periodic Colossal Jokulhlaups from Pleistocene Lake Missoula; Geological Society of America Bulletin, v. 96, no. 10, p. 1271-1286.

[4] Oregon Department of Geology and Mineral Industries, 2014, Statewide Landslide Information Database for Oregon (SLIDO 4.2): DOGAMI GIS website, updated October 30, 2020, map scale 1:9,028.

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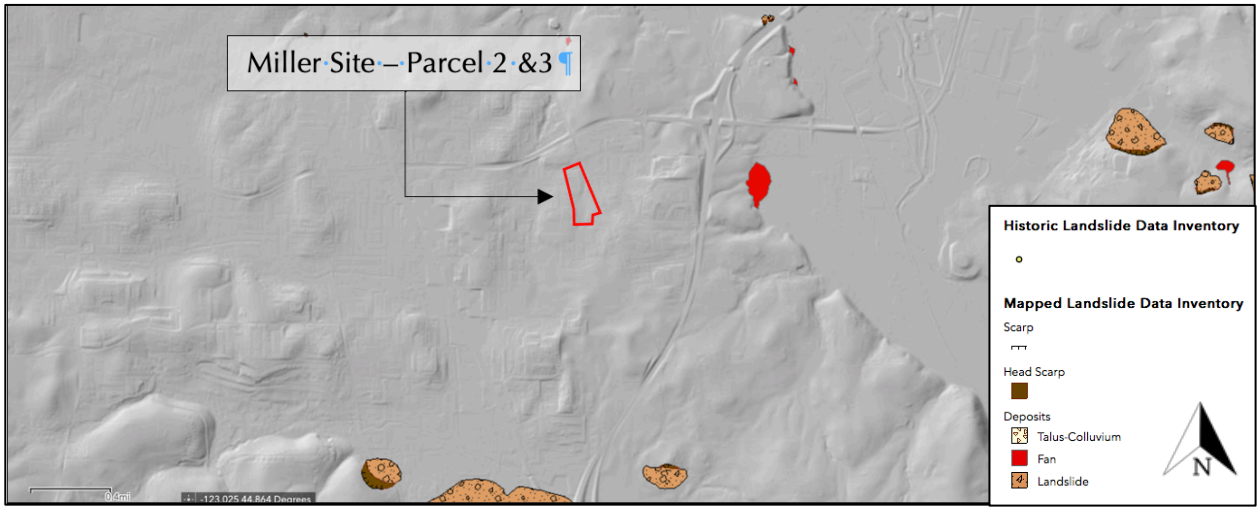

Figure 2-3: Landslide Inventory Map on LiDAR Bare Earth Imagery. Approximate Site Boundary Shown as Red Line. (Source: DOGAMI SLIDO 4.2)

The DOGAMI landslide inventory shows no mapped landslides on or in the vicinity of the Miller Site, and DOGAMI designates the site as a "low landslide susceptibility" area. The Oregon HazVu GIS database does not identify the property as having any Earthquake Liquefaction Hazard. The property does not appear to have any additional mapped geologic hazards.

2.5 Subsurface Exploration

We explored subsurface soil conditions at the site in fourteen exploratory test pits excavated to depths of up to 10 feet below the ground surface (bgs) on February 27, 2021. The test pits were completed with a Hitachi 40u, 8,000-pound, tracked-excavator operated by Dan Fischer Excavating of Forest Grove, Oregon. At the completion of logging and sampling, the test pits were loosely backfilled. The approximate locations of the explorations relative to the proposed development area are presented in Figure 2-4.

Summary logs of the test pit explorations are presented in Appendix A.

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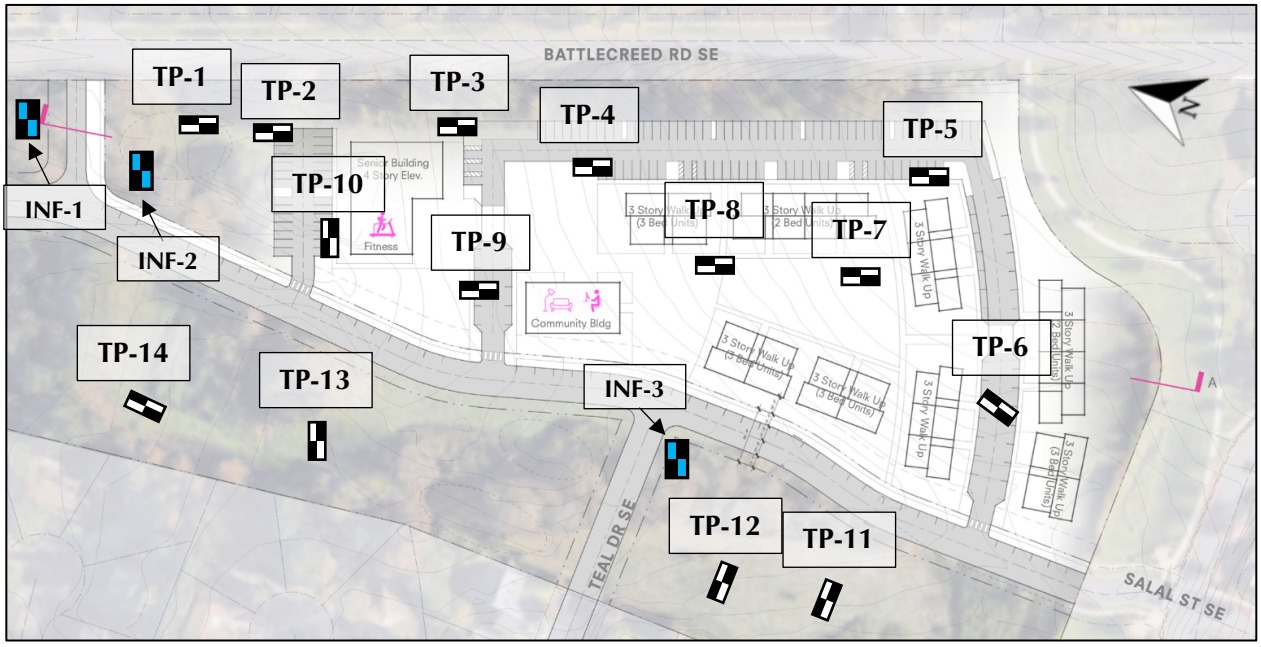

Figure 2-4: Phase 1 – Site Layout with Test Pit Locations. All locations are approximate.
(Source: CDP Salem Presentation, prepared by Scott Edwards Architecture, LLP, dated February 25, 2021, page 5 of 10)

2.6 Subsurface Conditions

We encountered three soil layers on the site; an upper layer of fill and/or disturbed topsoil, a middle layer of clayey silt residual soil, and a lower layer of weathered basalt rock. Each soil unit is described below.

2.6.1 Fill and/or Disturbed Native Topsoil

We encountered a thin layer of fill and/or disturbed native topsoil in all fourteen exploratory test pits that extended from the ground surface to a depth of 1.0 to 3.5 feet. The fill and/or disturbed native topsoil consists of clayey SILT (ML-OL) with variable amounts of sand and gravel with mixed organics. The gravel and sand was generally limited to the upper 18 inches. In general, the clayey SILT is soft to stiff. Pocket penetrometer measurements indicate an unconfined compressive strength of 0.5 to 1.5 tsf, consistent with a soft to stiff consistency. The moisture content of four of the fill and/or disturbed native topsoil samples was generally between 25% and 38%.

Additional unrecognized fill may be present around the existing foundations, subsurface structures, and other existing or abandoned improvements.

2.6.2 Residual Clayey SILT

Beneath the topsoil and/or disturbed native topsoil, we encountered native, residual soil derived from decomposition in-place of the underlying basalt in ten of our fourteen explorations. The residual soil

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consists of clayey SILT (ML) with trace to fine coarse sand and subangular, gravel to cobble-sized fragments of weathered rock. The amount of rock fragments increases with depth as the layer transitions to basalt at its base. In general, the clayey SILT is stiff to very-hard. Pocket penetrometer measurements indicate an unconfined compressive strength of 1.0 to 5.0 tsf, consistent with a stiff to very-hard consistency. The moisture content of five of the residual soil samples was generally between 28% and 31%.

In explorations, the clayey SILT generally extended to depths of 1.5 to 8 feet.

2.6.3 BASALT

Beneath the residual soil is weathered BASALT belonging to the Columbia River Basalt Group. The BASALT is red-brown to brown, moderately-weathered, fractured and vesicular. The estimated ODOT Rock Hardness Classification of the BASALT is generally Medium-hard (R3) (see ODOT Rock Hardness Classification Chart at end of Appendix A).

Practical refusal on Medium-hard (R3) basalt with an approximate 8,000 pound (GVW) tracked-excavator was encountered in eleven of the fourteen of our test pits at depths of 7.5 to 9 feet bgs. In two test pits, TP-7 and TP-8, the exploration was terminated at 9 feet bgs in soft (R2) weathered Columbia River Basalt. In TP-13, the exploration was terminated at 10 feet bgs in a stiff to very-stiff CLAY (CH). The clay is likely a thin interflow deposit of mudstone. The moisture content of three weathered BASALT samples was generally between 38% and 51%.

2.6.4 Groundwater

We encountered groundwater seepage in seven of our exploratory test pits between 5.5 and 7 feet bgs, which were excavated to a maximum depth of 10 feet in February 2021. The groundwater appeared to be perched on top of the underlying BASALT. These conditions, however, are specific to the locations of our explorations as well as the time of our exploration. Groundwater levels are generally higher (at shallower depths) during the wet season (October through June).

We expect that temporary perched groundwater conditions typically occur near to the ground surface during the wet-weather season in response to heavy rainfall events, due to the presence of low permeability clayey silt soil and shallow basalt.

Central Geotech is not currently engaged to provide observations of groundwater conditions on an ongoing basis. Due to the shallow water table at the site, further investigation of the perched groundwater and monitoring of groundwater levels may be required to determine appropriate shoring design, excavation, and de-watering measures for the project.

2.7 Infiltration Test Results

We conducted infiltration testing at the site on July 22, 2021 in general accordance with the methodology provided in the "City of Salem Department of Public Works Administrative Rules Chapter 109 Division

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004 Appendix C Infiltration Testing", dated January 2014, at the approximate locations shown in Figure 2-4, on the previous page, and depths shown in Table 2-1, next page.

Infiltration testing for the proposed stormwater facility was conducted using the "Encased Falling Head Procedure". This procedure utilizes a 6-inch-inside diameter casing or hollow stem auger seated and sealed approximately six inches into native soil. The goal of this field test is to evaluate the vertical infiltration rate through a 6-inch plug of soil without allowing lateral infiltration. This test attempts to mimic lab procedures to determine the infiltration rate for use in the design of infiltration features onsite. Testing was performed in a 6-inch-inside-diameter casing seated approximately six inches below the bottom of the hand auger borings, at the approximate depth of 2 feet below existing grade.

A 24-hour period of pre-saturation was performed prior to the final test runs. A total of two one-hour test runs were performed at each test location. Approximately 6 inches of water was added prior to each test, water levels were measured at periodic intervals from a fixed reference point.

Based on the test results, the recorded infiltration drawdown rates at depths of 2 feet bgs were low with a rate ranging from 1.60 to 2.75 inches per hour. The recorded drawdown rates and test parameters are summarized in Table 2-1.

Table 2-1 - Infiltration Test Parameters and Summary of Test Results

Test Number	Soil Type	Test Depth (feet)	Pressure Head (inches)	Infiltration Drawdown Rate (inches/hour)
INF-1	Clayey SILT	2.0	6	2.75
INF-2	Clayey SILT	2.0	6	2.00
INF-3	Clayey SILT	2.0	6	1.50

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3.0 CONCLUSIONS AND RECOMMENDATIONS

3.1 General

Based on the results of our geotechnical investigation, we consider the site suitable for multi-family residential development as proposed. Buildings and associated improvements may be supported on shallow foundations designed and constructed in accordance with our recommendations and applicable building codes. We expect a minimum excavation depth of 2 to 3.5 feet will be necessary to remove existing topsoil/fill and reach native subgrade that is suitable for footing support. In localized areas, additional depth of excavation may be required to remove unsatisfactory soils or existing uncontrolled fills.

The primary geotechnical concerns for the project are the presence of low permeability soil and shallow basalt bedrock that will pose difficult excavating conditions for underground structures. Excavations deeper than 7 feet will likely encounter Medium-hard (R3) BASALT. These conditions are shared by the majority of developments in the area and can be mitigated with proper design and construction.

The following sections present our conclusions and recommendations for project design and construction.

3.2 Landslide Hazard

Based on the results of our geotechnical investigation, there are no serious slope stability concerns for the proposed development. Slopes within the proposed development area are smooth and uniform in topography, consistent with stable slope conditions, and we observed no landform evidence of prior slope movement or landsliding in the vicinity of the proposed development. The proposed development is underlain by native stiff to very-hard clayey SILT and medium-hard (R3) BASALT. These earth materials are generally resistant to instability at slope inclinations of 50% grade or less, under well-drained conditions.

In our opinion, the proposed development will not pose any adverse effects on slope stability at the site or on adjacent properties, provided that the site is developed in accordance with our recommendations. No further evaluation of landslide hazard is considered necessary for conformance with SRC Chapter 810.

3.3 Site Preparation

The heavily rooted topsoil zone should be stripped and removed from the site in all proposed building and pavement areas and for a minimum 2-foot margin around such areas. Based on our explorations, the minimum depth of stripping will be approximately 18 inches. Greater stripping depths will be required to remove tree stumps or isolated zones of loose or organic soil. Stripped material should be transported off-site for disposal or stockpiled for use in landscaped areas.

All brush, trees, and shrubs should be removed in building and paved areas to the depth of roots greater than 1/2-inch in diameter. Depending on the methods used to remove the root balls, considerable disturbance and loosening of the subgrade could occur during site grubbing. Disturbed soil is to be

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removed to expose firm subgrade. The resulting excavations should be backfilled with engineered structural fill and compacted as described in this report, and evaluated by our office during construction phases.

After stripping and the required site cuts have been completed, we recommend the areas be observed by a member of our geotechnical staff who will evaluate the subgrade by probing or other applicable means. If soft areas are identified, the material should be excavated and replaced with compacted engineered structural fill as described in this report.

It is possible that unrecognized areas of undocumented fill may be encountered on the site during construction. It is recommended that all uncontrolled fill soils be removed completely in preparation for foundations or other construction and be replaced with engineered structural fill in accordance with *Section 3.8 Engineered Structural Fill*.

3.4 Site Grading

We expect that the project will include limited site grading to construct building pads for foundations, pavement areas and storm water facilities. Site grading should be designed and performed in accordance with Section 1804 and Appendix J of the OSSC. CGS should observe prepared subgrade in areas to receive Engineered Structural Fill prior to fill placement. Fill should be placed in accordance with Section *3.8 Engineered Structural Fill*.

Permanent cut and fill slopes should not exceed a grade of 2H:1V (Horizontal to Vertical). Slopes that will be maintained by mowing should not be constructed steeper than 3H:1V. CGS recommends that fill slopes be overbuilt by about 3 feet and trimmed back to finish grade in order to construct a stable slope face that is resistant to shallow sloughing and erosion. Structures and paved surfaces should be located at least 3 feet horizontal from the slope face. Finish slope faces should be planted with appropriate vegetation to provide protection against erosion. Surface water runoff should be collected and directed away from slopes steeper than 3H:1V to prevent water from running down the slope face.

3.5 Difficult Excavating Conditions on Basalt Rock

Based on our program of test pit exploration, we expect that excavations deeper than 7 feet bgs will encounter difficult excavating conditions on BASALT rock. The estimated rock hardness classification of BASALT encountered in eleven of the fourteen test pits was Medium-hard (R3). For reference purposes, Appendix A presents a modified ODOT rock hardness classification chart with typical excavation methods for each rock hardness class.

We encountered practical refusal on BASALT rock with a medium-sized (8,000 GVW) tracked-excavator at depths of 7.5 to 9 feet bgs. In one test pit where a localized seam of stiff to very-stiff silty CLAY (CH) was present, we achieved an excavation depth of 10 feet bgs, the maximum reach of the tracked-excavator.

Excavations deeper than 7 feet bgs will likely require large excavating equipment with ripper teeth and/or use of a hydraulic rock-chipper attachment. Excavation to depths greater than about 10 feet may require

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costly, time-consuming methods such as extensive hydraulic rock chipping or demolition with non-explosive expansion compounds such as Bristar.

3.6 Temporary Excavations

The stability of temporary excavation slopes is a function of many factors, including soil type, soil density, slope inclination, slope height, the presence of groundwater, and the duration of exposure. Generally, the likelihood of slope failure increases as the cut is deepened and as the duration of exposure increases. For this reason, temporary slope safety should remain the responsibility of the contractor, who is continually present at the site and is able to monitor the performance of the excavation and modify construction practices to reflect varying conditions.

Regardless of inclination, temporary slopes should be protected from surface runoff of storm water. This can typically be accomplished using berms or swales located along the top of the slope, and by placing plastic tarpaulins over the slope.

We recommend that the excavation contractor maintain adequate slopes and setbacks in conformance with OSHA Excavation Guidelines and all applicable regulations. Temporary cut slopes for the construction of basements or retaining walls should be limited to 1H:1V.

3.7 Utility Trench Backfill

Utility trench backfill in structural areas should consist of well-graded, granular fill limited to a maximum particle size of 1½ inches. Granular trench backfill should be compacted to at least 92% of the maximum dry density as determined by ASTM D1557. Excavator-mounted, vibratory-plate compactors are typically the most efficient for compaction of trench backfill. Lift thicknesses should be evaluated based on field density tests; however, care should be taken when operating vibratory compactors to prevent damage to pipes. An initial lift thickness over pipe may need to be up to 4 feet to protect the pipe from damage during compaction; however, thick lifts of loosely placed backfill should not be the standard practice for utility trench backfill. Native materials can be used for trench backfill in non-structural areas where a soft trench and future settlement of the backfill can be tolerated.

3.8 Engineered Structural Fill

Structural fill is any fill material used for support of foundations, retaining walls, slab-on-grade floors, sidewalks, embankments, pavements, and similar features. Upon approval by our office, the on-site soil is suitable for use as structural fill provided it can be separated from unsuitable material, be properly moisture conditioned, and compacted to the specified density as determined by standard testing in a soils lab. On-site soil used as structural fill should be placed in lifts with a maximum compacted thickness of 8 inches. Unsuitable, deleterious materials such as organics, wood, construction debris and oversize material should be removed prior to placement of the on-site soil as engineered structural fill.

Imported granular material should be used for engineered structural fill if the on-site material cannot be properly moisture conditioned or if fill is to be placed in tight access locations not accessible by appropriate compaction equipment. Imported granular fill should consist of crushed aggregate that is

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fairly well-graded between coarse and fine material and have less than 5 percent by weight passing the U.S. Standard No. 200 Sieve. Use of alternative granular fill material such as pit-run or quarry-run rock or sand should be evaluated for suitability by CGS prior to its use. Granular fill should be placed in lifts with a maximum compacted thickness of 12 inches.

All engineered structural fill should be compacted to at least 92% of the maximum dry density determined by Modified Proctor ASTM D1557 or equivalent. CGS should perform density testing of engineered structural fill with a nuclear density gauge to evaluate the compaction and moisture content of the tested soils. Moisture content at the time of compaction should be no more than 2% dry of optimum and 4% wet of optimum. Acceptable moisture contents may be adjusted by CGS personnel based on field performance observed at the time of construction. Proof-rolling with a loaded dump truck or water truck to evaluate fill compaction may be allowed in certain circumstances under the guidance of CGS.

Regardless of material or location, structural fill should be placed over firm, unyielding subgrade prepared in accordance with the "Site Preparation" section of this report. The condition of the subgrade should be evaluated by a CGS representative before filling or construction begins. Fill compaction should be verified by in-place density tests taken during fill placement to confirm that compaction meets project specifications.

3.9 Shallow Foundations

In our opinion, the proposed buildings and associated structures can be supported on shallow, spread footings bearing on a minimum 8-inch-thick layer of new engineered structural fill placed over stiff, native soil. Foundation design, construction, and setback requirements should conform to the Oregon Structural Specialty Code (OSSC) and other governing codes as applicable.

We recommend an allowable bearing pressure of 2,000 pounds per square foot (psf) for design of footings. The recommended allowable bearing pressure applies to the total of dead plus long-term live loads. The allowable bearing pressure may be increased by a factor of 1.33 for short-term loads, such as those resulting from wind or seismic forces.

Total static settlement of footings founded as recommended is expected to be less than 1 inch. Differential settlement is estimated to be less than ¾ inches over a horizontal span of 20 feet. Most of the settlement will occur during construction as the loads are applied. These estimates are based on maximum wall loads of 2,500 pounds per lineal foot and a maximum column load of 60 kips. For heavier loads, CGS should be consulted.

CGS should review the preliminary structural foundation loading plan, once it becomes available so that we can refine our settlement estimates. We expect that construction of granular engineered structural fill pads beneath footing areas may be necessary to reduce footing settlement to within structural tolerances for heavier column loads.

For protection against frost heave and maximizing bearing strength, perimeter footings should be embedded at least 18 inches below exterior finish grade. Interior footings should be embedded at least 12 inches below floor slabs. Minimum footing widths should be determined by the project architect/designer/structural engineer in accordance with applicable design codes. The OSSC specifies

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a minimum footing width of 12 inches for one-story, 15 inches for two-story, and 18 inches for three-story, light-frame structures. Excavations adjacent to footings should not extend beneath a 1H:1V plane projected downwards from the bottom edge of the footing or be backfilled with engineered structural fill.

Footing excavations should be trimmed neat and carefully prepared. Loose, wet or otherwise softened subgrade should be removed from footing areas prior to placing crushed rock backfill, forms and reinforcing steel. In wet weather conditions, we recommend that a several-inch-thick layer of granular material (typically 3/4"-0 crushed aggregate) be placed at the base of footing excavations. The granular material reduces water softening of subgrade soils, reduces subgrade disturbance during placement of forms and reinforcement, and provides a clean environment for reinforcing steel. To be effective, the granular material should be placed on firm, well-drained subgrade and lightly compacted until well-keyed using a small vibratory plate compactor.

We recommended that CGS observe the foundation excavation subgrade prior to placing structural fill, formwork, or reinforcing steel to evaluate subgrade support conditions are within recommended specifications.

3.9.1 Lateral Resistance

Lateral loads on the proposed structure imposed by wind or seismic forces can be resisted by a combination of sliding resistance on the base of footings and passive earth pressure on the sides of footings. We recommend an ultimate coefficient of friction of 0.35 for footings bearing on silt and 0.5 for footings bearing on structural granular fill.

Passive earth pressures on the sides of buried footings may be calculated using an allowable equivalent fluid pressure of 300 pcf per foot of embedment. For this value, backfill against the footing should be compacted to at least 92% of the maximum dry density of obtained from ASTM D1557. The upper foot of embedment should be neglected unless protected by pavement or concrete slabs on grade.

3.10 Slab on Grade Floors

Satisfactory subgrade support for lightly-loaded building floor slabs can be obtained on undisturbed native soil or on newly placed structural fill. The modulus of subgrade reaction for design of floor slabs may be taken as 100 pounds per cubic inch.

A minimum 8-inch-thick layer of imported granular material should be placed and compacted over the prepared subgrade to assist as a capillary break and blanket drain. Imported granular material should consist of crushed rock, crushed gravel or sand that is fairly well-graded between coarse and fine, contains no deleterious materials, has a maximum particle size of 1½ inches, and less than 5 percent by weight passing the U.S. Standard No. 200 Sieve. The imported granular material may be placed in one lift and should be compacted until well-keyed, to about 85 percent of the maximum dry density as determined by ASTM D 1557. An underslab drainage pipe system placed at the base of the granular material with a minimum 0.5% fall to a lowpoint drain outlet is recommended for living areas with concrete slab floors.

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A vapor retarder manufactured for use beneath floor slabs should be installed above the base rock and according to the manufacturer's recommendations. Careful attention should be made during construction to prevent perforating the retarder, and to seal edges and utility penetrations. We recommend following ACI 302.1, Chapter 3 with regard to installing a vapor retarder.

3.11 Retaining Walls

Because the project is in the preliminary design phase, it is unclear whether structural retaining walls will be included. Lateral pressures presented in this report are to be considered as general guidelines, should retaining walls be included. CGS should be consulted for feature-specific recommendations.

The design engineer for the retaining wall must take into consideration the state at which the soil retention walls will be placed, whether under active, passive, or at-rest pressures. Walls that may deflect by at least 0.01 times their height may be designed with active earth pressures. Walls that may not deflect should be designed with at-rest pressures. The possibility of additional non-seismic surcharge loading should also be considered.

Our recommended lateral earth pressures for design of retaining walls presented as equivalent fluid pressures are summarized in Table 3-1, below. Active and at-rest pressures should be modelled as a static triangular pressure profile with the resultant total force acting at one-third height of the exposed wall face. The recommended values are based on free-draining granular backfill, a wet density of 135 pounds per cubic foot and a friction angle of 35 degrees for the retained soils. The tabulated design parameters are to be used only for well-drained backfill conditions with no hydrostatic pressures behind the walls.

Table 3-1 - Equivalent Fluid Pressure Acting on Retaining Walls

Wall Type	Backfill Slope	Backfill Equivalent Fluid Pressure (pcf)
Active (Yielding wall)	Level	35
	2H:1V	50
At-Rest (Non-yielding wall)	Level	50
	2H:1V	70

Passive earth pressures on retaining walls may be calculated using an allowable equivalent fluid pressure of 300 pcf per foot of embedment. For this value, backfill against the wall footing should be compacted to at least 92% of the maximum dry density of obtained from ASTM D1557. The upper foot of embedment should be neglected unless protected by pavement or concrete slabs on grade.

If the wall will be subjected to the influence of surcharge loading, the wall should be designed for an additional horizontal pressure. For uniform surcharge pressures, a uniformly distributed lateral pressure

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of 0.3 times the vertical surcharge pressure should be added. The influence zone of an applied vertical load is generally considered to be a 45 degree plane projected downward from the bottom edge of the footing. Traffic surcharges may be estimated using an additional vertical load of 250 psf (2 feet of additional fill), in accordance with local practice, or as determined by the type of traffic expected to apply the surcharge loads.

It is difficult to accurately predict the additional lateral forces that will be generated on a retaining wall during an earthquake. Some factors affecting the magnitude of earthquake forces on the wall are the size and duration of the earthquake, the distance from the earthquake epicenter of the site, and the mass of soil retained by the wall. Retaining walls that are designed only for active earth pressures may fail when additional forces are generated by an earthquake.

A simple approach based on the work of Seed and Whitman (1970), is to include in the design analysis an additional horizontal force (P_E) to account for the additional loads imposed on the retaining wall by the earthquake (dynamic load)[5]. In this case, the static force is calculated and then an additional dynamic force (as shown below) is added to the wall for failure analysis.

$$P_E = \frac{3}{8}(0.5 * PGA_M)\gamma_t H^2$$

Where PGA_M = Peak Ground Acceleration (see Table 3-3)
γ_t = total unit weight of soil
H = height of retaining wall

The resultant of this equation is given in pounds per linear foot of wall. The location of this earthquake-induced force can be assumed to act at a distance of 0.6H up from the base of the wall.

Because P_E is a short-term loading that may never occur during the life of the retaining wall, it is common to allow a one third increase in the bearing pressure and passive resistance for the earthquake analysis. Also, for the analysis of sliding and overturning of the retaining wall, it is common to accept a lower factor of safety (1.1 to 1.2) under the combined static and earthquake loads.[6]

A layer of compacted aggregate that is a minimum of 1-foot-wide should be placed behind all retaining walls to allow for proper drainage, and placed utilizing the compaction recommendations described in this report. All structural retaining walls should be backfilled with an imported, free-draining granular material such as ¾"-0 crushed rock with no more than 5% passing the No. 200 sieve. Only light-weight compaction equipment should be used immediately behind retaining walls, so that compactive effort does not damage the wall.

At the base of the retaining walls and continuous with the wall backfill aggregate, a wall subdrain should be installed to divert water from the retaining the structures. The wall subdrain should consist of a 3- or 4-inch-diameter, perforated, gravity drain pipe (ADS Highway Grade or better) enveloped in at least 4 cubic feet per lineal foot of clean, drain rock. The drain rock should be wrapped within geotextile filter

[5] Seed, H.B. and Whitman, R.V., 1970, Design of Earth Retaining Structures for Dynamic Loads: ASCE Specialty Conference, Lateral Stresses in the Ground and Design of Earth Retaining Structures, Cornell University, Ithaca, New York, p. 103-147.

[6] Day, Robert W. "Geotechnical Engineer's Portable Handbook". Second Edition, 2012. Pg. 16.18, Table 16.5, Topic (1).

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fabric with a minimum 1 foot overlap at joints to prevent fines from washing into the drain rock. A diagram of a typical wall subdrain can be found in Appendix B as a recommended guideline for construction.

Retaining walls in living areas or other moisture sensitive areas should include water proofing and wall panel drains as specified by the wall designer in accordance with Section 1805 of the OSSC.

3.12 Site Drainage

Site drainage should include foundation drainage, surface runoff collection, and conveyance to a properly designed and permitted storm water drainage facility. As a matter of good construction practice, we recommend that perimeter footing subdrains be installed for all buildings. Perimeter subdrains should conform to the requirements of Section 1805.4.2 of the OSSC and should consist of perforated drainpipe enveloped in a zone of drain rock that is wrapped in a non-woven geotextile filter fabric. The subdrain should be connected to a non-perforated drainpipe conveyance to storm drain facilities. A diagram of a typical footing subdrain is presented in Appendix B as a recommended guideline for construction.

Water should not be allowed to pond beneath floor slabs or within crawl spaces. Floor slab and crawl space subgrade should be sloped to drain to a suitable low point drain outlet or sump to provide positive drainage from the area under the building in accordance with Section 1804.8 of the OSSC. The drain location and routing should be carefully considered to ensure drainage occurs as intended. It might be necessary to install underslab drainage and provide for sump pumps, depending on the below grade depth of floor slabs.

We recommend that all roof drains be connected to a non-perforated drainpipe leading to storm drain outlet facilities. Pavement surfaces and open space areas should be sloped such that surface water runoff is collected and routed to suitable discharge points. Ground surfaces adjacent to buildings should be sloped to drain away from the buildings in accordance with Section 1804.4 of the OSSC.

3.13 Storm Water Infiltration Facilities

Based on the results of field testing, we consider the project site suitable for limited subsurface disposal of storm water from a geotechnical perspective. Vertical infiltration is restricted by the presence of shallow, low permeability silt soil and basalt bedrock below the proposed storm water facilities.

For shallow infiltration systems constructed near a depth of 2 to 3 feet bgs, we recommend a design infiltration drawdown rate of 1.5 inches per hour. A field performance test of infiltration facilities is recommended at the time of construction to verify that the effective infiltration rate meets or exceeds the recommended rate. It should be noted that infiltration rates of the in-situ soils may vary across the site, and as such testing is generally required by the permitting agency at the actual location and depth of the facility to be constructed.

Because infiltration rates tend to decrease over time due to siltation clogging, an appropriate factor of safety (correction factor) should be applied to the recommended rate by the system designer. We recommend a factor of safety of 3 to 5 be applied to the recommended rates, because fracture

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permeability in basalt has shown to be susceptible to clogging and reduction in the rate of infiltration over a short period of time. Incorporation of silt traps and pre-filter elements will extend the service life of the system. All systems should include overflow outlets that discharge potential overflow to a suitable dispersal area.

3.14 Pavement Profiles

We do not have specific information on the frequency and type of vehicles that will use the development on a daily basis. Typically, pavement design requirements are controlled by the Fire Code, which states fire apparatus access roads shall be capable of supporting not less than 12,500 pounds point load (wheel load or gross wheel position weight) and 75,000 pounds live load (gross vehicle weight).

For design purposes, we assumed that post-construction traffic will be primarily light duty passenger vehicles averaging no more than five heavy trucks per day. The thickness of the driveway pavement profile is governed by the fire apparatus support requirements. If actual traffic loading will exceed those described above, we should be contacted to revise our recommended pavement sections.

We recommend the minimum pavement section profiles presented in Table 3-2 to support the anticipated traffic loads over a design life of 20 years. Our pavement recommendations are based on a typical subgrade stiffness for compacted soil at the site using a California Bearing Ratio value of 3. For loading dock approaches or areas where service trucks back and turn, a Portland Cement Concrete (PCC) pavement section should be used or the AC pavement thickness increased to 5 inches. The recommended minimum PCC section is 6 inches of PCC over 8 inches of 1½"-0 crushed rock compacted to at least 95% of ASTM D1557.

These thicknesses are intended to be the minimum acceptable for construction completed during an extended period of dry weather. If pavement areas are constructed during wet weather, CGS should review the subgrade and proposed construction methods immediately prior to the placement of base course so that specific recommendations can be provided. Wet-weather pavement construction may require cement amendment or an additional 6 inches of crushed aggregate base.

Table 3-2 - Recommended Minimum Dry-Weather Pavement Sections

Material	Driveway Areas Thickness (in)	Parking Areas Thickness (in)	Compaction Standard
Asphaltic Concrete (AC)	4	3	92% of Rice Density AASHTO T-209
Crushed Aggregate Base ¾"-0 (leveling course)	2	2	95% of Modified Proctor
Crushed Aggregate Base 1½ "-0	8	6	95% of Modified Proctor

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AC pavement should conform to Section 0074 of the Standard Specification for Highway Construction, Oregon Highway Specifications, and Marion County requirements. We recommend graded half-inch or three-quarter-inch, Dense Hot Mix Asphalt Concrete for Design Level 2 using Performance Grade Asphalt PG-64-22 which is appropriate for low to moderate volume pavements in Western Oregon. The aggregate base should conform to Section 02630 of the 2018 ODOT Oregon Standard Specifications for Construction with the addition that no more than 5 percent of the material by dry weight passes the U.S. Standard No. 200 Sieve. Aggregate base contaminated with soil during construction should be removed and replaced before paving.

As a matter of good construction practice, we recommend placing a woven separation fabric between the soil subgrade and the aggregate such as Contech C200 or US200. The fabric should conform to the minimum property values presented in Table 02320-4 – Subgrade Geotextile (Separation), in Section 02320 of the 2018 ODOT Oregon Standard Specifications for Construction.

We recommend that CGS conduct density testing and a proof roll performance test of the pavement subgrade prior to placement. Subgrade and base rock should be compacted to at least 95% of the maximum dry density obtained from ASTM D1557. Subgrade strength should be evaluated visually by proof-rolling directly on the subgrade with a loaded dump truck during dry weather and on top of base course in wet weather. Soft areas which rut, pump, or weave by more than ¼ inch should be stabilized prior to paving.

3.15 Seismic Design Considerations

At this time, we presume that the building will be designed to resist earthquake loading in accordance with the 2017 ASCE 7-16 standard methodology and as prescribed by the 2019 OSSC. Based on the results of our test pit explorations, pocket penetrometer readings of the soil strength, and laboratory tests, we designate the building site to be Seismic Site Class C.

Site coefficients and spectral response acceleration parameters determined for the site using the ASCE Hazard Tool in accordance with the standard ASCE 7-16 methodology are presented in Table 3-3, on the following page. These values are based on risk-targeted maximum considered earthquake (MCE_r) ground motions for the 0.2 and 1 second spectral response accelerations provided in the 2019 OSSC. The values are the lessor of deterministic and probabilistic estimates (2% chance of exceedance in 50 years at 5% critical dampening) of ground motion based on USGS hazard map data available in 2008 and updated in 2014.

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Table 3-3 - Seismic Design Parameters (ASCE7-16)

Parameter	Value
Location (Lat., Lon. in degrees)	44.8795, -123.0108
Mapped Maximum Considered Earthquake Spectral Response Acceleration (USGS Mapping Standardized to Site Class B)	
Short Period, S_S	0.809 g
1 Second Period, S_1	0.409 g
Design Site Coefficients (Site Class C)	
F_a	1.2
F_v	1.5
Design Spectral Response Acceleration Parameter (Site Class C)	
S_{DS} $(2/3 \times F_a \times S_s)$	0.647 g
S_{D1} $(2/3 \times F_v \times S_1)$	0.409 g
Seismic Design Category	D
Peak Ground Acceleration (PGA_M)	0.451 g

4.0 LIMITATIONS OF REPORT

We have prepared this report for the exclusive use of Community Development Partners and members of the design team, for this specific project only. The full geotechnical report should be provided in its entirety to prospective contractors for bidding and estimating purposes; however, the conclusions and interpretations presented should not be construed as a warranty of the subsurface conditions. Experience has shown that soil and groundwater conditions can vary significantly over small distances. Inconsistent conditions can occur between explorations that may not be detected by a geotechnical study. If, during future site operations, subsurface conditions are encountered which vary appreciably from those described herein, Central Geotech should be notified for review of the recommendations of this report, and revision of such if necessary.

We recommend that Central Geotech be retained to review the plans and specifications and verify that our recommendations have been interpreted and implemented as intended. Sufficient geotechnical monitoring, testing and consultation should be provided during construction to confirm that the conditions encountered are consistent with those indicated by explorations. Recommendations for design changes will be provided should conditions revealed during construction differ from those anticipated. Should Central Geotech not be retained for Design or Construction related services further into the development process, this report and its recommendations should be considered void, as we cannot take on responsibility for construction operations that were unobserved by our office.

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Within the limitations of scope, schedule and budget, the analysis, conclusions and recommendations presented in this report were prepared in accordance with generally accepted professional principles and practices in the fields of geotechnical engineering and engineering geology in this area at the time the report was prepared. No warranty, express or implied, is made. The scope of our work did not include environmental assessments or evaluations regarding the presence or absence of wetlands or hazardous or toxic substances in the soil, surface water, or groundwater at this site.

Thank you very much for the opportunity to work with you. If you feel obliged, we welcome referrals from our previous clients and would enjoy the opportunity to work with others in your professional and personal networks.

Central Geotechnical Services, LLC

EXPIRES: 06/30/22

Jose R. Serrano, P.E.
Associate Engineer

Kyle Warren
Staff Geologist

RENEWS 11-1-22

Paul A. Crenna C.E.G.
Principal Engineering Geologist

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APPENDIX A: LOGS OF EXPLORATORY TEST PITS

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TEST PIT LOG

PROJECT: MILLER SITE – BATTLE CREEK ROAD
SALEM, OREGON

CGS PROJECT NO. 21-023

TEST PIT NO. **TP-1**

DEPTH (FT)	P. PENE-TROMETER (TSF)	CORRELATED N-VALUE	SAMPLE NO.-TYPE	MOISTURE/ GROUND WATER	MATERIAL DESCRIPTION	LAB TEST RESULT
1	1.0				Medium-stiff, gravelly SILT (ML-OL), mixed dark brown to brown, fine organics in growth position in upper 18-inches, gravel is up to 6-inches in diameter and subrounded, damp	
2	0.5		1-GS	38%	(FILL)	
3	2.5				Stiff to very-stiff, clayey SILT (ML), brown to orange-brown, trace fine to coarse sand, includes abundant gravel to cobble-sized, sub-angular rock fragments in lower few feet, damp	
4	2.0		2-GS	28%	(RESIDUAL SOIL)	
5			3-GS			
6						
7			4-GS	38%		
			5-GS		Soft (R2) to medium-hard (R3) BASALT, fresh surfaces are gray with orange-brown staining on fracture faces, includes seams of silt and clay in upper 6 inches, damp	
8					(COLUMBIA RIVER BASALT)	
9						
10					Practical refusal on Medium-Hard (R3) BASALT at 7.5 feet bgs	
11					Slow groundwater seepage at 5.5 feet bgs	
12					Test pit walls standing vertical	
13						
14						
15						

LEGEND

20% SOIL MOISTURE CONTENT

0-10-18 STATIC GROUND WATER LEVEL WITH DATE OF MEASUREMENT

GROUND WATER LEVEL AT END OF DRILLING

GROUND WATER SEEPAGE ZONE

DATE EXCAVATED: 2-27-2021
LOGGED BY: K. Warren
SURFACE ELEVATION:
EQUIPMENT: Hitachi Z-Axis 40u

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TEST PIT LOG

PROJECT:	CGS PROJECT NO.	TEST PIT NO.
MILLER SITE – BATTLE CREEK ROAD SALEM, OREGON	21-023	**TP-2**

DEPTH (FT)	P. PENE-TROMETER (TSF)	CORRELATED N-VALUE	SAMPLE NO.-TYPE	MOISTURE/ GROUND WATER	MATERIAL DESCRIPTION	LAB TEST RESULT
1	1.0				Soft to medium-stiff, clayey SILT (ML-OL), mixed dark brown to brown, fine organics in growth position in upper 24-inches, gravel up to 6-inches in diameter and subrounded in upper 15-inches, damp	
2	0.5		1-GS		(FILL/DISTURBED NATIVE)	
3	1.0				Stiff to very-stiff, clayey SILT (ML), brown to orange-brown, trace fine to coarse sand, includes abundant gravel to cobble-sized, sub-angular rock fragments in lower few feet, damp	
4	1.0		2-GS		(RESIDUAL SOIL)	
5						
6			3-GS			
7						
8					Soft (R2) to medium-hard (R3) BASALT, fresh surfaces are gray with orange-brown staining on fracture faces, includes seams of silt and clay in upper 6 inches, damp	
9					(COLUMBIA RIVER BASALT)	
10					Practical refusal on Medium-Hard (R3) BASALT at 9.5 feet bgs	
11					Slow groundwater seepage at 6.5 feet bgs	
12					Test pit walls standing vertical	
13						
14						
15						

LEGEND

20% SOIL MOISTURE CONTENT

0-10-18 STATIC GROUND WATER LEVEL WITH DATE OF MEASUREMENT

GROUND WATER LEVEL AT END OF DRILLING

GROUND WATER SEEPAGE ZONE

DATE EXCAVATED: 2-27-2021
LOGGED BY: K. Warren
SURFACE ELEVATION:
EQUIPMENT: Hitachi Z-Axis 40u

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TEST PIT LOG

PROJECT: MILLER SITE – BATTLE CREEK ROAD
SALEM, OREGON

CGS PROJECT NO. 21-023

TEST PIT NO. **TP-3**

DEPTH (FT)	P. PENE-TROMETER (TSF)	CORRELATED N-VALUE	SAMPLE NO.-TYPE	MOISTURE/ GROUND WATER	MATERIAL DESCRIPTION	LAB TEST RESULT
1	0.5				Soft to medium-stiff, clayey SILT (ML-OL), mixed dark brown to brown, fine organics in growth position in upper 24-inches, gravel up to 6-inches in diameter and subrounded in upper 15-inches, damp	
2	0.5		1-GS	31%	(FILL/DISTURBED NATIVE)	
3	1.0				Soft (R2) to medium-hard (R3) BASALT, brown, gray, black, fresh surfaces are gray with orange-brown staining on fracture faces, includes seams of silt and clay in upper 12 inches, damp	
4	5.0		2-GS	40%	(COLUMBIA RIVER BASALT)	
5						
6						
7			3-GS	38%	Practical refusal on Medium-Hard (R3) BASALT at 7 feet bgs	
8					Slow groundwater seepage at 7 feet bgs	
9					Test pit walls standing vertical	
10						
11						
12						
13						
14						
15						

LEGEND

20% SOIL MOISTURE CONTENT

0-10-18 STATIC GROUND WATER LEVEL WITH DATE OF MEASUREMENT

GROUND WATER LEVEL AT END OF DRILLING

GROUND WATER SEEPAGE ZONE

DATE EXCAVATED: 2-27-2021
LOGGED BY: K. Warren
SURFACE ELEVATION:
EQUIPMENT: Hitachi Z-Axis 40u

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TEST PIT LOG

PROJECT: MILLER SITE – BATTLE CREEK ROAD SALEM, OREGON	CGS PROJECT NO. 21-023	TEST PIT NO. **TP-4**

DEPTH (FT)	P. PENE-TROMETER (TSF)	CORRELATED N-VALUE	SAMPLE NO.-TYPE	MOISTURE/ GROUND WATER	MATERIAL DESCRIPTION	LAB TEST RESULT
1	0.5				Soft to medium-stiff, clayey SILT (ML-OL), mixed dark brown to brown, fine organics and roots up to $^1/_2$-inch diameter in growth position in upper 18-inches, gravel up to 6-inches in diameter and subrounded in upper 12-inches, damp	
2	0.5		1-GS		(FILL/DISTURBED NATIVE)	
3	1.0				Stiff to very-stiff, clayey SILT (ML), brown to orange-brown, trace fine to coarse sand, includes abundant gravel to cobble-sized, sub-angular rock fragments in lower few feet, damp	
4	5.0		2-GS		(RESIDUAL SOIL)	
5						
6			3-GS			
7						
8			4-GS		Soft (R2) to medium-hard (R3) BASALT, brown, gray, black, fresh surfaces are gray with orange-brown staining on fracture faces, includes seams of silt and clay in upper 12 inches, damp	
9					(COLUMBIA RIVER BASALT)	
10					Practical refusal on Medium-Hard (R3) BASALT at 8 feet bgs	
11					No groundwater encountered	
12					Test pit walls standing vertical	
13						
14						
15						

LEGEND

20% SOIL MOISTURE CONTENT

0-10-18 STATIC GROUND WATER LEVEL WITH DATE OF MEASUREMENT

GROUND WATER LEVEL AT END OF DRILLING

GROUND WATER SEEPAGE ZONE

DATE EXCAVATED: 2-27-2021
LOGGED BY: K. Warren
SURFACE ELEVATION:
EQUIPMENT: Hitachi Z-Axis 40u

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TEST PIT LOG

PROJECT: MILLER SITE – BATTLE CREEK ROAD SALEM, OREGON	CGS PROJECT NO. 21-023	TEST PIT NO. **TP-5**

DEPTH (FT)	P. PENE-TROMETER (TSF)	CORRELATED N-VALUE	SAMPLE NO.-TYPE	MOISTURE/ GROUND WATER	MATERIAL DESCRIPTION	LAB TEST RESULT
1	0.5		1-GS	29%	Soft to medium-stiff, clayey SILT (ML-OL), mixed dark brown to brown, fine organics and roots up to $^1/_2$-inch diameter in growth position in upper 18-inches, gravel up to 6-inches in diameter and subrounded in upper 12-inches, damp (FILL/DISTURBED NATIVE)	
2						
3			2-GS	51%	Soft (R2) to medium-hard (R3) BASALT, brown, gray, black, red, fresh surfaces are gray with orange-brown staining on fracture faces, includes seams of silt and clay in upper 12 inches, damp (COLUMBIA RIVER BASALT)	
4						
5						
6						
7						
8			3-GS		Practical refusal on Medium-Hard (R3) BASALT at 8 feet bgs No groundwater encountered Test pit walls standing vertical	
9						
10						
11						
12						
13						
14						
15						

LEGEND

20% SOIL MOISTURE CONTENT

0-10-18 STATIC GROUND WATER LEVEL WITH DATE OF MEASUREMENT

GROUND WATER LEVEL AT END OF DRILLING

GROUND WATER SEEPAGE ZONE

DATE EXCAVATED: 2-27-2021
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SURFACE ELEVATION:
EQUIPMENT: Hitachi Z-Axis 40u

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TEST PIT LOG

PROJECT:	CGS PROJECT NO.	TEST PIT NO.
MILLER SITE – BATTLE CREEK ROAD SALEM, OREGON	21-023	**TP-6**

DEPTH (FT)	P. PENE-TROMETER (TSF)	CORRELATED N-VALUE	SAMPLE NO.-TYPE	MOISTURE/ GROUND WATER	MATERIAL DESCRIPTION	LAB TEST RESULT
1	0.5		1-GS		Soft to medium-stiff, clayey SILT (ML-OL), mixed dark brown to brown, fine organics and roots up to $^1/_2$-inch diameter in growth position in upper 18-inches, damp	
2					(FILL/DISTURBED NATIVE)	
3			2-GS		Soft (R2) to medium-hard (R3) BASALT, brown, gray, black, red, fresh surfaces are gray with orange-brown staining on fracture faces, includes seams of silt and clay in upper 12 inches, vesicles present in rock fragments, damp	
4						
5					(COLUMBIA RIVER BASALT)	
6						
7						
8						
9			3-GS		Practical refusal on Medium-Hard (R3) BASALT at 9 feet bgs	
10					No groundwater encountered	
11					Test pit walls standing vertical	
12						
13						
14						
15						

LEGEND

20% SOIL MOISTURE CONTENT

0-10-18 STATIC GROUND WATER LEVEL WITH DATE OF MEASUREMENT

GROUND WATER LEVEL AT END OF DRILLING

GROUND WATER SEEPAGE ZONE

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SURFACE ELEVATION:
EQUIPMENT: Hitachi Z-Axis 40u

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TEST PIT LOG

PROJECT: MILLER SITE – BATTLE CREEK ROAD
SALEM, OREGON

CGS PROJECT NO. 21-023

TEST PIT NO. **TP-7**

DEPTH (FT)	P. PENE-TROMETER (TSF)	CORRELATED N-VALUE	SAMPLE NO.-TYPE	MOISTURE/ GROUND WATER	MATERIAL DESCRIPTION	LAB TEST RESULT
1	0.5		1-GS	24%	Soft to medium-stiff, clayey SILT (ML-OL), mixed dark brown to brown, fine organics and roots up to $^1/_2$-inch diameter in growth position in upper 18-inches, damp	
2	0.5				(FILL/DISTURBED NATIVE)	
3			2-GS	42%	Very-soft (R1) to medium-hard (R3) BASALT, brown, gray, black, red, fresh surfaces are gray with orange-brown staining on fracture faces, includes seams of silt and clay in upper 12 inches, vesicles present in rock fragments, damp	
4						
5					(COLUMBIA RIVER BASALT) Color transitioned to gray	
6					Color transitioned to red	
7						
8			3-GS			
9			4-GS			
10					Terminated at 9 feet bgs	
11					No groundwater encountered	
12					Test pit walls standing vertical	
13						
14						
15						

LEGEND

20% SOIL MOISTURE CONTENT

0-10-18 STATIC GROUND WATER LEVEL WITH DATE OF MEASUREMENT

GROUND WATER LEVEL AT END OF DRILLING

GROUND WATER SEEPAGE ZONE

DATE EXCAVATED: 2-27-2021
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SURFACE ELEVATION:
EQUIPMENT: Hitachi Z-Axis 40u

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TEST PIT LOG

PROJECT: MILLER SITE – BATTLE CREEK ROAD
SALEM, OREGON

CGS PROJECT NO. 21-023

TEST PIT NO. **TP-8**

DEPTH (FT)	P. PENE-TROMETER (TSF)	CORRELATED N-VALUE	SAMPLE NO.-TYPE	MOISTURE/ GROUND WATER	MATERIAL DESCRIPTION	LAB TEST RESULT
1	0.5		1-GS		Soft to medium-stiff, clayey SILT (ML-OL), mixed dark brown to brown, fine organics and roots up to $^1/_2$-inch diameter in growth position in upper 18-inches, damp	
2	0.5				(FILL/DISTURBED NATIVE)	
3	2.5		2-GS		Stiff to very-stiff, clayey SILT (ML), brown to orange-brown, trace fine to coarse sand, includes abundant gravel to cobble-sized, sub-angular rock fragments in lower few feet, damp	
4	4.0				(RESIDUAL SOIL)	
5						
6						
7						
8					Very-soft (R1) to soft (R2) BASALT, brown, gray, black, red, fresh surfaces are gray with orange-brown staining on fracture faces, includes seams of silt and clay in upper 12 inches, vesicles present in rock fragments, damp	
9			3-GS		(COLUMBIA RIVER BASALT)	
10					Terminated at 9 feet bgs No groundwater encountered Test pit walls standing vertical	
11						
12						
13						
14						
15						

LEGEND

20% SOIL MOISTURE CONTENT

10-10-18 STATIC GROUND WATER LEVEL WITH DATE OF MEASUREMENT

GROUND WATER LEVEL AT END OF DRILLING

GROUND WATER SEEPAGE ZONE

DATE EXCAVATED: 2-27-2021
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SURFACE ELEVATION:
EQUIPMENT: Hitachi Z-Axis 40u

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TEST PIT LOG

PROJECT: MILLER SITE – BATTLE CREEK ROAD
SALEM, OREGON

CGS PROJECT NO. 21-023

TEST PIT NO. **TP-9**

DEPTH (FT)	P. PENE-TROMETER (TSF)	CORRELATED N-VALUE	SAMPLE NO.-TYPE	MOISTURE/ GROUND WATER	MATERIAL DESCRIPTION	LAB TEST RESULT
1	0.5				Soft to medium-stiff, clayey SILT (ML-OL), mixed dark brown to brown, fine organics and roots up to $^1/_2$-inch diameter in growth position in upper 18-inches, damp	
2	0.5		1-GS	31%	(FILL/DISTURBED NATIVE)	
3	1.5				Stiff to very-stiff, clayey SILT (ML), brown to orange-brown, trace fine to coarse sand, includes abundant gravel to cobble-sized, sub-angular rock fragments in lower few feet, damp	
4	3.0		2-GS	30%	(RESIDUAL SOIL)	
5						
6						
7						
8			3-GS			
9					Soft (R2) to medium-hard (R3) BASALT, brown, gray, black, red, fresh surfaces are gray with orange-brown staining on fracture faces, includes seams of silt and clay in upper 12 inches, vesicles present in rock fragments, damp	
10					(COLUMBIA RIVER BASALT)	
11					Practical refusal on Medium-Hard (R3) BASALT at 8.5 feet bgs	
12					Slow groundwater seepage at 7.5 feet bgs	
13					Test pit walls standing vertical	
14						
15						

LEGEND

20% SOIL MOISTURE CONTENT

0-10-18 STATIC GROUND WATER LEVEL WITH DATE OF MEASUREMENT

GROUND WATER LEVEL AT END OF DRILLING

GROUND WATER SEEPAGE ZONE

DATE EXCAVATED: 2-27-2021
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SURFACE ELEVATION:
EQUIPMENT: Hitachi Z-Axis 40u

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TEST PIT LOG

PROJECT: MILLER SITE – BATTLE CREEK ROAD SALEM, OREGON	CGS PROJECT NO. 21-023	TEST PIT NO. **TP-10**

DEPTH (FT)	P. PENE-TROMETER (TSF)	CORRELATED N-VALUE	SAMPLE NO.-TYPE	MOISTURE/ GROUND WATER	MATERIAL DESCRIPTION	LAB TEST RESULT
1	1.5				Soft to medium-stiff, clayey SILT (ML-OL), mixed dark brown to brown, fine organics and roots up to $^1/_2$-inch diameter in growth position in upper 18-inches, damp	
2	2.0		1-GS		(FILL/DISTURBED NATIVE)	
3	2.0				Stiff to very-stiff, clayey SILT (ML), brown to orange-brown, trace fine to coarse sand, includes abundant gravel to cobble-sized, sub-angular rock fragments in lower few feet, damp	
4	5.0		2-GS		(RESIDUAL SOIL)	
5						
6					Soft (R2) to medium-hard (R3) BASALT, brown, gray, black, red, fresh surfaces are gray with orange-brown staining on fracture faces, includes seams of silt and clay in upper 12 inches, vesicles present in rock fragments, damp	
7						
8					(COLUMBIA RIVER BASALT)	
9			3-GS		Practical refusal on Medium-Hard (R3) BASALT at 9 feet bgs	
10					Slow groundwater seepage at 5.5 feet bgs	
11					Test pit walls standing vertical	
12						
13						
14						
15						

LEGEND

20% SOIL MOISTURE CONTENT

10-10-18 STATIC GROUND WATER LEVEL WITH DATE OF MEASUREMENT

GROUND WATER LEVEL AT END OF DRILLING

GROUND WATER SEEPAGE ZONE

DATE EXCAVATED: 2-27-2021
LOGGED BY: K. Warren
SURFACE ELEVATION:
EQUIPMENT: Hitachi Z-Axis 40u

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TEST PIT LOG

PROJECT: MILLER SITE – BATTLE CREEK ROAD
SALEM, OREGON

CGS PROJECT NO. 21-023

TEST PIT NO. **TP-11**

DEPTH (FT)	P. PENE-TROMETER (TSF)	CORRELATED N-VALUE	SAMPLE NO.-TYPE	MOISTURE/ GROUND WATER	MATERIAL DESCRIPTION	LAB TEST RESULT
1	1.0				Soft to medium-stiff, clayey SILT (ML-OL), mixed dark brown to brown, fine organics and roots up to $^1/_2$-inch diameter in growth position in upper 18-inches, damp	
2	1.5		1-GS	29%	(FILL/DISTURBED NATIVE)	
3	2.5				Stiff to very-stiff, clayey SILT (ML), brown to orange-brown, trace fine to coarse sand, includes abundant gravel to cobble-sized, sub-angular rock fragments in lower few feet, damp	
4	5.0		2-GS	29%	(RESIDUAL SOIL)	
5						
6						
7					Soft (R2) to medium-hard (R3) BASALT, brown, gray, black, red, fresh surfaces are gray with orange-brown staining on fracture faces, includes seams of silt and clay in upper 12 inches, vesicles present in rock fragments, damp	
8			3-GS		(COLUMBIA RIVER BASALT)	
9					Practical refusal on Medium-Hard (R3) BASALT at 8 feet bgs	
10					Slow groundwater seepage at 5.5 feet bgs	
11					Test pit walls standing vertical	
12						
13						
14						
15						

LEGEND

20% SOIL MOISTURE CONTENT

0-10-18 STATIC GROUND WATER LEVEL WITH DATE OF MEASUREMENT

GROUND WATER LEVEL AT END OF DRILLING

GROUND WATER SEEPAGE ZONE

DATE EXCAVATED: 2-27-2021
LOGGED BY: K. Warren
SURFACE ELEVATION:
EQUIPMENT: Hitachi Z-Axis 40u

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TEST PIT LOG

PROJECT: MILLER SITE – BATTLE CREEK ROAD
SALEM, OREGON

CGS PROJECT NO. 21-023

TEST PIT NO. **TP-12**

DEPTH (FT)	P. PENE-TROMETER (TSF)	CORRELATED N-VALUE	SAMPLE NO.-TYPE	MOISTURE/ GROUND WATER	MATERIAL DESCRIPTION	LAB TEST RESULT
1	1.5				Soft to medium-stiff, clayey SILT (ML-OL), mixed dark brown to brown, fine organics and roots up to $^1/_2$-inch diameter in growth position in upper 18-inches, damp	
2	1.5		1-GS		(FILL/DISTURBED NATIVE)	
3	1.5					
4	1.5		2-GS		Stiff to very-stiff, clayey SILT (ML), brown to orange-brown, trace fine to coarse sand, includes abundant gravel to cobble-sized, sub-angular rock fragments in lower few feet, damp	
5					(RESIDUAL SOIL)	
6						
7						
8			3-GS		Soft (R2) to medium-hard (R3) BASALT, brown, gray, black, red, fresh surfaces are gray with orange-brown staining on fracture faces, includes seams of silt and clay in upper 12 inches, vesicles present in rock fragments, damp	
9					(COLUMBIA RIVER BASALT)	
10					Practical refusal on Medium-Hard (R3) BASALT at 8 feet bgs	
11					Slow groundwater seepage at 7.0 feet bgs	
12					Test pit walls standing vertical	
13						
14						
15						

LEGEND

20% SOIL MOISTURE CONTENT

10-10-18 STATIC GROUND WATER LEVEL WITH DATE OF MEASUREMENT

GROUND WATER LEVEL AT END OF DRILLING

GROUND WATER SEEPAGE ZONE

DATE EXCAVATED: 2-27-2021
LOGGED BY: K. Warren
SURFACE ELEVATION:
EQUIPMENT: Hitachi Z-Axis 40u

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TEST PIT LOG

PROJECT: MILLER SITE – BATTLE CREEK ROAD SALEM, OREGON	CGS PROJECT NO. 21-023	TEST PIT NO. **TP-13**

DEPTH (FT)	P. PENE-TROMETER (TSF)	CORRELATED N-VALUE	SAMPLE NO.-TYPE	MOISTURE/ GROUND WATER	MATERIAL DESCRIPTION	LAB TEST RESULT
1	0.5				Soft to medium-stiff, clayey SILT (ML-OL), mixed dark brown to brown, fine organics and roots up to $^1/_2$-inch diameter in growth position in upper 18-inches, damp	
2	1.5		1-GS		(FILL/DISTURBED NATIVE)	
3	1.5				Very-soft (R1) to soft (R2) BASALT, brown, gray, black, red, fresh surfaces are gray with orange-brown staining on fracture faces, includes seams of silt and clay in upper 12 inches, vesicles present in rock fragments, damp	
4	1.5		2-GS		(COLUMBIA RIVER BASALT)	
5						
6			3-GS			
7						
8						
9					Stiff to very-stiff, silty CLAY (CH), white to light brown, trace fine to coarse sand-sized, sub-angular rock fragments, damp	
10			4-GS		(MUDSTONE)	
11						
12					Terminated at 10 feet bgs No groundwater encountered Test pit walls standing vertical	
13						
14						
15						

LEGEND

20% SOIL MOISTURE CONTENT

0-10-18 STATIC GROUND WATER LEVEL WITH DATE OF MEASUREMENT

GROUND WATER LEVEL AT END OF DRILLING

GROUND WATER SEEPAGE ZONE

DATE EXCAVATED: 2-27-2021
LOGGED BY: K. Warren
SURFACE ELEVATION:
EQUIPMENT: Hitachi Z-Axis 40u

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TEST PIT LOG

PROJECT:	CGS PROJECT NO.	TEST PIT NO.
MILLER SITE – BATTLE CREEK ROAD SALEM, OREGON	21-023	**TP-14**

DEPTH (FT)	P. PENE-TROMETER (TSF)	CORRELATED N-VALUE	SAMPLE NO.-TYPE	MOISTURE/ GROUND WATER	MATERIAL DESCRIPTION	LAB TEST RESULT
1	1.5				Soft to medium-stiff, clayey SILT (ML-OL), mixed dark brown to brown, fine organics and roots up to $^1/_2$-inch diameter in growth position in upper 18-inches, damp	
2	1.5		1-GS		(FILL/DISTURBED NATIVE)	
3	3.0					
4	5.0		2-GS		Stiff to very-stiff, clayey SILT (ML), brown to orange-brown, trace fine to coarse sand, includes abundant gravel to cobble-sized, sub-angular rock fragments in lower few feet, damp	
5					(RESIDUAL SOIL)	
6						
7					Soft (R2) to medium-hard (R3) BASALT, brown, gray, black, red, fresh surfaces are gray with orange-brown staining on fracture faces, includes seams of silt and clay in upper 12 inches, vesicles present in rock fragments, damp	
8			3-GS		(COLUMBIA RIVER BASALT)	
9					Practical refusal on Medium-Hard (R3) BASALT at 8 feet bgs	
10					No groundwater encountered	
11					Test pit walls standing vertical	
12						
13						
14						
15						

LEGEND

20% SOIL MOISTURE CONTENT

10-10-18 STATIC GROUND WATER LEVEL WITH DATE OF MEASUREMENT

GROUND WATER LEVEL AT END OF DRILLING

GROUND WATER SEEPAGE ZONE

DATE EXCAVATED: 2-27-2021
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SURFACE ELEVATION:
EQUIPMENT: Hitachi Z-Axis 40u

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SOIL CLASSIFICATION DESCRIPTION AND GUIDELINES

SOIL CLASSIFICATION				
Major Divisions			**Symbol**	**Typical Descriptions**
Coarse Grained (More Than 50% Retained By No. 200 Sieve)	Gravel	Clean Gravels	GW	Well-Graded Gravels And Gravel/Sand Mixtures, Little Or No Fines
			GP	Poorly-Graded Gravels, Gravel/Sand Mixtures, Little Or No Fines
		Gravels With Fines	GM	Silty Gravels, Gravel/Sand/Silt Mixtures
			GC	Clayey Gravels, Gravel/Sand/Clay Mixtures
	Sand	Clean Sands	SW	Well-Graded Sand And Gravelly Sands, Little Or No Fines
			SP	Poorly-Graded Sand And Gravelly Sands, Little Or No Fines
		Sands With Fines	SM	Silty Sands, Sand/Silt Mixtures
			SC	Clayey Sands, Sand/Clay Mixtures
Fine Grained (More Than 50% Passing By No. 200 Sieve)	Silts And Clays	Liquid Limit Less Than 50	ML	Inorganic Silts, Silt With Slight Plasticity
			CL	Inorganic Clay, Clay With Low To Medium Plasticity
			OL	Organic Silts, Organic Silty Clays With Low Plasticity
		Liquid Limit More Than 50	MH	Inorganic Silts, Clayey Silts
			CH	Inorganic Clays Of High Plasticity, Fat Clays
			OH	Organinc Clays Of Medium To High Plasticity
Highly Organic Soils			PT	Peat, Humus And Other High Orgainc Soils

SOIL CHARACTERISTICS				
Granular Soil		**Cohesive Soil**		
Relative Density	**Standard Penetration Test**	**Consistency**	**Standard Penetration Test**	**Unconfined Strength (Tsf)**
Very-Loose	0 - 4	Very-Soft	< 2	< 0.25
Loose	4 - 10	Soft	2 - 4	0.25 - 0.5
Medium-Dense	10 - 30	Medium-Stiff	4 - 8	0.5 - 1.0
Dense	30 - 50	Stiff	8 - 16	1.0 - 2.0
Very-Dense	> 50	Very-Stiff	16 - 32	2.0 - 4.0
Standard Penetration Tests Record The Number Of Blows Required To Drive A Split-Spoon Sampler 12 Inches (N-Value)		Hard	32 - 50	> 4.0
		Very-Hard	> 50	

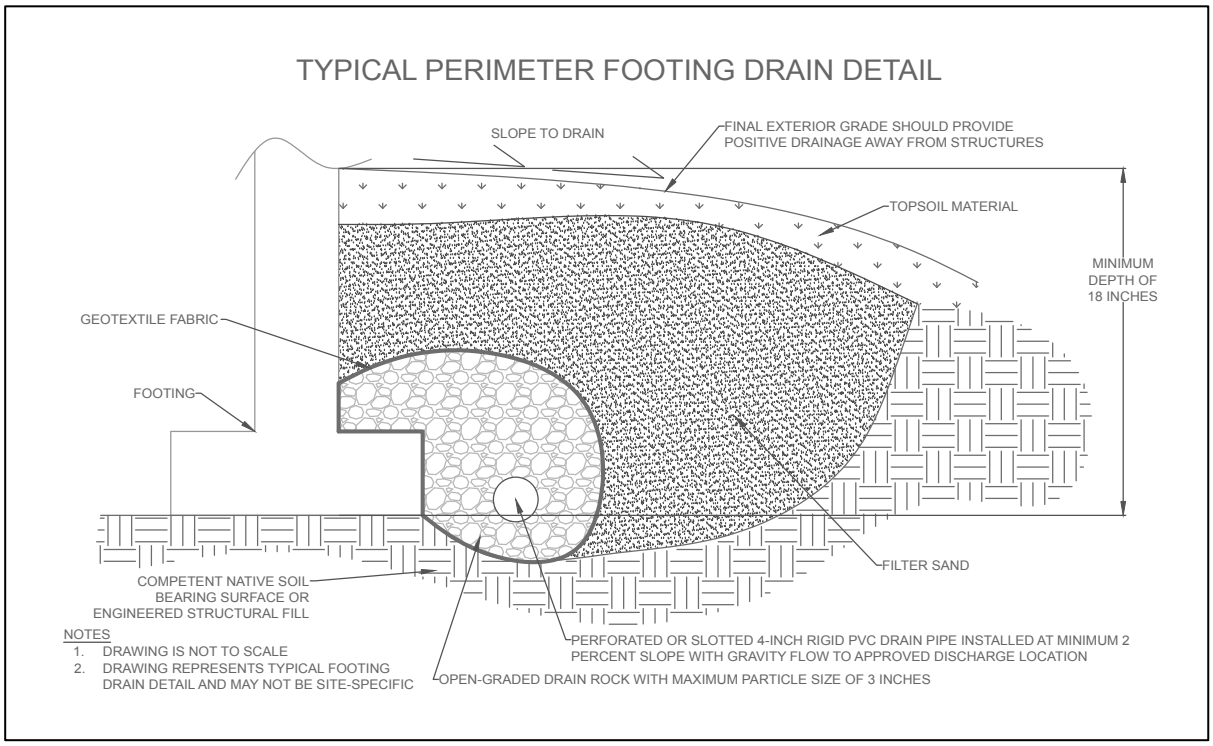
ADDITIONAL SOIL CLASSIFICATION TERMS			
Moisture Content		**Structure**	
Dry	Absence Of Moisture, Dusty, Dry To The Touch	Stratified	Alternating Layers of Material or Color > 6 mm
Damp	Some Moisture But Leaves No Moisture On Hand	Laminated	Alternating Layers of Material or Color < 6 mm
Moist	Leaves Moisture On Hand	Fissured	Breaks Along Definite Fracture Planes
Wet	Visible Free Water, Likely From Below Water Table	Slickenslided	Striated, Polished Or Glossy Fracture Planes
Groundwater Seepage		Blocky	Cohesive Soil That Can Be Broken Down Into Angular Lumps Which Resist Further Breakdown
Slow	< 1.0 gpm		
Moderate	1.1 - 3.0 gpm	Lenses	Small Pockets Of Different Soils, Note Thickness
Rapid	> 3.0 gpm	Homogeneous	Uniform Color And Appearance Througout
Minor Fractions in Fine Grained Soil		**Caving**	
Trace (Clay, Silt, Sand, or Gravel)	< 15 percent	Minor	Isolated Spalling
With (Clay, Silt, Sand, or Gravel)	16 to 30 percent	Moderate	Common Spalling
Clayey, Silty, Sandy, Gravelly	31 to 49 percent	Severe	Will not stand vertical
Plasticity		**Dilatancy**	
Nonplastic	Cannot Be Rolled At Any Water Content	None	No Visible Changes in the Specimen
Low	3 mm Thread Can Barely Be Rolled But Not Under The Plastic Limit	Slow	Water Slowly Appears and Dissapears
Medium	Can Be Rolled To 3 mm Thread , Crumbles When Drier Than Plastic Limit.	Rapid	Water Quickly Appears and Dissapears
High	Can Easily Be Rolled To 3 mm Thread. Can Be Rerolled Several Times.		

ODOT ROCK HARDNESS CLASSIFICATION CHART		
Hardness Designation	**Field Identification/Excavation Methods**	**Approx. Strength (Unconfined Compressive Strength)**
Extremely-Soft (RO)	Can Be Indented With Thumbnail. May Be Moldable Or Friable With Finger Pressure.	< 100 Psi
Very-Soft (R1)	Crumbles Under Firm Blows With Geology Pick. Scratched With Finger Nail.	100 - 1,000 psi
Soft (R2)	Can Be Peeled By Knife Or Pick. Shallow Indentation Made By Frim Blow Of Geology Pick.	1,000 - 4,000 psi
Medium-Hard (R3)	Can Be Scratched By Knife Or Pick, Specimen Can Be Fractured With A Single Blow Of Hamer Or Geology Pick / Excavation Often Requires Medium To Large Equipment With Ripper Teeth.	4,000 - 8,000 psi
Hard (R4)	Can Be Scratched With Knife Or Pick Only With Difficulty. Several Hammer Blows Required To Fracture Specimen / Excavation Requires Large Equipment, Rock Chipper, Expansive Compound Fracturing Or Blasting.	8,000 - 16,000 psi
Very-Hard (R5)	Cannont Be Scratched By Knife Or Sharp Pick. Specimen Requires Many Blows Of Hammer To Fracture Or Chip. Hammer Rebounds After Impact / Expansive Compound Fracturing Or Blasting Required To Excavate.	> 16,000 psi
Chart Taken From Oregon Department Of Transportation Soil/Rock Classification Manual. Modified To Include Typical Excavation Methods.		

CENTRAL
GEOTECHNICAL SERVICES, LLC

10240 SW Nimbus
Suite L6
Portland, Oregon 97223
503.616.9419
www.centralgeotech.com

APPENDIX B: TYPICAL DETAIL FOR PERIMETER FOOTING SUBDRAIN



Guideline drawing for reference only

APPENDIX E

WELL LOGS

M 21.....

11709

NOTICE TO WATER WELL CONTRACTOR
The original and first copy of this report are to be filed with the STATE ENGINEER, SALEM, OREGON 97310 within 30 days from the date of well completion.

RECEIVED
AUG 30 1965
STATE ENGINEER
SALEM, OREGON

WELL DRILLED AUGUST 1949

WATER WELL REPORT

STATE OF OREGON
(Please type or print)

State Well No. 8/3W-11 R1

State Permit No. .....

(1) OWNER:

Name SCHOOL DISTRICT NO. 24J

Address 1309 FERRY STREET
SALEM, OREGON

(2) LOCATION OF WELL:

County MARION Driller's well number

SE ¼ SE ¼ Section 11 T. 8S R. 3W W.M.

Bearing and distance from section or subdivision corner

Pringle School
Rt. 4, Box 142
Salem, Oregon

(3) TYPE OF WORK (check):

New Well X Deepening ☐ Reconditioning ☐ Abandon ☐

If abandonment, describe material and procedure in Item 12.

(4) PROPOSED USE (check):

Domestic ☐ Industrial ☐ Municipal ☐
Irrigation ☐ Test Well ☐ Other X

(5) TYPE OF WELL:

Rotary ☐ Driven ☐
Cable X Jetted ☐
Dug ☐ Bored ☐

(6) CASING INSTALLED:

Threaded ☐ Welded X

8 " Diam. from 0 ft. to 45 ft. Gage .280

..... " Diam. from ..... ft. to ..... ft. Gage .....

..... " Diam. from ..... ft. to ..... ft. Gage .....

(7) PERFORATIONS:

Perforated? ☐ Yes X No

Type of perforator used

Size of perforations in. by in.

..... perforations from ..... ft. to ..... ft.
..... perforations from ..... ft. to ..... ft.
..... perforations from ..... ft. to ..... ft.
..... perforations from ..... ft. to ..... ft.
..... perforations from ..... ft. to ..... ft.

(8) SCREENS:

Well screen installed? ☐ Yes X No

Manufacturer's Name .....

Type ..... Model No. .....

Diam. ..... Slot size ..... Set from ..... ft. to ..... ft.

Diam. ..... Slot size ..... Set from ..... ft. to ..... ft.

(9) CONSTRUCTION:

12" hole drilled to 45' pressured with cement to surface

Well seal—Material used in seal .....

Depth of seal 45 ft. Was a packer used? no

Diameter of well bore to bottom of seal 12 in.

Were any loose strata cemented off? ☐ Yes X No Depth .....

Was a drive shoe used? X Yes ☐ No

Was well gravel packed? ☐ Yes X No Size of gravel: .....

Gravel placed from ..... ft. to ..... ft.

Did any strata contain unusuable water? ☐ Yes X No

Type of water? depth of strata

Method of sealing strata off

(10) WATER LEVELS:

Static level 40 ft. below land surface Date 9/5/49

Artesian pressure lbs. per square inch Date

(11) WELL TESTS:

Drawdown is amount water level is lowered below static level

Was a pump test made? X Yes ☐ No If yes, by whom? SD 24J

Yield: gal./min. with ft. drawdown after hrs.

" " " "

" " " "

Bailer test 25 gal./min. with 45 ft. drawdown after 1 hrs.

Artesian flow g.p.m. Date

Temperature of water Was a chemical analysis made? ☐ Yes X No

(12) WELL LOG:

Diameter of well below casing 8

Depth drilled 105 ft. Depth of completed well 105 ft.

Formation: *Describe by color, character, size of material and structure, and show thickness of aquifers and the kind and nature of the material in each stratum penetrated, with at least one entry for each change of formation.*

MATERIAL	FROM	TO
Clay-surface	0	3
Clay-red	3	35
Lava-Basalt	35	105
Aquifers 52' 10Gpm		
61' 4Gpm		
78/97' 11Gpm		
Pump installed and pumped at 25GPM open flow.		

Work started App. 8/25/49 Completed 9/5/49 19

Date well drilling machine moved off of well 9/5/49 19

(13) PUMP:

Manufacturer's Name Pacific

Type: Jet H.P. 3

Water Well Contractor's Certification:

This well was drilled under my jurisdiction and this report is true to the best of my knowledge and belief.

NAME DUFFIELD BROS
(Person, firm or corporation) (Type or print)

Address 4123 BLUFF AVE S E, SALEM, ORE.

Drilling Machine Operator's License No. 46

[Signed] Leonard Duffield
(Water Well Contractor)

Contractor's License No. 15 Date Aug. 19, 1965

(USE ADDITIONAL SHEETS IF NECESSARY)

JAN 11 1990

STATE OF OREGON M 1 24 1838 WATER RESOURCES DEPT.
SALEM, OREGON

8S/3W/14ab

WATER WELL REPORT
(as required by ORS 537.765)

(START CARD) # W 16518

(1) OWNER:
Well Number:
Name Manford E. Turner
Address 1931 Barns Ave. SE
City Salem State Ore. Zip

(2) TYPE OF WORK:
☑ New Well ☐ Deepen ☐ Recondition ☐ Abandon

(3) DRILL METHOD
☐ Rotary Air ☑ Rotary Mud ☐ Cable
☐ Other

(4) PROPOSED USE:
☑ Domestic ☐ Community ☐ Industrial ☐ Irrigation
☐ Thermal ☐ Injection ☐ Other

(5) BORE HOLE CONSTRUCTION:
Special Construction approval Yes ☐ No ☑ Depth of Completed Well 99 ft.
Explosives used Yes ☐ No ☑ Type Amount

HOLE Diameter	From	To	SEAL Material	From	To	Amount sacks or pounds
10"	0	39	Cement	0	39	12+Bentonite
6"	39	99				

How was seal placed: Method ☐ A ☐ B ☑ C ☐ D ☐ E
☐ Other
Backfill placed from ft. to ft. Material
Gravel placed from ft. to ft. Size of gravel

(6) CASING/LINER:

	Diameter	From	To	Gauge	Steel	Plastic	Welded	Threaded
Casing:	6"	0+1	39	.250	☑	☐	☑	☐
					☐	☐	☐	☐
					☐	☐	☐	☐
					☐	☐	☐	☐
Liner:	4"	2'	99		☐	☑	☑	☐
					☐	☐	☐	☐

Final location of shoe(s)

(7) PERFORATIONS/SCREENS:
☐ Perforations Method Saw Cut
☐ Screens Type Material

From	To	Slot size	Number	Diameter	Tele/pipe size	Casing	Liner
80	98	1/8"	38	6"	long	☐	☑
						☐	☐
						☐	☐
						☐	☐
						☐	☐
						☐	☐

(8) WELL TESTS: Minimum testing time is 1 hour
☐ Pump ☐ Bailer ☑ Air ☐ Flowing Artesian

Yield gal/min	Drawdown	Drill stem at	Time
24 gpm		98	1 hr.

Temperature of water 54 Depth Artesian Flow Found
Was a water analysis done? ☐ Yes By whom
Did any strata contain water not suitable for intended use? ☐ Too little
☐ Salty ☐ Muddy ☐ Odor ☐ Colored ☐ Other
Depth of strata:

(9) LOCATION OF WELL by legal description:
County Marion Latitude ' " Longitude ' "
Township 8S N or S, Range 3W E or W, WM.
Section 14 B ¼ A ¼
Tax Lot 01000 Lot Block Subdivision
Street Address of Well (or nearest address) Same as Owner

(10) STATIC WATER LEVEL:
41' ft. below land surface. Date 1-4-90
Artesian pressure lb. per square inch. Date

(11) WATER BEARING ZONES:
Depth at which water was first found

From	To	Estimated Flow Rate	SWL
60	80	10	
80	98	14	

(12) WELL LOG:
Ground elevation

Material	From	To	SWL
Clay & Boulders	0	8	
Weathered out Rock	8		
with some boulders		30	
Rock partly weathered	30		
graduating to hard		34	
Rock Hard	34	44	
Rock partly broken	44	65	
Rock (Basalt)	65	99	

ROBINSON DRILLING
WELLS & PUMPS
4520 Dallas-Salem Hwy.
Salem, Ore. 97304
371-1844

Date started 12-21-89 Completed 1-4-90

(unbonded) Water Well Constructor Certification:
I certify that the work I performed on the construction, alteration, or abandonment of this well is in compliance with Oregon well construction standards. Materials used and information reported above are true to my best knowledge and belief.

WWC Number
Signed Date

(bonded) Water Well Constructor Certification:
I accept responsibility for the construction, alteration, or abandonment work performed on this well during the construction dates reported above. all work performed during this time is in compliance with Oregon well construction standards. This report is true to the best of my knowledge and belief.

WWC Number 13
Signed George K Robinson Date 1-5-89

ORIGINAL & FIRST COPY - WATER RESOURCES DEPARTMENT SECOND COPY - CONSTRUCTOR THIRD COPY - CUSTOMER 9809C 3/88

STATE OF OREGON

WATER WELL REPORT

(as required by ORS 537.765)

MARI 17275

MAY 21 1991

WATER RESOURCES DEPT
SALEM, OREGON

8S/3W/14 aa

(START CARD) # 22894

(1) OWNER:

Well Number

Name Bernard Hunt.

Address 1245 Cottage N.E

City Salem. State Or. Zip

(2) TYPE OF WORK:

☒ New Well ☐ Deepen ☐ Recondition ☐ Abandon

(3) DRILL METHOD

☒ Rotary Air ☐ Rotary Mud ☐ Cable

☐ Other

(4) PROPOSED USE:

☒ Domestic ☐ Community ☐ Industrial ☐ Irrigation

☐ Thermal ☐ Injection ☐ Other

(5) BORE HOLE CONSTRUCTION:

Special Construction approval Yes ☐ No ☐ Depth of Completed Well 165 ft.

Explosives used Yes ☐ No ☒ Type Amount

HOLE Diameter	From	To	SEAL Material	From	To	Amount sacks or pounds
16	0	25	Cement	0	25	8
8	25	53	Cement	25	53	8
4	53	165				

How was seal placed: Method ☐ A ☐ B ☒ C ☐ D ☐ E

☐ Other

Backfill placed from ft. to ft. Material

Gravel placed from ft. to ft. Size of gravel

(6) CASING/LINER:

	Diameter	From	To	Gauge	Steel	Plastic	Welded	Threaded
Casing:	4	0	52	250	☒	☐	☒	☐
					☐	☐	☐	☐
					☐	☐	☐	☐
					☐	☐	☐	☐
Liner:					☐	☐	☐	☐
					☐	☐	☐	☐

Final location of shoe(s)

(7) PERFORATIONS/SCREENS:

☐ Perforations Method

☐ Screens Type Material

From	To	Slot size	Number	Diameter	Tele/pipe size	Casing	Liner
						☐	☐
						☐	☐
						☐	☐
						☐	☐
						☐	☐
						☐	☐

(8) WELL TESTS: Minimum testing time is 1 hour

☐ Pump ☐ Bailer ☒ Air ☐ Flowing Artesian

Yield gal/min	Drawdown	Drill stem at	Time
8		162	1 hr.

Temperature of water 51° Depth Artesian Flow Found

Was a water analysis done? ☐ Yes By whom

Did any strata contain water not suitable for intended use? ☐ Too little

☐ Salty ☐ Muddy ☐ Odor ☐ Colored ☐ Other

Depth of strata:

(9) LOCATION OF WELL by legal description:

County Marion. Latitude Longitude

Township 8S N or S, Range 3W E or W, WM.

Section 14 N.E ¼ N.E ¼

Tax Lot 81350-732 Lot Block Subdivision

Street Address of Well (or nearest address) 1831 Burns Rd. S.E Salem, Or.

(10) STATIC WATER LEVEL:

37 ft. below land surface. Date March 22, 1991

Artesian pressure lb. per square inch. Date

(11) WATER BEARING ZONES:

Depth at which water was first found 124

From	To	Estimated Flow Rate	SWL
124	153	8 GPM	37

(12) WELL LOG:

Ground elevation

Material	From	To	SWL
Soil	0	3	
Boulders + Clay	3	18	
Clay + Gravel	18	45	
Rock Black	45	80	
Rock Black + Brown	80	97	
Rock Black Very Hard.	97	124	
Rock Grey	124	145	
Rock Black	145	165	37

Date started March 22, 1991 Completed March 22, 1991

(unbonded) Water Well Constructor Certification:

I certify that the work I performed on the construction, alteration, or abandonment of this well is in compliance with Oregon well construction standards. Materials used and information reported above are true to my best knowledge and belief.

WWC Number

Signed Date

(bonded) Water Well Constructor Certification:

I accept responsibility for the construction, alteration, or abandonment work performed on this well during the construction dates reported above. all work performed during this time is in compliance with Oregon well construction standards. This report is true to the best of my knowledge and belief.

WWC Number 75

Signed William Gray Date March 27, 1991

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