PRELIMINARY STORMWATER MANAGEMENT REPORT

FOR

MIXED USE – MULTIFAMILY
at
415 MOYER LANE NW
SALEM, OR. 97304

September 9th, 2024

PREPARED BY:

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Contents

I. PURPOSE OF REPORT 3
II. PROJECT DESCRIPTION 3
A. EXISTING CONDITION 3
B. PROPOSED CONDITION 3
III. METHODOLOGY 5
IV. CALCULATIONS 6
V. SUMMARY 7

APPENDICES

APPENDIX A - MAPS
APPENDIX B - CALCULATIONS
APPENDIX C - PLANS
APPENDIX D - SOIL INFORMATION

I. PURPOSE OF REPORT

This report describes the proposed improvements compliance with the City of Salem Stormwater Design Handbook for Developers and Large Projects.

II. PROJECT DESCRIPTION

The site is located at 415 Moyer Lane NW in the City of Salem. The property is bordered by Moyer Lane to the south and Bartell Drive to the east, with private property to the west and north.

A. EXISTING CONDITION

The existing site is currently vacant with a small portion of old concrete and gravel driveways remaining. The site is generally flat but slopes from the west towards the east, towards Bartell Drive NW.

The existing site is located within a FEMA flood zone, Zone AE with a Base Flood Elevation of 141', per FEMA flood map 41047C0333H, effective 1/2/2003.

B. PROPOSED CONDITION

The proposed development is a new mixed use building, with a proposed parking lot and proposed landscape. The ¾ width street section on Moyer will be constructed. The overall drainage pattern will be maintained, draining from west to east towards the proposed infiltration rain garden. A small portion of the parking lot will drain to the southwest corner of the site towards the proposed infiltration stormwater planter.

The proposed rain garden will utilize the available site infiltration rates, as noted in the Geotechnical Report prepared by Branch Engineering on March 13, 2024. The overflow will then be conveyed out via curb face into Bartell Drive or Moyer Lane. The total post development flow rate will not exceed the total predevelopment flow rate.

Geotechnical Report:
Branch Engineering, dated March 13, 2024
Project No. 24-055

Infiltration Rates:

Table 1: Infiltration Test Results

Test ID	*Soil Description*	*Test Depth (inches)*	*Infiltration Rate (in/hr)*
TP-1	Light Reddish Brown silt with clay (ML)	48	13
TP-2	Light Reddish Brown silt with clay (ML)	60	28
TP-4	Light Reddish Brown silt with clay (ML)	60	25

Groundwater:
Groundwater was not encountered at the explored depth of 11-feet. One nearby well log indicated that the groundwater is at a depth of approximately 29-feet.

III. METHODOLOGY

The City of Salem's stormwater design handbook for developers and large projects, and Chapter 71 of the Salem Revised Code (SRC) require the following;

Flow Control Requirements

- Stormwater detention facilities must be designed such that the post-development peak runoff rate is equal to or less than the pre-development peak runoff rate for half of the 2-year, 24-hour storm and the 10-year, 24-hour storm, 25-year and 100-year 24-hour storm event.

- The detention volume for a volume-based stormwater flow control facility (such as dry detention basin) shall be sufficient to detain a 100-year design storm event without overflow.

The proposed development will utilize an infiltration rain garden to mitigate the required flow rate.

Water Quality Treatment Requirements

- Stormwater treatment facilities must be designed to treat 80% of the average annual rainfall using the water quality design storm event of 1.38 inches in 24 hours.

GSI Requirements

The City of Salem requires large projects to apply GIS to the maximum extent feasible (MEF). The MEF requirements are;

- The total area of the site covered by GSI facilities is at least 10 percent of the combined amount of new plus replaced impervious surfaces on the entire site or;

- GSI is used to fully mitigate the impacts of stormwater runoff from at least 80 percent of the total new plus replaced impervious surfaces.

The proposed development will utilize an infiltration rain garden to mitigate 80 percent of the total new impervious surface area.

IV. CALCULATIONS

The development will be designed in accordance with the Design Standards in Division 004, Appendix D. The Santa Barbara Urban Hydrograph (SBUH) method will be the selected methodology used in the computer program HydroCAD Version 10.20. The following parameters were inputted;

Storm Type: *Type 1A Rainfall Distribution*
Soil Group: *Group C*

Curve Number:

Land Cover Category	Curve Numbers for Hydrologic Soil Group			
	A	B	C	D
Impervious Surface	**98**	**98**	**98**	**98**
Pervious Land Cover				
Pre-developed	35	58	72	79
Unamended Soils	72	82	87	89
Amended Soils	39	61	74	80

Rainfall Depth:

24-hour Rainfall Depths for Salem	
Design Storm Event	Precipitation (inches/24 hours)
WQ Event	1.38
2-year	2.20
10-year	3.20
100-year	4.40

The 25-year 24-hour storm event precipitation is 3.6in/24hr per PWDS Table 4D-3.

V. SUMMARY

A proposed GSI infiltration rain garden is being proposed at the east property line.

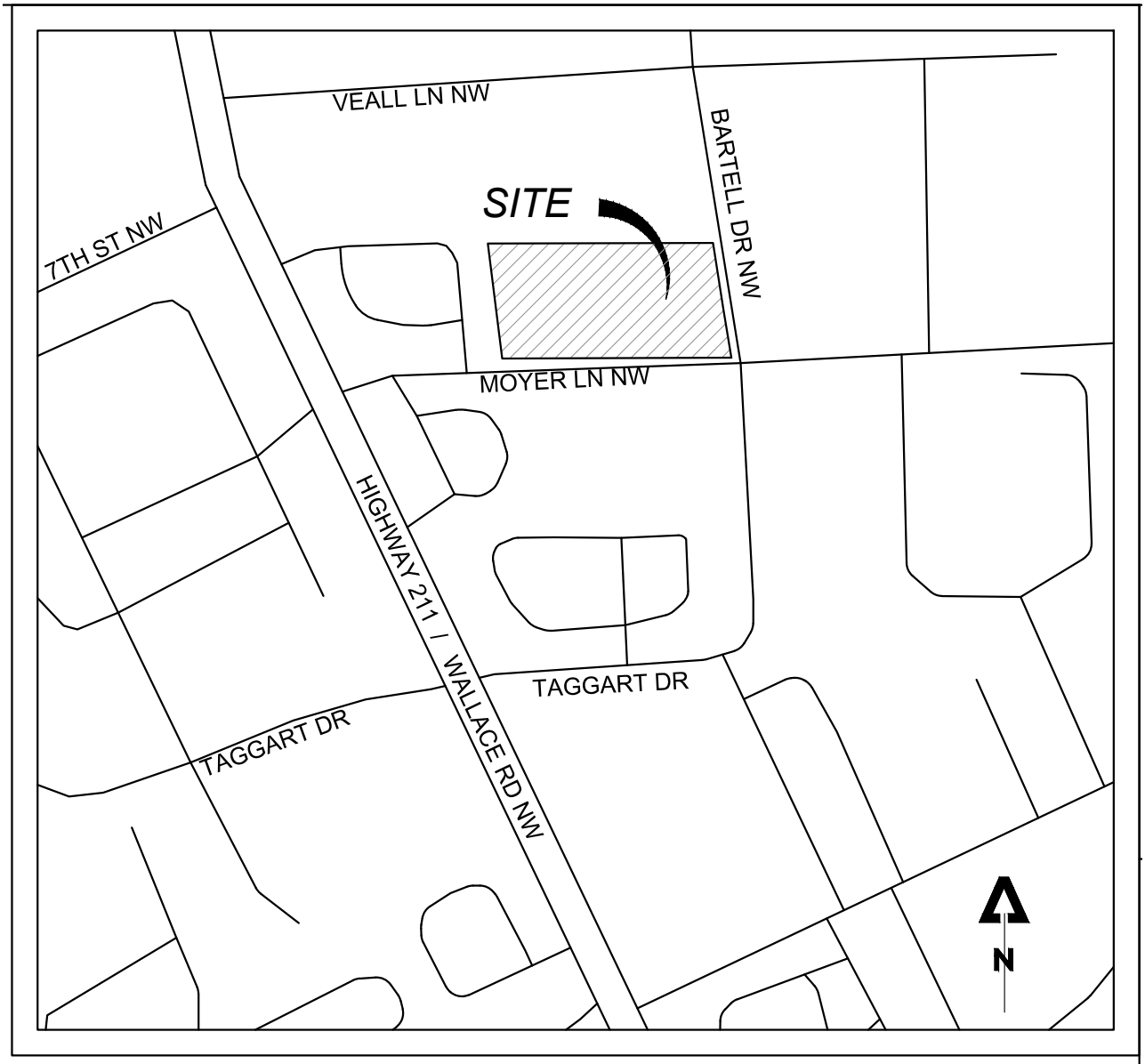
However, the GSI infiltration rain garden and infiltration stormwater planter will mitigate 80% of the proposed impervious surface area. Additionally, the rain garden has demonstrated flow restriction for the 2-Year, 10-year, 25-year, and 100-year 24-Hour Storm Event, and the post-development flow rate will not exceed the pre-development flow rate.

Lastly, the GSI infiltration rain garden and infiltration stormwater planter has been sized to properly treat the Water Quality Storm Event of 1.38 in/hr. The tables below provide the summary of calculations derived using HydroCAD. Please refer to the Appendix for the complete calculations.

CATCHMENT AND FACILITY TABLE						
CATCHMENT/ FACILITY ID	**TOTAL AREA (SF)/(AC.)**	**IMPERVIOUS AREA (SF)**	**PERVIOUS AREA (SF)**	**OWNERSHIP (PRIVATE/ PUBLIC)**	**FACILITY TYPE**	**FACILITY SIZE**
A	15,392	12,692	2,700	PRIVATE	INFILTRAITON RAIN GARDEN	345 SQ.FT.
B	4,653	3,853	800	PRIVATE	INFILTRATION STORMWATER PLANTER	86 SQ.FT.

PRE VS. POST CONSTRUCTION FLOW RATES								
FACILITY ID	**PEAK FLOW RATE (CFS)**							
	HALF OF THE 2 YEAR STORM		**10 YEAR STORM**		**25 YEAR STORM**		**100 YEAR STORM**	
PROJECT SITE	PRE	POST	PRE	POST	PRE	POST	PRE	POST
A	0.015	0	0.1	0	0.14	0	0.21	0.02
B		0		0		0		0.06

APPENDIX A – MAPS

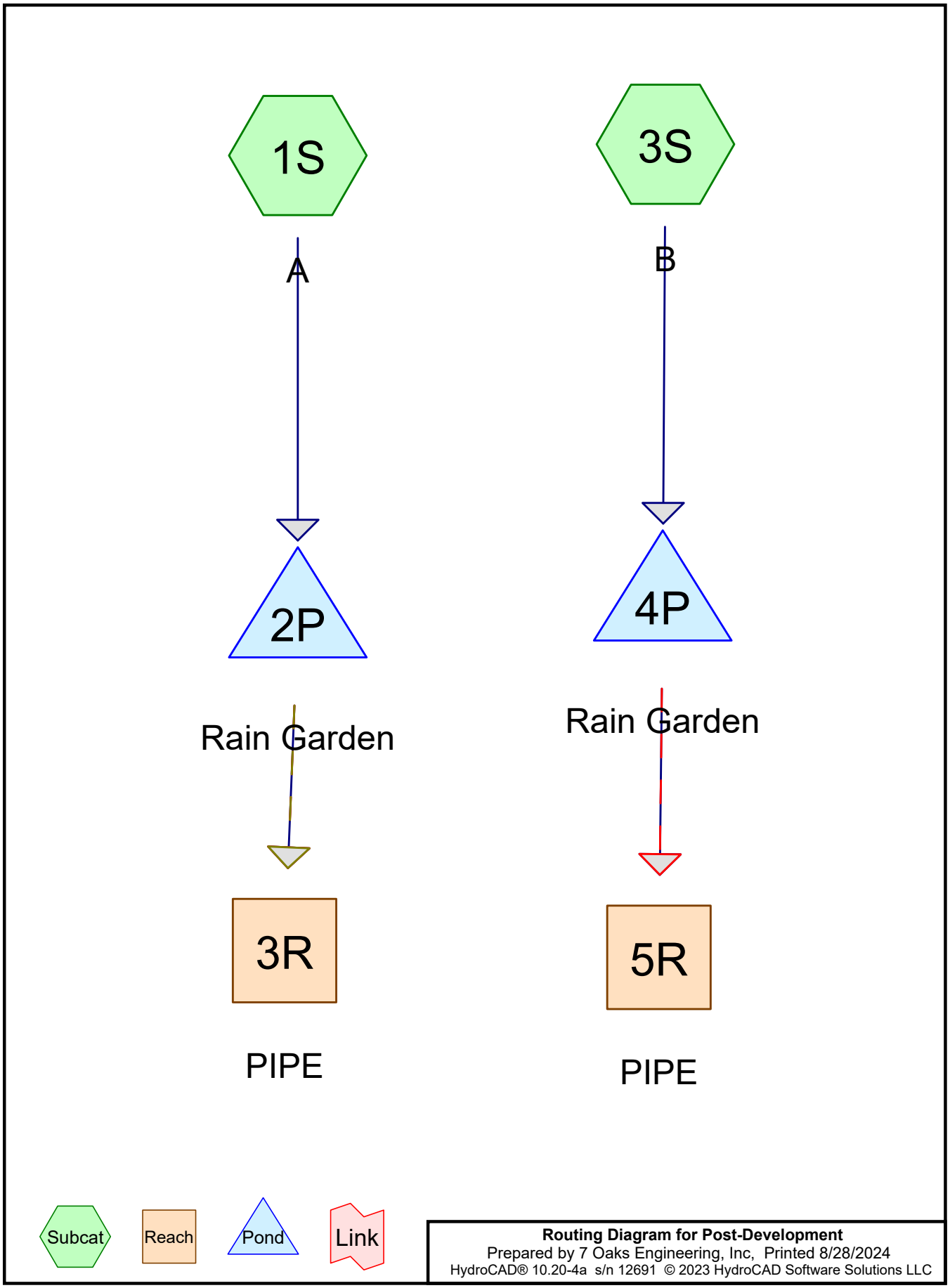


VICINITY MAP

APPENDIX B – CALCULATIONS

POST DEVELOPMENT HYDROCAD

THE ELEVATIONS SHOWN HEREIN ARE ARBITARY AND USED FOR CALCULATION PURPOSES ONLY



Routing Diagram for Post-Development
Prepared by 7 Oaks Engineering, Inc, Printed 8/28/2024
HydroCAD® 10.20-4a s/n 12691 © 2023 HydroCAD Software Solutions LLC

Rainfall Events Listing

Event#	Event Name	Storm Type	Curve	Mode	Duration (hours)	B/B	Depth (inches)	AMC
1	2-Yr	Type IA 24-hr		Default	24.00	1	2.20	2
2	10-Yr	Type IA 24-hr		Default	24.00	1	3.20	2
3	25-YR	Type IA 24-hr		Default	24.00	1	3.60	2
4	100-Yr	Type IA 24-hr		Default	24.00	1	4.40	2
5	WQV	Type IA 24-hr		Default	24.00	1	1.38	2

Area Listing (all nodes)

Area (acres)	CN	Description (subcatchment-numbers)
0.080	74	>75% Grass cover, Good, HSG C (1S, 3S)
0.380	98	Paved parking, HSG C (1S, 3S)
0.460	**94**	**TOTAL AREA**

Soil Listing (all nodes)

Area (acres)	Soil Group	Subcatchment Numbers
0.000	HSG A	
0.000	HSG B	
0.460	HSG C	1S, 3S
0.000	HSG D	
0.000	Other	
0.460		**TOTAL AREA**

Ground Covers (all nodes)

HSG-A (acres)	HSG-B (acres)	HSG-C (acres)	HSG-D (acres)	Other (acres)	Total (acres)	Ground Cover	Subcatchment Numbers
0.000	0.000	0.080	0.000	0.000	0.080	>75% Grass cover, Good	1S, 3S
0.000	0.000	0.380	0.000	0.000	0.380	Paved parking	1S, 3S
0.000	**0.000**	**0.460**	**0.000**	**0.000**	**0.460**	**TOTAL AREA**	

Pipe Listing (all nodes)

Line#	Node Number	In-Invert (feet)	Out-Invert (feet)	Length (feet)	Slope (ft/ft)	n	Width (inches)	Diam/Height (inches)	Inside-Fill (inches)	Node Name
1	3R	100.00	99.85	15.0	0.0100	0.013	0.0	3.0	0.0	
2	5R	100.00	99.85	15.0	0.0100	0.013	0.0	3.0	0.0	

Time span=0.10-36.00 hrs, dt=0.05 hrs, 719 points
Runoff by SBUH method, Split Pervious/Imperv.
Reach routing by Stor-Ind+Trans method - Pond routing by Stor-Ind method

Subcatchment1S: A Runoff Area=15,392 sf 82.46% Impervious Runoff Depth=1.71"
Tc=5.0 min CN=74/98 Runoff=0.15 cfs 0.050 af

Subcatchment3S: B Runoff Area=4,653 sf 82.81% Impervious Runoff Depth=1.71"
Tc=5.0 min CN=74/98 Runoff=0.05 cfs 0.015 af

Reach 3R: PIPE Avg. Flow Depth=0.00' Max Vel=0.00 fps Inflow=0.00 cfs 0.000 af
3.0" Round Pipe x 3.00 n=0.013 L=15.0' S=0.0100 '/' Capacity=0.27 cfs Outflow=0.00 cfs 0.000 af

Reach 5R: PIPE Avg. Flow Depth=0.00' Max Vel=0.00 fps Inflow=0.00 cfs 0.000 af
3.0" Round Pipe x 3.00 n=0.013 L=15.0' S=0.0100 '/' Capacity=0.27 cfs Outflow=0.00 cfs 0.000 af

Pond 2P: Rain Garden Peak Elev=100.93' Storage=128 cf Inflow=0.15 cfs 0.050 af
Discarded=0.08 cfs 0.050 af Primary=0.00 cfs 0.000 af Secondary=0.00 cfs 0.000 af Outflow=0.08 cfs 0.050 af

Pond 4P: Rain Garden Peak Elev=101.61' Storage=50 cf Inflow=0.05 cfs 0.015 af
Discarded=0.02 cfs 0.015 af Primary=0.00 cfs 0.000 af Secondary=0.00 cfs 0.000 af Outflow=0.02 cfs 0.015 af

Total Runoff Area = 0.460 ac Runoff Volume = 0.065 af Average Runoff Depth = 1.71"
17.46% Pervious = 0.080 ac 82.54% Impervious = 0.380 ac

Summary for Subcatchment 1S: A

[49] Hint: Tc<2dt may require smaller dt

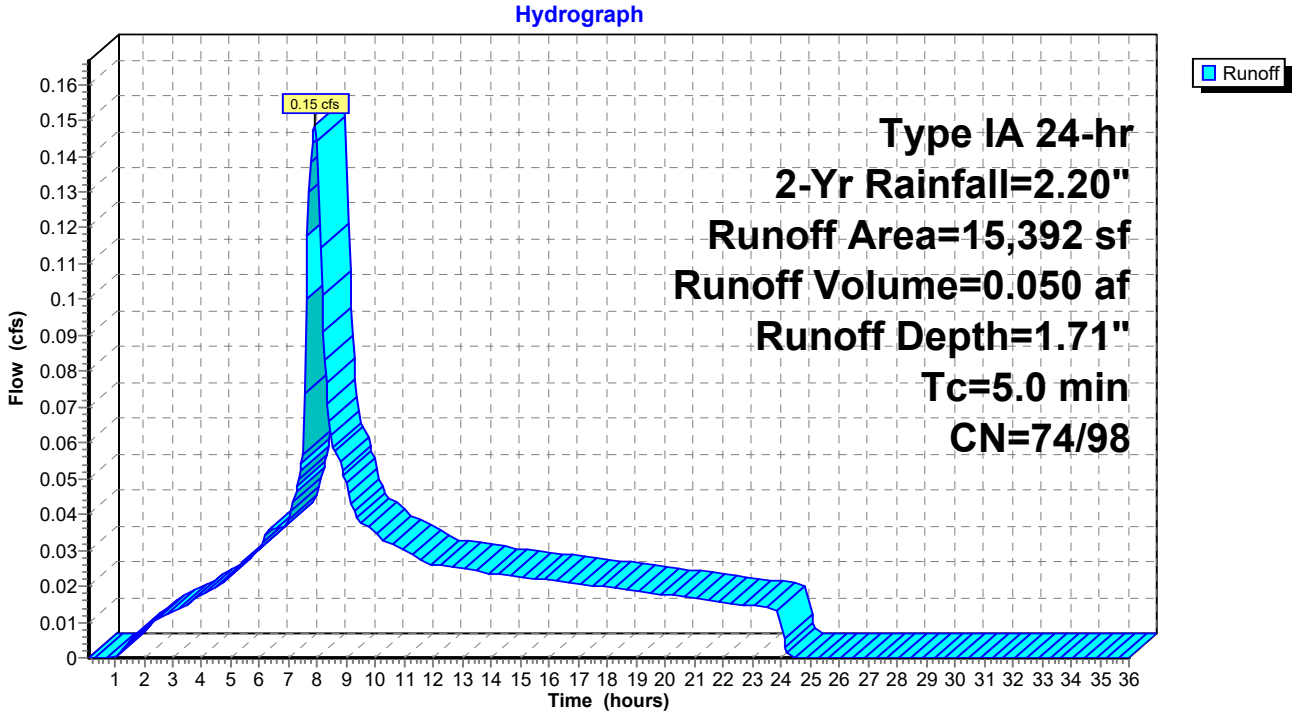
Runoff = 0.15 cfs @ 7.91 hrs, Volume= 0.050 af, Depth= 1.71"
Routed to Pond 2P : Rain Garden

Runoff by SBUH method, Split Pervious/Imperv., Time Span= 0.10-36.00 hrs, dt= 0.05 hrs
Type IA 24-hr 2-Yr Rainfall=2.20"

Area (sf)	CN	Description
12,692	98	Paved parking, HSG C
2,700	74	>75% Grass cover, Good, HSG C
15,392	94	Weighted Average
2,700	74	17.54% Pervious Area
12,692	98	82.46% Impervious Area

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

Subcatchment 1S: A



Summary for Subcatchment 3S: B

[49] Hint: Tc<2dt may require smaller dt

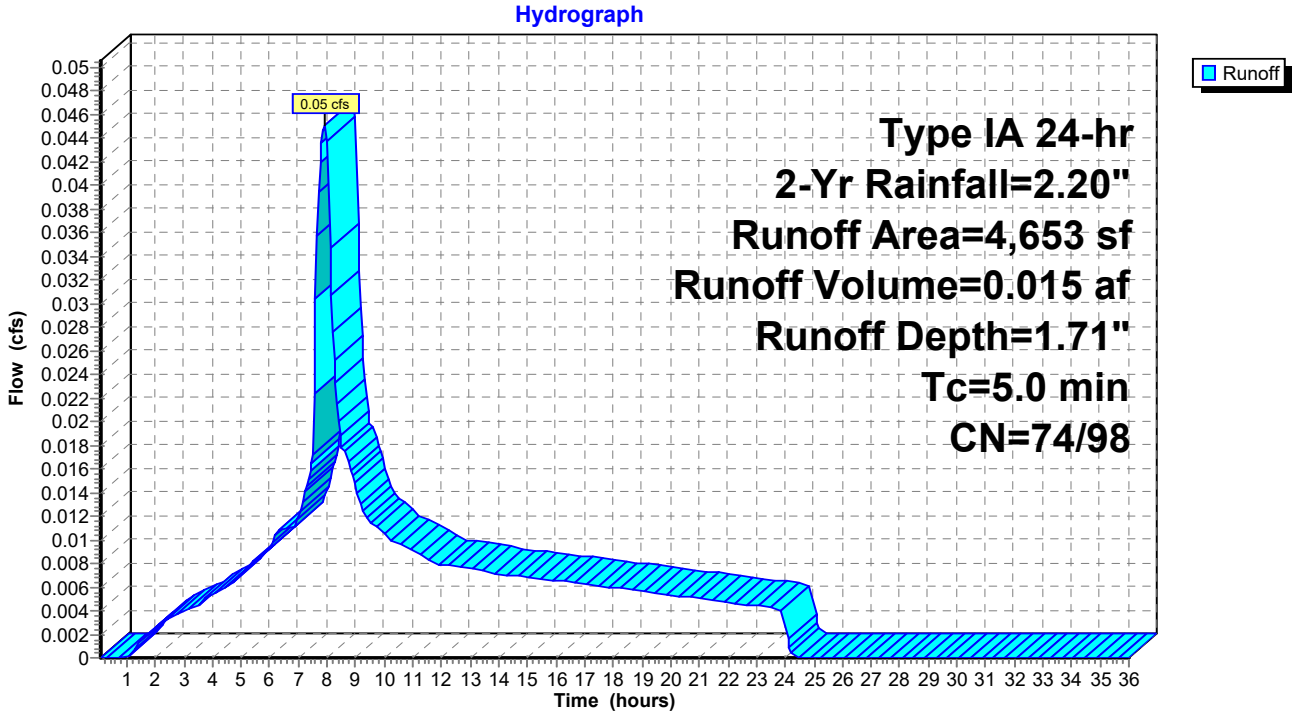
Runoff = 0.05 cfs @ 7.91 hrs, Volume= 0.015 af, Depth= 1.71"
Routed to Pond 4P : Rain Garden

Runoff by SBUH method, Split Pervious/Imperv., Time Span= 0.10-36.00 hrs, dt= 0.05 hrs
Type IA 24-hr 2-Yr Rainfall=2.20"

Area (sf)	CN	Description
3,853	98	Paved parking, HSG C
800	74	>75% Grass cover, Good, HSG C
4,653	94	Weighted Average
800	74	17.19% Pervious Area
3,853	98	82.81% Impervious Area

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

Subcatchment 3S: B



Summary for Reach 3R: PIPE

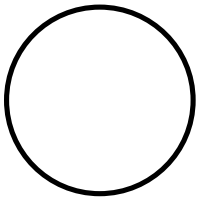
[52] Hint: Inlet/Outlet conditions not evaluated

Inflow Area = 0.353 ac, 82.46% Impervious, Inflow Depth = 0.00" for 2-Yr event
Inflow = 0.00 cfs @ 0.10 hrs, Volume= 0.000 af
Outflow = 0.00 cfs @ 0.10 hrs, Volume= 0.000 af, Atten= 0%, Lag= 0.0 min

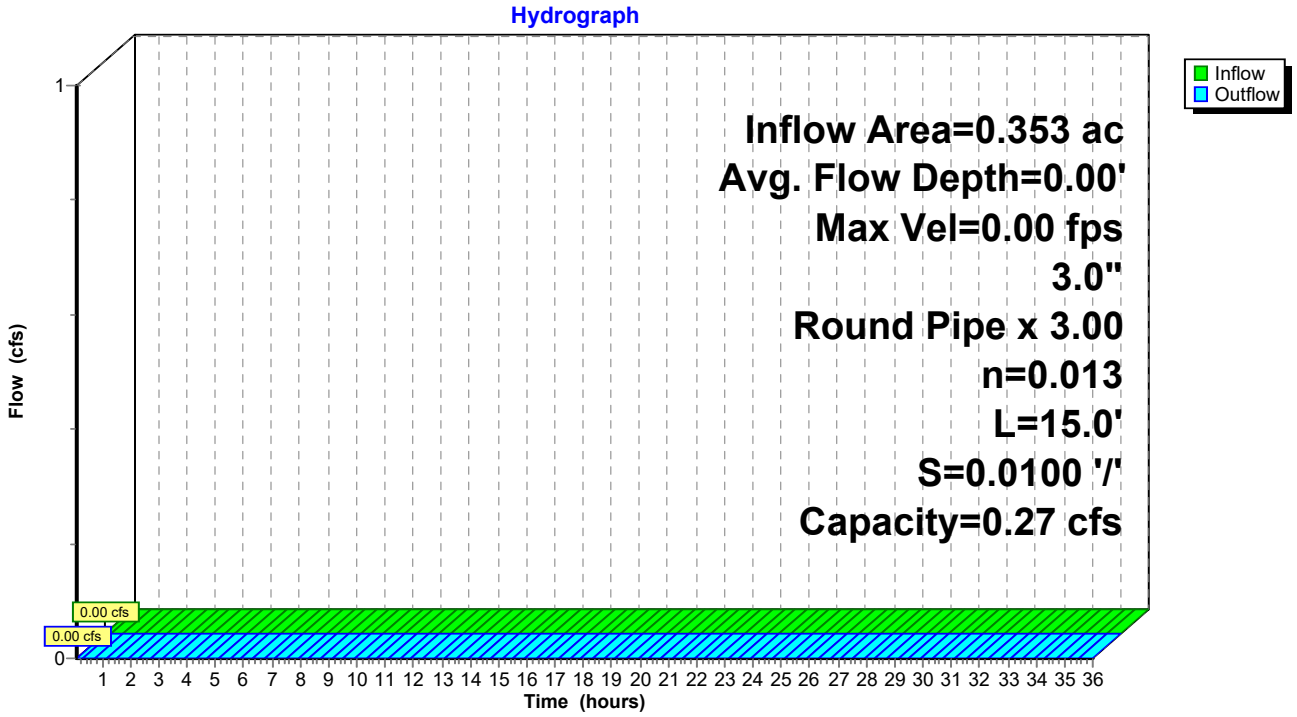
Routing by Stor-Ind+Trans method, Time Span= 0.10-36.00 hrs, dt= 0.05 hrs
Max. Velocity= 0.00 fps, Min. Travel Time= 0.0 min
Avg. Velocity = 0.00 fps, Avg. Travel Time= 0.0 min

Peak Storage= 0 cf @ 0.10 hrs
Average Depth at Peak Storage= 0.00'
Bank-Full Depth= 0.25' Flow Area= 0.1 sf, Capacity= 0.27 cfs

A factor of 3.00 has been applied to the storage and discharge capacity
3.0" Round Pipe
n= 0.013
Length= 15.0' Slope= 0.0100 '/'
Inlet Invert= 100.00', Outlet Invert= 99.85'



Reach 3R: PIPE



Summary for Reach 5R: PIPE

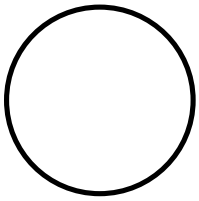
[52] Hint: Inlet/Outlet conditions not evaluated

Inflow Area = 0.107 ac, 82.81% Impervious, Inflow Depth = 0.00" for 2-Yr event
Inflow = 0.00 cfs @ 0.10 hrs, Volume= 0.000 af
Outflow = 0.00 cfs @ 0.10 hrs, Volume= 0.000 af, Atten= 0%, Lag= 0.0 min

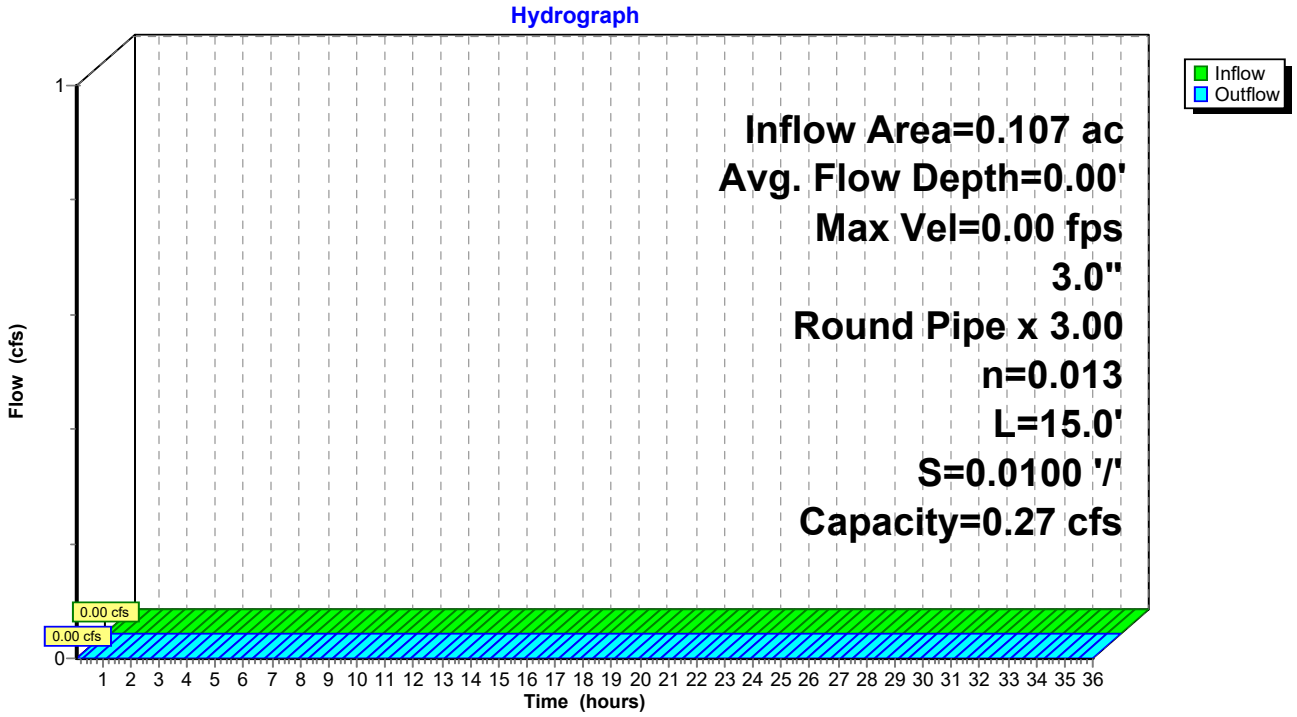
Routing by Stor-Ind+Trans method, Time Span= 0.10-36.00 hrs, dt= 0.05 hrs
Max. Velocity= 0.00 fps, Min. Travel Time= 0.0 min
Avg. Velocity = 0.00 fps, Avg. Travel Time= 0.0 min

Peak Storage= 0 cf @ 0.10 hrs
Average Depth at Peak Storage= 0.00'
Bank-Full Depth= 0.25' Flow Area= 0.1 sf, Capacity= 0.27 cfs

A factor of 3.00 has been applied to the storage and discharge capacity
3.0" Round Pipe
n= 0.013
Length= 15.0' Slope= 0.0100 '/'
Inlet Invert= 100.00', Outlet Invert= 99.85'



Reach 5R: PIPE



Summary for Pond 2P: Rain Garden

Inflow Area = 0.353 ac, 82.46% Impervious, Inflow Depth = 1.71" for 2-Yr event
Inflow = 0.15 cfs @ 7.91 hrs, Volume= 0.050 af
Outflow = 0.08 cfs @ 8.30 hrs, Volume= 0.050 af, Atten= 48%, Lag= 23.3 min
Discarded = 0.08 cfs @ 8.30 hrs, Volume= 0.050 af
Primary = 0.00 cfs @ 0.10 hrs, Volume= 0.000 af
Routed to Reach 3R : PIPE
Secondary = 0.00 cfs @ 0.10 hrs, Volume= 0.000 af
Routed to Reach 3R : PIPE

Routing by Stor-Ind method, Time Span= 0.10-36.00 hrs, dt= 0.05 hrs
Peak Elev= 100.93' @ 8.30 hrs Surf.Area= 345 sf Storage= 128 cf
Flood Elev= 104.00' Surf.Area= 345 sf Storage= 731 cf

Plug-Flow detention time= 5.3 min calculated for 0.050 af (100% of inflow)
Center-of-Mass det. time= 5.3 min (694.9 - 689.6)

Volume	Invert	Avail.Storage	Storage Description
#1	100.00'	731 cf	**Custom Stage Data (Prismatic)** Listed below (Recalc)

Elevation (feet)	Surf.Area (sq-ft)	Voids (%)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
100.00	345	0.0	0	0
101.00	345	40.0	138	138
101.33	345	30.0	34	172
102.83	345	30.0	155	327
103.83	345	100.0	345	672
104.00	345	100.0	59	731

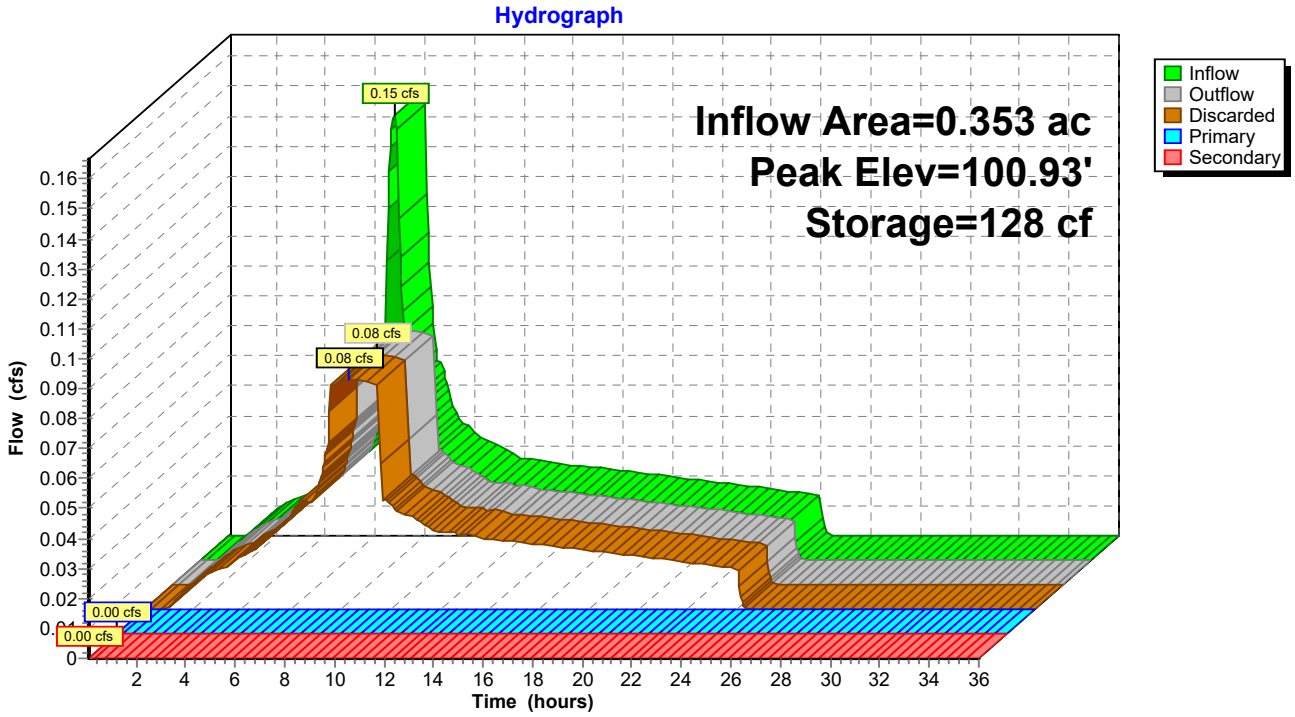
Device	Routing	Invert	Outlet Devices
#0	Secondary	104.00'	**Automatic Storage Overflow** (Discharged without head)
#1	Discarded	100.00'	**9.330 in/hr Exfiltration over Surface area** Conductivity to Groundwater Elevation = 70.00'
#2	Primary	103.83'	**6.0" Horiz. Grate** C= 0.600 Limited to weir flow at low heads

Discarded OutFlow Max=0.08 cfs @ 8.30 hrs HW=100.93' (Free Discharge)
↑└**1=Exfiltration** (Controls 0.08 cfs)

Primary OutFlow Max=0.00 cfs @ 0.10 hrs HW=100.00' (Free Discharge)
↑└**2=Grate** (Controls 0.00 cfs)

Secondary OutFlow Max=0.00 cfs @ 0.10 hrs HW=100.00' (Free Discharge)

Pond 2P: Rain Garden



Summary for Pond 4P: Rain Garden

Inflow Area = 0.107 ac, 82.81% Impervious, Inflow Depth = 1.71" for 2-Yr event
Inflow = 0.05 cfs @ 7.91 hrs, Volume= 0.015 af
Outflow = 0.02 cfs @ 8.42 hrs, Volume= 0.015 af, Atten= 57%, Lag= 30.5 min
Discarded = 0.02 cfs @ 8.42 hrs, Volume= 0.015 af
Primary = 0.00 cfs @ 0.10 hrs, Volume= 0.000 af
Routed to Reach 5R : PIPE
Secondary = 0.00 cfs @ 0.10 hrs, Volume= 0.000 af
Routed to Reach 5R : PIPE

Routing by Stor-Ind method, Time Span= 0.10-36.00 hrs, dt= 0.05 hrs / 2
Peak Elev= 101.61' @ 8.42 hrs Surf.Area= 86 sf Storage= 50 cf
Flood Elev= 104.00' Surf.Area= 86 sf Storage= 182 cf

Plug-Flow detention time= 9.3 min calculated for 0.015 af (100% of inflow)
Center-of-Mass det. time= 9.2 min (698.5 - 689.3)

Volume	Invert	Avail.Storage	Storage Description
#1	100.00'	182 cf	**Custom Stage Data (Prismatic)** Listed below (Recalc)

Elevation (feet)	Surf.Area (sq-ft)	Voids (%)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
100.00	86	0.0	0	0
101.00	86	40.0	34	34
101.33	86	30.0	9	43
102.83	86	30.0	39	82
103.83	86	100.0	86	168
104.00	86	100.0	15	182

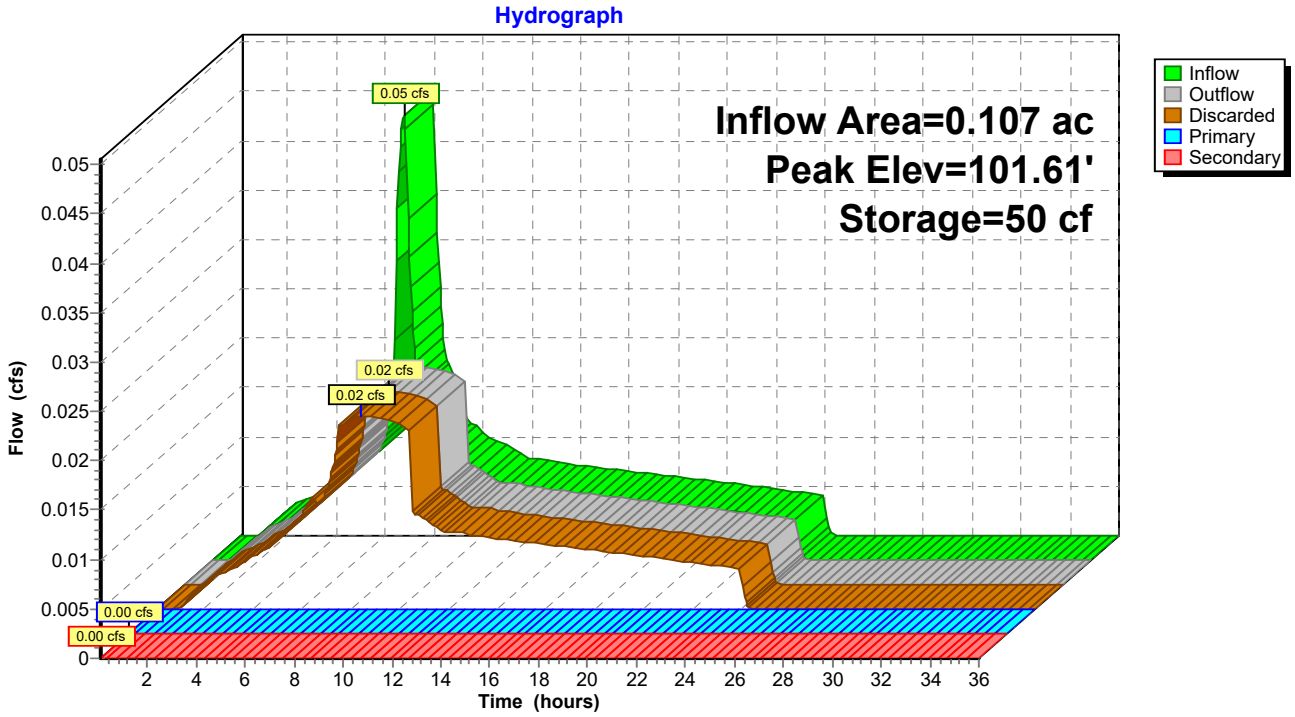
Device	Routing	Invert	Outlet Devices
#0	Secondary	104.00'	**Automatic Storage Overflow** (Discharged without head)
#1	Discarded	100.00'	**9.330 in/hr Exfiltration over Surface area** Conductivity to Groundwater Elevation = 70.00'
#2	Primary	103.83'	**6.0" Horiz. Grate** C= 0.600 Limited to weir flow at low heads

Discarded OutFlow Max=0.02 cfs @ 8.42 hrs HW=101.61' (Free Discharge)
↑└**1=Exfiltration** (Controls 0.02 cfs)

Primary OutFlow Max=0.00 cfs @ 0.10 hrs HW=100.00' (Free Discharge)
↑└**2=Grate** (Controls 0.00 cfs)

Secondary OutFlow Max=0.00 cfs @ 0.10 hrs HW=100.00' (Free Discharge)

Pond 4P: Rain Garden



Time span=0.10-36.00 hrs, dt=0.05 hrs, 719 points
Runoff by SBUH method, Split Pervious/Imperv.
Reach routing by Stor-Ind+Trans method - Pond routing by Stor-Ind method

Subcatchment1S: A Runoff Area=15,392 sf 82.46% Impervious Runoff Depth=2.63"
Tc=5.0 min CN=74/98 Runoff=0.23 cfs 0.077 af

Subcatchment3S: B Runoff Area=4,653 sf 82.81% Impervious Runoff Depth=2.64"
Tc=5.0 min CN=74/98 Runoff=0.07 cfs 0.023 af

Reach 3R: PIPE Avg. Flow Depth=0.00' Max Vel=0.00 fps Inflow=0.00 cfs 0.000 af
3.0" Round Pipe x 3.00 n=0.013 L=15.0' S=0.0100 '/' Capacity=0.27 cfs Outflow=0.00 cfs 0.000 af

Reach 5R: PIPE Avg. Flow Depth=0.00' Max Vel=0.00 fps Inflow=0.00 cfs 0.000 af
3.0" Round Pipe x 3.00 n=0.013 L=15.0' S=0.0100 '/' Capacity=0.27 cfs Outflow=0.00 cfs 0.000 af

Pond 2P: Rain Garden Peak Elev=102.83' Storage=328 cf Inflow=0.23 cfs 0.077 af
Discarded=0.08 cfs 0.077 af Primary=0.00 cfs 0.000 af Secondary=0.00 cfs 0.000 af Outflow=0.08 cfs 0.077 af

Pond 4P: Rain Garden Peak Elev=103.33' Storage=125 cf Inflow=0.07 cfs 0.023 af
Discarded=0.02 cfs 0.023 af Primary=0.00 cfs 0.000 af Secondary=0.00 cfs 0.000 af Outflow=0.02 cfs 0.023 af

Total Runoff Area = 0.460 ac Runoff Volume = 0.101 af Average Runoff Depth = 2.63"
17.46% Pervious = 0.080 ac 82.54% Impervious = 0.380 ac

Summary for Subcatchment 1S: A

[49] Hint: Tc<2dt may require smaller dt

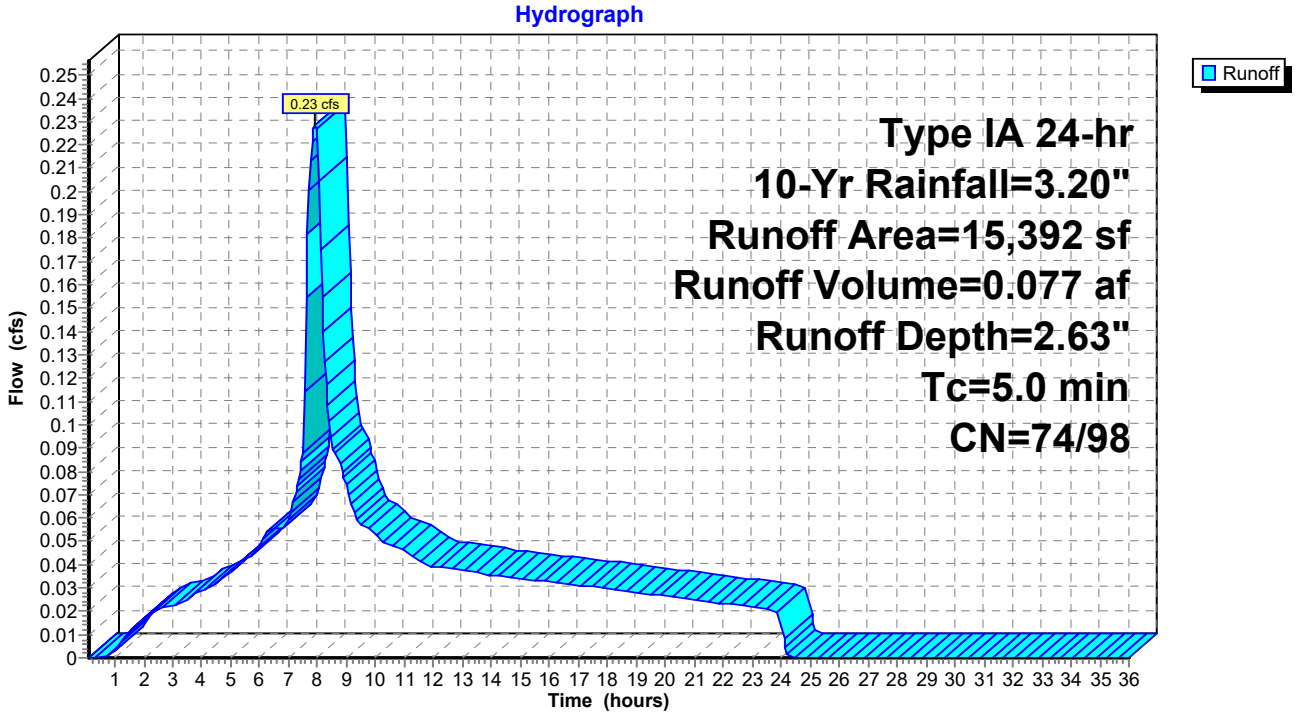
Runoff = 0.23 cfs @ 7.91 hrs, Volume= 0.077 af, Depth= 2.63"
Routed to Pond 2P : Rain Garden

Runoff by SBUH method, Split Pervious/Imperv., Time Span= 0.10-36.00 hrs, dt= 0.05 hrs
Type IA 24-hr 10-Yr Rainfall=3.20"

Area (sf)	CN	Description
12,692	98	Paved parking, HSG C
2,700	74	>75% Grass cover, Good, HSG C
15,392	94	Weighted Average
2,700	74	17.54% Pervious Area
12,692	98	82.46% Impervious Area

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

Subcatchment 1S: A



Summary for Subcatchment 3S: B

[49] Hint: Tc<2dt may require smaller dt

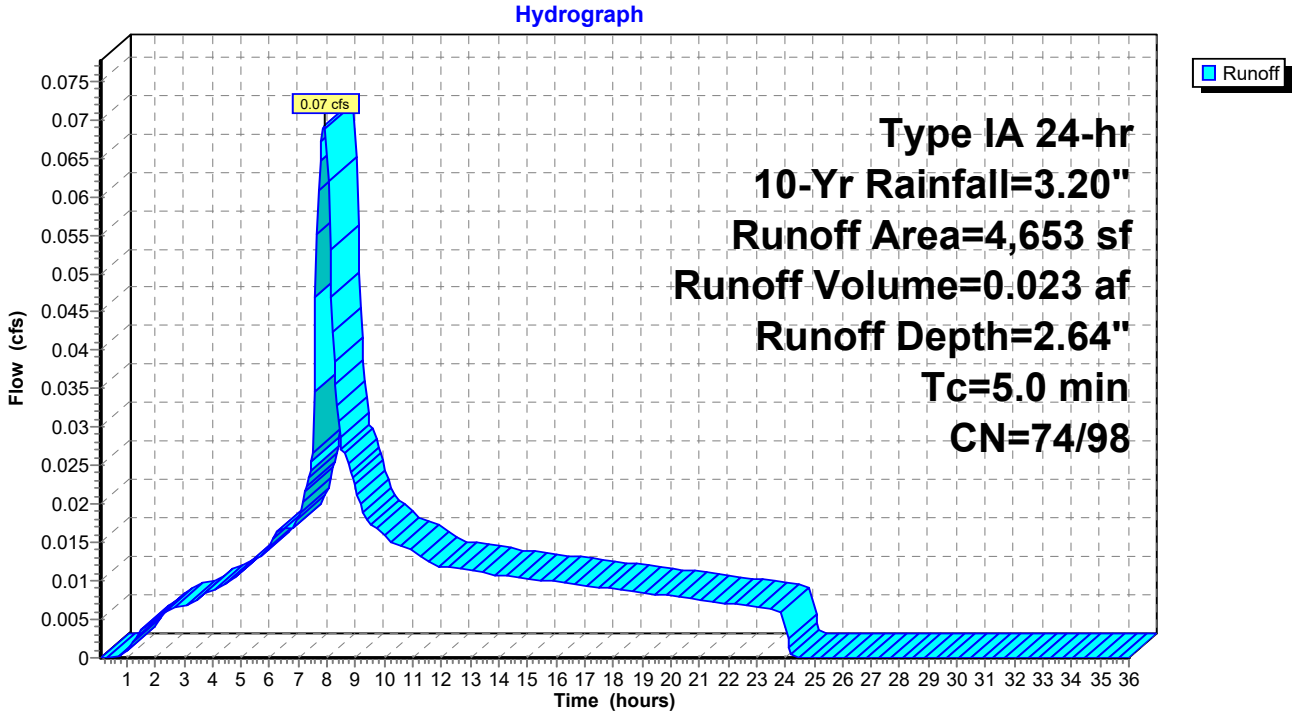
Runoff = 0.07 cfs @ 7.91 hrs, Volume= 0.023 af, Depth= 2.64"
Routed to Pond 4P : Rain Garden

Runoff by SBUH method, Split Pervious/Imperv., Time Span= 0.10-36.00 hrs, dt= 0.05 hrs
Type IA 24-hr 10-Yr Rainfall=3.20"

Area (sf)	CN	Description
3,853	98	Paved parking, HSG C
800	74	>75% Grass cover, Good, HSG C
4,653	94	Weighted Average
800	74	17.19% Pervious Area
3,853	98	82.81% Impervious Area

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

Subcatchment 3S: B



Summary for Reach 3R: PIPE

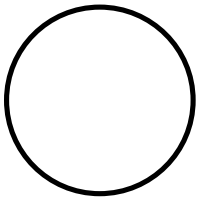
[52] Hint: Inlet/Outlet conditions not evaluated

Inflow Area = 0.353 ac, 82.46% Impervious, Inflow Depth = 0.00" for 10-Yr event
Inflow = 0.00 cfs @ 0.10 hrs, Volume= 0.000 af
Outflow = 0.00 cfs @ 0.10 hrs, Volume= 0.000 af, Atten= 0%, Lag= 0.0 min

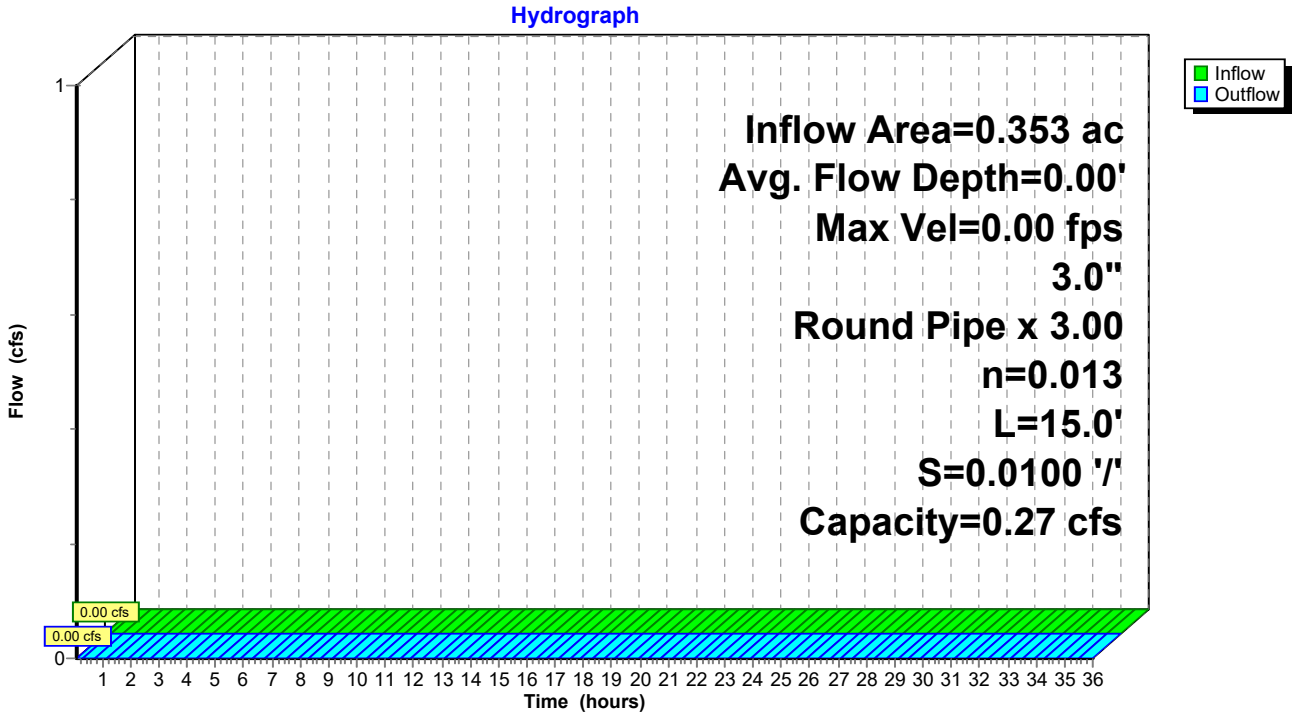
Routing by Stor-Ind+Trans method, Time Span= 0.10-36.00 hrs, dt= 0.05 hrs
Max. Velocity= 0.00 fps, Min. Travel Time= 0.0 min
Avg. Velocity = 0.00 fps, Avg. Travel Time= 0.0 min

Peak Storage= 0 cf @ 0.10 hrs
Average Depth at Peak Storage= 0.00'
Bank-Full Depth= 0.25' Flow Area= 0.1 sf, Capacity= 0.27 cfs

A factor of 3.00 has been applied to the storage and discharge capacity
3.0" Round Pipe
n= 0.013
Length= 15.0' Slope= 0.0100 '/'
Inlet Invert= 100.00', Outlet Invert= 99.85'



Reach 3R: PIPE



Summary for Reach 5R: PIPE

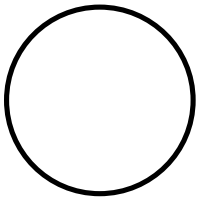
[52] Hint: Inlet/Outlet conditions not evaluated

Inflow Area = 0.107 ac, 82.81% Impervious, Inflow Depth = 0.00" for 10-Yr event
Inflow = 0.00 cfs @ 0.10 hrs, Volume= 0.000 af
Outflow = 0.00 cfs @ 0.10 hrs, Volume= 0.000 af, Atten= 0%, Lag= 0.0 min

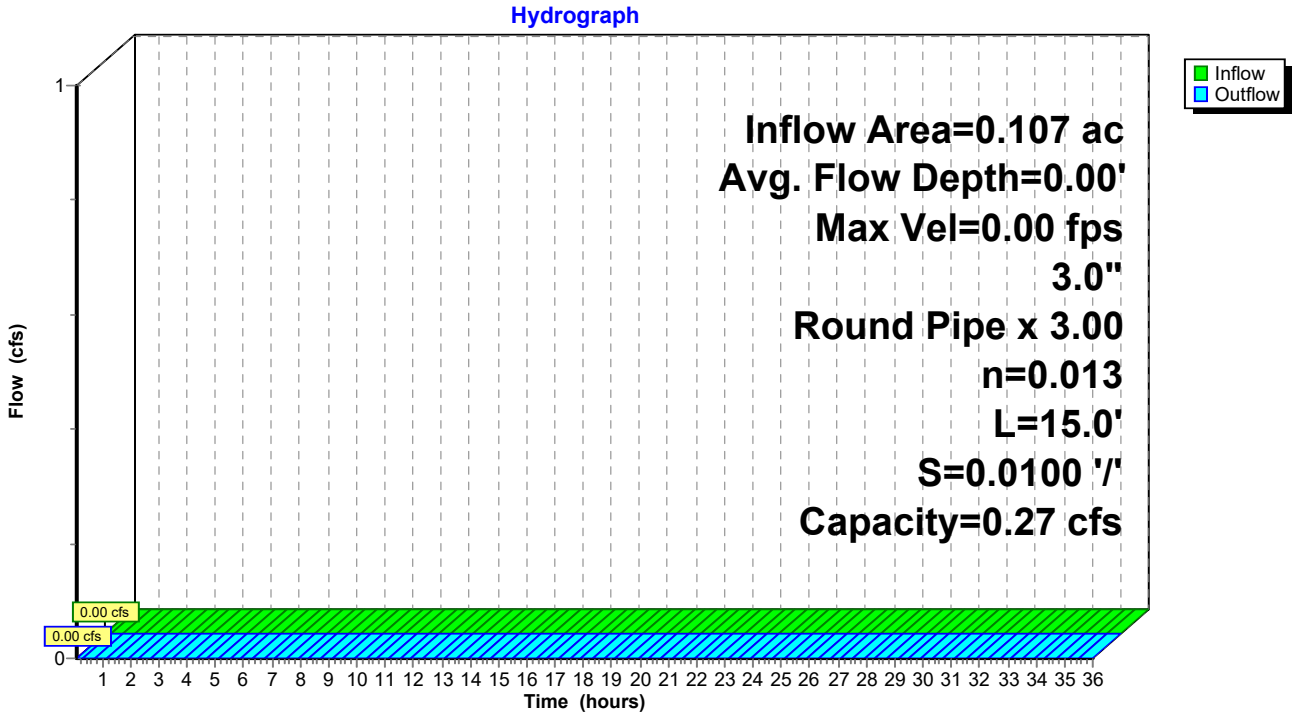
Routing by Stor-Ind+Trans method, Time Span= 0.10-36.00 hrs, dt= 0.05 hrs
Max. Velocity= 0.00 fps, Min. Travel Time= 0.0 min
Avg. Velocity = 0.00 fps, Avg. Travel Time= 0.0 min

Peak Storage= 0 cf @ 0.10 hrs
Average Depth at Peak Storage= 0.00'
Bank-Full Depth= 0.25' Flow Area= 0.1 sf, Capacity= 0.27 cfs

A factor of 3.00 has been applied to the storage and discharge capacity
3.0" Round Pipe
n= 0.013
Length= 15.0' Slope= 0.0100 '/'
Inlet Invert= 100.00', Outlet Invert= 99.85'



Reach 5R: PIPE



Summary for Pond 2P: Rain Garden

Inflow Area = 0.353 ac, 82.46% Impervious, Inflow Depth = 2.63" for 10-Yr event
Inflow = 0.23 cfs @ 7.91 hrs, Volume= 0.077 af
Outflow = 0.08 cfs @ 8.82 hrs, Volume= 0.077 af, Atten= 64%, Lag= 54.5 min
Discarded = 0.08 cfs @ 8.82 hrs, Volume= 0.077 af
Primary = 0.00 cfs @ 0.10 hrs, Volume= 0.000 af
Routed to Reach 3R : PIPE
Secondary = 0.00 cfs @ 0.10 hrs, Volume= 0.000 af
Routed to Reach 3R : PIPE

Routing by Stor-Ind method, Time Span= 0.10-36.00 hrs, dt= 0.05 hrs
Peak Elev= 102.83' @ 8.82 hrs Surf.Area= 345 sf Storage= 328 cf
Flood Elev= 104.00' Surf.Area= 345 sf Storage= 731 cf

Plug-Flow detention time= 17.3 min calculated for 0.077 af (100% of inflow)
Center-of-Mass det. time= 17.3 min (697.4 - 680.1)

Volume	Invert	Avail.Storage	Storage Description
#1	100.00'	731 cf	**Custom Stage Data (Prismatic)** Listed below (Recalc)

Elevation (feet)	Surf.Area (sq-ft)	Voids (%)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
100.00	345	0.0	0	0
101.00	345	40.0	138	138
101.33	345	30.0	34	172
102.83	345	30.0	155	327
103.83	345	100.0	345	672
104.00	345	100.0	59	731

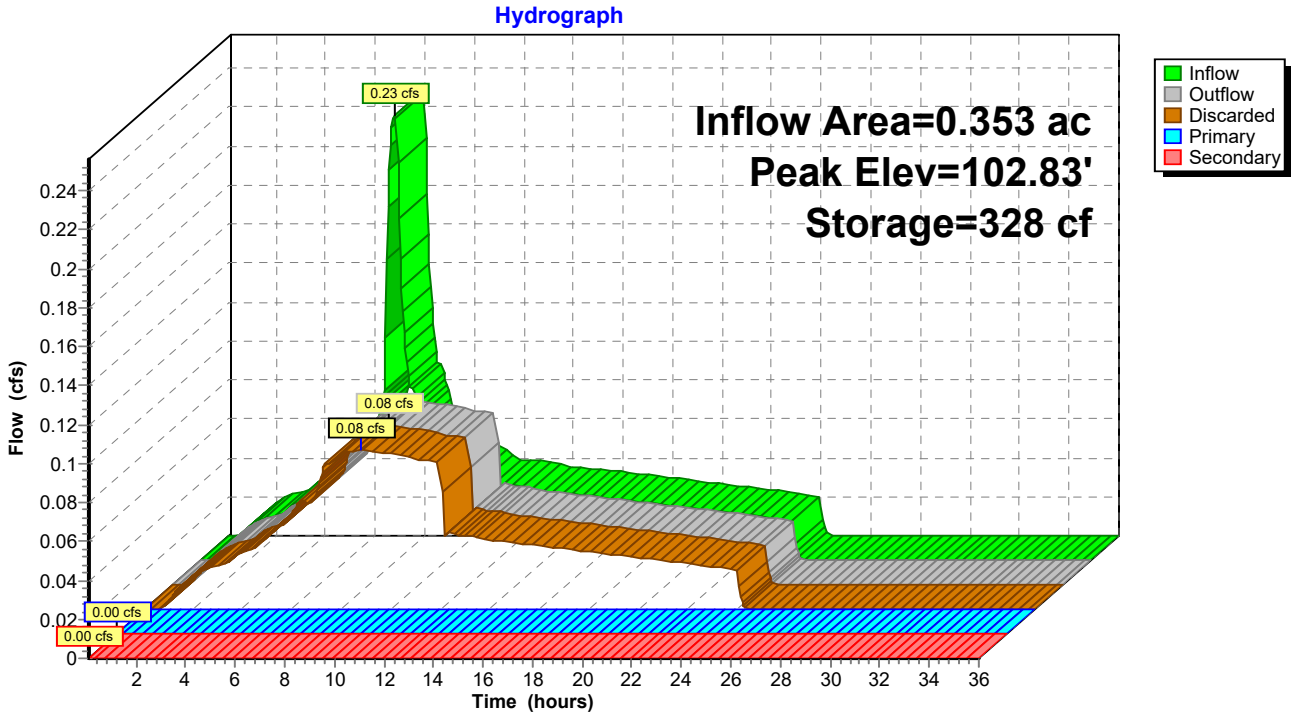
Device	Routing	Invert	Outlet Devices
#0	Secondary	104.00'	**Automatic Storage Overflow** (Discharged without head)
#1	Discarded	100.00'	**9.330 in/hr Exfiltration over Surface area** Conductivity to Groundwater Elevation = 70.00'
#2	Primary	103.83'	**6.0" Horiz. Grate** C= 0.600 Limited to weir flow at low heads

Discarded OutFlow Max=0.08 cfs @ 8.82 hrs HW=102.83' (Free Discharge)
↑└**1=Exfiltration** (Controls 0.08 cfs)

Primary OutFlow Max=0.00 cfs @ 0.10 hrs HW=100.00' (Free Discharge)
↑└**2=Grate** (Controls 0.00 cfs)

Secondary OutFlow Max=0.00 cfs @ 0.10 hrs HW=100.00' (Free Discharge)

Pond 2P: Rain Garden



Summary for Pond 4P: Rain Garden

Inflow Area = 0.107 ac, 82.81% Impervious, Inflow Depth = 2.64" for 10-Yr event
Inflow = 0.07 cfs @ 7.91 hrs, Volume= 0.023 af
Outflow = 0.02 cfs @ 9.12 hrs, Volume= 0.023 af, Atten= 70%, Lag= 72.5 min
Discarded = 0.02 cfs @ 9.12 hrs, Volume= 0.023 af
Primary = 0.00 cfs @ 0.10 hrs, Volume= 0.000 af
Routed to Reach 5R : PIPE
Secondary = 0.00 cfs @ 0.10 hrs, Volume= 0.000 af
Routed to Reach 5R : PIPE

Routing by Stor-Ind method, Time Span= 0.10-36.00 hrs, dt= 0.05 hrs / 2
Peak Elev= 103.33' @ 9.12 hrs Surf.Area= 86 sf Storage= 125 cf
Flood Elev= 104.00' Surf.Area= 86 sf Storage= 182 cf

Plug-Flow detention time= 31.0 min calculated for 0.023 af (100% of inflow)
Center-of-Mass det. time= 31.1 min (710.9 - 679.8)

Volume	Invert	Avail.Storage	Storage Description
#1	100.00'	182 cf	**Custom Stage Data (Prismatic)** Listed below (Recalc)

Elevation (feet)	Surf.Area (sq-ft)	Voids (%)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
100.00	86	0.0	0	0
101.00	86	40.0	34	34
101.33	86	30.0	9	43
102.83	86	30.0	39	82
103.83	86	100.0	86	168
104.00	86	100.0	15	182

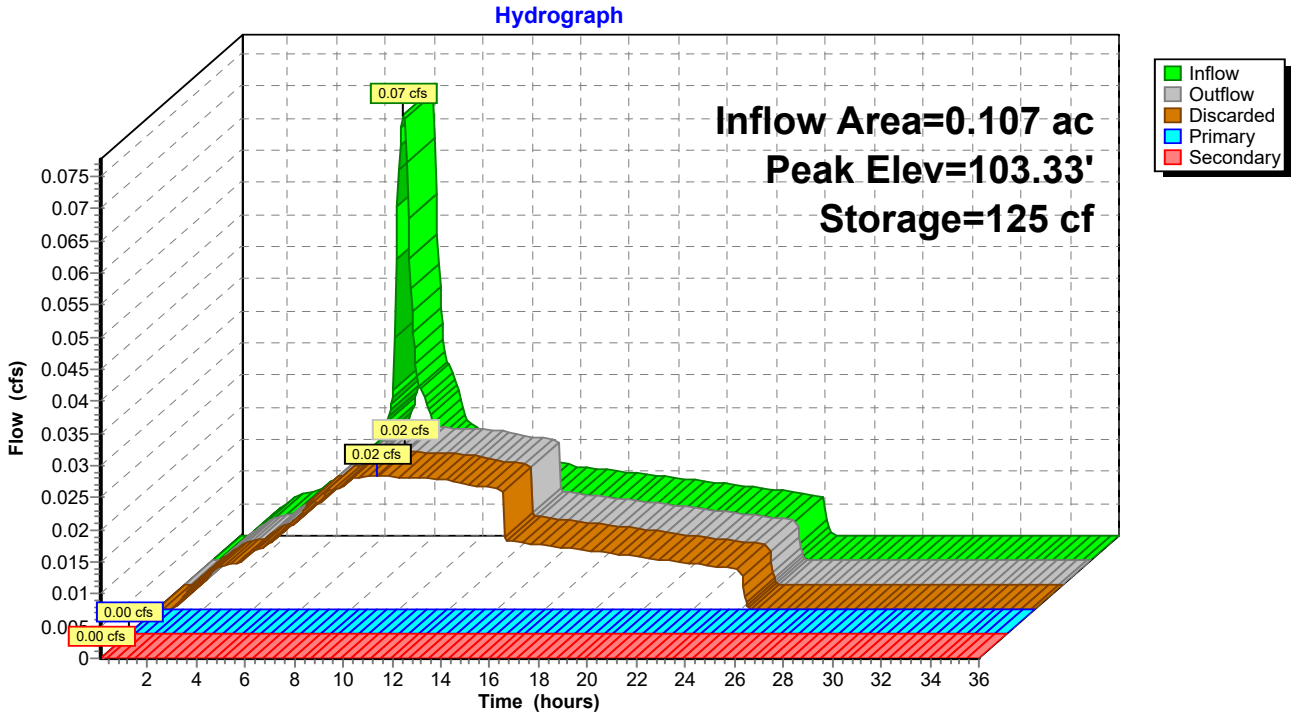
Device	Routing	Invert	Outlet Devices
#0	Secondary	104.00'	**Automatic Storage Overflow** (Discharged without head)
#1	Discarded	100.00'	**9.330 in/hr Exfiltration over Surface area** Conductivity to Groundwater Elevation = 70.00'
#2	Primary	103.83'	**6.0" Horiz. Grate** C= 0.600 Limited to weir flow at low heads

Discarded OutFlow Max=0.02 cfs @ 9.12 hrs HW=103.33' (Free Discharge)
↑—**1=Exfiltration** (Controls 0.02 cfs)

Primary OutFlow Max=0.00 cfs @ 0.10 hrs HW=100.00' (Free Discharge)
↑—**2=Grate** (Controls 0.00 cfs)

Secondary OutFlow Max=0.00 cfs @ 0.10 hrs HW=100.00' (Free Discharge)

Pond 4P: Rain Garden



Time span=0.10-36.00 hrs, dt=0.05 hrs, 719 points
Runoff by SBUH method, Split Pervious/Imperv.
Reach routing by Stor-Ind+Trans method - Pond routing by Stor-Ind method

Subcatchment1S: A Runoff Area=15,392 sf 82.46% Impervious Runoff Depth=3.01"
Tc=5.0 min CN=74/98 Runoff=0.26 cfs 0.088 af

Subcatchment3S: B Runoff Area=4,653 sf 82.81% Impervious Runoff Depth=3.01"
Tc=5.0 min CN=74/98 Runoff=0.08 cfs 0.027 af

Reach 3R: PIPE Avg. Flow Depth=0.00' Max Vel=0.00 fps Inflow=0.00 cfs 0.000 af
3.0" Round Pipe x 3.00 n=0.013 L=15.0' S=0.0100 '/' Capacity=0.27 cfs Outflow=0.00 cfs 0.000 af

Reach 5R: PIPE Avg. Flow Depth=0.00' Max Vel=0.00 fps Inflow=0.00 cfs 0.000 af
3.0" Round Pipe x 3.00 n=0.013 L=15.0' S=0.0100 '/' Capacity=0.27 cfs Outflow=0.00 cfs 0.000 af

Pond 2P: Rain Garden Peak Elev=103.15' Storage=437 cf Inflow=0.26 cfs 0.088 af
Discarded=0.08 cfs 0.088 af Primary=0.00 cfs 0.000 af Secondary=0.00 cfs 0.000 af Outflow=0.08 cfs 0.088 af

Pond 4P: Rain Garden Peak Elev=103.80' Storage=165 cf Inflow=0.08 cfs 0.027 af
Discarded=0.02 cfs 0.027 af Primary=0.00 cfs 0.000 af Secondary=0.00 cfs 0.000 af Outflow=0.02 cfs 0.027 af

Total Runoff Area = 0.460 ac Runoff Volume = 0.115 af Average Runoff Depth = 3.01"
17.46% Pervious = 0.080 ac 82.54% Impervious = 0.380 ac

Summary for Subcatchment 1S: A

[49] Hint: Tc<2dt may require smaller dt

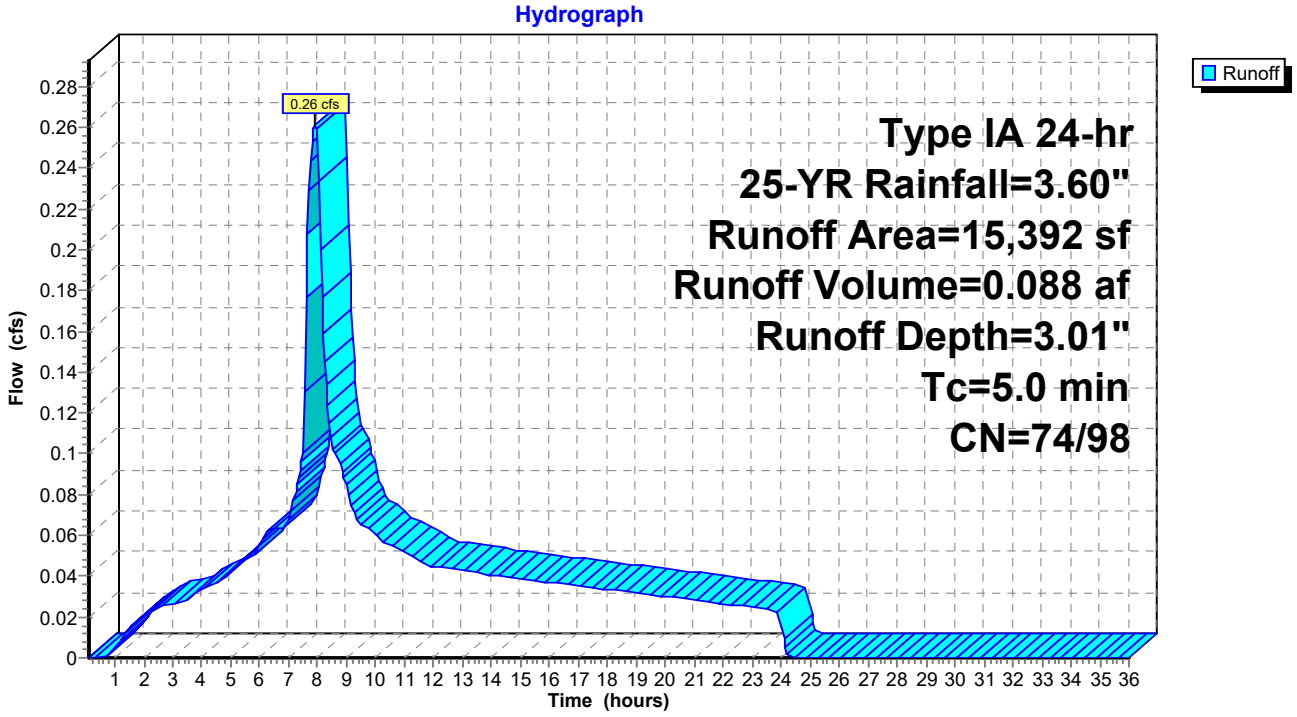
Runoff = 0.26 cfs @ 7.91 hrs, Volume= 0.088 af, Depth= 3.01"
Routed to Pond 2P : Rain Garden

Runoff by SBUH method, Split Pervious/Imperv., Time Span= 0.10-36.00 hrs, dt= 0.05 hrs
Type IA 24-hr 25-YR Rainfall=3.60"

Area (sf)	CN	Description
12,692	98	Paved parking, HSG C
2,700	74	>75% Grass cover, Good, HSG C
15,392	94	Weighted Average
2,700	74	17.54% Pervious Area
12,692	98	82.46% Impervious Area

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

Subcatchment 1S: A



Summary for Subcatchment 3S: B

[49] Hint: Tc<2dt may require smaller dt

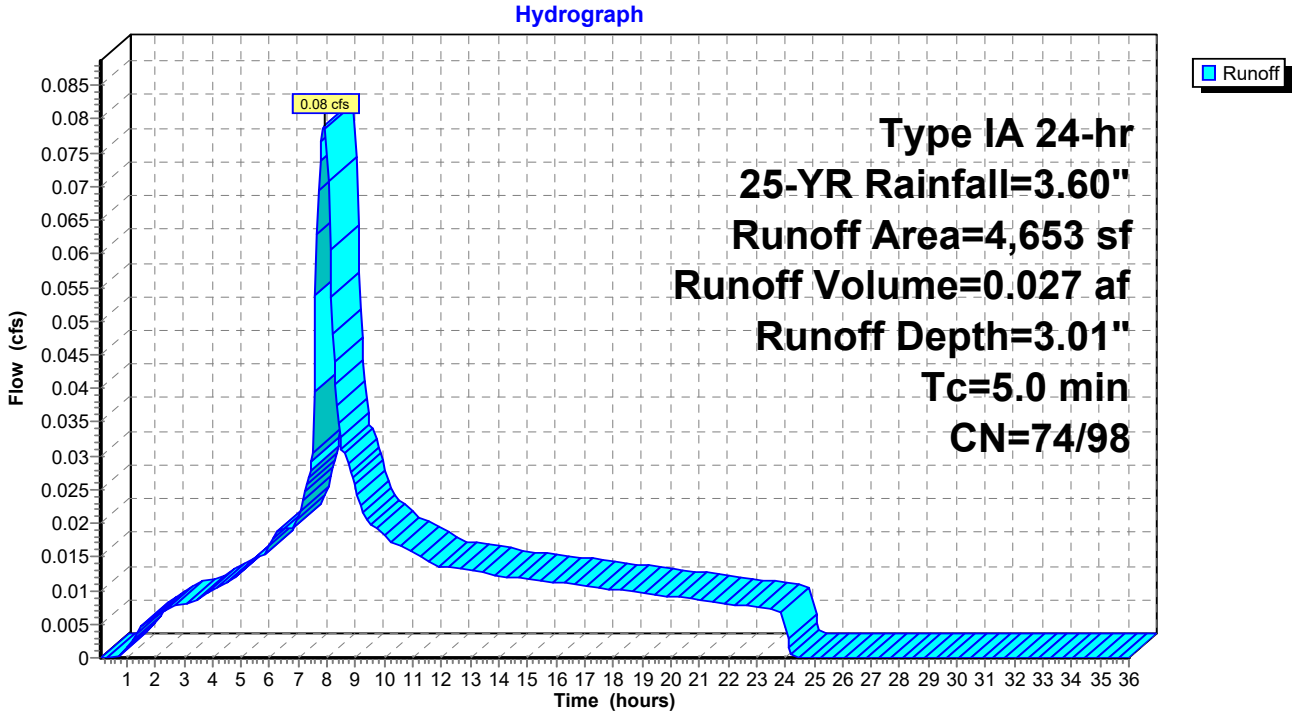
Runoff = 0.08 cfs @ 7.91 hrs, Volume= 0.027 af, Depth= 3.01"
Routed to Pond 4P : Rain Garden

Runoff by SBUH method, Split Pervious/Imperv., Time Span= 0.10-36.00 hrs, dt= 0.05 hrs
Type IA 24-hr 25-YR Rainfall=3.60"

Area (sf)	CN	Description
3,853	98	Paved parking, HSG C
800	74	>75% Grass cover, Good, HSG C
4,653	94	Weighted Average
800	74	17.19% Pervious Area
3,853	98	82.81% Impervious Area

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

Subcatchment 3S: B



Summary for Reach 3R: PIPE

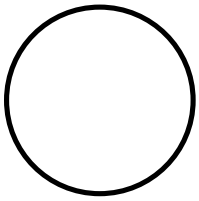
[52] Hint: Inlet/Outlet conditions not evaluated

Inflow Area = 0.353 ac, 82.46% Impervious, Inflow Depth = 0.00" for 25-YR event
Inflow = 0.00 cfs @ 0.10 hrs, Volume= 0.000 af
Outflow = 0.00 cfs @ 0.10 hrs, Volume= 0.000 af, Atten= 0%, Lag= 0.0 min

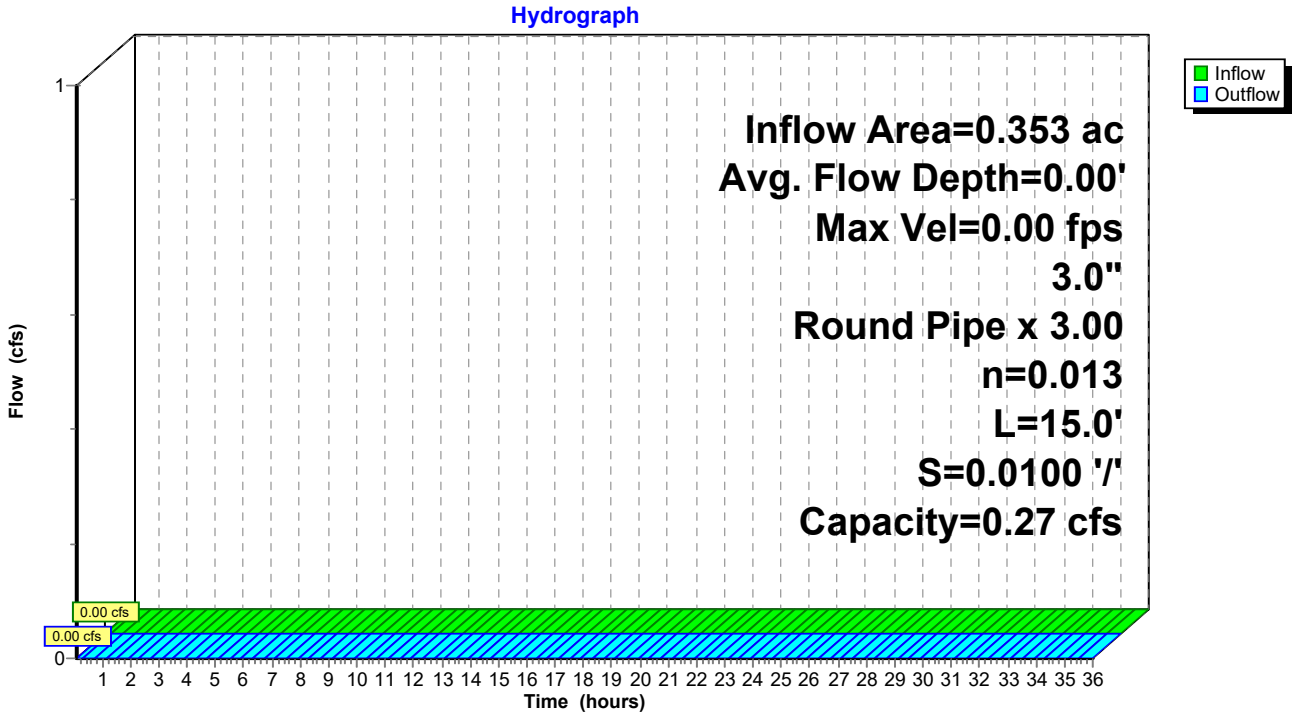
Routing by Stor-Ind+Trans method, Time Span= 0.10-36.00 hrs, dt= 0.05 hrs
Max. Velocity= 0.00 fps, Min. Travel Time= 0.0 min
Avg. Velocity = 0.00 fps, Avg. Travel Time= 0.0 min

Peak Storage= 0 cf @ 0.10 hrs
Average Depth at Peak Storage= 0.00'
Bank-Full Depth= 0.25' Flow Area= 0.1 sf, Capacity= 0.27 cfs

A factor of 3.00 has been applied to the storage and discharge capacity
3.0" Round Pipe
n= 0.013
Length= 15.0' Slope= 0.0100 '/'
Inlet Invert= 100.00', Outlet Invert= 99.85'



Reach 3R: PIPE



Summary for Reach 5R: PIPE

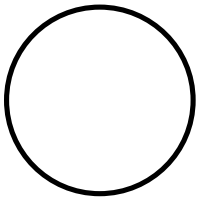
[52] Hint: Inlet/Outlet conditions not evaluated

Inflow Area = 0.107 ac, 82.81% Impervious, Inflow Depth = 0.00" for 25-YR event
Inflow = 0.00 cfs @ 0.10 hrs, Volume= 0.000 af
Outflow = 0.00 cfs @ 0.10 hrs, Volume= 0.000 af, Atten= 0%, Lag= 0.0 min

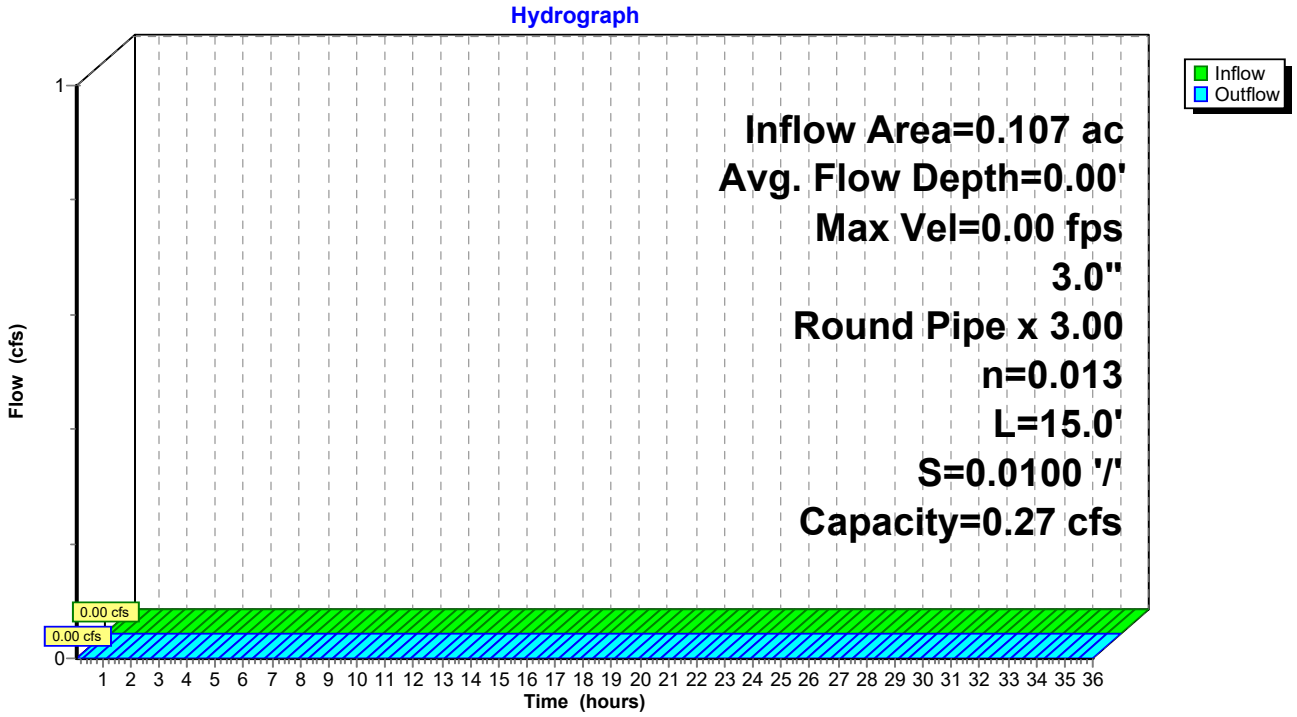
Routing by Stor-Ind+Trans method, Time Span= 0.10-36.00 hrs, dt= 0.05 hrs
Max. Velocity= 0.00 fps, Min. Travel Time= 0.0 min
Avg. Velocity = 0.00 fps, Avg. Travel Time= 0.0 min

Peak Storage= 0 cf @ 0.10 hrs
Average Depth at Peak Storage= 0.00'
Bank-Full Depth= 0.25' Flow Area= 0.1 sf, Capacity= 0.27 cfs

A factor of 3.00 has been applied to the storage and discharge capacity
3.0" Round Pipe
n= 0.013
Length= 15.0' Slope= 0.0100 '/'
Inlet Invert= 100.00', Outlet Invert= 99.85'



Reach 5R: PIPE



Summary for Pond 2P: Rain Garden

Inflow Area = 0.353 ac, 82.46% Impervious, Inflow Depth = 3.01" for 25-YR event
Inflow = 0.26 cfs @ 7.91 hrs, Volume= 0.088 af
Outflow = 0.08 cfs @ 9.02 hrs, Volume= 0.088 af, Atten= 68%, Lag= 66.9 min
Discarded = 0.08 cfs @ 9.02 hrs, Volume= 0.088 af
Primary = 0.00 cfs @ 0.10 hrs, Volume= 0.000 af
Routed to Reach 3R : PIPE
Secondary = 0.00 cfs @ 0.10 hrs, Volume= 0.000 af
Routed to Reach 3R : PIPE

Routing by Stor-Ind method, Time Span= 0.10-36.00 hrs, dt= 0.05 hrs
Peak Elev= 103.15' @ 9.02 hrs Surf.Area= 345 sf Storage= 437 cf
Flood Elev= 104.00' Surf.Area= 345 sf Storage= 731 cf

Plug-Flow detention time= 25.5 min calculated for 0.088 af (100% of inflow)
Center-of-Mass det. time= 25.5 min (703.0 - 677.5)

Volume	Invert	Avail.Storage	Storage Description
#1	100.00'	731 cf	**Custom Stage Data (Prismatic)** Listed below (Recalc)

Elevation (feet)	Surf.Area (sq-ft)	Voids (%)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
100.00	345	0.0	0	0
101.00	345	40.0	138	138
101.33	345	30.0	34	172
102.83	345	30.0	155	327
103.83	345	100.0	345	672
104.00	345	100.0	59	731

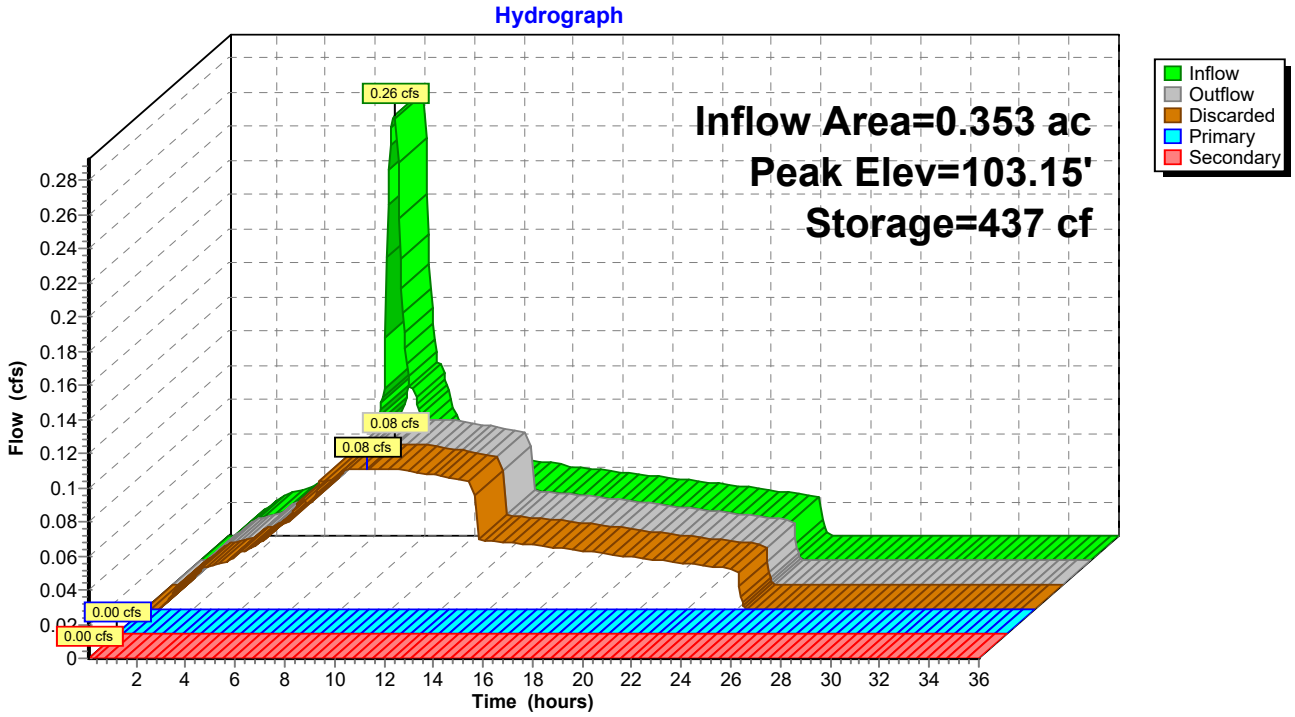
Device	Routing	Invert	Outlet Devices
#0	Secondary	104.00'	**Automatic Storage Overflow** (Discharged without head)
#1	Discarded	100.00'	**9.330 in/hr Exfiltration over Surface area** Conductivity to Groundwater Elevation = 70.00'
#2	Primary	103.83'	**6.0" Horiz. Grate** C= 0.600 Limited to weir flow at low heads

Discarded OutFlow Max=0.08 cfs @ 9.02 hrs HW=103.15' (Free Discharge)
↑**1=Exfiltration** (Controls 0.08 cfs)

Primary OutFlow Max=0.00 cfs @ 0.10 hrs HW=100.00' (Free Discharge)
↑**2=Grate** (Controls 0.00 cfs)

Secondary OutFlow Max=0.00 cfs @ 0.10 hrs HW=100.00' (Free Discharge)

Pond 2P: Rain Garden



Summary for Pond 4P: Rain Garden

Inflow Area = 0.107 ac, 82.81% Impervious, Inflow Depth = 3.01" for 25-YR event
Inflow = 0.08 cfs @ 7.91 hrs, Volume= 0.027 af
Outflow = 0.02 cfs @ 9.34 hrs, Volume= 0.027 af, Atten= 74%, Lag= 86.0 min
Discarded = 0.02 cfs @ 9.34 hrs, Volume= 0.027 af
Primary = 0.00 cfs @ 0.10 hrs, Volume= 0.000 af
Routed to Reach 5R : PIPE
Secondary = 0.00 cfs @ 0.10 hrs, Volume= 0.000 af
Routed to Reach 5R : PIPE

Routing by Stor-Ind method, Time Span= 0.10-36.00 hrs, dt= 0.05 hrs / 2
Peak Elev= 103.80' @ 9.34 hrs Surf.Area= 86 sf Storage= 165 cf
Flood Elev= 104.00' Surf.Area= 86 sf Storage= 182 cf

Plug-Flow detention time= 47.4 min calculated for 0.027 af (100% of inflow)
Center-of-Mass det. time= 47.3 min (724.5 - 677.2)

Volume	Invert	Avail.Storage	Storage Description
#1	100.00'	182 cf	**Custom Stage Data (Prismatic)** Listed below (Recalc)

Elevation (feet)	Surf.Area (sq-ft)	Voids (%)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
100.00	86	0.0	0	0
101.00	86	40.0	34	34
101.33	86	30.0	9	43
102.83	86	30.0	39	82
103.83	86	100.0	86	168
104.00	86	100.0	15	182

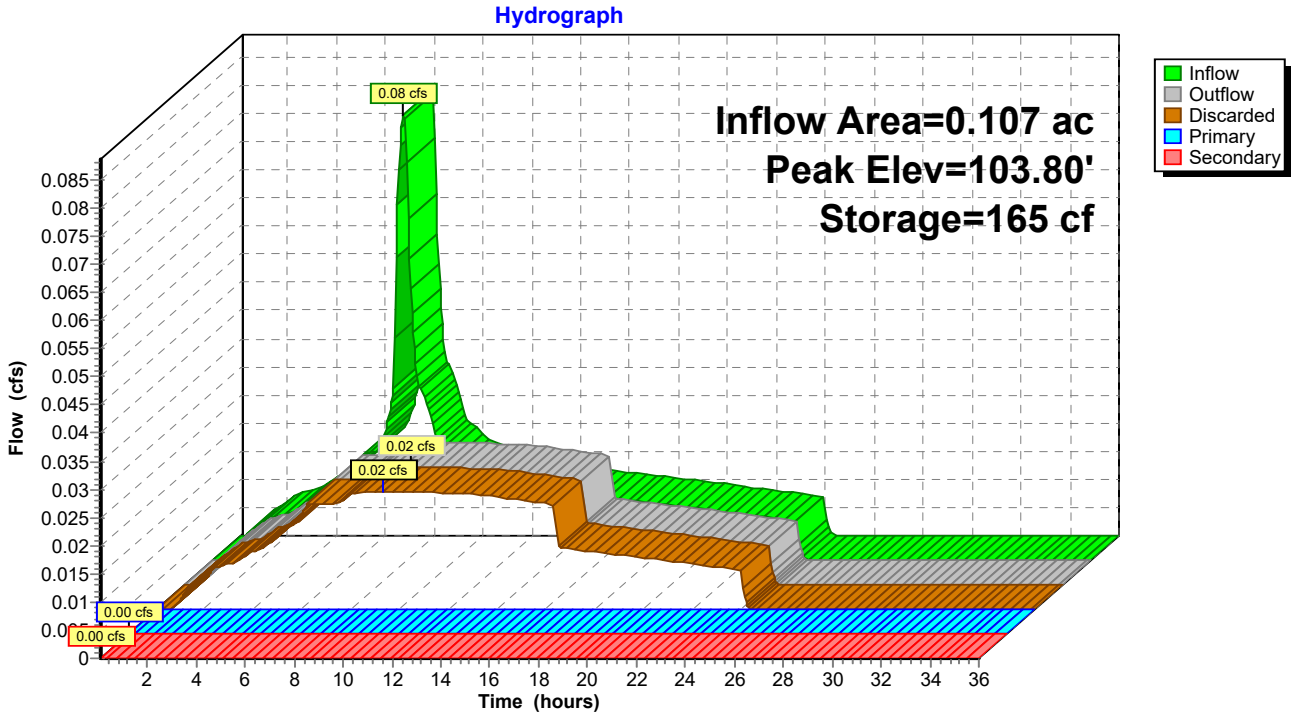
Device	Routing	Invert	Outlet Devices
#0	Secondary	104.00'	**Automatic Storage Overflow** (Discharged without head)
#1	Discarded	100.00'	**9.330 in/hr Exfiltration over Surface area** Conductivity to Groundwater Elevation = 70.00'
#2	Primary	103.83'	**6.0" Horiz. Grate** C= 0.600 Limited to weir flow at low heads

Discarded OutFlow Max=0.02 cfs @ 9.34 hrs HW=103.80' (Free Discharge)
↑**1=Exfiltration** (Controls 0.02 cfs)

Primary OutFlow Max=0.00 cfs @ 0.10 hrs HW=100.00' (Free Discharge)
↑**2=Grate** (Controls 0.00 cfs)

Secondary OutFlow Max=0.00 cfs @ 0.10 hrs HW=100.00' (Free Discharge)

Pond 4P: Rain Garden



Time span=0.10-36.00 hrs, dt=0.05 hrs, 719 points
Runoff by SBUH method, Split Pervious/Imperv.
Reach routing by Stor-Ind+Trans method - Pond routing by Stor-Ind method

Subcatchment1S: A Runoff Area=15,392 sf 82.46% Impervious Runoff Depth=3.77"
Tc=5.0 min CN=74/98 Runoff=0.33 cfs 0.111 af

Subcatchment3S: B Runoff Area=4,653 sf 82.81% Impervious Runoff Depth=3.77"
Tc=5.0 min CN=74/98 Runoff=0.10 cfs 0.034 af

Reach 3R: PIPE Avg. Flow Depth=0.05' Max Vel=1.10 fps Inflow=0.02 cfs 0.001 af
3.0" Round Pipe x 3.00 n=0.013 L=15.0' S=0.0100 '/' Capacity=0.27 cfs Outflow=0.02 cfs 0.001 af

Reach 5R: PIPE Avg. Flow Depth=0.08' Max Vel=1.43 fps Inflow=0.06 cfs 0.002 af
3.0" Round Pipe x 3.00 n=0.013 L=15.0' S=0.0100 '/' Capacity=0.27 cfs Outflow=0.06 cfs 0.002 af

Pond 2P: Rain Garden Peak Elev=103.85' Storage=681 cf Inflow=0.33 cfs 0.111 af
Discarded=0.08 cfs 0.110 af Primary=0.02 cfs 0.001 af Secondary=0.00 cfs 0.000 af Outflow=0.11 cfs 0.111 af

Pond 4P: Rain Garden Peak Elev=103.88' Storage=172 cf Inflow=0.10 cfs 0.034 af
Discarded=0.02 cfs 0.031 af Primary=0.06 cfs 0.002 af Secondary=0.00 cfs 0.000 af Outflow=0.08 cfs 0.034 af

Total Runoff Area = 0.460 ac Runoff Volume = 0.144 af Average Runoff Depth = 3.77"
17.46% Pervious = 0.080 ac 82.54% Impervious = 0.380 ac

Summary for Subcatchment 1S: A

[49] Hint: Tc<2dt may require smaller dt

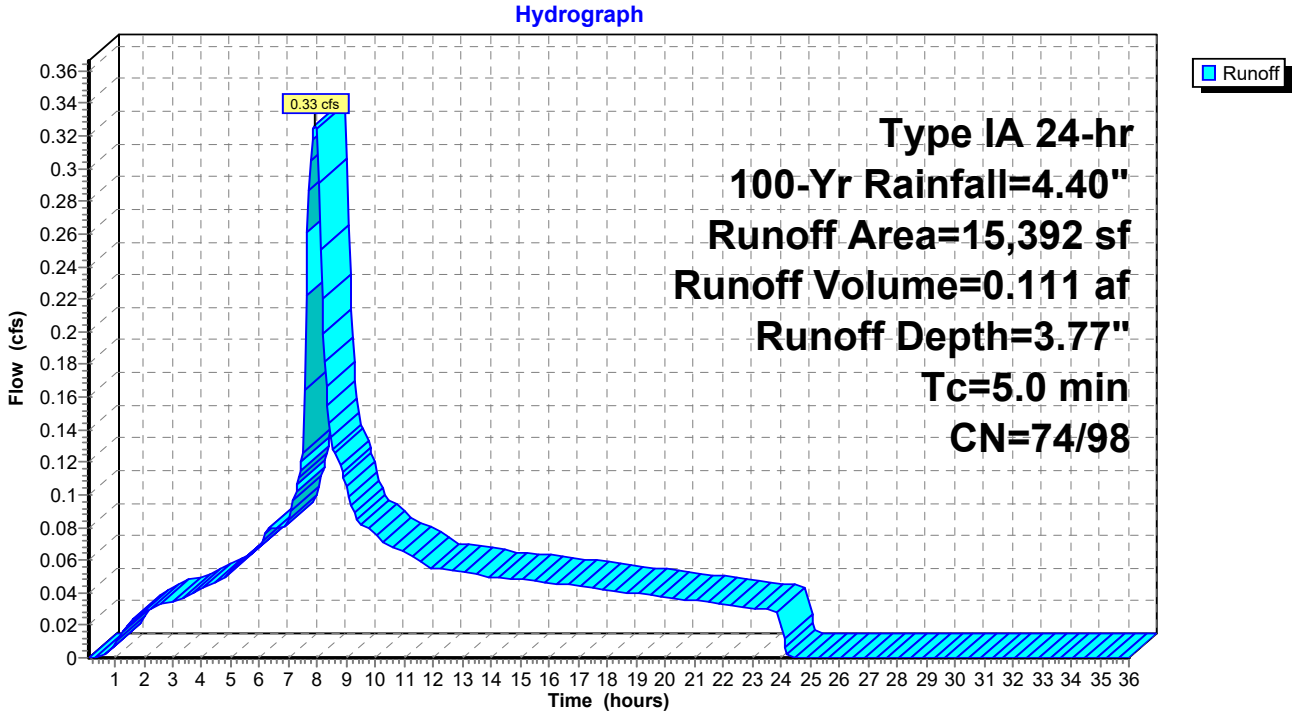
Runoff = 0.33 cfs @ 7.91 hrs, Volume= 0.111 af, Depth= 3.77"
Routed to Pond 2P : Rain Garden

Runoff by SBUH method, Split Pervious/Imperv., Time Span= 0.10-36.00 hrs, dt= 0.05 hrs
Type IA 24-hr 100-Yr Rainfall=4.40"

Area (sf)	CN	Description
12,692	98	Paved parking, HSG C
2,700	74	>75% Grass cover, Good, HSG C
15,392	94	Weighted Average
2,700	74	17.54% Pervious Area
12,692	98	82.46% Impervious Area

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

Subcatchment 1S: A



Summary for Subcatchment 3S: B

[49] Hint: Tc<2dt may require smaller dt

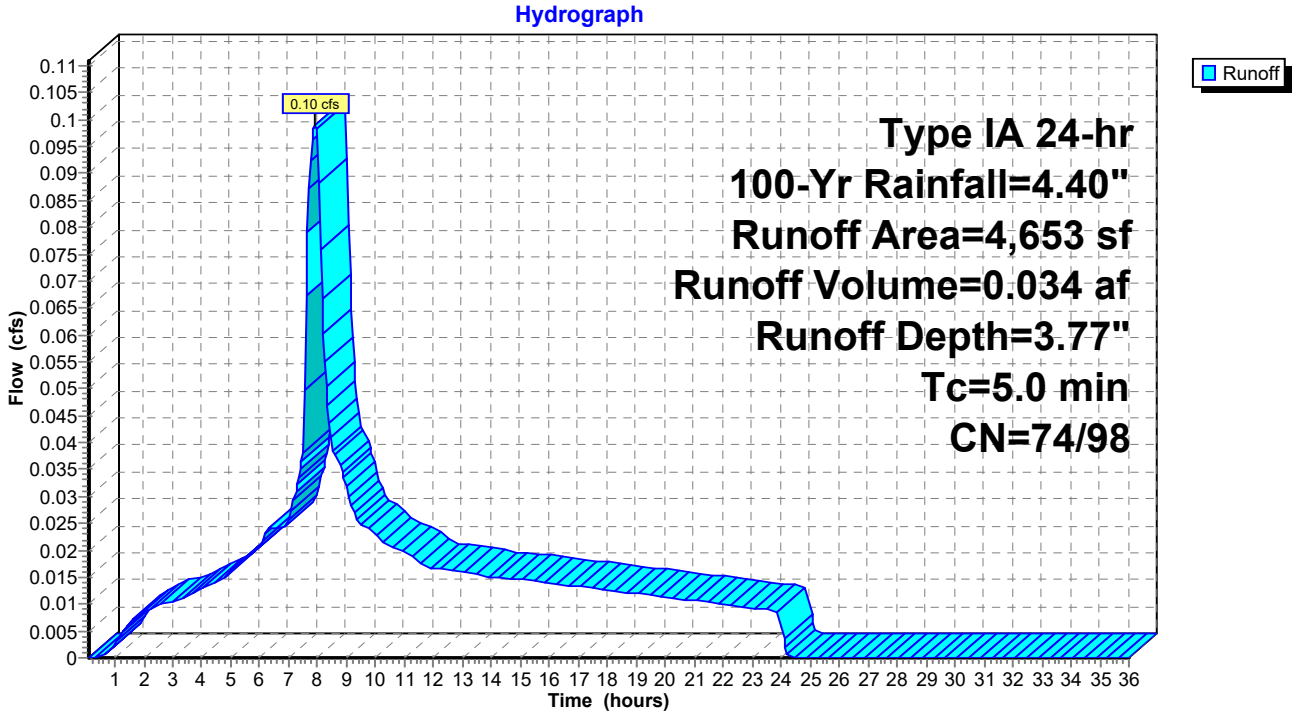
Runoff = 0.10 cfs @ 7.91 hrs, Volume= 0.034 af, Depth= 3.77"
Routed to Pond 4P : Rain Garden

Runoff by SBUH method, Split Pervious/Imperv., Time Span= 0.10-36.00 hrs, dt= 0.05 hrs
Type IA 24-hr 100-Yr Rainfall=4.40"

Area (sf)	CN	Description
3,853	98	Paved parking, HSG C
800	74	>75% Grass cover, Good, HSG C
4,653	94	Weighted Average
800	74	17.19% Pervious Area
3,853	98	82.81% Impervious Area

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

Subcatchment 3S: B



Summary for Reach 3R: PIPE

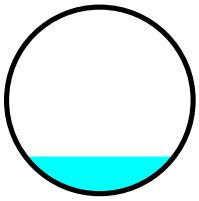
[52] Hint: Inlet/Outlet conditions not evaluated

Inflow Area = 0.353 ac, 82.46% Impervious, Inflow Depth = 0.02" for 100-Yr event
Inflow = 0.02 cfs @ 8.96 hrs, Volume= 0.001 af
Outflow = 0.02 cfs @ 8.98 hrs, Volume= 0.001 af, Atten= 1%, Lag= 0.9 min

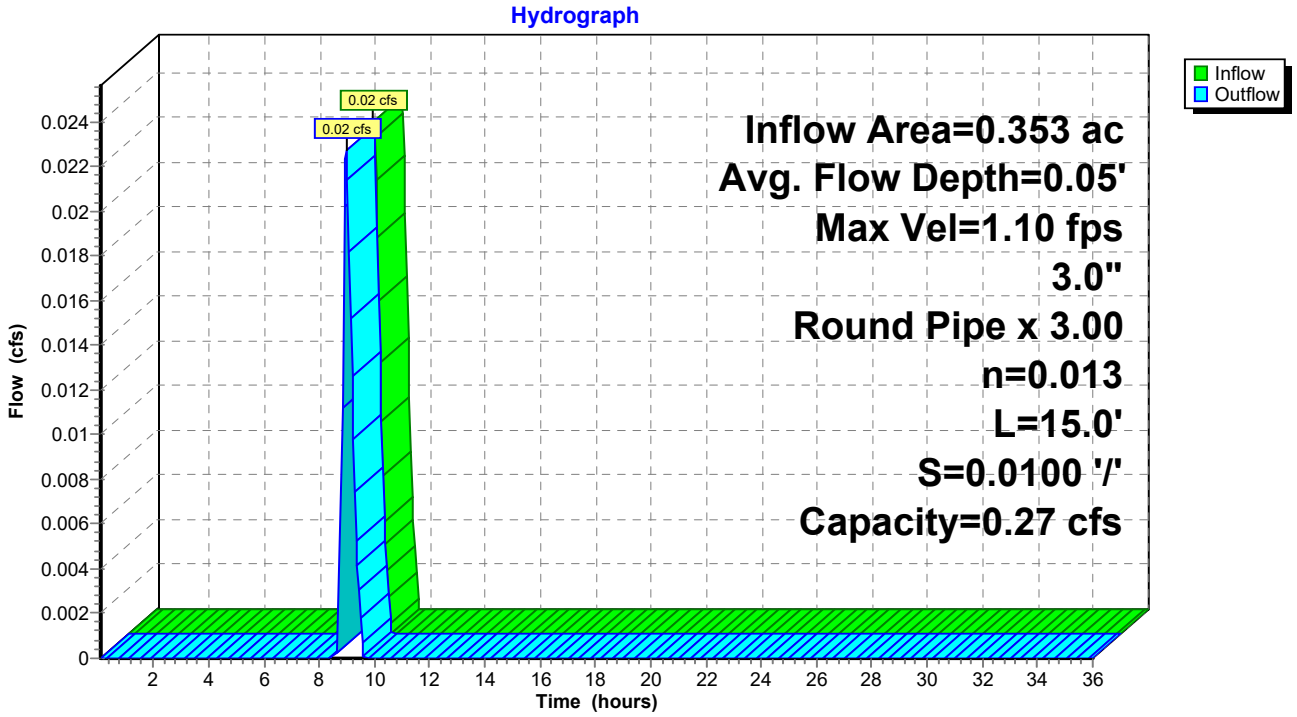
Routing by Stor-Ind+Trans method, Time Span= 0.10-36.00 hrs, dt= 0.05 hrs
Max. Velocity= 1.10 fps, Min. Travel Time= 0.2 min
Avg. Velocity = 0.78 fps, Avg. Travel Time= 0.3 min

Peak Storage= 0 cf @ 8.98 hrs
Average Depth at Peak Storage= 0.05' , Surface Width= 0.60'
Bank-Full Depth= 0.25' Flow Area= 0.1 sf, Capacity= 0.27 cfs

A factor of 3.00 has been applied to the storage and discharge capacity
3.0" Round Pipe
n= 0.013
Length= 15.0' Slope= 0.0100 '/'
Inlet Invert= 100.00', Outlet Invert= 99.85'



Reach 3R: PIPE



Summary for Reach 5R: PIPE

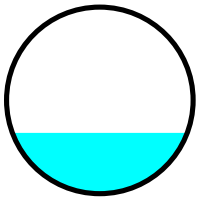
[52] Hint: Inlet/Outlet conditions not evaluated

Inflow Area = 0.107 ac, 82.81% Impervious, Inflow Depth = 0.27" for 100-Yr event
Inflow = 0.06 cfs @ 8.12 hrs, Volume= 0.002 af
Outflow = 0.06 cfs @ 8.12 hrs, Volume= 0.002 af, Atten= 4%, Lag= 0.3 min

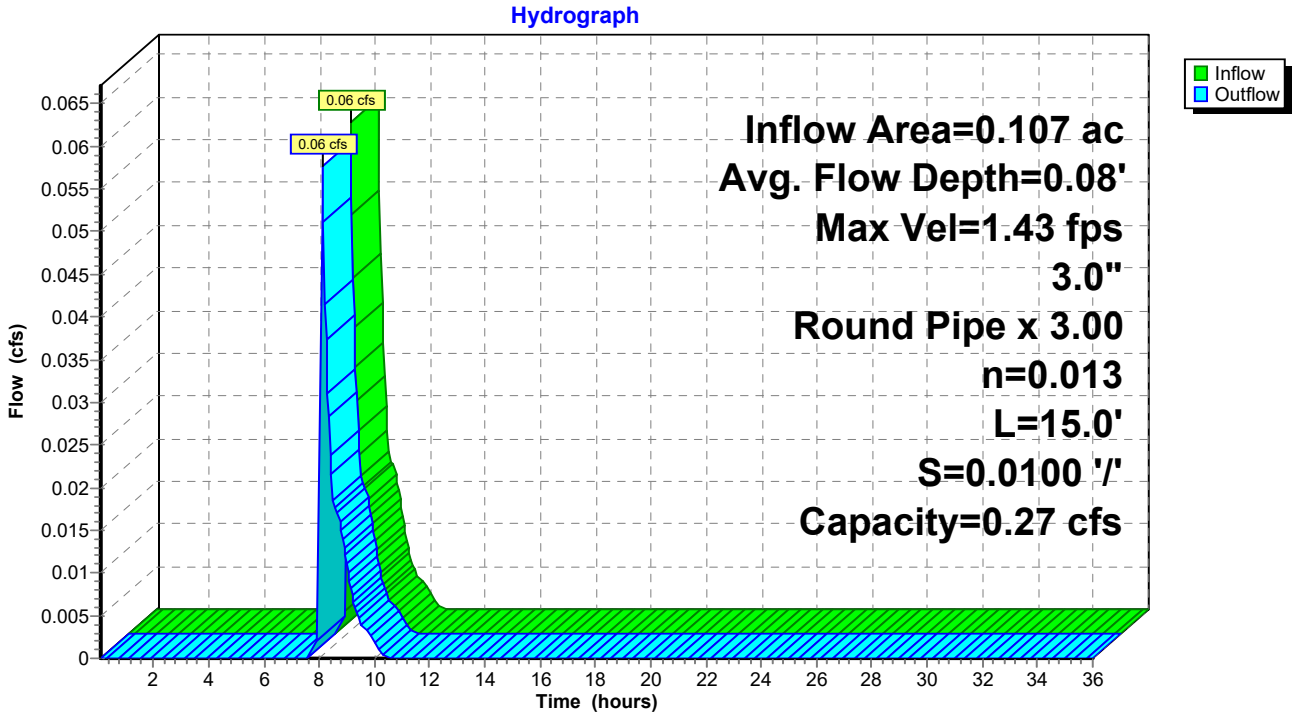
Routing by Stor-Ind+Trans method, Time Span= 0.10-36.00 hrs, dt= 0.05 hrs
Max. Velocity= 1.43 fps, Min. Travel Time= 0.2 min
Avg. Velocity = 0.80 fps, Avg. Travel Time= 0.3 min

Peak Storage= 1 cf @ 8.12 hrs
Average Depth at Peak Storage= 0.08' , Surface Width= 0.70'
Bank-Full Depth= 0.25' Flow Area= 0.1 sf, Capacity= 0.27 cfs

A factor of 3.00 has been applied to the storage and discharge capacity
3.0" Round Pipe
n= 0.013
Length= 15.0' Slope= 0.0100 '/'
Inlet Invert= 100.00', Outlet Invert= 99.85'



Reach 5R: PIPE



Summary for Pond 2P: Rain Garden

Inflow Area = 0.353 ac, 82.46% Impervious, Inflow Depth = 3.77" for 100-Yr event
Inflow = 0.33 cfs @ 7.91 hrs, Volume= 0.111 af
Outflow = 0.11 cfs @ 8.96 hrs, Volume= 0.111 af, Atten= 67%, Lag= 63.4 min
Discarded = 0.08 cfs @ 8.96 hrs, Volume= 0.110 af
Primary = 0.02 cfs @ 8.96 hrs, Volume= 0.001 af
Routed to Reach 3R : PIPE
Secondary = 0.00 cfs @ 0.10 hrs, Volume= 0.000 af
Routed to Reach 3R : PIPE

Routing by Stor-Ind method, Time Span= 0.10-36.00 hrs, dt= 0.05 hrs
Peak Elev= 103.85' @ 8.96 hrs Surf.Area= 345 sf Storage= 681 cf
Flood Elev= 104.00' Surf.Area= 345 sf Storage= 731 cf

Plug-Flow detention time= 49.3 min calculated for 0.111 af (100% of inflow)
Center-of-Mass det. time= 49.3 min (722.5 - 673.2)

Volume	Invert	Avail.Storage	Storage Description
#1	100.00'	731 cf	**Custom Stage Data (Prismatic)** Listed below (Recalc)

Elevation (feet)	Surf.Area (sq-ft)	Voids (%)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
100.00	345	0.0	0	0
101.00	345	40.0	138	138
101.33	345	30.0	34	172
102.83	345	30.0	155	327
103.83	345	100.0	345	672
104.00	345	100.0	59	731

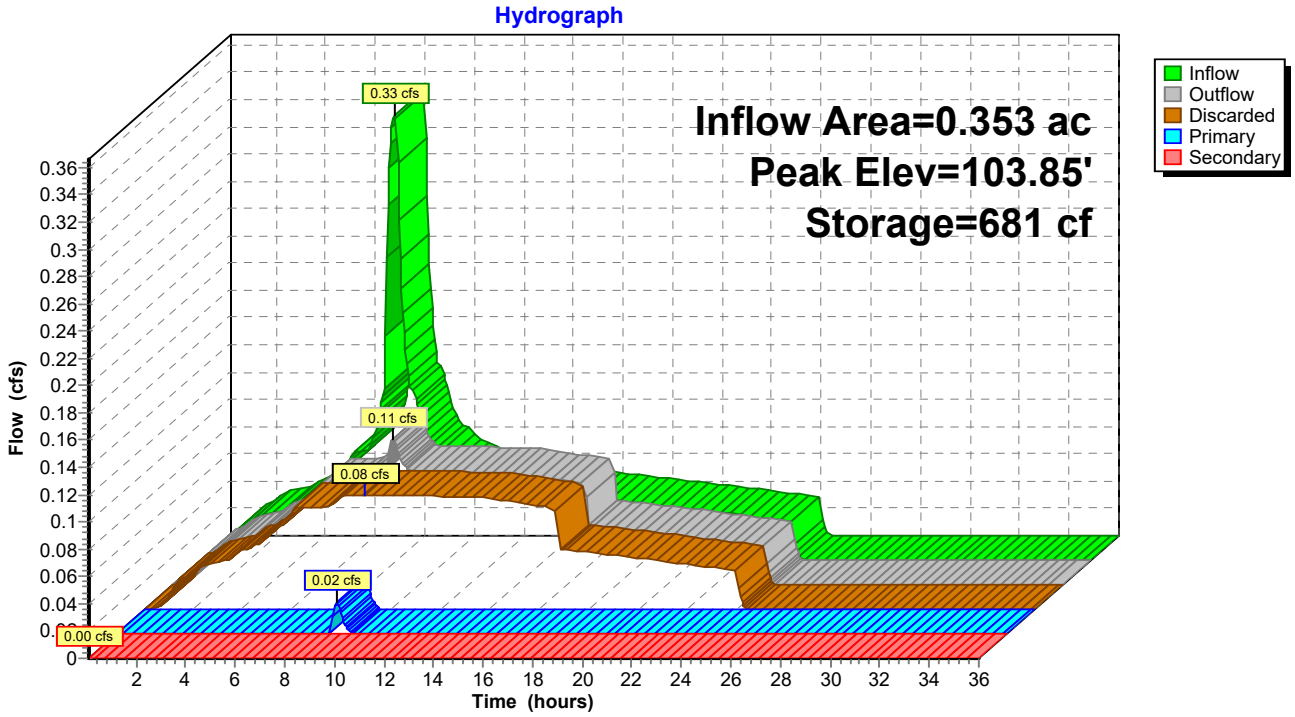
Device	Routing	Invert	Outlet Devices
#0	Secondary	104.00'	**Automatic Storage Overflow** (Discharged without head)
#1	Discarded	100.00'	**9.330 in/hr Exfiltration over Surface area** Conductivity to Groundwater Elevation = 70.00'
#2	Primary	103.83'	**6.0" Horiz. Grate** C= 0.600 Limited to weir flow at low heads

Discarded OutFlow Max=0.08 cfs @ 8.96 hrs HW=103.85' (Free Discharge)
↑**1=Exfiltration** (Controls 0.08 cfs)

Primary OutFlow Max=0.02 cfs @ 8.96 hrs HW=103.85' (Free Discharge)
↑**2=Grate** (Weir Controls 0.02 cfs @ 0.50 fps)

Secondary OutFlow Max=0.00 cfs @ 0.10 hrs HW=100.00' (Free Discharge)

Pond 2P: Rain Garden



Summary for Pond 4P: Rain Garden

Inflow Area = 0.107 ac, 82.81% Impervious, Inflow Depth = 3.77" for 100-Yr event
Inflow = 0.10 cfs @ 7.91 hrs, Volume= 0.034 af
Outflow = 0.08 cfs @ 8.12 hrs, Volume= 0.034 af, Atten= 18%, Lag= 12.6 min
Discarded = 0.02 cfs @ 8.12 hrs, Volume= 0.031 af
Primary = 0.06 cfs @ 8.12 hrs, Volume= 0.002 af
Routed to Reach 5R : PIPE
Secondary = 0.00 cfs @ 0.10 hrs, Volume= 0.000 af
Routed to Reach 5R : PIPE

Routing by Stor-Ind method, Time Span= 0.10-36.00 hrs, dt= 0.05 hrs / 2
Peak Elev= 103.88' @ 8.12 hrs Surf.Area= 86 sf Storage= 172 cf
Flood Elev= 104.00' Surf.Area= 86 sf Storage= 182 cf

Plug-Flow detention time= 56.6 min calculated for 0.034 af (100% of inflow)
Center-of-Mass det. time= 56.1 min (729.0 - 672.9)

Volume	Invert	Avail.Storage	Storage Description
#1	100.00'	182 cf	**Custom Stage Data (Prismatic)** Listed below (Recalc)

Elevation (feet)	Surf.Area (sq-ft)	Voids (%)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
100.00	86	0.0	0	0
101.00	86	40.0	34	34
101.33	86	30.0	9	43
102.83	86	30.0	39	82
103.83	86	100.0	86	168
104.00	86	100.0	15	182

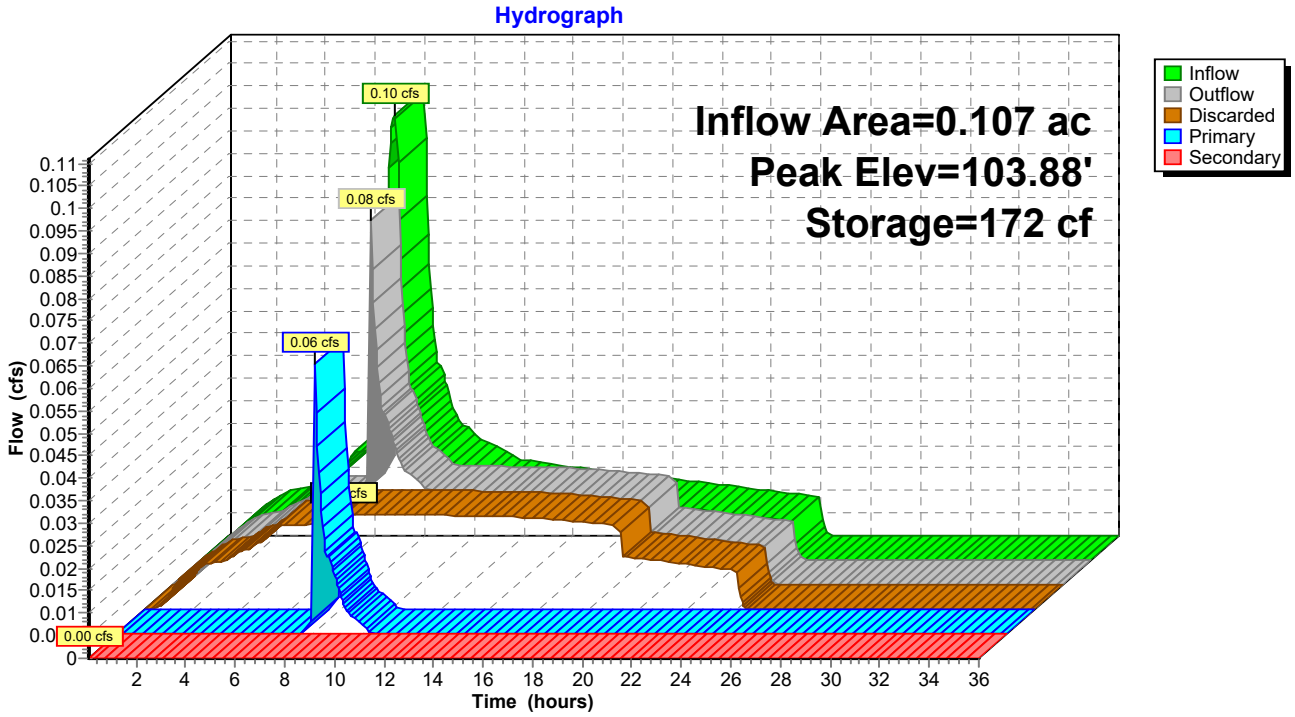
Device	Routing	Invert	Outlet Devices
#0	Secondary	104.00'	**Automatic Storage Overflow** (Discharged without head)
#1	Discarded	100.00'	**9.330 in/hr Exfiltration over Surface area** Conductivity to Groundwater Elevation = 70.00'
#2	Primary	103.83'	**6.0" Horiz. Grate** C= 0.600 Limited to weir flow at low heads

Discarded OutFlow Max=0.02 cfs @ 8.12 hrs HW=103.88' (Free Discharge)
↑**1=Exfiltration** (Controls 0.02 cfs)

Primary OutFlow Max=0.05 cfs @ 8.12 hrs HW=103.88' (Free Discharge)
↑**2=Grate** (Weir Controls 0.05 cfs @ 0.72 fps)

Secondary OutFlow Max=0.00 cfs @ 0.10 hrs HW=100.00' (Free Discharge)

Pond 4P: Rain Garden



Time span=0.10-36.00 hrs, dt=0.05 hrs, 719 points
Runoff by SBUH method, Split Pervious/Imperv.
Reach routing by Stor-Ind+Trans method - Pond routing by Stor-Ind method

Subcatchment1S: A Runoff Area=15,392 sf 82.46% Impervious Runoff Depth=0.98"
Tc=5.0 min CN=74/98 Runoff=0.09 cfs 0.029 af

Subcatchment3S: B Runoff Area=4,653 sf 82.81% Impervious Runoff Depth=0.98"
Tc=5.0 min CN=74/98 Runoff=0.03 cfs 0.009 af

Reach 3R: PIPE Avg. Flow Depth=0.00' Max Vel=0.00 fps Inflow=0.00 cfs 0.000 af
3.0" Round Pipe x 3.00 n=0.013 L=15.0' S=0.0100 '/' Capacity=0.27 cfs Outflow=0.00 cfs 0.000 af

Reach 5R: PIPE Avg. Flow Depth=0.00' Max Vel=0.00 fps Inflow=0.00 cfs 0.000 af
3.0" Round Pipe x 3.00 n=0.013 L=15.0' S=0.0100 '/' Capacity=0.27 cfs Outflow=0.00 cfs 0.000 af

Pond 2P: Rain Garden Peak Elev=100.13' Storage=18 cf Inflow=0.09 cfs 0.029 af
Discarded=0.07 cfs 0.029 af Primary=0.00 cfs 0.000 af Secondary=0.00 cfs 0.000 af Outflow=0.07 cfs 0.029 af

Pond 4P: Rain Garden Peak Elev=100.33' Storage=11 cf Inflow=0.03 cfs 0.009 af
Discarded=0.02 cfs 0.009 af Primary=0.00 cfs 0.000 af Secondary=0.00 cfs 0.000 af Outflow=0.02 cfs 0.009 af

Total Runoff Area = 0.460 ac Runoff Volume = 0.038 af Average Runoff Depth = 0.98"
17.46% Pervious = 0.080 ac 82.54% Impervious = 0.380 ac

Summary for Subcatchment 1S: A

[49] Hint: Tc<2dt may require smaller dt

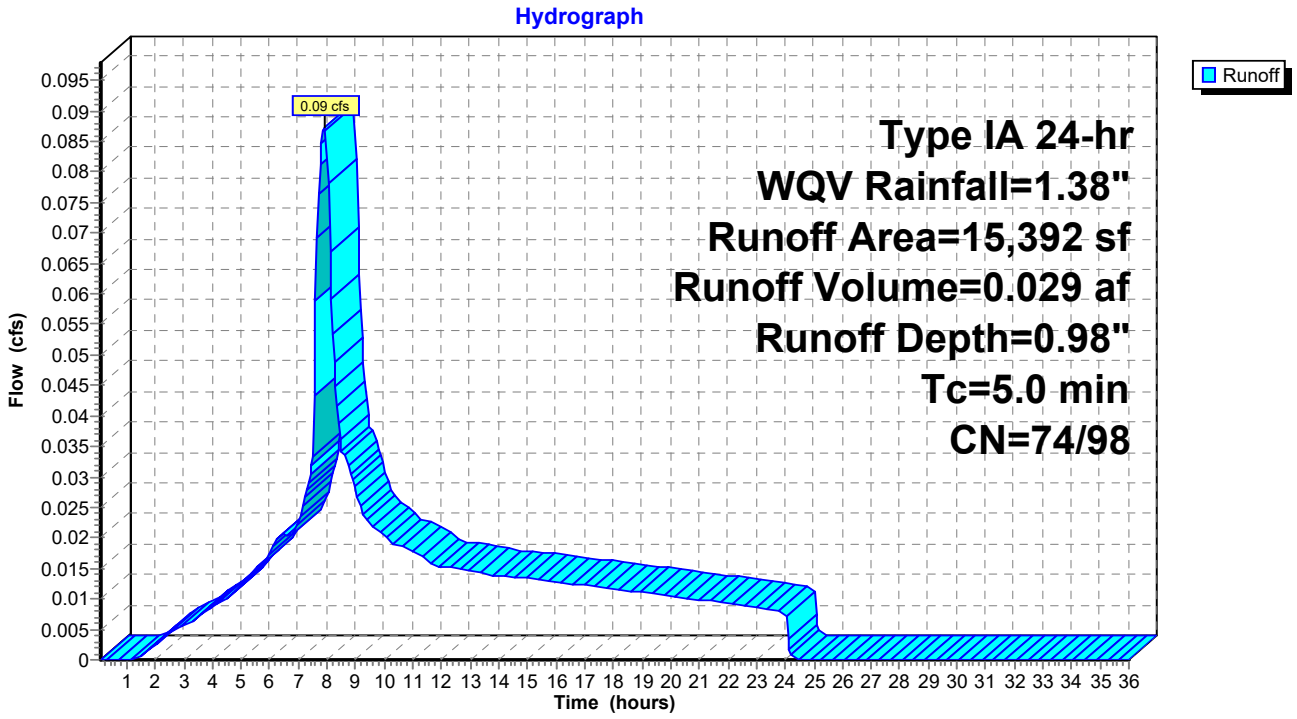
Runoff = 0.09 cfs @ 7.91 hrs, Volume= 0.029 af, Depth= 0.98"
Routed to Pond 2P : Rain Garden

Runoff by SBUH method, Split Pervious/Imperv., Time Span= 0.10-36.00 hrs, dt= 0.05 hrs
Type IA 24-hr WQV Rainfall=1.38"

Area (sf)	CN	Description
12,692	98	Paved parking, HSG C
2,700	74	>75% Grass cover, Good, HSG C
15,392	94	Weighted Average
2,700	74	17.54% Pervious Area
12,692	98	82.46% Impervious Area

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

Subcatchment 1S: A



Summary for Subcatchment 3S: B

[49] Hint: Tc<2dt may require smaller dt

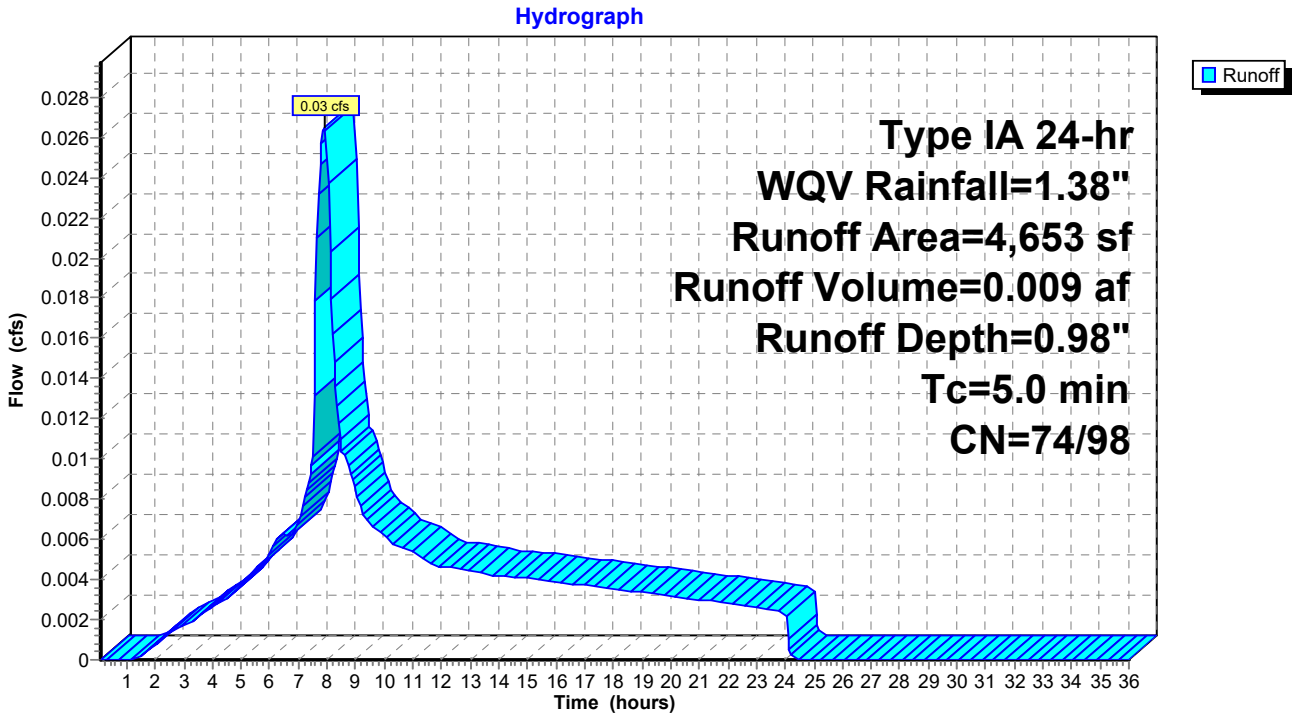
Runoff = 0.03 cfs @ 7.91 hrs, Volume= 0.009 af, Depth= 0.98"
Routed to Pond 4P : Rain Garden

Runoff by SBUH method, Split Pervious/Imperv., Time Span= 0.10-36.00 hrs, dt= 0.05 hrs
Type IA 24-hr WQV Rainfall=1.38"

Area (sf)	CN	Description
3,853	98	Paved parking, HSG C
800	74	>75% Grass cover, Good, HSG C
4,653	94	Weighted Average
800	74	17.19% Pervious Area
3,853	98	82.81% Impervious Area

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

Subcatchment 3S: B



Summary for Reach 3R: PIPE

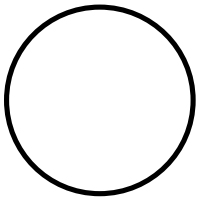
[52] Hint: Inlet/Outlet conditions not evaluated

Inflow Area = 0.353 ac, 82.46% Impervious, Inflow Depth = 0.00" for WQV event
Inflow = 0.00 cfs @ 0.10 hrs, Volume= 0.000 af
Outflow = 0.00 cfs @ 0.10 hrs, Volume= 0.000 af, Atten= 0%, Lag= 0.0 min

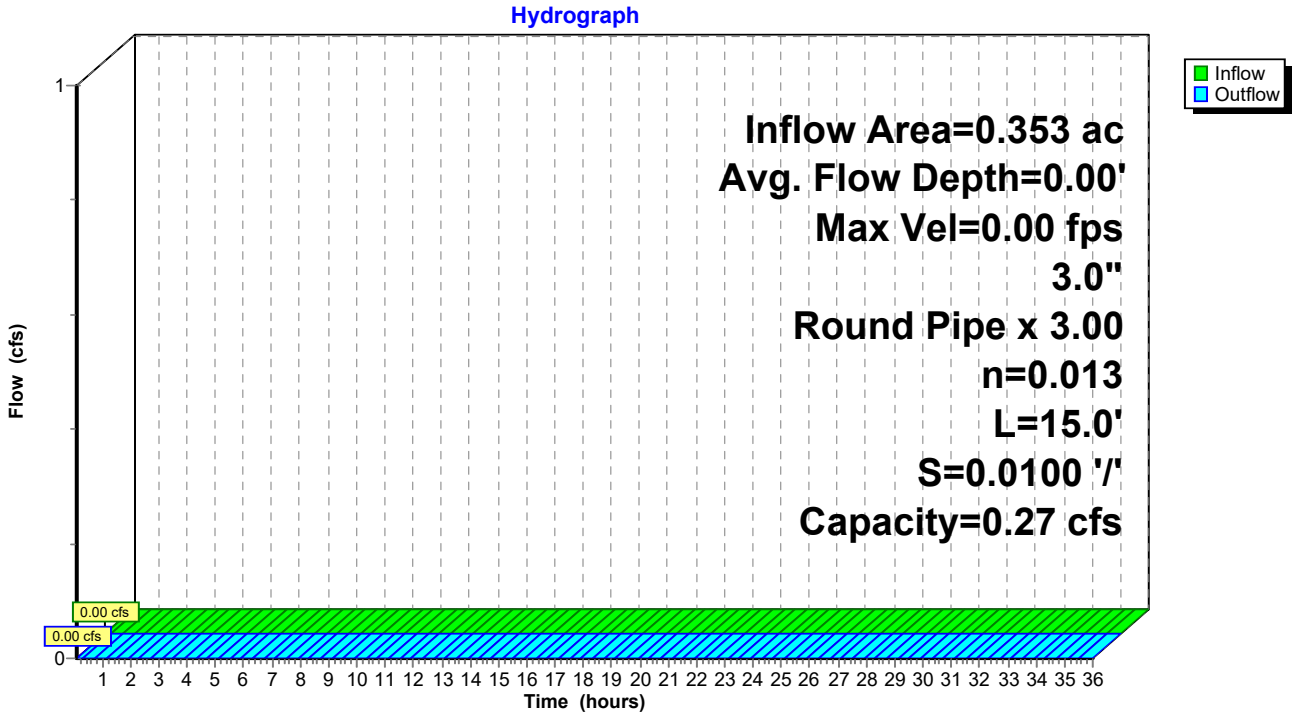
Routing by Stor-Ind+Trans method, Time Span= 0.10-36.00 hrs, dt= 0.05 hrs
Max. Velocity= 0.00 fps, Min. Travel Time= 0.0 min
Avg. Velocity = 0.00 fps, Avg. Travel Time= 0.0 min

Peak Storage= 0 cf @ 0.10 hrs
Average Depth at Peak Storage= 0.00'
Bank-Full Depth= 0.25' Flow Area= 0.1 sf, Capacity= 0.27 cfs

A factor of 3.00 has been applied to the storage and discharge capacity
3.0" Round Pipe
n= 0.013
Length= 15.0' Slope= 0.0100 '/'
Inlet Invert= 100.00', Outlet Invert= 99.85'



Reach 3R: PIPE



Summary for Reach 5R: PIPE

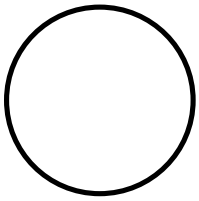
[52] Hint: Inlet/Outlet conditions not evaluated

Inflow Area = 0.107 ac, 82.81% Impervious, Inflow Depth = 0.00" for WQV event
Inflow = 0.00 cfs @ 0.10 hrs, Volume= 0.000 af
Outflow = 0.00 cfs @ 0.10 hrs, Volume= 0.000 af, Atten= 0%, Lag= 0.0 min

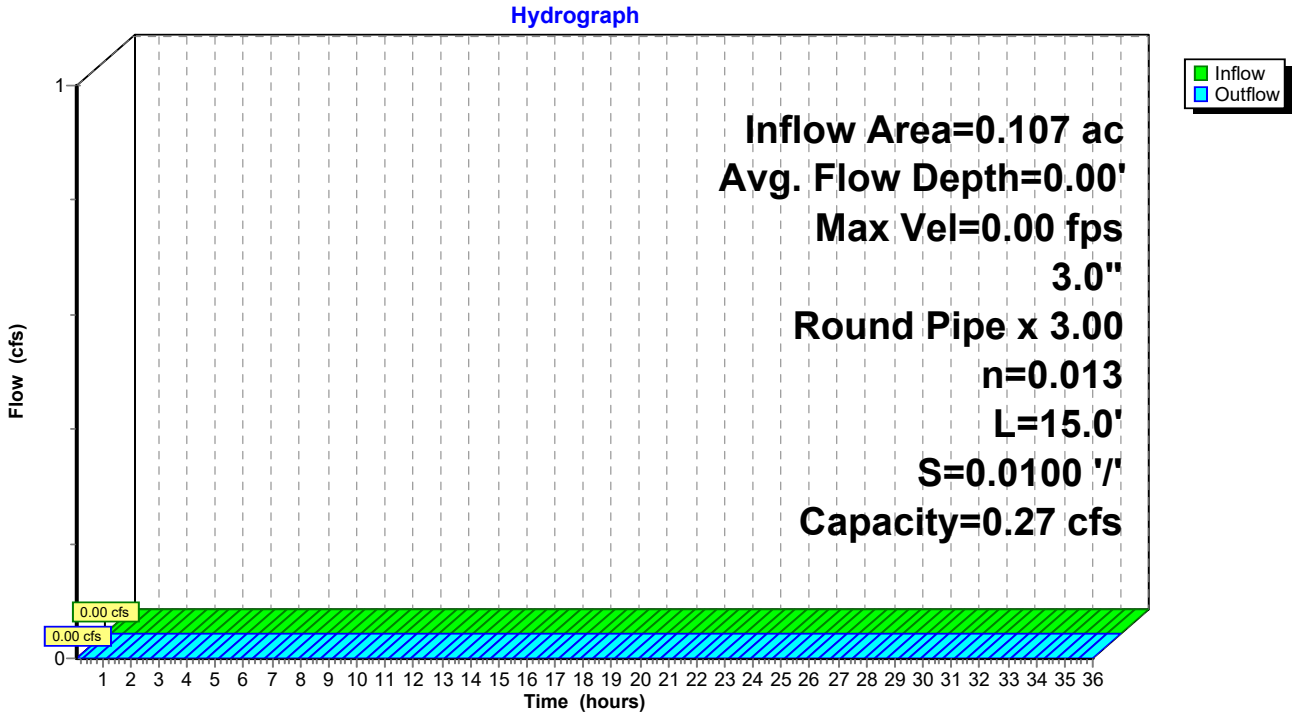
Routing by Stor-Ind+Trans method, Time Span= 0.10-36.00 hrs, dt= 0.05 hrs
Max. Velocity= 0.00 fps, Min. Travel Time= 0.0 min
Avg. Velocity = 0.00 fps, Avg. Travel Time= 0.0 min

Peak Storage= 0 cf @ 0.10 hrs
Average Depth at Peak Storage= 0.00'
Bank-Full Depth= 0.25' Flow Area= 0.1 sf, Capacity= 0.27 cfs

A factor of 3.00 has been applied to the storage and discharge capacity
3.0" Round Pipe
n= 0.013
Length= 15.0' Slope= 0.0100 '/'
Inlet Invert= 100.00', Outlet Invert= 99.85'



Reach 5R: PIPE



Summary for Pond 2P: Rain Garden

Inflow Area = 0.353 ac, 82.46% Impervious, Inflow Depth = 0.98" for WQV event
Inflow = 0.09 cfs @ 7.91 hrs, Volume= 0.029 af
Outflow = 0.07 cfs @ 8.06 hrs, Volume= 0.029 af, Atten= 14%, Lag= 9.1 min
Discarded = 0.07 cfs @ 8.06 hrs, Volume= 0.029 af
Primary = 0.00 cfs @ 0.10 hrs, Volume= 0.000 af
Routed to Reach 3R : PIPE
Secondary = 0.00 cfs @ 0.10 hrs, Volume= 0.000 af
Routed to Reach 3R : PIPE

Routing by Stor-Ind method, Time Span= 0.10-36.00 hrs, dt= 0.05 hrs
Peak Elev= 100.13' @ 8.06 hrs Surf.Area= 345 sf Storage= 18 cf
Flood Elev= 104.00' Surf.Area= 345 sf Storage= 731 cf

Plug-Flow detention time= 1.4 min calculated for 0.029 af (100% of inflow)
Center-of-Mass det. time= 1.4 min (705.6 - 704.2)

Volume	Invert	Avail.Storage	Storage Description
#1	100.00'	731 cf	**Custom Stage Data (Prismatic)** Listed below (Recalc)

Elevation (feet)	Surf.Area (sq-ft)	Voids (%)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
100.00	345	0.0	0	0
101.00	345	40.0	138	138
101.33	345	30.0	34	172
102.83	345	30.0	155	327
103.83	345	100.0	345	672
104.00	345	100.0	59	731

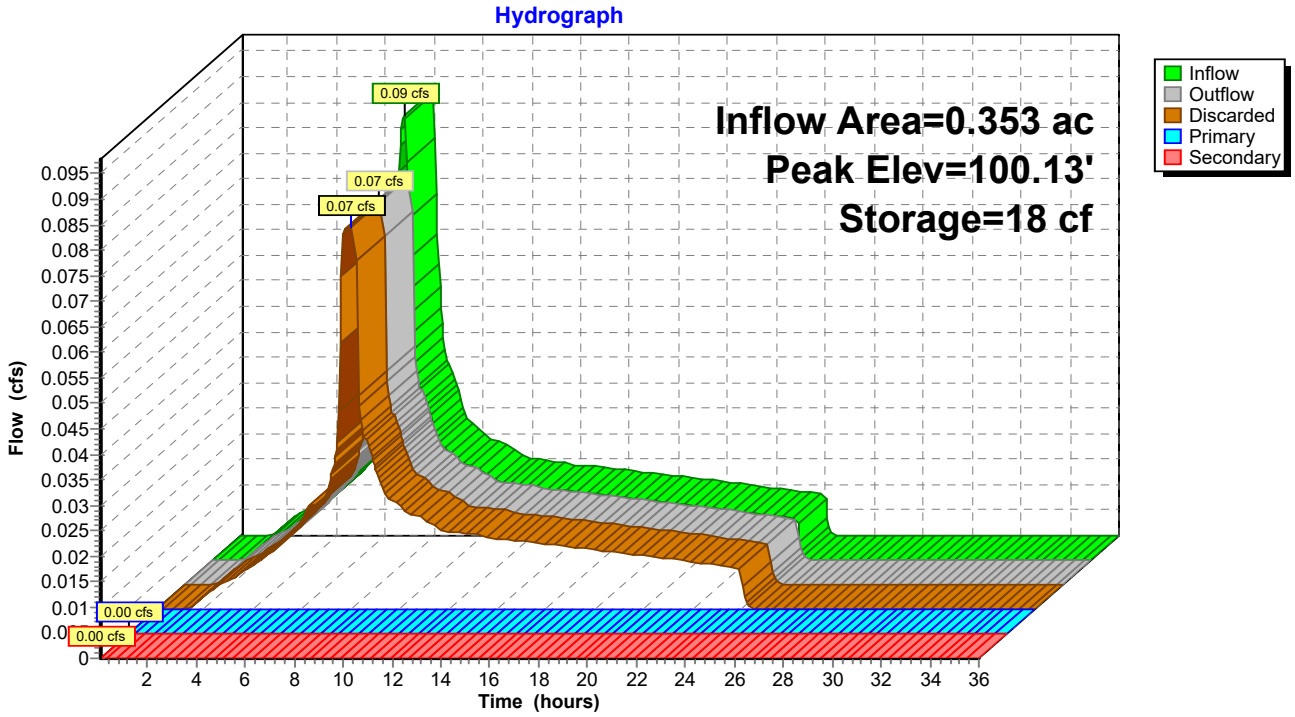
Device	Routing	Invert	Outlet Devices
#0	Secondary	104.00'	**Automatic Storage Overflow** (Discharged without head)
#1	Discarded	100.00'	**9.330 in/hr Exfiltration over Surface area** Conductivity to Groundwater Elevation = 70.00'
#2	Primary	103.83'	**6.0" Horiz. Grate** C= 0.600 Limited to weir flow at low heads

Discarded OutFlow Max=0.07 cfs @ 8.06 hrs HW=100.13' (Free Discharge)
↑└**1=Exfiltration** (Controls 0.07 cfs)

Primary OutFlow Max=0.00 cfs @ 0.10 hrs HW=100.00' (Free Discharge)
↑└**2=Grate** (Controls 0.00 cfs)

Secondary OutFlow Max=0.00 cfs @ 0.10 hrs HW=100.00' (Free Discharge)

Pond 2P: Rain Garden



Summary for Pond 4P: Rain Garden

Inflow Area = 0.107 ac, 82.81% Impervious, Inflow Depth = 0.98" for WQV event
Inflow = 0.03 cfs @ 7.91 hrs, Volume= 0.009 af
Outflow = 0.02 cfs @ 8.13 hrs, Volume= 0.009 af, Atten= 29%, Lag= 13.4 min
Discarded = 0.02 cfs @ 8.13 hrs, Volume= 0.009 af
Primary = 0.00 cfs @ 0.10 hrs, Volume= 0.000 af
Routed to Reach 5R : PIPE
Secondary = 0.00 cfs @ 0.10 hrs, Volume= 0.000 af
Routed to Reach 5R : PIPE

Routing by Stor-Ind method, Time Span= 0.10-36.00 hrs, dt= 0.05 hrs / 2
Peak Elev= 100.33' @ 8.13 hrs Surf.Area= 86 sf Storage= 11 cf
Flood Elev= 104.00' Surf.Area= 86 sf Storage= 182 cf

Plug-Flow detention time= 2.3 min calculated for 0.009 af (100% of inflow)
Center-of-Mass det. time= 2.1 min (706.1 - 704.0)

Volume	Invert	Avail.Storage	Storage Description
#1	100.00'	182 cf	**Custom Stage Data (Prismatic)** Listed below (Recalc)

Elevation (feet)	Surf.Area (sq-ft)	Voids (%)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
100.00	86	0.0	0	0
101.00	86	40.0	34	34
101.33	86	30.0	9	43
102.83	86	30.0	39	82
103.83	86	100.0	86	168
104.00	86	100.0	15	182

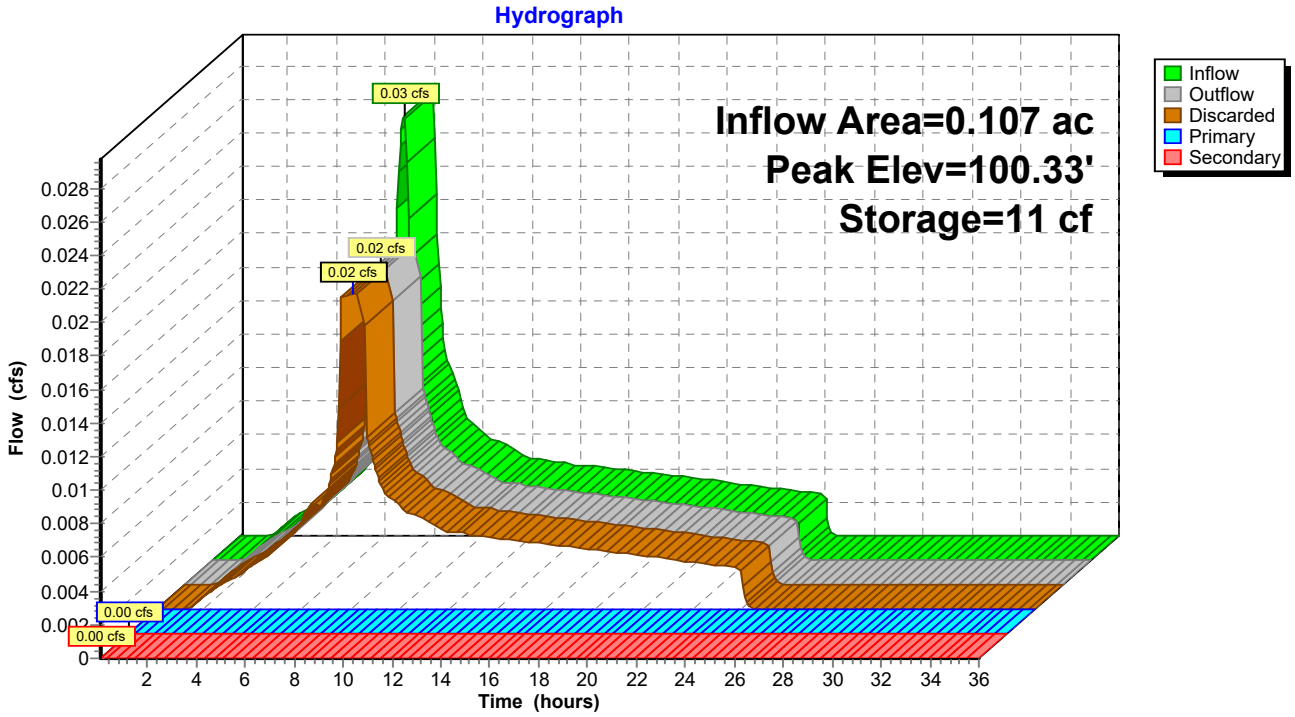
Device	Routing	Invert	Outlet Devices
#0	Secondary	104.00'	**Automatic Storage Overflow** (Discharged without head)
#1	Discarded	100.00'	**9.330 in/hr Exfiltration over Surface area** Conductivity to Groundwater Elevation = 70.00'
#2	Primary	103.83'	**6.0" Horiz. Grate** C= 0.600 Limited to weir flow at low heads

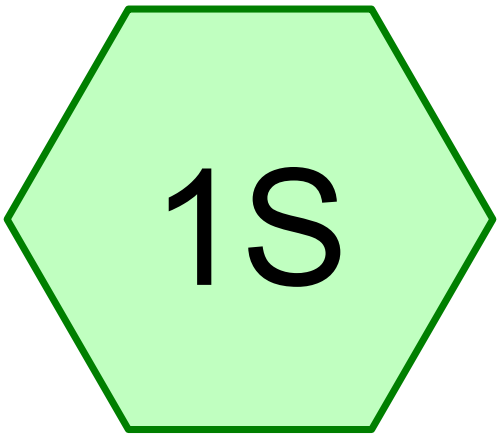
Discarded OutFlow Max=0.02 cfs @ 8.13 hrs HW=100.33' (Free Discharge)
↑└**1=Exfiltration** (Controls 0.02 cfs)

Primary OutFlow Max=0.00 cfs @ 0.10 hrs HW=100.00' (Free Discharge)
↑└**2=Grate** (Controls 0.00 cfs)

Secondary OutFlow Max=0.00 cfs @ 0.10 hrs HW=100.00' (Free Discharge)

Pond 4P: Rain Garden





EX

Subcat Reach Pond Link

Routing Diagram for Pre-Development
Prepared by 7 Oaks Engineering, Inc, Printed 4/8/2024

Rainfall Events Listing

Event#	Event Name	Storm Type	Curve	Mode	Duration (hours)	B/B	Depth (inches)	AMC
1	2-Yr	Type IA 24-hr		Default	24.00	1	2.20	2
2	10-Yr	Type IA 24-hr		Default	24.00	1	3.20	2
3	25-YR	Type IA 24-hr		Default	24.00	1	3.60	2
4	100-Yr	Type IA 24-hr		Default	24.00	1	4.40	2
5	WQV	Type IA 24-hr		Default	24.00	1	1.38	2

Area Listing (all nodes)

Area (acres)	CN	Description (subcatchment-numbers)
0.460	77	Brush, Poor, HSG C (1S)
0.460	**77**	**TOTAL AREA**

Soil Listing (all nodes)

Area (acres)	Soil Group	Subcatchment Numbers
0.000	HSG A	
0.000	HSG B	
0.460	HSG C	1S
0.000	HSG D	
0.000	Other	
0.460		**TOTAL AREA**

Ground Covers (all nodes)

HSG-A (acres)	HSG-B (acres)	HSG-C (acres)	HSG-D (acres)	Other (acres)	Total (acres)	Ground Cover	Subcatchment Numbers
0.000	0.000	0.460	0.000	0.000	0.460	Brush, Poor	1S
0.000	**0.000**	**0.460**	**0.000**	**0.000**	**0.460**	**TOTAL AREA**	

Time span=0.10-36.00 hrs, dt=0.05 hrs, 719 points
Runoff by SBUH method, Split Pervious/Imperv.
Reach routing by Stor-Ind+Trans method - Pond routing by Stor-Ind method

Subcatchment1S: EX Runoff Area=20,045 sf 0.00% Impervious Runoff Depth=0.56"
Flow Length=179' Slope=0.0090 '/' Tc=10.8 min CN=77/0 Runoff=0.03 cfs 0.021 af

Total Runoff Area = 0.460 ac Runoff Volume = 0.021 af Average Runoff Depth = 0.56"
100.00% Pervious = 0.460 ac 0.00% Impervious = 0.000 ac

Summary for Subcatchment 1S: EX

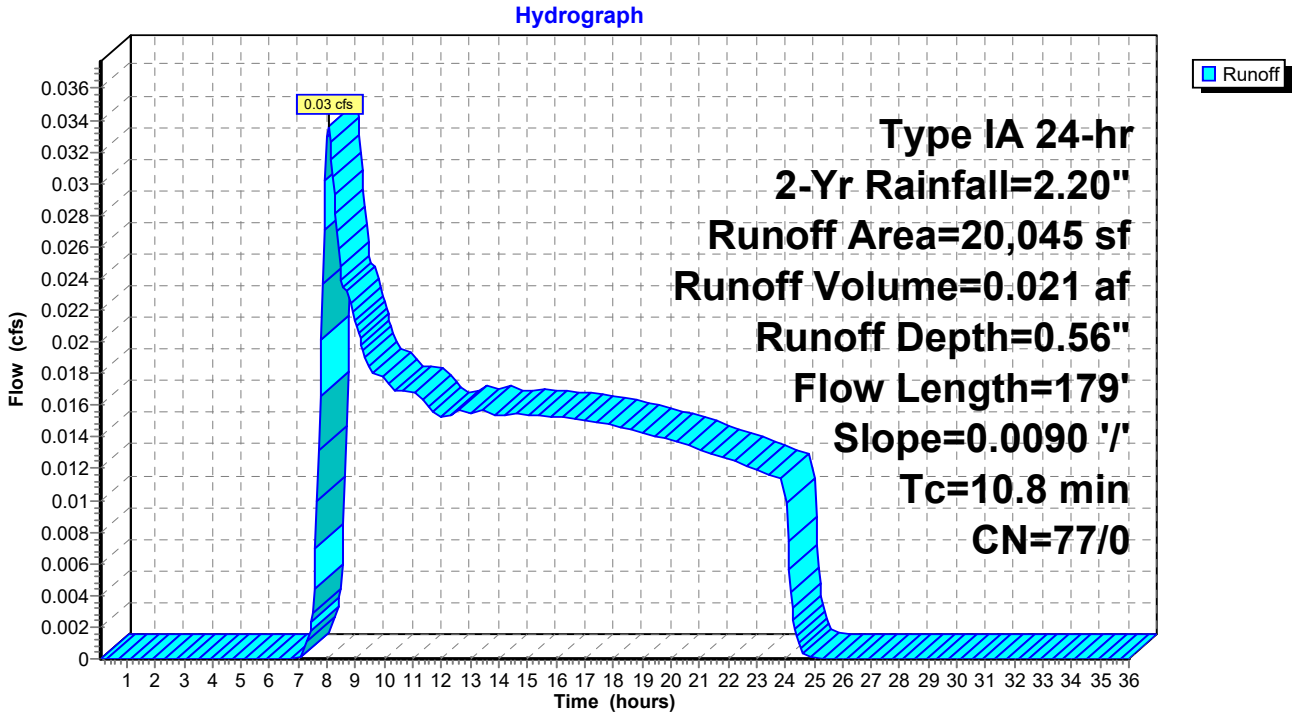
Runoff = 0.03 cfs @ 8.05 hrs, Volume= 0.021 af, Depth= 0.56"

Runoff by SBUH method, Split Pervious/Imperv., Time Span= 0.10-36.00 hrs, dt= 0.05 hrs
Type IA 24-hr 2-Yr Rainfall=2.20"

Area (sf)	CN	Description
20,045	77	Brush, Poor, HSG C
20,045	77	100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
10.8	179	0.0090	0.28		**Sheet Flow,** Fallow n= 0.050 P2= 2.20"

Subcatchment 1S: EX



Time span=0.10-36.00 hrs, dt=0.05 hrs, 719 points
Runoff by SBUH method, Split Pervious/Imperv.
Reach routing by Stor-Ind+Trans method - Pond routing by Stor-Ind method

Subcatchment1S: EX Runoff Area=20,045 sf 0.00% Impervious Runoff Depth=1.21"
Flow Length=179' Slope=0.0090 '/' Tc=10.8 min CN=77/0 Runoff=0.10 cfs 0.046 af

Total Runoff Area = 0.460 ac Runoff Volume = 0.046 af Average Runoff Depth = 1.21"
100.00% Pervious = 0.460 ac 0.00% Impervious = 0.000 ac

Summary for Subcatchment 1S: EX

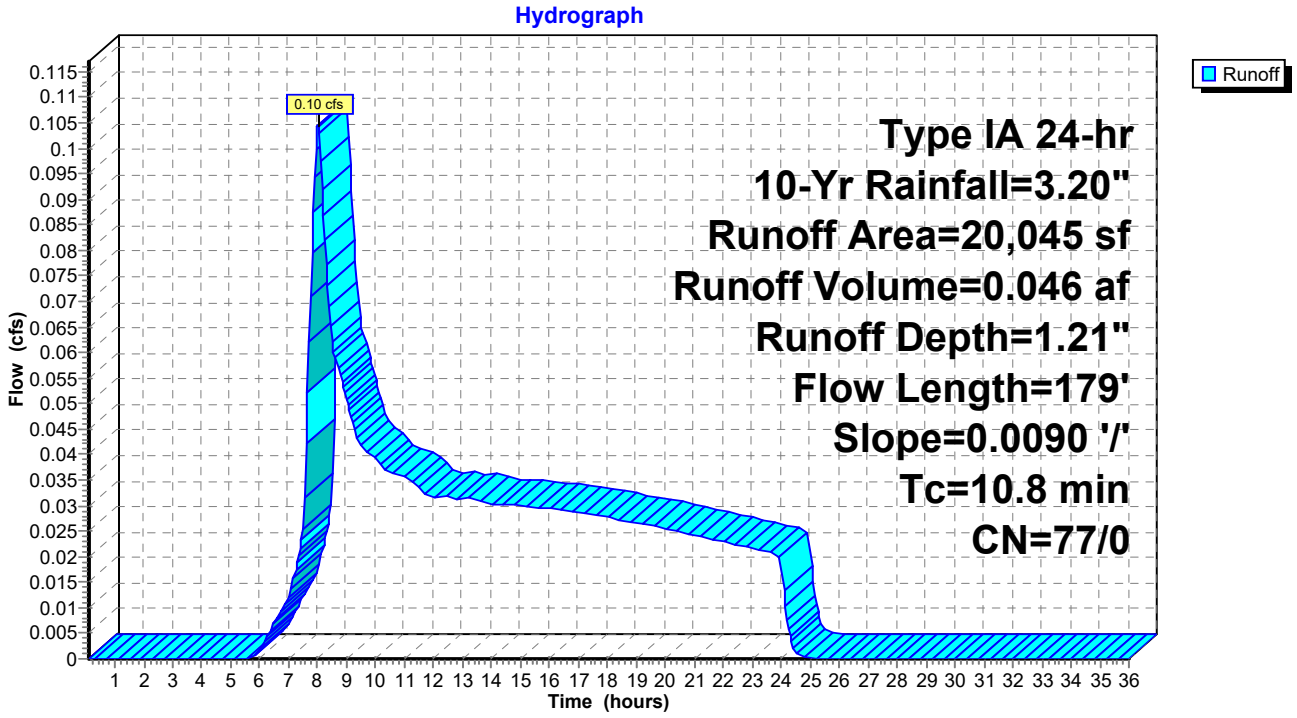
Runoff = 0.10 cfs @ 8.01 hrs, Volume= 0.046 af, Depth= 1.21"

Runoff by SBUH method, Split Pervious/Imperv., Time Span= 0.10-36.00 hrs, dt= 0.05 hrs
Type IA 24-hr 10-Yr Rainfall=3.20"

Area (sf)	CN	Description
20,045	77	Brush, Poor, HSG C
20,045	77	100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
10.8	179	0.0090	0.28		**Sheet Flow,** Fallow n= 0.050 P2= 2.20"

Subcatchment 1S: EX



Time span=0.10-36.00 hrs, dt=0.05 hrs, 719 points
Runoff by SBUH method, Split Pervious/Imperv.
Reach routing by Stor-Ind+Trans method - Pond routing by Stor-Ind method

Subcatchment1S: EX Runoff Area=20,045 sf 0.00% Impervious Runoff Depth=1.51"
Flow Length=179' Slope=0.0090 '/' Tc=10.8 min CN=77/0 Runoff=0.14 cfs 0.058 af

Total Runoff Area = 0.460 ac Runoff Volume = 0.058 af Average Runoff Depth = 1.51"
100.00% Pervious = 0.460 ac 0.00% Impervious = 0.000 ac

Summary for Subcatchment 1S: EX

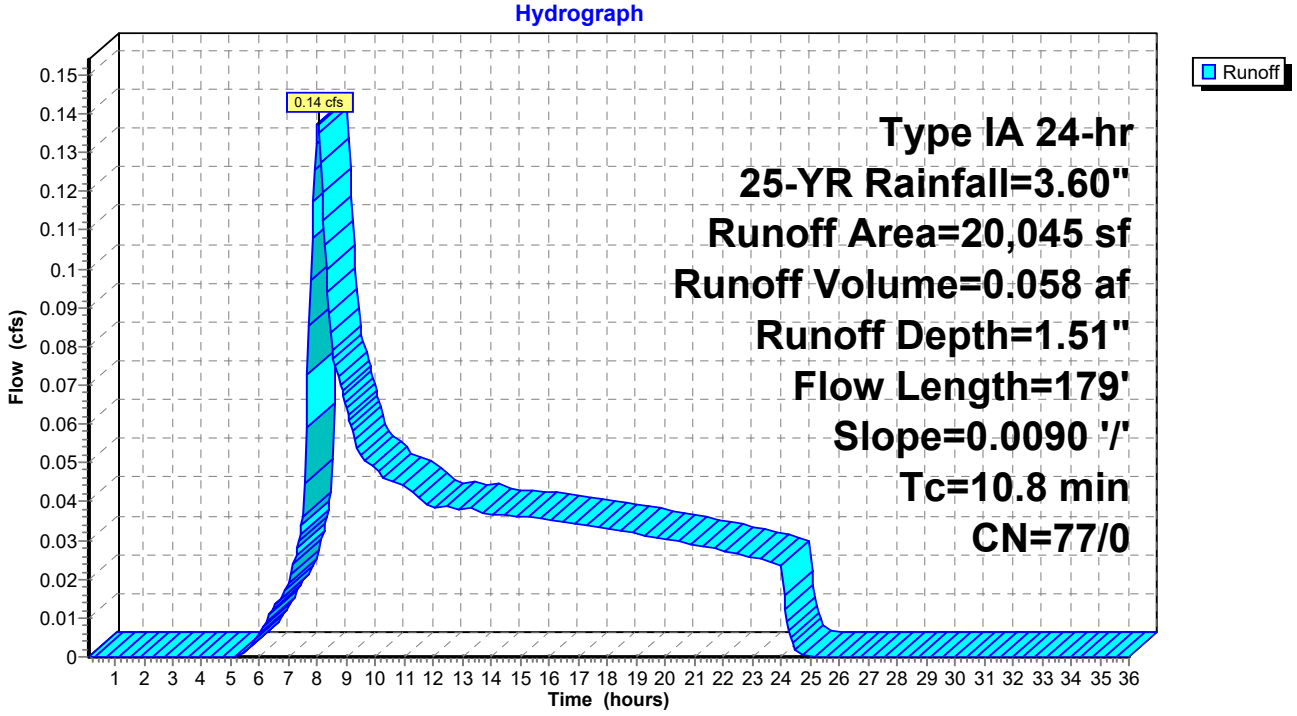
Runoff = 0.14 cfs @ 8.01 hrs, Volume= 0.058 af, Depth= 1.51"

Runoff by SBUH method, Split Pervious/Imperv., Time Span= 0.10-36.00 hrs, dt= 0.05 hrs
Type IA 24-hr 25-YR Rainfall=3.60"

Area (sf)	CN	Description
20,045	77	Brush, Poor, HSG C
20,045	77	100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
10.8	179	0.0090	0.28		**Sheet Flow,** Fallow n= 0.050 P2= 2.20"

Subcatchment 1S: EX



Time span=0.10-36.00 hrs, dt=0.05 hrs, 719 points
Runoff by SBUH method, Split Pervious/Imperv.
Reach routing by Stor-Ind+Trans method - Pond routing by Stor-Ind method

Subcatchment1S: EX Runoff Area=20,045 sf 0.00% Impervious Runoff Depth=2.13"
Flow Length=179' Slope=0.0090 '/' Tc=10.8 min CN=77/0 Runoff=0.21 cfs 0.082 af

Total Runoff Area = 0.460 ac Runoff Volume = 0.082 af Average Runoff Depth = 2.13"
100.00% Pervious = 0.460 ac 0.00% Impervious = 0.000 ac

Summary for Subcatchment 1S: EX

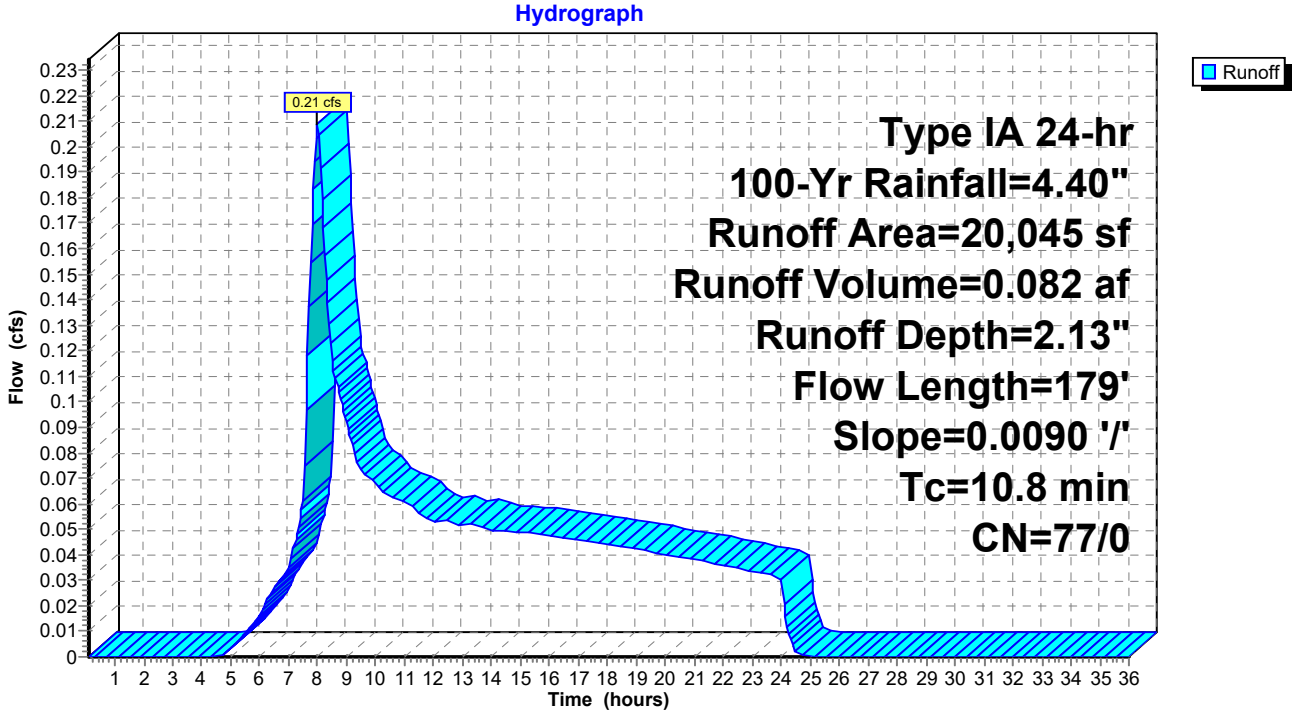
Runoff = 0.21 cfs @ 8.00 hrs, Volume= 0.082 af, Depth= 2.13"

Runoff by SBUH method, Split Pervious/Imperv., Time Span= 0.10-36.00 hrs, dt= 0.05 hrs
Type IA 24-hr 100-Yr Rainfall=4.40"

Area (sf)	CN	Description
20,045	77	Brush, Poor, HSG C
20,045	77	100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
10.8	179	0.0090	0.28		**Sheet Flow,** Fallow n= 0.050 P2= 2.20"

Subcatchment 1S: EX



Time span=0.10-36.00 hrs, dt=0.05 hrs, 719 points
Runoff by SBUH method, Split Pervious/Imperv.
Reach routing by Stor-Ind+Trans method - Pond routing by Stor-Ind method

Subcatchment1S: EX Runoff Area=20,045 sf 0.00% Impervious Runoff Depth=0.16"
Flow Length=179' Slope=0.0090 '/' Tc=10.8 min CN=77/0 Runoff=0.01 cfs 0.006 af

Total Runoff Area = 0.460 ac Runoff Volume = 0.006 af Average Runoff Depth = 0.16"
100.00% Pervious = 0.460 ac 0.00% Impervious = 0.000 ac

Summary for Subcatchment 1S: EX

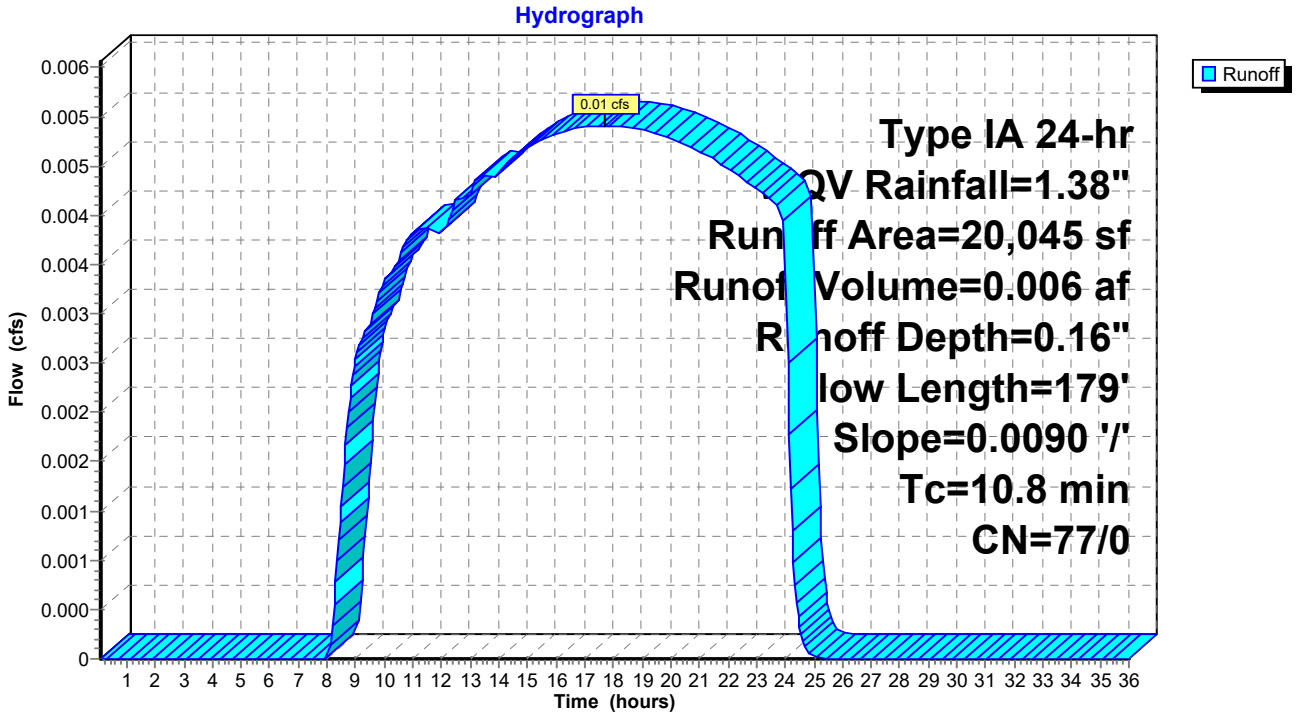
Runoff = 0.01 cfs @ 17.73 hrs, Volume= 0.006 af, Depth= 0.16"

Runoff by SBUH method, Split Pervious/Imperv., Time Span= 0.10-36.00 hrs, dt= 0.05 hrs
Type IA 24-hr WQV Rainfall=1.38"

Area (sf)	CN	Description
20,045	77	Brush, Poor, HSG C
20,045	77	100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
10.8	179	0.0090	0.28		**Sheet Flow,** Fallow n= 0.050 P2= 2.20"

Subcatchment 1S: EX



APPENDIX C – PLANS

PRELIMINARY ENGINEERING PLANS FOR:

MIXED-USE DEVELOPMENT

AT 415 MOYER LANE NW,
SALEM, OR. 97304

PROJECT DIRECTORY:

ARCHITECT:
STUDIO 3
275 COURT ST. NE
SALEM, OR 97301
503.390.6500

CIVIL ENGINEER:
7 OAKS ENGINEERING, INC.
KIM JOHNSON, P.E.
345 WESTFIELD ST. #107
SILVERTON, OR. 97381
503.308.8554
KIM@7OAKSENGINEERING.COM

LAND SURVEYOR:
BARKER SURVEYING
3657 KASHMIR WAY SE
SALEM, OREGON 97317
503.588.8800

GEOTECH:
BRANCH ENGINEERING, INC.
1215 MAIN STREET, SUITE 104
PHILOMATH, OREGON 97370

UTILITY PURVEYORS:

WATER:
CITY OF SALEM
1410 20TH STREET SE
SALEM, OREGON 97302
503.588.6099

STORM DRAIN:
CITY OF SALEM
1410 20TH STREET SE
SALEM, OREGON 97302
503.588.6311

SEWER:
CITY OF SALEM
1410 20TH STREET SE
SALEM, OREGON 97302
503.588.6099

NATURAL GAS:
NORTHWEST NATURAL GAS COMPANY
220 NW 2ND AVE.
PORTLAND, OR.
800.422.4012

ELECTRIC:
SALEM ELECTRIC
633 7TH ST NW
SALEM, OR. 97304
503.362.3601

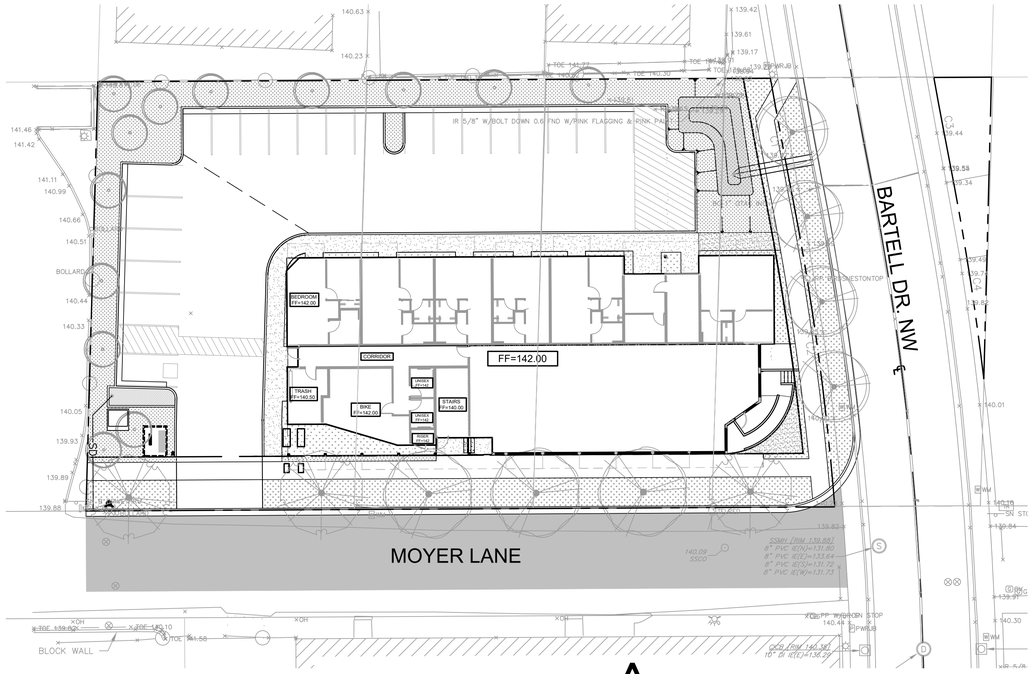
PROJECT SURVEY:

THIS SURVEY IS BASED UPON FIELD WORK COMPLETED BY BARKER SURVEYING, LLC IN FEBRUARY, 2024.

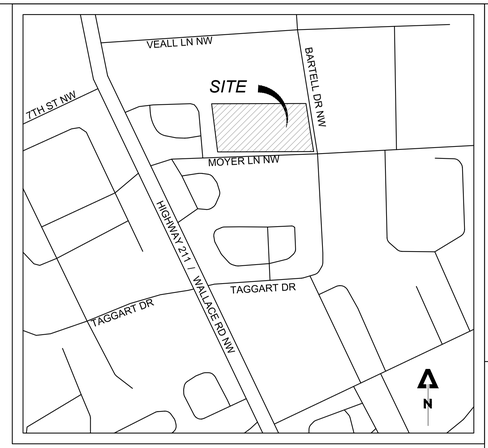
BENCHMARK UTILIZED
CITY OF SALEM CONTROL PT#1021

ELEVATION = 150.93' – NGVD 29

3" BRASS DISK IN SIDEWALK AT THE NORTHWEST CORNER OF THE INTERSECTION OF COMMERCIAL ST NE AND MARION ST NE



INDEX MAP
SCALE:1":20'



VICINITY MAP

SHEET INDEX:

1 – PRELIMINARY TITLE SHEET
2 – PRELIMINARY GRADING PLAN
3 – PRELIMINARY UTILITY PLAN
4 – PRELIMINARY STORMWATER PLAN

ABBREVIATIONS:

PL	PROPERTY LINE
FF	FINISHED FLOOR
TC	TOP OF CURB
FS	FINISHED SURFACE
FL	FLOW LINE
FG	FINISHED GRADE
GB	GRADE BREAK
CL	CENTERLINE
R	RIDGE LINE
R/W	RIGHT OF WAY
WV	WATER VALVE
PR.	PROPOSED
NAP	NOT A PART
FT	FEET
EV	ELECTRIC VEHICLE
CAV	CLEAN AIR VEHICLE
STD.	STANDARD
AC.	ACRES
CUP	CONDITIONAL USE PERMIT
EX.	EXISTING

TYP.	TYPICAL
MIN.	MINIMUM
SS	SANITARY SEWER
SD	STORM DRAIN
CF	CURB FACE
WM	WATER METER
FDC	FIRE DEPARTMENT CONNECTION
APN	ACCESSOR'S PARCEL MAP
SQ.FT	SQUARE FEET
INV.	INVERT
BF	BACKFLOW
CFS	CUBIC FEET PER SECOND
SCH.	SCHEDULE
PVC	POLYVINYL CHLORIDE
SDR	SPECIAL DRAWING RIGHT
PSI	POUNDS PER SQUARE INCH
NFPA	NATIONAL FIRE PREVENTION ASSOCIATION
CB	CATCH BASIN
D	DIAMETER
VCP	VITRIFIED CLAY PIPE

FEMA:

PROJECT IS LOCATED WITHIN FEMA FLOOD ZONE 'AE' PER MAP 41047C0333H, EFFECTIVE 01/02/2003. BASE FLOOD ELEVATION= 141.00'

NOTICE TO EXCAVATORS:

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(NOTE: THE TELEPHONE NUMBER FOR THE OREGON UTILITY NOTIFICATION CENTER IS 503-232-1987).

POTENTIAL UNDERGROUND FACILITY OWNERS

Dig Safely.

Call the Oregon One-Call Center
DIAL 811 or 1-800-332-2344

ENGINEER'S NOTICE TO CONTRACTOR:

THE EXISTENCE AND LOCATION OF ANY UNDERGROUND UTILITIES OR STRUCTURES SHOWN IN THESE PLANS ARE OBTAINED BY A SEARCH OF AVAILABLE RECORDS, AND TO THE BEST OF OUR KNOWLEDGE, THERE ARE NOT EXISTING UTILITIES EXCEPT THOSE SHOWN ON THESE PLANS. THE CONTRACTOR IS REQUIRED TO TAKE ALL PRECAUTIONARY MEASURES TO PROTECT THE UTILITIES SHOWN, AND ANY OTHER LINES OR STRUCTURES NOT SHOWN ON THESE PLANS, AND IS RESPONSIBLE FOR THE PROTECTION OF ANY DAMAGE TO THESE LINES OR STRUCTURES.

CONSTRUCTION CONTRACTOR AGREES THAT IN ACCORDANCE WITH GENERALLY ACCEPTED CONSTRUCTION PRACTICES, CONSTRUCTION CONTRACTOR WILL BE REQUIRED TO ASSUME SOLE AND COMPLETE RESPONSIBILITY FOR JOB SITE CONDITIONS DURING THE COURSE OF CONSTRUCTION FOR THE PROJECT, INCLUDING SAFETY OF ALL PERSONS AND PROPERTY; THAT THIS REQUIREMENTS SHALL BE MADE TO APPLY CONTINUOUSLY AND NOT BE LIMITED TO NORMAL WORKING HOURS, AND CONSTRUCTION CONTRACTOR FURTHER AGREES TO DEFEND, INDEMNIFY, AND HOLD HARMLESS THE CITY, ITS EMPLOYEES, AND AGENTS FROM ANY AND ALL LIABILITY, REAL OR ALLEGED, IN CONNECTION WITH THE PERFORMANCE OF WORK ON THIS PROJECT.

THE CONTRACTOR SHALL BE RESPONSIBLE TO REPORT DISCREPANCIES IN PLANS AND/OR FIELD CONDITIONS IMMEDIATELY TO THE DESIGN ENGINEER FOR RESOLUTION PRIOR TO CONSTRUCTION, AND SHALL BE RESPONSIBLE FOR DISCREPANCIES NOT SO REPORTED AND RESOLVED.

7 OAKS ENGINEERING
345 WESTFIELD ST. #107
SILVERTON, OR. 97381
503.308.8554
ADMIN@7OAKSENGINEERING.COM

STAMP:

REGISTERED PROFESSIONAL ENGINEER
94115PE
PRELIMINARY
OREGON
NOV 13, 2018
KIMBERLY JOHNSON

NO	DATE	ISSUE DESCRIPTION

QC BY: DRAWN BY:

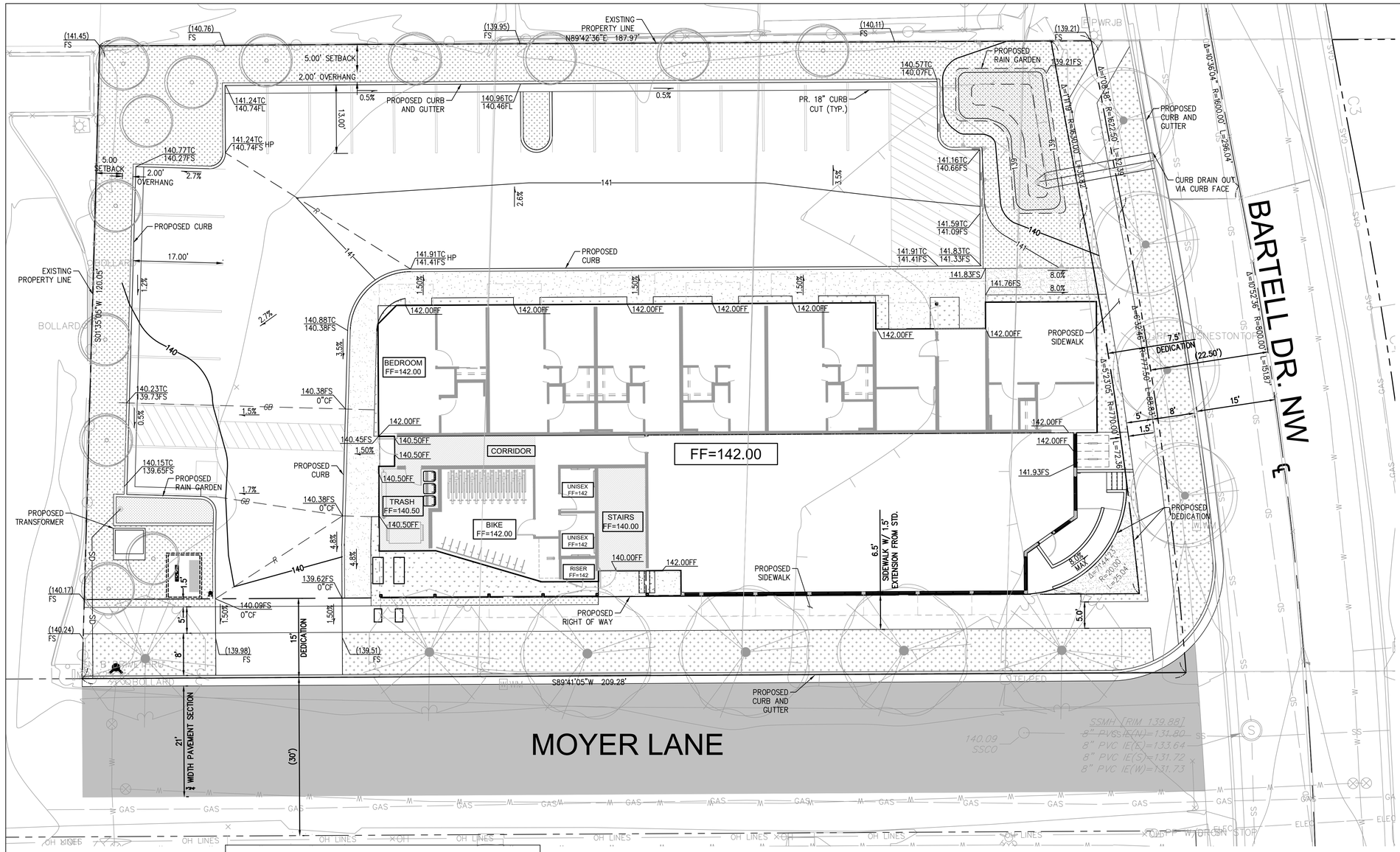
PROJECT NAME: MIXED-USE DEVELOPMENT
PROJECT ADDRESS: 415 MOYER LANE NW
SALEM, OR. 97304

SHEET TITLE:
PRELIMINARY TITLE SHEET

DATE: 05/24/2024

SHEET NUMBER: 1

JOB #00318



FLOOD ZONE NOTES:

THE SITE IS LOCATED WITHIN A FEMA FLOOD ZONE, ZONE AE, WITH A BASE FLOOD ELEVATION OF 141.00', PER FEMA FLOOD MAP 41047C0333H, EFFECTIVE 1/2/2023.

PER CITY OF SALEM CODE, THE BUILDING FINISH FLOOR MUST BE ELEVATED 1-FOOT ABOVE THE ESTABLISHED BASE FLOOD ELEVATION. FLOODPROOFING OF THE PORTION OF THE BUILDING BELOW BASE FLOOD ELEVATION SHALL BE DESIGNED TO COMPLY WITH FEMA TECHNICAL BULLETIN 3, DATED JAN. 2021. REFER TO SEPARATE ARCHITECTURAL PLAN FOR WET FLOODPROFFING DESIGN.

APPROXIMATE AREA BELOW BASE FLOOD ELEVATION OF 142.00'. REFER TO ARCHITECTURAL PLAN FOR FURTHER INFORMATION.

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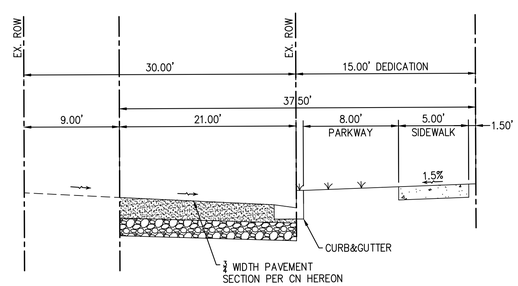
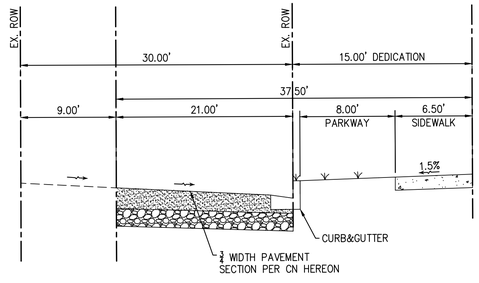
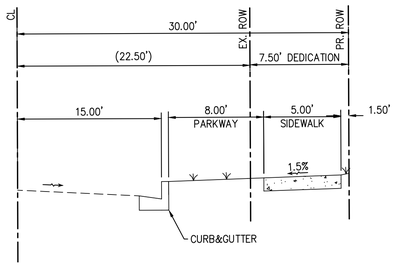


TYPICAL SECTION
MOYER LANE-SIDEWALK EXTENSION
NTS



TYPICAL SECTION
MOYER LANE
NTS



TYPICAL SECTION
BARTELL DR. NW
NTS

LEGEND:

- PROPERTY LINE / ROW
- PROPOSED LANDSCAPING
- PROPOSED PERVIOUS PAVING DRIVE ACCESS AND PARKING

7OAKS ENGINEERING
345 WESTFIELD ST. #107
SILVERTON, OR. 97381
503.308.8554
ADMIN@7OAKSENGINEERING.COM

STAMP:

REGISTERED PROFESSIONAL ENGINEER
94115PE
PRELIMINARY
OREGON
NOV. 13, 2018
KIMBERLY JOHNSON

NO	DATE	ISSUE DESCRIPTION

QC BY: DRAWN BY:

PROJECT NAME: MIXED-USE DEVELOPMENT
PROJECT ADDRESS: 415 MOYER LANE NW
SALEM, OR. 97304

SHEET TITLE: PRELIMINARY GRADING PLAN

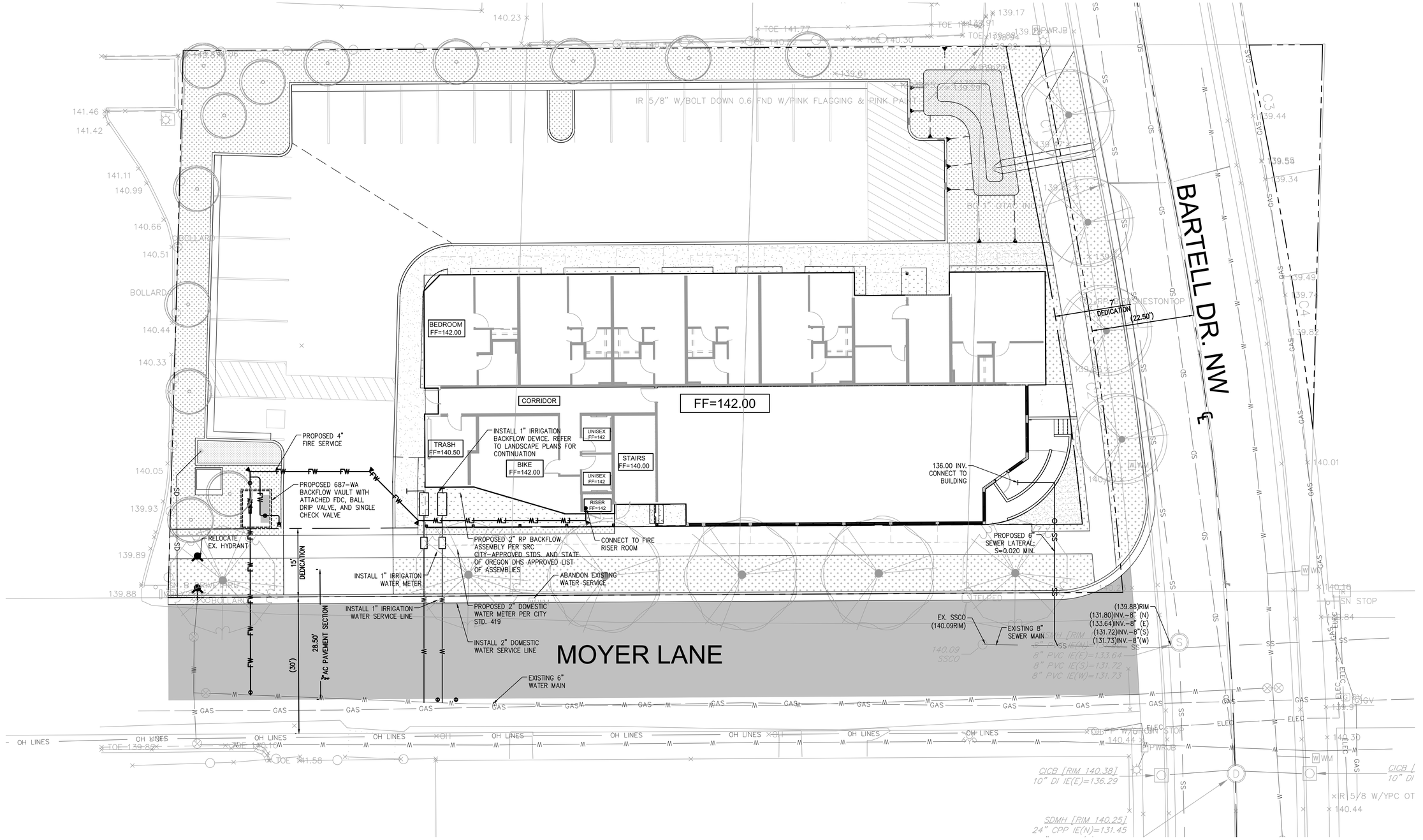
N

10 5 0 10 20
SCALE: 1"=10'

DATE: 05/24/2024

SHEET NUMBER: 2

JOB #00318



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LEGEND:

- SD — PROPOSED DRAIN LINE
- SS — PROPOSED SEWER
- W — PROPOSED WATER
- APPROXIMATE LIMITS OF UTILITY REMOVAL
- PROPOSED SEWER CLEANOUT
- PROPOSED WATER METER

UTILITY GENERAL NOTES:

1. REFER TO SEPARATE UTILITY PURVEYOR FOR ELECTRICAL AND GAS SERVICES.
2. ALL EXISTING UTILITIES SHALL BE PROTECTED IN PLACE UNLESS OTHERWISE SPECIFICALLY CALLED FOR ON THE PLANS.
3. THE ENGINEER OF RECORD SHALL BE CONTACTED IF ANY DISCREPANCIES ARISE IN THE FIELD.

N

10 5 0 10 20

SCALE: 1"=10'

7OAKS ENGINEERING
345 WESTFIELD ST. #107
SILVERTON, OR. 97381
503.308.8554
ADMIN@7OAKSENGINEERING.COM

STAMP:

REGISTERED PROFESSIONAL ENGINEER
94115PE
PRELIMINARY
OREGON
NOV. 13, 2018
KIMBERLY JOHNSON

NO	DATE	ISSUE DESCRIPTION

NO CHANGES, MODIFICATIONS OR REPRODUCTIONS TO BE MADE TO THESE DRAWINGS WITHOUT WRITTEN AUTHORIZATION FROM THE DESIGN ENGINEER.

DIMENSIONS AND NOTES TAKE PRECEDENCE OVER GRAPHICAL REPRESENTATION.

THESE DRAWINGS MAY HAVE BEEN REDUCED IN SIZE. IF SIZE DIFFERENTLY THAN ORIGINALLY DRAWN, OWNER AND ENGINEER ASSUME NO RESPONSIBILITY FOR USE OF INCORRECT SCALE.

CONTRACTOR SHALL VERIFY ALL EXISTING CONDITIONS PRIOR TO PROCEEDING WITH CONSTRUCTION AND NOTIFY ARCHITECT IMMEDIATELY OF ANY DISCREPANCIES OR CONFLICTS.

QC BY: DRAWN BY:

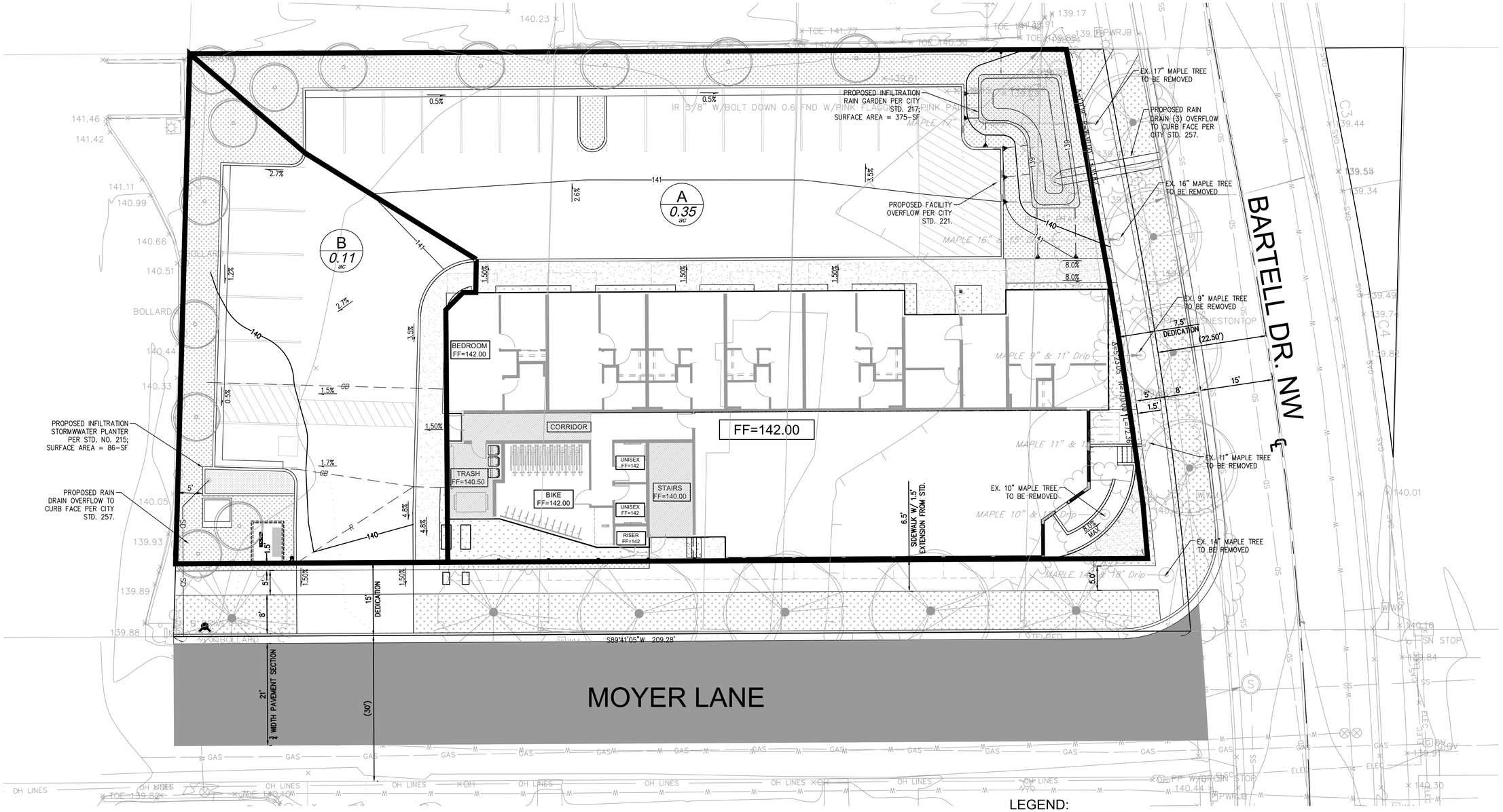
PROJECT NAME: MIXED-USE DEVELOPMENT
PROJECT ADDRESS: 415 MOYER LANE NW
SALEM, OR. 97304

SHEET TITLE: PRELIMINARY UTILITY PLAN

DATE: 05/24/2024

SHEET NUMBER: 3

JOB #00318



CATCHMENT AND FACILITY TABLE

CATCHMENT/ FACILITY ID	TOTAL AREA (SF)/(AC.)	IMPERVIOUS AREA (SF)	PERVIOUS AREA (SF)	OWNERSHIP (PRIVATE/ PUBLIC)	FACILITY TYPE	FACILITY SIZE
A	15,392	12,692	2,700	PRIVATE	INFILTRAITON RAIN GARDEN	345 SQ.FT.
B	4,653	3,853	800	PRIVATE	INFILTRATION STORMWATER	68 SQ.FT.

LEGEND:

- DRAINAGE AREA
- DRAINAGE FLOW PATH
- A 1.21 ac — DRAINAGE AREA CALLOUT

NOTICE TO EXCAVATORS:

ATTENTION: OREGON LAW REQUIRES YOU TO FOLLOW RULES ADOPTED BY THE OREGON UTILITY NOTIFICATION CENTER. THOSE RULES ARE SET FORTH IN OAR 952-001-0010 THROUGH OAR 952-001-0090. YOU MAY OBTAIN COPIES OF THE RULES BY CALLING THE CENTER.
(NOTE: THE TELEPHONE NUMBER FOR THE OREGON UTILITY NOTIFICATION CENTER IS 503-232-1987).

POTENTIAL UNDERGROUND FACILITY OWNERS

Dig Safely.

Call the Oregon One-Call Center
DIAL 811 or 1-800-332-2344

ENGINEER'S NOTICE TO CONTRACTOR:

THE EXISTENCE AND LOCATION OF ANY UNDERGROUND UTILITIES OR STRUCTURES SHOWN IN THESE PLANS ARE OBTAINED BY A SEARCH OF AVAILABLE RECORDS, AND TO THE BEST OF OUR KNOWLEDGE, THERE ARE NOT EXISTING UTILITIES EXCEPT THOSE SHOWN ON THESE PLANS. THE CONTRACTOR IS REQUIRED TO TAKE ALL PRECAUTIONARY MEASURES TO PROTECT THE UTILITIES SHOWN, AND ANY OTHER LINES OR STRUCTURES NOT SHOWN ON THESE PLANS, AND IS RESPONSIBLE FOR THE PROTECTION OF ANY DAMAGE TO THESE LINES OR STRUCTURES.

CONSTRUCTION CONTRACTOR AGREES THAT IN ACCORDANCE WITH GENERALLY ACCEPTED CONSTRUCTION PRACTICES, CONSTRUCTION CONTRACTOR WILL BE REQUIRED TO ASSUME SOLE AND COMPLETE RESPONSIBILITY FOR JOB SITE CONDITIONS DURING THE COURSE OF CONSTRUCTION FOR THE PROJECT, INCLUDING SAFETY OF ALL PERSONS AND PROPERTY; THAT THIS REQUIREMENTS SHALL BE MADE TO APPLY CONTINUOUSLY AND NOT BE LIMITED TO NORMAL WORKING HOURS, AND CONSTRUCTION CONTRACTOR FURTHER AGREES TO DEFEND, INDEMNIFY, AND HOLD HARMLESS THE CITY, ITS EMPLOYEES, AND AGENTS FROM ANY AND ALL LIABILITY, REAL OR ALLEGED, IN CONNECTION WITH THE PERFORMANCE OF WORK ON THIS PROJECT.

THE CONTRACTOR SHALL BE RESPONSIBLE TO REPORT DISCREPANCIES IN PLANS AND/OR FIELD CONDITIONS IMMEDIATELY TO THE DESIGN ENGINEER FOR RESOLUTION PRIOR TO CONSTRUCTION, AND SHALL BE RESPONSIBLE FOR DISCREPANCIES NOT SO REPORTED AND RESOLVED.

PRE VS. POST CONSTRUCTION FLOW RATES

FACILITY ID	PEAK FLOW RATE (CFS)							
	HALF OF THE 2 YEAR STORM		10 YEAR STORM		25 YEAR STORM		100 YEAR STORM	
PROJECT SITE	PRE	POST	PRE	POST	PRE	POST	PRE	POST
A	0.015	0	0.1	0	0.14	0	0.21	0.02
B		0		0.02		0.06		0.08

N

10 5 0 10 20

SCALE: 1"=10'

7OAKS ENGINEERING
345 WESTFIELD ST. #107
SILVERTON, OR. 97381
503.308.8554
ADMIN@7OAKSENGINEERING.COM

STAMP:

REGISTERED PROFESSIONAL ENGINEER
94115PE
PRELIMINARY
OREGON
NOV. 13, 2018
KIMBERLY JOHNSON

NO	DATE	ISSUE DESCRIPTION

QC BY: DRAWN BY:

PROJECT NAME: MIXED-USE DEVELOPMENT
PROJECT ADDRESS: 415 MOYER LANE NW SALEM, OR. 97304

SHEET TITLE: PRELIMINARY STORMWATER PLAN

DATE: 05/24/2024

SHEET NUMBER: 4

JOB #00318

APPENDIX D – SUPPORTING SOILS REPORT

March 13, 2024

Landon Hattan
Skyline Builders
1280 Fir Street S
Salem, Oregon 97302

RE: SITE INFILTRATION TESTING
415 MOYER LANE
SALEM, OREGON
BRANCH ENGINEERING INC. PROJECT NO. 24-055

Branch Engineering Inc (BEI) visited the site, see Figure 1, on February 22, 2024 to set up three site infiltration tests and returned on February 24, 2024 to determine the rate of infiltration of the onsite soils for use in an onsite stormwater disposal system that will be designed by others. The results presented herein are for initial design and should be verified by the design engineer of record (EOR) at the time of construction. The following is a summary of our visit to the site and testing results.

SITE SOILS

Five test pits were excavated using a rubber-tracked excavator on the site in the approximate locations shown on the attached Figure-2. Three of the pits (1, 2 & 4) were set up for infiltration testing of the subsurface soils at 4- to 5-feet below surface grade (BSG). The observed soils were visually classified using the American Society of Testing and Materials (ASTM) Method D-2488. The soils observed in the test pits were generally consistent in composition with 1.5- to 2-feet of either soft fill or topsoil overlying a clayey silt alluvium that is moist and medium stiff, a more detail description of the soils and logs of each test pits are presented in our *Geotechnical Investigation Report* for the site.

A nearby Oregon Water Resources Department (OWRD) well log, see attached, shows similar soil conditions as described above down to 27-feet BGS and transitioning to sandy silt down to 32-feet. The NRCS Web Soil Survey of Polk County maps the site soils as stream terrace deposits of Coburg and Malabon silty clay loam derived from mixed alluvium and are moderate to well drained.

GROUNDWATER

We did not encounter any groundwater during our onsite explorations to a depth of 11-feet BGS. One nearby well log indicates that the groundwater is at depth of approximately 29-feet BGS.

INFILTRATION TESTING

Site infiltration testing was conducted on February 24, 2024 in general accordance with the procedures set forth in the Salem Administrative Rules 109-004 Appendix C for the encased falling head method. The soil is assumed to be laterally homogeneous and that sidewall infiltration is negligible as a 6-inch diameter, open-ended, plastic standpipe was used for containment of the water column. Water was added to the pipe to pre-saturate the soil prior to testing. Infiltration testing commenced over three successive trials with water being added and the height of the water column being recorded over time. The measured infiltration rates are tabulated in the following Table and shown in the attached Field Data Sheet; no factor of safety has been applied to the rates.

Table 1: Infiltration Test Results

Test ID	*Soil Description*	*Test Depth (inches)*	*Infiltration Rate (in/hr)*
TP-1	Light Reddish Brown silt with clay (ML)	48	13
TP-2	Light Reddish Brown silt with clay (ML)	60	28
TP-4	Light Reddish Brown silt with clay (ML)	60	25

CONCLUSIONS

The infiltration rates measured in the field ranged from 13 to 28 inches per hour with no factor of safety applied to the results. The rates appear to increase between 4 and 5-feet BGS and rates of infiltration may vary across the site. The rates reported herein should be considered preliminary and be confirmed by the EOR once the stormwater facility has been completed as soil type and consistency may vary with distance from the test location.

Any areas proposed for infiltration shall not be subjected to compaction of the soil by vehicle traffic, storage of materials, or other means that can influence the rate of infiltration in those areas. It is the client/design professional's responsibility to determine that the stormwater facility meets these requirements for sizing, setbacks, and overflow routing.

LIMITATIONS

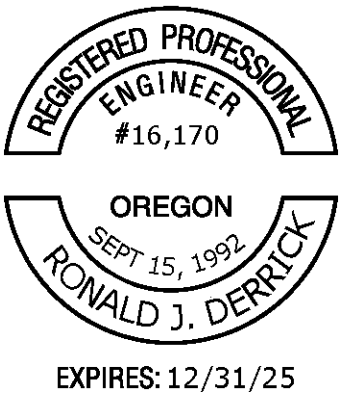
This report has been prepared for the exclusive use of the addressee and their designated representatives for use in design of the proposed development. The analysis and recommendations contained herein were prepared in general accordance with the standards of practice for the area at the time of this report's preparation, and may not be suitable for purposes other than those described in this report.

Subsurface explorations indicate soil conditions at specific locations and depths and do not necessarily reflect soil and groundwater variations that may exist at other locations at the site; however, site conditions were generally consistent in all our explorations. If design changes are made that may affect the results of our testing, development plans change, or at least a year passes between our investigation and the site development, we reserve the right to review the changes for applicability.

We assume no responsibility or liability for engineering, inspection, or testing performed by others and no warranty, expressed or implied, is given. Use of this report constitutes an agreement and consent by the addressee and their designated representatives to the limitations listed above.

If you have any questions regarding the test method, data analysis or design, please contact the undersigned.

Sincerely,
Branch Engineering Inc,



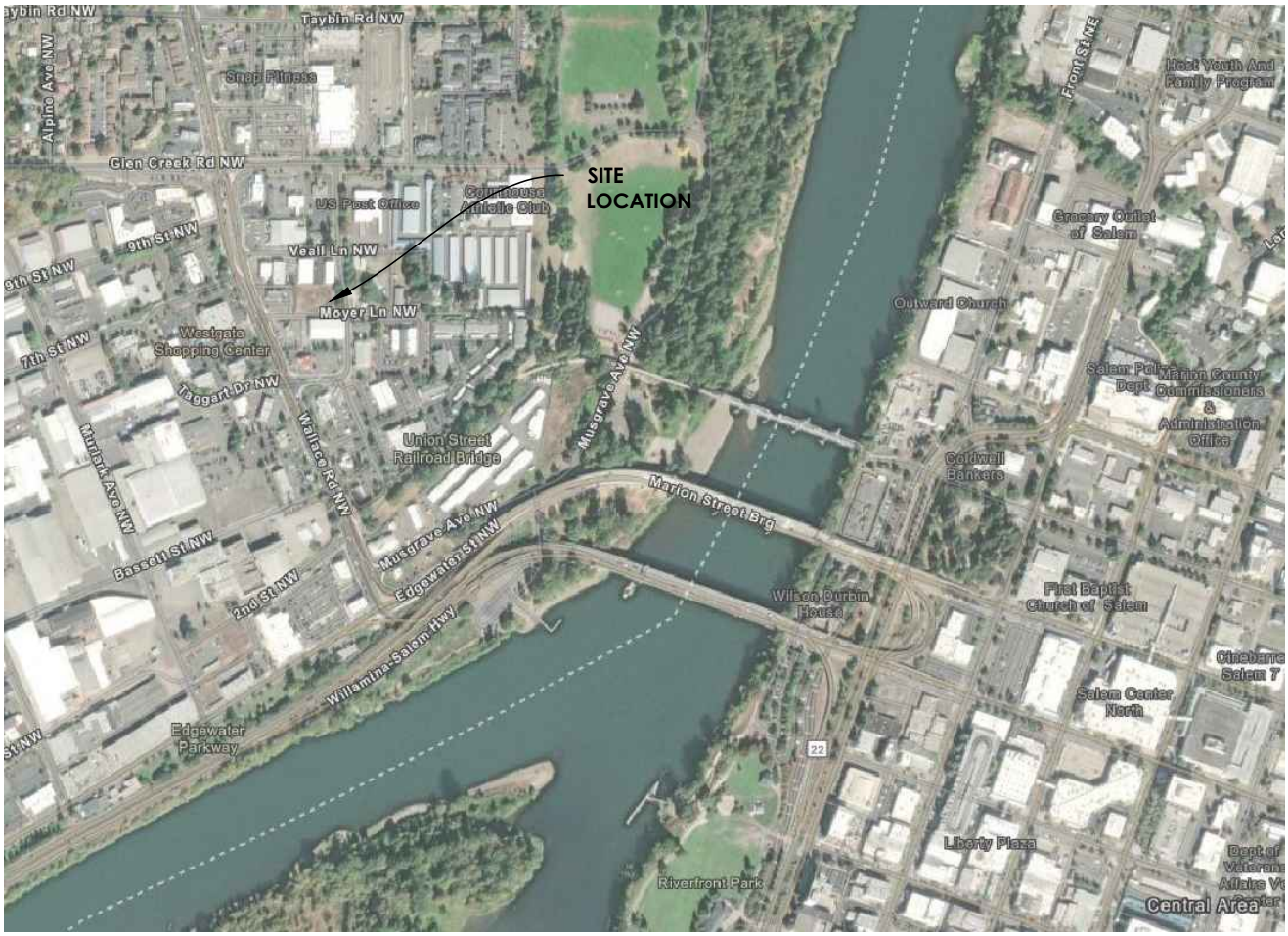
Ronald J. Derrick, P.E., G.E.
Principal Geotechnical Engineer

ATTACHED:

Figure-1, Site Vicinity Map
Figure-2, Site Exploration Map
Infiltration Test Results
ORWD Well Log (1)
USDA NRCS Site Soil Mapping and Soil Descriptions

Branch ENGINEERING Inc
Since 1977

N



NOTE: MAP COURTESY OF DOGAMI ONLINE HAZARD VIEWER, 2024

SCALE: NOT TO SCALE

SITE VICINITY MAP - MOYER LANE MIXED USE

FIGURE-1

415 MOYER LANE NW SALEM, OREGON

02-22-2024

PROJECT NO. 24-055

Branch ENGINEERING Inc
Since 1977

LEGEND:

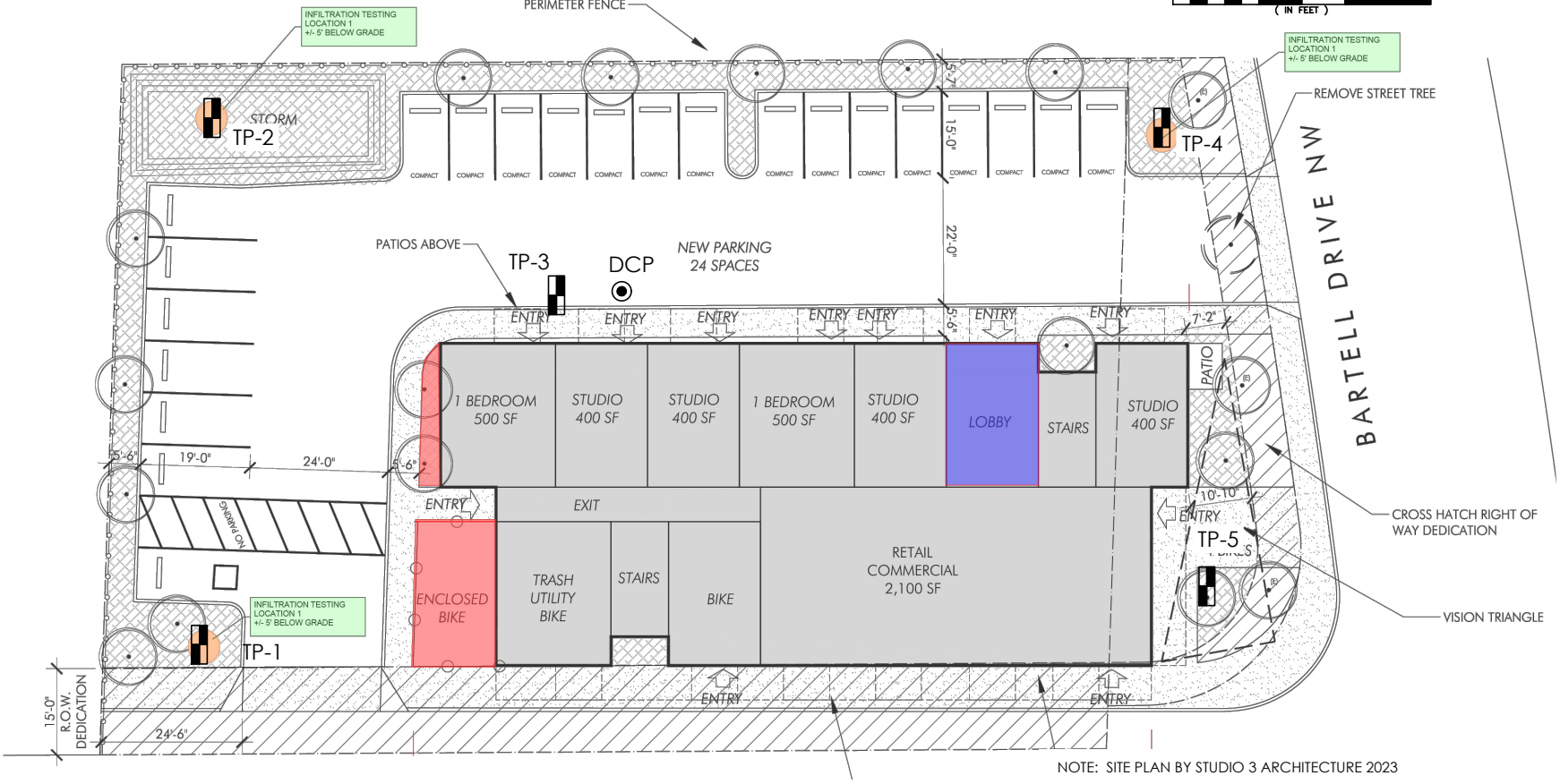
TP-1 APPROXIMATE TEST PIT LOCATION

IT-1 INFILTRATION TEST LOCATION

DCP DYNAMIC CONE PENETROMETER TEST

N

GRAPHIC SCALE
15 0 15 30
(IN FEET)



NOTE: SITE PLAN BY STUDIO 3 ARCHITECTURE 2023

SCALE: 1:30 (8.5 x 11)

SITE EXPLORATION MAP - MOYER LANE MIXED USE

FIGURE-2

415 MOYER LANE NW SALEM, OREGON

02-27-2024

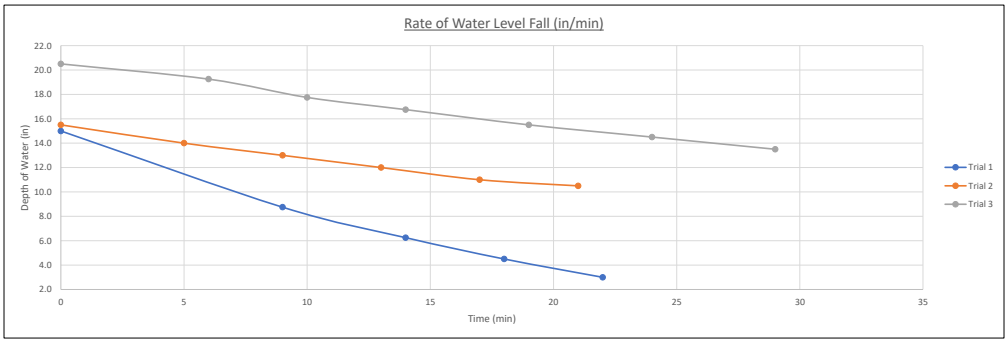
PROJECT NO. 24-039

Branch ENGINEERING Inc. Since 1977
civil · transportation
structural · geotechnical
SURVEYING

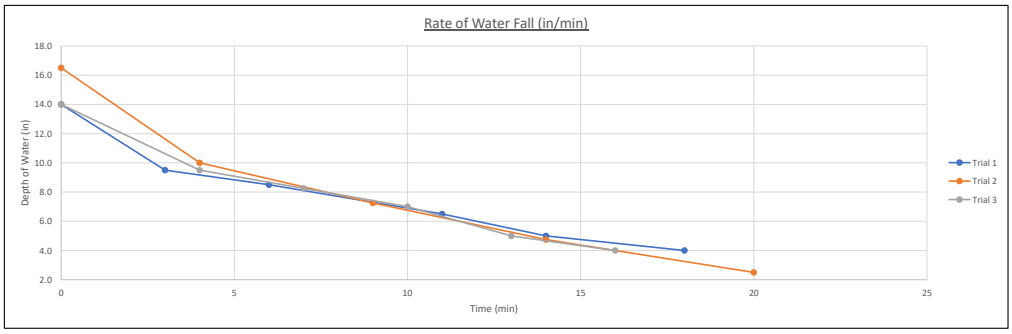
Infiltration Test Results

Project: 415 Moyer Lane, Salem
Testing Date: 02/24/2024
BEI Project Number: 24-055
Test Type: Encased Falling Head Infiltration
Time = 0 at addition of H2O

Infiltration Test 1 Trial 1		Elapsed Time (min)	Depth to Water Surface (in)	Height of Water (in)	Rate of Fall (in/min)	Rate of Fall (in/hr)	Avg Rate of Fall T-1 (in/hr)
Standpipe Diameter (in)	6	0	31.5	15.0			
Standpipe Height AGS (in)	0	9	37.8	8.8	0.69	41.7	
Test Depth BGS (in)	46.5	14	40.3	6.3	0.50	30.0	
Volume of Water Added (gal)	1.5	18	42.0	4.5	0.44	26.3	
Clocktime at Start	13:02	22	43.5	3.0	0.38	22.5	24.4
ASTM Soil Type	(CL)						
Infiltration Test 1 Trial 2		**Elapsed Time (min)**	**Depth to Water Surface (in)**	**Height of Water (in)**	**Rate of Fall (in/min)**	**Rate of Fall (in/hr)**	**Avg Rate of Fall T-2 (in/hr)**
Volume of Water Added (gal)	1.5	0	31.0	15.5			
Clocktime	14:01	5	32.5	14.0	0.30	18.0	
		9	33.5	13.0	0.25	15.0	
		13	34.5	12.0	0.25	15.0	
		17	35.5	11.00	0.25	15.0	
		21	36	10.5	0.13	7.5	13.1
Infiltration Test 1 Trial 3		**Elapsed Time (min)**	**Depth to Water Surface (in)**	**Height of Water (in)**	**Rate of Fall (in/min)**	**Rate of Fall (in/hr)**	**Avg Rate of Fall T-3 (in/hr)**
Volume of Water Added (gal)	1.5	0	26.0	20.5			
Clocktime	14:54	6	27.3	19.3	0.21	12.5	
		10	28.8	17.8	0.38	22.5	
		14	29.8	16.8	0.25	15.0	
		19	31.0	15.5	0.25	15.0	
		24	32	14.5	0.20	12.0	
		29	33	13.5	0.20	12.0	13.5



Infiltration Test 2 Trial 1		Elapsed Time (min)	Depth to Water Surface (in)	Height of Water (in)	Rate of Fall (in/min)	Rate of Fall (in/hr)	Avg Rate of Fall T-1 (in/hr)
Standpipe Diameter (in)	6	0	47.5	14.0			
Standpipe Height AGS (in)	0	3	52.0	9.5	1.50	90.0	
Test Depth BGS (in)	61.5	6	53.0	8.5	0.33	20.0	
Volume of Water Added (gal)	1.5	11	55.0	6.5	0.40	24.0	
Clocktime	14:05	14	56.5	5.0	0.50	30.0	
ASTM Soil Type	(CL)	18	57.5	4.0	0.25	15.0	23.0
Infiltration Test 2 Trial 2		**Elapsed Time (min)**	**Depth to Water Surface (in)**	**Height of Water (in)**	**Rate of Fall (in/min)**	**Rate of Fall (in/hr)**	**AVG Rate of Fall T-2 (in/hr)**
Volume of Water Added (gal)	1.5	0	45.0	16.5			
Clocktime	14:30	4	51.5	10.0	1.63	97.5	
		9	54.3	7.3	0.55	33.0	
		14	56.8	4.8	0.50	30.0	
		20	59.0	2.5	0.38	22.5	28.5
Infiltration Test 2 Trial 3		**Elapsed Time (min)**	**Depth to Water Surface (in)**	**Height of Water (in)**	**Rate of Fall (in/min)**	**Rate of Fall (in/hr)**	**AVG Rate of Fall T-2 (in/hr)**
Volume of Water Added (gal)	1.5	0	47.5	14.0			
Clocktime	15:58	4	52.0	9.5	1.13	67.5	
		7	53.3	8.3	0.42	25.0	
		10	54.5	7.0	0.42	25.0	
		13	56.5	5.0	0.67	40.0	
		16	57.5	4.0	0.33	20.0	28.3

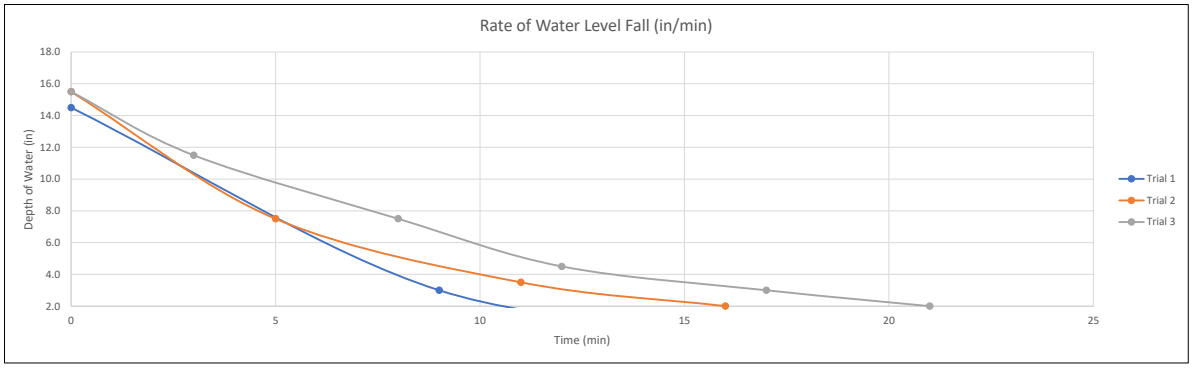


Branch ENGINEERING Inc. Since 1977
civil · transportation
structural · geotechnical
SURVEYING

Infiltration Test Results

Project: 415 Moyer Lane, Salem
Testing Date: 02/23/2024
BEI Project Number: 24-055
Test Type: Encased Falling Head Infiltration
Time = 0 at addition of H2O

Infiltration Test 4 Trial 1			Elapsed Time (min)	Depth to Water Surface (in)	Height of Water (in)	Rate of Fall (in/min)	Rate of Fall (in/hr)	Avg Rate of Fall T-1 (in/hr)
Standpipe Diameter (in)	6		0	31.0	14.5			
Standpipe Height AGS (in)	0		9	42.5	3.0	1.28	76.7	
Test Depth BGS (in)	45.5		17	45.0	0.5	0.31	18.8	18.8
Volume of Water Added (gal)	1.5							
Clocktime at Start	12:48							
ASTM Soil Type	(CL)							
Infiltration Test 3 Trial 2			**Elapsed Time (min)**	**Depth to Water Surface (in)**	**Height of Water (in)**	**Rate of Fall (in/min)**	**Rate of Fall (in/hr)**	**Avg Rate of Fall T-2 (in/hr)**
Volume of Water Added (gal)	1.5		0	30.0	15.5			
Clocktime	14:26		5	38.0	7.5	1.60	96.0	
			11	42.0	3.5	0.67	40.0	
			16	43.5	2.0	0.30	18.0	
			21	45.0	0.50	0.30	18.0	25.3
Infiltration Test 3 Trial 3			**Elapsed Time (min)**	**Depth to Water Surface (in)**	**Height of Water (in)**	**Rate of Fall (in/min)**	**Rate of Fall (in/hr)**	**Avg Rate of Fall T-3 (in/hr)**
Volume of Water Added (gal)	1.5		0	30.0	15.5			
Clocktime	14:58		3	34.0	11.5	1.33	80.0	
			8	38.0	7.5	0.80	48.0	
			12	41.0	4.5	0.75	45.0	
			17	42.5	3.0	0.30	18.0	
			21	43.5	2.0	0.25	15.0	26.0



STATE OF OREGON
MONITORING WELL REPORT

POLK 51510

(as required by ORS 537.765 & OAR 690-240-095)

Instructions for completing this report are on the last page of this form.

Well ID# L56354

Start Card # W127131

(1) OWNER/PROJECT

WELL NO. HC-4

Name Westgate shopping Center, attn: Richard Fisher

Address 3450 Cherry Ave. NE

City Salem State Ore Zip 97303

(2) TYPE OF WORK

☒ New construction ☐ Alteration (Repair/Recondition)

☐ Conversion ☐ Deepening ☐ Abandonment

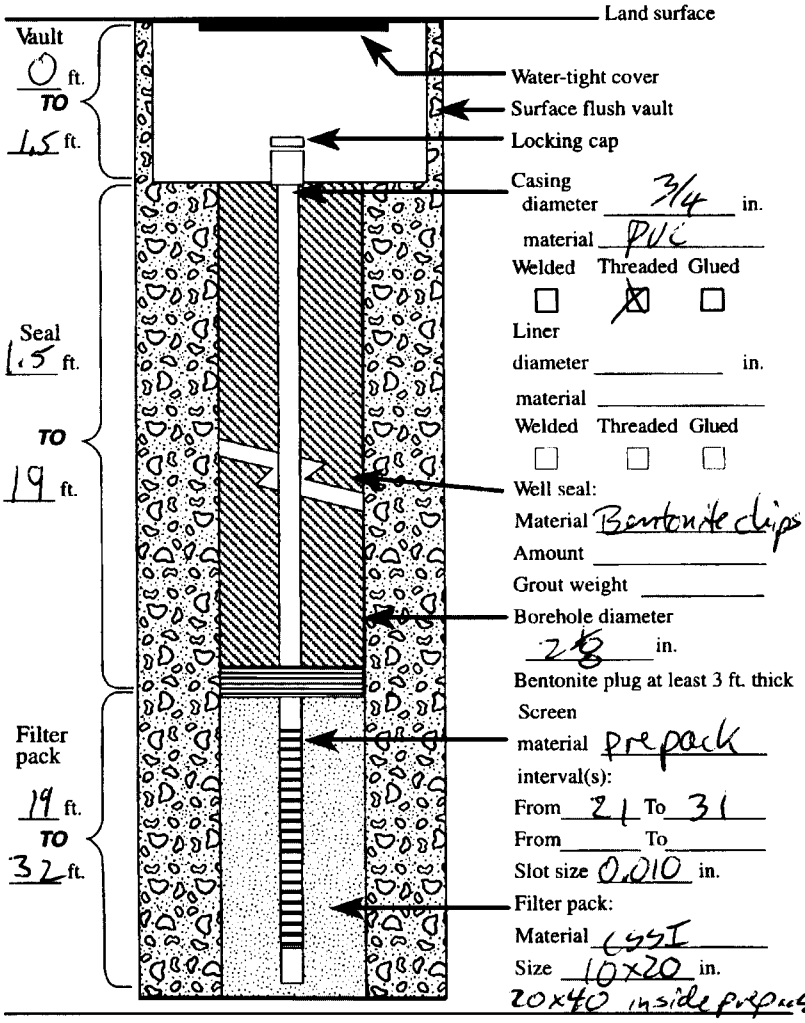
(3) DRILLING METHOD

☐ Rotary Air ☐ Rotary Mud ☐ Cable

☐ Hollow Stem Auger ☒ Other Push Probe

(4) BORE HOLE CONSTRUCTION:

Special Standards Yes ☐ No ☒ Depth of Completed Well 32 ft.



(5) WELL TESTS:

☒ Pump ☐ Bailer ☐ Air ☐ Flowing Artesian

Permeability — Yield < 1 GPM

Conductivity 331 µS PH 8.1

Temperature of water 14.0 °F/C Depth artesian flow found ____ ft.

Was water analysis done? ☒ Yes ☐ No

By whom? North Creek Analytical

Depth of strata to be analyzed. From 19 ft. to 32 ft.

Remarks: 8260 VOCs

Name of supervising Geologist/Engineer Julie LeGassick (Hart Crowser)

(6) LOCATION OF WELL By legal description:

County Polk Latitude 44° 56.87' Longitude 123° 3.13'

Township 7 (N or S) Range 3 (E or W) Section 21

NE 1/4 of SE 1/4 of above section.

Street address of well location Intersection of 7th St. NW and Wallace Rd. Salem

Tax lot number of well location 100

ATTACH MAP WITH LOCATION IDENTIFIED. Map shall include approximate scale and north arrow.

(7) STATIC WATER LEVEL:

16 Ft. below land surface. Date 2/27/02

Artesian Pressure ____ lb/sq. in. Date ____

(8) WATER BEARING ZONES:

Depth at which water was first found 29 ft.

From	To	Est. Flow Rate	SWL

(9) WELL LOG:

Ground Elevation 160'

Material	From	To	SWL
3" ASPHALT + GRAVEL	0	0.5	
SILT (ML)	0.5	27	
SANDY SILT (ML-SM)	27	32	

RECEIVED

APR 22 2002

WATER RESOURCES DEPT.
SALEM, OREGON

Date started 2/27/02 Completed 2/27/02

(unbonded) Monitor Well Constructor Certification:

I certify that the work I performed on the construction, alteration, or abandonment of this well is in compliance with Oregon water supply well construction standards. Materials used and information reported above are true to the best of my knowledge and belief.

Signed ____ MWC Number MWC 10363

Date 4/15/02

(bonded) Monitor 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 water supply well construction standards. This report is true to the best of my knowledge and belief.

MWC Number ____

Signed ____ Date ____

ORIGINAL COPY – WATER RESOURCES DEPARTMENT FIRST COPY – CONSTRUCTOR SECOND COPY – CUSTOMER

POLK 51510

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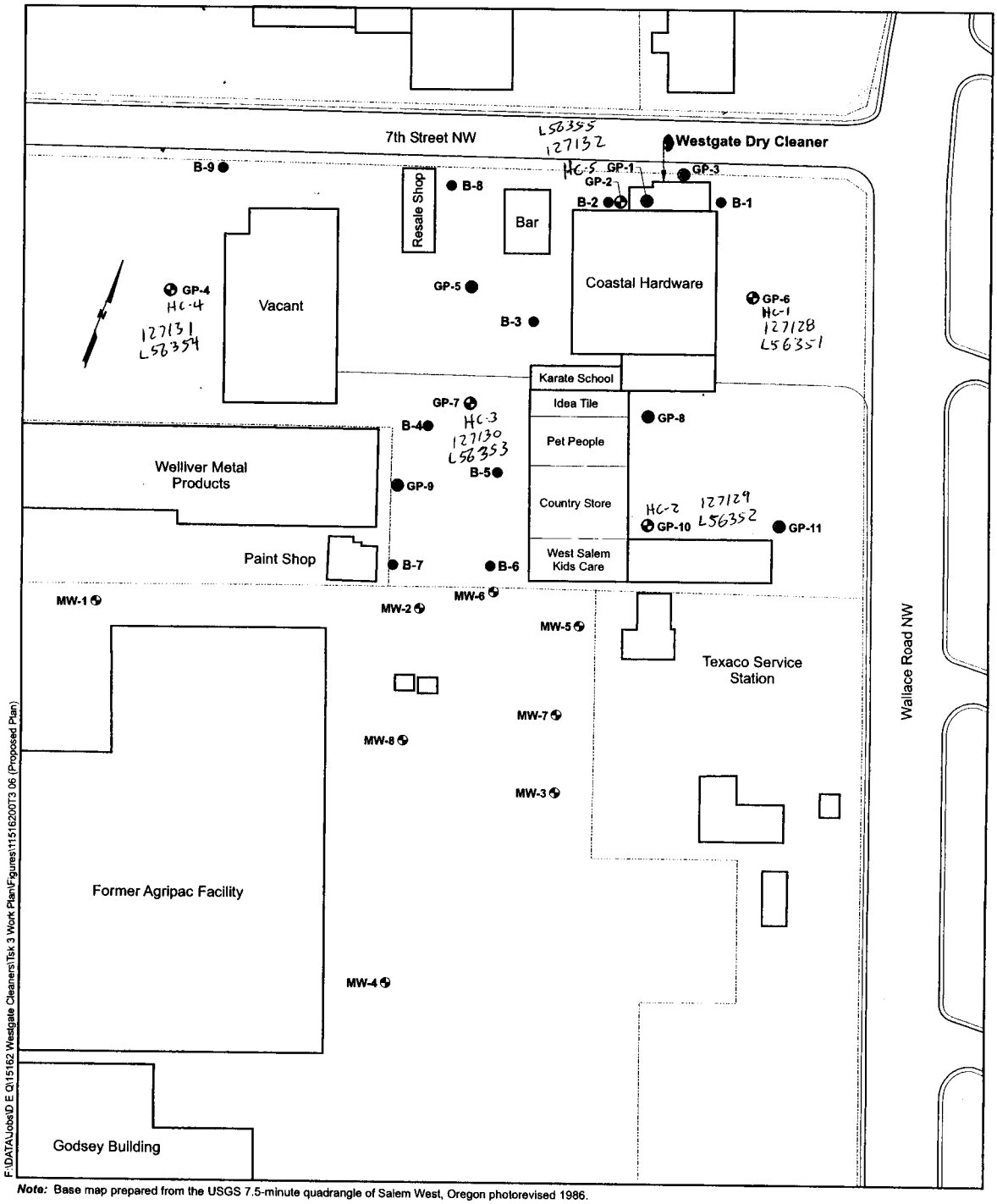
APR 2 2 2002
WATER RESOURCES DEPT.
SALEM, OREGON

Proposed Site Exploration Plan
Westgate Cleaners - 697 Wallace Road NW
Salem, Oregon



Note: Base map prepared from the USGS 7.5-minute quadrangle of Salem West, Oregon photorevised 1986.

Legend:

- B-4 ● Historical Geoprobe Location and Number per Evergreen Enviro, 1/01
- MW-1 ⊕ Historical Monitoring Well Location and Number per PBS Environmental & LPG Associates
- GP-1 ● Proposed Soil Exploration Location and Number
- GP-3 ⊕ Proposed Soil Exploration Location and Number (To Be Converted to a Monitoring Well)

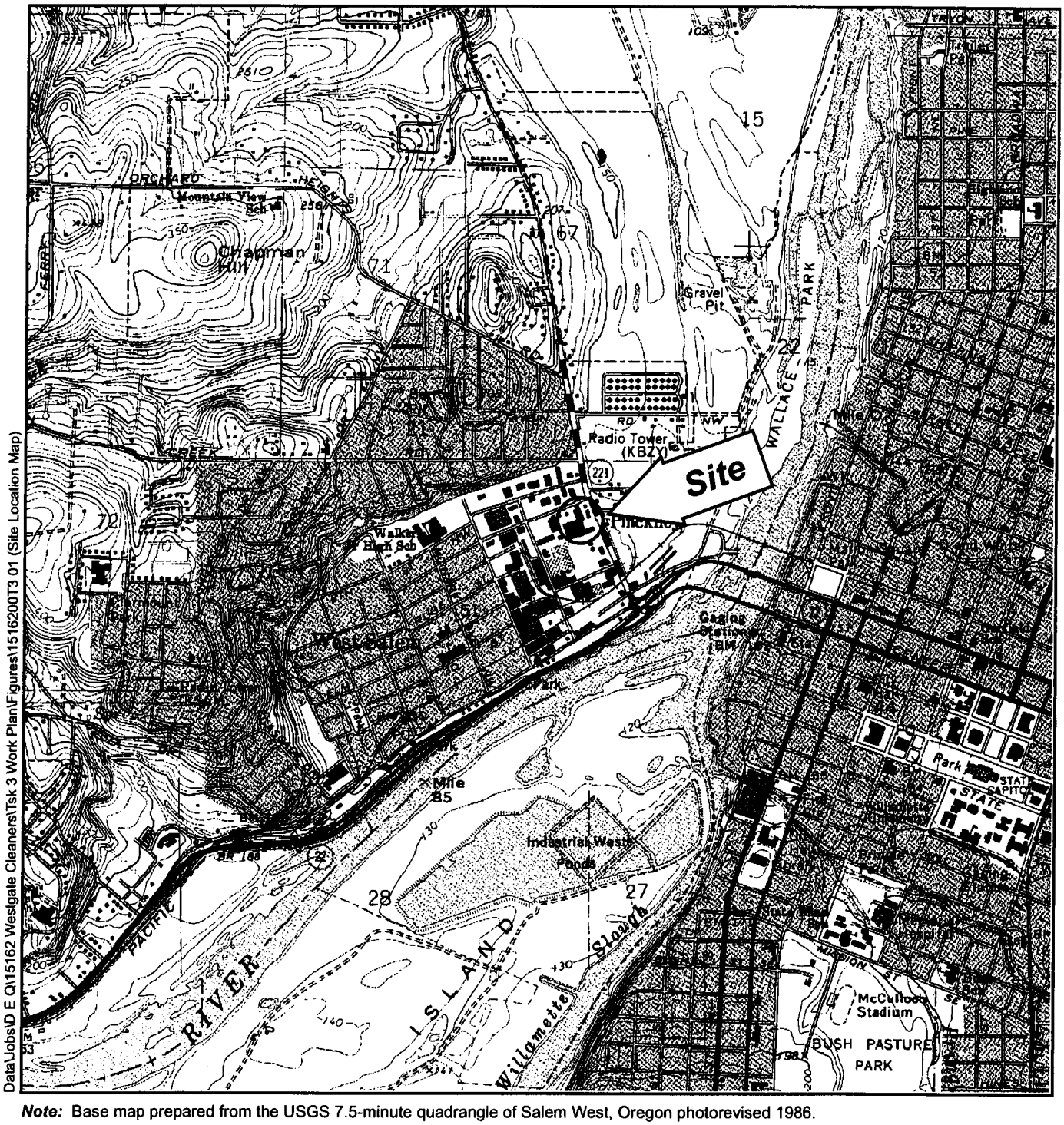
0 100 200
Approximate Scale in Feet

HARTCROWSER
15162-00/Task 3
Figure 6
12/01

POLK 51510

RECEIVED
APR 2 2 2002
WATER RESOURCES DEPT.
SALEM, OREGON

Site Location Map
Westgate Cleaners - 697 Wallace Road NW
Salem, Oregon



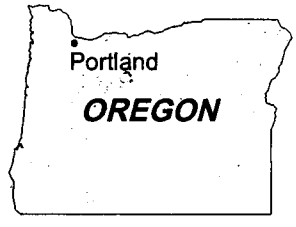
DataUobs\D E Q\15162 Westgate Cleaners\Tsk 3 Work Plan\Figures\1516200T3 01 (Site Location Map)

Note: Base map prepared from the USGS 7.5-minute quadrangle of Salem West, Oregon photorevised 1986.

0 2,000 4,000

Scale in Feet
Contour Interval 10 Feet

N

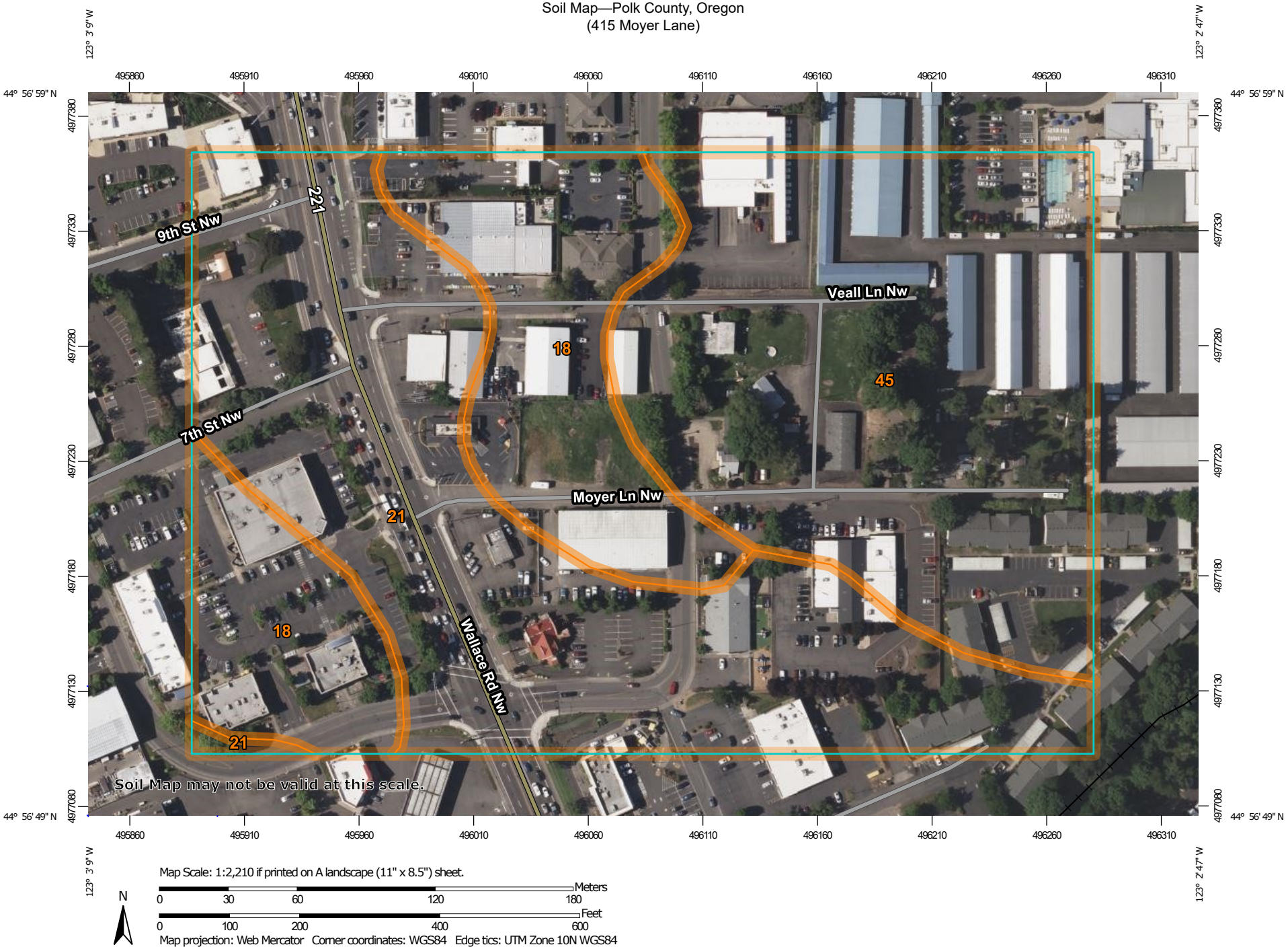


HARTCROWSER

15162-00\Task3 12/01

Figure 1

Soil Map—Polk County, Oregon
(415 Moyer Lane)



Map Scale: 1:2,210 if printed on A landscape (11" x 8.5") sheet.

N

Meters
0 30 60 120 180

Feet
0 100 200 400 600

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 Map Unit Polygons
- Soil Map Unit Lines
- Soil Map Unit Points

Special Point Features
- Blowout
- Borrow Pit
- Clay Spot
- Closed Depression
- Gravel Pit
- Gravelly Spot
- Landfill
- Lava Flow
- Marsh or swamp
- Mine or Quarry
- Miscellaneous Water
- Perennial Water
- Rock Outcrop
- Saline Spot
- Sandy Spot
- Severely Eroded Spot
- Sinkhole
- Slide or Slip
- Sodic Spot
- Spoil Area
- Stony Spot
- Very Stony Spot
- Wet Spot
- Other
- Special Line Features

Water Features
- Streams and Canals

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

Background
- Aerial Photography

MAP INFORMATION

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

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: Polk County, Oregon
Survey Area Data: Version 22, Sep 7, 2023

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

Date(s) aerial images were photographed: May 17, 2023—Jun 3, 2023

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

Map Unit Legend

Map Unit Symbol	Map Unit Name	Acres in AOI	Percent of AOI
18	Coburg silty clay loam	5.8	22.9%
21	Cove silty clay loam	10.3	40.2%
45	Malabon silty clay loam	9.4	37.0%
Totals for Area of Interest		**25.5**	**100.0%**

Polk County, Oregon

45—Malabon silty clay loam

Map Unit Setting

National map unit symbol: 22ww
Elevation: 200 to 300 feet
Mean annual precipitation: 40 to 50 inches
Mean annual air temperature: 52 to 54 degrees F
Frost-free period: 165 to 210 days
Farmland classification: All areas are prime farmland

Map Unit Composition

Malabon and similar soils: 95 percent
Minor components: 1 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Malabon

Setting

Landform: Stream terraces
Landform position (three-dimensional): Tread
Down-slope shape: Linear
Across-slope shape: Linear
Parent material: Mixed silty and clayey alluvium

Typical profile

H1 - 0 to 15 inches: silty clay loam
H2 - 15 to 60 inches: silty clay

Properties and qualities

Slope: 0 to 3 percent
Depth to restrictive feature: More than 80 inches
Drainage class: Well drained
Capacity of the most limiting layer to transmit water (Ksat): Moderately high (0.20 to 0.57 in/hr)
Depth to water table: More than 80 inches
Frequency of flooding: None
Frequency of ponding: None
Available water supply, 0 to 60 inches: High (about 11.4 inches)

Interpretive groups

Land capability classification (irrigated): 1
Land capability classification (nonirrigated): 1
Hydrologic Soil Group: C
Ecological site: R002XC006OR - Stream Terrace Group
Forage suitability group: Well drained < 15% Slopes (G002XY002OR)
Other vegetative classification: Well drained < 15% Slopes (G002XY002OR)
Hydric soil rating: No

Minor Components

Aquolls

Percent of map unit: 1 percent
Landform: Terraces
Hydric soil rating: Yes

Data Source Information

Soil Survey Area: Polk County, Oregon
Survey Area Data: Version 22, Sep 7, 2023

Polk County, Oregon

18—Coburg silty clay loam

Map Unit Setting

National map unit symbol: 22v1
Elevation: 180 to 200 feet
Mean annual precipitation: 40 to 60 inches
Mean annual air temperature: 52 to 54 degrees F
Frost-free period: 165 to 210 days
Farmland classification: All areas are prime farmland

Map Unit Composition

Coburg and similar soils: 85 percent
Minor components: 1 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Coburg

Setting

Landform: Stream terraces
Landform position (three-dimensional): Tread
Down-slope shape: Linear
Across-slope shape: Linear
Parent material: Silty alluvium

Typical profile

H1 - 0 to 15 inches: silty clay loam
H2 - 15 to 60 inches: silty clay

Properties and qualities

Slope: 0 to 3 percent
Depth to restrictive feature: More than 80 inches
Drainage class: Moderately well drained
Capacity of the most limiting layer to transmit water (Ksat): Moderately high (0.20 to 0.57 in/hr)
Depth to water table: About 18 to 30 inches
Frequency of flooding: None
Frequency of ponding: None
Available water supply, 0 to 60 inches: High (about 11.4 inches)

Interpretive groups

Land capability classification (irrigated): 2w
Land capability classification (nonirrigated): 2w
Hydrologic Soil Group: C
Ecological site: R002XC006OR - Stream Terrace Group
Forage suitability group: Moderately Well Drained < 15% Slopes (G002XY004OR)
Other vegetative classification: Moderately Well Drained < 15% Slopes (G002XY004OR)
Hydric soil rating: No

Minor Components

Aquolls

Percent of map unit: 1 percent
Landform: Flood plains
Hydric soil rating: Yes

Data Source Information

Soil Survey Area: Polk County, Oregon
Survey Area Data: Version 22, Sep 7, 2023