

STORMWATER REPORT

**Juniper Avenue – Taxlot 81021CB01500
Preliminary Subdivision Plan
Warrenton, OR 97146**

**Prepared November 23, 2020
Revised October 27, 2021
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HydraFlow Express output

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Stormwater Report

I. OBJECTIVE

The objective is to address stormwater system capacity for the Juniper Avenue Subdivision, as well as addressing how fill will impact the existing storm sewer outfall and stormwater storage in the existing wetlands.

II. STORMWATER STORAGE IN EXISTING WETLANDS & FLOODPLAIN

The proposed fill slope will not encroach on the existing wetlands and so will not impact stormwater storage within the wetlands. There are no mapped FEMA floodplains in the project vicinity (FIRMette included in the appendix for reference). The entire project site is mapped as Zone X, area of minimal flood hazard. The mapped 100-year floodplain nearest to the site is roughly 1/3 of a mile to the northeast, mapped at an elevation of 8 feet (FIRMette included in the appendix for reference). Fill is planned to be placed down to an elevation of approximately 17 feet, well above the nearest 100-year floodplain elevation. Therefore, stormwater storage within wetland and floodplain limits will not be negatively impacted.

III. EXISTING STORMWATER OUTFALL & CONNECTION

The existing storm sewer outfall line is a 12" corrugated plastic pipe, assumed to be ADS N-12, constructed at a slope of approximately 4.6% with a hydraulic capacity of 8.9 cfs will be abandoned. A new 15" PVC pipe will be re-routed through our site to avoid encumbering the site with a 20' utility easement that would be required by the City of Warrenton. To demonstrate that the 15" PVC storm line is capable of conveying runoff from all existing, proposed, and possible future tributary impervious areas, a maximum tributary impervious area was calculated using HydroCAD. A pipe capacity analysis for a 15" pipe with a 1.9% slope shows a maximum capacity of 8.9 cfs and matches the existing 12" corrugated plastic pipe. As shown in the HydroCAD model, it takes approximately 6.3 acres of impervious surface (with a minimum time of concentration) to generate a peak runoff of 8.9 cfs in a 100-year storm event. The 100-year storm event of 6.1" over 24 hours was modeled using the Santa Barbara Urban Hydrograph (SBUH) with a Type 1A rainfall distribution. HydraFlow Express and HydroCAD outputs are included in the appendix for reference. The existing outfall will be protected until the new storm pipe and swale is installed.

The high point of Juniper Avenue is approximately 750' upstream of the existing Juniper Avenue catch basins; assuming a paved width of 60' at full build-out, there could be up to 1.0 acres of tributary impervious roadway. Coupled with a proposed project site of 1.1 acres (much of which is not impervious), approximately 2/3 of total existing outfall pipe capacity is still available. Therefore, the existing outfall has sufficient capacity.

National Flood Hazard Layer FIRMette



Legend

SEE FIS REPORT FOR DETAILED LEGEND AND INDEX MAP FOR FIRM PANEL LAYOUT

SPECIAL FLOOD HAZARD AREAS		Without Base Flood Elevation (BFE) <i>Zone A, V, A99</i>
		With BFE or Depth <i>Zone AE, AO, AH, VE, AR</i>
		Regulatory Floodway
OTHER AREAS OF FLOOD HAZARD		0.2% Annual Chance Flood Hazard, Areas of 1% annual chance flood with average depth less than one foot or with drainage areas of less than one square mile <i>Zone X</i>
		Future Conditions 1% Annual Chance Flood Hazard <i>Zone X</i>
		Area with Reduced Flood Risk due to Levee. See Notes. <i>Zone X</i>
		Area with Flood Risk due to Levee <i>Zone D</i>
OTHER AREAS		NO SCREEN Area of Minimal Flood Hazard <i>Zone X</i>
		Effective LOMRs
		Area of Undetermined Flood Hazard <i>Zone D</i>
GENERAL STRUCTURES		Channel, Culvert, or Storm Sewer
		Levee, Dike, or Floodwall
OTHER FEATURES		Cross Sections with 1% Annual Chance Water Surface Elevation
		Coastal Transect
		Base Flood Elevation Line (BFE)
		Limit of Study
		Jurisdiction Boundary
		Coastal Transect Baseline
MAP PANELS		Digital Data Available
		No Digital Data Available
		Unmapped

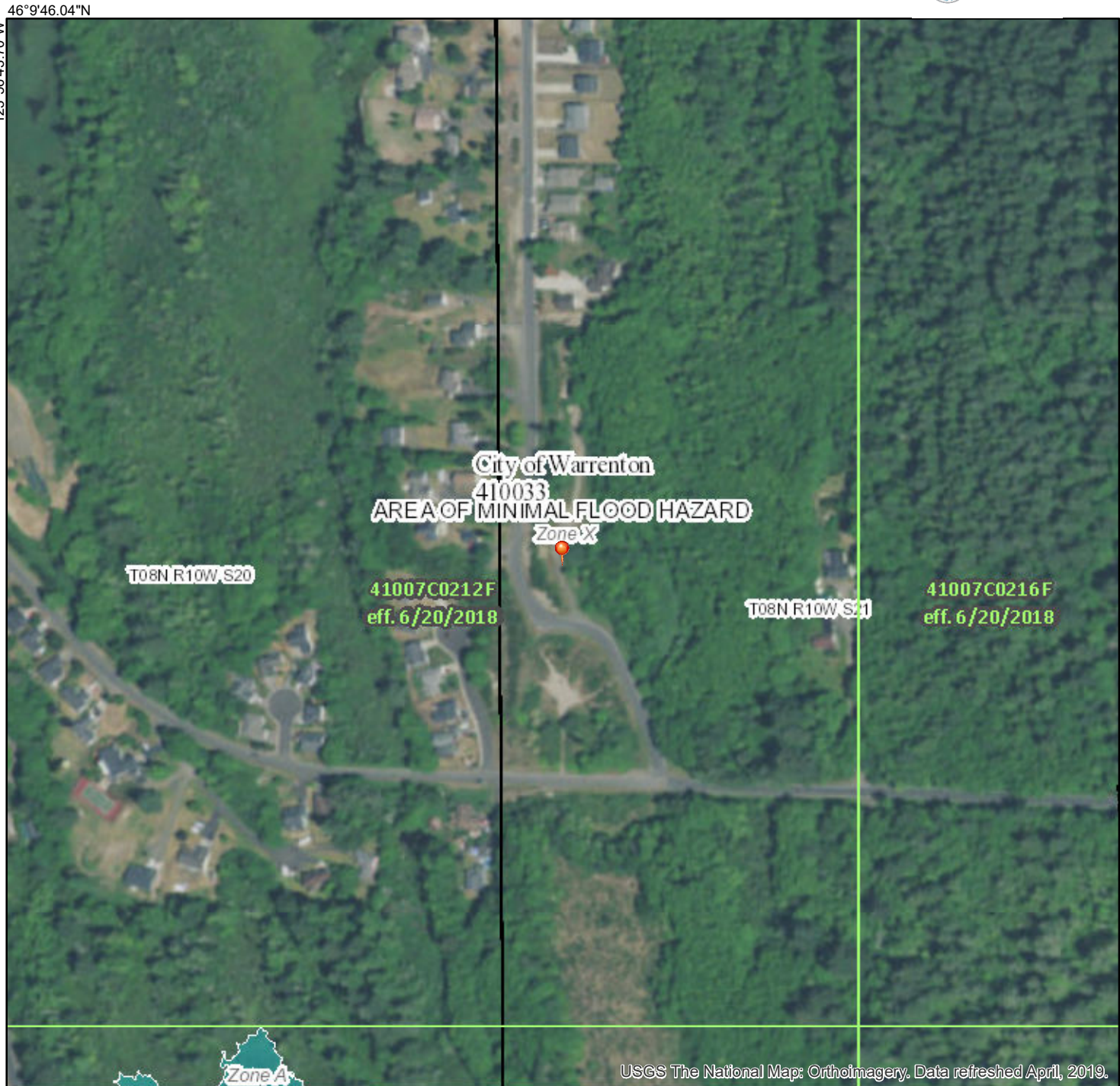


The pin displayed on the map is an approximate point selected by the user and does not represent an authoritative property location.

This map complies with FEMA's standards for the use of digital flood maps if it is not void as described below. The basemap shown complies with FEMA's basemap accuracy standards

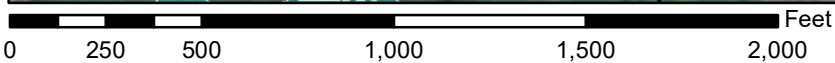
The flood hazard information is derived directly from the authoritative NFHL web services provided by FEMA. This map was exported on **6/9/2020 at 11:31:22 AM** and does not reflect changes or amendments subsequent to this date and time. The NFHL and effective information may change or become superseded by new data over time.

This map image is void if the one or more of the following map elements do not appear: basemap imagery, flood zone labels, legend, scale bar, map creation date, community identifiers, FIRM panel number, and FIRM effective date. Map images for unmapped and unmodernized areas cannot be used for regulatory purposes.



46°9'46.04"N

123°56'43.70"W



USGS The National Map: Orthoimagery. Data refreshed April, 2019.

1:6,000

46°9'21.12"N

123°56'6.24"W



National Flood Hazard Layer FIRMMette



Legend

SEE FIS REPORT FOR DETAILED LEGEND AND INDEX MAP FOR FIRM PANEL LAYOUT

SPECIAL FLOOD HAZARD AREAS		Without Base Flood Elevation (BFE) Zone A, V, A99
		With BFE or Depth Zone AE, AO, AH, VE, AR
		Regulatory Floodway
OTHER AREAS OF FLOOD HAZARD		0.2% Annual Chance Flood Hazard, Areas of 1% annual chance flood with average depth less than one foot or with drainage areas of less than one square mile Zone X
		Future Conditions 1% Annual Chance Flood Hazard Zone X
		Area with Reduced Flood Risk due to Levee. See Notes. Zone X
		Area with Flood Risk due to Levee Zone D
OTHER AREAS		NO SCREEN Area of Minimal Flood Hazard Zone X
		Effective LOMRs
GENERAL STRUCTURES		Area of Undetermined Flood Hazard Zone D
		Channel, Culvert, or Storm Sewer
OTHER FEATURES		Levee, Dike, or Floodwall
		20.2 Cross Sections with 1% Annual Chance Water Surface Elevation
OTHER FEATURES		17.5 Coastal Transect
		Coastal Transect Baseline
OTHER FEATURES		Base Flood Elevation Line (BFE)
		Limit of Study
OTHER FEATURES		Jurisdiction Boundary
		Profile Baseline
OTHER FEATURES		Hydrographic Feature
	MAP PANELS	
		No Digital Data Available
		Unmapped



The pin displayed on the map is an approximate point selected by the user and does not represent an authoritative property location.

This map complies with FEMA's standards for the use of digital flood maps if it is not void as described below. The basemap shown complies with FEMA's basemap accuracy standards

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46°10'3.70"N

123°56'23.30"W



USGS The National Map: Orthoimagery. Data refreshed April, 2019.



46°9'38.79"N

123°55'45.84"W



Channel Report

12in Outfall Capacity

Circular

Diameter (ft) = 1.00

Invert Elev (ft) = 1.00

Slope (%) = 4.60

N-Value = 0.012

Calculations

Compute by: Known Depth

Known Depth (ft) = 0.94

Highlighted

Depth (ft) = 0.94

Q (cfs) = 8.901

Area (sqft) = 0.77

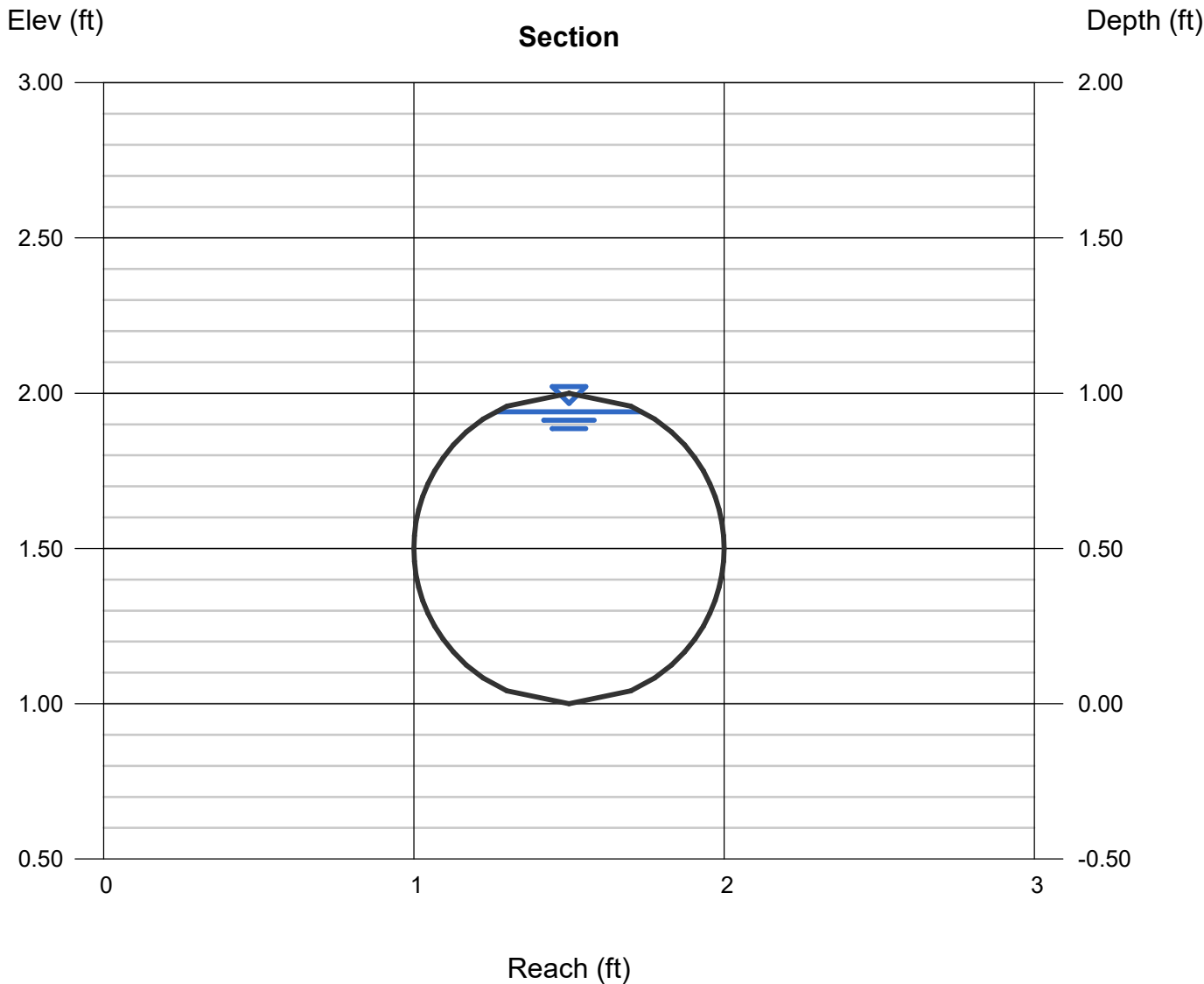
Velocity (ft/s) = 11.61

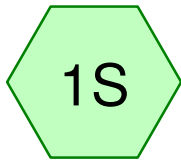
Wetted Perim (ft) = 2.65

Crit Depth, Y_c (ft) = 0.99

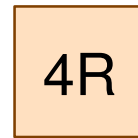
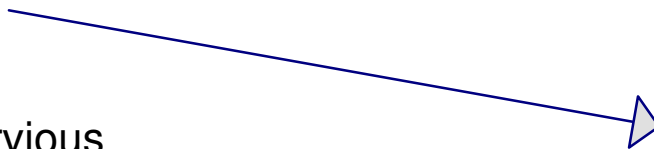
Top Width (ft) = 0.47

EGL (ft) = 3.04

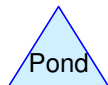
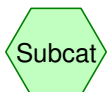




Tributary Impervious



15" PIPE CAPACITY



Juniper Ave - Const

Prepared by Firwood Design Group

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Rainfall Events Listing (selected events)

Event#	Event Name	Storm Type	Curve	Mode	Duration (hours)	B/B	Depth (inches)	AMC
1	Warrenton 100-Yr	Type IA 24-hr		Default	24.00	1	6.10	2

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Area Listing (all nodes)

Area (acres)	CN	Description (subcatchment-numbers)
6.200	98	Paved parking, HSG B (1S)
6.200	98	TOTAL AREA

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Soil Listing (all nodes)

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

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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	6.200	0.000	0.000	0.000	6.200	Paved parking	1S
0.000	6.200	0.000	0.000	0.000	6.200	TOTAL AREA	

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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)
1	4R	100.00	98.10	100.0	0.0190	0.013	0.0	15.0	0.0

Juniper Ave - Const

Type IA 24-hr Warrenton 100-Yr Rainfall=6.10"

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Time span=0.00-24.00 hrs, dt=0.05 hrs, 481 points

Runoff by SBUH method, Split Pervious/Imperv.

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

Subcatchment 1S: Tributary Impervious Runoff Area=6.200 ac 100.00% Impervious Runoff Depth>5.85"
Tc=6.0 min CN=0/98 Runoff=8.88 cfs 3.023 af

Reach 4R: 15" PIPE CAPACITY Avg. Flow Depth=1.02' Max Vel=8.27 fps Inflow=8.88 cfs 3.023 af
15.0" Round Pipe n=0.013 L=100.0' S=0.0190 '/' Capacity=8.90 cfs Outflow=8.88 cfs 3.022 af

Total Runoff Area = 6.200 ac Runoff Volume = 3.023 af Average Runoff Depth = 5.85"
0.00% Pervious = 0.000 ac 100.00% Impervious = 6.200 ac

Summary for Subcatchment 1S: Tributary Impervious

Runoff = 8.88 cfs @ 7.91 hrs, Volume= 3.023 af, Depth> 5.85"
 Routed to Reach 4R : 15" PIPE CAPACITY

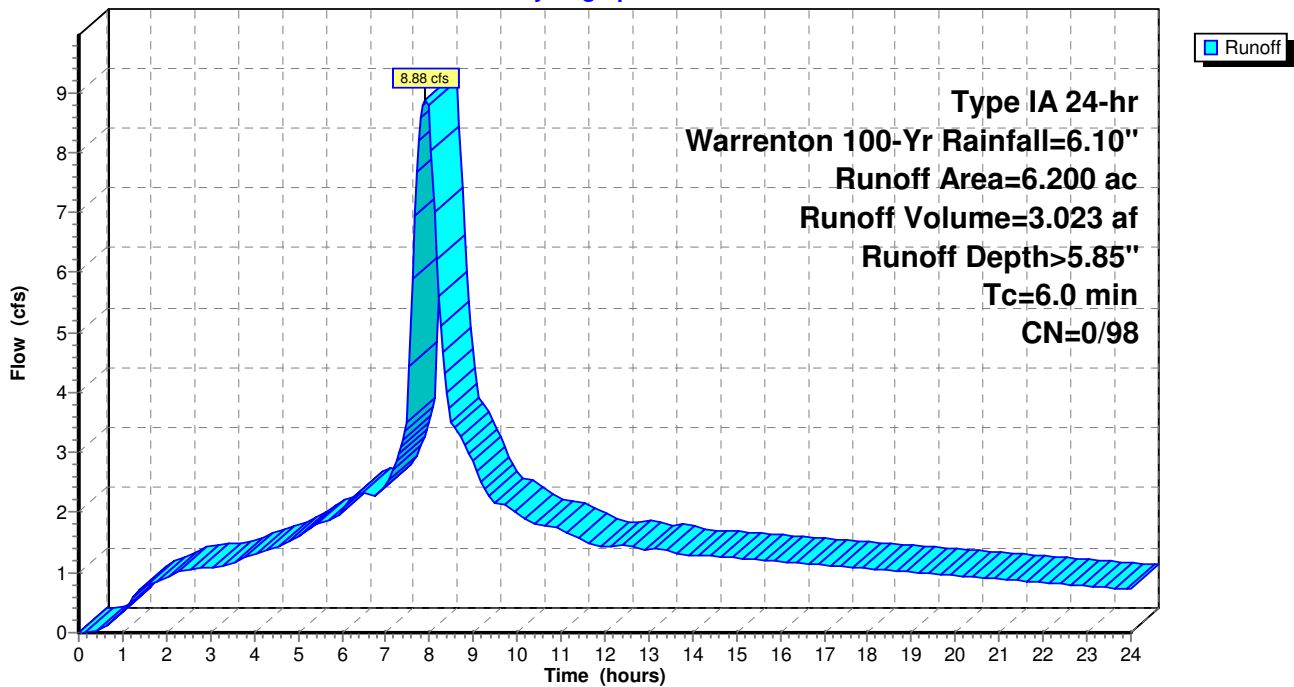
Runoff by SBUH method, Split Pervious/Imperv., Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
 Type IA 24-hr Warrenton 100-Yr Rainfall=6.10"

Area (ac)	CN	Description
6.200	98	Paved parking, HSG B
6.200	98	100.00% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
5.0					Direct Entry, Standard Min Tc
5.0	0	Total, Increased to minimum Tc = 6.0 min			

Subcatchment 1S: Tributary Impervious

Hydrograph



Summary for Reach 4R: 15" PIPE CAPACITY

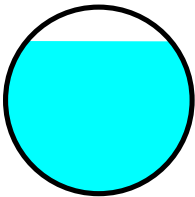
[52] Hint: Inlet/Outlet conditions not evaluated

Inflow Area =	6.200 ac, 100.00% Impervious, Inflow Depth > 5.85"	for Warrenton 100-Yr event
Inflow =	8.88 cfs @ 7.91 hrs, Volume=	3.023 af
Outflow =	8.88 cfs @ 7.92 hrs, Volume=	3.022 af, Atten= 0%, Lag= 0.5 min

Routing by Stor-Ind+Trans method, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
 Max. Velocity= 8.27 fps, Min. Travel Time= 0.2 min
 Avg. Velocity = 5.19 fps, Avg. Travel Time= 0.3 min

Peak Storage= 107 cf @ 7.92 hrs
 Average Depth at Peak Storage= 1.02' , Surface Width= 0.97'
 Bank-Full Depth= 1.25' Flow Area= 1.2 sf, Capacity= 8.90 cfs

15.0" Round Pipe
 n= 0.013
 Length= 100.0' Slope= 0.0190 '/'
 Inlet Invert= 100.00', Outlet Invert= 98.10'



Reach 4R: 15" PIPE CAPACITY

Hydrograph

