Land Surveying Civil Engineering Land Use Planning Landscape Architecture

CITY OF LA CENTER

FINAL STORMWATER REPORT

MINIT MANAGEMENT
MINIT MANAGEMENT, LLC

JOB # 9825.01.01

REVIEWED BY: CHARLES E. "CHAD" MCMURRY, P.E.
DESIGNED BY: CHARLES E. "CHAD" MCMURRY, P.E.

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City of La Center

Final Stormwater Report

Minit Management
Minit Management, LLC

Job #9825.01.01

August 5, 2020

Designed by: Charles E. "Chad" McMurry, P.E.
Reviewed by: Charles E. "Chad" McMurry, P.E.

Olson Engineering, Inc.
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Vancouver, WA 98660
(360) 695-1385

REVISION	BY	DATE	COMMENTS

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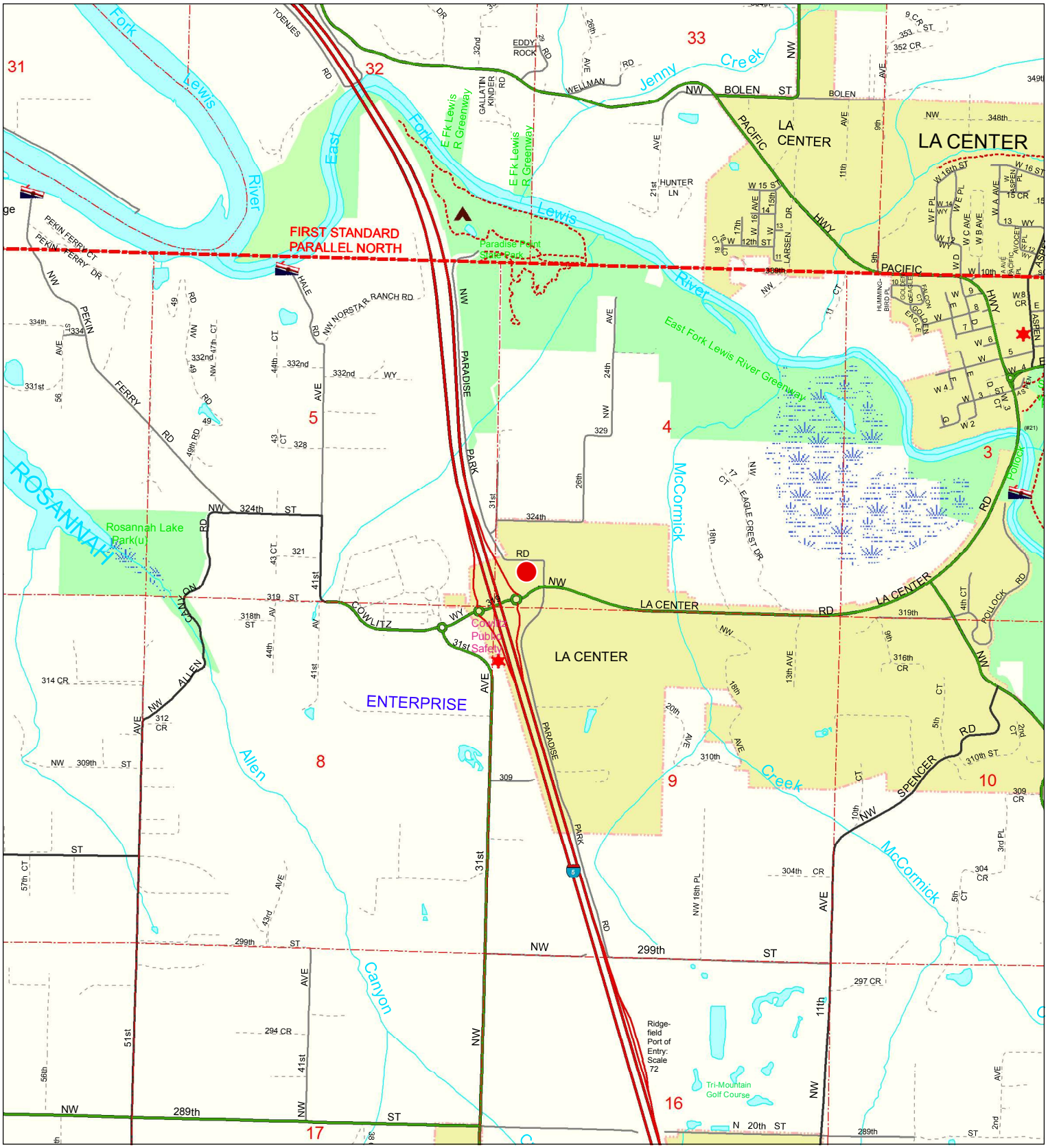


General Location

Printed on: February 11, 2020

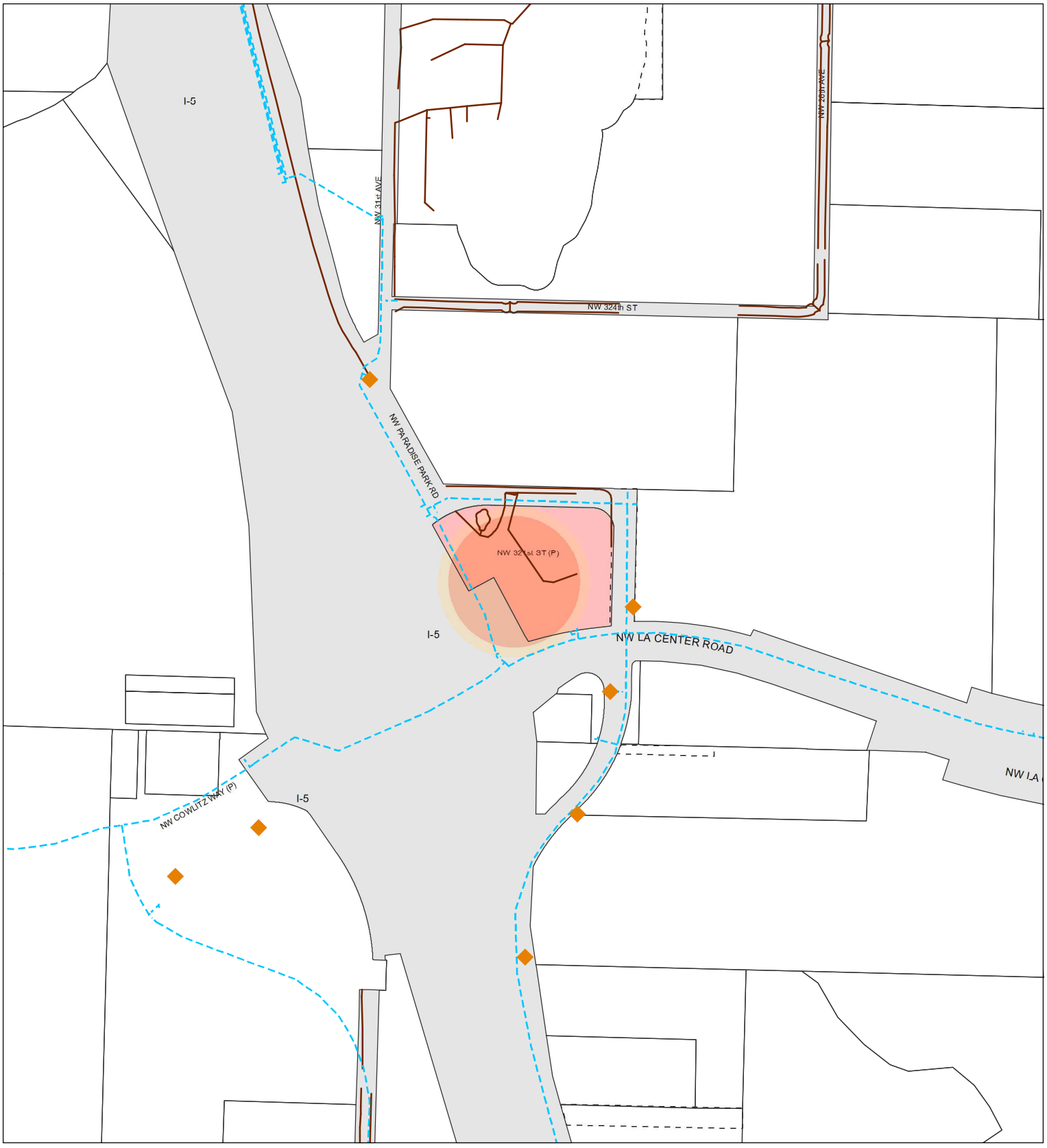
Account: 209738000
Owner: MINIT MANAGEMENT LLC
Address: PO BOX 5889
C/S/Z: VANCOUVER, WA 98668

Location of Subject Property(s)

CLARK COUNTY, WASHINGTON
Geographic Information System

0 1,000 2,000 Feet

Information shown on this map was collected from several sources. Clark County accepts no responsibility for any inaccuracies that may be present.



Water, Sewer, and Storm Systems

Account: 209738000
Owner: MINIT MANAGEMENT LLC
Address: PO BOX 5889
C/S/Z: VANCOUVER, WA 98668

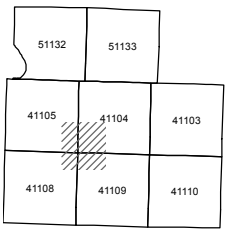
Printed on: February 11, 2020

CLARK COUNTY, WASHINGTON
Geographic Information System

N

0 200 400 Feet

Subject Property(s)
Public Road
Transportation or Major Utility Easement
Water Lines
Sewer Lines
Storm Water Lines
1-year Wellhead ZOC
5-year Wellhead ZOC
10-year Wellhead ZOC
Hydrants



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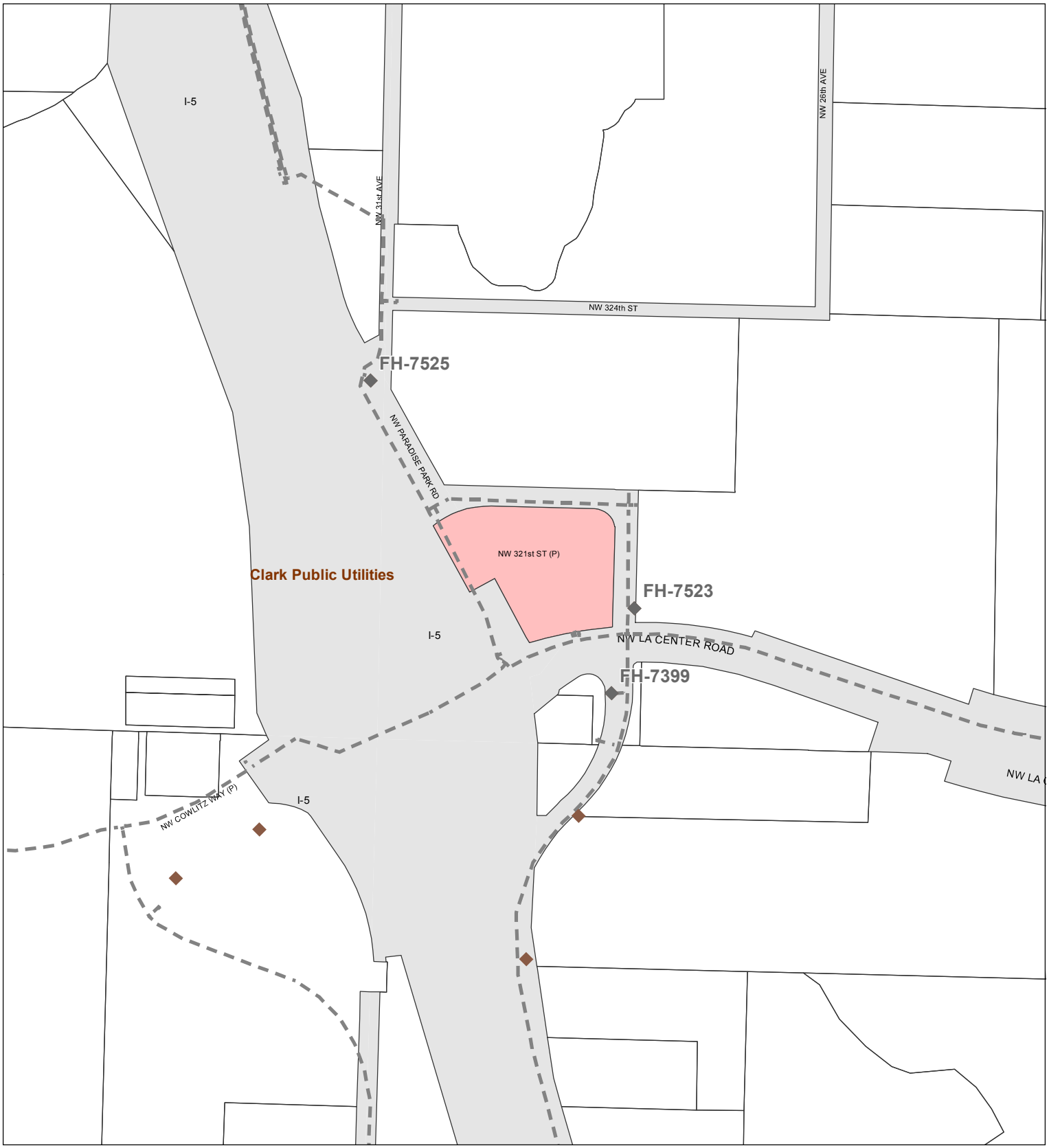


Water Systems

Printed on: February 11, 2020

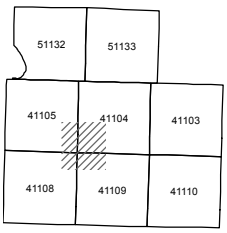
Account: 209738000
Owner: MINIT MANAGEMENT LLC
Address: PO BOX 5889
C/S/Z: VANCOUVER, WA 98668

Subject Property(s)
Public Road
Water District Boundary
Unknown Size Water Line
< 10" Water LIne
10-20" Water Line
> 20" Water Line
No Flow Data Hydrant
0 - 499 GPM at 20 PSI
500 - 999 GPM at 20 PSI
> 1000 - 1749 GPM at 20 PSI
> 1750 GPM at 20 PSI
Hydrant > 500' from parcel(s)

CLARK COUNTY, WASHINGTON
Geographic Information System

N

0 200 400 Feet



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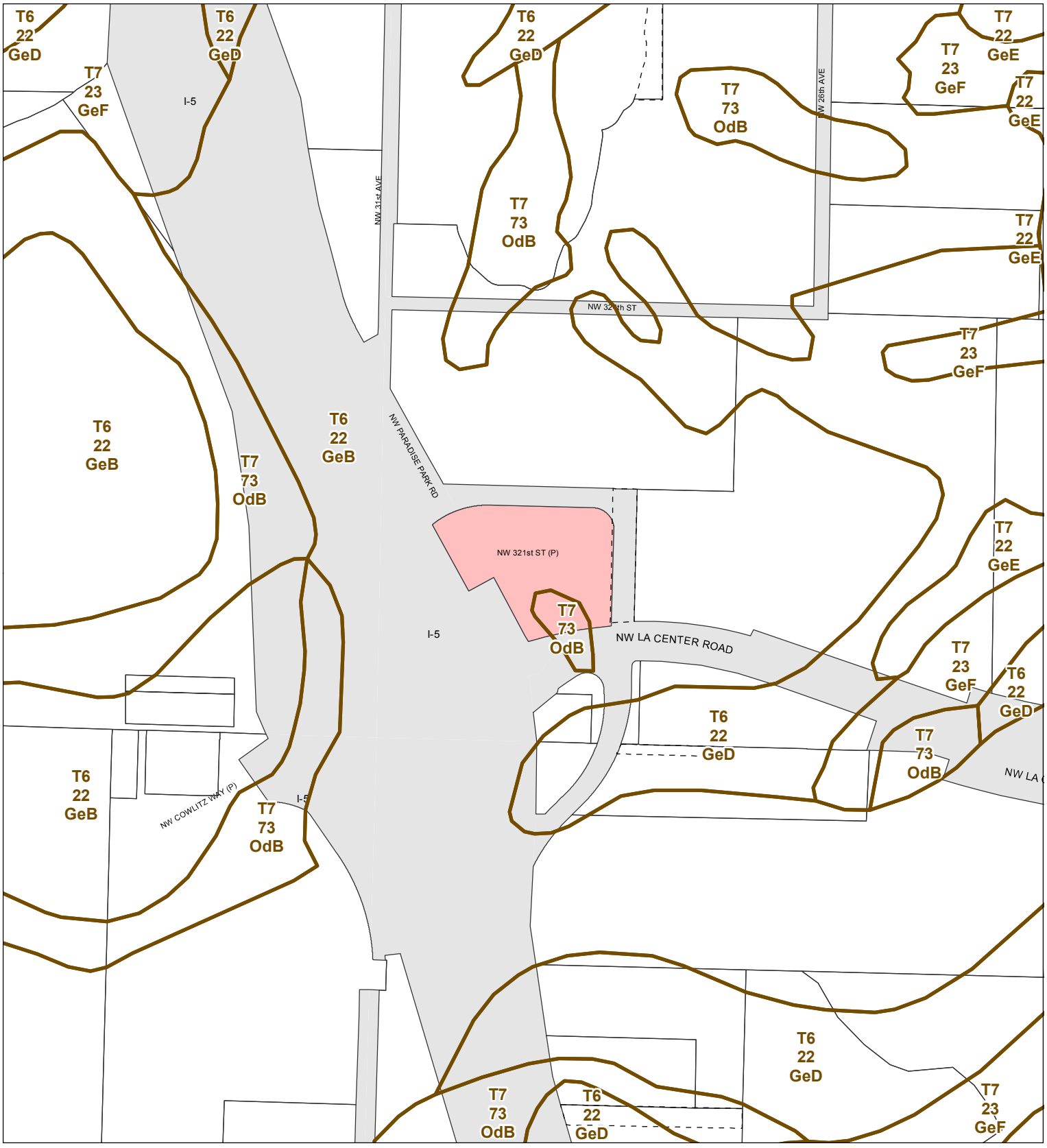
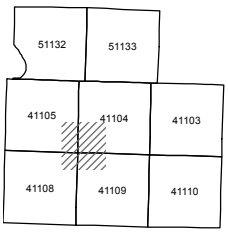


Soil Types

Account: 209738000
Owner: MINIT MANAGEMENT LLC
Address: PO BOX 5889
C/S/Z: VANCOUVER, WA 98668

Printed on: February 11, 2020

Subject Property(s)
Public Road
Transportation or Major Utility Easement
Soil Type Boundary



CLARK COUNTY, WASHINGTON
Geographic Information System

N

0 200 400 Feet

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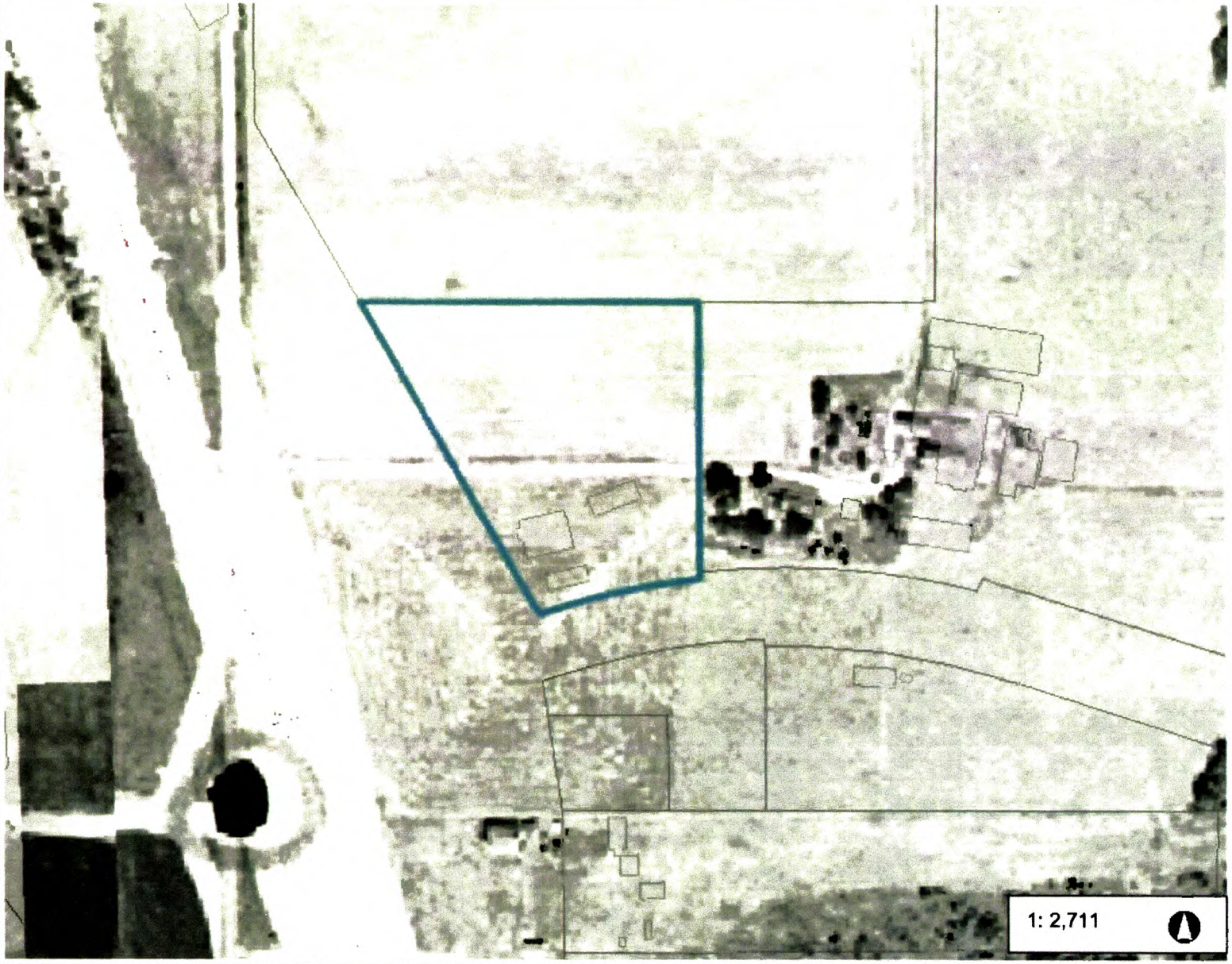
Minit Mart Historic Condition



Legend

- Building Footprints
- Taxlots
- Cities Boundaries
- Urban Growth Boundaries

Notes:

1955 Aerial Photography

451.9 0 225.95 451.9 Feet

WGS_1984_Web_Mercator_Auxiliary_Sphere
Clark County, WA. GIS - http://gis.clark.wa.gov

1.1 Project Introduction

Minit Management LLC proposes the construction of four commercial pads on the site of the current Minit Mart which lies on a parcel bounded by La Center Road, Paradise Park Road, and the I-5 freeway. This phased commercial development includes the following:

- 101-unit, 5-story hotel.
- 11,600 square foot, one-story multi-tenant commercial building.
- 4,510 square foot, one-story convenience store with a drive through window.
- 2,800 square foot, one-story drive-through restaurant.
- 12-pump automobile fueling island.
- Associated parking, utility, and other infrastructure improvements.
- Four-lot commercial short plat.

The existing convenience store and fueling islands will be removed. This parcel is already served by a treatment and detention system installed during the reconstruction of the La Center Road/I-5 interchange. This report will demonstrate the adequacy of that system to treat and detain runoff from the proposed improvements.

The requirements for stormwater management on this parcel are described in a Development Agreement between Minit Management and the City of La Center, vesting stormwater design requirements at those described in Chapter 18 of the La Center Municipal Code in effect on March 28, 2016.

1.2 Site Location

Minit Management owns property at the northwest quadrant of the I-5/La Center Road Interchange in the SW ¼ of Section 4, T4N, R1E, W.M. The parcel is bounded on the west by I-5, on the north and east by Paradise Park Road, and on the south by La Center Road.

1.3 Scope of Work

The redevelopment of the property is expected to replace approximately 2.9 acres of existing pavement, two fueling islands, and a convenience store with approximately 0.7 acres of roof area and 2.7 acres of pavement and hardscape. Frontage improvements (with the exception of the removal of one driveway) were previously completed with the La Center Road improvements.

Site Improvements

2.1 Existing Conditions

The area of the project is currently developed as a fueling station, convenience store, and associated parking and truck maneuvering area. An existing drainage system captures runoff from the southerly portions of the site and directs that runoff to a flow splitter, which directs events equivalent to the water quality treatment storm through treatment and bypasses larger flows directly to the detention pipe gallery. Water quality treatment is provided by a coalescing plate oil-water separator and a StormFilter treatment vault.

2.2 Soils

Based on the Washington Division of Geology and Earth Resources Geologic Map of the Vancouver Quadrangle, the site is mapped as Quaternary periglacial deposits of sand silt and clay resulting from outburst from the Missoula floods. In addition, the near surface soils have been mapped by the USDA Soil Conservation Service as Gee Silt Loam with a small amount of Odne silt loam at the southeast corner of the property.

A) Topsoil – approximately 5 inches of organic root mat with a tilled zone extending approximately 18 inches from the surface.
B) Silt – below the tilled zone, a deposit of silt with variable percentages of clay and sand extends to approximately 12.5 feet to 15 feet. In general, the silt zone is stiff in the upper 5 feet with an underlying softer layer.
C) Clay – Below the silt, a stiff to very stiff clay layer extends to a depth of between 23 and over 42 feet below the surface. In some locations, gravel is present within the clay layer.
D) Sandy Silt – Below the clay, a stiff deposit of sandy silt exists. Total depth of the sandy silt was not determined by the onsite testing.

As seen in the soil profile, the predominant soil types consist of silts and clays which generally have little to no infiltration capability. This has been confirmed by field testing. Previously placed fill material was also found in several explorations around the property; this material includes soils, reclaimed asphalt, and reclaimed concrete.

2.3 Groundwater

Based on testing in the project vicinity, groundwater may be present in the vicinity of the stormwater facility. This is a closed detention system, however; groundwater does not appear to affect it.

2.4 Existing Stormwater System

The existing onsite system has already been described. There is an additional storm system adjacent to the site in La Center Road and in Paradise Park Road; this system drains to an existing stormwater treatment and detention facility southeast of the intersection of these two streets.

3.0 Drainage Analysis

Runoff quantities for this project were estimated using the SCS TR-20 method in HydroCAD software. Soil conditions were selected based on the City's requirements; Odne silt loam and Gee silt loam are classified as Hydrologic Soil Groups D and C, respectively. Soil Group C was used for the historic and developed conditions.

3.1 Design Storms

In accordance with the La Center stormwater standards, the following design storms were used to determine the detention and conveyance requirements:

Water Quality Storm	1.54 inches (70% of the 2-year Storm)
2-year Storm	2.2 inches
10-year Storm	3.1 inches
25-year Storm	3.7 inches
100-year Storm	4.4 inches

3.2 Historic and Developed Land Uses

Based on historic photography, the historic land use was determined to be pasture.

The developed land uses expected to drain to the stormwater facility are:

- 2.65 acres pavement and sidewalk
- 0.88 acres roof (including accessory structures)
- 1.03 acres landscape

These do not include landscaped right-of-way along La Center Road that drains onto the site, and limited driveway areas on the north edge of the site that cannot be routed through this project's storm system, but are caught, treated, and detained by the public facility constructed with the Paradise Park Road realignment. This was anticipated when the Paradise Park Road system was designed, totals approximately 0.34 acres and is approximately 15% impervious. This area can be managed through the existing Paradise Park Road storm system without exceeding treatment or detention standards.

3.3 Water Quality Treatment

Pre-treatment of runoff is provided by a coalescing plate oil-water separator designed in accordance with the *Stormwater Management Manual for the Puget Sound Basin.* This is followed by a Contech Stormfilter™. A splitter manhole is used upstream of the oil-water separator to limit flows through the treatment devices as required by the stormwater manual; large storm events bypass these treatment devices and are routed directly to the detention facility. An outlet trap is used to limit the transport of floatable debris and oils in these overflow events.

The water quality storm runoff rate for the existing and proposed pavement north of the building and truck fueling island was determined to be 1.00 cfs, or 448 gpm. At 22.5 gpm/cartridge, this requires 18 StormFilter ZPG cartridges (27" height) to treat the water quality storm. Vault size for this number of cartridges is 8' x 11'. These BMPs were installed with the previous project and are still appropriate for the proposed use. Additional details are included in the appendices.

3.4 Water Quantity Control

Where infiltration of the 100-year storm event is not feasible, La Center requires detention to match the historic runoff rates in the 2-, 10-, and 100-year storm events. In order to meet this standard, an underground gallery of detention pipe was used, providing approximately 600 linear feet of 72" diameter pipe (16,965 cf storage) with a control structure at the northwest corner. A pond volume correction factor was also applied in accordance with the requirements of the *Stormwater Management Manual for the Puget Sound Basin.* This correction factor increased the required storage by 80%.

The following table summarizes the results of the detention design calculations:

Design Storm	Historic Flow (cfs)	Developed Flow (cfs)	Storage Required (cf)*	Depth (ft)
2-year	0.78	0.77	3,095	2.50
10-year	1.52	1.47	4,957	3.45
100-year	2.71	2.50	7,601	4.86

Table A1: Detention Design Calculations

* indicates storage required before application of the Pond Volume Correction Factor as required under the Puget Sound Manual.

As shown in the table, the facility proposed limits flows following site development to less than the pre-developed flows in the 2-, 10-, and 100-year storm events.

A review of the existing ditch and culvert conditions and the current stormwater management indicates no downstream conveyance capacity limitations sufficient to further limit discharge from this site. The roadside ditch network has not had identified capacity issues. No further downstream analysis is necessary.

The capacity of the proposed pipe network has been calculated in accordance with LCMC. In the 25-year storm event, the storm sewer has been designed to convey all flow in an open channel manner without surcharging. See the 25-year flow calculations in the appendices for details.

4.0 Erosion Control

All improvements are required to meet the latest requirements for Erosion and Sediment Prevention as required by the City of La Center and WSDOE when obtaining an NPDES permit for the construction of the site improvements.

To meet the requirements of the Construction Stormwater General Permit (NPDES Permit), a SWPPP must be developed. The SWPPP must consist of and make provisions for:

- Erosion prevention and sediment control
- Control of other potential pollutants

The Construction SWPPP will describes construction practices, stabilization techniques and structural BMPs that are to be implemented to prevent erosion and minimize sediment transport. A copy of that SWPPP has been provided with this submittal.

Technical Appendix

Appendix A WQ HydoCAD Report

Appendix B 2 Year HydroCAD Report

Appendix C 10 Year HydroCAD Report

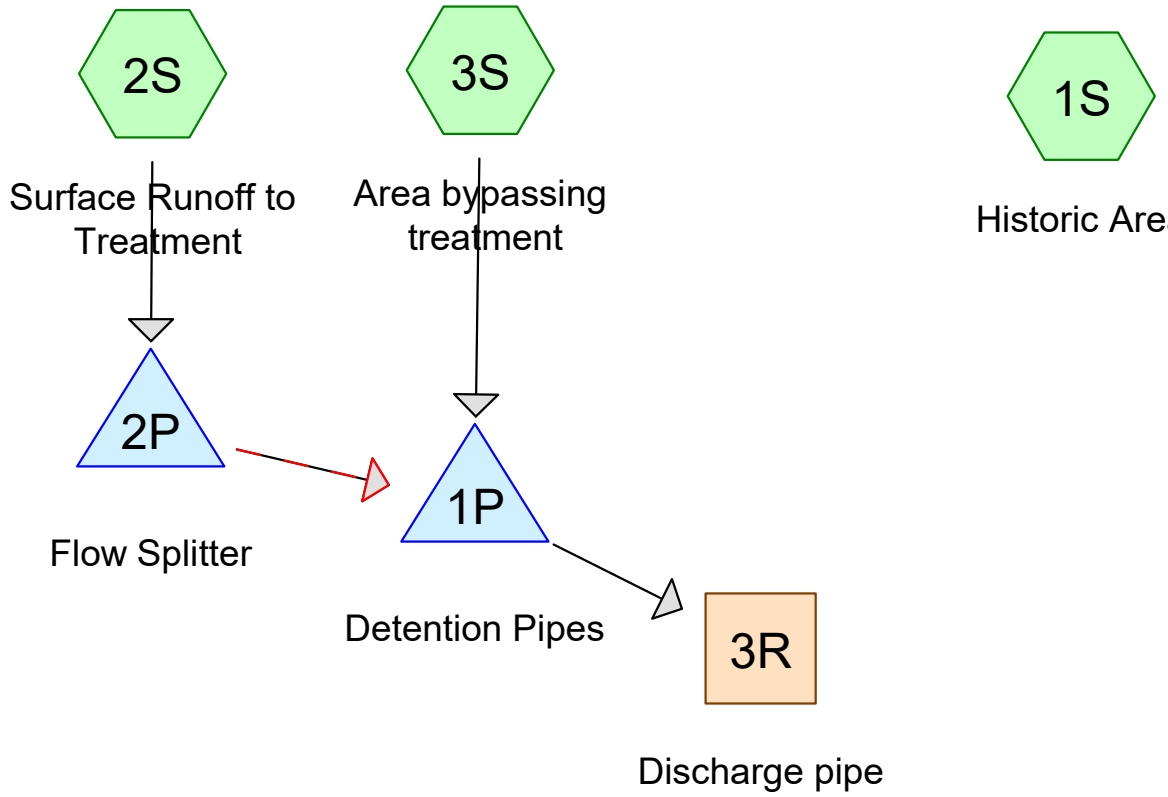
Appendix D 25 Year HydroCAD Report

Appendix E 100 Year HydroCAD Report

Appendix F Downspout Conveyance HydroCAD Report

Appendix G Catchment Plan

Appendix H Development Plans



Subcat Reach Pond Link

Routing Diagram for 9825.e.final.detention
Prepared by {enter your company name here}, Printed 8/5/2020
HydroCAD® 10.00-25 s/n 00549 © 2019 HydroCAD Software Solutions LLC

Summary for Subcatchment 1S: Historic Area

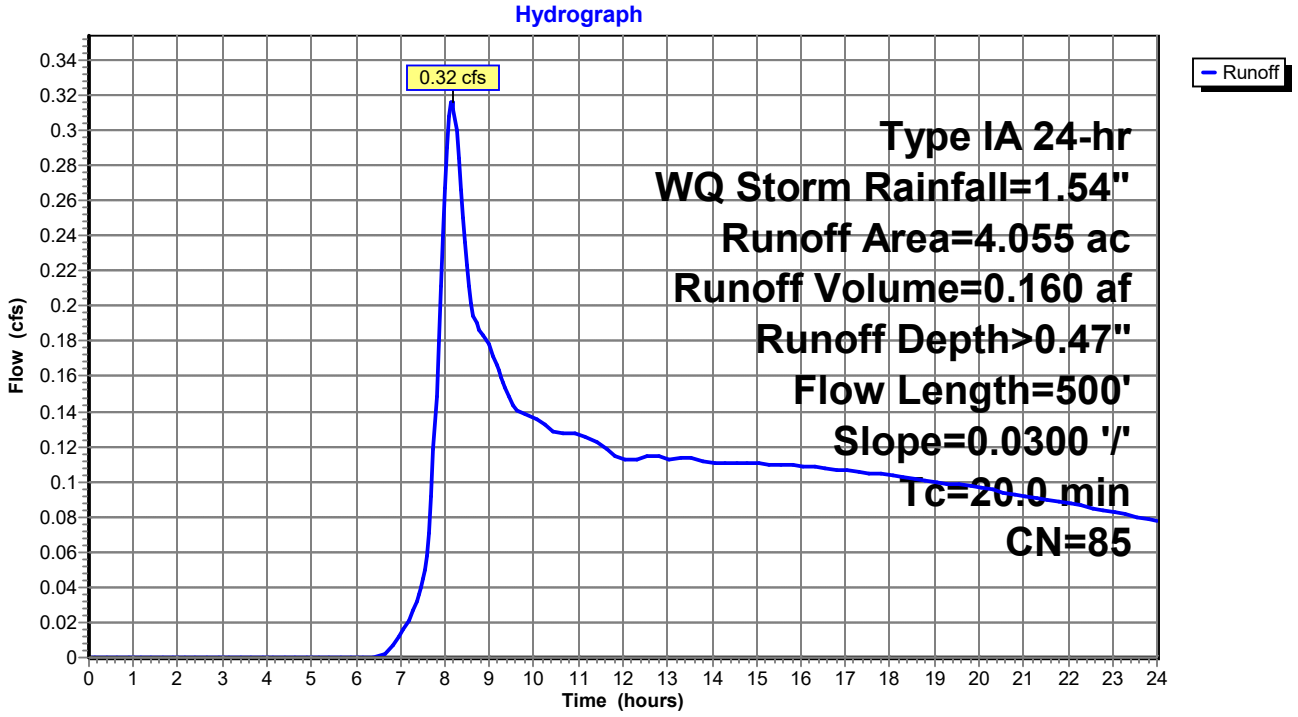
Runoff = 0.32 cfs @ 8.16 hrs, Volume= 0.160 af, Depth> 0.47"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
Type IA 24-hr WQ Storm Rainfall=1.54"

	Area (ac)	CN	Description
*	4.055	85	Pasture
	4.055		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
16.6	250	0.0300	0.25		**Sheet Flow,** Grass: Short n= 0.150 P2= 3.50"
3.4	250	0.0300	1.21		**Shallow Concentrated Flow,** Short Grass Pasture Kv= 7.0 fps
20.0	500	Total			

Subcatchment 1S: Historic Area



Summary for Subcatchment 2S: Surface Runoff to Treatment

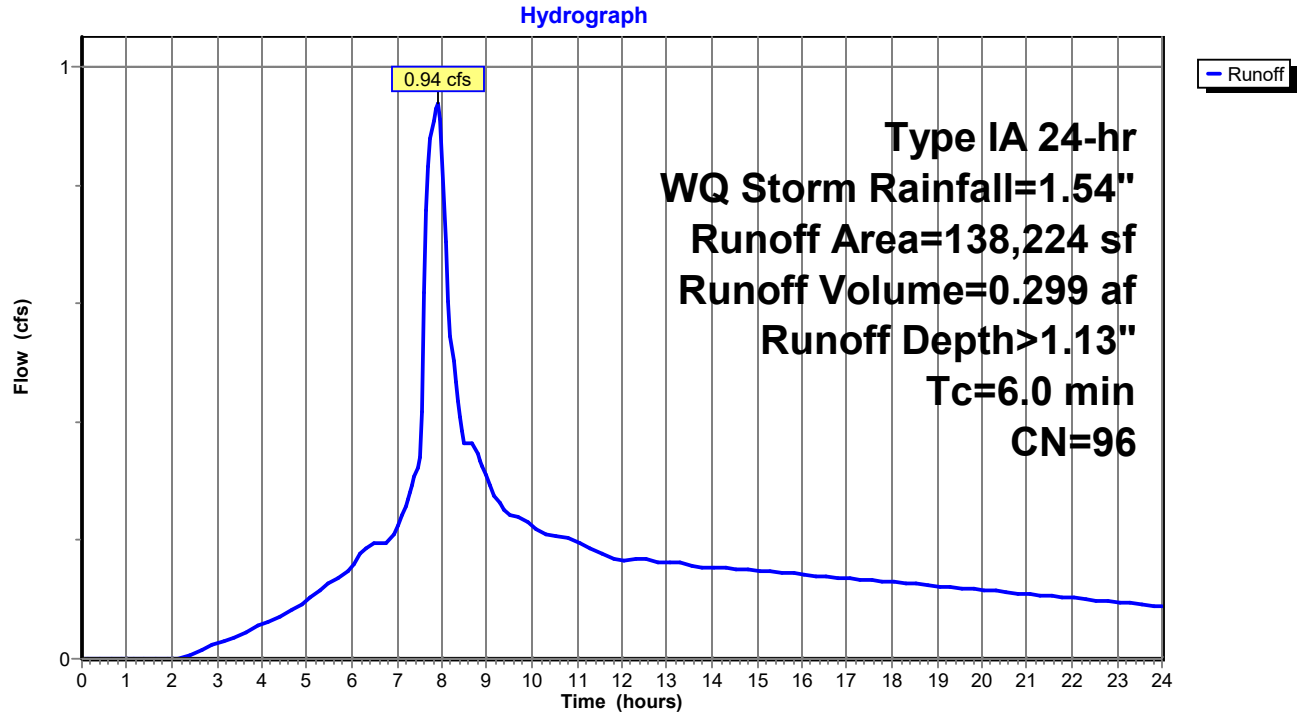
Runoff = 0.94 cfs @ 7.91 hrs, Volume= 0.299 af, Depth> 1.13"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
Type IA 24-hr WQ Storm Rainfall=1.54"

	Area (sf)	CN	Description
*	115,514	98	Pavement, sidewalk
*	22,710	86	Landscape
	138,224	96	Weighted Average
	22,710		16.43% Pervious Area
	115,514		83.57% Impervious Area

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

Subcatchment 2S: Surface Runoff to Treatment



Summary for Subcatchment 3S: Area bypassing treatment

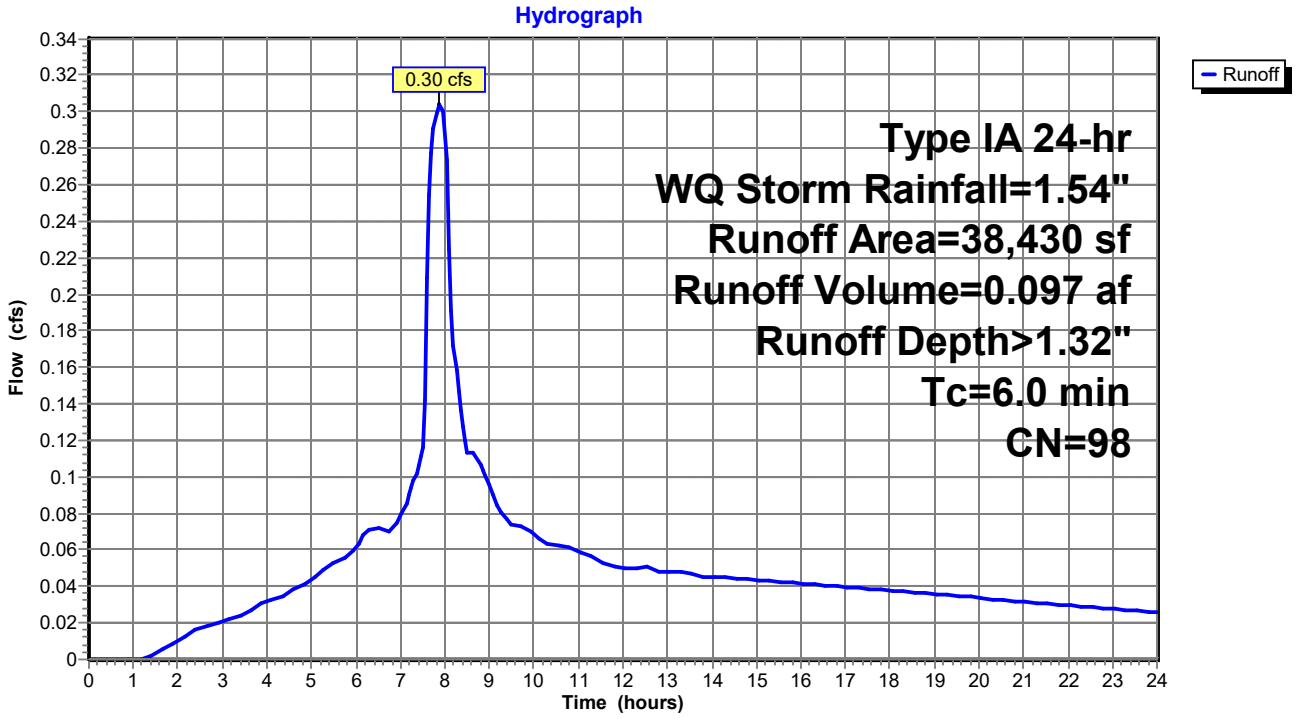
Runoff = 0.30 cfs @ 7.89 hrs, Volume= 0.097 af, Depth> 1.32"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
Type IA 24-hr WQ Storm Rainfall=1.54"

	Area (sf)	CN	Description
*	38,430	98	Roof
	38,430		100.00% Impervious Area

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

Subcatchment 3S: Area bypassing treatment



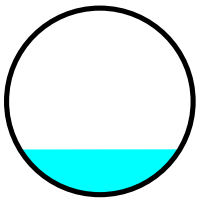
Summary for Reach 3R: Discharge pipe

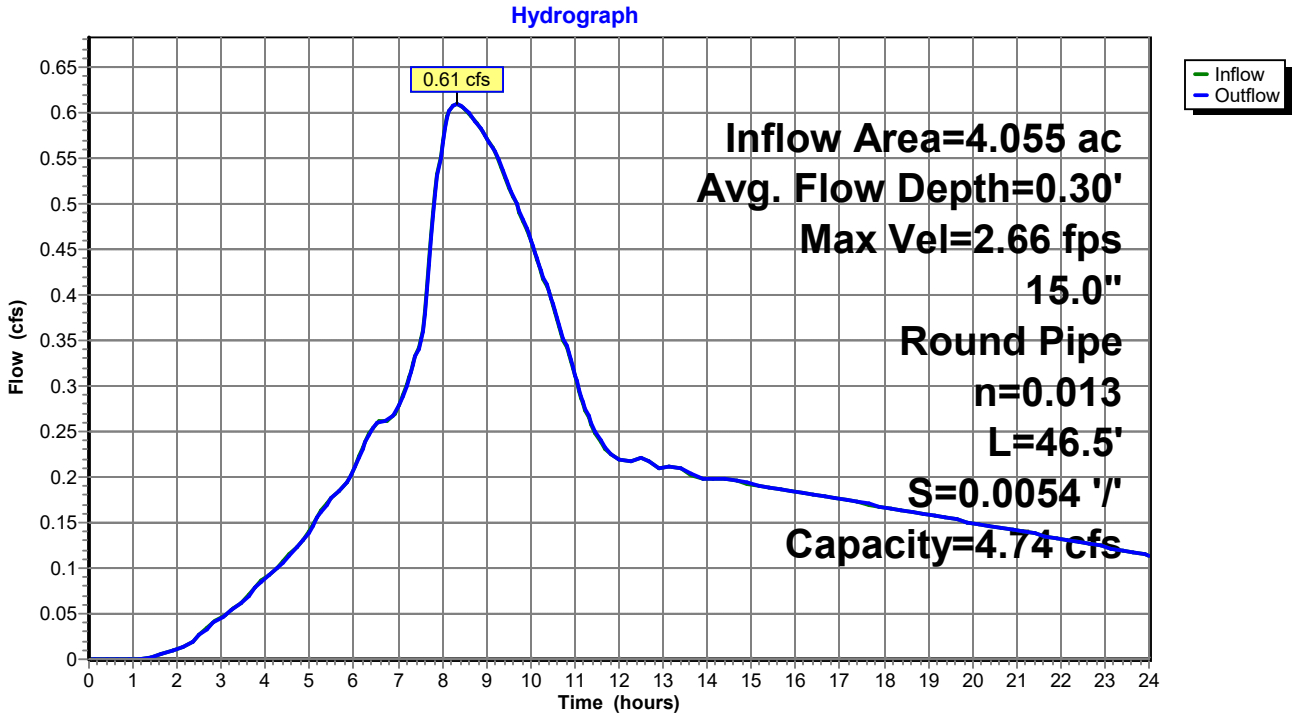
Inflow Area = 4.055 ac, 87.14% Impervious, Inflow Depth > 1.17" for WQ Storm event
Inflow = 0.61 cfs @ 8.32 hrs, Volume= 0.396 af
Outflow = 0.61 cfs @ 8.32 hrs, Volume= 0.396 af, Atten= 0%, Lag= 0.5 min

Routing by Stor-Ind+Trans method, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
Max. Velocity= 2.66 fps, Min. Travel Time= 0.3 min
Avg. Velocity = 1.84 fps, Avg. Travel Time= 0.4 min

Peak Storage= 11 cf @ 8.32 hrs
Average Depth at Peak Storage= 0.30'
Bank-Full Depth= 1.25' Flow Area= 1.2 sf, Capacity= 4.74 cfs

15.0" Round Pipe
n= 0.013
Length= 46.5' Slope= 0.0054 '/'
Inlet Invert= 245.35', Outlet Invert= 245.10'





Summary for Pond 1P: Detention Pipes

Inflow Area = 4.055 ac, 87.14% Impervious, Inflow Depth > 1.17" for WQ Storm event
Inflow = 1.24 cfs @ 7.93 hrs, Volume= 0.396 af
Outflow = 0.61 cfs @ 8.32 hrs, Volume= 0.396 af, Atten= 51%, Lag= 23.4 min
Primary = 0.61 cfs @ 8.32 hrs, Volume= 0.396 af

Routing by Stor-Ind method, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
Peak Elev= 246.93' @ 8.32 hrs Surf.Area= 2,938 sf Storage= 1,463 cf

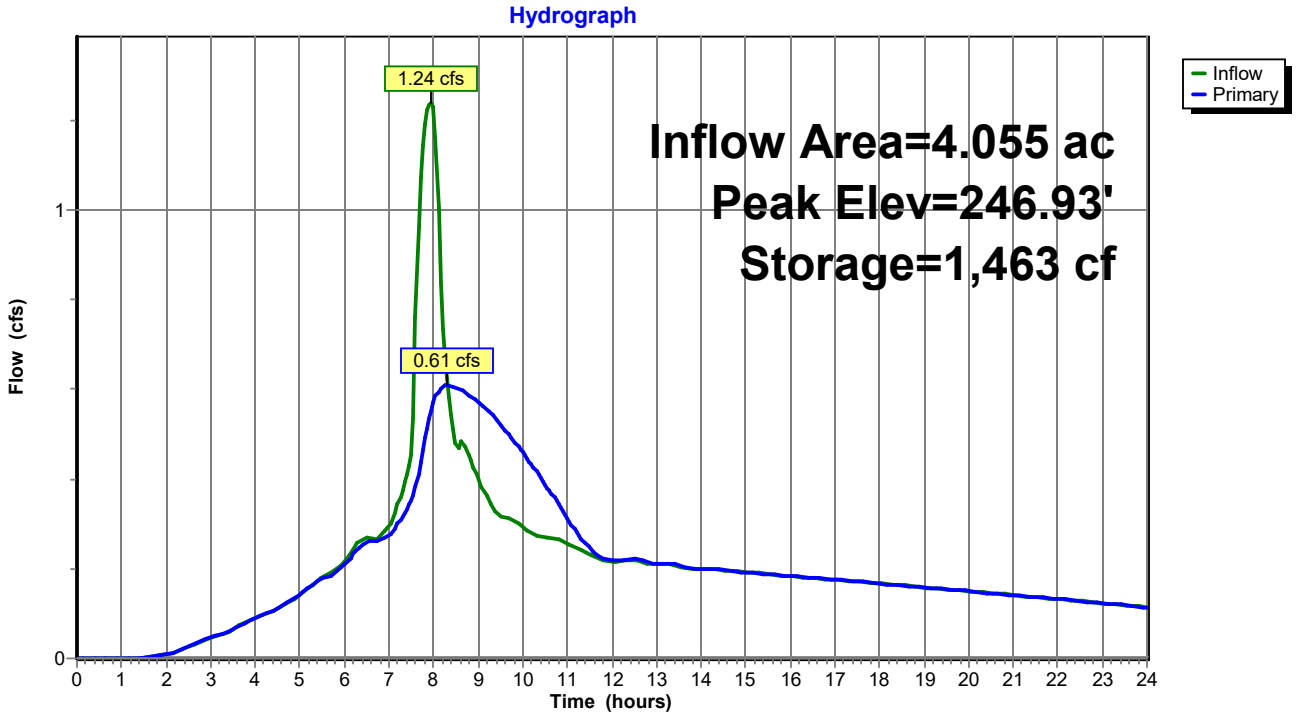
Plug-Flow detention time= 10.0 min calculated for 0.396 af (100% of inflow)
Center-of-Mass det. time= 10.0 min (729.5 - 719.5)

Volume	Invert	Avail.Storage	Storage Description
#1	245.35'	9,331 cf	**72.0" Round Pipe Storage** L= 600.0' S= 0.0010 '/' 16,965 cf Overall x 55.0% Voids

Device	Routing	Invert	Outlet Devices
#1	Primary	245.35'	**4.3" Horiz. Orifice/Grate** C= 0.600
#2	Primary	248.05'	**5.0" Horiz. Orifice/Grate** C= 0.600
#3	Primary	249.00'	**4.0" Horiz. Orifice/Grate** C= 0.600
#4	Primary	250.40'	**15.0" Horiz. Orifice/Grate** C= 0.600 Limited to weir flow at low heads

Primary OutFlow Max=0.61 cfs @ 8.32 hrs HW=246.93' (Free Discharge)
- **1=Orifice/Grate** (Orifice Controls 0.61 cfs @ 6.05 fps)
- **2=Orifice/Grate** (Controls 0.00 cfs)
- **3=Orifice/Grate** (Controls 0.00 cfs)
- **4=Orifice/Grate** (Controls 0.00 cfs)

Pond 1P: Detention Pipes



Summary for Pond 2P: Flow Splitter

Inflow Area = 3.173 ac, 83.57% Impervious, Inflow Depth > 1.13" for WQ Storm event
Inflow = 0.94 cfs @ 7.91 hrs, Volume= 0.299 af
Outflow = 0.94 cfs @ 7.94 hrs, Volume= 0.299 af, Atten= 0%, Lag= 1.6 min
Primary = 0.94 cfs @ 7.94 hrs, Volume= 0.299 af
Secondary = 0.00 cfs @ 0.00 hrs, Volume= 0.000 af

Routing by Stor-Ind method, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
Peak Elev= 254.40' @ 7.94 hrs Surf.Area= 20 sf Storage= 47 cf

Plug-Flow detention time= 0.3 min calculated for 0.298 af (100% of inflow)
Center-of-Mass det. time= 0.2 min (729.1 - 728.8)

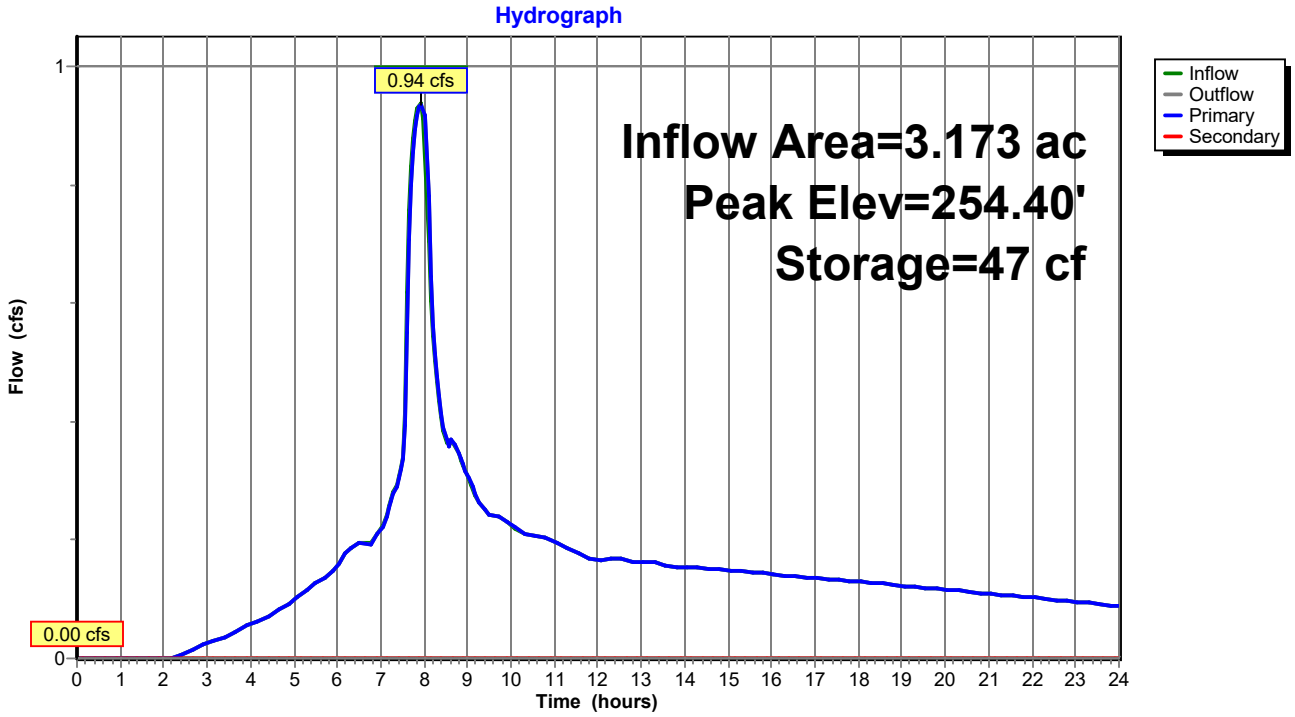
Volume	Invert	Avail.Storage	Storage Description
#1	252.00'	157 cf	**5.00'D x 8.00'H Vertical Cone/Cylinder**

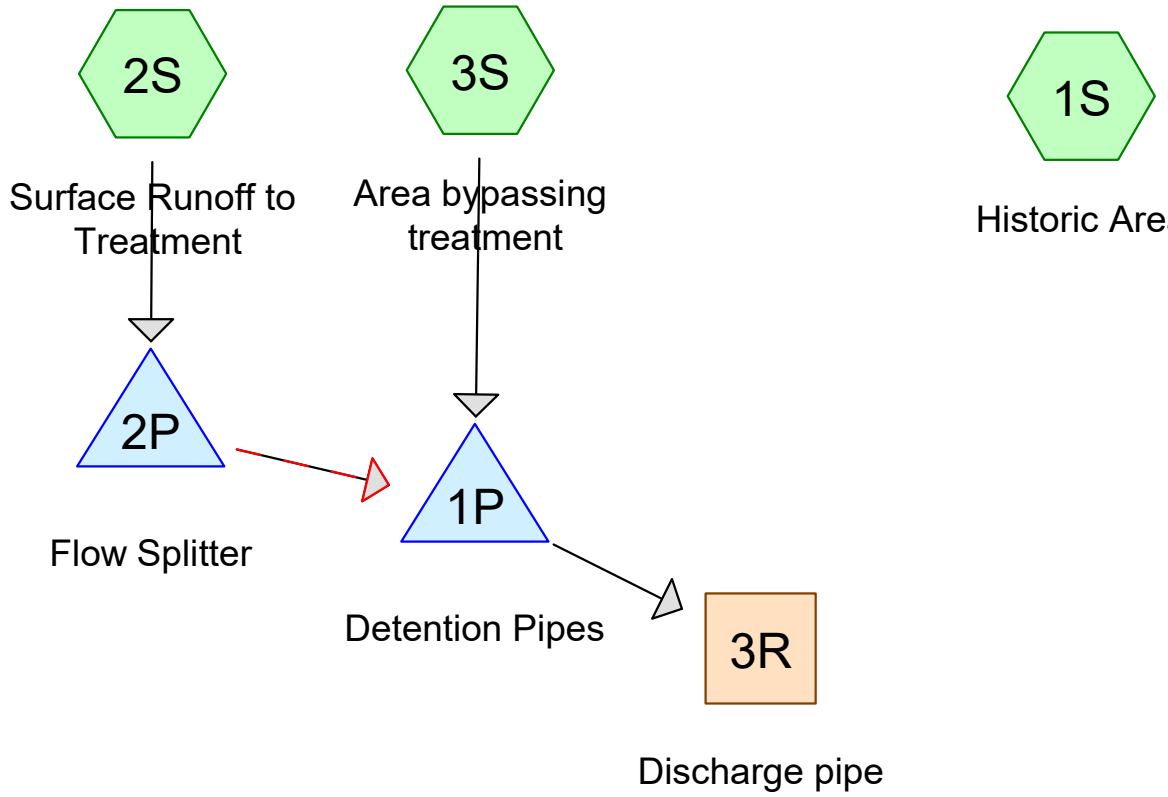
Device	Routing	Invert	Outlet Devices
#1	Primary	252.00'	**4.8" Horiz. Orifice/Grate** C= 0.600
#2	Secondary	254.75'	**12.0" Horiz. Orifice/Grate** C= 0.600 Limited to weir flow at low heads

Primary OutFlow Max=0.94 cfs @ 7.94 hrs HW=254.39' (Free Discharge)
↑—**1=Orifice/Grate** (Orifice Controls 0.94 cfs @ 7.45 fps)

Secondary OutFlow Max=0.00 cfs @ 0.00 hrs HW=252.00' (Free Discharge)
↑—**2=Orifice/Grate** (Controls 0.00 cfs)

Pond 2P: Flow Splitter





Subcat Reach Pond Link

Routing Diagram for 9825.e.final.detention
Prepared by {enter your company name here}, Printed 8/5/2020
HydroCAD® 10.00-25 s/n 00549 © 2019 HydroCAD Software Solutions LLC

Summary for Subcatchment 1S: Historic Area

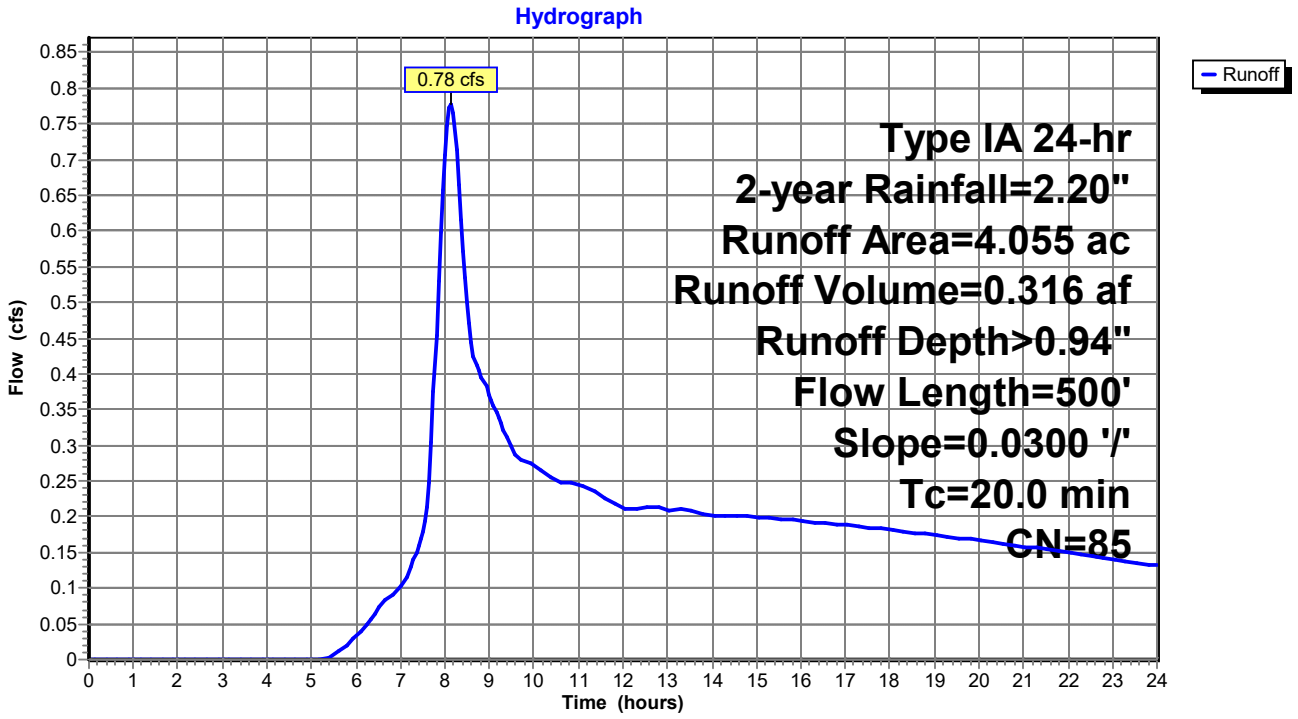
Runoff = 0.78 cfs @ 8.13 hrs, Volume= 0.316 af, Depth> 0.94"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
Type IA 24-hr 2-year Rainfall=2.20"

	Area (ac)	CN	Description
*	4.055	85	Pasture
	4.055		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
16.6	250	0.0300	0.25		**Sheet Flow,** Grass: Short n= 0.150 P2= 3.50"
3.4	250	0.0300	1.21		**Shallow Concentrated Flow,** Short Grass Pasture Kv= 7.0 fps
20.0	500	Total			

Subcatchment 1S: Historic Area



Summary for Subcatchment 2S: Surface Runoff to Treatment

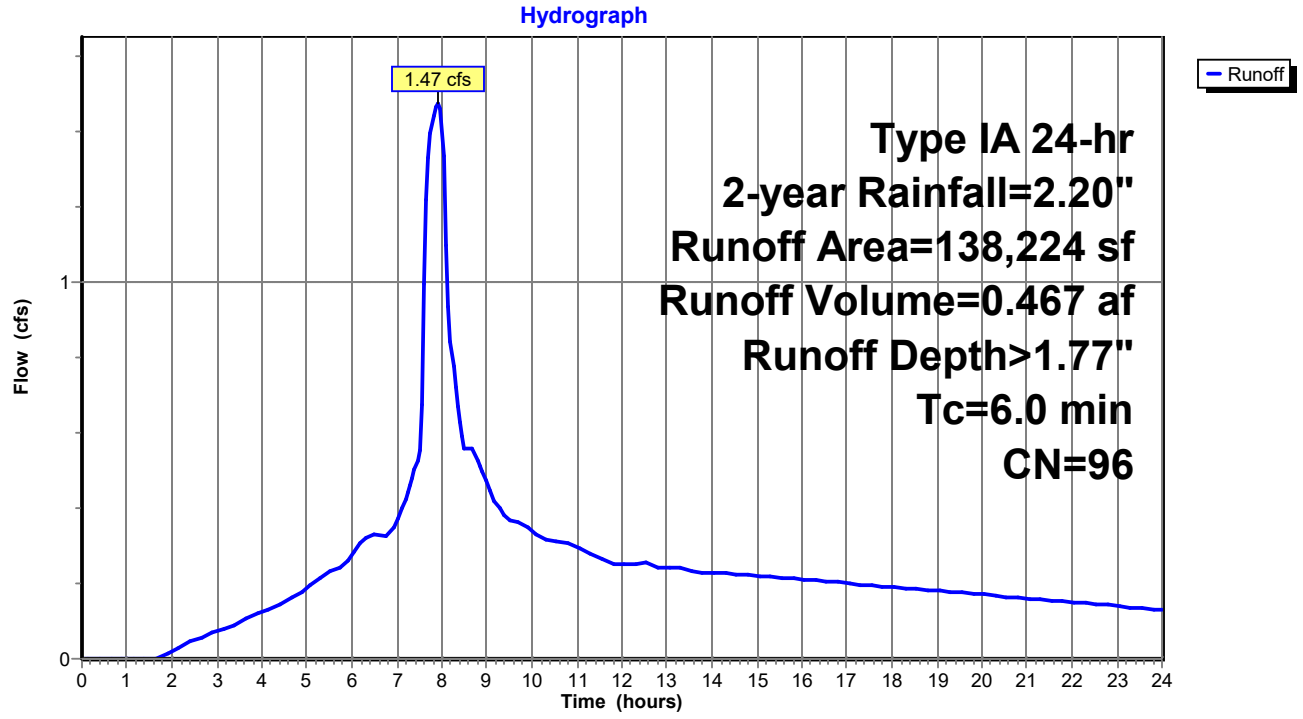
Runoff = 1.47 cfs @ 7.90 hrs, Volume= 0.467 af, Depth> 1.77"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
Type IA 24-hr 2-year Rainfall=2.20"

	Area (sf)	CN	Description
*	115,514	98	Pavement, sidewalk
*	22,710	86	Landscape
	138,224	96	Weighted Average
	22,710		16.43% Pervious Area
	115,514		83.57% Impervious Area

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

Subcatchment 2S: Surface Runoff to Treatment



Summary for Subcatchment 3S: Area bypassing treatment

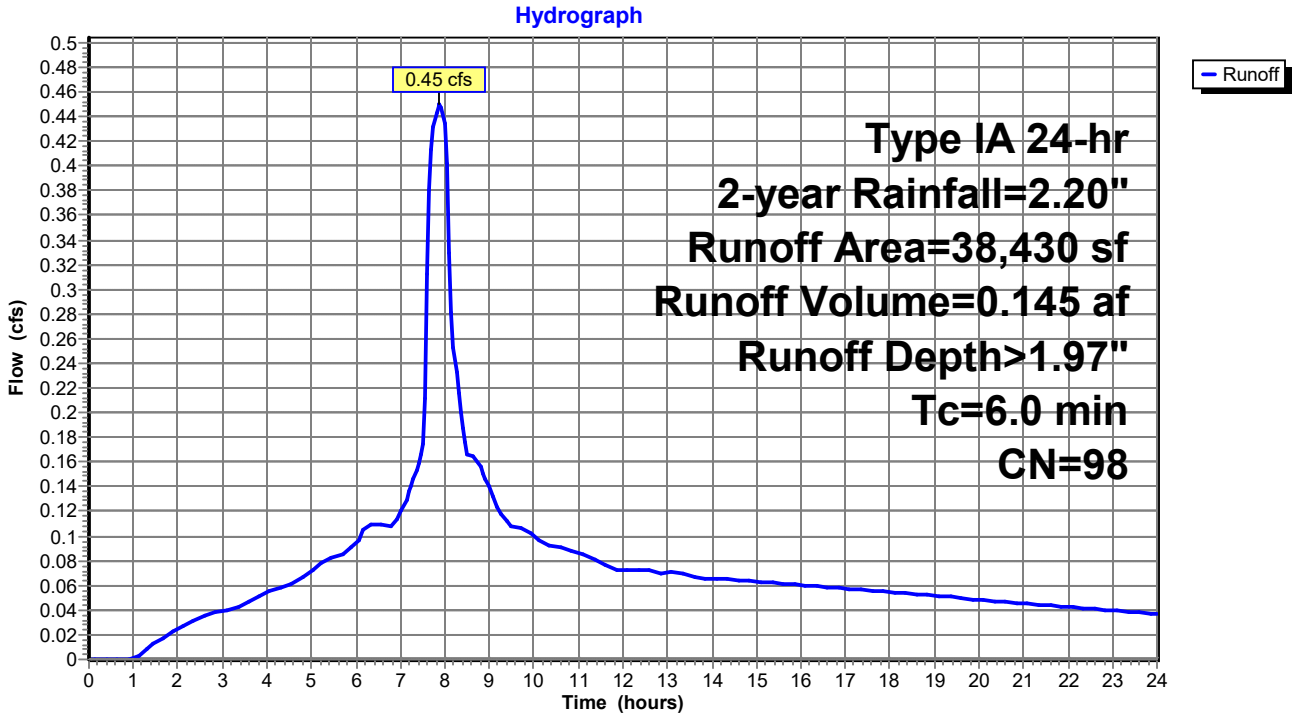
Runoff = 0.45 cfs @ 7.88 hrs, Volume= 0.145 af, Depth> 1.97"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
Type IA 24-hr 2-year Rainfall=2.20"

	Area (sf)	CN	Description
*	38,430	98	Roof
	38,430		100.00% Impervious Area

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

Subcatchment 3S: Area bypassing treatment



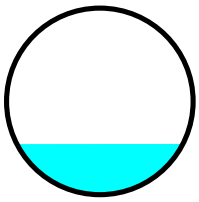
Summary for Reach 3R: Discharge pipe

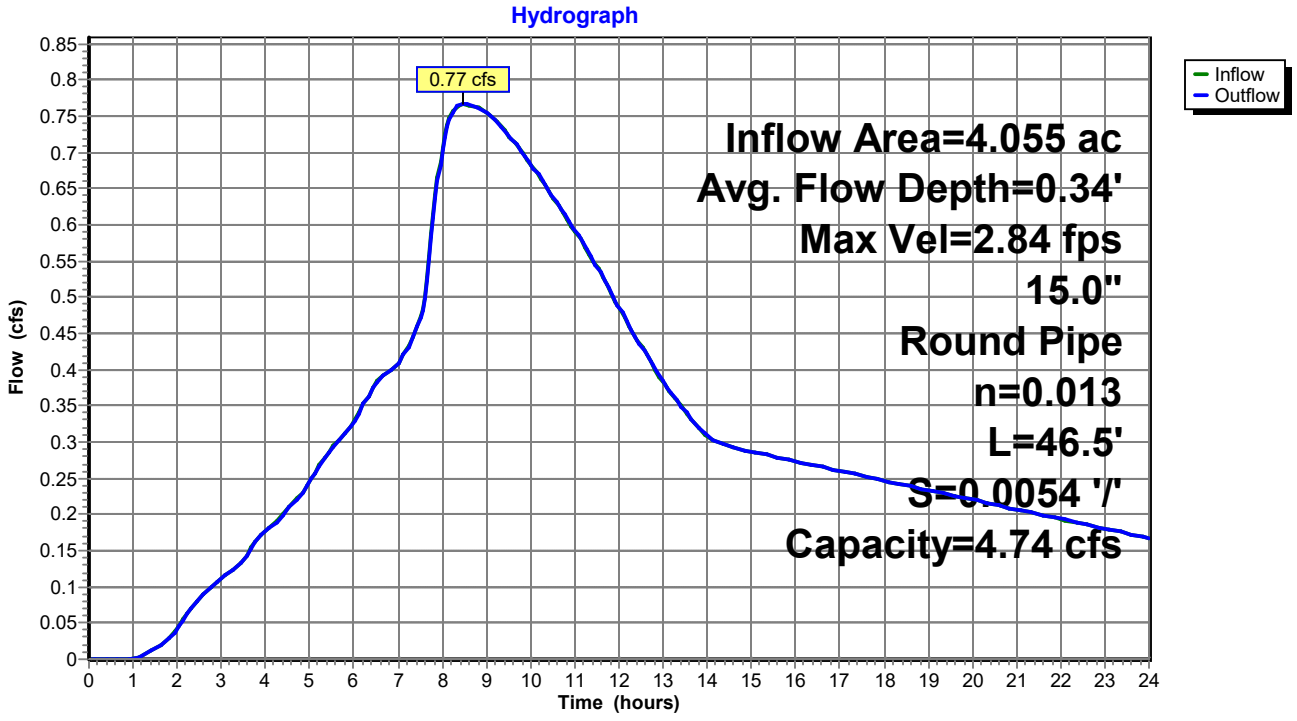
Inflow Area = 4.055 ac, 87.14% Impervious, Inflow Depth > 1.81" for 2-year event
Inflow = 0.77 cfs @ 8.47 hrs, Volume= 0.612 af
Outflow = 0.77 cfs @ 8.47 hrs, Volume= 0.611 af, Atten= 0%, Lag= 0.5 min

Routing by Stor-Ind+Trans method, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
Max. Velocity= 2.84 fps, Min. Travel Time= 0.3 min
Avg. Velocity = 2.10 fps, Avg. Travel Time= 0.4 min

Peak Storage= 13 cf @ 8.47 hrs
Average Depth at Peak Storage= 0.34'
Bank-Full Depth= 1.25' Flow Area= 1.2 sf, Capacity= 4.74 cfs

15.0" Round Pipe
n= 0.013
Length= 46.5' Slope= 0.0054 '/'
Inlet Invert= 245.35', Outlet Invert= 245.10'





Summary for Pond 1P: Detention Pipes

Inflow Area = 4.055 ac, 87.14% Impervious, Inflow Depth > 1.81" for 2-year event
Inflow = 1.94 cfs @ 7.90 hrs, Volume= 0.612 af
Outflow = 0.77 cfs @ 8.47 hrs, Volume= 0.612 af, Atten= 61%, Lag= 34.0 min
Primary = 0.77 cfs @ 8.47 hrs, Volume= 0.612 af

Routing by Stor-Ind method, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
Peak Elev= 247.85' @ 8.47 hrs Surf.Area= 3,461 sf Storage= 3,095 cf

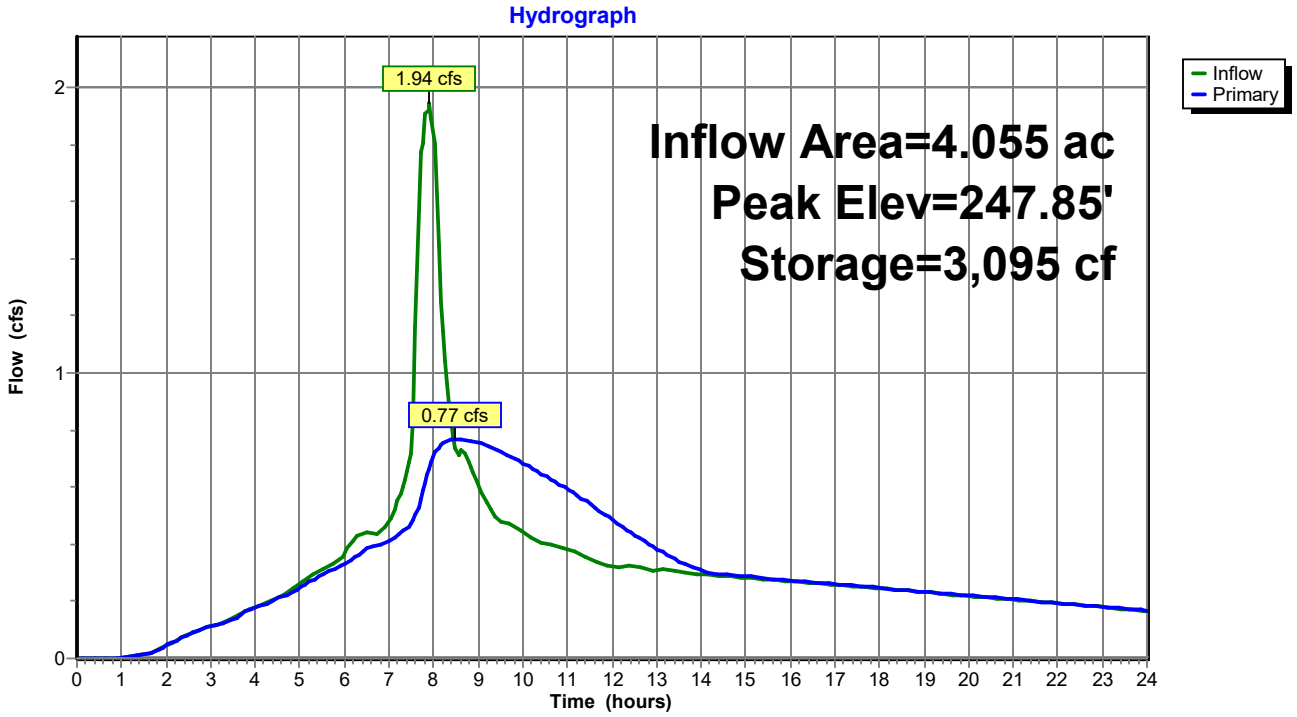
Plug-Flow detention time= 22.9 min calculated for 0.610 af (100% of inflow)
Center-of-Mass det. time= 22.7 min (723.1 - 700.4)

Volume	Invert	Avail.Storage	Storage Description
#1	245.35'	9,331 cf	**72.0" Round Pipe Storage** L= 600.0' S= 0.0010 '/' 16,965 cf Overall x 55.0% Voids

Device	Routing	Invert	Outlet Devices
#1	Primary	245.35'	**4.3" Horiz. Orifice/Grate** C= 0.600
#2	Primary	248.05'	**5.0" Horiz. Orifice/Grate** C= 0.600
#3	Primary	249.00'	**4.0" Horiz. Orifice/Grate** C= 0.600
#4	Primary	250.40'	**15.0" Horiz. Orifice/Grate** C= 0.600 Limited to weir flow at low heads

Primary OutFlow Max=0.77 cfs @ 8.47 hrs HW=247.85' (Free Discharge)
- **1=Orifice/Grate** (Orifice Controls 0.77 cfs @ 7.61 fps)
- **2=Orifice/Grate** (Controls 0.00 cfs)
- **3=Orifice/Grate** (Controls 0.00 cfs)
- **4=Orifice/Grate** (Controls 0.00 cfs)

Pond 1P: Detention Pipes



Summary for Pond 2P: Flow Splitter

Inflow Area = 3.173 ac, 83.57% Impervious, Inflow Depth > 1.77" for 2-year event
Inflow = 1.47 cfs @ 7.90 hrs, Volume= 0.467 af
Outflow = 1.49 cfs @ 7.90 hrs, Volume= 0.467 af, Atten= 0%, Lag= 0.2 min
Primary = 1.03 cfs @ 7.90 hrs, Volume= 0.453 af
Secondary = 0.47 cfs @ 7.90 hrs, Volume= 0.014 af

Routing by Stor-Ind method, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
Peak Elev= 254.88' @ 7.90 hrs Surf.Area= 20 sf Storage= 56 cf

Plug-Flow detention time= 0.3 min calculated for 0.467 af (100% of inflow)
Center-of-Mass det. time= 0.3 min (707.9 - 707.7)

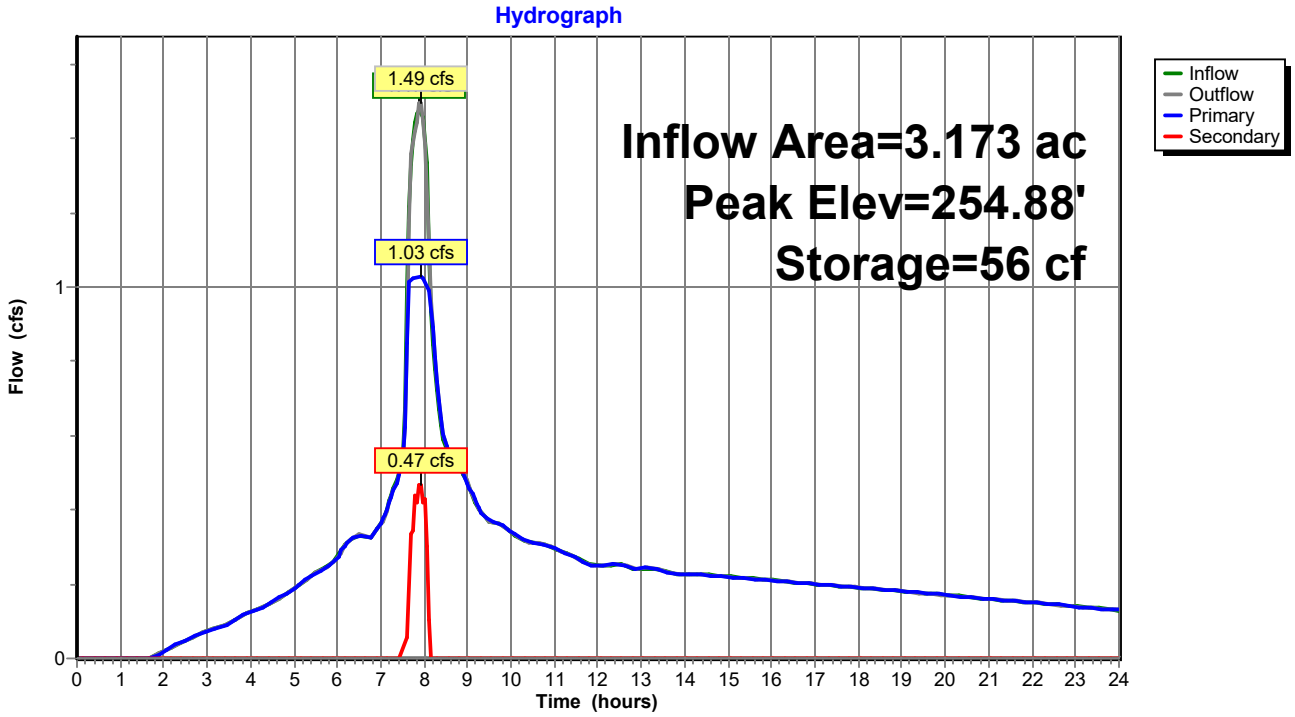
Volume	Invert	Avail.Storage	Storage Description
#1	252.00'	157 cf	**5.00'D x 8.00'H Vertical Cone/Cylinder**

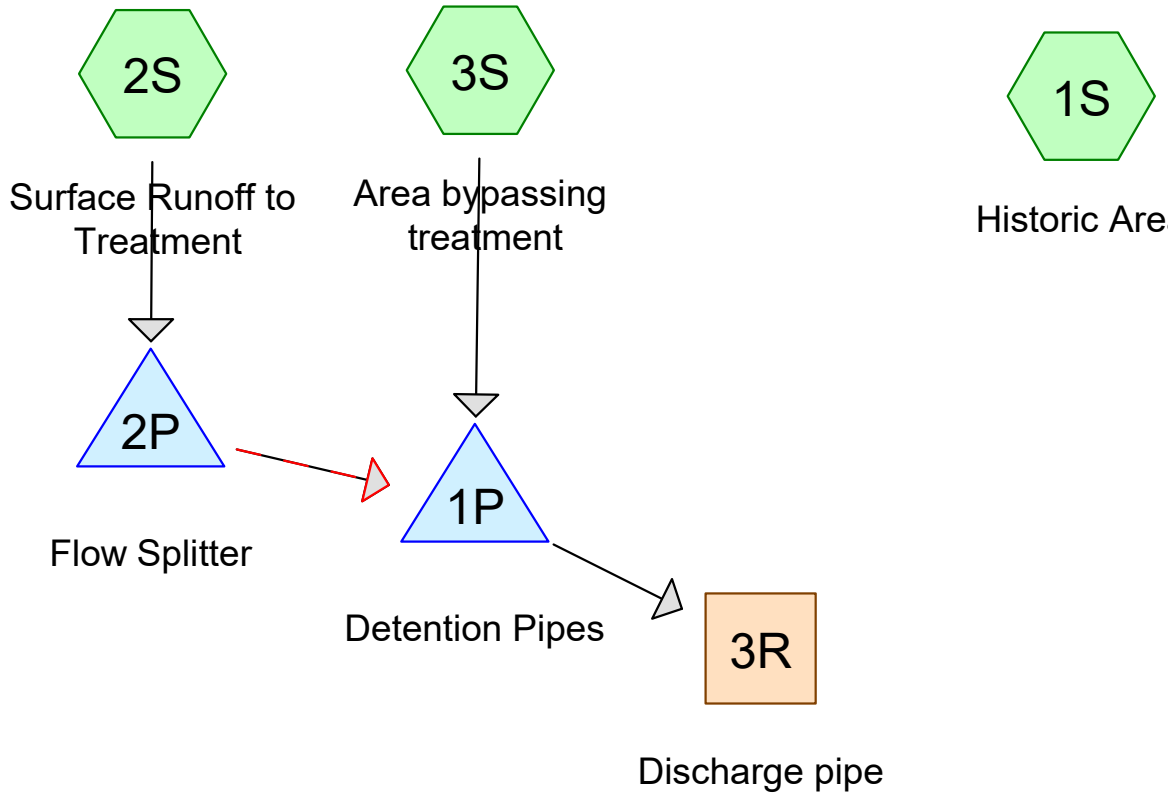
Device	Routing	Invert	Outlet Devices
#1	Primary	252.00'	**4.8" Horiz. Orifice/Grate** C= 0.600
#2	Secondary	254.75'	**12.0" Horiz. Orifice/Grate** C= 0.600 Limited to weir flow at low heads

Primary OutFlow Max=1.03 cfs @ 7.90 hrs HW=254.88' (Free Discharge)
└**1=Orifice/Grate** (Orifice Controls 1.03 cfs @ 8.17 fps)

Secondary OutFlow Max=0.46 cfs @ 7.90 hrs HW=254.88' (Free Discharge)
└**2=Orifice/Grate** (Weir Controls 0.46 cfs @ 1.16 fps)

Pond 2P: Flow Splitter





Subcat Reach Pond Link

Routing Diagram for 9825.e.final.detention
Prepared by {enter your company name here}, Printed 8/5/2020
HydroCAD® 10.00-25 s/n 00549 © 2019 HydroCAD Software Solutions LLC

Summary for Subcatchment 1S: Historic Area

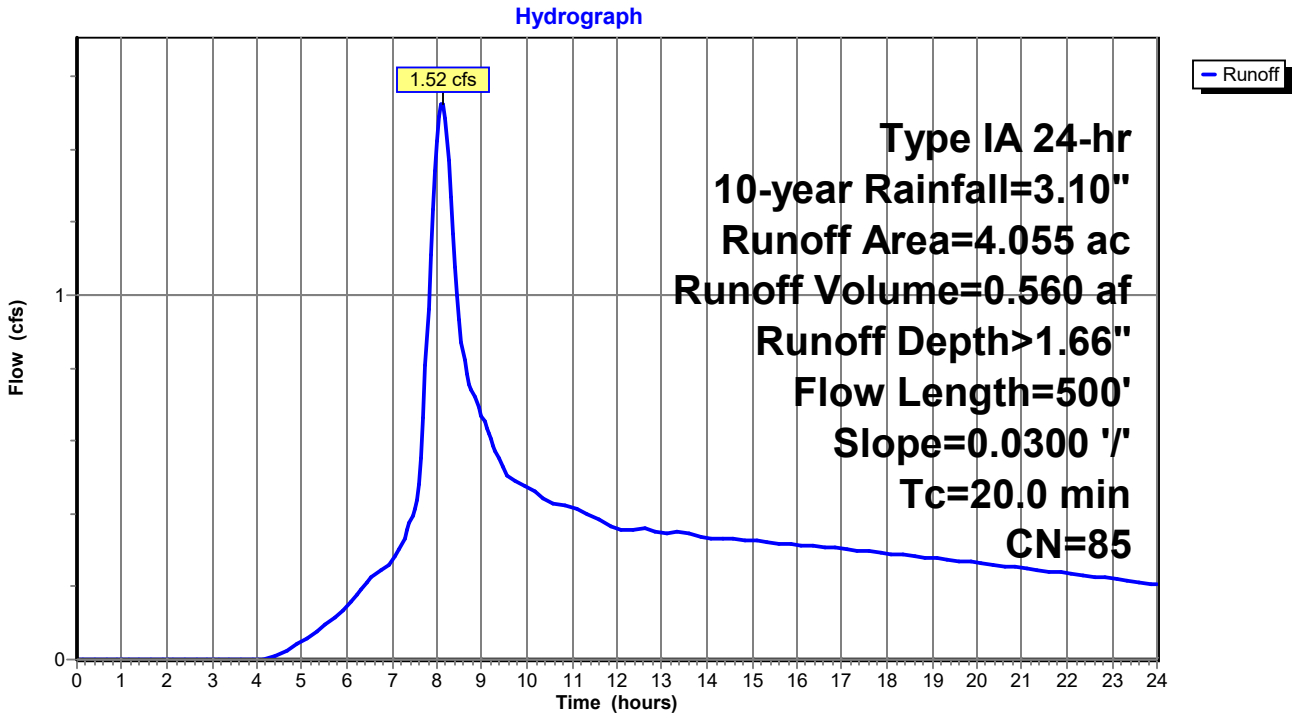
Runoff = 1.52 cfs @ 8.12 hrs, Volume= 0.560 af, Depth> 1.66"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
Type IA 24-hr 10-year Rainfall=3.10"

	Area (ac)	CN	Description
*	4.055	85	Pasture
	4.055		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
16.6	250	0.0300	0.25		**Sheet Flow,** Grass: Short n= 0.150 P2= 3.50"
3.4	250	0.0300	1.21		**Shallow Concentrated Flow,** Short Grass Pasture Kv= 7.0 fps
20.0	500	Total			

Subcatchment 1S: Historic Area



Summary for Subcatchment 2S: Surface Runoff to Treatment

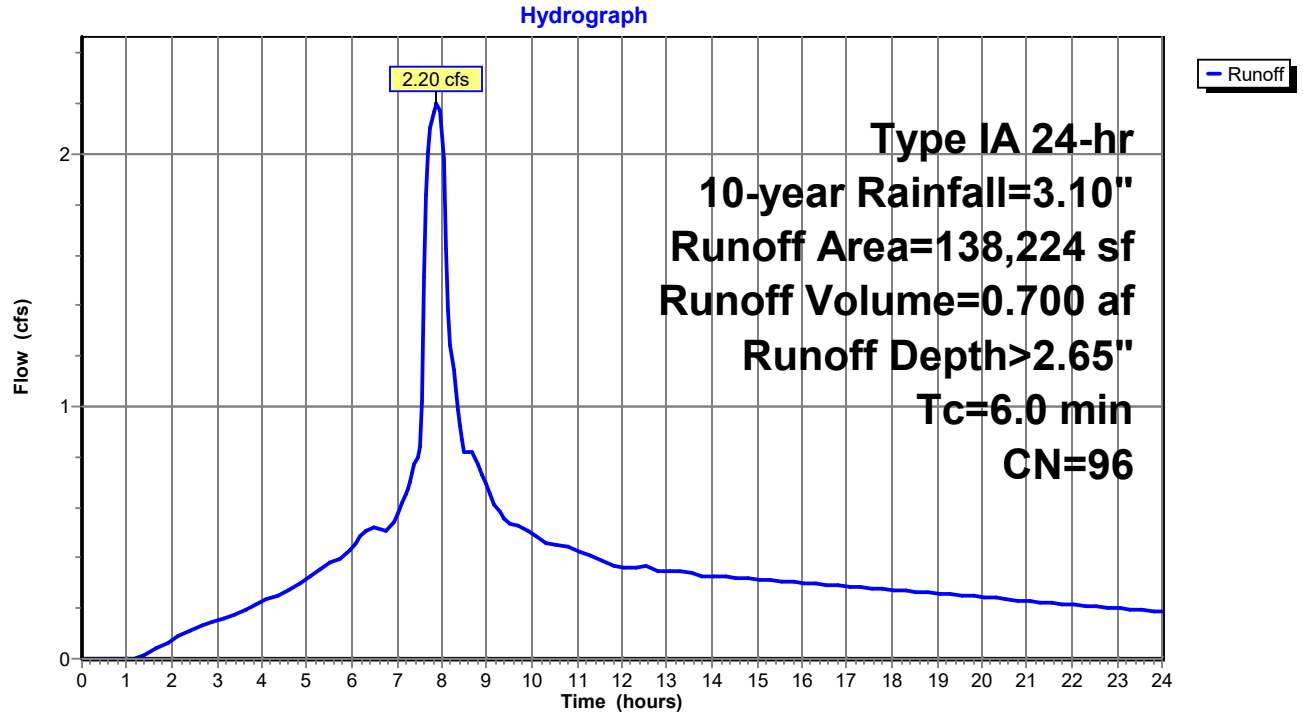
Runoff = 2.20 cfs @ 7.89 hrs, Volume= 0.700 af, Depth> 2.65"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
Type IA 24-hr 10-year Rainfall=3.10"

	Area (sf)	CN	Description
*	115,514	98	Pavement, sidewalk
*	22,710	86	Landscape
	138,224	96	Weighted Average
	22,710		16.43% Pervious Area
	115,514		83.57% Impervious Area

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

Subcatchment 2S: Surface Runoff to Treatment



Summary for Subcatchment 3S: Area bypassing treatment

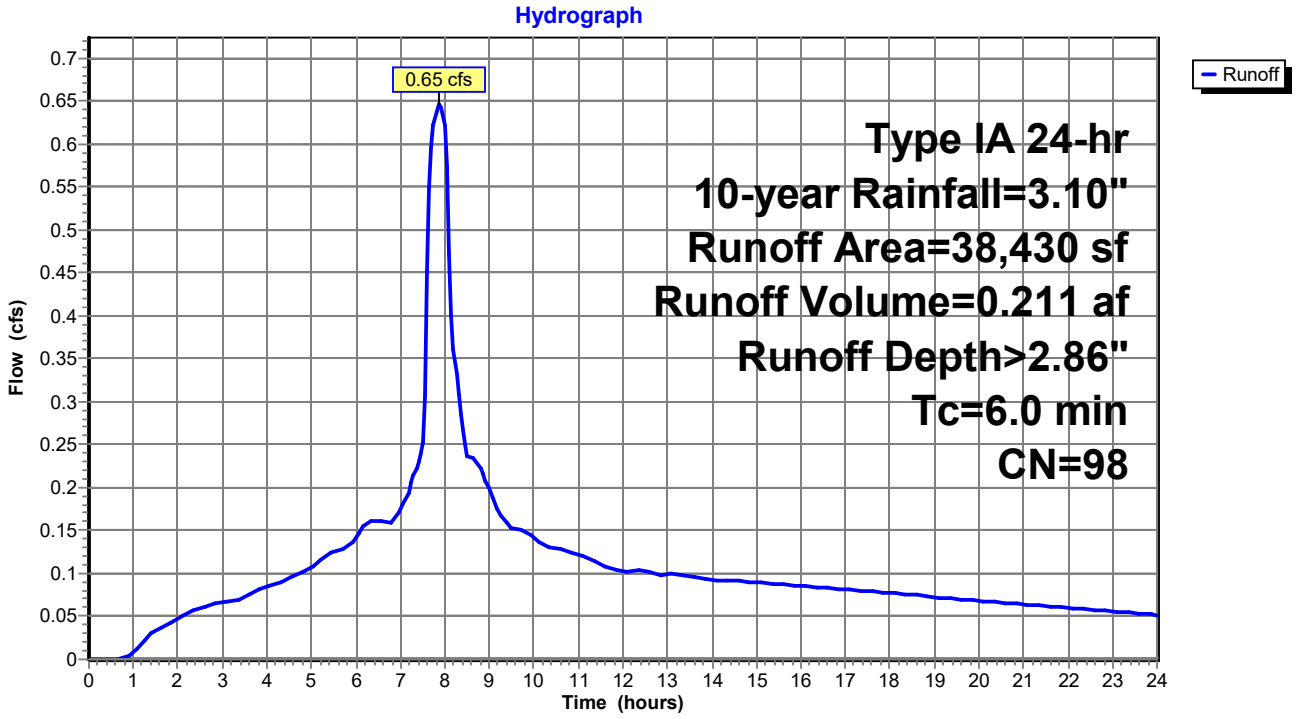
Runoff = 0.65 cfs @ 7.87 hrs, Volume= 0.211 af, Depth> 2.86"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
Type IA 24-hr 10-year Rainfall=3.10"

	Area (sf)	CN	Description
*	38,430	98	Roof
	38,430		100.00% Impervious Area

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

Subcatchment 3S: Area bypassing treatment



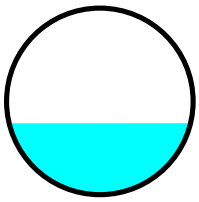
Summary for Reach 3R: Discharge pipe

Inflow Area = 4.055 ac, 87.14% Impervious, Inflow Depth > 2.69" for 10-year event
Inflow = 1.47 cfs @ 8.26 hrs, Volume= 0.910 af
Outflow = 1.47 cfs @ 8.26 hrs, Volume= 0.910 af, Atten= 0%, Lag= 0.0 min

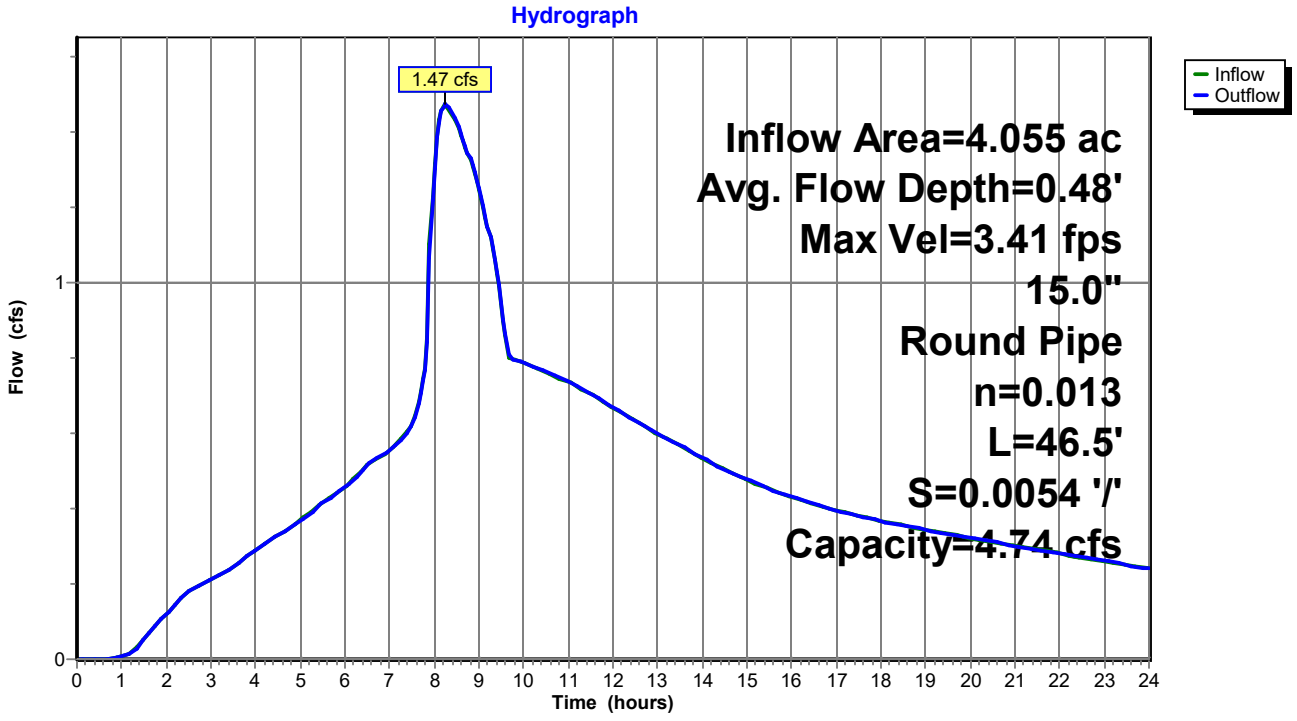
Routing by Stor-Ind+Trans method, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
Max. Velocity= 3.41 fps, Min. Travel Time= 0.2 min
Avg. Velocity = 2.36 fps, Avg. Travel Time= 0.3 min

Peak Storage= 20 cf @ 8.26 hrs
Average Depth at Peak Storage= 0.48'
Bank-Full Depth= 1.25' Flow Area= 1.2 sf, Capacity= 4.74 cfs

15.0" Round Pipe
n= 0.013
Length= 46.5' Slope= 0.0054 '/'
Inlet Invert= 245.35', Outlet Invert= 245.10'



Reach 3R: Discharge pipe



Summary for Pond 1P: Detention Pipes

Inflow Area = 4.055 ac, 87.14% Impervious, Inflow Depth > 2.69" for 10-year event
Inflow = 2.85 cfs @ 7.87 hrs, Volume= 0.910 af
Outflow = 1.47 cfs @ 8.26 hrs, Volume= 0.910 af, Atten= 48%, Lag= 23.4 min
Primary = 1.47 cfs @ 8.26 hrs, Volume= 0.910 af

Routing by Stor-Ind method, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
Peak Elev= 248.80' @ 8.26 hrs Surf.Area= 3,590 sf Storage= 4,957 cf

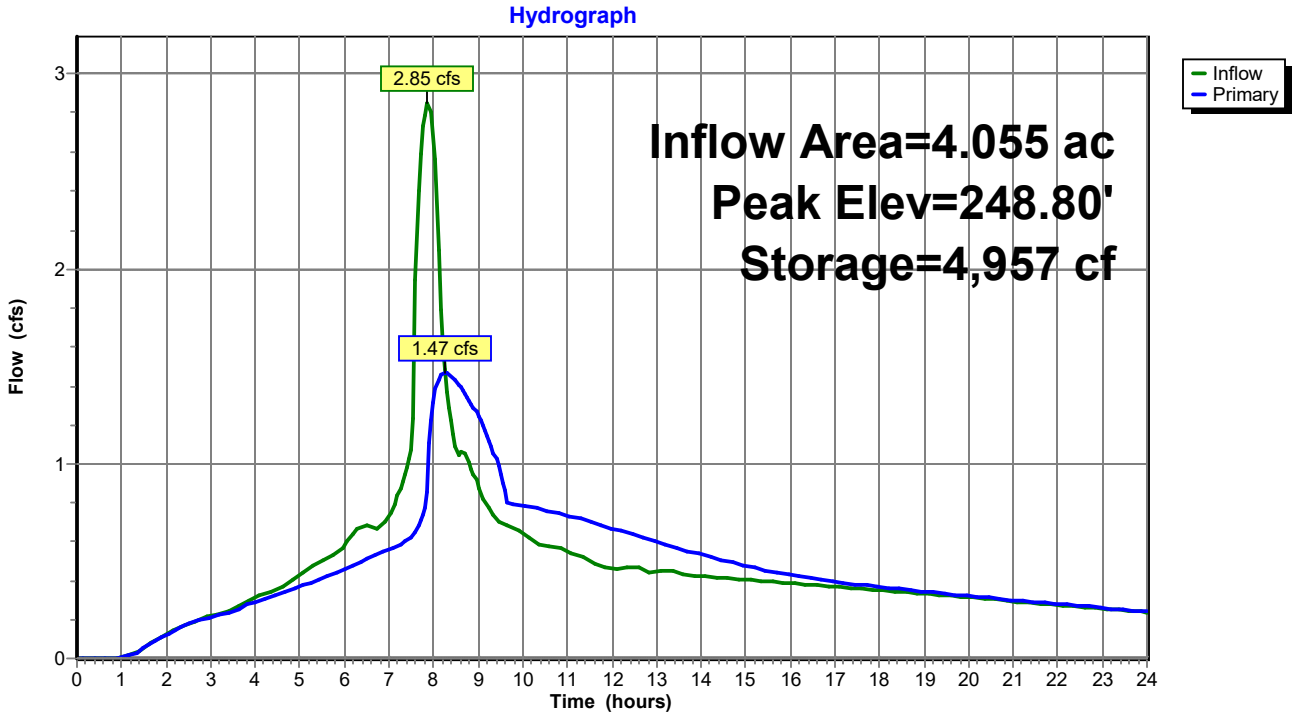
Plug-Flow detention time= 33.2 min calculated for 0.908 af (100% of inflow)
Center-of-Mass det. time= 32.7 min (717.9 - 685.2)

Volume	Invert	Avail.Storage	Storage Description
#1	245.35'	9,331 cf	**72.0" Round Pipe Storage** L= 600.0' S= 0.0010 '/' 16,965 cf Overall x 55.0% Voids

Device	Routing	Invert	Outlet Devices
#1	Primary	245.35'	**4.3" Horiz. Orifice/Grate** C= 0.600
#2	Primary	248.05'	**5.0" Horiz. Orifice/Grate** C= 0.600
#3	Primary	249.00'	**4.0" Horiz. Orifice/Grate** C= 0.600
#4	Primary	250.40'	**15.0" Horiz. Orifice/Grate** C= 0.600 Limited to weir flow at low heads

Primary OutFlow Max=1.47 cfs @ 8.26 hrs HW=248.80' (Free Discharge)
- **1=Orifice/Grate** (Orifice Controls 0.90 cfs @ 8.94 fps)
- **2=Orifice/Grate** (Orifice Controls 0.57 cfs @ 4.16 fps)
- **3=Orifice/Grate** (Controls 0.00 cfs)
- **4=Orifice/Grate** (Controls 0.00 cfs)

Pond 1P: Detention Pipes



Summary for Pond 2P: Flow Splitter

Inflow Area = 3.173 ac, 83.57% Impervious, Inflow Depth > 2.65" for 10-year event
Inflow = 2.20 cfs @ 7.89 hrs, Volume= 0.700 af
Outflow = 2.20 cfs @ 7.87 hrs, Volume= 0.700 af, Atten= 0%, Lag= 0.0 min
Primary = 1.04 cfs @ 7.87 hrs, Volume= 0.653 af
Secondary = 1.16 cfs @ 7.87 hrs, Volume= 0.046 af

Routing by Stor-Ind method, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
Peak Elev= 254.98' @ 7.87 hrs Surf.Area= 20 sf Storage= 59 cf

Plug-Flow detention time= 0.4 min calculated for 0.698 af (100% of inflow)
Center-of-Mass det. time= 0.3 min (691.2 - 690.8)

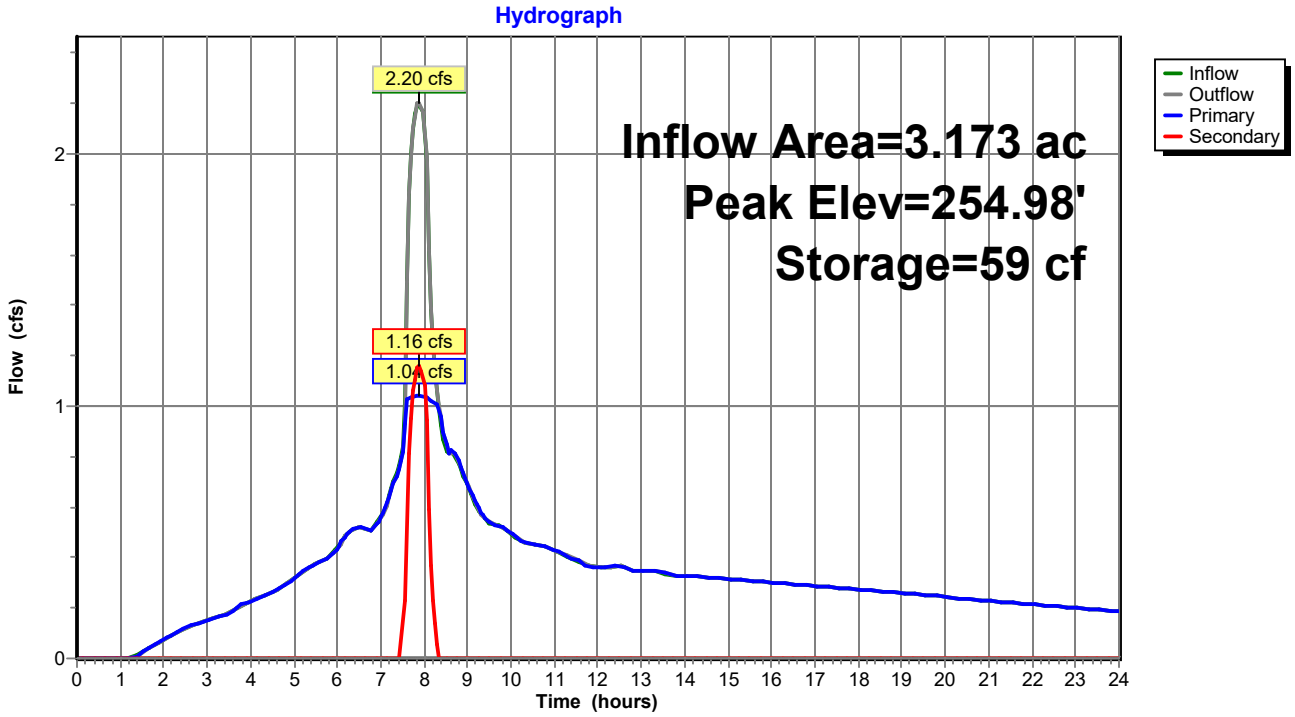
Volume	Invert	Avail.Storage	Storage Description
#1	252.00'	157 cf	**5.00'D x 8.00'H Vertical Cone/Cylinder**

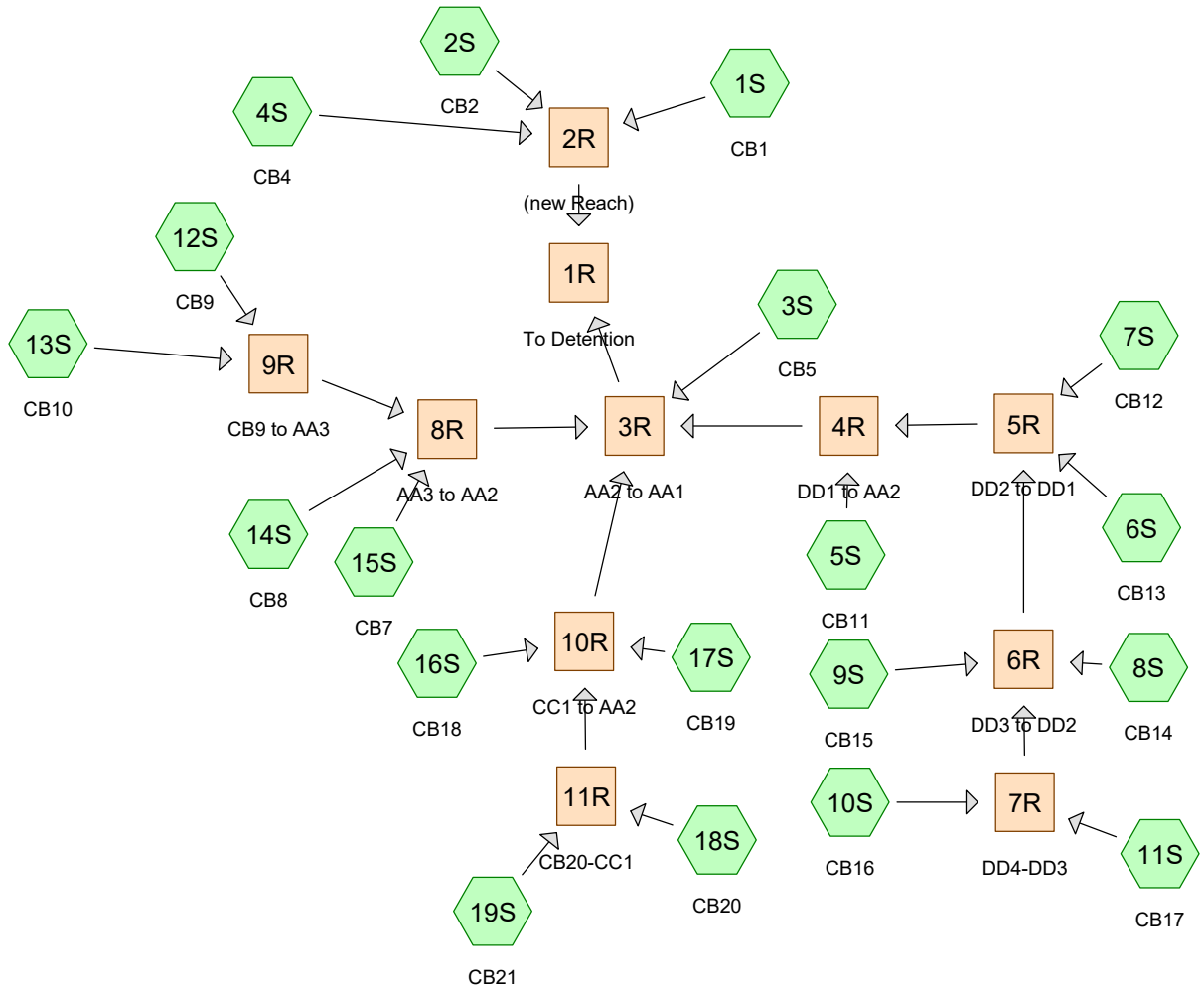
Device	Routing	Invert	Outlet Devices
#1	Primary	252.00'	**4.8" Horiz. Orifice/Grate** C= 0.600
#2	Secondary	254.75'	**12.0" Horiz. Orifice/Grate** C= 0.600 Limited to weir flow at low heads

Primary OutFlow Max=1.04 cfs @ 7.87 hrs HW=254.98' (Free Discharge)
└**1=Orifice/Grate** (Orifice Controls 1.04 cfs @ 8.31 fps)

Secondary OutFlow Max=1.14 cfs @ 7.87 hrs HW=254.98' (Free Discharge)
└**2=Orifice/Grate** (Weir Controls 1.14 cfs @ 1.57 fps)

Pond 2P: Flow Splitter





Subcat Reach Pond Link

Routing Diagram for 9825.e.final.conveyance
Prepared by {enter your company name here}, Printed 8/5/2020

Summary for Subcatchment 1S: CB1

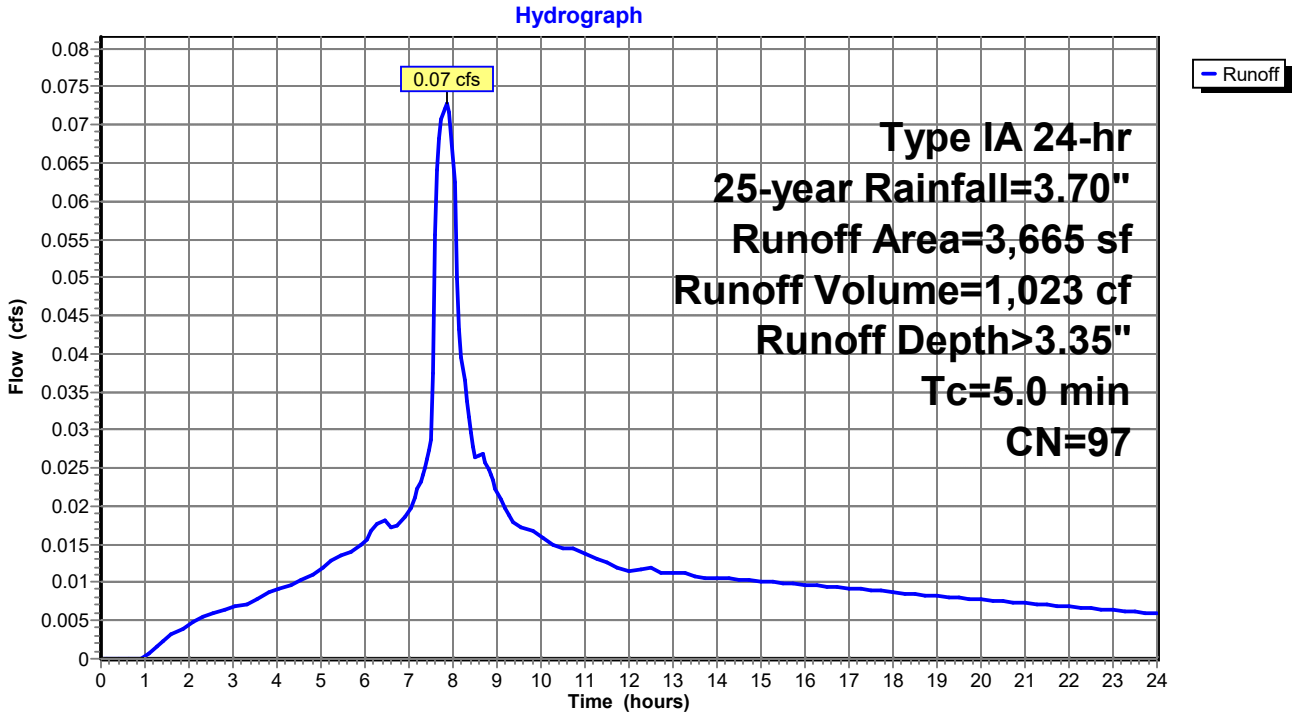
Runoff = 0.07 cfs @ 7.86 hrs, Volume= 1,023 cf, Depth> 3.35"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
Type IA 24-hr 25-year Rainfall=3.70"

	Area (sf)	CN	Description
*	340	86	Landscape
*	3,325	98	Pavement, sidewalk
	3,665	97	Weighted Average
	340		9.28% Pervious Area
	3,325		90.72% Impervious Area

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

Subcatchment 1S: CB1



Summary for Subcatchment 2S: CB2

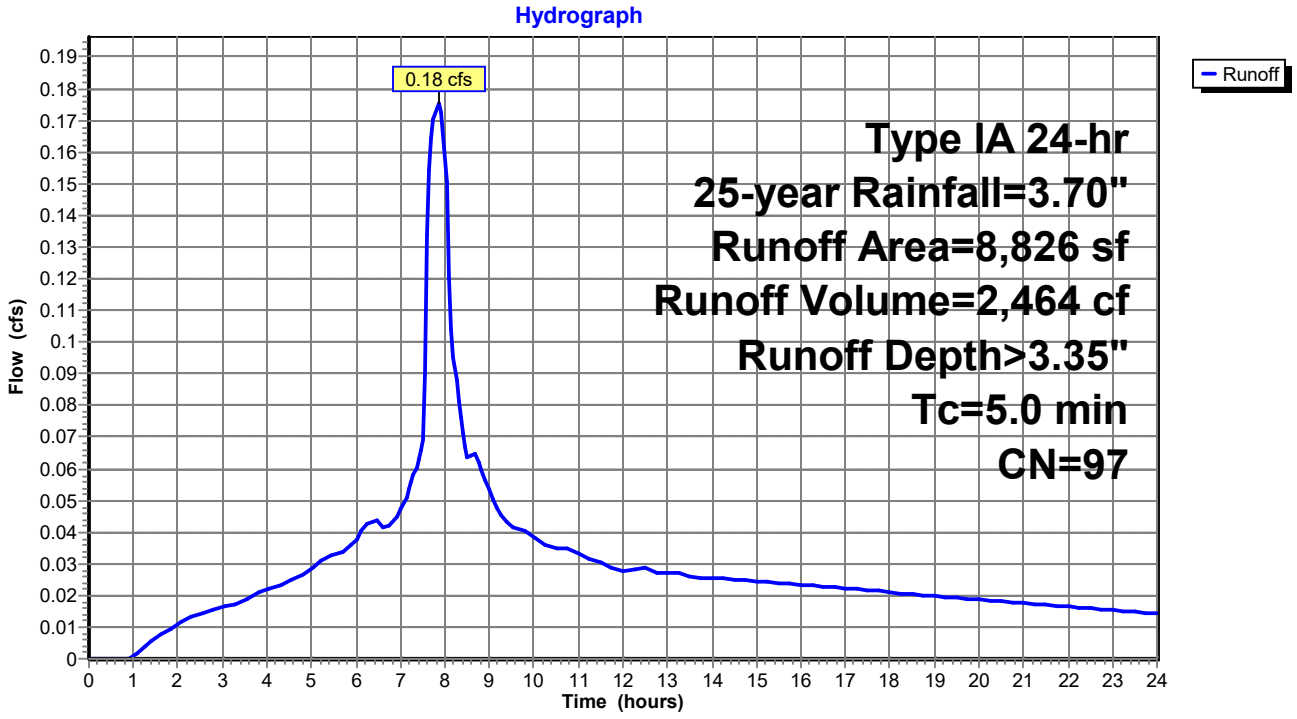
Runoff = 0.18 cfs @ 7.86 hrs, Volume= 2,464 cf, Depth> 3.35"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
Type IA 24-hr 25-year Rainfall=3.70"

	Area (sf)	CN	Description
*	390	86	Landscape
*	8,436	98	Pavement, sidewalk
	8,826	97	Weighted Average
	390		4.42% Pervious Area
	8,436		95.58% Impervious Area

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

Subcatchment 2S: CB2



Summary for Subcatchment 3S: CB5

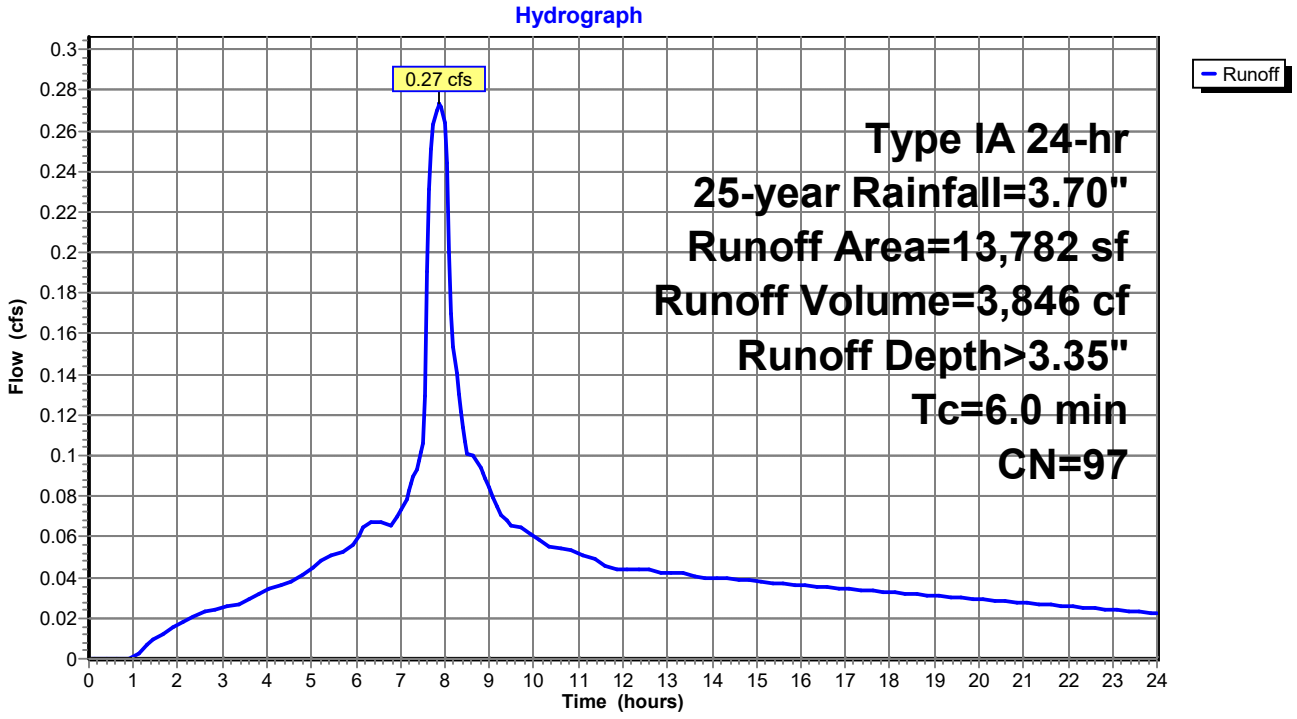
Runoff = 0.27 cfs @ 7.88 hrs, Volume= 3,846 cf, Depth> 3.35"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
Type IA 24-hr 25-year Rainfall=3.70"

	Area (sf)	CN	Description
*	1,362	86	Landscape
*	12,420	98	Pavement, sidewalk
	13,782	97	Weighted Average
	1,362		9.88% Pervious Area
	12,420		90.12% Impervious Area

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

Subcatchment 3S: CB5



Summary for Subcatchment 4S: CB4

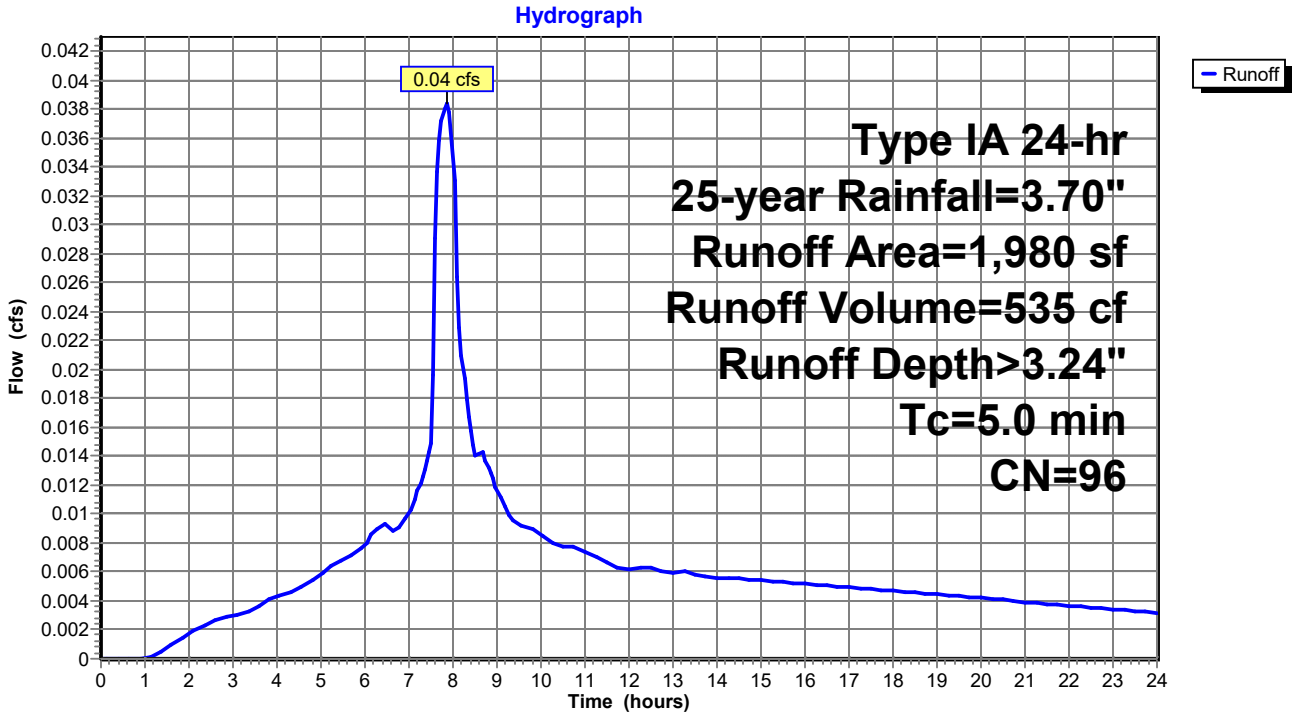
Runoff = 0.04 cfs @ 7.87 hrs, Volume= 535 cf, Depth> 3.24"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
Type IA 24-hr 25-year Rainfall=3.70"

	Area (sf)	CN	Description
*	355	86	Landscape
*	1,625	98	Pavement, Sidewalk
	1,980	96	Weighted Average
	355		17.93% Pervious Area
	1,625		82.07% Impervious Area

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

Subcatchment 4S: CB4



Summary for Subcatchment 5S: CB11

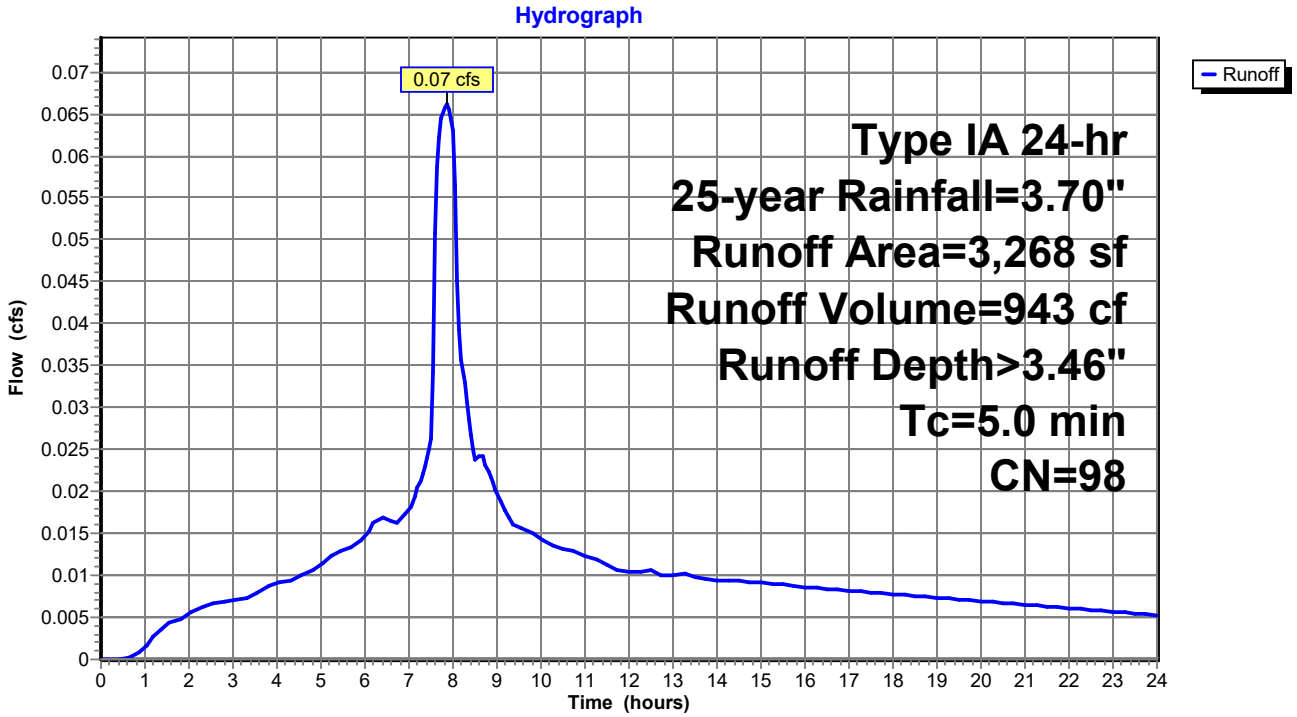
Runoff = 0.07 cfs @ 7.86 hrs, Volume= 943 cf, Depth> 3.46"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
Type IA 24-hr 25-year Rainfall=3.70"

	Area (sf)	CN	Description
*	3,268	98	Pavement
	3,268		100.00% Impervious Area

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

Subcatchment 5S: CB11



Summary for Subcatchment 6S: CB13

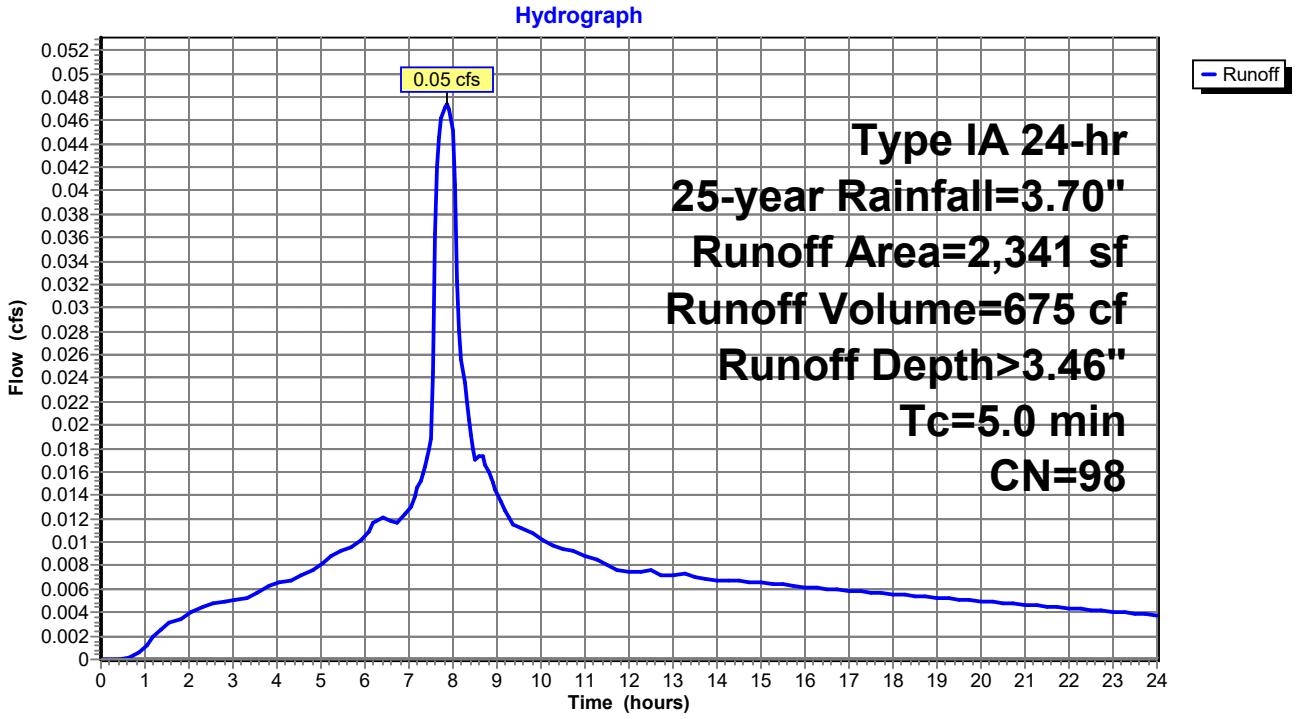
Runoff = 0.05 cfs @ 7.86 hrs, Volume= 675 cf, Depth> 3.46"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
Type IA 24-hr 25-year Rainfall=3.70"

	Area (sf)	CN	Description
*	2,341	98	Pavement
	2,341		100.00% Impervious Area

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

Subcatchment 6S: CB13



Summary for Subcatchment 7S: CB12

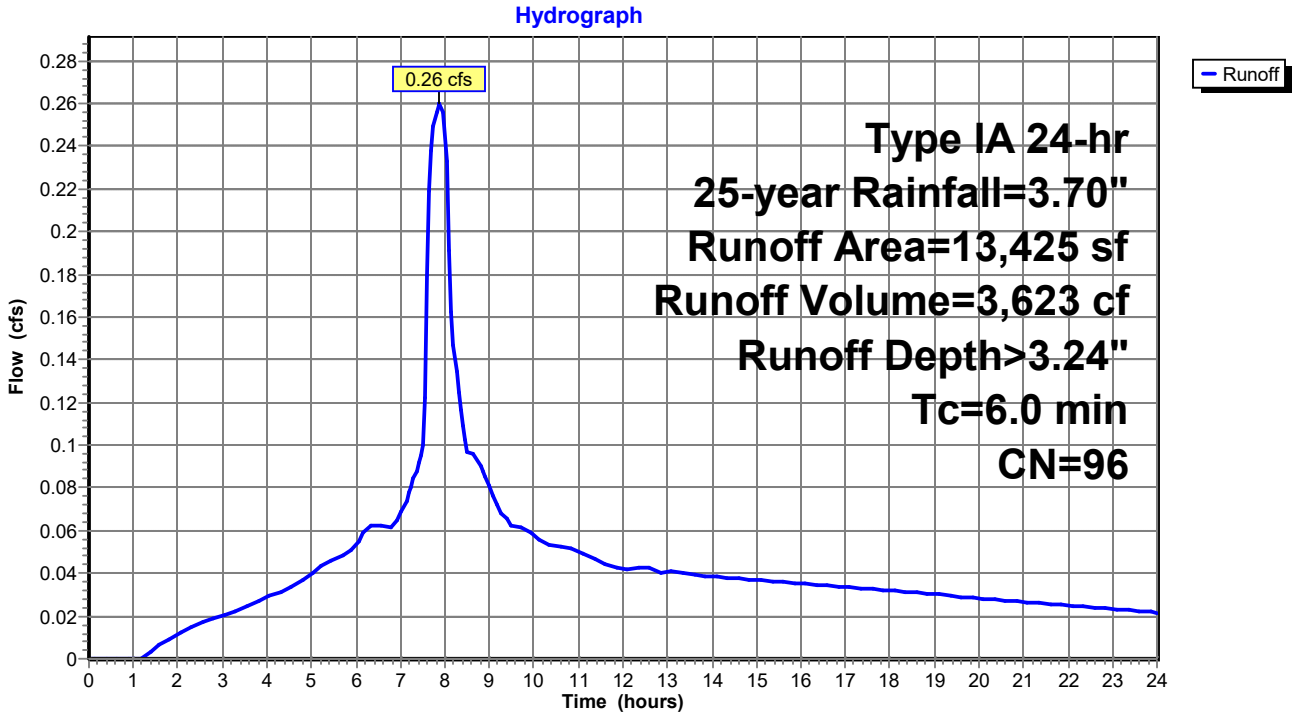
Runoff = 0.26 cfs @ 7.88 hrs, Volume= 3,623 cf, Depth> 3.24"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
Type IA 24-hr 25-year Rainfall=3.70"

	Area (sf)	CN	Description
*	2,580	86	Landscape
*	10,845	98	Pavement, sidewalk
	13,425	96	Weighted Average
	2,580		19.22% Pervious Area
	10,845		80.78% Impervious Area

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

Subcatchment 7S: CB12



Summary for Subcatchment 8S: CB14

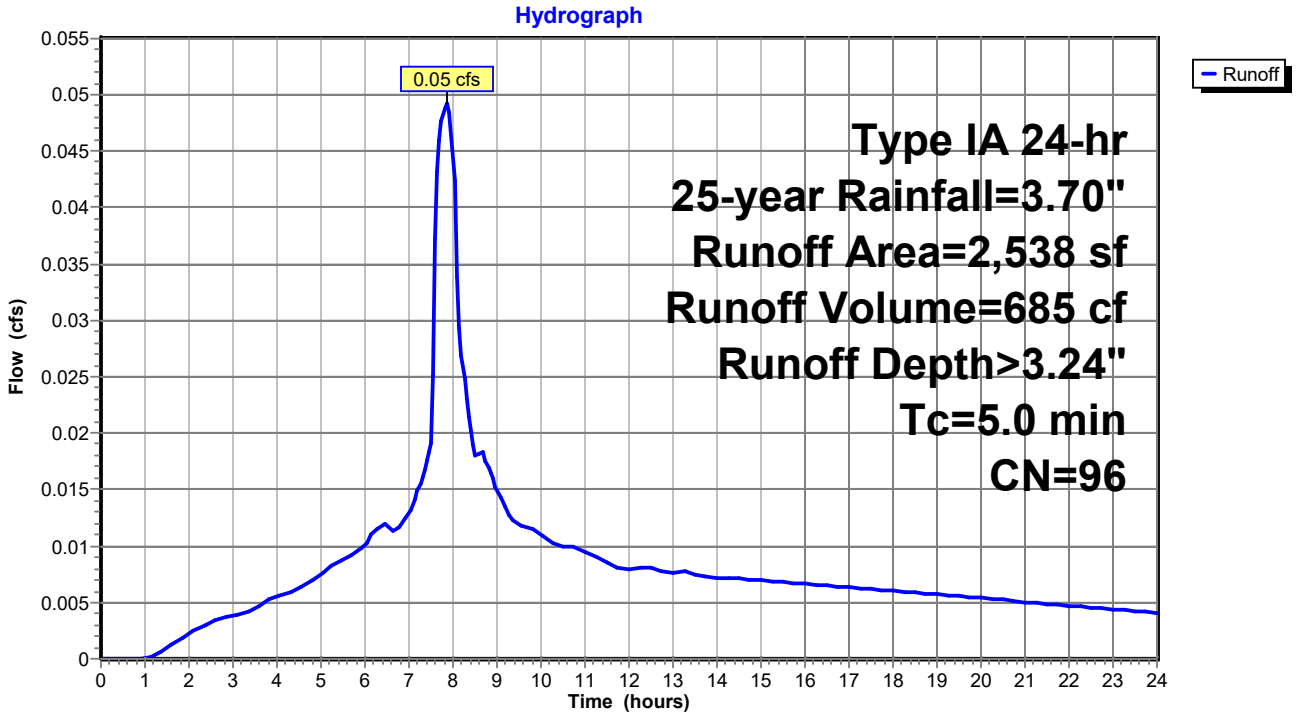
Runoff = 0.05 cfs @ 7.87 hrs, Volume= 685 cf, Depth> 3.24"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
Type IA 24-hr 25-year Rainfall=3.70"

	Area (sf)	CN	Description
*	505	86	Landscape
*	2,033	98	Pavement
	2,538	96	Weighted Average
	505		19.90% Pervious Area
	2,033		80.10% Impervious Area

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

Subcatchment 8S: CB14



Summary for Subcatchment 9S: CB15

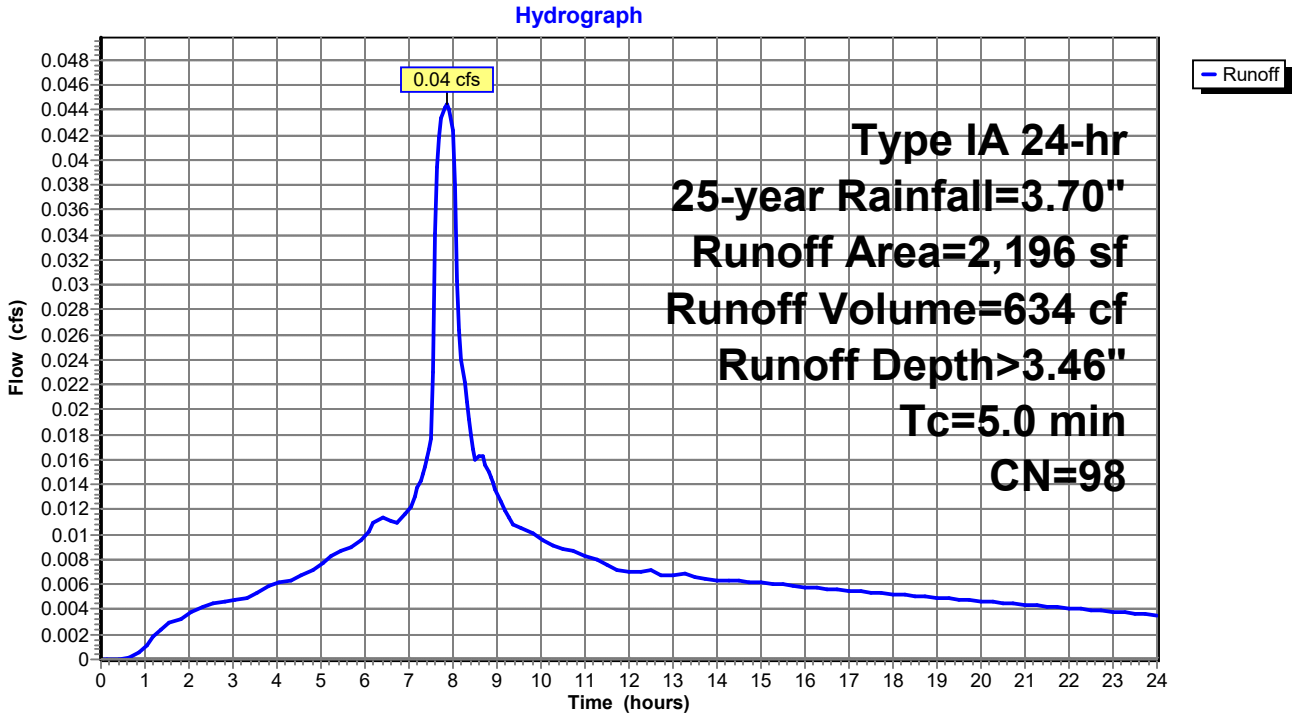
Runoff = 0.04 cfs @ 7.86 hrs, Volume= 634 cf, Depth> 3.46"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
Type IA 24-hr 25-year Rainfall=3.70"

	Area (sf)	CN	Description
*	2,196	98	Pavement, sidewalk
	2,196		100.00% Impervious Area

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

Subcatchment 9S: CB15



Summary for Subcatchment 10S: CB16

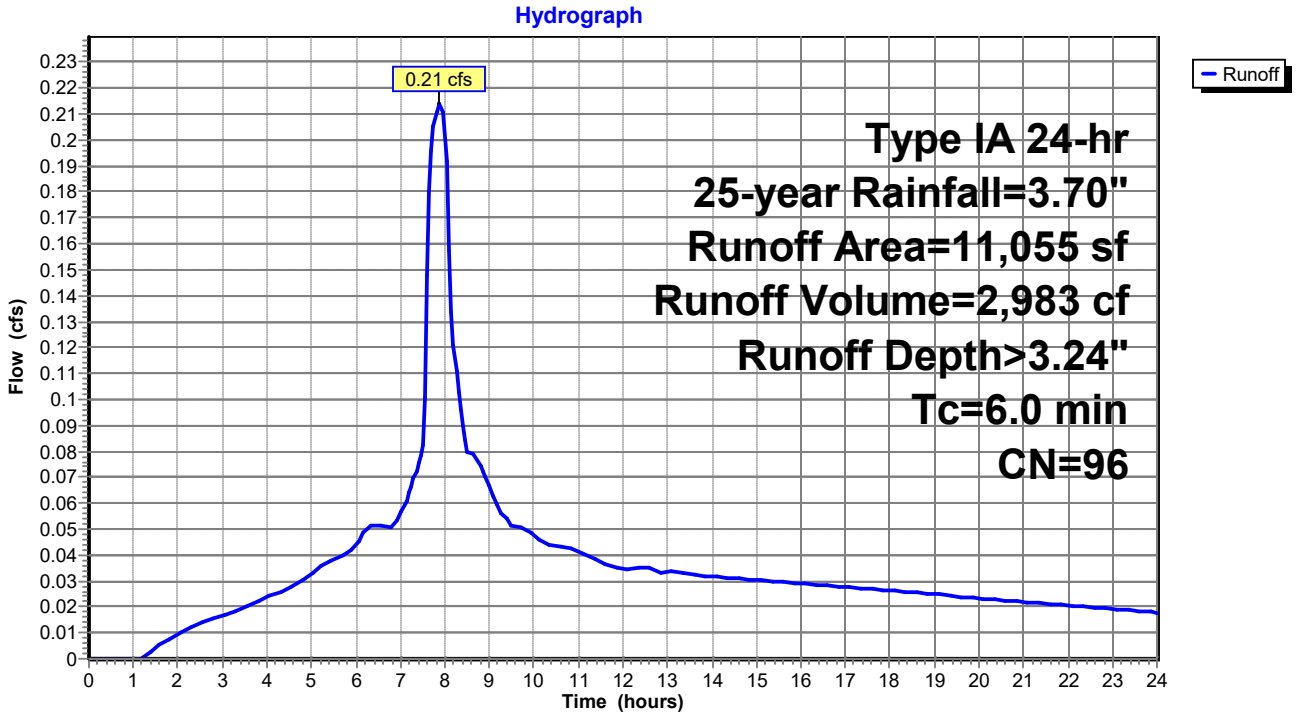
Runoff = 0.21 cfs @ 7.88 hrs, Volume= 2,983 cf, Depth> 3.24"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
Type IA 24-hr 25-year Rainfall=3.70"

	Area (sf)	CN	Description
*	1,479	86	Landscape
*	9,576	98	Pavement, sidewalk
	11,055	96	Weighted Average
	1,479		13.38% Pervious Area
	9,576		86.62% Impervious Area

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

Subcatchment 10S: CB16



Summary for Subcatchment 11S: CB17

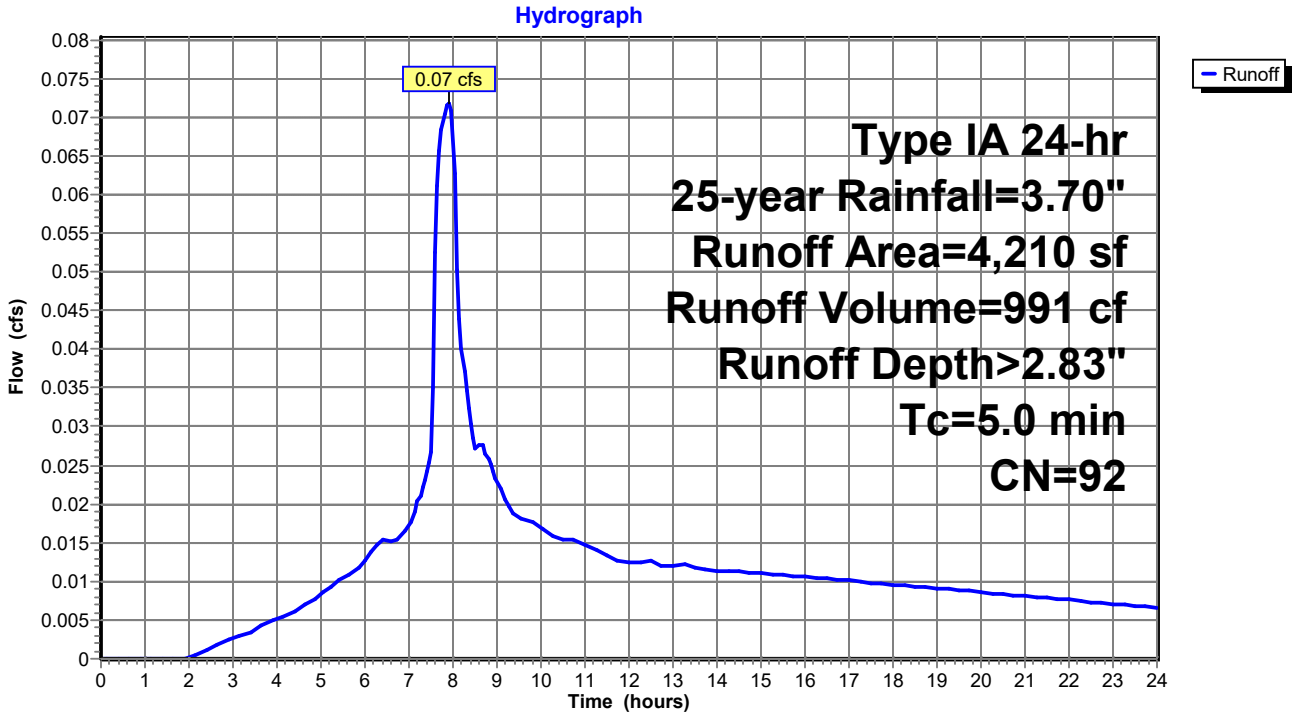
Runoff = 0.07 cfs @ 7.89 hrs, Volume= 991 cf, Depth> 2.83"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
Type IA 24-hr 25-year Rainfall=3.70"

	Area (sf)	CN	Description
*	2,100	86	Landscape
*	2,110	98	Pavement, sidewalk
	4,210	92	Weighted Average
	2,100		49.88% Pervious Area
	2,110		50.12% Impervious Area

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

Subcatchment 11S: CB17



Summary for Subcatchment 12S: CB9

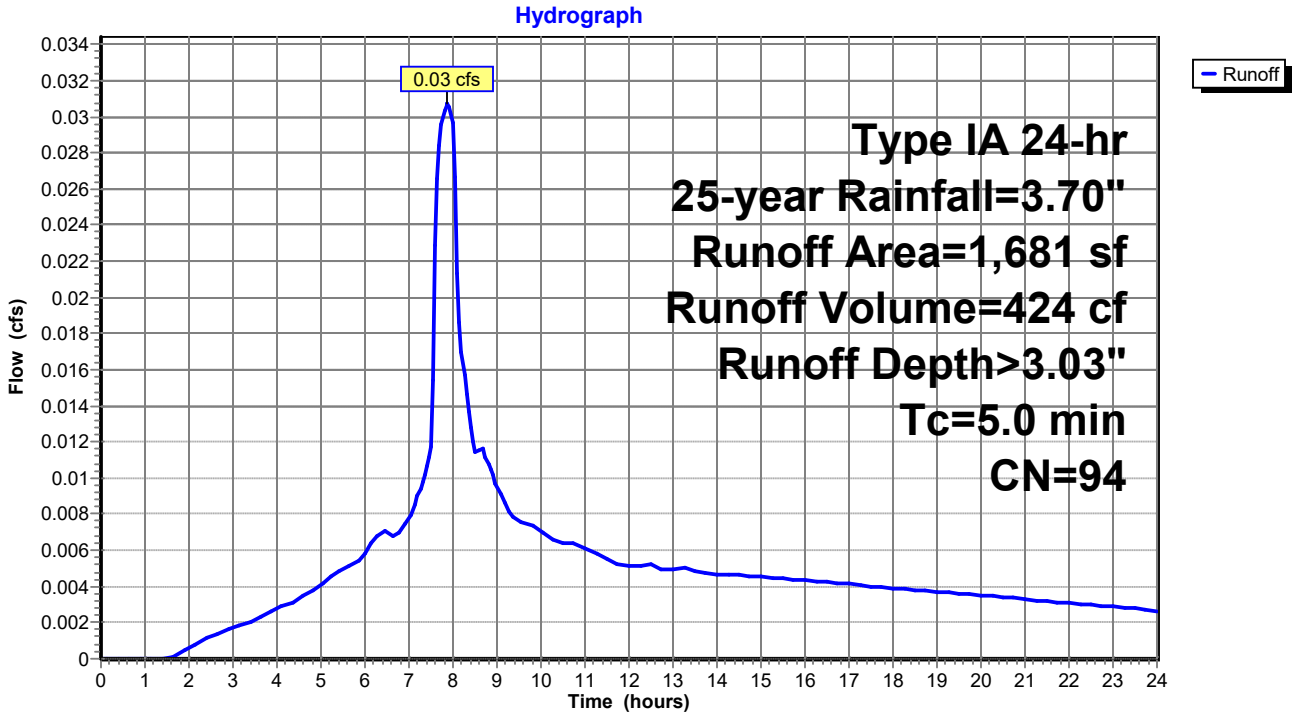
Runoff = 0.03 cfs @ 7.88 hrs, Volume= 424 cf, Depth> 3.03"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
Type IA 24-hr 25-year Rainfall=3.70"

	Area (sf)	CN	Description
*	580	86	Landscape
*	1,101	98	Pavement, sidewalk
	1,681	94	Weighted Average
	580		34.50% Pervious Area
	1,101		65.50% Impervious Area

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

Subcatchment 12S: CB9



Summary for Subcatchment 13S: CB10

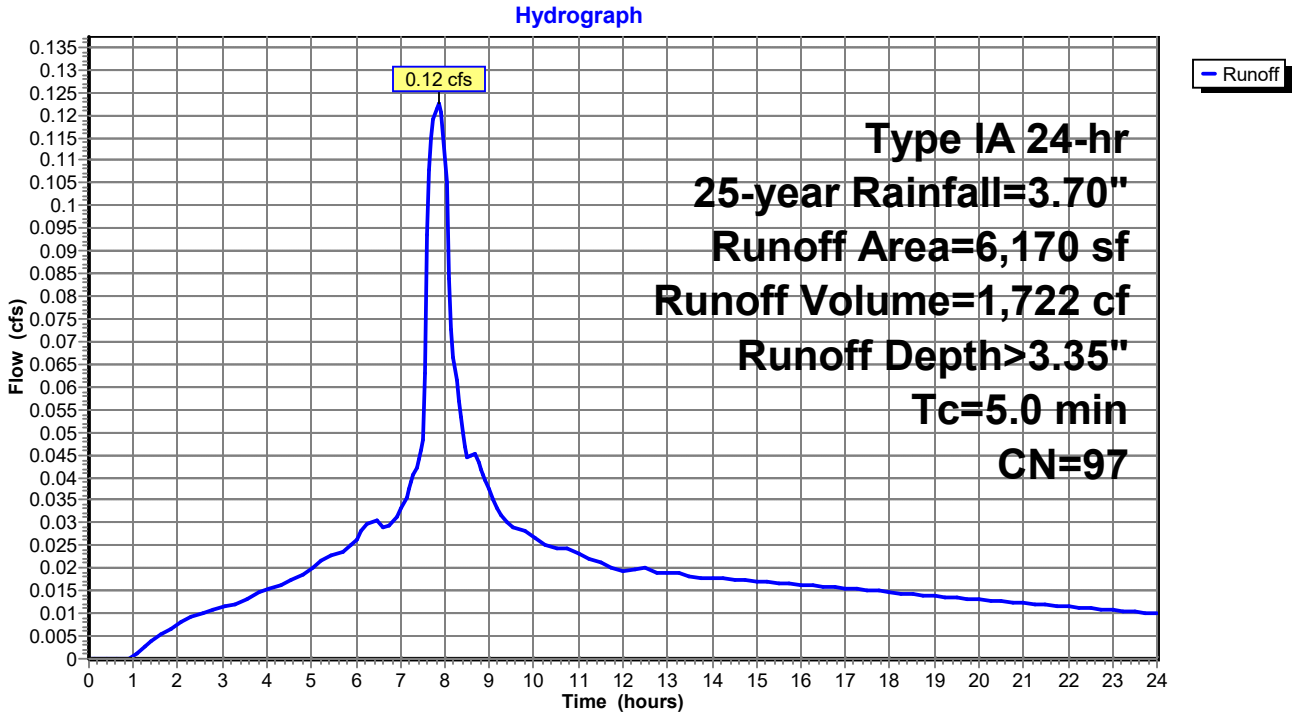
Runoff = 0.12 cfs @ 7.86 hrs, Volume= 1,722 cf, Depth> 3.35"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
Type IA 24-hr 25-year Rainfall=3.70"

	Area (sf)	CN	Description
*	620	86	Landscape
*	5,550	98	Pavement, sidewalk
	6,170	97	Weighted Average
	620		10.05% Pervious Area
	5,550		89.95% Impervious Area

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

Subcatchment 13S: CB10



Summary for Subcatchment 14S: CB8

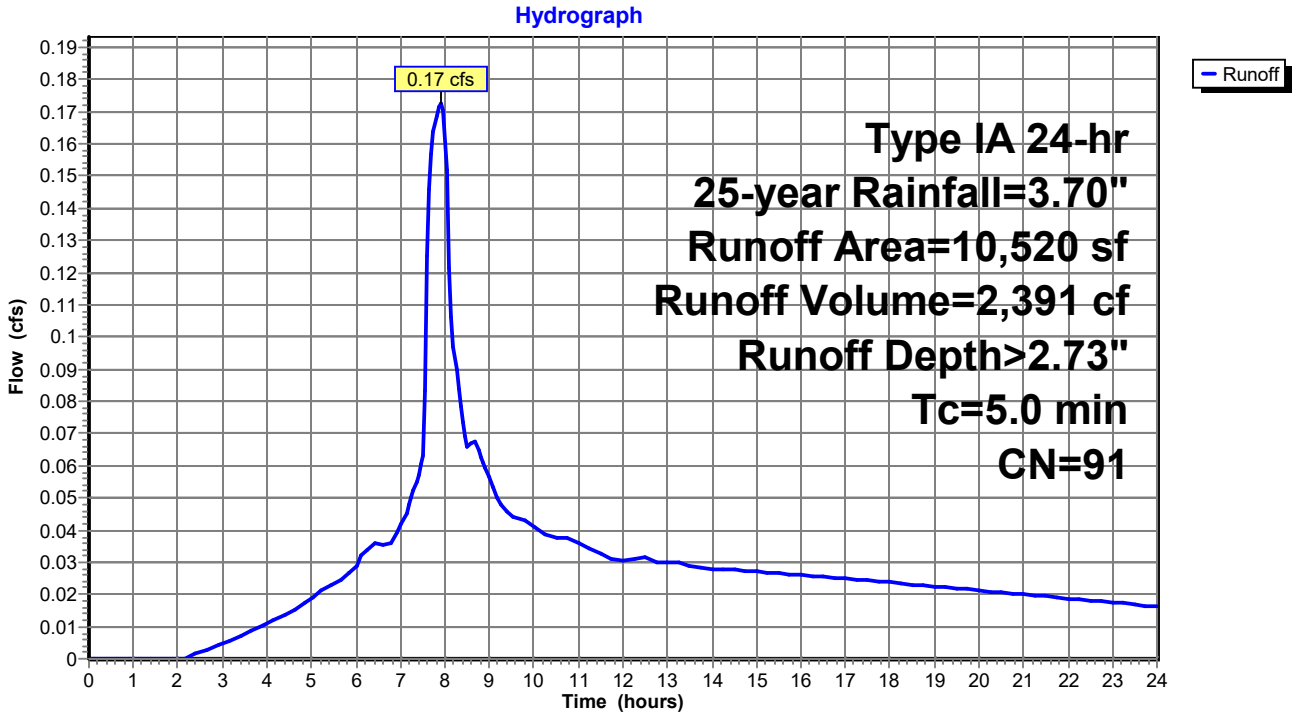
Runoff = 0.17 cfs @ 7.90 hrs, Volume= 2,391 cf, Depth> 2.73"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
Type IA 24-hr 25-year Rainfall=3.70"

	Area (sf)	CN	Description
*	6,358	86	Landscape
*	4,162	98	Pavement, sidewalk
	10,520	91	Weighted Average
	6,358		60.44% Pervious Area
	4,162		39.56% Impervious Area

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

Subcatchment 14S: CB8



Summary for Subcatchment 15S: CB7

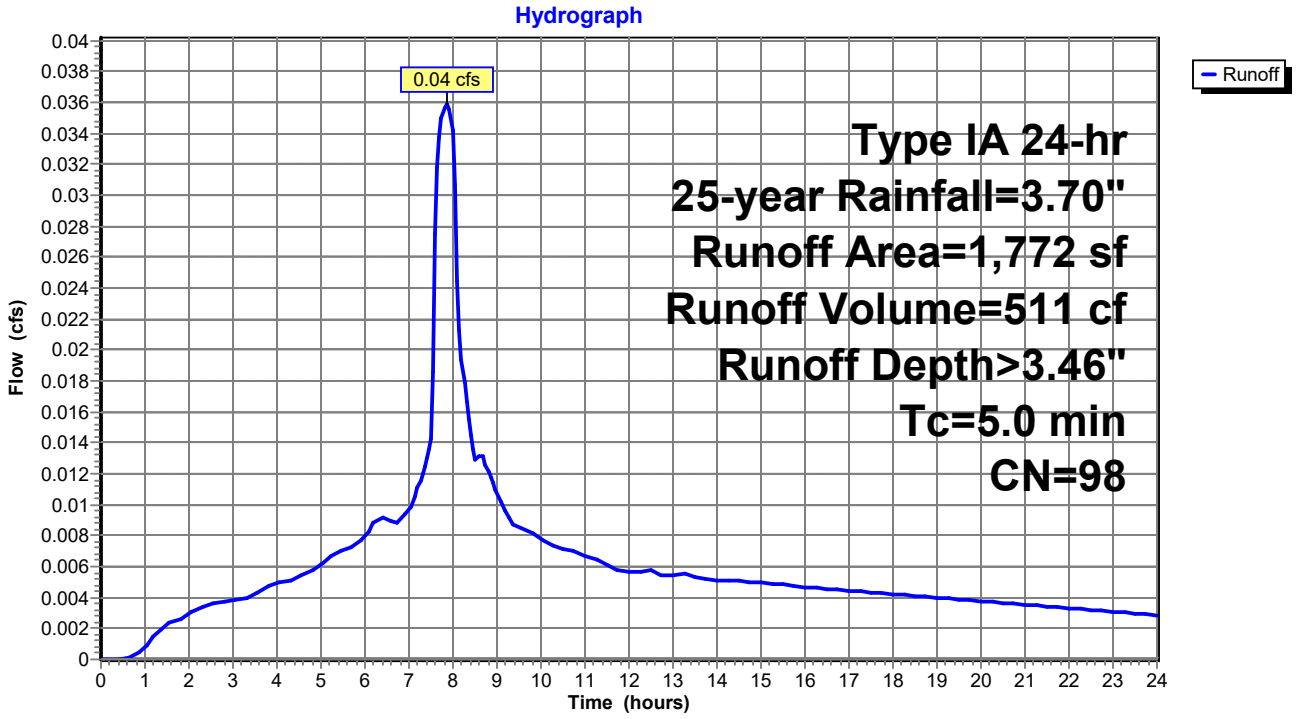
Runoff = 0.04 cfs @ 7.86 hrs, Volume= 511 cf, Depth> 3.46"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
Type IA 24-hr 25-year Rainfall=3.70"

	Area (sf)	CN	Description
*	1,772	98	Pavement, sidewalk
	1,772		100.00% Impervious Area

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

Subcatchment 15S: CB7



Summary for Subcatchment 16S: CB18

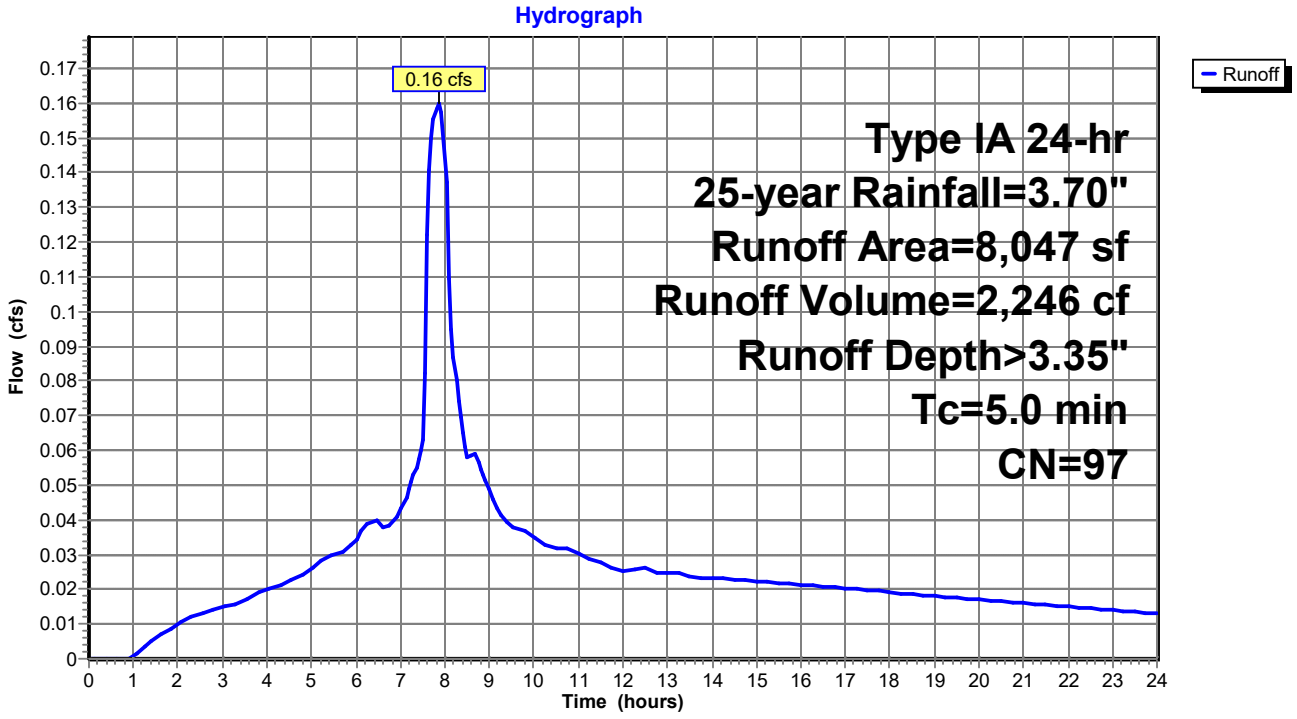
Runoff = 0.16 cfs @ 7.86 hrs, Volume= 2,246 cf, Depth> 3.35"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
Type IA 24-hr 25-year Rainfall=3.70"

	Area (sf)	CN	Description
*	760	86	Landscape
*	7,287	98	Pavement, sidewalk
	8,047	97	Weighted Average
	760		9.44% Pervious Area
	7,287		90.56% Impervious Area

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

Subcatchment 16S: CB18



Summary for Subcatchment 17S: CB19

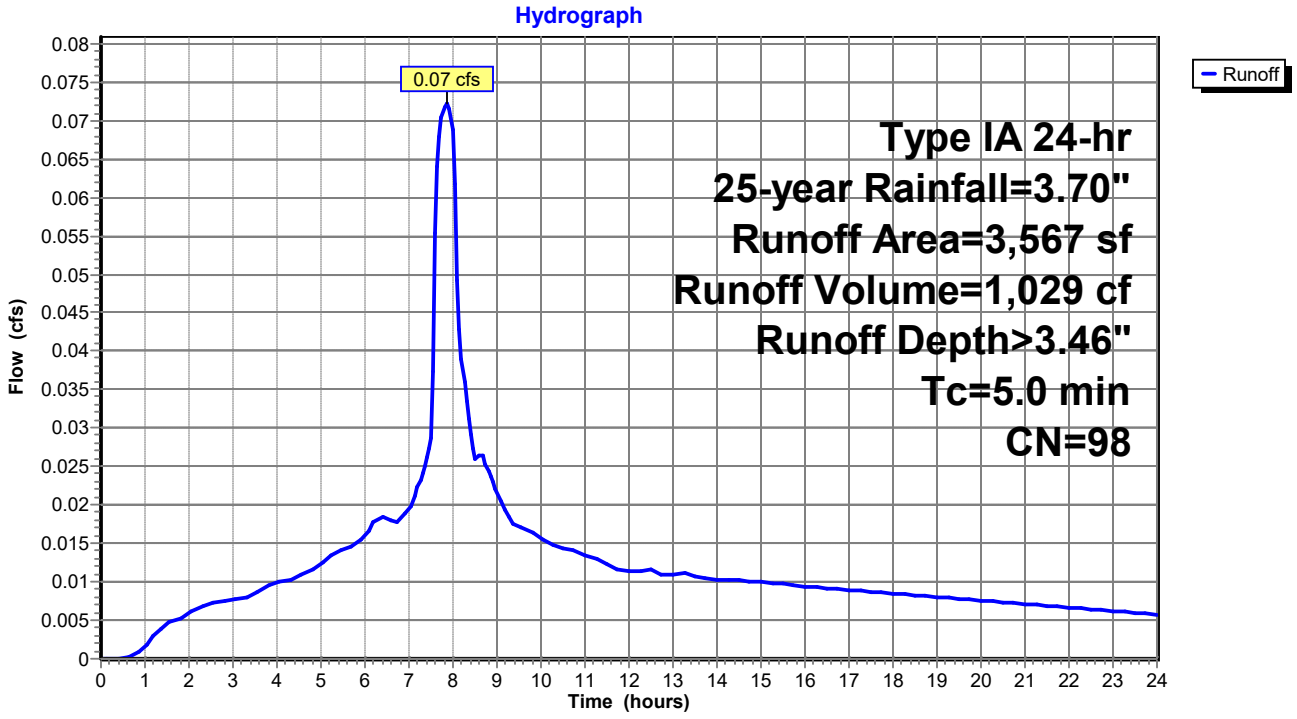
Runoff = 0.07 cfs @ 7.86 hrs, Volume= 1,029 cf, Depth> 3.46"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
Type IA 24-hr 25-year Rainfall=3.70"

	Area (sf)	CN	Description
*	100	86	Landscape
*	3,467	98	Pavement, landscape
	3,567	98	Weighted Average
	100		2.80% Pervious Area
	3,467		97.20% Impervious Area

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

Subcatchment 17S: CB19



Summary for Subcatchment 18S: CB20

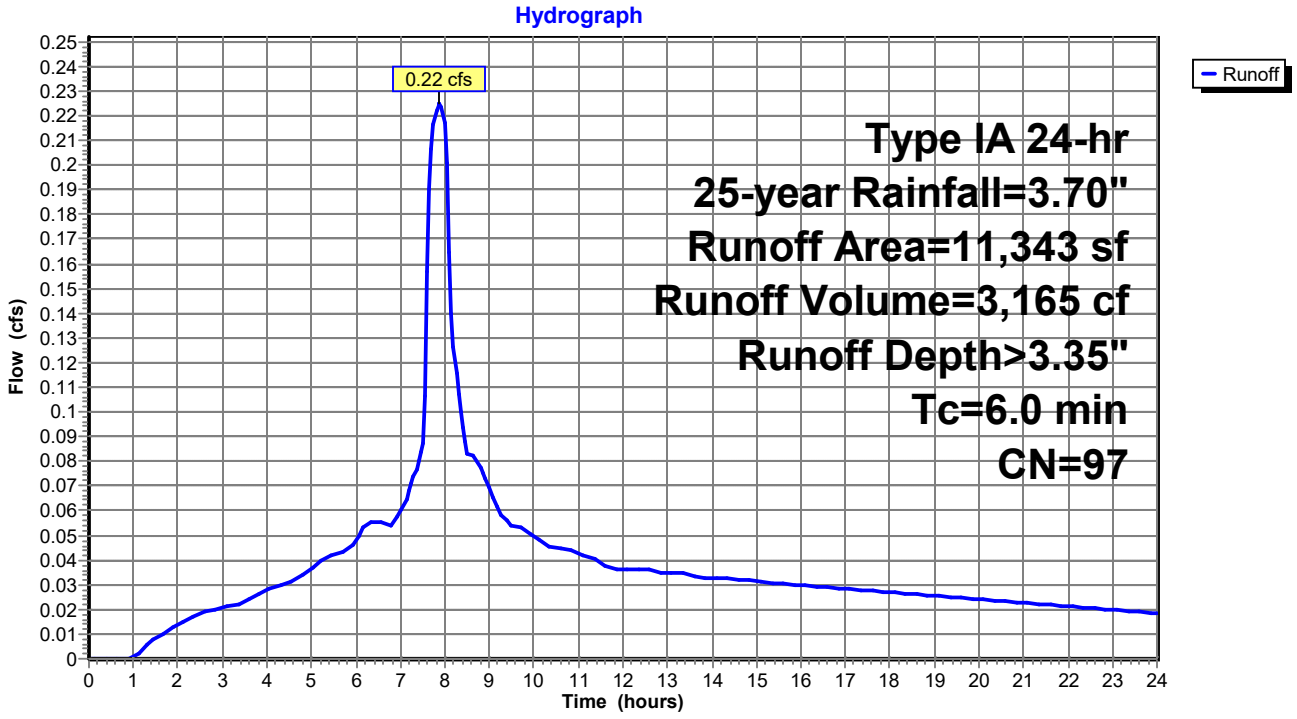
Runoff = 0.22 cfs @ 7.88 hrs, Volume= 3,165 cf, Depth> 3.35"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
Type IA 24-hr 25-year Rainfall=3.70"

	Area (sf)	CN	Description
*	530	86	Landscape
*	10,813	98	Pavement, sidewalk
	11,343	97	Weighted Average
	530		4.67% Pervious Area
	10,813		95.33% Impervious Area

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

Subcatchment 18S: CB20



Summary for Subcatchment 19S: CB21

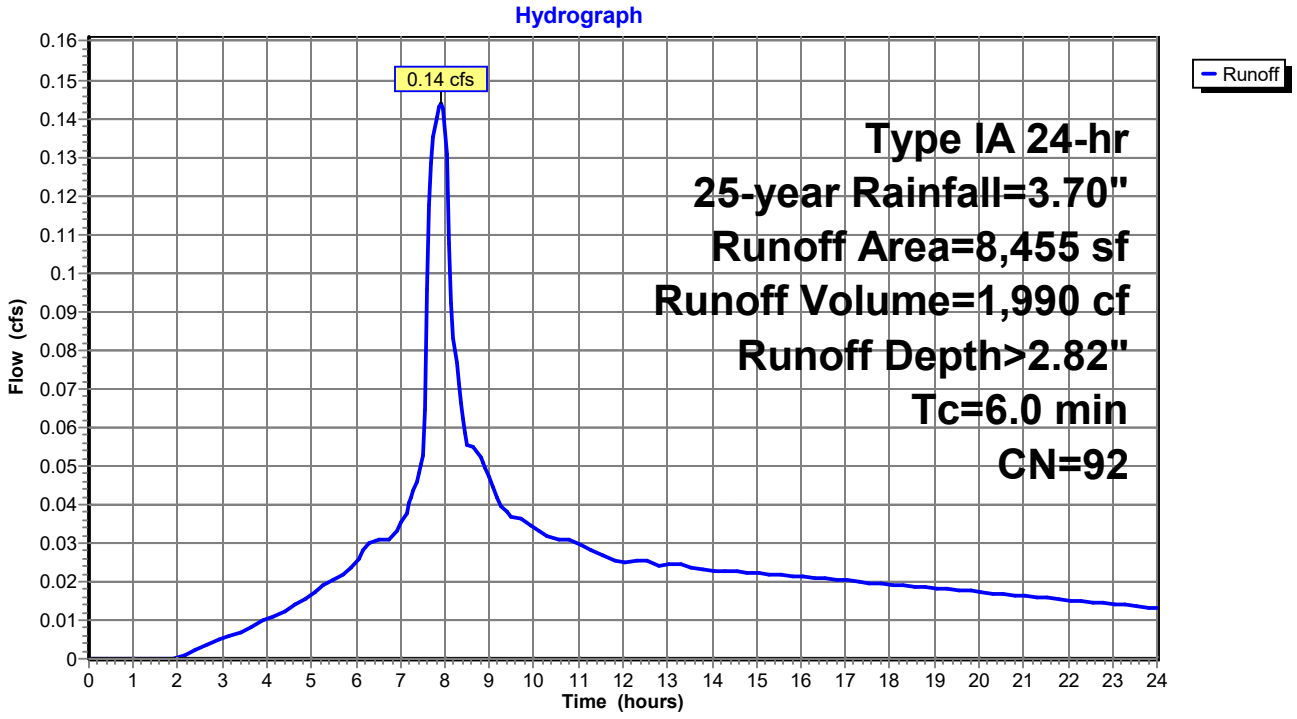
Runoff = 0.14 cfs @ 7.91 hrs, Volume= 1,990 cf, Depth> 2.82"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
Type IA 24-hr 25-year Rainfall=3.70"

	Area (sf)	CN	Description
*	3,930	86	Landscape
*	4,525	98	Pavement, sidewalk
	8,455	92	Weighted Average
	3,930		46.48% Pervious Area
	4,525		53.52% Impervious Area

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

Subcatchment 19S: CB21

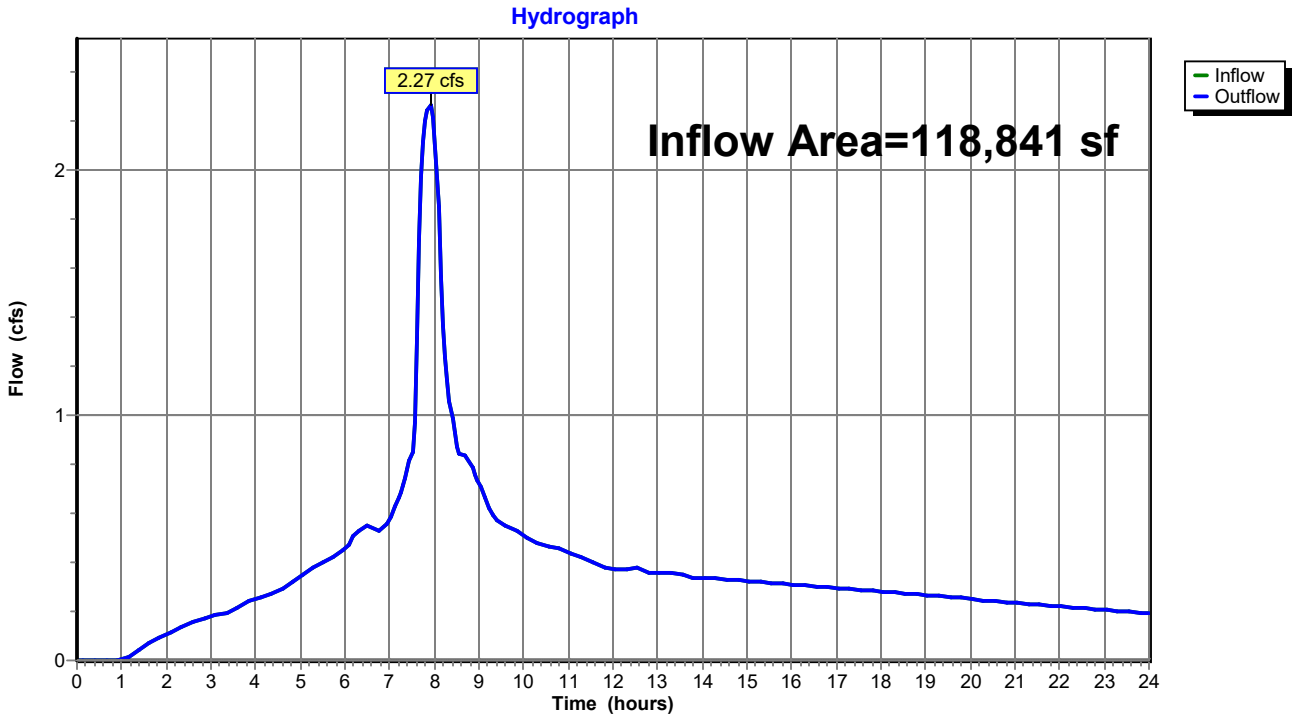


Summary for Reach 1R: To Detention

Inflow Area = 118,841 sf, 81.50% Impervious, Inflow Depth > 3.22" for 25-year event
Inflow = 2.27 cfs @ 7.91 hrs, Volume= 31,841 cf
Outflow = 2.27 cfs @ 7.91 hrs, Volume= 31,841 cf, Atten= 0%, Lag= 0.0 min

Routing by Stor-Ind+Trans method, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs

Reach 1R: To Detention

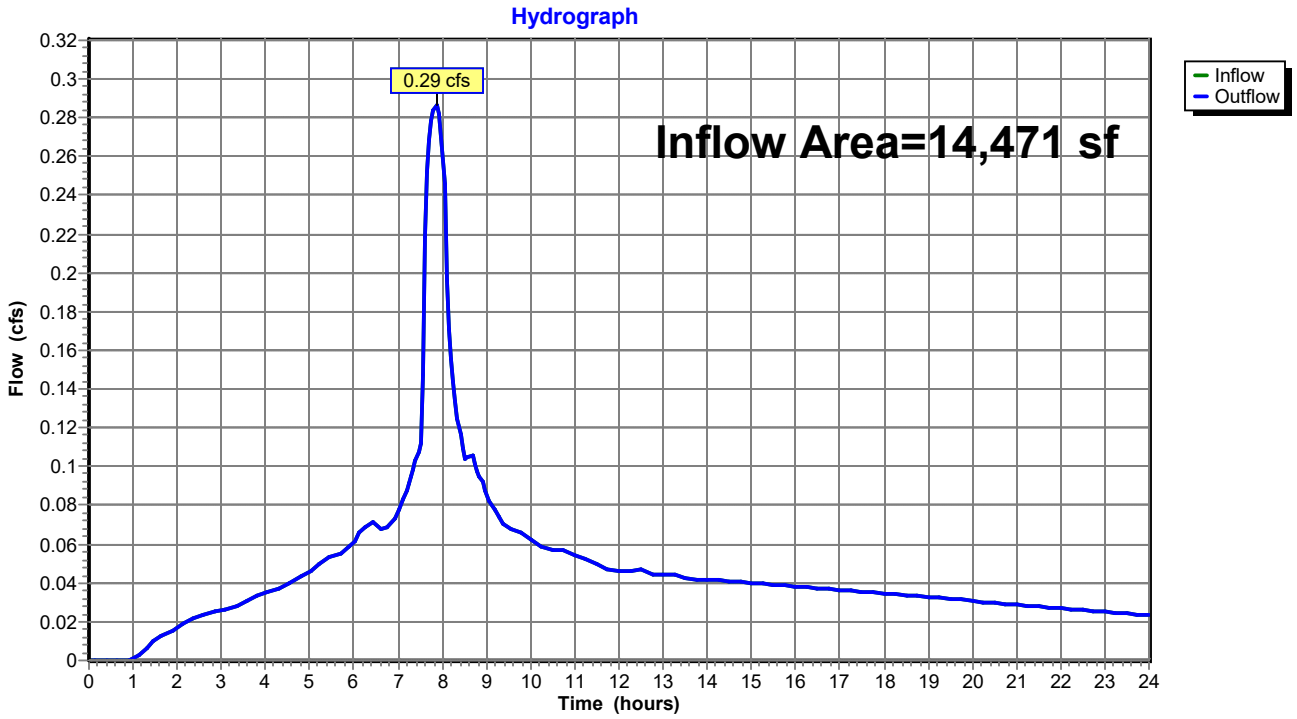


Summary for Reach 2R: (new Reach)

Inflow Area = 14,471 sf, 92.50% Impervious, Inflow Depth > 3.33" for 25-year event
Inflow = 0.29 cfs @ 7.86 hrs, Volume= 4,021 cf
Outflow = 0.29 cfs @ 7.86 hrs, Volume= 4,021 cf, Atten= 0%, Lag= 0.0 min

Routing by Stor-Ind+Trans method, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs

Reach 2R: (new Reach)



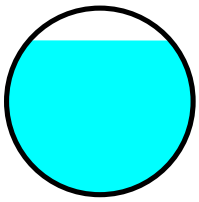
Summary for Reach 3R: AA2 to AA1

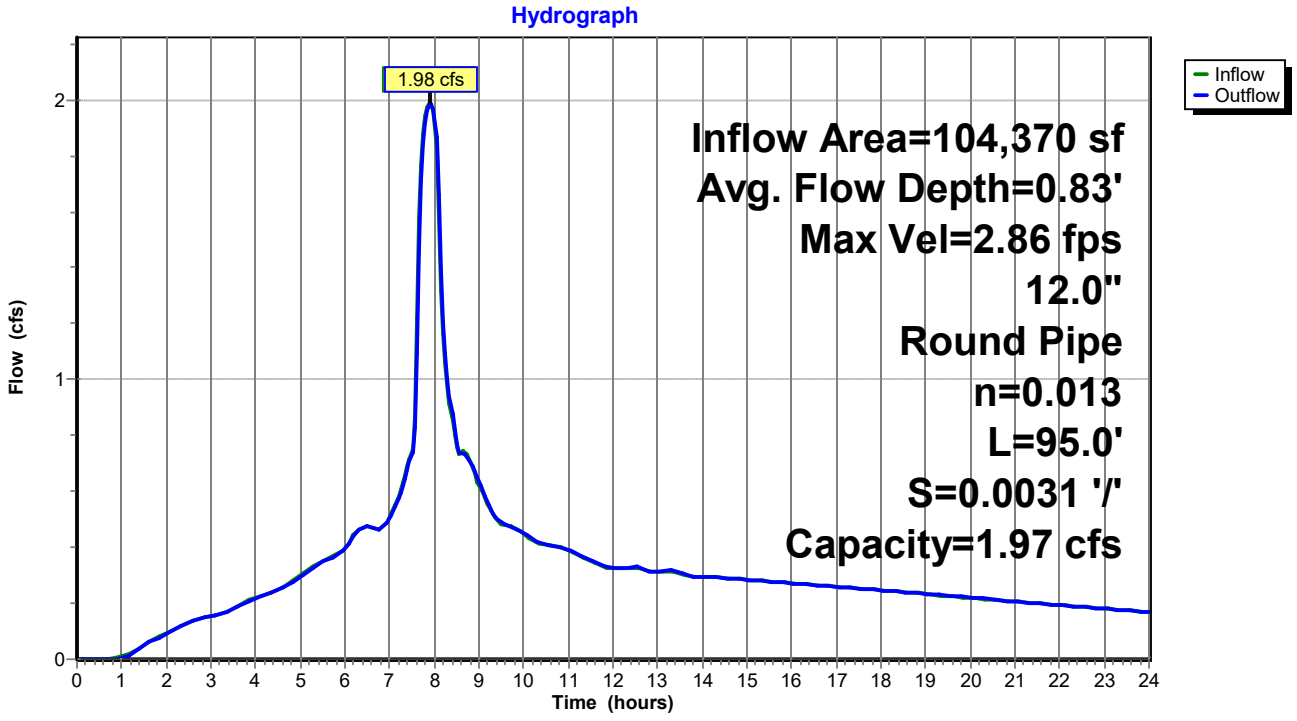
Inflow Area = 104,370 sf, 79.97% Impervious, Inflow Depth > 3.20" for 25-year event
Inflow = 1.98 cfs @ 7.90 hrs, Volume= 27,836 cf
Outflow = 1.98 cfs @ 7.92 hrs, Volume= 27,820 cf, Atten= 0%, Lag= 1.1 min

Routing by Stor-Ind+Trans method, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
Max. Velocity= 2.86 fps, Min. Travel Time= 0.6 min
Avg. Velocity = 1.76 fps, Avg. Travel Time= 0.9 min

Peak Storage= 66 cf @ 7.91 hrs
Average Depth at Peak Storage= 0.83'
Bank-Full Depth= 1.00' Flow Area= 0.8 sf, Capacity= 1.97 cfs

12.0" Round Pipe
n= 0.013
Length= 95.0' Slope= 0.0031 '/'
Inlet Invert= 0.00', Outlet Invert= -0.29'





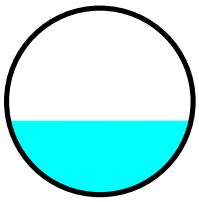
Summary for Reach 4R: DD1 to AA2

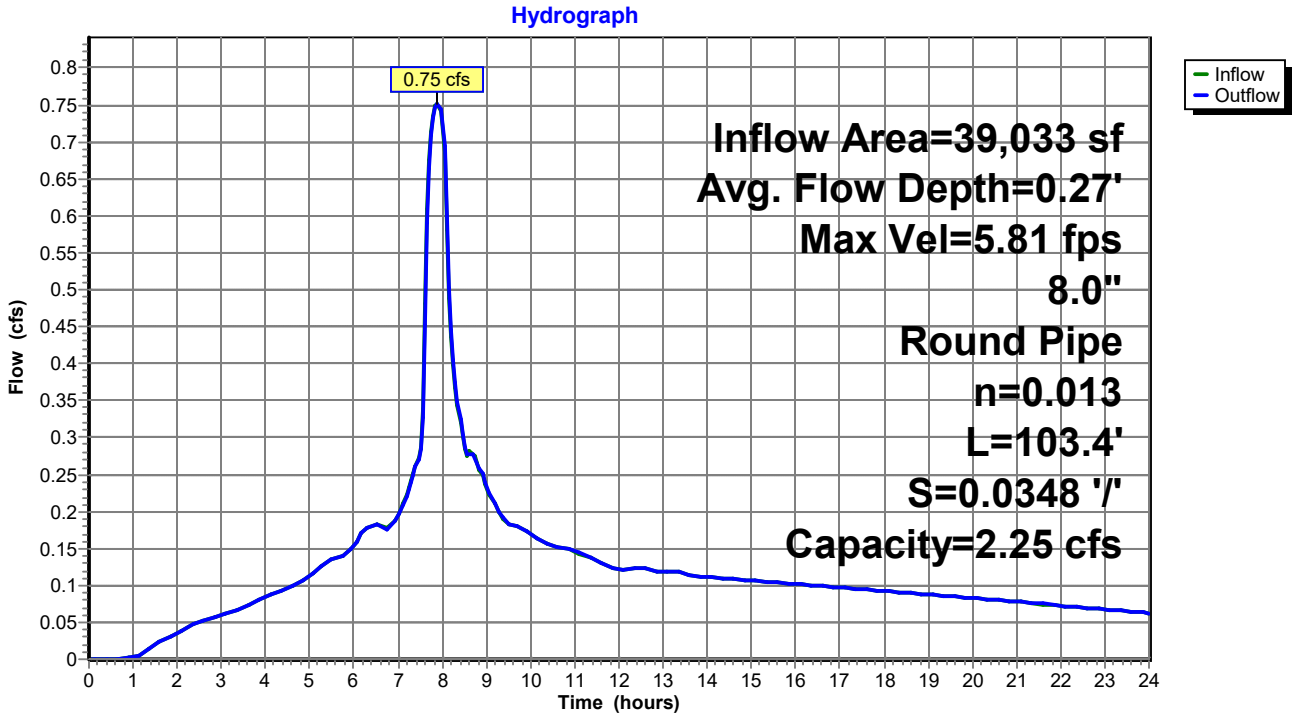
Inflow Area = 39,033 sf, 82.93% Impervious, Inflow Depth > 3.24" for 25-year event
Inflow = 0.75 cfs @ 7.89 hrs, Volume= 10,528 cf
Outflow = 0.75 cfs @ 7.90 hrs, Volume= 10,524 cf, Atten= 0%, Lag= 0.6 min

Routing by Stor-Ind+Trans method, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
Max. Velocity= 5.81 fps, Min. Travel Time= 0.3 min
Avg. Velocity = 3.30 fps, Avg. Travel Time= 0.5 min

Peak Storage= 13 cf @ 7.90 hrs
Average Depth at Peak Storage= 0.27'
Bank-Full Depth= 0.67' Flow Area= 0.3 sf, Capacity= 2.25 cfs

8.0" Round Pipe
n= 0.013
Length= 103.4' Slope= 0.0348 '/'
Inlet Invert= 0.00', Outlet Invert= -3.60'





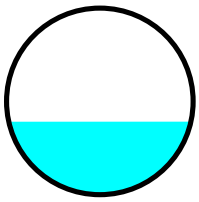
Summary for Reach 5R: DD2 to DD1

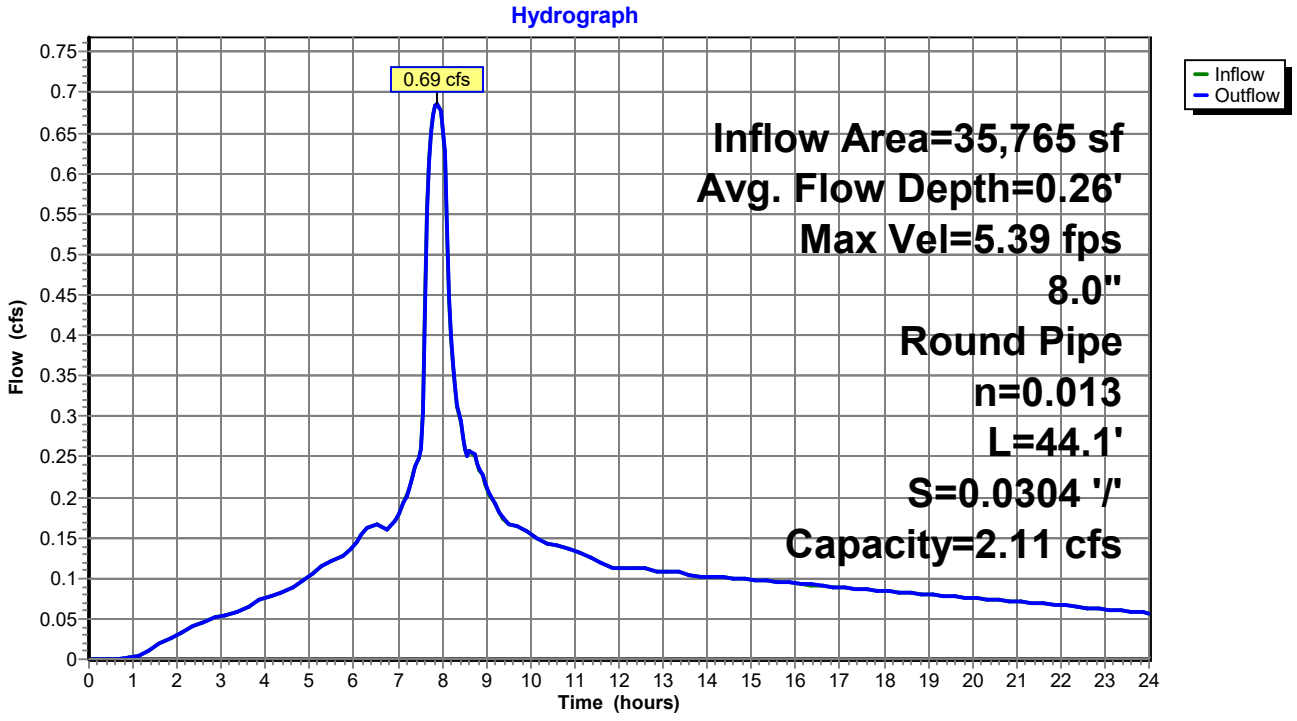
Inflow Area = 35,765 sf, 81.37% Impervious, Inflow Depth > 3.22" for 25-year event
Inflow = 0.69 cfs @ 7.89 hrs, Volume= 9,586 cf
Outflow = 0.69 cfs @ 7.89 hrs, Volume= 9,585 cf, Atten= 0%, Lag= 0.2 min

Routing by Stor-Ind+Trans method, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
Max. Velocity= 5.39 fps, Min. Travel Time= 0.1 min
Avg. Velocity = 3.05 fps, Avg. Travel Time= 0.2 min

Peak Storage= 6 cf @ 7.89 hrs
Average Depth at Peak Storage= 0.26'
Bank-Full Depth= 0.67' Flow Area= 0.3 sf, Capacity= 2.11 cfs

8.0" Round Pipe
n= 0.013
Length= 44.1' Slope= 0.0304 '/'
Inlet Invert= 0.00', Outlet Invert= -1.34'





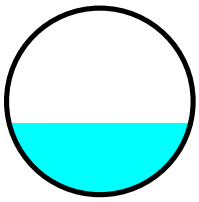
Summary for Reach 6R: DD3 to DD2

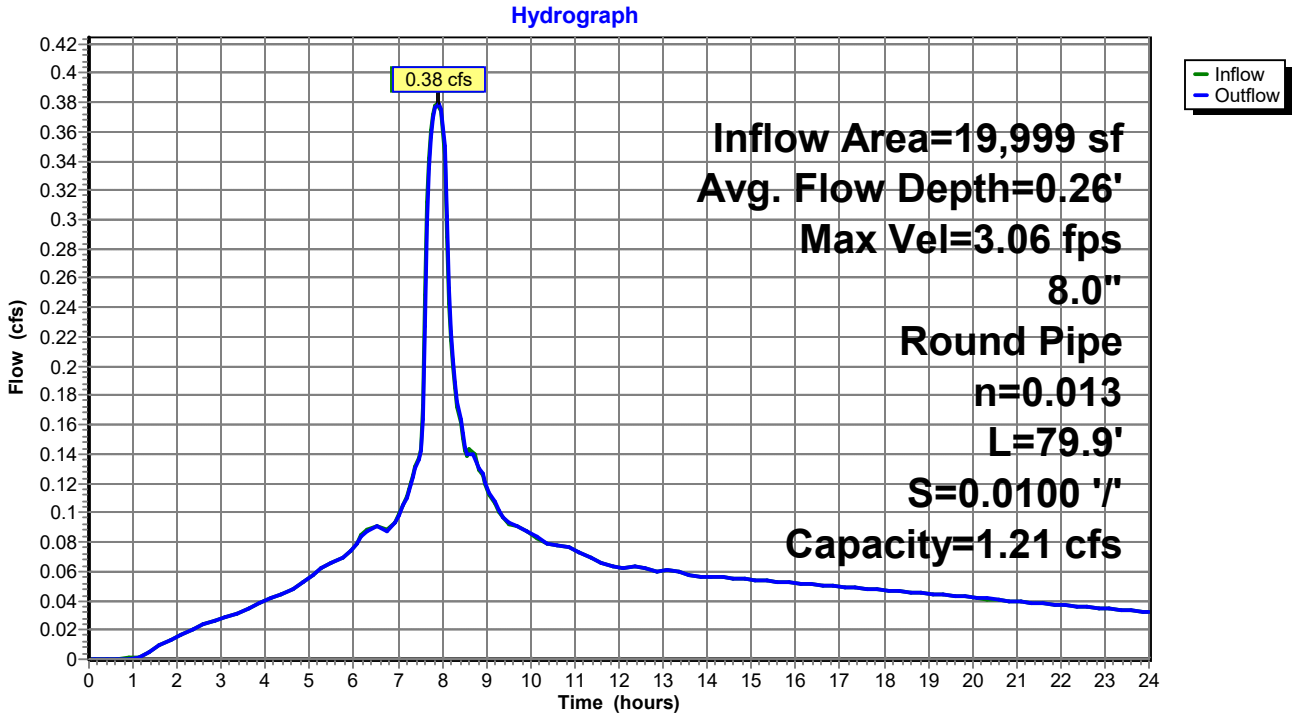
Inflow Area = 19,999 sf, 79.58% Impervious, Inflow Depth > 3.17" for 25-year event
Inflow = 0.38 cfs @ 7.89 hrs, Volume= 5,291 cf
Outflow = 0.38 cfs @ 7.90 hrs, Volume= 5,288 cf, Atten= 0%, Lag= 0.8 min

Routing by Stor-Ind+Trans method, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
Max. Velocity= 3.06 fps, Min. Travel Time= 0.4 min
Avg. Velocity = 1.73 fps, Avg. Travel Time= 0.8 min

Peak Storage= 10 cf @ 7.90 hrs
Average Depth at Peak Storage= 0.26'
Bank-Full Depth= 0.67' Flow Area= 0.3 sf, Capacity= 1.21 cfs

8.0" Round Pipe
n= 0.013
Length= 79.9' Slope= 0.0100 '/'
Inlet Invert= 0.00', Outlet Invert= -0.80'





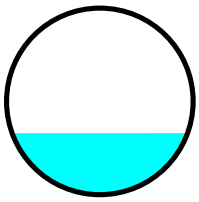
Summary for Reach 7R: DD4-DD3

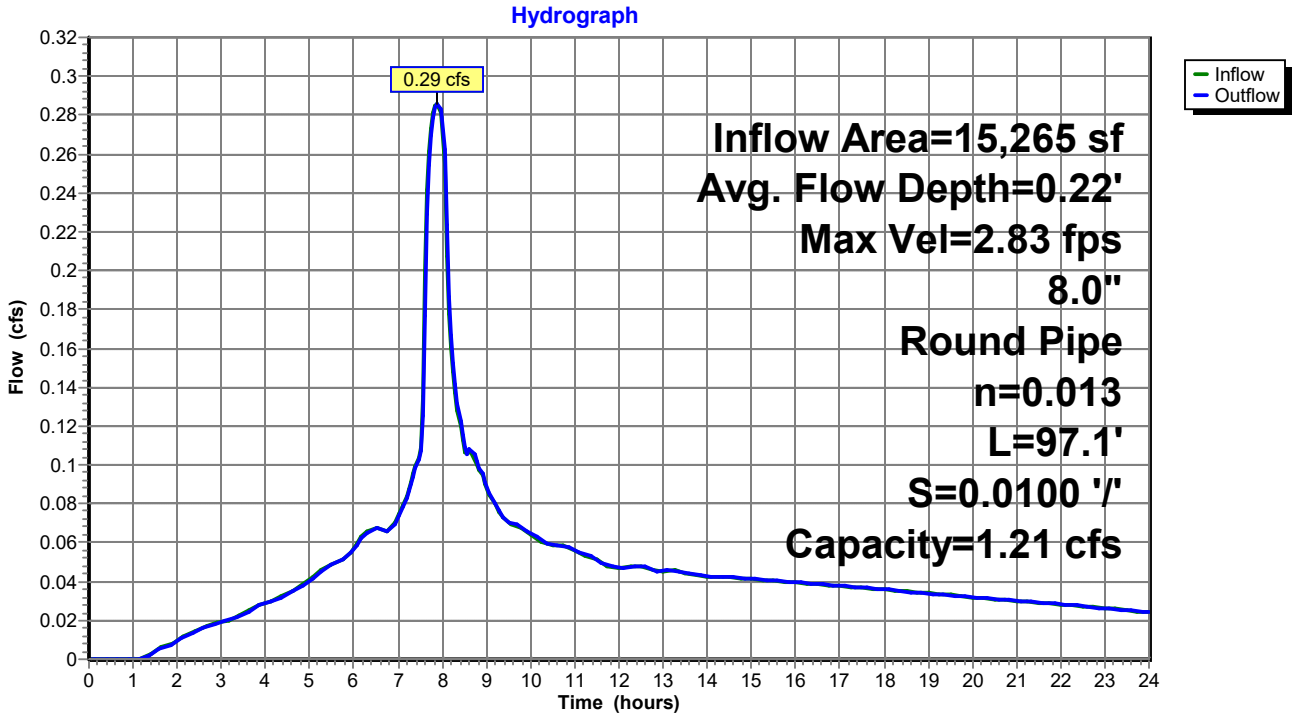
Inflow Area = 15,265 sf, 76.55% Impervious, Inflow Depth > 3.12" for 25-year event
Inflow = 0.29 cfs @ 7.88 hrs, Volume= 3,974 cf
Outflow = 0.29 cfs @ 7.90 hrs, Volume= 3,972 cf, Atten= 0%, Lag= 1.0 min

Routing by Stor-Ind+Trans method, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
Max. Velocity= 2.83 fps, Min. Travel Time= 0.6 min
Avg. Velocity = 1.61 fps, Avg. Travel Time= 1.0 min

Peak Storage= 10 cf @ 7.89 hrs
Average Depth at Peak Storage= 0.22'
Bank-Full Depth= 0.67' Flow Area= 0.3 sf, Capacity= 1.21 cfs

8.0" Round Pipe
n= 0.013
Length= 97.1' Slope= 0.0100 '/'
Inlet Invert= 0.00', Outlet Invert= -0.97'





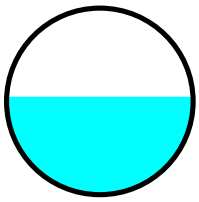
Summary for Reach 8R: AA3 to AA2

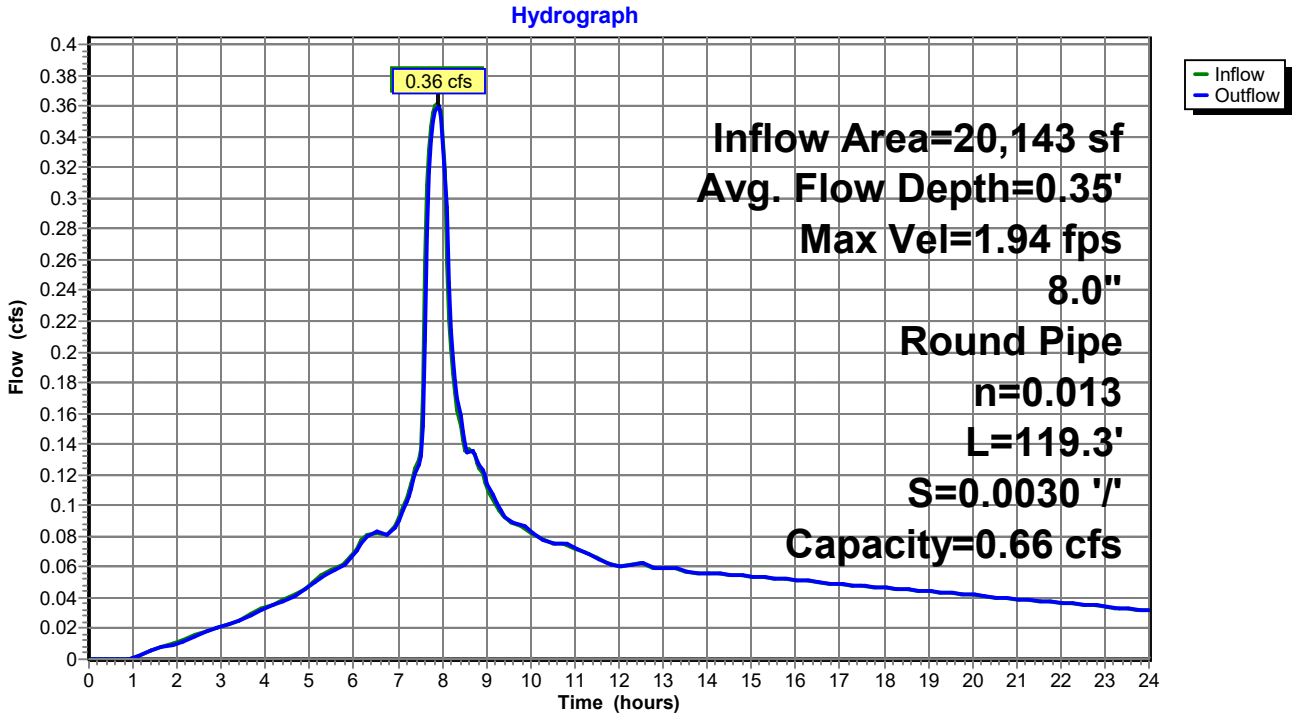
Inflow Area = 20,143 sf, 62.48% Impervious, Inflow Depth > 3.01" for 25-year event
Inflow = 0.36 cfs @ 7.88 hrs, Volume= 5,048 cf
Outflow = 0.36 cfs @ 7.91 hrs, Volume= 5,042 cf, Atten= 0%, Lag= 1.9 min

Routing by Stor-Ind+Trans method, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
Max. Velocity= 1.94 fps, Min. Travel Time= 1.0 min
Avg. Velocity = 1.11 fps, Avg. Travel Time= 1.8 min

Peak Storage= 22 cf @ 7.90 hrs
Average Depth at Peak Storage= 0.35'
Bank-Full Depth= 0.67' Flow Area= 0.3 sf, Capacity= 0.66 cfs

8.0" Round Pipe
n= 0.013
Length= 119.3' Slope= 0.0030 '/'
Inlet Invert= 0.00', Outlet Invert= -0.36'





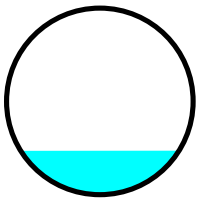
Summary for Reach 9R: CB9 to AA3

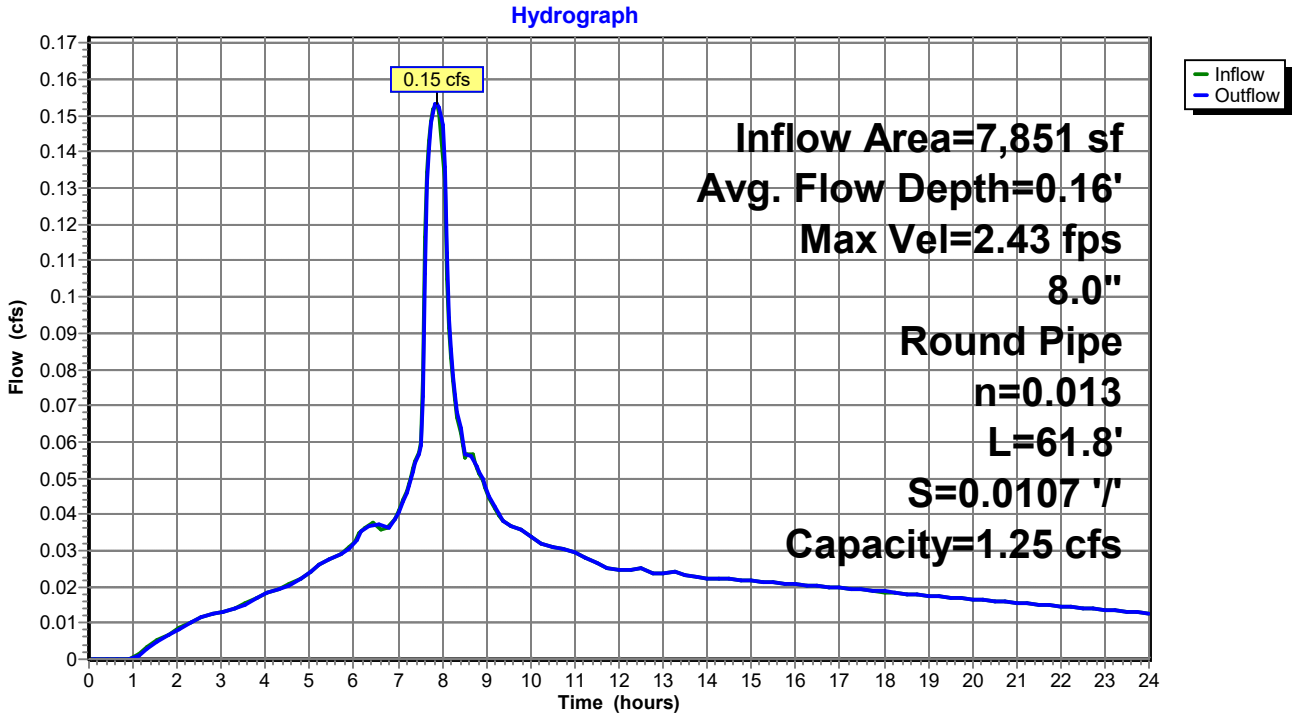
Inflow Area = 7,851 sf, 84.72% Impervious, Inflow Depth > 3.28" for 25-year event
Inflow = 0.15 cfs @ 7.86 hrs, Volume= 2,146 cf
Outflow = 0.15 cfs @ 7.87 hrs, Volume= 2,145 cf, Atten= 0%, Lag= 0.4 min

Routing by Stor-Ind+Trans method, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
Max. Velocity= 2.43 fps, Min. Travel Time= 0.4 min
Avg. Velocity = 1.37 fps, Avg. Travel Time= 0.8 min

Peak Storage= 4 cf @ 7.86 hrs
Average Depth at Peak Storage= 0.16'
Bank-Full Depth= 0.67' Flow Area= 0.3 sf, Capacity= 1.25 cfs

8.0" Round Pipe
n= 0.013
Length= 61.8' Slope= 0.0107 '/'
Inlet Invert= 0.00', Outlet Invert= -0.66'





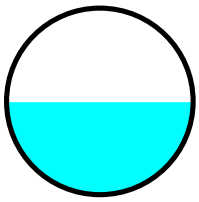
Summary for Reach 10R: CC1 to AA2

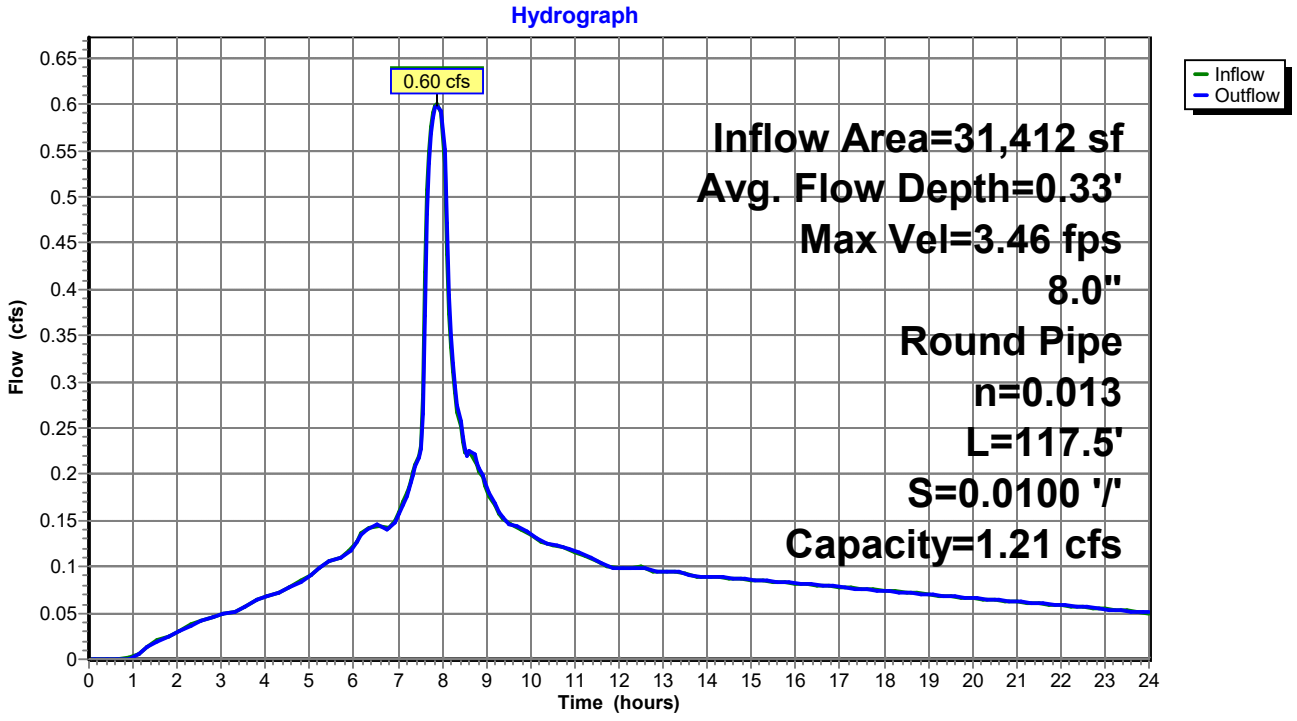
Inflow Area = 31,412 sf, 83.06% Impervious, Inflow Depth > 3.22" for 25-year event
Inflow = 0.60 cfs @ 7.87 hrs, Volume= 8,429 cf
Outflow = 0.60 cfs @ 7.90 hrs, Volume= 8,424 cf, Atten= 0%, Lag= 1.4 min

Routing by Stor-Ind+Trans method, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
Max. Velocity= 3.46 fps, Min. Travel Time= 0.6 min
Avg. Velocity = 1.99 fps, Avg. Travel Time= 1.0 min

Peak Storage= 20 cf @ 7.89 hrs
Average Depth at Peak Storage= 0.33'
Bank-Full Depth= 0.67' Flow Area= 0.3 sf, Capacity= 1.21 cfs

8.0" Round Pipe
n= 0.013
Length= 117.5' Slope= 0.0100 '/'
Inlet Invert= 0.00', Outlet Invert= -1.18'





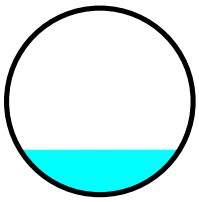
Summary for Reach 11R: CB20-CC1

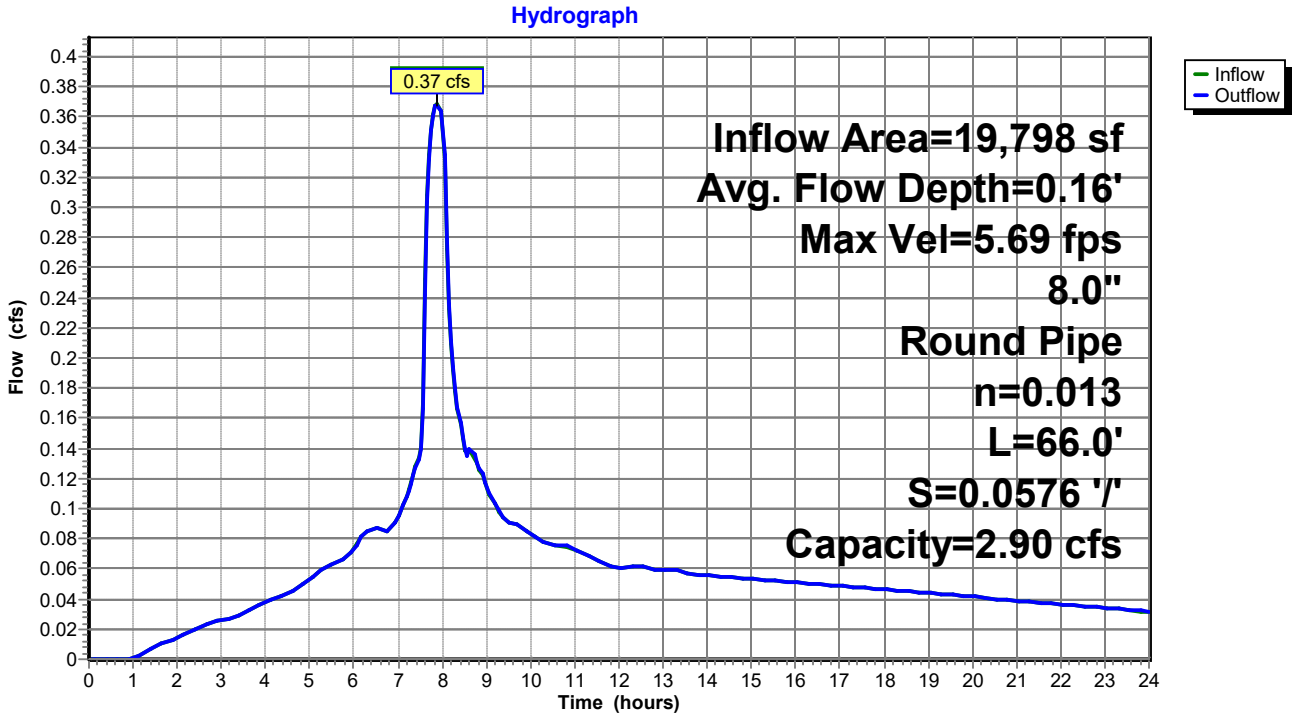
Inflow Area = 19,798 sf, 77.47% Impervious, Inflow Depth > 3.12" for 25-year event
Inflow = 0.37 cfs @ 7.89 hrs, Volume= 5,155 cf
Outflow = 0.37 cfs @ 7.89 hrs, Volume= 5,154 cf, Atten= 0%, Lag= 0.0 min

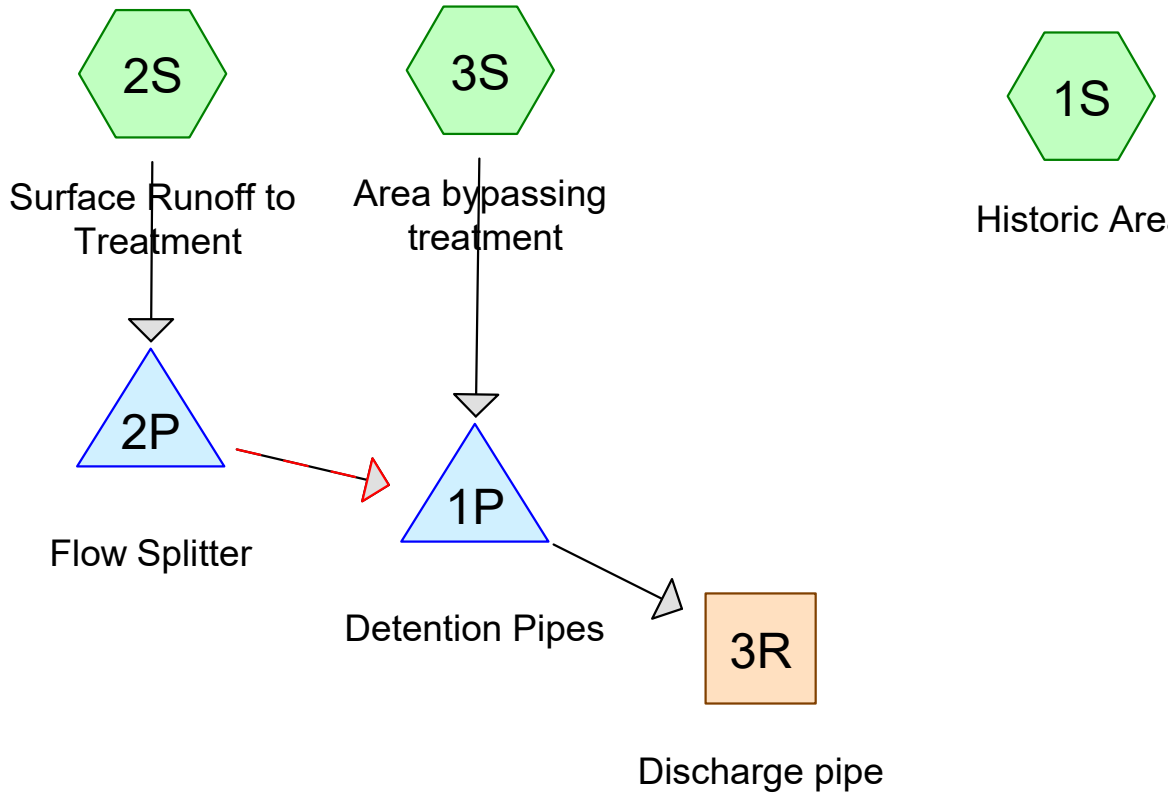
Routing by Stor-Ind+Trans method, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
Max. Velocity= 5.69 fps, Min. Travel Time= 0.2 min
Avg. Velocity = 3.20 fps, Avg. Travel Time= 0.3 min

Peak Storage= 4 cf @ 7.88 hrs
Average Depth at Peak Storage= 0.16'
Bank-Full Depth= 0.67' Flow Area= 0.3 sf, Capacity= 2.90 cfs

8.0" Round Pipe
n= 0.013
Length= 66.0' Slope= 0.0576 '/'
Inlet Invert= 0.00', Outlet Invert= -3.80'







Subcat Reach Pond Link

Routing Diagram for 9825.e.final.detention
Prepared by {enter your company name here}, Printed 8/5/2020
HydroCAD® 10.00-25 s/n 00549 © 2019 HydroCAD Software Solutions LLC

Summary for Subcatchment 1S: Historic Area

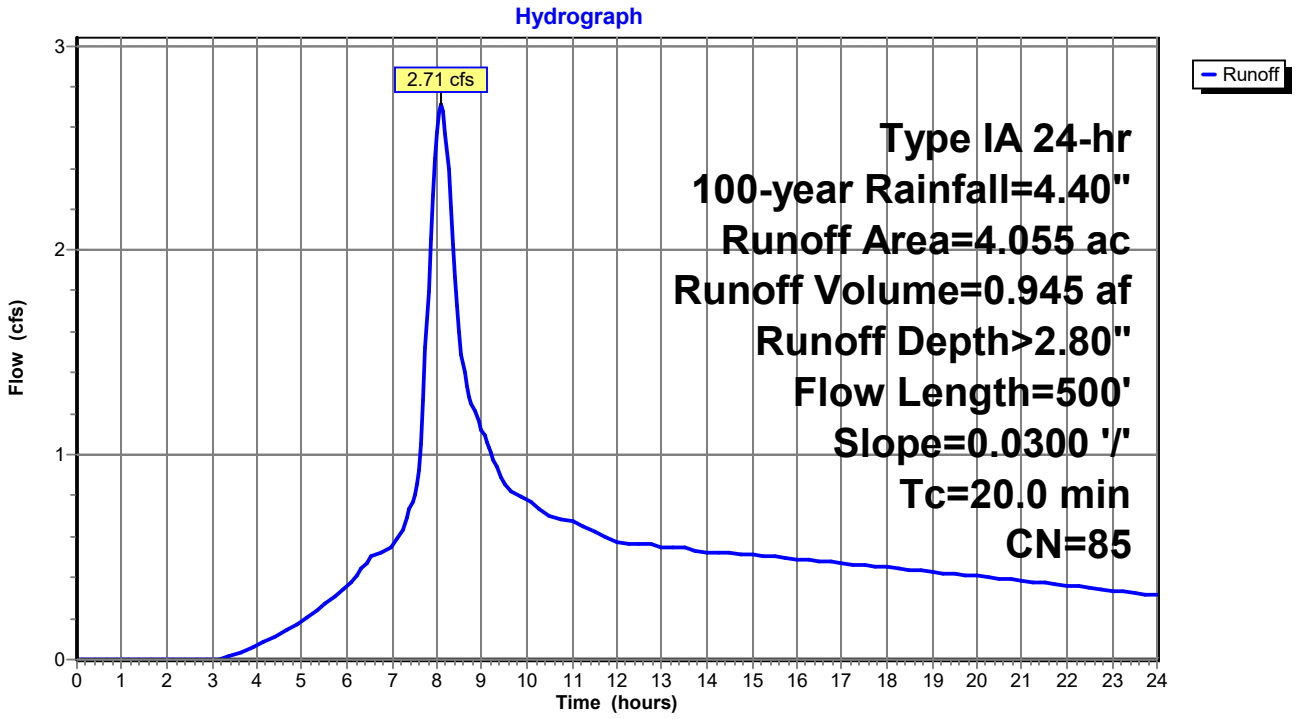
Runoff = 2.71 cfs @ 8.10 hrs, Volume= 0.945 af, Depth> 2.80"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
Type IA 24-hr 100-year Rainfall=4.40"

	Area (ac)	CN	Description
*	4.055	85	Pasture
	4.055		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
16.6	250	0.0300	0.25		**Sheet Flow,** Grass: Short n= 0.150 P2= 3.50"
3.4	250	0.0300	1.21		**Shallow Concentrated Flow,** Short Grass Pasture Kv= 7.0 fps
20.0	500	Total			

Subcatchment 1S: Historic Area



Summary for Subcatchment 2S: Surface Runoff to Treatment

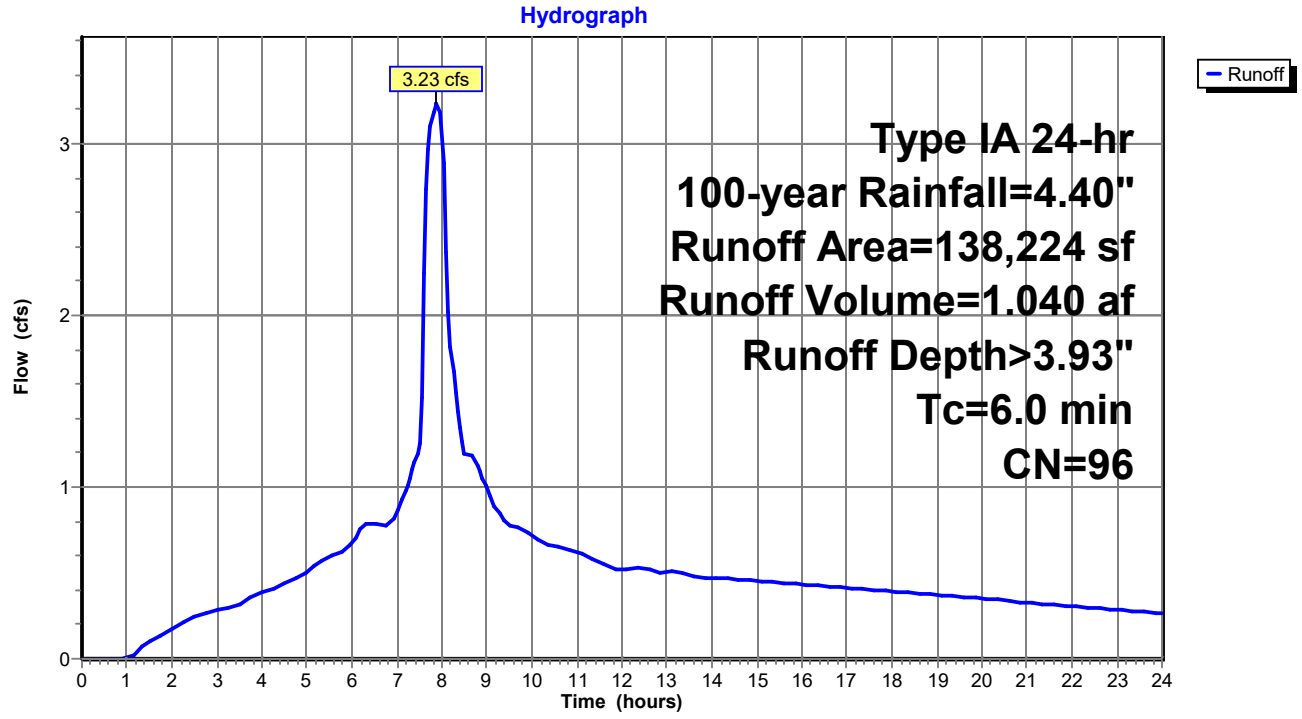
Runoff = 3.23 cfs @ 7.88 hrs, Volume= 1.040 af, Depth> 3.93"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
Type IA 24-hr 100-year Rainfall=4.40"

	Area (sf)	CN	Description
*	115,514	98	Pavement, sidewalk
*	22,710	86	Landscape
	138,224	96	Weighted Average
	22,710		16.43% Pervious Area
	115,514		83.57% Impervious Area

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

Subcatchment 2S: Surface Runoff to Treatment



Summary for Subcatchment 3S: Area bypassing treatment

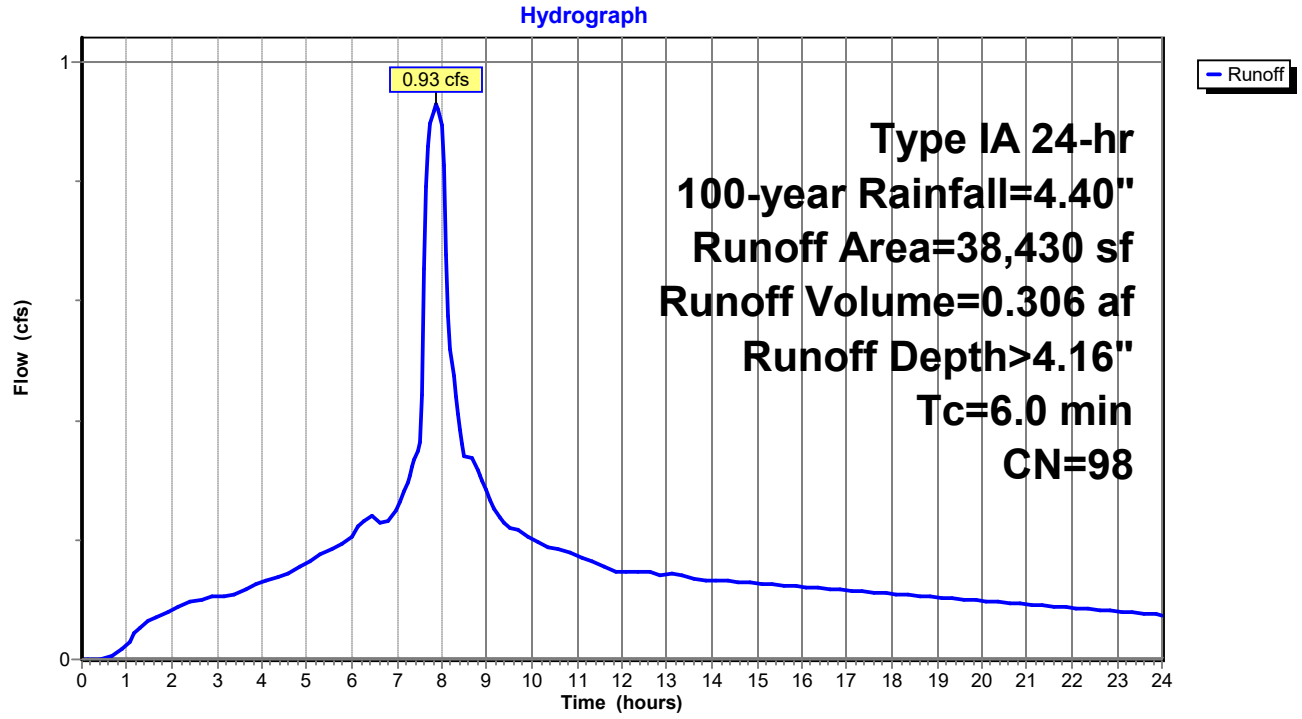
Runoff = 0.93 cfs @ 7.87 hrs, Volume= 0.306 af, Depth> 4.16"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
Type IA 24-hr 100-year Rainfall=4.40"

	Area (sf)	CN	Description
*	38,430	98	Roof
	38,430		100.00% Impervious Area

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

Subcatchment 3S: Area bypassing treatment



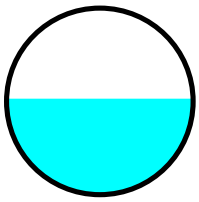
Summary for Reach 3R: Discharge pipe

Inflow Area = 4.055 ac, 87.14% Impervious, Inflow Depth > 3.97" for 100-year event
Inflow = 2.50 cfs @ 8.17 hrs, Volume= 1.342 af
Outflow = 2.50 cfs @ 8.17 hrs, Volume= 1.341 af, Atten= 0%, Lag= 0.0 min

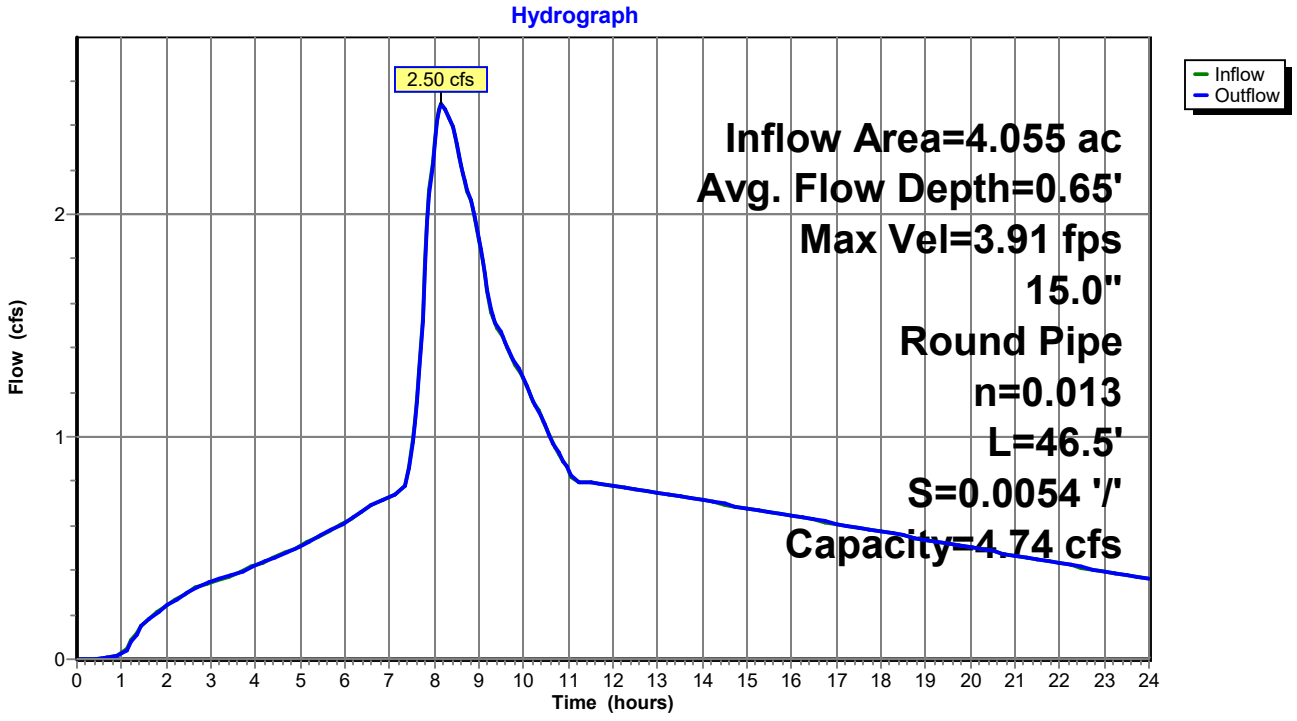
Routing by Stor-Ind+Trans method, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
Max. Velocity= 3.91 fps, Min. Travel Time= 0.2 min
Avg. Velocity = 2.63 fps, Avg. Travel Time= 0.3 min

Peak Storage= 30 cf @ 8.17 hrs
Average Depth at Peak Storage= 0.65'
Bank-Full Depth= 1.25' Flow Area= 1.2 sf, Capacity= 4.74 cfs

15.0" Round Pipe
n= 0.013
Length= 46.5' Slope= 0.0054 '/'
Inlet Invert= 245.35', Outlet Invert= 245.10'



Reach 3R: Discharge pipe



Summary for Pond 1P: Detention Pipes

Inflow Area = 4.055 ac, 87.14% Impervious, Inflow Depth > 3.98" for 100-year event
Inflow = 4.16 cfs @ 7.88 hrs, Volume= 1.345 af
Outflow = 2.50 cfs @ 8.17 hrs, Volume= 1.342 af, Atten= 40%, Lag= 17.7 min
Primary = 2.50 cfs @ 8.17 hrs, Volume= 1.342 af

Routing by Stor-Ind method, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
Peak Elev= 250.21' @ 8.17 hrs Surf.Area= 3,066 sf Storage= 7,601 cf

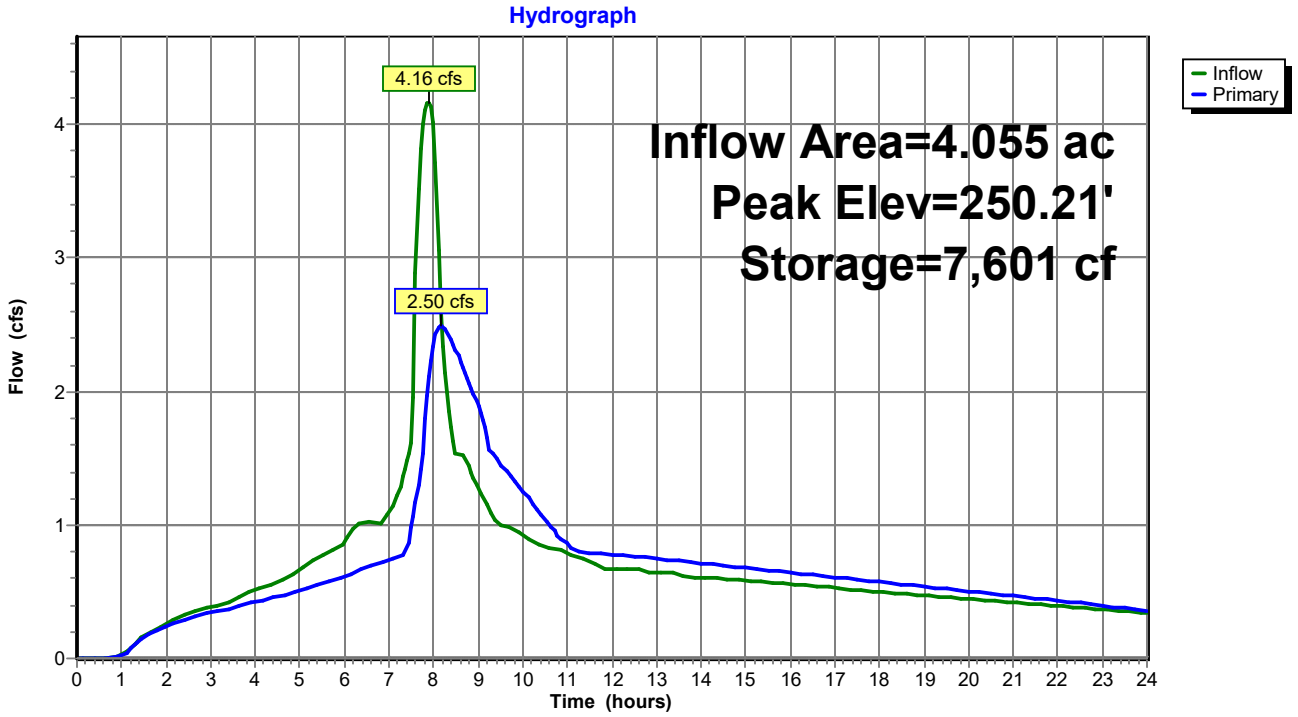
Plug-Flow detention time= 44.8 min calculated for 1.339 af (100% of inflow)
Center-of-Mass det. time= 42.7 min (715.2 - 672.6)

Volume	Invert	Avail.Storage	Storage Description
#1	245.35'	9,331 cf	**72.0" Round Pipe Storage** L= 600.0' S= 0.0010 '/' 16,965 cf Overall x 55.0% Voids

Device	Routing	Invert	Outlet Devices
#1	Primary	245.35'	**4.3" Horiz. Orifice/Grate** C= 0.600
#2	Primary	248.05'	**5.0" Horiz. Orifice/Grate** C= 0.600
#3	Primary	249.00'	**4.0" Horiz. Orifice/Grate** C= 0.600
#4	Primary	250.40'	**15.0" Horiz. Orifice/Grate** C= 0.600 Limited to weir flow at low heads

Primary OutFlow Max=2.49 cfs @ 8.17 hrs HW=250.20' (Free Discharge)
- **1=Orifice/Grate** (Orifice Controls 1.07 cfs @ 10.61 fps)
- **2=Orifice/Grate** (Orifice Controls 0.96 cfs @ 7.07 fps)
- **3=Orifice/Grate** (Orifice Controls 0.46 cfs @ 5.28 fps)
- **4=Orifice/Grate** (Controls 0.00 cfs)

Pond 1P: Detention Pipes



Summary for Pond 2P: Flow Splitter

Inflow Area = 3.173 ac, 83.57% Impervious, Inflow Depth > 3.93" for 100-year event
Inflow = 3.23 cfs @ 7.88 hrs, Volume= 1.040 af
Outflow = 3.23 cfs @ 7.88 hrs, Volume= 1.039 af, Atten= 0%, Lag= 0.0 min
Primary = 1.07 cfs @ 7.88 hrs, Volume= 0.928 af
Secondary = 2.17 cfs @ 7.88 hrs, Volume= 0.111 af

Routing by Stor-Ind method, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
Peak Elev= 255.10' @ 7.88 hrs Surf.Area= 20 sf Storage= 61 cf

Plug-Flow detention time= 0.5 min calculated for 1.037 af (100% of inflow)
Center-of-Mass det. time= 0.4 min (677.3 - 676.9)

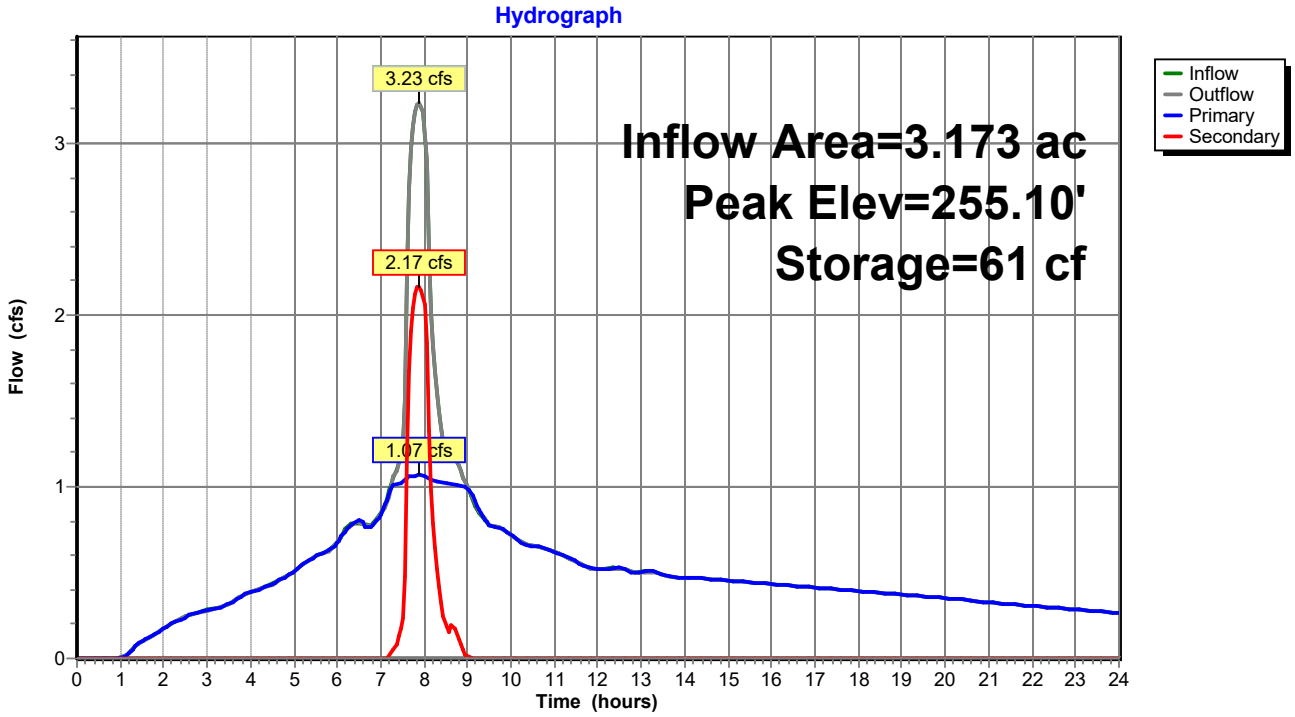
Volume	Invert	Avail.Storage	Storage Description
#1	252.00'	157 cf	**5.00'D x 8.00'H Vertical Cone/Cylinder**

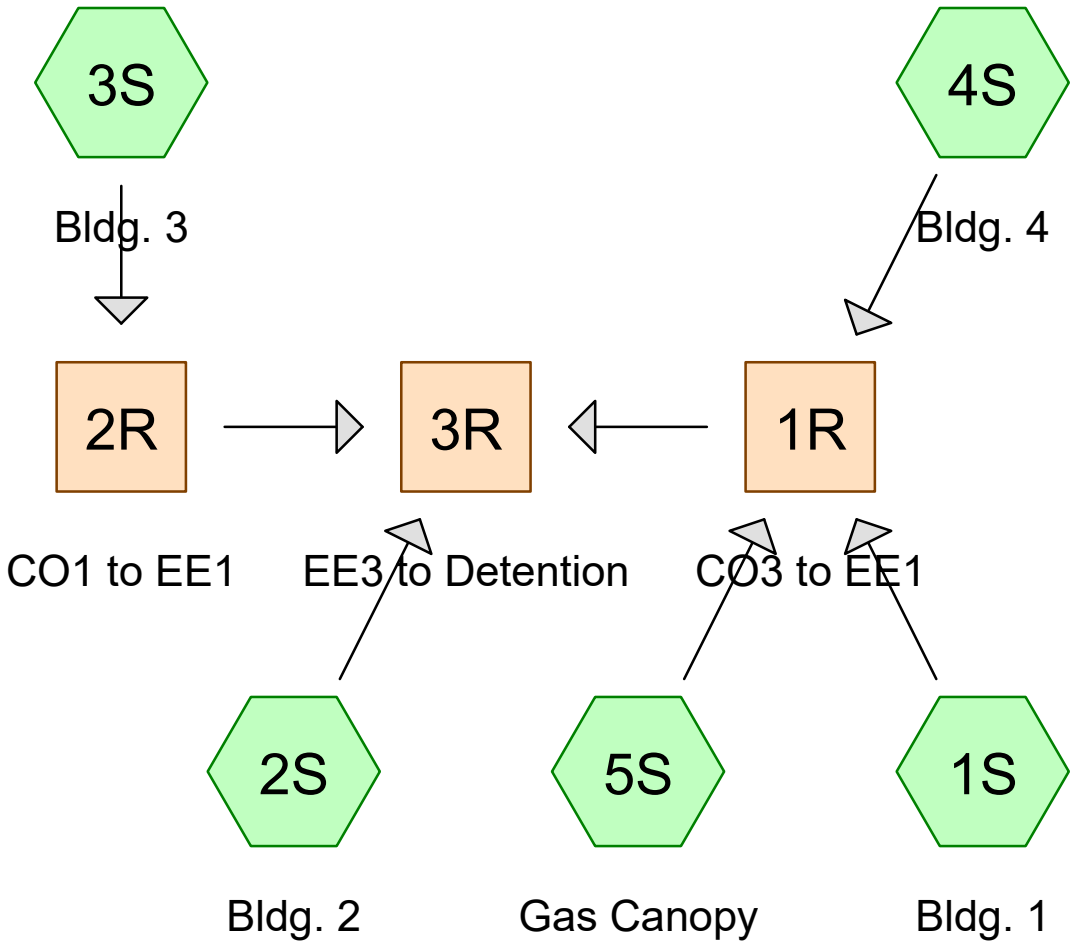
Device	Routing	Invert	Outlet Devices
#1	Primary	252.00'	**4.8" Horiz. Orifice/Grate** C= 0.600
#2	Secondary	254.75'	**12.0" Horiz. Orifice/Grate** C= 0.600 Limited to weir flow at low heads

Primary OutFlow Max=1.07 cfs @ 7.88 hrs HW=255.10' (Free Discharge)
└**1=Orifice/Grate** (Orifice Controls 1.07 cfs @ 8.48 fps)

Secondary OutFlow Max=2.16 cfs @ 7.88 hrs HW=255.10' (Free Discharge)
└**2=Orifice/Grate** (Weir Controls 2.16 cfs @ 1.95 fps)

Pond 2P: Flow Splitter





Subcat Reach Pond Link

Routing Diagram for 9825.e.downspout.system
Prepared by {enter your company name here}, Printed 8/5/2020

Summary for Subcatchment 1S: Bldg. 1

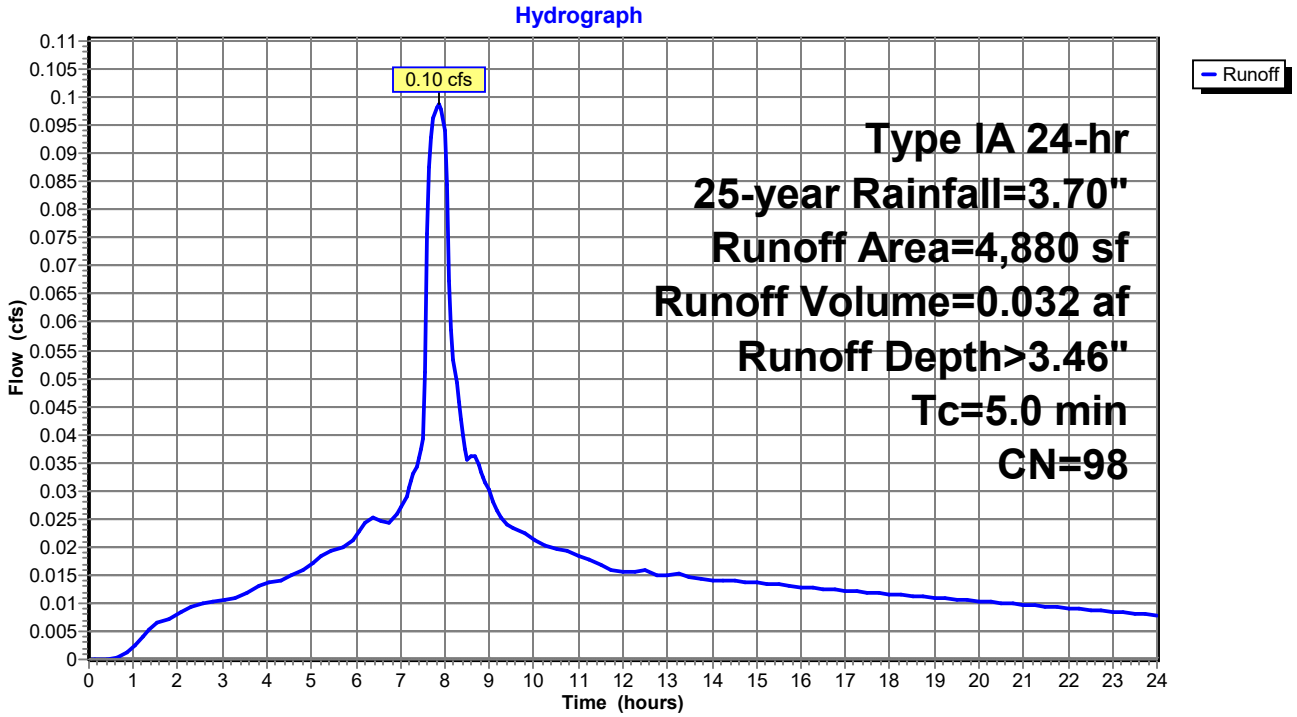
Runoff = 0.10 cfs @ 7.86 hrs, Volume= 0.032 af, Depth> 3.46"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
Type IA 24-hr 25-year Rainfall=3.70"

	Area (sf)	CN	Description
*	4,880	98	Roof
	4,880		100.00% Impervious Area

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

Subcatchment 1S: Bldg. 1



Summary for Subcatchment 2S: Bldg. 2

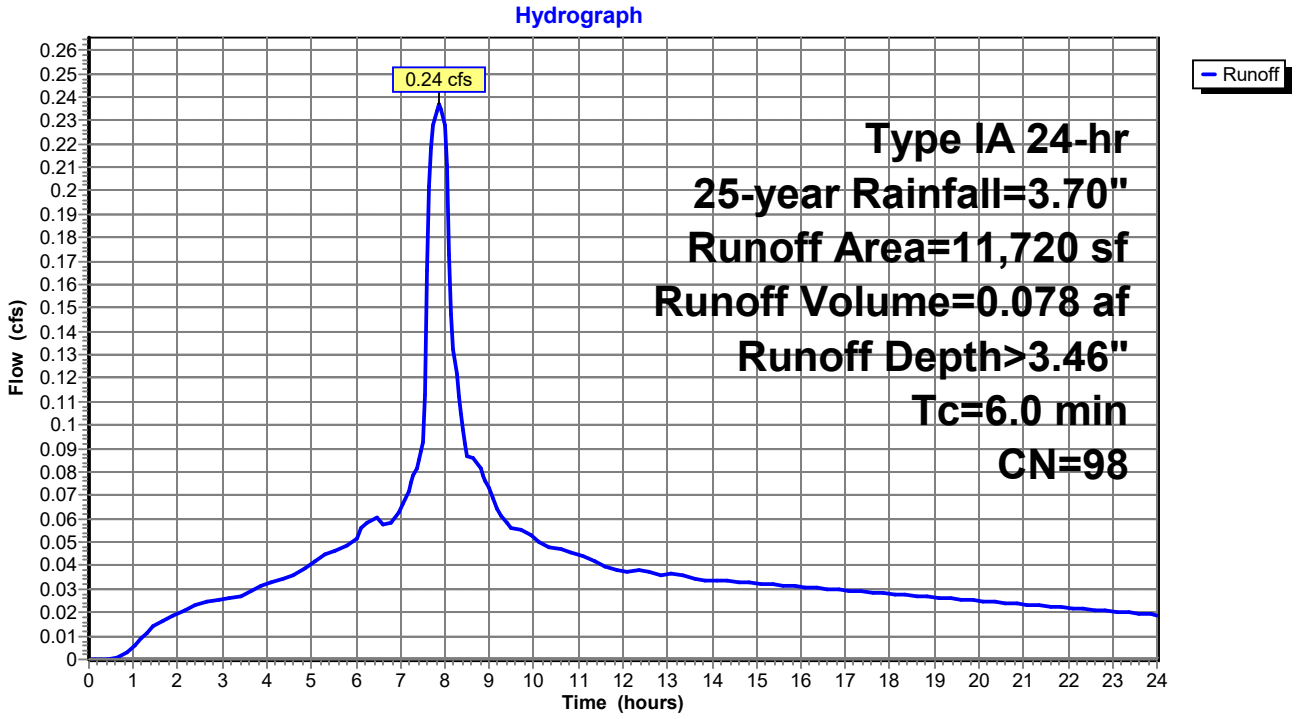
Runoff = 0.24 cfs @ 7.87 hrs, Volume= 0.078 af, Depth> 3.46"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
Type IA 24-hr 25-year Rainfall=3.70"

	Area (sf)	CN	Description
*	11,720	98	Roof
	11,720		100.00% Impervious Area

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

Subcatchment 2S: Bldg. 2



Summary for Subcatchment 3S: Bldg. 3

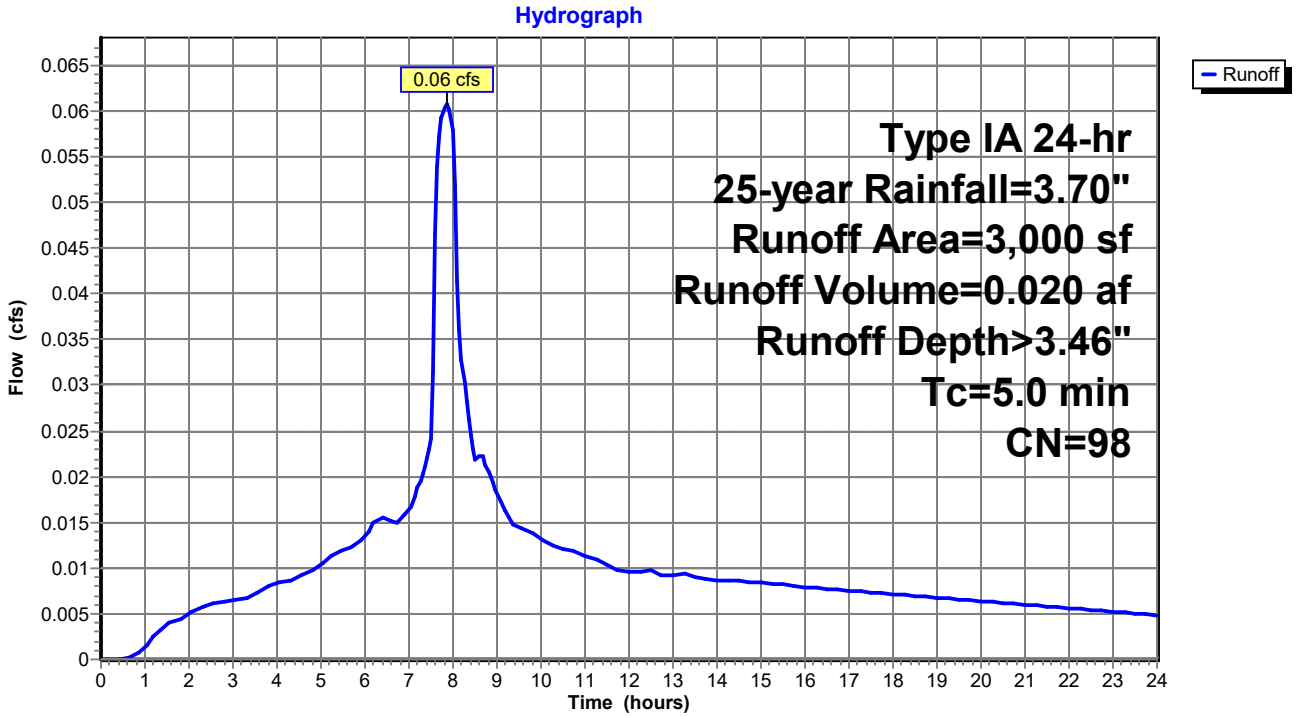
Runoff = 0.06 cfs @ 7.86 hrs, Volume= 0.020 af, Depth> 3.46"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
Type IA 24-hr 25-year Rainfall=3.70"

	Area (sf)	CN	Description
*	3,000	98	Roof
	3,000		100.00% Impervious Area

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

Subcatchment 3S: Bldg. 3



Summary for Subcatchment 4S: Bldg. 4

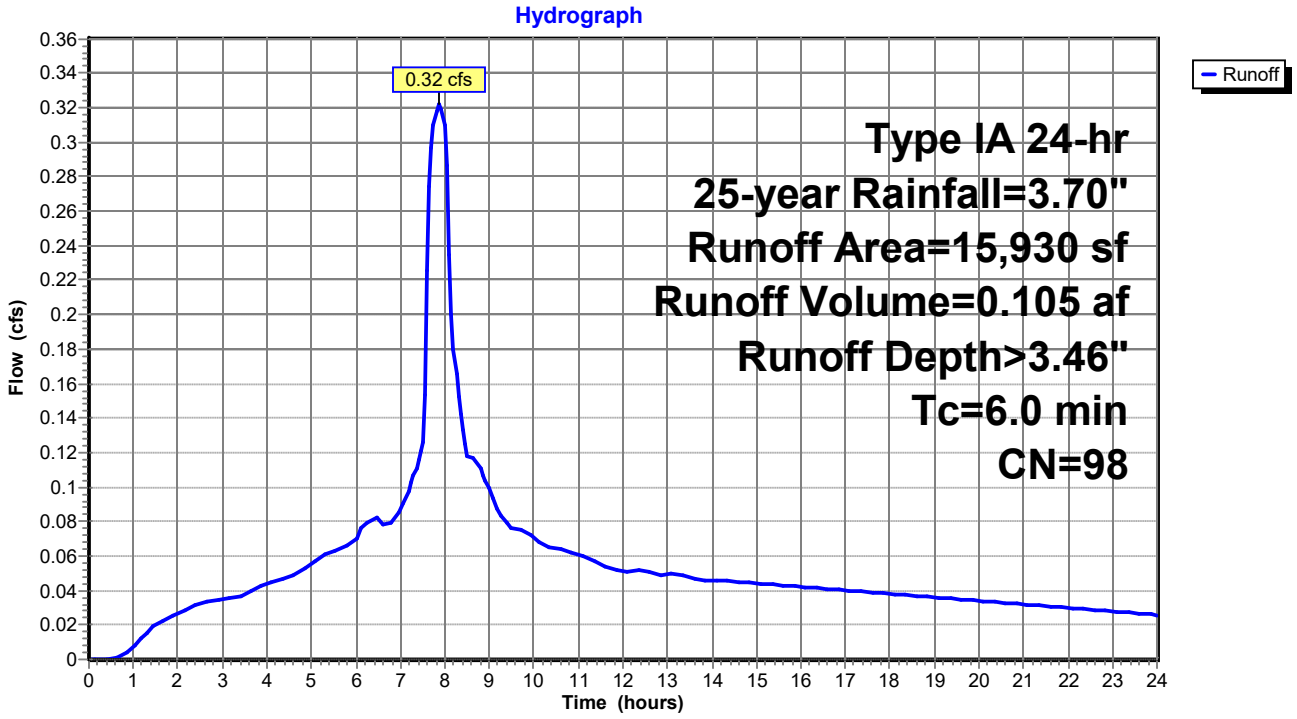
Runoff = 0.32 cfs @ 7.87 hrs, Volume= 0.105 af, Depth> 3.46"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
Type IA 24-hr 25-year Rainfall=3.70"

	Area (sf)	CN	Description
*	15,930	98	Roof
	15,930		100.00% Impervious Area

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

Subcatchment 4S: Bldg. 4



Summary for Subcatchment 5S: Gas Canopy

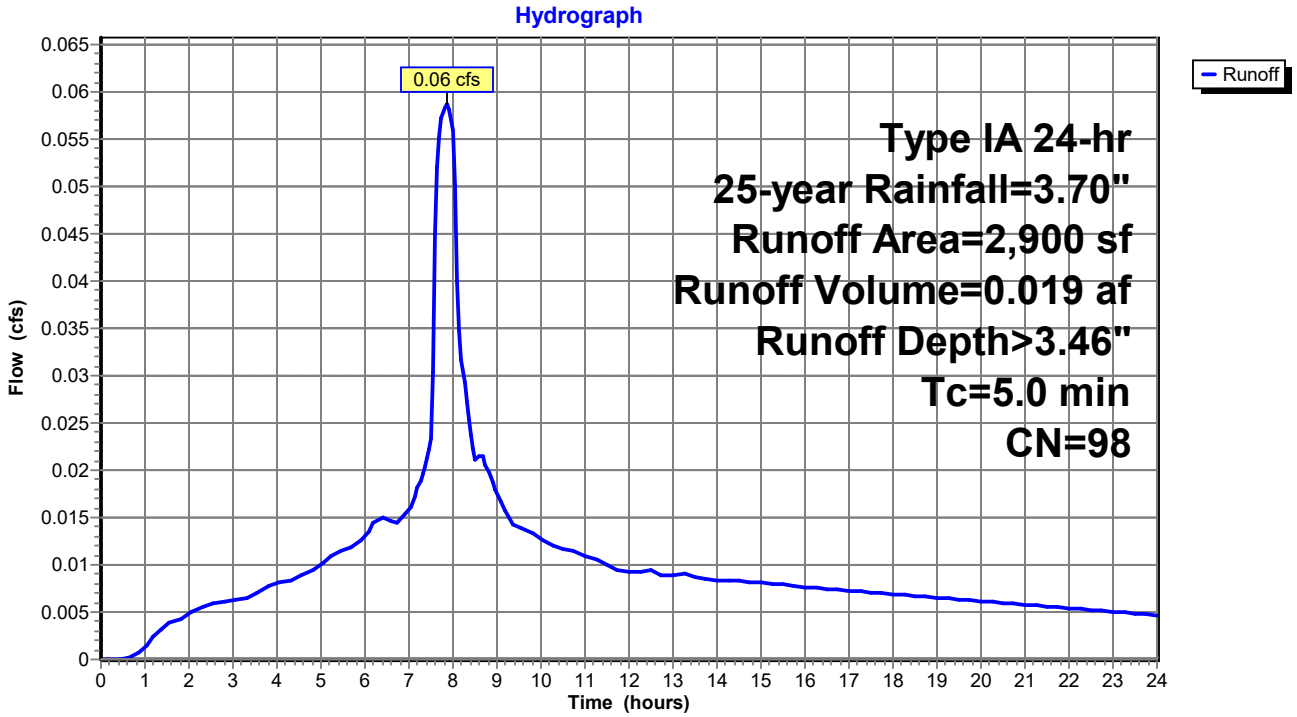
Runoff = 0.06 cfs @ 7.86 hrs, Volume= 0.019 af, Depth> 3.46"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
Type IA 24-hr 25-year Rainfall=3.70"

	Area (sf)	CN	Description
*	2,900	98	Roof
	2,900		100.00% Impervious Area

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

Subcatchment 5S: Gas Canopy



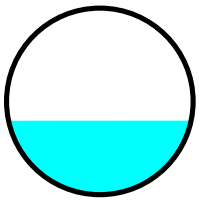
Summary for Reach 1R: CO3 to EE1

Inflow Area = 0.544 ac,100.00% Impervious, Inflow Depth > 3.46" for 25-year event
Inflow = 0.48 cfs @ 7.87 hrs, Volume= 0.157 af
Outflow = 0.48 cfs @ 7.90 hrs, Volume= 0.157 af, Atten= 0%, Lag= 2.0 min

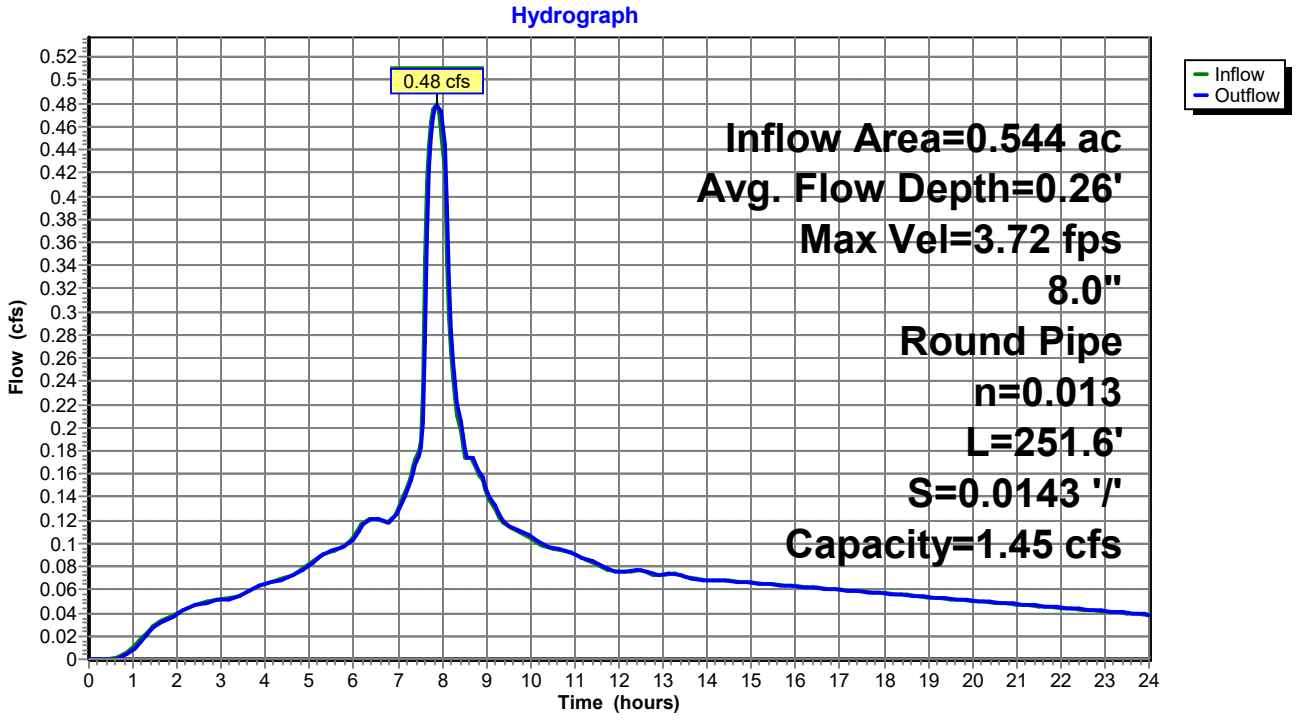
Routing by Stor-Ind+Trans method, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
Max. Velocity= 3.72 fps, Min. Travel Time= 1.1 min
Avg. Velocity = 2.14 fps, Avg. Travel Time= 2.0 min

Peak Storage= 32 cf @ 7.88 hrs
Average Depth at Peak Storage= 0.26'
Bank-Full Depth= 0.67' Flow Area= 0.3 sf, Capacity= 1.45 cfs

8.0" Round Pipe
n= 0.013
Length= 251.6' Slope= 0.0143 '/'
Inlet Invert= 0.00', Outlet Invert= -3.60'



Reach 1R: CO3 to EE1



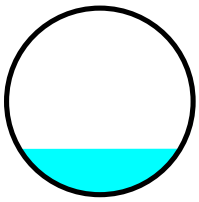
Summary for Reach 2R: CO1 to EE1

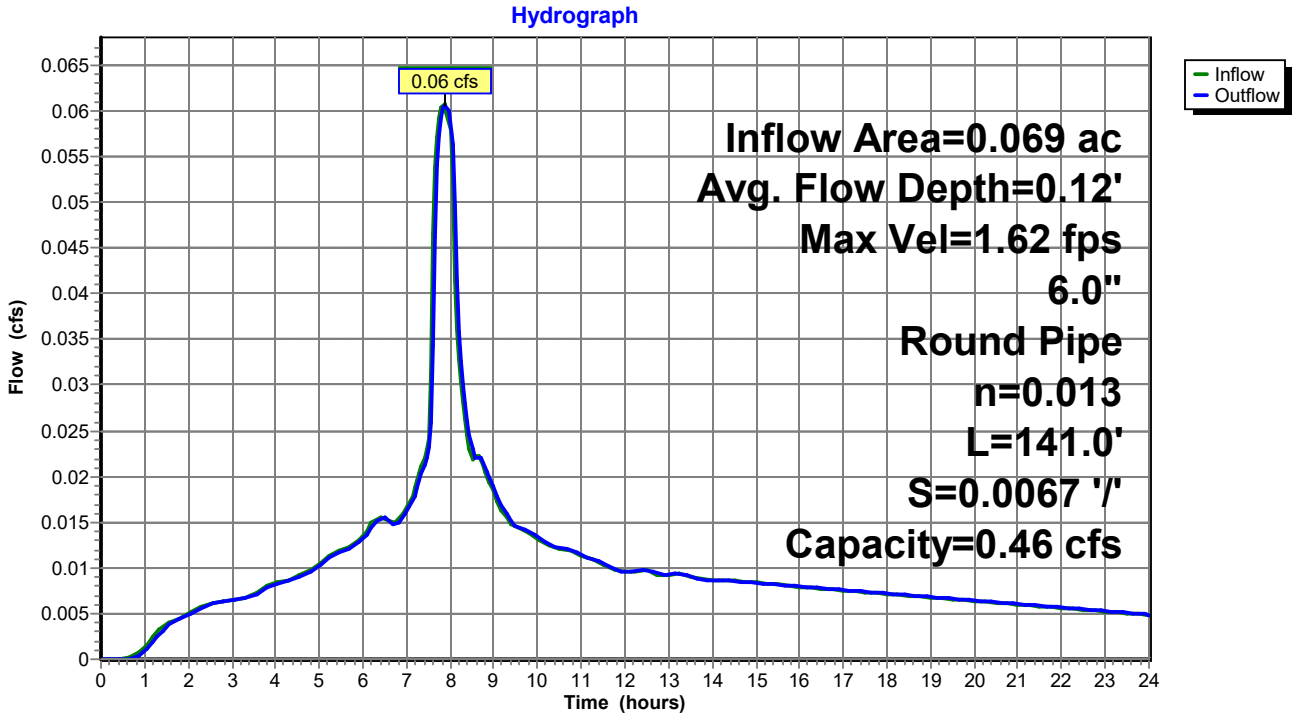
Inflow Area = 0.069 ac,100.00% Impervious, Inflow Depth > 3.46" for 25-year event
Inflow = 0.06 cfs @ 7.86 hrs, Volume= 0.020 af
Outflow = 0.06 cfs @ 7.90 hrs, Volume= 0.020 af, Atten= 0%, Lag= 2.5 min

Routing by Stor-Ind+Trans method, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
Max. Velocity= 1.62 fps, Min. Travel Time= 1.5 min
Avg. Velocity = 0.92 fps, Avg. Travel Time= 2.6 min

Peak Storage= 5 cf @ 7.87 hrs
Average Depth at Peak Storage= 0.12'
Bank-Full Depth= 0.50' Flow Area= 0.2 sf, Capacity= 0.46 cfs

6.0" Round Pipe
n= 0.013
Length= 141.0' Slope= 0.0067 '/'
Inlet Invert= 0.00', Outlet Invert= -0.94'





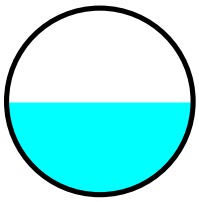
Summary for Reach 3R: EE3 to Detention

Inflow Area = 0.882 ac,100.00% Impervious, Inflow Depth > 3.46" for 25-year event
Inflow = 0.78 cfs @ 7.89 hrs, Volume= 0.254 af
Outflow = 0.78 cfs @ 7.89 hrs, Volume= 0.254 af, Atten= 0%, Lag= 0.2 min

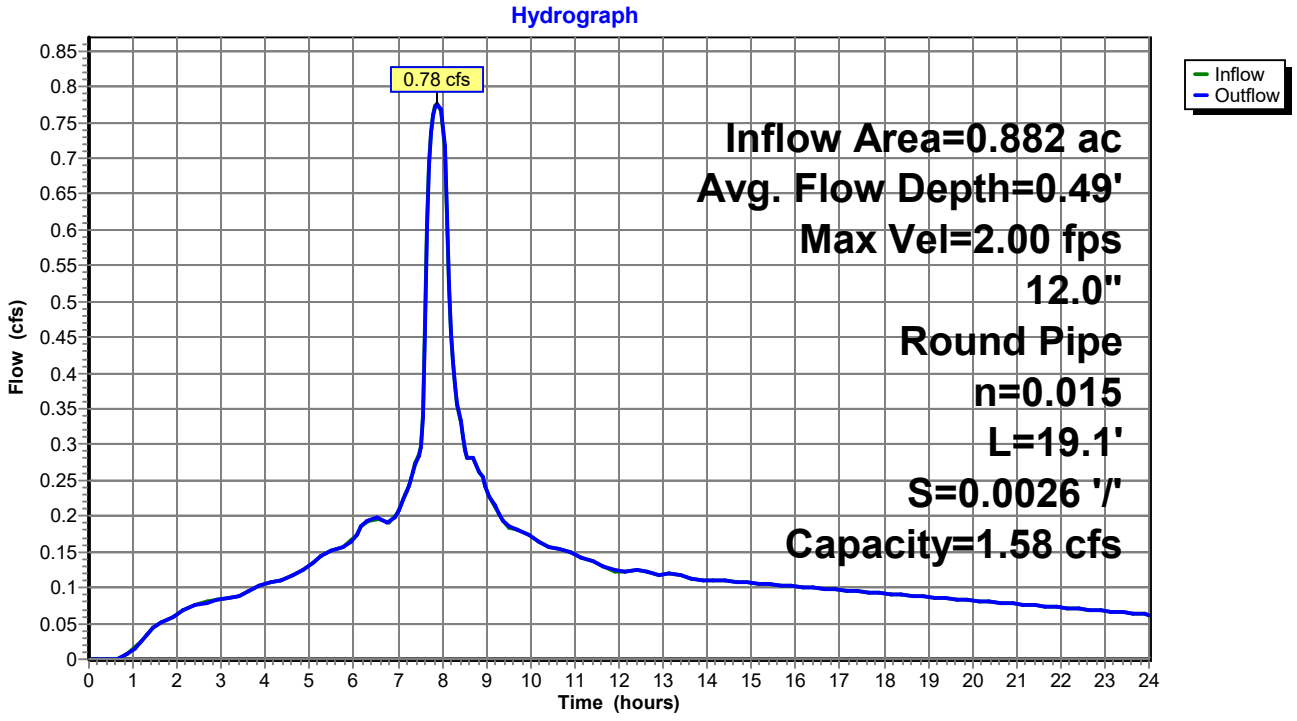
Routing by Stor-Ind+Trans method, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
Max. Velocity= 2.00 fps, Min. Travel Time= 0.2 min
Avg. Velocity = 1.17 fps, Avg. Travel Time= 0.3 min

Peak Storage= 7 cf @ 7.89 hrs
Average Depth at Peak Storage= 0.49'
Bank-Full Depth= 1.00' Flow Area= 0.8 sf, Capacity= 1.58 cfs

12.0" Round Pipe
n= 0.015
Length= 19.1' Slope= 0.0026 '/'
Inlet Invert= 0.00', Outlet Invert= -0.05'



Reach 3R: EE3 to Detention



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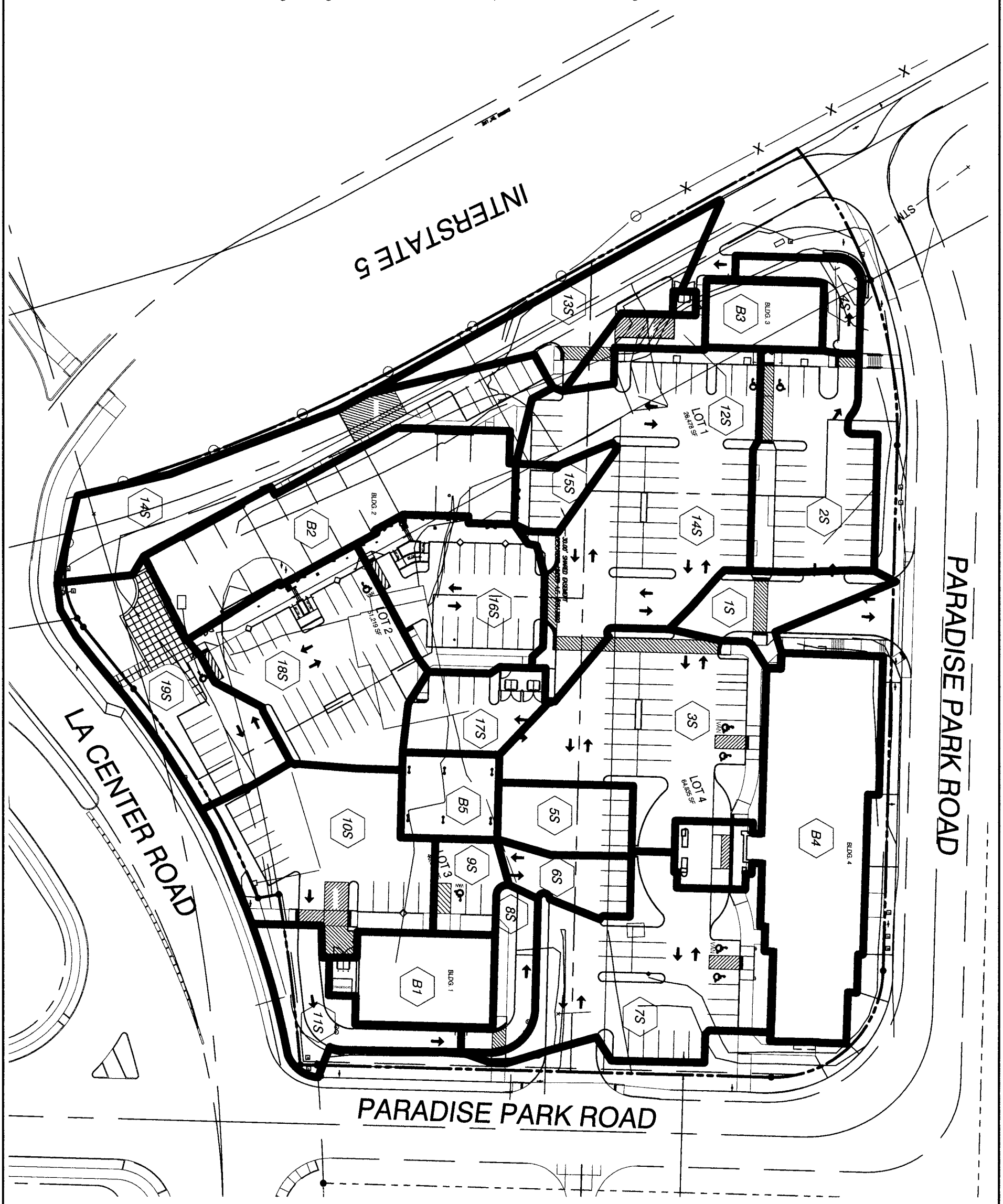
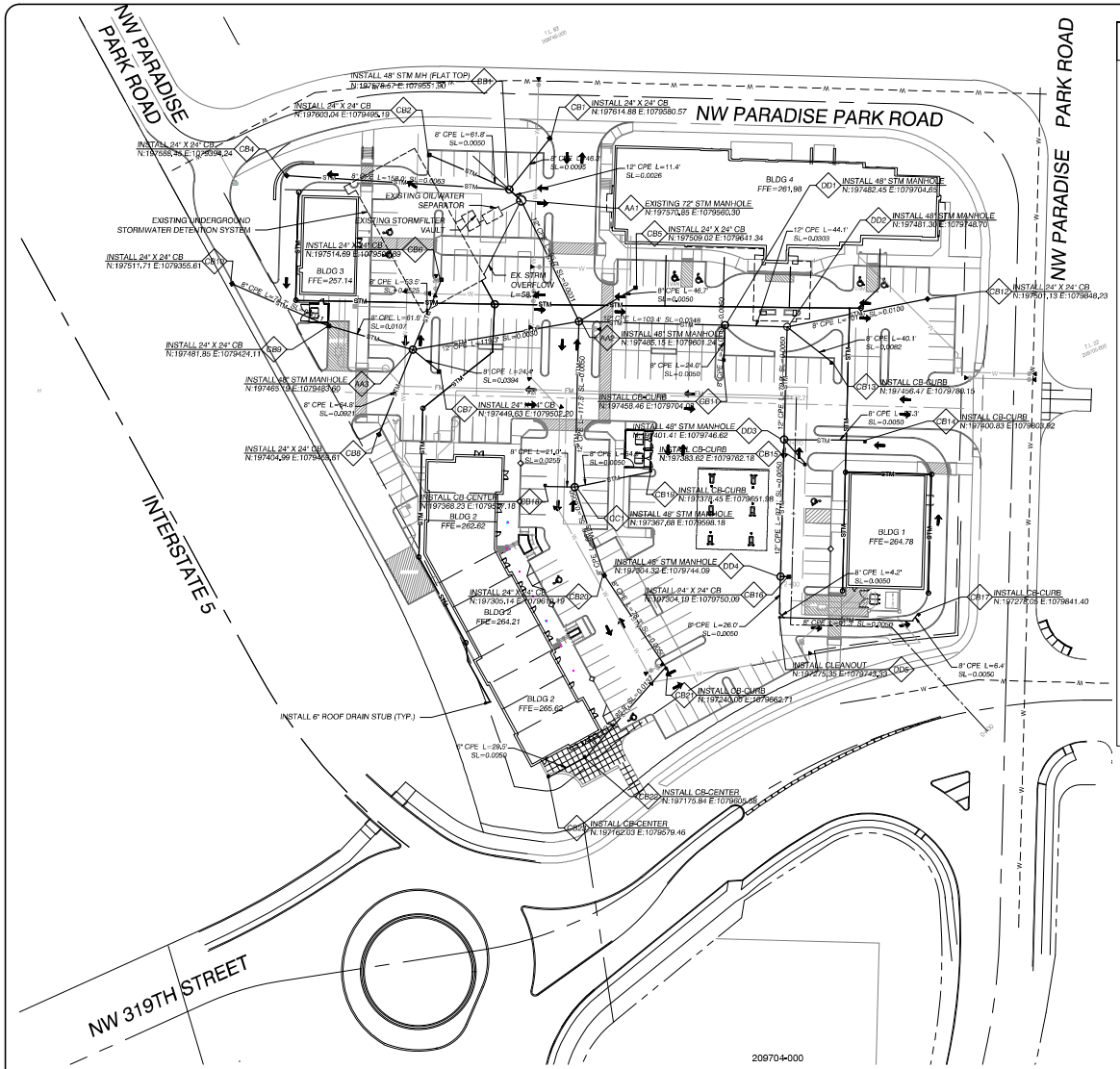


DEVELOPED CATCHMENT PLAN

SCALE: 1"= 60'	
DATE: 07/28/2020	
ISSUED BY: CEM	
JOB NO. 9825.0101	
DWG. NO. 1 OF 1	

OLSON ENGINEERING INC. LAND SURVEYORS ENGINEERS
360-695-1385
503-289-9936
222 EVERGREEN, VANCOUVER, WA 98660

PROJECT: MINIT MANAGEMENT



CITY OF LA CENTER
STORM SEWER DETAIL SHEETS

SM-1	GENERAL STORMWATER NOTES
SM-2	STANDARD STORM MANHOLE
SM-3	STANDARD MANHOLE FRAMES & COVERS
SM-4	CURB INLET
SM-5	CATCH BASIN
SM-6	COMBINATION CURB INLET
SM-7	HERRINGBONE GRATE DETAIL
SM-8	C-2 CATCH BASIN
SM-9	SLOPED FIELD INLET
SM-10	STANDARD AREA INLET
SM-11	SEDIMENTATION MANHOLE
SM-12	PRECAST DRYWELL
SM-13	RIPRAP ENERGY DISSIPATER
SM-16	LOW POINT FOOTING DRAIN
SM-18	PIPE ANCHOR DETAIL
SM-19	DOUTSPOUT DETENTION PIPE

STORM NOTES

AA1 **EXISTING 72" STM MANHOLE**
N: 197570.85 E: 1079560.30
RIM=257.17
12" IE IN (NW) = 252.20
12" IE IN (SE) = 250.11

AA2 INSTALL 48" STM MANHOLE
N: 197485.15 E: 1079601.24
RIM=260.99
12" IE IN (W) = 250.96
12" IE IN (E) = 250.60
12" IE IN (S) = 245.09
8" IE IN (NE) = 254.51
12" IE OUT (NW) = 250.40

AA3 INSTALL 48" STM MANHOLE
N: 197465.10 E: 1079483.60
RIM=256.34
8" IE IN (W) = 251.52
8" IE IN (N) = 251.52
8" IE IN (SE) = 252.16
8" IE IN (S) = 252.17
12" IE OUT (E) = 251.32

BB1 INSTALL 48" STM MH (FLAT TOP)
N: 197578.57 E: 1079551.90
RIM=256.46
8" IE IN (NW) = 253.04
8" IE IN (W) = 252.83
8" IE IN (NE) = 252.43
12" IE OUT (SE) = 252.23

CC1 INSTALL 48" STM MANHOLE
N: 197367.68 E: 1079598.18
RIM=263.34
8" IE IN (S) = 246.09
8" IE IN (E) = 245.62
8" IE IN (W) = 255.25
12" IE OUT (N) = 245.67

DD1 INSTALL 48" STM MANHOLE
N: 197482.45 E: 1079704.65
RIM=262.32
12" IE IN (E) = 254.20
12" IE OUT (W) = 254.20
8" IE OUT (S) = 255.89

DD2 INSTALL 48" STM MANHOLE
N: 197481.30 E: 1079748.70
RIM=263.34
8" IE IN (E) = 257.75
12" IE IN (S) = 255.96
8" IE IN (SE) = 256.32
12" IE OUT (W) = 255.54

DD3 INSTALL 48" STM MANHOLE
N: 197401.41 E: 1079746.62
RIM=263.27
12" IE IN (S) = 256.56
8" IE IN (E) = 257.01
8" IE IN (SE) = 258.12
12" IE OUT (N) = 256.36

DD4 INSTALL 48" STM MANHOLE
N: 197304.32 E: 1079744.09
RIM=264.30
8" IE IN (S) = 257.25
10" IE IN (E) = 258.30
12" IE OUT (N) = 257.05

CATCH BASIN NOTES

CB1 INSTALL 24" X 24" CB
N: 197614.88 E: 1079580.57
RIM=254.67
8" IE OUT (SW) = 252.87

CB2 INSTALL 24" X 24" CB
N: 197603.04 E: 1079495.19
RIM=255.09
8" IE OUT (SE) = 253.35

CB4 INSTALL 24" X 24" CB
N: 197588.45 E: 1079394.24
RIM=255.44
8" IE OUT (E) = 253.82

CB5 INSTALL 24" X 24" CB
N: 197509.02 E: 1079641.34
RIM=260.45
8" IE OUT (SW) = 254.74

CB6 INSTALL 24" X 24" CB
N: 197514.69 E: 1079503.89
RIM=256.13
8" IE OUT (S) = 254.33

CB7 INSTALL 24" X 24" CB
N: 197449.63 E: 1079502.20
RIM=258.84
8" IE OUT (NW) = 255.84

CB8 INSTALL 24" X 24" CB
N: 197404.99 E: 1079459.61
RIM=260.17
8" IE OUT (N) = 258.14

CB9 INSTALL 24" X 24" CB
N: 197481.85 E: 1079424.11
RIM=257.09
8" IE IN (NW) = 252.38
8" IE OUT (E) = 252.18

CB10 INSTALL 24" X 24" CB
N: 197511.71 E: 1079355.61
RIM=???
8" IE OUT (SE) = 253.21

CB11 INSTALL CB-CURB
N: 197458.46 E: 1079704.03
RIM=262.36
8" IE IN (N) = 255.77

CB12 INSTALL 24" X 24" CB
N: 197601.13 E: 1079648.23
RIM=260.48
8" IE OUT (W) = 256.76

CB13 INSTALL CB-CURB
N: 197456.47 E: 1079780.15
RIM=262.36
8" IE OUT (NW) = 256.65

CB14 INSTALL CB-CURB
N: 197600.83 E: 1079803.92
RIM=263.01
8" IE OUT (W) = 257.30

CB15 INSTALL CB-CURB
N: 197383.62 E: 1079762.18
RIM=263.95
8" IE OUT (NW) = 258.24

CB16 INSTALL 24" X 24" CB
N: 197304.19 E: 1079750.09
RIM=264.21
10" IE OUT (W) = 258.33

CB17 INSTALL CB-CURB
N: 197278.05 E: 1079841.40
RIM=263.60
8" IE OUT (SW) = 257.89

CB18 INSTALL CB-CENTER
N: 197368.23 E: 1079577.18
RIM=261.50
8" IE OUT (E) = 255.79

CB19 INSTALL CB-CURB
N: 197378.45 E: 1079651.98
RIM=263.76
8" IE OUT (W) = 245.89

CB20 INSTALL 24" X 24" CB
N: 197305.14 E: 1079619.19
RIM=262.66
8" IE OUT (N) = 246.42
8" IE OUT (SE) = 256.26

CB21 INSTALL CB-CURB
N: 197240.00 E: 1079662.71
RIM=264.12
8" IE IN (NW) = 256.56
6" IE IN (SW) = 258.42

CB22 INSTALL CB-CENTER
N: 197175.84 E: 1079605.58
RIM=265.55
6" IE IN (SW) = 259.59
6" IE OUT (NE) = 259.59

CB23 INSTALL CB-CENTER
N: 197162.03 E: 1079579.46
RIM=265.28
6" IE OUT (NE) = 259.74

SCALE: 1"=40'

-40 0 40 80

J:\data\9000\9900\9830\9825\Engineering\Final\Sheets\9825.e.C5.0.storm.dwg
STORM STS

CLIENT:
MINIT MANAGEMENT LLC.
P.O. BOX 5996
VANCOUVER, WA, 98668

PH: (360) 901-3675
FX: N/A
CONTACT: DON RHOADS
EMAIL: drhoads@lcgslores.com

OLSON ENGINEERING, INC.
LAND SURVEYORS
ENGINEERS
222 E. EVERGREEN, VANCOUVER, WA 98660
360-695-1385
503-289-9836

STORM SEWER PLAN FOR:

MINIT MANAGEMENT

PRELIMINARY

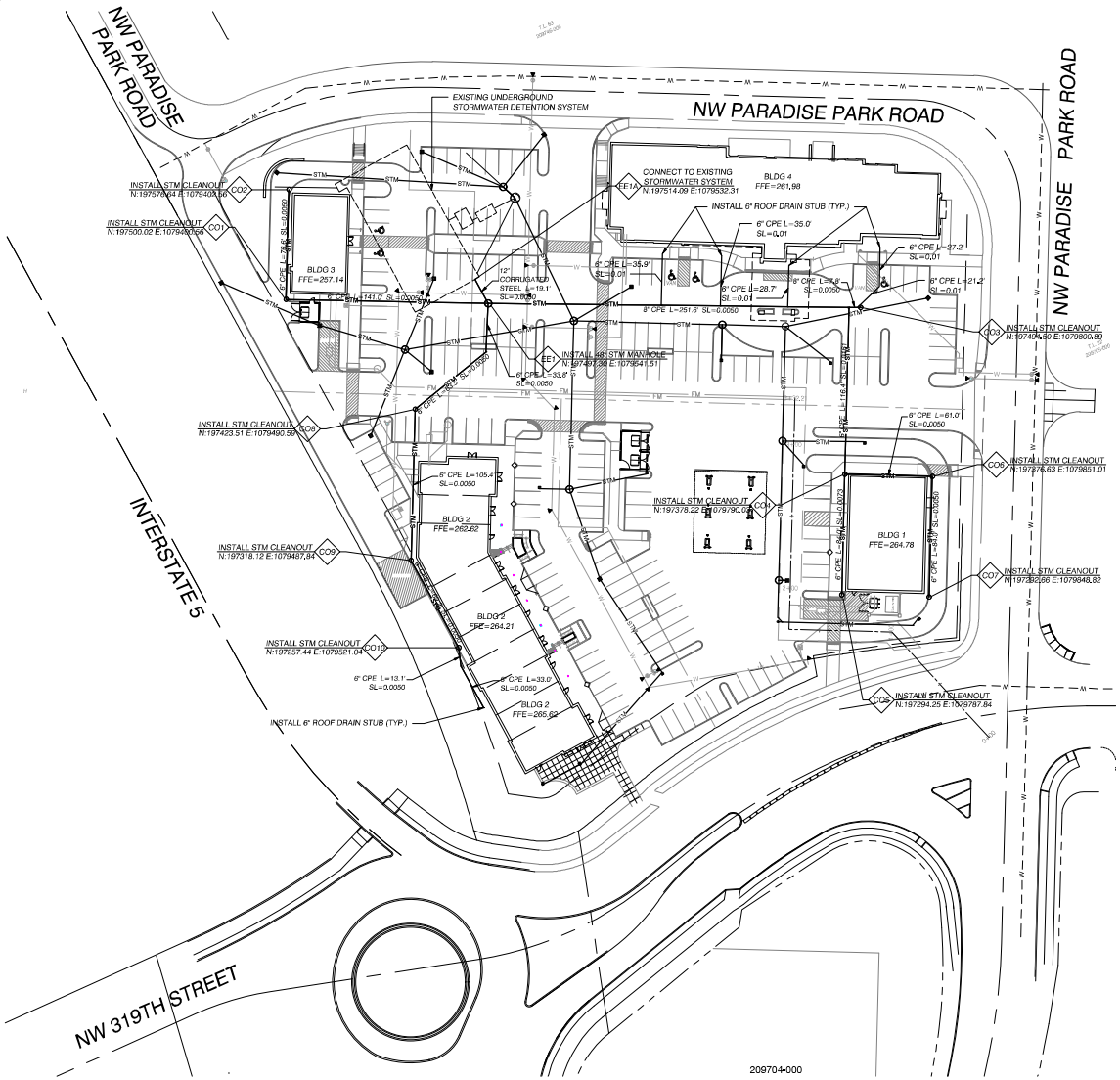
CHANGES / REVISIONS

DESCRIPTION:	DATE:

DESIGNED: CEM
DRAWN: TAS
CHECKED: CEM
DATE: APRIL 2020
SCALE: H: 1" = 40' V: N/A

MINIT MANAGEMENT
JOB NO.: 9825.01.01

SHEET
C5.0



STORM NOTES

EE1 — INSTALL 48" STM MANHOLE
N: 197497.30 E: 1079541.51
RIM=258.35
6" IE IN (W) = 249.11
8" IE IN (E) = 236.33
6" IE IN (S) = 235.96
12" IE OUT (NW) = 250.83

EE1A — CONNECT TO EXISTING STORMWATER SYSTEM
N: 197514.09 E: 1079532.31
RIM=257.45
12" IE IN (SE) = 250.73

ROOF DRAIN CLEANOUTS

CO1 — INSTALL STM CLEANOUT
N: 197500.02 E: 1079400.56
RIM=256.53
6" IE IN (N) = 249.82
6" IE OUT (E) = 249.92

CO2 — INSTALL STM CLEANOUT
N: 197576.64 E: 1079402.56
RIM=255.74
6" IE OUT (S) = 250.20

CO3 — INSTALL STM CLEANOUT
N: 197494.50 E: 1079800.89
RIM=261.33
8" IE OUT (W) = 246.54

CO4 — INSTALL STM CLEANOUT
N: 197378.22 E: 1079790.03
RIM=264.99
6" IE IN (E) = 257.67
6" IE IN (S) = 258.93
6" IE OUT (N) = 257.67

CO5 — INSTALL STM CLEANOUT
N: 197294.25 E: 1079787.84
RIM=265.08
6" IE OUT (N) = 259.54

CO6 — INSTALL STM CLEANOUT
N: 197376.63 E: 1079851.01
RIM=264.45
6" IE IN (S) = 257.98
6" IE OUT (W) = 257.98

CO7 — INSTALL STM CLEANOUT
N: 197382.66 E: 1079848.82
RIM=263.93
6" IE OUT (N) = 258.40

CO8 — INSTALL STM CLEANOUT
N: 197423.51 E: 1079490.59
RIM=260.24
6" IE IN (S) = 252.07
6" IE OUT (NE) = 252.61

CO9 — INSTALL STM CLEANOUT
N: 197318.12 E: 1079487.84
RIM=262.59
6" IE IN (SE) = 255.32
6" IE OUT (N) = 252.60

CO10 — INSTALL STM CLEANOUT
N: 197257.44 E: 1079521.04
RIM=263.76
6" IE IN (S) = 257.90
6" IE OUT (NW) = 255.67

CITY OF LA CENTER STORM SEWER DETAIL SHEETS

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SM-16	LOW POINT FOOTING DRAIN
SM-18	PIPE ANCHOR DETAIL
SM-19	DOUTSPOUT DETENTION PIPE

SCALE: 1"=40'

-40 0 40 80

J:\data\9000\9900\9830\9825\Engineering\Final\Sheets\9825.e.C5.0.storm.dwg
STORM STS

CLIENT:
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P.O. BOX 5996
VANCOUVER, WA, 98668
PH: (360) 901-3875
FX: N/A
CONTACT: DON RHOADS
EMAIL: drhoads@lcgslores.com

ROOF DRAIN STORM PLAN FOR:
MINIT MANAGEMENT

OLSON ENGINEERING, INC. LAND SURVEYORS ENGINEERS
222 E. EVERGREEN, VANCOUVER, WA 98660
360-695-1385
503-289-9836

PRELIMINARY
CHESTER A. TUSK
STATE OF WASHINGTON
31817
REGISTERED PROFESSIONAL ENGINEER

CHANGES / REVISIONS

DESCRIPTION:	DATE:

DESIGNED: CEM
DRAWN: TAS
CHECKED: CEM
DATE: APRIL 2020
SCALE: H: 1"= 40' V: N/A
MINIT MANAGEMENT
JOB NO.: 9825.01.01

SHEET
C5.1