STORM WATER MANAGEMENT REPORT

PROJECT:
Lighthouse of Waukesha Senior Living Development
STH 164 and E. Broadway
Waukesha, WI

PREPARED FOR:
New Perspective Senior Living
c/o The Boldt Company
1110 N. Old World Third Street
Milwaukee, WI

PREPARED BY:
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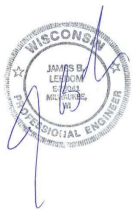

August 24, 2018
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Preliminary Site Civil Plan (separate cover)

1. INTRODUCTION

This report presents the proposed preliminary storm water management plan, including supporting modeling, analyses and plans/figures, for the proposed Lighthouse of Waukesha Senior Living Development. The project site is located at the southeast quadrant of State Highway 164 and E. Broadway in the City of Waukesha. An approximate 23.18 acre parcel will be split by Certified Survey Map from the existing Salem United Methodist Church parcel to create a 6.5-acre parcel for the senior living development.

This project involves the construction of a multi-level senior living facility building with a footprint of approximately 75,480 square feet along with associated drives, surface parking, utilities and storm water management facility.

2. EXISTING CONDITIONS SUMMARY

The project site is bound by State Highway 164 to the west, East Broadway to the north, the Salem United Methodist Church to the north and residential development to the east. The project site is currently vacant. Approximately the western 2/3's of the site is surfaced with grasses; the eastern 1/3 is covered with dense stands of trees and brush. The site generally slopes/drains to the north/northeast. The western 2/3's of the site is relatively flat; the eastern 1/3 of the site slopes sharply to the northeast with a total of approximately 31 feet of drop from the southwest corner of the site to the northeast corner of the site. An existing conditions survey is included in the preliminary civil plans attached to this report.

The existing soils and hydraulic group on the site, according to NRCS soil mapping, include the following: approximately 1.0% Hochheim laom HmB2, 58.2% Hochheim laom HmC2, 3.4% Hochheim loam HmD2, 11.5% Hochheim soils HoD3, 23.6% Lamartine silt loam LmB, and 2.4% Pella silt loam Ph. For the modeling purposes the hydraulic group C was used. Refer to NRCS soil mapping in Appendix A.

3. PROPOSED CONDITIONS SUMMARY

The project will result in the addition of approximately 3.09 acres of impervious surface including building and pavements. Storm water will be collected in storm inlets and piped to the proposed storm water management facilities located at the northeast quadrant of the site. A swale will also be constructed along the eastern border of the site to collect runoff from east the proposed drive through the site. The swale discharges to a culvert which discharges to the storm water management basins. Refer to the attached preliminary site civil plans.

4. STORM WATER MANAGEMENT REQUIREMENTS

As a new development project that will disturb more than one acre of land, the project will be subject to the following storm water management requirements under WDNR NR 151 and City of Waukesha storm water management regulations.

QUALITY
WDNR NR 151 / City of Waukesha Chapter 32.10(d)(2)(i)
Reduce to the maximum extent practicable, the total suspended solids load by 80%, based on an average annual rainfall, as compared to no runoff management controls.

QUANTITY/PEAK FLOW
City of Waukesha Chapter 32.10(d)(1)(A)
The calculated post-development peak storm water discharge rate shall not exceed the calculated pre-development discharge rates for the 2-year, 10-year, and 100-year, 24-hour design storms.

WDNR NR 151.123(1)
Maintain or reduce the 1-year, 24-hour and the 2-year, 24-hour post construction discharge rates to the 1-year, 24-hour and the 2-year, 24-hour predevelopment peak discharge rates.

INFILTRATION
City of Waukesha Chapter 32.10(d)(3)(A)
Infiltrate sufficient runoff volume so that the post-development infiltration volume shall be at least 90% of the pre-development infiltration volume, based on average annual rainfall; or, infiltrate 25% of the post-development runoff volume from the 2-year, 24-hour design storm with a type II distribution. In either case, when designing appropriate infiltration systems to meet this requirement, no more than 1% of the project site is required as an effective infiltration area.

5. PROPOSED STORM WATER MANAGEMENT FACILITIES

In order to meet the applicable storm water management regulations, a combination of bio-infiltration basins and a surface infiltration basin will be utilized. Based on correspondence with the FAA, a wet detention basin will not be allowed for the development, and preliminary soil testing has shown that the site soils are suitable for infiltration. The two bio-infiltration basins will receive the storm water runoff from the site and provide pre-treatment prior to discharge into the infiltration basin. The two bio-infiltration pre-treatment basins will have two feet of engineered soil meeting WDNR technical standards and will provide more than 60% TSS removal.

The basin has a bottom elevation of 880.00 which provides sufficient clearance between the observed ground water level and the bottom of the infiltration basin. Water from all parking areas will enter a pre-treatment cell where it will be filtered via engineered media to obtain TSS reduction requirements. Most smaller storm events will

remain primarily contained within the pre-treatment cells where the water will be fully infiltrated. During larger storm events, water will fill the pre-treatment cells beyond their berm elevation of 883 and will spill over into the infiltration portion of the basin which will allow for additional surface area to infiltrate waters as well as allow peak flow control using an outlet structure. The outlet control structure consists of a rectangular orifice at an elevation of 880.55 that is 12 inches tall and 24 inches wide and top of structure elevation (which serves as a 36 inch horizontal orifice) of 882.30. The high water level during the 100-year design storm event is modeled at an elevation of 883.35. Should the site experience a rainfall event in excess of the 100-year design storm or a plugged outlet structure the curb cut within the driveway will act as an emergency overflow at an elevation of 883.70. Overflowing water will naturally flow toward the swale along East Broadway and enter the existing system.

6. MODELING & CALCULATIONS

The hydraulic calculations and analysis presented in this report were performed using HydroCad Watershed Modeling software which utilizes the methodologies of TR-55 for a hydrograph based analysis of watershed conditions. Hydrographs were developed using a standard Type II hydrograph for the various 24-hr storm events. Rainfall depths used in this model area as follows: 2 year = 2.70 in., 10 year = 4.00 in., 100 year = 5.60 in.

Based on an evaluation of the site for storm water infiltration, the bottom of the basin will sit on a layer of silty clay loam which is underlain by very gravely coarse sand, and sand. The Silty clay loam has NCRS infiltration rates of 0.63 to 2.0 and WDNR Technical Standard 1002 Table 2 Infiltration rates of 0.04 inches per hour. The underlaying very gravely coarse sand and sand has NCRS infiltration rates of >20 and WDNR Technical Standard 1002 Table 2 Infiltration rates of 3.60 inches per hour. Due to the underlaying soils having considerable infiltration properties it is proposed that the basin shall be over excavated to expose the underlaying very gravely sand layer and backfilled with infiltrative materials to meet technical standards. An infiltration rate of 0.50 was used in modeling as apposed to 3.60 as a conservative measure, actual observed infiltration rates may be greater than modeling. The contractor should verify infiltration rates with a certified geotechnical engineer upon excavation of the basin area and report any discrepancies to the design engineer. Soil infiltration evaluation forms and bore logs are included in Appendix D.

WinSLAMM modeling was used to model TSS removal for the storm water management measures.

Based on the NRCS soils data for the site, the majority of the native soils are silty loams a type C soil (CN = 79).

Time of concentration values were calculated based on the standard TR-55 method.

Refer to Figures SW 1.0 and SW 2.0 for watershed areas used to model pre-development and post development conditions.

HydroCad and WinSLAMM modeling backup are presented in Appendices D and E, respectively.

7. SUMMARY OF MODELING/CALCULATIONS

A summary of results for can be viewed in the tables below:

	Storm Frequency (yr)	Pre-development Site Conditions	Post-Development Site Conditions
		Peak Runoff Discharge Rate (cfs)	Peak Runoff Discharge Rate (cfs)
	1	9.79	5.90
	2	12.57	8.74
	10	25.36	24.82
	100	42.30	37.44

Water Quality (TSS Reduction) Summary Table:

	Drainage Area (AC)	Pounds of TSS Loading Generated (lbs)	Pounds of TSS Remaining After Post Control Treatment (lbs)	Removal Rate
PT 1	**2.88**	**914**	**358.2**	**60.82**
PT 2	**2.52**	**715**	**276.7**	**61.30**
Total	**7.24**	**1820**	**355.0**	**80.49**

As shown, the proposed basin meets both the peak discharge requirements as well as total suspended solids treatment requirements.

Infiltration

Rain Volume = 708,324 cf
Pre-Development Infiltration Volume = 670,474 cf
Post-Development Infiltration Volume = 652,857 cf
Percent of Pre-Development Infiltration Volume = 97.4%

8. STORM SEWER SIZING

Site storm sewers were sized using HydroFlow. The storm sewers were sized for the 10-year storm event. In addition, the hydraulic grade line of the storm sewers were checked for the 100-year storm event to ensure that the hydraulic grade line is below storm manhole rim elevations. Storm sewer sizing tables are included in Appendix E.

9. MAINTENANCE PLAN

The Owner will be responsible for the regular inspection and maintenance of the storm water management facilities to ensure that they are functioning properly. We understand a maintenance agreement is required and will be prepared and submitted upon approval of our storm water approach and finalization of our storm water plans.

Proposed inspection and maintenance activities and frequencies are included in Appendix F to this report.

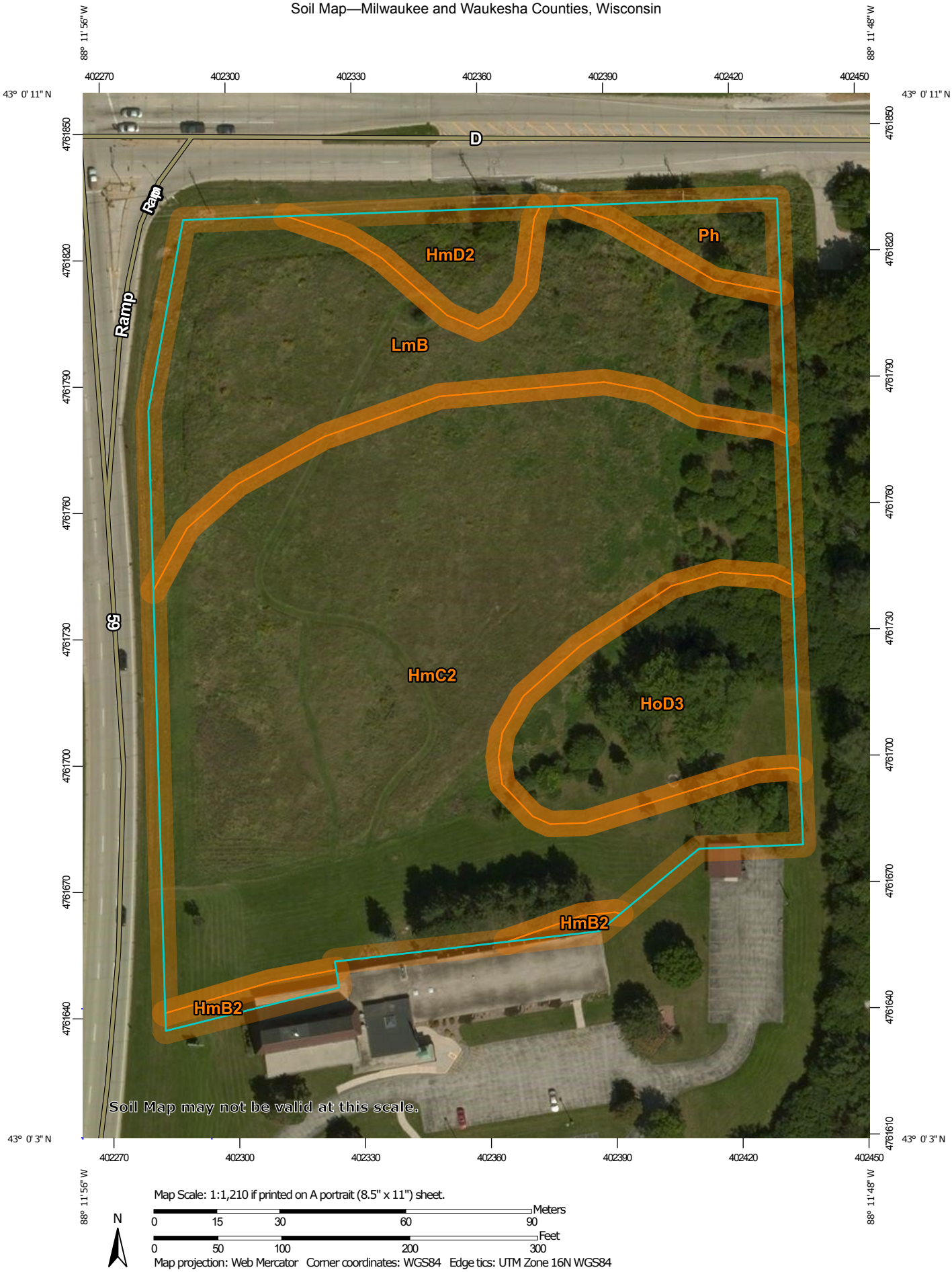
10. CONCLUSION

Based on Sigma's evaluation, the proposed storm water management approach as summarized in this report and presented on the attached plans and attachments, meets City and WDNR storm water management requirements for infiltration, peak flow control and TSS removal.

APPENDIX A

SOILS MAP

Soil Map—Milwaukee and Waukesha Counties, Wisconsin



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

N

Meters
0 15 30 60 90

Feet
0 50 100 200 300

Map projection: Web Mercator Corner coordinates: WGS84 Edge tics: UTM Zone 16N WGS84

MAP LEGEND

Area of Interest (AOI)
- Area of Interest (AOI)

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

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

Water Features
- Streams and Canals

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

Background
- Aerial Photography

MAP INFORMATION

The soil surveys that comprise your AOI were mapped at 1:15,800.

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

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

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

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

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

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

Soil Survey Area: Milwaukee and Waukesha Counties, Wisconsin
Survey Area Data: Version 13, Oct 6, 2017

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

Date(s) aerial images were photographed: Sep 7, 2014—Sep 22, 2014

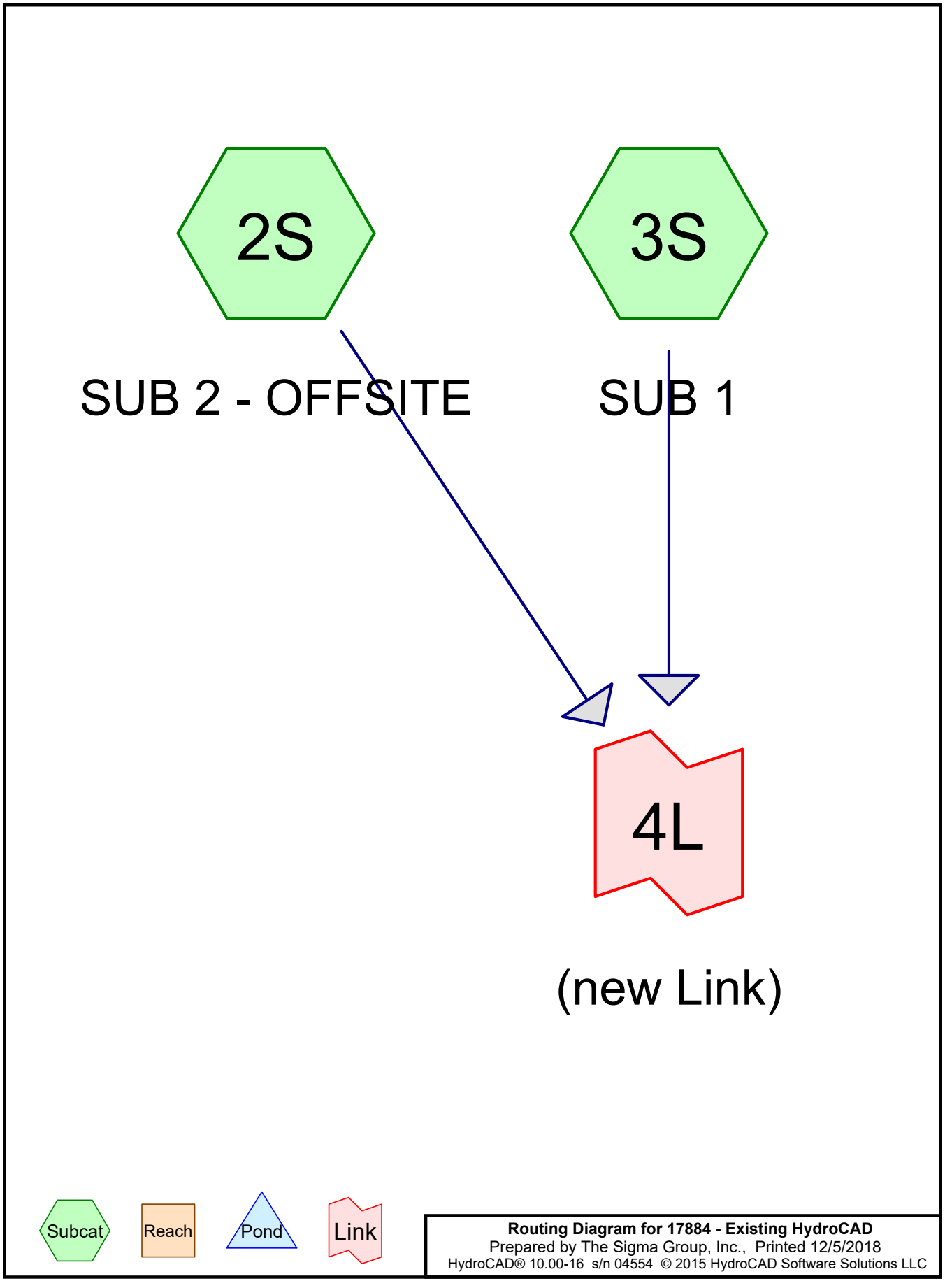
The orthophoto or other base map on which the soil lines were compiled and digitized probably differs from the background imagery displayed on these maps. As a result, some minor shifting of map unit boundaries may be evident.

Map Unit Legend

Map Unit Symbol	Map Unit Name	Acres in AOI	Percent of AOI
HmB2	Hochheim loam, 2 to 6 percent slopes, eroded	0.1	1.0%
HmC2	Hochheim loam, 6 to 12 percent slopes, eroded	3.8	58.2%
HmD2	Hochheim loam, 12 to 20 percent slopes, eroded	0.2	3.4%
HoD3	Hochheim soils, 12 to 20 percent slopes, severely eroded	0.7	11.5%
LmB	Lamartine silt loam, 0 to 3 percent slopes	1.5	23.6%
Ph	Pella silt loam, 0 to 2 percent slopes	0.2	2.4%
Totals for Area of Interest		**6.5**	**100.0%**

APPENDIX B

STORM WATER QUANTITY MODELING (HYDROCAD)



Routing Diagram for 17884 - Existing HydroCAD
Prepared by The Sigma Group, Inc., Printed 12/5/2018

Area Listing (all nodes)

Area (acres)	CN	Description (subcatchment-numbers)
7.223	79	>75% Grass cover, Good, HSG C (2S, 3S)
7.223	**79**	**TOTAL AREA**

Soil Listing (all nodes)

Area (acres)	Soil Group	Subcatchment Numbers
0.000	HSG A	
0.000	HSG B	
7.223	HSG C	2S, 3S
0.000	HSG D	
0.000	Other	
7.223		**TOTAL AREA**

Ground Covers (all nodes)

HSG-A (acres)	HSG-B (acres)	HSG-C (acres)	HSG-D (acres)	Other (acres)	Total (acres)	Ground Cover	Subcatchment Numbers
0.000	0.000	7.223	0.000	0.000	7.223	>75% Grass cover, Good	2S, 3S
0.000	**0.000**	**7.223**	**0.000**	**0.000**	**7.223**	**TOTAL AREA**	

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

Subcatchment2S: SUB 2 - OFFSITE Runoff Area=21,748 sf 0.00% Impervious Runoff Depth=0.74"
Tc=6.0 min CN=79 Runoff=0.68 cfs 0.031 af

Subcatchment3S: SUB 1 Runoff Area=292,904 sf 0.00% Impervious Runoff Depth=0.74"
Tc=6.0 min CN=79 Runoff=9.11 cfs 0.414 af

Link 4L: (new Link) Inflow=9.79 cfs 0.445 af
Primary=9.79 cfs 0.445 af

Total Runoff Area = 7.223 ac Runoff Volume = 0.445 af Average Runoff Depth = 0.74"
100.00% Pervious = 7.223 ac 0.00% Impervious = 0.000 ac

Summary for Subcatchment 2S: SUB 2 - OFFSITE

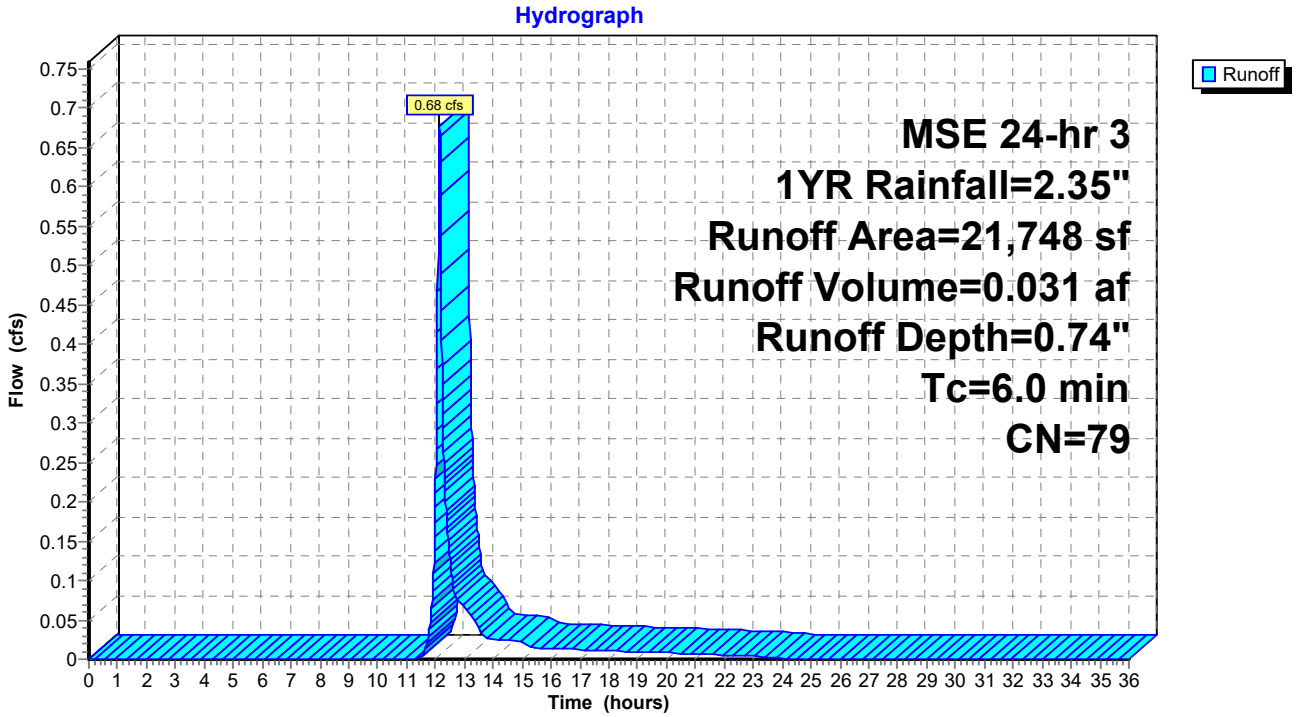
Runoff = 0.68 cfs @ 12.14 hrs, Volume= 0.031 af, Depth= 0.74"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-36.00 hrs, dt= 0.01 hrs
MSE 24-hr 3 1YR Rainfall=2.35"

	Area (sf)	CN	Description
*	21,748	79	>75% Grass cover, Good, HSG C
	21,748		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
6.0					**Direct Entry, 6 Minute Min**

Subcatchment 2S: SUB 2 - OFFSITE



Summary for Subcatchment 3S: SUB 1

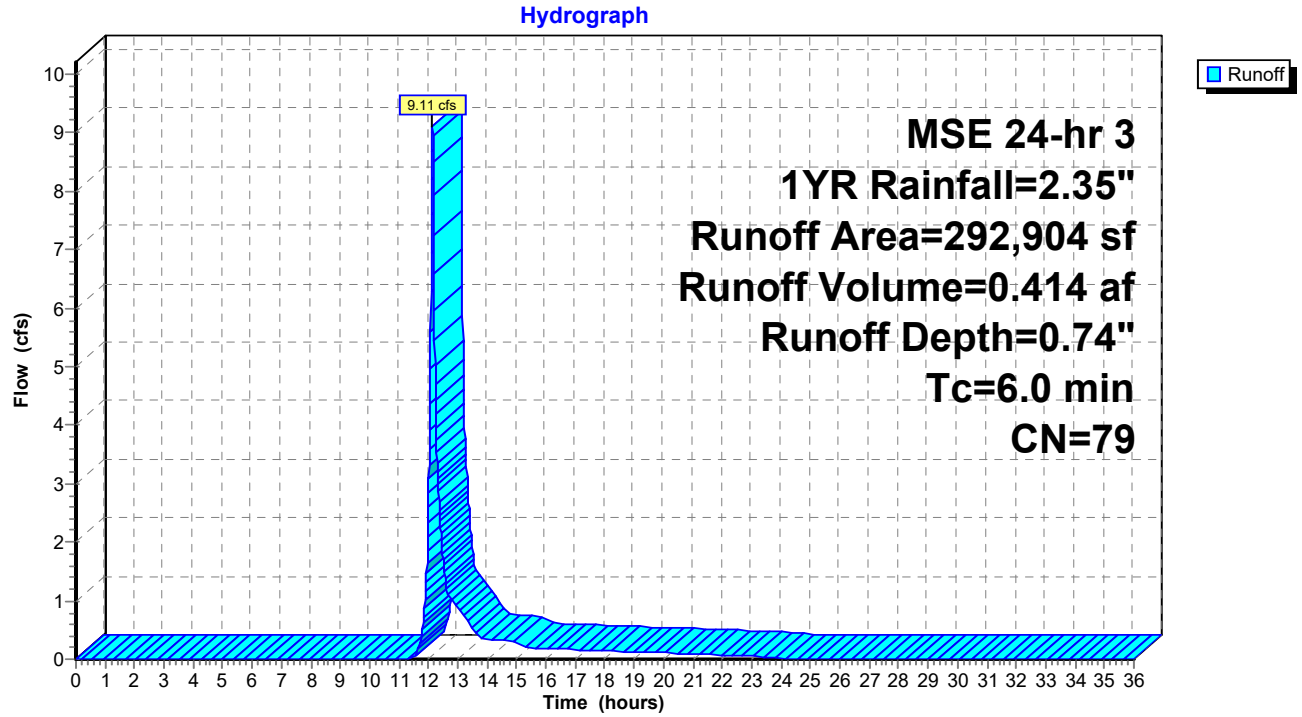
Runoff = 9.11 cfs @ 12.14 hrs, Volume= 0.414 af, Depth= 0.74"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-36.00 hrs, dt= 0.01 hrs
MSE 24-hr 3 1YR Rainfall=2.35"

	Area (sf)	CN	Description
*	292,904	79	>75% Grass cover, Good, HSG C
	292,904		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
6.0					**Direct Entry, 6 Minute Minimum**

Subcatchment 3S: SUB 1

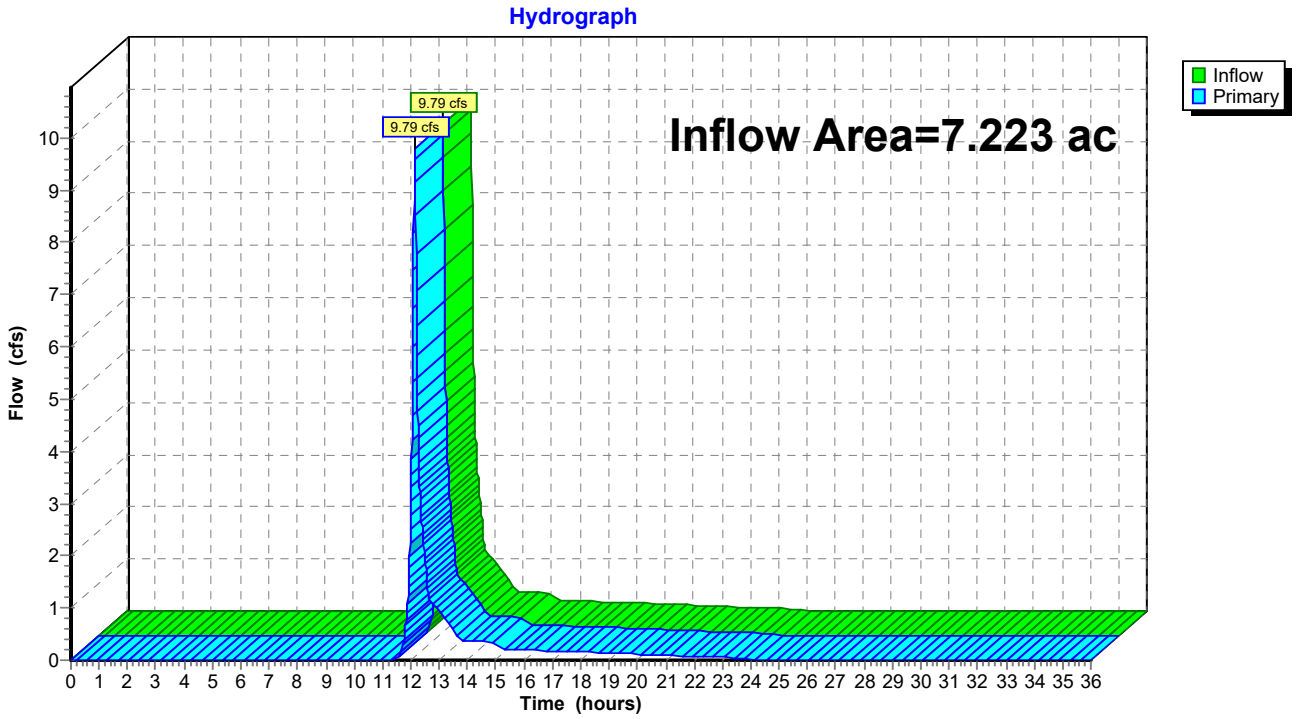


Summary for Link 4L: (new Link)

Inflow Area = 7.223 ac, 0.00% Impervious, Inflow Depth = 0.74" for 1YR event
Inflow = 9.79 cfs @ 12.14 hrs, Volume= 0.445 af
Primary = 9.79 cfs @ 12.14 hrs, Volume= 0.445 af, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 0.00-36.00 hrs, dt= 0.01 hrs

Link 4L: (new Link)



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

Subcatchment2S: SUB 2 - OFFSITE Runoff Area=21,748 sf 0.00% Impervious Runoff Depth=0.97"
Tc=6.0 min CN=79 Runoff=0.87 cfs 0.041 af

Subcatchment3S: SUB 1 Runoff Area=292,904 sf 0.00% Impervious Runoff Depth=0.97"
Tc=6.0 min CN=79 Runoff=11.70 cfs 0.546 af

Link 4L: (new Link) Inflow=12.57 cfs 0.586 af
Primary=12.57 cfs 0.586 af

Total Runoff Area = 7.223 ac Runoff Volume = 0.586 af Average Runoff Depth = 0.97"
100.00% Pervious = 7.223 ac 0.00% Impervious = 0.000 ac

Summary for Subcatchment 2S: SUB 2 - OFFSITE

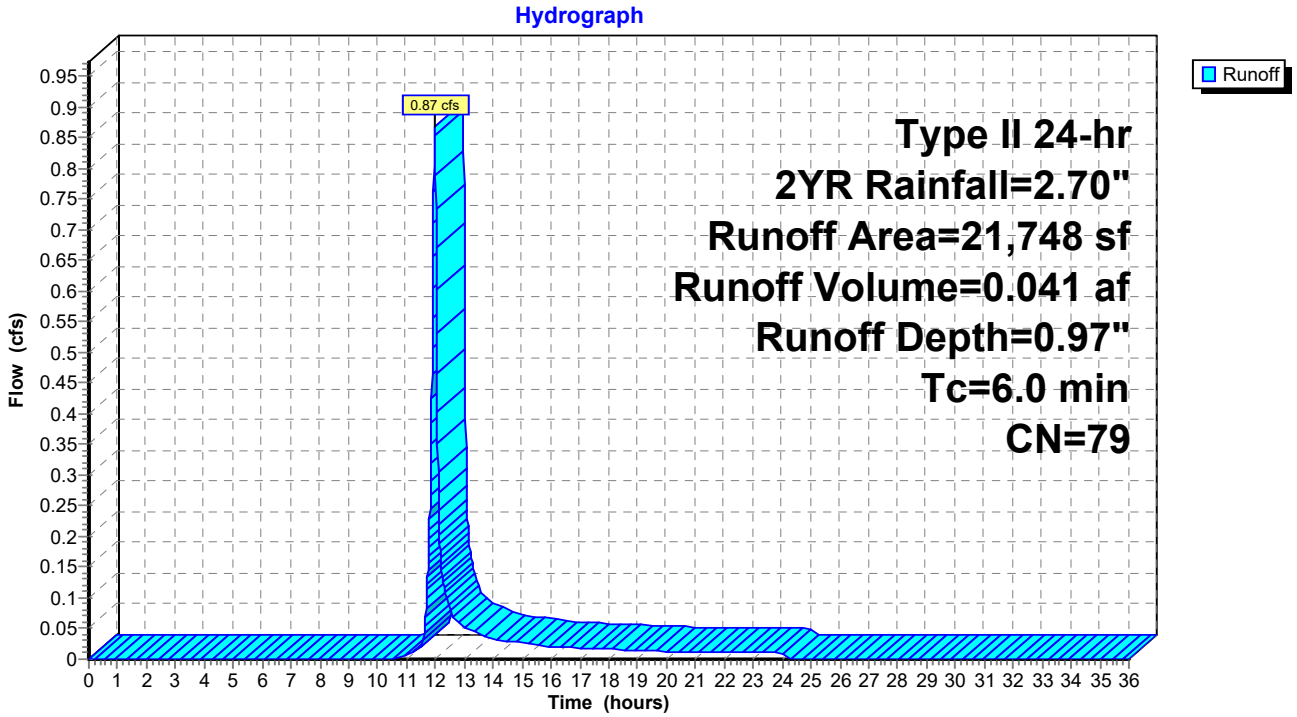
Runoff = 0.87 cfs @ 11.98 hrs, Volume= 0.041 af, Depth= 0.97"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-36.00 hrs, dt= 0.01 hrs
Type II 24-hr 2YR Rainfall=2.70"

	Area (sf)	CN	Description
*	21,748	79	>75% Grass cover, Good, HSG C
	21,748		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
6.0					**Direct Entry, 6 Minute Min**

Subcatchment 2S: SUB 2 - OFFSITE



Summary for Subcatchment 3S: SUB 1

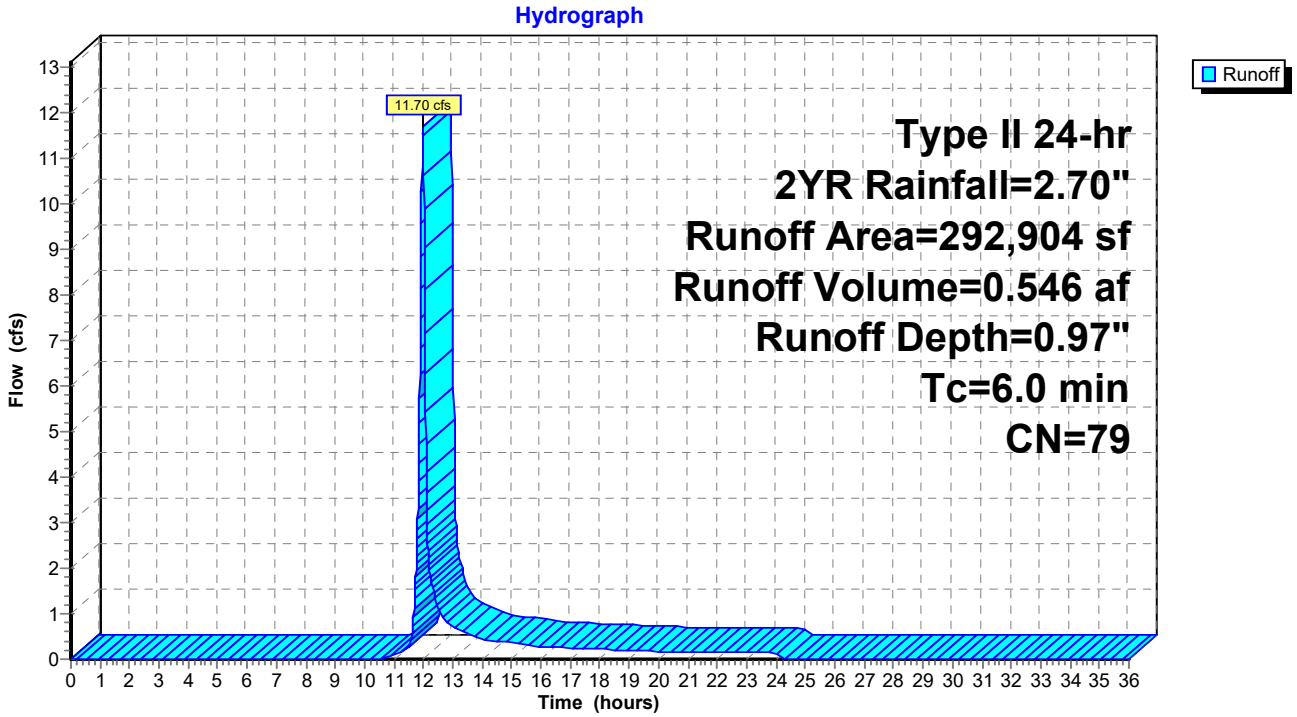
Runoff = 11.70 cfs @ 11.98 hrs, Volume= 0.546 af, Depth= 0.97"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-36.00 hrs, dt= 0.01 hrs
Type II 24-hr 2YR Rainfall=2.70"

	Area (sf)	CN	Description
*	292,904	79	>75% Grass cover, Good, HSG C
	292,904		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
6.0					**Direct Entry, 6 Minute Minimum**

Subcatchment 3S: SUB 1

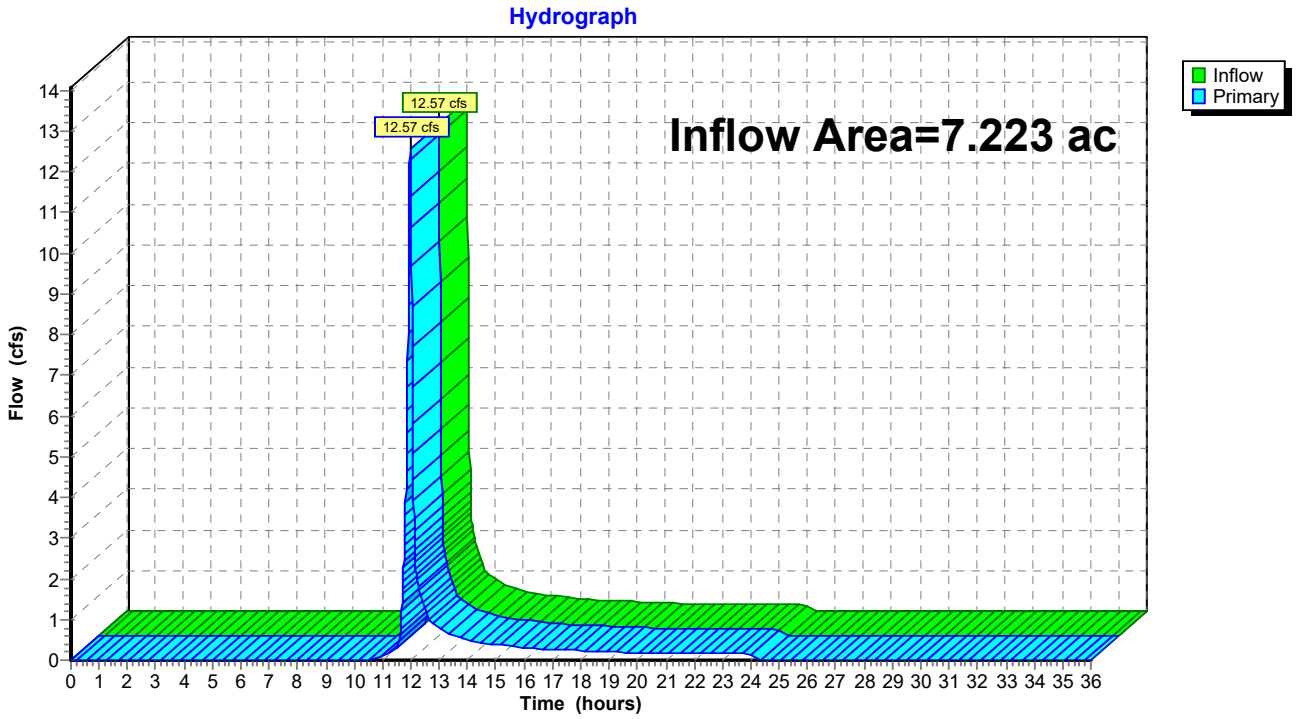


Summary for Link 4L: (new Link)

Inflow Area = 7.223 ac, 0.00% Impervious, Inflow Depth = 0.97" for 2YR event
Inflow = 12.57 cfs @ 11.98 hrs, Volume= 0.586 af
Primary = 12.57 cfs @ 11.98 hrs, Volume= 0.586 af, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 0.00-36.00 hrs, dt= 0.01 hrs

Link 4L: (new Link)



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

Subcatchment2S: SUB 2 - OFFSITE Runoff Area=21,748 sf 0.00% Impervious Runoff Depth=1.96"
Tc=6.0 min CN=79 Runoff=1.75 cfs 0.082 af

Subcatchment3S: SUB 1 Runoff Area=292,904 sf 0.00% Impervious Runoff Depth=1.96"
Tc=6.0 min CN=79 Runoff=23.61 cfs 1.100 af

Link 4L: (new Link) Inflow=25.36 cfs 1.182 af
Primary=25.36 cfs 1.182 af

Total Runoff Area = 7.223 ac Runoff Volume = 1.182 af Average Runoff Depth = 1.96"
100.00% Pervious = 7.223 ac 0.00% Impervious = 0.000 ac

Summary for Subcatchment 2S: SUB 2 - OFFSITE

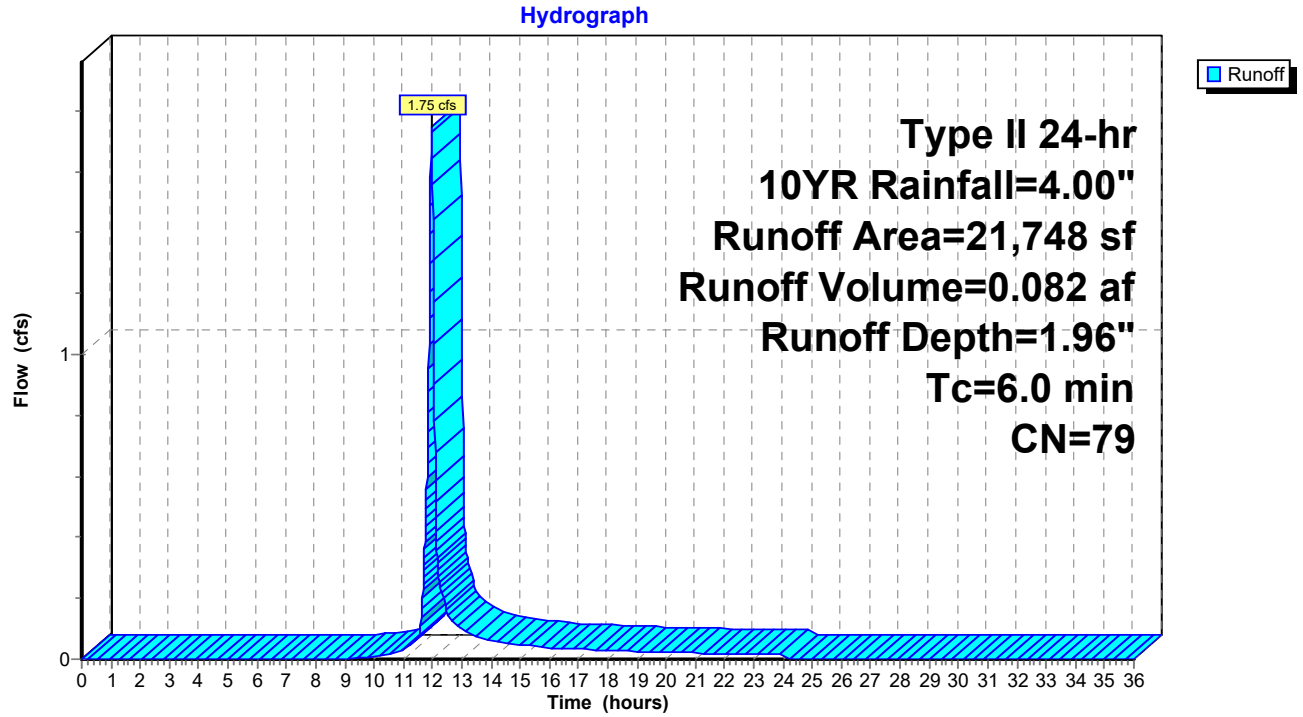
Runoff = 1.75 cfs @ 11.97 hrs, Volume= 0.082 af, Depth= 1.96"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-36.00 hrs, dt= 0.01 hrs
Type II 24-hr 10YR Rainfall=4.00"

	Area (sf)	CN	Description
*	21,748	79	>75% Grass cover, Good, HSG C
	21,748		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
6.0					**Direct Entry, 6 Minute Min**

Subcatchment 2S: SUB 2 - OFFSITE



Summary for Subcatchment 3S: SUB 1

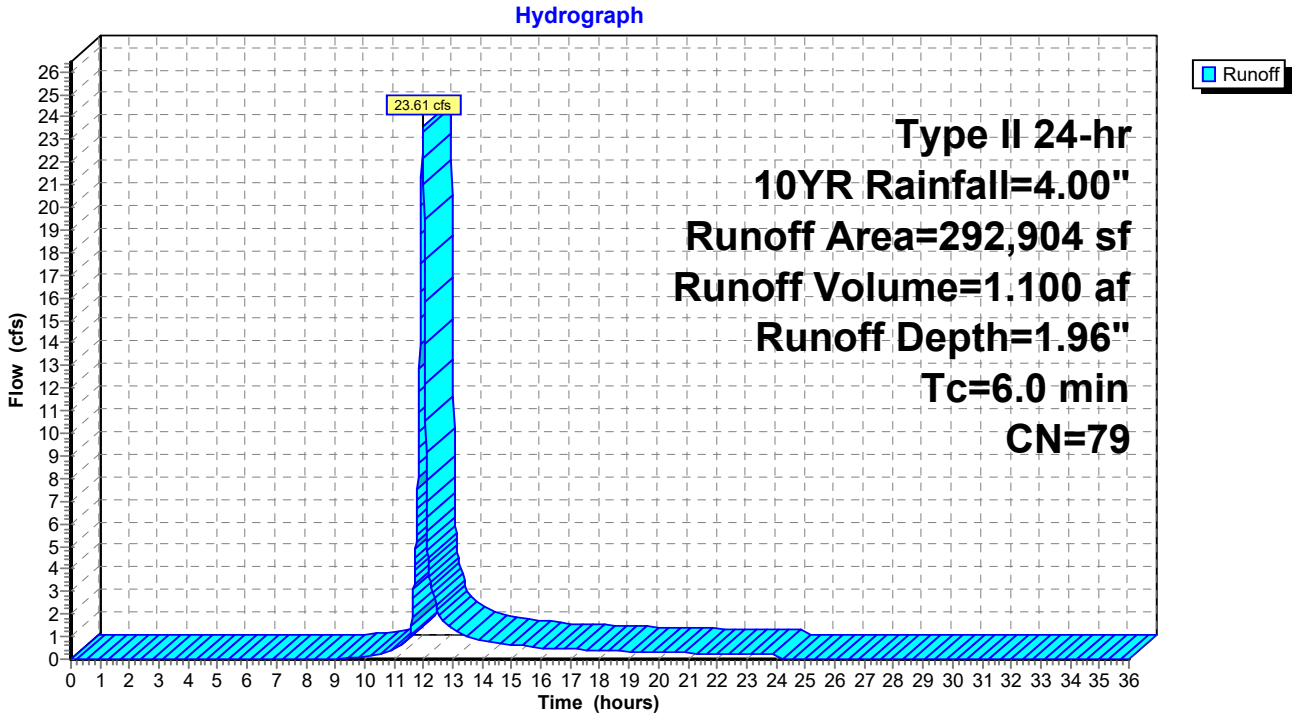
Runoff = 23.61 cfs @ 11.97 hrs, Volume= 1.100 af, Depth= 1.96"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-36.00 hrs, dt= 0.01 hrs
Type II 24-hr 10YR Rainfall=4.00"

	Area (sf)	CN	Description
*	292,904	79	>75% Grass cover, Good, HSG C
	292,904		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
6.0					**Direct Entry, 6 Minute Minimum**

Subcatchment 3S: SUB 1

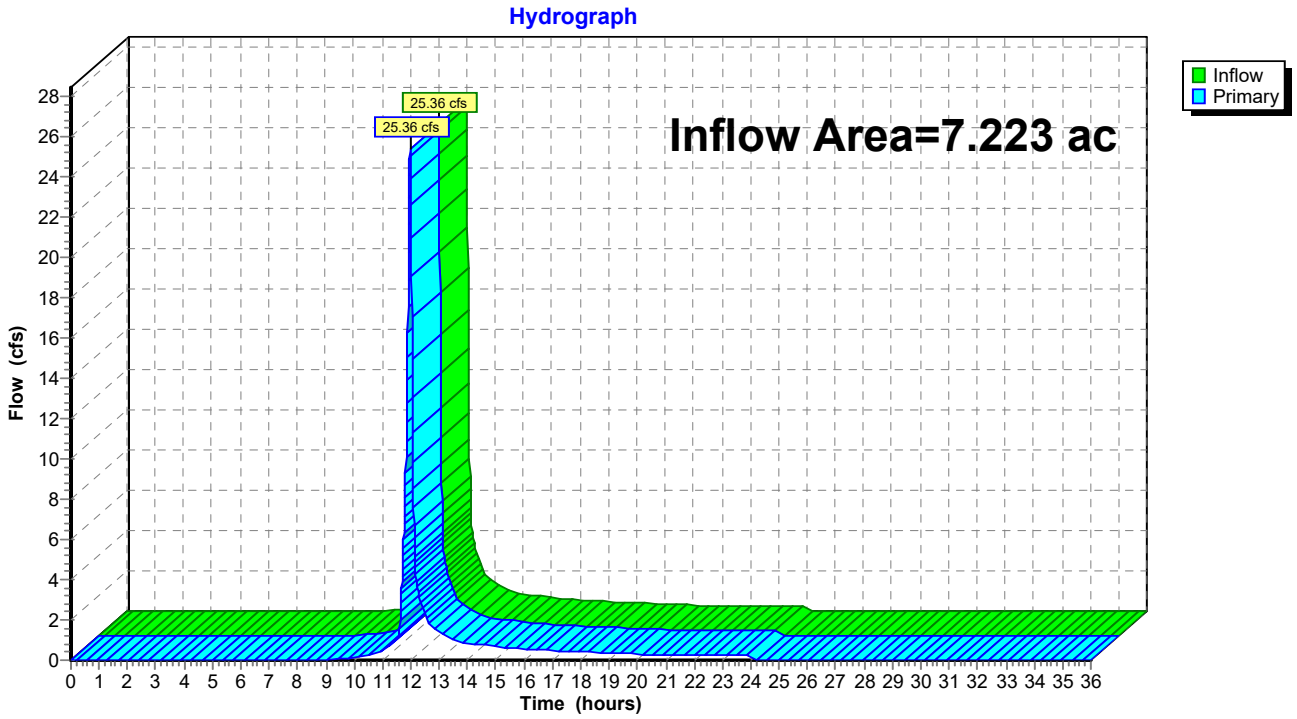


Summary for Link 4L: (new Link)

Inflow Area = 7.223 ac, 0.00% Impervious, Inflow Depth = 1.96" for 10YR event
Inflow = 25.36 cfs @ 11.97 hrs, Volume= 1.182 af
Primary = 25.36 cfs @ 11.97 hrs, Volume= 1.182 af, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 0.00-36.00 hrs, dt= 0.01 hrs

Link 4L: (new Link)



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

Subcatchment2S: SUB 2 - OFFSITE Runoff Area=21,748 sf 0.00% Impervious Runoff Depth=3.32"
Tc=6.0 min CN=79 Runoff=2.92 cfs 0.138 af

Subcatchment3S: SUB 1 Runoff Area=292,904 sf 0.00% Impervious Runoff Depth=3.32"
Tc=6.0 min CN=79 Runoff=39.37 cfs 1.863 af

Link 4L: (new Link) Inflow=42.30 cfs 2.001 af
Primary=42.30 cfs 2.001 af

Total Runoff Area = 7.223 ac Runoff Volume = 2.001 af Average Runoff Depth = 3.32"
100.00% Pervious = 7.223 ac 0.00% Impervious = 0.000 ac

Summary for Subcatchment 2S: SUB 2 - OFFSITE

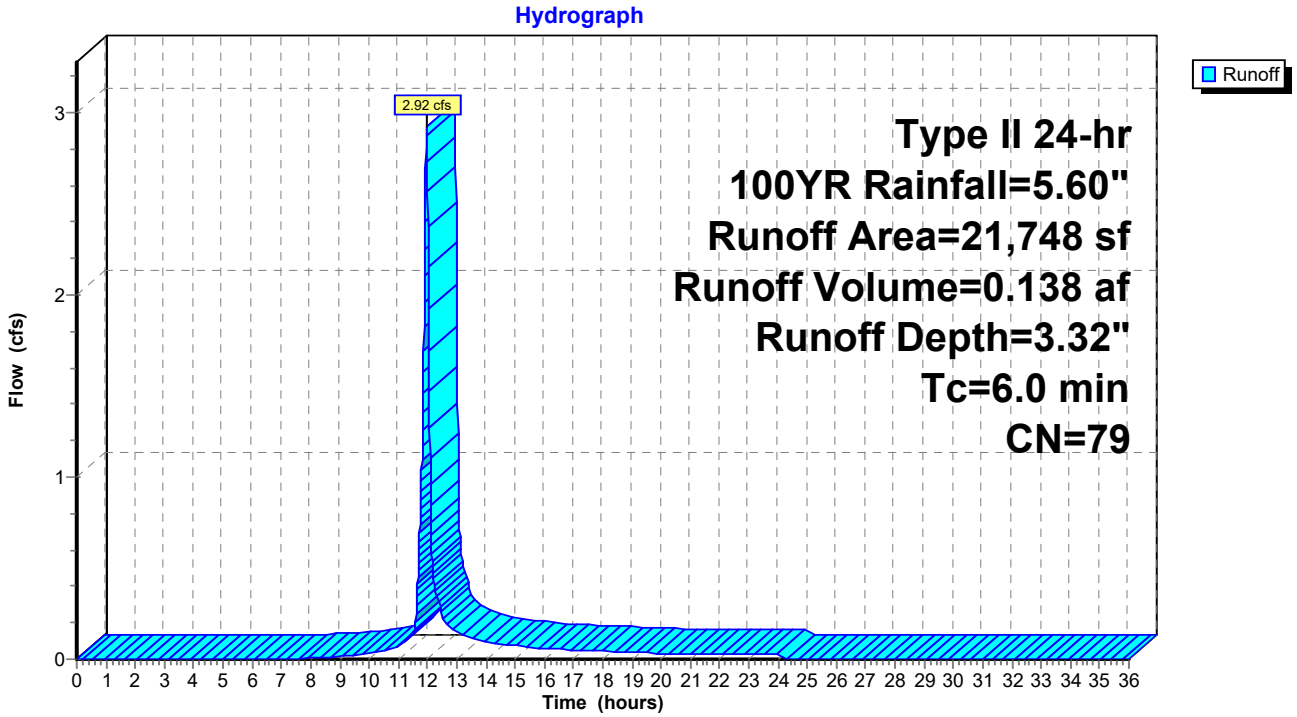
Runoff = 2.92 cfs @ 11.97 hrs, Volume= 0.138 af, Depth= 3.32"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-36.00 hrs, dt= 0.01 hrs
Type II 24-hr 100YR Rainfall=5.60"

	Area (sf)	CN	Description
*	21,748	79	>75% Grass cover, Good, HSG C
	21,748		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
6.0					**Direct Entry, 6 Minute Min**

Subcatchment 2S: SUB 2 - OFFSITE



Summary for Subcatchment 3S: SUB 1

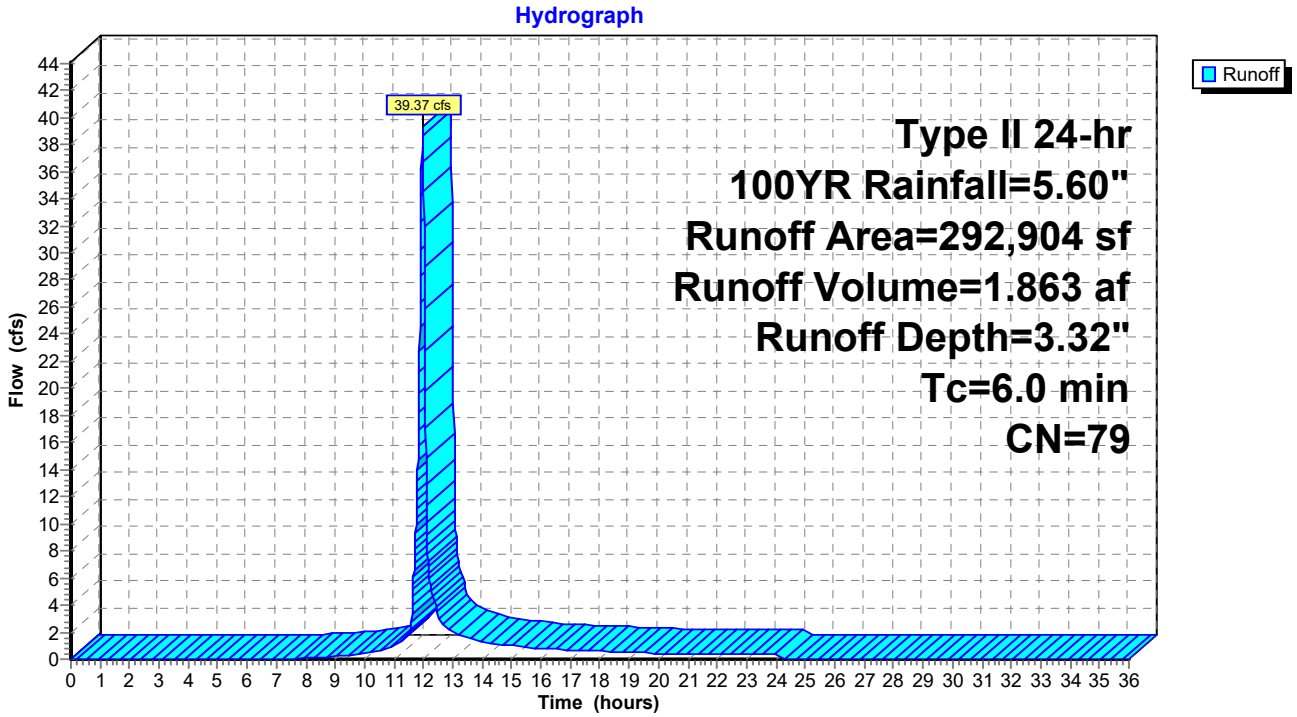
Runoff = 39.37 cfs @ 11.97 hrs, Volume= 1.863 af, Depth= 3.32"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-36.00 hrs, dt= 0.01 hrs
Type II 24-hr 100YR Rainfall=5.60"

	Area (sf)	CN	Description
*	292,904	79	>75% Grass cover, Good, HSG C
	292,904		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
6.0					**Direct Entry, 6 Minute Minimum**

Subcatchment 3S: SUB 1

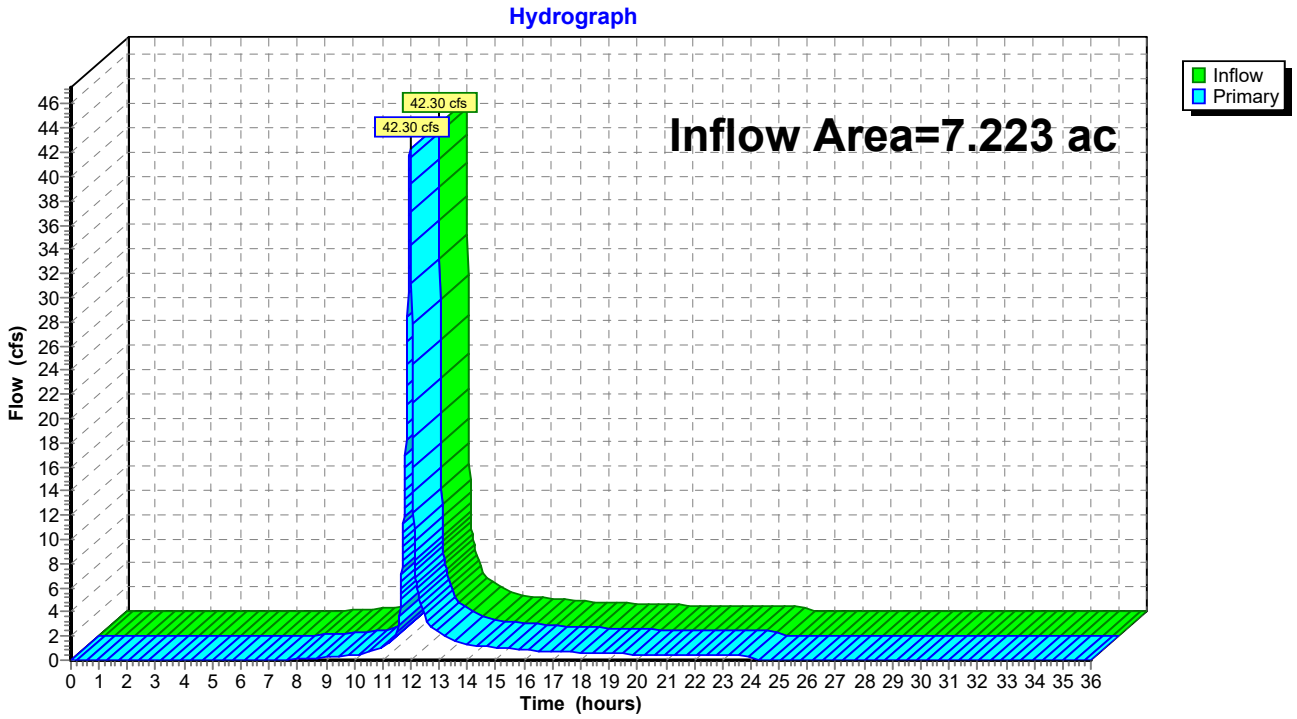


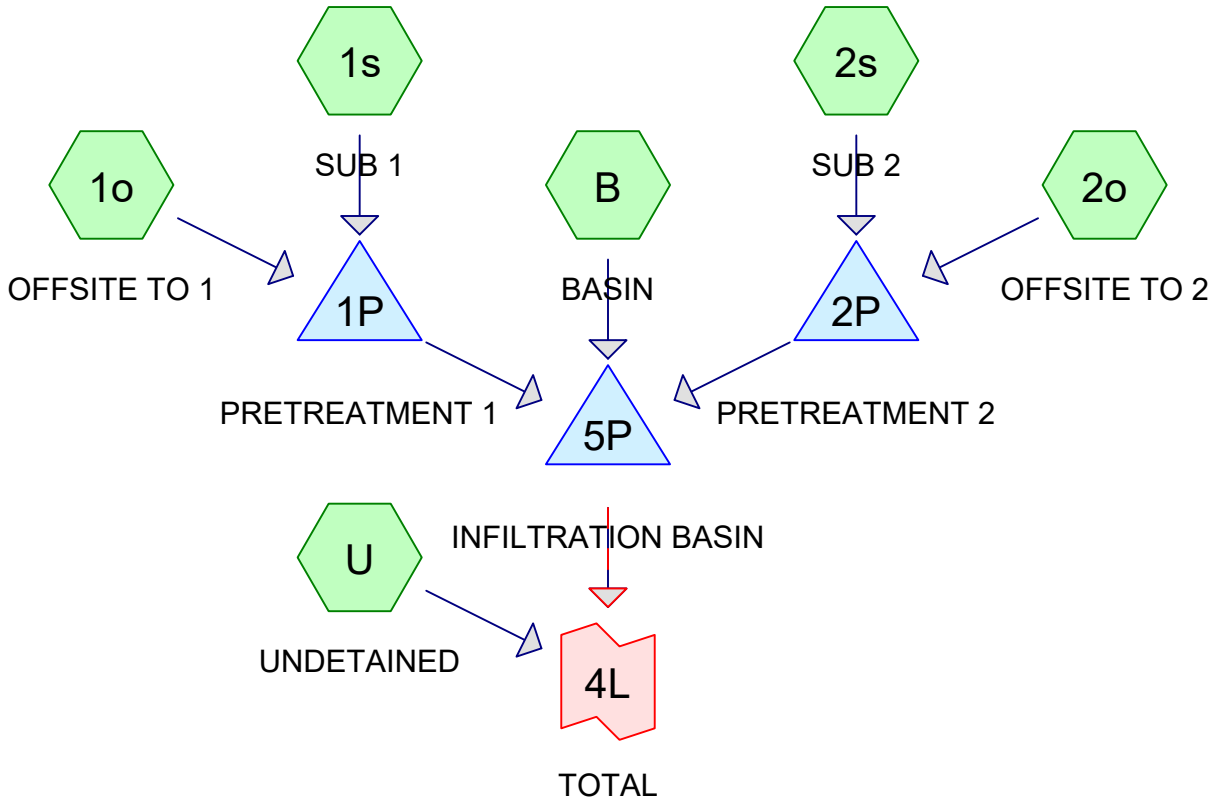
Summary for Link 4L: (new Link)

Inflow Area = 7.223 ac, 0.00% Impervious, Inflow Depth = 3.32" for 100YR event
Inflow = 42.30 cfs @ 11.97 hrs, Volume= 2.001 af
Primary = 42.30 cfs @ 11.97 hrs, Volume= 2.001 af, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 0.00-36.00 hrs, dt= 0.01 hrs

Link 4L: (new Link)





Subcat Reach Pond Link

Routing Diagram for 17884 - Proposed 11-8-18 - Infiltration
Prepared by The Sigma Group, Inc., Printed 12/5/2018

Area Listing (selected nodes)

Area (acres)	CN	Description (subcatchment-numbers)
3.619	79	>75% Grass cover, Good, HSG C (1o, 1s, 2o, 2s, B, U)
0.848	98	Paved parking (2s)
1.044	98	Pavement (1s)
1.320	98	Roof (1s, B)
0.413	98	Roofs (2s)
7.243	**89**	**TOTAL AREA**

Soil Listing (selected nodes)

Area (acres)	Soil Group	Subcatchment Numbers
0.000	HSG A	
0.000	HSG B	
3.619	HSG C	1o, 1s, 2o, 2s, B, U
0.000	HSG D	
3.624	Other	1s, 2s, B
7.243		**TOTAL AREA**

Ground Covers (selected nodes)

HSG-A (acres)	HSG-B (acres)	HSG-C (acres)	HSG-D (acres)	Other (acres)	Total (acres)	Ground Cover	Subcatchment Numbers
0.000	0.000	3.619	0.000	0.000	3.619	>75% Grass cover, Good	1o, 1s, 2o, 2s, B, U
0.000	0.000	0.000	0.000	0.848	0.848	Paved parking	2s
0.000	0.000	0.000	0.000	1.044	1.044	Pavement	1s
0.000	0.000	0.000	0.000	1.320	1.320	Roof	1s, B
0.000	0.000	0.000	0.000	0.413	0.413	Roofs	2s
0.000	**0.000**	**3.619**	**0.000**	**3.624**	**7.243**	**TOTAL AREA**	

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

Subcatchment1o: OFFSITE TO 1 Runoff Area=12,345 sf 0.00% Impervious Runoff Depth=0.74"
Tc=6.0 min CN=79 Runoff=0.38 cfs 0.017 af

Subcatchment1s: SUB 1 Runoff Area=112,925 sf 73.08% Impervious Runoff Depth=1.64"
Tc=6.0 min CN=93 Runoff=7.61 cfs 0.354 af

Subcatchment2o: OFFSITE TO 2 Runoff Area=9,125 sf 0.00% Impervious Runoff Depth=0.74"
Tc=6.0 min CN=79 Runoff=0.28 cfs 0.013 af

Subcatchment2s: SUB 2 Runoff Area=100,780 sf 54.49% Impervious Runoff Depth=1.32"
Tc=6.0 min CN=89 Runoff=5.66 cfs 0.255 af

SubcatchmentB: BASIN Runoff Area=53,490 sf 38.18% Impervious Runoff Depth=1.12"
Tc=6.0 min CN=86 Runoff=2.57 cfs 0.115 af

SubcatchmentU: UNDETAINED Runoff Area=26,825 sf 0.00% Impervious Runoff Depth=0.74"
Tc=6.0 min CN=79 Runoff=0.83 cfs 0.038 af

Pond 1P: PRETREATMENT1 Peak Elev=883.16' Storage=4,239 cf Inflow=7.99 cfs 0.371 af
Discarded=0.03 cfs 0.056 af Primary=7.94 cfs 0.249 af Outflow=7.96 cfs 0.305 af

Pond 2P: PRETREATMENT2 Peak Elev=883.13' Storage=3,264 cf Inflow=5.95 cfs 0.268 af
Discarded=0.02 cfs 0.043 af Primary=5.91 cfs 0.174 af Outflow=5.93 cfs 0.217 af

Pond 5P: INFILTRATIONBASIN Peak Elev=881.46' Storage=7,174 cf Inflow=16.41 cfs 0.538 af
Discarded=0.08 cfs 0.116 af Primary=5.58 cfs 0.422 af Secondary=0.00 cfs 0.000 af Outflow=5.66 cfs 0.538 af

Link 4L: TOTAL Inflow=5.90 cfs 0.459 af
Primary=5.90 cfs 0.459 af

Total Runoff Area = 7.243 ac Runoff Volume = 0.792 af Average Runoff Depth = 1.31"
49.96% Pervious = 3.619 ac 50.04% Impervious = 3.624 ac

Summary for Subcatchment 1o: OFFSITE TO 1

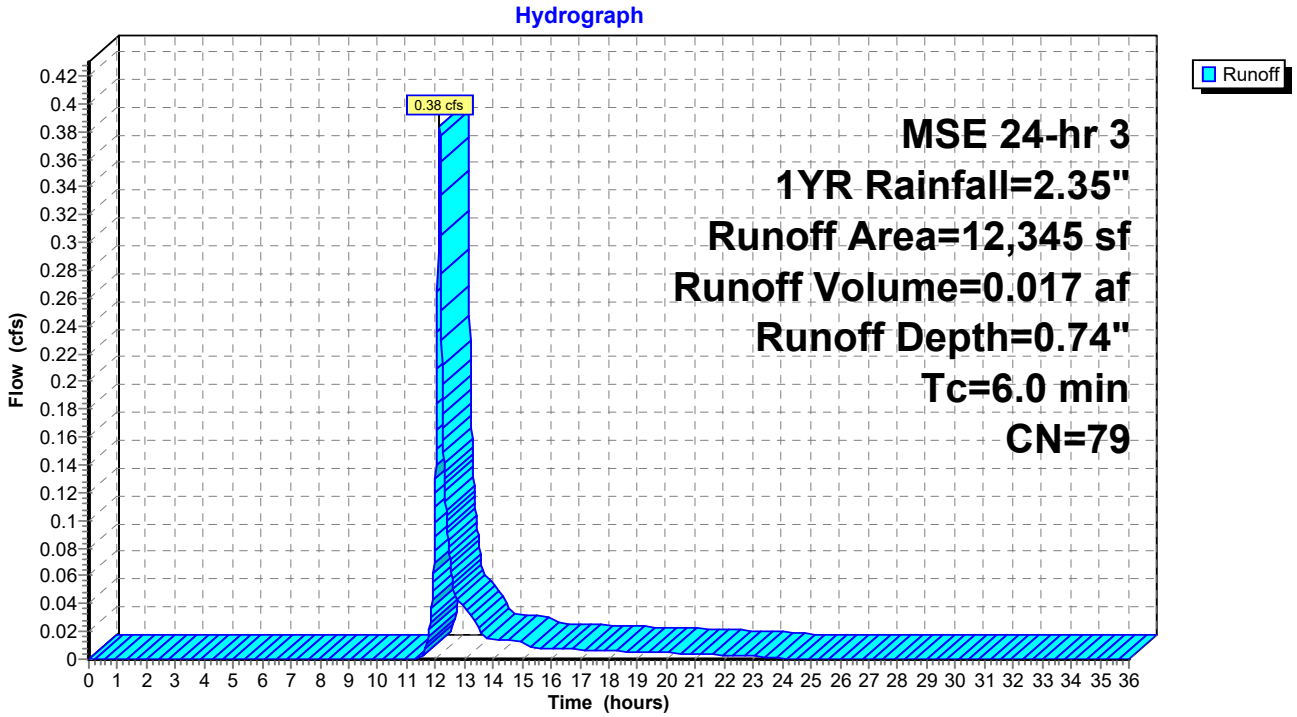
Runoff = 0.38 cfs @ 12.14 hrs, Volume= 0.017 af, Depth= 0.74"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-36.00 hrs, dt= 0.01 hrs
MSE 24-hr 3 1YR Rainfall=2.35"

	Area (sf)	CN	Description
*	12,345	79	>75% Grass cover, Good, HSG C
	12,345		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
6.0					**Direct Entry, 6 Minute Min**

Subcatchment 1o: OFFSITE TO 1



Summary for Subcatchment 1s: SUB 1

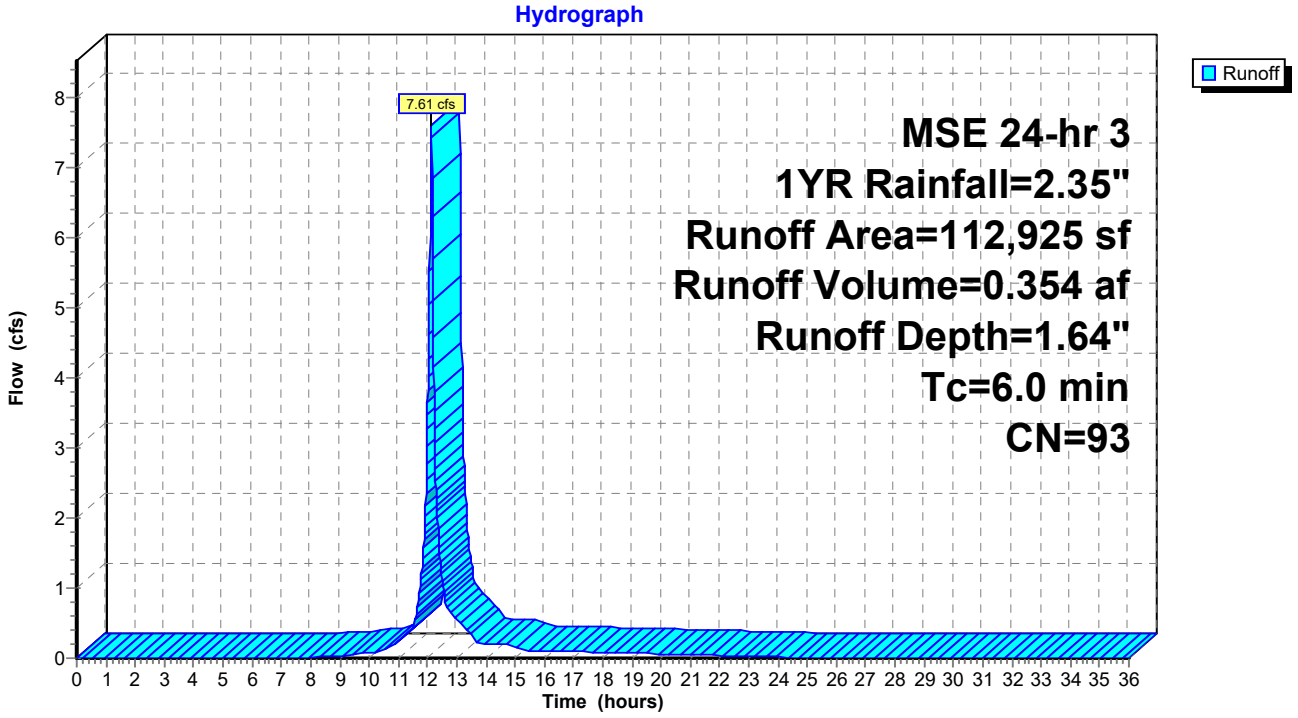
Runoff = 7.61 cfs @ 12.13 hrs, Volume= 0.354 af, Depth= 1.64"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-36.00 hrs, dt= 0.01 hrs
MSE 24-hr 3 1YR Rainfall=2.35"

	Area (sf)	CN	Description
*	37,055	98	Roof
*	45,465	98	Pavement
*	30,405	79	>75% Grass cover, Good, HSG C
	112,925	93	Weighted Average
	30,405		26.92% Pervious Area
	82,520		73.08% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
6.0					**Direct Entry, 6 Minute Min**

Subcatchment 1s: SUB 1



Summary for Subcatchment 2o: OFFSITE TO 2

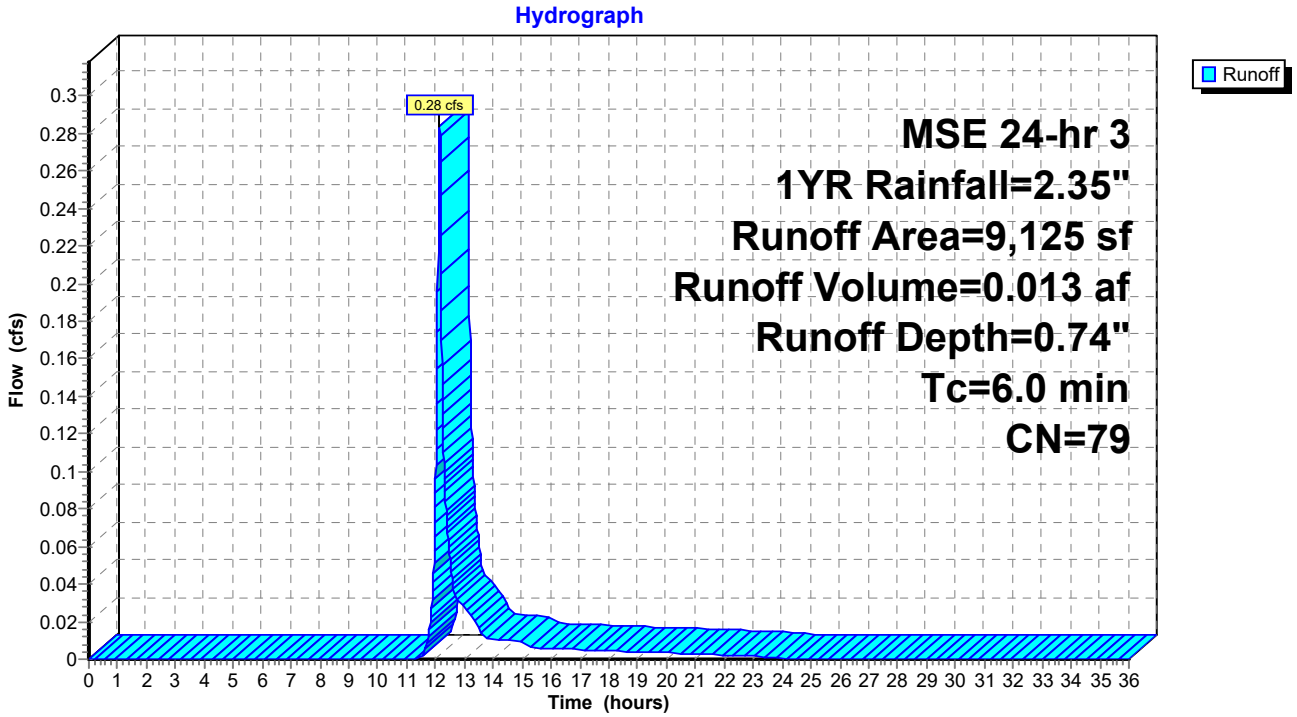
Runoff = 0.28 cfs @ 12.14 hrs, Volume= 0.013 af, Depth= 0.74"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-36.00 hrs, dt= 0.01 hrs
MSE 24-hr 3 1YR Rainfall=2.35"

	Area (sf)	CN	Description
*	9,125	79	>75% Grass cover, Good, HSG C
	9,125		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
6.0					**Direct Entry, 6 MINUTE MIN**

Subcatchment 2o: OFFSITE TO 2



Summary for Subcatchment 2s: SUB 2

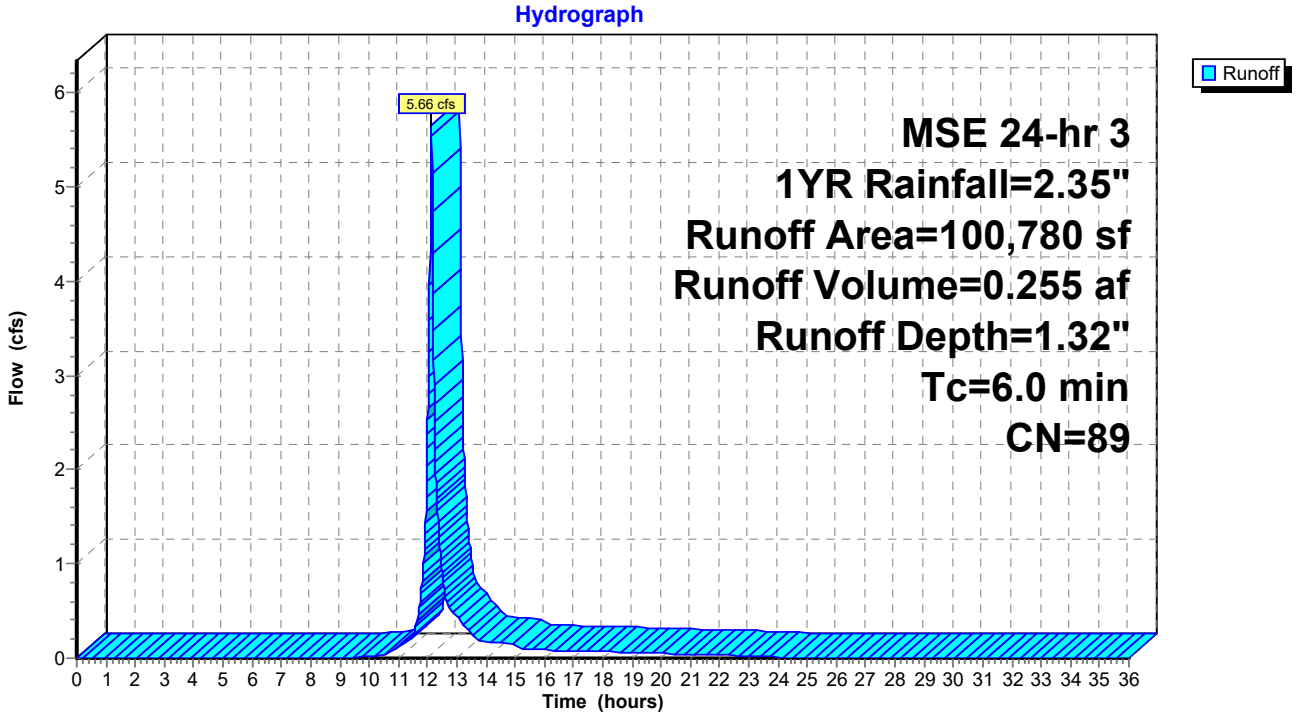
Runoff = 5.66 cfs @ 12.13 hrs, Volume= 0.255 af, Depth= 1.32"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-36.00 hrs, dt= 0.01 hrs
MSE 24-hr 3 1YR Rainfall=2.35"

	Area (sf)	CN	Description
*	45,860	79	>75% Grass cover, Good, HSG C
*	18,000	98	Roofs
*	36,920	98	Paved parking
	100,780	89	Weighted Average
	45,860		45.51% Pervious Area
	54,920		54.49% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
6.0					**Direct Entry, 6 Minute Minimum**

Subcatchment 2s: SUB 2



Summary for Subcatchment B: BASIN

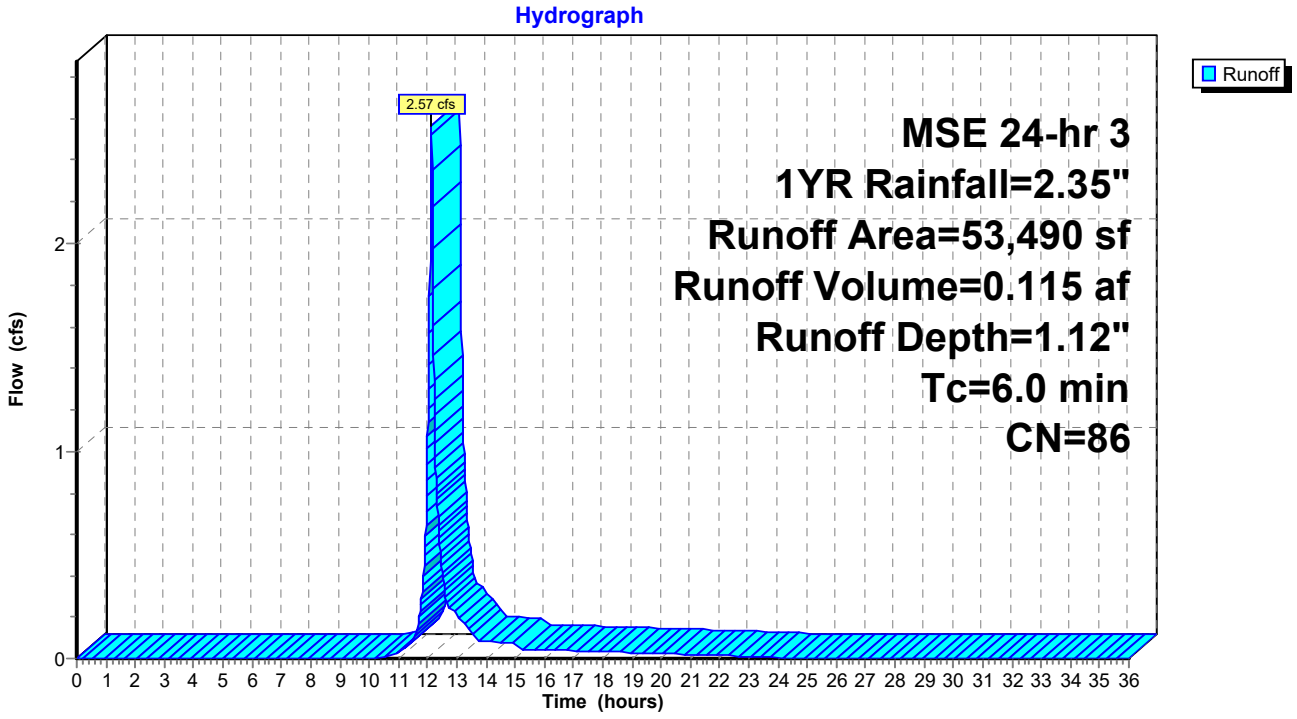
Runoff = 2.57 cfs @ 12.13 hrs, Volume= 0.115 af, Depth= 1.12"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-36.00 hrs, dt= 0.01 hrs
MSE 24-hr 3 1YR Rainfall=2.35"

	Area (sf)	CN	Description
*	20,425	98	Roof
*	33,065	79	>75% Grass cover, Good, HSG C
	53,490	86	Weighted Average
	33,065		61.82% Pervious Area
	20,425		38.18% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
6.0					**Direct Entry, 6 MINUTE MIN**

Subcatchment B: BASIN



Summary for Subcatchment U: UNDETAINED

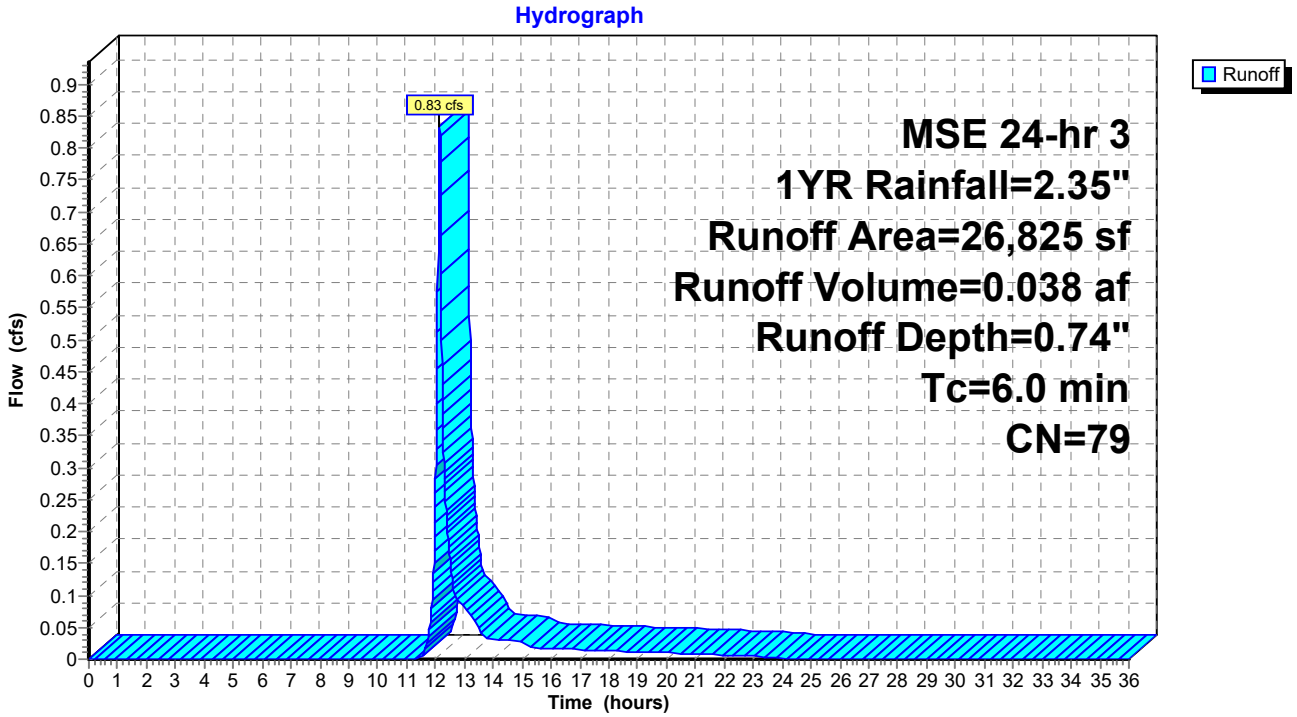
Runoff = 0.83 cfs @ 12.14 hrs, Volume= 0.038 af, Depth= 0.74"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-36.00 hrs, dt= 0.01 hrs
MSE 24-hr 3 1YR Rainfall=2.35"

	Area (sf)	CN	Description
*	26,825	79	>75% Grass cover, Good, HSG C
	26,825		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
6.0					**Direct Entry, 6 Minute Min**

Subcatchment U: UNDETAINED



Summary for Pond 1P: PRETREATMENT 1

Inflow Area = 2.876 ac, 65.87% Impervious, Inflow Depth = 1.55" for 1YR event
Inflow = 7.99 cfs @ 12.13 hrs, Volume= 0.371 af
Outflow = 7.96 cfs @ 12.14 hrs, Volume= 0.305 af, Atten= 0%, Lag= 0.3 min
Discarded = 0.03 cfs @ 12.14 hrs, Volume= 0.056 af
Primary = 7.94 cfs @ 12.14 hrs, Volume= 0.249 af

Routing by Dyn-Stor-Ind method, Time Span= 0.00-36.00 hrs, dt= 0.01 hrs
Peak Elev= 883.16' @ 12.14 hrs Surf.Area= 1,500 sf Storage= 4,239 cf

Plug-Flow detention time= 170.8 min calculated for 0.305 af (82% of inflow)
Center-of-Mass det. time= 112.1 min (901.0 - 788.9)

Volume	Invert	Avail.Storage	Storage Description
#1	880.00'	5,500 cf	**Custom Stage Data (Prismatic)** Listed below (Recalc)

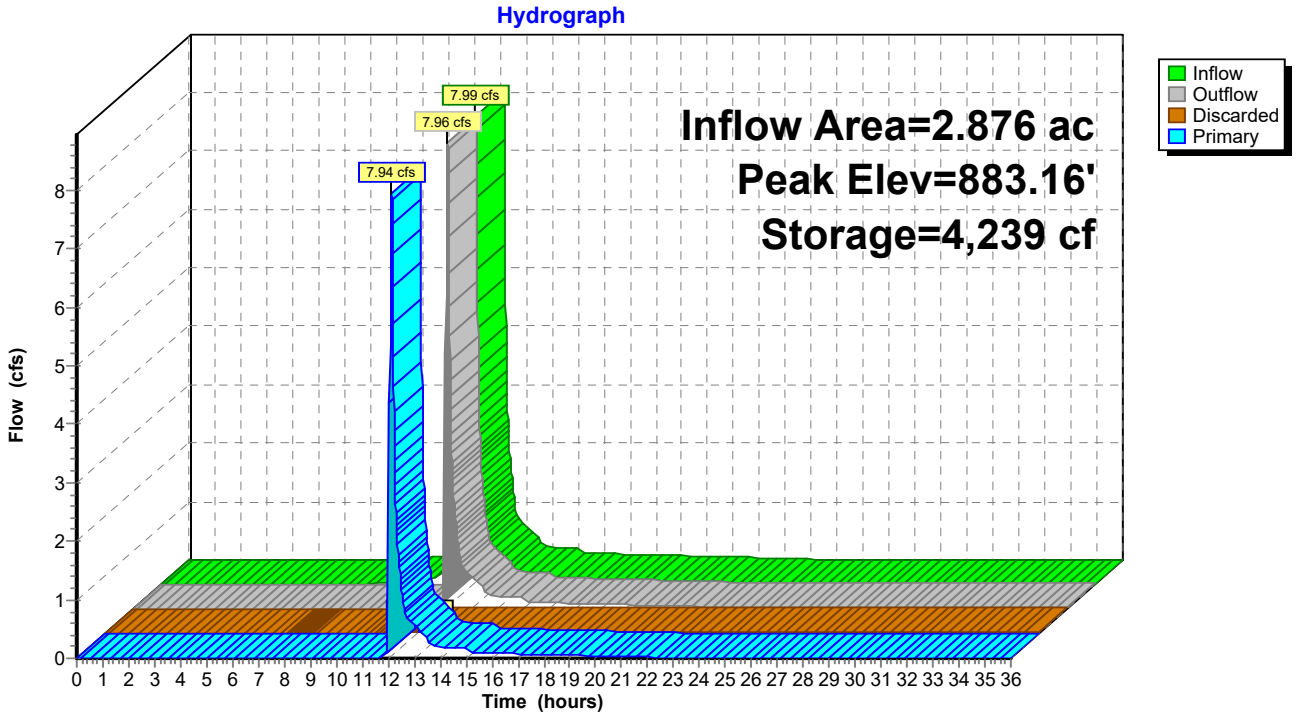
Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
880.00	1,000	0	0
882.00	1,500	2,500	2,500
884.00	1,500	3,000	5,500

Device	Routing	Invert	Outlet Devices
#1	Discarded	880.00'	**0.500 in/hr Exfiltration over Surface area** Conductivity to Groundwater Elevation = 875.00'
#2	Primary	883.00'	**50.0' long x 10.0' breadth Broad-Crested Rectangular Weir** Head (feet) 0.20 0.40 0.60 0.80 1.00 1.20 1.40 1.60 Coef. (English) 2.49 2.56 2.70 2.69 2.68 2.69 2.67 2.64

Discarded OutFlow Max=0.03 cfs @ 12.14 hrs HW=883.16' (Free Discharge)
↑—**1=Exfiltration** (Controls 0.03 cfs)

Primary OutFlow Max=7.92 cfs @ 12.14 hrs HW=883.16' TW=880.87' (Dynamic Tailwater)
↑—**2=Broad-Crested Rectangular Weir** (Weir Controls 7.92 cfs @ 0.99 fps)

Pond 1P: PRETREATMENT 1



Summary for Pond 2P: PRETREATMENT 2

Inflow Area = 2.523 ac, 49.97% Impervious, Inflow Depth = 1.28" for 1YR event
Inflow = 5.95 cfs @ 12.13 hrs, Volume= 0.268 af
Outflow = 5.93 cfs @ 12.14 hrs, Volume= 0.217 af, Atten= 0%, Lag= 0.3 min
Discarded = 0.02 cfs @ 12.14 hrs, Volume= 0.043 af
Primary = 5.91 cfs @ 12.14 hrs, Volume= 0.174 af

Routing by Dyn-Stor-Ind method, Time Span= 0.00-36.00 hrs, dt= 0.01 hrs
Peak Elev= 883.13' @ 12.14 hrs Surf.Area= 1,250 sf Storage= 3,264 cf

Plug-Flow detention time= 186.5 min calculated for 0.217 af (81% of inflow)
Center-of-Mass det. time= 123.7 min (926.1 - 802.4)

Volume	Invert	Avail.Storage	Storage Description
#1	880.00'	4,350 cf	**Custom Stage Data (Prismatic)** Listed below (Recalc)

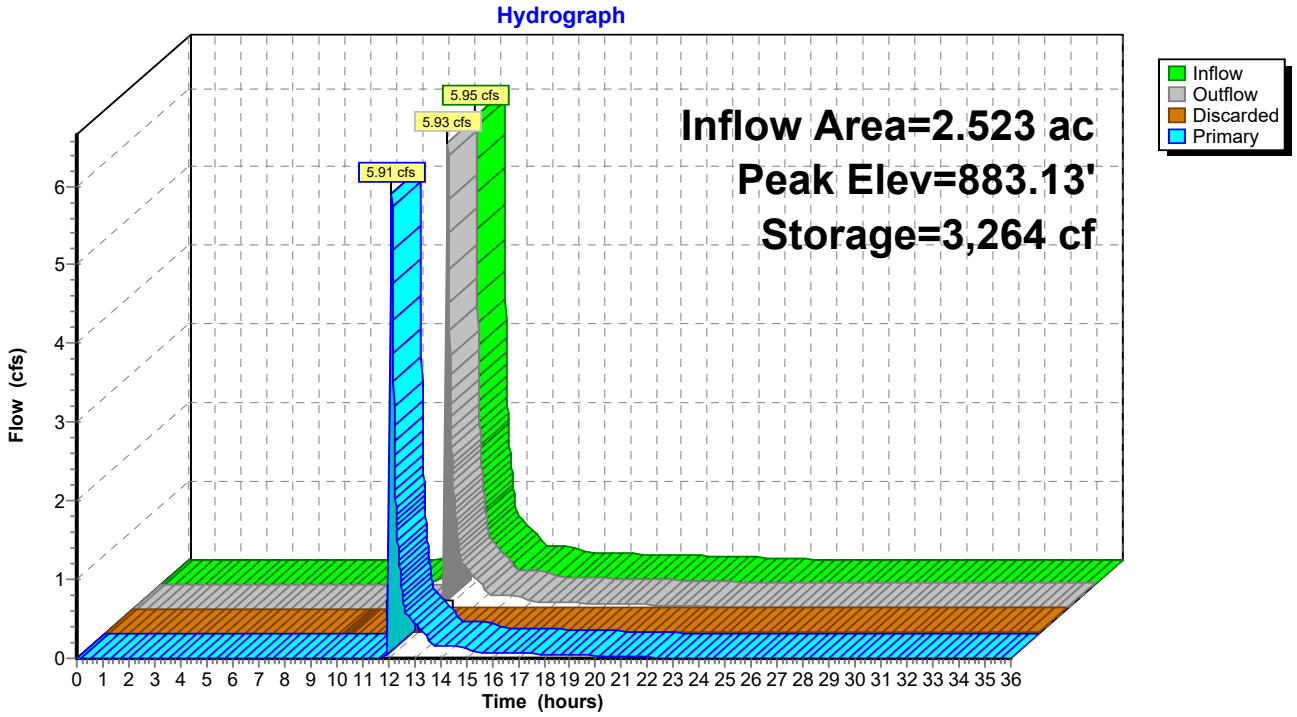
Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
880.00	600	0	0
882.00	1,250	1,850	1,850
884.00	1,250	2,500	4,350

Device	Routing	Invert	Outlet Devices
#1	Discarded	880.00'	**0.500 in/hr Exfiltration over Surface area** Conductivity to Groundwater Elevation = 875.00'
#2	Primary	883.00'	**50.0' long x 10.0' breadth Broad-Crested Rectangular Weir** Head (feet) 0.20 0.40 0.60 0.80 1.00 1.20 1.40 1.60 Coef. (English) 2.49 2.56 2.70 2.69 2.68 2.69 2.67 2.64

Discarded OutFlow Max=0.02 cfs @ 12.14 hrs HW=883.13' (Free Discharge)
↑—**1=Exfiltration** (Controls 0.02 cfs)

Primary OutFlow Max=5.90 cfs @ 12.14 hrs HW=883.13' TW=880.89' (Dynamic Tailwater)
↑—**2=Broad-Crested Rectangular Weir** (Weir Controls 5.90 cfs @ 0.90 fps)

Pond 2P: PRETREATMENT 2



Summary for Pond 5P: INFILTRATION BASIN

Inflow Area = 6.627 ac, 54.69% Impervious, Inflow Depth = 0.97" for 1YR event
Inflow = 16.41 cfs @ 12.14 hrs, Volume= 0.538 af
Outflow = 5.66 cfs @ 12.29 hrs, Volume= 0.538 af, Atten= 66%, Lag= 8.9 min
Discarded = 0.08 cfs @ 12.29 hrs, Volume= 0.116 af
Primary = 5.58 cfs @ 12.29 hrs, Volume= 0.422 af
Secondary = 0.00 cfs @ 0.00 hrs, Volume= 0.000 af

Routing by Dyn-Stor-Ind method, Time Span= 0.00-36.00 hrs, dt= 0.01 hrs
Peak Elev= 881.46' @ 12.29 hrs Surf.Area= 5,825 sf Storage= 7,174 cf

Plug-Flow detention time= 121.2 min calculated for 0.538 af (100% of inflow)
Center-of-Mass det. time= 121.4 min (926.4 - 805.1)

Volume	Invert	Avail.Storage	Storage Description
#1	880.00'	26,000 cf	**Custom Stage Data (Prismatic)** Listed below (Recalc)

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
880.00	4,000	0	0
884.00	9,000	26,000	26,000

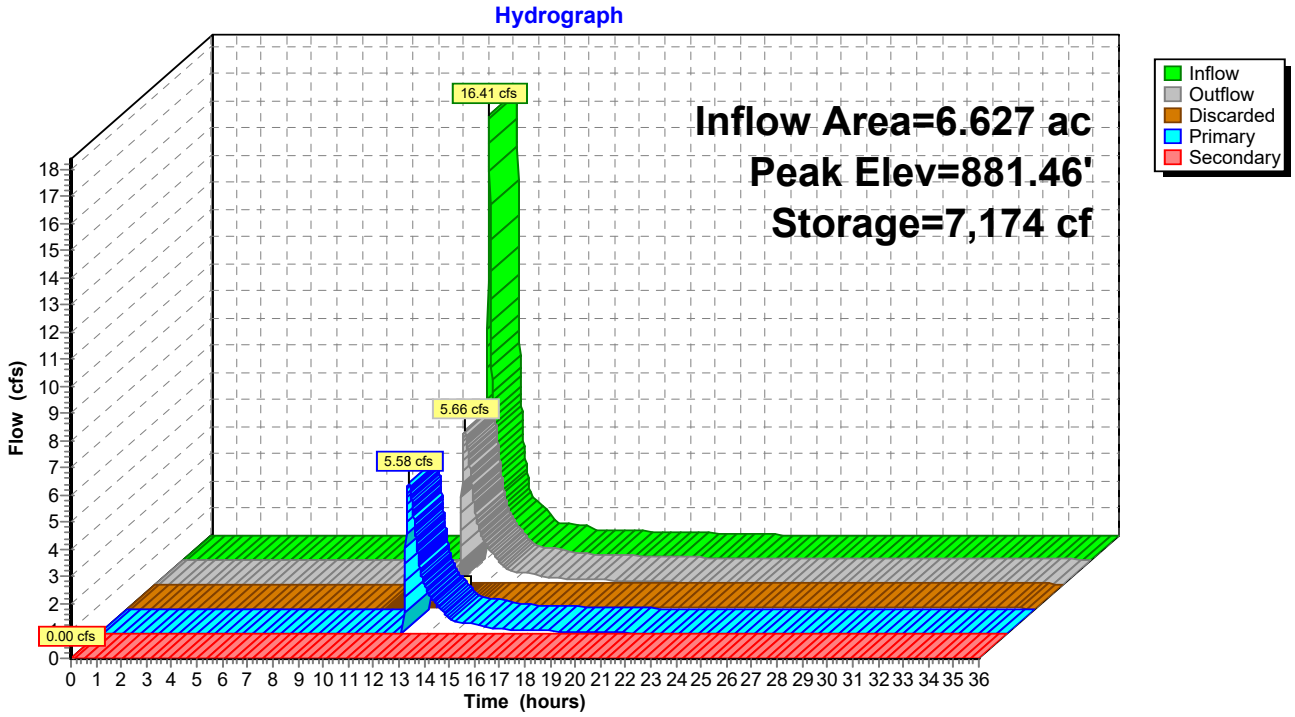
Device	Routing	Invert	Outlet Devices
#1	Primary	879.00'	**27.0" Round Culvert** L= 145.0' RCP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 879.00' / 878.00' S= 0.0069 '/' Cc= 0.900 n= 0.011 Concrete pipe, straight & clean, Flow Area= 3.98 sf
#2	Device 1	880.55'	**24.0" W x 12.0" H Vert. Orifice/Grate** C= 0.600
#3	Device 1	882.30'	**36.0" Horiz. Orifice/Grate** C= 0.600 Limited to weir flow at low heads
#4	Secondary	883.70'	**3.0' long x 3.0' breadth Broad-Crested Rectangular Weir** Head (feet) 0.20 0.40 0.60 0.80 1.00 1.20 1.40 1.60 1.80 2.00 2.50 3.00 3.50 4.00 4.50 Coef. (English) 2.44 2.58 2.68 2.67 2.65 2.64 2.64 2.68 2.68 2.72 2.81 2.92 2.97 3.07 3.32
#5	Discarded	880.00'	**0.500 in/hr Exfiltration over Surface area** Conductivity to Groundwater Elevation = 875.00'

Discarded OutFlow Max=0.08 cfs @ 12.29 hrs HW=881.46' (Free Discharge)
└**5=Exfiltration** (Controls 0.08 cfs)

Primary OutFlow Max=5.57 cfs @ 12.29 hrs HW=881.46' TW=0.00' (Dynamic Tailwater)
└**1=Culvert** (Passes 5.57 cfs of 22.12 cfs potential flow)
  ├**2=Orifice/Grate** (Orifice Controls 5.57 cfs @ 3.06 fps)
  └**3=Orifice/Grate** (Controls 0.00 cfs)

Secondary OutFlow Max=0.00 cfs @ 0.00 hrs HW=880.00' TW=0.00' (Dynamic Tailwater)
└**4=Broad-Crested Rectangular Weir** (Controls 0.00 cfs)

Pond 5P: INFILTRATION BASIN

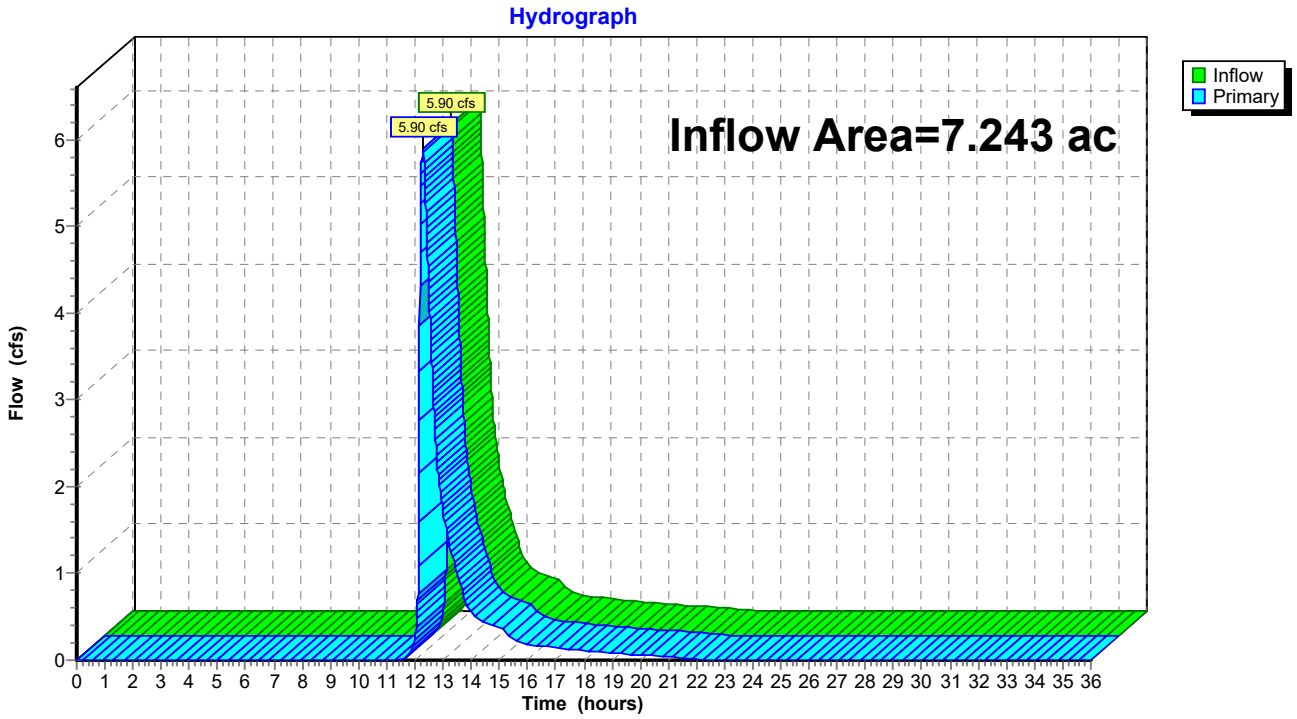


Summary for Link 4L: TOTAL

Inflow Area = 7.243 ac, 50.04% Impervious, Inflow Depth = 0.76" for 1YR event
Inflow = 5.90 cfs @ 12.28 hrs, Volume= 0.459 af
Primary = 5.90 cfs @ 12.28 hrs, Volume= 0.459 af, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 0.00-36.00 hrs, dt= 0.01 hrs

Link 4L: TOTAL



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

Subcatchment1o: OFFSITE TO 1 Runoff Area=12,345 sf 0.00% Impervious Runoff Depth=0.97"
Tc=6.0 min CN=79 Runoff=0.49 cfs 0.023 af

Subcatchment1s: SUB 1 Runoff Area=112,925 sf 73.08% Impervious Runoff Depth=1.97"
Tc=6.0 min CN=93 Runoff=8.65 cfs 0.425 af

Subcatchment2o: OFFSITE TO 2 Runoff Area=9,125 sf 0.00% Impervious Runoff Depth=0.97"
Tc=6.0 min CN=79 Runoff=0.36 cfs 0.017 af

Subcatchment2s: SUB 2 Runoff Area=100,780 sf 54.49% Impervious Runoff Depth=1.63"
Tc=6.0 min CN=89 Runoff=6.63 cfs 0.314 af

SubcatchmentB: BASIN Runoff Area=53,490 sf 38.18% Impervious Runoff Depth=1.41"
Tc=6.0 min CN=86 Runoff=3.08 cfs 0.144 af

SubcatchmentU: UNDETAINED Runoff Area=26,825 sf 0.00% Impervious Runoff Depth=0.97"
Tc=6.0 min CN=79 Runoff=1.07 cfs 0.050 af

Pond 1P: PRETREATMENT1 Peak Elev=883.17' Storage=4,262 cf Inflow=9.14 cfs 0.448 af
Discarded=0.03 cfs 0.059 af Primary=9.09 cfs 0.322 af Outflow=9.12 cfs 0.381 af

Pond 2P: PRETREATMENT2 Peak Elev=883.15' Storage=3,283 cf Inflow=6.99 cfs 0.331 af
Discarded=0.02 cfs 0.045 af Primary=6.96 cfs 0.235 af Outflow=6.98 cfs 0.280 af

Pond 5P: INFILTRATIONBASIN Peak Elev=881.81' Storage=9,278 cf Inflow=19.13 cfs 0.701 af
Discarded=0.09 cfs 0.125 af Primary=8.22 cfs 0.570 af Secondary=0.00 cfs 0.000 af Outflow=8.31 cfs 0.695 af

Link 4L: TOTAL Inflow=8.74 cfs 0.620 af
Primary=8.74 cfs 0.620 af

Total Runoff Area = 7.243 ac Runoff Volume = 0.974 af Average Runoff Depth = 1.61"
49.96% Pervious = 3.619 ac 50.04% Impervious = 3.624 ac

Summary for Subcatchment 1o: OFFSITE TO 1

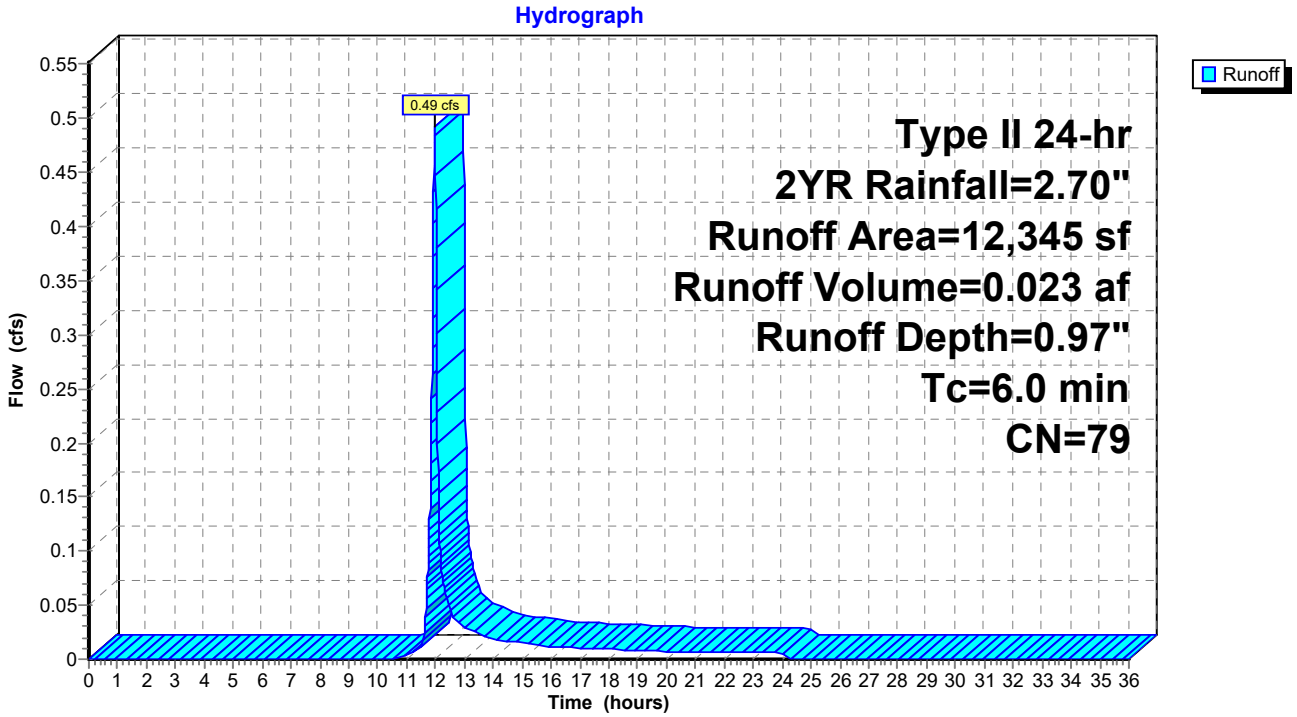
Runoff = 0.49 cfs @ 11.98 hrs, Volume= 0.023 af, Depth= 0.97"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-36.00 hrs, dt= 0.01 hrs
Type II 24-hr 2YR Rainfall=2.70"

	Area (sf)	CN	Description
*	12,345	79	>75% Grass cover, Good, HSG C
	12,345		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
6.0					**Direct Entry, 6 Minute Min**

Subcatchment 1o: OFFSITE TO 1



Summary for Subcatchment 1s: SUB 1

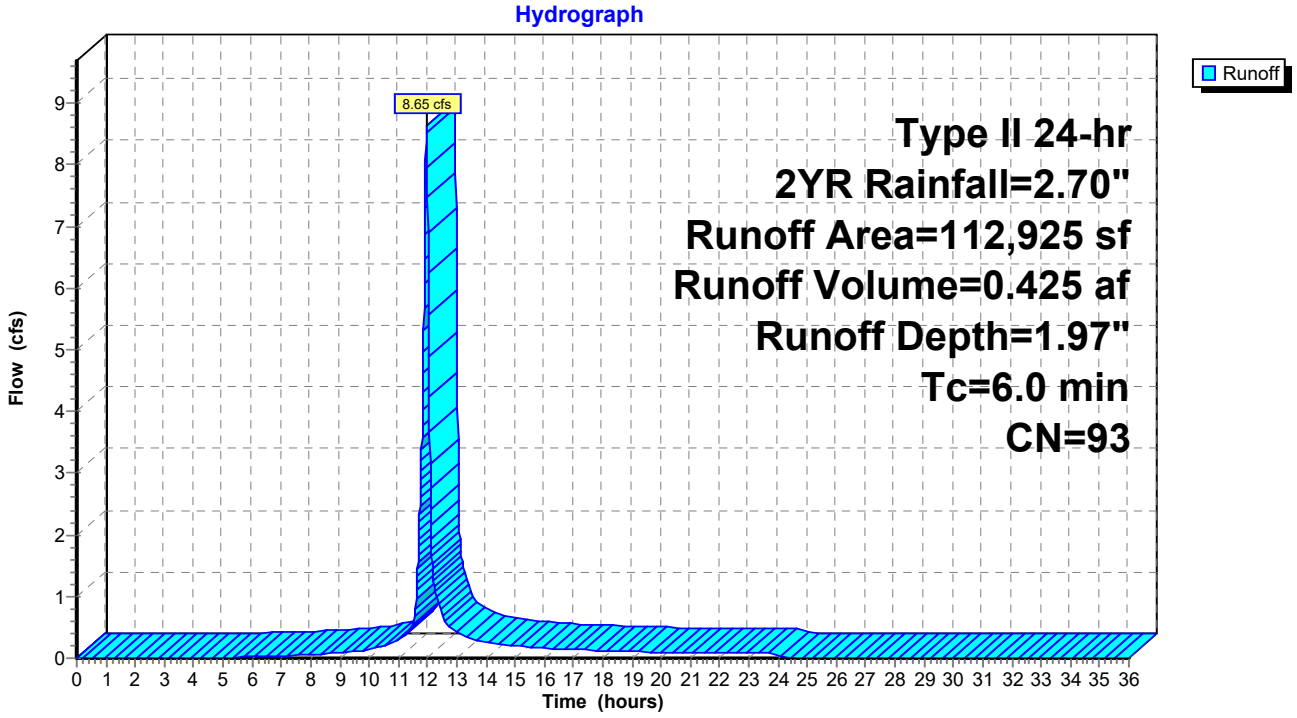
Runoff = 8.65 cfs @ 11.97 hrs, Volume= 0.425 af, Depth= 1.97"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-36.00 hrs, dt= 0.01 hrs
Type II 24-hr 2YR Rainfall=2.70"

	Area (sf)	CN	Description
*	37,055	98	Roof
*	45,465	98	Pavement
*	30,405	79	>75% Grass cover, Good, HSG C
	112,925	93	Weighted Average
	30,405		26.92% Pervious Area
	82,520		73.08% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
6.0					**Direct Entry, 6 Minute Min**

Subcatchment 1s: SUB 1



Summary for Subcatchment 2o: OFFSITE TO 2

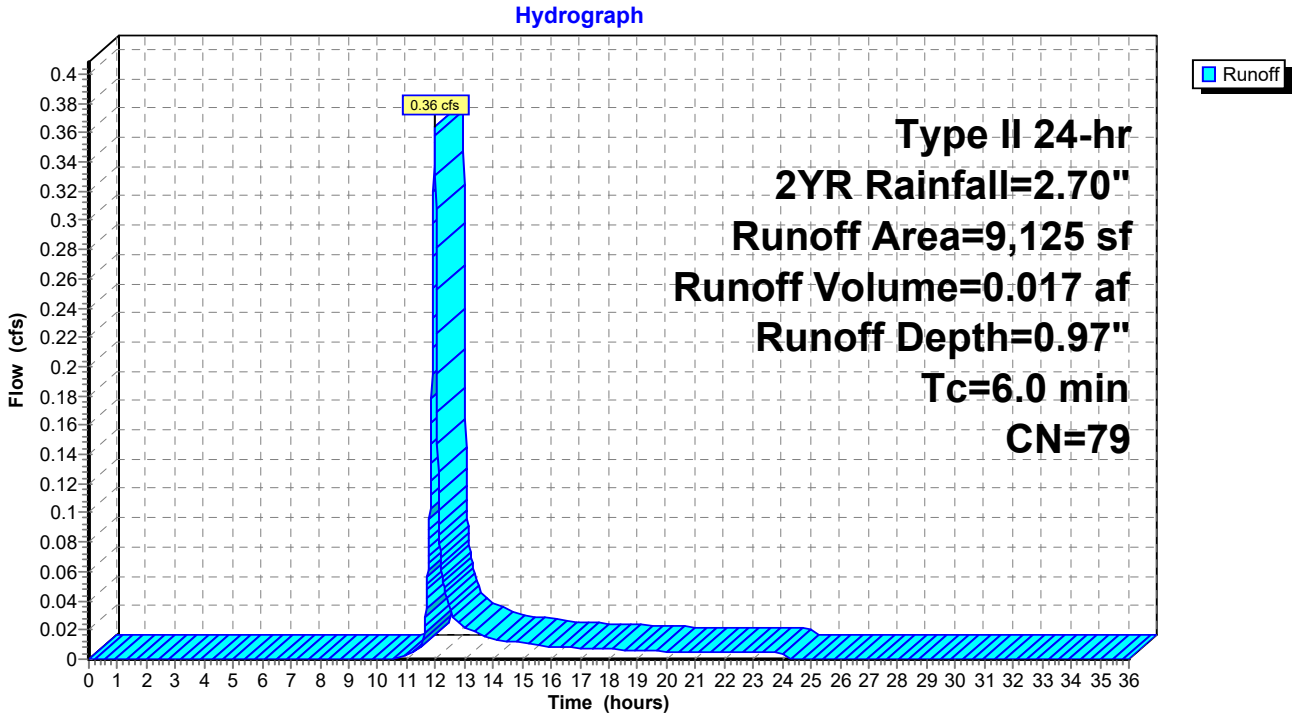
Runoff = 0.36 cfs @ 11.98 hrs, Volume= 0.017 af, Depth= 0.97"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-36.00 hrs, dt= 0.01 hrs
Type II 24-hr 2YR Rainfall=2.70"

	Area (sf)	CN	Description
*	9,125	79	>75% Grass cover, Good, HSG C
	9,125		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
6.0					**Direct Entry, 6 MINUTE MIN**

Subcatchment 2o: OFFSITE TO 2



Summary for Subcatchment 2s: SUB 2

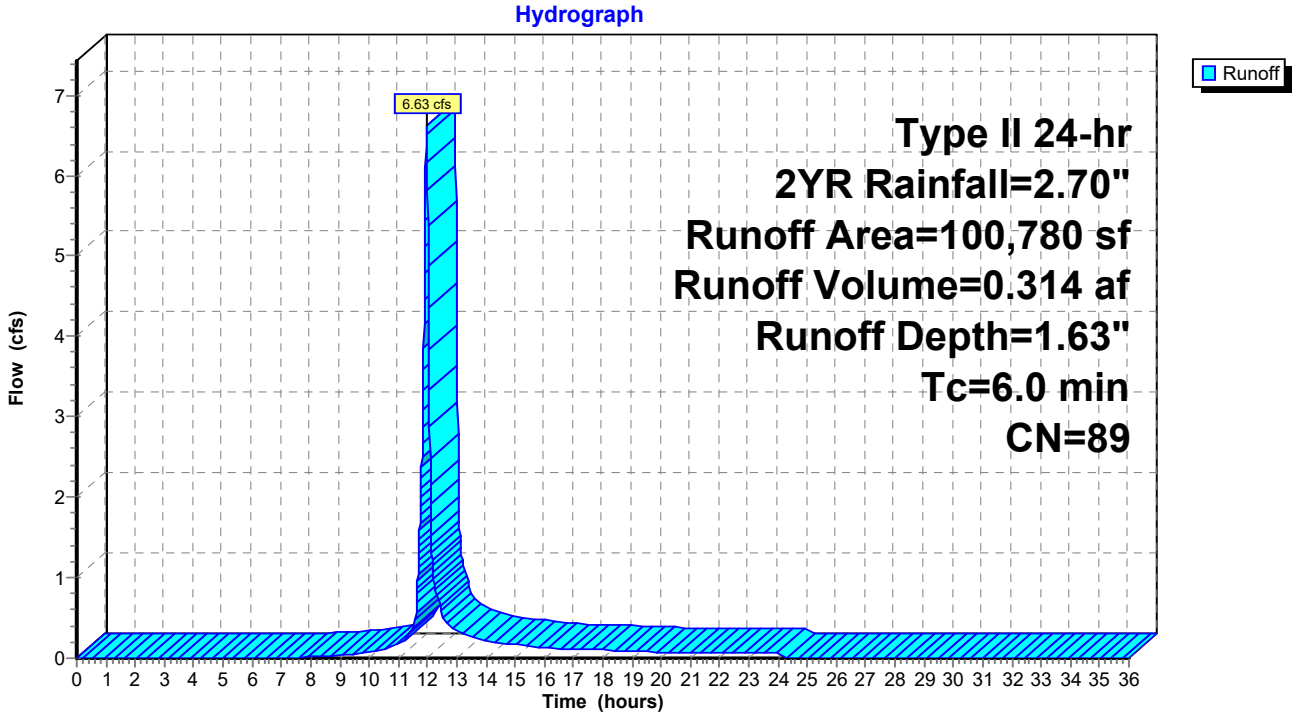
Runoff = 6.63 cfs @ 11.97 hrs, Volume= 0.314 af, Depth= 1.63"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-36.00 hrs, dt= 0.01 hrs
Type II 24-hr 2YR Rainfall=2.70"

	Area (sf)	CN	Description
*	45,860	79	>75% Grass cover, Good, HSG C
*	18,000	98	Roofs
*	36,920	98	Paved parking
	100,780	89	Weighted Average
	45,860		45.51% Pervious Area
	54,920		54.49% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
6.0					**Direct Entry, 6 Minute Minimum**

Subcatchment 2s: SUB 2



Summary for Subcatchment B: BASIN

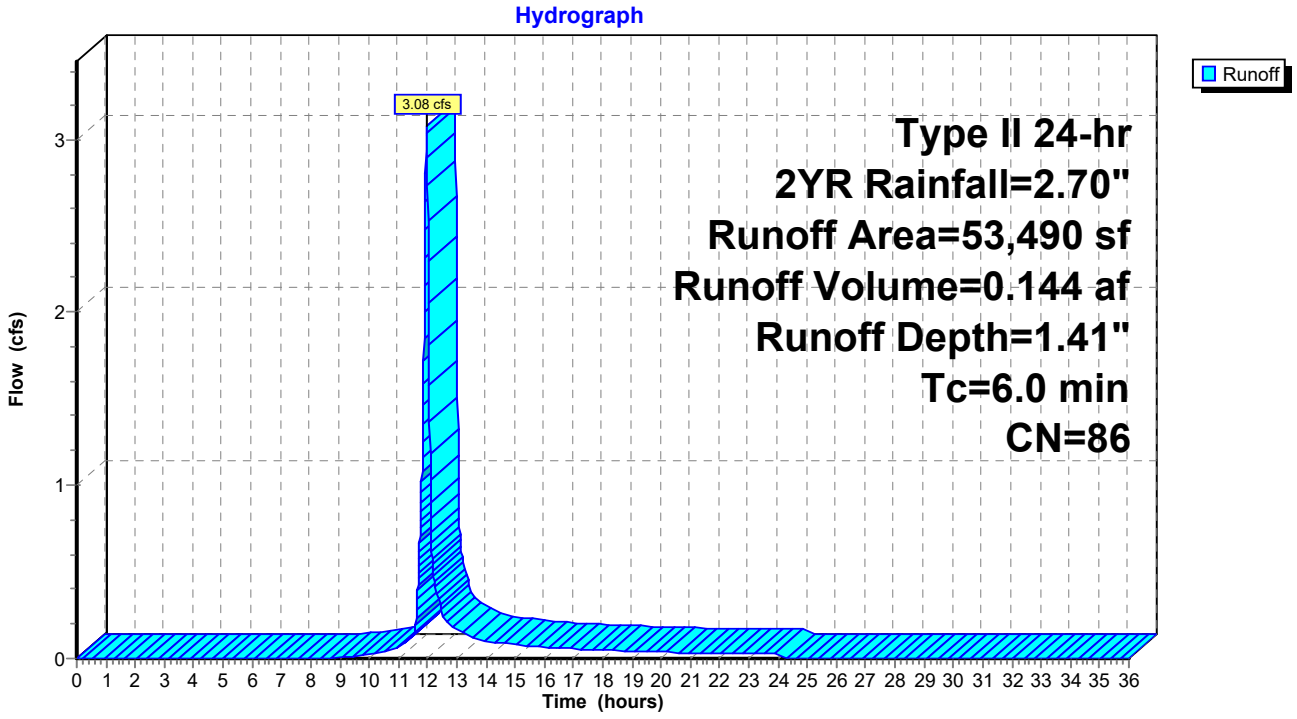
Runoff = 3.08 cfs @ 11.97 hrs, Volume= 0.144 af, Depth= 1.41"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-36.00 hrs, dt= 0.01 hrs
Type II 24-hr 2YR Rainfall=2.70"

	Area (sf)	CN	Description
*	20,425	98	Roof
*	33,065	79	>75% Grass cover, Good, HSG C
	53,490	86	Weighted Average
	33,065		61.82% Pervious Area
	20,425		38.18% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
6.0					**Direct Entry, 6 MINUTE MIN**

Subcatchment B: BASIN



Summary for Subcatchment U: UNDETAINED

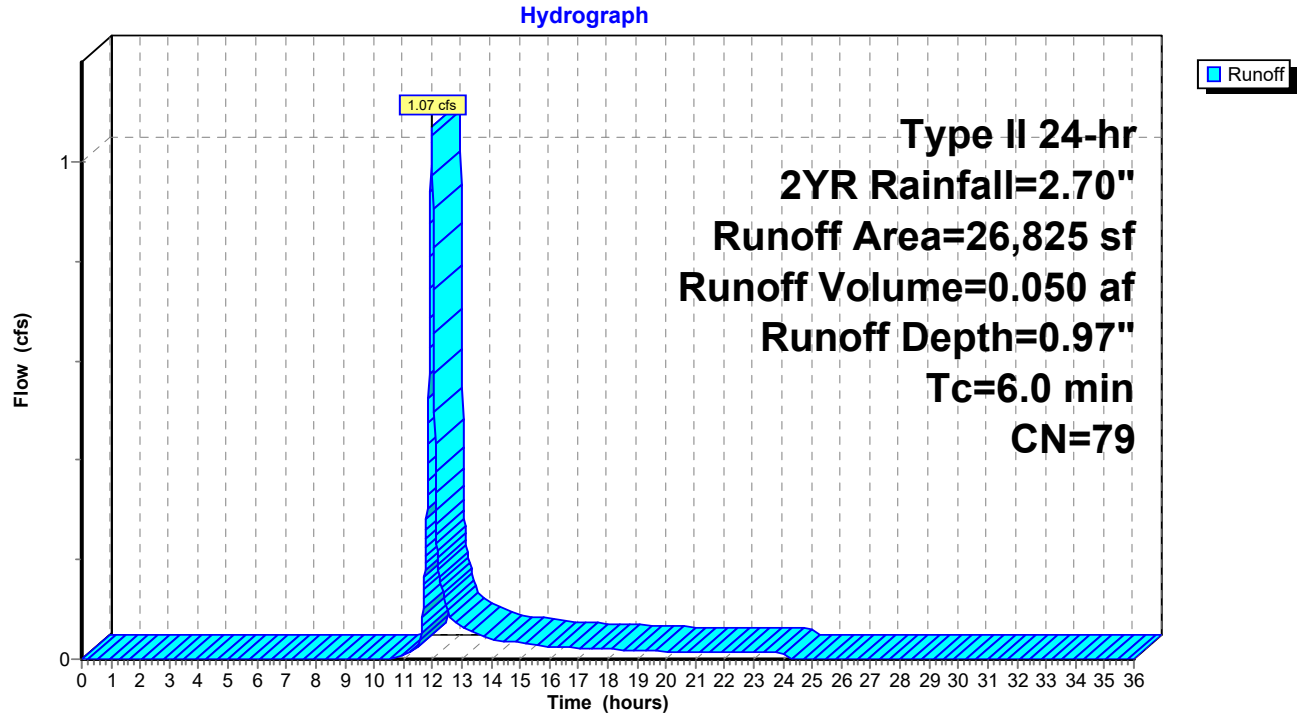
Runoff = 1.07 cfs @ 11.98 hrs, Volume= 0.050 af, Depth= 0.97"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-36.00 hrs, dt= 0.01 hrs
Type II 24-hr 2YR Rainfall=2.70"

	Area (sf)	CN	Description
*	26,825	79	>75% Grass cover, Good, HSG C
	26,825		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
6.0					**Direct Entry, 6 Minute Min**

Subcatchment U: UNDETAINED



Summary for Pond 1P: PRETREATMENT 1

Inflow Area = 2.876 ac, 65.87% Impervious, Inflow Depth = 1.87" for 2YR event
Inflow = 9.14 cfs @ 11.97 hrs, Volume= 0.448 af
Outflow = 9.12 cfs @ 11.98 hrs, Volume= 0.381 af, Atten= 0%, Lag= 0.3 min
Discarded = 0.03 cfs @ 11.98 hrs, Volume= 0.059 af
Primary = 9.09 cfs @ 11.98 hrs, Volume= 0.322 af

Routing by Dyn-Stor-Ind method, Time Span= 0.00-36.00 hrs, dt= 0.01 hrs
Peak Elev= 883.17' @ 11.98 hrs Surf.Area= 1,500 sf Storage= 4,262 cf

Plug-Flow detention time= 168.6 min calculated for 0.381 af (85% of inflow)
Center-of-Mass det. time= 100.2 min (898.7 - 798.4)

Volume	Invert	Avail.Storage	Storage Description
#1	880.00'	5,500 cf	**Custom Stage Data (Prismatic)** Listed below (Recalc)

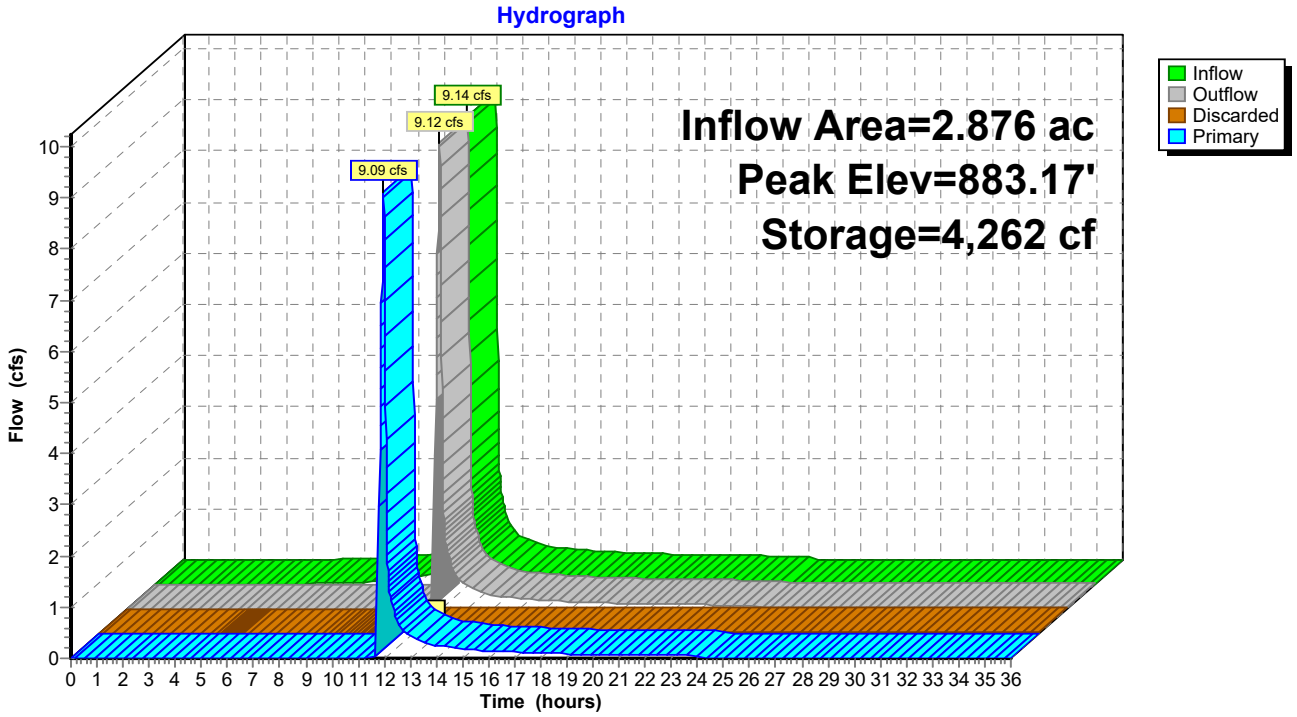
Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
880.00	1,000	0	0
882.00	1,500	2,500	2,500
884.00	1,500	3,000	5,500

Device	Routing	Invert	Outlet Devices
#1	Discarded	880.00'	**0.500 in/hr Exfiltration over Surface area** Conductivity to Groundwater Elevation = 875.00'
#2	Primary	883.00'	**50.0' long x 10.0' breadth Broad-Crested Rectangular Weir** Head (feet) 0.20 0.40 0.60 0.80 1.00 1.20 1.40 1.60 Coef. (English) 2.49 2.56 2.70 2.69 2.68 2.69 2.67 2.64

Discarded OutFlow Max=0.03 cfs @ 11.98 hrs HW=883.17' (Free Discharge)
↑—**1=Exfiltration** (Controls 0.03 cfs)

Primary OutFlow Max=9.07 cfs @ 11.98 hrs HW=883.17' TW=881.36' (Dynamic Tailwater)
↑—**2=Broad-Crested Rectangular Weir** (Weir Controls 9.07 cfs @ 1.04 fps)

Pond 1P: PRETREATMENT 1



Summary for Pond 2P: PRETREATMENT 2

Inflow Area = 2.523 ac, 49.97% Impervious, Inflow Depth = 1.58" for 2YR event
Inflow = 6.99 cfs @ 11.97 hrs, Volume= 0.331 af
Outflow = 6.98 cfs @ 11.98 hrs, Volume= 0.280 af, Atten= 0%, Lag= 0.3 min
Discarded = 0.02 cfs @ 11.98 hrs, Volume= 0.045 af
Primary = 6.96 cfs @ 11.98 hrs, Volume= 0.235 af

Routing by Dyn-Stor-Ind method, Time Span= 0.00-36.00 hrs, dt= 0.01 hrs
Peak Elev= 883.15' @ 11.98 hrs Surf.Area= 1,250 sf Storage= 3,283 cf

Plug-Flow detention time= 174.9 min calculated for 0.280 af (84% of inflow)
Center-of-Mass det. time= 104.7 min (921.6 - 816.9)

Volume	Invert	Avail.Storage	Storage Description
#1	880.00'	4,350 cf	**Custom Stage Data (Prismatic)** Listed below (Recalc)

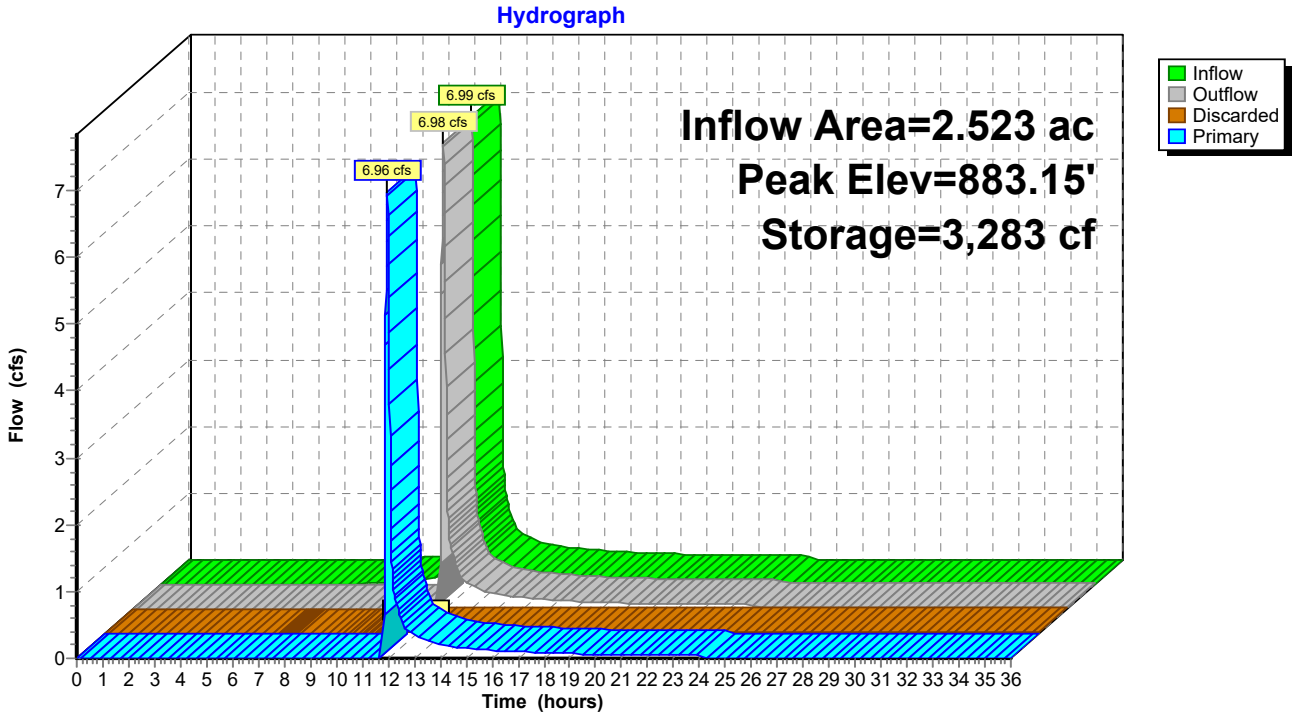
Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
880.00	600	0	0
882.00	1,250	1,850	1,850
884.00	1,250	2,500	4,350

Device	Routing	Invert	Outlet Devices
#1	Discarded	880.00'	**0.500 in/hr Exfiltration over Surface area** Conductivity to Groundwater Elevation = 875.00'
#2	Primary	883.00'	**50.0' long x 10.0' breadth Broad-Crested Rectangular Weir** Head (feet) 0.20 0.40 0.60 0.80 1.00 1.20 1.40 1.60 Coef. (English) 2.49 2.56 2.70 2.69 2.68 2.69 2.67 2.64

Discarded OutFlow Max=0.02 cfs @ 11.98 hrs HW=883.15' (Free Discharge)
↑—**1=Exfiltration** (Controls 0.02 cfs)

Primary OutFlow Max=6.95 cfs @ 11.98 hrs HW=883.15' TW=881.37' (Dynamic Tailwater)
↑—**2=Broad-Crested Rectangular Weir** (Weir Controls 6.95 cfs @ 0.95 fps)

Pond 2P: PRETREATMENT 2



Summary for Pond 5P: INFILTRATION BASIN

Inflow Area = 6.627 ac, 54.69% Impervious, Inflow Depth = 1.27" for 2YR event
Inflow = 19.13 cfs @ 11.98 hrs, Volume= 0.701 af
Outflow = 8.31 cfs @ 12.08 hrs, Volume= 0.695 af, Atten= 57%, Lag= 6.0 min
Discarded = 0.09 cfs @ 12.08 hrs, Volume= 0.125 af
Primary = 8.22 cfs @ 12.08 hrs, Volume= 0.570 af
Secondary = 0.00 cfs @ 0.00 hrs, Volume= 0.000 af

Routing by Dyn-Stor-Ind method, Time Span= 0.00-36.00 hrs, dt= 0.01 hrs
Peak Elev= 881.81' @ 12.08 hrs Surf.Area= 6,261 sf Storage= 9,278 cf

Plug-Flow detention time= (not calculated: outflow precedes inflow)
Center-of-Mass det. time= 98.4 min (927.7 - 829.2)

Volume	Invert	Avail.Storage	Storage Description
#1	880.00'	26,000 cf	**Custom Stage Data (Prismatic)** Listed below (Recalc)

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
880.00	4,000	0	0
884.00	9,000	26,000	26,000

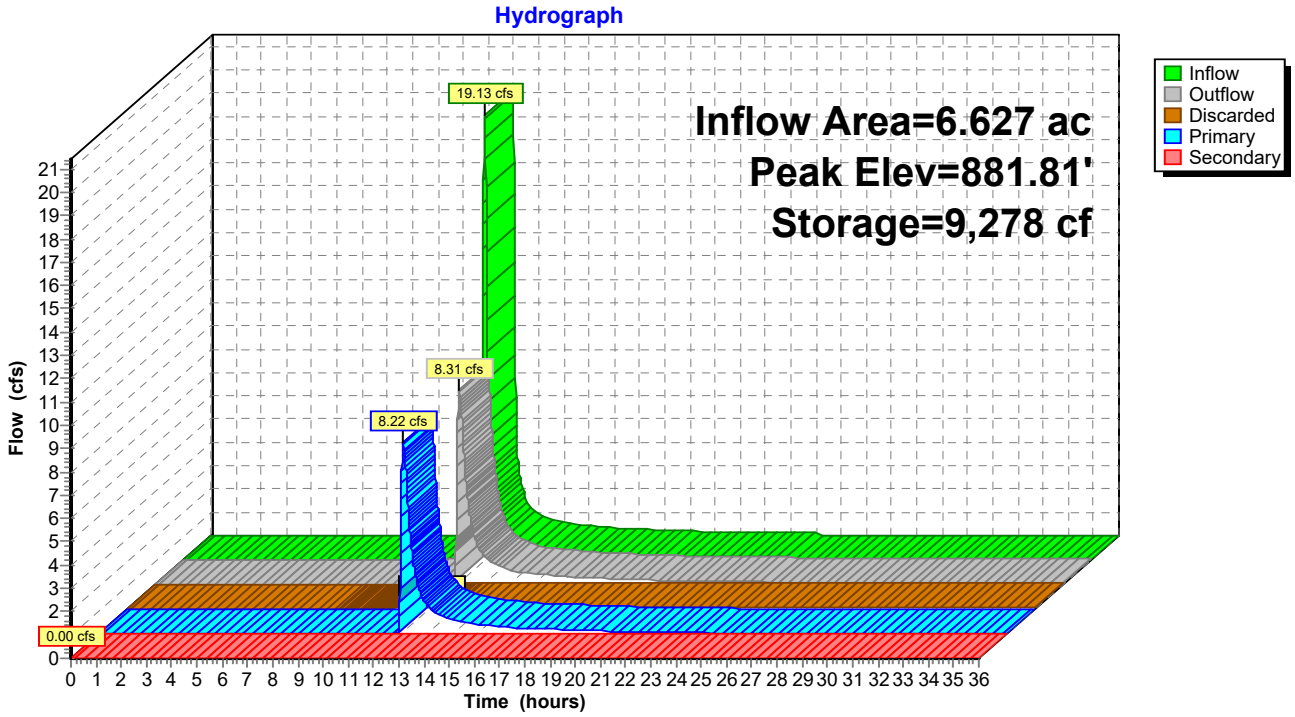
Device	Routing	Invert	Outlet Devices
#1	Primary	879.00'	**27.0" Round Culvert** L= 145.0' RCP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 879.00' / 878.00' S= 0.0069 '/' Cc= 0.900 n= 0.011 Concrete pipe, straight & clean, Flow Area= 3.98 sf
#2	Device 1	880.55'	**24.0" W x 12.0" H Vert. Orifice/Grate** C= 0.600
#3	Device 1	882.30'	**36.0" Horiz. Orifice/Grate** C= 0.600 Limited to weir flow at low heads
#4	Secondary	883.70'	**3.0' long x 3.0' breadth Broad-Crested Rectangular Weir** Head (feet) 0.20 0.40 0.60 0.80 1.00 1.20 1.40 1.60 1.80 2.00 2.50 3.00 3.50 4.00 4.50 Coef. (English) 2.44 2.58 2.68 2.67 2.65 2.64 2.64 2.68 2.68 2.72 2.81 2.92 2.97 3.07 3.32
#5	Discarded	880.00'	**0.500 in/hr Exfiltration over Surface area** Conductivity to Groundwater Elevation = 875.00'

Discarded OutFlow Max=0.09 cfs @ 12.08 hrs HW=881.81' (Free Discharge)
└**5=Exfiltration** (Controls 0.09 cfs)

Primary OutFlow Max=8.22 cfs @ 12.08 hrs HW=881.81' TW=0.00' (Dynamic Tailwater)
└**1=Culvert** (Passes 8.22 cfs of 24.83 cfs potential flow)
  ├**2=Orifice/Grate** (Orifice Controls 8.22 cfs @ 4.11 fps)
  └**3=Orifice/Grate** (Controls 0.00 cfs)

Secondary OutFlow Max=0.00 cfs @ 0.00 hrs HW=880.00' TW=0.00' (Dynamic Tailwater)
└**4=Broad-Crested Rectangular Weir** (Controls 0.00 cfs)

Pond 5P: INFILTRATION BASIN

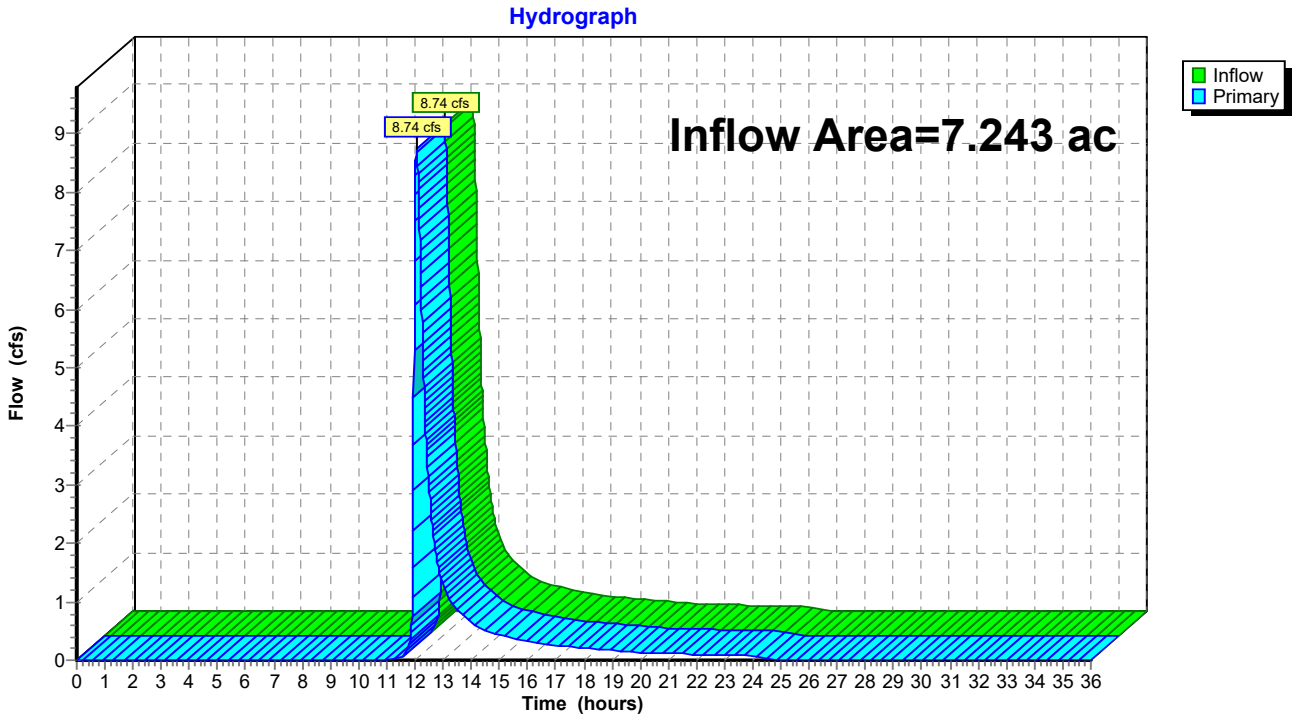


Summary for Link 4L: TOTAL

Inflow Area = 7.243 ac, 50.04% Impervious, Inflow Depth = 1.03" for 2YR event
Inflow = 8.74 cfs @ 12.06 hrs, Volume= 0.620 af
Primary = 8.74 cfs @ 12.06 hrs, Volume= 0.620 af, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 0.00-36.00 hrs, dt= 0.01 hrs

Link 4L: TOTAL



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

Subcatchment1o: OFFSITE TO 1 Runoff Area=12,345 sf 0.00% Impervious Runoff Depth=1.96"
Tc=6.0 min CN=79 Runoff=0.99 cfs 0.046 af

Subcatchment1s: SUB 1 Runoff Area=112,925 sf 73.08% Impervious Runoff Depth=3.22"
Tc=6.0 min CN=93 Runoff=13.71 cfs 0.696 af

Subcatchment2o: OFFSITE TO 2 Runoff Area=9,125 sf 0.00% Impervious Runoff Depth=1.96"
Tc=6.0 min CN=79 Runoff=0.74 cfs 0.034 af

Subcatchment2s: SUB 2 Runoff Area=100,780 sf 54.49% Impervious Runoff Depth=2.82"
Tc=6.0 min CN=89 Runoff=11.16 cfs 0.544 af

SubcatchmentB: BASIN Runoff Area=53,490 sf 38.18% Impervious Runoff Depth=2.55"
Tc=6.0 min CN=86 Runoff=5.45 cfs 0.261 af

SubcatchmentU: UNDETAINED Runoff Area=26,825 sf 0.00% Impervious Runoff Depth=1.96"
Tc=6.0 min CN=79 Runoff=2.16 cfs 0.101 af

Pond 1P: PRETREATMENT1 Peak Elev=883.24' Storage=4,359 cf Inflow=14.70 cfs 0.742 af
Discarded=0.03 cfs 0.063 af Primary=14.65 cfs 0.612 af Outflow=14.67 cfs 0.675 af

Pond 2P: PRETREATMENT2 Peak Elev=883.21' Storage=3,361 cf Inflow=11.90 cfs 0.579 af
Discarded=0.02 cfs 0.048 af Primary=11.86 cfs 0.480 af Outflow=11.88 cfs 0.527 af

Pond 5P: INFILTRATIONBASIN Peak Elev=882.79' Storage=16,023 cf Inflow=31.95 cfs 1.352 af
Discarded=0.12 cfs 0.136 af Primary=23.22 cfs 1.210 af Secondary=0.00 cfs 0.000 af Outflow=23.34 cfs 1.345 af

Link 4L: TOTAL Inflow=24.82 cfs 1.311 af
Primary=24.82 cfs 1.311 af

Total Runoff Area = 7.243 ac Runoff Volume = 1.682 af Average Runoff Depth = 2.79"
49.96% Pervious = 3.619 ac 50.04% Impervious = 3.624 ac

Summary for Subcatchment 1o: OFFSITE TO 1

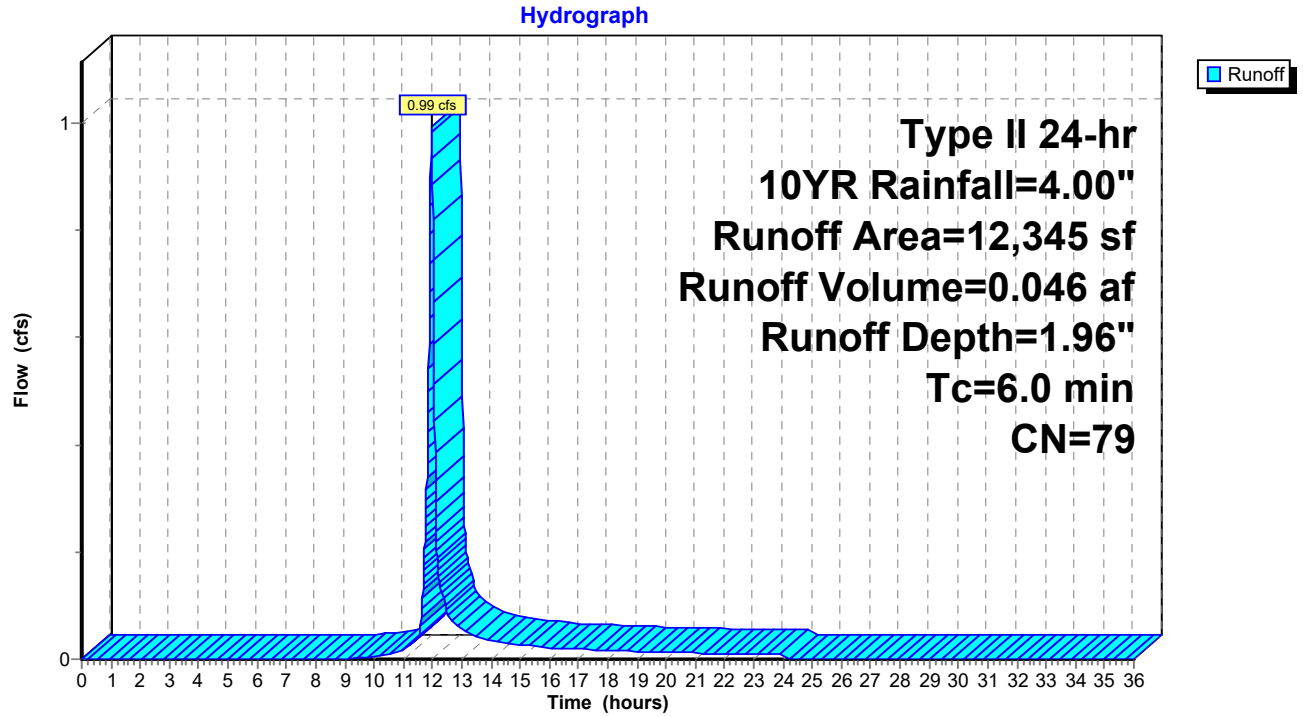
Runoff = 0.99 cfs @ 11.97 hrs, Volume= 0.046 af, Depth= 1.96"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-36.00 hrs, dt= 0.01 hrs
Type II 24-hr 10YR Rainfall=4.00"

	Area (sf)	CN	Description
*	12,345	79	>75% Grass cover, Good, HSG C
	12,345		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
6.0					**Direct Entry, 6 Minute Min**

Subcatchment 1o: OFFSITE TO 1



Summary for Subcatchment 1s: SUB 1

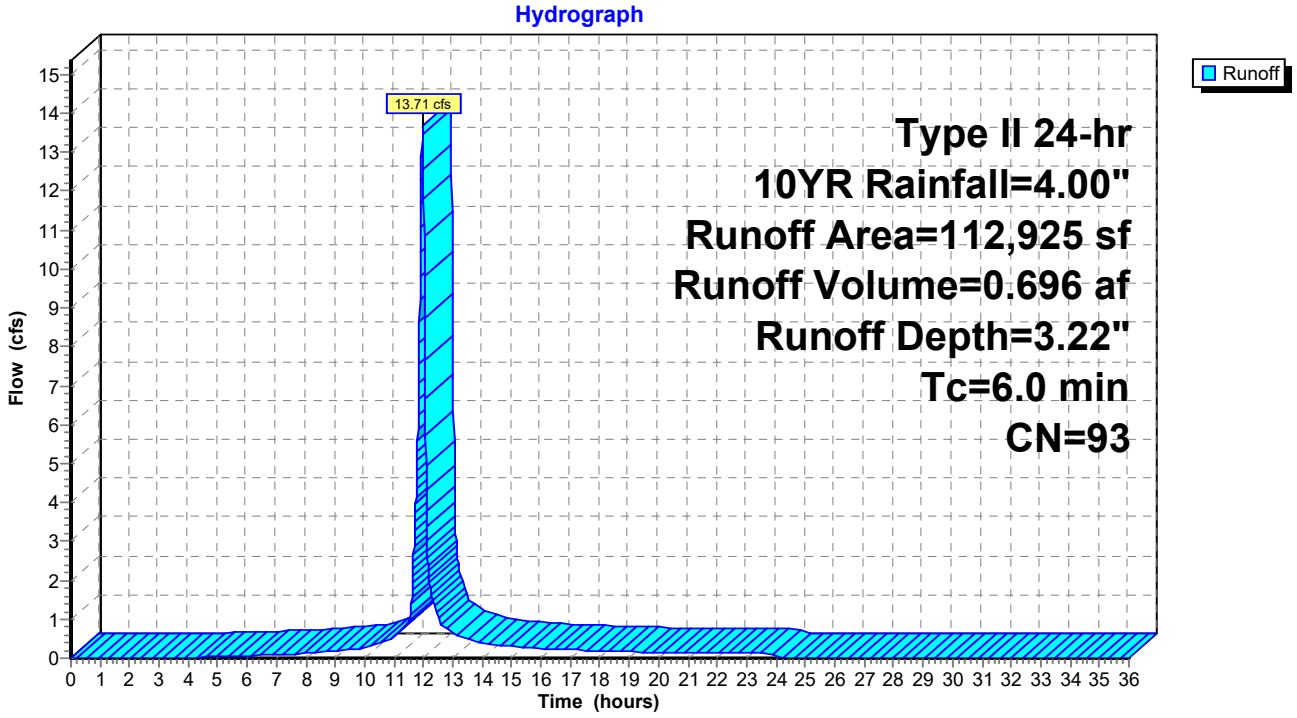
Runoff = 13.71 cfs @ 11.97 hrs, Volume= 0.696 af, Depth= 3.22"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-36.00 hrs, dt= 0.01 hrs
Type II 24-hr 10YR Rainfall=4.00"

	Area (sf)	CN	Description
*	37,055	98	Roof
*	45,465	98	Pavement
*	30,405	79	>75% Grass cover, Good, HSG C
	112,925	93	Weighted Average
	30,405		26.92% Pervious Area
	82,520		73.08% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
6.0					**Direct Entry, 6 Minute Min**

Subcatchment 1s: SUB 1



Summary for Subcatchment 2o: OFFSITE TO 2

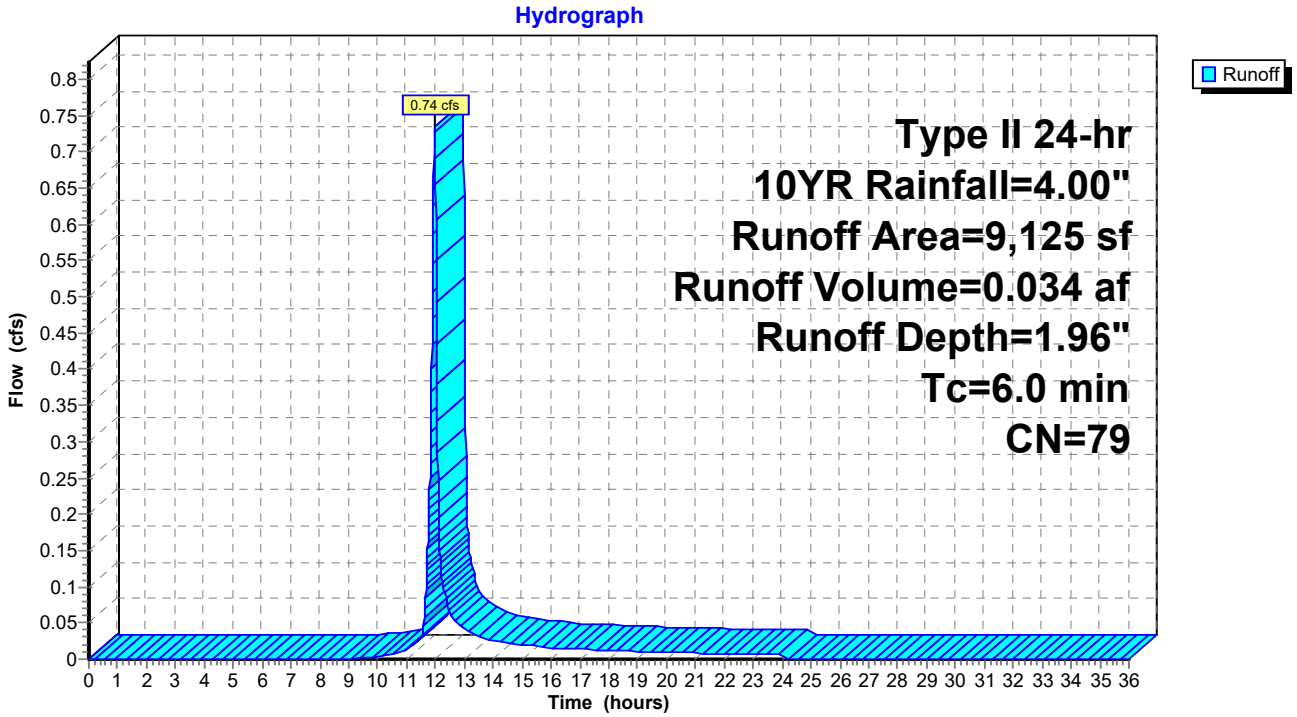
Runoff = 0.74 cfs @ 11.97 hrs, Volume= 0.034 af, Depth= 1.96"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-36.00 hrs, dt= 0.01 hrs
Type II 24-hr 10YR Rainfall=4.00"

	Area (sf)	CN	Description
*	9,125	79	>75% Grass cover, Good, HSG C
	9,125		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
6.0					**Direct Entry, 6 MINUTE MIN**

Subcatchment 2o: OFFSITE TO 2



Summary for Subcatchment 2s: SUB 2

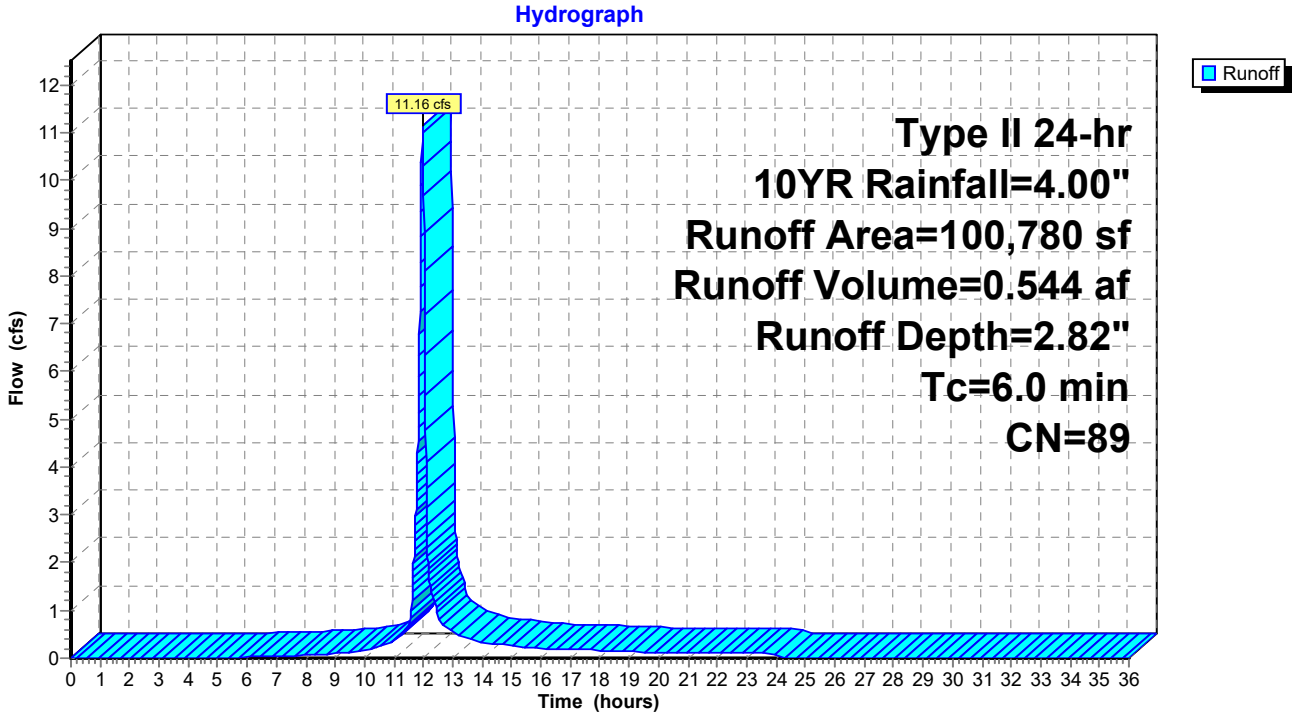
Runoff = 11.16 cfs @ 11.97 hrs, Volume= 0.544 af, Depth= 2.82"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-36.00 hrs, dt= 0.01 hrs
Type II 24-hr 10YR Rainfall=4.00"

	Area (sf)	CN	Description
*	45,860	79	>75% Grass cover, Good, HSG C
*	18,000	98	Roofs
*	36,920	98	Paved parking
	100,780	89	Weighted Average
	45,860		45.51% Pervious Area
	54,920		54.49% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
6.0					**Direct Entry, 6 Minute Minimum**

Subcatchment 2s: SUB 2



Summary for Subcatchment B: BASIN

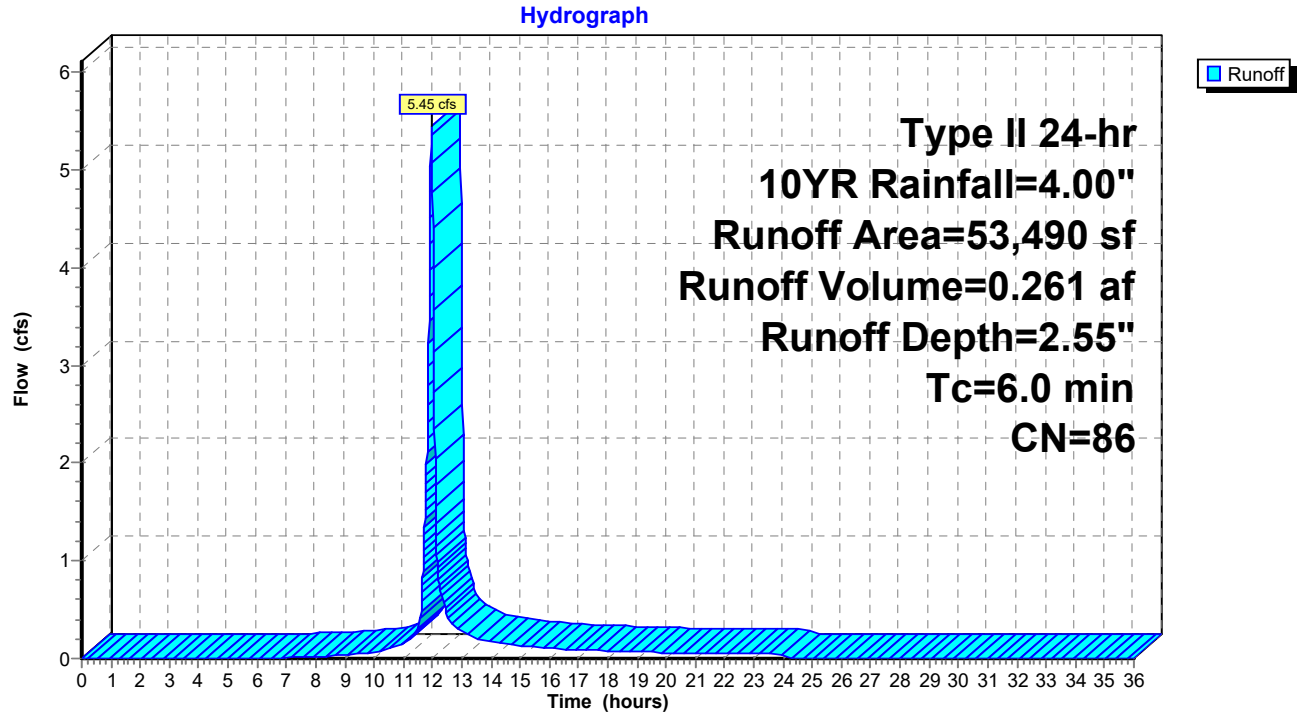
Runoff = 5.45 cfs @ 11.97 hrs, Volume= 0.261 af, Depth= 2.55"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-36.00 hrs, dt= 0.01 hrs
Type II 24-hr 10YR Rainfall=4.00"

	Area (sf)	CN	Description
*	20,425	98	Roof
*	33,065	79	>75% Grass cover, Good, HSG C
	53,490	86	Weighted Average
	33,065		61.82% Pervious Area
	20,425		38.18% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
6.0					**Direct Entry, 6 MINUTE MIN**

Subcatchment B: BASIN



Summary for Subcatchment U: UNDETAINED

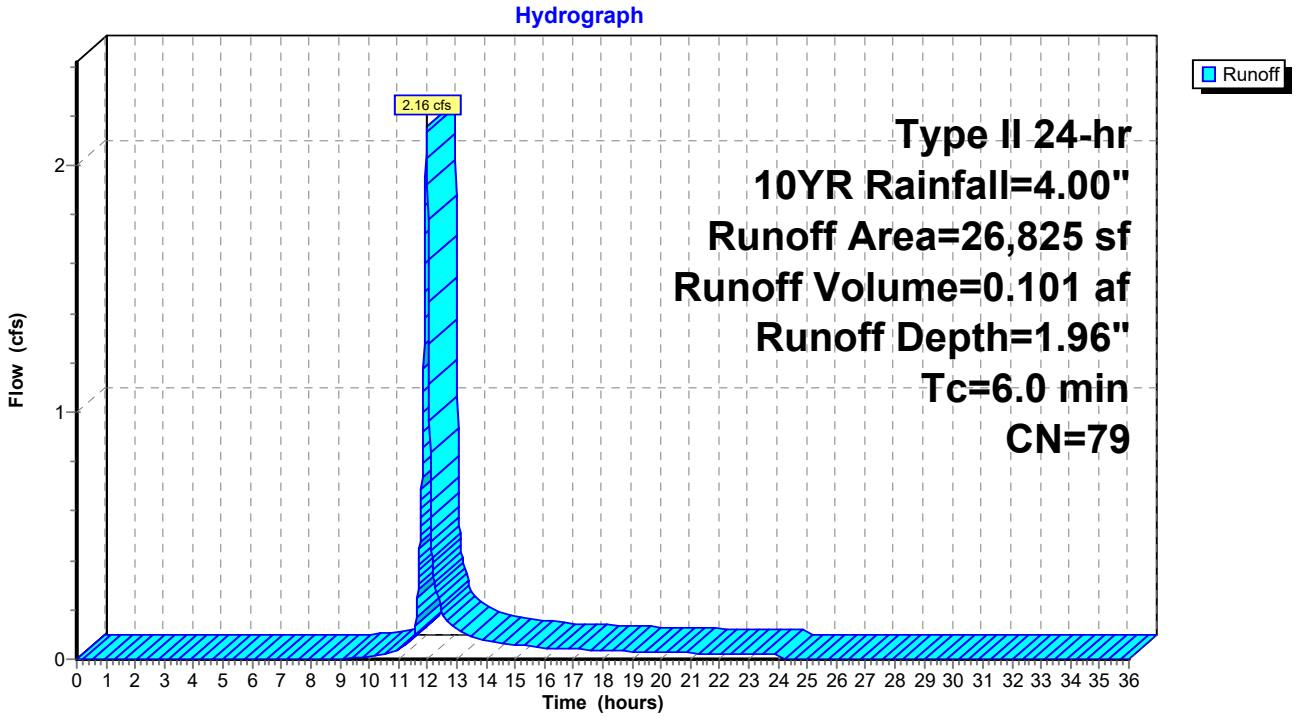
Runoff = 2.16 cfs @ 11.97 hrs, Volume= 0.101 af, Depth= 1.96"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-36.00 hrs, dt= 0.01 hrs
Type II 24-hr 10YR Rainfall=4.00"

	Area (sf)	CN	Description
*	26,825	79	>75% Grass cover, Good, HSG C
	26,825		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
6.0					**Direct Entry, 6 Minute Min**

Subcatchment U: UNDETAINED



Summary for Pond 1P: PRETREATMENT 1

Inflow Area = 2.876 ac, 65.87% Impervious, Inflow Depth = 3.10" for 10YR event
Inflow = 14.70 cfs @ 11.97 hrs, Volume= 0.742 af
Outflow = 14.67 cfs @ 11.97 hrs, Volume= 0.675 af, Atten= 0%, Lag= 0.3 min
Discarded = 0.03 cfs @ 11.97 hrs, Volume= 0.063 af
Primary = 14.65 cfs @ 11.97 hrs, Volume= 0.612 af

Routing by Dyn-Stor-Ind method, Time Span= 0.00-36.00 hrs, dt= 0.01 hrs
Peak Elev= 883.24' @ 11.97 hrs Surf.Area= 1,500 sf Storage= 4,359 cf

Plug-Flow detention time= 114.3 min calculated for 0.675 af (91% of inflow)
Center-of-Mass det. time= 66.5 min (851.5 - 785.0)

Volume	Invert	Avail.Storage	Storage Description
#1	880.00'	5,500 cf	**Custom Stage Data (Prismatic)** Listed below (Recalc)

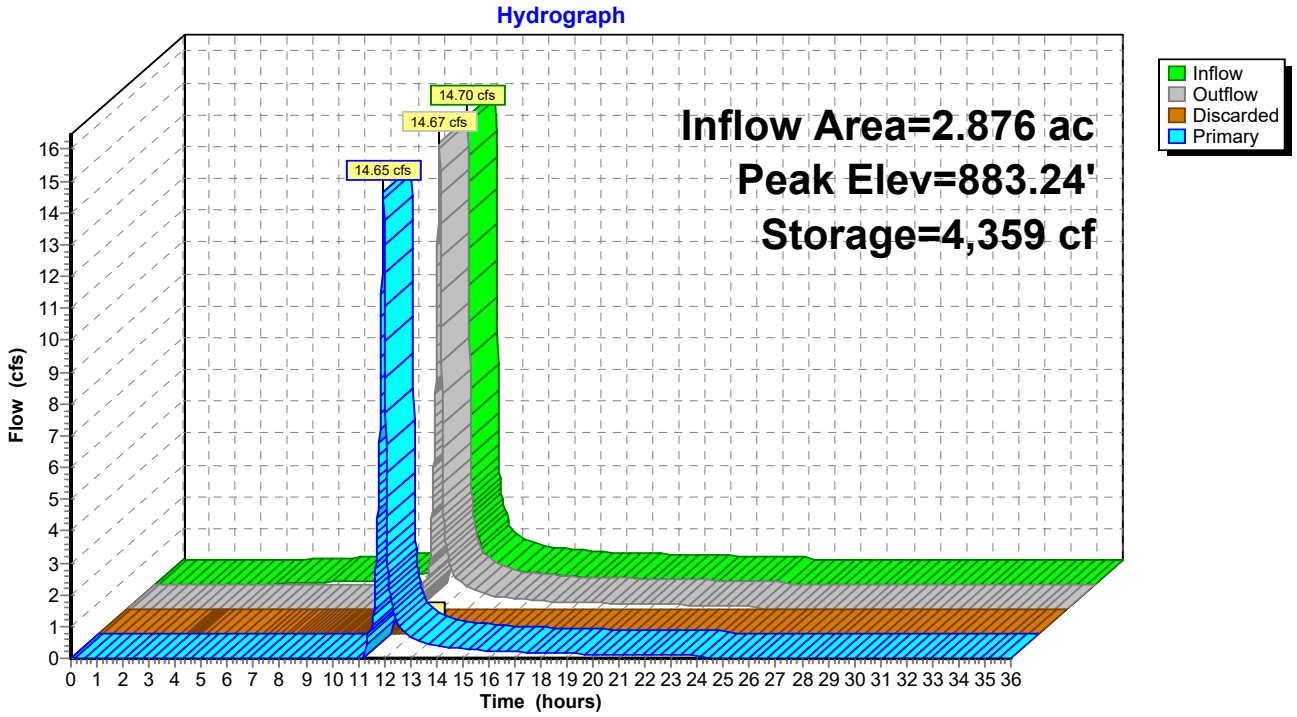
Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
880.00	1,000	0	0
882.00	1,500	2,500	2,500
884.00	1,500	3,000	5,500

Device	Routing	Invert	Outlet Devices
#1	Discarded	880.00'	**0.500 in/hr Exfiltration over Surface area** Conductivity to Groundwater Elevation = 875.00'
#2	Primary	883.00'	**50.0' long x 10.0' breadth Broad-Crested Rectangular Weir** Head (feet) 0.20 0.40 0.60 0.80 1.00 1.20 1.40 1.60 Coef. (English) 2.49 2.56 2.70 2.69 2.68 2.69 2.67 2.64

Discarded OutFlow Max=0.03 cfs @ 11.97 hrs HW=883.24' (Free Discharge)
↑—**1=Exfiltration** (Controls 0.03 cfs)

Primary OutFlow Max=14.62 cfs @ 11.97 hrs HW=883.24' TW=882.55' (Dynamic Tailwater)
↑—**2=Broad-Crested Rectangular Weir** (Weir Controls 14.62 cfs @ 1.22 fps)

Pond 1P: PRETREATMENT 1



Summary for Pond 2P: PRETREATMENT 2

Inflow Area = 2.523 ac, 49.97% Impervious, Inflow Depth = 2.75" for 10YR event
Inflow = 11.90 cfs @ 11.97 hrs, Volume= 0.579 af
Outflow = 11.88 cfs @ 11.97 hrs, Volume= 0.527 af, Atten= 0%, Lag= 0.2 min
Discarded = 0.02 cfs @ 11.97 hrs, Volume= 0.048 af
Primary = 11.86 cfs @ 11.97 hrs, Volume= 0.480 af

Routing by Dyn-Stor-Ind method, Time Span= 0.00-36.00 hrs, dt= 0.01 hrs
Peak Elev= 883.21' @ 11.97 hrs Surf.Area= 1,250 sf Storage= 3,361 cf

Plug-Flow detention time= 109.2 min calculated for 0.527 af (91% of inflow)
Center-of-Mass det. time= 62.6 min (863.8 - 801.3)

Volume	Invert	Avail.Storage	Storage Description
#1	880.00'	4,350 cf	**Custom Stage Data (Prismatic)** Listed below (Recalc)

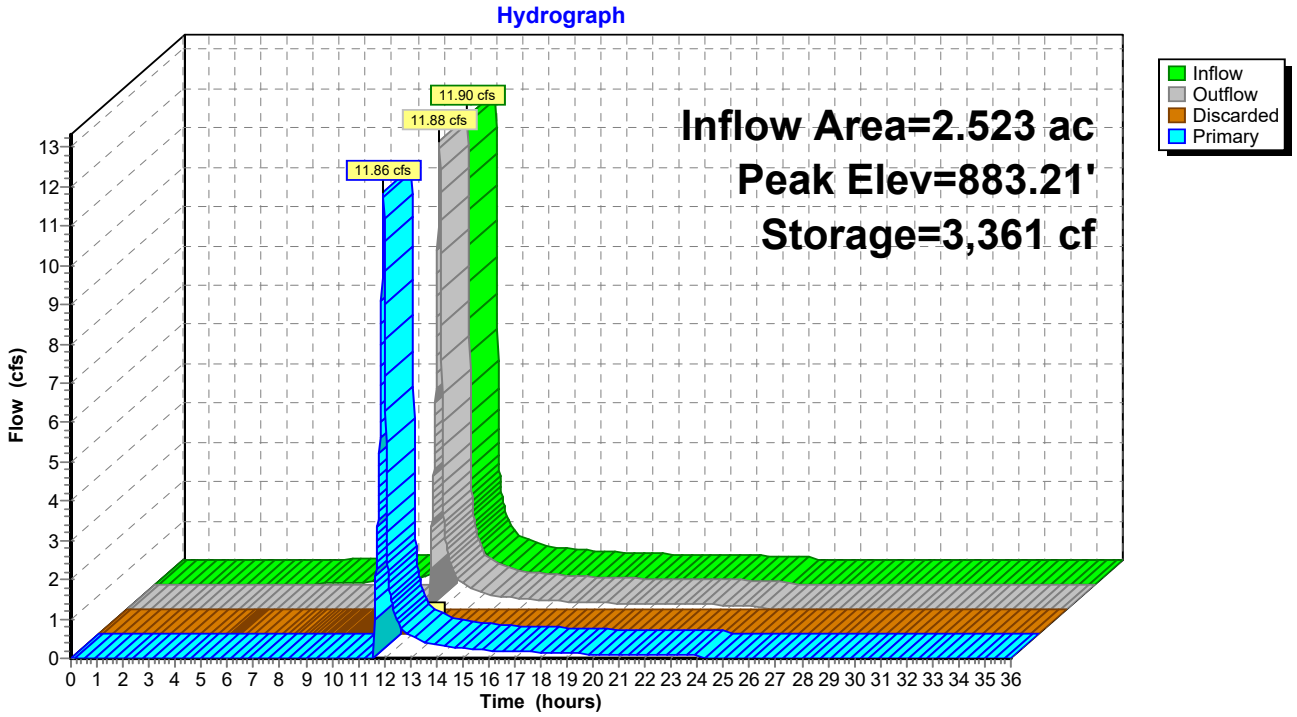
Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
880.00	600	0	0
882.00	1,250	1,850	1,850
884.00	1,250	2,500	4,350

Device	Routing	Invert	Outlet Devices
#1	Discarded	880.00'	**0.500 in/hr Exfiltration over Surface area** Conductivity to Groundwater Elevation = 875.00'
#2	Primary	883.00'	**50.0' long x 10.0' breadth Broad-Crested Rectangular Weir** Head (feet) 0.20 0.40 0.60 0.80 1.00 1.20 1.40 1.60 Coef. (English) 2.49 2.56 2.70 2.69 2.68 2.69 2.67 2.64

Discarded OutFlow Max=0.02 cfs @ 11.97 hrs HW=883.21' (Free Discharge)
↑—**1=Exfiltration** (Controls 0.02 cfs)

Primary OutFlow Max=11.83 cfs @ 11.97 hrs HW=883.21' TW=882.56' (Dynamic Tailwater)
↑—**2=Broad-Crested Rectangular Weir** (Weir Controls 11.83 cfs @ 1.14 fps)

Pond 2P: PRETREATMENT 2



Summary for Pond 5P: INFILTRATION BASIN

Inflow Area = 6.627 ac, 54.69% Impervious, Inflow Depth = 2.45" for 10YR event
Inflow = 31.95 cfs @ 11.97 hrs, Volume= 1.352 af
Outflow = 23.34 cfs @ 12.03 hrs, Volume= 1.345 af, Atten= 27%, Lag= 3.6 min
Discarded = 0.12 cfs @ 12.03 hrs, Volume= 0.136 af
Primary = 23.22 cfs @ 12.03 hrs, Volume= 1.210 af
Secondary = 0.00 cfs @ 0.00 hrs, Volume= 0.000 af

Routing by Dyn-Stor-Ind method, Time Span= 0.00-36.00 hrs, dt= 0.01 hrs
Peak Elev= 882.79' @ 12.03 hrs Surf.Area= 7,487 sf Storage= 16,023 cf

Plug-Flow detention time= (not calculated: outflow precedes inflow)
Center-of-Mass det. time= 58.4 min (871.7 - 813.3)

Volume	Invert	Avail.Storage	Storage Description
#1	880.00'	26,000 cf	**Custom Stage Data (Prismatic)** Listed below (Recalc)

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
880.00	4,000	0	0
884.00	9,000	26,000	26,000

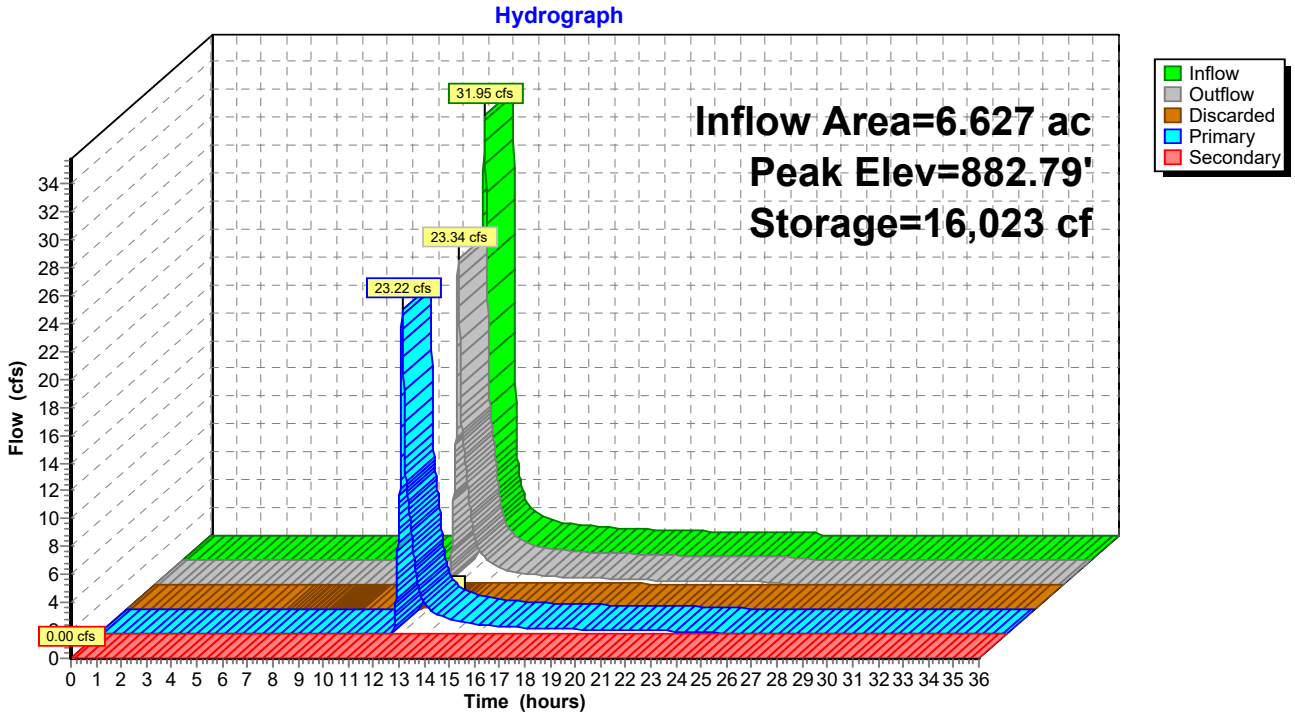
Device	Routing	Invert	Outlet Devices
#1	Primary	879.00'	**27.0" Round Culvert** L= 145.0' RCP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 879.00' / 878.00' S= 0.0069 '/' Cc= 0.900 n= 0.011 Concrete pipe, straight & clean, Flow Area= 3.98 sf
#2	Device 1	880.55'	**24.0" W x 12.0" H Vert. Orifice/Grate** C= 0.600
#3	Device 1	882.30'	**36.0" Horiz. Orifice/Grate** C= 0.600 Limited to weir flow at low heads
#4	Secondary	883.70'	**3.0' long x 3.0' breadth Broad-Crested Rectangular Weir** Head (feet) 0.20 0.40 0.60 0.80 1.00 1.20 1.40 1.60 1.80 2.00 2.50 3.00 3.50 4.00 4.50 Coef. (English) 2.44 2.58 2.68 2.67 2.65 2.64 2.64 2.68 2.68 2.72 2.81 2.92 2.97 3.07 3.32
#5	Discarded	880.00'	**0.500 in/hr Exfiltration over Surface area** Conductivity to Groundwater Elevation = 875.00'

Discarded OutFlow Max=0.12 cfs @ 12.03 hrs HW=882.79' (Free Discharge)
└**5=Exfiltration** (Controls 0.12 cfs)

Primary OutFlow Max=23.17 cfs @ 12.03 hrs HW=882.79' TW=0.00' (Dynamic Tailwater)
└**1=Culvert** (Passes 23.17 cfs of 31.24 cfs potential flow)
  ├**2=Orifice/Grate** (Orifice Controls 12.65 cfs @ 6.33 fps)
  └**3=Orifice/Grate** (Weir Controls 10.52 cfs @ 2.29 fps)

Secondary OutFlow Max=0.00 cfs @ 0.00 hrs HW=880.00' TW=0.00' (Dynamic Tailwater)
└**4=Broad-Crested Rectangular Weir** (Controls 0.00 cfs)

Pond 5P: INFILTRATION BASIN

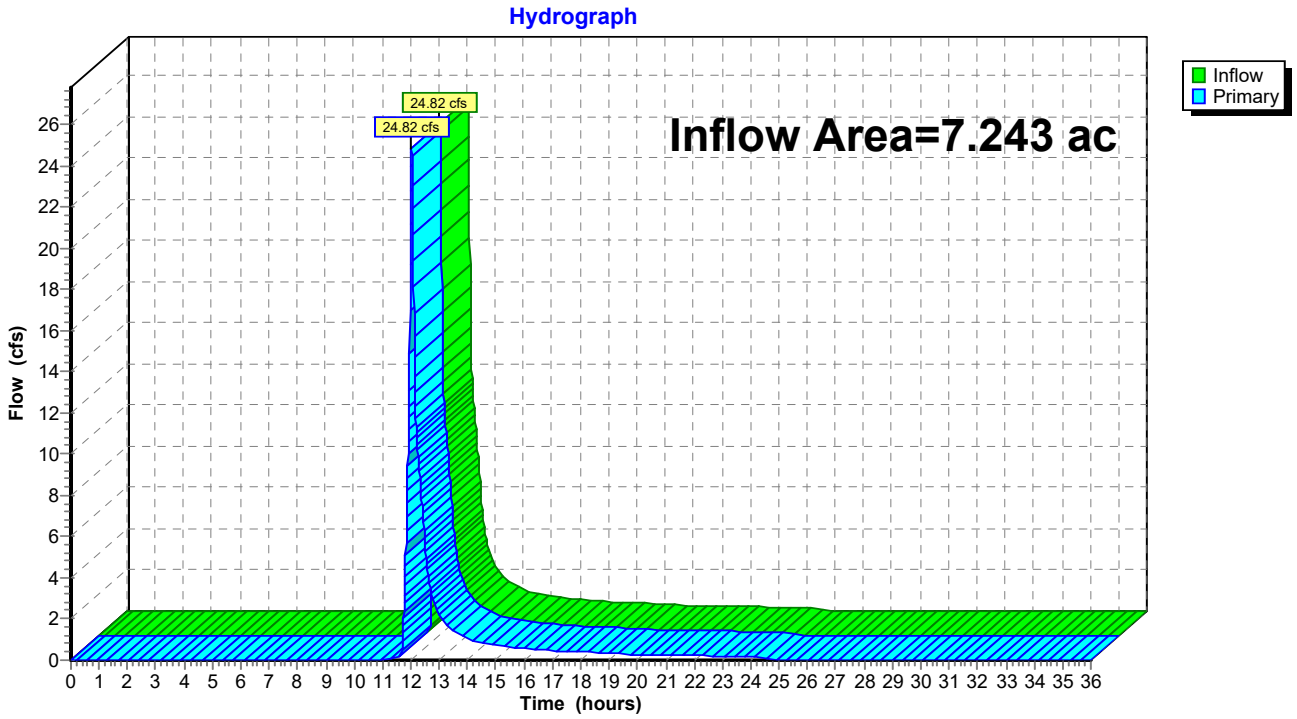


Summary for Link 4L: TOTAL

Inflow Area = 7.243 ac, 50.04% Impervious, Inflow Depth = 2.17" for 10YR event
Inflow = 24.82 cfs @ 12.03 hrs, Volume= 1.311 af
Primary = 24.82 cfs @ 12.03 hrs, Volume= 1.311 af, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 0.00-36.00 hrs, dt= 0.01 hrs

Link 4L: TOTAL



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

Subcatchment1o: OFFSITE TO 1 Runoff Area=12,345 sf 0.00% Impervious Runoff Depth=3.32"
Tc=6.0 min CN=79 Runoff=1.66 cfs 0.079 af

Subcatchment1s: SUB 1 Runoff Area=112,925 sf 73.08% Impervious Runoff Depth=4.79"
Tc=6.0 min CN=93 Runoff=19.85 cfs 1.034 af

Subcatchment2o: OFFSITE TO 2 Runoff Area=9,125 sf 0.00% Impervious Runoff Depth=3.32"
Tc=6.0 min CN=79 Runoff=1.23 cfs 0.058 af

Subcatchment2s: SUB 2 Runoff Area=100,780 sf 54.49% Impervious Runoff Depth=4.35"
Tc=6.0 min CN=89 Runoff=16.74 cfs 0.838 af

SubcatchmentB: BASIN Runoff Area=53,490 sf 38.18% Impervious Runoff Depth=4.03"
Tc=6.0 min CN=86 Runoff=8.42 cfs 0.412 af

SubcatchmentU: UNDETAINED Runoff Area=26,825 sf 0.00% Impervious Runoff Depth=3.32"
Tc=6.0 min CN=79 Runoff=3.61 cfs 0.171 af

Pond 1P: PRETREATMENT1 Peak Elev=883.39' Storage=4,579 cf Inflow=21.51 cfs 1.113 af
Discarded=0.03 cfs 0.065 af Primary=21.19 cfs 0.980 af Outflow=21.22 cfs 1.046 af

Pond 2P: PRETREATMENT2 Peak Elev=883.37' Storage=3,567 cf Inflow=17.96 cfs 0.896 af
Discarded=0.02 cfs 0.050 af Primary=17.68 cfs 0.795 af Outflow=17.70 cfs 0.845 af

Pond 5P: INFILTRATIONBASIN Peak Elev=883.35' Storage=20,397 cf Inflow=47.25 cfs 2.187 af
Discarded=0.14 cfs 0.146 af Primary=34.37 cfs 2.034 af Secondary=0.00 cfs 0.000 af Outflow=34.51 cfs 2.180 af

Link 4L: TOTAL Inflow=37.44 cfs 2.204 af
Primary=37.44 cfs 2.204 af

Total Runoff Area = 7.243 ac Runoff Volume = 2.592 af Average Runoff Depth = 4.30"
49.96% Pervious = 3.619 ac 50.04% Impervious = 3.624 ac

Summary for Subcatchment 1o: OFFSITE TO 1

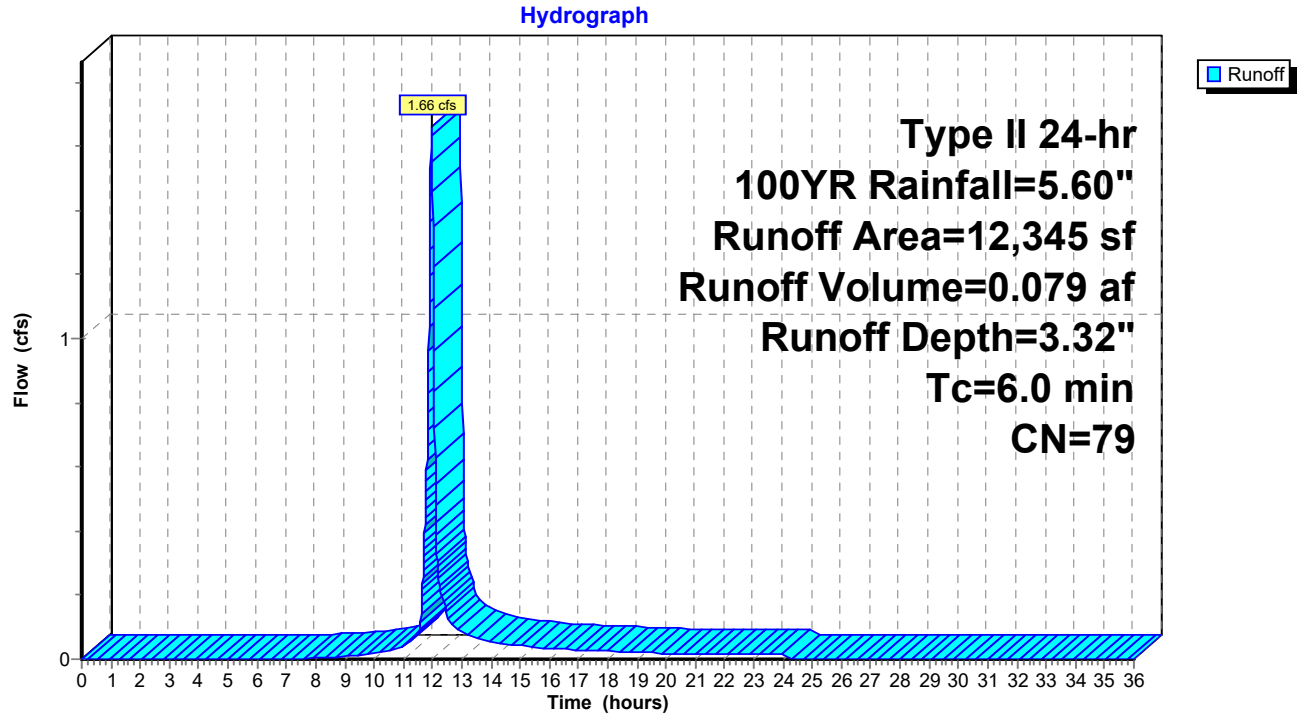
Runoff = 1.66 cfs @ 11.97 hrs, Volume= 0.079 af, Depth= 3.32"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-36.00 hrs, dt= 0.01 hrs
Type II 24-hr 100YR Rainfall=5.60"

	Area (sf)	CN	Description
*	12,345	79	>75% Grass cover, Good, HSG C
	12,345		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
6.0					**Direct Entry, 6 Minute Min**

Subcatchment 1o: OFFSITE TO 1



Summary for Subcatchment 1s: SUB 1

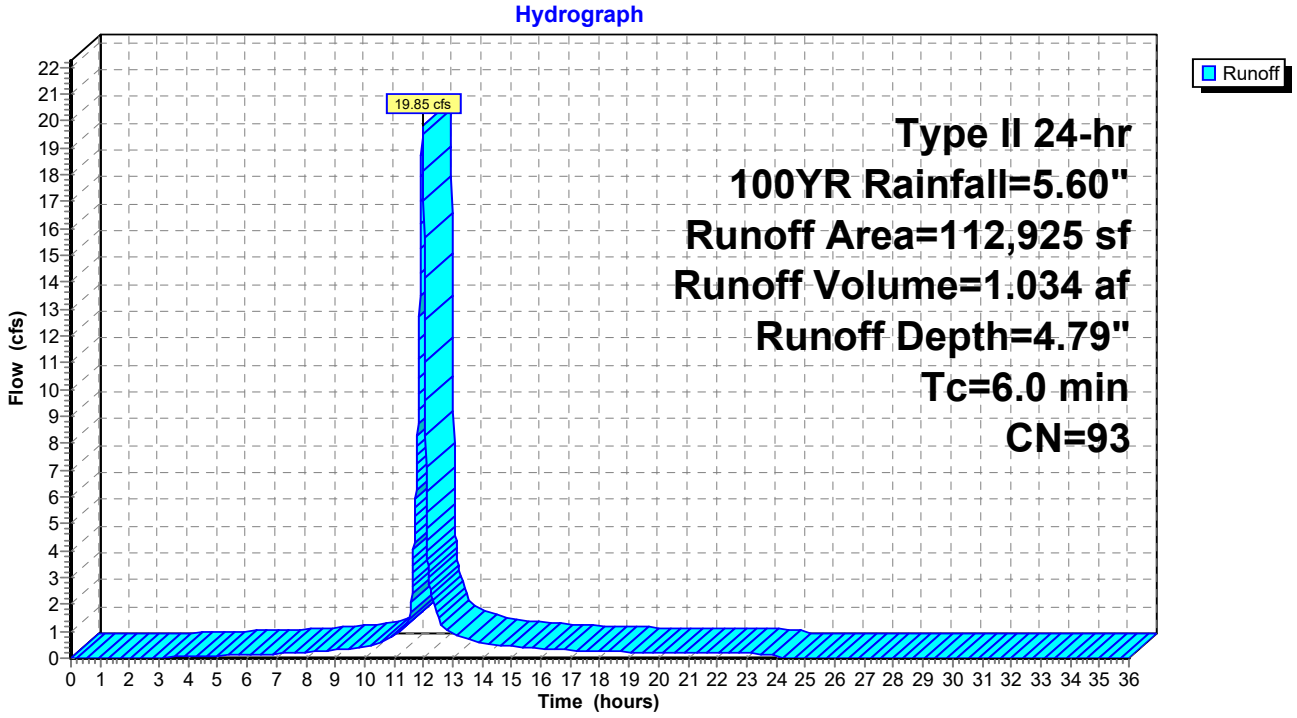
Runoff = 19.85 cfs @ 11.97 hrs, Volume= 1.034 af, Depth= 4.79"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-36.00 hrs, dt= 0.01 hrs
Type II 24-hr 100YR Rainfall=5.60"

	Area (sf)	CN	Description
*	37,055	98	Roof
*	45,465	98	Pavement
*	30,405	79	>75% Grass cover, Good, HSG C
	112,925	93	Weighted Average
	30,405		26.92% Pervious Area
	82,520		73.08% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
6.0					**Direct Entry, 6 Minute Min**

Subcatchment 1s: SUB 1



Summary for Subcatchment 2o: OFFSITE TO 2

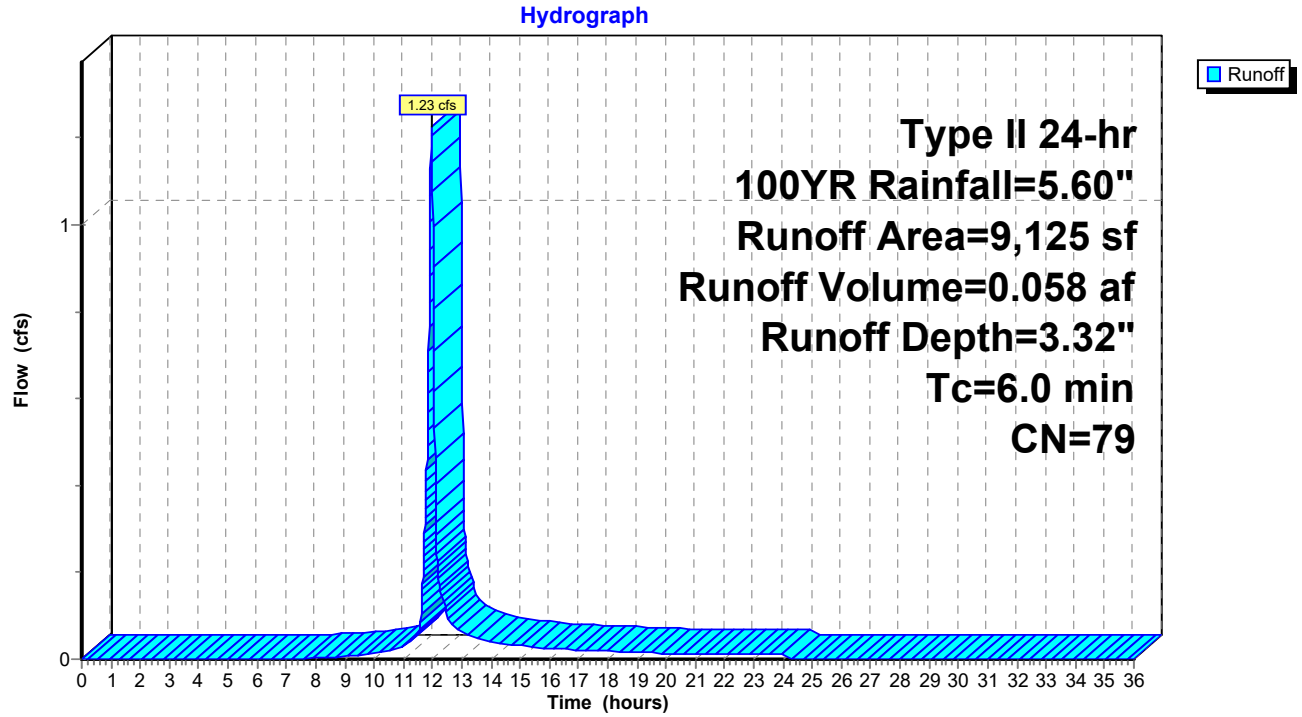
Runoff = 1.23 cfs @ 11.97 hrs, Volume= 0.058 af, Depth= 3.32"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-36.00 hrs, dt= 0.01 hrs
Type II 24-hr 100YR Rainfall=5.60"

	Area (sf)	CN	Description
*	9,125	79	>75% Grass cover, Good, HSG C
	9,125		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
6.0					**Direct Entry, 6 MINUTE MIN**

Subcatchment 2o: OFFSITE TO 2



Summary for Subcatchment 2s: SUB 2

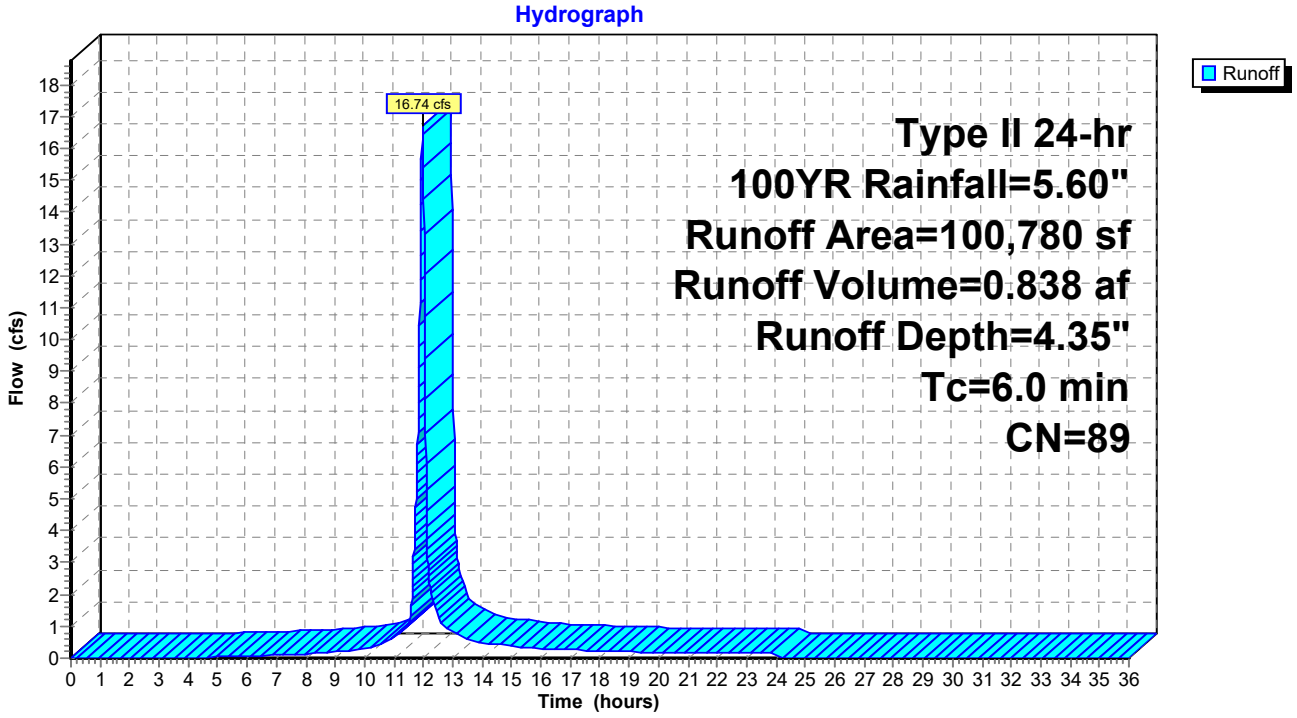
Runoff = 16.74 cfs @ 11.97 hrs, Volume= 0.838 af, Depth= 4.35"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-36.00 hrs, dt= 0.01 hrs
Type II 24-hr 100YR Rainfall=5.60"

	Area (sf)	CN	Description
*	45,860	79	>75% Grass cover, Good, HSG C
*	18,000	98	Roofs
*	36,920	98	Paved parking
	100,780	89	Weighted Average
	45,860		45.51% Pervious Area
	54,920		54.49% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
6.0					**Direct Entry, 6 Minute Minimum**

Subcatchment 2s: SUB 2



Summary for Subcatchment B: BASIN

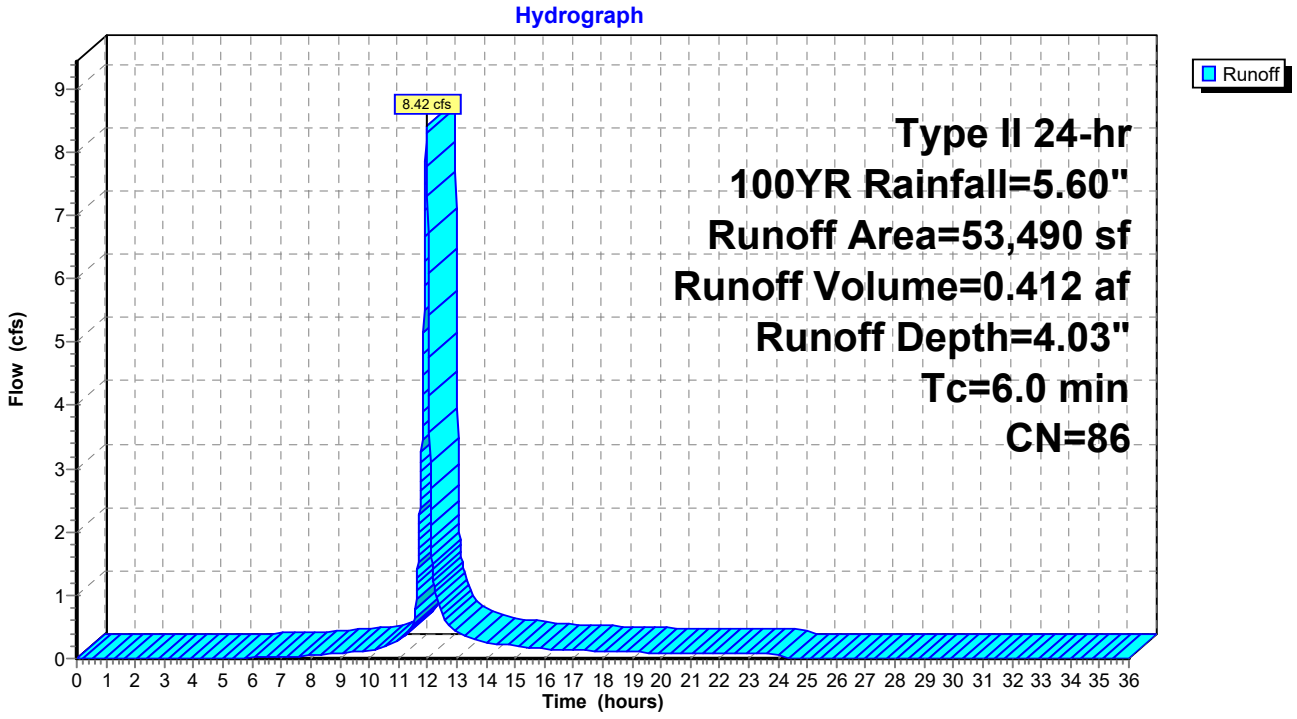
Runoff = 8.42 cfs @ 11.97 hrs, Volume= 0.412 af, Depth= 4.03"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-36.00 hrs, dt= 0.01 hrs
Type II 24-hr 100YR Rainfall=5.60"

	Area (sf)	CN	Description
*	20,425	98	Roof
*	33,065	79	>75% Grass cover, Good, HSG C
	53,490	86	Weighted Average
	33,065		61.82% Pervious Area
	20,425		38.18% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
6.0					**Direct Entry, 6 MINUTE MIN**

Subcatchment B: BASIN



Summary for Subcatchment U: UNDETAINED

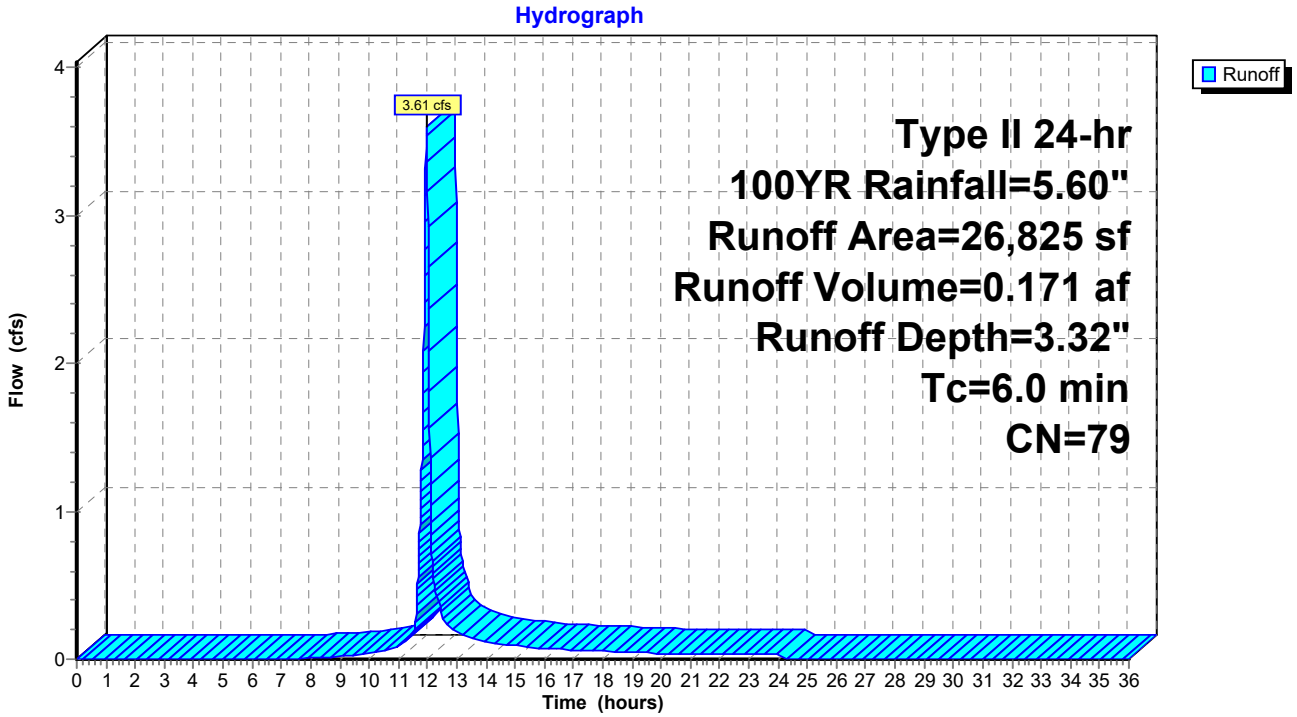
Runoff = 3.61 cfs @ 11.97 hrs, Volume= 0.171 af, Depth= 3.32"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-36.00 hrs, dt= 0.01 hrs
Type II 24-hr 100YR Rainfall=5.60"

	Area (sf)	CN	Description
*	26,825	79	>75% Grass cover, Good, HSG C
	26,825		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
6.0					**Direct Entry, 6 Minute Min**

Subcatchment U: UNDETAINED



Summary for Pond 1P: PRETREATMENT 1

Inflow Area = 2.876 ac, 65.87% Impervious, Inflow Depth = 4.64" for 100YR event
Inflow = 21.51 cfs @ 11.97 hrs, Volume= 1.113 af
Outflow = 21.22 cfs @ 11.96 hrs, Volume= 1.046 af, Atten= 1%, Lag= 0.0 min
Discarded = 0.03 cfs @ 12.03 hrs, Volume= 0.065 af
Primary = 21.19 cfs @ 11.96 hrs, Volume= 0.980 af

Routing by Dyn-Stor-Ind method, Time Span= 0.00-36.00 hrs, dt= 0.01 hrs
Peak Elev= 883.39' @ 12.03 hrs Surf.Area= 1,500 sf Storage= 4,579 cf

Plug-Flow detention time= 85.5 min calculated for 1.046 af (94% of inflow)
Center-of-Mass det. time= 50.7 min (825.4 - 774.6)

Volume	Invert	Avail.Storage	Storage Description
#1	880.00'	5,500 cf	**Custom Stage Data (Prismatic)** Listed below (Recalc)

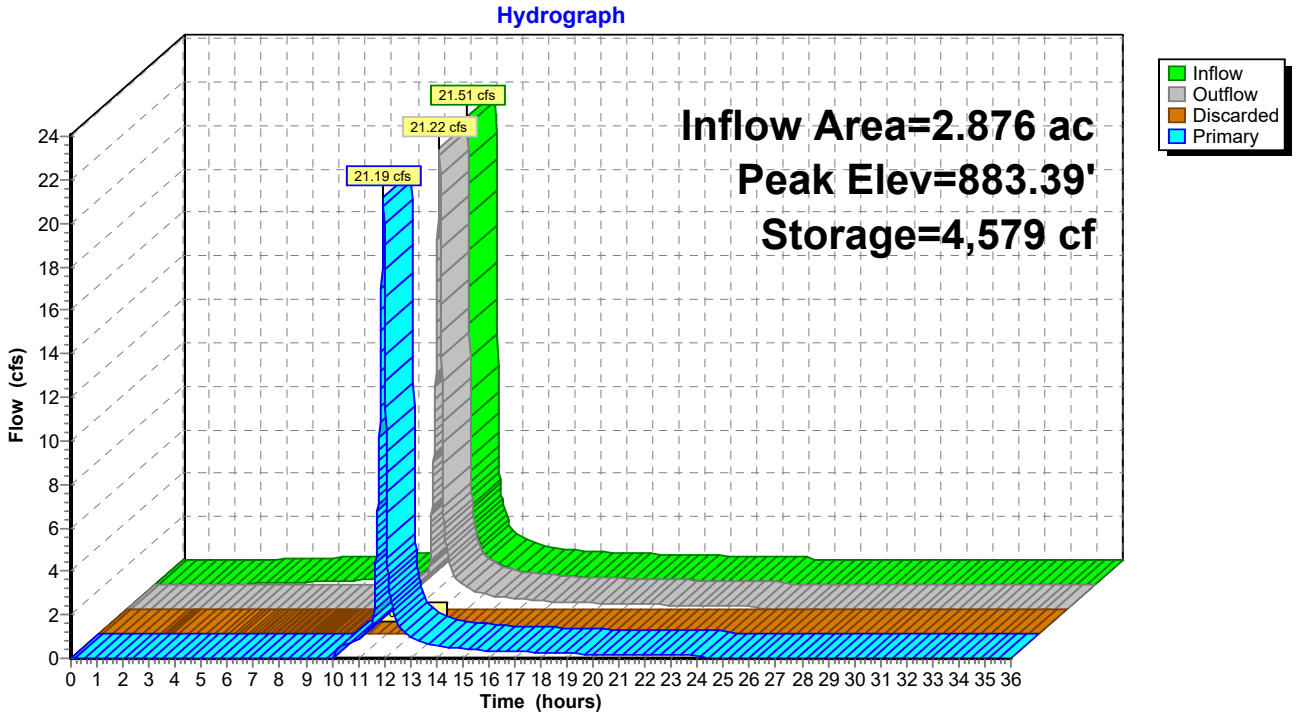
Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
880.00	1,000	0	0
882.00	1,500	2,500	2,500
884.00	1,500	3,000	5,500

Device	Routing	Invert	Outlet Devices
#1	Discarded	880.00'	**0.500 in/hr Exfiltration over Surface area** Conductivity to Groundwater Elevation = 875.00'
#2	Primary	883.00'	**50.0' long x 10.0' breadth Broad-Crested Rectangular Weir** Head (feet) 0.20 0.40 0.60 0.80 1.00 1.20 1.40 1.60 Coef. (English) 2.49 2.56 2.70 2.69 2.68 2.69 2.67 2.64

Discarded OutFlow Max=0.03 cfs @ 12.03 hrs HW=883.39' (Free Discharge)
↑—**1=Exfiltration** (Controls 0.03 cfs)

Primary OutFlow Max=19.98 cfs @ 11.96 hrs HW=883.31' TW=883.09' (Dynamic Tailwater)
↑—**2=Broad-Crested Rectangular Weir** (Weir Controls 19.98 cfs @ 1.30 fps)

Pond 1P: PRETREATMENT 1



Summary for Pond 2P: PRETREATMENT 2

Inflow Area = 2.523 ac, 49.97% Impervious, Inflow Depth = 4.26" for 100YR event
Inflow = 17.96 cfs @ 11.97 hrs, Volume= 0.896 af
Outflow = 17.70 cfs @ 11.96 hrs, Volume= 0.845 af, Atten= 1%, Lag= 0.0 min
Discarded = 0.02 cfs @ 12.03 hrs, Volume= 0.050 af
Primary = 17.68 cfs @ 11.96 hrs, Volume= 0.795 af

Routing by Dyn-Stor-Ind method, Time Span= 0.00-36.00 hrs, dt= 0.01 hrs
Peak Elev= 883.37' @ 12.03 hrs Surf.Area= 1,250 sf Storage= 3,567 cf

Plug-Flow detention time= 78.5 min calculated for 0.845 af (94% of inflow)
Center-of-Mass det. time= 45.7 min (834.9 - 789.2)

Volume	Invert	Avail.Storage	Storage Description
#1	880.00'	4,350 cf	**Custom Stage Data (Prismatic)** Listed below (Recalc)

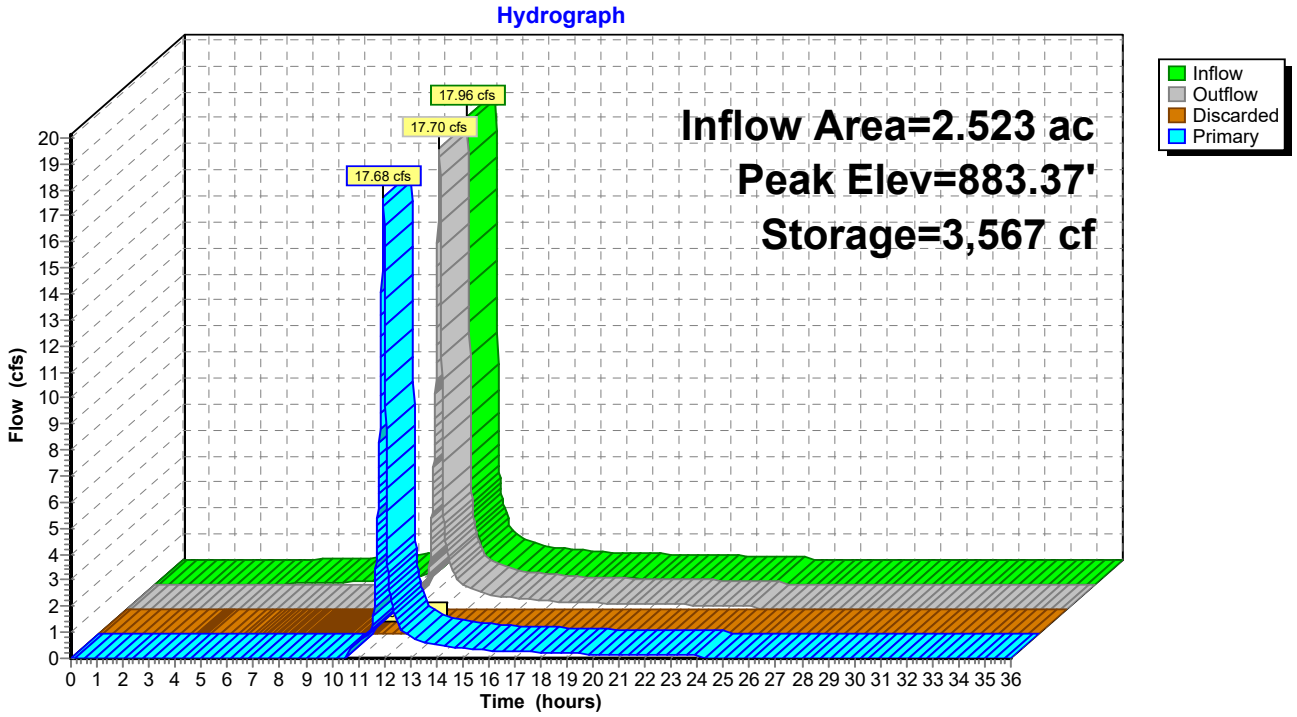
Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
880.00	600	0	0
882.00	1,250	1,850	1,850
884.00	1,250	2,500	4,350

Device	Routing	Invert	Outlet Devices
#1	Discarded	880.00'	**0.500 in/hr Exfiltration over Surface area** Conductivity to Groundwater Elevation = 875.00'
#2	Primary	883.00'	**50.0' long x 10.0' breadth Broad-Crested Rectangular Weir** Head (feet) 0.20 0.40 0.60 0.80 1.00 1.20 1.40 1.60 Coef. (English) 2.49 2.56 2.70 2.69 2.68 2.69 2.67 2.64

Discarded OutFlow Max=0.02 cfs @ 12.03 hrs HW=883.37' (Free Discharge)
↑—**1=Exfiltration** (Controls 0.02 cfs)

Primary OutFlow Max=16.48 cfs @ 11.96 hrs HW=883.27' TW=883.09' (Dynamic Tailwater)
↑—**2=Broad-Crested Rectangular Weir** (Weir Controls 16.48 cfs @ 1.21 fps)

Pond 2P: PRETREATMENT 2



Summary for Pond 5P: INFILTRATION BASIN

Inflow Area = 6.627 ac, 54.69% Impervious, Inflow Depth = 3.96" for 100YR event
Inflow = 47.25 cfs @ 11.96 hrs, Volume= 2.187 af
Outflow = 34.51 cfs @ 12.03 hrs, Volume= 2.180 af, Atten= 27%, Lag= 3.9 min
Discarded = 0.14 cfs @ 12.03 hrs, Volume= 0.146 af
Primary = 34.37 cfs @ 12.03 hrs, Volume= 2.034 af
Secondary = 0.00 cfs @ 0.00 hrs, Volume= 0.000 af

Routing by Dyn-Stor-Ind method, Time Span= 0.00-36.00 hrs, dt= 0.01 hrs
Peak Elev= 883.35' @ 12.03 hrs Surf.Area= 8,185 sf Storage= 20,397 cf

Plug-Flow detention time= (not calculated: outflow precedes inflow)
Center-of-Mass det. time= 42.2 min (843.8 - 801.7)

Volume	Invert	Avail.Storage	Storage Description
#1	880.00'	26,000 cf	**Custom Stage Data (Prismatic)** Listed below (Recalc)

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
880.00	4,000	0	0
884.00	9,000	26,000	26,000

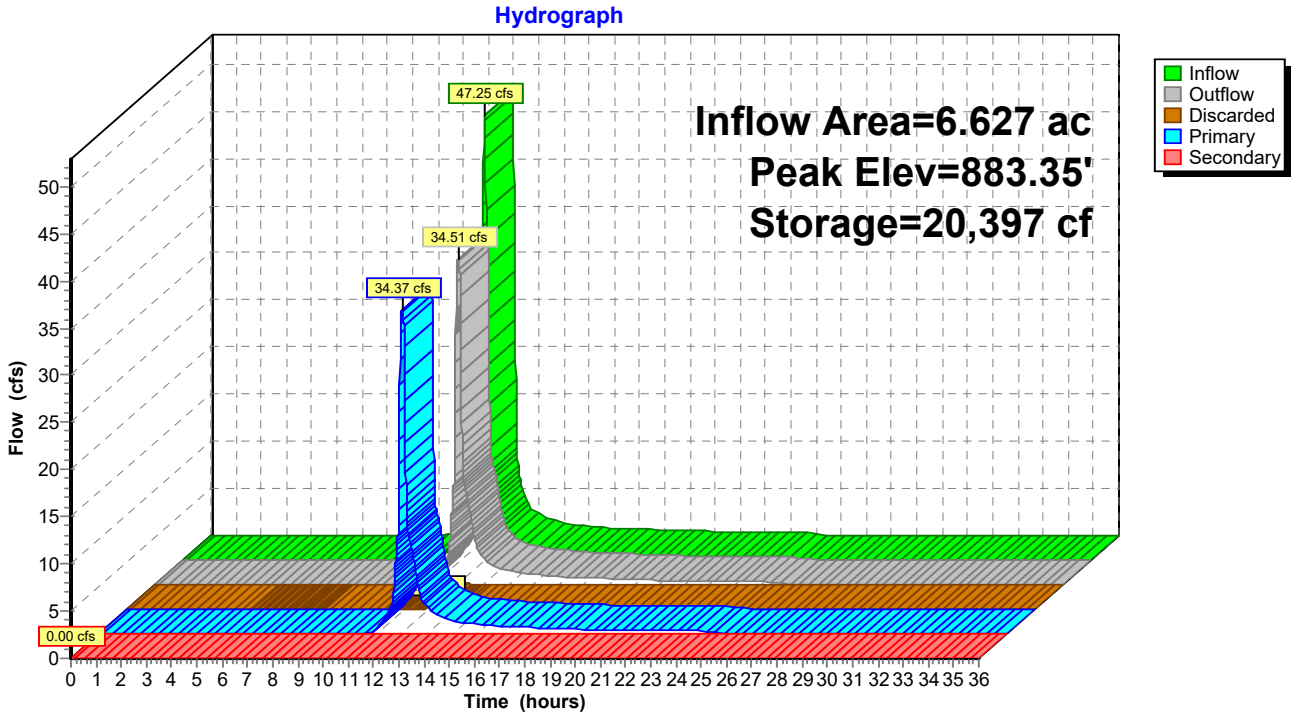
Device	Routing	Invert	Outlet Devices
#1	Primary	879.00'	**27.0" Round Culvert** L= 145.0' RCP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 879.00' / 878.00' S= 0.0069 '/' Cc= 0.900 n= 0.011 Concrete pipe, straight & clean, Flow Area= 3.98 sf
#2	Device 1	880.55'	**24.0" W x 12.0" H Vert. Orifice/Grate** C= 0.600
#3	Device 1	882.30'	**36.0" Horiz. Orifice/Grate** C= 0.600 Limited to weir flow at low heads
#4	Secondary	883.70'	**3.0' long x 3.0' breadth Broad-Crested Rectangular Weir** Head (feet) 0.20 0.40 0.60 0.80 1.00 1.20 1.40 1.60 1.80 2.00 2.50 3.00 3.50 4.00 4.50 Coef. (English) 2.44 2.58 2.68 2.67 2.65 2.64 2.64 2.68 2.68 2.72 2.81 2.92 2.97 3.07 3.32
#5	Discarded	880.00'	**0.500 in/hr Exfiltration over Surface area** Conductivity to Groundwater Elevation = 875.00'

Discarded OutFlow Max=0.14 cfs @ 12.03 hrs HW=883.35' (Free Discharge)
└**5=Exfiltration** (Controls 0.14 cfs)

Primary OutFlow Max=34.37 cfs @ 12.03 hrs HW=883.35' TW=0.00' (Dynamic Tailwater)
└**1=Culvert** (Inlet Controls 34.37 cfs @ 8.64 fps)
  ├**2=Orifice/Grate** (Passes < 14.57 cfs potential flow)
  └**3=Orifice/Grate** (Passes < 33.03 cfs potential flow)

Secondary OutFlow Max=0.00 cfs @ 0.00 hrs HW=880.00' TW=0.00' (Dynamic Tailwater)
└**4=Broad-Crested Rectangular Weir** (Controls 0.00 cfs)

Pond 5P: INFILTRATION BASIN

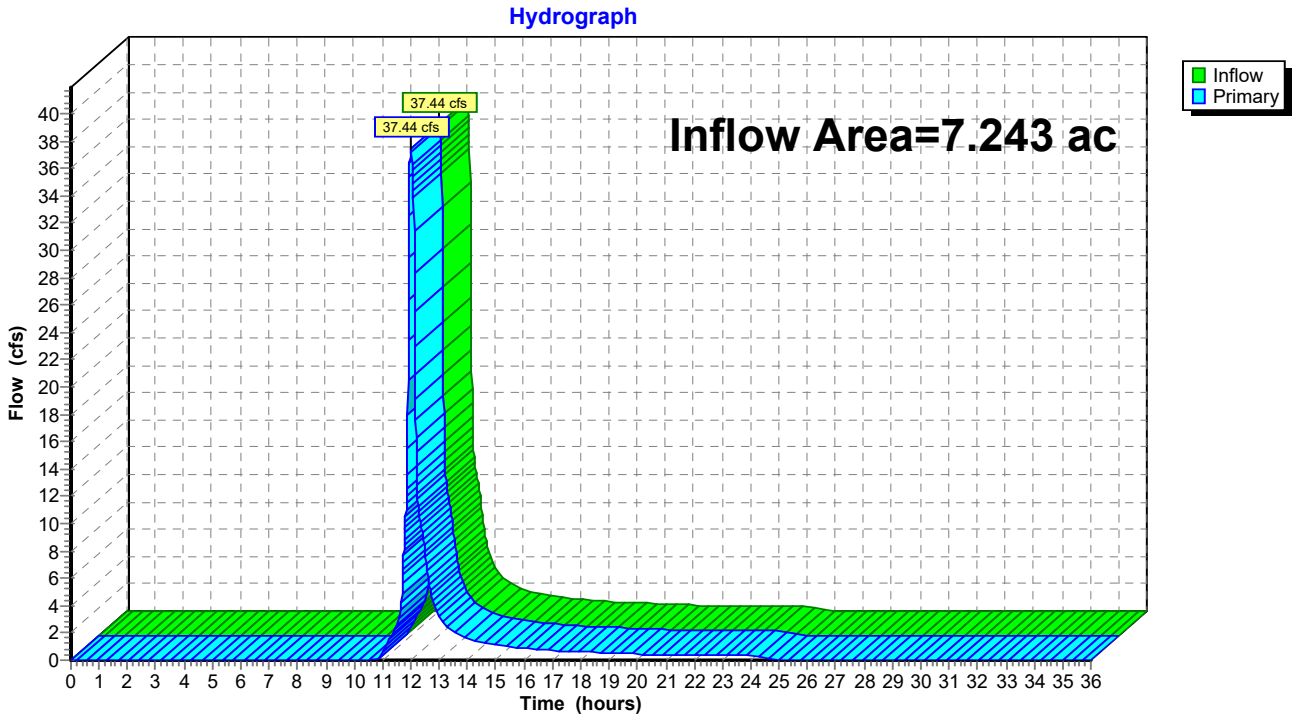


Summary for Link 4L: TOTAL

Inflow Area = 7.243 ac, 50.04% Impervious, Inflow Depth = 3.65" for 100YR event
Inflow = 37.44 cfs @ 12.00 hrs, Volume= 2.204 af
Primary = 37.44 cfs @ 12.00 hrs, Volume= 2.204 af, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 0.00-36.00 hrs, dt= 0.01 hrs

Link 4L: TOTAL



APPENDIX C

STORM WATER QUALITY MODELING (WINSLAMM)

17884 Water Infiltration 11-8 - InputData

Data file name: I:\Boldt Company\17884 Lighthouse of Waukesha\060 CAD\C - Civil\100 Modeling\Storm Sewer\040 WinSLAMM\17884 Water Infiltration 11-8.mdb
WinSLAMM Version 10.3.4
Rain file name: C:\WinSLAMM Files\Rain Files\WisReg - Milwaukee WI 1969.RAN
Particulate Solids Concentration file name: C:\WinSLAMM Files\v10.1 WI_AVG01.pscx
Runoff Coefficient file name: C:\WinSLAMM Files\WI_SL06 Dec06.rsvx
Residential Street Delivery file name: C:\WinSLAMM Files\WI_Res and Other Urban Dec06.std
Institutional Street Delivery file name: C:\WinSLAMM Files\WI_Com Inst Indust Dec06.std
Commercial Street Delivery file name: C:\WinSLAMM Files\WI_Com Inst Indust Dec06.std
Industrial Street Delivery file name: C:\WinSLAMM Files\WI_Com Inst Indust Dec06.std
Other Urban Street Delivery file name: C:\WinSLAMM Files\WI_Res and Other Urban Dec06.std
Freeway Street Delivery file name: C:\WinSLAMM Files\Freeway Dec06.std
Apply Street Delivery Files to Adjust the After Event Load Street Dirt Mass Balance: False
Pollutant Relative Concentration file name: C:\WinSLAMM Files\WI_GEO03.ppdx
Source Area PSD and Peak to Average Flow Ratio File: C:\WinSLAMM Files\NURP Source Area PSD Files.csv
Cost Data file name:
Seed for random number generator: -42
Study period starting date: 01/05/69 Study period ending date: 12/31/69
Start of Winter Season: 12/06 End of Winter Season: 03/28
Date: 11-16-2018 Time: 10:28:05
Site information:

Pre-Development Area Description	Pre-Development Area (ac)	Pre-Development CN
	6.720	75
Total Area (ac)/Composite CN	6.720	75

LU# 1 - Residential: SUB 1 Total area (ac): 2.593
  1 - Roofs 1: 0.851 ac. Pitched Connected Source Area PSD File: C:\WinSLAMM Files\NURP.cpz
  13 - Paved Parking 1: 1.044 ac. Connected Source Area PSD File: C:\WinSLAMM Files\NURP.cpz
  45 - Large Landscaped Areas 1: 0.698 ac. Normal Silty Source Area PSD File: C:\WinSLAMM Files\NURP.cpz

LU# 2 - Residential: SUB 2 Total area (ac): 2.314
  1 - Roofs 1: 0.413 ac. Pitched Connected Source Area PSD File: C:\WinSLAMM Files\NURP.cpz
  13 - Paved Parking 1: 0.848 ac. Connected Source Area PSD File: C:\WinSLAMM Files\NURP.cpz

45 - Large Landscaped Areas 1: 1.053 ac. Normal Silty Source Area PSD File: C:\WinSLAMM Files\NURP.cpz

LU# 3 - Residential: UNDETAINED Total area (ac): 0.616
45 - Large Landscaped Areas 1: 0.616 ac. Normal Silty Source Area PSD File: C:\WinSLAMM Files\NURP.cpz

LU# 4 - Residential: BASIN Total area (ac): 1.228
1 - Roofs 1: 0.469 ac. Flat Connected Source Area PSD File: C:\WinSLAMM Files\NURP.cpz
45 - Large Landscaped Areas 1: 0.759 ac. Normal Silty Source Area PSD File: C:\WinSLAMM Files\NURP.cpz

LU# 5 - Residential: OFFSITE TO 1 Total area (ac): 0.283
45 - Large Landscaped Areas 1: 0.283 ac. Normal Silty Source Area PSD File: C:\WinSLAMM Files\NURP.cpz

LU# 6 - Residential: OFFSITE TO 2 Total area (ac): 0.209
45 - Large Landscaped Areas 1: 0.209 ac. Normal Silty Source Area PSD File: C:\WinSLAMM Files\NURP.cpz

Control Practice 1: Biofilter CP# 1 (DS) - PRETREATMENT 2
1. Top area (square feet) = 1250
2. Bottom aea (square feet) = 600
3. Depth (ft): 6
4. Biofilter width (ft) - for Cost Purposes Only: 10
5. Infiltration rate (in/hr) = 0.5
6. Random infiltration rate generation? No
7. Infiltration rate fraction (side): 1
8. Infiltration rate fraction (bottom): 1

9. Depth of biofilter that is rock filled (ft) 0
10. Porosity of rock filled volume = 0
11. Engineered soil infiltration rate: 3.6
12. Engineered soil depth (ft) = 2
13. Engineered soil porosity = 0.33
14. Percent solids reduction due to flow through engineered soil = 80
15. Biofilter peak to average flow ratio = 3.8
16. Number of biofiltration control devices = 1
17. Particle size distribution file: Not needed - calculated by program
18. Initial water surface elevation (ft): 0

Soil Data — Soil Type Fraction in Eng. Soil

User-Defined Soil Type 1.000

Biofilter Outlet/Discharge Characteristics:

Outlet type: Broad Crested Weir

1. Weir crest length (ft): 30
2. Weir crest width (ft): 20
3. Height of datum to bottom of weir opening: 5

Control Practice 2: Biofilter CP# 2 (DS) - INFILTRATION BASIN

1. Top area (square feet) = 9000
2. Bottom aea (square feet) = 4000
3. Depth (ft): 4
4. Biofilter width (ft) - for Cost Purposes Only: 10
5. Infiltration rate (in/hr) = 0.5
6. Random infiltration rate generation? No
7. Infiltration rate fraction (side): 1
8. Infiltration rate fraction (bottom): 1
9. Depth of biofilter that is rock filled (ft) 0
10. Porosity of rock filled volume = 0
11. Engineered soil infiltration rate: 0
12. Engineered soil depth (ft) = 0
13. Engineered soil porosity = 0
14. Percent solids reduction due to flow through engineered soil = 0
15. Biofilter peak to average flow ratio = 3.8
16. Number of biofiltration control devices = 1

17. Particle size distribution file: Not needed - calculated by program
18. Initial water surface elevation (ft): 0
Soil Data Soil Type Fraction in Eng. Soil
Biofilter Outlet/Discharge Characteristics:
Outlet type: Sharp Crested Weir
1. Weir length (ft): 2
2. Invert elevation above datum (ft): 0.55
Outlet type: Broad Crested Weir
1. Weir crest length (ft): 10
2. Weir crest width (ft): 10
3. Height of datum to bottom of weir opening: 3.7
Outlet type: Vertical Stand Pipe
1. Stand pipe diameter (ft): 3
2. Stand pipe height above datum (ft): 2.3

Control Practice 3: Biofilter CP# 3 (DS) - PRETREATMENT 1
1. Top area (square feet) = 1500
2. Bottom aea (square feet) = 1000
3. Depth (ft): 6
4. Biofilter width (ft) - for Cost Purposes Only: 10
5. Infiltration rate (in/hr) = 0.5
6. Random infiltration rate generation? No
7. Infiltration rate fraction (side): 1
8. Infiltration rate fraction (bottom): 1
9. Depth of biofilter that is rock filled (ft) 0
10. Porosity of rock filled volume = 0
11. Engineered soil infiltration rate: 3.6
12. Engineered soil depth (ft) = 2
13. Engineered soil porosity = 0.33
14. Percent solids reduction due to flow through engineered soil = 80
15. Biofilter peak to average flow ratio = 3.8
16. Number of biofiltration control devices = 1
17. Particle size distribution file: Not needed - calculated by program
18. Initial water surface elevation (ft): 0
Soil Data Soil Type Fraction in Eng. Soil

User-Defined Soil Type 1.000

Biofilter Outlet/Discharge Characteristics:

Outlet type: Broad Crested Weir

1. Weir crest length (ft): 30
2. Weir crest width (ft): 20
3. Height of datum to bottom of weir opening: 5

17884 Water Infiltration 11-8 - Output Summary

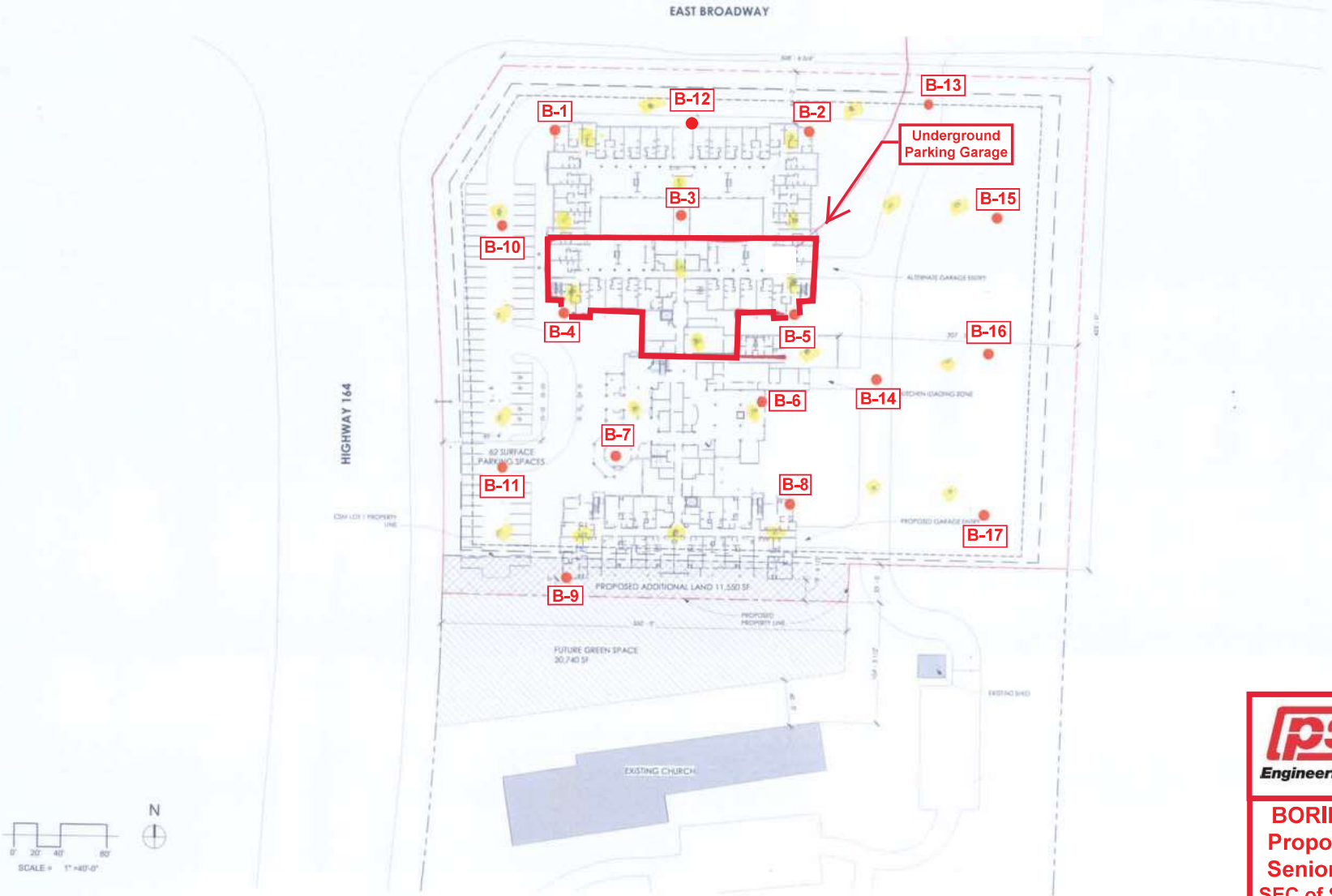
SLAMM for Windows Version 10.3.4

Data file name: I:\Boldt Company\17884 Lighthouse of Waukesha\060 CAD\C - Civil\100 Modeling\Storm Sewer\040 WinSLAMM\17884 Water Infiltration 11-8.mdb
Data file description:
Rain file name: C:\WinSLAMM Files\Rain Files\WisReg - Milwaukee WI 1969.RAN
Particulate Solids Concentration file name: C:\WinSLAMM Files\v10.1 WI_AVG01.pscx
Runoff Coefficient file name: C:\WinSLAMM Files\WI_SL06 Dec06.rsvx
Residential Street Delivery file name: C:\WinSLAMM Files\WI_Res and Other Urban Dec06.std
Institutional Street Delivery file name: C:\WinSLAMM Files\WI_Com Inst Indust Dec06.std
Commercial Street Delivery file name: C:\WinSLAMM Files\WI_Com Inst Indust Dec06.std
Industrial Street Delivery file name: C:\WinSLAMM Files\WI_Com Inst Indust Dec06.std
Other Urban Street Delivery file name: C:\WinSLAMM Files\WI_Res and Other Urban Dec06.std
Freeway Street Delivery file name: C:\WinSLAMM Files\Freeway Dec06.std
Pollutant Relative Concentration file name: C:\WinSLAMM Files\WI_GEO03.ppdx
Start of Winter Season: 12/06 End of Winter Season: 03/28
Model Run Start Date: 01/05/69 Model Run End Date: 12/31/69
Date of run: 11-16-2018 Time of run: 10:27:46
Total Area Modeled (acres): 7.243
Years in Model Run: 0.99

	Runoff Volume (cu ft)	Percent Runoff Volume Reduction	Particulate Solids Conc. (mg/L)	Particulate Solids Yield (lbs)	Percent Particulate Solids Reduction
Total of all Land Uses without Controls:	324978	-	89.69	1820	-
Outfall Total with Controls:	55467	82.93%	102.5	355.0	80.49%
Annualized Total After Outfall Controls:	56237			359.9	

APPENDIX D

PRELIMINARY SOIL INFILTRATION EVALUATION FORMS



New Perspective - Waukesha

East Broadway, Waukesha, Wisconsin

Site Plan - Opti

psi Information To Build On

Engineering • Consulting • Testing

BORING LOCATION PLAN

Proposed New Perspective Senior Living Development

SEC of STH 164 and E Broadway

Waukesha, Wisconsin

PSI PROJECT NO. 00522166

*Adapted from Site Plan provided by client.

BORING B-15

DATE STARTED:	4/27/18	**DRILL COMPANY:**	PSI, Inc.
DATE COMPLETED:	4/27/18	**DRILLER:** PR	**LOGGED BY:** VJ
COMPLETION DEPTH	20.0 ft	**DRILL RIG:**	ASV D-50 ATV - No. 420
BENCHMARK:	N/A	**DRILLING METHOD:**	Hollow Stem Auger
ELEVATION:	882 ft	**SAMPLING METHOD:**	2-in SS
LATITUDE:	43.00255°	**HAMMER TYPE:**	Automatic
LONGITUDE:	-88.19705°	**EFFICIENCY**	N/A
STATION: N/A	**OFFSET:** N/A	**REVIEWED BY:**	CH

REMARKS:

Water

While Drilling	6	feet
Upon Completion	7	feet
Delay	N/A	

BORING LOCATION:
Prop Stormwater MGMT Area

Elevation (feet)	Depth, (feet)	Graphic Log	Sample Type	Sample No.	Recovery (inches)	MATERIAL DESCRIPTION	USCS Classification	SPT Blows per 6-inch (SS)	Moisture, %
	0					Topsoil, Dark Brown Organic Silt, Trace Clay, Very Moist (8"± Thick)	OL		
				1	8	Fill, Yellowish Brown Clayey Sand with Gravel, Very Moist	FILL	2-2-3-3 N=5	30 15
880				2	6	Yellowish Brown Silty Fine Sand with Gravel, Trace Clay, Very Moist, Medium Dense	SM	4-5-7-9 N=12	11
	5			3	10	Yellowish Brown Silty Sand and Gravel, Damp to Moist, Medium Dense	SM	10-12-14-16 N=26	4
875				4	14	Light Yellowish Brown Silty Fine Sand, Wet, Medium Dense	SM	16-14-11-10 N=25	19
				5	12	Light Yellowish Brown Coarse Sand and Gravel, Wet, Dense to Very Dense (Possible Cobbles and Boulders)	SP	8-24-30-28 N=54	11
	10			6	13			10-16-26-34 N=42	12
870				7	16			10-26-24-36 N=50	13
	15			8	10			8-22-28-30 N=50	12
865				9	13			10-20-30-22 N=50	11
				10	6			12-21-27-30 N=48	17
	20					End of Boring at 20' Cave-in at 15'			

STANDARD PENETRATION TEST DATA
N in blows/ft ◎
× Moisture ◪ PL ✚ LL
0 25 50

STRENGTH, tsf
▲ Qu ✳ Qp
0 2.0 4.0

Additional Remarks

intertek psi

Professional Service Industries, Inc.
821 Corporate Court, Suite 100
Waukesha, WI 53189
Telephone: (262) 521-2125

PROJECT NO.: 00522166
PROJECT: New Perspective Senior Living Development
LOCATION: SEC of STH 164 and E Broadway
Waukesha, WI

The stratification lines represent approximate boundaries. The transition may be gradual.

BORING B-16

DATE STARTED:	4/27/18	**DRILL COMPANY:**	PSI, Inc.
DATE COMPLETED:	4/27/18	**DRILLER:** JF	**LOGGED BY:** DP
COMPLETION DEPTH	20.0 ft	**DRILL RIG:**	CME 45 ATV - No. 383
BENCHMARK:	N/A	**DRILLING METHOD:**	Hollow Stem Auger
ELEVATION:	891 ft	**SAMPLING METHOD:**	2-in SS
LATITUDE:	43.00227°	**HAMMER TYPE:**	Automatic
LONGITUDE:	-88.19702°	**EFFICIENCY**	N/A
STATION: N/A	**OFFSET:** N/A	**REVIEWED BY:**	CH

REMARKS:

Water		
	While Drilling	Not Obsd
	Upon Completion	Not Obsd
	Delay	N/A

BORING LOCATION:
Prop Stormwater MGMT Area

Elevation (feet)	Depth, (feet)	Sample No.	Recovery (inches)	MATERIAL DESCRIPTION	USCS Classification	SPT Blows per 6-inch (SS)	Moisture, %	Additional Remarks
890	0	1	24	Topsoil, Dark Brown Organic Silt, Trace Clay, Very Moist (6"± Thick)	OL	3-3-3-4 N=6	30 22	Q_t = 2.2 tsf
				Dark Yellowish Brown Lean Clay, Trace Sand and Gravel, Very Moist, Very Stiff	CL			
		2	12	Yellowish Brown Silty Fine Sand with Gravel, Very Moist to Wet, Loose	SM	4-3-4-4 N=7	12	
	5	3	24	(Possible Perched Water from 3' to 6')		6-5-4-4 N=9	9	
885		4	12	Light Yellowish Brown Silty Sand and Gravel, Moist, Dense to Very Dense		12-16-33-29 N=49	6	
				(Probable Cobbles and Boulders)				
		5	2		SM	50/5"		>>Poor Recovery
	10							
880		6	0			50/1"		>>No Recovery
		7	12	Yellowish Brown Silty Fine Sand with Gravel, Moist, Dense to Very Dense		18-13-15-42 N=28	5	
				(Probable Cobbles and Boulders)				
	15	8	18			15-18-23-21 N=41	6	
875					SM			
		9	2			50/2"	5	>>Poor Recovery
		10	18			17-19-24-31 N=43	6	
	20			End of Boring at 20'				
				Cave-in at 12'				

STANDARD PENETRATION TEST DATA
N in blows/ft
Moisture, PL, LL
0 25 50
STRENGTH, tsf
Qu, Qp
0 2.0 4.0

intertek psi
Professional Service Industries, Inc.
821 Corporate Court, Suite 100
Waukesha, WI 53189
Telephone: (262) 521-2125

PROJECT NO.: 00522166
PROJECT: New Perspective Senior Living Development
LOCATION: SEC of STH 164 and E Broadway
Waukesha, WI

The stratification lines represent approximate boundaries. The transition may be gradual.

BORING B-17

DATE STARTED:	4/27/18	**DRILL COMPANY:**	PSI, Inc.
DATE COMPLETED:	4/27/18	**DRILLER:** JF	**LOGGED BY:** DP
COMPLETION DEPTH	20.0 ft	**DRILL RIG:**	CME 45 ATV - No. 383
BENCHMARK:	N/A	**DRILLING METHOD:**	Hollow Stem Auger
ELEVATION:	898 ft	**SAMPLING METHOD:**	2-in SS
LATITUDE:	43.00186°	**HAMMER TYPE:**	Automatic
LONGITUDE:	-88.19711°	**EFFICIENCY**	N/A
STATION: N/A	**OFFSET:** N/A	**REVIEWED BY:**	CH

REMARKS:

Water		
	While Drilling	Not Obsd
	Upon Completion	Not Obsd
	Delay	N/A

BORING LOCATION:
Prop Stormwater MGMT Area

Elevation (feet)	Depth, (feet)	Sample No.	Recovery (inches)	MATERIAL DESCRIPTION	USCS Classification	SPT Blows per 6-inch (SS)	Moisture, %	Additional Remarks
	0	1	24	Topsoil, Dark Brown Organic Silt, Trace Clay, Very Moist (9"± Thick)	OL	2-3-3-3 N=6	27	
				Dark Yellowish Brown Silty Clay, Trace to Little Sand, Very Moist, Stiff	CL		24	
895		2	24	Dark Yellowish Brown Sandy Clay, Trace Gravel, Moist to Very Moist, Very Stiff	CL	3-4-5-6 N=9	18	
	5	3	24	Light Yellowish Brown Silty Sand and Gravel, Damp, Medium Dense	SM	5-9-15-16 N=24	4	
		4	24	Light Yellowish Brown Silty Fine Sand with Gravel, Moist, Medium Dense	SM	19-11-8-9 N=19	8	
890		5	18	Light Yellowish Brown Silty Sand and Gravel, Moist, Medium Dense	SM	9-9-11-22 N=20	8	
	10	6	18	Yellowish Brown Silty Fine Sand with Gravel, Moist, Medium Dense to Very Dense (Probable Cobbles and Boulders)	SM	7-9-10-10 N=19	8	
885		7	0			35-41-45-30 N=86		>> No Recovery
	15	8	24	Brownish Yellow Fine Sand, Moist to Damp, Dense to Very Dense		21-23-26-30 N=49	4	
		9	24		SP	23-27-32-29 N=59	2	>>
880		10	24			28-31-33-35 N=64	2	>>
	20			End of Boring at 20' Cave-in at 12'				

STANDARD PENETRATION TEST DATA
N in blows/ft ◎
× Moisture ◪ PL ✚ LL
0 25 50
STRENGTH, tsf
▲ Qu ✳ Qp
0 2.0 4.0

Professional Service Industries, Inc.
821 Corporate Court, Suite 100
Waukesha, WI 53189
Telephone: (262) 521-2125

PROJECT NO.: 00522166
PROJECT: New Perspective Senior Living Development
LOCATION: SEC of STH 164 and E Broadway
Waukesha, WI

The stratification lines represent approximate boundaries. The transition may be gradual.

Wisconsin Department of Safety and Professional Services
Division of Safety and Buildings

SOIL EVALUATION - STORM

In accordance with SPS 382.365 and 385, Wis. Adm. Code

Attach complete site plan on paper not less than 8 ½ x 11 inches in size. Plan must include, but not be limited to: vertical and horizontal reference point (BM), direction and percent slope, scale or dimensions, north arrow, and BM referenced to nearest road.

Please print all information

Personal information you provide may be used for secondary purposes (Privacy Law, s. 15.04 (1) (m).

County	Waukesha
Parcel I.D.	WAKC1342998
Reviewed by	Date

Property Owner	Property Location		
SALEM UNITED METHODIST CHURCH	PT NW1/4 SEC 12 T6N R19E		
Property Owner's Mailing Address	Lot #	Block #	Subd. Name or CSM#
541 WI-59			

City	State	Zip Code	Phone Number	☒ City ☐ Village ☐ Town	Nearest Road
WAUKESHA	WI	53186	( )	City of Waukesha	STH 59

Drainage area _____ ☐ sq. ft. ☐ acres

Optional:

Test Site Suitable for (check all that apply)

☐ Irrigation ☐ Bioretention trench ☐ Trench(es)

☐ Rain garden ☐ Infiltration Pond ☐ Reuse

☐ infiltration trench ☐ Retention Pond ☐ Other _____

Hydraulic Application Test Method:

☒ Morphological Evaluation

☐ Double-Ring Infiltrometer

☐ Other (specify) _____

1 Obs. #

☒ Boring B-15

☐ Pit

Ground surface elev. EL. 882± Depth to limiting factor 72 in.

Horizon	Depth in.	Dominant Color Munsell	Redox Description Qu. Sz. Cont. Color	Texture	Structure Gr. Sz. Sh.	Consistence	Boundary	% Rock Frag.	Hydraulic App. Rate NCRS Inches/Hr
A	0-8	10YR 3/3		sil	0 gr	mfr		<15	0.63 to 2.0
B	8-24	10YR 5/6		grlfs (fill)	0 gr	mfr		>15	2.0 to 6.3
B	24-48	10YR 5/6		grlfs	0 gr	mfr		>15	2.0 to 6.3
B	48-72	10YR 5/8		vgrls	0 sg	mfr		>35	6.3 to 20
B	72-96	10YR 6/4		lfs	0 gr	mfr		<15	2.0 to 6.3
B	96-240	10YR 6/4		vgrcos	0 sg	mfr		>35	>20

2 Obs. #

☒ Boring B-16

☐ Pit

Ground surface elev. EL. 891± Depth to limiting factor >240 in.

Horizon	Depth in.	Dominant Color Munsell	Redox Description Qu. Sz. Cont. Color	Texture	Structure Gr. Sz. Sh.	Consistence	Boundary	% Rock Frag.	Hydraulic App. Rate NCRS Inches/Hr
A	0-6	10YR 3/3		sil	0 gr	mfr		<15	0.63 to 2.0
B	6-36	10YR 4/4		c	1 f sbk	mfi		<15	0.06 to 0.2
B	36-72	10YR 5/6		grlfs	0 gr	mfr		>15	2.0 to 6.3
B	72-144	10YR 6/4		vgrls	0 sg	mfr		>35	6.3 to 20
B	144-240	10YR 5/6		grlfs	0 gr	mfr		>15	2.0 to 6.3

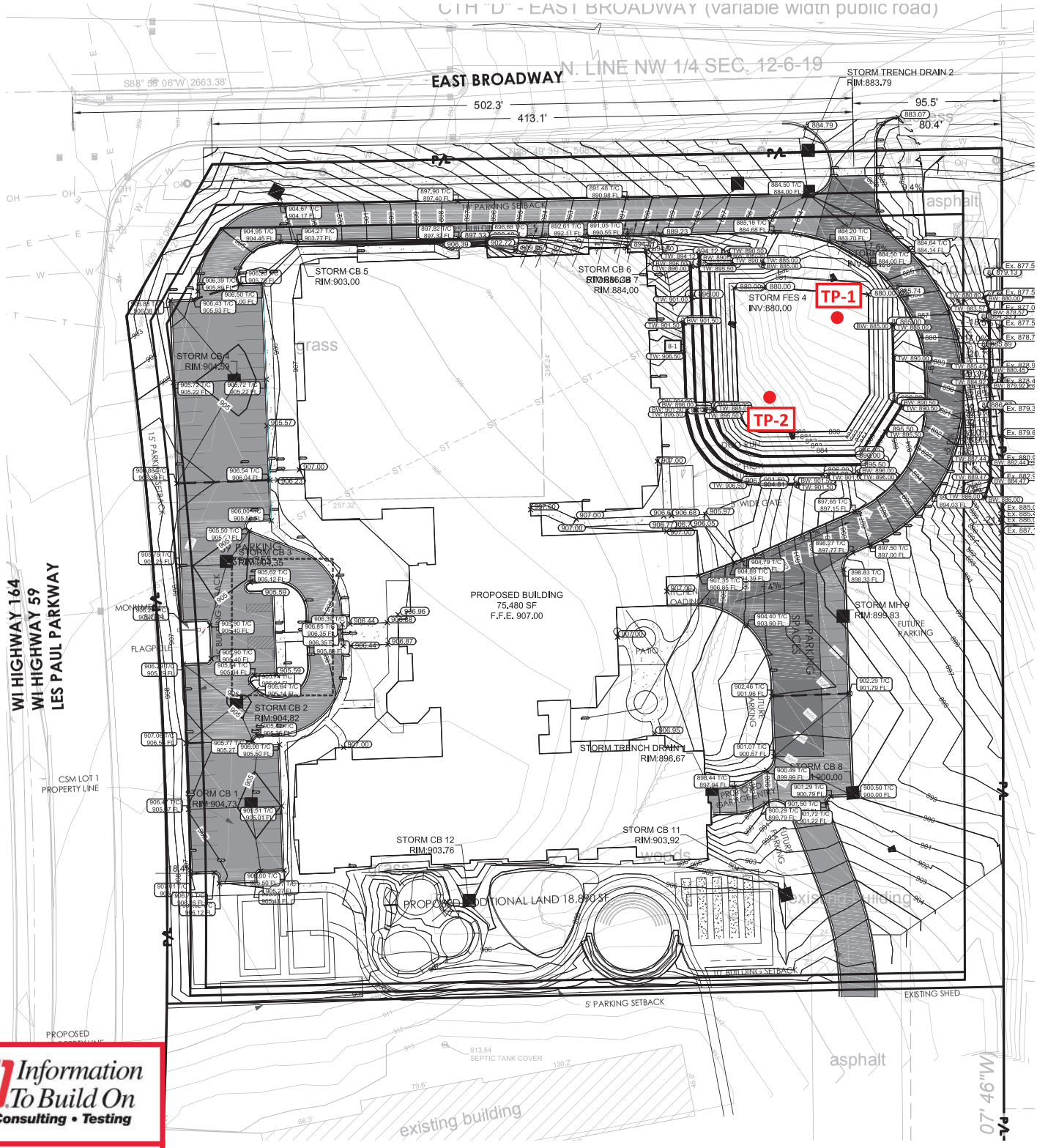
CST/PSS Name (Please Print)	Signature	WI-CST Number
Kenneth R. Wojtanowski, P.E.	KRW	1263332
Address	**Date Evaluation Conducted**	**Telephone Number**
821 Corporate Court, Waukesha, Wisconsin 53189	5/11/2018	262-521-2125

3 Obs. #

☒ Boring B-17
☐ Pit

Ground surface elev. EL. 898± Depth to limiting factor >240 in.

Horizon	Depth in.	Dominant Color Munsell	Redox Description Qu. Sz. Cont. Color	Texture	Structure Gr. Sz. Sh.	Consistence	Boundary	% Rock Frag.	Hydraulic App. Rate NCRS Inches/Hr
A	0-9	10YR 3/3		sil	0 gr	mfr		<15	0.63 to 2.0
B	9-24	10YR 3/4		sicl	1 f sbk	mfi		<15	0.63 to 2.0
B	24-48	10YR 4/4		sc	1 f sbk	mfi		<15	0.63 to 2.0
B	48-72	10YR 6/4		vgrls	0 sg	mfr		>35	6.3 to 20
B	72-96	10YR 6/4		grlfs	0 gr	mfr		>15	2.0 to 6.3
B	96-120	10YR 6/4		vgrls	0 sg	mfr		>35	6.3 to 20
B	120-168	10YR 5/8		grlfs	0 gr	mfr		>15	2.0 to 6.3
B	168-240	10YR 6/6		lfs	0 gr	mfr		<15	2.0 to 6.3



psi Information To Build On
Engineering • Consulting • Testing

Test Pit Location Plan

Proposed Stormwater Management Device

New Perspective Senior Living

East Broadway

Waukesha, Wisconsin

PSI Project No. 00522285

**Adapted from Grading Plan provided by client.*

Professional Service Industries, Inc.
821 Corporate Court, Suite 100
Waukesha, WI 53189
Telephone: (262) 521-2125
Fax: (262) 521-2471

LOG OF TP-1

PSI Job No.:	00522285
Project:	Proposed Stormwater Management Device
Location:	New Perpective Senior Living Facility East Broadway Waukesha, WI

Excavation Method:	Backhoe
Sampling Method:	Bag Samples
DCP Type:	N/A
Boring Location:	TP-1

WATER LEVELS

While Excavating	9 feet
Upon Completion	9 feet
Delay	N/A

Elevation (feet)	Depth, (feet)	Graphic Log	Sample Type	Sample No.	Recovery (inches)	MATERIAL DESCRIPTION	USCS Classification	Dynamic Cone (DCP) Blows per 1¾-inch	Moisture, %	DYNAMIC CONE PENETRATION TEST DATA Blows per 1¾-inch ◎ (0 / 15 / 30) × Moisture ◪ PL ✚ LL (0 / 25 / 50) STRENGTH, tsf ▲ Qu ✳ Qp (0 / 2.0 / 4.0)	Additional Remarks
	0					**Surface Elev.:** 881 ft					
880	1			1		Topsoil Fill, Very Dark Brown Organic Silt Loam (13"± Thick)			23		>>◎P200 = 85.3%
	2					Dark Yellowish Brown Sandy Clay Loam, Moist					
878	3			2		Brownish Yellow Gravelly Loamy Fine Sand, Moist			9		>>◎P200 = 30.4%
	4										
876	5			3		Light Reddish Brown Silty Clay Loam, Moist			18		>>◎P200 = 94.5%
	6					Yellowish Brown Very Gravelly Coarse Sand, Moist					
874	7			4					3		>>◎P200 = 1.9%
	8										
872	9			5		Light Yellowish Brown Sand, Wet			18		>>◎P200 = 1.2%
	10					End of Test Pit at 10'					

Completion Depth:	10.0 ft
Date Boring Started:	11/20/18
Date Boring Completed:	11/20/18
Logged By:	
Excavation Contractor:	R&W

Sample Types:
- Shelby Tube
- Dynamic Cone (DCP)
- Grab Sample

Latitude: 43.00261°
Longitude: -88.19719°
Excavation Equipment: Backhoe
Remarks:

The stratification lines represent approximate boundaries. The transition may be gradual.

Professional Service Industries, Inc.
821 Corporate Court, Suite 100
Waukesha, WI 53189
Telephone: (262) 521-2125
Fax: (262) 521-2471

LOG OF TP-2

PSI Job No.: 00522285
Project: Proposed Stormwater Management Device
Location: New Perpective Senior Living Facility
East Broadway
Waukesha, WI

Excavation Method: Backhoe
Sampling Method: Bag Samples
DCP Type: N/A
Boring Location: TP-2

WATER LEVELS

While Excavating	18 feet
Upon Completion	Not Obsd
Delay	N/A

Surface Elev.: 890 ft

Elevation (feet)	Depth, (feet)	Sample No.	Recovery (inches)	MATERIAL DESCRIPTION	USCS Classification	Dynamic Cone (DCP) Blows per 1¾-inch	Moisture, %	Additional Remarks
890	0			Topsoil Fill, Very Dark Brown Organic Silt Loam (6"± Thick)				
	1			Fill, Very Dark Brown and Brown Gravelly Loamy Sand, Very Moist				
888	2							
	3							
886	4							
	5			Dark Yellowish Brown Sandy Clay, Trace Gravel, Moist				
884	6			Yellowish Brown Gravelly Loamy Sand, Moist				
	7			Brownish Yellow Very Gravelly Coarse Sand				
882	8							
	9			Brownish Yellow Gravelly Loamy Fine Sand				
880	10							
	11	1					8	>>#200 = 27.8%
878	12			Yellowish Brown Very Gravelly Coarse Sand, Moist				
	13	2					5	>>#200 = 7.3%
876	14							
	15	3					3	>>#200 = 2.8%
874	16			Light Yellowish Brown Sand, Moist				
	17	4					4	>>#200 = 1.1%
872	18			Yellowish Brown Gravelly Coarse Sand, Wet				
	19	5					4	>>#200 = 1.0%
870	20			End of Test Pit at 20' *Substantial Caving Occured within Test Pit. Therefore, Water Could Not Be Observed Upon Completion				

DYNAMIC CONE PENETRATION TEST DATA
Blows per 1¾-inch ◎ (0 – 15 – 30)
Moisture (0 – 25 – 50) PL LL
STRENGTH, tsf ▲ Qu ✳ Qp (0 – 2.0 – 4.0)

Completion Depth: 20.0 ft
Date Boring Started: 11/20/18
Date Boring Completed: 11/20/18
Logged By:
Excavation Contractor: R&W

Sample Types:
Shelby Tube
Dynamic Cone (DCP)
Grab Sample

Latitude: 43.00248°
Longitude: -88.19736°
Excavation Equipment: Backhoe
Remarks:

The stratification lines represent approximate boundaries. The transition may be gradual.

Wis. Dept. of Safety and Professional Services
Division of Industry Services

SOIL EVALUATION - STORM

In accordance with SPS 382.365 & 385, Wis. Adm. Code and WDNR Standard 1002

Attach complete site plan on paper not less that 8 1/2 x 11 inches in size. Plan must include, but not limited to: vertical and horizontal reference point (BM), direction and percent slope, scale or dimensions, north arrow, and BM referenced to nearest road.

Please print all information.

Personal information you provide may be used for secondary purposes [Privacy Law, s. 15.04 (1) (m)].

County: Waukesha

Parcel I.D.: WAKC1342998

Reviewed by:

Date:

Property Owner	Property Location
SALEM UNITED METHODIST CHURCH	Govt. Lot PT NW1/4 SEC 12 T6N R19E

Property Owner's Mailing Address	Lot #	Block #	Subd. Name or CSM#
541 WI-59			

City	State	Zip Code	Phone Number	☒ City ☐ Village ☐ Town	Nearest Road
WAUKESHA	WI	53186		City of Waukesha	STH 59

Drainage area _____ ☐ sq. ft. ☐ acres

Optional:

Test Site Suitable for (check all that apply)

☐ Irrigation ☐ Bioretention trench ☐ Trench(es)

☐ Rain Garden ☐ Grassed swale ☐ Reuse

☐ Infiltration trench ☐ SDS (> 15' wide) ☐ Other _____

Hydraulic Application Test Method:

☒ Morphological Evaluation

☐ Double Ring Infiltrometer

☐ Other (specify)

Soil Moisture

Date of Soil Borings:_____

USDA-NRCS WETS Value:

☐ **Dry =1;**

☐ **Normal = 2;**

☐ **Wet = 3.**

TP-1 Obs. #1 ☒ Pit ☐ Boring Ground surface elevation 881± ft Elevation of limiting factor 872± ft.

Horizon	Depth in.	Dominant Color Munsell	Redox Description Qu. Sz. Cont. Color	Texture	Structure Gr. Sz. Sh.	Consistence	Boundary	% Rock Frag.	% Fines	Hydraulic App. Rate Inches/Hr.
A	0-13	10YR 2/2		sil	1 vf gr	mfr		<15		0.63 to 2.0
B	13-36	10YR 4/6		sacl	1 f sbk	mfi		<15		0.63 to 2.0
B	36-60	10YR 6/6		grlfs	1 vf gr	mfr		>15		2.0 to 6.3
B	60-72	5YR 6/4		sicl	1 f sbk	mfi		<15		0.63 to 2.0
B	72-108	10YR 5/6		vgrcos	0 sg	mfr		>35		>20
B	108-120	10YR 6/4		s	0 sg	mfr		<15		>20

Comments: Groundwater encountered at 9'

TP-2 Obs. # 2 ☒ Pit ☐ Boring Ground surface elevation 890± ft Elevation of limiting factor 872± ft.

Horizon	Depth in.	Dominant Color Munsell	Redox Description Qu. Sz. Cont. Color	Texture	Structure Gr. Sz. Sh.	Consistence	Boundary	% Rock Frag.	% Fines	Hydraulic App. Rate Inches/Hr.
A	0-6	10YR 2/2		sil (fill)	1 vf gr	mfr		<15		0.63 to 2.0
B	6-60	10YR 2/2		grls (fill)	1 f sbk	mfr		>15		2.0 to 6.3
B	60-66	10YR 4/4		sc	1 f sbk	mfi		<15		0.63 to 2.0
B	66-78	10YR 5/6		grls	1 vf gr	mfr		>15		6.3 to 20
B	72-102	10YR 6/6		vgrcos	0 sg	mfr		>35		>20
B	102-144	10YR 6/6		grlfs	1 vf gr	mfr		>15		2.0 to 6.3
B	144-192	10YR 5/6		vgrcos	0 sg	mfr		>35		>20
B	192-216	10YR 6/4		s	0 sg	mfr		<15		>20
B	216-240	10YR 5/6		grcos	0 sg	mfr		>15		>20

Comments: Asphalt rubble and clay observed within fill from 6" to 66". Groundwater encountered at 18'

CST/PSS Name (Please Print)	Signature	CST/PSS Number
Bradley J. Broback	Bradley J. Broback	1411511
Address	**Date Evaluation Conducted**	**Telephone Number**
821 Corporate Court, Suite 102, Waukesha, WI 53189		262 521 2125

APPENDIX E

OPERATION, MAINTENANCE AND INSPECTION REQUIREMENTS

Document Number

Storm Water Management Practice Maintenance Agreement

Waukesha RE, LLC as "Owner" of the property described below, in accordance with Chapter 32 City of Waukesha Storm Water Management and Erosion Control, agrees to install and maintain storm water management practice(s) on the subject property in accordance with approved plans and Storm Water Management Plan conditions. The owner further agrees to the terms stated in this document to ensure that the storm water management practice(s) continues serving the intended functions in perpetuity. This Agreement includes the following exhibits:

Exhibit A: Legal Description of the real estate for which this Agreement applies ("Property").
Exhibit B: Location Map(s) – shows an accurate location of each storm water management practice affected by this Agreement.
Exhibit C: Maintenance Plan – prescribes those activities that must be carried out to maintain compliance with this Agreement.

Note: After construction verification has been accepted by the City of Waukesha, for all planned storm water management practices, an addendum(s) to this agreement shall be recorded by the Owner showing design and construction details. The addendum(s) may contain several additional exhibits, including certification by City of Waukesha of Storm Water and Erosion Control Permit termination, as described below.

Name and Return Address

City of Waukesha
130 Delafield Street
Waukesha, WI 53188

Parcel Identification Number(s) – (PIN)

Through this Agreement, the Owner hereby subjects the Property to the following covenants, conditions and restrictions:

1. The Owner shall be responsible for the routine and extraordinary maintenance and repair of the storm water management practice(s) and drainage easements identified in Exhibit B until Storm Water and Erosion Control Permit termination by the City of Waukesha in accordance with Chapter 32 of the City Code of Ordinances.
2. After Storm Water and Erosion Control Permit termination under 1., the current Owner(s) shall be solely responsible for maintenance and repair of the storm water management practices and drainage easements in accordance with the maintenance plan contained in Exhibit C.
3. The Owner(s) shall, at their own cost, complete inspections of the storm water management practices at the time intervals listed in Exhibit C, and conduct the inspections by a a qualified professional, file the reports with the City of Waukesha after each inspection and complete any maintenance or repair work recommended in the report. The Owner(s) shall be liable for the failure to undertake any maintenance or repairs. After the work is completed by the Contractor, the qualified professional shall verify that the work was properly completed and submit the follow-up report to the City within 30 days.
4. In addition, and independent of the requirements under paragraph 3 above, the City of Waukesha, or its designee, is authorized to access the property as necessary to conduct inspections of the storm water management practices or drainage easements to ascertain compliance with the intent of this Agreement and the activities prescribed in Exhibit C. The City of Waukesha may require work to be done which differs from the report described in paragraph 3 above, if the City of Waukesha reasonably concludes that such work is necessary and consistent with the intent of this agreement. Upon notification by the City of Waukesha of required maintenance or repairs, the Owner(s) shall complete the specified maintenance or repairs within a reasonable time frame determined by the City of Waukesha.
5. If the Owner(s) do not complete an inspection under 3. above or required maintenance or repairs under 4. above within the specified time period, the City of Waukesha is authorized, but not required, to perform the specified inspections, maintenance or repairs. In the case of an emergency situation, as determined by the City of Waukesha, no notice shall be required prior to the City of Waukesha performing emergency maintenance or repairs. The City of Waukesha may levy the costs and expenses of such inspections, maintenance or repair related actions as a special charge against the Property and collected as such in accordance with the procedures under s. 66.0627 Wis. Stats. or subch. VII of ch. 66 Wis. Stats.

6. This Agreement shall run with the Property and be binding upon all heirs, successors and assigns. After the Owner records the addendum noted above, the City of Waukesha shall have the sole authority to modify this agreement upon a 30-day notice to the current Owner(s).

Dated this ___ day of _____, 201_.

Owner:

_____
(Owners Signature)

_____
(Owners Typed Name)

Acknowledgements

State of Wisconsin:
County of Waukesha

Personally came before me this ____ day of _____, 201_, the above named ___[Owners name]_____ to me known to be the person who executed the foregoing instrument and acknowledged the same.

_____.
[Name]
Notary Public, Waukesha County, WI
My commission expires:_____.

This document was drafted by:

James B. Leedom, P.E.
The Sigma Group, Inc.
1300 W. Canal Street
Milwaukee, WI 53233

For Certification Stamp

City of Waukesha Common Council Approval

Dated this ___ day of _____, 201_.

_____

Shawn N. Reilly, Mayor

_____

Gina Kozlik, City Clerk

Acknowledgements

State of Wisconsin:
County of Waukesha

Personally came before me this ____ day of _____, 201_, the above named __ _____ to me known to be the person who executed the foregoing instrument and acknowledged the same.

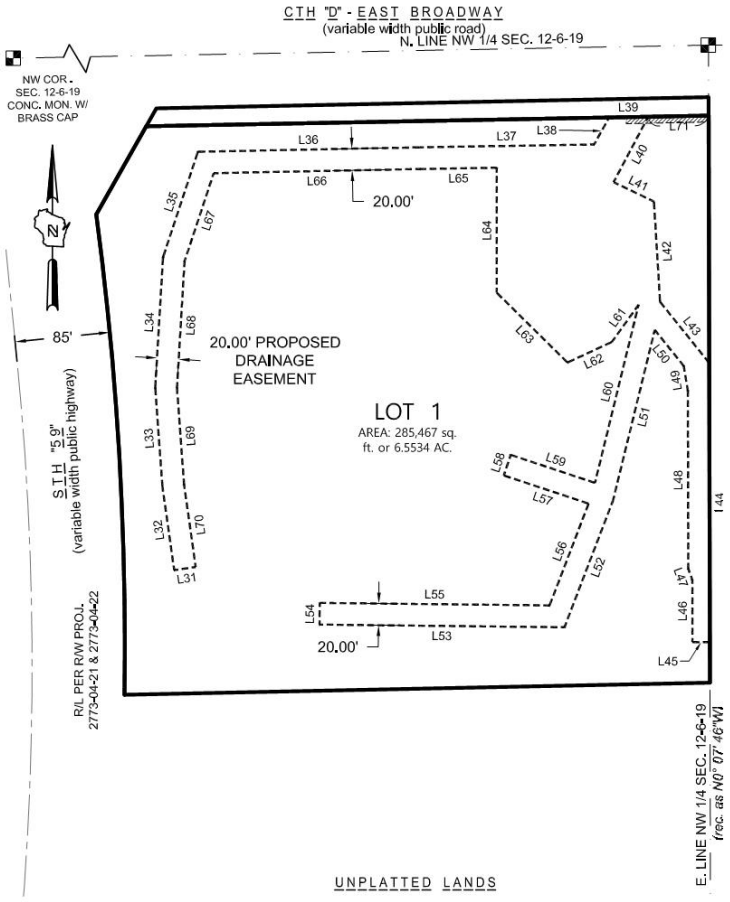
_____.
[Name]
Notary Public, Waukesha County, WI
My commission expires:_____.

Exhibit A – Legal Description

The following description and reduced copy map identifies the land parcel(s) affected by this Agreement. For a larger scale view of the referenced document, contact the Waukesha County Register of Deeds office.

Project Identifier: **Lighthouse of Waukesha** Acres**: 6.7**
Date of Recording: ???
Map Produced By: **The Sigma Group, Inc. 1300 W Canal Street; Milwaukee, WI**
Legal Description: **Lot 1 of Certified Survey Map No. ????, located in all that part of the Northwest Quarter (NW ¼) of Section 12, Township 6N, Range 19E (City of Waukesha) Waukesha County, Wisconsin.**

Drainage Easement Restrictions: Drainage easement for storm water collection, conveyance and treatment are shown on the CSM. No buildings or other structures are allowed in these areas. No grading or filling is allowed that may interrupt storm water flows in any way. See Exhibit C for specific maintenance requirements for storm water management practices within this area.



PROPOSED DRAINAGE EASEMENT FOR THE BENEFIT OF THE CITY OF WAUKESHA
see data tables on Sheet 4 of 7

THE SIGMA GROUP
Single Source. Sound Solutions.
www.thesigmagroup.com
1300 West Canal Street
Milwaukee, WI 53233
Phone: 414-643-4200
Fax: 414-643-4210

GRAPHIC SCALE
0 100' 200'

PROJECT NUMBER 17884 DRAFTED BY B. ROZITE 9-12-18 rev. 11-28-18 Sheet 3 of 7

Exhibit B - Location Map
Storm Water Management Practices Covered by this Agreement

The storm water management practices covered by this Agreement are depicted in the reduced copy of a portion of the construction plans, as shown below. The practices include two biofiltration pretreatment basin, one surface infiltration basin, grass swale and all associated pipes, earthen berms and other components of these practices. All of the noted storm water management practices are located within a drainage easement in Lot 1 of the CSM, as noted in Exhibit A.

Project Name**:** **The Lighthouse of Waukesha**
Storm water Practices**:** **Biofiltration Pretreatment Basin/Surface Infiltration Basin**
Location of Practices**:** **Lot 1 of CSM ????**
Owners of Lot: Waukesha RE, LLC

Figure 1
Plan View of Storm Water Practices

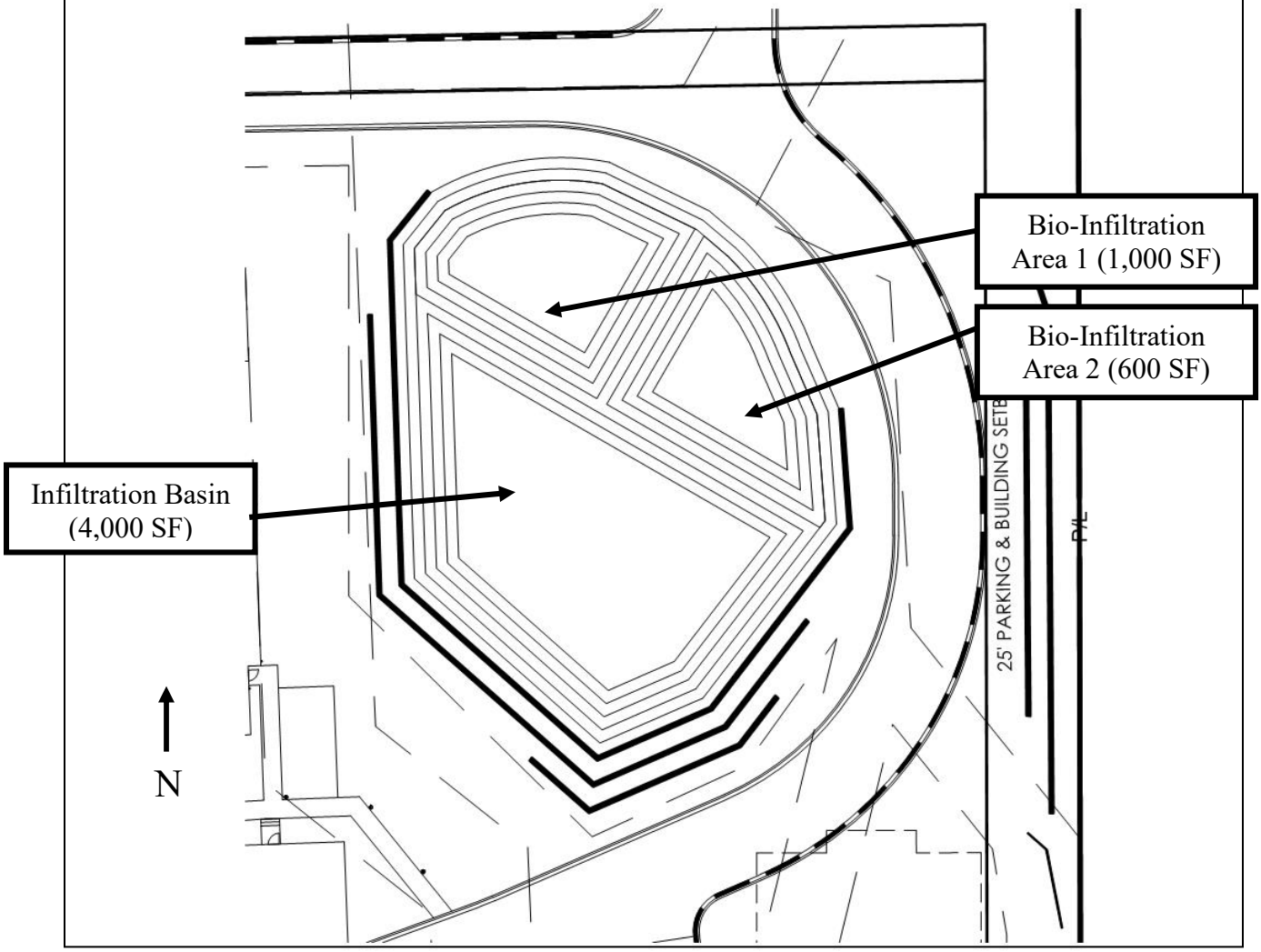


Exhibit C
Storm Water Practice Maintenance Plan

This exhibit explains the basic function of each of the storm water practices listed in Exhibit B and prescribes the minimum maintenance requirements to remain compliant with this Agreement. The maintenance activities listed below are aimed to ensure these practices continue serving their intended functions in perpetuity. The list of activities is not all inclusive, but rather indicates the minimum type of maintenance that can be expected for this particular site. Any failure of a storm water practice that is caused by a lack of maintenance will subject the Owner(s) to enforcement of the provisions listed on page 1 of this Agreement by the City of Waukesha.

System Description:
The surface infiltration basin is designed to trap 80% of sediment in runoff as compared to no controls, maintain pre-development downstream peak flows and provide infiltration of 90% of the predevelopment infiltration volume. The basin is provided with two bioinfiltration forebays to provide pretreatment of storm water prior to discharging to the infiltration basin. Storm water will be conveyed to the basins by storm sewer and by a grass swale along the eastern portion of the site. In addition to runoff conveyance, the grass swales also allow infiltration and filtering of pollutants, especially from smaller storms. The biofiltration basins are provided with two feet of engineered soil and will provide 60% TSS removal from the storm water runoff prior to being discharged into the infiltration basin. The bottom of the bioinfiltration basins are set at an elevation of 880 and have a surface area of 1,600 total square feet. A berm is provided between the biofiltration basins and the infiltration basin. The top of the berm is set at an elevation of 883. Most smaller storm events will be contained within the bioinfiltration basins where the runoff will be fully infiltrated through the engineered soil into the native subsoils. During larger storm events, runoff will fill the bioinfiltration basins and will eventually overtop the berm into the infiltration basin. The surface infiltration basin has a bottom surface area of approximately 4,000 square-feet. An outlet control structure is provided for the infiltration basin consisting of a 12" x 24" rectangular orifice set at an elevation of 880.55 and a overflow rim elevation of 882.30. The surface infiltration basin discharges to the drainage ditch along E. Broadway through the outlet control structure and a 24 inch diameter pipe.

The basins receives runoff from a 6.627-acre drainage area. During high rainfall or snow melt events, the water level will temporarily rise and slowly drain down infiltrating into subsoils. The high water level in the basin is 883.35 based on modeling for the 100-year storm event. Based on storm water modeling performed, the basin will drain down within 24 hours. "As-built" construction drawings of the basin, showing actual dimensions, elevations, outlet structures, etc. will be recorded as an addendum(s) to this agreement within 60 days after City of Waukesha accepts verification of construction from the project engineer.

Minimum Maintenance Requirements:
To ensure the proper long-term function of the storm water infiltration basin, the following activities must be completed:

1. A minimum of 70% soil cover made up of native grasses must be maintained on the basin bottom to ensure infiltration rates. Periodic burning or mowing is recommended to enhance establishment of the prairie grasses (which may take 2-3 years) and maintain the minimum native cover. To reduce competition from cool season grasses (bluegrass, fescues, quack, etc.) and other weeds:
    - For the first year, cut to a 6" height three times – once each in June, July and early August. To prevent damage to the native grasses, do not mow below a 6" height. Remove excessive accumulation of clippings to avoid smothering next year's seedlings.
    - After the first year, mowing may only be needed in early June each year to help control the spread of cool season plants. The mowing should also be raised to 10-12" to avoid damage to the warm season plants.
    - Burning may also be used to manage weeds in 2-5 years intervals. Late spring burns (mid-late May) provide maximum stimulus to warm season grasses and work well to control cool season grasses. Burn when the cool season grasses are growing and the warm season plants are just barely starting to grow to get maximum control of cool season species.
    - Any major bare areas or areas taken over by nonnative species must be reseeded. To clear area of weeds and cool season grasses, treat with an herbicide that contains glysophosphate in accordance with manufacture's instructions. Ensure a firm seedbed is prepared to a depth of 3 inches (a roller is recommended). Seeding should occur in early-mid June. Seed with Big Bluestem, Indian Grass, Little Blue Stem or Switchgrass (preferably an equal mix of all four types). A companion crop of

oats is recommended. Seed must be placed at a depth of 1/4 – 1/2" and a minimum rate of 1/4 pound per 100 square feet. If broadcast seeding by hand, drag leaf rake over soil surface after seeding. Then roll it again and cover with a light layer of mulch and staked erosion control netting to hold it in place until germination. For other planting details, see NRCS standard 342 (Critical Area Planting).

2. Invasive plant and animal species shall be managed in compliance with Wisconsin Administrative Code Chapter NR 40. This may require eradication of invasive species in some cases.
3. The basin and all components (grass swales, forebay, inlets, outlets, etc.) should be inspected after each heavy rain, but at a minimum of once per year. If the basin is not draining properly (within 72 hours), further inspection may be required by persons with expertise in storm water management and/or soils.
    - If soil testing shows that the soil surface has become crusted, sealed or compacted, some deep tillage should be performed. Deep tillage will cut through the underlying soils at a 2-3 foot depth, loosening the soil and improving infiltration rates, with minimal disturbance of the surface vegetation. Types of tillage equipment that can be used include a subsoiler or straight, narrow-shanked chisel plow.
    - If sedimentation is determined to be causing the failure, the accumulated sediment must be removed and the area reseeded in accordance with the notes above.
4. All outlet pipes, stone trenches and other flow control devices must be kept free of debris. Any blockage must be removed immediately.
5. Any eroding areas must be repaired immediately to prevent premature sediment build-up in the system. Erosion matting is recommended for repairing grassed areas.
6. Heavy equipment and vehicles must be kept off of the bottom and side slopes of infiltration basins to prevent soil compaction. Soil compaction will reduce infiltration rates and may cause failure of the basin, resulting in ponding and possible growth of wetland plants.
7. No trees are to be planted or allowed to grow on the earthen berms of the bottom of the basin. On the berms, tree root systems can reduce soil compaction and cause berm failure. On the basin bottom, trees may shade out the native grasses. The basin must be inspected annually and any woody vegetation removed.
8. Grass swales leading to the basin shall be preserved to allow free flowing of surface runoff in accordance with approved grading plans. No buildings or other structures are allowed in these areas. No grading or filling is allowed that may interrupt flows in any way.
9. When standing water is observed in 50% or more of the bioinfiltration pretreatment basin bottoms for more than 3 days after a rainfall event it is an indication that the engineered soils have become clogged. Soil maintenance to address clogging of engineered soils shall consist of the removal of sediment and the replacement of the top 2 to 3 inches of engineered soil and deep tilling with replacement/re-establishment of plants damaged during the soil maintenance activities.
10. No grading or filling of the basin or berms other than for sediment removal is allowed.
11. Periodic mowing of the grass swales will encourage rigorous grass cover and allow better inspections for erosion. Waiting until after August 1 will avoid disturbing nesting wildlife. Mowing around forebay may attract nuisance populations of geese to the property and is not necessary or recommended.
12. Any other repair or maintenance needed to ensure the continued function of the infiltration basin as ordered by the City of Waukesha under the provisions listed on page 1 of this Agreement.
13. The titleholder(s) or their designee must document all inspections as specified above. Documentation shall include as a minimum: (a) Inspectors Name, Address and Telephone Number, (b) Date of Inspections, (c) Condition Report of the Storm Water Management Practice, (d) Corrective Actions to be Taken and Time Frame for Completion, (e) Follow-up Documentation after Completion of the Maintenance Activities. All documentation is to be delivered to the attention of the City Engineer at the City of Waukesha Engineering Department on January 10th and July 10th each year.

Addendum 1 (Sample)
Storm Water Management Practice Maintenance Agreement

Document number

The purpose of this addendum is to record verified "as-built" construction details, supporting design data and permit termination documentation for the storm water management practice(s) located on Outlot 1 of the Highland Preserve Subdivision, described as being all that part of the Southwest Quarter (SW ¼) of Section 4, Township 8N, Range 19E (Town of Lisbon) Waukesha County, Wisconsin. This document shall serve as an addendum to document # _____, herein referred to as the "Maintenance Agreement". This addendum includes all of the following exhibits:

Exhibit D: Design Summary – contains a summary of key engineering calculations and other data used to design the infiltration basin.
Exhibit E: As-built Survey – shows detailed "as-built" cross-section and plan view of the bioinfiltration and infiltration basins.
Exhibit F: Engineering/Construction Verification – provides verification from the project engineer that the design and construction of the bioinfiltration and infiltration basins complies with all applicable technical standards and Waukesha County ordinance requirements.
Exhibit G: Storm Water Management & Erosion Control Permit Termination – provides certification by the City of Waukesha that the Storm Water and Erosion Control Permit for the above noted site has been terminated.

Name and Return Address

_____
Parcel Identification Number(s) – (PIN)

Dated this ___ day of _____, 201_.

Owner:

_____
[Owners Signature – per the Maintenance Agreement]

_____
[Owners Typed Name]

Acknowledgements

State of Wisconsin County of Waukesha

Personally came before me this ____ day of _____, 201_, the above named ___[Owners name]_____ to me known to be the person who executed the foregoing instrument and acknowledged the same.

_____.
[Name]
Notary Public, Waukesha County, WI
My commission expires:_____.

This document was drafted by:

_____

_____
[Name and address of drafter]

For Certification Stamp

Exhibit D
Design Summaries for Infiltration Basin

Project Identifier: Lighthouse of Waukesha **Project Size:** 6.5 Acres
Number of Runoff Discharge Points: 1 **Watershed (ultimate discharge)**: Pewaukee Lake
Watershed Area (including off-site runoff traveling through project area): 7.223 acres

Watershed Data Summary. The following table summarizes the watershed data used to determine peak flows and runoff volumes required to design the infiltration basin system.

Summary Table

Summary Data Elements	Pre-develop	Total	Post-develop to pretreat 1	Post-develop to pretreat 2	Post-develop to inf basin	Post-develop undetained
Watershed Area (ac)	7.223	7.223	2.876	2.523	1.228	0.616
Average Watershed Slopes	2-8%		2-5%	2-5%	2-5%	10-33%
Land Uses	6.724 ac Green 0.499 ac Offsite		2.592 ac Res 0.283 ac Offsite	2.314 ac Res 0.209 ac Offsite	1.228 ac Res	0.616 ac Green
Runoff Curve Numbers	79		92	88	86	79
Conveyance Systems Types	Sheet flow (grass)		Storm Sewer Sheet flow	Storm Sewer Sheet flow	Bldg sewer Sheet flow	Sheet flow
Summary of Average Conveyance System Data	2-8% grass slopes		2% Sheet flow storm sewer	2% Sheet flow storm sewer	12" Building sewer to basin	10-33% Downslopes Sheet flow
Time of Concentration (min)	6.0		6.0	6.0	6.0	6.0
Peak Flow 1-year (cfs)	9.79	5.90	7.94	5.91	5.58	0.83
Peak Flow 2-year (cfs)	12.57	8.74	9.09	6.96	8.22	1.07
Peak Flow 10-year (cfs)	25.36	24.82	14.65	11.86	23.22	2.16
Peak Flow 100-year (cfs)	42.30	37.44	21.19	17.68	34.37	3.61

Exhibit D (continued)

Practice Design Summary. The following table summarizes the data used to design the infiltration basin.

Design Element	Design Data
Site assessment data: (see attached maps)	
Contributing drainage area to basin (subwatershed A & B)	7.223 acres
Distance to nearest private well (including off-site wells)	> 100 feet
Distance to municipal well (including off-site wells)	> 1200 feet
Wellhead protection area involved?	No
Ground slope at site of proposed basin	average 3%
Any buried or overhead utilities in the area?	Yes, Storm sewer to be relocated
Proposed outfall conveyance system/discharge (w/ distances)	145 ft. to CTH "D" Road ditch
Any downstream roads or other structures? (describe)	Yes – 18" cmp road culvert
Floodplain, shoreland or wetlands?	No
Soil investigation data (see attached map & soil logs):	
Number of soil investigations completed	2 (in basin area)
Do elevations of test holes extend 3 ft. below proposed bottom?	Yes (see map)
Average soil texture at pond bottom elevation (USDA)	Gravely Sand
Distance from pond bottom to bedrock	> 5 feet
Distance from pond bottom to seasonal water table	Groundwater observed 8 feet below proposed bottom of basin
General basin design data (see attached detailed drawings):	
Bioinfiltration Basin Bottom area/elevation	1,600 sf / elev 880.00
Infiltration Basin Bottom area/elevation	4,000 sf / elev 880.00
Top of berm elevation	884.00
100-year water surface elevation	883.35
Drain down time	24 hrs

Design Basin Inflow, Outflow & Storage Data
(see attached hydrographs and detail drawings)

Inflow Peak	Maximum Outflow Rate	Max. Water Elevation	Storage Volume at Max. Elev.	Outflow Control Structures*
1-yr./24 hr. (volume)	5.58 cfs (24 hr. drawdown)	881.46 ft.	0.165 acre feet	#1, #2, #5
19.13 cfs (Post 2-yr./24 hr. peak)	8.22 cfs	881.81 ft.	0.213 acre feet	#1, #2, #5
31.95 cfs (Post 10-yr./24 hr. peak)	23.22 cfs	882.79 ft.	0.368 acre feet	#1, #2, #3, #5
47.25 cfs (Post 100-yr./24 hr. peak)	34.37 cfs	883.35 ft.	0.468 acre feet	#1, #2, #3, #5

* #1 = 27 inch diameter RCP pipe – Inv: 879.00 145 LF @ 0.69%
#2 = 24" W x 12" H orifice – Inv: 880.55
#3 = 36 inch top of standpipe – Inv: 882.30
#4 = 3 foot overflow weir (curb cut) – Inv: 883.70
#5 = Exfiltration

Exhibit D (continued)

Watershed Map. The watershed map shown below was used to determine the post-development data contained in this exhibit. The post-developed watershed boundaries are the same as the pre-development watershed areas for this project.

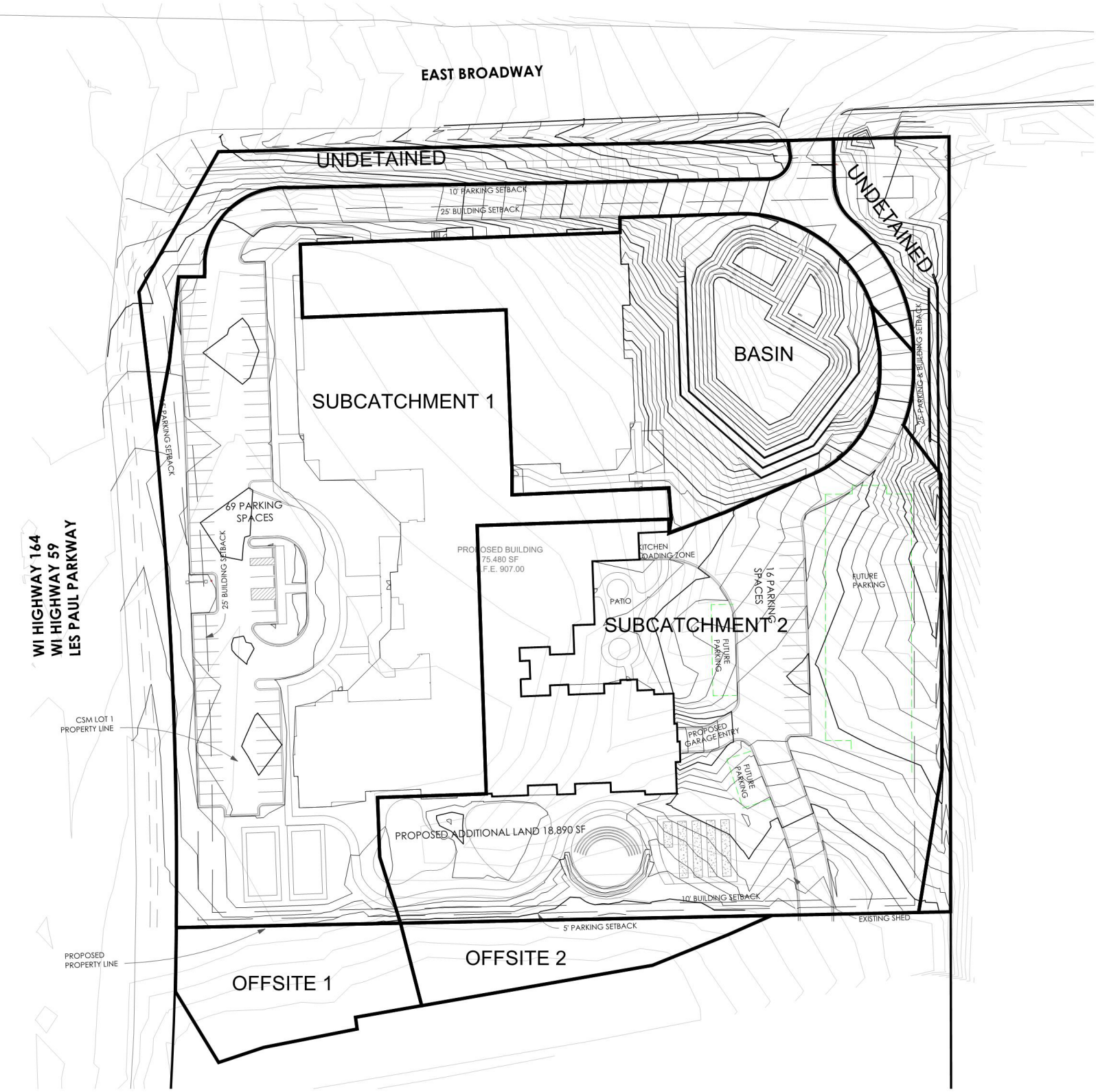


Exhibit E
As-built Survey for Bioinfiltration and Infiltration Basins

The basins depicted in Figure 1 is a reduced copy of the as-built plan.

Project Identifier**:** **Lighthouse of Waukesha**
Storm water Practice**:** **Bioinfiltration pretreatment basin/infiltration basin**
Location of Practice**:** **Lot 1 of CSM No. ????**

Exhibit E

Cross-Section A – A'

Figure 2

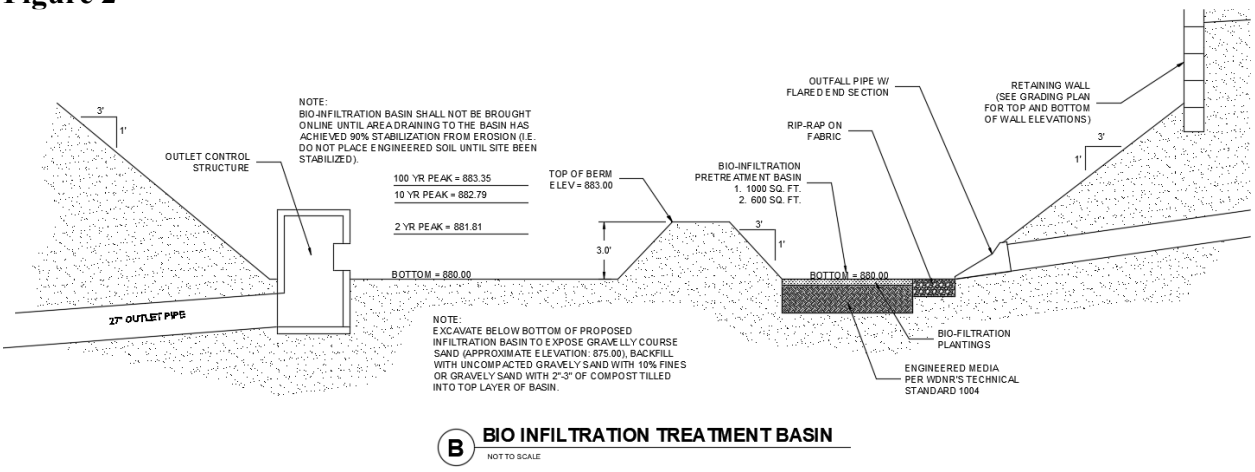


Figure 3

Outlet Structure Detail

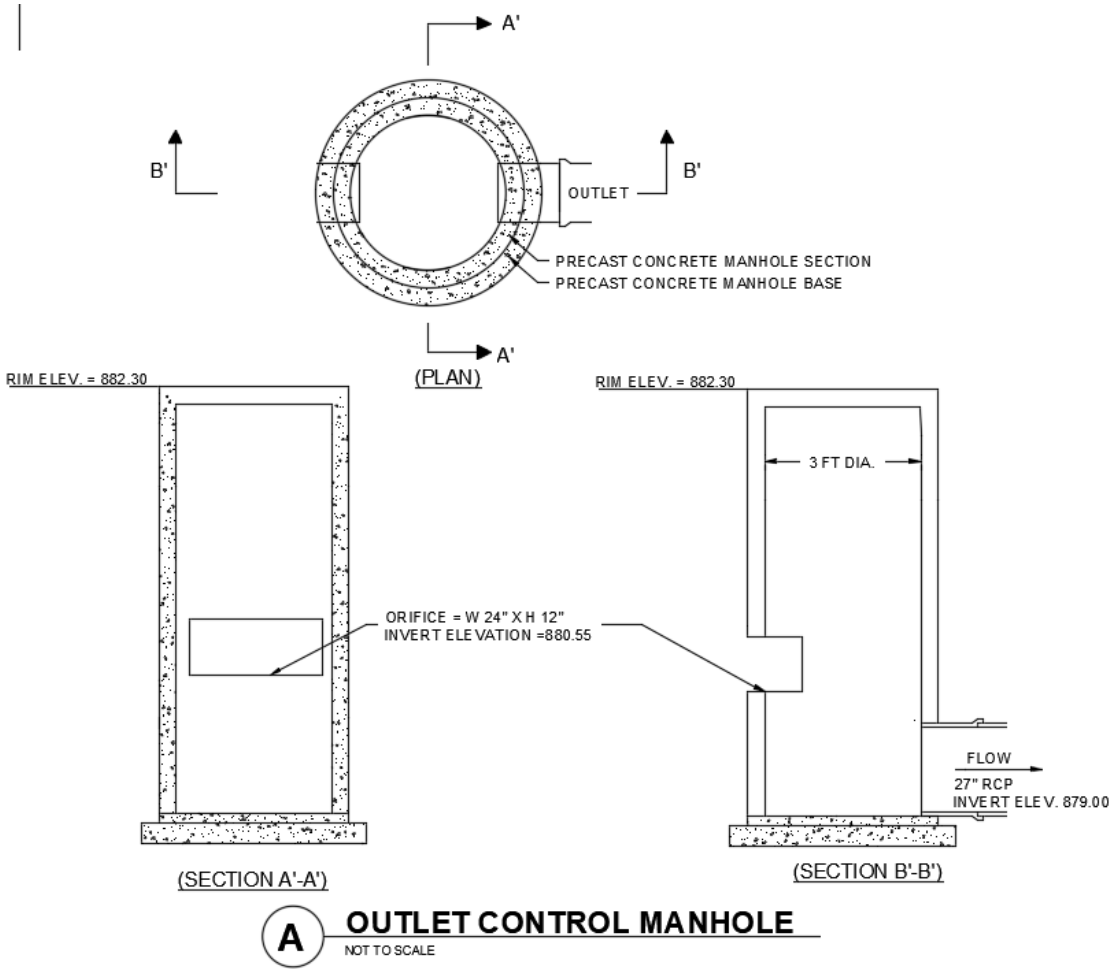


Exhibit "F"
Engineering/Construction Verification

DATE: _____

TO: City of Waukesha

FROM: _The Sigma Group, Inc._____

RE: Engineering/Construction Verification for the following project:

Project Name: __Lighthouse of Waukesha_____

Section _____, Town of _____

Storm Water Management & Erosion Control Permit # _____

Storm Water Management Practices: Bioinfiltration Pretreatment Basins and Infiltration Basin

For the above-referenced project and storm water management practices, this correspondence shall serve as verification that: 1) all site inspections outlined in approved inspection plans have been successfully completed; and 2) the storm water management practice design data presented in Exhibit D, and the "as-built" construction documentation presented in Exhibit E comply with all applicable state and local technical standards, in accordance with the City of Waukesha Storm Water Management and Erosion Control Ordinance.

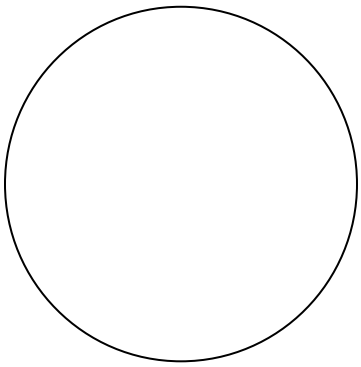
[Must include one of the following two statements:]

1. Any variations from the originally approved construction plans are noted in Exhibit E. These variations are considered to be within the tolerances of standard construction techniques and do not affect the original design as presented in Exhibit D in any way.
[Note: The City may request additional documentation to support this statement depending on the extent of deviations from the approved plans.]

Or

2. Any design or construction changes from the originally approved construction plans are documented in Exhibits D and E and have been approved by the City of Waukesha.

[Note: If warm season and wetland planting verification is required, it may be included in this exhibit.]



(Signed P.E. stamp must be included)

Exhibit G
Storm Water Management and Erosion Control Permit Termination

Project Identifier: Lighthouse of Waukesha

Location: Located in all that part of the Northwest Quarter (NW ¼) of Section 12, Township 6N, Range 19E (City of Waukesha) Waukesha County, Wisconsin.

Storm Water Management and Erosion Control Permit Holder's Name: Waukesha RE, LLC_____

Storm Water Management & Erosion Control Permit #: _____

Chapter 32 – City of Waukesha Storm Water Management and Erosion Control requires that all newly constructed storm water management practices be maintained by the Storm Water and Erosion Control Permit Holder until permit termination, after which maintenance responsibilities shall be transferred to the responsible party identified on the subdivision plat [or CSM] and referenced in this Maintenance Agreement.

Upon execution below, this exhibit shall serve to certify that the Storm Water Permit Holder has satisfied all requirements of the Storm Water Management and Erosion Control Ordinance and that the City of Waukesha has terminated the Storm Water Management and Erosion Control Permit for the property covered by this Maintenance Agreement.

Dated this ___ day of _____, 201_.

City of Waukesha representative:

_____
(Signature)

_____

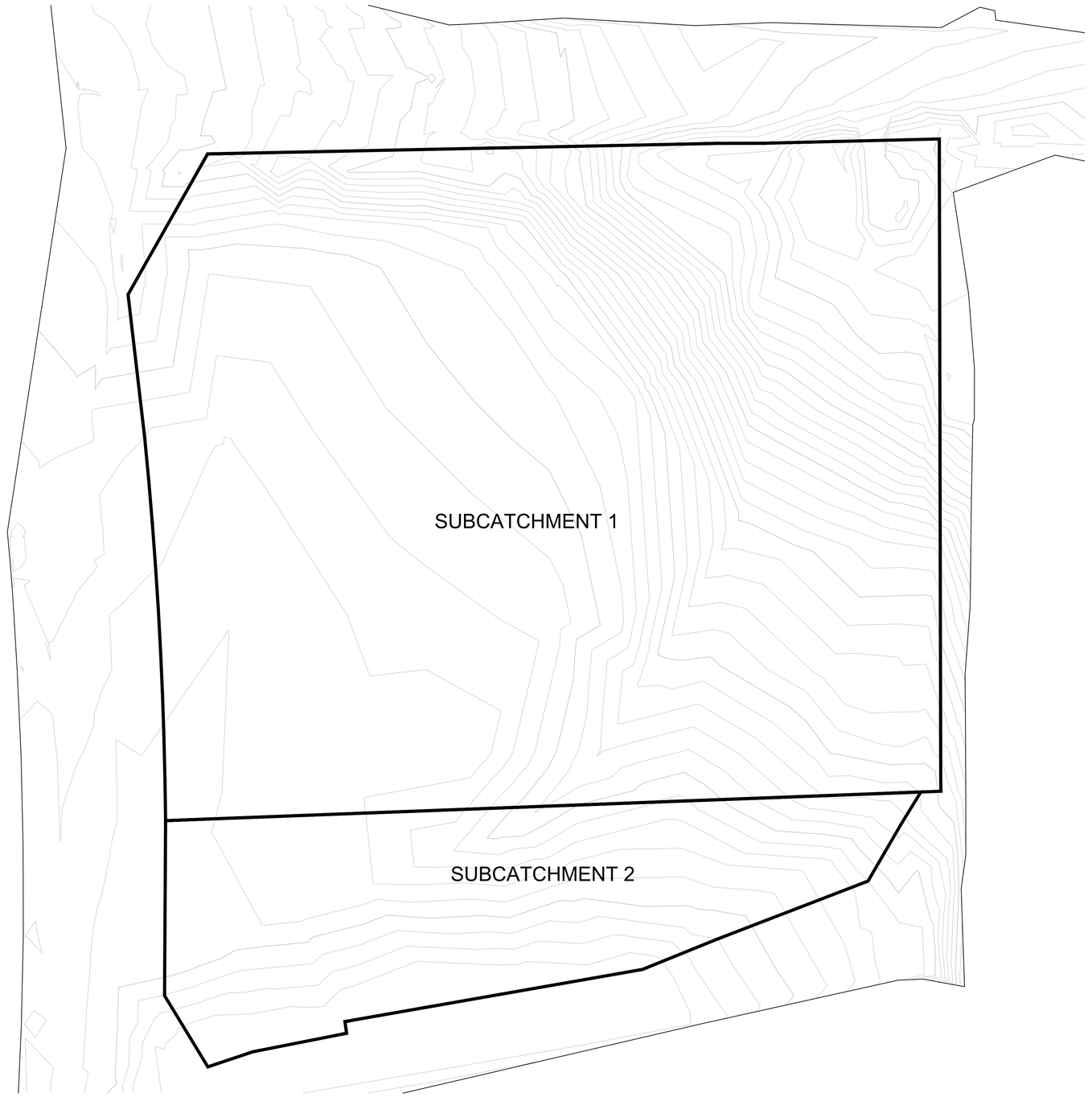
(Typed Name and Title)

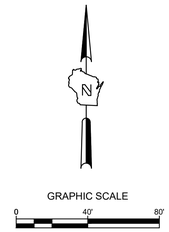
Acknowledgements

State of Wisconsin
County of Waukesha

Personally came before me this ____ day of _____, 201_, the above named ___ _____ ____ to me known to be the person who executed the foregoing instrument and acknowledged the same.

_____.
[Name]
Notary Public, Waukesha County, WI
My commission expires: _____





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CALL DIGGERS HOTLINE
1-800-242-8511
TOLL FREE

WIS STATUTE 182.0175(1974) REQUIRES MIN. 3 WORK DAYS NOTICE BEFORE YOU EXCAVATE

MILW. AREA 259-1181

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THE SIGMA GROUP
Single Source. Sound Solutions.
www.thesigmagroup.com
1300 West Canal Street
Milwaukee, WI 53233
Phone: 414-643-4200
Fax: 414-643-4210

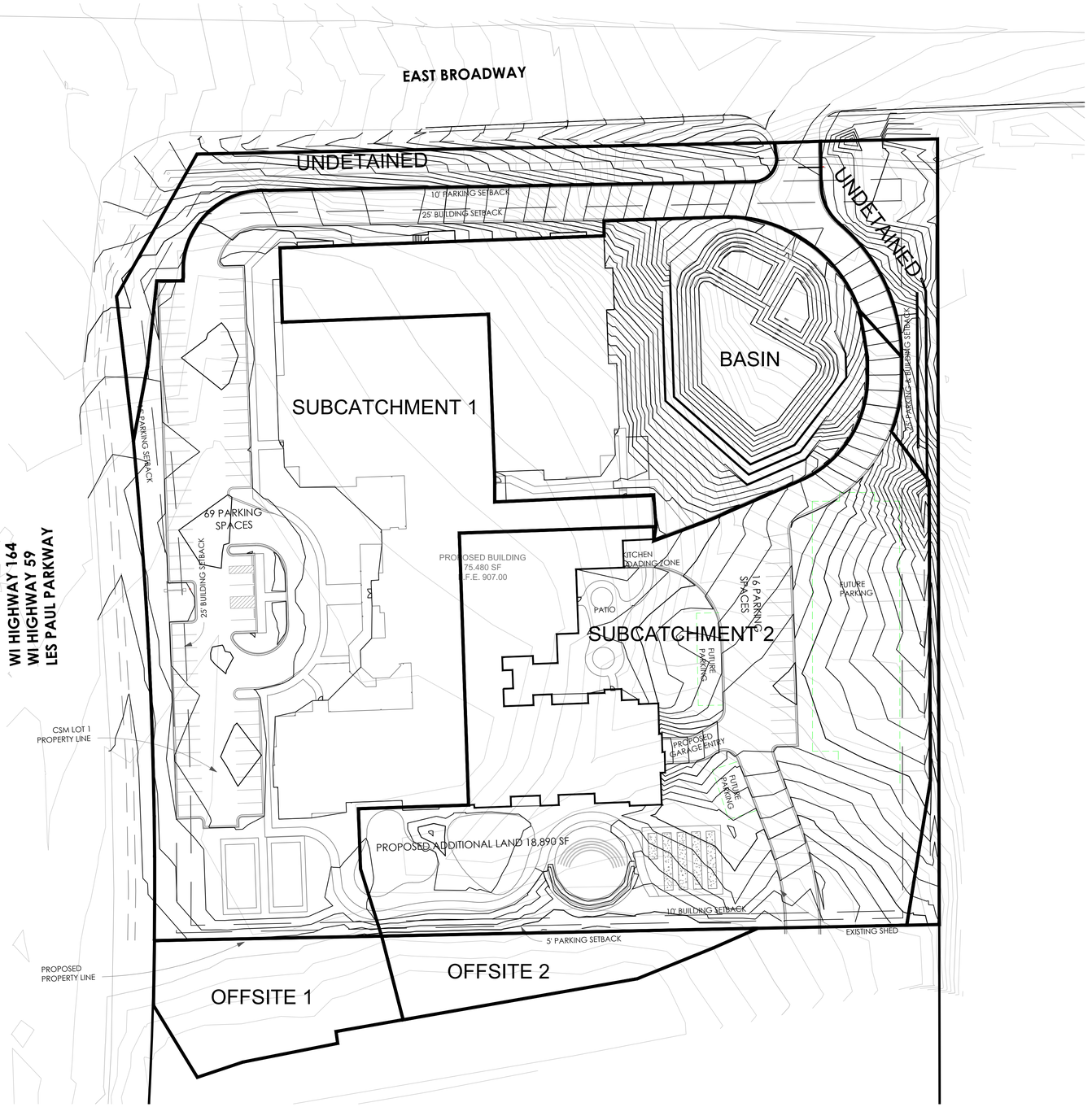
NEW PERSPECTIVE
WAUKESHA, WISCONSIN

GRADING PLAN

NO. REVISION DATE BY

DRAWING NO. 17884-SW 1.0.dwg
DRAWN BY: ---
DATE: ---
PROJECT NO: 17884
CHECKED BY: CTC
APPROVED BY: ---
SHEET NO.:

SW 1.0



GRAPHIC SCALE
0 40' 80'

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NEW PERSPECTIVE
WAUKESHA, WISCONSIN

GRADING PLAN

NO. REVISION DATE BY

DRAWING NO. 17884-SW 2.0 11-8.dwg
DRAWN BY: ---
DATE: ---
PROJECT NO: 17884
CHECKED BY: CTC
APPROVED BY: ---
SHEET NO.:

SW 2.0