Stormwater Management
Hydrologic and Hydraulic Study

Pleasant View Pointe
Chanhassen, MN

City of Chanhassen
Minnehaha Creek Watershed District
June 4, 2025

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Introduction

Included in this report are the materials necessary to review the stormwater management plan for the proposed "Pleasant View Pointe" project in Chanhassen, Minnesota. The following information is included:

- Study Narrative
- Stormwater Wetland Zone Classifications
- Drainage Area Maps
- Rate Control HydroCAD Calculation Reports
- Water Quality Calculations:
    - Proposed MIDS estimating pond phosphorous and TSS removal efficiency.
- Storm Sewer Calculations
- Low Point Modeling
- Geotechnical Soil Borings

Background

This study was conducted to analyze the stormwater treatment requirements for a proposed residential subdivision in Chanhassen, MN and within Minnehaha Creek Watershed District (MCWD) boundary. The study will show that the proposed stormwater management system will nullify the effects of the increased impervious cover resulting from the new development. The study assumes the following two scenarios:

- Existing conditions – Single Residence occupying property.
- Proposed conditions – Development of the residential project.
    - City of Chanhassen urban improvements of Pleasant View Road and installation of storm sewer.

	Project Area
Total Site Area based on boundary (acres)	14.560
Total Proposed SWMP Area including Offsite Area (acres)	24.134
Existing Site Impervious (acres)	0.443
Post Construction Site Impervious (acres)	4.466
Proposed (future) Pleasant View Road Impervious	1.099
Proposed Peaceful Lane Road	0.231
Total Volume Control Impervious Area (acres) *	5.795
Impervious Area Routed to North BMP (acres)	4.893
Impervious Area Routed to West BMP (acres)	0.683
Impervious Area Routed to South BMP (acres)	0.219

*Total volume control area impervious is the proposed impervious created from the subdivision and additionally, impervious for proposed future Pleasant View Road.

Runoff Rate Control

All rate control calculations have been performed using the method via HydroCAD software. Three events were modeled including: the 2-year, 10-year and 100-year, MSE Type 3 24-hour storm events, AMC 2, with ATLAS-14 precipitation amounts of 2.87", 4.28", and 7.38", used respectively. All existing and proposed curve numbers are based on estimations of land cover and soil type from attached geotechnical report. Based on the soil borings from Geotechnical Analysis, an aggregate hydrologic soil group of "D" was assumed throughout the site. Times of concentrations were typically estimated and modeled using direct entry and lag method.

Existing Conditions

The project site is currently 5 parcels, with 1 single family residence, driveway, and outbuildings. The development site is located South of Christmas Lake. A portion of the site does fall withing the 1,000' shoreland district for Christmas Lake. The site consists of wooded uplands and grassed areas, existing stormwater pond, historic remnant wetland, and incidental wetland. The project does contain bluff as defined by the City of Chanhassen code. The property has variable slopes from flat to more than 3:1. Roughly ½ of the site drains via overland or storm sewer to the existing pond. The existing pond was modified with the development of the Troendle Addition. A majority of the Troendle Addition does drain to the existing pond via storm sewer. The existing pond/wetland outlets via 8" pipe to the west to existing preserve wetland as defined by MCWD. A small portion of the site NE drains to existing Pleasant View Road and continues East. A small portion drains east offsite. A portion drains south through existing residential to Lake Lucy Road. A portion drains overland to the west down to a ditch that swales and drains to a low point culvert. The culvert then outlets west towards the existing preserve wetland. Wetland 1 was determined to be incidental and will be graded and removed. The historic remnant wetland will remain in place except a small portion of 1268 sf will be filled. The wetland has been permitted to be impacted completely and will be mitigated offsite. In effort to preserve and satisfy the City of Chanhassen code, the remnant wetland is being incorporated into the proposed BMP.

- E-1 – Onsite area that drains overland to the existing onsite remnant wetland/pond.
- E-2 – Onsite area that drains overland to existing Troendle Additon storm sewer proceeding to the existing remnant wetland/onsite pond.
- E-3 – Onsite area that drains overland to the South through existing residential, proceeding to Lake Lucy Road storm sewer.
- E-4 - Onsite area that drains West overland to a ditch that swales and drains to a low point culvert. The culvert outlets and drains to an existing offsite preserve wetland.
- E-5 – Onsite area that drains overland offsite to existing Pleasant View Road and continues East
- E-6 – Onsite area that drains East to existing residential area.
- E-7 – Onsite area that drains overland to existing Troendle Additon storm sewer proceeding to the existing onsite remnant wetland/pond.
- E-8 – Onsite pervious area that drains overland West to existing offsite preserve wetland.
- OFF-1 – Offsite Troendle Addition residential single family homes and roadways that drain via storm sewer to the onsite existing remnant wetland/pond.
- OFF-2 – Offsite residential that drains overland to the existing remnant wetland/pond.
- OFF-3 – Offsite residential and Pleasant View Road that drains via roadway and ditches to the existing onsite remnant wetland/pond.
- OFF-4 – Offsite existing residential and Peaceful Lane roadway that drains to the existing offsite preserve wetland to the West.
- OFF-5 – Offsite pervious area drains West overland to a ditch that swales and drains to a low point culvert. The culvert outlets and drains to an existing offsite preserve wetland.
- OFF-6 – Offsite area that drains onto the site overland and proceeds South to Lake Lucy Road storm sewer.

To compare peak discharge rates for the existing and proposed conditions, flows were analyzed compositely. Refer to the existing conditions drainage map and HydroCAD report for additional information and detailed calculations.

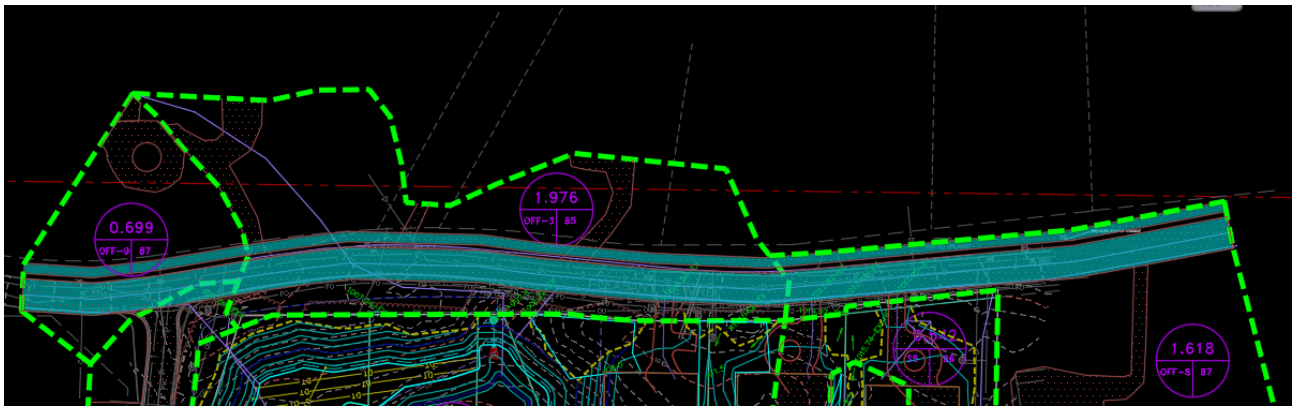
Site composite existing runoff rate as calculated by HydroCAD are listed in the table below:

Event	South (cfs)	West (cfs)	Northeast (cfs)	East (cfs)	Northwest (cfs)
2 year (2.87" 24hr)	4.80	8.54	4.49	0.59	2.28
10 year (4.28" 24hr)	9.32	13.92	8.04	1.16	3.91
100 year (7.33" 24hr)	20.13	24.06	16.45	2.53	7.66

Proposed Conditions

The proposed development area is made up of 5 existing parcels totaling in 13.60 acres. The parcels are split in the middle by existing public ROW intended to connect Nez Pierce Drive and Peaceful Lane. The ROW splitting the parcels will be vacated (included in new site area) and new road ROW will be provided. The site is bound by existing residential properties to the east and south. The property is then bound on the west and north by a two roads and public ROW. A portion of the existing ROW along the old Redman Lane has a resolution to be vacated from 1987 (see survey and plan). This ROW will be vacated and given back to abutting landowner and is **included** in site area. The total site area included to be platted with new ROW is **14.56 AC**. Rachel Development is proposing 20 new residential single-family homes. Drainage maps provided show delineations based on full development. The site is capturing and treating **all** new created imperious from the site.

The city will be re-constructing Pleasant View Road in the future. The proposed stormwater management plan has assumed treatment for an assumed city street section 31' back to back with a 10' wide trail as well as a forecasted larger drainage area that will be captured in the future by storm sewer and piped back to the new north BMP. The expanded drainage area was estimated by assuming 4' minimum starting catch basin build, with 0.5% slope to the NWL of the north BMP at 994.0. The below screen shot shows blue hatched area, the new area added to the proposed conditions of the modeling and is included. The added area will now show greater areas than the existing conditions and will **not** match.



The stormwater management plan for the proposed conditions will meet the guidelines required by the City of Chanhassen and Minnehaha Creek Watershed District (MCWD) for stormwater rate and volume control. The following criterion was used in designing the stormwater management system:

- Post-development peak runoff rate from the site for the 2, 10 and 100-year 24-hour MSE 3 24-hour storm events (Hershfield, DM. 1961 rainfall frequency.) must not be greater than existing condition rates in

accordance with the City and. To remain conservative, Alliant used the (Atlas 14) rainfall data for modeling purposes.

- Development may not increase the peak runoff rate from the site, in aggregate for the design rainfall events.
- Newly constructed stormwater BMPs shall provide water quality volume treatment in accordance with 90 percent TSS removal and 60 percent TP removal.
- Provide volume control equivalent to 1.0" of runoff from all proposed impervious surface, in accordance with MCWD volume control requirements. If filtration is used as BMP volume provided must be twice the required volume reduction.
- Freeboard, the lowest building opening must be at minimum 1' above the emergency over flow elevation. Building adjacent to stormwater basin shall be 3' above the 100 year high water level (HWL).
- Impact to downstream waterbodies receiving runoff shall be in accordance with MCWD.

The proposed residential development will consist of 20 single family homes and associated roadways as shown in the plan set. The project will include one stormwater wetland with a filtration bench and one filtration basin to provide rate and volume control, for treatment of the stormwater runoff. The filtration basin to the west will have pre-treatment provided by overland drainage.

Stormwater runoff from the new roadways, and all front yards and several rear yards will be collected by storm sewer and piped to the proposed north stormwater treatment BMP. Some of the rear yards will run directly into the BMP. 5 rear yards will run west to the filtration basin. The proposed stormwater that was being collected for Troendle Additon is still being collected via stormsewer and routed to the proposed stormwater wetland/filtration basin. The proposed basin will be capturing, the OFF-4 that previously drained West toward the existing pond. Most of the area that previously drained south to Lake Lucy Road is being captured and will run to the proposed north BMP via storm sewer. The following HydroCAD sub catchments were used in the proposed conditions model:

- S-1 - Onsite area that drains overland and unconnected to the proposed BMP
- S-2 - Onsite area that drains to storm sewer and then to the proposed BMP.
- S-3 – Onsite pervious area that drains overland to the South through existing residential, proceeding to Lake Lucy Road storm sewer.
- S-4 – Onsite area that drains overland to the West to a proposed filtration basin.
- S-5 - Onsite area that drains overland offsite to Exiting Pleasant View Road and will be captured with the City's Pleasant View Road re-construction storm sewer.
- S-6 - Onsite pervious area that drains East to existing residential area.
- S-7 – Onsite pervious area that drains overland west to existing wetland.
- S-9 – Onsite pervious area that drains overland west to existing wetland.
- OFF-1 – Offsite existing Troendle Addition residential single family homes and roadways that drain via storm sewer to the onsite proposed BMP.
- OFF-2 – Offsite residential that drains overland to the proposed BMP.
- OFF-3 – Offsite residential and Proposed Pleasant View Road that drains via roadway and ditches and future storm sewer to a low point proposed catch basin and rip rap forebay to and proposed BMP. The impervious area included here includes the future city road and trail.
- OFF-4 – Offsite existing residential and Peaceful Lane roadway that is now captured via stormsewer and drains to the proposed BMP.
- OFF-5 – Offsite pervious area drains overland to the proposed West filtration basin.
- OFF-6 – Offsite area that drains overland to storm sewer that is directed to the north BMP. This area previously drained to the south to Lake Lucy Road storm sewer.
- OFF – 7 – offsite area that drains overland to the north BMP. This area newly captured by the site due to proposed grading. Previously drained onto the site then south and east with S6 area.
- OFF – 8 – offsite area that can be captured by newly constructed Pleasant View Road construction and storm sewer. Area previously drained to the east away from project.
- OFF – 9 – offsite area that can be captured by newly constructed Pleasant View Road construction and storm sewer. Area previously drained to the west away from project.

Most of the runoff from the site's developed area will be routed to the proposed BMP stormwater wetland with a filtration bench and underdrain or a filtration basin to the west. The filtration bench will provide the required filtration volume required by the city and watershed. The BMPs have an OCS (Outlet Control Structure) that will be used to provide a controlled discharge rate to the existing west wetland offsite. The outlet for the proposed pond will be installed in the same location and have the same elevation as the existing pond outlet.

The proposed stormwater management plan decreases the composite peak discharge rate for all stormwater events to below existing conditions. The proposed stormwater plan also decreases to 3 discharge points and will ultimately remove drainage to the NW and NE discharge points once Pleasant View Rd is reconstructed. Refer to the proposed conditions drainage map and HydroCAD report sheets for additional information.

Site composite proposed runoff rate as calculated by HydroCAD are listed in the table below:

Event	South (cfs)	West (cfs)	Northeast (cfs)	East (cfs)	Northwest (cfs)
2 year (2.87" 24hr)	3.07	3.85	0	0.25	0
10 year (4.28" 24hr)	5.93	11.38	0	0.50	0
100 year (7.33" 24hr)	12.43	17.76	0	1.07	0

Stormwater Volume Control

Required Volume
The project is required to provide volume control in accordance with the MCWD criteria. Volume control equivalent to 1" over the proposed impervious surface is required. The volume control shall be taken care of by infiltration unless deemed in-feasible. The site soils are primarily made up of Hydraulic Soil Group D soils (sandy lean clay (CL), clayey sands (SC). Per watershed stormwater management rule 3.b.5, infiltration shall not be used. The volume control requirement is being met through filtration. The total new proposed impervious surface from proposed roadways, driveways, buildings, is 194,547 sf (4.446 AC). The new proposed site impervious is the actual new road impervious, and the maximum amount of impervious per lot. Conservatively, the maximum allowed impervious per lot was used to determine the required treatment volume, not what is shown by sample footprint in the plans. Required treatment volume for the site is equal to 16,212 cubic feet. MCWD requires filtration bmp to provided twice the required volume to be provided. The required volume control for the proposed subdivision is **32,425** cubic feet.

Additional Required Volume
The city will be re-constructing Pleasant View Road and will be installing storm sewer to capture the re-constructed road. An analysis has been completed to determine the extents to what can be captured by the storm sewer. The new road area has been assumed to be 31' back to back road with 10' trail. Impervious to be treated for Pleasant View Road section is 47,867 sf (1.099 AC). Also, Peaceful Lane will be re-constructed in coordination with the City of Chanhassen. This adds, 10,072 sf (0.231 AC), impervious road. The required treatment volume for Peaceful Lane and future Pleasant View Road is 4,828 CF x 2 (MCWD) **9,656.44 CF.**

Total Required Water Quality Volume 42,081 CF

Proposed Volume
The total treatment volume provided is equal to **54,469 CF**.

Stormwater Wetland / Filtration Shelf
There is **47,696 CF provided** by the north Stormwater Wetland. The filtration volume is set by the OCS orifice within weir wall set at 995.0 resulting in a 1.0' storage depth will filter through a 11,928 sf media mix

c section to an underdrain system. Details of the OCS and wetland/filtration shelf can be found in the proposed development plans.

West Filtration Basin
There is **5,066 CF provided** treatment volume by the West Filtration Basin. The filtration volume is set by the OCS notch in wier wall set at 996.5 resulting in a 1.5' storage depth that will filter through 2,510 sf media mix c section to an underdrain system. Details of the OCS and basin can be found in the proposed development plans.

South Filtration Trench
There is **1,707 CF provided** treatment volume by the South Filtration Trench. The filtration volume is set by the overflow berm at 1020.0 located along the south edge of the proposed trench. The filtration depth is 1.0' that will filter through the 600 sf trench/and filter to an underdrain system. Details of the trench can be found in the proposed development plans.

Proposed Underdrains
The underdrains proposed in the project will be installed per city of Chanhassen standard details and the MN stormwater manual. The quantity of underdrain is determined by the Carver County watershed design criteria of 1 lf of draintile per 50 cf of ponded filtration volume. See the development plans for further details on the proposed filtration section and underdrain designs.

Stormwater Wetland / Filtration Shelf
Minimum recommended draintile is equal to 47,696 CF /1LF 50 cf = **954 LF**.

West Filtration Basin
Minimum recommended draintile is equal to 5,066 CF /1LF 50 cf = **102 LF**.

South Filtration Trench
Minimum recommended draintile is equal to 1,707 CF /1LF 50 cf = **34 LF**.

Filtration Systems Draw Down Calculation
The filtration basin will draw down within 48 hours per MPCA guidelines. The assumed infiltration rate of media mix c and sand has been assumed at 1.0 in/hr. The infiltration rate is a reasonably conservative estimate and will likely be the filtration rate over time. Per the MPCA an infiltration rate of 1.63in/hr can be used for sand.

Basin	Filtration Volume (cf)	Filtration Depth	Filtration Surface Area (sf)	Effective Filtration Depth (in)*	Draw Down Time
Stormwater Wetland /Filtration	47,696	1.0'	11,928	47.98	48 hr
West Filtration Basin	5,066	1.5'	2,510	24.22	25 hr
South Filtration Trench	1,707	1.0'	600	34.14	35 hr

* Effective filtration depth is used for estimating draw down timeframe.

$$\textbf{\textit{Maximum Allowable Draw Down computation.}}\ \mathbf{48}\ \boldsymbol{in}\ \div\ \mathbf{1.0}\ \frac{\boldsymbol{in}}{\boldsymbol{hr}}\ = \mathbf{48}\ \boldsymbol{hr}$$

Stormwater Quality

The stormwater management system must have an 90% TSS and 60% Phosphorus removal efficiency from proposed conditions. MIDS Calculator was used to calculate TSS and TP removal efficiencies. See the MIDS Results for reference. The onsite area totaling and proposed Peaceful Lane and Pleasant View Road. 14.56 AC + 1.33 = **15.89 AC.** When analyzing the removal efficiency for the stormwater wetland/filtration system it has been estimated that 25% of inflow will bypass treatment by the stormwater wetland (per MN BMP manual this translates to a 40% undersized BMP. This bypass has been conservatively assumed to factor in the approximate flow that will route to the wetland filter with forebay pretreatment. This assumption remains consistent for all 3 scenarios considered.

TSS and TP removal efficiencies as calculated by MIDS Calculator (Site and Pleasant View Imp.:

Total	Proposed TSS Removal Efficiency	Proposed P Removal Efficiency
Site Removal	93%	66%

Troendle Addition

Although not required to provide upgrade water quality treatment for this drainage area, a MIDS model was created to analyze what the treatment will be provided for the offsite Troendle Addition. This scenario adds the offsite catchment OFF-1 area and impervious to the required design area and impervious. The MIDS result shows that the system will treat above the required 90% TSS and 60% TP removal efficiencies.

TSS and TP removal efficiencies as calculated by MIDS Calculator (Site and Pleasant View Imp.:

Total	Proposed TSS Removal Efficiency	Proposed P Removal Efficiency
Site Removal	93%	64%

Entire SWM Site Area

Although not required to provide upgrade water quality treatment for all offsite contributing area and impervious surfaces, a MIDS model was created to analyze what the treatment will be provided for that scenario. This scenario analyzes the entire watershed 24.137AC. The MIDS result shows that the system is treating above the required 90% TSS and 60% TP removal efficiencies.

TSS and TP removal efficiencies as calculated by MIDS Calculator (Site and Pleasant View Imp.:

Total	Proposed TSS Removal Efficiency	Proposed P Removal Efficiency
Site Removal	93%	63%

Impact on Downgradient Waterbodies

Per MCWD wetland inventory, there are 3 wetlands that receive runoff from the site.

Existing wetland to the west is a preserve wetland per the MCWD. Per wetland rules the permitted bounce for storm event is existing for a preserve wetland. To determine that the site meets the requirements, lidar contours were used to model the existing wetland. The normal water level was surveyed at an elevation of 974.1. An 18” standpipe was observed and recorded to be the outlet for the preserve wetland. The model only takes into consideration the project site drainage area. See below the results from the existing and proposed conditions for the bounce.

Event	Existing HWL	Proposed HWL
2 year (2.87” 24hr)	974.35	974.27
10 year (4.28” 24hr)	974.48	974.38
100 year (7.33” 24hr)	974.85	974.84

Existing Wetland to SE of catchment S6 is a preserve wetland per MCWD. The total area and flow to the East was reduced in all storm events; therefore, does not create a bounce on the downstream wetland. No new impervious is created that flows to the east from catchment S6. See below results of existing and proposed volumes.

Event	Existing Volume (AC-FT)	Proposed Volume (AC-FT)
2 year (2.87" 24hr)	0.024	0.010
10 year (4.28" 24hr)	0.047	0.019
100 year (7.33" 24hr)	0.107	0.043

Existing Wetland to South of catchment S3 and S9 is a manage 1 wetland per MCWD. The total area and flow to the South initially drains to city storm sewer in Lake Lucy Road but will eventually drain to the wetland. The flow offsite south was reduced in all storm events; therefore, it will not create a negative bounce on the downstream wetland. A filtration trench has been installed to migitate the new impervious in catchment S9. See below results of existing and proposed volumes.

Event	Existing Volume (AC-FT)	Proposed Volume (AC-FT)
2 year (2.87" 24hr)	0.227	0.178
10 year (4.28" 24hr)	0.440	0.332
100 year (7.33" 24hr)	0.978	0.715

Low Point Analysis (per MCWD)

Analysis estimates the 100 year storm high water level for two rear yard catch basins, CB 203 and CB 210 as requested by MCWD. Also refer to HydroCAD report in appendix.

CB 203 – Rim Elevation = 1008.90, EOF = 1010.05, 100-yr HWL = 1009.23

CB210 – Rim Elevation = 1015.40, EOF = 1017.70, 100-yr HWL = 1015.99

Conclusion

Alliant Engineering believes that the proposed design is acceptable for all parties involved. The peak discharge rates for the 2-year, 10-year and 100-year 24-hour storm events will be decreased in aggregate from existing rates for the proposed conditions. Sufficient runoff volume control has been provided by the stormwater management system to mitigate the proposed impervious surface additions. The proposed stormwater management system meets the TSS and TP removal efficiency requirements. Finally, the proposed grading and SWPPP plans will utilize Best Management Practices whenever possible to provide adequate erosion control measures to contain sediment during construction.

Please call 612-767-9330 with any questions or comments regarding stormwater issues for the Pleasant View Pointe subdivision.

Tyler Stricherz, PE
Mark Rausch, PE
Alliant Engineering, Inc. CC: File 4000320

APPENDIX

- Stormwater Wetland Zone Classifications
- Rate Control Supporting Documents
    - Drainage Delineation Maps
        - Existing Conditions
        - Proposed Conditions
    - Rate Control HydroCAD Reports
        - Existing Conditions
        - Proposed Conditions
- Water Quality Supporting Calculations
        - Proposed MIDS Calculator
- Storm Sewer Calculations
- Low point modeling analysis
- Geotechnical Analysis

CONSTRUCTED WETLAND LEGEND

- DEEPWATER ZONE/MICROPOOL/POND 1.5–6 FEET DEEP
- LOW MARSH ZONE 0.5'–1.5' FEET DEEP
- HIGH MARSH ZONE 0.5'–1.5' FEET DEEP
- VEGETATED POND BUFFER
- FILTRATION STRIPS
- HISTORIC WETLAND AREA TO REMAIN NOT GRADED /HIGH MARSH ZONE

PLEASANT VIEW RD

PEACEFUL LANE

STORMWATER WETLAND/FILTRATION
NWL:994.0
100 YEAR HWL:999.86

BLOCK 1

3

7

6

5

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PLEASANT VIEW POINTE - CONSTRUCTED WETLAND - ZONE CLASSIFICATIONS

1"
0' 20' 40'
DATE: 4–18–25
DRAWN BY: TAS
SCALE: 1" = 40'

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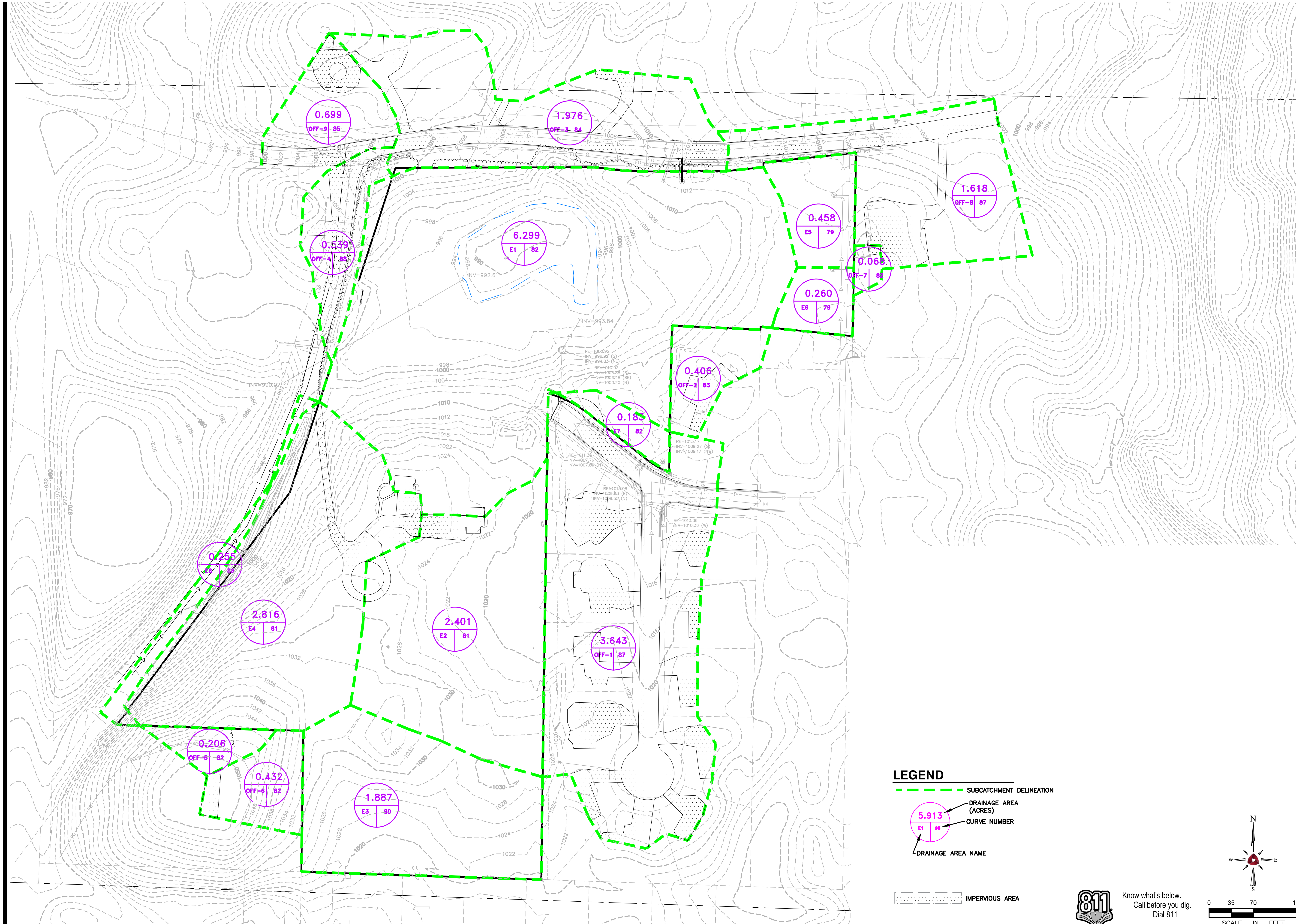

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RACHEL DEVELOPMENT

PLEASANT VIEW POINTE

CHANHASSEN, MN

EXISTING DRAINAGE MAP

DATE	DESCRIPTION
12-19-2024	PRELIMINARY PLAT CITY SUBMITTAL
4-18-2025	FINAL PLAT - CITY SUBMITTAL

CERTIFICATION

I hereby certify that this plan, specification, or report was prepared by me or under my direct supervision and that I am a duly Licensed Professional Engineer under the laws of the State of Minnesota.

FOR REVIEW ONLY
PRELIMINARY
NOT FOR CONSTRUCTION

Date License no.

QA/QC CHECK

By Date

PROJECT TEAM DATA

Designed By: TAS
Drafted By:
Project No.:

1

Sheet 1 of 1

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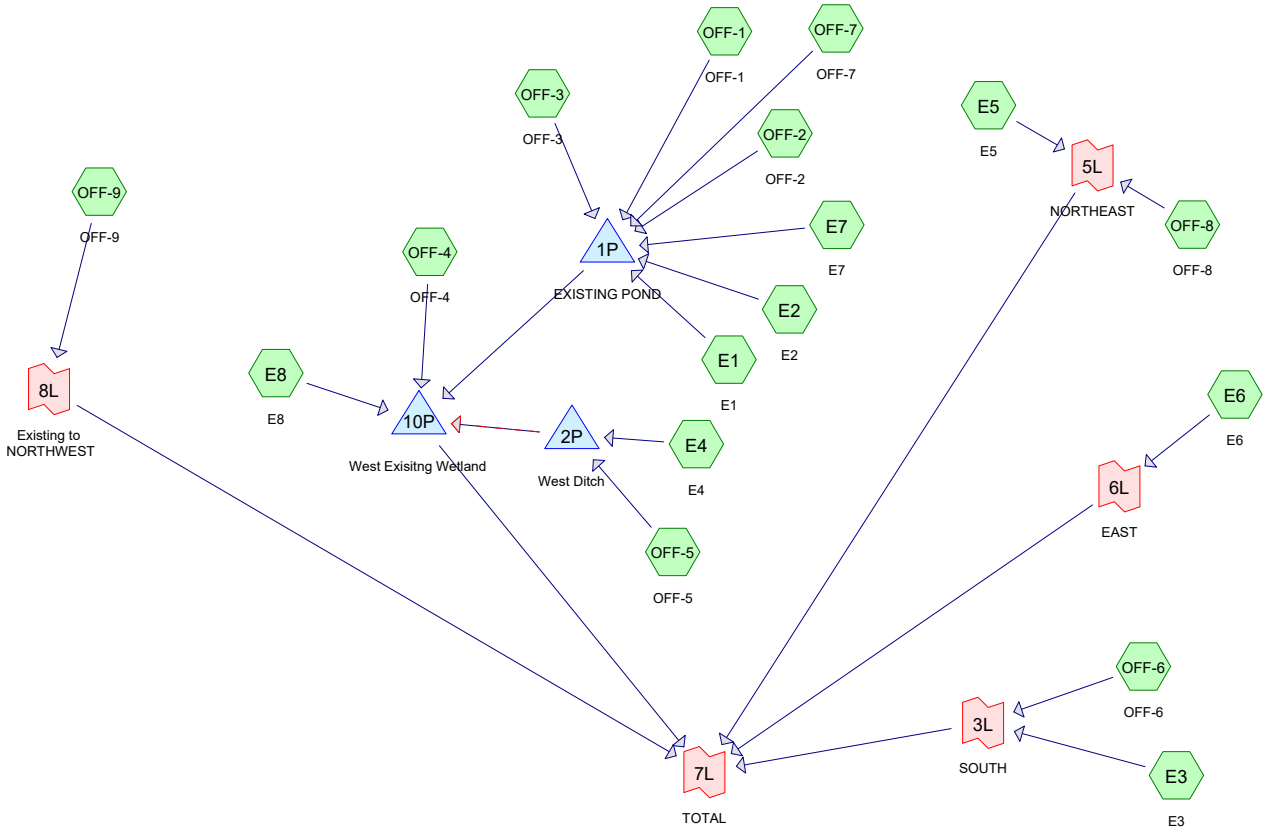


Subcat Reach Pond Link

Routing Diagram for EDRN

Prepared by Alliant Engineering, Inc, Printed 6/4/2025

Area Listing (all nodes)

Area (acres)	CN	Description (subcatchment-numbers)
12.403	80	>75% Grass cover, Good, HSG D (E1, E2, E3, E7, OFF-4, OFF-6, OFF-7, OFF-8, OFF-9)
0.040	98	Impervious, HSG D (OFF-6)
3.086	98	Paved parking, HSG D (E7, OFF-1, OFF-3, OFF-4, OFF-8, OFF-9)
0.523	98	Unconnected roofs, HSG D (E1, E2, E4, OFF-2, OFF-7)
0.555	98	Water Surface, HSG D (E1)
0.206	82	Woods/grass comb., Fair, HSG D (OFF-5)
7.066	79	Woods/grass comb., Good, HSG D (E4, E5, E6, OFF-1, OFF-2, OFF-3)
0.255	86	Woods/grass comb., Poor, HSG D (E8)

EDRN

Soil Listing (all nodes)

Area (acres)	Soil Group	Subcatchment Numbers
0.000	HSG A	
0.000	HSG B	
0.000	HSG C	
24.133	HSG D	E1, E2, E3, E4, E5, E6, E7, E8, OFF-1, OFF-2, OFF-3, OFF-4, OFF-5, OFF-6, OFF-7, OFF-8, OFF-9
0.000	Other	

Time span=0.00-600.00 hrs, dt=0.01 hrs, 60001 points
Runoff by SCS TR-20 method, UH=SCS, Weighted-Q
Reach routing by Dyn-Stor-Ind method - Pond routing by Dyn-Stor-Ind method

SubcatchmentE1: E1 Runoff Area=274,415 sf 9.50% Impervious Runoff Depth=1.29"
Flow Length=498' Slope=0.0723 '/' Tc=6.3 min CN=WQ Runoff=14.59 cfs 0.680 af

SubcatchmentE2: E2 Runoff Area=2.401 ac 4.33% Impervious Runoff Depth=1.22"
Flow Length=680' Slope=0.0323 '/' Tc=13.6 min UI Adjusted CN=WQ Runoff=3.88 cfs 0.244 af

SubcatchmentE3: E3 Runoff Area=1.887 ac 0.00% Impervious Runoff Depth=1.15"
Flow Length=327' Slope=0.0550 '/' Tc=5.5 min CN=80 Runoff=4.18 cfs 0.181 af

SubcatchmentE4: E4 Runoff Area=122,681 sf 9.85% Impervious Runoff Depth=1.25"
Flow Length=550' Tc=9.4 min UI Adjusted CN=WQ Runoff=5.42 cfs 0.293 af

SubcatchmentE5: E5 Runoff Area=0.458 ac 0.00% Impervious Runoff Depth=1.09"
Flow Length=198' Slope=0.0404 '/' Tc=4.5 min CN=79 Runoff=1.01 cfs 0.042 af

SubcatchmentE6: E6 Runoff Area=0.260 ac 0.00% Impervious Runoff Depth=1.09"
Flow Length=136' Slope=0.0330 '/' Tc=3.7 min CN=79 Runoff=0.59 cfs 0.024 af

SubcatchmentE7: E7 Runoff Area=0.183 ac 10.38% Impervious Runoff Depth=1.31"
Flow Length=155' Slope=0.0160 '/' Tc=6.3 min CN=WQ Runoff=0.43 cfs 0.020 af

SubcatchmentE8: E8 Runoff Area=11,092 sf 0.00% Impervious Runoff Depth=1.55"
Tc=1.0 min CN=86 Runoff=0.86 cfs 0.033 af

SubcatchmentOFF-1: OFF-1 Runoff Area=3.643 ac 43.65% Impervious Runoff Depth=1.77"
Flow Length=564' Slope=0.0323 '/' Tc=9.8 min CN=WQ Runoff=9.27 cfs 0.537 af

SubcatchmentOFF-2: OFF-2 Runoff Area=0.406 ac 22.66% Impervious Runoff Depth=1.44"
Flow Length=270' Slope=0.0741 '/' Tc=3.7 min UI Adjusted CN=WQ Runoff=1.13 cfs 0.049 af

SubcatchmentOFF-3: OFF-3 Runoff Area=86,082 sf 27.02% Impervious Runoff Depth=1.51"
Flow Length=489' Slope=0.0613 '/' Tc=6.4 min CN=WQ Runoff=5.10 cfs 0.249 af

SubcatchmentOFF-4: OFF-4 Runoff Area=23,335 sf 43.88% Impervious Runoff Depth=1.81"
Flow Length=337' Slope=0.0297 '/' Tc=5.9 min CN=WQ Runoff=1.65 cfs 0.081 af

SubcatchmentOFF-5: OFF-5 Runoff Area=8,976 sf 0.00% Impervious Runoff Depth=1.28"
Flow Length=349' Tc=5.2 min CN=82 Runoff=0.51 cfs 0.022 af

SubcatchmentOFF-6: OFF-6 Runoff Area=18,405 sf 9.38% Impervious Runoff Depth=1.29"
Flow Length=564' Slope=0.0323 '/' Tc=11.5 min CN=WQ Runoff=0.78 cfs 0.046 af

SubcatchmentOFF-7: OFF-7 Runoff Area=2,943 sf 9.17% Impervious Runoff Depth=1.29"
Flow Length=429' Tc=7.1 min UI Adjusted CN=WQ Runoff=0.15 cfs 0.007 af

SubcatchmentOFF-8: OFF-8 Runoff Area=70,469 sf 31.01% Impervious Runoff Depth=1.61"
Tc=10.0 min CN=WQ Runoff=3.80 cfs 0.218 af

Subcatchment OFF-9: OFF-9 Runoff Area=30,431 sf 29.47% Impervious Runoff Depth=1.59"
Tc=0.0 min CN=WQ Runoff=2.28 cfs 0.093 af

Pond 1P: EXISTING POND Peak Elev=994.35' Storage=50,141 cf Inflow=32.79 cfs 1.785 af
8.0" Round Culvert n=0.010 L=324.0' S=0.0080 '/' Outflow=1.53 cfs 1.783 af

Pond 2P: West Ditch Peak Elev=995.91' Storage=27 cf Inflow=5.80 cfs 0.314 af
Primary=5.80 cfs 0.314 af Secondary=0.00 cfs 0.000 af Outflow=5.80 cfs 0.314 af

Pond 10P: West Exisitng Wetland Peak Elev=974.35' Storage=19,101 cf Inflow=8.54 cfs 2.211 af
Outflow=1.92 cfs 2.210 af

Link 3L: SOUTH Inflow=4.80 cfs 0.227 af
Primary=4.80 cfs 0.227 af

Link 5L: NORTHEAST Inflow=4.49 cfs 0.259 af
Primary=4.49 cfs 0.259 af

Link 6L: EAST Inflow=0.59 cfs 0.024 af
Primary=0.59 cfs 0.024 af

Link 7L: TOTAL Inflow=10.98 cfs 2.813 af
Primary=10.98 cfs 2.813 af

Link 8L: Existing to NORTHWEST Inflow=2.28 cfs 0.093 af
Primary=2.28 cfs 0.093 af

Summary for Subcatchment E1: E1

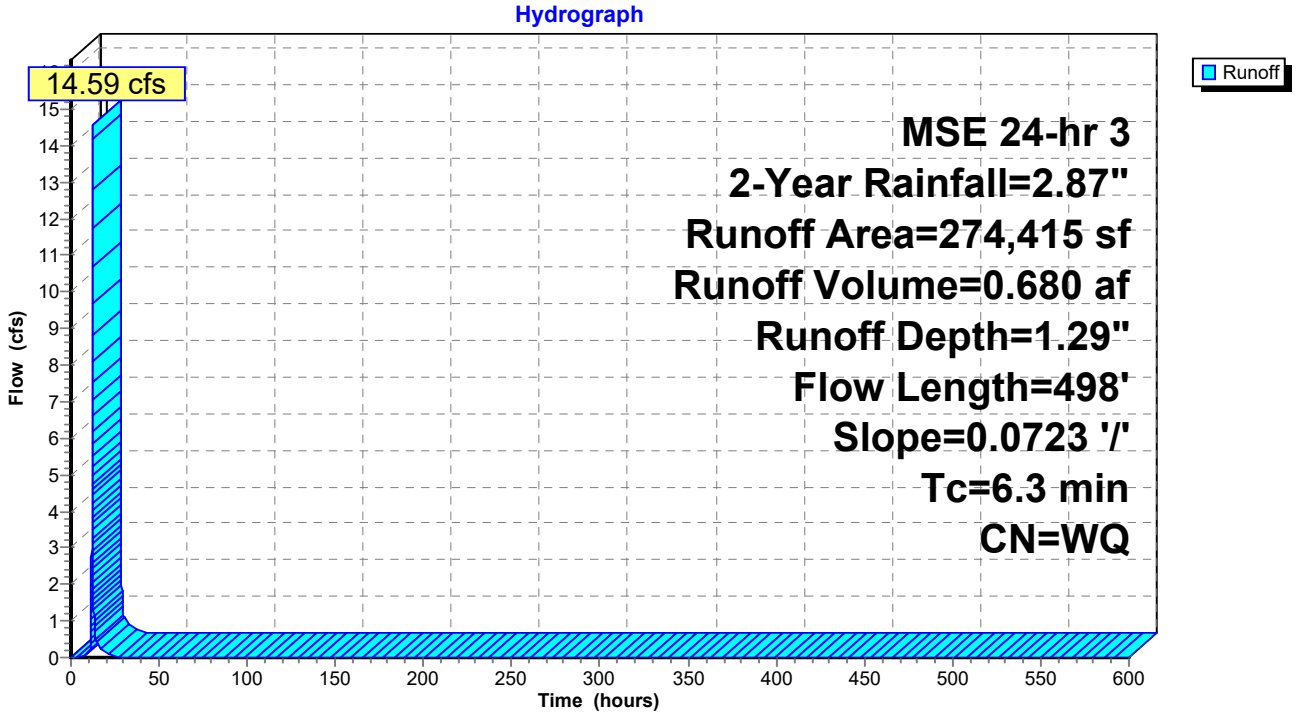
Runoff = 14.59 cfs @ 12.14 hrs, Volume= 0.680 af, Depth= 1.29"
Routed to Pond 1P : EXISTING POND

Runoff by SCS TR-20 method, UH=SCS, Weighted-Q, Time Span= 0.00-600.00 hrs, dt= 0.01 hrs
MSE 24-hr 3 2-Year Rainfall=2.87"

Area (sf)	CN	Description
1,904	98	Unconnected roofs, HSG D
24,173	98	Water Surface, HSG D
248,338	80	>75% Grass cover, Good, HSG D
274,415		Weighted Average
248,338		90.50% Pervious Area
26,077		9.50% Impervious Area
1,904		7.30% Unconnected

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
6.3	498	0.0723	1.31		**Lag/CN Method,**

Subcatchment E1: E1



Summary for Subcatchment E2: E2

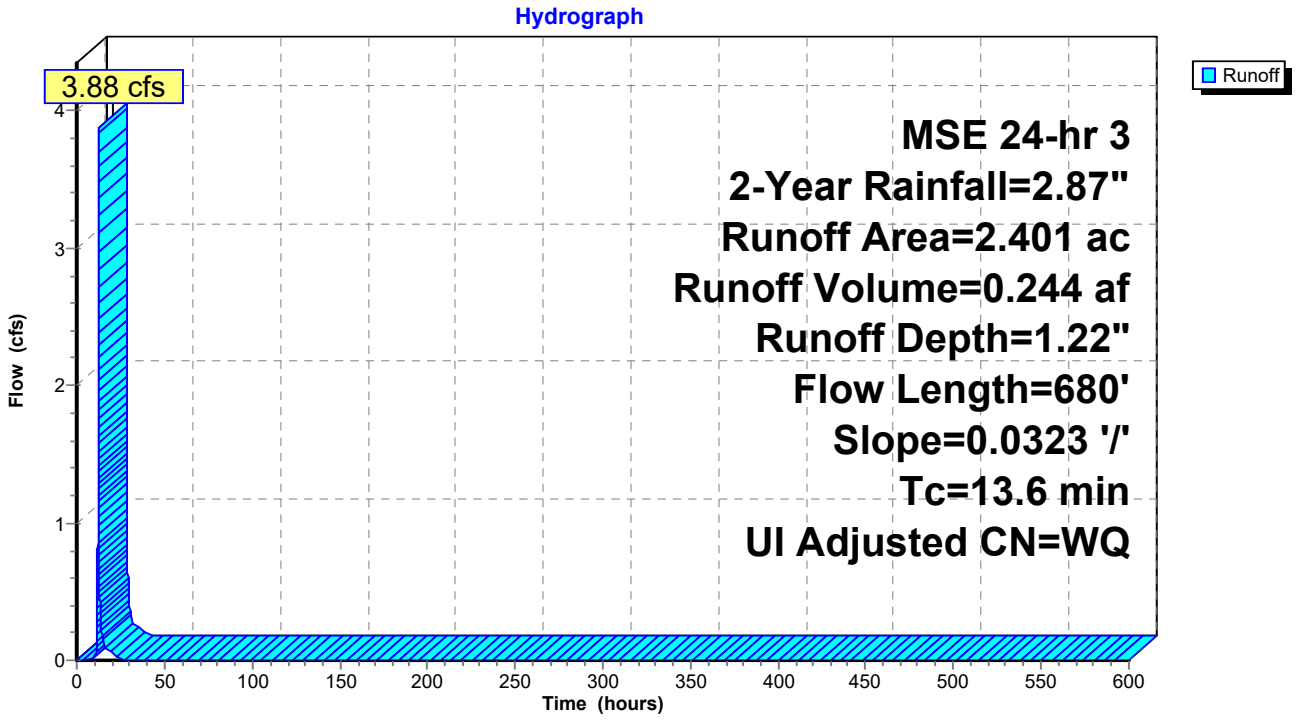
Runoff = 3.88 cfs @ 12.22 hrs, Volume= 0.244 af, Depth= 1.22"
Routed to Pond 1P : EXISTING POND

Runoff by SCS TR-20 method, UH=SCS, Weighted-Q, Time Span= 0.00-600.00 hrs, dt= 0.01 hrs
MSE 24-hr 3 2-Year Rainfall=2.87"

Area (ac)	CN	Adj	Description
0.104	98	98	Unconnected roofs, HSG D
2.297	80	80	>75% Grass cover, Good, HSG D
2.401			Weighted Average
2.297			95.67% Pervious Area
0.104			4.33% Impervious Area
0.104			100.00% Unconnected

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
12.6	680	0.0323	0.90		**Lag/CN Method, OVERLAND - SWALE**
1.0					**Direct Entry, STORM SEWER**
13.6	680	Total			

Subcatchment E2: E2



Summary for Subcatchment E3: E3

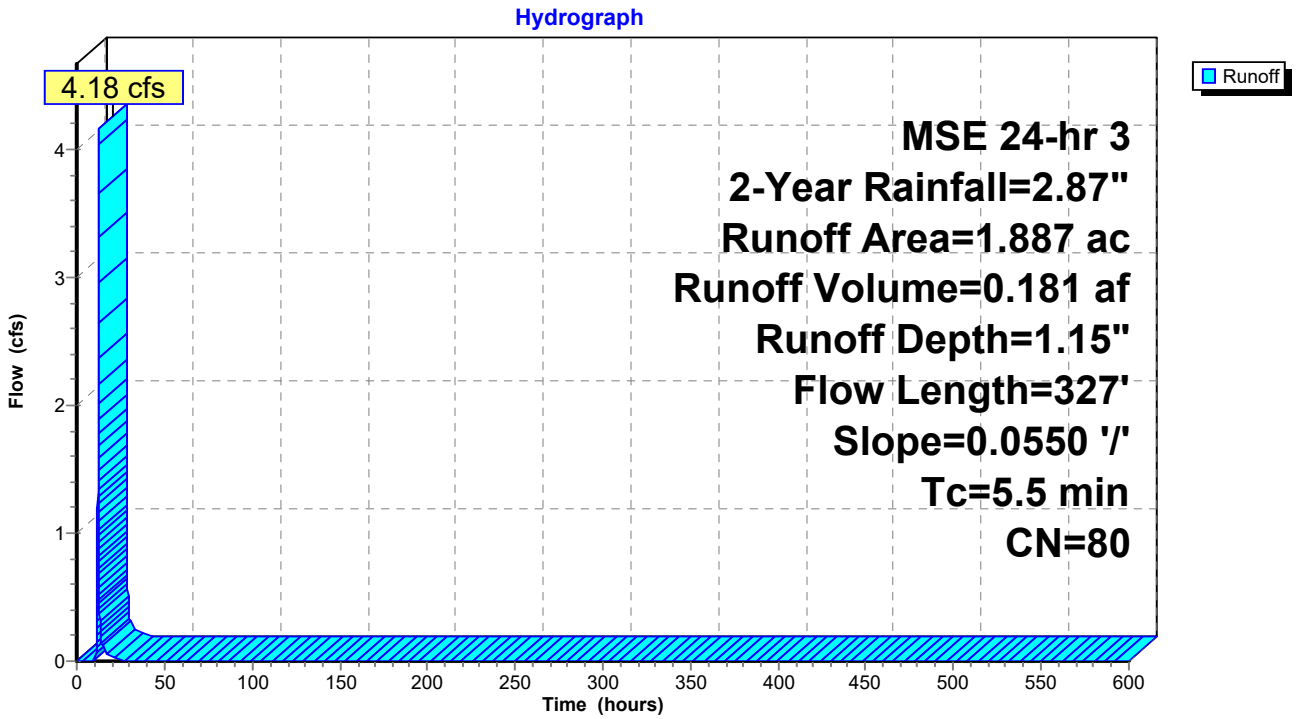
Runoff = 4.18 cfs @ 12.13 hrs, Volume= 0.181 af, Depth= 1.15"
Routed to Link 3L : SOUTH

Runoff by SCS TR-20 method, UH=SCS, Weighted-Q, Time Span= 0.00-600.00 hrs, dt= 0.01 hrs
MSE 24-hr 3 2-Year Rainfall=2.87"

Area (ac)	CN	Description
1.887	80	>75% Grass cover, Good, HSG D
1.887		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
5.5	327	0.0550	0.98		**Lag/CN Method, OVERLAND**

Subcatchment E3: E3



Summary for Subcatchment E4: E4

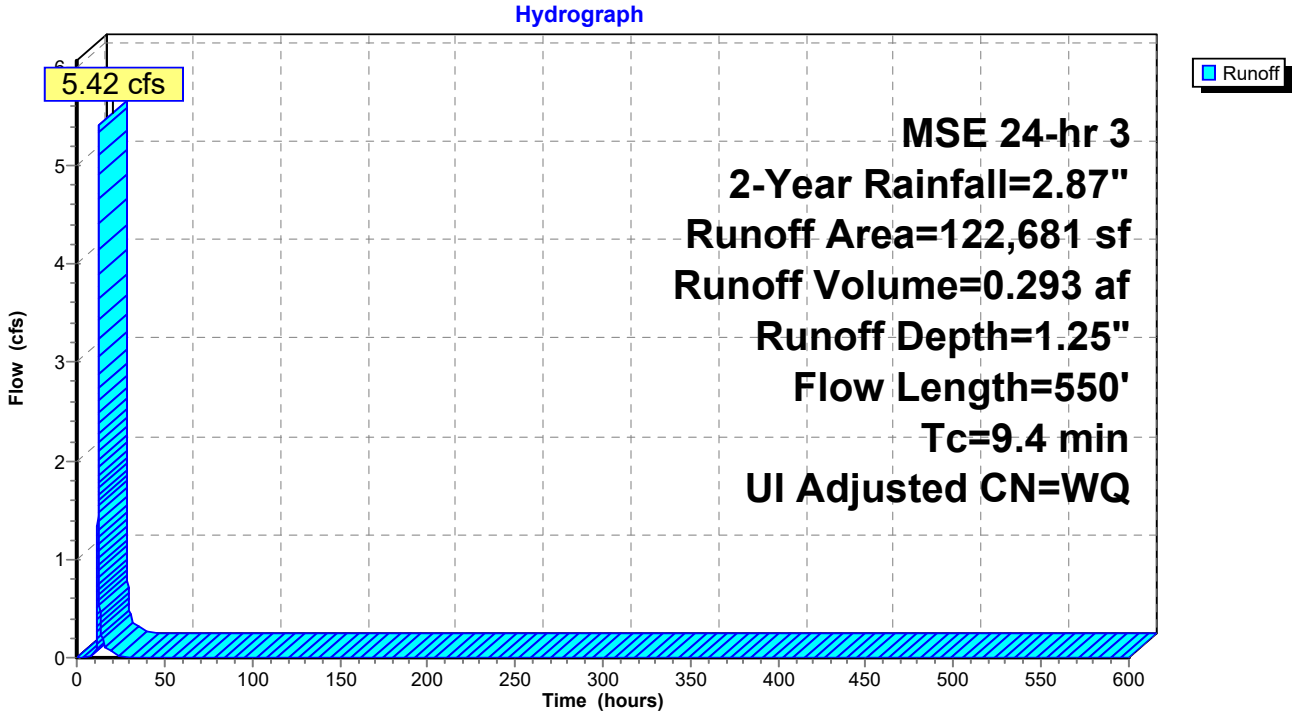
Runoff = 5.42 cfs @ 12.17 hrs, Volume= 0.293 af, Depth= 1.25"
Routed to Pond 2P : West Ditch

Runoff by SCS TR-20 method, UH=SCS, Weighted-Q, Time Span= 0.00-600.00 hrs, dt= 0.01 hrs
MSE 24-hr 3 2-Year Rainfall=2.87"

Area (sf)	CN	Adj	Description
12,084	98	98	Unconnected roofs, HSG D
110,597	79	79	Woods/grass comb., Good, HSG D
122,681			Weighted Average
110,597			90.15% Pervious Area
12,084			9.85% Impervious Area
12,084			100.00% Unconnected

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
5.8	385	0.0620	1.11		**Lag/CN Method, OVERLAND**
1.1	100	0.2000	1.53		**Lag/CN Method,**
2.5	65	0.0198	0.44		**Lag/CN Method,**
9.4	550	Total			

Subcatchment E4: E4



Summary for Subcatchment E5: E5

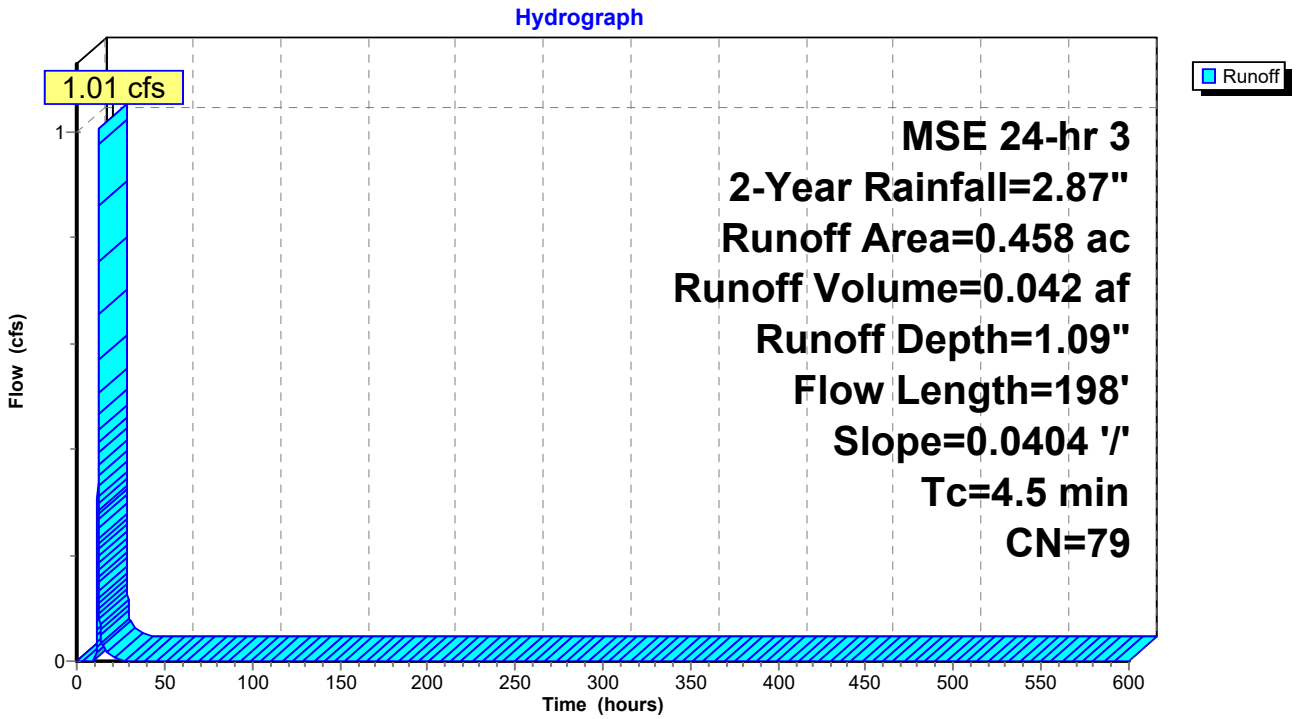
Runoff = 1.01 cfs @ 12.12 hrs, Volume= 0.042 af, Depth= 1.09"
Routed to Link 5L : NORTHEAST

Runoff by SCS TR-20 method, UH=SCS, Weighted-Q, Time Span= 0.00-600.00 hrs, dt= 0.01 hrs
MSE 24-hr 3 2-Year Rainfall=2.87"

Area (ac)	CN	Description
0.458	79	Woods/grass comb., Good, HSG D
0.458		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
4.5	198	0.0404	0.74		**Lag/CN Method, OVERLAND**

Subcatchment E5: E5



Summary for Subcatchment E6: E6

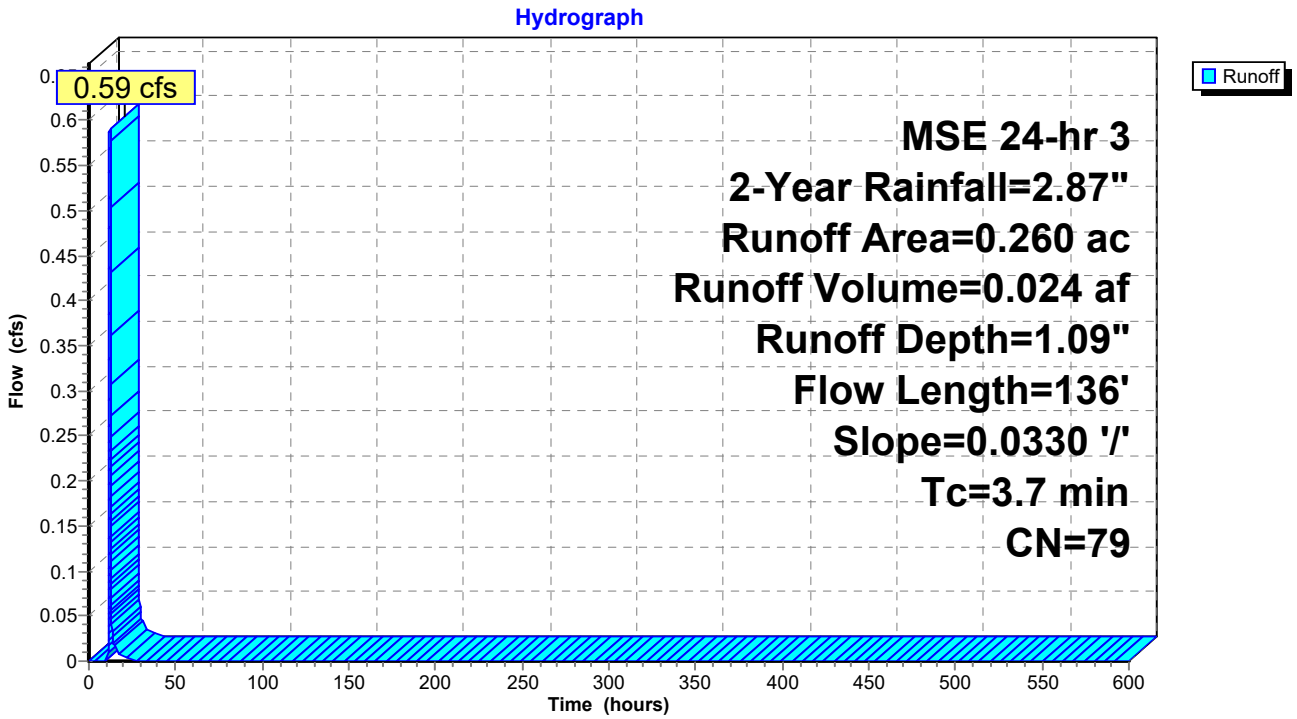
Runoff = 0.59 cfs @ 12.12 hrs, Volume= 0.024 af, Depth= 1.09"
Routed to Link 6L : EAST

Runoff by SCS TR-20 method, UH=SCS, Weighted-Q, Time Span= 0.00-600.00 hrs, dt= 0.01 hrs
MSE 24-hr 3 2-Year Rainfall=2.87"

Area (ac)	CN	Description
0.260	79	Woods/grass comb., Good, HSG D
0.260		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
3.7	136	0.0330	0.62		**Lag/CN Method, OVERLAND**

Subcatchment E6: E6



Summary for Subcatchment E7: E7

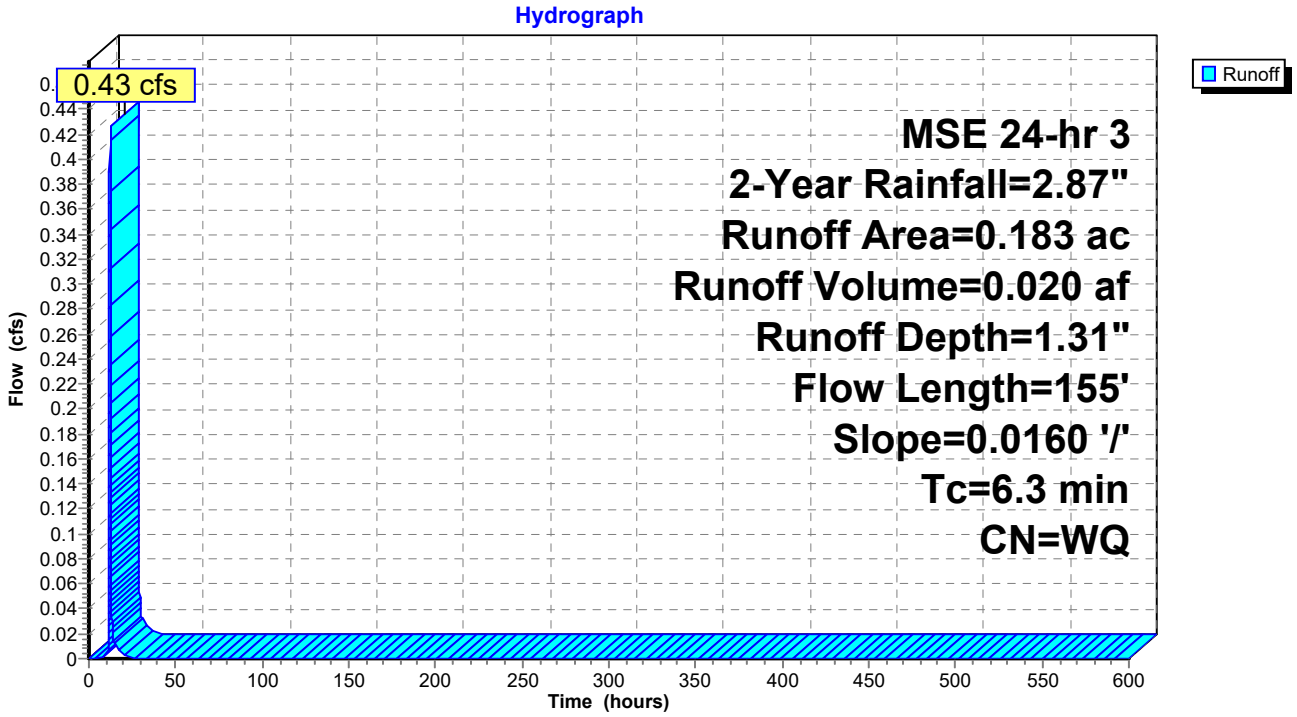
Runoff = 0.43 cfs @ 12.14 hrs, Volume= 0.020 af, Depth= 1.31"
Routed to Pond 1P : EXISTING POND

Runoff by SCS TR-20 method, UH=SCS, Weighted-Q, Time Span= 0.00-600.00 hrs, dt= 0.01 hrs
MSE 24-hr 3 2-Year Rainfall=2.87"

Area (ac)	CN	Description
0.019	98	Paved parking, HSG D
0.164	80	>75% Grass cover, Good, HSG D
0.183		Weighted Average
0.164		89.62% Pervious Area
0.019		10.38% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
5.3	155	0.0160	0.49		**Lag/CN Method, OVERLAND**
1.0					**Direct Entry, STORM SEWER**
6.3	155	Total			

Subcatchment E7: E7



Summary for Subcatchment E8: E8

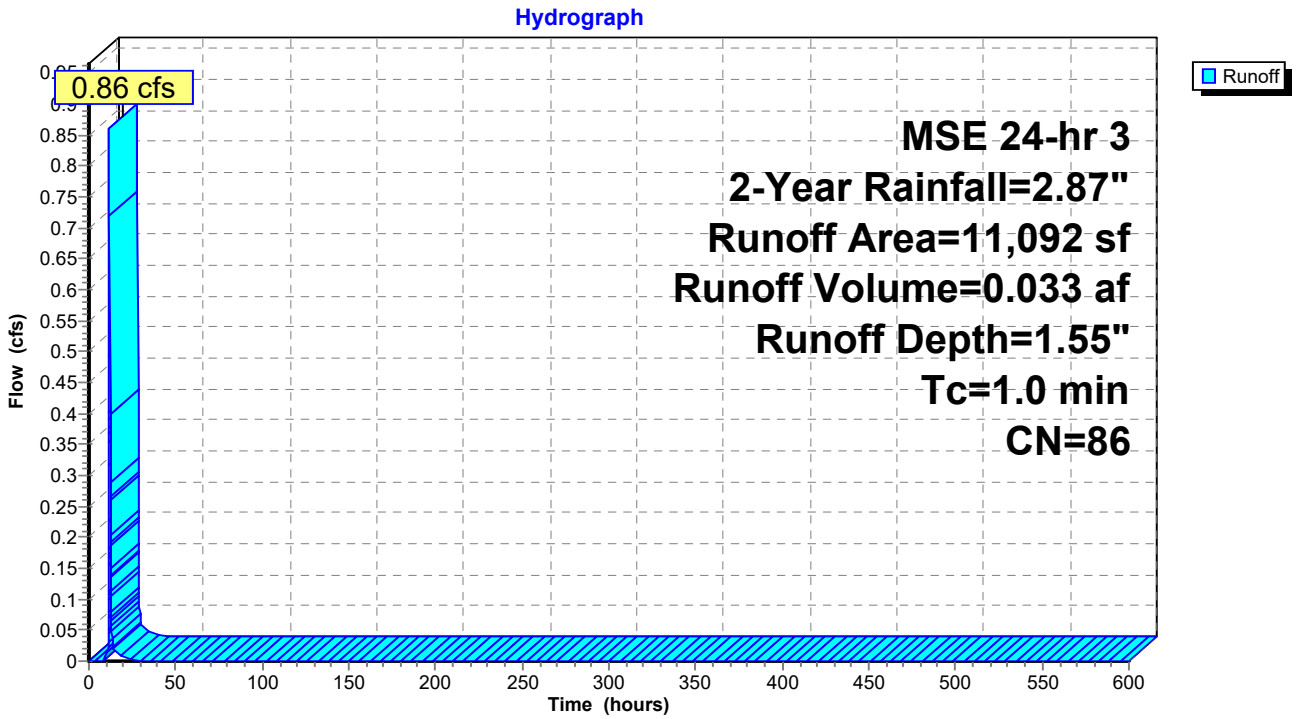
Runoff = 0.86 cfs @ 12.10 hrs, Volume= 0.033 af, Depth= 1.55"
Routed to Pond 10P : West Exisitng Wetland

Runoff by SCS TR-20 method, UH=SCS, Weighted-Q, Time Span= 0.00-600.00 hrs, dt= 0.01 hrs
MSE 24-hr 3 2-Year Rainfall=2.87"

Area (sf)	CN	Description
11,092	86	Woods/grass comb., Poor, HSG D
11,092		100.00% Pervious Area

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

Subcatchment E8: E8



Summary for Subcatchment OFF-1: OFF-1

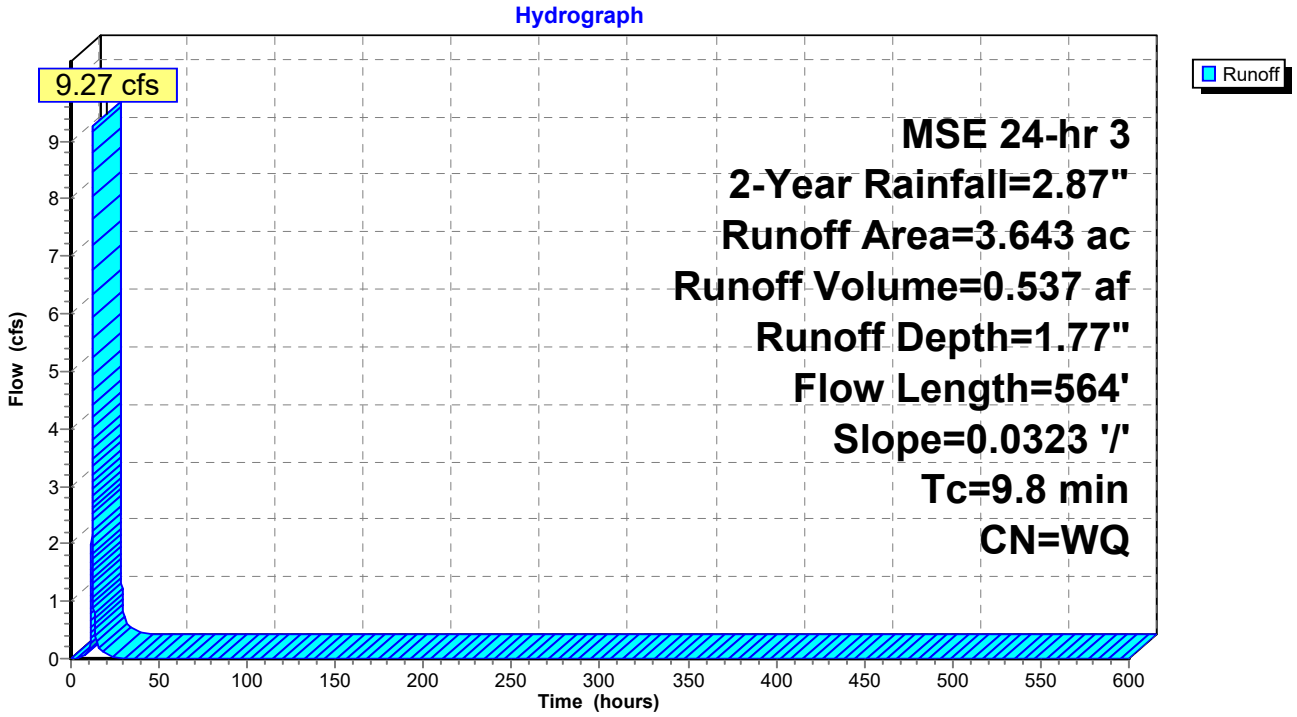
Runoff = 9.27 cfs @ 12.17 hrs, Volume= 0.537 af, Depth= 1.77"
Routed to Pond 1P : EXISTING POND

Runoff by SCS TR-20 method, UH=SCS, Weighted-Q, Time Span= 0.00-600.00 hrs, dt= 0.01 hrs
MSE 24-hr 3 2-Year Rainfall=2.87"

Area (ac)	CN	Description
1.590	98	Paved parking, HSG D
2.053	79	Woods/grass comb., Good, HSG D
3.643		Weighted Average
2.053		56.35% Pervious Area
1.590		43.65% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
8.8	564	0.0323	1.07		**Lag/CN Method, BACK YARD SWALE**
1.0					**Direct Entry, Storm Sewer**
9.8	564	Total			

Subcatchment OFF-1: OFF-1



Summary for Subcatchment OFF-2: OFF-2

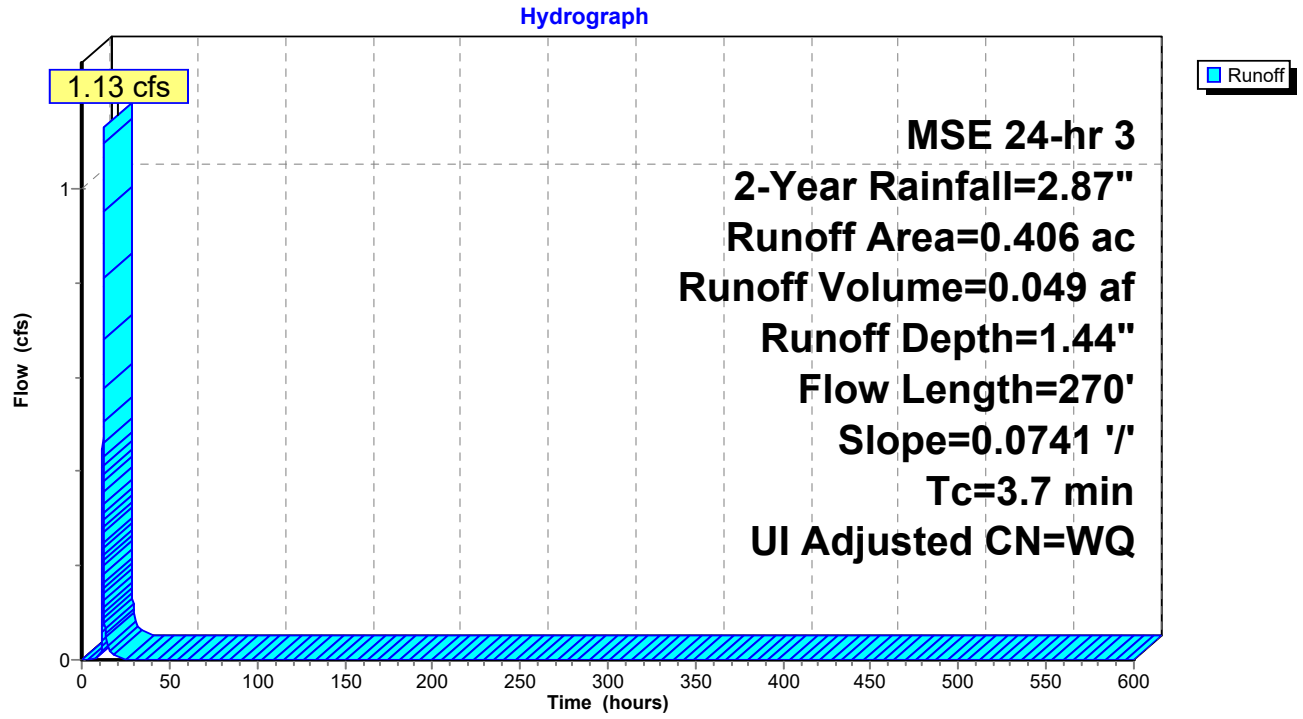
Runoff = 1.13 cfs @ 12.11 hrs, Volume= 0.049 af, Depth= 1.44"
Routed to Pond 1P : EXISTING POND

Runoff by SCS TR-20 method, UH=SCS, Weighted-Q, Time Span= 0.00-600.00 hrs, dt= 0.01 hrs
MSE 24-hr 3 2-Year Rainfall=2.87"

Area (ac)	CN	Adj	Description
0.092	98	98	Unconnected roofs, HSG D
0.314	79	79	Woods/grass comb., Good, HSG D
0.406			Weighted Average
0.314			77.34% Pervious Area
0.092			22.66% Impervious Area
0.092			100.00% Unconnected

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
3.7	270	0.0741	1.21		**Lag/CN Method,**

Subcatchment OFF-2: OFF-2



Summary for Subcatchment OFF-3: OFF-3

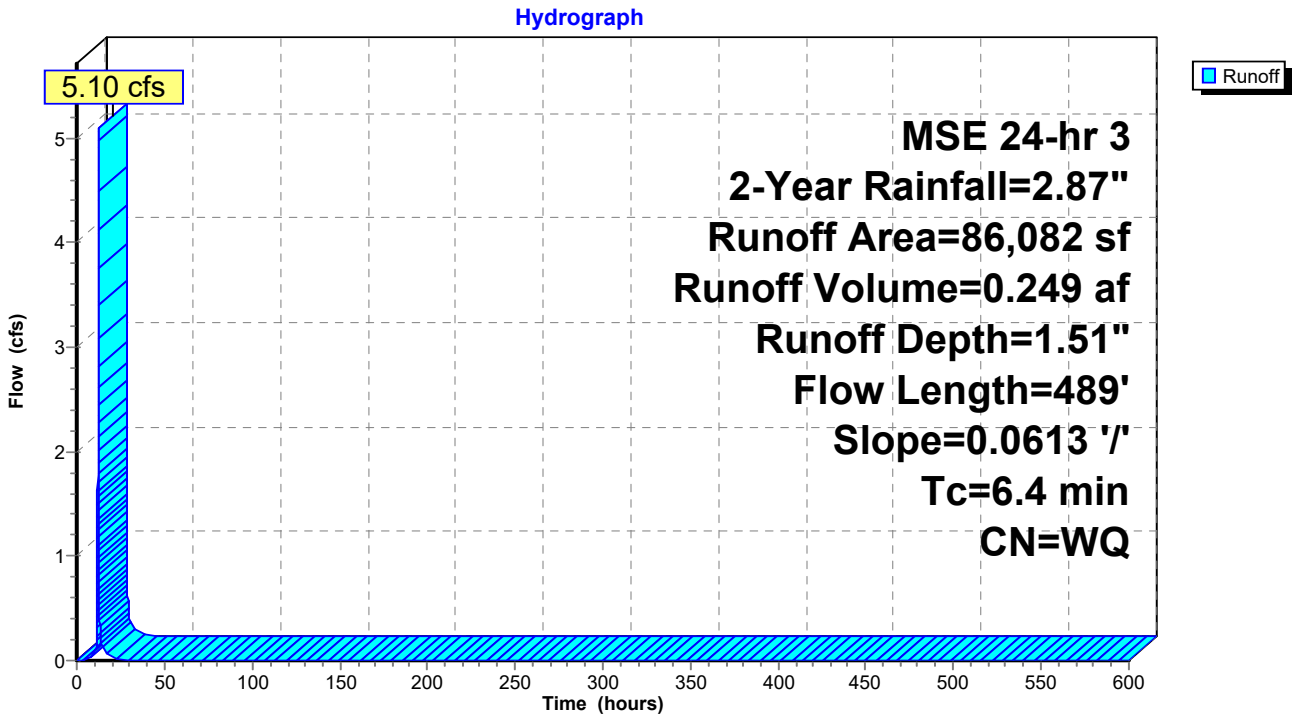
Runoff = 5.10 cfs @ 12.14 hrs, Volume= 0.249 af, Depth= 1.51"
Routed to Pond 1P : EXISTING POND

Runoff by SCS TR-20 method, UH=SCS, Weighted-Q, Time Span= 0.00-600.00 hrs, dt= 0.01 hrs
MSE 24-hr 3 2-Year Rainfall=2.87"

Area (sf)	CN	Description
23,261	98	Paved parking, HSG D
62,821	79	Woods/grass comb., Good, HSG D
86,082		Weighted Average
62,821		72.98% Pervious Area
23,261		27.02% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
6.4	489	0.0613	1.28		**Lag/CN Method,**

Subcatchment OFF-3: OFF-3



Summary for Subcatchment OFF-4: OFF-4

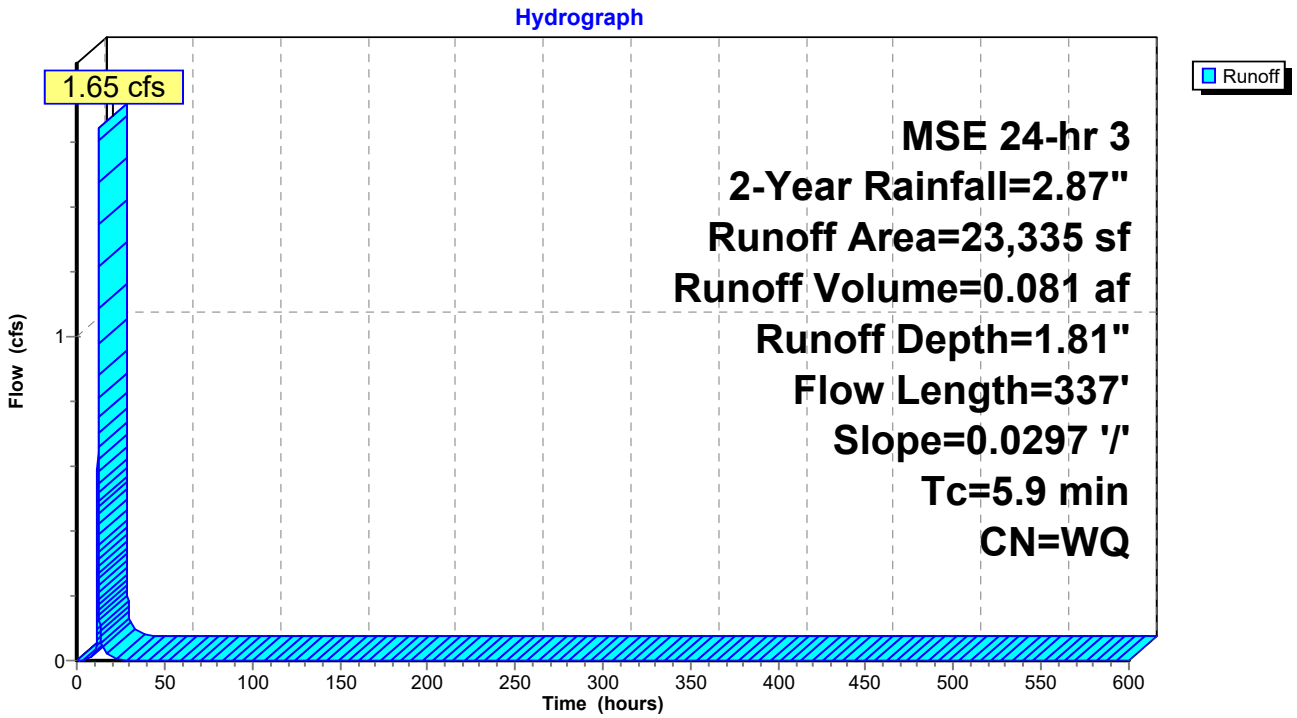
Runoff = 1.65 cfs @ 12.13 hrs, Volume= 0.081 af, Depth= 1.81"
Routed to Pond 10P : West Exisitng Wetland

Runoff by SCS TR-20 method, UH=SCS, Weighted-Q, Time Span= 0.00-600.00 hrs, dt= 0.01 hrs
MSE 24-hr 3 2-Year Rainfall=2.87"

Area (sf)	CN	Description
10,240	98	Paved parking, HSG D
13,095	80	>75% Grass cover, Good, HSG D
23,335		Weighted Average
13,095		56.12% Pervious Area
10,240		43.88% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
5.9	337	0.0297	0.96		**Lag/CN Method,**

Subcatchment OFF-4: OFF-4



Summary for Subcatchment OFF-5: OFF-5

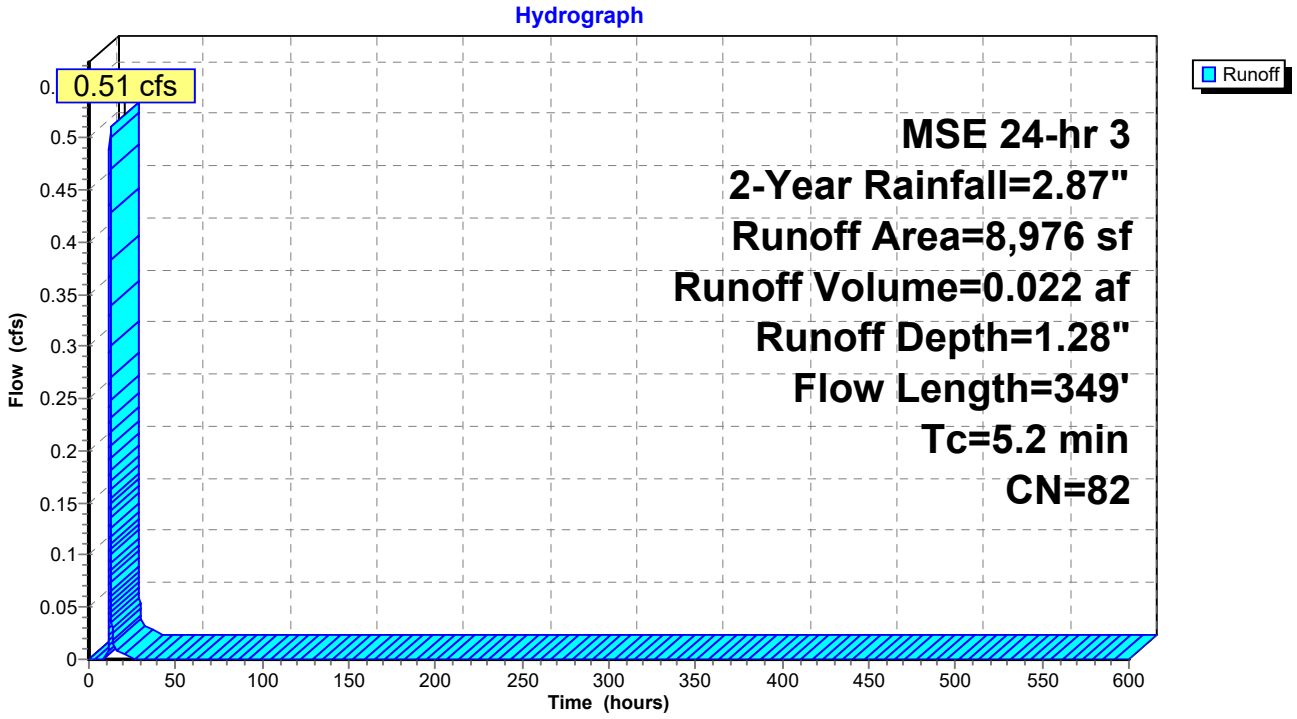
Runoff = 0.51 cfs @ 12.13 hrs, Volume= 0.022 af, Depth= 1.28"
Routed to Pond 2P : West Ditch

Runoff by SCS TR-20 method, UH=SCS, Weighted-Q, Time Span= 0.00-600.00 hrs, dt= 0.01 hrs
MSE 24-hr 3 2-Year Rainfall=2.87"

Area (sf)	CN	Description
8,976	82	Woods/grass comb., Fair, HSG D
8,976		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
1.6	194	0.2474	2.00		**Lag/CN Method,**
3.6	155	0.0354	0.72		**Lag/CN Method,**
5.2	349	Total			

Subcatchment OFF-5: OFF-5



Summary for Subcatchment OFF-6: OFF-6

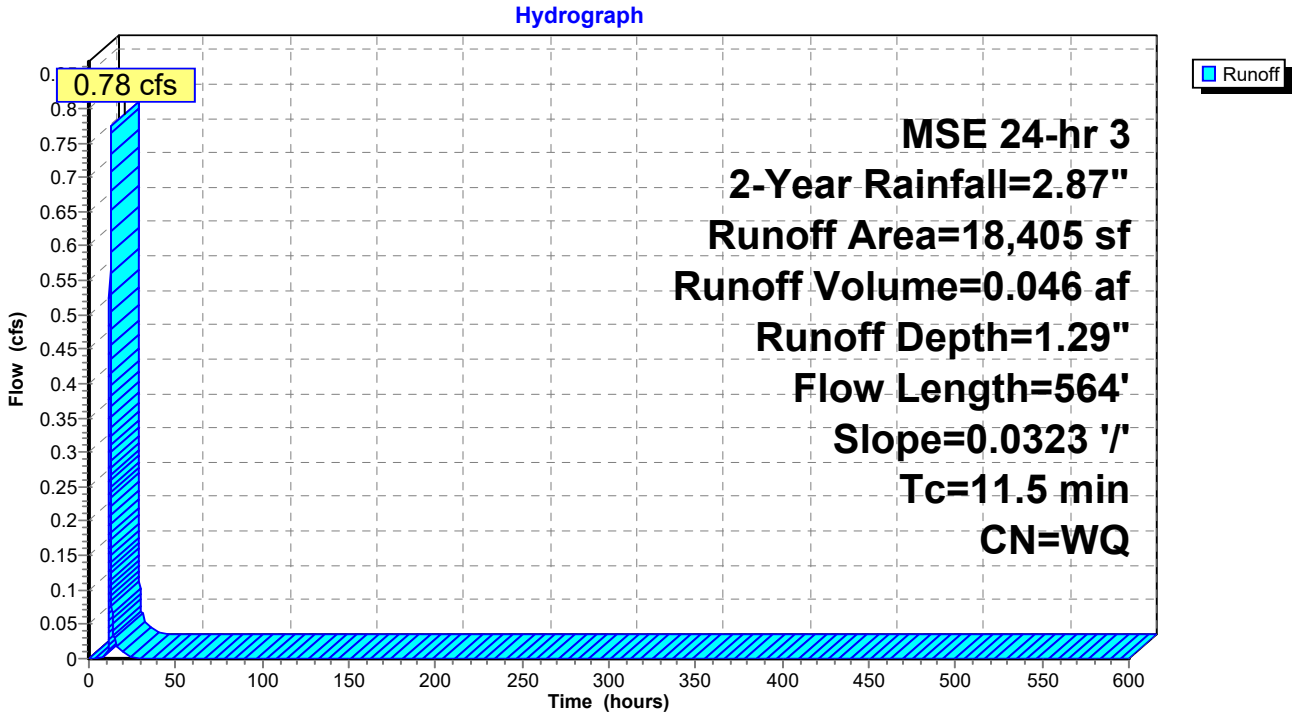
Runoff = 0.78 cfs @ 12.20 hrs, Volume= 0.046 af, Depth= 1.29"
Routed to Link 3L : SOUTH

Runoff by SCS TR-20 method, UH=SCS, Weighted-Q, Time Span= 0.00-600.00 hrs, dt= 0.01 hrs
MSE 24-hr 3 2-Year Rainfall=2.87"

	Area (sf)	CN	Description
*	1,727	98	Impervious, HSG D
	16,678	80	>75% Grass cover, Good, HSG D
	18,405		Weighted Average
	16,678		90.62% Pervious Area
	1,727		9.38% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
10.5	564	0.0323	0.90		**Lag/CN Method, BACK YARD SWALE**
1.0					**Direct Entry, Storm Sewer**
11.5	564	Total			

Subcatchment OFF-6: OFF-6



Summary for Subcatchment OFF-7: OFF-7

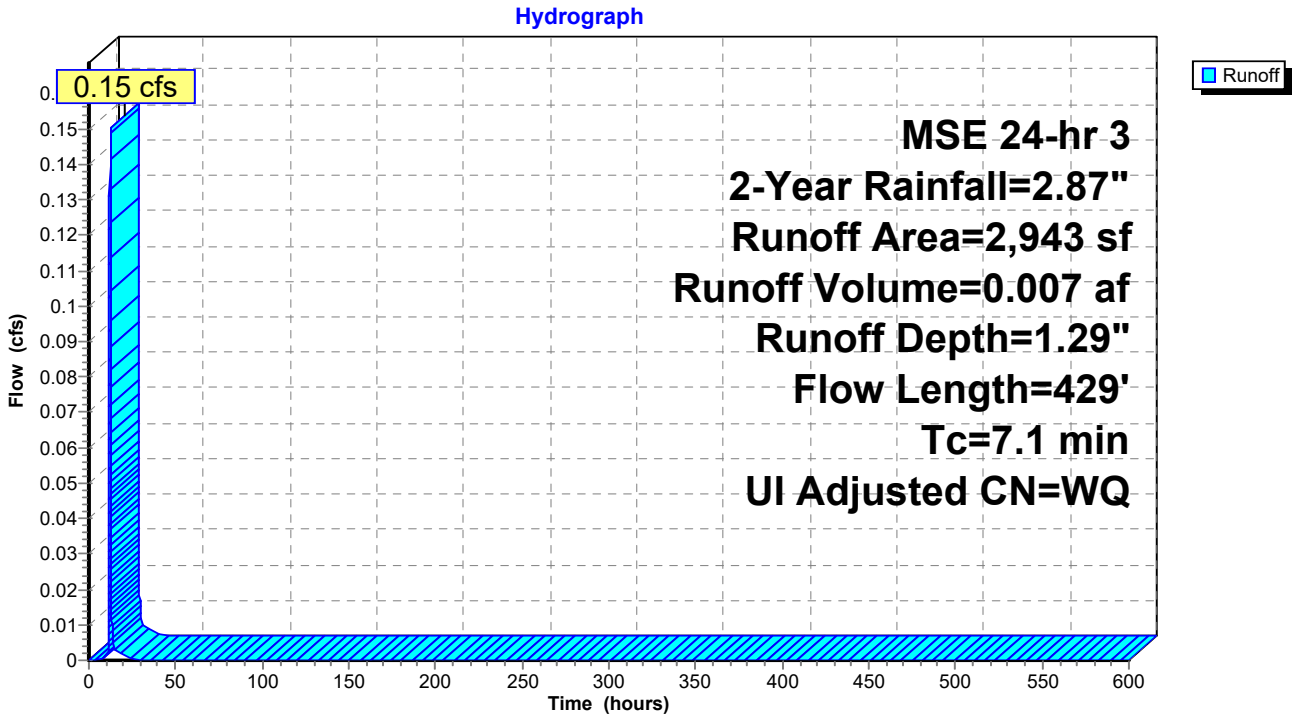
Runoff = 0.15 cfs @ 12.15 hrs, Volume= 0.007 af, Depth= 1.29"
Routed to Pond 1P : EXISTING POND

Runoff by SCS TR-20 method, UH=SCS, Weighted-Q, Time Span= 0.00-600.00 hrs, dt= 0.01 hrs
MSE 24-hr 3 2-Year Rainfall=2.87"

Area (sf)	CN	Adj	Description
2,673	80	80	>75% Grass cover, Good, HSG D
270	98	98	Unconnected roofs, HSG D
2,943			Weighted Average
2,673			90.83% Pervious Area
270			9.17% Impervious Area
270			100.00% Unconnected

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
1.1	83	0.1445	1.29		**Lag/CN Method,**
6.0	346	0.0448	0.96		**Lag/CN Method,**
7.1	429	Total			

Subcatchment OFF-7: OFF-7



Summary for Subcatchment OFF-8: OFF-8

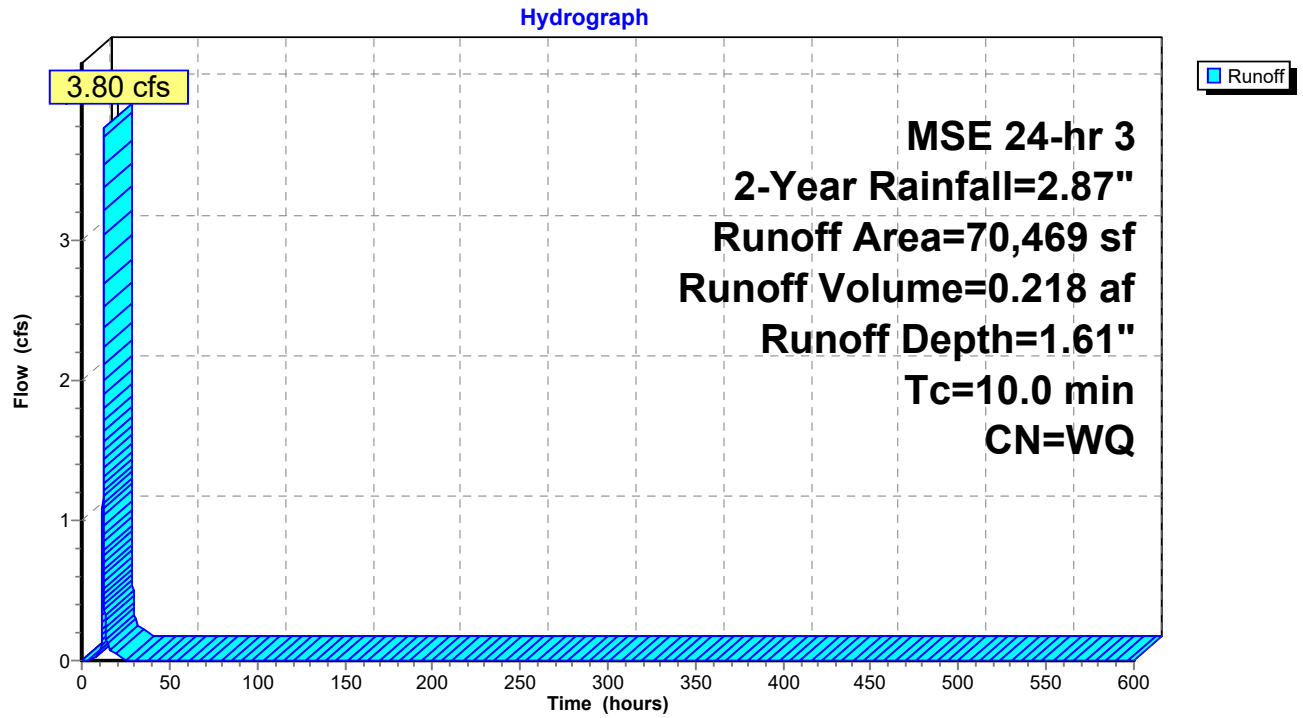
Runoff = 3.80 cfs @ 12.18 hrs, Volume= 0.218 af, Depth= 1.61"
Routed to Link 5L : NORTHEAST

Runoff by SCS TR-20 method, UH=SCS, Weighted-Q, Time Span= 0.00-600.00 hrs, dt= 0.01 hrs
MSE 24-hr 3 2-Year Rainfall=2.87"

Area (sf)	CN	Description
21,849	98	Paved parking, HSG D
48,620	80	>75% Grass cover, Good, HSG D
70,469		Weighted Average
48,620		68.99% Pervious Area
21,849		31.01% Impervious Area

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

Subcatchment OFF-8: OFF-8



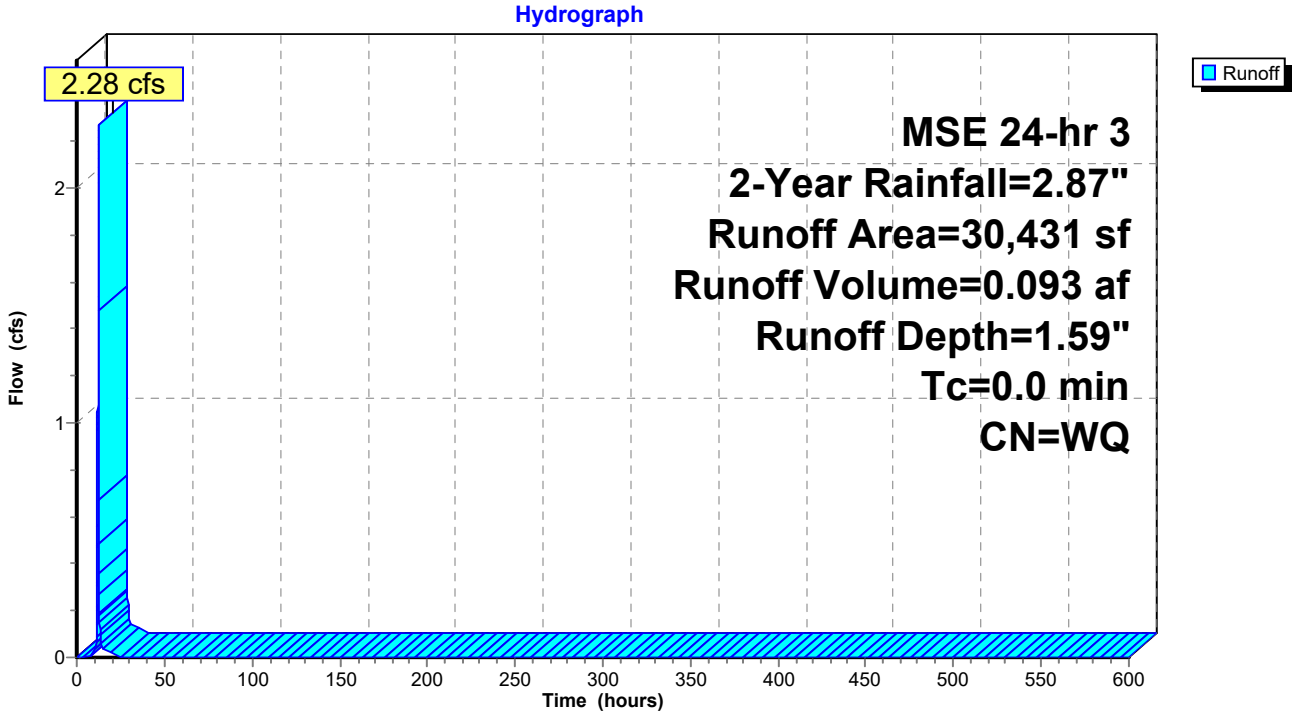
Summary for Subcatchment OFF-9: OFF-9

Runoff = 2.28 cfs @ 12.09 hrs, Volume= 0.093 af, Depth= 1.59"
Routed to Link 8L : Existing to NORTHWEST

Runoff by SCS TR-20 method, UH=SCS, Weighted-Q, Time Span= 0.00-600.00 hrs, dt= 0.01 hrs
MSE 24-hr 3 2-Year Rainfall=2.87"

Area (sf)	CN	Description
8,967	98	Paved parking, HSG D
21,464	80	>75% Grass cover, Good, HSG D
30,431		Weighted Average
21,464		70.53% Pervious Area
8,967		29.47% Impervious Area

Subcatchment OFF-9: OFF-9



Summary for Pond 1P: EXISTING POND

Inflow Area = 14.976 ac, 19.66% Impervious, Inflow Depth = 1.43" for 2-Year event
Inflow = 32.79 cfs @ 12.15 hrs, Volume= 1.785 af
Outflow = 1.53 cfs @ 13.62 hrs, Volume= 1.783 af, Atten= 95%, Lag= 88.5 min
Primary = 1.53 cfs @ 13.62 hrs, Volume= 1.783 af
Routed to Pond 10P : West Exisitng Wetland

Routing by Dyn-Stor-Ind method, Time Span= 0.00-600.00 hrs, dt= 0.01 hrs
Peak Elev= 994.35' @ 13.62 hrs Surf.Area= 36,088 sf Storage= 50,141 cf

Plug-Flow detention time= 573.6 min calculated for 1.783 af (100% of inflow)
Center-of-Mass det. time= 573.3 min (1,370.9 - 797.6)

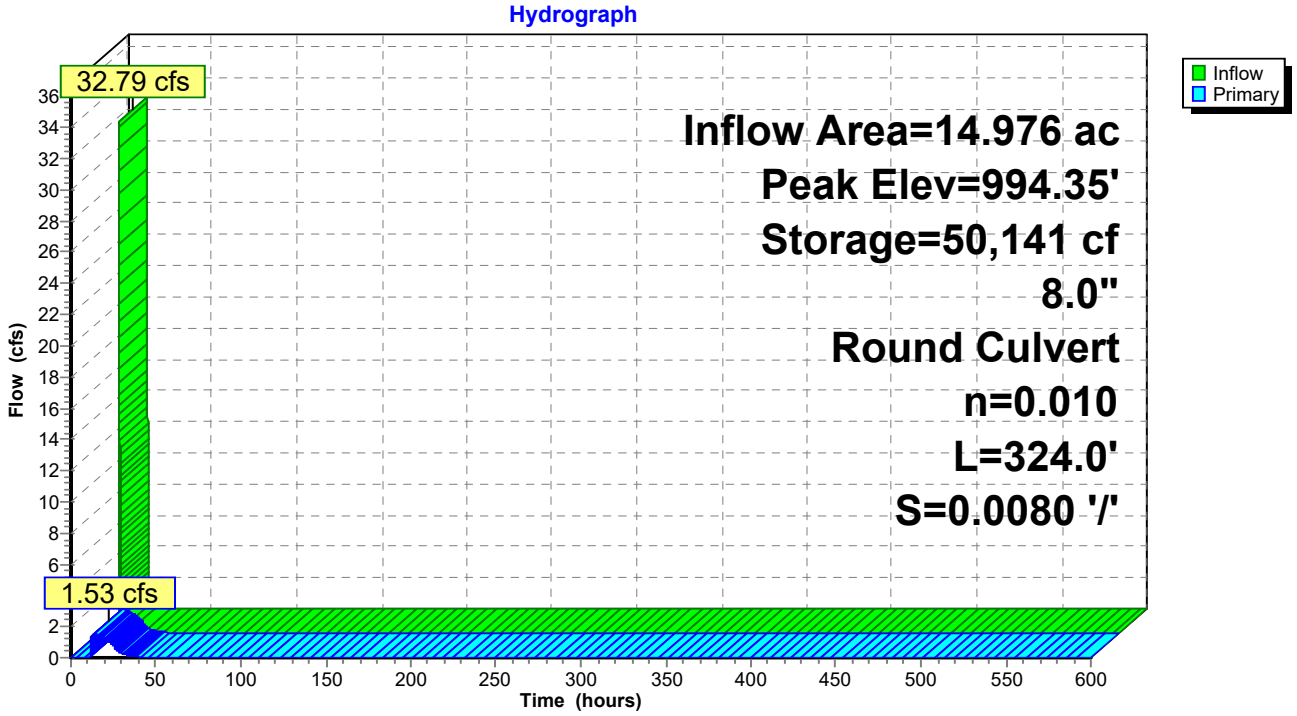
Volume	Invert	Avail.Storage	Storage Description
#1	992.61'	277,554 cf	**Custom Stage Data (Prismatic)** Listed below (Recalc)

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
992.61	24,173	0	0
994.00	31,142	38,444	38,444
996.00	59,569	90,711	129,155
998.00	88,830	148,399	277,554

Device	Routing	Invert	Outlet Devices
#1	Primary	992.61'	**8.0" Round Culvert** L= 324.0' CPP, projecting, no headwall, Ke= 0.900 Inlet / Outlet Invert= 992.61' / 990.02' S= 0.0080 '/' Cc= 0.900 n= 0.010 PVC, smooth interior, Flow Area= 0.35 sf

Primary OutFlow Max=1.53 cfs @ 13.62 hrs HW=994.35' TW=974.35' (Dynamic Tailwater)
↑—**1=Culvert** (Barrel Controls 1.53 cfs @ 4.39 fps)

Pond 1P: EXISTING POND



Summary for Pond 2P: West Ditch

Inflow Area = 3.022 ac, 9.18% Impervious, Inflow Depth = 1.25" for 2-Year event
Inflow = 5.80 cfs @ 12.17 hrs, Volume= 0.314 af
Outflow = 5.80 cfs @ 12.17 hrs, Volume= 0.314 af, Atten= 0%, Lag= 0.2 min
Primary = 5.80 cfs @ 12.17 hrs, Volume= 0.314 af
Routed to Pond 10P : West Exisitng Wetland
Secondary = 0.00 cfs @ 0.00 hrs, Volume= 0.000 af
Routed to Pond 10P : West Exisitng Wetland

Routing by Dyn-Stor-Ind method, Time Span= 0.00-600.00 hrs, dt= 0.01 hrs
Peak Elev= 995.91' @ 12.17 hrs Surf.Area= 54 sf Storage= 27 cf

Plug-Flow detention time= (not calculated: outflow precedes inflow)
Center-of-Mass det. time= 0.0 min (810.3 - 810.2)

Volume	Invert	Avail.Storage	Storage Description
#1	995.00'	5,727 cf	**Custom Stage Data (Prismatic)** Listed below (Recalc)

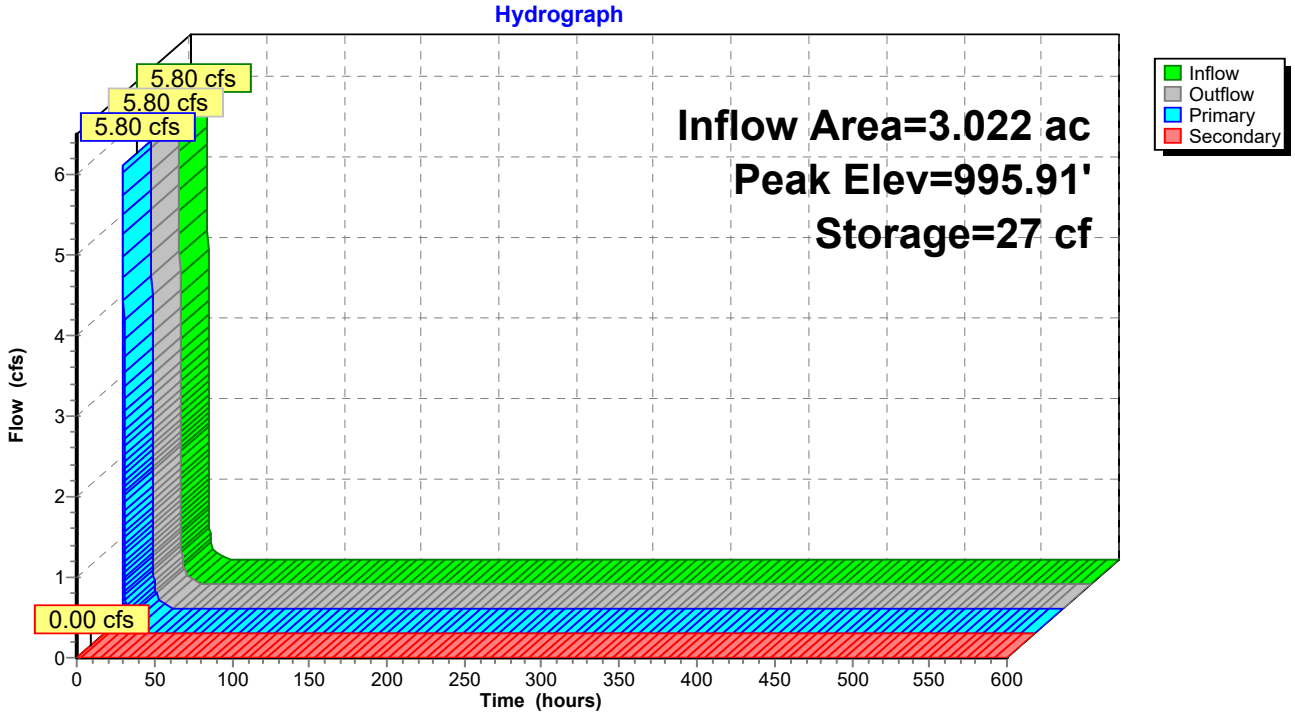
Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
995.00	5	0	0
996.00	59	32	32
997.00	825	442	474
998.00	2,243	1,534	2,008
998.60	4,093	1,901	3,909
999.00	5,000	1,819	5,727

Device	Routing	Invert	Outlet Devices
#1	Primary	994.57'	**18.0" Round CMP_Round 18"** L= 57.1' CMP, mitered to conform to fill, Ke= 0.700 Inlet / Outlet Invert= 994.57' / 989.52' S= 0.0884 '/' Cc= 0.900 n= 0.025 Corrugated metal, Flow Area= 1.77 sf
#2	Secondary	998.59'	**20.0' long x 16.0' breadth Existing Berm** Head (feet) 0.20 0.40 0.60 0.80 1.00 1.20 1.40 1.60 Coef. (English) 2.68 2.70 2.70 2.64 2.63 2.64 2.64 2.63

Primary OutFlow Max=5.80 cfs @ 12.17 hrs HW=995.91' TW=974.23' (Dynamic Tailwater)
1=CMP_Round 18" (Inlet Controls 5.80 cfs @ 3.48 fps)

Secondary OutFlow Max=0.00 cfs @ 0.00 hrs HW=995.00' TW=974.10' (Dynamic Tailwater)
2=Existing Berm (Controls 0.00 cfs)

Pond 2P: West Ditch



Summary for Pond 10P: West Exisitng Wetland

Inflow Area = 18.789 ac, 18.40% Impervious, Inflow Depth = 1.41" for 2-Year event
Inflow = 8.54 cfs @ 12.16 hrs, Volume= 2.211 af
Outflow = 1.92 cfs @ 13.61 hrs, Volume= 2.210 af, Atten= 78%, Lag= 87.2 min
Primary = 1.92 cfs @ 13.61 hrs, Volume= 2.210 af
Routed to Link 7L : TOTAL

Routing by Dyn-Stor-Ind method, Time Span= 0.00-600.00 hrs, dt= 0.01 hrs
Starting Elev= 974.10' Surf.Area= 54,326 sf Storage= 5,411 cf
Peak Elev= 974.35' @ 13.61 hrs Surf.Area= 55,407 sf Storage= 19,101 cf (13,690 cf above start)

Plug-Flow detention time= 371.9 min calculated for 2.086 af (94% of inflow)
Center-of-Mass det. time= 168.8 min (1,429.8 - 1,261.0)

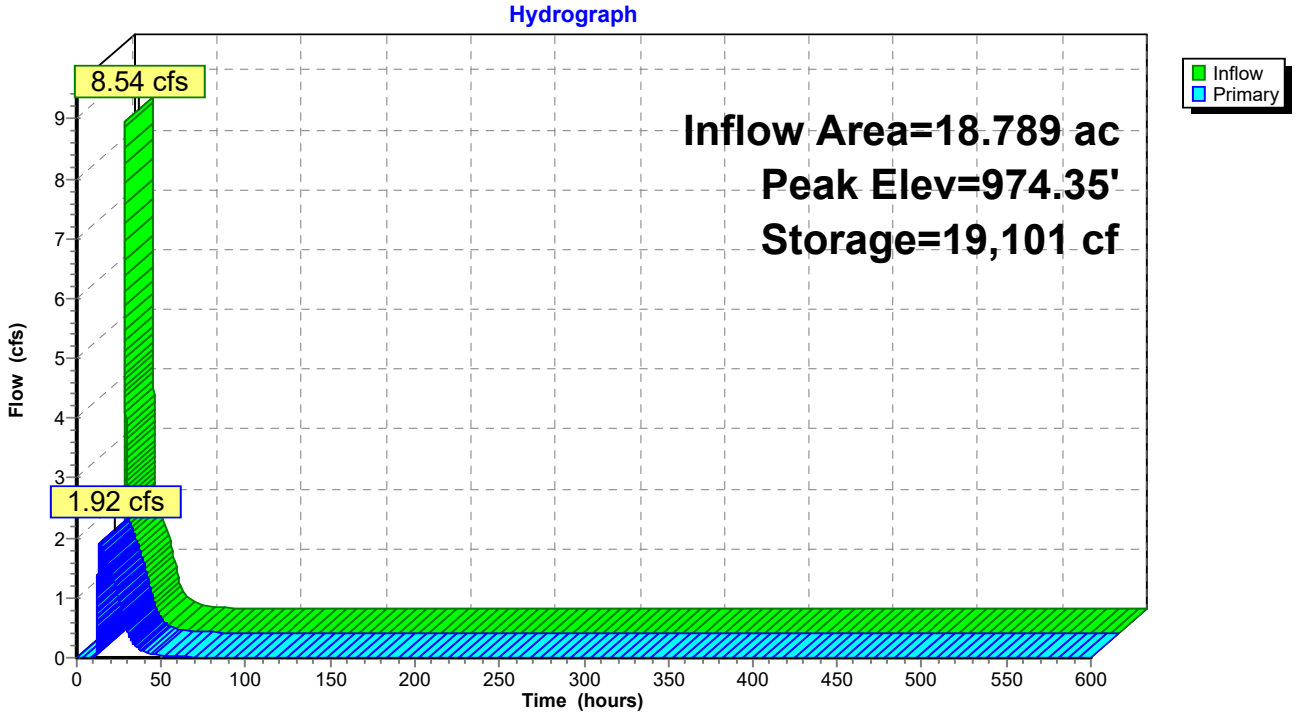
Volume	Invert	Avail.Storage	Storage Description
#1	974.00'	487,616 cf	**Custom Stage Data (Prismatic)** Listed below (Recalc)

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
974.00	53,893	0	0
975.00	58,226	56,060	56,060
976.00	62,886	60,556	116,616
977.00	67,093	64,990	181,605
978.00	71,582	69,338	250,943
979.00	76,083	73,833	324,775
980.00	81,311	78,697	403,472
981.00	86,977	84,144	487,616

Device	Routing	Invert	Outlet Devices
#1	Primary	974.10'	**18.0" Horiz. Orifice/Grate** C= 0.600 Limited to weir flow at low heads

Primary OutFlow Max=1.92 cfs @ 13.61 hrs HW=974.35' TW=0.00' (Dynamic Tailwater)
↑—**1=Orifice/Grate** (Weir Controls 1.92 cfs @ 1.63 fps)

Pond 10P: West Exisitng Wetland

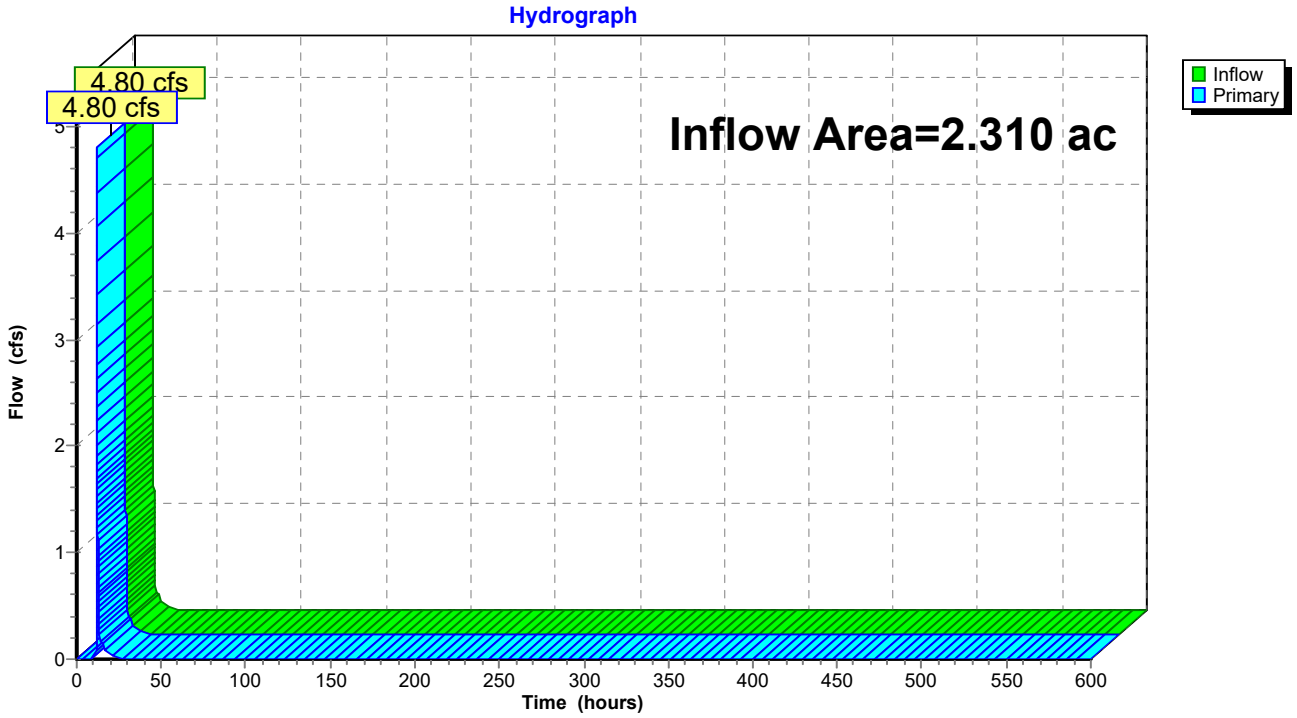


Summary for Link 3L: SOUTH

Inflow Area = 2.310 ac, 1.72% Impervious, Inflow Depth = 1.18" for 2-Year event
Inflow = 4.80 cfs @ 12.14 hrs, Volume= 0.227 af
Primary = 4.80 cfs @ 12.14 hrs, Volume= 0.227 af, Atten= 0%, Lag= 0.0 min
Routed to Link 7L : TOTAL

Primary outflow = Inflow, Time Span= 0.00-600.00 hrs, dt= 0.01 hrs

Link 3L: SOUTH

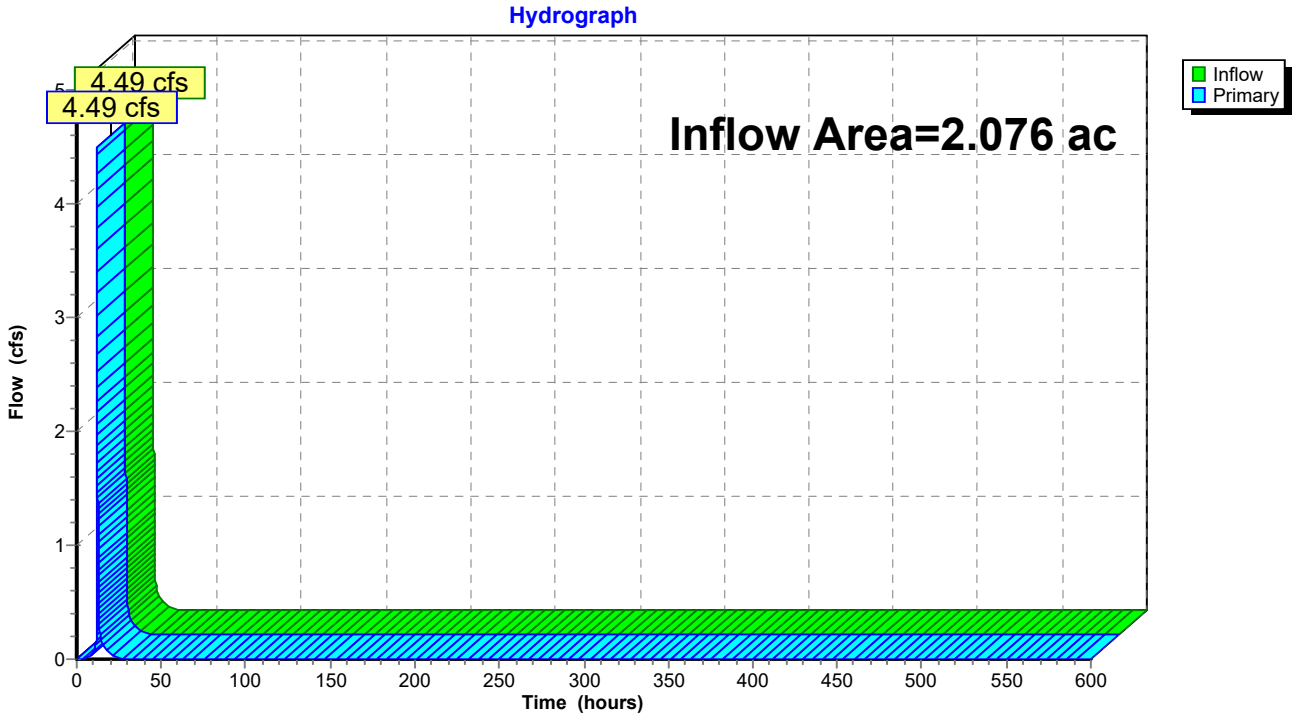


Summary for Link 5L: NORTHEAST

Inflow Area = 2.076 ac, 24.16% Impervious, Inflow Depth = 1.50" for 2-Year event
Inflow = 4.49 cfs @ 12.16 hrs, Volume= 0.259 af
Primary = 4.49 cfs @ 12.16 hrs, Volume= 0.259 af, Atten= 0%, Lag= 0.0 min
Routed to Link 7L : TOTAL

Primary outflow = Inflow, Time Span= 0.00-600.00 hrs, dt= 0.01 hrs

Link 5L: NORTHEAST

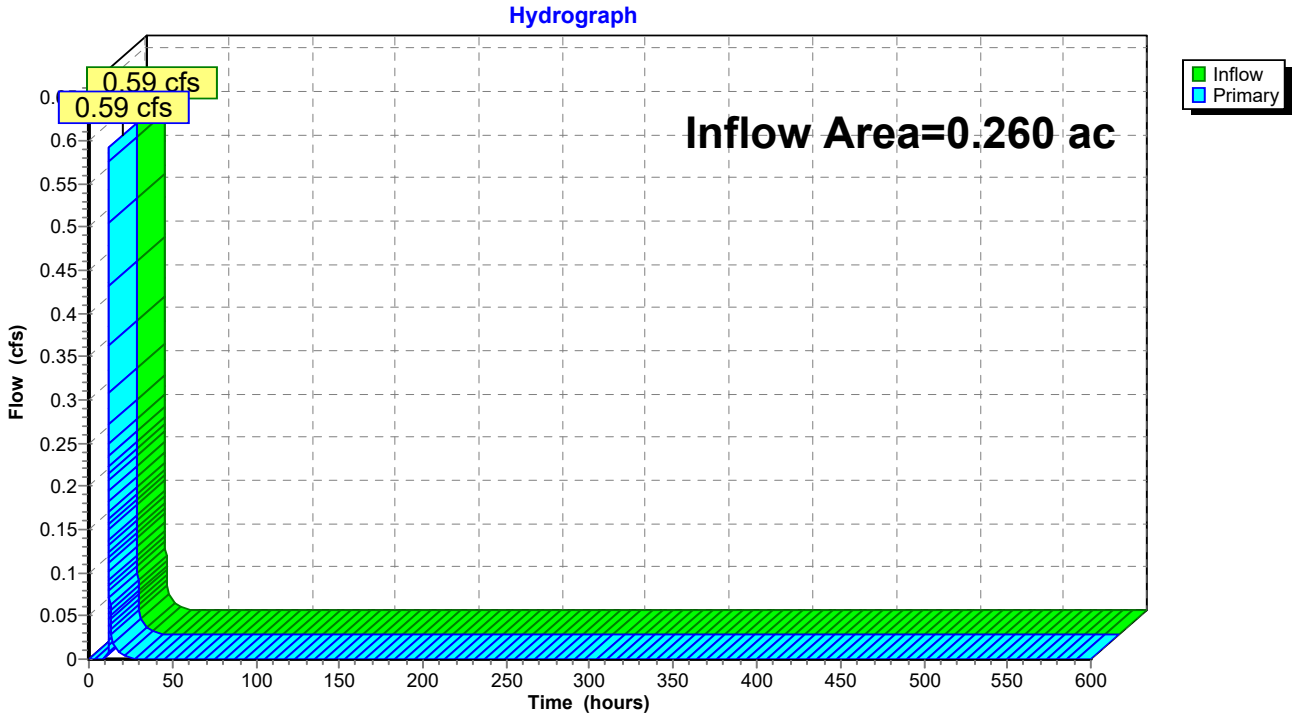


Summary for Link 6L: EAST

Inflow Area = 0.260 ac, 0.00% Impervious, Inflow Depth = 1.09" for 2-Year event
Inflow = 0.59 cfs @ 12.12 hrs, Volume= 0.024 af
Primary = 0.59 cfs @ 12.12 hrs, Volume= 0.024 af, Atten= 0%, Lag= 0.0 min
Routed to Link 7L : TOTAL

Primary outflow = Inflow, Time Span= 0.00-600.00 hrs, dt= 0.01 hrs

Link 6L: EAST

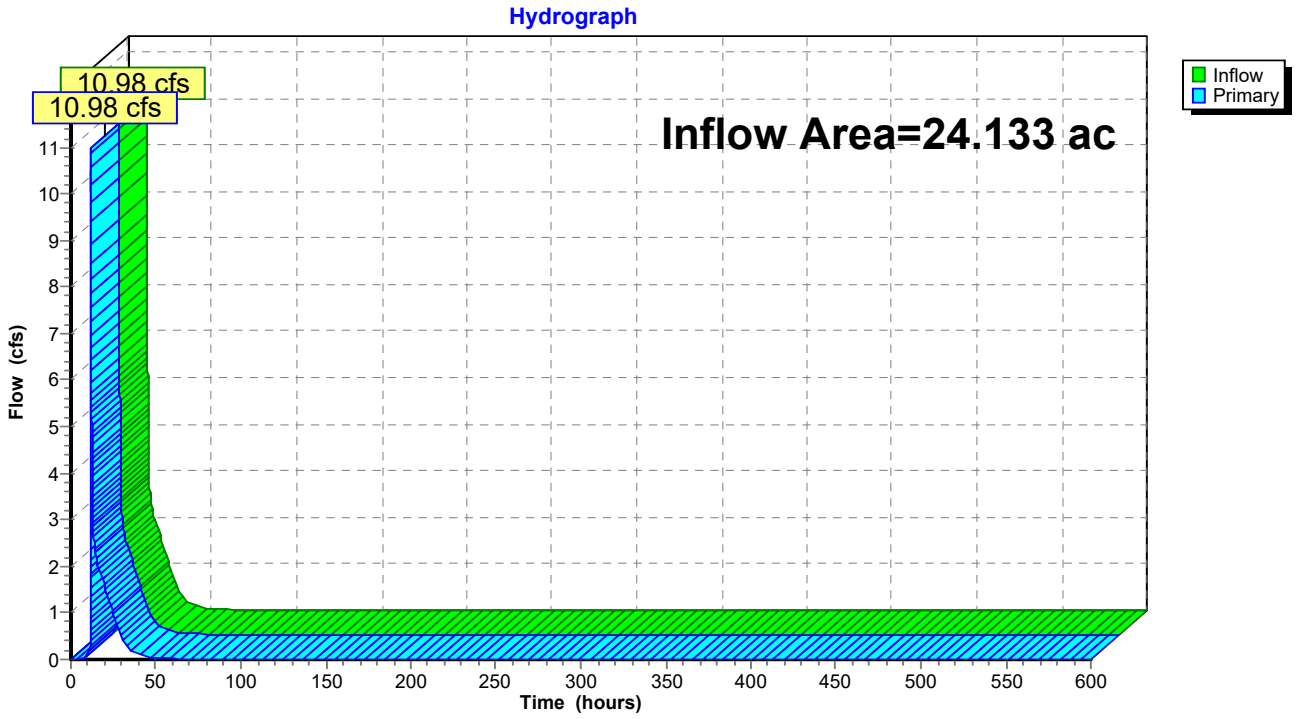


Summary for Link 7L: TOTAL

Inflow Area = 24.133 ac, 17.42% Impervious, Inflow Depth = 1.40" for 2-Year event
Inflow = 10.98 cfs @ 12.14 hrs, Volume= 2.813 af
Primary = 10.98 cfs @ 12.14 hrs, Volume= 2.813 af, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 0.00-600.00 hrs, dt= 0.01 hrs

Link 7L: TOTAL

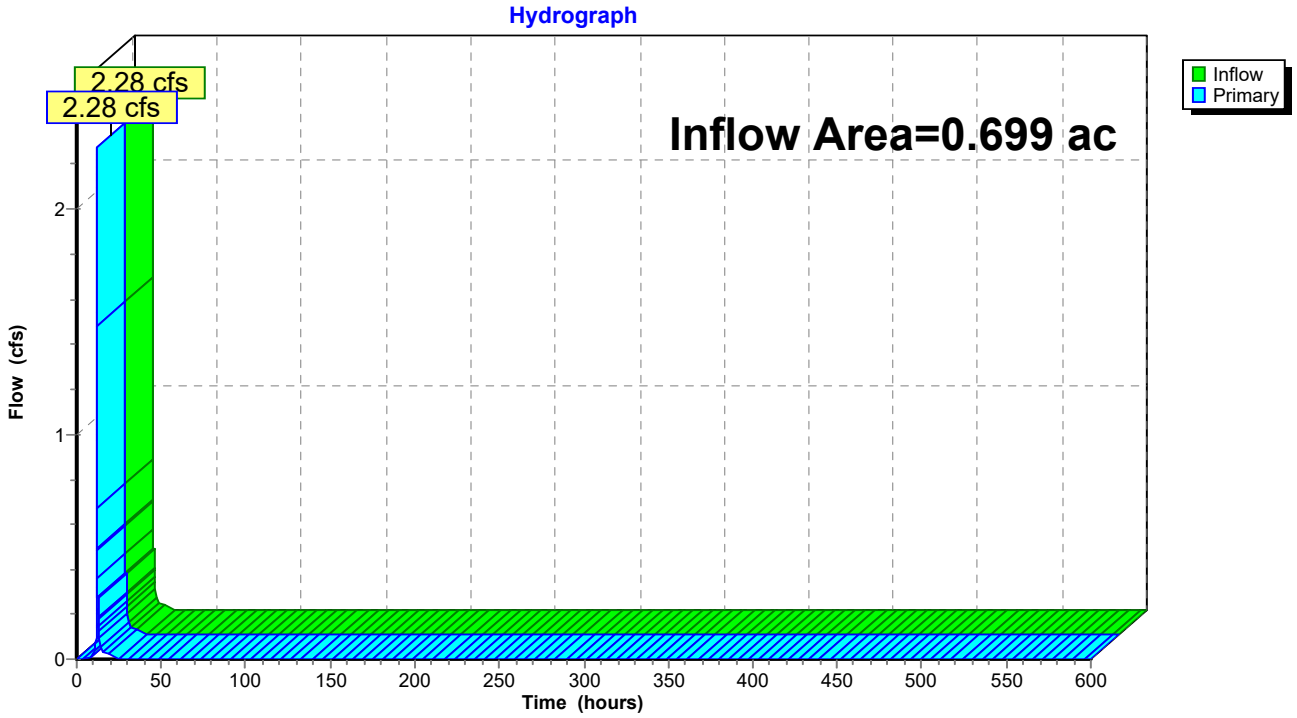


Summary for Link 8L: Existing to NORTHWEST

Inflow Area = 0.699 ac, 29.47% Impervious, Inflow Depth = 1.59" for 2-Year event
Inflow = 2.28 cfs @ 12.09 hrs, Volume= 0.093 af
Primary = 2.28 cfs @ 12.09 hrs, Volume= 0.093 af, Atten= 0%, Lag= 0.0 min
Routed to Link 7L : TOTAL

Primary outflow = Inflow, Time Span= 0.00-600.00 hrs, dt= 0.01 hrs

Link 8L: Existing to NORTHWEST



Time span=0.00-600.00 hrs, dt=0.01 hrs, 60001 points
Runoff by SCS TR-20 method, UH=SCS, Weighted-Q
Reach routing by Dyn-Stor-Ind method - Pond routing by Dyn-Stor-Ind method

SubcatchmentE1: E1 Runoff Area=274,415 sf 9.50% Impervious Runoff Depth=2.43"
Flow Length=498' Slope=0.0723 '/' Tc=6.3 min CN=WQ Runoff=27.35 cfs 1.274 af

SubcatchmentE2: E2 Runoff Area=2.401 ac 4.33% Impervious Runoff Depth=2.33"
Flow Length=680' Slope=0.0323 '/' Tc=13.6 min UI Adjusted CN=WQ Runoff=7.54 cfs 0.467 af

SubcatchmentE3: E3 Runoff Area=1.887 ac 0.00% Impervious Runoff Depth=2.26"
Flow Length=327' Slope=0.0550 '/' Tc=5.5 min CN=80 Runoff=8.12 cfs 0.355 af

SubcatchmentE4: E4 Runoff Area=122,681 sf 9.85% Impervious Runoff Depth=2.36"
Flow Length=550' Tc=9.4 min UI Adjusted CN=WQ Runoff=10.37 cfs 0.554 af

SubcatchmentE5: E5 Runoff Area=0.458 ac 0.00% Impervious Runoff Depth=2.18"
Flow Length=198' Slope=0.0404 '/' Tc=4.5 min CN=79 Runoff=1.99 cfs 0.083 af

SubcatchmentE6: E6 Runoff Area=0.260 ac 0.00% Impervious Runoff Depth=2.18"
Flow Length=136' Slope=0.0330 '/' Tc=3.7 min CN=79 Runoff=1.16 cfs 0.047 af

SubcatchmentE7: E7 Runoff Area=0.183 ac 10.38% Impervious Runoff Depth=2.44"
Flow Length=155' Slope=0.0160 '/' Tc=6.3 min CN=WQ Runoff=0.80 cfs 0.037 af

SubcatchmentE8: E8 Runoff Area=11,092 sf 0.00% Impervious Runoff Depth=2.78"
Tc=1.0 min CN=86 Runoff=1.48 cfs 0.059 af

SubcatchmentOFF-1: OFF-1 Runoff Area=3.643 ac 43.65% Impervious Runoff Depth=2.98"
Flow Length=564' Slope=0.0323 '/' Tc=9.8 min CN=WQ Runoff=15.68 cfs 0.906 af

SubcatchmentOFF-2: OFF-2 Runoff Area=0.406 ac 22.66% Impervious Runoff Depth=2.60"
Flow Length=270' Slope=0.0741 '/' Tc=3.7 min UI Adjusted CN=WQ Runoff=2.03 cfs 0.088 af

SubcatchmentOFF-3: OFF-3 Runoff Area=86,082 sf 27.02% Impervious Runoff Depth=2.68"
Flow Length=489' Slope=0.0613 '/' Tc=6.4 min CN=WQ Runoff=9.06 cfs 0.441 af

SubcatchmentOFF-4: OFF-4 Runoff Area=23,335 sf 43.88% Impervious Runoff Depth=3.03"
Flow Length=337' Slope=0.0297 '/' Tc=5.9 min CN=WQ Runoff=2.76 cfs 0.135 af

SubcatchmentOFF-5: OFF-5 Runoff Area=8,976 sf 0.00% Impervious Runoff Depth=2.43"
Flow Length=349' Tc=5.2 min CN=82 Runoff=0.96 cfs 0.042 af

SubcatchmentOFF-6: OFF-6 Runoff Area=18,405 sf 9.38% Impervious Runoff Depth=2.42"
Flow Length=564' Slope=0.0323 '/' Tc=11.5 min CN=WQ Runoff=1.47 cfs 0.085 af

SubcatchmentOFF-7: OFF-7 Runoff Area=2,943 sf 9.17% Impervious Runoff Depth=2.42"
Flow Length=429' Tc=7.1 min UI Adjusted CN=WQ Runoff=0.28 cfs 0.014 af

SubcatchmentOFF-8: OFF-8 Runoff Area=70,469 sf 31.01% Impervious Runoff Depth=2.81"
Tc=10.0 min CN=WQ Runoff=6.64 cfs 0.378 af

Subcatchment OFF-9: OFF-9 Runoff Area=30,431 sf 29.47% Impervious Runoff Depth=2.78"
Tc=0.0 min CN=WQ Runoff=3.91 cfs 0.162 af

Pond 1P: EXISTING POND Peak Elev=995.45' Storage=98,488 cf Inflow=59.68 cfs 3.226 af
8.0" Round Culvert n=0.010 L=324.0' S=0.0080 '/' Outflow=1.75 cfs 3.223 af

Pond 2P: West Ditch Peak Elev=997.09' Storage=551 cf Inflow=11.09 cfs 0.595 af
Primary=9.98 cfs 0.595 af Secondary=0.00 cfs 0.000 af Outflow=9.98 cfs 0.595 af

Pond 10P: West Exisitng Wetland Peak Elev=974.48' Storage=26,250 cf Inflow=13.92 cfs 4.013 af
Outflow=3.58 cfs 4.013 af

Link 3L: SOUTH Inflow=9.32 cfs 0.440 af
Primary=9.32 cfs 0.440 af

Link 5L: NORTHEAST Inflow=8.04 cfs 0.461 af
Primary=8.04 cfs 0.461 af

Link 6L: EAST Inflow=1.16 cfs 0.047 af
Primary=1.16 cfs 0.047 af

Link 7L: TOTAL Inflow=21.06 cfs 5.124 af
Primary=21.06 cfs 5.124 af

Link 8L: Existing to NORTHWEST Inflow=3.91 cfs 0.162 af
Primary=3.91 cfs 0.162 af

Summary for Subcatchment E1: E1

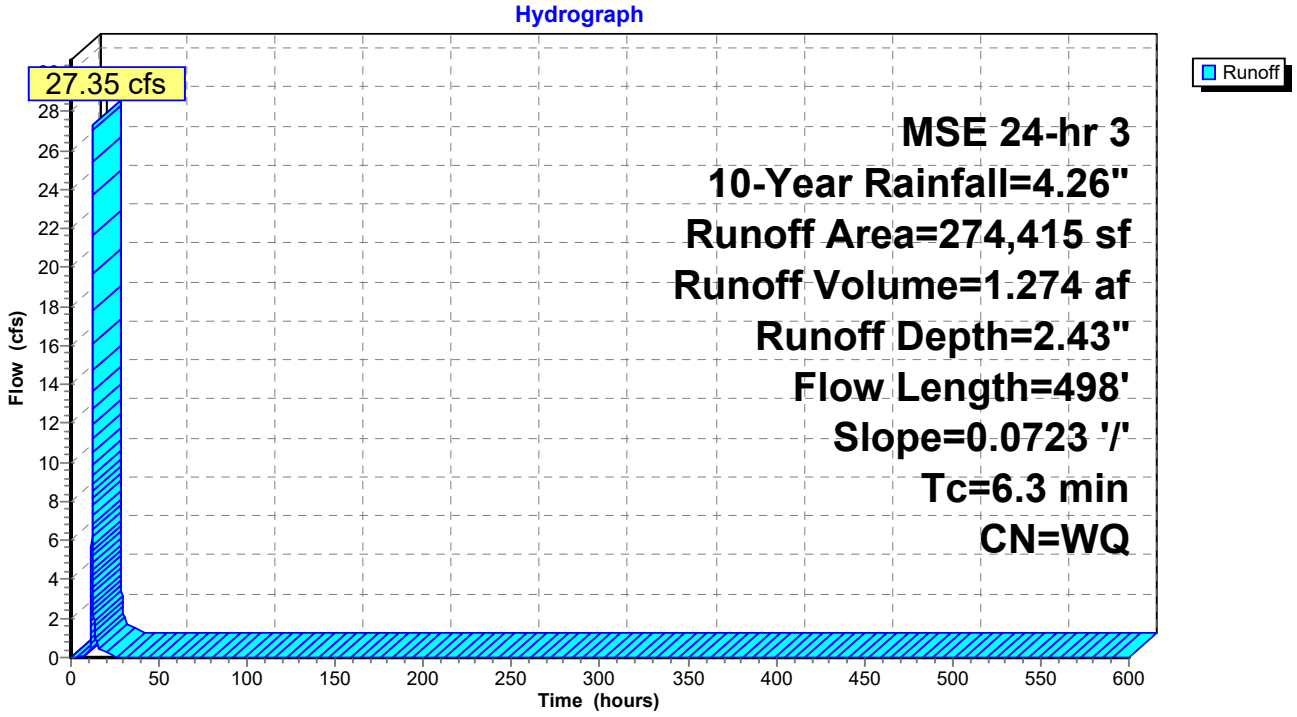
Runoff = 27.35 cfs @ 12.14 hrs, Volume= 1.274 af, Depth= 2.43"
Routed to Pond 1P : EXISTING POND

Runoff by SCS TR-20 method, UH=SCS, Weighted-Q, Time Span= 0.00-600.00 hrs, dt= 0.01 hrs
MSE 24-hr 3 10-Year Rainfall=4.26"

Area (sf)	CN	Description
1,904	98	Unconnected roofs, HSG D
24,173	98	Water Surface, HSG D
248,338	80	>75% Grass cover, Good, HSG D
274,415		Weighted Average
248,338		90.50% Pervious Area
26,077		9.50% Impervious Area
1,904		7.30% Unconnected

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
6.3	498	0.0723	1.31		**Lag/CN Method,**

Subcatchment E1: E1



Summary for Subcatchment E2: E2

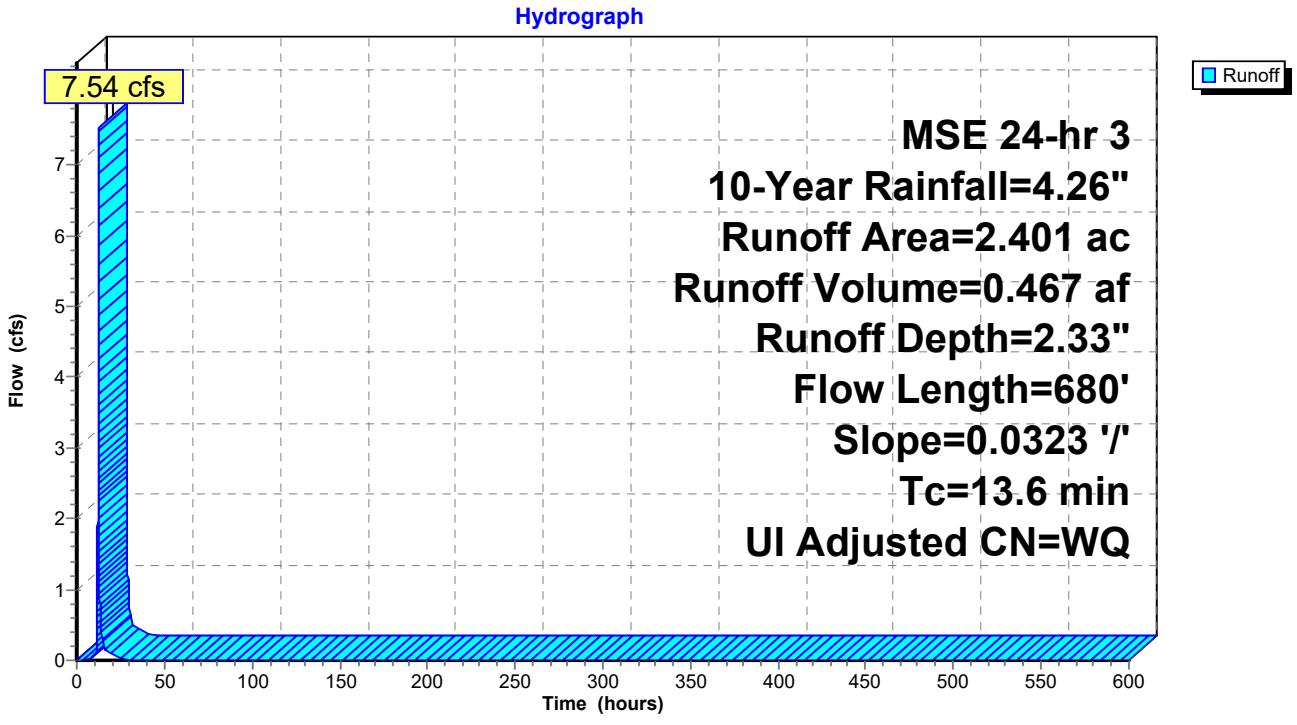
Runoff = 7.54 cfs @ 12.22 hrs, Volume= 0.467 af, Depth= 2.33"
Routed to Pond 1P : EXISTING POND

Runoff by SCS TR-20 method, UH=SCS, Weighted-Q, Time Span= 0.00-600.00 hrs, dt= 0.01 hrs
MSE 24-hr 3 10-Year Rainfall=4.26"

Area (ac)	CN	Adj	Description
0.104	98	98	Unconnected roofs, HSG D
2.297	80	80	>75% Grass cover, Good, HSG D
2.401			Weighted Average
2.297			95.67% Pervious Area
0.104			4.33% Impervious Area
0.104			100.00% Unconnected

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
12.6	680	0.0323	0.90		**Lag/CN Method, OVERLAND - SWALE**
1.0					**Direct Entry, STORM SEWER**
13.6	680	Total			

Subcatchment E2: E2



Summary for Subcatchment E3: E3

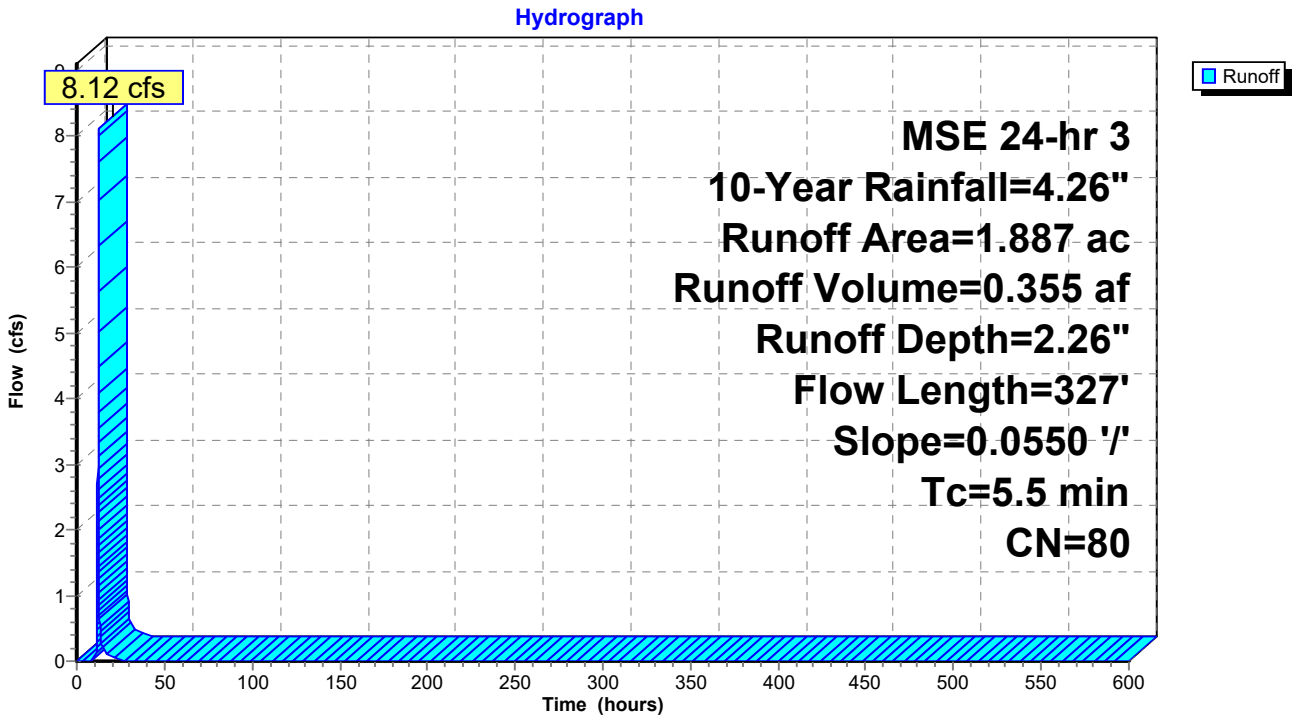
Runoff = 8.12 cfs @ 12.13 hrs, Volume= 0.355 af, Depth= 2.26"
Routed to Link 3L : SOUTH

Runoff by SCS TR-20 method, UH=SCS, Weighted-Q, Time Span= 0.00-600.00 hrs, dt= 0.01 hrs
MSE 24-hr 3 10-Year Rainfall=4.26"

Area (ac)	CN	Description
1.887	80	>75% Grass cover, Good, HSG D
1.887		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
5.5	327	0.0550	0.98		**Lag/CN Method, OVERLAND**

Subcatchment E3: E3



Summary for Subcatchment E4: E4

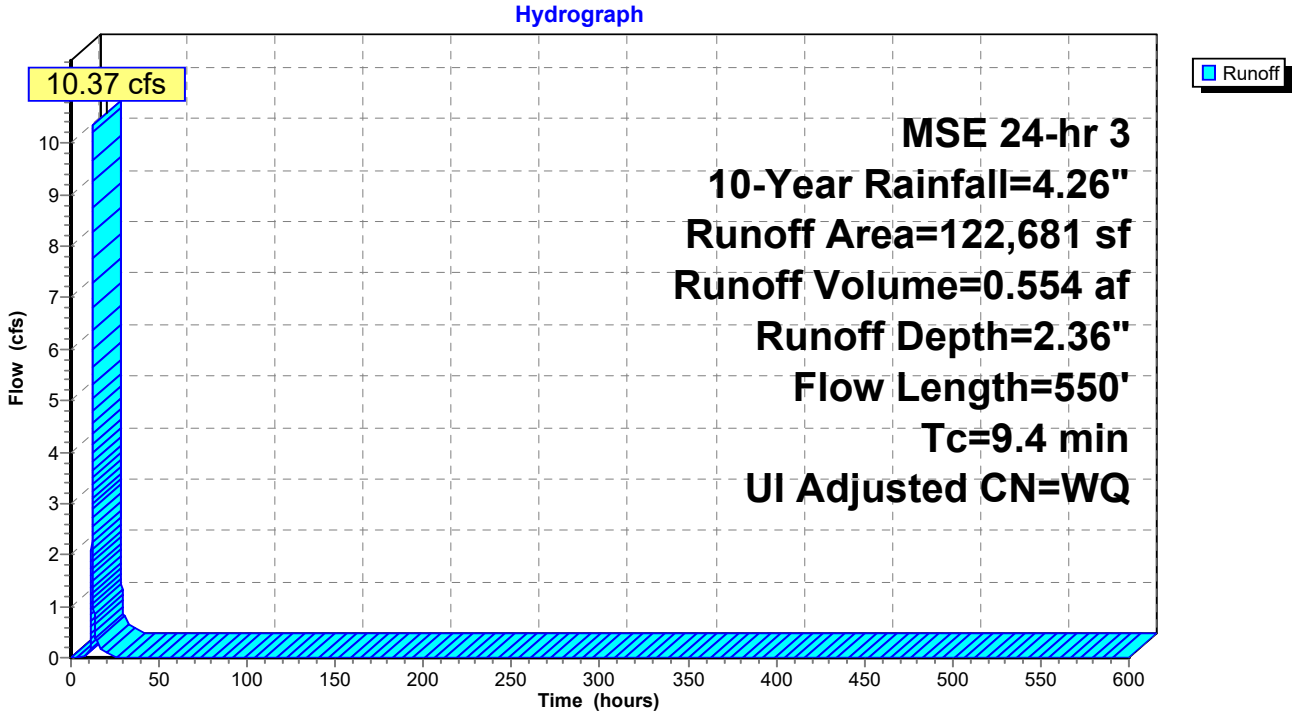
Runoff = 10.37 cfs @ 12.17 hrs, Volume= 0.554 af, Depth= 2.36"
Routed to Pond 2P : West Ditch

Runoff by SCS TR-20 method, UH=SCS, Weighted-Q, Time Span= 0.00-600.00 hrs, dt= 0.01 hrs
MSE 24-hr 3 10-Year Rainfall=4.26"

Area (sf)	CN	Adj	Description
12,084	98	98	Unconnected roofs, HSG D
110,597	79	79	Woods/grass comb., Good, HSG D
122,681			Weighted Average
110,597			90.15% Pervious Area
12,084			9.85% Impervious Area
12,084			100.00% Unconnected

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
5.8	385	0.0620	1.11		**Lag/CN Method, OVERLAND**
1.1	100	0.2000	1.53		**Lag/CN Method,**
2.5	65	0.0198	0.44		**Lag/CN Method,**
9.4	550	Total			

Subcatchment E4: E4



Summary for Subcatchment E5: E5

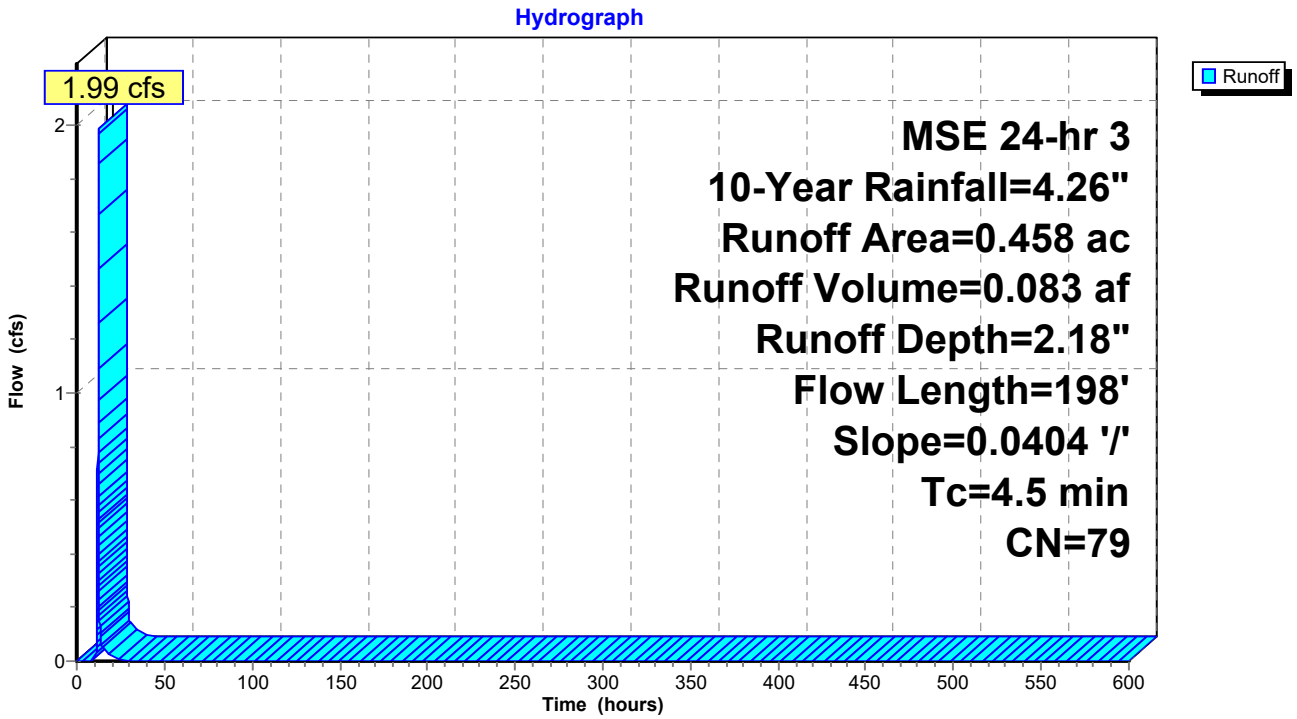
Runoff = 1.99 cfs @ 12.12 hrs, Volume= 0.083 af, Depth= 2.18"
Routed to Link 5L : NORTHEAST

Runoff by SCS TR-20 method, UH=SCS, Weighted-Q, Time Span= 0.00-600.00 hrs, dt= 0.01 hrs
MSE 24-hr 3 10-Year Rainfall=4.26"

Area (ac)	CN	Description
0.458	79	Woods/grass comb., Good, HSG D
0.458		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
4.5	198	0.0404	0.74		**Lag/CN Method, OVERLAND**

Subcatchment E5: E5



Summary for Subcatchment E6: E6

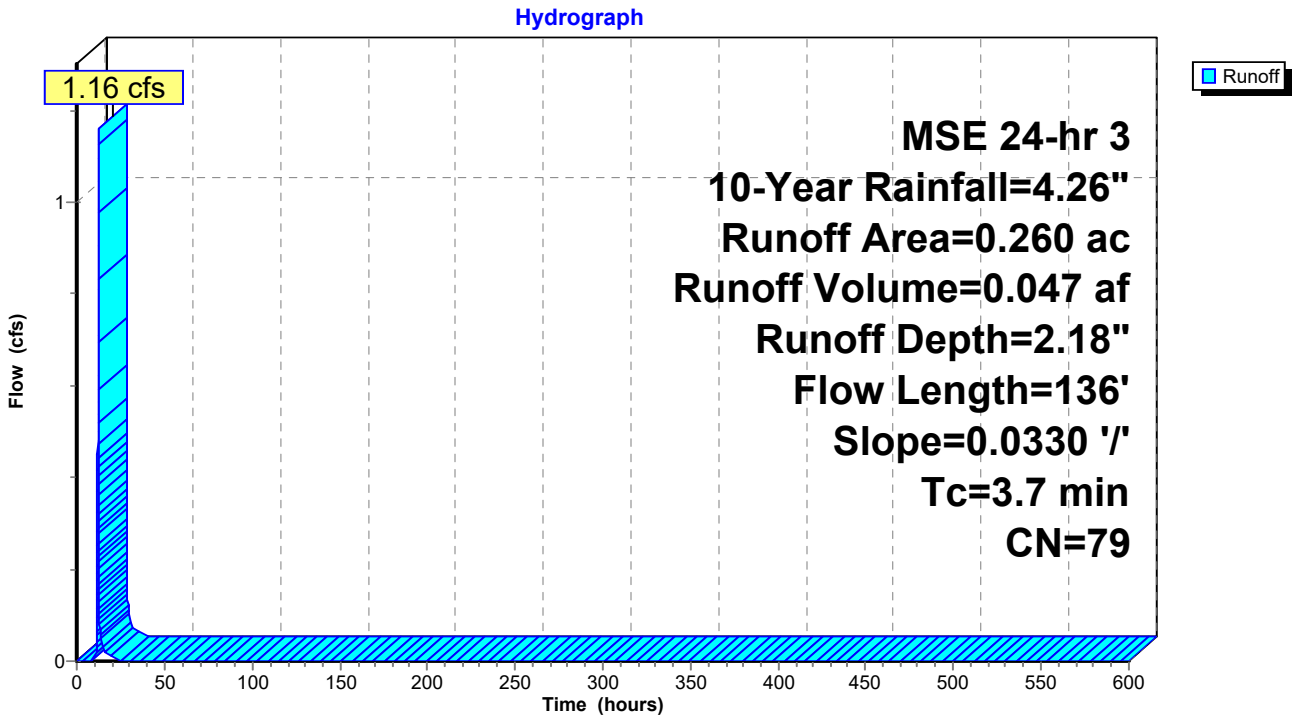
Runoff = 1.16 cfs @ 12.11 hrs, Volume= 0.047 af, Depth= 2.18"
Routed to Link 6L : EAST

Runoff by SCS TR-20 method, UH=SCS, Weighted-Q, Time Span= 0.00-600.00 hrs, dt= 0.01 hrs
MSE 24-hr 3 10-Year Rainfall=4.26"

Area (ac)	CN	Description
0.260	79	Woods/grass comb., Good, HSG D
0.260		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
3.7	136	0.0330	0.62		**Lag/CN Method, OVERLAND**

Subcatchment E6: E6



Summary for Subcatchment E7: E7

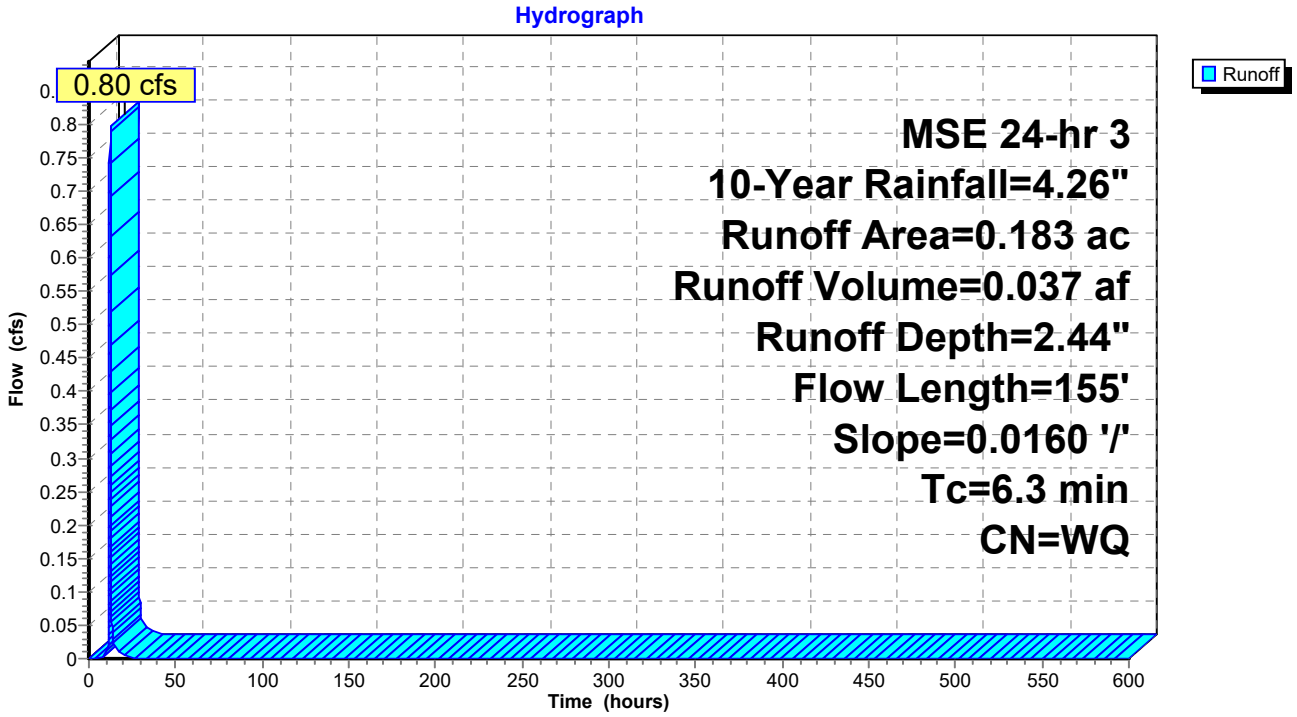
Runoff = 0.80 cfs @ 12.14 hrs, Volume= 0.037 af, Depth= 2.44"
Routed to Pond 1P : EXISTING POND

Runoff by SCS TR-20 method, UH=SCS, Weighted-Q, Time Span= 0.00-600.00 hrs, dt= 0.01 hrs
MSE 24-hr 3 10-Year Rainfall=4.26"

Area (ac)	CN	Description
0.019	98	Paved parking, HSG D
0.164	80	>75% Grass cover, Good, HSG D
0.183		Weighted Average
0.164		89.62% Pervious Area
0.019		10.38% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
5.3	155	0.0160	0.49		**Lag/CN Method, OVERLAND**
1.0					**Direct Entry, STORM SEWER**
6.3	155	Total			

Subcatchment E7: E7



Summary for Subcatchment E8: E8

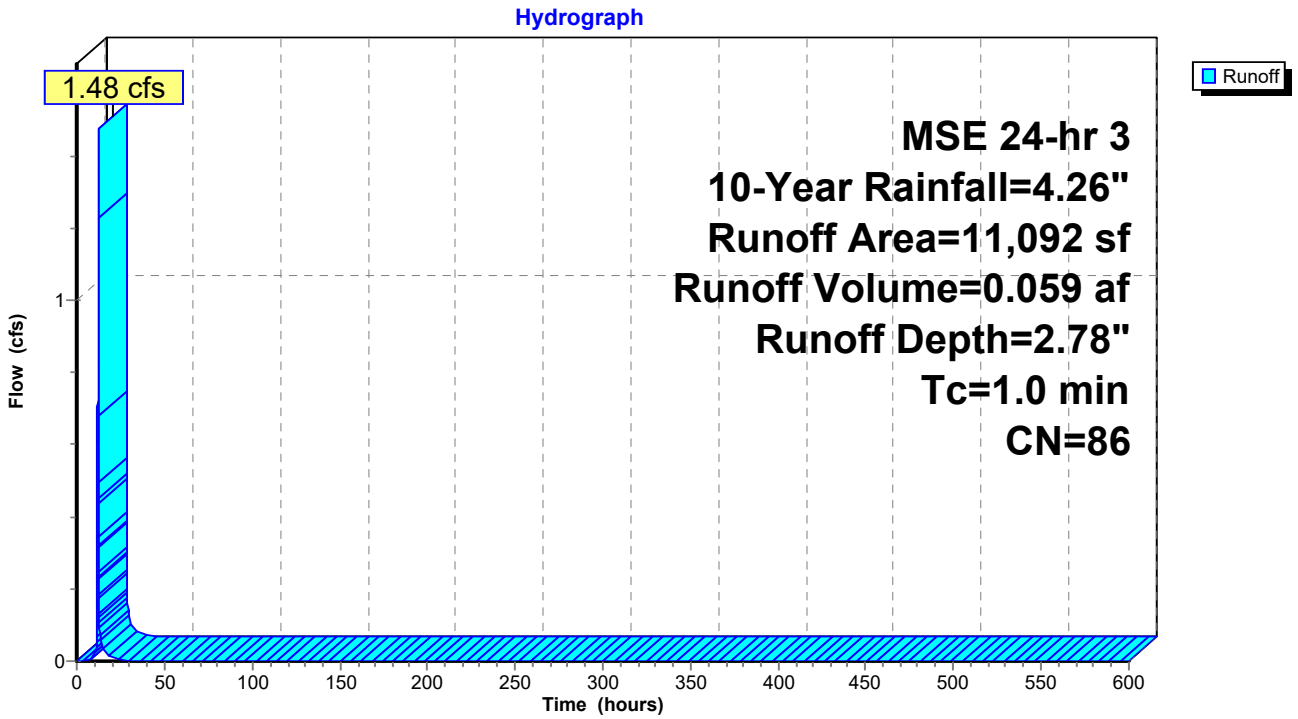
Runoff = 1.48 cfs @ 12.10 hrs, Volume= 0.059 af, Depth= 2.78"
Routed to Pond 10P : West Exisitng Wetland

Runoff by SCS TR-20 method, UH=SCS, Weighted-Q, Time Span= 0.00-600.00 hrs, dt= 0.01 hrs
MSE 24-hr 3 10-Year Rainfall=4.26"

Area (sf)	CN	Description
11,092	86	Woods/grass comb., Poor, HSG D
11,092		100.00% Pervious Area

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

Subcatchment E8: E8



Summary for Subcatchment OFF-1: OFF-1

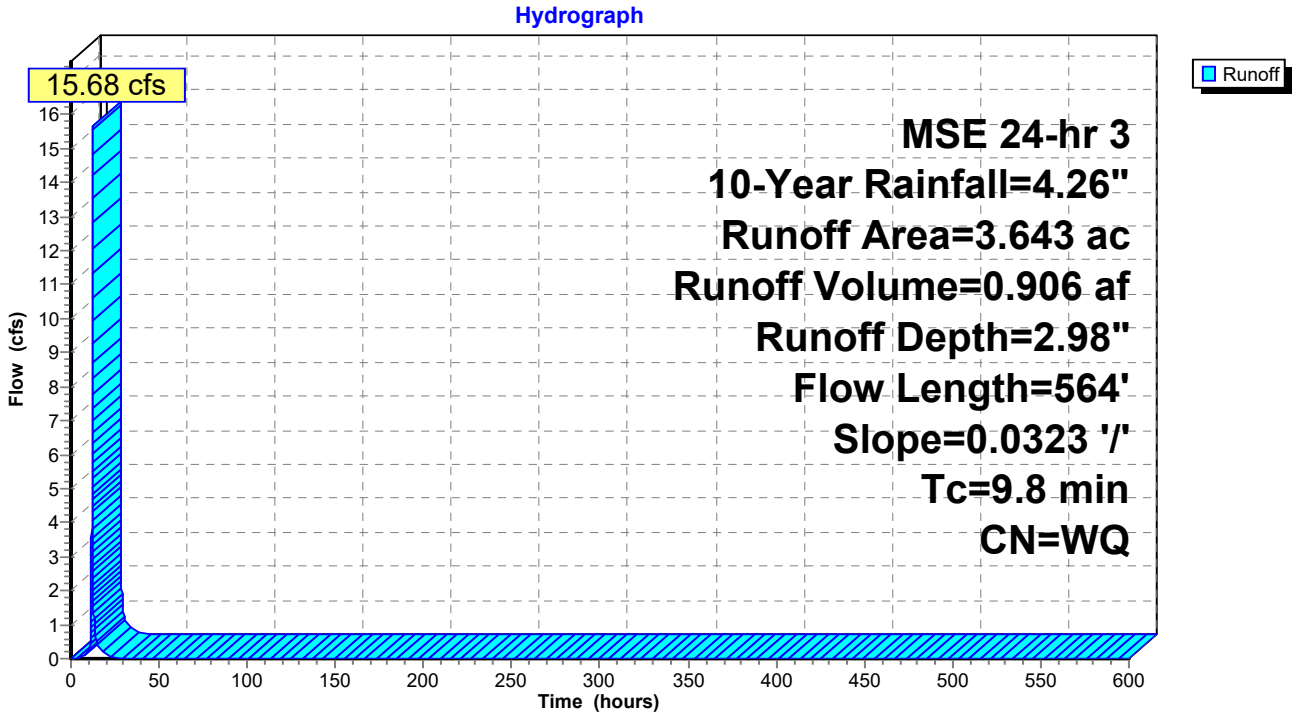
Runoff = 15.68 cfs @ 12.17 hrs, Volume= 0.906 af, Depth= 2.98"
Routed to Pond 1P : EXISTING POND

Runoff by SCS TR-20 method, UH=SCS, Weighted-Q, Time Span= 0.00-600.00 hrs, dt= 0.01 hrs
MSE 24-hr 3 10-Year Rainfall=4.26"

Area (ac)	CN	Description
1.590	98	Paved parking, HSG D
2.053	79	Woods/grass comb., Good, HSG D
3.643		Weighted Average
2.053		56.35% Pervious Area
1.590		43.65% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
8.8	564	0.0323	1.07		**Lag/CN Method, BACK YARD SWALE**
1.0					**Direct Entry, Storm Sewer**
9.8	564	Total			

Subcatchment OFF-1: OFF-1



Summary for Subcatchment OFF-2: OFF-2

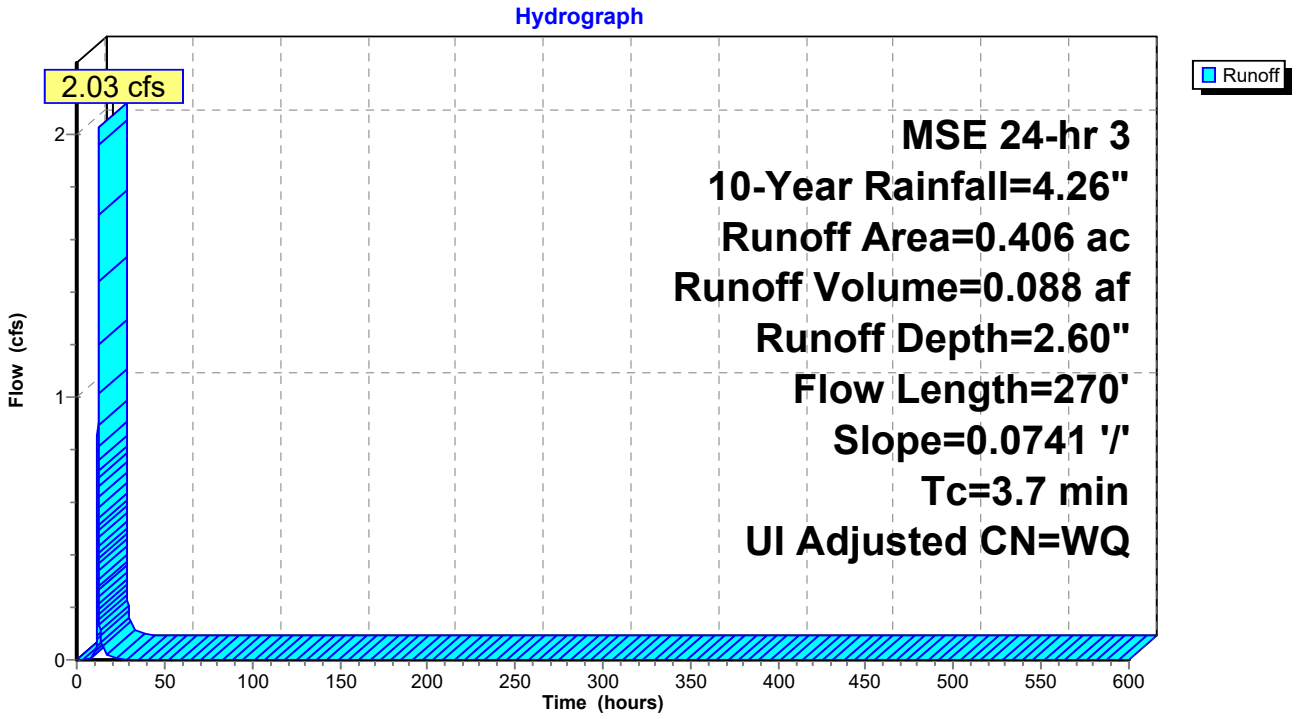
Runoff = 2.03 cfs @ 12.11 hrs, Volume= 0.088 af, Depth= 2.60"
Routed to Pond 1P : EXISTING POND

Runoff by SCS TR-20 method, UH=SCS, Weighted-Q, Time Span= 0.00-600.00 hrs, dt= 0.01 hrs
MSE 24-hr 3 10-Year Rainfall=4.26"

Area (ac)	CN	Adj	Description
0.092	98	98	Unconnected roofs, HSG D
0.314	79	79	Woods/grass comb., Good, HSG D
0.406			Weighted Average
0.314			77.34% Pervious Area
0.092			22.66% Impervious Area
0.092			100.00% Unconnected

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
3.7	270	0.0741	1.21		**Lag/CN Method,**

Subcatchment OFF-2: OFF-2



Summary for Subcatchment OFF-3: OFF-3

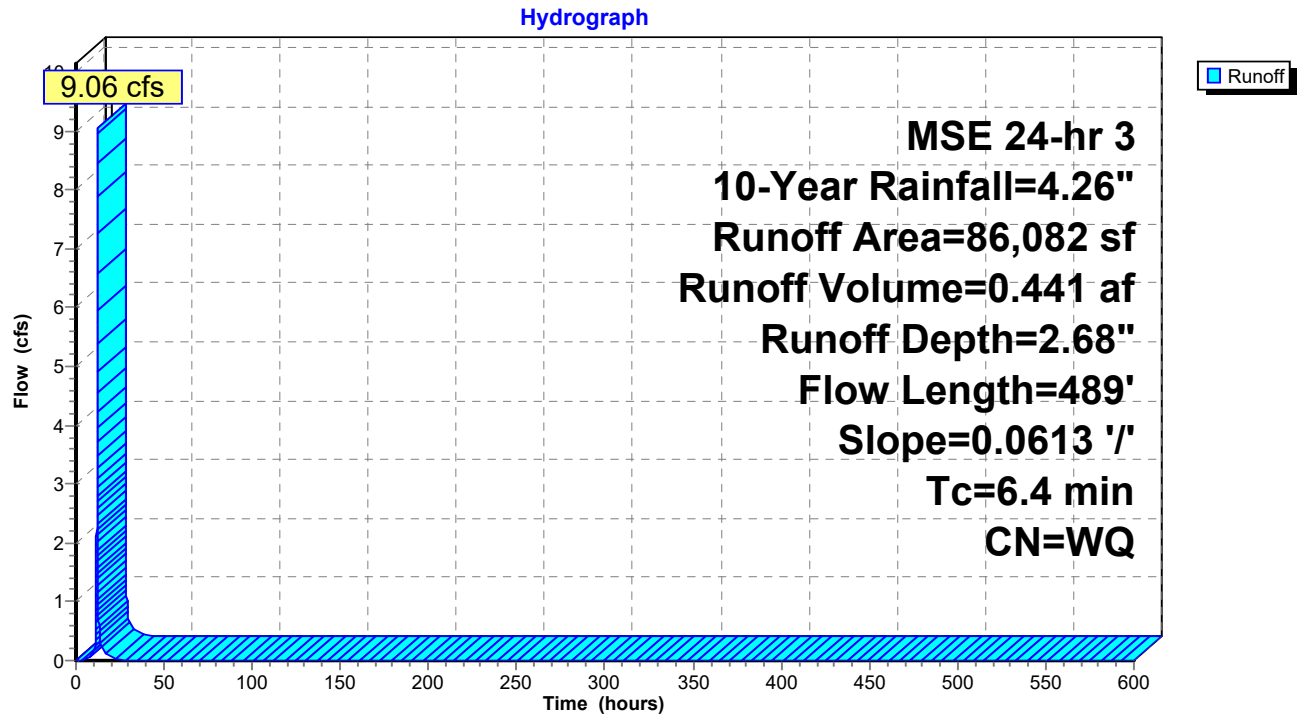
Runoff = 9.06 cfs @ 12.14 hrs, Volume= 0.441 af, Depth= 2.68"
Routed to Pond 1P : EXISTING POND

Runoff by SCS TR-20 method, UH=SCS, Weighted-Q, Time Span= 0.00-600.00 hrs, dt= 0.01 hrs
MSE 24-hr 3 10-Year Rainfall=4.26"

Area (sf)	CN	Description
23,261	98	Paved parking, HSG D
62,821	79	Woods/grass comb., Good, HSG D
86,082		Weighted Average
62,821		72.98% Pervious Area
23,261		27.02% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
6.4	489	0.0613	1.28		**Lag/CN Method,**

Subcatchment OFF-3: OFF-3



Summary for Subcatchment OFF-4: OFF-4

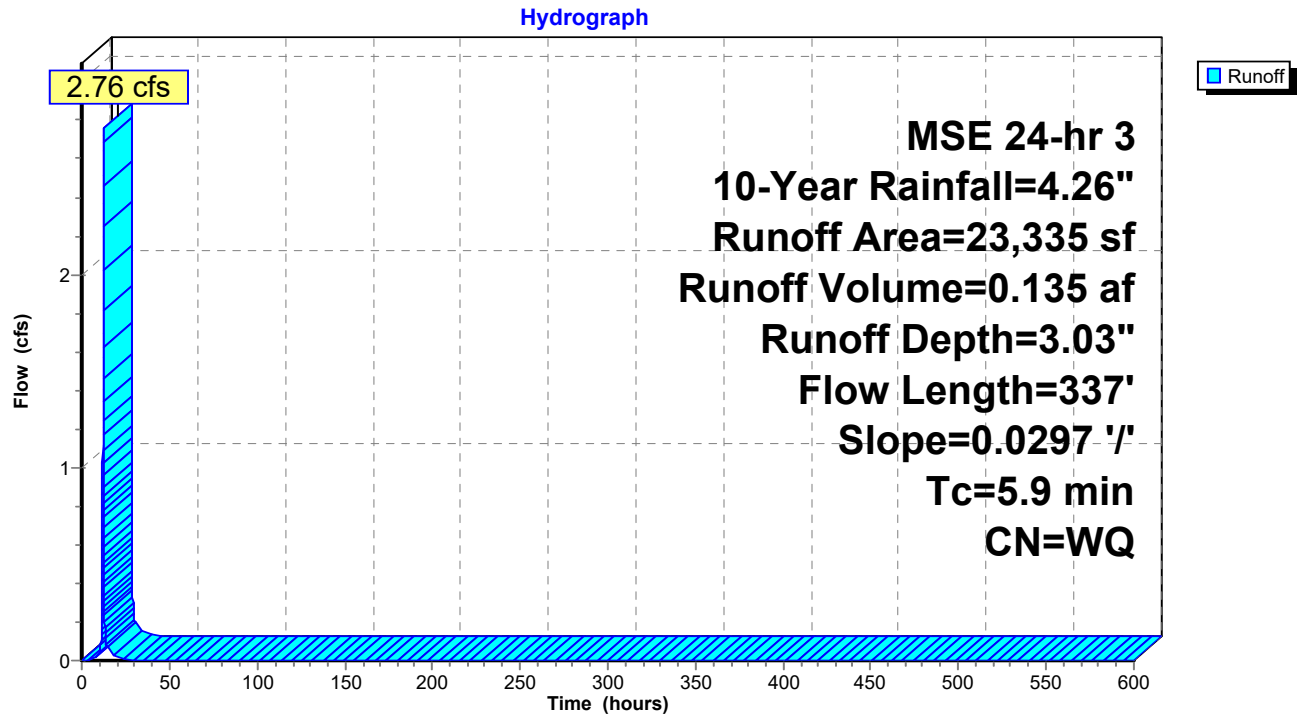
Runoff = 2.76 cfs @ 12.13 hrs, Volume= 0.135 af, Depth= 3.03"
Routed to Pond 10P : West Exisitng Wetland

Runoff by SCS TR-20 method, UH=SCS, Weighted-Q, Time Span= 0.00-600.00 hrs, dt= 0.01 hrs
MSE 24-hr 3 10-Year Rainfall=4.26"

Area (sf)	CN	Description
10,240	98	Paved parking, HSG D
13,095	80	>75% Grass cover, Good, HSG D
23,335		Weighted Average
13,095		56.12% Pervious Area
10,240		43.88% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
5.9	337	0.0297	0.96		**Lag/CN Method,**

Subcatchment OFF-4: OFF-4



Summary for Subcatchment OFF-5: OFF-5

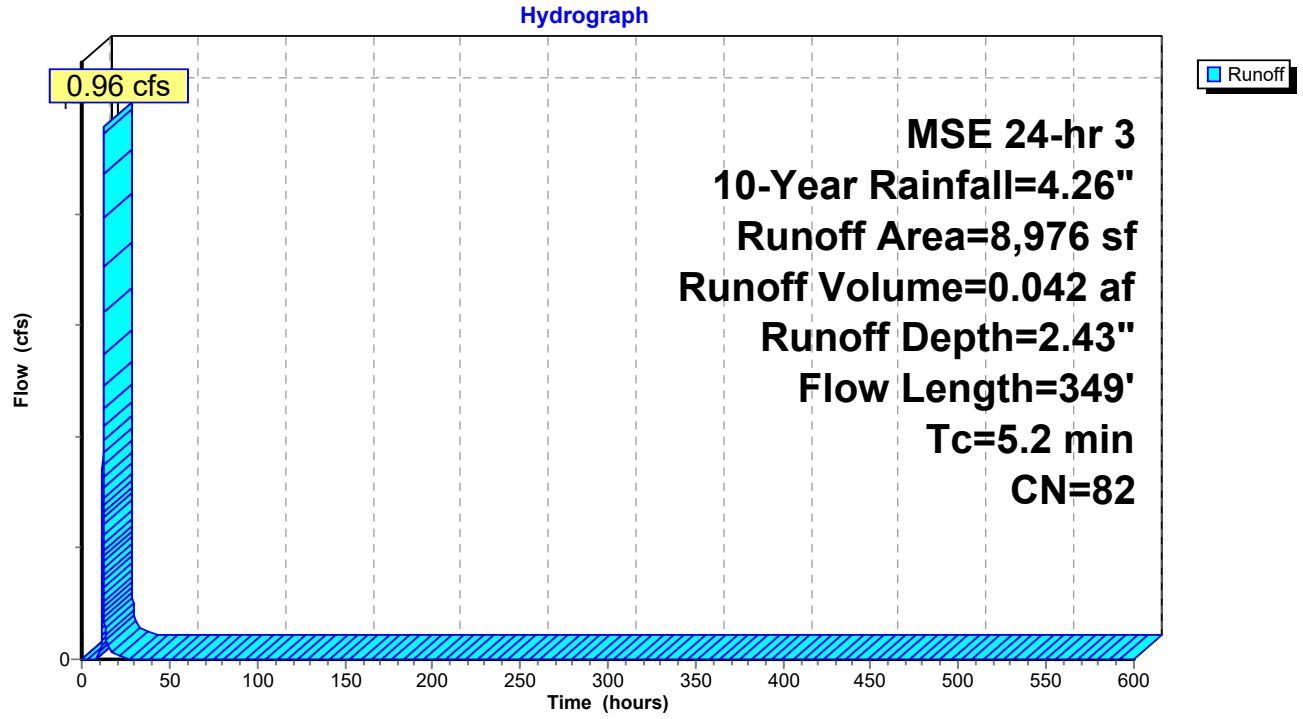
Runoff = 0.96 cfs @ 12.13 hrs, Volume= 0.042 af, Depth= 2.43"
Routed to Pond 2P : West Ditch

Runoff by SCS TR-20 method, UH=SCS, Weighted-Q, Time Span= 0.00-600.00 hrs, dt= 0.01 hrs
MSE 24-hr 3 10-Year Rainfall=4.26"

Area (sf)	CN	Description
8,976	82	Woods/grass comb., Fair, HSG D
8,976		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
1.6	194	0.2474	2.00		**Lag/CN Method,**
3.6	155	0.0354	0.72		**Lag/CN Method,**
5.2	349	Total			

Subcatchment OFF-5: OFF-5



Summary for Subcatchment OFF-6: OFF-6

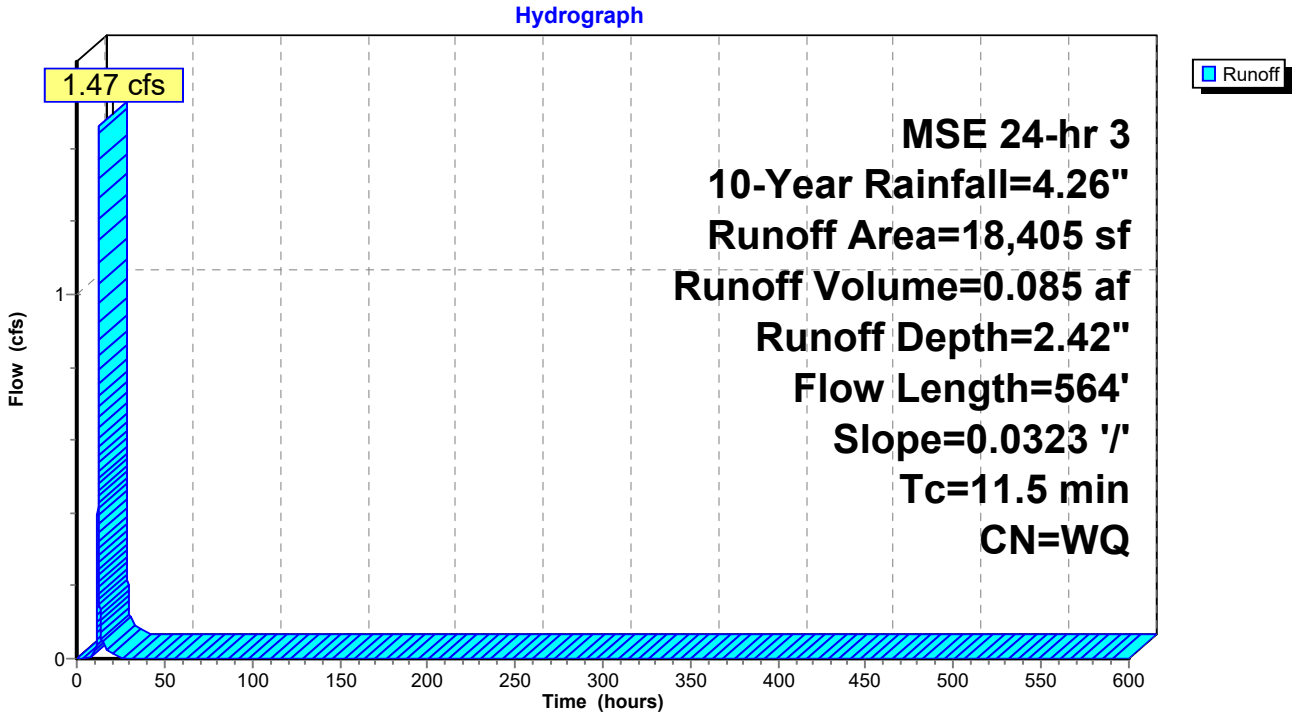
Runoff = 1.47 cfs @ 12.19 hrs, Volume= 0.085 af, Depth= 2.42"
Routed to Link 3L : SOUTH

Runoff by SCS TR-20 method, UH=SCS, Weighted-Q, Time Span= 0.00-600.00 hrs, dt= 0.01 hrs
MSE 24-hr 3 10-Year Rainfall=4.26"

	Area (sf)	CN	Description
*	1,727	98	Impervious, HSG D
	16,678	80	>75% Grass cover, Good, HSG D
	18,405		Weighted Average
	16,678		90.62% Pervious Area
	1,727		9.38% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
10.5	564	0.0323	0.90		**Lag/CN Method, BACK YARD SWALE**
1.0					**Direct Entry, Storm Sewer**
11.5	564	Total			

Subcatchment OFF-6: OFF-6



Summary for Subcatchment OFF-7: OFF-7

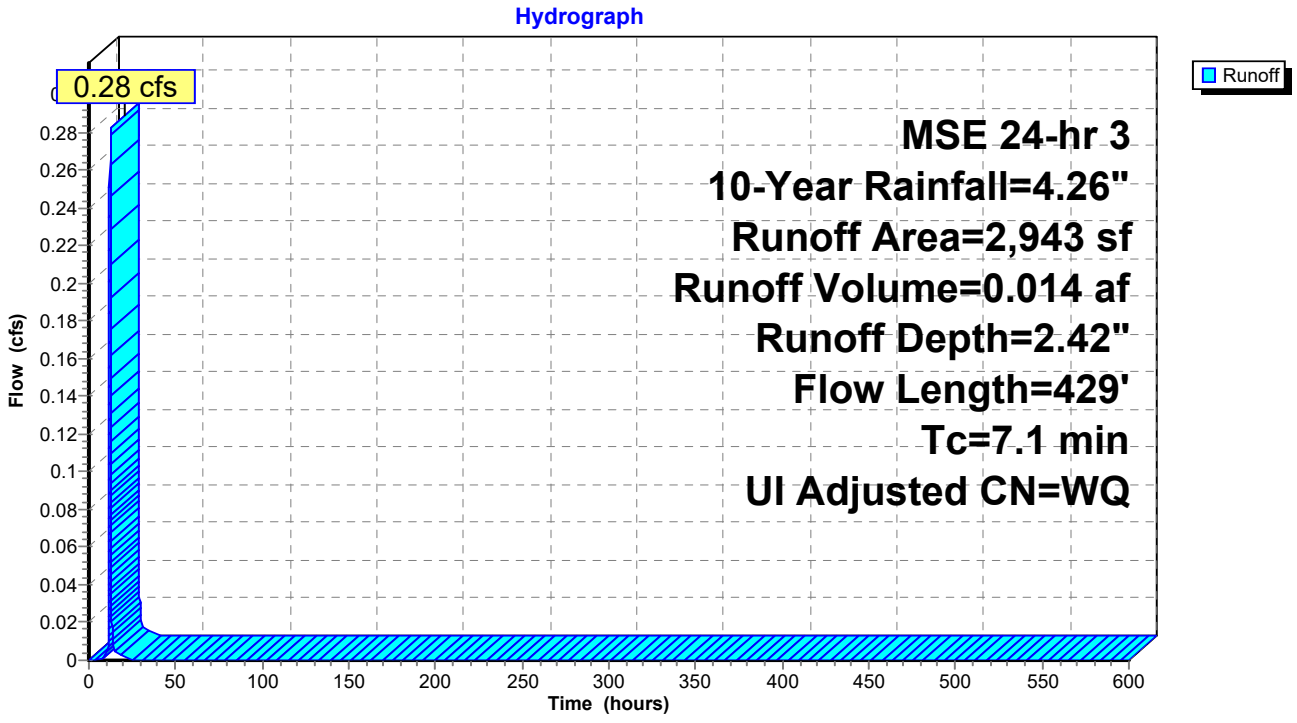
Runoff = 0.28 cfs @ 12.14 hrs, Volume= 0.014 af, Depth= 2.42"
Routed to Pond 1P : EXISTING POND

Runoff by SCS TR-20 method, UH=SCS, Weighted-Q, Time Span= 0.00-600.00 hrs, dt= 0.01 hrs
MSE 24-hr 3 10-Year Rainfall=4.26"

Area (sf)	CN	Adj	Description
2,673	80	80	>75% Grass cover, Good, HSG D
270	98	98	Unconnected roofs, HSG D
2,943			Weighted Average
2,673			90.83% Pervious Area
270			9.17% Impervious Area
270			100.00% Unconnected

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
1.1	83	0.1445	1.29		**Lag/CN Method,**
6.0	346	0.0448	0.96		**Lag/CN Method,**
7.1	429	Total			

Subcatchment OFF-7: OFF-7



Summary for Subcatchment OFF-8: OFF-8

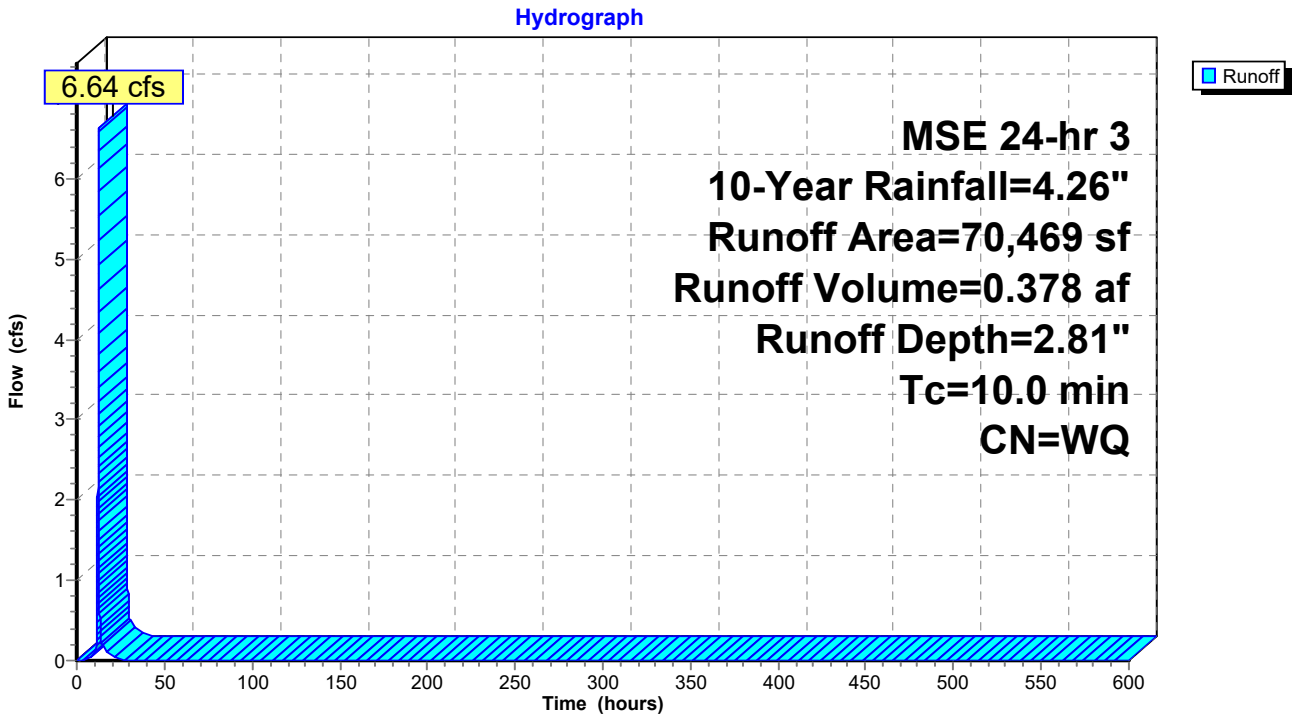
Runoff = 6.64 cfs @ 12.17 hrs, Volume= 0.378 af, Depth= 2.81"
Routed to Link 5L : NORTHEAST

Runoff by SCS TR-20 method, UH=SCS, Weighted-Q, Time Span= 0.00-600.00 hrs, dt= 0.01 hrs
MSE 24-hr 3 10-Year Rainfall=4.26"

Area (sf)	CN	Description
21,849	98	Paved parking, HSG D
48,620	80	>75% Grass cover, Good, HSG D
70,469		Weighted Average
48,620		68.99% Pervious Area
21,849		31.01% Impervious Area

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

Subcatchment OFF-8: OFF-8



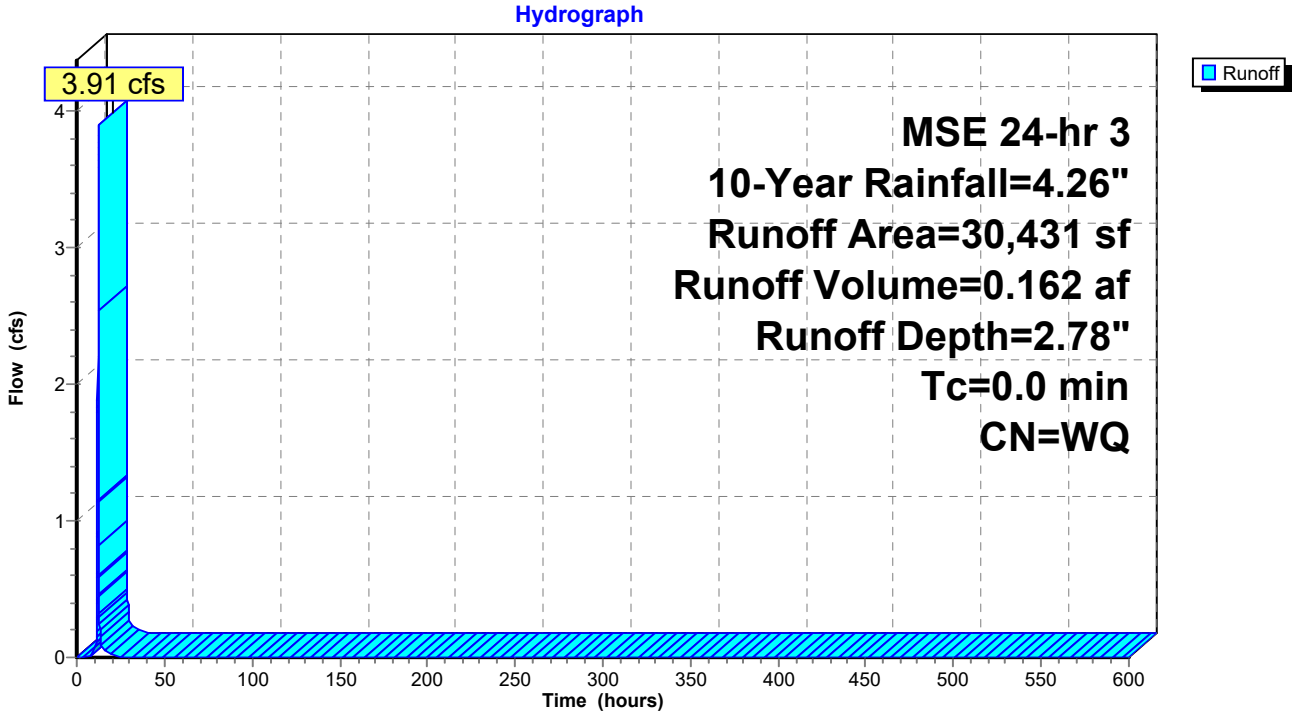
Summary for Subcatchment OFF-9: OFF-9

Runoff = 3.91 cfs @ 12.09 hrs, Volume= 0.162 af, Depth= 2.78"
Routed to Link 8L : Existing to NORTHWEST

Runoff by SCS TR-20 method, UH=SCS, Weighted-Q, Time Span= 0.00-600.00 hrs, dt= 0.01 hrs
MSE 24-hr 3 10-Year Rainfall=4.26"

Area (sf)	CN	Description
8,967	98	Paved parking, HSG D
21,464	80	>75% Grass cover, Good, HSG D
30,431		Weighted Average
21,464		70.53% Pervious Area
8,967		29.47% Impervious Area

Subcatchment OFF-9: OFF-9



Summary for Pond 1P: EXISTING POND

Inflow Area = 14.976 ac, 19.66% Impervious, Inflow Depth = 2.58" for 10-Year event
Inflow = 59.68 cfs @ 12.14 hrs, Volume= 3.226 af
Outflow = 1.75 cfs @ 15.04 hrs, Volume= 3.223 af, Atten= 97%, Lag= 173.6 min
Primary = 1.75 cfs @ 15.04 hrs, Volume= 3.223 af
Routed to Pond 10P : West Exisitng Wetland

Routing by Dyn-Stor-Ind method, Time Span= 0.00-600.00 hrs, dt= 0.01 hrs
Peak Elev= 995.45' @ 15.04 hrs Surf.Area= 51,737 sf Storage= 98,488 cf

Plug-Flow detention time= 729.1 min calculated for 3.223 af (100% of inflow)
Center-of-Mass det. time= 729.1 min (1,518.7 - 789.6)

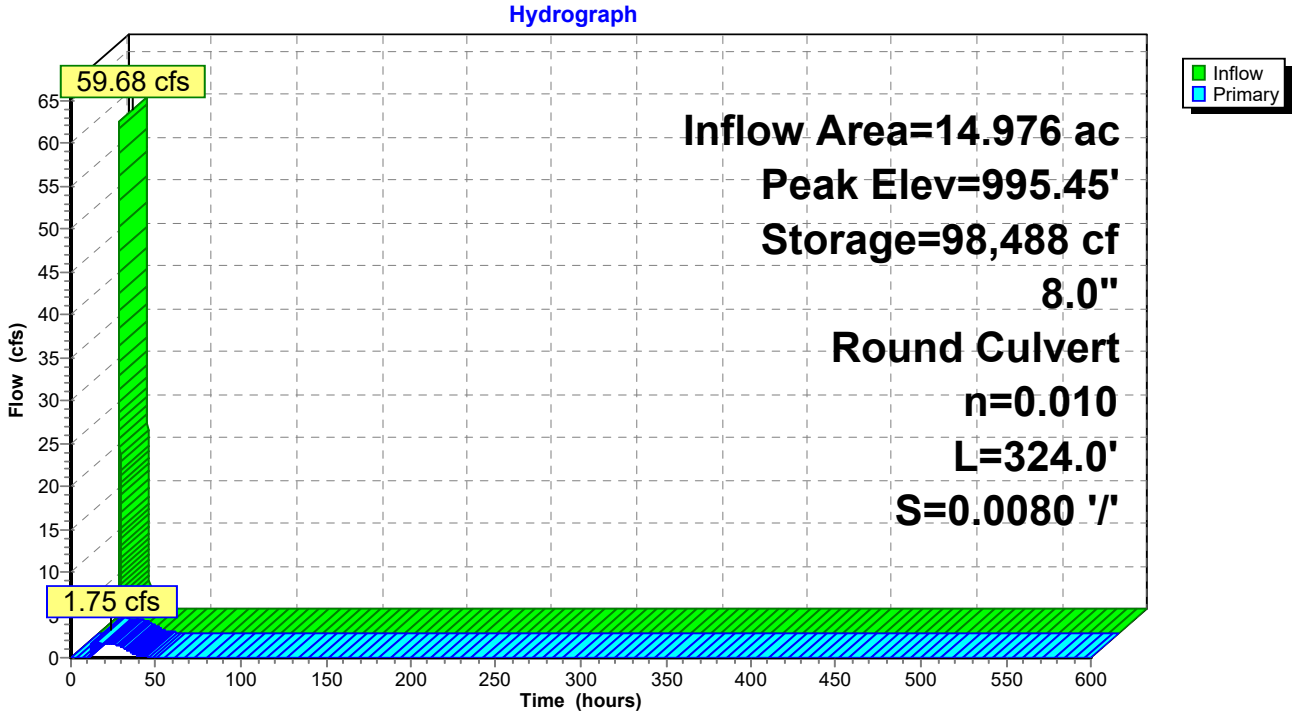
Volume	Invert	Avail.Storage	Storage Description
#1	992.61'	277,554 cf	**Custom Stage Data (Prismatic)** Listed below (Recalc)

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
992.61	24,173	0	0
994.00	31,142	38,444	38,444
996.00	59,569	90,711	129,155
998.00	88,830	148,399	277,554

Device	Routing	Invert	Outlet Devices
#1	Primary	992.61'	**8.0" Round Culvert** L= 324.0' CPP, projecting, no headwall, Ke= 0.900 Inlet / Outlet Invert= 992.61' / 990.02' S= 0.0080 '/' Cc= 0.900 n= 0.010 PVC, smooth interior, Flow Area= 0.35 sf

Primary OutFlow Max=1.75 cfs @ 15.04 hrs HW=995.45' TW=974.40' (Dynamic Tailwater)
↑—**1=Culvert** (Barrel Controls 1.75 cfs @ 5.01 fps)

Pond 1P: EXISTING POND



Summary for Pond 2P: West Ditch

Inflow Area = 3.022 ac, 9.18% Impervious, Inflow Depth = 2.36" for 10-Year event
Inflow = 11.09 cfs @ 12.16 hrs, Volume= 0.595 af
Outflow = 9.98 cfs @ 12.20 hrs, Volume= 0.595 af, Atten= 10%, Lag= 2.4 min
Primary = 9.98 cfs @ 12.20 hrs, Volume= 0.595 af
Routed to Pond 10P : West Exisitng Wetland
Secondary = 0.00 cfs @ 0.00 hrs, Volume= 0.000 af
Routed to Pond 10P : West Exisitng Wetland

Routing by Dyn-Stor-Ind method, Time Span= 0.00-600.00 hrs, dt= 0.01 hrs
Peak Elev= 997.09' @ 12.20 hrs Surf.Area= 948 sf Storage= 551 cf

Plug-Flow detention time= (not calculated: outflow precedes inflow)
Center-of-Mass det. time= 0.2 min (799.9 - 799.7)

Volume	Invert	Avail.Storage	Storage Description
#1	995.00'	5,727 cf	**Custom Stage Data (Prismatic)** Listed below (Recalc)

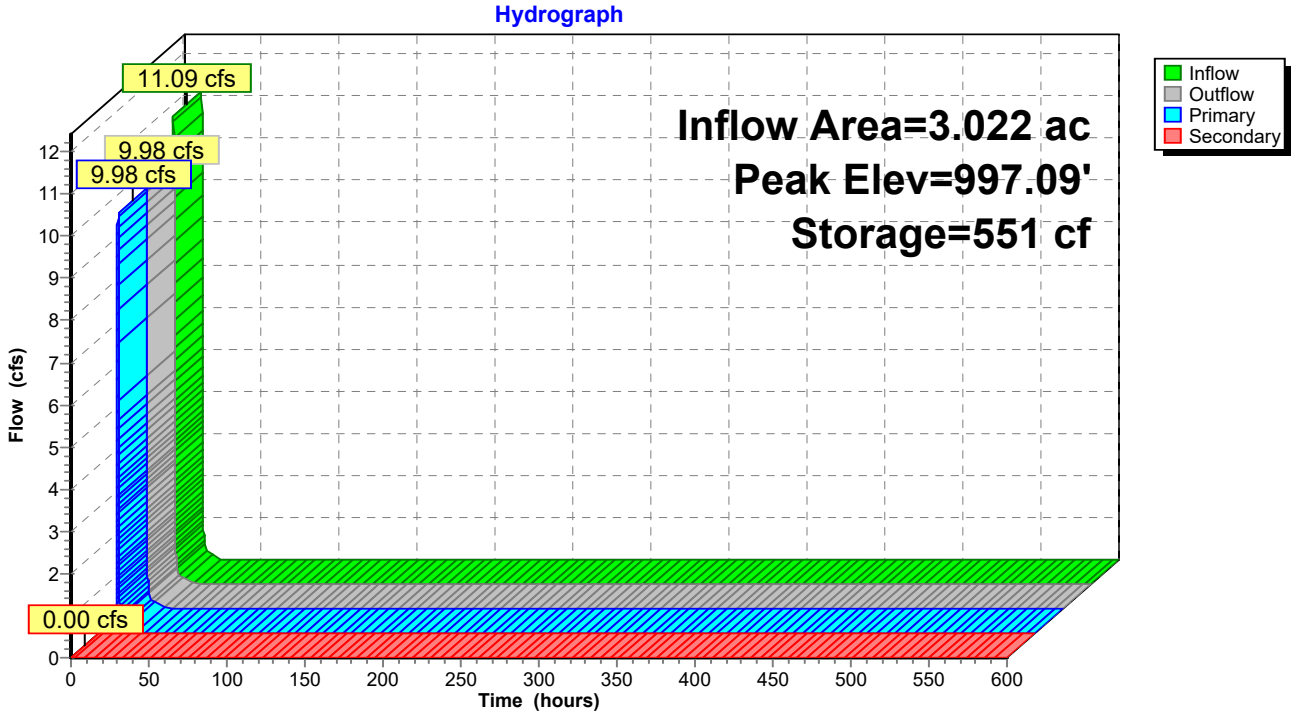
Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
995.00	5	0	0
996.00	59	32	32
997.00	825	442	474
998.00	2,243	1,534	2,008
998.60	4,093	1,901	3,909
999.00	5,000	1,819	5,727

Device	Routing	Invert	Outlet Devices
#1	Primary	994.57'	**18.0" Round CMP_Round 18"** L= 57.1' CMP, mitered to conform to fill, Ke= 0.700 Inlet / Outlet Invert= 994.57' / 989.52' S= 0.0884 '/' Cc= 0.900 n= 0.025 Corrugated metal, Flow Area= 1.77 sf
#2	Secondary	998.59'	**20.0' long x 16.0' breadth Existing Berm** Head (feet) 0.20 0.40 0.60 0.80 1.00 1.20 1.40 1.60 Coef. (English) 2.68 2.70 2.70 2.64 2.63 2.64 2.64 2.63

Primary OutFlow Max=9.97 cfs @ 12.20 hrs HW=997.08' TW=974.38' (Dynamic Tailwater)
↑—**1=CMP_Round 18"** (Inlet Controls 9.97 cfs @ 5.64 fps)

Secondary OutFlow Max=0.00 cfs @ 0.00 hrs HW=995.00' TW=974.10' (Dynamic Tailwater)
↑—**2=Existing Berm** (Controls 0.00 cfs)

Pond 2P: West Ditch



Summary for Pond 10P: West Exisitng Wetland

Inflow Area = 18.789 ac, 18.40% Impervious, Inflow Depth = 2.56" for 10-Year event
Inflow = 13.92 cfs @ 12.17 hrs, Volume= 4.013 af
Outflow = 3.58 cfs @ 12.66 hrs, Volume= 4.013 af, Atten= 74%, Lag= 29.6 min
Primary = 3.58 cfs @ 12.66 hrs, Volume= 4.013 af
Routed to Link 7L : TOTAL

Routing by Dyn-Stor-Ind method, Time Span= 0.00-600.00 hrs, dt= 0.01 hrs
Starting Elev= 974.10' Surf.Area= 54,326 sf Storage= 5,411 cf
Peak Elev= 974.48' @ 12.66 hrs Surf.Area= 55,964 sf Storage= 26,250 cf (20,839 cf above start)

Plug-Flow detention time= 270.2 min calculated for 3.889 af (97% of inflow)
Center-of-Mass det. time= 143.4 min (1,519.5 - 1,376.1)

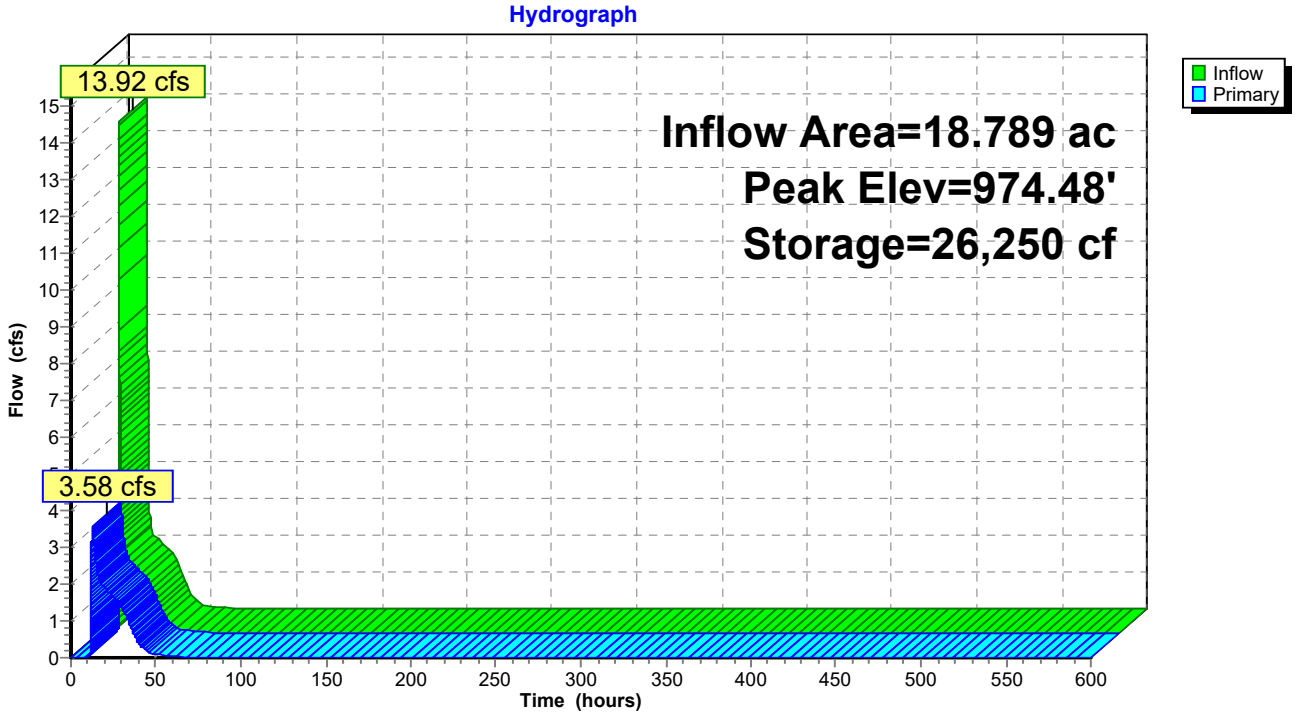
Volume	Invert	Avail.Storage	Storage Description
#1	974.00'	487,616 cf	**Custom Stage Data (Prismatic)** Listed below (Recalc)

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
974.00	53,893	0	0
975.00	58,226	56,060	56,060
976.00	62,886	60,556	116,616
977.00	67,093	64,990	181,605
978.00	71,582	69,338	250,943
979.00	76,083	73,833	324,775
980.00	81,311	78,697	403,472
981.00	86,977	84,144	487,616

Device	Routing	Invert	Outlet Devices
#1	Primary	974.10'	**18.0" Horiz. Orifice/Grate** C= 0.600 Limited to weir flow at low heads

Primary OutFlow Max=3.58 cfs @ 12.66 hrs HW=974.48' TW=0.00' (Dynamic Tailwater)
↑—**1=Orifice/Grate** (Weir Controls 3.58 cfs @ 2.01 fps)

Pond 10P: West Exisitng Wetland

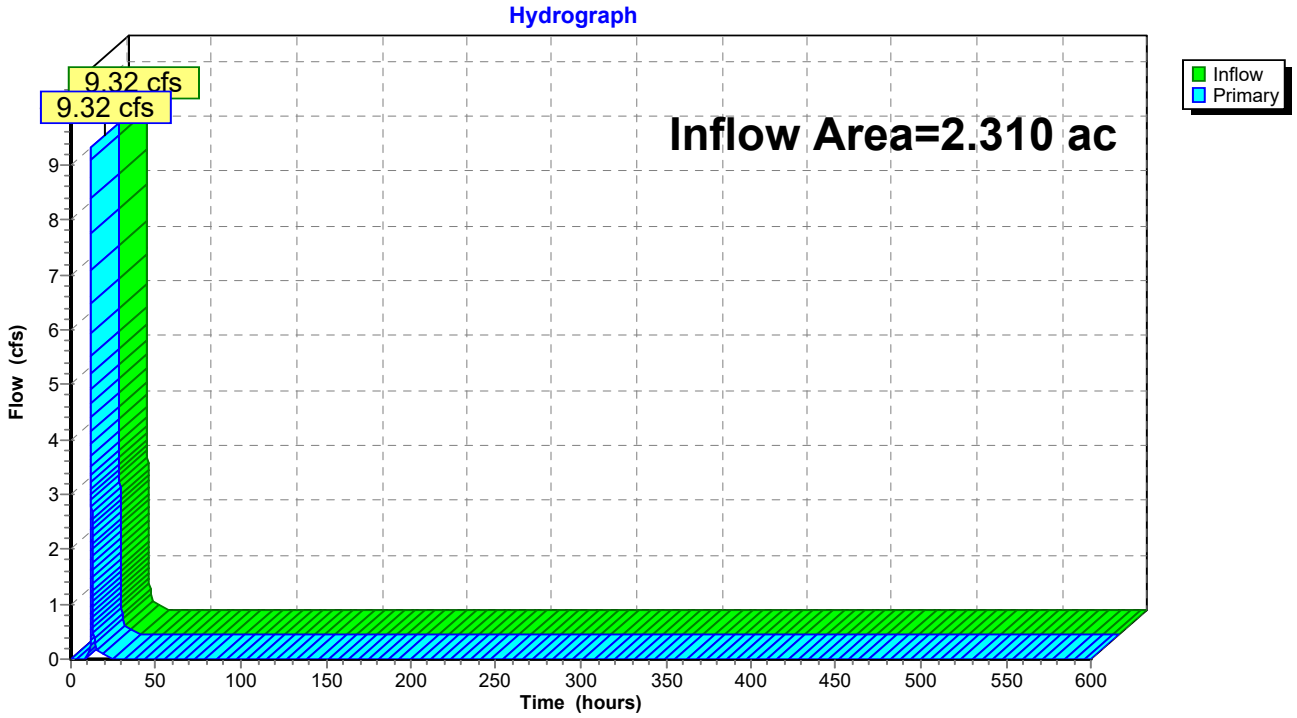


Summary for Link 3L: SOUTH

Inflow Area = 2.310 ac, 1.72% Impervious, Inflow Depth = 2.29" for 10-Year event
Inflow = 9.32 cfs @ 12.13 hrs, Volume= 0.440 af
Primary = 9.32 cfs @ 12.13 hrs, Volume= 0.440 af, Atten= 0%, Lag= 0.0 min
Routed to Link 7L : TOTAL

Primary outflow = Inflow, Time Span= 0.00-600.00 hrs, dt= 0.01 hrs

Link 3L: SOUTH

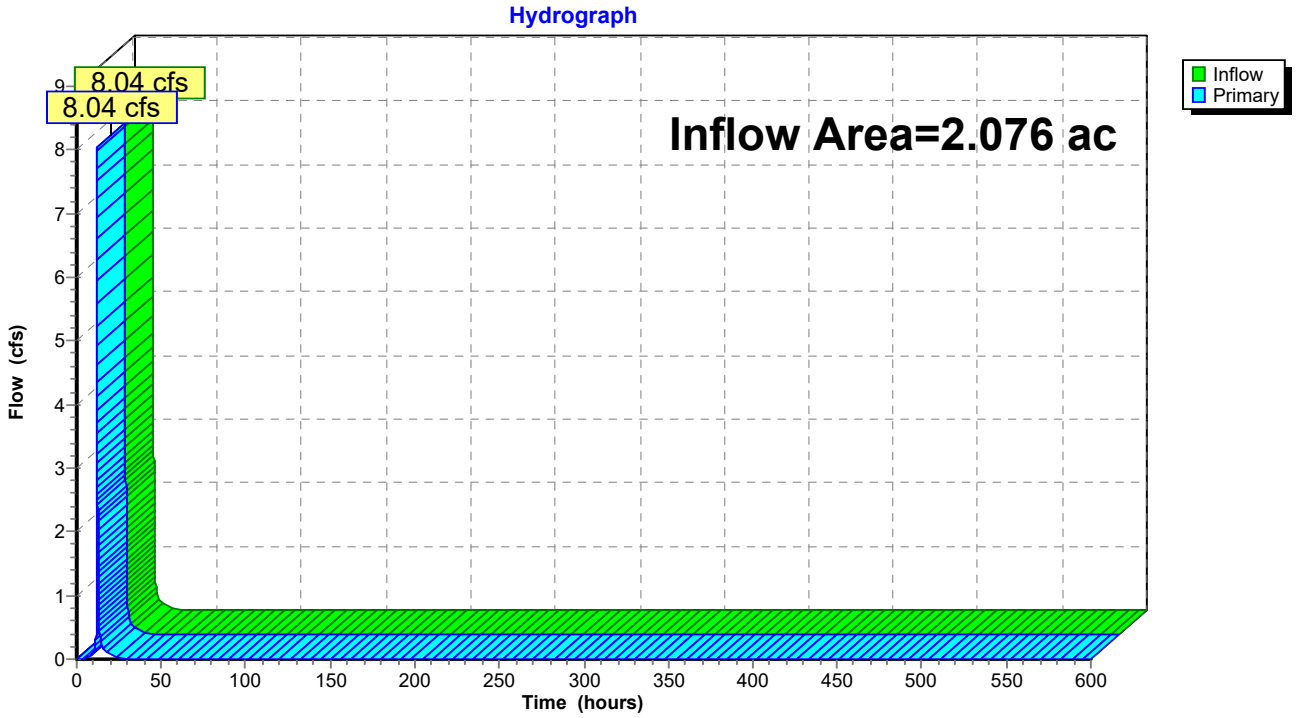


Summary for Link 5L: NORTHEAST

Inflow Area = 2.076 ac, 24.16% Impervious, Inflow Depth = 2.67" for 10-Year event
Inflow = 8.04 cfs @ 12.15 hrs, Volume= 0.461 af
Primary = 8.04 cfs @ 12.15 hrs, Volume= 0.461 af, Atten= 0%, Lag= 0.0 min
Routed to Link 7L : TOTAL

Primary outflow = Inflow, Time Span= 0.00-600.00 hrs, dt= 0.01 hrs

Link 5L: NORTHEAST

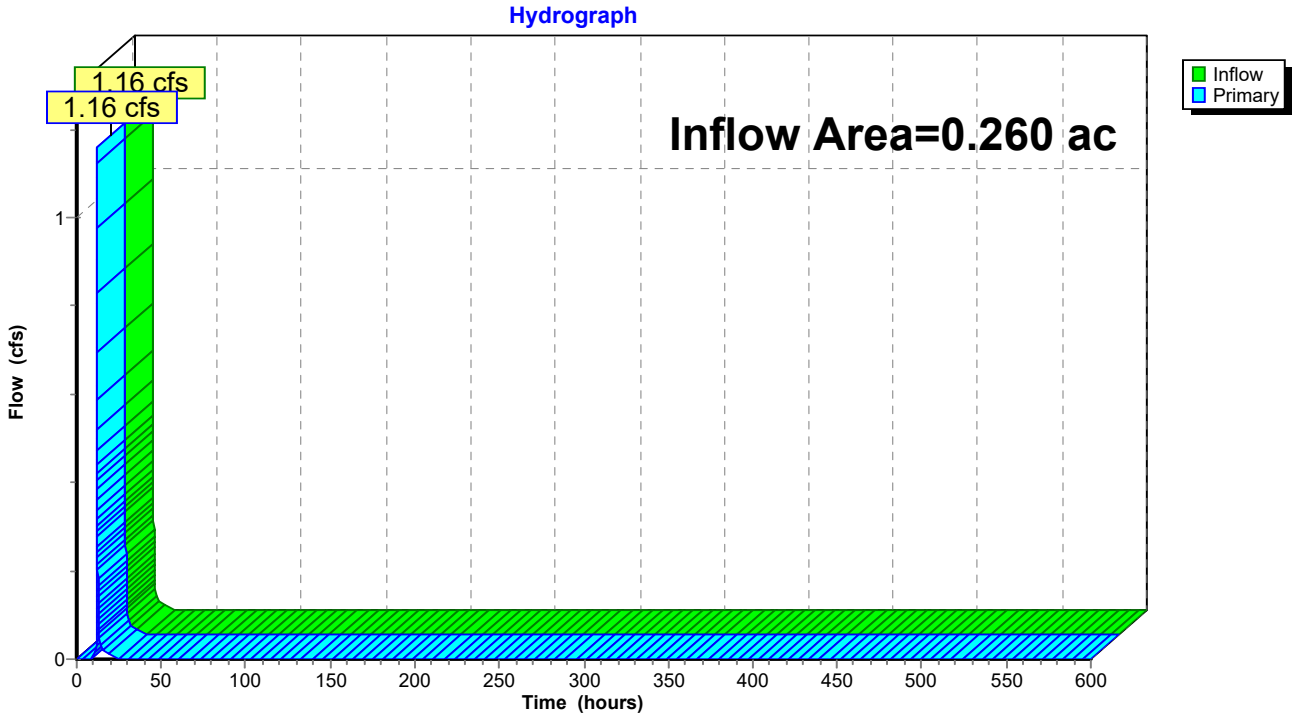


Summary for Link 6L: EAST

Inflow Area = 0.260 ac, 0.00% Impervious, Inflow Depth = 2.18" for 10-Year event
Inflow = 1.16 cfs @ 12.11 hrs, Volume= 0.047 af
Primary = 1.16 cfs @ 12.11 hrs, Volume= 0.047 af, Atten= 0%, Lag= 0.0 min
Routed to Link 7L : TOTAL

Primary outflow = Inflow, Time Span= 0.00-600.00 hrs, dt= 0.01 hrs

Link 6L: EAST

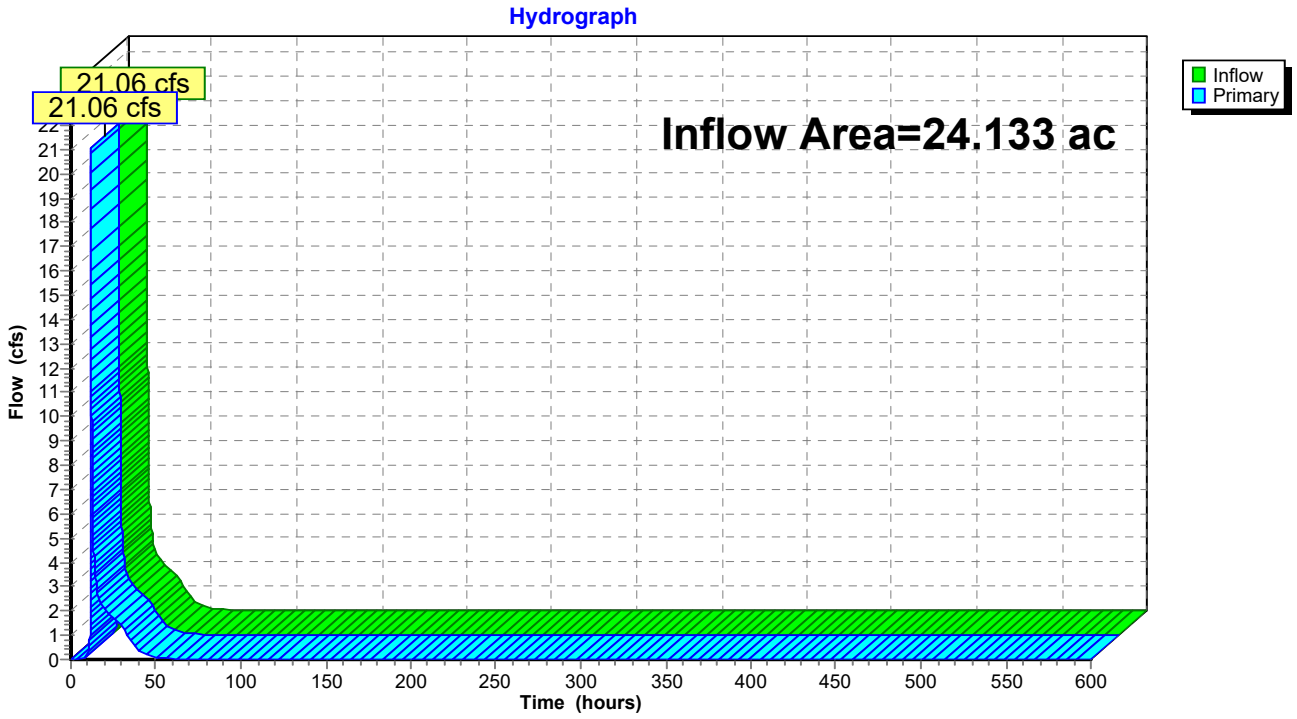


Summary for Link 7L: TOTAL

Inflow Area = 24.133 ac, 17.42% Impervious, Inflow Depth = 2.55" for 10-Year event
Inflow = 21.06 cfs @ 12.14 hrs, Volume= 5.124 af
Primary = 21.06 cfs @ 12.14 hrs, Volume= 5.124 af, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 0.00-600.00 hrs, dt= 0.01 hrs

Link 7L: TOTAL

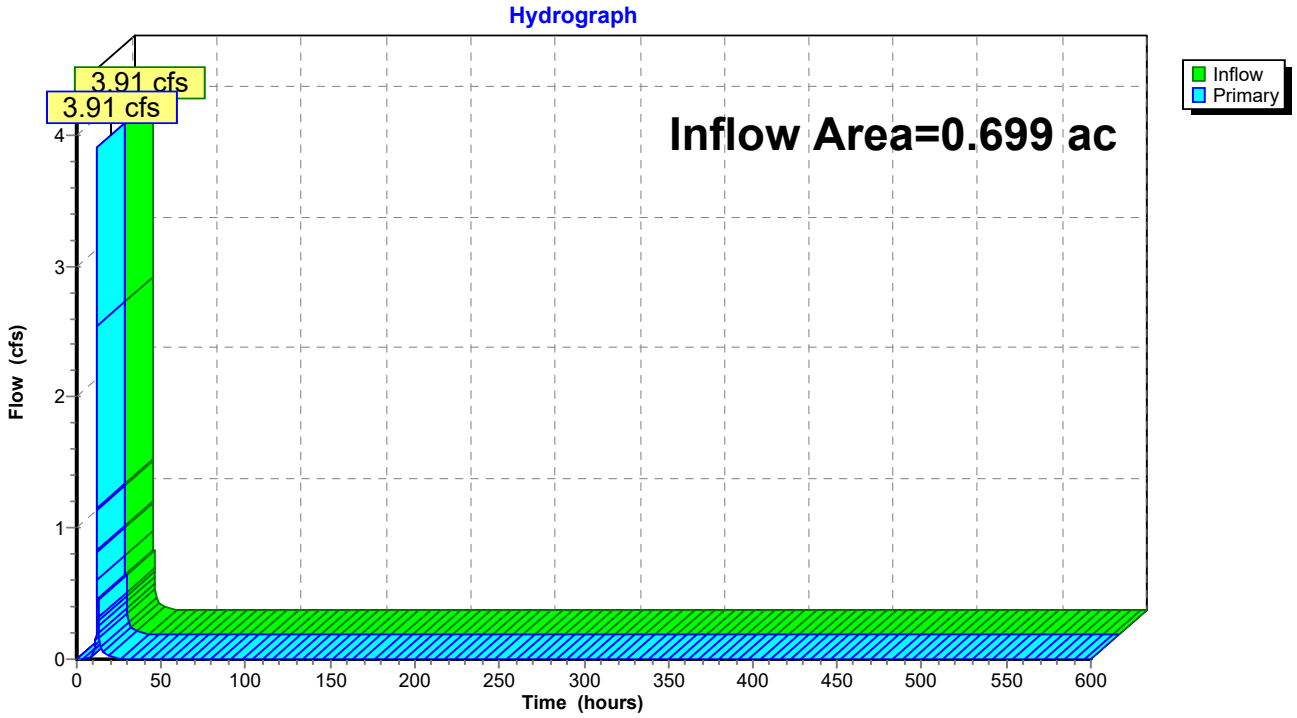


Summary for Link 8L: Existing to NORTHWEST

Inflow Area = 0.699 ac, 29.47% Impervious, Inflow Depth = 2.78" for 10-Year event
Inflow = 3.91 cfs @ 12.09 hrs, Volume= 0.162 af
Primary = 3.91 cfs @ 12.09 hrs, Volume= 0.162 af, Atten= 0%, Lag= 0.0 min
Routed to Link 7L : TOTAL

Primary outflow = Inflow, Time Span= 0.00-600.00 hrs, dt= 0.01 hrs

Link 8L: Existing to NORTHWEST



Time span=0.00-600.00 hrs, dt=0.01 hrs, 60001 points
Runoff by SCS TR-20 method, UH=SCS, Weighted-Q
Reach routing by Dyn-Stor-Ind method - Pond routing by Dyn-Stor-Ind method

SubcatchmentE1: E1 Runoff Area=274,415 sf 9.50% Impervious Runoff Depth=5.25"
Flow Length=498' Slope=0.0723 '/' Tc=6.3 min CN=WQ Runoff=57.64 cfs 2.754 af

SubcatchmentE2: E2 Runoff Area=2.401 ac 4.33% Impervious Runoff Depth=5.14"
Flow Length=680' Slope=0.0323 '/' Tc=13.6 min UI Adjusted CN=WQ Runoff=16.32 cfs 1.028 af

SubcatchmentE3: E3 Runoff Area=1.887 ac 0.00% Impervious Runoff Depth=5.05"
Flow Length=327' Slope=0.0550 '/' Tc=5.5 min CN=80 Runoff=17.55 cfs 0.794 af

SubcatchmentE4: E4 Runoff Area=122,681 sf 9.85% Impervious Runoff Depth=5.15"
Flow Length=550' Tc=9.4 min UI Adjusted CN=WQ Runoff=22.28 cfs 1.209 af

SubcatchmentE5: E5 Runoff Area=0.458 ac 0.00% Impervious Runoff Depth=4.93"
Flow Length=198' Slope=0.0404 '/' Tc=4.5 min CN=79 Runoff=4.35 cfs 0.188 af

SubcatchmentE6: E6 Runoff Area=0.260 ac 0.00% Impervious Runoff Depth=4.93"
Flow Length=136' Slope=0.0330 '/' Tc=3.7 min CN=79 Runoff=2.53 cfs 0.107 af

SubcatchmentE7: E7 Runoff Area=0.183 ac 10.38% Impervious Runoff Depth=5.26"
Flow Length=155' Slope=0.0160 '/' Tc=6.3 min CN=WQ Runoff=1.68 cfs 0.080 af

SubcatchmentE8: E8 Runoff Area=11,092 sf 0.00% Impervious Runoff Depth=5.73"
Tc=1.0 min CN=86 Runoff=2.86 cfs 0.122 af

SubcatchmentOFF-1: OFF-1 Runoff Area=3.643 ac 43.65% Impervious Runoff Depth=5.90"
Flow Length=564' Slope=0.0323 '/' Tc=9.8 min CN=WQ Runoff=30.69 cfs 1.790 af

SubcatchmentOFF-2: OFF-2 Runoff Area=0.406 ac 22.66% Impervious Runoff Depth=5.43"
Flow Length=270' Slope=0.0741 '/' Tc=3.7 min UI Adjusted CN=WQ Runoff=4.15 cfs 0.184 af

SubcatchmentOFF-3: OFF-3 Runoff Area=86,082 sf 27.02% Impervious Runoff Depth=5.53"
Flow Length=489' Slope=0.0613 '/' Tc=6.4 min CN=WQ Runoff=18.44 cfs 0.911 af

SubcatchmentOFF-4: OFF-4 Runoff Area=23,335 sf 43.88% Impervious Runoff Depth=5.97"
Flow Length=337' Slope=0.0297 '/' Tc=5.9 min CN=WQ Runoff=5.35 cfs 0.266 af

SubcatchmentOFF-5: OFF-5 Runoff Area=8,976 sf 0.00% Impervious Runoff Depth=5.27"
Flow Length=349' Tc=5.2 min CN=82 Runoff=2.00 cfs 0.091 af

SubcatchmentOFF-6: OFF-6 Runoff Area=18,405 sf 9.38% Impervious Runoff Depth=5.24"
Flow Length=564' Slope=0.0323 '/' Tc=11.5 min CN=WQ Runoff=3.12 cfs 0.185 af

SubcatchmentOFF-7: OFF-7 Runoff Area=2,943 sf 9.17% Impervious Runoff Depth=5.24"
Flow Length=429' Tc=7.1 min UI Adjusted CN=WQ Runoff=0.60 cfs 0.029 af

SubcatchmentOFF-8: OFF-8 Runoff Area=70,469 sf 31.01% Impervious Runoff Depth=5.70"
Tc=10.0 min CN=WQ Runoff=13.30 cfs 0.768 af

Subcatchment OFF-9: OFF-9 Runoff Area=30,431 sf 29.47% Impervious Runoff Depth=5.66"
Tc=0.0 min CN=WQ Runoff=7.66 cfs 0.330 af

Pond 1P: EXISTING POND Peak Elev=997.39' Storage=226,085 cf Inflow=123.52 cfs 6.776 af
8.0" Round Culvert n=0.010 L=324.0' S=0.0080 '/' Outflow=2.07 cfs 6.773 af

Pond 2P: West Ditch Peak Elev=998.80' Storage=4,751 cf Inflow=23.82 cfs 1.299 af
Primary=14.00 cfs 1.265 af Secondary=4.98 cfs 0.035 af Outflow=18.98 cfs 1.299 af

Pond 10P: West Exisitng Wetland Peak Elev=974.85' Storage=47,132 cf Inflow=24.07 cfs 8.461 af
Outflow=7.35 cfs 8.460 af

Link 3L: SOUTH Inflow=20.13 cfs 0.978 af
Primary=20.13 cfs 0.978 af

Link 5L: NORTHEAST Inflow=16.45 cfs 0.956 af
Primary=16.45 cfs 0.956 af

Link 6L: EAST Inflow=2.53 cfs 0.107 af
Primary=2.53 cfs 0.107 af

Link 7L: TOTAL Inflow=45.65 cfs 10.831 af
Primary=45.65 cfs 10.831 af

Link 8L: Existing to NORTHWEST Inflow=7.66 cfs 0.330 af
Primary=7.66 cfs 0.330 af

Summary for Subcatchment E1: E1

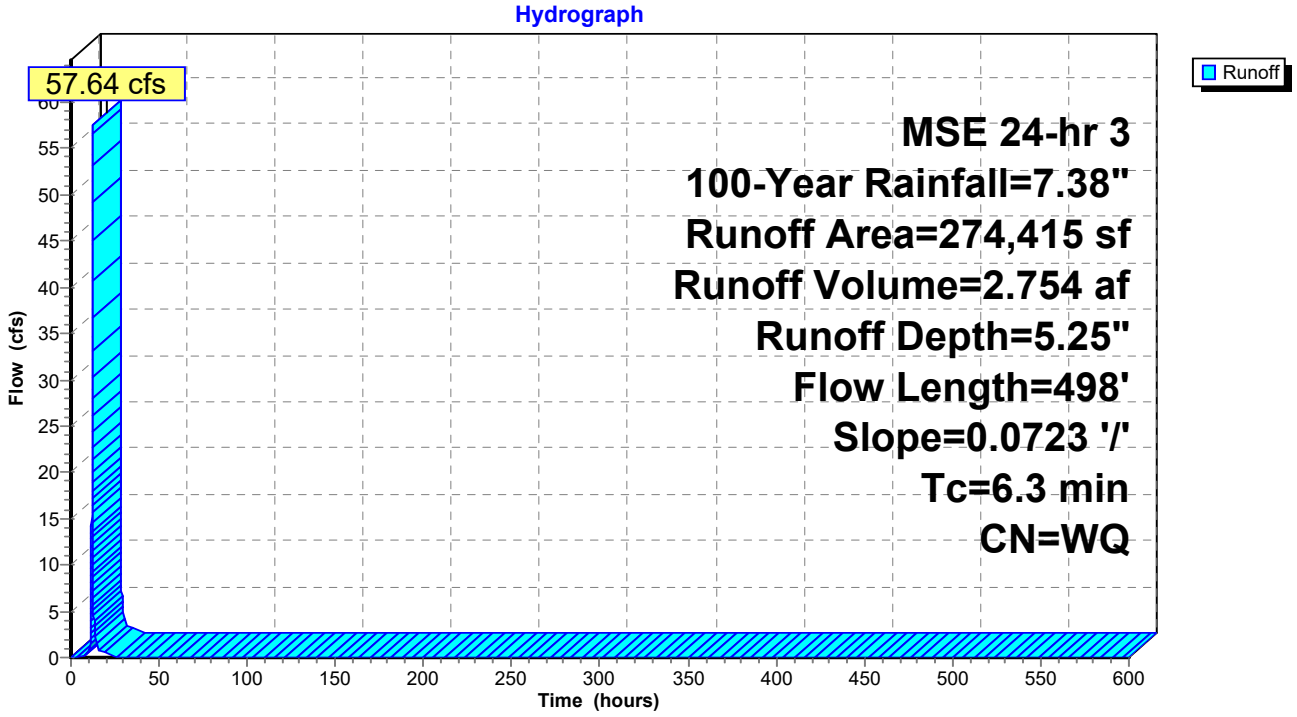
Runoff = 57.64 cfs @ 12.13 hrs, Volume= 2.754 af, Depth= 5.25"
Routed to Pond 1P : EXISTING POND

Runoff by SCS TR-20 method, UH=SCS, Weighted-Q, Time Span= 0.00-600.00 hrs, dt= 0.01 hrs
MSE 24-hr 3 100-Year Rainfall=7.38"

Area (sf)	CN	Description
1,904	98	Unconnected roofs, HSG D
24,173	98	Water Surface, HSG D
248,338	80	>75% Grass cover, Good, HSG D
274,415		Weighted Average
248,338		90.50% Pervious Area
26,077		9.50% Impervious Area
1,904		7.30% Unconnected

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
6.3	498	0.0723	1.31		**Lag/CN Method,**

Subcatchment E1: E1



Summary for Subcatchment E2: E2

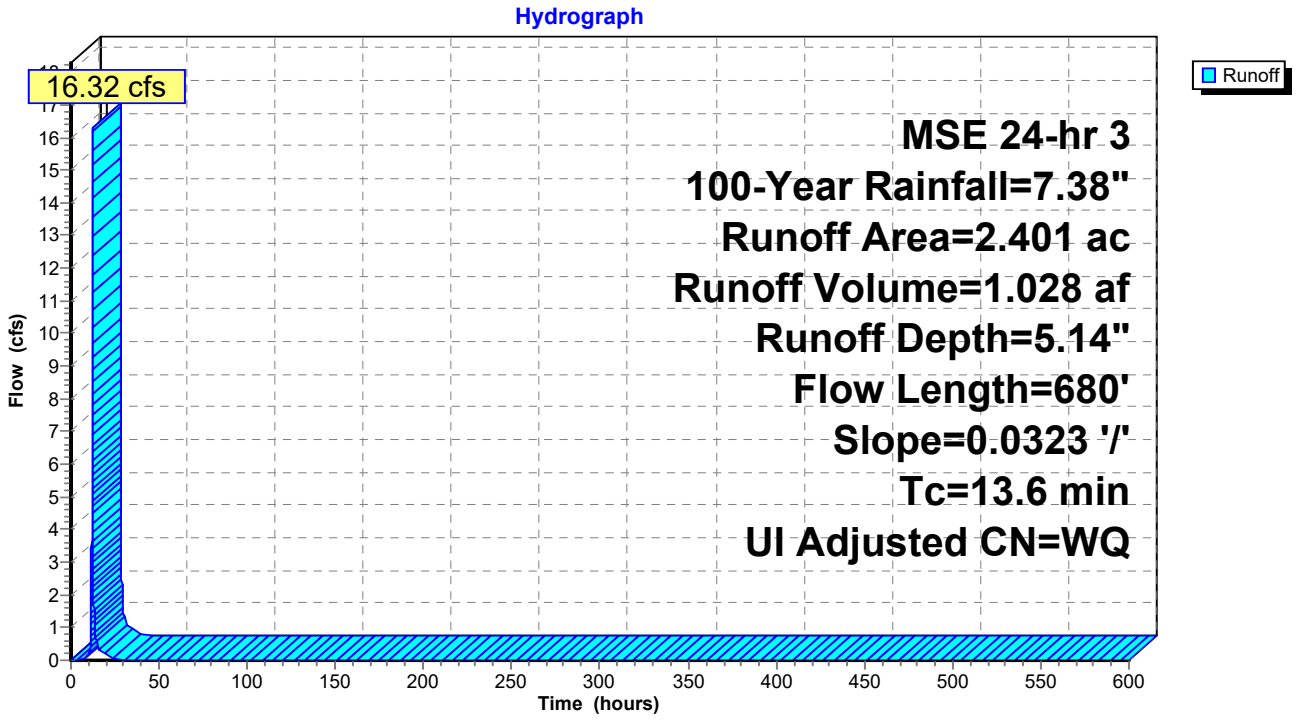
Runoff = 16.32 cfs @ 12.22 hrs, Volume= 1.028 af, Depth= 5.14"
Routed to Pond 1P : EXISTING POND

Runoff by SCS TR-20 method, UH=SCS, Weighted-Q, Time Span= 0.00-600.00 hrs, dt= 0.01 hrs
MSE 24-hr 3 100-Year Rainfall=7.38"

Area (ac)	CN	Adj	Description
0.104	98	98	Unconnected roofs, HSG D
2.297	80	80	>75% Grass cover, Good, HSG D
2.401			Weighted Average
2.297			95.67% Pervious Area
0.104			4.33% Impervious Area
0.104			100.00% Unconnected

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
12.6	680	0.0323	0.90		**Lag/CN Method, OVERLAND - SWALE**
1.0					**Direct Entry, STORM SEWER**
13.6	680	Total			

Subcatchment E2: E2



Summary for Subcatchment E3: E3

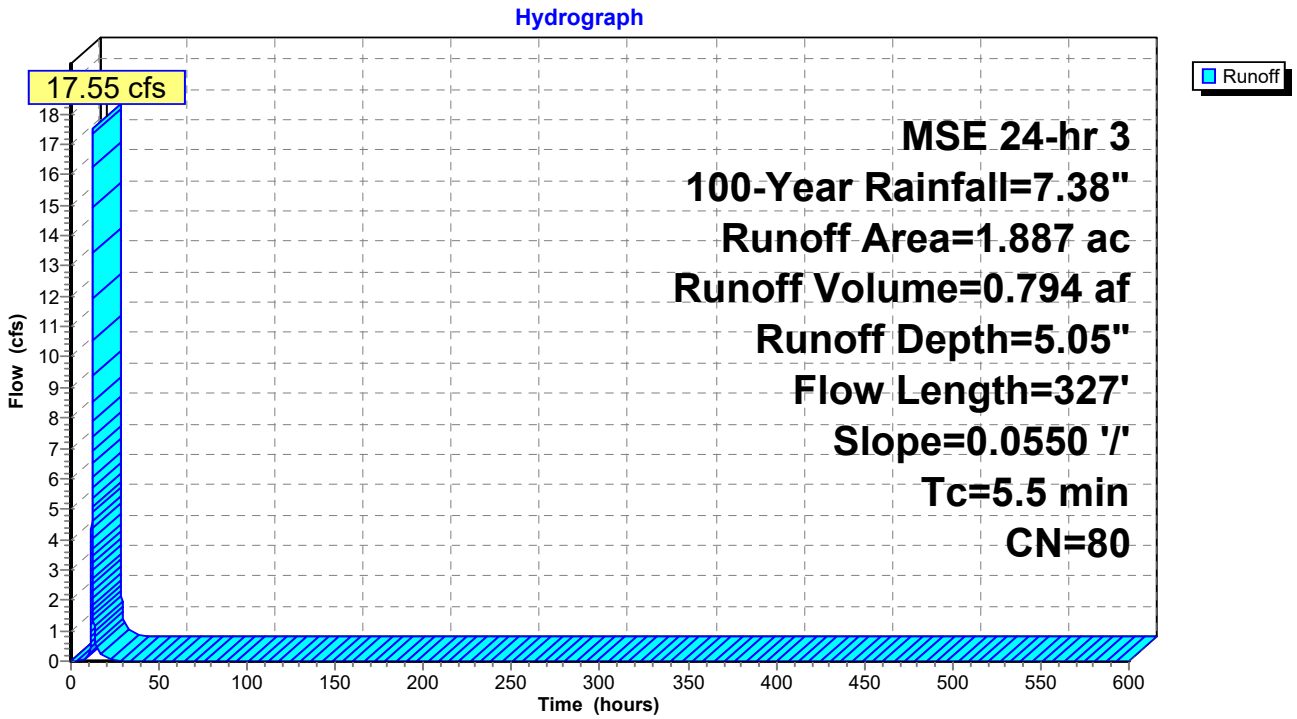
Runoff = 17.55 cfs @ 12.13 hrs, Volume= 0.794 af, Depth= 5.05"
Routed to Link 3L : SOUTH

Runoff by SCS TR-20 method, UH=SCS, Weighted-Q, Time Span= 0.00-600.00 hrs, dt= 0.01 hrs
MSE 24-hr 3 100-Year Rainfall=7.38"

Area (ac)	CN	Description
1.887	80	>75% Grass cover, Good, HSG D
1.887		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
5.5	327	0.0550	0.98		**Lag/CN Method, OVERLAND**

Subcatchment E3: E3



Summary for Subcatchment E4: E4

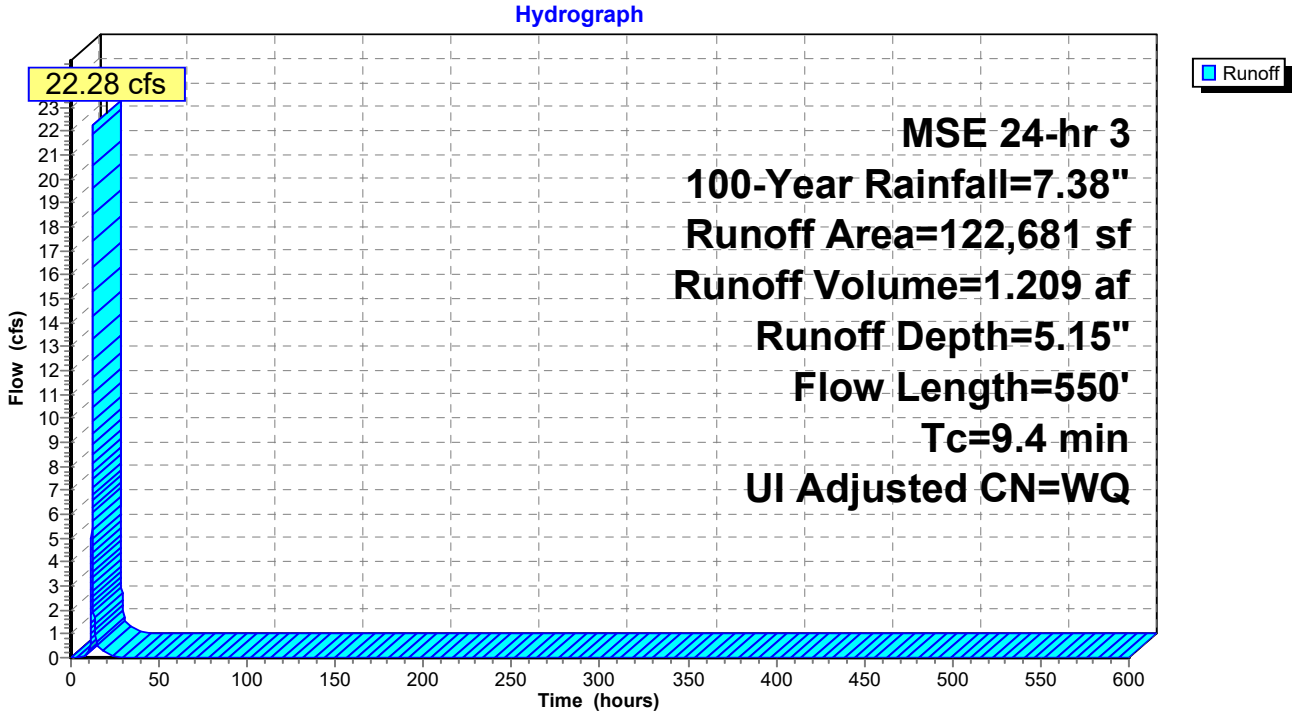
Runoff = 22.28 cfs @ 12.17 hrs, Volume= 1.209 af, Depth= 5.15"
Routed to Pond 2P : West Ditch

Runoff by SCS TR-20 method, UH=SCS, Weighted-Q, Time Span= 0.00-600.00 hrs, dt= 0.01 hrs
MSE 24-hr 3 100-Year Rainfall=7.38"

Area (sf)	CN	Adj	Description
12,084	98	98	Unconnected roofs, HSG D
110,597	79	79	Woods/grass comb., Good, HSG D
122,681			Weighted Average
110,597			90.15% Pervious Area
12,084			9.85% Impervious Area
12,084			100.00% Unconnected

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
5.8	385	0.0620	1.11		**Lag/CN Method, OVERLAND**
1.1	100	0.2000	1.53		**Lag/CN Method,**
2.5	65	0.0198	0.44		**Lag/CN Method,**
9.4	550	Total			

Subcatchment E4: E4



Summary for Subcatchment E5: E5

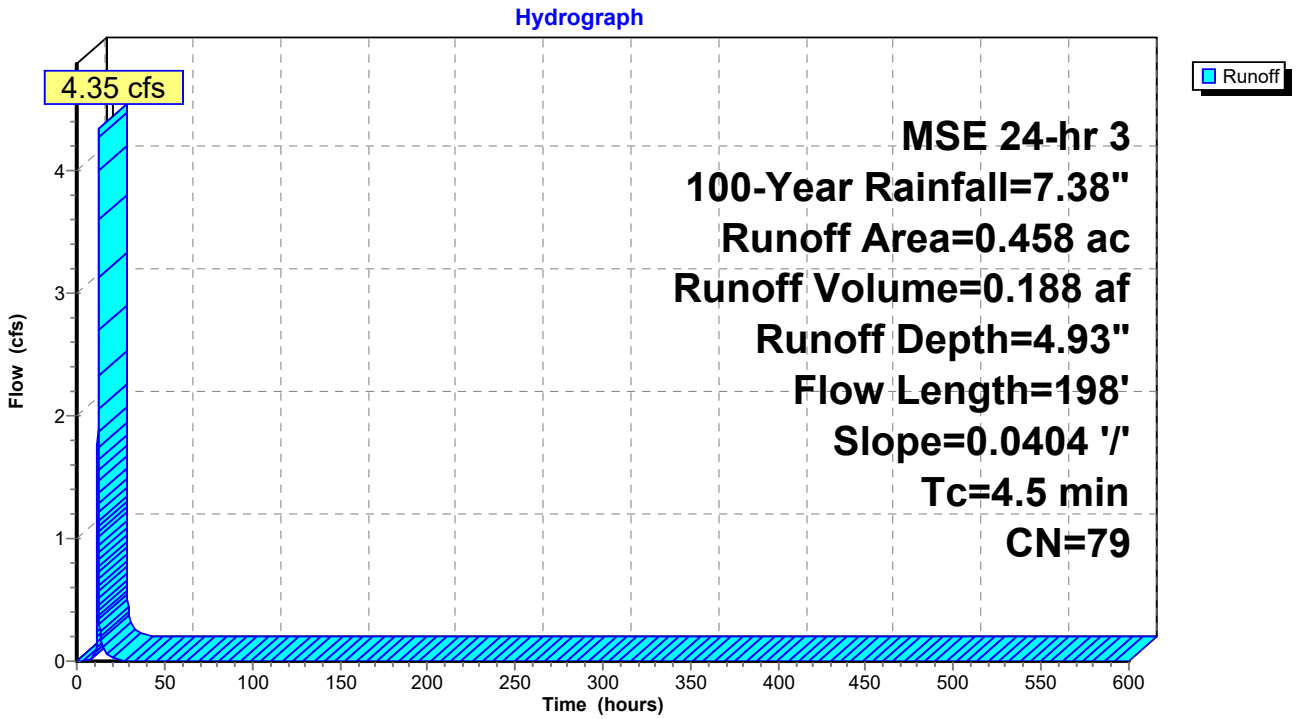
Runoff = 4.35 cfs @ 12.12 hrs, Volume= 0.188 af, Depth= 4.93"
Routed to Link 5L : NORTHEAST

Runoff by SCS TR-20 method, UH=SCS, Weighted-Q, Time Span= 0.00-600.00 hrs, dt= 0.01 hrs
MSE 24-hr 3 100-Year Rainfall=7.38"

Area (ac)	CN	Description
0.458	79	Woods/grass comb., Good, HSG D
0.458		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
4.5	198	0.0404	0.74		**Lag/CN Method, OVERLAND**

Subcatchment E5: E5



Summary for Subcatchment E6: E6

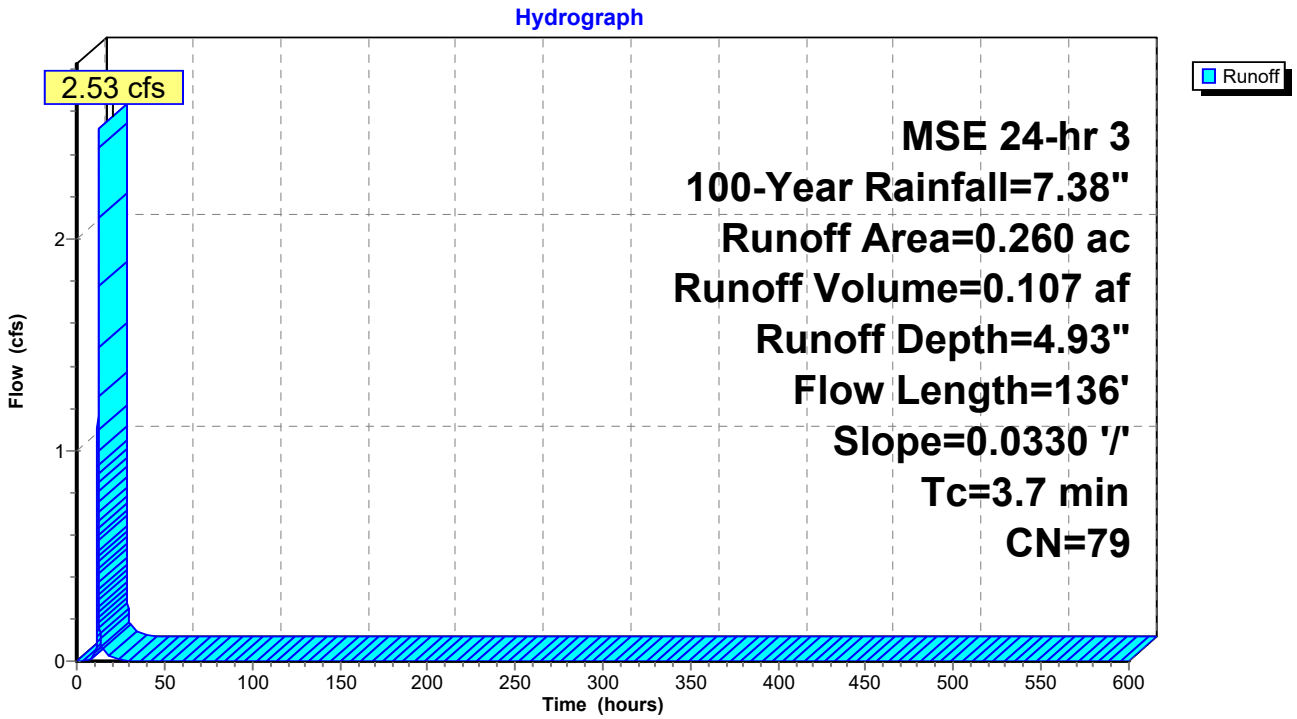
Runoff = 2.53 cfs @ 12.11 hrs, Volume= 0.107 af, Depth= 4.93"
Routed to Link 6L : EAST

Runoff by SCS TR-20 method, UH=SCS, Weighted-Q, Time Span= 0.00-600.00 hrs, dt= 0.01 hrs
MSE 24-hr 3 100-Year Rainfall=7.38"

Area (ac)	CN	Description
0.260	79	Woods/grass comb., Good, HSG D
0.260		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
3.7	136	0.0330	0.62		**Lag/CN Method, OVERLAND**

Subcatchment E6: E6



Summary for Subcatchment E7: E7

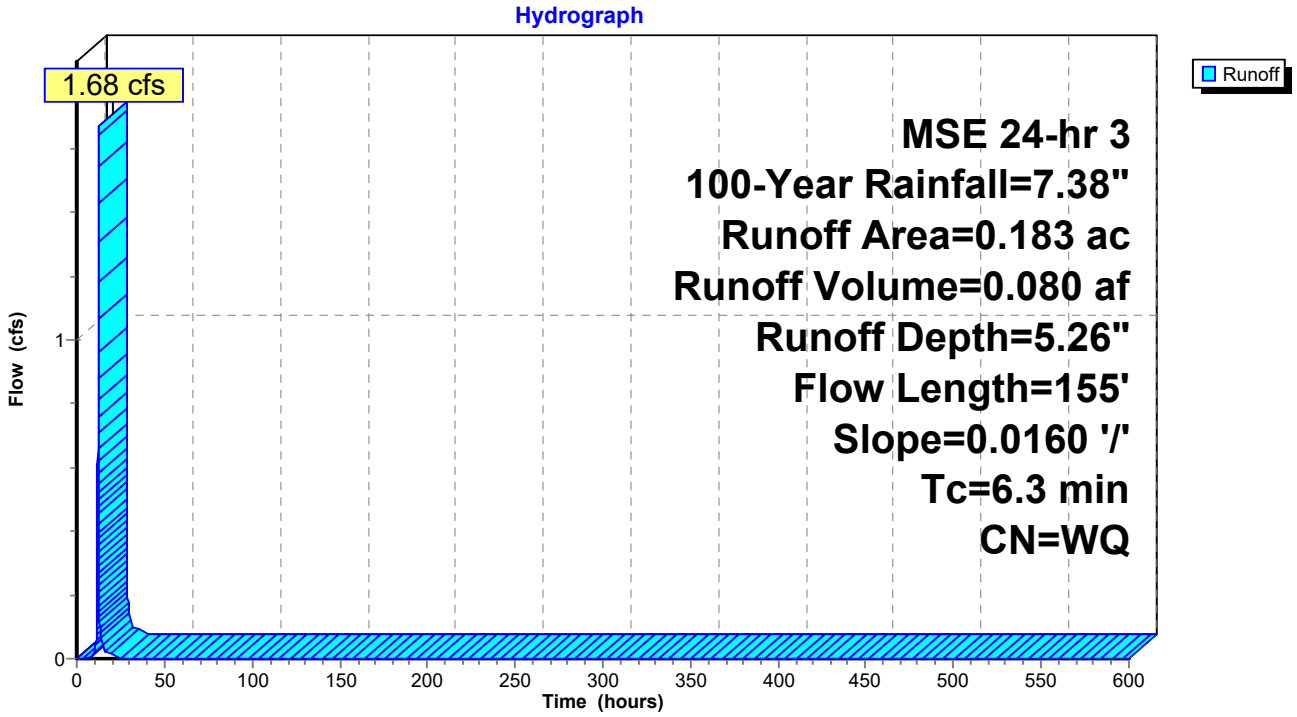
Runoff = 1.68 cfs @ 12.13 hrs, Volume= 0.080 af, Depth= 5.26"
Routed to Pond 1P : EXISTING POND

Runoff by SCS TR-20 method, UH=SCS, Weighted-Q, Time Span= 0.00-600.00 hrs, dt= 0.01 hrs
MSE 24-hr 3 100-Year Rainfall=7.38"

Area (ac)	CN	Description
0.019	98	Paved parking, HSG D
0.164	80	>75% Grass cover, Good, HSG D
0.183		Weighted Average
0.164		89.62% Pervious Area
0.019		10.38% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
5.3	155	0.0160	0.49		**Lag/CN Method, OVERLAND**
1.0					**Direct Entry, STORM SEWER**
6.3	155	Total			

Subcatchment E7: E7



Summary for Subcatchment E8: E8

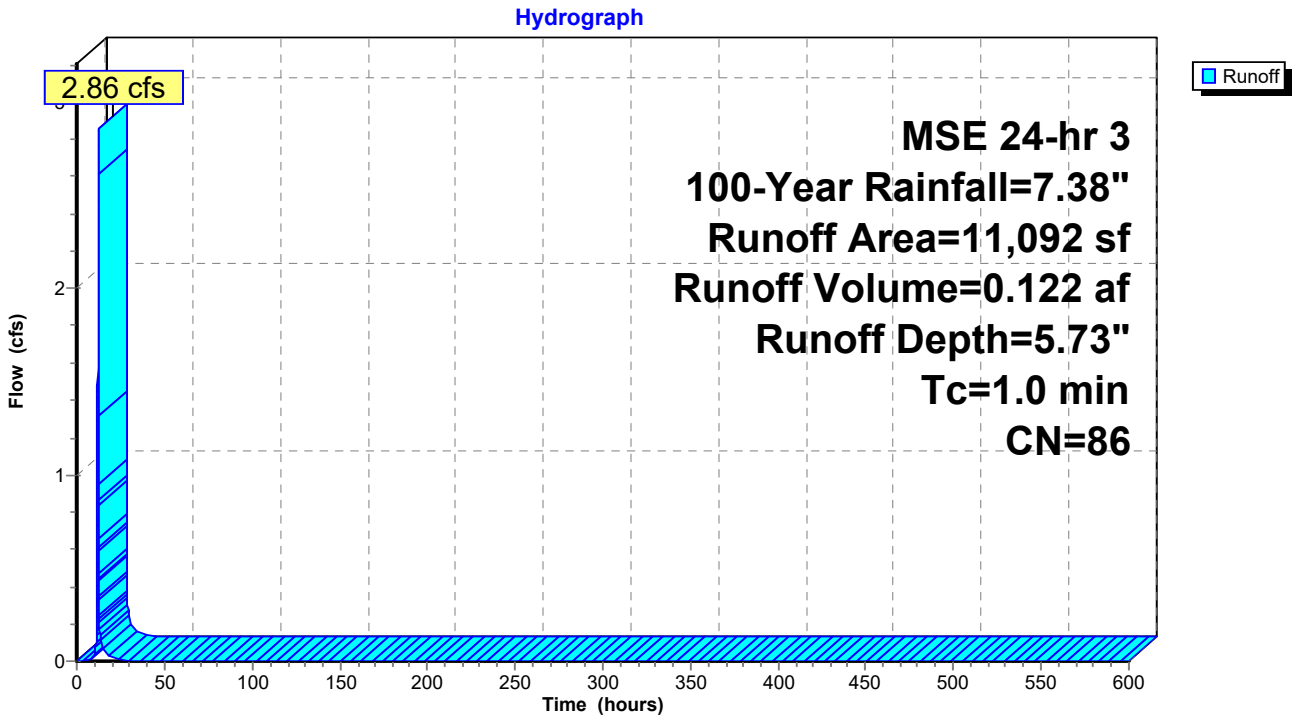
Runoff = 2.86 cfs @ 12.10 hrs, Volume= 0.122 af, Depth= 5.73"
Routed to Pond 10P : West Exisitng Wetland

Runoff by SCS TR-20 method, UH=SCS, Weighted-Q, Time Span= 0.00-600.00 hrs, dt= 0.01 hrs
MSE 24-hr 3 100-Year Rainfall=7.38"

Area (sf)	CN	Description
11,092	86	Woods/grass comb., Poor, HSG D
11,092		100.00% Pervious Area

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

Subcatchment E8: E8



Summary for Subcatchment OFF-1: OFF-1

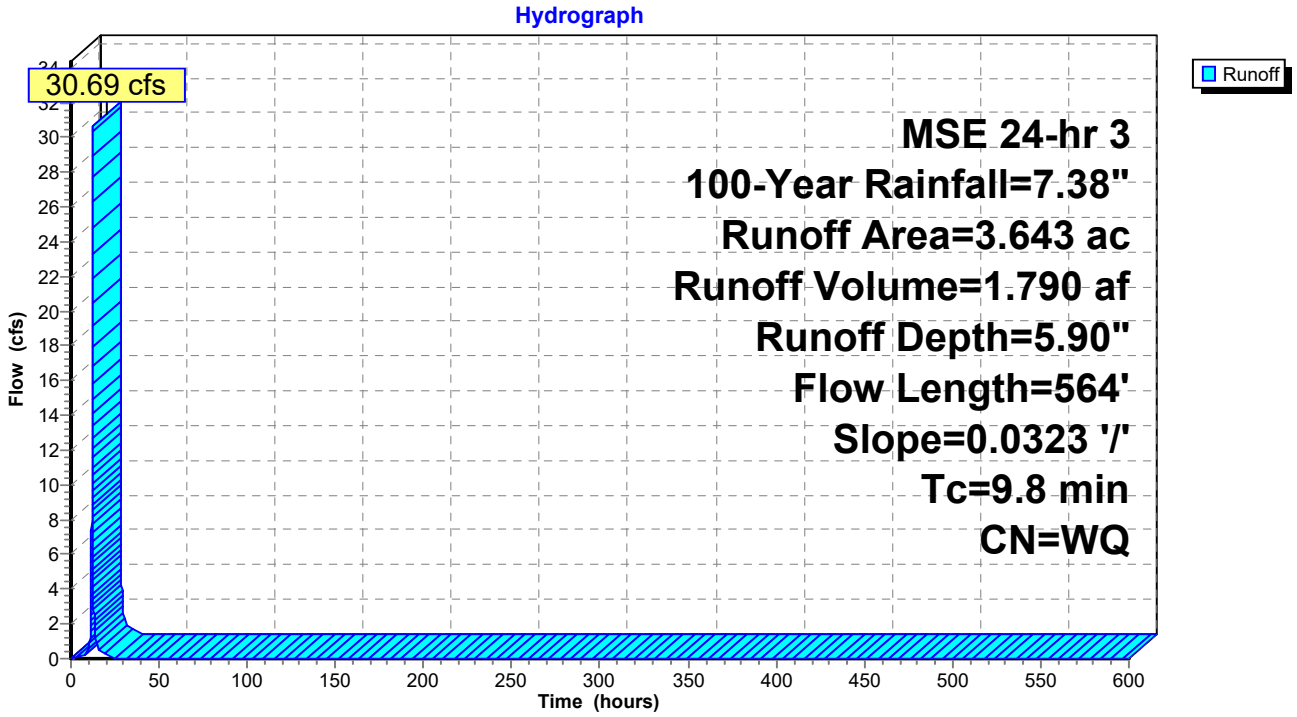
Runoff = 30.69 cfs @ 12.17 hrs, Volume= 1.790 af, Depth= 5.90"
Routed to Pond 1P : EXISTING POND

Runoff by SCS TR-20 method, UH=SCS, Weighted-Q, Time Span= 0.00-600.00 hrs, dt= 0.01 hrs
MSE 24-hr 3 100-Year Rainfall=7.38"

Area (ac)	CN	Description
1.590	98	Paved parking, HSG D
2.053	79	Woods/grass comb., Good, HSG D
3.643		Weighted Average
2.053		56.35% Pervious Area
1.590		43.65% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
8.8	564	0.0323	1.07		**Lag/CN Method, BACK YARD SWALE**
1.0					**Direct Entry, Storm Sewer**
9.8	564	Total			

Subcatchment OFF-1: OFF-1



Summary for Subcatchment OFF-2: OFF-2

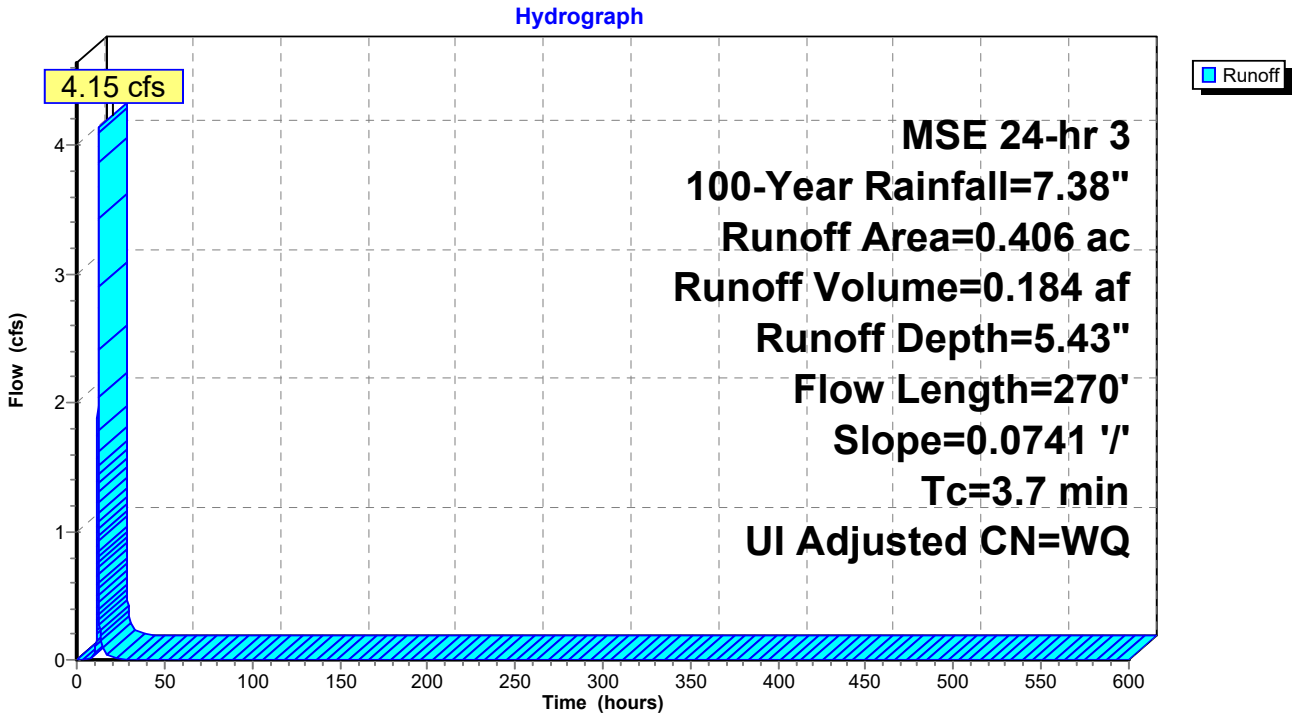
Runoff = 4.15 cfs @ 12.11 hrs, Volume= 0.184 af, Depth= 5.43"
Routed to Pond 1P : EXISTING POND

Runoff by SCS TR-20 method, UH=SCS, Weighted-Q, Time Span= 0.00-600.00 hrs, dt= 0.01 hrs
MSE 24-hr 3 100-Year Rainfall=7.38"

Area (ac)	CN	Adj	Description
0.092	98	98	Unconnected roofs, HSG D
0.314	79	79	Woods/grass comb., Good, HSG D
0.406			Weighted Average
0.314			77.34% Pervious Area
0.092			22.66% Impervious Area
0.092			100.00% Unconnected

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
3.7	270	0.0741	1.21		**Lag/CN Method,**

Subcatchment OFF-2: OFF-2



Summary for Subcatchment OFF-3: OFF-3

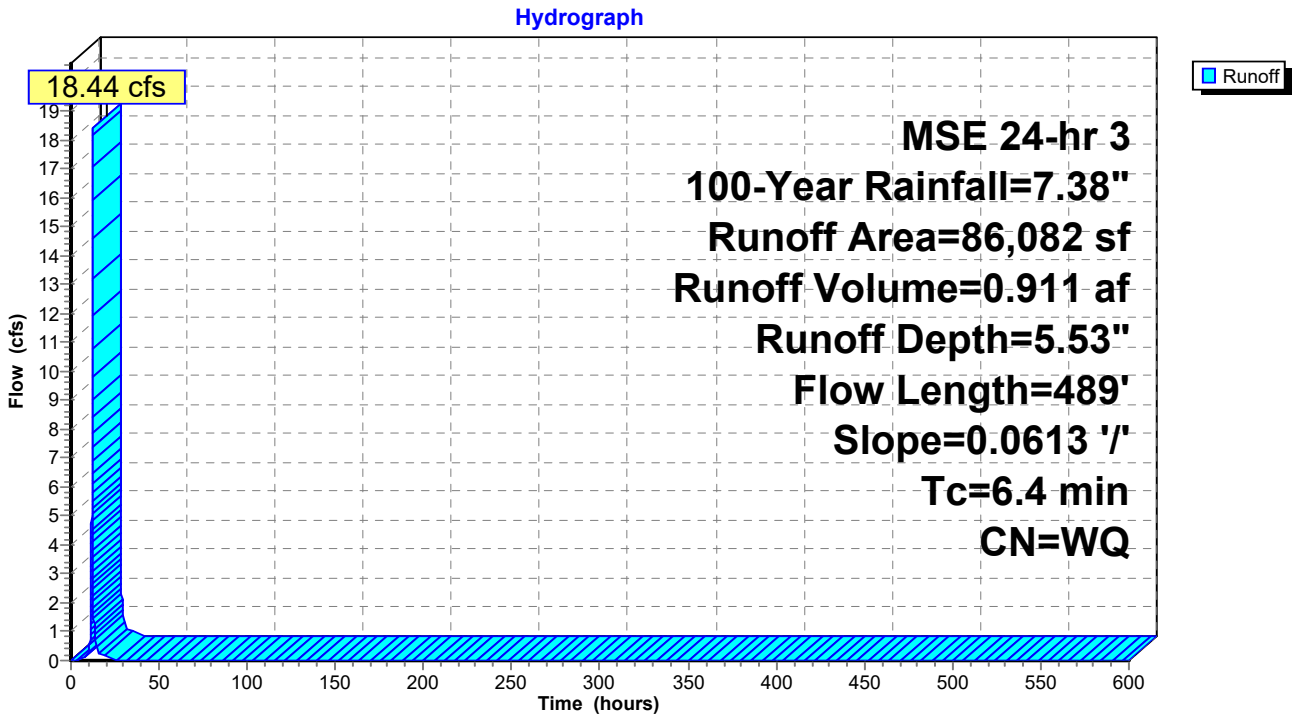
Runoff = 18.44 cfs @ 12.14 hrs, Volume= 0.911 af, Depth= 5.53"
Routed to Pond 1P : EXISTING POND

Runoff by SCS TR-20 method, UH=SCS, Weighted-Q, Time Span= 0.00-600.00 hrs, dt= 0.01 hrs
MSE 24-hr 3 100-Year Rainfall=7.38"

Area (sf)	CN	Description
23,261	98	Paved parking, HSG D
62,821	79	Woods/grass comb., Good, HSG D
86,082		Weighted Average
62,821		72.98% Pervious Area
23,261		27.02% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
6.4	489	0.0613	1.28		**Lag/CN Method,**

Subcatchment OFF-3: OFF-3



Summary for Subcatchment OFF-4: OFF-4

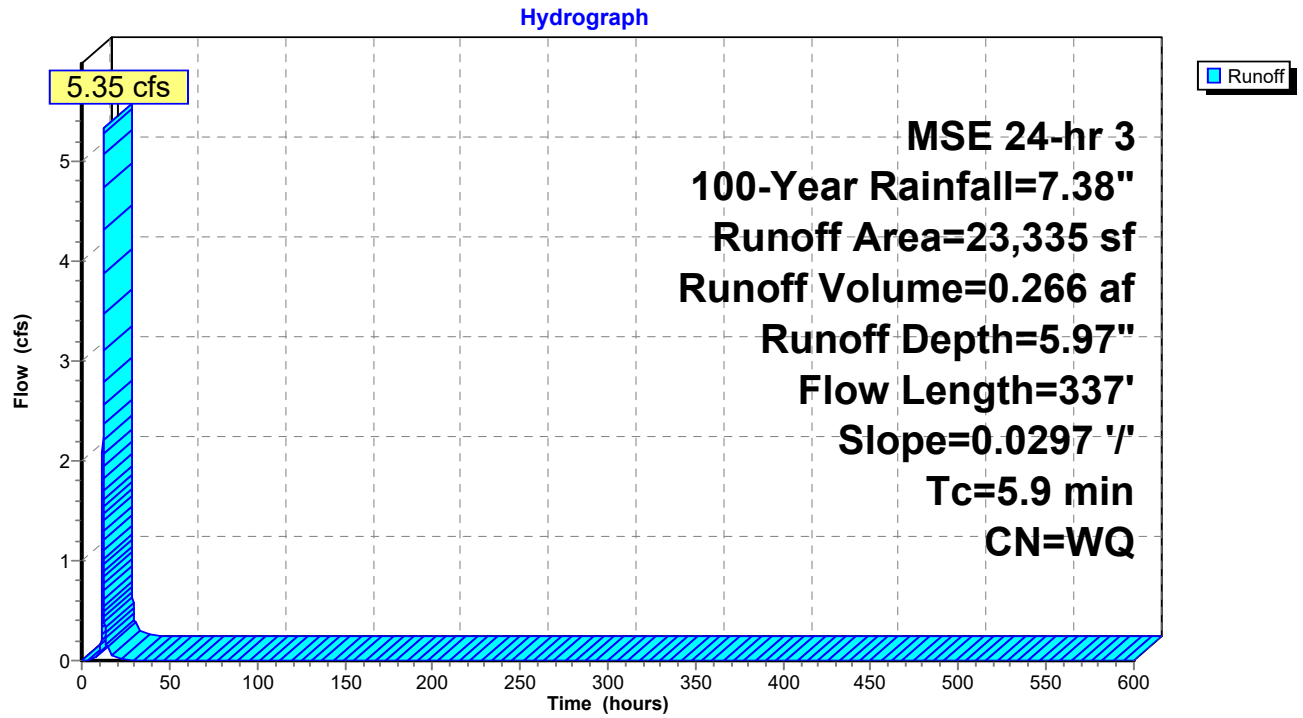
Runoff = 5.35 cfs @ 12.13 hrs, Volume= 0.266 af, Depth= 5.97"
Routed to Pond 10P : West Exisitng Wetland

Runoff by SCS TR-20 method, UH=SCS, Weighted-Q, Time Span= 0.00-600.00 hrs, dt= 0.01 hrs
MSE 24-hr 3 100-Year Rainfall=7.38"

Area (sf)	CN	Description
10,240	98	Paved parking, HSG D
13,095	80	>75% Grass cover, Good, HSG D
23,335		Weighted Average
13,095		56.12% Pervious Area
10,240		43.88% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
5.9	337	0.0297	0.96		**Lag/CN Method,**

Subcatchment OFF-4: OFF-4



Summary for Subcatchment OFF-5: OFF-5

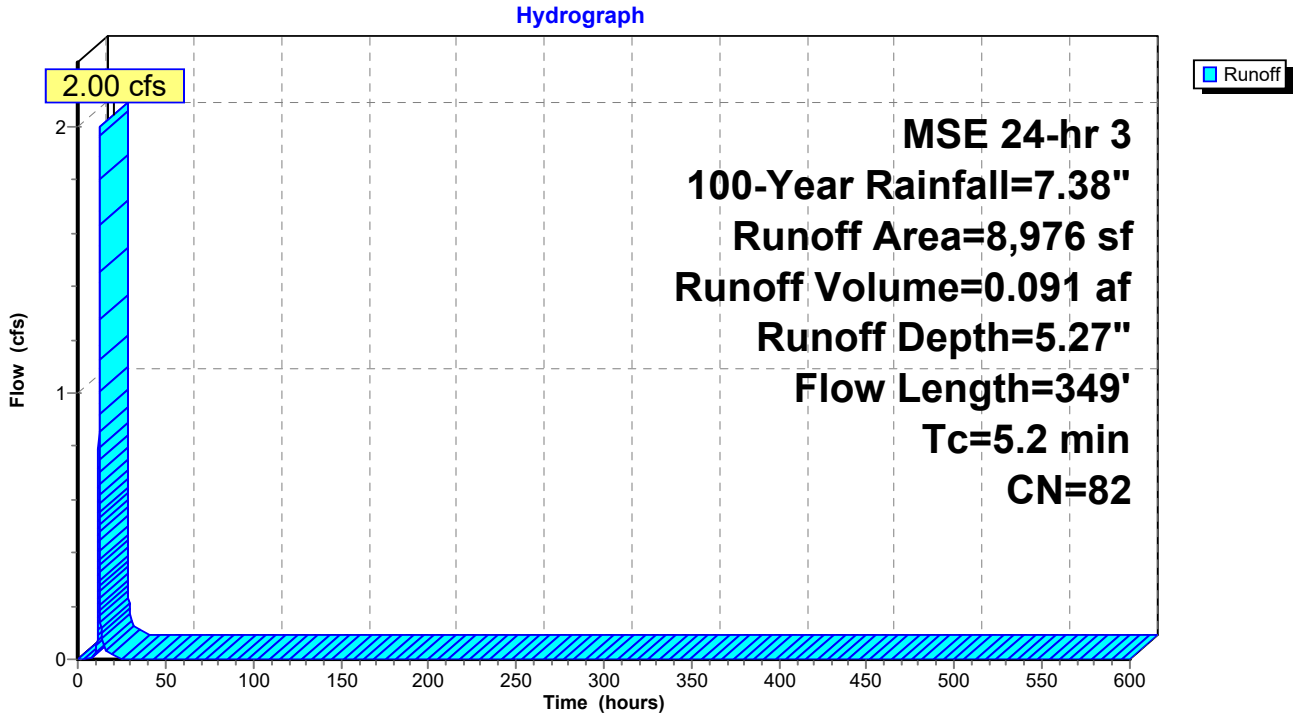
Runoff = 2.00 cfs @ 12.12 hrs, Volume= 0.091 af, Depth= 5.27"
Routed to Pond 2P : West Ditch

Runoff by SCS TR-20 method, UH=SCS, Weighted-Q, Time Span= 0.00-600.00 hrs, dt= 0.01 hrs
MSE 24-hr 3 100-Year Rainfall=7.38"

Area (sf)	CN	Description
8,976	82	Woods/grass comb., Fair, HSG D
8,976		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
1.6	194	0.2474	2.00		**Lag/CN Method,**
3.6	155	0.0354	0.72		**Lag/CN Method,**
5.2	349	Total			

Subcatchment OFF-5: OFF-5



Summary for Subcatchment OFF-6: OFF-6

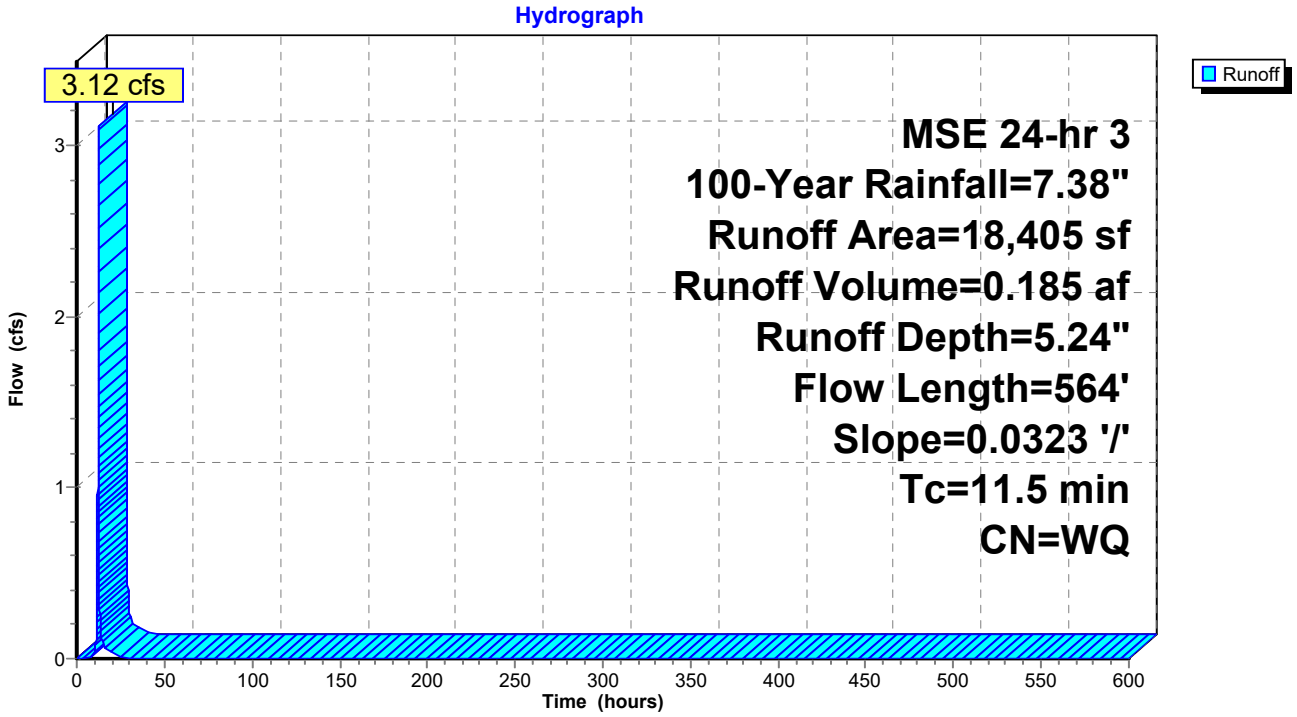
Runoff = 3.12 cfs @ 12.19 hrs, Volume= 0.185 af, Depth= 5.24"
Routed to Link 3L : SOUTH

Runoff by SCS TR-20 method, UH=SCS, Weighted-Q, Time Span= 0.00-600.00 hrs, dt= 0.01 hrs
MSE 24-hr 3 100-Year Rainfall=7.38"

	Area (sf)	CN	Description
*	1,727	98	Impervious, HSG D
	16,678	80	>75% Grass cover, Good, HSG D
	18,405		Weighted Average
	16,678		90.62% Pervious Area
	1,727		9.38% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
10.5	564	0.0323	0.90		**Lag/CN Method, BACK YARD SWALE**
1.0					**Direct Entry, Storm Sewer**
11.5	564	Total			

Subcatchment OFF-6: OFF-6



Summary for Subcatchment OFF-7: OFF-7

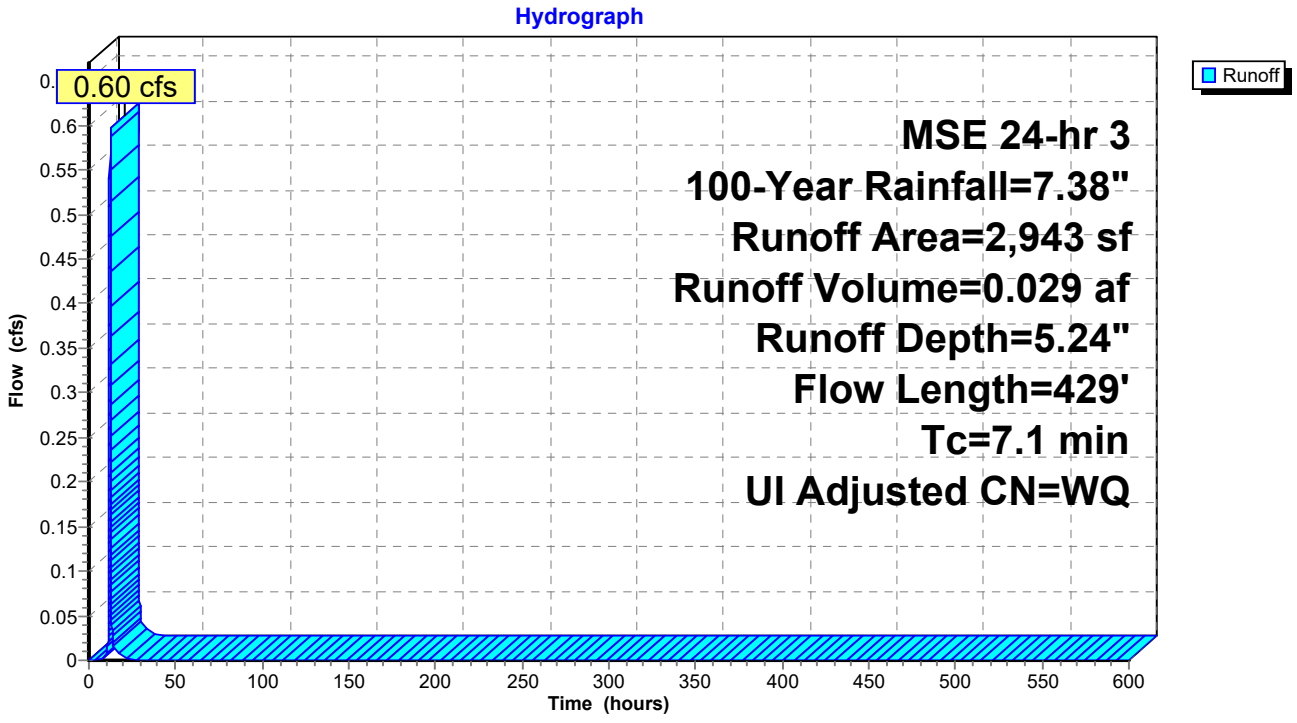
Runoff = 0.60 cfs @ 12.14 hrs, Volume= 0.029 af, Depth= 5.24"
Routed to Pond 1P : EXISTING POND

Runoff by SCS TR-20 method, UH=SCS, Weighted-Q, Time Span= 0.00-600.00 hrs, dt= 0.01 hrs
MSE 24-hr 3 100-Year Rainfall=7.38"

Area (sf)	CN	Adj	Description
2,673	80	80	>75% Grass cover, Good, HSG D
270	98	98	Unconnected roofs, HSG D
2,943			Weighted Average
2,673			90.83% Pervious Area
270			9.17% Impervious Area
270			100.00% Unconnected

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
1.1	83	0.1445	1.29		**Lag/CN Method,**
6.0	346	0.0448	0.96		**Lag/CN Method,**
7.1	429	Total			

Subcatchment OFF-7: OFF-7



Summary for Subcatchment OFF-8: OFF-8

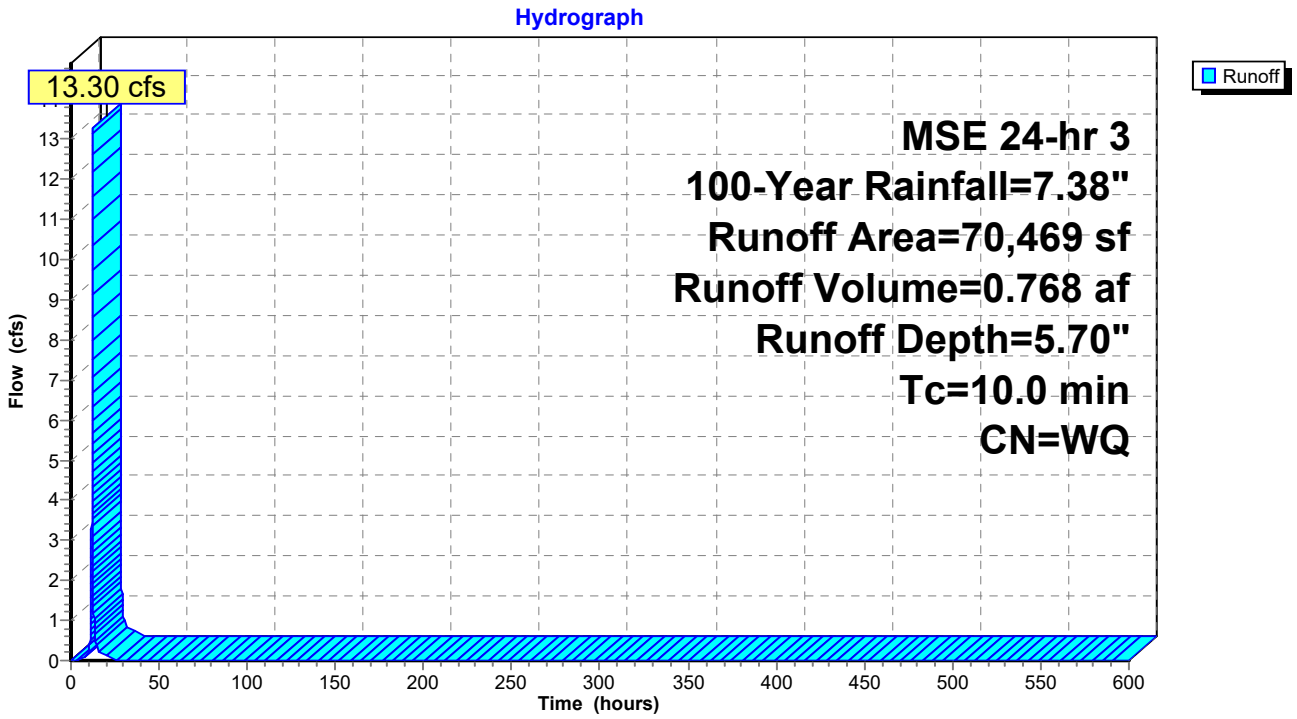
Runoff = 13.30 cfs @ 12.17 hrs, Volume= 0.768 af, Depth= 5.70"
Routed to Link 5L : NORTHEAST

Runoff by SCS TR-20 method, UH=SCS, Weighted-Q, Time Span= 0.00-600.00 hrs, dt= 0.01 hrs
MSE 24-hr 3 100-Year Rainfall=7.38"

Area (sf)	CN	Description
21,849	98	Paved parking, HSG D
48,620	80	>75% Grass cover, Good, HSG D
70,469		Weighted Average
48,620		68.99% Pervious Area
21,849		31.01% Impervious Area

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

Subcatchment OFF-8: OFF-8



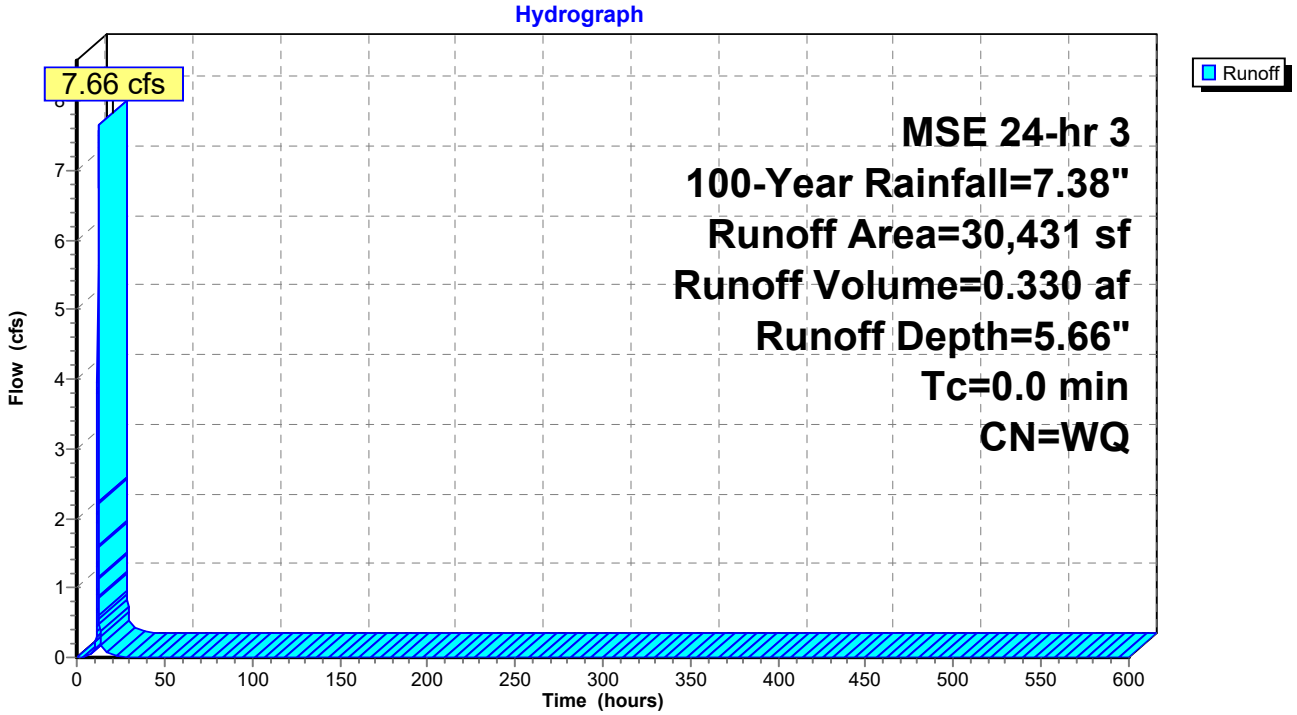
Summary for Subcatchment OFF-9: OFF-9

Runoff = 7.66 cfs @ 12.09 hrs, Volume= 0.330 af, Depth= 5.66"
Routed to Link 8L : Existing to NORTHWEST

Runoff by SCS TR-20 method, UH=SCS, Weighted-Q, Time Span= 0.00-600.00 hrs, dt= 0.01 hrs
MSE 24-hr 3 100-Year Rainfall=7.38"

Area (sf)	CN	Description
8,967	98	Paved parking, HSG D
21,464	80	>75% Grass cover, Good, HSG D
30,431		Weighted Average
21,464		70.53% Pervious Area
8,967		29.47% Impervious Area

Subcatchment OFF-9: OFF-9



Summary for Pond 1P: EXISTING POND

Inflow Area = 14.976 ac, 19.66% Impervious, Inflow Depth = 5.43" for 100-Year event
Inflow = 123.52 cfs @ 12.14 hrs, Volume= 6.776 af
Outflow = 2.07 cfs @ 15.38 hrs, Volume= 6.773 af, Atten= 98%, Lag= 194.6 min
Primary = 2.07 cfs @ 15.38 hrs, Volume= 6.773 af
Routed to Pond 10P : West Exisitng Wetland

Routing by Dyn-Stor-Ind method, Time Span= 0.00-600.00 hrs, dt= 0.01 hrs
Peak Elev= 997.39' @ 15.38 hrs Surf.Area= 79,905 sf Storage= 226,085 cf

Plug-Flow detention time= 1,201.5 min calculated for 6.773 af (100% of inflow)
Center-of-Mass det. time= 1,201.3 min (1,979.8 - 778.5)

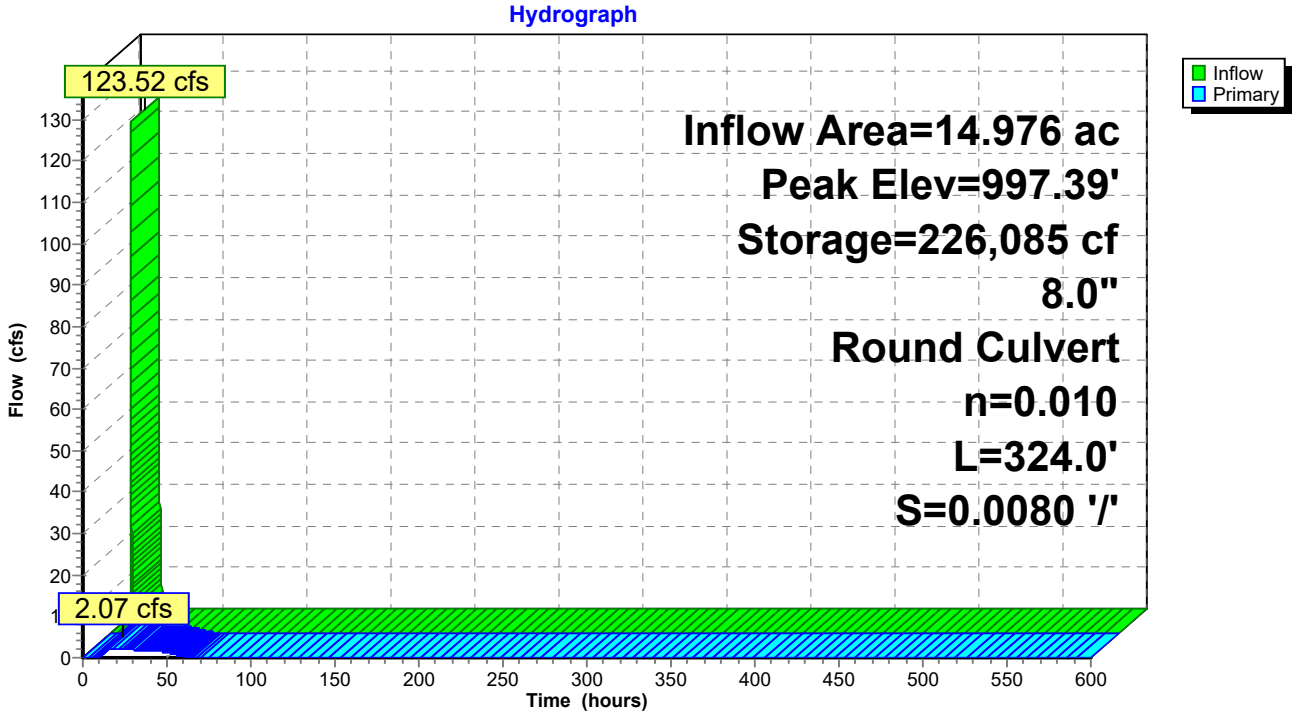
Volume	Invert	Avail.Storage	Storage Description
#1	992.61'	277,554 cf	**Custom Stage Data (Prismatic)** Listed below (Recalc)

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
992.61	24,173	0	0
994.00	31,142	38,444	38,444
996.00	59,569	90,711	129,155
998.00	88,830	148,399	277,554

Device	Routing	Invert	Outlet Devices
#1	Primary	992.61'	**8.0" Round Culvert** L= 324.0' CPP, projecting, no headwall, Ke= 0.900 Inlet / Outlet Invert= 992.61' / 990.02' S= 0.0080 '/' Cc= 0.900 n= 0.010 PVC, smooth interior, Flow Area= 0.35 sf

Primary OutFlow Max=2.07 cfs @ 15.38 hrs HW=997.39' TW=974.48' (Dynamic Tailwater)
↑—**1=Culvert** (Barrel Controls 2.07 cfs @ 5.94 fps)

Pond 1P: EXISTING POND



Summary for Pond 2P: West Ditch

Inflow Area = 3.022 ac, 9.18% Impervious, Inflow Depth = 5.16" for 100-Year event
Inflow = 23.82 cfs @ 12.16 hrs, Volume= 1.299 af
Outflow = 18.98 cfs @ 12.22 hrs, Volume= 1.299 af, Atten= 20%, Lag= 3.7 min
Primary = 14.00 cfs @ 12.22 hrs, Volume= 1.265 af
Routed to Pond 10P : West Exisitng Wetland
Secondary = 4.98 cfs @ 12.22 hrs, Volume= 0.035 af
Routed to Pond 10P : West Exisitng Wetland

Routing by Dyn-Stor-Ind method, Time Span= 0.00-600.00 hrs, dt= 0.01 hrs
Peak Elev= 998.80' @ 12.22 hrs Surf.Area= 4,536 sf Storage= 4,751 cf

Plug-Flow detention time= (not calculated: outflow precedes inflow)
Center-of-Mass det. time= 1.4 min (787.7 - 786.3)

Volume	Invert	Avail.Storage	Storage Description
#1	995.00'	5,727 cf	**Custom Stage Data (Prismatic)** Listed below (Recalc)

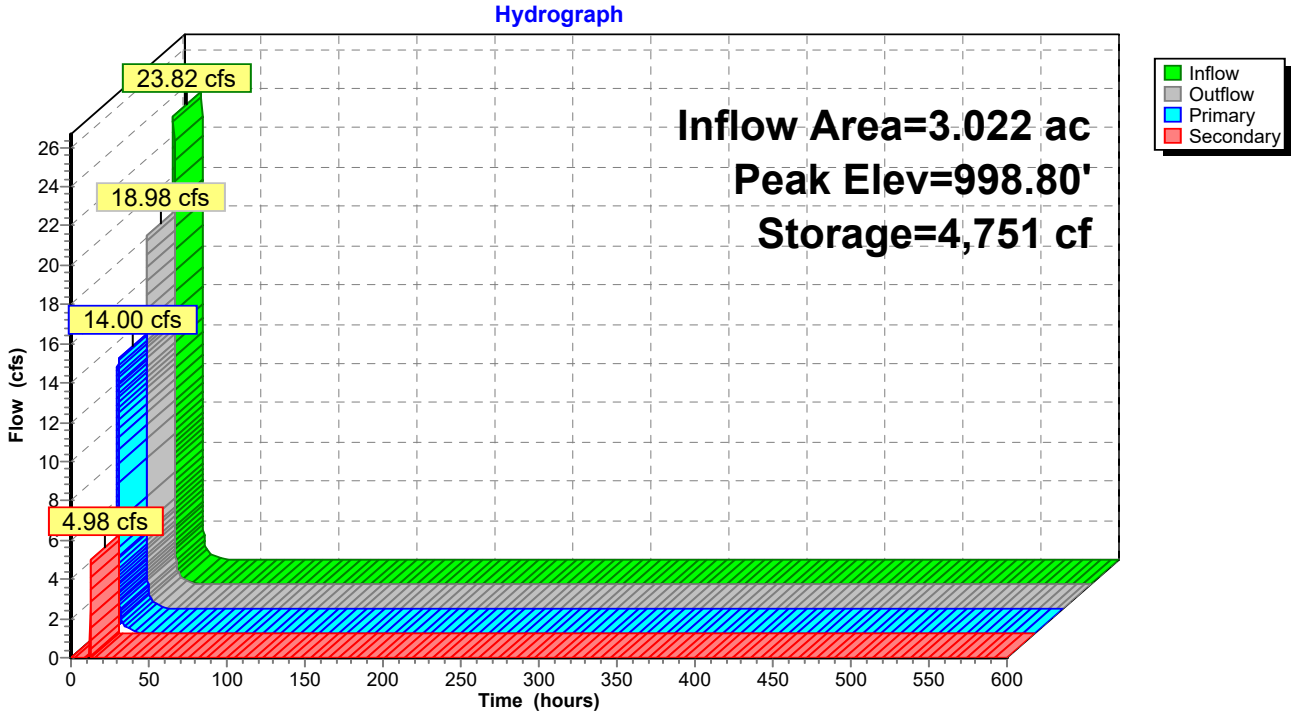
Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
995.00	5	0	0
996.00	59	32	32
997.00	825	442	474
998.00	2,243	1,534	2,008
998.60	4,093	1,901	3,909
999.00	5,000	1,819	5,727

Device	Routing	Invert	Outlet Devices
#1	Primary	994.57'	**18.0" Round CMP_Round 18"** L= 57.1' CMP, mitered to conform to fill, Ke= 0.700 Inlet / Outlet Invert= 994.57' / 989.52' S= 0.0884 '/' Cc= 0.900 n= 0.025 Corrugated metal, Flow Area= 1.77 sf
#2	Secondary	998.59'	**20.0' long x 16.0' breadth Existing Berm** Head (feet) 0.20 0.40 0.60 0.80 1.00 1.20 1.40 1.60 Coef. (English) 2.68 2.70 2.70 2.64 2.63 2.64 2.64 2.63

Primary OutFlow Max=13.99 cfs @ 12.22 hrs HW=998.79' TW=974.65' (Dynamic Tailwater)
↑—**1=CMP_Round 18"** (Inlet Controls 13.99 cfs @ 7.92 fps)

Secondary OutFlow Max=4.94 cfs @ 12.22 hrs HW=998.79' TW=974.65' (Dynamic Tailwater)
↑—**2=Existing Berm** (Weir Controls 4.94 cfs @ 1.21 fps)

Pond 2P: West Ditch



Summary for Pond 10P: West Exisitng Wetland

Inflow Area = 18.789 ac, 18.40% Impervious, Inflow Depth = 5.40" for 100-Year event
Inflow = 24.07 cfs @ 12.22 hrs, Volume= 8.461 af
Outflow = 7.35 cfs @ 12.55 hrs, Volume= 8.460 af, Atten= 69%, Lag= 20.1 min
Primary = 7.35 cfs @ 12.55 hrs, Volume= 8.460 af
Routed to Link 7L : TOTAL

Routing by Dyn-Stor-Ind method, Time Span= 0.00-600.00 hrs, dt= 0.01 hrs
Starting Elev= 974.10' Surf.Area= 54,326 sf Storage= 5,411 cf
Peak Elev= 974.85' @ 12.55 hrs Surf.Area= 57,558 sf Storage= 47,132 cf (41,721 cf above start)

Plug-Flow detention time= 202.8 min calculated for 8.336 af (99% of inflow)
Center-of-Mass det. time= 125.0 min (1,866.1 - 1,741.1)

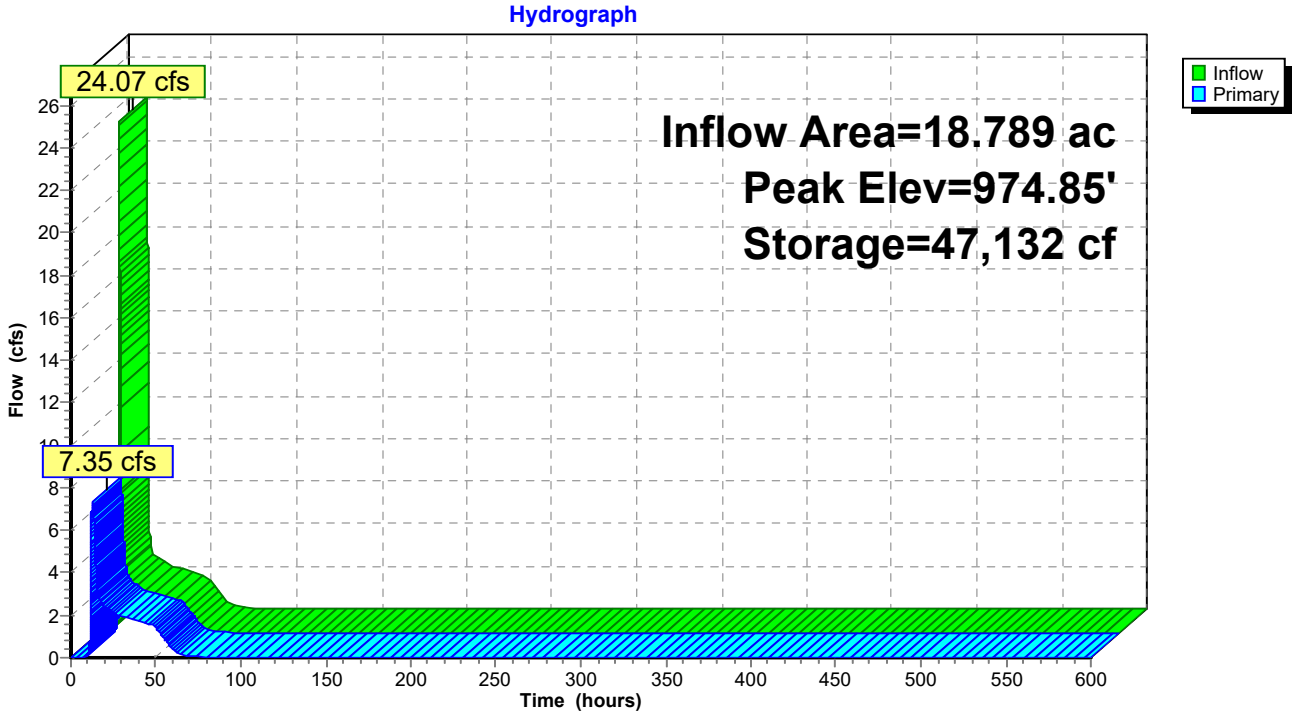
Volume	Invert	Avail.Storage	Storage Description
#1	974.00'	487,616 cf	**Custom Stage Data (Prismatic)** Listed below (Recalc)

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
974.00	53,893	0	0
975.00	58,226	56,060	56,060
976.00	62,886	60,556	116,616
977.00	67,093	64,990	181,605
978.00	71,582	69,338	250,943
979.00	76,083	73,833	324,775
980.00	81,311	78,697	403,472
981.00	86,977	84,144	487,616

Device	Routing	Invert	Outlet Devices
#1	Primary	974.10'	**18.0" Horiz. Orifice/Grate** C= 0.600 Limited to weir flow at low heads

Primary OutFlow Max=7.35 cfs @ 12.55 hrs HW=974.85' TW=0.00' (Dynamic Tailwater)
↑—**1=Orifice/Grate** (Orifice Controls 7.35 cfs @ 4.16 fps)

Pond 10P: West Exisitng Wetland

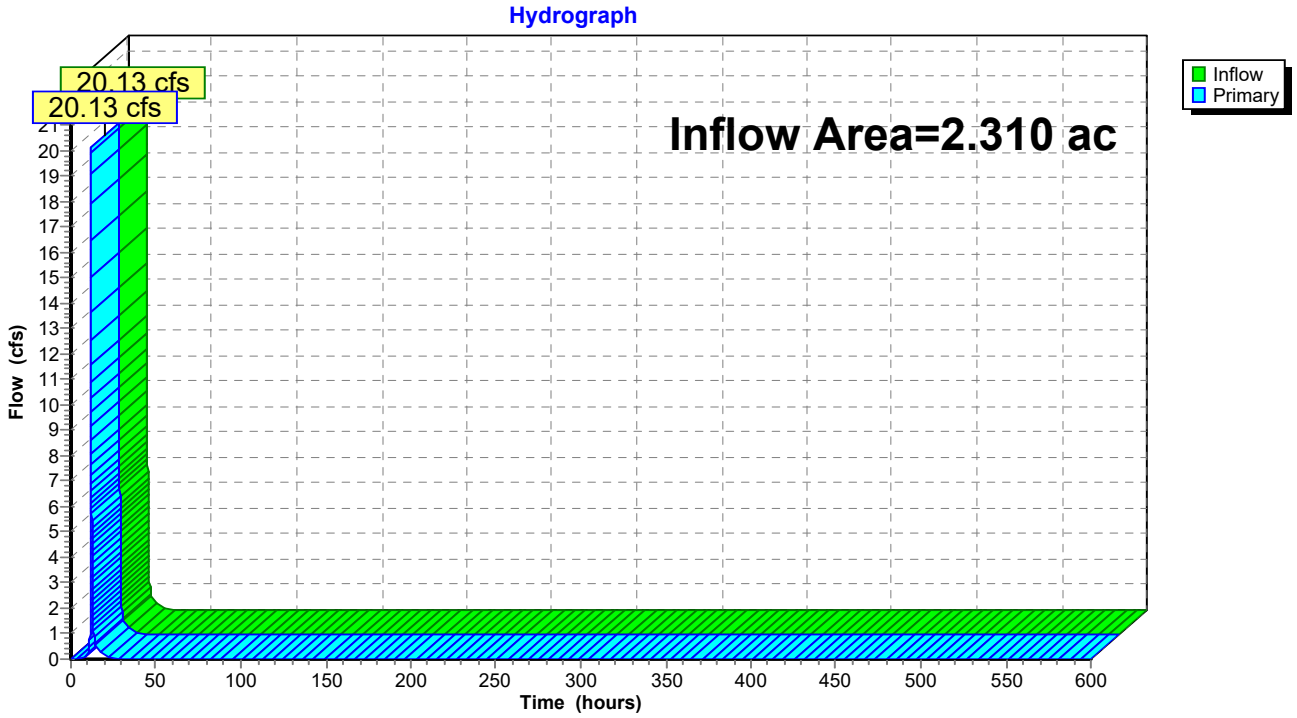


Summary for Link 3L: SOUTH

Inflow Area = 2.310 ac, 1.72% Impervious, Inflow Depth = 5.08" for 100-Year event
Inflow = 20.13 cfs @ 12.13 hrs, Volume= 0.978 af
Primary = 20.13 cfs @ 12.13 hrs, Volume= 0.978 af, Atten= 0%, Lag= 0.0 min
Routed to Link 7L : TOTAL

Primary outflow = Inflow, Time Span= 0.00-600.00 hrs, dt= 0.01 hrs

Link 3L: SOUTH

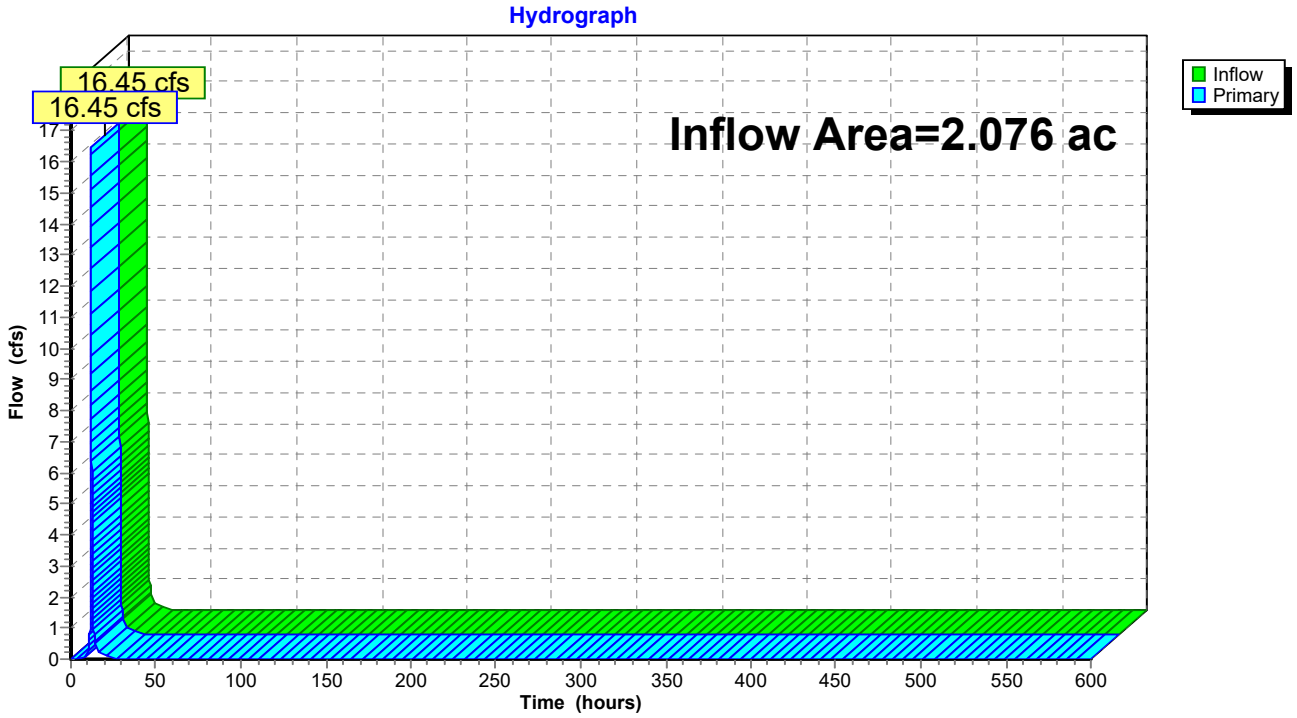


Summary for Link 5L: NORTHEAST

Inflow Area = 2.076 ac, 24.16% Impervious, Inflow Depth = 5.53" for 100-Year event
Inflow = 16.45 cfs @ 12.15 hrs, Volume= 0.956 af
Primary = 16.45 cfs @ 12.15 hrs, Volume= 0.956 af, Atten= 0%, Lag= 0.0 min
Routed to Link 7L : TOTAL

Primary outflow = Inflow, Time Span= 0.00-600.00 hrs, dt= 0.01 hrs

Link 5L: NORTHEAST

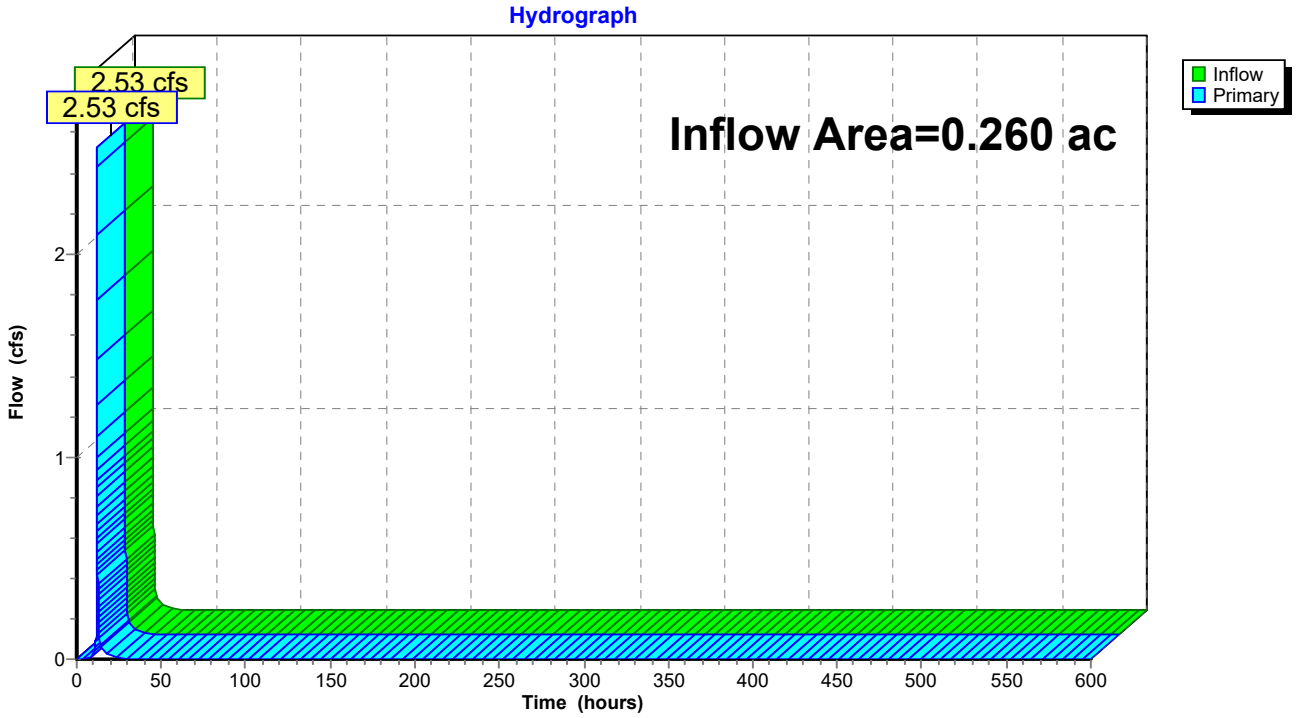


Summary for Link 6L: EAST

Inflow Area = 0.260 ac, 0.00% Impervious, Inflow Depth = 4.93" for 100-Year event
Inflow = 2.53 cfs @ 12.11 hrs, Volume= 0.107 af
Primary = 2.53 cfs @ 12.11 hrs, Volume= 0.107 af, Atten= 0%, Lag= 0.0 min
Routed to Link 7L : TOTAL

Primary outflow = Inflow, Time Span= 0.00-600.00 hrs, dt= 0.01 hrs

Link 6L: EAST

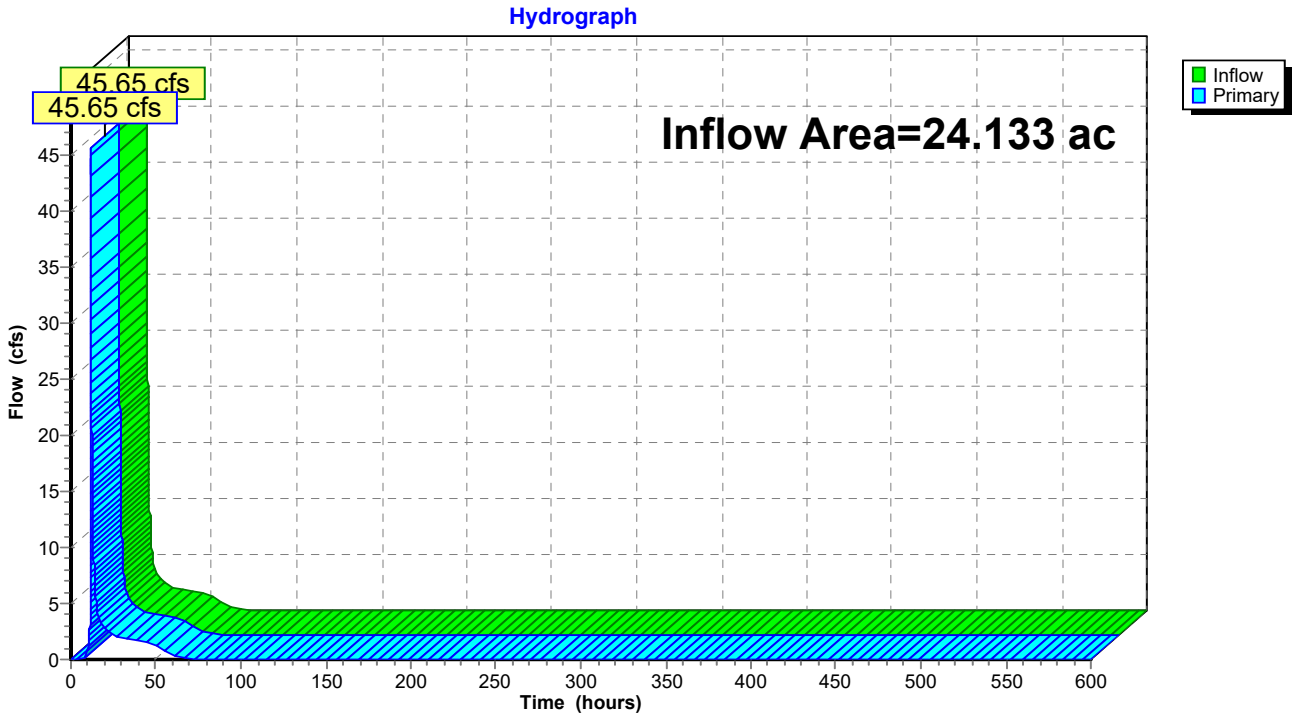


Summary for Link 7L: TOTAL

Inflow Area = 24.133 ac, 17.42% Impervious, Inflow Depth = 5.39" for 100-Year event
Inflow = 45.65 cfs @ 12.13 hrs, Volume= 10.831 af
Primary = 45.65 cfs @ 12.13 hrs, Volume= 10.831 af, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 0.00-600.00 hrs, dt= 0.01 hrs

Link 7L: TOTAL

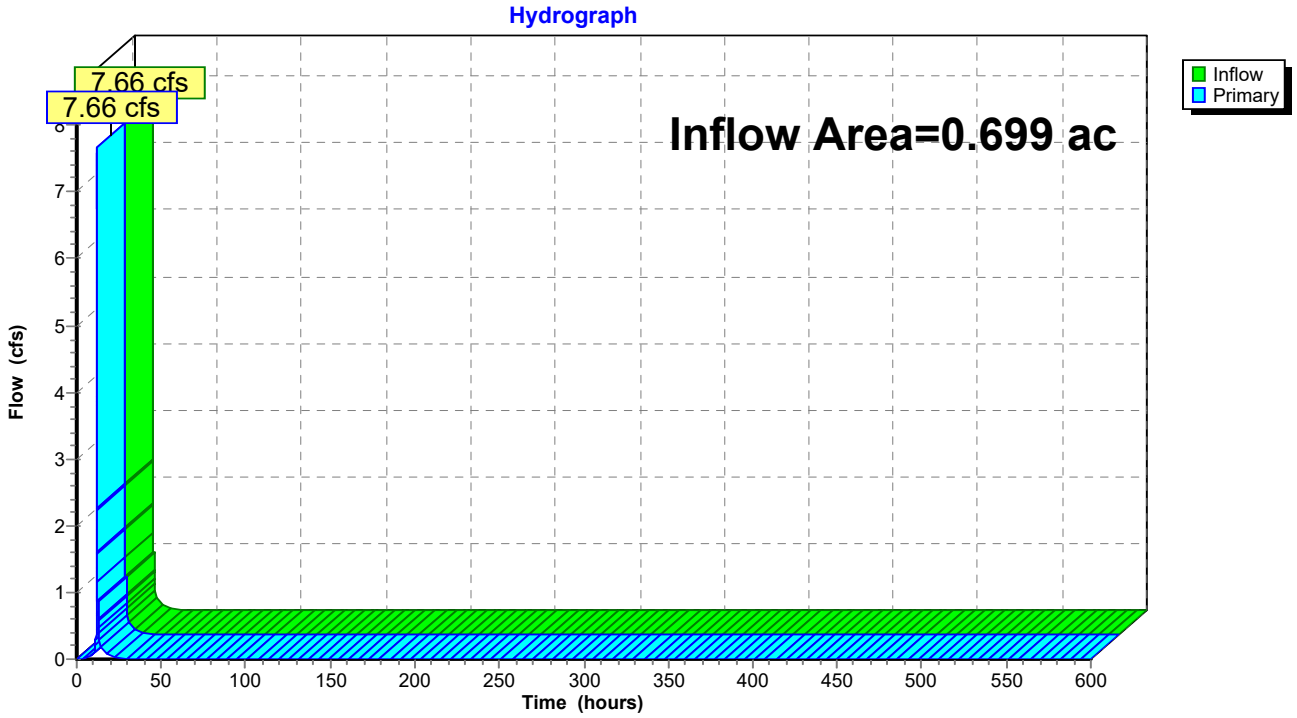


Summary for Link 8L: Existing to NORTHWEST

Inflow Area = 0.699 ac, 29.47% Impervious, Inflow Depth = 5.66" for 100-Year event
Inflow = 7.66 cfs @ 12.09 hrs, Volume= 0.330 af
Primary = 7.66 cfs @ 12.09 hrs, Volume= 0.330 af, Atten= 0%, Lag= 0.0 min
Routed to Link 7L : TOTAL

Primary outflow = Inflow, Time Span= 0.00-600.00 hrs, dt= 0.01 hrs

Link 8L: Existing to NORTHWEST



EDRN
Prepared by Alliant Engineering, Inc

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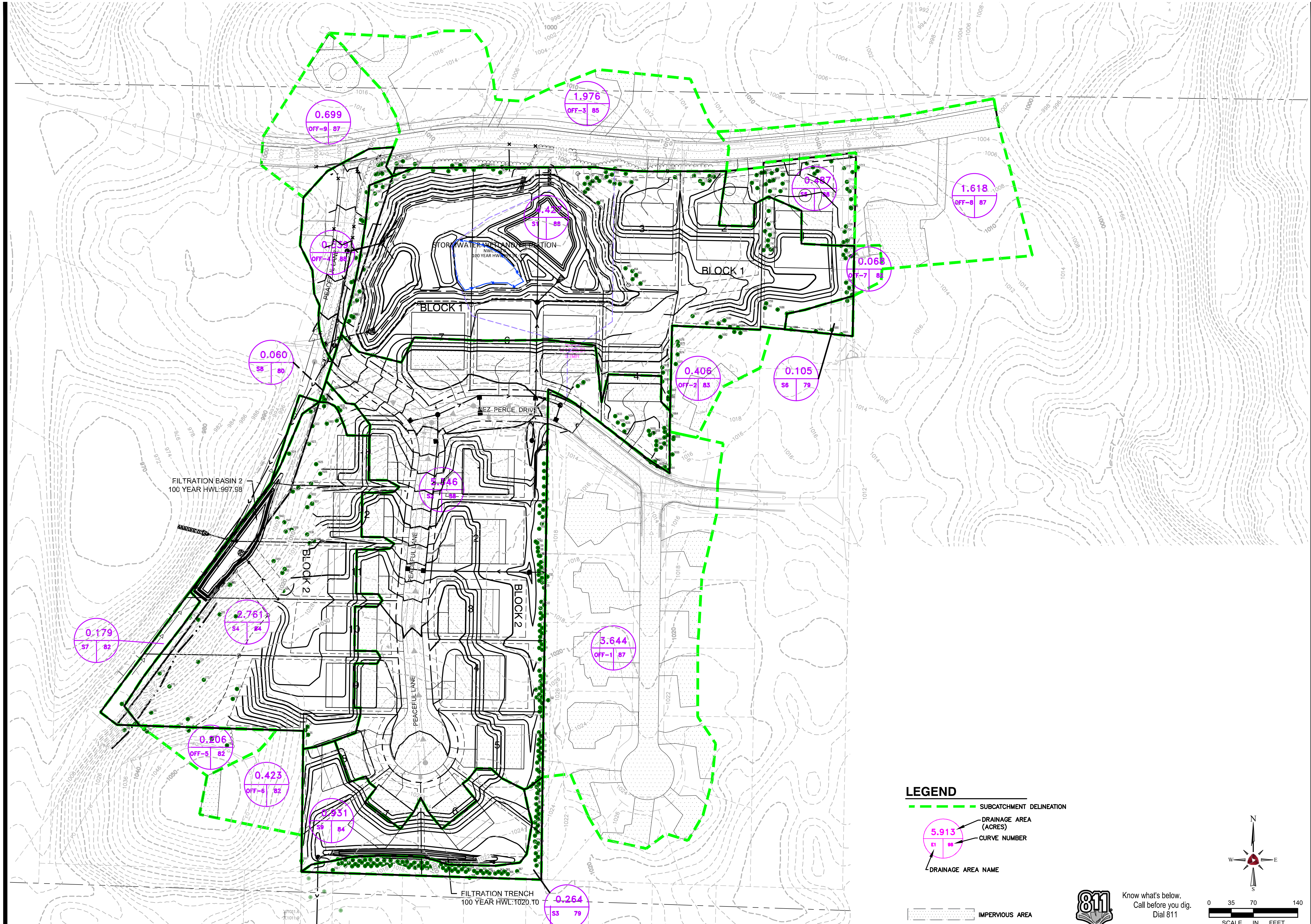

STORMWATER WETLAND/FILTRATION
BLOCK 1
BLOCK 2
NEZ PERCE DRIVE
PEACEFUL LANE
FILTRATION BASIN 2
100 YEAR HWL:997.98
FILTRATION TRENCH
100 YEAR HWL:1020.10
0.699 OFF-9 87
1.976 OFF-3 85
1.618 OFF-8 87
0.068 OFF-7 82
0.406 OFF-2 83
0.105 S6 79
0.060 S8 80
0.179 S7 82
2.761 S4 84
3.644 OFF-1 87
0.206 OFF-5 82
0.423 OFF-6 82
0.931 S9 84
0.264 S3 79
LEGEND
SUBCATCHMENT DELINEATION
5.913 E1 86
DRAINAGE AREA (ACRES)
CURVE NUMBER
DRAINAGE AREA NAME
IMPERVIOUS AREA
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PROPOSED DRAINAGE MAP

DATE	DESCRIPTION
12-19-2024	PRELIMINARY PLAT CITY SUBMITTAL
4-18-2025	FINAL PLAT CITY SUBMITTAL

CERTIFICATION

PRELIMINARY
FOR REVIEW ONLY
NOT FOR CONSTRUCTION

QA/QC CHECK

By Date

PROJECT TEAM DATA

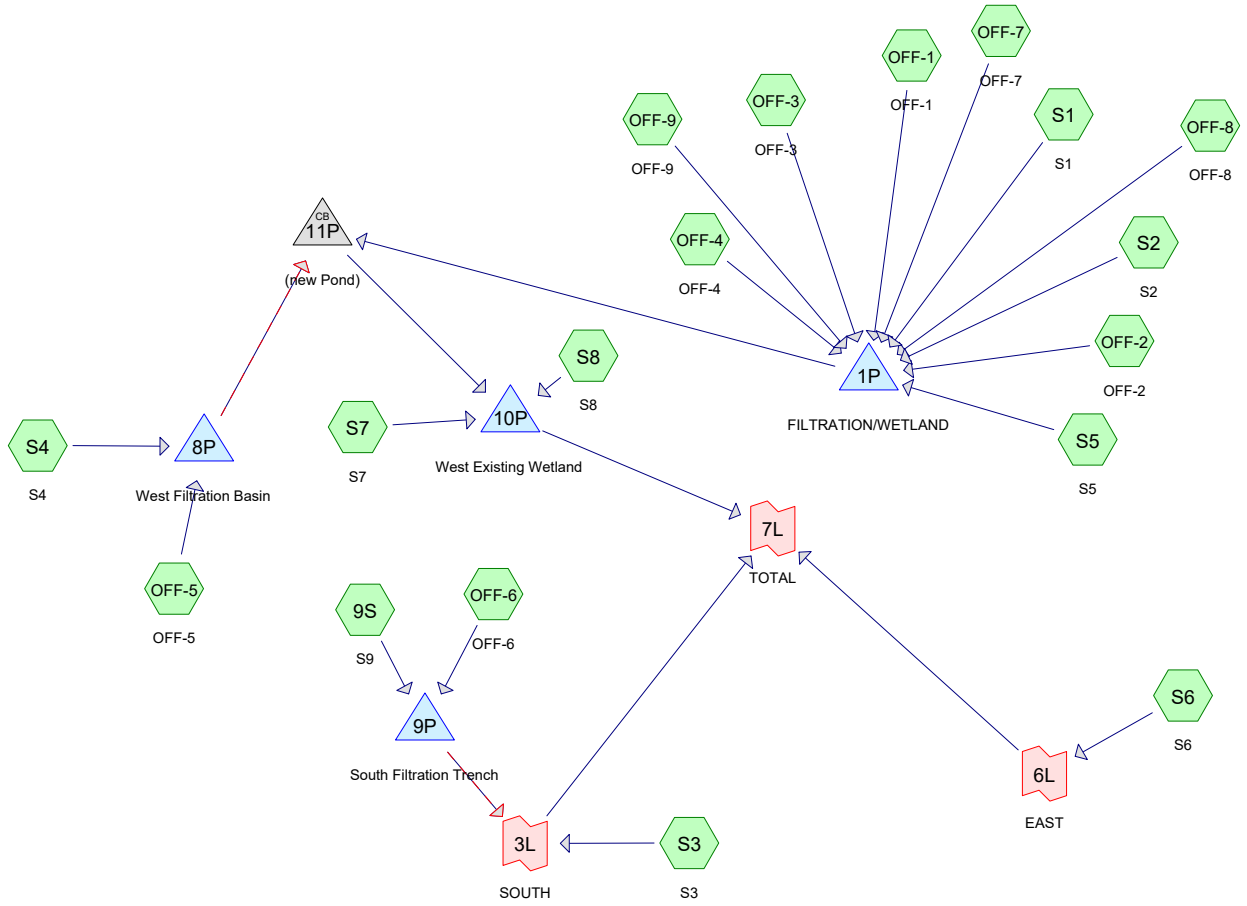
Designed By: TAS

Drafted By:

Project No.:

1

Sheet 1 of 1



Subcat Reach Pond Link

Routing Diagram for PDRN

Prepared by Alliant Engineering, Inc, Printed 6/4/2025

PDRN

Area Listing (all nodes)

Area (acres)	CN	Description (subcatchment-numbers)
8.275	80	>75% Grass cover, Good, HSG D (9S, OFF-4, OFF-6, OFF-7, OFF-8, OFF-9, S1, S2, S8)
0.040	98	Impervious, HSG D (OFF-6)
0.911	98	Paved parking, HSG C (OFF-3, OFF-4)
5.065	98	Paved parking, HSG D (OFF-1, OFF-8, OFF-9, S2)
0.092	98	Unconnected roofs, HSG C (OFF-2)
1.927	98	Unconnected roofs, HSG D (9S, OFF-7, S1, S4, S5)
1.043	98	Water Surface, HSG D (994) (S1)
0.676	82	Woods/grass comb., Fair, HSG D (OFF-5, S5, S7)
6.108	79	Woods/grass comb., Good, HSG D (OFF-1, OFF-2, OFF-3, S3, S4, S6)

PDRN

Soil Listing (all nodes)

Area (acres)	Soil Group	Subcatchment Numbers
0.000	HSG A	
0.000	HSG B	
1.003	HSG C	OFF-2, OFF-3, OFF-4
23.135	HSG D	9S, OFF-1, OFF-2, OFF-3, OFF-4, OFF-5, OFF-6, OFF-7, OFF-8, OFF-9, S1, S2, S3, S4, S5, S6, S7, S8
0.000	Other	

Time span=0.00-600.00 hrs, dt=0.01 hrs, 60001 points
Runoff by SCS TR-20 method, UH=SCS, Weighted-Q
Reach routing by Dyn-Stor-Ind method - Pond routing by Dyn-Stor-Ind method

Subcatchment9S: S9 Runoff Area=40,548 sf 23.56% Impervious Runoff Depth=1.50"
Tc=9.0 min UI Adjusted CN=WQ Runoff=2.17 cfs 0.117 af

SubcatchmentOFF-1: OFF-1 Runoff Area=158,729 sf 43.99% Impervious Runoff Depth=1.77"
Flow Length=564' Slope=0.0323 '/' Tc=9.8 min CN=WQ Runoff=9.30 cfs 0.539 af

SubcatchmentOFF-2: OFF-2 Runoff Area=17,669 sf 22.68% Impervious Runoff Depth=1.44"
Flow Length=287' Slope=0.0766 '/' Tc=3.8 min UI Adjusted CN=WQ Runoff=1.13 cfs 0.049 af

SubcatchmentOFF-3: OFF-3 Runoff Area=86,096 sf 33.88% Impervious Runoff Depth=1.62"
Flow Length=499' Slope=0.0613 '/' Tc=6.2 min CN=WQ Runoff=5.45 cfs 0.266 af

SubcatchmentOFF-4: OFF-4 Runoff Area=23,465 sf 44.73% Impervious Runoff Depth=1.82"
Tc=10.0 min CN=WQ Runoff=1.40 cfs 0.082 af

SubcatchmentOFF-5: OFF-5 Runoff Area=8,976 sf 0.00% Impervious Runoff Depth=1.28"
Tc=8.0 min CN=82 Runoff=0.45 cfs 0.022 af

SubcatchmentOFF-6: OFF-6 Runoff Area=18,404 sf 9.37% Impervious Runoff Depth=1.29"
Tc=13.0 min CN=WQ Runoff=0.74 cfs 0.046 af

SubcatchmentOFF-7: OFF-7 Runoff Area=2,943 sf 9.17% Impervious Runoff Depth=1.29"
Flow Length=429' Tc=7.1 min UI Adjusted CN=WQ Runoff=0.15 cfs 0.007 af

SubcatchmentOFF-8: OFF-8 Runoff Area=70,470 sf 40.24% Impervious Runoff Depth=1.75"
Tc=10.0 min CN=WQ Runoff=4.07 cfs 0.236 af

SubcatchmentOFF-9: OFF-9 Runoff Area=30,431 sf 37.98% Impervious Runoff Depth=1.72"
Tc=0.0 min CN=WQ Runoff=2.40 cfs 0.100 af

SubcatchmentS1: S1 Runoff Area=192,846 sf 42.14% Impervious Runoff Depth=1.78"
Flow Length=400' Slope=0.0300 '/' Tc=13.4 min CN=WQ Runoff=9.96 cfs 0.656 af

SubcatchmentS2: S2 Runoff Area=232,863 sf 47.62% Impervious Runoff Depth=1.86"
Tc=15.7 min CN=WQ Runoff=11.66 cfs 0.829 af

SubcatchmentS3: S3 Runoff Area=11,516 sf 0.00% Impervious Runoff Depth=1.09"
Tc=5.0 min CN=79 Runoff=0.57 cfs 0.024 af

SubcatchmentS4: S4 Runoff Area=120,250 sf 24.75% Impervious Runoff Depth=1.48"
Flow Length=345' Tc=10.0 min UI Adjusted CN=WQ Runoff=5.96 cfs 0.340 af

SubcatchmentS5: S5 Runoff Area=21,220 sf 40.16% Impervious Runoff Depth=1.82"
Tc=8.0 min CN=WQ Runoff=1.40 cfs 0.074 af

SubcatchmentS6: S6 Runoff Area=4,590 sf 0.00% Impervious Runoff Depth=1.09"
Flow Length=60' Slope=0.0330 '/' Tc=1.9 min CN=79 Runoff=0.25 cfs 0.010 af

Subcatchment S7: S7 Runoff Area=7,792 sf 0.00% Impervious Runoff Depth=1.28"
Tc=8.0 min CN=82 Runoff=0.39 cfs 0.019 af

Subcatchment S8: S8 Runoff Area=2,613 sf 0.00% Impervious Runoff Depth=1.15"
Tc=8.0 min CN=80 Runoff=0.12 cfs 0.006 af

Pond 1P: FILTRATION/WETLAND Peak Elev=995.96' Storage=179,608 cf Inflow=41.52 cfs 2.838 af
Outflow=0.94 cfs 2.801 af

Pond 8P: West Filtration Basin Peak Elev=996.83' Storage=6,547 cf Inflow=6.39 cfs 0.362 af
Primary=3.26 cfs 0.202 af Secondary=0.05 cfs 0.159 af Outflow=3.31 cfs 0.362 af

Pond 9P: South Filtration Trench Peak Elev=1,020.04' Storage=2,185 cf Inflow=2.83 cfs 0.162 af
Primary=0.05 cfs 0.078 af Secondary=2.71 cfs 0.075 af Outflow=2.76 cfs 0.154 af

Pond 10P: West Existing Wetland Peak Elev=974.27' Storage=14,762 cf Inflow=3.85 cfs 3.188 af
Outflow=1.09 cfs 3.184 af

Pond 11P: (new Pond) Peak Elev=987.39' Inflow=3.65 cfs 3.163 af
18.0" Round Culvert n=0.013 L=35.0' S=0.0049 '/' Outflow=3.65 cfs 3.163 af

Link 3L: SOUTH Inflow=3.07 cfs 0.178 af
Primary=3.07 cfs 0.178 af

Link 6L: EAST Inflow=0.25 cfs 0.010 af
Primary=0.25 cfs 0.010 af

Link 7L: TOTAL Inflow=3.17 cfs 3.371 af
Primary=3.17 cfs 3.371 af

Summary for Subcatchment 9S: S9

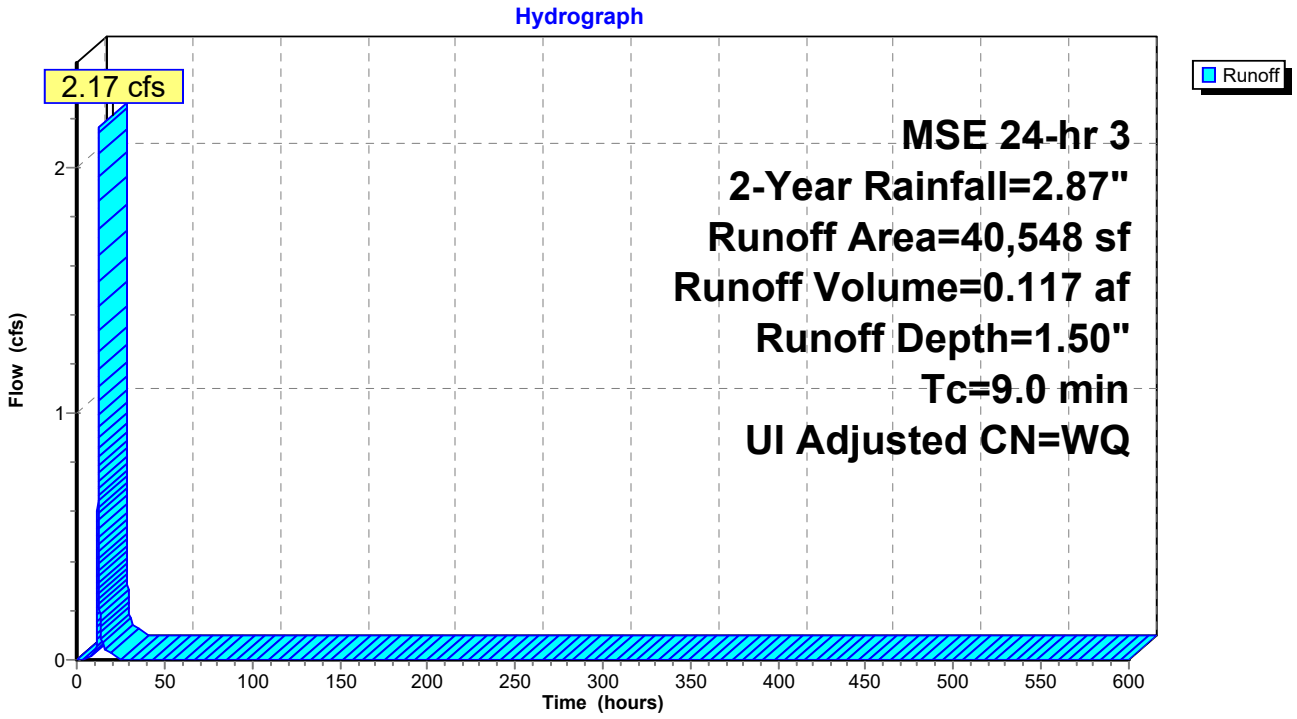
Runoff = 2.17 cfs @ 12.17 hrs, Volume= 0.117 af, Depth= 1.50"
Routed to Pond 9P : South Filtration Trench

Runoff by SCS TR-20 method, UH=SCS, Weighted-Q, Time Span= 0.00-600.00 hrs, dt= 0.01 hrs
MSE 24-hr 3 2-Year Rainfall=2.87"

Area (sf)	CN	Adj	Description
9,552	98	98	Unconnected roofs, HSG D
30,996	80	80	>75% Grass cover, Good, HSG D
40,548			Weighted Average
30,996			76.44% Pervious Area
9,552			23.56% Impervious Area
9,552			100.00% Unconnected

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

Subcatchment 9S: S9



Summary for Subcatchment OFF-1: OFF-1

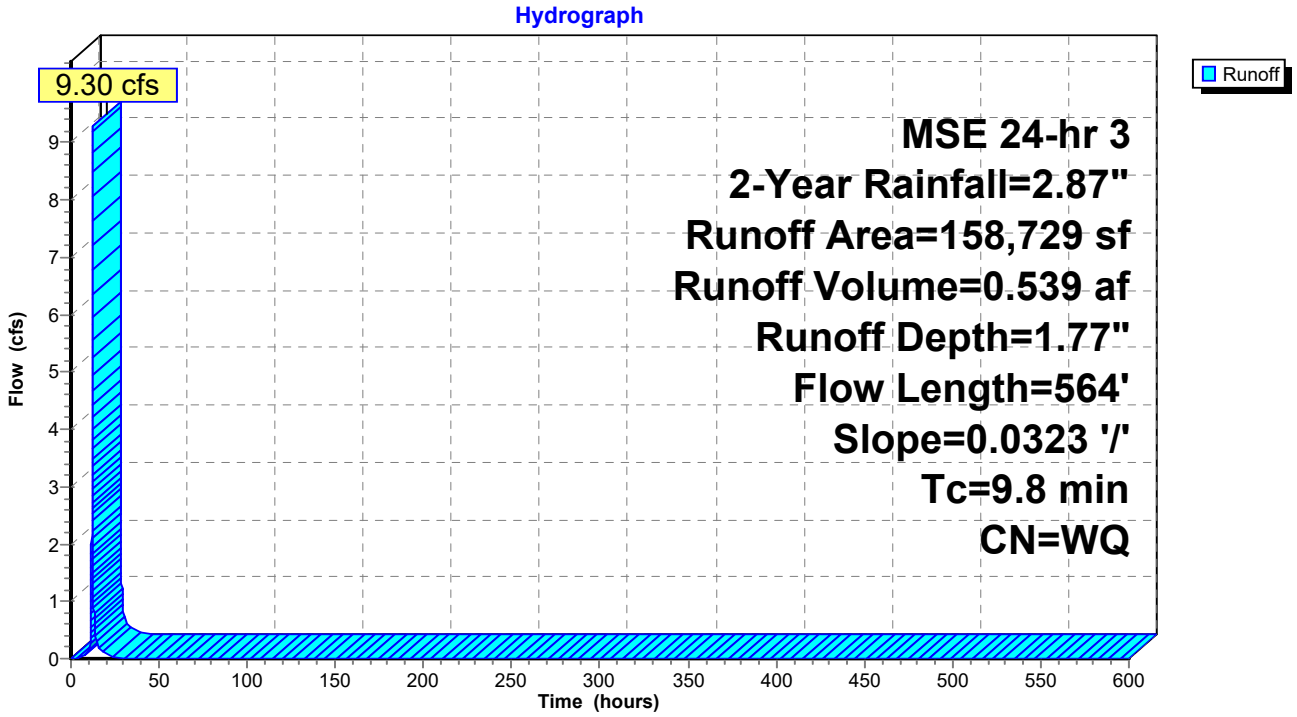
Runoff = 9.30 cfs @ 12.17 hrs, Volume= 0.539 af, Depth= 1.77"
Routed to Pond 1P : FILTRATION/WETLAND

Runoff by SCS TR-20 method, UH=SCS, Weighted-Q, Time Span= 0.00-600.00 hrs, dt= 0.01 hrs
MSE 24-hr 3 2-Year Rainfall=2.87"

Area (sf)	CN	Description
69,832	98	Paved parking, HSG D
88,897	79	Woods/grass comb., Good, HSG D
158,729		Weighted Average
88,897		56.01% Pervious Area
69,832		43.99% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
8.8	564	0.0323	1.07		**Lag/CN Method, BACK YARD SWALE**
1.0					**Direct Entry, Storm Sewer**
9.8	564	Total			

Subcatchment OFF-1: OFF-1



Summary for Subcatchment OFF-2: OFF-2

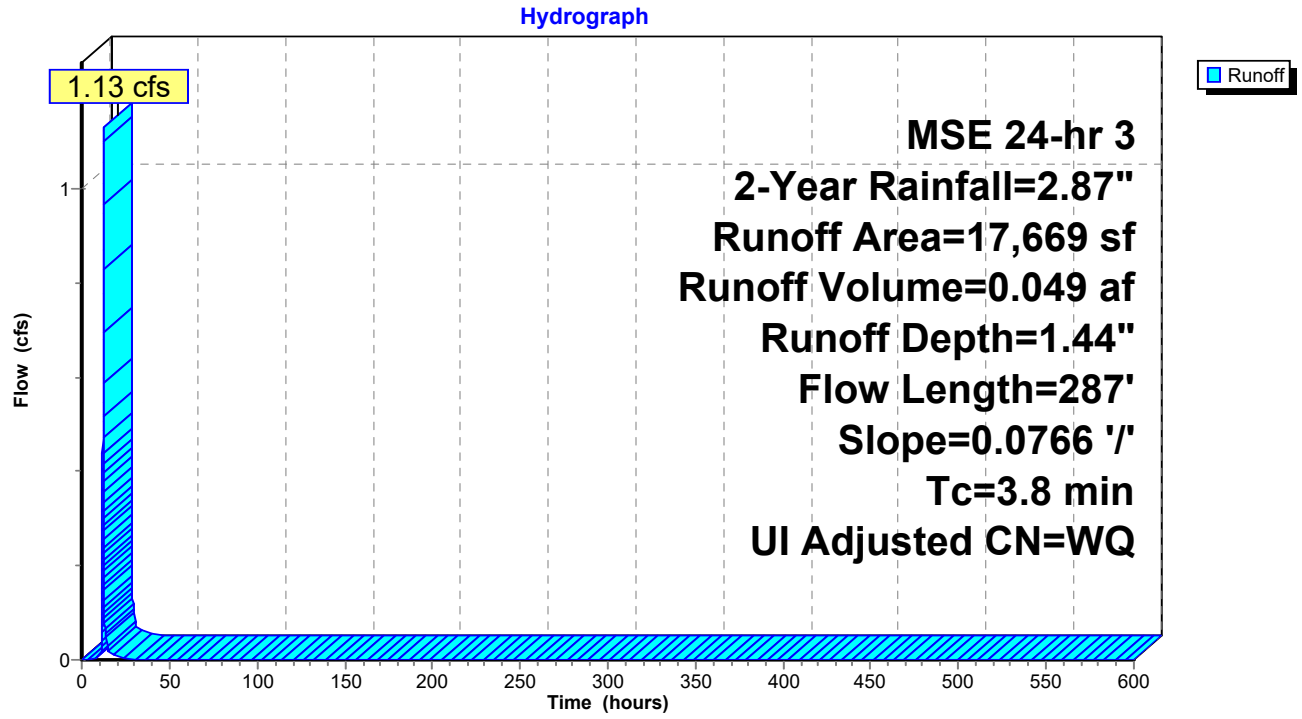
Runoff = 1.13 cfs @ 12.12 hrs, Volume= 0.049 af, Depth= 1.44"
Routed to Pond 1P : FILTRATION/WETLAND

Runoff by SCS TR-20 method, UH=SCS, Weighted-Q, Time Span= 0.00-600.00 hrs, dt= 0.01 hrs
MSE 24-hr 3 2-Year Rainfall=2.87"

Area (sf)	CN	Adj	Description
4,008	98	98	Unconnected roofs, HSG C
13,661	79	79	Woods/grass comb., Good, HSG D
17,669			Weighted Average
13,661			77.32% Pervious Area
4,008			22.68% Impervious Area
4,008			100.00% Unconnected

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
3.8	287	0.0766	1.25		**Lag/CN Method,**

Subcatchment OFF-2: OFF-2



Summary for Subcatchment OFF-3: OFF-3

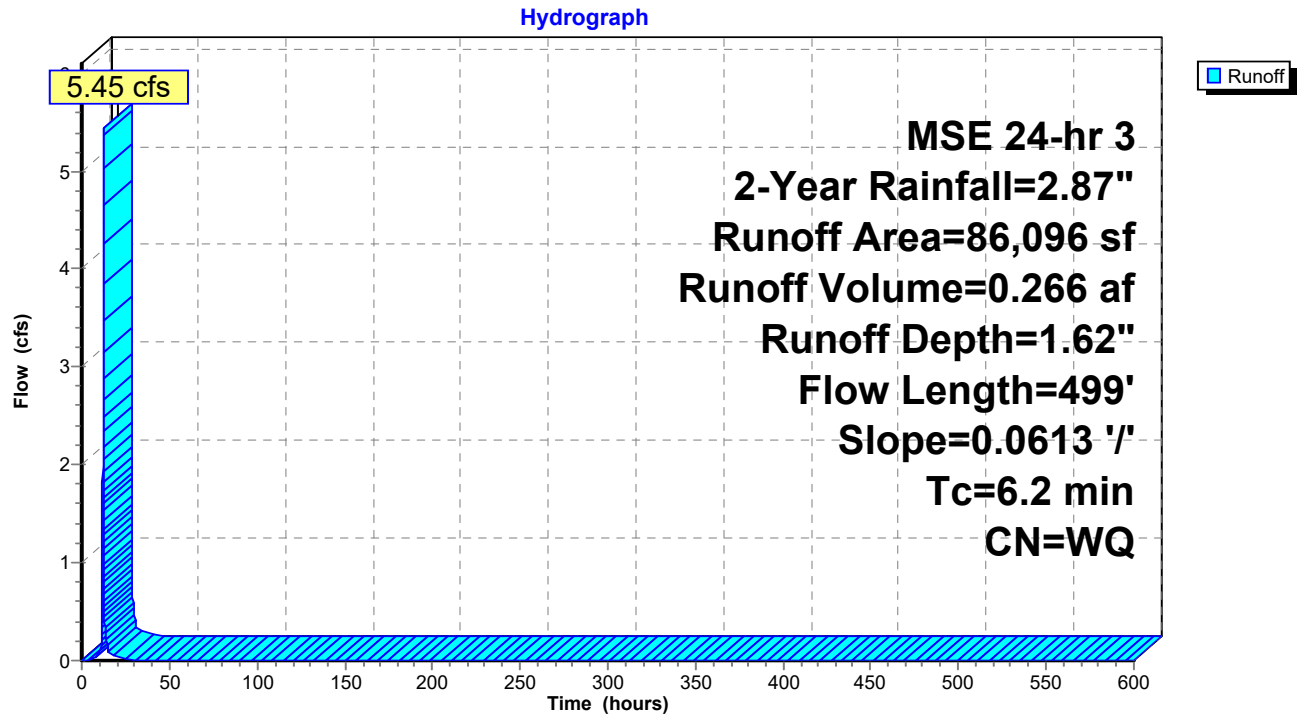
Runoff = 5.45 cfs @ 12.14 hrs, Volume= 0.266 af, Depth= 1.62"
Routed to Pond 1P : FILTRATION/WETLAND

Runoff by SCS TR-20 method, UH=SCS, Weighted-Q, Time Span= 0.00-600.00 hrs, dt= 0.01 hrs
MSE 24-hr 3 2-Year Rainfall=2.87"

Area (sf)	CN	Description
29,173	98	Paved parking, HSG C
56,923	79	Woods/grass comb., Good, HSG D
86,096		Weighted Average
56,923		66.12% Pervious Area
29,173		33.88% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
6.2	499	0.0613	1.33		**Lag/CN Method,**

Subcatchment OFF-3: OFF-3



Summary for Subcatchment OFF-4: OFF-4

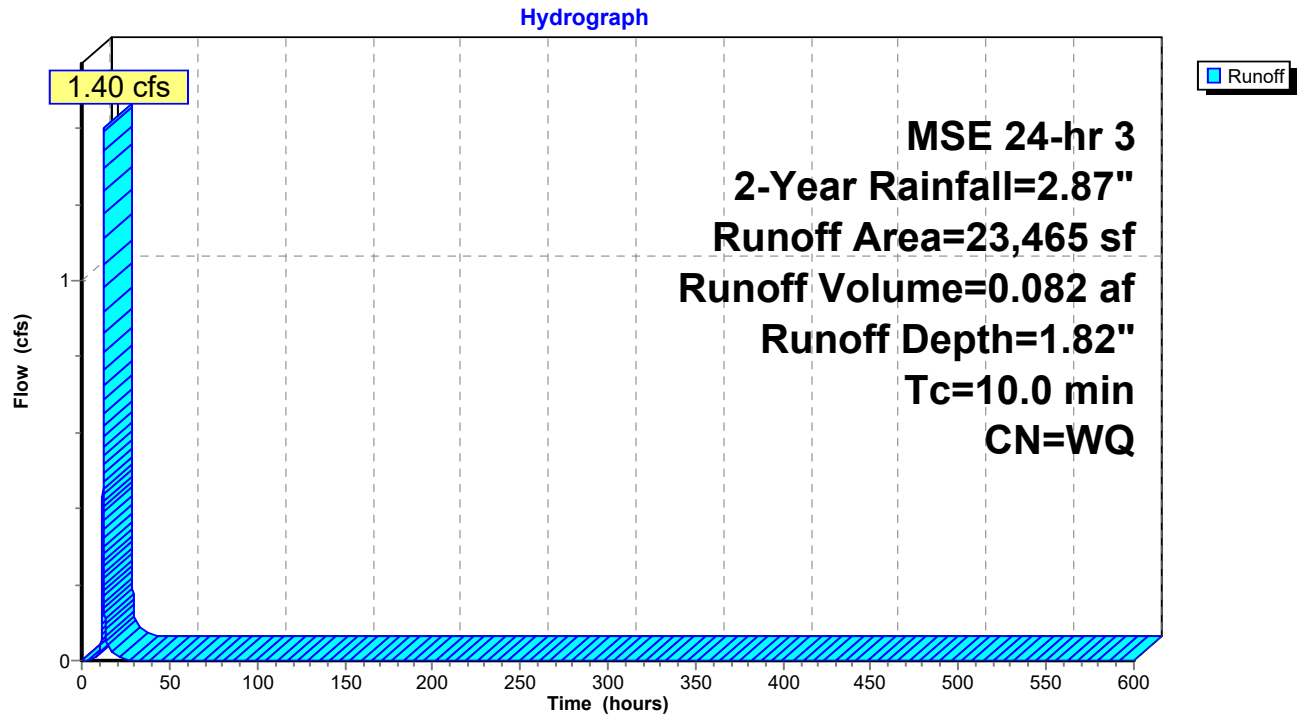
Runoff = 1.40 cfs @ 12.17 hrs, Volume= 0.082 af, Depth= 1.82"
Routed to Pond 1P : FILTRATION/WETLAND

Runoff by SCS TR-20 method, UH=SCS, Weighted-Q, Time Span= 0.00-600.00 hrs, dt= 0.01 hrs
MSE 24-hr 3 2-Year Rainfall=2.87"

Area (sf)	CN	Description
10,497	98	Paved parking, HSG C
12,968	80	>75% Grass cover, Good, HSG D
23,465		Weighted Average
12,968		55.27% Pervious Area
10,497		44.73% Impervious Area

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

Subcatchment OFF-4: OFF-4



Summary for Subcatchment OFF-5: OFF-5

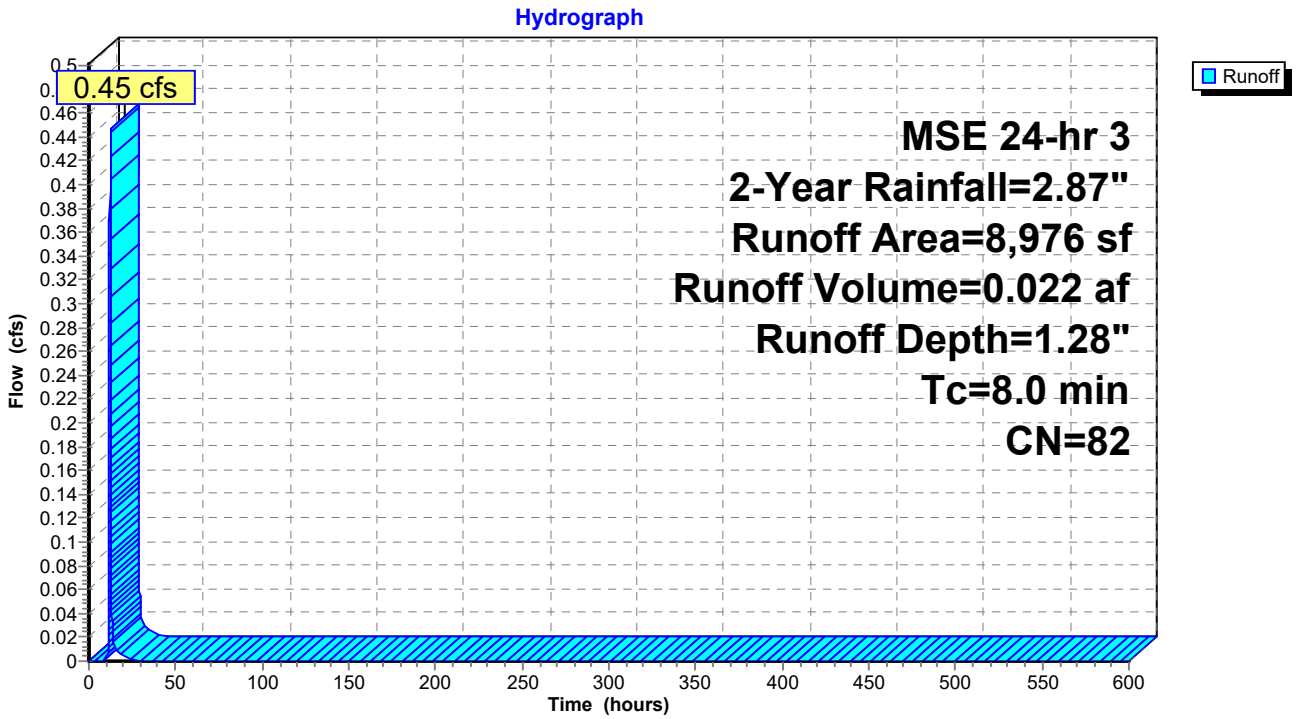
Runoff = 0.45 cfs @ 12.16 hrs, Volume= 0.022 af, Depth= 1.28"
Routed to Pond 8P : West Filtration Basin

Runoff by SCS TR-20 method, UH=SCS, Weighted-Q, Time Span= 0.00-600.00 hrs, dt= 0.01 hrs
MSE 24-hr 3 2-Year Rainfall=2.87"

Area (sf)	CN	Description
8,976	82	Woods/grass comb., Fair, HSG D
8,976		100.00% Pervious Area

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

Subcatchment OFF-5: OFF-5



Summary for Subcatchment OFF-6: OFF-6

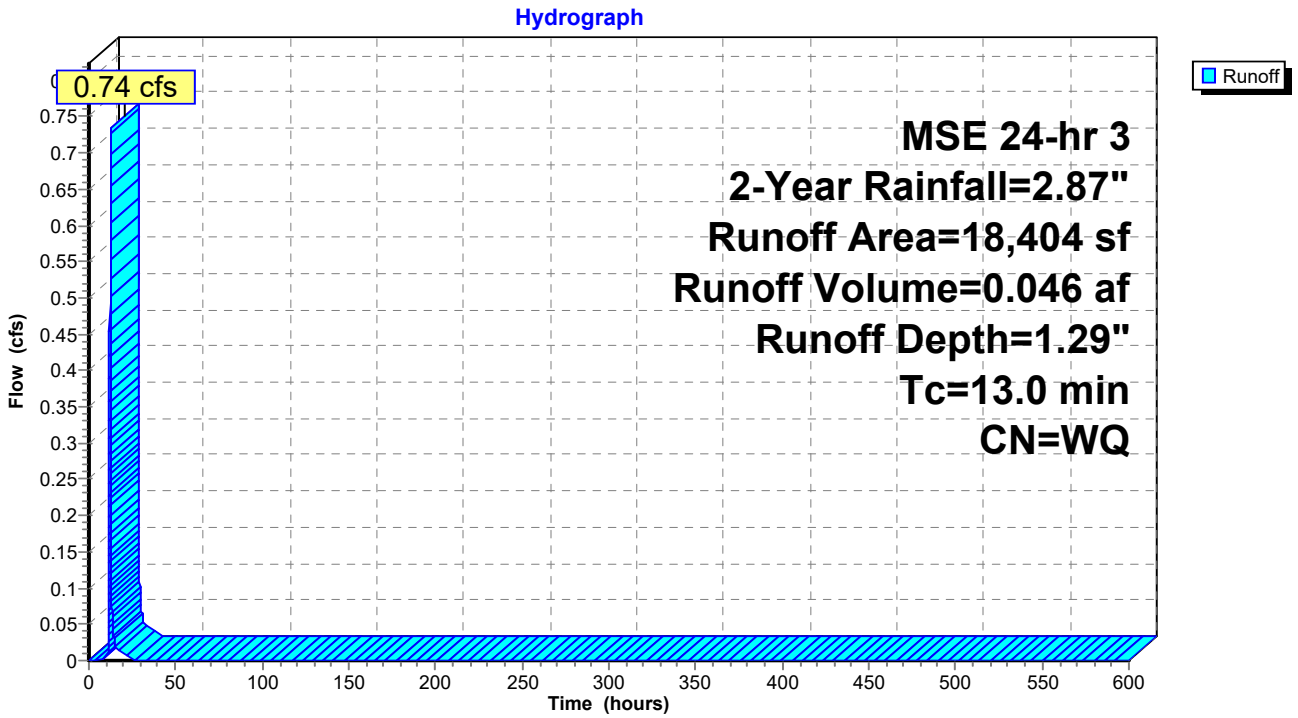
Runoff = 0.74 cfs @ 12.21 hrs, Volume= 0.046 af, Depth= 1.29"
Routed to Pond 9P : South Filtration Trench

Runoff by SCS TR-20 method, UH=SCS, Weighted-Q, Time Span= 0.00-600.00 hrs, dt= 0.01 hrs
MSE 24-hr 3 2-Year Rainfall=2.87"

	Area (sf)	CN	Description
*	1,725	98	Impervious, HSG D
	16,679	80	>75% Grass cover, Good, HSG D
	18,404		Weighted Average
	16,679		90.63% Pervious Area
	1,725		9.37% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
13.0					**Direct Entry, Sheet/Conc Flow**

Subcatchment OFF-6: OFF-6



Summary for Subcatchment OFF-7: OFF-7

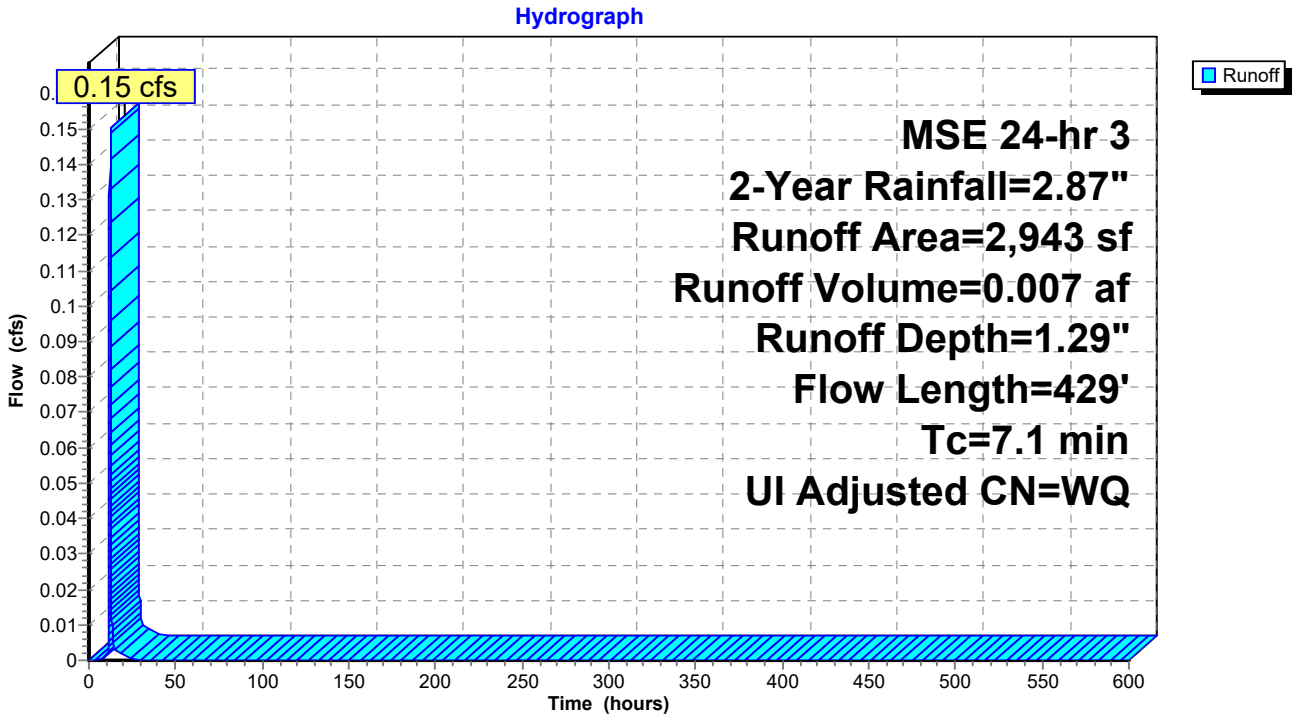
Runoff = 0.15 cfs @ 12.15 hrs, Volume= 0.007 af, Depth= 1.29"
Routed to Pond 1P : FILTRATION/WETLAND

Runoff by SCS TR-20 method, UH=SCS, Weighted-Q, Time Span= 0.00-600.00 hrs, dt= 0.01 hrs
MSE 24-hr 3 2-Year Rainfall=2.87"

Area (sf)	CN	Adj	Description
2,673	80	80	>75% Grass cover, Good, HSG D
270	98	98	Unconnected roofs, HSG D
2,943			Weighted Average
2,673			90.83% Pervious Area
270			9.17% Impervious Area
270			100.00% Unconnected

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
1.1	83	0.1445	1.29		**Lag/CN Method,**
6.0	346	0.0448	0.96		**Lag/CN Method,**
7.1	429	Total			

Subcatchment OFF-7: OFF-7



Summary for Subcatchment OFF-8: OFF-8

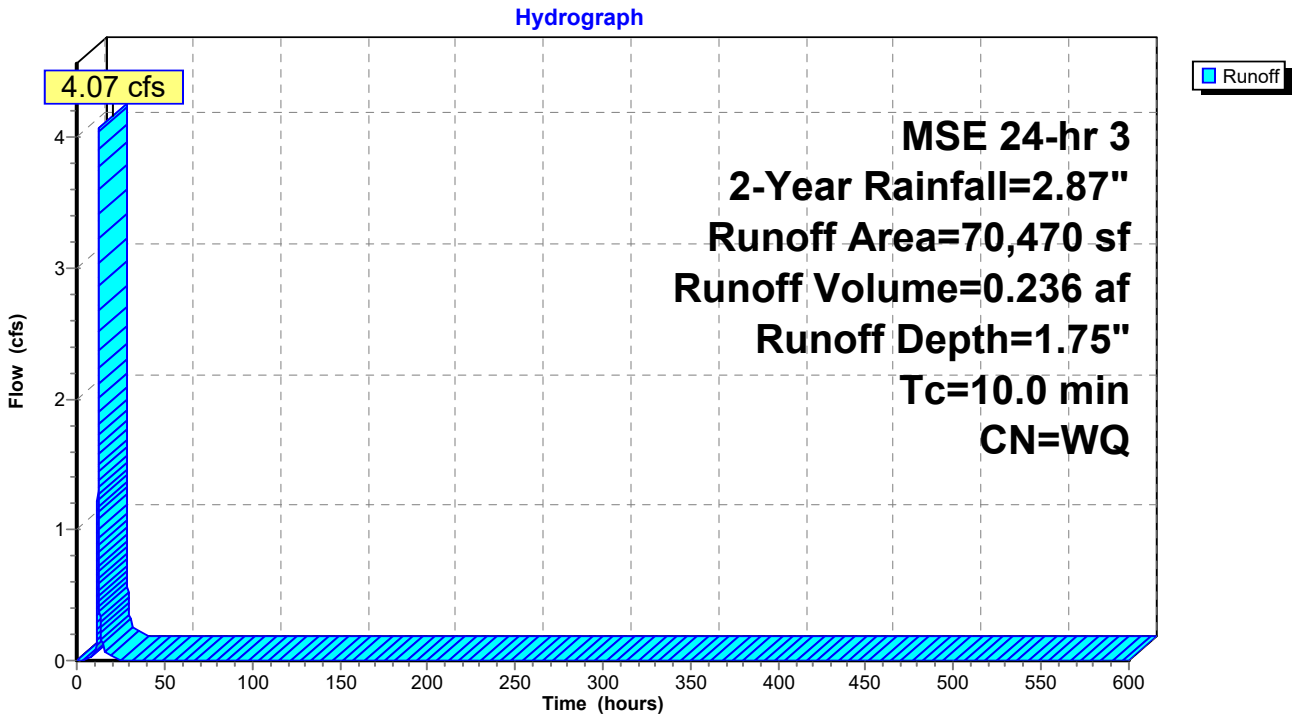
Runoff = 4.07 cfs @ 12.17 hrs, Volume= 0.236 af, Depth= 1.75"
Routed to Pond 1P : FILTRATION/WETLAND

Runoff by SCS TR-20 method, UH=SCS, Weighted-Q, Time Span= 0.00-600.00 hrs, dt= 0.01 hrs
MSE 24-hr 3 2-Year Rainfall=2.87"

Area (sf)	CN	Description
28,355	98	Paved parking, HSG D
42,115	80	>75% Grass cover, Good, HSG D
70,470		Weighted Average
42,115		59.76% Pervious Area
28,355		40.24% Impervious Area

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

Subcatchment OFF-8: OFF-8



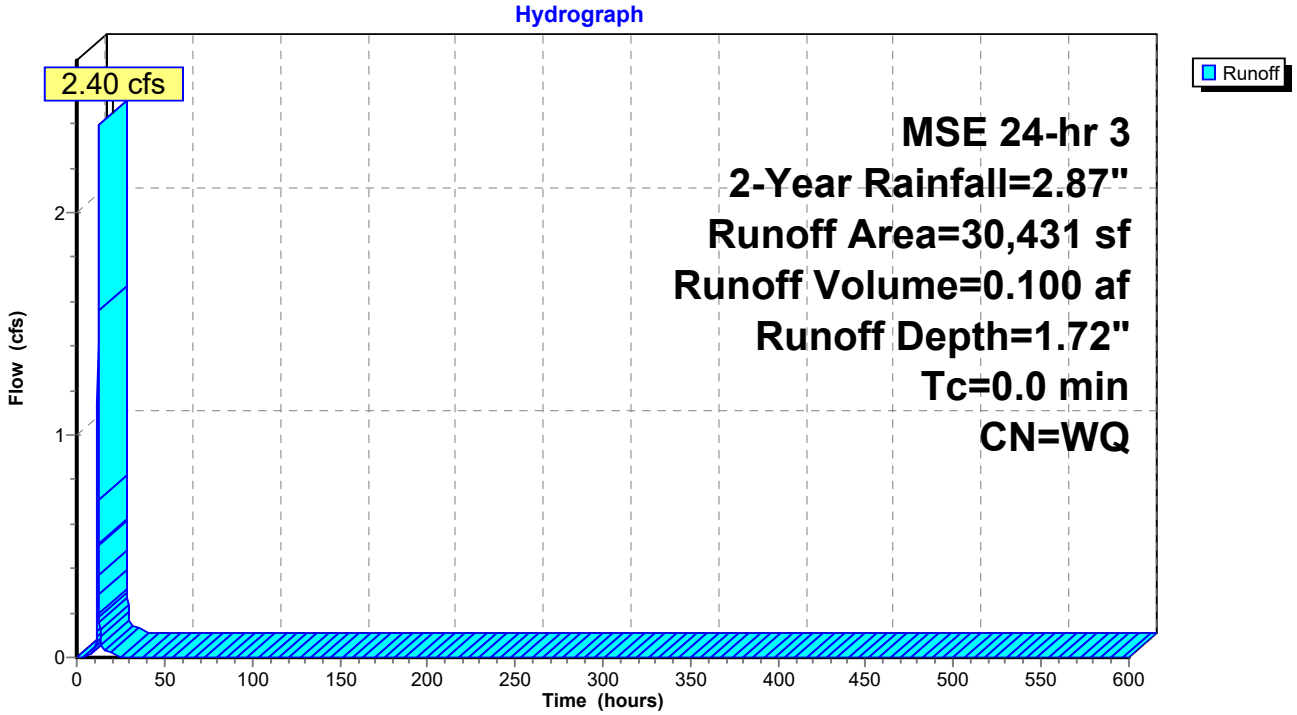
Summary for Subcatchment OFF-9: OFF-9

Runoff = 2.40 cfs @ 12.09 hrs, Volume= 0.100 af, Depth= 1.72"
Routed to Pond 1P : FILTRATION/WETLAND

Runoff by SCS TR-20 method, UH=SCS, Weighted-Q, Time Span= 0.00-600.00 hrs, dt= 0.01 hrs
MSE 24-hr 3 2-Year Rainfall=2.87"

Area (sf)	CN	Description
11,557	98	Paved parking, HSG D
18,874	80	>75% Grass cover, Good, HSG D
30,431		Weighted Average
18,874		62.02% Pervious Area
11,557		37.98% Impervious Area

Subcatchment OFF-9: OFF-9



Summary for Subcatchment S1: S1

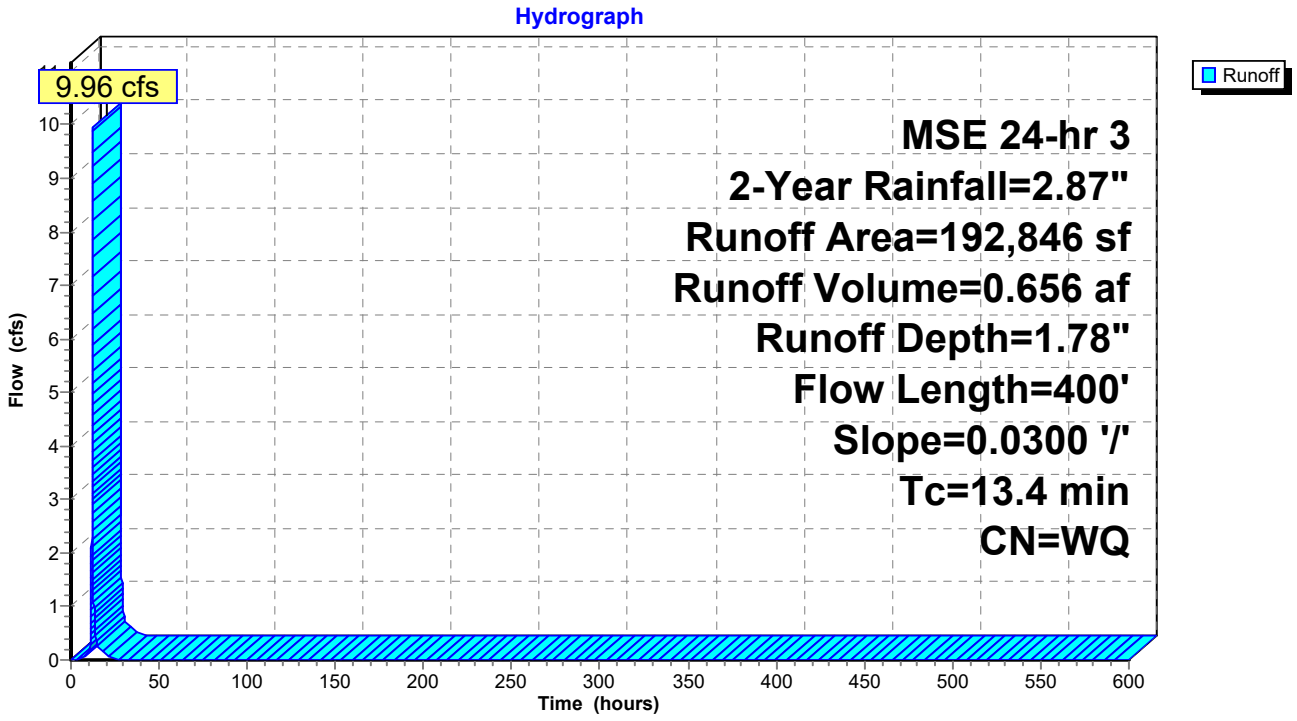
Runoff = 9.96 cfs @ 12.21 hrs, Volume= 0.656 af, Depth= 1.78"
Routed to Pond 1P : FILTRATION/WETLAND

Runoff by SCS TR-20 method, UH=SCS, Weighted-Q, Time Span= 0.00-600.00 hrs, dt= 0.01 hrs
MSE 24-hr 3 2-Year Rainfall=2.87"

	Area (sf)	CN	Description
	35,827	98	Unconnected roofs, HSG D
*	45,445	98	Water Surface, HSG D (994)
	111,574	80	>75% Grass cover, Good, HSG D
	192,846		Weighted Average
	111,574		57.86% Pervious Area
	81,272		42.14% Impervious Area
	35,827		44.08% Unconnected

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
7.4	50	0.0300	0.11		**Sheet Flow,** Grass: Dense n= 0.240 P2= 2.87"
6.0	350	0.0300	0.97		**Lag/CN Method, OVERLAND**
13.4	400	Total			

Subcatchment S1: S1



Summary for Subcatchment S2: S2

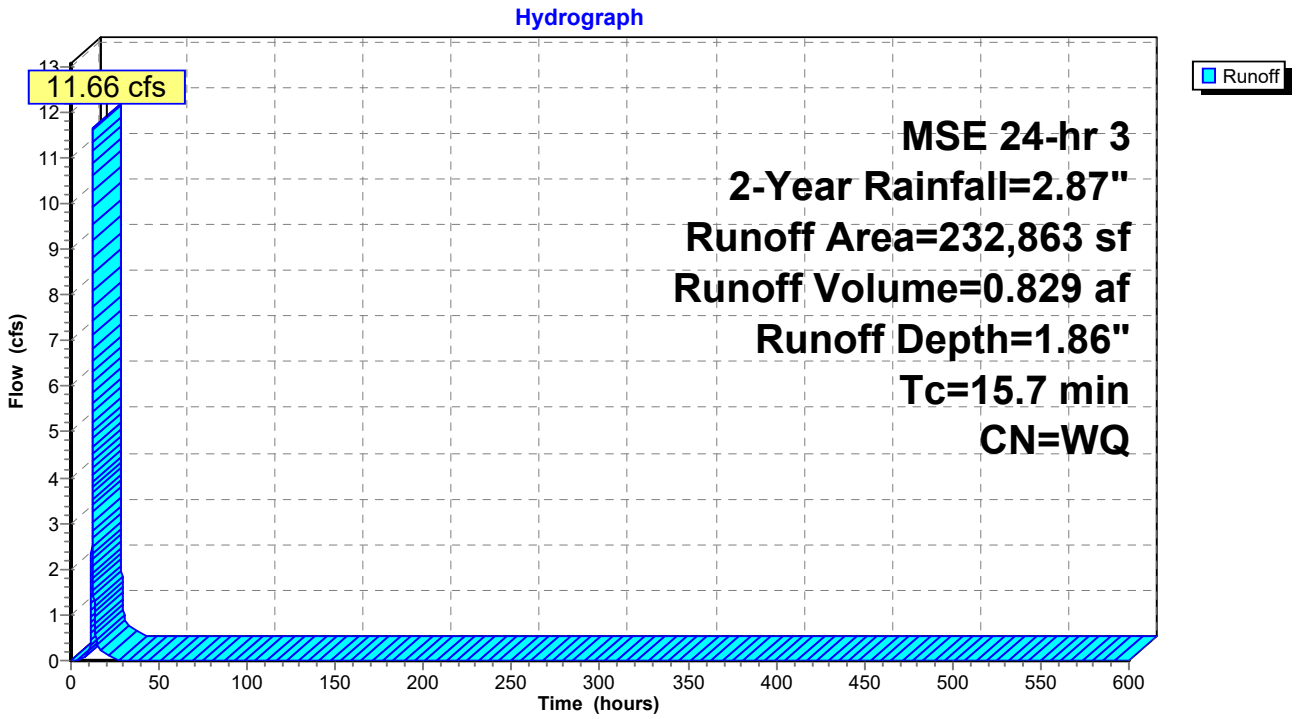
Runoff = 11.66 cfs @ 12.24 hrs, Volume= 0.829 af, Depth= 1.86"
Routed to Pond 1P : FILTRATION/WETLAND

Runoff by SCS TR-20 method, UH=SCS, Weighted-Q, Time Span= 0.00-600.00 hrs, dt= 0.01 hrs
MSE 24-hr 3 2-Year Rainfall=2.87"

Area (sf)	CN	Description
110,886	98	Paved parking, HSG D
121,977	80	>75% Grass cover, Good, HSG D
232,863		Weighted Average
121,977		52.38% Pervious Area
110,886		47.62% Impervious Area

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

Subcatchment S2: S2



Summary for Subcatchment S3: S3

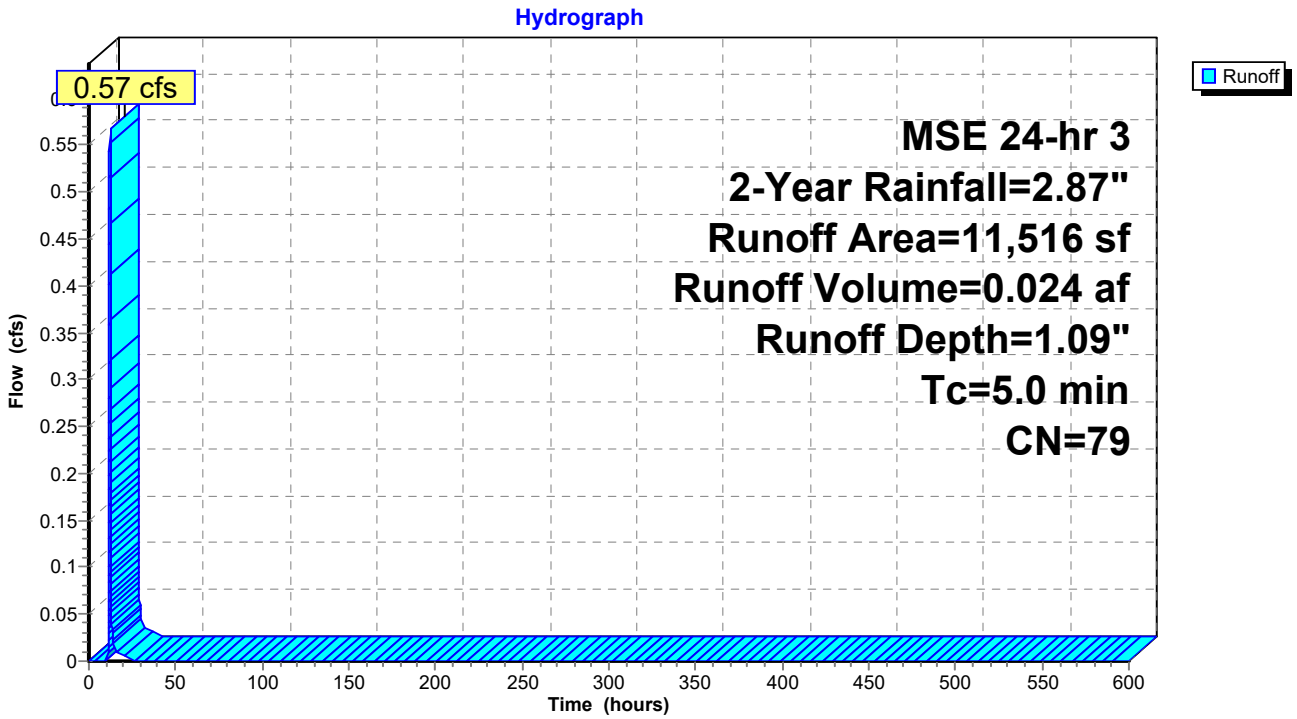
Runoff = 0.57 cfs @ 12.13 hrs, Volume= 0.024 af, Depth= 1.09"
Routed to Link 3L : SOUTH

Runoff by SCS TR-20 method, UH=SCS, Weighted-Q, Time Span= 0.00-600.00 hrs, dt= 0.01 hrs
MSE 24-hr 3 2-Year Rainfall=2.87"

Area (sf)	CN	Description
11,516	79	Woods/grass comb., Good, HSG D
11,516		100.00% Pervious Area

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

Subcatchment S3: S3



Summary for Subcatchment S4: S4

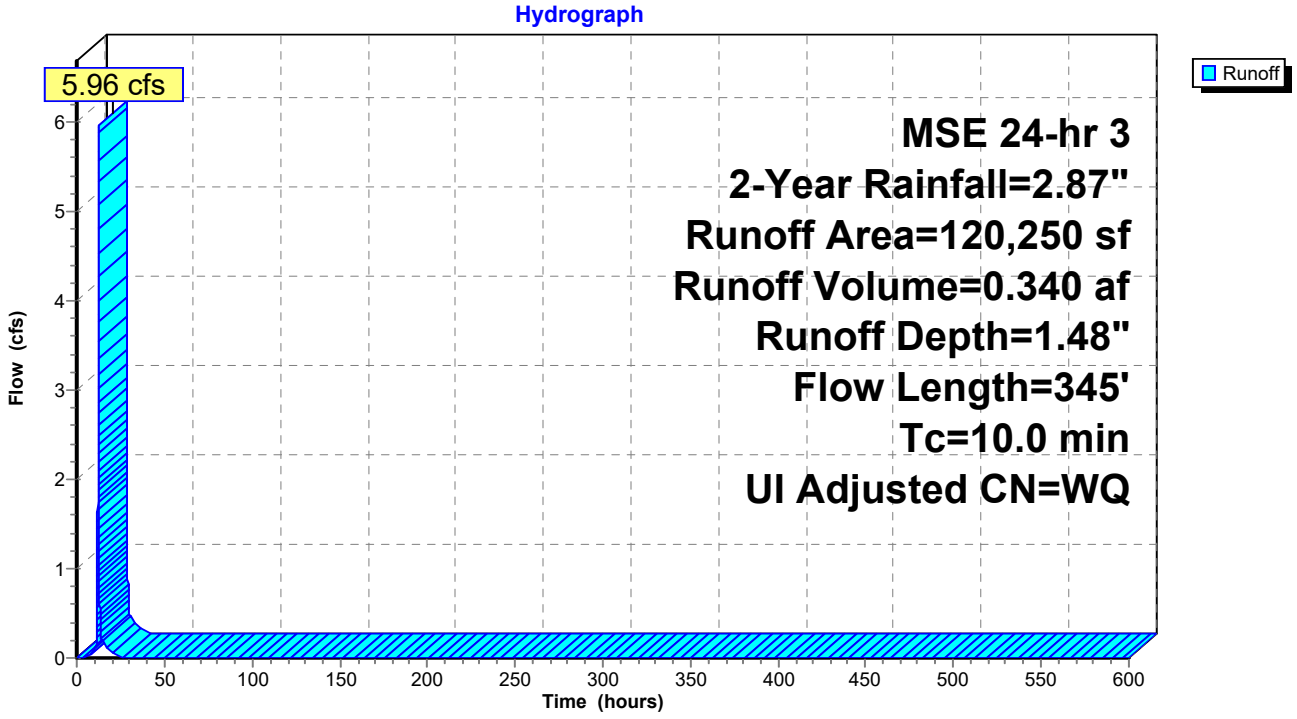
Runoff = 5.96 cfs @ 12.18 hrs, Volume= 0.340 af, Depth= 1.48"
Routed to Pond 8P : West Filtration Basin

Runoff by SCS TR-20 method, UH=SCS, Weighted-Q, Time Span= 0.00-600.00 hrs, dt= 0.01 hrs
MSE 24-hr 3 2-Year Rainfall=2.87"

Area (sf)	CN	Adj	Description
29,761	98	98	Unconnected roofs, HSG D
90,489	79	79	Woods/grass comb., Good, HSG D
120,250			Weighted Average
90,489			75.25% Pervious Area
29,761			24.75% Impervious Area
29,761			100.00% Unconnected

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
4.2	25	0.0300	0.10		**Sheet Flow,** Grass: Dense n= 0.240 P2= 2.87"
5.1	240	0.0300	0.78		**Lag/CN Method, OVERLAND**
0.7	80	0.2750	1.89		**Lag/CN Method, over**
10.0	345	Total			

Subcatchment S4: S4



Summary for Subcatchment S5: S5

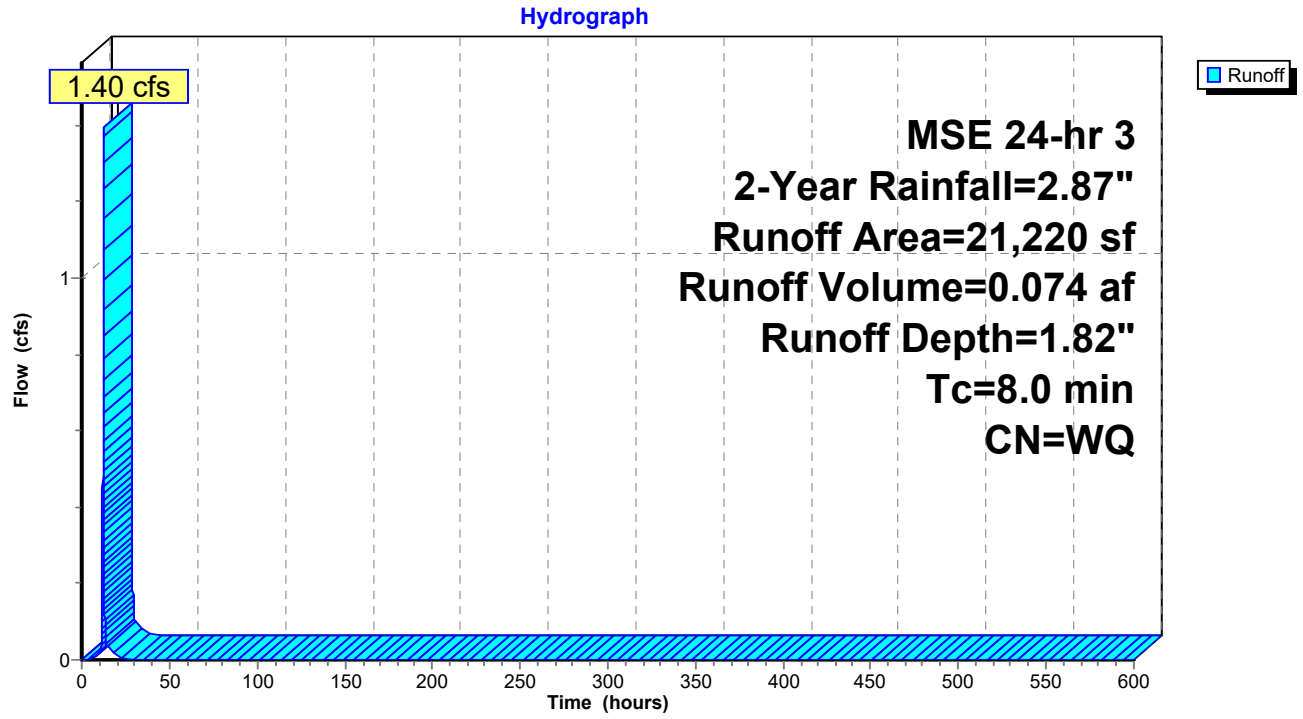
Runoff = 1.40 cfs @ 12.15 hrs, Volume= 0.074 af, Depth= 1.82"
Routed to Pond 1P : FILTRATION/WETLAND

Runoff by SCS TR-20 method, UH=SCS, Weighted-Q, Time Span= 0.00-600.00 hrs, dt= 0.01 hrs
MSE 24-hr 3 2-Year Rainfall=2.87"

Area (sf)	CN	Description
8,522	98	Unconnected roofs, HSG D
12,698	82	Woods/grass comb., Fair, HSG D
21,220		Weighted Average
12,698		59.84% Pervious Area
8,522		40.16% Impervious Area
8,522		100.00% Unconnected

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

Subcatchment S5: S5



Summary for Subcatchment S6: S6

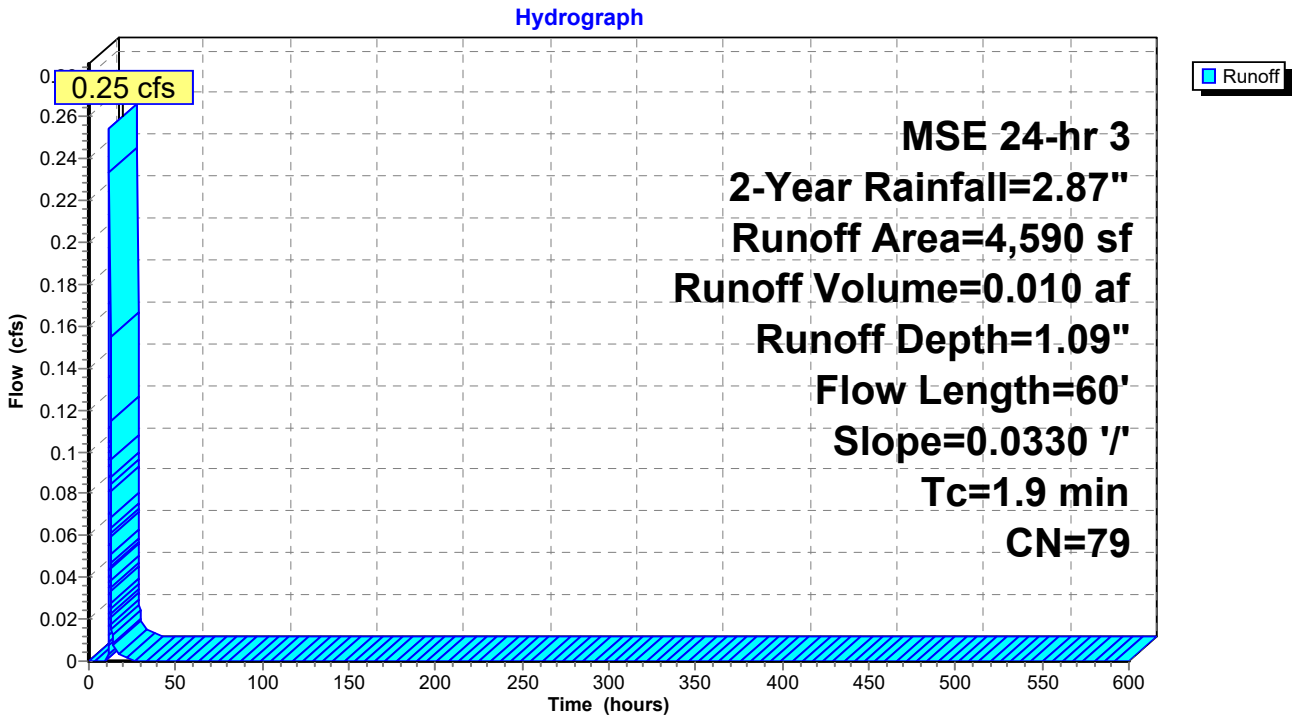
Runoff = 0.25 cfs @ 12.10 hrs, Volume= 0.010 af, Depth= 1.09"
Routed to Link 6L : EAST

Runoff by SCS TR-20 method, UH=SCS, Weighted-Q, Time Span= 0.00-600.00 hrs, dt= 0.01 hrs
MSE 24-hr 3 2-Year Rainfall=2.87"

Area (sf)	CN	Description
4,590	79	Woods/grass comb., Good, HSG D
4,590		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
1.9	60	0.0330	0.53		**Lag/CN Method, OVERLAND**

Subcatchment S6: S6



Summary for Subcatchment S7: S7

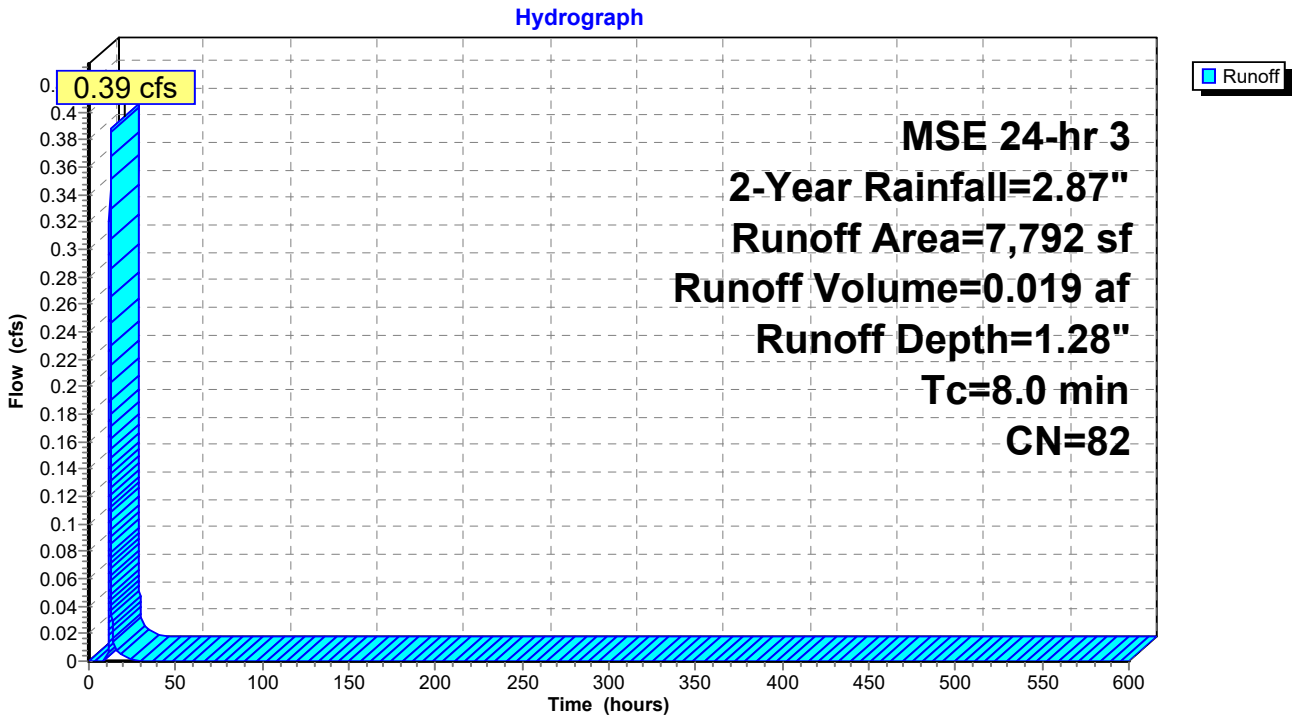
Runoff = 0.39 cfs @ 12.16 hrs, Volume= 0.019 af, Depth= 1.28"
Routed to Pond 10P : West Existing Wetland

Runoff by SCS TR-20 method, UH=SCS, Weighted-Q, Time Span= 0.00-600.00 hrs, dt= 0.01 hrs
MSE 24-hr 3 2-Year Rainfall=2.87"

Area (sf)	CN	Description
7,792	82	Woods/grass comb., Fair, HSG D
7,792		100.00% Pervious Area

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

Subcatchment S7: S7



Summary for Subcatchment S8: S8

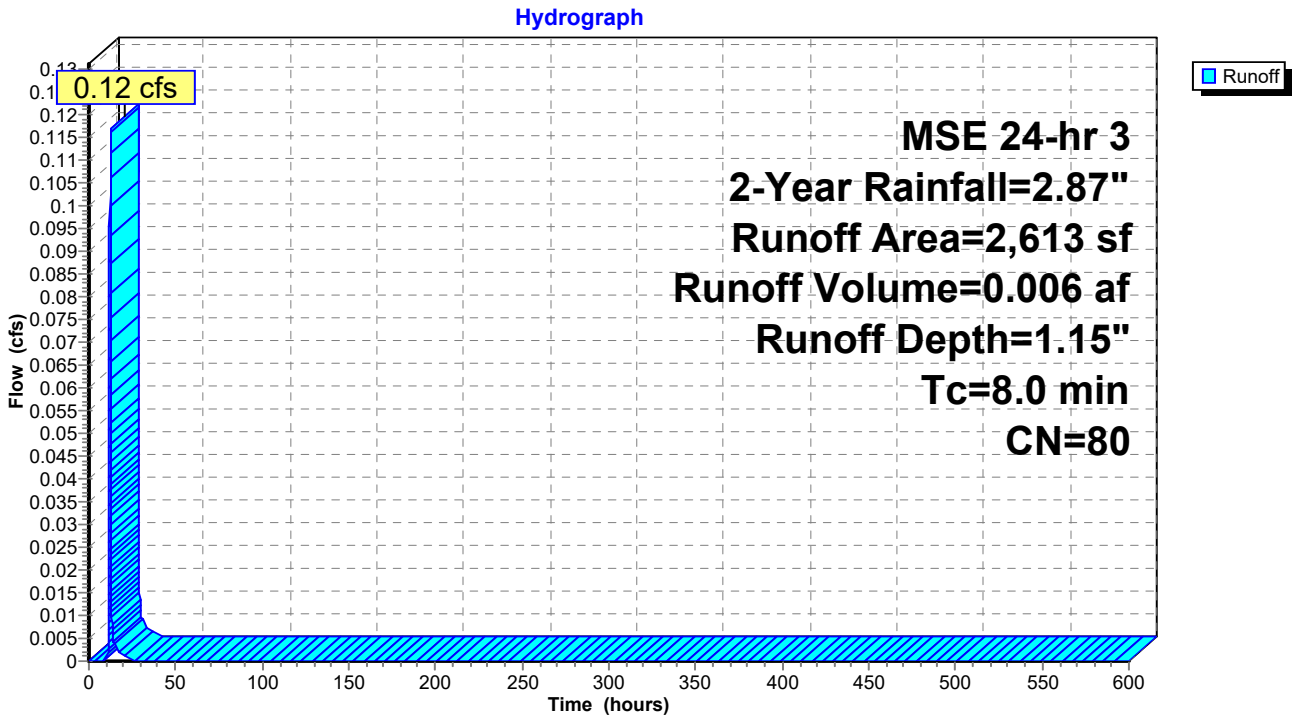
Runoff = 0.12 cfs @ 12.16 hrs, Volume= 0.006 af, Depth= 1.15"
Routed to Pond 10P : West Existing Wetland

Runoff by SCS TR-20 method, UH=SCS, Weighted-Q, Time Span= 0.00-600.00 hrs, dt= 0.01 hrs
MSE 24-hr 3 2-Year Rainfall=2.87"

Area (sf)	CN	Description
2,613	80	>75% Grass cover, Good, HSG D
2,613		100.00% Pervious Area

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

Subcatchment S8: S8



Summary for Pond 1P: FILTRATION/WETLAND

Inflow Area = 19.209 ac, 42.35% Impervious, Inflow Depth = 1.77" for 2-Year event
Inflow = 41.52 cfs @ 12.18 hrs, Volume= 2.838 af
Outflow = 0.94 cfs @ 15.38 hrs, Volume= 2.801 af, Atten= 98%, Lag= 192.0 min
Primary = 0.94 cfs @ 15.38 hrs, Volume= 2.801 af
Routed to Pond 11P : (new Pond)

Routing by Dyn-Stor-Ind method, Time Span= 0.00-600.00 hrs, dt= 0.01 hrs
Starting Elev= 994.00' Surf.Area= 77,880 sf Storage= 82,249 cf
Peak Elev= 995.96' @ 15.38 hrs Surf.Area= 85,449 sf Storage= 179,608 cf (97,360 cf above start)

Plug-Flow detention time= 12,920.6 min calculated for 0.913 af (32% of inflow)
Center-of-Mass det. time= 4,896.9 min (5,679.9 - 783.0)

Volume	Invert	Avail.Storage	Storage Description
#1	990.00'	17,111 cf	**West Forebay (Prismatic)**Listed below (Recalc)
#2	993.50'	1,136 cf	**West shallow wetland (Prismatic)**Listed below (Recalc)
#3	990.00'	18,942 cf	**Remnant Wetland (Prismatic)**Listed below (Recalc)
#4	989.00'	40,459 cf	**Middle Forebay (Prismatic)**Listed below (Recalc)
#5	993.50'	665 cf	**East shallow wetland (Prismatic)**Listed below (Recalc)
#6	992.90'	3,936 cf	**Filtration (Prismatic)**Listed below (Recalc) -Impervious 13,121 cf Overall x 30.0% Voids
#7	994.00'	336,285 cf	**Live Storage (Prismatic)**Listed below (Recalc)
		418,533 cf	Total Available Storage

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
990.00	2,470	0	0
992.00	4,186	6,656	6,656
994.00	6,269	10,455	17,111

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
993.50	1,701	0	0
994.00	2,844	1,136	1,136

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
990.00	1,596	0	0
992.00	4,761	6,357	6,357
994.00	7,824	12,585	18,942

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
989.00	5,024	0	0
990.00	6,006	5,515	5,515
991.00	7,121	6,564	12,079
993.00	9,592	16,713	28,792
994.00	13,742	11,667	40,459

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
993.50	961	0	0
994.00	1,698	665	665

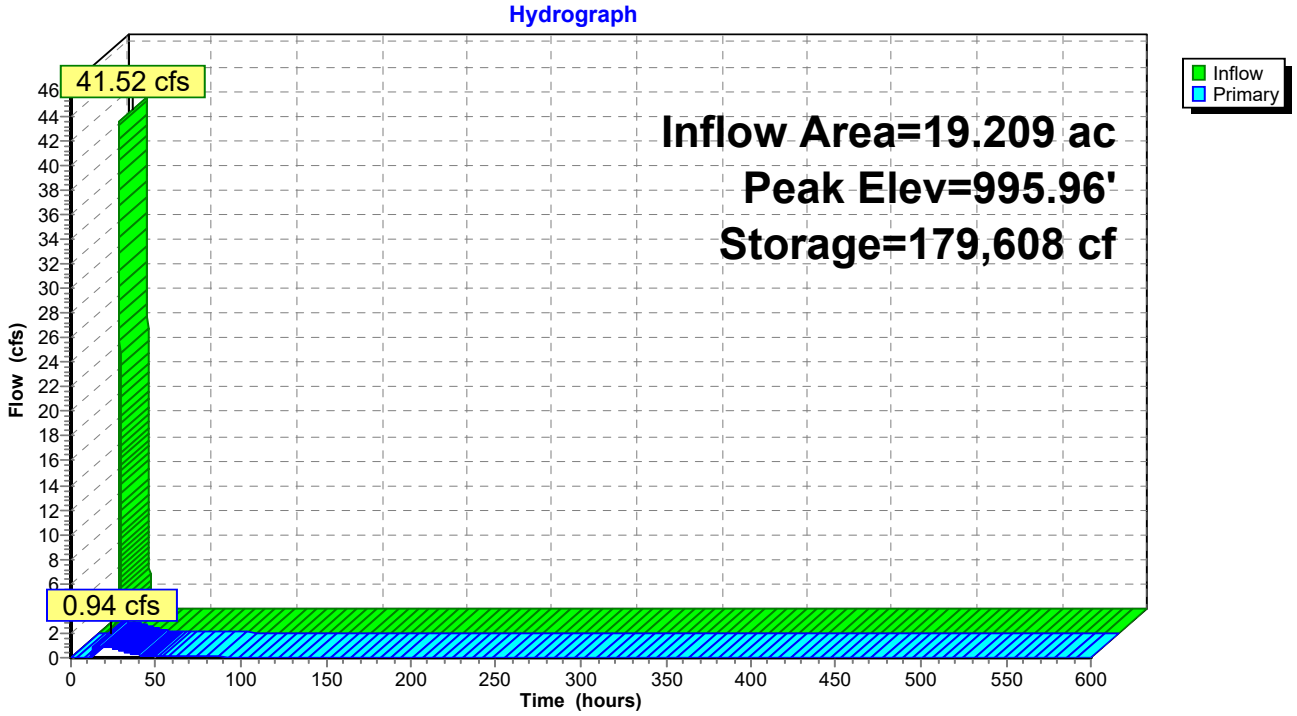
Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
992.90	11,928	0	0
994.00	11,928	13,121	13,121

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
994.00	45,503	0	0
995.00	49,888	47,696	47,696
996.00	53,188	51,538	99,234
998.00	56,729	109,917	209,151
1,000.00	70,405	127,134	336,285

Device	Routing	Invert	Outlet Devices
#1	Primary	990.90'	**15.0" Round Culvert** L= 556.1' RCP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 990.90' / 988.10' S= 0.0050 '/' Cc= 0.900 n= 0.013 Concrete sewer w/manholes & inlets, Flow Area= 1.23 sf
#2	Device 1	999.10'	**6.0' long x 0.5' breadth Broad-Crested Rectangular Weir** Head (feet) 0.20 0.40 0.60 0.80 1.00 Coef. (English) 2.80 2.92 3.08 3.30 3.32
#3	Device 1	994.00'	**0.800 in/hr Filtration over Surface area above 994.00'** Excluded Surface area = 77,880 sf
#4	Device 1	995.00'	**6.0" Vert. Orifice/Grate** C= 0.600 Limited to weir flow at low heads

Primary OutFlow Max=0.94 cfs @ 15.38 hrs HW=995.96' TW=986.86' (Dynamic Tailwater)
└─**1=Culvert** (Passes 0.94 cfs of 6.66 cfs potential flow)
  ├─**2=Broad-Crested Rectangular Weir** (Controls 0.00 cfs)
  ├─**3=Filtration** (Exfiltration Controls 0.14 cfs)
  └─**4=Orifice/Grate** (Orifice Controls 0.80 cfs @ 4.07 fps)

Pond 1P: FILTRATION/WETLAND



Summary for Pond 8P: West Filtration Basin

Inflow Area = 2.967 ac, 23.03% Impervious, Inflow Depth = 1.46" for 2-Year event
Inflow = 6.39 cfs @ 12.18 hrs, Volume= 0.362 af
Outflow = 3.31 cfs @ 12.31 hrs, Volume= 0.362 af, Atten= 48%, Lag= 8.3 min
Primary = 3.26 cfs @ 12.31 hrs, Volume= 0.202 af
Routed to Pond 11P : (new Pond)
Secondary = 0.05 cfs @ 12.31 hrs, Volume= 0.159 af
Routed to Pond 11P : (new Pond)

Routing by Dyn-Stor-Ind method, Time Span= 0.00-600.00 hrs, dt= 0.01 hrs
Peak Elev= 996.83' @ 12.31 hrs Surf.Area= 4,729 sf Storage= 6,547 cf

Plug-Flow detention time= 842.0 min calculated for 0.362 af (100% of inflow)
Center-of-Mass det. time= 842.3 min (1,638.4 - 796.1)

Volume	Invert	Avail.Storage	Storage Description
#1	995.00'	16,465 cf	**Custom Stage Data (Prismatic)** Listed below (Recalc)

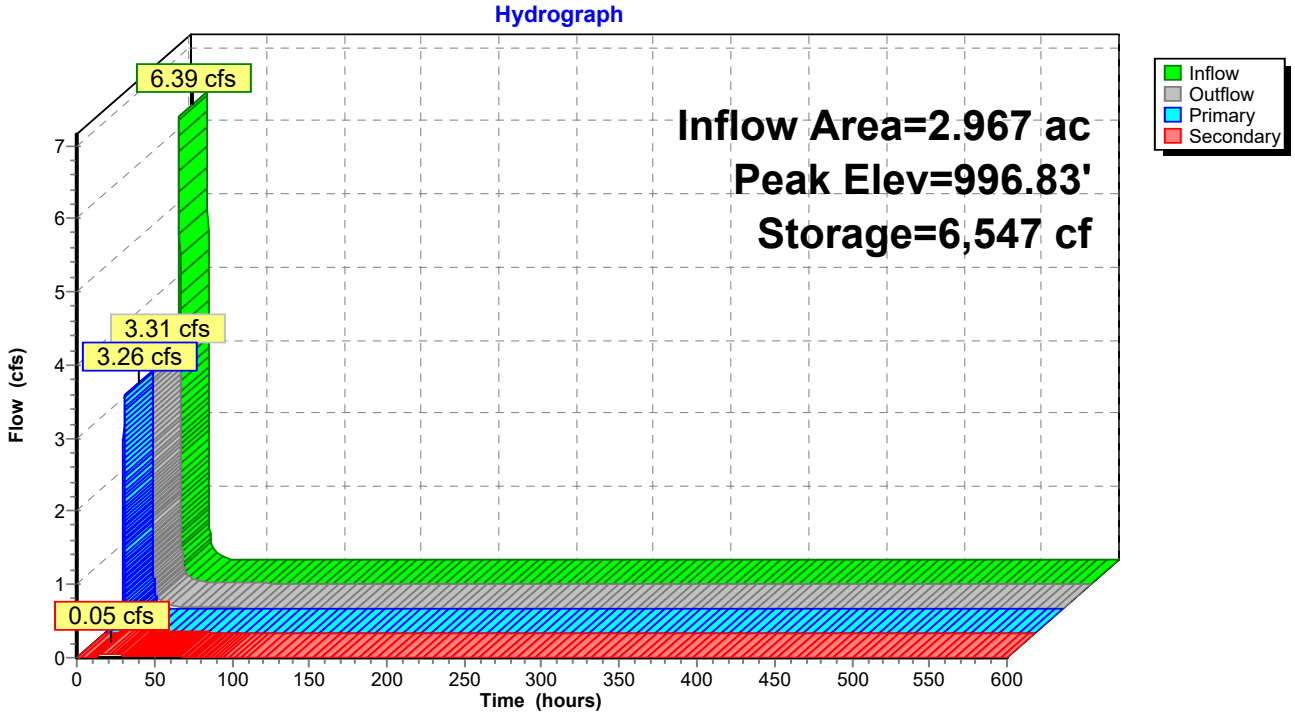
Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
995.00	2,510	0	0
996.00	3,654	3,082	3,082
996.50	4,280	1,984	5,066
997.00	4,962	2,311	7,376
998.00	6,420	5,691	13,067
998.50	7,173	3,398	16,465

Device	Routing	Invert	Outlet Devices
#1	Secondary	995.00'	**1.000 in/hr Filtration over Surface area above 995.00'** Excluded Surface area = 2,510 sf
#2	Device 3	996.50'	**6.0' long x 0.5' breadth Broad-Crested Rectangular Weir** Head (feet) 0.20 0.40 0.60 0.80 1.00 Coef. (English) 2.80 2.92 3.08 3.30 3.32
#3	Primary	995.00'	**21.0" Round Culvert** L= 14.0' RCP, mitered to conform to fill, Ke= 0.700 Inlet / Outlet Invert= 995.00' / 994.79' S= 0.0150 '/' Cc= 0.900 n= 0.013, Flow Area= 2.41 sf

Primary OutFlow Max=3.25 cfs @ 12.31 hrs HW=996.83' TW=987.39' (Dynamic Tailwater)
↑—**3=Culvert** (Passes 3.25 cfs of 9.72 cfs potential flow)
↑—**2=Broad-Crested Rectangular Weir** (Weir Controls 3.25 cfs @ 1.65 fps)

Secondary OutFlow Max=0.05 cfs @ 12.31 hrs HW=996.83' TW=987.39' (Dynamic Tailwater)
↑—**1=Filtration** (Exfiltration Controls 0.05 cfs)

Pond 8P: West Filtration Basin



Summary for Pond 9P: South Filtration Trench

Inflow Area = 1.353 ac, 19.13% Impervious, Inflow Depth = 1.44" for 2-Year event
Inflow = 2.83 cfs @ 12.17 hrs, Volume= 0.162 af
Outflow = 2.76 cfs @ 12.19 hrs, Volume= 0.154 af, Atten= 3%, Lag= 1.4 min
Primary = 0.05 cfs @ 12.19 hrs, Volume= 0.078 af
Routed to Link 3L : SOUTH
Secondary = 2.71 cfs @ 12.19 hrs, Volume= 0.075 af
Routed to Link 3L : SOUTH

Routing by Dyn-Stor-Ind method, Time Span= 0.00-600.00 hrs, dt= 0.01 hrs
Peak Elev= 1,020.04' @ 12.19 hrs Surf.Area= 3,474 sf Storage= 2,185 cf

Plug-Flow detention time= 284.7 min calculated for 0.154 af (95% of inflow)
Center-of-Mass det. time= 258.3 min (1,057.8 - 799.5)

Volume	Invert	Avail.Storage	Storage Description
#1	1,017.25'	368 cf	**Filter Storage (Min) (Prismatic)** Listed below (Recalc) 1,050 cf Overall x 35.0% Voids
#2	1,019.00'	3,345 cf	**Live Storage (Prismatic)** Listed below (Recalc)
		3,712 cf	Total Available Storage

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
1,017.25	600	0	0
1,019.00	600	1,050	1,050

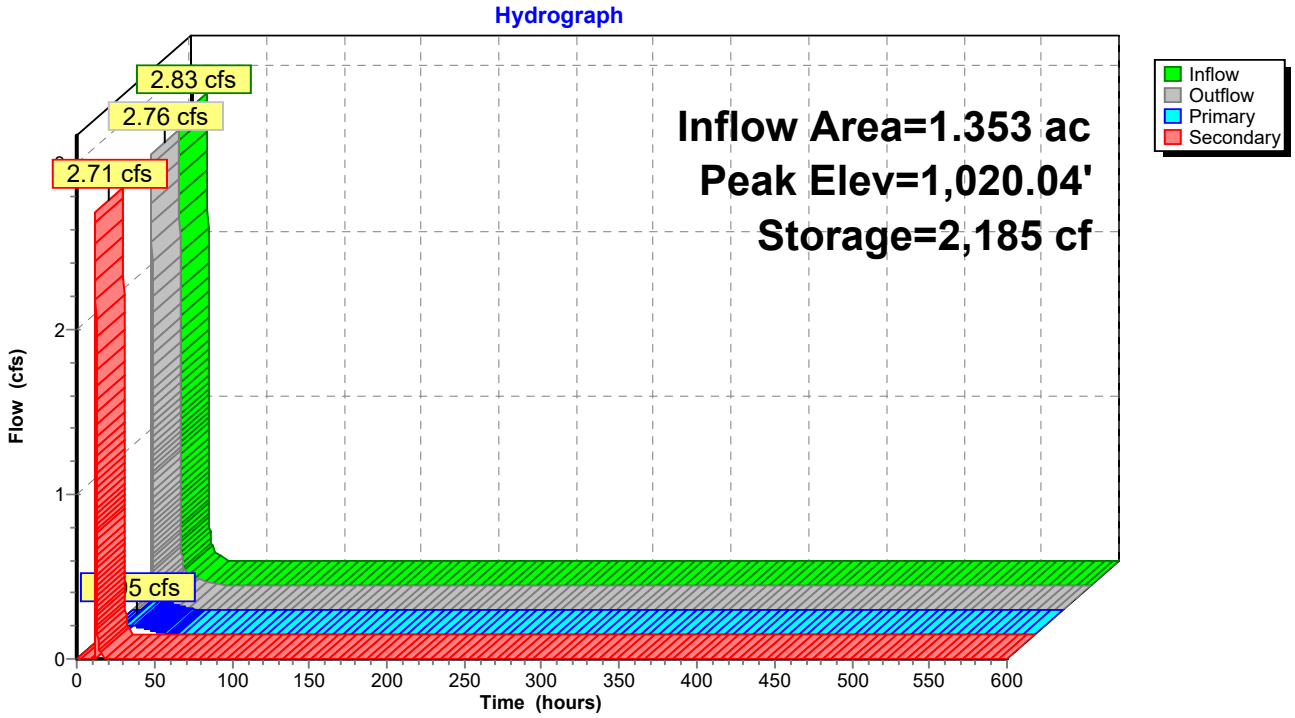
Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
1,019.00	600	0	0
1,019.50	1,714	579	579
1,020.00	2,800	1,129	1,707
1,020.50	3,750	1,638	3,345

Device	Routing	Invert	Outlet Devices
#1	Primary	1,015.00'	**15.0" Round Culvert** L= 200.0' RCP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 1,015.00' / 1,000.00' S= 0.0750 '/' Cc= 0.900 n= 0.013 Concrete pipe, bends & connections, Flow Area= 1.23 sf
#2	Device 1	1,019.00'	**1.000 in/hr Filtration over Surface area above 1,019.00'** Excluded Surface area = 1,200 sf
#3	Secondary	1,020.00'	**130.0' long + 3.0 '/' SideZ x 1.0' 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 Coef. (English) 2.69 2.72 2.75 2.85 2.98 3.08 3.20 3.28 3.31 3.30 3.31 3.32

Primary OutFlow Max=0.05 cfs @ 12.19 hrs HW=1,020.04' TW=0.00' (Dynamic Tailwater)
└─**1=Culvert** (Passes 0.05 cfs of 12.41 cfs potential flow)
└─**2=Filtration** (Exfiltration Controls 0.05 cfs)

Secondary OutFlow Max=2.68 cfs @ 12.19 hrs HW=1,020.04' TW=0.00' (Dynamic Tailwater)
└─**3=Broad-Crested Rectangular Weir** (Weir Controls 2.68 cfs @ 0.53 fps)

Pond 9P: South Filtration Trench



Summary for Pond 10P: West Existing Wetland

Inflow Area = 22.414 ac, 39.34% Impervious, Inflow Depth > 1.71" for 2-Year event
Inflow = 3.85 cfs @ 12.32 hrs, Volume= 3.188 af
Outflow = 1.09 cfs @ 15.65 hrs, Volume= 3.184 af, Atten= 72%, Lag= 199.4 min
Primary = 1.09 cfs @ 15.65 hrs, Volume= 3.184 af
Routed to Link 7L : TOTAL

Routing by Dyn-Stor-Ind method, Time Span= 0.00-600.00 hrs, dt= 0.01 hrs
Starting Elev= 974.10' Surf.Area= 54,326 sf Storage= 5,411 cf
Peak Elev= 974.27' @ 15.65 hrs Surf.Area= 55,067 sf Storage= 14,762 cf (9,351 cf above start)

Plug-Flow detention time= 1,349.3 min calculated for 3.059 af (96% of inflow)
Center-of-Mass det. time= 234.3 min (5,417.9 - 5,183.6)

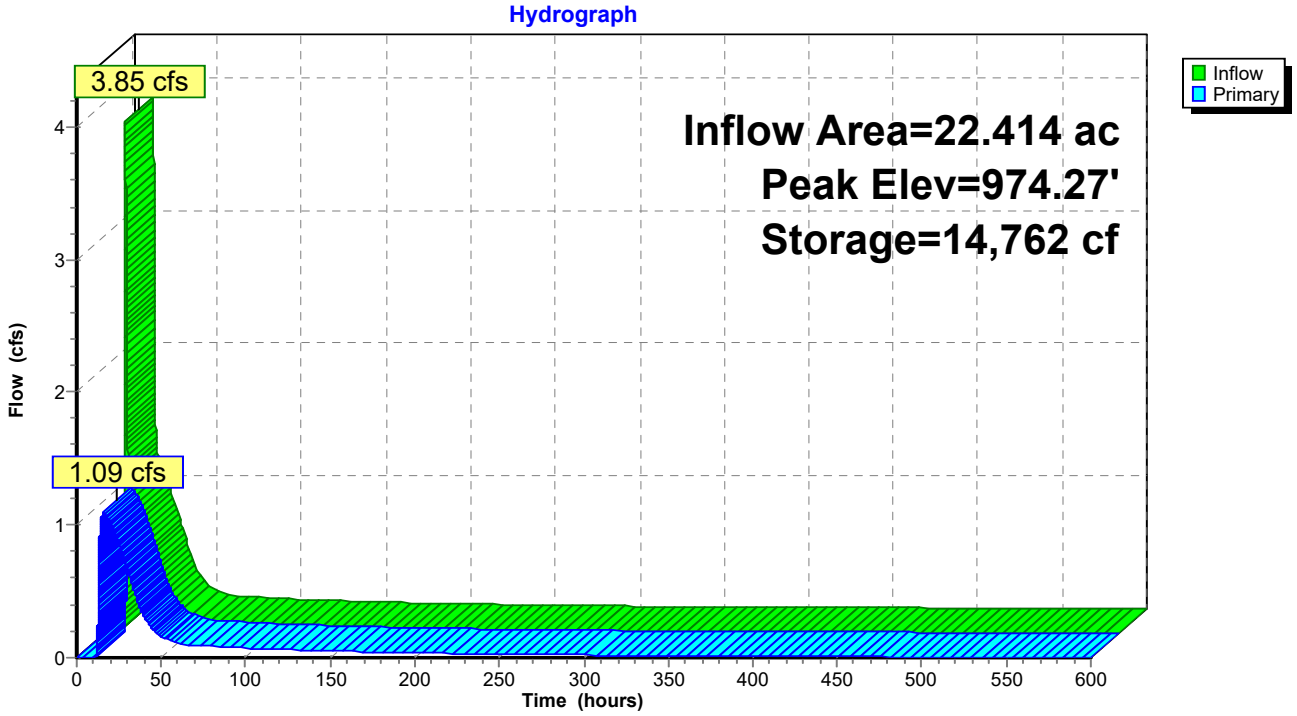
Volume	Invert	Avail.Storage	Storage Description
#1	974.00'	487,616 cf	**Custom Stage Data (Prismatic)** Listed below (Recalc)

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
974.00	53,893	0	0
975.00	58,226	56,060	56,060
976.00	62,886	60,556	116,616
977.00	67,093	64,990	181,605
978.00	71,582	69,338	250,943
979.00	76,083	73,833	324,775
980.00	81,311	78,697	403,472
981.00	86,977	84,144	487,616

Device	Routing	Invert	Outlet Devices
#1	Primary	974.10'	**18.0" Horiz. Orifice/Grate** C= 0.600 Limited to weir flow at low heads

Primary OutFlow Max=1.09 cfs @ 15.65 hrs HW=974.27' TW=0.00' (Dynamic Tailwater)
↑—**1=Orifice/Grate** (Weir Controls 1.09 cfs @ 1.35 fps)

Pond 10P: West Existing Wetland



Summary for Pond 11P: (new Pond)

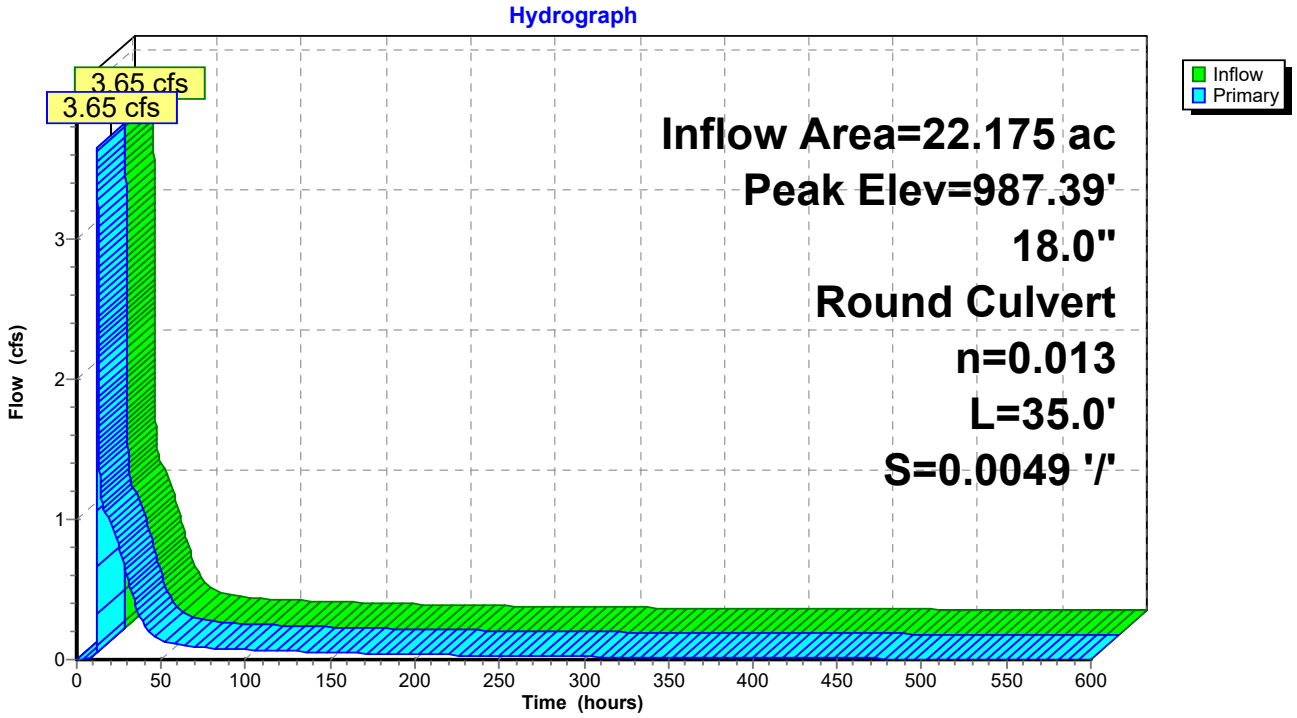
Inflow Area = 22.175 ac, 39.77% Impervious, Inflow Depth > 1.71" for 2-Year event
Inflow = 3.65 cfs @ 12.33 hrs, Volume= 3.163 af
Outflow = 3.65 cfs @ 12.33 hrs, Volume= 3.163 af, Atten= 0%, Lag= 0.0 min
Primary = 3.65 cfs @ 12.33 hrs, Volume= 3.163 af
Routed to Pond 10P : West Existing Wetland

Routing by Dyn-Stor-Ind method, Time Span= 0.00-600.00 hrs, dt= 0.01 hrs
Peak Elev= 987.39' @ 12.33 hrs

Device	Routing	Invert	Outlet Devices
#1	Primary	986.30'	**18.0" Round Culvert** L= 35.0' RCP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 986.30' / 986.13' S= 0.0049 '/' Cc= 0.900 n= 0.013, Flow Area= 1.77 sf

Primary OutFlow Max=3.65 cfs @ 12.33 hrs HW=987.39' TW=974.14' (Dynamic Tailwater)
└**1=Culvert** (Barrel Controls 3.65 cfs @ 3.69 fps)

Pond 11P: (new Pond)

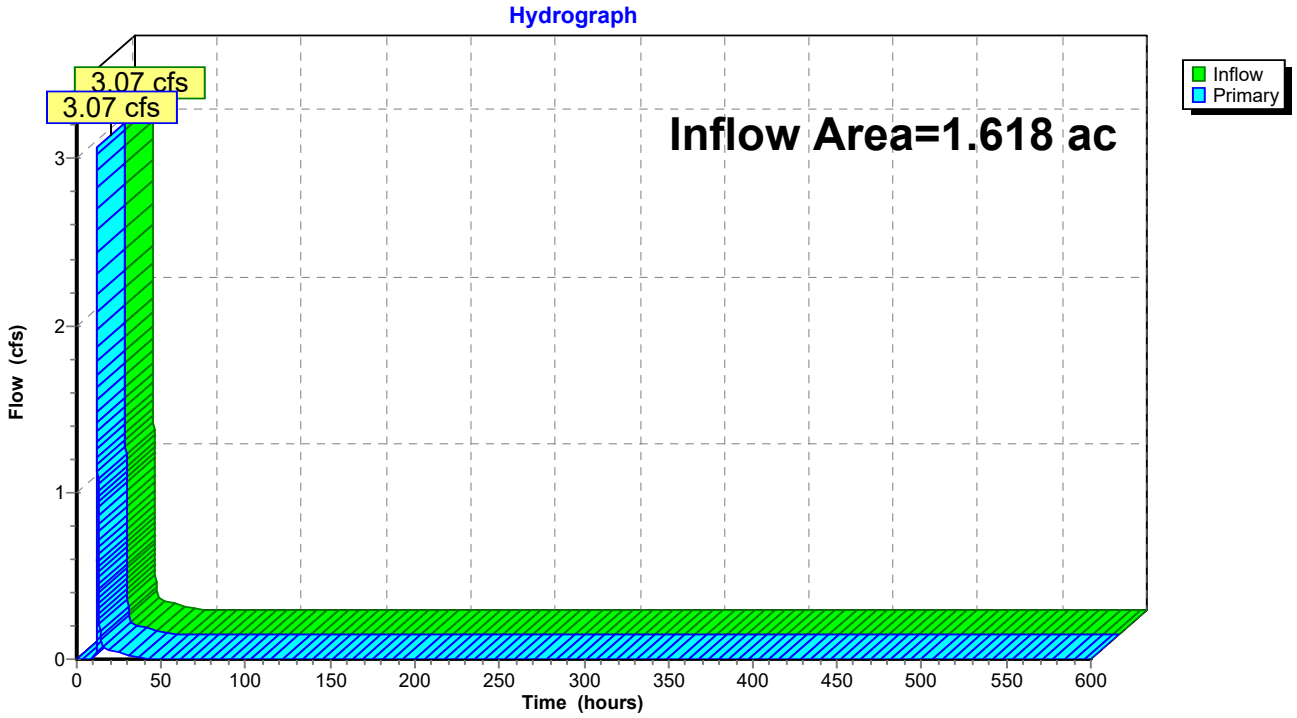


Summary for Link 3L: SOUTH

Inflow Area = 1.618 ac, 16.00% Impervious, Inflow Depth = 1.32" for 2-Year event
Inflow = 3.07 cfs @ 12.19 hrs, Volume= 0.178 af
Primary = 3.07 cfs @ 12.19 hrs, Volume= 0.178 af, Atten= 0%, Lag= 0.0 min
Routed to Link 7L : TOTAL

Primary outflow = Inflow, Time Span= 0.00-600.00 hrs, dt= 0.01 hrs

Link 3L: SOUTH

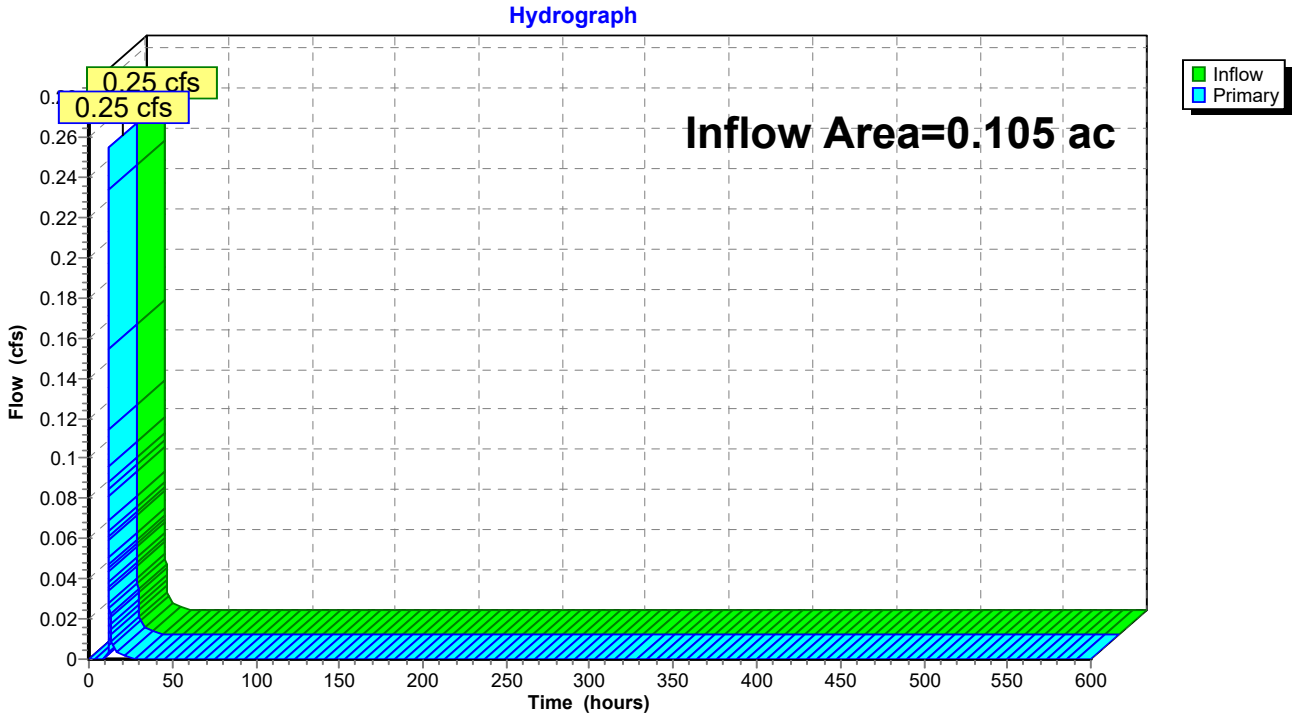


Summary for Link 6L: EAST

Inflow Area = 0.105 ac, 0.00% Impervious, Inflow Depth = 1.09" for 2-Year event
Inflow = 0.25 cfs @ 12.10 hrs, Volume= 0.010 af
Primary = 0.25 cfs @ 12.10 hrs, Volume= 0.010 af, Atten= 0%, Lag= 0.0 min
Routed to Link 7L : TOTAL

Primary outflow = Inflow, Time Span= 0.00-600.00 hrs, dt= 0.01 hrs

Link 6L: EAST

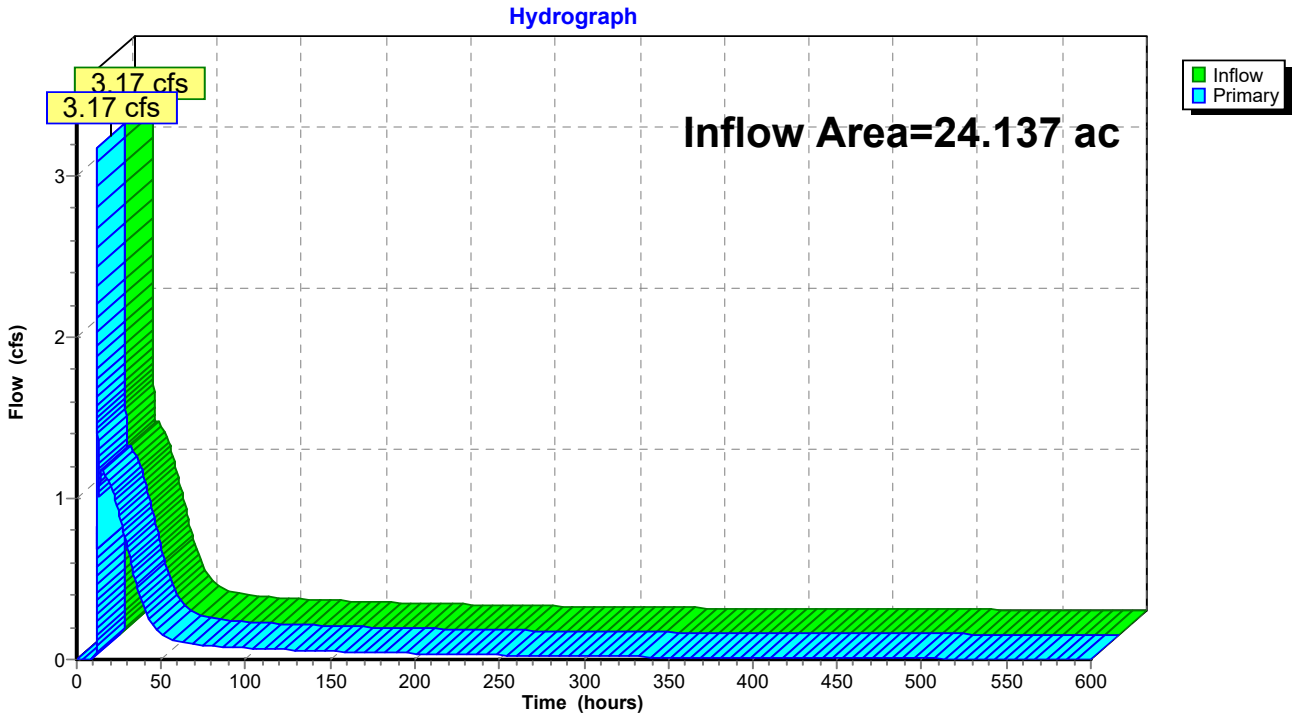


Summary for Link 7L: TOTAL

Inflow Area = 24.137 ac, 37.61% Impervious, Inflow Depth > 1.68" for 2-Year event
Inflow = 3.17 cfs @ 12.19 hrs, Volume= 3.371 af
Primary = 3.17 cfs @ 12.19 hrs, Volume= 3.371 af, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 0.00-600.00 hrs, dt= 0.01 hrs

Link 7L: TOTAL



Time span=0.00-600.00 hrs, dt=0.01 hrs, 60001 points
Runoff by SCS TR-20 method, UH=SCS, Weighted-Q
Reach routing by Dyn-Stor-Ind method - Pond routing by Dyn-Stor-Ind method

Subcatchment9S: S9 Runoff Area=40,548 sf 23.56% Impervious Runoff Depth=2.67"
Tc=9.0 min UI Adjusted CN=WQ Runoff=3.87 cfs 0.207 af

SubcatchmentOFF-1: OFF-1 Runoff Area=158,729 sf 43.99% Impervious Runoff Depth=2.99"
Flow Length=564' Slope=0.0323 '/' Tc=9.8 min CN=WQ Runoff=15.71 cfs 0.908 af

SubcatchmentOFF-2: OFF-2 Runoff Area=17,669 sf 22.68% Impervious Runoff Depth=2.60"
Flow Length=287' Slope=0.0766 '/' Tc=3.8 min UI Adjusted CN=WQ Runoff=2.02 cfs 0.088 af

SubcatchmentOFF-3: OFF-3 Runoff Area=86,096 sf 33.88% Impervious Runoff Depth=2.80"
Flow Length=499' Slope=0.0613 '/' Tc=6.2 min CN=WQ Runoff=9.46 cfs 0.462 af

SubcatchmentOFF-4: OFF-4 Runoff Area=23,465 sf 44.73% Impervious Runoff Depth=3.05"
Tc=10.0 min CN=WQ Runoff=2.35 cfs 0.137 af

SubcatchmentOFF-5: OFF-5 Runoff Area=8,976 sf 0.00% Impervious Runoff Depth=2.43"
Tc=8.0 min CN=82 Runoff=0.85 cfs 0.042 af

SubcatchmentOFF-6: OFF-6 Runoff Area=18,404 sf 9.37% Impervious Runoff Depth=2.42"
Tc=13.0 min CN=WQ Runoff=1.39 cfs 0.085 af

SubcatchmentOFF-7: OFF-7 Runoff Area=2,943 sf 9.17% Impervious Runoff Depth=2.42"
Flow Length=429' Tc=7.1 min UI Adjusted CN=WQ Runoff=0.28 cfs 0.014 af

SubcatchmentOFF-8: OFF-8 Runoff Area=70,470 sf 40.24% Impervious Runoff Depth=2.97"
Tc=10.0 min CN=WQ Runoff=6.92 cfs 0.400 af

SubcatchmentOFF-9: OFF-9 Runoff Area=30,431 sf 37.98% Impervious Runoff Depth=2.93"
Tc=0.0 min CN=WQ Runoff=4.03 cfs 0.171 af

SubcatchmentS1: S1 Runoff Area=192,846 sf 42.14% Impervious Runoff Depth=3.00"
Flow Length=400' Slope=0.0300 '/' Tc=13.4 min CN=WQ Runoff=16.86 cfs 1.108 af

SubcatchmentS2: S2 Runoff Area=232,863 sf 47.62% Impervious Runoff Depth=3.10"
Tc=15.7 min CN=WQ Runoff=19.48 cfs 1.381 af

SubcatchmentS3: S3 Runoff Area=11,516 sf 0.00% Impervious Runoff Depth=2.18"
Tc=5.0 min CN=79 Runoff=1.12 cfs 0.048 af

SubcatchmentS4: S4 Runoff Area=120,250 sf 24.75% Impervious Runoff Depth=2.63"
Flow Length=345' Tc=10.0 min UI Adjusted CN=WQ Runoff=10.74 cfs 0.606 af

SubcatchmentS5: S5 Runoff Area=21,220 sf 40.16% Impervious Runoff Depth=3.07"
Tc=8.0 min CN=WQ Runoff=2.34 cfs 0.125 af

SubcatchmentS6: S6 Runoff Area=4,590 sf 0.00% Impervious Runoff Depth=2.18"
Flow Length=60' Slope=0.0330 '/' Tc=1.9 min CN=79 Runoff=0.50 cfs 0.019 af

SubcatchmentS7: S7 Runoff Area=7,792 sf 0.00% Impervious Runoff Depth=2.43"
Tc=8.0 min CN=82 Runoff=0.73 cfs 0.036 af

SubcatchmentS8: S8 Runoff Area=2,613 sf 0.00% Impervious Runoff Depth=2.26"
Tc=8.0 min CN=80 Runoff=0.23 cfs 0.011 af

Pond 1P: FILTRATION/WETLAND Peak Elev=997.22' Storage=247,638 cf Inflow=70.30 cfs 4.792 af
Outflow=1.51 cfs 4.751 af

Pond 8P: West Filtration Basin Peak Elev=997.15' Storage=8,120 cf Inflow=11.55 cfs 0.648 af
Primary=9.77 cfs 0.483 af Secondary=0.06 cfs 0.164 af Outflow=9.83 cfs 0.648 af

Pond 9P: South Filtration Trench Peak Elev=1,020.06' Storage=2,244 cf Inflow=5.15 cfs 0.293 af
Primary=0.05 cfs 0.087 af Secondary=5.08 cfs 0.197 af Outflow=5.13 cfs 0.284 af

Pond 10P: West Existing Wetland Peak Elev=974.38' Storage=20,836 cf Inflow=11.38 cfs 5.446 af
Outflow=2.29 cfs 5.441 af

Pond 11P: (new Pond) Peak Elev=988.85' Inflow=10.71 cfs 5.398 af
18.0" Round Culvert n=0.013 L=35.0' S=0.0049 '/' Outflow=10.71 cfs 5.398 af

Link 3L: SOUTH Inflow=5.93 cfs 0.332 af
Primary=5.93 cfs 0.332 af

Link 6L: EAST Inflow=0.50 cfs 0.019 af
Primary=0.50 cfs 0.019 af

Link 7L: TOTAL Inflow=6.33 cfs 5.793 af
Primary=6.33 cfs 5.793 af

Summary for Subcatchment 9S: S9

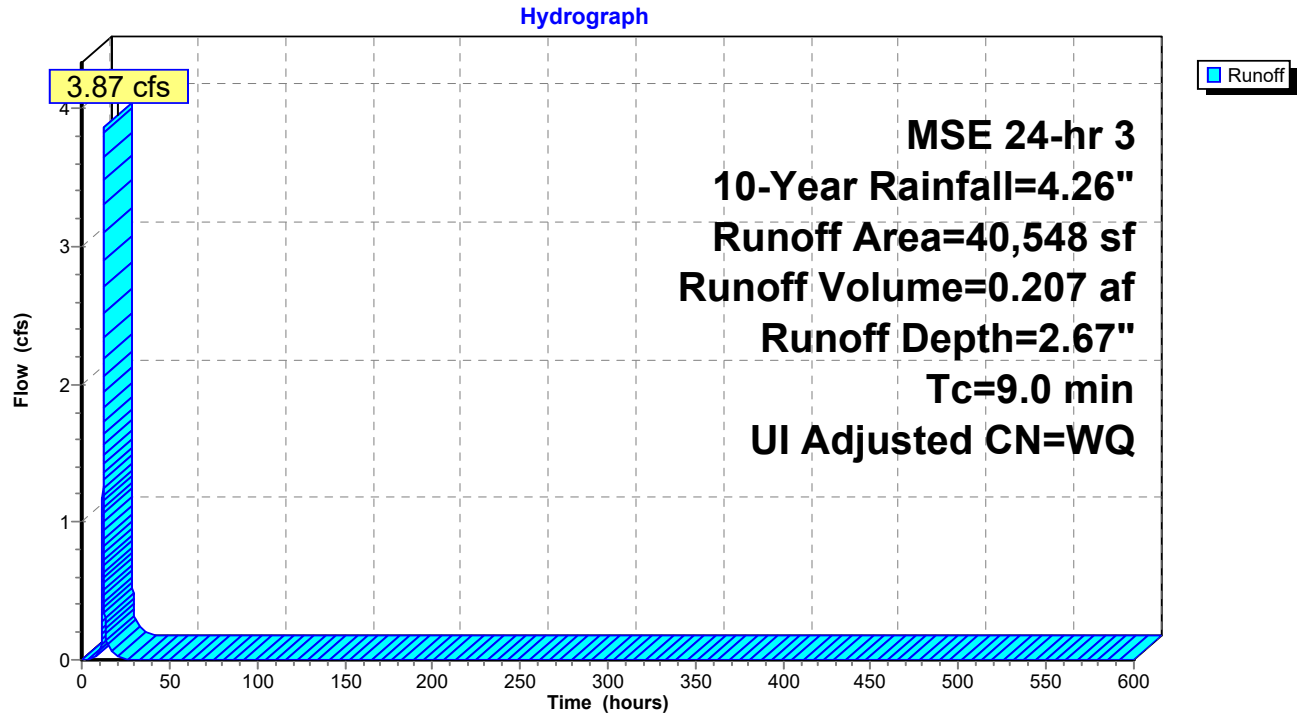
Runoff = 3.87 cfs @ 12.16 hrs, Volume= 0.207 af, Depth= 2.67"
Routed to Pond 9P : South Filtration Trench

Runoff by SCS TR-20 method, UH=SCS, Weighted-Q, Time Span= 0.00-600.00 hrs, dt= 0.01 hrs
MSE 24-hr 3 10-Year Rainfall=4.26"

Area (sf)	CN	Adj	Description
9,552	98	98	Unconnected roofs, HSG D
30,996	80	80	>75% Grass cover, Good, HSG D
40,548			Weighted Average
30,996			76.44% Pervious Area
9,552			23.56% Impervious Area
9,552			100.00% Unconnected

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

Subcatchment 9S: S9



Summary for Subcatchment OFF-1: OFF-1

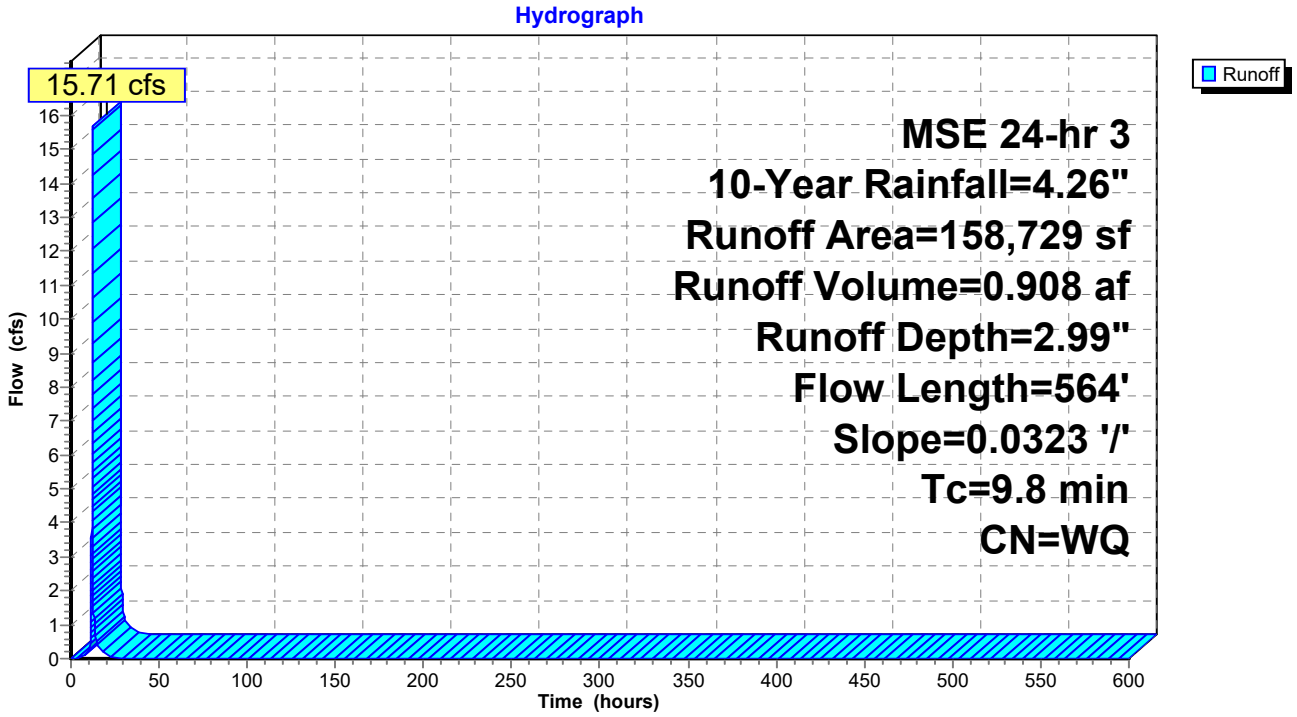
Runoff = 15.71 cfs @ 12.17 hrs, Volume= 0.908 af, Depth= 2.99"
Routed to Pond 1P : FILTRATION/WETLAND

Runoff by SCS TR-20 method, UH=SCS, Weighted-Q, Time Span= 0.00-600.00 hrs, dt= 0.01 hrs
MSE 24-hr 3 10-Year Rainfall=4.26"

Area (sf)	CN	Description
69,832	98	Paved parking, HSG D
88,897	79	Woods/grass comb., Good, HSG D
158,729		Weighted Average
88,897		56.01% Pervious Area
69,832		43.99% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
8.8	564	0.0323	1.07		**Lag/CN Method, BACK YARD SWALE**
1.0					**Direct Entry, Storm Sewer**
9.8	564	Total			

Subcatchment OFF-1: OFF-1



Summary for Subcatchment OFF-2: OFF-2

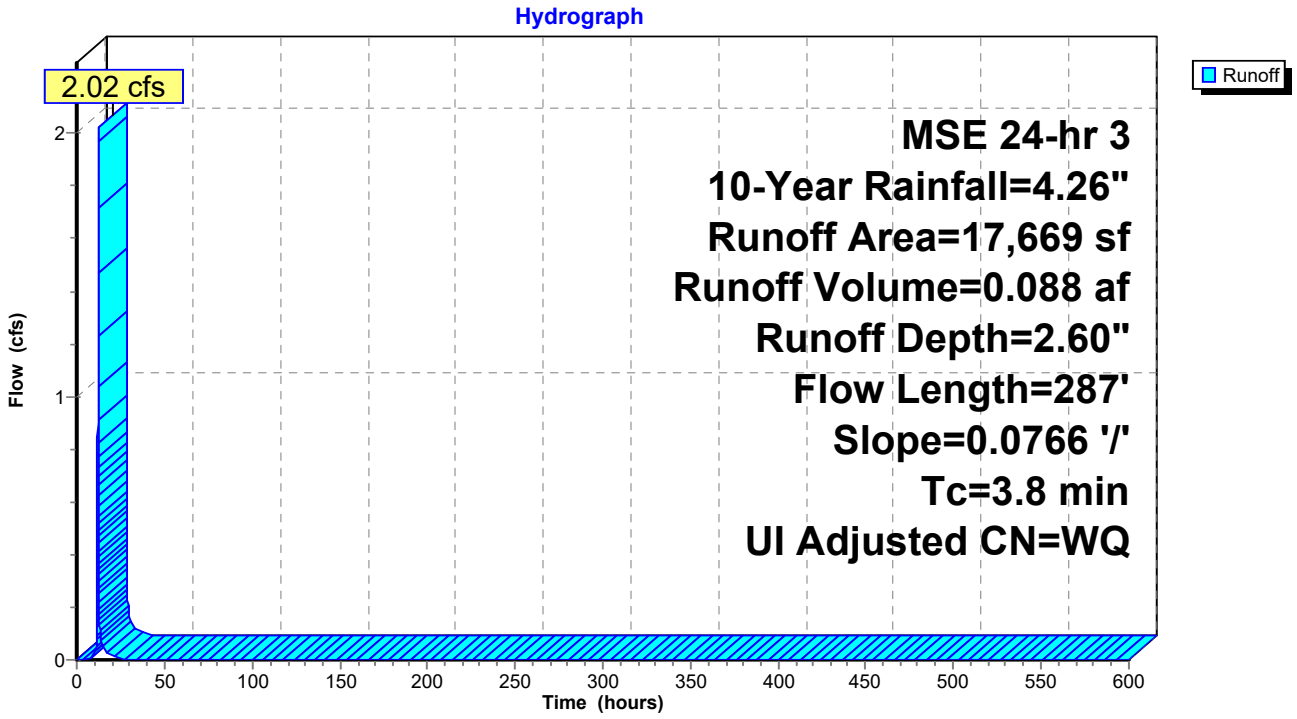
Runoff = 2.02 cfs @ 12.11 hrs, Volume= 0.088 af, Depth= 2.60"
Routed to Pond 1P : FILTRATION/WETLAND

Runoff by SCS TR-20 method, UH=SCS, Weighted-Q, Time Span= 0.00-600.00 hrs, dt= 0.01 hrs
MSE 24-hr 3 10-Year Rainfall=4.26"

Area (sf)	CN	Adj	Description
4,008	98	98	Unconnected roofs, HSG C
13,661	79	79	Woods/grass comb., Good, HSG D
17,669			Weighted Average
13,661			77.32% Pervious Area
4,008			22.68% Impervious Area
4,008			100.00% Unconnected

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
3.8	287	0.0766	1.25		**Lag/CN Method,**

Subcatchment OFF-2: OFF-2



Summary for Subcatchment OFF-3: OFF-3

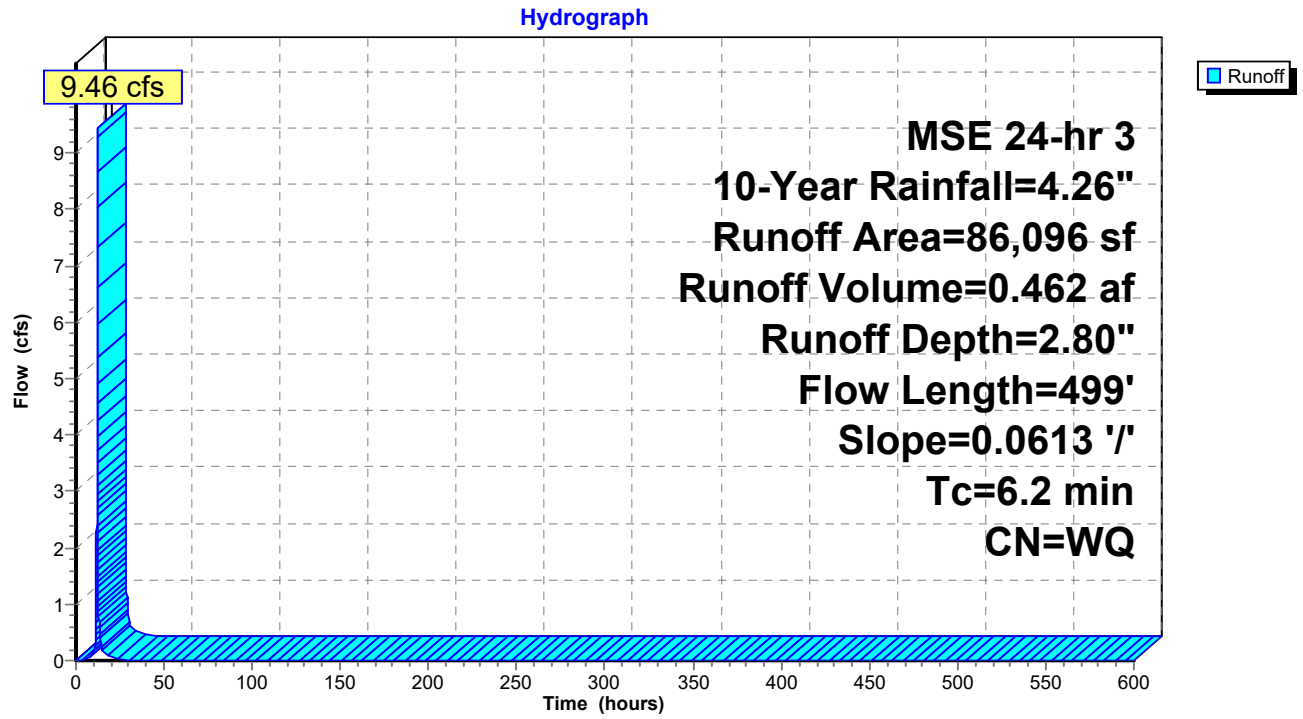
Runoff = 9.46 cfs @ 12.13 hrs, Volume= 0.462 af, Depth= 2.80"
Routed to Pond 1P : FILTRATION/WETLAND

Runoff by SCS TR-20 method, UH=SCS, Weighted-Q, Time Span= 0.00-600.00 hrs, dt= 0.01 hrs
MSE 24-hr 3 10-Year Rainfall=4.26"

Area (sf)	CN	Description
29,173	98	Paved parking, HSG C
56,923	79	Woods/grass comb., Good, HSG D
86,096		Weighted Average
56,923		66.12% Pervious Area
29,173		33.88% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
6.2	499	0.0613	1.33		**Lag/CN Method,**

Subcatchment OFF-3: OFF-3



Summary for Subcatchment OFF-4: OFF-4

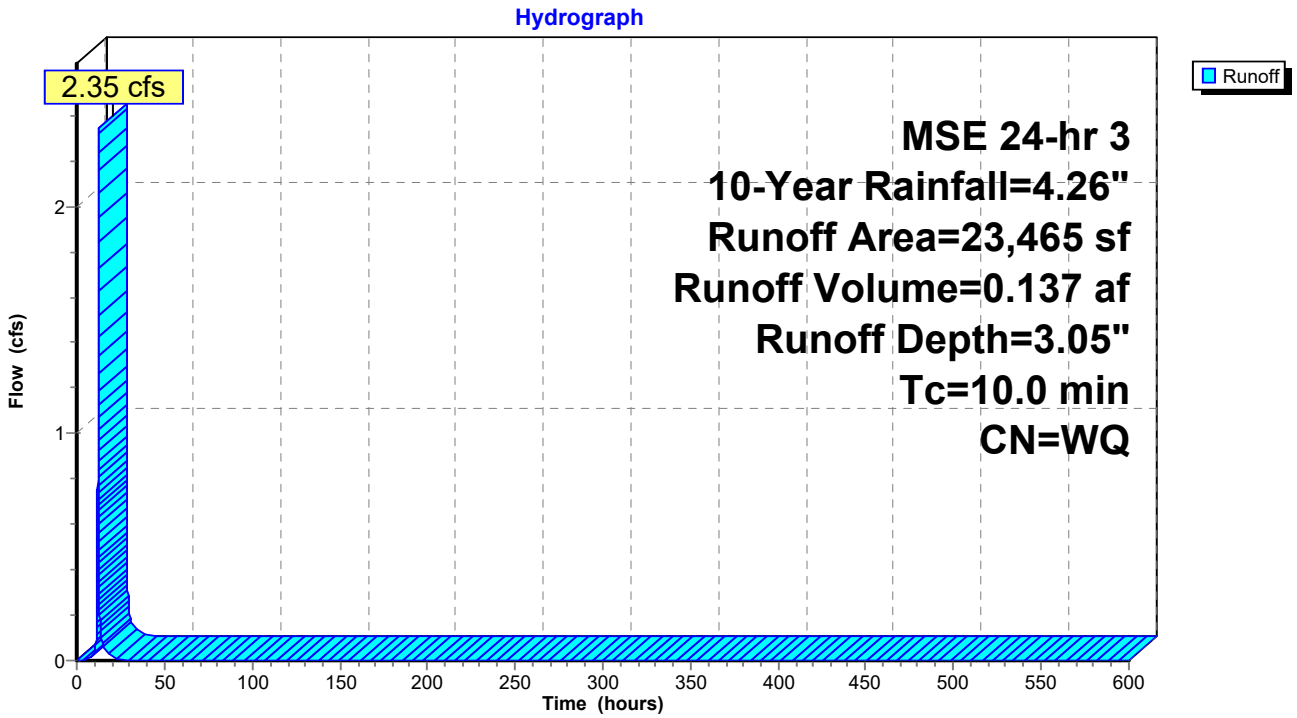
Runoff = 2.35 cfs @ 12.17 hrs, Volume= 0.137 af, Depth= 3.05"
Routed to Pond 1P : FILTRATION/WETLAND

Runoff by SCS TR-20 method, UH=SCS, Weighted-Q, Time Span= 0.00-600.00 hrs, dt= 0.01 hrs
MSE 24-hr 3 10-Year Rainfall=4.26"

Area (sf)	CN	Description
10,497	98	Paved parking, HSG C
12,968	80	>75% Grass cover, Good, HSG D
23,465		Weighted Average
12,968		55.27% Pervious Area
10,497		44.73% Impervious Area

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

Subcatchment OFF-4: OFF-4



Summary for Subcatchment OFF-5: OFF-5

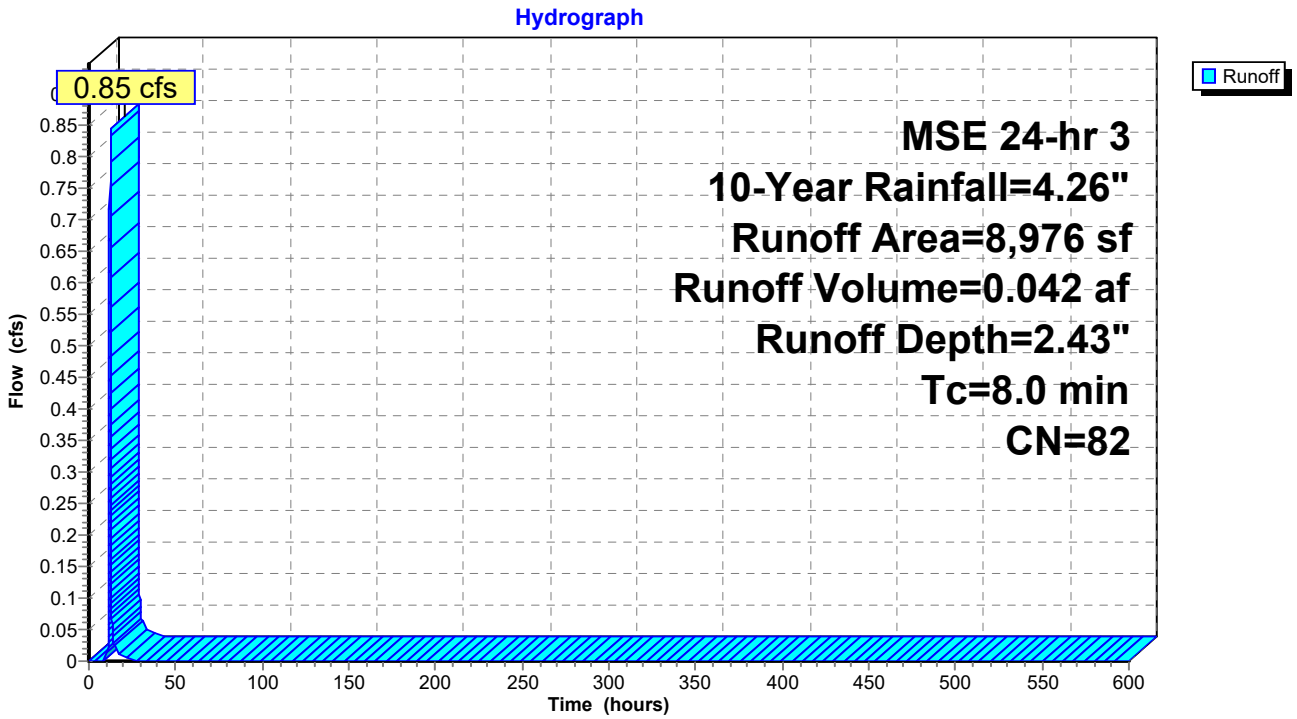
Runoff = 0.85 cfs @ 12.15 hrs, Volume= 0.042 af, Depth= 2.43"
Routed to Pond 8P : West Filtration Basin

Runoff by SCS TR-20 method, UH=SCS, Weighted-Q, Time Span= 0.00-600.00 hrs, dt= 0.01 hrs
MSE 24-hr 3 10-Year Rainfall=4.26"

Area (sf)	CN	Description
8,976	82	Woods/grass comb., Fair, HSG D
8,976		100.00% Pervious Area

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

Subcatchment OFF-5: OFF-5



Summary for Subcatchment OFF-6: OFF-6

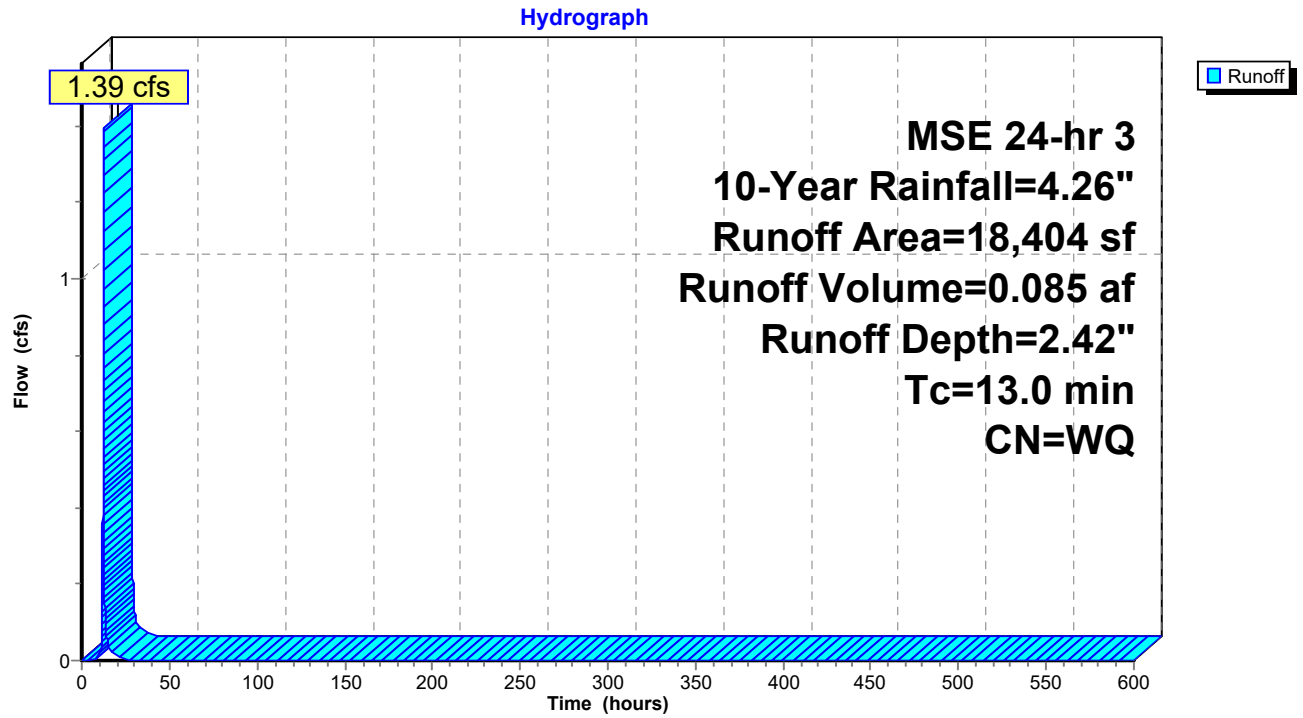
Runoff = 1.39 cfs @ 12.21 hrs, Volume= 0.085 af, Depth= 2.42"
Routed to Pond 9P : South Filtration Trench

Runoff by SCS TR-20 method, UH=SCS, Weighted-Q, Time Span= 0.00-600.00 hrs, dt= 0.01 hrs
MSE 24-hr 3 10-Year Rainfall=4.26"

	Area (sf)	CN	Description
*	1,725	98	Impervious, HSG D
	16,679	80	>75% Grass cover, Good, HSG D
	18,404		Weighted Average
	16,679		90.63% Pervious Area
	1,725		9.37% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
13.0					**Direct Entry, Sheet/Conc Flow**

Subcatchment OFF-6: OFF-6



Summary for Subcatchment OFF-7: OFF-7

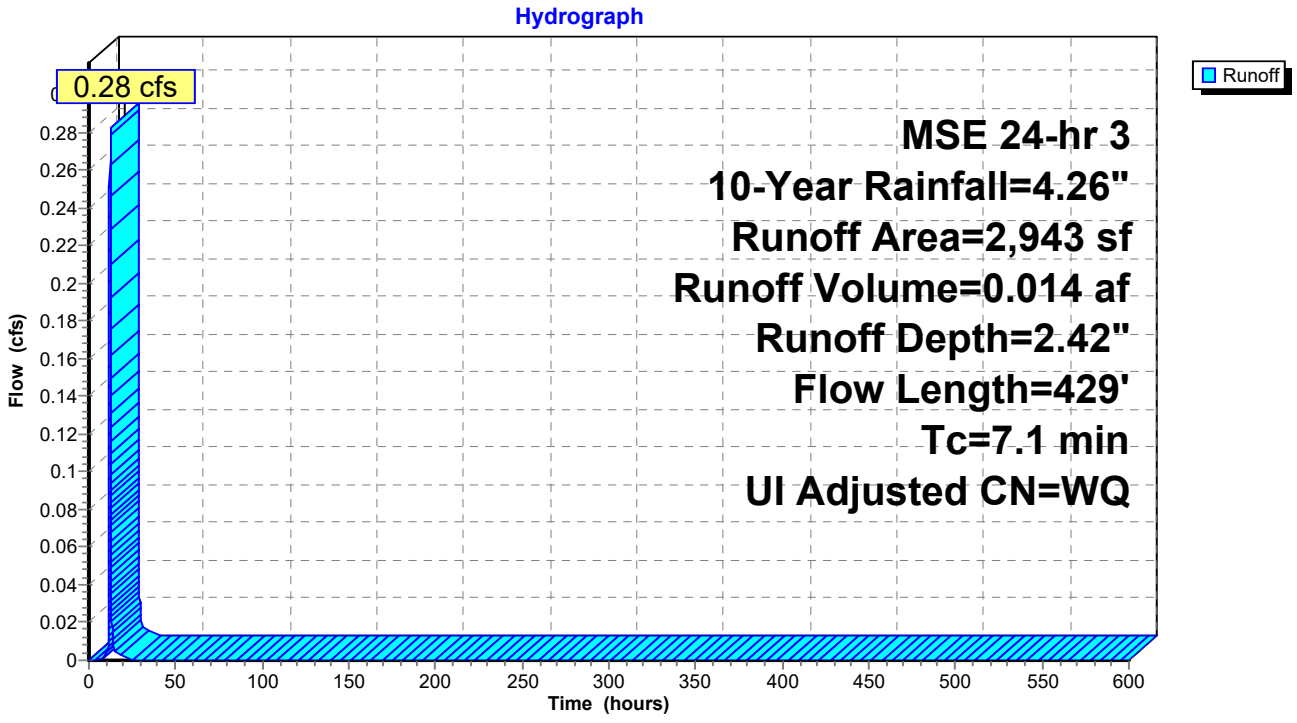
Runoff = 0.28 cfs @ 12.14 hrs, Volume= 0.014 af, Depth= 2.42"
Routed to Pond 1P : FILTRATION/WETLAND

Runoff by SCS TR-20 method, UH=SCS, Weighted-Q, Time Span= 0.00-600.00 hrs, dt= 0.01 hrs
MSE 24-hr 3 10-Year Rainfall=4.26"

Area (sf)	CN	Adj	Description
2,673	80	80	>75% Grass cover, Good, HSG D
270	98	98	Unconnected roofs, HSG D
2,943			Weighted Average
2,673			90.83% Pervious Area
270			9.17% Impervious Area
270			100.00% Unconnected

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
1.1	83	0.1445	1.29		**Lag/CN Method,**
6.0	346	0.0448	0.96		**Lag/CN Method,**
7.1	429	Total			

Subcatchment OFF-7: OFF-7



Summary for Subcatchment OFF-8: OFF-8

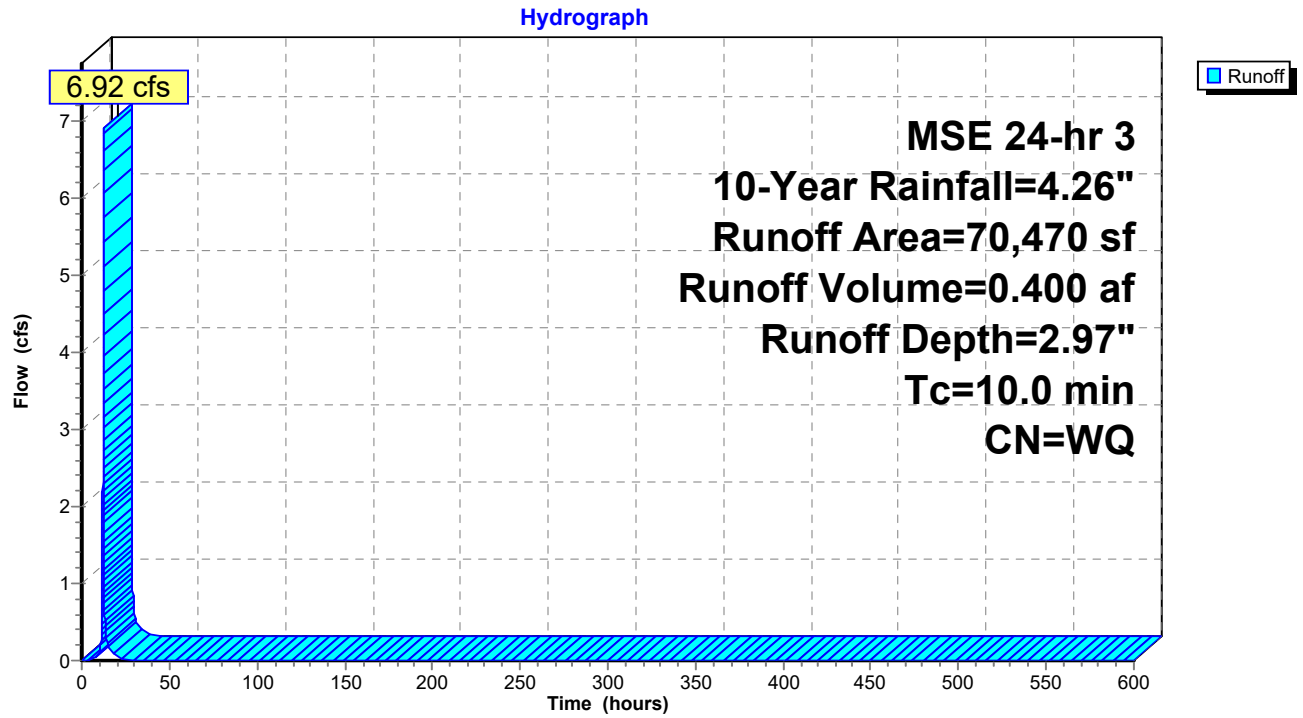
Runoff = 6.92 cfs @ 12.17 hrs, Volume= 0.400 af, Depth= 2.97"
Routed to Pond 1P : FILTRATION/WETLAND

Runoff by SCS TR-20 method, UH=SCS, Weighted-Q, Time Span= 0.00-600.00 hrs, dt= 0.01 hrs
MSE 24-hr 3 10-Year Rainfall=4.26"

Area (sf)	CN	Description
28,355	98	Paved parking, HSG D
42,115	80	>75% Grass cover, Good, HSG D
70,470		Weighted Average
42,115		59.76% Pervious Area
28,355		40.24% Impervious Area

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

Subcatchment OFF-8: OFF-8



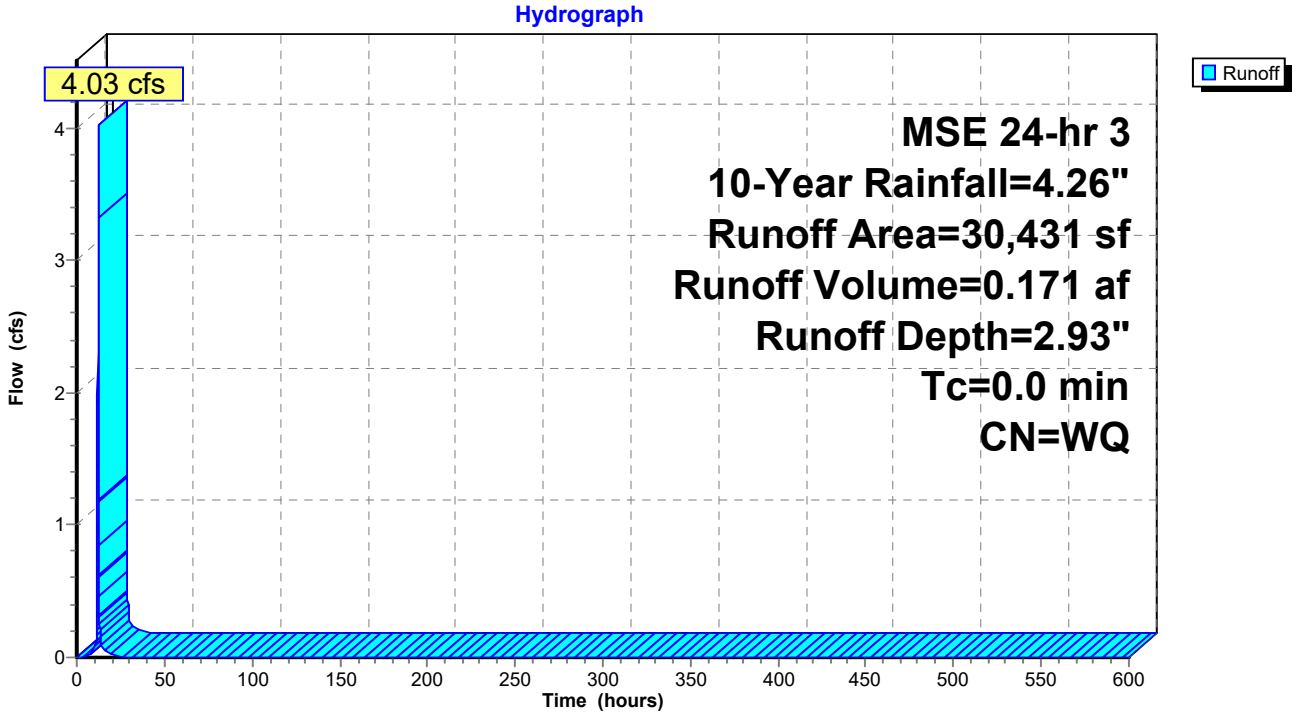
Summary for Subcatchment OFF-9: OFF-9

Runoff = 4.03 cfs @ 12.09 hrs, Volume= 0.171 af, Depth= 2.93"
Routed to Pond 1P : FILTRATION/WETLAND

Runoff by SCS TR-20 method, UH=SCS, Weighted-Q, Time Span= 0.00-600.00 hrs, dt= 0.01 hrs
MSE 24-hr 3 10-Year Rainfall=4.26"

Area (sf)	CN	Description
11,557	98	Paved parking, HSG D
18,874	80	>75% Grass cover, Good, HSG D
30,431		Weighted Average
18,874		62.02% Pervious Area
11,557		37.98% Impervious Area

Subcatchment OFF-9: OFF-9



Summary for Subcatchment S1: S1

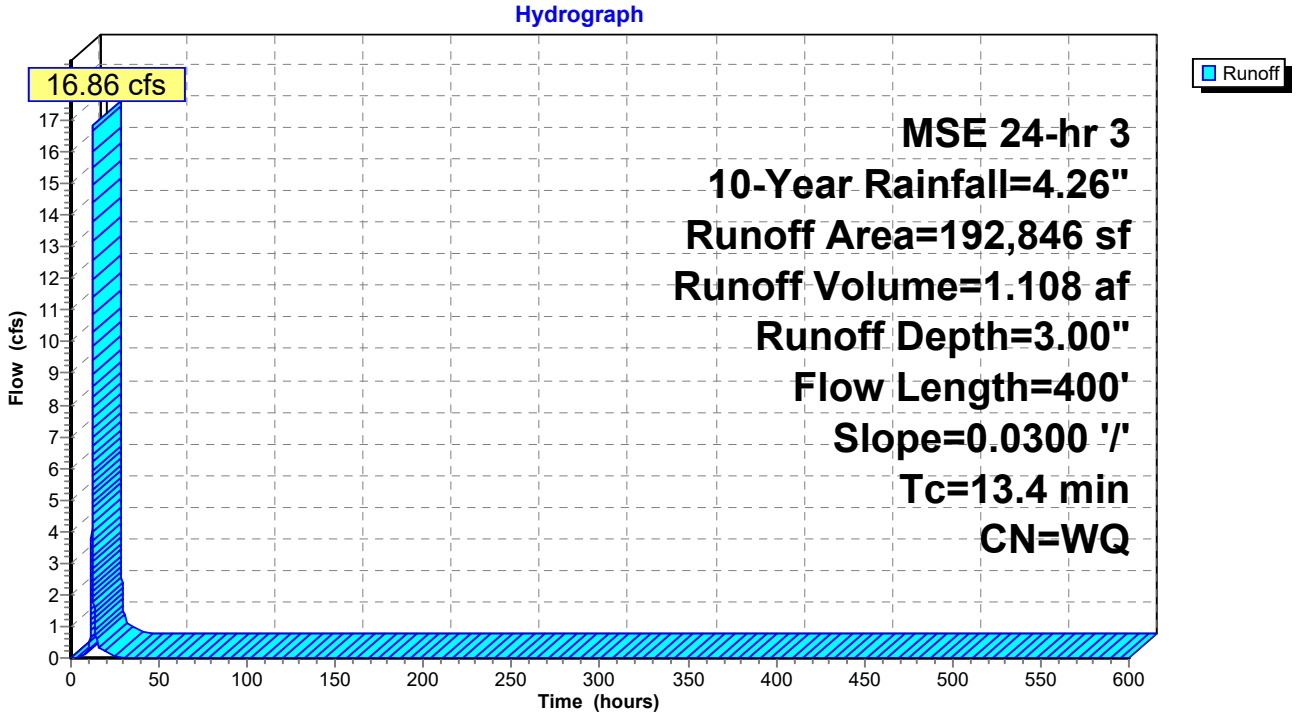
Runoff = 16.86 cfs @ 12.21 hrs, Volume= 1.108 af, Depth= 3.00"
Routed to Pond 1P : FILTRATION/WETLAND

Runoff by SCS TR-20 method, UH=SCS, Weighted-Q, Time Span= 0.00-600.00 hrs, dt= 0.01 hrs
MSE 24-hr 3 10-Year Rainfall=4.26"

	Area (sf)	CN	Description
	35,827	98	Unconnected roofs, HSG D
*	45,445	98	Water Surface, HSG D (994)
	111,574	80	>75% Grass cover, Good, HSG D
	192,846		Weighted Average
	111,574		57.86% Pervious Area
	81,272		42.14% Impervious Area
	35,827		44.08% Unconnected

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
7.4	50	0.0300	0.11		**Sheet Flow,** Grass: Dense n= 0.240 P2= 2.87"
6.0	350	0.0300	0.97		**Lag/CN Method, OVERLAND**
13.4	400	Total			

Subcatchment S1: S1



Summary for Subcatchment S2: S2

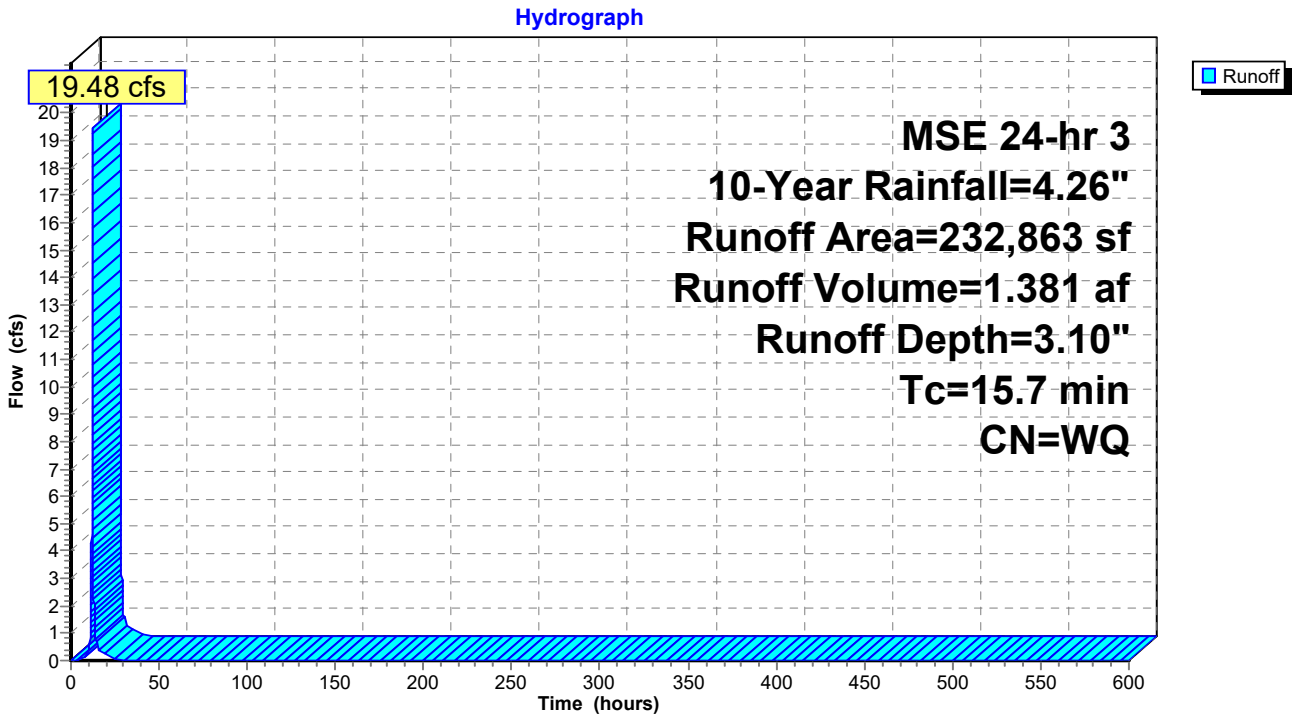
Runoff = 19.48 cfs @ 12.23 hrs, Volume= 1.381 af, Depth= 3.10"
Routed to Pond 1P : FILTRATION/WETLAND

Runoff by SCS TR-20 method, UH=SCS, Weighted-Q, Time Span= 0.00-600.00 hrs, dt= 0.01 hrs
MSE 24-hr 3 10-Year Rainfall=4.26"

Area (sf)	CN	Description
110,886	98	Paved parking, HSG D
121,977	80	>75% Grass cover, Good, HSG D
232,863		Weighted Average
121,977		52.38% Pervious Area
110,886		47.62% Impervious Area

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

Subcatchment S2: S2



Summary for Subcatchment S3: S3

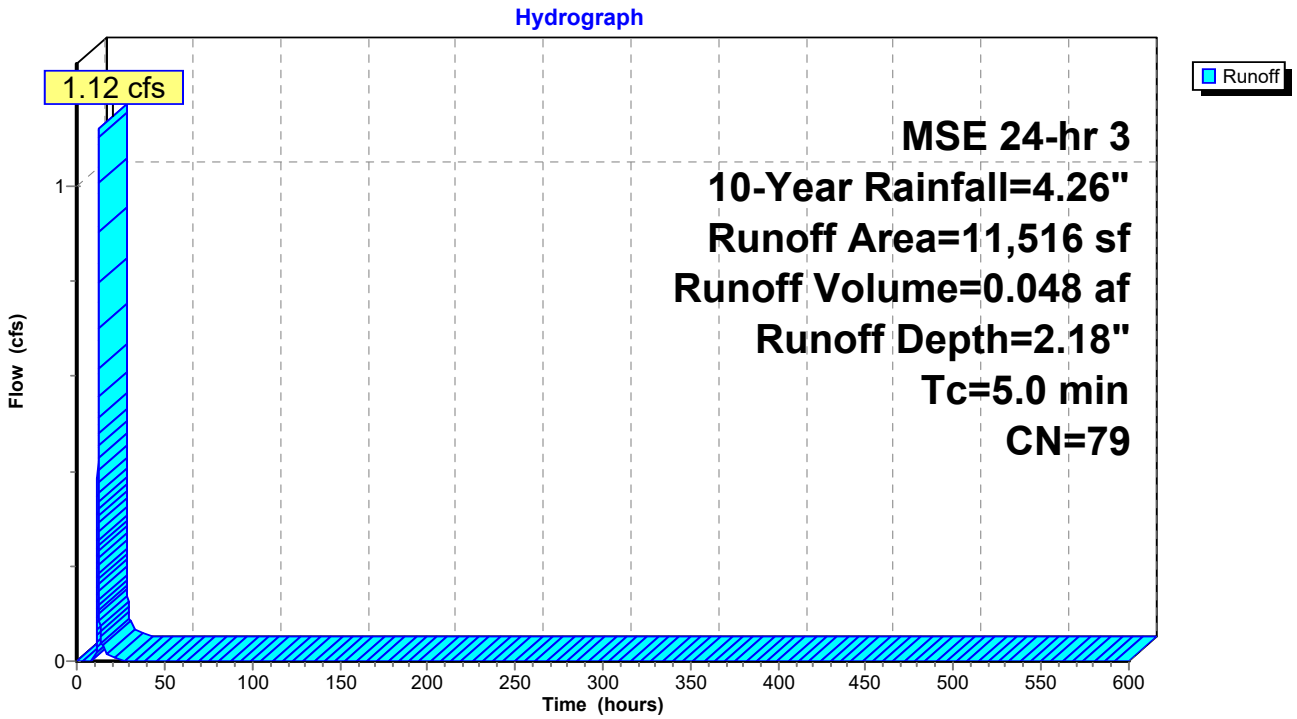
Runoff = 1.12 cfs @ 12.13 hrs, Volume= 0.048 af, Depth= 2.18"
Routed to Link 3L : SOUTH

Runoff by SCS TR-20 method, UH=SCS, Weighted-Q, Time Span= 0.00-600.00 hrs, dt= 0.01 hrs
MSE 24-hr 3 10-Year Rainfall=4.26"

Area (sf)	CN	Description
11,516	79	Woods/grass comb., Good, HSG D
11,516		100.00% Pervious Area

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

Subcatchment S3: S3



Summary for Subcatchment S4: S4

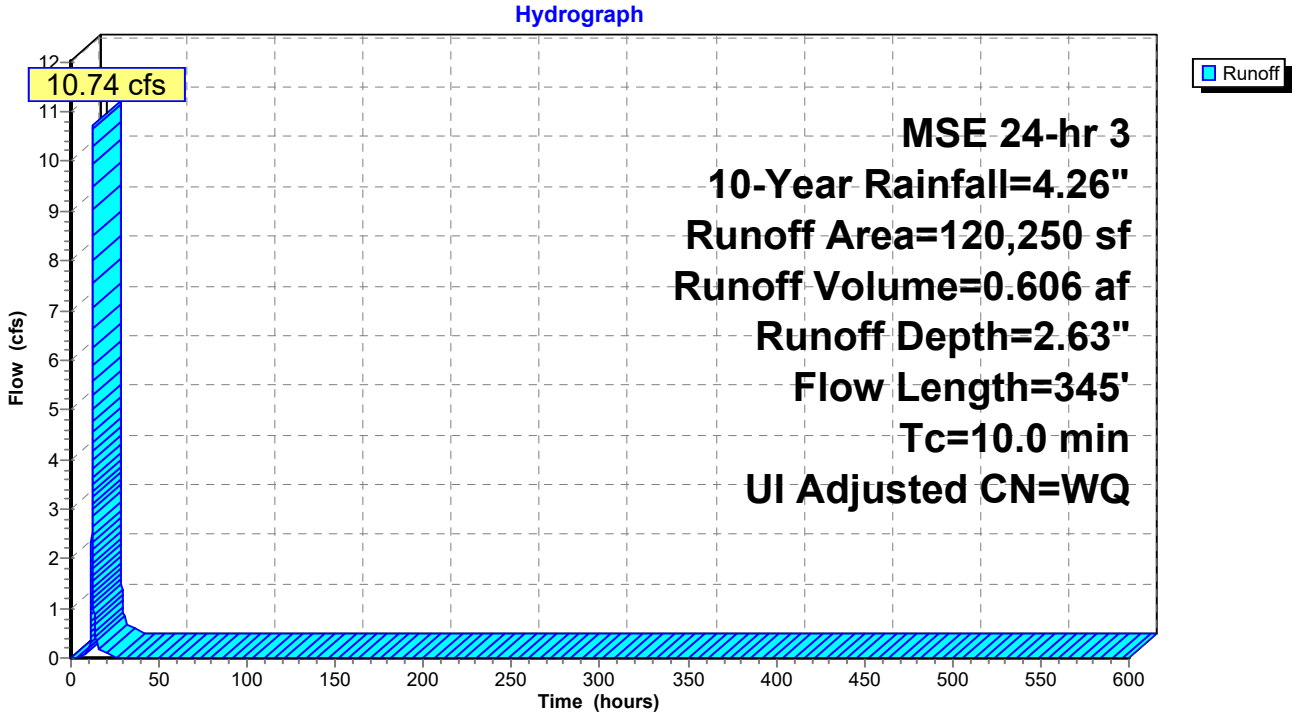
Runoff = 10.74 cfs @ 12.17 hrs, Volume= 0.606 af, Depth= 2.63"
Routed to Pond 8P : West Filtration Basin

Runoff by SCS TR-20 method, UH=SCS, Weighted-Q, Time Span= 0.00-600.00 hrs, dt= 0.01 hrs
MSE 24-hr 3 10-Year Rainfall=4.26"

Area (sf)	CN	Adj	Description
29,761	98	98	Unconnected roofs, HSG D
90,489	79	79	Woods/grass comb., Good, HSG D
120,250			Weighted Average
90,489			75.25% Pervious Area
29,761			24.75% Impervious Area
29,761			100.00% Unconnected

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
4.2	25	0.0300	0.10		**Sheet Flow,** Grass: Dense n= 0.240 P2= 2.87"
5.1	240	0.0300	0.78		**Lag/CN Method, OVERLAND**
0.7	80	0.2750	1.89		**Lag/CN Method, over**
10.0	345	Total			

Subcatchment S4: S4



Summary for Subcatchment S5: S5

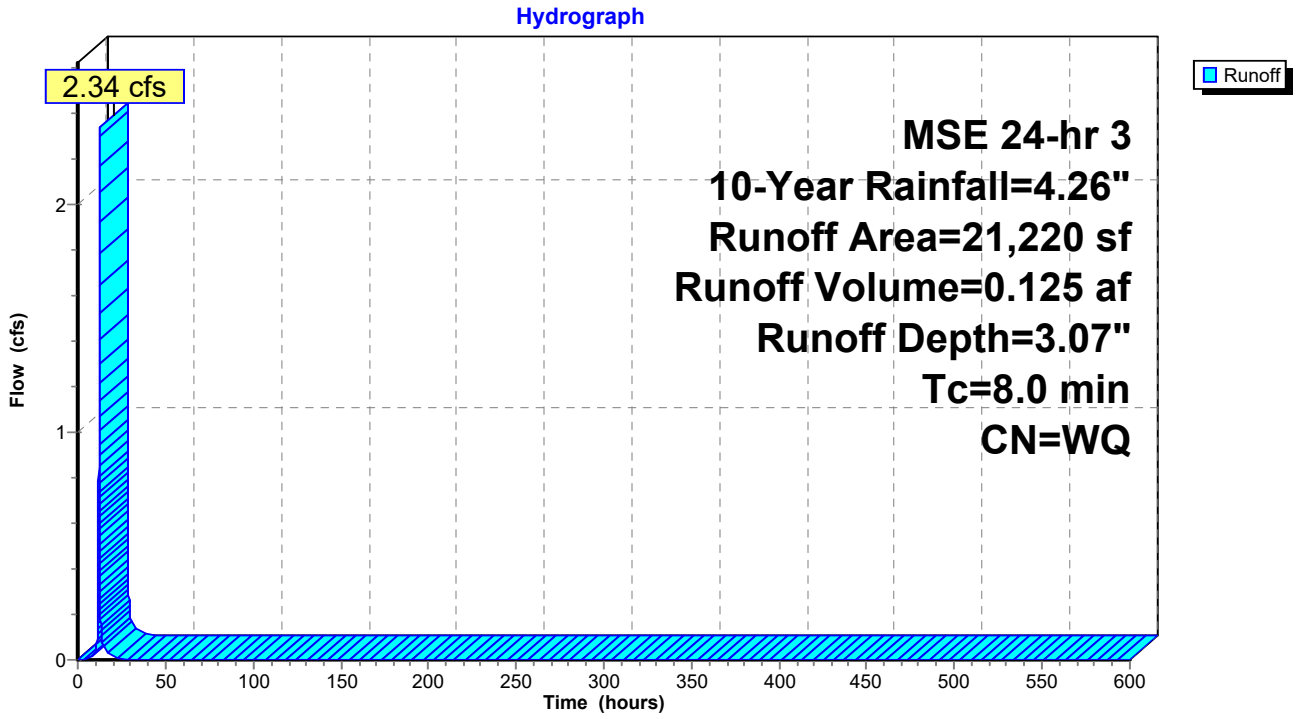
Runoff = 2.34 cfs @ 12.15 hrs, Volume= 0.125 af, Depth= 3.07"
Routed to Pond 1P : FILTRATION/WETLAND

Runoff by SCS TR-20 method, UH=SCS, Weighted-Q, Time Span= 0.00-600.00 hrs, dt= 0.01 hrs
MSE 24-hr 3 10-Year Rainfall=4.26"

Area (sf)	CN	Description
8,522	98	Unconnected roofs, HSG D
12,698	82	Woods/grass comb., Fair, HSG D
21,220		Weighted Average
12,698		59.84% Pervious Area
8,522		40.16% Impervious Area
8,522		100.00% Unconnected

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

Subcatchment S5: S5



Summary for Subcatchment S6: S6

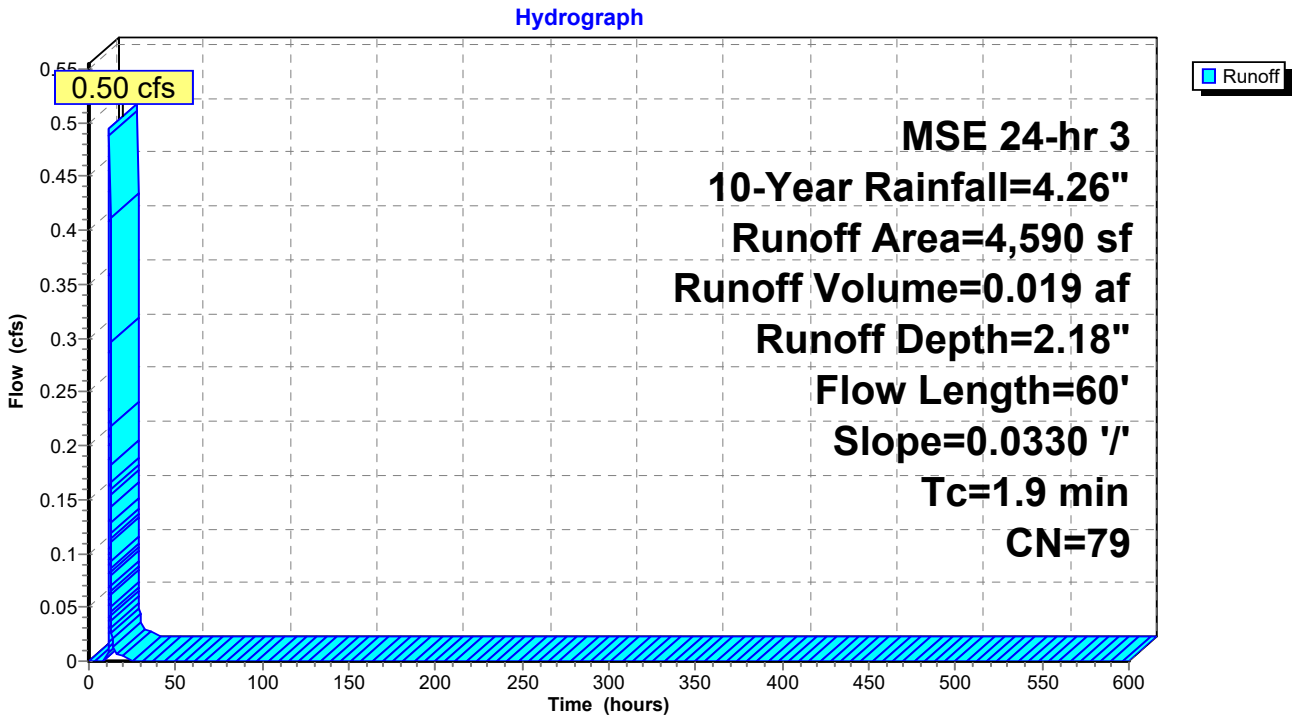
Runoff = 0.50 cfs @ 12.10 hrs, Volume= 0.019 af, Depth= 2.18"
Routed to Link 6L : EAST

Runoff by SCS TR-20 method, UH=SCS, Weighted-Q, Time Span= 0.00-600.00 hrs, dt= 0.01 hrs
MSE 24-hr 3 10-Year Rainfall=4.26"

Area (sf)	CN	Description
4,590	79	Woods/grass comb., Good, HSG D
4,590		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
1.9	60	0.0330	0.53		**Lag/CN Method, OVERLAND**

Subcatchment S6: S6



Summary for Subcatchment S7: S7

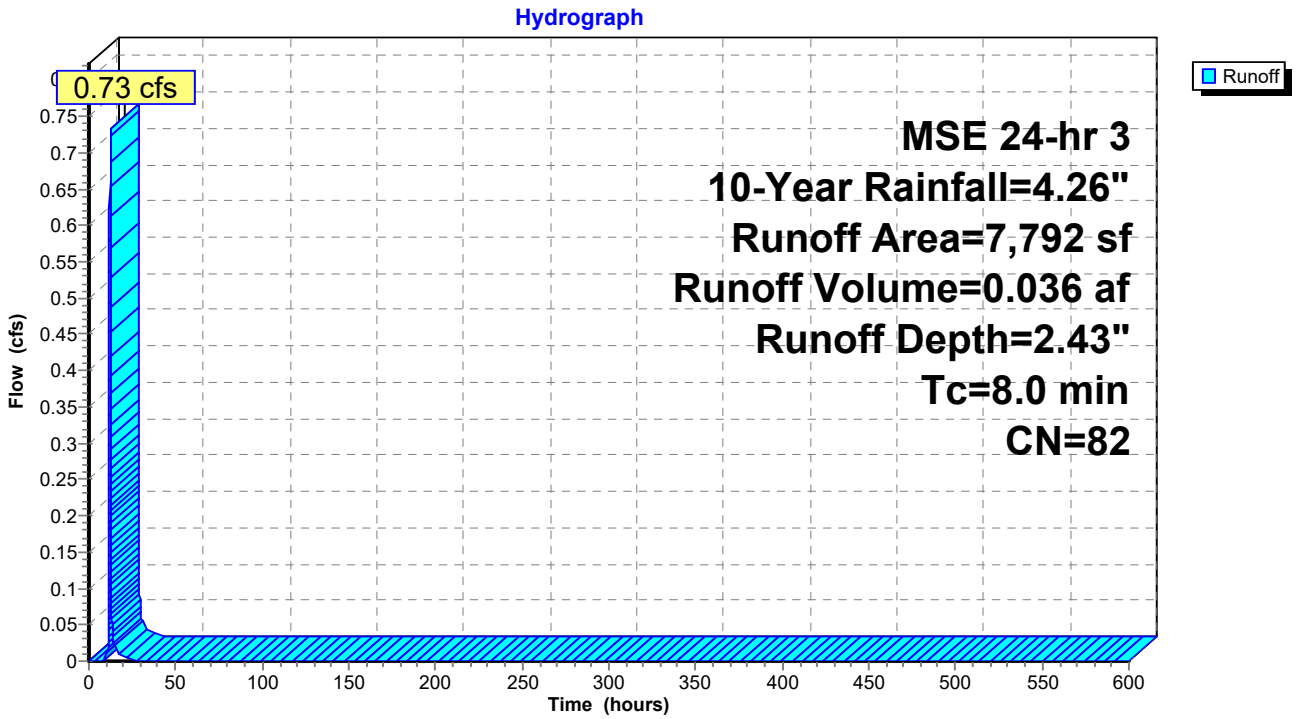
Runoff = 0.73 cfs @ 12.15 hrs, Volume= 0.036 af, Depth= 2.43"
Routed to Pond 10P : West Existing Wetland

Runoff by SCS TR-20 method, UH=SCS, Weighted-Q, Time Span= 0.00-600.00 hrs, dt= 0.01 hrs
MSE 24-hr 3 10-Year Rainfall=4.26"

Area (sf)	CN	Description
7,792	82	Woods/grass comb., Fair, HSG D
7,792		100.00% Pervious Area

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

Subcatchment S7: S7



Summary for Subcatchment S8: S8

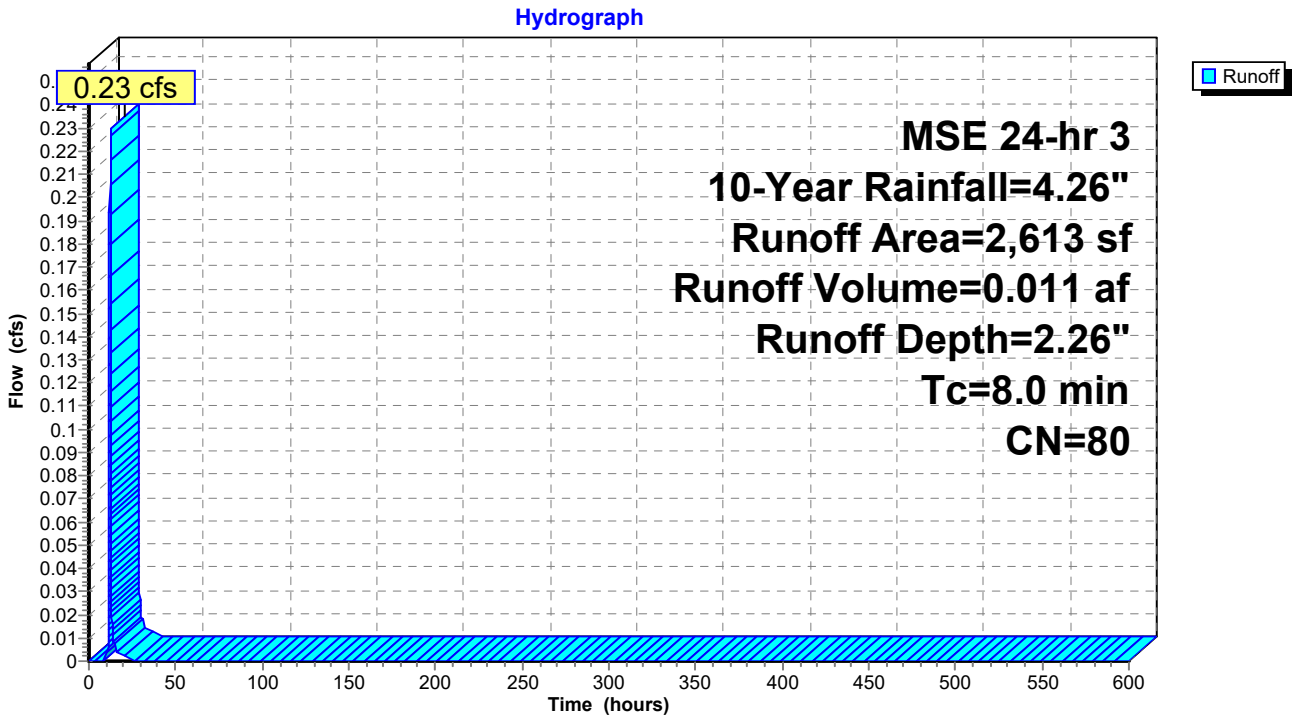
Runoff = 0.23 cfs @ 12.15 hrs, Volume= 0.011 af, Depth= 2.26"
Routed to Pond 10P : West Existing Wetland

Runoff by SCS TR-20 method, UH=SCS, Weighted-Q, Time Span= 0.00-600.00 hrs, dt= 0.01 hrs
MSE 24-hr 3 10-Year Rainfall=4.26"

Area (sf)	CN	Description
2,613	80	>75% Grass cover, Good, HSG D
2,613		100.00% Pervious Area

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

Subcatchment S8: S8



Summary for Pond 1P: FILTRATION/WETLAND

Inflow Area = 19.209 ac, 42.35% Impervious, Inflow Depth = 2.99" for 10-Year event
Inflow = 70.30 cfs @ 12.18 hrs, Volume= 4.792 af
Outflow = 1.51 cfs @ 15.38 hrs, Volume= 4.751 af, Atten= 98%, Lag= 192.2 min
Primary = 1.51 cfs @ 15.38 hrs, Volume= 4.751 af
Routed to Pond 11P : (new Pond)

Routing by Dyn-Stor-Ind method, Time Span= 0.00-600.00 hrs, dt= 0.01 hrs
Starting Elev= 994.00' Surf.Area= 77,880 sf Storage= 82,249 cf
Peak Elev= 997.22' @ 15.38 hrs Surf.Area= 87,723 sf Storage= 247,638 cf (165,390 cf above start)

Plug-Flow detention time= 5,758.9 min calculated for 2.863 af (60% of inflow)
Center-of-Mass det. time= 3,588.5 min (4,365.8 - 777.3)

Volume	Invert	Avail.Storage	Storage Description
#1	990.00'	17,111 cf	**West Forebay (Prismatic)**Listed below (Recalc)
#2	993.50'	1,136 cf	**West shallow wetland (Prismatic)**Listed below (Recalc)
#3	990.00'	18,942 cf	**Remnant Wetland (Prismatic)**Listed below (Recalc)
#4	989.00'	40,459 cf	**Middle Forebay (Prismatic)**Listed below (Recalc)
#5	993.50'	665 cf	**East shallow wetland (Prismatic)**Listed below (Recalc)
#6	992.90'	3,936 cf	**Filtration (Prismatic)**Listed below (Recalc) -Impervious 13,121 cf Overall x 30.0% Voids
#7	994.00'	336,285 cf	**Live Storage (Prismatic)**Listed below (Recalc)
		418,533 cf	Total Available Storage

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
990.00	2,470	0	0
992.00	4,186	6,656	6,656
994.00	6,269	10,455	17,111

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
993.50	1,701	0	0
994.00	2,844	1,136	1,136

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
990.00	1,596	0	0
992.00	4,761	6,357	6,357
994.00	7,824	12,585	18,942

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
989.00	5,024	0	0
990.00	6,006	5,515	5,515
991.00	7,121	6,564	12,079
993.00	9,592	16,713	28,792
994.00	13,742	11,667	40,459

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
993.50	961	0	0
994.00	1,698	665	665

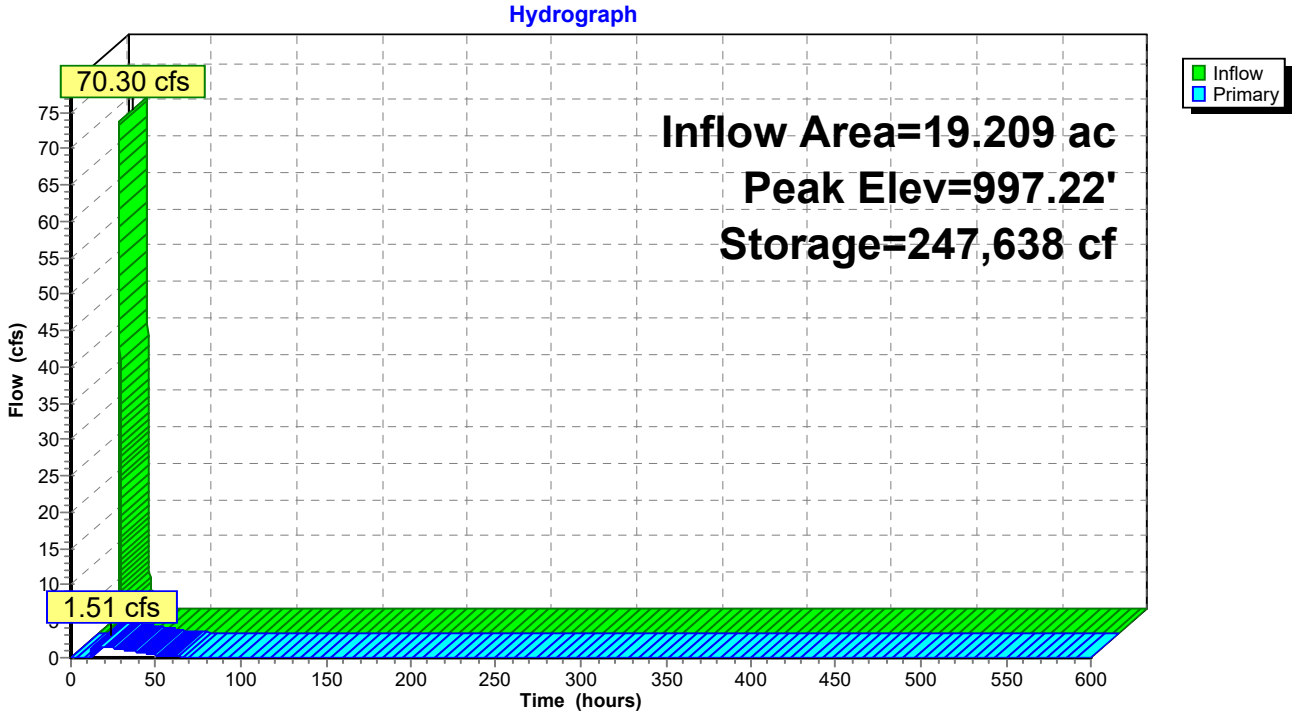
Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
992.90	11,928	0	0
994.00	11,928	13,121	13,121

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
994.00	45,503	0	0
995.00	49,888	47,696	47,696
996.00	53,188	51,538	99,234
998.00	56,729	109,917	209,151
1,000.00	70,405	127,134	336,285

Device	Routing	Invert	Outlet Devices
#1	Primary	990.90'	**15.0" Round Culvert** L= 556.1' RCP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 990.90' / 988.10' S= 0.0050 '/' Cc= 0.900 n= 0.013 Concrete sewer w/manholes & inlets, Flow Area= 1.23 sf
#2	Device 1	999.10'	**6.0' long x 0.5' breadth Broad-Crested Rectangular Weir** Head (feet) 0.20 0.40 0.60 0.80 1.00 Coef. (English) 2.80 2.92 3.08 3.30 3.32
#3	Device 1	994.00'	**0.800 in/hr Filtration over Surface area above 994.00'** Excluded Surface area = 77,880 sf
#4	Device 1	995.00'	**6.0" Vert. Orifice/Grate** C= 0.600 Limited to weir flow at low heads

Primary OutFlow Max=1.51 cfs @ 15.38 hrs HW=997.22' TW=987.02' (Dynamic Tailwater)
└─**1=Culvert** (Passes 1.51 cfs of 7.26 cfs potential flow)
  ├─**2=Broad-Crested Rectangular Weir** (Controls 0.00 cfs)
  ├─**3=Filtration** (Exfiltration Controls 0.18 cfs)
  └─**4=Orifice/Grate** (Orifice Controls 1.33 cfs @ 6.76 fps)

Pond 1P: FILTRATION/WETLAND



Summary for Pond 8P: West Filtration Basin

Inflow Area = 2.967 ac, 23.03% Impervious, Inflow Depth = 2.62" for 10-Year event
Inflow = 11.55 cfs @ 12.17 hrs, Volume= 0.648 af
Outflow = 9.83 cfs @ 12.23 hrs, Volume= 0.648 af, Atten= 15%, Lag= 3.1 min
Primary = 9.77 cfs @ 12.23 hrs, Volume= 0.483 af
Routed to Pond 11P : (new Pond)
Secondary = 0.06 cfs @ 12.23 hrs, Volume= 0.164 af
Routed to Pond 11P : (new Pond)

Routing by Dyn-Stor-Ind method, Time Span= 0.00-600.00 hrs, dt= 0.01 hrs
Peak Elev= 997.15' @ 12.23 hrs Surf.Area= 5,176 sf Storage= 8,120 cf

Plug-Flow detention time= 485.3 min calculated for 0.648 af (100% of inflow)
Center-of-Mass det. time= 485.2 min (1,274.0 - 788.8)

Volume	Invert	Avail.Storage	Storage Description
#1	995.00'	16,465 cf	**Custom Stage Data (Prismatic)** Listed below (Recalc)

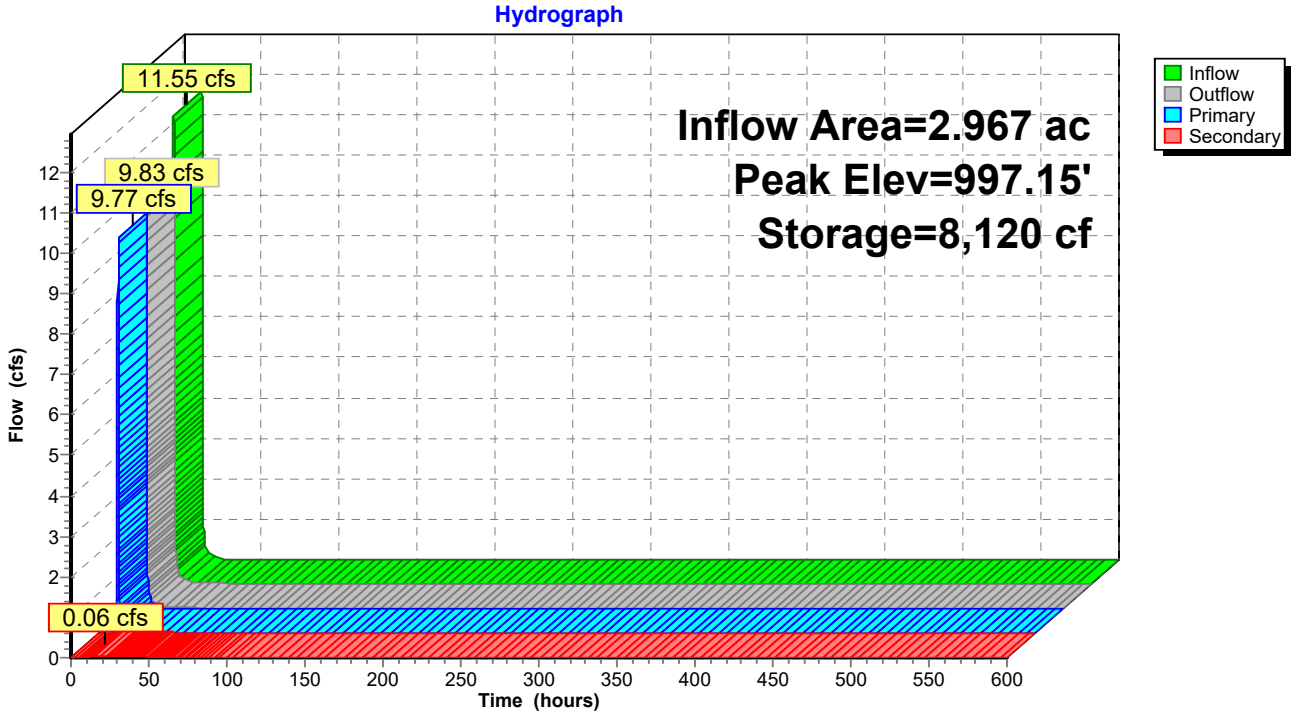
Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
995.00	2,510	0	0
996.00	3,654	3,082	3,082
996.50	4,280	1,984	5,066
997.00	4,962	2,311	7,376
998.00	6,420	5,691	13,067
998.50	7,173	3,398	16,465

Device	Routing	Invert	Outlet Devices
#1	Secondary	995.00'	**1.000 in/hr Filtration over Surface area above 995.00'** Excluded Surface area = 2,510 sf
#2	Device 3	996.50'	**6.0' long x 0.5' breadth Broad-Crested Rectangular Weir** Head (feet) 0.20 0.40 0.60 0.80 1.00 Coef. (English) 2.80 2.92 3.08 3.30 3.32
#3	Primary	995.00'	**21.0" Round Culvert** L= 14.0' RCP, mitered to conform to fill, Ke= 0.700 Inlet / Outlet Invert= 995.00' / 994.79' S= 0.0150 '/' Cc= 0.900 n= 0.013, Flow Area= 2.41 sf

Primary OutFlow Max=9.76 cfs @ 12.23 hrs HW=997.15' TW=988.85' (Dynamic Tailwater)
↑—**3=Culvert** (Passes 9.76 cfs of 11.52 cfs potential flow)
↑—**2=Broad-Crested Rectangular Weir** (Weir Controls 9.76 cfs @ 2.52 fps)

Secondary OutFlow Max=0.06 cfs @ 12.23 hrs HW=997.15' TW=988.85' (Dynamic Tailwater)
↑—**1=Filtration** (Exfiltration Controls 0.06 cfs)

Pond 8P: West Filtration Basin



Summary for Pond 9P: South Filtration Trench

Inflow Area = 1.353 ac, 19.13% Impervious, Inflow Depth = 2.60" for 10-Year event
Inflow = 5.15 cfs @ 12.17 hrs, Volume= 0.293 af
Outflow = 5.13 cfs @ 12.18 hrs, Volume= 0.284 af, Atten= 0%, Lag= 0.4 min
Primary = 0.05 cfs @ 12.18 hrs, Volume= 0.087 af
Routed to Link 3L : SOUTH
Secondary = 5.08 cfs @ 12.18 hrs, Volume= 0.197 af
Routed to Link 3L : SOUTH

Routing by Dyn-Stor-Ind method, Time Span= 0.00-600.00 hrs, dt= 0.01 hrs
Peak Elev= 1,020.06' @ 12.18 hrs Surf.Area= 3,513 sf Storage= 2,244 cf

Plug-Flow detention time= 175.9 min calculated for 0.284 af (97% of inflow)
Center-of-Mass det. time= 159.9 min (951.3 - 791.4)

Volume	Invert	Avail.Storage	Storage Description
#1	1,017.25'	368 cf	**Filter Storage (Min) (Prismatic)** Listed below (Recalc) 1,050 cf Overall x 35.0% Voids
#2	1,019.00'	3,345 cf	**Live Storage (Prismatic)** Listed below (Recalc)
		3,712 cf	Total Available Storage

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
1,017.25	600	0	0
1,019.00	600	1,050	1,050

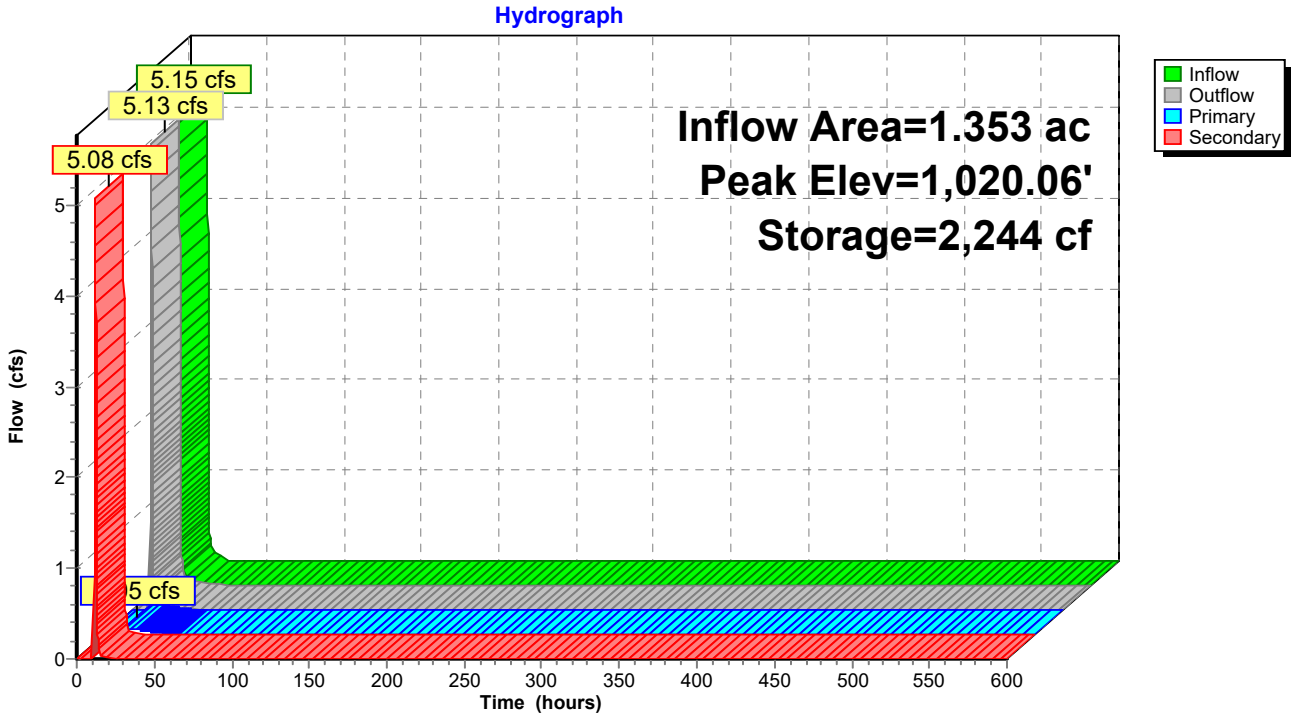
Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
1,019.00	600	0	0
1,019.50	1,714	579	579
1,020.00	2,800	1,129	1,707
1,020.50	3,750	1,638	3,345

Device	Routing	Invert	Outlet Devices
#1	Primary	1,015.00'	**15.0" Round Culvert** L= 200.0' RCP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 1,015.00' / 1,000.00' S= 0.0750 '/' Cc= 0.900 n= 0.013 Concrete pipe, bends & connections, Flow Area= 1.23 sf
#2	Device 1	1,019.00'	**1.000 in/hr Filtration over Surface area above 1,019.00'** Excluded Surface area = 1,200 sf
#3	Secondary	1,020.00'	**130.0' long + 3.0 '/' SideZ x 1.0' 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 Coef. (English) 2.69 2.72 2.75 2.85 2.98 3.08 3.20 3.28 3.31 3.30 3.31 3.32

Primary OutFlow Max=0.05 cfs @ 12.18 hrs HW=1,020.06' TW=0.00' (Dynamic Tailwater)
└─**1=Culvert** (Passes 0.05 cfs of 12.44 cfs potential flow)
└─**2=Filtration** (Exfiltration Controls 0.05 cfs)

Secondary OutFlow Max=5.07 cfs @ 12.18 hrs HW=1,020.06' TW=0.00' (Dynamic Tailwater)
└─**3=Broad-Crested Rectangular Weir** (Weir Controls 5.07 cfs @ 0.66 fps)

Pond 9P: South Filtration Trench



Summary for Pond 10P: West Existing Wetland

Inflow Area = 22.414 ac, 39.34% Impervious, Inflow Depth > 2.92" for 10-Year event
Inflow = 11.38 cfs @ 12.22 hrs, Volume= 5.446 af
Outflow = 2.29 cfs @ 13.52 hrs, Volume= 5.441 af, Atten= 80%, Lag= 77.8 min
Primary = 2.29 cfs @ 13.52 hrs, Volume= 5.441 af
Routed to Link 7L : TOTAL

Routing by Dyn-Stor-Ind method, Time Span= 0.00-600.00 hrs, dt= 0.01 hrs
Starting Elev= 974.10' Surf.Area= 54,326 sf Storage= 5,411 cf
Peak Elev= 974.38' @ 13.52 hrs Surf.Area= 55,543 sf Storage= 20,836 cf (15,425 cf above start)

Plug-Flow detention time= 840.1 min calculated for 5.317 af (98% of inflow)
Center-of-Mass det. time= 184.1 min (4,151.2 - 3,967.1)

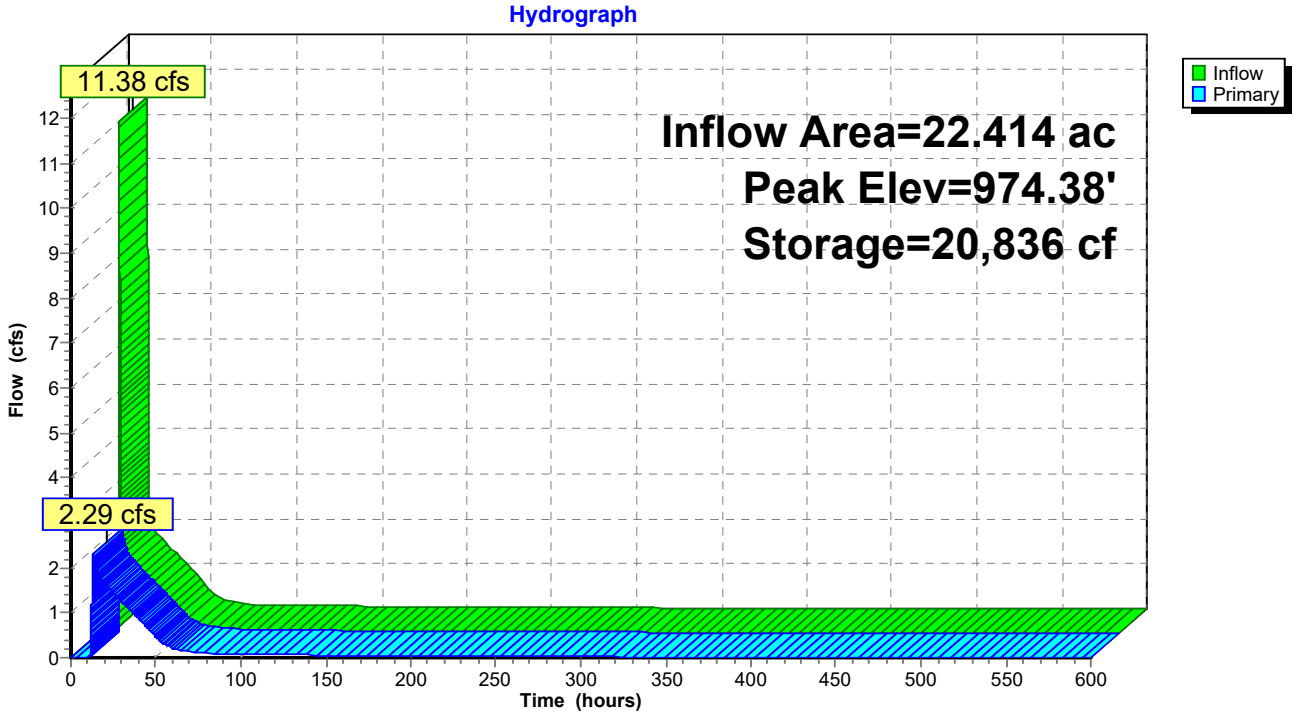
Volume	Invert	Avail.Storage	Storage Description
#1	974.00'	487,616 cf	**Custom Stage Data (Prismatic)** Listed below (Recalc)

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
974.00	53,893	0	0
975.00	58,226	56,060	56,060
976.00	62,886	60,556	116,616
977.00	67,093	64,990	181,605
978.00	71,582	69,338	250,943
979.00	76,083	73,833	324,775
980.00	81,311	78,697	403,472
981.00	86,977	84,144	487,616

Device	Routing	Invert	Outlet Devices
#1	Primary	974.10'	**18.0" Horiz. Orifice/Grate** C= 0.600 Limited to weir flow at low heads

Primary OutFlow Max=2.29 cfs @ 13.52 hrs HW=974.38' TW=0.00' (Dynamic Tailwater)
↑—**1=Orifice/Grate** (Weir Controls 2.29 cfs @ 1.73 fps)

Pond 10P: West Existing Wetland



Summary for Pond 11P: (new Pond)

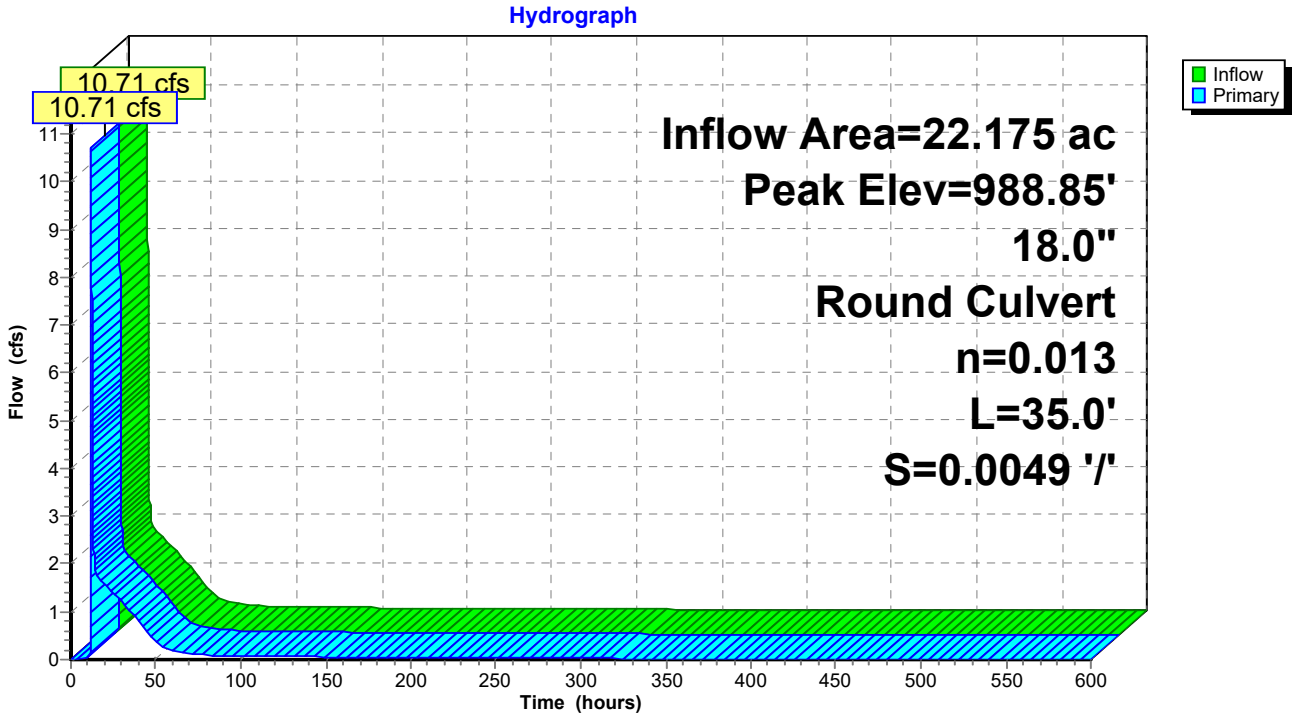
Inflow Area = 22.175 ac, 39.77% Impervious, Inflow Depth > 2.92" for 10-Year event
Inflow = 10.71 cfs @ 12.23 hrs, Volume= 5.398 af
Outflow = 10.71 cfs @ 12.23 hrs, Volume= 5.398 af, Atten= 0%, Lag= 0.0 min
Primary = 10.71 cfs @ 12.23 hrs, Volume= 5.398 af
Routed to Pond 10P : West Existing Wetland

Routing by Dyn-Stor-Ind method, Time Span= 0.00-600.00 hrs, dt= 0.01 hrs
Peak Elev= 988.85' @ 12.23 hrs

Device	Routing	Invert	Outlet Devices
#1	Primary	986.30'	**18.0" Round Culvert** L= 35.0' RCP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 986.30' / 986.13' S= 0.0049 '/' Cc= 0.900 n= 0.013, Flow Area= 1.77 sf

Primary OutFlow Max=10.71 cfs @ 12.23 hrs HW=988.85' TW=974.21' (Dynamic Tailwater)
↑**1=Culvert** (Barrel Controls 10.71 cfs @ 6.06 fps)

Pond 11P: (new Pond)

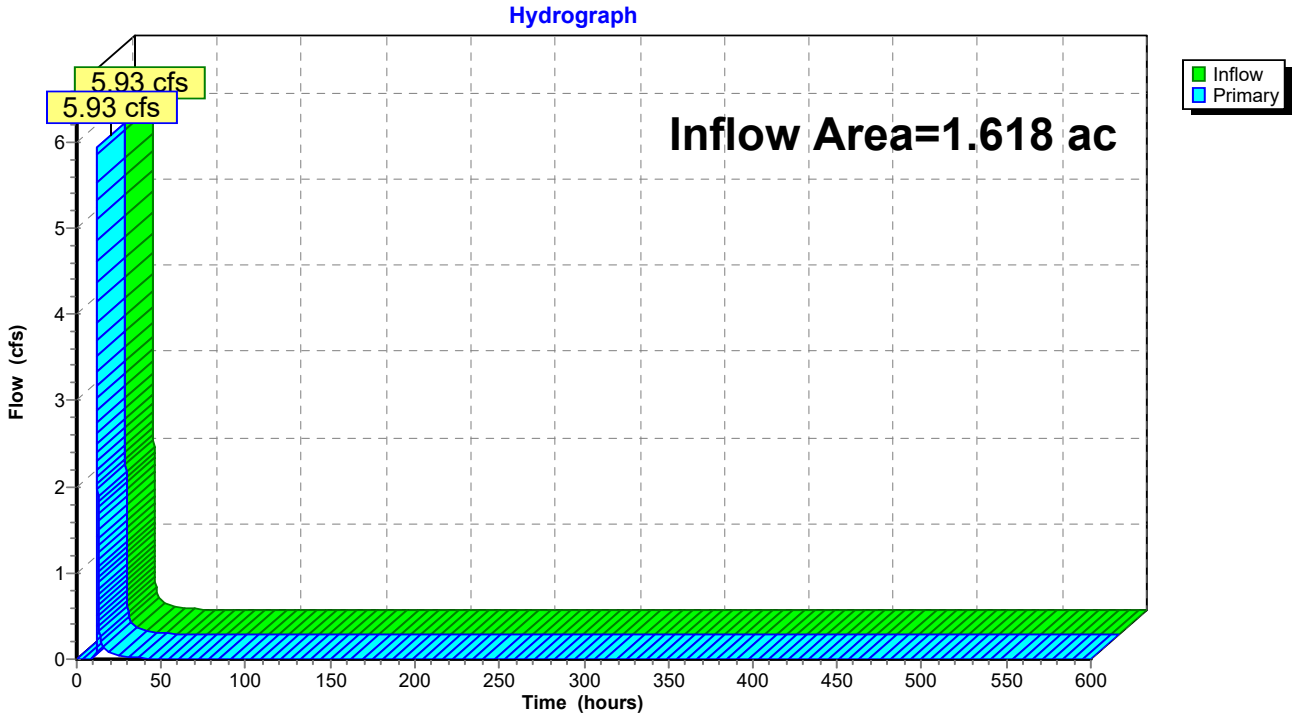


Summary for Link 3L: SOUTH

Inflow Area = 1.618 ac, 16.00% Impervious, Inflow Depth = 2.47" for 10-Year event
Inflow = 5.93 cfs @ 12.16 hrs, Volume= 0.332 af
Primary = 5.93 cfs @ 12.16 hrs, Volume= 0.332 af, Atten= 0%, Lag= 0.0 min
Routed to Link 7L : TOTAL

Primary outflow = Inflow, Time Span= 0.00-600.00 hrs, dt= 0.01 hrs

Link 3L: SOUTH

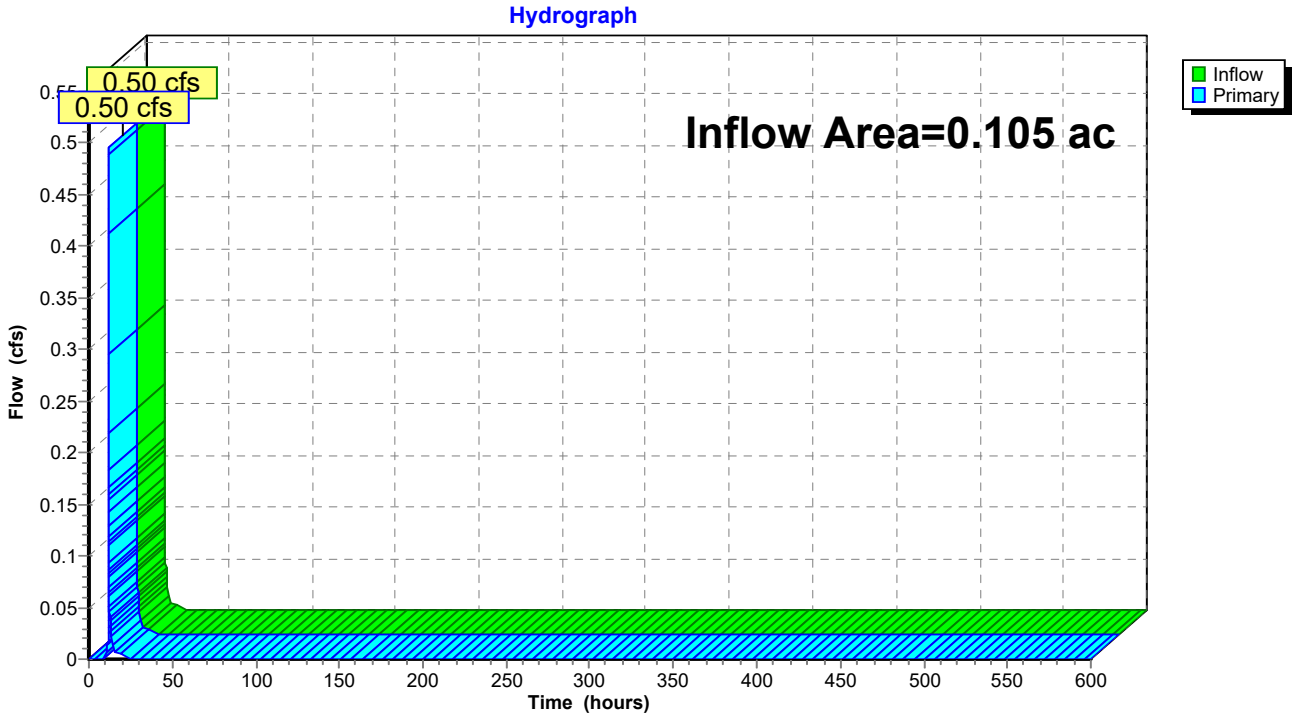


Summary for Link 6L: EAST

Inflow Area = 0.105 ac, 0.00% Impervious, Inflow Depth = 2.18" for 10-Year event
Inflow = 0.50 cfs @ 12.10 hrs, Volume= 0.019 af
Primary = 0.50 cfs @ 12.10 hrs, Volume= 0.019 af, Atten= 0%, Lag= 0.0 min
Routed to Link 7L : TOTAL

Primary outflow = Inflow, Time Span= 0.00-600.00 hrs, dt= 0.01 hrs

Link 6L: EAST

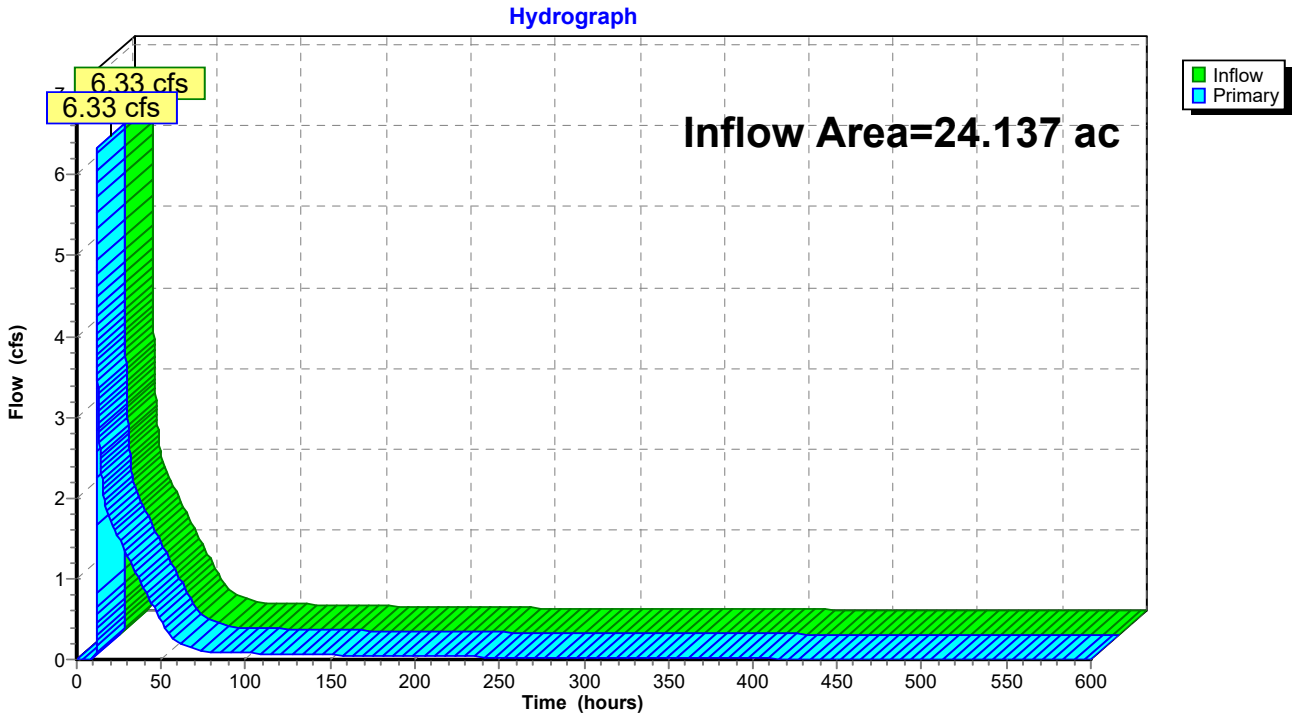


Summary for Link 7L: TOTAL

Inflow Area = 24.137 ac, 37.61% Impervious, Inflow Depth > 2.88" for 10-Year event
Inflow = 6.33 cfs @ 12.17 hrs, Volume= 5.793 af
Primary = 6.33 cfs @ 12.17 hrs, Volume= 5.793 af, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 0.00-600.00 hrs, dt= 0.01 hrs

Link 7L: TOTAL



Time span=0.00-600.00 hrs, dt=0.01 hrs, 60001 points
Runoff by SCS TR-20 method, UH=SCS, Weighted-Q
Reach routing by Dyn-Stor-Ind method - Pond routing by Dyn-Stor-Ind method

Subcatchment9S: S9 Runoff Area=40,548 sf 23.56% Impervious Runoff Depth=5.54"
Tc=9.0 min UI Adjusted CN=WQ Runoff=7.89 cfs 0.430 af

SubcatchmentOFF-1: OFF-1 Runoff Area=158,729 sf 43.99% Impervious Runoff Depth=5.90"
Flow Length=564' Slope=0.0323 '/' Tc=9.8 min CN=WQ Runoff=30.72 cfs 1.793 af

SubcatchmentOFF-2: OFF-2 Runoff Area=17,669 sf 22.68% Impervious Runoff Depth=5.43"
Flow Length=287' Slope=0.0766 '/' Tc=3.8 min UI Adjusted CN=WQ Runoff=4.14 cfs 0.184 af

SubcatchmentOFF-3: OFF-3 Runoff Area=86,096 sf 33.88% Impervious Runoff Depth=5.68"
Flow Length=499' Slope=0.0613 '/' Tc=6.2 min CN=WQ Runoff=18.89 cfs 0.936 af

SubcatchmentOFF-4: OFF-4 Runoff Area=23,465 sf 44.73% Impervious Runoff Depth=5.98"
Tc=10.0 min CN=WQ Runoff=4.56 cfs 0.269 af

SubcatchmentOFF-5: OFF-5 Runoff Area=8,976 sf 0.00% Impervious Runoff Depth=5.27"
Tc=8.0 min CN=82 Runoff=1.78 cfs 0.091 af

SubcatchmentOFF-6: OFF-6 Runoff Area=18,404 sf 9.37% Impervious Runoff Depth=5.24"
Tc=13.0 min CN=WQ Runoff=2.97 cfs 0.185 af

SubcatchmentOFF-7: OFF-7 Runoff Area=2,943 sf 9.17% Impervious Runoff Depth=5.24"
Flow Length=429' Tc=7.1 min UI Adjusted CN=WQ Runoff=0.60 cfs 0.029 af

SubcatchmentOFF-8: OFF-8 Runoff Area=70,470 sf 40.24% Impervious Runoff Depth=5.89"
Tc=10.0 min CN=WQ Runoff=13.56 cfs 0.794 af

SubcatchmentOFF-9: OFF-9 Runoff Area=30,431 sf 37.98% Impervious Runoff Depth=5.84"
Tc=0.0 min CN=WQ Runoff=7.77 cfs 0.340 af

SubcatchmentS1: S1 Runoff Area=192,846 sf 42.14% Impervious Runoff Depth=5.93"
Flow Length=400' Slope=0.0300 '/' Tc=13.4 min CN=WQ Runoff=32.96 cfs 2.187 af

SubcatchmentS2: S2 Runoff Area=232,863 sf 47.62% Impervious Runoff Depth=6.04"
Tc=15.7 min CN=WQ Runoff=37.66 cfs 2.692 af

SubcatchmentS3: S3 Runoff Area=11,516 sf 0.00% Impervious Runoff Depth=4.93"
Tc=5.0 min CN=79 Runoff=2.46 cfs 0.109 af

SubcatchmentS4: S4 Runoff Area=120,250 sf 24.75% Impervious Runoff Depth=5.48"
Flow Length=345' Tc=10.0 min UI Adjusted CN=WQ Runoff=22.10 cfs 1.261 af

SubcatchmentS5: S5 Runoff Area=21,220 sf 40.16% Impervious Runoff Depth=6.02"
Tc=8.0 min CN=WQ Runoff=4.52 cfs 0.245 af

SubcatchmentS6: S6 Runoff Area=4,590 sf 0.00% Impervious Runoff Depth=4.93"
Flow Length=60' Slope=0.0330 '/' Tc=1.9 min CN=79 Runoff=1.07 cfs 0.043 af

SubcatchmentS7: S7 Runoff Area=7,792 sf 0.00% Impervious Runoff Depth=5.27"
Tc=8.0 min CN=82 Runoff=1.55 cfs 0.079 af

SubcatchmentS8: S8 Runoff Area=2,613 sf 0.00% Impervious Runoff Depth=5.05"
Tc=8.0 min CN=80 Runoff=0.50 cfs 0.025 af

Pond 1P: FILTRATION/WETLAND Peak Elev=999.57' Storage=388,566 cf Inflow=137.66 cfs 9.469 af
Outflow=8.03 cfs 9.423 af

Pond 8P: West Filtration Basin Peak Elev=997.98' Storage=12,964 cf Inflow=23.81 cfs 1.351 af
Primary=14.84 cfs 1.179 af Secondary=0.09 cfs 0.172 af Outflow=14.93 cfs 1.351 af

Pond 9P: South Filtration Trench Peak Elev=1,020.10' Storage=2,355 cf Inflow=10.65 cfs 0.614 af
Primary=0.06 cfs 0.098 af Secondary=10.57 cfs 0.508 af Outflow=10.63 cfs 0.606 af

Pond 10P: West Existing Wetland Peak Elev=974.84' Storage=46,842 cf Inflow=17.76 cfs 10.878 af
Outflow=7.32 cfs 10.873 af

Pond 11P: (new Pond) Peak Elev=990.92' Inflow=16.74 cfs 10.774 af
18.0" Round Culvert n=0.013 L=35.0' S=0.0049 '/' Outflow=16.74 cfs 10.774 af

Link 3L: SOUTH Inflow=12.43 cfs 0.715 af
Primary=12.43 cfs 0.715 af

Link 6L: EAST Inflow=1.07 cfs 0.043 af
Primary=1.07 cfs 0.043 af

Link 7L: TOTAL Inflow=14.95 cfs 11.631 af
Primary=14.95 cfs 11.631 af

Summary for Subcatchment 9S: S9

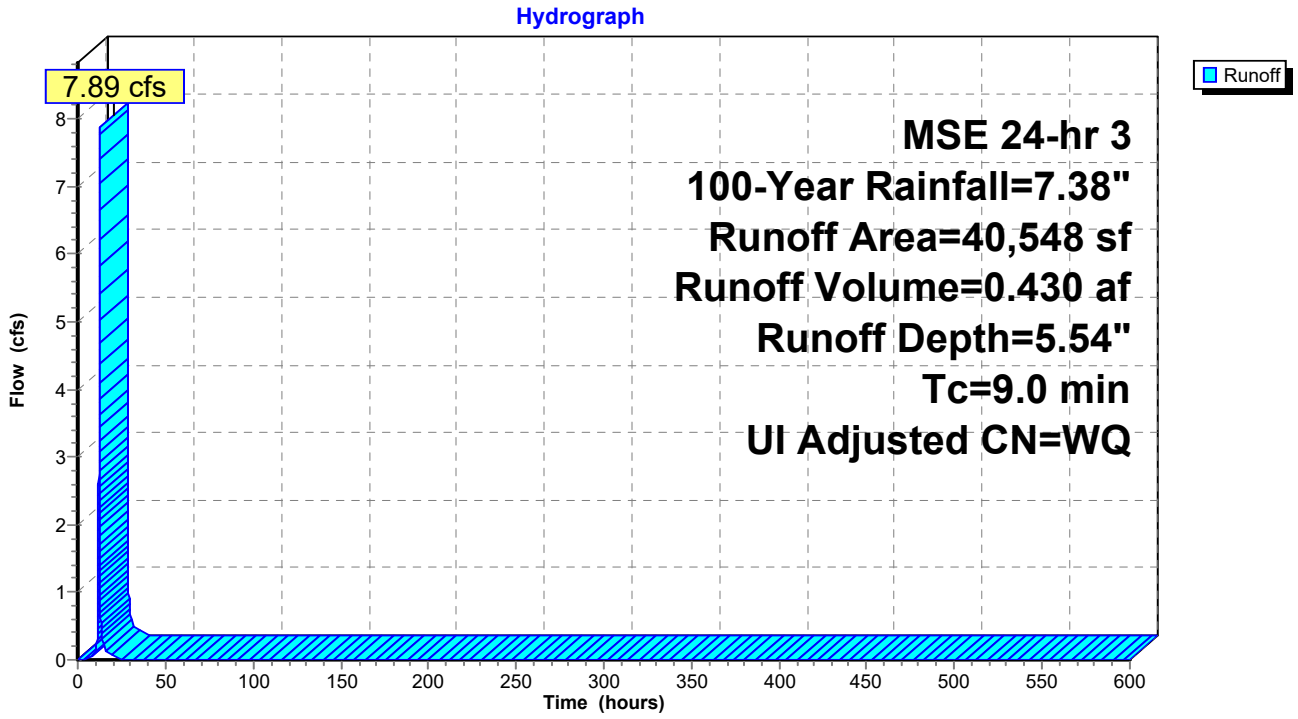
Runoff = 7.89 cfs @ 12.16 hrs, Volume= 0.430 af, Depth= 5.54"
Routed to Pond 9P : South Filtration Trench

Runoff by SCS TR-20 method, UH=SCS, Weighted-Q, Time Span= 0.00-600.00 hrs, dt= 0.01 hrs
MSE 24-hr 3 100-Year Rainfall=7.38"

Area (sf)	CN	Adj	Description
9,552	98	98	Unconnected roofs, HSG D
30,996	80	80	>75% Grass cover, Good, HSG D
40,548			Weighted Average
30,996			76.44% Pervious Area
9,552			23.56% Impervious Area
9,552			100.00% Unconnected

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

Subcatchment 9S: S9



Summary for Subcatchment OFF-1: OFF-1

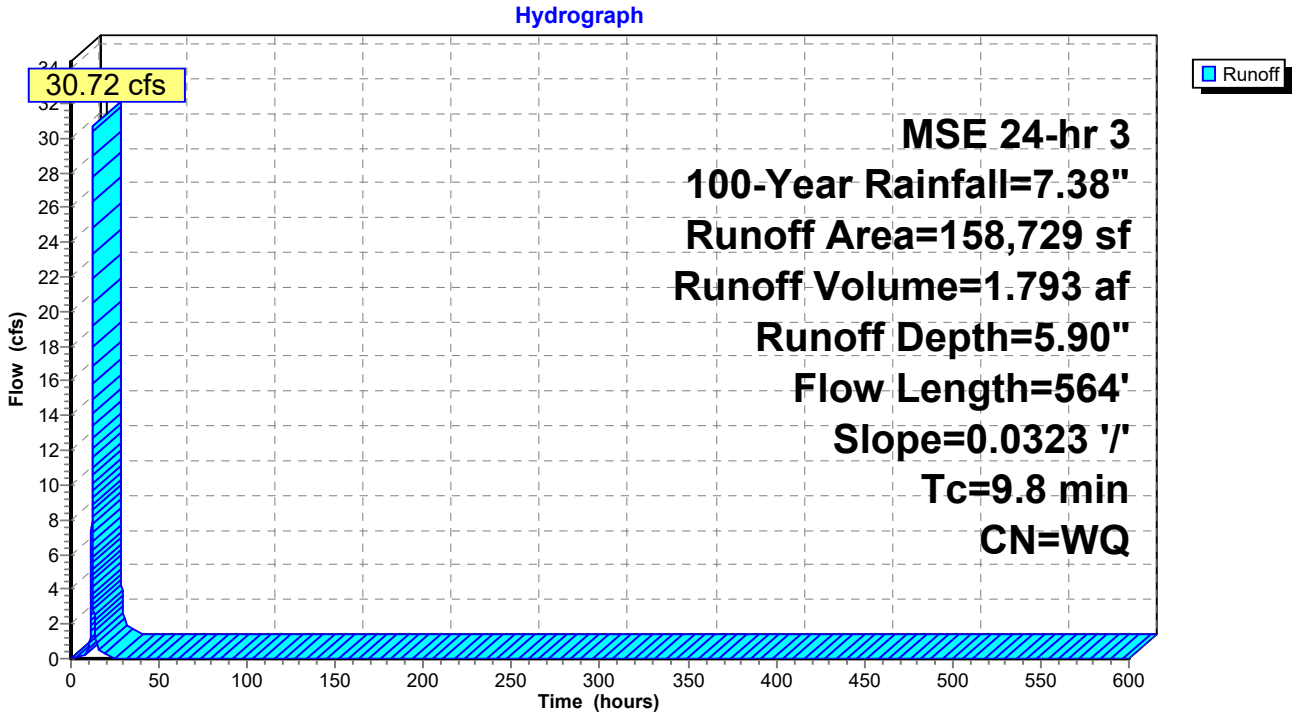
Runoff = 30.72 cfs @ 12.17 hrs, Volume= 1.793 af, Depth= 5.90"
Routed to Pond 1P : FILTRATION/WETLAND

Runoff by SCS TR-20 method, UH=SCS, Weighted-Q, Time Span= 0.00-600.00 hrs, dt= 0.01 hrs
MSE 24-hr 3 100-Year Rainfall=7.38"

Area (sf)	CN	Description
69,832	98	Paved parking, HSG D
88,897	79	Woods/grass comb., Good, HSG D
158,729		Weighted Average
88,897		56.01% Pervious Area
69,832		43.99% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
8.8	564	0.0323	1.07		**Lag/CN Method, BACK YARD SWALE**
1.0					**Direct Entry, Storm Sewer**
9.8	564	Total			

Subcatchment OFF-1: OFF-1



Summary for Subcatchment OFF-2: OFF-2

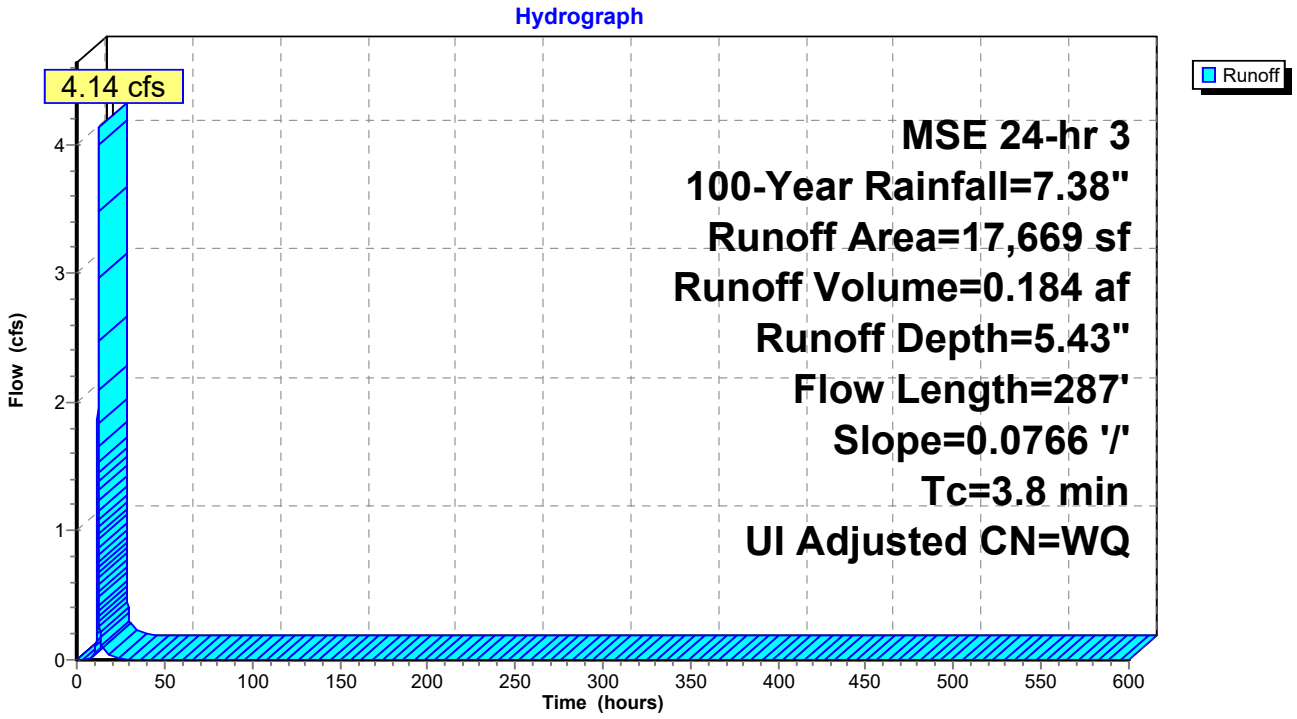
Runoff = 4.14 cfs @ 12.11 hrs, Volume= 0.184 af, Depth= 5.43"
Routed to Pond 1P : FILTRATION/WETLAND

Runoff by SCS TR-20 method, UH=SCS, Weighted-Q, Time Span= 0.00-600.00 hrs, dt= 0.01 hrs
MSE 24-hr 3 100-Year Rainfall=7.38"

Area (sf)	CN	Adj	Description
4,008	98	98	Unconnected roofs, HSG C
13,661	79	79	Woods/grass comb., Good, HSG D
17,669			Weighted Average
13,661			77.32% Pervious Area
4,008			22.68% Impervious Area
4,008			100.00% Unconnected

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
3.8	287	0.0766	1.25		**Lag/CN Method,**

Subcatchment OFF-2: OFF-2



Summary for Subcatchment OFF-3: OFF-3

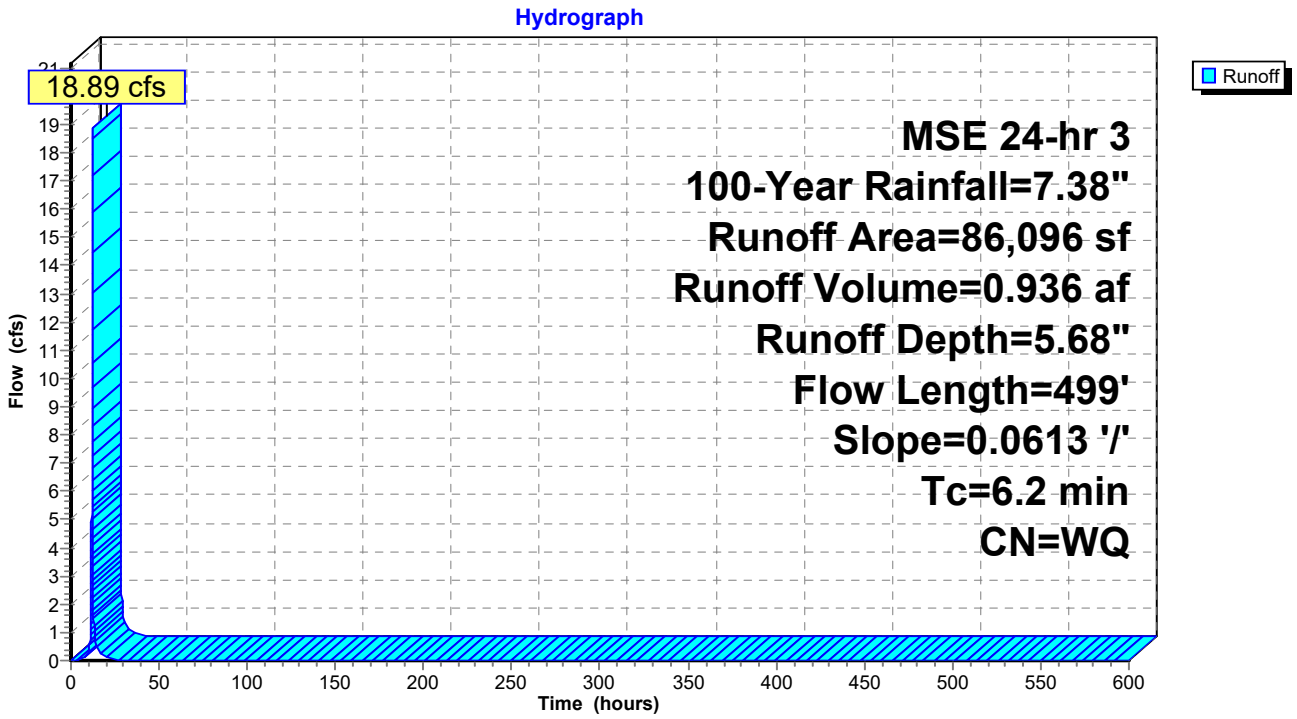
Runoff = 18.89 cfs @ 12.13 hrs, Volume= 0.936 af, Depth= 5.68"
Routed to Pond 1P : FILTRATION/WETLAND

Runoff by SCS TR-20 method, UH=SCS, Weighted-Q, Time Span= 0.00-600.00 hrs, dt= 0.01 hrs
MSE 24-hr 3 100-Year Rainfall=7.38"

Area (sf)	CN	Description
29,173	98	Paved parking, HSG C
56,923	79	Woods/grass comb., Good, HSG D
86,096		Weighted Average
56,923		66.12% Pervious Area
29,173		33.88% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
6.2	499	0.0613	1.33		**Lag/CN Method,**

Subcatchment OFF-3: OFF-3



Summary for Subcatchment OFF-4: OFF-4

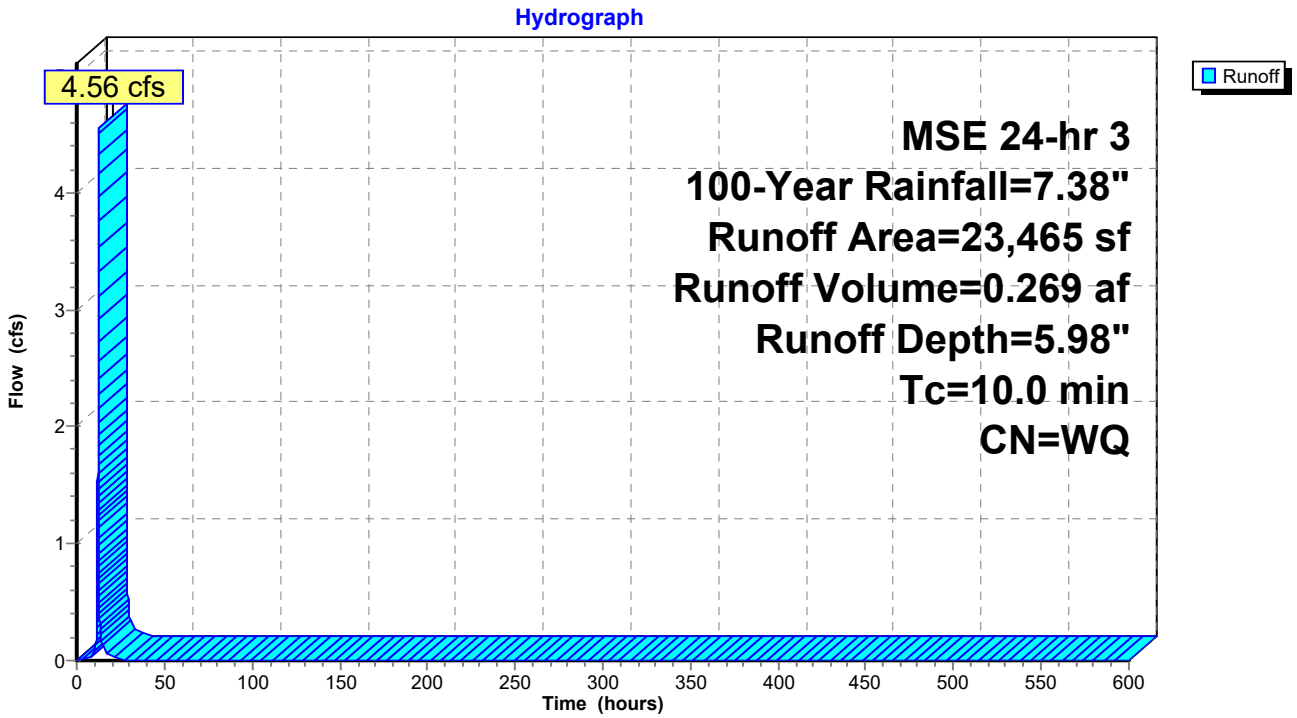
Runoff = 4.56 cfs @ 12.17 hrs, Volume= 0.269 af, Depth= 5.98"
Routed to Pond 1P : FILTRATION/WETLAND

Runoff by SCS TR-20 method, UH=SCS, Weighted-Q, Time Span= 0.00-600.00 hrs, dt= 0.01 hrs
MSE 24-hr 3 100-Year Rainfall=7.38"

Area (sf)	CN	Description
10,497	98	Paved parking, HSG C
12,968	80	>75% Grass cover, Good, HSG D
23,465		Weighted Average
12,968		55.27% Pervious Area
10,497		44.73% Impervious Area

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

Subcatchment OFF-4: OFF-4



Summary for Subcatchment OFF-5: OFF-5

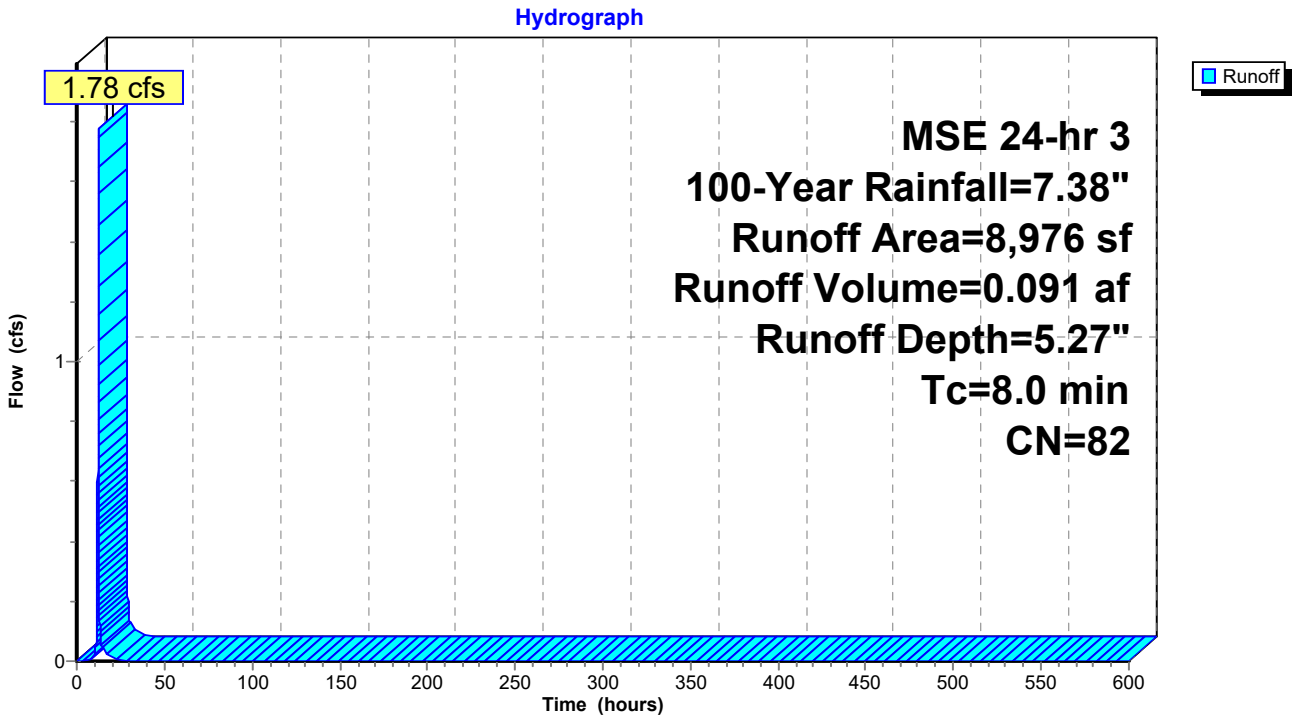
Runoff = 1.78 cfs @ 12.15 hrs, Volume= 0.091 af, Depth= 5.27"
Routed to Pond 8P : West Filtration Basin

Runoff by SCS TR-20 method, UH=SCS, Weighted-Q, Time Span= 0.00-600.00 hrs, dt= 0.01 hrs
MSE 24-hr 3 100-Year Rainfall=7.38"

Area (sf)	CN	Description
8,976	82	Woods/grass comb., Fair, HSG D
8,976		100.00% Pervious Area

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

Subcatchment OFF-5: OFF-5



Summary for Subcatchment OFF-6: OFF-6

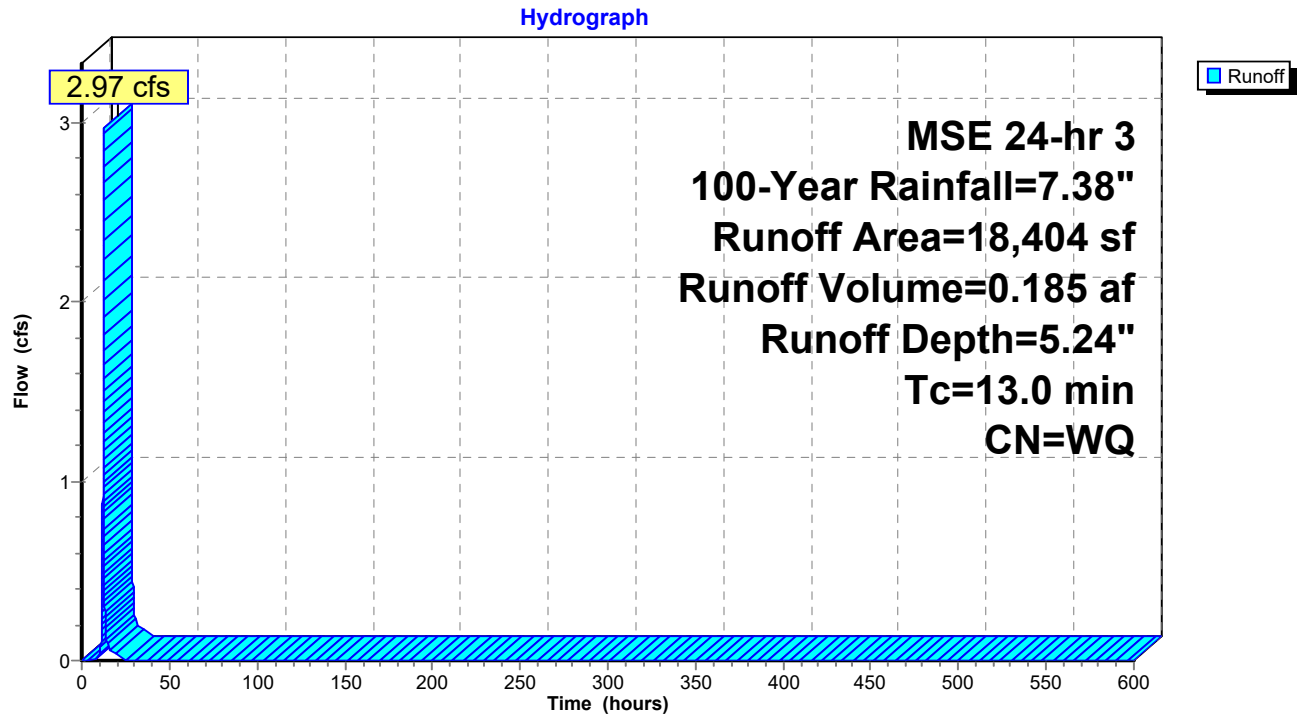
Runoff = 2.97 cfs @ 12.21 hrs, Volume= 0.185 af, Depth= 5.24"
Routed to Pond 9P : South Filtration Trench

Runoff by SCS TR-20 method, UH=SCS, Weighted-Q, Time Span= 0.00-600.00 hrs, dt= 0.01 hrs
MSE 24-hr 3 100-Year Rainfall=7.38"

	Area (sf)	CN	Description
*	1,725	98	Impervious, HSG D
	16,679	80	>75% Grass cover, Good, HSG D
	18,404		Weighted Average
	16,679		90.63% Pervious Area
	1,725		9.37% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
13.0					**Direct Entry, Sheet/Conc Flow**

Subcatchment OFF-6: OFF-6



Summary for Subcatchment OFF-7: OFF-7

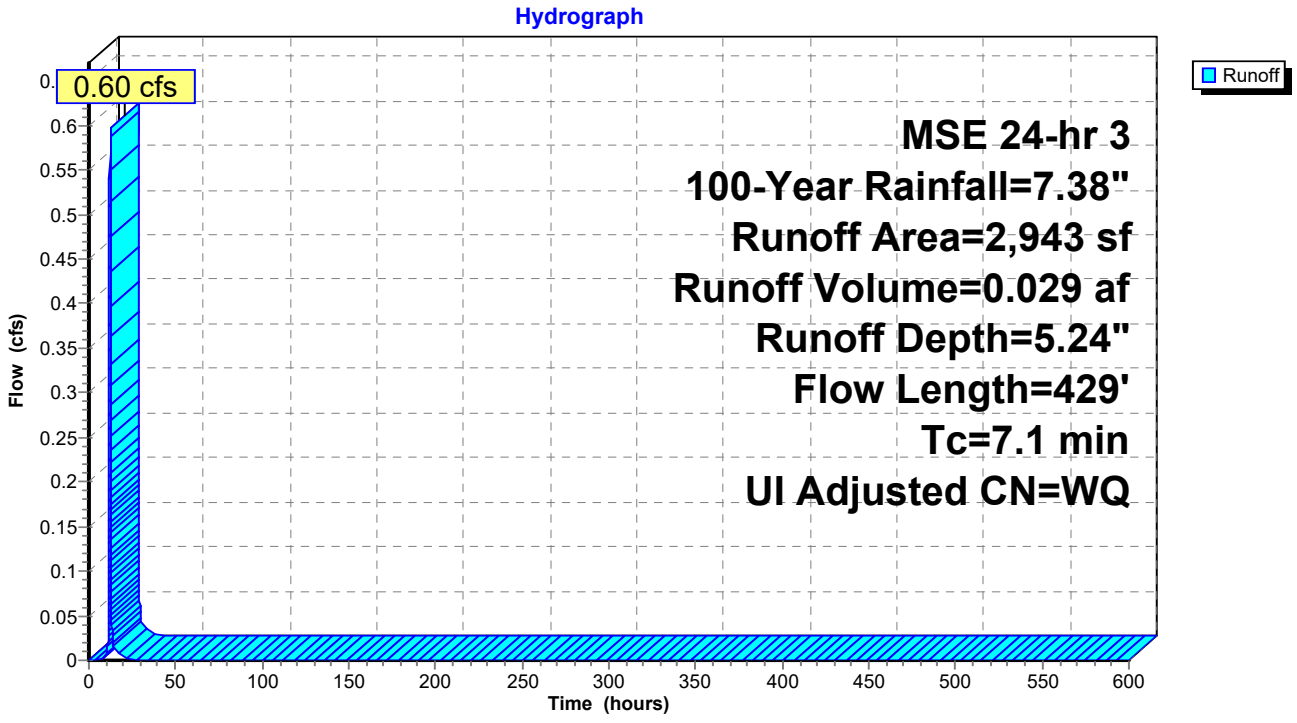
Runoff = 0.60 cfs @ 12.14 hrs, Volume= 0.029 af, Depth= 5.24"
Routed to Pond 1P : FILTRATION/WETLAND

Runoff by SCS TR-20 method, UH=SCS, Weighted-Q, Time Span= 0.00-600.00 hrs, dt= 0.01 hrs
MSE 24-hr 3 100-Year Rainfall=7.38"

Area (sf)	CN	Adj	Description
2,673	80	80	>75% Grass cover, Good, HSG D
270	98	98	Unconnected roofs, HSG D
2,943			Weighted Average
2,673			90.83% Pervious Area
270			9.17% Impervious Area
270			100.00% Unconnected

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
1.1	83	0.1445	1.29		**Lag/CN Method,**
6.0	346	0.0448	0.96		**Lag/CN Method,**
7.1	429	Total			

Subcatchment OFF-7: OFF-7



Summary for Subcatchment OFF-8: OFF-8

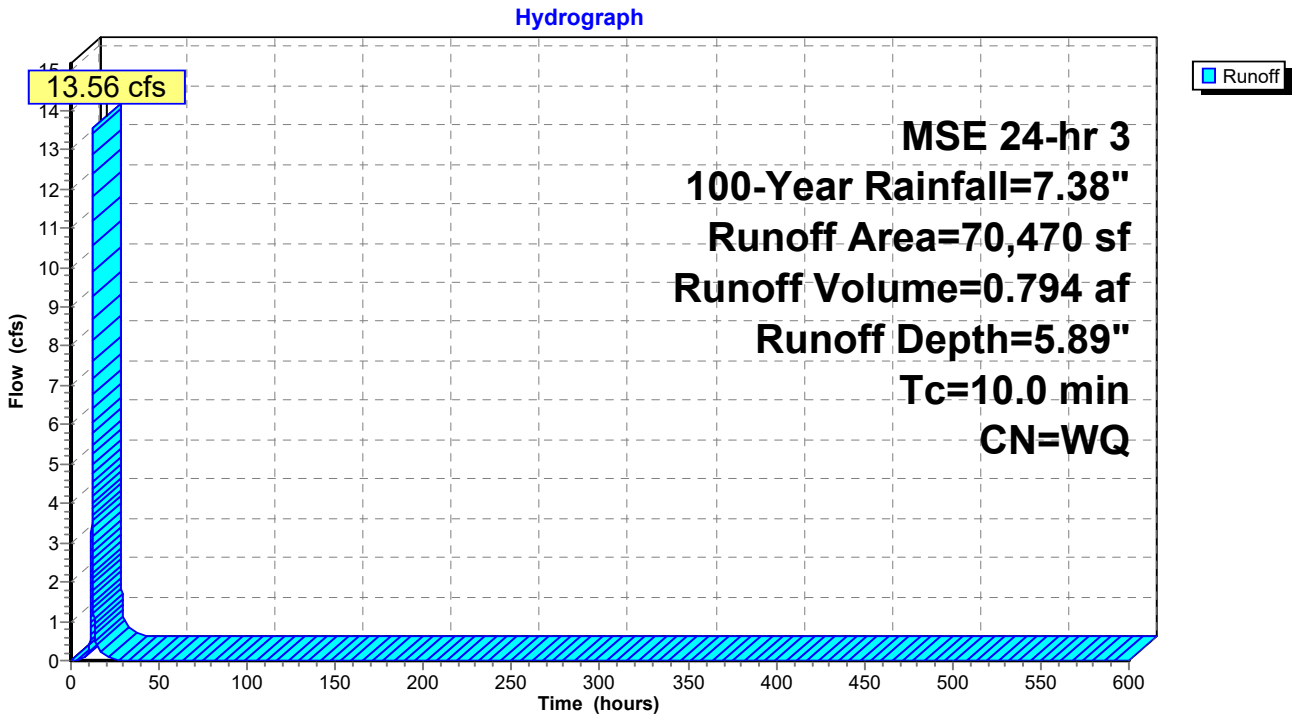
Runoff = 13.56 cfs @ 12.17 hrs, Volume= 0.794 af, Depth= 5.89"
Routed to Pond 1P : FILTRATION/WETLAND

Runoff by SCS TR-20 method, UH=SCS, Weighted-Q, Time Span= 0.00-600.00 hrs, dt= 0.01 hrs
MSE 24-hr 3 100-Year Rainfall=7.38"

Area (sf)	CN	Description
28,355	98	Paved parking, HSG D
42,115	80	>75% Grass cover, Good, HSG D
70,470		Weighted Average
42,115		59.76% Pervious Area
28,355		40.24% Impervious Area

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

Subcatchment OFF-8: OFF-8



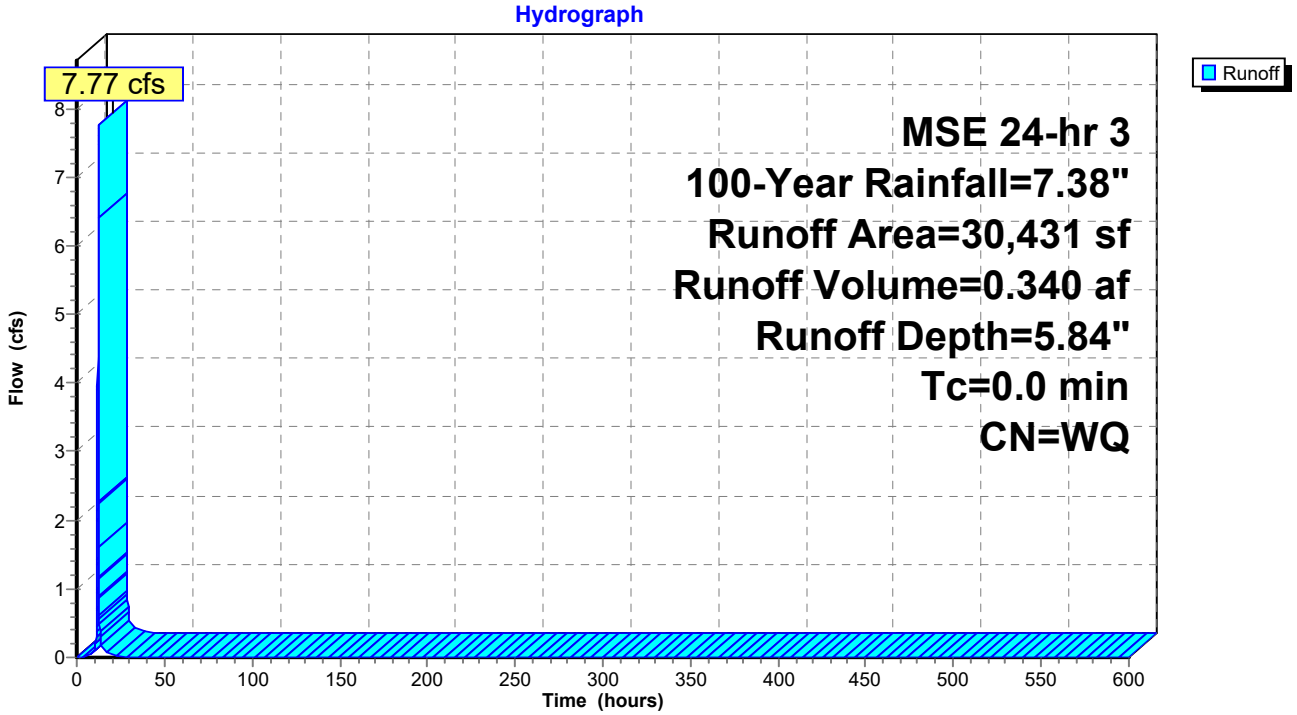
Summary for Subcatchment OFF-9: OFF-9

Runoff = 7.77 cfs @ 12.09 hrs, Volume= 0.340 af, Depth= 5.84"
Routed to Pond 1P : FILTRATION/WETLAND

Runoff by SCS TR-20 method, UH=SCS, Weighted-Q, Time Span= 0.00-600.00 hrs, dt= 0.01 hrs
MSE 24-hr 3 100-Year Rainfall=7.38"

Area (sf)	CN	Description
11,557	98	Paved parking, HSG D
18,874	80	>75% Grass cover, Good, HSG D
30,431		Weighted Average
18,874		62.02% Pervious Area
11,557		37.98% Impervious Area

Subcatchment OFF-9: OFF-9



Summary for Subcatchment S1: S1

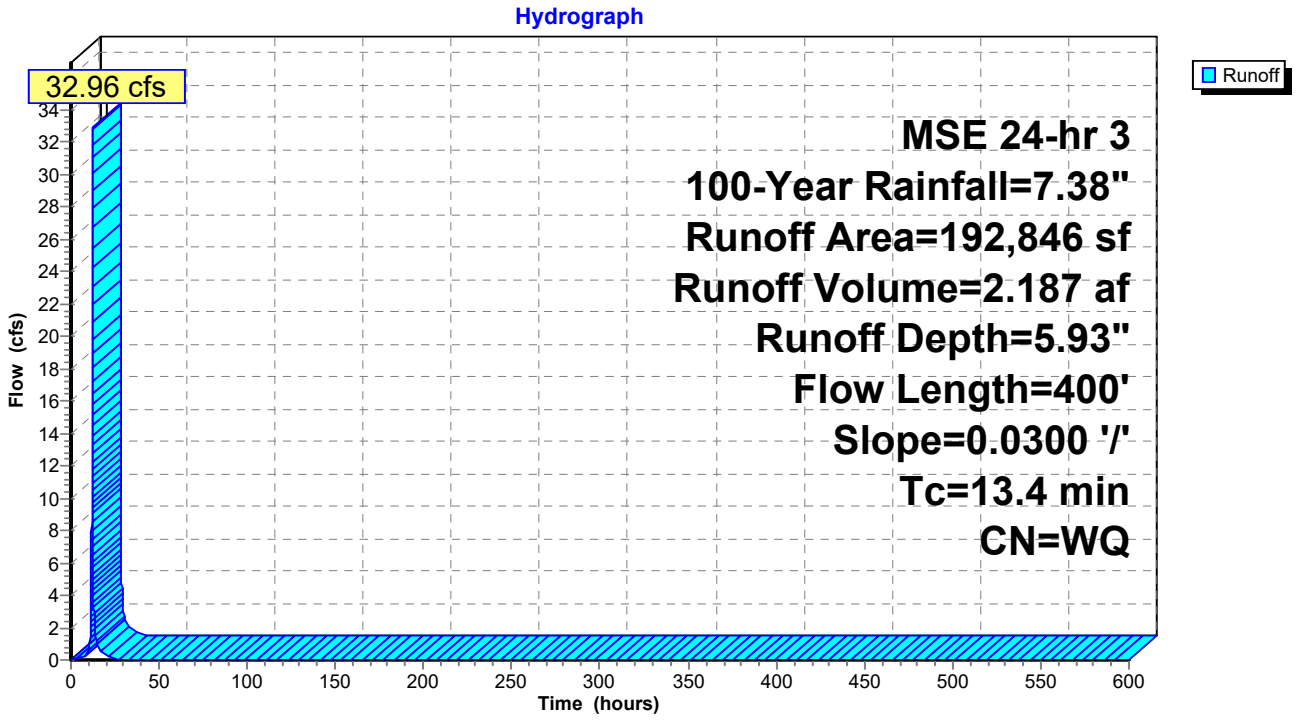
Runoff = 32.96 cfs @ 12.21 hrs, Volume= 2.187 af, Depth= 5.93"
Routed to Pond 1P : FILTRATION/WETLAND

Runoff by SCS TR-20 method, UH=SCS, Weighted-Q, Time Span= 0.00-600.00 hrs, dt= 0.01 hrs
MSE 24-hr 3 100-Year Rainfall=7.38"

	Area (sf)	CN	Description
	35,827	98	Unconnected roofs, HSG D
*	45,445	98	Water Surface, HSG D (994)
	111,574	80	>75% Grass cover, Good, HSG D
	192,846		Weighted Average
	111,574		57.86% Pervious Area
	81,272		42.14% Impervious Area
	35,827		44.08% Unconnected

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
7.4	50	0.0300	0.11		**Sheet Flow,** Grass: Dense n= 0.240 P2= 2.87"
6.0	350	0.0300	0.97		**Lag/CN Method, OVERLAND**
13.4	400	Total			

Subcatchment S1: S1



Summary for Subcatchment S2: S2

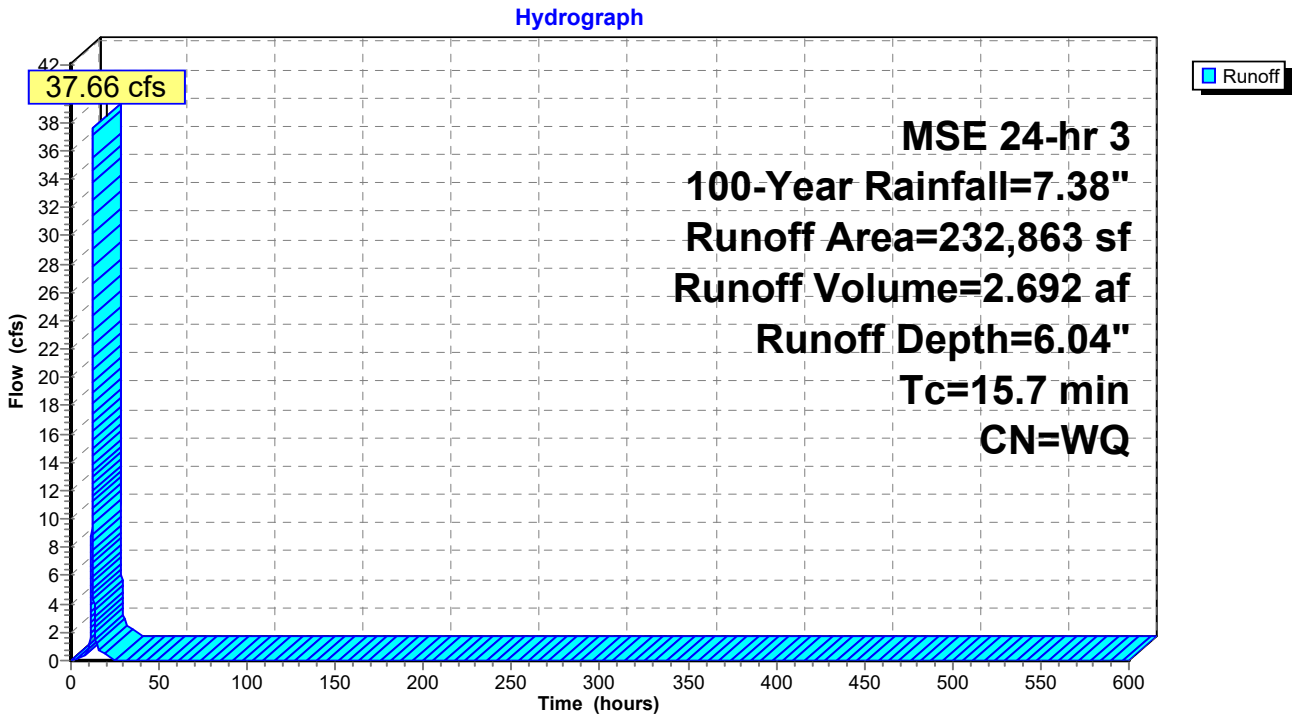
Runoff = 37.66 cfs @ 12.23 hrs, Volume= 2.692 af, Depth= 6.04"
Routed to Pond 1P : FILTRATION/WETLAND

Runoff by SCS TR-20 method, UH=SCS, Weighted-Q, Time Span= 0.00-600.00 hrs, dt= 0.01 hrs
MSE 24-hr 3 100-Year Rainfall=7.38"

Area (sf)	CN	Description
110,886	98	Paved parking, HSG D
121,977	80	>75% Grass cover, Good, HSG D
232,863		Weighted Average
121,977		52.38% Pervious Area
110,886		47.62% Impervious Area

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

Subcatchment S2: S2



Summary for Subcatchment S3: S3

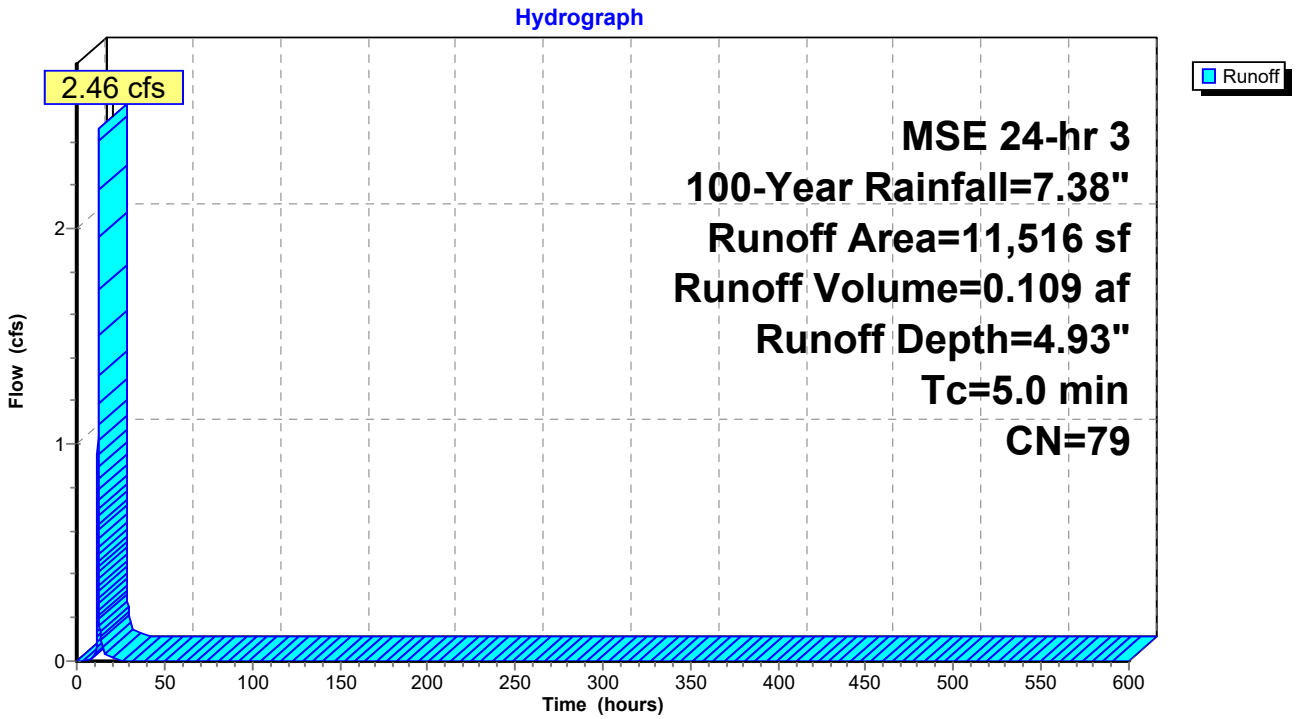
Runoff = 2.46 cfs @ 12.12 hrs, Volume= 0.109 af, Depth= 4.93"
Routed to Link 3L : SOUTH

Runoff by SCS TR-20 method, UH=SCS, Weighted-Q, Time Span= 0.00-600.00 hrs, dt= 0.01 hrs
MSE 24-hr 3 100-Year Rainfall=7.38"

Area (sf)	CN	Description
11,516	79	Woods/grass comb., Good, HSG D
11,516		100.00% Pervious Area

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

Subcatchment S3: S3



Summary for Subcatchment S4: S4

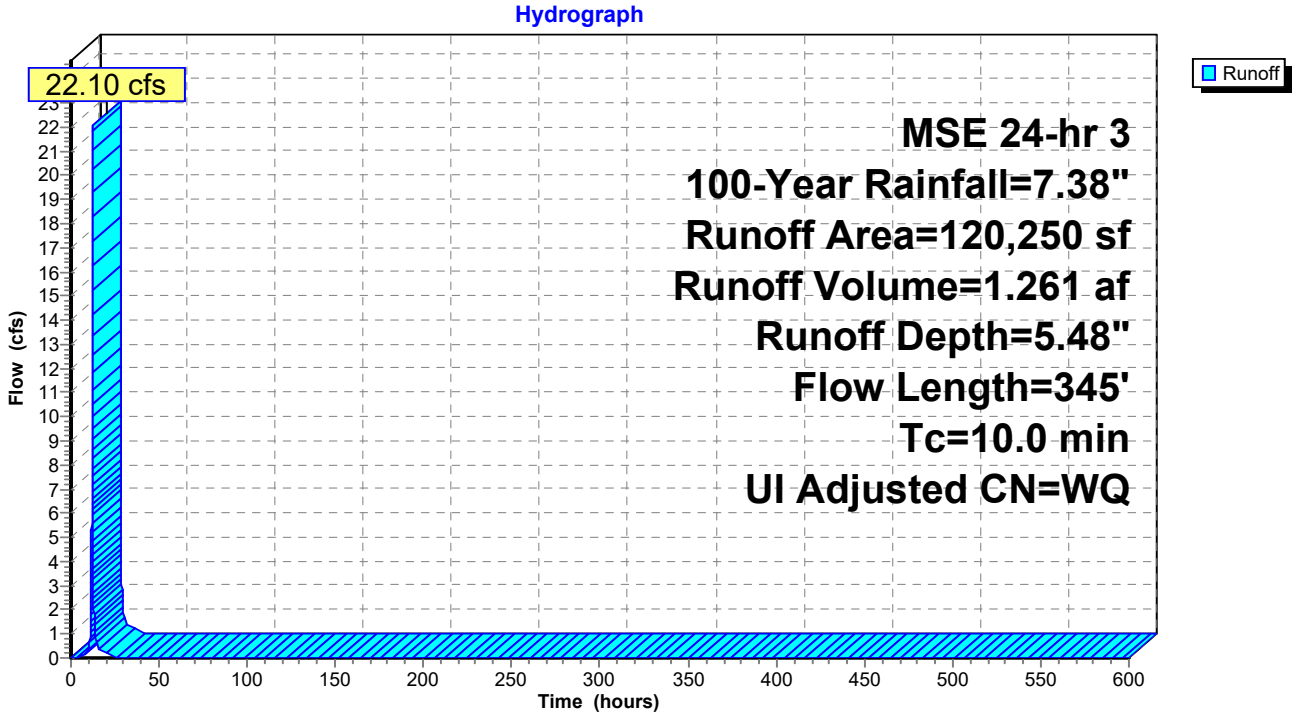
Runoff = 22.10 cfs @ 12.17 hrs, Volume= 1.261 af, Depth= 5.48"
Routed to Pond 8P : West Filtration Basin

Runoff by SCS TR-20 method, UH=SCS, Weighted-Q, Time Span= 0.00-600.00 hrs, dt= 0.01 hrs
MSE 24-hr 3 100-Year Rainfall=7.38"

Area (sf)	CN	Adj	Description
29,761	98	98	Unconnected roofs, HSG D
90,489	79	79	Woods/grass comb., Good, HSG D
120,250			Weighted Average
90,489			75.25% Pervious Area
29,761			24.75% Impervious Area
29,761			100.00% Unconnected

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
4.2	25	0.0300	0.10		**Sheet Flow,** Grass: Dense n= 0.240 P2= 2.87"
5.1	240	0.0300	0.78		**Lag/CN Method, OVERLAND**
0.7	80	0.2750	1.89		**Lag/CN Method, over**
10.0	345	Total			

Subcatchment S4: S4



Summary for Subcatchment S5: S5

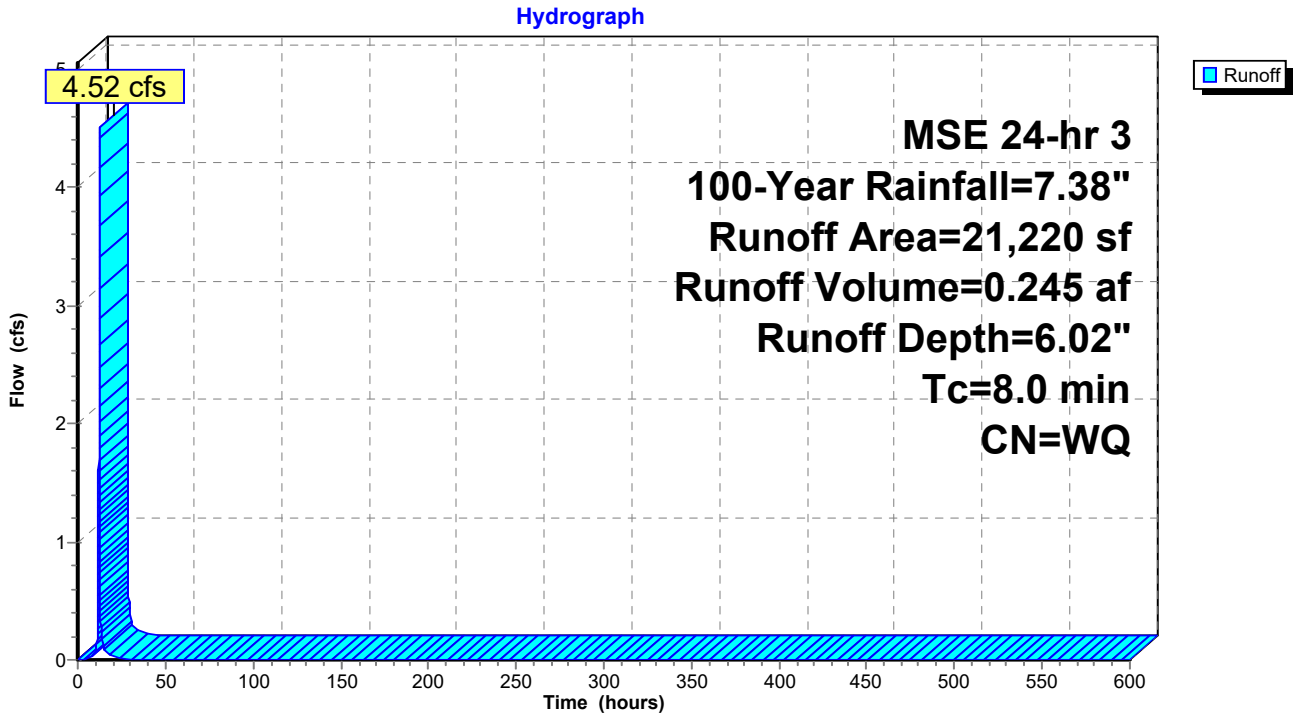
Runoff = 4.52 cfs @ 12.15 hrs, Volume= 0.245 af, Depth= 6.02"
Routed to Pond 1P : FILTRATION/WETLAND

Runoff by SCS TR-20 method, UH=SCS, Weighted-Q, Time Span= 0.00-600.00 hrs, dt= 0.01 hrs
MSE 24-hr 3 100-Year Rainfall=7.38"

Area (sf)	CN	Description
8,522	98	Unconnected roofs, HSG D
12,698	82	Woods/grass comb., Fair, HSG D
21,220		Weighted Average
12,698		59.84% Pervious Area
8,522		40.16% Impervious Area
8,522		100.00% Unconnected

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

Subcatchment S5: S5



Summary for Subcatchment S6: S6

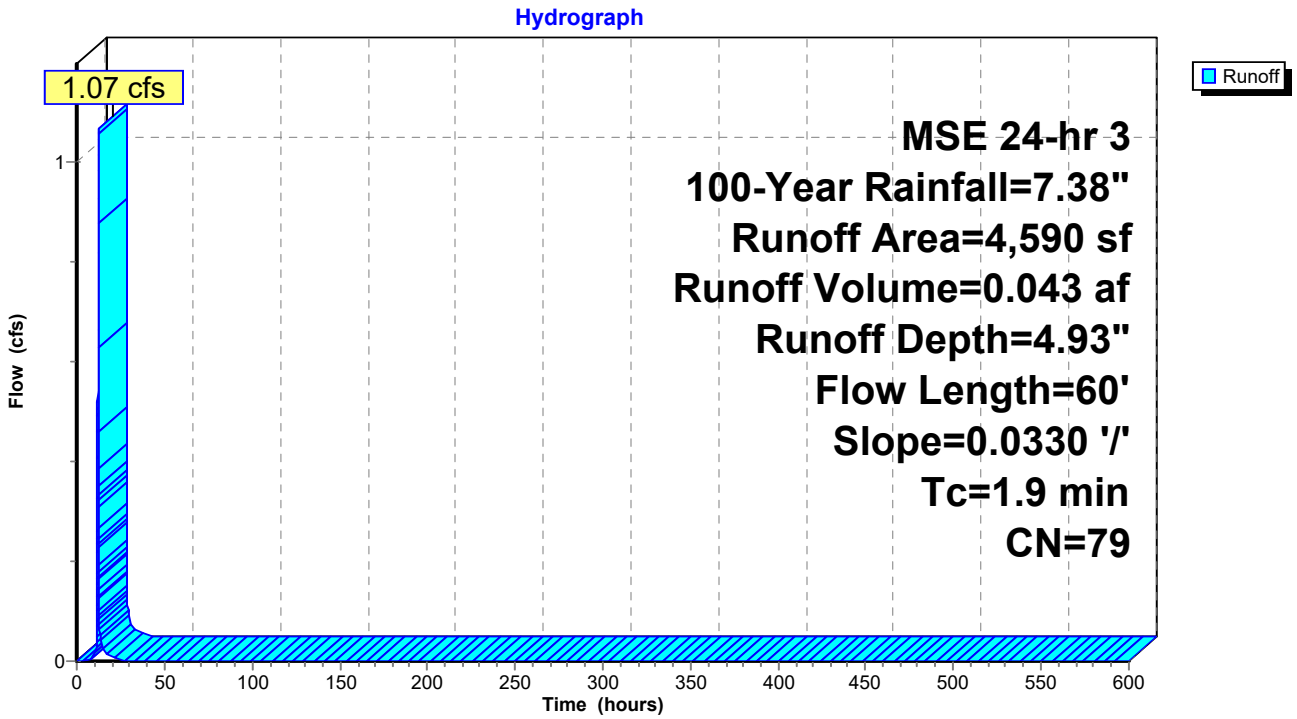
Runoff = 1.07 cfs @ 12.10 hrs, Volume= 0.043 af, Depth= 4.93"
Routed to Link 6L : EAST

Runoff by SCS TR-20 method, UH=SCS, Weighted-Q, Time Span= 0.00-600.00 hrs, dt= 0.01 hrs
MSE 24-hr 3 100-Year Rainfall=7.38"

Area (sf)	CN	Description
4,590	79	Woods/grass comb., Good, HSG D
4,590		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
1.9	60	0.0330	0.53		**Lag/CN Method, OVERLAND**

Subcatchment S6: S6



Summary for Subcatchment S7: S7

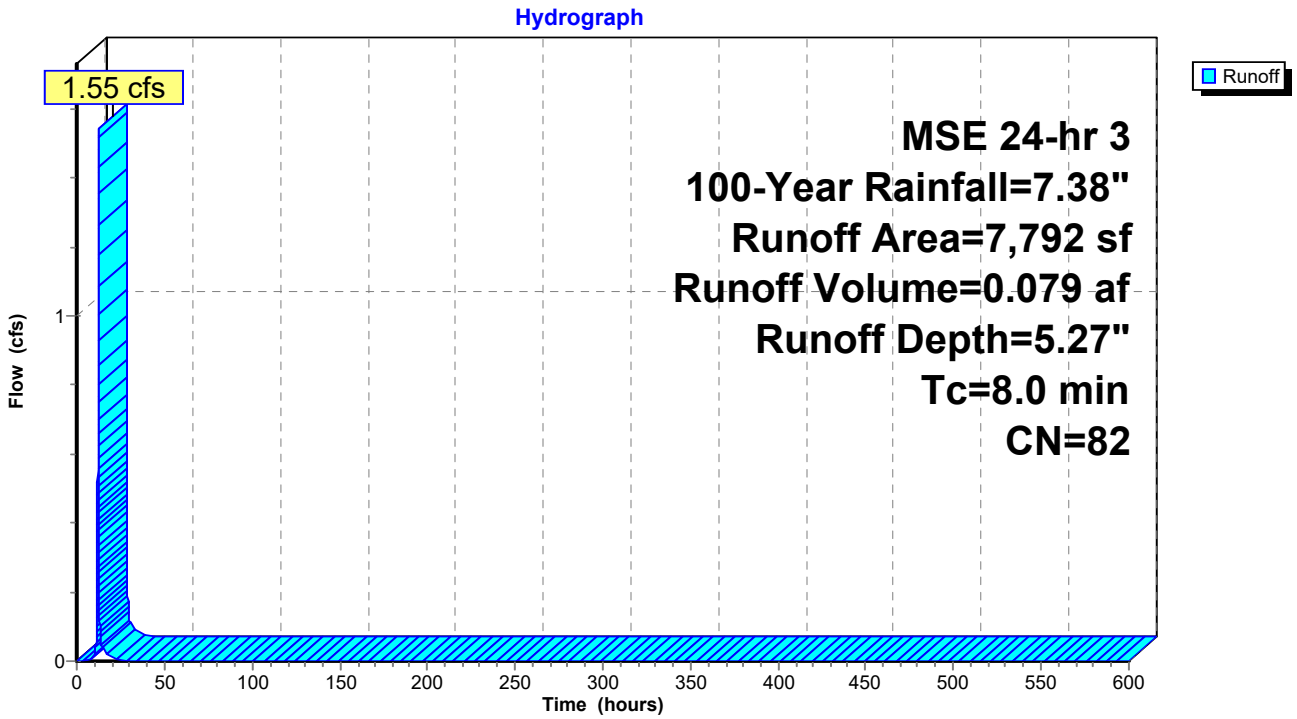
Runoff = 1.55 cfs @ 12.15 hrs, Volume= 0.079 af, Depth= 5.27"
Routed to Pond 10P : West Existing Wetland

Runoff by SCS TR-20 method, UH=SCS, Weighted-Q, Time Span= 0.00-600.00 hrs, dt= 0.01 hrs
MSE 24-hr 3 100-Year Rainfall=7.38"

Area (sf)	CN	Description
7,792	82	Woods/grass comb., Fair, HSG D
7,792		100.00% Pervious Area

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

Subcatchment S7: S7



Summary for Subcatchment S8: S8

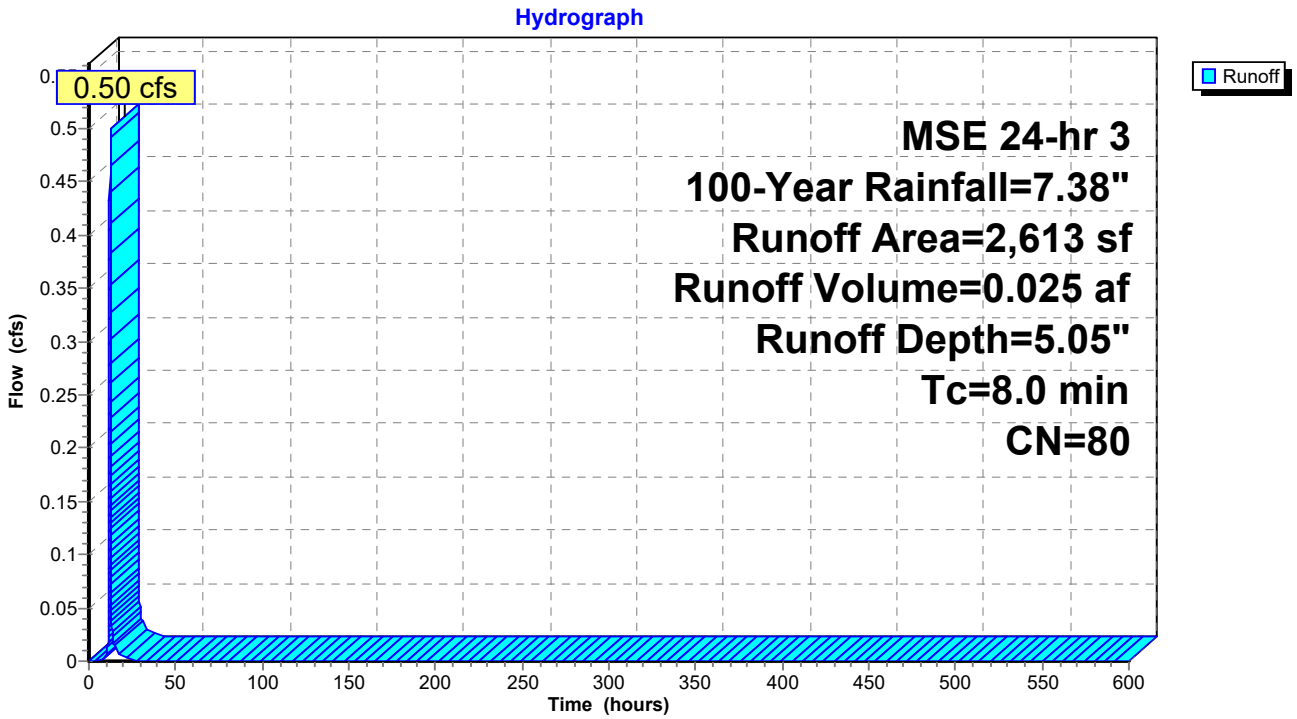
Runoff = 0.50 cfs @ 12.15 hrs, Volume= 0.025 af, Depth= 5.05"
Routed to Pond 10P : West Existing Wetland

Runoff by SCS TR-20 method, UH=SCS, Weighted-Q, Time Span= 0.00-600.00 hrs, dt= 0.01 hrs
MSE 24-hr 3 100-Year Rainfall=7.38"

Area (sf)	CN	Description
2,613	80	>75% Grass cover, Good, HSG D
2,613		100.00% Pervious Area

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

Subcatchment S8: S8



Summary for Pond 1P: FILTRATION/WETLAND

Inflow Area = 19.209 ac, 42.35% Impervious, Inflow Depth = 5.92" for 100-Year event
Inflow = 137.66 cfs @ 12.18 hrs, Volume= 9.469 af
Outflow = 8.03 cfs @ 13.58 hrs, Volume= 9.423 af, Atten= 94%, Lag= 84.2 min
Primary = 8.03 cfs @ 13.58 hrs, Volume= 9.423 af
Routed to Pond 11P : (new Pond)

Routing by Dyn-Stor-Ind method, Time Span= 0.00-600.00 hrs, dt= 0.01 hrs
Starting Elev= 994.00' Surf.Area= 77,880 sf Storage= 82,249 cf
Peak Elev= 999.57' @ 13.58 hrs Surf.Area= 99,809 sf Storage= 388,566 cf (306,318 cf above start)

Plug-Flow detention time= 3,225.6 min calculated for 7.535 af (80% of inflow)
Center-of-Mass det. time= 2,546.2 min (3,315.4 - 769.2)

Volume	Invert	Avail.Storage	Storage Description
#1	990.00'	17,111 cf	**West Forebay (Prismatic)**Listed below (Recalc)
#2	993.50'	1,136 cf	**West shallow wetland (Prismatic)**Listed below (Recalc)
#3	990.00'	18,942 cf	**Remnant Wetland (Prismatic)**Listed below (Recalc)
#4	989.00'	40,459 cf	**Middle Forebay (Prismatic)**Listed below (Recalc)
#5	993.50'	665 cf	**East shallow wetland (Prismatic)**Listed below (Recalc)
#6	992.90'	3,936 cf	**Filtration (Prismatic)**Listed below (Recalc) -Impervious 13,121 cf Overall x 30.0% Voids
#7	994.00'	336,285 cf	**Live Storage (Prismatic)**Listed below (Recalc)
		418,533 cf	Total Available Storage

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
990.00	2,470	0	0
992.00	4,186	6,656	6,656
994.00	6,269	10,455	17,111

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
993.50	1,701	0	0
994.00	2,844	1,136	1,136

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
990.00	1,596	0	0
992.00	4,761	6,357	6,357
994.00	7,824	12,585	18,942

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
989.00	5,024	0	0
990.00	6,006	5,515	5,515
991.00	7,121	6,564	12,079
993.00	9,592	16,713	28,792
994.00	13,742	11,667	40,459

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
993.50	961	0	0
994.00	1,698	665	665

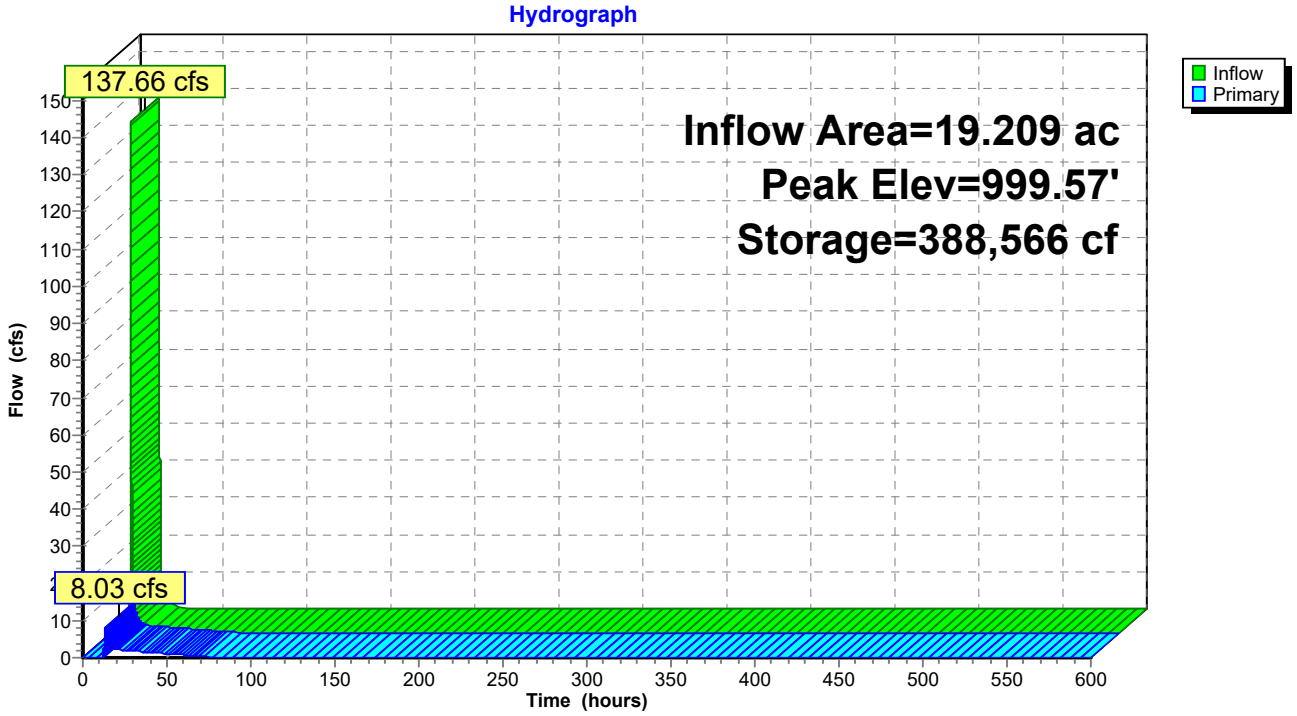
Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
992.90	11,928	0	0
994.00	11,928	13,121	13,121

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
994.00	45,503	0	0
995.00	49,888	47,696	47,696
996.00	53,188	51,538	99,234
998.00	56,729	109,917	209,151
1,000.00	70,405	127,134	336,285

Device	Routing	Invert	Outlet Devices
#1	Primary	990.90'	**15.0" Round Culvert** L= 556.1' RCP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 990.90' / 988.10' S= 0.0050 '/' Cc= 0.900 n= 0.013 Concrete sewer w/manholes & inlets, Flow Area= 1.23 sf
#2	Device 1	999.10'	**6.0' long x 0.5' breadth Broad-Crested Rectangular Weir** Head (feet) 0.20 0.40 0.60 0.80 1.00 Coef. (English) 2.80 2.92 3.08 3.30 3.32
#3	Device 1	994.00'	**0.800 in/hr Filtration over Surface area above 994.00'** Excluded Surface area = 77,880 sf
#4	Device 1	995.00'	**6.0" Vert. Orifice/Grate** C= 0.600 Limited to weir flow at low heads

Primary OutFlow Max=8.03 cfs @ 13.58 hrs HW=999.57' TW=988.57' (Dynamic Tailwater)
↑└─**1=Culvert** (Passes 8.03 cfs of 8.28 cfs potential flow)
  ├─**2=Broad-Crested Rectangular Weir** (Weir Controls 5.66 cfs @ 2.03 fps)
  ├─**3=Filtration** (Exfiltration Controls 0.41 cfs)
  └─**4=Orifice/Grate** (Orifice Controls 1.96 cfs @ 10.00 fps)

Pond 1P: FILTRATION/WETLAND



Summary for Pond 8P: West Filtration Basin

Inflow Area = 2.967 ac, 23.03% Impervious, Inflow Depth = 5.47" for 100-Year event
Inflow = 23.81 cfs @ 12.17 hrs, Volume= 1.351 af
Outflow = 14.93 cfs @ 12.27 hrs, Volume= 1.351 af, Atten= 37%, Lag= 6.1 min
Primary = 14.84 cfs @ 12.27 hrs, Volume= 1.179 af
Routed to Pond 11P : (new Pond)
Secondary = 0.09 cfs @ 12.27 hrs, Volume= 0.172 af
Routed to Pond 11P : (new Pond)

Routing by Dyn-Stor-Ind method, Time Span= 0.00-600.00 hrs, dt= 0.01 hrs
Peak Elev= 997.98' @ 12.27 hrs Surf.Area= 6,397 sf Storage= 12,964 cf

Plug-Flow detention time= 245.8 min calculated for 1.351 af (100% of inflow)
Center-of-Mass det. time= 245.6 min (1,024.0 - 778.4)

Volume	Invert	Avail.Storage	Storage Description
#1	995.00'	16,465 cf	**Custom Stage Data (Prismatic)** Listed below (Recalc)

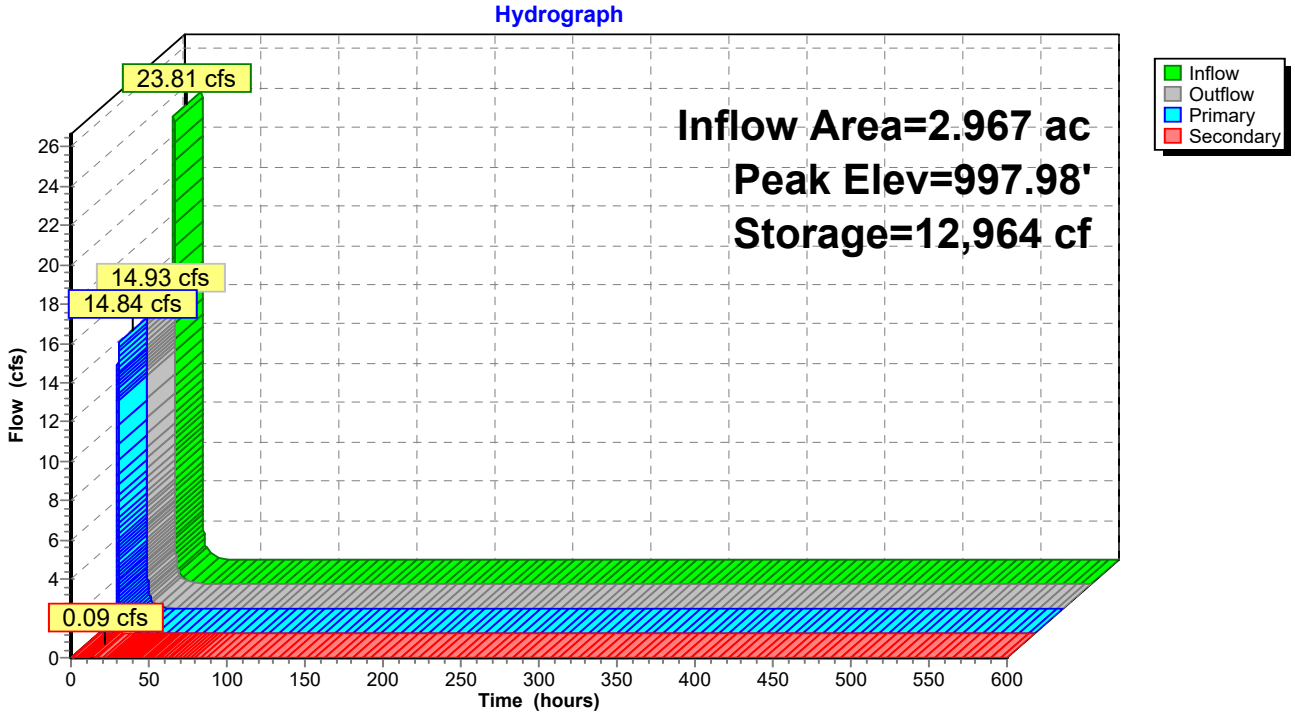
Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
995.00	2,510	0	0
996.00	3,654	3,082	3,082
996.50	4,280	1,984	5,066
997.00	4,962	2,311	7,376
998.00	6,420	5,691	13,067
998.50	7,173	3,398	16,465

Device	Routing	Invert	Outlet Devices
#1	Secondary	995.00'	**1.000 in/hr Filtration over Surface area above 995.00'** Excluded Surface area = 2,510 sf
#2	Device 3	996.50'	**6.0' long x 0.5' breadth Broad-Crested Rectangular Weir** Head (feet) 0.20 0.40 0.60 0.80 1.00 Coef. (English) 2.80 2.92 3.08 3.30 3.32
#3	Primary	995.00'	**21.0" Round Culvert** L= 14.0' RCP, mitered to conform to fill, Ke= 0.700 Inlet / Outlet Invert= 995.00' / 994.79' S= 0.0150 '/' Cc= 0.900 n= 0.013, Flow Area= 2.41 sf

Primary OutFlow Max=14.84 cfs @ 12.27 hrs HW=997.98' TW=990.91' (Dynamic Tailwater)
↑**3=Culvert** (Inlet Controls 14.84 cfs @ 6.17 fps)
↑**2=Broad-Crested Rectangular Weir** (Passes 14.84 cfs of 35.99 cfs potential flow)

Secondary OutFlow Max=0.09 cfs @ 12.27 hrs HW=997.98' TW=990.91' (Dynamic Tailwater)
↑**1=Filtration** (Exfiltration Controls 0.09 cfs)

Pond 8P: West Filtration Basin



Summary for Pond 9P: South Filtration Trench

Inflow Area = 1.353 ac, 19.13% Impervious, Inflow Depth = 5.45" for 100-Year event
Inflow = 10.65 cfs @ 12.17 hrs, Volume= 0.614 af
Outflow = 10.63 cfs @ 12.17 hrs, Volume= 0.606 af, Atten= 0%, Lag= 0.3 min
Primary = 0.06 cfs @ 12.17 hrs, Volume= 0.098 af
Routed to Link 3L : SOUTH
Secondary = 10.57 cfs @ 12.17 hrs, Volume= 0.508 af
Routed to Link 3L : SOUTH

Routing by Dyn-Stor-Ind method, Time Span= 0.00-600.00 hrs, dt= 0.01 hrs
Peak Elev= 1,020.10' @ 12.17 hrs Surf.Area= 3,584 sf Storage= 2,355 cf

Plug-Flow detention time= 94.3 min calculated for 0.606 af (99% of inflow)
Center-of-Mass det. time= 86.1 min (866.3 - 780.3)

Volume	Invert	Avail.Storage	Storage Description
#1	1,017.25'	368 cf	**Filter Storage (Min) (Prismatic)** Listed below (Recalc) 1,050 cf Overall x 35.0% Voids
#2	1,019.00'	3,345 cf	**Live Storage (Prismatic)** Listed below (Recalc)
		3,712 cf	Total Available Storage

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
1,017.25	600	0	0
1,019.00	600	1,050	1,050

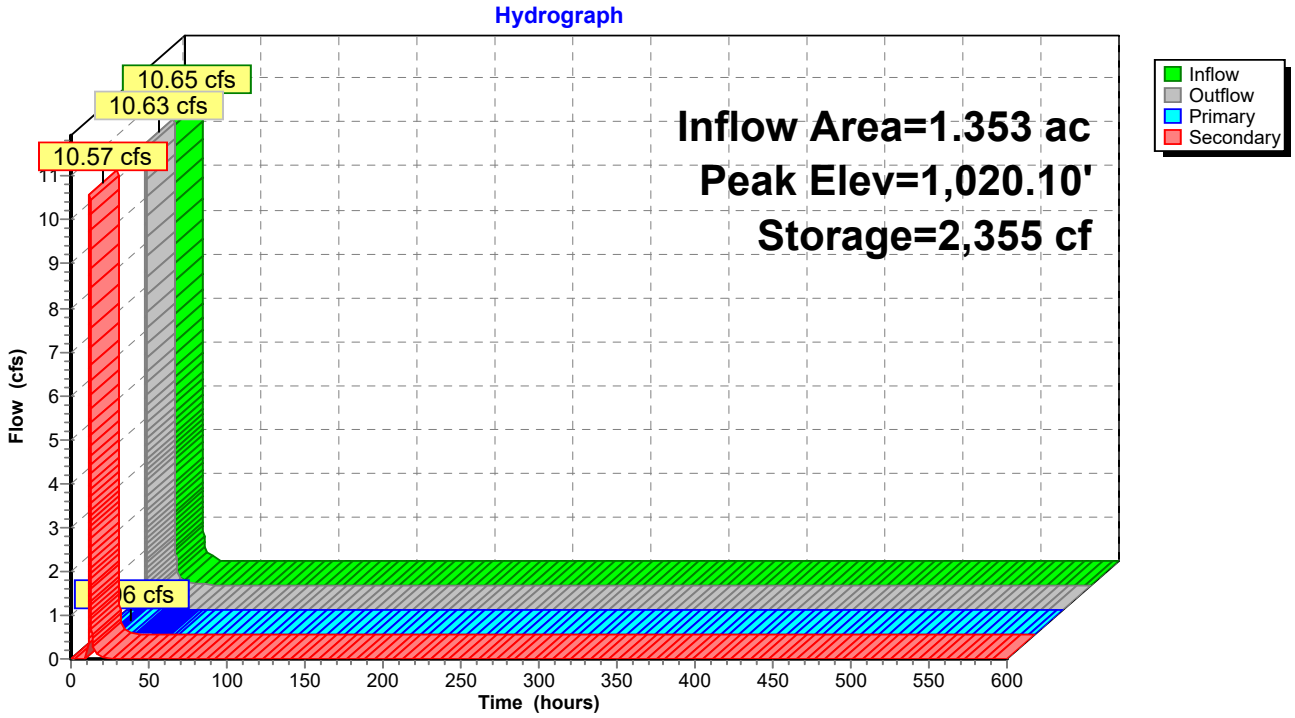
Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
1,019.00	600	0	0
1,019.50	1,714	579	579
1,020.00	2,800	1,129	1,707
1,020.50	3,750	1,638	3,345

Device	Routing	Invert	Outlet Devices
#1	Primary	1,015.00'	**15.0" Round Culvert** L= 200.0' RCP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 1,015.00' / 1,000.00' S= 0.0750 '/' Cc= 0.900 n= 0.013 Concrete pipe, bends & connections, Flow Area= 1.23 sf
#2	Device 1	1,019.00'	**1.000 in/hr Filtration over Surface area above 1,019.00'** Excluded Surface area = 1,200 sf
#3	Secondary	1,020.00'	**130.0' long + 3.0 '/' SideZ x 1.0' 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 Coef. (English) 2.69 2.72 2.75 2.85 2.98 3.08 3.20 3.28 3.31 3.30 3.31 3.32

Primary OutFlow Max=0.06 cfs @ 12.17 hrs HW=1,020.10' TW=0.00' (Dynamic Tailwater)
└─**1=Culvert** (Passes 0.06 cfs of 12.50 cfs potential flow)
└─**2=Filtration** (Exfiltration Controls 0.06 cfs)

Secondary OutFlow Max=10.55 cfs @ 12.17 hrs HW=1,020.10' TW=0.00' (Dynamic Tailwater)
└─**3=Broad-Crested Rectangular Weir** (Weir Controls 10.55 cfs @ 0.84 fps)

Pond 9P: South Filtration Trench



Summary for Pond 10P: West Existing Wetland

Inflow Area = 22.414 ac, 39.34% Impervious, Inflow Depth > 5.82" for 100-Year event
Inflow = 17.76 cfs @ 12.24 hrs, Volume= 10.878 af
Outflow = 7.32 cfs @ 14.39 hrs, Volume= 10.873 af, Atten= 59%, Lag= 129.0 min
Primary = 7.32 cfs @ 14.39 hrs, Volume= 10.873 af
Routed to Link 7L : TOTAL

Routing by Dyn-Stor-Ind method, Time Span= 0.00-600.00 hrs, dt= 0.01 hrs
Starting Elev= 974.10' Surf.Area= 54,326 sf Storage= 5,411 cf
Peak Elev= 974.84' @ 14.39 hrs Surf.Area= 57,536 sf Storage= 46,842 cf (41,432 cf above start)

Plug-Flow detention time= 471.8 min calculated for 10.749 af (99% of inflow)
Center-of-Mass det. time= 139.5 min (3,146.2 - 3,006.7)

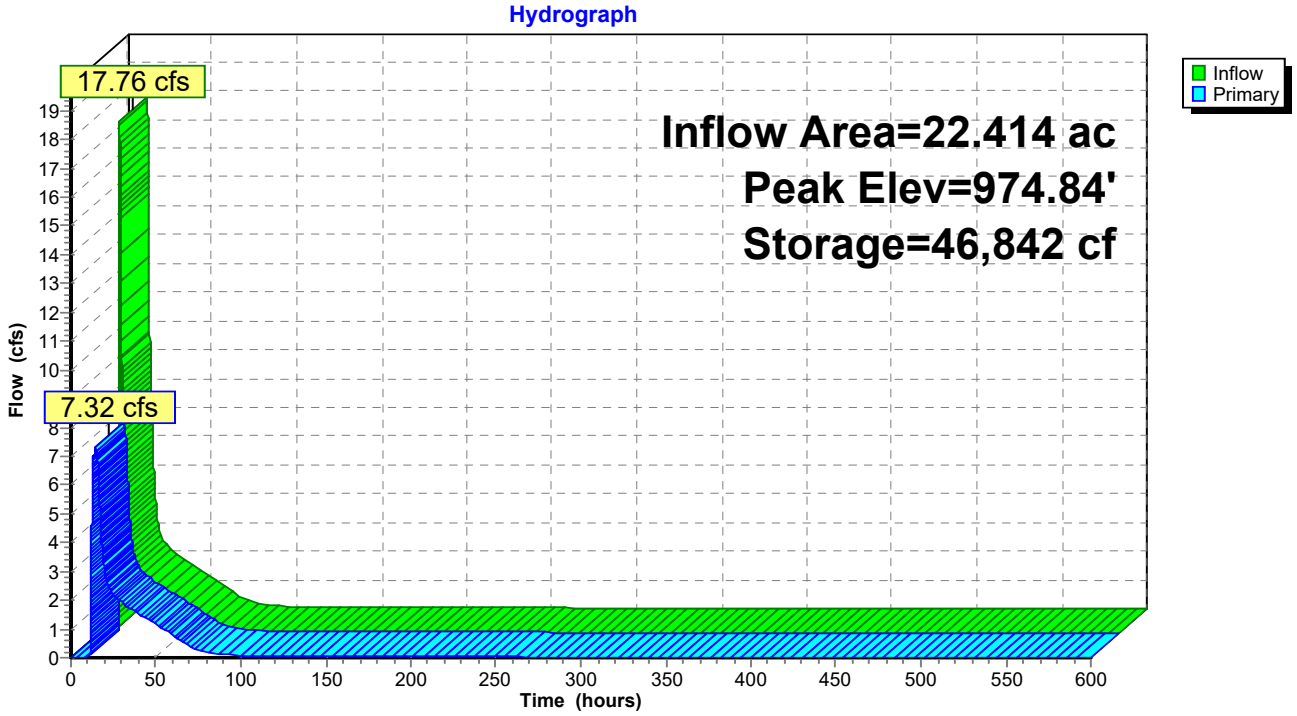
Volume	Invert	Avail.Storage	Storage Description
#1	974.00'	487,616 cf	**Custom Stage Data (Prismatic)** Listed below (Recalc)

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
974.00	53,893	0	0
975.00	58,226	56,060	56,060
976.00	62,886	60,556	116,616
977.00	67,093	64,990	181,605
978.00	71,582	69,338	250,943
979.00	76,083	73,833	324,775
980.00	81,311	78,697	403,472
981.00	86,977	84,144	487,616

Device	Routing	Invert	Outlet Devices
#1	Primary	974.10'	**18.0" Horiz. Orifice/Grate** C= 0.600 Limited to weir flow at low heads

Primary OutFlow Max=7.32 cfs @ 14.39 hrs HW=974.84' TW=0.00' (Dynamic Tailwater)
↑—**1=Orifice/Grate** (Orifice Controls 7.32 cfs @ 4.14 fps)

Pond 10P: West Existing Wetland



Summary for Pond 11P: (new Pond)

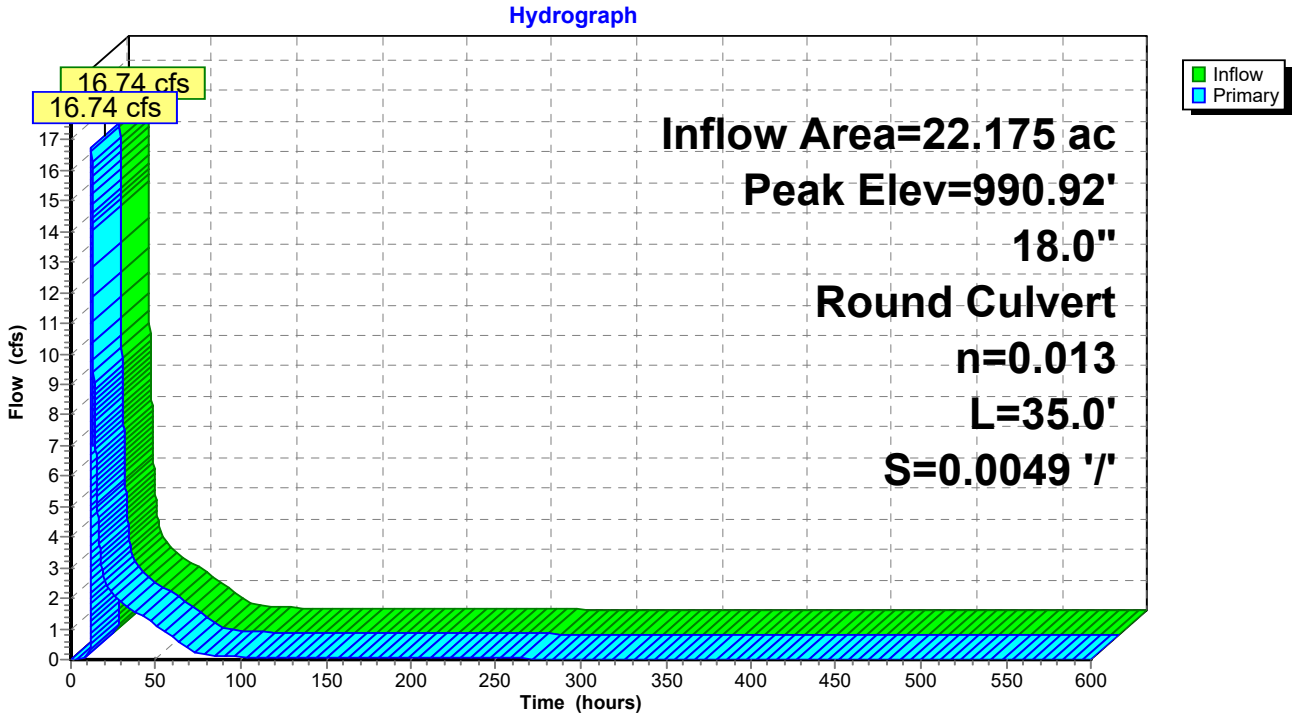
Inflow Area = 22.175 ac, 39.77% Impervious, Inflow Depth > 5.83" for 100-Year event
Inflow = 16.74 cfs @ 12.29 hrs, Volume= 10.774 af
Outflow = 16.74 cfs @ 12.29 hrs, Volume= 10.774 af, Atten= 0%, Lag= 0.0 min
Primary = 16.74 cfs @ 12.29 hrs, Volume= 10.774 af
Routed to Pond 10P : West Existing Wetland

Routing by Dyn-Stor-Ind method, Time Span= 0.00-600.00 hrs, dt= 0.01 hrs
Peak Elev= 990.92' @ 12.29 hrs

Device	Routing	Invert	Outlet Devices
#1	Primary	986.30'	**18.0" Round Culvert** L= 35.0' RCP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 986.30' / 986.13' S= 0.0049 '/' Cc= 0.900 n= 0.013, Flow Area= 1.77 sf

Primary OutFlow Max=16.74 cfs @ 12.29 hrs HW=990.92' TW=974.49' (Dynamic Tailwater)
└**1=Culvert** (Inlet Controls 16.74 cfs @ 9.47 fps)

Pond 11P: (new Pond)

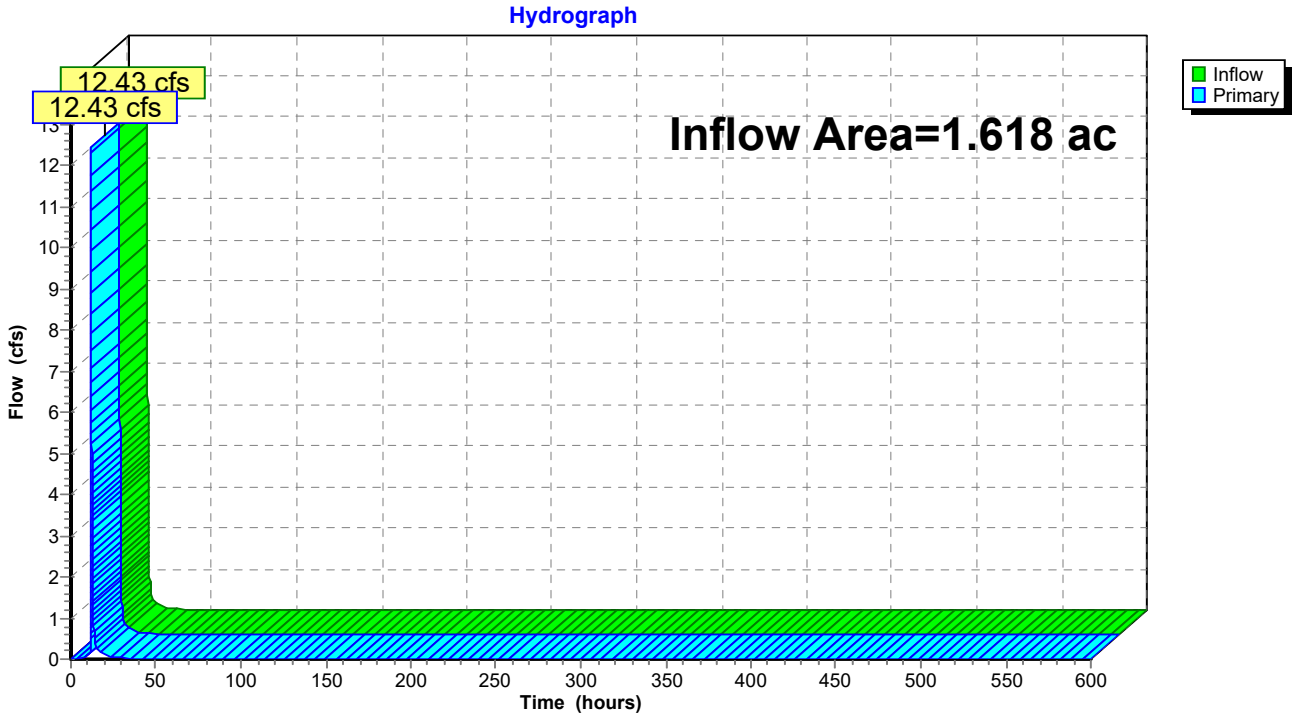


Summary for Link 3L: SOUTH

Inflow Area = 1.618 ac, 16.00% Impervious, Inflow Depth = 5.30" for 100-Year event
Inflow = 12.43 cfs @ 12.16 hrs, Volume= 0.715 af
Primary = 12.43 cfs @ 12.16 hrs, Volume= 0.715 af, Atten= 0%, Lag= 0.0 min
Routed to Link 7L : TOTAL

Primary outflow = Inflow, Time Span= 0.00-600.00 hrs, dt= 0.01 hrs

Link 3L: SOUTH

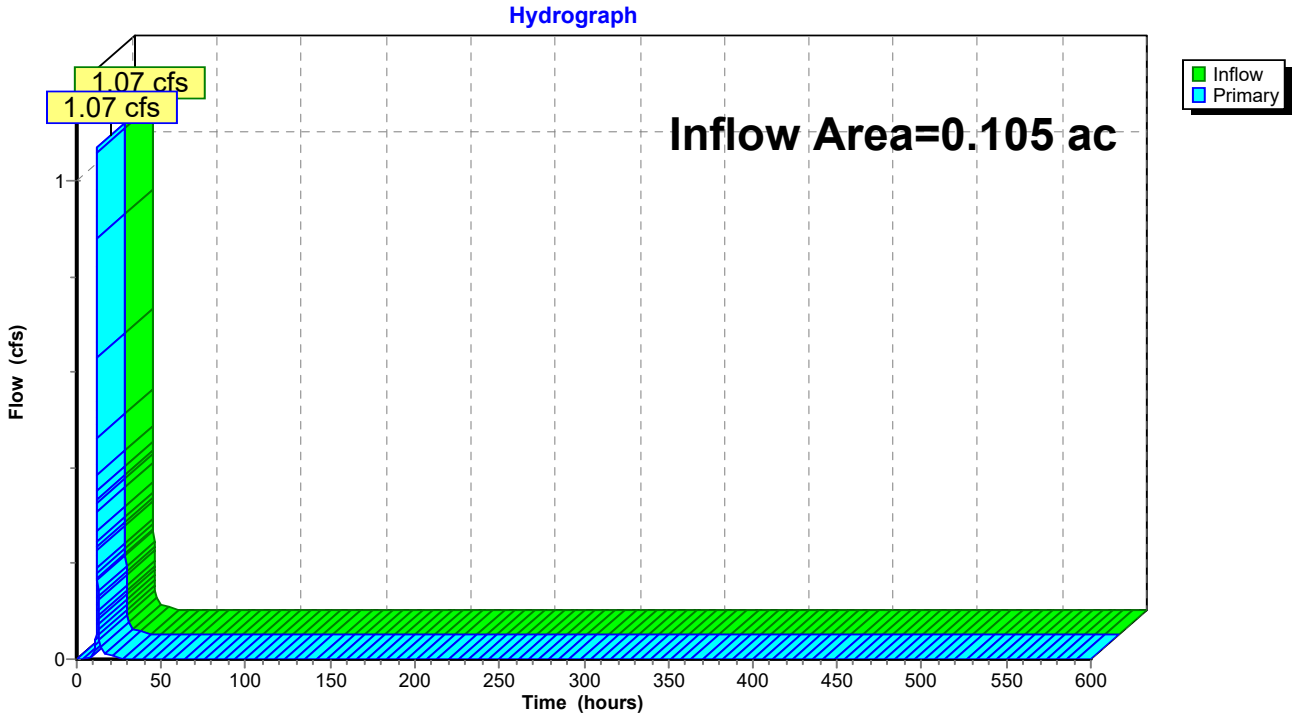


Summary for Link 6L: EAST

Inflow Area = 0.105 ac, 0.00% Impervious, Inflow Depth = 4.93" for 100-Year event
Inflow = 1.07 cfs @ 12.10 hrs, Volume= 0.043 af
Primary = 1.07 cfs @ 12.10 hrs, Volume= 0.043 af, Atten= 0%, Lag= 0.0 min
Routed to Link 7L : TOTAL

Primary outflow = Inflow, Time Span= 0.00-600.00 hrs, dt= 0.01 hrs

Link 6L: EAST

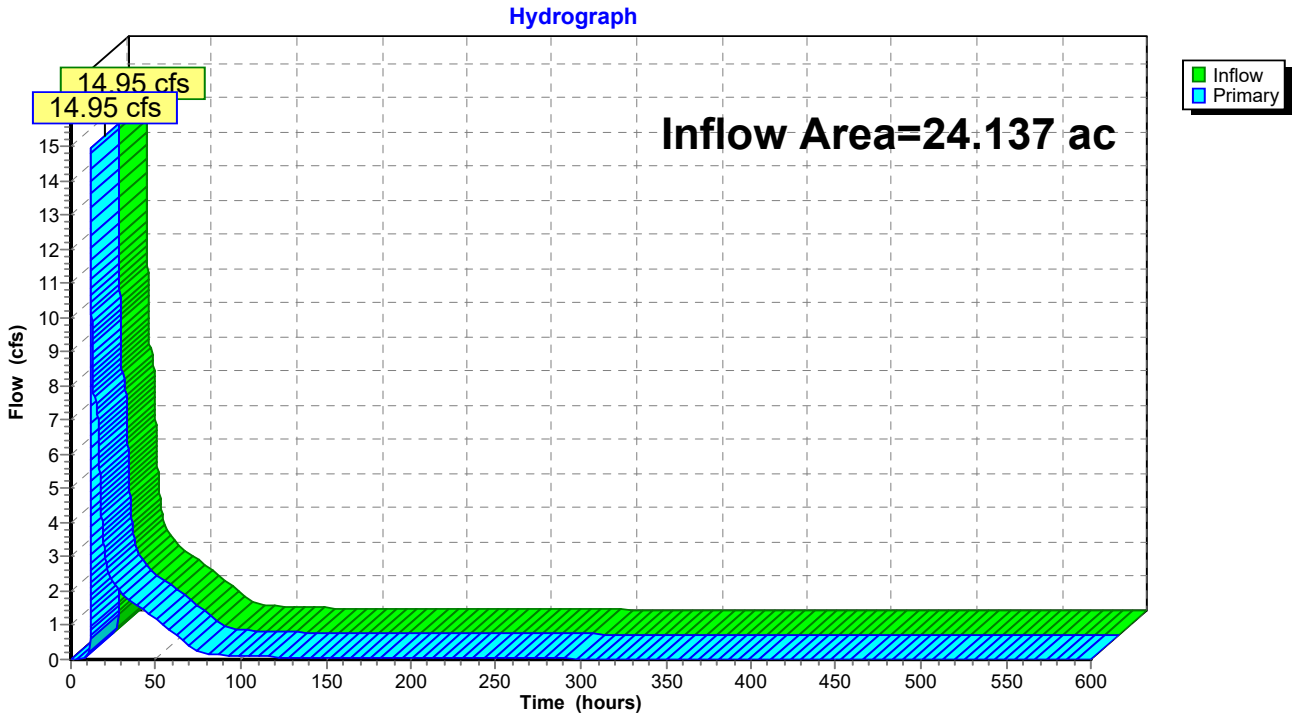


Summary for Link 7L: TOTAL

Inflow Area = 24.137 ac, 37.61% Impervious, Inflow Depth > 5.78" for 100-Year event
Inflow = 14.95 cfs @ 12.17 hrs, Volume= 11.631 af
Primary = 14.95 cfs @ 12.17 hrs, Volume= 11.631 af, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 0.00-600.00 hrs, dt= 0.01 hrs

Link 7L: TOTAL



PDRN
Prepared by Alliant Engineering, Inc

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PDRN
Prepared by Alliant Engineering, Inc

Project Information

Calculator Version:	Version 4: July 2020
Project Name:	Pleasant View Pointe - Project Site + Pleasant View Dr.
User Name / Company Name:	Alliant Engineering
Date:	6-4-25
Project Description:	Proposed subdivision + Peaceful Lane reconstruction + future Pleasant View Road with project future impervious surface addition
Construction Permit?:	No

Site Information

Retention Requirement (inches):	1
Site's Zip Code:	55317
Annual Rainfall (inches):	29.9
Phosphorus EMC (mg/l):	0.3
TSS EMC (mg/l):	54.5

Total Site Area

Land Cover	A Soils (acres)	B Soils (acres)	C Soils (acres)	D Soils (acres)	Total (acres)
Forest/Open Space - Undisturbed, protected forest/open space or reforested land				4.229	4.229
Managed Turf - disturbed, graded for yards or other turf to be mowed/managed				5.866	5.866
				Impervious Area (acres)	5.795
				Total Area (acres)	15.89

Site Areas Routed to BMPs

Land Cover	A Soils (acres)	B Soils (acres)	C Soils (acres)	D Soils (acres)	Total (acres)
Forest/Open Space - Undisturbed, protected forest/open space or reforested land				4.229	4.229
Managed Turf - disturbed, graded for yards or other turf to be mowed/managed				5.866	5.866
				Impervious Area (acres)	5.795
				Total Area (acres)	15.89

Summary Information

Performance Goal Requirement

Performance goal volume retention requirement:	21036	ft3
Volume removed by BMPs towards performance goal:	12735	ft^3
Percent volume removed towards performance goal	**61**	**%**

Annual Volume and Pollutant Load Reductions

Post development annual runoff volume	16.1083	acre-ft
Annual runoff volume removed by BMPs:	4.5507	acre-ft
Percent annual runoff volume removed:	**28**	**%**
Post development annual particulate P load:	7.2294	lbs
Annual particulate P removed by BMPs:	6.355	lbs
Post development annual dissolved P load:	5.915	lbs
Annual dissolved P removed by BMPs:	2.263	lbs
Total P removed by BMPs	8.618	lbs
Percent annual total phosphorus removed:	**66**	**%**
Post development annual TSS load:	2387.9	lbs
Annual TSS removed by BMPs:	2226.9	lbs
Percent annual TSS removed:	**93**	**%**

BMP Summary

Performance Goal Summary

BMP Name	BMP Volume Capacity (ft3)	Volume Recieved (ft3)	Volume Retained (ft3)	Volume Outflow (ft3)	Percent Retained (%)
Wetland Filtration Shelf	8575	16451	8575	7876	52
West Filtration Basin	1418	1381	1381	0	100
Disconnected Impervious Direct to Constru	1311	2984	1311	1673	44
Disconnected - Untreated	0	0	0	0	0
West Disconnected Impervious (S4)	1098	2479	1098	1381	44
South Disconnected Impervious (S9)	370	795	370	425	47
South Filtration Trench	0	425	0	425	0
Constructed wetland	0	16451	0	16451	0

Annual Volume Summary

BMP Name	Volume From Direct Watershed (acre-ft)	Volume From Upstream BMPs (acre-ft)	Volume Retained (acre-ft)	Volume outflow (acre-ft)	Percent Retained (%)
Wetland Filtration Shelf	0	12.6582	3.273	9.3852	26
West Filtration Basin	0	1.8217	0.5381	1.2836	30
Disconnected Impervious Direct to Constru	2.7321	0	0.329	2.4031	12
Disconnected - Untreated	0.1432	0	0	0.1432	0
West Disconnected Impervious (S4)	2.1122	0	0.2905	1.8217	14
South Disconnected Impervious (S9)	0.8657	0	0.1201	0.7456	14
South Filtration Trench	0	0.7457	0	0.7457	0
Constructed wetland	10.2551	2.4031	0	12.6582	0

Particulate Phosphorus Summary

BMP Name	Load From Direct Watershed (lbs)	Load From Upstream BMPs (lbs)	Load Retained (lbs)	Outflow Load (lbs)	Percent Retained (%)
Wetland Filtration Shelf	0	3.357	2.8592	0.4978	85
West Filtration Basin	0	0.8176	0.7024	0.1152	86
Disconnected Impervious Direct to Constru	1.2262	0	0.1477	1.0785	12
Disconnected - Untreated	0.0643	0	0	0.0643	0
West Disconnected Impervious (S4)	0.948	0	0.1304	0.8176	14
South Disconnected Impervious (S9)	0.3885	0	0.0539	0.3346	14
South Filtration Trench	0	0.3346	0.1372	0.1974	41
Constructed wetland	4.6025	1.0785	2.324	3.357	41

Dissolved Phosphorus Summary

BMP Name	Load From Direct Watershed (lbs)	Load From Upstream BMPs (lbs)	Load Retained (lbs)	Outflow Load (lbs)	Percent Retained (%)
Wetland Filtration Shelf	0	4.6481	1.7222	2.9259	37
West Filtration Basin	0	0.6689	0.2688	0.4001	40
Disconnected Impervious Direct to Constru	1.0032	0	0.1208	0.8824	12
Disconnected - Untreated	0.0526	0	0	0.0526	0
West Disconnected Impervious (S4)	0.7756	0	0.1067	0.6689	14
South Disconnected Impervious (S9)	0.3179	0	0.0441	0.2738	14
South Filtration Trench	0	0.2738	0	0.2738	0
Constructed wetland	3.7657	0.8824	0	4.6481	0

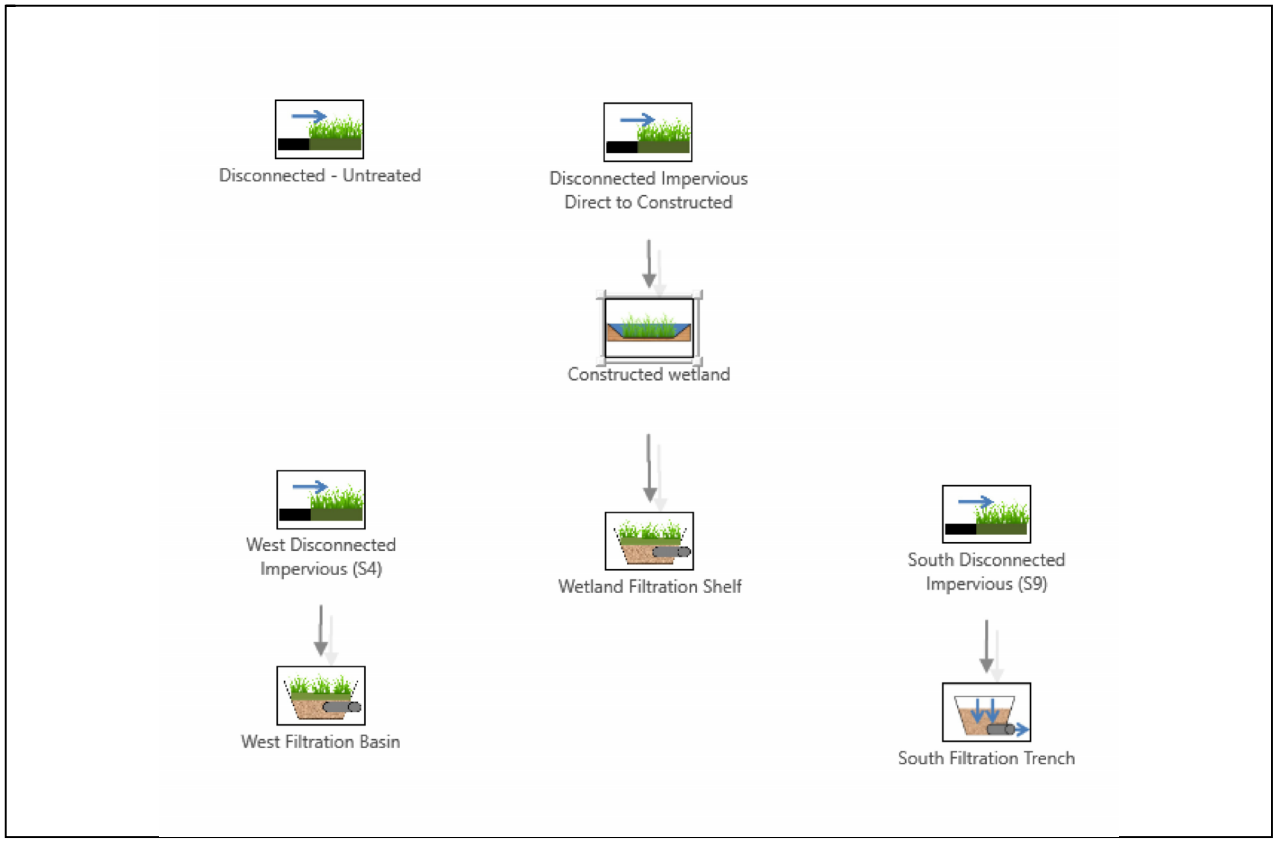
Total Phosphorus Summary

BMP Name	Load From Direct Watershed (lbs)	Load From Upstream BMPs (lbs)	Load Retained (lbs)	Outflow Load (lbs)	Percent Retained (%)
Wetland Filtration Shelf	0	8.0051	4.5814	3.4237	61
West Filtration Basin	0	1.4865	0.9712	0.5153	63
Disconnected Impervious Direct to Constru	2.2294	0	0.2685	1.9609	12
Disconnected - Untreated	0.1169	0	0	0.1169	0
West Disconnected Impervious (S4)	1.7236	0	0.2371	1.4865	14
South Disconnected Impervious (S9)	0.7064	0	0.098	0.6084	14
South Filtration Trench	0	0.6084	0.1372	0.4712	20
Constructed wetland	8.3682	1.9609	2.324	8.0051	20

TSS Summary

BMP Name	Load From Direct Watershed (lbs)	Load From Upstream BMPs (lbs)	Load Retained (lbs)	Outflow Load (lbs)	Percent Retained (%)
Wetland Filtration Shelf	0	800.76	682.02	118.74	85
West Filtration Basin	0	86.42	74.24	12.18	86
Disconnected Impervious Direct to Constru	405.01	0	291.02	113.99	72
Disconnected - Untreated	21.23	0	0	21.23	0
West Disconnected Impervious (S4)	313.11	0	226.69	86.42	72
South Disconnected Impervious (S9)	128.33	0	92.96	35.37	72
South Filtration Trench	0	35.37	26.53	8.8400000000	75
Constructed wetland	1520.21	113.99	833.44	800.76	51

BMP Schematic


Disconnected - Untreated
Disconnected Impervious Direct to Constructed
Constructed wetland
West Disconnected Impervious (S4)
Wetland Filtration Shelf
South Disconnected Impervious (S9)
West Filtration Basin
South Filtration Trench

Project Information

Calculator Version:	Version 4: July 2020
Project Name:	Pleasant View Pointe - Project Site + Pleasant View Dr + Troendle
User Name / Company Name:	Alliant Engineering
Date:	6-4-25
Project Description:	Proposed subdivision + Peaceful Lane reconstruction + future Pleasant View Road with project future impervious surface addition + Existing Troendle Addition
Construction Permit?:	No

Site Information

Retention Requirement (inches):	1
Site's Zip Code:	55317
Annual Rainfall (inches):	29.9
Phosphorus EMC (mg/l):	0.3
TSS EMC (mg/l):	54.5

Total Site Area

Land Cover	A Soils (acres)	B Soils (acres)	C Soils (acres)	D Soils (acres)	Total (acres)
Forest/Open Space - Undisturbed, protected forest/open space or reforested land				4.229	4.229
Managed Turf - disturbed, graded for yards or other turf to be mowed/managed				7.907	7.907
				Impervious Area (acres)	7.398
				Total Area (acres)	19.534

Site Areas Routed to BMPs

Land Cover	A Soils (acres)	B Soils (acres)	C Soils (acres)	D Soils (acres)	Total (acres)
Forest/Open Space - Undisturbed, protected forest/open space or reforested land				4.229	4.229
Managed Turf - disturbed, graded for yards or other turf to be mowed/managed				7.907	7.907
				Impervious Area (acres)	7.398
				Total Area (acres)	19.534

Summary Information

Performance Goal Requirement

Performance goal volume retention requirement:	26855	ft3
Volume removed by BMPs towards performance goal:	12735	ft^3
Percent volume removed towards performance goal	**47**	**%**

Annual Volume and Pollutant Load Reductions

Post development annual runoff volume	20.6676	acre-ft
Annual runoff volume removed by BMPs:	5.0329	acre-ft
Percent annual runoff volume removed:	**24**	**%**
Post development annual particulate P load:	9.2756	lbs
Annual particulate P removed by BMPs:	8.185	lbs
Post development annual dissolved P load:	7.589	lbs
Annual dissolved P removed by BMPs:	2.666	lbs
Total P removed by BMPs	10.851	lbs
Percent annual total phosphorus removed:	**64**	**%**
Post development annual TSS load:	3063.8	lbs
Annual TSS removed by BMPs:	2844.5	lbs
Percent annual TSS removed:	**93**	**%**

BMP Summary

Performance Goal Summary

BMP Name	BMP Volume Capacity (ft3)	Volume Recieved (ft3)	Volume Retained (ft3)	Volume Outflow (ft3)	Percent Retained (%)
Wetland Filtration Shelf	8575	22269	8575	13694	39
West Filtration Basin	1418	1381	1381	0	100
Disconnected Impervious Direct to Constru	1311	2984	1311	1673	44
Disconnected - Untreated	0	0	0	0	0
West Disconnected Impervious (S4)	1098	2479	1098	1381	44
South Disconnected Impervious (S9)	370	795	370	425	47
South Filtration Trench	0	425	0	425	0
Constructed wetland	0	22269	0	22269	0

Annual Volume Summary

BMP Name	Volume From Direct Watershed (acre-ft)	Volume From Upstream BMPs (acre-ft)	Volume Retained (acre-ft)	Volume outflow (acre-ft)	Percent Retained (%)
Wetland Filtration Shelf	0	17.2174	3.7552	13.4622	22
West Filtration Basin	0	1.8217	0.5381	1.2836	30
Disconnected Impervious Direct to Constru	2.7321	0	0.329	2.4031	12
Disconnected - Untreated	0.1432	0	0	0.1432	0
West Disconnected Impervious (S4)	2.1122	0	0.2905	1.8217	14
South Disconnected Impervious (S9)	0.8657	0	0.1201	0.7456	14
South Filtration Trench	0	0.7457	0	0.7457	0
Constructed wetland	14.8143	2.4031	0	17.2174	0

Particulate Phosphorus Summary

BMP Name	Load From Direct Watershed (lbs)	Load From Upstream BMPs (lbs)	Load Retained (lbs)	Outflow Load (lbs)	Percent Retained (%)
Wetland Filtration Shelf	0	4.5661	3.8521	0.714	84
West Filtration Basin	0	0.8176	0.7024	0.1152	86
Disconnected Impervious Direct to Constru	1.2262	0	0.1477	1.0785	12
Disconnected - Untreated	0.0643	0	0	0.0643	0
West Disconnected Impervious (S4)	0.948	0	0.1304	0.8176	14
South Disconnected Impervious (S9)	0.3885	0	0.0539	0.3346	14
South Filtration Trench	0	0.3346	0.1372	0.1974	41
Constructed wetland	6.6487	1.0785	3.1611	4.5661	41

Dissolved Phosphorus Summary

BMP Name	Load From Direct Watershed (lbs)	Load From Upstream BMPs (lbs)	Load Retained (lbs)	Outflow Load (lbs)	Percent Retained (%)
Wetland Filtration Shelf	0	6.3222	2.1253	4.1969	34
West Filtration Basin	0	0.6689	0.2688	0.4001	40
Disconnected Impervious Direct to Constru	1.0032	0	0.1208	0.8824	12
Disconnected - Untreated	0.0526	0	0	0.0526	0
West Disconnected Impervious (S4)	0.7756	0	0.1067	0.6689	14
South Disconnected Impervious (S9)	0.3179	0	0.0441	0.2738	14
South Filtration Trench	0	0.2738	0	0.2738	0
Constructed wetland	5.4398	0.8824	0	6.3222	0

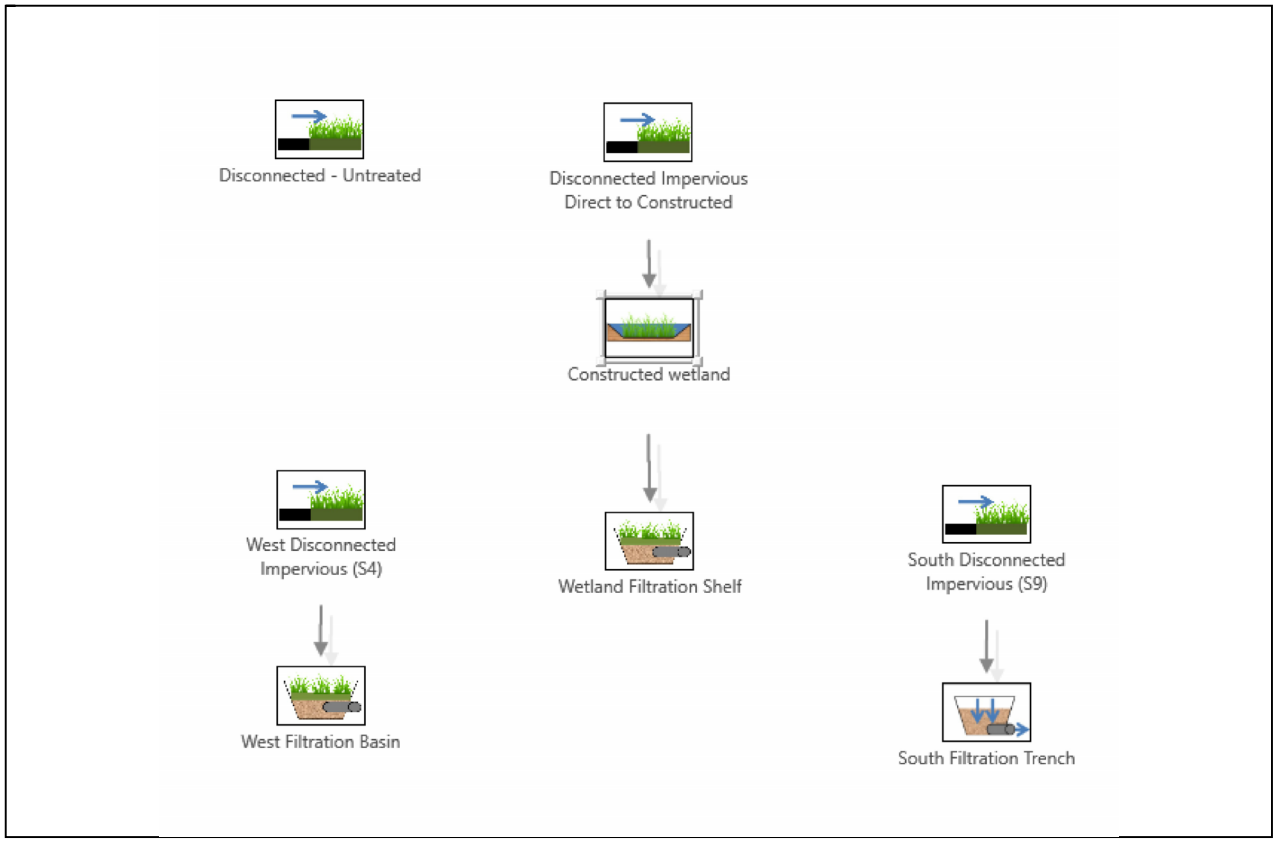
Total Phosphorus Summary

BMP Name	Load From Direct Watershed (lbs)	Load From Upstream BMPs (lbs)	Load Retained (lbs)	Outflow Load (lbs)	Percent Retained (%)
Wetland Filtration Shelf	0	10.8883	5.9774	4.9109	59
West Filtration Basin	0	1.4865	0.9712	0.5153	63
Disconnected Impervious Direct to Constru	2.2294	0	0.2685	1.9609	12
Disconnected - Untreated	0.1169	0	0	0.1169	0
West Disconnected Impervious (S4)	1.7236	0	0.2371	1.4865	14
South Disconnected Impervious (S9)	0.7064	0	0.098	0.6084	14
South Filtration Trench	0	0.6084	0.1372	0.4712	20
Constructed wetland	12.0885	1.9609	3.1611	10.8883	20

TSS Summary

BMP Name	Load From Direct Watershed (lbs)	Load From Upstream BMPs (lbs)	Load Retained (lbs)	Outflow Load (lbs)	Percent Retained (%)
Wetland Filtration Shelf	0	1131.93	954.92	177.01	84
West Filtration Basin	0	86.42	74.24	12.18	86
Disconnected Impervious Direct to Constru	405.01	0	291.02	113.99	72
Disconnected - Untreated	21.23	0	0	21.23	0
West Disconnected Impervious (S4)	313.11	0	226.69	86.42	72
South Disconnected Impervious (S9)	128.33	0	92.96	35.37	72
South Filtration Trench	0	35.37	26.53	8.8400000000	75
Constructed wetland	2196.07	113.99	1178.13	1131.93	51

BMP Schematic


Disconnected - Untreated
Disconnected Impervious Direct to Constructed
Constructed wetland
West Disconnected Impervious (S4)
Wetland Filtration Shelf
South Disconnected Impervious (S9)
West Filtration Basin
South Filtration Trench

Project Information

Calculator Version:	Version 4: July 2020
Project Name:	Pleasant View Pointe - Project Site + Pleasant View Dr + Troendle +Offsite
User Name / Company Name:	Alliant Engineering
Date:	6-4-25
Project Description:	Proposed subdivision + Peaceful Lane reconstruction + future Pleasant View Road with project future impervious surface addition + Existing Troendle Addition + All Offsite = Entire Watershed
Construction Permit?:	No

Site Information

Retention Requirement (inches):	1
Site's Zip Code:	55317
Annual Rainfall (inches):	29.9
Phosphorus EMC (mg/l):	0.3
TSS EMC (mg/l):	54.5

Total Site Area

Land Cover	A Soils (acres)	B Soils (acres)	C Soils (acres)	D Soils (acres)	Total (acres)
Forest/Open Space - Undisturbed, protected forest/open space or reforested land				4.229	4.229
Managed Turf - disturbed, graded for yards or other turf to be mowed/managed				11.875	11.875
				Impervious Area (acres)	8.034
				Total Area (acres)	24.138

Site Areas Routed to BMPs

Land Cover	A Soils (acres)	B Soils (acres)	C Soils (acres)	D Soils (acres)	Total (acres)
Forest/Open Space - Undisturbed, protected forest/open space or reforested land				4.229	4.229
Managed Turf - disturbed, graded for yards or other turf to be mowed/managed				11.875	11.875
				Impervious Area (acres)	8.034
				Total Area (acres)	24.138

Summary Information

Performance Goal Requirement

Performance goal volume retention requirement:	29163	ft3
Volume removed by BMPs towards performance goal:	12735	ft^3
Percent volume removed towards performance goal	**44**	**%**

Annual Volume and Pollutant Load Reductions

Post development annual runoff volume	24.247	acre-ft
Annual runoff volume removed by BMPs:	5.39	acre-ft
Percent annual runoff volume removed:	**22**	**%**
Post development annual particulate P load:	10.8821	lbs
Annual particulate P removed by BMPs:	9.556	lbs
Post development annual dissolved P load:	8.904	lbs
Annual dissolved P removed by BMPs:	2.96	lbs
Total P removed by BMPs	12.516	lbs
Percent annual total phosphorus removed:	**63**	**%**
Post development annual TSS load:	3594.4	lbs
Annual TSS removed by BMPs:	3333.1	lbs
Percent annual TSS removed:	**93**	**%**

BMP Summary

Performance Goal Summary

BMP Name	BMP Volume Capacity (ft3)	Volume Recieved (ft3)	Volume Retained (ft3)	Volume Outflow (ft3)	Percent Retained (%)
Wetland Filtration Shelf	8575	24433	8575	15858	35
West Filtration Basin	1418	1381	1381	0	100
Disconnected Impervious Direct to Constru	1311	3340	1311	2029	39
Disconnected - Untreated	0	0	0	0	0
West Disconnected Impervious (S4)	1098	2479	1098	1381	44
South Disconnected Impervious (S9)	370	940	370	570	39
South Filtration Trench	0	570	0	570	0
Constructed wetland	0	24433	0	24433	0

Annual Volume Summary

BMP Name	Volume From Direct Watershed (acre-ft)	Volume From Upstream BMPs (acre-ft)	Volume Retained (acre-ft)	Volume outflow (acre-ft)	Percent Retained (%)
Wetland Filtration Shelf	0	20.3526	4.047	16.3056	20
West Filtration Basin	0	1.9328	0.5564	1.3764	29
Disconnected Impervious Direct to Constru	3.1517	0	0.3579	2.7938	11
Disconnected - Untreated	0.1432	0	0	0.1432	0
West Disconnected Impervious (S4)	2.2283	0	0.2955	1.9328	13
South Disconnected Impervious (S9)	1.1651	0	0.1333	1.0318	11
South Filtration Trench	0	1.0318	0	1.0318	0
Constructed wetland	17.5588	2.7939	0	20.3527	0

Particulate Phosphorus Summary

BMP Name	Load From Direct Watershed (lbs)	Load From Upstream BMPs (lbs)	Load Retained (lbs)	Outflow Load (lbs)	Percent Retained (%)
Wetland Filtration Shelf	0	5.3975	4.5327	0.8648	84
West Filtration Basin	0	0.8674	0.7439	0.1235	86
Disconnected Impervious Direct to Constru	1.4145	0	0.1606	1.2539	11
Disconnected - Untreated	0.0643	0	0	0.0643	0
West Disconnected Impervious (S4)	1	0	0.1326	0.8674	13
South Disconnected Impervious (S9)	0.5229	0	0.0598	0.4631	11
South Filtration Trench	0	0.4631	0.1899	0.2732	41
Constructed wetland	7.8804	1.2539	3.7368	5.3975	41

Dissolved Phosphorus Summary

BMP Name	Load From Direct Watershed (lbs)	Load From Upstream BMPs (lbs)	Load Retained (lbs)	Outflow Load (lbs)	Percent Retained (%)
Wetland Filtration Shelf	0	7.4735	2.3902	5.0833	32
West Filtration Basin	0	0.7097	0.2806	0.4291	40
Disconnected Impervious Direct to Constru	1.1573	0	0.1314	1.0259	11
Disconnected - Untreated	0.0526	0	0	0.0526	0
West Disconnected Impervious (S4)	0.8182	0	0.1085	0.7097	13
South Disconnected Impervious (S9)	0.4278	0	0.049	0.3788	11
South Filtration Trench	0	0.3788	0	0.3788	0
Constructed wetland	6.4476	1.0259	0	7.4735	0

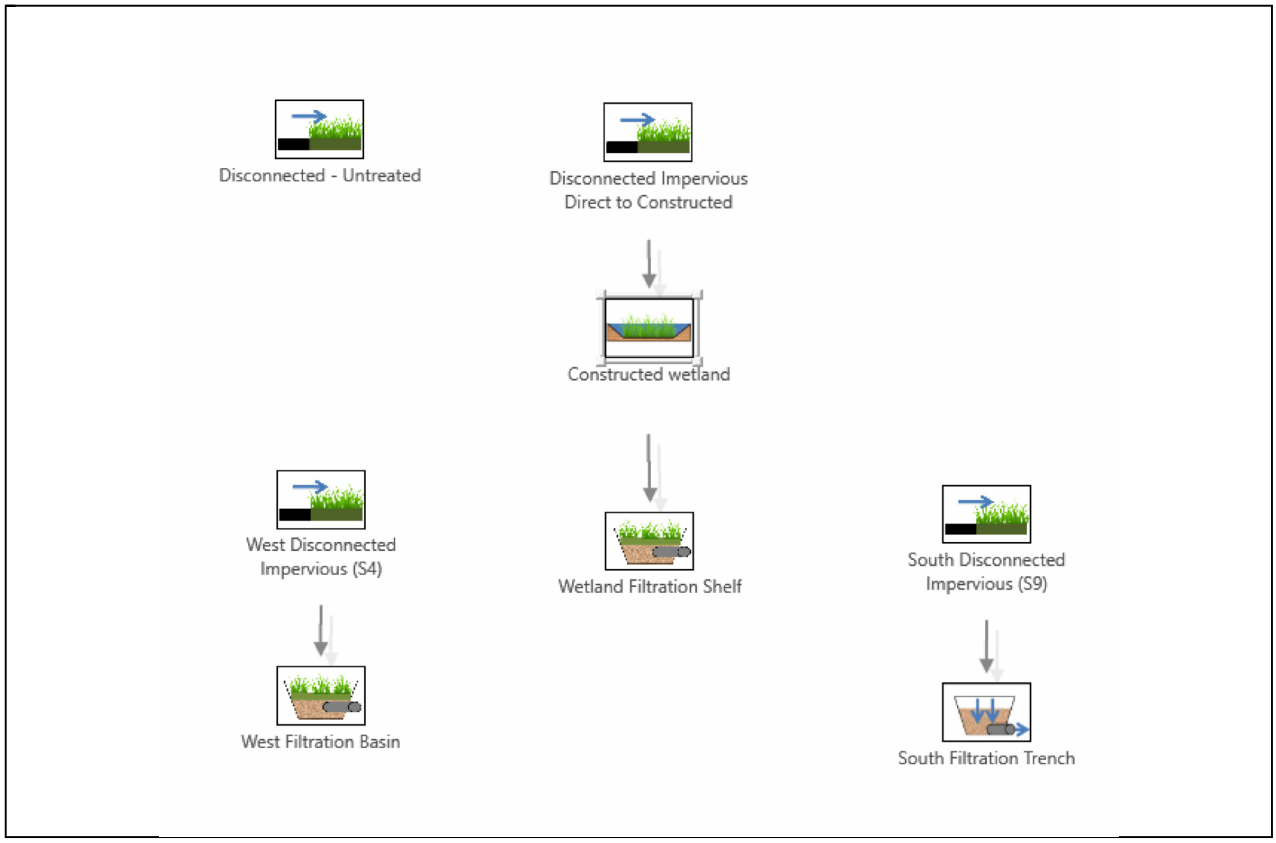
Total Phosphorus Summary

BMP Name	Load From Direct Watershed (lbs)	Load From Upstream BMPs (lbs)	Load Retained (lbs)	Outflow Load (lbs)	Percent Retained (%)
Wetland Filtration Shelf	0	12.871	6.9229	5.9481	58
West Filtration Basin	0	1.5771	1.0245	0.5526	63
Disconnected Impervious Direct to Constru	2.5718	0	0.292	2.2798	11
Disconnected - Untreated	0.1169	0	0	0.1169	0
West Disconnected Impervious (S4)	1.8182	0	0.2411	1.5771	13
South Disconnected Impervious (S9)	0.9507	0	0.1088	0.8419	11
South Filtration Trench	0	0.8419	0.1899	0.652	20
Constructed wetland	14.328	2.2798	3.7368	12.871	20

TSS Summary

BMP Name	Load From Direct Watershed (lbs)	Load From Upstream BMPs (lbs)	Load Retained (lbs)	Outflow Load (lbs)	Percent Retained (%)
Wetland Filtration Shelf	0	1340.37	1125.6	214.77	84
West Filtration Basin	0	91.68	78.62	13.06	86
Disconnected Impervious Direct to Constru	467.21	0	334.68	132.53	72
Disconnected - Untreated	21.23	0	0	21.23	0
West Disconnected Impervious (S4)	330.32	0	238.64	91.68	72
South Disconnected Impervious (S9)	172.71	0	123.77	48.94	72
South Filtration Trench	0	48.94	36.71	12.23	75
Constructed wetland	2602.91	132.53	1395.07	1340.37	51

BMP Schematic


Disconnected - Untreated
Disconnected Impervious Direct to Constructed
Constructed wetland
West Disconnected Impervious (S4)
Wetland Filtration Shelf
South Disconnected Impervious (S9)
West Filtration Basin
South Filtration Trench

STORM SEWER DESIGN WORKSHEET - POST-DEVELOPMENT CONDITIONS

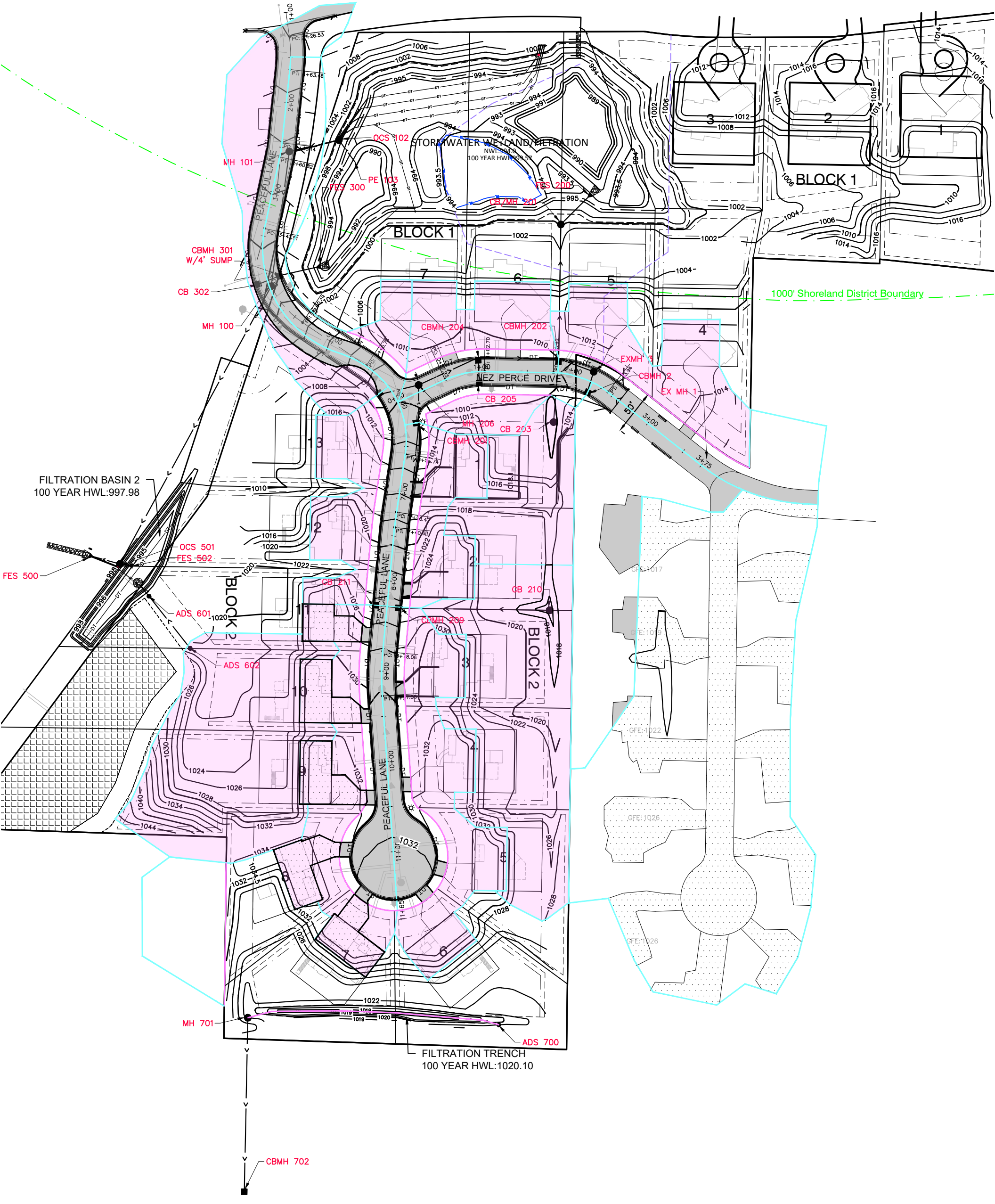
PROJECT NAME: Pleasant View Pointe
PROJECT NUMBER: 4000320
PREPARED BY: MPR
REVISION DATE: 6-4-25

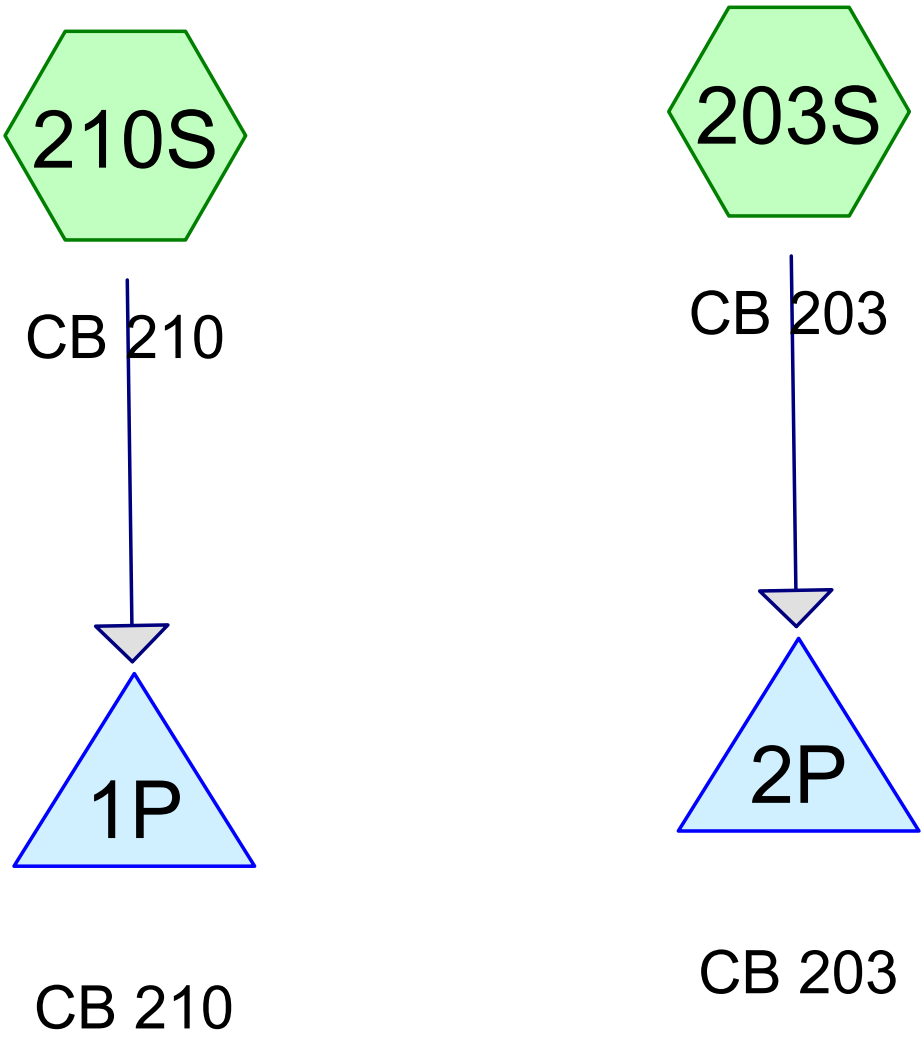
IDF Curve Carver County 10-yr
i = -1.567ln(x) + 8.6456

ALLIANT

DESIGN STORM FREQUENCY = 10 YEARS

MH/CB		AREA [SF]		AREA [AC]		IMP	RUNOFF	A*C		TIME OF CONC. [MIN]		INTENSITY	Q [CFS]		P. DIA.	P. SLOPE	P. TYPE	MANNING'S	P. CAP.	P. VELOCITY	PIPE	CAP. OVER	FROM	TO	RIM	COVER	STR.	CAST	BUILD	
FROM	TO	TOTAL	IMPERVIOUS	INCR.	CUM.	%	C	INCR.	CUM.	PIPE	CUM.	i	INCR.	CUM.	D [IN]	S [FT/FT]		n	Q [CFS]	MAX [FT/S]	LENGTH [FT]	Q [CFS]	INVERT	INVERT	ELEV	[FT]	TYPE	TYPE	[FT]	
PE 103	OCS 102												0.00	0.00	15	-0.0583	RCP				30.0	0.000	992.00	993.75			15"	PE		
OCS 102	MH 101												0.00	0.00	15	0.0050	RCP				56.2	0.000	990.90	990.62	1000.00	7.85	72"	OCS	9.10	
MH 101	MH 100												0.00	0.00	15	0.0050	RCP				150.4	0.000	990.62	989.87	1003.53	11.66	48"	R-1642	12.91	
MH 100	OCS 501												0.00	0.00	15	0.0050	RCP				349.5	0.000	988.37	986.62	999.61	9.99	48"	R-1642	11.24	
EXMH 1	EXMH 3	111200	56544	2.55	2.55	0.51	0.56	1.42	1.42	15.00	15.00	4.40	6.25	6.25	15	0.0169	RCP	0.013	8.40	6.84	159.1	2.150	1009.17	1006.48	1017.00	6.58	27	R-4342	7.83	Existing Pipe
CBMH2	EXMH3	33064	7777	0.76	0.76	0.24	0.36	0.28	0.28	12.00	12.00	4.75	1.32	1.32	15	0.0072	RCP	0.013	5.48	4.47	26.8	4.166	1006.67	1006.48	1010.67	2.75	2'x3'	R-3067-V	4.00	
EXMH 3	CBMH 202	0	0	0.00	3.31	0.00	0.20	0.00	1.70	0.39	15.39	4.36	0.00	7.40	15	0.0250	RCP	0.013	10.21	8.32	41.2	2.816	1006.48	1005.45	1010.77	3.04	48"	R-1642	10.57	Ex MH
CB 211	CBMH 209	36460	15686	0.84	0.84	0.43	0.50	0.42	0.42	10.00	10.00	5.04	2.11	2.11	15	0.0050	RCP	0.013	4.57	3.72	31.0	2.455	1020.32	1020.17	1024.32	2.75	2'x3'	R-3067-V	4.00	
CB 210	CBMH 209	42120	12636	0.97	0.97	0.30	0.41	0.40	0.40	10.00	10.00	5.04	2.00	2.00	15	0.0050	RCP	0.013	4.57	3.72	164.5	2.571	1012.15	1011.33	1015.40	2.00	27"	R-4342	3.25	
CBMH 209	CBMH 208	34797	15009	0.80	2.60	0.43	0.50	0.40	1.22	0.74	10.74	4.93	1.98	5.99	15	0.0222	RCP	0.013	9.61	7.83	206.3	3.620	1011.33	1006.76	1024.39	11.81	48"	R-3067-V	13.06	
CBMH 208	MH 206	16308	6827	0.37	2.98	0.42	0.49	0.18	1.40	0.44	11.18	4.86	0.90	6.82	15	0.0313	RCP	0.013	11.43	9.31	41.4	4.613	1006.76	1005.46	1010.76	2.75	48"	R-3067-V	4.00	
CB 207	MH 206	19168	7716	0.44	0.44	0.40	0.48	0.21	0.21	10.00	10.00	5.04	1.07	1.07	15	0.0050	RCP	0.013	4.57	3.72	47.1	3.500	1004.78	1004.54	1008.78	2.75	2'x3'	R-3067-V	4.00	
MH 206	CBMH 204	0	0	0.00	3.42	0.00	0.20	0.00	1.61	0.07	11.25	4.85	0.00	7.83	18	0.0060	RCP	0.013	8.14	4.60	72.4	0.307	1004.29	1003.86	1009.47	3.68	48"	R-1642	5.18	
CB 205	CBMH 204	10199	4979	0.23	0.23	0.49	0.54	0.13	0.13	8.00	8.00	5.39	0.68	0.68	15	0.0050	RCP	0.013	4.57	3.72	31.0	3.884	1004.74	1004.59	1008.74	2.75	2'x3'	R-3067-V	4.00	
CBMH 204	CBMH 202	16305	6085	0.37	4.03	0.37	0.46	0.17	1.91	0.26	11.51	4.82	0.83	9.21	18	0.0080	RCP	0.013	9.40	5.32	89.1	0.181	1003.86	1003.15	1008.74	3.38	48"	R-3067-V	4.88	
CB203	CBMH 202	17905	5372	0.41	0.41	0.30	0.41	0.17	0.17	10.00	10.00	5.04	0.85	0.85	15	0.0050	RCP	0.013	4.57	3.72	94.7	3.719	1005.47	1005.00	1008.90	2.18	27"	R-4342	3.43	
CBMH 202	CBMH 201	31951	10017	0.73	8.48	0.31	0.42	0.31	4.09	0.08	15.47	4.35	1.34	17.79	18	0.0287	RCP	0.013	17.80	10.07	148.6	0.010	1000.57	996.30	1009.50	7.43	48"	R-3067-V	12.93	4 FT SUMP
CBMH 201	FES 200	0	0	0.00	8.48	0.00	0.20	0.00	4.09	0.25	15.72	4.33	0.00	17.68	27	0.0041	RCP	0.013	19.83	4.99	46.7	2.146	994.19	994.00	1000.00	3.56	48"	R-4342	5.81	
FES 200	POND				8.48				4.09															**994.00**			27"	FES		
CB 302	CBMH 301	23682	11891	0.54	0.54	0.50	0.55	0.30	0.30	10.00	10.00	5.04	1.51	1.51	15	0.0050	RCP	0.013	4.57	3.72	31.0	3.057	995.13	994.98	999.13	2.75	2'x3'	R-3067-V	4.00	
CBMH 301	FES 300	18066	7762	0.41	0.96	0.43	0.50	0.21	0.51	0.14	10.14	5.02	1.04	2.55	15	0.0050	RCP	0.013	4.57	3.72	43.5	2.022	994.22	994.00	999.13	3.66	48"	R-3067-V	8.91	4 FT SUMP
FES 300	POND				0.96				0.51															**994.00**			15"	FES		
ADS 700	MH701														6	0.0050	PVC	0.012			279.6	0.000	1017.48	1016.08	1021.00	3.02	24"		3.52	
MH701	CBMH 702														15	0.0734	RCP	0.013			189.4	0.000	1015.50	1001.60	1022.00	5.25	48		6.50	
CBMH 702	Ex Pipe																						1000.80	1000.80	1005.60	4.80	48		4.80	
FES 502	OCS 501														21	0.0150	RCP	0.013			14.0		995.00	994.79			72"	OCS	-986.30	
OCS 501	FES 500														18	0.0050	RCP	0.021			34.9		986.30	986.13	998.00					
FES 500																								**986.13**			18"	FES		
ADS 602	ADS 601	40488	12146	0.93	0.93	0.30	0.41	0.38	0.38	10.00	10.00	5.04	1.92	1.92	8	0.2750	HDPE	0.012	6.87	19.67	73.4	4.945	1017.00	996.80	1020.00		18"		3.00	
ADS 601	PE 600	0	12146	0.00	0.93	0.00	0.20	0.00	0.38	0.06	10.06	5.03	0.00	1.92	10	0.0070	HDPE	0.012	1.99	3.64	13.7	0.070	995.10	995.00	999.70		30"		4.60	
PE 600					0.93				0.38															**995.00**			10"	PE		


QCS 102
STORMWATER WETLAND/FILTRATION
NWL:994.8
100 YEAR HWL:995.57
MH 101
FES 300
PE 103
FES 200
CB/MH 201
BLOCK 1
CBMH 301
W/4' SUMP
CB 302
MH 100
CBMH 204
CBMH 202
EXMH 3
CBMH 2
EX MH 1
NEZ PERCE DRIVE
CB 205
MH 206
CB 203
CBMH 207
1000' Shoreland District Boundary
FILTRATION BASIN 2
100 YEAR HWL:997.98
OCS 501
FES 502
FES 500
CB 211
CB 210
CBMH 209
ADS 601
ADS 602
BLOCK 2
PEACEFUL LANE
MH 701
ADS 700
FILTRATION TRENCH
100 YEAR HWL:1020.10
CBMH 702



Subcat Reach Pond Link

Routing Diagram for PDRN - Low Point Rear Yard
Prepared by Alliant Engineering, Inc, Printed 6/3/2025

Area Listing (all nodes)

Area (acres)	CN	Description (subcatchment-numbers)
0.965	80	>75% Grass cover, Good, HSG D (203S, 210S)
0.413	98	Unconnected pavement, HSG D (203S, 210S)

Time span=0.00-600.00 hrs, dt=0.01 hrs, 60001 points
Runoff by SCS TR-20 method, UH=SCS, Weighted-Q
Reach routing by Dyn-Stor-Ind method - Pond routing by Dyn-Stor-Ind method

Subcatchment203S: CB 203 Runoff Area=17,905 sf 30.00% Impervious Runoff Depth=5.67"
Tc=10.0 min CN=WQ Runoff=3.37 cfs 0.194 af

Subcatchment210S: CB 210 Runoff Area=42,120 sf 30.00% Impervious Runoff Depth=5.67"
Tc=10.0 min UI Adjusted CN=WQ Runoff=7.93 cfs 0.457 af

Pond 1P: CB 210 Peak Elev=1,015.99' Storage=55 cf Inflow=7.93 cfs 0.457 af
Outflow=7.89 cfs 0.457 af

Pond 2P: CB 203 Peak Elev=1,009.23' Storage=29 cf Inflow=3.37 cfs 0.194 af
Outflow=3.37 cfs 0.194 af

Summary for Subcatchment 203S: CB 203

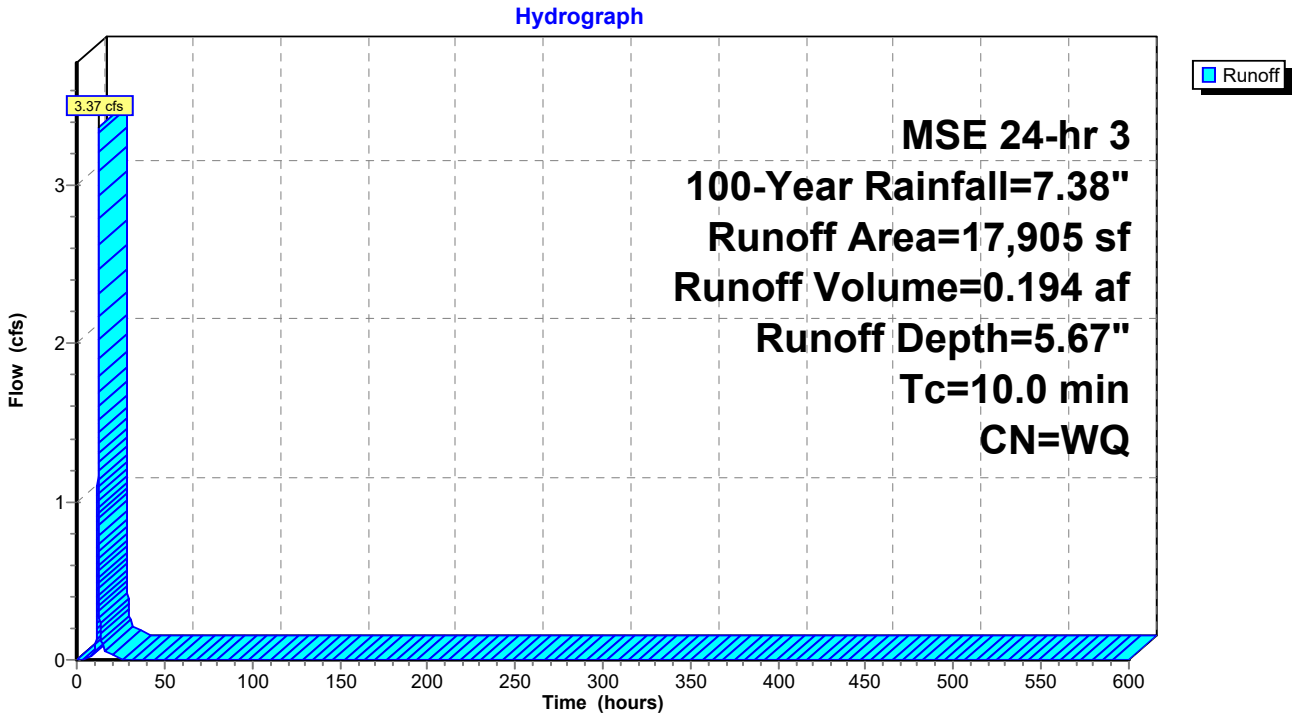
Runoff = 3.37 cfs @ 12.17 hrs, Volume= 0.194 af, Depth= 5.67"
Routed to Pond 2P : CB 203

Runoff by SCS TR-20 method, UH=SCS, Weighted-Q, Time Span= 0.00-600.00 hrs, dt= 0.01 hrs
MSE 24-hr 3 100-Year Rainfall=7.38"

Area (sf)	CN	Description
5,372	98	Unconnected pavement, HSG D
12,533	80	>75% Grass cover, Good, HSG D
17,905		Weighted Average
12,533		70.00% Pervious Area
5,372		30.00% Impervious Area
5,372		100.00% Unconnected

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

Subcatchment 203S: CB 203



Summary for Subcatchment 210S: CB 210

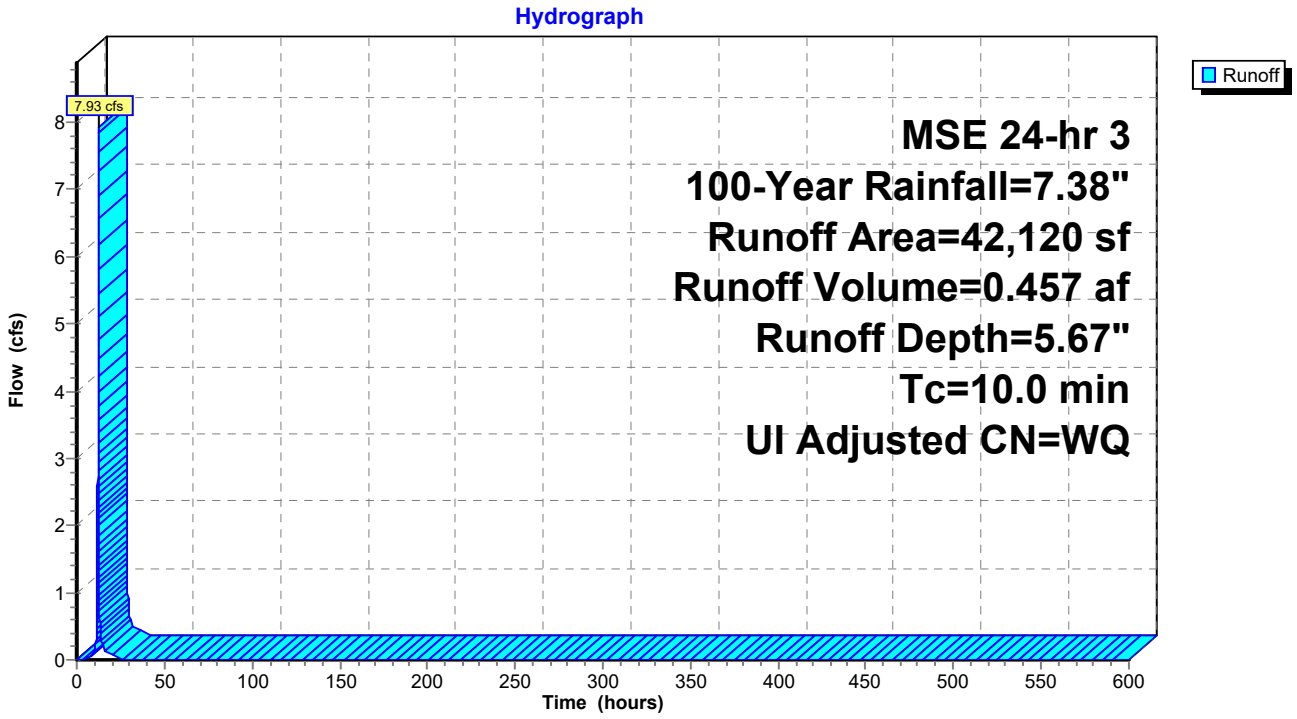
Runoff = 7.93 cfs @ 12.17 hrs, Volume= 0.457 af, Depth= 5.67"
Routed to Pond 1P : CB 210

Runoff by SCS TR-20 method, UH=SCS, Weighted-Q, Time Span= 0.00-600.00 hrs, dt= 0.01 hrs
MSE 24-hr 3 100-Year Rainfall=7.38"

Area (sf)	CN	Adj	Description
12,636	98	98	Unconnected pavement, HSG D
29,484	80	80	>75% Grass cover, Good, HSG D
42,120			Weighted Average
29,484			70.00% Pervious Area
12,636			30.00% Impervious Area
12,636			100.00% Unconnected

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

Subcatchment 210S: CB 210



Summary for Pond 1P: CB 210

Inflow Area = 0.967 ac, 30.00% Impervious, Inflow Depth = 5.67" for 100-Year event
Inflow = 7.93 cfs @ 12.17 hrs, Volume= 0.457 af
Outflow = 7.89 cfs @ 12.18 hrs, Volume= 0.457 af, Atten= 1%, Lag= 0.4 min
Primary = 7.89 cfs @ 12.18 hrs, Volume= 0.457 af

Routing by Dyn-Stor-Ind method, Time Span= 0.00-600.00 hrs, dt= 0.01 hrs
Peak Elev= 1,015.99' @ 12.18 hrs Surf.Area= 184 sf Storage= 55 cf

Plug-Flow detention time= 0.1 min calculated for 0.457 af (100% of inflow)
Center-of-Mass det. time= 0.1 min (774.1 - 774.0)

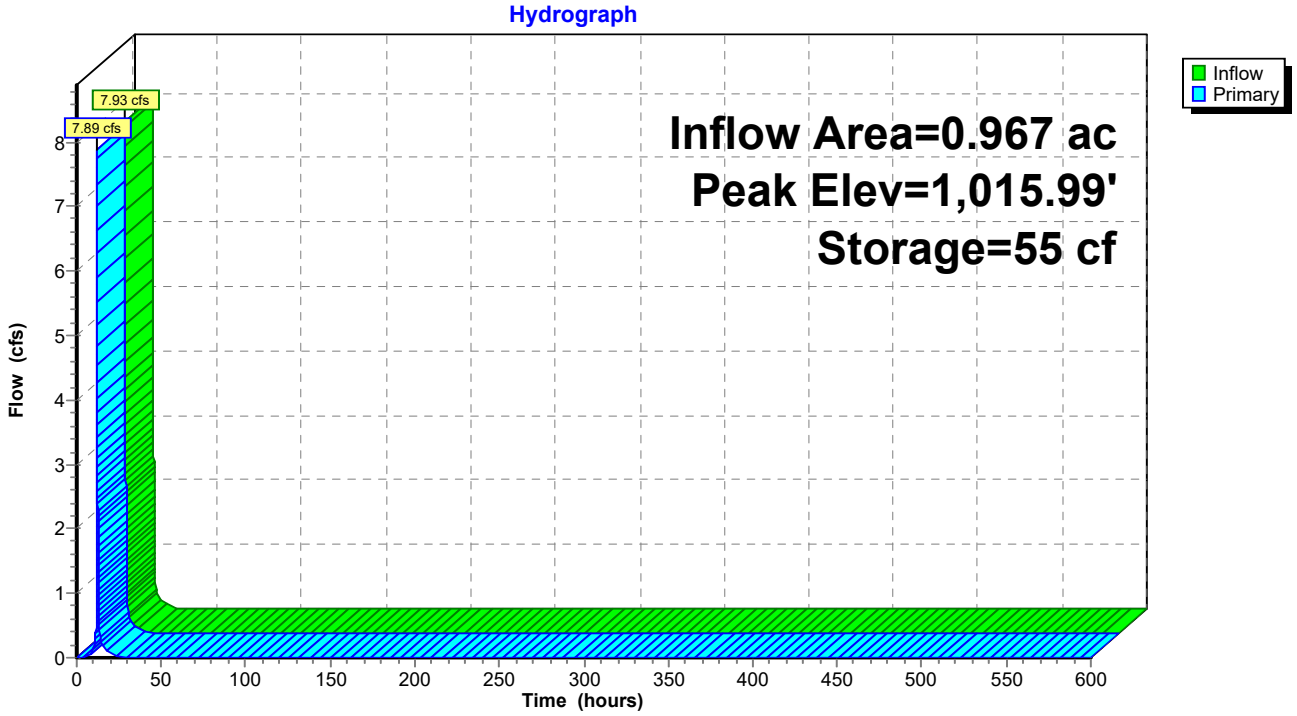
Volume	Invert	Avail.Storage	Storage Description
#1	1,015.40'	2,071 cf	**Custom Stage Data (Prismatic)** Listed below (Recalc)

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
1,015.40	3	0	0
1,016.00	187	57	57
1,018.00	1,827	2,014	2,071

Device	Routing	Invert	Outlet Devices
#1	Primary	1,012.15'	**15.0" Round Culvert** L= 163.6' RCP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 1,012.15' / 1,011.33' S= 0.0050 '/' Cc= 0.900 n= 0.013 Concrete pipe, bends & connections, Flow Area= 1.23 sf
#2	Device 1	1,015.40'	**21.0" Horiz. Orifice/Grate** C= 0.600 Limited to weir flow at low heads

Primary OutFlow Max=7.89 cfs @ 12.18 hrs HW=1,015.99' (Free Discharge)
↑**1=Culvert** (Barrel Controls 7.89 cfs @ 6.43 fps)
↑**2=Orifice/Grate** (Passes 7.89 cfs of 8.12 cfs potential flow)

Pond 1P: CB 210



Summary for Pond 2P: CB 203

Inflow Area = 0.411 ac, 30.00% Impervious, Inflow Depth = 5.67" for 100-Year event
Inflow = 3.37 cfs @ 12.17 hrs, Volume= 0.194 af
Outflow = 3.37 cfs @ 12.18 hrs, Volume= 0.194 af, Atten= 0%, Lag= 0.2 min
Primary = 3.37 cfs @ 12.18 hrs, Volume= 0.194 af

Routing by Dyn-Stor-Ind method, Time Span= 0.00-600.00 hrs, dt= 0.01 hrs
Peak Elev= 1,009.23' @ 12.18 hrs Surf.Area= 174 sf Storage= 29 cf

Plug-Flow detention time= 0.1 min calculated for 0.194 af (100% of inflow)
Center-of-Mass det. time= 0.1 min (774.1 - 774.0)

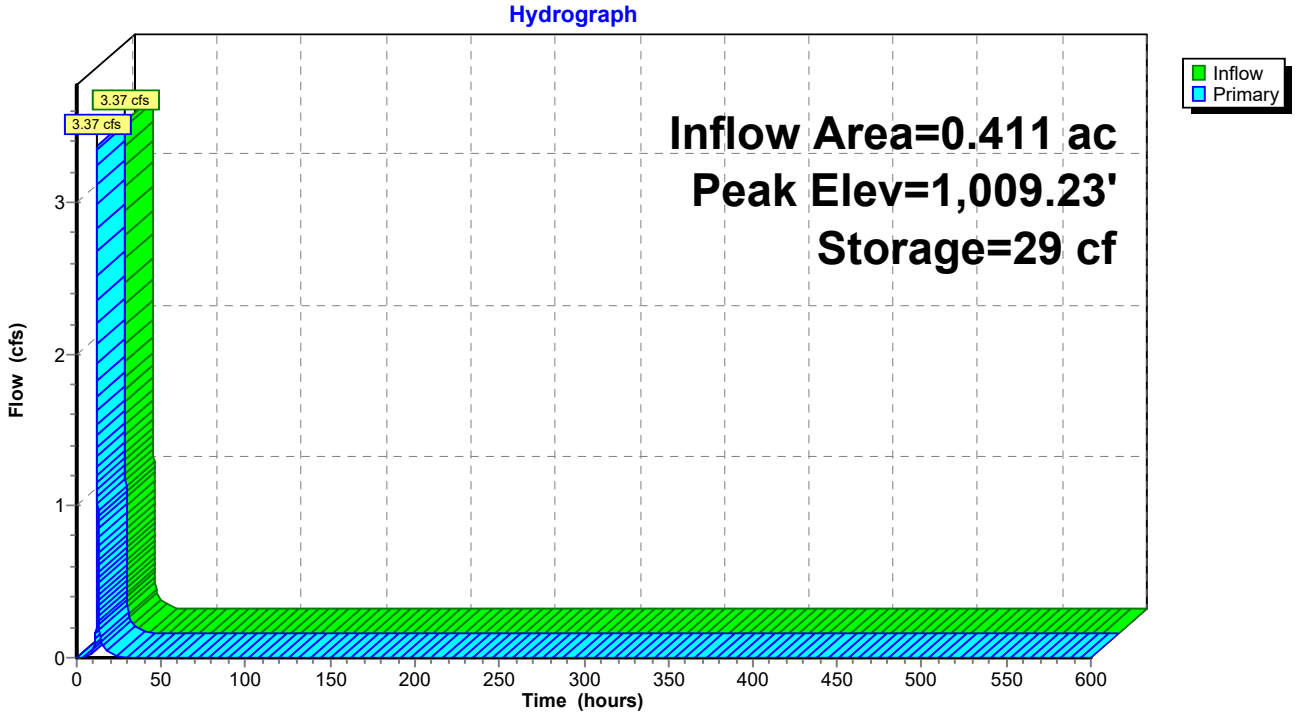
Volume	Invert	Avail.Storage	Storage Description
#1	1,008.90'	318 cf	**Custom Stage Data (Prismatic)** Listed below (Recalc)

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
1,008.90	3	0	0
1,010.00	576	318	318

Device	Routing	Invert	Outlet Devices
#1	Primary	1,005.70'	**15.0" Round Culvert** L= 94.7' RCP, mitered to conform to fill, Ke= 0.700 Inlet / Outlet Invert= 1,005.70' / 1,005.00' S= 0.0074 '/' Cc= 0.900 n= 0.013 Concrete pipe, bends & connections, Flow Area= 1.23 sf
#2	Device 1	1,008.90'	**21.0" Horiz. Orifice/Grate** C= 0.600 Limited to weir flow at low heads

Primary OutFlow Max=3.36 cfs @ 12.18 hrs HW=1,009.23' (Free Discharge)
↑ **1=Culvert** (Passes 3.36 cfs of 8.60 cfs potential flow)
↑ **2=Orifice/Grate** (Weir Controls 3.36 cfs @ 1.87 fps)

Pond 2P: CB 203



PDRN - Low Point Rear Yard
Prepared by Alliant Engineering, Inc

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Geotechnical Evaluation Report

Pleasant View Pointe Development
6535 Peaceful Lane
Chanhassen, Minnesota

Prepared for

Rachel Development, Inc.

Professional Certification:
I hereby certify that this plan, specification, or report was prepared by me or under my direct supervision and that I am a duly Licensed Professional Engineer under the laws of the State of Minnesota.

John T. Carlson, PE
Senior Engineer
License Number: 20663
February 17, 2025

Project B2405314

Braun Intertec Corporation

Braun Intertec Corporation
11001 Hampshire Avenue S
Minneapolis, MN 55438

Phone: 952.995.2000
Fax: 952.995.2020
Web: braunintertec.com

February 17, 2025 Project B2405314

Mr. Paul Robinson
Rachel Development, Inc.
4180 Napier Court NE
St. Michael, MN 55446

Re: Geotechnical Evaluation
Pleasant View Pointe Development
6535 Peaceful Lane
Chanhassen, Minnesota

Dear Mr. Robinson:

We are pleased to present this Geotechnical Evaluation Report for the proposed Pleasant View Pointe residential development in Chanhassen, Minnesota. Please read the entire attached report for details regarding our findings and recommendations.

Thank you for making Braun Intertec Corporation your geotechnical consultant for this project. If you have questions about this report, or if there are other services that we can provide in support of our work to date, please contact John Carlson at 952.540.7248 (johcarlson@braunintertec.com).

Sincerely,

BRAUN INTERTEC CORPORATION

Henry Vloo, PE
Senior Engineer

John T. Carlson, PE
Senior Engineer

Cc: Steve Wolbeck; Rachel Development, LLC
Mark Rausch, PE; Alliant Engineering, Inc.
Joe Westphal, PE; Braun Intertec Corporation

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Appendix

A. Introduction

A.1. Project Description

Rachel Development, Inc. (Rachel) is planning to develop a new residential housing development on the four parcels of land known as the Beddor Properties. One of the properties has an address of 6535 Peaceful Lane in Chanhassen, Minnesota. Concept plans indicate that the proposed development will likely consist of construction of 19 single-family building pads along with construction of associated streets, underground utilities, and stormwater features/ponds. Figure 1 shows the proposed site development plan dated May 1, 2024 prepared by Alliant Engineering.

Figure 1. Beddor Property – Initial Concept Plan

Concept site plan prepared by Alliant Engineering.

A.1.a. Structural Loads

Construction will likely consist of one- to two-story wood-framed houses with pitched roofs. The homes will likely be constructed with full-depth basements with wood framing above grade.

A.1.b. Pavement Traffic Loads

We have assumed that bituminous pavements, typical of residential neighborhoods, will be subjected to normal traffic conditions over a design life of 20 years.

A.2. Site Conditions and History

The site consists of four parcels of land totaling about 13 1/4 acres of mostly open property. There is a home on one of the properties. There are scattered wooded areas on this site as well as a pond in the north parcel. Just off the southwest corner of the site is a City of Chanhassen water storage facility. The site generally slopes down to the northwest, with the highest elevations of about 1025 Mean Sea Level (MSL) near the water storage facility in the southwest part of the site down to the low area of the site at about 925 MSL near the existing pond in the northwest part of the site.

Figure 2 shows an aerial photograph showing the current site conditions, as obtained from the Carver County GIS site using 2022 aerial imagery.

Figure 2. Aerial Photograph of the Site - 2022

Photograph obtained from Carver County GIS.

A.3. Purpose

The purpose of our geotechnical evaluation will be to characterize subsurface geologic conditions at selected exploration locations and evaluate their impact on the design and construction of the proposed residential development.

A.4. Background Information and Reference Documents

We reviewed the following information:

- Site information provided to us by Rachel.
- Concept plan dated May 1, 2024 prepared by Alliant Engineering.
- Available public aerial photographs showing the existing site conditions.
- Geologic atlas showing the general soil types present in this area.

We have described our understanding of the proposed construction and site to the extent others reported it to us. Depending on the extent of available information, we may have made assumptions based on our experience with similar projects. If we have not correctly recorded or interpreted the project details, the project team should notify us. New or changed information could require additional evaluation, analyses and/or recommendations.

A.5. Scope of Services

We completed our services based on the Proposal for Geotechnical Evaluation QTB197503 to Rachel Development, Inc. dated May 29, 2024. The following list describes the geotechnical tasks completed in accordance with our authorized scope of services.

- Reviewing the background information and reference documents previously cited.
- Coordinating the clearing of the exploration locations of public underground utilities. The soil boring locations were chosen and staked in the field by Braun Intertec. The existing ground surface elevations at the borings were obtained by Braun Intertec personnel using a GPS locating system.
- Performing eight standard penetration test (SPT) borings, denoted as ST-1 to ST-8, to nominal depths of 15 to 20 feet below grade across the site.
- Performing laboratory testing on select samples to aid in soil classification and engineering analysis.
- After the borings were completed, we were requested to observe backhoe test pits to further evaluate the soil conditions. A total of eight test pits were observed by Braun Intertec on January 8, 2025. Alliant Engineering provided the surface elevations at the test pit locations.
- Preparing this report containing a boring location sketch, logs of the soil borings, a summary of the soils encountered by the borings, results of laboratory tests, and recommendations for structure and pavement subgrade preparation and the design of foundations, floor slabs, exterior slabs, and utilities.

We are currently completing a Phase 1 ESA (Environmental Site Assessment) for this site. The Phase I ESA report was sent under separate cover. Our current scope of services did not include any other environmental services.

B. Results

B.1. Geologic Overview

We reviewed the map "Surficial Geology of the Twin Cities Metropolitan Area, Minnesota," dated 2007. Based upon the map, the site is underlain by glacial till deposits associated with the New Ulm Formation. Glacial till associated with the Des Moines lobe typically consists of clayey soils with small but variable amounts of gravel, and lesser amounts of cobbles. The depth of soil to the bedrock surface is generally greater than 250 feet beyond the current ground surface.

We based the geologic origins used in this report on the soil types, in-situ and laboratory testing, and available common knowledge of the geological history of the site. Because of the complex depositional history, geologic origins can be difficult to ascertain.

B.2. Boring Results

Table 1 provides a summary of the soil boring results in the general order we encountered the strata. Please refer to the Log of Boring sheets in the Appendix for additional details. The Descriptive Terminology sheet in the Appendix includes definitions of abbreviations used in Table 1.

Table 1. Subsurface Profile Summary*

Strata	Soil Type - ASTM Classification	Range of Penetration Resistances	Commentary and Details
Topsoil, Topsoil fill	CL, SC, SM	NA	▪ Encountered by all the borings and test pits. Consisted of lean clay, clayey sand, and silty sand. ▪ Thickness ranged from about 1/2 to 4 feet. ▪ Dark brown in color. ▪ Moisture condition generally moist or frozen.
Swamp deposits	OL, OH	3 to 5 Blows per Foot (BPF)	▪ Only encountered by Borings ST-3 and ST-4 and Test Pit TP-2 to depths of about 4 and 6 feet. ▪ Consisted of organic clay or organic silt with fibers. ▪ Black in color. ▪ Moisture condition generally moist.
Alluvial deposits	CL, SC	0 to 5 BPF	▪ Encountered by Borings ST-1, ST-3, and ST-4 and Test Pits TP-2. ▪ Consisted of clayey sand and lean clay. ▪ Extended to depths of about 4 to 13 feet. ▪ Color mostly brown, brownish gray and gray. ▪ Moisture condition generally moist to wet.

Strata	Soil Type - ASTM Classification	Range of Penetration Resistances	Commentary and Details
Glacial deposits	SC, CL	4 to 28 BPF	▪ Encountered by all the borings and test pits. ▪ Consisted of clayey sand and sandy lean clay. ▪ Color mostly brown and grayish brown, transitioning to gray at depth. ▪ Moisture condition generally moist to wet.

*Abbreviations defined in the attached Descriptive Terminology sheet.

B.3. Groundwater

While completing the soil borings, water was only observed in Boring ST-5 at a depth of about 10 1/2 feet, or an elevation of about 999 MSL. Based on the results of the soil borings, it is our opinion that the water observed in Boring ST-5 is perched within more granular soil underlain by more impervious soil. It is likely that there is a local water level near the existing pond in the northwest part of the site. Seasonal and annual fluctuations of groundwater should be anticipated.

B.4. Laboratory Test Results

The boring logs show the results of the laboratory testing we performed on the soil borings, next to the tested sample depth. The laboratory tests were all completed in general conformance with the applicable American Society for Testing and Materials (ASTM) standards. The Log of Boring sheets are in the Appendix of this report.

The moisture content tests (ASTM D 2216) performed on selected clayey soil samples showed moisture contents ranging from about 17 to 27 percent. Most of the clayey soils tested appeared to be near or slightly above the soils' estimated optimum moisture content, although some of the alluvial clay soils were much above their optimum moisture contents.

C. Recommendations

C.1. Design and Construction Discussion

C.1.a. Building Subgrade Preparation

Based on the results of our subsurface exploration and evaluation, spread footing foundations bearing on engineered fill and/or native soils can support the proposed houses after performing typical subgrade

preparation. Typical subgrade preparation includes removing existing vegetation, topsoil, or organic soils, fill, and areas of soft clay. Any existing structures, including slabs and foundations, as well as pavements and septic systems will also need to be removed. Any wells on the property will need to be properly sealed.

We estimate that cuts and fills could range from about 5 to 10 feet below, or above, existing grades. Any soil correction work to further remove unsuitably soft soils could add or subtract to the assumed cut and fill depths. Based on the soil borings, soil correction work could range from around 1 to 11 feet.

C.1.b. Reuse of On-Site Soils

Most of the on-site soils, free of organic materials appear suitable for reuse as engineered fill. Some of the lean clay, sandy lean clay, and clayey sand will likely require some moisture conditioning to allow the recommended soil compaction levels to be achieved. This includes both drying and wetting the soils. If fill soil is mined from beneath wooded areas, the clayey soils could be dry of optimum and will need to be properly wetted if these soils are used as structural fill.

The higher moisture content lean clay should not be used as structural fill below the proposed houses or streets, unless they can be properly moisture conditioned.

C.1.c. Disturbance of On-Site Soils

We caution that the clayey nature of some of the site soils makes them very susceptible to disturbance from construction. Care should be taken not to disturb these soils during construction, as once stable subgrades are destabilized, they will require additional moisture conditioning and compacting.

C.1.d. Effects of Groundwater

Groundwater is anticipated to be below typical excavation depths at this site, although perched water could be present at higher elevations within layers of granular soils overlying lower permeability soils. The contractor should immediately remove any collected water within the excavations to facilitate construction and proper backfilling.

C.2. Site Grading and Subgrade Preparation

C.2.a. Building Subgrade Excavations

We recommend removing unsuitable materials from beneath house pads and oversize areas. We define unsuitable materials as vegetation, topsoil, organic soils, fill, existing structures, existing utilities, and soft/loose soil.

Table 2 shows the anticipated excavation depths and bottom of soil correction excavation elevations at each of the current soil boring and test pit locations, assuming that structures, utilities, or roads will be built at each location. Excavation depths could be reduced in areas that will not support future structures, utilities, or roads.

Table 2. Recommended Excavation Depths for Building Pads and Streets

Location	Measured Surface Elevation (feet)	Anticipated Excavation Depth (feet)	Anticipated Bottom Elevation (feet)
ST-1	1008.3	4	1004
ST-2	1005.8	1	1004 1/2
ST-3	995.4	Pond area	---
ST-4	996.2	Pond area	---
ST-5	1009.4	7	1002 1/2
ST-6	1021.2	1/2	1020 1/2
ST-7	1025.6	1	1024 1/2
ST-8	1023.3	1 1/2	1022
TP-1	1003.1	Pond area	---
TP-2	996.1	Pond area	---
TP-3	1005.5	Pond area	---
TP-4	1018.4	1 1/2	1017
TP-5	1001.1	2	999
TP-6	1009.9	3	1007
TP-7	1019.4	4	1015 1/2
TP-8	1040.6	1/2	1040

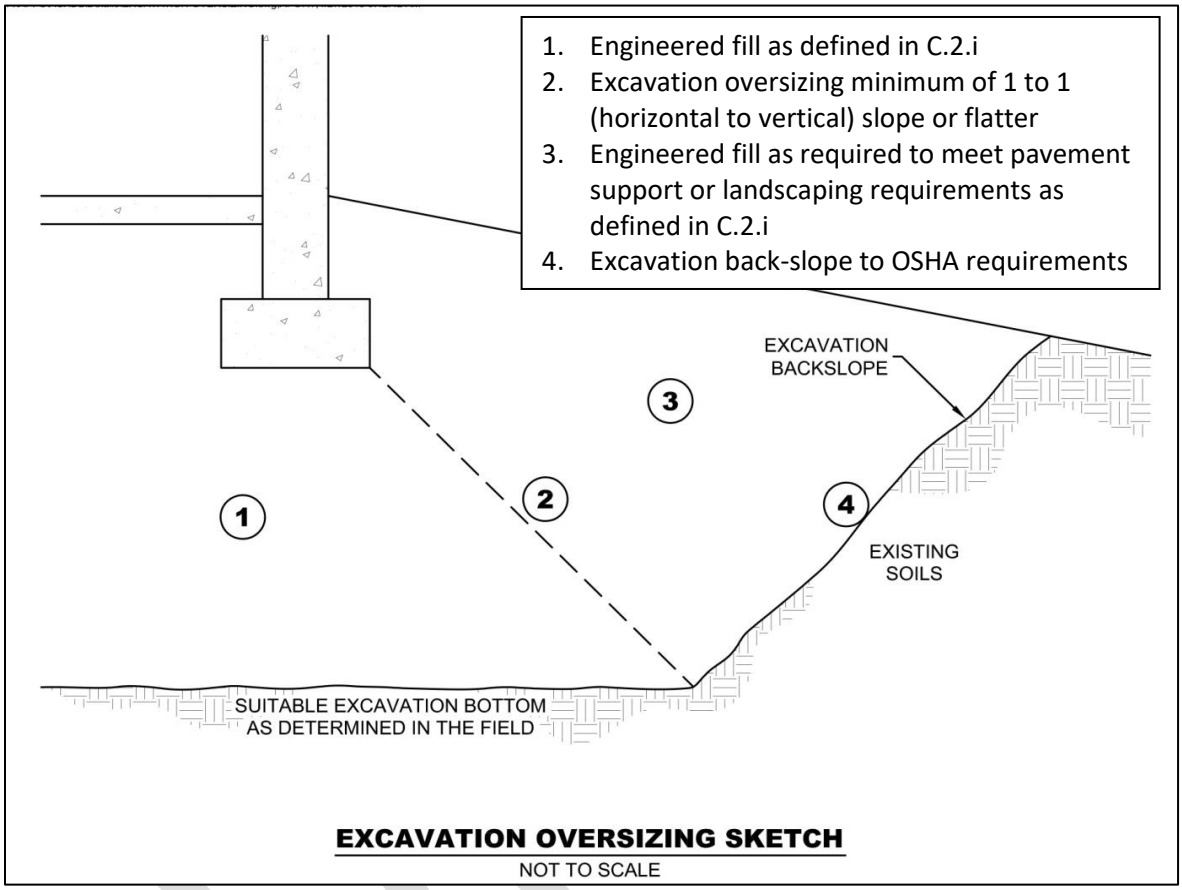
Excavation depths will vary between the borings and test pits. Portions of the excavations may also extend deeper than indicated by the borings and test pits. A geotechnical representative should observe the excavations to make the necessary field judgments regarding the suitability of the exposed soils. Any disturbed areas should be moisture conditioned, if necessary, and re-compacted.

The contractor should use equipment and techniques to reduce soil disturbance. If soils become disturbed or are wet, we recommend excavation and replacement of the disturbed or unstable soils. Provided the existing soils do not become disturbed, surface compaction will not be necessary prior to construction of footings.

C.2.b. Excavation Oversizing

When removing unsuitable materials below structures or pavements, we recommend the excavation extend outward and downward at a slope of 1H:1V (horizontal:vertical) or flatter. See Figure 3 for an illustration of excavation oversizing.

Figure 3. Generalized Illustration of Oversizing



C.2.c. Excavated Slopes

Based on the borings, we anticipate the near surface on-site soils in excavations will consist of mostly clayey soils. The clayey soils are typically considered Type B Soil under OSHA (Occupational Safety and Health Administration) guidelines. OSHA guidelines indicate unsupported excavations in Type B soils should have a gradient no steeper than 1:H:1V. Slopes constructed in this manner may still exhibit surface sloughing. OSHA requires an engineer to evaluate slopes or excavations over 20 feet in depth.

An OSHA-approved qualified person should review the soil classification in the field. Excavations must comply with the requirements of OSHA 29 CFR, Part 1926, Subpart P, “Excavations and Trenches.” This

document states excavation safety is the responsibility of the contractor. The project specifications should reference these OSHA requirements.

C.2.d. Filling on Slopes

Where existing or excavated grades are steeper than 4H:1V, we recommend placing fill from low to high elevations on horizontal benches cut into the native soils so that successive lifts are spread and compacted on level surfaces, and a potential failure surface is not created along the fill's lower boundary. Depending on fill requirements, the contractor can construct benches by cutting into existing grades while placing fill (the composition of the exposed soils thus being in compliance with fill specifications), or by cutting the benches in advance of filling (to prevent mixing with soils not in compliance with fill specifications). The height of a given bench may vary but the width should consistently be great enough to accommodate large, self-propelled compaction equipment.

C.2.e. Excavation Dewatering

Although likely perched water was observed in Boring ST-5, perched water could also be encountered in other parts of the site. We recommend removing any water from the excavations. Project planning should include temporary sumps and pumps for excavations in low-permeability soils, such as clays and silts.

C.2.f. Selecting Excavation Backfill and Additional Required Fill

On-site soils free of organic soil and debris can be considered for reuse as backfill and fill. However, the topsoil and the organic soils should not be re-used as engineered fill under the building pads or below streets. In addition, any higher moisture content lean clay soils should also not be used as engineered fill below building pads and streets unless they can be properly moisture conditioned.

Some of the clayey soils on this site are both wet and dry of optimum. Therefore, drying of these soils, or wetting, will be critical to the success of the site. The wet soils should be continuously disced to lower the moisture content to near optimum. For dry clayey soils, water should be added to the soils and then thoroughly mixed with the soil to obtain a uniform moisture content in these soils. The moisture condition (drying or wetting) of the soils would be best done in the warmer less rainy months of July and August, where the soils can be properly dried, if needed. The drier months will also allow the contractor to better control the moisture content of the soil, should water need to be added to them.

C.2.g. Pavement and Exterior Slab Subgrade Preparation

We recommend the following steps for pavement and exterior slab subgrade preparation. Note that project planning may need to require additional subcuts to limit frost heave.

1. Strip unsuitable soils consisting of topsoil, organic soils, vegetation, and soft clay or existing structures and pavements from the area, down to suitable native soils below the proposed pavement surface.

2. Have a geotechnical representative observe the excavated subgrade to evaluate if additional subgrade improvements are necessary.

3. Slope subgrade soils to areas of sand or drain tile to allow the removal of accumulating water.

4. Scarify, moisture condition and surface compact the subgrade with at least 3 passes by a large roller with a minimum drum diameter of 3 1/2 feet.

5. Place pavement subgrade fill to grade and compact in accordance with Section C.2.i to bottom of pavement and exterior slab section.

6. Proofroll the pavement or exterior slab subgrade as described in Section C.2.h.

C.2.h. Pavement Subgrade Proofroll

After preparing the subgrade as described above and prior to the placement of the aggregate base, we recommend proofrolling the subgrade soils with a fully loaded tandem-axle truck. We also recommend having a geotechnical representative observe the proofroll. Areas that fail the proofroll likely indicate soft or weak areas that will require additional soil correction work to support pavements or slabs. The contractor should correct areas that display excessive yielding or rutting during the proofroll, as determined by the geotechnical representative. Possible options for subgrade correction include moisture conditioning and re-compaction, subcutting and replacement with soil or crushed aggregate, chemical stabilization and/or geotextiles. We recommend performing a second proofroll after the aggregate base material is in place, and prior to placing bituminous or concrete pavement/slabs.

C.2.i. Engineered Fill Materials and Compaction Requirements

Table 3 below contains our recommendations for engineered fill materials.

Table 3. Engineered Fill Materials

Locations To Be Used	Engineered Fill Classification	Possible Soil Type Descriptions	Gradation	Additional Requirements
▪ Below foundations ▪ Below interior slabs	Structural fill*	CL, SC	100% passing 2-inch sieve	< 2% Organic Content (OC) Plasticity Index (PI) < 20%

Locations To Be Used	Engineered Fill Classification	Possible Soil Type Descriptions	Gradation	Additional Requirements
▪ Drainage layer ▪ Non-frost-susceptible	▪ Free-draining ▪ Non-frost-susceptible fill	GP, GW, SP, SW	100% passing 1-inch sieve < 50% passing #40 sieve < 5% passing #200 sieve	< 2% OC
Behind below-grade walls, beyond drainage layer	Retained fill	SP, SP-SM, SM, SC, CL	100% passing 3-inch sieve < 20% passing #200 sieve	< 2% OC PI < 4%
Pavements	Pavement fill	CL, SC	100% passing 3-inch sieve	< 2% OC PI < 20%
Below landscaped surfaces, where subsidence is not a concern	Non-structural fill	All soil types	100% passing 6-inch sieve	< 10% OC

*More select soils comprised of coarse sands with < 5% passing #200 sieve may be needed to accommodate work occurring in periods of wet or freezing weather.

If there are building pads that will require more than 10 feet of compacted fill under the lowest floor slabs, a construction delay may be needed if only clay fill is used to fill these building pads. The construction delay could range from 3 to 12 months, depending on the final depths of clay fill used. As an alternative, on lots where deep fills are needed, clean sand fill (less than 12 percent passing the #200 sieve) could be used to initially fill the excavations below these house pads. The clean sand fill should be placed in thin compacted lifts, up to an elevation of 10 feet or less from finished basement floor grades. (Based on the borings, this sand would need to be imported to the site.) On-site clay can then be used to complete construction of the building pads. If the alternative method of filling the house pads is used, a construction delay would not be needed.

For large self-propelled vibratory compactors, we recommend spreading engineered fill in loose lifts of no more than 12 inches thick. For walk-behind compactors, we recommend spreading engineered fill in loose lifts of no more than 6 inches thick. We recommend compacting fill in accordance with the criteria presented below in Table 4. The project documents should specify relative compaction of fill, based on the structure located above the fill, and vertical proximity to that structure.

Table 4. Compaction Recommendations Summary

Reference	Relative Compaction, percent (ASTM D698 – Standard Proctor)	Moisture Content Variance from Optimum, percentage points	
		< 12% Passing #200 Sieve (SP, SP-SM)	> 12% Passing #200 Sieve (CL, SC, SM)
Below building pads and oversizing zones, less than 10 feet of fill.	95	*---	-1 to +3
Below building pads and oversizing zones, more than 10 feet of fill.	98	*---	-1 to +3
Within 3 feet of pavement subgrade	100	*---	-2 to +1
More than 3 feet below pavement subgrade	95	*---	-1 to +3
Below landscaped surfaces	90	*---	-1 to +5
Adjacent to below-grade wall (exterior wall backfill)	95**	*---	-1 to +3

*The minimum moisture content should be no less than 5 percent and no more than 3 percentage points over optimum.
**Increase compaction requirement to meet compaction required for structure supported by this engineered fill.

The project documents should not allow the contractor to use frozen material as fill or to place fill on frozen material. Frost should not penetrate under foundations during construction.

We recommend performing density tests in fill to evaluate if the contractors are effectively compacting the soil and meeting project requirements. Refer to Section C.3.d below for additional remarks for thicker layers of fill soils.

C.3. Spread Footings

C.3.a. Embedment Depth

For frost protection, we recommend embedding perimeter footings of the proposed houses, including attached garages, a minimum of 42 inches below the lowest exterior grade. Interior footings may be placed directly below floor slabs unless they will be subjected to freezing. We recommend embedding building footings not heated during winter construction, and other unheated footings associated with decks, porches, or stoops, 60 inches below the lowest exterior grade.

C.3.b. Subgrade Improvement

If a small amount of groundwater is present within the footing excavation, or if the footing subgrade soils become disturbed prior to placing forms or reinforcement, we recommend subcutting any soft or wet

soil and placing a 6- to 12-inch layer of clear rock. The clear rock will provide a stable working surface and will allow for the flow of water to a drain tile or sump pump.

C.3.c. Net Allowable Bearing Pressure

We recommend sizing spread footings to exert a net allowable bearing pressure of up to 2,000 pounds per square foot (psf). This value includes a safety factor of at least 3.0 with regard to bearing capacity failure.

C.3.d. Settlement

We estimate that total and differential settlements among the footings will amount to less than 1 and 1/2 inch, respectively, under the assumed loads. If there are areas where more than 10 feet of fill is required, higher settlements could occur, unless the deeper fill areas are only filled with poorly graded sand (SP) or poorly graded sand with silt (SP-SM) fill.

If deep fill areas are completed using clay soil, a construction delay may also be needed to allow the fill soils to consolidate under its own weight. Construction delays could range from 3 to 12 months, depending on the type of fill used, the compaction level obtained in the fill and the thickness of the fill. The construction delays should be evaluated after grading is completed by using settlement plates to monitor the consolidation of the fill.

C.4. Basement Walls

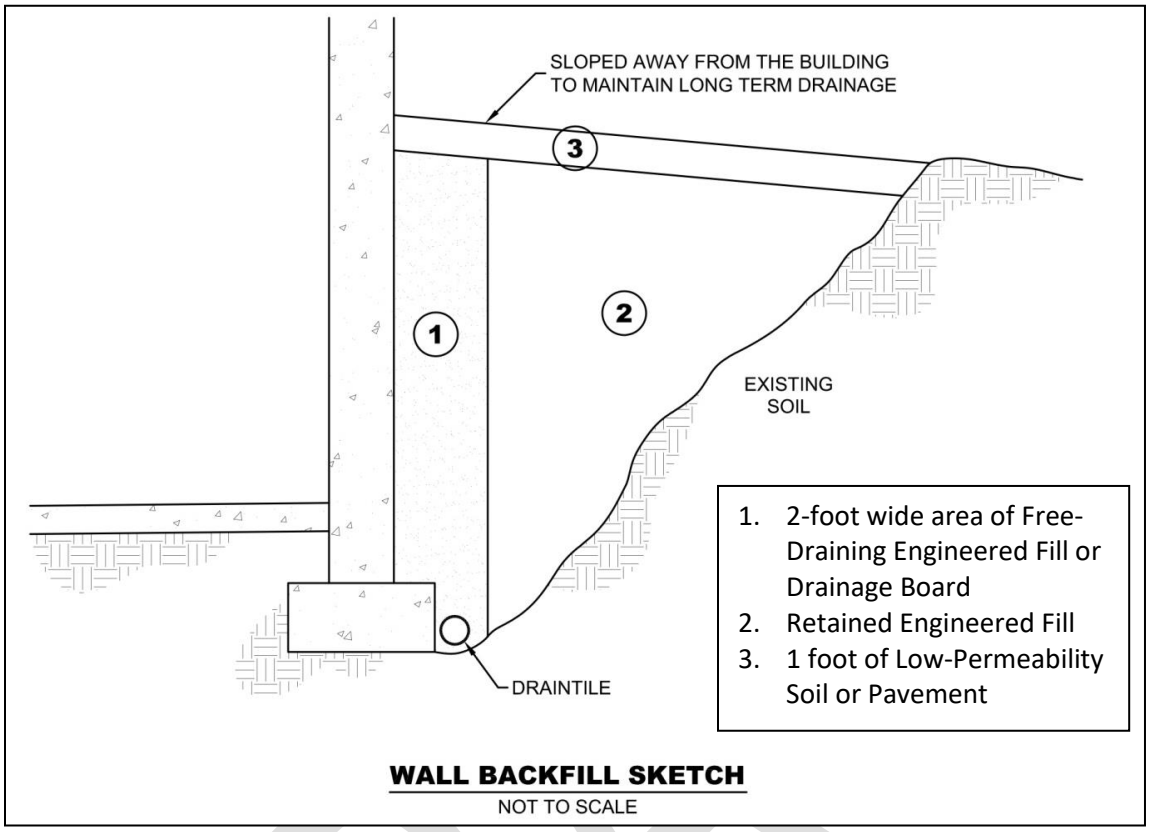
The following sections address soil parameters for basement wall design. Although construction of retaining walls has not been specified for this project to date, the following recommendations can also be used for preliminary retaining wall design. Additional soil analysis, including additional soil borings, may be needed for final retaining wall design.

C.4.a. Drainage Control

We recommend installing drain tile to remove water behind the below-grade walls at the location shown in Figure 4. The below-grade wall drainage system should also incorporate free-draining, engineered fill or a drainage board placed against the wall and connected to the drain tile.

Even with the use of free-draining, engineered fill, we recommend general waterproofing of below-grade walls that surround occupied or potentially occupied areas because of the potential cost impacts related to seepage after construction is complete.

Figure 4. Generalized Illustration of Wall Engineered Fill



The materials listed in the sketch should meet the definitions in Section C.4.b. The low-permeability material should be capable of directing water away from the wall, like clay, topsoil, or pavement. The project documents should indicate if the contractor should brace the walls prior to filling, and the allowable unbalanced fill heights.

As shown in Figure 4, we recommend Zone 2 consist of retained, engineered fill, and this material will control lateral pressures on the wall. However, we are also providing design parameters for using other engineered fill material. If final design uses non-sand material for engineered fill, project planning should account for the following items:

- Other engineered fill material may result in higher lateral pressure on the wall.
- Other engineered fill material may be more difficult to compact.

- Post-construction consolidation of other engineered fill material may result in settlement-related damage to the structures or slabs supported on the engineered fill. Post-construction settlement of other engineered fill material may also cause drainage towards the structure. The magnitude of consolidation could be up to about 3 percent of the wall fill thickness.

C.4.b. Selection, Placement and Compaction of Backfill

Unless a drainage composite is placed against the backs of the exterior perimeter basement walls, we recommend that backfill placed within 2 horizontal feet of those walls consist of sand having less than 50 percent of the particles, by weight, passing a #40 sieve and less than 5 percent of the particles, by weight, passing a #200 sieve.

If clay or silt must be considered for use to make up the balance of the below-grade wall backfill (assuming a drainage composite or sand is placed against the backs of the walls), post-compaction consolidation of the clay and silt occurring under its own weight can be expected to continue beyond the end of construction. The magnitude of consolidation could amount to between 1 and 3 percent of the backfill thickness, or wall height, and if not accommodated, could cause slabs or pavements to settle unfavorably or be damaged. Should clay or silt still be considered for use as backfill, however, we further recommend that:

- The bottoms of the excavations required for basement wall construction are wide enough to accommodate compaction equipment.
- Backfill is placed at moisture contents at least equal to, but not more than, 3 percentage points above its optimum moisture content.
- Backfill is placed in loose lifts no thicker than 6 inches prior to compaction.
- The relative compaction of the backfill is measured through density testing at intervals not exceeding 1 test per 50 horizontal feet for each 2 vertical feet of backfill placed.

We recommend using a walk-behind compactor to compact the backfill placed within about 5 feet of the basement walls. Further away than that, a self-propelled compactor can be used. Compaction criteria for basement walls should be determined based on the compaction recommendations provided above in Section C.2.

Exterior wall backfill not capped with slabs or pavement should be capped with a low-permeability soil to limit the infiltration of surface drainage into the backfill. The finished surface should also be sloped to divert water away from the walls.

C.4.c. Configuring and Resisting Lateral Loads

Below-grade wall design can use active earth pressure conditions if the walls can rotate slightly. If the wall design cannot tolerate rotation, then design should use at-rest earth pressure conditions. Rotation up to 0.002 times the wall height is generally required for walls supporting sand. Rotation up to 0.02 times the wall height is required when wall supports clay.

Table 5 presents our recommended lateral coefficients and equivalent fluid pressures for wall design of active, at-rest and passive earth pressure conditions. The table also provides recommended wet unit weights and internal friction angles. Designs should also consider the slope of any engineered fill and dead or live loads placed behind the walls within a horizontal distance that is equal to the height of the walls. Our recommended values assume the wall design provides drainage so water cannot accumulate behind the walls. The construction documents should clearly identify what soils the contractor should use for engineered fill of walls.

Table 5. Recommended Below-Grade Wall Design Parameters – Drained Conditions

Retained Soil	Wet Unit Weight (pcf)	Friction Angle (degrees)	Equivalent Active Fluid Pressure* (pcf)	Equivalent At-Rest Fluid Pressure* (pcf)	Equivalent Passive Fluid Pressure* (pcf)
Imported Sand (SP, SP-SM)	120	33	35	55	NA
Clay Soil (CL, SC)	125	26	50	70	320

*Based on Rankine model for soils in a region behind the wall extending at least 2 horizontal feet beyond the bottom outer edges of the wall footings and then rising up and away from the wall at an angle no steeper than 60 degrees from horizontal.

Sliding resistance between the bottom of the footing and the soil can also resist lateral pressures. We recommend assuming a sliding coefficient equal to 0.30 between the concrete and clay soil.

The values presented in this section are un-factored.

C.5. Interior Slabs

C.5.a. Moisture Vapor Protection

Excess transmission of water vapor could cause floor dampness, certain types of floor bonding agents to separate, or mold to form under floor coverings. If project planning includes using floor coverings or coatings, we recommend placing a vapor retarder or vapor barrier immediately beneath the slab. We also recommend consulting with floor covering manufacturers regarding the appropriate type, use and installation of the vapor retarder or barrier to preserve warranty assurances.

C.5.b. Radon

We recommend installing radon resistant construction components for the proposed building, including appropriate sub-slab material and vent piping, if required by applicable local building codes. Our radon mitigation professionals can assist with evaluation of site-specific radon resistant construction requirements and/or design of a system, at your request.

C.6. Frost Protection

C.6.a. General

Clayey soils will likely underlie most of the exterior slabs, as well as pavements. Most of the clayey soils are moderately to highly frost susceptible. The fine-grained soils can retain moisture and heave upon freezing. In general, this characteristic is not an issue unless these soils become saturated, due to surface runoff or infiltration, or are excessively wet in situ. Once frozen, unfavorable amounts of general and isolated heaving of the soils and the surface structures supported on them could develop. This type of heaving could affect design drainage patterns and the performance of exterior slabs and pavements, as well as any isolated exterior footings and piers.

Note that general runoff and infiltration from precipitation are not the only sources of water that can saturate subgrade soils and contribute to frost heave. Roof drainage and irrigation of landscaped areas, close to exterior slabs, pavements, and isolated footings and piers, contribute as well.

C.6.b. Frost Heave Mitigation

To address some of the heave related issues, we recommend setting general site grades and grades for exterior surface features to direct surface drainage away from buildings, across large, paved areas and away from walkways. Such grading will limit the potential for saturation of the subgrade and subsequent heaving. General grades should also have enough “slope” to tolerate potential larger areas of heave, which may not fully settle after thawing.

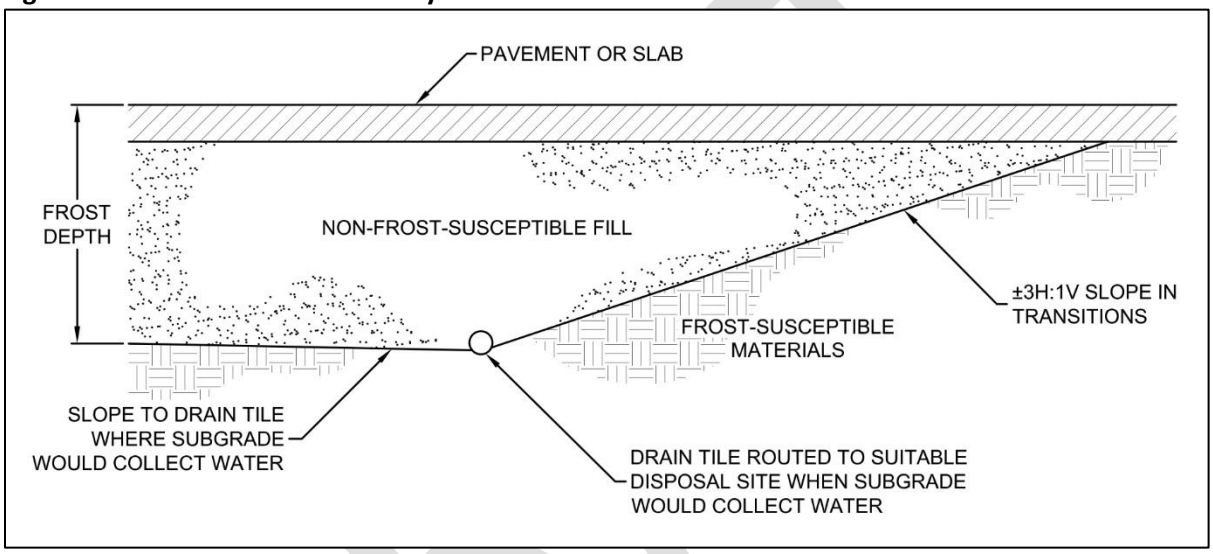
Even small amounts of frost-related differential movement at walkway joints or cracks can create tripping hazards. Project planning can explore several subgrade-improvement options to address this condition.

One of the more conservative subgrade improvement options to mitigate potential heave is removing any frost-susceptible soils present below the exterior slab areas down to a minimum depth of 4 feet below subgrade elevations. We recommend filling the resulting excavation with non-frost-susceptible fill. We also recommend sloping the bottom of the excavation toward one or more collection points to remove any water entering the engineered fill. This approach will not be effective in controlling frost heave without removing the water.

An important geometric aspect of the excavation and replacement approach described above is sloping the banks of the excavations to create a more gradual transition between the unexcavated soils considered frost susceptible and the engineered fill in the excavated area, which is not frost susceptible. The slope allows attenuation of differential movement that may occur along the excavation boundary. We recommend slopes that are 3H:1V, or flatter, along transitions between frost-susceptible and non-frost-susceptible soils.

Figure 5 that follows shows an illustration summarizing some of the recommendations.

Figure 5. Frost Protection Geometry Illustration



Another option is to limit frost heave in critical areas, such as doorways and entrances, via frost-depth footings or localized excavations with sloped transitions between frost-susceptible and non-frost-susceptible soils, as described above.

Over the life of slabs and pavements, cracks will develop, and joints will open which will expose the subgrade and allow water to enter from the surface and either saturate or perch atop the subgrade soils. This water intrusion increases the potential for frost heave or moisture-related distress near the crack or joint. Therefore, we recommend implementing a detailed maintenance program to seal and/or fill any cracks and joints. The maintenance program should give special attention to areas where dissimilar materials abut one another, where construction joints occur and where shrinkage cracks develop.

C.7. Pavements

C.7.a. Design Sections

Our scope of services for this project did not include laboratory tests on subgrade soils to determine an R-value for pavement design. Since much of the soils on this site consist of clay, we recommend that the pavements be designed for an assume R-value of 12. Note the contractor may need to perform limited removal of unsuitable or less suitable soils to achieve this value.

We assumed that pavements for the residential development will be subject to a maximum of 50,000 ESALs over a 20-year design life. We assume the pavements will be designed in accordance with the City of Chanhassen standard pavement section which includes a sand subbase.

C.7.b. Bituminous Pavement Materials

Appropriate mix designs are critical to the performance of flexible pavements. We can provide recommendations for pavement material selection during final pavement design.

C.7.c. Subgrade Drainage

We recommend installing perforated drainpipes throughout pavement areas at low points, around catch basins, and behind curb in landscaped areas. We also recommend installing drainpipes along pavement and exterior slab edges where exterior grades promote drainage toward those edge areas. The contractor should place drainpipes at the base of the granular subbase layer, or in shallow trenches, extending just below the aggregate base material where no subbase is present.

C.7.d. Performance and Maintenance

We based the above pavement designs on a 20-year performance life for bituminous. This is the amount of time before we anticipate the pavement will require reconstruction. This performance life assumes routine maintenance, such as seal coating and crack sealing. The actual pavement life will vary depending on variations in weather, traffic conditions and maintenance.

It is common to place the non-wear course of bituminous and then delay placement of the wear course. For this situation, we recommend evaluating if the reduced pavement section will have sufficient structure to support construction traffic.

Many conditions affect the overall performance of the exterior slabs and pavements. Some of these conditions include the environment, loading conditions and the level of ongoing maintenance. With bituminous pavements, it is common to have thermal cracking develop within the first few years of placement and continue throughout the life of the pavement. We recommend developing a regular

maintenance plan for filling cracks in exterior slabs and pavements to lessen the potential impacts for cold weather distress due to frost heave or warm weather distress due to wetting and softening of the subgrade.

C.8. Utilities

C.8.a. Subgrade Stabilization

Earthwork activities associated with utility installations located inside building pad areas should adhere to the recommendations in Section C.2.

For exterior utilities, we anticipate the soils at typical invert elevations will be suitable for utility support. However, if construction encounters unfavorable conditions such as soft clay, very loose silt, organic soils or perched water at invert grades, the unsuitable soils may require some additional subcutting and replacement with sand or crushed rock to prepare a proper subgrade for pipe support. Project design and construction should not place utilities within the 1H:1V oversizing of foundations.

C.8.b. Selection, Placement, and Compaction of Backfill

We recommend selecting, placing, and compacting utility backfill in accordance with the recommendations provided above in Section C.2.i.

C.8.c. Corrosion Potential

Based on our experience, some of the clayey soils encountered by the borings are moderately corrosive to metallic conduits. We recommend specifying non-corrosive materials or providing corrosion protection, unless project planning chooses to perform additional tests to demonstrate the soils are not corrosive.

C.9. Stormwater

Based on borings performed, the majority of onsite soils consist of clayey soils. These soils are consistent with Hydrologic Soil Group D of the Minnesota Stormwater Manual and not conducive to soil infiltration. While limited amounts of sand soils were encountered, we do not anticipate that significant quantities of these can be located for stormwater infiltration. For stormwater design, we recommend consulting the Minnesota Stormwater Manual.

This Geotechnical Evaluation does not constitute a review of site suitability for stormwater infiltration or evaluate the potential impacts, if any, from infiltration of large amounts of stormwater.

D. Procedures

D.1. Penetration Test Borings

We drilled the penetration test borings on June 20, 2024, with an off-road-mounted core and auger drill equipped with hollow-stem auger. We performed the borings in general accordance with ASTM D6151 taking penetration test samples at 2 1/2- or 5-foot intervals in general accordance with ASTM D1586. The boring logs show the actual sample intervals and corresponding depths.

We sealed penetration test boreholes meeting the Minnesota Department of Health (MDH) Environmental Borehole criteria with an MDH-approved grout, with sealing record submitted, as required.

D.2. Exploration Logs

D.2.a. Log of Boring Sheets

The Appendix includes Log of Boring sheets for our penetration test borings. The logs identify and describe the penetrated geologic materials and present the results of penetration resistance and other in-situ tests performed. The logs also present the results of laboratory tests performed on penetration test samples, and groundwater measurements.

We inferred strata boundaries from changes in the penetration test samples and the auger cuttings. Because we did not perform continuous sampling, the strata boundary depths are only approximate. The boundary depths likely vary away from the boring locations, and the boundaries themselves may occur as gradual rather than abrupt transitions.

D.2.b. Log of Test Pit Sheets

The Appendix also includes Log of Test Pit sheets. The logs classify and describe the geologic materials exposed in the sidewalls and bottoms of the pits, present the results of laboratory tests performed on bulk samples obtained from them, and depict groundwater measurements.

D.2.c. Geologic Origins

We assigned geologic origins to the materials shown on the logs and referenced within this report, based on: (1) a review of the background information and reference documents cited above, (2) visual classification of the various geologic material samples retrieved during the course of our subsurface exploration, (3) penetration resistance and other in-situ testing performed for the project, (4) laboratory test results, and (5) available common knowledge of the geologic processes and environments that have impacted the site and surrounding area in the past.

D.3. Material Classification and Testing

D.3.a. Visual and Manual Classification

We visually and manually classified the geologic materials encountered based on ASTM D2488. When we performed laboratory classification tests, we used the results to classify the geologic materials in accordance with ASTM D2487. The Appendix includes a chart explaining the classification system we used.

D.3.b. Laboratory Testing

The exploration logs in the Appendix note the results of the laboratory tests performed on geologic material samples. We performed the tests in general accordance with ASTM procedures.

D.4. Groundwater Measurements

The drillers checked for groundwater while advancing the penetration test borings, and again after auger withdrawal. We then immediately filled the boreholes, as described in our scope in our authorized scope of work and as noted on the boring log.

E. Qualifications

E.1. Variations in Subsurface Conditions

E.1.a. Material Strata

We developed our evaluation, analyses, and recommendations from a limited amount of site and subsurface information. It is not standard engineering practice to retrieve material samples from exploration locations continuously with depth. Therefore, we must infer strata boundaries and thicknesses to some extent. Strata boundaries may also be gradual transitions, and project planning should expect the strata to vary in depth, elevation, and thickness, away from the exploration locations.

Variations in subsurface conditions present between exploration locations may not be revealed until performing additional exploration work or starting construction. If future activity for this project reveals any such variations, you should notify us so that we may reevaluate our recommendations. Such variations could increase construction costs, and we recommend including a contingency to accommodate them.

E.1.b. Groundwater Levels

We made groundwater measurements under the conditions reported herein and shown on the exploration logs and interpreted in the text of this report. Note that the observation periods were relatively short, and project planning can expect groundwater levels to fluctuate in response to rainfall, flooding, irrigation, seasonal freezing and thawing, surface drainage modifications and other seasonal and annual factors.

E.2. Continuity of Professional Responsibility

E.2.a. Plan Review

We based this report on a limited amount of information, and we made several assumptions to help us develop our recommendations. Braun Intertec should be retained to review the geotechnical aspects of the designs and specifications. This review will allow us to evaluate whether we anticipated the design correctly, if any design changes affect the validity of our recommendations, and if the design and specifications correctly interpret and implement our recommendations. Braun Intertec should also be retained to complete the soil observations and testing as the site is being graded.

E.2.b. Construction Observations and Testing

We recommend retaining Braun Intertec to perform the required observations and testing during construction as part of the ongoing geotechnical evaluation. This will allow us to correlate the subsurface conditions exposed during construction with those encountered by the borings and provide professional continuity from the design phase to the construction phase. If we do not perform observations and testing during construction, it becomes the responsibility of others to validate the assumption made during the preparation of this report and to accept the construction-related geotechnical engineer-of-record responsibilities.

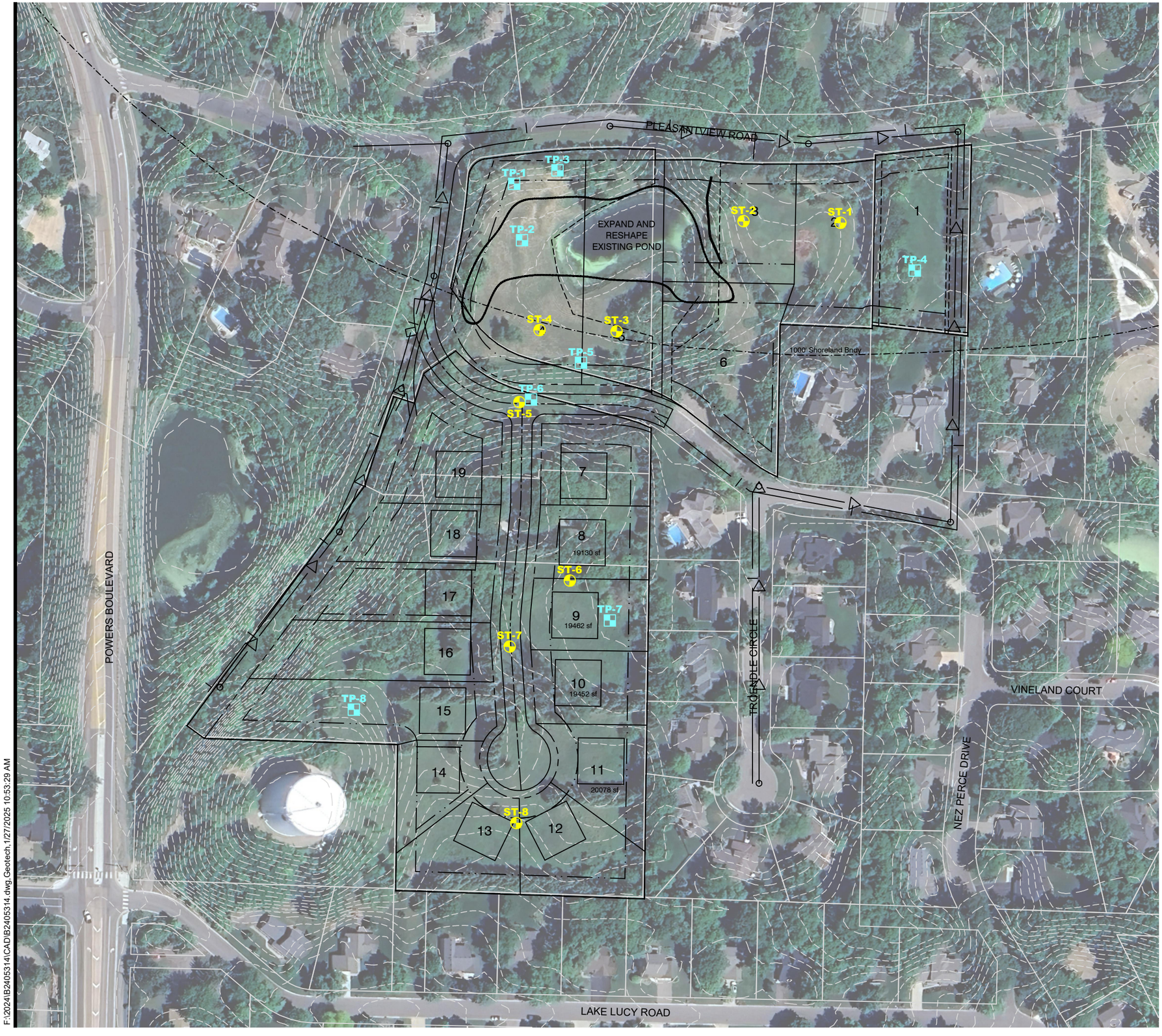
E.3. Use of Report

This report is for the exclusive use of the addressed parties. Without written approval, we assume no responsibility to other parties regarding this report. Our evaluation, analyses and recommendations may not be appropriate for other parties or projects.

E.4. Standard of Care

In performing its services, Braun Intertec used that degree of care and skill ordinarily exercised under similar circumstances by reputable members of its profession currently practicing in the same locality. No warranty, express or implied, is made.

Appendix



DENOTES APPROXIMATE LOCATION OF STANDARD PENETRATION TEST BORING

DENOTES APPROXIMATE LOCATION OF TEST PIT

75' 0 150'

SCALE: 1"= 150'

F:\2024\B2405314\CAD\B2405314.dwg,Geotech,1/27/2025 10:53:29 AM

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11001 Hampshire Avenue S
Minneapolis, MN 55438
952.995.2000
braunintertec.com

Drawing Information

Project No:	B2405314
Drawing No:	B2405314
Drawn By:	JAG
Date Drawn:	6/12/24
Checked By:	JLW
Last Modified:	1/27/25

Project Information

Pleasant View Pointe Development

6535 Peaceful Lane

Chanhassen, Minnesota

Soil Boring Location Sketch

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LOG OF BORING

See Descriptive Terminology sheet for explanation of abbreviations

Project Number B2405314
Geotechnical Evaluation
Pleasant View Pointe Development
6535 Peaceful Lane
Chanhassen, Minnesota

BORING: **ST-1**
LOCATION: Captured with RTK GPS.
DATUM: NAD 1983 HARN Adj MN Carver (US Feet)
NORTHING: 190270.2 EASTING: 557415.4
DRILLER: M Barber/C McClain LOGGED BY: J Carlson
START DATE: 06/20/24 END DATE: 06/20/24
SURFACE ELEVATION: 1008.3 ft RIG: GP-1 METHOD: 3 1/4" HSA
SURFACING: Grass WEATHER: Cloudy, 60°F

Elev./ Depth ft	Water Level	Description of Materials (Soil-ASTM D2488 or 2487; Rock-USACE EM 1110-1-2908)	Sample	Blows (N-Value) Recovery	q_p tsf	MC %	Tests or Remarks
1007.3		CLAYEY SAND (SC), trace roots, dark brown, moist (TOPSOIL)					
1.0		LEAN CLAY (CL), brownish gray, moist, soft, rust staining (ALLUVIUM)		3-1-3 (4) 18"		25	
1004.3							
4.0		CLAYEY SAND (SC), contains lenses of Poorly Graded Sand with Silt, trace Gravel, brown, moist, stiff to very stiff (GLACIAL TILL)	5	3-8-5 (13) 18"			
				3-5-6 (11) 18"			
			10	3-4-8 (12) 18"			
				5-8-12-14 (20) 16"			
993.8							
14.5		END OF BORING Boring then backfilled with bentonite chips	15				Water not observed while drilling.
			20				
			25				
			30				

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LOG OF BORING

See Descriptive Terminology sheet for explanation of abbreviations

Project Number B2405314
Geotechnical Evaluation
Pleasant View Pointe Development
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Chanhassen, Minnesota

BORING: **ST-2**
LOCATION: Captured with RTK GPS.
DATUM: NAD 1983 HARN Adj MN Carver (US Feet)
NORTHING: 190272.8 EASTING: 557267.9
DRILLER: M Barber/C McClain LOGGED BY: J Carlson START DATE: 06/20/24 END DATE: 06/20/24
SURFACE ELEVATION: 1005.8 ft RIG: GP-1 METHOD: 3 1/4" HSA SURFACING: Grass WEATHER: Cloudy, 60°F

Elev./ Depth ft	Water Level	Description of Materials (Soil-ASTM D2488 or 2487; Rock-USACE EM 1110-1-2908)	Sample	Blows (N-Value) Recovery	q_p tsf	MC %	Tests or Remarks
1005.1							
0.7		SANDY LEAN CLAY (CL), trace roots, dark brown, moist (TOPSOIL)					
		CLAYEY SAND (SC), trace Gravel, brown to grayish brown, moist, stiff, rust staining (GLACIAL TILL)		2-6-6 (12) 16"			
				4-7-7 (14) 16"		18	
				3-5-5 (10) 18"			
				3-5-8 (13) 15"			
				4-6-8-8 (14) 14"			
991.3							
14.5		END OF BORING					Water not observed while drilling.
		Boring then backfilled with bentonite chips					

5 10 15 20 25 30

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See Descriptive Terminology sheet for explanation of abbreviations

Project Number B2405314
Geotechnical Evaluation
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BORING: **ST-3**
LOCATION: Captured with RTK GPS.
DATUM: NAD 1983 HARN Adj MN Carver (US Feet)
NORTHING: 190105.1 EASTING: 557074.6
DRILLER: M Barber/C McClain LOGGED BY: J Carlson
START DATE: 06/20/24 END DATE: 06/20/24
SURFACE ELEVATION: 995.4 ft RIG: GP-1 METHOD: 3 1/4" HSA
SURFACING: Grass WEATHER: Cloudy, 60°F

Elev./ Depth ft	Water Level	Description of Materials (Soil-ASTM D2488 or 2487; Rock-USACE EM 1110-1-2908)	Sample	Blows (N-Value) Recovery	q_p tsf	MC %	Tests or Remarks
995.0		SANDY LEAN CLAY (CL), trace roots, dark brown, moist (TOPSOIL FILL)					
0.4		FILL: CLAYEY SAND (SC), brown, moist					
993.4		ORGANIC SILT (OH), trace fibers, black, moist (SWAMP DEPOSIT)		0-2-3 (5) 18"			
2.0							
991.4		CLAYEY SAND (SC), trace Gravel, trace fibers, gray and brown, moist, very soft to soft (ALLUVIUM)		0-0-0 WOH/18" 18"			
4.0			5				
				0-1-2 (3) 18"		20	
986.4							
9.0		CLAYEY SAND (SC), trace Gravel, gray and brown to gray, moist, medium to stiff (GLACIAL TILL)	10	1-3-3 (6) 18"			
				1-3-4 (7) 18"			
			15	3-5-7 (12) 18"			
975.4							
20.0		END OF BORING	20	3-5-7 (12) 18"			Water not observed while drilling.
		Boring then backfilled with bentonite chips					
			25				
			30				

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See Descriptive Terminology sheet for explanation of abbreviations

Project Number B2405314
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BORING: **ST-4**
LOCATION: Captured with RTK GPS.
DATUM: NAD 1983 HARN Adj MN Carver (US Feet)
NORTHING: 190107.0 EASTING: 556957.4
DRILLER: M Barber/C McClain LOGGED BY: J Carlson START DATE: 06/20/24 END DATE: 06/20/24
SURFACE ELEVATION: 996.2 ft RIG: GP-1 METHOD: 3 1/4" HSA SURFACING: Grass WEATHER: Cloudy, 60°F

Elev./ Depth ft	Water Level	Description of Materials (Soil-ASTM D2488 or 2487; Rock-USACE EM 1110-1-2908)	Sample	Blows (N-Value) Recovery	q_p tsf	MC %	Tests or Remarks
994.9		CLAYEY SAND (SC), trace roots, dark brown, moist (TOPSOIL)					
1.3		ORGANIC SILT (OH), trace fibers, black, moist (SWAMP DEPOSIT)		0-1-2 (3) 18"			
			5	0-3-2 (5) 18"			
990.2							
6.0		CLAYEY SAND (SC), trace Gravel, brownish gray, moist, very soft to medium (ALLUVIUM)		0-0-0 WOH/18" 16"			
			10	0-0-0 WOH/18" 18"		23	
				0-2-3 (5) 18"			
982.2							
14.0		CLAYEY SAND (SC), contains lenses of Poorly Graded Sand, trace Gravel, gray, moist, soft to stiff (GLACIAL TILL)	15	0-1-3 (4) 18"			
976.2				1-4-6 (10) 18"			
20.0		END OF BORING	20				Water not observed while drilling.
		Boring then backfilled with bentonite chips					
			25				
			30				

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See Descriptive Terminology sheet for explanation of abbreviations

Project Number B2405314
Geotechnical Evaluation
Pleasant View Pointe Development
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BORING: **ST-5**
LOCATION: Captured with RTK GPS.
DATUM: NAD 1983 HARN Adj MN Carver (US Feet)
NORTHING: 189997.3 EASTING: 556926.7
DRILLER: M Barber/C McClain LOGGED BY: J Carlson START DATE: 06/20/24 END DATE: 06/20/24
SURFACE ELEVATION: 1009.4 ft RIG: GP-1 METHOD: 3 1/4" HSA SURFACING: Weed WEATHER: Cloudy, 60°F

Elev./ Depth ft	Water Level	Description of Materials (Soil-ASTM D2488 or 2487; Rock-USACE EM 1110-1-2908)	Sample	Blows (N-Value) Recovery	q_p tsf	MC %	Tests or Remarks
1008.9							
0.5		SILTY SAND (SM), fine-grained, trace roots, dark brown, moist (TOPSOIL)					
		CLAYEY SAND (SC), contains lenses and seams of Poorly Graded Sand, trace Gravel, brown, moist, very soft to soft (ALLUVIUM)		0-2-2 (4) 18"			
			5	0-0-0 WOH/18" 18"		27	
1002.4							
7.0		CLAYEY SAND (SC), trace Gravel, brown to grayish brown, moist to wet, medium to stiff (GLACIAL TILL)		3-4-5 (9) 18"			
	▽		10	3-3-4 (7) 18"		20	
				3-4-6 (10) 18"			
			15	3-5-6 (11) 18"			
	▼						
989.4				4-5-6 (11) 18"			
20.0		END OF BORING	20				Water observed at 10.5 feet while drilling.
		Boring then backfilled with bentonite chips					Water observed at 17.5 feet at end of drilling.
			25				
			30				

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Project Number B2405314
Geotechnical Evaluation
Pleasant View Pointe Development
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Chanhassen, Minnesota

BORING: **ST-6**
LOCATION: Captured with RTK GPS.
DATUM: NAD 1983 HARN Adj MN Carver (US Feet)
NORTHING: 189725.8 EASTING: 557003.4
DRILLER: M Barber/C McClain LOGGED BY: J Carlson
START DATE: 06/20/24 END DATE: 06/20/24
SURFACE ELEVATION: 1021.2 ft RIG: GP-1 METHOD: 3 1/4" HSA
SURFACING: Grass WEATHER: Cloudy, 60°F

Elev./ Depth ft	Water Level	Description of Materials (Soil-ASTM D2488 or 2487; Rock-USACE EM 1110-1-2908)	Sample	Blows (N-Value) Recovery	q_p tsf	MC %	Tests or Remarks
~~1020.8~~ 0.4		CLAYEY SAND (SC), trace roots, dark brown, moist (TOPSOIL)					
		CLAYEY SAND (SC), contains lenses of Poorly Graded Sand, trace Gravel, brown and gray, moist, medium to stiff (GLACIAL TILL)		0-2-3 (5) 18"			
5				2-4-6 (10) 18"			
				3-4-6 (10) 18"		17	
10				4-6-10 (16) 18"			
1006.7				6-14-14 (28) 18"			
14.5		END OF BORING	15				Water not observed while drilling.
		Boring then backfilled with bentonite chips					
20							
25							
30							

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See Descriptive Terminology sheet for explanation of abbreviations

Project Number B2405314
Geotechnical Evaluation
Pleasant View Pointe Development
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Chanhassen, Minnesota

BORING: **ST-7**
LOCATION: Captured with RTK GPS.
DATUM: NAD 1983 HARN Adj MN Carver (US Feet)
NORTHING: 189625.4 EASTING: 556911.9
DRILLER: M Barber/C McClain LOGGED BY: J Carlson
START DATE: 06/20/24 END DATE: 06/20/24
SURFACE ELEVATION: 1025.6 ft RIG: GP-1 METHOD: 3 1/4" HSA
SURFACING: Grass WEATHER: Cloudy, 60°F

Elev./ Depth ft	Water Level	Description of Materials (Soil-ASTM D2488 or 2487; Rock-USACE EM 1110-1-2908)	Sample	Blows (N-Value) Recovery	q_p tsf	MC %	Tests or Remarks
1024.7		CLAYEY SAND (SC), trace roots, dark brown, moist (TOPSOIL)					
0.8		CLAYEY SAND (SC), contains lenses of Poorly Graded Sand, trace Gravel, brown and gray to brown, moist, medium to very stiff (GLACIAL TILL)		1-2-3 (5) 7"			
				0-3-4 (7) 18"		20	
				2-4-5 (9) 18"			
				1-4-5 (9) 18"			
				8-9-11-11 (20) 24"			
1011.1							
14.5		END OF BORING Boring then backfilled with bentonite chips					Water not observed while drilling.

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LOG OF BORING

See Descriptive Terminology sheet for explanation of abbreviations

Project Number B2405314
Geotechnical Evaluation
Pleasant View Pointe Development
6535 Peaceful Lane
Chanhassen, Minnesota

BORING: **ST-8**
LOCATION: Captured with RTK GPS.
DATUM: NAD 1983 HARN Adj MN Carver (US Feet)
NORTHING: 189356.8 EASTING: 556921.9
DRILLER: M Barber/C McClain LOGGED BY: J Carlson START DATE: 06/20/24 END DATE: 06/20/24
SURFACE ELEVATION: 1023.3 ft RIG: GP-1 METHOD: 3 1/4" HSA SURFACING: Grass WEATHER: Cloudy, 60°F

Elev./ Depth ft	Water Level	Description of Materials (Soil-ASTM D2488 or 2487; Rock-USACE EM 1110-1-2908)	Sample	Blows (N-Value) Recovery	q_p tsf	MC %	Tests or Remarks
1022.1		CLAYEY SAND (SC), trace roots, dark brown, moist (TOPSOIL)					
1.2		SANDY LEAN CLAY (CL), brown, moist, medium, rust staining (ALLUVIUM)		1-2-3 (5) 18"			
1019.3							
4.0		SANDY LEAN CLAY (CL), trace Gravel, brown, moist, medium to stiff (GLACIAL TILL)	5	2-2-4 (6) 18"			
				3-4-5 (9) 18"		18	
1014.3							
9.0		CLAYEY SAND (SC), trace Gravel, brown, moist, stiff to very stiff (GLACIAL TILL)	10	4-5-8 (13) 18"			
				4-7-14 (21) 18"			
1008.8							
14.5		END OF BORING	15				Water not observed while drilling.
		Boring then backfilled with bentonite chips					
			20				
			25				
			30				

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LOG OF TEST PIT

See Descriptive Terminology sheet for explanation of abbreviations

Project Number B2405314
Geotechnical Evaluation
Pleasant View Pointe Development
6535 Peaceful Lane
Chanhassen, Minnesota

TEST PIT:	**TP-1**		
LOCATION: See attached sketch			
DATUM:			
NORTHING:		EASTING:	
EXCAVATOR: Rachel Contracting	LOGGED BY: J Carlson	START DATE: 01/08/25	END DATE: 01/08/25
SURFACE ELEVATION: 1003.1 ft	RIG: Excavator	SURFACING: Topsoil	WEATHER: Sun, 10°F

Elev./ Depth ft	Water Level	Description of Materials (Soil-ASTM D2488 or 2487)	Sample	Sample Blows Recovery	q_p tsf	MC %	Tests or Remarks
1002.1		CLAYEY SAND (SC), trace roots, dark brown, frozen (moist when thawed) (TOPSOIL FILL)					Surface elevations provided by Rachel Development
1.0		FILL: CLAYEY SAND (SC), trace Gravel, brown, moist					
995.1			5				
8.0		CLAYEY SAND (SC), trace Gravel, with SILTY SAND layers, mottled brown, moist (GLACIAL TILL)					
992.1			10				
11.0		END OF TEST PIT Test pit then backfilled with spoils					Water not observed while excavating.

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LOG OF TEST PIT

See Descriptive Terminology sheet for explanation of abbreviations

Project Number B2405314
Geotechnical Evaluation
Pleasant View Pointe Development
6535 Peaceful Lane
Chanhassen, Minnesota

TEST PIT:	**TP-2**		
LOCATION: See attached sketch			
DATUM:			
NORTHING:		EASTING:	
EXCAVATOR: Rachel Contracting	LOGGED BY: J Carlson	START DATE: 01/08/25	END DATE: 01/08/25
SURFACE ELEVATION: 996.1 ft	RIG: Excavator	SURFACING: Topsol	WEATHER: Sun, 10°F

Elev./ Depth ft	Water Level	Description of Materials (Soil-ASTM D2488 or 2487)	Sample	Sample Blows Recovery	q_p tsf	MC %	Tests or Remarks
995.1		SILTY SAND (SM), trace roots, dark brown, frozen (moist when thawed) (TOPSOIL FILL)					
1.0		ORGANIC CLAY (OH), black, moist (SWAMP DEPOSIT)					
990.1			5				
6.0		LEAN CLAY (CL), gray, moist, soft (ALLUVIUM)					
983.1			10				
13.0		SANDY LEAN CLAY (CL), trace Gravel, brown, moist (GLACIAL TILL)					
981.1							Too much steam to evaluate groundwater
15.0		END OF TEST PIT					

Test pit then backfilled with spoils

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LOG OF TEST PIT

See Descriptive Terminology sheet for explanation of abbreviations

Project Number B2405314
Geotechnical Evaluation
Pleasant View Pointe Development
6535 Peaceful Lane
Chanhassen, Minnesota

TEST PIT:	**TP-3**		
LOCATION: See attached sketch			
DATUM:			
NORTHING:		EASTING:	
EXCAVATOR: Rachel Contracting	LOGGED BY: J Carlson	START DATE: 01/08/25	END DATE: 01/08/25
SURFACE ELEVATION: 1005.5 ft	RIG: Excavator	SURFACING: Topsoil	WEATHER: Sun, 10°F

Elev./ Depth ft	Water Level	Description of Materials (Soil-ASTM D2488 or 2487)	Sample	Sample Blows Recovery	q_p tsf	MC %	Tests or Remarks
1004.5		SANDY LEAN CLAY (CL), trace roots, dark brown, frozen (moist when thawed) (TOPSOIL FILL)					
1.0		FILL: SANDY LEAN CLAY (CL), trace Gravel, brown and dark brown, moist					
992.5							
13.0		SANDY LEAN CLAY (CL), trace Gravel, mottled brown, moist (GLACIAL TILL)					
991.5							
14.0		END OF TEST PIT Test pit then backfilled with spoils					Water not observed while excavating.

5

10

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LOG OF TEST PIT

See Descriptive Terminology sheet for explanation of abbreviations

Project Number B2405314
Geotechnical Evaluation
Pleasant View Pointe Development
6535 Peaceful Lane
Chanhassen, Minnesota

TEST PIT:	**TP-4**		
LOCATION: See attached sketch			
DATUM:			
NORTHING:		EASTING:	
EXCAVATOR: Rachel Contracting	LOGGED BY: J Carlson	START DATE: 01/08/25	END DATE: 01/08/25
SURFACE ELEVATION: 1018.4 ft	RIG: Excavator	SURFACING: Topsoil	WEATHER: Sun, 10°F

Elev./ Depth ft	Water Level	Description of Materials (Soil-ASTM D2488 or 2487)	Sample	Sample Blows Recovery	q_p tsf	MC %	Tests or Remarks
1016.9		SANDY LEAN CLAY (CL), trace roots, dark brown, frozen (moist when thawed) (TOPSOIL)					
1.5		SANDY LEAN CLAY (CL), trace Gravel, brown, moist (GLACIAL TILL)					
1012.4			5				
6.0		END OF TEST PIT Test pit then backfilled with spoils					Water not observed while excavating.
			10				

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LOG OF TEST PIT

See Descriptive Terminology sheet for explanation of abbreviations

Project Number B2405314
Geotechnical Evaluation
Pleasant View Pointe Development
6535 Peaceful Lane
Chanhassen, Minnesota

TEST PIT:	**TP-5**		
LOCATION: See attached sketch			
DATUM:			
NORTHING:		EASTING:	
EXCAVATOR: Rachel Contracting	LOGGED BY: J Carlson	START DATE: 01/08/25	END DATE: 01/08/25
SURFACE ELEVATION: 1001.1 ft	RIG: Excavator	SURFACING: Topsoil	WEATHER: Sun, 10°F

Elev./ Depth ft	Water Level	Description of Materials (Soil-ASTM D2488 or 2487)	Sample	Sample Blows Recovery	q_p tsf	MC %	Tests or Remarks
999.1		CLAYEY SAND (SC), trace roots, dark brown, frozen (moist when thawed) (TOPSOIL)					
2.0		CLAYEY SAND (SC), trace Gravel, brown, moist (GLACIAL TILL)					
995.1							
6.0		END OF TEST PIT Test pit then backfilled with spoils					Water not observed while excavating.

5

10

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LOG OF TEST PIT

See Descriptive Terminology sheet for explanation of abbreviations

Project Number B2405314
Geotechnical Evaluation
Pleasant View Pointe Development
6535 Peaceful Lane
Chanhassen, Minnesota

TEST PIT:	**TP-6**
LOCATION: See attached sketch	
DATUM:	
NORTHING:	EASTING:
EXCAVATOR: Rachel Contracting	LOGGED BY: J Carlson
START DATE: 01/08/25	END DATE: 01/08/25
SURFACE ELEVATION: 1009.9 ft	RIG: Excavator
SURFACING: Topsoi	WEATHER: Sun, 10°F

Elev./ Depth ft	Water Level	Description of Materials (Soil-ASTM D2488 or 2487)	Sample	Sample Blows Recovery	q_p tsf	MC %	Tests or Remarks
1009.4		CLAYEY SAND (SC), trace roots, dark brown, frozen (moist when thawed) (TOPSOIL FILL)					
0.5		FILL: CLAYEY SAND (SC), trace Gravel, dark brown, moist					
1006.9							
3.0		CLAYEY SAND (SC), trace Gravel, brown, moist (GLACIAL TILL)					
			5				
1001.9							
8.0		END OF TEST PIT					Water not observed while excavating.
		Test pit then backfilled with spoils					
			10				

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LOG OF TEST PIT

See Descriptive Terminology sheet for explanation of abbreviations

Project Number B2405314
Geotechnical Evaluation
Pleasant View Pointe Development
6535 Peaceful Lane
Chanhassen, Minnesota

TEST PIT:	**TP-7**		
LOCATION: See attached sketch			
DATUM:			
NORTHING:		EASTING:	
EXCAVATOR: Rachel Contracting	LOGGED BY: J Carlson	START DATE: 01/08/25	END DATE: 01/08/25
SURFACE ELEVATION: 1019.4 ft	RIG: Excavator	SURFACING: Topsoil	WEATHER: Sun, 10°F

Elev./ Depth ft	Water Level	Description of Materials (Soil-ASTM D2488 or 2487)	Sample	Sample Blows Recovery	q_p tsf	MC %	Tests or Remarks
		CLAYEY SAND (SC), trace roots, dark brown, frozen (moist when thawed) (TOPSOIL FILL)					
1015.4							
4.0		CLAYEY SAND (SC), trace Gravel, brown, moist (GLACIAL TILL)					
			5				
1013.4							
6.0		END OF TEST PIT					Water not observed while excavating.
		Test pit then backfilled with spoils					
			10				

BRAUN INTERTEC
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LOG OF TEST PIT

See Descriptive Terminology sheet for explanation of abbreviations

Project Number B2405314
Geotechnical Evaluation
Pleasant View Pointe Development
6535 Peaceful Lane
Chanhassen, Minnesota

TEST PIT:	**TP-8**
LOCATION: See attached sketch	
DATUM:	
NORTHING:	EASTING:
EXCAVATOR: Rachel Contracting	LOGGED BY: J Carlson
START DATE: 01/08/25	END DATE: 01/08/25
SURFACE ELEVATION: 1040.6 ft	RIG: Excavator
SURFACING: Topsoil	WEATHER: Sun, 10°F

Elev./ Depth ft	Water Level	Description of Materials (Soil-ASTM D2488 or 2487)	Sample	Sample Blows Recovery	q_p tsf	MC %	Tests or Remarks
1040.1		CLAYEY SAND (SC), trace roots, dark brown, frozen (moist when thawed) (TOPSOIL)					
0.5		CLAYEY SAND (SC), trace Gravel, brown, moist (GLACIAL TILL)					
1035.6			5				
5.0		END OF TEST PIT Test pit then backfilled with spoils					Water not observed while excavating.
			10				

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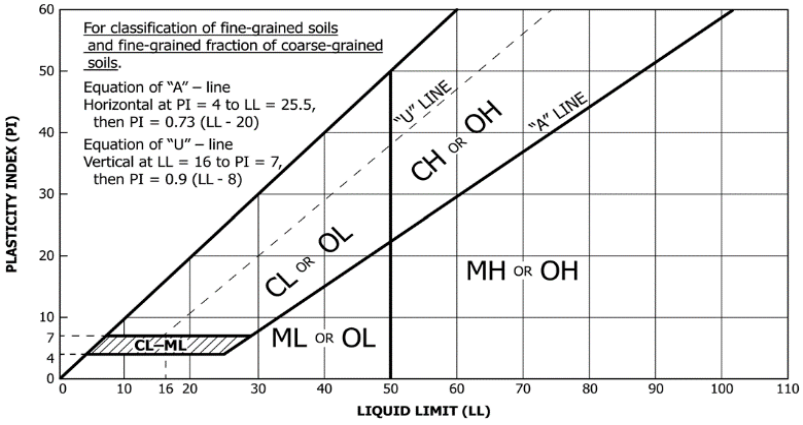
Descriptive Terminology of Soil

Based on Standards ASTM D2487/2488
(Unified Soil Classification System)

Criteria for Assigning Group Symbols and Group Names Using Laboratory Tests[A]				Soil Classification	
				Group Symbol	Group Name[B]
Coarse-grained Soils (more than 50% retained on No. 200 sieve)	Gravels (More than 50% of coarse fraction retained on No. 4 sieve)	Clean Gravels (Less than 5% fines[C])	$C_u \geq 4$ and $1 \leq C_c \leq 3^D$	GW	Well-graded gravel[E]
			$C_u < 4$ and/or ($C_c < 1$ or $C_c > 3$)[D]	GP	Poorly graded gravel[E]
		Gravels with Fines (More than 12% fines[C])	Fines classify as ML or MH	GM	Silty gravel[E F G]
			Fines Classify as CL or CH	GC	Clayey gravel[E F G]
	Sands (50% or more coarse fraction passes No. 4 sieve)	Clean Sands (Less than 5% fines[H])	$C_u \geq 6$ and $1 \leq C_c \leq 3^D$	SW	Well-graded sand[I]
			$C_u < 6$ and/or ($C_c < 1$ or $C_c > 3$)[D]	SP	Poorly graded sand[I]
		Sands with Fines (More than 12% fines[H])	Fines classify as ML or MH	SM	Silty sand[F G I]
			Fines classify as CL or CH	SC	Clayey sand[F G I]
Fine-grained Soils (50% or more passes the No. 200 sieve)	Silts and Clays (Liquid limit less than 50)	Inorganic	PI > 7 and plots on or above "A" line[J]	CL	Lean clay[K L M]
			PI < 4 or plots below "A" line[J]	ML	Silt[K L M]
		Organic	Liquid Limit – oven dried / Liquid Limit – not dried <0.75	OL	Organic clay[K L M N] / Organic silt[K L M O]
	Silts and Clays (Liquid limit 50 or more)	Inorganic	PI plots on or above "A" line	CH	Fat clay[K L M]
			PI plots below "A" line	MH	Elastic silt[K L M]
		Organic	Liquid Limit – oven dried / Liquid Limit – not dried <0.75	OH	Organic clay[K L M P] / Organic silt[K L M Q]
Highly Organic Soils		Primarily organic matter, dark in color, and organic odor		PT	Peat

A. Based on the material passing the 3-inch (75-mm) sieve.
B. If field sample contained cobbles or boulders, or both, add "with cobbles or boulders, or both" to group name.
C. Gravels with 5 to 12% fines require dual symbols:
   GW-GM well-graded gravel with silt
   GW-GC well-graded gravel with clay
   GP-GM poorly graded gravel with silt
   GP-GC poorly graded gravel with clay
D. $C_u = D_{60} / D_{10}$ $C_c = (D_{30})^2 / (D_{10} \times D_{60})$
E. If soil contains ≥ 15% sand, add "with sand" to group name.
F. If fines classify as CL-ML, use dual symbol GC-GM or SC-SM.
G. If fines are organic, add "with organic fines" to group name.
H. Sands with 5 to 12% fines require dual symbols:
   SW-SM well-graded sand with silt
   SW-SC well-graded sand with clay
   SP-SM poorly graded sand with silt
   SP-SC poorly graded sand with clay
I. If soil contains ≥ 15% gravel, add "with gravel" to group name.
J. If Atterberg limits plot in hatched area, soil is CL-ML, silty clay.
K. If soil contains 15 to < 30% plus No. 200, add "with sand" or "with gravel", whichever is predominant.
L. If soil contains ≥ 30% plus No. 200, predominantly sand, add "sandy" to group name.
M. If soil contains ≥ 30% plus No. 200 predominantly gravel, add "gravelly" to group name.
N. PI ≥ 4 and plots on or above "A" line.
O. PI < 4 or plots below "A" line.
P. PI plots on or above "A" line.
Q. PI plots below "A" line.



Laboratory Tests

DD	Dry density, pcf	**q_p**	Pocket penetrometer strength, tsf
WD	Wet density, pcf	**q_U**	Unconfined compression test, tsf
P200	% Passing #200 sieve	**LL**	Liquid limit
MC	Moisture content, %	**PL**	Plastic limit
OC	Organic content, %	**PI**	Plasticity index

Particle Size Identification

Boulders..... over 12"
Cobbles..... 3" to 12"
Gravel
  Coarse..... 3/4" to 3" (19.00 mm to 75.00 mm)
  Fine..... No. 4 to 3/4" (4.75 mm to 19.00 mm)
Sand
  Coarse..... No. 10 to No. 4 (2.00 mm to 4.75 mm)
  Medium..... No. 40 to No. 10 (0.425 mm to 2.00 mm)
  Fine..... No. 200 to No. 40 (0.075 mm to 0.425 mm)
Silt..... No. 200 (0.075 mm) to .005 mm
Clay..... < .005 mm

Relative Proportions[L, M]

trace..... 0 to 5%
little..... 6 to 14%
with..... ≥ 15%

Inclusion Thicknesses

lens..... 0 to 1/8"
seam..... 1/8" to 1"
layer..... over 1"

Apparent Relative Density of Cohesionless Soils

Very loose ..... 0 to 4 BPF
Loose ..... 5 to 10 BPF
Medium dense..... 11 to 30 BPF
Dense..... 31 to 50 BPF
Very dense..... over 50 BPF

Consistency of Cohesive Soils	Blows Per Foot	Approximate Unconfined Compressive Strength
Very soft	0 to 1 BPF	< 0.25 tsf
Soft	2 to 4 BPF	0.25 to 0.5 tsf
Medium	5 to 8 BPF	0.5 to 1 tsf
Stiff	9 to 15 BPF	1 to 2 tsf
Very Stiff	16 to 30 BPF	2 to 4 tsf
Hard	over 30 BPF	> 4 tsf

Moisture Content:

Dry: Absence of moisture, dusty, dry to the touch.
Moist: Damp but no visible water.
Wet: Visible free water, usually soil is below water table.

Drilling Notes:

Blows/N-value: Blows indicate the driving resistance recorded for each 6-inch interval. The reported N-value is the blows per foot recorded by summing the second and third interval in accordance with the Standard Penetration Test, ASTM D1586.

Partial Penetration: If the sampler could not be driven through a full 6-inch interval, the number of blows for that partial penetration is shown as #/x" (i.e. 50/2"). The N-value is reported as "REF" indicating refusal.

Recovery: Indicates the inches of sample recovered from the sampled interval. For a standard penetration test, full recovery is 18", and is 24" for a thinwall/shelby tube sample.

WOH: Indicates the sampler penetrated soil under weight of hammer and rods alone; driving not required.

WOR: Indicates the sampler penetrated soil under weight of rods alone; hammer weight and driving not required.

Water Level: Indicates the water level measured by the drillers either while drilling (▽), at the end of drilling (▼), or at some time after drilling (▼).

Sample Symbols

Standard Penetration Test
Modified California (MC)
Auger
Grab Sample
Rock Core
Thinwall (TW)/Shelby Tube (SH)
Texas Cone Penetrometer
Dynamic Cone Penetrometer