STORMWATER MANAGEMENT, GROUNDWATER RECHARGE AND WATER QUALITY ANALYSIS

For

Odin Pharmaceuticals, LLC

300 Franklin Square Drive
Franklin, NJ 08873

Proposed Building Expansion

300 Franklin Square Drive
Block 502.02, Lot 39.05
Township of Franklin, Somerset County, NJ

Prepared by:

DYNAMIC ENGINEERING

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TABLE OF CONTENTS

		Page No.
	Executive Summary	1
I.	Introduction	1
II.	Existing Site Conditions	2
III.	Proposed Site Conditions	3
IV.	Design Methodology	4
V.	Runoff Rate Reduction Performance	6
VI.	Underground Detention Basin	7
VII.	Aboveground Bioretention Basin	7
VIII.	Water Quality	7
IX.	Groundwater Recharge	8
X.	Conclusion	9

APPENDIX

- Runoff Curve Number (CN) Calculations – Existing
- Runoff Curve Number (CN) Calculations – Proposed
- Time of Concentration (Tc) Calculations
- Hydrograph Summary Reports – Existing and Proposed Conditions 2 yr. 10 yr. & 100 yr.
- Hydrograph Summary Reports – Water Quality Storm
- Underground Detention Basin Schematic
- Extended Detention Basin TSS Removal Rate Calculations
- TSS Removal Rate for BMPs in Series
- Stormwater Collection System Calculations (Pipe Sizing)
- NJDEP 80% TSS Removal Certification for the Contech Peak Diversion Stormfilter MTDs
- NSPS Spreadsheet
- NJDEP Geoweb Metropolitan Planning Area
- Soil Test Results (By Dynamic Earth, LLC)
- Drainage Area Maps

EXECUTIVE SUMMARY

SITE DESCRIPTION

The project area is comprised of Lot 39.05, Block 502.02 in the Township of Franklin in Somerset County, New Jersey. The property is located at the intersection of Davidson Avenue and Franklin Square Drive. The subject parcel consists of an existing mixed-use warehouse, manufacturing and office building. The site presently contains 128,895 SF (2.96 AC.) of impervious coverage. Stormwater runoff from the existing development primarily drains via overland flow and the existing stormwater infrastructure to a manhole located at the southwest corner of the property.

The existing conditions of the tract have been verified by the Boundary and Topographic Survey, as prepared by Dynamic Survey, LLC, dated 05/10/2018, last revised 05/29/2018.

PROJECT DESCRIPTION

The proposed development includes the expansion of the existing mixed-use building with associated roadways, utilities, lighting, and other site improvements. The proposed development will result in a total amount of impervious coverage of 183,562 SF (4.21 AC). Please note the proposed improvements include and expand upon the previously approved building addition scope; existing conditions will be considered the site prior to the building addition approval. The total disturbance area is 3.58 AC. The project includes new stormwater management facilities to address applicable aspects of the Township of Franklin Ordinance and NJAC 7:8.

I. INTRODUCTION

This report has been prepared to define and analyze the stormwater drainage conditions that would occur as a result of the redevelopment of Lot 39.05, Block 502.02 in the Township of Franklin in Somerset County, New Jersey. The proposed development includes the expansion of a mixed warehouse, manufacturing and office use.

This Stormwater Management Study identifies and describes the manner by which the design and performance measures set forth by NJAC 7:8 and the Township of Franklin Ordinance are achieved to minimize the adverse impact of stormwater runoff quantity and quality in receiving water bodies and groundwater recharge into subsurface soils. The scope of the study includes the structures, associated driveways and roadways, landscaping, stormwater collection system, underground detention basin,

aboveground bioretention basin, and other associated improvements as shown on the accompanying engineering drawings.

Based upon the scope of the project, the development is classified as a major development as it disturbs more than one (1) acre of land and increases the amount of impervious coverage onsite by more than ¼ acre; therefore, the project has been designed to meet the groundwater recharge, stormwater runoff quantity and quality standards set forth under NJAC 7:8. Accordingly, the following items are addressed within this report:

- Non-structural stormwater management strategies (7:8-5.3)
- Erosion control, groundwater recharge and runoff quantity standards (7:8-5.4)
- Stormwater runoff quality standards (7:8-5.5)
- Calculation of stormwater runoff (7:8-5.6)
- Standards for structural stormwater management measures (7:8-5.7)

A hydrological evaluation is provided for the 2-, 10- and 100-year storm events utilizing the Urban Hydrology for Small Watershed TR-55 method. The TR-55 method is utilized to design the proposed underground detention basin facility.

The NJDEP flow reduction requirements are as follows:

2-year:	50% reduction
10-year:	25% reduction
100-year:	20% reduction

It is also the intention of the design of this facility to comply with the Stormwater Management Best Management Practices.

II. EXISTING SITE CONDITIONS

The existing lot contains a mix of pervious and impervious surfaces including structures, driveways, sidewalks, landscaping and other site amenities.

The existing conditions of the tract have been verified by the Boundary and Topographic Survey, as prepared by Dynamic Survey, LLC, dated 05/10/2018, last revised 05/29/2018. This information has been utilized to establish an Existing Conditions Drainage Area Map which is included within the Appendix of this Report.

The tract has been evaluated with the following existing drainage sub-watershed areas:

Study Area Davidson Avenue: This portion of the tract consists of a small pervious area in the southeastern corner of the site. The stormwater runoff from this study area currently drains to Davidson Avenue and the existing infrastructure within the Right-of-Way.

Study Area Lot 42.01: This portion of the tract consists of a small pervious area along the western property line. The stormwater runoff from this study area currently drains to existing infrastructure on Lot 42.01.

Study Area Site: This portion of the tract consists of much of Lot 39.05. It includes the vast majority of green space on the site as well as all of the pavement area. The stormwater runoff from this study area currently drains via overland flow to the existing stormwater infrastructure that is either within the site limits or just outside of the property boundaries. This runoff is ultimately tributary to an existing storm manhole in the southwestern corner of the site.

Study Area Roof: This portion of the tract consists of the roof runoff from the existing mixed use building. Runoff from this study area is also ultimately tributary to the existing storm manhole in the southwestern corner of the site. Therefore, it will be combined with "Study Area Site" when comparing pre vs. post development storm events onsite.

Based on Somerset County soils survey information and infiltration tests conducted onsite by Dynamic Earth, LLC, the soil types native to the site include:

SOMERSET COUNTY SOIL SURVEY INFORMATION		
SOIL TYPE (SYMBOL)	**SOIL TYPE (NAME)**	**HYDROLOGIC SOIL GROUP**
PenB	Penn Silt Loam, 2 to 6% slopes	C
RehA	Reaville Silt Loam, 0 to 2% slopes	C

III. PROPOSED SITE CONDITIONS

The proposed development includes a 12,000 SF (first-floor footprint) building addition to the existing mixed use building. Additional site improvements include new asphalt parking and drive aisle areas, associated landscaping, lighting and stormwater management facilities.

The tract has been evaluated with the following drainage sub-watershed areas as depicted on the Proposed Conditions Drainage Area Map:

Study Area Davidson Avenue: This portion of the tract consists of a small pervious area in the southwestern corner of the site. The stormwater runoff from this study area drains to Davidson Avenue and the existing infrastructure within the Right-of-Way.

Study Area Lot 42.01: This portion of the tract consists of a small pervious area along the western property line. The stormwater runoff from this study area currently drains to existing infrastructure on Lot 42.01.

Study Area Site: This portion of the tract includes a majority of the site, including the parking lot as well as a mix of impervious and pervious surfaces. The stormwater runoff from this study area drains via overland flow into the existing and proposed stormwater infrastructure onsite. This runoff is ultimately tributary to an existing storm manhole in the southwestern corner of the site.

Study Area Site Undetained: This portion of the tract includes much of the pervious area in the southern and eastern portions of the site, as well as portions of the site driveways. The stormwater runoff from this study area drains via overland flow or into the proposed stormwater management pipe network into the existing stormwater infrastructure within Franklin Square Drive or along the rear of the property. This runoff is ultimately tributary to the existing storm manhole in the southwestern corner of the site and, therefore, will be combined with "Study Area Site" when comparing pre vs. post development storm events onsite.

Study Area Roof: This portion of the tract consists of the roof runoff from the existing mixed use building and proposed addition. Runoff from this study area is ultimately tributary to the existing storm manhole in the southwestern corner of the site. Therefore, it will be combined with "Study Area Site" when comparing pre vs. post development storm events onsite.

IV. DESIGN METHODOLOGY

In order to prepare the stormwater management, water quality and groundwater recharge design for the subject project, an investigation of the property and topography was performed. On-site review of the tract was initially performed by Dynamic Engineering Consultants, PC to verify existing site conditions and land cover characteristics. Dynamic Survey, LLC, was contracted to prepare a Boundary and Topographic survey for the existing site.

Furthermore, Dynamic Earth, LLC performed test pits within the site to establish the seasonal high water table.

Based on our review of the existing site conditions and survey, the drainage area maps for the existing site conditions as defined within this report were established. A grading plan was developed for the proposed site improvements with consideration to the existing drainage patterns. The plan was designed to ensure that runoff from the proposed development could be directed to stormwater management facilities in order to address the applicable sections of NJAC 7:8 and the Township Ordinance.

Stormwater runoff from the majority of the proposed development is collected by the proposed on-site stormwater collection system and routed to the proposed underground detention basin or aboveground bioretention basin. Stormwater runoff from the previously approved building addition and existing roof is routed through the roof leader conveyance system and bypasses the proposed detention system. However, the new proposed building addition roof runoff is routed directly to the underground detention basin; bypassing

the Contech Peak Diversion Stormfilters. The detention basin is tributary to the existing stormwater manhole in the southwestern corner of the property. The underground detention basin has been designed to detain and release stormwater runoff at a controlled rate via the outlet control structure in order to meet the runoff quantity reduction standards set forth by NJAC 7:8-5.4 and the Township of Franklin Land Use Ordinance. Before entering the underground basin, the newly constructed and existing resurfaced asphalt parking area onsite is treated by one of the two Contech Peak Diversion Stormfilters to meet runoff quality standards set forth by NJAC 7:8-5.5. Stormwater runoff from the new parking area proposed to the north of the building is to be conveyed to the aboveground bioretention along the Franklin Square right-of-way. The bioretention basin is designed to detain the water quality design storm runoff and outlet exclusively via an underdrain to meet runoff quality standards set forth by NJAC 7:8-5.5. The stormwater runoff from the underground detention basin and aboveground bioretention basin stormwater are also tributary to the existing stormwater manhole in the southwestern corner of the property.

The Stormwater Management standards in NJAC 7:8-5.5 require stormwater management measures that are designed to reduce the post-construction load of TSS in stormwater generated from the NJDEP water quality storm by 80% of the anticipated load from the developed site for sites that increase the amount of impervious coverage by one-quarter (0.25) acre. The proposed development increases impervious coverage by 54,667 SF (1.25 Ac); therefore, the proposed stormwater system has been designed to treat the stormwater runoff generated by the NJDEP Water Quality Design Storm by utilizing a Contech Peak Diversion Stormfilter. The NJDEP Water Quality Storm is defined as a 1.25 inch, 2-hour variable rate rainfall event.

Dynamic Earth, LLC was contracted to perform stormwater management test pits in order to confirm the infiltration capabilities of the subsurface soils onsite. A copy of their findings can be found appended to this report. Two (2) basin flood tests were performed in the area of the proposed detention basin to confirm whether or not infiltration could be utilized in this basin area. One of the test pits did not drain within 24 hours and the other pit provided an infiltration rate of 0.5 in/hr. Per the New Jersey BMP Manual, neither of these tests yielded results that would allow for infiltration at the proposed detention basin.

The overall stormwater management design for the subject tract has been prepared by Dynamic Engineering Consultants to ensure that the overall development satisfies the standards set forth in the Township of Franklin Ordinance, and NJAC 7:8.

V. RUNOFF RATE REDUCTION PERFORMANCE

Pre-Development and Post Development Peak Runoff Results
Summary – Overall Site

DESIGN STORM	EX. UNDISTURBED PEAK FLOW (CFS)	EX. DISTURBED PEAK FLOW (CFS)	REDUCTION (%)	REDUCED DISTURBED PEAK FLOW ALLOWABLE (CFS)	TOTAL ALLOWABLE PEAK FLOW (CFS)	TOTAL PROPOSED PEAK FLOW (CFS)
2	4.693	5.706	50	2.853	7.546	7.542
10	7.401	10.13	25	7.598	14.999	14.990
100	12.69	19.16	20	15.328	28.018	27.920

Pre-Development and Post Development Peak Runoff Results
Summary- Davidson Avenue

Design Storm	EXISTING RUNOFF RATE (CFS)	PROPOSED RUNOFF RATE (CFS)	REDUCTION IN RUNOFF RATE (CFS)
2 Year	0.071	0.071	0
10 Year	0.155	0.155	0
100 Year	0.334	0.334	0

Pre-Development and Post Development Peak Runoff Results
Summary – Site

	EXISTING RUNOFF RATE (CFS)	PROPOSED RUNOFF RATE (CFS)	REDUCTION IN RUNOFF RATE (CFS)
2 Year	10.15	7.430	2.72
10 Year	16.98	14.720	2.26
100 Year	30.65	27.430	3.22

Pre-Development and Post Development Peak Runoff Results
Summary – Lot 42.01

	EXISTING RUNOFF RATE AREAS (CFS)	PROPOSED RUNOFF RATE (CFS)	REDUCTION IN RUNOFF RATE (CFS)
2 Year	0.183	0.051	0.132
10 Year	0.399	0.111	0.288
100 Year	0.858	0.238	0.62

VI. UNDERGROUND DETENTION BASIN

As previously stated within this report, the stormwater management design utilizes an underground detention basin and a proposed underground conveyance pipe system to satisfy the stormwater quantity and quality regulations set forth by the Township of Franklin Land Development Ordinance and the NJDEP. Stormwater runoff from the proposed underground detention basin will be released at a controlled rate through an outlet control structure in order to satisfy the stormwater runoff quantity regulations. Stormwater runoff from the basin will ultimately be discharged to the existing stormwater conveyance system in the southwest corner of the site.

VII. ABOVEGROUND BIORETENTION BASIN

As previously stated within this report, the stormwater management design utilizes an aboveground detention basin and a proposed underground conveyance pipe system to satisfy the stormwater quantity and quality regulations set forth by the Township of Franklin Land Development Ordinance and the NJDEP. The aboveground bioretention basin is capable of detaining the entire water quality design storm volume, as is required by the New Jersey Best Management Practices for small scale bioretention basins. Underdrains are proposed below the basin to route any excess runoff through the proposed outlet control structure. All storm runoff greater than the water quality storm peak elevation will be released at a controlled rate through an outlet control structure in order to satisfy the stormwater runoff quantity regulations. Stormwater runoff from the basin will ultimately be discharged to the existing stormwater conveyance system in the southwest corner of the site.

VIII. WATER QUALITY

The TSS removal rate requirement set forth by the Township of Franklin Land Use Ordinance and NJAC 7:45 is 80% for new/reconstructed pavement and 0% for areas that are milled and overlaid to the previously existing grade. Roof runoff that is collected is considered "clean" and does not require any TSS removal.

There is 91,287 SF of new and reconstructed impervious coverage proposed onsite (including banked parking areas). Therefore, the equivalent of 80% TSS removal must be provided for this area of the site.

The stormwater management design for the project satisfies the water quality requirement by utilizing two (2) Contech Peak Diversion Stormfilter manufactured treatment device and an extended detention basin certified to provide a TSS removal rate of 40.00%.

To provide a weighted calculation of the required TSS removal rate for both treated and untreated areas for the total site, the underground detention basin has been designed to use the combined treatment train of extended detention and a water quality treatment unit that has been approved by the NJDEP to achieve 80% TSS removal. The proposed detention basin has been designed for a TSS removal rate of 40.00%. The combined TSS removal rate for stormwater tributary to treatment train from both underground basin detention time and the Contech Stormfilter manufactured treatment devices is 88.0%. The bioretention basin functions completely independent of the Stormfilter and extended detention system, and therefor has a separate TSS removal rate of 80% when constructed in accordance with the NJDEP BMP. There is 4,744 SF of new impervious driveway area that will not be collected and treated by the basin, therefore providing 0% TSS removal rate. The clean runoff from the proposed roof area will also be routed to the proposed underground basin, where it will receive the additional benefit of TSS removal due to extended detention. For the purposes of this exercise, that runoff will not be included in the tabulation for required TSS removal. The weighted average for proposed TSS removal proposed is calculated below:

Treated Runoff by MTD & Extended Detention = 77,400 SF
Treated Runoff by Bioretention Basin = 9,143 SF
Untreated Runoff = 4,744 SF

$$Provided\ TSS\ REmoval\ Rate = \frac{(77{,}400\ SF \times 88.0\%)+(9{,}143\ SF \times 80\%)+(4{,}744\ SF \times 0\%)}{91{,}287\ SF} = 82.63\%$$

Since the provided TSS removal rate (82.63%) is greater than the required rate (80%), the TSS obligation onsite has been met. Calculations of both the detention time TSS removal rate as well as the NJDEP Certification Letter and sizing requirements for the Stormfilter MTD have been provided within the appendix of this report.

IX. GROUNDWATER RECHARGE

As was mentioned previously, two (2) basin flood tests were conducted in accordance with the NJ BMP manual in the area of the proposed detention basin due to the fact that bedrock was encountered between 6

and 8 feet below existing ground surface. The results yielded data that did not support infiltration as only one test pit drained within 24 hours. The infiltration rate that can be applied to the drained test pit is 0.5 in/hour. Previous field explorations in other areas of the site have yielded very similar subsurface makeups, with refusal of testing equipment between 6 and 8 feet below surface elevation. It is assumed that this condition exists in all areas of the site, including pervious areas that are being paved over as part of this proposed development. Thus, the groundwater recharge requirement does not apply.

X. CONCLUSION

The proposed development has been designed with provisions for the safe and efficient control of stormwater runoff in a manner that will not adversely impact the existing drainage patterns, adjacent roadways, or adjacent parcels. The proposed drainage design complies with the requirements outlined in the Township of Franklin Ordinance and NJAC 7:8. With this stated, it is evident the proposed development will not have a negative impact on the existing drainage patterns, stormwater runoff quantity, water quality or groundwater recharge on-site or within the vicinity of the subject parcel.

APPENDIX

RUNOFF CURVE NUMBER (CN) CALCULATIONS
EXISTING

DYNAMIC ENGINEERING

EXISTING DRAINAGE AREA SUMMARY AND AVERAGE CURVE NUMBER(CN) CALCULATIONS

Project: Odin Pharmaceuticals, LLC
Job #: 2137-99-001
Location: Franklin Township, NJ

Computed By: MJS
Checked By: MJB
Date: 12/01/2022

Drainage Area	Impervious Area (acre)	Impervious Area (sf)	Curve Number (CN) Used	HSG C - Open Space Area (acre)	HSG C - Open Space Area (sf)	Curve Number (CN) Used	Total Area (acres)	TC (Min.)
Ex DA Davidson Avenue Undisturbed	0.00	-	98	0.06	2,483	74	0.06	10
Ex DA Davidson Avenue Disturbed	0.00	-	98	0.01	532	74	0.01	10
Ex DA Lot 42.01 Undisturbed	0.00	-	98	0.02	821	74	0.02	10
Ex DA Lot 42.01 Disturbed	0.00	-	98	0.16	7,134	74	0.16	10
Ex DA Site Undisturbed	0.44	19,151	98	0.38	16,480	74	0.82	11
Ex DA Site Disturbed	1.34	58,361	98	2.05	89,367	74	3.39	10
Ex DA Roof	1.20	52,475	98	0.00	-	74	1.20	10
Total	**2.98**	**129,987**		**2.68**	**116,817**		**5.67**	

Per County Soil Survey -	PenB	HSG	C	Soil	Penn Sitl Loam, 2-6% Slopes
Per County Soil Survey -	RehA	HSG	C	Soil	Reaville Silt Loam, 0-2% Slopes

Description	Runoff Curve Number (CN) (HSG C)
Impervious Surface	98
Open Space (lawn) (good)	74

RUNOFF CURVE NUMBER (CN) CALCULATIONS
PROPOSED

DYNAMIC ENGINEERING

PROPOSED DRAINAGE AREA SUMMARY AND AVERAGE CURVE NUMBER(CN) CALCULATIONS

Project: Odin Pharmaceuticals, LLC
Job #: 2137-99-001
Location: Franklin Township, NJ

Computed By: MJS
Checked By: MJB
Date: 12/01/2022

Drainage Area	Impervious Area (acre)	Impervious Area (sf)	Curve Number (CN) Used	HSG C - Open Space Area (acre)	HSG C - Open Space Area (sf)	Curve Number (CN) Used	Total Area (acres)	TC (Min.)
Prop DA Lot Lot 42.01	0.00	-	98	0.05	2,347	74	0.05	10
Prop DA Davidson Avenue	0.00	-	98	0.07	3,183	74	0.07	10
Proposed DA Roof	1.78	77,484	98	0.00	-	74	1.78	10
Proposed DA Detained Roof	0.28	12,000	98	0.00	-	74	0.28	10
Proposed DA Basin	1.73	75,355	98	0.23	10,070	74	1.96	10
Proposed DA Bioretention	0.26	11,152	98	0.20	8,573	74	0.45	10
Proposed DA Undetained	0.17	7,225	98	0.90	39,415	74	1.07	14
Total	**4.21**	**183,216**		**1.46**	**63,588**		**5.67**	

Per County Soil Survey -	PenB	HSG	C	Soil	Penn Sitl Loam, 2-6% Slopes
Per County Soil Survey -	RehA	HSG	C	Soil	Reaville Silt Loam, 0-2% Slopes

Description	Runoff Curve Number (CN)
Impervious Surface	98
Open Space (lawn) (good)	74

TIME OF CONCENTRATION (Tc) CALCULATIONS

DYNAMIC ENGINEERING

1904 Main Street, Lake Como, NJ 07719
(732) 974-0198

Date: 5/3/2022
Project: Somerset Therapeutics
Project No: 2137-99-001

Calculated By: MJS
Checked By: KO

Worksheet 3: Time of Concentration (T_c) Calculations

Land Condition: Proposed
Drainage Area: xisting Infrastructure

- ***Sheet Flow*:**

	AB							
1. Surface Description	Short Grass, Prairie							
2. Manning's Roughness Coefficient, n	0.15							
3. Flow Length, L { total $L \le 150$ ft }	42.0 ft							
4. Two-Year 24-hour Rainfall, p_2 for . . Somerset County	3.34 in	3.34 in		3.34 in				
5. Land Slope, s (ft/ft)	0.050 ft/ft							
6. Travel Time, $T_t = \frac{0.007\,(n\,L)^{0.8}}{p_2^{0.5}\,s^{0.4}}$	0.055 hr	+	0.000 hr	+	0.000 hr	=	0.055 hr	

- ***Shallow Concentrated Flow*:**

7. Surface Description								
8. Flow Length, L								
9. Watercourse Slope, s								
10. Average velocity, V { see Figure 3.1)								
11. Travel Time, $T_t = \frac{L}{3600\,V}$	0.000 hr	+	0.000 hr	+	0.000 hr	=	0.000 hr	

- ***Channel Flow*:**

	BC	CD	DE
12. Pipe Diameter, D	15 in	15 in	36 in
13. Cross-Sectional Flow Area, A	1.227 sf	1.227 sf	7.069 sf
14. Wetted Perimeter, p_w	3.9 ft	3.9 ft	9.4 ft
15. Hydraulic Radius, $r = A / p_w$	0.3 ft	0.3 ft	0.8 ft
16. Channel Slope, s	0.005 ft/ft	0.010 ft/ft	0.008 ft/ft
17. Pipe Material	PVC	RCP	RCP
18. Manning's Roughness Coefficient, n	0.010	0.013	0.013
19. Velocity, $V = \frac{1.49\,r^{2/3}\,s^{1/2}}{n}$	4.85 ft/s	5.28 ft/s	8.46 ft/s
20. Flow Length, L	333.0	340.0	640.0

21. Travel Time, $T_t = \frac{L}{3600\,V}$	0.019 hr	+	0.018 hr	+	0.021 hr	=	0.058 hr	
22. Watershed or subarea Time of Concentration, T_c { add T_t in steps 6, 11 and 21 }							0.113 hr	
							6.8 min	

HYDROGRAPH SUMMARY REPORTS
EXISTING AND PROPOSED CONDITIONS
2YR, 10YR & 100YR STORMS

Hydraflow Table of Contents

Watershed Model Schematic **1**

Hydrograph Return Period Recap **2**

2 - Year

Summary Report **4**
Hydrograph Reports **6**
Hydrograph No. 1, SCS Runoff, Ex DA Lot 42.01 Undisturbed (Perv) 6
Precipitation Report 7
Hydrograph No. 2, SCS Runoff, Ex DA Lot 42.01 Disturbed (Perv) 8
Precipitation Report 9
Hydrograph No. 3, Combine, Ex DA Lot 42.01 Total 10
Hydrograph No. 5, SCS Runoff, Ex. DA Davidson Undisturbed (Perv) 11
Precipitation Report 12
Hydrograph No. 6, SCS Runoff, Ex. DA Davidson Disturbed (Perv) 13
Precipitation Report 14
Hydrograph No. 7, Combine, Ex DA Davidson Total 15
Hydrograph No. 9, SCS Runoff, Ex DA Site Undisturbed (Imp) 16
Precipitation Report 17
Hydrograph No. 10, SCS Runoff, Ex DA Site Undisturbed (Perv) 18
Precipitation Report 19
Hydrograph No. 11, SCS Runoff, Ex DA Roof Undisturbed (Imp) 20
Precipitation Report 21
Hydrograph No. 12, SCS Runoff, Ex DA Site Disturbed (Imp) 22
Precipitation Report 23
Hydrograph No. 13, SCS Runoff, Ex DA Site Disturbed (Perv) 24
Precipitation Report 25
Hydrograph No. 14, Combine, Ex DA to MH Total 26
Hydrograph No. 16, Combine, Ex Undisturbed Total 27
Hydrograph No. 17, Combine, Ex Disturbed Total 28
Hydrograph No. 20, SCS Runoff, Prop DA Lot 42.01 (Perv) 29
Precipitation Report 30
Hydrograph No. 22, SCS Runoff, Prop DA Davidson Avenue (Perv) 31
Precipitation Report 32
Hydrograph No. 24, SCS Runoff, Prop DA Roof Imp 33
Precipitation Report 34
Hydrograph No. 25, SCS Runoff, Prop DA Undetained (Imp) 35
Precipitation Report 36
Hydrograph No. 26, SCS Runoff, Prop DA Undetained (Perv) 37
Precipitation Report 38
Hydrograph No. 27, Combine, Prop DA Undetained Total 39
Hydrograph No. 29, SCS Runoff, Prop DA Basin (Imp) 40
Precipitation Report 41
Hydrograph No. 30, SCS Runoff, Prop DA Basin (Perv) 42
Precipitation Report 43
Hydrograph No. 31, SCS Runoff, Prop DA Detained Roof 44
Precipitation Report 45
Hydrograph No. 32, Combine, Prop DA Basin Total 46
Hydrograph No. 33, Reservoir, Post Route To Basin 47

Contents continued...

Pond Report - UG Basin 48
Hydrograph No. 35, SCS Runoff, Prop DA Bioretention (Imp) 50
Precipitation Report 51
Hydrograph No. 36, SCS Runoff, Prop DA Bioretention (Perv) 52
Precipitation Report 53
Hydrograph No. 37, Combine, Prop DA Bioretention Total 54
Hydrograph No. 38, Reservoir, Post Route Bio 55
Pond Report - Bioretention 56
Hydrograph No. 40, Combine, Prop DA to MH Total 57
Hydrograph No. 42, Combine, Prop Total Overall Runoff 58

10 - Year

Summary Report **59**
Hydrograph Reports **61**
Hydrograph No. 1, SCS Runoff, Ex DA Lot 42.01 Undisturbed (Perv) 61
Precipitation Report 62
Hydrograph No. 2, SCS Runoff, Ex DA Lot 42.01 Disturbed (Perv) 63
Precipitation Report 64
Hydrograph No. 3, Combine, Ex DA Lot 42.01 Total 65
Hydrograph No. 5, SCS Runoff, Ex. DA Davidson Undisturbed (Perv) 66
Precipitation Report 67
Hydrograph No. 6, SCS Runoff, Ex. DA Davidson Disturbed (Perv) 68
Precipitation Report 69
Hydrograph No. 7, Combine, Ex DA Davidson Total 70
Hydrograph No. 9, SCS Runoff, Ex DA Site Undisturbed (Imp) 71
Precipitation Report 72
Hydrograph No. 10, SCS Runoff, Ex DA Site Undisturbed (Perv) 73
Precipitation Report 74
Hydrograph No. 11, SCS Runoff, Ex DA Roof Undisturbed (Imp) 75
Precipitation Report 76
Hydrograph No. 12, SCS Runoff, Ex DA Site Disturbed (Imp) 77
Precipitation Report 78
Hydrograph No. 13, SCS Runoff, Ex DA Site Disturbed (Perv) 79
Precipitation Report 80
Hydrograph No. 14, Combine, Ex DA to MH Total 81
Hydrograph No. 16, Combine, Ex Undisturbed Total 82
Hydrograph No. 17, Combine, Ex Disturbed Total 83
Hydrograph No. 20, SCS Runoff, Prop DA Lot 42.01 (Perv) 84
Precipitation Report 85
Hydrograph No. 22, SCS Runoff, Prop DA Davidson Avenue (Perv) 86
Precipitation Report 87
Hydrograph No. 24, SCS Runoff, Prop DA Roof Imp 88
Precipitation Report 89
Hydrograph No. 25, SCS Runoff, Prop DA Undetained (Imp) 90
Precipitation Report 91
Hydrograph No. 26, SCS Runoff, Prop DA Undetained (Perv) 92
Precipitation Report 93
Hydrograph No. 27, Combine, Prop DA Undetained Total 94
Hydrograph No. 29, SCS Runoff, Prop DA Basin (Imp) 95
Precipitation Report 96
Hydrograph No. 30, SCS Runoff, Prop DA Basin (Perv) 97
Precipitation Report 98

Hydrograph No. 31, SCS Runoff, Prop DA Detained Roof 99
Precipitation Report 100
Hydrograph No. 32, Combine, Prop DA Basin Total 101
Hydrograph No. 33, Reservoir, Post Route To Basin 102
Hydrograph No. 35, SCS Runoff, Prop DA Bioretention (Imp) 103
Precipitation Report 104
Hydrograph No. 36, SCS Runoff, Prop DA Bioretention (Perv) 105
Precipitation Report 106
Hydrograph No. 37, Combine, Prop DA Bioretention Total 107
Hydrograph No. 38, Reservoir, Post Route Bio 108
Hydrograph No. 40, Combine, Prop DA to MH Total 109
Hydrograph No. 42, Combine, Prop Total Overall Runoff 110

100 - Year

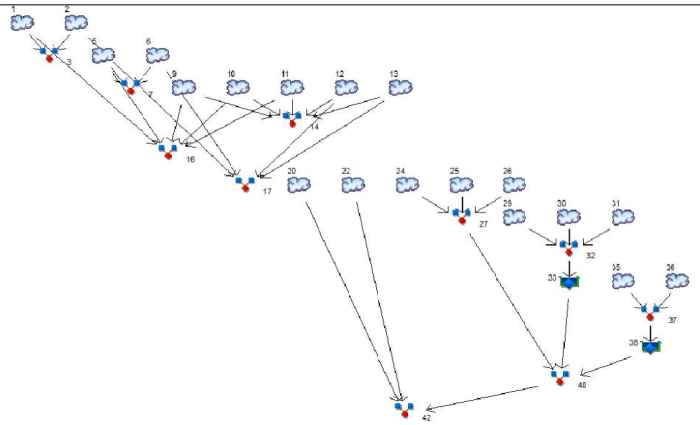
Summary Report 111
Hydrograph Reports 113
Hydrograph No. 1, SCS Runoff, Ex DA Lot 42.01 Undisturbed (Perv) 113
Precipitation Report 114
Hydrograph No. 2, SCS Runoff, Ex DA Lot 42.01 Disturbed (Perv) 115
Precipitation Report 116
Hydrograph No. 3, Combine, Ex DA Lot 42.01 Total 117
Hydrograph No. 5, SCS Runoff, Ex. DA Davidson Undisturbed (Perv) 118
Precipitation Report 119
Hydrograph No. 6, SCS Runoff, Ex. DA Davidson Disturbed (Perv) 120
Precipitation Report 121
Hydrograph No. 7, Combine, Ex DA Davidson Total 122
Hydrograph No. 9, SCS Runoff, Ex DA Site Undisturbed (Imp) 123
Precipitation Report 124
Hydrograph No. 10, SCS Runoff, Ex DA Site Undisturbed (Perv) 125
Precipitation Report 126
Hydrograph No. 11, SCS Runoff, Ex DA Roof Undisturbed (Imp) 127
Precipitation Report 128
Hydrograph No. 12, SCS Runoff, Ex DA Site Disturbed (Imp) 129
Precipitation Report 130
Hydrograph No. 13, SCS Runoff, Ex DA Site Disturbed (Perv) 131
Precipitation Report 132
Hydrograph No. 14, Combine, Ex DA to MH Total 133
Hydrograph No. 16, Combine, Ex Undisturbed Total 134
Hydrograph No. 17, Combine, Ex Disturbed Total 135
Hydrograph No. 20, SCS Runoff, Prop DA Lot 42.01 (Perv) 136
Precipitation Report 137
Hydrograph No. 22, SCS Runoff, Prop DA Davidson Avenue (Perv) 138
Precipitation Report 139
Hydrograph No. 24, SCS Runoff, Prop DA Roof Imp 140
Precipitation Report 141
Hydrograph No. 25, SCS Runoff, Prop DA Undetained (Imp) 142
Precipitation Report 143
Hydrograph No. 26, SCS Runoff, Prop DA Undetained (Perv) 144
Precipitation Report 145
Hydrograph No. 27, Combine, Prop DA Undetained Total 146
Hydrograph No. 29, SCS Runoff, Prop DA Basin (Imp) 147
Precipitation Report 148

Hydrograph No. 30, SCS Runoff, Prop DA Basin (Perv) 149
Precipitation Report 150
Hydrograph No. 31, SCS Runoff, Prop DA Detained Roof 151
Precipitation Report 152
Hydrograph No. 32, Combine, Prop DA Basin Total 153
Hydrograph No. 33, Reservoir, Post Route To Basin 154
Hydrograph No. 35, SCS Runoff, Prop DA Bioretention (Imp) 155
Precipitation Report 156
Hydrograph No. 36, SCS Runoff, Prop DA Bioretention (Perv) 157
Precipitation Report 158
Hydrograph No. 37, Combine, Prop DA Bioretention Total 159
Hydrograph No. 38, Reservoir, Post Route Bio 160
Hydrograph No. 40, Combine, Prop DA to MH Total 161
Hydrograph No. 42, Combine, Prop Total Overall Runoff 162

IDF Report 163

Watershed Model Schematic

Hydraflow Hydrographs by Intelisolve v9.1



Legend

Hyd.	Origin	Description
1	SCS Runoff	Ex DA Lot 42.01 Undisturbed (Perv)
2	SCS Runoff	Ex DA Lot 42.01 Disturbed (Perv)
3	Combine	Ex DA Lot 42.01 Total
5	SCS Runoff	Ex. DA Davidson Undisturbed (Perv)
6	SCS Runoff	Ex. DA Davidson Disturbed (Perv)
7	Combine	Ex DA Davidson Total
9	SCS Runoff	Ex DA Site Undisturbed (Imp)
10	SCS Runoff	Ex DA Site Undisturbed (Perv)
11	SCS Runoff	Ex DA Roof Undisturbed (Imp)
12	SCS Runoff	Ex DA Site Disturbed (Imp)
13	SCS Runoff	Ex DA Site Disturbed (Perv)
14	Combine	Ex DA to MH Total
16	Combine	Ex Undisturbed Total
17	Combine	Ex Disturbed Total
20	SCS Runoff	Prop DA Lot 42.01 (Perv)
22	SCS Runoff	Prop DA Davidson Avenue (Perv)
24	SCS Runoff	Prop DA Roof Imp
25	SCS Runoff	Prop DA Undetained (Imp)
26	SCS Runoff	Prop DA Undetained (Perv)
27	Combine	Prop DA Undetained Total
29	SCS Runoff	Prop DA Basin (Imp)
30	SCS Runoff	Prop DA Basin (Perv)
31	SCS Runoff	Prop DA Detained Roof
32	Combine	Prop DA Basin Total
33	Reservoir	Post Route To Basin
35	SCS Runoff	Prop DA Bioretention (Imp)
36	SCS Runoff	Prop DA Bioretention (Perv)
37	Combine	Prop DA Bioretention Total
38	Reservoir	Post Route Bio
40	Combine	Prop DA to MH Total
42	Combine	Prop Total Overall Runoff

Hydrograph Return Period Recap

Hydraflow Hydrographs by Intelisolve v9.1

Hyd. No.	Hydrograph type (origin)	Inflow Hyd(s)	Peak Outflow (cfs)								Hydrograph description
			1-Yr	2-Yr	3-Yr	5-Yr	10-Yr	25-Yr	50-Yr	100-Yr	
1	SCS Runoff	-----	-----	0.020	-----	-----	0.044	-----	-----	0.095	Ex DA Lot 42.01 Undisturbed (Perv)
2	SCS Runoff	-----	-----	0.162	-----	-----	0.354	-----	-----	0.763	Ex DA Lot 42.01 Disturbed (Perv)
3	Combine	1, 2	-----	0.183	-----	-----	0.399	-----	-----	0.858	Ex DA Lot 42.01 Total
5	SCS Runoff	-----	-----	0.061	-----	-----	0.133	-----	-----	0.286	Ex. DA Davidson Undisturbed (Perv)
6	SCS Runoff	-----	-----	0.010	-----	-----	0.022	-----	-----	0.048	Ex. DA Davidson Disturbed (Perv)
7	Combine	5, 6	-----	0.071	-----	-----	0.155	-----	-----	0.334	Ex DA Davidson Total
9	SCS Runoff	-----	-----	1.134	-----	-----	1.712	-----	-----	2.816	Ex DA Site Undisturbed (Imp)
10	SCS Runoff	-----	-----	0.386	-----	-----	0.841	-----	-----	1.811	Ex DA Site Undisturbed (Perv)
11	SCS Runoff	-----	-----	3.093	-----	-----	4.670	-----	-----	7.680	Ex DA Roof Undisturbed (Imp)
12	SCS Runoff	-----	-----	3.453	-----	-----	5.215	-----	-----	8.576	Ex DA Site Disturbed (Imp)
13	SCS Runoff	-----	-----	2.080	-----	-----	4.539	-----	-----	9.770	Ex DA Site Disturbed (Perv)
14	Combine	9, 10, 11, 12, 13	-----	10.15	-----	-----	16.98	-----	-----	30.65	Ex DA to MH Total
16	Combine	1, 5, 9, 10, 11,	-----	4.693	-----	-----	7.401	-----	-----	12.69	Ex Undisturbed Total
17	Combine	2, 6, 12, 13,	-----	5.706	-----	-----	10.13	-----	-----	19.16	Ex Disturbed Total
20	SCS Runoff	-----	-----	0.051	-----	-----	0.111	-----	-----	0.238	Prop DA Lot 42.01 (Perv)
22	SCS Runoff	-----	-----	0.071	-----	-----	0.155	-----	-----	0.334	Prop DA Davidson Avenue (Perv)
24	SCS Runoff	-----	-----	4.587	-----	-----	6.927	-----	-----	11.39	Prop DA Roof Imp
25	SCS Runoff	-----	-----	0.438	-----	-----	0.662	-----	-----	1.088	Prop DA Undetained (Imp)
26	SCS Runoff	-----	-----	0.913	-----	-----	1.993	-----	-----	4.289	Prop DA Undetained (Perv)
27	Combine	24, 25, 26	-----	5.939	-----	-----	9.581	-----	-----	16.77	Prop DA Undetained Total
29	SCS Runoff	-----	-----	4.459	-----	-----	6.732	-----	-----	11.07	Prop DA Basin (Imp)
30	SCS Runoff	-----	-----	0.233	-----	-----	0.509	-----	-----	1.096	Prop DA Basin (Perv)
31	SCS Runoff	-----	-----	0.722	-----	-----	1.090	-----	-----	1.792	Prop DA Detained Roof
32	Combine	29, 30, 31	-----	5.414	-----	-----	8.331	-----	-----	13.96	Prop DA Basin Total
33	Reservoir	32	-----	3.090	-----	-----	5.715	-----	-----	12.49	Post Route To Basin
35	SCS Runoff	-----	-----	0.670	-----	-----	1.012	-----	-----	1.664	Prop DA Bioretention (Imp)
36	SCS Runoff	-----	-----	0.203	-----	-----	0.443	-----	-----	0.953	Prop DA Bioretention (Perv)
37	Combine	35, 36	-----	0.873	-----	-----	1.455	-----	-----	2.617	Prop DA Bioretention Total
38	Reservoir	37	-----	0.182	-----	-----	0.498	-----	-----	0.805	Post Route Bio
40	Combine	27, 33, 38,	-----	7.430	-----	-----	14.72	-----	-----	27.43	Prop DA to MH Total

Hydrograph Return Period Recap

Hydraflow Hydrographs by Intelisolve v9.1

Hyd. No.	Hydrograph type (origin)	Inflow Hyd(s)	Peak Outflow (cfs)								Hydrograph description
			1-Yr	2-Yr	3-Yr	5-Yr	10-Yr	25-Yr	50-Yr	100-Yr	
42	Combine	20, 22, 40,	-----	7.542	-----	-----	14.99	-----	-----	27.92	Prop Total Overall Runoff

Hydrograph Summary Report

Hydraflow Hydrographs by Intelisolve v9.1

Hyd. No.	Hydrograph type (origin)	Peak flow (cfs)	Time interval (min)	Time to peak (min)	Hyd. volume (cuft)	Inflow hyd(s)	Maximum elevation (ft)	Total strge used (cuft)	Hydrograph description
1	SCS Runoff	0.020	5	730	77	----	-----	-----	Ex DA Lot 42.01 Undisturbed (Perv)
2	SCS Runoff	0.162	5	730	616	----	-----	-----	Ex DA Lot 42.01 Disturbed (Perv)
3	Combine	0.183	5	730	693	1, 2	-----	-----	Ex DA Lot 42.01 Total
5	SCS Runoff	0.061	5	730	231	----	-----	-----	Ex. DA Davidson Undisturbed (Perv)
6	SCS Runoff	0.010	5	730	38	----	-----	-----	Ex. DA Davidson Disturbed (Perv)
7	Combine	0.071	5	730	269	5, 6	-----	-----	Ex DA Davidson Total
9	SCS Runoff	1.134	5	730	4,652	----	-----	-----	Ex DA Site Undisturbed (Imp)
10	SCS Runoff	0.386	5	730	1,462	----	-----	-----	Ex DA Site Undisturbed (Perv)
11	SCS Runoff	3.093	5	730	12,688	----	-----	-----	Ex DA Roof Undisturbed (Imp)
12	SCS Runoff	3.453	5	730	14,168	----	-----	-----	Ex DA Site Disturbed (Imp)
13	SCS Runoff	2.080	5	730	7,889	----	-----	-----	Ex DA Site Disturbed (Perv)
14	Combine	10.15	5	730	40,860	9, 10, 11, 12, 13	-----	-----	Ex DA to MH Total
16	Combine	4.693	5	730	19,111	1, 5, 9, 10, 11,	-----	-----	Ex Undisturbed Total
17	Combine	5.706	5	730	22,712	2, 6, 12, 13,	-----	-----	Ex Disturbed Total
20	SCS Runoff	0.051	5	730	192	----	-----	-----	Prop DA Lot 42.01 (Perv)
22	SCS Runoff	0.071	5	730	269	----	-----	-----	Prop DA Davidson Avenue (Perv)
24	SCS Runoff	4.587	5	730	18,821	----	-----	-----	Prop DA Roof Imp
25	SCS Runoff	0.438	5	730	1,797	----	-----	-----	Prop DA Undetained (Imp)
26	SCS Runoff	0.913	5	730	3,463	----	-----	-----	Prop DA Undetained (Perv)
27	Combine	5.939	5	730	24,082	24, 25, 26	-----	-----	Prop DA Undetained Total
29	SCS Runoff	4.459	5	730	18,292	----	-----	-----	Prop DA Basin (Imp)
30	SCS Runoff	0.233	5	730	885	----	-----	-----	Prop DA Basin (Perv)
31	SCS Runoff	0.722	5	730	2,961	----	-----	-----	Prop DA Detained Roof
32	Combine	5.414	5	730	22,138	29, 30, 31	-----	-----	Prop DA Basin Total
33	Reservoir	3.090	5	740	22,123	32	58.13	9,044	Post Route To Basin
35	SCS Runoff	0.670	5	730	2,749	----	-----	-----	Prop DA Bioretention (Imp)
36	SCS Runoff	0.203	5	730	770	----	-----	-----	Prop DA Bioretention (Perv)
37	Combine	0.873	5	730	3,519	35, 36	-----	-----	Prop DA Bioretention Total
38	Reservoir	0.182	5	760	2,577	37	62.86	1,953	Post Route Bio
40	Combine	7.430	5	735	48,781	27, 33, 38,	-----	-----	Prop DA to MH Total

Hydrograph Summary Report

Hydraflow Hydrographs by Intelisolve v9.1

Hyd. No.	Hydrograph type (origin)	Peak flow (cfs)	Time interval (min)	Time to peak (min)	Hyd. volume (cuft)	Inflow hyd(s)	Maximum elevation (ft)	Total strge used (cuft)	Hydrograph description
42	Combine	7.542	5	735	49,243	20, 22, 40,	-----	-----	Prop Total Overall Runoff

Amended Site Plans Revision 1.gpw	Return Period: 2 Year	Friday, Dec 2, 2022

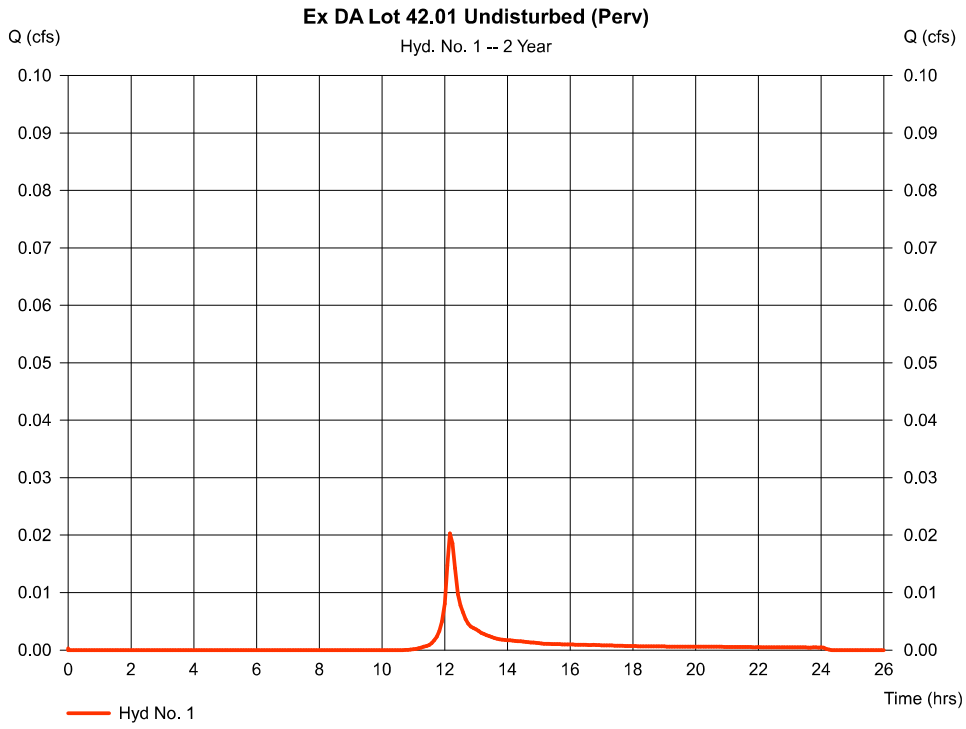
Hydrograph Report

Hydraflow Hydrographs by Intelisolve v9.1 — Friday, Dec 2, 2022

Hyd. No. 1

Ex DA Lot 42.01 Undisturbed (Perv)

Hydrograph type	= SCS Runoff	Peak discharge	= 0.020 cfs
Storm frequency	= 2 yrs	Time to peak	= 12.17 hrs
Time interval	= 5 min	Hyd. volume	= 77 cuft
Drainage area	= 0.020 ac	Curve number	= 74
Basin Slope	= 0.0 %	Hydraulic length	= 0 ft
Tc method	= USER	Time of conc. (Tc)	= 10.00 min
Total precip.	= 3.34 in	Distribution	= Custom
Storm duration	= NOAA Atlas 14 Type-C.cds	Shape factor	= 484

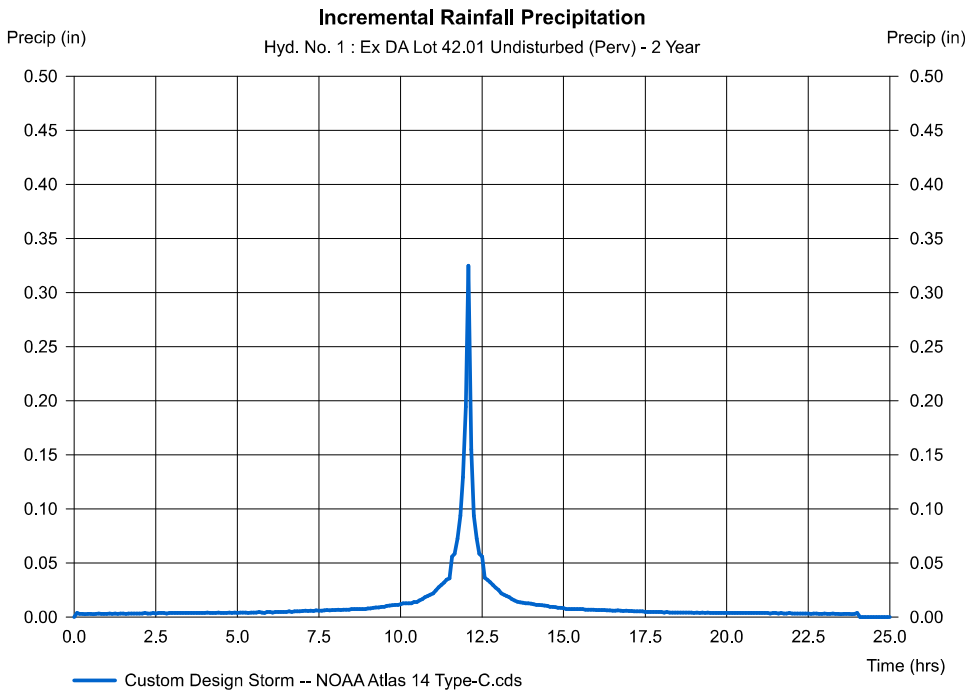


Precipitation Report

Hyd. No. 1

Ex DA Lot 42.01 Undisturbed (Perv)

Storm Frequency	= 2 yrs	Time interval	= 5 min
Total precip.	= 3.3400 in	Distribution	= Custom
Storm duration	= NOAA Atlas 14 Type-C.cds		

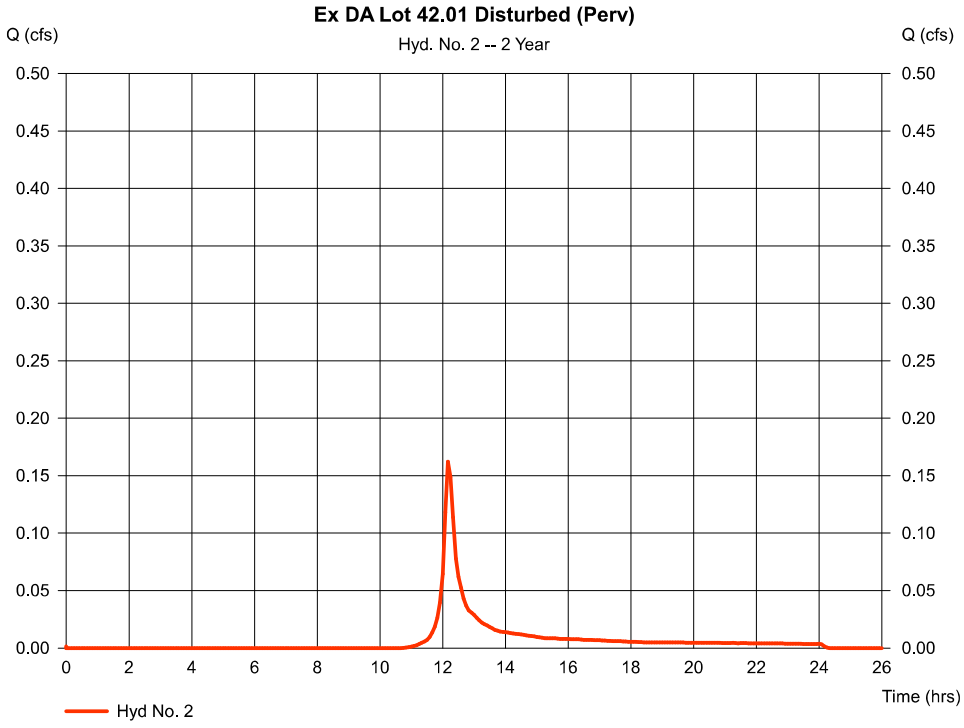


Hydrograph Report

Hyd. No. 2

Ex DA Lot 42.01 Disturbed (Perv)

Hydrograph type	= SCS Runoff	Peak discharge	= 0.162 cfs
Storm frequency	= 2 yrs	Time to peak	= 12.17 hrs
Time interval	= 5 min	Hyd. volume	= 616 cuft
Drainage area	= 0.160 ac	Curve number	= 74
Basin Slope	= 0.0 %	Hydraulic length	= 0 ft
Tc method	= USER	Time of conc. (Tc)	= 10.00 min
Total precip.	= 3.34 in	Distribution	= Custom
Storm duration	= NOAA Atlas 14 Type-C.cds	Shape factor	= 484

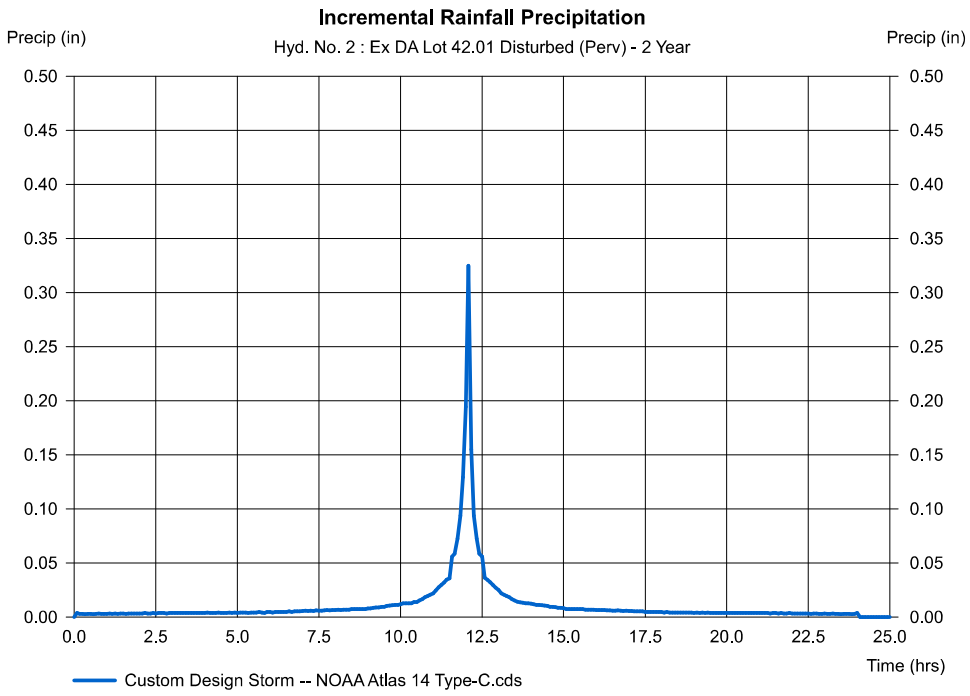


Precipitation Report

Hyd. No. 2

Ex DA Lot 42.01 Disturbed (Perv)

Storm Frequency	= 2 yrs	Time interval	= 5 min
Total precip.	= 3.3400 in	Distribution	= Custom
Storm duration	= NOAA Atlas 14 Type-C.cds		

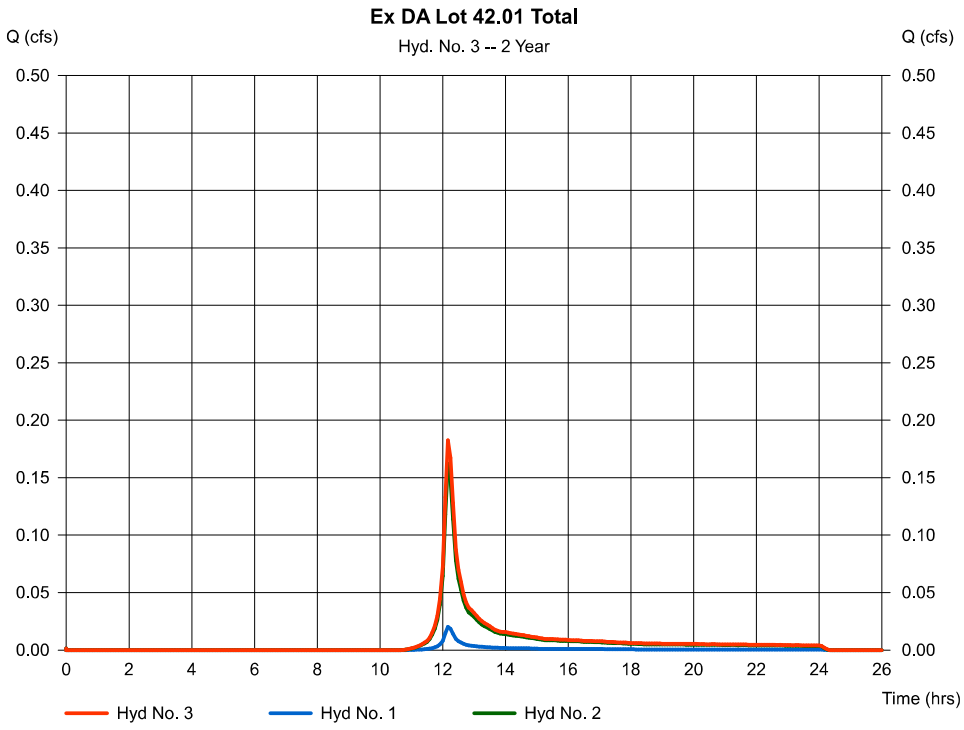


Hydrograph Report

Hyd. No. 3

Ex DA Lot 42.01 Total

Hydrograph type	= Combine	Peak discharge	= 0.183 cfs
Storm frequency	= 2 yrs	Time to peak	= 12.17 hrs
Time interval	= 5 min	Hyd. volume	= 693 cuft
Inflow hyds.	= 1, 2	Contrib. drain. area	= 0.180 ac

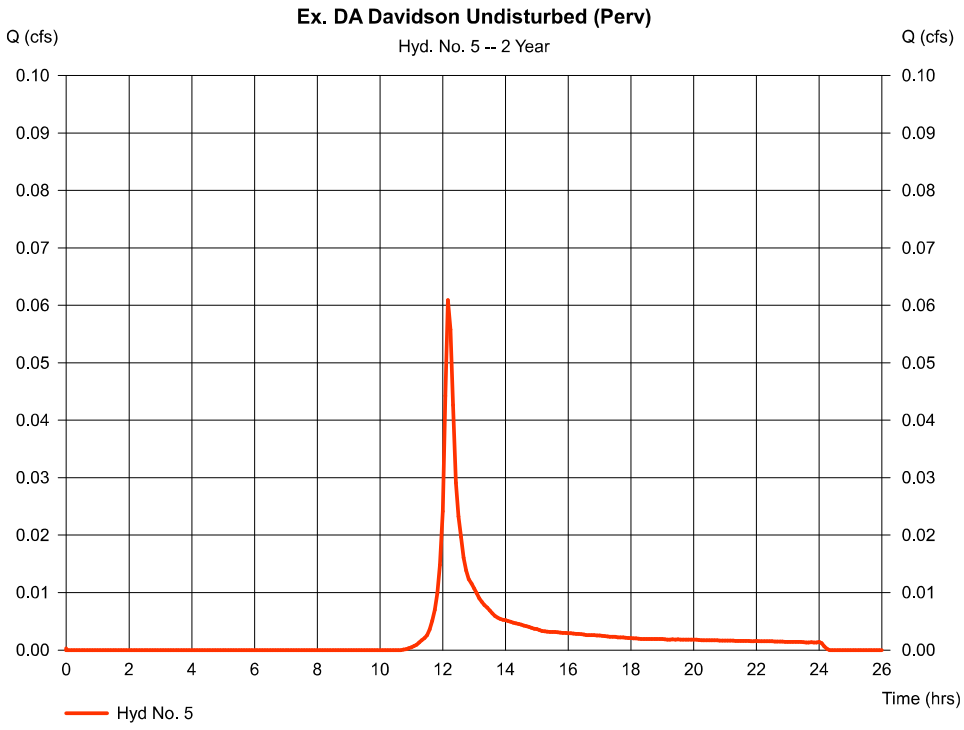


Hydrograph Report

Hyd. No. 5

Ex. DA Davidson Undisturbed (Perv)

Hydrograph type	= SCS Runoff	Peak discharge	= 0.061 cfs
Storm frequency	= 2 yrs	Time to peak	= 12.17 hrs
Time interval	= 5 min	Hyd. volume	= 231 cuft
Drainage area	= 0.060 ac	Curve number	= 74
Basin Slope	= 0.0 %	Hydraulic length	= 0 ft
Tc method	= USER	Time of conc. (Tc)	= 10.00 min
Total precip.	= 3.34 in	Distribution	= Custom
Storm duration	= NOAA Atlas 14 Type-C.cds	Shape factor	= 484

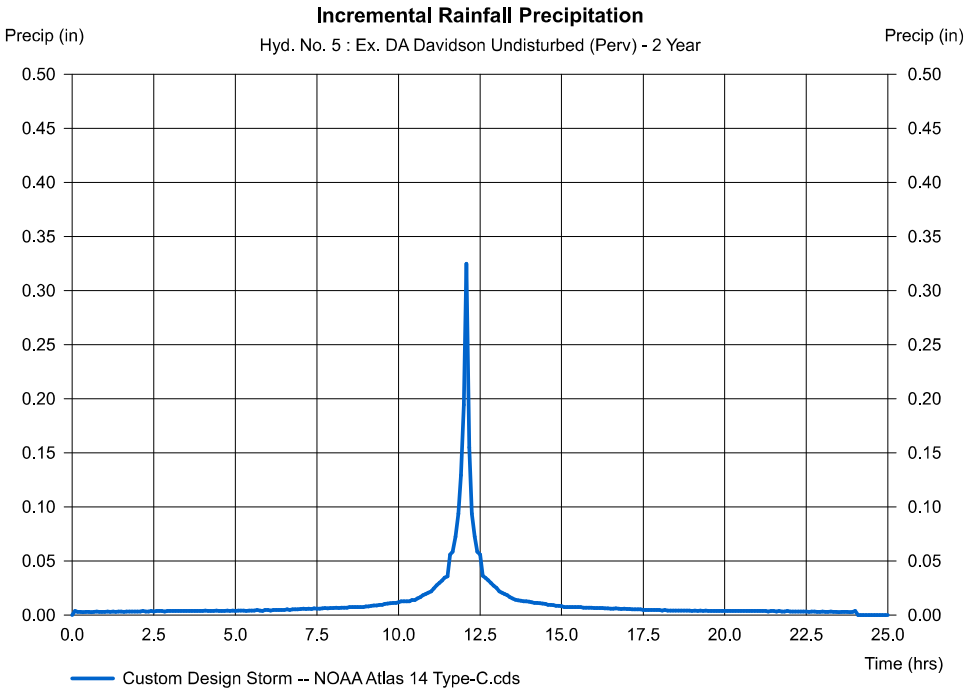


Precipitation Report

Hyd. No. 5

Ex. DA Davidson Undisturbed (Perv)

Storm Frequency	= 2 yrs	Time interval	= 5 min
Total precip.	= 3.3400 in	Distribution	= Custom
Storm duration	= NOAA Atlas 14 Type-C.cds		

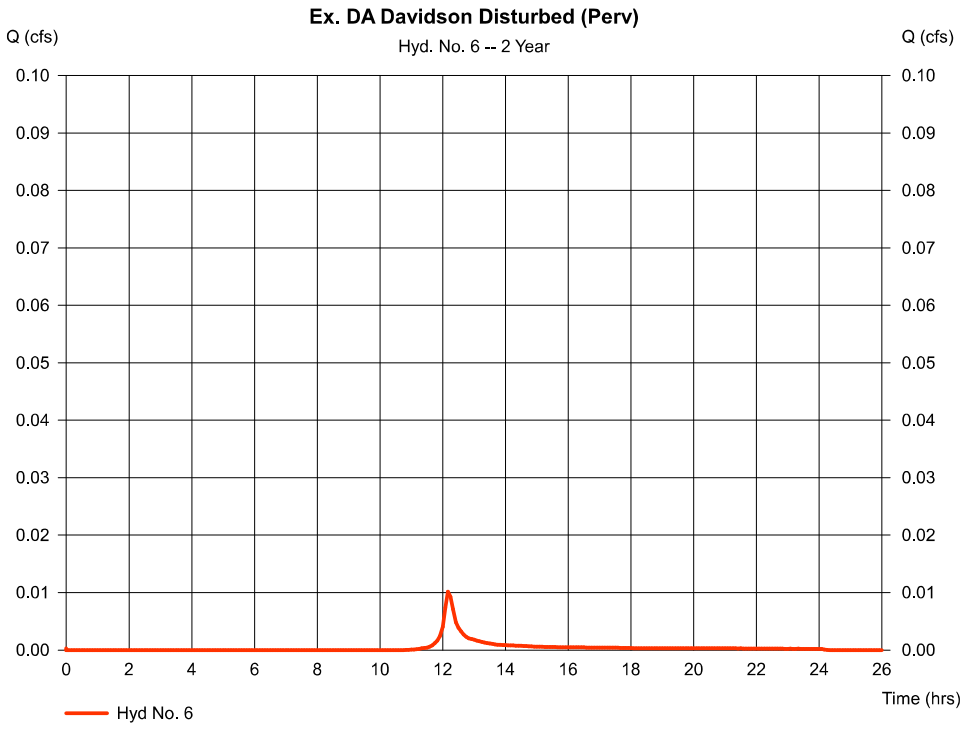


Hydrograph Report

Hyd. No. 6

Ex. DA Davidson Disturbed (Perv)

Hydrograph type	= SCS Runoff	Peak discharge	= 0.010 cfs
Storm frequency	= 2 yrs	Time to peak	= 12.17 hrs
Time interval	= 5 min	Hyd. volume	= 38 cuft
Drainage area	= 0.010 ac	Curve number	= 74
Basin Slope	= 0.0 %	Hydraulic length	= 0 ft
Tc method	= USER	Time of conc. (Tc)	= 10.00 min
Total precip.	= 3.34 in	Distribution	= Custom
Storm duration	= NOAA Atlas 14 Type-C.cds	Shape factor	= 484

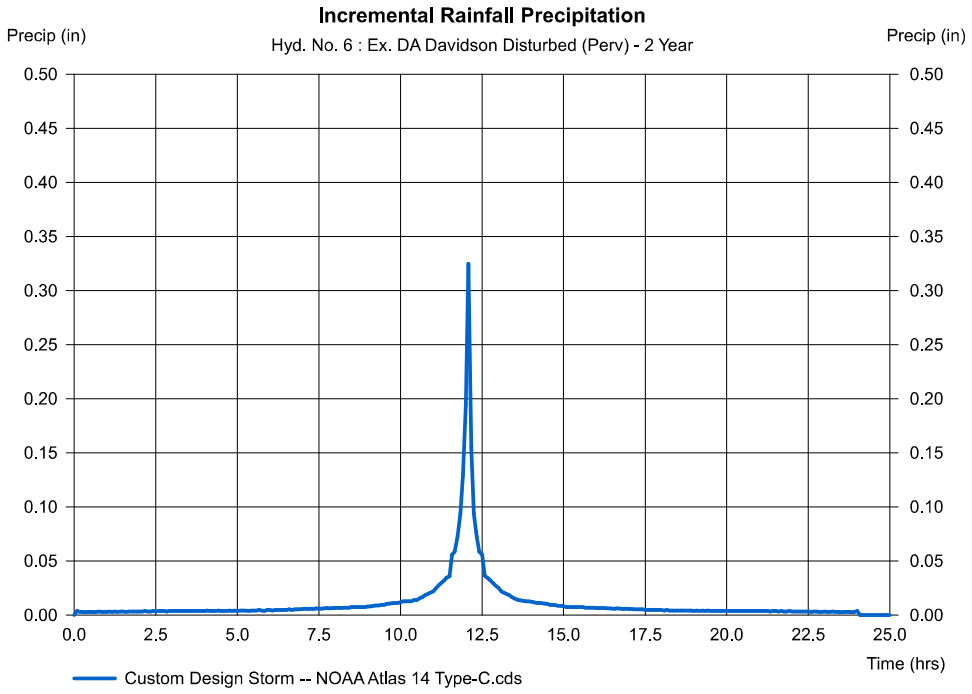


Precipitation Report

Hyd. No. 6

Ex. DA Davidson Disturbed (Perv)

Storm Frequency	= 2 yrs	Time interval	= 5 min
Total precip.	= 3.3400 in	Distribution	= Custom
Storm duration	= NOAA Atlas 14 Type-C.cds		

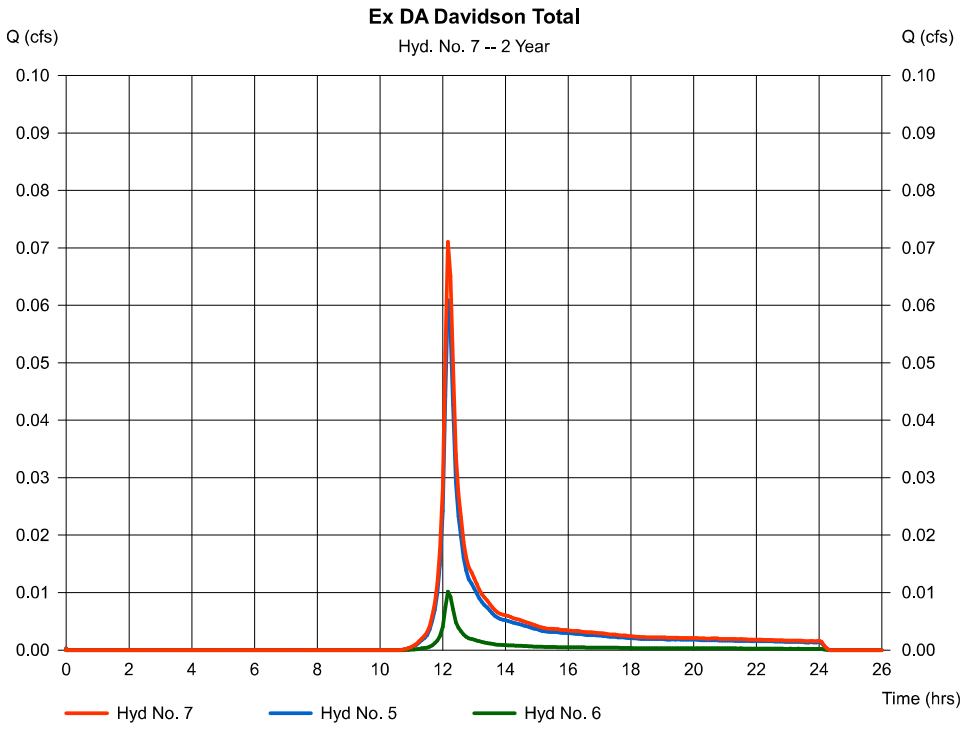


Hydrograph Report

Hyd. No. 7

Ex DA Davidson Total

Hydrograph type	= Combine	Peak discharge	= 0.071 cfs
Storm frequency	= 2 yrs	Time to peak	= 12.17 hrs
Time interval	= 5 min	Hyd. volume	= 269 cuft
Inflow hyds.	= 5, 6	Contrib. drain. area	= 0.070 ac

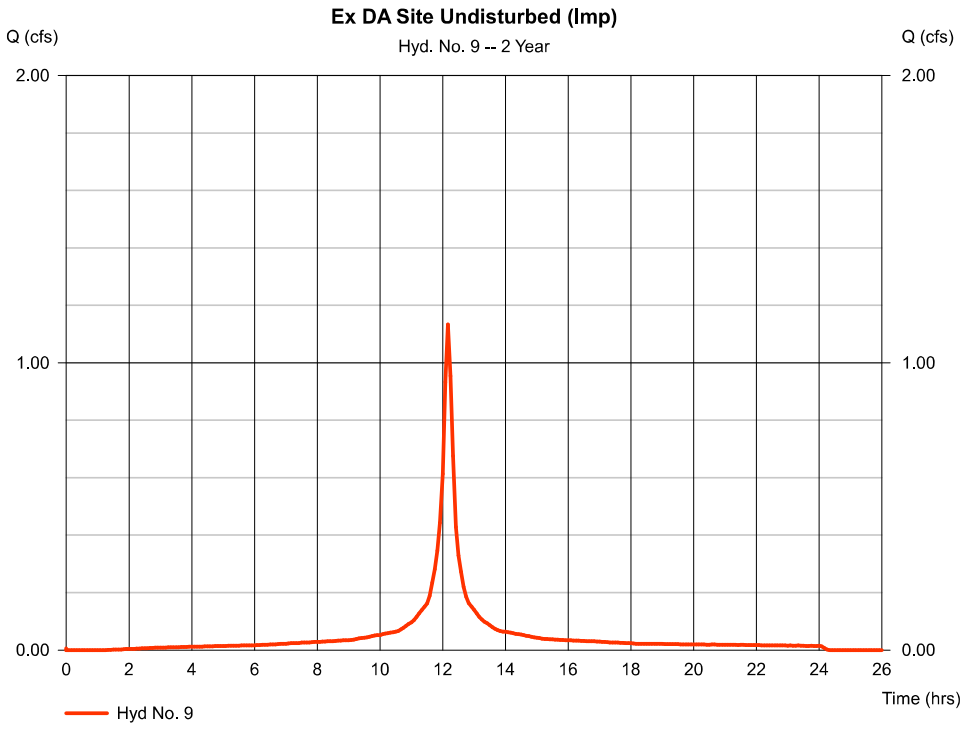


Hydrograph Report

Hyd. No. 9

Ex DA Site Undisturbed (Imp)

Hydrograph type	= SCS Runoff	Peak discharge	= 1.134 cfs
Storm frequency	= 2 yrs	Time to peak	= 12.17 hrs
Time interval	= 5 min	Hyd. volume	= 4,652 cuft
Drainage area	= 0.440 ac	Curve number	= 98
Basin Slope	= 0.0 %	Hydraulic length	= 0 ft
Tc method	= USER	Time of conc. (Tc)	= 10.00 min
Total precip.	= 3.34 in	Distribution	= Custom
Storm duration	= NOAA Atlas 14 Type-C.cds	Shape factor	= 484

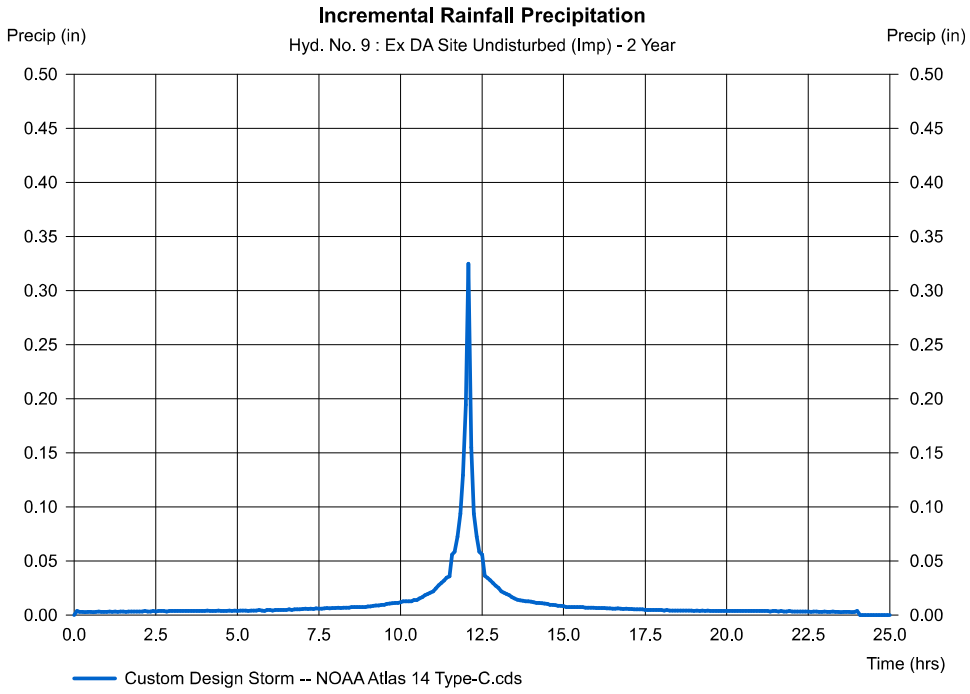


Precipitation Report

Hyd. No. 9

Ex DA Site Undisturbed (Imp)

Storm Frequency	= 2 yrs	Time interval	= 5 min
Total precip.	= 3.3400 in	Distribution	= Custom
Storm duration	= NOAA Atlas 14 Type-C.cds		

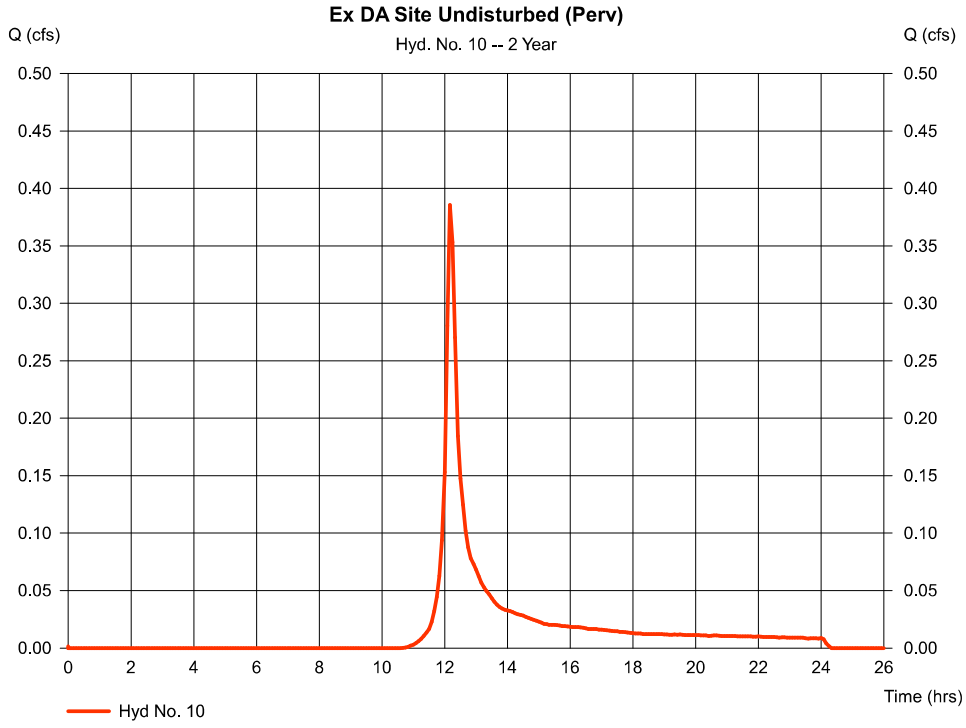


Hydrograph Report

Hyd. No. 10

Ex DA Site Undisturbed (Perv)

Hydrograph type	= SCS Runoff	Peak discharge	= 0.386 cfs
Storm frequency	= 2 yrs	Time to peak	= 12.17 hrs
Time interval	= 5 min	Hyd. volume	= 1,462 cuft
Drainage area	= 0.380 ac	Curve number	= 74
Basin Slope	= 0.0 %	Hydraulic length	= 0 ft
Tc method	= USER	Time of conc. (Tc)	= 11.00 min
Total precip.	= 3.34 in	Distribution	= Custom
Storm duration	= NOAA Atlas 14 Type-C.cds	Shape factor	= 484

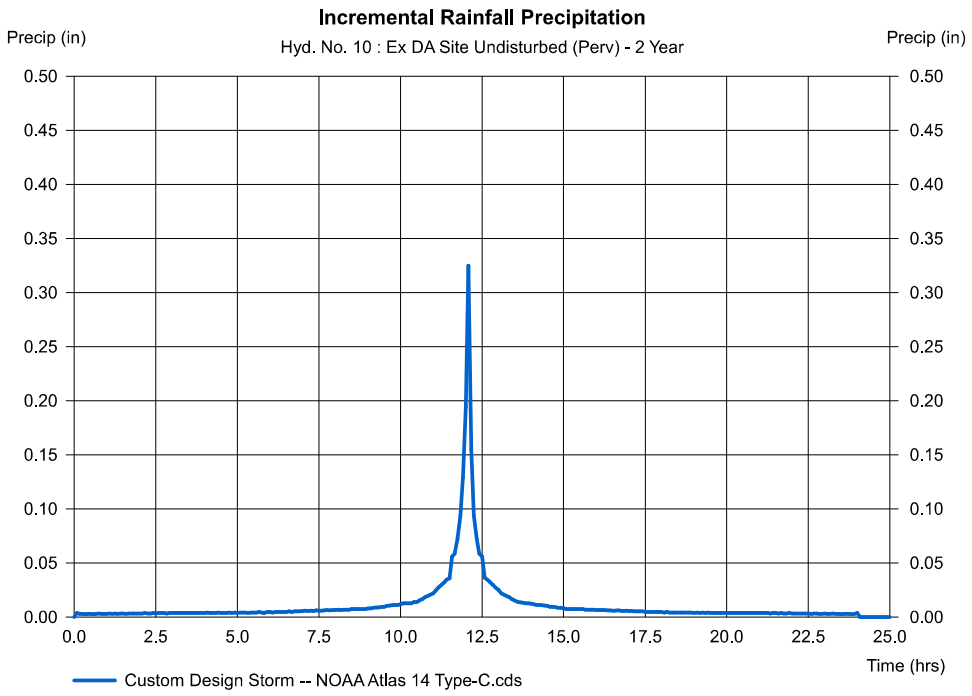


Precipitation Report

Hyd. No. 10

Ex DA Site Undisturbed (Perv)

Storm Frequency	= 2 yrs	Time interval	= 5 min
Total precip.	= 3.3400 in	Distribution	= Custom
Storm duration	= NOAA Atlas 14 Type-C.cds		

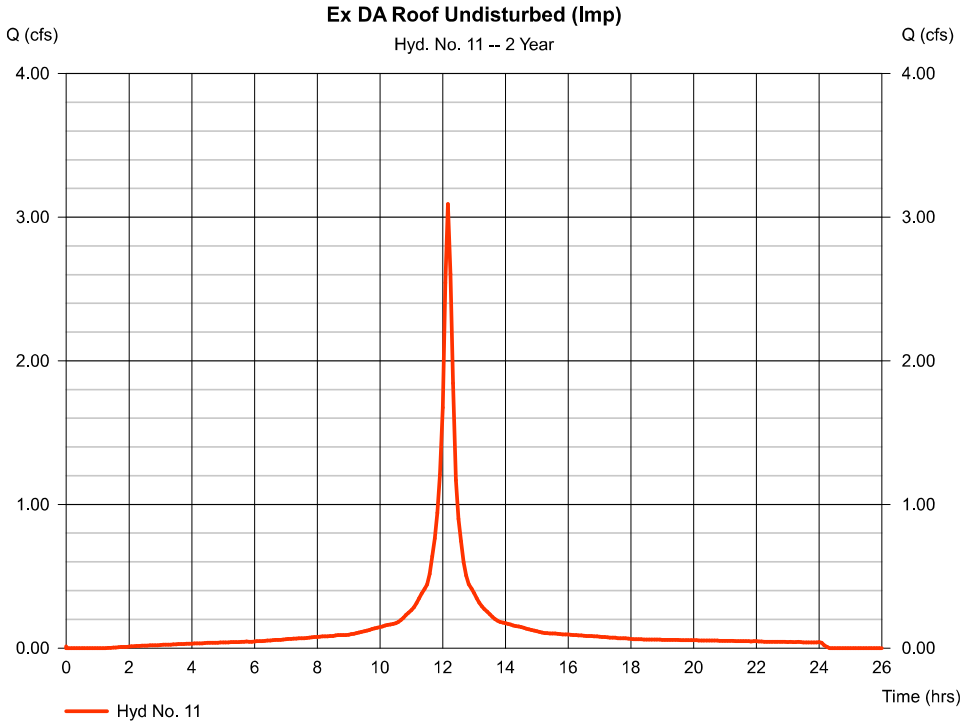


Hydrograph Report

Hyd. No. 11

Ex DA Roof Undisturbed (Imp)

Hydrograph type	= SCS Runoff	Peak discharge	= 3.093 cfs
Storm frequency	= 2 yrs	Time to peak	= 12.17 hrs
Time interval	= 5 min	Hyd. volume	= 12,688 cuft
Drainage area	= 1.200 ac	Curve number	= 98
Basin Slope	= 0.0 %	Hydraulic length	= 0 ft
Tc method	= USER	Time of conc. (Tc)	= 10.00 min
Total precip.	= 3.34 in	Distribution	= Custom
Storm duration	= NOAA Atlas 14 Type-C.cds	Shape factor	= 484

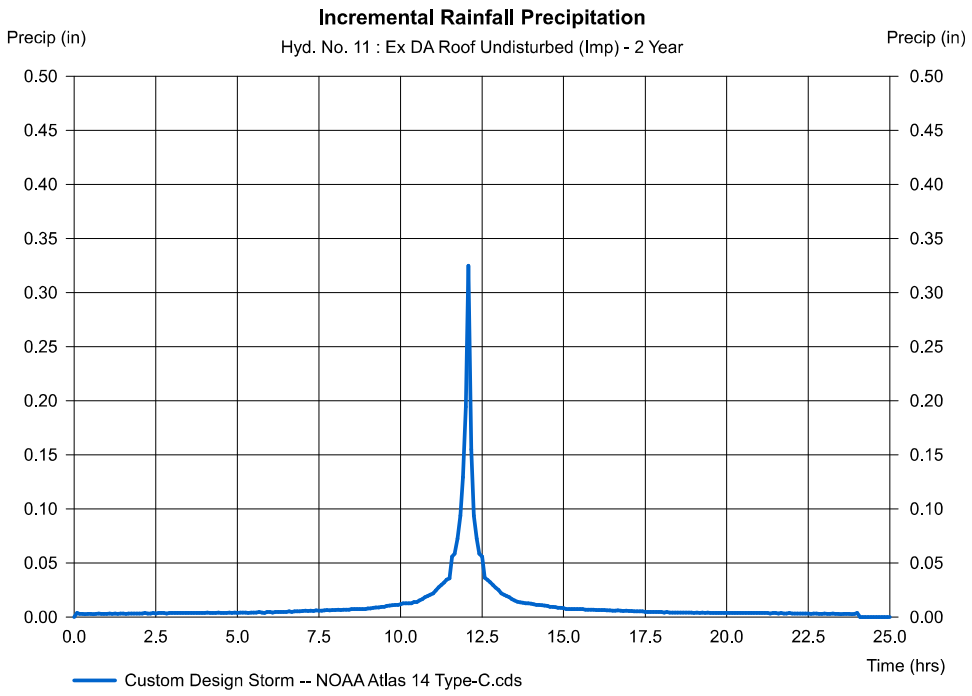


Precipitation Report

Hyd. No. 11

Ex DA Roof Undisturbed (Imp)

Storm Frequency	= 2 yrs	Time interval	= 5 min
Total precip.	= 3.3400 in	Distribution	= Custom
Storm duration	= NOAA Atlas 14 Type-C.cds		

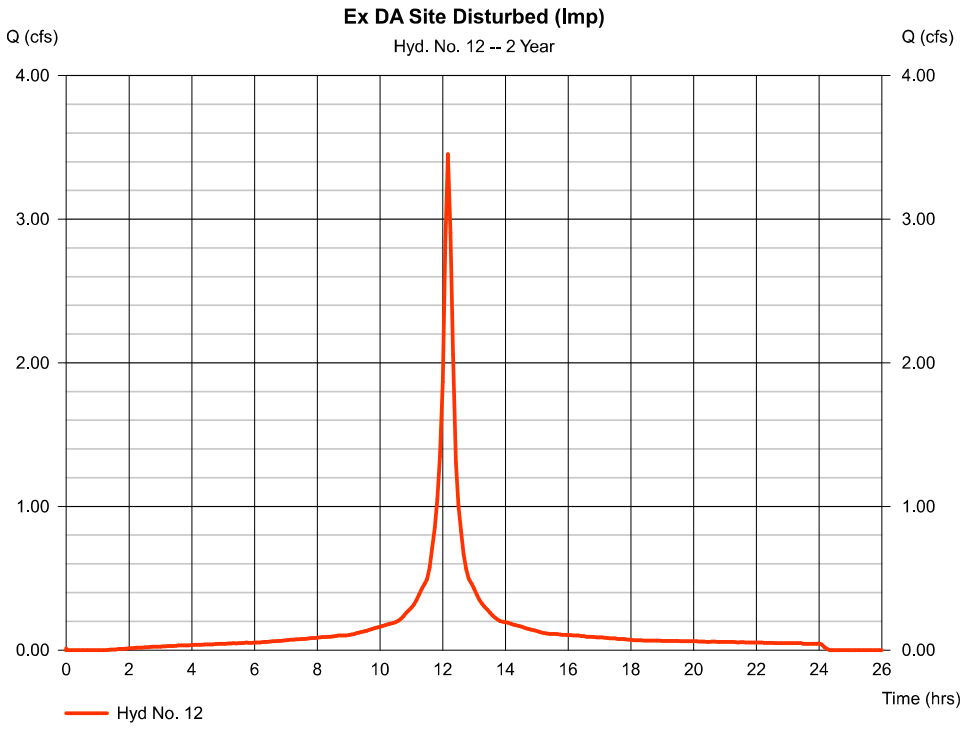


Hydrograph Report

Hyd. No. 12

Ex DA Site Disturbed (Imp)

Hydrograph type	= SCS Runoff	Peak discharge	= 3.453 cfs
Storm frequency	= 2 yrs	Time to peak	= 12.17 hrs
Time interval	= 5 min	Hyd. volume	= 14,168 cuft
Drainage area	= 1.340 ac	Curve number	= 98
Basin Slope	= 0.0 %	Hydraulic length	= 0 ft
Tc method	= USER	Time of conc. (Tc)	= 10.00 min
Total precip.	= 3.34 in	Distribution	= Custom
Storm duration	= NOAA Atlas 14 Type-C.cds	Shape factor	= 484

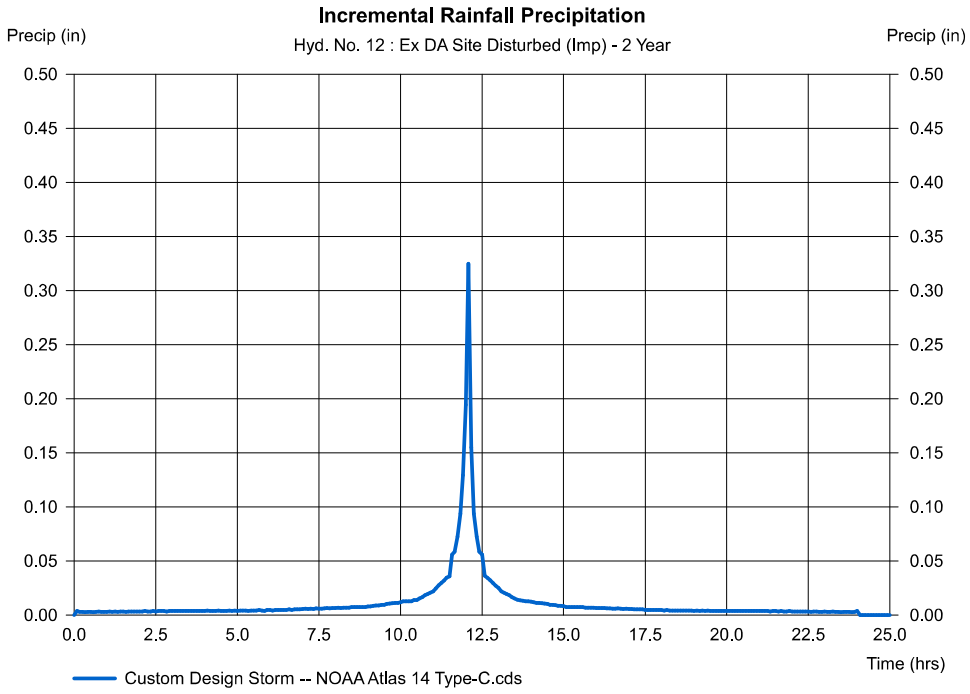


Precipitation Report

Hyd. No. 12

Ex DA Site Disturbed (Imp)

Storm Frequency	= 2 yrs	Time interval	= 5 min
Total precip.	= 3.3400 in	Distribution	= Custom
Storm duration	= NOAA Atlas 14 Type-C.cds		

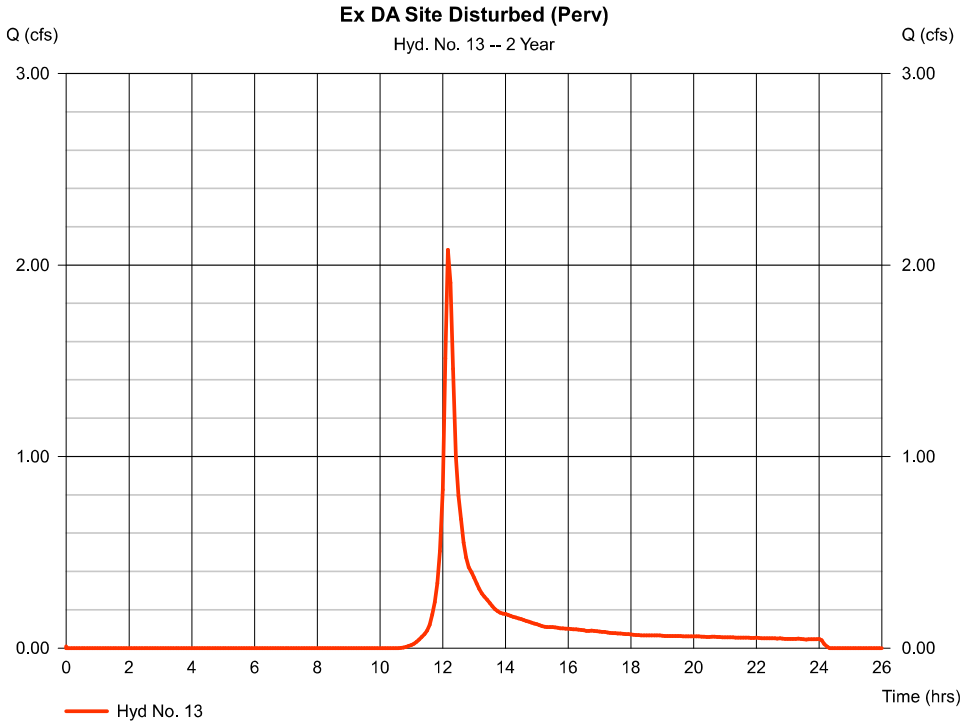


Hydrograph Report

Hyd. No. 13

Ex DA Site Disturbed (Perv)

Hydrograph type	= SCS Runoff	Peak discharge	= 2.080 cfs
Storm frequency	= 2 yrs	Time to peak	= 12.17 hrs
Time interval	= 5 min	Hyd. volume	= 7,889 cuft
Drainage area	= 2.050 ac	Curve number	= 74
Basin Slope	= 0.0 %	Hydraulic length	= 0 ft
Tc method	= USER	Time of conc. (Tc)	= 10.00 min
Total precip.	= 3.34 in	Distribution	= Custom
Storm duration	= NOAA Atlas 14 Type-C.cds	Shape factor	= 484

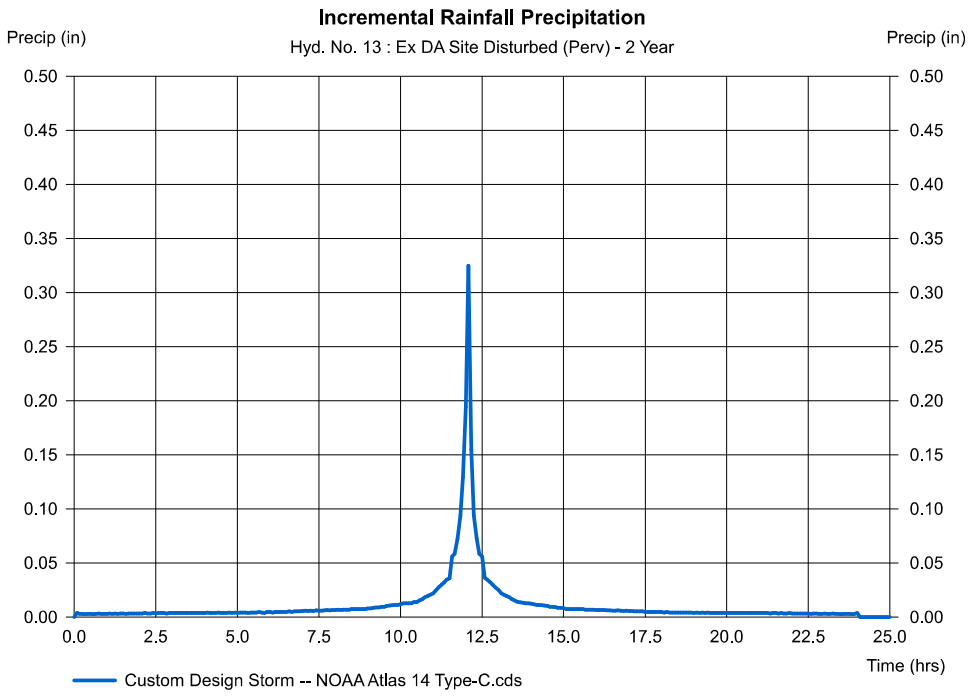


Precipitation Report

Hyd. No. 13

Ex DA Site Disturbed (Perv)

Storm Frequency	= 2 yrs	Time interval	= 5 min
Total precip.	= 3.3400 in	Distribution	= Custom
Storm duration	= NOAA Atlas 14 Type-C.cds		

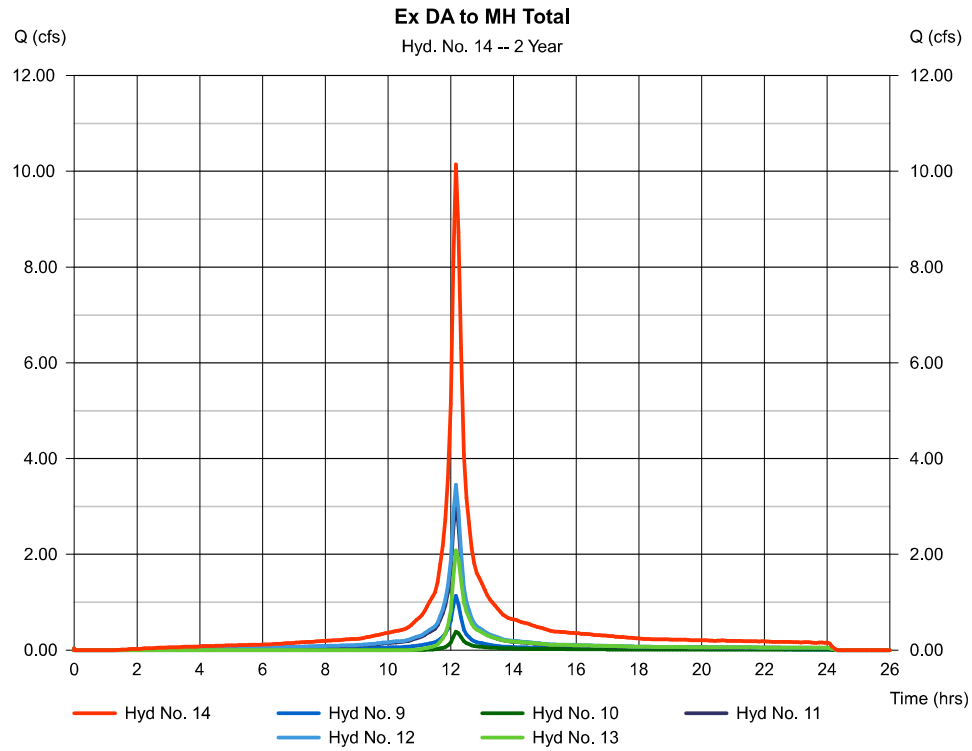


Hydrograph Report

Hyd. No. 14

Ex DA to MH Total

Hydrograph type	= Combine	Peak discharge	= 10.15 cfs
Storm frequency	= 2 yrs	Time to peak	= 12.17 hrs
Time interval	= 5 min	Hyd. volume	= 40,860 cuft
Inflow hyds.	= 9, 10, 11, 12, 13	Contrib. drain. area	= 5.410 ac

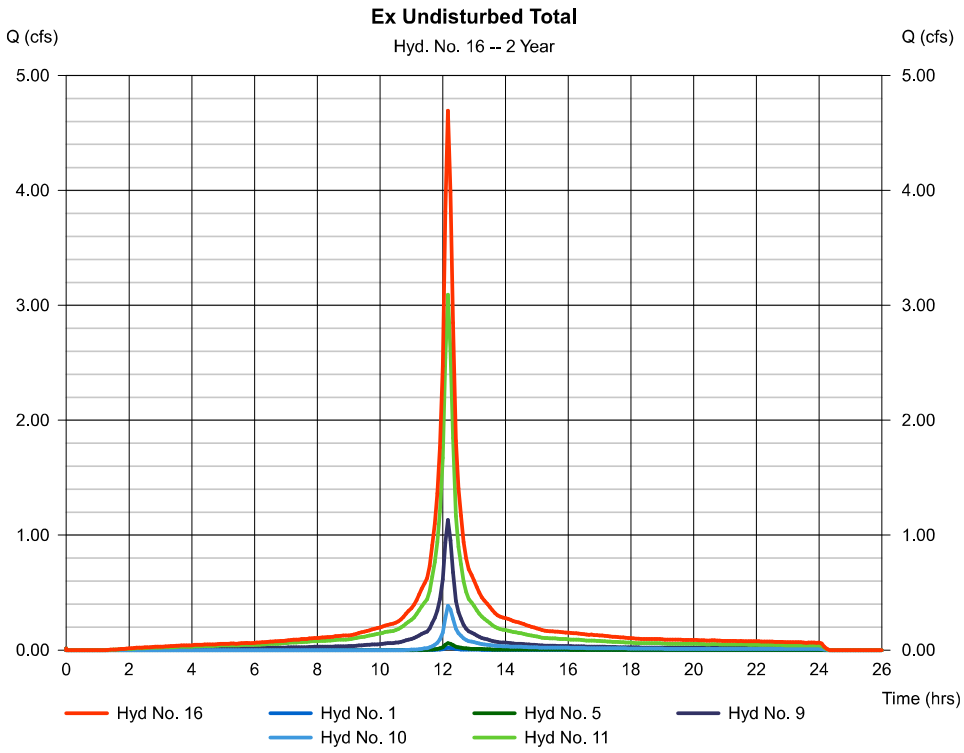


Hydrograph Report

Hyd. No. 16

Ex Undisturbed Total

Hydrograph type	= Combine	Peak discharge	= 4.693 cfs
Storm frequency	= 2 yrs	Time to peak	= 12.17 hrs
Time interval	= 5 min	Hyd. volume	= 19,111 cuft
Inflow hyds.	= 1, 5, 9, 10, 11	Contrib. drain. area	= 2.100 ac

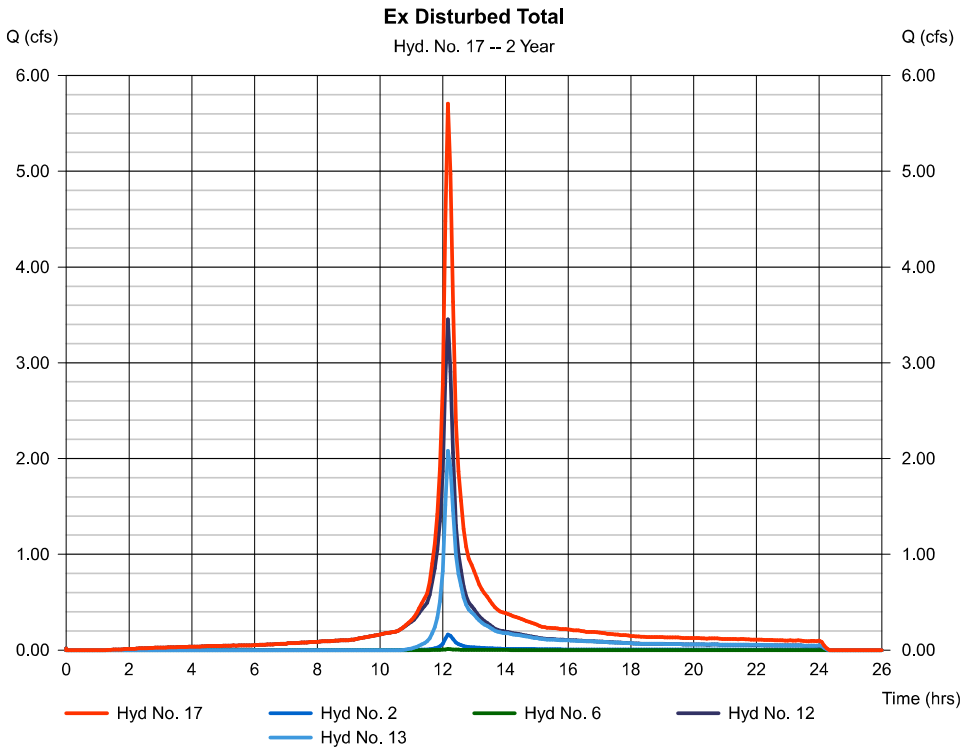


Hydrograph Report

Hyd. No. 17

Ex Disturbed Total

Hydrograph type	= Combine	Peak discharge	= 5.706 cfs
Storm frequency	= 2 yrs	Time to peak	= 12.17 hrs
Time interval	= 5 min	Hyd. volume	= 22,712 cuft
Inflow hyds.	= 2, 6, 12, 13	Contrib. drain. area	= 3.560 ac

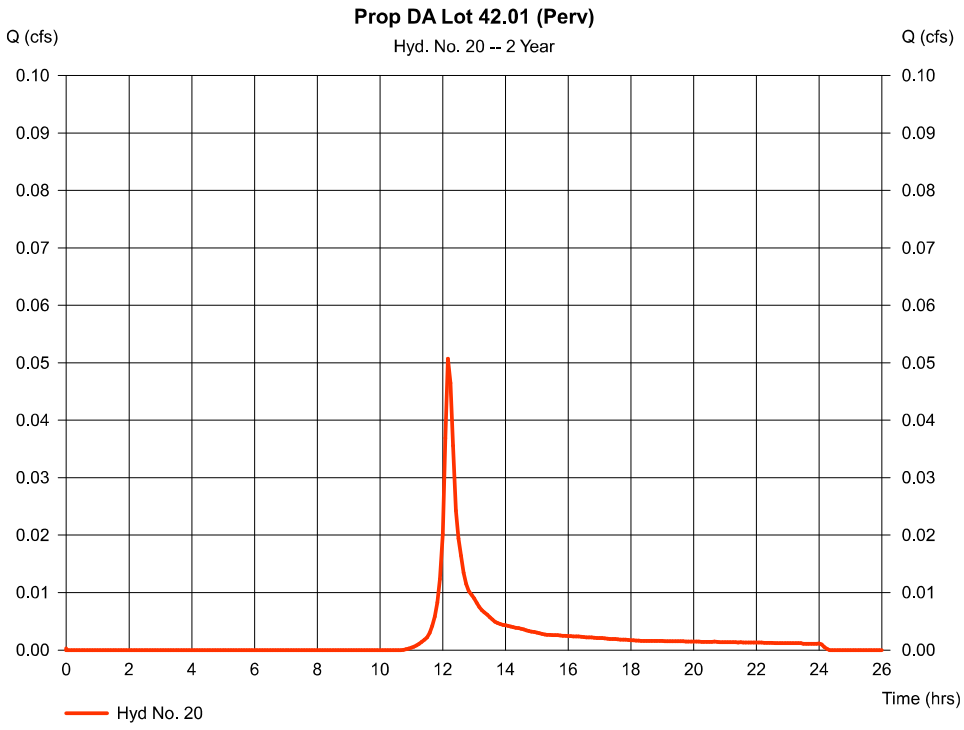


Hydrograph Report

Hyd. No. 20

Prop DA Lot 42.01 (Perv)

Hydrograph type	= SCS Runoff	Peak discharge	= 0.051 cfs
Storm frequency	= 2 yrs	Time to peak	= 12.17 hrs
Time interval	= 5 min	Hyd. volume	= 192 cuft
Drainage area	= 0.050 ac	Curve number	= 74
Basin Slope	= 0.0 %	Hydraulic length	= 0 ft
Tc method	= USER	Time of conc. (Tc)	= 10.00 min
Total precip.	= 3.34 in	Distribution	= Custom
Storm duration	= NOAA Atlas 14 Type-C.cds	Shape factor	= 484

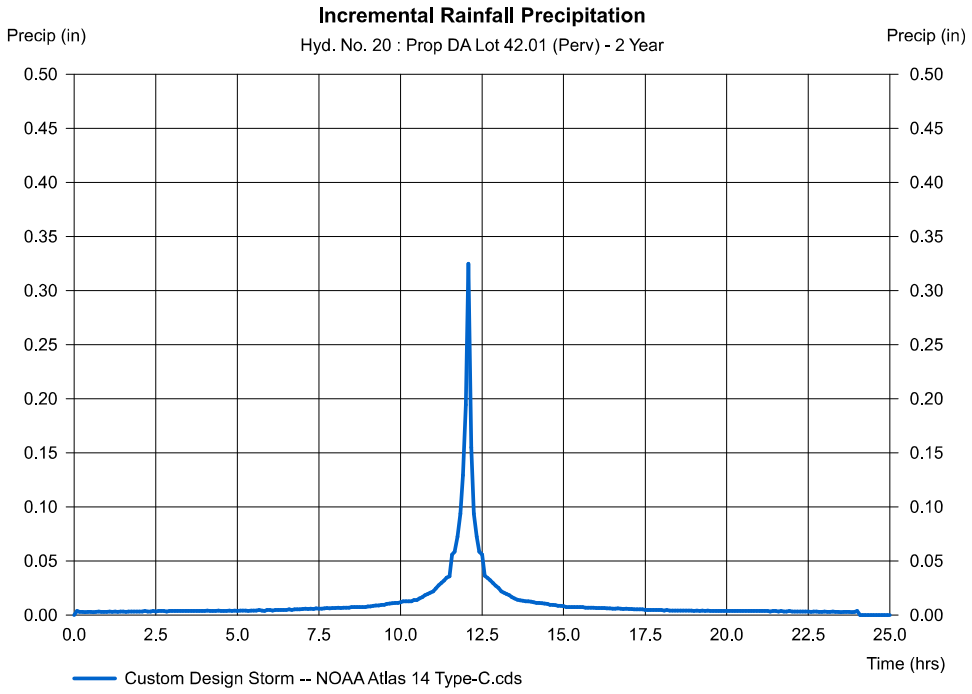


Precipitation Report

Hyd. No. 20

Prop DA Lot 42.01 (Perv)

Storm Frequency	= 2 yrs	Time interval	= 5 min
Total precip.	= 3.3400 in	Distribution	= Custom
Storm duration	= NOAA Atlas 14 Type-C.cds		

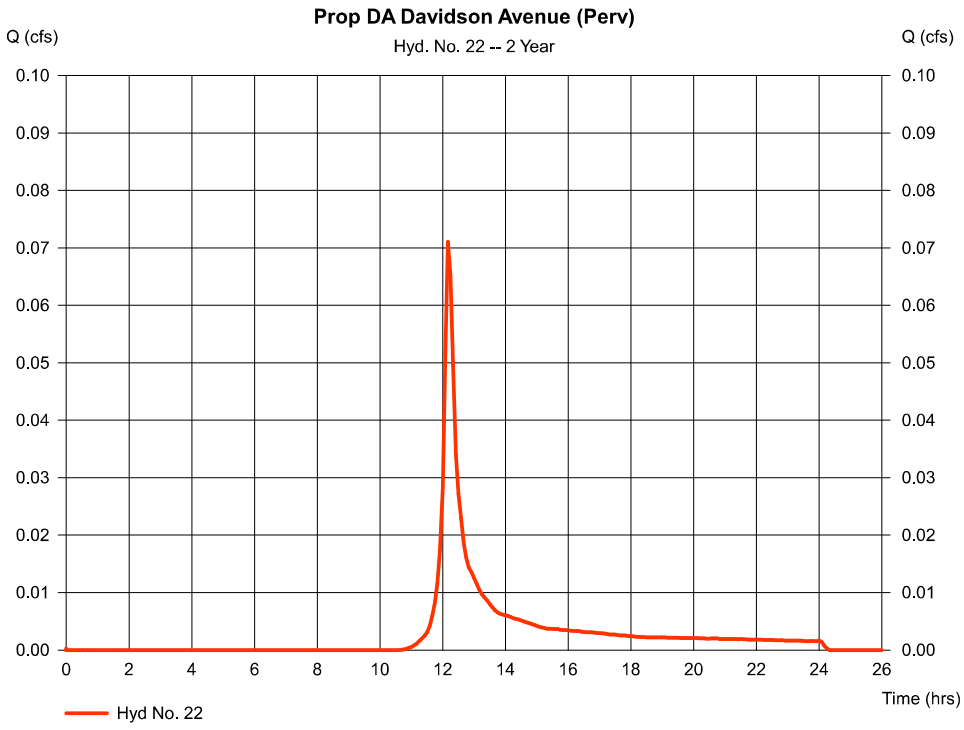


Hydrograph Report

Hyd. No. 22

Prop DA Davidson Avenue (Perv)

Hydrograph type	= SCS Runoff	Peak discharge	= 0.071 cfs
Storm frequency	= 2 yrs	Time to peak	= 12.17 hrs
Time interval	= 5 min	Hyd. volume	= 269 cuft
Drainage area	= 0.070 ac	Curve number	= 74
Basin Slope	= 0.0 %	Hydraulic length	= 0 ft
Tc method	= USER	Time of conc. (Tc)	= 10.00 min
Total precip.	= 3.34 in	Distribution	= Custom
Storm duration	= NOAA Atlas 14 Type-C.cds	Shape factor	= 484

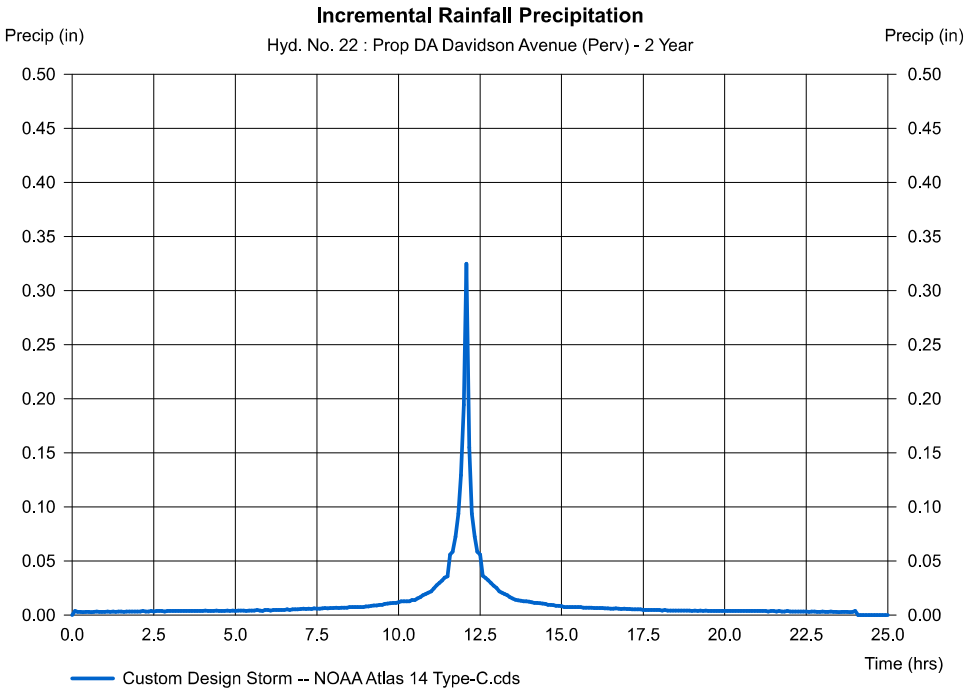


Precipitation Report

Hyd. No. 22

Prop DA Davidson Avenue (Perv)

Storm Frequency	= 2 yrs	Time interval	= 5 min
Total precip.	= 3.3400 in	Distribution	= Custom
Storm duration	= NOAA Atlas 14 Type-C.cds		

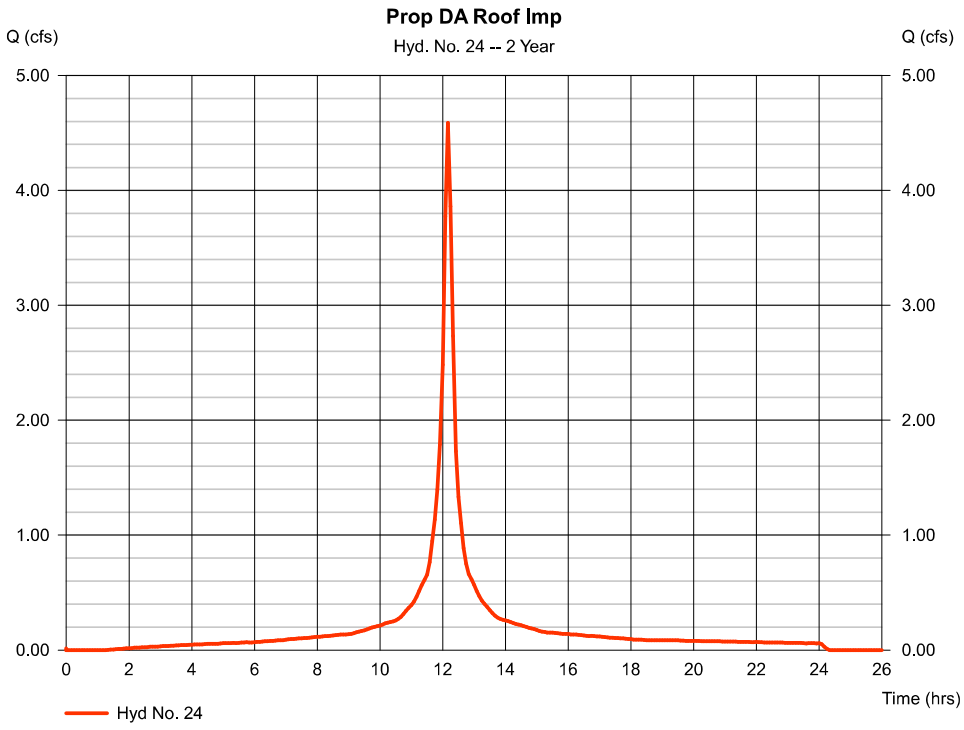


Hydrograph Report

Hyd. No. 24

Prop DA Roof Imp

Hydrograph type	= SCS Runoff	Peak discharge	= 4.587 cfs
Storm frequency	= 2 yrs	Time to peak	= 12.17 hrs
Time interval	= 5 min	Hyd. volume	= 18,821 cuft
Drainage area	= 1.780 ac	Curve number	= 98
Basin Slope	= 0.0 %	Hydraulic length	= 0 ft
Tc method	= USER	Time of conc. (Tc)	= 10.00 min
Total precip.	= 3.34 in	Distribution	= Custom
Storm duration	= NOAA Atlas 14 Type-C.cds	Shape factor	= 484

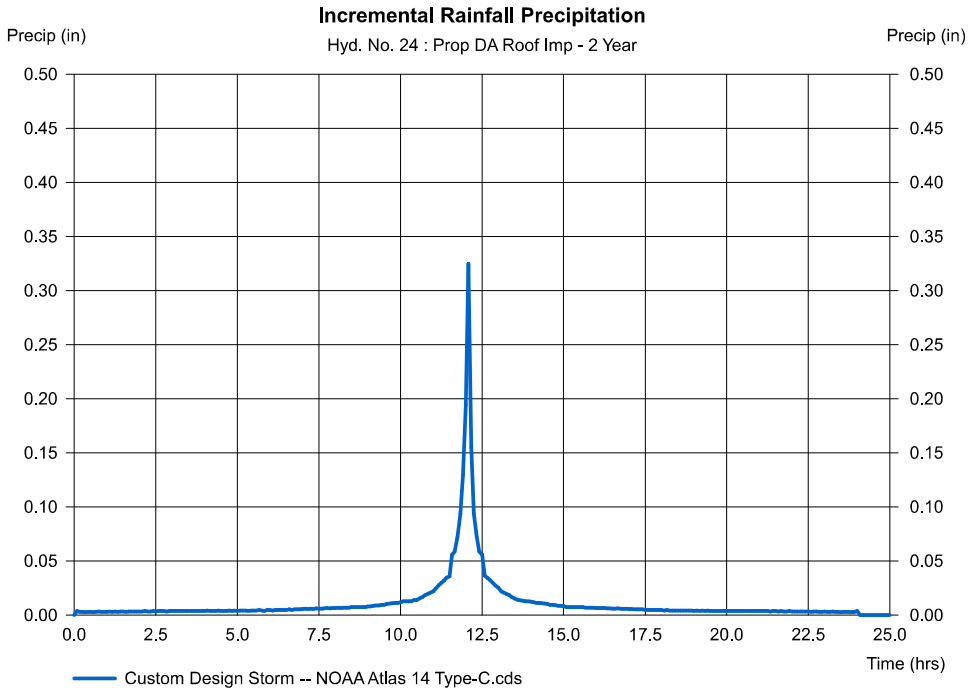


Precipitation Report

Hyd. No. 24

Prop DA Roof Imp

Storm Frequency	= 2 yrs	Time interval	= 5 min
Total precip.	= 3.3400 in	Distribution	= Custom
Storm duration	= NOAA Atlas 14 Type-C.cds		

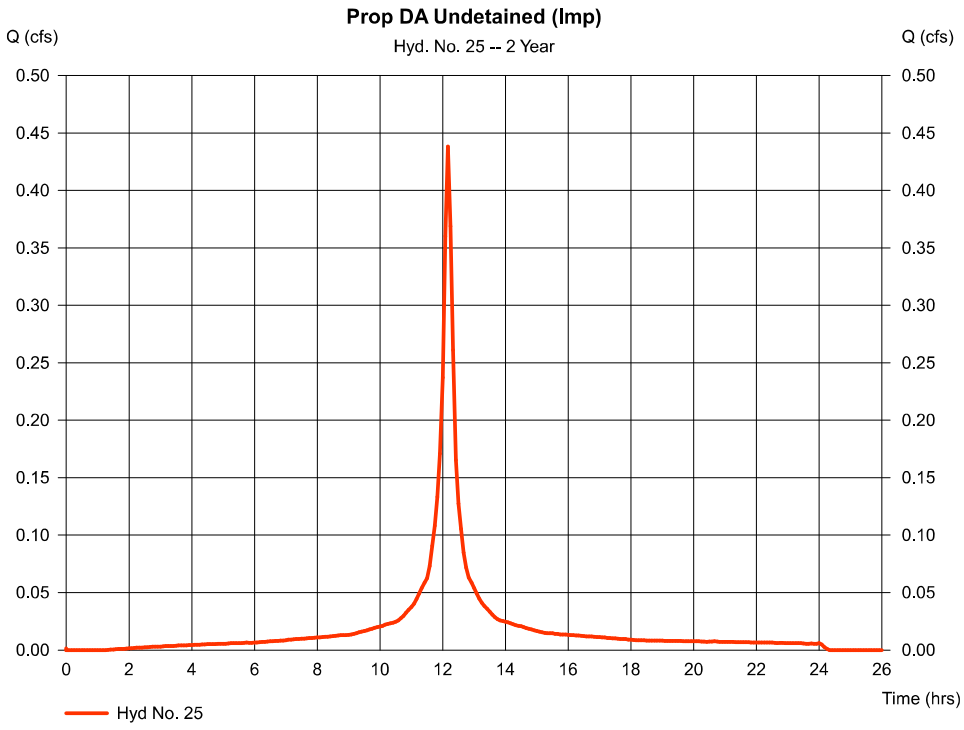


Hydrograph Report

Hyd. No. 25

Prop DA Undetained (Imp)

Hydrograph type	=	SCS Runoff	Peak discharge	=	0.438 cfs
Storm frequency	=	2 yrs	Time to peak	=	12.17 hrs
Time interval	=	5 min	Hyd. volume	=	1,797 cuft
Drainage area	=	0.170 ac	Curve number	=	98
Basin Slope	=	0.0 %	Hydraulic length	=	0 ft
Tc method	=	USER	Time of conc. (Tc)	=	14.00 min
Total precip.	=	3.34 in	Distribution	=	Custom
Storm duration	=	NOAA Atlas 14 Type-C.cds	Shape factor	=	484

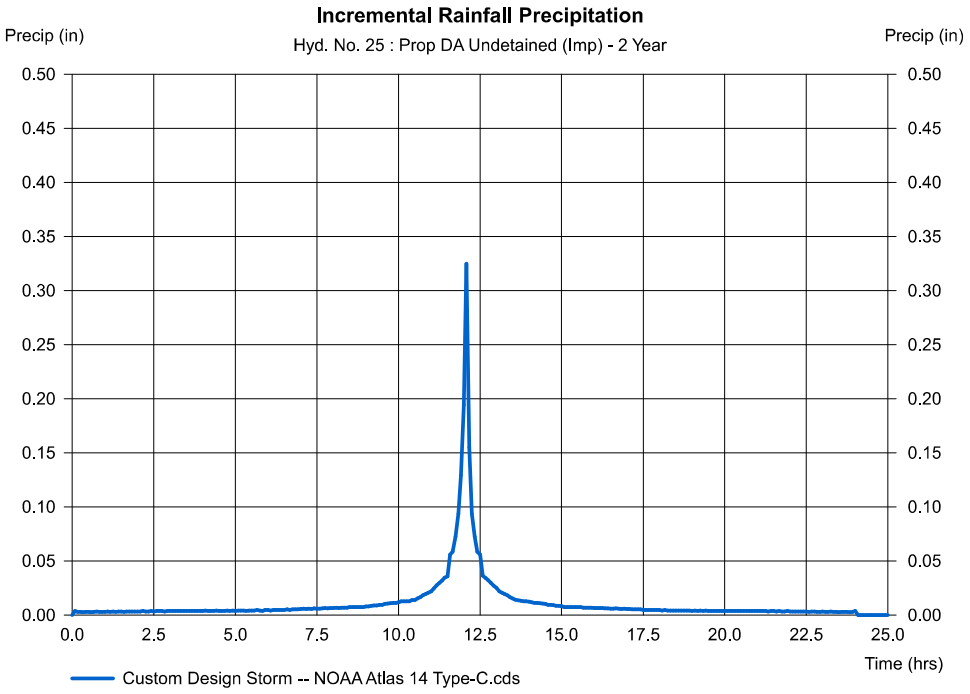


Precipitation Report

Hyd. No. 25

Prop DA Undetained (Imp)

Storm Frequency	=	2 yrs	Time interval	=	5 min
Total precip.	=	3.3400 in	Distribution	=	Custom
Storm duration	=	NOAA Atlas 14 Type-C.cds			

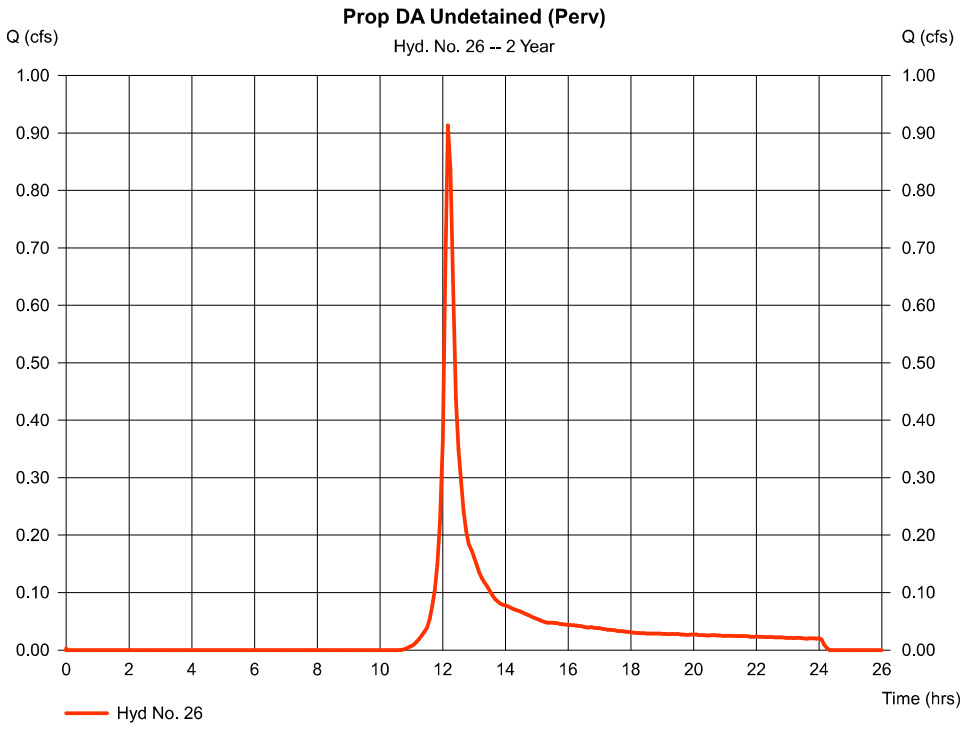


Hydrograph Report

Hyd. No. 26

Prop DA Undetained (Perv)

Hydrograph type	= SCS Runoff	Peak discharge	= 0.913 cfs
Storm frequency	= 2 yrs	Time to peak	= 12.17 hrs
Time interval	= 5 min	Hyd. volume	= 3,463 cuft
Drainage area	= 0.900 ac	Curve number	= 74
Basin Slope	= 0.0 %	Hydraulic length	= 0 ft
Tc method	= USER	Time of conc. (Tc)	= 14.00 min
Total precip.	= 3.34 in	Distribution	= Custom
Storm duration	= NOAA Atlas 14 Type-C.cds	Shape factor	= 484

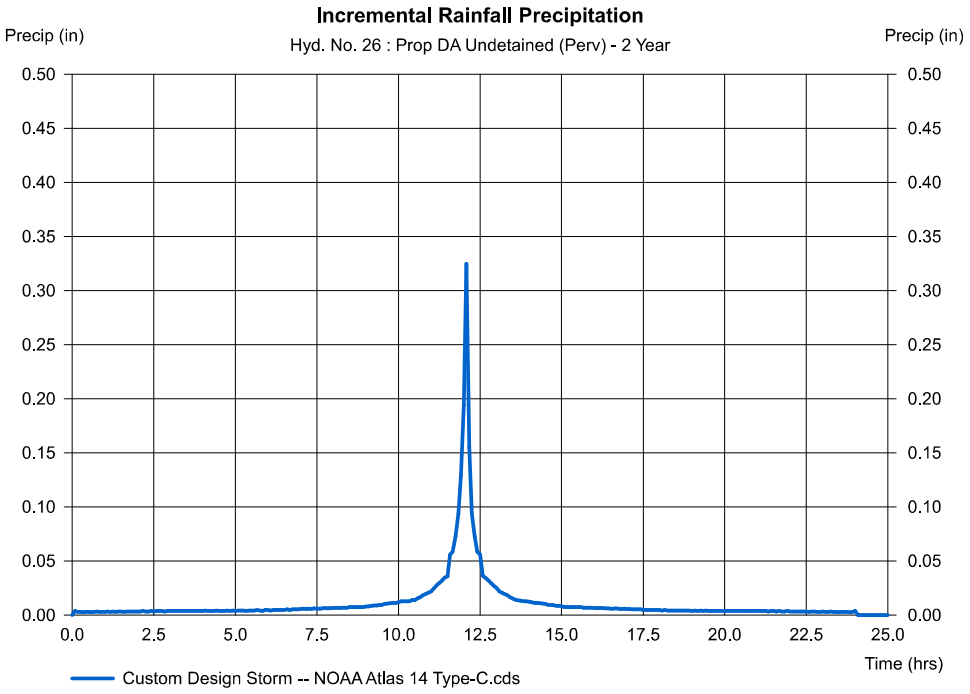


Precipitation Report

Hyd. No. 26

Prop DA Undetained (Perv)

Storm Frequency	= 2 yrs	Time interval	= 5 min
Total precip.	= 3.3400 in	Distribution	= Custom
Storm duration	= NOAA Atlas 14 Type-C.cds		

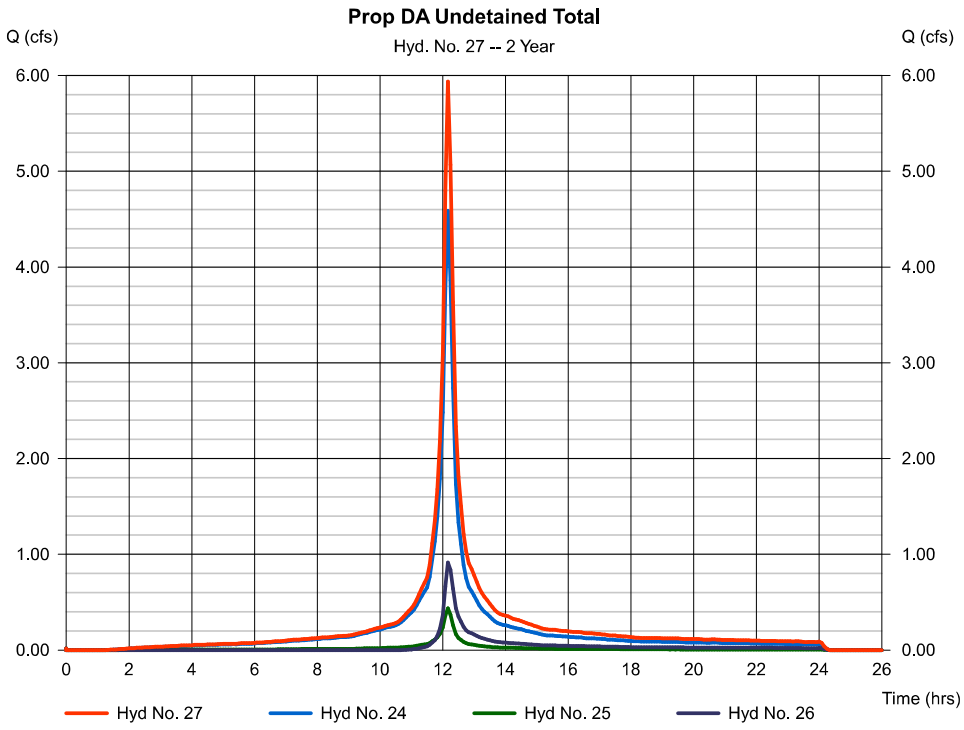


Hydrograph Report

Hyd. No. 27

Prop DA Undetained Total

Hydrograph type	= Combine	Peak discharge	= 5.939 cfs
Storm frequency	= 2 yrs	Time to peak	= 12.17 hrs
Time interval	= 5 min	Hyd. volume	= 24,082 cuft
Inflow hyds.	= 24, 25, 26	Contrib. drain. area	= 2.850 ac

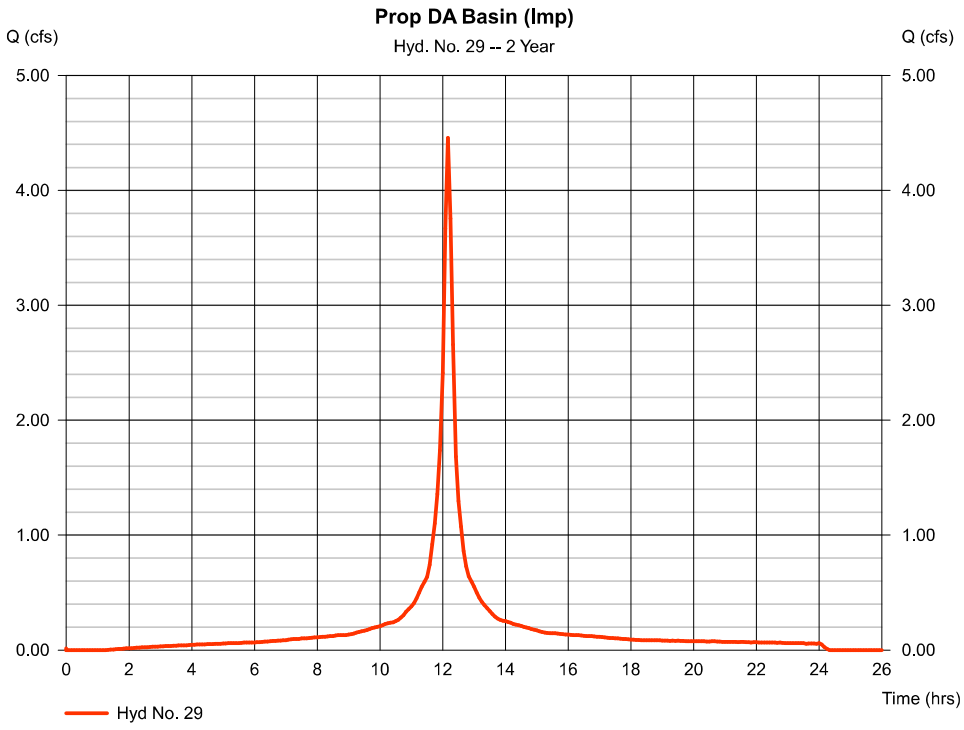


Hydrograph Report

Hyd. No. 29

Prop DA Basin (Imp)

Hydrograph type	= SCS Runoff	Peak discharge	= 4.459 cfs
Storm frequency	= 2 yrs	Time to peak	= 12.17 hrs
Time interval	= 5 min	Hyd. volume	= 18,292 cuft
Drainage area	= 1.730 ac	Curve number	= 98
Basin Slope	= 0.0 %	Hydraulic length	= 0 ft
Tc method	= USER	Time of conc. (Tc)	= 10.00 min
Total precip.	= 3.34 in	Distribution	= Custom
Storm duration	= NOAA Atlas 14 Type-C.cds	Shape factor	= 484

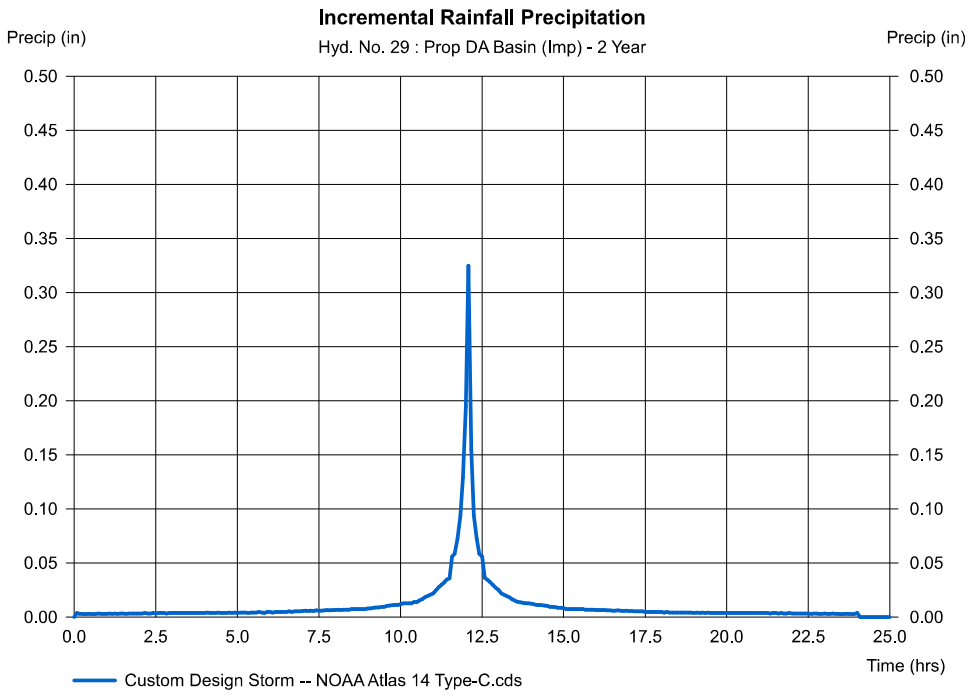


Precipitation Report

Hyd. No. 29

Prop DA Basin (Imp)

Storm Frequency	= 2 yrs	Time interval	= 5 min
Total precip.	= 3.3400 in	Distribution	= Custom
Storm duration	= NOAA Atlas 14 Type-C.cds		

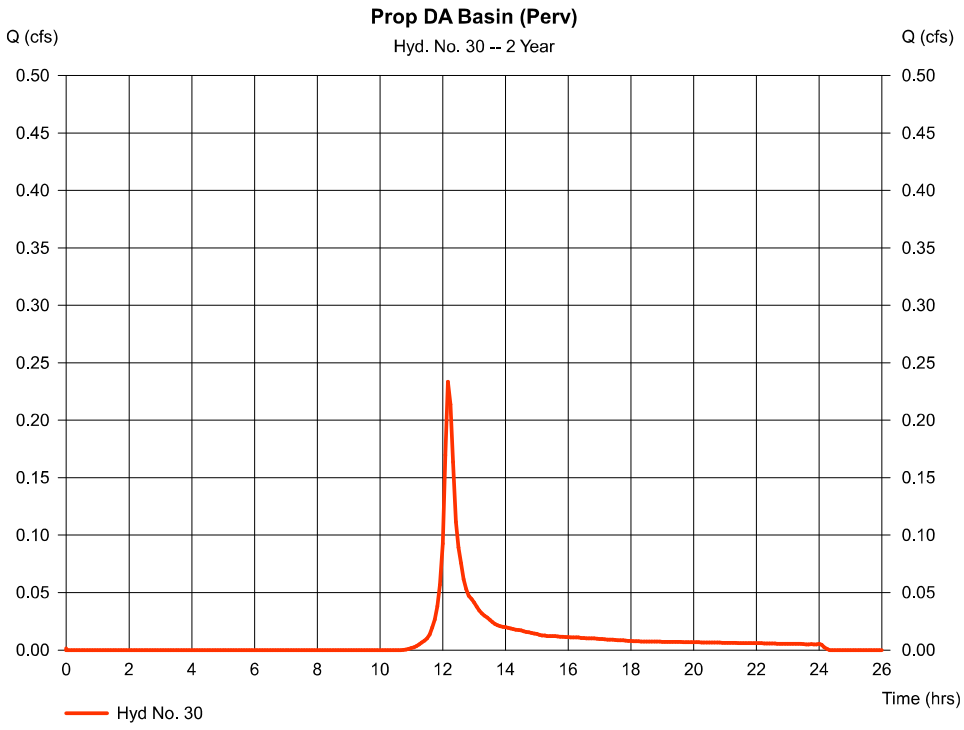


Hydrograph Report

Hyd. No. 30

Prop DA Basin (Perv)

Hydrograph type	= SCS Runoff	Peak discharge	= 0.233 cfs
Storm frequency	= 2 yrs	Time to peak	= 12.17 hrs
Time interval	= 5 min	Hyd. volume	= 885 cuft
Drainage area	= 0.230 ac	Curve number	= 74
Basin Slope	= 0.0 %	Hydraulic length	= 0 ft
Tc method	= USER	Time of conc. (Tc)	= 10.00 min
Total precip.	= 3.34 in	Distribution	= Custom
Storm duration	= NOAA Atlas 14 Type-C.cds	Shape factor	= 484

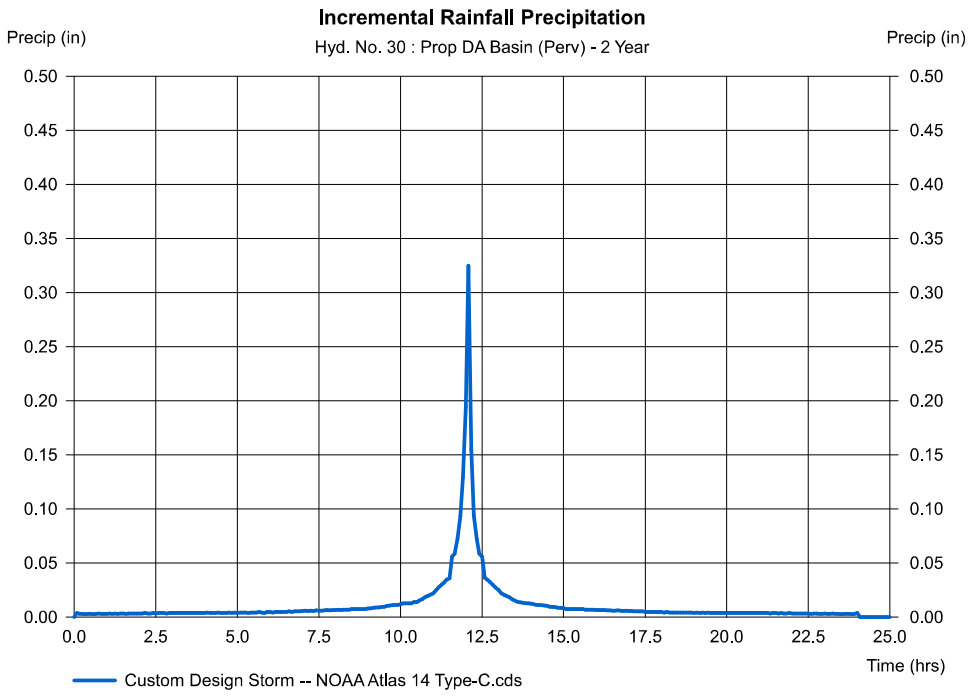


Precipitation Report

Hyd. No. 30

Prop DA Basin (Perv)

Storm Frequency	= 2 yrs	Time interval	= 5 min
Total precip.	= 3.3400 in	Distribution	= Custom
Storm duration	= NOAA Atlas 14 Type-C.cds		

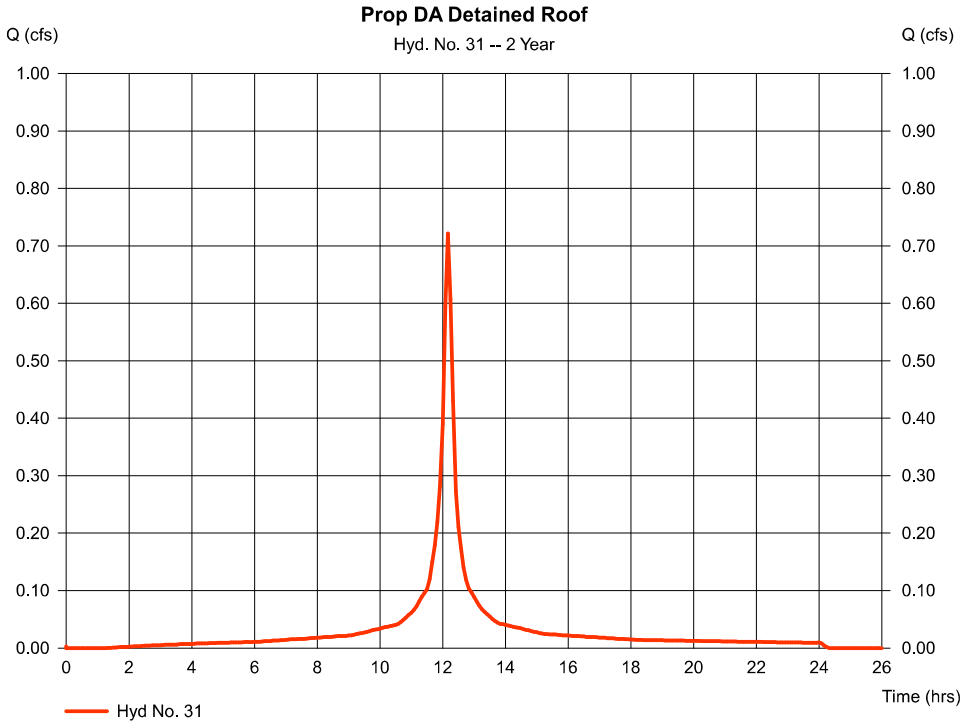


Hydrograph Report

Hyd. No. 31

Prop DA Detained Roof

Hydrograph type	= SCS Runoff	Peak discharge	= 0.722 cfs
Storm frequency	= 2 yrs	Time to peak	= 12.17 hrs
Time interval	= 5 min	Hyd. volume	= 2,961 cuft
Drainage area	= 0.280 ac	Curve number	= 98
Basin Slope	= 0.0 %	Hydraulic length	= 0 ft
Tc method	= USER	Time of conc. (Tc)	= 10.00 min
Total precip.	= 3.34 in	Distribution	= Custom
Storm duration	= NOAA Atlas 14 Type-C.cds	Shape factor	= 484

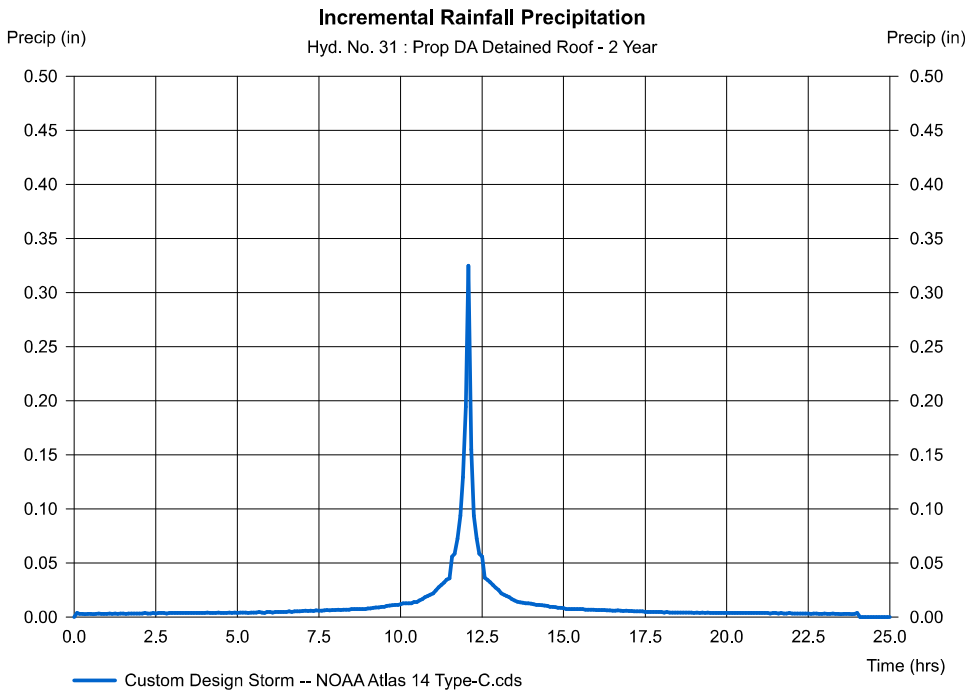


Precipitation Report

Hyd. No. 31

Prop DA Detained Roof

Storm Frequency	= 2 yrs	Time interval	= 5 min
Total precip.	= 3.3400 in	Distribution	= Custom
Storm duration	= NOAA Atlas 14 Type-C.cds		

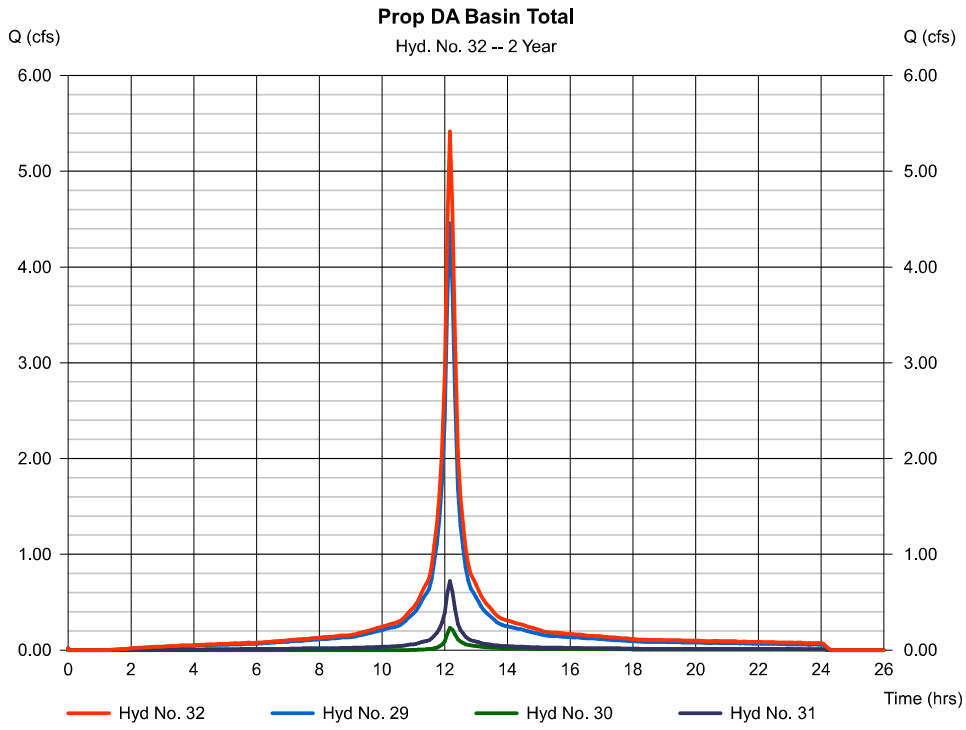


Hydrograph Report

Hyd. No. 32

Prop DA Basin Total

Hydrograph type	= Combine	Peak discharge	= 5.414 cfs
Storm frequency	= 2 yrs	Time to peak	= 12.17 hrs
Time interval	= 5 min	Hyd. volume	= 22,138 cuft
Inflow hyds.	= 29, 30, 31	Contrib. drain. area	= 2.240 ac



Hydrograph Report

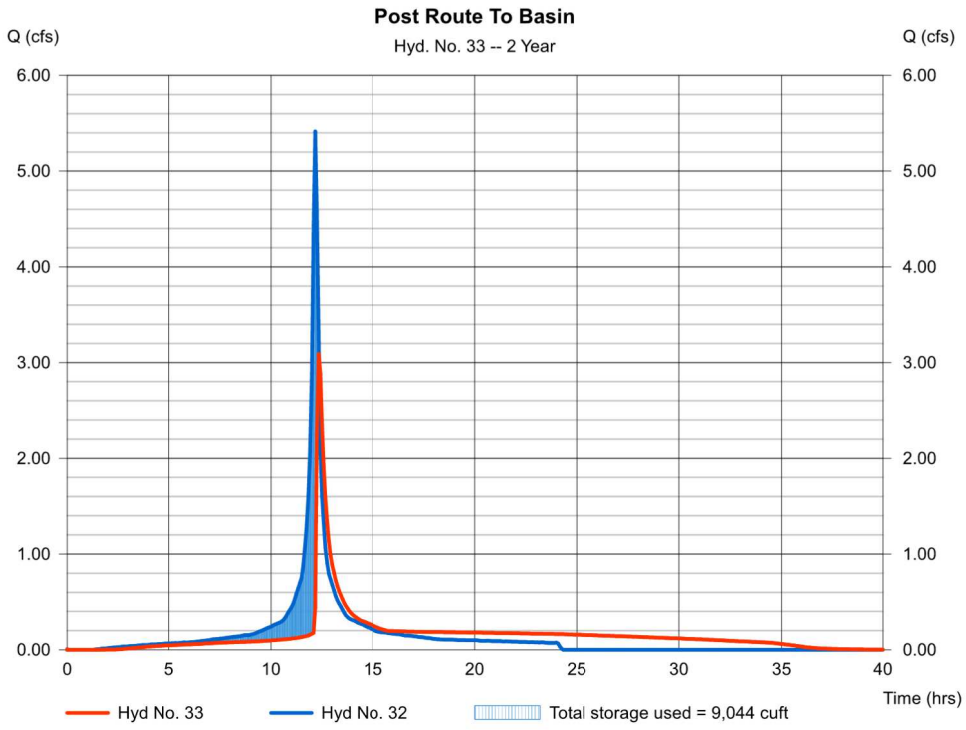
Hydraflow Hydrographs by Intelisolve v9.1 — Friday, Dec 2, 2022

Hyd. No. 33

Post Route To Basin

Hydrograph type	= Reservoir	Peak discharge	= 3.090 cfs
Storm frequency	= 2 yrs	Time to peak	= 12.33 hrs
Time interval	= 5 min	Hyd. volume	= 22,123 cuft
Inflow hyd. No.	= 32 - Prop DA Basin Total	Max. Elevation	= 58.13 ft
Reservoir name	= UG Basin	Max. Storage	= 9,044 cuft

Storage Indication method used.



Pond Report

Hydraflow Hydrographs by Intelisolve v9.1 — Friday, Dec 2, 2022

Pond No. 1 - UG Basin

Pond Data

UG Chambers - Invert elev. = 55.50 ft, Rise x Span = 4.00 x 4.00 ft, Barrel Len = 98.00 ft, No. Barrels = 10, Slope = 0.25%, Headers = Yes

Stage / Storage Table

Stage (ft)	Elevation (ft)	Contour area (sqft)	Incr. Storage (cuft)	Total storage (cuft)
0.00	55.50	n/a	0	0
0.42	55.92	n/a	485	485
0.85	56.35	n/a	1,230	1,716
1.27	56.77	n/a	1,569	3,285
1.70	57.20	n/a	1,758	5,043
2.12	57.62	n/a	1,847	6,890
2.55	58.05	n/a	1,845	8,735
2.97	58.47	n/a	1,759	10,494
3.40	58.90	n/a	1,569	12,063
3.82	59.32	n/a	1,228	13,291
4.25	59.75	n/a	484	13,775

Culvert / Orifice Structures

	[A]	[B]	[C]	[PrfRsr]
Rise (in)	= 18.00	2.25	5.00	0.00
Span (in)	= 18.00	2.25	38.00	0.00
No. Barrels	= 1	1	1	0
Invert El. (ft)	= 55.50	55.50	57.70	0.00
Length (ft)	= 46.00	0.00	0.00	0.00
Slope (%)	= 5.43	0.00	0.00	n/a
N-Value	= .013	.013	.013	n/a
Orifice Coeff.	= 0.60	0.60	0.60	0.60
Multi-Stage	= n/a	Yes	Yes	No

Weir Structures

	[A]	[B]	[C]	[D]
Crest Len (ft)	= 2.25	0.00	0.00	0.00
Crest El. (ft)	= 58.95	0.00	0.00	0.00
Weir Coeff.	= 3.33	3.33	3.33	3.33
Weir Type	= Rect	---	---	---
Multi-Stage	= Yes	No	No	No

Exfil.(in/hr) = 0.000 (by Wet area)

TW Elev. (ft) = 0.00

Note: Culvert/Orifice outflows are analyzed under inlet (ic) and outlet (oc) control. Weir risers checked for orifice conditions (ic) and submergence (s).

Stage / Storage / Discharge Table

Stage ft	Storage cuft	Elevation ft	Clv A cfs	Clv B cfs	Clv C cfs	PrfRsr cfs	Wr A cfs	Wr B cfs	Wr C cfs	Wr D cfs	Exfil cfs	User cfs	Total cfs
0.00	0	55.50	0.00	0.00	0.00	---	0.00	---	---	---	---	---	0.00
0.04	49	55.54	0.00 ic	0.00 ic	0.00	---	0.00	---	---	---	---	---	0.00
0.08	97	55.58	0.01 ic	0.01 ic	0.00	---	0.00	---	---	---	---	---	0.01
0.13	146	55.63	0.02 ic	0.02 ic	0.00	---	0.00	---	---	---	---	---	0.02
0.17	194	55.67	0.04 ic	0.04 ic	0.00	---	0.00	---	---	---	---	---	0.04
0.21	243	55.71	0.05 ic	0.05 ic	0.00	---	0.00	---	---	---	---	---	0.05
0.25	291	55.75	0.05 ic	0.05 ic	0.00	---	0.00	---	---	---	---	---	0.05
0.30	340	55.80	0.06 ic	0.06 ic	0.00	---	0.00	---	---	---	---	---	0.06
0.34	388	55.84	0.06 ic	0.06 ic	0.00	---	0.00	---	---	---	---	---	0.06
0.38	437	55.88	0.07 ic	0.07 ic	0.00	---	0.00	---	---	---	---	---	0.07
0.42	485	55.92	0.07 ic	0.07 ic	0.00	---	0.00	---	---	---	---	---	0.07
0.47	609	55.97	0.08 ic	0.08 ic	0.00	---	0.00	---	---	---	---	---	0.08
0.51	732	56.01	0.09 ic	0.08 ic	0.00	---	0.00	---	---	---	---	---	0.08
0.55	855	56.05	0.09 ic	0.09 ic	0.00	---	0.00	---	---	---	---	---	0.09
0.59	978	56.09	0.09 ic	0.09 ic	0.00	---	0.00	---	---	---	---	---	0.09
0.64	1,101	56.14	0.10 ic	0.09 ic	0.00	---	0.00	---	---	---	---	---	0.09
0.68	1,224	56.18	0.10 ic	0.10 ic	0.00	---	0.00	---	---	---	---	---	0.10
0.72	1,347	56.22	0.11 ic	0.10 ic	0.00	---	0.00	---	---	---	---	---	0.10
0.76	1,470	56.26	0.11 ic	0.11 ic	0.00	---	0.00	---	---	---	---	---	0.11
0.81	1,593	56.31	0.11 ic	0.11 ic	0.00	---	0.00	---	---	---	---	---	0.11
0.85	1,716	56.35	0.12 ic	0.11 ic	0.00	---	0.00	---	---	---	---	---	0.11
0.89	1,873	56.39	0.12 ic	0.11 ic	0.00	---	0.00	---	---	---	---	---	0.11
0.93	2,030	56.43	0.12 ic	0.12 ic	0.00	---	0.00	---	---	---	---	---	0.12
0.98	2,187	56.48	0.12 ic	0.12 ic	0.00	---	0.00	---	---	---	---	---	0.12
1.02	2,343	56.52	0.13 ic	0.12 ic	0.00	---	0.00	---	---	---	---	---	0.12
1.06	2,500	56.56	0.13 ic	0.13 ic	0.00	---	0.00	---	---	---	---	---	0.13
1.10	2,657	56.60	0.13 ic	0.13 ic	0.00	---	0.00	---	---	---	---	---	0.13
1.15	2,814	56.65	0.13 ic	0.13 ic	0.00	---	0.00	---	---	---	---	---	0.13
1.19	2,971	56.69	0.14 ic	0.13 ic	0.00	---	0.00	---	---	---	---	---	0.13
1.23	3,128	56.73	0.14 ic	0.14 ic	0.00	---	0.00	---	---	---	---	---	0.14
1.27	3,285	56.77	0.14 ic	0.14 ic	0.00	---	0.00	---	---	---	---	---	0.14
1.32	3,461	56.82	0.14 ic	0.14 ic	0.00	---	0.00	---	---	---	---	---	0.14
1.36	3,637	56.86	0.15 ic	0.15 ic	0.00	---	0.00	---	---	---	---	---	0.15

Continues on next page...

UG Basin

Stage / Storage / Discharge Table

Stage ft	Storage cuft	Elevation ft	Clv A cfs	Clv B cfs	Clv C cfs	PrfRsr cfs	Wr A cfs	Wr B cfs	Wr C cfs	Wr D cfs	Exfil cfs	User cfs	Total cfs
1.40	3,812	56.90	0.16 ic	0.15 ic	0.00	---	0.00	---	---	---	---	---	0.15
1.44	3,988	56.94	0.16 ic	0.15 ic	0.00	---	0.00	---	---	---	---	---	0.15
1.49	4,164	56.99	0.16 ic	0.15 ic	0.00	---	0.00	---	---	---	---	---	0.15
1.53	4,340	57.03	0.16 ic	0.16 ic	0.00	---	0.00	---	---	---	---	---	0.16
1.57	4,516	57.07	0.16 ic	0.16 ic	0.00	---	0.00	---	---	---	---	---	0.16
1.61	4,691	57.11	0.17 ic	0.16 ic	0.00	---	0.00	---	---	---	---	---	0.16
1.66	4,867	57.16	0.17 ic	0.16 ic	0.00	---	0.00	---	---	---	---	---	0.16
1.70	5,043	57.20	0.17 ic	0.16 ic	0.00	---	0.00	---	---	---	---	---	0.16
1.74	5,228	57.24	0.17 ic	0.17 ic	0.00	---	0.00	---	---	---	---	---	0.17
1.78	5,412	57.28	0.17 ic	0.17 ic	0.00	---	0.00	---	---	---	---	---	0.17
1.83	5,597	57.33	0.17 ic	0.17 ic	0.00	---	0.00	---	---	---	---	---	0.17
1.87	5,782	57.37	0.17 ic	0.17 ic	0.00	---	0.00	---	---	---	---	---	0.17
1.91	5,967	57.41	0.18 ic	0.17 ic	0.00	---	0.00	---	---	---	---	---	0.17
1.95	6,151	57.45	0.18 ic	0.18 ic	0.00	---	0.00	---	---	---	---	---	0.18
2.00	6,336	57.50	0.18 ic	0.18 ic	0.00	---	0.00	---	---	---	---	---	0.18
2.04	6,521	57.54	0.18 ic	0.18 ic	0.00	---	0.00	---	---	---	---	---	0.18
2.08	6,705	57.58	0.18 ic	0.18 ic	0.00	---	0.00	---	---	---	---	---	0.18
2.12	6,890	57.62	0.19 ic	0.19 ic	0.00	---	0.00	---	---	---	---	---	0.19
2.16	7,075	57.66	0.19 ic	0.19 ic	0.00	---	0.00	---	---	---	---	---	0.19
2.21	7,259	57.71	0.20 ic	0.19 ic	0.01 ic	---	0.00	---	---	---	---	---	0.20
2.25	7,444	57.75	0.31 ic	0.19 ic	0.12 ic	---	0.00	---	---	---	---	---	0.31
2.29	7,628	57.79	0.49 ic	0.19 ic	0.30 ic	---	0.00	---	---	---	---	---	0.49
2.33	7,813	57.83	0.72 ic	0.19 ic	0.53 ic	---	0.00	---	---	---	---	---	0.72
2.38	7,997	57.88	1.02 ic	0.18 ic	0.80 ic	---	0.00	---	---	---	---	---	0.99
2.42	8,182	57.92	1.31 ic	0.18 ic	1.11 ic	---	0.00	---	---	---	---	---	1.29
2.46	8,366	57.96	1.65 ic	0.18 ic	1.45 ic	---	0.00	---	---	---	---	---	1.63
2.50	8,551	58.00	2.03 ic	0.18 ic	1.81 ic	---	0.00	---	---	---	---	---	1.99
2.55	8,735	58.05	2.38 ic	0.18 ic	2.20 ic	---	0.00	---	---	---	---	---	2.38
2.59	8,911	58.09	2.80 ic	0.18 ic	2.62 ic	---	0.00	---	---	---	---	---	2.80
2.63	9,087	58.13	3.18 ic	0.18 ic	3.00 ic	---	0.00	---	---	---	---	---	3.18
2.67	9,263	58.17	3.49 ic	0.18 ic	3.28 ic	---	0.00	---	---	---	---	---	3.45
2.72	9,439	58.22	3.72 ic	0.18 ic	3.53 ic	---	0.00	---	---	---	---	---	3.71
2.76	9,615	58.26	3.96 ic	0.18 ic	3.76 ic	---	0.00	---	---	---	---	---	3.94
2.80	9,791	58.30	4.19 ic	0.18 ic	3.98 ic	---	0.00	---	---	---	---	---	4.16
2.84	9,967	58.34	4.42 ic	0.18 ic	4.19 ic	---	0.00	---	---	---	---	---	4.37
2.89	10,143	58.39	4.57 ic	0.18 ic	4.39 ic	---	0.00	---	---	---	---	---	4.57
2.93	10,318	58.43	4.80 ic	0.18 ic	4.58 ic	---	0.00	---	---	---	---	---	4.77
2.97	10,494	58.47	4.95 ic	0.18 ic	4.77 ic	---	0.00	---	---	---	---	---	4.95
3.01	10,651	58.51	5.16 ic	0.18 ic	4.94 ic	---	0.00	---	---	---	---	---	5.13
3.06	10,808	58.56	5.30 ic	0.18 ic	5.11 ic	---	0.00	---	---	---	---	---	5.30
3.10	10,965	58.60	5.50 ic	0.18 ic	5.28 ic	---	0.00	---	---	---	---	---	5.46
3.14	11,122	58.64	5.63 ic	0.19 ic	5.44 ic	---	0.00	---	---	---	---	---	5.62
3.18	11,279	58.68	5.78 ic	0.19 ic	5.59 ic	---	0.00	---	---	---	---	---	5.78
3.23	11,436	58.73	5.94 ic	0.19 ic	5.75 ic	---	0.00	---	---	---	---	---	5.93
3.27	11,593	58.77	6.11 ic	0.19 ic	5.89 ic	---	0.00	---	---	---	---	---	6.08
3.31	11,749	58.81	6.23 ic	0.19 ic	6.04 ic	---	0.00	---	---	---	---	---	6.23
3.35	11,906	58.85	6.38 ic	0.19 ic	6.18 ic	---	0.00	---	---	---	---	---	6.37
3.40	12,063	58.90	6.52 ic	0.19 ic	6.31 ic	---	0.00	---	---	---	---	---	6.50
3.44	12,186	58.94	6.65 ic	0.19 ic	6.45 ic	---	0.00	---	---	---	---	---	6.64
3.48	12,309	58.98	6.81 ic	0.19 ic	6.58 ic	---	0.04	---	---	---	---	---	6.81
3.52	12,432	59.02	7.05 ic	0.19 ic	6.71 ic	---	0.15	---	---	---	---	---	7.05
3.57	12,554	59.07	7.32 ic	0.19 ic	6.84 ic	---	0.30	---	---	---	---	---	7.32
3.61	12,677	59.11	7.62 ic	0.19 ic	6.96 ic	---	0.47	---	---	---	---	---	7.62
3.65	12,800	59.15	7.94 ic	0.19 ic	7.08 ic	---	0.67	---	---	---	---	---	7.94
3.69	12,923	59.19	8.29 ic	0.19 ic	7.20 ic	---	0.90	---	---	---	---	---	8.29
3.74	13,045	59.24	8.65 ic	0.19 ic	7.32 ic	---	1.14	---	---	---	---	---	8.65
3.78	13,168	59.28	9.03 ic	0.18 ic	7.44 ic	---	1.41	---	---	---	---	---	9.03
3.82	13,291	59.32	9.42 ic	0.18 ic	7.55 ic	---	1.69	---	---	---	---	---	9.42
3.86	13,339	59.36	9.83 ic	0.18 ic	7.66 ic	---	1.99	---	---	---	---	---	9.83
3.91	13,388	59.41	10.25 ic	0.17 ic	7.77 ic	---	2.30	---	---	---	---	---	10.25
3.95	13,436	59.45	10.68 ic	0.17 ic	7.88 ic	---	2.63	---	---	---	---	---	10.68
3.99	13,485	59.49	11.06 ic	0.17 ic	7.91 ic	---	2.98	---	---	---	---	---	11.06
4.03	13,533	59.53	11.31 ic	0.16 ic	7.82 ic	---	3.33	---	---	---	---	---	11.31
4.08	13,581	59.58	11.58 ic	0.16 ic	7.71 ic	---	3.70	---	---	---	---	---	11.58
4.12	13,630	59.62	11.84 ic	0.16 ic	7.60 ic	---	4.09	---	---	---	---	---	11.84
4.16	13,678	59.66	12.11 ic	0.16 ic	7.47 ic	---	4.48	---	---	---	---	---	12.11
4.20	13,727	59.70	12.38 ic	0.15 ic	7.34 ic	---	4.89	---	---	---	---	---	12.38
4.25	13,775	59.75	12.66 ic	0.15 ic	7.19 ic	---	5.31	---	---	---	---	---	12.66

...End

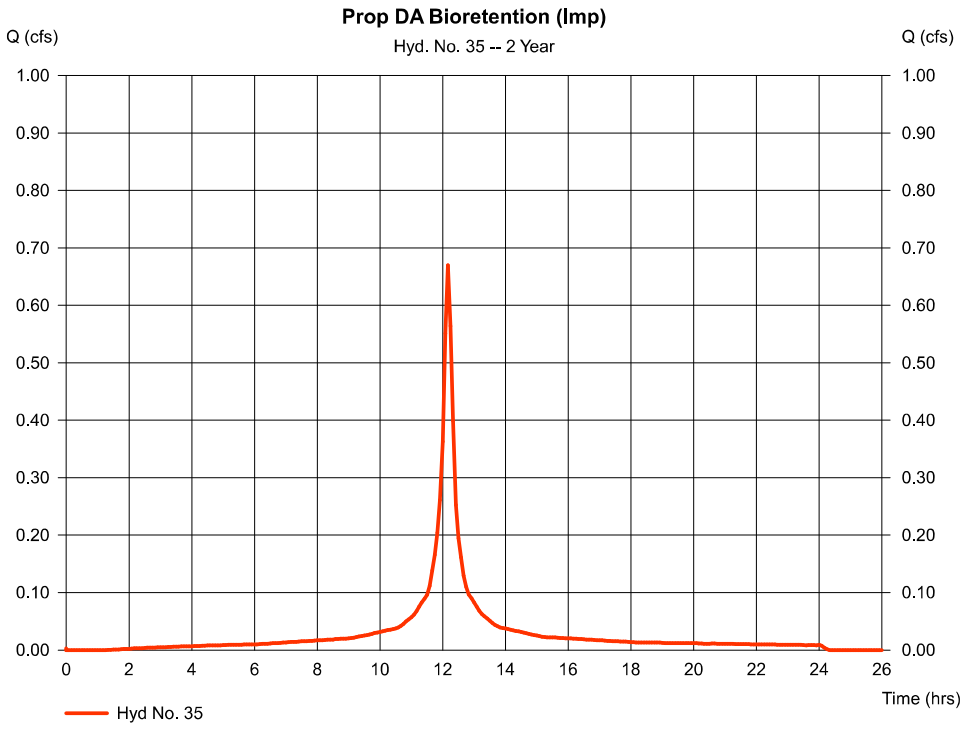
Hydrograph Report

Hydraflow Hydrographs by Intelisolve v9.1 — Friday, Dec 2, 2022

Hyd. No. 35

Prop DA Bioretention (Imp)

Hydrograph type	= SCS Runoff	Peak discharge	= 0.670 cfs
Storm frequency	= 2 yrs	Time to peak	= 12.17 hrs
Time interval	= 5 min	Hyd. volume	= 2,749 cuft
Drainage area	= 0.260 ac	Curve number	= 98
Basin Slope	= 0.0 %	Hydraulic length	= 0 ft
Tc method	= USER	Time of conc. (Tc)	= 14.00 min
Total precip.	= 3.34 in	Distribution	= Custom
Storm duration	= NOAA Atlas 14 Type-C.cds	Shape factor	= 484

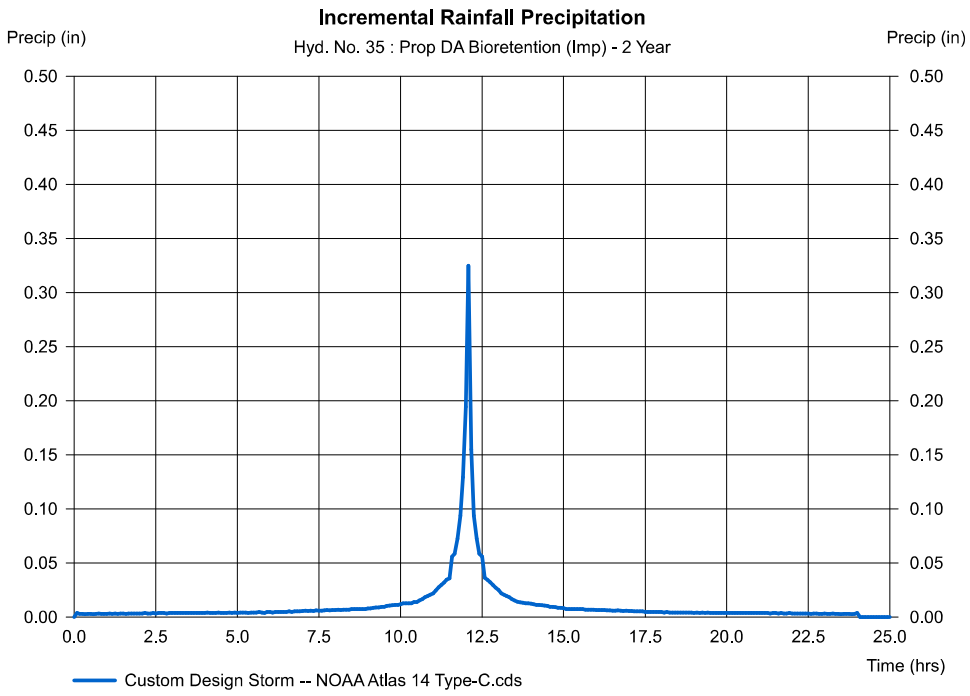


Precipitation Report

Hyd. No. 35

Prop DA Bioretention (Imp)

Storm Frequency	= 2 yrs	Time interval	= 5 min
Total precip.	= 3.3400 in	Distribution	= Custom
Storm duration	= NOAA Atlas 14 Type-C.cds		

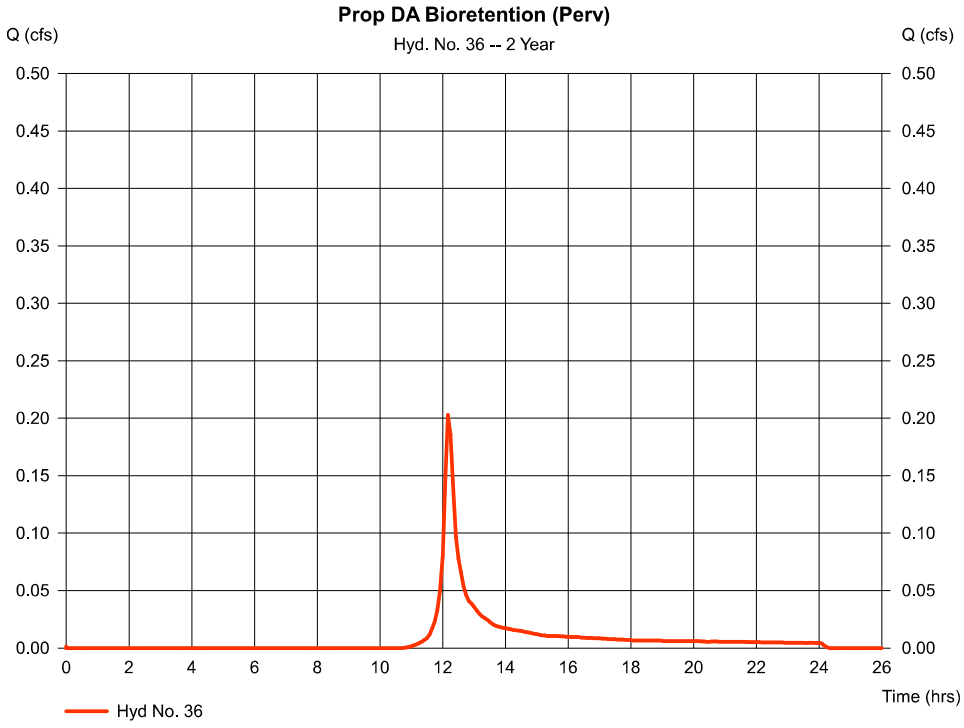


Hydrograph Report

Hyd. No. 36

Prop DA Bioretention (Perv)

Hydrograph type	= SCS Runoff	Peak discharge	= 0.203 cfs
Storm frequency	= 2 yrs	Time to peak	= 12.17 hrs
Time interval	= 5 min	Hyd. volume	= 770 cuft
Drainage area	= 0.200 ac	Curve number	= 74
Basin Slope	= 0.0 %	Hydraulic length	= 0 ft
Tc method	= USER	Time of conc. (Tc)	= 14.00 min
Total precip.	= 3.34 in	Distribution	= Custom
Storm duration	= NOAA Atlas 14 Type-C.cds	Shape factor	= 484

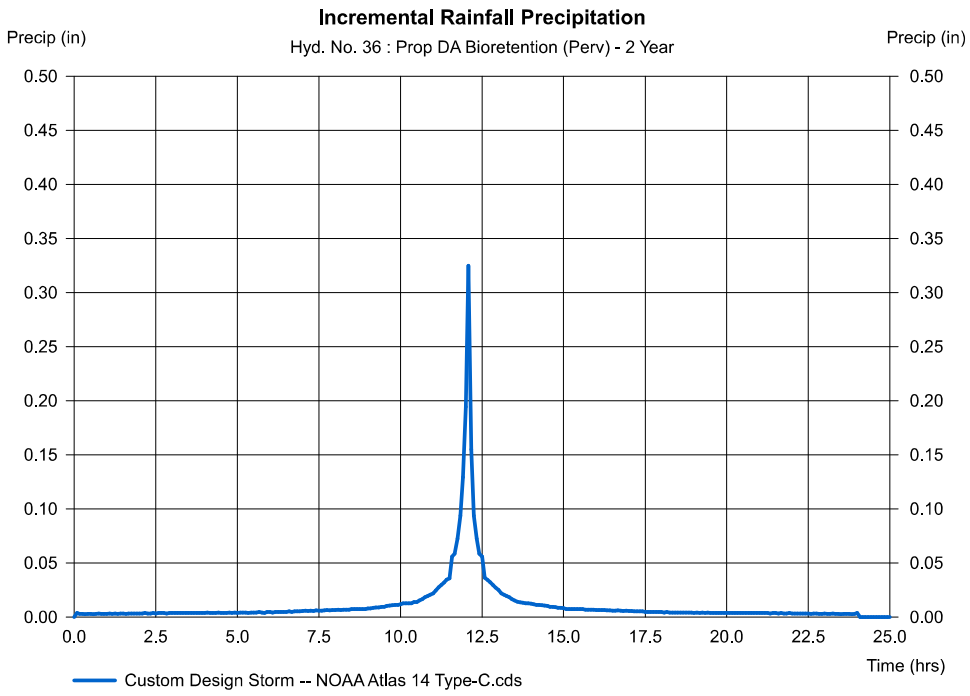


Precipitation Report

Hyd. No. 36

Prop DA Bioretention (Perv)

Storm Frequency	= 2 yrs	Time interval	= 5 min
Total precip.	= 3.3400 in	Distribution	= Custom
Storm duration	= NOAA Atlas 14 Type-C.cds		

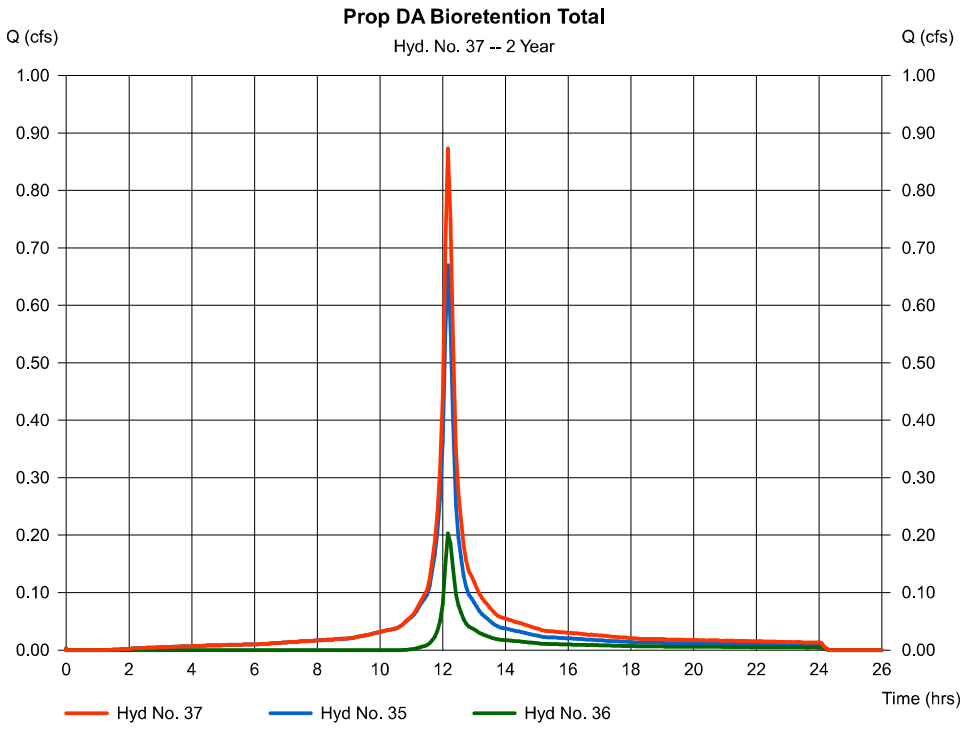


Hydrograph Report

Hyd. No. 37

Prop DA Bioretention Total

Hydrograph type	= Combine	Peak discharge	= 0.873 cfs
Storm frequency	= 2 yrs	Time to peak	= 12.17 hrs
Time interval	= 5 min	Hyd. volume	= 3,519 cuft
Inflow hyds.	= 35, 36	Contrib. drain. area	= 0.460 ac



Hydrograph Report

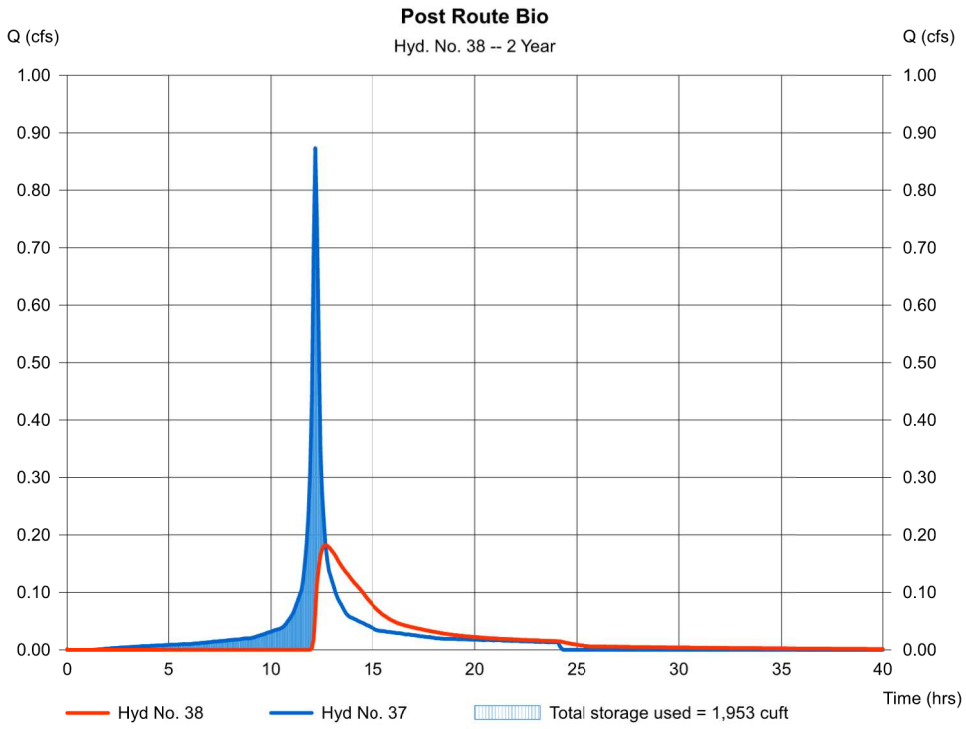
Hydraflow Hydrographs by Intelisolve v9.1 — Friday, Dec 2, 2022

Hyd. No. 38

Post Route Bio

Hydrograph type	= Reservoir	Peak discharge	= 0.182 cfs
Storm frequency	= 2 yrs	Time to peak	= 12.67 hrs
Time interval	= 5 min	Hyd. volume	= 2,577 cuft
Inflow hyd. No.	= 37 - Prop DA Bioretention Total	Max. Elevation	= 62.86 ft
Reservoir name	= Bioretention	Max. Storage	= 1,953 cuft

Storage Indication method used.



Pond Report

Hydraflow Hydrographs by Intelisolve v9.1 — Friday, Dec 2, 2022

Pond No. 2 - Bioretention

Pond Data

Contours - User-defined contour areas. Conic method used for volume calculation. Begining Elevation = 62.00 ft

Stage / Storage Table

Stage (ft)	Elevation (ft)	Contour area (sqft)	Incr. Storage (cuft)	Total storage (cuft)
0.00	62.00	1,800	0	0
1.00	63.00	2,755	2,260	2,260
2.00	64.00	3,775	3,251	5,512

Culvert / Orifice Structures

	[A]	[B]	[C]	[PrfRsr]
Rise (in)	= 15.00	3.50	2.00	0.00
Span (in)	= 15.00	3.50	8.00	0.00
No. Barrels	= 1	1	1	0
Invert El. (ft)	= 58.50	62.45	62.85	0.00
Length (ft)	= 17.00	0.00	0.00	0.00
Slope (%)	= 10.26	0.00	0.00	n/a
N-Value	= .013	.013	.013	n/a
Orifice Coeff.	= 0.60	0.60	0.60	0.60
Multi-Stage	= n/a	Yes	Yes	No

Weir Structures

	[A]	[B]	[C]	[D]
Crest Len (ft)	= 25.00	0.00	0.00	0.00
Crest El. (ft)	= 63.70	0.00	0.00	0.00
Weir Coeff.	= 3.33	3.33	3.33	3.33
Weir Type	= Rect	Rect	---	---
Multi-Stage	= Yes	No	No	No
Exfil.(in/hr)	= 0.000 (by Contour)			
TW Elev. (ft)	= 0.00			

Note: Culvert/Orifice outflows are analyzed under inlet (ic) and outlet (oc) control. Weir risers checked for orifice conditions (ic) and submergence (s).

Stage / Storage / Discharge Table

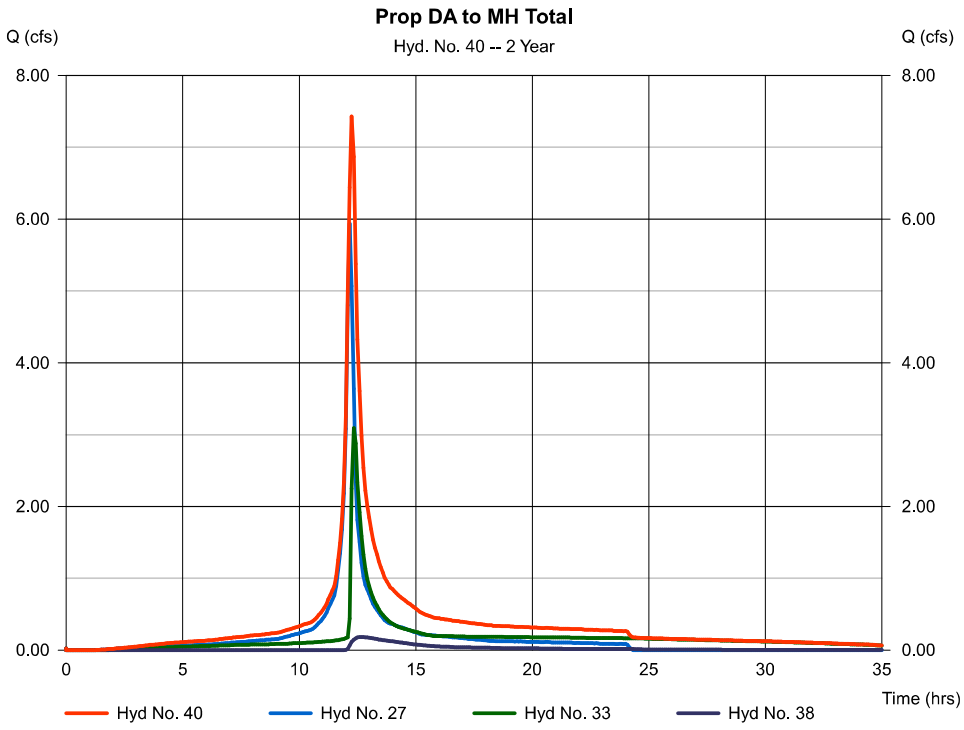
Stage ft	Storage cuft	Elevation ft	Clv A cfs	Clv B cfs	Clv C cfs	PrfRsr cfs	Wr A cfs	Wr B cfs	Wr C cfs	Wr D cfs	Exfil cfs	User cfs	Total cfs
0.00	0	62.00	0.00	0.00	0.00	---	0.00	---	---	---	---	---	0.00
0.10	226	62.10	10.02 ic	0.00	0.00	---	0.00	---	---	---	---	---	0.00
0.20	452	62.20	10.02 ic	0.00	0.00	---	0.00	---	---	---	---	---	0.00
0.30	678	62.30	10.02 ic	0.00	0.00	---	0.00	---	---	---	---	---	0.00
0.40	904	62.40	10.02 ic	0.00	0.00	---	0.00	---	---	---	---	---	0.00
0.50	1,130	62.50	10.02 ic	0.01 ic	0.00	---	0.00	---	---	---	---	---	0.01
0.60	1,356	62.60	10.02 ic	0.05 ic	0.00	---	0.00	---	---	---	---	---	0.05
0.70	1,582	62.70	10.02 ic	0.10 ic	0.00	---	0.00	---	---	---	---	---	0.10
0.80	1,808	62.80	10.02 ic	0.15 ic	0.00	---	0.00	---	---	---	---	---	0.15
0.90	2,034	62.90	10.02 ic	0.18 ic	0.03 ic	---	0.00	---	---	---	---	---	0.20
1.00	2,260	63.00	10.02 ic	0.20 ic	0.13 ic	---	0.00	---	---	---	---	---	0.34
1.10	2,586	63.10	10.02 ic	0.23 ic	0.22 ic	---	0.00	---	---	---	---	---	0.45
1.20	2,911	63.20	10.02 ic	0.25 ic	0.28 ic	---	0.00	---	---	---	---	---	0.53
1.30	3,236	63.30	10.02 ic	0.27 ic	0.32 ic	---	0.00	---	---	---	---	---	0.59
1.40	3,561	63.40	10.02 ic	0.29 ic	0.37 ic	---	0.00	---	---	---	---	---	0.65
1.50	3,886	63.50	10.02 ic	0.31 ic	0.40 ic	---	0.00	---	---	---	---	---	0.71
1.60	4,211	63.60	10.02 ic	0.32 ic	0.44 ic	---	0.00	---	---	---	---	---	0.76
1.70	4,536	63.70	10.02 ic	0.34 ic	0.47 ic	---	0.00	---	---	---	---	---	0.81
1.80	4,861	63.80	10.02 ic	0.35 ic	0.50 ic	---	2.63	---	---	---	---	---	3.48
1.90	5,187	63.90	10.02 ic	0.37 ic	0.53 ic	---	7.45	---	---	---	---	---	8.34
2.00	5,512	64.00	12.79 ic	0.14 ic	0.23 ic	---	12.41 s	---	---	---	---	---	12.79

Hydrograph Report

Hyd. No. 40

Prop DA to MH Total

Hydrograph type	= Combine	Peak discharge	= 7.430 cfs
Storm frequency	= 2 yrs	Time to peak	= 12.25 hrs
Time interval	= 5 min	Hyd. volume	= 48,781 cuft
Inflow hyds.	= 27, 33, 38	Contrib. drain. area	= 0.000 ac

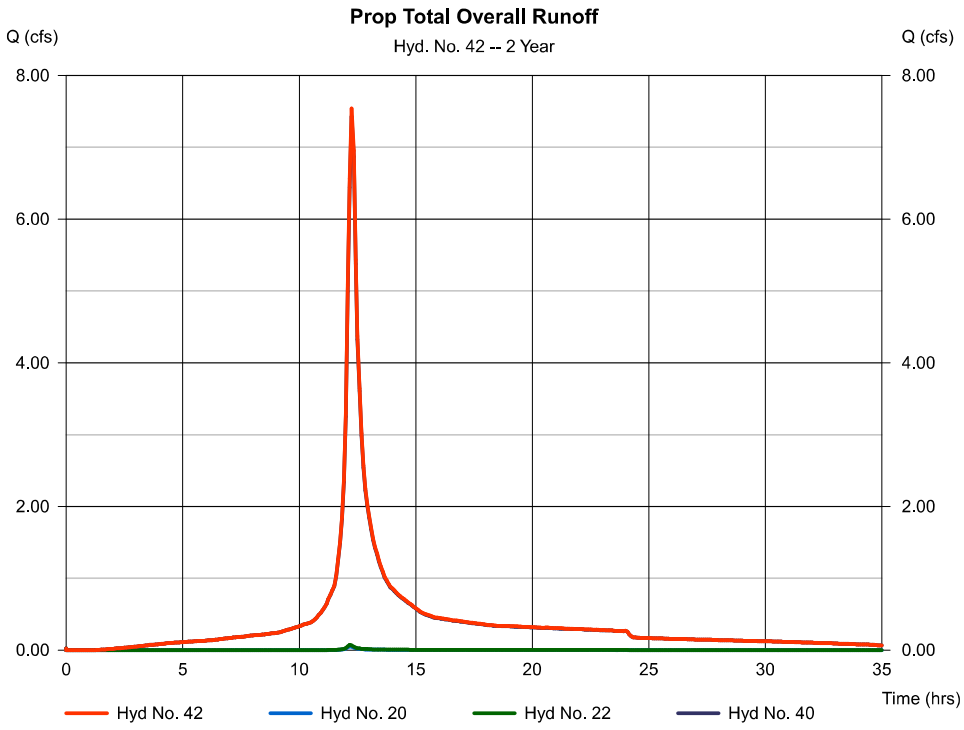


Hydrograph Report

Hyd. No. 42

Prop Total Overall Runoff

Hydrograph type	= Combine	Peak discharge	= 7.542 cfs
Storm frequency	= 2 yrs	Time to peak	= 12.25 hrs
Time interval	= 5 min	Hyd. volume	= 49,243 cuft
Inflow hyds.	= 20, 22, 40	Contrib. drain. area	= 0.120 ac



Hydrograph Summary Report

Hydraflow Hydrographs by Intelisolve v9.1

Hyd. No.	Hydrograph type (origin)	Peak flow (cfs)	Time interval (min)	Time to peak (min)	Hyd. volume (cuft)	Inflow hyd(s)	Maximum elevation (ft)	Total strge used (cuft)	Hydrograph description
1	SCS Runoff	0.044	5	730	161	----	-----	-----	Ex DA Lot 42.01 Undisturbed (Perv)
2	SCS Runoff	0.354	5	730	1,292	----	-----	-----	Ex DA Lot 42.01 Disturbed (Perv)
3	Combine	0.399	5	730	1,453	1, 2	-----	-----	Ex DA Lot 42.01 Total
5	SCS Runoff	0.133	5	730	484	----	-----	-----	Ex. DA Davidson Undisturbed (Perv)
6	SCS Runoff	0.022	5	730	81	----	-----	-----	Ex. DA Davidson Disturbed (Perv)
7	Combine	0.155	5	730	565	5, 6	-----	-----	Ex DA Davidson Total
9	SCS Runoff	1.712	5	730	7,147	----	-----	-----	Ex DA Site Undisturbed (Imp)
10	SCS Runoff	0.841	5	730	3,068	----	-----	-----	Ex DA Site Undisturbed (Perv)
11	SCS Runoff	4.670	5	730	19,492	----	-----	-----	Ex DA Roof Undisturbed (Imp)
12	SCS Runoff	5.215	5	730	21,766	----	-----	-----	Ex DA Site Disturbed (Imp)
13	SCS Runoff	4.539	5	730	16,550	----	-----	-----	Ex DA Site Disturbed (Perv)
14	Combine	16.98	5	730	68,023	9, 10, 11, 12, 13	-----	-----	Ex DA to MH Total
16	Combine	7.401	5	730	30,353	1, 5, 9, 10, 11,	-----	-----	Ex Undisturbed Total
17	Combine	10.13	5	730	39,689	2, 6, 12, 13,	-----	-----	Ex Disturbed Total
20	SCS Runoff	0.111	5	730	404	----	-----	-----	Prop DA Lot 42.01 (Perv)
22	SCS Runoff	0.155	5	730	565	----	-----	-----	Prop DA Davidson Avenue (Perv)
24	SCS Runoff	6.927	5	730	28,914	----	-----	-----	Prop DA Roof Imp
25	SCS Runoff	0.662	5	730	2,761	----	-----	-----	Prop DA Undetained (Imp)
26	SCS Runoff	1.993	5	730	7,266	----	-----	-----	Prop DA Undetained (Perv)
27	Combine	9.581	5	730	38,941	24, 25, 26	-----	-----	Prop DA Undetained Total
29	SCS Runoff	6.732	5	730	28,101	----	-----	-----	Prop DA Basin (Imp)
30	SCS Runoff	0.509	5	730	1,857	----	-----	-----	Prop DA Basin (Perv)
31	SCS Runoff	1.090	5	730	4,548	----	-----	-----	Prop DA Detained Roof
32	Combine	8.331	5	730	34,507	29, 30, 31	-----	-----	Prop DA Basin Total
33	Reservoir	5.715	5	740	34,491	32	58.70	11,212	Post Route To Basin
35	SCS Runoff	1.012	5	730	4,223	----	-----	-----	Prop DA Bioretention (Imp)
36	SCS Runoff	0.443	5	730	1,615	----	-----	-----	Prop DA Bioretention (Perv)
37	Combine	1.455	5	730	5,838	35, 36	-----	-----	Prop DA Bioretention Total
38	Reservoir	0.498	5	750	4,896	37	63.17	2,796	Post Route Bio
40	Combine	14.72	5	730	78,328	27, 33, 38,	-----	-----	Prop DA to MH Total

Hydrograph Summary Report

Hydraflow Hydrographs by Intelisolve v9.1

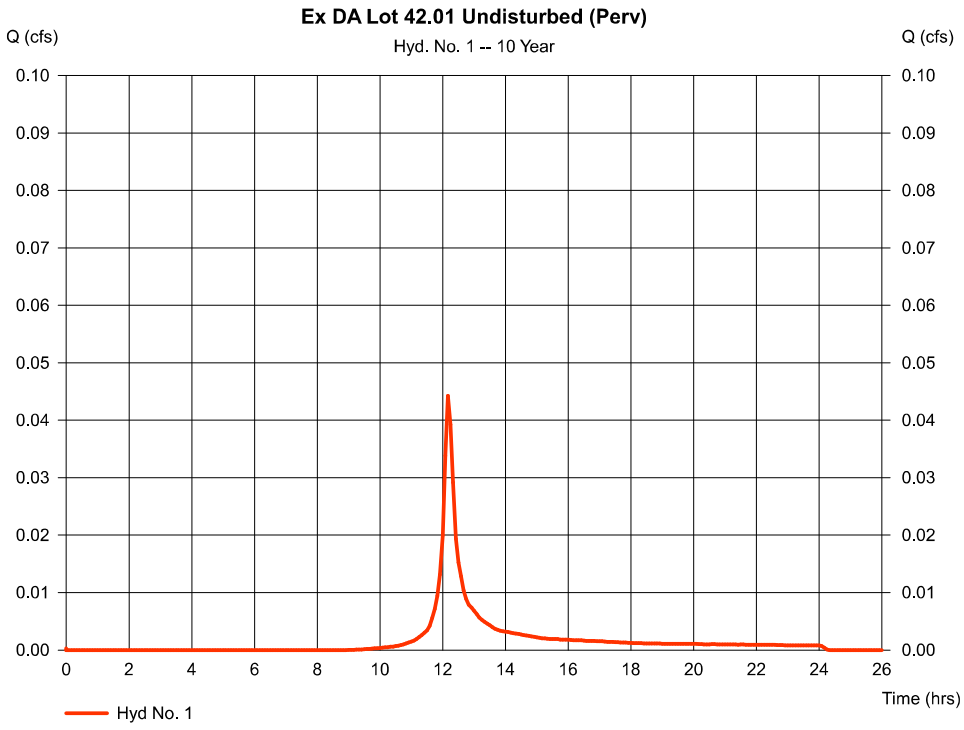
Hyd. No.	Hydrograph type (origin)	Peak flow (cfs)	Time interval (min)	Time to peak (min)	Hyd. volume (cuft)	Inflow hyd(s)	Maximum elevation (ft)	Total strge used (cuft)	Hydrograph description
42	Combine	14.99	5	730	79,297	20, 22, 40,	-----	-----	Prop Total Overall Runoff

Hydrograph Report

Hyd. No. 1

Ex DA Lot 42.01 Undisturbed (Perv)

Hydrograph type	= SCS Runoff	Peak discharge	= 0.044 cfs
Storm frequency	= 10 yrs	Time to peak	= 12.17 hrs
Time interval	= 5 min	Hyd. volume	= 161 cuft
Drainage area	= 0.020 ac	Curve number	= 74
Basin Slope	= 0.0 %	Hydraulic length	= 0 ft
Tc method	= USER	Time of conc. (Tc)	= 10.00 min
Total precip.	= 5.01 in	Distribution	= Custom
Storm duration	= NOAA Atlas 14 Type-C.cds	Shape factor	= 484

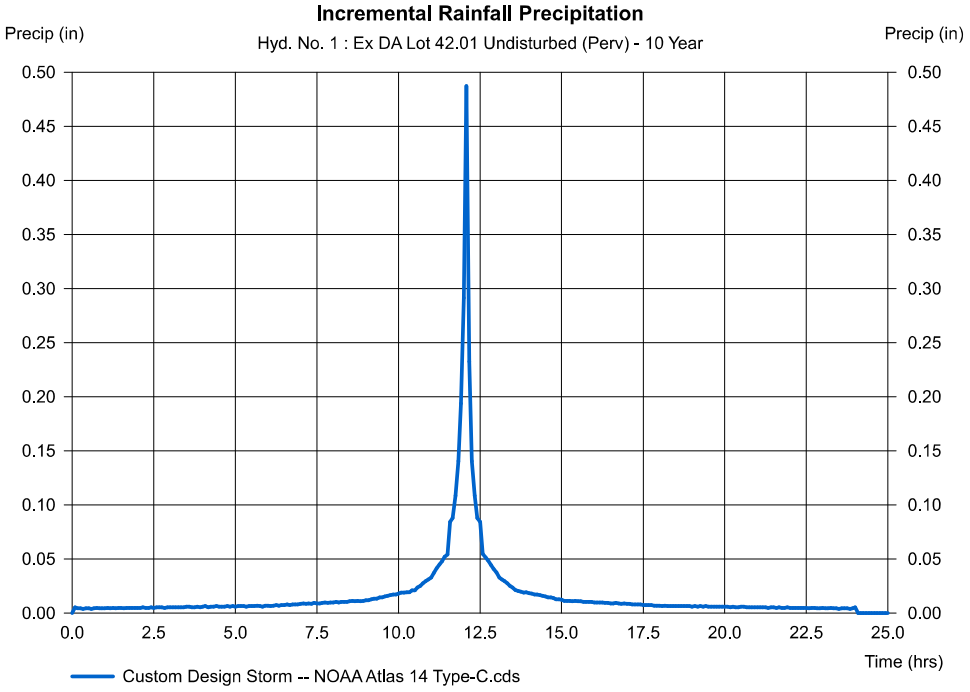


Precipitation Report

Hyd. No. 1

Ex DA Lot 42.01 Undisturbed (Perv)

Storm Frequency	= 10 yrs	Time interval	= 5 min
Total precip.	= 5.0100 in	Distribution	= Custom
Storm duration	= NOAA Atlas 14 Type-C.cds		

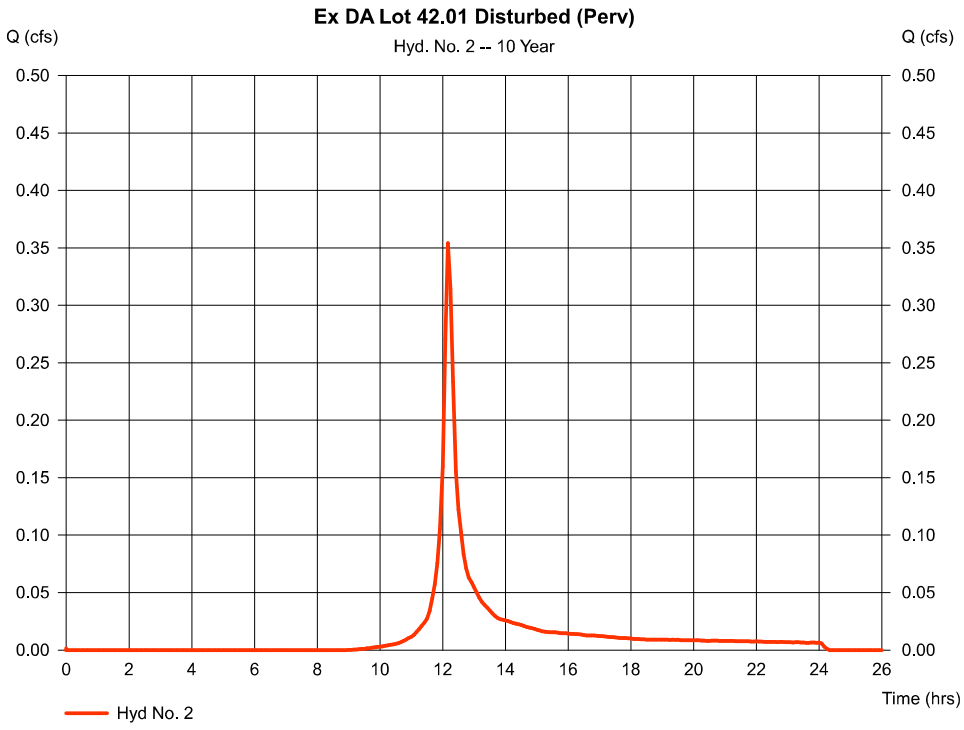


Hydrograph Report

Hyd. No. 2

Ex DA Lot 42.01 Disturbed (Perv)

Hydrograph type	= SCS Runoff	Peak discharge	= 0.354 cfs
Storm frequency	= 10 yrs	Time to peak	= 12.17 hrs
Time interval	= 5 min	Hyd. volume	= 1,292 cuft
Drainage area	= 0.160 ac	Curve number	= 74
Basin Slope	= 0.0 %	Hydraulic length	= 0 ft
Tc method	= USER	Time of conc. (Tc)	= 10.00 min
Total precip.	= 5.01 in	Distribution	= Custom
Storm duration	= NOAA Atlas 14 Type-C.cds	Shape factor	= 484

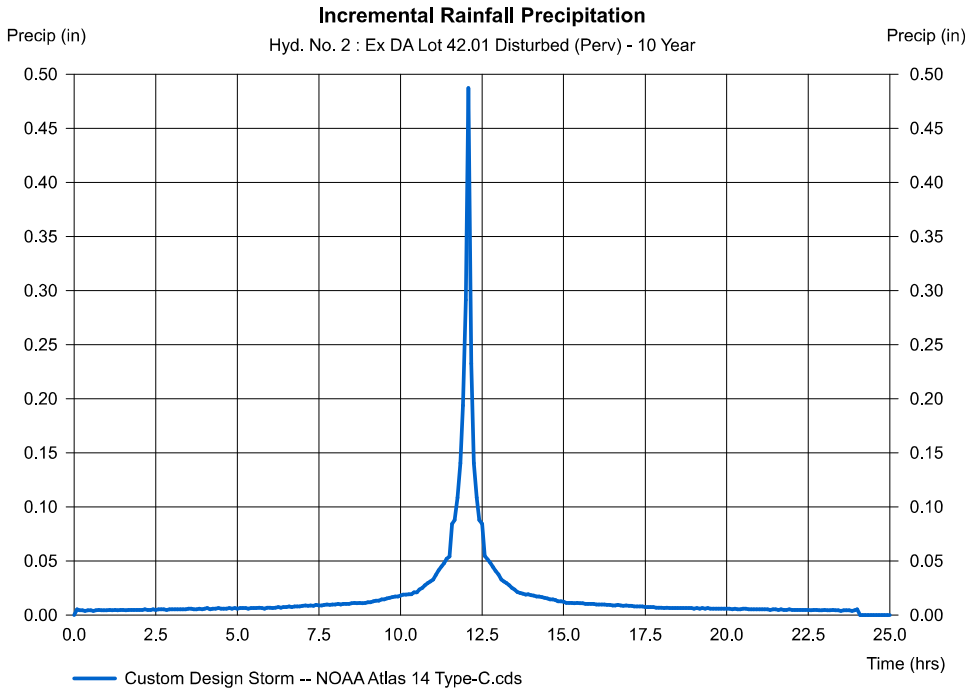


Precipitation Report

Hyd. No. 2

Ex DA Lot 42.01 Disturbed (Perv)

Storm Frequency	= 10 yrs	Time interval	= 5 min
Total precip.	= 5.0100 in	Distribution	= Custom
Storm duration	= NOAA Atlas 14 Type-C.cds		

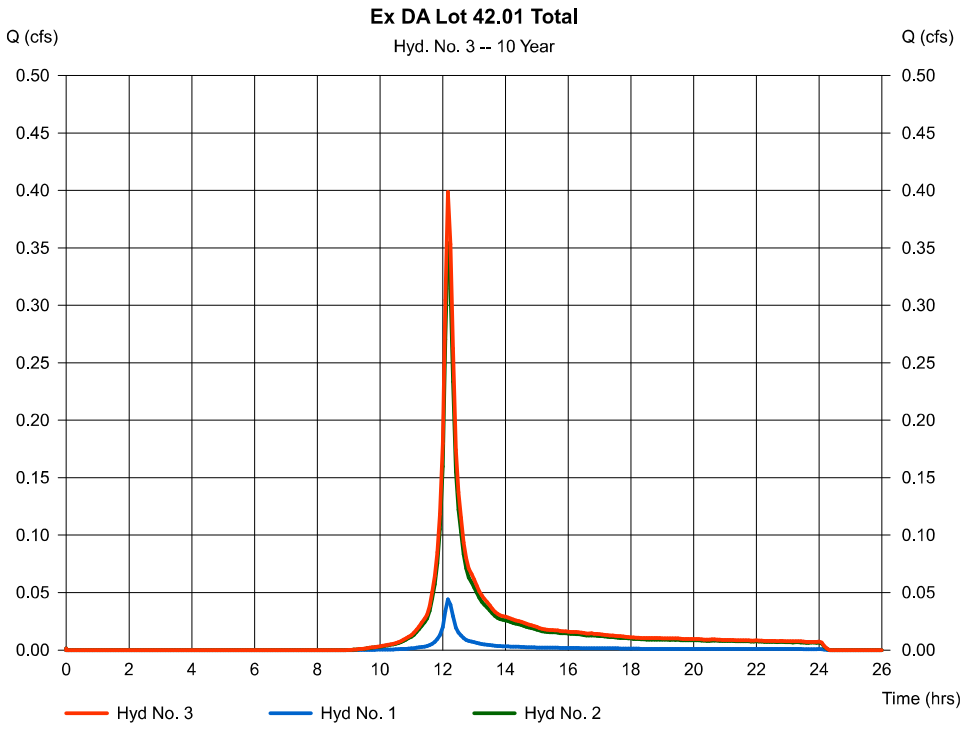


Hydrograph Report

Hyd. No. 3

Ex DA Lot 42.01 Total

Hydrograph type	= Combine	Peak discharge	= 0.399 cfs
Storm frequency	= 10 yrs	Time to peak	= 12.17 hrs
Time interval	= 5 min	Hyd. volume	= 1,453 cuft
Inflow hyds.	= 1, 2	Contrib. drain. area	= 0.180 ac

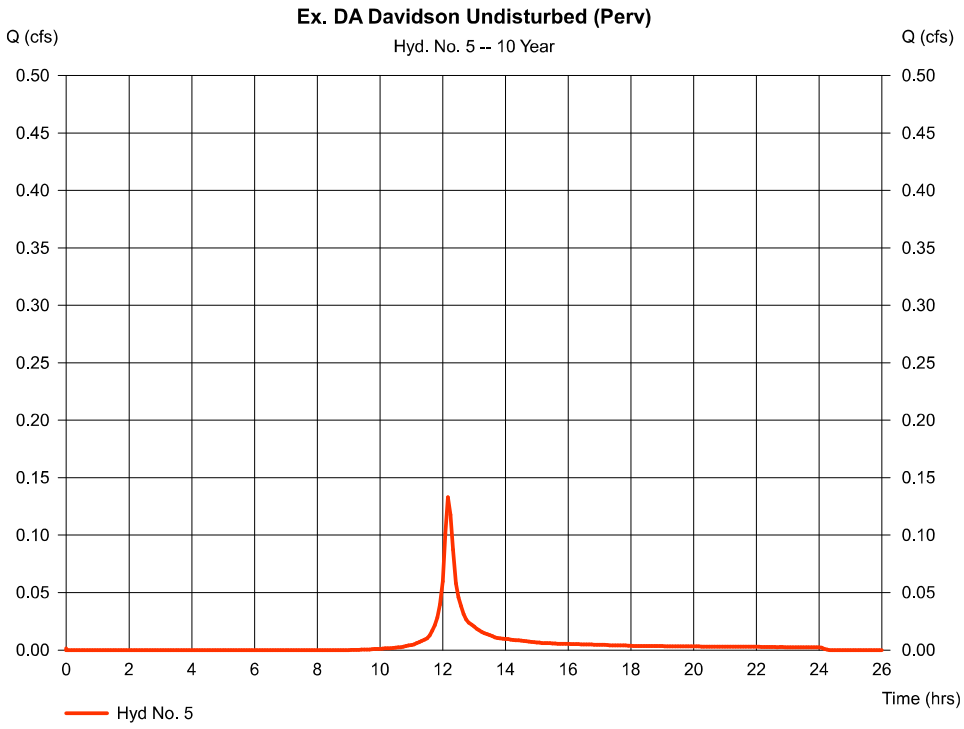


Hydrograph Report

Hyd. No. 5

Ex. DA Davidson Undisturbed (Perv)

Hydrograph type	= SCS Runoff	Peak discharge	= 0.133 cfs
Storm frequency	= 10 yrs	Time to peak	= 12.17 hrs
Time interval	= 5 min	Hyd. volume	= 484 cuft
Drainage area	= 0.060 ac	Curve number	= 74
Basin Slope	= 0.0 %	Hydraulic length	= 0 ft
Tc method	= USER	Time of conc. (Tc)	= 10.00 min
Total precip.	= 5.01 in	Distribution	= Custom
Storm duration	= NOAA Atlas 14 Type-C.cds	Shape factor	= 484

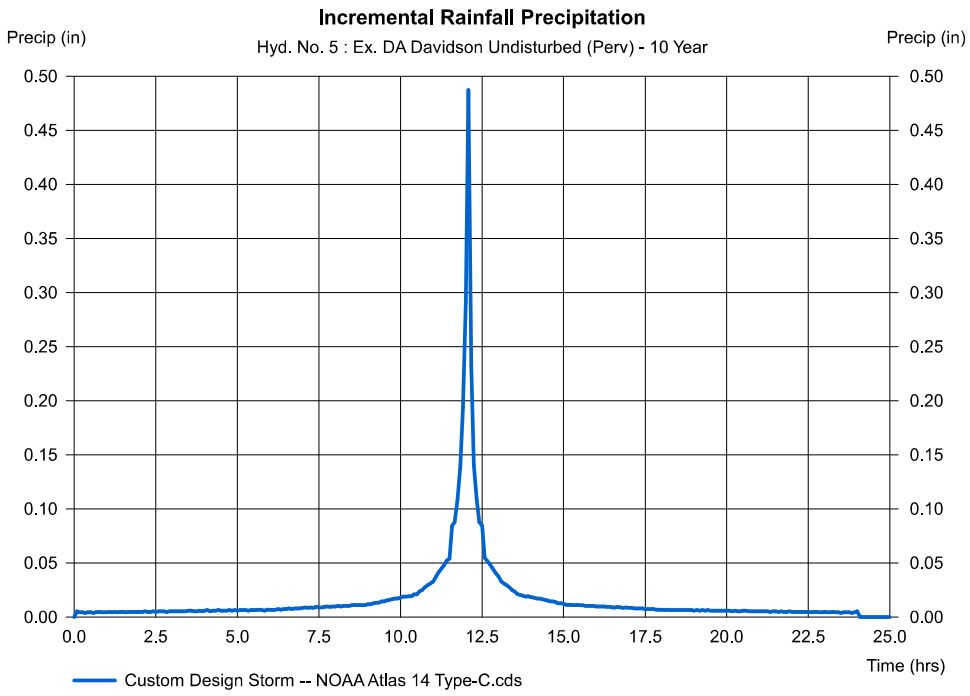


Precipitation Report

Hyd. No. 5

Ex. DA Davidson Undisturbed (Perv)

Storm Frequency	= 10 yrs	Time interval	= 5 min
Total precip.	= 5.0100 in	Distribution	= Custom
Storm duration	= NOAA Atlas 14 Type-C.cds		

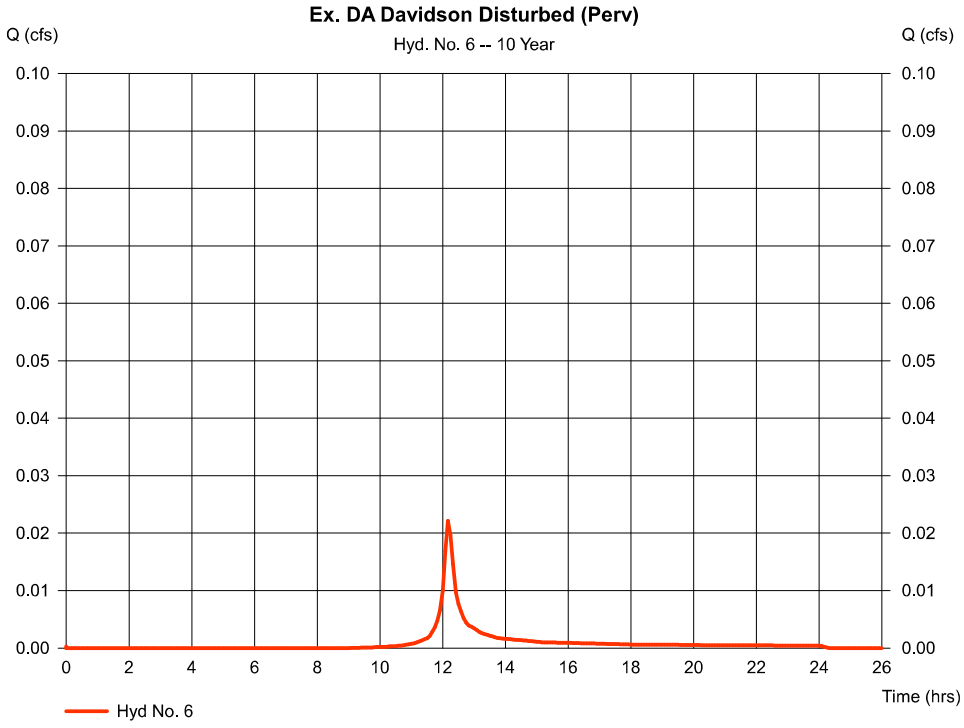


Hydrograph Report

Hyd. No. 6

Ex. DA Davidson Disturbed (Perv)

Hydrograph type	= SCS Runoff	Peak discharge	= 0.022 cfs
Storm frequency	= 10 yrs	Time to peak	= 12.17 hrs
Time interval	= 5 min	Hyd. volume	= 81 cuft
Drainage area	= 0.010 ac	Curve number	= 74
Basin Slope	= 0.0 %	Hydraulic length	= 0 ft
Tc method	= USER	Time of conc. (Tc)	= 10.00 min
Total precip.	= 5.01 in	Distribution	= Custom
Storm duration	= NOAA Atlas 14 Type-C.cds	Shape factor	= 484

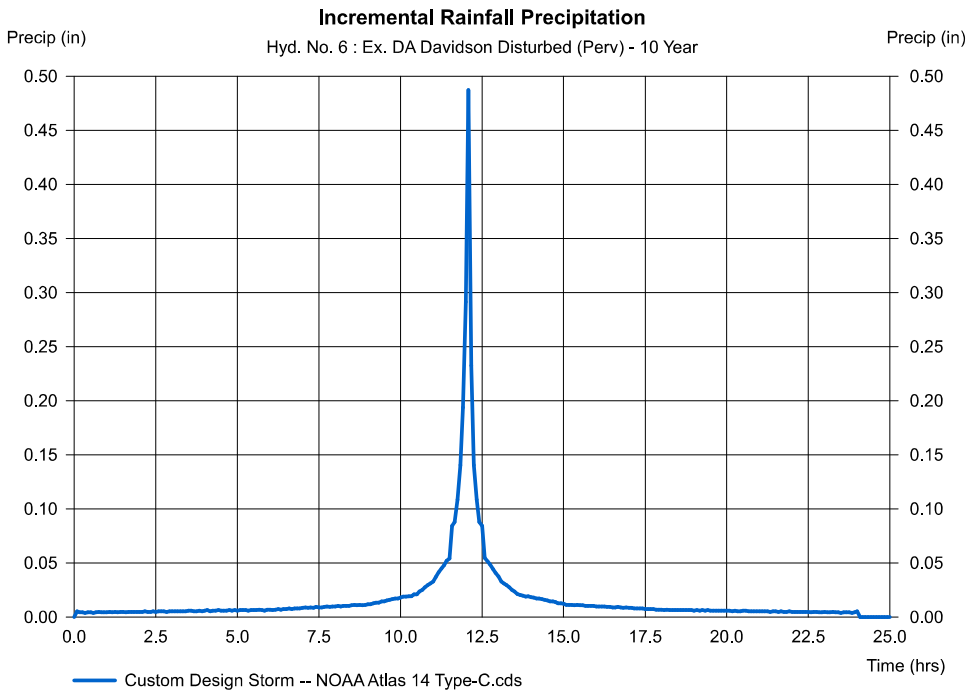


Precipitation Report

Hyd. No. 6

Ex. DA Davidson Disturbed (Perv)

Storm Frequency	= 10 yrs	Time interval	= 5 min
Total precip.	= 5.0100 in	Distribution	= Custom
Storm duration	= NOAA Atlas 14 Type-C.cds		

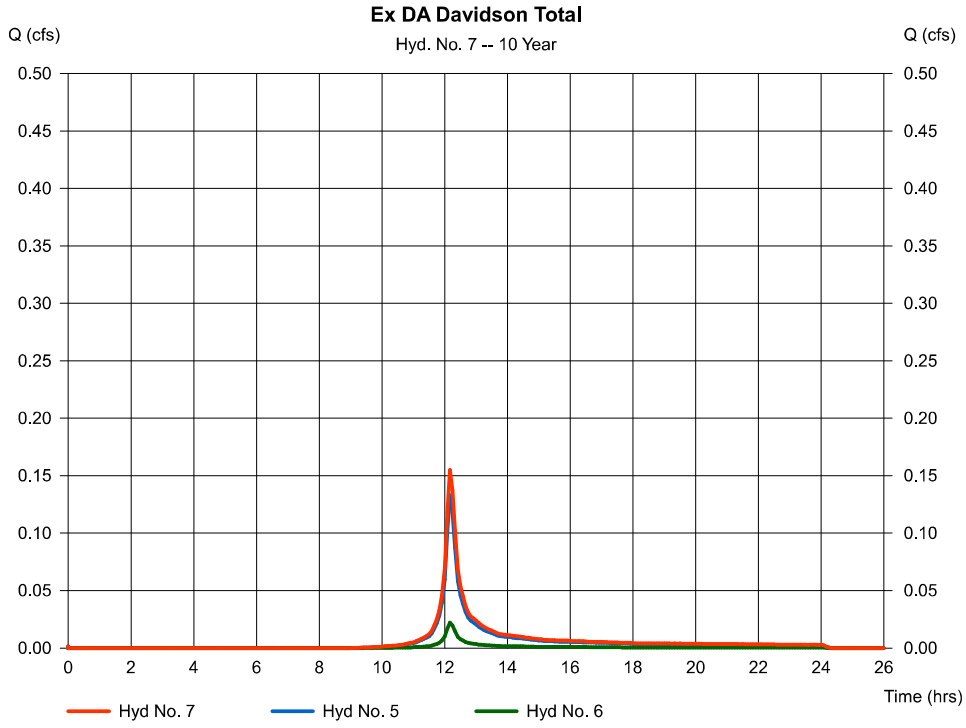


Hydrograph Report

Hyd. No. 7

Ex DA Davidson Total

Hydrograph type	= Combine	Peak discharge	= 0.155 cfs
Storm frequency	= 10 yrs	Time to peak	= 12.17 hrs
Time interval	= 5 min	Hyd. volume	= 565 cuft
Inflow hyds.	= 5, 6	Contrib. drain. area	= 0.070 ac

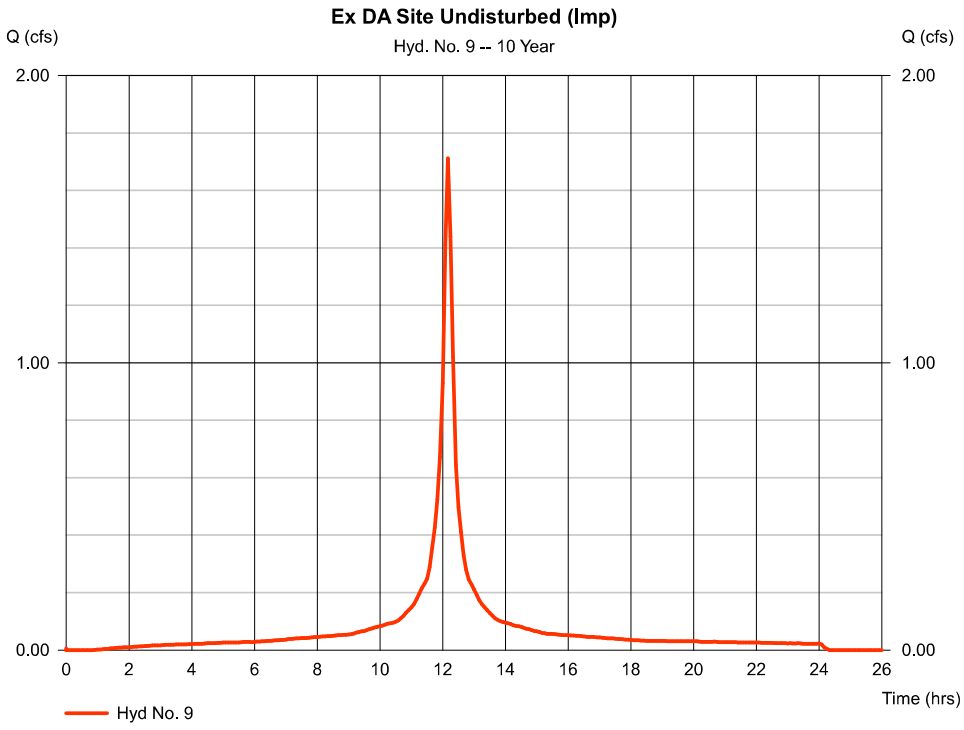


Hydrograph Report

Hyd. No. 9

Ex DA Site Undisturbed (Imp)

Hydrograph type	= SCS Runoff	Peak discharge	= 1.712 cfs
Storm frequency	= 10 yrs	Time to peak	= 12.17 hrs
Time interval	= 5 min	Hyd. volume	= 7,147 cuft
Drainage area	= 0.440 ac	Curve number	= 98
Basin Slope	= 0.0 %	Hydraulic length	= 0 ft
Tc method	= USER	Time of conc. (Tc)	= 10.00 min
Total precip.	= 5.01 in	Distribution	= Custom
Storm duration	= NOAA Atlas 14 Type-C.cds	Shape factor	= 484

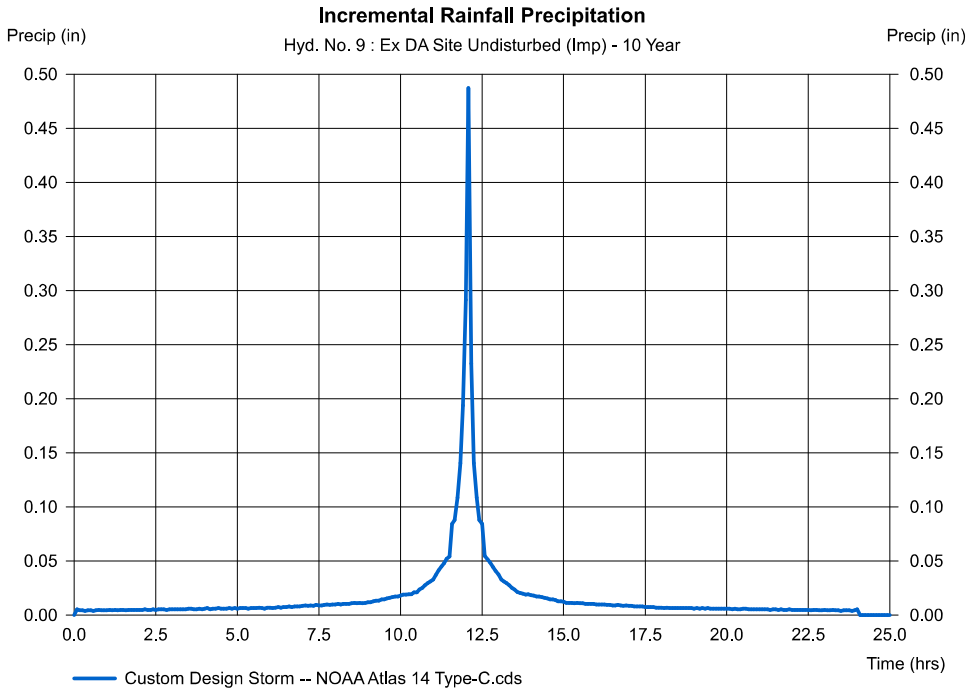


Precipitation Report

Hyd. No. 9

Ex DA Site Undisturbed (Imp)

Storm Frequency	= 10 yrs	Time interval	= 5 min
Total precip.	= 5.0100 in	Distribution	= Custom
Storm duration	= NOAA Atlas 14 Type-C.cds		

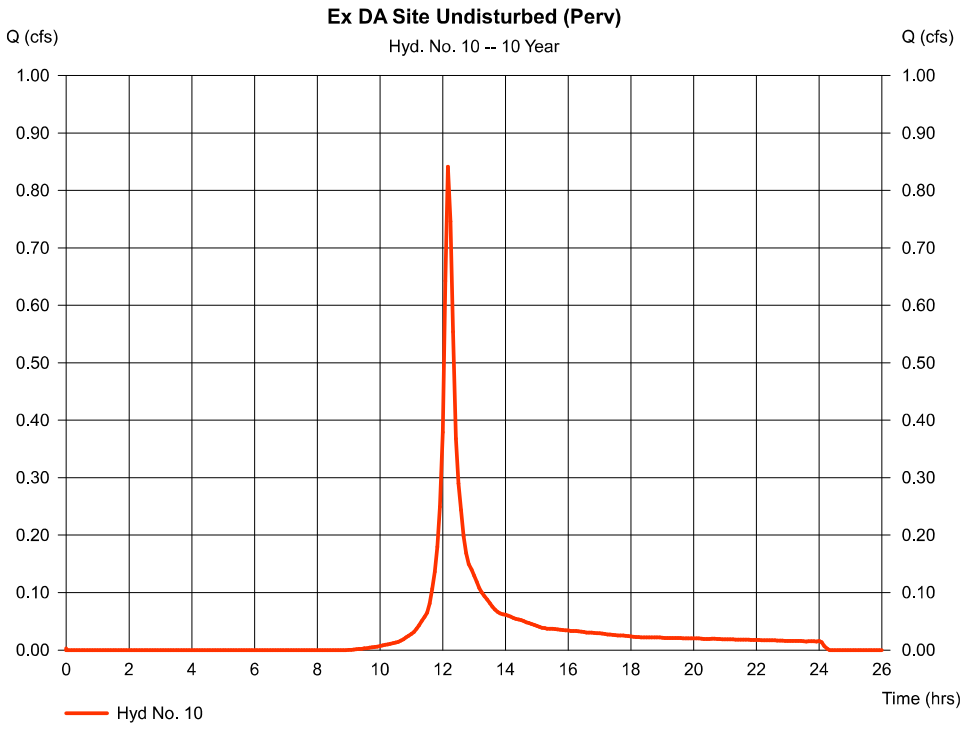


Hydrograph Report

Hyd. No. 10

Ex DA Site Undisturbed (Perv)

Hydrograph type	= SCS Runoff	Peak discharge	= 0.841 cfs
Storm frequency	= 10 yrs	Time to peak	= 12.17 hrs
Time interval	= 5 min	Hyd. volume	= 3,068 cuft
Drainage area	= 0.380 ac	Curve number	= 74
Basin Slope	= 0.0 %	Hydraulic length	= 0 ft
Tc method	= USER	Time of conc. (Tc)	= 11.00 min
Total precip.	= 5.01 in	Distribution	= Custom
Storm duration	= NOAA Atlas 14 Type-C.cds	Shape factor	= 484

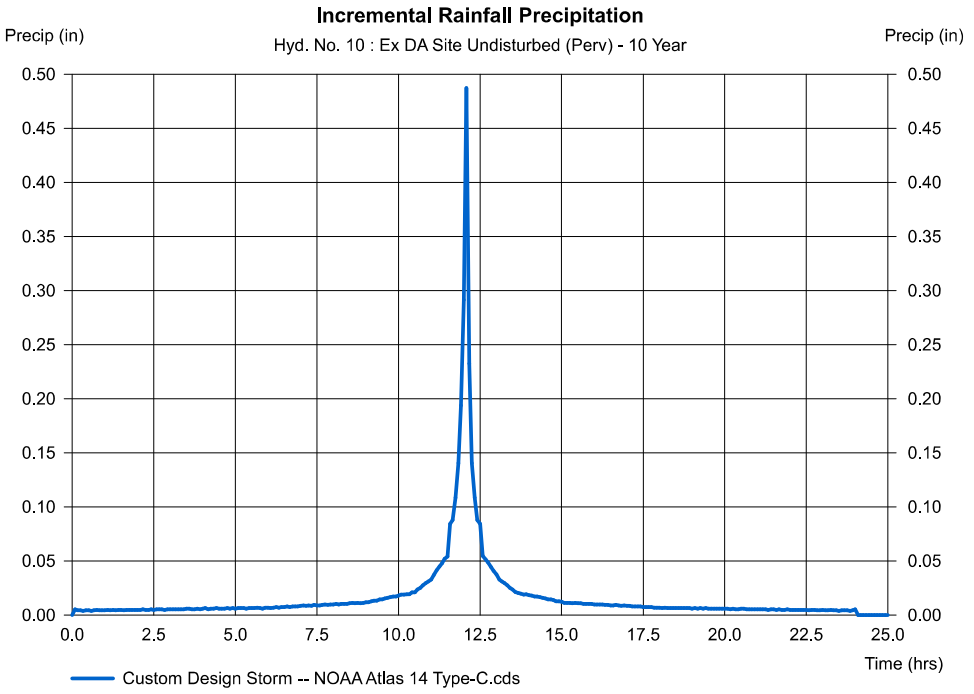


Precipitation Report

Hyd. No. 10

Ex DA Site Undisturbed (Perv)

Storm Frequency	= 10 yrs	Time interval	= 5 min
Total precip.	= 5.0100 in	Distribution	= Custom
Storm duration	= NOAA Atlas 14 Type-C.cds		

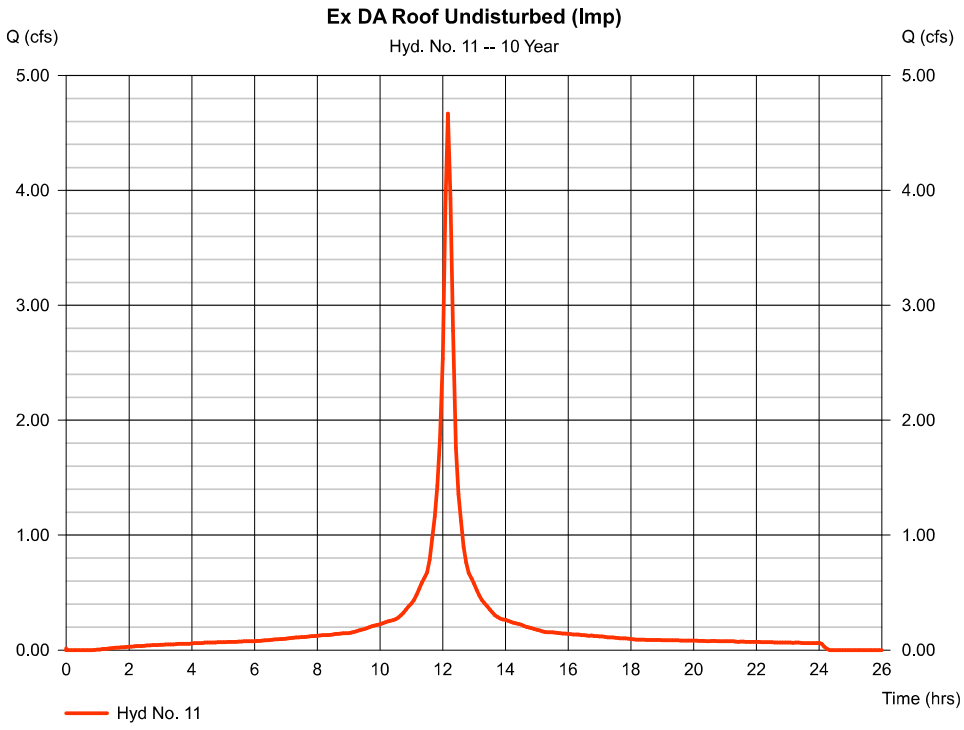


Hydrograph Report

Hyd. No. 11

Ex DA Roof Undisturbed (Imp)

Hydrograph type	= SCS Runoff	Peak discharge	= 4.670 cfs
Storm frequency	= 10 yrs	Time to peak	= 12.17 hrs
Time interval	= 5 min	Hyd. volume	= 19,492 cuft
Drainage area	= 1.200 ac	Curve number	= 98
Basin Slope	= 0.0 %	Hydraulic length	= 0 ft
Tc method	= USER	Time of conc. (Tc)	= 10.00 min
Total precip.	= 5.01 in	Distribution	= Custom
Storm duration	= NOAA Atlas 14 Type-C.cds	Shape factor	= 484

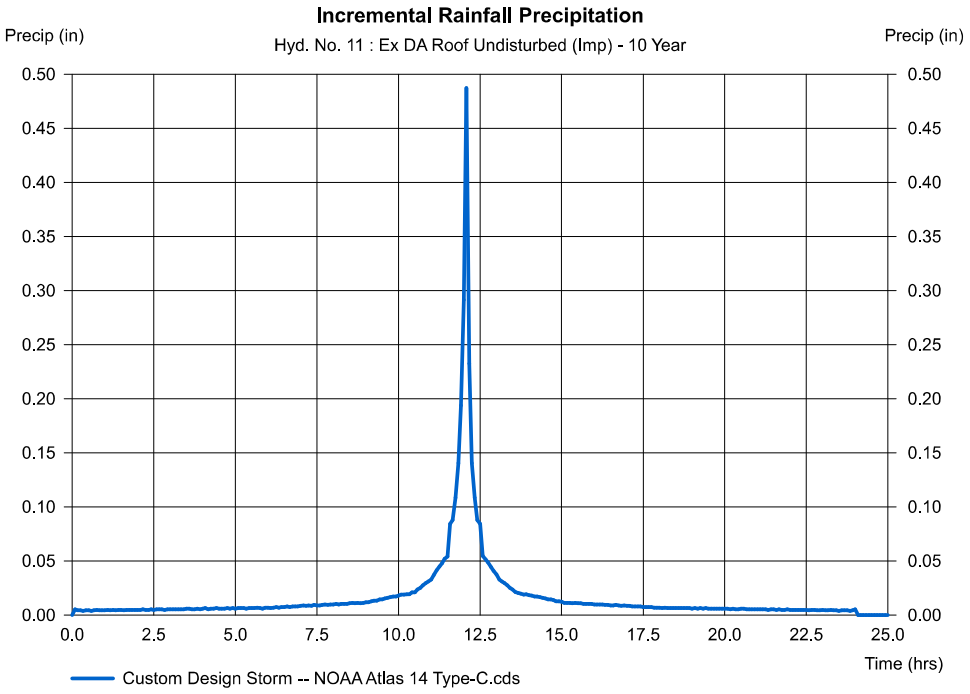


Precipitation Report

Hyd. No. 11

Ex DA Roof Undisturbed (Imp)

Storm Frequency	= 10 yrs	Time interval	= 5 min
Total precip.	= 5.0100 in	Distribution	= Custom
Storm duration	= NOAA Atlas 14 Type-C.cds		

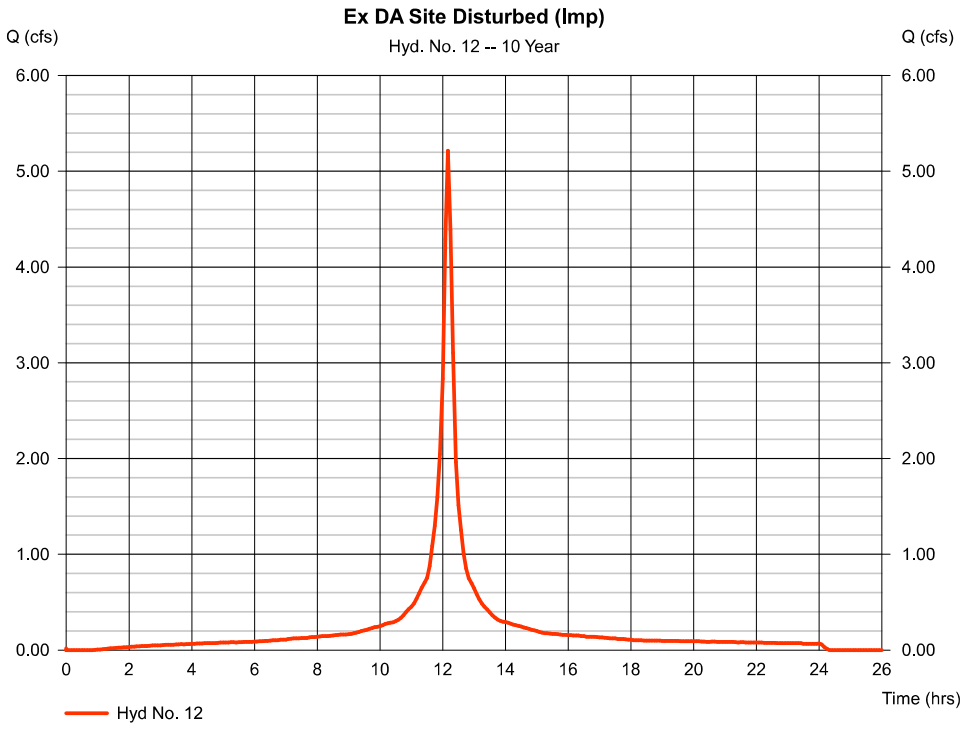


Hydrograph Report

Hyd. No. 12

Ex DA Site Disturbed (Imp)

Hydrograph type	= SCS Runoff	Peak discharge	= 5.215 cfs
Storm frequency	= 10 yrs	Time to peak	= 12.17 hrs
Time interval	= 5 min	Hyd. volume	= 21,766 cuft
Drainage area	= 1.340 ac	Curve number	= 98
Basin Slope	= 0.0 %	Hydraulic length	= 0 ft
Tc method	= USER	Time of conc. (Tc)	= 10.00 min
Total precip.	= 5.01 in	Distribution	= Custom
Storm duration	= NOAA Atlas 14 Type-C.cds	Shape factor	= 484

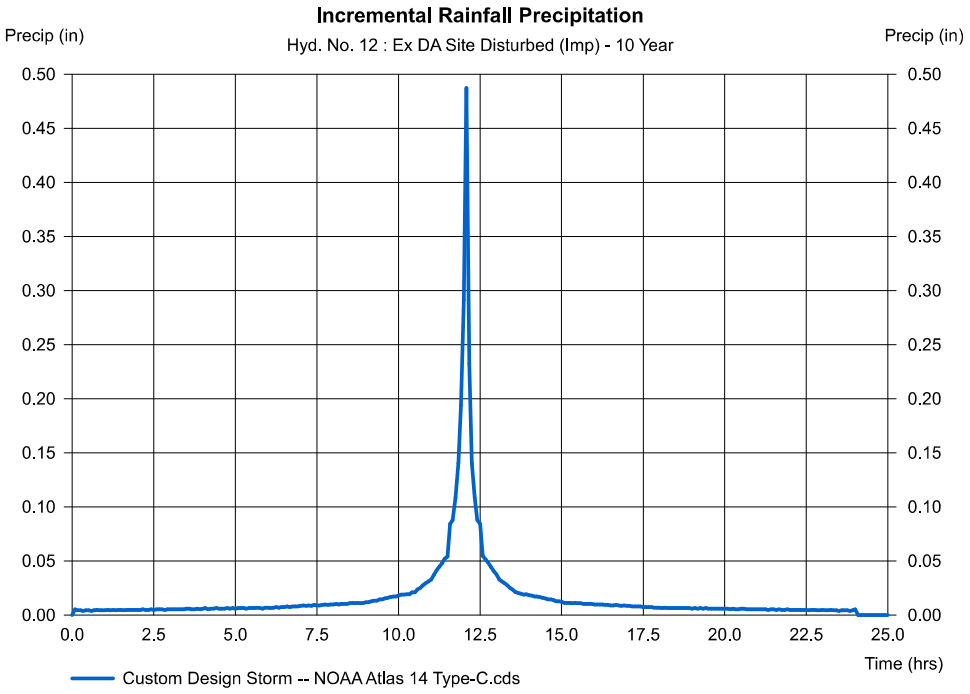


Precipitation Report

Hyd. No. 12

Ex DA Site Disturbed (Imp)

Storm Frequency	= 10 yrs	Time interval	= 5 min
Total precip.	= 5.0100 in	Distribution	= Custom
Storm duration	= NOAA Atlas 14 Type-C.cds		

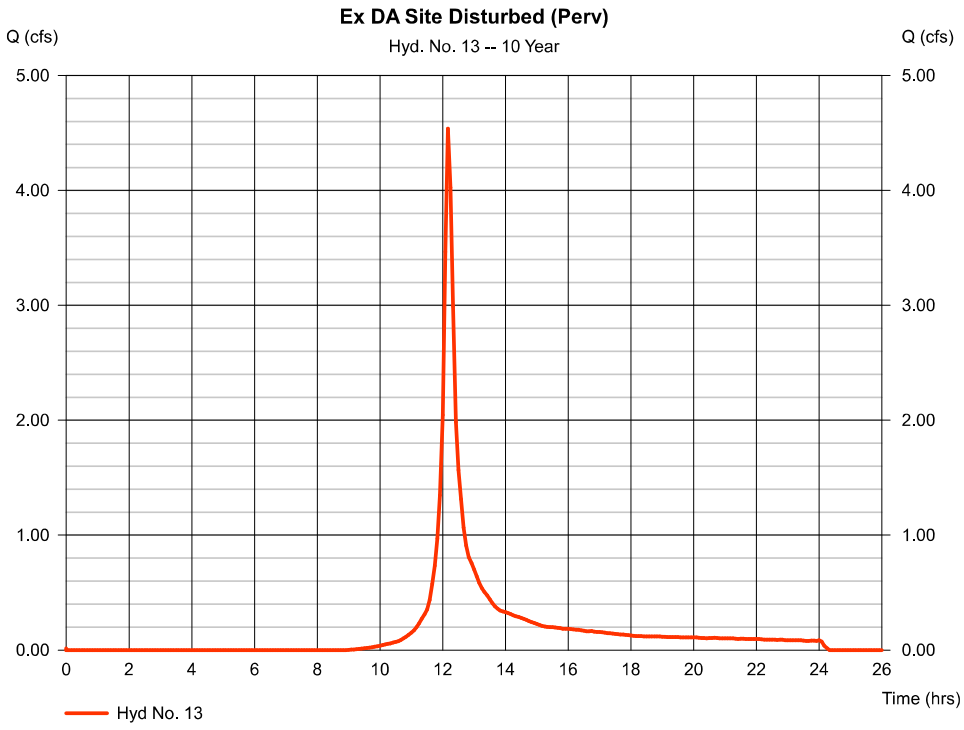


Hydrograph Report

Hyd. No. 13

Ex DA Site Disturbed (Perv)

Hydrograph type	= SCS Runoff	Peak discharge	= 4.539 cfs
Storm frequency	= 10 yrs	Time to peak	= 12.17 hrs
Time interval	= 5 min	Hyd. volume	= 16,550 cuft
Drainage area	= 2.050 ac	Curve number	= 74
Basin Slope	= 0.0 %	Hydraulic length	= 0 ft
Tc method	= USER	Time of conc. (Tc)	= 10.00 min
Total precip.	= 5.01 in	Distribution	= Custom
Storm duration	= NOAA Atlas 14 Type-C.cds	Shape factor	= 484

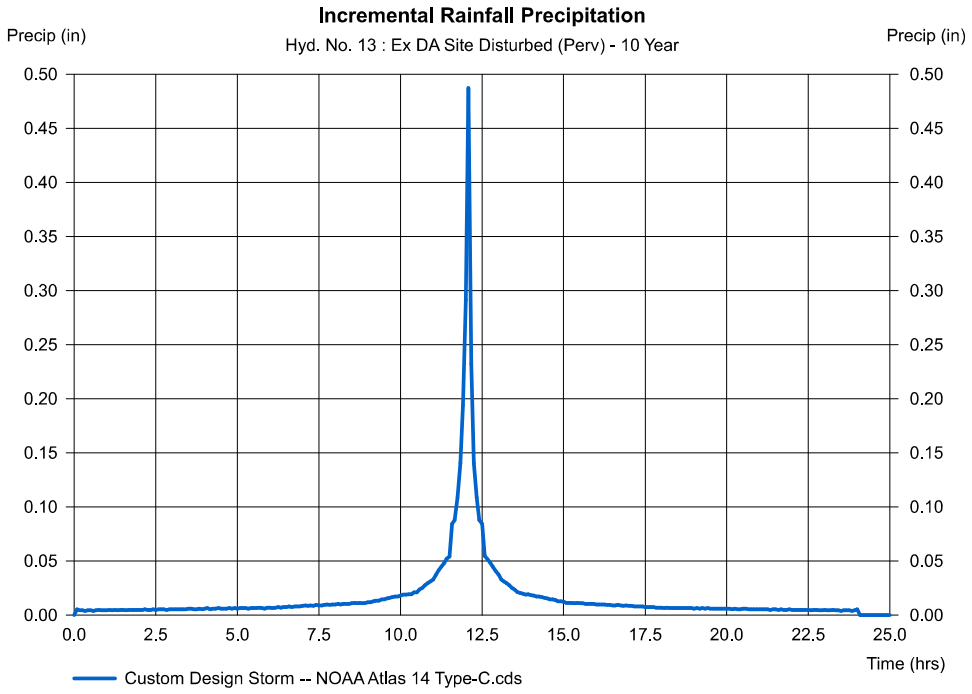


Precipitation Report

Hyd. No. 13

Ex DA Site Disturbed (Perv)

Storm Frequency	= 10 yrs	Time interval	= 5 min
Total precip.	= 5.0100 in	Distribution	= Custom
Storm duration	= NOAA Atlas 14 Type-C.cds		

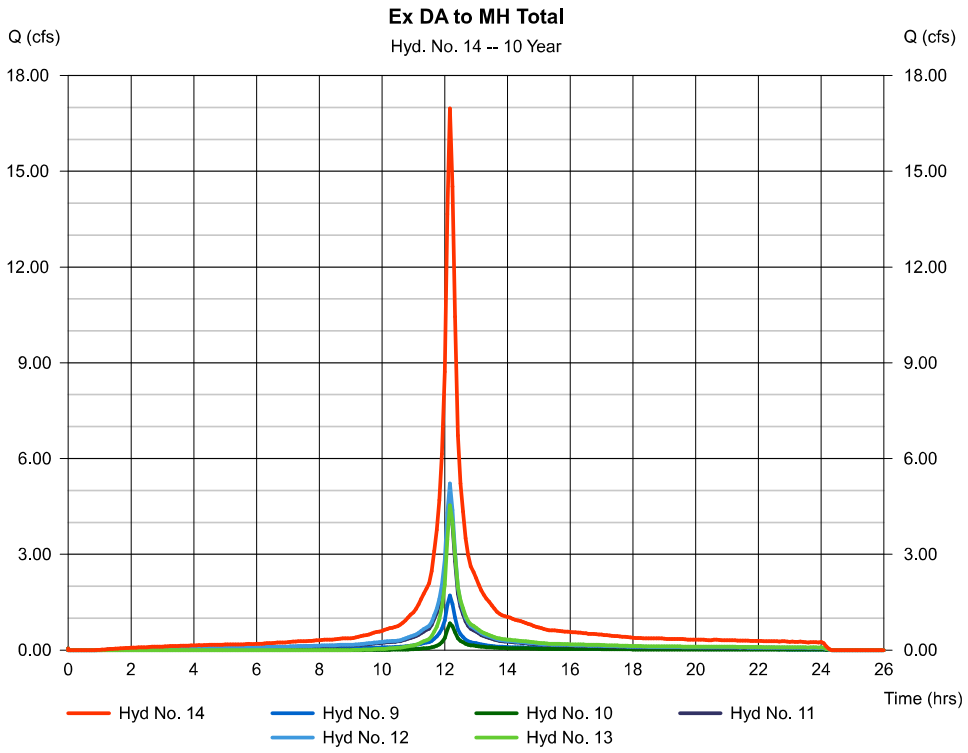


Hydrograph Report

Hyd. No. 14

Ex DA to MH Total

Hydrograph type	= Combine	Peak discharge	= 16.98 cfs
Storm frequency	= 10 yrs	Time to peak	= 12.17 hrs
Time interval	= 5 min	Hyd. volume	= 68,023 cuft
Inflow hyds.	= 9, 10, 11, 12, 13	Contrib. drain. area	= 5.410 ac

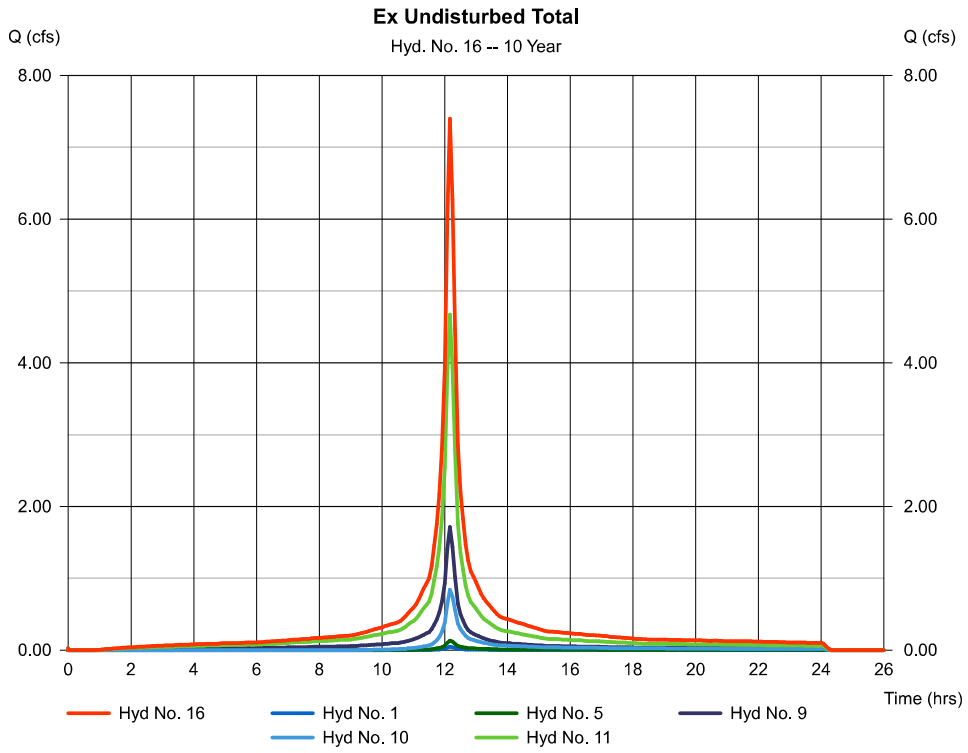


Hydrograph Report

Hyd. No. 16

Ex Undisturbed Total

Hydrograph type	= Combine	Peak discharge	= 7.401 cfs
Storm frequency	= 10 yrs	Time to peak	= 12.17 hrs
Time interval	= 5 min	Hyd. volume	= 30,353 cuft
Inflow hyds.	= 1, 5, 9, 10, 11	Contrib. drain. area	= 2.100 ac

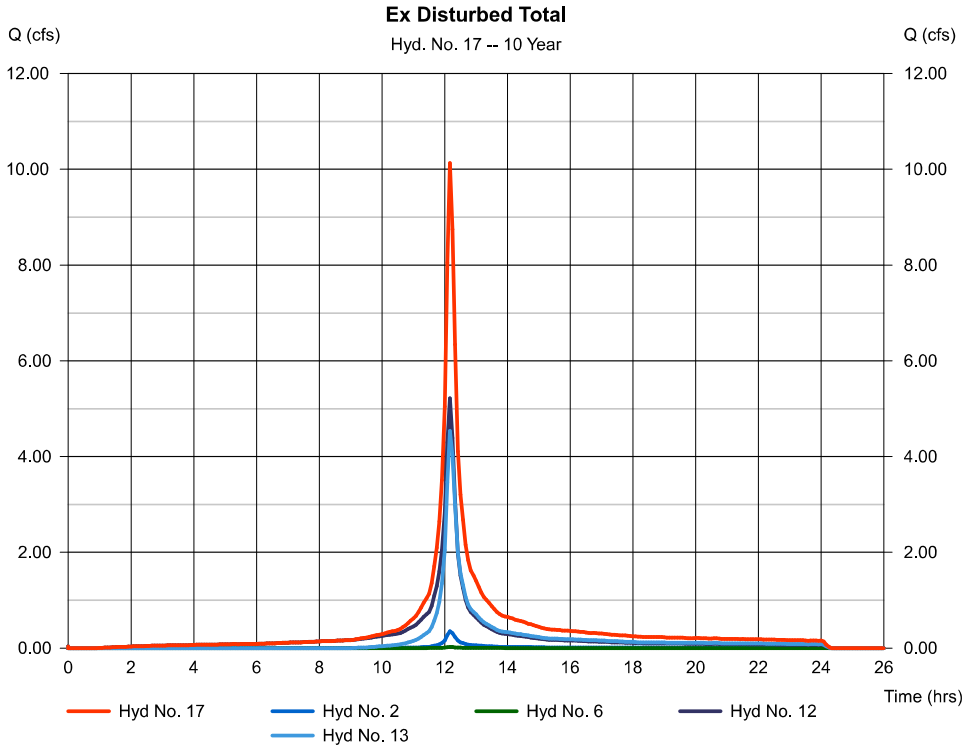


Hydrograph Report

Hyd. No. 17

Ex Disturbed Total

Hydrograph type	= Combine	Peak discharge	= 10.13 cfs
Storm frequency	= 10 yrs	Time to peak	= 12.17 hrs
Time interval	= 5 min	Hyd. volume	= 39,689 cuft
Inflow hyds.	= 2, 6, 12, 13	Contrib. drain. area	= 3.560 ac

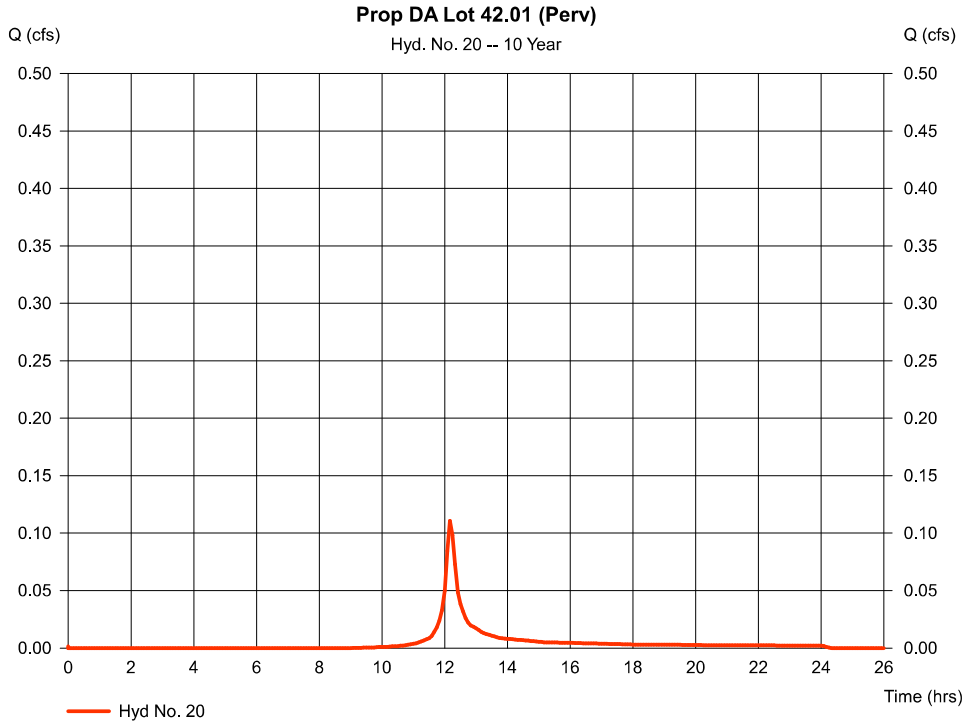


Hydrograph Report

Hyd. No. 20

Prop DA Lot 42.01 (Perv)

Hydrograph type	= SCS Runoff	Peak discharge	= 0.111 cfs
Storm frequency	= 10 yrs	Time to peak	= 12.17 hrs
Time interval	= 5 min	Hyd. volume	= 404 cuft
Drainage area	= 0.050 ac	Curve number	= 74
Basin Slope	= 0.0 %	Hydraulic length	= 0 ft
Tc method	= USER	Time of conc. (Tc)	= 10.00 min
Total precip.	= 5.01 in	Distribution	= Custom
Storm duration	= NOAA Atlas 14 Type-C.cds	Shape factor	= 484

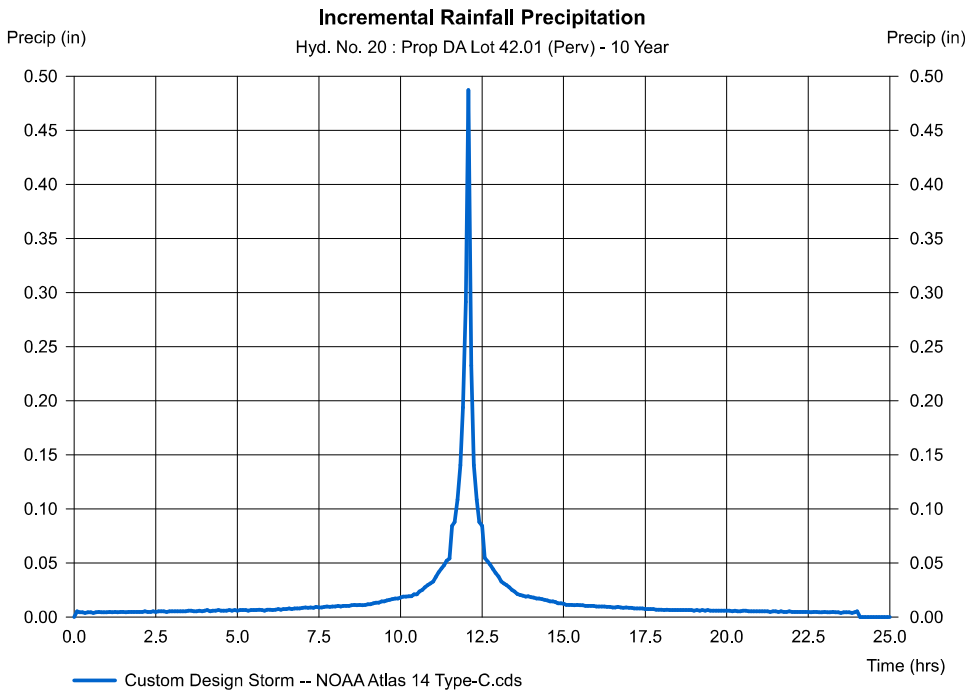


Precipitation Report

Hyd. No. 20

Prop DA Lot 42.01 (Perv)

Storm Frequency	= 10 yrs	Time interval	= 5 min
Total precip.	= 5.0100 in	Distribution	= Custom
Storm duration	= NOAA Atlas 14 Type-C.cds		

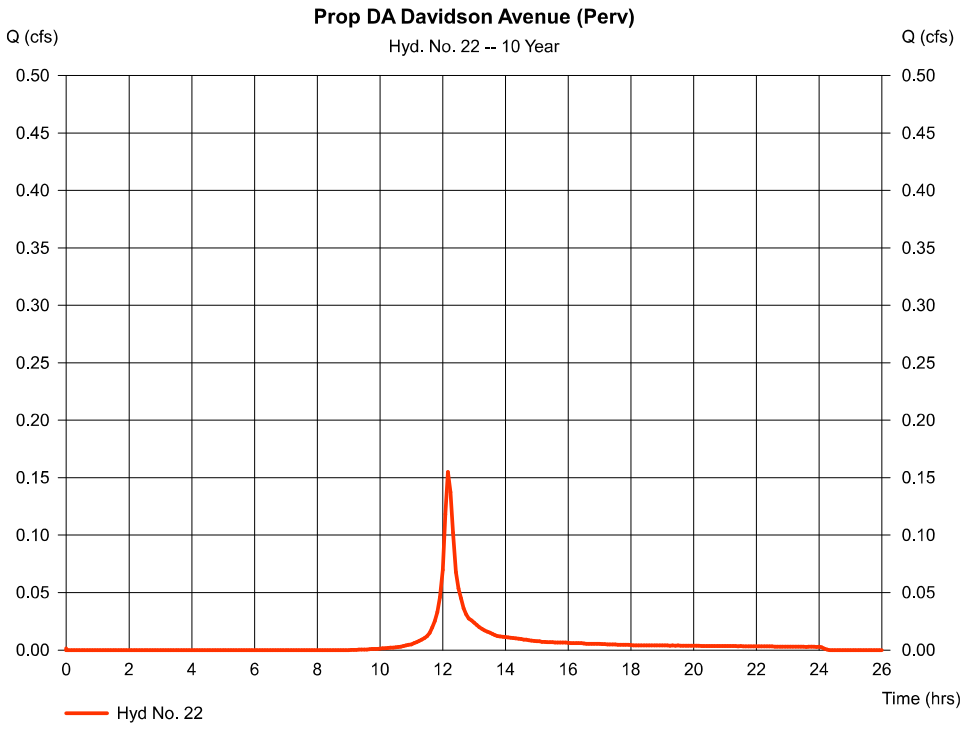


Hydrograph Report

Hyd. No. 22

Prop DA Davidson Avenue (Perv)

Hydrograph type	= SCS Runoff	Peak discharge	= 0.155 cfs
Storm frequency	= 10 yrs	Time to peak	= 12.17 hrs
Time interval	= 5 min	Hyd. volume	= 565 cuft
Drainage area	= 0.070 ac	Curve number	= 74
Basin Slope	= 0.0 %	Hydraulic length	= 0 ft
Tc method	= USER	Time of conc. (Tc)	= 10.00 min
Total precip.	= 5.01 in	Distribution	= Custom
Storm duration	= NOAA Atlas 14 Type-C.cds	Shape factor	= 484

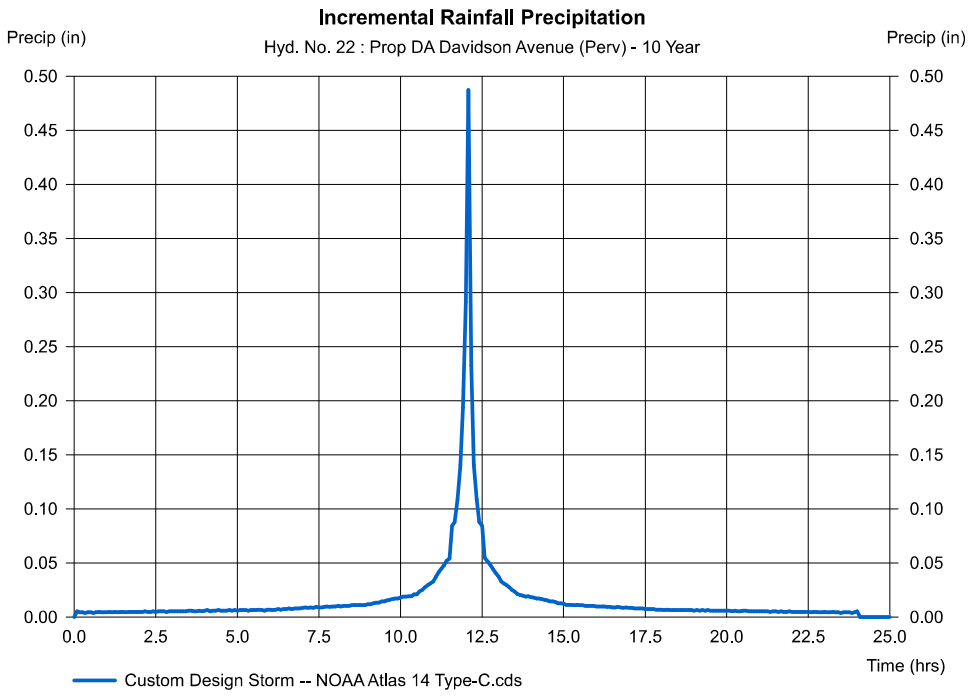


Precipitation Report

Hyd. No. 22

Prop DA Davidson Avenue (Perv)

Storm Frequency	= 10 yrs	Time interval	= 5 min
Total precip.	= 5.0100 in	Distribution	= Custom
Storm duration	= NOAA Atlas 14 Type-C.cds		

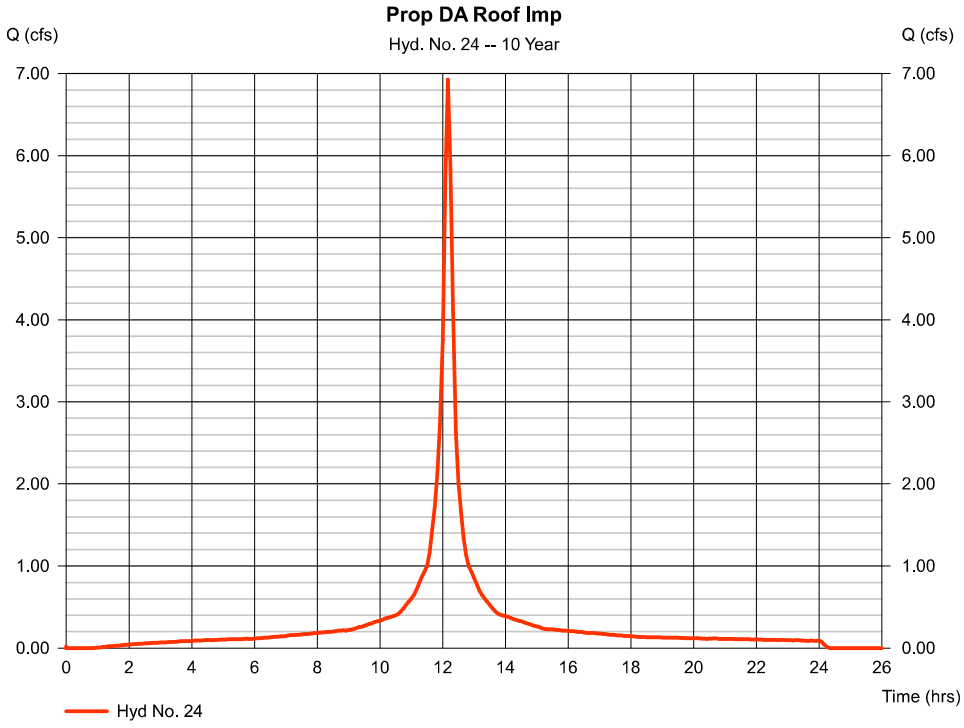


Hydrograph Report

Hyd. No. 24

Prop DA Roof Imp

Hydrograph type	= SCS Runoff	Peak discharge	= 6.927 cfs
Storm frequency	= 10 yrs	Time to peak	= 12.17 hrs
Time interval	= 5 min	Hyd. volume	= 28,914 cuft
Drainage area	= 1.780 ac	Curve number	= 98
Basin Slope	= 0.0 %	Hydraulic length	= 0 ft
Tc method	= USER	Time of conc. (Tc)	= 10.00 min
Total precip.	= 5.01 in	Distribution	= Custom
Storm duration	= NOAA Atlas 14 Type-C.cds	Shape factor	= 484

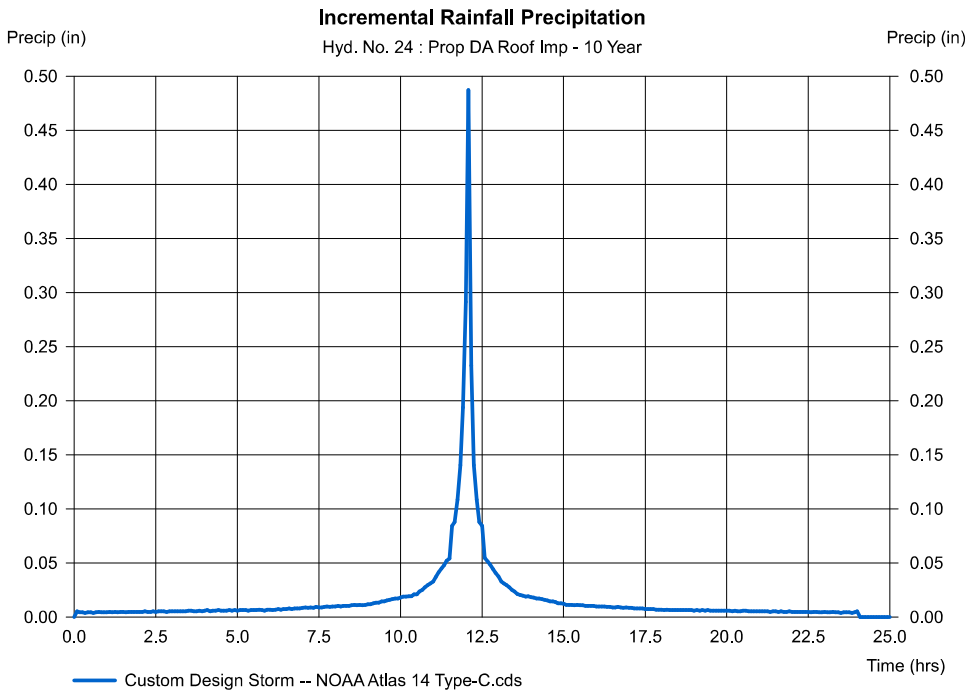


Precipitation Report

Hyd. No. 24

Prop DA Roof Imp

Storm Frequency	= 10 yrs	Time interval	= 5 min
Total precip.	= 5.0100 in	Distribution	= Custom
Storm duration	= NOAA Atlas 14 Type-C.cds		

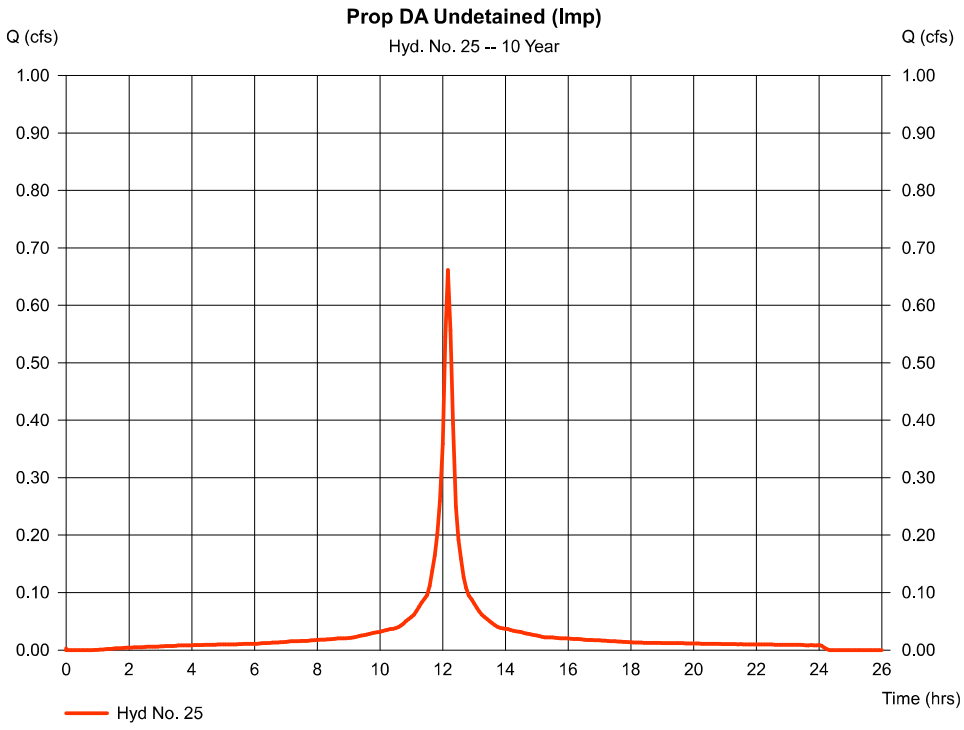


Hydrograph Report

Hyd. No. 25

Prop DA Undetained (Imp)

Hydrograph type	= SCS Runoff	Peak discharge	= 0.662 cfs
Storm frequency	= 10 yrs	Time to peak	= 12.17 hrs
Time interval	= 5 min	Hyd. volume	= 2,761 cuft
Drainage area	= 0.170 ac	Curve number	= 98
Basin Slope	= 0.0 %	Hydraulic length	= 0 ft
Tc method	= USER	Time of conc. (Tc)	= 14.00 min
Total precip.	= 5.01 in	Distribution	= Custom
Storm duration	= NOAA Atlas 14 Type-C.cds	Shape factor	= 484

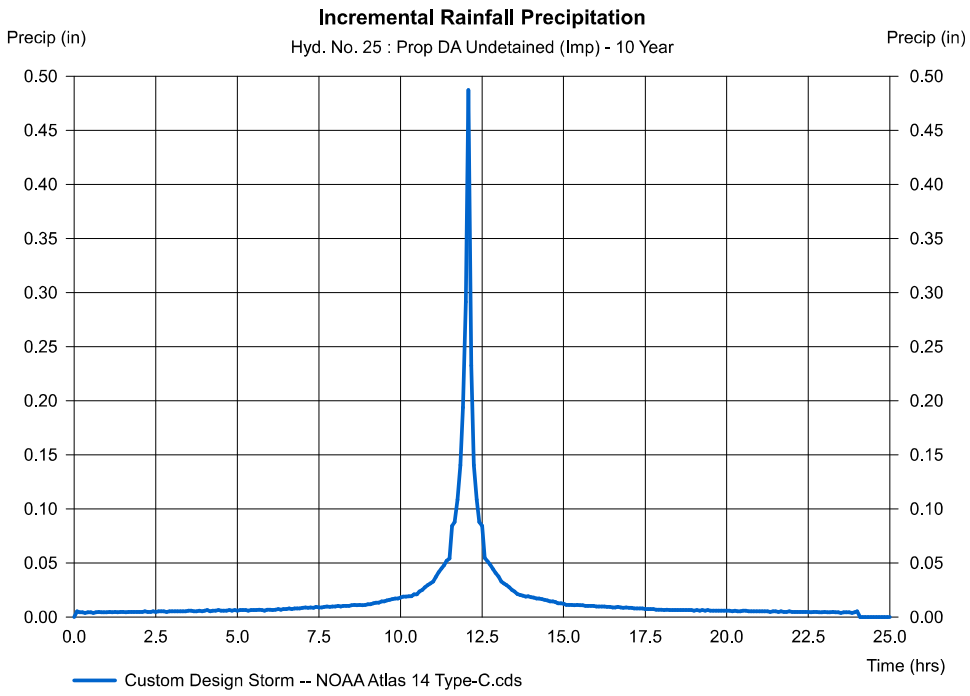


Precipitation Report

Hyd. No. 25

Prop DA Undetained (Imp)

Storm Frequency	= 10 yrs	Time interval	= 5 min
Total precip.	= 5.0100 in	Distribution	= Custom
Storm duration	= NOAA Atlas 14 Type-C.cds		

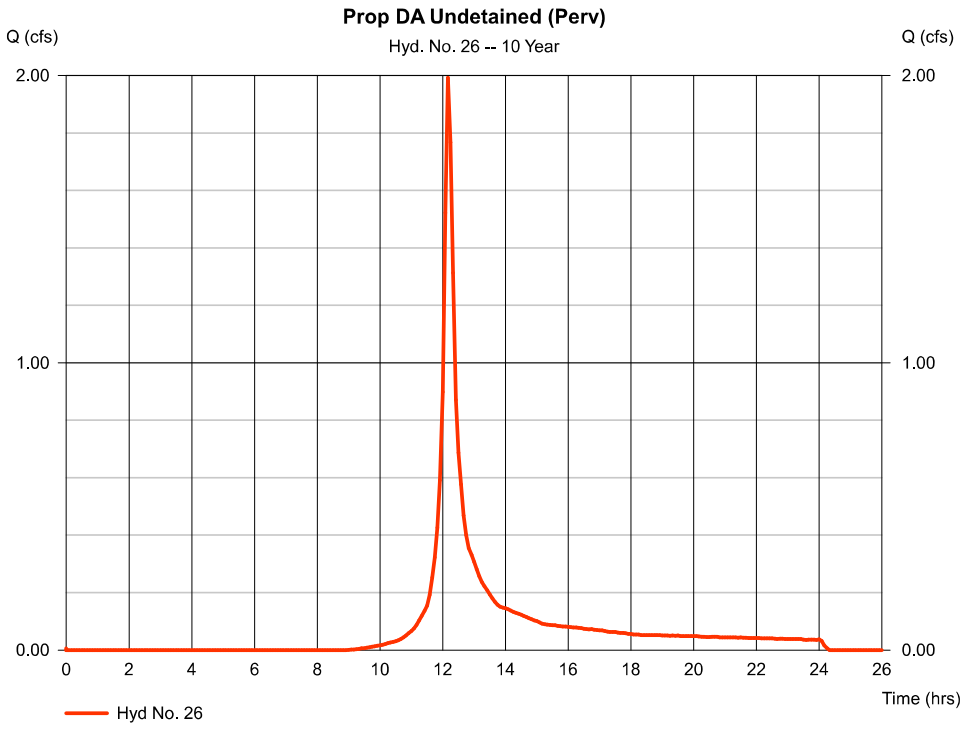


Hydrograph Report

Hyd. No. 26

Prop DA Undetained (Perv)

Hydrograph type	= SCS Runoff	Peak discharge	= 1.993 cfs
Storm frequency	= 10 yrs	Time to peak	= 12.17 hrs
Time interval	= 5 min	Hyd. volume	= 7,266 cuft
Drainage area	= 0.900 ac	Curve number	= 74
Basin Slope	= 0.0 %	Hydraulic length	= 0 ft
Tc method	= USER	Time of conc. (Tc)	= 14.00 min
Total precip.	= 5.01 in	Distribution	= Custom
Storm duration	= NOAA Atlas 14 Type-C.cds	Shape factor	= 484

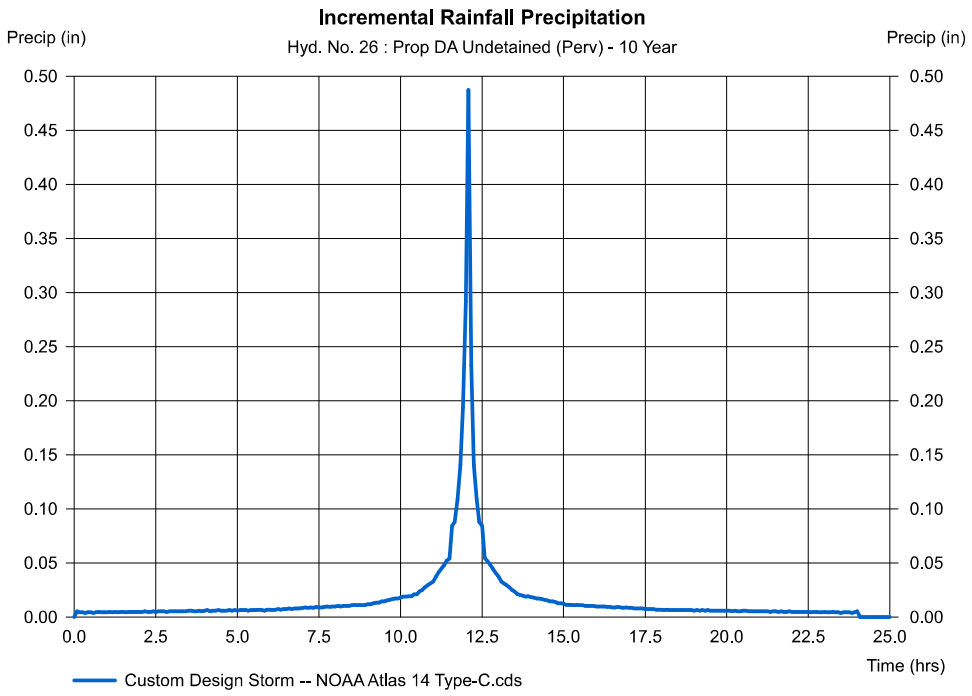


Precipitation Report

Hyd. No. 26

Prop DA Undetained (Perv)

Storm Frequency	= 10 yrs	Time interval	= 5 min
Total precip.	= 5.0100 in	Distribution	= Custom
Storm duration	= NOAA Atlas 14 Type-C.cds		

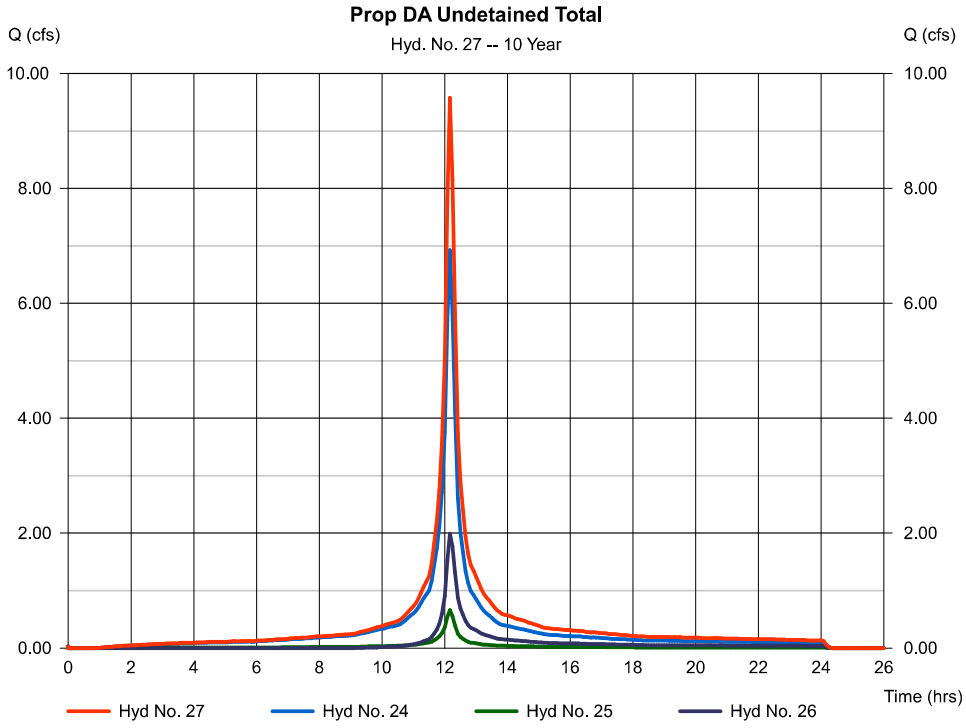


Hydrograph Report

Hyd. No. 27

Prop DA Undetained Total

Hydrograph type	= Combine	Peak discharge	= 9.581 cfs
Storm frequency	= 10 yrs	Time to peak	= 12.17 hrs
Time interval	= 5 min	Hyd. volume	= 38,941 cuft
Inflow hyds.	= 24, 25, 26	Contrib. drain. area	= 2.850 ac

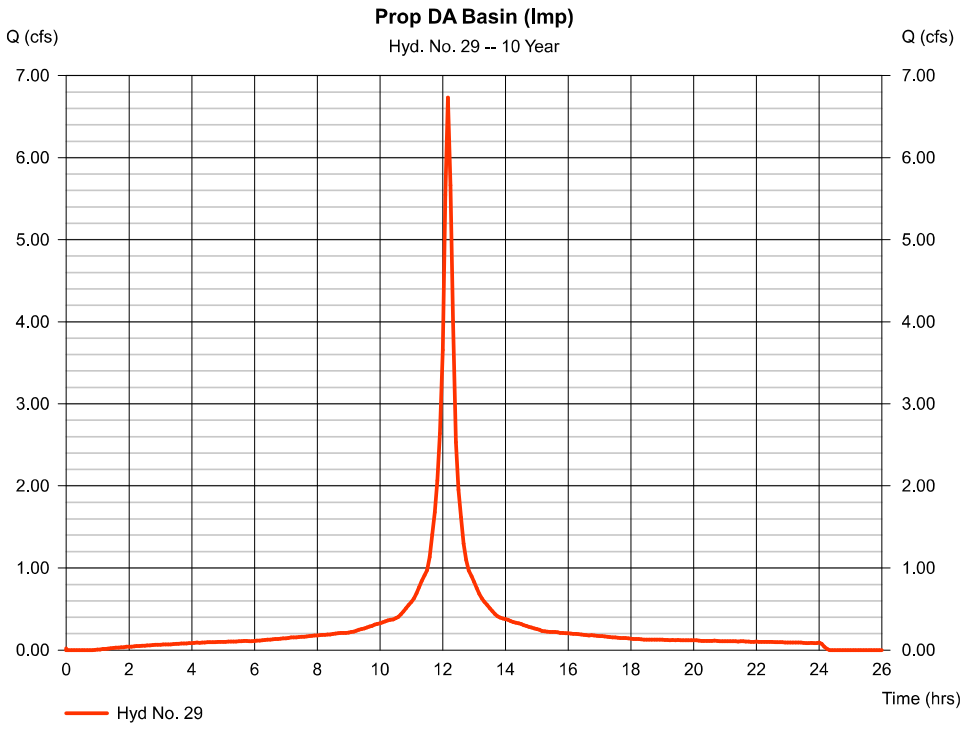


Hydrograph Report

Hyd. No. 29

Prop DA Basin (Imp)

Hydrograph type	= SCS Runoff	Peak discharge	= 6.732 cfs
Storm frequency	= 10 yrs	Time to peak	= 12.17 hrs
Time interval	= 5 min	Hyd. volume	= 28,101 cuft
Drainage area	= 1.730 ac	Curve number	= 98
Basin Slope	= 0.0 %	Hydraulic length	= 0 ft
Tc method	= USER	Time of conc. (Tc)	= 10.00 min
Total precip.	= 5.01 in	Distribution	= Custom
Storm duration	= NOAA Atlas 14 Type-C.cds	Shape factor	= 484

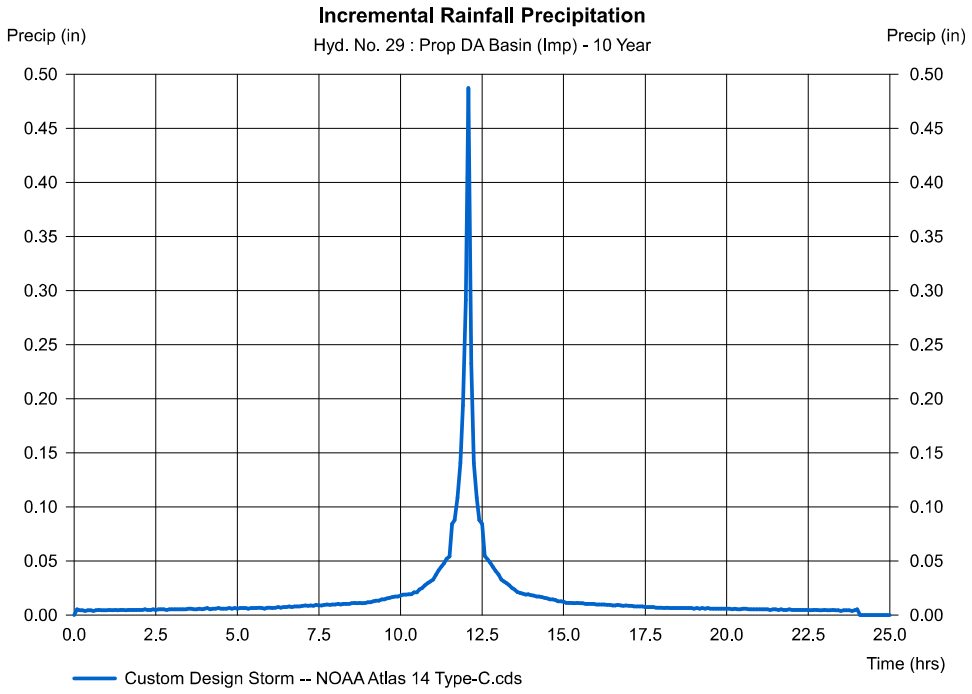


Precipitation Report

Hyd. No. 29

Prop DA Basin (Imp)

Storm Frequency	= 10 yrs	Time interval	= 5 min
Total precip.	= 5.0100 in	Distribution	= Custom
Storm duration	= NOAA Atlas 14 Type-C.cds		

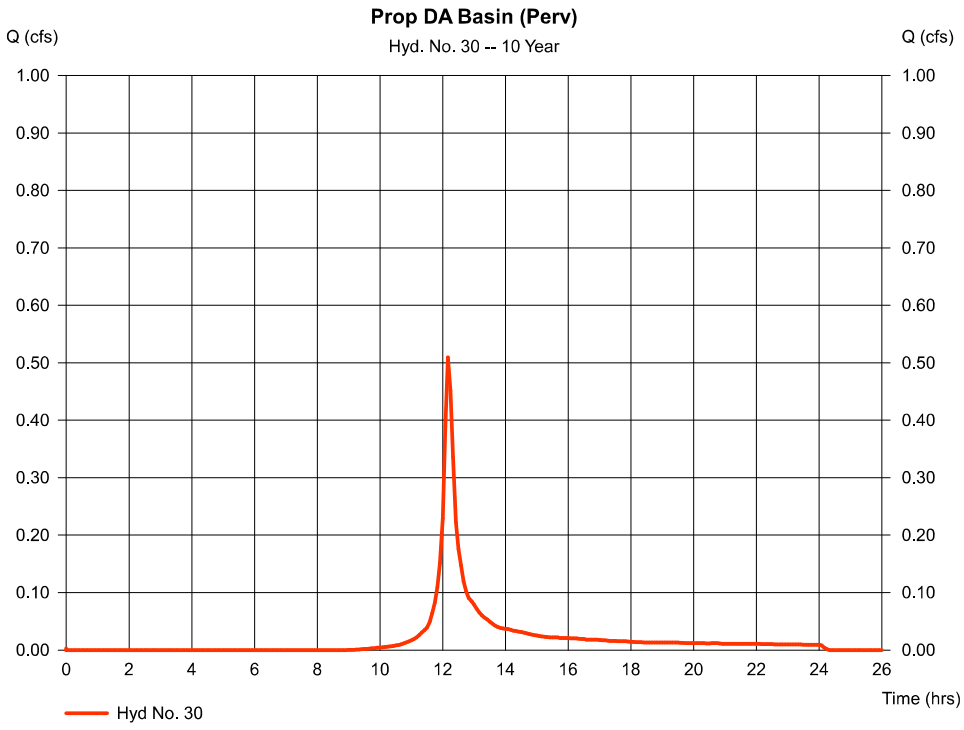


Hydrograph Report

Hyd. No. 30

Prop DA Basin (Perv)

Hydrograph type	= SCS Runoff	Peak discharge	= 0.509 cfs
Storm frequency	= 10 yrs	Time to peak	= 12.17 hrs
Time interval	= 5 min	Hyd. volume	= 1,857 cuft
Drainage area	= 0.230 ac	Curve number	= 74
Basin Slope	= 0.0 %	Hydraulic length	= 0 ft
Tc method	= USER	Time of conc. (Tc)	= 10.00 min
Total precip.	= 5.01 in	Distribution	= Custom
Storm duration	= NOAA Atlas 14 Type-C.cds	Shape factor	= 484

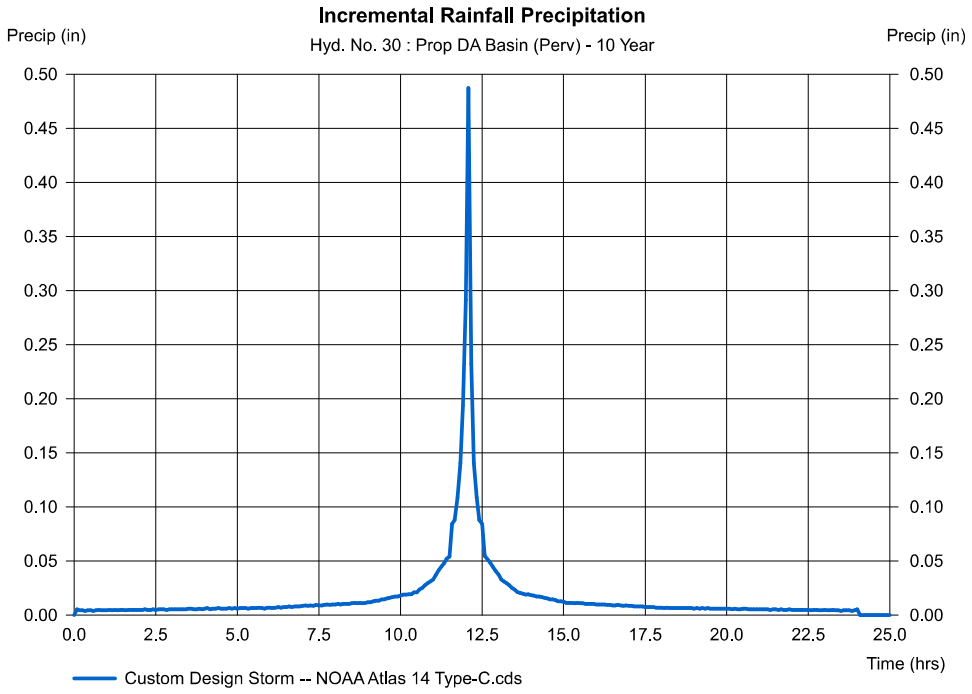


Precipitation Report

Hyd. No. 30

Prop DA Basin (Perv)

Storm Frequency	= 10 yrs	Time interval	= 5 min
Total precip.	= 5.0100 in	Distribution	= Custom
Storm duration	= NOAA Atlas 14 Type-C.cds		

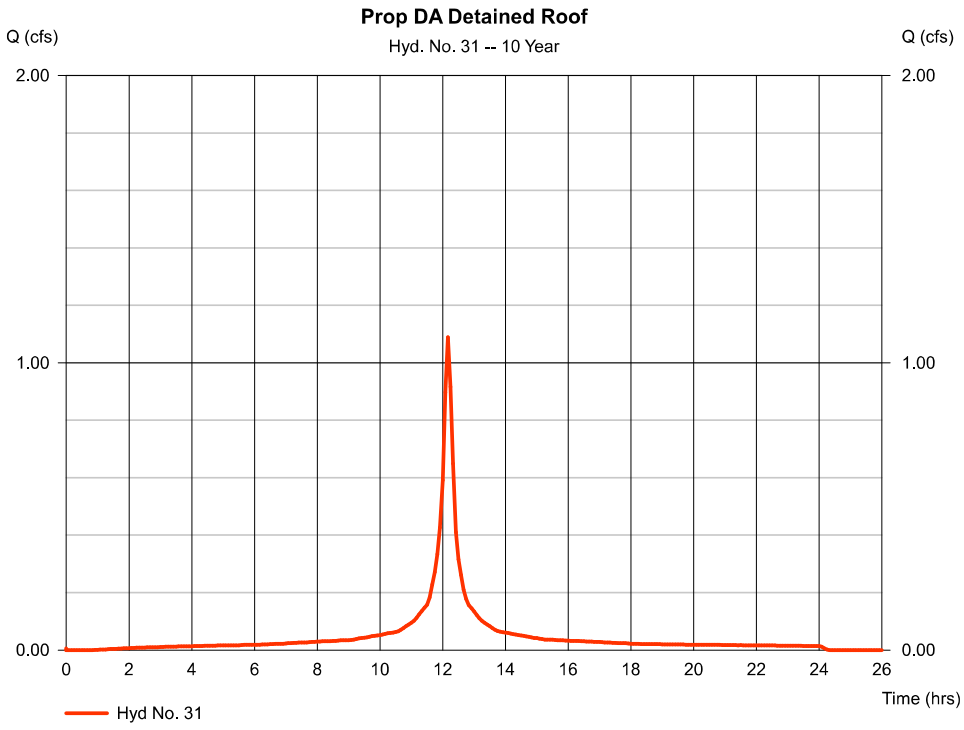


Hydrograph Report

Hyd. No. 31

Prop DA Detained Roof

Hydrograph type	= SCS Runoff	Peak discharge	= 1.090 cfs
Storm frequency	= 10 yrs	Time to peak	= 12.17 hrs
Time interval	= 5 min	Hyd. volume	= 4,548 cuft
Drainage area	= 0.280 ac	Curve number	= 98
Basin Slope	= 0.0 %	Hydraulic length	= 0 ft
Tc method	= USER	Time of conc. (Tc)	= 10.00 min
Total precip.	= 5.01 in	Distribution	= Custom
Storm duration	= NOAA Atlas 14 Type-C.cds	Shape factor	= 484

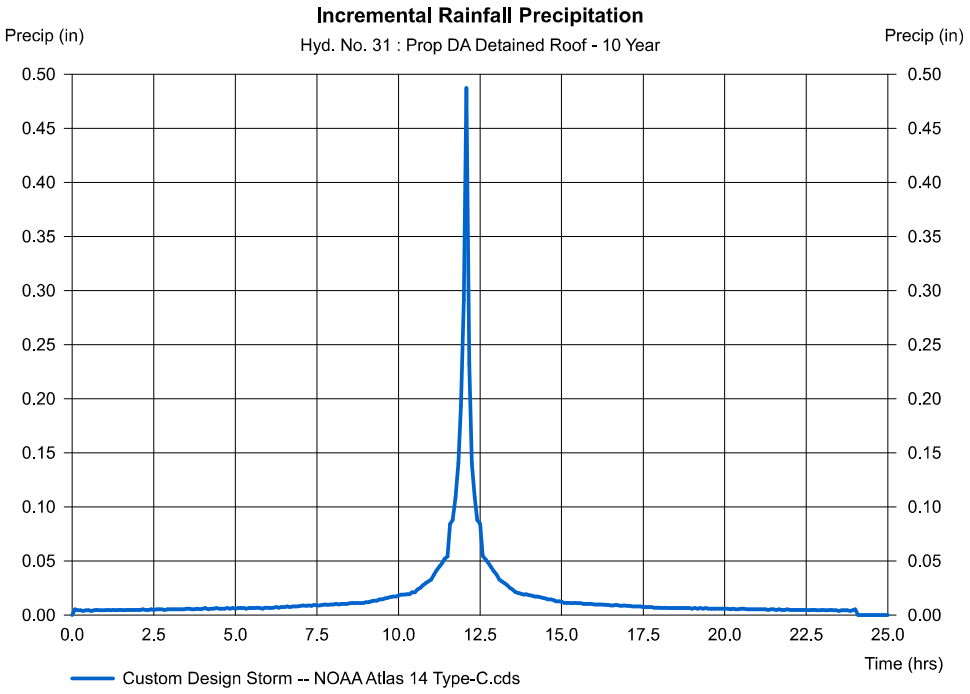


Precipitation Report

Hyd. No. 31

Prop DA Detained Roof

Storm Frequency	= 10 yrs	Time interval	= 5 min
Total precip.	= 5.0100 in	Distribution	= Custom
Storm duration	= NOAA Atlas 14 Type-C.cds		

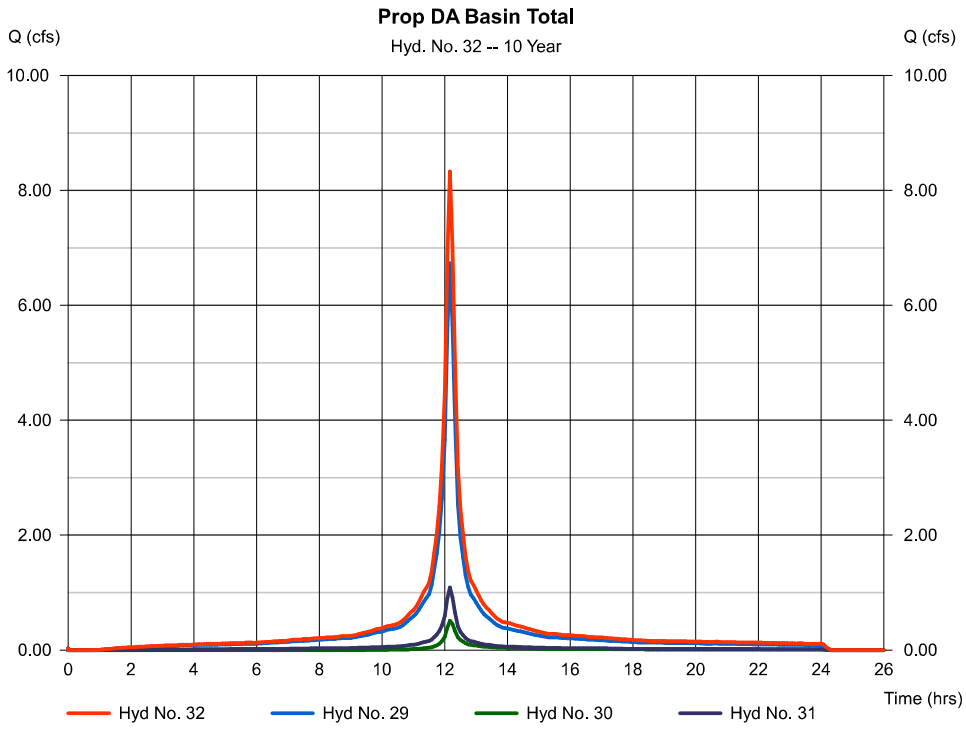


Hydrograph Report

Hyd. No. 32

Prop DA Basin Total

Hydrograph type	= Combine	Peak discharge	= 8.331 cfs
Storm frequency	= 10 yrs	Time to peak	= 12.17 hrs
Time interval	= 5 min	Hyd. volume	= 34,507 cuft
Inflow hyds.	= 29, 30, 31	Contrib. drain. area	= 2.240 ac



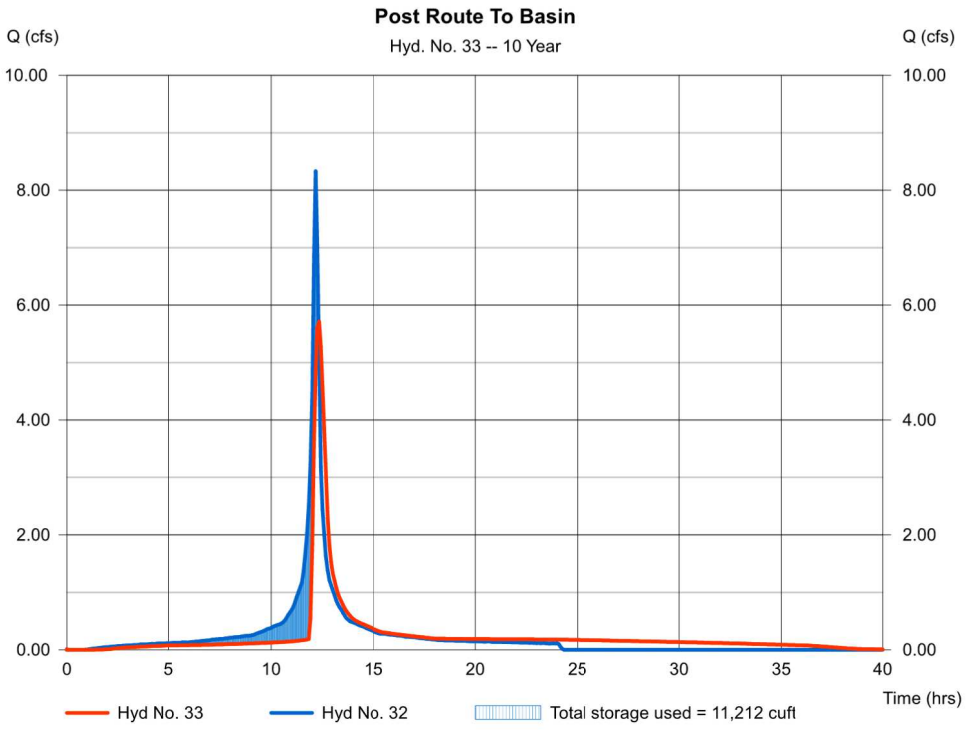
Hydrograph Report

Hyd. No. 33

Post Route To Basin

Hydrograph type	= Reservoir	Peak discharge	= 5.715 cfs
Storm frequency	= 10 yrs	Time to peak	= 12.33 hrs
Time interval	= 5 min	Hyd. volume	= 34,491 cuft
Inflow hyd. No.	= 32 - Prop DA Basin Total	Max. Elevation	= 58.70 ft
Reservoir name	= UG Basin	Max. Storage	= 11,212 cuft

Storage Indication method used.

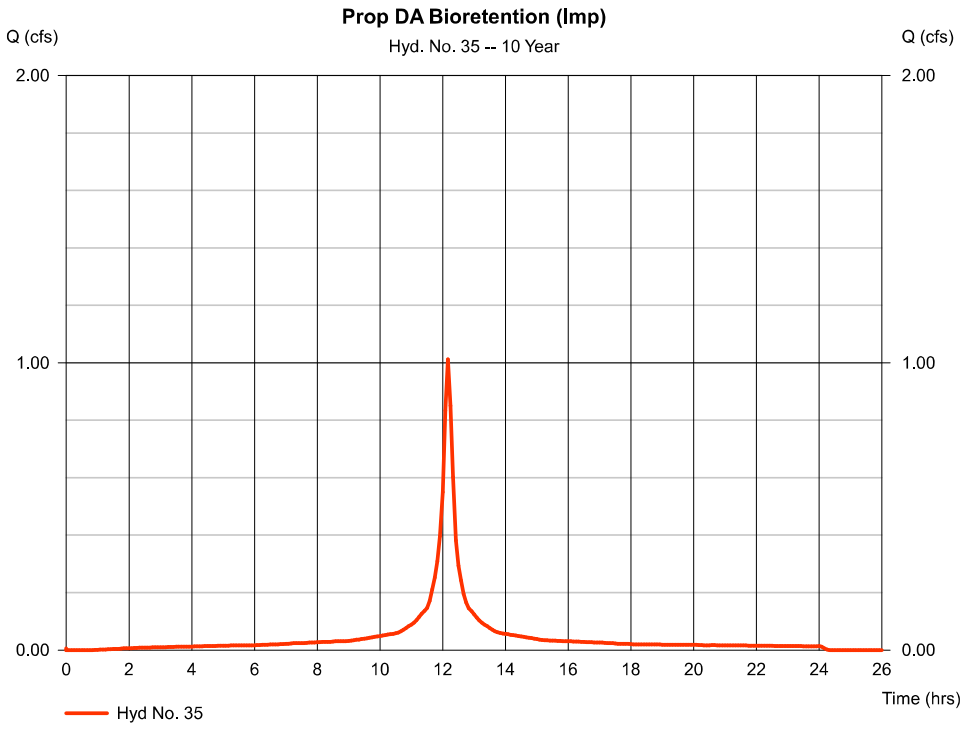


Hydrograph Report

Hyd. No. 35

Prop DA Bioretention (Imp)

Hydrograph type	= SCS Runoff	Peak discharge	= 1.012 cfs
Storm frequency	= 10 yrs	Time to peak	= 12.17 hrs
Time interval	= 5 min	Hyd. volume	= 4,223 cuft
Drainage area	= 0.260 ac	Curve number	= 98
Basin Slope	= 0.0 %	Hydraulic length	= 0 ft
Tc method	= USER	Time of conc. (Tc)	= 14.00 min
Total precip.	= 5.01 in	Distribution	= Custom
Storm duration	= NOAA Atlas 14 Type-C.cds	Shape factor	= 484

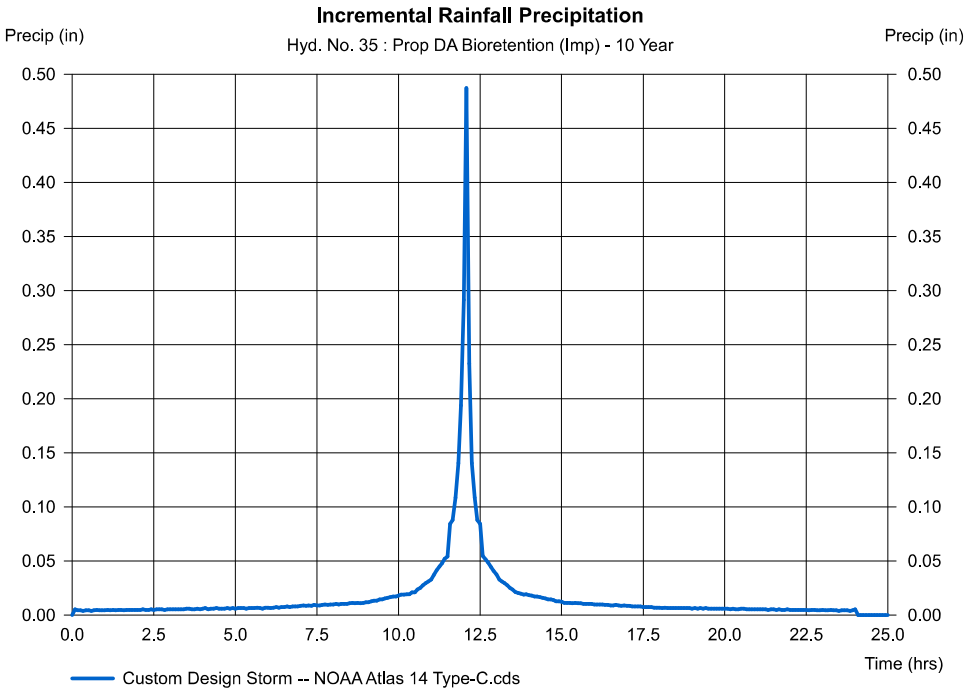


Precipitation Report

Hyd. No. 35

Prop DA Bioretention (Imp)

Storm Frequency	= 10 yrs	Time interval	= 5 min
Total precip.	= 5.0100 in	Distribution	= Custom
Storm duration	= NOAA Atlas 14 Type-C.cds		

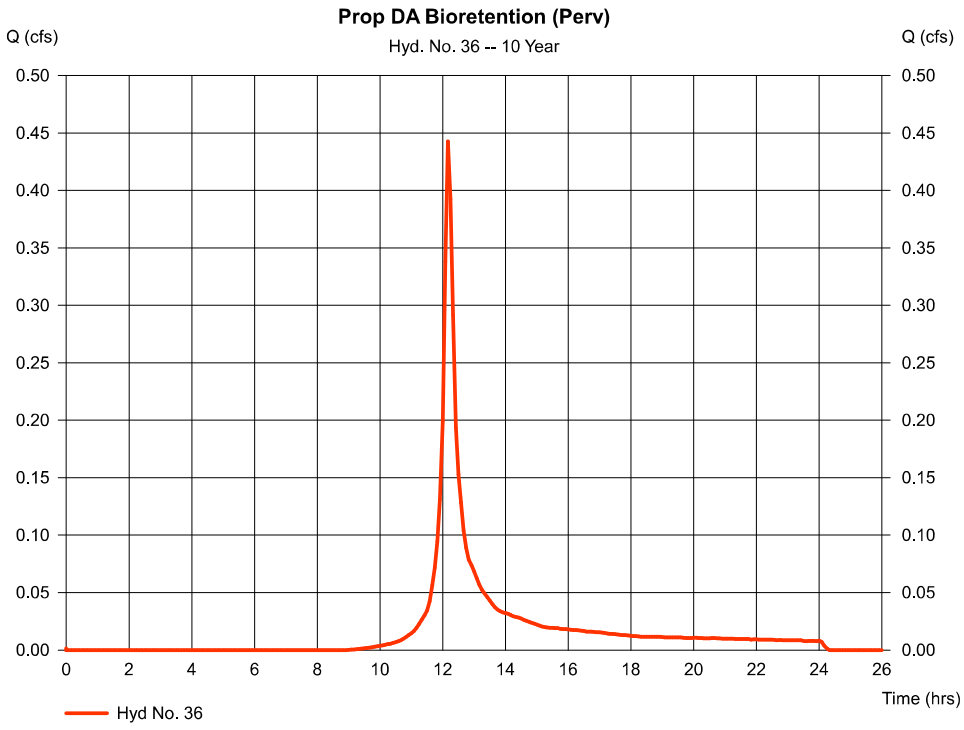


Hydrograph Report

Hyd. No. 36

Prop DA Bioretention (Perv)

Hydrograph type	= SCS Runoff	Peak discharge	= 0.443 cfs
Storm frequency	= 10 yrs	Time to peak	= 12.17 hrs
Time interval	= 5 min	Hyd. volume	= 1,615 cuft
Drainage area	= 0.200 ac	Curve number	= 74
Basin Slope	= 0.0 %	Hydraulic length	= 0 ft
Tc method	= USER	Time of conc. (Tc)	= 14.00 min
Total precip.	= 5.01 in	Distribution	= Custom
Storm duration	= NOAA Atlas 14 Type-C.cds	Shape factor	= 484

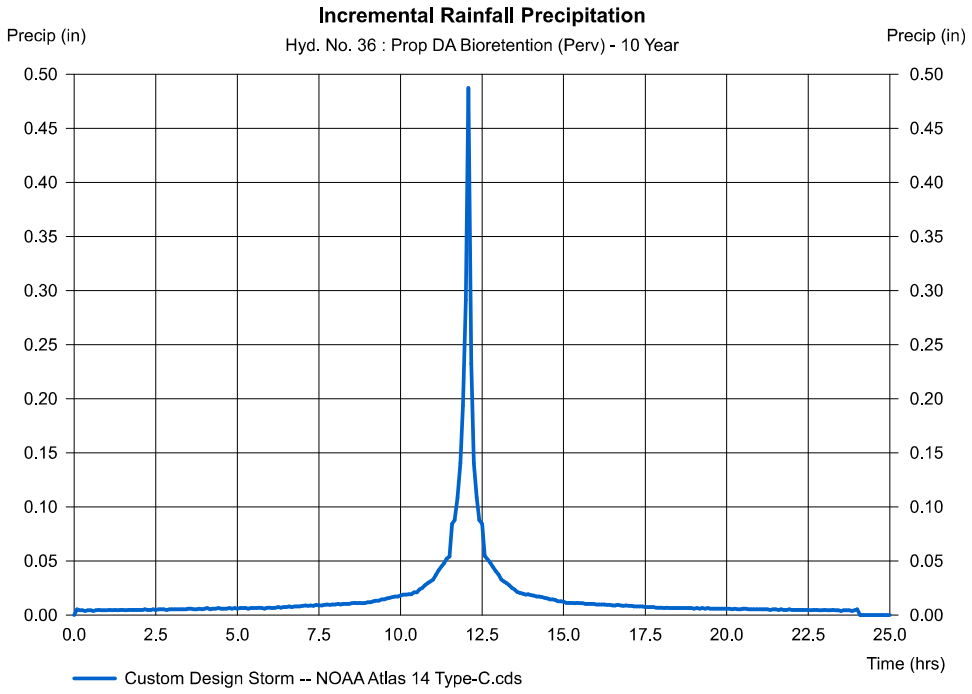


Precipitation Report

Hyd. No. 36

Prop DA Bioretention (Perv)

Storm Frequency	= 10 yrs	Time interval	= 5 min
Total precip.	= 5.0100 in	Distribution	= Custom
Storm duration	= NOAA Atlas 14 Type-C.cds		

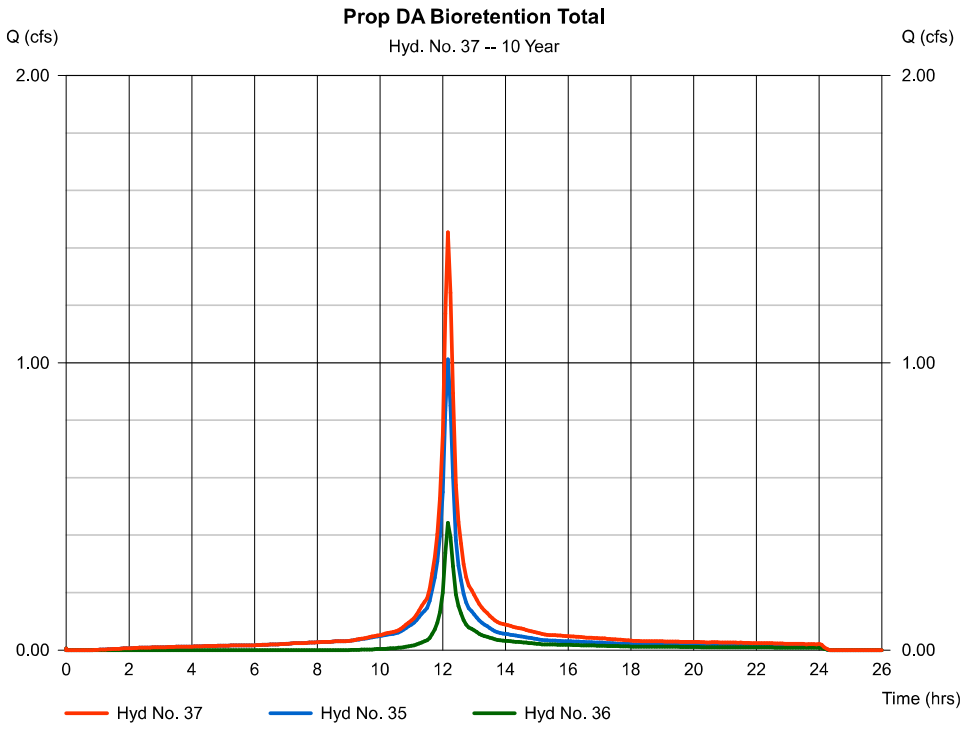


Hydrograph Report

Hyd. No. 37

Prop DA Bioretention Total

Hydrograph type	= Combine	Peak discharge	= 1.455 cfs
Storm frequency	= 10 yrs	Time to peak	= 12.17 hrs
Time interval	= 5 min	Hyd. volume	= 5,838 cuft
Inflow hyds.	= 35, 36	Contrib. drain. area	= 0.460 ac



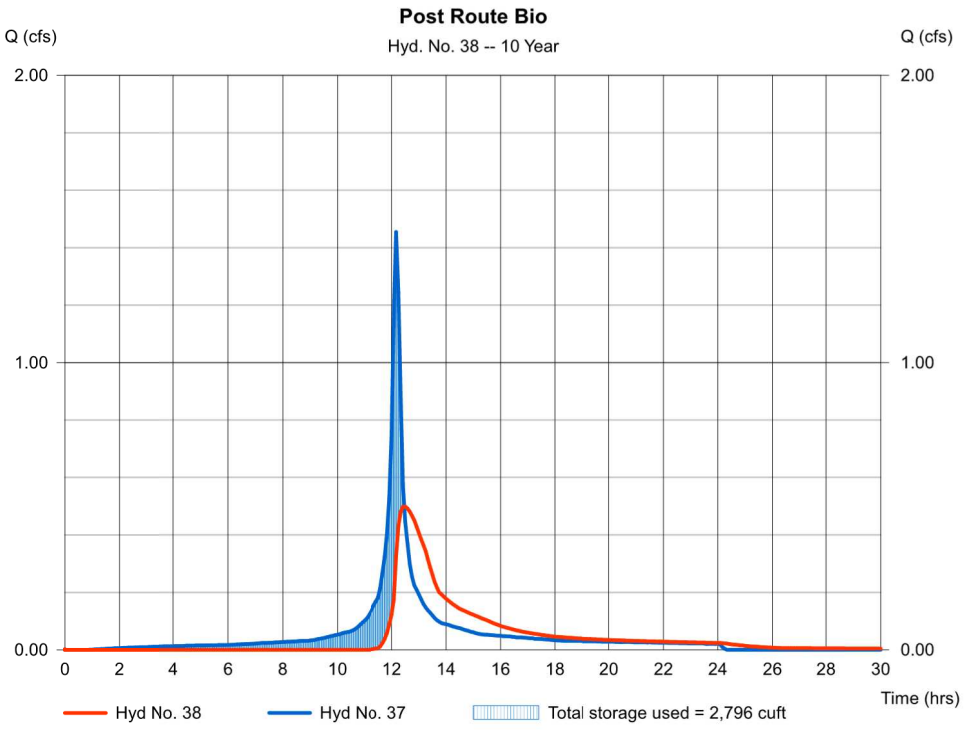
Hydrograph Report

Hyd. No. 38

Post Route Bio

Hydrograph type	= Reservoir	Peak discharge	= 0.498 cfs
Storm frequency	= 10 yrs	Time to peak	= 12.50 hrs
Time interval	= 5 min	Hyd. volume	= 4,896 cuft
Inflow hyd. No.	= 37 - Prop DA Bioretention Total	Max. Elevation	= 63.17 ft
Reservoir name	= Bioretention	Max. Storage	= 2,796 cuft

Storage Indication method used.

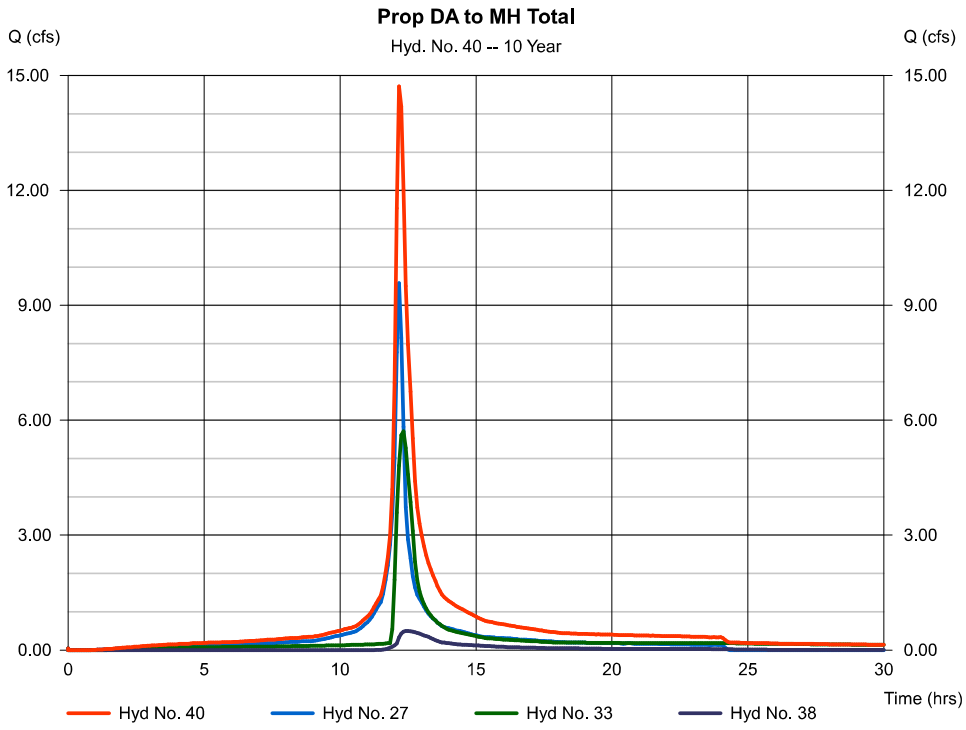


Hydrograph Report

Hyd. No. 40

Prop DA to MH Total

Hydrograph type	= Combine	Peak discharge	= 14.72 cfs
Storm frequency	= 10 yrs	Time to peak	= 12.17 hrs
Time interval	= 5 min	Hyd. volume	= 78,328 cuft
Inflow hyds.	= 27, 33, 38	Contrib. drain. area	= 0.000 ac

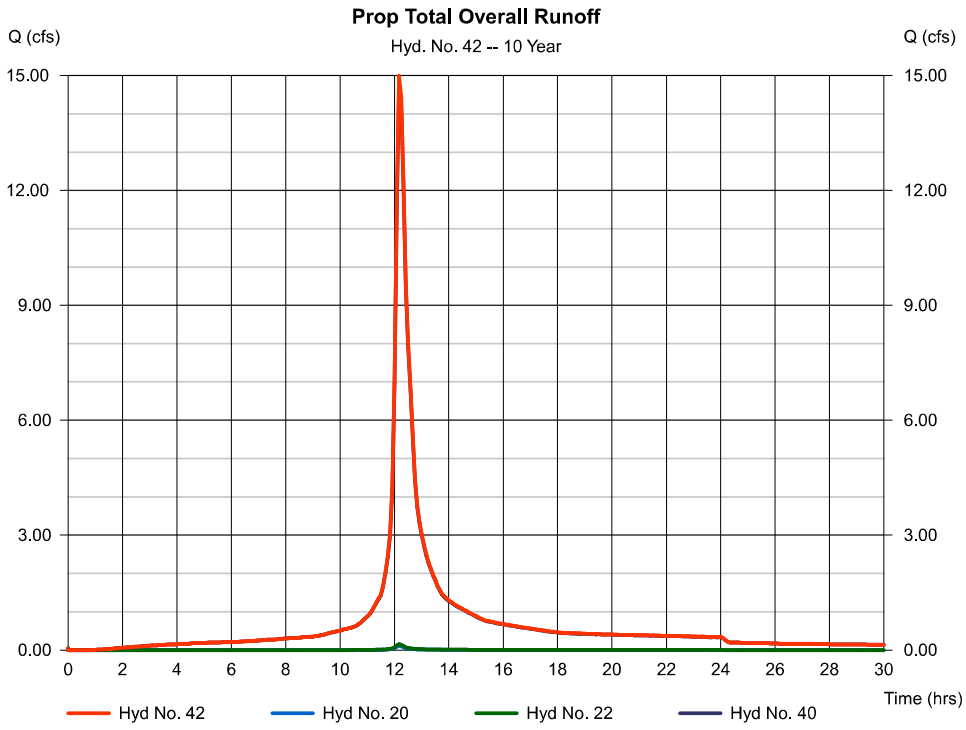


Hydrograph Report

Hyd. No. 42

Prop Total Overall Runoff

Hydrograph type	= Combine	Peak discharge	= 14.99 cfs
Storm frequency	= 10 yrs	Time to peak	= 12.17 hrs
Time interval	= 5 min	Hyd. volume	= 79,297 cuft
Inflow hyds.	= 20, 22, 40	Contrib. drain. area	= 0.120 ac



Hydrograph Summary Report

Hydraflow Hydrographs by Intelisolve v9.1

Hyd. No.	Hydrograph type (origin)	Peak flow (cfs)	Time interval (min)	Time to peak (min)	Hyd. volume (cuft)	Inflow hyd(s)	Maximum elevation (ft)	Total strge used (cuft)	Hydrograph description
1	SCS Runoff	0.095	5	730	348	----	-----	-----	Ex DA Lot 42.01 Undisturbed (Perv)
2	SCS Runoff	0.763	5	730	2,785	----	-----	-----	Ex DA Lot 42.01 Disturbed (Perv)
3	Combine	0.858	5	730	3,133	1, 2	-----	-----	Ex DA Lot 42.01 Total
5	SCS Runoff	0.286	5	730	1,044	----	-----	-----	Ex. DA Davidson Undisturbed (Perv)
6	SCS Runoff	0.048	5	730	174	----	-----	-----	Ex. DA Davidson Disturbed (Perv)
7	Combine	0.334	5	730	1,218	5, 6	-----	-----	Ex DA Davidson Total
9	SCS Runoff	2.816	5	730	11,934	----	-----	-----	Ex DA Site Undisturbed (Imp)
10	SCS Runoff	1.811	5	730	6,613	----	-----	-----	Ex DA Site Undisturbed (Perv)
11	SCS Runoff	7.680	5	730	32,548	----	-----	-----	Ex DA Roof Undisturbed (Imp)
12	SCS Runoff	8.576	5	730	36,345	----	-----	-----	Ex DA Site Disturbed (Imp)
13	SCS Runoff	9.770	5	730	35,677	----	-----	-----	Ex DA Site Disturbed (Perv)
14	Combine	30.65	5	730	123,117	9, 10, 11, 12, 13	-----	-----	Ex DA to MH Total
16	Combine	12.69	5	730	52,487	1, 5, 9, 10, 11,	-----	-----	Ex Undisturbed Total
17	Combine	19.16	5	730	74,980	2, 6, 12, 13,	-----	-----	Ex Disturbed Total
20	SCS Runoff	0.238	5	730	870	----	-----	-----	Prop DA Lot 42.01 (Perv)
22	SCS Runoff	0.334	5	730	1,218	----	-----	-----	Prop DA Davidson Avenue (Perv)
24	SCS Runoff	11.39	5	730	48,279	----	-----	-----	Prop DA Roof Imp
25	SCS Runoff	1.088	5	730	4,611	----	-----	-----	Prop DA Undetained (Imp)
26	SCS Runoff	4.289	5	730	15,663	----	-----	-----	Prop DA Undetained (Perv)
27	Combine	16.77	5	730	68,553	24, 25, 26	-----	-----	Prop DA Undetained Total
29	SCS Runoff	11.07	5	730	46,923	----	-----	-----	Prop DA Basin (Imp)
30	SCS Runoff	1.096	5	730	4,003	----	-----	-----	Prop DA Basin (Perv)
31	SCS Runoff	1.792	5	730	7,594	----	-----	-----	Prop DA Detained Roof
32	Combine	13.96	5	730	58,520	29, 30, 31	-----	-----	Prop DA Basin Total
33	Reservoir	12.49	5	735	58,505	32	59.72	13,746	Post Route To Basin
35	SCS Runoff	1.664	5	730	7,052	----	-----	-----	Prop DA Bioretention (Imp)
36	SCS Runoff	0.953	5	730	3,481	----	-----	-----	Prop DA Bioretention (Perv)
37	Combine	2.617	5	730	10,533	35, 36	-----	-----	Prop DA Bioretention Total
38	Reservoir	0.805	5	750	9,591	37	63.70	4,527	Post Route Bio
40	Combine	27.43	5	735	136,648	27, 33, 38,	-----	-----	Prop DA to MH Total

Hydrograph Summary Report

Hydraflow Hydrographs by Intelisolve v9.1

Hyd. No.	Hydrograph type (origin)	Peak flow (cfs)	Time interval (min)	Time to peak (min)	Hyd. volume (cuft)	Inflow hyd(s)	Maximum elevation (ft)	Total strge used (cuft)	Hydrograph description
42	Combine	27.92	5	735	138,737	20, 22, 40,	-----	-----	Prop Total Overall Runoff

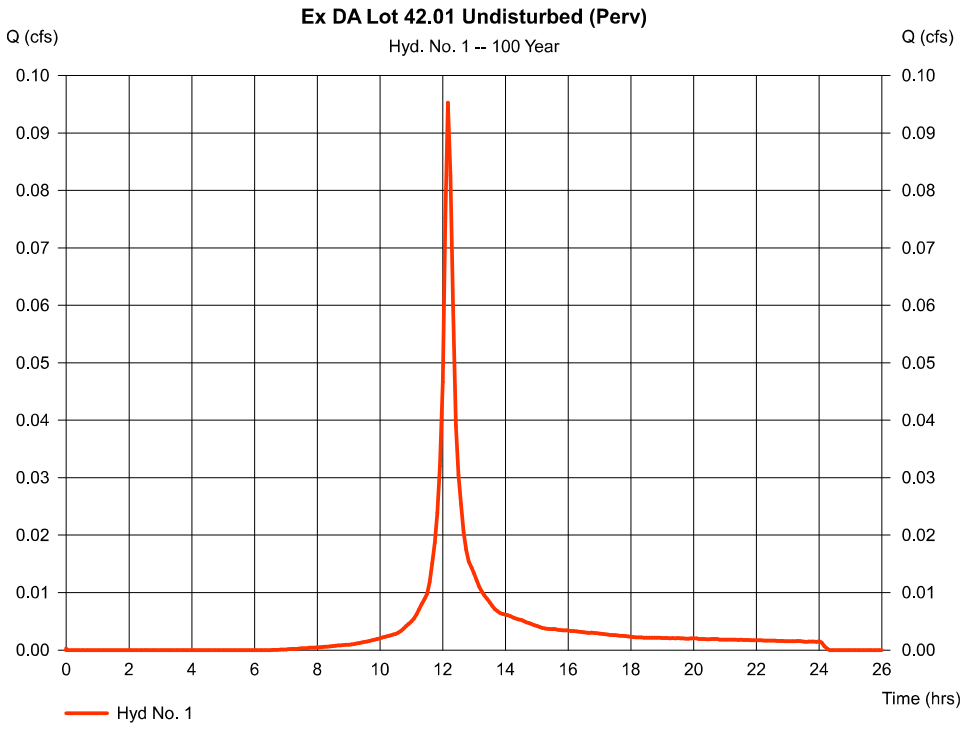
Amended Site Plans Revision 1.gpw | Return Period: 100 Year | Friday, Dec 2, 2022

Hydrograph Report

Hyd. No. 1

Ex DA Lot 42.01 Undisturbed (Perv)

Hydrograph type	= SCS Runoff	Peak discharge	= 0.095 cfs
Storm frequency	= 100 yrs	Time to peak	= 12.17 hrs
Time interval	= 5 min	Hyd. volume	= 348 cuft
Drainage area	= 0.020 ac	Curve number	= 74
Basin Slope	= 0.0 %	Hydraulic length	= 0 ft
Tc method	= USER	Time of conc. (Tc)	= 10.00 min
Total precip.	= 8.21 in	Distribution	= Custom
Storm duration	= NOAA Atlas 14 Type-C.cds	Shape factor	= 484

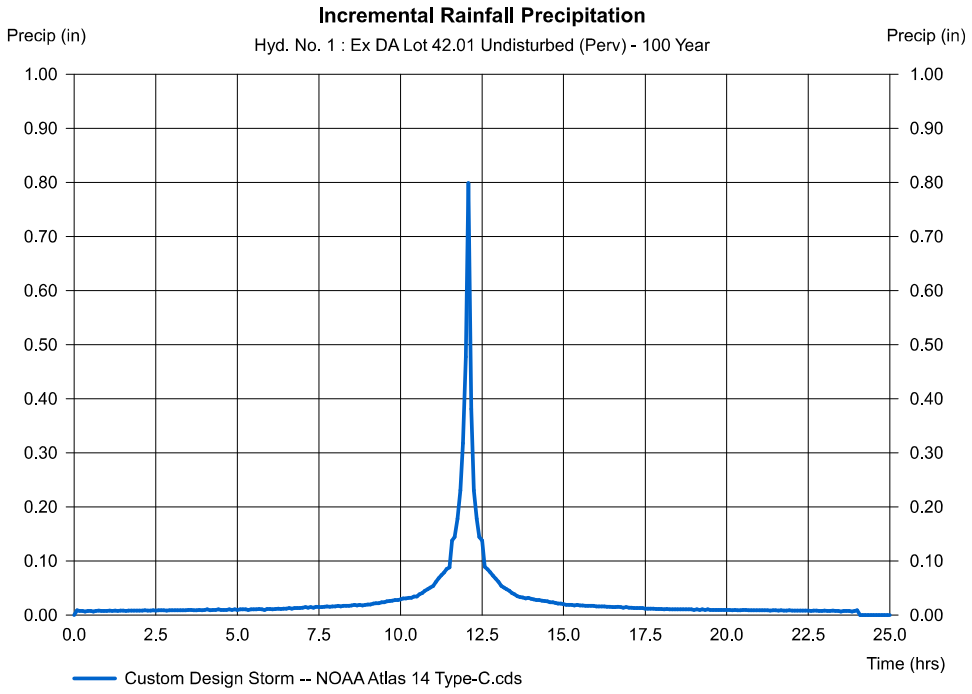


Precipitation Report

Hyd. No. 1

Ex DA Lot 42.01 Undisturbed (Perv)

Storm Frequency	= 100 yrs	Time interval	= 5 min
Total precip.	= 8.2100 in	Distribution	= Custom
Storm duration	= NOAA Atlas 14 Type-C.cds		

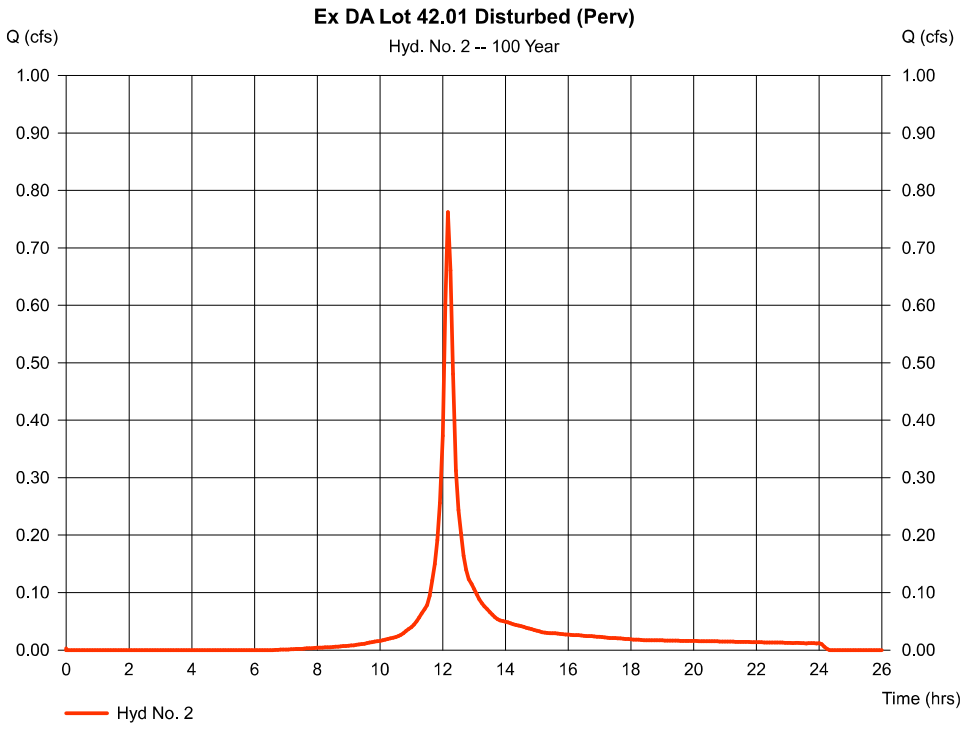


Hydrograph Report

Hyd. No. 2

Ex DA Lot 42.01 Disturbed (Perv)

Hydrograph type	= SCS Runoff	Peak discharge	= 0.763 cfs
Storm frequency	= 100 yrs	Time to peak	= 12.17 hrs
Time interval	= 5 min	Hyd. volume	= 2,785 cuft
Drainage area	= 0.160 ac	Curve number	= 74
Basin Slope	= 0.0 %	Hydraulic length	= 0 ft
Tc method	= USER	Time of conc. (Tc)	= 10.00 min
Total precip.	= 8.21 in	Distribution	= Custom
Storm duration	= NOAA Atlas 14 Type-C.cds	Shape factor	= 484

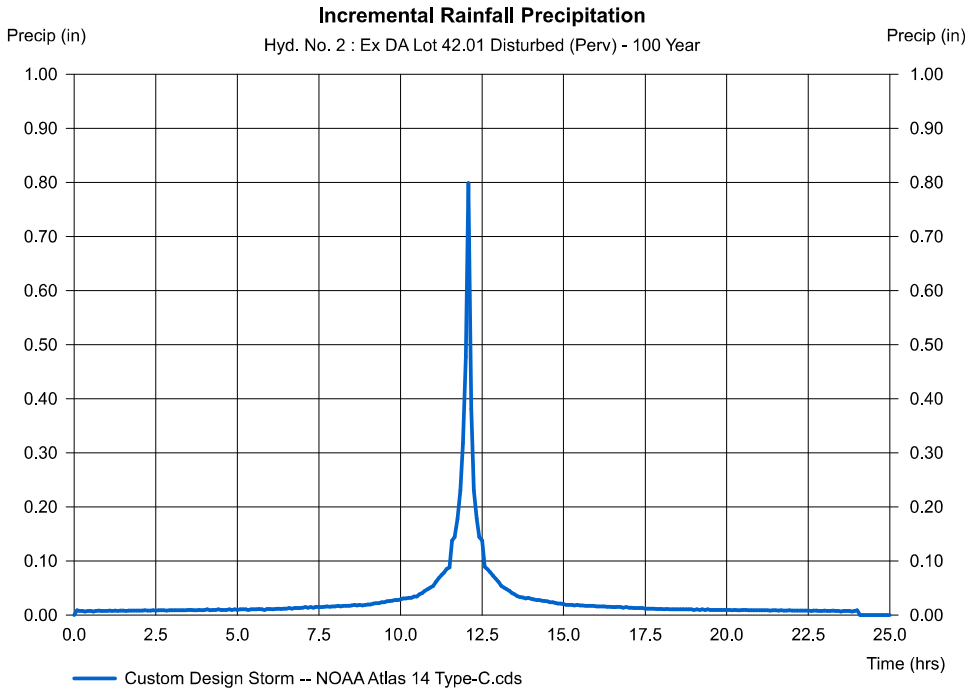


Precipitation Report

Hyd. No. 2

Ex DA Lot 42.01 Disturbed (Perv)

Storm Frequency	= 100 yrs	Time interval	= 5 min
Total precip.	= 8.2100 in	Distribution	= Custom
Storm duration	= NOAA Atlas 14 Type-C.cds		

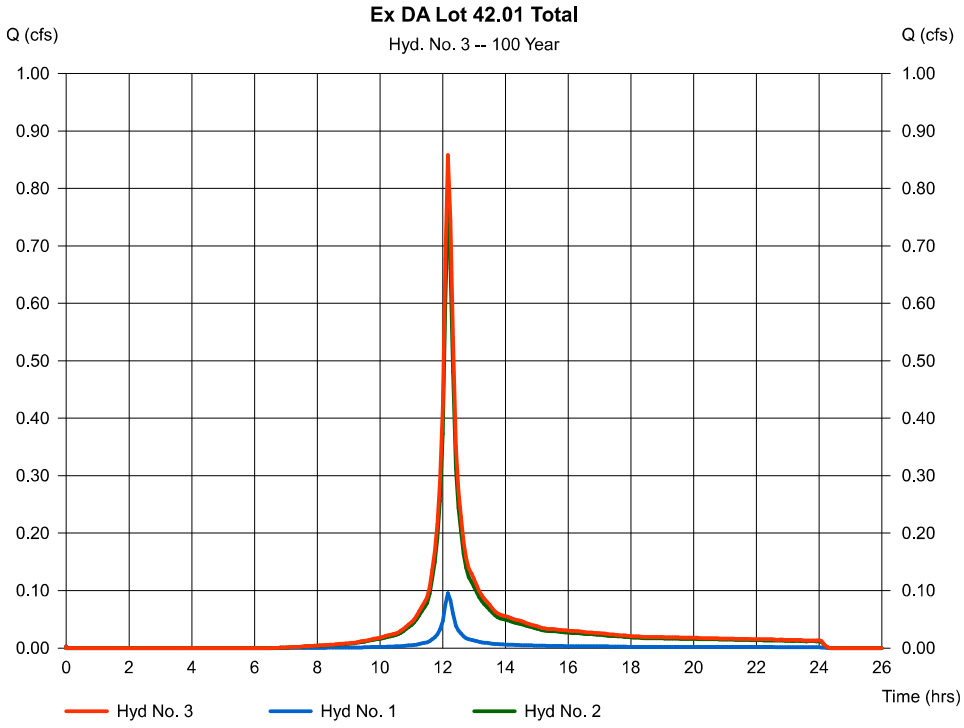


Hydrograph Report

Hyd. No. 3

Ex DA Lot 42.01 Total

Hydrograph type	= Combine	Peak discharge	= 0.858 cfs
Storm frequency	= 100 yrs	Time to peak	= 12.17 hrs
Time interval	= 5 min	Hyd. volume	= 3,133 cuft
Inflow hyds.	= 1, 2	Contrib. drain. area	= 0.180 ac

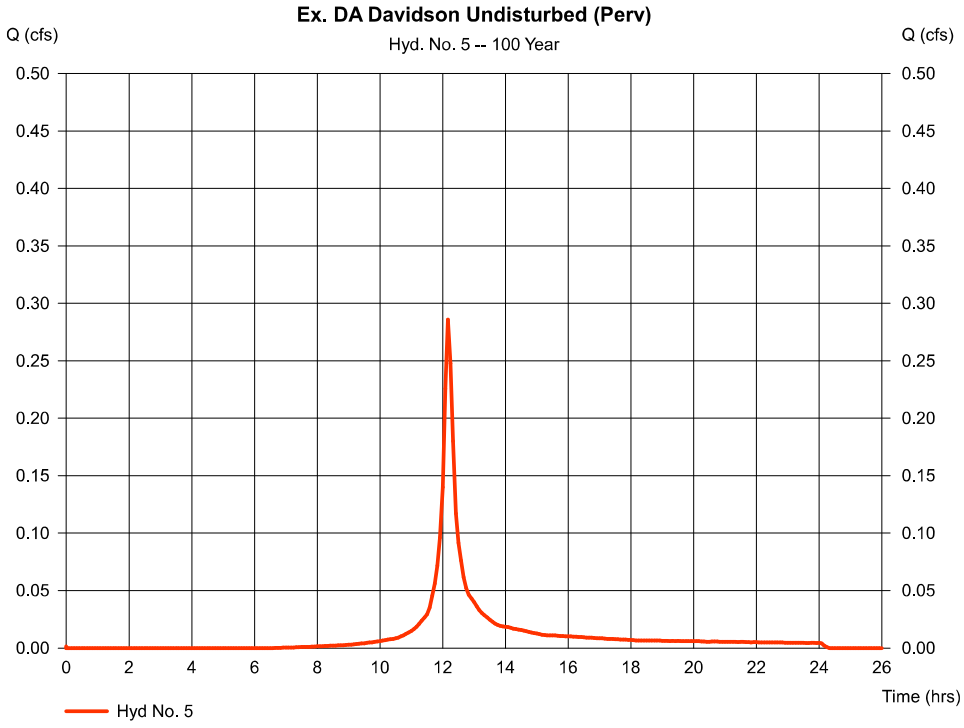


Hydrograph Report

Hyd. No. 5

Ex. DA Davidson Undisturbed (Perv)

Hydrograph type	= SCS Runoff	Peak discharge	= 0.286 cfs
Storm frequency	= 100 yrs	Time to peak	= 12.17 hrs
Time interval	= 5 min	Hyd. volume	= 1,044 cuft
Drainage area	= 0.060 ac	Curve number	= 74
Basin Slope	= 0.0 %	Hydraulic length	= 0 ft
Tc method	= USER	Time of conc. (Tc)	= 10.00 min
Total precip.	= 8.21 in	Distribution	= Custom
Storm duration	= NOAA Atlas 14 Type-C.cds	Shape factor	= 484

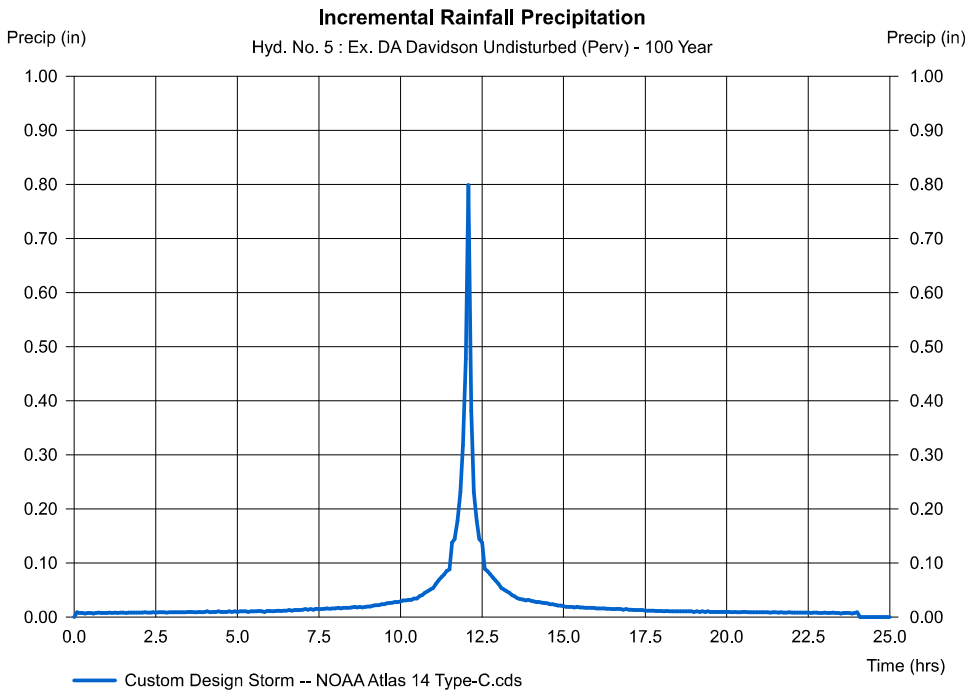


Precipitation Report

Hyd. No. 5

Ex. DA Davidson Undisturbed (Perv)

Storm Frequency	= 100 yrs	Time interval	= 5 min
Total precip.	= 8.2100 in	Distribution	= Custom
Storm duration	= NOAA Atlas 14 Type-C.cds		

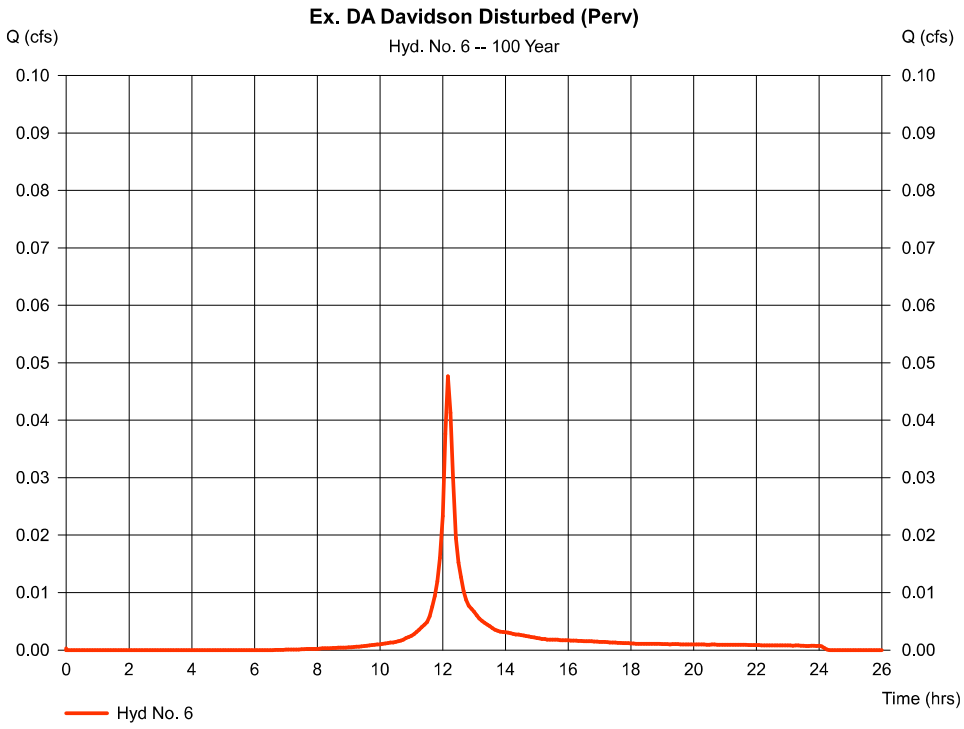


Hydrograph Report

Hyd. No. 6

Ex. DA Davidson Disturbed (Perv)

Hydrograph type	= SCS Runoff	Peak discharge	= 0.048 cfs
Storm frequency	= 100 yrs	Time to peak	= 12.17 hrs
Time interval	= 5 min	Hyd. volume	= 174 cuft
Drainage area	= 0.010 ac	Curve number	= 74
Basin Slope	= 0.0 %	Hydraulic length	= 0 ft
Tc method	= USER	Time of conc. (Tc)	= 10.00 min
Total precip.	= 8.21 in	Distribution	= Custom
Storm duration	= NOAA Atlas 14 Type-C.cds	Shape factor	= 484

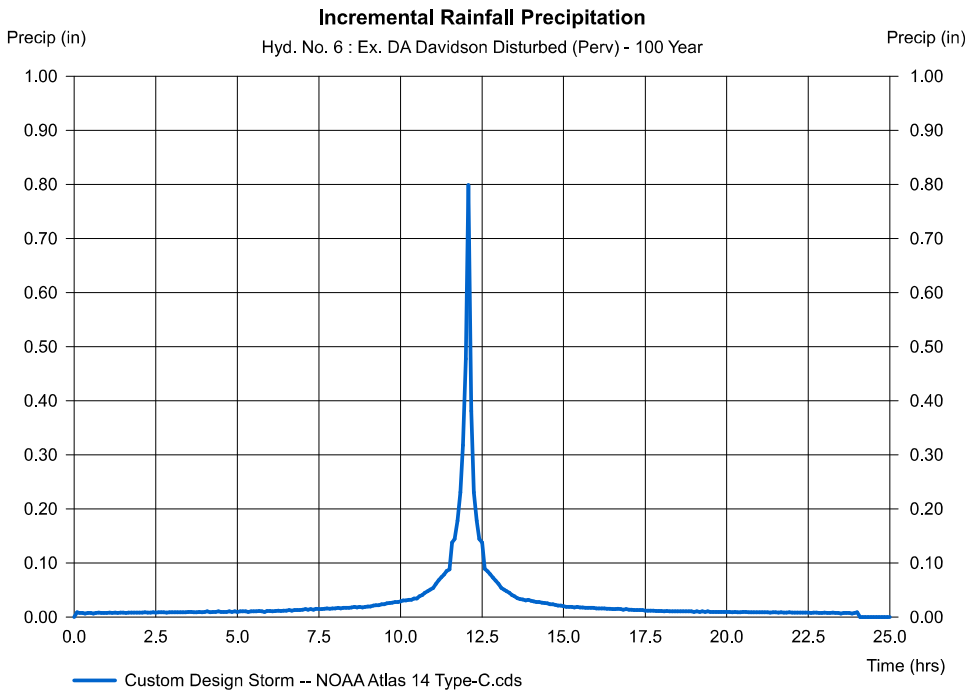


Precipitation Report

Hyd. No. 6

Ex. DA Davidson Disturbed (Perv)

Storm Frequency	= 100 yrs	Time interval	= 5 min
Total precip.	= 8.2100 in	Distribution	= Custom
Storm duration	= NOAA Atlas 14 Type-C.cds		

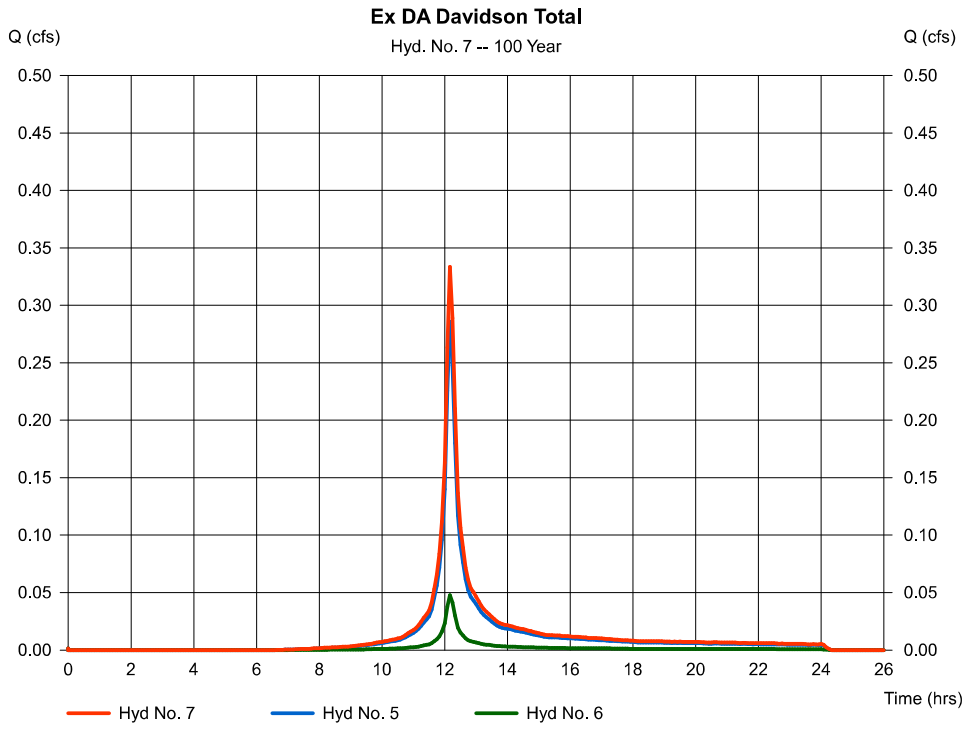


Hydrograph Report

Hyd. No. 7

Ex DA Davidson Total

Hydrograph type	= Combine	Peak discharge	= 0.334 cfs
Storm frequency	= 100 yrs	Time to peak	= 12.17 hrs
Time interval	= 5 min	Hyd. volume	= 1,218 cuft
Inflow hyds.	= 5, 6	Contrib. drain. area	= 0.070 ac

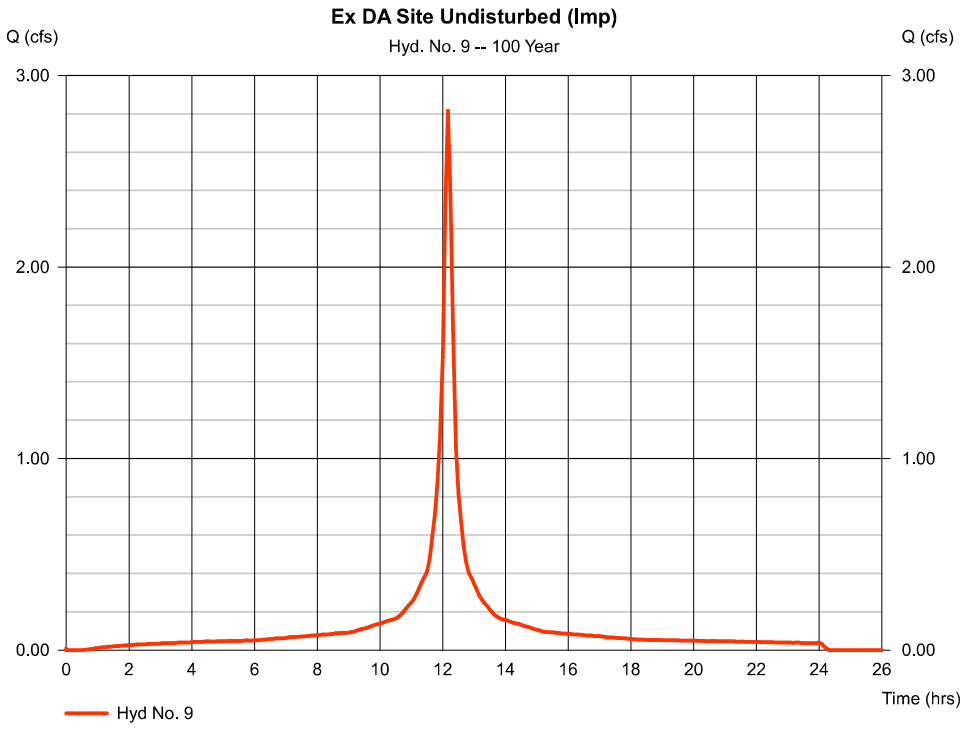


Hydrograph Report

Hyd. No. 9

Ex DA Site Undisturbed (Imp)

Hydrograph type	= SCS Runoff	Peak discharge	= 2.816 cfs
Storm frequency	= 100 yrs	Time to peak	= 12.17 hrs
Time interval	= 5 min	Hyd. volume	= 11,934 cuft
Drainage area	= 0.440 ac	Curve number	= 98
Basin Slope	= 0.0 %	Hydraulic length	= 0 ft
Tc method	= USER	Time of conc. (Tc)	= 10.00 min
Total precip.	= 8.21 in	Distribution	= Custom
Storm duration	= NOAA Atlas 14 Type-C.cds	Shape factor	= 484

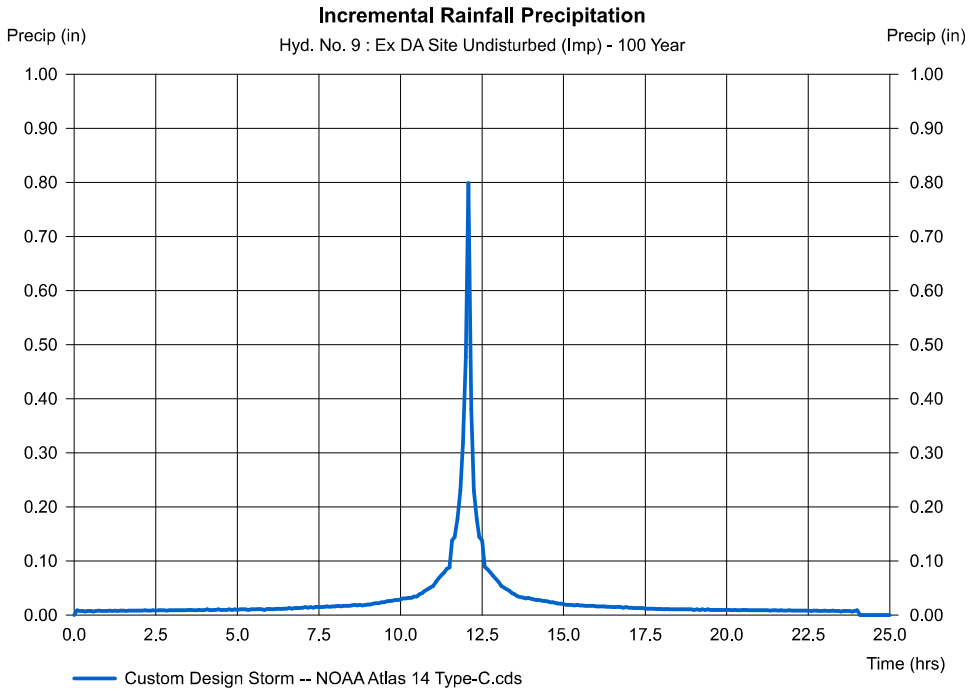


Precipitation Report

Hyd. No. 9

Ex DA Site Undisturbed (Imp)

Storm Frequency	= 100 yrs	Time interval	= 5 min
Total precip.	= 8.2100 in	Distribution	= Custom
Storm duration	= NOAA Atlas 14 Type-C.cds		

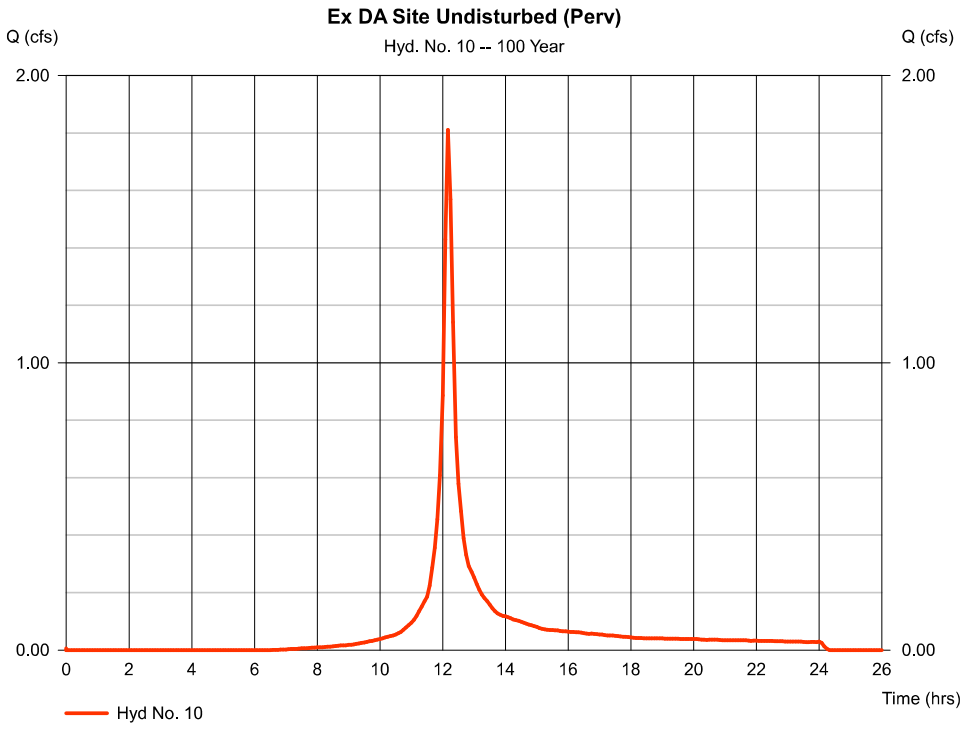


Hydrograph Report

Hyd. No. 10

Ex DA Site Undisturbed (Perv)

Hydrograph type	= SCS Runoff	Peak discharge	= 1.811 cfs
Storm frequency	= 100 yrs	Time to peak	= 12.17 hrs
Time interval	= 5 min	Hyd. volume	= 6,613 cuft
Drainage area	= 0.380 ac	Curve number	= 74
Basin Slope	= 0.0 %	Hydraulic length	= 0 ft
Tc method	= USER	Time of conc. (Tc)	= 11.00 min
Total precip.	= 8.21 in	Distribution	= Custom
Storm duration	= NOAA Atlas 14 Type-C.cds	Shape factor	= 484

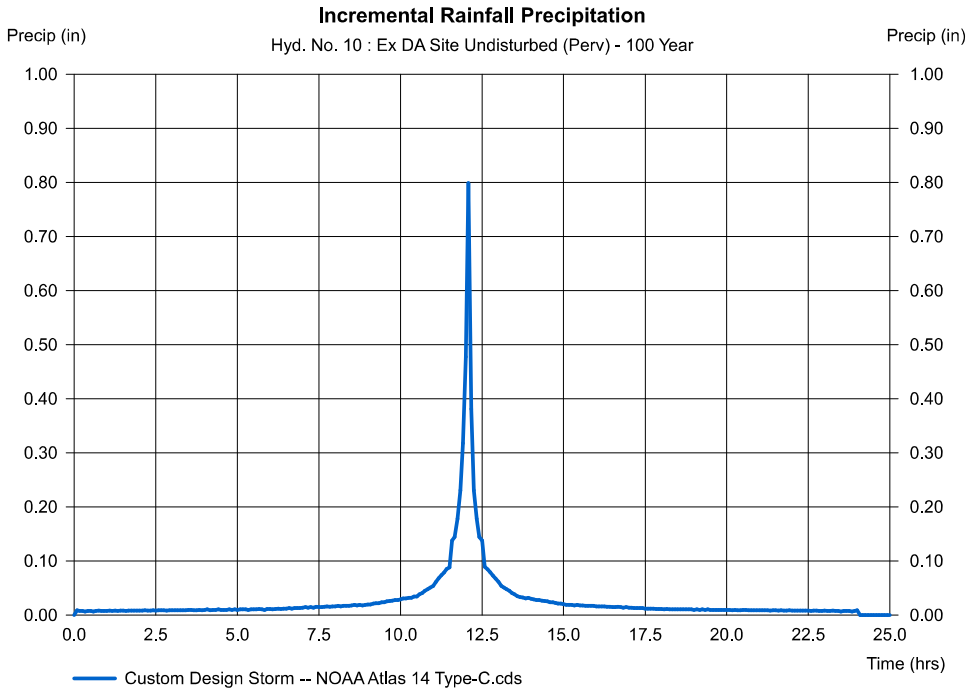


Precipitation Report

Hyd. No. 10

Ex DA Site Undisturbed (Perv)

Storm Frequency	= 100 yrs	Time interval	= 5 min
Total precip.	= 8.2100 in	Distribution	= Custom
Storm duration	= NOAA Atlas 14 Type-C.cds		

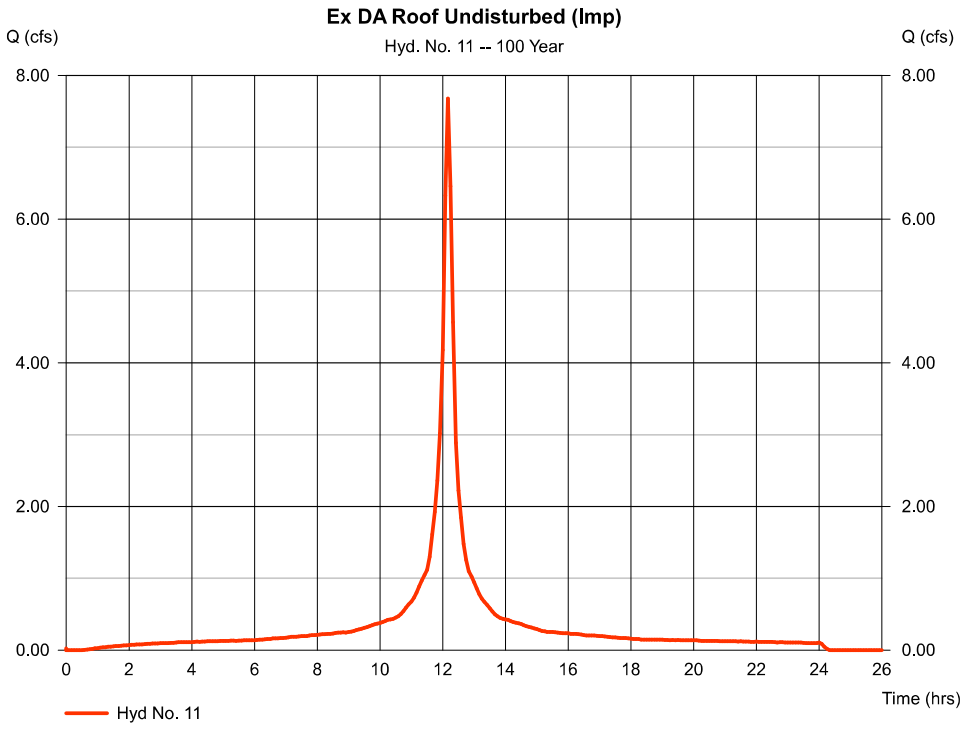


Hydrograph Report

Hyd. No. 11

Ex DA Roof Undisturbed (Imp)

Hydrograph type	= SCS Runoff	Peak discharge	= 7.680 cfs
Storm frequency	= 100 yrs	Time to peak	= 12.17 hrs
Time interval	= 5 min	Hyd. volume	= 32,548 cuft
Drainage area	= 1.200 ac	Curve number	= 98
Basin Slope	= 0.0 %	Hydraulic length	= 0 ft
Tc method	= USER	Time of conc. (Tc)	= 10.00 min
Total precip.	= 8.21 in	Distribution	= Custom
Storm duration	= NOAA Atlas 14 Type-C.cds	Shape factor	= 484

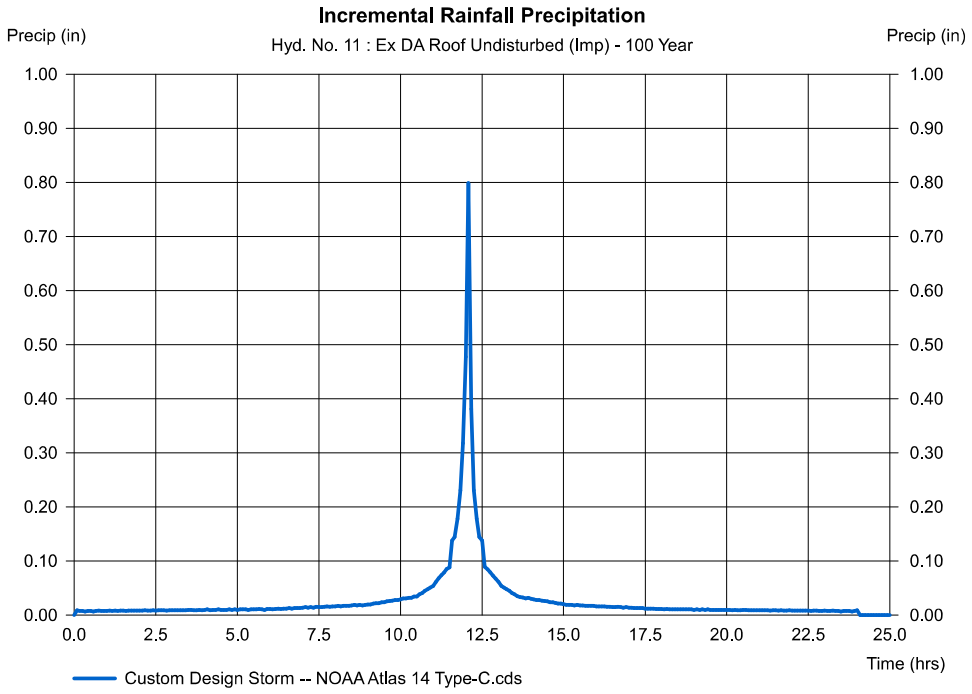


Precipitation Report

Hyd. No. 11

Ex DA Roof Undisturbed (Imp)

Storm Frequency	= 100 yrs	Time interval	= 5 min
Total precip.	= 8.2100 in	Distribution	= Custom
Storm duration	= NOAA Atlas 14 Type-C.cds		

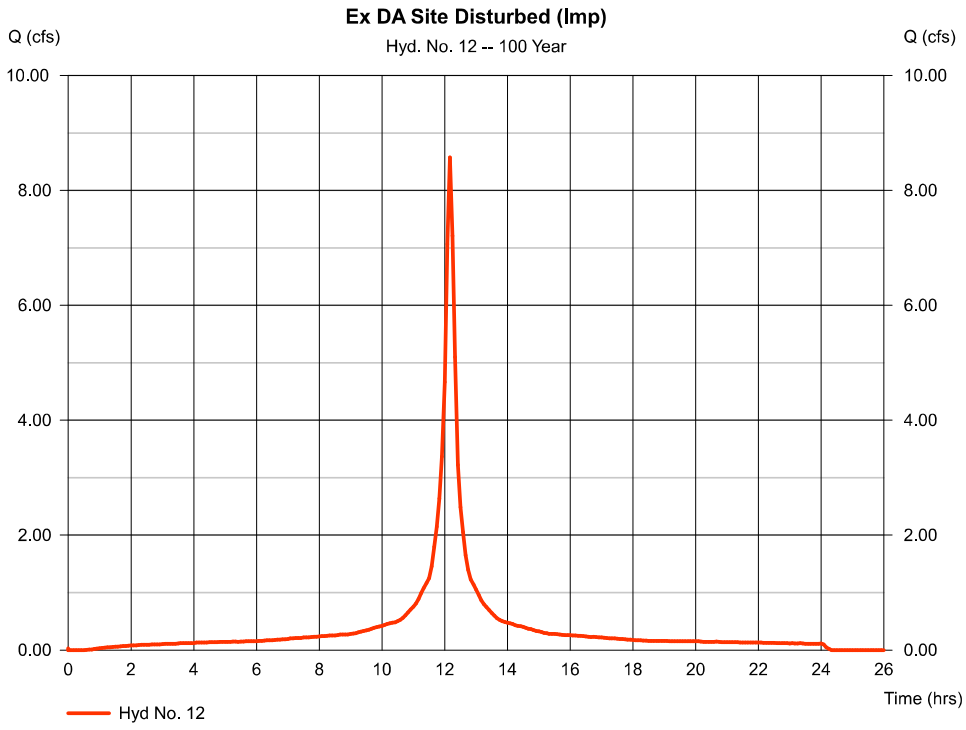


Hydrograph Report

Hyd. No. 12

Ex DA Site Disturbed (Imp)

Hydrograph type	= SCS Runoff	Peak discharge	= 8.576 cfs
Storm frequency	= 100 yrs	Time to peak	= 12.17 hrs
Time interval	= 5 min	Hyd. volume	= 36,345 cuft
Drainage area	= 1.340 ac	Curve number	= 98
Basin Slope	= 0.0 %	Hydraulic length	= 0 ft
Tc method	= USER	Time of conc. (Tc)	= 10.00 min
Total precip.	= 8.21 in	Distribution	= Custom
Storm duration	= NOAA Atlas 14 Type-C.cds	Shape factor	= 484

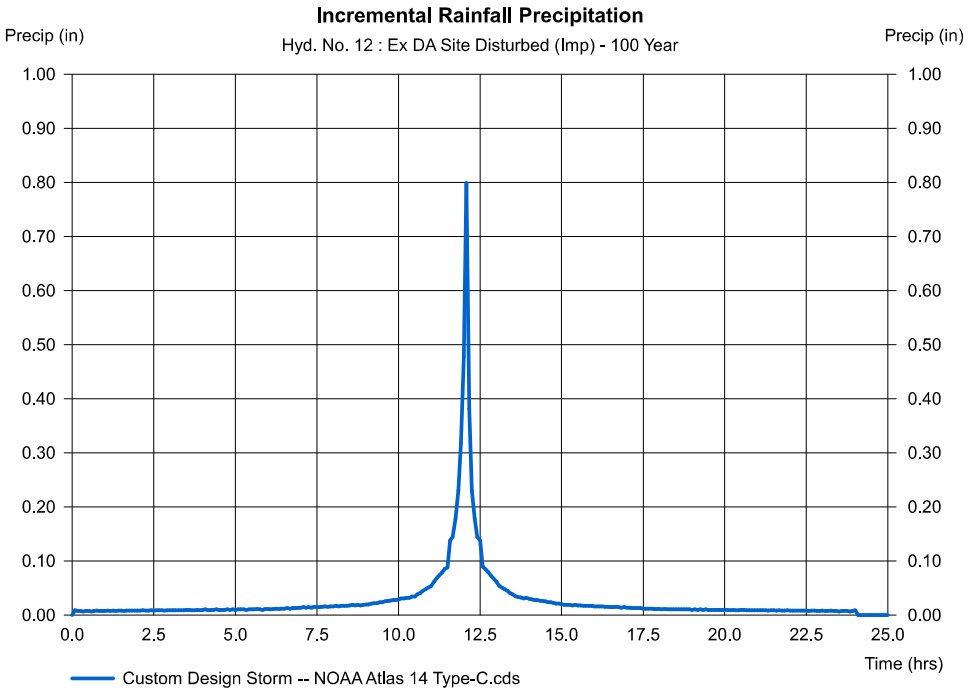


Precipitation Report

Hyd. No. 12

Ex DA Site Disturbed (Imp)

Storm Frequency	= 100 yrs	Time interval	= 5 min
Total precip.	= 8.2100 in	Distribution	= Custom
Storm duration	= NOAA Atlas 14 Type-C.cds		

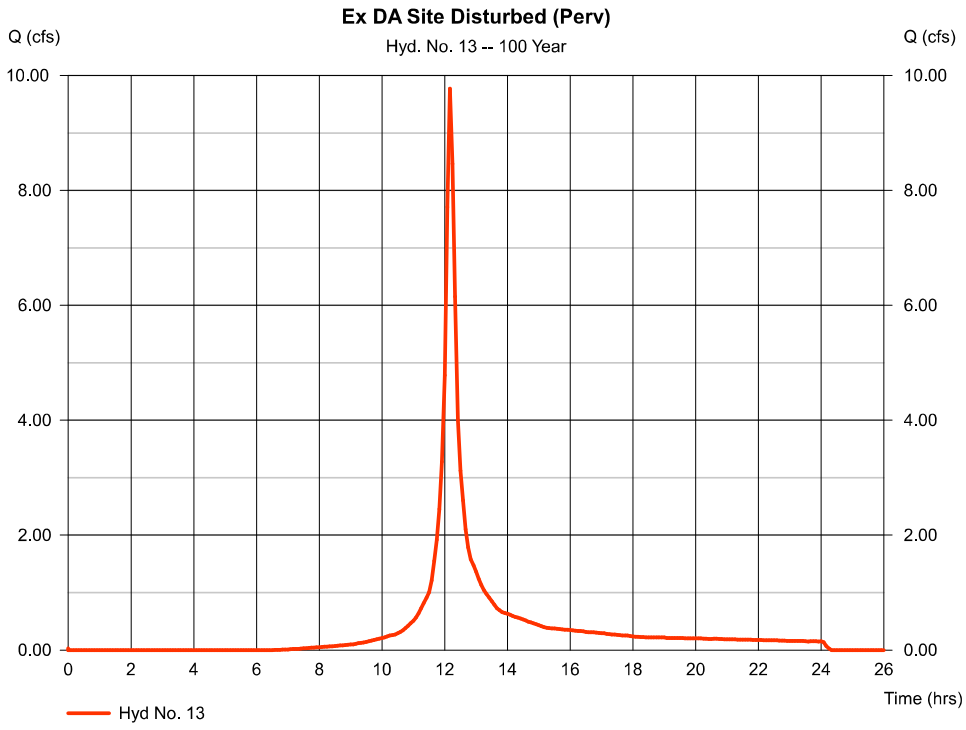


Hydrograph Report

Hyd. No. 13

Ex DA Site Disturbed (Perv)

Hydrograph type	= SCS Runoff	Peak discharge	= 9.770 cfs
Storm frequency	= 100 yrs	Time to peak	= 12.17 hrs
Time interval	= 5 min	Hyd. volume	= 35,677 cuft
Drainage area	= 2.050 ac	Curve number	= 74
Basin Slope	= 0.0 %	Hydraulic length	= 0 ft
Tc method	= USER	Time of conc. (Tc)	= 10.00 min
Total precip.	= 8.21 in	Distribution	= Custom
Storm duration	= NOAA Atlas 14 Type-C.cds	Shape factor	= 484

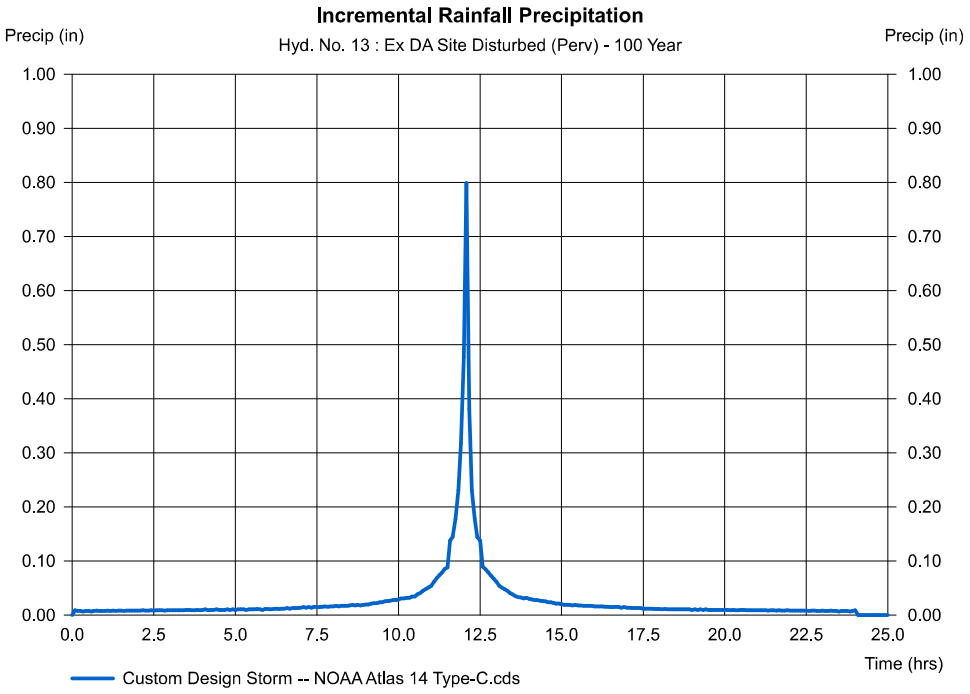


Precipitation Report

Hyd. No. 13

Ex DA Site Disturbed (Perv)

Storm Frequency	= 100 yrs	Time interval	= 5 min
Total precip.	= 8.2100 in	Distribution	= Custom
Storm duration	= NOAA Atlas 14 Type-C.cds		

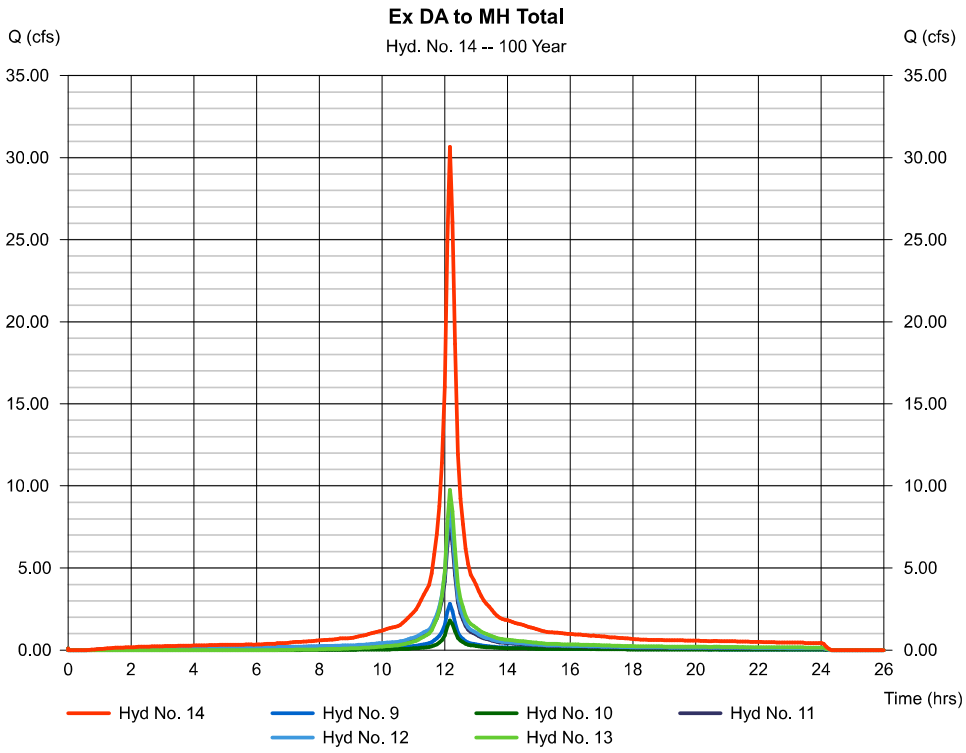


Hydrograph Report

Hyd. No. 14

Ex DA to MH Total

Hydrograph type	= Combine	Peak discharge	= 30.65 cfs
Storm frequency	= 100 yrs	Time to peak	= 12.17 hrs
Time interval	= 5 min	Hyd. volume	= 123,117 cuft
Inflow hyds.	= 9, 10, 11, 12, 13	Contrib. drain. area	= 5.410 ac

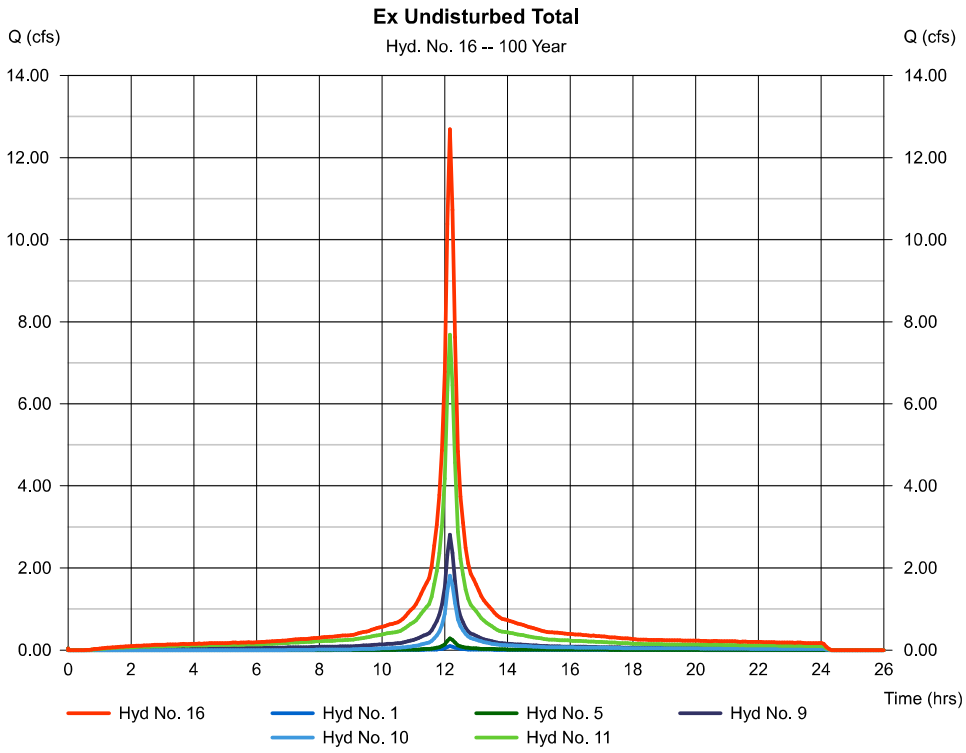


Hydrograph Report

Hyd. No. 16

Ex Undisturbed Total

Hydrograph type	= Combine	Peak discharge	= 12.69 cfs
Storm frequency	= 100 yrs	Time to peak	= 12.17 hrs
Time interval	= 5 min	Hyd. volume	= 52,487 cuft
Inflow hyds.	= 1, 5, 9, 10, 11	Contrib. drain. area	= 2.100 ac

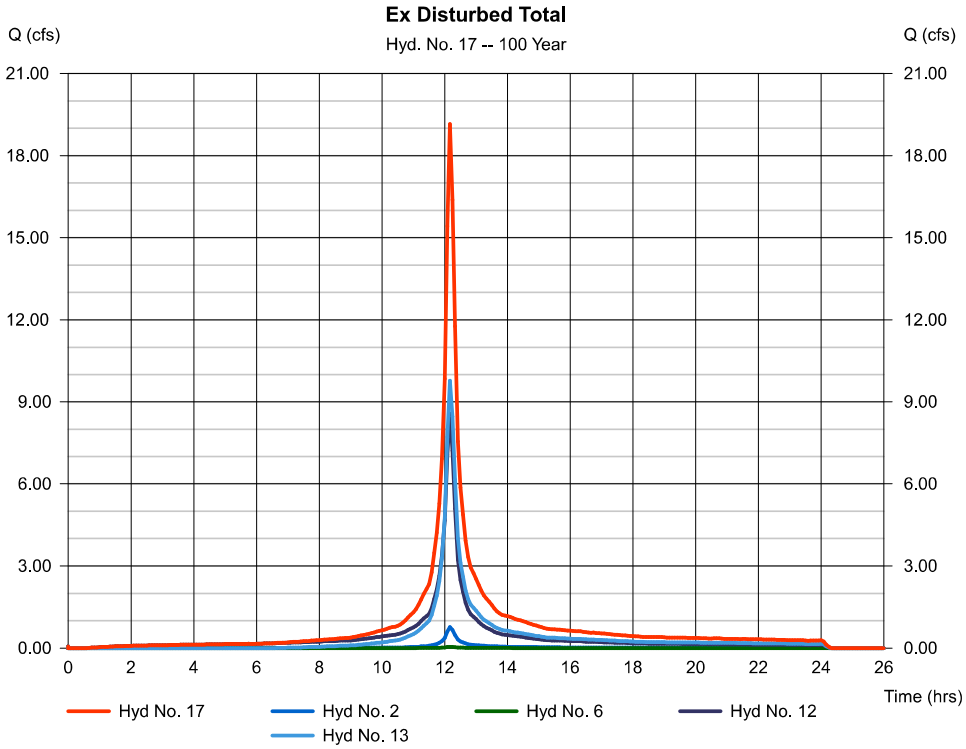


Hydrograph Report

Hyd. No. 17

Ex Disturbed Total

Hydrograph type	= Combine	Peak discharge	= 19.16 cfs
Storm frequency	= 100 yrs	Time to peak	= 12.17 hrs
Time interval	= 5 min	Hyd. volume	= 74,980 cuft
Inflow hyds.	= 2, 6, 12, 13	Contrib. drain. area	= 3.560 ac

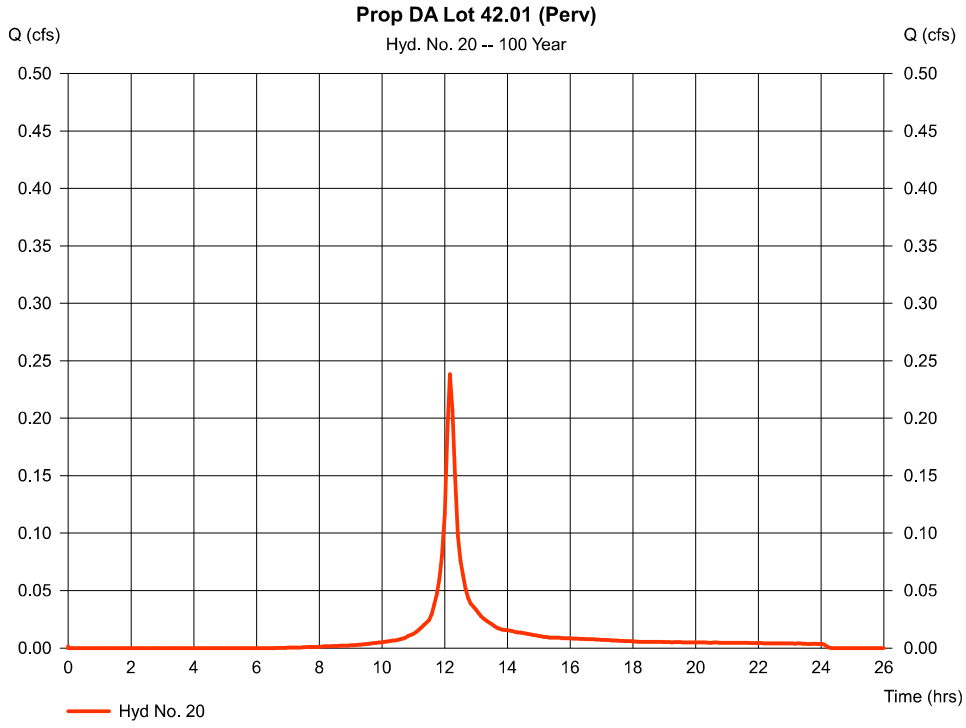


Hydrograph Report

Hyd. No. 20

Prop DA Lot 42.01 (Perv)

Hydrograph type	= SCS Runoff	Peak discharge	= 0.238 cfs
Storm frequency	= 100 yrs	Time to peak	= 12.17 hrs
Time interval	= 5 min	Hyd. volume	= 870 cuft
Drainage area	= 0.050 ac	Curve number	= 74
Basin Slope	= 0.0 %	Hydraulic length	= 0 ft
Tc method	= USER	Time of conc. (Tc)	= 10.00 min
Total precip.	= 8.21 in	Distribution	= Custom
Storm duration	= NOAA Atlas 14 Type-C.cds	Shape factor	= 484

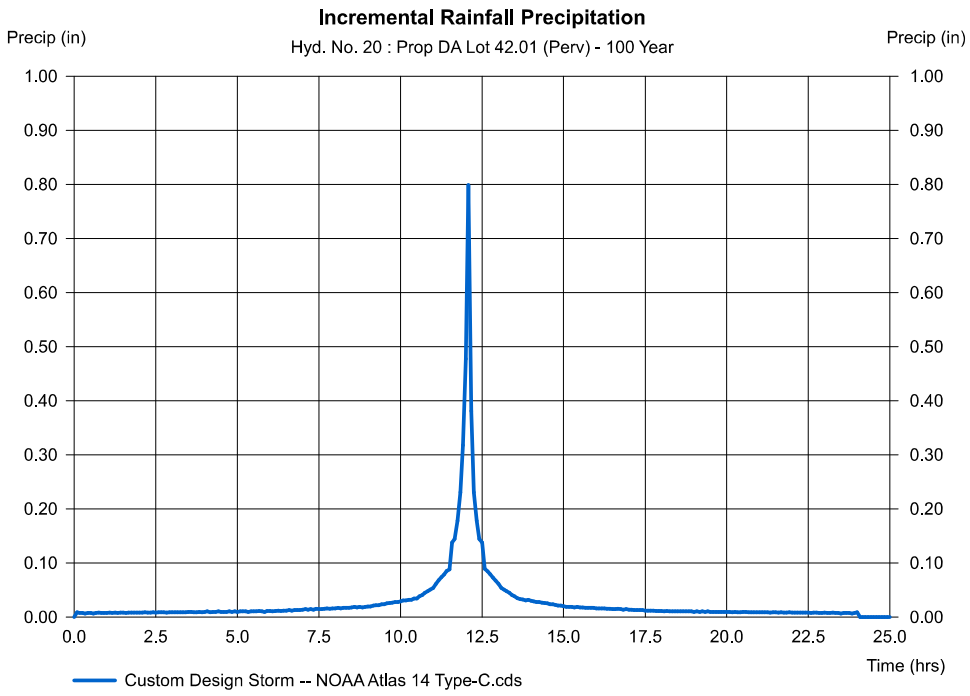


Precipitation Report

Hyd. No. 20

Prop DA Lot 42.01 (Perv)

Storm Frequency	= 100 yrs	Time interval	= 5 min
Total precip.	= 8.2100 in	Distribution	= Custom
Storm duration	= NOAA Atlas 14 Type-C.cds		

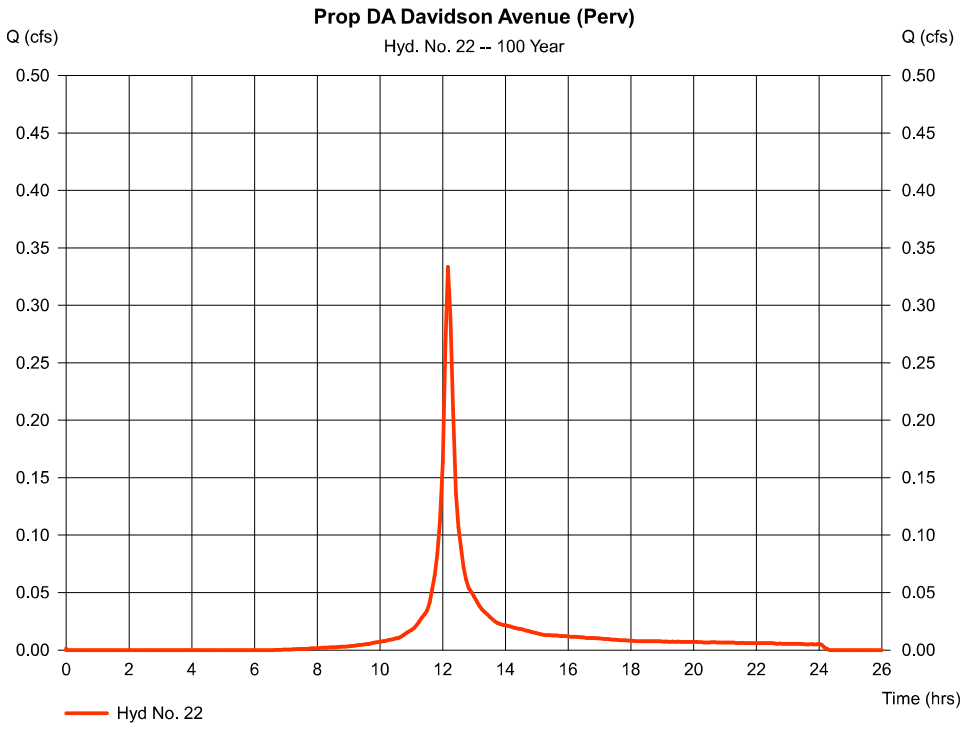


Hydrograph Report

Hyd. No. 22

Prop DA Davidson Avenue (Perv)

Hydrograph type	= SCS Runoff	Peak discharge	= 0.334 cfs
Storm frequency	= 100 yrs	Time to peak	= 12.17 hrs
Time interval	= 5 min	Hyd. volume	= 1,218 cuft
Drainage area	= 0.070 ac	Curve number	= 74
Basin Slope	= 0.0 %	Hydraulic length	= 0 ft
Tc method	= USER	Time of conc. (Tc)	= 10.00 min
Total precip.	= 8.21 in	Distribution	= Custom
Storm duration	= NOAA Atlas 14 Type-C.cds	Shape factor	= 484

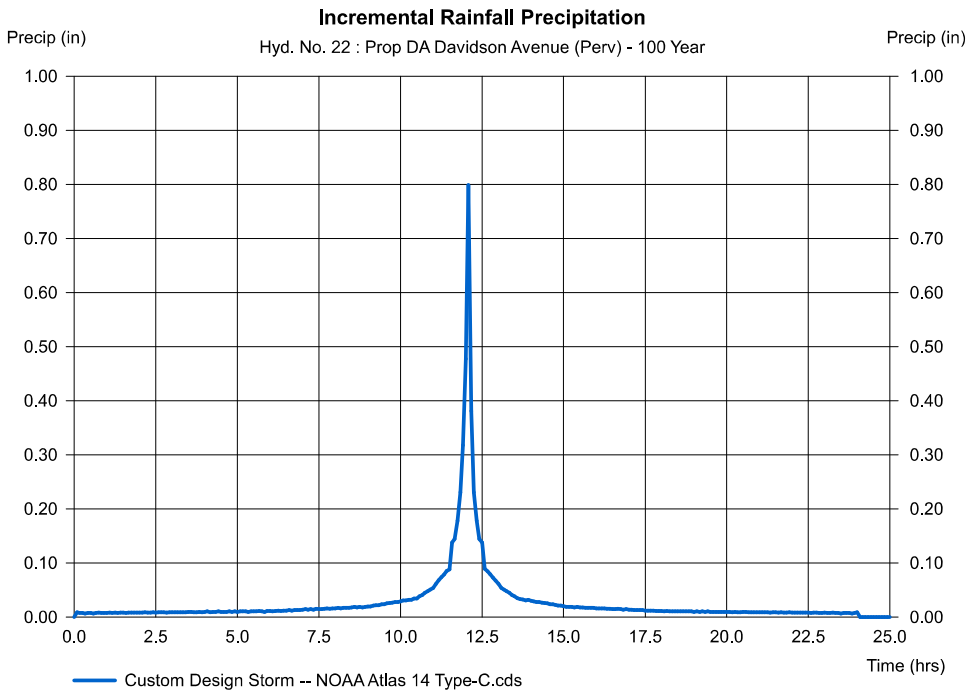


Precipitation Report

Hyd. No. 22

Prop DA Davidson Avenue (Perv)

Storm Frequency	= 100 yrs	Time interval	= 5 min
Total precip.	= 8.2100 in	Distribution	= Custom
Storm duration	= NOAA Atlas 14 Type-C.cds		

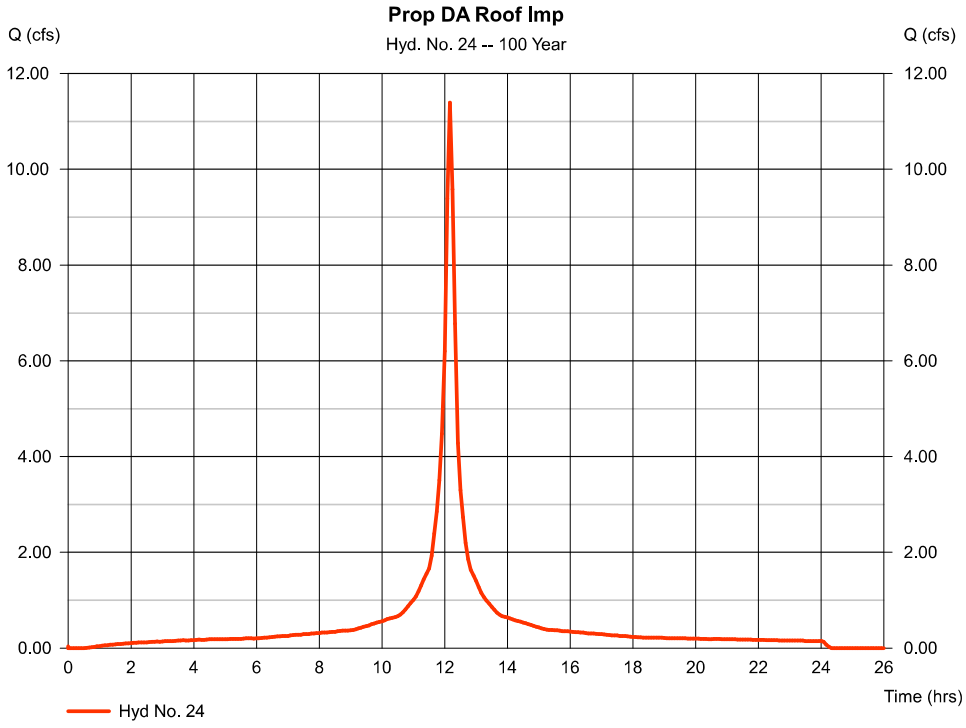


Hydrograph Report

Hyd. No. 24

Prop DA Roof Imp

Hydrograph type	= SCS Runoff	Peak discharge	= 11.39 cfs
Storm frequency	= 100 yrs	Time to peak	= 12.17 hrs
Time interval	= 5 min	Hyd. volume	= 48,279 cuft
Drainage area	= 1.780 ac	Curve number	= 98
Basin Slope	= 0.0 %	Hydraulic length	= 0 ft
Tc method	= USER	Time of conc. (Tc)	= 10.00 min
Total precip.	= 8.21 in	Distribution	= Custom
Storm duration	= NOAA Atlas 14 Type-C.cds	Shape factor	= 484

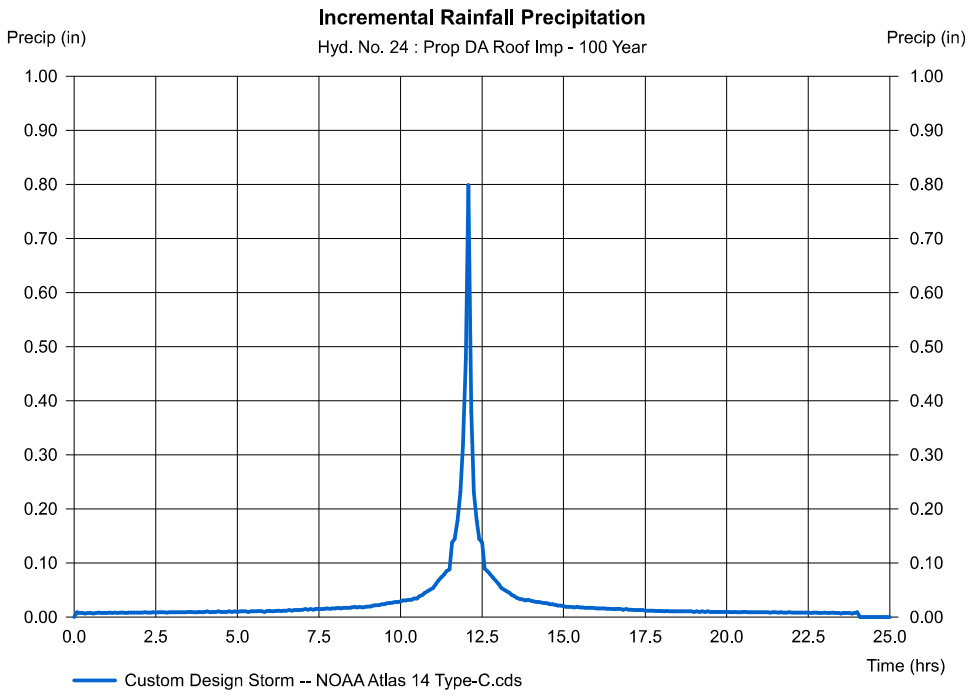


Precipitation Report

Hyd. No. 24

Prop DA Roof Imp

Storm Frequency	= 100 yrs	Time interval	= 5 min
Total precip.	= 8.2100 in	Distribution	= Custom
Storm duration	= NOAA Atlas 14 Type-C.cds		

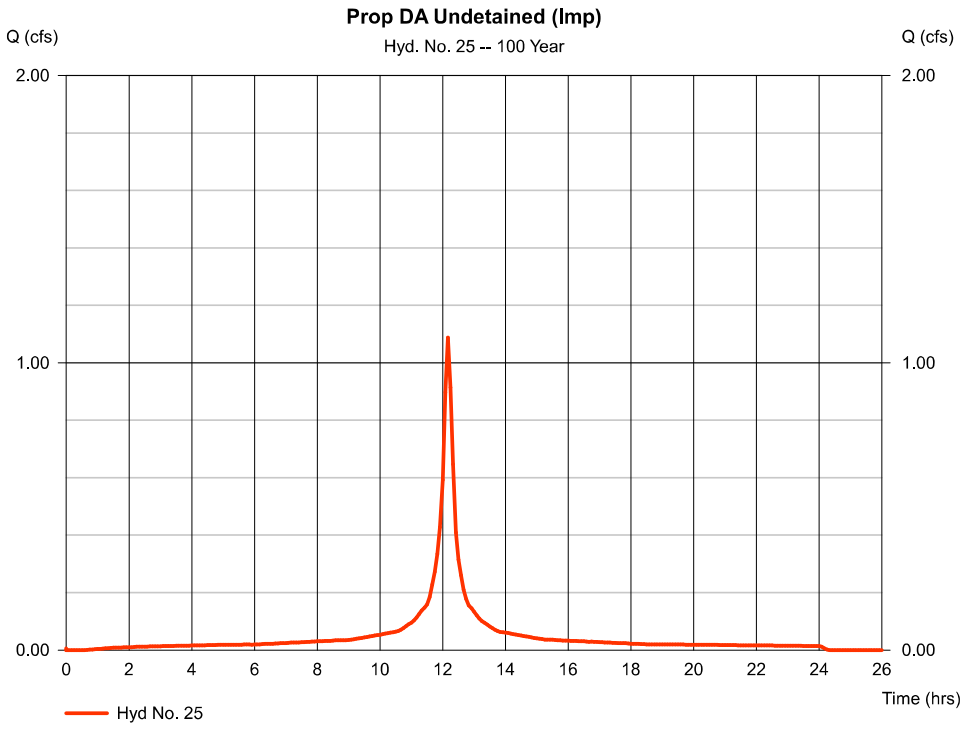


Hydrograph Report

Hyd. No. 25

Prop DA Undetained (Imp)

Hydrograph type	= SCS Runoff	Peak discharge	= 1.088 cfs
Storm frequency	= 100 yrs	Time to peak	= 12.17 hrs
Time interval	= 5 min	Hyd. volume	= 4,611 cuft
Drainage area	= 0.170 ac	Curve number	= 98
Basin Slope	= 0.0 %	Hydraulic length	= 0 ft
Tc method	= USER	Time of conc. (Tc)	= 14.00 min
Total precip.	= 8.21 in	Distribution	= Custom
Storm duration	= NOAA Atlas 14 Type-C.cds	Shape factor	= 484

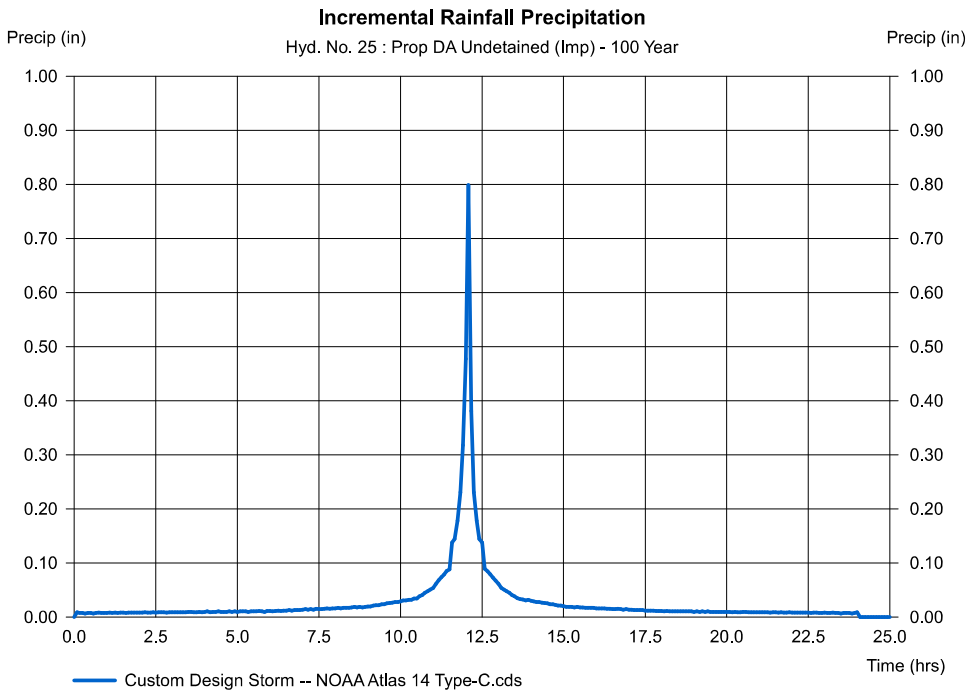


Precipitation Report

Hyd. No. 25

Prop DA Undetained (Imp)

Storm Frequency	= 100 yrs	Time interval	= 5 min
Total precip.	= 8.2100 in	Distribution	= Custom
Storm duration	= NOAA Atlas 14 Type-C.cds		

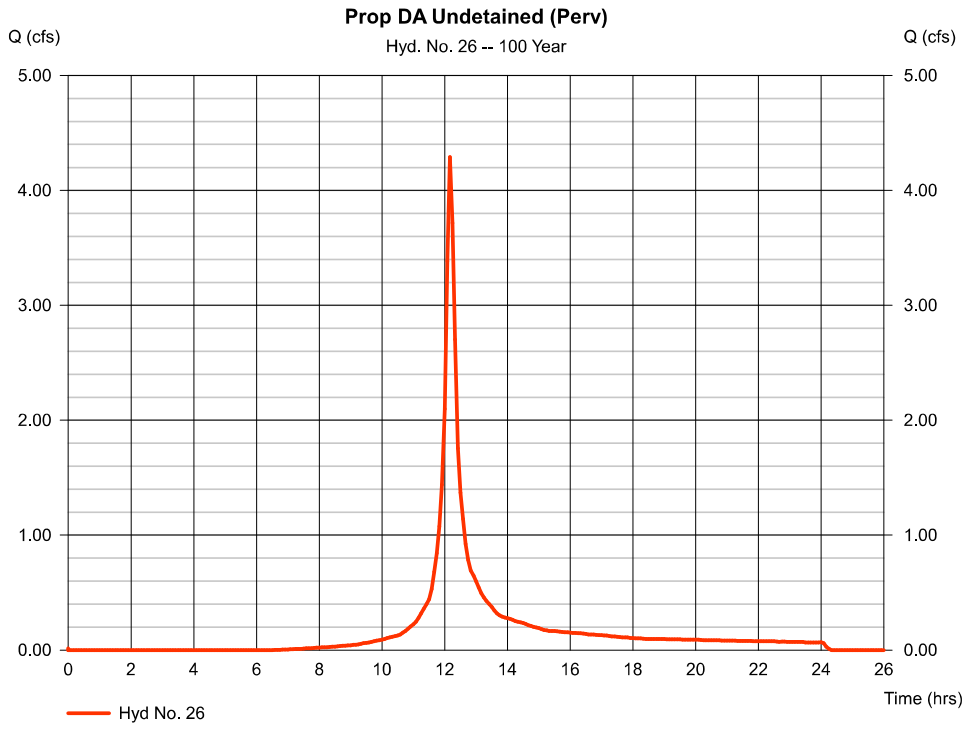


Hydrograph Report

Hyd. No. 26

Prop DA Undetained (Perv)

Hydrograph type	= SCS Runoff	Peak discharge	= 4.289 cfs
Storm frequency	= 100 yrs	Time to peak	= 12.17 hrs
Time interval	= 5 min	Hyd. volume	= 15,663 cuft
Drainage area	= 0.900 ac	Curve number	= 74
Basin Slope	= 0.0 %	Hydraulic length	= 0 ft
Tc method	= USER	Time of conc. (Tc)	= 14.00 min
Total precip.	= 8.21 in	Distribution	= Custom
Storm duration	= NOAA Atlas 14 Type-C.cds	Shape factor	= 484

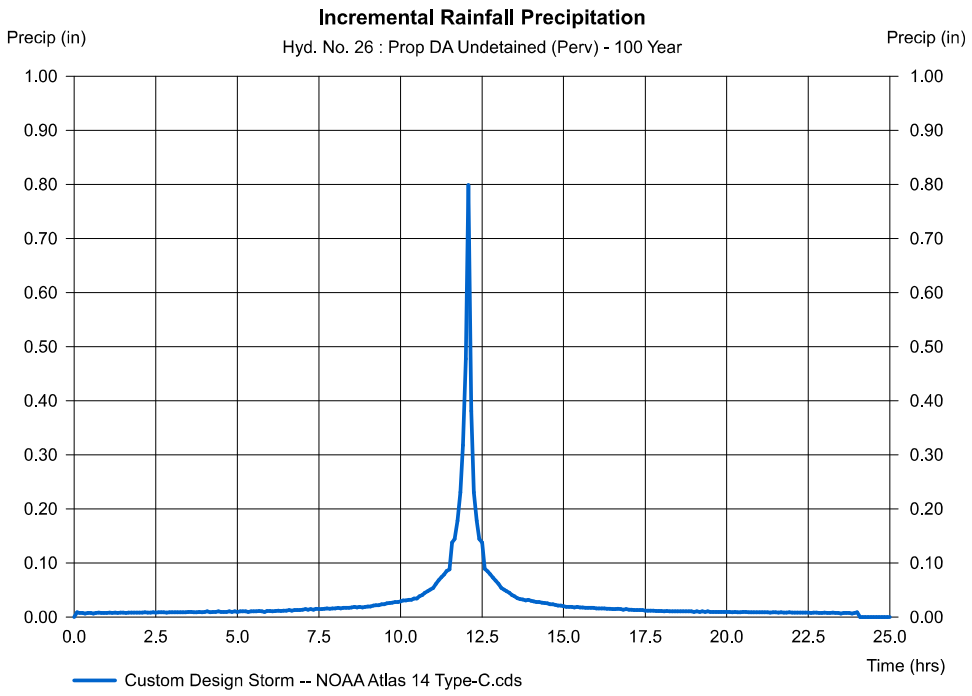


Precipitation Report

Hyd. No. 26

Prop DA Undetained (Perv)

Storm Frequency	= 100 yrs	Time interval	= 5 min
Total precip.	= 8.2100 in	Distribution	= Custom
Storm duration	= NOAA Atlas 14 Type-C.cds		

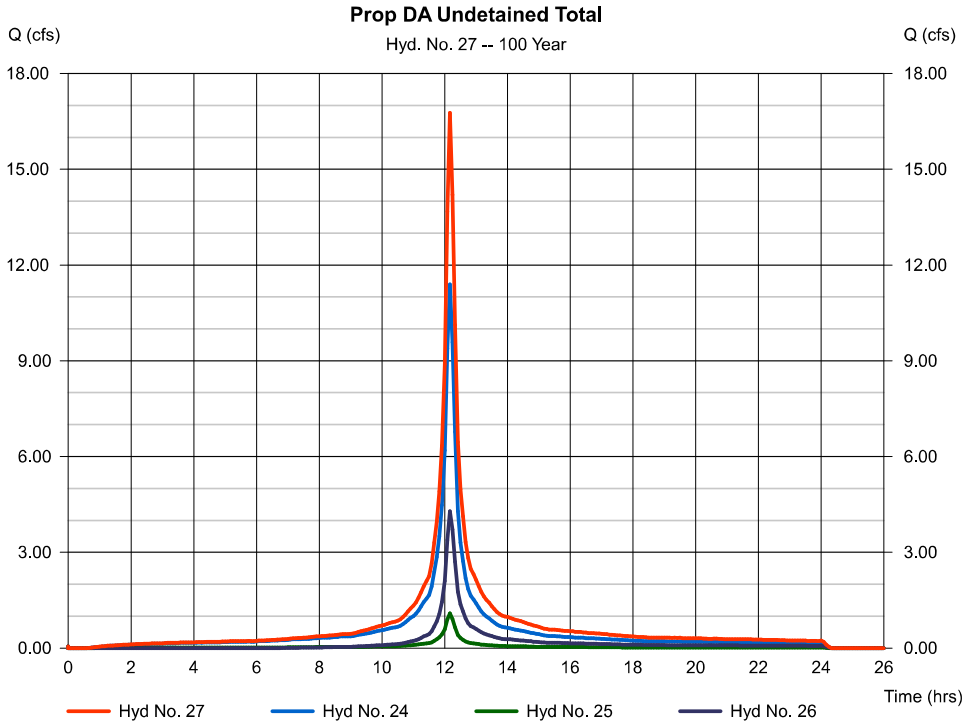


Hydrograph Report

Hyd. No. 27

Prop DA Undetained Total

Hydrograph type	= Combine	Peak discharge	= 16.77 cfs
Storm frequency	= 100 yrs	Time to peak	= 12.17 hrs
Time interval	= 5 min	Hyd. volume	= 68,553 cuft
Inflow hyds.	= 24, 25, 26	Contrib. drain. area	= 2.850 ac

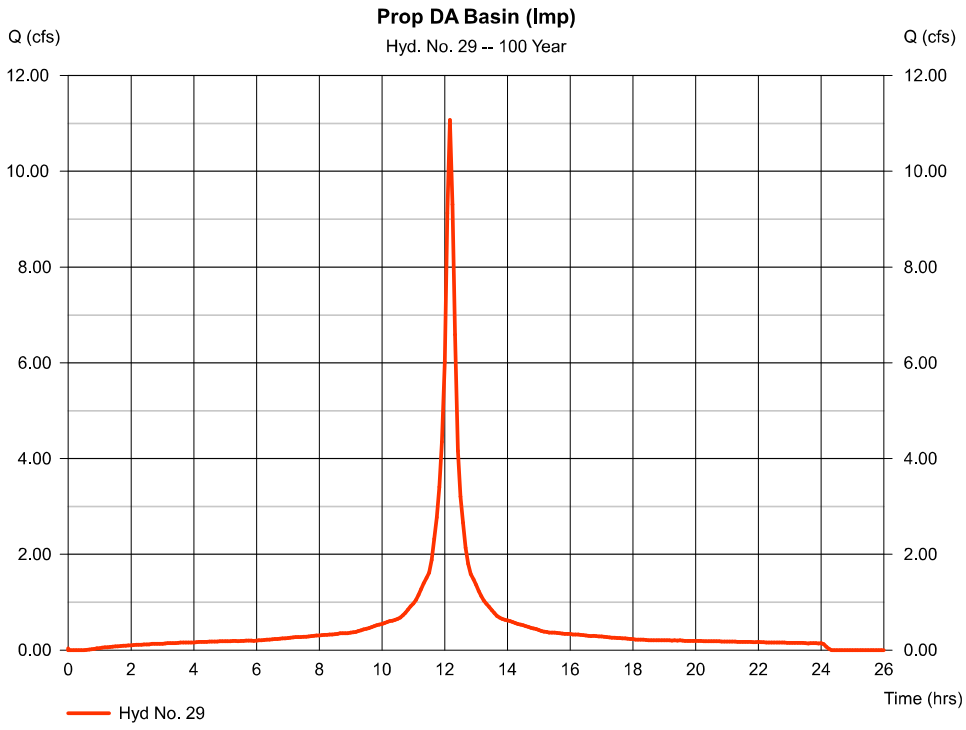


Hydrograph Report

Hyd. No. 29

Prop DA Basin (Imp)

Hydrograph type	= SCS Runoff	Peak discharge	= 11.07 cfs
Storm frequency	= 100 yrs	Time to peak	= 12.17 hrs
Time interval	= 5 min	Hyd. volume	= 46,923 cuft
Drainage area	= 1.730 ac	Curve number	= 98
Basin Slope	= 0.0 %	Hydraulic length	= 0 ft
Tc method	= USER	Time of conc. (Tc)	= 10.00 min
Total precip.	= 8.21 in	Distribution	= Custom
Storm duration	= NOAA Atlas 14 Type-C.cds	Shape factor	= 484

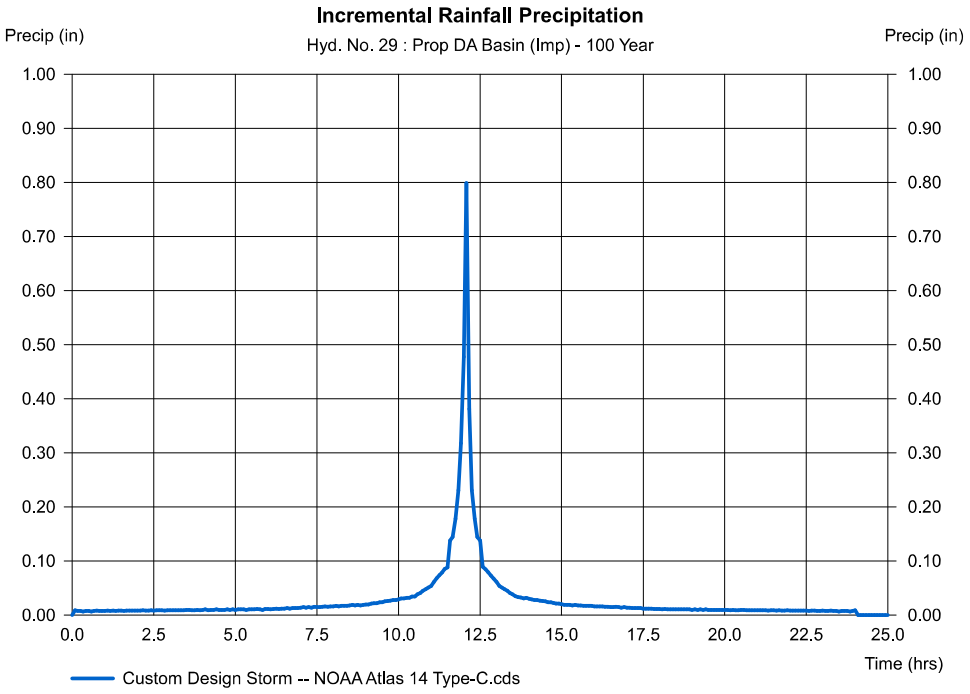


Precipitation Report

Hyd. No. 29

Prop DA Basin (Imp)

Storm Frequency	= 100 yrs	Time interval	= 5 min
Total precip.	= 8.2100 in	Distribution	= Custom
Storm duration	= NOAA Atlas 14 Type-C.cds		

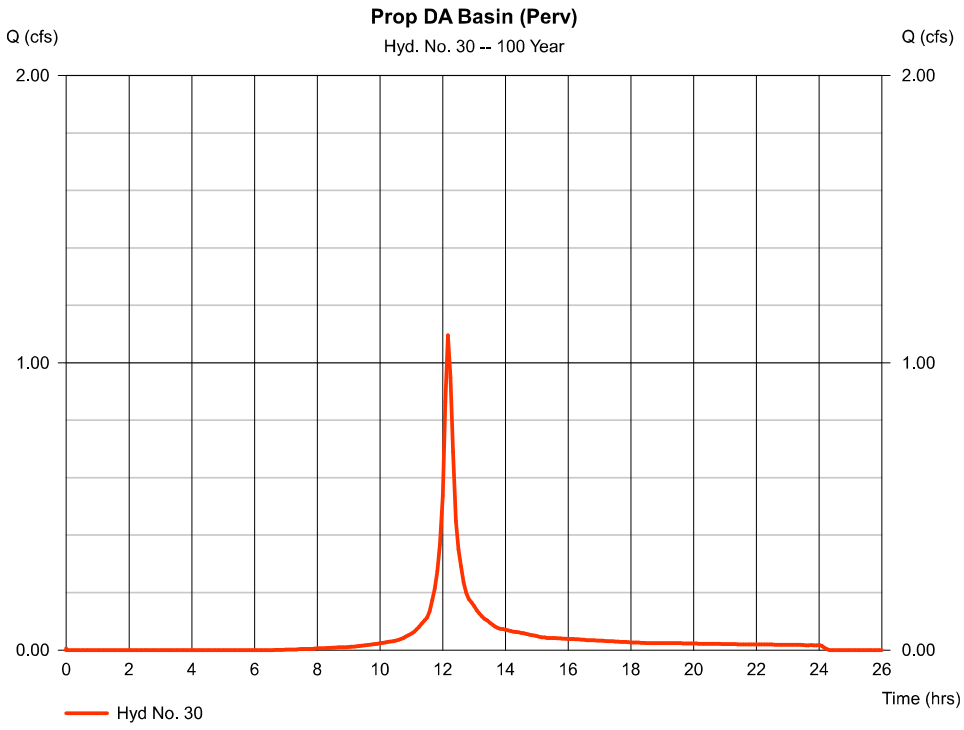


Hydrograph Report

Hyd. No. 30

Prop DA Basin (Perv)

Hydrograph type	= SCS Runoff	Peak discharge	= 1.096 cfs
Storm frequency	= 100 yrs	Time to peak	= 12.17 hrs
Time interval	= 5 min	Hyd. volume	= 4,003 cuft
Drainage area	= 0.230 ac	Curve number	= 74
Basin Slope	= 0.0 %	Hydraulic length	= 0 ft
Tc method	= USER	Time of conc. (Tc)	= 10.00 min
Total precip.	= 8.21 in	Distribution	= Custom
Storm duration	= NOAA Atlas 14 Type-C.cds	Shape factor	= 484

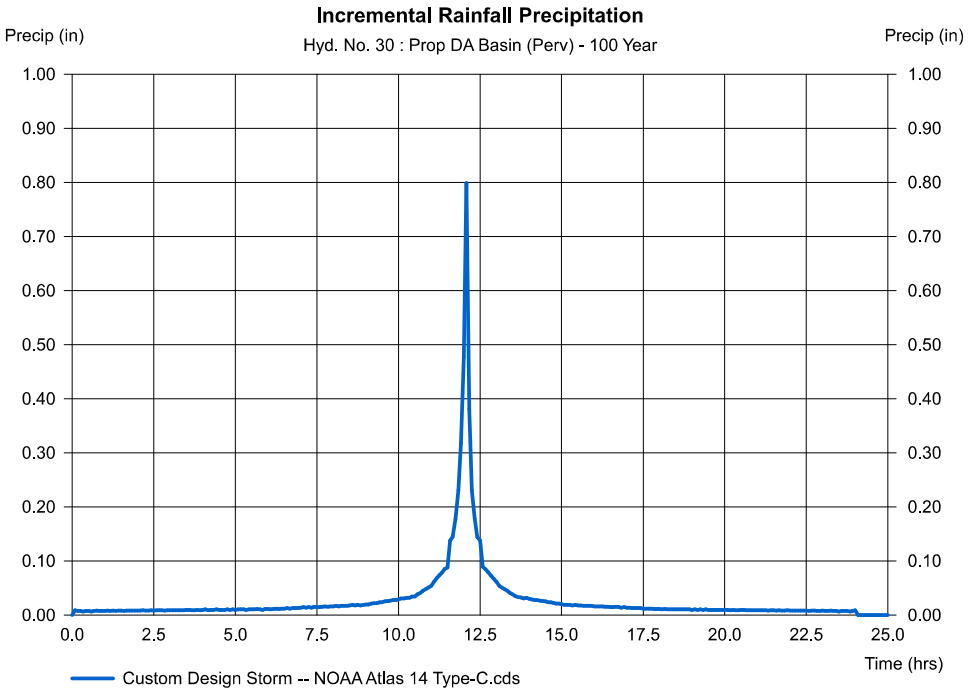


Precipitation Report

Hyd. No. 30

Prop DA Basin (Perv)

Storm Frequency	= 100 yrs	Time interval	= 5 min
Total precip.	= 8.2100 in	Distribution	= Custom
Storm duration	= NOAA Atlas 14 Type-C.cds		

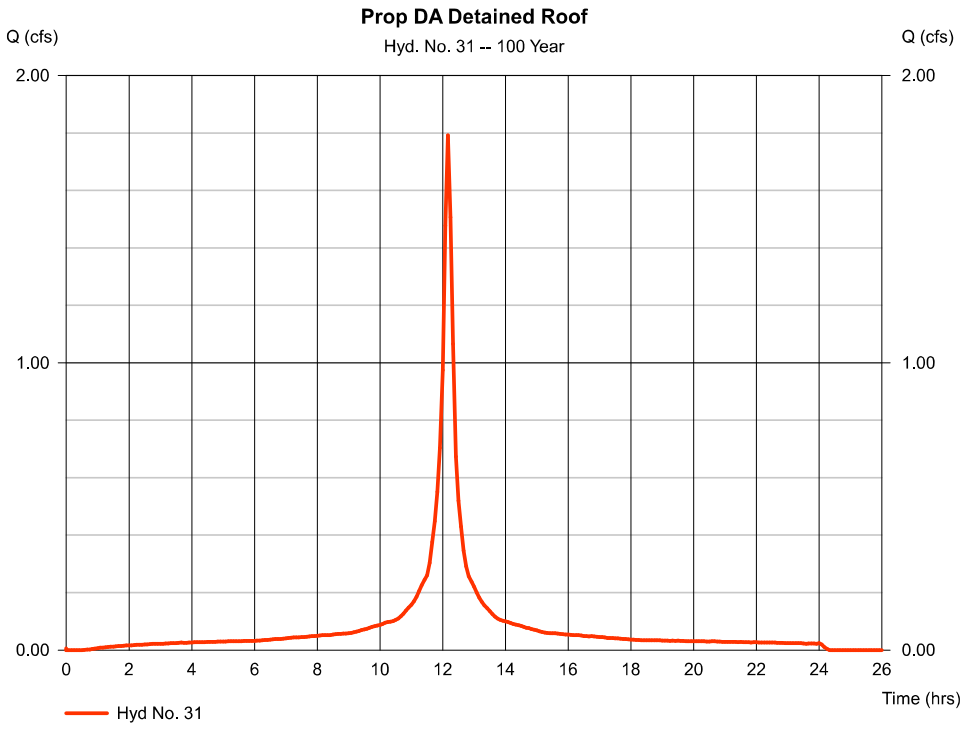


Hydrograph Report

Hyd. No. 31

Prop DA Detained Roof

Hydrograph type	= SCS Runoff	Peak discharge	= 1.792 cfs
Storm frequency	= 100 yrs	Time to peak	= 12.17 hrs
Time interval	= 5 min	Hyd. volume	= 7,594 cuft
Drainage area	= 0.280 ac	Curve number	= 98
Basin Slope	= 0.0 %	Hydraulic length	= 0 ft
Tc method	= USER	Time of conc. (Tc)	= 10.00 min
Total precip.	= 8.21 in	Distribution	= Custom
Storm duration	= NOAA Atlas 14 Type-C.cds	Shape factor	= 484

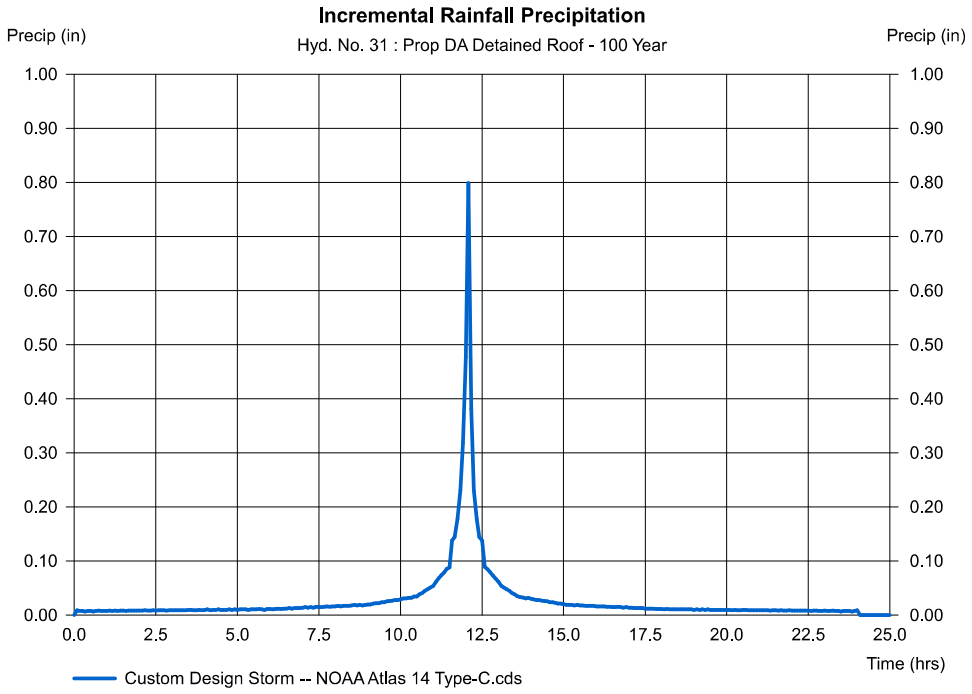


Precipitation Report

Hyd. No. 31

Prop DA Detained Roof

Storm Frequency	= 100 yrs	Time interval	= 5 min
Total precip.	= 8.2100 in	Distribution	= Custom
Storm duration	= NOAA Atlas 14 Type-C.cds		

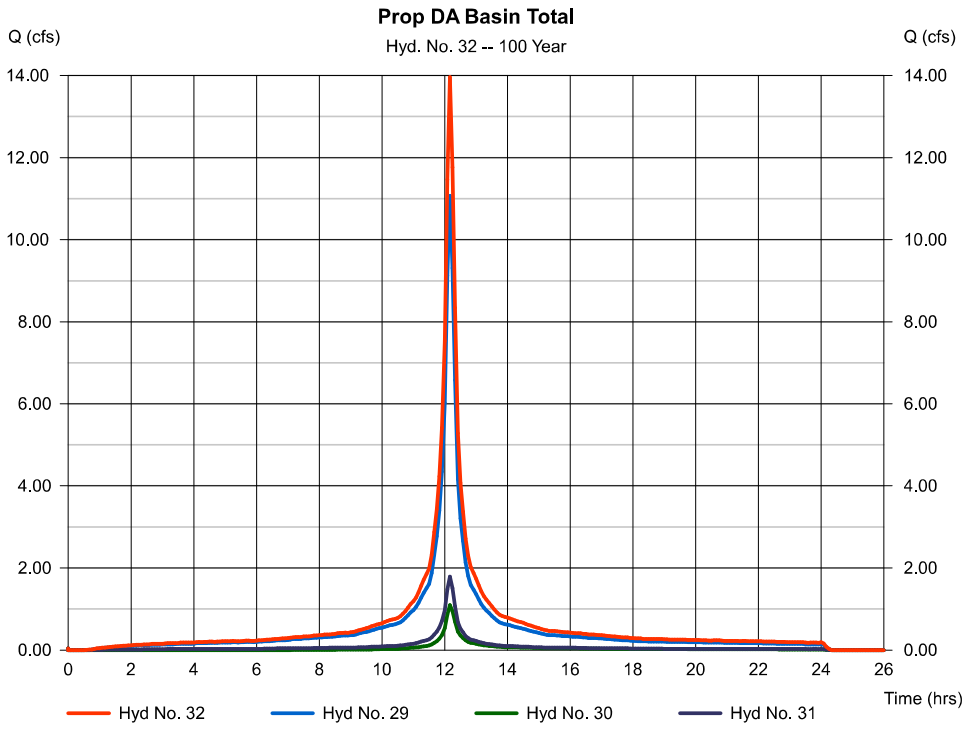


Hydrograph Report

Hyd. No. 32

Prop DA Basin Total

Hydrograph type	= Combine	Peak discharge	= 13.96 cfs
Storm frequency	= 100 yrs	Time to peak	= 12.17 hrs
Time interval	= 5 min	Hyd. volume	= 58,520 cuft
Inflow hyds.	= 29, 30, 31	Contrib. drain. area	= 2.240 ac



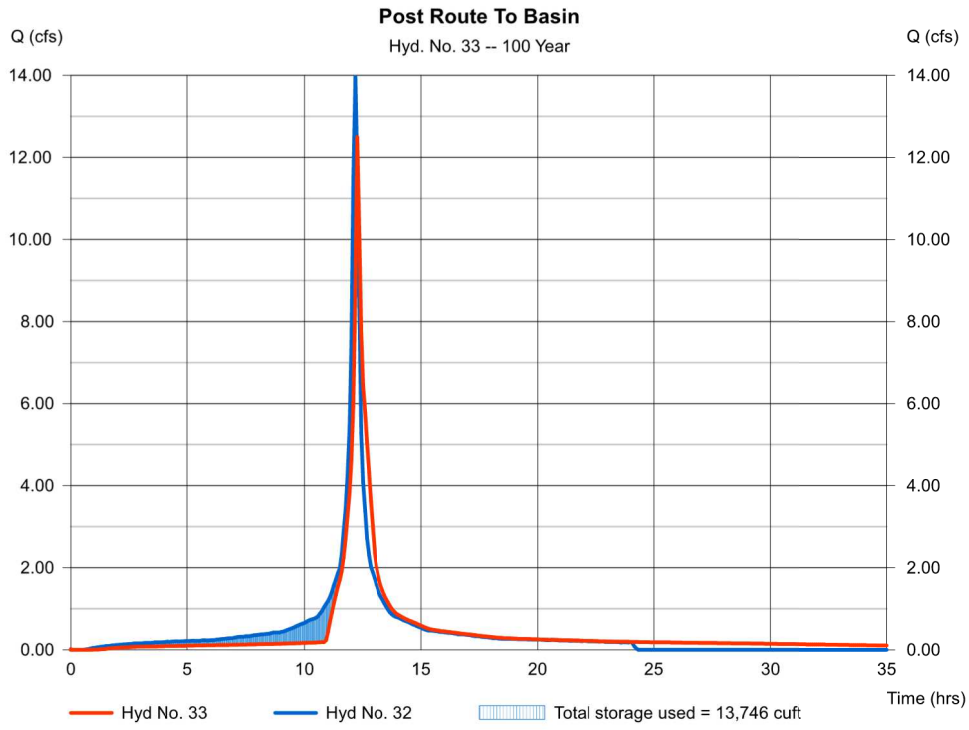
Hydrograph Report

Hyd. No. 33

Post Route To Basin

Hydrograph type	= Reservoir	Peak discharge	= 12.49 cfs
Storm frequency	= 100 yrs	Time to peak	= 12.25 hrs
Time interval	= 5 min	Hyd. volume	= 58,505 cuft
Inflow hyd. No.	= 32 - Prop DA Basin Total	Max. Elevation	= 59.72 ft
Reservoir name	= UG Basin	Max. Storage	= 13,746 cuft

Storage Indication method used.

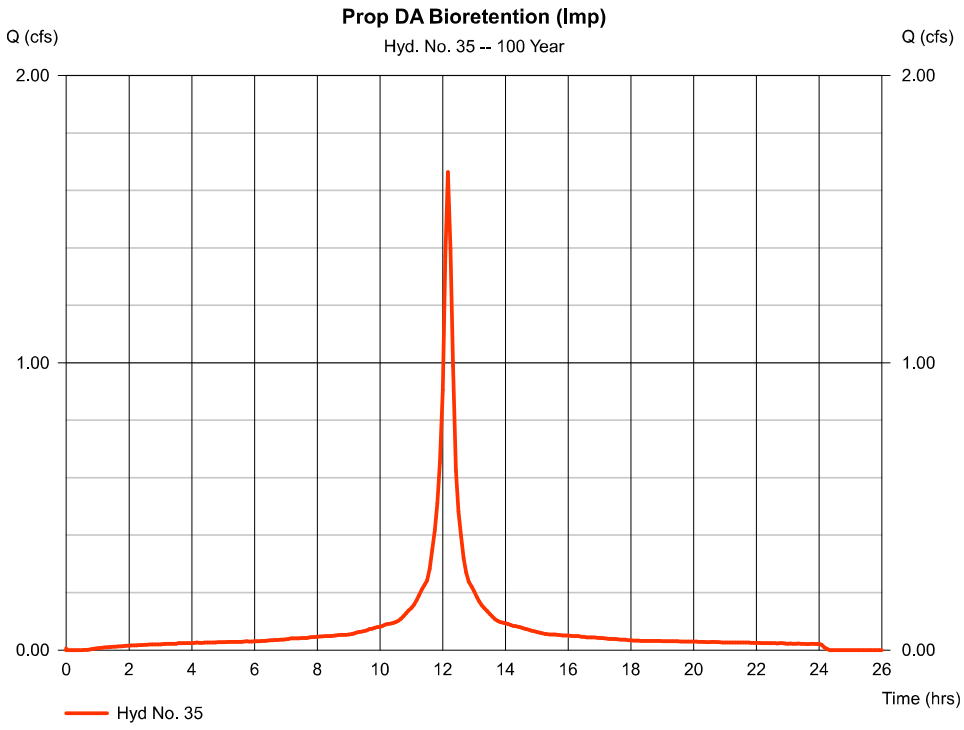


Hydrograph Report

Hyd. No. 35

Prop DA Bioretention (Imp)

Hydrograph type	= SCS Runoff	Peak discharge	= 1.664 cfs
Storm frequency	= 100 yrs	Time to peak	= 12.17 hrs
Time interval	= 5 min	Hyd. volume	= 7,052 cuft
Drainage area	= 0.260 ac	Curve number	= 98
Basin Slope	= 0.0 %	Hydraulic length	= 0 ft
Tc method	= USER	Time of conc. (Tc)	= 14.00 min
Total precip.	= 8.21 in	Distribution	= Custom
Storm duration	= NOAA Atlas 14 Type-C.cds	Shape factor	= 484

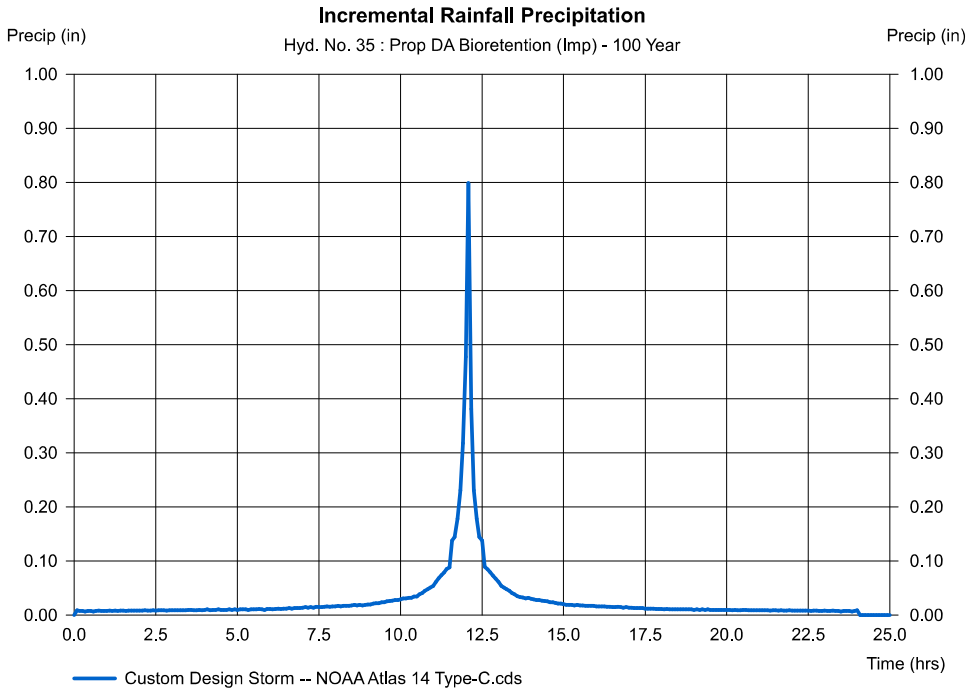


Precipitation Report

Hyd. No. 35

Prop DA Bioretention (Imp)

Storm Frequency	= 100 yrs	Time interval	= 5 min
Total precip.	= 8.2100 in	Distribution	= Custom
Storm duration	= NOAA Atlas 14 Type-C.cds		

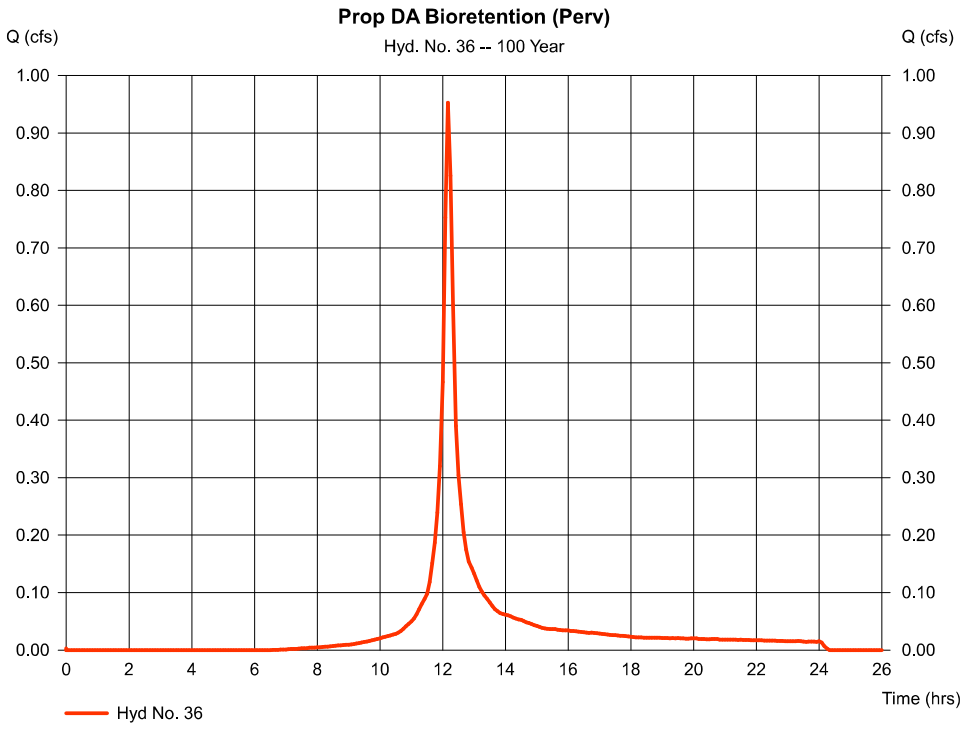


Hydrograph Report

Hyd. No. 36

Prop DA Bioretention (Perv)

Hydrograph type	= SCS Runoff	Peak discharge	= 0.953 cfs
Storm frequency	= 100 yrs	Time to peak	= 12.17 hrs
Time interval	= 5 min	Hyd. volume	= 3,481 cuft
Drainage area	= 0.200 ac	Curve number	= 74
Basin Slope	= 0.0 %	Hydraulic length	= 0 ft
Tc method	= USER	Time of conc. (Tc)	= 14.00 min
Total precip.	= 8.21 in	Distribution	= Custom
Storm duration	= NOAA Atlas 14 Type-C.cds	Shape factor	= 484

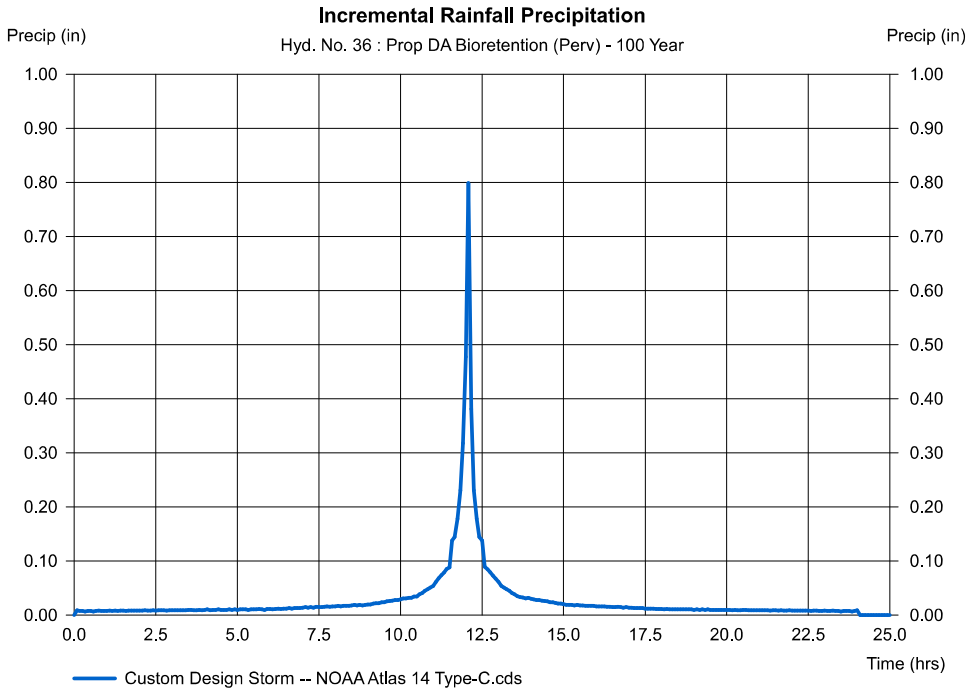


Precipitation Report

Hyd. No. 36

Prop DA Bioretention (Perv)

Storm Frequency	= 100 yrs	Time interval	= 5 min
Total precip.	= 8.2100 in	Distribution	= Custom
Storm duration	= NOAA Atlas 14 Type-C.cds		

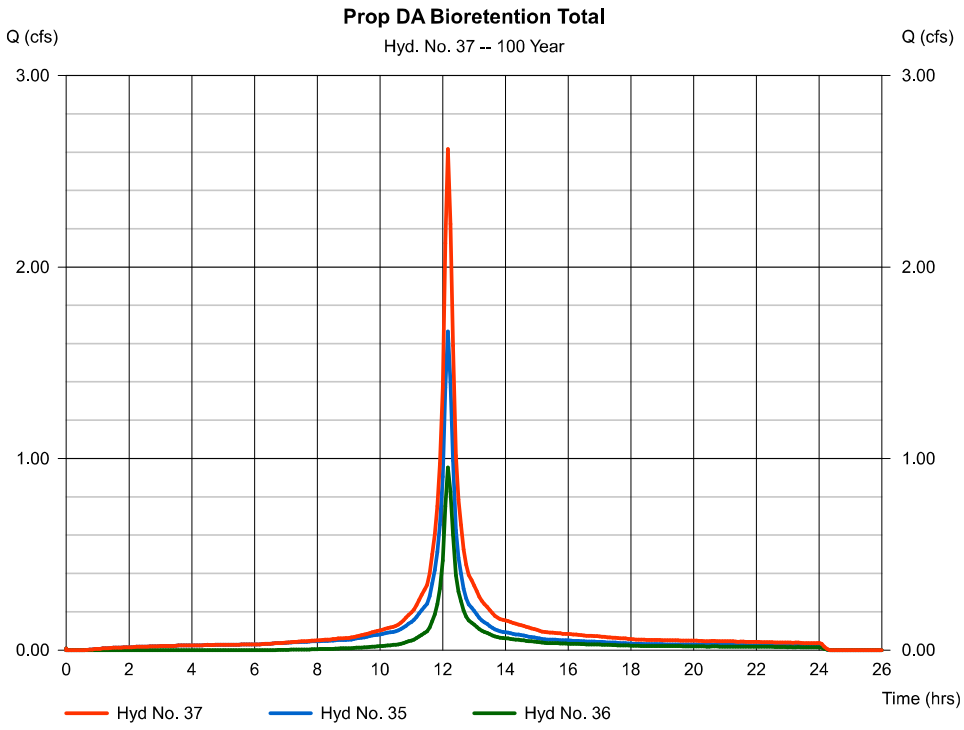


Hydrograph Report

Hyd. No. 37

Prop DA Bioretention Total

Hydrograph type	= Combine	Peak discharge	= 2.617 cfs
Storm frequency	= 100 yrs	Time to peak	= 12.17 hrs
Time interval	= 5 min	Hyd. volume	= 10,533 cuft
Inflow hyds.	= 35, 36	Contrib. drain. area	= 0.460 ac



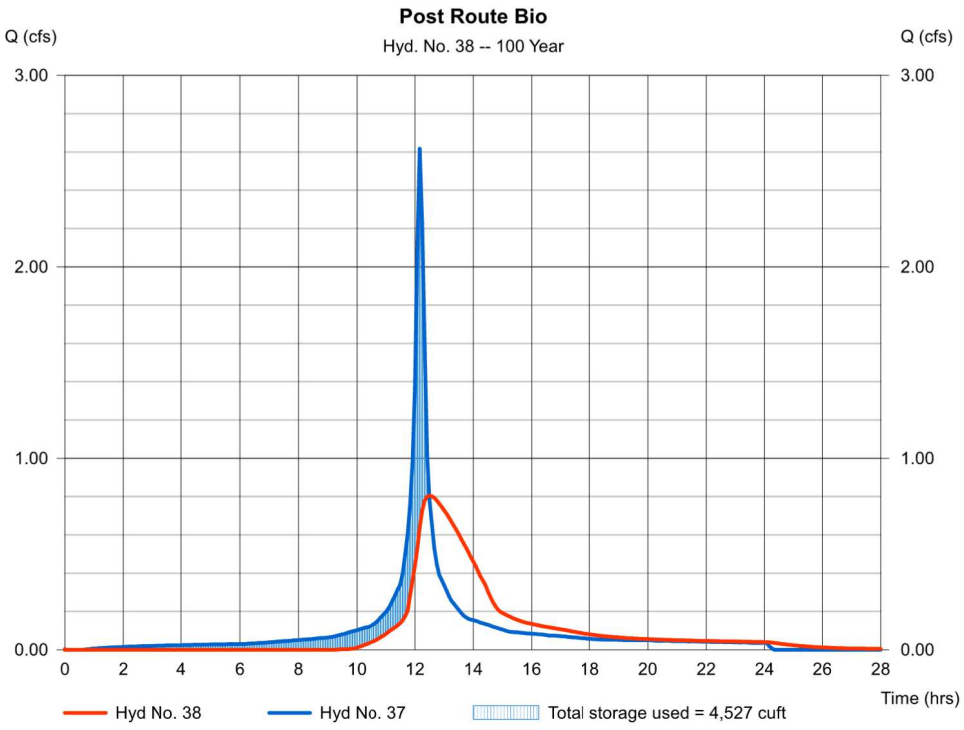
Hydrograph Report

Hyd. No. 38

Post Route Bio

Hydrograph type	= Reservoir	Peak discharge	= 0.805 cfs
Storm frequency	= 100 yrs	Time to peak	= 12.50 hrs
Time interval	= 5 min	Hyd. volume	= 9,591 cuft
Inflow hyd. No.	= 37 - Prop DA Bioretention Total	Max. Elevation	= 63.70 ft
Reservoir name	= Bioretention	Max. Storage	= 4,527 cuft

Storage Indication method used.

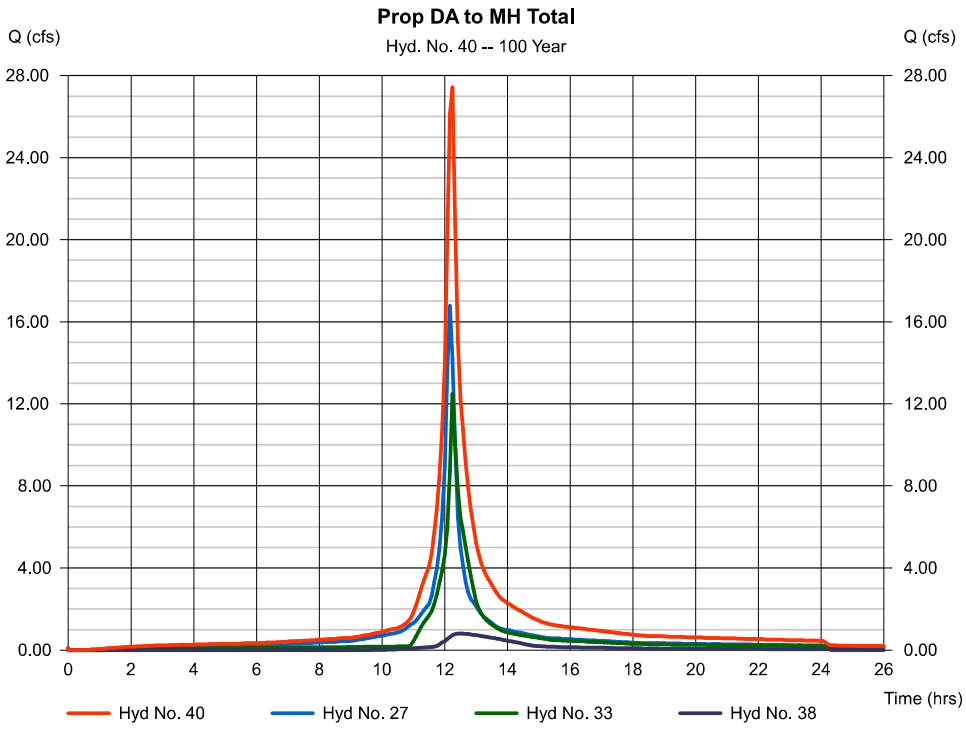


Hydrograph Report

Hyd. No. 40

Prop DA to MH Total

Hydrograph type	= Combine	Peak discharge	= 27.43 cfs
Storm frequency	= 100 yrs	Time to peak	= 12.25 hrs
Time interval	= 5 min	Hyd. volume	= 136,648 cuft
Inflow hyds.	= 27, 33, 38	Contrib. drain. area	= 0.000 ac

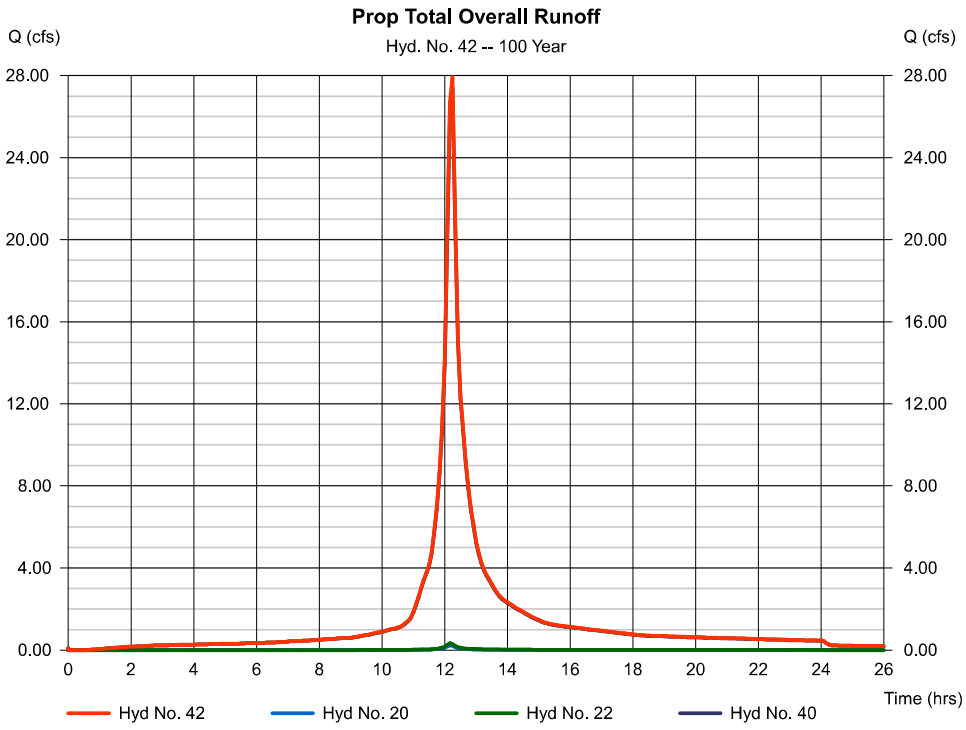


Hydrograph Report

Hyd. No. 42

Prop Total Overall Runoff

Hydrograph type	= Combine	Peak discharge	= 27.92 cfs
Storm frequency	= 100 yrs	Time to peak	= 12.25 hrs
Time interval	= 5 min	Hyd. volume	= 138,737 cuft
Inflow hyds.	= 20, 22, 40	Contrib. drain. area	= 0.120 ac



Hydraflow Rainfall Report

Return Period (Yrs)	Intensity-Duration-Frequency Equation Coefficients (FHA)			
	B	D	E	(N/A)
1	39.0824	9.5000	0.8528	------
2	45.6943	10.7000	0.8185	------
3	0.0000	0.0000	0.0000	------
5	99.7061	14.8000	0.9304	------
10	249.7597	21.8001	1.0961	------
25	115.7547	14.9000	0.8980	------
50	7.3699	0.1000	0.2544	------
100	403.8513	25.1001	1.1108	------

File name: TRENTON.idf

Intensity = B / (Tc + D)^E

Return Period (Yrs)	Intensity Values (in/hr)											
	5 min	10	15	20	25	30	35	40	45	50	55	60
1	4.00	3.10	2.55	2.18	1.91	1.70	1.54	1.40	1.29	1.20	1.12	1.05
2	4.80	3.83	3.21	2.77	2.45	2.20	2.00	1.84	1.70	1.59	1.49	1.40
3	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
5	6.20	5.03	4.24	3.67	3.24	2.90	2.63	2.40	2.22	2.06	1.92	1.80
10	6.80	5.63	4.80	4.17	3.69	3.30	2.98	2.72	2.50	2.31	2.14	2.00
25	7.89	6.45	5.47	4.76	4.23	3.80	3.46	3.17	2.93	2.73	2.55	2.40
50	4.87	4.09	3.69	3.44	3.25	3.10	2.98	2.88	2.80	2.72	2.66	2.60
100	9.20	7.76	6.69	5.87	5.22	4.70	4.27	3.91	3.60	3.33	3.10	2.90

Tc = time in minutes. Values may exceed 60.

Precip. file name: Somerset County.pcp

Storm Distribution	Rainfall Precipitation Table (in)							
	1-yr	2-yr	3-yr	5-yr	10-yr	25-yr	50-yr	100-yr
SCS 24-hour	0.00	3.34	0.00	0.00	5.01	6.15	0.00	8.21
SCS 6-Hr	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Huff-1st	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Huff-2nd	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Huff-3rd	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Huff-4th	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Huff-Indy	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Custom	1.25	3.34	0.00	0.00	5.01	6.15	0.00	8.21

HYDROGRAPH SUMMARY REPORTS
WATER QUALITY STORM

Hydraflow Table of Contents

Watershed Model Schematic 1

Hydrograph Return Period Recap 2

1 - Year

Summary Report 3

Hydrograph Reports 4

Hydrograph No. 1, SCS Runoff, Prop DA Basin (Imp) 4

Precipitation Report 5

Hydrograph No. 2, SCS Runoff, Prop DA Basin (Perv) 6

Precipitation Report 7

Hydrograph No. 3, SCS Runoff, Prop DA Detained Roof 8

Precipitation Report 9

Hydrograph No. 4, Combine, Prop DA Basin Total 10

Hydrograph No. 5, Reservoir, Post Route To Basin 11

Pond Report - UG Basin 12

Hydrograph No. 7, SCS Runoff, Prop DA Bioretention (Imp) 14

Precipitation Report 15

Hydrograph No. 8, SCS Runoff, Prop DA Bioretention (Perv) 16

Precipitation Report 17

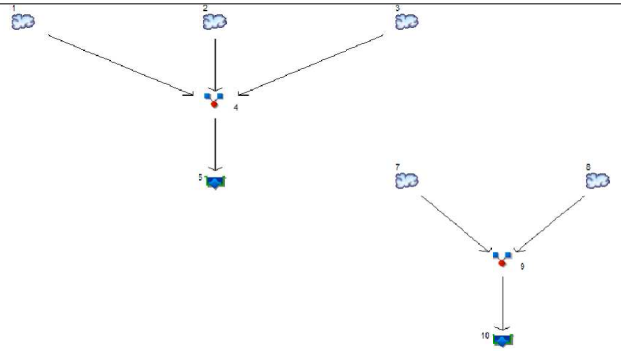
Hydrograph No. 9, Combine, Prop DA Bioretention Total 18

Hydrograph No. 10, Reservoir, Post Route Bio 19

Pond Report - Bioretention 20

IDF Report 21

Watershed Model Schematic



Legend

Hyd.	Origin	Description
1	SCS Runoff	Prop DA Basin (Imp)
2	SCS Runoff	Prop DA Basin (Perv)
3	SCS Runoff	Prop DA Detained Roof
4	Combine	Prop DA Basin Total
5	Reservoir	Post Route To Basin
7	SCS Runoff	Prop DA Bioretention (Imp)
8	SCS Runoff	Prop DA Bioretention (Perv)
9	Combine	Prop DA Bioretention Total
10	Reservoir	Post Route Bio

Hydrograph Return Period Recap

Hydraflow Hydrographs by Intelisolve v9.1

Hyd. No.	Hydrograph type (origin)	Inflow Hyd(s)	Peak Outflow (cfs)								Hydrograph description
			1-Yr	2-Yr	3-Yr	5-Yr	10-Yr	25-Yr	50-Yr	100-Yr	
1	SCS Runoff	-----	3.835	-----	-----	-----	-----	-----	-----	-----	Prop DA Basin (Imp)
2	SCS Runoff	-----	0.024	-----	-----	-----	-----	-----	-----	-----	Prop DA Basin (Perv)
3	SCS Runoff	-----	0.621	-----	-----	-----	-----	-----	-----	-----	Prop DA Detained Roof
4	Combine	1, 2, 3	4.470	-----	-----	-----	-----	-----	-----	-----	Prop DA Basin Total
5	Reservoir	4	0.179	-----	-----	-----	-----	-----	-----	-----	Post Route To Basin
7	SCS Runoff	-----	0.576	-----	-----	-----	-----	-----	-----	-----	Prop DA Bioretention (Imp)
8	SCS Runoff	-----	0.021	-----	-----	-----	-----	-----	-----	-----	Prop DA Bioretention (Perv)
9	Combine	7, 8	0.589	-----	-----	-----	-----	-----	-----	-----	Prop DA Bioretention Total
10	Reservoir	9	0.002	-----	-----	-----	-----	-----	-----	-----	Post Route Bio

Hydrograph Summary Report

Hydraflow Hydrographs by Intelisolve v9.1

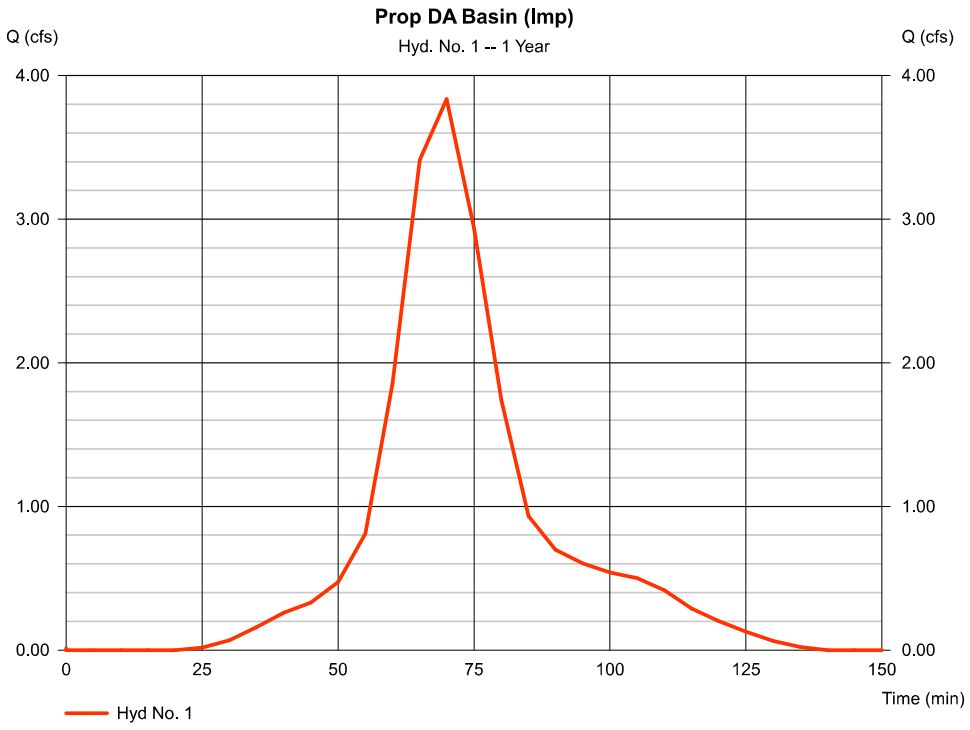
Hyd. No.	Hydrograph type (origin)	Peak flow (cfs)	Time interval (min)	Time to peak (min)	Hyd. volume (cuft)	Inflow hyd(s)	Maximum elevation (ft)	Total strge used (cuft)	Hydrograph description
1	SCS Runoff	3.835	5	70	6,089	---	-----	-----	Prop DA Basin (Imp)
2	SCS Runoff	0.024	5	80	56	---	-----	-----	Prop DA Basin (Perv)
3	SCS Runoff	0.621	5	70	985	---	-----	-----	Prop DA Detained Roof
4	Combine	4.470	5	70	7,130	1, 2, 3	-----	-----	Prop DA Basin Total
5	Reservoir	0.179	5	125	7,115	4	57.50	6,370	Post Route To Basin
7	SCS Runoff	0.576	5	70	915	---	-----	-----	Prop DA Bioretention (Imp)
8	SCS Runoff	0.021	5	80	49	---	-----	-----	Prop DA Bioretention (Perv)
9	Combine	0.589	5	70	964	7, 8	-----	-----	Prop DA Bioretention Total
10	Reservoir	0.002	5	140	22	9	62.43	962	Post Route Bio

Hydrograph Report

Hyd. No. 1

Prop DA Basin (Imp)

Hydrograph type	= SCS Runoff	Peak discharge	= 3.835 cfs
Storm frequency	= 1 yrs	Time to peak	= 70 min
Time interval	= 5 min	Hyd. volume	= 6,089 cuft
Drainage area	= 1.730 ac	Curve number	= 98
Basin Slope	= 0.0 %	Hydraulic length	= 0 ft
Tc method	= USER	Time of conc. (Tc)	= 10.00 min
Total precip.	= 1.25 in	Distribution	= Custom
Storm duration	= Water Quality Storm.cds	Shape factor	= 484

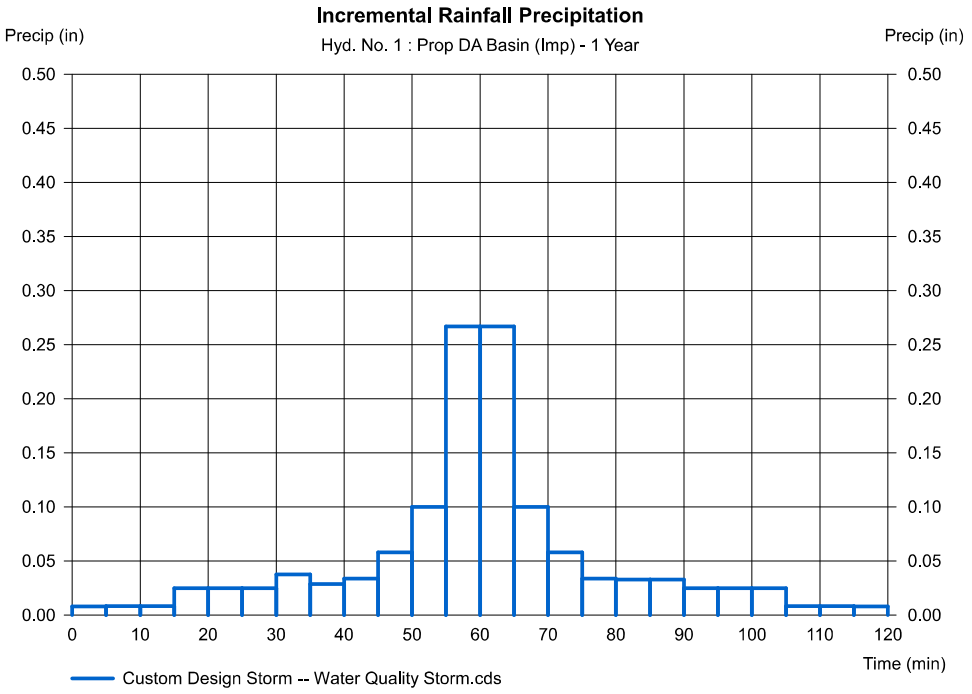


Precipitation Report

Hyd. No. 1

Prop DA Basin (Imp)

Storm Frequency	= 1 yrs	Time interval	= 5 min
Total precip.	= 1.2500 in	Distribution	= Custom
Storm duration	= Water Quality Storm.cds		

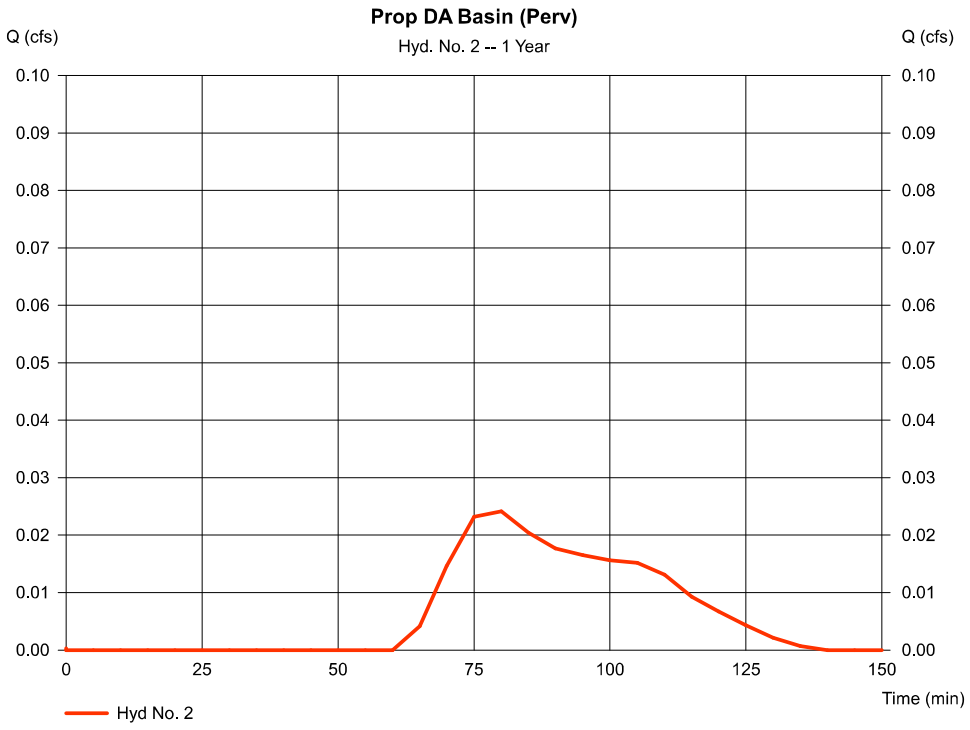


Hydrograph Report

Hyd. No. 2

Prop DA Basin (Perv)

Hydrograph type	= SCS Runoff	Peak discharge	= 0.024 cfs
Storm frequency	= 1 yrs	Time to peak	= 80 min
Time interval	= 5 min	Hyd. volume	= 56 cuft
Drainage area	= 0.230 ac	Curve number	= 74
Basin Slope	= 0.0 %	Hydraulic length	= 0 ft
Tc method	= USER	Time of conc. (Tc)	= 10.00 min
Total precip.	= 1.25 in	Distribution	= Custom
Storm duration	= Water Quality Storm.cds	Shape factor	= 484

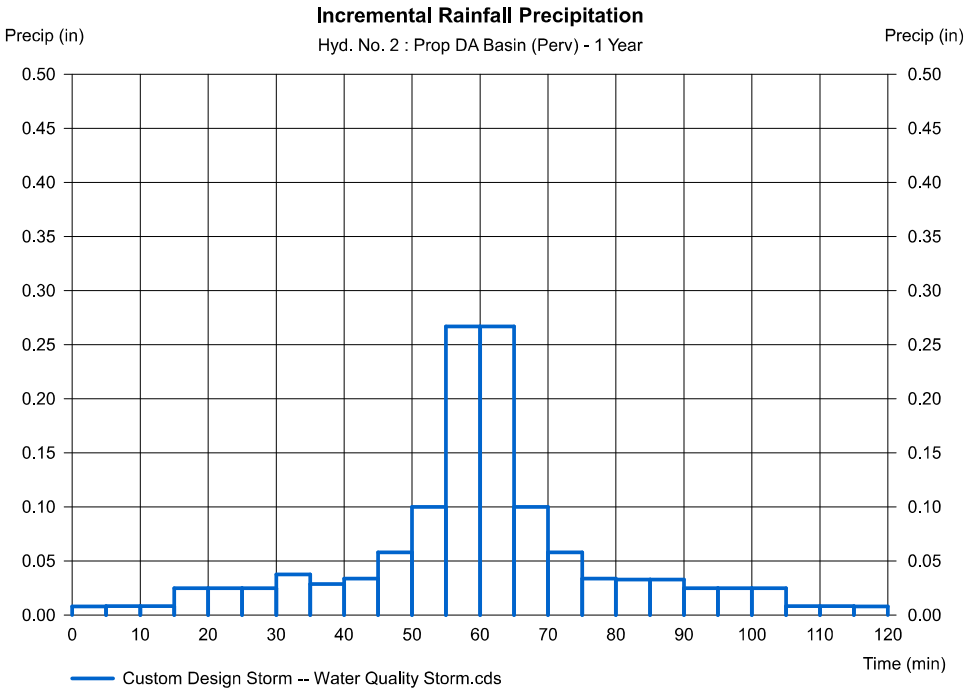


Precipitation Report

Hyd. No. 2

Prop DA Basin (Perv)

Storm Frequency	= 1 yrs	Time interval	= 5 min
Total precip.	= 1.2500 in	Distribution	= Custom
Storm duration	= Water Quality Storm.cds		

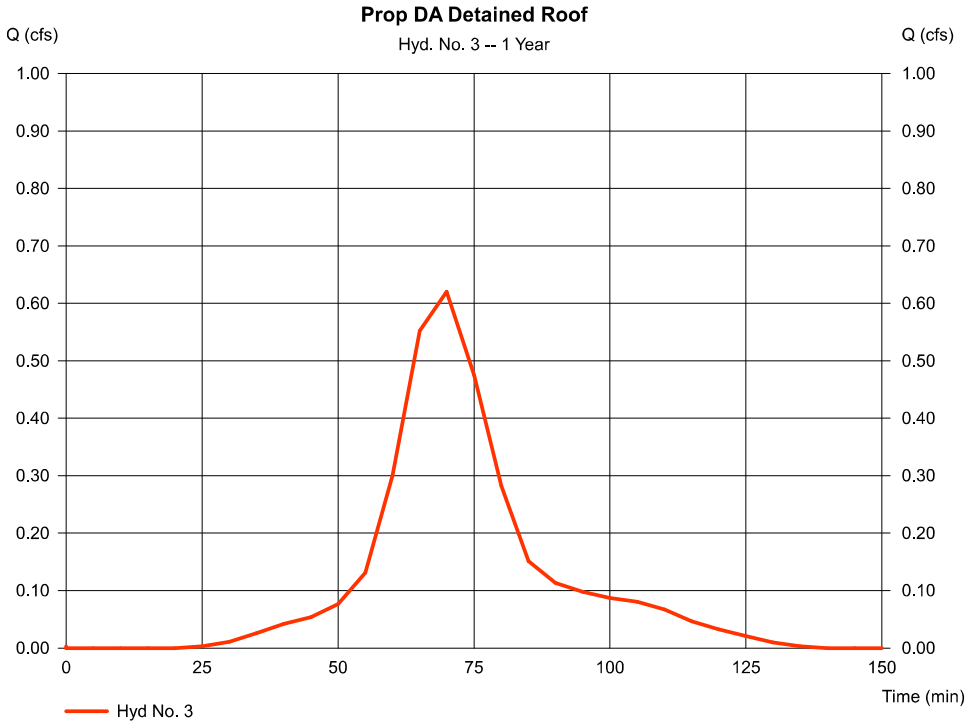


Hydrograph Report

Hyd. No. 3

Prop DA Detained Roof

Hydrograph type	= SCS Runoff	Peak discharge	= 0.621 cfs
Storm frequency	= 1 yrs	Time to peak	= 70 min
Time interval	= 5 min	Hyd. volume	= 985 cuft
Drainage area	= 0.280 ac	Curve number	= 98
Basin Slope	= 0.0 %	Hydraulic length	= 0 ft
Tc method	= USER	Time of conc. (Tc)	= 10.00 min
Total precip.	= 1.25 in	Distribution	= Custom
Storm duration	= Water Quality Storm.cds	Shape factor	= 484

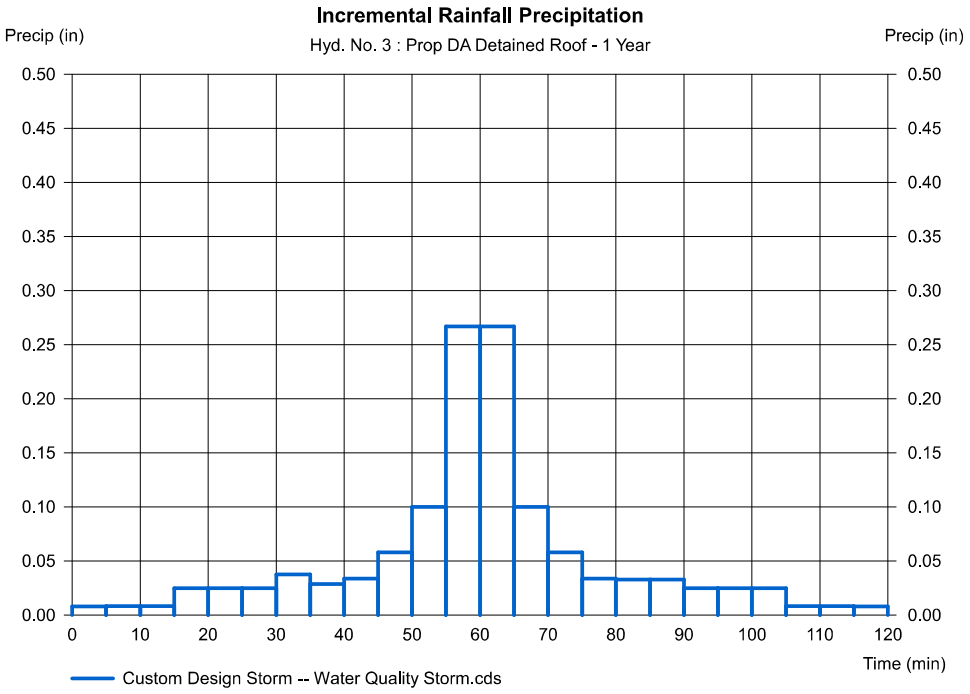


Precipitation Report

Hyd. No. 3

Prop DA Detained Roof

Storm Frequency	= 1 yrs	Time interval	= 5 min
Total precip.	= 1.2500 in	Distribution	= Custom
Storm duration	= Water Quality Storm.cds		

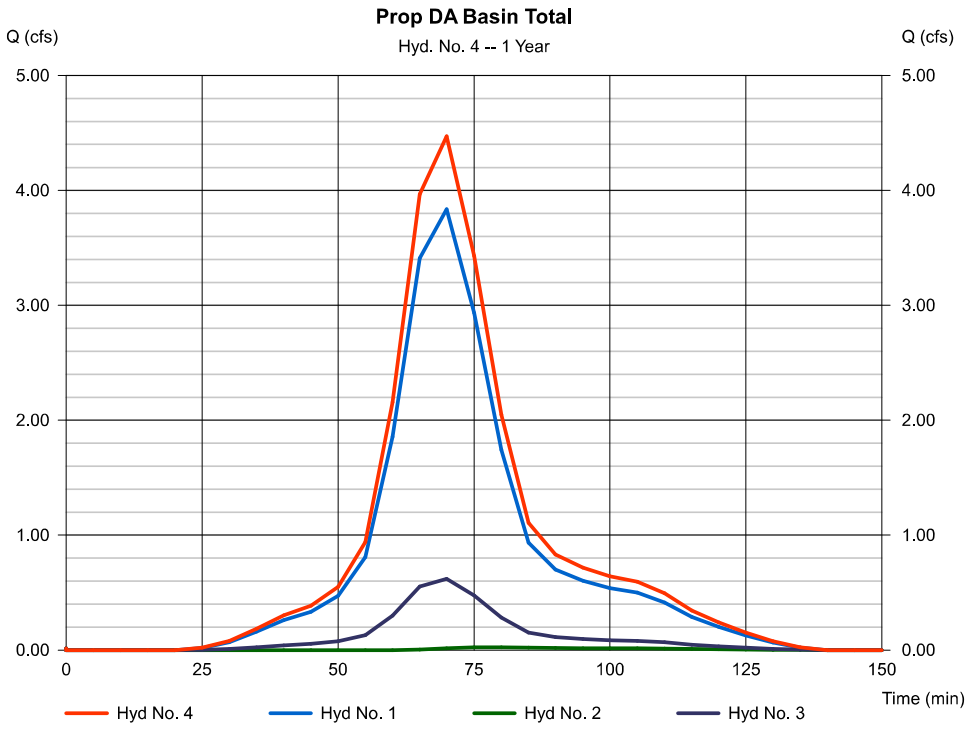


Hydrograph Report

Hyd. No. 4

Prop DA Basin Total

Hydrograph type	= Combine	Peak discharge	= 4.470 cfs
Storm frequency	= 1 yrs	Time to peak	= 70 min
Time interval	= 5 min	Hyd. volume	= 7,130 cuft
Inflow hyds.	= 1, 2, 3	Contrib. drain. area	= 2.240 ac



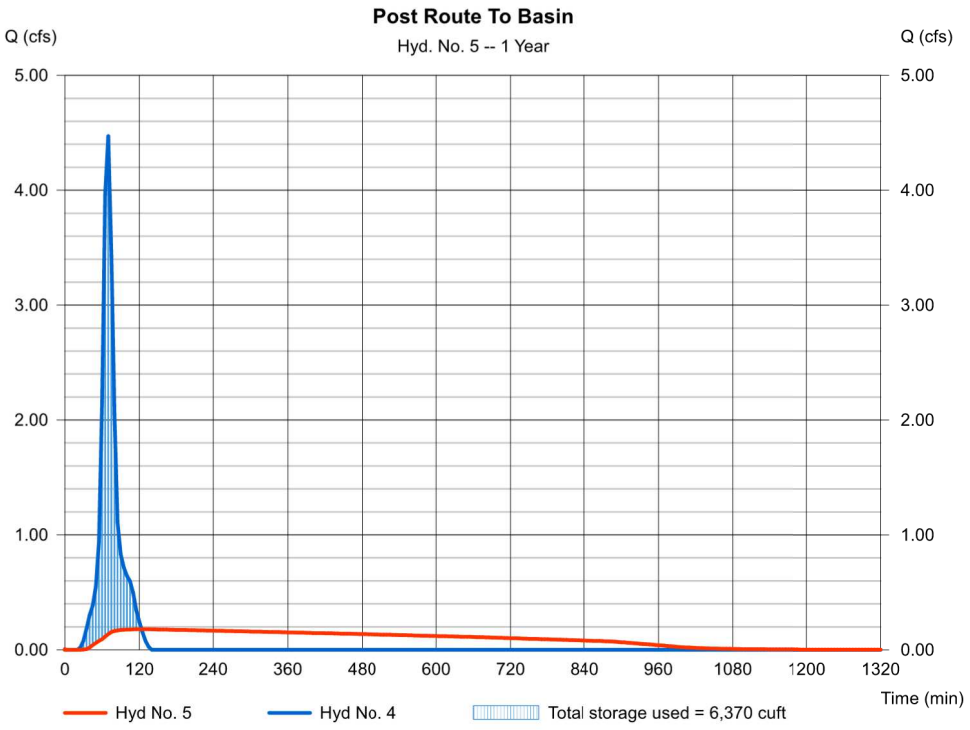
Hydrograph Report

Hyd. No. 5

Post Route To Basin

Hydrograph type	= Reservoir	Peak discharge	= 0.179 cfs
Storm frequency	= 1 yrs	Time to peak	= 125 min
Time interval	= 5 min	Hyd. volume	= 7,115 cuft
Inflow hyd. No.	= 4 - Prop DA Basin Total	Max. Elevation	= 57.50 ft
Reservoir name	= UG Basin	Max. Storage	= 6,370 cuft

Storage Indication method used.



Pond Report

Pond No. 1 - UG Basin

Pond Data

UG Chambers - Invert elev. = 55.50 ft, Rise x Span = 4.00 x 4.00 ft, Barrel Len = 98.00 ft, No. Barrels = 10, Slope = 0.25%, Headers = Yes

Stage / Storage Table

Stage (ft)	Elevation (ft)	Contour area (sqft)	Incr. Storage (cuft)	Total storage (cuft)
0.00	55.50	n/a	0	0
0.42	55.92	n/a	485	485
0.85	56.35	n/a	1,230	1,716
1.27	56.77	n/a	1,569	3,285
1.70	57.20	n/a	1,758	5,043
2.12	57.62	n/a	1,847	6,890
2.55	58.05	n/a	1,845	8,735
2.97	58.47	n/a	1,759	10,494
3.40	58.90	n/a	1,569	12,063
3.82	59.32	n/a	1,228	13,291
4.25	59.75	n/a	484	13,775

Culvert / Orifice Structures

	[A]	[B]	[C]	[PrfRsr]
Rise (in)	= 18.00	2.25	5.00	0.00
Span (in)	= 18.00	2.25	38.00	0.00
No. Barrels	= 1	1	1	0
Invert El. (ft)	= 55.50	55.50	57.70	0.00
Length (ft)	= 46.00	0.00	0.00	0.00
Slope (%)	= 5.43	0.00	0.00	n/a
N-Value	= .013	.013	.013	n/a
Orifice Coeff.	= 0.60	0.60	0.60	0.60
Multi-Stage	= n/a	Yes	Yes	No

Weir Structures

	[A]	[B]	[C]	[D]
Crest Len (ft)	= 2.25	0.00	0.00	0.00
Crest El. (ft)	= 58.95	0.00	0.00	0.00
Weir Coeff.	= 3.33	3.33	3.33	3.33
Weir Type	= Rect	---	---	---
Multi-Stage	= Yes	No	No	No
Exfil.(in/hr)	= 0.000 (by Wet area)			
TW Elev. (ft)	= 0.00			

Note: Culvert/Orifice outflows are analyzed under inlet (ic) and outlet (oc) control. Weir risers checked for orifice conditions (ic) and submergence (s).

Stage / Storage / Discharge Table

Stage ft	Storage cuft	Elevation ft	Clv A cfs	Clv B cfs	Clv C cfs	PrfRsr cfs	Wr A cfs	Wr B cfs	Wr C cfs	Wr D cfs	Exfil cfs	User cfs	Total cfs
0.00	0	55.50	0.00	0.00	0.00	---	0.00	---	---	---	---	---	0.00
0.04	49	55.54	0.00 ic	0.00 ic	0.00	---	0.00	---	---	---	---	---	0.00
0.08	97	55.58	0.01 ic	0.01 ic	0.00	---	0.00	---	---	---	---	---	0.01
0.13	146	55.63	0.02 ic	0.02 ic	0.00	---	0.00	---	---	---	---	---	0.02
0.17	194	55.67	0.04 ic	0.04 ic	0.00	---	0.00	---	---	---	---	---	0.04
0.21	243	55.71	0.05 ic	0.05 ic	0.00	---	0.00	---	---	---	---	---	0.05
0.25	291	55.75	0.05 ic	0.05 ic	0.00	---	0.00	---	---	---	---	---	0.05
0.30	340	55.80	0.06 ic	0.06 ic	0.00	---	0.00	---	---	---	---	---	0.06
0.34	388	55.84	0.06 ic	0.06 ic	0.00	---	0.00	---	---	---	---	---	0.06
0.38	437	55.88	0.07 ic	0.07 ic	0.00	---	0.00	---	---	---	---	---	0.07
0.42	485	55.92	0.07 ic	0.07 ic	0.00	---	0.00	---	---	---	---	---	0.07
0.47	609	55.97	0.08 ic	0.08 ic	0.00	---	0.00	---	---	---	---	---	0.08
0.51	732	56.01	0.09 ic	0.08 ic	0.00	---	0.00	---	---	---	---	---	0.08
0.55	855	56.05	0.09 ic	0.09 ic	0.00	---	0.00	---	---	---	---	---	0.09
0.59	978	56.09	0.09 ic	0.09 ic	0.00	---	0.00	---	---	---	---	---	0.09
0.64	1,101	56.14	0.10 ic	0.09 ic	0.00	---	0.00	---	---	---	---	---	0.09
0.68	1,224	56.18	0.10 ic	0.10 ic	0.00	---	0.00	---	---	---	---	---	0.10
0.72	1,347	56.22	0.11 ic	0.10 ic	0.00	---	0.00	---	---	---	---	---	0.10
0.76	1,470	56.26	0.11 ic	0.11 ic	0.00	---	0.00	---	---	---	---	---	0.11
0.81	1,593	56.31	0.11 ic	0.11 ic	0.00	---	0.00	---	---	---	---	---	0.11
0.85	1,716	56.35	0.12 ic	0.11 ic	0.00	---	0.00	---	---	---	---	---	0.11
0.89	1,873	56.39	0.12 ic	0.11 ic	0.00	---	0.00	---	---	---	---	---	0.11
0.93	2,030	56.43	0.12 ic	0.12 ic	0.00	---	0.00	---	---	---	---	---	0.12
0.98	2,187	56.48	0.12 ic	0.12 ic	0.00	---	0.00	---	---	---	---	---	0.12
1.02	2,343	56.52	0.13 ic	0.12 ic	0.00	---	0.00	---	---	---	---	---	0.12
1.06	2,500	56.56	0.13 ic	0.13 ic	0.00	---	0.00	---	---	---	---	---	0.13
1.10	2,657	56.60	0.13 ic	0.13 ic	0.00	---	0.00	---	---	---	---	---	0.13
1.15	2,814	56.65	0.13 ic	0.13 ic	0.00	---	0.00	---	---	---	---	---	0.13
1.19	2,971	56.69	0.14 ic	0.13 ic	0.00	---	0.00	---	---	---	---	---	0.13
1.23	3,128	56.73	0.14 ic	0.14 ic	0.00	---	0.00	---	---	---	---	---	0.14
1.27	3,285	56.77	0.14 ic	0.14 ic	0.00	---	0.00	---	---	---	---	---	0.14
1.32	3,461	56.82	0.14 ic	0.14 ic	0.00	---	0.00	---	---	---	---	---	0.14
1.36	3,637	56.86	0.15 ic	0.15 ic	0.00	---	0.00	---	---	---	---	---	0.15

Continues on next page...

UG Basin

Stage / Storage / Discharge Table

Stage ft	Storage cuft	Elevation ft	Clv A cfs	Clv B cfs	Clv C cfs	PrfRsr cfs	Wr A cfs	Wr B cfs	Wr C cfs	Wr D cfs	Exfil cfs	User cfs	Total cfs
1.40	3,812	56.90	0.16 ic	0.15 ic	0.00	---	0.00	---	---	---	---	---	0.15
1.44	3,988	56.94	0.16 ic	0.15 ic	0.00	---	0.00	---	---	---	---	---	0.15
1.49	4,164	56.99	0.16 ic	0.15 ic	0.00	---	0.00	---	---	---	---	---	0.15
1.53	4,340	57.03	0.16 ic	0.16 ic	0.00	---	0.00	---	---	---	---	---	0.16
1.57	4,516	57.07	0.16 ic	0.16 ic	0.00	---	0.00	---	---	---	---	---	0.16
1.61	4,691	57.11	0.17 ic	0.16 ic	0.00	---	0.00	---	---	---	---	---	0.16
1.66	4,867	57.16	0.17 ic	0.16 ic	0.00	---	0.00	---	---	---	---	---	0.16
1.70	5,043	57.20	0.17 ic	0.16 ic	0.00	---	0.00	---	---	---	---	---	0.16
1.74	5,228	57.24	0.17 ic	0.17 ic	0.00	---	0.00	---	---	---	---	---	0.17
1.78	5,412	57.28	0.17 ic	0.17 ic	0.00	---	0.00	---	---	---	---	---	0.17
1.83	5,597	57.33	0.17 ic	0.17 ic	0.00	---	0.00	---	---	---	---	---	0.17
1.87	5,782	57.37	0.17 ic	0.17 ic	0.00	---	0.00	---	---	---	---	---	0.17
1.91	5,967	57.41	0.18 ic	0.17 ic	0.00	---	0.00	---	---	---	---	---	0.17
1.95	6,151	57.45	0.18 ic	0.18 ic	0.00	---	0.00	---	---	---	---	---	0.18
2.00	6,336	57.50	0.18 ic	0.18 ic	0.00	---	0.00	---	---	---	---	---	0.18
2.04	6,521	57.54	0.18 ic	0.18 ic	0.00	---	0.00	---	---	---	---	---	0.18
2.08	6,705	57.58	0.18 ic	0.18 ic	0.00	---	0.00	---	---	---	---	---	0.18
2.12	6,890	57.62	0.19 ic	0.19 ic	0.00	---	0.00	---	---	---	---	---	0.19
2.16	7,075	57.66	0.19 ic	0.19 ic	0.00	---	0.00	---	---	---	---	---	0.19
2.21	7,259	57.71	0.20 ic	0.19 ic	0.01 ic	---	0.00	---	---	---	---	---	0.20
2.25	7,444	57.75	0.31 ic	0.19 ic	0.12 ic	---	0.00	---	---	---	---	---	0.31
2.29	7,628	57.79	0.49 ic	0.19 ic	0.30 ic	---	0.00	---	---	---	---	---	0.49
2.33	7,813	57.83	0.72 ic	0.19 ic	0.53 ic	---	0.00	---	---	---	---	---	0.72
2.38	7,997	57.88	1.02 ic	0.18 ic	0.80 ic	---	0.00	---	---	---	---	---	0.99
2.42	8,182	57.92	1.31 ic	0.18 ic	1.11 ic	---	0.00	---	---	---	---	---	1.29
2.46	8,366	57.96	1.65 ic	0.18 ic	1.45 ic	---	0.00	---	---	---	---	---	1.63
2.50	8,551	58.00	2.03 ic	0.18 ic	1.81 ic	---	0.00	---	---	---	---	---	1.99
2.55	8,735	58.05	2.38 ic	0.18 ic	2.20 ic	---	0.00	---	---	---	---	---	2.38
2.59	8,911	58.09	2.80 ic	0.18 ic	2.62 ic	---	0.00	---	---	---	---	---	2.80
2.63	9,087	58.13	3.18 ic	0.18 ic	3.00 ic	---	0.00	---	---	---	---	---	3.18
2.67	9,263	58.17	3.49 ic	0.18 ic	3.28 ic	---	0.00	---	---	---	---	---	3.45
2.72	9,439	58.22	3.72 ic	0.18 ic	3.53 ic	---	0.00	---	---	---	---	---	3.71
2.76	9,615	58.26	3.96 ic	0.18 ic	3.76 ic	---	0.00	---	---	---	---	---	3.94
2.80	9,791	58.30	4.19 ic	0.18 ic	3.98 ic	---	0.00	---	---	---	---	---	4.16
2.84	9,967	58.34	4.42 ic	0.18 ic	4.19 ic	---	0.00	---	---	---	---	---	4.37
2.89	10,143	58.39	4.57 ic	0.18 ic	4.39 ic	---	0.00	---	---	---	---	---	4.57
2.93	10,318	58.43	4.80 ic	0.18 ic	4.58 ic	---	0.00	---	---	---	---	---	4.77
2.97	10,494	58.47	4.95 ic	0.18 ic	4.77 ic	---	0.00	---	---	---	---	---	4.95
3.01	10,651	58.51	5.16 ic	0.18 ic	4.94 ic	---	0.00	---	---	---	---	---	5.13
3.06	10,808	58.56	5.30 ic	0.18 ic	5.11 ic	---	0.00	---	---	---	---	---	5.30
3.10	10,965	58.60	5.50 ic	0.18 ic	5.28 ic	---	0.00	---	---	---	---	---	5.46
3.14	11,122	58.64	5.63 ic	0.19 ic	5.44 ic	---	0.00	---	---	---	---	---	5.62
3.18	11,279	58.68	5.78 ic	0.19 ic	5.59 ic	---	0.00	---	---	---	---	---	5.78
3.23	11,436	58.73	5.94 ic	0.19 ic	5.75 ic	---	0.00	---	---	---	---	---	5.93
3.27	11,593	58.77	6.11 ic	0.19 ic	5.89 ic	---	0.00	---	---	---	---	---	6.08
3.31	11,749	58.81	6.23 ic	0.19 ic	6.04 ic	---	0.00	---	---	---	---	---	6.23
3.35	11,906	58.85	6.38 ic	0.19 ic	6.18 ic	---	0.00	---	---	---	---	---	6.37
3.40	12,063	58.90	6.52 ic	0.19 ic	6.31 ic	---	0.00	---	---	---	---	---	6.50
3.44	12,186	58.94	6.65 ic	0.19 ic	6.45 ic	---	0.00	---	---	---	---	---	6.64
3.48	12,309	58.98	6.81 ic	0.19 ic	6.58 ic	---	0.04	---	---	---	---	---	6.81
3.52	12,432	59.02	7.05 ic	0.19 ic	6.71 ic	---	0.15	---	---	---	---	---	7.05
3.57	12,554	59.07	7.32 ic	0.19 ic	6.84 ic	---	0.30	---	---	---	---	---	7.32
3.61	12,677	59.11	7.62 ic	0.19 ic	6.96 ic	---	0.47	---	---	---	---	---	7.62
3.65	12,800	59.15	7.94 ic	0.19 ic	7.08 ic	---	0.67	---	---	---	---	---	7.94
3.69	12,923	59.19	8.29 ic	0.19 ic	7.20 ic	---	0.90	---	---	---	---	---	8.29
3.74	13,045	59.24	8.65 ic	0.19 ic	7.32 ic	---	1.14	---	---	---	---	---	8.65
3.78	13,168	59.28	9.03 ic	0.18 ic	7.44 ic	---	1.41	---	---	---	---	---	9.03
3.82	13,291	59.32	9.42 ic	0.18 ic	7.55 ic	---	1.69	---	---	---	---	---	9.42
3.86	13,339	59.36	9.83 ic	0.18 ic	7.66 ic	---	1.99	---	---	---	---	---	9.83
3.91	13,388	59.41	10.25 ic	0.17 ic	7.77 ic	---	2.30	---	---	---	---	---	10.25
3.95	13,436	59.45	10.68 ic	0.17 ic	7.88 ic	---	2.63	---	---	---	---	---	10.68
3.99	13,485	59.49	11.06 ic	0.17 ic	7.91 ic	---	2.98	---	---	---	---	---	11.06
4.03	13,533	59.53	11.31 ic	0.16 ic	7.82 ic	---	3.33	---	---	---	---	---	11.31
4.08	13,581	59.58	11.58 ic	0.16 ic	7.71 ic	---	3.70	---	---	---	---	---	11.58
4.12	13,630	59.62	11.84 ic	0.16 ic	7.60 ic	---	4.09	---	---	---	---	---	11.84
4.16	13,678	59.66	12.11 ic	0.16 ic	7.47 ic	---	4.48	---	---	---	---	---	12.11
4.20	13,727	59.70	12.38 ic	0.15 ic	7.34 ic	---	4.89	---	---	---	---	---	12.38
4.25	13,775	59.75	12.66 ic	0.15 ic	7.19 ic	---	5.31	---	---	---	---	---	12.66

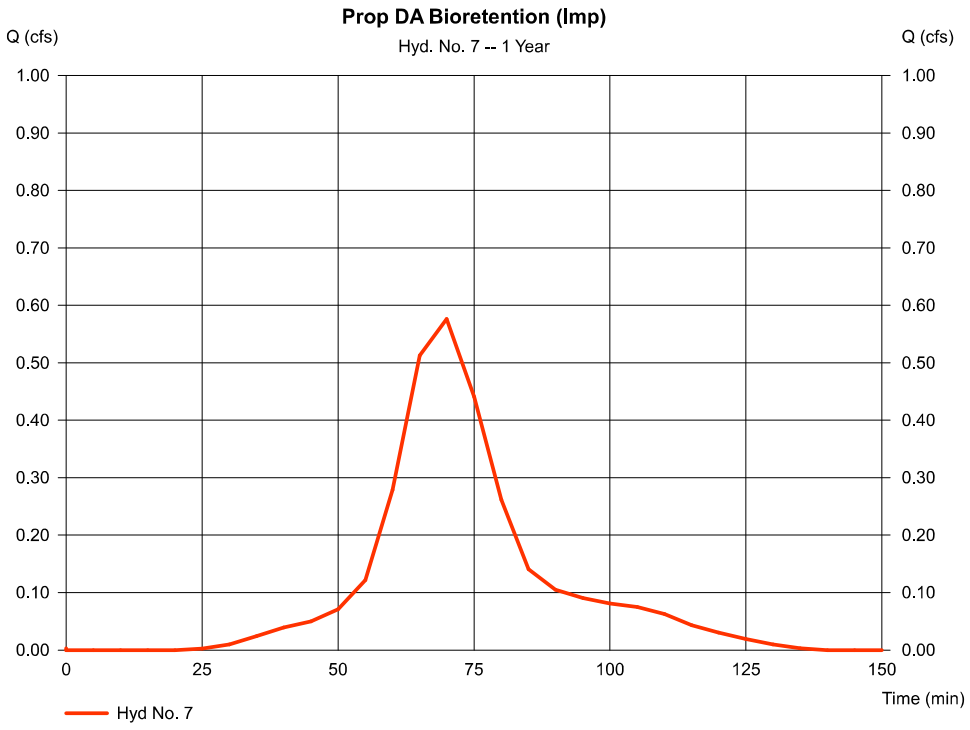
...End

Hydrograph Report

Hyd. No. 7

Prop DA Bioretention (Imp)

Hydrograph type	= SCS Runoff	Peak discharge	= 0.576 cfs
Storm frequency	= 1 yrs	Time to peak	= 70 min
Time interval	= 5 min	Hyd. volume	= 915 cuft
Drainage area	= 0.260 ac	Curve number	= 98
Basin Slope	= 0.0 %	Hydraulic length	= 0 ft
Tc method	= USER	Time of conc. (Tc)	= 14.00 min
Total precip.	= 1.25 in	Distribution	= Custom
Storm duration	= Water Quality Storm.cds	Shape factor	= 484

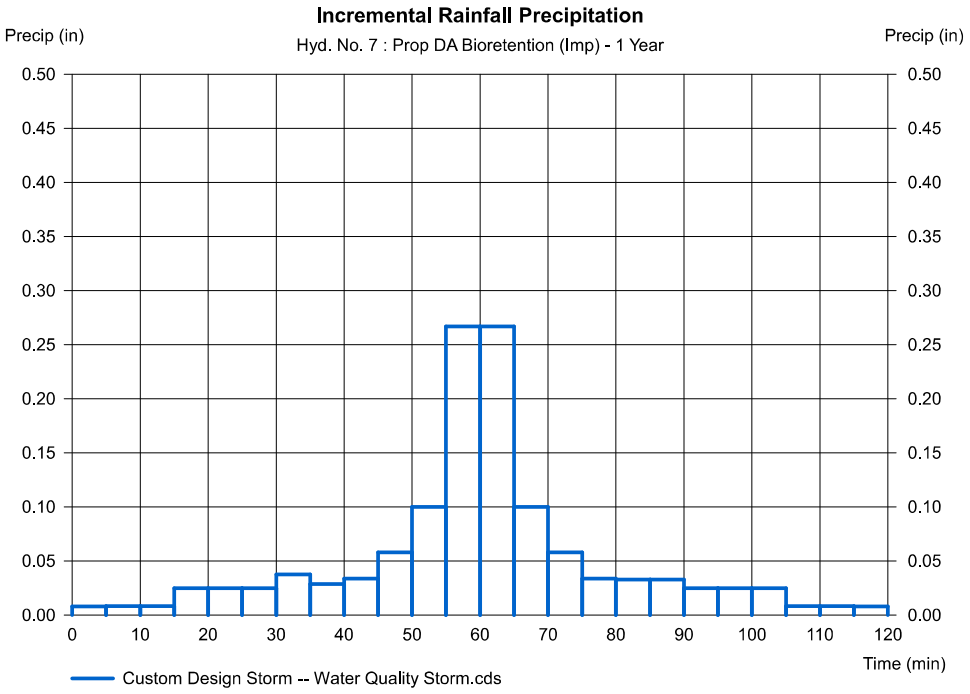


Precipitation Report

Hyd. No. 7

Prop DA Bioretention (Imp)

Storm Frequency	= 1 yrs	Time interval	= 5 min
Total precip.	= 1.2500 in	Distribution	= Custom
Storm duration	= Water Quality Storm.cds		

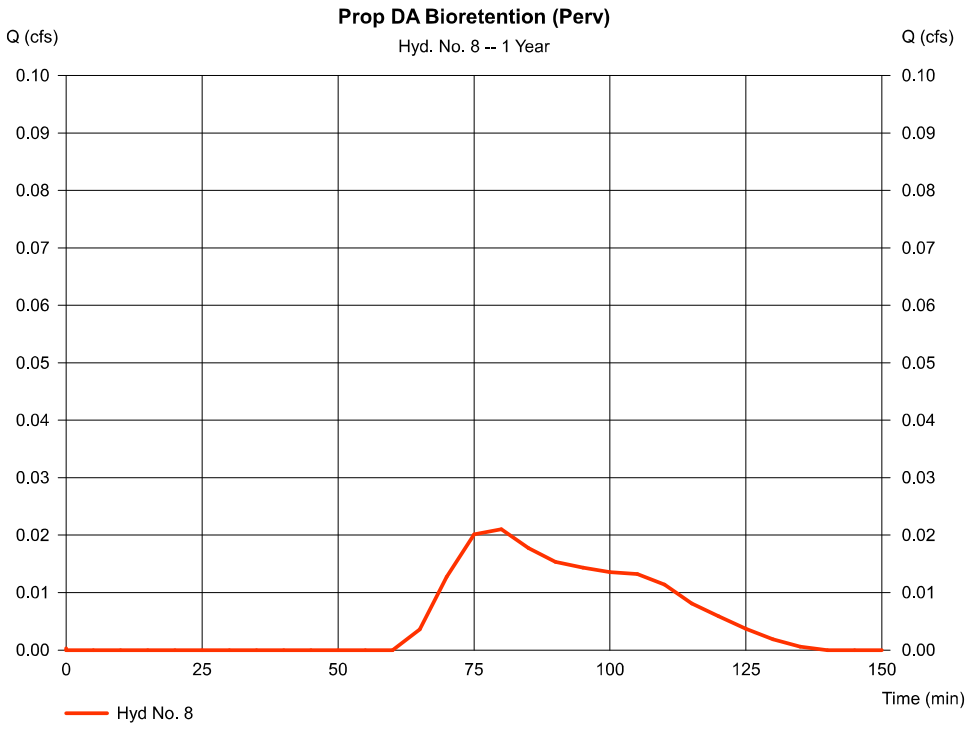


Hydrograph Report

Hyd. No. 8

Prop DA Bioretention (Perv)

Hydrograph type	= SCS Runoff	Peak discharge	= 0.021 cfs
Storm frequency	= 1 yrs	Time to peak	= 80 min
Time interval	= 5 min	Hyd. volume	= 49 cuft
Drainage area	= 0.200 ac	Curve number	= 74
Basin Slope	= 0.0 %	Hydraulic length	= 0 ft
Tc method	= USER	Time of conc. (Tc)	= 14.00 min
Total precip.	= 1.25 in	Distribution	= Custom
Storm duration	= Water Quality Storm.cds	Shape factor	= 484

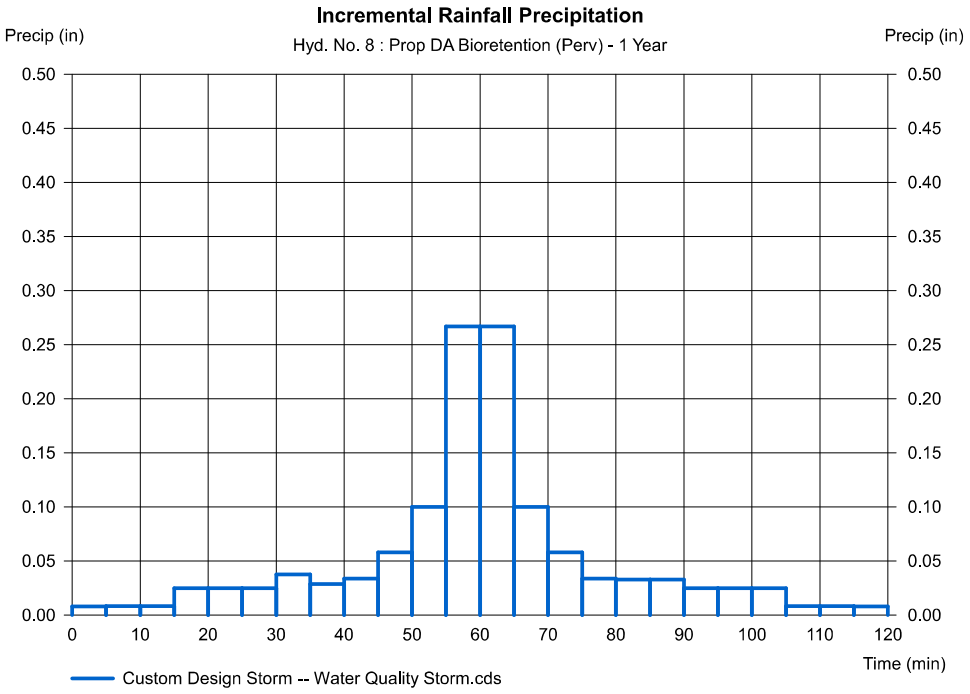


Precipitation Report

Hyd. No. 8

Prop DA Bioretention (Perv)

Storm Frequency	= 1 yrs	Time interval	= 5 min
Total precip.	= 1.2500 in	Distribution	= Custom
Storm duration	= Water Quality Storm.cds		

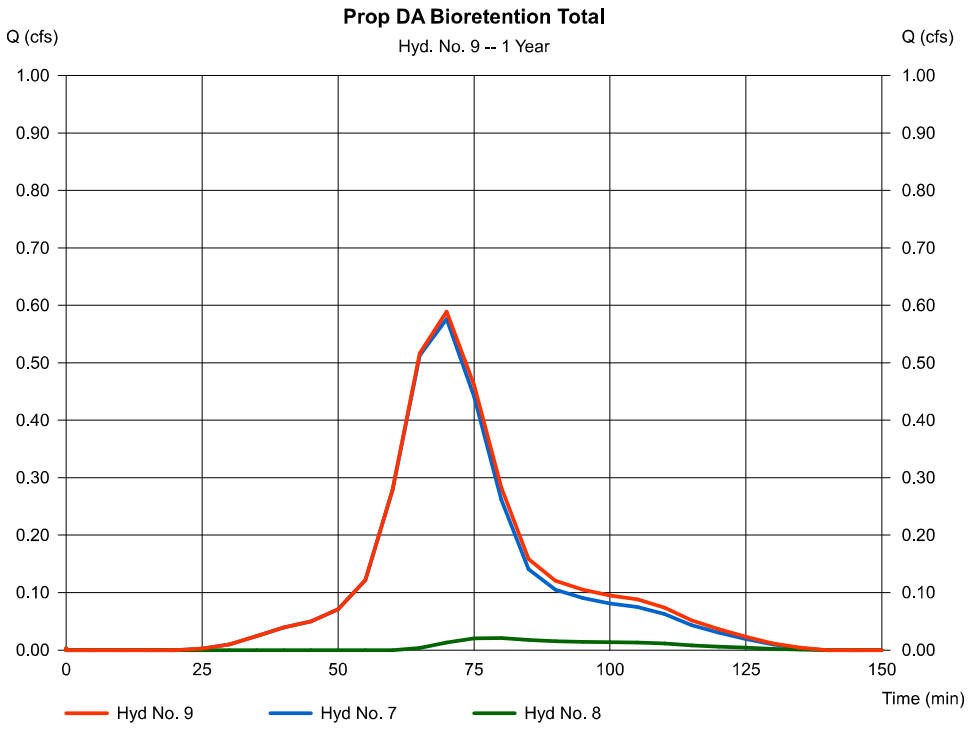


Hydrograph Report

Hyd. No. 9

Prop DA Bioretention Total

Hydrograph type	= Combine	Peak discharge	= 0.589 cfs
Storm frequency	= 1 yrs	Time to peak	= 70 min
Time interval	= 5 min	Hyd. volume	= 964 cuft
Inflow hyds.	= 7, 8	Contrib. drain. area	= 0.460 ac



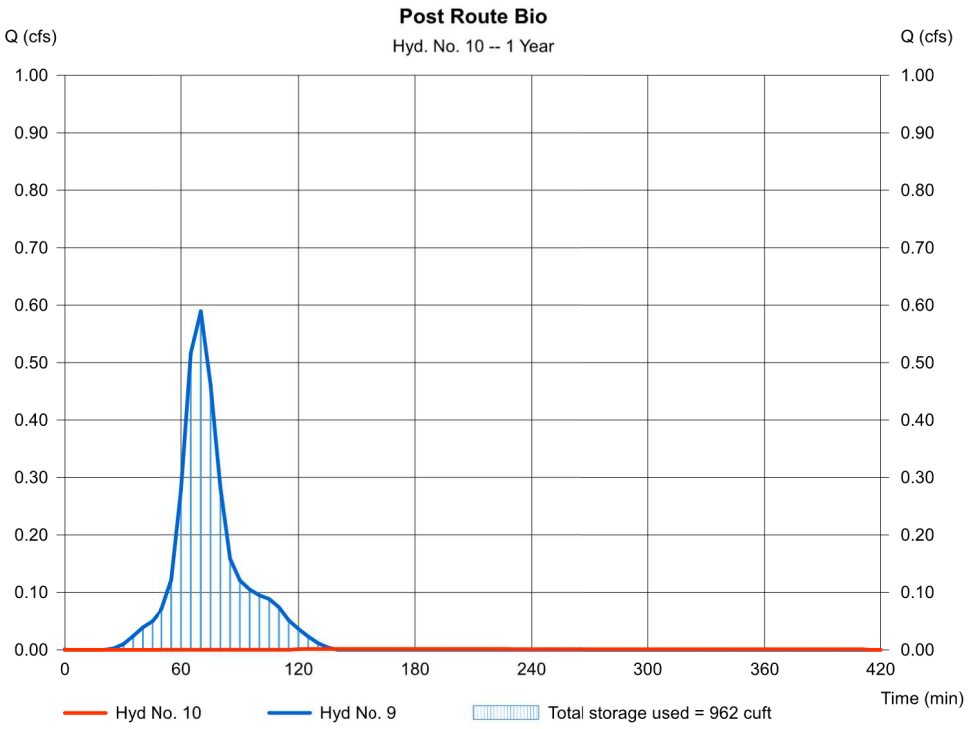
Hydrograph Report

Hyd. No. 10

Post Route Bio

Hydrograph type	= Reservoir	Peak discharge	= 0.002 cfs
Storm frequency	= 1 yrs	Time to peak	= 140 min
Time interval	= 5 min	Hyd. volume	= 22 cuft
Inflow hyd. No.	= 9 - Prop DA Bioretention Total	Max. Elevation	= 62.43 ft
Reservoir name	= Bioretention	Max. Storage	= 962 cuft

Storage Indication method used.



Pond Report

Pond No. 2 - Bioretention

Pond Data

Contours - User-defined contour areas. Conic method used for volume calculation. Begining Elevation = 62.00 ft

Stage / Storage Table

Stage (ft)	Elevation (ft)	Contour area (sqft)	Incr. Storage (cuft)	Total storage (cuft)
0.00	62.00	1,800	0	0
1.00	63.00	2,755	2,260	2,260
2.00	64.00	3,775	3,251	5,512

Culvert / Orifice Structures

	[A]	[B]	[C]	[PrfRsr]
Rise (in)	= 15.00	3.50	2.00	0.00
Span (in)	= 15.00	3.50	8.00	0.00
No. Barrels	= 1	1	1	0
Invert El. (ft)	= 58.50	62.45	62.85	0.00
Length (ft)	= 17.00	0.00	0.00	0.00
Slope (%)	= 10.26	0.00	0.00	n/a
N-Value	= .013	.013	.013	n/a
Orifice Coeff.	= 0.60	0.60	0.60	0.60
Multi-Stage	= n/a	Yes	Yes	No

Weir Structures

	[A]	[B]	[C]	[D]
Crest Len (ft)	= 25.00	Inactive	0.00	0.00
Crest El. (ft)	= 63.70	0.00	0.00	0.00
Weir Coeff.	= 3.33	3.33	3.33	3.33
Weir Type	= Rect	Rect	---	---
Multi-Stage	= Yes	No	No	No
Exfil.(in/hr)	= 0.000 (by Contour)			
TW Elev. (ft)	= 0.00			

Note: Culvert/Orifice outflows are analyzed under inlet (ic) and outlet (oc) control. Weir risers checked for orifice conditions (ic) and submergence (s).

Stage / Storage / Discharge Table

Stage ft	Storage cuft	Elevation ft	Clv A cfs	Clv B cfs	Clv C cfs	PrfRsr cfs	Wr A cfs	Wr B cfs	Wr C cfs	Wr D cfs	Exfil cfs	User cfs	Total cfs
0.00	0	62.00	0.00	0.00	0.00	---	0.00	---	---	---	---	---	0.00
0.10	226	62.10	10.02 ic	0.00	0.00	---	0.00	---	---	---	---	---	0.00
0.20	452	62.20	10.02 ic	0.00	0.00	---	0.00	---	---	---	---	---	0.00
0.30	678	62.30	10.02 ic	0.00	0.00	---	0.00	---	---	---	---	---	0.00
0.40	904	62.40	10.02 ic	0.00	0.00	---	0.00	---	---	---	---	---	0.00
0.50	1,130	62.50	10.02 ic	0.01 ic	0.00	---	0.00	---	---	---	---	---	0.01
0.60	1,356	62.60	10.02 ic	0.05 ic	0.00	---	0.00	---	---	---	---	---	0.05
0.70	1,582	62.70	10.02 ic	0.10 ic	0.00	---	0.00	---	---	---	---	---	0.10
0.80	1,808	62.80	10.02 ic	0.15 ic	0.00	---	0.00	---	---	---	---	---	0.15
0.90	2,034	62.90	10.02 ic	0.18 ic	0.03 ic	---	0.00	---	---	---	---	---	0.20
1.00	2,260	63.00	10.02 ic	0.20 ic	0.13 ic	---	0.00	---	---	---	---	---	0.34
1.10	2,586	63.10	10.02 ic	0.23 ic	0.22 ic	---	0.00	---	---	---	---	---	0.45
1.20	2,911	63.20	10.02 ic	0.25 ic	0.28 ic	---	0.00	---	---	---	---	---	0.53
1.30	3,236	63.30	10.02 ic	0.27 ic	0.32 ic	---	0.00	---	---	---	---	---	0.59
1.40	3,561	63.40	10.02 ic	0.29 ic	0.37 ic	---	0.00	---	---	---	---	---	0.65
1.50	3,886	63.50	10.02 ic	0.31 ic	0.40 ic	---	0.00	---	---	---	---	---	0.71
1.60	4,211	63.60	10.02 ic	0.32 ic	0.44 ic	---	0.00	---	---	---	---	---	0.76
1.70	4,536	63.70	10.02 ic	0.34 ic	0.47 ic	---	0.00	---	---	---	---	---	0.81
1.80	4,861	63.80	10.02 ic	0.35 ic	0.50 ic	---	2.63	---	---	---	---	---	3.48
1.90	5,187	63.90	10.02 ic	0.37 ic	0.53 ic	---	7.45	---	---	---	---	---	8.34
2.00	5,512	64.00	12.79 ic	0.14 ic	0.23 ic	---	12.41 s	---	---	---	---	---	12.79

Hydraflow Rainfall Report

Return Period (Yrs)	Intensity-Duration-Frequency Equation Coefficients (FHA) B	D	E	(N/A)
1	39.0824	9.5000	0.8528	------
2	45.6943	10.7000	0.8185	------
3	0.0000	0.0000	0.0000	------
5	99.7061	14.8000	0.9304	------
10	249.7597	21.8001	1.0961	------
25	115.7547	14.9000	0.8980	------
50	7.3699	0.1000	0.2544	------
100	403.8513	25.1001	1.1108	------

File name: TRENTON.idf

Intensity = B / (Tc + D)^E

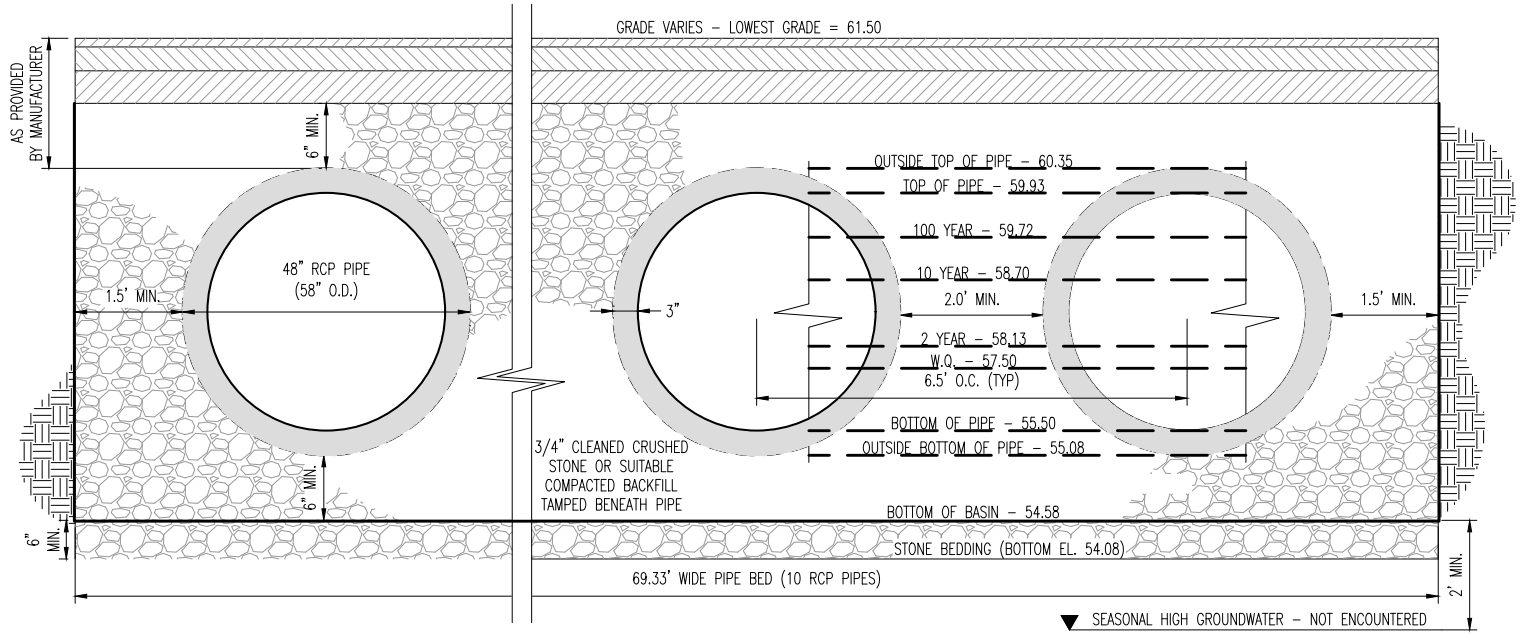
Return Period (Yrs)	Intensity Values (in/hr) 5 min	10	15	20	25	30	35	40	45	50	55	60
1	4.00	3.10	2.55	2.18	1.91	1.70	1.54	1.40	1.29	1.20	1.12	1.05
2	4.80	3.83	3.21	2.77	2.45	2.20	2.00	1.84	1.70	1.59	1.49	1.40
3	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
5	6.20	5.03	4.24	3.67	3.24	2.90	2.63	2.40	2.22	2.06	1.92	1.80
10	6.80	5.63	4.80	4.17	3.69	3.30	2.98	2.72	2.50	2.31	2.14	2.00
25	7.89	6.45	5.47	4.76	4.23	3.80	3.46	3.17	2.93	2.73	2.55	2.40
50	4.87	4.09	3.69	3.44	3.25	3.10	2.98	2.88	2.80	2.72	2.66	2.60
100	9.20	7.76	6.69	5.87	5.22	4.70	4.27	3.91	3.60	3.33	3.10	2.90

Tc = time in minutes. Values may exceed 60.

Precip. file name: Somerset County.pcp

Storm Distribution	Rainfall Precipitation Table (in) 1-yr	2-yr	3-yr	5-yr	10-yr	25-yr	50-yr	100-yr
SCS 24-hour	0.00	3.34	0.00	0.00	5.01	6.15	0.00	8.21
SCS 6-Hr	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Huff-1st	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Huff-2nd	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Huff-3rd	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Huff-4th	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Huff-Indy	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Custom	1.25	3.34	0.00	0.00	5.01	6.15	0.00	8.21

UNDERGROUND DETENTION SCHEMATIC



NOTES:

1. BASIN CONSTRUCTION MUST NOT OVER COMPACT OR SMEAR SOILS BELOW BASIN BOTTOM.
2. OWNER SHALL CONTACT AND ENGAGE DYNAMIC EARTH, LLC. TO TEST SOIL PERMEABILITY AND PROVIDE CONSTRUCTION PHASE INSPECTIONS OF THE BASIN BOTTOM SOILS AND FILL MATERIALS WITHIN ANY PROPOSED INFILTRATION OR RETENTION BASIN TO COMPARE RESULTS TO DESIGN CRITERIA. CONTRACTOR SHALL CONTACT DYNAMIC EARTH AT (908) 879-7095 (WWW.DYNAMIC-EARTH.COM) AT ONSET OF PROJECT TO CONFIRM REQUIREMENTS AND COORDINATE INSPECTIONS.

48" RCP SCHEMATIC UNDERGROUND BASIN DETAIL

NOT TO SCALE

EXTENDED DETENTION BASIN TSS REMOVAL RATE CALCULATIONS

Detention Basin Detention Time and TSS Removal Calculations

Based on the NJDEP Best Management Practices, the TSS removal rate for an extended detention basin is based on the basin's detention time. The detention time begins when the maximum storage volume is achieved and ends when only 10% of the maximum volume remains.

Based on the following numerical hydrograph discharge table, the maximum storage volume in the proposed basin for the Water Quality storm occurs at basin storage elevation 57.50, which corresponds to a maximum volume of 6,336 CF based on the stage-storage of the proposed basin. Accordingly, the 10% peak volume is 634 CF, which occurs at the basin storage elevation of 55.98.

Based on the following numerical hydrograph discharge table, the maximum storage volume occurs at time 125 minutes and the 10% volume occurs at time 845 minutes. Therefore, the total detention time is:

t = 845 minutes – 125 minutes = 720 minutes = 12.00 hours

The total TSS removal is given by the following equation:

$$\% \text{ TSS Removal Rate} = 40 + \{[\frac{t-12}{12}]\text{x}20\}$$

Where t is the time of detention in hours and $12 \leq t \leq 24$

Therefore, the total TSS removal rate is:

%TSS Removal Rate = 40 + {[0]x20} = 40.00 %

TSS REMOVAL RATE FOR BMPS IN SERIES

DYNAMIC ENGINEERING

TSS Removal Rate for BMP's in Series

Project:	Odin Pharmaceuticals	Computed By:	KO
Job #:	2137-99-001	Checked By:	MJB
Location:	Franklin Township, NJ	Date:	12/2/2022

Note: This spreadsheet has been prepared in accordance with Chapter 4 of the New Jersey Best Management Practices Manual

In such cases, the total removal rate of the BMP treatment train is based on the removal rate of the second BMP applied to the fraction of the TSS load remaining after the runoff has passed through the first BMP (Massachusetts DEP, 1997).

A simplified equation for the total TSS removal rate (R) for two BMPs in series is:

R = A + B – [(A X B) / 100] (Equation 4-1)

Where:
R = Total TSS Removal Rate
A = TSS Removal Rate of the First or Upstream BMP
B = TSS Removal Rate of the Second or Downstream BMP

Proposed Stormwater Management System

The proposed stormwater management facility consists of a

A-	Manufactured Treatment Device	
	TSS Removal Rate* =	80 %

* From Total Suspended Solids Removal Rate of Extended Detention Basin Calculation Spreadsheet

B-	Extended Detention Basin w/ a 12.00 hr Detention Time	
	TSS Removal Rate =	40 %

R (Total TSS Removal Rate - Utilizing Equation 4-1) = **88.00 %**

STORMWATER COLLECTION SYSTEM CALCULATIONS (PIPE SIZING)

DYNAMIC ENGINEERING

Stormwater Collection System Calculations

Project: Odin Pharmaceuticals, LLC
Job #: 2137-99-001
Location: Franklin, NJ
Design Storm: 25

Computed By: KO
Checked By: MJB
Date: 2/26/2019
Revised: 12/2/2022

NOTES:
1) Design method used is Rational Method
2) Refer to Weighted Runoff Coefficient table for calculation of incremental areas and C values

PIPE SECTION		SUBCATCHMENT AREA	INCREMENTAL		CUMULATIVE	TIME OF CONCENTRATION			I	PEAK RUNOFF		PIPING INPUT			PIPING DATA			
FROM	TO	Area (Acres)	"C"	A x C Ac	A x C (acres)	Tc to Inlet (min)	Tc in Pipe (min.)	Final Tc (min)	(In/Hr)	Q to Inlet (CFS)	Q cum. for Pipe (CFS)	Dia. (In)	Length (Ft)	Man. "n"	Slope (ft/ft)	Pipe Capacity (cfs)	Full Pipe Velocity (fps)	Actual Pipe Velocity (fps)
IA #113	IA #114	0.13	0.86	0.11	0.11	10.00	0.62	10.00	6.80	0.75	0.75	12	121.0	0.013	0.0052	2.57	3.27	2.50
IA #114	IA #7	0.14	0.85	0.12	0.23	10.00	0.10	10.62	6.68	0.80	1.54	15	19.0	0.013	0.0037	3.93	3.20	2.86
IA #7	IA #8	0.04	0.86	0.03	0.26	10.00	0.93	10.72	6.68	0.20	1.74	15	208.0	0.013	0.0050	4.57	3.73	3.28
IA #8	IA #12	0.18	0.91	0.16	0.42	10.00	0.34	11.65	6.44	1.03	2.70	15	77.0	0.013	0.0050	4.57	3.73	3.98
IA #12	MH #65	0.62	0.85	0.53	0.95	10.00	0.23	11.99	6.44	3.41	6.12	18	58.0	0.013	0.0050	7.43	4.21	4.80
IA #27	MH #63	0.26	0.85	0.22	0.22	10.00	0.01	10.00	6.80	1.50	1.50	15	14.0	0.013	0.0944	19.84	16.18	5.64
MH #63	MH #64	0.00	0.95	0.00	0.22	10.00	0.78	10.01	6.80	0.00	1.50	15	186.0	0.013	0.0057	4.88	3.98	3.15
MH #64	MH #65	0.00	0.95	0.00	0.22	10.00	0.22	10.79	6.68	0.00	1.47	15	50.0	0.013	0.0050	4.57	3.73	3.00
MH #65	MTD	0.00	0.95	0.00	0.95	10.00	0.06	12.22	6.32	0.00	6.00	18	14.0	0.013	0.0050	7.43	4.21	4.81
MTD	Basin	0.00	0.95	0.00	0.95	10.00	0.03	12.28	6.32	0.00	6.00	18	7.0	0.013	0.0050	7.43	4.21	4.81
IA #54	IA #55	0.02	0.53	0.01	0.01	10.00	0.33	10.00	6.80	0.07	0.07	15	65.0	0.013	0.0040	4.08	3.33	0.47
IA #55	IA #56	0.01	0.59	0.01	0.02	10.00	0.29	10.33	6.80	0.07	0.14	15	65.0	0.013	0.0050	4.57	3.73	0.69
IA #56	IA #25	0.03	0.48	0.01	0.03	10.00	0.16	10.62	6.68	0.07	0.20	15	35.0	0.013	0.0050	4.57	3.73	0.83
Roof	IA #25	1.76	0.95	1.67	1.67	10.00	0.02	10.00	6.80	11.36	11.36	18	11.0	0.013	0.0250	16.60	9.40	10.49
IA #25	IA #46	0.01	0.49	0.00	1.70	10.00	0.10	10.78	6.68	0.00	11.36	18	41.0	0.013	0.0145	12.64	7.16	8.07
IA #46	EX MH	0.03	0.95	0.03	1.73	10.00	0.57	10.88	6.68	0.20	11.56	18	258.0	0.013	0.0160	13.28	7.52	8.55
IA #74	IA #50	0.05	0.35	0.02	0.02	10.00	0.21	10.00	6.80	0.14	0.14	15	62.0	0.010	0.0050	5.94	4.84	0.68
IA #50	IA #51	0.05	0.35	0.02	0.04	10.00	0.31	10.21	6.80	0.14	0.27	15	90.0	0.010	0.0050	5.94	4.84	1.25
IA #51	IA #52	0.11	0.35	0.04	0.08	10.00	0.31	10.52	6.68	0.27	0.53	15	90.0	0.010	0.0050	5.94	4.84	1.82
IA #52	MH #57	0.13	0.35	0.05	0.13	10.00	0.24	10.83	6.68	0.33	0.87	15	71.0	0.010	0.0050	5.94	4.84	2.51
MH #57	IA #53	0.00	0.35	0.00	0.13	10.00	0.07	11.07	6.56	0.00	0.85	15	20.0	0.010	0.0050	5.94	4.84	2.40
IA #53	MH #101(7)	0.24	0.35	0.08	0.21	10.00	0.68	11.14	6.56	0.52	1.38	15	280.0	0.010	0.0101	8.44	6.88	3.71
MH #101(7)	MH #101(8)	0.03	0.95	0.03	0.24	10.00	0.19	11.82	6.44	0.19	1.55	15	60.0	0.013	0.0100	6.46	5.27	3.61
Roof #2	Basin	0.28	0.95	0.27	0.27	10.00	0.16	10.00	6.80	1.84	1.84	12	57.0	0.010	0.0100	4.63	5.90	5.33
Basin	EX. MH	0.43	0.95	0.41	1.63	10.00	0.06	12.31	6.32	2.59	10.30	18	46.0	0.013	0.0543	24.47	13.85	12.83
IA #111	Bio Basin	0.18	0.70	0.13	0.13	10.00	0.01	10.00	6.80	0.88	0.88	15	12.0	0.010	0.0401	16.81	13.70	3.53
IA #110	Bio Basin	0.10	0.95	0.10	0.10	10.00	0.01	10.00	6.80	0.68	0.68	15	12.0	0.010	0.0400	16.79	13.69	3.05
IA #112	Bio Basin	0.09	0.95	0.09	0.09	10.00	0.02	10.00	6.80	0.61	0.61	15	14.0	0.010	0.0350	15.70	12.80	2.85
Bio Basin	IA #115	0.10	0.95	0.10	0.10	10.00	0.02	10.00	6.80	0.68	0.68	15	17.0	0.013	0.1026	20.68	16.86	3.11

NJDEP 80% TSS REMOVAL CERTIFICATION FOR THE CONTECH PEAK DIVERSION STORMFILTER
8’x22’ Stormfilter & 8’x16’ Stormfilter

StormFilter Design Summary

Odin Pharmaceuticals (North StormFilter)

Franklin, NJ
4/11/22

Information Provided by Engineer (Dynamic Engineering):

- Required TSS removal rate = 80%
- Pervious drainage area = 4,100 SF
- Impervious Area = 27,072 SF
- Presiding agency = DRCC

Information Determined by Contech:

- Attenuated WQ flow rate = 1.103 cfs

StormFilter Information and Cartridge Data:

The Stormwater Management StormFilter® is a passive, siphon-actuated, flow-through stormwater filtration system consisting of a precast concrete structure that houses rechargeable, media-filled filter cartridges. The StormFilter works by passing stormwater through the media-filled cartridges, which trap particulates and adsorb pollutants such as dissolved metals, nutrients, and hydrocarbons. **The StormFilter has received final certification from the NJDEP for 80% TSS removal as a stand-alone treatment system.**

- StormFilter cartridge filter media = Perlite
- StormFilter cartridge media height = 18 inches (nominal)
- StormFilter cartridge surface area = 7.07 square feet (nominal)
- StormFilter cartridge specific treatment flow rate = 2.12 gallons/minute per square foot (nominal)
- StormFilter cartridge treatment flow = 15 gpm
- **Hydraulic head required = 2.00 feet** (with 18 inch cartridge)
- Minimum physical drop between inlet and outlet pipe = 6 inches

Design Summary:

The StormFilter is sized based on the NJDEP certification, which lists an approved treatment flow rate and maximum impervious acreage limit per cartridge in Table 1. The number of cartridges required based on the impervious drainage area is compared with the number of cartridges required based on the treatment flowrate; the larger number of cartridges governs the sizing.

The StormFilter for this site was sized to provide **33 cartridges** in order to meet the hydraulic load requirement (calculations shown below). To house this number of cartridges, Contech Engineered Solutions recommends an 8'x16' precast Peak Diversion StormFilter vaults.

$$N_{\substack{cartridges \\ Hyd.load}} = \frac{Q_{treat} \times 449\ {}^{gpm}/_{cfs}}{Q_{cartridge}} = \frac{1.103\ cfs \times 448.83\ {}^{gpm}/_{cfs}}{15\ {}^{gpm}/_{cartridge}} = 33.00 \Rightarrow (33)\ 18"\ Cartridges$$

$$N_{\substack{cartridges \\ Mass\ load}} = \frac{Area_{site}}{Max\ Area_{cartridge}} = \frac{0.621\ acre}{0.09\ {}^{acres}/_{cartridge}} = 6.90 \Rightarrow (7)\ 18"\ Cartridges$$

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conteches.com

7037 Ridge Road, Suite 350 | Hanover, MD 21076
Office: 443-457-1500 Fax: 410-740-8492

StormFilter Design Summary

Maintenance:

Maintenance of Stormwater best management practices is required per the New Jersey Administrative Code 7:8-5.8. Recommendations for maintenance are included in chapters 8 & 9 of the New Jersey Stormwater Best Management Practices Manual. To comply with requirements, CONTECH offers a network of Preferred Service Providers that have the capability to perform all necessary inspections, compliance reporting and cleaning services. CONTECH recommends inspecting the system annually and maintaining the system at the recommendation of the annual inspection. Full maintenance is typically required every 24-36 months. Disposal of material should be handled in accordance with local regulations. Please contact CONTECH's Maintenance Department for all questions regarding maintenance at (503) 258-3157 or visit our website at www.contech-cpi.com/maintenance.

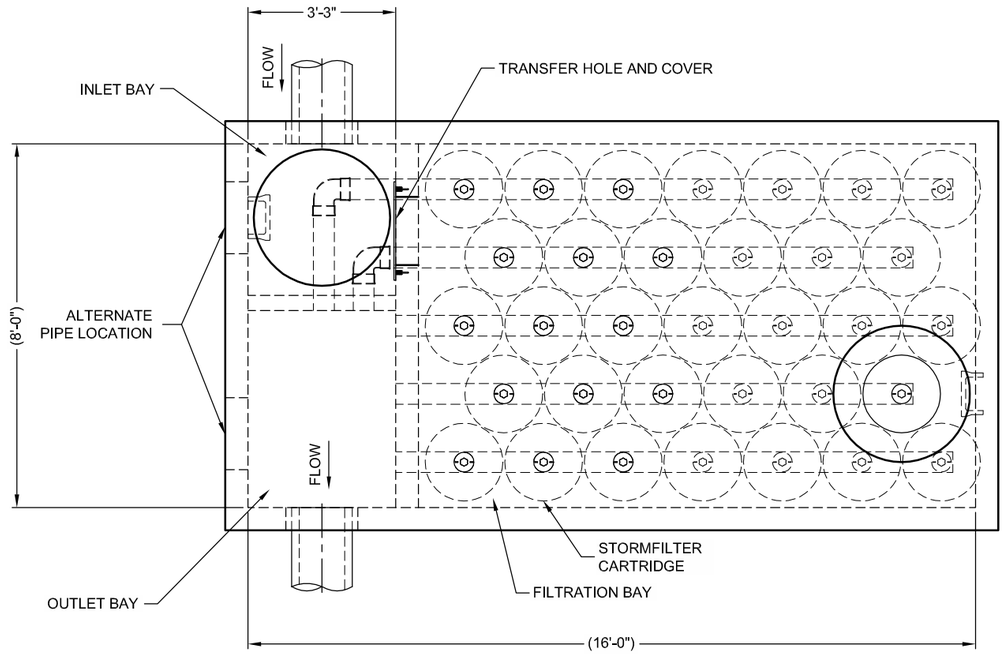
Thank you for the opportunity to present this information to you and your client.

Sincerely,

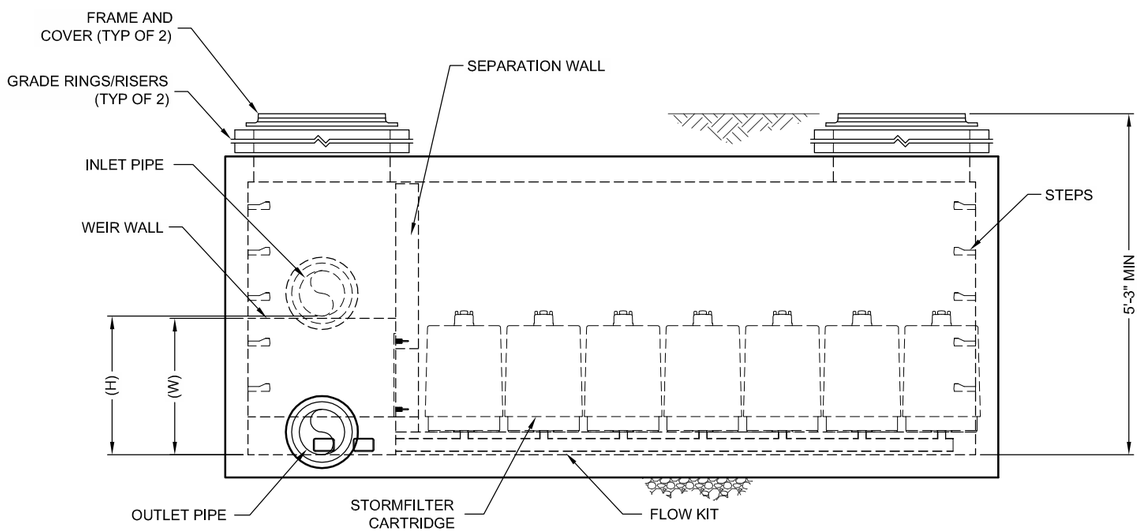
Taylor Murdock
Contech Engineered Solutions LLC

©2017 Contech Engineered Solutions

7037 Ridge Road, Suite 350 | Hanover, MD 21076
Office: 443-457-1500 Fax: 410-740-8492



PLAN



ELEVATION

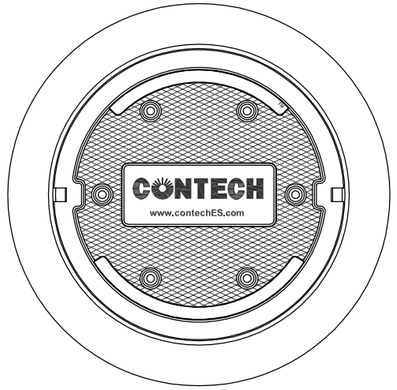
The Stormwater Management StormFilter®

THIS PRODUCT MAY BE PROTECTED BY ONE OR MORE OF THE FOLLOWING U.S. PATENTS: 5,322,629; 5,536,519; 5,707,527; 5,788,797; 5,827,429; 6,045,046; RELATED FOREIGN PATENTS, OR OTHER PATENTS PENDING.

STORMFILTER DESIGN TABLE

- THE 8' x 16' PEAK DIVERSION STORMFILTER TREATMENT CAPACITY VARIES BY CARTRIDGE COUNT AND LOCALLY APPROVED SURFACE AREA SPECIFIC FLOW RATE. PEAK CONVEYANCE CAPACITY TO BE DETERMINED BY ENGINEER OF RECORD.
- THE PEAK DIVERSION STORMFILTER IS AVAILABLE IN A LEFT INLET (AS SHOWN) OR RIGHT INLET CONFIGURATION.
- ALL PARTS AND INTERNAL ASSEMBLY PROVIDED BY CONTECH UNLESS OTHERWISE NOTED.

CARTRIDGE HEIGHT	27"		18"		LOW DROP	
SYSTEM HYDRAULIC DROP (H - REQ'D. MIN.)	3.05'		2.3'		1.8'	
HEIGHT OF WEIR (W)	3.00'		2.25'		1.75'	
TREATMENT BY MEDIA SURFACE AREA	2 gpm/ft²	1 gpm/ft²	2 gpm/ft²	1 gpm/ft²	2 gpm/ft²	1 gpm/ft²
CARTRIDGE FLOW RATE (gpm)	22.5	11.25	15	7.5	10	5



FRAME AND COVER
(DIAMETER VARIES)
N.T.S.

SITE SPECIFIC DATA REQUIREMENTS

STRUCTURE ID	*
WATER QUALITY FLOW RATE (cfs)	*
PEAK FLOW RATE (cfs)	*
RETURN PERIOD OF PEAK FLOW (yrs)	*
# OF CARTRIDGES REQUIRED	*
CARTRIDGE FLOW RATE	*
MEDIA TYPE (CSF, PERLITE, ZPG)	*

PIPE DATA:	I.E.	MATERIAL	DIAMETER
INLET PIPE	*	*	*
OUTLET PIPE	*	*	*

INLET BAY RIM ELEVATION	*
FILTER BAY RIM ELEVATION	*

ANTI-FLOTATION BALLAST	WIDTH	HEIGHT
	*	*

NOTES/SPECIAL REQUIREMENTS:

PERFORMANCE SPECIFICATION

FILTER CARTRIDGES SHALL BE MEDIA-FILLED, PASSIVE, SIPHON ACTUATED, RADIAL FLOW, AND SELF CLEANING. **RADIAL MEDIA DEPTH SHALL BE 7-INCHES**. FILTER MEDIA CONTACT TIME SHALL BE AT LEAST **37 SECONDS**. SPECIFIC FLOW RATE SHALL BE **2 GPM/SF (MAXIMUM)**. SPECIFIC FLOW RATE IS THE MEASURE OF THE FLOW (GPM) DIVIDED BY THE MEDIA SURFACE CONTACT AREA (SF). MEDIA VOLUMETRIC FLOW RATE SHALL BE **6 GPM/CF OF MEDIA (MAXIMUM).**

GENERAL NOTES

1. CONTECH TO PROVIDE ALL MATERIALS UNLESS NOTED OTHERWISE.
2. DIMENSIONS MARKED WITH ( ) ARE REFERENCE DIMENSIONS. ACTUAL DIMENSIONS MAY VARY.
3. FOR FABRICATION DRAWINGS WITH DETAILED STRUCTURE DIMENSIONS AND WEIGHTS, PLEASE CONTACT YOUR CONTECH REPRESENTATIVE. www.contechES.com
4. STORMFILTER WATER QUALITY STRUCTURE SHALL BE IN ACCORDANCE WITH ALL DESIGN DATA AND INFORMATION CONTAINED IN THIS DRAWING. CONTRACTOR TO CONFIRM STRUCTURE MEETS REQUIREMENTS OF PROJECT.
5. STRUCTURE SHALL MEET AASHTO HS20 LOAD RATING, ASSUMING EARTH COVER OF 0' - 5' AND GROUNDWATER ELEVATION AT, OR BELOW, THE OUTLET PIPE INVERT ELEVATION. ENGINEER OF RECORD TO CONFIRM ACTUAL GROUNDWATER ELEVATION. CASTINGS SHALL MEET AASHTO M306 AND BE CAST WITH THE CONTECH LOGO.

INSTALLATION NOTES

A. ANY SUB-BASE, BACKFILL DEPTH, AND/OR ANTI-FLOTATION PROVISIONS ARE SITE-SPECIFIC DESIGN CONSIDERATIONS AND SHALL BE SPECIFIED BY ENGINEER OF RECORD.
B. CONTRACTOR TO PROVIDE EQUIPMENT WITH SUFFICIENT LIFTING AND REACH CAPACITY TO LIFT AND SET THE STORMFILTER STRUCTURE (LIFTING CLUTCHES PROVIDED).
C. CONTRACTOR TO INSTALL JOINT SEALANT BETWEEN ALL SECTIONS AND ASSEMBLE STRUCTURE.
D. CONTRACTOR TO PROVIDE, INSTALL, AND GROUT PIPES. MATCH OUTLET PIPE INVERT WITH OUTLET BAY FLOOR.
E. CONTRACTOR TO TAKE APPROPRIATE MEASURES TO PROTECT CARTRIDGES FROM CONSTRUCTION-RELATED EROSION RUNOFF.
F. CONTRACTOR TO REMOVE THE TRANSFER HOLE COVER WHEN THE SYSTEM IS BROUGHT ONLINE.

CONTECH® ENGINEERED SOLUTIONS LLC
www.contechES.com
9025 Centre Pointe Dr., Suite 400, West Chester, OH 45069
800-338-1122 513-645-7000 513-645-7993 FAX

THE STORMWATER MANAGEMENT STORMFILTER 8' x 16' PEAK DIVERSION STORMFILTER STANDARD DETAIL

Summary for Subcatchment 9S: North Drainage Area

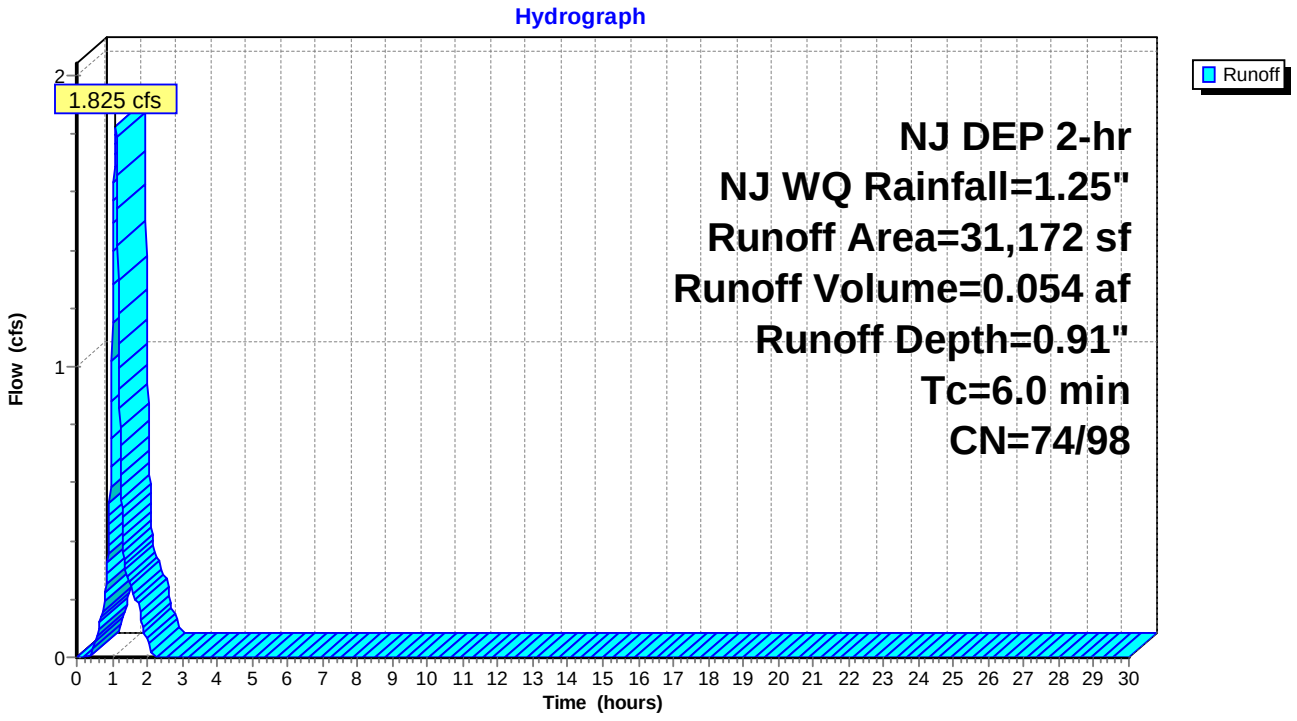
Runoff = 1.825 cfs @ 1.11 hrs, Volume= 0.054 af, Depth= 0.91"

Runoff by SCS TR-20 method, UH=SCS, Split Pervious/Imperv., Time Span= 0.00-30.00 hrs, dt= 0.01 hrs
NJ DEP 2-hr NJ WQ Rainfall=1.25"

	Area (sf)	CN	Description
*	27,072	98	
*	4,100	74	
	31,172	95	Weighted Average
	4,100	74	13.15% Pervious Area
	27,072	98	86.85% Impervious Area

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

Subcatchment 9S: North Drainage Area



Summary for Pond 10P: North SF & Network

Inflow Area = 0.716 ac, 86.85% Impervious, Inflow Depth = 0.91" for NJ WQ event
Inflow = 1.825 cfs @ 1.11 hrs, Volume= 0.054 af
Outflow = 1.103 cfs @ 1.08 hrs, Volume= 0.053 af, Atten= 40%, Lag= 0.0 min
Primary = 1.103 cfs @ 1.08 hrs, Volume= 0.053 af
Secondary = 0.000 cfs @ 0.00 hrs, Volume= 0.000 af

Routing by Dyn-Stor-Ind method, Time Span= 0.00-30.00 hrs, dt= 0.01 hrs
Peak Elev= 59.45' @ 1.19 hrs Surf.Area= 0.004 ac Storage= 0.011 af

Plug-Flow detention time= 5.8 min calculated for 0.053 af (97% of inflow)
Center-of-Mass det. time= 4.4 min (74.9 - 70.5)

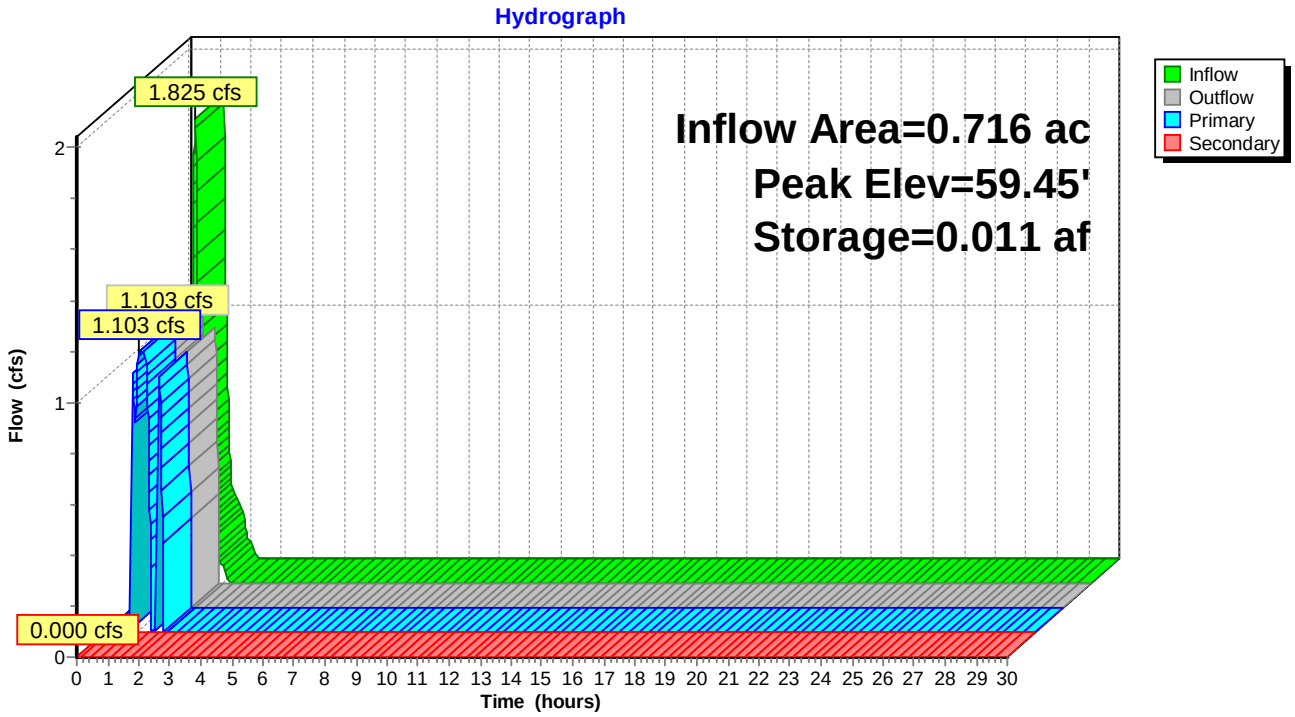
Volume	Invert	Avail.Storage	Storage Description
#1	56.70'	0.006 af	**8.46'W x 8.46'L x 3.80'H SFPD0816 Equiv. Vol**
#2	56.70'	0.002 af	**18.0" Round RCP_Round 18"** L= 39.0' S= 0.0150 '/'
#3	57.28'	0.001 af	**3.50'W x 4.00'L x 3.95'H Type B Inlet**
#4	57.28'	0.002 af	**15.0" Round RCP_Round 15"** L= 71.0' S= 0.0120 '/'
#5	58.13'	0.001 af	**3.50'W x 4.00'L x 3.78'H Type B Inlet**
#6	58.21'	0.002 af	**15.0" Round RCP_Round 15"** L= 72.0' S= 0.0100 '/'
#7	58.93'	0.001 af	**3.50'W x 4.00'L x 3.61'H Type B Inlet**
		0.015 af	Total Available Storage

Device	Routing	Invert	Outlet Devices (Turned on 2 times)
#1	Primary	56.20'	**18.0" Round RCP_Round 18"** L= 39.0' RCP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 56.20' / 55.62' S= 0.0149 '/' Cc= 0.900 n= 0.011 Concrete pipe, straight & clean, Flow Area= 1.77 sf
#2	Device 1	58.20'	**StormFilter 18 - 15gpm @ 18in X 33.00** Discharges@56.70' Turns Off<56.87'
#3	Secondary	59.46'	**3.1' 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

Primary OutFlow Max=1.103 cfs @ 1.08 hrs HW=58.51' (Free Discharge)
1=RCP_Round 18" (Passes 1.103 cfs of 10.617 cfs potential flow)
2=StormFilter 18 - 15gpm @ 18in (Pump Controls 1.103 cfs)

Secondary OutFlow Max=0.000 cfs @ 0.00 hrs HW=56.70' (Free Discharge)
3=Broad-Crested Rectangular Weir (Controls 0.000 cfs)

Pond 10P: North SF & Network



Summary for Subcatchment 9S: North Drainage Area

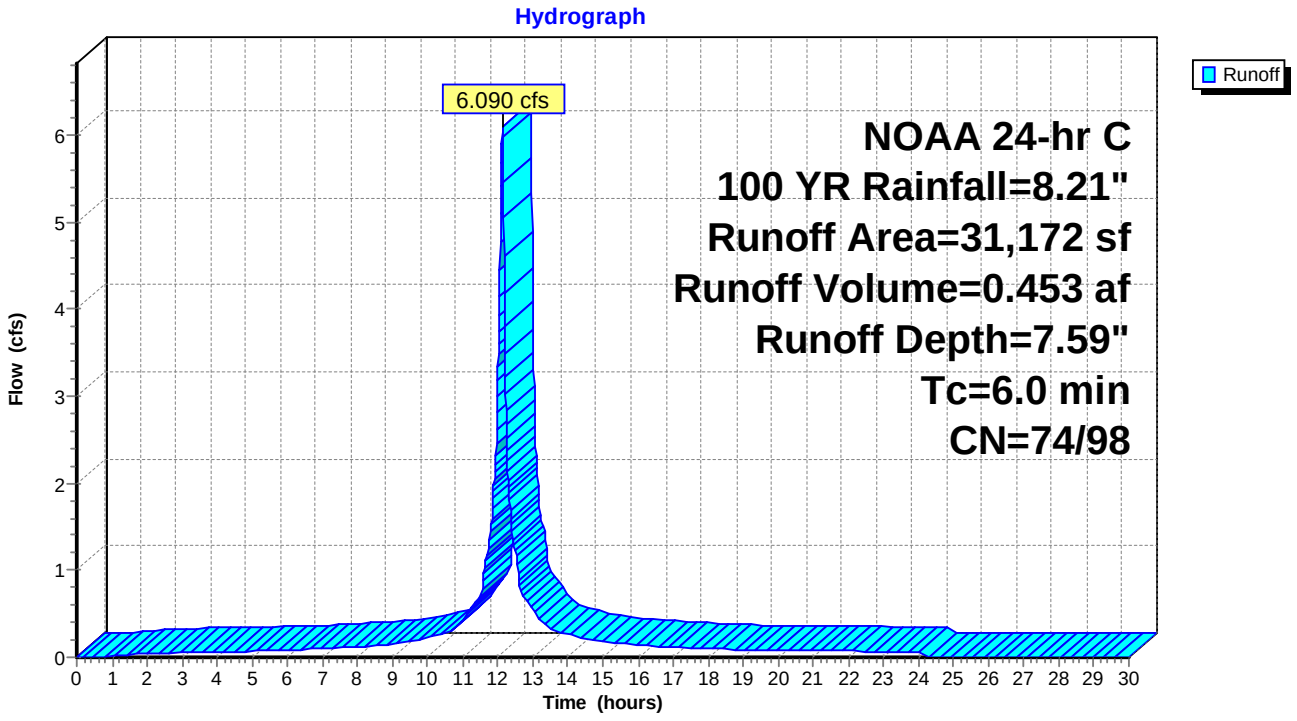
Runoff = 6.090 cfs @ 12.13 hrs, Volume= 0.453 af, Depth= 7.59"

Runoff by SCS TR-20 method, UH=SCS, Split Pervious/Imperv., Time Span= 0.00-30.00 hrs, dt= 0.01 hrs
NOAA 24-hr C 100 YR Rainfall=8.21"

	Area (sf)	CN	Description
*	27,072	98	
*	4,100	74	
	31,172	95	Weighted Average
	4,100	74	13.15% Pervious Area
	27,072	98	86.85% Impervious Area

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

Subcatchment 9S: North Drainage Area



Summary for Pond 10P: North SF & Network

Inflow Area = 0.716 ac, 86.85% Impervious, Inflow Depth = 7.59" for 100 YR event
Inflow = 6.090 cfs @ 12.13 hrs, Volume= 0.453 af
Outflow = 6.085 cfs @ 12.13 hrs, Volume= 0.452 af, Atten= 0%, Lag= 0.1 min
Primary = 1.103 cfs @ 11.81 hrs, Volume= 0.358 af
Secondary = 4.982 cfs @ 12.13 hrs, Volume= 0.094 af

Routing by Dyn-Stor-Ind method, Time Span= 0.00-30.00 hrs, dt= 0.01 hrs
Peak Elev= 60.10' @ 12.13 hrs Surf.Area= 0.003 ac Storage= 0.013 af

Plug-Flow detention time= 8.5 min calculated for 0.452 af (100% of inflow)
Center-of-Mass det. time= 7.9 min (756.2 - 748.3)

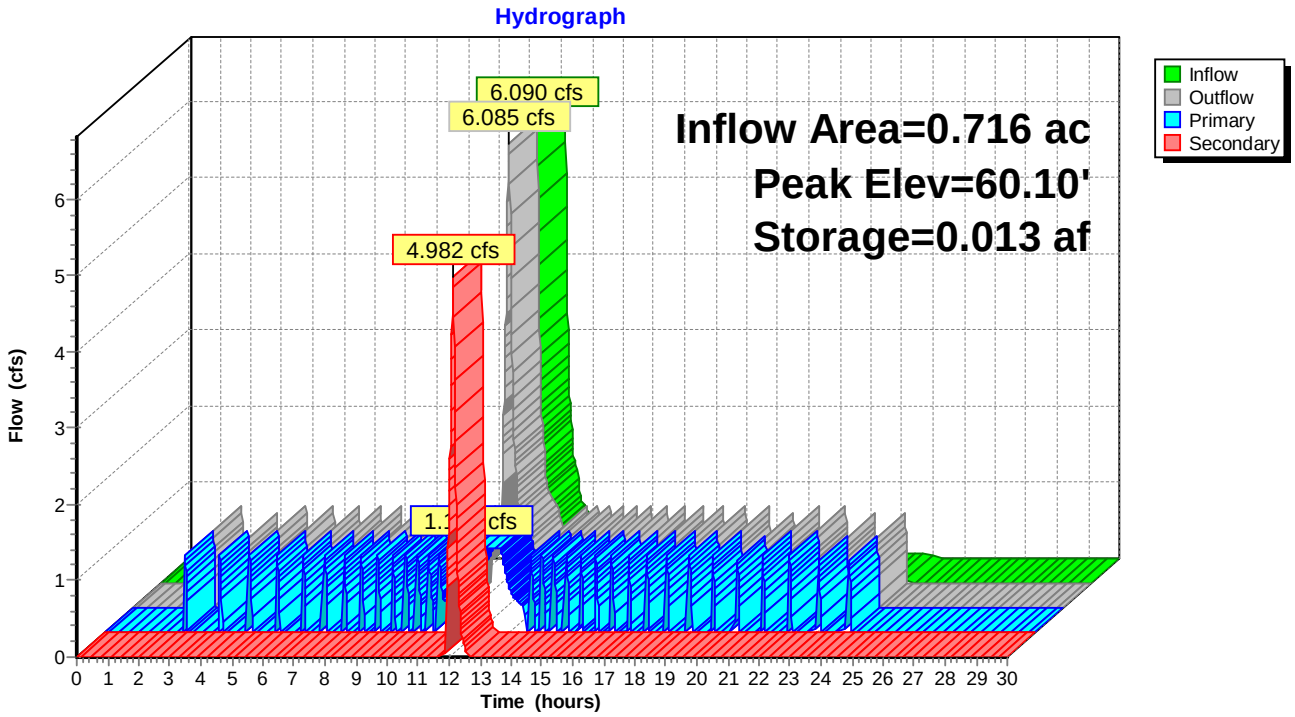
Volume	Invert	Avail.Storage	Storage Description
#1	56.70'	0.006 af	**8.46'W x 8.46'L x 3.80'H SFPD0816 Equiv. Vol**
#2	56.70'	0.002 af	**18.0" Round RCP_Round 18"** L= 39.0' S= 0.0150 '/'
#3	57.28'	0.001 af	**3.50'W x 4.00'L x 3.95'H Type B Inlet**
#4	57.28'	0.002 af	**15.0" Round RCP_Round 15"** L= 71.0' S= 0.0120 '/'
#5	58.13'	0.001 af	**3.50'W x 4.00'L x 3.78'H Type B Inlet**
#6	58.21'	0.002 af	**15.0" Round RCP_Round 15"** L= 72.0' S= 0.0100 '/'
#7	58.93'	0.001 af	**3.50'W x 4.00'L x 3.61'H Type B Inlet**
		0.015 af	Total Available Storage

Device	Routing	Invert	Outlet Devices (Turned on 31 times)
#1	Primary	56.20'	**18.0" Round RCP_Round 18"** L= 39.0' RCP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 56.20' / 55.62' S= 0.0149 '/' Cc= 0.900 n= 0.011 Concrete pipe, straight & clean, Flow Area= 1.77 sf
#2	Device 1	58.20'	**StormFilter 18 - 15gpm @ 18in X 33.00** Discharges@56.70' Turns Off<56.87'
#3	Secondary	59.46'	**3.1' 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

Primary OutFlow Max=1.103 cfs @ 11.81 hrs HW=58.48' (Free Discharge)
↑—**1=RCP_Round 18"** (Passes 1.103 cfs of 10.522 cfs potential flow)
↑—**2=StormFilter 18 - 15gpm @ 18in** (Pump Controls 1.103 cfs)

Secondary OutFlow Max=4.976 cfs @ 12.13 hrs HW=60.10' (Free Discharge)
↑—**3=Broad-Crested Rectangular Weir** (Weir Controls 4.976 cfs @ 2.50 fps)

Pond 10P: North SF & Network



State of New Jersey
DEPARTMENT OF ENVIRONMENTAL PROTECTION
Bureau of Nonpoint Pollution Control
Division of Water Quality
Mail Code 401-02B
Post Office Box 420
Trenton, New Jersey 08625-0420
609-633-7021 Fax: 609-777-0432
http://www.state.nj.us/dep/dwq/bnpc_home.htm

CHRIS CHRISTIE
Governor

KIM GUADAGNO
Lt. Governor

BOB MARTIN
Commissioner

December 14, 2016

Derek M. Berg
Director - Stormwater Regulatory Management - East
Contech Engineered Solutions LLC
71 US Route 1, Suite F
Scarborough, ME 04074

Re: MTD Laboratory Certification
Stormwater Management StormFilter® (StormFilter) by Contech Engineered Solutions LLC
Off-line Installation

TSS Removal Rate 80%

Dear Mr. Berg:

The Stormwater Management rules under N.J.A.C. 7:8-5.5(b) and 5.7(c) allow the use of manufactured treatment devices (MTDs) for compliance with the design and performance standards at N.J.A.C. 7:8-5 if the pollutant removal rates have been verified by the New Jersey Corporation for Advanced Technology (NJCAT) and have been certified by the New Jersey Department of Environmental Protection (NJDEP). Contech Engineered Solutions LLC has requested a Laboratory Certification for the StormFilter System.

This project falls under the "Procedure for Obtaining Verification of a Stormwater Manufactured Treatment Device from New Jersey Corporation for Advanced Technology" dated January 25, 2013. The applicable protocol is the "New Jersey Department of Environmental Protection Laboratory Protocol to Assess Total Suspended Solids Removal by a Filtration Manufactured Treatment Device" dated January 25, 2013.

NJCAT verification documents submitted to the NJDEP indicate that the requirements of the afore-mentioned protocol have been met or exceeded. The NJCAT letter also included a recommended certification TSS removal rate and the required maintenance plan. The NJCAT Verification Report with the Verification Appendix for this device is published online at http://www.njcat.org/verification-process/technology-verification-database.html.

The NJDEP certifies the use of the StormFilter System by Contech Engineered Solutions LLC at a TSS removal rate of 80%, when designed, operated and maintained in accordance with the information provided in the Verification Appendix and subject to the following conditions:

1. The maximum treatment flow rate (MTFR) for the manufactured treatment device (MTD) is calculated using the New Jersey Water Quality Design Storm (1.25 inches in 2 hrs) in N.J.A.C. 7:8-5.5. The MTFR is calculated based on a verified loading rate of 2.12 gpm/sf of effective filtration treatment area.

2. The StormFilter System shall be installed using the same configuration as the unit tested by NJCAT, and sized in accordance with the criteria specified in item 6 below.

3. This device cannot be used in series with another MTD or a media filter (such as a sand filter), to achieve an enhanced removal rate for total suspended solids (TSS) removal under N.J.A.C. 7:8-5.5.

4. Additional design criteria for MTDs can be found in Chapter 9.6 of the New Jersey Stormwater Best Management Practices (NJ Stormwater BMP) Manual which can be found on-line at www.njstormwater.org.

5. The maintenance plan for a site using this device shall incorporate, at a minimum, the maintenance requirements for the StormFilter, which is attached to this document. However, it is recommended to review the maintenance website at http://www.conteches.com/DesktopModules/Bring2mind/DMX/Download.aspx?EntryId=2813&PortalId=0&DownloadMethod=attachment for any changes to the maintenance requirements.

6. Sizing Requirements:

   The example below demonstrates the sizing procedure for a StormFilter System.

   Example: A 0.25 acre impervious site is to be treated to 80% TSS removal using a StormFilter System. The impervious site runoff (Q) based on the New Jersey Water Quality Design Storm was determined to be 0.79 cfs or 354.58 gpm.

   The calculation of the minimum number of cartridges for use in the StormFilter System is based upon both the MTFR and the maximum inflow drainage area. It is necessary to calculate the required cartridges using both methods and to rely on the method that results in the highest minimum number of cartridges determined by the two methods.

   Inflow Drainage Area Evaluation:

   The drainage area to the StormFilter System in this example is 0.25 acres. Based upon the information in Table 1 below, the following minimum number of cartridges are required in a StormFilter System to treat the impervious area without exceeding the maximum drainage area:

1. Five (5) 12” cartridges,
2. Three (3) 18” cartridges, or
3. Two (2) 27” cartridges

Maximum Treatment Flow Rate (MTFR) Evaluation:

The site runoff (Q) was determined based on the following:

time of concentration = 10 minutes
i=3.2 in/hr (page 5-8, Fig. 5-3 of the NJ Stormwater BMP Manual)
c=0.99 (runoff coefficient for impervious)
Q=ciA=0.99x3.2x0.25=0.79 cfs=0.79x448.83 gpm=354.58 gpm

Based on a flow rate of 354.58 gpm, the following minimum number of cartridges are required in a StormFilter System to treat the impervious area without exceeding the MTFR:

1. Thirty-six (36) 12” cartridges,
2. Twenty-four (24) 18” cartridges, or
3. Sixteen (16) 27” cartridges

The MTFR Evaluation results will be used since that method results in the higher minimum number of cartridges determined by the two methods.

The sizing table corresponding to the available system models are noted below:

TABLE 1 STORMFILTER CARTRIDGE HEIGHTS AND NEW JERSEY TREATMENT CAPACITIES

StormFilter Cartridge Heights and New Jersey Treatment Capacities				
StormFilter Cartridge Height	**Filtration Surface Area (sq.ft)**	**MTFR[1] (GPM)**	**Mass Capture Capacity (lbs)**	**Maximum Allowable Inflow Area[2] (acres)**
Low Drop (12")	4.71	10	36.3	0.061
18"	7.07	15	54.5	0.09
27"	10.61	22.5	81.8	0.136

Notes:

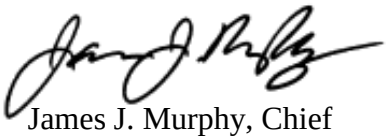
1. *MTFR calculated based on 4.72x10-3 cfs/sf (2.12 gpm/sf) of effective filtration treatment area.*
2. *Based upon the equation found in the NJDEP Filter Protocol Maximum Inflow Drainage Area (acres) = weight of TSS before 10% loss in MTFR (lbs)/600 lbs/acre of drainage area annually.*

Be advised a detailed maintenance plan is mandatory for any project with a Stormwater BMP subject to the Stormwater Management Rules, N.J.A.C. 7:8. The plan must include all of the items identified in Stormwater Management Rules, N.J.A.C. 7:8-5.8. Such items include, but are not limited to, the list of

indication of problems in the system, and training of maintenance personnel. Additional information can be found in Chapter 8: Maintenance and Retrofit of Stormwater Management Measures.

If you have any questions regarding the above information, please contact Shashi Nayak of my office at (609) 633-7021.

Sincerely,



James J. Murphy, Chief
Bureau of Nonpoint Pollution Control

Attachment: Maintenance Plan

cc: Chron File
Richard Magee, NJCAT
Vince Mazzei, NJDEP - DLUR
Ravi Patraju, NJDEP - BES
Gabriel Mahon, NJDEP - BNPC
Shashi Nayak, NJDEP - BNPC

StormFilter Design Summary

Odin Pharmaceuticals (South StormFilter)

Franklin, NJ
4/11/22

Information Provided by Engineer (Dynamic Engineering):

- Required TSS removal rate = 80%
- Pervious drainage area = 9,770 SF
- Impervious Area = 47,653 SF
- Presiding agency = DRCC

Information Determined by Contech:

- Attenuated WQ flow rate = 1.604 cfs

StormFilter Information and Cartridge Data:

The Stormwater Management StormFilter® is a passive, siphon-actuated, flow-through stormwater filtration system consisting of a precast concrete structure that houses rechargeable, media-filled filter cartridges. The StormFilter works by passing stormwater through the media-filled cartridges, which trap particulates and adsorb pollutants such as dissolved metals, nutrients, and hydrocarbons. **The StormFilter has received final certification from the NJDEP for 80% TSS removal as a stand-alone treatment system.**

- StormFilter cartridge filter media = Perlite
- StormFilter cartridge media height = 18 inches (nominal)
- StormFilter cartridge surface area = 7.07 square feet (nominal)
- StormFilter cartridge specific treatment flow rate = 2.12 gallons/minute per square foot (nominal)
- StormFilter cartridge treatment flow = 15 gpm
- **Hydraulic head required = 2.00 feet** (with 18 inch cartridge)
- Minimum physical drop between inlet and outlet pipe = 6 inches

Design Summary:

The StormFilter is sized based on the NJDEP certification, which lists an approved treatment flow rate and maximum impervious acreage limit per cartridge in Table 1. The number of cartridges required based on the impervious drainage area is compared with the number of cartridges required based on the treatment flowrate; the larger number of cartridges governs the sizing.

The StormFilter for this site was sized to provide **48 cartridges** in order to meet the hydraulic load requirement (calculations shown below). To house this number of cartridges, Contech Engineered Solutions recommends an 8'x22' precast Peak Diversion StormFilter.

$$N_{\substack{cartridges \\ Hyd.load}} = \frac{Q_{treat} \times 449\ {}^{gpm}/_{cfs}}{Q_{cartridge}} = \frac{1.604\ cfs \times 448.83\ {}^{gpm}/_{cfs}}{15\ {}^{gpm}/_{cartridge}} = 47.99 \Rightarrow (48)\ 18"\ Cartridges$$

$$N_{\substack{cartridges \\ Mass\ load}} = \frac{Area_{site}}{Max\ Area_{cartridge}} = \frac{1.09\ acre}{0.09\ {}^{acres}/_{cartridge}} = 12.16 \Rightarrow (13)\ 18"\ Cartridges$$

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conteches.com
7037 Ridge Road, Suite 350 | Hanover, MD 21076
Office: 443-457-1500 Fax: 410-740-8492

StormFilter Design Summary

Maintenance:

Maintenance of Stormwater best management practices is required per the New Jersey Administrative Code 7:8-5.8. Recommendations for maintenance are included in chapters 8 & 9 of the New Jersey Stormwater Best Management Practices Manual. To comply with requirements, CONTECH offers a network of Preferred Service Providers that have the capability to perform all necessary inspections, compliance reporting and cleaning services. CONTECH recommends inspecting the system annually and maintaining the system at the recommendation of the annual inspection. Full maintenance is typically required every 24-36 months. Disposal of material should be handled in accordance with local regulations. Please contact CONTECH's Maintenance Department for all questions regarding maintenance at (503) 258-3157 or visit our website at www.contech-cpi.com/maintenance.

Thank you for the opportunity to present this information to you and your client.

Sincerely,

Taylor Murdock
Contech Engineered Solutions LLC

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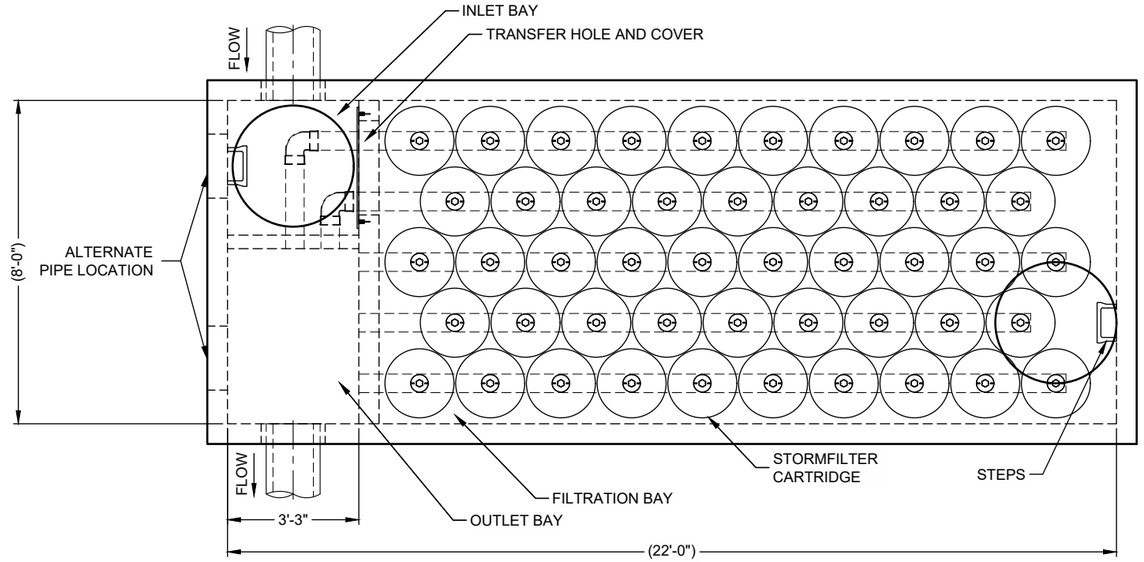
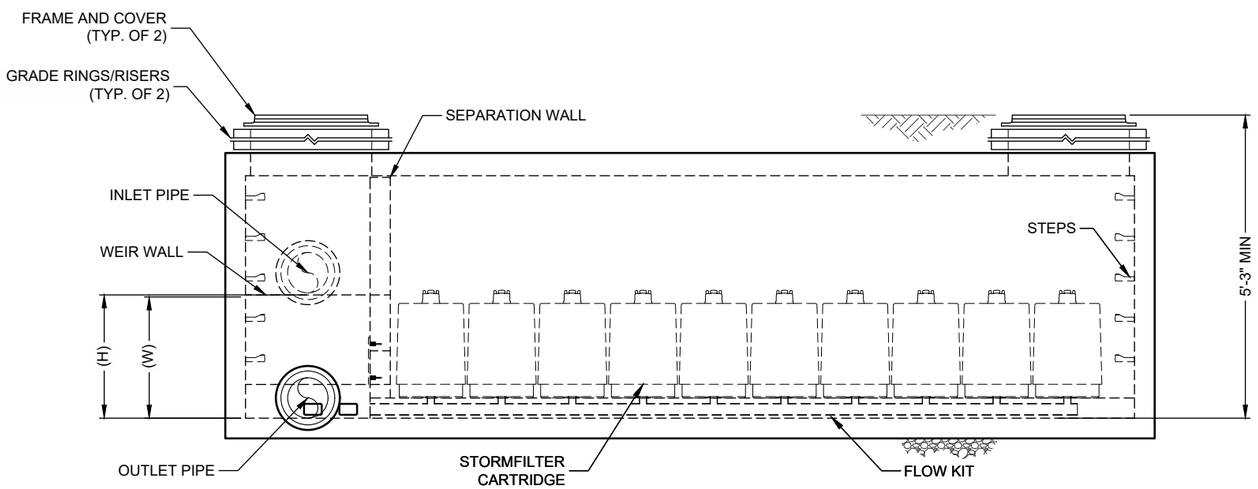
7037 Ridge Road, Suite 350 | Hanover, MD 21076
Office: 443-457-1500 Fax: 410-740-8492



PLAN VIEW



ELEVATION

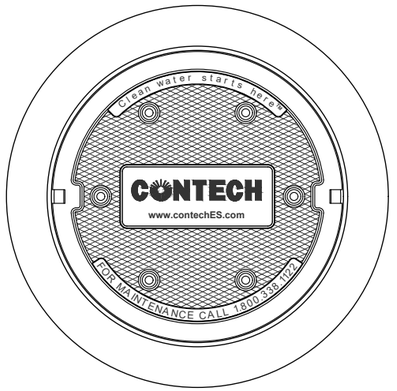
STORMFILTER DESIGN NOTES

- THE 8' x 22' PEAK DIVERSION STORMFILTER TREATMENT CAPACITY VARIES BY CARTRIDGE COUNT AND LOCALLY APPROVED SURFACE AREA SPECIFIC FLOW RATE. PEAK CONVEYANCE CAPACITY TO BE DETERMINED BY ENGINEER OF RECORD.
- THE PEAK DIVERSION STORMFILTER IS AVAILABLE IN A LEFT INLET (AS SHOWN) OR RIGHT INLET CONFIGURATION.
- ALL PARTS AND INTERNAL ASSEMBLY PROVIDED BY CONTECH UNLESS OTHERWISE NOTED.

CARTRIDGE SELECTION

CARTRIDGE HEIGHT	27"			18"			LOW DROP		
RECOMMENDED HYDRAULIC DROP (H)	3.05'			2.3'			1.8'		
HEIGHT OF WEIR (W)	3.00'			2.25'			1.75'		
SPECIFIC FLOW RATE (gpm/sf)	2 gpm/sf	1.67* gpm/sf	1 gpm/sf	2 gpm/sf	1.67* gpm/sf	1 gpm/sf	2 gpm/sf	1.67* gpm/sf	1 gpm/sf
CARTRIDGE FLOW RATE (gpm)	22.5	18.79	11.25	15	12.53	7.5	10	8.35	5

* 1.67 gpm/sf SPECIFIC FLOW RATE IS APPROVED WITH PHOSPHOSORB® (PSORB) MEDIA ONLY



FRAME AND COVER
(DIAMETER VARIES)
N.T.S.

SITE SPECIFIC DATA REQUIREMENTS

STRUCTURE ID	*
WATER QUALITY FLOW RATE (cfs)	*
PEAK FLOW RATE (cfs)	*
RETURN PERIOD OF PEAK FLOW (yrs)	*
CARTRIDGE HEIGHT (27", 18", LOW DROP(LD))	*
NUMBER OF CARTRIDGES REQUIRED	*
CARTRIDGE FLOW RATE	*
MEDIA TYPE (PERLITE, ZPG, PSORB)	*

PIPE DATA:	I.E.	MATERIAL	DIAMETER
INLET PIPE	*	*	*
OUTLET PIPE	*	*	*

UPSTREAM RIM ELEVATION	*
DOWNSTREAM RIM ELEVATION	*

ANTI-FLOTATION BALLAST	WIDTH	HEIGHT
	*	*

NOTES/SPECIAL REQUIREMENTS:

* PER ENGINEER OF RECORD

PERFORMANCE SPECIFICATION

FILTER CARTRIDGES SHALL BE MEDIA-FILLED, PASSIVE, SIPHON ACTUATED, RADIAL FLOW, AND SELF CLEANING. **RADIAL MEDIA DEPTH SHALL BE 7-INCHES**. FILTER MEDIA CONTACT TIME SHALL BE AT LEAST **38 SECONDS**.
SPECIFIC FLOW RATE SHALL BE **2 GPM/SF (MAXIMUM)**. SPECIFIC FLOW RATE IS THE MEASURE OF THE FLOW (GPM) DIVIDED BY THE MEDIA SURFACE CONTACT AREA (SF). MEDIA VOLUMETRIC FLOW RATE SHALL BE **6 GPM/CF OF MEDIA (MAXIMUM).**

GENERAL NOTES

1. CONTECH TO PROVIDE ALL MATERIALS UNLESS NOTED OTHERWISE.
2. DIMENSIONS MARKED WITH ( ) ARE REFERENCE DIMENSIONS. ACTUAL DIMENSIONS MAY VARY.
3. FOR FABRICATION DRAWINGS WITH DETAILED STRUCTURE DIMENSIONS AND WEIGHTS, PLEASE CONTACT YOUR CONTECH REPRESENTATIVE. www.contechES.com
4. STORMFILTER WATER QUALITY STRUCTURE SHALL BE IN ACCORDANCE WITH ALL DESIGN DATA AND INFORMATION CONTAINED IN THIS DRAWING. CONTRACTOR TO CONFIRM STRUCTURE MEETS REQUIREMENTS OF PROJECT.
5. STRUCTURE SHALL MEET AASHTO HS20 LOAD RATING, ASSUMING EARTH COVER OF 0' - 5' AND GROUNDWATER ELEVATION AT, OR BELOW, THE OUTLET PIPE INVERT ELEVATION. ENGINEER OF RECORD TO CONFIRM ACTUAL GROUNDWATER ELEVATION. CASTINGS SHALL MEET AASHTO M306 AND BE CAST WITH THE CONTECH LOGO.

INSTALLATION NOTES

A. ANY SUB-BASE, BACKFILL DEPTH, AND/OR ANTI-FLOTATION PROVISIONS ARE SITE-SPECIFIC DESIGN CONSIDERATIONS AND SHALL BE SPECIFIED BY ENGINEER OF RECORD.
B. CONTRACTOR TO PROVIDE EQUIPMENT WITH SUFFICIENT LIFTING AND REACH CAPACITY TO LIFT AND SET THE STORMFILTER STRUCTURE (LIFTING CLUTCHES PROVIDED).
C. CONTRACTOR TO INSTALL JOINT SEALANT BETWEEN ALL SECTIONS AND ASSEMBLE STRUCTURE.
D. CONTRACTOR TO PROVIDE, INSTALL, AND GROUT PIPES. MATCH OUTLET PIPE INVERT WITH OUTLET BAY FLOOR.
E. CONTRACTOR TO TAKE APPROPRIATE MEASURES TO PROTECT CARTRIDGES FROM CONSTRUCTION-RELATED EROSION RUNOFF.
F. CONTRACTOR TO REMOVE THE TRANSFER HOLE COVER WHEN THE SYSTEM IS BROUGHT ONLINE.

The Stormwater Management StormFilter®
THIS PRODUCT MAY BE PROTECTED BY ONE OR MORE OF THE FOLLOWING U.S. PATENTS: 5,322,629; 5,534,074; 5,707,527; 5,865,197; 6,027,639; 6,946,646; RELATED FOREIGN PATENTS, OR OTHER PATENTS PENDING.

CONTECH® ENGINEERED SOLUTIONS LLC
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THE STORMWATER MANAGEMENT STORMFILTER 8' x 22' PEAK DIVERSION STORMFILTER STANDARD DETAIL

Summary for Subcatchment 19S: South Drainage Area

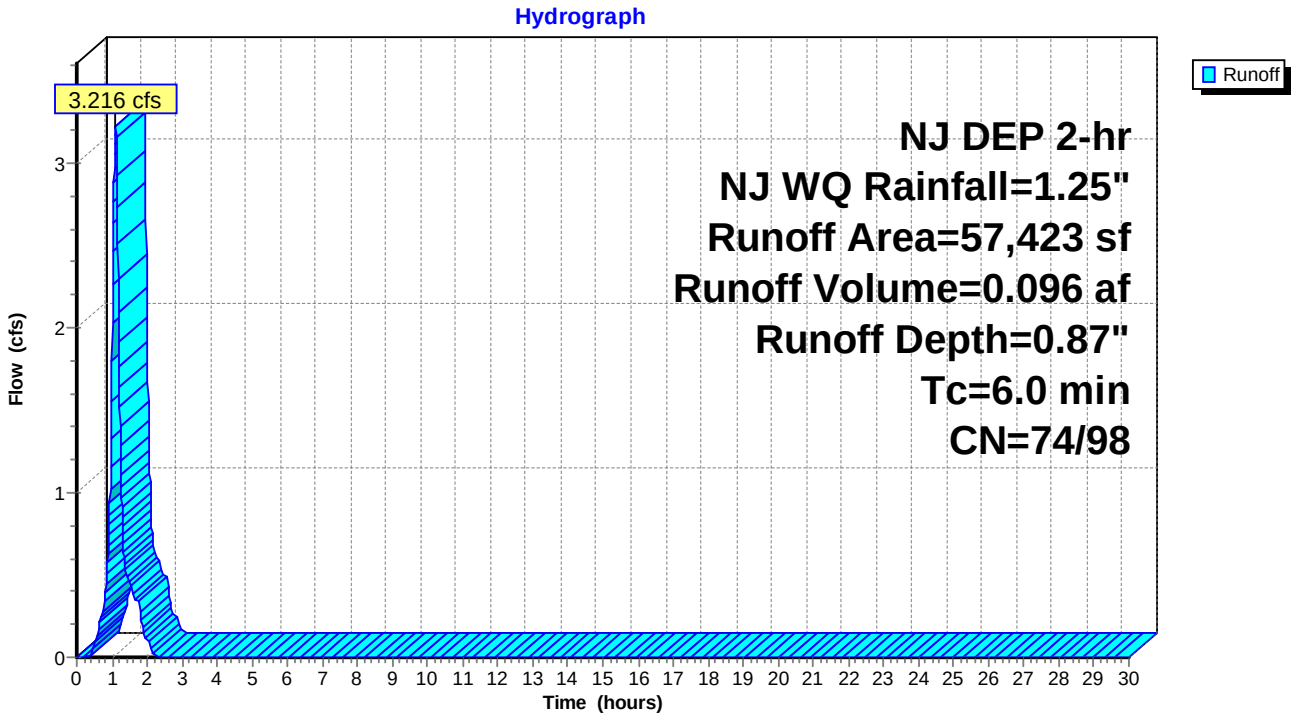
Runoff = 3.216 cfs @ 1.11 hrs, Volume= 0.096 af, Depth= 0.87"

Runoff by SCS TR-20 method, UH=SCS, Split Pervious/Imperv., Time Span= 0.00-30.00 hrs, dt= 0.01 hrs
NJ DEP 2-hr NJ WQ Rainfall=1.25"

	Area (sf)	CN	Description
*	47,653	98	
*	9,770	74	
	57,423	94	Weighted Average
	9,770	74	17.01% Pervious Area
	47,653	98	82.99% Impervious Area

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

Subcatchment 19S: South Drainage Area



Summary for Pond 20P: South SF & Network

Inflow Area = 1.318 ac, 82.99% Impervious, Inflow Depth = 0.87" for NJ WQ event
Inflow = 3.216 cfs @ 1.11 hrs, Volume= 0.096 af
Outflow = 1.604 cfs @ 1.03 hrs, Volume= 0.092 af, Atten= 50%, Lag= 0.0 min
Primary = 1.604 cfs @ 1.03 hrs, Volume= 0.092 af
Secondary = 0.000 cfs @ 0.00 hrs, Volume= 0.000 af

Routing by Dyn-Stor-Ind method, Time Span= 0.00-30.00 hrs, dt= 0.01 hrs
Peak Elev= 59.03' @ 1.21 hrs Surf.Area= 0.016 ac Storage= 0.023 af

Plug-Flow detention time= 5.9 min calculated for 0.092 af (96% of inflow)
Center-of-Mass det. time= 4.0 min (74.6 - 70.5)

Volume	Invert	Avail.Storage	Storage Description
#1	56.03'	0.010 af	**10.35'W x 10.35'L x 4.23'H SFPD0822 Equiv. Vol**
#2	57.02'	0.001 af	**18.0" Round RCP_Round 18"** L= 14.0' S= 0.0050 '/'
#3	57.09'	0.001 af	**4.00'D x 3.10'H MH #65**
#4	57.09'	0.002 af	**18.0" Round RCP_Round 18"** L= 58.0' S= 0.0050 '/'
#5	57.38'	0.001 af	**3.50'W x 4.00'L x 3.26'H Type E Inlet #12**
#6	57.38'	0.002 af	**15.0" Round RCP_Round 15"** L= 77.0' S= 0.0050 '/'
#7	57.76'	0.001 af	**3.50'W x 4.00'L x 3.80'H Type E Inlet #8**
#8	57.76'	0.006 af	**15.0" Round RCP_Round 15"** L= 208.0' S= 0.0050 '/'
#9	58.80'	0.001 af	**3.50'W x 4.00'L x 2.20'H Type B Inlet #7**
#10	58.80'	0.000 af	**15.0" Round RCP_Round 15"** L= 14.0' S= 0.0050 '/'
#11	58.87'	0.001 af	**3.50'W x 4.00'L x 2.33'H Type B Inlet**
#12	58.87'	0.001 af	**3.50'W x 4.00'L x 2.33'H Type B Inlet**
#13	58.80'	0.002 af	**12.0" Round RCP_Round 12"** L= 125.0' S= 0.0050 '/'
#14	57.58'	0.001 af	**15.0" Round RCP_Round 15"** L= 50.0' S= 0.0050 '/'
#15	57.83'	0.001 af	**4.00'D x 3.14'H MH #64**
#16	57.83'	0.006 af	**15.0" Round RCP_Round 15"** L= 212.0' S= 0.0050 '/'
#17	58.89'	0.001 af	**4.00'D x 3.50'H MH #63**
#18	58.89'	0.001 af	**15.0" Round RCP_Round 15"** L= 22.0' S= 0.0050 '/'
		0.039 af	Total Available Storage

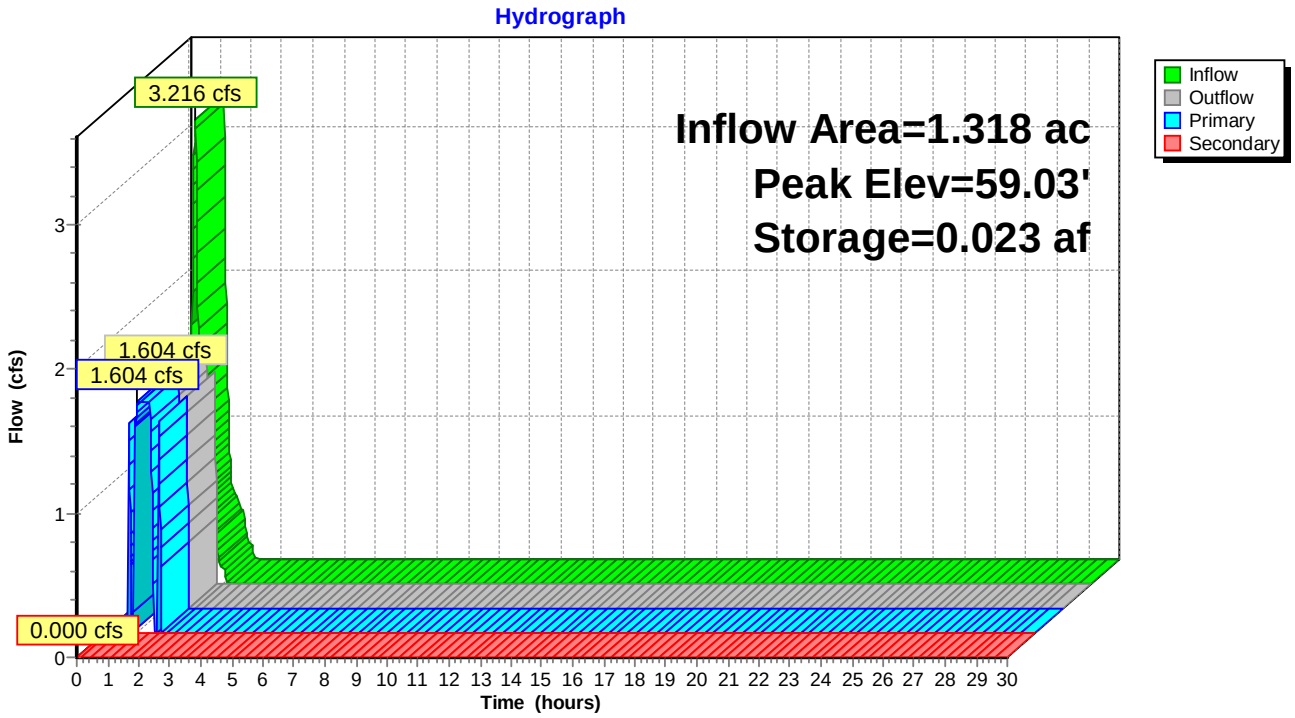
Device	Routing	Invert	Outlet Devices (Turned on 3 times)
#1	Primary	55.53'	**18.0" Round RCP_Round 18"** L= 7.0' RCP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 55.53' / 55.50' S= 0.0043 '/' Cc= 0.900 n= 0.011 Concrete pipe, straight & clean, Flow Area= 1.77 sf
#2	Device 1	57.53'	**StormFilter 18 - 15gpm @ 18in X 48.00** Discharges@56.03' Turns Off<56.20'

#3	Secondary	59.04'	**3.2' 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

Primary OutFlow Max=1.604 cfs @ 1.03 hrs HW=57.81' (Free Discharge)
└─**1=RCP_Round 18"** (Passes 1.604 cfs of 10.126 cfs potential flow)
└─**2=StormFilter 18 - 15gpm @ 18in** (Pump Controls 1.604 cfs)

Secondary OutFlow Max=0.000 cfs @ 0.00 hrs HW=56.03' (Free Discharge)
└─**3=Broad-Crested Rectangular Weir** (Controls 0.000 cfs)

Pond 20P: South SF & Network



Summary for Subcatchment 19S: South Drainage Area

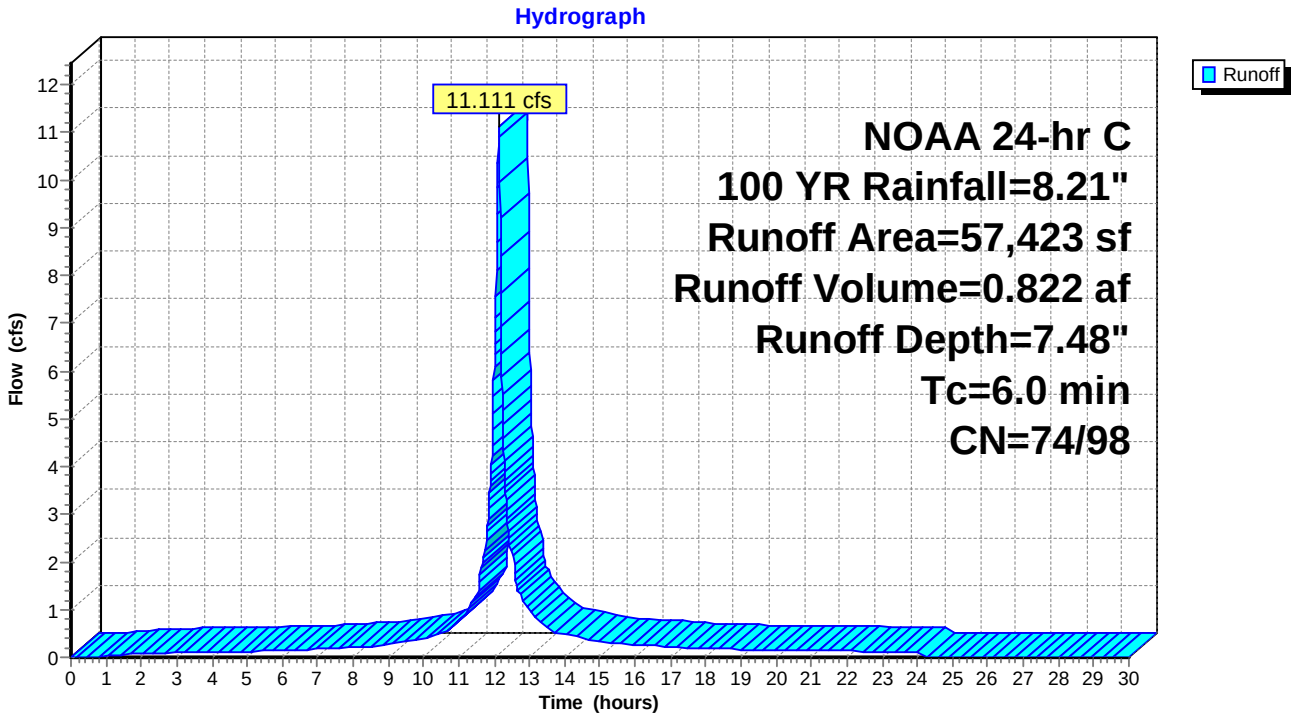
Runoff = 11.111 cfs @ 12.13 hrs, Volume= 0.822 af, Depth= 7.48"

Runoff by SCS TR-20 method, UH=SCS, Split Pervious/Imperv., Time Span= 0.00-30.00 hrs, dt= 0.01 hrs
NOAA 24-hr C 100 YR Rainfall=8.21"

	Area (sf)	CN	Description
*	47,653	98	
*	9,770	74	
	57,423	94	Weighted Average
	9,770	74	17.01% Pervious Area
	47,653	98	82.99% Impervious Area

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

Subcatchment 19S: South Drainage Area



Summary for Pond 20P: South SF & Network

Inflow Area = 1.318 ac, 82.99% Impervious, Inflow Depth = 7.48" for 100 YR event
Inflow = 11.111 cfs @ 12.13 hrs, Volume= 0.822 af
Outflow = 11.070 cfs @ 12.14 hrs, Volume= 0.821 af, Atten= 0%, Lag= 0.4 min
Primary = 1.604 cfs @ 11.68 hrs, Volume= 0.625 af
Secondary = 9.466 cfs @ 12.14 hrs, Volume= 0.196 af

Routing by Dyn-Stor-Ind method, Time Span= 0.00-30.00 hrs, dt= 0.01 hrs
Peak Elev= 59.97' @ 12.14 hrs Surf.Area= 0.008 ac Storage= 0.035 af

Plug-Flow detention time= 5.9 min calculated for 0.821 af (100% of inflow)
Center-of-Mass det. time= 5.1 min (755.6 - 750.4)

Volume	Invert	Avail.Storage	Storage Description
#1	56.03'	0.010 af	**10.35'W x 10.35'L x 4.23'H SFPD0822 Equiv. Vol**
#2	57.02'	0.001 af	**18.0" Round RCP_Round 18"** L= 14.0' S= 0.0050 '/'
#3	57.09'	0.001 af	**4.00'D x 3.10'H MH #65**
#4	57.09'	0.002 af	**18.0" Round RCP_Round 18"** L= 58.0' S= 0.0050 '/'
#5	57.38'	0.001 af	**3.50'W x 4.00'L x 3.26'H Type E Inlet #12**
#6	57.38'	0.002 af	**15.0" Round RCP_Round 15"** L= 77.0' S= 0.0050 '/'
#7	57.76'	0.001 af	**3.50'W x 4.00'L x 3.80'H Type E Inlet #8**
#8	57.76'	0.006 af	**15.0" Round RCP_Round 15"** L= 208.0' S= 0.0050 '/'
#9	58.80'	0.001 af	**3.50'W x 4.00'L x 2.20'H Type B Inlet #7**
#10	58.80'	0.000 af	**15.0" Round RCP_Round 15"** L= 14.0' S= 0.0050 '/'
#11	58.87'	0.001 af	**3.50'W x 4.00'L x 2.33'H Type B Inlet**
#12	58.87'	0.001 af	**3.50'W x 4.00'L x 2.33'H Type B Inlet**
#13	58.80'	0.002 af	**12.0" Round RCP_Round 12"** L= 125.0' S= 0.0050 '/'
#14	57.58'	0.001 af	**15.0" Round RCP_Round 15"** L= 50.0' S= 0.0050 '/'
#15	57.83'	0.001 af	**4.00'D x 3.14'H MH #64**
#16	57.83'	0.006 af	**15.0" Round RCP_Round 15"** L= 212.0' S= 0.0050 '/'
#17	58.89'	0.001 af	**4.00'D x 3.50'H MH #63**
#18	58.89'	0.001 af	**15.0" Round RCP_Round 15"** L= 22.0' S= 0.0050 '/'
		0.039 af	Total Available Storage

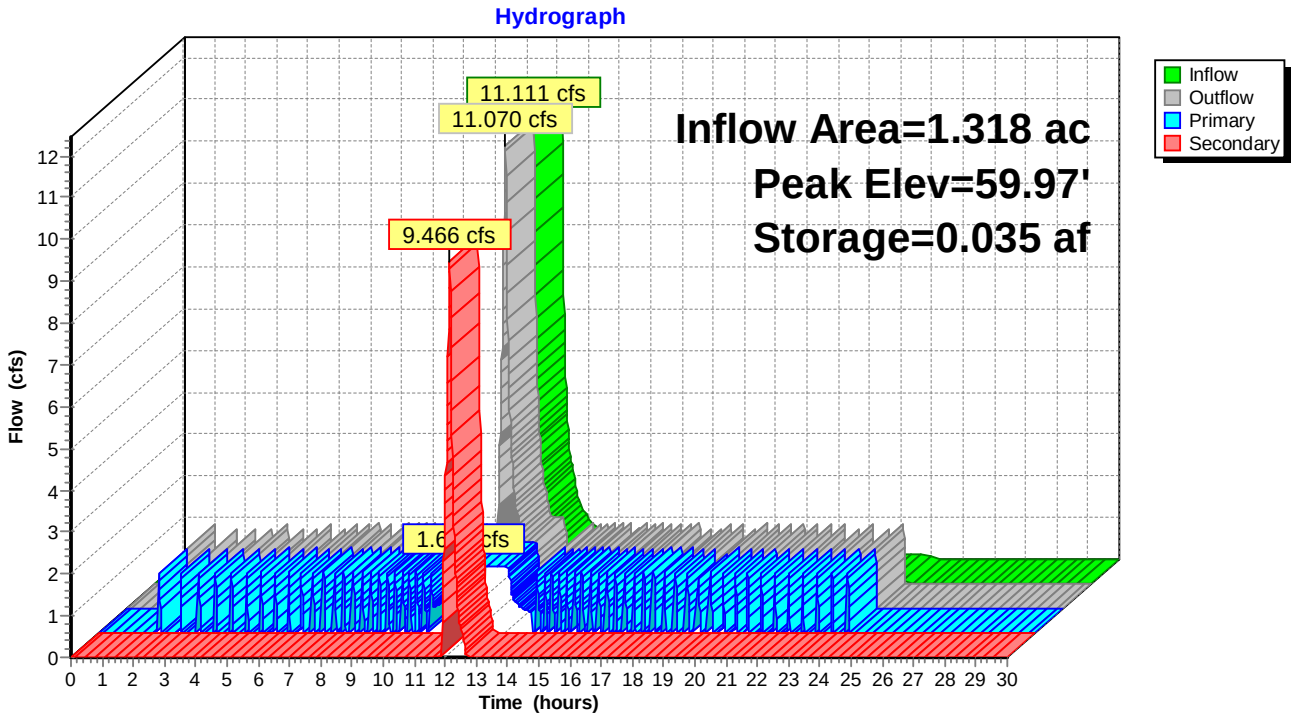
Device	Routing	Invert	Outlet Devices (Turned on 55 times)
#1	Primary	55.53'	**18.0" Round RCP_Round 18"** L= 7.0' RCP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 55.53' / 55.50' S= 0.0043 '/' Cc= 0.900 n= 0.011 Concrete pipe, straight & clean, Flow Area= 1.77 sf
#2	Device 1	57.53'	**StormFilter 18 - 15gpm @ 18in X 48.00** Discharges@56.03' Turns Off<56.20'

#3 Secondary 59.04' **3.2' 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

Primary OutFlow Max=1.604 cfs @ 11.68 hrs HW=57.82' (Free Discharge)
└**1=RCP_Round 18"** (Passes 1.604 cfs of 10.202 cfs potential flow)
└**2=StormFilter 18 - 15gpm @ 18in** (Pump Controls 1.604 cfs)

Secondary OutFlow Max=9.437 cfs @ 12.14 hrs HW=59.97' (Free Discharge)
└**3=Broad-Crested Rectangular Weir** (Weir Controls 9.437 cfs @ 3.19 fps)

Pond 20P: South SF & Network



State of New Jersey
DEPARTMENT OF ENVIRONMENTAL PROTECTION
Bureau of Nonpoint Pollution Control
Division of Water Quality
Mail Code 401-02B
Post Office Box 420
Trenton, New Jersey 08625-0420
609-633-7021 Fax: 609-777-0432
http://www.state.nj.us/dep/dwq/bnpc_home.htm

CHRIS CHRISTIE
Governor

KIM GUADAGNO
Lt. Governor

BOB MARTIN
Commissioner

December 14, 2016

Derek M. Berg
Director - Stormwater Regulatory Management - East
Contech Engineered Solutions LLC
71 US Route 1, Suite F
Scarborough, ME 04074

Re: MTD Laboratory Certification
Stormwater Management StormFilter® (StormFilter) by Contech Engineered Solutions LLC
Off-line Installation

TSS Removal Rate 80%

Dear Mr. Berg:

The Stormwater Management rules under N.J.A.C. 7:8-5.5(b) and 5.7(c) allow the use of manufactured treatment devices (MTDs) for compliance with the design and performance standards at N.J.A.C. 7:8-5 if the pollutant removal rates have been verified by the New Jersey Corporation for Advanced Technology (NJCAT) and have been certified by the New Jersey Department of Environmental Protection (NJDEP). Contech Engineered Solutions LLC has requested a Laboratory Certification for the StormFilter System.

This project falls under the "Procedure for Obtaining Verification of a Stormwater Manufactured Treatment Device from New Jersey Corporation for Advanced Technology" dated January 25, 2013. The applicable protocol is the "New Jersey Department of Environmental Protection Laboratory Protocol to Assess Total Suspended Solids Removal by a Filtration Manufactured Treatment Device" dated January 25, 2013.

NJCAT verification documents submitted to the NJDEP indicate that the requirements of the afore-mentioned protocol have been met or exceeded. The NJCAT letter also included a recommended certification TSS removal rate and the required maintenance plan. The NJCAT Verification Report with the Verification Appendix for this device is published online at http://www.njcat.org/verification-process/technology-verification-database.html.

The NJDEP certifies the use of the StormFilter System by Contech Engineered Solutions LLC at a TSS removal rate of 80%, when designed, operated and maintained in accordance with the information provided in the Verification Appendix and subject to the following conditions:

1. The maximum treatment flow rate (MTFR) for the manufactured treatment device (MTD) is calculated using the New Jersey Water Quality Design Storm (1.25 inches in 2 hrs) in N.J.A.C. 7:8-5.5. The MTFR is calculated based on a verified loading rate of 2.12 gpm/sf of effective filtration treatment area.

2. The StormFilter System shall be installed using the same configuration as the unit tested by NJCAT, and sized in accordance with the criteria specified in item 6 below.

3. This device cannot be used in series with another MTD or a media filter (such as a sand filter), to achieve an enhanced removal rate for total suspended solids (TSS) removal under N.J.A.C. 7:8-5.5.

4. Additional design criteria for MTDs can be found in Chapter 9.6 of the New Jersey Stormwater Best Management Practices (NJ Stormwater BMP) Manual which can be found on-line at www.njstormwater.org.

5. The maintenance plan for a site using this device shall incorporate, at a minimum, the maintenance requirements for the StormFilter, which is attached to this document. However, it is recommended to review the maintenance website at http://www.conteches.com/DesktopModules/Bring2mind/DMX/Download.aspx?EntryId=2813&PortalId=0&DownloadMethod=attachment for any changes to the maintenance requirements.

6. Sizing Requirements:

   The example below demonstrates the sizing procedure for a StormFilter System.

   Example: A 0.25 acre impervious site is to be treated to 80% TSS removal using a StormFilter System. The impervious site runoff (Q) based on the New Jersey Water Quality Design Storm was determined to be 0.79 cfs or 354.58 gpm.

   The calculation of the minimum number of cartridges for use in the StormFilter System is based upon both the MTFR and the maximum inflow drainage area. It is necessary to calculate the required cartridges using both methods and to rely on the method that results in the highest minimum number of cartridges determined by the two methods.

   Inflow Drainage Area Evaluation:

   The drainage area to the StormFilter System in this example is 0.25 acres. Based upon the information in Table 1 below, the following minimum number of cartridges are required in a StormFilter System to treat the impervious area without exceeding the maximum drainage area:

1. Five (5) 12” cartridges,
2. Three (3) 18” cartridges, or
3. Two (2) 27” cartridges

Maximum Treatment Flow Rate (MTFR) Evaluation:

The site runoff (Q) was determined based on the following:

time of concentration = 10 minutes
i=3.2 in/hr (page 5-8, Fig. 5-3 of the NJ Stormwater BMP Manual)
c=0.99 (runoff coefficient for impervious)
Q=ciA=0.99x3.2x0.25=0.79 cfs=0.79x448.83 gpm=354.58 gpm

Based on a flow rate of 354.58 gpm, the following minimum number of cartridges are required in a StormFilter System to treat the impervious area without exceeding the MTFR:

1. Thirty-six (36) 12” cartridges,
2. Twenty-four (24) 18” cartridges, or
3. Sixteen (16) 27” cartridges

The MTFR Evaluation results will be used since that method results in the higher minimum number of cartridges determined by the two methods.

The sizing table corresponding to the available system models are noted below:

TABLE 1 STORMFILTER CARTRIDGE HEIGHTS AND NEW JERSEY TREATMENT CAPACITIES

StormFilter Cartridge Heights and New Jersey Treatment Capacities				
StormFilter Cartridge Height	**Filtration Surface Area (sq.ft)**	**MTFR[1] (GPM)**	**Mass Capture Capacity (lbs)**	**Maximum Allowable Inflow Area[2] (acres)**
Low Drop (12")	4.71	10	36.3	0.061
18"	7.07	15	54.5	0.09
27"	10.61	22.5	81.8	0.136

Notes:

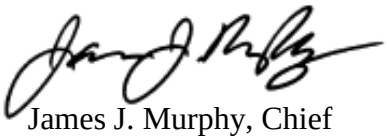
1. *MTFR calculated based on 4.72x10-3 cfs/sf (2.12 gpm/sf) of effective filtration treatment area.*
2. *Based upon the equation found in the NJDEP Filter Protocol Maximum Inflow Drainage Area (acres) = weight of TSS before 10% loss in MTFR (lbs)/600 lbs/acre of drainage area annually.*

Be advised a detailed maintenance plan is mandatory for any project with a Stormwater BMP subject to the Stormwater Management Rules, N.J.A.C. 7:8. The plan must include all of the items identified in Stormwater Management Rules, N.J.A.C. 7:8-5.8. Such items include, but are not limited to, the list of

indication of problems in the system, and training of maintenance personnel. Additional information can be found in Chapter 8: Maintenance and Retrofit of Stormwater Management Measures.

If you have any questions regarding the above information, please contact Shashi Nayak of my office at (609) 633-7021.

Sincerely,



James J. Murphy, Chief
Bureau of Nonpoint Pollution Control

Attachment: Maintenance Plan

cc: Chron File
Richard Magee, NJCAT
Vince Mazzei, NJDEP - DLUR
Ravi Patraju, NJDEP - BES
Gabriel Mahon, NJDEP - BNPC
Shashi Nayak, NJDEP - BNPC

NSPS SPREADSHEET

NJDEP Nonstructural Strategies Points System (NSPS)

Version: January 31, 2006

Note: Input Values in Yellow Cells Only

Project:	Odin Pharmaceuticals
Date:	April 6, 2022
User:	MJS/MJB
Notes:	

Step 1 - Provide Basic Major Development Site Information

A. Specify Total Area in Acres of Development Site Described in Steps 2 and 3 = 5.7 **Acres**

B. Specify by Percent the Various Planning Areas Located within the Development Site:

State Plan Planning Area:	PA-1	PA-2	PA-3	PA-4	PA-4B	PA-5	Total % Area
Percent of Each Planning Area within Site:	100.0%						100.0%

Note: See User's Guide for Equivalent Zones within Designated Centers and the NJ Meadowlands, Pinelands, and Highlands Districts

Step 2 - Describe Existing or Pre-Developed Site Conditions

A. Specify Existing Land Use/Land Cover Descriptions and Areas:

Site Segment	Land Use/Land Cover Description	Specify Land Use/Land Cover in Acres for Each HSG				Use/Cover Subtotals		Points
		HSG A	HSG B	HSG C	HSG D			
1	Wetlands and Undisturbed Stream Buffers					0.0		0
2	Lawn and Open Space			2.7		2.7		109
3	Brush and Shrub					0.0		0
4	Meadow, Pasture, Grassland, or Range					0.0		0
5	Row Crop					0.0		0
6	Small Grain and Legumes					0.0		0
7	Woods - Indigenous					0.0		0
8	Woods - Planted					0.0		0
9	Woods and Grass Combination					0.0		0
10	Ponds, Lakes, and Other Open Water					0.0		0
11	Gravel and Dirt					0.0		0
12	Porous and Permeable Paving					0.0		0
13	Directly Connected Impervious			3.0		3.0		0
14	Unconnected Impervious with Small D/S Pervious					0.0		0
15	Unconnected Impervious with Large D/S Pervious					0.0		0
	HSG Subtotals (Acres):	0.0	0.0	5.7	0.0		**Total Area:**	5.7
	HSG Subtotals (%):	0.0%	0.0%	100.0%	0.0%		**Total % Area:**	100.0%

Points Subtotal: **109**

Total Existing Site Points: **109**

Step 3 - Describe Proposed or Post-Developed Site Conditions

A. Specify Proposed Land Use/Land Cover Descriptions and Areas:

Site Segment	Land Use/Land Cover Description	Specify Land Use/Land Cover in Acres for Each HSG				Use/Cover Subtotals	Points
		HSG A	HSG B	HSG C	HSG D		
1	Wetlands and Undisturbed Stream Buffers					0.0	0
2	Lawn and Open Space					0.0	0
3	Brush and Shrub			1.5		1.5	69
4	Meadow, Pasture, Grassland, or Range					0.0	0
5	Row Crop					0.0	0
6	Small Grain and Legumes					0.0	0
7	Woods - Indigenous					0.0	0
8	Woods - Planted					0.0	0
9	Woods and Grass Combination					0.0	0
10	Ponds, Lakes, and Other Open Water					0.0	0
11	Gravel and Dirt					0.0	0
12	Porous and Permeable Paving					0.0	0
13	Directly Connected Impervious			4.1		4.1	0
14	Unconnected Impervious with Small D/S Pervious					0.0	0
15	Unconnected Impervious with Large D/S Pervious					0.0	0
	HSG Subtotals (Acres):	0.0	0.0	5.7	0.0	**Total Area:**	5.7
	HSG Subtotals (%):	0.0%	0.0%	100.0%	0.0%	**Total % Area:**	100.0%
						Points Subtotal:	**69**

B. Compare Proposed Impervious Coverage with Maximum Allowable Impervious Coverage:

Total Directly Connected Impervious Coverage =	73%	% of Site
Total Unconnected Impervious Coverage with Small D/S Pervious =	0%	% of Site
Total Unconnected Impervious Coverage with Large D/S Pervious =	0%	% of Site
Total Site Impervious Coverage =	73%	% of Site
Effective Site Impervious Coverage =	73%	% of Site
Specify Source of Maximum Allowable Impervious Coverage:	Table	(None or Table)
Allowable Site Impervious Cover from Maximum Impervious Cover Table:	85%	

Note: See Maximum Impervious Cover Table Worksheet for Details

Points Subtotal: 7

C. Compare Proposed Site Disturbance with Maximum Allowable Site Disturbance:

Total Proposed Site Disturbance =	61%	% of Site
Maximum Allowable Site Disturbance by Municipal Ordinance =	100%	% of Site

Points Subtotal: 18

D. Describe Proposed Runoff Conveyance System:

Total Length of Runoff Conveyance System =	318	Feet
Length of Vegetated Runoff Conveyance System =	0	Feet
% of Total Runoff Conveyance System That is Vegetated =	0%	

Points Subtotal: 0

E. Residential Lot Clustering:

Percent of Total Site Area that will be Clustered =		% of Site
Minimum Standard Lot Size as Per Zoning (Note: 1/2 Acre or Greater) =		Acres
Maximum Proposed Cluster Lot Size (Note:1/4 Acre or Less) =		Acres
Percent of Clustered Portion of Site to be Preserved as Vegetated Open Space =		% of Clustered Site Portion

Points Subtotal: 0

F. Will the Following be Utilized to Minimize Soil Compaction?

Proposed Lawn Areas will be Graded with Lightweight Construction Equipment:	Yes	(Yes or No)
Percent of Proposed Lawn Areas to be Graded with Such Equipment:	75%	% of Lawn Areas

Points Subtotal: 17

G. Are Any of the Following Stormwater Management Standards Met Using Only Nonstructural Strategies and Measures?

Groundwater Recharge Standards (NJAC 7:8-5.4-a-2):	No	(Yes or No)
Stormwater Runoff Quality Standards (NJAC 7:8-5.5):	No	(Yes or No)
Stormwater Runoff Quantity Standards (NJAC 7:8-5.4-a-3):	No	(Yes or No)

Points Subtotal: 0

Note: If the Answers to All Three Questions at G Above are "Yes", Adequate Nonstructural Measures have been Utilized.

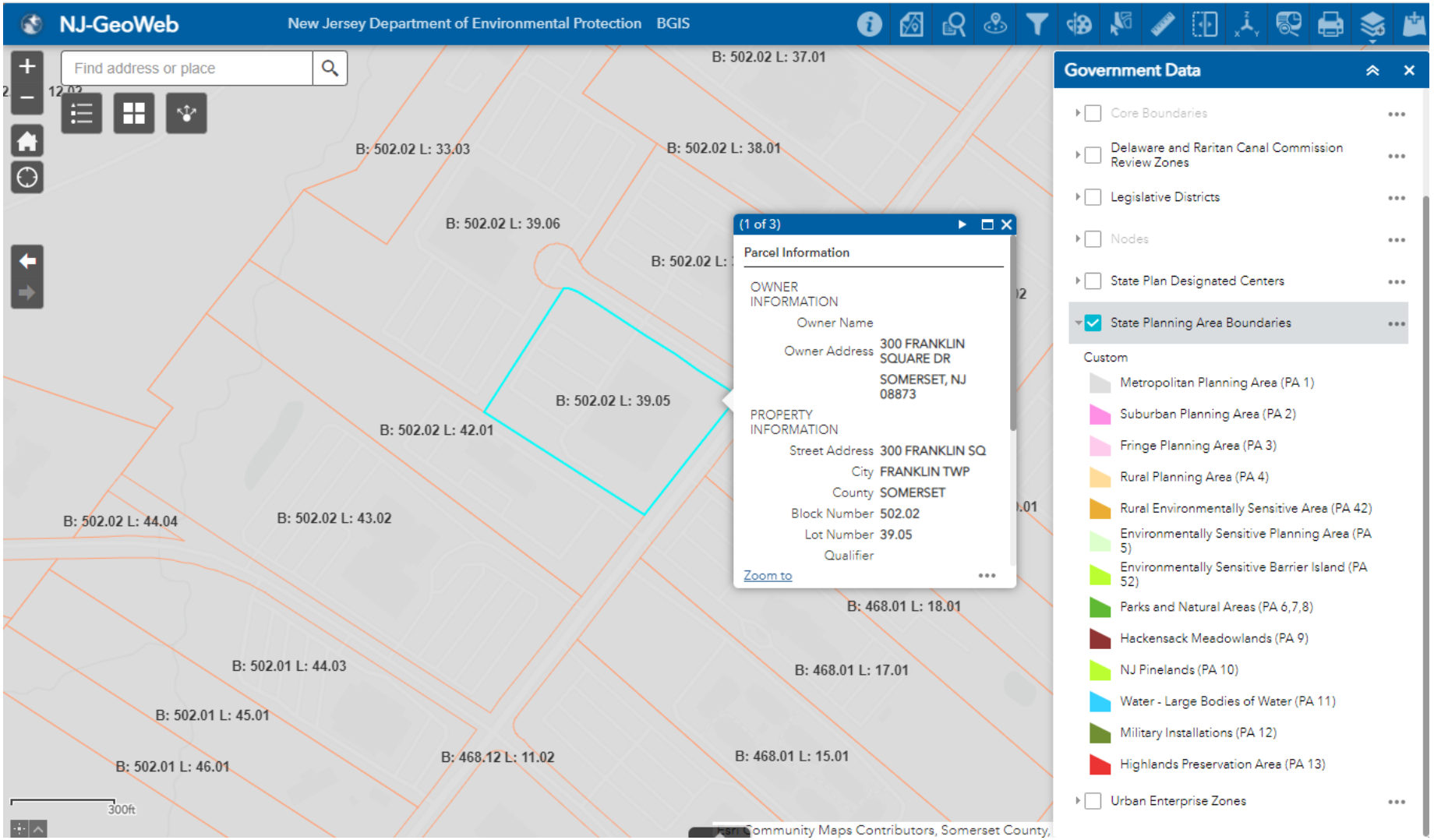
Total Proposed Site Points: 110

Ratio of Proposed to Existing Site Points: 101%

Required Site Points Ratio: 74%

Nonstructural Point System Results: Proposed Nonstructural Measures are Adequate

NJDEP GEOWEB METROPOLITAN PLANNING AREA


NJ-GeoWeb
New Jersey Department of Environmental Protection BGIS
Find address or place
B: 502.02 L: 37.01
B: 502.02 L: 33.03
B: 502.02 L: 38.01
B: 502.02 L: 39.06
B: 502.02 L: 39.05
B: 502.02 L: 42.01
B: 502.02 L: 44.04
B: 502.02 L: 43.02
B: 468.01 L: 18.01
B: 502.01 L: 44.03
B: 468.01 L: 17.01
B: 502.01 L: 45.01
B: 502.01 L: 46.01
B: 468.12 L: 11.02
B: 468.01 L: 15.01
300ft
(1 of 3)
Parcel Information
OWNER INFORMATION
Owner Name
Owner Address 300 FRANKLIN SQUARE DR
SOMERSET, NJ 08873
PROPERTY INFORMATION
Street Address 300 FRANKLIN SQ
City FRANKLIN TWP
County SOMERSET
Block Number 502.02
Lot Number 39.05
Qualifier
Zoom to
Government Data
Core Boundaries
Delaware and Raritan Canal Commission Review Zones
Legislative Districts
Nodes
State Plan Designated Centers
State Planning Area Boundaries
Custom
Metropolitan Planning Area (PA 1)
Suburban Planning Area (PA 2)
Fringe Planning Area (PA 3)
Rural Planning Area (PA 4)
Rural Environmentally Sensitive Area (PA 42)
Environmentally Sensitive Planning Area (PA 5)
Environmentally Sensitive Barrier Island (PA 52)
Parks and Natural Areas (PA 6,7,8)
Hackensack Meadowlands (PA 9)
NJ Pinelands (PA 10)
Water - Large Bodies of Water (PA 11)
Military Installations (PA 12)
Highlands Preservation Area (PA 13)
Urban Enterprise Zones
Community Maps Contributors, Somerset County,

SOIL TEST RESULTS (BY DYNAMIC EARTH, LLC)

REPORT OF GEOTECHNICAL AND STORMWATER BASIN AREA INVESTIGATION

PROPOSED WAREHOUSE EXPANSION
300 Franklin Square Drive
Block 502.2, Lot 39.05
Township of Franklin, Somerset County, New Jersey

Prepared for:

SOMERSET THERAPEUTICS, LLC
475 Bernardsville Road
Mendham, New Jersey

Prepared by:

245 Main Street, Suite 110
Chester, New Jersey 07930

Peter H. Howell, P.E.
Principal
NJ PE License No. 24GE04728700

Patrick J. Granitzki, PE
Project Manager
NJ PE License No. 24GE05355900

Project #2137-99-001E
May 11, 2018

REPORT OF GEOTECHNICAL AND STORMWATER BASIN AREA INVESTIGATION

Proposed Warehouse Expansion
300 Franklin Square Drive
Block 502.02, Lot 39.05
Township of Franklin, Somerset County, New Jersey

TABLE OF CONTENTS

1.0 SUMMARY OF FINDINGS 1

2.0 INTRODUCTION 3

2.1 Authorization 3
2.2 Purpose 3
2.3 Scope 3
2.3.1 Field Exploration 3
2.3.2 Laboratory Testing Program 5

3.0 SITE DESCRIPTION 6

3.1 Location and Description 6
3.2 Existing Conditions 6
3.3 Proposed Construction 6

4.0 SUBSURFACE CONDITIONS 8

4.1 Site Geology 8
4.2 Soil Survey 8
4.3 Subsurface Soil Profile 8
4.4 Seasonal High Groundwater and Groundwater 9

5.0 CONCLUSIONS AND RECOMMENDATIONS 10

5.1 General 10
5.2 Site Preparation and Earthwork 10
5.3 Structural Fill and Backfill 12
5.4 Groundwater Control 13
5.5 Foundations 13
5.6 Floor Slab 15
5.7 Pavement Design Criteria 15
5.8 Retaining Walls and Lateral Earth Pressures 15
5.9 Seismic and Liquefaction Considerations 15

REPORT OF GEOTECHNICAL AND STORMWATER BASIN AREA INVESTIGATION

Proposed Warehouse Expansion
300 Franklin Square Drive
Block 502.02, Lot 39.05
Township of Franklin, Somerset County, New Jersey

TABLE OF CONTENTS
(continued)

5.10 Temporary Excavations 16
5.11 Seasonal High Groundwater and Soil Permeability 16
5.12 Supplemental Post-Investigation Services 16

6.0 GENERAL COMMENTS 18

APPENDICES

Boring and Soil Profile Pit Location Plan
Records of Subsurface Exploration
Laboratory Testing
Geotechnical Terms and Symbols
USCS Standard Classification System

1.0 SUMMARY OF FINDINGS

Dynamic Earth, LLC (Dynamic Earth) has completed an exploration and evaluation of the subsurface conditions for the proposed site improvements located at 300 Franklin Square Drive in the Township of Franklin, Somerset County, New Jersey. The site is further identified as Block 502.02, Lot 39.05. The subject site is shown on the *Boring and Soil Profile Pit Location Plan*, attached within the appendix of this report.

At the time of Dynamic Earth's investigation, the subject site was developed with an existing two-story masonry building with associated pavement and utilities. The proposed site improvements will include construction of an addition along the western wall of the existing warehouse. The proposed building addition is expected to occupy a footprint area of approximately 18,396 square feet. The site development will also include associated stormwater management facilities, pavement and utilities. The proposed site improvements were provided on a March 17, 2017 *Conceptual Site Plan 'A'*.

The subsurface exploration included reconnaissance of the project site, drilling soil borings, excavating soil profile pits, performing laboratory testing and evaluating the geotechnical conditions relevant to the proposed construction details provided. A summary of Dynamic Earth's findings and recommendations is presented below:

- **Generalized Subsurface Conditions:** Beneath the surface cover (topsoil and asphaltic concrete), existing fill material was encountered that generally consisted of gravel, sand and clay with variable amounts of silt and debris (asphalt, glass, rope and brick). The existing debris was generally encountered within proposed stormwater management facility areas. The existing fill material was encountered to depths ranging between approximately one foot and four feet below the ground surface. Beneath the surficial cover and/or existing fill material, natural residual soils were encountered that generally consisted of gravel (USCS: GP-GM) and sand (USCS: SM) with variable amounts of silt. The natural residual soils were encountered to depths ranging between approximately 2.5 feet and 4.5 feet below the ground surface. Beneath the existing fill material and/or residual soils, weathered rock was encountered that generally consisted of gravel (USCS:GP-GM) and silt (USCS: ML) with variable amounts of sand and clay. The weathered rock/top of rock was encountered to depths ranging between approximately 3.5 feet and 7.5 feet below the ground surface. Seasonal high groundwater and groundwater was not encountered during our investigation. However, soil mottling was encountered to depths ranging between 2.7 feet and 3.2 feet below the ground surface which is likely due to a perched groundwater above the rock stratum.

- **Overexcavation of Existing Fill Material:** Existing fill material was encountered that is not suitable for direct support of proposed foundations without the risk of excessive settlement. As such, these materials will need to be overexcavated and replaced below the

proposed foundations (were encountered). Suitable portions may remain below proposed floor slabs provided that they are properly evaluated during construction, as detailed herein.

- **Foundations:** Following overexcavation of the existing fill material, the proposed building may be supported on conventional shallow foundation bearing within newly placed compacted structural fill material and/or approved residual soils or weathered rock. Foundations may be designed to exert a maximum allowable net bearing pressure of 3,000 pounds per square foot (psf).

- **Floor Slabs:** The majority of the existing fill material is primarily expected to be suitable for support of proposed floor slabs provided these materials are properly evaluated and inspected during construction. **At least partial overexcavation and replacement of the existing fill material should be anticipated beneath the floor slab. In addition, portions of the on-site soils are considered moisture sensitive and partial overexcavation and replacement should be anticipated.**

- **Use of Site Soils as Structural Fill:** The on-site soils are anticipated to be suitable for reuse as structural fill material provided that moisture contents are within tolerable limits to achieve compaction and oversize and deleterious debris (if encountered) is separated. Portions of the on-site soils are considered moisture sensitive and may require moisture conditioning and/or become impractical for reuse if exposed to periods of moisture.

- **Groundwater Control:** Groundwater was encountered deeper than anticipated excavation depths and the need for extensive groundwater control is not expected.

Detailed design criteria and construction recommendations for proposed foundations, floor slabs, stormwater management facilities and related earthwork are discussed in the following report. Dynamic Earth should remain involved to provide consultation and review during final design.

2.0 INTRODUCTION

2.1 Authorization

Dynamic Earth, LLC (Dynamic Earth) was authorized to conduct a geotechnical investigation in accordance with Dynamic Engineering Consulting, PC's proposal to Dr. Veerappan Subramanian of Somerset Therapeutics, LLC.

2.2 Purpose

The purpose of this subsurface exploration and analysis was to:

- ascertain the various soil profile components at test locations;
- estimate the engineering characteristics of the proposed foundation bearing and subgrade materials;
- provide geotechnical criteria for use by the design engineers in preparing the foundations, floor slab and pavement designs;
- provide recommendations for required earthwork and subgrade preparation;
- record seasonal high groundwater and groundwater levels at the time of the investigation and discuss the potential impact on the proposed construction; and
- recommend additional investigation, if warranted.

2.3 Scope

The scope of the exploration and analysis included site geologic research and evaluation, subsurface exploration, field testing and sampling, performing laboratory testing and geotechnical engineering analysis and evaluation of the subsurface materials. This *Report of Geotechnical Investigation* is limited to addressing the site conditions as they relate to the physical support of the proposed construction. Environmental conditions were not evaluated by Dynamic Earth.

2.3.1 Field Exploration

The investigation was conducted by means of seven soil borings (identified as borings B-1 through B-7) and four soil profile pits (identified as SPP-1 through SPP-4). The borings were performed using hollow stem auger drilling techniques with a truck-mounted drill-rig, and the soil profile pits were excavated with a rubber-tired backhoe. Test locations are summarized in the following table and are shown on the accompanying *Boring and Soil Profile Pit Location Plan*.

TEST LOCATION SUMMARY TABLE		
Number	**Proposed Location**	**Final Depth** [1] **(feet)**
B-1	Warehouse Expansion	6.0
B-2		7.0
B-3		6.5
B-4		5.5
B-5		7.0
B-6		6.5
B-7		7.5
SPP-1	Stormwater Management Facility	4.3
SPP-2		4.8
SPP-3		3.5
SPP-4		4.3

[1]Refusal was encountered at each location

The soil borings and soil profile pits were completed in the presence of a Dynamic Earth engineer who performed field tests, recorded visual classifications, and collected samples of the various strata encountered. The test locations were located in the field using conventional taping procedures with estimated right angles, and are presumed to be accurate within several feet of the location plotted on the plans.

Soil borings and standard penetration tests (SPTs) were conducted in general accordance with ASTM D6151 (*Standard Practice for Using Hollow-Stem Augers for Geotechnical Exploration and Soil Sampling*) and ASTM D1586 (*Standard Test Method for Standard Penetration Test and Split Barrel Sampling of Soils).* The SPT resistance value (N) is used extensively in conjunction with may correlations which relate to blow count, or SPT N-value to engineering behavior of soils to develop foundation and earthwork recommendations. Unconfined compressive strength (Q_p) values were assessed with a pocket penetrometer within the fine-grained soils and are correlated with the engineering behavior of soil to develop foundation and earthwork recommendations in fine-grained soils.

The soils encountered within soil profile pits were classified using the United States Department of Agriculture (USDA) classification system. Observations were made for groundwater and/or soil mottling and mineral deposits potentially indicative of zones of saturation or seasonal high groundwater. Soil logs are included in the Appendix of this report.

Groundwater level observations were recorded during and at the completion of field operations prior to backfilling the borings. Seasonal variations, temperature, anthropogenic, seasonality, soil permeability, and precipitation will influence the actual and observed groundwater levels.

Groundwater elevations derived from sources other than seasonally observed groundwater monitoring wells may not be representative of true groundwater levels.

2.3.2 Laboratory Testing Program

Physical/Textural Analysis: Each sample was visually classified in general accordance with ASTM D-2488 (visual-manual procedure). In addition, representative samples of selected strata encountered were subjected to a laboratory testing program which included moisture content determinations (ASTM D-2216), particle size distribution (ASTM D-6913) and washed gradation analyses (ASTM D1140) in order to perform supplementary engineering soil classifications in general accordance with ASTM D-2487. The soil strata tested were classified by the Unified Soil Classification System (USCS) and results of the laboratory testing are summarized in the following table:

PHYSICAL/TEXTURAL RESULTS					
Boring	Sample No.	Depth (feet)	Natural Moisture Content (%)	Percent Passing No. 200 (%)	USCS Classification
B-1	S-2	2-3.2	9.5	79.0	ML
B-7	S-3	4-5.1	9.9	56.0	ML

The engineering classifications are useful when considered in conjunction with the additional site data to estimate properties of the soil types encountered and to predict the soil's behavior under construction and service loads. Laboratory test results are provided in the appendix identified as *Laboratory Testing*.

3.0 SITE DESCRIPTION

3.1 Location and Description

The subject property is located at 300 Franklin Square Drive in the Township of Franklin, Somerset County, New Jersey and is further identified as Block 502.02, Lot 39.05. The subject site is bound to the north by Franklin Square Drive; to the east by Davidson Avenue; to the south by an existing hotel (Comfort Inn and Suites); and to the west by an existing parking lot part of the adjacent commercial property (Philips Lighting). The site of the proposed construction is shown on the attached *Boring and Soil Profile Pit Location Plan*.

3.2 Existing Conditions

Surface Cover: At the time of Dynamic Earth's investigation, the subject site was developed with an existing two-story masonry building with associated pavement and utilities.

Topography: Topographic information was provided on an April 27, 2018 *Boundary and Topographic Survey* prepared by Dynamic Survey, LLC. Site elevations ranged between 73 feet above mean sea elevation (mse) within the eastern portion of the property and 61 feet above mse within the north eastern and north western portion of the property.

Site Drainage: Surface runoff generally appears to follow existing site topography toward inlet structures located along adjacent roadways. The terminus of the pipes have not been assessed or determined as part of this investigation.

3.3 Proposed Construction

The proposed site improvements are expected to include the construction of an addition to the west of the existing warehouse and is expected to occupy a footprint area of approximately 18,396 square feet. The site development will also include associated stormwater management facilities, pavement and utilities. The proposed site improvements were provided on a March 17, 2017 *Conceptual Site Plan 'A'*.

The maximum anticipated loads were preliminarily assumed based on similar projects and are expected to be as follows:

- wall loads – 2.5 kips per linear foot;
- column loads - 120 kips; and
- floor slab loads - 125 pounds per square foot.

The scope of Dynamic Earth's investigation and the professional advice contained in this report were generated based on the project details and loading noted herein. Any revisions or additions to the design details enumerated in this report should be brought to the attention of Dynamic Earth for additional evaluation as warranted.

4.0 SUBSURFACE CONDITIONS

4.1 Site Geology

The subject property is located within the Piedmont physiographic province of New Jersey and is situated in the Newark Basin Geomorphic Province. Specifically, this area is underlain by the Lower Jurassic and Upper Triassic Passaic Formation, which is predominantly composed of reddish-brown to brownish-purple and grayish-red argillaceous siltstone; silty-mudstone; argillaceous, very-fine-grained sandstone; and shale.

Overburden materials mapped within the subject site include weathered shale, mudstone and sandstone formed during the Pleistocene age. This material generally includes reddish-brown, yellow, and light-grey silty-sand to silty-clay with shale, mudstone or sandstone fragments. Overburden materials also include man-made fills.

4.2 Soil Survey

Based on a review of the United States Department of Agriculture – Natural Resources Conservation Services (USDA-NRCS) soil survey the following soil resources are mapped underlying the site within the area of the proposed site improvements and are described below:

Penn Silt Loam, two to six percent slopes (PenB): The typical soil profile of this soil series (as reported in the soil survey) consists of silt loam to a depth of 12 inches; channery silt loam to a depth of 25 inches; very channery silt loam to 30 inches; underlain by bedrock (limit of the report). The depth to the groundwater table is reported to be greater than 80 inches below the natural ground surface.

4.3 Subsurface Soil Profile

Details of the subsurface materials encountered are presented on the *Records of Subsurface Exploration* presented in the Appendix of this report. The subsurface soil conditions encountered in the soil borings and soil profile pits were generally consistent with the subsurface conditions mapped for the site and consisted of the following generalized strata in order of increasing depth.

Surface Cover: Soil borings were performed within existing pavement and landscape areas. Tests performed within existing pavement areas encountered one inch to 3.5 inches of asphaltic concrete at the surface. Tests performed within existing landscape areas encountered two inches to eight inches of topsoil at the surface.

Existing Fill Material: Beneath the surface cover, existing fill material was encountered that generally consisted of gravel, sand and clay with variable amounts of silt and debris. The debris encountered included asphalt, glass, rope and brick. The existing debris was generally encountered within proposed stormwater management facility areas. The existing fill material was encountered to depths ranging between approximately one foot and four feet below the ground surface. A Standard Penetration Test (SPT) N-value of six blows per foot (bpf) was encountered within the coarse-grained soils. An unconfined compressive strength (Q_p) pocket penetration test value of 0.25 tons per square foot (tsf) was recorded within the fine-grained soils.

Residual Soils: Beneath the surficial cover and/or existing fill material, natural residual soils were encountered that generally consisted of gravel (USCS: GP-GM) and sand (USCS: SM) with variable amounts of silt. The natural residual soils were encountered to depths ranging between approximately 2.5 feet and 4.5 feet below the ground surface. SPT N-values ranged between 24 bpf and 30 bpf, and averaged 27 bpf; generally indicating a medium dense condition.

Weathered Rock/Top of Rock: Beneath the existing fill material and/or residual soils, weathered rock was encountered that generally consisted of gravel (USCS:GP-GM) and silt (USCS: ML) with variable amounts of sand and clay. The weathered rock was encountered to depths ranging between approximately 3.5 feet and 7.5 feet below the ground surface. Split spoon sampler refusal was generally encountered within this stratum, indicating a very dense condition. Auger refusal is anticipated to be the top of rock.

4.4 Seasonal High Groundwater and Groundwater

Seasonal high groundwater and groundwater were not encountered during our investigation. However, soil mottling was encountered to depths ranging between approximately 2.7 feet and 3.2 feet below the ground surface. The soil mottling is likely due to a perched groundwater above the rock stratum. Groundwater levels are expected to fluctuate seasonally, and following significant periods of precipitation.

5.0 CONCLUSIONS AND RECOMMENDATIONS

5.1 General

Proposed foundations are expected to bear partially within existing fill material and partially within natural material, residual soils and/or weathered rock. The existing fill material is not suitable for direct foundation support without the risk of excessive settlement. Dynamic Earth recommends overexcavating the existing fill material (were encountered) below proposed foundations and replacement with approved compacted structural fill material. Following overexcavation and replacement, the proposed building may be supported on a conventional shallow foundation system bearing within structural fill material or approved natural residual soils and/or weathered rock. The existing fill material is preliminarily anticipated to be suitable for support of the proposed floor slab, provided the material is properly inspected by a Dynamic Earth geotechnical engineer as detailed herein.

The recommendations presented herein are sufficient to support the initial design and planning phase. These recommendations are contingent on the assumption that Dynamic Earth will remain involved in the final design process and that Dynamic Earth will be engaged to conduct the necessary construction phase geotechnical testing and inspection to ensure these recommendations are properly implemented.

5.2 Site Preparation and Earthwork

Surface Cover Stripping: Prior to stripping operations, all utilities should be identified and secured. The surface cover materials, including vegetation and topsoil, should be removed from within, and at least five feet beyond, the limits of the proposed building and new pavement areas as well as any other area which will require fill placement. Removal of trees should include root mats and tree stumps.

Surface Preparation/Proofrolling: Prior to placing any fill or subbase materials to raise or restore grades to the desired building pad or pavement subgrade elevations, the existing exposed soils should be compacted to a firm and unyielding surface with several passes in two perpendicular directions with a vibratory, smooth drum roller during favorable moisture conditions. The drum roller should be operated in the static mode or a kneading "sheepsfoot" roller should be used if fine-grained soils (such as within the existing fill layer) are encountered at the subgrade elevation. The surface then should be proofrolled with a loaded tandem axle truck in the presence of Dynamic Earth to help identify soft or loose pockets which may require removal and replacement or further investigation. Dynamic Earth anticipates at least partial overexcavation if the subgrade is wetted or subjected to repeated construction traffic. Any fill or backfill should be placed and compacted in accordance with Section 5.3.

Subgrade Protection and Inspection: Portions of the on-site soils are considered moisture sensitive and every effort should be made to minimize disturbance of the on-site soils by construction traffic and surface runoff. The on-site soils with higher amounts of silt and clay will likely become unsuitable if exposed to moisture and/or construction traffic. Therefore, the subgrades should be sealed daily and construction traffic be minimized to designated non-structural areas and following periods of precipitation as an attempt to minimize deterioration of otherwise suitable subgrade soils. If these materials become overly wetted, the on-site soils may require increased handling such as discing and drying during extended periods of favorable weather and/or partial overexcavation and geogrid stabilization. A triaxial geogrid such as Tensor TX5 or TX7, may be used for excessively soft or pumping conditions as directed by the geotechnical engineer. Dynamic Earth should be retained as the Geotechnical Engineer of Record to inspect soil conditions during construction and verify the suitability of prepared foundation, floor slab and pavement subgrades for support of design loads.

Difficult Excavation: Difficult auger advancement and auger refusal was encountered at depths as shallow as 3.5 feet below the ground surface. Depending on final invert elevations, difficult excavation to remove cobbles/boulders and/or weathered rock should be anticipated during construction.

While small boulder and cobble sized rock may typically be removed with conventional excavation equipment, heavy excavating equipment with rock ripping tools may be required for larger boulders and/or to remove only the uppermost weathered rock. The speed and ease of excavation will depend on the type of grading equipment, the skill of the equipment operators, and the geologic structure of the material itself, such as the direction of bedding, planes of weakness, and spacing between discontinuities. Planned excavation depths beyond refusal depths will likely require pneumatic hammers to remove the rock.

Earthwork during Freezing Weather: When temperatures fall below freezing for periods of time, the moisture within the soil matrix will freeze. Fine grained soils have a higher susceptibility to frost than well drained granular soils and could freeze at fast rates. Frost susceptible soils will often become unstable once they thaw, even if the material is properly placed and compacted. As such, special construction methods, additional handling and/or construction sequencing should be planned when weather forecasts predict periods of freezing ambient air temperatures. **Fill and subbase material should not be placed on water, snow, ice, or frozen soil.** Subgrade materials that freeze will need to be removed and replaced with suitable structural fill material prior to placement of subsequent fill layers, subbase material and/or surficial cover material as detailed throughout this report. Frozen soils are not suitable for placement as structural fill material and generally need to be exported from the site, unless construction schedules allow for stockpiling and drying of these materials during warmer weather. The contractor should be responsible for

including budgetary rates for earthwork during periods of potential freezing weather and for protection against freezing subgrades.

5.3 Structural Fill and Backfill

Import/On-site Structural Fill Material: Soils placed as structural fill material should consist of well graded sand or gravel with a maximum particle size of three inches in diameter and less than 15 percent of material passing the number 200 sieve. These materials should be free of objectionable debris (clay clumps, organic and/or deleterious material, etc.) and within moisture contents suitable for compaction. Alternative soil types with higher percentages of silt and clay may be considered, provided that the contractor is able to achieve proper compaction and maintain suitable subgrade once the material is placed. Fine-grained soils and/or granular soils with higher percentages of silt and clay are extremely moisture sensitive and will only be suitable for reuse as structural fill material during ideal weather conditions. Materials that are wetted beyond the optimum moisture content; contain oversized rock or debris; and/or contain increased amounts of objectionable debris will not be suitable for reuse as structural fill material without special handling. As such, the contractor should be responsible for importing structural fill material and/or processing on-site soils as required so that these materials are suitable for structural fill placement.

If encountered cobbles/boulders and oversized debris greater than three inches in diameter will need to be separated from on-site soils to be placed as structural fill. Approved material between three to 12 inches in diameter may be crushed or individually placed in fill layers deeper than two feet below proposed subgrade levels. Care must be taken to individually seat any large particles and to compact soil around large particles with hand operated equipment to minimize the risk of void formation. The larger material should not be placed near areas of the proposed utility or planned excavation. Boulders larger than approximately 12 inches are not expected to be adequate for use as fill or backfill and should be removed from the site or crushed to an adequate size.

The on-site soils encountered included existing fill material, residual soils, weathered rock and rock. The on-site soils are preliminarily expected to be suitable for reuse as structural fill material, provided moisture contents are within tolerable limits to achieve compaction and oversized and deleterious debris is seperated. In addition, portions of these materials are considered moisture sensitive and may require moisture conditioning and/or become impractical for reuse if exposed to periods of moisture. Reuse of the on-site soils will be contingent upon further evaluation during construction.

Compaction and Placement Requirements: Structural fill and backfill should be placed in maximum 12 inch loose lifts and compacted to 95 percent of the maximum dry density as determined by ASTM D1557 (Modified Proctor). Variations in moisture content may be acceptable subject to Dynamic Earth's on site geotechnical engineer's approval if the contractor is

able to achieve the necessary compaction. Dynamic Earth recommends using a drum roller to compact subgrade soils beneath larger areas such as pavements or slabs. Hand operated vibratory jumping jacks and plate compactors should be used in confined excavations for foundations or utilities. Fill material compacted with relatively light weight equipment or with drum roller in the static mode may require additional passes and/or the material may need to be placed in thinner, loose lifts.

Structural Fill Testing: Before filling operations begin, representative samples of each proposed fill material (on-site and imported) should be collected. The samples should be tested to determine the maximum dry density (ASTM D1557), optimum moisture content (ASTM D1557), natural moisture content (ASTM D2216), gradation (ASTM D6913), and plasticity (ASTM D4318) of the soil. These tests are needed for quality control during compaction and also to determine if the fill material is acceptable. The placement of all fill and backfill should be monitored by Dynamic Earth's geotechnical engineer or technician to ensure that the specified material and lift thicknesses are properly installed. A sufficient number of in-place density tests should be performed during fill placement to ensure that the specified compaction is achieved throughout the area and height of the fill or backfill.

5.4 Groundwater Control

Groundwater levels are expected to be deeper than proposed foundation and utility excavations and the need for extensive dewatering or permanent groundwater control is not anticipated for this project.

The contractor should anticipate the use of gravity fed sump pumps for construction phase dewatering of surface runoff, perched and infiltrating water, especially following wet weather periods. Surface water runoff must be controlled and diverted away from construction areas by grading and limiting the exposure of excavations to rainfall.

5.5 Foundations

Anticipated Bearing Strata: Proposed foundations are expected to bear partially within existing fill material, residual soils and/or weathered rock. As detailed throughout this report, the existing fill material (were encountered) will need to be overexcavated and replaced with approved structural fill material.

Shallow Foundation Design Criteria: Following overexcavation and replacement, Dynamic Earth recommends supporting the proposed structures on conventional shallow foundations bearing within structural fill material, residual soils and/or weathered rock. Foundations may be preliminarily designed to impart a maximum allowable net bearing pressure of 3,000 pounds per

square foot (psf). Foundations designed/extended to bear deeper to the underlying bedrock may be designed to impart a maximum allowable net bearing pressure of 4,000 psf. Regardless of loading conditions or ground improvement methods proposed foundations should be sized no less than the minimum dimensions of 24 inches for continuous wall footings, and 36 inches for isolated column footings.

Any footings subject to tension loads should be designed so that the maximum toe pressure due to the combined effect of vertical loads and overturning moment does not exceed the recommended maximum allowable net bearing pressure recommended above. In addition, positive contact pressure should be maintained throughout the base of the footings such that no uplift or tension exists between the base of the footings (vertically along the face of the foundation) should be neglected.

Lateral resistance should be provided by friction on the base of the footing with a recommended coefficient of friction against sliding:

- Formed concrete on gravel subbase material – 0.40;
- Mass concrete on gravel subbase material – 0.50; and
- Mass concrete on on-site natural soils - 0.35.

Partial Rock Support: Footings should not bear partially on rock and partially on soil due to the risk of brittle fracture at hinging points. Any foundation subgrades that would result in partially supported rock conditions should be overexcavated an additional six inches and replaced with well graded, compacted structural fill, per Section 5.3, to provide a cushion against brittle fracture. Alternatively, isolated spread footings may be extended to bear entirely on rock.

Frost Coverage: Exterior footings or foundations not protected from extreme temperatures should be placed at least 36 inches below adjacent exterior grades or as required by the local building code to provide protection from frost heave. Interior footings or foundations protected from extreme temperature (including during the period of construction) may be placed at a minimum depth of 18 inches below the slab subgrade.

Inspection/Overexcavation Criteria: As described in previous sections, existing fill material will need to be overexcavated below proposed foundations (were encountered). As such, a level of inspection and testing beyond routine footing bottom verification, by a testing laboratory will be required. Therefore, the suitability of the bearing soils along and below the footing bottoms should be verified by Dynamic Earth's geotechnical engineer prior to placing concrete. Any foundation overexcavation to be restored with structural fill must be excavated one foot laterally for each foot of vertical overexcavation. We recommend performing the overexcavation of unsuitable foundation subgrade soils prior to placing new fill material and subsequent to laying

out the proposed building foundations. Alternatively, lateral overexcavation may be minimized by backfilling the resulting overexcavation with lean concrete or flowable fill material.

Settlement: Dynamic Earth estimates post construction settlements of proposed building foundations to be less than one inch if the recommendations outlined in this report are properly implemented. Differential settlements of building foundations should be less than one-half inch.

5.6 Floor Slab

Properly prepared and inspected on-site soils are preliminarily expected to be suitable for support of proposed floor slabs. **Due to the potential variability of the existing fill material, at least partial overexcavation and replacement should be expected.** Furthermore, in-place densification and/or limited correlation and recompaction of loose existing fill material may be required. Any areas that become softened or disturbed as a result of wetting and/or repeated exposure to construction traffic should be removed and replaced with compacted structural fill. The properly prepared on-site soils are expected to yield a minimum subgrade modulus (k) of 125 psi/in.

A minimum four-inch layer of stone should be installed below the floor slabs to provide a capillary break. A vapor barrier beneath the floor slab is recommended. Total and post-construction settlements of floor slabs installed in accordance with the recommendations outlined in this report are estimated to be less than one-quarter inch.

5.7 Pavement Design Criteria

New pavement was not proposed at the time of this report. If new pavement areas are proposed, Dynamic Earth can assist with pavement design criteria.

5.8 Retaining Walls and Lateral Earth Pressures

Retaining walls and structures requiring lateral earth pressures were not identified at this time. Dynamic Earth should be notified if structures requiring lateral earth pressure estimates subsequently are proposed.

5.9 Seismic and Liquefaction Considerations

The soils are most consistent with a Site Class C defined by the *International Building Code*. Based on the seismic zone and soil profile, liquefaction considerations are not expected to have a substantial impact on design.

5.10 Temporary Excavations

The natural granular soils encountered during the investigation are consistent with Type C Soil Conditions as defined by 29 CFR Part 1926 (OSHA) which require a maximum unbraced excavation angle of 1.5:1 (horizontal:vertical). Actual conditions encountered during construction should be evaluated by a competent person (as defined by OSHA) to ensure that safe excavation methods and/or shoring and bracing requirements are implemented.

5.11 Seasonal High Groundwater and Soil Permeability

Seasonal high groundwater and groundwater was not encountered during our investigation. However, soil mottling was encountered to depths ranging between 2.7 feet and 3.2 feet below the ground surface. The soil mottling is anticipated to be due to a perched groundwater above the rock stratum. A summary of the seasonal high groundwater levels are presented in the following table:

SEASONAL HIGH GROUNDWATER SUMMARY					
Location	**Surface Elevation (mse)**	**Mottling Depth**		**Estimated Seasonal High Groundwater**	
		Depth (feet)	**Elevation (mse)**	**Depth (feet)**	**Elevation (mse)**
SPP-1	65.5	3.2	63.30	Not Encountered	
SPP-2	70.0	3.0	67.0	Not Encountered	
SPP-3	68.0	2.5	65.5	Not Encountered	
SPP-4	68.0	2.7	65.3	Not Encountered	

Tube permeameter samples were not collected due to the relatively coarse material and rock stratum encountered. If design permeability rates are required, Dynamic Earth recommends performing basin flood testing in accordance with the *New Jersey Best Management Practices Manual – Appendix E*.

5.12 Supplemental Post-Investigation Services

Construction Phase Inspection of Existing Fill Soils: The conditions disclosed by the soil borings preliminarily indicate that the existing fill material may be suitable for proposed floor slab support if evaluated and prepared as described herein. Existing fill material beneath the proposed building will need to be overexcavated and replaced with structural backfill in a controlled manner. However, there is a potential risk of variability in existing fill which may not be disclosed solely by soil borings because conventional auguring and split-spoon sampling only reveal a very limited section of subsurface materials. Therefore, the composition of the existing fill should be verified by visual observation and test pit excavations prior to or during the early phase of construction to enable further assessment of the depth, possible presence of voids, uncontrolled conditions, or

possible deleterious materials. If unsuitable conditions are encountered, alternative recommendations, possibly including additional overexcavation and replacement, may be required.

Construction Monitoring and Testing: The recommendations presented herein are contingent on the owner retaining Dynamic Earth to perform inspection, testing, and consultation during construction as described in previous sections of this report. **Construction phase evaluation by Dynamic Earth should be performed to further evaluate the lateral extent of existing fill material and make sure unsuitable soils are removed from below proposed foundations.** In addition, limited overexcavation and replacement of fill material within floor slab areas and/or special handling should be expected. **Construction phase evaluation by means of dynamic cone penetrometer (DCP) testing should be performed on the natural soils in order to confirm design bearing capacities for the proposed structures.** Monitoring and testing should also be performed to verify that suitable materials are used for controlled fill, and that they are properly placed and compacted over suitable subgrade soils. Testing of fill placement will also be critical to limiting differential settlement.

6.0 GENERAL COMMENTS

Supplemental recommendations may be required upon finalization of construction plans or if significant changes are made in the characteristics or location of the proposed structure. Dynamic Earth should be included as a consultant to the design team and should be provided final plans for review to confirm these criteria apply or to modify recommendations as necessary.

The recommendations presented herein should be utilized by a qualified engineer in preparing the project plans and specifications. The engineer should consider these recommendations as minimum physical standards that may be superseded by local and regional building codes and structural considerations. These recommendations are prepared for the use of the client for the specific project detailed and should not be used by any third party. These recommendations are relevant to the design phase and should not be substituted for construction specifications.

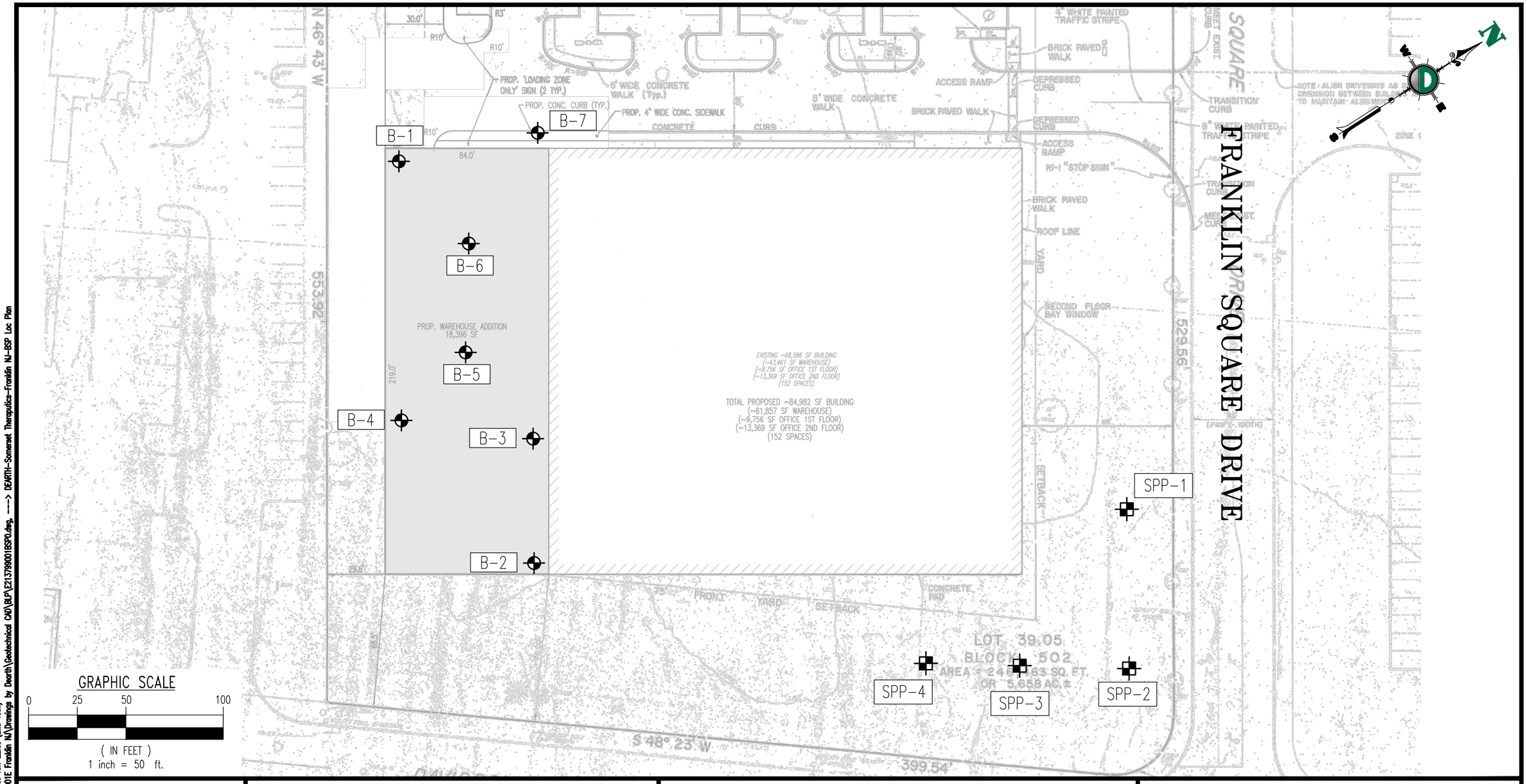
The possibility exists that conditions between borings may differ from those at specific boring locations, and conditions may not be as anticipated by the designers or contractors. In addition, the construction process may itself alter soil conditions. Therefore, Dynamic Earth's Geotechnical Engineers or their representatives should observe and document the construction procedures used and the conditions encountered, as well as conduct testing and inspection to ensure the design criteria are met or recommendations to address deviations are implemented.

Dynamic Earth assumes that a qualified contractor will be employed to perform the construction work, and that the contractor will be required to exercise care to ensure all excavations are performed in accordance with applicable regulations and good practice. Particular attention should be paid to avoiding damaging or undermining adjacent properties and maintaining slope stability.

The exploration and analysis of the foundation conditions reported herein are presented to form a reasonable basis for foundation design. The recommendations submitted for the proposed construction are based on the available soil information and the preliminary design details furnished or assumed. Deviations from the noted subsurface conditions encountered during construction should be brought to the attention of the geotechnical engineer.

The geotechnical engineer warrants that the findings, recommendations, specifications, or professional advice contained herein have been promulgated after being prepared in accordance with generally accepted professional engineering practice in the fields of foundation engineering, soil mechanics, and engineering geology. No other warranties are implied or expressed.

Soil Boring & Soil Profile Pit Location Plan



SCALE: (H) 1"=50' (V)

JOB No: 2137-99-001E

SHEET No: 1 OF 1

DRAWN BY: KJH

DESIGNED BY: SH

CHECKED BY: PG

DATE: 04/23/18

TITLE:
BORING & SOIL PROFILE PIT LOCATION PLAN

PROJECT: **SOMERSET THERAPUTICS, LLC.**
PROPOSED WAREHOUSE EXPANSION
BLOCK 502.02, LOT 39.05
300 FRANKLIN SQUARE DRIVE
TOWNSHIP OF FRANKLIN, SOMERSET COUNTY, NEW JERSEY

Rev. # 0

DEC Client Code: 2137

LEGEND:

SPP-X — APPROXIMATE SOIL PROFILE PIT LOCATION

B-X — APPROXIMATE BORING LOCATION

NOTES:
1. THIS PLAN HAS BEEN PREPARED BASED ON A CONCEPTUAL SITE PLAN 'A' PREPARED ON 03/17/17 BY DYNAMIC ENGINEERING, LLC.
2. THIS PLAN IS NOT FOR CONSTRUCTION AND WAS PREPARED TO ILLUSTRATE TEST LOCATIONS ONLY, AND MAY NOT REFLECT THE MOST CURRENT REVISION OF THE BASE PLAN.

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Plotted: 04/23/18 - 5:06 PM, By: kheege, - Product Ver: 22.0a (LMS Tech)
File: C:\EARTH Projects\2137 Somerset Therapeutics\99 001E Franklin NJ\Drawings by Dearth\Geotechnical CAD\BLP\2137990018SPP0.dwg, ----> DEARTH-Somerset Therapeutics-Franklin NJ-BSP Loc Plan

Records of Subsurface Exploration

DYNAMIC EARTH

BORING LOG

Boring No.: B-1

Project:	Proposed Warehouse Expansion	**Proj. No.:**	2137-99-001E
Location:	300 Franklin Square Drive, Township of Franklin, Somerset County, New Jersey	**Client:**	Somerset Theraputics, LLC

				Groundwater Data	Depth (ft)	El. (mse)	Additional Groundwater Data	Depth (ft)	El. (mse)
Surface Elevation:	62.5 mse	**Date Started:**	4/2/18						
Termination Depth:	6.0 feet	**Date Completed:**	4/2/18						
Proposed Location:	Building	**Logged by:**	S. Hume	**While Drilling:** ▽	NE	--			
Drill/Test Method:	HSA/SPT	**Contractor:**	FM&W	**At Completion:** ▼	NE	--			
Hammer Type:	Automatic	**Rig Type:**	CME55						

Sample Information							Depth (ft)	Strata	DESCRIPTION OF MATERIALS (Classification)	Remarks
Depth (Feet)	Number	Type	Rec (in)	RQD %	Blows per 6" or drill time (min/ft)	N				
0.5-2	S-1	SS	12	--	-- 5 / 6 14	30		Surface Cover	3.5" Asphaltic Concrete	
								Fill	Dark gray coarse to fine gravel, some coarse to fine sand, moist (FILL)	
								Residual Soils	Reddish-brown coarse to fine sand, some coarse to fine gravel, little silt, moist (SM)	
2-3.2	S-2	SS	16	--	35 43 / 50/2"	93/8"			Reddish-brown clayey silt, little coarse to fine silt, trace fine gravel, moist, very dense (ML)	
								Weathered Rock		
4-4.4	S-3	SS	2	--	50/5"	50/5"	5		As above (ML)	
6-6	--	SS	NR	--	50/0"	50/0"			No Recovery	
									Boring B-1 encountered refusal at approximately 6.0 feet below the ground surface.	
							10			
							15			
							20			
							25			

DYNAMIC EARTH

BORING LOG

Boring No.: B-2

Project:	Proposed Warehouse Expansion	**Proj. No.:**	2137-99-001E
Location:	300 Franklin Square Drive, Township of Franklin, Somerset County, New Jersey	**Client:**	Somerset Theraputics, LLC
Surface Elevation:	65.5 mse	**Date Started:**	4/2/18
Termination Depth:	7.0 feet	**Date Completed:**	4/2/18
Proposed Location:	Building	**Logged by:**	S. Hume
Drill/Test Method:	HSA/SPT	**Contractor:**	FM&W
Hammer Type:	Automatic	**Rig Type:**	CME55

Groundwater Data	**Depth (ft)**	**El. (mse)**	**Additional Groundwater Data**	**Depth (ft)**	**El. (mse)**
While Drilling: ▽	NE	--			
At Completion: ▼	NE	--			

Sample Information									
Depth (Feet)	Number	Type	Rec (in)	RQD %	Blows per 6" or drill time (min/ft)	N	Depth (ft)	Strata	DESCRIPTION OF MATERIALS (Classification)	Remarks
0-2	S-1	SS	12	--	W.O.H. 1 / 5 38	6		Surface Cover	2" Grass/Topsoil	
								Fill	Brown clay, little silt, wet (FILL)	Qp=0.25 tsf
2-2.8	S-2	SS	6	--	35 50/3"	50/3"			Reddish-brown clayey silt, little coarse to fine sand, trace fine gravel, moist, very dense (ML)	
4-4.3	S-3	SS	2	--	50/4"	50/4"		Weathered Rock	As above (ML)	
							5			
6-6.1	--	SS	NR	--	50/1"	50/1"			No Recovery	
									Boring B-2 encountered refusal at approximately 7.0 feet below the ground surface.	Auger Refusal
							10			
							15			
							20			
							25			

DYNAMIC EARTH

BORING LOG

Boring No.: B-3

Project:	Proposed Warehouse Expansion	**Proj. No.:**	2137-99-001E
Location:	300 Franklin Square Drive, Township of Franklin, Somerset County, New Jersey	**Client:**	Somerset Theraputics, LLC
Surface Elevation:	65.4 mse	**Date Started:**	4/2/18
Termination Depth:	6.5 feet	**Date Completed:**	4/2/18
Proposed Location:	Building	**Logged by:**	S. Hume
Drill/Test Method:	HSA/SPT	**Contractor:**	FM&W
Hammer Type:	Automatic	**Rig Type:**	CME55

Groundwater Data	Depth (ft)	El. (mse)	Additional Groundwater Data	Depth (ft)	El. (mse)
While Drilling: ▽	NE	--			
At Completion: ▼	NE	--			

Sample Information									
Depth (Feet)	Number	Type	Rec (in)	RQD %	Blows per 6" or drill time (min/ft)	N	Depth (ft)	Strata	DESCRIPTION OF MATERIALS (Classification)	Remarks
0-1.9	S-1	SS	12	--	1 4 / 24 50/5"	28		Surface Cover	3" Grass/Topsoil	
								Residual Soils	Reddish brown coarse to fine gravel, little coarse to fine sand, little silt, trace clay, moist, very dense (GP-GM)	
3-3.4	S-2	SS	3	--	50/5"	50/5"		Weathered Rock	Reddish brown coarse to fine gravel, little coarse to fine sand, little silt, trace clay, moist, very dense (GP-GM)	
5-5.3	S-3	SS	3	--	50/3"	50/3"	5		As above (GP-GM)	
									Boring B-3 encountered refusal at approximately 6.5 feet below the ground surface.	Auger Refusal
							10			
							15			
							20			
							25			

DYNAMIC EARTH

BORING LOG

Boring No.: B-4

Project:	Proposed Warehouse Expansion	**Proj. No.:**	2137-99-001E
Location:	300 Franklin Square Drive, Township of Franklin, Somerset County, New Jersey	**Client:**	Somerset Theraputics, LLC

				Groundwater Data	Depth (ft)	El. (mse)	Additional Groundwater Data	Depth (ft)	El. (mse)
Surface Elevation:	65.4 mse	**Date Started:**	4/2/18						
Termination Depth:	5.5 feet	**Date Completed:**	4/2/18						
Proposed Location:	Building	**Logged by:**	S. Hume	**While Drilling:** ▽	NE	--			
Drill/Test Method:	HSA/SPT	**Contractor:**	FM&W	**At Completion:** ▼	NE	--			
Hammer Type:	Automatic	**Rig Type:**	CME55						

Sample Information							Depth (ft)	Strata	DESCRIPTION OF MATERIALS (Classification)	Remarks
Depth (Feet)	Number	Type	Rec (in)	RQD %	Blows per 6" or drill time (min/ft)	N				
0-1.9	S-1A/B	SS	12	--	- 4 / 20 50/5"	70/11"		Surface Cover	1" Asphaltic Concrete	
								Fill	Dark gray coarse to fine gravel, some coarse to fine sand, moist (FILL)	
								Weathered Rock	Reddish brown coarse to fine gravel, little coarse to fine sand, trace silt, moist , very dense (GP-GM)	
2-2.1	--	SS	NR	--	50/1"	50/1"			No Recovery	
4-4.4	S-2	SS	2	--	50/5"	50/5"	5		As above, very dense (GP-GM)	
							10		Boring B-4 encountered refusal at approximately 5.5 feet below the ground surface.	Auger Refusal
							15			
							20			
							25			

DYNAMIC EARTH

BORING LOG

Boring No.: B-5

Project:	Proposed Warehouse Expansion	**Proj. No.:**	2137-99-001E
Location:	300 Franklin Square Drive, Township of Franklin, Somerset County, New Jersey	**Client:**	Somerset Theraputics, LLC

				Groundwater Data	Depth (ft)	El. (mse)	Additional Groundwater Data	Depth (ft)	El. (mse)
Surface Elevation:	64.0 mse	**Date Started:**	4/2/18						
Termination Depth:	7.0 feet	**Date Completed:**	4/2/18						
Proposed Location:	Building	**Logged by:**	S. Hume	**While Drilling:** ▽	NE	--			
Drill/Test Method:	HSA/SPT	**Contractor:**	FM&W	**At Completion:** ▼	NE	--			
Hammer Type:	Automatic	**Rig Type:**	CME55						

Sample Information							Depth (ft)	Strata	DESCRIPTION OF MATERIALS (Classification)	Remarks
Depth (Feet)	Number	Type	Rec (in)	RQD %	Blows per 6" or drill time (min/ft)	N				
								Surface Cover	3" Asphaltic Concrete	
0.5-1.9	S-1	SS	12	--	-- 5 / 27 50/5"	77/11"		Fill	Dark gray coarse to fine gravel, some coarse to fine sand, moist (FILL)	
									Reddish brown coarse to fine gravel, little coarse to fine sand, little silt, trace clay, moist, very dense (GP-GM)	
2-2.3	--	SS	NR	--	50/3"	50/3"			As above (GP-GM)	
								Weathered Rock		
4-4.9	S-2	SS	8	--	19 50/5"	50/5"	5		As above (GP-GM)	
									Dark reddish brown coarse to fine gravel, little coarse to fine sand, trace silt, moist (GP-GM)	Sample identified from auger cuttings
									Boring B-5 encountered refusal at approximately 7.0 feet below the ground surface.	Auger Refusal
							10			
							15			
							20			
							25			

DYNAMIC EARTH

BORING LOG

Boring No.: B-6

Project:	Proposed Warehouse Expansion	**Proj. No.:**	2137-99-001E
Location:	300 Franklin Square Drive, Township of Franklin, Somerset County, New Jersey	**Client:**	Somerset Theraputics, LLC
Surface Elevation:	61.5 mse	**Date Started:**	4/2/18
Termination Depth:	6.5 feet	**Date Completed:**	4/2/18
Proposed Location:	Building	**Logged by:**	S. Hume
Drill/Test Method:	HSA/SPT	**Contractor:**	FM&W
Hammer Type:	Automatic	**Rig Type:**	CME55

Groundwater Data	Depth (ft)	El. (mse)	Additional Groundwater Data	Depth (ft)	El. (mse)
While Drilling: ▽	NE	--			
At Completion: ▼	NE	--			

Sample Information									
Depth (Feet)	Number	Type	Rec (in)	RQD %	Blows per 6" or drill time (min/ft)	N	Depth (ft)	Strata	DESCRIPTION OF MATERIALS (Classification)	Remarks
0.5-1.7	S-1	SS	12	--	-- 6 / 24 50/5"	74/11"		Surface Cover	3" Asphaltic Concrete	
								Fill	Dark gray coarse to fine gravel, some coarse to fine sand, moist (FILL)	
								Weathered Rock	Reddish brown coarse to fine gravel, little coarse to fine sand, little silt, trace clay, moist, very dense (GP-GM)	
3-3.4	S-2	SS	3	--	50/5"	50/5"			As above (GP-GM)	
							5			
5-5.5	--	NR	3	--	50/0"	50/0"			No Recovery	
									Boring B-6 encountered refusal at approximately 6.5 feet below the ground surface.	Auger Refusal
							10			
							15			
							20			
							25			

DYNAMIC EARTH

BORING LOG

Boring No.: B-7

Project:	Proposed Warehouse Expansion	**Proj. No.:**	2137-99-001E
Location:	300 Franklin Square Drive, Township of Franklin, Somerset County, New Jersey	**Client:**	Somerset Theraputics, LLC
Surface Elevation:	62.6 mse	**Date Started:**	4/2/18
Termination Depth:	7.5 feet	**Date Completed:**	4/2/18
Proposed Location:	Building	**Logged by:**	S. Hume
Drill/Test Method:	HSA/SPT	**Contractor:**	FM&W
Hammer Type:	Automatic	**Rig Type:**	CME55

Groundwater Data	Depth (ft)	El. (mse)	Additional Groundwater Data	Depth (ft)	El. (mse)
While Drilling: ▽	NE	--	**Perched**	0.3	
At Completion: ▼	NE	--			

Sample Information									
Depth (Feet)	Number	Type	Rec (in)	RQD %	Blows per 6" or drill time (min/ft)	N	Depth (ft)	Strata	DESCRIPTION OF MATERIALS (Classification)	Remarks
0.5-2	S-1	SS	10	--	-- 2 / 4 20	24		Surface Cover	2.5" Asphaltic Concrete	
								Fill	Dark gray coarse to fine gravel, some coarse to fine sand, wet (FILL)	
								Residual Soils	Reddish brown coarse to fine gravel, little coarse to fine sand, little silt, trace clay, moist, very dense (GP-GM)	
2-2.9	S-2	SS	6	--	28 50/5"	50/5"				
									Red clayey silt, some coarse to fine sand, trace fine gravel, moist, very dense (GP-GM)	
4-5.1	S-3	SS	10	--	30 41 / 50/1"	91/7"	5	Weathered Rock	As above (ML)	
7-7.3	S-4	SS	2	--	50/4"	50/4"			As above (ML)	
									Boring B-7 encountered refusal at approximately 7.5 feet below the ground surface.	Auger Refusal
							10			
							15			
							20			
							25			

SOIL PROFILE PIT LOG

Soil Profile Pit: SPP- 1

Project: Proposed Warehouse Expansion | **Project No.:** 2137-99-001E

Location: 300 Franklin Square Drive, Township of Franklin, Somerset County, New Jersey | **Client:** Somerset Therapeutics, LLC

				Groundwater Data	Depth (Feet)	El (msl)	Groundwater Comments
Surface Elevation (ft):	66.5	**Date Started:**	4/3/18				
Termination Depth (ft):	4.3	**Date Completed:**	4/3/18				
Proposed Location:	SWM	**Logged by:**	S. Hume	**Seepage**	NE	--	
Excavation / Test Method:	Visual Observation	**Contractor:**	John's Lawn Service	**Groundwater**	NE	--	Grey 1 6/N grey mottles between 38-52 inches possibly due to a perched condition above bedrock.
		Rig Type:	Rubber Tire Backhoe	**Mottling**	3.2	63.3	

DEPTH (IN)	COLOR	SOIL TEXTURE	COARSE FRAGMENTS (%)				STRUCTURE			WATER CONTENT	CONSISTENCY			BOUNDARY		ROOTS		MOTTLING			SAMPLING			LAB RESULTS
							Shape	Grade	Size		Resistance to Rupture	Stickiness	Plasticity	Distinctness	Topography			Quantity	Size	Contrast	Type	Depth (in)	No.	
			CHANNERS	FLAGSTONES	STONES	BOULDERS																		
0-4	TOPSOIL Brown (7.5YR 4/2)	LOAM	10	<5	0	0	SUBANGULAR BLOCKY	WEAK	MEDIUM	MOIST	LOOSE	NONSTICKY	NONPLASTIC	CLEAR <2.5"	WAVY	CMN (20% MAX)	MEDIUM	NONE						
4-10	Dark Reddish Brown (5YR 3/2)	SANDY LOAM	10	5	0	0	SUBANGULAR BLOCKY	WEAK	MEDIUM	MOIST	LOOSE	NONSTICKY	NONPLASTIC	CLEAR <2.5"	SMOOTH	NONE		NONE			BAG	6	S-1	
10-14	Light Yellowish Brown (5YR 3/2)	SAND	<5	0	0	0	SINGLE GRAIN	STRUCTURELESS		MOIST	LOOSE	NONSTICKY	NONPLASTIC	CLEAR <2.5"	WAVY	NONE		NONE			BAG	12	S-2	
14-22	Dark Reddish Brown (5YR 4/3)	CHANNERY SILT LOAM	15	<5	0	0	SUBANGULAR BLOCKY	WEAK	FINE	MOIST	FRIABLE	NONSTICKY	NONPLASTIC	GRADUAL <5"	IRREGULAR	NONE		NONE			BAG	16	S-3	
22-30	Reddish Brown (5YR 4/3)	CHANNERY SILT LOAM	15	5	0	0	SUBANGULAR BLOCKY	WEAK	FINE	MOIST	FIRM	NONSTICKY	NONPLASTIC	GRADUAL <5"	WAVY	NONE		NONE			BAG	26	S-4	
30-38	Reddish Brown (5YR 4/3)	CHANNERY SILT LOAM	25	15	0	0	SUBANGULAR BLOCKY	WEAK	FINE	MOIST	FIRM	NONSTICKY	NONPLASTIC	CLEAR <2.5"	WAVY	FEW (5% MAX)	MEDIUM	NONE			BAG	32	S-5	
38-52	Reddish Brown (5YR 4/3)	VERY CHANNERY SILTY CLAY LOAM	45	35	0	0	ANGULAR BLOCKY	WEAK	COARSE	MOIST	HARD	SLIGHTLY STICKY	NONPLASTIC			NONE		CMN 2%-20%	FINE <5MM	DISTINCT	BAG	42	S-6	

Additional Remarks: 4" Topsoil encountered. Fill encountered to approximately 30 inches below ground surface. Debris included asphalt, glass and rope. Weathered rock encountered between 30 inches and 52 inches. Refusal at approximately 52 inches below ground surface on apparent rock.

SOIL PROFILE PIT LOG

Soil Profile Pit: SPP- 2

Project:	**Proposed Warehouse Expansion**	**Project No.:**	**2137-99-001E**
Location:	**300 Franklin Square Drive, Township of Franklin, Somerset County, New Jersey**	**Client:**	**Somerset Therapeutics, LLC**

Surface Elevation (ft):	70.0	**Date Started:**	4/3/18	**Groundwater Data**	**Depth (Feet)**	**El (msl)**
Termination Depth (ft):	4.3	**Date Completed:**	4/3/18			
Proposed Location:	SWM	**Logged by:**	S. Hume	**Seepage**	--	--
Excavation / Test Method:	Visual Observation	**Contractor:**	John's Lawn Service	**Groundwater**	--	--
		Rig Type:	Rubber Tire Backhoe	**Mottling**	3.0	67.0

Groundwater Comments

Grey 1 6/N grey mottles between 36-58 inches possibly due to a perched condition above bedrock.

DEPTH (IN)	COLOR	SOIL TEXTURE	COARSE FRAGMENTS (%)				STRUCTURE			WATER CONTENT	CONSISTENCY			BOUNDARY		ROOTS		MOTTLING			SAMPLING			LAB RESULTS
							Shape	Grade	Size		Resistance to Rupture	Stickiness	Plasticity	Distinctness	Topography			Quantity	Size	Contrast	Type	Depth (in)	No.	
0-6	TOPSOIL Brown (7.5YR 4/2)	LOAM	CHANNERS: 10	FLAGSTONES: <5	STONES: 0	BOULDERS: 0	SUBANGULAR BLOCKY	WEAK	MEDIUM	MOIST	LOOSE	NONSTICKY	NONPLASTIC	GRADUAL <5"	IRREGULAR	MNY (>20% MAX)	MEDIUM	NONE						
6-36	Reddish Brown (5YR 4/3)	CHANNERY SILT LOAM	CHANNERS: 25	COBBLES: 10	STONES: 0	BOULDERS: 0	SUBANGULAR BLOCKY	WEAK	FINE	MOIST	FRIABLE	SLIGHTLY STICKY	NONPLASTIC	GRADUAL <5"	IRREGULAR	FEW (5% MAX)	MEDIUM	NONE			BAG	12	S-1	
36-58	Reddish Brown (5YR 4/3)	VERY CHANNERY SANDY CLAY LOAM	CHANNERS: 45	FLAGSTONES: 30	STONES: 0	BOULDERS: 0	ANGULAR BLOCKY	WEAK	COARSE	MOIST	HARD	SLIGHTLY STICKY	NONPLASTIC			NONE		CMN 2%-20%	FINE <5MM	DISTINCT	BAG	42	S-2	

Additional Remarks: 6" Topsoil encountered. Fill encountered to approximately 36 inches below ground surface. Debris included asphalt, glass and rope. Weathered rock encountered between 36 inches and 58 inches. Refusal at approximately 58 inches below ground surface on apparent rock.

SOIL PROFILE PIT LOG

Soil Profile Pit: SPP- 3

Project:	**Proposed Warehouse Expansion**	**Project No.:**	**2137-99-001E**
Location:	**300 Franklin Square Drive, Township of Franklin, Somerset County, New Jersey**	**Client:**	**Somerset Therapeutics, LLC**

Surface Elevation (ft):	68.0	**Date Started:**	4/3/18	**Groundwater Data**	**Depth (Feet)**	**El (msl)**
Termination Depth (ft):	4.8	**Date Completed:**	4/3/18			
Proposed Location:	SWM	**Logged by:**	S. Hume	**Seepage**	NE	--
Excavation / Test Method:	Visual Observation	**Contractor:**	John's Lawn Service	**Groundwater**	NE	--
		Rig Type:	Rubber Tire Backhoe	**Mottling**	2.5	65.5

Groundwater Comments

Grey 1 6/N grey mottles between 30-42 inches possibly due to a perched condition above bedrock.

DEPTH (IN)	COLOR	SOIL TEXTURE	COARSE FRAGMENTS (%)				STRUCTURE			WATER CONTENT	CONSISTENCY			BOUNDARY		ROOTS		MOTTLING			SAMPLING			LAB RESULTS
							Shape	Grade	Size		Resistance to Rupture	Stickiness	Plasticity	Distinctness	Topography			Quantity	Size	Contrast	Type	Depth (in)	No.	
0-8	TOPSOIL Brown (7.5YR 4/2)	LOAM	CHANNERS	FLAGSTONES	STONES	BOULDERS	SUBANGULAR BLOCKY	WEAK	MEDIUM	MOIST	LOOSE	NONSTICKY	NONPLASTIC	GRADUAL <5"	IRREGULAR	MNY (>20% MAX)	MEDIUM	NONE						
			10	<5	0	0																		
8-30	Reddish Brown (5YR 4/3)	CHANNERY SILT LOAM	CHANNERS	FLAGSTONES	STONES	BOULDERS	SUBANGULAR BLOCKY	WEAK	FINE	MOIST	FRIABLE	NONSTICKY	NONPLASTIC	CLEAR <2.5"	WAVY	FEW (5% MAX)	MEDIUM	NONE			BAG	12	S-1	
			25	15	0	0																		
30-42	Reddish Brown (5YR 4/3)	VERY CHANNERY SILTY CLAY LOAM	CHANNERS	FLAGSTONES	STONES	BOULDERS	ANGULAR BLOCKY	WEAK	COARSE	MOIST	LOOSE	SLIGHTLY STICKY	NONPLASTIC			NONE		CMN 2%-20%	FINE <5MM	DISTINCT	BAG	36	S-2	
			45	35	0	0																		

Additional Remarks: 8" Topsoil encountered. Fill encountered to approximately 30 inches below ground surface. Debris included asphalt, glass and rope. Weathered rock encountered between 30 inches and 42 inches. Refusal at approximately 42 inches below ground surface on apparent rock.

SOIL PROFILE PIT LOG

Soil Profile Pit: SPP- 4

Project:	**Proposed Warehouse Expansion**	**Project No.:**	**2137-99-001E**
Location:	**300 Franklin Square Drive, Township of Franklin, Somerset County, New Jersey**	**Client:**	**Somerset Therapeutics, LLC**

Surface Elevation (ft):	68.0	**Date Started:**	4/3/18	**Groundwater Data**	**Depth (Feet)**	**El (msl)**
Termination Depth (ft):	4.3	**Date Completed:**	4/3/18			
Proposed Location:	SWM	**Logged by:**	S. Hume	**Seepage**	NE	--
Excavation / Test Method:	Visual Observation	**Contractor:**	John's Lawn Service	**Groundwater**	NE	--
		Rig Type:	Rubber Tire Backhoe	**Mottling**	2.7	65.3

Groundwater Comments

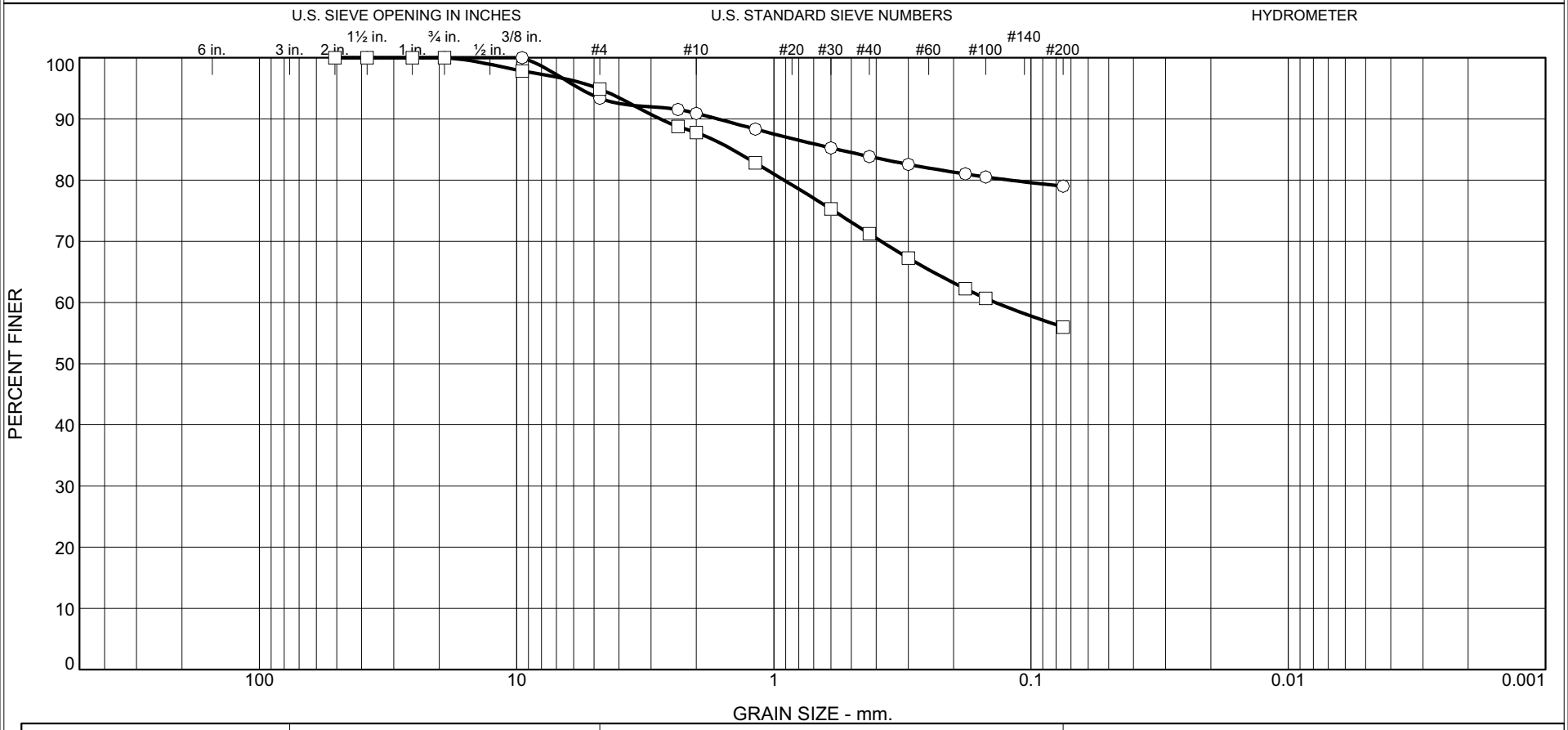
Grey 1 6/N grey mottles between 32-52 inches possibly due to a perched condition above bedrock.

DEPTH (IN)	COLOR	SOIL TEXTURE	COARSE FRAGMENTS (%)				STRUCTURE			WATER CONTENT	CONSISTENCY			BOUNDARY		ROOTS		MOTTLING			SAMPLING			LAB RESULTS
							Shape	Grade	Size		Resistance to Rupture	Stickiness	Plasticity	Distinctness	Topography			Quantity	Size	Contrast	Type	Depth (in)	No.	
0-8	TOPSOIL Brown (7.5YR 4/2)	LOAM	CHANNERS: 10	FLAGSTONES: <5	STONES: 0	BOULDERS: 0	SUBANGULAR BLOCKY	WEAK	MEDIUM	MOIST	LOOSE	NONSTICKY	NONPLASTIC	GRADUAL <5"	WAVY	MNY (>20% MAX)	MEDIUM	NONE						
8-32	Reddish Brown (5YR 4/3)	CHANNERY SILT LOAM	CHANNERS: 25	COBBLES: 15	STONES: 0	BOULDERS: 0	SUBANGULAR BLOCKY	WEAK	FINE	MOIST	FRIABLE	NONSTICKY	NONPLASTIC	CLEAR <2.5"	SMOOTH	FEW (5% MAX)	FINE	NONE			BAG	12	S-1	
32-52	Reddish Brown (5YR 4/3)	VERY CHANNERY SANDY CLAY LOAM	CHANNERS: 45	FLAGSTONES: 35	STONES: 0	BOULDERS: 0	ANGULAR BLOCKY	WEAK	COARSE	MOIST	HARD	NONSTICKY	NONPLASTIC			NONE		CMN 2%-20%	FINE <5MM	DISTINCT	BAG	36	S-2	

Additional Remarks: 8" Topsoil encountered. Fill encountered to approximately 10 inches below ground surface. Debris included asphalt, glass and rope. Weathered rock encountered between 32 inches and 52 inches. Refusal at approximately 52 inches below ground surface on apparent rock.

Laboratory Test Results

Particle Size Distribution Report



	% +3"	% Gravel		% Sand			% Fines	
		Coarse	Fine	Coarse	Medium	Fine	Silt	Clay
○	0.0	0.0	6.6	2.5	7.1	4.8	79.0	
□	0.0	0.0	5.1	7.1	16.6	15.2	56.0	

	Source	Sample #	Depth/Elev.	Date Sampled	USCS	Material Description	NM %	LL	PL
○	Onsite	B-1 S-2	2-3.2	4-13-18	ML	Red clayey silt, little C-F sand, trace fine gravel	9.5		
□	Onsite	B-7 S-3	4-5.1	4-13-18	ML	Red clayey silt, some C-F sand, trace gravel	9.9		

Client Somerset Therapeutics

Project Proposed Warehouse Addition

300 Franklin Square Drive, Township of Franklin, New Jersey

Project No. 2137-99-001E Figure 1

DYNAMIC EARTH

Geotechnical Terms and Symbols

DYNAMIC EARTH

245 Main Street; Suite 110
Chester, NJ 07930
908-879-7095: Fax 908-879-0222

GEOTECHNICAL TERMS AND SYMBOLS

SAMPLE IDENTIFICATION

The Unified Soil Classification System is used to identify the soil unless otherwise noted.

SOIL PROPERTY SYMBOLS

N:	Standard Penetration Value: Blows per ft. or a 140 lb. hammer falling 30" on a 2" O.D. split-spoon.
Qu:	Unconfined compressive strength, TSF.
Qp:	Penetrometer value, unconfined compressive strength, TSF.
Mc:	Moisture content, %
LL:	Liquid limit, %
PI:	Plasiticity index, %
δd:	Natural dry density, PCF.
▼:	Apparent groundwater level at time noted after completion of boring.
=	

DRILLING AND SAMPLING SYMBOLS

NE:	Not Encountered (Groundwater was not encountered)
SS:	Split-Spoon – 1⅜" I.D., 2" O.D., except where noted
ST:	Shelby Tube – 3" O.D., except where noted
AU:	Auger Sample
OB:	Diamond Bit
CB:	Carbide Bit
WS:	Washed Sample

RELATIVE DENSITY AND CONSISTENCY CLASSIFICATION

Term (Non-Cohesive Soils)	Standard Penetration Resistance
Very Loose	0-4
Loose	4-10
Medium Dense	10-30
Dense	30-50
Very Dense	Over 50

Term (Cohesive Soils)	Qu (TSF)
Very Soft	0-0.25
Soft	0.25-0.50
Firm (Medium)	0.50-1.00
Stiff	1.00-2.00
Very Stiff	2.00-4.00
Hard	4.00 +

PARTICLE SIZE

Boulders	8 in. +	Coarse Sand	5mm-0.6mm	Silt	0.074mm-0.005mm
Cobbles	8 in. – 3 in.	Medium Sand	0.6mm-0.2mm	Clay	- 0.005mm
Gravel	3 in. – 5mm	Fine Sand	0.2mm – 0.074mm		

USCS Standard Classification System

UNIFIED SOIL CLASSIFICATION SYSTEM - ASTM D2488

MAJOR DIVISION			GROUP SYMBOL	LETTER SYMBOL	GROUP NAME
COARSE GRAINED SOILS CONTAINS MORE THAN 50% FINES	**GRAVEL AND GRAVELLY SOILS** MORE THAN 50% OF COARSE FRACTION RETAINED ON NO. 4 SIEVE	GRAVEL WITH * 5% FINES		GW	Well-graded GRAVEL
				GP	Poorly graded GRAVEL
		GRAVEL WITH BETWEEN 5% AND 15% FINES		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
		GRAVEL WITH ≥ 15% FINES		GM	Silty GRAVEL
				GC	Clayey GRAVEL
	SAND AND SANDY SOILS MORE THAN 50% OF COARSE FRACTION PASSING ON NO. 4 SIEVE	SAND WITH * 5% FINES		SW	Well-graded SAND
				SP	Poorly graded SAND
		SAND WITH BETWEEN 5% AND 15% FINES		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
		SAND WITH ≥ 15% FINES		SM	Silty SAND
				SC	Clayey SAND
FINE GRAINED SOILS CONTAINS MORE THAN 50% FINES	SILT AND CLAY	LIQUID LIMIT LESS THAN 50		ML	Inorganic SILT with low plasticity
				CL	Lean inorganic CLAY with low plasticity
				OL	Organic SILT with low plasticity
		LIQUID LIMIT GREATER THAN 50		MH	Elastic inorganic SILT with moderate to high plasticity
				CH	Fat inorganic CLAY with moderate to high plasticity
				OH	Organic SILT or CLAY with moderate to high plasticity
HIGHLY ORGANIC SOILS				PT	PEAT soils with high organic contents

NOTES:

1) Sample descriptions are based on visual field and laboratory observations using classification methods of ASTM D2488. Where laboratory data are available, classifications are in accordance with ASTM D2487.

2) Solid lines between soil descriptions indicate change in interpreted geologic unit. Dashed lines indicate stratigraphic change within the unit.

3) Fines are material passing the U.S. Std. #200 Sieve.

DYNAMIC
ENGINEERING EARTH SURVEY TRAFFIC

Dynamic Earth, LLC
www.dynamic-earth.com
245 Main Street, Suite 110
Chester, NJ 07930
T. 908-879-7095

May 10, 2019
Via email: Kevin O'Connell (DECPC)

ODIN PHARMACEUTICALS, LLC
300 Franklin Square Drive
Franklin, New Jersey

Attention: Ilango Subramanian

Regarding: **SUPPLEMENTAL STORMWATER BASIN AREA INVESTIGATION & PERMEABILITY TESTING SERVICES**
300 Franklin Square Drive
Block 502.2, Lot 39.05
Township of Franklin,
Somerset County, New Jersey
Dynamic Earth Project No. 2137-99-001E

Dear Mr. Subramanian,

Dynamic Earth, LLC (Dynamic Earth) previously completed a *Stormwater Basin Area Investigation Report* dated May 11, 2018 for the above referenced project. Subsequent to our initial investigation site plans were updated and a supplemental stormwater basin area investigation was performed as requested.

Project Description

At the time of our supplemental testing, the subject site was developed with an existing two-story masonry building with associated pavement and utilities. The proposed site improvements will include the construction of an addition along the western and southern wall of the existing warehouse. Additional site improvements are expected to include underground stormwater management facility within the northwestern portion of the site. Proposed site improvements were provided on a February 21, 2019 *Grading Plan* prepared by Dynamic Engineering Consultants, PC (Dynamic)

Scope of Services

Dynamic Earth's scope of services pertaining to this data report included evaluating the subsurface conditions at soil profile pits to estimate the apparent seasonal high groundwater level. Two soil profile pits (identified as SPP-100 through SPP-101) were excavated at the site using a rubber tire backhoe. Since relatively shallow rock was encountered during the excavation, basin flood testing was performed in accordance with the New Jersey Department of Environmental Protection (NJDEP) *Best Management Practices* (BMP) *Manual- Appendix E*. Test locations were located within the area of proposed stormwater management facilities and were backfilled to the surface with excavated soils. The test locations are shown on the attached *Supplemental Soil Profile Pit Location Plan.*

Field Investigation

Field exploration of this investigation was conducted by means of two supplemental test pits (identified as TP-100 through TP-101). The test pits were excavated with a rubber-tired backhoe. The testing locations are shown on the accompanying *Supplemental Test Pit Location Plan* within the Appendix of this letter.

Test pits were completed in the presence of a Dynamic Earth engineer who performed field tests, recorded visual classifications, and collected samples of the various strata encountered. The test locations were located in the field using normal taping procedures and estimated right angles. These locations are presumed to be accurate within several feet with the location plotted on the plans.

Basin flood testing was conducted within/near proposed stormwater management facilities in accordance with Appendix E of the NJDEP *BMP Manual*. The soils encountered were classified using the United States Department of Agriculture (USDA) classification system. Observations were made for groundwater and/or soil mottling and mineral deposits potentially indicative of zones of saturation or seasonal high groundwater. Soil logs and results of the basin flood testing are included in the Appendix.

3.0 Summary of Subsurface Conditions

Detailed descriptions of the subsurface conditions encountered at each location are provided on the *Records of Subsurface Exploration* included herein. A summary of the subsurface conditions encountered is included below.

Test pits were performed within landscape areas and encountered between approximately six inches and 12 inches of topsoil at the surface. Beneath the surface cover, residual soils were encountered that consisted of loam, silt loam and silty clay loam with variable amounts of channers and flagstones. The residual soils were encountered to refusal depths ranging between approximately six feet and eight feet below the ground surface; corresponding to elevations ranging between 58.5 and 56 feet above mean sea elevation (mse). The refusal encountered is expected to be the top of rock/

4.0 Seasonal High Groundwater and Basin Flood Test

Groundwater and evidence of seasonal high groundwater were not encountered during our investigation. The groundwater levels are expected to fluctuate seasonally and following periods of significant precipitation. The results of the subsurface investigation are summarized below.

SEASONAL HIGH GROUNDWATER AND PERMEABILITY TEST SUMMARY			
Location	**Surface Elevation (mse)**	**Estimated Seasonal High Groundwater**	
		Depth (Feet)	**Elevation (mse)**
TP-100	64.5	Not Encountered	
TP-101	64.0	Not Encountered	

Basin Flood Test Results: Basin flood tests were performed at depths ranging between six feet and eight feet below the ground surface. As detailed on the following table, one basin did not fully drain; therefore, the rock is considered massive. One location drained within 12 hours after the initial pre-soak period and the rock may be condensed fractured. Detailed basin flood test results can be found in the Appendix. A summary of the basin flood tests results is tabulated below:

FIELD PERMEABILITY TEST RESULTS SUMMARY				
Test Pit Location	**Test Depth (feet)**	**Basin Flood Test Results (After Initial 24 Hr Pre-Soak)**		**Permeability[1] (Inches/Hour)**
		Drained Within 12 Hours	**Drained Within 24 Hours**	
TP-100	6.0	No	No	N/A
TP-101	8.0	Yes	Yes	0.5

[1]Per *NJDEP Stormwater BMP Manual*

While one location encountered fractured rock, we do not recommend designing a system that relies on infiltration, as there is a relatively high risk that occasional fractures encountered during this investigation will become filled.

5.0 General Comments

The recommendations presented herein should be utilized by a qualified engineer in preparing the project plans and specifications. The engineer should consider these recommendations as minimum physical standards that may be superseded by local and regional building codes and structural considerations. These recommendations are prepared for the use of the client for the specific project detailed and should not be used by any third party. These recommendations are relevant to the design phase and should not be substituted for construction specifications.

The possibility exists that conditions between test locations may differ, and conditions may not be as anticipated by the designers or contractors. In addition, the construction process may itself alter soil conditions. Therefore, Dynamic Earth's Geotechnical Engineers or their representatives should observe and document the construction procedures used and the conditions encountered, as well as conduct testing and inspection to ensure the design criteria are met or recommendations to address deviations are implemented.

Dynamic Earth assumes that a qualified contractor will be employed to perform the construction work, and that the contractor will be required to exercise care to ensure all excavations are performed in accordance with applicable regulations and good practice.

The recommendations submitted for the proposed construction are based on the available soil information and the preliminary design details furnished or assumed. Deviations from the noted subsurface conditions encountered during construction should be brought to the attention of the geotechnical engineer.

The geotechnical engineer warrants that the findings, recommendations, specifications, or professional advice contained herein have been promulgated after being prepared in accordance with generally accepted professional engineering practice in the fields of foundation engineering, soil mechanics, and engineering geology. No other warranties are implied or expressed.

Please do not hesitate to contact us with any questions regarding these matters.

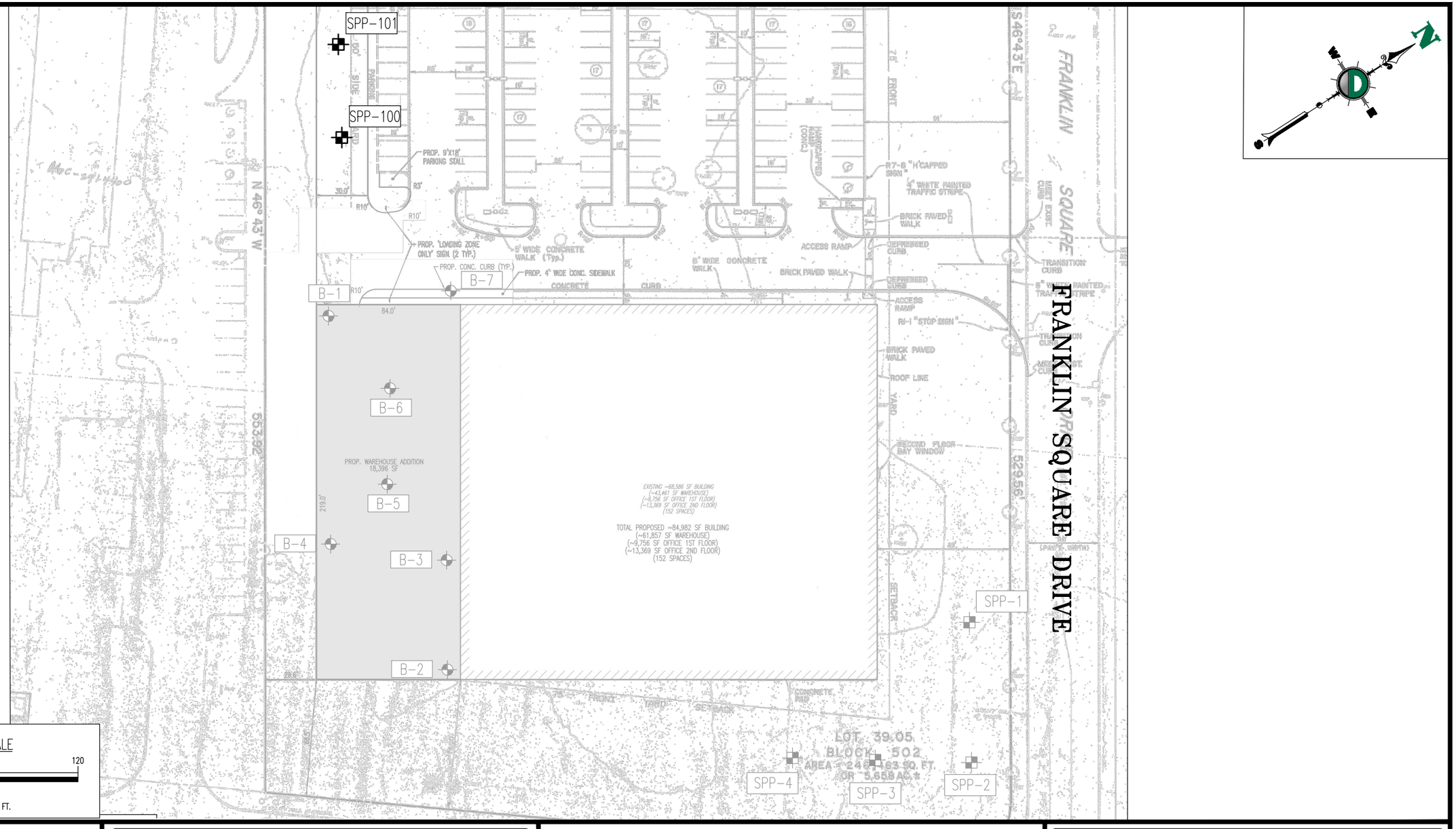
Sincerely,
DYNAMIC EARTH, LLC

Peter H. Howell, P.E.
Principal
PE License No. 24GE04728700

Patrick Granitzka, PE
Project Manager
PE License No. 24GE05355900

Enclosures: Supplemental Soil Profile Pit Location Plan, Records of Subsurface Investigation, Field Testing
CC: Matthew Bersch (DECPC); John Palus (DECPC)
O:\EARTH Projects\2137 Somerset Therapeutics\99 001E Franklin NJ\Reports by Dearth\Drafts\Supplemental SWM Report & Basin Flood\Chester NJ Dearth Letterhead Template for Proposals.doc

Supplemental Soil Profile Pit Location Plan



SCALE: (H) 1"=50' (V)

JOB No: 2137-99-001E

SHEET No: 1 OF 1

DRAWN BY: KFG

DESIGNED BY: BH

CHECKED BY: PG

DATE: 05/01/19

TITLE:
SUPPLEMENTAL SOIL PROFILE PIT LOCATION PLAN

PROJECT: **ODIN THERAPUTICS, LLC.**
PROPOSED WAREHOUSE EXPANSION
BLOCK 502.02, LOT 39.05
300 FRANKLIN SQUARE DRIVE
TOWNSHIP OF FRANKLIN, SOMERSET COUNTY, NEW JERSEY

Rev. # 0

DEC Client Code: 2137

LEGEND:

SPP-X — APPROXIMATE SOIL PROFILE PIT LOCATION

SPP-X — APPROXIMATE SOIL PROFILE PIT LOCATION (APRIL, 2018)

B-X — APPROXIMATE BORING LOCATION (APRIL, 2018)

NOTES:
1. THIS PLAN HAS BEEN PREPARED BASED ON A CONCEPTUAL SITE PLAN 'A' PREPARED ON 03/17/17 BY DYNAMIC ENGINEERING, LLC.
2. THIS PLAN IS NOT FOR CONSTRUCTION AND WAS PREPARED TO ILLUSTRATE TEST LOCATIONS ONLY, AND MAY NOT REFLECT THE MOST CURRENT REVISION OF THE BASE PLAN.

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