STORMWATER MANAGEMENT, GROUNDWATER RECHARGE AND WATER QUALITY ANALYSIS

For

InSite Development Partners, LLC

Proposed 3-Story Self Storage Facility

US Route 22 & Wilson Avenue
Block 119.00, Lot 1.01
Borough of North Plainfield
Somerset County, New Jersey

Prepared by:

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APPENDIX

I. SITE DESCRIPTION

The project area is comprised of Block 119.00, Lot 1.01 in the Borough of North Plainfield, Somerset County, New Jersey. The property is located at the corner of US Route 22 and Wilson Avenue. The project consists of constructing a 3-story Self-Storage Facility with a footprint of 29,821 SF and a gross floor area of 89,463 SF, with 10 parking stalls and drive-in overhead doors located around the building. Additional site improvements include grading, landscaping, lighting, and stormwater management facilities. The amount of proposed impervious coverage for the subject development is 62,206 SF.

The subject site is bordered to the north by residential dwellings with commercial uses and Ridge Avenue beyond, to the west by residential dwellings and Wilson Avenue with residential dwellings and commercial uses beyond, to the south by US Route 22 with commercial and residential uses beyond, and to the east by commercial uses with US Route 22 and commercial uses beyond.

The existing conditions of the tract have been verified by the ALTA/NSPS Land Title Survey, prepared by Dynamic Survey, LLC, dated July 20, 2021.

II. DESIGN OVERVIEW

This report has been prepared to define and analyze the stormwater drainage conditions that will occur as a result of the redevelopment of Block 119.00, Lot 1.01 in the Borough of North Plainfield, Somerset County, New Jersey.

This Stormwater Management Study identifies and describes the manner by which the design and performance measures set forth by N.J.A.C. 7:8 and the Borough of North Plainfield Ordinance are achieved to minimize the adverse impact of stormwater runoff quantity and quality in receiving drainage facilities and groundwater recharge into subsurface soils. The study has been prepared in accordance with N.J.A.C. 7:8 Stormwater Management. The scope of the study includes the building, associated driveway, parking and loading areas, landscaping, stormwater collection system, underground R-Tank basins, 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 N.J.A.C. 7:8. Accordingly, the following items are addressed within this report:

- Green infrastructure standards (7:8-5.3)
- Groundwater recharge standards (7:8-5.4)
- Stormwater runoff quality standards (7:8-5.5)

- Stormwater runoff quantity standards (7:8-5.6)
- Calculation of stormwater runoff and groundwater recharge (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 TR55 method. The TR55 method is utilized to design the proposed aboveground bioretention basin facilities.

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.

III. EXISTING DRAINAGE CONDITIONS

The subject parcel is currently developed as a retail building with associated parking areas, driveways, landscaping, and other associated site amenities. The existing conditions of the tract have been verified by the ALTA/NSPS Land Title Survey, prepared by Dynamic Survey, LLC, dated July 20, 2021. 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 Site: This area consists of the entirety of the proposed development, which includes the existing building, parking, driveways, walkways, landscaping and open space. The Stormwater runoff from this area flows overland towards the existing stormwater conveyance system located onsite. The stormwater from this area is ultimately tributary to the existing drainage facilities located within Wilson Avenue and US Route 22.

Based on Somerset County soils survey information, the soil types native to the site include:

SOMERSET COUNTY SOIL SURVEY INFORMATION		
SOIL TYPE (SYMBOL)	**SOIL TYPE (NAME)**	**HYDROLOGIC SOIL GROUP (HSG)**
AmdB	Amwell gravelly loam, 2 to 6 percent slopes	C
DunC	Dunellen sandy loam, 8 to 15 percent slopes	A

IV. PROPOSED DRAINAGE CONDITIONS

The proposed development on Block 119.00, Lot 1.01, includes the construction of a 3-story Self-Storage Facility with a footprint of 29,821 SF and a gross floor area of 89,463 SF, with 10 parking stalls and drive-in overhead doors located around the building. Additional site improvements include grading, landscaping, lighting, and stormwater management facilities. The stormwater management facilities include a pervious pavement system with underground storage that consists of 15" perforated PVC pipe and two (2) underground R-Tank basins.

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

Study Area Basin: This area consists of the proposed self-storage building, parking areas, drive aisles, and grass areas to the north of the proposed building. Stormwater runoff from these areas is collected by the pervious pavement system and routed to the proposed underground storage system. The stormwater is then released at a controlled rate and routed to the existing drainage facilities located within US Route 22.

Study Area Undetained: This area consists of portions of the driveway along Wilson Avenue and near the adjacent bank as well as the proposed landscaped areas to the south of the proposed building. Stormwater runoff from these areas flows via overland flow to the existing drainage facilities located within Wilson Avenue and US Route 22.

V. DESIGN METHODOLOGY

In order to prepare the stormwater management, water quality and groundwater recharge design system for the subject project, extensive up-front 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 an overall location and topographical survey for the existing site and surrounding watershed areas.

Furthermore, Dynamic Earth, LLC performed test pits within the site to establish the seasonal high-water table and soil permeability rates.

Based on our review of the existing site conditions and the Topographic Survey, the Drainage Area Maps for the existing and proposed 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 runoff from the proposed development could be directed to stormwater management facilities in order to address the applicable sections of the Borough of North Plainfield Land Development Ordinance and N.J.A.C. 7:8.

Stormwater runoff from the majority of the proposed development is collected by the on-site stormwater collection system or conveyed by overland flow to the pervious pavement system. Stormwater runoff from the proposed building is routed through the roof leader conveyance system and is tributary to the on-site stormwater collection system. An outlet control structure has been implemented at the southeastern portion of the underground R-Tank infiltration basin to release stormwater runoff at a controlled rate to satisfy the stormwater quantity requirements of N.J.A.C. 7:8.

The majority of the site will be collected via a pervious pavement system and is ultimately connected via an underground storm sewer system to the underground R-Tank basins. The stormwater from the underground R-Tank basins is discharged by an outlet control structure where it is routed to the existing drainage facilities located within US Route 22. In addition, the design of the pervious pavement complies with the standards set forth by the NJ Stormwater Best Management Practices Manual, thereby providing a TSS Removal Rate of 80%, thereby satisfying the water quality aspect of N.J.A.C. 7:8.

The proposed development is exempt from the groundwater recharge requirements set forth by N.J.A.C. 7:8 due to the fact that the project is located within and "urban redevelopment area" as it is a previously developed portion of the Metropolitan Planning Area as delineated on the State Plan Policy Map (SPPM).

VI. RUNOFF RATE REDUCTION PERFORMANCE

Pre-development and Post Development Peak Runoff Results Summary for Total Site

	EXISTING RUNOFF RATE (CFS)	REDUCTION REQUIREMENT	ALLOWABLE RUNOFF RATE (CFS)	PROPOSED RUNOFF RATE (CFS)
2 Year	2.096	50%	1.048	0.927
10 Year	4.057	25%	3.043	2.487
100 Year	8.458	20%	6.77	6.585

In order to meet the stormwater runoff quantity requirements, set forth by the Borough of North Plainfield and N.J.A.C. 7:8 for the proposed development, the site design incorporates pervious pavement and two (2) underground R-Tank basins. The proposed basins are designed to accept stormwater runoff from the proposed building roof, the proposed parking areas, loading areas and tributary yard areas. The stormwater runoff from these areas will be conveyed to the basins by the proposed stormwater conveyance system. Stormwater runoff from the proposed basins will be released at a controlled rate through an outlet control structure and is ultimately tributary to the existing drainage facilities located within US Route 22.

VII. PERVIOUS PAVEMENT SYSTEM DESIGN

As previously stated within this report, five (5) underground pervious pavement systems and proposed underground underdrains will be constructed to satisfy the stormwater quantity and quality regulations set forth by N.J.A.C 7:8, the New Jersey Soil Erosion and Sediment Control Standards and Borough of North Plainfield land use ordinance.

Stormwater runoff tributary to the pervious pavement will infiltrate through void space in the pavement to the stone storage section where the stormwater runoff will be detained. The bottom of the stone storage beds are located at least one foot above the seasonal high water table in each location. As noted in the hydrograph summary reports included within the appendix, the volume of the water quality design storm for the area tributary to pervious pavement system is equal to 4,049 CF. The pervious pavement system is designed to connect to a 15-inch perforated HDPE storm pipe with a proposed invert at elevation 114.80 FT, to discharge storms larger than the water quality storm and to provide at least 3 inches of stone underneath the underdrain as outlined in Chapter 9.5 of the New Jersey Stormwater Best Management Practices Manual. The 100-year stormwater runoff tributary to the pervious pavement systems with calculations for the stone section (0.40 void ratio) is located in the Hydrograph Summary Reports: Proposed Conditions section within the Appendix of this Report. Overflow of stormwater runoff from the paver system in the event of larger storms will be discharged through an outlet control structure which ultimate discharge to the proposed stormwater conveyance system located on site, which is ultimately tributary to the existing drainage facilities located within US Route 22.

In accordance with the New Jersey Stormwater Best Management Practices Manual, the following design considerations have been satisfied:

- Filter fabric is required along the sides and the bottom of the system to prevent migration of fines from the surrounding soil.
- The seasonal high water table (SHWT) or bedrock must be at least 1 foot below the bottom of the storage bed.
- The capacity of the underdrain must be sufficient to allow the system to drain within 72 hours.
- At least one inspection port, with a removable cap, must be provided in the storage bed with its location denoted in the maintenance plan. The inspection port must be placed at least 3 feet from any edge.

As previously stated within this report, the stormwater management design utilizes two (2) underground R-Tank stormwater basins and a proposed underground conveyance pipe system to satisfy the stormwater quantity regulations set forth by N.J.A.C 7:8, the New Jersey Soil Erosion and Sediment Control Standards and Borough of North Plainfield land use ordinance.

The proposed basins have been designed to detain and discharge larger storms through an outlet control structure at a controlled rate to satisfy the stormwater quantity reduction requirements of N.J.A.C. 7:8.

Additionally, prior to entering the basins, stormwater runoff from the proposed motor vehicle surfaces will be routed to an 80% TSS removal rate Pervious Pavement Systems.

In accordance with the New Jersey Stormwater Best Management Practices Manual, the following design considerations have been satisfied:

- Bottom of Basin with underdrain must be a minimum of 1 foot above Seasonal High Water Table.
- Basin must fully drain basin volume within 72 hours.
- Basin bottom must be as level as possible.
- Basin must be designed to safely convey overflow volume.
- Basin may not be used where there is risk of basement flooding, etc.
- Contributary drainage area is 3:1 to the pervious pavement area

VIII. WATER QUALITY

The TSS removal rate requirement set forth by the Borough of North Plainfield Land Use Ordinance and N.J.A.C. 7:8 is 80% for proposed motor vehicle surfaces. The stormwater management design for the project satisfies this requirement by utilizing a pervious pavement system certified by the NJDEP to provide a TSS removal rate of 80%. The entirety of the proposed motor vehicle surfaces is routed to these water quality measures. Therefore, the stormwater management facilities provide a TSS removal rate of greater than 80% for the subject project, thereby, satisfying the water quality aspect of the Borough of North Plainfield Land Use Ordinance and N.J.A.C. 7:8.

IX. GROUNDWATER RECHARGE

The proposed development is exempt from the groundwater recharge requirements set forth by N.J.A.C. 7:8 due to the fact that the project is located within and "urban redevelopment area" as it is a previously developed portion of the Metropolitan Planning Area as delineated on the State Plan Policy Map (SPPM).

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 site design has been prepared to implement green infrastructure techniques in accordance with N.J.A.C. 7:8 and the Borough of North Plainfield Stormwater Management Regulations.

The stormwater management design shall reduce peak flow rates for the proposed development area and meets the minimum peak flow reduction for the 2, 10 and 100-year storm frequencies as dictated by N.J.A.C. 7:8.

The proposed stormwater management design incorporates a pervious pavement system, capable of 80% total suspended solid (TSS) removal as stated within the New Jersey Stormwater Best Management Practices Manual thereby satisfying N.J.A.C. 7:8 Water Quality Standards.

The proposed development is exempt from the groundwater recharge requirements set forth by N.J.A.C. 7:8 due to the fact that the project is located within and "urban redevelopment area" as it is a previously developed portion of the Metropolitan Planning Area as delineated on the State Plan Policy Map (SPPM).

With this stated, it is evident that the proposed development will not have a negative impact on the existing stormwater management system, water quality or groundwater recharge on site or within the vicinity of the subject parcel.

APPENDIX

NRCS WEB SOIL SURVEY

Hydrologic Soil Group—Somerset County, New Jersey

MAP LEGEND

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

Soils

Soil Rating Polygons
- A
- A/D
- B
- B/D
- C
- C/D
- D
- Not rated or not available

Soil Rating Lines
- A
- A/D
- B
- B/D
- C
- C/D
- D
- Not rated or not available

Soil Rating Points
- A
- A/D
- B
- B/D
- C
- C/D
- D
- Not rated or not available

Water Features
- Streams and Canals

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

Background
- Aerial Photography

MAP INFORMATION

The soil surveys that comprise your AOI were mapped at 1:24,000.

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

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

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

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

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

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

Soil Survey Area: Somerset County, New Jersey
Survey Area Data: Version 18, Jun 1, 2020

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

Date(s) aerial images were photographed: Jul 26, 2019—Jul 31, 2019

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

Hydrologic Soil Group

Map unit symbol	Map unit name	Rating	Acres in AOI	Percent of AOI
AmdB	Amwell gravelly loam, 2 to 6 percent slopes	C	2.6	74.0%
DunC	Dunellen sandy loam, 8 to 15 percent slopes	A	0.9	26.0%
Totals for Area of Interest			**3.5**	**100.0%**

Description

Hydrologic soil groups are based on estimates of runoff potential. Soils are assigned to one of four groups according to the rate of water infiltration when the soils are not protected by vegetation, are thoroughly wet, and receive precipitation from long-duration storms.

The soils in the United States are assigned to four groups (A, B, C, and D) and three dual classes (A/D, B/D, and C/D). The groups are defined as follows:

Group A. Soils having a high infiltration rate (low runoff potential) when thoroughly wet. These consist mainly of deep, well drained to excessively drained sands or gravelly sands. These soils have a high rate of water transmission.

Group B. Soils having a moderate infiltration rate when thoroughly wet. These consist chiefly of moderately deep or deep, moderately well drained or well drained soils that have moderately fine texture to moderately coarse texture. These soils have a moderate rate of water transmission.

Group C. Soils having a slow infiltration rate when thoroughly wet. These consist chiefly of soils having a layer that impedes the downward movement of water or soils of moderately fine texture or fine texture. These soils have a slow rate of water transmission.

Group D. Soils having a very slow infiltration rate (high runoff potential) when thoroughly wet. These consist chiefly of clays that have a high shrink-swell potential, soils that have a high water table, soils that have a claypan or clay layer at or near the surface, and soils that are shallow over nearly impervious material. These soils have a very slow rate of water transmission.

If a soil is assigned to a dual hydrologic group (A/D, B/D, or C/D), the first letter is for drained areas and the second is for undrained areas. Only the soils that in their natural condition are in group D are assigned to dual classes.

Rating Options

Aggregation Method: Dominant Condition

Component Percent Cutoff: None Specified

Tie-break Rule: Higher

RUNOFF CURVE NUMBER (CN) CALCULATIONS – EXISTING

DYNAMIC ENGINEERING

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

Project:	Proposed 3-Story Self Storage Facility	Computed By:	MDC
Job #:	3041-99-010	Checked By:	TJM
Location:	Borough of North Plainfield	Date:	10/19/2021

Drainage Area	Impervious Area (acre)	Impervious Area (sf)	Curve Number (CN) Used	HSG A - Open Space Area (acre)	HSG A - Open Space Area (sf)	Curve Number (CN) Used	HSG A - Wooded Area (acre)	HSG A - Wooded Area (sf)	Curve Number (CN) Used	HSG C - Open Space Area (acre)	HSG C - Open Space Area (sf)	Curve Number (CN) Used	HSG C - Wooded Area (acre)	HSG C - Wooded Area (sf)	Curve Number (CN) Used	Avg. Perv. Curve Number	Total PerviousArea (acres)	Total Area (acres)	TC (Min.)
Site	0.77	33,645	98	0.54	23,505	39	0.00	-	30	0.86	37,368	74	0.00	-	70	60	1.40	2.17	10
	0.00	-	98	0.00	-	39	0.00	-	30	0.00	-	74	0.00	-	70	N/A	0.00	0.00	10
	0.00	-	98	0.00	-	39	0.00	-	30	0.00	-	74	0.00	-	70	N/A	0.00	0.00	10
	0.00	-	98	0.00	-	39	0.00	-	30	0.00	-	74	0.00	-	70	N/A	0.00	0.00	10
	0.00	-	98	0.00	-	39	0.00	-	30	0.00	-	74	0.00	-	70	N/A	0.00	0.00	10
Total	0.77	33645.00		0.54	23505.00		0.00	0.00		0.86	37368.00		0.00	0.00			1.40	2.17	

Per County Soil Survey -	DunC	HSG	A	Soil	Dunellen sandy loam, 8 to 15 percent slopes
Per County Soil Survey -	Soil Abbr	HSG	B	Soil	Soil Name
Per County Soil Survey -	AmdB	HSG	C	Soil	Amwell gravelly loam, 2 to 6 percent slopes
Per County Soil Survey -	Soil Abbr	HSG	D	Soil	Soil Name

Description	Runoff Curve Number (CN) (HSG A)	Runoff Curve Number (CN) (HSG B)	Runoff Curve Number (CN) (HSG C)	Runoff Curve Number (CN) (HSG D)
Impervious Surface	98	98	98	98
Open Space (lawn) (good)	39	61	74	80
Woods (good)	30	55	70	77

RUNOFF CURVE NUMBER (CN) CALCULATIONS – PROPOSED

DYNAMIC ENGINEERING

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

Project:	Proposed 3-Story Self Storage Facility	Computed By:	MDC
Job #:	3041-99-010	Checked By:	TJM
Location:	Borough of North Plainfield	Date:	10/19/2021

Drainage Area	Impervious Area (acre)	Impervious Area (sf)	Curve Number (CN) Used	HSG A - Open Space Area (acre)	HSG A - Open Space Area (sf)	Curve Number (CN) Used	HSG A - Wooded Area (acre)	HSG A - Wooded Area (sf)	Curve Number (CN) Used	HSG C - Open Space Area (acre)	HSG C - Open Space Area (sf)	Curve Number (CN) Used	HSG C - Wooded Area (acre)	HSG C - Wooded Area (sf)	Curve Number (CN) Used	Avg. Perv. Curve Number	Total PerviousArea (acres)	Total Area (acres)	TC (Min.)
Basin	1.15	49,944	98	0.24	10,354	39	0.00	-	30	0.06	2,531	74	0.00	-	70	46	0.30	1.44	10
Undetained	0.23	10,172	98	0.22	9,433	39	0.00	-	30	0.28	12,084	74	0.00	-	70	59	0.49	0.73	10
	0.00	-	98	0.00	-	39	0.00	-	30	0.00	-	74	0.00	-	70	N/A	0.00	0.00	10
	0.00	-	98	0.00	-	39	0.00	-	30	0.00	-	74	0.00	-	70	N/A	0.00	0.00	10
	0.00	-	98	0.00	-	39	0.00	-	30	0.00	-	74	0.00	-	70	N/A	0.00	0.00	10
Total	1.38	60116.00		0.45	19787.00		0.00	0.00		0.34	14615.00		0.00	0.00			0.79	2.17	

Per County Soil Survey -	DunC	HSG	A	Soil	Dunellen sandy loam, 8 to 15 percent slopes
Per County Soil Survey -	Soil Abbr	HSG	B	Soil	Soil Name
Per County Soil Survey -	AmdB	HSG	C	Soil	Amwell gravelly loam, 2 to 6 percent slopes
Per County Soil Survey -	Soil Abbr	HSG	D	Soil	Soil Name

Description	Runoff Curve Number (CN) (HSG A)	Runoff Curve Number (CN) (HSG B)	Runoff Curve Number (CN) (HSG C)	Runoff Curve Number (CN) (HSG D)
Impervious Surface	98	98	98	98
Open Space (lawn) (good)	39	61	74	80
Woods (good)	30	55	70	77

HYDROGRAPH SUMMARY REPORTS – EXISTING AND PROPOSED CONDITIONS
2YR. 10 YR. & 100 YR.

Hydraflow Table of Contents

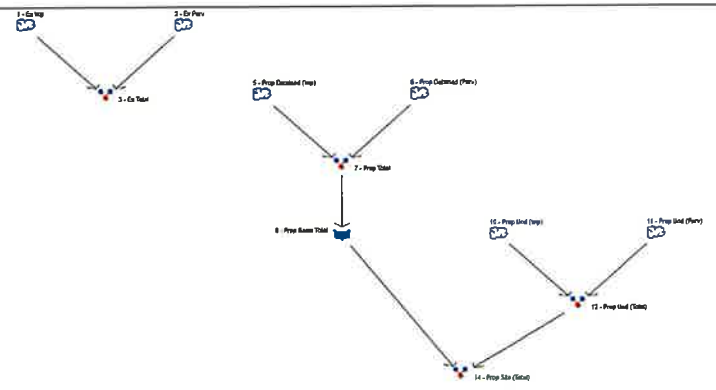
2.10.100.gpw

Hydraflow Hydrographs by Intelisolve v9.1

Tuesday, Oct 19, 2021

Watershed Model Schematic

Hydraflow Hydrographs by Intelisolve v9.1



Legend

Hyd.	Origin	Description
1	SCS Runoff	Ex Imp
2	SCS Runoff	Ex Perv
3	Combine	Ex Total
5	SCS Runoff	Prop Detained (Imp)
6	SCS Runoff	Prop Detained (Perv)
7	Combine	Prop Total
8	Reservoir	Prop Basin Total
10	SCS Runoff	Prop Und (Imp)
11	SCS Runoff	Prop Und (Perv)
12	Combine	Prop Und (Total)
14	Combine	Prop Site (Total)

Hydrograph Return Period Recap

Hydraflow Hydrographs by Intelisolve v9.1

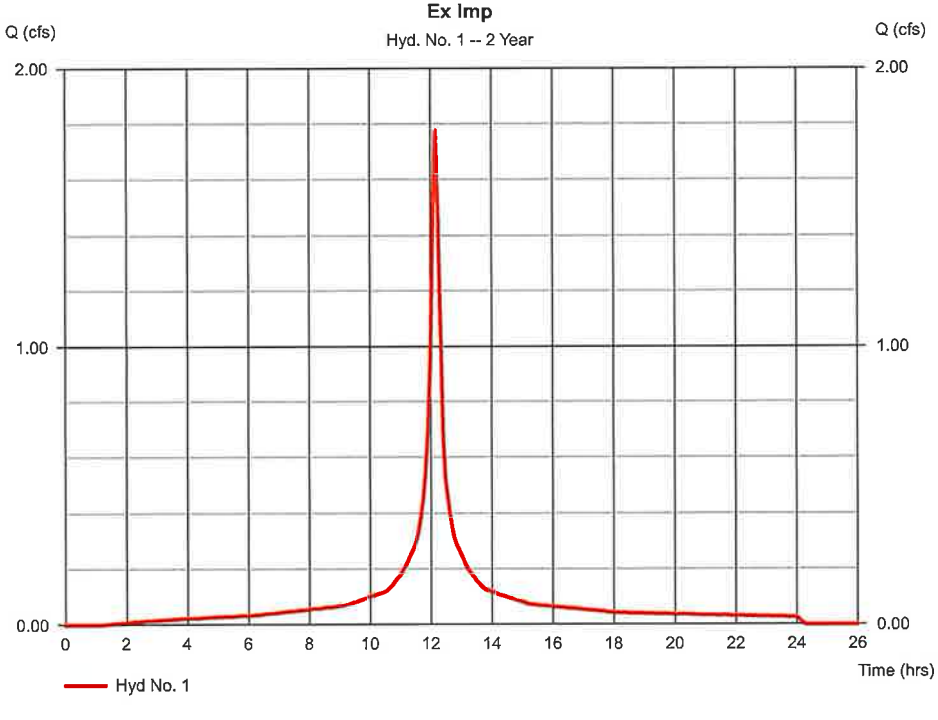
Hyd. No.	Hydrograph type (origin)	Inflow Hyd(s)	Peak Outflow (cfs)								Hydrograph description
			1-Yr	2-Yr	3-Yr	5-Yr	10-Yr	25-Yr	50-Yr	100-Yr	
1	SCS Runoff	------	------	1.775	------	------	2.681	------	------	4.409	Ex Imp
2	SCS Runoff	------	------	0.353	------	------	1.376	------	------	4.050	Ex Perv
3	Combine	1, 2	------	2.096	------	------	4.057	------	------	8.458	Ex Total
5	SCS Runoff	------	------	2.652	------	------	4.004	------	------	6.584	Prop Detained (Imp)
6	SCS Runoff	------	------	0.002	------	------	0.055	------	------	0.426	Prop Detained (Perv)
7	Combine	5, 6	------	2.652	------	------	4.043	------	------	7.011	Prop Total
8	Reservoir	7	------	0.386	------	------	1.754	------	------	4.618	Prop Basin Total
10	SCS Runoff	------	------	0.530	------	------	0.801	------	------	1.317	Prop Und (Imp)
11	SCS Runoff	------	------	0.106	------	------	0.449	------	------	1.367	Prop Und (Perv)
12	Combine	10, 11	------	0.623	------	------	1.250	------	------	2.684	Prop Und (Total)
14	Combine	8, 12,	------	0.927	------	------	2.487	------	------	6.585	Prop Site (Total)

Hydrograph Report

Hyd. No. 1

Ex Imp

Hydrograph type	= SCS Runoff	Peak discharge	= 1.775 cfs
Storm frequency	= 2 yrs	Time to peak	= 12.17 hrs
Time interval	= 5 min	Hyd. volume	= 8,142 cuft
Drainage area	= 0.770 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-D.cds	Shape factor	= 484

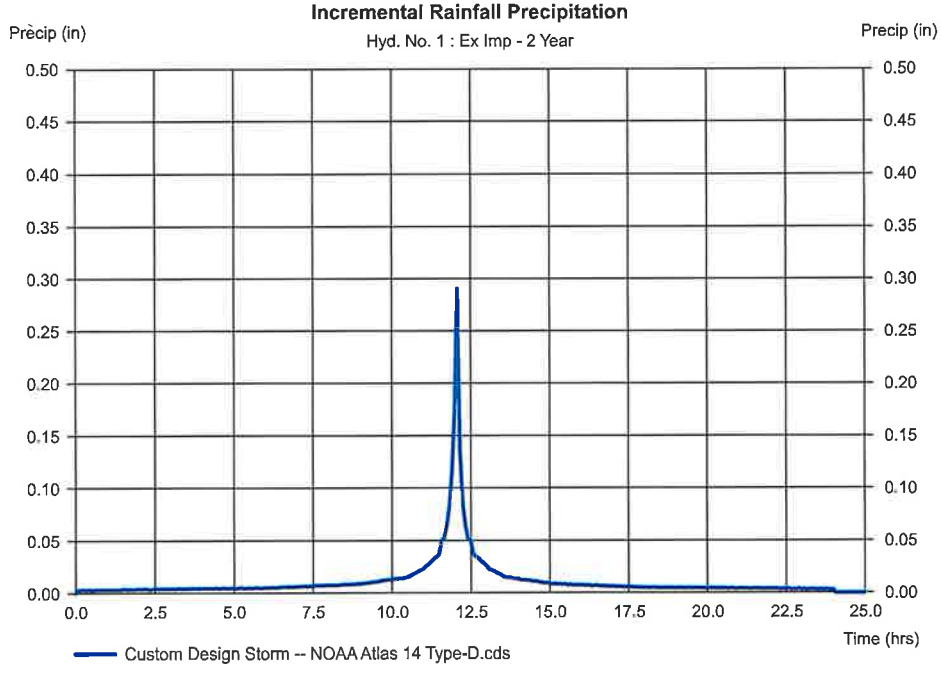


Precipitation Report

Hyd. No. 1

Ex Imp

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

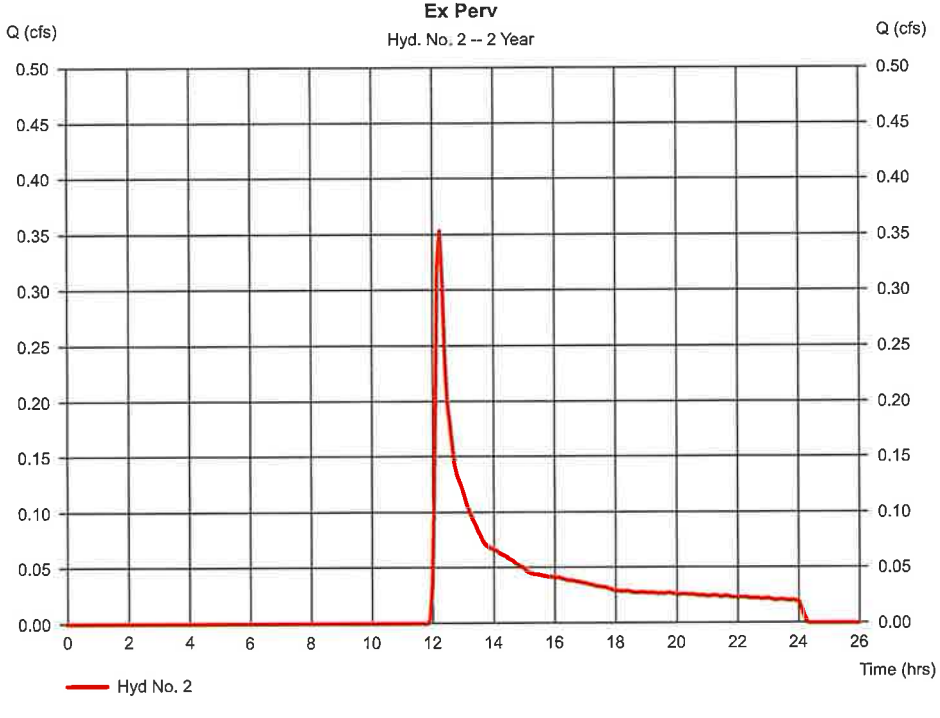


Hydrograph Report

Hyd. No. 2

Ex Perv

Hydrograph type	= SCS Runoff	Peak discharge	= 0.353 cfs
Storm frequency	= 2 yrs	Time to peak	= 12.25 hrs
Time interval	= 5 min	Hyd. volume	= 2,212 cuft
Drainage area	= 1.400 ac	Curve number	= 60
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-D.cds	Shape factor	= 484

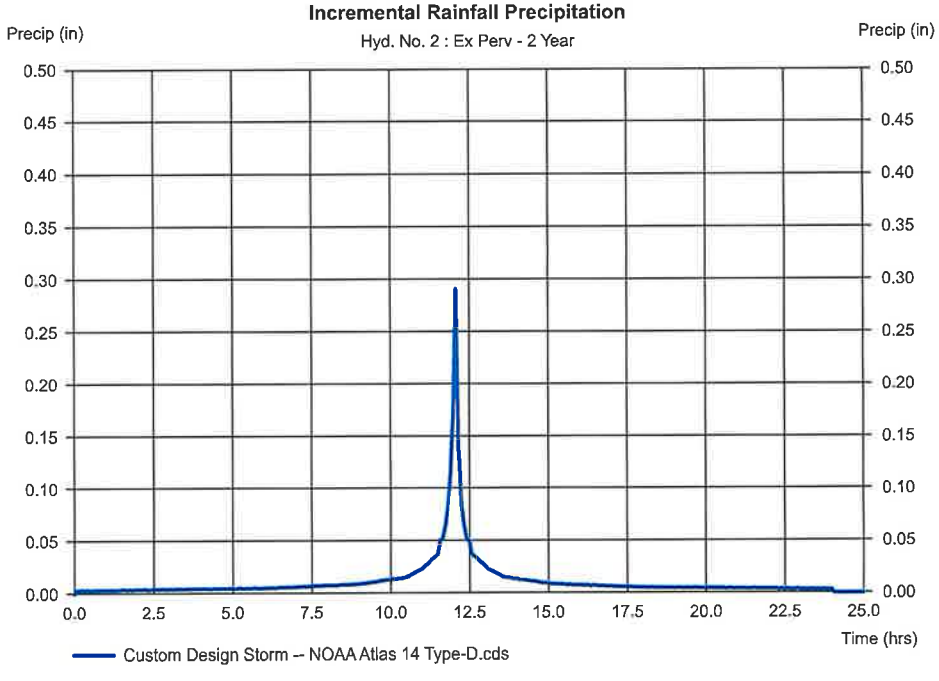


Precipitation Report

Hyd. No. 2

Ex Perv

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

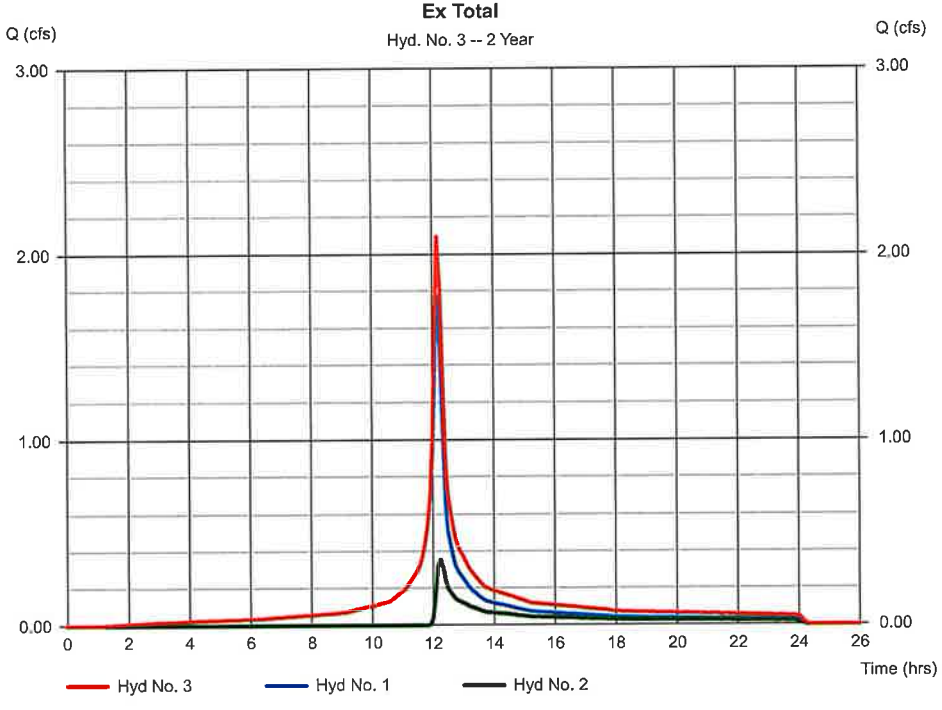


Hydrograph Report

Hyd. No. 3

Ex Total

Hydrograph type	= Combine	Peak discharge	= 2.096 cfs
Storm frequency	= 2 yrs	Time to peak	= 12.17 hrs
Time interval	= 5 min	Hyd. volume	= 10,353 cuft
Inflow hyds.	= 1, 2	Contrib. drain. area	= 2.170 ac

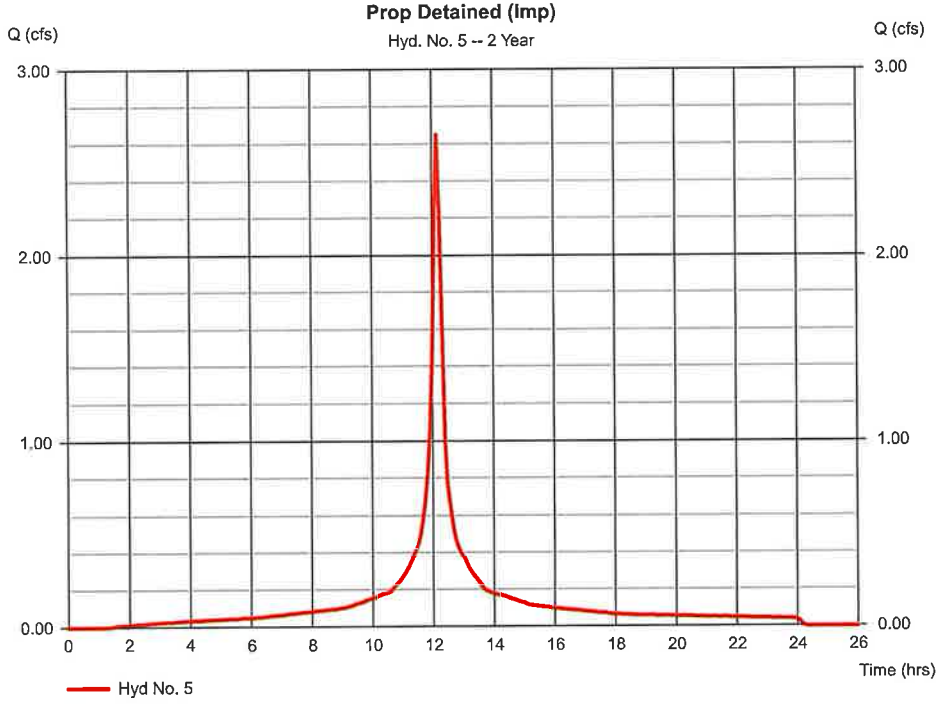


Hydrograph Report

Hyd. No. 5

Prop Detained (Imp)

Hydrograph type	= SCS Runoff	Peak discharge	= 2.652 cfs
Storm frequency	= 2 yrs	Time to peak	= 12.17 hrs
Time interval	= 5 min	Hyd. volume	= 12,159 cuft
Drainage area	= 1.150 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-D.cds	Shape factor	= 484

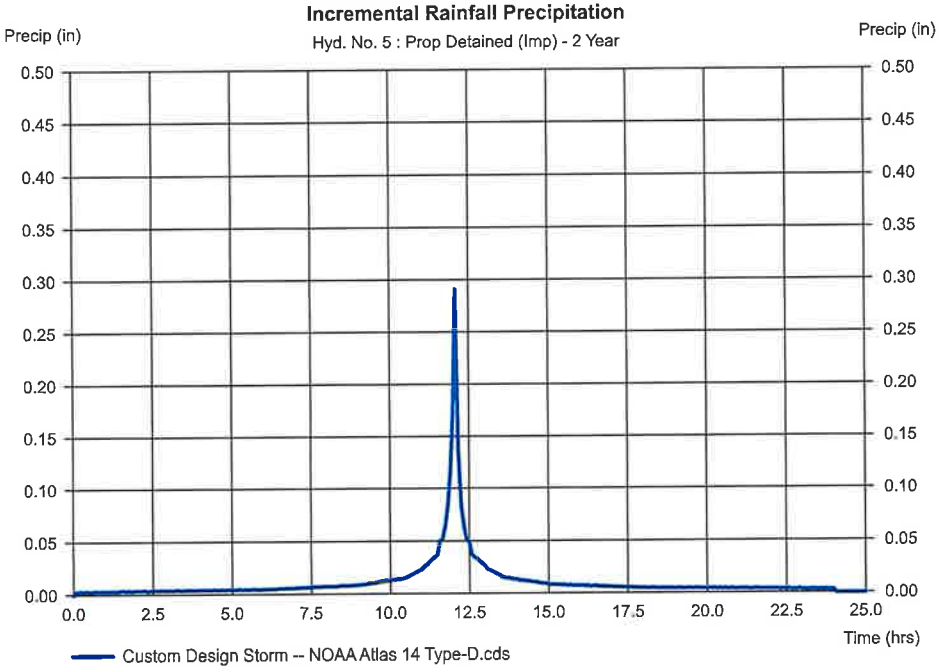


Precipitation Report

Hyd. No. 5

Prop Detained (Imp)

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

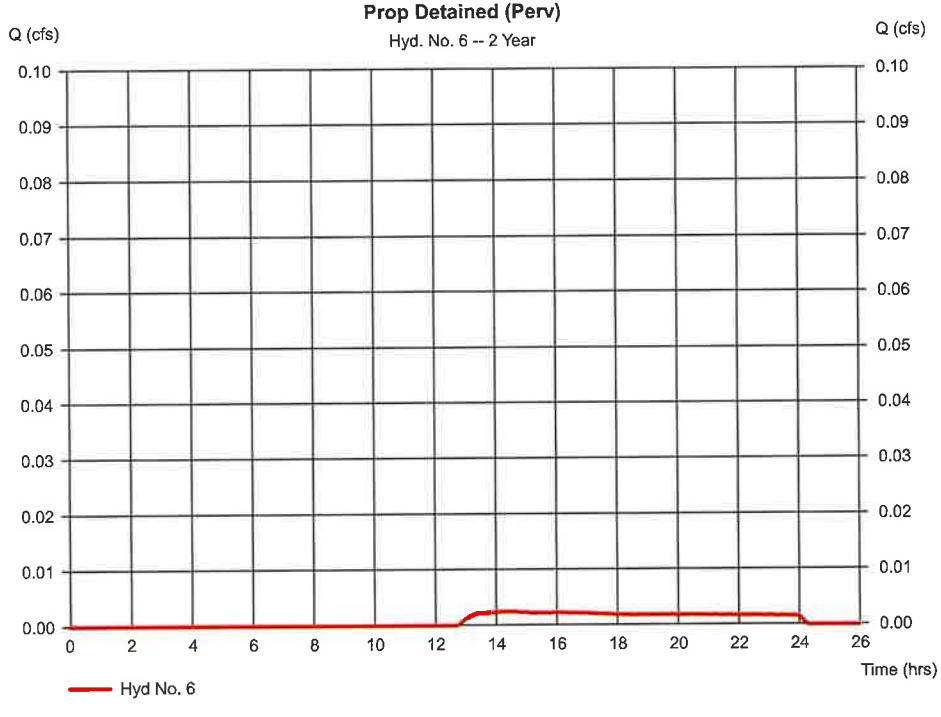


Hydrograph Report

Hyd. No. 6

Prop Detained (Perv)

Hydrograph type	= SCS Runoff	Peak discharge	= 0.002 cfs
Storm frequency	= 2 yrs	Time to peak	= 14.42 hrs
Time interval	= 5 min	Hyd. volume	= 79 cuft
Drainage area	= 0.300 ac	Curve number	= 46
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-D.cds	Shape factor	= 484

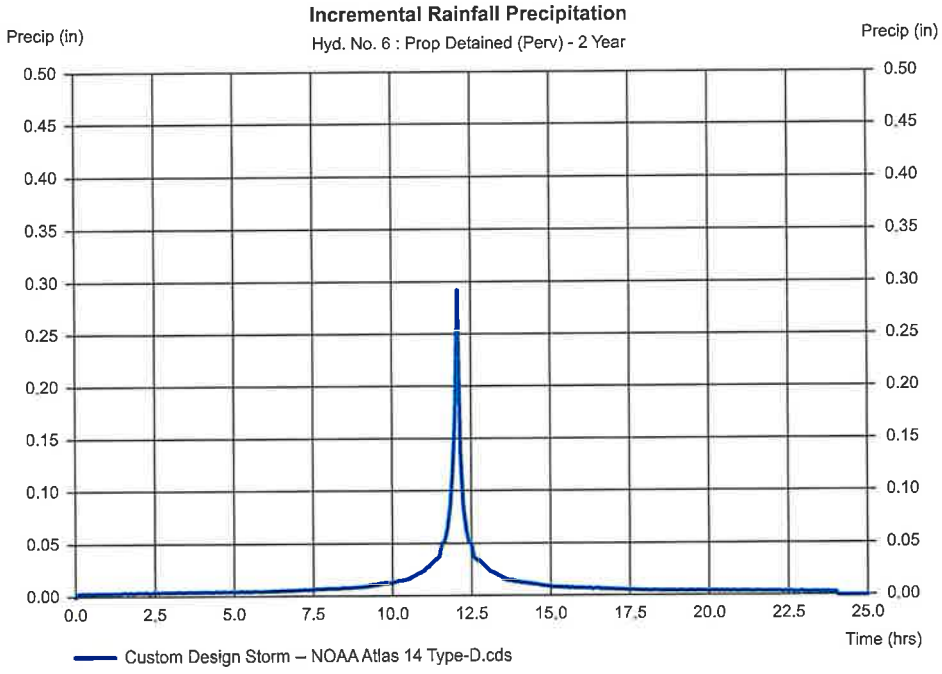


Precipitation Report

Hyd. No. 6

Prop Detained (Perv)

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

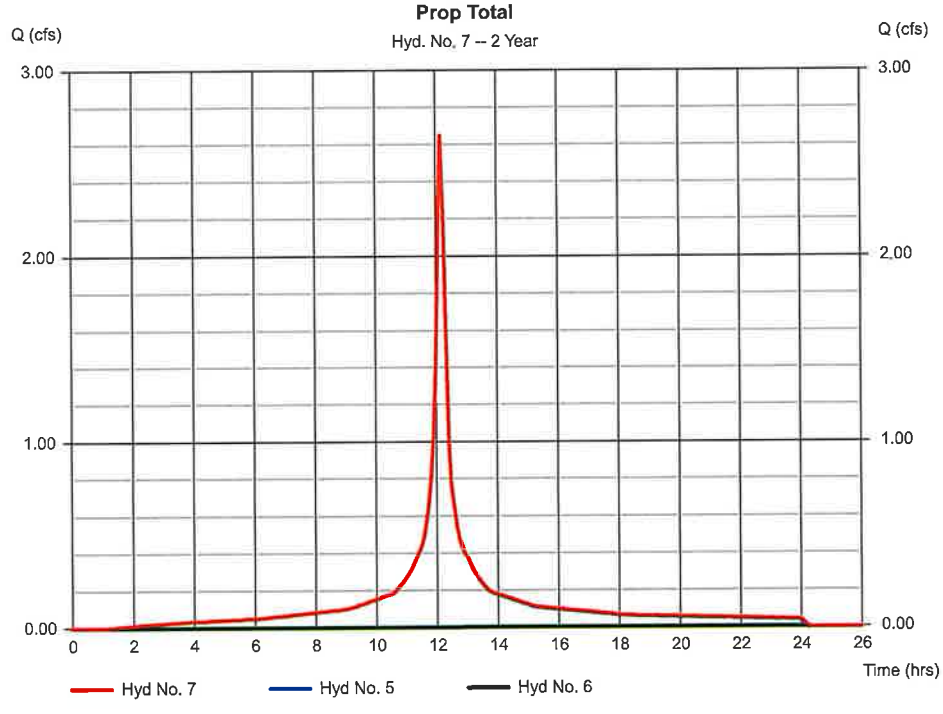


Hydrograph Report

Hyd. No. 7

Prop Total

Hydrograph type	= Combine	Peak discharge	= 2.652 cfs
Storm frequency	= 2 yrs	Time to peak	= 12.17 hrs
Time interval	= 5 min	Hyd. volume	= 12,238 cuft
Inflow hyds.	= 5, 6	Contrib. drain. area	= 1.450 ac



Hydrograph Report

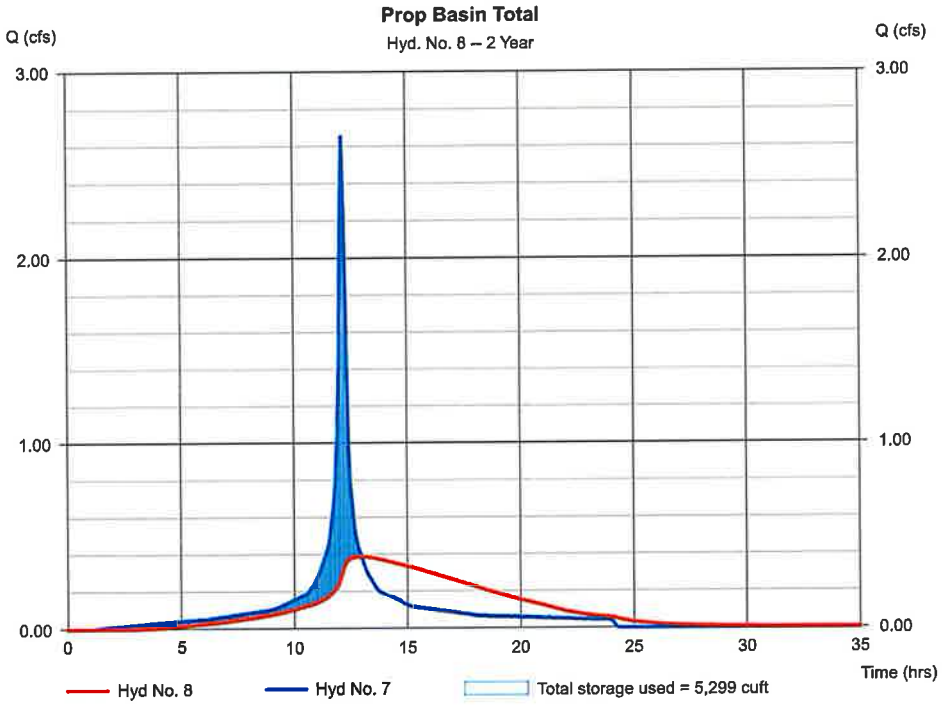
Hydraflow Hydrographs by Intelisolve v9.1 — Tuesday, Oct 19, 2021

Hyd. No. 8

Prop Basin Total

Hydrograph type	= Reservoir	Peak discharge	= 0.386 cfs
Storm frequency	= 2 yrs	Time to peak	= 13.00 hrs
Time interval	= 5 min	Hyd. volume	= 12,152 cuft
Inflow hyd. No.	= 7 - Prop Total	Max. Elevation	= 113.73 ft
Reservoir name	= Basin 2 (Rtank)	Max. Storage	= 5,299 cuft

Storage Indication method used.



Pond Report

Hydraflow Hydrographs by Intelisolve v9.1 — Tuesday, Oct 19, 2021

Pond No. 2 - Basin 2 (Rtank)

Pond Data

Pond storage is based on user-defined values.

Stage / Storage Table

Stage (ft)	Elevation (ft)	Contour area (sqft)	Incr. Storage (cuft)	Total storage (cuft)
0.00	112.00	n/a	0	0
0.25	112.25	n/a	767	767
0.50	112.50	n/a	768	1,535
0.75	112.75	n/a	768	2,303
1.00	113.00	n/a	769	3,072
1.25	113.25	n/a	768	3,840
1.50	113.50	n/a	768	4,608
1.75	113.75	n/a	769	5,377
2.00	114.00	n/a	768	6,145
2.25	114.25	n/a	768	6,913
2.50	114.50	n/a	768	7,681
2.75	114.75	n/a	769	8,450
3.00	115.00	n/a	851	9,301
3.25	115.25	n/a	941	10,242
3.50	115.50	n/a	967	11,209
3.75	115.75	n/a	189	11,398
4.00	116.00	n/a	132	11,530
4.05	116.05	n/a	17	11,547

Culvert / Orifice Structures

	[A]	[B]	[C]	[PrfRsr]
Rise (in)	= 15.00	3.50	5.00	0.00
Span (in)	= 15.00	3.50	16.00	0.00
No. Barrels	= 1	1	1	0
Invert El. (ft)	= 112.00	112.01	113.80	0.00
Length (ft)	= 50.00	0.00	0.00	0.00
Slope (%)	= 0.50	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)	= 2.00	0.00	0.00	0.00
Crest El. (ft)	= 114.75	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

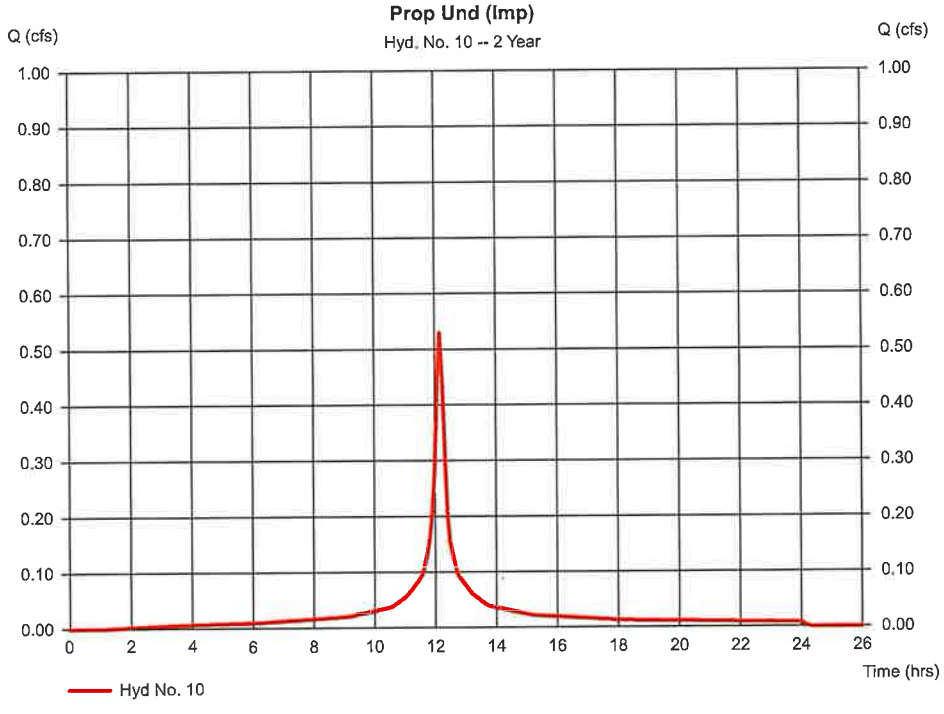
Stage ft	Storage cuft	Elevation ft	Clv A cfs	Clv B cfs	Clv C cfs	PrfRsr cfs	Wr A cfs	Wr B cfs	Wr C cfs	Wr D cfs	Exfil cfs	User cfs	Total cfs
0.00	0	112.00	0.00	0.00	0.00	---	0.00	---	---	---	---	---	0.00
0.25	767	112.25	0.10 ic	0.10 ic	0.00	---	0.00	---	---	---	---	---	0.10
0.50	1,535	112.50	0.18 ic	0.18 ic	0.00	---	0.00	---	---	---	---	---	0.18
0.75	2,303	112.75	0.24 ic	0.23 ic	0.00	---	0.00	---	---	---	---	---	0.23
1.00	3,072	113.00	0.29 ic	0.28 ic	0.00	---	0.00	---	---	---	---	---	0.28
1.25	3,840	113.25	0.33 ic	0.32 ic	0.00	---	0.00	---	---	---	---	---	0.32
1.50	4,608	113.50	0.37 ic	0.36 ic	0.00	---	0.00	---	---	---	---	---	0.36
1.75	5,377	113.75	0.39 ic	0.39 ic	0.00	---	0.00	---	---	---	---	---	0.39
2.00	6,145	114.00	0.83 ic	0.40 ic	0.41 ic	---	0.00	---	---	---	---	---	0.81
2.25	6,913	114.25	1.72 oc	0.40 ic	1.32 ic	---	0.00	---	---	---	---	---	1.72
2.50	7,681	114.50	2.30 oc	0.41 ic	1.88 ic	---	0.00	---	---	---	---	---	2.29
2.75	8,450	114.75	2.73 oc	0.43 ic	2.30 ic	---	0.00	---	---	---	---	---	2.73
3.00	9,301	115.00	3.90 oc	0.40 ic	2.66 ic	---	0.83	---	---	---	---	---	3.90
3.25	10,242	115.25	5.71 oc	0.37 ic	2.98 ic	---	2.35	---	---	---	---	---	5.71
3.50	11,209	115.50	7.35 oc	0.33 ic	2.70 ic	---	4.33	---	---	---	---	---	7.35
3.75	11,398	115.75	8.68 oc	0.27 ic	2.22 ic	---	6.19 s	---	---	---	---	---	8.68
4.00	11,530	116.00	9.53 oc	0.23 ic	1.92 ic	---	7.39 s	---	---	---	---	---	9.53
4.05	11,547	116.05	9.68 oc	0.22 ic	1.87 ic	---	7.59 s	---	---	---	---	---	9.68

Hydrograph Report

Hyd. No. 10

Prop Und (Imp)

Hydrograph type	= SCS Runoff	Peak discharge	= 0.530 cfs
Storm frequency	= 2 yrs	Time to peak	= 12.17 hrs
Time interval	= 5 min	Hyd. volume	= 2,432 cuft
Drainage area	= 0.230 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-D.cds	Shape factor	= 484

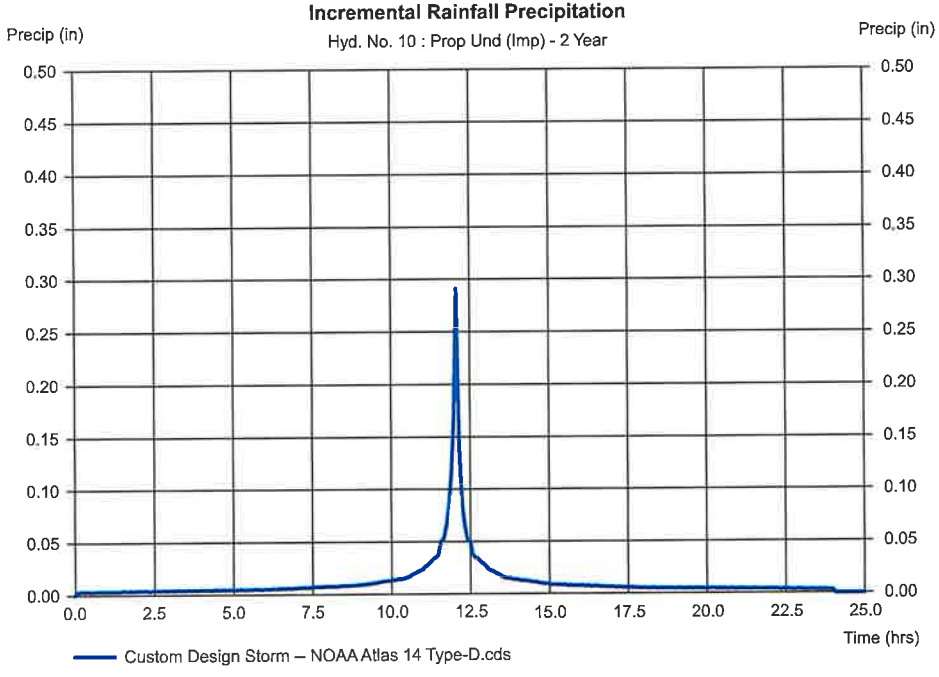


Precipitation Report

Hyd. No. 10

Prop Und (Imp)

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

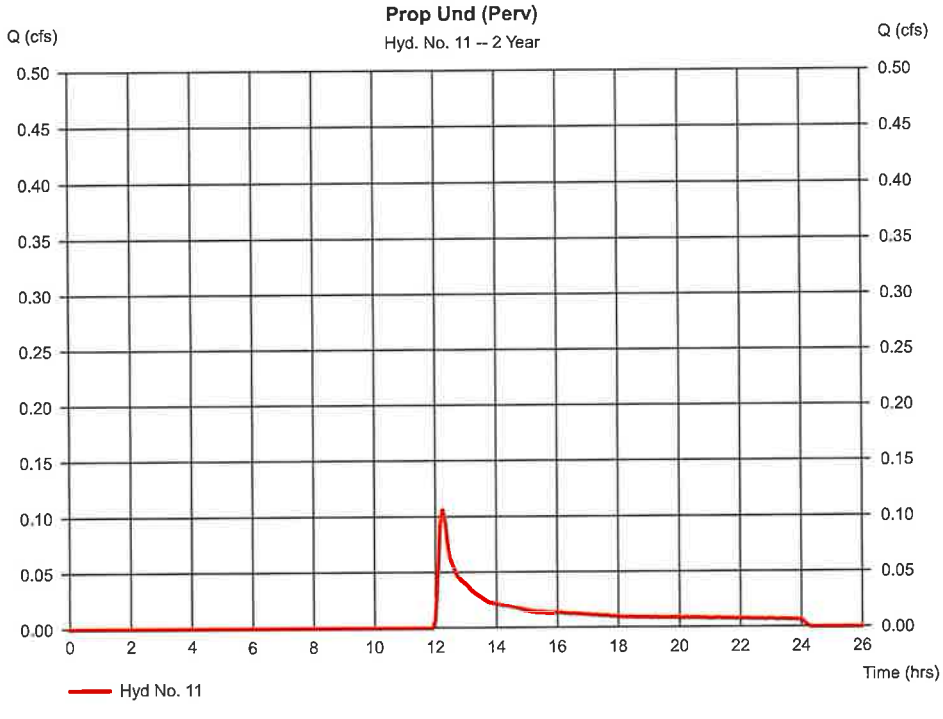


Hydrograph Report

Hyd. No. 11

Prop Und (Perv)

Hydrograph type	= SCS Runoff	Peak discharge	= 0.106 cfs
Storm frequency	= 2 yrs	Time to peak	= 12.25 hrs
Time interval	= 5 min	Hyd. volume	= 712 cuft
Drainage area	= 0.490 ac	Curve number	= 59
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-D.cds	Shape factor	= 484

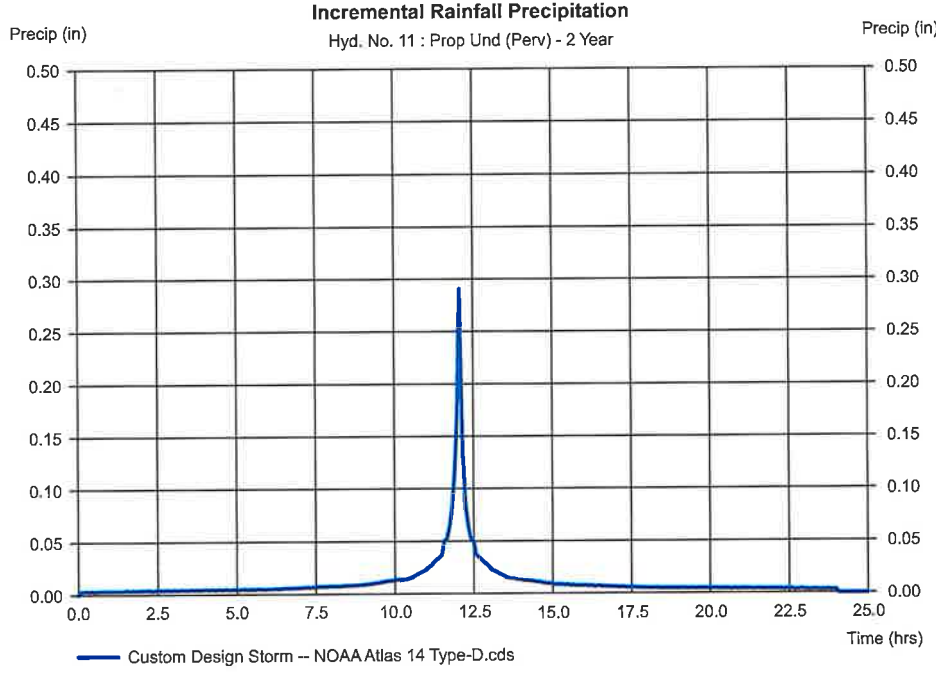


Precipitation Report

Hyd. No. 11

Prop Und (Perv)

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

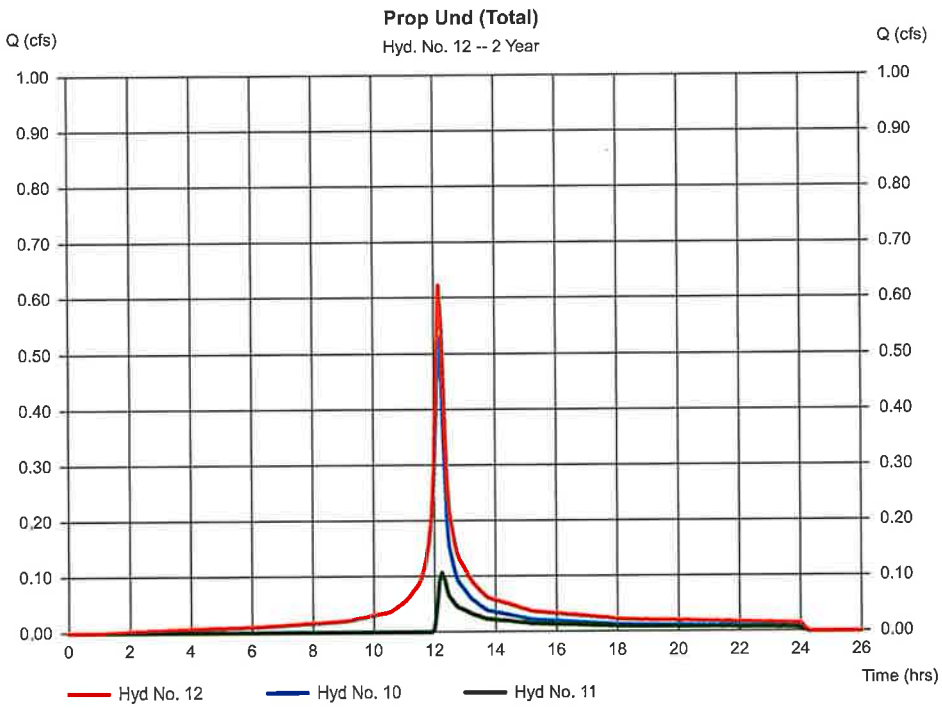


Hydrograph Report

Hyd. No. 12

Prop Und (Total)

Hydrograph type	= Combine	Peak discharge	= 0.623 cfs
Storm frequency	= 2 yrs	Time to peak	= 12.17 hrs
Time interval	= 5 min	Hyd. volume	= 3,144 cuft
Inflow hyds.	= 10, 11	Contrib. drain. area	= 0.720 ac

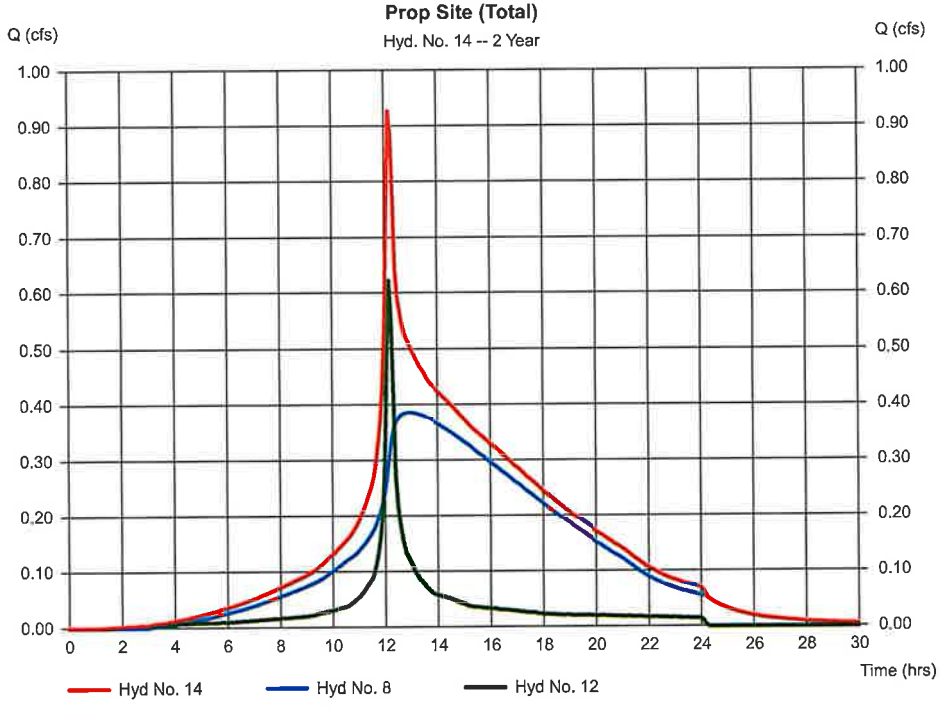


Hydrograph Report

Hyd. No. 14

Prop Site (Total)

Hydrograph type	= Combine	Peak discharge	= 0.927 cfs
Storm frequency	= 2 yrs	Time to peak	= 12.17 hrs
Time interval	= 5 min	Hyd. volume	= 15,296 cuft
Inflow hyds.	= 8, 12	Contrib. drain. area	= 0.000 ac

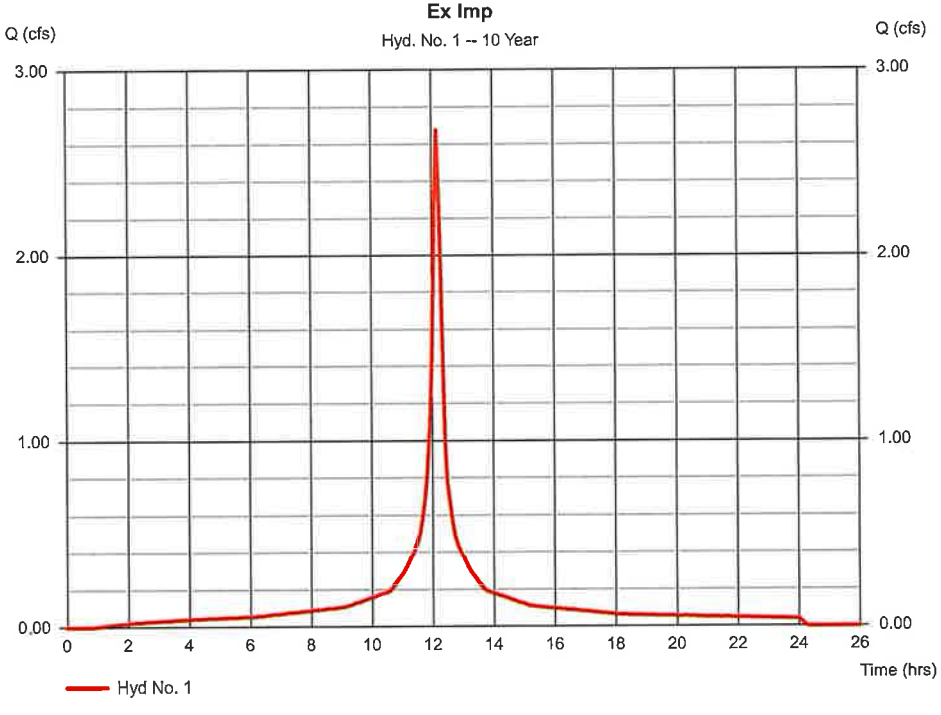


Hydrograph Report

Hyd. No. 1

Ex Imp

Hydrograph type	= SCS Runoff	Peak discharge	= 2.681 cfs
Storm frequency	= 10 yrs	Time to peak	= 12.17 hrs
Time interval	= 5 min	Hyd. volume	= 12,508 cuft
Drainage area	= 0.770 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-D.cds	Shape factor	= 484

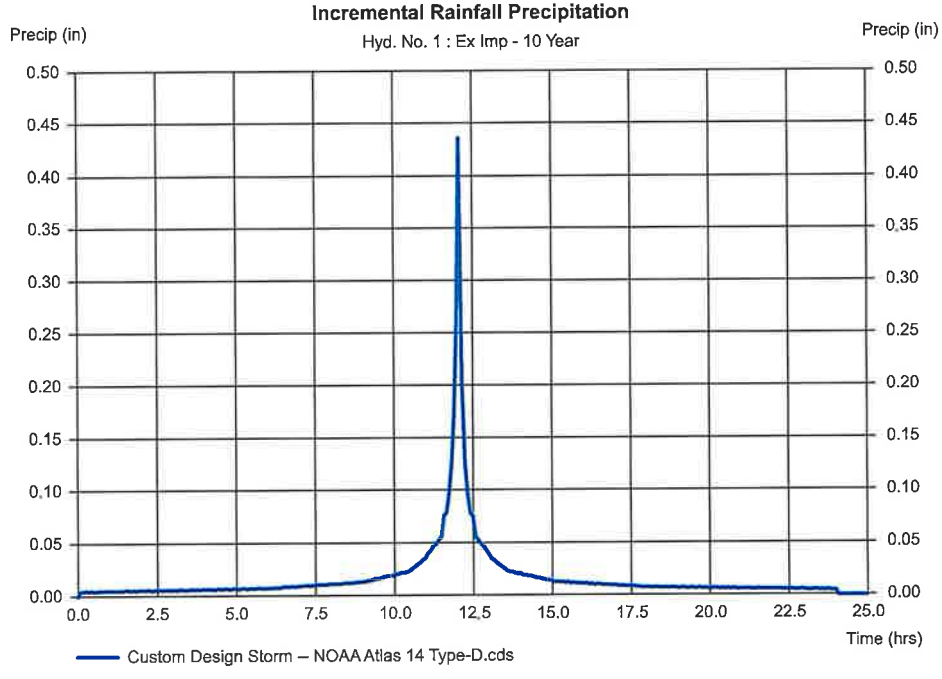


Precipitation Report

Hyd. No. 1

Ex Imp

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

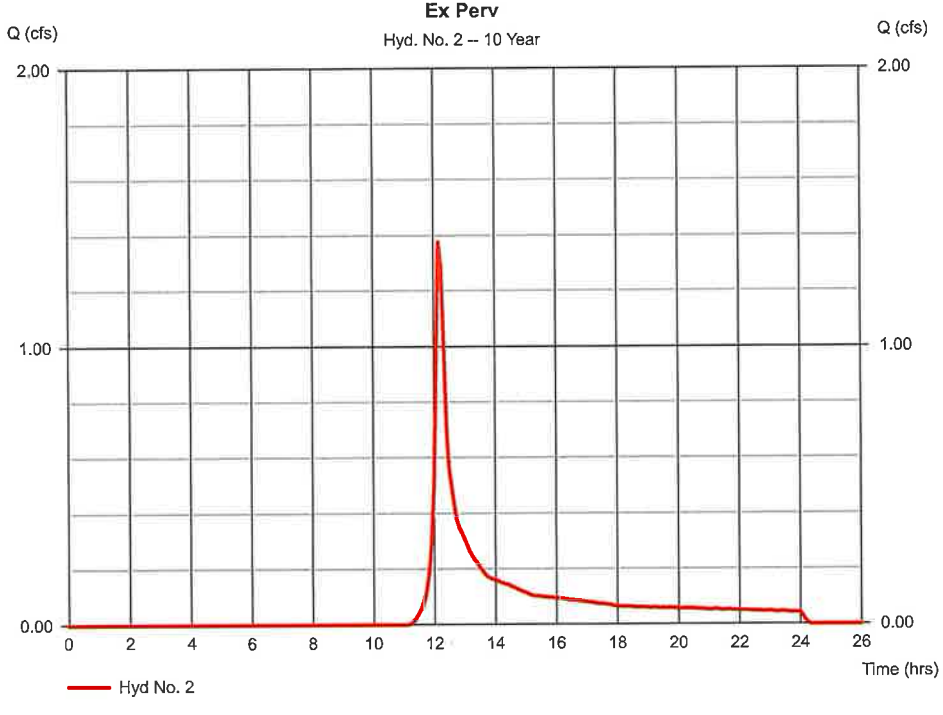


Hydrograph Report

Hyd. No. 2

Ex Perv

Hydrograph type	= SCS Runoff	Peak discharge	= 1.376 cfs
Storm frequency	= 10 yrs	Time to peak	= 12.17 hrs
Time interval	= 5 min	Hyd. volume	= 6,227 cuft
Drainage area	= 1.400 ac	Curve number	= 60
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-D.cds	Shape factor	= 484

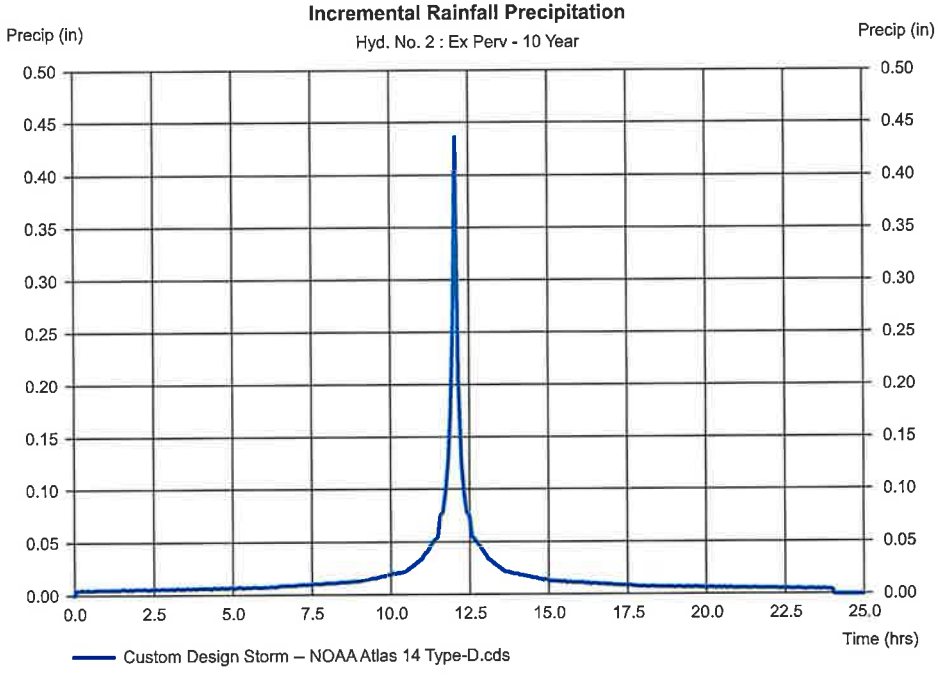


Precipitation Report

Hyd. No. 2

Ex Perv

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

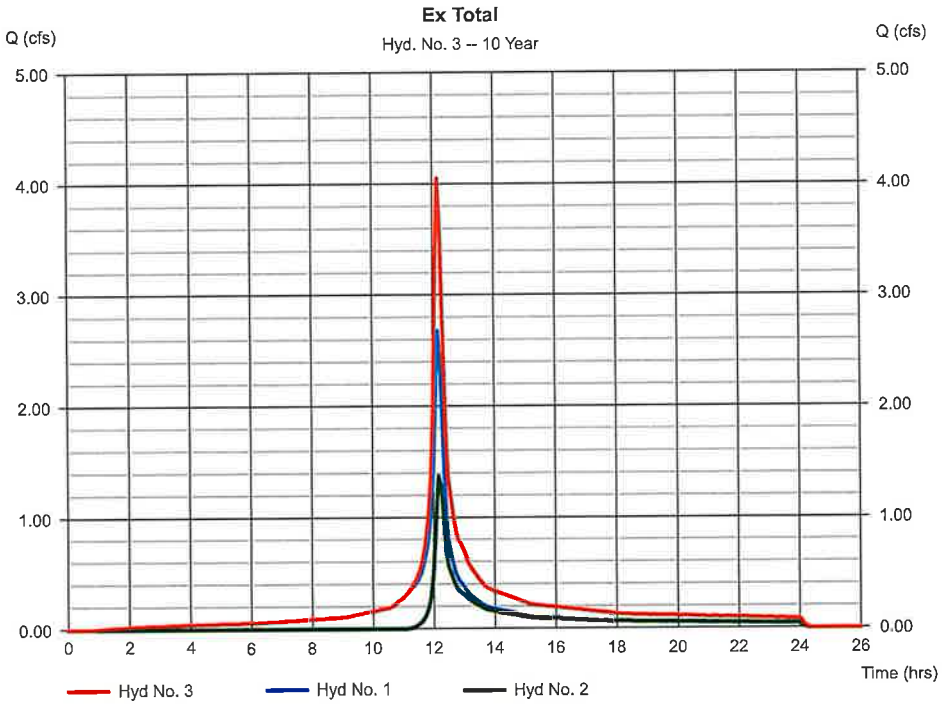


Hydrograph Report

Hyd. No. 3

Ex Total

Hydrograph type	= Combine	Peak discharge	= 4.057 cfs
Storm frequency	= 10 yrs	Time to peak	= 12.17 hrs
Time interval	= 5 min	Hyd. volume	= 18,734 cuft
Inflow hyds.	= 1, 2	Contrib. drain. area	= 2.170 ac

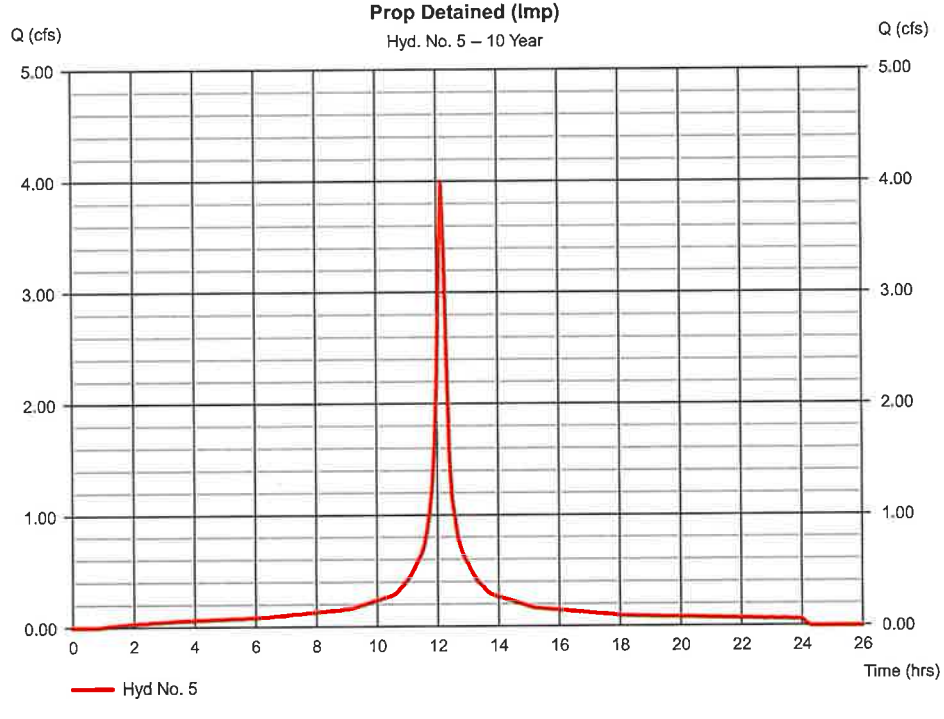


Hydrograph Report

Hyd. No. 5

Prop Detained (Imp)

Hydrograph type	= SCS Runoff	Peak discharge	= 4.004 cfs
Storm frequency	= 10 yrs	Time to peak	= 12.17 hrs
Time interval	= 5 min	Hyd. volume	= 18,680 cuft
Drainage area	= 1.150 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-D.cds	Shape factor	= 484

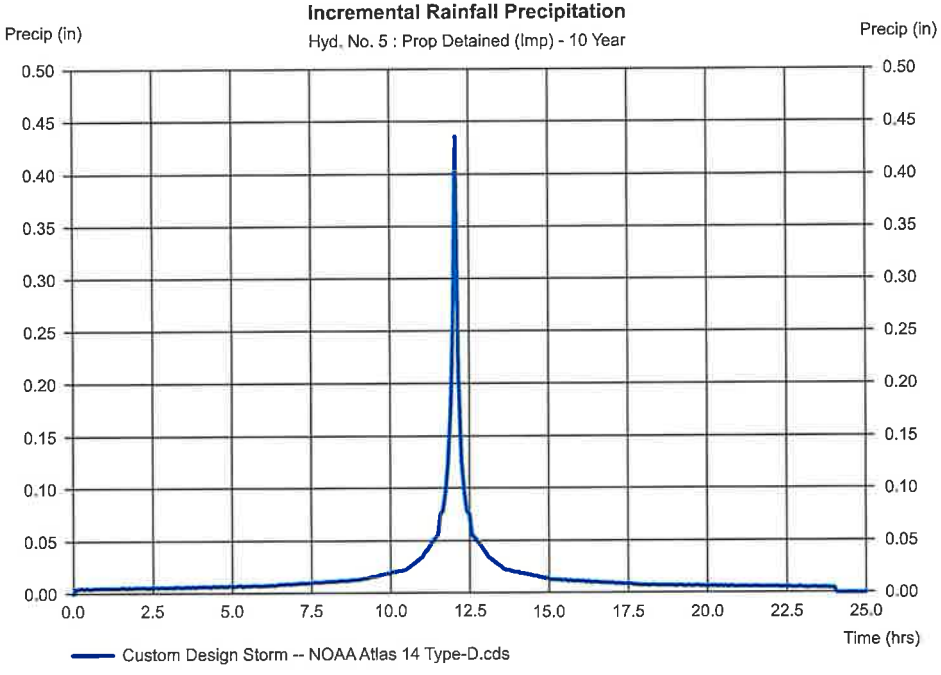


Precipitation Report

Hyd. No. 5

Prop Detained (Imp)

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

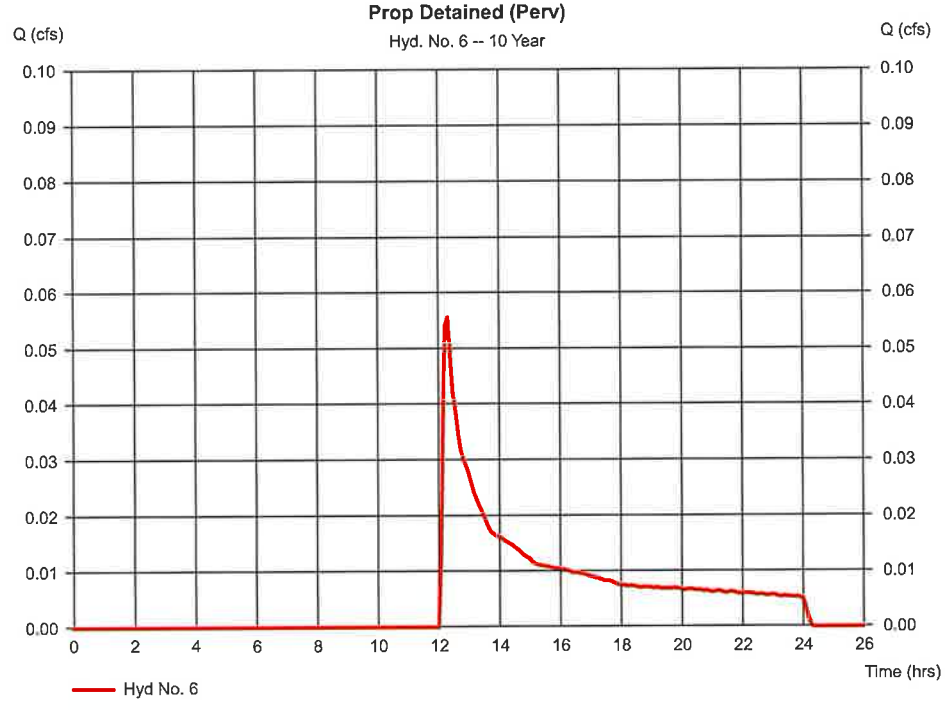


Hydrograph Report

Hyd. No. 6

Prop Detained (Perv)

Hydrograph type	= SCS Runoff	Peak discharge	= 0.055 cfs
Storm frequency	= 10 yrs	Time to peak	= 12.33 hrs
Time interval	= 5 min	Hyd. volume	= 502 cuft
Drainage area	= 0.300 ac	Curve number	= 46
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-D.cds	Shape factor	= 484

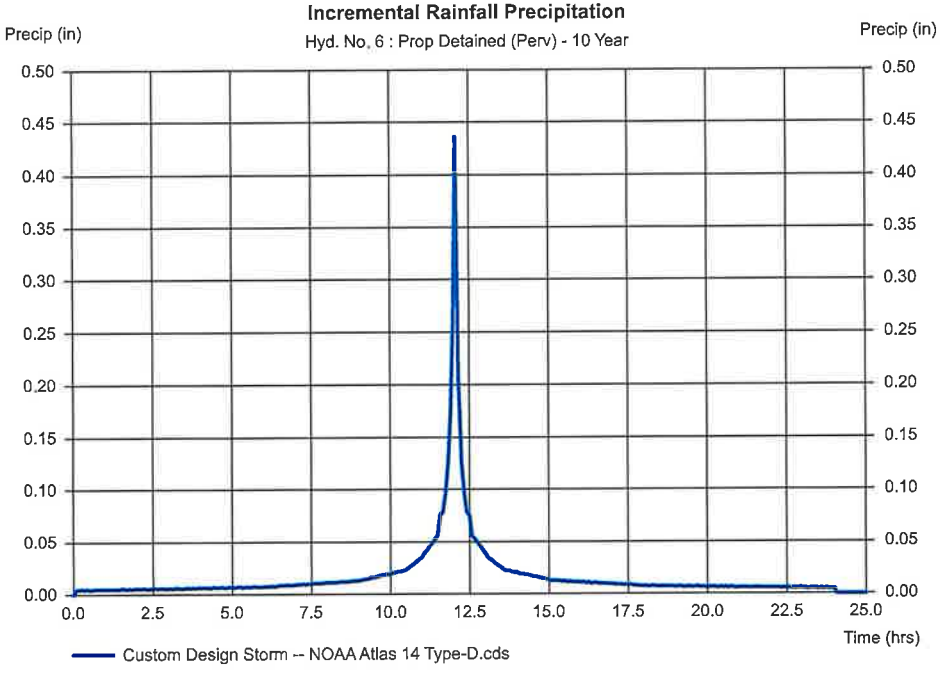


Precipitation Report

Hyd. No. 6

Prop Detained (Perv)

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

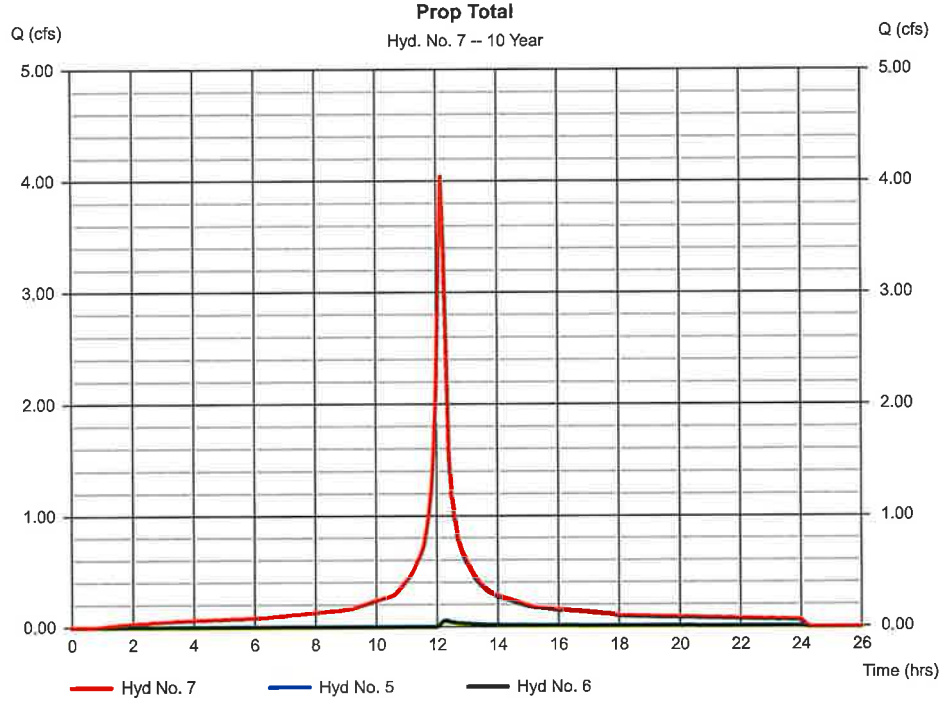


Hydrograph Report

Hyd. No. 7

Prop Total

Hydrograph type	= Combine	Peak discharge	= 4.043 cfs
Storm frequency	= 10 yrs	Time to peak	= 12.17 hrs
Time interval	= 5 min	Hyd. volume	= 19,182 cuft
Inflow hyds.	= 5, 6	Contrib. drain. area	= 1.450 ac



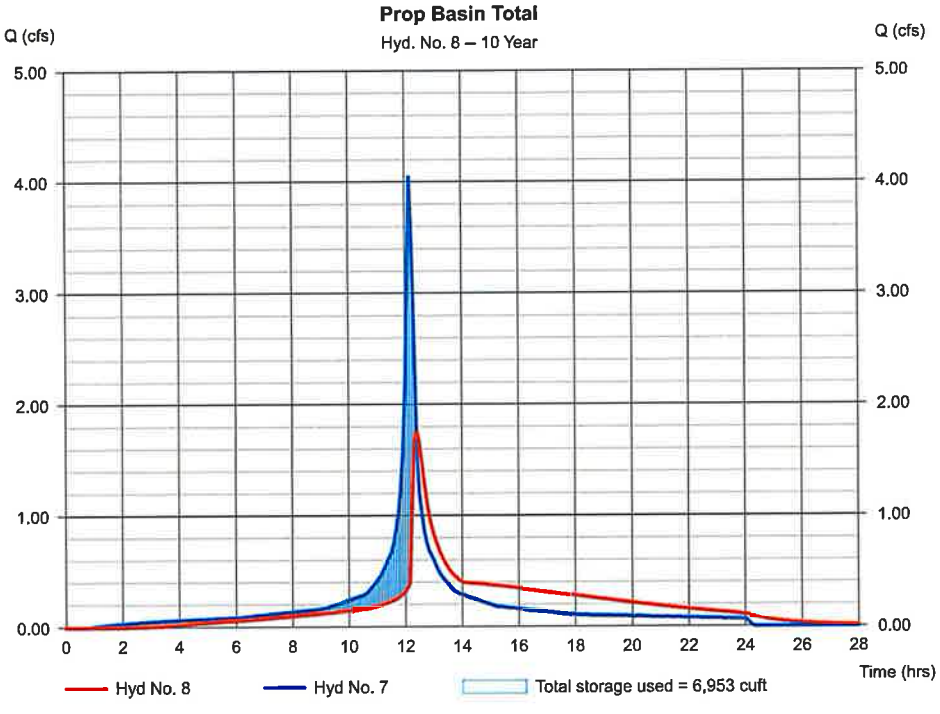
Hydrograph Report

Hyd. No. 8

Prop Basin Total

Hydrograph type	= Reservoir	Peak discharge	= 1.754 cfs
Storm frequency	= 10 yrs	Time to peak	= 12.42 hrs
Time interval	= 5 min	Hyd. volume	= 19,096 cuft
Inflow hyd. No.	= 7 - Prop Total	Max. Elevation	= 114.27 ft
Reservoir name	= Basin 2 (Rtank)	Max. Storage	= 6,953 cuft

Storage Indication method used.

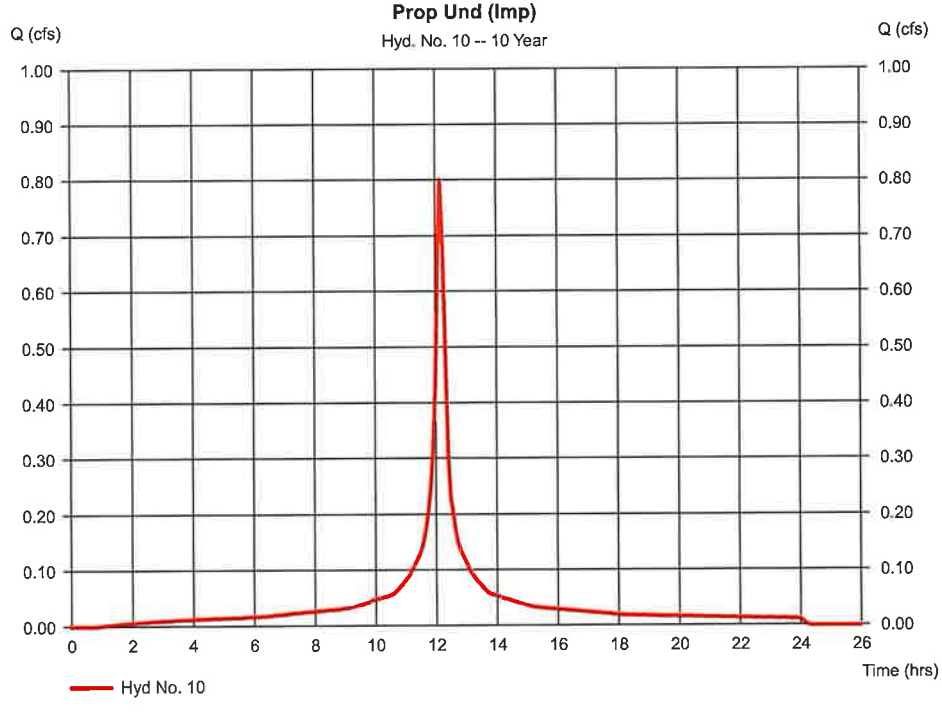


Hydrograph Report

Hyd. No. 10

Prop Und (Imp)

Hydrograph type	= SCS Runoff	Peak discharge	= 0.801 cfs
Storm frequency	= 10 yrs	Time to peak	= 12.17 hrs
Time interval	= 5 min	Hyd. volume	= 3,736 cuft
Drainage area	= 0.230 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-D.cds	Shape factor	= 484

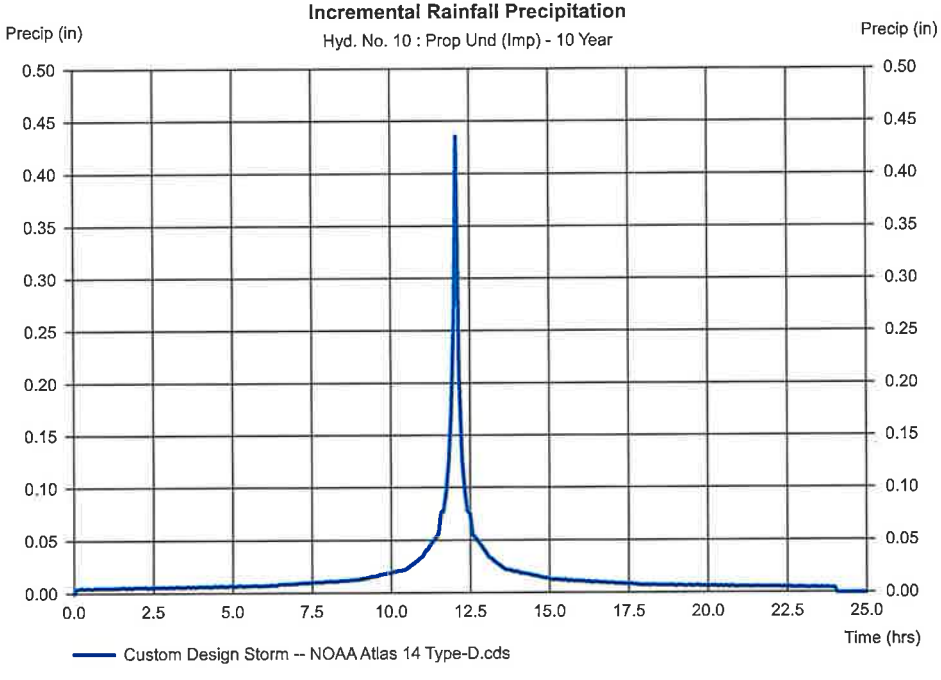


Precipitation Report

Hyd. No. 10

Prop Und (Imp)

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

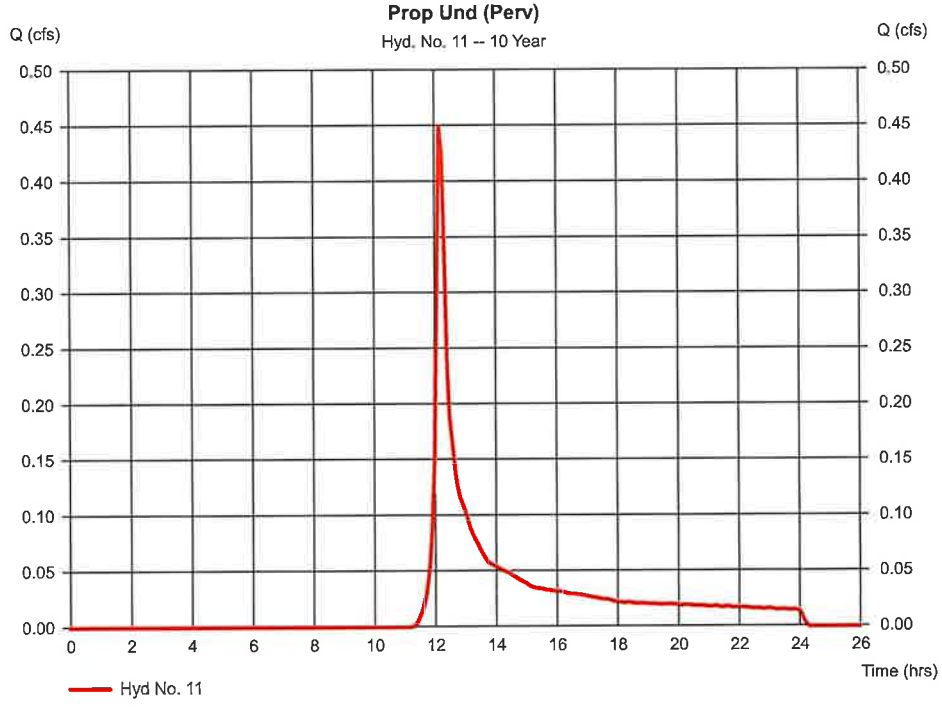


Hydrograph Report

Hyd. No. 11

Prop Und (Perv)

Hydrograph type	= SCS Runoff	Peak discharge	= 0.449 cfs
Storm frequency	= 10 yrs	Time to peak	= 12.17 hrs
Time interval	= 5 min	Hyd. volume	= 2,068 cuft
Drainage area	= 0.490 ac	Curve number	= 59
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-D.cds	Shape factor	= 484

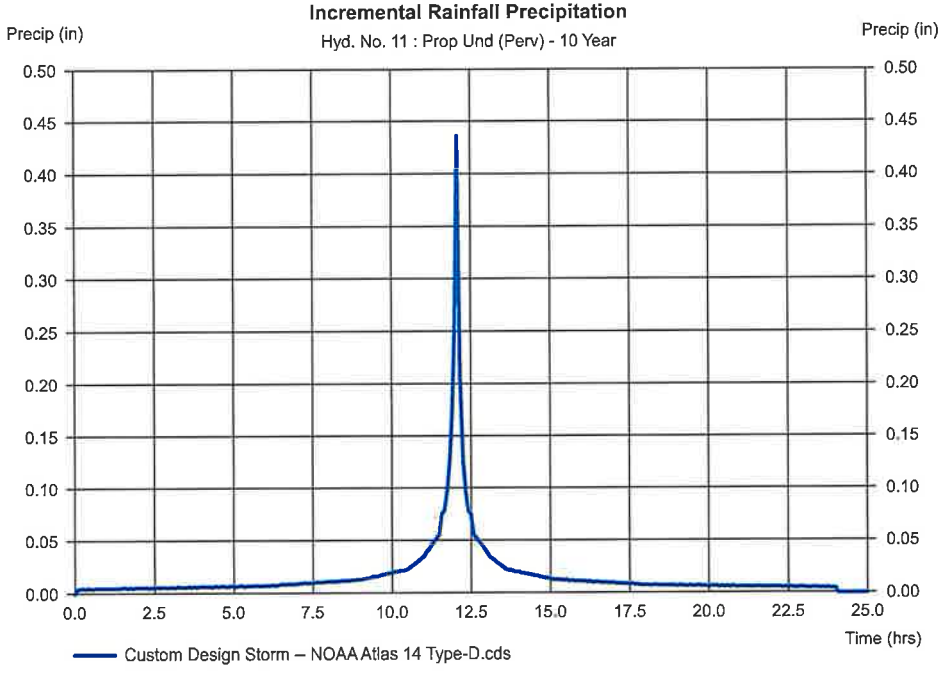


Precipitation Report

Hyd. No. 11

Prop Und (Perv)

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

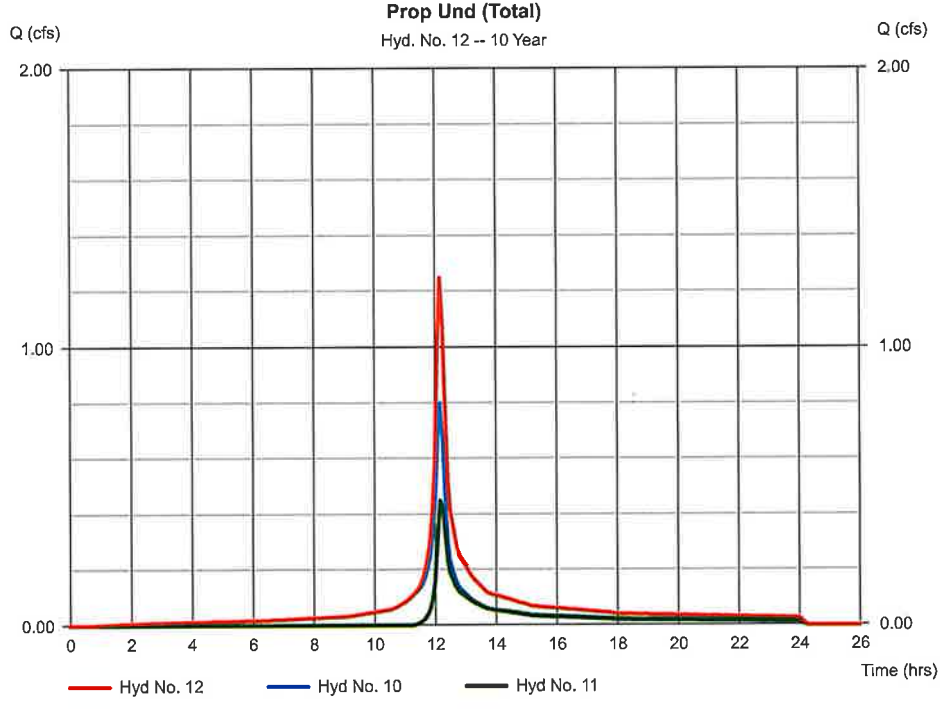


Hydrograph Report

Hyd. No. 12

Prop Und (Total)

Hydrograph type	= Combine	Peak discharge	= 1.250 cfs
Storm frequency	= 10 yrs	Time to peak	= 12.17 hrs
Time interval	= 5 min	Hyd. volume	= 5,804 cuft
Inflow hyds.	= 10, 11	Contrib. drain. area	= 0.720 ac

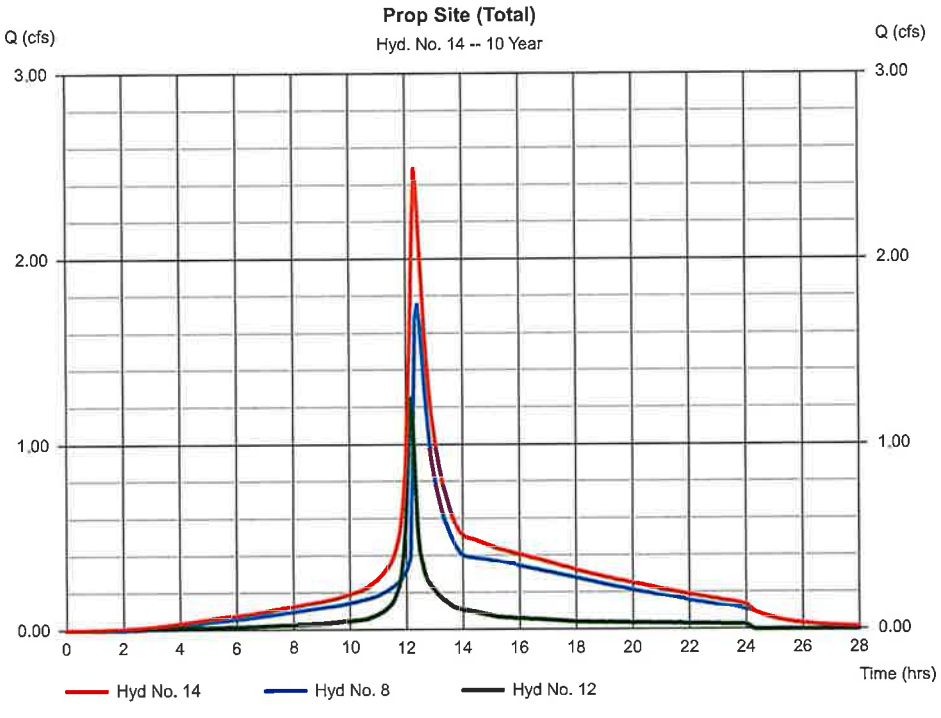


Hydrograph Report

Hyd. No. 14

Prop Site (Total)

Hydrograph type	= Combine	Peak discharge	= 2.487 cfs
Storm frequency	= 10 yrs	Time to peak	= 12.33 hrs
Time interval	= 5 min	Hyd. volume	= 24,900 cuft
Inflow hyds.	= 8, 12	Contrib. drain. area	= 0.000 ac

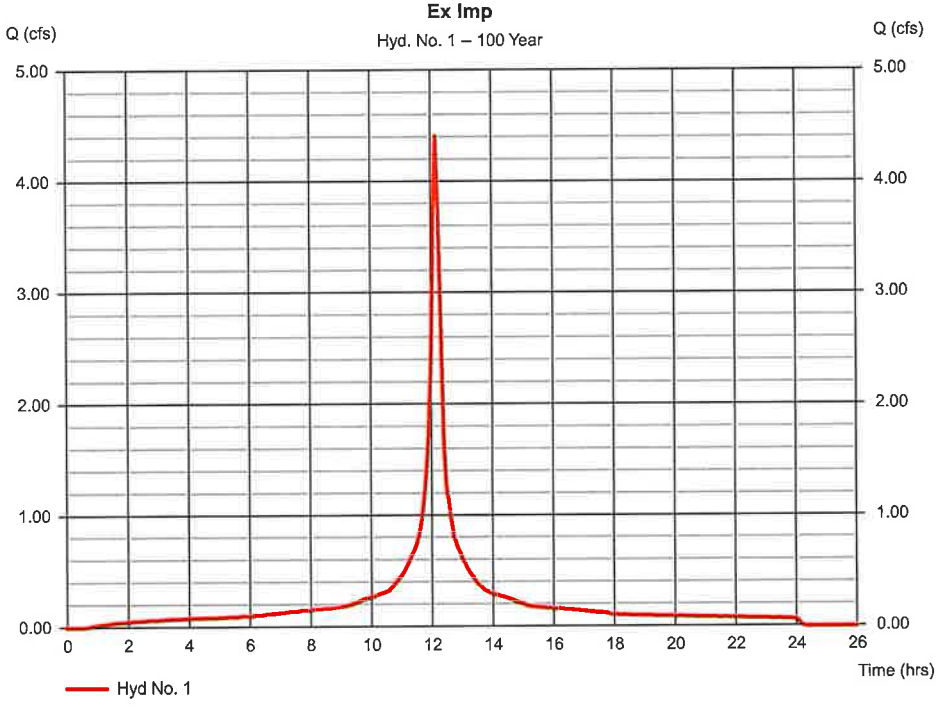


Hydrograph Report

Hyd. No. 1

Ex Imp

Hydrograph type	= SCS Runoff	Peak discharge	= 4.409 cfs
Storm frequency	= 100 yrs	Time to peak	= 12.17 hrs
Time interval	= 5 min	Hyd. volume	= 20,885 cuft
Drainage area	= 0.770 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-D.cds	Shape factor	= 484

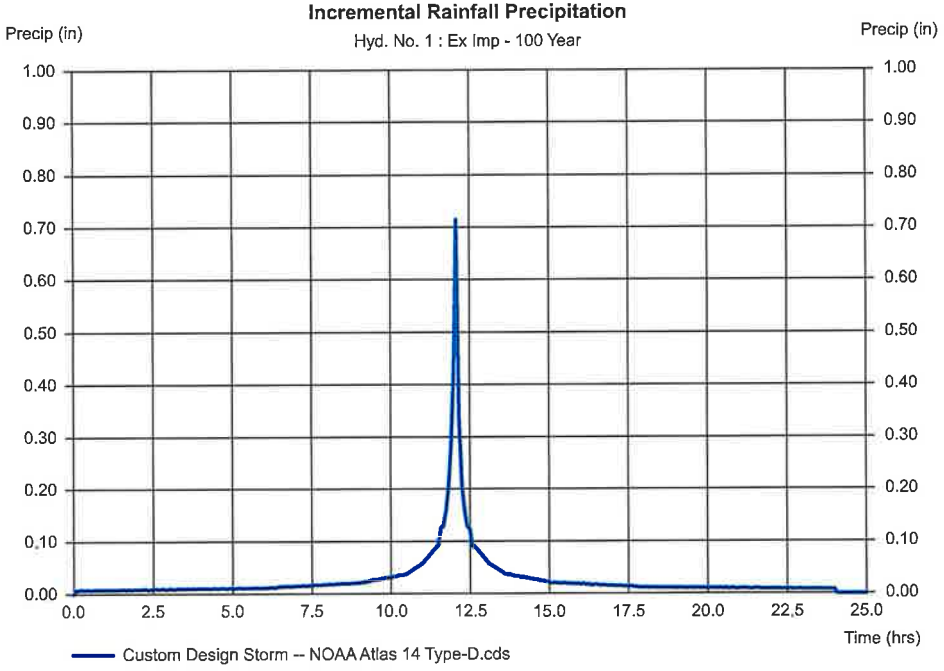


Precipitation Report

Hyd. No. 1

Ex Imp

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

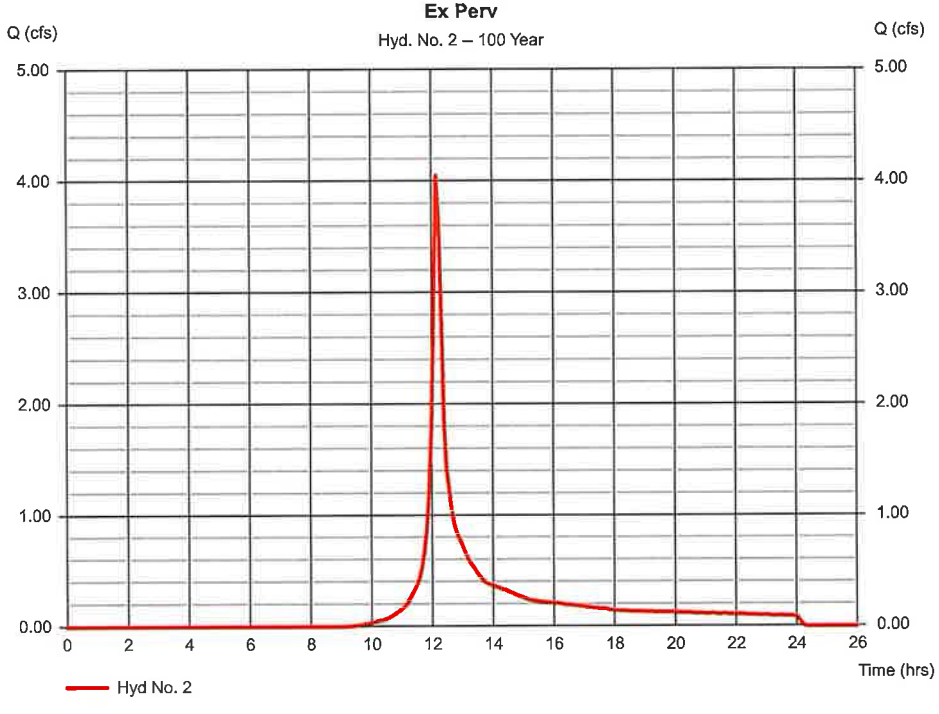


Hydrograph Report

Hyd. No. 2

Ex Perv

Hydrograph type	= SCS Runoff	Peak discharge	= 4.050 cfs
Storm frequency	= 100 yrs	Time to peak	= 12.17 hrs
Time interval	= 5 min	Hyd. volume	= 16,635 cuft
Drainage area	= 1.400 ac	Curve number	= 60
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-D.cds	Shape factor	= 484

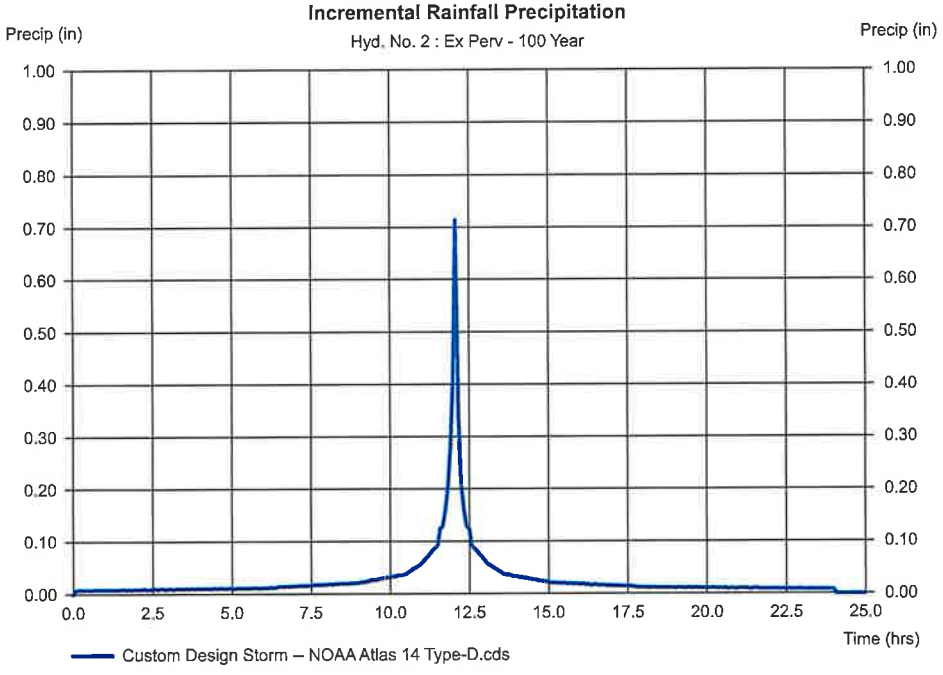


Precipitation Report

Hyd. No. 2

Ex Perv

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

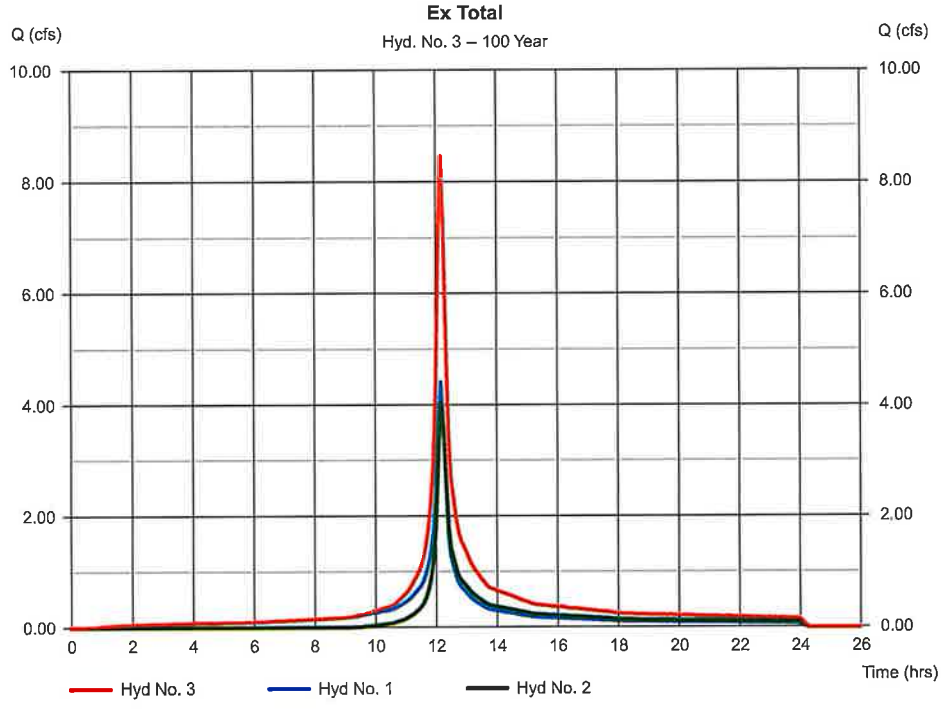


Hydrograph Report

Hyd. No. 3

Ex Total

Hydrograph type	= Combine	Peak discharge	= 8.458 cfs
Storm frequency	= 100 yrs	Time to peak	= 12.17 hrs
Time interval	= 5 min	Hyd. volume	= 37,520 cuft
Inflow hyds.	= 1, 2	Contrib. drain. area	= 2.170 ac

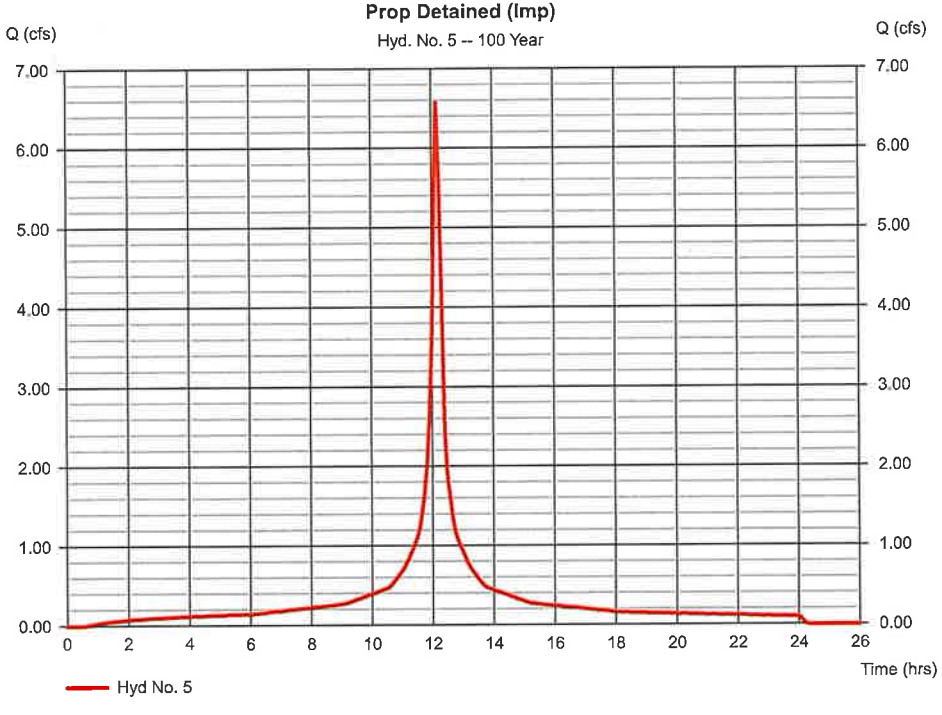


Hydrograph Report

Hyd. No. 5

Prop Detained (Imp)

Hydrograph type	= SCS Runoff	Peak discharge	= 6.584 cfs
Storm frequency	= 100 yrs	Time to peak	= 12.17 hrs
Time interval	= 5 min	Hyd. volume	= 31,192 cuft
Drainage area	= 1.150 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-D.cds	Shape factor	= 484

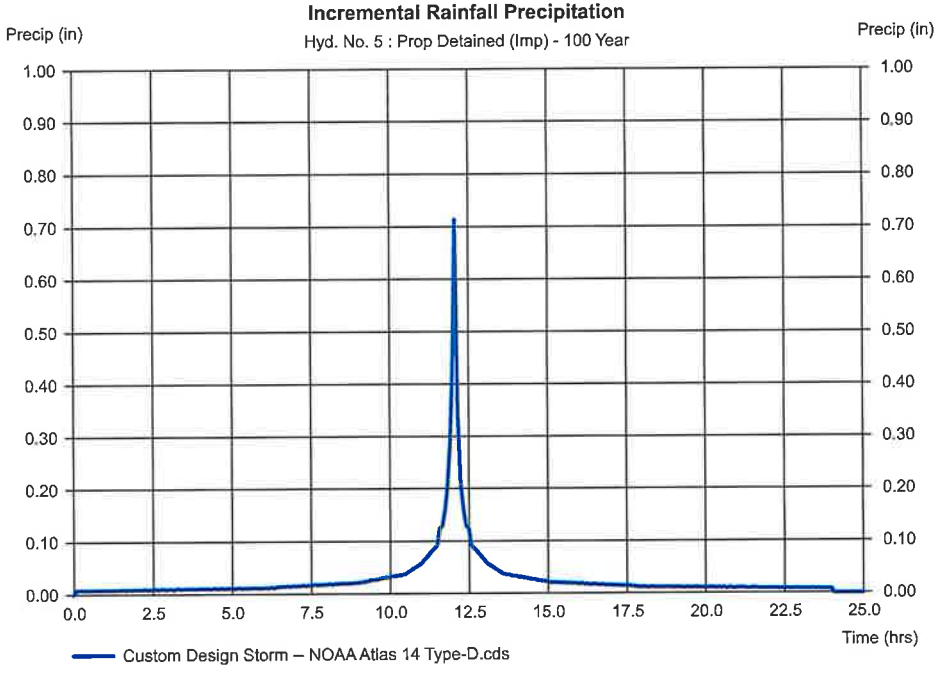


Precipitation Report

Hyd. No. 5

Prop Detained (Imp)

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

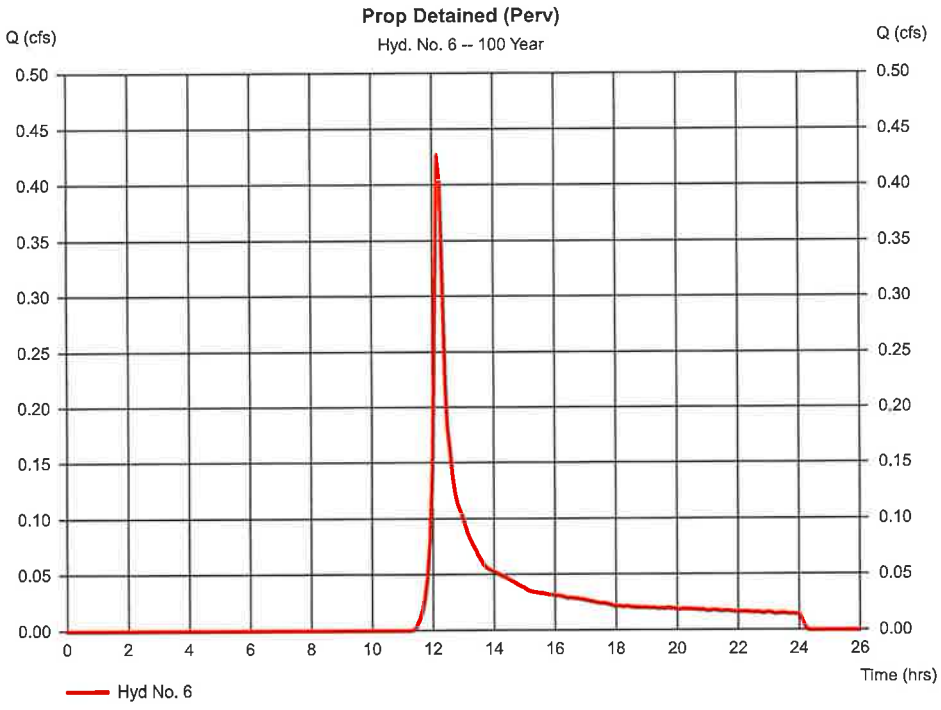


Hydrograph Report

Hyd. No. 6

Prop Detained (Perv)

Hydrograph type	= SCS Runoff	Peak discharge	= 0.426 cfs
Storm frequency	= 100 yrs	Time to peak	= 12.17 hrs
Time interval	= 5 min	Hyd. volume	= 1,993 cuft
Drainage area	= 0.300 ac	Curve number	= 46
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-D.cds	Shape factor	= 484

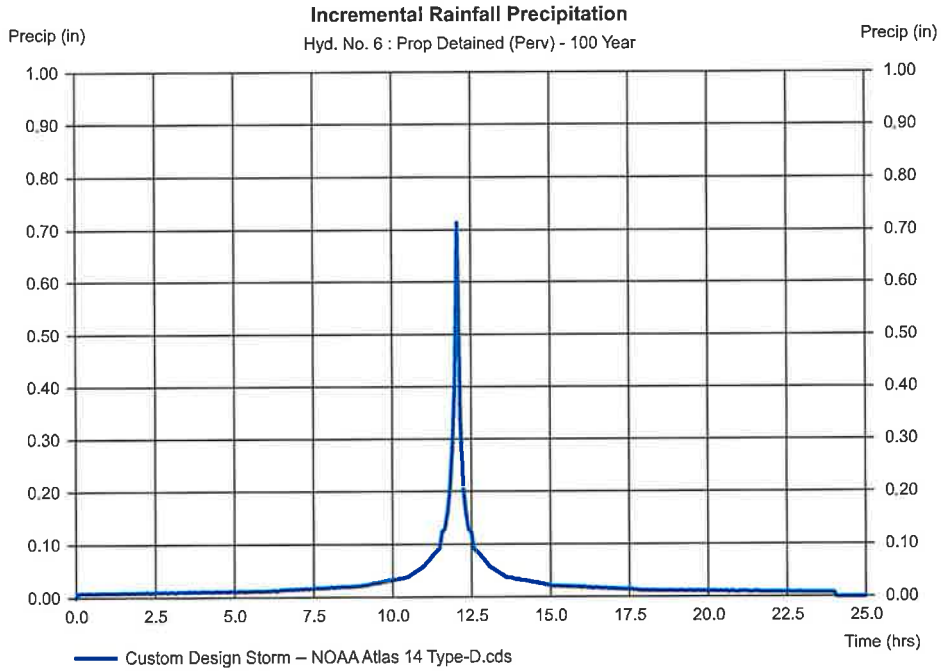


Precipitation Report

Hyd. No. 6

Prop Detained (Perv)

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

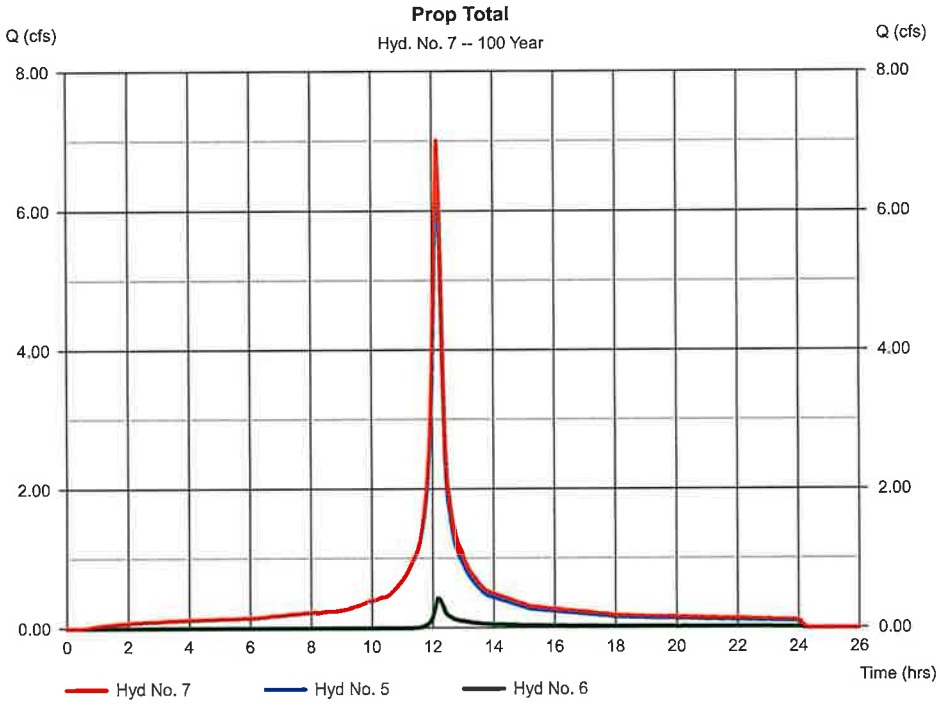


Hydrograph Report

Hyd. No. 7

Prop Total

Hydrograph type	= Combine	Peak discharge	= 7.011 cfs
Storm frequency	= 100 yrs	Time to peak	= 12.17 hrs
Time interval	= 5 min	Hyd. volume	= 33,185 cuft
Inflow hyds.	= 5, 6	Contrib. drain. area	= 1.450 ac



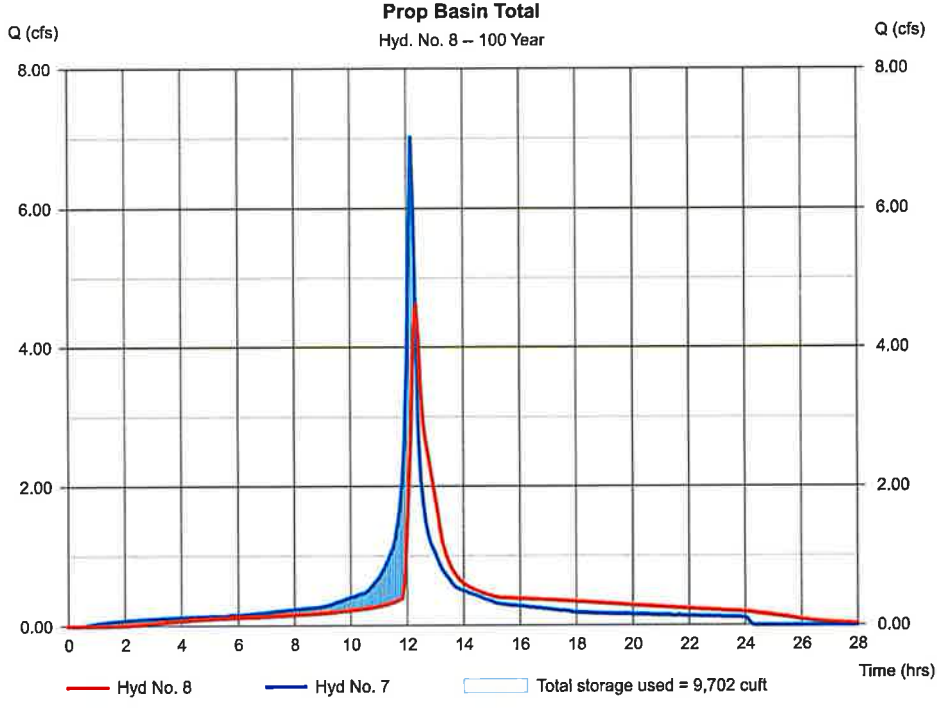
Hydrograph Report

Hyd. No. 8

Prop Basin Total

Hydrograph type	= Reservoir	Peak discharge	= 4.618 cfs
Storm frequency	= 100 yrs	Time to peak	= 12.33 hrs
Time interval	= 5 min	Hyd. volume	= 33,099 cuft
Inflow hyd. No.	= 7 - Prop Total	Max. Elevation	= 115.12 ft
Reservoir name	= Basin 2 (Rtank)	Max. Storage	= 9,702 cuft

Storage Indication method used.

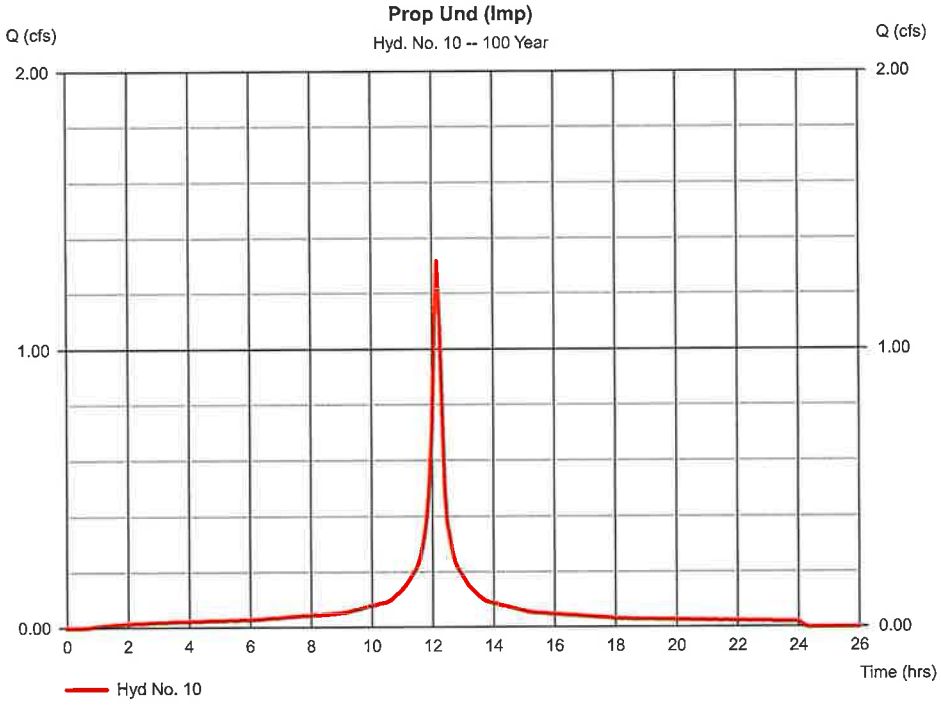


Hydrograph Report

Hyd. No. 10

Prop Und (Imp)

Hydrograph type	= SCS Runoff	Peak discharge	= 1.317 cfs
Storm frequency	= 100 yrs	Time to peak	= 12.17 hrs
Time interval	= 5 min	Hyd. volume	= 6,238 cuft
Drainage area	= 0.230 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-D.cds	Shape factor	= 484

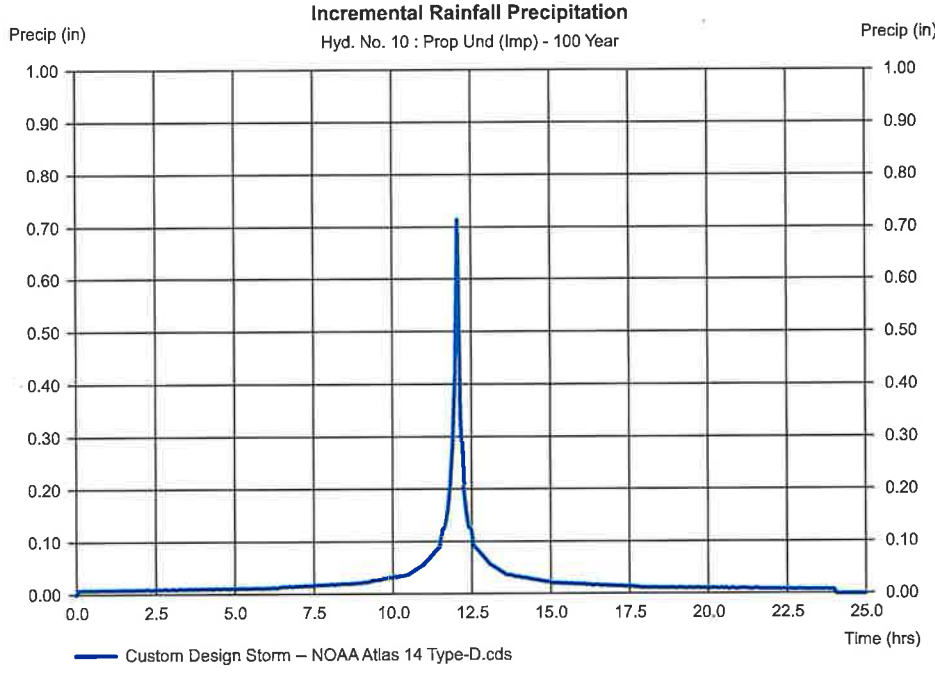


Precipitation Report

Hyd. No. 10

Prop Und (Imp)

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

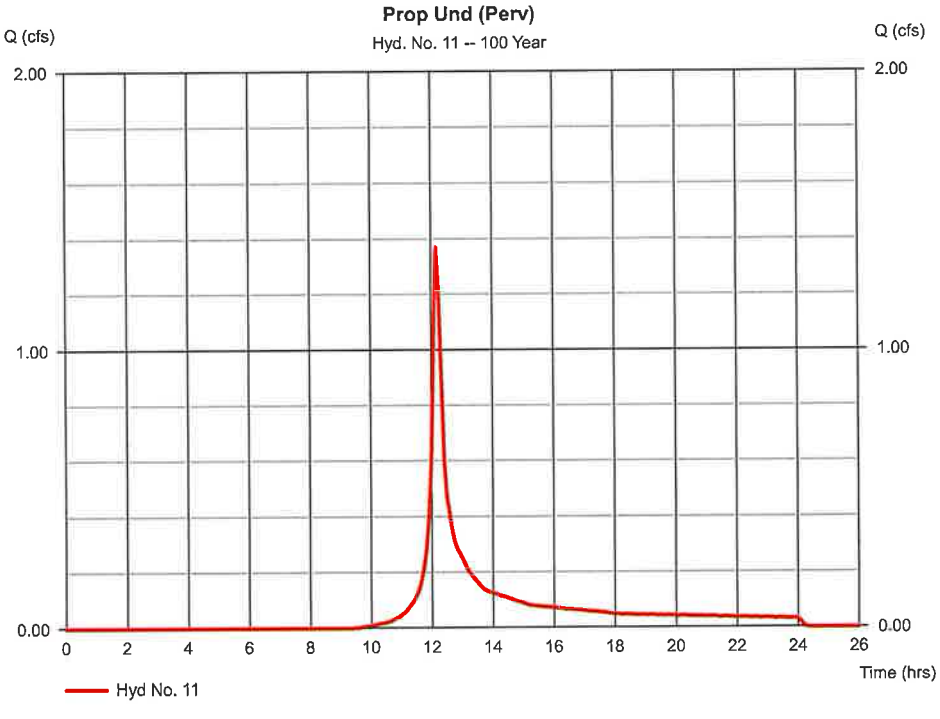


Hydrograph Report

Hyd. No. 11

Prop Und (Perv)

Hydrograph type	= SCS Runoff	Peak discharge	= 1.367 cfs
Storm frequency	= 100 yrs	Time to peak	= 12.17 hrs
Time interval	= 5 min	Hyd. volume	= 5,633 cuft
Drainage area	= 0.490 ac	Curve number	= 59
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-D.cds	Shape factor	= 484

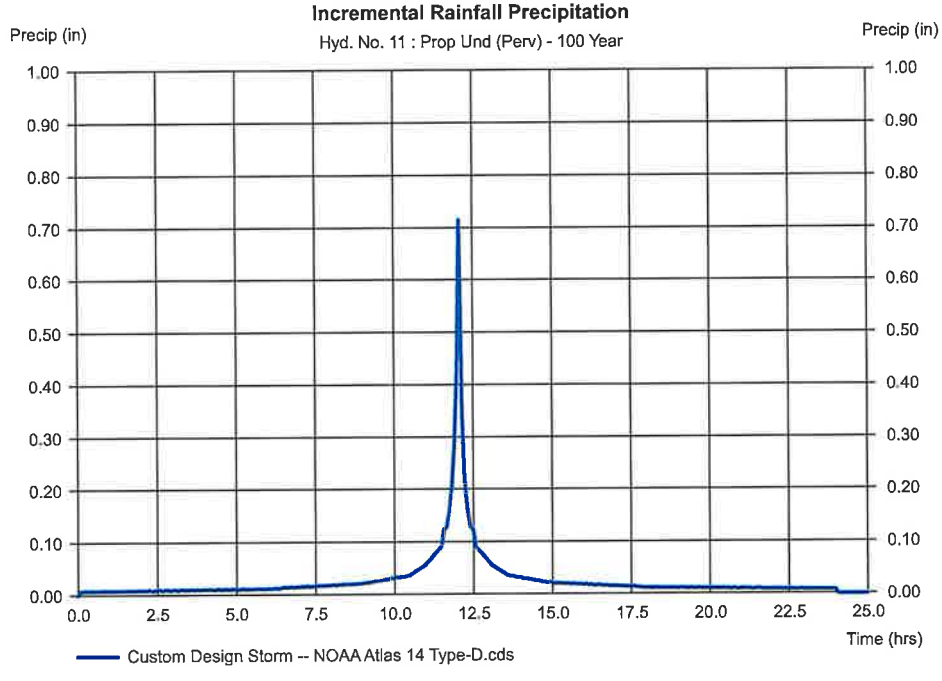


Precipitation Report

Hyd. No. 11

Prop Und (Perv)

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

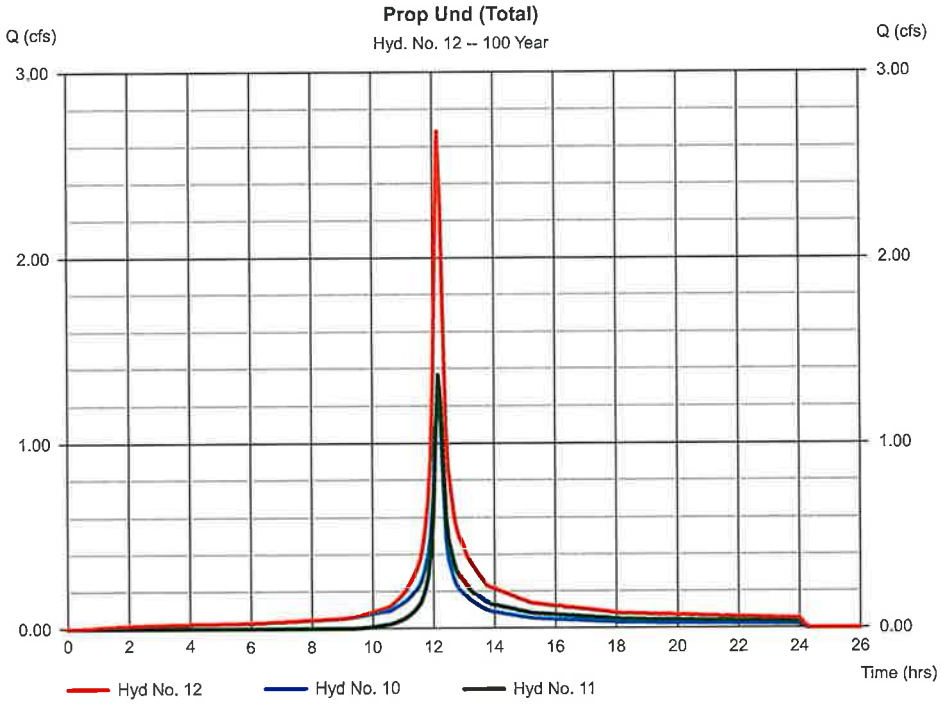


Hydrograph Report

Hyd. No. 12

Prop Und (Total)

Hydrograph type	= Combine	Peak discharge	= 2.684 cfs
Storm frequency	= 100 yrs	Time to peak	= 12.17 hrs
Time interval	= 5 min	Hyd. volume	= 11,871 cuft
Inflow hyds.	= 10, 11	Contrib. drain. area	= 0.720 ac

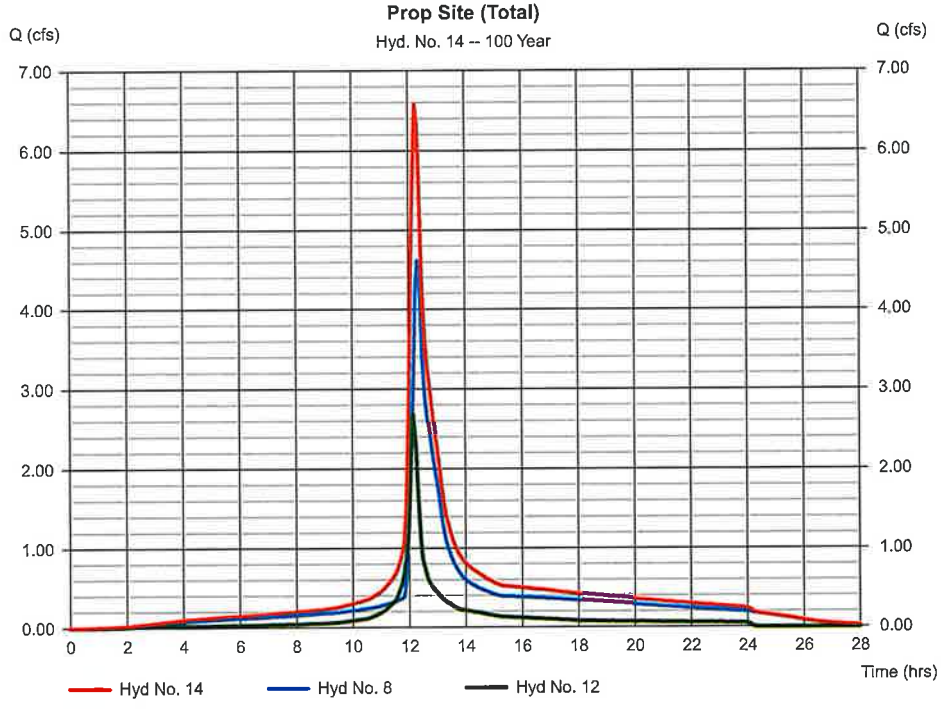


Hydrograph Report

Hyd. No. 14

Prop Site (Total)

Hydrograph type	= Combine	Peak discharge	= 6.585 cfs
Storm frequency	= 100 yrs	Time to peak	= 12.25 hrs
Time interval	= 5 min	Hyd. volume	= 44,970 cuft
Inflow hyds.	= 8, 12	Contrib. drain. area	= 0.000 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

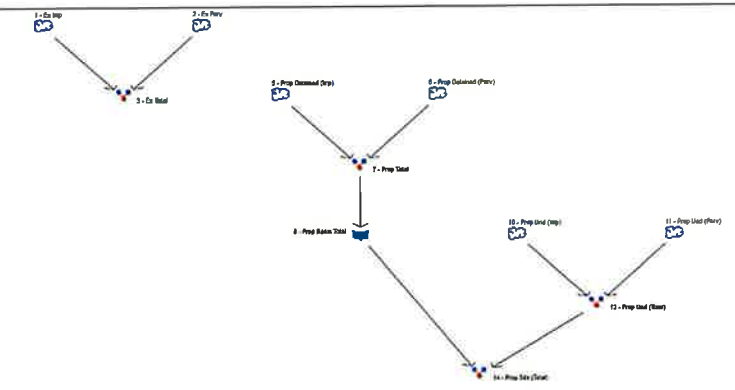
Storm Distribution	Rainfall Precipitation Table (in)							
	1-yr	2-yr	3-yr	5-yr	10-yr	25-yr	50-yr	100-yr
SCS 24-hour	0.00	3.34	0.00	0.00	5.01	6.15	0.00	8.21
SCS 6-Hr	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Huff-1st	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Huff-2nd	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00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

Hydraflow Hydrographs by Intelisolve v9.1



Legend

Hyd.	Origin	Description
1	SCS Runoff	Ex Imp
2	SCS Runoff	Ex Perv
3	Combine	Ex Total
5	SCS Runoff	Prop Detained (Imp)
6	SCS Runoff	Prop Detained (Perv)
7	Combine	Prop Total
8	Reservoir	Prop Basin Total
10	SCS Runoff	Prop Und (Imp)
11	SCS Runoff	Prop Und (Perv)
12	Combine	Prop Und (Total)
14	Combine	Prop Site (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	
1	SCS Runoff	------	0.628	------	------	------	------	------	------	------	Ex Imp
2	SCS Runoff	------	0.000	------	------	------	------	------	------	------	Ex Perv
3	Combine	1, 2	0.628	------	------	------	------	------	------	------	Ex Total
5	SCS Runoff	------	0.938	------	------	------	------	------	------	------	Prop Detained (Imp)
6	SCS Runoff	------	0.000	------	------	------	------	------	------	------	Prop Detained (Perv)
7	Combine	5, 6	0.938	------	------	------	------	------	------	------	Prop Total
8	Reservoir	7	0.196	------	------	------	------	------	------	------	Prop Basin Total
10	SCS Runoff	------	0.188	------	------	------	------	------	------	------	Prop Und (Imp)
11	SCS Runoff	------	0.000	------	------	------	------	------	------	------	Prop Und (Perv)
12	Combine	10, 11	0.188	------	------	------	------	------	------	------	Prop Und (Total)
14	Combine	8, 12,	0.341	------	------	------	------	------	------	------	Prop Site (Total)

Hydrograph Summary Report

Hydraflow Hydrographs by Intelisolve v9.1

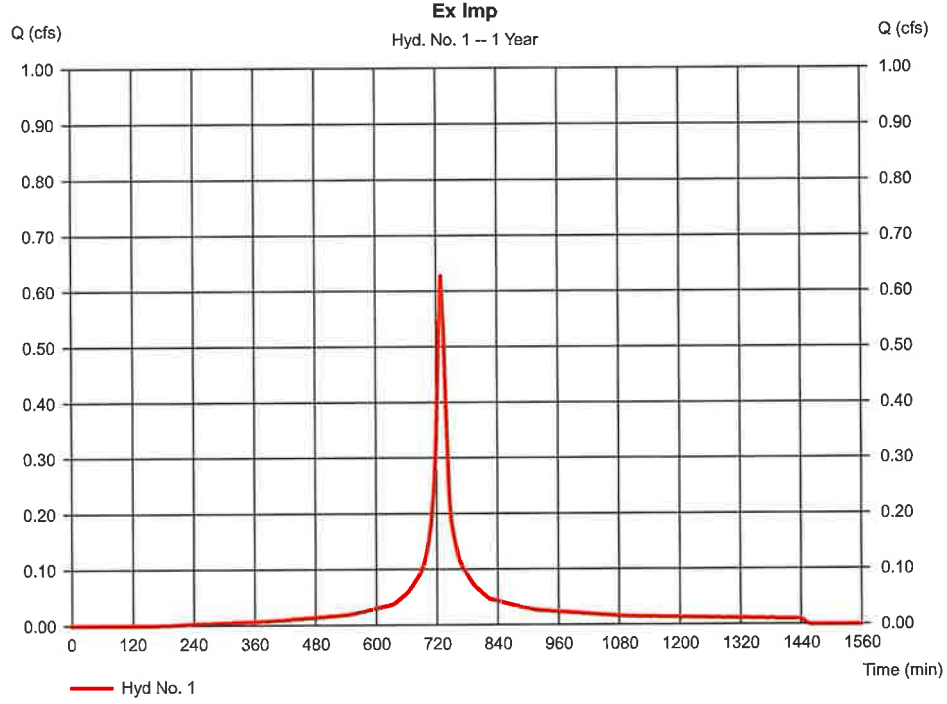
Hyd. No.	Hydrograph type (origin)	Peak flow (cfs)	Time interval (min)	Time to peak (min)	Hyd. volume (cuft)	Inflow hyd(s)	Maximum elevation (ft)	Total strge used (cuft)	Hydrograph description
1	SCS Runoff	0.628	5	730	2,711	---	-----	-----	Ex Imp
2	SCS Runoff	0.000	5	n/a	0	---	-----	-----	Ex Perv
3	Combine	0.628	5	730	2,711	1, 2	-----	-----	Ex Total
5	SCS Runoff	0.938	5	730	4,049	---	-----	-----	Prop Detained (Imp)
6	SCS Runoff	0.000	5	n/a	0	---	-----	-----	Prop Detained (Perv)
7	Combine	0.938	5	730	4,049	5, 6	-----	-----	Prop Total
8	Reservoir	0.196	5	760	3,963	7	112.57	1,746	Prop Basin Total
10	SCS Runoff	0.188	5	730	810	---	-----	-----	Prop Und (Imp)
11	SCS Runoff	0.000	5	n/a	0	---	-----	-----	Prop Und (Perv)
12	Combine	0.188	5	730	810	10, 11	-----	-----	Prop Und (Total)
14	Combine	0.341	5	730	4,773	8, 12,	-----	-----	Prop Site (Total)

Hydrograph Report

Hyd. No. 1

Ex Imp

Hydrograph type	= SCS Runoff	Peak discharge	= 0.628 cfs
Storm frequency	= 1 yrs	Time to peak	= 730 min
Time interval	= 5 min	Hyd. volume	= 2,711 cuft
Drainage area	= 0.770 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	= NOAA Atlas 14 Type-D.cds	Shape factor	= 484

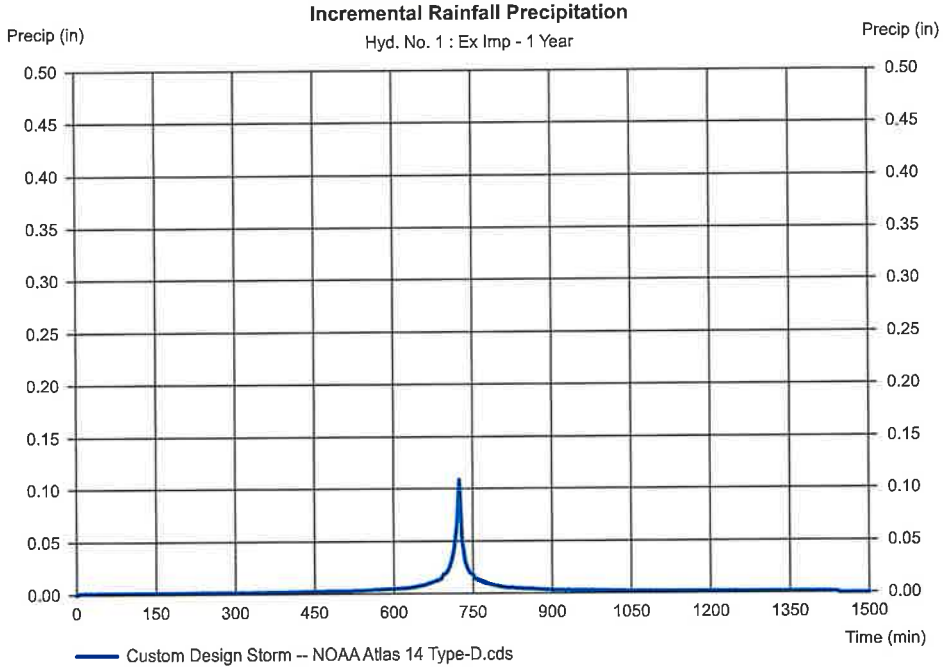


Precipitation Report

Hyd. No. 1

Ex Imp

Storm Frequency	= 1 yrs	Time interval	= 5 min
Total precip.	= 1.2500 in	Distribution	= Custom
Storm duration	= NOAA Atlas 14 Type-D.cds		

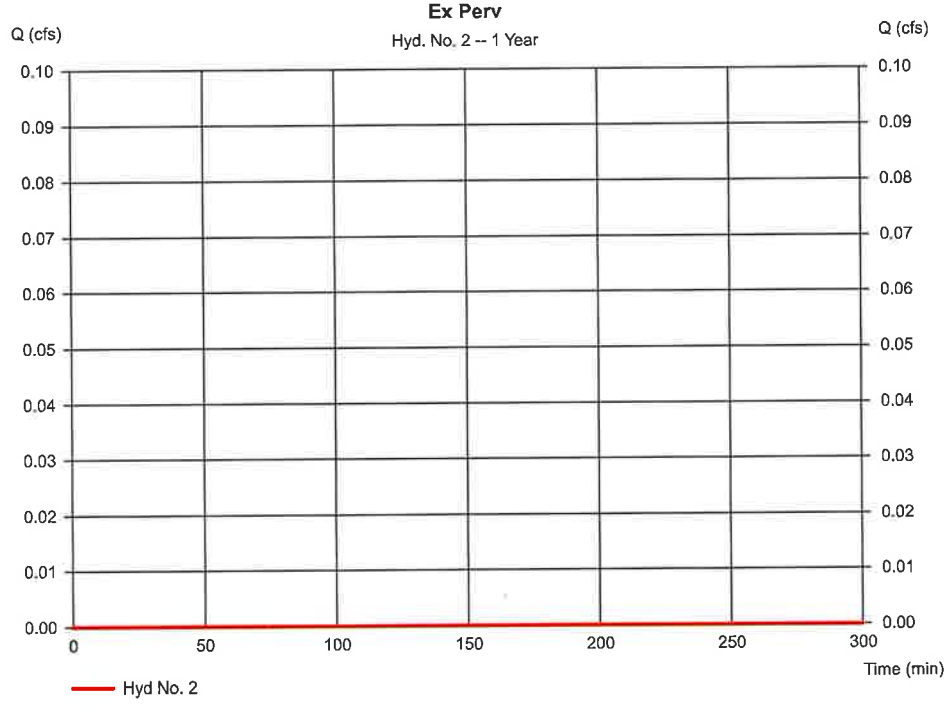


Hydrograph Report

Hyd. No. 2

Ex Perv

Hydrograph type	= SCS Runoff	Peak discharge	= 0.000 cfs
Storm frequency	= 1 yrs	Time to peak	= n/a
Time interval	= 5 min	Hyd. volume	= 0 cuft
Drainage area	= 1.400 ac	Curve number	= 60
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	= NOAA Atlas 14 Type-D.cds	Shape factor	= 484

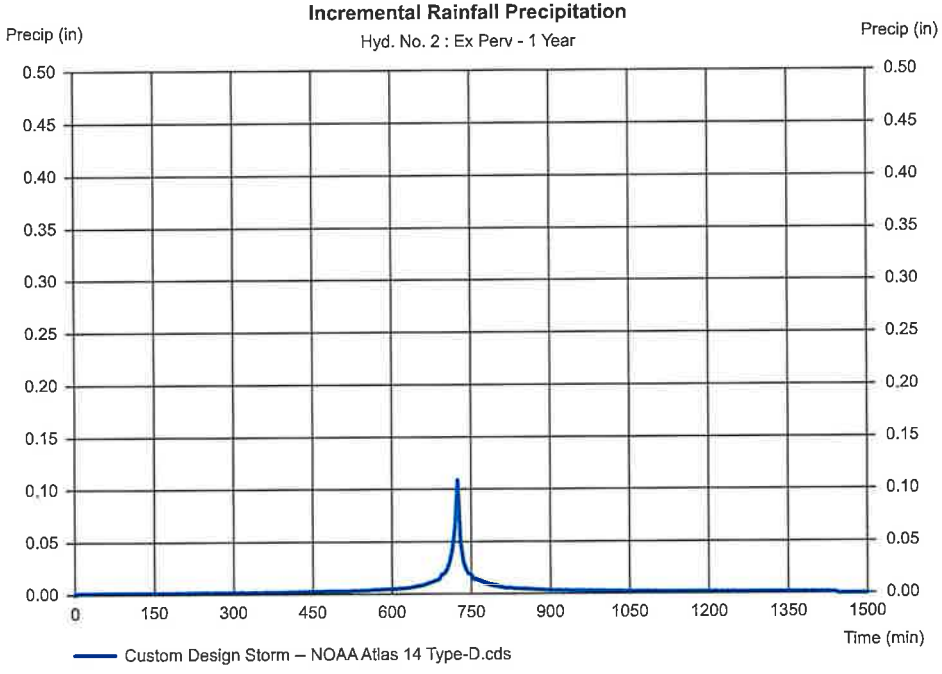


Precipitation Report

Hyd. No. 2

Ex Perv

Storm Frequency	= 1 yrs	Time interval	= 5 min
Total precip.	= 1.2500 in	Distribution	= Custom
Storm duration	= NOAA Atlas 14 Type-D.cds		

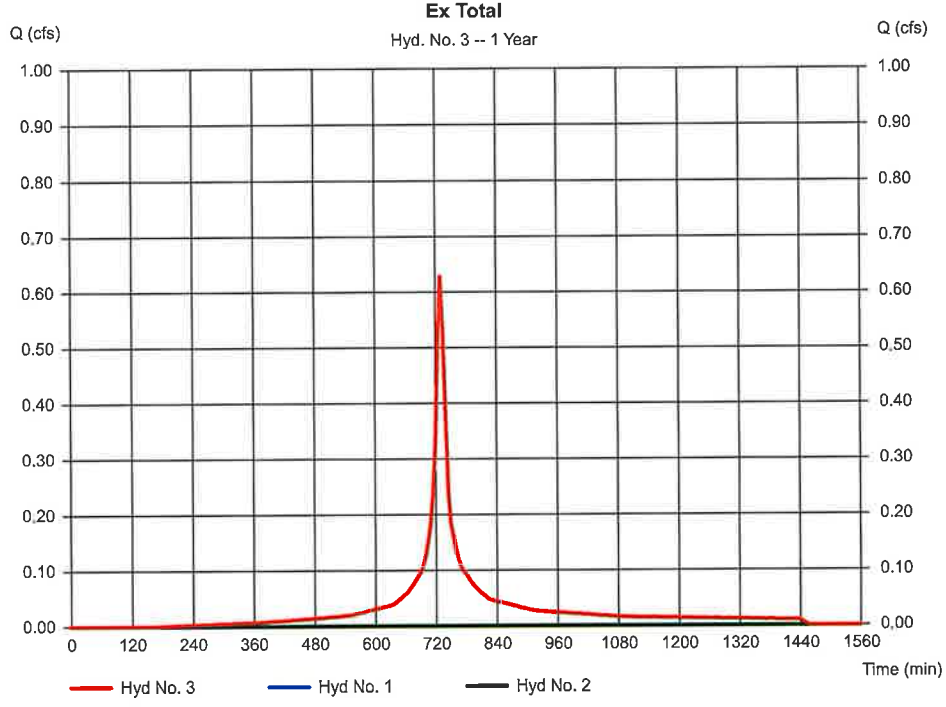


Hydrograph Report

Hyd. No. 3

Ex Total

Hydrograph type	= Combine	Peak discharge	= 0.628 cfs
Storm frequency	= 1 yrs	Time to peak	= 730 min
Time interval	= 5 min	Hyd. volume	= 2,711 cuft
Inflow hyds.	= 1, 2	Contrib. drain. area	= 2.170 ac

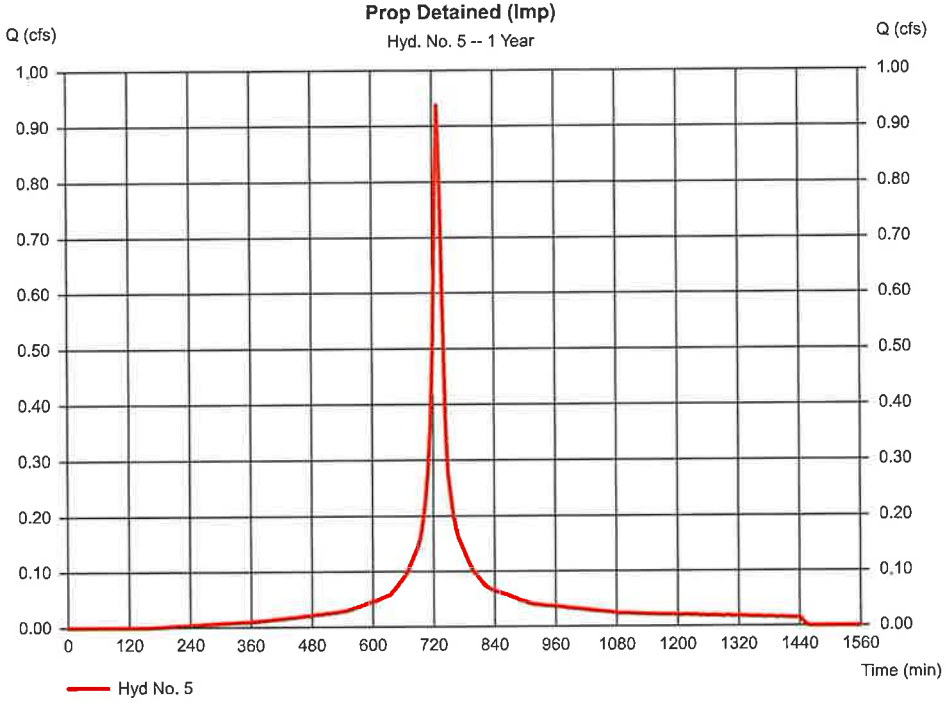


Hydrograph Report

Hyd. No. 5

Prop Detained (Imp)

Hydrograph type	= SCS Runoff	Peak discharge	= 0.938 cfs
Storm frequency	= 1 yrs	Time to peak	= 730 min
Time interval	= 5 min	Hyd. volume	= 4,049 cuft
Drainage area	= 1.150 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	= NOAA Atlas 14 Type-D.cds	Shape factor	= 484

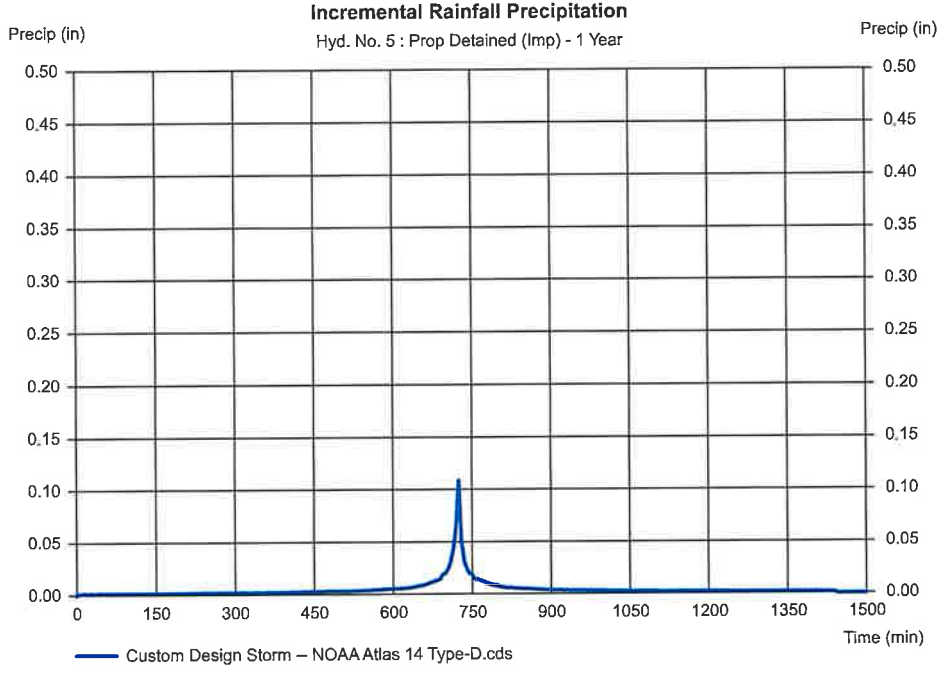


Precipitation Report

Hyd. No. 5

Prop Detained (Imp)

Storm Frequency	= 1 yrs	Time interval	= 5 min
Total precip.	= 1.2500 in	Distribution	= Custom
Storm duration	= NOAA Atlas 14 Type-D.cds		

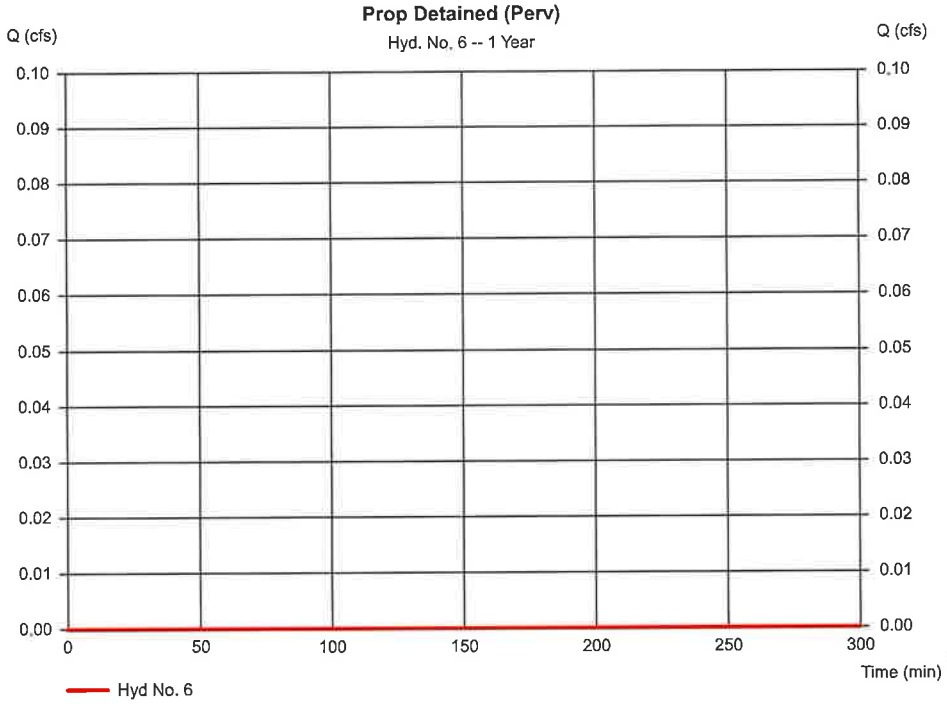


Hydrograph Report

Hyd. No. 6

Prop Detained (Perv)

Hydrograph type	= SCS Runoff	Peak discharge	= 0.000 cfs
Storm frequency	= 1 yrs	Time to peak	= n/a
Time interval	= 5 min	Hyd. volume	= 0 cuft
Drainage area	= 0.300 ac	Curve number	= 46
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	= NOAA Atlas 14 Type-D.cds	Shape factor	= 484

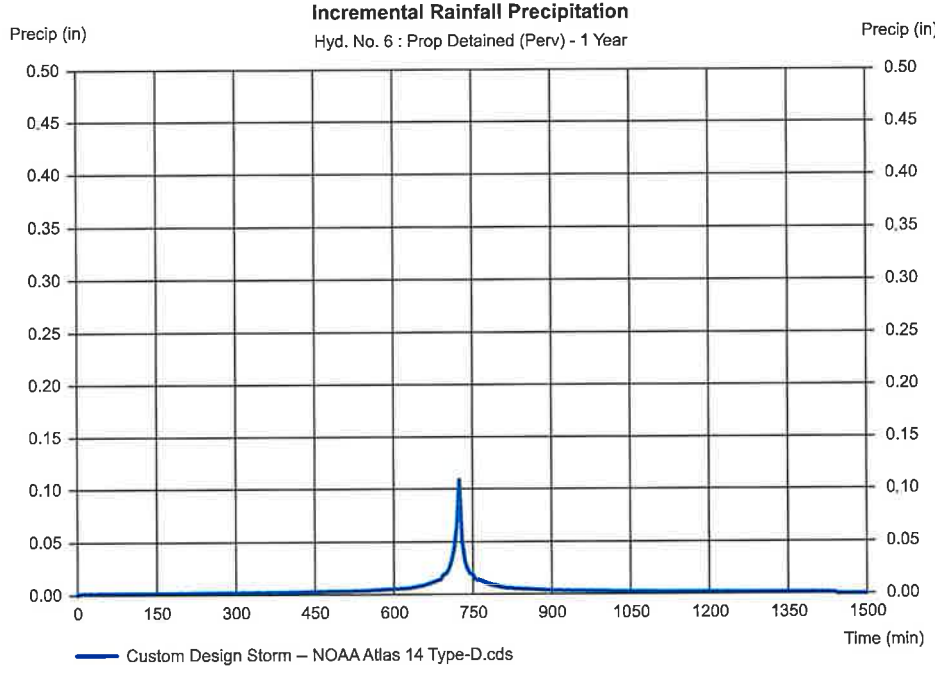


Precipitation Report

Hyd. No. 6

Prop Detained (Perv)

Storm Frequency	= 1 yrs	Time interval	= 5 min
Total precip.	= 1.2500 in	Distribution	= Custom
Storm duration	= NOAA Atlas 14 Type-D.cds		

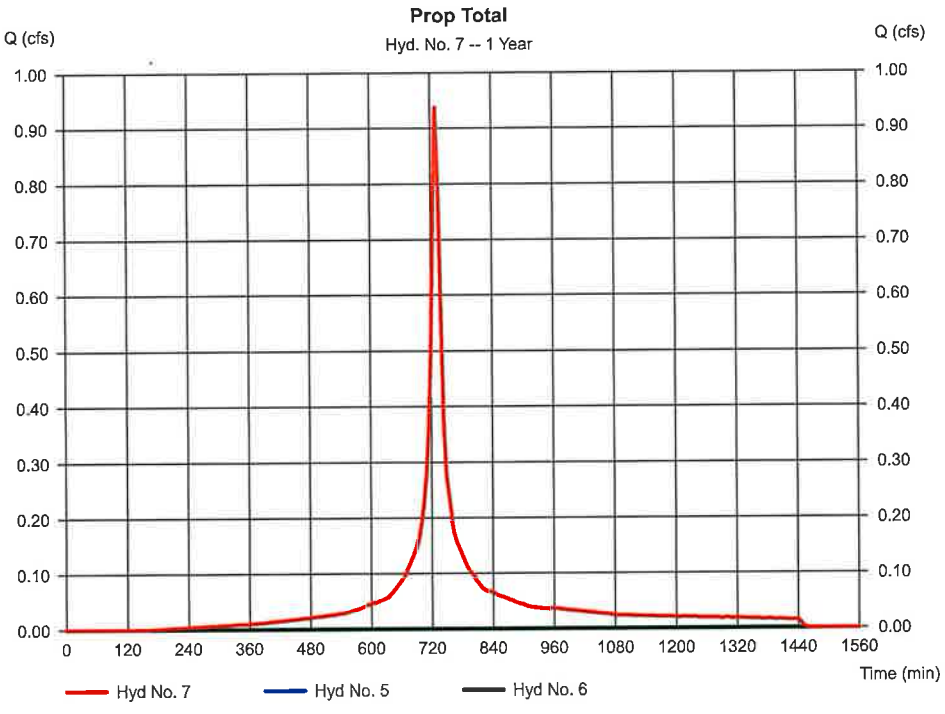


Hydrograph Report

Hyd. No. 7

Prop Total

Hydrograph type	= Combine	Peak discharge	= 0.938 cfs
Storm frequency	= 1 yrs	Time to peak	= 730 min
Time interval	= 5 min	Hyd. volume	= 4,049 cuft
Inflow hyds.	= 5, 6	Contrib. drain. area	= 1.450 ac



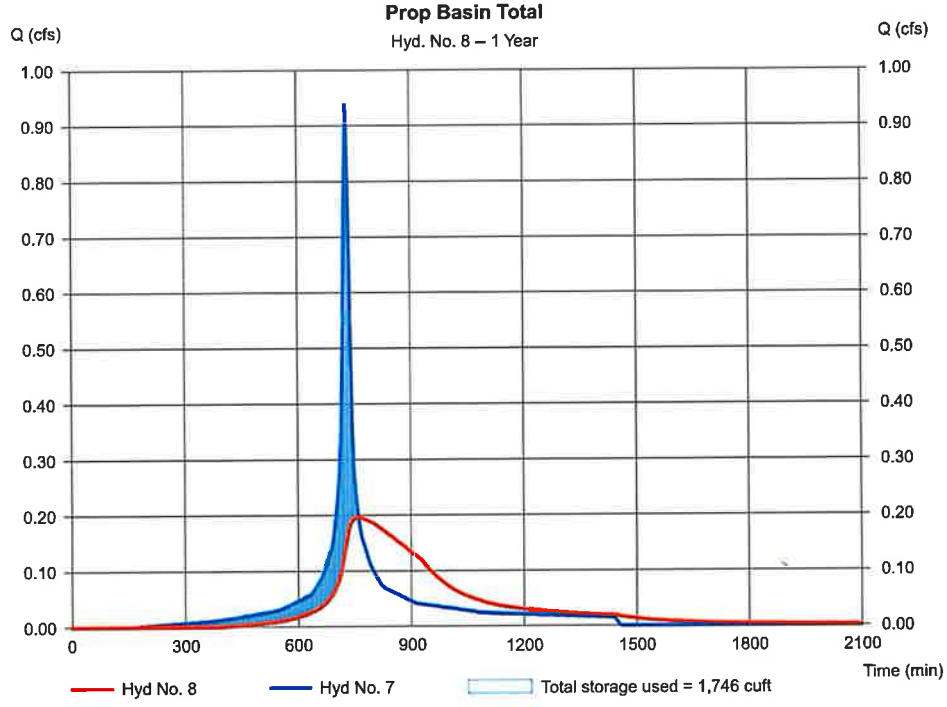
Hydrograph Report

Hyd. No. 8

Prop Basin Total

Hydrograph type	= Reservoir	Peak discharge	= 0.196 cfs
Storm frequency	= 1 yrs	Time to peak	= 760 min
Time interval	= 5 min	Hyd. volume	= 3,963 cuft
Inflow hyd. No.	= 7 - Prop Total	Max. Elevation	= 112.57 ft
Reservoir name	= Basin 2 (Rtank)	Max. Storage	= 1,746 cuft

Storage Indication method used.



Pond Report

Pond No. 2 - Basin 2 (Rtank)

Pond Data

Pond storage is based on user-defined values.

Stage / Storage Table

Stage (ft)	Elevation (ft)	Contour area (sqft)	Incr. Storage (cuft)	Total storage (cuft)
0.00	112.00	n/a	0	0
0.25	112.25	n/a	767	767
0.50	112.50	n/a	768	1,535
0.75	112.75	n/a	768	2,303
1.00	113.00	n/a	769	3,072
1.25	113.25	n/a	768	3,840
1.50	113.50	n/a	768	4,608
1.75	113.75	n/a	769	5,377
2.00	114.00	n/a	768	6,145
2.25	114.25	n/a	768	6,913
2.50	114.50	n/a	768	7,681
2.75	114.75	n/a	769	8,450
3.00	115.00	n/a	851	9,301
3.25	115.25	n/a	941	10,242
3.50	115.50	n/a	967	11,209
3.75	115.75	n/a	189	11,398
4.00	116.00	n/a	132	11,530
4.05	116.05	n/a	17	11,547

Culvert / Orifice Structures

	[A]	[B]	[C]	[PrfRsr]
Rise (in)	= 15.00	3.50	5.00	0.00
Span (in)	= 15.00	3.50	16.00	0.00
No. Barrels	= 1	1	1	0
Invert El. (ft)	= 112.00	112.01	113.80	0.00
Length (ft)	= 50.00	0.00	0.00	0.00
Slope (%)	= 0.50	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)	= 2.00	0.00	0.00	0.00
Crest El. (ft)	= 114.75	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

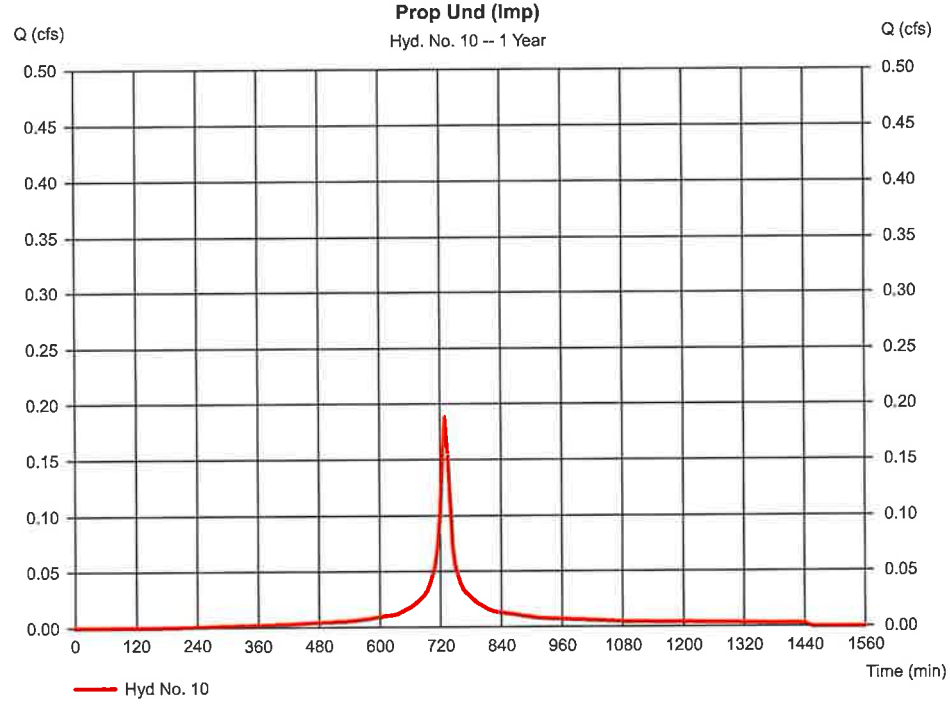
Stage ft	Storage cuft	Elevation ft	Clv A cfs	Clv B cfs	Clv C cfs	PrfRsr cfs	Wr A cfs	Wr B cfs	Wr C cfs	Wr D cfs	Exfil cfs	User cfs	Total cfs
0.00	0	112.00	0.00	0.00	0.00	---	0.00	---	---	---	---	---	0.00
0.25	767	112.25	0.10 ic	0.10 ic	0.00	---	0.00	---	---	---	---	---	0.10
0.50	1,535	112.50	0.18 ic	0.18 ic	0.00	---	0.00	---	---	---	---	---	0.18
0.75	2,303	112.75	0.24 ic	0.23 ic	0.00	---	0.00	---	---	---	---	---	0.23
1.00	3,072	113.00	0.29 ic	0.28 ic	0.00	---	0.00	---	---	---	---	---	0.28
1.25	3,840	113.25	0.33 ic	0.32 ic	0.00	---	0.00	---	---	---	---	---	0.32
1.50	4,608	113.50	0.37 ic	0.36 ic	0.00	---	0.00	---	---	---	---	---	0.36
1.75	5,377	113.75	0.39 ic	0.39 ic	0.00	---	0.00	---	---	---	---	---	0.39
2.00	6,145	114.00	0.83 ic	0.40 ic	0.41 ic	---	0.00	---	---	---	---	---	0.81
2.25	6,913	114.25	1.72 oc	0.40 ic	1.32 ic	---	0.00	---	---	---	---	---	1.72
2.50	7,681	114.50	2.30 oc	0.41 ic	1.88 ic	---	0.00	---	---	---	---	---	2.29
2.75	8,450	114.75	2.73 oc	0.43 ic	2.30 ic	---	0.00	---	---	---	---	---	2.73
3.00	9,301	115.00	3.90 oc	0.40 ic	2.66 ic	---	0.83	---	---	---	---	---	3.90
3.25	10,242	115.25	5.71 oc	0.37 ic	2.98 ic	---	2.35	---	---	---	---	---	5.71
3.50	11,209	115.50	7.35 oc	0.33 ic	2.70 ic	---	4.33	---	---	---	---	---	7.35
3.75	11,398	115.75	8.68 oc	0.27 ic	2.22 ic	---	6.19 s	---	---	---	---	---	8.68
4.00	11,530	116.00	9.53 oc	0.23 ic	1.92 ic	---	7.39 s	---	---	---	---	---	9.53
4.05	11,547	116.05	9.68 oc	0.22 ic	1.87 ic	---	7.59 s	---	---	---	---	---	9.68

Hydrograph Report

Hyd. No. 10

Prop Und (Imp)

Hydrograph type	= SCS Runoff	Peak discharge	= 0.188 cfs
Storm frequency	= 1 yrs	Time to peak	= 730 min
Time interval	= 5 min	Hyd. volume	= 810 cuft
Drainage area	= 0.230 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	= NOAA Atlas 14 Type-D.cds	Shape factor	= 484

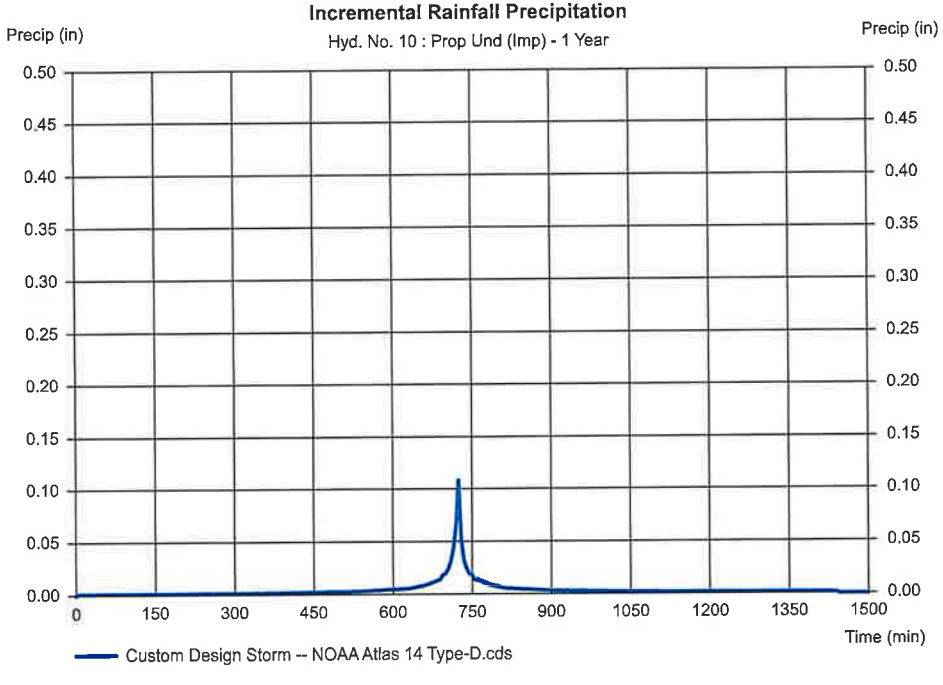


Precipitation Report

Hyd. No. 10

Prop Und (Imp)

Storm Frequency	= 1 yrs	Time interval	= 5 min
Total precip.	= 1.2500 in	Distribution	= Custom
Storm duration	= NOAA Atlas 14 Type-D.cds		

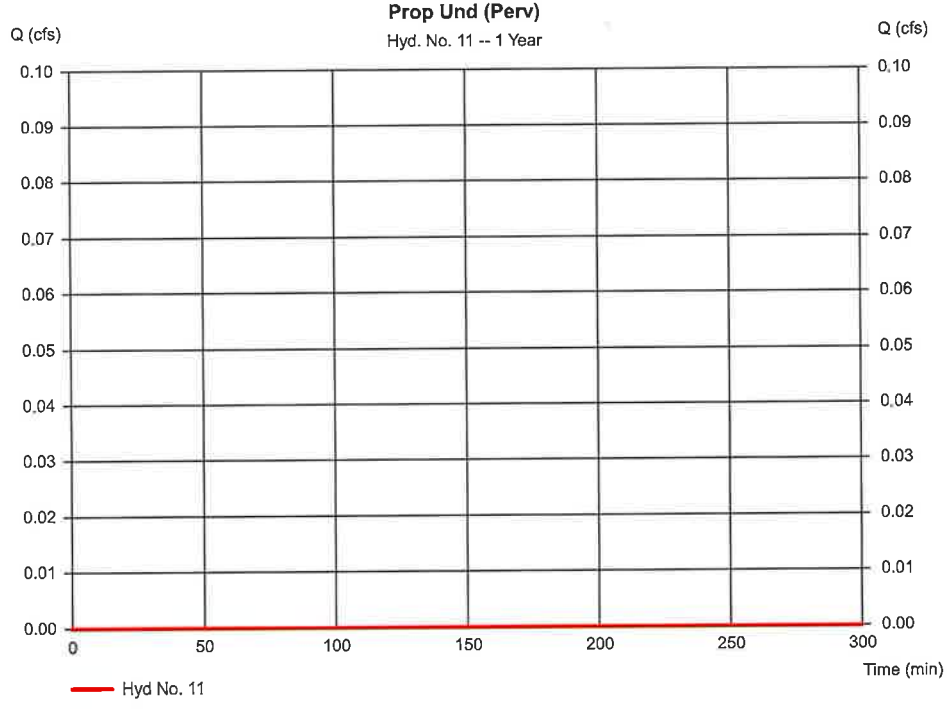


Hydrograph Report

Hyd. No. 11

Prop Und (Perv)

Hydrograph type	= SCS Runoff	Peak discharge	= 0.000 cfs
Storm frequency	= 1 yrs	Time to peak	= n/a
Time interval	= 5 min	Hyd. volume	= 0 cuft
Drainage area	= 0.490 ac	Curve number	= 59
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	= NOAA Atlas 14 Type-D.cds	Shape factor	= 484

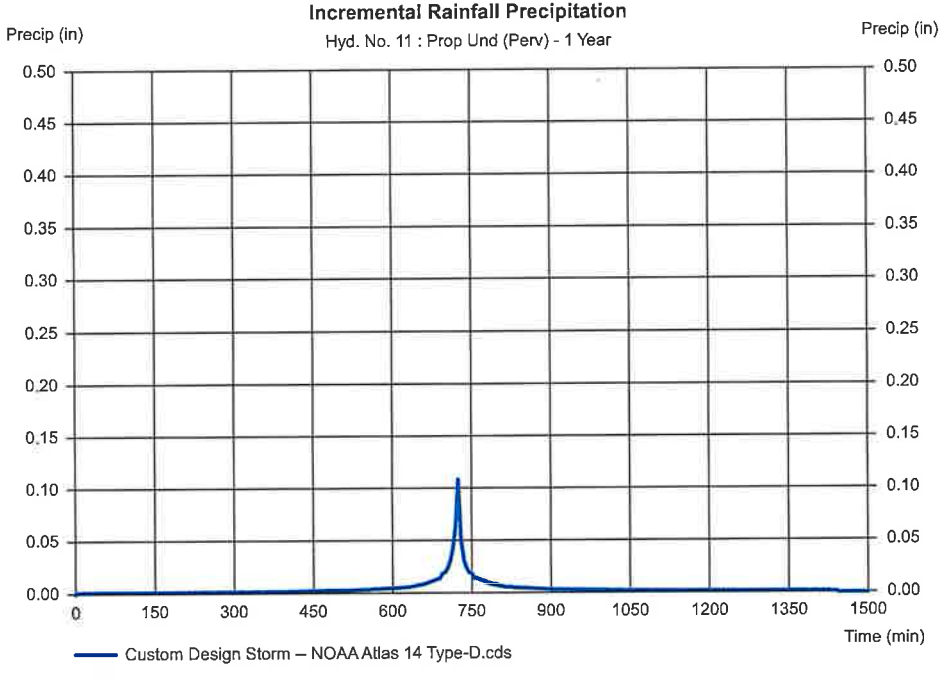


Precipitation Report

Hyd. No. 11

Prop Und (Perv)

Storm Frequency	= 1 yrs	Time interval	= 5 min
Total precip.	= 1.2500 in	Distribution	= Custom
Storm duration	= NOAA Atlas 14 Type-D.cds		

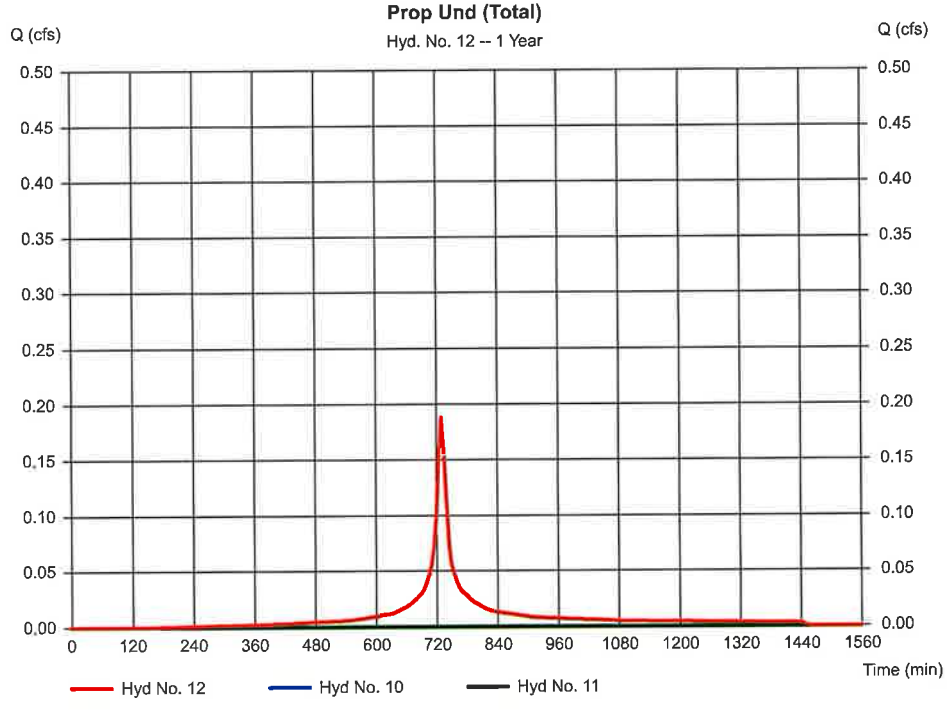


Hydrograph Report

Hyd. No. 12

Prop Und (Total)

Hydrograph type	= Combine	Peak discharge	= 0.188 cfs
Storm frequency	= 1 yrs	Time to peak	= 730 min
Time interval	= 5 min	Hyd. volume	= 810 cuft
Inflow hyds.	= 10, 11	Contrib. drain. area	= 0.720 ac

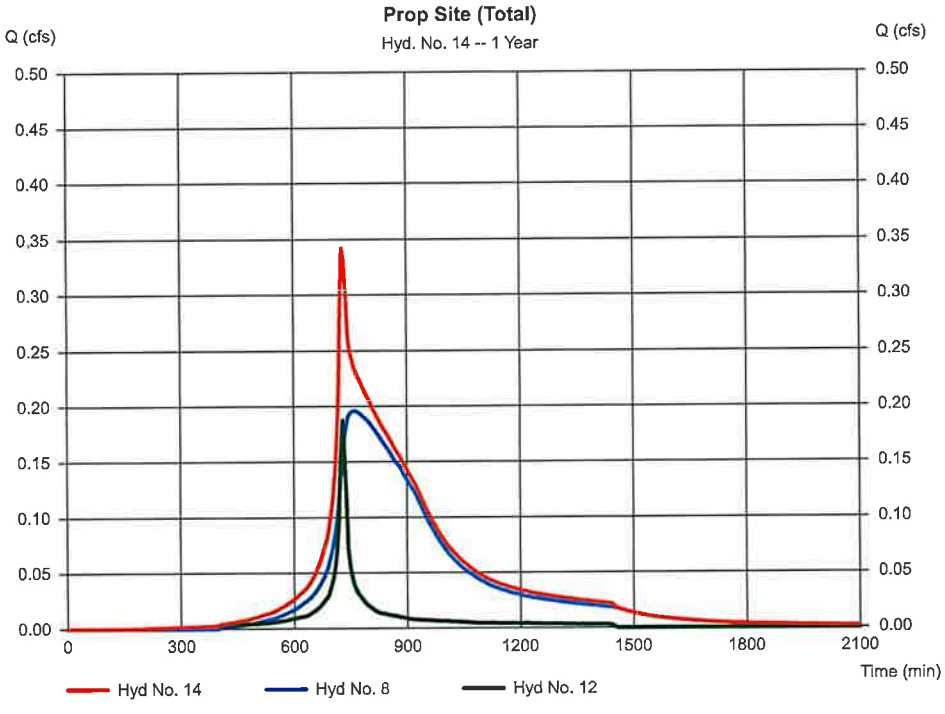


Hydrograph Report

Hyd. No. 14

Prop Site (Total)

Hydrograph type	= Combine	Peak discharge	= 0.341 cfs
Storm frequency	= 1 yrs	Time to peak	= 730 min
Time interval	= 5 min	Hyd. volume	= 4,773 cuft
Inflow hyds.	= 8, 12	Contrib. drain. area	= 0.000 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

STORMWATER COLLECTION SYSTEM CALCULATIONS (PIPESIZING)

DYNAMIC ENGINEERING

Inlet Area Summary and Average Coefficient (C) Calculations

Project: Proposed 3-Story Self Storage Facility
Job #: 3041-99-010
Location: North Plainfield

Computed By: MWD
Checked By: MDC
Date: 10/19/2021

Drainage Area	Impervious Area (sf)	Coefficient (C) Used	Open Space (SF)	Coefficient (C) Used	Average Coefficient (C) Used	Total Area (SF)	Total Area (acres)
IA #11	1223	0.95	2007	0.35	0.58	3231	0.07
IA #12	1375	0.95	1499	0.35	0.64	2874	0.07
IA #13	1376	0.95	1495	0.35	0.64	2871	0.07
IA #14	3049	0.95	3799	0.35	0.62	6848	0.16
IA #1	1092	0.95	1718	0.35	0.58	2810	0.06
IA #2	1351	0.95	1341	0.35	0.65	2692	0.06
IA #3	743	0.95	919	0.35	0.62	1662	0.04
IA #4	1970	0.95	0	0.35	0.95	1970	0.05
IA #5	1380	0.95	0	0.35	0.95	1380	0.03
IA #6	1378	0.95	0	0.35	0.95	1378	0.03
IA #7	2190	0.95	0	0.35	0.95	2190	0.05
IA #17	4672	0.95	0	0.35	0.95	4672	0.11
Roof 1	4466	0.95	0	0.35	0.95	4466	0.10
Roof 2	5287	0.95	0	0.35	0.95	5287	0.12
Roof 3	5218	0.95	0	0.35	0.95	5218	0.12
Roof 4	5218	0.95	0	0.35	0.95	5218	0.12
Roof 5	5218	0.95	0	0.35	0.95	5218	0.12
Roof 6	4384	0.95	0	0.35	0.95	4384	0.10

DYNAMIC ENGINEERING

Stormwater Collection System Calculations

Project: Proposed Self Storage facility
Job #: 3041-99-010
Location: Borough of North Plainfield
Design Storm: 25-year

Computed By: MWD
Checked By: MDC
Date: 10/19/2021

NOTES:
1) Design method used is Rational Method, unless otherwise noted.
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)	Pipe Velocity (fps)
Inlet Area 11	Inlet Area 12	0.07	0.58	0.04	0.04	10.00	0.21	10.00	6.80	0.27	0.27	15	56.0	0.011	0.0050	5.40	4.40
Inlet Area 12	Inlet Area 13	0.07	0.64	0.04	0.08	10.00	0.23	10.21	6.80	0.27	0.54	15	60.0	0.011	0.0050	5.40	4.40
Inlet Area 13	Inlet Area 14	0.07	0.64	0.04	0.12	10.00	0.23	10.44	6.80	0.27	0.82	15	60.0	0.011	0.0050	5.40	4.40
Inlet Area 14	Manhole 16	0.16	0.62	0.10	0.22	10.00	0.56	10.67	6.68	0.67	1.47	15	148.0	0.011	0.0050	5.40	4.40
Roof 1	Manhole 17	0.10	0.95	0.10	0.10	10.00	0.18	10.00	6.80	0.68	0.68	8	32.0	0.011	0.0050	1.01	2.89
Inlet Area 1	Inlet Area 2	0.06	0.58	0.03	0.03	10.00	0.22	10.00	6.80	0.20	0.20	15	59.0	0.011	0.0050	5.40	4.40
Inlet Area 2	Inlet Area 3	0.06	0.65	0.04	0.07	10.00	0.15	10.22	6.80	0.27	0.48	15	39.0	0.011	0.0050	5.40	4.40
Inlet Area 3	Inlet Area 4	0.04	0.62	0.02	0.09	10.00	0.25	10.37	6.80	0.14	0.61	15	66.0	0.011	0.0050	5.40	4.40
Roof 6	Inlet Area 4	0.10	0.95	0.10	0.10	10.00	0.16	10.00	6.80	0.68	0.68	8	27.0	0.011	0.0050	1.01	2.89
Inlet Area 4	Inlet Area 5	0.05	0.95	0.05	0.24	10.00	0.25	10.62	6.68	0.33	1.60	15	67.0	0.011	0.0050	5.40	4.40
Roof 5	Inlet Area 5	0.12	0.95	0.11	0.11	10.00	0.25	10.00	6.80	0.75	0.75	8	43.0	0.011	0.0050	1.01	2.89
Roof 4	Inlet Area 5	0.12	0.95	0.11	0.11	10.00	0.14	10.00	6.80	0.75	0.75	8	25.0	0.011	0.0050	1.01	2.89
Inlet Area 5	Inlet Area 6	0.03	0.95	0.03	0.49	10.00	0.23	10.87	6.68	0.20	3.27	15	60.0	0.011	0.0050	5.40	4.40
Roof 3	Inlet Area 6	0.12	0.95	0.11	0.11	10.00	0.08	10.00	6.80	0.75	0.75	15	22.0	0.011	0.0050	5.40	4.40
Inlet Area 6	Manhole 7	0.03	0.95	0.03	0.63	10.00	0.18	11.10	6.56	0.20	4.13	15	48.0	0.011	0.0050	5.40	4.40
Roof 2	Manhole 7	0.12	0.95	0.11	0.11	10.00	0.12	10.00	6.80	0.75	0.75	8	20.0	0.011	0.0050	1.01	2.89
Basin	Out	0.75	0.95	0.71	0.71	10.00	0.18	10.00	6.80	4.83	4.83	15	47.0	0.011	0.0050	5.40	4.40

REPORT OF GEOTECHNICAL AND STORMWATER BASIN AREA INVESTIGATION, PREPARED BY DYNAMIC EARTH, LLC

REPORT OF PRELIMINARY GEOTECHNICAL AND STORMWATER BASIN AREA INVESTIGATION

PROPOSED THREE-STORY SELF-STORAGE FACILITY

825 New Jersey State Highway (NJSH) Route 22 West
Block 119.00, Lot 1.01
Borough of North Plainfield, Somerset County, New Jersey

Prepared for:

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Project #3041-99-010E
August 10, 2021

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REPORT OF PRELIMINARY GEOTECHNICAL AND STORMWATER BASIN AREA INVESTIGATION

Proposed Three Story Self-Storage Facility
825 NJSH Route 22 West
Block 119.00, Lot 1.01
Borough of North Plainfield, Somerset County, New Jersey

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APPENDICES

1.0 EXECUTIVE SUMMARY

Dynamic Earth, LLC (Dynamic Earth) has completed a preliminary geotechnical investigation and stormwater basin area investigation at the subject site. The subsurface conditions encountered generally consisted of existing fill material underlain by residual soils and weathered rock. **As detailed herein, the existing fill material is not suitable for direct foundation support without the risk of excessive settlement and will need to be overexcavated and replaced with approved structural fill material where encountered below proposed foundations.** The existing fill material is expected to be at least partially suitable for support of proposed floor slabs and pavements; however due to the debris encountered and potential variability of the fill material, at least partial overexcavation and replacement and/or subgrade stabilization should be anticipated. Following overexcavation of the existing fill material, we preliminarily anticipate the proposed structure may be supported on a conventional shallow foundation bearing within properly compacted structural fill and/or approved portions of the natural residual soils.

2.0 PROJECT DETAILS

The subject site is located at 825 New Jersey State Highway (NJSH) Route 22 West in the Borough of North Plainfield, Somerset County, New Jersey and is further identified as Block 119.00, Lot 1.01. The subject site is bordered directly to the east by a bank (Capital One Rewards), with NJSH Route 22 beyond; to the south by the NJSH Route 22 exit ramp; and to the west and north by residential properties. The site of the proposed construction is shown on the attached *Test Location Plan* within the Appendix of this report.

At the time of Dynamic Earth's investigation, the subject site was developed with a vacant two-story building with associated pavement, utilities, and landscaped/wooded areas. The proposed site redevelopment will include demolition of the existing structure and construction of a three-story self-storage facility building occupying a footprint area of approximately 30,026 square feet. Additional improvements include new pavement, utilities, loading docks, retaining walls and potential stormwater management facilities. A retaining wall of unknown type/height is proposed within the northern portion of the site that will have a total length of approximately 435 linear feet. Conceptual site plans were provided on an August 4, 2021 *Conceptual Site Plan A* prepared by Dynamic Engineering Consultants, PC (Dynamic). Proposed grading plans were not available at this time; however, we preliminarily expect site grades will remain relatively close to existing grades, with only minor earth cuts and fills throughout the majority of the site. Earth cuts are anticipated during installation of the retaining wall within the northwestern portion of the site.

Topographic information was provided on a July 20, 2021 *ALTA/NSPS Land Title Survey* prepared by Dynamic Survey, LLC. Existing site elevations range generally slope downward from north to south; ranging from approximately 125 feet within the northern portion of the site and 110 feet

within the southern portion of the site. The elevations herein reference the North American Vertical Datum of 1988 (NAVD 88), unless otherwise noted.

Proposed architectural details and structural loading conditions were not finalized at the time of this report. However, we understand the proposed building will be three-stories in height and will be constructed with a slab-on-grade and no basement. The maximum anticipated column loads were provided by the structural engineer and expected to be as follows.

- Axial column load – 100 kips;

The maximum anticipated wall, floor slab and pavement loads were preliminarily assumed based on similar projects and are expected to be as follows:

- wall loads – 3.0 kips per linear foot;
- floor slab loads – 125 pounds per square foot; and
- pavement – 200,000 18-kip Equivalent Single Axle Loads (ESAL)

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.

3.0 SCOPE OF SERVICES

3.1 Field Investigation

This preliminary investigation was conducted by means of three soil borings (identified as borings B-1 through B-3) and eight soil profile pit excavations (identified as soil profile pits SPP-1 through SPP-8). The borings were drilled using hollow stem auger drilling techniques with a truck-mounted drill rig. The soil profile pits were excavated with a rubber-tire backhoe. Test locations are summarized in the following table and are shown on the accompanying *Test Location Plan.*

TEST LOCATION SUMMARY TABLE SUMMARY		
Number	Proposed Location	Final Depth (feet)
B-1	Northeastern Portion of Building	33.6[1]
B-2	Southeastern Portion of Building	12.5[1]
B-3	Western Portion of Building	33.6[1]
SPP-1	Southwestern Portion of Site	10.0
SPP-2		12.0
SPP-3	Western Portion of Building	12.0
SPP-4	Northern Portion of Building	11.0
SPP-5		12.0
SPP-6	Northeastern Portion of Site	10.0
SPP-7	Eastern Portion of Site	12.0
SPP-8		12.0

[1] Machine Refusal

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 normal taping procedures and estimated right angles. These locations are presumed to be accurate within several feet.

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 values (N) can be used as an indicator of the consistency of fine-grained soils and relative density of coarse-grained soils. Unconfined compressive strength (Q_p) values were assessed with a pocket penetrometer within the fine-grained soils. The N-value and/or unconfined compressive strength for various soil types can be correlated with engineering behavior of soils to develop foundation and earthwork recommendations.

The soils encountered within the area of the proposed/anticipated stormwater management areas were classified using the United States Department of Agriculture (USDA) Classification System and observations were made for groundwater and/or soil mottling and mineral deposits potentially indicative of zones of saturation or seasonal high groundwater. The results of our preliminary stormwater basin soils area investigation are included herein.

Groundwater level observations were recorded during and at the completion of field operations prior to backfilling the test locations. Seasonal variations, temperature effects, man-made effects, and recent rainfall conditions may influence the levels of the groundwater, and the observed levels will depend on the permeability of the soils. Groundwater elevations derived from sources other

than seasonally observed groundwater monitoring wells may not be representative of true groundwater levels.

Dynamic Earth previously completed a July 29, 2021 *Phase I Environmental Site Assessment* and an August 4, 2021 *Asbestos Containing Materials Survey* that were issued under separate covers. In addition, a Phase II Environmental Site Investigation was in progress at the time of this report.

3.2 Laboratory Testing Program

Physical/Textural Analysis: Each sample was subjected to supplemental identification and classifications in general accordance with ASTM D2488 (manual procedure). The engineering classifications are utilized in conjunction with the site data to estimate properties of the soil types encountered and to assess the soil response under construction and service loads.

Permeability Testing: Undisturbed tube permeameter tests were collected in general accordance with New Jersey Department of Environmental Protection (N.J.D.E.P.) *Stormwater Best Practices Manual – Chapter 12: Soil Testing Criteria* on representative samples obtained from anticipated stormwater management facility infiltration depths. Results of the permeability testing are included herein in Section 5.8.

4.0 SUMMARY OF SUBSURFACE CONDITIONS

4.1 Site Geology

The subject property is situated in the Newark Basin Geomorphic Province of New Jersey. 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. The surficial deposits at the site reportedly include Pleistocene-aged basalt colluvium (Qcb) that generally consists of clayey silt with basalt fragments. Overburden soils also include manmade fill material.

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 area of the proposed site development:

Amwell gravelly loam, two to six percent slopes (AmdB): Amwell gravelly loam, two to six percent slopes is mapped within the majority of the subject site. The typical soil profile (as reported in the soil survey) consists of gravelly loam to a depth of 14 inches; clay loam to a depth of 21 inches; loam to a depth of 26 inches; underlain by fine sandy loam to a depth of 60 inches below the natural ground surface (limit of the report). The depth to groundwater table is reported to range between 24 inches and 36 inches below the natural ground surface.

Dunellen sandy loam, eight to 15 percent slopes (DunC): Dunellen sandy loam, eight to 15 percent slopes is mapped within a relatively small area within the western portion of the site. The typical soil profile (as reported in the soil survey) consists of sandy loam to a depth of 42 inches; underlain by loamy sand to a depth of 70 below the natural ground surface (limit of the report). The depth to the groundwater table is reported to be more than 80 inches below the natural ground surface (limits of the report).

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 consisted of the following generalized strata in order of increasing depth.

Surface Cover: Soil borings and soil profile pits performed within existing landscaped areas encountered existing fill material or approximately six to 12 inches of topsoil at the surface. One

soil boring location (B-3) performed within the existing pavement encountered approximately four inches of asphaltic concrete at the surface with no apparent underlying subbase material.

Existing Fill Material: At the surface and/or beneath the surface cover, existing fill material was encountered that generally consisted of silt with variable amounts of sand, gravel, clay, and debris. The debris encountered included brick, concrete, wood, glass, and asphalt. The existing fill material was encountered within the area of the proposed building footprint to depths ranging between approximately 2.7 feet and five feet below the ground surface; corresponding to elevations ranging between 114.5 feet 110.5 feet. SPT N-values within this stratum ranged between three blows per foot (bpf) and 35 bpf; and unconfined compressive strength pocket penetrometer (Q_p) values ranged between 0.5 tons per square foot (tsf) and 0.75 tsf.

Natural Residual Soils: Beneath the existing fill material, natural residual soils were encountered that generally consisted of silt (USCS: ML) with variable amounts of sand, clay and gravel. The natural residual soils were encountered to depths ranging between approximately eight feet and 24 feet below the ground surface; corresponding to elevations ranging between 104.5 feet and 95.5 feet. Except where refusal of the split spoon sampler was encountered, SPT N-values within this stratum ranged between nine bpf and 58 bpf, and averaged approximately 22 bpf. Unconfined compressive strength (Q_p) pocket penetrometer values within this stratum ranged between 1.5 tons per square foot (tsf) and four tsf; and averaged approximately 2.5 tsf, generally indicating a relatively very stiff consistency within the fine-grained soils.

Weathered Rock: Beneath the natural residual soils, weathered rock was encountered that generally consisted of gravel sized shale fragments (USCS: GM) with variable amounts of sand, silt, and clay. The weathered rock stratum was encountered within the borings to auger refusal depths ranging between approximately 12.5 feet and 33.6 feet below the ground surface; corresponding to elevations ranging between 100.0 feet and 81.9 feet. Split spoon refusal was encountered at each sample interval within this stratum, generally indicating a very dense/hard consistency.

4.4 Seasonal High Groundwater and Groundwater

Indicators of seasonal high groundwater (soil mottling) were observed within the soil profile pits at depths ranging between approximately 1.8 feet and four feet below the ground surface; corresponding to elevations ranging between 114.5 feet and 109.3 feet. Apparent perched/trapped water within the existing fill material was encountered at one soil profile pit location (SPP-4) at a depth of approximately four feet; corresponding to elevation 115.0 feet. Groundwater was encountered within the soil borings at depths ranging between approximately 26.0 feet and 29.0 feet; corresponding to elevations ranging between 90.5 feet and 89.5 feet. Groundwater levels are expected to fluctuate seasonally and following significant periods of precipitation.

5.0 PRELIMINARY GEOTECHNICAL RECOMMENDATIONS

5.1 General

The following preliminary considerations are based on the soil conditions encountered during our limited subsurface investigation for the proposed site development and are intended to provide general characteristics of the subsurface conditions for preliminary planning purposes and should not be utilized for final design of structural foundations, floor slabs, or pavements. Final recommendations pertaining to the geotechnical aspects of the site development will need to be developed from a supplemental subsurface investigation and engineering analyses of the final grading and structural plans.

Based on the results of this subsurface investigation, existing fill material was encountered within the proposed building footprint that is not suitable for direct foundation support without the risk of excessive settlement. **As such, the existing fill material will need to be overexcavated and replaced with approved structural fill material where encountered below proposed foundations.** Based on the subsurface conditions encountered as part of this preliminary investigation, overexcavation and replacement up to approximately five feet below the ground surface should be anticipated. Following overexcavation and replacement, the proposed structure may be supported on conventional shallow foundations bearing within approved structural fill material and/or approved natural residual soils.

Overexcavation and Supplemental Evaluation of Existing Fill Materials: Existing, undocumented fill materials were noted with sufficient variability to suggest uncontrolled conditions for foundation support. Based on the conditions disclosed by the soil borings, Dynamic Earth recommends overexcavating unsuitable existing fill where present below foundations, but anticipates that the majority of fill may remain in-place, where possible, below proposed floor slabs and pavements. **Due to the potential variability of the existing fill material, at least partial overexcavation and replacement of unsuitable fill material should be expected beneath proposed floor slabs and pavements.** A Dynamic Earth geotechnical engineer familiar with this study will be needed to provide careful construction phase inspection to maximize salvageable areas to remain and identify areas that must be removed and replaced. The supplemental evaluation via test pit excavations may be deferred to the demolition and construction phases.

Existing, undocumented fill materials cannot be conclusively evaluated solely based on soil borings because the sampling techniques expose a very small, approximately two inch split spoon sample at widely spaced locations and variable intervals. Therefore, engineering judgment and evaluation of risks needs to be applied to determine how to address the fill condition. Often, small pieces of debris are encountered which in some cases may appear to be the result of simply small fragments of materials intermixed in a well compacted soil matrix. However, in many cases the small pieces of recovered foreign material can be fragments of much larger or more extensive buried

objectionable material. In addition, undocumented fill on previously developed sites can vary substantially. Where deep fills would impact the foundation selection or where more definitive earthwork budgets are necessary, it is customary to conduct further exploration with supplemental test pit excavations to expose a larger cross section of the fill material and enable a better evaluation of the presence of voids, debris, organics, and general consistency. The decision as to whether to conduct such further evaluation during pre-design phases or during initial construction phases also is impacted by the site use and accessibility for larger disturbances, and the owner's risk tolerance for the specific project.

To develop geotechnical recommendations and consult with the client regarding how to address the existing fill on this site based on the information available, Dynamic Earth considered factors that weigh either negatively or positively toward the existing fill condition overall. Factors suggesting unsuitable conditions for foundation support include the presence of debris, occasional low split spoon sampler recovery and relatively low SPT N-values, which generally indicates that the material was placed or re-worked on-site without strict engineering control. Records documenting the fill placement also were not available to Dynamic Earth.

Existing fill material should be overexcavated prior to placing new fill material if site grades are raised. Furthermore, the proposed building footprint and interior column locations should be located by a professional surveyor prior to performing overexcavation operations.

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 Preliminary Shallow Foundation Design Recommendations

Anticipated Bearing Strata: Depending on final site grading plans and foundation bearing elevations, proposed foundations are expected to bear at least partially within the existing fill layer and partially within natural residual soils. As detailed throughout this report, the existing fill material is not suitable for direct foundation support and will need to be overexcavated and replaced where encountered below proposed foundation influence zones. Approved portions of the natural residual soils are expected to be suitable for support of proposed foundations. A Dynamic Earth geotechnical engineer familiar with this study will be needed to provide careful construction phase testing and inspection to maximize salvageable areas to remain and identify areas that must be removed and replaced.

Conventional Shallow Foundation Design Criteria: Following overexcavation and replacement of existing fill material, the proposed structures may be supported on conventional shallow foundations bearing within approved structural fill material and/or approved natural residual soils. Foundations may preliminarily be designed to impart a maximum allowable net bearing pressure of 3,000 pounds per square foot (psf). Regardless of loading conditions, proposed foundations should be sized no less than a minimum of 24 inches for continuous wall footings and 36 inches for isolated column footings.

Settlement: Dynamic Earth preliminarily estimates post construction settlements of proposed building foundations on the order of one inch if the recommendations outlined in this report are properly implemented. Differential settlements of building foundations should be less than one-half inch. Settlement estimates should be reviewed following supplemental geotechnical investigation and the development of final design loads.

Frost Depth: Footings subject to frost action should be placed at least 36 inches below adjacent exterior grades or as required by the local building code to provide protection from frost penetration. Interior footings not subject to frost action (including during the period of construction) may be placed at a minimum depth of 18 inches below the slab subgrade.

Inspection/Overexcavation Criteria: The suitability of the bearing soils along and below the footing bottoms must be verified by Dynamic Earth's geotechnical engineer prior to placing concrete, especially to confirm that unsuitable materials are removed and new fills are adequately placed and compacted. Any overexcavation to be restored with structural fill (on-site or imported) will need to extend at least one foot laterally beyond footing edges for each vertical foot of overexcavation. Alternatively, proposed foundations may be designed to bear deeper (below the existing fill) or lean concrete/flowable fill material may be used to minimize lateral overexcavation. The bottom of overexcavations should be compacted with smooth drum rollers, walk-behind compactors, vibrating plates or plate tampers ("jumping jacks") to compact locally disturbed materials and densify underlying natural soil zones.

5.3 Preliminary Floor Slab Recommendations

Dynamic Earth anticipates that the approved on-site soils and/or compacted structural fill material placed over approved natural subgrades will be suitable for support of the proposed floor slabs provided these materials are properly evaluated, compacted and proofrolled as detailed herein. **Due to the deleterious debris encountered within the existing fill material and moisture sensitivity of the on-site soils, at least partial overexcavation and replacement and/or subgrade stabilization should be anticipated below proposed floor slabs.** Depending on construction phase evaluation, overexcavation may be limited (to a typical depth of approximately two feet) with the use of geogrid reinforcement (such as Tensar TX-5 or TX-7 or equivalent). In addition,

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. We preliminarily expect that 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 moisture 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.

5.4 Preliminary Pavement Recommendations

The on-site soils are preliminarily expected to be suitable for support of proposed pavements, provided that the risk of more frequent paving and/or increased maintenance is acceptable. If this risk is not acceptable, considerations for additional overexcavation and replacement or subgrade stabilization may be evaluated. **Due to the potential variability of the existing fill material and moisture sensitivity of the on-site soils, at least partial overexcavation and replacement and/or subgrade stabilization should be anticipated below proposed pavements.** Pavement life may benefit from using a geogrid (Tensar TX-5 or TX-7) to provide additional subgrade reinforcement to minimize the amount of overexcavation and attempt to stabilize marginally suitable subgrade soils. Depending on the overall subgrade conditions and weather conditions, more extensive mitigation efforts may be required.

Preliminary Design Criteria: A preliminary design California Bearing Ratio (CBR) value of five has been assigned to the anticipated properly prepared subgrade soils for pavement design purposes. This value was correlated with pertinent soil support values and assumed traffic loads to prepare flexible and rigid pavement designs per the AASHTO *Guide for the Design of Pavement Structures.*

Pavement Sections: The preliminary recommended flexible pavement section is presented below in tabular format. Alternate pavement design sections may be considered based on local requirements.

PRELIMINARY RECOMMENDED FLEXIBLE PAVEMENT SECTIONS		
Layer	**Material[1]**	**Thickness (Inches)**
Surface	HMA 9.5 64 (L or M) (Section 902.02.01)[2]	1.5
Base	HMA 19.0 (L or M) (Section 902.02.01)[2]	3.0
Subbase	DGA (Section 901.10)[2]	6.0

[1] Per New Jersey Department of Transportation *Standard Specification for Road and Bridge Construction* 2019

[2] Per the designation compaction level shall be "L" or Low for Standard Duty Pavement and "M" or Medium for Heavy Duty Pavement.

A rigid concrete pavement should be used to provide suitable support at areas of high traffic or severe turns, or relatively long-term point loads. The preliminary recommended rigid pavement is presented below in tabular format:

PRELIMINARY RECOMMENDED RIGID PAVEMENT SECTION		
Layer	**Material**	**Thickness (Inches)**
Surface	4,000 psi air-entrained concrete	5.0
Base	NJDOT DGA BASE COURSE	6.0

Additional Design Considerations: The preliminary pavement section thickness designs presented in this report are based on the design parameters detailed herein and are contingent on proper construction, inspection, and maintenance. The designs are contingent on achieving the minimum soil support value in the field. To accomplish this requirement, all subgrade soil and supporting fill or backfill must be placed, prepared, and evaluated which would be detailed in the final geotechnical report. Proper drainage must be provided for the pavement structure including appropriate grading and surface water control, as well as measures to drain water from the subgrade such as bleeder drains at inlets.

The performance of the pavement also will depend on the quality of materials and workmanship. Dynamic Earth recommends that New Jersey Department of Transportation (NJDOT) standards for materials, workmanship, and maintenance be applied to this site. Project specifications should include verifying that the installed asphaltic concrete material composition is within tolerance for the specified materials and that the percentage of air voids of the installed pavement is within specified ranges for the respective materials. All rigid concrete pavements should be suitably air-entrained, jointed, and reinforced.

5.5 Preliminary Groundwater Considerations

Depending on final grading plans, groundwater levels are expected to be slightly deeper than anticipated foundation bearing elevations. **However, excavations extending below the seasonal high groundwater level and/or perched zone of saturation should be anticipated during overexcavation and replacement of existing fill material. As such, the contractor should anticipate the need for groundwater control during construction.**

While groundwater control means and methods are the responsibility of the contractor, depending on the flow rate through the soil, groundwater may typically be controlled by sump pumps and strategically placed sump pits in and adjacent to excavations for relatively small areas where the

rate of flow is relatively low. Larger excavations and excavations extending deeper than two feet below groundwater may require deeper well recovery points.

Surface water runoff must be controlled and diverted away from construction areas by grading and limiting the exposure of excavations to rainfall.

5.6 Preliminary Earthwork Considerations

Demolition/Surface Cover Stripping: Prior to the start of construction, all utilities should be identified and secured. Existing structural elements, such as concrete foundations, slabs, and remnant basement walls, should be removed entirely from below proposed foundations and slabs and excavated to at least two feet below pavement subgrades. Remnant structural elements may remain in-place below these depths below pavements provided they do not interfere with future construction. Any slabs left in-place should be thoroughly fractured to promote vertical drainage in the presence of a qualified Geotechnical Engineer and should be backfilled with structural fill in accordance with the recommendations included herein.

The surface cover materials, including asphalt, concrete, 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.

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 under ideal weather conditions. Materials wetted beyond the optimum moisture content; that contain oversized material or debris; or with 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/or oversized debris greater than three inches in diameter will need to be separated from material 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 proposed utilities 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 materials include existing fill material, natural residual soils, and underlying weathered rock. Portions of the existing fill material and natural residual soils (above the zone of saturation) are preliminary anticipated 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 segregated. Portions of the existing fill material contained increased amounts of objectionable debris and will not be suitable for reuse soils without significant handling/processing to segregate the deleterious materials. In addition, the on-site soils are considered extremely moisture sensitive and will likely require moisture conditioning during a period of favorable weather or become impractical for reuse if exposed to moisture. As such, the contractor should include a unit rate for importing granular structural fill material. The underlying weathered rock is generally not expected to be encountered during construction (depending on the final grading plans). Reuse of the on-site materials will be contingent upon further evaluation during construction.

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 where fine-grained soils are encountered at the subgrade elevation and/or where water is suspected near subgrade elevations. The surface should then 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 the recommendations included herein.

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 within a targeted two percent of the optimum moisture content as determined by ASTM D 1557 (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 minimum 20-ton smooth drum roller to compact subgrade soils beneath pavements or slabs and hand operated vibratory jumping jacks and plate compactors within confined excavations for foundations or utilities. The drum roller should be operated in the static mode or a kneading "sheepsfoot" roller should be used to compact fine-grained soils. Fill

material compacted with hand operated equipment, static drum roller and/or sheepsfoot roller, may need to be placed in thinner, loose lifts and an increased number of passes may be required to achieve proper compaction.

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, optimum moisture content, natural moisture content, gradation, and plasticity 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 will need to be monitored by Dynamic Earth 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 height of the fill or backfill.

Submerged Fill: If excavation/overexcavations extend below water (in conjunction with dewatering methods), the backfill at excavations that extend below the groundwater level (in conjunction with dewatering methods) may consist of nominally one inch, crushed stone (such as AASHTO #57 Stone) placed to raise grade above water levels before subsequent lifts of structural fill. Submerged fill should be separated from surrounding soils (below, adjacent, and above) with a fines barrier geotextile, such as Mirafi FW700 or equivalent to prevent future migration of fines content from surrounding soils.

Difficult Excavation: As detailed throughout this report, existing fill material was encountered with variable amounts of debris. As evident by the test pit excavations, relatively larger cobble/boulder concrete debris was encountered within the existing fill material. Therefore, difficult excavation to remove oversized debris should be included as part of the construction planning.

While small boulders, cobbles and debris may typically be removed with conventional excavation equipment, heavy excavating equipment with rock ripping tools may be required for larger materials. The speed and ease of excavation will depend on the equipment used, the skill of the operator, and the structure of the material itself.

Demolition Material: Considerations for reuse of demolition material as fill material may be evaluated provided the material is properly segregated and processed to meet the gradation requirements of the structural fill material, as detailed herein. The deleterious building material (such as wood, insulation, metal, shingles, etc.) should not be used as fill material.

Asphalt Milling Reuse: Typically portions of existing asphaltic concrete may be reused within the subbase layer of the proposed pavement section (as detailed in Section 5.4), provided that environmental concerns do not preclude reuse. The millings should be processed to a maximum

particle size of 1.5 inches and blended (less than 50 percent) with approved dense-graded aggregate (DGA) in accordance with the NJDOT DGA Gradation requirements. The approved DGA material shall not contain with asphaltic millings prior to blending.

5.7 Retaining Walls and Lateral Earth Pressure Recommendations

General: While the retaining wall type has not been defined, Dynamic Earth understands a retaining wall with a total length of approximately 435 linear feet is proposed within the northern portion of the site. In addition, we anticipate the proposed loading docks will need to resist lateral earth pressures. Dynamic Earth presents the following preliminary design recommendations for earth retaining structures and/or loading docks.

Soil Parameters and Design Considerations: Proposed retaining walls that are free to rotate generally can be designed to resist active earth pressures. Restrained walls and retaining wall corners need to be designed to resist at-rest earth pressures. Backfill soils adjacent to retaining structures should consist of freely draining materials composed primarily of sand and gravel. The soil parameters provided below apply to properly compacted granular fill and backfill placed in a well-drained, level condition and may be used for preliminary design of retaining structures.

SUMMARY OF LATERAL EARTH PRESSURE PARAMETERS

Stratum	Moist Density, γ_{moist}, (pcf)	Internal Friction Angle, Φ (degrees)	Coefficient of Active Earth Pressure (K_a)	Coefficient of Passive Earth Pressure (K_p)	Cohesion (psf)
Existing Fill Material*	115	28	0.36	2.70	0
Natural Residual Soils (fine-grained)	125	20	0.49	2.04	1,000
Import/ Granular Soil	135	32	0.31	3.25	0

*Should not be used for resistance

The effect of any surcharge loads including construction equipment, traffic, proposed/existing structures and temporary and permanent stockpiles also will need to be included in earth pressure calculations. Dynamic Earth would be pleased to assist with the calculation of lateral earth pressures based on the soil parameters presented herein during the structural design phase.

Retaining walls should be designed so that the combined effect of vertical and horizontal resultant loads and overturning moment does not exceed the maximum allowable soil bearing capacity recommended in this report.

Adequate drainage of water which may collect on the backfill side of the retaining walls should be incorporated into the design and/or hydrostatic pressures should be added to the pressure calculations. A system of perforated drain pipes should be used at the base of the backfill side of the wall structure to collect and remove the water and relieve hydrostatic pressure.

Dynamic Earth recommends that granular soils be used to backfill the proposed subgrade and retaining walls. Clays and silts or soils with a fine fraction with a liquid limit exceeding 40 or a plastic index exceeding 20 should not be used as backfill. Acceptable backfill should be placed in maximum nine-inch loose lifts and compacted to 95 percent of the maximum dry density, within two percent of the optimum moisture content, as determined by ASTM D 1557 (Modified Proctor). A maximum density of 135 pounds per cubic foot should not be exceeded in order to avoid creating excessive lateral pressure on the walls during compaction operations.

Dynamic Earth recommends that backfill directly behind the walls be compacted with light, hand-held compactors. Heavy compactors and grading equipment should not be allowed to operate within a zone measured at a 45-degree angle from the base of the walls during backfilling to avoid developing excessive temporary or long-term lateral soil pressures.

Resistance to sliding should be provided by friction resistance at the base of the retaining structure foundation. For mass concrete on the natural on-site soils, a coefficient of friction against sliding of 0.35 should be used in the design of the retaining structures. Passive earth pressures at the toe of the retaining structure should be neglected in the design.

5.8 Mottling, Groundwater and Soil Permeability

Indicators of seasonal high groundwater (soil mottling) were observed at depths ranging between approximately 1.8 feet and four feet below the ground surface; corresponding to elevations ranging between 114.5 feet and 109.8 feet. Since groundwater was not encountered within the soil profile pit excavations and was relatively deeper within the soil borings performed, the soil mottling encountered may be a perched zone of saturation. However, supplemental testing would need to be performed to evaluate the potential for the mottling to be indicative of a perched zone of saturation. Seepage was observed at one soil profile pit location (SPP-4) at a depth of four feet below the ground surface; corresponding to elevation 115.0 feet. Permeability test results ranged between approximately less than 0.2 inches per hour (iph) and 2.7 iph. A summary of the seasonal high groundwater levels and permeability test results are presented in the following table:

MOTTLING, GROUNDWATER, AND PERMEABILITY TEST SUMMARY

Location	Approximate Surface Elevation	Mottling		Groundwater		Permeability Test Results		
		Depth (Feet)	Elevation	Depth (Feet)	Elevation	Sample Depth (Inches)	Permeability (Inches/Hour) Replicate A	Permeability (Inches/Hour) Replicate B
SPP-1	115.0	4.0	111.0	Not Encountered		40	< 0.2	< 0.2
SPP-2	117.8	3.3	114.5			36	< 0.2	< 0.2
SPP-3	116.5	2.7	113.8			30 [2]	< 0.2	0.3
SPP-4	119.0	Not Encountered		[1] 4.0	115.0	30 [2]	2.7	< 0.2
SPP-5	117.0	3.7	113.3	Not Encountered		30	< 0.2	< 0.2
SPP-6	113.5	Not Encountered				48	--	
SPP-7	111.3					70		
SPP-8	111.1	1.8	109.3			19		

[1] Seepage observed at the bottom of existing fill layer.

[2] Permeability rates within the existing fill material are expected to be variable due to the heterogeneous nature of these materials

5.9 Preliminary Seismic and Liquefaction Considerations

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

5.10 Temporary Excavations

The granular portions of the on-site 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 Supplemental Evaluation and Investigation

Final Design/Supplemental Investigation: Since these preliminary geotechnical investigation activities have been completed during the initial design phase, many critical assumptions or preliminarily details regarding assumed structural loads, existing and proposed elevations, etc. affect the geotechnical analysis. The preliminary considerations presented herein should be considered to help develop the optimum site design and grading, and Dynamic Earth should remain involved during final design. In addition, a portion of the proposed building footprint was

occupied by an existing building at the time of this investigation. Therefore, the conditions below presently inaccessible areas should be evaluated with a supplemental geotechnical investigation following demolition to confirm that the soil conditions are consistent with those encountered during this investigation and/or provide additional geotechnical recommendations, if required.

Construction Monitoring and Testing: The recommendations presented herein are contingent on the owner retaining Dynamic Earth to perform the final plan review, supplement geotechnical testing and consultation during construction as described in previous sections of this report. **Construction phase consulting will be necessary to verify suitable bearing material below the proposed building foundations and to confirm the suitability of the material for support of the proposed floor slabs and pavements.** 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 AND LIMITATIONS

Supplemental recommendations will be required upon finalization of conceptual site plans or if significant changes are made in the characteristics or location of the proposed structures. 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 preliminary design concepts and site grading. 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 preliminary design phase and should not be substituted for construction specifications.

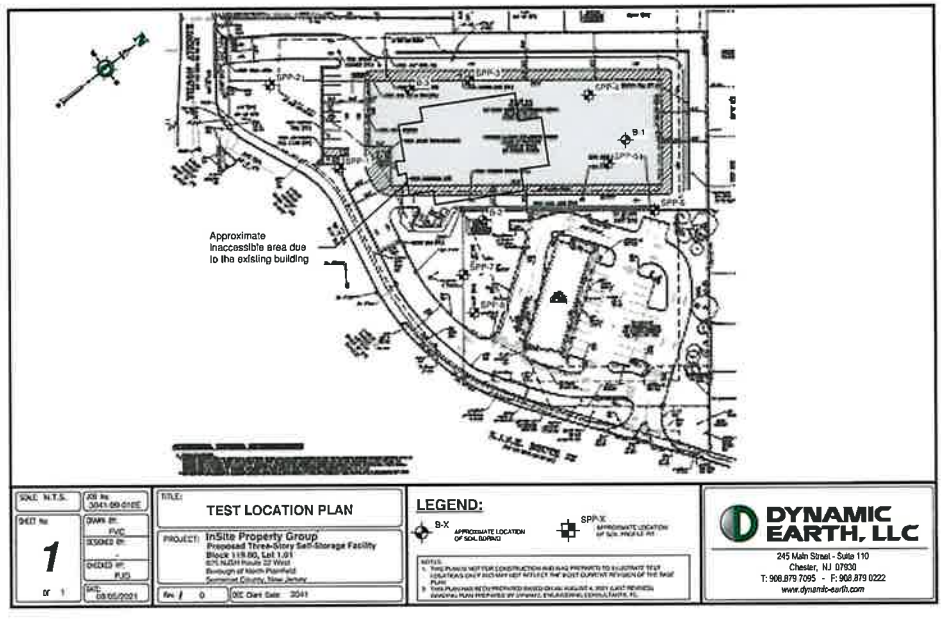
The possibility exists that conditions between test locations may differ from those at specific test pit locations, and conditions may not be as anticipated by the designers or contractors. In addition, the construction process may itself alter soil conditions. Therefore, Dynamic Earth Geotechnical Engineers or their representatives should observe and document the final 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 preliminary site evaluation. 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.

Test Location Plan



Records of Subsurface Exploration

DYNAMIC EARTH

BOREHOLE LOG

Boring No : B-1

Project:	Proposed Self Storage Facility	**Proj. No.:**	3041-99-010E
Location:	825 NJSH Route 22 West, North Plainfield, Somerset County, New Jersey	**Client:**	InSite Property Group
Surface Elevation:	119.5 feet	**Date Started:**	07-15-2021
Termination Depth:	33.6 feet	**Date Completed:**	07-15-2021
Proposed Location:	Proposed Building	**Logged by:**	J. Scardigno
Drill/Test Method:	HSA/SPT	**Contractor:**	FMW
Hammer Type:	Auto	**Rig Type:**	CME 55

Groundwater Data	Depth (ft)	El. (ft)	Additional Groundwater Data	Depth (ft)	El. (ft)
While Drilling: ▽	NE	-			
At Completion: ▼	29.0	90.5			

Sample Information							Depth (ft)	Strata	DESCRIPTION OF MATERIALS (Classification)	Remarks
Depth (Feet)	Number	Type	Rec (in)	RQD %	Blows per 6" or drill time (mm:ss)	N				
0.0-2.0	S-1	SS	10	--	1 2 / 2 2	4		FILL	Brown and red silt, little medium to fine gravel, little coarse to fine sand, trace debris (concrete) soft, moist (FILL)	Qp = 0.75 tsf
2.0-4.0	S-2	SS	12	--	1 2 / 3 6	5			Brown silt, some medium to fine gravel, little coarse to fine sand, trace debris (asphalt), moist (FILL)	Qp = 0.75 tsf
4.0-6.0	S-3	SS	16	--	2 2 / 6 13	10	5		Brown silt, trace medium to fine gravel, little coarse to fine sand, moist (FILL)	Qp = 0.5 tsf
6.0-8.0	S-4	SS	24	--	5 4 / 5 6	9			Gray and brown silt, stiff, moist (ML)	Qp = 3.0 tsf
8.0-10.0	S-5	SS	10	--	5 5 / 6 10	13			Gray and brown silt, little coarse to fine sand, moist, very stiff (ML)	Qp = 3.5 tsf
10.0-12.0	S-6	SS	24	--	12 20 / 25 17	45	10		Gray and brown silt, some medium to fine gravel, little coarse to fine sand, moist, stiff (ML)	Qp = 2.5 tsf
									Reddish brown silt, some medium to fine gravel, little coarse to fine sand, moist, very stiff (ML)	Qp = 2.5 tsf
14.0-15.2	S-7	SS	12	--	33 45 / 50/2 --	95/8	15	Residual Soils	Reddish brown silt, little medium to fine gravel, little coarse to fine sand, moist, hard (ML)	
19.0-21.0	S-8	SS	10	--	44 33 / 25 20	58	20		Brown silt, some medium to fine gravel, little coarse to fine sand, moist, hard (ML)	Qp = 4.0 tsf
24.0-24.8	S-9	SS	15	--	38 50/3 / -- --	50/3		Weathered Rock	Brown coarse to fine gravel (shale fragments), little coarse to fine sand, moist, hard (GM)	

DYNAMIC EARTH

BOREHOLE LOG

Boring No : B-1

Project:	Proposed Self Storage Facility	Proj. No.:	3041-99-010E
Location:	825 NJSH Route 22 West, North Plainfield, Somerset County, New Jersey	Client:	InSite Property Group
Surface Elevation:	119.5 feet	Date Started:	07-15-2021
Termination Depth:	33.6 feet	Date Completed:	07-15-2021
Proposed Location:	Proposed Building	Logged by:	J. Scardigno
Drill/Test Method:	HSA/SPT	Contractor:	FMW
Hammer Type:	Auto	Rig Type:	CME 55

Groundwater Data	Depth (ft)	El. (ft)	Additional Groundwater Data	Depth (ft)	El. (ft)
While Drilling: ▽	NE	-			
At Completion: ▼	29.0	90.5			

Sample Information							Depth (ft)	Strata	DESCRIPTION OF MATERIALS (Classification)	Remarks
Depth (Feet)	Number	Type	Rec (in)	RQD %	Blows per 6" or drill time (mm:ss)	N				
29.0-29.7	S-10	SS	15	--	29 / 50/2 -- / --	50/2	30	Weathered Rock	As above (GM)	
33.0-33.6	S-11	SS	12	--	36 / 50/1 -- / --	50/1	35		As above (GM)	
									Boring B-1 was terminated at approximately 33.6 feet below the ground surface.	
							40			
							45			

DYNAMIC EARTH

BOREHOLE LOG

Boring No : B-2

Project:	Proposed Self Storage Facility	Proj. No.:	3041-99-010E
Location:	825 NJSH Route 22 West, North Plainfield, Somerset County, New Jersey	Client:	InSite Property Group
Surface Elevation:	112.5 feet	Date Started:	07-15-2021
Termination Depth:	12.5 feet	Date Completed:	07-15-2021
Proposed Location:	Proposed Building	Logged by:	J. Scardigno
Drill/Test Method:	HSA/SPT	Contractor:	FMW
Hammer Type:	Auto	Rig Type:	CME 55

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

Sample Information							Depth (ft)	Strata	DESCRIPTION OF MATERIALS (Classification)	Remarks
Depth (Feet)	Number	Type	Rec (in)	RQD %	Blows per 6" or drill time (mm:ss)	N				
0.0-2.0	S-1	SS	18	--	18 25 / 32 9	57		FILL	Brown silt, some coarse to fine gravel, moist (FILL)	
2.0-4.0	S-2	SS	7	--	8 8 / 8 10	18		Residual Soils	Brown and gray silt, some medium to fine gravel, some coarse to fine sand, moist, stiff (ML)	Qp = 1.5 tsf
4.0-6.0	S-3	SS	18	--	8 9 / 9 10	19	5		Brown silt, some coarse to fine gravel, little coarse to fine sand, stiff (ML)	Qp = 2.0 tsf
6.0-8.0	S-4	SS	12	--	7 10 / 10 12	20			Brown and orange clayey silt, little coarse to fine sand, moist, stiff (ML)	Qp = 2.0 tsf
8.0-8.3	S-5	SS	12	--	50/3 -- / --	50/3			Brown and red coarse to fine gravel (shale fragments), some clayey silt, little coarse to fine sand, very moist, hard (GM)	
10.0-11.9	S-6	SS	12	--	46 23 / 29 50/5	52	10	Weathered Rock	As above (GM)	
12.0-12.5	S-7	SS		--	50/2 -- / --	50/2			As above (GM)	
									Boring B-2 encountered refusal at 12.5 feet below the ground surface.	Auger refusal at 12.5 feet
							15			
							20			

DYNAMIC EARTH

BOREHOLE LOG

Boring No : B-3

Project:	Proposed Self Storage Facility	**Proj. No.:**	3041-99-010E
Location:	825 NJSH Route 22 West, North Plainfield, Somerset County, New Jersey	**Client:**	InSite Property Group
Surface Elevation:	115.5 feet	**Date Started:**	07-15-2021
Termination Depth:	33.6 feet	**Date Completed:**	07-15-2021
Proposed Location:	Proposed Building	**Logged by:**	J. Scardigno
Drill/Test Method:	HSA/SPT	**Contractor:**	FMW
Hammer Type:	Auto	**Rig Type:**	CME 55

Groundwater Data	Depth (ft)	El. (ft)	Additional Groundwater Data	Depth (ft)	El. (ft)
While Drilling: ▽	NE	-			
At Completion: ▼	28.0	89.5			

Sample Information							Depth (ft)	Strata	DESCRIPTION OF MATERIALS (Classification)	Remarks
Depth (Feet)	Number	Type	Rec (in)	RQD %	Blows per 6" or drill time (min:sec)	N				
0.0-2.0	S-1	SS	18	--	-- 18 / 6 4	10		Surface Cover	4 inches of asphalt with no apparent subbase material	
								FILL	Brown silt, little coarse to fine sand, little fine gravel, moist (FILL)	
2.0-4.0	S-2	SS	18	--	3 4 / 37 25	41			As above (FILL)	Qp = 2.5 tsf
4.0-6.0	S-3	SS	16	--	7 5 / 5 11	10	5	Residual Soils	Reddish brown silt, little fine sand, moist, stiff (ML)	
									Reddish brown clayey silt, trace fine sand, moist (ML)	Qp = 1.5 tsf
6.0-8.0	S-4	SS	14	--	7 5 / 6 6	11			As above (ML)	Qp = 1.5 tsf
8.0-10.0	S-5	SS	14	--	8 8 / 8 10	14			As above (ML)	Qp = 1.5 tsf
10.0-12.0	S-6	SS	18	--	13 15 / 17 17	32	10		Orange and brown silt, little coarse to fine sand, trace medium to fine gravel, moist, stiff (ML)	Qp = 3.0 tsf
14.0-16.0	S-7	SS	6	--	8 17 / 18 19	35	15		Reddish brown silt, little coarse to fine sand, trace coarse to fine gravel, moist, stiff (ML)	Qp = 3.0 tsf
19.0-20.3	S-8	SS	15	--	35 61 / 50/3 --	111/9	20	Weathered Rock	Reddish brown coarse to fine gravel (shale fragments), little silt, little coarse to fine sand, moist, very dense (GM)	
24.0-24.3	S-9	SS	6	--	50/4 -- / -- --	50/4			As above (GM)	

DYNAMIC EARTH

BOREHOLE LOG

Boring No : B-3

Project:	Proposed Self Storage Facility	**Proj. No.:**	3041-99-010E
Location:	825 NJSH Route 22 West, North Plainfield, Somerset County, New Jersey	**Client:**	InSite Property Group
Surface Elevation:	115.5 feet	**Date Started:**	07-15-2021
Termination Depth:	33.6 feet	**Date Completed:**	07-15-2021
Proposed Location:	Proposed Building	**Logged by:**	J. Scardigno
Drill/Test Method:	HSA/SPT	**Contractor:**	FMW
Hammer Type:	Auto	**Rig Type:**	CME 55

Groundwater Data	Depth (ft)	El. (ft)	Additional Groundwater Data	Depth (ft)	El. (ft)
While Drilling: ▽	NE	-			
At Completion: ▼	28.0	89.5			

Sample Information							Depth (ft)	Strata	DESCRIPTION OF MATERIALS (Classification)	Remarks
Depth (Feet)	Number	Type	Rec (in)	RQD %	Blows per 6" or drill time (min:sec)	N				
29.0-29.4	S-10	SS	6	--	50/5 -- / -- --	50/5	30	Weathered Rock	As above (GM)	
33.0-33.6	S-11	SS	18	--	40 50/1 / -- --	50/1			As above (GM)	
							35		Boring B-3 encountered refusal at approximately 33.6 feet below the ground surface.	
							40			
							45			

DYNAMIC EARTH

SOIL PROFILE PIT LOG

Soil Profile Pit: [illegible]

Page [illegible]

[illegible]

DEPTH (IN)	COLOR	SOIL TEXTURE	COARSE FRAGMENTS (%)	STRUCTURE	WATER CONTENT	CONSISTENCY	BOUNDARY	ROOTS	MOTTLING	SAMPLING	LAB RESULTS
[illegible]	[illegible]	LOAM	[illegible]	[illegible]	[illegible]	FRIABLE [illegible]	[illegible]	[illegible]	[illegible]		
[illegible]	[illegible]	LOAM	[illegible]	[illegible] FINE	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	
[illegible]	[illegible]	SILTY CLAY LOAM	[illegible]	[illegible] FINE	[illegible]	FRIABLE [illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
[illegible]	[illegible]	SANDY LOAM	[illegible]	[illegible] FINE	[illegible]	FRIABLE [illegible]	[illegible]	[illegible]	[illegible]	[illegible]	
[illegible]	[illegible]	SILTY CLAY	[illegible]	[illegible] FINE	[illegible]	SOFT [illegible]		[illegible]	[illegible]	[illegible]	

Additional Remarks: [illegible]

DYNAMIC EARTH

SOIL PROFILE PIT LOG

Soil Profile Pit: [illegible]

Page [illegible]

[illegible]

DEPTH (IN)	COLOR	SOIL TEXTURE	COARSE FRAGMENTS (%)	STRUCTURE	WATER CONTENT	CONSISTENCY	BOUNDARY	ROOTS	MOTTLING	SAMPLING	LAB RESULTS
[illegible]	[illegible]	LOAM	[illegible]	[illegible]	[illegible]	FRIABLE [illegible]	[illegible]	[illegible]	[illegible]		
[illegible]	[illegible]	LOAM	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	
[illegible]	[illegible]	SILT LOAM	[illegible]	[illegible]	[illegible]	FRIABLE [illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
[illegible]	[illegible]	SANDY LOAM	[illegible]	[illegible]	[illegible]	SOFT [illegible]	[illegible]	[illegible]	[illegible]	[illegible]	
[illegible]	[illegible]	SANDY CLAY LOAM	[illegible]	[illegible]	[illegible]	FRIABLE [illegible]		[illegible]	[illegible]	[illegible]	

Additional Remarks: [illegible]

DYNAMIC EARTH

SOIL PROFILE PIT LOG

Soil Profile Pit: SPP-3

Page 1 of 1

Depth (m)	Color	Soil Texture	Coarse Fragments (%)	Structure			Moist Consistence	Wet Consistence	Plasticity	Boundary	Topography	Roots	Pores	Quantity	Size	Contrast	Type	Depth (m)	No.	Lab ID SSLTx
0-10	Brown (10YR 4/3)	LOAM	0	0	0	0	FRIABLE	NONSTICKY	NONPLASTIC	CLEAR SMOOTH	LEVEL	CMF DPO ELAS	FEW	NONE						
10-20	Brown (10YR 4/3)	LOAM	0	0	0	0	FRIABLE	STICKY	NONPLASTIC	CLEAR SMOOTH	LEVEL	CMF DPO ELAS	FEW	NONE				10-20	M	0-1 / 1-2
20-30	Brownish Grey (2.5Y 5/2)	SILT CLAY LOAM	0	0	0	0	SOFT	SMEARY	NONPLASTIC	CLEAR SMOOTH	LEVEL	NONE						20-30	M	0-2
30-40	Brownish Grey (2.5Y 5/2)	SILT CLAY LOAM	0	0	0	0	FIRM	STICKY	NONPLASTIC	CLEAR SMOOTH	LEVEL	NONE		NONE				30-40	M	0-2
40-50	Dark Yellowish Brown (10YR 3/4)	SILTY CLAY LOAM	0	0	0	0	FIRM	SLIGHTLY STICKY	SLIGHTLY PLASTIC	CLEAR SMOOTH	LEVEL	NONE		FEW FINE VERY				40-50	M	0-1

Additional Notes: Topsoil with scattered roots (1 and 2 mm) and fine gravel. Subsoil moderately developed with blocky structure. Roots mostly confined to upper 30 cm. Boundary between horizons gradual. Pit dug to 50 cm; no restrictive layer encountered. Soil moist throughout profile. Sampled for laboratory analysis.

DYNAMIC EARTH

SOIL PROFILE PIT LOG

Soil Profile Pit: SPP-4

Page 1 of 1

Depth (m)	Color	Soil Texture	Coarse Fragments (%)	Structure			Moist Consistence	Wet Consistence	Plasticity	Boundary	Topography	Roots	Pores	Quantity	Size	Contrast	Type	Depth (m)	No.	Lab ID SSLTx
0-10	Brown (10YR 4/3)	LOAM	0	0	0	0	FRIABLE	NONSTICKY	NONPLASTIC	CLEAR SMOOTH	LEVEL	CMF DPO ELAS	FEW	NONE						
10-20	Brown (10YR 4/3)	LOAM	0	0	0	0	FRIABLE	STICKY	SLIGHTLY PLASTIC	CLEAR SMOOTH	LEVEL	CMF DPO ELAS	FEW	NONE				10-20	M	0-1 / 1-2
20-30	Brown (10YR 4/3)	SILTY CLAY LOAM	0	0	0	0	SOFT	SMEARY	NONPLASTIC	CLEAR SMOOTH	LEVEL	NONE						20-30	M	0-2
30-40	Brownish Grey (2.5Y 5/2)	SILTY CLAY LOAM	0	0	0	0	FIRM	STICKY	NONPLASTIC	CLEAR SMOOTH	LEVEL	NONE		NONE				30-40	M	0-2
40-50	Dark Yellowish Brown (10YR 3/4)	SILTY CLAY LOAM	0	0	0	0	FIRM	SLIGHTLY STICKY	SLIGHTLY PLASTIC	CLEAR SMOOTH	LEVEL	NONE		FEW FINE VERY				40-50	M	0-1

Additional Notes: Topsoil with scattered roots (1 and 2 mm) and fine gravel. Subsoil moderately developed with blocky structure. Roots mostly confined to upper 30 cm. Boundary between horizons gradual. Pit dug to 50 cm; no restrictive layer encountered. Soil moist throughout profile. Sampled for laboratory analysis.

DYNAMIC EARTH

SOIL PROFILE PIT LOG

Soil Profile Pit: [illegible]

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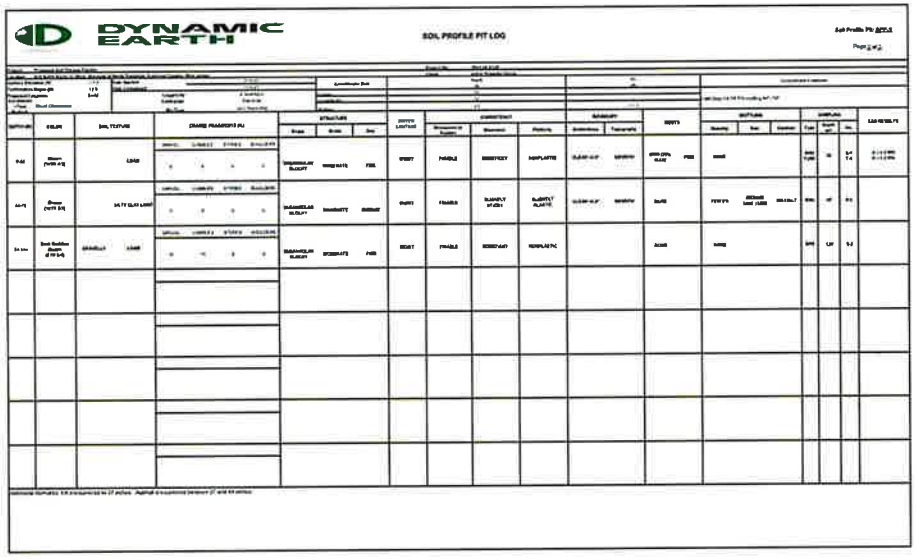

DYNAMIC EARTH

SOIL PROFILE PIT LOG

Soil Profile Pit: [illegible]

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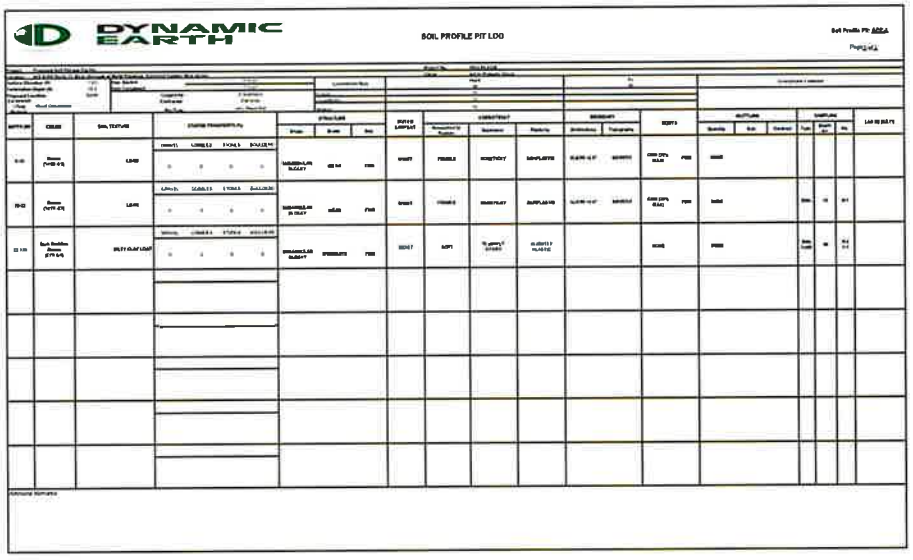

DYNAMIC EARTH

SOIL PROFILE PIT LOG

Soil Profile Pit: [illegible]

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[illegible]

LOAM

LOAM

SILTY CLAY LOAM

[illegible]

DYNAMIC EARTH

SOIL PROFILE PIT LOG

Soil Profile Pit: [illegible]

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Laboratory Test Results

Tube Permeameter Test Data

Job Number: 3041-99-010E
Project: Proposed Self-Storage Facility
Client: InSite Property Group
Lab Tech: PH

Sample ID: Boring/Test Pit No.: SPP-1 Sample No.: T-1 Depth: 40"

MUNICIPALITY Borough of North Plainfield BLOCK 119 LOT 1.01

1. Test Number T-1 Replicate (letter) A Date Collected 7/15/2021

2. Material Tested: ____ Fill x Test In Native Soil-Indicate Depth

3. Type of Sample: x Undisturbed ____ Disturbed

4. Sample Dimensions: Inside Radius of Sample Tube, R, in cm 3.8
Length of Sample, L, in inches 3.00

5. Bulk Density Determination (Disturbed Samples Only): N/A

6. Sample Weight (Wt. Tube Containing Sample-Wt. of Empty Tube), grams N/A

7. Sample Volume (L x 2.54 cm./inch x 3.14R2), cc. 345.503

8. Bulk Density (Sample Wt./Sample Volume), grams/cc. –

9. Standpipe Used: x No ____ Yes, Indicate Internal Radius, cm. N/A

10. Height of Water Level Above Rim of Test Basin, in inches:

At the Beginning of Each Test Interval, H1 5.00
At the End of Each Test Interval, H2 5.00

11. Rate of Water Level Drop (Add additional lines if needed):

Time, Start of Test Interval, T1	Time End of Test Interval T2	Length of Test Interval, T, Minutes
		240
		240
		240

12. Calculation of Permeability: K, (in/hr) = 60 min/hr x r2/R2 x L(in)/T(min) x ln (H1/H2) T= 240.0

K = < 0.2 Classification: K0

13. Defects in the Sample (Check appropriate items):

x NONE

____ Soil/Tube Contact ____ Large Gravel ____ Large Roots

____ Dry Soil ____ Smearing ____ Compaction

____ Other - Specify ____

Tube Permeameter Test Data

Job Number: 3041-99-010E
Project: Proposed Self-Storage Facility
Client: InSite Property Group
Lab Tech: PH

Sample ID: **Boring/Test Pit No.:** SPP-1 **Sample No.:** T-1 **Depth:** 40"

MUNICIPALITY Borough of North Plainfield BLOCK 119 LOT 1.01

1. Test Number T-1 Replicate (letter) B Date Collected 7/15/2021

2. Material Tested: _____ Fill x Test In Native Soil-Indicate Depth

3. Type of Sample: x Undisturbed _____ Disturbed

4. Sample Dimensions: Inside Radius of Sample Tube, R, in cm 3.8
Length of Sample, L, in inches 3.00

5. Bulk Density Determination (Disturbed Samples Only): N/A

6. Sample Weight (Wt. Tube Containing Sample-Wt. of Empty Tube), grams N/A

7. Sample Volume (L x 2.54 cm./inch x 3.14R2), cc. 345.503

8. Bulk Density (Sample Wt./Sample Volume), grams/cc. –

9. Standpipe Used: x No _____ Yes, Indicate Internal Radius, cm. N/A

10. Height of Water Level Above Rim of Test Basin, in inches:

At the Beginning of Each Test Interval, H1 5.00
At the End of Each Test Interval, H2 5.00

11. Rate of Water Level Drop (Add additional lines if needed):

Time, Start of Test Interval, T1	Time End of Test Interval T2	Length of Test Interval, T, Minutes
		240
		240
		240

12. Calculation of Permeability: K, (in/hr) = 60 min/hr x r2/R2 x L(in)/T(min) x ln (H1/H2) T= 240.0

K = < 0.2 **Classification:** K0

13. Defects in the Sample (Check appropriate items):

x NONE

_____ Soil/Tube Contact _____ Large Gravel _____ Large Roots

_____ Dry Soil _____ Smearing _____ Compaction

_____ Other - Specify _____

Tube Permeameter Test Data

Job Number: 3041-99-010E
Project: Proposed Self-Storage Facility
Client: InSite Property Group
Lab Tech: PH

Sample ID: **Boring/Test Pit No.:** SPP-2 **Sample No.:** T-1 **Depth:** 36"

MUNICIPALITY Borough of North Plainfield BLOCK 119 LOT 1.01

1. Test Number T-1 Replicate (letter) A Date Collected 7/15/2021

2. Material Tested: _____ Fill x Test In Native Soil-Indicate Depth

3. Type of Sample: x Undisturbed _____ Disturbed

4. Sample Dimensions: Inside Radius of Sample Tube, R, in cm 3.8
Length of Sample, L, in inches 3.00

5. Bulk Density Determination (Disturbed Samples Only): N/A

6. Sample Weight (Wt. Tube Containing Sample-Wt. of Empty Tube), grams N/A

7. Sample Volume (L x 2.54 cm./inch x 3.14R2), cc. 345.503

8. Bulk Density (Sample Wt./Sample Volume), grams/cc. –

9. Standpipe Used: x No _____ Yes, Indicate Internal Radius, cm. N/A

10. Height of Water Level Above Rim of Test Basin, in inches:

At the Beginning of Each Test Interval, H1 5.00
At the End of Each Test Interval, H2 5.00

11. Rate of Water Level Drop (Add additional lines if needed):

Time, Start of Test Interval, T1	Time End of Test Interval T2	Length of Test Interval, T, Minutes
		240
		240
		240

12. Calculation of Permeability: K, (in/hr) = 60 min/hr x r2/R2 x L(in)/T(min) x ln (H1/H2) T= 240.0

K = < 0.2 **Classification:** K0

13. Defects in the Sample (Check appropriate items):

x NONE

_____ Soil/Tube Contact _____ Large Gravel _____ Large Roots

_____ Dry Soil _____ Smearing _____ Compaction

_____ Other - Specify _____

Tube Permeameter Test Data

Job Number: 3041-99-010E
Project: Proposed Self-Storage Facility
Client: InSite Property Group
Lab Tech: PH

Sample ID: Boring/Test Pit No.: SPP-2 Sample No.: T-1 Depth: 36"

MUNICIPALITY Borough of North Plainfield BLOCK 119 LOT 1.01

1. Test Number T-1 Replicate (letter) B Date Collected 7/15/2021
2. Material Tested: ____ Fill x Test In Native Soil-Indicate Depth
3. Type of Sample: x Undisturbed ____ Disturbed
4. Sample Dimensions: Inside Radius of Sample Tube, R, in cm 3.8
   Length of Sample, L, in inches 3.00
5. Bulk Density Determination (Disturbed Samples Only): N/A
6. Sample Weight (Wt. Tube Containing Sample-Wt. of Empty Tube), grams N/A
7. Sample Volume (L x 2.54 cm./inch x 3.14R2), cc. 345.503
8. Bulk Density (Sample Wt./Sample Volume), grams/cc. –
9. Standpipe Used: x No ____ Yes, Indicate Internal Radius, cm. N/A
10. Height of Water Level Above Rim of Test Basin, in inches:
    At the Beginning of Each Test Interval, H1 5.00
    At the End of Each Test Interval, H2 5.00
11. Rate of Water Level Drop (Add additional lines if needed):

Time, Start of Test Interval, T1	Time End of Test Interval T2	Length of Test Interval, T, Minutes
		240
		240
		240

12. Calculation of Permeability: K, (in/hr) = 60 min/hr x r2/R2 x L(in)/T(min) x ln (H1/H2) T= 240.0
    K = < 0.2 Classification: K0
13. Defects in the Sample (Check appropriate items):
    x NONE
    ____ Soil/Tube Contact ____ Large Gravel ____ Large Roots
    ____ Dry Soil ____ Smearing ____ Compaction
    ____ Other - Specify ____

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Tube Permeameter Test Data

Job Number: 3041-99-010E
Project: Proposed Self-Storage Facility
Client: InSite Property Group
Lab Tech: PH

Sample ID: Boring/Test Pit No.: SPP-3 Sample No.: T-1 Depth: 30"

MUNICIPALITY Borough of North Plainfield BLOCK 119 LOT 1.01

1. Test Number T-1 Replicate (letter) A Date Collected 7/15/2021
2. Material Tested: x Fill ____ Test In Native Soil-Indicate Depth
3. Type of Sample: x Undisturbed ____ Disturbed
4. Sample Dimensions: Inside Radius of Sample Tube, R, in cm 3.8
   Length of Sample, L, in inches 3.00
5. Bulk Density Determination (Disturbed Samples Only): N/A
6. Sample Weight (Wt. Tube Containing Sample-Wt. of Empty Tube), grams N/A
7. Sample Volume (L x 2.54 cm./inch x 3.14R2), cc. 345.503
8. Bulk Density (Sample Wt./Sample Volume), grams/cc. –
9. Standpipe Used: x No ____ Yes, Indicate Internal Radius, cm. N/A
10. Height of Water Level Above Rim of Test Basin, in inches:
    At the Beginning of Each Test Interval, H1 5.00
    At the End of Each Test Interval, H2 5.00
11. Rate of Water Level Drop (Add additional lines if needed):

Time, Start of Test Interval, T1	Time End of Test Interval T2	Length of Test Interval, T, Minutes
		240
		240
		240

12. Calculation of Permeability: K, (in/hr) = 60 min/hr x r2/R2 x L(in)/T(min) x ln (H1/H2) T= 240.0
    K = < 0.2 Classification: K0
13. Defects in the Sample (Check appropriate items):
    x NONE
    ____ Soil/Tube Contact ____ Large Gravel ____ Large Roots
    ____ Dry Soil ____ Smearing ____ Compaction
    ____ Other - Specify ____

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Tube Permeameter Test Data

Job Number: 3041-99-010E
Project: Proposed Self-Storage Facility
Client: InSite Property Group
Lab Tech: PH

Sample ID: Boring/Test Pit No.: SPP-3 Sample No.: T-1 Depth: 30"

MUNICIPALITY Borough of North Plainfield BLOCK 119 LOT 1.01

1. Test Number T-1 Replicate (letter) B Date Collected 7/15/2021

2. Material Tested: x Fill _____ Test in Native Soil-Indicate Depth

3. Type of Sample: x Undisturbed _____ Disturbed

4. Sample Dimensions: Inside Radius of Sample Tube, R, in cm 3.8
Length of Sample, L, In Inches 2.50

5. Bulk Density Determination (Disturbed Samples Only): N/A

6. Sample Weight (Wt. Tube Containing Sample-Wt. of Empty Tube), grams N/A

7. Sample Volume (L x 2.54 cm./inch x 3.14R2), cc. 287.9192

8. Bulk Density (Sample Wt./Sample Volume), grams/cc. –

9. Standpipe Used: x No _____ Yes, Indicate Internal Radius, cm. N/A

10. Height of Water Level Above Rim of Test Basin, in inches:

At the Beginning of Each Test Interval, H1 5.00
At the End of Each Test Interval, H2 4.00

11. Rate of Water Level Drop (Add additional lines if needed):

Time, Start of Test Interval, T1	Time End of Test Interval T2	Length of Test Interval, T, Minutes
		130
		130
		130

12. Calculation of Permeability: K, (In/hr) = 60 min/hr x r2/R2 x L(in)/T(min) x ln (H1/H2) T= 130.0

K = 0.3 Classification: K1

13. Defects in the Sample (Check appropriate items):

x NONE

_____ Soil/Tube Contact _____ Large Gravel _____ Large Roots

_____ Dry Soil _____ Smearing _____ Compaction

_____ Other - Specify _____

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Tube Permeameter Test Data

Job Number: 3041-99-010E
Project: Proposed Self-Storage Facility
Client: InSite Property Group
Lab Tech: PH

Sample ID: Boring/Test Pit No.: SPP-4 Sample No.: T-1 Depth: 30"

MUNICIPALITY Borough of North Plainfield BLOCK 119 LOT 1.01

1. Test Number T-1 Replicate (letter) A Date Collected 7/15/2021

2. Material Tested: x Fill _____ Test in Native Soil-Indicate Depth

3. Type of Sample: x Undisturbed _____ Disturbed

4. Sample Dimensions: Inside Radius of Sample Tube, R, in cm 3.8
Length of Sample, L, In Inches 3.00

5. Bulk Density Determination (Disturbed Samples Only): N/A

6. Sample Weight (Wt. Tube Containing Sample-Wt. of Empty Tube), grams N/A

7. Sample Volume (L x 2.54 cm./inch x 3.14R2), cc. 345.503

8. Bulk Density (Sample Wt./Sample Volume), grams/cc. –

9. Standpipe Used: x No _____ Yes, Indicate Internal Radius, cm. N/A

10. Height of Water Level Above Rim of Test Basin, in inches:

At the Beginning of Each Test Interval, H1 5.00
At the End of Each Test Interval, H2 4.00

11. Rate of Water Level Drop (Add additional lines if needed):

Time, Start of Test Interval, T1	Time End of Test Interval T2	Length of Test Interval, T, Minutes
		14
		14
		15

12. Calculation of Permeability: K, (In/hr) = 60 min/hr x r2/R2 x L(In)/T(min) x ln (H1/H2) T= 15.0

K = 2.7 Classification: K3

13. Defects in the Sample (Check appropriate items):

x NONE

_____ Soil/Tube Contact _____ Large Gravel _____ Large Roots

_____ Dry Soil _____ Smearing _____ Compaction

_____ Other - Specify _____

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Tube Permeameter Test Data

Job Number: 3041-99-010E
Project: Proposed Self-Storage Facility
Client: InSite Property Group
Lab Tech: PH

Sample ID: **Boring/Test Pit No.:** SPP-4 **Sample No.:** T-1 **Depth:** 30"

MUNICIPALITY Borough of North Plainfield BLOCK 119 LOT 1.01

1. Test Number T-1 Replicate (letter) B Date Collected 7/15/2021
2. Material Tested: x Fill _____ Test In Native Soil-Indicate Depth
3. Type of Sample: x Undisturbed _____ Disturbed
4. Sample Dimensions: Inside Radius of Sample Tube, R, in cm 3.8
   Length of Sample, L, in Inches 3.00
5. Bulk Density Determination (Disturbed Samples Only): N/A
6. Sample Weight (Wt. Tube Containing Sample-Wt. of Empty Tube), grams N/A
7. Sample Volume (L x 2.54 cm./inch x 3.14R2), cc. 345.503
8. Bulk Density (Sample Wt./Sample Volume), grams/cc. –
9. Standpipe Used: x No _____ Yes, Indicate Internal Radius, cm. N/A
10. Height of Water Level Above Rim of Test Basin, in inches:

    At the Beginning of Each Test Interval, H1 5.00
    At the End of Each Test Interval, H2 5.00

11. Rate of Water Level Drop (Add additional lines if needed):

Time, Start of Test Interval, T1	Time End of Test Interval T2	Length of Test Interval, T, Minutes
		240
		240
		240

12. Calculation of Permeability: K, (in/hr) = 60 min/hr x r2/R2 x L(in)/T(min) x ln (H1/H2) T= 240.0

    K = < 0.2 **Classification:** K0

13. Defects in the Sample (Check appropriate items):

    x NONE

    _____ Soil/Tube Contact _____ Large Gravel _____ Large Roots

    _____ Dry Soil _____ Smearing _____ Compaction

    _____ Other - Specify _____

Tube Permeameter Test Data

Job Number: 3041-99-010E
Project: Proposed Self-Storage Facility
Client: InSite Property Group
Lab Tech: PH

Sample ID: **Boring/Test Pit No.:** SPP-5 **Sample No.:** T-1 **Depth:** 30"

MUNICIPALITY Borough of North Plainfield BLOCK 119 LOT 1.01

1. Test Number T-1 Replicate (letter) A Date Collected 7/15/2021
2. Material Tested: _____ Fill x Test In Native Soil-Indicate Depth
3. Type of Sample: x Undisturbed _____ Disturbed
4. Sample Dimensions: Inside Radius of Sample Tube, R, in cm 3.8
   Length of Sample, L, in Inches 3.00
5. Bulk Density Determination (Disturbed Samples Only): N/A
6. Sample Weight (Wt. Tube Containing Sample-Wt. of Empty Tube), grams N/A
7. Sample Volume (L x 2.54 cm./inch x 3.14R2), cc. 345.503
8. Bulk Density (Sample Wt./Sample Volume), grams/cc. –
9. Standpipe Used: x No _____ Yes, Indicate Internal Radius, cm. N/A
10. Height of Water Level Above Rim of Test Basin, in inches:

    At the Beginning of Each Test Interval, H1 5.00
    At the End of Each Test Interval, H2 5.00

11. Rate of Water Level Drop (Add additional lines if needed):

Time, Start of Test Interval, T1	Time End of Test Interval T2	Length of Test Interval, T, Minutes
		240
		240
		240

12. Calculation of Permeability: K, (in/hr) = 60 min/hr x r2/R2 x L(in)/T(min) x ln (H1/H2) T= 240.0

    K = < 0.2 **Classification:** K0

13. Defects in the Sample (Check appropriate items):

    x NONE

    _____ Soil/Tube Contact _____ Large Gravel _____ Large Roots

    _____ Dry Soil _____ Smearing _____ Compaction

    _____ Other - Specify _____

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Tube Permeameter Test Data

Job Number: 3041-99-010E
Project: Proposed Self-Storage Facility
Client: InSite Property Group
Lab Tech: PH

Sample ID: Boring/Test Pit No.: SPP-5 **Sample No.:** T-1 **Depth:** 30"

MUNICIPALITY Borough of North Plainfield BLOCK 119 LOT 1.01

1. Test Number T-1 Replicate (letter) B Date Collected 7/15/2021

2. Material Tested: _____ Fill x Test In Native Soil-Indicate Depth

3. Type of Sample: x Undisturbed _____ Disturbed

4. Sample Dimensions: Inside Radius of Sample Tube, R, in cm 3.8
Length of Sample, L, in inches 3.00

5. Bulk Density Determination (Disturbed Samples Only): N/A

6. Sample Weight (Wt. Tube Containing Sample-Wt. of Empty Tube), grams N/A

7. Sample Volume (L x 2.54 cm./inch x 3.14R2), cc. 345.503

8. Bulk Density (Sample Wt./Sample Volume), grams/cc. --

9. Standpipe Used: x No _____ Yes, Indicate Internal Radius, cm. N/A

10. Height of Water Level Above Rim of Test Basin, in inches:

At the Beginning of Each Test Interval, H1 5.00
At the End of Each Test Interval, H2 5.00

11. Rate of Water Level Drop (Add additional lines if needed):

Time, Start of Test Interval, T1	Time End of Test Interval T2	Length of Test Interval, T, Minutes
		240
		240
		240

12. Calculation of Permeability: K, (In/hr) = 60 min/hr x r2/R2 x L(In)/T(min) x ln (H1/H2) T= 240.0

K = < 0.2 **Classification:** K0

13. Defects in the Sample (Check appropriate items):

x NONE

_____ Soil/Tube Contact _____ Large Gravel _____ Large Roots

_____ Dry Soil _____ Smearing _____ Compaction

_____ Other - Specify _____

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NRCS – USDA Custom Soil Resource Report for Somerset County

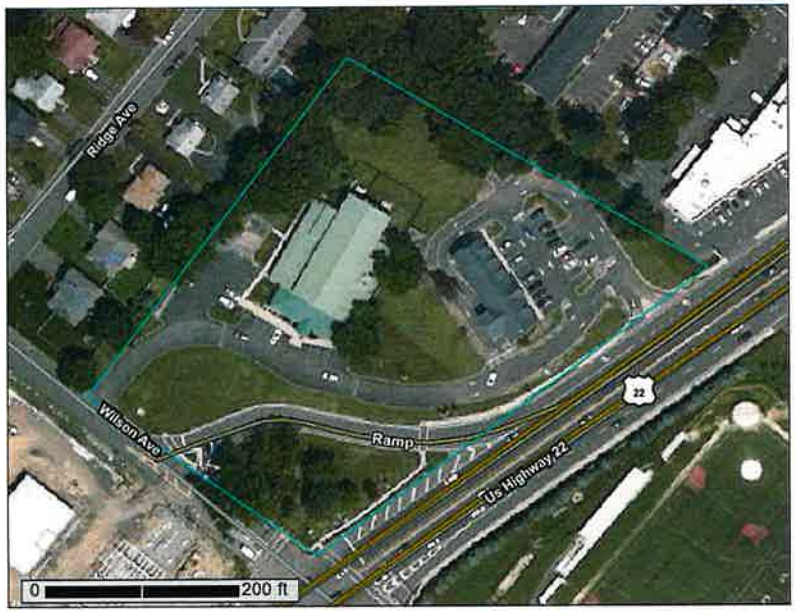
United States Department of Agriculture

NRCS

Natural Resources Conservation Service

A product of the National Cooperative Soil Survey, a joint effort of the United States Department of Agriculture and other Federal agencies, State agencies including the Agricultural Experiment Stations, and local participants

Custom Soil Resource Report for Somerset County, New Jersey



July 14, 2021

Preface

Soil surveys contain information that affects land use planning in survey areas. They highlight soil limitations that affect various land uses and provide information about the properties of the soils in the survey areas. Soil surveys are designed for many different users, including farmers, ranchers, foresters, agronomists, urban planners, community officials, engineers, developers, builders, and home buyers. Also, conservationists, teachers, students, and specialists in recreation, waste disposal, and pollution control can use the surveys to help them understand, protect, or enhance the environment.

Various land use regulations of Federal, State, and local governments may impose special restrictions on land use or land treatment. Soil surveys identify soil properties that are used in making various land use or land treatment decisions. The information is intended to help the land users identify and reduce the effects of soil limitations on various land uses. The landowner or user is responsible for identifying and complying with existing laws and regulations.

Although soil survey information can be used for general farm, local, and wider area planning, onsite investigation is needed to supplement this information in some cases. Examples include soil quality assessments (http://www.nrcs.usda.gov/wps/portal/nrcs/main/soils/health/) and certain conservation and engineering applications. For more detailed information, contact your local USDA Service Center (https://offices.sc.egov.usda.gov/locator/app?agency=nrcs) or your NRCS State Soil Scientist (http://www.nrcs.usda.gov/wps/portal/nrcs/detail/soils/contactus/?cid=nrcs142p2_053951).

Great differences in soil properties can occur within short distances. Some soils are seasonally wet or subject to flooding. Some are too unstable to be used as a foundation for buildings or roads. Clayey or wet soils are poorly suited to use as septic tank absorption fields. A high water table makes a soil poorly suited to basements or underground installations.

The National Cooperative Soil Survey is a joint effort of the United States Department of Agriculture and other Federal agencies, State agencies including the Agricultural Experiment Stations, and local agencies. The Natural Resources Conservation Service (NRCS) has leadership for the Federal part of the National Cooperative Soil Survey.

Information about soils is updated periodically. Updated information is available through the NRCS Web Soil Survey, the site for official soil survey information.

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Contents

How Soil Surveys Are Made

Soil surveys are made to provide information about the soils and miscellaneous areas in a specific area. They include a description of the soils and miscellaneous areas and their location on the landscape and tables that show soil properties and limitations affecting various uses. Soil scientists observed the steepness, length, and shape of the slopes; the general pattern of drainage; the kinds of crops and native plants; and the kinds of bedrock. They observed and described many soil profiles. A soil profile is the sequence of natural layers, or horizons, in a soil. The profile extends from the surface down into the unconsolidated material in which the soil formed or from the surface down to bedrock. The unconsolidated material is devoid of roots and other living organisms and has not been changed by other biological activity.

Currently, soils are mapped according to the boundaries of major land resource areas (MLRAs). MLRAs are geographically associated land resource units that share common characteristics related to physiography, geology, climate, water resources, soils, biological resources, and land uses (USDA, 2006). Soil survey areas typically consist of parts of one or more MLRA.

The soils and miscellaneous areas in a survey area occur in an orderly pattern that is related to the geology, landforms, relief, climate, and natural vegetation of the area. Each kind of soil and miscellaneous area is associated with a particular kind of landform or with a segment of the landform. By observing the soils and miscellaneous areas in the survey area and relating their position to specific segments of the landform, a soil scientist develops a concept, or model, of how they were formed. Thus, during mapping, this model enables the soil scientist to predict with a considerable degree of accuracy the kind of soil or miscellaneous area at a specific location on the landscape.

Commonly, individual soils on the landscape merge into one another as their characteristics gradually change. To construct an accurate soil map, however, soil scientists must determine the boundaries between the soils. They can observe only a limited number of soil profiles. Nevertheless, these observations, supplemented by an understanding of the soil-vegetation-landscape relationship, are sufficient to verify predictions of the kinds of soil in an area and to determine the boundaries.

Soil scientists recorded the characteristics of the soil profiles that they studied. They noted soil color, texture, size and shape of soil aggregates, kind and amount of rock fragments, distribution of plant roots, reaction, and other features that enable them to identify soils. After describing the soils in the survey area and determining their properties, the soil scientists assigned the soils to taxonomic classes (units). Taxonomic classes are concepts. Each taxonomic class has a set of soil characteristics with precisely defined limits. The classes are used as a basis for comparison to classify soils systematically. Soil taxonomy, the system of taxonomic classification used in the United States, is based mainly on the kind and character of soil properties and the arrangement of horizons within the profile. After the soil

scientists classified and named the soils in the survey area, they compared the individual soils with similar soils in the same taxonomic class in other areas so that they could confirm data and assemble additional data based on experience and research.

The objective of soil mapping is not to delineate pure map unit components; the objective is to separate the landscape into landforms or landform segments that have similar use and management requirements. Each map unit is defined by a unique combination of soil components and/or miscellaneous areas in predictable proportions. Some components may be highly contrasting to the other components of the map unit. The presence of minor components in a map unit in no way diminishes the usefulness or accuracy of the data. The delineation of such landforms and landform segments on the map provides sufficient information for the development of resource plans. If intensive use of small areas is planned, onsite investigation is needed to define and locate the soils and miscellaneous areas.

Soil scientists make many field observations in the process of producing a soil map. The frequency of observation is dependent upon several factors, including scale of mapping, intensity of mapping, design of map units, complexity of the landscape, and experience of the soil scientist. Observations are made to test and refine the soil-landscape model and predictions and to verify the classification of the soils at specific locations. Once the soil-landscape model is refined, a significantly smaller number of measurements of individual soil properties are made and recorded. These measurements may include field measurements, such as those for color, depth to bedrock, and texture, and laboratory measurements, such as those for content of sand, silt, clay, salt, and other components. Properties of each soil typically vary from one point to another across the landscape.

Observations for map unit components are aggregated to develop ranges of characteristics for the components. The aggregated values are presented. Direct measurements do not exist for every property presented for every map unit component. Values for some properties are estimated from combinations of other properties.

While a soil survey is in progress, samples of some of the soils in the area generally are collected for laboratory analyses and for engineering tests. Soil scientists interpret the data from these analyses and tests as well as the field-observed characteristics and the soil properties to determine the expected behavior of the soils under different uses. Interpretations for all of the soils are field tested through observation of the soils in different uses and under different levels of management. Some interpretations are modified to fit local conditions, and some new interpretations are developed to meet local needs. Data are assembled from other sources, such as research information, production records, and field experience of specialists. For example, data on crop yields under defined levels of management are assembled from farm records and from field or plot experiments on the same kinds of soil.

Predictions about soil behavior are based not only on soil properties but also on such variables as climate and biological activity. Soil conditions are predictable over long periods of time, but they are not predictable from year to year. For example, soil scientists can predict with a fairly high degree of accuracy that a given soil will have a high water table within certain depths in most years, but they cannot predict that a high water table will always be at a specific level in the soil on a specific date.

After soil scientists located and identified the significant natural bodies of soil in the survey area, they drew the boundaries of these bodies on aerial photographs and

identified each as a specific map unit. Aerial photographs show trees, buildings, fields, roads, and rivers, all of which help in locating boundaries accurately.

Soil Map

The soil map section includes the soil map for the defined area of interest, a list of soil map units on the map and extent of each map unit, and cartographic symbols displayed on the map. Also presented are various metadata about data used to produce the map, and a description of each soil map unit.

Soil Map

MAP LEGEND

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

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

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

Water Features
- Streams and Canals

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

Background
- Aerial Photography

MAP INFORMATION

The soil surveys that comprise your AOI were mapped at 1:24,000.

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

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

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

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

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

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

Soil Survey Area: Somerset County, New Jersey
Survey Area Data: Version 18, Jun 1, 2020

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

Date(s) aerial images were photographed: Jul 26, 2019—Jul 31, 2019

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

Map Unit Legend

Map Unit Symbol	Map Unit Name	Acres in AOI	Percent of AOI
AmdB	Amwell gravelly loam, 2 to 6 percent slopes	3.0	81.0%
DunC	Dunellen sandy loam, 8 to 15 percent slopes	0.7	19.0%
Totals for Area of Interest		3.8	**100.0%**

Map Unit Descriptions

The map units delineated on the detailed soil maps in a soil survey represent the soils or miscellaneous areas in the survey area. The map unit descriptions, along with the maps, can be used to determine the composition and properties of a unit.

A map unit delineation on a soil map represents an area dominated by one or more major kinds of soil or miscellaneous areas. A map unit is identified and named according to the taxonomic classification of the dominant soils. Within a taxonomic class there are precisely defined limits for the properties of the soils. On the landscape, however, the soils are natural phenomena, and they have the characteristic variability of all natural phenomena. Thus, the range of some observed properties may extend beyond the limits defined for a taxonomic class. Areas of soils of a single taxonomic class rarely, if ever, can be mapped without including areas of other taxonomic classes. Consequently, every map unit is made up of the soils or miscellaneous areas for which it is named and some minor components that belong to taxonomic classes other than those of the major soils.

Most minor soils have properties similar to those of the dominant soil or soils in the map unit, and thus they do not affect use and management. These are called noncontrasting, or similar, components. They may or may not be mentioned in a particular map unit description. Other minor components, however, have properties and behavioral characteristics divergent enough to affect use or to require different management. These are called contrasting, or dissimilar, components. They generally are in small areas and could not be mapped separately because of the scale used. Some small areas of strongly contrasting soils or miscellaneous areas are identified by a special symbol on the maps. If included in the database for a given area, the contrasting minor components are identified in the map unit descriptions along with some characteristics of each. A few areas of minor components may not have been observed, and consequently they are not mentioned in the descriptions, especially where the pattern was so complex that it was impractical to make enough observations to identify all the soils and miscellaneous areas on the landscape.

The presence of minor components in a map unit in no way diminishes the usefulness or accuracy of the data. The objective of mapping is not to delineate pure taxonomic classes but rather to separate the landscape into landforms or landform segments that have similar use and management requirements. The delineation of such segments on the map provides sufficient information for the development of resource plans. If intensive use of small areas is planned, however,

onsite investigation is needed to define and locate the soils and miscellaneous areas.

An identifying symbol precedes the map unit name in the map unit descriptions. Each description includes general facts about the unit and gives important soil properties and qualities.

Soils that have profiles that are almost alike make up a *soil series*. Except for differences in texture of the surface layer, all the soils of a series have major horizons that are similar in composition, thickness, and arrangement.

Soils of one series can differ in texture of the surface layer, slope, stoniness, salinity, degree of erosion, and other characteristics that affect their use. On the basis of such differences, a soil series is divided into *soil phases*. Most of the areas shown on the detailed soil maps are phases of soil series. The name of a soil phase commonly indicates a feature that affects use or management. For example, Alpha silt loam, 0 to 2 percent slopes, is a phase of the Alpha series.

Some map units are made up of two or more major soils or miscellaneous areas. These map units are complexes, associations, or undifferentiated groups.

A *complex* consists of two or more soils or miscellaneous areas in such an intricate pattern or in such small areas that they cannot be shown separately on the maps. The pattern and proportion of the soils or miscellaneous areas are somewhat similar in all areas. Alpha-Beta complex, 0 to 6 percent slopes, is an example.

An *association* is made up of two or more geographically associated soils or miscellaneous areas that are shown as one unit on the maps. Because of present or anticipated uses of the map units in the survey area, it was not considered practical or necessary to map the soils or miscellaneous areas separately. The pattern and relative proportion of the soils or miscellaneous areas are somewhat similar. Alpha-Beta association, 0 to 2 percent slopes, is an example.

An *undifferentiated group* is made up of two or more soils or miscellaneous areas that could be mapped individually but are mapped as one unit because similar interpretations can be made for use and management. The pattern and proportion of the soils or miscellaneous areas in a mapped area are not uniform. An area can be made up of only one of the major soils or miscellaneous areas, or it can be made up of all of them. Alpha and Beta soils, 0 to 2 percent slopes, is an example.

Some surveys include *miscellaneous areas*. Such areas have little or no soil material and support little or no vegetation. Rock outcrop is an example.

Somerset County, New Jersey

AmdB—Amwell gravelly loam, 2 to 6 percent slopes

Map Unit Setting

National map unit symbol: 1j50v
Elevation: 100 to 2,000 feet
Mean annual precipitation: 30 to 64 inches
Mean annual air temperature: 46 to 79 degrees F
Frost-free period: 131 to 178 days
Farmland classification: Farmland of statewide importance

Map Unit Composition

Amwell and similar soils: 90 percent
Minor components: 10 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Amwell

Setting

Landform: Valley flats
Down-slope shape: Linear
Across-slope shape: Linear
Parent material: Loamy colluvium derived from igneous rock

Typical profile

A - 0 to 3 inches: gravelly loam
BA - 3 to 14 inches: gravelly loam
Bt - 14 to 21 inches: clay loam
Bx1 - 21 to 26 inches: loam
Bx2 - 26 to 36 inches: fine sandy loam
C1 - 36 to 46 inches: fine sandy loam
C2 - 46 to 60 inches: fine sandy loam

Properties and qualities

Slope: 2 to 6 percent
Depth to restrictive feature: 18 to 30 inches to fragipan
Drainage class: Somewhat poorly drained
Runoff class: Medium
Capacity of the most limiting layer to transmit water (Ksat): Moderately low to moderately high (0.06 to 0.20 in/hr)
Depth to water table: About 24 to 36 inches
Frequency of flooding: None
Frequency of ponding: None
Available water capacity: Low (about 3.2 inches)

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 2e
Hydrologic Soil Group: C
Hydric soil rating: No

Minor Components

Watchung

Percent of map unit: 10 percent

Landform: Depressions
Landform position (two-dimensional): Toeslope
Landform position (three-dimensional): Base slope
Down-slope shape: Concave
Across-slope shape: Concave
Hydric soil rating: Yes

DunC—Dunellen sandy loam, 8 to 15 percent slopes

Map Unit Setting

National map unit symbol: ldqk
Elevation: 50 to 2,000 feet
Mean annual precipitation: 30 to 64 inches
Mean annual air temperature: 46 to 79 degrees F
Frost-free period: 131 to 178 days
Farmland classification: Farmland of statewide importance

Map Unit Composition

Dunellen and similar soils: 85 percent
Minor components: 15 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Dunellen

Setting

Landform: Outwash plains
Down-slope shape: Linear
Across-slope shape: Linear
Parent material: Coarse-loamy outwash derived from sandstone

Typical profile

A1 - 0 to 8 inches: sandy loam
A2 - 8 to 14 inches: sandy loam
BA - 14 to 20 inches: sandy loam
Bt - 20 to 31 inches: sandy loam
C - 31 to 42 inches: sandy loam
2C - 42 to 70 inches: loamy sand

Properties and qualities

Slope: 8 to 15 percent
Depth to restrictive feature: More than 80 inches
Drainage class: Well drained
Runoff class: Medium
Capacity of the most limiting layer to transmit water (Ksat): High (1.98 to 6.00 in/hr)
Depth to water table: More than 80 inches
Frequency of flooding: None
Frequency of ponding: None
Available water capacity: Moderate (about 7.7 inches)

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 3e
Hydrologic Soil Group: A
Hydric soil rating: No

Minor Components

Tunkhannock

Percent of map unit: 10 percent
Landform: Kames, outwash terraces, deltas
Landform position (three-dimensional): Riser, rise
Down-slope shape: Convex, linear
Across-slope shape: Convex, linear
Hydric soil rating: No

Udorthents, dunellen substratum

Percent of map unit: 5 percent
Landform: Outwash plains
Landform position (three-dimensional): Lower third of mountainflank
Down-slope shape: Linear
Across-slope shape: Linear
Hydric soil rating: No

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Geotechnical Terms and Symbols

DYNAMIC EARTH

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Chester, NJ 07930
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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

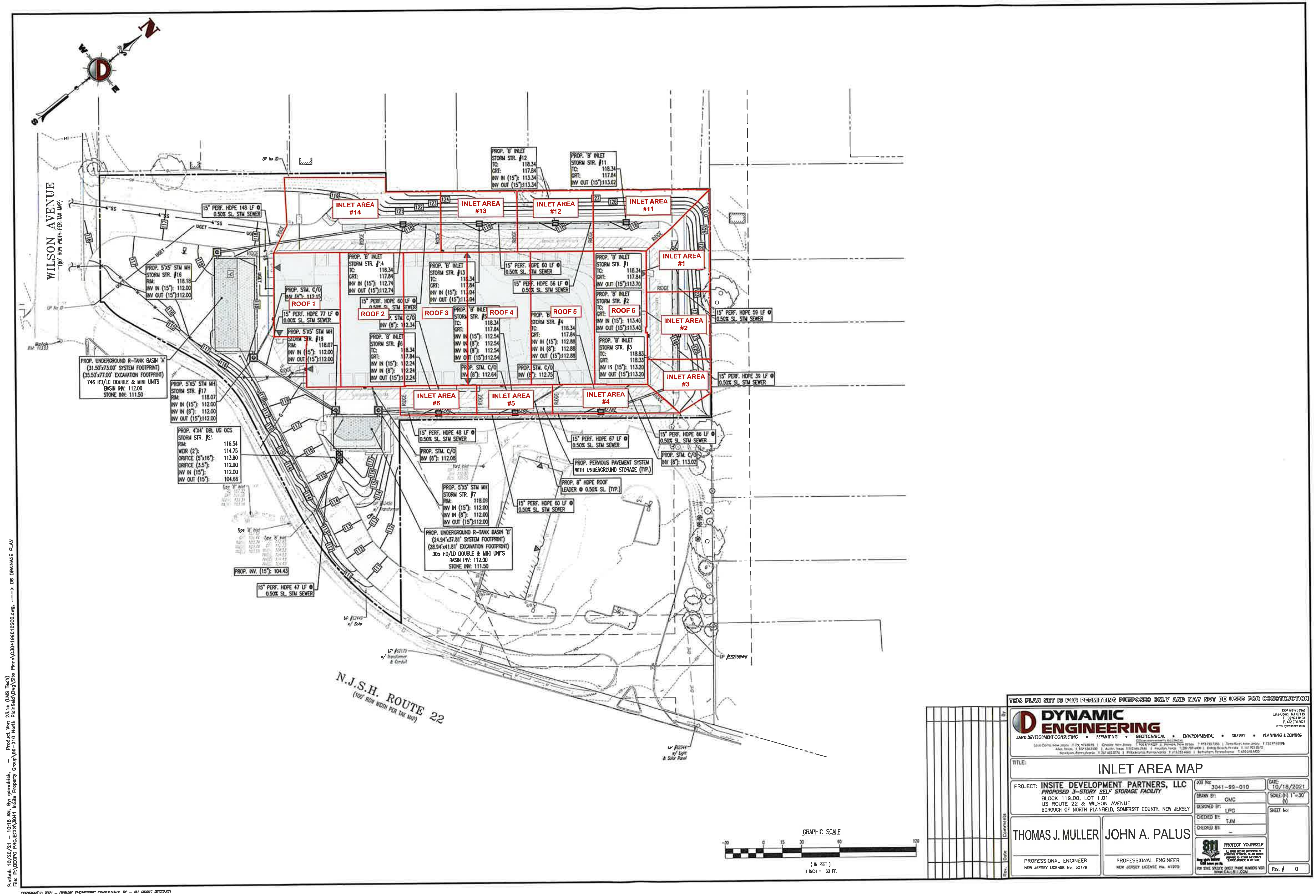
NOTES:

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.

INLET AREA MAPS



WILSON AVENUE
(60' ROW WIDTH PER TAX MAP)
N.J.S.H. ROUTE 22
(100' ROW WIDTH PER TAX MAP)
INLET AREA #1
INLET AREA #2
INLET AREA #3
INLET AREA #4
INLET AREA #5
INLET AREA #6
INLET AREA #11
INLET AREA #12
INLET AREA #13
INLET AREA #14
ROOF 1
ROOF 2
ROOF 3
ROOF 4
ROOF 5
ROOF 6
PROP. UNDERGROUND R-TANK BASIN 'A' (31.50'x73.00' SYSTEM FOOTPRINT) (35.50'x77.00' EXCAVATION FOOTPRINT) 746 HD/LD DOUBLE & MINI UNITS BASIN INV: 112.00 STONE INV: 111.50
PROP. UNDERGROUND R-TANK BASIN 'B' (24.94'x37.81' SYSTEM FOOTPRINT) (28.94'x41.81' EXCAVATION FOOTPRINT) 305 HD/LD DOUBLE & MINI UNITS BASIN INV: 112.00 STONE INV: 111.50
PROP. PERVIOUS PAVEMENT SYSTEM WITH UNDERGROUND STORAGE (TYP.)
PROP. 8" HDPE ROOF LEADER @ 0.50% SL. (TYP.)
GRAPHIC SCALE
(IN FEET)
1 INCH = 30 FT.
THIS PLAN SET IS FOR PERMITTING PURPOSES ONLY AND MAY NOT BE USED FOR CONSTRUCTION
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LAND DEVELOPMENT CONSULTING • PERMITTING • GEOTECHNICAL • ENVIRONMENTAL • SURVEY • PLANNING & ZONING
1904 Main Street
Lake Como, NJ 07719
T. 732.974.0198
F. 732.974.3521
TITLE:
INLET AREA MAP
PROJECT: INSITE DEVELOPMENT PARTNERS, LLC
PROPOSED 3-STORY SELF STORAGE FACILITY
BLOCK 119.00, LOT 1.01
US ROUTE 22 & WILSON AVENUE
BOROUGH OF NORTH PLAINFIELD, SOMERSET COUNTY, NEW JERSEY
JOB No: 3041-99-010
DATE: 10/18/2021
DRAWN BY: GMC
DESIGNED BY: LPG
CHECKED BY: TJM
CHECKED BY: -
SCALE: (H) 1"=30' (V)
SHEET No:
Rev. # 0
THOMAS J. MULLER
PROFESSIONAL ENGINEER
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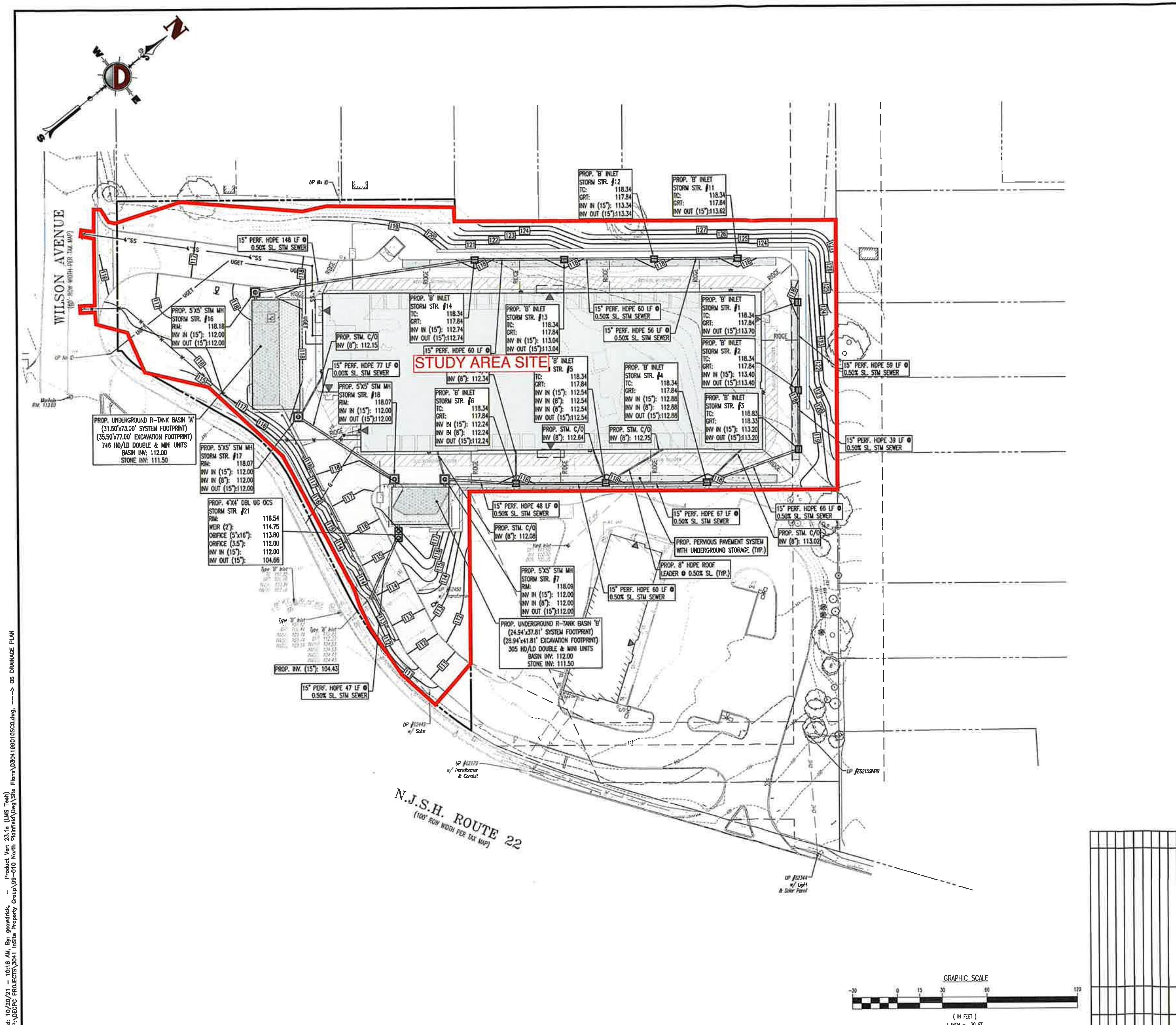
DRAINAGE AREA MAPS



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T. 732.974.0198
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www.dynamicec.com

TITLE: EXISTING DRAINAGE AREA MAP

PROJECT: INSITE DEVELOPMENT PARTNERS, LLC
PROPOSED 3-STORY SELF STORAGE FACILITY
BLOCK 119.00, LOT 1.01
US ROUTE 22 & WILSON AVENUE
BOROUGH OF NORTH PLAINFIELD, SOMERSET COUNTY, NEW JERSEY

JOB No:	3041-99-010
DATE:	10/18/2021
DRAWN BY:	GMC
DESIGNED BY:	LPG
CHECKED BY:	TJM
CHECKED BY:	-
SCALE: (H)	1"=30'
SHEET No:	
Rev.	0

THOMAS J. MULLER
PROFESSIONAL ENGINEER
NEW JERSEY LICENSE No. 53179

JOHN A. PALUS
PROFESSIONAL ENGINEER
NEW JERSEY LICENSE No. 41975

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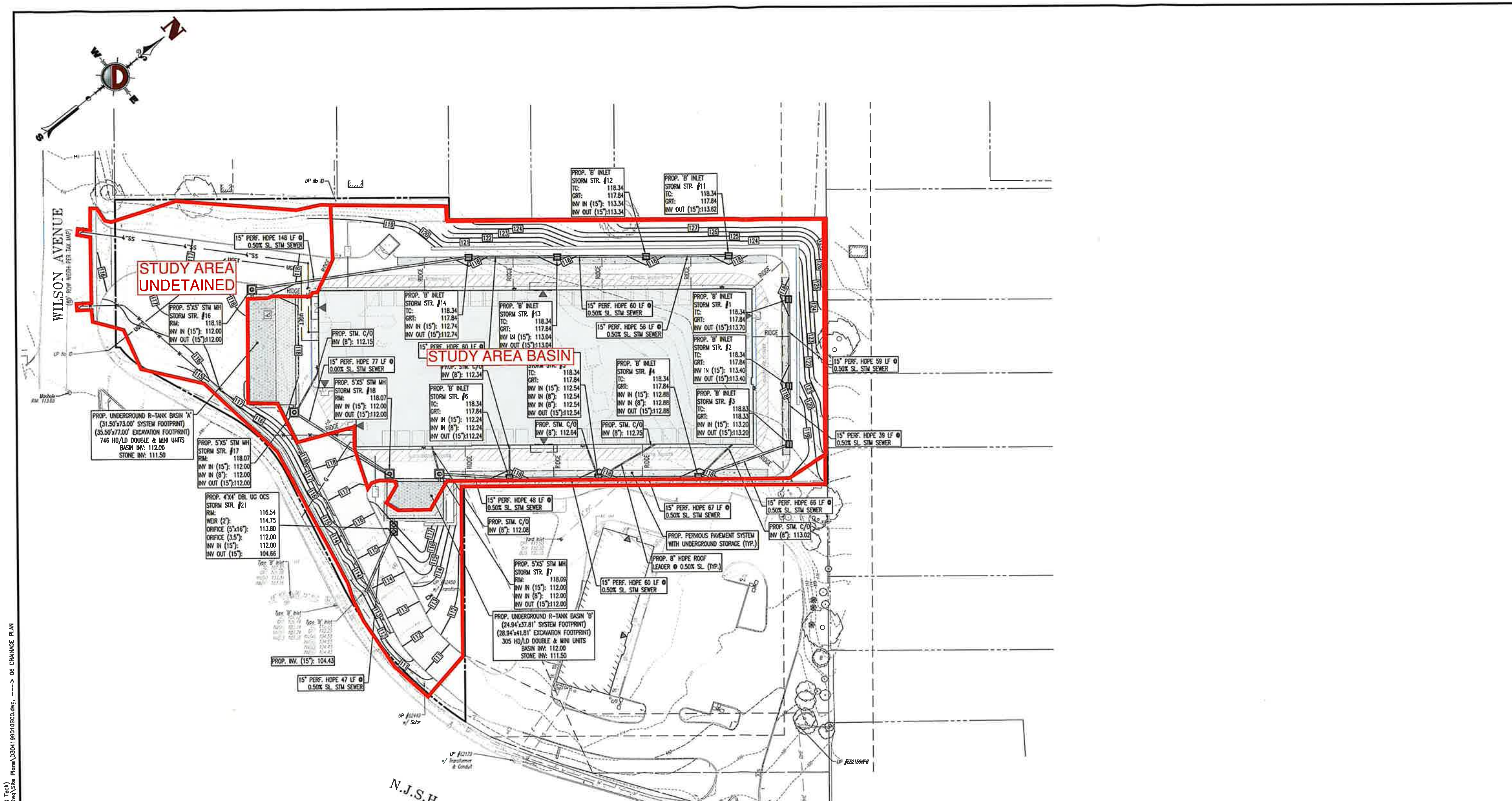

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