

STORMWATER MANAGEMENT REPORT

For

**Penn Medicine Princeton Health
Cancer Center and Imaging Center**

Block 1701, Lot 3.01

Township of Plainsboro

Middlesex County, New Jersey



Prepared For:

Princeton HealthCare System
A New Jersey Nonprofit Corporation
d/b/a Penn Medicine Princeton Health
1 Plainsboro Road
Plainsboro, NJ 08536

Andrew L. French
Professional Engineer, NJ License No # 42894

July 31, 2024 | FPA No. 06C028T.003
Last Revised October 18, 2024
1800 Route 34, Suite 101, Wall Township, NJ 07719

TABLE OF CONTENTS

1.0	INTRODUCTION	1
2.0	BASIS OF ENGINEERING ANALYSIS	1
3.0	EXISTING CONDITIONS	2
4.0	PROPOSED CONDITIONS	4
5.0	COMPLIANCE.....	4
5.1	Groundwater Recharge.....	4
5.2	Water Quality.....	5
5.3	Water Quantity	5
5.4	Delaware and Raritan Canal Commission	7
5.5	Soil Erosion and Sediment Control	7
6.0	CONCLUSION.....	8

Appendix A

Supporting Documents

- NRCS Soils Map
- NJ 24 Hour Rainfall Frequency Data
- Subsurface Testing Location Map
- Soil Logs
- Percolation Tests

Appendix B

Present Conditions Runoff Calculations

- Time of Concentration Calculations
- Existing Condition Runoff Calculations – Total
- Existing Condition Runoff Calculations – Reduction Areas

TABLE OF CONTENTS

Appendix C

Proposed Conditions Calculations

- Proposed Conditions Runoff Calculations
- Storm Sewer Sizing Calculations
- 100-year HGL
- Scour Hole Calculations
- Culvert Calculations

Appendix D

Delaware and Raritan Canal Commission

- Nonstructural Stormwater Strategies Point System (NSPS) worksheet

Appendix E

Drainage Area Maps

1.0 INTRODUCTION

The applicant/owner Princeton Healthcare System, a New Jersey nonprofit corporation, d/b/a Penn Medicine Princeton Health, is proposing to construct a new Cancer Center and Imaging Center (CCIC) on the hospital site known as Block 1701, Lot 3.01 in Plainsboro, New Jersey. The project proposes the construction of a new four (4) story CCIC and other site improvements, such as sidewalks, landscaping, lighting, and stormwater management facilities.

This report contains the stormwater management calculations demonstrating compliance with the requirements of the Stormwater Management Rules at N.J.A.C. 7:8 for the proposed CCIC on Lot 3.01 in the Township of Plainsboro, Middlesex County, New Jersey.

2.0 BASIS OF ENGINEERING ANALYSIS

The stormwater management systems, including collection and conveyance structures, groundwater recharge, water quality, and detention measures (BMP'S) have been designed in accordance with the provisions outlined in N.J.A.C. 7:8 New Jersey Stormwater Management Rules and the Plainsboro Township Stormwater Management Ordinance. The New Jersey Best Management Practices Manual dated April 2004 and last updated March 2021 was used for technical guidance to comply with the above regulations.

The soils map located in Appendix A, published by Natural Resources Conservation Service Web Soil Survey, National Cooperative Soil Survey, was used to obtain the required soil information for the project, including soil types and hydrologic soil groups. A subsurface soil assessment was performed to obtain site specific information to determine the seasonal high water table and on-site soil permeability conditions; see Appendix A for supporting documentation.

The calculation of the stormwater runoff rates and volumes were performed utilizing the procedures outlined in the New Jersey Best Management Practices Manual. The PondPack Connect Edition Update 2 Computer Program developed by the Haested Methods was used to generate the runoff hydrographs and hydrologic model for project site. Peak discharges, run-off volumes, and hydrographs were computed for the current 2, 10, 25, and 100-year storm events, and projected year 2100 2, 10, and 100-year storm events utilizing the USDA Natural Resources Conservation Service (NRCS) methodology, as found in the NRCS National Engineering Handbook, Part 630-Hydrology. The NOAA Type D, 24-hour rainfall distribution, and 24-hour rainfall frequency data for Middlesex County, New Jersey published in August 2012 by NRCS were used in the computations. Runoff calculations and precipitation losses were calculated using the NRCS Curve Numbers (CNs), based upon the present and proposed watershed conditions. Times of Concentration (TC) were based upon estimates of overland, shallow concentrated, and open channel flow utilizing methods presented in Chapter 15 of the NEH, Part 630-Hydrology.

The rainfall distribution for the NJDEP Water Quality Design Storm (1.25 inches of rain falling nonuniformly in a 2-hour storm event), as shown on Table 5-2 of the New Jersey Stormwater Best Management Practices Manual was used to compute the peak runoff rate and runoff volume for this storm.

3.0 EXISTING CONDITIONS

The subject property consists of 49.42 acres and is located in the Township of Plainsboro, Middlesex County, New Jersey. The property is known as Block 1701, Lot 3.01. The site currently contains a hospital and parking lots. The property fronts on Plainsboro Rd to the south. Existing parking lots are adjacent to the property across Hospital Drive to the north. Stormwater currently drains to an existing wet pond to the south of the site. The wetpond was designed under the previous stormwater rules to manage the stormwater runoff quantity reductions for the maximum development of the hospital property. Stormwater drains from the proposed CCIC through a pipe network to the wet pond.

The existing conditions were previously approved for reductions in peak runoff rates in accordance with N.J.A.C. 7:8 New Jersey Stormwater Management Rules. The proposed development increases the impervious area. The required peak runoff reductions were applied for the increase in impervious area. The total existing peak runoff is presented in Table 3.1 Column B. The portion of peak runoff to be reduced is the existing peak runoff from the proposed building footprint and presented in Table 3.1 Column C. The Reduction required (Column D) is only applied to the portion of peak runoff from the area of the proposed building (Column C).

The following table summarizes the existing conditions, peak runoff rates and establishes the allowable proposed conditions peak runoff rates in accordance with N.J.A.C. 7:8 New Jersey Stormwater Management Rules. The formula describes how the allowable peak runoff rates were calculated to incorporate areas with and without required reductions. Detailed calculations are presented in Appendix B of this report.

$$F = E + \sqrt{C * D}$$

Summary of Present Conditions Peak Runoff Rates Present Rainfall

Summary of Present Conditions Peak Runoff Rates 2100 Rainfall					
A	B	C	D	E	F
Storm Frequency	Total Existing Peak Runoff (cfs)	Portion of Peak Runoff to be Reduced	Required Reduction	Portion of Peak runoff with no required reduction	Allowable Proposed Conditions Runoff (cfs)
2-Year	14.69	0.35	0.50	14.69-0.35=14.34	14.34+(0.5*0.35) = 14.52
10-Year	24.27	0.74	0.75	24.27-0.74=23.53	23.53+(0.75*0.74) = 24.09
100-Year	48.11	1.75	0.80	48.11-1.75=46.36	46.36+(0.8*1.75) = 47.76

Summary of Present Conditions Peak Runoff Rates 2100 Rainfall

4.0 PROPOSED CONDITIONS

The applicant is proposing to construct a new CCIC and Parking Garage. Both the new CCIC and Parking Garage are located on Block 1701, Lot 3.01 in Plainsboro, New Jersey. The CCIC project proposes the construction of a new four (4) story building with other site improvements, such as sidewalks, landscaping, lighting, and stormwater management facilities. The CCIC results in an increased demand for parking; therefore, both the CCIC and Parking Garage are considered as one project. Two reports have been provided to simplify the design and calculations. Please see the approved "Stormwater Management Report for Penn Medicine Princeton Health Cancer Center Parking Garage" prepared by French and Parello Associates, dated April 14, 2023, last revised December 2023 for more information regarding the Parking Garage portion of the project.

The existing impervious cover on the Hospital (HMOC) site is 56.21% or 27.78 acres. The proposed CCIC and parking garage project will result in a total impervious cover of 57.36% or 28.35 acres. There is an increase of 0.561 acres in impervious cover. This increase consists of 0.461 acres of impervious for the garage and 0.100 acres of impervious for the CCIC.

However, for the overall project there is a decrease in motor vehicle surfaces, which are generating total suspended solids, because much of the existing parking lot will be converted to building. The CCIC project results in an increase of impervious surface of 4,347 sf, which includes the built out condition for the land bank parking spaces. The decrease in motor vehicle surface for the CCIC project is 26,973 sf. The proposed CCIC and Parking Garage shall result in an increase of total impervious of 24,455 sf. However, there will be a decrease in motor vehicle surface of 7,393 sf for the overall project.

The proposed stormwater management facilities for the CCIC consist of a bioretention system to manage the water quantity aspect of the rules. Although there is only an increase of 0.100 acres of impervious for the CCIC, the calculations for required reductions and the system was designed for an assumed increase of 0.22 acres of impervious to account for any changes that may take place based on township comments and/or during the resolution compliance process.

5.0 COMPLIANCE

5.1 Groundwater Recharge

N.J.A.C. 7:8 New Jersey Stormwater Management Rules requires that the proposed project maintain the present conditions average annual groundwater recharge volume for the project site. The property is currently used as a grassed area and a parking lot.

The results of the soil logs were consistent with the subsurface soil conditions at the Parking Garage and the surrounding properties within the Redevelopment area, which included mostly silty clay loam. Based on the soil logs, the seasonal high water table was not encountered in any of the soil excavations, which is consistent with the findings of the subsurface soil conditions performed for the Parking Garage

located at the north side of the property. Also, on-site percolation testing was performed at locations as shown in Appendix A. Testing was performed at depths from 6" to 14" below the surface and all percolation testing failed during the pre-soak where the water elevation either did not drop at all or insignificantly after 1 hour. The on-site percolation testing results indicated that the existing surface soil conditions do not provide any infiltration of stormwater runoff into the groundwater. Therefore, the annual pre-construction groundwater recharge is zero and the requirement for post-construction recharge would be the same. Since there is no groundwater recharge under the existing conditions, the project meets the recharge requirements of N.J.A.C. 7:8 New Jersey Stormwater Management Rules or a waiver is hereby requested. Soil Logs and on-site percolation testing results are included in Appendix A of this report.

5.2 Water Quality

Since there is a decrease in motor vehicle surface area, water quality treatment is not required as per NJAC 7:8-5.5(a):

This section contains the minimum design and performance standards to control stormwater runoff quality impacts of major development. Stormwater runoff quality standards are applicable when the major development results in an increase of one quarter acre or more of regulated motor vehicle surface.

5.3 Water Quantity

The governing regulations require that the proposed peak runoff rates for the 2-year, 10-year, and 100-year storm events from the proposed development be reduced to 50, 75, and 80 percent, respectively, of the projects present conditions peak runoff rates for the same storms. The proposed stormwater management facilities consist of a rain garden which takes roof runoff from the proposed cancer center.

The proposed small-scale bioretention system (rain gardens) are approved Green Infrastructure BMPs that have been designed to meet the peak runoff reductions of N.J.A.C. 7:8 New Jersey Stormwater Management Rules. The basin routing summary and the overall peak runoff rate reductions for the site are shown in the following tables:

Table 5.1

Rain Garden Routing Summary Present Rainfall			
Storm Frequency	Peak Inflow (cfs)	Peak Outflow (cfs)	Maximum Water Surface Elevation (ft)
2-Year Storm	1.92	1.28	81.91
10-Year Storm	3.15	1.96	82.33
25-Year Storm	3.96	2.59	82.55
100-Year Storm	5.70	3.93	82.91

Table 5.2

Comparison of Present Conditions vs. Proposed Conditions Peak Runoff Rates POA-A Present Rainfall			
Storm Frequency	Maximum Allowable Proposed Conditions Peak Runoff Rate (From Table 3.1) (cfs)	Estimated Proposed Conditions Peak Runoff Rate (cfs)	
2-Year Storm	11.89	11.85	OK
10-Year Storm	19.61	19.30	OK
25-Year Storm	24.98	24.53	OK
100-Year Storm	36.08	35.84	OK

Table 5.3

Rain Garden Storage Routing Summary 2100 Rainfall			
Storm Frequency	Peak Inflow (cfs)	Peak Outflow (cfs)	Maximum Water Surface Elevation (ft)
2-Year Storm	2.35	1.44	82.07
10-Year Storm	3.85	2.51	82.52
100-Year Storm	7.50	5.26	83.22

Table 5.4

Comparison of Present Conditions vs. Proposed Conditions Peak Runoff Rates POA-A 2100 Rainfall			
Storm Frequency	Maximum Allowable Proposed Conditions Peak Runoff Rate (From Table 3.1) (cfs)	Estimated Proposed Conditions Peak Runoff Rate (cfs)	
2-Year Storm	14.52	14.37	OK
10-Year Storm	24.09	23.82	OK
100-Year Storm	47.76	47.51	OK

Detailed computations are presented in Appendix D of this report.

5.4 Delaware and Raritan Canal Commission

This project is located within the Delaware and Raritan Canal Commission (DRCC) jurisdiction area. It is located in Review Zone B. The DRCC regulations, NJAC 7:45-8.5, have the same requirements as N.J.A.C. 7:8 for water quantity and recharge. For water quality, N.J.A.C. 7:45-8.5 requires that the post-construction load of total suspended solids (TSS) in stormwater runoff generated from the water quality design storm be reduced by 80% of the anticipated load from the developed site, expressed as an annual average. This requirement differs from N.J.A.C. 7:8 in that the 80% TSS reduction is applicable to the impervious for the development, not just the increase in motor vehicle surfaces. The increase in total impervious area for the Cancer Center is 0.100 ac. However, the DRCC regulations allow the use of the wet pond for stormwater management for both the volume and water quality. The wet pond was designed to treat and reduce the runoff from the maximum site development of 60%. The proposed impervious with both the Cancer Center and Parking Garage is 57.36%. Therefore, water quantity reductions and water quality treatment requirements are met by the existing wet pond.

The DRCC requires that the nonstructural stormwater management strategies be incorporated into the site design. A Nonstructural Stormwater Strategies Point System (NSPS) worksheet can be provided to demonstrate compliance. The NSPS worksheet can be found in Appendix D.

5.5 Soil Erosion and Sediment Control

The discharge pipe to the interconnected, bioretention basins was designed with a scour hole. The bottom of both basins will be lined with Delaware River rock to address erosion for the two interconnected pipes. The basin will discharge through an outlet control structure and connect to the existing stormwater system with a pipe. Ultimately the project area will discharge into the existing wet

pond to the south. The existing system discharges to the wet pond via a pipes that outfall into a riprap apron. Therefore, per The Standards for Soil Erosion and Sediment Control in New Jersey, 7th Edition, January 2014, Revised July 2017; Chapter 21: Standard for Off-Site Stability, off-site stability conditions are stable due to the stormwater discharging into a stable conveyance pipe.

6.0 CONCLUSION

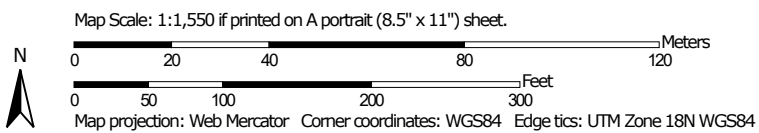
The proposed CCIC on Lot 3.01 has been designed with a rain garden to comply with the Township Stormwater Management requirements, which for this project include stormwater quantity reductions only using Green Infrastructure (GI) elements.

Based upon the calculations present in this report, the proposed stormwater management system meets the requirements of the N.J.A.C. 7:8 - New Jersey Stormwater Management Rules, the Plainsboro Township Stormwater Management Ordinance and the DRCC.



Appendix A **Supporting Documents**

Hydrologic Soil Group—Middlesex County, New Jersey (CancerCenterLOD)



**Natural Resources
Conservation Service**

Web Soil Survey
National Cooperative Soil Survey

7/8/2024
Page 1 of 4

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: Middlesex County, New Jersey
Survey Area Data: Version 19, Aug 29, 2023

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

Date(s) aerial images were photographed: Jun 4, 2022—Jul 22, 2022

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
NknB	Nixon loam, 2 to 5 percent slopes	B	3.3	69.0%
NkrA	Nixon moderately well drained variant loam, 0 to 2 percent slopes	C	1.5	31.0%
Totals for Area of Interest			4.7	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

NEW JERSEY 24 HOUR RAINFALL FREQUENCY DATA

Rainfall amounts in Inches

County	1 year	2 year	5 year	10 year	25 year	50 year	100 year
Atlantic	2.72	3.31	4.30	5.16	6.46	7.61	8.90
Bergen	2.75	3.34	4.27	5.07	6.28	7.32	8.47
Burlington	2.77	3.36	4.34	5.18	6.45	7.56	8.81
Camden	2.73	3.31	4.25	5.06	6.28	7.34	8.52
Cape May	2.67	3.25	4.22	5.07	6.34	7.47	8.73
Cumberland	2.69	3.27	4.25	5.09	6.37	7.49	8.76
Essex	2.85	3.44	4.40	5.22	6.44	7.49	8.66
Gloucester	2.71	3.29	4.24	5.05	6.29	7.36	8.55
Hudson	2.73	3.31	4.23	5.02	6.19	7.20	8.31
Hunterdon	2.80	3.38	4.26	5.00	6.09	7.02	8.03
Mercer	2.74	3.31	4.23	5.01	6.19	7.20	8.33
Middlesex	2.76	3.35	4.30	5.12	6.36	7.43	8.63
Monmouth	2.79	3.38	4.38	5.23	6.53	7.66	8.94
Morris	2.94	3.54	4.47	5.24	6.37	7.32	8.35
Ocean	2.81	3.42	4.45	5.33	6.68	7.87	9.20
Passaic	2.87	3.47	4.42	5.23	6.43	7.47	8.62
Salem	2.69	3.26	4.20	5.00	6.22	7.28	8.45
Somerset	2.76	3.34	4.25	5.01	6.15	7.13	8.21
Sussex	2.68	3.22	4.02	4.70	5.72	6.60	7.58
Union	2.80	3.39	4.35	5.17	6.42	7.49	8.69
Warren	2.78	3.34	4.18	4.89	5.93	6.83	7.82

Notes: The average point rainfall amounts listed above were developed from data contained in NOAA Atlas 14 Volume 2.

Point rainfall estimates for specific locations may be obtained from the Precipitation Frequency Data Server located at <http://www.nws.noaa.gov/ohd/hdsc/>

For most hydrologic design procedures, the rainfall amounts listed above may be rounded to the nearest tenth of an inch.

Present Rainfall Factors

2 year= 1.00

10 year = 1.01

100 year = 1.03

Present Rainfall Totals Used

2 year= 1.00*3.35 = 3.35

10 year = 1.01*5.12= 5.17

100 year = 1.03*8.63=8.89

2100 Rainfall Factors

2 year = 1.19

10 year = 1.21

100 year = 1.33

2100 Rainfall Factors

2 year = 1.19*3.35= 3.99

10 year = 1.21*5.12= 6.20

100 year = 1.33*8.63=11.48

TEST BORING LOG

**PENN MEDICINE CANCER CENTER PROJECT
TOWNSHIP OF PLAINSBORO, MIDDLESEX COUNTY, NEW JERSEY
FPA NO. 06C028T.003**

BORING NO.: B-33
SHEET 1 OF 1

DATE STARTED: 4/12/2024
DATE FINISHED: 4/12/2024

DEPTH OF WATER: Dry
LOCATION: See Plan

GROUND ELEVATION: +87'±
GROUND WATER ELEV.: N/A

DRILLING TECHNIQUE: Mud Rotary

HAMMER TYPE: 140 lb. Automatic Trip Hammer, 30 Inch Drop

DEPTH FEET	SAMPLE DEPTH	SPT BLOW COUNTS (PER 6")	STRATA	DESCRIPTION OF SOIL	
--- 5' ---	S-1 0-2'	X – 9 – 6 – 3		S-1	TOP 6": Asphalt . MID 4": Grey cmf GRAVEL , little mf Sand, little Silt.
	S-2 2-4'	11 – 8 – 9 – 9			BOT 14": Dark Grey Clayey SILT , little mf+ Sand, trace f Gravel.
	S-3 4-6'	3 – 4 – 6 – 8		S-2	Red-Brown Clayey SILT , trace f Sand.
	S-4 6-8'	9 – 9 – 45 – 50/3"		S-3	TOP 5": Dark Grey cm+f SAND , little Silt, trace cmf Gravel.
	S-5 8-10'	11 – 27 – 100/4" – X			BOT 19": Red-Brown Clayey SILT , little f Gravel, trace f Sand.
---10' ---				S-4	Red-Brown Clayey SILT , little cmf Gravel, trace f Sand.
				S-5	Yellow-Brown f+ SAND , little cmf Gravel, trace Clayey Silt. (completely weathered Sandstone)
---15' ---	RUN-1 10-15'	REC.: 53% RQD: 20%		RUN-1	Yellow-Brown moderately weathered SANDSTONE .
				END OF BORING @ 15'	
---20' ---					
---25' ---					
---30' ---					
---35' ---					

SOILS ENGINEER: R. KNOTZ, PE
DRILLING INSPECTOR: S. SAINTILMA

CONTRACTOR: CRAIG TEST BORING
DRILLER: M. TARTER

The information shown hereon indicates the subsurface conditions encountered at the specific boring location on the date(s) of drilling. Subsurface conditions are likely to vary across the project site. Interpretation of the subsurface data shall be at the discretion of the user.



TEST BORING LOG

PENN MEDICINE CANCER CENTER PROJECT
TOWNSHIP OF PLAINSBORO, MIDDLESEX COUNTY, NEW JERSEY
FPA NO. 06C028T.003

BORING NO.: B-34
SHEET 1 OF 1

DATE STARTED: 4/15/2024
DATE FINISHED: 4/15/2024

DEPTH OF WATER: Dry
LOCATION: See Plan

GROUND ELEVATION: +87.5'±
GROUND WATER ELEV.: N/A

DRILLING TECHNIQUE: Mud Rotary
HAMMER TYPE: 140 lb. Automatic Trip Hammer, 30 Inch Drop

DEPTH FEET	SAMPLE DEPTH	SPT BLOW COUNTS (PER 6")	STRATA	DESCRIPTION OF SOIL
--- 5' ---	S-1 0-2'	X - 14 - 6 - 8		S-1 TOP 6": Asphalt . BOT 18": Brown cm ^f SAND , little Silt, trace mf Gravel.
	S-2 2-4'	12 - 7 - 8 - 9		S-2 Tan-brown mf SAND , little Silt.
	S-3 4-6'	4 - 5 - 6 - 6		S-3 Same as S-2 .
	S-4 6-8'	8 - 6 - 12 - 18		S-4 Same as S-2 .
	S-5 8-10'	6 - 9 - 16 - 18		S-5 Tan-Brown mf SAND , trace Clayey Silt.
	S-6 10-12'	24 - 30 - 22 - 25		S-6 Brown cmf SAND , little Silt, trace mf Gravel.
---15'---	S-7 15-17'	31 - 50 - 46 - 60		S-7 Red-Brown Clayey SILT , little f Sand, trace f Gravel. (completely weathered Shale)
---20'---	S-8 20-22'	17 - 30 - 34 - 45		S-8 Same as S-7 .
---25'---				END OF BORING @ 22'
---30'---				
---35'---				

SOILS ENGINEER: R. KNOTZ, PE
DRILLING INSPECTOR: S. SAINTILMA

CONTRACTOR: CRAIG TEST BORING
DRILLER: M. TARTER

The information shown hereon indicates the subsurface conditions encountered at the specific boring location on the date(s) of drilling. Subsurface conditions are likely to vary across the project site. Interpretation of the subsurface data shall be at the discretion of the user.

TEST BORING LOG

**PENN MEDICINE CANCER CENTER PROJECT
TOWNSHIP OF PLAINSBORO, MIDDLESEX COUNTY, NEW JERSEY
FPA NO. 06C028T.003**

BORING NO.: B-35
SHEET 1 OF 1

DATE STARTED: 4/12/2024
DATE FINISHED: 4/12/2024

DEPTH OF WATER: Dry
LOCATION: See Plan

GROUND ELEVATION: +85'±
GROUND WATER ELEV.: N/A

DRILLING TECHNIQUE: Mud Rotary

HAMMER TYPE: 140 lb. Automatic Trip Hammer, 30 Inch Drop

DEPTH FEET	SAMPLE DEPTH	SPT BLOW COUNTS (PER 6")	STRATA	DESCRIPTION OF SOIL	
--- 5' ---	S-1 0-2'	X – 9 – 9 – 7		S-1	TOP 6": Asphalt . MID 4": Grey cmf GRAVEL , little mf Sand, little Silt. BOT 14": Red-Brown Clayey SILT , little f Sand, trace f Gravel.
	S-2 2-4'	9 – 7 – 13 – 169		S-2	Same a S-1, BOT 14" .
	S-3 4-6'	7 – 24 – 38 – 25		S-3	Red-Brown Clayey SILT , some mf Gravel, trace f Sand.
	S-4 6-8'	50 – 95 – 50/3" – X		S-4	Same as S-3 .
	S-5 8-10'	82 – 50/3" – X – X		S-5	Red-Brown Clayey SILT , and cmf+ GRAVEL , trace f Sand. (completely weathered Shale)
	S-6 10-12'	150/3" – X – X – X		S-6	Same as S-5 .
---15' ---	RUN-1 11-16'	REC.: 67% RQD: 40%		RUN-1	Red-Brown moderately weathered SHALE .
---20' ---				END OF BORING @ 16'	
---25' ---					
---30' ---					
---35' ---					

SOILS ENGINEER: R. KNOTZ, PE
DRILLING INSPECTOR: S. SAINTILMA

CONTRACTOR: CRAIG TEST BORING
DRILLER: M. TARTER

The information shown hereon indicates the subsurface conditions encountered at the specific boring location on the date(s) of drilling. Subsurface conditions are likely to vary across the project site. Interpretation of the subsurface data shall be at the discretion of the user.



TEST BORING LOG

PENN MEDICINE CANCER CENTER PROJECT
TOWNSHIP OF PLAINSBORO, MIDDLESEX COUNTY, NEW JERSEY
FPA NO. 06C028T.003

BORING NO.: B-36
SHEET 1 OF 1

DATE STARTED: 4/15/2024
DATE FINISHED: 4/15/2024

DEPTH OF WATER: Dry
LOCATION: See Plan

GROUND ELEVATION: +85'±
GROUND WATER ELEV.: N/A

DRILLING TECHNIQUE: Mud Rotary
HAMMER TYPE: 140 lb. Automatic Trip Hammer, 30 Inch Drop

DEPTH FEET	SAMPLE DEPTH	SPT BLOW COUNTS (PER 6")	STRATA	DESCRIPTION OF SOIL
--- 5' ---	S-1 0-2'	2 – 8 – 10 – 18		S-1 Red-Brown & Tan-Brown mf+ SAND , little Clayey Silt, trace f Gavel.
	S-2 2-4'	10 – 18 – 44 – 50		S-2 Brown mf+ SAND , little cmf Gravel, trace Clayey Silt.
	S-3 4-6'	14 – 9 – 5 – 8		S-3 Brown mf+ SAND , little Clayey Silt, trace cmf Gravel.
	S-4 6-8'	8 – 6 – 8 – 19		S-4 Same as S-3 .
	S-5 8-10'	25 – 100 – X – X		S-5 Brown mf+ SAND , little+ Clayey Silt, trace f Gravel.
---10'---				
---15'---	RUN-1 9-14'	REC.: 70% RQD: 17%		RUN-1 Yellow-Brown moderately weathered SANDSTONE . (w/ veins of Red-Brown Shale)
				END OF BORING @ 14'
---20'---				
---25'---				
---30'---				
---35'---				

SOILS ENGINEER: R. KNOTZ, PE
DRILLING INSPECTOR: S. SAINTILMA

CONTRACTOR: CRAIG TEST BORING
DRILLER: M. TARTER

The information shown hereon indicates the subsurface conditions encountered at the specific boring location on the date(s) of drilling. Subsurface conditions are likely to vary across the project site. Interpretation of the subsurface data shall be at the discretion of the user.



TEST BORING LOG

PENN MEDICINE CANCER CENTER PROJECT
TOWNSHIP OF PLAINSBORO, MIDDLESEX COUNTY, NEW JERSEY
FPA NO. 06C028T.003

BORING NO.: B-37
SHEET 1 OF 1

DATE STARTED: 4/12/2024
DATE FINISHED: 4/12/2024

DEPTH OF WATER: Dry
LOCATION: See Plan

GROUND ELEVATION: +86'±
GROUND WATER ELEV.: N/A

DRILLING TECHNIQUE: Mud Rotary
HAMMER TYPE: 140 lb. Automatic Trip Hammer, 30 Inch Drop

DEPTH FEET	SAMPLE DEPTH	SPT BLOW COUNTS (PER 6")	STRATA	DESCRIPTION OF SOIL
--- 5' ---	S-1 0-2'	X - 8 - 7 - 6		S-1 TOP 6": Asphalt . MID 4": Grey cmf GRAVEL , little mf Sand, little Silt. BOT 14": Tan mf SAND , little Silt.
	S-2 2-4'	3 - 3 - 5 - 6		S-2 Tan mf SAND , little Silt.
	S-3 4-6'	3 - 6 - 6 - 6		S-3 Same as S-2 .
	S-4 6-8'	8 - 15 - 16 - 22		S-4 Same as S-2 .
	S-5 8-10'	13 - 12 - 10 - 10		S-5 TOP 20": Same as S-2 . BOT 4": Red-Brown Clayey SILT , trace f Sand.
--- 10' ---	S-6 10-12'	9 - 12 - 12 - 13		S-6 Same as S-5, BOT 4" .
--- 15' ---	S-7 15-17'	16 - 30 - 49 - 50		S-7 Red-Brown Clayey SILT , little mf Gravel, trace f Sand. (completely weathered Shale)
--- 20' ---	S-8 20-22'	12 - 13 - 50/4" - X		S-8 Same as S-7 .
--- 25' ---				END OF BORING @ 21.3'
--- 30' ---				
--- 35' ---				

SOILS ENGINEER: R. KNOTZ, PE
DRILLING INSPECTOR: S. SAINTILMA

CONTRACTOR: CRAIG TEST BORING
DRILLER: M. TARTER

The information shown hereon indicates the subsurface conditions encountered at the specific boring location on the date(s) of drilling. Subsurface conditions are likely to vary across the project site. Interpretation of the subsurface data shall be at the discretion of the user.



TEST BORING LOG

PENN MEDICINE CANCER CENTER PROJECT
TOWNSHIP OF PLAINSBORO, MIDDLESEX COUNTY, NEW JERSEY
FPA NO. 06C028T.003

BORING NO.: B-38
SHEET 1 OF 1

DATE STARTED: 4/15/2024
DATE FINISHED: 4/15/2024

DEPTH OF WATER: Dry
LOCATION: See Plan

GROUND ELEVATION: +85'±
GROUND WATER ELEV.: N/A

DRILLING TECHNIQUE: Mud Rotary
HAMMER TYPE: 140 lb. Automatic Trip Hammer, 30 Inch Drop

DEPTH FEET	SAMPLE DEPTH	SPT BLOW COUNTS (PER 6")	STRATA	DESCRIPTION OF SOIL
--- 5' ---	S-1 0-2'	2 – 10 – 20 – 63		S-1 TOP 12": Red-Brown f+ SAND , some Clayey Silt, trace f Gravel.
	S-2 2-4'	42 – 82 – 95 – 50/3"		BOT 12": Brown mf+ SAND , little Silt, trace f Gravel.
	S-3 4-6'	37 – 40 – 30 – 16		S-2 Light Grey mf+ SAND , some cmf Gravel, little Silt.
	S-4 6-8'	14 – 17 – 85 – 100/2"		S-3 Tan-Brown m+f SAND , little Silt, trace f Gravel.
	S-5 8-10'	80/2" – X – X – X		S-4 Same as S-3 .
---10'---	RUN-1 8-13.2'	REC.: 100% RQD: 66%		S-5 Brown cm+f SAND , little Silt, trace f Gravel. (completely weathered Sandstone)
---15'---				RUN-1 Red-Brown highly weathered SANDSTONE .
---20'---				END OF BORING @ 13.2'
---25'---				
---30'---				
---35'---				

SOILS ENGINEER: R. KNOTZ, PE
DRILLING INSPECTOR: S. SAINTILMA

CONTRACTOR: CRAIG TEST BORING
DRILLER: M. TARTER

The information shown hereon indicates the subsurface conditions encountered at the specific boring location on the date(s) of drilling. Subsurface conditions are likely to vary across the project site. Interpretation of the subsurface data shall be at the discretion of the user.



TEST BORING LOG

PENN MEDICINE CANCER CENTER PROJECT
TOWNSHIP OF PLAINSBORO, MIDDLESEX COUNTY, NEW JERSEY
FPA NO. 06C028T.003

BORING NO.: B-39
SHEET 1 OF 1

DATE STARTED: 4/15/2024
DATE FINISHED: 4/15/2024

DEPTH OF WATER: Dry
LOCATION: See Plan

GROUND ELEVATION: +87.5'±
GROUND WATER ELEV.: N/A

DRILLING TECHNIQUE: Mud Rotary
HAMMER TYPE: 140 lb. Automatic Trip Hammer, 30 Inch Drop

DEPTH FEET	SAMPLE DEPTH	SPT BLOW COUNTS (PER 6")	STRATA	DESCRIPTION OF SOIL
--- 5' ---	S-1 0-2'	X - 4 - 2 - 2		S-1 TOP 6": Asphalt . BOT 18": Red-Brown mf+ SAND , some Clayey Silt, trace f Gravel.
	S-2 2-4'	7 - 5 - 7 - 8		S-2 Red-Brown Clayey SILT , little f Sand, trace Silt.
	S-3 4-6'	6 - 7 - 7 - 10		S-3 Red-Brown mf+ SAND , little Clayey Silt, trace f Gravel.
	S-4 6-8'	15 - 29 - 45 - 13		S-4 Light Tan mf+ SAND , little Silt.
	S-5 8-10'	15 - 37 - 26 - 49		S-5 Tan-Brown mf+ SAND , little Silt.
	S-6 10-12'	60 - 130 - 50/2" - X		S-6 Tan-Brown & Red-Brown m+f SAND , little Silt, little f Gravel. (completely weathered Sandstone)
--- 15' ---		Drilled Directly to 15' through weathered Sandstone.		
--- 20' ---	RUN-1 15-20'	REC.: 78% RQD: 56%		RUN-1 Yellow-Brown moderately weathered SANDSTONE .
--- 25' ---				END OF BORING @ 20'
--- 30' ---				
--- 35' ---				

SOILS ENGINEER: R. KNOTZ, PE
DRILLING INSPECTOR: S. SAINTILMA

CONTRACTOR: CRAIG TEST BORING
DRILLER: M. TARTER

The information shown hereon indicates the subsurface conditions encountered at the specific boring location on the date(s) of drilling. Subsurface conditions are likely to vary across the project site. Interpretation of the subsurface data shall be at the discretion of the user.



TEST BORING LOG

PENN MEDICINE CANCER CENTER PROJECT
TOWNSHIP OF PLAINSBORO, MIDDLESEX COUNTY, NEW JERSEY
FPA NO. 06C028T.003

BORING NO.: B-40
SHEET 1 OF 1

DATE STARTED: 4/12/2024
DATE FINISHED: 4/12/2024

DEPTH OF WATER: Dry
LOCATION: See Plan

GROUND ELEVATION: +85'±
GROUND WATER ELEV.: N/A

DRILLING TECHNIQUE: Mud Rotary
HAMMER TYPE: 140 lb. Automatic Trip Hammer, 30 Inch Drop

DEPTH FEET	SAMPLE DEPTH	SPT BLOW COUNTS (PER 6")	STRATA	DESCRIPTION OF SOIL
--- 5' ---	S-1 0-2'	X - 7 - 6 - 6		S-1 TOP 6": Asphalt . MID 4": Grey cmf GRAVEL , little mf Sand, little Silt. BOT 14": Red-Brown Clayey SILT , trace f Gravel.
	S-2 2-4'	7 - 6 - 10 - 13		S-2 Red-Brown Clayey SILT , little mf Gravel, trace f Sand.
	S-3 4-6'	10 - 13 - 12 - 16		S-3 Same as S-2 .
	S-4 6-8'	13 - 12 - 13 - 15		S-4 Same as S-2 .
	S-5 8-10'	14 - 25 - 51 - 92		S-5 Same as S-2 .
	S-6 10-12'	17 - 31 - 105 - 70/3"		S-6 Red-Brown Clayey SILT , some mf Gravel, trace f Sand. (completely weathered Shale)
--- 15' ---	S-7 15-17'	80 - 120/5" - X - X		S-7 Same as S-6 .
--- 20' ---				END OF BORING @ 17'
--- 25' ---				
--- 30' ---				
--- 35' ---				

SOILS ENGINEER: R. KNOTZ, PE
DRILLING INSPECTOR: S. SAINTILMA

CONTRACTOR: CRAIG TEST BORING
DRILLER: M. TARTER

The information shown hereon indicates the subsurface conditions encountered at the specific boring location on the date(s) of drilling. Subsurface conditions are likely to vary across the project site. Interpretation of the subsurface data shall be at the discretion of the user.



TEST BORING LOG

PENN MEDICINE CANCER CENTER PROJECT
TOWNSHIP OF PLAINSBORO, MIDDLESEX COUNTY, NEW JERSEY
FPA NO. 06C028T.003

BORING NO.: B-41
SHEET 1 OF 1

DATE STARTED: 4/12/2024
DATE FINISHED: 4/12/2024

DEPTH OF WATER: Dry
LOCATION: See Plan

GROUND ELEVATION: +88'±
GROUND WATER ELEV.: N/A

DRILLING TECHNIQUE: Mud Rotary
HAMMER TYPE: 140 lb. Automatic Trip Hammer, 30 Inch Drop

DEPTH FEET	SAMPLE DEPTH	SPT BLOW COUNTS (PER 6")	STRATA	DESCRIPTION OF SOIL
--- 5' ---	S-1 0-2'	X - 7 - 8 - 14		S-1 TOP 6": Asphalt . MID 12": Brown mf ⁺ SAND , little Silt, trace f Gravel. BOT 6": Brown Clayey SILT , trace f Sand.
	S-2 2-4'	14 - 7 - 7 - 8		S-2 Tan-Brown Clayey SILT , little f Sand, trace mf Gravel.
	S-3 4-6'	11 - 11 - 15 - 13		S-3 Light Red-Brown m ⁺ f SAND , little cmf Gravel, trace Silt.
	S-4 6-8'	8 - 5 - 8 - 9		S-4 TOP 20": Tan-Brown mf ⁺ SAND , little Clayey Silt, trace f Gravel.
	S-5 8-10'	9 - 7 - 9 - 12		S-5 BOT 4": Red-Brown Clayey SILT , trace f Sand.
	S-6 10-12'	18 - 16 - 17 - 17		S-6 Same as S-4, BOT 4" .
--- 15' ---				END OF BORING @ 12'
--- 20' ---				
--- 25' ---				
--- 30' ---				
--- 35' ---				

SOILS ENGINEER: R. KNOTZ, PE
DRILLING INSPECTOR: S. SAINTILMA

CONTRACTOR: CRAIG TEST BORING
DRILLER: M. TARTER

The information shown hereon indicates the subsurface conditions encountered at the specific boring location on the date(s) of drilling. Subsurface conditions are likely to vary across the project site. Interpretation of the subsurface data shall be at the discretion of the user.



TEST BORING LOG

PENN MEDICINE CANCER CENTER PROJECT
TOWNSHIP OF PLAINSBORO, MIDDLESEX COUNTY, NEW JERSEY
FPA NO. 06C028T.003

BORING NO.: B-42
SHEET 1 OF 1

DATE STARTED: 4/12/2024
DATE FINISHED: 4/12/2024

DEPTH OF WATER: Dry
LOCATION: See Plan

GROUND ELEVATION: +86'±
GROUND WATER ELEV.: N/A

DRILLING TECHNIQUE: Mud Rotary
HAMMER TYPE: 140 lb. Automatic Trip Hammer, 30 Inch Drop

DEPTH FEET	SAMPLE DEPTH	SPT BLOW COUNTS (PER 6")	STRATA	DESCRIPTION OF SOIL
--- 5' ---	S-1 0-2'	X - 8 - 6 - 11		S-1 TOP 6": Asphalt . BOT 18": Brown f+ SAND , some Clayey Silt, trace f Gravel.
	S-2 2-4'	14 - 9 - 10 - 12		S-2 Same as S-1 , BOT 18".
	S-3 4-6'	10 - 7 - 10 - 19		S-3 Red-Brown Clayey SILT , little f Sand, trace f Gravel.
	S-4 6-8'	27 - 19 - 24 - 70		S-4 Red-Brown Clayey SILT , little f Gravel, trace f Sand.
	S-5 8-10'	45 - 50/3" - X - X		S-5 Red-Brown cmf GRAVEL , little Clayey Silt, trace f Sand. (completely weathered Shale)
--- 10' ---				END OF BORING @ 10'
--- 15' ---				
--- 20' ---				
--- 25' ---				
--- 30' ---				
--- 35' ---				

SOILS ENGINEER: R. KNOTZ, PE
DRILLING INSPECTOR: S. SAINTILMA

CONTRACTOR: CRAIG TEST BORING
DRILLER: M. TARTER

The information shown hereon indicates the subsurface conditions encountered at the specific boring location on the date(s) of drilling. Subsurface conditions are likely to vary across the project site. Interpretation of the subsurface data shall be at the discretion of the user.



TEST BORING LOG

PENN MEDICINE CANCER CENTER PROJECT
TOWNSHIP OF PLAINSBORO, MIDDLESEX COUNTY, NEW JERSEY
FPA NO. 06C028T.003

BORING NO.: B-43
SHEET 1 OF 1

DATE STARTED: 4/16/2024
DATE FINISHED: 4/16/2024

DEPTH OF WATER: Dry
LOCATION: See Plan

GROUND ELEVATION: +84'±
GROUND WATER ELEV.: N/A

DRILLING TECHNIQUE: Mud Rotary
HAMMER TYPE: 140 lb. Automatic Trip Hammer, 30 Inch Drop

DEPTH FEET	SAMPLE DEPTH	SPT BLOW COUNTS (PER 6")	STRATA	DESCRIPTION OF SOIL
--- 5' ---	S-1 0-2'	1 - 2 - 3 - 4		S-1 Brown Clayey SILT , little f ⁺ Sand, trace f Gravel.
	S-2 2-4'	4 - 4 - 5 - 10		S-2 Tan-Brown mf ⁺ SAND , some Clayey Silt, trace f Gravel.
	S-3 4-6'	10 - 10 - 14 - 13		S-3 Tan-Brown mf ⁺ SAND , little Silt.
	S-4 6-8'	23 - 30 - 45 - 70		S-4 Light Tan mf ⁺ SAND , little Silt.
	S-5 8-10'	50 - 50 - 40 - 40		S-5 BTan-Brown cmf ⁺ SAND , little Silt.
	S-6 10-12'	95/3" - X - X - X		S-6 Same as S-5 .
---15'---				END OF BORING @ 12'
---20'---				
---25'---				
---30'---				
---35'---				

SOILS ENGINEER: R. KNOTZ, PE
DRILLING INSPECTOR: S. SAINTILMA

CONTRACTOR: CRAIG TEST BORING
DRILLER: M. TARTER

The information shown hereon indicates the subsurface conditions encountered at the specific boring location on the date(s) of drilling. Subsurface conditions are likely to vary across the project site. Interpretation of the subsurface data shall be at the discretion of the user.



TEST BORING LOG

PENN MEDICINE CANCER CENTER PROJECT
TOWNSHIP OF PLAINSBORO, MIDDLESEX COUNTY, NEW JERSEY
FPA NO. 06C028T.003

BORING NO.: B-44
SHEET 1 OF 1

DATE STARTED: 4/16/2024
DATE FINISHED: 4/16/2024

DEPTH OF WATER: Dry
LOCATION: See Plan

GROUND ELEVATION: +85'±
GROUND WATER ELEV.: N/A

DRILLING TECHNIQUE: Mud Rotary
HAMMER TYPE: 140 lb. Automatic Trip Hammer, 30 Inch Drop

DEPTH FEET	SAMPLE DEPTH	SPT BLOW COUNTS (PER 6")	STRATA	DESCRIPTION OF SOIL
--- 5' ---	S-1 0-2'	1 - 9 - 3 - 4		S-1 Brown f+ SAND , some Clayey Silt, trace f Gravel.
	S-2 2-4'	3 - 4 - 7 - 8		S-2 TOP 12": Same as S-1. BOT 12": Yellow-Brown m+f SAND , little Silt, trace f Gravel.
	S-3 4-6'	10 - 7 - 11 - 14		S-3 TOP 12": Same as S-2, BOT 12" . MID 6": Red-Brown Clayey SILT , little f Sand, trace Gravel.
	S-4 6-8'	11 - 11 - 15 - 15		BOT 6": Yellow-Brown m+f SAND , little Silt, trace f Gravel.
	S-5 8-10'	16 - 17 - 18 - 37		S-4 Red-Brown Clayey SILT , little f Sand, trace f Gravel.
	S-6 10-12'	38 - 30 - 70 - 50/3"		S-5 TOP 12": Same as S-4. BOT 12": Red-Brown & Tan cmf SAND , little cmf Gravel, trace Silt.
---10'---				S-6 Tan-Brown cmf SAND , little Silt.
---15'---				END OF BORING @ 12'
---20'---				
---25'---				
---30'---				
---35'---				

SOILS ENGINEER: R. KNOTZ, PE
DRILLING INSPECTOR: S. SAINTILMA

CONTRACTOR: CRAIG TEST BORING
DRILLER: M. TARTER

The information shown hereon indicates the subsurface conditions encountered at the specific boring location on the date(s) of drilling. Subsurface conditions are likely to vary across the project site. Interpretation of the subsurface data shall be at the discretion of the user.



TEST BORING LOG

PENN MEDICINE CANCER CENTER PROJECT
TOWNSHIP OF PLAINSBORO, MIDDLESEX COUNTY, NEW JERSEY
FPA NO. 06C028T.003

BORING NO.: B-45
SHEET 1 OF 1

DATE STARTED: 4/16/2024
DATE FINISHED: 4/16/2024

DEPTH OF WATER: Dry
LOCATION: See Plan

GROUND ELEVATION: +83'±
GROUND WATER ELEV.: N/A

DRILLING TECHNIQUE: Mud Rotary
HAMMER TYPE: 140 lb. Automatic Trip Hammer, 30 Inch Drop

DEPTH FEET	SAMPLE DEPTH	SPT BLOW COUNTS (PER 6")	STRATA	DESCRIPTION OF SOIL
--- 5' ---	S-1 0-2'	X - 5 - 3 - 10		S-1 TOP 6": Asphalt . BOT 18": Brown m ^f SAND , little Clayey Silt, trace f Gravel.
	S-2 2-4'	10 - 10 - 11 - 9		S-2 Brown f+ SAND , some Clayey Silt, trace f Gravel.
	S-3 4-6'	10 - 10 - 7 - 9		S-3 Same as S-2 .
	S-4 6-8'	11 - 9 - 10 - 7		S-4 Red-Brown m ^f SAND , little Silt.
	S-5 8-10'	12 - 12 - 13 - 16		S-5 Tan m ^f SAND , little Silt.
	S-6 10-12'	20 - 26 - 40 - 60		S-6 Same as S-5 .
---10'---				END OF BORING @ 12'
---15'---				
---20'---				
---25'---				
---30'---				
---35'---				

SOILS ENGINEER: R. KNOTZ, PE
DRILLING INSPECTOR: S. SAINTILMA

CONTRACTOR: CRAIG TEST BORING
DRILLER: M. TARTER

The information shown hereon indicates the subsurface conditions encountered at the specific boring location on the date(s) of drilling. Subsurface conditions are likely to vary across the project site. Interpretation of the subsurface data shall be at the discretion of the user.



TEST BORING LOG

PENN MEDICINE CANCER CENTER PROJECT
TOWNSHIP OF PLAINSBORO, MIDDLESEX COUNTY, NEW JERSEY
FPA NO. 06C028T.003

BORING NO.: B-46
SHEET 1 OF 1

DATE STARTED: 4/16/2024
DATE FINISHED: 4/16/2024

DEPTH OF WATER: Dry
LOCATION: See Plan

GROUND ELEVATION: +84'±
GROUND WATER ELEV.: N/A

DRILLING TECHNIQUE: Mud Rotary
HAMMER TYPE: 140 lb. Automatic Trip Hammer, 30 Inch Drop

DEPTH FEET	SAMPLE DEPTH	SPT BLOW COUNTS (PER 6")	STRATA	DESCRIPTION OF SOIL
--- 5' ---	S-1 0-2'	8 - 9 - 6 - 5		S-1 TOP 6": Asphalt . BOT 18": Red-Brown Clayey SILT , some f Sand, little f Gravel.
	S-2 2-4'	6 - 7 - 14 - 10		S-2 Same as S-1, BOT 18" .
	S-3 4-6'	8 - 9 - 8 - 9		S-3 TOP 12": Brown mft SAND , some cmf Gravel, little Clayey Silt.
	S-4 6-8'	7 - 8 - 11 - 20		BOT 12": Brown mft SAND , little Silt, trace f Gravel.
	S-5 8-10'	19 - 17 - 12 - 24		S-4 Tan mf SAND , little Silt, trace f Gravel.
	S-6 10-12'	21 - 28 - 21 - 30		S-5 Same as S-4 . S-6 Same as S-4 .
--- 15' ---				END OF BORING @ 12'
--- 20' ---				
--- 25' ---				
--- 30' ---				
--- 35' ---				

SOILS ENGINEER: R. KNOTZ, PE
DRILLING INSPECTOR: S. SAINTILMA

CONTRACTOR: CRAIG TEST BORING
DRILLER: M. TARTER

The information shown hereon indicates the subsurface conditions encountered at the specific boring location on the date(s) of drilling. Subsurface conditions are likely to vary across the project site. Interpretation of the subsurface data shall be at the discretion of the user.

COUNTY/MUNICIPALITY PLAINSBORO / TOWNSHIP OF PLAINSBORO

Percolation Test Data:

Block 1701 Lot 3.01

1. Test Number P-13 (B-41) Date Tested 7/9/2024
2. Depth 10" below grade
3. Pre-soak:
_____ Sandy Textured Soil Only, Shortened Pre-soak - Indicate Time Required
for 12 in. of Water to Drain after Second Filling, Minutes
_____ Four Hour Pre-soak completed - Indicate result:
_____ Test Hole Drained within 15 to 24 hours after Pre-soak
X Test Hole did not Drain within 24 hours after Pre-soak

Pre-Soak water elevation dropped 1/8" after 1 hour. Due to insignificant fall in water elevation, Percolation Test has failed, and soil is determined to be unsuitable for water infiltration.

4. Rate of Fall Data:
a. Time Interval Selected, Minutes
b. Record the Drop in Water Level during each time Interval to the nearest 1/10th-inch on the line below:

Depth of Water, Start of Interval (inches)	Depth of Water, End of Interval (inches)	Drop in Water Level (inches)
7"		
7"		
7"		

5. Percolation Rate:
a. Time, minutes, Required for a Six-inch Drop in the Water level
b. Percolation Rate = $a/6 = / 6 =$
6. Per NJ Stormwater Best Management Practices Manual, Appendix E Section B1(e.)

 $K = a/pm$ (in/hr) where $a = 20$ for a bottom width of 6 inches
 $K = 20/ \text{ min/in.} = \text{ in/ hr } /2 = \text{ in/hr}$ Therefore, Use
7. I hereby certify that the information furnished on Form 3d of this application is true and accurate. I am aware that falsification of data is a violation of the Water Pollution Control Act (N.J.S.A. 58:10A-1 et seq.) and is subject to penalties as prescribed in N.J.A.C. 7:14-8.

Signature of Site Evaluator _____
Robert Skinner

Date _____

Signature of Professional Engineer _____
Mark Kalusz, PE

License No. 24GE05937000

Percolation Test Data:Block 1701 Lot 3.01

1. Test Number P-14 (B-34) Date Tested 7/9/2024
2. Depth 6" below grade
3. Pre-soak:
 _____ Sandy Textured Soil Only, Shortened Pre-soak - Indicate Time Required
 for 12 in. of Water to Drain after Second Filling, Minutes
 _____ Four Hour Pre-soak completed - Indicate result:
 _____ Test Hole Drained within 15 to 24 hours after Pre-soak
 X Test Hole did not Drain within 24 hours after Pre-soak

Pre-Soak water elevation dropped 1/8" after 1 hour. Due to insignificant fall in water elevation, Percolation Test has failed, and soil is determined to be unsuitable for water infiltration.

4. Rate of Fall Data:
 a. Time Interval Selected, Minutes
 b. Record the Drop in Water Level during each time Interval to the nearest 1/10th-inch on the line below:

Depth of Water, Start of Interval (inches)	Depth of Water, End of Interval (inches)	Drop in Water Level (inches)
7"		
7"		
7"		

5. Percolation Rate:
 a. Time, minutes, Required for a Six-inch Drop in the Water level
 b. Percolation Rate = $a/6 = / 6 =$
6. Per NJ Stormwater Best Management Practices Manual, Appendix E Section B1(e.)
 $K = a/pm \text{ (in/hr) where } a = 20 \text{ for a bottom width of 6 inches}$
 $K = 20/ \text{ min/in.} = \text{ in/ hr } /2 = \text{ in/hr}$ Therefore, Use
7. I hereby certify that the information furnished on Form 3d of this application is true and accurate. I am aware that falsification of data is a violation of the Water Pollution Control Act (N.J.S.A. 58:10A-1 et seq.) and is subject to penalties as prescribed in N.J.A.C. 7:14-8.

Signature of Site Evaluator _____
Robert Skinner

Date _____

Signature of Professional Engineer _____
Mark Kalusz, PE

License No. 24GE05937000

COUNTY/MUNICIPALITY PLAINSBORO / TOWNSHIP OF PLAINSBORO

Percolation Test Data:

Block 1701 Lot 3.01

1. Test Number P-15 (B-33) Date Tested 7/9/2024
2. Depth 7" below grade
3. Pre-soak:
_____ Sandy Textured Soil Only, Shortened Pre-soak - Indicate Time Required
for 12 in. of Water to Drain after Second Filling, Minutes
_____ Four Hour Pre-soak completed - Indicate result:
_____ Test Hole Drained within 15 to 24 hours after Pre-soak
X Test Hole did not Drain within 24 hours after Pre-soak

Pre-Soak water elevation dropped 1/8" after 1 hour. Due to insignificant fall in water elevation, Percolation Test has failed, and soil is determined to be unsuitable for water infiltration.

4. Rate of Fall Data:
a. Time Interval Selected, Minutes
b. Record the Drop in Water Level during each time Interval to the nearest 1/10th-inch on the line below:

Depth of Water, Start of Interval (inches)	Depth of Water, End of Interval (inches)	Drop in Water Level (inches)
7"		
7"		
7"		

5. Percolation Rate:
a. Time, minutes, Required for a Six-inch Drop in the Water level
b. Percolation Rate = $a/6 = / 6 =$
6. Per NJ Stormwater Best Management Practices Manual, Appendix E Section B1(e.)

 $K = a/pm$ (in/hr) where $a = 20$ for a bottom width of 6 inches
 $K = 20/ \text{ min/in.} = \text{ in/ hr } /2 = \text{ in/hr}$ Therefore, Use
7. I hereby certify that the information furnished on Form 3d of this application is true and accurate. I am aware that falsification of data is a violation of the Water Pollution Control Act (N.J.S.A. 58:10A-1 et seq.) and is subject to penalties as prescribed in N.J.A.C. 7:14-8.

Signature of Site Evaluator _____
Robert Skinner

Date _____

Signature of Professional Engineer _____
Mark Kalusz, PE

License No. 24GE05937000

COUNTY/MUNICIPALITY PLAINSBORO / TOWNSHIP OF PLAINSBORO

Percolation Test Data:

Block 1701 Lot 3.01

1. Test Number P-16 (B-40) Date Tested 7/9/2024
2. Depth 8" below grade
3. Pre-soak:
_____ Sandy Textured Soil Only, Shortened Pre-soak - Indicate Time Required
for 12 in. of Water to Drain after Second Filling, Minutes
_____ Four Hour Pre-soak completed - Indicate result:
_____ Test Hole Drained within 15 to 24 hours after Pre-soak
X Test Hole did not Drain within 24 hours after Pre-soak

Pre-Soak water elevation dropped 1/8" after 1 hour. Due to insignificant fall in water elevation, Percolation Test has failed, and soil is determined to be unsuitable for water infiltration.

4. Rate of Fall Data:
a. Time Interval Selected, Minutes
b. Record the Drop in Water Level during each time Interval to the nearest 1/10th-inch on the line below:

Depth of Water, Start of Interval (inches)	Depth of Water, End of Interval (inches)	Drop in Water Level (inches)
7"		
7"		
7"		

5. Percolation Rate:
a. Time, minutes, Required for a Six-inch Drop in the Water level
b. Percolation Rate = $a/6 = / 6 =$
6. Per NJ Stormwater Best Management Practices Manual, Appendix E Section B1(e.)

 $K = a/pm$ (in/hr) where $a = 20$ for a bottom width of 6 inches
 $K = 20/ \text{ min/in.} = \text{ in/ hr } /2 = \text{ in/hr}$ Therefore, Use
7. I hereby certify that the information furnished on Form 3d of this application is true and accurate. I am aware that falsification of data is a violation of the Water Pollution Control Act (N.J.S.A. 58:10A-1 et seq.) and is subject to penalties as prescribed in N.J.A.C. 7:14-8.

Signature of Site Evaluator _____
Robert Skinner

Date _____

Signature of Professional Engineer _____
Mark Kalusz, PE

License No. 24GE05937000

COUNTY/MUNICIPALITY PLAINSBORO / TOWNSHIP OF PLAINSBORO

Percolation Test Data:

Block 1701 Lot 3.01

1. Test Number P-17 (B-43) Date Tested 7/9/2024
2. Depth 10" below grade
3. Pre-soak:
_____ Sandy Textured Soil Only, Shortened Pre-soak - Indicate Time Required
for 12 in. of Water to Drain after Second Filling, Minutes
_____ Four Hour Pre-soak completed - Indicate result:
_____ Test Hole Drained within 15 to 24 hours after Pre-soak
X Test Hole did not Drain within 24 hours after Pre-soak

Pre-Soak water elevation dropped 1/8" after 1 hour. Due to insignificant fall in water elevation, Percolation Test has failed, and soil is determined to be unsuitable for water infiltration.

4. Rate of Fall Data:
a. Time Interval Selected, Minutes
b. Record the Drop in Water Level during each time Interval to the nearest 1/10th-inch on the line below:

Depth of Water, Start of Interval (inches)	Depth of Water, End of Interval (inches)	Drop in Water Level (inches)
7"		
7"		
7"		

5. Percolation Rate:
a. Time, minutes, Required for a Six-inch Drop in the Water level
b. Percolation Rate = $a/6 = / 6 =$
6. Per NJ Stormwater Best Management Practices Manual, Appendix E Section B1(e.)

 $K = a/pm$ (in/hr) where $a = 20$ for a bottom width of 6 inches
 $K = 20/ \text{ min/in.} = \text{ in/ hr } /2 = \text{ in/hr}$ Therefore, Use
7. I hereby certify that the information furnished on Form 3d of this application is true and accurate. I am aware that falsification of data is a violation of the Water Pollution Control Act (N.J.S.A. 58:10A-1 et seq.) and is subject to penalties as prescribed in N.J.A.C. 7:14-8.

Signature of Site Evaluator _____
Robert Skinner

Date _____

Signature of Professional Engineer _____
Mark Kalusz, PE

License No. 24GE05937000

COUNTY/MUNICIPALITY PLAINSBORO / TOWNSHIP OF PLAINSBORO

Percolation Test Data:

Block 1701 Lot 3.01

1. Test Number P-18 (B-36) Date Tested 7/9/2024
2. Depth 8" below grade
3. Pre-soak:
 Sandy Textured Soil Only, Shortened Pre-soak - Indicate Time Required
for 12 in. of Water to Drain after Second Filling, Minutes
 Four Hour Pre-soak completed - Indicate result:
 Test Hole Drained within 15 to 24 hours after Pre-soak
 X Test Hole did not Drain within 24 hours after Pre-soak

Pre-Soak water elevation dropped 1/8" after 1 hour. Due to insignificant fall in water elevation, Percolation Test has failed, and soil is determined to be unsuitable for water infiltration.

4. Rate of Fall Data:
a. Time Interval Selected, Minutes
b. Record the Drop in Water Level during each time Interval to the nearest 1/10th-inch on the line below:

Depth of Water, Start of Interval (inches)	Depth of Water, End of Interval (inches)	Drop in Water Level (inches)
7"		
7"		
7"		

5. Percolation Rate:
a. Time, minutes, Required for a Six-inch Drop in the Water level
b. Percolation Rate = $a/6 = / 6 =$
6. Per NJ Stormwater Best Management Practices Manual, Appendix E Section B1(e.)

 $K = a/pm$ (in/hr) where $a = 20$ for a bottom width of 6 inches
 $K = 20/ \text{ min/in.} = \text{ in/ hr } /2 = \text{ in/hr}$ Therefore, Use
7. I hereby certify that the information furnished on Form 3d of this application is true and accurate. I am aware that falsification of data is a violation of the Water Pollution Control Act (N.J.S.A. 58:10A-1 et seq.) and is subject to penalties as prescribed in N.J.A.C. 7:14-8.

Signature of Site Evaluator _____
Robert Skinner

Date _____

Signature of Professional Engineer _____
Mark Kalusz, PE

License No. 24GE05937000

COUNTY/MUNICIPALITY PLAINSBORO / TOWNSHIP OF PLAINSBORO

Percolation Test Data:

Block 1701 Lot 3.01

1. Test Number P-19 (B-45) Date Tested 7/9/2024

2. Depth 10" below grade

3. Pre-soak:
 Sandy Textured Soil Only, Shortened Pre-soak - Indicate Time Required
for 12 in. of Water to Drain after Second Filling, Minutes
 Four Hour Pre-soak completed - Indicate result:
 Test Hole Drained within 15 to 24 hours after Pre-soak
 X Test Hole did not Drain within 24 hours after Pre-soak

Pre-Soak water elevation dropped 1/8" after 1 hour. Due to insignificant fall in water elevation, Percolation Test has failed, and soil is determined to be unsuitable for water infiltration.

4. Rate of Fall Data:
a. Time Interval Selected, Minutes
b. Record the Drop in Water Level during each time Interval to the nearest 1/10th-inch on the line below:

Depth of Water, Start of Interval (inches)	Depth of Water, End of Interval (inches)	Drop in Water Level (inches)
<u>7"</u>		
<u>7"</u>		
<u>7"</u>		

5. Percolation Rate:
a. Time, minutes, Required for a Six-inch Drop in the Water level
b. Percolation Rate = $a/6 = / 6 =$

6. Per NJ Stormwater Best Management Practices Manual, Appendix E Section B1(e.)

$K = a/pm$ (in/hr) where $a = 20$ for a bottom width of 6 inches
 $K = 20/ \text{ min/in.} = \text{ in/ hr } /2 = \text{ in/hr}$ Therefore, Use

7. I hereby certify that the information furnished on Form 3d of this application is true and accurate. I am aware that falsification of data is a violation of the Water Pollution Control Act (N.J.S.A. 58:10A-1 et seq.) and is subject to penalties as prescribed in N.J.A.C. 7:14-8.

Signature of Site Evaluator Robert Skinner

Date _____

Signature of Professional Engineer Mark Kalusz, PE

License No. 24GE05937000

COUNTY/MUNICIPALITY PLAINSBORO / TOWNSHIP OF PLAINSBORO

Percolation Test Data:

Block 1701 Lot 3.01

1. Test Number P-20 (B-20) Date Tested 7/9/2024
2. Depth 10" below grade
3. Pre-soak:
 Sandy Textured Soil Only, Shortened Pre-soak - Indicate Time Required
for 12 in. of Water to Drain after Second Filling, Minutes
 Four Hour Pre-soak completed - Indicate result:
 Test Hole Drained within 15 to 24 hours after Pre-soak
 X Test Hole did not Drain within 24 hours after Pre-soak

Pre-Soak water elevation dropped 1/8" after 1 hour. Due to insignificant fall in water elevation, Percolation Test has failed, and soil is determined to be unsuitable for water infiltration.

4. Rate of Fall Data:
 - a. Time Interval Selected, Minutes
 - b. Record the Drop in Water Level during each time Interval to the nearest 1/10th-inch on the line below:

Depth of Water, Start of Interval (inches)	Depth of Water, End of Interval (inches)	Drop in Water Level (inches)
7"		
7"		
7"		

5. Percolation Rate:
 - a. Time, minutes, Required for a Six-inch Drop in the Water level
 - b. Percolation Rate = $a/6 = / 6 =$
6. Per NJ Stormwater Best Management Practices Manual, Appendix E Section B1(e.)

 $K = a/pm \text{ (in/hr) where } a = 20 \text{ for a bottom width of 6 inches}$
 $K = 20/ \text{ min/in.} = \text{ in/ hr } /2 = \text{ in/hr}$ Therefore, Use
7. I hereby certify that the information furnished on Form 3d of this application is true and accurate. I am aware that falsification of data is a violation of the Water Pollution Control Act (N.J.S.A. 58:10A-1 et seq.) and is subject to penalties as prescribed in N.J.A.C. 7:14-8.

Signature of Site Evaluator _____
Robert Skinner

Date _____

Signature of Professional Engineer _____
Mark Kalusz, PE

License No. 24GE05937000



Appendix B

Present Conditions and Runoff Calculations



TELEPHONE : (732) 312-9800 1800 ROUTE 34, SUITE 101
 FAX : (732) 312-9801 WALL, NEW JERSEY 07719

PROJECT NUMBER: 06C028T.003
 PROJECT NAME: Cancer Center
 CALCULATED BY: KAN DATE: 2/28/2024
 CHECKED BY: DATE:
 REVISED BY: DATE:

Sheet: 1 of 2

TIME OF CONCENTRATION CALCULATOR

DRAINAGE AREA NAME:	Impervious Existing	DRAINAGE AREA NOTATION:	
----------------------------	---------------------	--------------------------------	--

Sheet Flow:

Segment 1

Surface Type:	Smooth surface (concrete, asphalt, gravel, or bare soil)	
Slope of land surface, S:	0.016	ft/ft
n-value (from Table 15-1):	0.011	---
Limiting Length of flow, L: (Eq 15-9)	100.0	ft
2-year, 24 hours rainfall, P₂:	3.350	in
Travel time, T_t: (Eq 15-8)	1.3	minutes

calculations for sheet flow based upon Equation 15-8 from "Part 630 Hydrology, National Engineering Handbook: Chapter 15 - Time of Concentration" issued by the United States Department of Agriculture, Natural Resources Conservation Service.

$$T_t = \frac{0.007(nL)^{0.8}}{(P_2)^{0.5} S^{0.4}} \quad (\text{Eq 15-8})$$

$$L = \frac{100(S)^{0.5}}{n} \quad (\text{Eq 15-9})$$

Shallow Concentrated Flow:

Segment 2

Surface Type:	Pavement and small upland gullies	
Flow length, L:	68	ft
Slope of land surface, S:	0.016	ft/ft
n-value (from Table 15-3):	0.025	---
Average velocity, V:	2.571	ft/s
Travel time, T_t: (Eq 15-1)	0.4	minutes

calculations for shallow concentrated flow based upon Equation 15-1 from "Part 630 Hydrology, National Engineering Handbook: Chapter 15 - Time of Concentration" issued by the United States Department of Agriculture, Natural Resources Conservation Service.

$$T_t = \frac{L}{3,600V} \quad (\text{Eq 15-1})$$

Open Channel Flow:

Hydraulic Length:	40	ft	136	ft
Slope:	0.010	ft/ft	0.009	ft/ft
Manning's n:	0.013	---	0.013	---
Flow Area:	1.2265625	ft ²	7.065	ft ²
Wetted Perimeter:	3.93	ft	9.42	ft
Velocity:	5.34	fps	8.81	fps
Travel time, T_t:	0.1	minutes	0.3	0

Segment 5

Segment 6

Hydraulic Length:	70	ft	80	ft
Slope:	0.006	ft/ft	0.010	ft/ft
Manning's n:	0.013	---	0.013	---
Flow Area:	7.065	ft ²	7.065	ft ²
Wetted Perimeter:	9.42	ft	9.42	ft
Velocity:	7.42	fps	9.52	fps
Travel time, T_t:	0.2	minutes	0.1	0

Continued on next sheet



TELEPHONE : (732) 312-9800 1800 ROUTE 34, SUITE 101
 FAX : (732) 312-9801 WALL, NEW JERSEY 07719

PROJECT NUMBER: 06C028T.003
 PROJECT NAME: Cancer Center
 CALCULATED BY: KAN DATE: 2/28/2024
 CHECKED BY: DATE:
 REVISED BY: DATE:

Sheet: 2 of 2

TIME OF CONCENTRATION CALCULATOR

DRAINAGE AREA NAME:	Impervious Existing	DRAINAGE AREA NOTATION:	0
----------------------------	---------------------	--------------------------------	---

	Segment 7		Segment 8	
Hydraulic Length:	37	ft		
Slope:	0.007	ft/ft		ft
Manning's n:	0.013	---		ft/ft
Flow Area:	7.065	ft ²	0	---
Wetted Perimeter:	9.42	ft	0.000	ft/s
Velocity:	7.92	fps	0.0	minutes
Travel time, T_t:	0.1	minutes		

Total Time of Concentration:	2	minutes	user input
-------------------------------------	---	---------	------------



TELEPHONE : (732) 312-9800 1800 ROUTE 34, SUITE 101
 FAX : (732) 312-9801 WALL, NEW JERSEY 07719

PROJECT NUMBER: 06C028T.003
 PROJECT NAME: Cancer Center
 CALCULATED BY: KAN DATE: 2/28/2024
 CHECKED BY: DATE:
 REVISED BY: DATE:

Sheet: 1 of 1

TIME OF CONCENTRATION CALCULATOR

DRAINAGE AREA NAME:	Pervious Existing	DRAINAGE AREA NOTATION:	
----------------------------	-------------------	--------------------------------	--

Sheet Flow:

Segment 1

Surface Type:	Grass: Short-grass prairie	
Slope of land surface, S:	0.025	ft/ft
n-value (from Table 15-1):	0.15	---
Limiting Length of flow, l: (Eq 15-9)	100.0	ft
2-year, 24 hours rainfall, P₂:	3.350	in
Travel time, T_t: (Eq 15-8)	8.8	minutes

calculations for sheet flow based upon Equation 15-8 from "Part 630 Hydrology, National Engineering Handbook: Chapter 15 - Time of Concentration" issued by the United States Department of Agriculture, Natural Resources Conservation Service.

$$T_t = \frac{0.007(nl)^{0.8}}{(P_2)^{0.5} S^{0.4}} \quad (\text{Eq 15-8})$$

$$l = \frac{100(S)^{0.5}}{n} \quad (\text{Eq 15-9})$$

Shallow Concentrated Flow:

Segment 2

Surface Type:	Short-grass pasture	
Flow length, l:	58.0	ft
Slope of land surface, S:	0.025	ft/ft
n-value (from Table 15-3):	0.073	---
Average velocity, V:	1.101	ft/s
Travel time, T_t: (Eq 15-1)	0.9	minutes

calculations for shallow concentrated flow based upon Equation 15-1 from "Part 630 Hydrology, National Engineering Handbook: Chapter 15 - Time of Concentration" issued by the United States Department of Agriculture, Natural Resources Conservation Service.

$$T_t = \frac{l}{3,600V} \quad (\text{Eq 15-1})$$

Shallow Concentrated Flow:

Segment 3

Segment 4

Surface Type:	Pavement and small upland gullies			
Flow length, l:	48.0	ft		ft
Slope of land surface, S:	0.008	ft/ft		ft/ft
n-value (from Table 15-3):	0.025	---	0	---
Average velocity, V:	1.856	ft/s	0.000	ft/s
Travel time, T_t: (Eq 15-1)	0.4	minutes	0.0	minutes

Open Channel Flow:

Hydraulic Length:	130	ft
Slope:	0.005	ft/ft
Manning's n:	0.013	---
Flow Area:	7.065	ft ²
Wetted Perimeter:	9.42	ft
Velocity:	6.86	fps
Travel time, T_t:	0.3	minutes

Total Time of Concentration:	10	minutes	user input
-------------------------------------	----	---------	------------



TELEPHONE : (732) 312-9800 1800 ROUTE 34, SUITE 101
FAX : (732) 312-9801 WALL, NEW JERSEY 07719

PROJECT NUMBER: 06C028T.003

PROJECT NAME: Cancer Center
CALCULATED BY: KAN DATE: 2/28/2024
CHECKED BY: DATE:
REVISED BY: DATE:

Sheet: 1 of 1

TIME OF CONCENTRATION CALCULATOR

DRAINAGE AREA NAME:	Pervious Proposed	DRAINAGE AREA NOTATION:	
----------------------------	-------------------	--------------------------------	--

Sheet Flow: Segment 1

Surface Type:	Grass: Short-grass prairie	
Slope of land surface, S:	0.034	ft/ft
n-value (from Table 15-1):	0.15	---
Limiting Length of flow, l: (Eq 15-9)	82.0	ft
2-year, 24 hours rainfall, P₂:	3.350	in
Travel time, T_t: (Eq 15-8)	6.6	minutes

calculations for sheet flow based upon Equation 15-8 from "Part 630 Hydrology, National Engineering Handbook: Chapter 15 - Time of Concentration" issued by the United States Department of Agriculture, Natural Resources Conservation Service.

$$T_t = \frac{0.007(n/l)^{0.8}}{(P_2)^{0.5} S^{0.4}} \quad (\text{Eq 15-8})$$

$$l = \frac{100(S)^{0.5}}{n} \quad (\text{Eq 15-9})$$

calculations for shallow concentrated flow based upon Equation 15-1 from "Part 630 Hydrology, National Engineering Handbook: Chapter 15 - Time of Concentration" issued by the United States Department of

Sheet Flow: Segment 2

Surface Type:	Smooth surface (concrete,	
Slope of land surface, S:	0.020	ft/ft
n-value (from Table 15-1):	0.011	---
Limiting Length of flow, l: (Eq 15-9)	6.0	ft
2-year, 24 hours rainfall, P₂:	3.350	in
Travel time, T_t: (Eq 15-8)	0.1	minutes

$$T_t = \frac{l}{3,600V} \quad (\text{Eq 15-1})$$

Sheet Flow: Segment 3

Surface Type:	Grass: Short-grass prairie	
Slope of land surface, S:	0.050	ft/ft
n-value (from Table 15-1):	0.15	---
Limiting Length of flow, l: (Eq 15-9)	12.0	ft
2-year, 24 hours rainfall, P₂:	3.350	in
Travel time, T_t: (Eq 15-8)	1.2	minutes

Shallow Concentrated Flow: Segment 4

Surface Type:	Short-grass pasture	
Flow length, l:	12.0	ft
Slope of land surface, S:	0.050	ft/ft
n-value (from Table 15-3):	0.073	---
Average velocity, V:	1.557	ft/s
Travel time, T_t: (Eq 15-1)	0.1	minutes

Shallow Concentrated Flow:**Segment 5**

Surface Type:	Pavement and small upland gullies	
Flow length, l:	85.0	ft
Slope of land surface, S:	0.010	ft/ft
n-value (from Table 15-3):	0.025	---
Average velocity, V:	2.033	ft/s
Travel time, T_t: (Eq 15-1)	0.7	minutes

Open Channel Flow:**Segment 6**

Hydraulic Length:	133	ft
Slope:	0.005	ft/ft
Manning's n:	0.013	---
Flow Area:	7.065	ft ²
Wetted Perimeter:	9.42	ft
Velocity:	6.86	fps
Travel time, T_t:	0.3	minutes

Total Time of Concentration:	9	minutes	user input
-------------------------------------	---	---------	------------



TELEPHONE : (732) 312-9800 1800 ROUTE 34, SUITE 101
FAX : (732) 312-9801 WALL, NEW JERSEY 07719

PROJECT NUMBER: 06C028T.003
PROJECT NAME: Cancer Center
CALCULATED BY: KAN DATE: 2/28/2024
CHECKED BY: DATE:
REVISED BY: DATE:

Sheet: 1 of 2

TIME OF CONCENTRATION CALCULATOR

DRAINAGE AREA NAME:	Impervious Proposed	DRAINAGE AREA NOTATION:	
----------------------------	---------------------	--------------------------------	--

Sheet Flow:

Segment 1

Surface Type:	Smooth surface (concrete, asphalt, gravel, or bare soil)	
Slope of land surface, S:	0.030	ft/ft
n-value (from Table 15-1):	0.011	---
Limiting Length of flow, l: (Eq 15-9)	100.0	ft
2-year, 24 hours rainfall, P₂:	3.350	in
Travel time, T_t: (Eq 15-8)	1.0	minutes

calculations for sheet flow based upon Equation 15-8 from "Part 630 Hydrology, National Engineering Handbook: Chapter 15 - Time of Concentration" issued by the United States Department of Agriculture, Natural Resources Conservation Service.

$$T_t = \frac{0.007(nl)^{0.8}}{(P_2)^{0.5} S^{0.4}} \quad (\text{Eq 15-8})$$

$$l = \frac{100(S)^{0.5}}{n} \quad (\text{Eq 15-9})$$

Shallow Concentrated Flow:

Segment 2

Surface Type:	Pavement and small upland gullies	
Flow length, l:	70	ft
Slope of land surface, S:	0.030	ft/ft
n-value (from Table 15-3):	0.025	---
Average velocity, V:	3.521	ft/s
Travel time, T_t: (Eq 15-1)	0.3	minutes

calculations for shallow concentrated flow based upon Equation 15-1 from "Part 630 Hydrology, National Engineering Handbook: Chapter 15 - Time of Concentration" issued by the United States Department of Agriculture, Natural Resources Conservation Service.

$$T_t = \frac{l}{3,600V} \quad (\text{Eq 15-1})$$

Open Channel Flow:

Segment 3

Hydraulic Length:	307	ft
Slope:	0.005	ft/ft
Manning's n:	0.013	---
Flow Area:	7.069	ft ²
Wetted Perimeter:	9.42	ft
Velocity:	6.69	fps
Travel time, T_t:	0.8	minutes

Total Time of Concentration:	2	minutes	user input
-------------------------------------	---	---------	------------



TELEPHONE : (732) 312-9800 1800 ROUTE 34, SUITE 101
FAX : (732) 312-9801 WALL, NEW JERSEY 07719

PROJECT NUMBER: 06C028T.003

PROJECT NAME: Cancer Center

CALCULATED BY: KAN DATE: 9/27/2024

CHECKED BY: DATE:

REVISED BY: DATE:

Sheet: 1 of 2

TIME OF CONCENTRATION CALCULATOR

DRAINAGE AREA NAME:	Proposed Perv Area to Basin	DRAINAGE AREA NOTATION:	
----------------------------	-----------------------------	--------------------------------	--

Sheet Flow:

Segment 1

Surface Type:	Grass: Short-grass prairie	
Slope of land surface, S:	0.075	ft/ft
n-value (from Table 15-1):	0.15	---
Limiting Length of flow, l: (Eq 15-9)	67.0	ft
2-year, 24 hours rainfall, P₂:	3.350	in
Travel time, T_t: (Eq 15-8)	4.1	minutes

calculations for sheet flow based upon Equation 15-8 from
"Part 630 Hydrology, National Engineering Handbook:
Chapter 15 - Time of Concentration" issued by the United
States Department of Agriculture, Natural Resources
Conservation Service.

$$T_t = \frac{0.007(n/l)^{0.8}}{(P_2)^{0.5} S^{0.4}} \quad (\text{Eq 15-8})$$

$$l = 100(S)^{0.5} \quad (\text{Eq 15-9})$$

Total Time of Concentration:	4	minutes	user input
-------------------------------------	---	---------	------------



TELEPHONE : (732) 312-9800 1800 ROUTE 34, SUITE 101
 FAX : (732) 312-9801 WALL, NEW JERSEY 07719

PROJECT NUMBER: 06C028T.003

PROJECT NAME: Cancer Center
 CALCULATED BY: KAN DATE: 9/27/2024
 CHECKED BY: DATE:
 REVISED BY: DATE:

Sheet: 1 of 2

TIME OF CONCENTRATION CALCULATOR

DRAINAGE AREA NAME:	Proposed Impervious to Basin	DRAINAGE AREA NOTATION:	
----------------------------	------------------------------	--------------------------------	--

Sheet Flow:

Segment 1

Surface Type:	Smooth surface (concrete, asphalt, gravel, or bare soil)	
Slope of land surface, S:	0.005	ft/ft
n-value (from Table 15-1):	0.011	---
Limiting Length of flow, l: (Eq 15-9)	25.0	ft
2-year, 24 hours rainfall, P₂:	3.350	in
Travel time, T_t: (Eq 15-8)	0.7	minutes

calculations for sheet flow based upon Equation 15-8 from "Part 630 Hydrology, National Engineering Handbook: Chapter 15 - Time of Concentration" issued by the United States Department of Agriculture, Natural Resources Conservation Service.

$$T_t = \frac{0.007(n/l)^{0.8}}{(P_2)^{0.5} S^{0.4}} \quad (\text{Eq 15-8})$$

$$l = \frac{100(S)^{0.5}}{n} \quad (\text{Eq 15-9})$$

Open Channel Flow:

Segment 2

Hydraulic Length:	150	ft
Slope:	0.020	ft/ft
Manning's n:	0.012	---
Flow Area:	0.785	ft ²
Wetted Perimeter:	3.14	ft
Velocity:	6.97	fps
Travel time, T_t:	0.4	minutes

Open Channel Flow:

Segment 3

Segment 4

Hydraulic Length:	50	ft	37	ft
Slope:	0.005	ft/ft	0.006	ft/ft
Manning's n:	0.012	---	0.012	---
Flow Area:	0.785	ft ²	1.767	ft ²
Wetted Perimeter:	3.14	ft	4.71	ft
Velocity:	3.48	fps	4.88	fps
Travel time, T_t:	0.2	minutes	0.1	0

Total Time of Concentration:

1

minutes

user input

Project Summary	
Title	Penn Medicine Cancer Center
Engineer	Kiera Nissen
Company	French and Parrello Associates
Date	10/2/2024
Notes	
Existing Conditions	

Table of Contents

	Master Network Summary	2
Existing Impervious		
	Runoff CN-Area, 2 years (Pre-Development 2 year, Year 2100)	4
	Runoff CN-Area, 2 years (Pre-Development 2 year)	5
	Runoff CN-Area, 10 years (Pre-Development 10 year, Year 2100)	6
	Runoff CN-Area, 10 years (Pre-Development 10 year)	7
	Runoff CN-Area, 25 years (Pre-Development 25 year)	8
	Runoff CN-Area, 100 years (Pre-Development 100 year, Year 2100)	9
	Runoff CN-Area, 100 years (Pre-Development 100 year)	10
Existing Pervious		
	Runoff CN-Area, 2 years (Pre-Development 2 year, Year 2100)	11
	Runoff CN-Area, 2 years (Pre-Development 2 year)	12
	Runoff CN-Area, 10 years (Pre-Development 10 year, Year 2100)	13
	Runoff CN-Area, 10 years (Pre-Development 10 year)	14
	Runoff CN-Area, 25 years (Pre-Development 25 year)	15
	Runoff CN-Area, 100 years (Pre-Development 100 year, Year 2100)	16
	Runoff CN-Area, 100 years (Pre-Development 100 year)	17
Existing Impervious		
	Unit Hydrograph Summary, 2 years (Pre-Development 2 year, Year 2100)	18
	Unit Hydrograph Summary, 2 years (Pre-Development 2 year)	20
	Unit Hydrograph Summary, 10 years (Pre-Development 10 year, Year 2100)	22
	Unit Hydrograph Summary, 10 years (Pre-Development 10 year)	24
	Unit Hydrograph Summary, 25 years (Pre-Development 25 year)	26
	Unit Hydrograph Summary, 100 years (Pre-Development 100 year, Year 2100)	28
	Unit Hydrograph Summary, 100 years (Pre-Development 100 year)	30
Existing Pervious		
	Unit Hydrograph Summary, 2 years (Pre-Development 2 year, Year 2100)	32
	Unit Hydrograph Summary, 2 years (Pre-Development 2 year)	34
	Unit Hydrograph Summary, 10 years (Pre-Development 10 year, Year 2100)	36
	Unit Hydrograph Summary, 10 years (Pre-Development 10 year)	38
	Unit Hydrograph Summary, 25 years (Pre-Development 25 year)	40

Table of Contents

Unit Hydrograph Summary, 100 years (Pre-Development 100 year, Year 2100)	42
Unit Hydrograph Summary, 100 years (Pre-Development 100 year)	44
Addition Summary, 2 years (Pre-Development 2 year, Year 2100)	46
Addition Summary, 2 years (Pre-Development 2 year)	47
Addition Summary, 10 years (Pre-Development 10 year, Year 2100)	48
Addition Summary, 10 years (Pre-Development 10 year)	49
Addition Summary, 25 years (Pre-Development 25 year)	50
Addition Summary, 100 years (Pre-Development 100 year, Year 2100)	51
Addition Summary, 100 years (Pre-Development 100 year)	52

Subsection: Master Network Summary

Catchments Summary

Label	Scenario	Return Event (years)	Hydrograph Volume (ft ³)	Time to Peak (min)	Peak Flow (ft ³ /s)
Existing Pervious	Pre-Development 2 year	2	3,595.000	730.000	0.84
Existing Pervious	Pre-Development 2 year, Year 2100	2	5,450.000	730.000	1.38
Existing Pervious	Pre-Development 10 year	10	9,424.000	729.000	2.53
Existing Pervious	Pre-Development 10 year, Year 2100	10	13,320.000	729.000	3.65
Existing Pervious	Pre-Development 25 year	25	13,953.000	729.000	3.84
Existing Pervious	Pre-Development 100 year	100	24,674.000	729.000	6.85
Existing Pervious	Pre-Development 100 year, Year 2100	100	36,574.000	729.000	10.11
Existing Impervious	Pre-Development 2 year	2	36,986.000	726.000	11.38
Existing Impervious	Pre-Development 2 year, Year 2100	2	44,559.000	725.000	13.60
Existing Impervious	Pre-Development 10 year	10	58,535.000	725.000	17.67
Existing Impervious	Pre-Development 10 year, Year 2100	10	70,742.000	725.000	21.22
Existing Impervious	Pre-Development 25 year	25	72,639.000	725.000	21.77
Existing Impervious	Pre-Development 100 year	100	102,640.000	725.000	30.48
Existing Impervious	Pre-Development 100 year, Year 2100	100	133,361.000	725.000	39.38

Node Summary

Label	Scenario	Return Event (years)	Hydrograph Volume (ft ³)	Time to Peak (min)	Peak Flow (ft ³ /s)
O-1	Pre-Development 2 year	2	40,581.000	726.000	12.01
O-1	Pre-Development 2 year, Year 2100	2	50,009.000	726.000	14.69
O-1	Pre-Development 10 year	10	67,959.000	726.000	19.75
O-1	Pre-Development 10 year, Year 2100	10	84,062.000	726.000	24.27
O-1	Pre-Development 25 year	25	86,592.000	726.000	24.98
O-1	Pre-Development 100 year	100	127,313.000	726.000	36.33

Subsection: Master Network Summary

Node Summary

Label	Scenario	Return Event (years)	Hydrograph Volume (ft ³)	Time to Peak (min)	Peak Flow (ft ³ /s)
O-1	Pre-Development 100 year, Year 2100	100	169,935.000	726.000	48.11

Subsection: Runoff CN-Area

Label: Existing Impervious

Scenario: Pre-Development 2 year, Year 2100

Return Event: 2 years

Storm Event: NOAA-D 2100 (3.99)

Runoff Curve Number Data

Soil/Surface Description	CN	Area (acres)	C (%)	UC (%)	Adjusted CN
Impervious Areas - Paved parking lots, roofs, driveways, Streets and roads - Soil B	98.000	3.270	0.000	0.000	98.000
COMPOSITE AREA & WEIGHTED CN --->	(N/A)	3.270	(N/A)	(N/A)	98.000

Subsection: Runoff CN-Area
 Label: Existing Impervious
 Scenario: Pre-Development 2 year

Return Event: 2 years
 Storm Event: NOAA-D (3.35 in)

Runoff Curve Number Data

Soil/Surface Description	CN	Area (acres)	C (%)	UC (%)	Adjusted CN
Impervious Areas - Paved parking lots, roofs, driveways, Streets and roads - Soil B	98.000	3.270	0.000	0.000	98.000
COMPOSITE AREA & WEIGHTED CN --->	(N/A)	3.270	(N/A)	(N/A)	98.000

Subsection: Runoff CN-Area
 Label: Existing Impervious
 Scenario: Pre-Development 10 year, Year 2100

Return Event: 10 years
 Storm Event: NOAA-D 2100 (6.20)

Runoff Curve Number Data

Soil/Surface Description	CN	Area (acres)	C (%)	UC (%)	Adjusted CN
Impervious Areas - Paved parking lots, roofs, driveways, Streets and roads - Soil B	98.000	3.270	0.000	0.000	98.000
COMPOSITE AREA & WEIGHTED CN --->	(N/A)	3.270	(N/A)	(N/A)	98.000

Subsection: Runoff CN-Area
 Label: Existing Impervious
 Scenario: Pre-Development 10 year

Return Event: 10 years
 Storm Event: NOAA-D (5.17 in)

Runoff Curve Number Data

Soil/Surface Description	CN	Area (acres)	C (%)	UC (%)	Adjusted CN
Impervious Areas - Paved parking lots, roofs, driveways, Streets and roads - Soil B	98.000	3.270	0.000	0.000	98.000
COMPOSITE AREA & WEIGHTED CN --->	(N/A)	3.270	(N/A)	(N/A)	98.000

Subsection: Runoff CN-Area
 Label: Existing Impervious
 Scenario: Pre-Development 25 year

Return Event: 25 years
 Storm Event: NOAA-D (6.36 in)

Runoff Curve Number Data

Soil/Surface Description	CN	Area (acres)	C (%)	UC (%)	Adjusted CN
Impervious Areas - Paved parking lots, roofs, driveways, Streets and roads - Soil B	98.000	3.270	0.000	0.000	98.000
COMPOSITE AREA & WEIGHTED CN --->	(N/A)	3.270	(N/A)	(N/A)	98.000

Subsection: Runoff CN-Area
 Label: Existing Impervious
 Scenario: Pre-Development 100 year, Year 2100

Return Event: 100 years
 Storm Event: NOAA-D 2100 (11.48)

Runoff Curve Number Data

Soil/Surface Description	CN	Area (acres)	C (%)	UC (%)	Adjusted CN
Impervious Areas - Paved parking lots, roofs, driveways, Streets and roads - Soil B	98.000	3.270	0.000	0.000	98.000
COMPOSITE AREA & WEIGHTED CN --->	(N/A)	3.270	(N/A)	(N/A)	98.000

Subsection: Runoff CN-Area
 Label: Existing Impervious
 Scenario: Pre-Development 100 year

Return Event: 100 years
 Storm Event: NOAA-D (8.89 in)

Runoff Curve Number Data

Soil/Surface Description	CN	Area (acres)	C (%)	UC (%)	Adjusted CN
Impervious Areas - Paved parking lots, roofs, driveways, Streets and roads - Soil B	98.000	3.270	0.000	0.000	98.000
COMPOSITE AREA & WEIGHTED CN --->	(N/A)	3.270	(N/A)	(N/A)	98.000

Subsection: Runoff CN-Area

Label: Existing Pervious

Scenario: Pre-Development 2 year, Year 2100

Return Event: 2 years

Storm Event: NOAA-D 2100 (3.99)

Runoff Curve Number Data

Soil/Surface Description	CN	Area (acres)	C (%)	UC (%)	Adjusted CN
Open space (Lawns,parks etc.) - Good condition; grass cover > 75% - Soil C	74.000	0.444	0.000	0.000	74.000
Open space (Lawns,parks etc.) - Good condition; grass cover > 75% - Soil B	61.000	1.029	0.000	0.000	61.000
COMPOSITE AREA & WEIGHTED CN --->	(N/A)	1.473	(N/A)	(N/A)	64.919

Subsection: Runoff CN-Area
 Label: Existing Pervious
 Scenario: Pre-Development 2 year

Return Event: 2 years
 Storm Event: NOAA-D (3.35 in)

Runoff Curve Number Data

Soil/Surface Description	CN	Area (acres)	C (%)	UC (%)	Adjusted CN
Open space (Lawns,parks etc.) - Good condition; grass cover > 75% - Soil C	74.000	0.444	0.000	0.000	74.000
Open space (Lawns,parks etc.) - Good condition; grass cover > 75% - Soil B	61.000	1.029	0.000	0.000	61.000
COMPOSITE AREA & WEIGHTED CN --->	(N/A)	1.473	(N/A)	(N/A)	64.919

Subsection: Runoff CN-Area

Label: Existing Pervious

Scenario: Pre-Development 10 year, Year 2100

Return Event: 10 years

Storm Event: NOAA-D 2100 (6.20)

Runoff Curve Number Data

Soil/Surface Description	CN	Area (acres)	C (%)	UC (%)	Adjusted CN
Open space (Lawns,parks etc.) - Good condition; grass cover > 75% - Soil C	74.000	0.444	0.000	0.000	74.000
Open space (Lawns,parks etc.) - Good condition; grass cover > 75% - Soil B	61.000	1.029	0.000	0.000	61.000
COMPOSITE AREA & WEIGHTED CN --->	(N/A)	1.473	(N/A)	(N/A)	64.919

Subsection: Runoff CN-Area
 Label: Existing Pervious
 Scenario: Pre-Development 10 year

Return Event: 10 years
 Storm Event: NOAA-D (5.17 in)

Runoff Curve Number Data

Soil/Surface Description	CN	Area (acres)	C (%)	UC (%)	Adjusted CN
Open space (Lawns,parks etc.) - Good condition; grass cover > 75% - Soil C	74.000	0.444	0.000	0.000	74.000
Open space (Lawns,parks etc.) - Good condition; grass cover > 75% - Soil B	61.000	1.029	0.000	0.000	61.000
COMPOSITE AREA & WEIGHTED CN --->	(N/A)	1.473	(N/A)	(N/A)	64.919

Subsection: Runoff CN-Area
 Label: Existing Pervious
 Scenario: Pre-Development 25 year

Return Event: 25 years
 Storm Event: NOAA-D (6.36 in)

Runoff Curve Number Data

Soil/Surface Description	CN	Area (acres)	C (%)	UC (%)	Adjusted CN
Open space (Lawns,parks etc.) - Good condition; grass cover > 75% - Soil C	74.000	0.444	0.000	0.000	74.000
Open space (Lawns,parks etc.) - Good condition; grass cover > 75% - Soil B	61.000	1.029	0.000	0.000	61.000
COMPOSITE AREA & WEIGHTED CN --->	(N/A)	1.473	(N/A)	(N/A)	64.919

Subsection: Runoff CN-Area

Label: Existing Pervious

Scenario: Pre-Development 100 year, Year 2100

Return Event: 100 years

Storm Event: NOAA-D 2100 (11.48)

Runoff Curve Number Data

Soil/Surface Description	CN	Area (acres)	C (%)	UC (%)	Adjusted CN
Open space (Lawns,parks etc.) - Good condition; grass cover > 75% - Soil C	74.000	0.444	0.000	0.000	74.000
Open space (Lawns,parks etc.) - Good condition; grass cover > 75% - Soil B	61.000	1.029	0.000	0.000	61.000
COMPOSITE AREA & WEIGHTED CN --->	(N/A)	1.473	(N/A)	(N/A)	64.919

Subsection: Runoff CN-Area
 Label: Existing Pervious
 Scenario: Pre-Development 100 year

Return Event: 100 years
 Storm Event: NOAA-D (8.89 in)

Runoff Curve Number Data

Soil/Surface Description	CN	Area (acres)	C (%)	UC (%)	Adjusted CN
Open space (Lawns,parks etc.) - Good condition; grass cover > 75% - Soil C	74.000	0.444	0.000	0.000	74.000
Open space (Lawns,parks etc.) - Good condition; grass cover > 75% - Soil B	61.000	1.029	0.000	0.000	61.000
COMPOSITE AREA & WEIGHTED CN --->	(N/A)	1.473	(N/A)	(N/A)	64.919

Subsection: Unit Hydrograph Summary
Label: Existing Impervious
Scenario: Pre-Development 2 year, Year 2100

Return Event: 2 years
Storm Event: NOAA-D 2100 (3.99)

Storm Event	NOAA-D 2100 (3.99)
Return Event	2 years
Duration	1,440.000 min
Depth	3.99 in
Time of Concentration (Composite)	2.000 min
Area (User Defined)	3.270 acres
Computational Time Increment	0.267 min
Time to Peak (Computed)	725.867 min
Flow (Peak, Computed)	13.62 ft ³ /s
Output Increment	1.002 min
Time to Flow (Peak Interpolated Output)	725.000 min
Flow (Peak Interpolated Output)	13.60 ft ³ /s
Drainage Area	
SCS CN (Composite)	98.000
Area (User Defined)	3.270 acres
Maximum Retention (Pervious)	0.20 in
Maximum Retention (Pervious, 20 percent)	0.04 in
Cumulative Runoff	
Cumulative Runoff Depth (Pervious)	3.76 in
Runoff Volume (Pervious)	44,573.761 ft ³
Hydrograph Volume (Area under Hydrograph curve)	
Volume	44,559.000 ft ³
SCS Unit Hydrograph Parameters	
Time of Concentration (Composite)	2.000 min
Computational Time Increment	0.267 min
Unit Hydrograph Shape Factor	483.432
K Factor	0.749
Receding/Rising, Tr/Tp	1.670
Unit peak, qp	111.15 ft ³ /s

Subsection: Unit Hydrograph Summary

Label: Existing Impervious

Scenario: Pre-Development 2 year, Year 2100

Return Event: 2 years

Storm Event: NOAA-D 2100 (3.99)

SCS Unit Hydrograph Parameters

Unit peak time, Tp	1.333 min
Unit receding limb, Tr	5.333 min
Total unit time, Tb	6.667 min

Subsection: Unit Hydrograph Summary
Label: Existing Impervious
Scenario: Pre-Development 2 year

Return Event: 2 years
Storm Event: NOAA-D (3.35 in)

Storm Event	NOAA-D (3.35 in)
Return Event	2 years
Duration	1,440.000 min
Depth	3.35 in
Time of Concentration (Composite)	2.000 min
Area (User Defined)	3.270 acres
Computational Time Increment	0.267 min
Time to Peak (Computed)	725.867 min
Flow (Peak, Computed)	11.41 ft ³ /s
Output Increment	1.002 min
Time to Flow (Peak Interpolated Output)	726.000 min
Flow (Peak Interpolated Output)	11.38 ft ³ /s
Drainage Area	
SCS CN (Composite)	98.000
Area (User Defined)	3.270 acres
Maximum Retention (Pervious)	0.20 in
Maximum Retention (Pervious, 20 percent)	0.04 in
Cumulative Runoff	
Cumulative Runoff Depth (Pervious)	3.12 in
Runoff Volume (Pervious)	36,998.571 ft ³
Hydrograph Volume (Area under Hydrograph curve)	
Volume	36,986.000 ft ³
SCS Unit Hydrograph Parameters	
Time of Concentration (Composite)	2.000 min
Computational Time Increment	0.267 min
Unit Hydrograph Shape Factor	483.432
K Factor	0.749
Receding/Rising, Tr/Tp	1.670
Unit peak, qp	111.15 ft ³ /s

Subsection: Unit Hydrograph Summary
Label: Existing Impervious
Scenario: Pre-Development 2 year

Return Event: 2 years
Storm Event: NOAA-D (3.35 in)

SCS Unit Hydrograph Parameters	
Unit peak time, Tp	1.333 min
Unit receding limb, Tr	5.333 min
Total unit time, Tb	6.667 min

Subsection: Unit Hydrograph Summary

Label: Existing Impervious

Scenario: Pre-Development 10 year, Year 2100

Return Event: 10 years

Storm Event: NOAA-D 2100 (6.20)

Storm Event	NOAA-D 2100 (6.20)
Return Event	10 years
Duration	1,440.000 min
Depth	6.20 in
Time of Concentration (Composite)	2.000 min
Area (User Defined)	3.270 acres
Computational Time Increment	0.267 min
Time to Peak (Computed)	725.867 min
Flow (Peak, Computed)	21.26 ft ³ /s
Output Increment	1.002 min
Time to Flow (Peak Interpolated Output)	725.000 min
Flow (Peak Interpolated Output)	21.22 ft ³ /s
Drainage Area	
SCS CN (Composite)	98.000
Area (User Defined)	3.270 acres
Maximum Retention (Pervious)	0.20 in
Maximum Retention (Pervious, 20 percent)	0.04 in
Cumulative Runoff	
Cumulative Runoff Depth (Pervious)	5.96 in
Runoff Volume (Pervious)	70,765.343 ft ³
Hydrograph Volume (Area under Hydrograph curve)	
Volume	70,742.000 ft ³
SCS Unit Hydrograph Parameters	
Time of Concentration (Composite)	2.000 min
Computational Time Increment	0.267 min
Unit Hydrograph Shape Factor	483.432
K Factor	0.749
Receding/Rising, Tr/Tp	1.670
Unit peak, qp	111.15 ft ³ /s

Subsection: Unit Hydrograph Summary

Label: Existing Impervious

Scenario: Pre-Development 10 year, Year 2100

Return Event: 10 years

Storm Event: NOAA-D 2100 (6.20)

SCS Unit Hydrograph Parameters

Unit peak time, T_p	1.333 min
Unit receding limb, T_r	5.333 min
Total unit time, T_b	6.667 min

Subsection: Unit Hydrograph Summary
Label: Existing Impervious
Scenario: Pre-Development 10 year

Return Event: 10 years
Storm Event: NOAA-D (5.17 in)

Storm Event	NOAA-D (5.17 in)
Return Event	10 years
Duration	1,440.000 min
Depth	5.17 in
Time of Concentration (Composite)	2.000 min
Area (User Defined)	3.270 acres
Computational Time Increment	0.267 min
Time to Peak (Computed)	725.867 min
Flow (Peak, Computed)	17.70 ft ³ /s
Output Increment	1.002 min
Time to Flow (Peak Interpolated Output)	725.000 min
Flow (Peak Interpolated Output)	17.67 ft ³ /s
Drainage Area	
SCS CN (Composite)	98.000
Area (User Defined)	3.270 acres
Maximum Retention (Pervious)	0.20 in
Maximum Retention (Pervious, 20 percent)	0.04 in
Cumulative Runoff	
Cumulative Runoff Depth (Pervious)	4.93 in
Runoff Volume (Pervious)	58,554.141 ft ³
Hydrograph Volume (Area under Hydrograph curve)	
Volume	58,535.000 ft ³
SCS Unit Hydrograph Parameters	
Time of Concentration (Composite)	2.000 min
Computational Time Increment	0.267 min
Unit Hydrograph Shape Factor	483.432
K Factor	0.749
Receding/Rising, Tr/Tp	1.670
Unit peak, qp	111.15 ft ³ /s

Subsection: Unit Hydrograph Summary
Label: Existing Impervious
Scenario: Pre-Development 10 year

Return Event: 10 years
Storm Event: NOAA-D (5.17 in)

SCS Unit Hydrograph Parameters	
Unit peak time, Tp	1.333 min
Unit receding limb, Tr	5.333 min
Total unit time, Tb	6.667 min

Subsection: Unit Hydrograph Summary
Label: Existing Impervious
Scenario: Pre-Development 25 year

Return Event: 25 years
Storm Event: NOAA-D (6.36 in)

Storm Event	NOAA-D (6.36 in)
Return Event	25 years
Duration	1,440.000 min
Depth	6.36 in
Time of Concentration (Composite)	2.000 min
Area (User Defined)	3.270 acres
Computational Time Increment	0.267 min
Time to Peak (Computed)	725.867 min
Flow (Peak, Computed)	21.81 ft ³ /s
Output Increment	1.002 min
Time to Flow (Peak Interpolated Output)	725.000 min
Flow (Peak Interpolated Output)	21.77 ft ³ /s
Drainage Area	
SCS CN (Composite)	98.000
Area (User Defined)	3.270 acres
Maximum Retention (Pervious)	0.20 in
Maximum Retention (Pervious, 20 percent)	0.04 in
Cumulative Runoff	
Cumulative Runoff Depth (Pervious)	6.12 in
Runoff Volume (Pervious)	72,662.650 ft ³
Hydrograph Volume (Area under Hydrograph curve)	
Volume	72,639.000 ft ³
SCS Unit Hydrograph Parameters	
Time of Concentration (Composite)	2.000 min
Computational Time Increment	0.267 min
Unit Hydrograph Shape Factor	483.432
K Factor	0.749
Receding/Rising, Tr/Tp	1.670
Unit peak, qp	111.15 ft ³ /s

Subsection: Unit Hydrograph Summary
Label: Existing Impervious
Scenario: Pre-Development 25 year

Return Event: 25 years
Storm Event: NOAA-D (6.36 in)

SCS Unit Hydrograph Parameters	
Unit peak time, Tp	1.333 min
Unit receding limb, Tr	5.333 min
Total unit time, Tb	6.667 min

Subsection: Unit Hydrograph Summary
Label: Existing Impervious
Scenario: Pre-Development 100 year, Year 2100

Return Event: 100 years
Storm Event: NOAA-D 2100 (11.48)

Storm Event	NOAA-D 2100 (11.48)
Return Event	100 years
Duration	1,440.000 min
Depth	11.48 in
Time of Concentration (Composite)	2.000 min
Area (User Defined)	3.270 acres
Computational Time Increment	0.267 min
Time to Peak (Computed)	725.867 min
Flow (Peak, Computed)	39.45 ft ³ /s
Output Increment	1.002 min
Time to Flow (Peak Interpolated Output)	725.000 min
Flow (Peak Interpolated Output)	39.38 ft ³ /s
Drainage Area	
SCS CN (Composite)	98.000
Area (User Defined)	3.270 acres
Maximum Retention (Pervious)	0.20 in
Maximum Retention (Pervious, 20 percent)	0.04 in
Cumulative Runoff	
Cumulative Runoff Depth (Pervious)	11.24 in
Runoff Volume (Pervious)	133,404.245 ft ³
Hydrograph Volume (Area under Hydrograph curve)	
Volume	133,361.000 ft ³
SCS Unit Hydrograph Parameters	
Time of Concentration (Composite)	2.000 min
Computational Time Increment	0.267 min
Unit Hydrograph Shape Factor	483.432
K Factor	0.749
Receding/Rising, Tr/Tp	1.670
Unit peak, qp	111.15 ft ³ /s

Subsection: Unit Hydrograph Summary

Label: Existing Impervious

Scenario: Pre-Development 100 year, Year 2100

Return Event: 100 years

Storm Event: NOAA-D 2100 (11.48)

SCS Unit Hydrograph Parameters

Unit peak time, Tp	1.333 min
Unit receding limb, Tr	5.333 min
Total unit time, Tb	6.667 min

Subsection: Unit Hydrograph Summary
Label: Existing Impervious
Scenario: Pre-Development 100 year

Return Event: 100 years
Storm Event: NOAA-D (8.89 in)

Storm Event	NOAA-D (8.89 in)
Return Event	100 years
Duration	1,440.000 min
Depth	8.89 in
Time of Concentration (Composite)	2.000 min
Area (User Defined)	3.270 acres
Computational Time Increment	0.267 min
Time to Peak (Computed)	725.867 min
Flow (Peak, Computed)	30.53 ft ³ /s
Output Increment	1.002 min
Time to Flow (Peak Interpolated Output)	725.000 min
Flow (Peak Interpolated Output)	30.48 ft ³ /s
Drainage Area	
SCS CN (Composite)	98.000
Area (User Defined)	3.270 acres
Maximum Retention (Pervious)	0.20 in
Maximum Retention (Pervious, 20 percent)	0.04 in
Cumulative Runoff	
Cumulative Runoff Depth (Pervious)	8.65 in
Runoff Volume (Pervious)	102,672.833 ft ³
Hydrograph Volume (Area under Hydrograph curve)	
Volume	102,640.000 ft ³
SCS Unit Hydrograph Parameters	
Time of Concentration (Composite)	2.000 min
Computational Time Increment	0.267 min
Unit Hydrograph Shape Factor	483.432
K Factor	0.749
Receding/Rising, Tr/Tp	1.670
Unit peak, qp	111.15 ft ³ /s

Subsection: Unit Hydrograph Summary
Label: Existing Impervious
Scenario: Pre-Development 100 year

Return Event: 100 years
Storm Event: NOAA-D (8.89 in)

SCS Unit Hydrograph Parameters	
Unit peak time, Tp	1.333 min
Unit receding limb, Tr	5.333 min
Total unit time, Tb	6.667 min

Subsection: Unit Hydrograph Summary
Label: Existing Pervious
Scenario: Pre-Development 2 year, Year 2100

Return Event: 2 years
Storm Event: NOAA-D 2100 (3.99)

Storm Event	NOAA-D 2100 (3.99)
Return Event	2 years
Duration	1,440.000 min
Depth	3.99 in
Time of Concentration (Composite)	10.000 min
Area (User Defined)	1.473 acres
Computational Time Increment	1.333 min
Time to Peak (Computed)	729.333 min
Flow (Peak, Computed)	1.39 ft ³ /s
Output Increment	1.002 min
Time to Flow (Peak Interpolated Output)	730.000 min
Flow (Peak Interpolated Output)	1.38 ft ³ /s
Drainage Area	
SCS CN (Composite)	65.000
Area (User Defined)	1.473 acres
Maximum Retention (Pervious)	5.38 in
Maximum Retention (Pervious, 20 percent)	1.08 in
Cumulative Runoff	
Cumulative Runoff Depth (Pervious)	1.02 in
Runoff Volume (Pervious)	5,468.340 ft ³
Hydrograph Volume (Area under Hydrograph curve)	
Volume	5,450.000 ft ³
SCS Unit Hydrograph Parameters	
Time of Concentration (Composite)	10.000 min
Computational Time Increment	1.333 min
Unit Hydrograph Shape Factor	483.432
K Factor	0.749
Receding/Rising, Tr/Tp	1.670
Unit peak, qp	10.01 ft ³ /s

Subsection: Unit Hydrograph Summary

Label: Existing Pervious

Scenario: Pre-Development 2 year, Year 2100

Return Event: 2 years

Storm Event: NOAA-D 2100 (3.99)

SCS Unit Hydrograph Parameters

Unit peak time, Tp	6.667 min
Unit receding limb, Tr	26.667 min
Total unit time, Tb	33.333 min

Subsection: Unit Hydrograph Summary
Label: Existing Pervious
Scenario: Pre-Development 2 year

Return Event: 2 years
Storm Event: NOAA-D (3.35 in)

Storm Event	NOAA-D (3.35 in)
Return Event	2 years
Duration	1,440.000 min
Depth	3.35 in
Time of Concentration (Composite)	10.000 min
Area (User Defined)	1.473 acres
Computational Time Increment	1.333 min
Time to Peak (Computed)	729.333 min
Flow (Peak, Computed)	0.84 ft ³ /s
Output Increment	1.002 min
Time to Flow (Peak Interpolated Output)	730.000 min
Flow (Peak Interpolated Output)	0.84 ft ³ /s
Drainage Area	
SCS CN (Composite)	65.000
Area (User Defined)	1.473 acres
Maximum Retention (Pervious)	5.38 in
Maximum Retention (Pervious, 20 percent)	1.08 in
Cumulative Runoff	
Cumulative Runoff Depth (Pervious)	0.67 in
Runoff Volume (Pervious)	3,607.777 ft ³
Hydrograph Volume (Area under Hydrograph curve)	
Volume	3,595.000 ft ³
SCS Unit Hydrograph Parameters	
Time of Concentration (Composite)	10.000 min
Computational Time Increment	1.333 min
Unit Hydrograph Shape Factor	483.432
K Factor	0.749
Receding/Rising, Tr/Tp	1.670
Unit peak, qp	10.01 ft ³ /s

Subsection: Unit Hydrograph Summary
Label: Existing Pervious
Scenario: Pre-Development 2 year

Return Event: 2 years
Storm Event: NOAA-D (3.35 in)

SCS Unit Hydrograph Parameters	
Unit peak time, Tp	6.667 min
Unit receding limb, Tr	26.667 min
Total unit time, Tb	33.333 min

Subsection: Unit Hydrograph Summary

Label: Existing Pervious

Scenario: Pre-Development 10 year, Year 2100

Return Event: 10 years

Storm Event: NOAA-D 2100 (6.20)

Storm Event	NOAA-D 2100 (6.20)
Return Event	10 years
Duration	1,440.000 min
Depth	6.20 in
Time of Concentration (Composite)	10.000 min
Area (User Defined)	1.473 acres
Computational Time Increment	1.333 min
Time to Peak (Computed)	729.333 min
Flow (Peak, Computed)	3.68 ft ³ /s
Output Increment	1.002 min
Time to Flow (Peak Interpolated Output)	729.000 min
Flow (Peak Interpolated Output)	3.65 ft ³ /s
Drainage Area	
SCS CN (Composite)	65.000
Area (User Defined)	1.473 acres
Maximum Retention (Pervious)	5.38 in
Maximum Retention (Pervious, 20 percent)	1.08 in
Cumulative Runoff	
Cumulative Runoff Depth (Pervious)	2.50 in
Runoff Volume (Pervious)	13,355.612 ft ³
Hydrograph Volume (Area under Hydrograph curve)	
Volume	13,320.000 ft ³
SCS Unit Hydrograph Parameters	
Time of Concentration (Composite)	10.000 min
Computational Time Increment	1.333 min
Unit Hydrograph Shape Factor	483.432
K Factor	0.749
Receding/Rising, Tr/Tp	1.670
Unit peak, qp	10.01 ft ³ /s

Subsection: Unit Hydrograph Summary

Label: Existing Pervious

Scenario: Pre-Development 10 year, Year 2100

Return Event: 10 years

Storm Event: NOAA-D 2100 (6.20)

SCS Unit Hydrograph Parameters

Unit peak time, Tp	6.667 min
Unit receding limb, Tr	26.667 min
Total unit time, Tb	33.333 min

Subsection: Unit Hydrograph Summary
Label: Existing Pervious
Scenario: Pre-Development 10 year

Return Event: 10 years
Storm Event: NOAA-D (5.17 in)

Storm Event	NOAA-D (5.17 in)
Return Event	10 years
Duration	1,440.000 min
Depth	5.17 in
Time of Concentration (Composite)	10.000 min
Area (User Defined)	1.473 acres
Computational Time Increment	1.333 min
Time to Peak (Computed)	729.333 min
Flow (Peak, Computed)	2.56 ft ³ /s
Output Increment	1.002 min
Time to Flow (Peak Interpolated Output)	729.000 min
Flow (Peak Interpolated Output)	2.53 ft ³ /s
Drainage Area	
SCS CN (Composite)	65.000
Area (User Defined)	1.473 acres
Maximum Retention (Pervious)	5.38 in
Maximum Retention (Pervious, 20 percent)	1.08 in
Cumulative Runoff	
Cumulative Runoff Depth (Pervious)	1.77 in
Runoff Volume (Pervious)	9,451.627 ft ³
Hydrograph Volume (Area under Hydrograph curve)	
Volume	9,424.000 ft ³
SCS Unit Hydrograph Parameters	
Time of Concentration (Composite)	10.000 min
Computational Time Increment	1.333 min
Unit Hydrograph Shape Factor	483.432
K Factor	0.749
Receding/Rising, Tr/Tp	1.670
Unit peak, qp	10.01 ft ³ /s

Subsection: Unit Hydrograph Summary
Label: Existing Pervious
Scenario: Pre-Development 10 year

Return Event: 10 years
Storm Event: NOAA-D (5.17 in)

SCS Unit Hydrograph Parameters	
Unit peak time, Tp	6.667 min
Unit receding limb, Tr	26.667 min
Total unit time, Tb	33.333 min

Subsection: Unit Hydrograph Summary
Label: Existing Pervious
Scenario: Pre-Development 25 year

Return Event: 25 years
Storm Event: NOAA-D (6.36 in)

Storm Event	NOAA-D (6.36 in)
Return Event	25 years
Duration	1,440.000 min
Depth	6.36 in
Time of Concentration (Composite)	10.000 min
Area (User Defined)	1.473 acres
Computational Time Increment	1.333 min
Time to Peak (Computed)	729.333 min
Flow (Peak, Computed)	3.87 ft ³ /s
Output Increment	1.002 min
Time to Flow (Peak Interpolated Output)	729.000 min
Flow (Peak Interpolated Output)	3.84 ft ³ /s
Drainage Area	
SCS CN (Composite)	65.000
Area (User Defined)	1.473 acres
Maximum Retention (Pervious)	5.38 in
Maximum Retention (Pervious, 20 percent)	1.08 in
Cumulative Runoff	
Cumulative Runoff Depth (Pervious)	2.62 in
Runoff Volume (Pervious)	13,989.840 ft ³
Hydrograph Volume (Area under Hydrograph curve)	
Volume	13,953.000 ft ³
SCS Unit Hydrograph Parameters	
Time of Concentration (Composite)	10.000 min
Computational Time Increment	1.333 min
Unit Hydrograph Shape Factor	483.432
K Factor	0.749
Receding/Rising, Tr/Tp	1.670
Unit peak, qp	10.01 ft ³ /s

Subsection: Unit Hydrograph Summary
Label: Existing Pervious
Scenario: Pre-Development 25 year

Return Event: 25 years
Storm Event: NOAA-D (6.36 in)

SCS Unit Hydrograph Parameters	
Unit peak time, Tp	6.667 min
Unit receding limb, Tr	26.667 min
Total unit time, Tb	33.333 min

Subsection: Unit Hydrograph Summary

Label: Existing Pervious

Scenario: Pre-Development 100 year, Year 2100

Return Event: 100 years

Storm Event: NOAA-D 2100 (11.48)

Storm Event	NOAA-D 2100 (11.48)
Return Event	100 years
Duration	1,440.000 min
Depth	11.48 in
Time of Concentration (Composite)	10.000 min
Area (User Defined)	1.473 acres
Computational Time Increment	1.333 min
Time to Peak (Computed)	729.333 min
Flow (Peak, Computed)	10.16 ft ³ /s
Output Increment	1.002 min
Time to Flow (Peak Interpolated Output)	729.000 min
Flow (Peak Interpolated Output)	10.11 ft ³ /s
Drainage Area	
SCS CN (Composite)	65.000
Area (User Defined)	1.473 acres
Maximum Retention (Pervious)	5.38 in
Maximum Retention (Pervious, 20 percent)	1.08 in
Cumulative Runoff	
Cumulative Runoff Depth (Pervious)	6.85 in
Runoff Volume (Pervious)	36,653.406 ft ³
Hydrograph Volume (Area under Hydrograph curve)	
Volume	36,574.000 ft ³
SCS Unit Hydrograph Parameters	
Time of Concentration (Composite)	10.000 min
Computational Time Increment	1.333 min
Unit Hydrograph Shape Factor	483.432
K Factor	0.749
Receding/Rising, Tr/Tp	1.670
Unit peak, qp	10.01 ft ³ /s

Subsection: Unit Hydrograph Summary

Label: Existing Pervious

Scenario: Pre-Development 100 year, Year 2100

Return Event: 100 years

Storm Event: NOAA-D 2100 (11.48)

SCS Unit Hydrograph Parameters

Unit peak time, Tp	6.667 min
Unit receding limb, Tr	26.667 min
Total unit time, Tb	33.333 min

Subsection: Unit Hydrograph Summary
Label: Existing Pervious
Scenario: Pre-Development 100 year

Return Event: 100 years
Storm Event: NOAA-D (8.89 in)

Storm Event	NOAA-D (8.89 in)
Return Event	100 years
Duration	1,440.000 min
Depth	8.89 in
Time of Concentration (Composite)	10.000 min
Area (User Defined)	1.473 acres
Computational Time Increment	1.333 min
Time to Peak (Computed)	729.333 min
Flow (Peak, Computed)	6.89 ft ³ /s
Output Increment	1.002 min
Time to Flow (Peak Interpolated Output)	729.000 min
Flow (Peak Interpolated Output)	6.85 ft ³ /s
Drainage Area	
SCS CN (Composite)	65.000
Area (User Defined)	1.473 acres
Maximum Retention (Pervious)	5.38 in
Maximum Retention (Pervious, 20 percent)	1.08 in
Cumulative Runoff	
Cumulative Runoff Depth (Pervious)	4.63 in
Runoff Volume (Pervious)	24,731.791 ft ³
Hydrograph Volume (Area under Hydrograph curve)	
Volume	24,674.000 ft ³
SCS Unit Hydrograph Parameters	
Time of Concentration (Composite)	10.000 min
Computational Time Increment	1.333 min
Unit Hydrograph Shape Factor	483.432
K Factor	0.749
Receding/Rising, Tr/Tp	1.670
Unit peak, qp	10.01 ft ³ /s

Subsection: Unit Hydrograph Summary
Label: Existing Pervious
Scenario: Pre-Development 100 year

Return Event: 100 years
Storm Event: NOAA-D (8.89 in)

SCS Unit Hydrograph Parameters	
Unit peak time, Tp	6.667 min
Unit receding limb, Tr	26.667 min
Total unit time, Tb	33.333 min

Subsection: Addition Summary

Label: O-1

Scenario: Pre-Development 2 year, Year 2100

Return Event: 2 years

Storm Event: NOAA-D 2100 (3.99)

Summary for Hydrograph Addition at 'O-1'

Upstream Link	Upstream Node
<Catchment to Outflow Node>	Existing Impervious
<Catchment to Outflow Node>	Existing Pervious

Node Inflows

Inflow Type	Element	Volume (ft ³)	Time to Peak (min)	Flow (Peak) (ft ³ /s)
Flow (From)	Existing Impervious	44,558.872	725.000	13.60
Flow (From)	Existing Pervious	5,450.283	730.000	1.38
Flow (In)	O-1	50,009.155	726.000	14.69

Subsection: Addition Summary
Label: O-1
Scenario: Pre-Development 2 year

Return Event: 2 years
Storm Event: NOAA-D (3.35 in)

Summary for Hydrograph Addition at 'O-1'

Upstream Link	Upstream Node
<Catchment to Outflow Node>	Existing Impervious
<Catchment to Outflow Node>	Existing Pervious

Node Inflows

Inflow Type	Element	Volume (ft ³)	Time to Peak (min)	Flow (Peak) (ft ³ /s)
Flow (From)	Existing Impervious	36,986.079	726.000	11.38
Flow (From)	Existing Pervious	3,594.539	730.000	0.84
Flow (In)	O-1	40,580.619	726.000	12.01

Subsection: Addition Summary

Label: O-1

Scenario: Pre-Development 10 year, Year 2100

Return Event: 10 years

Storm Event: NOAA-D 2100 (6.20)

Summary for Hydrograph Addition at 'O-1'

Upstream Link	Upstream Node
<Catchment to Outflow Node>	Existing Impervious
<Catchment to Outflow Node>	Existing Pervious

Node Inflows

Inflow Type	Element	Volume (ft ³)	Time to Peak (min)	Flow (Peak) (ft ³ /s)
Flow (From)	Existing Impervious	70,742.194	725.000	21.22
Flow (From)	Existing Pervious	13,319.825	729.000	3.65
Flow (In)	O-1	84,062.019	726.000	24.27

Subsection: Addition Summary
Label: O-1
Scenario: Pre-Development 10 year

Return Event: 10 years
Storm Event: NOAA-D (5.17 in)

Summary for Hydrograph Addition at 'O-1'

Upstream Link	Upstream Node
<Catchment to Outflow Node>	Existing Impervious
<Catchment to Outflow Node>	Existing Pervious

Node Inflows

Inflow Type	Element	Volume (ft ³)	Time to Peak (min)	Flow (Peak) (ft ³ /s)
Flow (From)	Existing Impervious	58,534.843	725.000	17.67
Flow (From)	Existing Pervious	9,424.231	729.000	2.53
Flow (In)	O-1	67,959.074	726.000	19.75

Subsection: Addition Summary
Label: O-1
Scenario: Pre-Development 25 year

Return Event: 25 years
Storm Event: NOAA-D (6.36 in)

Summary for Hydrograph Addition at 'O-1'

Upstream Link	Upstream Node
<Catchment to Outflow Node>	Existing Impervious
<Catchment to Outflow Node>	Existing Pervious

Node Inflows

Inflow Type	Element	Volume (ft ³)	Time to Peak (min)	Flow (Peak) (ft ³ /s)
Flow (From)	Existing Impervious	72,638.906	725.000	21.77
Flow (From)	Existing Pervious	13,952.739	729.000	3.84
Flow (In)	O-1	86,591.645	726.000	24.98

Subsection: Addition Summary

Label: O-1

Scenario: Pre-Development 100 year, Year 2100

Return Event: 100 years

Storm Event: NOAA-D 2100 (11.48)

Summary for Hydrograph Addition at 'O-1'

Upstream Link	Upstream Node
<Catchment to Outflow Node>	Existing Impervious
<Catchment to Outflow Node>	Existing Pervious

Node Inflows

Inflow Type	Element	Volume (ft ³)	Time to Peak (min)	Flow (Peak) (ft ³ /s)
Flow (From)	Existing Impervious	133,361.366	725.000	39.38
Flow (From)	Existing Pervious	36,573.928	729.000	10.11
Flow (In)	O-1	169,935.295	726.000	48.11

Subsection: Addition Summary

Label: O-1

Scenario: Pre-Development 100 year

Return Event: 100 years

Storm Event: NOAA-D (8.89 in)

Summary for Hydrograph Addition at 'O-1'

Upstream Link	Upstream Node
<Catchment to Outflow Node>	Existing Impervious
<Catchment to Outflow Node>	Existing Pervious

Node Inflows

Inflow Type	Element	Volume (ft ³)	Time to Peak (min)	Flow (Peak) (ft ³ /s)
Flow (From)	Existing Impervious	102,639.630	725.000	30.48
Flow (From)	Existing Pervious	24,673.755	729.000	6.85
Flow (In)	O-1	127,313.385	726.000	36.33

Index

E

Existing Impervious (Runoff CN-Area, 10 years (Pre-Development 10 year))...7
Existing Impervious (Runoff CN-Area, 10 years (Pre-Development 10 year, Year 2100))...6
Existing Impervious (Runoff CN-Area, 100 years (Pre-Development 100 year))...10
Existing Impervious (Runoff CN-Area, 100 years (Pre-Development 100 year, Year 2100))...9
Existing Impervious (Runoff CN-Area, 2 years (Pre-Development 2 year))...5
Existing Impervious (Runoff CN-Area, 2 years (Pre-Development 2 year, Year 2100))...4
Existing Impervious (Runoff CN-Area, 25 years (Pre-Development 25 year))...8
Existing Impervious (Unit Hydrograph Summary, 10 years (Pre-Development 10 year))...24, 25
Existing Impervious (Unit Hydrograph Summary, 10 years (Pre-Development 10 year, Year 2100))...22, 23
Existing Impervious (Unit Hydrograph Summary, 100 years (Pre-Development 100 year))...30, 31
Existing Impervious (Unit Hydrograph Summary, 100 years (Pre-Development 100 year, Year 2100))...28, 29
Existing Impervious (Unit Hydrograph Summary, 2 years (Pre-Development 2 year))...20, 21
Existing Impervious (Unit Hydrograph Summary, 2 years (Pre-Development 2 year, Year 2100))...18, 19
Existing Impervious (Unit Hydrograph Summary, 25 years (Pre-Development 25 year))...26, 27
Existing Pervious (Runoff CN-Area, 10 years (Pre-Development 10 year))...14
Existing Pervious (Runoff CN-Area, 10 years (Pre-Development 10 year, Year 2100))...13
Existing Pervious (Runoff CN-Area, 100 years (Pre-Development 100 year))...17
Existing Pervious (Runoff CN-Area, 100 years (Pre-Development 100 year, Year 2100))...16
Existing Pervious (Runoff CN-Area, 2 years (Pre-Development 2 year))...12
Existing Pervious (Runoff CN-Area, 2 years (Pre-Development 2 year, Year 2100))...11
Existing Pervious (Runoff CN-Area, 25 years (Pre-Development 25 year))...15
Existing Pervious (Unit Hydrograph Summary, 10 years (Pre-Development 10 year))...38, 39
Existing Pervious (Unit Hydrograph Summary, 10 years (Pre-Development 10 year, Year 2100))...36, 37
Existing Pervious (Unit Hydrograph Summary, 100 years (Pre-Development 100 year))...44, 45
Existing Pervious (Unit Hydrograph Summary, 100 years (Pre-Development 100 year, Year 2100))...42, 43
Existing Pervious (Unit Hydrograph Summary, 2 years (Pre-Development 2 year))...34, 35
Existing Pervious (Unit Hydrograph Summary, 2 years (Pre-Development 2 year, Year 2100))...32, 33

Existing Pervious (Unit Hydrograph Summary, 25 years (Pre-Development 25 year))...40, 41

M

Master Network Summary...2, 3

O

O-1 (Addition Summary, 10 years (Pre-Development 10 year))...49

O-1 (Addition Summary, 10 years (Pre-Development 10 year, Year 2100))...48

O-1 (Addition Summary, 100 years (Pre-Development 100 year))...52

O-1 (Addition Summary, 100 years (Pre-Development 100 year, Year 2100))...51

O-1 (Addition Summary, 2 years (Pre-Development 2 year))...47

O-1 (Addition Summary, 2 years (Pre-Development 2 year, Year 2100))...46

O-1 (Addition Summary, 25 years (Pre-Development 25 year))...50

Project Summary	
Title	Penn Medicine Cancer and Imaging Center Reduction Areas
Engineer	Kiera Nissen
Company	French and Parrello Associates
Date	8/28/2024
Notes	
Pervious to Impervious Area	

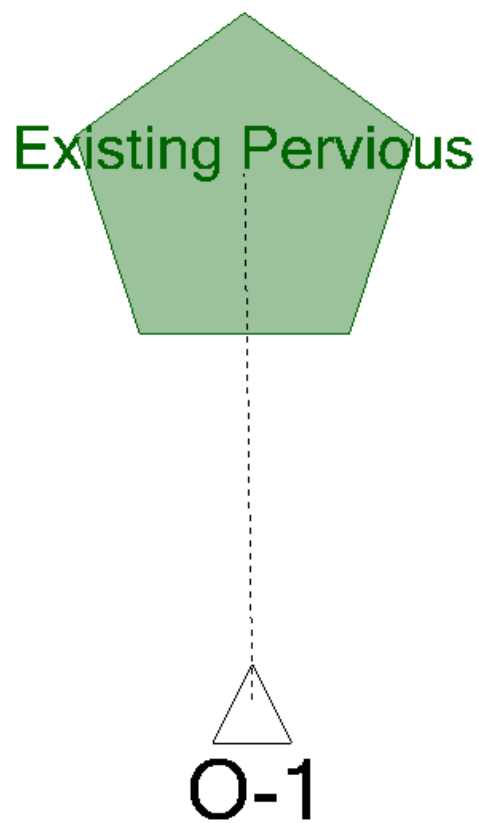


Table of Contents

	Master Network Summary	2
Existing Pervious		
	Unit Hydrograph Summary, 2 years (Pre-Development 2 year, Year 2100)	3
	Unit Hydrograph Summary, 2 years (Pre-Development 2 year)	5
	Unit Hydrograph Summary, 10 years (Pre-Development 10 year, Year 2100)	7
	Unit Hydrograph Summary, 10 years (Pre-Development 10 year)	9
	Unit Hydrograph Summary, 100 years (Pre-Development 100 year, Year 2100)	11
	Unit Hydrograph Summary, 100 years (Pre-Development 100 year)	13

Subsection: Master Network Summary

Catchments Summary

Label	Scenario	Return Event (years)	Hydrograph Volume (ft ³)	Time to Peak (min)	Peak Flow (ft ³ /s)
Existing Pervious	Pre-Development 2 year, Year 2100	2	1,266.000	729.000	0.35
Existing Pervious	Pre-Development 2 year	2	906.000	729.000	0.24
Existing Pervious	Pre-Development 10 year, Year 2100	10	2,672.000	729.000	0.74
Existing Pervious	Pre-Development 10 year	10	1,992.000	729.000	0.55
Existing Pervious	Pre-Development 100 year, Year 2100	100	6,478.000	729.000	1.75
Existing Pervious	Pre-Development 100 year	100	4,566.000	729.000	1.25

Node Summary

Label	Scenario	Return Event (years)	Hydrograph Volume (ft ³)	Time to Peak (min)	Peak Flow (ft ³ /s)
O-1	Pre-Development 2 year, Year 2100	2	1,266.000	729.000	0.35
O-1	Pre-Development 2 year	2	906.000	729.000	0.24
O-1	Pre-Development 10 year, Year 2100	10	2,672.000	729.000	0.74
O-1	Pre-Development 10 year	10	1,992.000	729.000	0.55
O-1	Pre-Development 100 year, Year 2100	100	6,478.000	729.000	1.75
O-1	Pre-Development 100 year	100	4,566.000	729.000	1.25

Subsection: Unit Hydrograph Summary
Label: Existing Pervious
Scenario: Pre-Development 2 year, Year 2100

Return Event: 2 years
Storm Event: NOAA-D 2100 (3.99)

Storm Event	NOAA-D 2100 (3.99)
Return Event	2 years
Duration	1,440.000 min
Depth	3.99 in
Time of Concentration (Composite)	10.000 min
Area (User Defined)	0.220 acres
Computational Time Increment	1.333 min
Time to Peak (Computed)	729.333 min
Flow (Peak, Computed)	0.35 ft ³ /s
Output Increment	1.002 min
Time to Flow (Peak Interpolated Output)	729.000 min
Flow (Peak Interpolated Output)	0.35 ft ³ /s
Drainage Area	
SCS CN (Composite)	74.000
Area (User Defined)	0.220 acres
Maximum Retention (Pervious)	3.51 in
Maximum Retention (Pervious, 20 percent)	0.70 in
Cumulative Runoff	
Cumulative Runoff Depth (Pervious)	1.59 in
Runoff Volume (Pervious)	1,268.956 ft ³
Hydrograph Volume (Area under Hydrograph curve)	
Volume	1,266.000 ft ³
SCS Unit Hydrograph Parameters	
Time of Concentration (Composite)	10.000 min
Computational Time Increment	1.333 min
Unit Hydrograph Shape Factor	483.432
K Factor	0.749
Receding/Rising, Tr/Tp	1.670
Unit peak, qp	1.50 ft ³ /s

Subsection: Unit Hydrograph Summary

Label: Existing Pervious

Scenario: Pre-Development 2 year, Year 2100

Return Event: 2 years

Storm Event: NOAA-D 2100 (3.99)

SCS Unit Hydrograph Parameters

Unit peak time, Tp	6.667 min
Unit receding limb, Tr	26.667 min
Total unit time, Tb	33.333 min

Subsection: Unit Hydrograph Summary
Label: Existing Pervious
Scenario: Pre-Development 2 year

Return Event: 2 years
Storm Event: NOAA-D (3.35 in)

Storm Event	NOAA-D (3.35 in)
Return Event	2 years
Duration	1,440.000 min
Depth	3.35 in
Time of Concentration (Composite)	10.000 min
Area (User Defined)	0.220 acres
Computational Time Increment	1.333 min
Time to Peak (Computed)	729.333 min
Flow (Peak, Computed)	0.25 ft ³ /s
Output Increment	1.002 min
Time to Flow (Peak Interpolated Output)	729.000 min
Flow (Peak Interpolated Output)	0.24 ft ³ /s
Drainage Area	
SCS CN (Composite)	74.000
Area (User Defined)	0.220 acres
Maximum Retention (Pervious)	3.51 in
Maximum Retention (Pervious, 20 percent)	0.70 in
Cumulative Runoff	
Cumulative Runoff Depth (Pervious)	1.14 in
Runoff Volume (Pervious)	908.441 ft ³
Hydrograph Volume (Area under Hydrograph curve)	
Volume	906.000 ft ³
SCS Unit Hydrograph Parameters	
Time of Concentration (Composite)	10.000 min
Computational Time Increment	1.333 min
Unit Hydrograph Shape Factor	483.432
K Factor	0.749
Receding/Rising, Tr/Tp	1.670
Unit peak, qp	1.50 ft ³ /s

Subsection: Unit Hydrograph Summary
Label: Existing Pervious
Scenario: Pre-Development 2 year

Return Event: 2 years
Storm Event: NOAA-D (3.35 in)

SCS Unit Hydrograph Parameters	
Unit peak time, Tp	6.667 min
Unit receding limb, Tr	26.667 min
Total unit time, Tb	33.333 min

Subsection: Unit Hydrograph Summary

Label: Existing Pervious

Scenario: Pre-Development 10 year, Year 2100

Return Event: 10 years

Storm Event: NOAA-D 2100 (6.20)

Storm Event	NOAA-D 2100 (6.20)
Return Event	10 years
Duration	1,440.000 min
Depth	6.20 in
Time of Concentration (Composite)	10.000 min
Area (User Defined)	0.220 acres
Computational Time Increment	1.333 min
Time to Peak (Computed)	729.333 min
Flow (Peak, Computed)	0.75 ft ³ /s
Output Increment	1.002 min
Time to Flow (Peak Interpolated Output)	729.000 min
Flow (Peak Interpolated Output)	0.74 ft ³ /s
Drainage Area	
SCS CN (Composite)	74.000
Area (User Defined)	0.220 acres
Maximum Retention (Pervious)	3.51 in
Maximum Retention (Pervious, 20 percent)	0.70 in
Cumulative Runoff	
Cumulative Runoff Depth (Pervious)	3.35 in
Runoff Volume (Pervious)	2,678.328 ft ³
Hydrograph Volume (Area under Hydrograph curve)	
Volume	2,672.000 ft ³
SCS Unit Hydrograph Parameters	
Time of Concentration (Composite)	10.000 min
Computational Time Increment	1.333 min
Unit Hydrograph Shape Factor	483.432
K Factor	0.749
Receding/Rising, Tr/Tp	1.670
Unit peak, qp	1.50 ft ³ /s

Subsection: Unit Hydrograph Summary

Label: Existing Pervious

Scenario: Pre-Development 10 year, Year 2100

Return Event: 10 years

Storm Event: NOAA-D 2100 (6.20)

SCS Unit Hydrograph Parameters

Unit peak time, T_p	6.667 min
Unit receding limb, T_r	26.667 min
Total unit time, T_b	33.333 min

Subsection: Unit Hydrograph Summary
Label: Existing Pervious
Scenario: Pre-Development 10 year

Return Event: 10 years
Storm Event: NOAA-D (5.17 in)

Storm Event	NOAA-D (5.17 in)
Return Event	10 years
Duration	1,440.000 min
Depth	5.17 in
Time of Concentration (Composite)	10.000 min
Area (User Defined)	0.220 acres
Computational Time Increment	1.333 min
Time to Peak (Computed)	729.333 min
Flow (Peak, Computed)	0.56 ft ³ /s
Output Increment	1.002 min
Time to Flow (Peak Interpolated Output)	729.000 min
Flow (Peak Interpolated Output)	0.55 ft ³ /s
Drainage Area	
SCS CN (Composite)	74.000
Area (User Defined)	0.220 acres
Maximum Retention (Pervious)	3.51 in
Maximum Retention (Pervious, 20 percent)	0.70 in
Cumulative Runoff	
Cumulative Runoff Depth (Pervious)	2.50 in
Runoff Volume (Pervious)	1,996.972 ft ³
Hydrograph Volume (Area under Hydrograph curve)	
Volume	1,992.000 ft ³
SCS Unit Hydrograph Parameters	
Time of Concentration (Composite)	10.000 min
Computational Time Increment	1.333 min
Unit Hydrograph Shape Factor	483.432
K Factor	0.749
Receding/Rising, Tr/Tp	1.670
Unit peak, qp	1.50 ft ³ /s

Subsection: Unit Hydrograph Summary
Label: Existing Pervious
Scenario: Pre-Development 10 year

Return Event: 10 years
Storm Event: NOAA-D (5.17 in)

SCS Unit Hydrograph Parameters	
Unit peak time, Tp	6.667 min
Unit receding limb, Tr	26.667 min
Total unit time, Tb	33.333 min

Subsection: Unit Hydrograph Summary
Label: Existing Pervious
Scenario: Pre-Development 100 year, Year 2100

Return Event: 100 years
Storm Event: NOAA-D 2100 (11.48)

Storm Event	NOAA-D 2100 (11.48)
Return Event	100 years
Duration	1,440.000 min
Depth	11.48 in
Time of Concentration (Composite)	10.000 min
Area (User Defined)	0.220 acres
Computational Time Increment	1.333 min
Time to Peak (Computed)	729.333 min
Flow (Peak, Computed)	1.76 ft ³ /s
Output Increment	1.002 min
Time to Flow (Peak Interpolated Output)	729.000 min
Flow (Peak Interpolated Output)	1.75 ft ³ /s
Drainage Area	
SCS CN (Composite)	74.000
Area (User Defined)	0.220 acres
Maximum Retention (Pervious)	3.51 in
Maximum Retention (Pervious, 20 percent)	0.70 in
Cumulative Runoff	
Cumulative Runoff Depth (Pervious)	8.13 in
Runoff Volume (Pervious)	6,490.709 ft ³
Hydrograph Volume (Area under Hydrograph curve)	
Volume	6,478.000 ft ³
SCS Unit Hydrograph Parameters	
Time of Concentration (Composite)	10.000 min
Computational Time Increment	1.333 min
Unit Hydrograph Shape Factor	483.432
K Factor	0.749
Receding/Rising, Tr/Tp	1.670
Unit peak, qp	1.50 ft ³ /s

Subsection: Unit Hydrograph Summary

Label: Existing Pervious

Scenario: Pre-Development 100 year, Year 2100

Return Event: 100 years

Storm Event: NOAA-D 2100 (11.48)

SCS Unit Hydrograph Parameters

Unit peak time, T_p 6.667 min

Unit receding limb, T_r 26.667 min

Total unit time, T_b 33.333 min

Subsection: Unit Hydrograph Summary
Label: Existing Pervious
Scenario: Pre-Development 100 year

Return Event: 100 years
Storm Event: NOAA-D (8.89 in)

Storm Event	NOAA-D (8.89 in)
Return Event	100 years
Duration	1,440.000 min
Depth	8.89 in
Time of Concentration (Composite)	10.000 min
Area (User Defined)	0.220 acres
Computational Time Increment	1.333 min
Time to Peak (Computed)	729.333 min
Flow (Peak, Computed)	1.26 ft ³ /s
Output Increment	1.002 min
Time to Flow (Peak Interpolated Output)	729.000 min
Flow (Peak Interpolated Output)	1.25 ft ³ /s
Drainage Area	
SCS CN (Composite)	74.000
Area (User Defined)	0.220 acres
Maximum Retention (Pervious)	3.51 in
Maximum Retention (Pervious, 20 percent)	0.70 in
Cumulative Runoff	
Cumulative Runoff Depth (Pervious)	5.73 in
Runoff Volume (Pervious)	4,575.035 ft ³
Hydrograph Volume (Area under Hydrograph curve)	
Volume	4,566.000 ft ³
SCS Unit Hydrograph Parameters	
Time of Concentration (Composite)	10.000 min
Computational Time Increment	1.333 min
Unit Hydrograph Shape Factor	483.432
K Factor	0.749
Receding/Rising, Tr/Tp	1.670
Unit peak, qp	1.50 ft ³ /s

Subsection: Unit Hydrograph Summary
Label: Existing Pervious
Scenario: Pre-Development 100 year

Return Event: 100 years
Storm Event: NOAA-D (8.89 in)

SCS Unit Hydrograph Parameters	
Unit peak time, Tp	6.667 min
Unit receding limb, Tr	26.667 min
Total unit time, Tb	33.333 min

Index

E

Existing Pervious (Unit Hydrograph Summary, 10 years (Pre-Development 10 year))...9, 10
Existing Pervious (Unit Hydrograph Summary, 10 years (Pre-Development 10 year, Year 2100))...7, 8
Existing Pervious (Unit Hydrograph Summary, 100 years (Pre-Development 100 year))...13, 14
Existing Pervious (Unit Hydrograph Summary, 100 years (Pre-Development 100 year, Year 2100))...11, 12
Existing Pervious (Unit Hydrograph Summary, 2 years (Pre-Development 2 year))...5, 6
Existing Pervious (Unit Hydrograph Summary, 2 years (Pre-Development 2 year, Year 2100))...3, 4

M

Master Network Summary...2



Appendix C

Proposed Conditions Calculations

Project Summary	
Title	Penn Medicine Cancer Center
Engineer	Kiera Nissen
Company	French and Parrello Associates
Date	10/2/2024
Notes	
Proposed Conditions	

Table of Contents

	Master Network Summary	2
DA2-PR Imp		
	Runoff CN-Area, 2 years (Post-Development 2 year, Year 2100)	5
	Runoff CN-Area, 2 years (Post-Development 2 year)	6
	Runoff CN-Area, 10 years (Post-Development 10 year, Year 2100)	7
	Runoff CN-Area, 10 years (Post-Development 10 year)	8
	Runoff CN-Area, 25 years (Post-Development 25 year)	9
	Runoff CN-Area, 100 years (Post-Development 100 year, Year 2100)	10
	Runoff CN-Area, 100 years (Post-Development 100 year)	11
DA2-PR Perv		
	Runoff CN-Area, 2 years (Post-Development 2 year, Year 2100)	12
	Runoff CN-Area, 2 years (Post-Development 2 year)	13
	Runoff CN-Area, 10 years (Post-Development 10 year, Year 2100)	14
	Runoff CN-Area, 10 years (Post-Development 10 year)	15
	Runoff CN-Area, 25 years (Post-Development 25 year)	16
	Runoff CN-Area, 100 years (Post-Development 100 year, Year 2100)	17
	Runoff CN-Area, 100 years (Post-Development 100 year)	18
DA2-PR Imp		
	Unit Hydrograph Summary, 2 years (Post-Development 2 year, Year 2100)	19
	Unit Hydrograph Summary, 2 years (Post-Development 2 year)	21
	Unit Hydrograph Summary, 10 years (Post-Development 10 year, Year 2100)	23
	Unit Hydrograph Summary, 10 years (Post-Development 10 year)	25
	Unit Hydrograph Summary, 25 years (Post-Development 25 year)	27
	Unit Hydrograph Summary, 100 years (Post-Development 100 year, Year 2100)	29
	Unit Hydrograph Summary, 100 years (Post-Development 100 year)	31
DA2-PR Perv		
	Unit Hydrograph Summary, 2 years (Post-Development 2 year, Year 2100)	33
	Unit Hydrograph Summary, 2 years (Post-Development 2 year)	35
	Unit Hydrograph Summary, 10 years (Post-Development 10 year, Year 2100)	37
	Unit Hydrograph Summary, 10 years (Post-Development 10 year)	39
	Unit Hydrograph Summary, 25 years (Post-Development 25 year)	41

Table of Contents

	Unit Hydrograph Summary, 100 years (Post-Development 100 year, Year 2100)	43
	Unit Hydrograph Summary, 100 years (Post-Development 100 year)	45
Impervious to Basin		
	Unit Hydrograph Summary, 2 years (Post-Development 2 year, Year 2100)	47
	Unit Hydrograph Summary, 2 years (Post-Development 2 year)	49
	Unit Hydrograph Summary, 10 years (Post-Development 10 year, Year 2100)	51
	Unit Hydrograph Summary, 10 years (Post-Development 10 year)	53
	Unit Hydrograph Summary, 25 years (Post-Development 25 year)	55
	Unit Hydrograph Summary, 100 years (Post-Development 100 year, Year 2100)	57
	Unit Hydrograph Summary, 100 years (Post-Development 100 year)	59
Pervious to basin		
	Unit Hydrograph Summary, 2 years (Post-Development 2 year, Year 2100)	61
	Unit Hydrograph Summary, 2 years (Post-Development 2 year)	63
	Unit Hydrograph Summary, 10 years (Post-Development 10 year, Year 2100)	65
	Unit Hydrograph Summary, 10 years (Post-Development 10 year)	67
	Unit Hydrograph Summary, 25 years (Post-Development 25 year)	69
	Unit Hydrograph Summary, 100 years (Post-Development 100 year, Year 2100)	71
	Unit Hydrograph Summary, 100 years (Post-Development 100 year)	73
O-1		
	Addition Summary, 2 years (Post-Development 2 year, Year 2100)	75
	Addition Summary, 2 years (Post-Development 2 year)	76
	Addition Summary, 10 years (Post-Development 10 year, Year 2100)	77
	Addition Summary, 10 years (Post-Development 10 year)	78
	Addition Summary, 25 years (Post-Development 25 year)	79
	Addition Summary, 100 years (Post-Development 100 year, Year 2100)	80
	Addition Summary, 100 years (Post-Development 100 year)	81
Basin		
	Elevation-Area Volume Curve, 100 years (Post-Development 100 year, Year 2100)	82
	Volume Equations, 100 years (Post-Development 100 year, Year 2100)	83
Composite Outlet Structure - 1		

Table of Contents

	Outlet Input Data, 100 years (Post-Development 100 year, Year 2100)	84
	Individual Outlet Curves, 100 years (Post-Development 100 year, Year 2100)	86
	Composite Rating Curve, 100 years (Post-Development 100 year, Year 2100)	94
Basin (IN)		
	Level Pool Pond Routing Summary, 2 years (Post-Development 2 year, Year 2100)	96
	Level Pool Pond Routing Summary, 2 years (Post-Development 2 year)	97
	Level Pool Pond Routing Summary, 10 years (Post-Development 10 year, Year 2100)	98
	Level Pool Pond Routing Summary, 10 years (Post-Development 10 year)	99
	Level Pool Pond Routing Summary, 25 years (Post-Development 25 year)	100
	Level Pool Pond Routing Summary, 100 years (Post-Development 100 year, Year 2100)	101
	Level Pool Pond Routing Summary, 100 years (Post-Development 100 year)	102

Subsection: Master Network Summary

Catchments Summary

Label	Scenario	Return Event (years)	Hydrograph Volume (ft ³)	Time to Peak (min)	Peak Flow (ft ³ /s)
DA2-PR Imp	Post-Development 2 year	2	32,564.000	726.000	10.02
DA2-PR Imp	Post-Development 2 year, Year 2100	2	39,231.000	725.000	11.97
DA2-PR Imp	Post-Development 10 year	10	51,536.000	725.000	15.56
DA2-PR Imp	Post-Development 10 year, Year 2100	10	62,283.000	725.000	18.68
DA2-PR Imp	Post-Development 25 year	25	63,953.000	725.000	19.17
DA2-PR Imp	Post-Development 100 year, Year 2100	100	117,415.000	725.000	34.67
DA2-PR Imp	Post-Development 100 year	100	90,367.000	725.000	26.83
DA2-PR Perv	Post-Development 2 year	2	2,954.000	729.000	0.72
DA2-PR Perv	Post-Development 2 year, Year 2100	2	4,479.000	729.000	1.19
DA2-PR Perv	Post-Development 10 year	10	7,744.000	729.000	2.18
DA2-PR Perv	Post-Development 10 year, Year 2100	10	10,945.000	729.000	3.14
DA2-PR Perv	Post-Development 25 year	25	11,465.000	729.000	3.29
DA2-PR Perv	Post-Development 100 year, Year 2100	100	30,050.000	729.000	8.62
DA2-PR Perv	Post-Development 100 year	100	20,273.000	729.000	5.85
Impervious to Basin	Post-Development 2 year	2	5,549.000	726.000	1.71
Impervious to Basin	Post-Development 2 year, Year 2100	2	6,685.000	726.000	2.05
Impervious to Basin	Post-Development 10 year	10	8,782.000	726.000	2.66
Impervious to Basin	Post-Development 10 year, Year 2100	10	10,613.000	726.000	3.19
Impervious to Basin	Post-Development 25 year	25	10,898.000	726.000	3.27
Impervious to Basin	Post-Development 100 year, Year 2100	100	20,008.000	726.000	5.92
Impervious to Basin	Post-Development 100 year	100	15,399.000	726.000	4.58
Pervious to basin	Post-Development 2 year	2	621.000	727.000	0.21
Pervious to basin	Post-Development 2 year, Year 2100	2	878.000	727.000	0.30
Pervious to basin	Post-Development 10 year	10	1,401.000	726.000	0.49

Subsection: Master Network Summary

Catchments Summary

Label	Scenario	Return Event (years)	Hydrograph Volume (ft ³)	Time to Peak (min)	Peak Flow (ft ³ /s)
Pervious to basin	Post-Development 10 year, Year 2100	10	1,894.000	726.000	0.66
Pervious to basin	Post-Development 25 year	25	1,973.000	726.000	0.69
Pervious to basin	Post-Development 100 year, Year 2100	100	4,679.000	726.000	1.58
Pervious to basin	Post-Development 100 year	100	3,276.000	726.000	1.12

Node Summary

Label	Scenario	Return Event (years)	Hydrograph Volume (ft ³)	Time to Peak (min)	Peak Flow (ft ³ /s)
O-1	Post-Development 2 year	2	41,645.000	726.000	11.85
O-1	Post-Development 2 year, Year 2100	2	51,222.000	726.000	14.37
O-1	Post-Development 10 year	10	69,406.000	726.000	19.30
O-1	Post-Development 10 year, Year 2100	10	85,673.000	726.000	23.82
O-1	Post-Development 25 year	25	88,226.000	726.000	24.53
O-1	Post-Development 100 year, Year 2100	100	172,062.000	726.000	47.51
O-1	Post-Development 100 year	100	129,238.000	726.000	35.84

Pond Summary

Label	Scenario	Return Event (years)	Hydrograph Volume (ft ³)	Time to Peak (min)	Peak Flow (ft ³ /s)	Maximum Water Surface Elevation (ft)	Maximum Pond Storage (ft ³)
Basin (IN)	Post-Development 2 year	2	6,170.000	726.000	1.92	(N/A)	(N/A)
Basin (OUT)	Post-Development 2 year	2	6,128.000	727.000	1.28	81.91	672.000
Basin (IN)	Post-Development 2 year, Year 2100	2	7,563.000	726.000	2.35	(N/A)	(N/A)

Subsection: Master Network Summary

Pond Summary

Label	Scenario	Return Event (years)	Hydrograph Volume (ft ³)	Time to Peak (min)	Peak Flow (ft ³ /s)	Maximum Water Surface Elevation (ft)	Maximum Pond Storage (ft ³)
Basin (OUT)	Post-Development 2 year, Year 2100	2	7,513.000	727.000	1.44	82.07	841.000
Basin (IN)	Post-Development 10 year	10	10,183.000	726.000	3.15	(N/A)	(N/A)
Basin (OUT)	Post-Development 10 year	10	10,126.000	727.000	1.96	82.33	1,168.000
Basin (IN)	Post-Development 10 year, Year 2100	10	12,507.000	726.000	3.85	(N/A)	(N/A)
Basin (OUT)	Post-Development 10 year, Year 2100	10	12,445.000	727.000	2.51	82.52	1,436.000
Basin (IN)	Post-Development 25 year	25	12,870.000	726.000	3.96	(N/A)	(N/A)
Basin (OUT)	Post-Development 25 year	25	12,808.000	727.000	2.59	82.55	1,477.000
Basin (IN)	Post-Development 100 year, Year 2100	100	24,686.000	726.000	7.50	(N/A)	(N/A)
Basin (OUT)	Post-Development 100 year, Year 2100	100	24,597.000	727.000	5.26	83.22	2,726.000
Basin (IN)	Post-Development 100 year	100	18,674.000	726.000	5.70	(N/A)	(N/A)
Basin (OUT)	Post-Development 100 year	100	18,598.000	727.000	3.93	82.91	2,103.000

Subsection: Runoff CN-Area
 Label: DA2-PR Imp
 Scenario: Post-Development 2 year, Year 2100

Return Event: 2 years
 Storm Event: NOAA-D 2100 (3.99)

Runoff Curve Number Data

Soil/Surface Description	CN	Area (acres)	C (%)	UC (%)	Adjusted CN
Impervious Areas - Paved parking lots, roofs, driveways, Streets and roads - Soil D	98.000	2.879	0.000	0.000	98.000
COMPOSITE AREA & WEIGHTED CN --->	(N/A)	2.879	(N/A)	(N/A)	98.000

Subsection: Runoff CN-Area
 Label: DA2-PR Imp
 Scenario: Post-Development 2 year

Return Event: 2 years
 Storm Event: NOAA-D (3.35 in)

Runoff Curve Number Data

Soil/Surface Description	CN	Area (acres)	C (%)	UC (%)	Adjusted CN
Impervious Areas - Paved parking lots, roofs, driveways, Streets and roads - Soil D	98.000	2.879	0.000	0.000	98.000
COMPOSITE AREA & WEIGHTED CN --->	(N/A)	2.879	(N/A)	(N/A)	98.000

Subsection: Runoff CN-Area
 Label: DA2-PR Imp
 Scenario: Post-Development 10 year, Year 2100

Return Event: 10 years
 Storm Event: NOAA-D 2100 (6.20)

Runoff Curve Number Data

Soil/Surface Description	CN	Area (acres)	C (%)	UC (%)	Adjusted CN
Impervious Areas - Paved parking lots, roofs, driveways, Streets and roads - Soil D	98.000	2.879	0.000	0.000	98.000
COMPOSITE AREA & WEIGHTED CN --->	(N/A)	2.879	(N/A)	(N/A)	98.000

Subsection: Runoff CN-Area
 Label: DA2-PR Imp
 Scenario: Post-Development 10 year

Return Event: 10 years
 Storm Event: NOAA-D (5.17 in)

Runoff Curve Number Data

Soil/Surface Description	CN	Area (acres)	C (%)	UC (%)	Adjusted CN
Impervious Areas - Paved parking lots, roofs, driveways, Streets and roads - Soil D	98.000	2.879	0.000	0.000	98.000
COMPOSITE AREA & WEIGHTED CN --->	(N/A)	2.879	(N/A)	(N/A)	98.000

Subsection: Runoff CN-Area
 Label: DA2-PR Imp
 Scenario: Post-Development 25 year

Return Event: 25 years
 Storm Event: NOAA-D (6.36 in)

Runoff Curve Number Data

Soil/Surface Description	CN	Area (acres)	C (%)	UC (%)	Adjusted CN
Impervious Areas - Paved parking lots, roofs, driveways, Streets and roads - Soil D	98.000	2.879	0.000	0.000	98.000
COMPOSITE AREA & WEIGHTED CN --->	(N/A)	2.879	(N/A)	(N/A)	98.000

Subsection: Runoff CN-Area
 Label: DA2-PR Imp
 Scenario: Post-Development 100 year, Year 2100

Return Event: 100 years
 Storm Event: NOAA-D 2100 (11.48)

Runoff Curve Number Data

Soil/Surface Description	CN	Area (acres)	C (%)	UC (%)	Adjusted CN
Impervious Areas - Paved parking lots, roofs, driveways, Streets and roads - Soil D	98.000	2.879	0.000	0.000	98.000
COMPOSITE AREA & WEIGHTED CN --->	(N/A)	2.879	(N/A)	(N/A)	98.000

Subsection: Runoff CN-Area
 Label: DA2-PR Imp
 Scenario: Post-Development 100 year

Return Event: 100 years
 Storm Event: NOAA-D (8.89 in)

Runoff Curve Number Data

Soil/Surface Description	CN	Area (acres)	C (%)	UC (%)	Adjusted CN
Impervious Areas - Paved parking lots, roofs, driveways, Streets and roads - Soil D	98.000	2.879	0.000	0.000	98.000
COMPOSITE AREA & WEIGHTED CN --->	(N/A)	2.879	(N/A)	(N/A)	98.000

Subsection: Runoff CN-Area

Label: DA2-PR Perv

Scenario: Post-Development 2 year, Year 2100

Return Event: 2 years

Storm Event: NOAA-D 2100 (3.99)

Runoff Curve Number Data

Soil/Surface Description	CN	Area (acres)	C (%)	UC (%)	Adjusted CN
Open space (Lawns,parks etc.) - Good condition; grass cover > 75% - Soil B	61.000	0.808	0.000	0.000	61.000
Open space (Lawns,parks etc.) - Good condition; grass cover > 75% - Soil C	74.000	0.402	0.000	0.000	74.000
COMPOSITE AREA & WEIGHTED CN --->	(N/A)	1.210	(N/A)	(N/A)	65.319

Subsection: Runoff CN-Area
 Label: DA2-PR Perv
 Scenario: Post-Development 2 year

Return Event: 2 years
 Storm Event: NOAA-D (3.35 in)

Runoff Curve Number Data

Soil/Surface Description	CN	Area (acres)	C (%)	UC (%)	Adjusted CN
Open space (Lawns,parks etc.) - Good condition; grass cover > 75% - Soil B	61.000	0.808	0.000	0.000	61.000
Open space (Lawns,parks etc.) - Good condition; grass cover > 75% - Soil C	74.000	0.402	0.000	0.000	74.000
COMPOSITE AREA & WEIGHTED CN --->	(N/A)	1.210	(N/A)	(N/A)	65.319

Subsection: Runoff CN-Area
 Label: DA2-PR Perv
 Scenario: Post-Development 10 year, Year 2100

Return Event: 10 years
 Storm Event: NOAA-D 2100 (6.20)

Runoff Curve Number Data

Soil/Surface Description	CN	Area (acres)	C (%)	UC (%)	Adjusted CN
Open space (Lawns,parks etc.) - Good condition; grass cover > 75% - Soil B	61.000	0.808	0.000	0.000	61.000
Open space (Lawns,parks etc.) - Good condition; grass cover > 75% - Soil C	74.000	0.402	0.000	0.000	74.000
COMPOSITE AREA & WEIGHTED CN --->	(N/A)	1.210	(N/A)	(N/A)	65.319

Subsection: Runoff CN-Area
 Label: DA2-PR Perv
 Scenario: Post-Development 10 year

Return Event: 10 years
 Storm Event: NOAA-D (5.17 in)

Runoff Curve Number Data

Soil/Surface Description	CN	Area (acres)	C (%)	UC (%)	Adjusted CN
Open space (Lawns,parks etc.) - Good condition; grass cover > 75% - Soil B	61.000	0.808	0.000	0.000	61.000
Open space (Lawns,parks etc.) - Good condition; grass cover > 75% - Soil C	74.000	0.402	0.000	0.000	74.000
COMPOSITE AREA & WEIGHTED CN --->	(N/A)	1.210	(N/A)	(N/A)	65.319

Subsection: Runoff CN-Area
 Label: DA2-PR Perv
 Scenario: Post-Development 25 year

Return Event: 25 years
 Storm Event: NOAA-D (6.36 in)

Runoff Curve Number Data

Soil/Surface Description	CN	Area (acres)	C (%)	UC (%)	Adjusted CN
Open space (Lawns,parks etc.) - Good condition; grass cover > 75% - Soil B	61.000	0.808	0.000	0.000	61.000
Open space (Lawns,parks etc.) - Good condition; grass cover > 75% - Soil C	74.000	0.402	0.000	0.000	74.000
COMPOSITE AREA & WEIGHTED CN --->	(N/A)	1.210	(N/A)	(N/A)	65.319

Subsection: Runoff CN-Area

Label: DA2-PR Perv

Scenario: Post-Development 100 year, Year 2100

Return Event: 100 years

Storm Event: NOAA-D 2100 (11.48)

Runoff Curve Number Data

Soil/Surface Description	CN	Area (acres)	C (%)	UC (%)	Adjusted CN
Open space (Lawns,parks etc.) - Good condition; grass cover > 75% - Soil B	61.000	0.808	0.000	0.000	61.000
Open space (Lawns,parks etc.) - Good condition; grass cover > 75% - Soil C	74.000	0.402	0.000	0.000	74.000
COMPOSITE AREA & WEIGHTED CN --->	(N/A)	1.210	(N/A)	(N/A)	65.319

Subsection: Runoff CN-Area
 Label: DA2-PR Perv
 Scenario: Post-Development 100 year

Return Event: 100 years
 Storm Event: NOAA-D (8.89 in)

Runoff Curve Number Data

Soil/Surface Description	CN	Area (acres)	C (%)	UC (%)	Adjusted CN
Open space (Lawns,parks etc.) - Good condition; grass cover > 75% - Soil B	61.000	0.808	0.000	0.000	61.000
Open space (Lawns,parks etc.) - Good condition; grass cover > 75% - Soil C	74.000	0.402	0.000	0.000	74.000
COMPOSITE AREA & WEIGHTED CN --->	(N/A)	1.210	(N/A)	(N/A)	65.319

Subsection: Unit Hydrograph Summary
Label: DA2-PR Imp
Scenario: Post-Development 2 year, Year 2100

Return Event: 2 years
Storm Event: NOAA-D 2100 (3.99)

Storm Event	NOAA-D 2100 (3.99)
Return Event	2 years
Duration	1,440.000 min
Depth	3.99 in
Time of Concentration (Composite)	2.000 min
Area (User Defined)	2.879 acres
Computational Time Increment	0.267 min
Time to Peak (Computed)	725.867 min
Flow (Peak, Computed)	12.00 ft ³ /s
Output Increment	1.002 min
Time to Flow (Peak Interpolated Output)	725.000 min
Flow (Peak Interpolated Output)	11.97 ft ³ /s
Drainage Area	
SCS CN (Composite)	98.000
Area (User Defined)	2.879 acres
Maximum Retention (Pervious)	0.20 in
Maximum Retention (Pervious, 20 percent)	0.04 in
Cumulative Runoff	
Cumulative Runoff Depth (Pervious)	3.76 in
Runoff Volume (Pervious)	39,243.993 ft ³
Hydrograph Volume (Area under Hydrograph curve)	
Volume	39,231.000 ft ³
SCS Unit Hydrograph Parameters	
Time of Concentration (Composite)	2.000 min
Computational Time Increment	0.267 min
Unit Hydrograph Shape Factor	483.432
K Factor	0.749
Receding/Rising, Tr/Tp	1.670
Unit peak, qp	97.86 ft ³ /s

Subsection: Unit Hydrograph Summary

Label: DA2-PR Imp

Scenario: Post-Development 2 year, Year 2100

Return Event: 2 years

Storm Event: NOAA-D 2100 (3.99)

SCS Unit Hydrograph Parameters

Unit peak time, Tp	1.333 min
Unit receding limb, Tr	5.333 min
Total unit time, Tb	6.667 min

Subsection: Unit Hydrograph Summary
Label: DA2-PR Imp
Scenario: Post-Development 2 year

Return Event: 2 years
Storm Event: NOAA-D (3.35 in)

Storm Event	NOAA-D (3.35 in)
Return Event	2 years
Duration	1,440.000 min
Depth	3.35 in
Time of Concentration (Composite)	2.000 min
Area (User Defined)	2.879 acres
Computational Time Increment	0.267 min
Time to Peak (Computed)	725.867 min
Flow (Peak, Computed)	10.04 ft ³ /s
Output Increment	1.002 min
Time to Flow (Peak Interpolated Output)	726.000 min
Flow (Peak Interpolated Output)	10.02 ft ³ /s
Drainage Area	
SCS CN (Composite)	98.000
Area (User Defined)	2.879 acres
Maximum Retention (Pervious)	0.20 in
Maximum Retention (Pervious, 20 percent)	0.04 in
Cumulative Runoff	
Cumulative Runoff Depth (Pervious)	3.12 in
Runoff Volume (Pervious)	32,574.583 ft ³
Hydrograph Volume (Area under Hydrograph curve)	
Volume	32,564.000 ft ³
SCS Unit Hydrograph Parameters	
Time of Concentration (Composite)	2.000 min
Computational Time Increment	0.267 min
Unit Hydrograph Shape Factor	483.432
K Factor	0.749
Receding/Rising, Tr/Tp	1.670
Unit peak, qp	97.86 ft ³ /s

Subsection: Unit Hydrograph Summary
Label: DA2-PR Imp
Scenario: Post-Development 2 year

Return Event: 2 years
Storm Event: NOAA-D (3.35 in)

SCS Unit Hydrograph Parameters	
Unit peak time, Tp	1.333 min
Unit receding limb, Tr	5.333 min
Total unit time, Tb	6.667 min

Subsection: Unit Hydrograph Summary
Label: DA2-PR Imp
Scenario: Post-Development 10 year, Year 2100

Return Event: 10 years
Storm Event: NOAA-D 2100 (6.20)

Storm Event	NOAA-D 2100 (6.20)
Return Event	10 years
Duration	1,440.000 min
Depth	6.20 in
Time of Concentration (Composite)	2.000 min
Area (User Defined)	2.879 acres
Computational Time Increment	0.267 min
Time to Peak (Computed)	725.867 min
Flow (Peak, Computed)	18.72 ft ³ /s
Output Increment	1.002 min
Time to Flow (Peak Interpolated Output)	725.000 min
Flow (Peak Interpolated Output)	18.68 ft ³ /s
Drainage Area	
SCS CN (Composite)	98.000
Area (User Defined)	2.879 acres
Maximum Retention (Pervious)	0.20 in
Maximum Retention (Pervious, 20 percent)	0.04 in
Cumulative Runoff	
Cumulative Runoff Depth (Pervious)	5.96 in
Runoff Volume (Pervious)	62,303.799 ft ³
Hydrograph Volume (Area under Hydrograph curve)	
Volume	62,283.000 ft ³
SCS Unit Hydrograph Parameters	
Time of Concentration (Composite)	2.000 min
Computational Time Increment	0.267 min
Unit Hydrograph Shape Factor	483.432
K Factor	0.749
Receding/Rising, Tr/Tp	1.670
Unit peak, qp	97.86 ft ³ /s

Subsection: Unit Hydrograph Summary

Label: DA2-PR Imp

Scenario: Post-Development 10 year, Year 2100

Return Event: 10 years

Storm Event: NOAA-D 2100 (6.20)

SCS Unit Hydrograph Parameters

Unit peak time, Tp	1.333 min
Unit receding limb, Tr	5.333 min
Total unit time, Tb	6.667 min

Subsection: Unit Hydrograph Summary
Label: DA2-PR Imp
Scenario: Post-Development 10 year

Return Event: 10 years
Storm Event: NOAA-D (5.17 in)

Storm Event	NOAA-D (5.17 in)
Return Event	10 years
Duration	1,440.000 min
Depth	5.17 in
Time of Concentration (Composite)	2.000 min
Area (User Defined)	2.879 acres
Computational Time Increment	0.267 min
Time to Peak (Computed)	725.867 min
Flow (Peak, Computed)	15.59 ft ³ /s
Output Increment	1.002 min
Time to Flow (Peak Interpolated Output)	725.000 min
Flow (Peak Interpolated Output)	15.56 ft ³ /s
Drainage Area	
SCS CN (Composite)	98.000
Area (User Defined)	2.879 acres
Maximum Retention (Pervious)	0.20 in
Maximum Retention (Pervious, 20 percent)	0.04 in
Cumulative Runoff	
Cumulative Runoff Depth (Pervious)	4.93 in
Runoff Volume (Pervious)	51,552.713 ft ³
Hydrograph Volume (Area under Hydrograph curve)	
Volume	51,536.000 ft ³
SCS Unit Hydrograph Parameters	
Time of Concentration (Composite)	2.000 min
Computational Time Increment	0.267 min
Unit Hydrograph Shape Factor	483.432
K Factor	0.749
Receding/Rising, Tr/Tp	1.670
Unit peak, qp	97.86 ft ³ /s

Subsection: Unit Hydrograph Summary
Label: DA2-PR Imp
Scenario: Post-Development 10 year

Return Event: 10 years
Storm Event: NOAA-D (5.17 in)

SCS Unit Hydrograph Parameters	
Unit peak time, Tp	1.333 min
Unit receding limb, Tr	5.333 min
Total unit time, Tb	6.667 min

Subsection: Unit Hydrograph Summary
Label: DA2-PR Imp
Scenario: Post-Development 25 year

Return Event: 25 years
Storm Event: NOAA-D (6.36 in)

Storm Event	NOAA-D (6.36 in)
Return Event	25 years
Duration	1,440.000 min
Depth	6.36 in
Time of Concentration (Composite)	2.000 min
Area (User Defined)	2.879 acres
Computational Time Increment	0.267 min
Time to Peak (Computed)	725.867 min
Flow (Peak, Computed)	19.20 ft ³ /s
Output Increment	1.002 min
Time to Flow (Peak Interpolated Output)	725.000 min
Flow (Peak Interpolated Output)	19.17 ft ³ /s
Drainage Area	
SCS CN (Composite)	98.000
Area (User Defined)	2.879 acres
Maximum Retention (Pervious)	0.20 in
Maximum Retention (Pervious, 20 percent)	0.04 in
Cumulative Runoff	
Cumulative Runoff Depth (Pervious)	6.12 in
Runoff Volume (Pervious)	63,974.241 ft ³
Hydrograph Volume (Area under Hydrograph curve)	
Volume	63,953.000 ft ³
SCS Unit Hydrograph Parameters	
Time of Concentration (Composite)	2.000 min
Computational Time Increment	0.267 min
Unit Hydrograph Shape Factor	483.432
K Factor	0.749
Receding/Rising, Tr/Tp	1.670
Unit peak, qp	97.86 ft ³ /s

Subsection: Unit Hydrograph Summary
Label: DA2-PR Imp
Scenario: Post-Development 25 year

Return Event: 25 years
Storm Event: NOAA-D (6.36 in)

SCS Unit Hydrograph Parameters	
Unit peak time, Tp	1.333 min
Unit receding limb, Tr	5.333 min
Total unit time, Tb	6.667 min

Subsection: Unit Hydrograph Summary
Label: DA2-PR Imp
Scenario: Post-Development 100 year, Year 2100

Return Event: 100 years
Storm Event: NOAA-D 2100 (11.48)

Storm Event	NOAA-D 2100 (11.48)
Return Event	100 years
Duration	1,440.000 min
Depth	11.48 in
Time of Concentration (Composite)	2.000 min
Area (User Defined)	2.879 acres
Computational Time Increment	0.267 min
Time to Peak (Computed)	725.867 min
Flow (Peak, Computed)	34.74 ft ³ /s
Output Increment	1.002 min
Time to Flow (Peak Interpolated Output)	725.000 min
Flow (Peak Interpolated Output)	34.67 ft ³ /s
Drainage Area	
SCS CN (Composite)	98.000
Area (User Defined)	2.879 acres
Maximum Retention (Pervious)	0.20 in
Maximum Retention (Pervious, 20 percent)	0.04 in
Cumulative Runoff	
Cumulative Runoff Depth (Pervious)	11.24 in
Runoff Volume (Pervious)	117,452.851 ft ³
Hydrograph Volume (Area under Hydrograph curve)	
Volume	117,415.000 ft ³
SCS Unit Hydrograph Parameters	
Time of Concentration (Composite)	2.000 min
Computational Time Increment	0.267 min
Unit Hydrograph Shape Factor	483.432
K Factor	0.749
Receding/Rising, Tr/Tp	1.670
Unit peak, qp	97.86 ft ³ /s

Subsection: Unit Hydrograph Summary

Label: DA2-PR Imp

Scenario: Post-Development 100 year, Year 2100

Return Event: 100 years

Storm Event: NOAA-D 2100 (11.48)

SCS Unit Hydrograph Parameters

Unit peak time, Tp	1.333 min
Unit receding limb, Tr	5.333 min
Total unit time, Tb	6.667 min

Subsection: Unit Hydrograph Summary
Label: DA2-PR Imp
Scenario: Post-Development 100 year

Return Event: 100 years
Storm Event: NOAA-D (8.89 in)

Storm Event	NOAA-D (8.89 in)
Return Event	100 years
Duration	1,440.000 min
Depth	8.89 in
Time of Concentration (Composite)	2.000 min
Area (User Defined)	2.879 acres
Computational Time Increment	0.267 min
Time to Peak (Computed)	725.867 min
Flow (Peak, Computed)	26.88 ft ³ /s
Output Increment	1.002 min
Time to Flow (Peak Interpolated Output)	725.000 min
Flow (Peak Interpolated Output)	26.83 ft ³ /s
Drainage Area	
SCS CN (Composite)	98.000
Area (User Defined)	2.879 acres
Maximum Retention (Pervious)	0.20 in
Maximum Retention (Pervious, 20 percent)	0.04 in
Cumulative Runoff	
Cumulative Runoff Depth (Pervious)	8.65 in
Runoff Volume (Pervious)	90,396.051 ft ³
Hydrograph Volume (Area under Hydrograph curve)	
Volume	90,367.000 ft ³
SCS Unit Hydrograph Parameters	
Time of Concentration (Composite)	2.000 min
Computational Time Increment	0.267 min
Unit Hydrograph Shape Factor	483.432
K Factor	0.749
Receding/Rising, Tr/Tp	1.670
Unit peak, qp	97.86 ft ³ /s

Subsection: Unit Hydrograph Summary
Label: DA2-PR Imp
Scenario: Post-Development 100 year

Return Event: 100 years
Storm Event: NOAA-D (8.89 in)

SCS Unit Hydrograph Parameters	
Unit peak time, Tp	1.333 min
Unit receding limb, Tr	5.333 min
Total unit time, Tb	6.667 min

Subsection: Unit Hydrograph Summary

Label: DA2-PR Perv

Scenario: Post-Development 2 year, Year 2100

Return Event: 2 years

Storm Event: NOAA-D 2100 (3.99)

Storm Event	NOAA-D 2100 (3.99)
Return Event	2 years
Duration	1,440.000 min
Depth	3.99 in
Time of Concentration (Composite)	9.000 min
Area (User Defined)	1.210 acres
Computational Time Increment	1.200 min
Time to Peak (Computed)	729.600 min
Flow (Peak, Computed)	1.19 ft ³ /s
Output Increment	1.002 min
Time to Flow (Peak Interpolated Output)	729.000 min
Flow (Peak Interpolated Output)	1.19 ft ³ /s
Drainage Area	
SCS CN (Composite)	65.000
Area (User Defined)	1.210 acres
Maximum Retention (Pervious)	5.38 in
Maximum Retention (Pervious, 20 percent)	1.08 in
Cumulative Runoff	
Cumulative Runoff Depth (Pervious)	1.02 in
Runoff Volume (Pervious)	4,491.988 ft ³
Hydrograph Volume (Area under Hydrograph curve)	
Volume	4,479.000 ft ³
SCS Unit Hydrograph Parameters	
Time of Concentration (Composite)	9.000 min
Computational Time Increment	1.200 min
Unit Hydrograph Shape Factor	483.432
K Factor	0.749
Receding/Rising, Tr/Tp	1.670
Unit peak, qp	9.14 ft ³ /s

Subsection: Unit Hydrograph Summary

Label: DA2-PR Perv

Scenario: Post-Development 2 year, Year 2100

Return Event: 2 years

Storm Event: NOAA-D 2100 (3.99)

SCS Unit Hydrograph Parameters

Unit peak time, Tp	6.000 min
Unit receding limb, Tr	24.000 min
Total unit time, Tb	30.000 min

Subsection: Unit Hydrograph Summary
Label: DA2-PR Perv
Scenario: Post-Development 2 year

Return Event: 2 years
Storm Event: NOAA-D (3.35 in)

Storm Event	NOAA-D (3.35 in)
Return Event	2 years
Duration	1,440.000 min
Depth	3.35 in
Time of Concentration (Composite)	9.000 min
Area (User Defined)	1.210 acres
Computational Time Increment	1.200 min
Time to Peak (Computed)	729.600 min
Flow (Peak, Computed)	0.73 ft ³ /s
Output Increment	1.002 min
Time to Flow (Peak Interpolated Output)	729.000 min
Flow (Peak Interpolated Output)	0.72 ft ³ /s
Drainage Area	
SCS CN (Composite)	65.000
Area (User Defined)	1.210 acres
Maximum Retention (Pervious)	5.38 in
Maximum Retention (Pervious, 20 percent)	1.08 in
Cumulative Runoff	
Cumulative Runoff Depth (Pervious)	0.67 in
Runoff Volume (Pervious)	2,963.619 ft ³
Hydrograph Volume (Area under Hydrograph curve)	
Volume	2,954.000 ft ³
SCS Unit Hydrograph Parameters	
Time of Concentration (Composite)	9.000 min
Computational Time Increment	1.200 min
Unit Hydrograph Shape Factor	483.432
K Factor	0.749
Receding/Rising, Tr/Tp	1.670
Unit peak, qp	9.14 ft ³ /s

Subsection: Unit Hydrograph Summary
Label: DA2-PR Perv
Scenario: Post-Development 2 year

Return Event: 2 years
Storm Event: NOAA-D (3.35 in)

SCS Unit Hydrograph Parameters	
Unit peak time, Tp	6.000 min
Unit receding limb, Tr	24.000 min
Total unit time, Tb	30.000 min

Subsection: Unit Hydrograph Summary

Label: DA2-PR Perv

Scenario: Post-Development 10 year, Year 2100

Return Event: 10 years

Storm Event: NOAA-D 2100 (6.20)

Storm Event	NOAA-D 2100 (6.20)
Return Event	10 years
Duration	1,440.000 min
Depth	6.20 in
Time of Concentration (Composite)	9.000 min
Area (User Defined)	1.210 acres
Computational Time Increment	1.200 min
Time to Peak (Computed)	728.400 min
Flow (Peak, Computed)	3.16 ft ³ /s
Output Increment	1.002 min
Time to Flow (Peak Interpolated Output)	729.000 min
Flow (Peak Interpolated Output)	3.14 ft ³ /s
Drainage Area	
SCS CN (Composite)	65.000
Area (User Defined)	1.210 acres
Maximum Retention (Pervious)	5.38 in
Maximum Retention (Pervious, 20 percent)	1.08 in
Cumulative Runoff	
Cumulative Runoff Depth (Pervious)	2.50 in
Runoff Volume (Pervious)	10,971.005 ft ³
Hydrograph Volume (Area under Hydrograph curve)	
Volume	10,945.000 ft ³
SCS Unit Hydrograph Parameters	
Time of Concentration (Composite)	9.000 min
Computational Time Increment	1.200 min
Unit Hydrograph Shape Factor	483.432
K Factor	0.749
Receding/Rising, Tr/Tp	1.670
Unit peak, qp	9.14 ft ³ /s

Subsection: Unit Hydrograph Summary

Label: DA2-PR Perv

Scenario: Post-Development 10 year, Year 2100

Return Event: 10 years

Storm Event: NOAA-D 2100 (6.20)

SCS Unit Hydrograph Parameters

Unit peak time, Tp	6.000 min
Unit receding limb, Tr	24.000 min
Total unit time, Tb	30.000 min

Subsection: Unit Hydrograph Summary
Label: DA2-PR Perv
Scenario: Post-Development 10 year

Return Event: 10 years
Storm Event: NOAA-D (5.17 in)

Storm Event	NOAA-D (5.17 in)
Return Event	10 years
Duration	1,440.000 min
Depth	5.17 in
Time of Concentration (Composite)	9.000 min
Area (User Defined)	1.210 acres
Computational Time Increment	1.200 min
Time to Peak (Computed)	728.400 min
Flow (Peak, Computed)	2.19 ft ³ /s
Output Increment	1.002 min
Time to Flow (Peak Interpolated Output)	729.000 min
Flow (Peak Interpolated Output)	2.18 ft ³ /s
Drainage Area	
SCS CN (Composite)	65.000
Area (User Defined)	1.210 acres
Maximum Retention (Pervious)	5.38 in
Maximum Retention (Pervious, 20 percent)	1.08 in
Cumulative Runoff	
Cumulative Runoff Depth (Pervious)	1.77 in
Runoff Volume (Pervious)	7,764.066 ft ³
Hydrograph Volume (Area under Hydrograph curve)	
Volume	7,744.000 ft ³
SCS Unit Hydrograph Parameters	
Time of Concentration (Composite)	9.000 min
Computational Time Increment	1.200 min
Unit Hydrograph Shape Factor	483.432
K Factor	0.749
Receding/Rising, Tr/Tp	1.670
Unit peak, qp	9.14 ft ³ /s

Subsection: Unit Hydrograph Summary
Label: DA2-PR Perv
Scenario: Post-Development 10 year

Return Event: 10 years
Storm Event: NOAA-D (5.17 in)

SCS Unit Hydrograph Parameters	
Unit peak time, Tp	6.000 min
Unit receding limb, Tr	24.000 min
Total unit time, Tb	30.000 min

Subsection: Unit Hydrograph Summary
Label: DA2-PR Perv
Scenario: Post-Development 25 year

Return Event: 25 years
Storm Event: NOAA-D (6.36 in)

Storm Event	NOAA-D (6.36 in)
Return Event	25 years
Duration	1,440.000 min
Depth	6.36 in
Time of Concentration (Composite)	9.000 min
Area (User Defined)	1.210 acres
Computational Time Increment	1.200 min
Time to Peak (Computed)	728.400 min
Flow (Peak, Computed)	3.31 ft ³ /s
Output Increment	1.002 min
Time to Flow (Peak Interpolated Output)	729.000 min
Flow (Peak Interpolated Output)	3.29 ft ³ /s
Drainage Area	
SCS CN (Composite)	65.000
Area (User Defined)	1.210 acres
Maximum Retention (Pervious)	5.38 in
Maximum Retention (Pervious, 20 percent)	1.08 in
Cumulative Runoff	
Cumulative Runoff Depth (Pervious)	2.62 in
Runoff Volume (Pervious)	11,491.991 ft ³
Hydrograph Volume (Area under Hydrograph curve)	
Volume	11,465.000 ft ³
SCS Unit Hydrograph Parameters	
Time of Concentration (Composite)	9.000 min
Computational Time Increment	1.200 min
Unit Hydrograph Shape Factor	483.432
K Factor	0.749
Receding/Rising, Tr/Tp	1.670
Unit peak, qp	9.14 ft ³ /s

Subsection: Unit Hydrograph Summary
Label: DA2-PR Perv
Scenario: Post-Development 25 year

Return Event: 25 years
Storm Event: NOAA-D (6.36 in)

SCS Unit Hydrograph Parameters	
Unit peak time, Tp	6.000 min
Unit receding limb, Tr	24.000 min
Total unit time, Tb	30.000 min

Subsection: Unit Hydrograph Summary
Label: DA2-PR Perv
Scenario: Post-Development 100 year, Year 2100

Return Event: 100 years
Storm Event: NOAA-D 2100 (11.48)

Storm Event	NOAA-D 2100 (11.48)
Return Event	100 years
Duration	1,440.000 min
Depth	11.48 in
Time of Concentration (Composite)	9.000 min
Area (User Defined)	1.210 acres
Computational Time Increment	1.200 min
Time to Peak (Computed)	728.400 min
Flow (Peak, Computed)	8.71 ft ³ /s
Output Increment	1.002 min
Time to Flow (Peak Interpolated Output)	729.000 min
Flow (Peak Interpolated Output)	8.62 ft ³ /s
Drainage Area	
SCS CN (Composite)	65.000
Area (User Defined)	1.210 acres
Maximum Retention (Pervious)	5.38 in
Maximum Retention (Pervious, 20 percent)	1.08 in
Cumulative Runoff	
Cumulative Runoff Depth (Pervious)	6.85 in
Runoff Volume (Pervious)	30,109.044 ft ³
Hydrograph Volume (Area under Hydrograph curve)	
Volume	30,050.000 ft ³
SCS Unit Hydrograph Parameters	
Time of Concentration (Composite)	9.000 min
Computational Time Increment	1.200 min
Unit Hydrograph Shape Factor	483.432
K Factor	0.749
Receding/Rising, Tr/Tp	1.670
Unit peak, qp	9.14 ft ³ /s

Subsection: Unit Hydrograph Summary

Label: DA2-PR Perv

Scenario: Post-Development 100 year, Year 2100

Return Event: 100 years

Storm Event: NOAA-D 2100 (11.48)

SCS Unit Hydrograph Parameters

Unit peak time, Tp	6.000 min
Unit receding limb, Tr	24.000 min
Total unit time, Tb	30.000 min

Subsection: Unit Hydrograph Summary
Label: DA2-PR Perv
Scenario: Post-Development 100 year

Return Event: 100 years
Storm Event: NOAA-D (8.89 in)

Storm Event	NOAA-D (8.89 in)
Return Event	100 years
Duration	1,440.000 min
Depth	8.89 in
Time of Concentration (Composite)	9.000 min
Area (User Defined)	1.210 acres
Computational Time Increment	1.200 min
Time to Peak (Computed)	728.400 min
Flow (Peak, Computed)	5.91 ft ³ /s
Output Increment	1.002 min
Time to Flow (Peak Interpolated Output)	729.000 min
Flow (Peak Interpolated Output)	5.85 ft ³ /s
Drainage Area	
SCS CN (Composite)	65.000
Area (User Defined)	1.210 acres
Maximum Retention (Pervious)	5.38 in
Maximum Retention (Pervious, 20 percent)	1.08 in
Cumulative Runoff	
Cumulative Runoff Depth (Pervious)	4.63 in
Runoff Volume (Pervious)	20,316.000 ft ³
Hydrograph Volume (Area under Hydrograph curve)	
Volume	20,273.000 ft ³
SCS Unit Hydrograph Parameters	
Time of Concentration (Composite)	9.000 min
Computational Time Increment	1.200 min
Unit Hydrograph Shape Factor	483.432
K Factor	0.749
Receding/Rising, Tr/Tp	1.670
Unit peak, qp	9.14 ft ³ /s

Subsection: Unit Hydrograph Summary
Label: DA2-PR Perv
Scenario: Post-Development 100 year

Return Event: 100 years
Storm Event: NOAA-D (8.89 in)

SCS Unit Hydrograph Parameters	
Unit peak time, Tp	6.000 min
Unit receding limb, Tr	24.000 min
Total unit time, Tb	30.000 min

Subsection: Unit Hydrograph Summary
 Label: Impervious to Basin
 Scenario: Post-Development 2 year, Year 2100

Return Event: 2 years
 Storm Event: NOAA-D 2100 (3.99)

Storm Event	NOAA-D 2100 (3.99)
Return Event	2 years
Duration	1,440.000 min
Depth	3.99 in
Time of Concentration (Composite)	1.000 min
Area (User Defined)	0.491 acres
Computational Time Increment	0.133 min
Time to Peak (Computed)	726.000 min
Flow (Peak, Computed)	2.05 ft ³ /s
Output Increment	1.002 min
Time to Flow (Peak Interpolated Output)	726.000 min
Flow (Peak Interpolated Output)	2.05 ft ³ /s
Drainage Area	
SCS CN (Composite)	98.000
Area (User Defined)	0.491 acres
Maximum Retention (Pervious)	0.20 in
Maximum Retention (Pervious, 20 percent)	0.04 in
Cumulative Runoff	
Cumulative Runoff Depth (Pervious)	3.76 in
Runoff Volume (Pervious)	6,686.058 ft ³
Hydrograph Volume (Area under Hydrograph curve)	
Volume	6,685.000 ft ³
SCS Unit Hydrograph Parameters	
Time of Concentration (Composite)	1.000 min
Computational Time Increment	0.133 min
Unit Hydrograph Shape Factor	483.432
K Factor	0.749
Receding/Rising, Tr/Tp	1.670
Unit peak, qp	33.35 ft ³ /s

Subsection: Unit Hydrograph Summary

Label: Impervious to Basin

Scenario: Post-Development 2 year, Year 2100

Return Event: 2 years

Storm Event: NOAA-D 2100 (3.99)

SCS Unit Hydrograph Parameters

Unit peak time, Tp	0.667 min
Unit receding limb, Tr	2.667 min
Total unit time, Tb	3.333 min

Subsection: Unit Hydrograph Summary
Label: Impervious to Basin
Scenario: Post-Development 2 year

Return Event: 2 years
Storm Event: NOAA-D (3.35 in)

Storm Event	NOAA-D (3.35 in)
Return Event	2 years
Duration	1,440.000 min
Depth	3.35 in
Time of Concentration (Composite)	1.000 min
Area (User Defined)	0.491 acres
Computational Time Increment	0.133 min
Time to Peak (Computed)	726.000 min
Flow (Peak, Computed)	1.71 ft ³ /s
Output Increment	1.002 min
Time to Flow (Peak Interpolated Output)	726.000 min
Flow (Peak Interpolated Output)	1.71 ft ³ /s
Drainage Area	
SCS CN (Composite)	98.000
Area (User Defined)	0.491 acres
Maximum Retention (Pervious)	0.20 in
Maximum Retention (Pervious, 20 percent)	0.04 in
Cumulative Runoff	
Cumulative Runoff Depth (Pervious)	3.12 in
Runoff Volume (Pervious)	5,549.778 ft ³
Hydrograph Volume (Area under Hydrograph curve)	
Volume	5,549.000 ft ³
SCS Unit Hydrograph Parameters	
Time of Concentration (Composite)	1.000 min
Computational Time Increment	0.133 min
Unit Hydrograph Shape Factor	483.432
K Factor	0.749
Receding/Rising, Tr/Tp	1.670
Unit peak, qp	33.35 ft ³ /s

Subsection: Unit Hydrograph Summary
Label: Impervious to Basin
Scenario: Post-Development 2 year

Return Event: 2 years
Storm Event: NOAA-D (3.35 in)

SCS Unit Hydrograph Parameters	
Unit peak time, Tp	0.667 min
Unit receding limb, Tr	2.667 min
Total unit time, Tb	3.333 min

Subsection: Unit Hydrograph Summary
Label: Impervious to Basin
Scenario: Post-Development 10 year, Year 2100

Return Event: 10 years
Storm Event: NOAA-D 2100 (6.20)

Storm Event	NOAA-D 2100 (6.20)
Return Event	10 years
Duration	1,440.000 min
Depth	6.20 in
Time of Concentration (Composite)	1.000 min
Area (User Defined)	0.491 acres
Computational Time Increment	0.133 min
Time to Peak (Computed)	726.000 min
Flow (Peak, Computed)	3.19 ft ³ /s
Output Increment	1.002 min
Time to Flow (Peak Interpolated Output)	726.000 min
Flow (Peak Interpolated Output)	3.19 ft ³ /s
Drainage Area	
SCS CN (Composite)	98.000
Area (User Defined)	0.491 acres
Maximum Retention (Pervious)	0.20 in
Maximum Retention (Pervious, 20 percent)	0.04 in
Cumulative Runoff	
Cumulative Runoff Depth (Pervious)	5.96 in
Runoff Volume (Pervious)	10,614.799 ft ³
Hydrograph Volume (Area under Hydrograph curve)	
Volume	10,613.000 ft ³
SCS Unit Hydrograph Parameters	
Time of Concentration (Composite)	1.000 min
Computational Time Increment	0.133 min
Unit Hydrograph Shape Factor	483.432
K Factor	0.749
Receding/Rising, Tr/Tp	1.670
Unit peak, qp	33.35 ft ³ /s

Subsection: Unit Hydrograph Summary

Label: Impervious to Basin

Scenario: Post-Development 10 year, Year 2100

Return Event: 10 years

Storm Event: NOAA-D 2100 (6.20)

SCS Unit Hydrograph Parameters

Unit peak time, Tp	0.667 min
Unit receding limb, Tr	2.667 min
Total unit time, Tb	3.333 min

Subsection: Unit Hydrograph Summary
Label: Impervious to Basin
Scenario: Post-Development 10 year

Return Event: 10 years
Storm Event: NOAA-D (5.17 in)

Storm Event	NOAA-D (5.17 in)
Return Event	10 years
Duration	1,440.000 min
Depth	5.17 in
Time of Concentration (Composite)	1.000 min
Area (User Defined)	0.491 acres
Computational Time Increment	0.133 min
Time to Peak (Computed)	726.000 min
Flow (Peak, Computed)	2.66 ft ³ /s
Output Increment	1.002 min
Time to Flow (Peak Interpolated Output)	726.000 min
Flow (Peak Interpolated Output)	2.66 ft ³ /s
Drainage Area	
SCS CN (Composite)	98.000
Area (User Defined)	0.491 acres
Maximum Retention (Pervious)	0.20 in
Maximum Retention (Pervious, 20 percent)	0.04 in
Cumulative Runoff	
Cumulative Runoff Depth (Pervious)	4.93 in
Runoff Volume (Pervious)	8,783.118 ft ³
Hydrograph Volume (Area under Hydrograph curve)	
Volume	8,782.000 ft ³
SCS Unit Hydrograph Parameters	
Time of Concentration (Composite)	1.000 min
Computational Time Increment	0.133 min
Unit Hydrograph Shape Factor	483.432
K Factor	0.749
Receding/Rising, Tr/Tp	1.670
Unit peak, qp	33.35 ft ³ /s

Subsection: Unit Hydrograph Summary
Label: Impervious to Basin
Scenario: Post-Development 10 year

Return Event: 10 years
Storm Event: NOAA-D (5.17 in)

SCS Unit Hydrograph Parameters	
Unit peak time, Tp	0.667 min
Unit receding limb, Tr	2.667 min
Total unit time, Tb	3.333 min

Subsection: Unit Hydrograph Summary
Label: Impervious to Basin
Scenario: Post-Development 25 year

Return Event: 25 years
Storm Event: NOAA-D (6.36 in)

Storm Event	NOAA-D (6.36 in)
Return Event	25 years
Duration	1,440.000 min
Depth	6.36 in
Time of Concentration (Composite)	1.000 min
Area (User Defined)	0.491 acres
Computational Time Increment	0.133 min
Time to Peak (Computed)	726.000 min
Flow (Peak, Computed)	3.27 ft ³ /s
Output Increment	1.002 min
Time to Flow (Peak Interpolated Output)	726.000 min
Flow (Peak Interpolated Output)	3.27 ft ³ /s
Drainage Area	
SCS CN (Composite)	98.000
Area (User Defined)	0.491 acres
Maximum Retention (Pervious)	0.20 in
Maximum Retention (Pervious, 20 percent)	0.04 in
Cumulative Runoff	
Cumulative Runoff Depth (Pervious)	6.12 in
Runoff Volume (Pervious)	10,899.396 ft ³
Hydrograph Volume (Area under Hydrograph curve)	
Volume	10,898.000 ft ³
SCS Unit Hydrograph Parameters	
Time of Concentration (Composite)	1.000 min
Computational Time Increment	0.133 min
Unit Hydrograph Shape Factor	483.432
K Factor	0.749
Receding/Rising, Tr/Tp	1.670
Unit peak, qp	33.35 ft ³ /s

Subsection: Unit Hydrograph Summary
Label: Impervious to Basin
Scenario: Post-Development 25 year

Return Event: 25 years
Storm Event: NOAA-D (6.36 in)

SCS Unit Hydrograph Parameters	
Unit peak time, Tp	0.667 min
Unit receding limb, Tr	2.667 min
Total unit time, Tb	3.333 min

Subsection: Unit Hydrograph Summary
 Label: Impervious to Basin
 Scenario: Post-Development 100 year, Year 2100

Return Event: 100 years
 Storm Event: NOAA-D 2100 (11.48)

Storm Event	NOAA-D 2100 (11.48)
Return Event	100 years
Duration	1,440.000 min
Depth	11.48 in
Time of Concentration (Composite)	1.000 min
Area (User Defined)	0.491 acres
Computational Time Increment	0.133 min
Time to Peak (Computed)	726.000 min
Flow (Peak, Computed)	5.92 ft ³ /s
Output Increment	1.002 min
Time to Flow (Peak Interpolated Output)	726.000 min
Flow (Peak Interpolated Output)	5.92 ft ³ /s
Drainage Area	
SCS CN (Composite)	98.000
Area (User Defined)	0.491 acres
Maximum Retention (Pervious)	0.20 in
Maximum Retention (Pervious, 20 percent)	0.04 in
Cumulative Runoff	
Cumulative Runoff Depth (Pervious)	11.24 in
Runoff Volume (Pervious)	20,010.635 ft ³
Hydrograph Volume (Area under Hydrograph curve)	
Volume	20,008.000 ft ³
SCS Unit Hydrograph Parameters	
Time of Concentration (Composite)	1.000 min
Computational Time Increment	0.133 min
Unit Hydrograph Shape Factor	483.432
K Factor	0.749
Receding/Rising, Tr/Tp	1.670
Unit peak, qp	33.35 ft ³ /s

Subsection: Unit Hydrograph Summary

Label: Impervious to Basin

Scenario: Post-Development 100 year, Year 2100

Return Event: 100 years

Storm Event: NOAA-D 2100 (11.48)

SCS Unit Hydrograph Parameters

Unit peak time, Tp 0.667 min

Unit receding limb, Tr 2.667 min

Total unit time, Tb 3.333 min

Subsection: Unit Hydrograph Summary
Label: Impervious to Basin
Scenario: Post-Development 100 year

Return Event: 100 years
Storm Event: NOAA-D (8.89 in)

Storm Event	NOAA-D (8.89 in)
Return Event	100 years
Duration	1,440.000 min
Depth	8.89 in
Time of Concentration (Composite)	1.000 min
Area (User Defined)	0.491 acres
Computational Time Increment	0.133 min
Time to Peak (Computed)	726.000 min
Flow (Peak, Computed)	4.58 ft ³ /s
Output Increment	1.002 min
Time to Flow (Peak Interpolated Output)	726.000 min
Flow (Peak Interpolated Output)	4.58 ft ³ /s
Drainage Area	
SCS CN (Composite)	98.000
Area (User Defined)	0.491 acres
Maximum Retention (Pervious)	0.20 in
Maximum Retention (Pervious, 20 percent)	0.04 in
Cumulative Runoff	
Cumulative Runoff Depth (Pervious)	8.65 in
Runoff Volume (Pervious)	15,400.922 ft ³
Hydrograph Volume (Area under Hydrograph curve)	
Volume	15,399.000 ft ³
SCS Unit Hydrograph Parameters	
Time of Concentration (Composite)	1.000 min
Computational Time Increment	0.133 min
Unit Hydrograph Shape Factor	483.432
K Factor	0.749
Receding/Rising, Tr/Tp	1.670
Unit peak, qp	33.35 ft ³ /s

Subsection: Unit Hydrograph Summary
Label: Impervious to Basin
Scenario: Post-Development 100 year

Return Event: 100 years
Storm Event: NOAA-D (8.89 in)

SCS Unit Hydrograph Parameters	
Unit peak time, Tp	0.667 min
Unit receding limb, Tr	2.667 min
Total unit time, Tb	3.333 min

Subsection: Unit Hydrograph Summary

Label: Pervious to basin

Scenario: Post-Development 2 year, Year 2100

Return Event: 2 years

Storm Event: NOAA-D 2100 (3.99)

Storm Event	NOAA-D 2100 (3.99)
Return Event	2 years
Duration	1,440.000 min
Depth	3.99 in
Time of Concentration (Composite)	4.000 min
Area (User Defined)	0.163 acres
Computational Time Increment	0.533 min
Time to Peak (Computed)	726.400 min
Flow (Peak, Computed)	0.31 ft ³ /s
Output Increment	1.002 min
Time to Flow (Peak Interpolated Output)	727.000 min
Flow (Peak Interpolated Output)	0.30 ft ³ /s
Drainage Area	
SCS CN (Composite)	72.492
Area (User Defined)	0.163 acres
Maximum Retention (Pervious)	3.79 in
Maximum Retention (Pervious, 20 percent)	0.76 in
Cumulative Runoff	
Cumulative Runoff Depth (Pervious)	1.49 in
Runoff Volume (Pervious)	878.671 ft ³
Hydrograph Volume (Area under Hydrograph curve)	
Volume	878.000 ft ³
SCS Unit Hydrograph Parameters	
Time of Concentration (Composite)	4.000 min
Computational Time Increment	0.533 min
Unit Hydrograph Shape Factor	483.432
K Factor	0.749
Receding/Rising, Tr/Tp	1.670
Unit peak, qp	2.77 ft ³ /s

Subsection: Unit Hydrograph Summary

Label: Pervious to basin

Scenario: Post-Development 2 year, Year 2100

Return Event: 2 years

Storm Event: NOAA-D 2100 (3.99)

SCS Unit Hydrograph Parameters

Unit peak time, Tp	2.667 min
Unit receding limb, Tr	10.667 min
Total unit time, Tb	13.333 min

Subsection: Unit Hydrograph Summary
Label: Pervious to basin
Scenario: Post-Development 2 year

Return Event: 2 years
Storm Event: NOAA-D (3.35 in)

Storm Event	NOAA-D (3.35 in)
Return Event	2 years
Duration	1,440.000 min
Depth	3.35 in
Time of Concentration (Composite)	4.000 min
Area (User Defined)	0.163 acres
Computational Time Increment	0.533 min
Time to Peak (Computed)	726.400 min
Flow (Peak, Computed)	0.21 ft ³ /s
Output Increment	1.002 min
Time to Flow (Peak Interpolated Output)	727.000 min
Flow (Peak Interpolated Output)	0.21 ft ³ /s
Drainage Area	
SCS CN (Composite)	72.492
Area (User Defined)	0.163 acres
Maximum Retention (Pervious)	3.79 in
Maximum Retention (Pervious, 20 percent)	0.76 in
Cumulative Runoff	
Cumulative Runoff Depth (Pervious)	1.05 in
Runoff Volume (Pervious)	621.688 ft ³
Hydrograph Volume (Area under Hydrograph curve)	
Volume	621.000 ft ³
SCS Unit Hydrograph Parameters	
Time of Concentration (Composite)	4.000 min
Computational Time Increment	0.533 min
Unit Hydrograph Shape Factor	483.432
K Factor	0.749
Receding/Rising, Tr/Tp	1.670
Unit peak, qp	2.77 ft ³ /s

Subsection: Unit Hydrograph Summary
Label: Pervious to basin
Scenario: Post-Development 2 year

Return Event: 2 years
Storm Event: NOAA-D (3.35 in)

SCS Unit Hydrograph Parameters	
Unit peak time, Tp	2.667 min
Unit receding limb, Tr	10.667 min
Total unit time, Tb	13.333 min

Subsection: Unit Hydrograph Summary

Label: Pervious to basin

Scenario: Post-Development 10 year, Year 2100

Return Event: 10 years

Storm Event: NOAA-D 2100 (6.20)

Storm Event	NOAA-D 2100 (6.20)
Return Event	10 years
Duration	1,440.000 min
Depth	6.20 in
Time of Concentration (Composite)	4.000 min
Area (User Defined)	0.163 acres
Computational Time Increment	0.533 min
Time to Peak (Computed)	726.400 min
Flow (Peak, Computed)	0.66 ft ³ /s
Output Increment	1.002 min
Time to Flow (Peak Interpolated Output)	726.000 min
Flow (Peak Interpolated Output)	0.66 ft ³ /s
Drainage Area	
SCS CN (Composite)	72.492
Area (User Defined)	0.163 acres
Maximum Retention (Pervious)	3.79 in
Maximum Retention (Pervious, 20 percent)	0.76 in
Cumulative Runoff	
Cumulative Runoff Depth (Pervious)	3.21 in
Runoff Volume (Pervious)	1,895.498 ft ³
Hydrograph Volume (Area under Hydrograph curve)	
Volume	1,894.000 ft ³
SCS Unit Hydrograph Parameters	
Time of Concentration (Composite)	4.000 min
Computational Time Increment	0.533 min
Unit Hydrograph Shape Factor	483.432
K Factor	0.749
Receding/Rising, Tr/Tp	1.670
Unit peak, qp	2.77 ft ³ /s

Subsection: Unit Hydrograph Summary

Label: Pervious to basin

Scenario: Post-Development 10 year, Year 2100

Return Event: 10 years

Storm Event: NOAA-D 2100 (6.20)

SCS Unit Hydrograph Parameters

Unit peak time, Tp	2.667 min
Unit receding limb, Tr	10.667 min
Total unit time, Tb	13.333 min

Subsection: Unit Hydrograph Summary
Label: Pervious to basin
Scenario: Post-Development 10 year

Return Event: 10 years
Storm Event: NOAA-D (5.17 in)

Storm Event	NOAA-D (5.17 in)
Return Event	10 years
Duration	1,440.000 min
Depth	5.17 in
Time of Concentration (Composite)	4.000 min
Area (User Defined)	0.163 acres
Computational Time Increment	0.533 min
Time to Peak (Computed)	726.400 min
Flow (Peak, Computed)	0.49 ft ³ /s
Output Increment	1.002 min
Time to Flow (Peak Interpolated Output)	726.000 min
Flow (Peak Interpolated Output)	0.49 ft ³ /s
Drainage Area	
SCS CN (Composite)	72.492
Area (User Defined)	0.163 acres
Maximum Retention (Pervious)	3.79 in
Maximum Retention (Pervious, 20 percent)	0.76 in
Cumulative Runoff	
Cumulative Runoff Depth (Pervious)	2.37 in
Runoff Volume (Pervious)	1,402.156 ft ³
Hydrograph Volume (Area under Hydrograph curve)	
Volume	1,401.000 ft ³
SCS Unit Hydrograph Parameters	
Time of Concentration (Composite)	4.000 min
Computational Time Increment	0.533 min
Unit Hydrograph Shape Factor	483.432
K Factor	0.749
Receding/Rising, Tr/Tp	1.670
Unit peak, qp	2.77 ft ³ /s

Subsection: Unit Hydrograph Summary
Label: Pervious to basin
Scenario: Post-Development 10 year

Return Event: 10 years
Storm Event: NOAA-D (5.17 in)

SCS Unit Hydrograph Parameters	
Unit peak time, Tp	2.667 min
Unit receding limb, Tr	10.667 min
Total unit time, Tb	13.333 min

Subsection: Unit Hydrograph Summary
Label: Pervious to basin
Scenario: Post-Development 25 year

Return Event: 25 years
Storm Event: NOAA-D (6.36 in)

Storm Event	NOAA-D (6.36 in)
Return Event	25 years
Duration	1,440.000 min
Depth	6.36 in
Time of Concentration (Composite)	4.000 min
Area (User Defined)	0.163 acres
Computational Time Increment	0.533 min
Time to Peak (Computed)	726.400 min
Flow (Peak, Computed)	0.69 ft ³ /s
Output Increment	1.002 min
Time to Flow (Peak Interpolated Output)	726.000 min
Flow (Peak Interpolated Output)	0.69 ft ³ /s
Drainage Area	
SCS CN (Composite)	72.492
Area (User Defined)	0.163 acres
Maximum Retention (Pervious)	3.79 in
Maximum Retention (Pervious, 20 percent)	0.76 in
Cumulative Runoff	
Cumulative Runoff Depth (Pervious)	3.34 in
Runoff Volume (Pervious)	1,974.411 ft ³
Hydrograph Volume (Area under Hydrograph curve)	
Volume	1,973.000 ft ³
SCS Unit Hydrograph Parameters	
Time of Concentration (Composite)	4.000 min
Computational Time Increment	0.533 min
Unit Hydrograph Shape Factor	483.432
K Factor	0.749
Receding/Rising, Tr/Tp	1.670
Unit peak, qp	2.77 ft ³ /s

Subsection: Unit Hydrograph Summary
Label: Pervious to basin
Scenario: Post-Development 25 year

Return Event: 25 years
Storm Event: NOAA-D (6.36 in)

SCS Unit Hydrograph Parameters	
Unit peak time, Tp	2.667 min
Unit receding limb, Tr	10.667 min
Total unit time, Tb	13.333 min

Subsection: Unit Hydrograph Summary
Label: Pervious to basin
Scenario: Post-Development 100 year, Year 2100

Return Event: 100 years
Storm Event: NOAA-D 2100 (11.48)

Storm Event	NOAA-D 2100 (11.48)
Return Event	100 years
Duration	1,440.000 min
Depth	11.48 in
Time of Concentration (Composite)	4.000 min
Area (User Defined)	0.163 acres
Computational Time Increment	0.533 min
Time to Peak (Computed)	726.400 min
Flow (Peak, Computed)	1.58 ft ³ /s
Output Increment	1.002 min
Time to Flow (Peak Interpolated Output)	726.000 min
Flow (Peak Interpolated Output)	1.58 ft ³ /s
Drainage Area	
SCS CN (Composite)	72.492
Area (User Defined)	0.163 acres
Maximum Retention (Pervious)	3.79 in
Maximum Retention (Pervious, 20 percent)	0.76 in
Cumulative Runoff	
Cumulative Runoff Depth (Pervious)	7.92 in
Runoff Volume (Pervious)	4,682.353 ft ³
Hydrograph Volume (Area under Hydrograph curve)	
Volume	4,679.000 ft ³
SCS Unit Hydrograph Parameters	
Time of Concentration (Composite)	4.000 min
Computational Time Increment	0.533 min
Unit Hydrograph Shape Factor	483.432
K Factor	0.749
Receding/Rising, Tr/Tp	1.670
Unit peak, qp	2.77 ft ³ /s

Subsection: Unit Hydrograph Summary

Label: Pervious to basin

Scenario: Post-Development 100 year, Year 2100

Return Event: 100 years

Storm Event: NOAA-D 2100 (11.48)

SCS Unit Hydrograph Parameters

Unit peak time, Tp	2.667 min
Unit receding limb, Tr	10.667 min
Total unit time, Tb	13.333 min

Subsection: Unit Hydrograph Summary
Label: Pervious to basin
Scenario: Post-Development 100 year

Return Event: 100 years
Storm Event: NOAA-D (8.89 in)

Storm Event	NOAA-D (8.89 in)
Return Event	100 years
Duration	1,440.000 min
Depth	8.89 in
Time of Concentration (Composite)	4.000 min
Area (User Defined)	0.163 acres
Computational Time Increment	0.533 min
Time to Peak (Computed)	726.400 min
Flow (Peak, Computed)	1.13 ft ³ /s
Output Increment	1.002 min
Time to Flow (Peak Interpolated Output)	726.000 min
Flow (Peak Interpolated Output)	1.12 ft ³ /s
Drainage Area	
SCS CN (Composite)	72.492
Area (User Defined)	0.163 acres
Maximum Retention (Pervious)	3.79 in
Maximum Retention (Pervious, 20 percent)	0.76 in
Cumulative Runoff	
Cumulative Runoff Depth (Pervious)	5.54 in
Runoff Volume (Pervious)	3,278.211 ft ³
Hydrograph Volume (Area under Hydrograph curve)	
Volume	3,276.000 ft ³
SCS Unit Hydrograph Parameters	
Time of Concentration (Composite)	4.000 min
Computational Time Increment	0.533 min
Unit Hydrograph Shape Factor	483.432
K Factor	0.749
Receding/Rising, Tr/Tp	1.670
Unit peak, qp	2.77 ft ³ /s

Subsection: Unit Hydrograph Summary
Label: Pervious to basin
Scenario: Post-Development 100 year

Return Event: 100 years
Storm Event: NOAA-D (8.89 in)

SCS Unit Hydrograph Parameters	
Unit peak time, Tp	2.667 min
Unit receding limb, Tr	10.667 min
Total unit time, Tb	13.333 min

Subsection: Addition Summary

Label: O-1

Scenario: Post-Development 2 year, Year 2100

Return Event: 2 years

Storm Event: NOAA-D 2100 (3.99)

Summary for Hydrograph Addition at 'O-1'

Upstream Link	Upstream Node
Outlet-1	Basin
<Catchment to Outflow Node>	DA2-PR Imp
<Catchment to Outflow Node>	DA2-PR Perv

Node Inflows

Inflow Type	Element	Volume (ft ³)	Time to Peak (min)	Flow (Peak) (ft ³ /s)
Flow (From)	Outlet-1	7,512.621	727.000	1.44
Flow (From)	DA2-PR Imp	39,230.885	725.000	11.97
Flow (From)	DA2-PR Perv	4,478.592	729.000	1.19
Flow (In)	O-1	51,222.098	726.000	14.37

Subsection: Addition Summary

Label: O-1

Scenario: Post-Development 2 year

Return Event: 2 years

Storm Event: NOAA-D (3.35 in)

Summary for Hydrograph Addition at 'O-1'

Upstream Link	Upstream Node
Outlet-1	Basin
<Catchment to Outflow Node>	DA2-PR Imp
<Catchment to Outflow Node>	DA2-PR Perv

Node Inflows

Inflow Type	Element	Volume (ft ³)	Time to Peak (min)	Flow (Peak) (ft ³ /s)
Flow (From)	Outlet-1	6,127.588	727.000	1.28
Flow (From)	DA2-PR Imp	32,563.585	726.000	10.02
Flow (From)	DA2-PR Perv	2,953.793	729.000	0.72
Flow (In)	O-1	41,644.967	726.000	11.85

Subsection: Addition Summary

Label: O-1

Scenario: Post-Development 10 year, Year 2100

Return Event: 10 years

Storm Event: NOAA-D 2100 (6.20)

Summary for Hydrograph Addition at 'O-1'

Upstream Link	Upstream Node
Outlet-1	Basin
<Catchment to Outflow Node>	DA2-PR Imp
<Catchment to Outflow Node>	DA2-PR Perv

Node Inflows

Inflow Type	Element	Volume (ft ³)	Time to Peak (min)	Flow (Peak) (ft ³ /s)
Flow (From)	Outlet-1	12,445.149	727.000	2.51
Flow (From)	DA2-PR Imp	62,283.418	725.000	18.68
Flow (From)	DA2-PR Perv	10,944.513	729.000	3.14
Flow (In)	O-1	85,673.080	726.000	23.82

Subsection: Addition Summary

Label: O-1

Scenario: Post-Development 10 year

Return Event: 10 years
Storm Event: NOAA-D (5.17 in)

Summary for Hydrograph Addition at 'O-1'

Upstream Link	Upstream Node
Outlet-1	Basin
<Catchment to Outflow Node>	DA2-PR Imp
<Catchment to Outflow Node>	DA2-PR Perv

Node Inflows

Inflow Type	Element	Volume (ft ³)	Time to Peak (min)	Flow (Peak) (ft ³ /s)
Flow (From)	Outlet-1	10,126.183	727.000	1.96
Flow (From)	DA2-PR Imp	51,535.723	725.000	15.56
Flow (From)	DA2-PR Perv	7,743.771	729.000	2.18
Flow (In)	O-1	69,405.677	726.000	19.30

Subsection: Addition Summary

Label: O-1

Scenario: Post-Development 25 year

Return Event: 25 years
Storm Event: NOAA-D (6.36 in)

Summary for Hydrograph Addition at 'O-1'

Upstream Link	Upstream Node
Outlet-1	Basin
<Catchment to Outflow Node>	DA2-PR Imp
<Catchment to Outflow Node>	DA2-PR Perv

Node Inflows

Inflow Type	Element	Volume (ft ³)	Time to Peak (min)	Flow (Peak) (ft ³ /s)
Flow (From)	Outlet-1	12,807.717	727.000	2.59
Flow (From)	DA2-PR Imp	63,953.336	725.000	19.17
Flow (From)	DA2-PR Perv	11,464.532	729.000	3.29
Flow (In)	O-1	88,225.586	726.000	24.53

Subsection: Addition Summary

Label: O-1

Scenario: Post-Development 100 year, Year 2100

Return Event: 100 years

Storm Event: NOAA-D 2100 (11.48)

Summary for Hydrograph Addition at 'O-1'

Upstream Link	Upstream Node
Outlet-1	Basin
<Catchment to Outflow Node>	DA2-PR Imp
<Catchment to Outflow Node>	DA2-PR Perv

Node Inflows

Inflow Type	Element	Volume (ft ³)	Time to Peak (min)	Flow (Peak) (ft ³ /s)
Flow (From)	Outlet-1	24,596.862	727.000	5.26
Flow (From)	DA2-PR Imp	117,415.099	725.000	34.67
Flow (From)	DA2-PR Perv	30,050.336	729.000	8.62
Flow (In)	O-1	172,062.298	726.000	47.51

Subsection: Addition Summary

Label: O-1

Scenario: Post-Development 100 year

Return Event: 100 years

Storm Event: NOAA-D (8.89 in)

Summary for Hydrograph Addition at 'O-1'

Upstream Link	Upstream Node
Outlet-1	Basin
<Catchment to Outflow Node>	DA2-PR Imp
<Catchment to Outflow Node>	DA2-PR Perv

Node Inflows

Inflow Type	Element	Volume (ft ³)	Time to Peak (min)	Flow (Peak) (ft ³ /s)
Flow (From)	Outlet-1	18,598.182	727.000	3.93
Flow (From)	DA2-PR Imp	90,366.818	725.000	26.83
Flow (From)	DA2-PR Perv	20,273.094	729.000	5.85
Flow (In)	O-1	129,238.095	726.000	35.84

Subsection: Elevation-Area Volume Curve

Return Event: 100 years

Label: Basin

Storm Event: NOAA-D 2100 (11.48)

Scenario: Post-Development 100 year, Year 2100

Elevation (ft)	Planimeter (ft ²)	Area (acres)	A1+A2+sqr (A1*A2) (acres)	Volume (ft ³)	Volume (Total) (ft ³)
81.00	0.0	0.011	0.000	0.000	0.000
82.00	0.0	0.025	0.053	764.000	764.000
83.00	0.0	0.045	0.104	1,503.000	2,267.000
84.00	0.0	0.067	0.167	2,424.000	4,690.000

Subsection: Volume Equations

Label: Basin

Scenario: Post-Development 100 year, Year 2100

Return Event: 100 years

Storm Event: NOAA-D 2100 (11.48)

Pond Volume Equations

*** Incremental volume computed by the Conic Method for Reservoir Volumes.**

$$\text{Volume} = (1/3) * (\text{EL2} - \text{EL1}) * (\text{Area1} + \text{Area2} + \text{sqr}(\text{Area1} * \text{Area2}))$$

where:	EL1, EL2	Lower and upper elevations of the increment
	Area1, Area2	Areas computed for EL1, EL2, respectively
	Volume	Incremental volume between EL1 and EL2

Subsection: Outlet Input Data

Label: Composite Outlet Structure - 1

Scenario: Post-Development 100 year, Year 2100

Return Event: 100 years

Storm Event: NOAA-D 2100 (11.48)

Requested Pond Water Surface Elevations	
Minimum (Headwater)	81.00 ft
Increment (Headwater)	0.10 ft
Maximum (Headwater)	84.00 ft

Outlet Connectivity

Structure Type	Outlet ID	Direction	Outfall	E1 (ft)	E2 (ft)
Orifice-Circular	Orifice - 1	Forward	TW	81.00	84.00
Rectangular Weir	Weir - 2	Forward	TW	82.10	84.00
Rectangular Weir	Weir - 1	Forward	TW	83.55	84.00
Tailwater Settings	Tailwater			(N/A)	(N/A)

Subsection: Outlet Input Data

Label: Composite Outlet Structure - 1

Scenario: Post-Development 100 year, Year 2100

Return Event: 100 years

Storm Event: NOAA-D 2100 (11.48)

Structure ID: Orifice - 1	
Structure Type: Orifice-Circular	
Number of Openings	1
Elevation	81.00 ft
Orifice Diameter	8.0 in
Orifice Coefficient	0.600
Structure ID: Weir - 1	
Structure Type: Rectangular Weir	
Number of Openings	1
Elevation	83.55 ft
Weir Length	3.50 ft
Weir Coefficient	3.50 (ft ^{0.5})/s
Structure ID: Weir - 2	
Structure Type: Rectangular Weir	
Number of Openings	1
Elevation	82.10 ft
Weir Length	0.75 ft
Weir Coefficient	3.30 (ft ^{0.5})/s
Structure ID: TW	
Structure Type: TW Setup, DS Channel	
Tailwater Type	Free Outfall
Convergence Tolerances	
Maximum Iterations	30
Tailwater Tolerance (Minimum)	0.01 ft
Tailwater Tolerance (Maximum)	0.50 ft
Headwater Tolerance (Minimum)	0.01 ft
Headwater Tolerance (Maximum)	0.50 ft
Flow Tolerance (Minimum)	0.001 ft ³ /s
Flow Tolerance (Maximum)	10.000 ft ³ /s

Subsection: Individual Outlet Curves
 Label: Composite Outlet Structure - 1
 Scenario: Post-Development 100 year, Year 2100

Return Event: 100 years
 Storm Event: NOAA-D 2100 (11.48)

RATING TABLE FOR ONE OUTLET TYPE
 Structure ID = Orifice - 1 (Orifice-Circular)

Upstream ID = (Pond Water Surface)
 Downstream ID = Tailwater (Pond Outfall)

Water Surface Elevation (ft)	Flow (ft ³ /s)	Tailwater Elevation (ft)	Convergence Error (ft)
81.00	0.00	(N/A)	0.00
81.10	0.03	(N/A)	0.00
81.20	0.11	(N/A)	0.00
81.30	0.23	(N/A)	0.00
81.40	0.39	(N/A)	0.00
81.50	0.58	(N/A)	0.00
81.60	0.79	(N/A)	0.00
81.70	1.02	(N/A)	0.00
81.80	1.15	(N/A)	0.00
81.90	1.26	(N/A)	0.00
82.00	1.37	(N/A)	0.00
82.10	1.47	(N/A)	0.00
82.20	1.56	(N/A)	0.00
82.30	1.65	(N/A)	0.00
82.40	1.74	(N/A)	0.00
82.50	1.81	(N/A)	0.00
82.60	1.89	(N/A)	0.00
82.70	1.96	(N/A)	0.00
82.80	2.03	(N/A)	0.00
82.90	2.10	(N/A)	0.00
83.00	2.17	(N/A)	0.00
83.10	2.23	(N/A)	0.00
83.20	2.30	(N/A)	0.00
83.30	2.36	(N/A)	0.00
83.40	2.42	(N/A)	0.00
83.50	2.47	(N/A)	0.00
83.55	2.50	(N/A)	0.00
83.60	2.53	(N/A)	0.00
83.70	2.58	(N/A)	0.00
83.80	2.64	(N/A)	0.00
83.90	2.69	(N/A)	0.00
84.00	2.74	(N/A)	0.00

Computation Messages

Upstream HW &
 DNstream TW < Inv.El
 CRIT.DEPTH CONTROL
 Vh= .025ft Dcr= .075ft
 CRIT.DEPTH Hev= .00ft

Subsection: Individual Outlet Curves
Label: Composite Outlet Structure - 1
Scenario: Post-Development 100 year, Year 2100

Return Event: 100 years
Storm Event: NOAA-D 2100 (11.48)

RATING TABLE FOR ONE OUTLET TYPE
Structure ID = Orifice - 1 (Orifice-Circular)

Upstream ID = (Pond Water Surface)
Downstream ID = Tailwater (Pond Outfall)

Computation Messages

CRIT.DEPTH CONTROL Vh= .052ft Dcr= .148ft CRIT.DEPTH Hev= .00ft CRIT.DEPTH CONTROL Vh= .080ft Dcr= .220ft CRIT.DEPTH Hev= .00ft CRIT.DEPTH CONTROL Vh= .110ft Dcr= .290ft CRIT.DEPTH Hev= .00ft CRIT.DEPTH CONTROL Vh= .143ft Dcr= .357ft CRIT.DEPTH Hev= .00ft CRIT.DEPTH CONTROL Vh= .180ft Dcr= .420ft CRIT.DEPTH Hev= .00ft H =.37 H =.47 H =.57 H =.67 H =.77 H =.87 H =.97 H =1.07 H =1.17 H =1.27 H =1.37 H =1.47 H =1.57 H =1.67 H =1.77 H =1.87 H =1.97 H =2.07 H =2.17 H =2.22 H =2.27 H =2.37 H =2.47 H =2.57 H =2.67

Subsection: Individual Outlet Curves
 Label: Composite Outlet Structure - 1
 Scenario: Post-Development 100 year, Year 2100

Return Event: 100 years
 Storm Event: NOAA-D 2100 (11.48)

RATING TABLE FOR ONE OUTLET TYPE
 Structure ID = Weir - 1 (Rectangular Weir)

Upstream ID = (Pond Water Surface)
 Downstream ID = Tailwater (Pond Outfall)

Water Surface Elevation (ft)	Flow (ft ³ /s)	Tailwater Elevation (ft)	Convergence Error (ft)
81.00	0.00	(N/A)	0.00
81.10	0.00	(N/A)	0.00
81.20	0.00	(N/A)	0.00
81.30	0.00	(N/A)	0.00
81.40	0.00	(N/A)	0.00
81.50	0.00	(N/A)	0.00
81.60	0.00	(N/A)	0.00
81.70	0.00	(N/A)	0.00
81.80	0.00	(N/A)	0.00
81.90	0.00	(N/A)	0.00
82.00	0.00	(N/A)	0.00
82.10	0.00	(N/A)	0.00
82.20	0.00	(N/A)	0.00
82.30	0.00	(N/A)	0.00
82.40	0.00	(N/A)	0.00
82.50	0.00	(N/A)	0.00
82.60	0.00	(N/A)	0.00
82.70	0.00	(N/A)	0.00
82.80	0.00	(N/A)	0.00
82.90	0.00	(N/A)	0.00
83.00	0.00	(N/A)	0.00
83.10	0.00	(N/A)	0.00
83.20	0.00	(N/A)	0.00
83.30	0.00	(N/A)	0.00
83.40	0.00	(N/A)	0.00
83.50	0.00	(N/A)	0.00
83.55	0.00	(N/A)	0.00
83.60	0.14	(N/A)	0.00
83.70	0.71	(N/A)	0.00
83.80	1.53	(N/A)	0.00
83.90	2.54	(N/A)	0.00
84.00	3.70	(N/A)	0.00

Computation Messages

HW & TW below
 Inv.El.=83.550
 HW & TW below
 Inv.El.=83.550
 HW & TW below
 Inv.El.=83.550

Return Event: 100 years
Storm Event: NOAA-D 2100 (11.48)

Upstream ID = (Pond Water Surface)
Downstream ID = Tailwater (Pond Outfall)

[illegible]

Subsection: Individual Outlet Curves
Label: Composite Outlet Structure - 1
Scenario: Post-Development 100 year, Year 2100

Return Event: 100 years
Storm Event: NOAA-D 2100 (11.48)

RATING TABLE FOR ONE OUTLET TYPE
Structure ID = Weir - 1 (Rectangular Weir)

Upstream ID = (Pond Water Surface)
Downstream ID = Tailwater (Pond Outfall)

Computation Messages

HW & TW below
Inv.El.=83.550
HW & TW below
Inv.El.=83.550
H=.00; Htw=.00;
Qfree=.00;
H=.05; Htw=.00;
Qfree=.14;
H=.15; Htw=.00;
Qfree=.71;
H=.25; Htw=.00;
Qfree=1.53;
H=.35; Htw=.00;
Qfree=2.54;
H=.45; Htw=.00;
Qfree=3.70;

Subsection: Individual Outlet Curves
 Label: Composite Outlet Structure - 1
 Scenario: Post-Development 100 year, Year 2100

Return Event: 100 years
 Storm Event: NOAA-D 2100 (11.48)

RATING TABLE FOR ONE OUTLET TYPE
 Structure ID = Weir - 2 (Rectangular Weir)

Upstream ID = (Pond Water Surface)
 Downstream ID = Tailwater (Pond Outfall)

Water Surface Elevation (ft)	Flow (ft ³ /s)	Tailwater Elevation (ft)	Convergence Error (ft)
81.00	0.00	(N/A)	0.00
81.10	0.00	(N/A)	0.00
81.20	0.00	(N/A)	0.00
81.30	0.00	(N/A)	0.00
81.40	0.00	(N/A)	0.00
81.50	0.00	(N/A)	0.00
81.60	0.00	(N/A)	0.00
81.70	0.00	(N/A)	0.00
81.80	0.00	(N/A)	0.00
81.90	0.00	(N/A)	0.00
82.00	0.00	(N/A)	0.00
82.10	0.00	(N/A)	0.00
82.20	0.08	(N/A)	0.00
82.30	0.22	(N/A)	0.00
82.40	0.41	(N/A)	0.00
82.50	0.63	(N/A)	0.00
82.60	0.88	(N/A)	0.00
82.70	1.15	(N/A)	0.00
82.80	1.45	(N/A)	0.00
82.90	1.77	(N/A)	0.00
83.00	2.11	(N/A)	0.00
83.10	2.48	(N/A)	0.00
83.20	2.86	(N/A)	0.00
83.30	3.25	(N/A)	0.00
83.40	3.67	(N/A)	0.00
83.50	4.10	(N/A)	0.00
83.55	4.32	(N/A)	0.00
83.60	4.55	(N/A)	0.00
83.70	5.01	(N/A)	0.00
83.80	5.49	(N/A)	0.00
83.90	5.98	(N/A)	0.00
84.00	6.48	(N/A)	0.00

Computation Messages

HW & TW below
 Inv.El.=82.100
 HW & TW below
 Inv.El.=82.100
 HW & TW below
 Inv.El.=82.100

Subsection: Individual Outlet Curves
Label: Composite Outlet Structure - 1
Scenario: Post-Development 100 year, Year 2100

Return Event: 100 years
Storm Event: NOAA-D 2100 (11.48)

RATING TABLE FOR ONE OUTLET TYPE
Structure ID = Weir - 2 (Rectangular Weir)

Upstream ID = (Pond Water Surface)
Downstream ID = Tailwater (Pond Outfall)

Computation Messages

HW & TW below Inv.El.=82.100 HW & TW below Inv.El.=82.100 HW & TW below Inv.El.=82.100 HW & TW below Inv.El.=82.100 HW & TW below Inv.El.=82.100 HW & TW below Inv.El.=82.100 HW & TW below Inv.El.=82.100 H=.00; Htw=.00; Qfree=.00; H=.10; Htw=.00; Qfree=.08; H=.20; Htw=.00; Qfree=.22; H=.30; Htw=.00; Qfree=.41; H=.40; Htw=.00; Qfree=.63; H=.50; Htw=.00; Qfree=.88; H=.60; Htw=.00; Qfree=1.15; H=.70; Htw=.00; Qfree=1.45; H=.80; Htw=.00; Qfree=1.77; H=.90; Htw=.00; Qfree=2.11; H=1.00; Htw=.00; Qfree=2.48; H=1.10; Htw=.00; Qfree=2.86; H=1.20; Htw=.00; Qfree=3.25;
--

Subsection: Individual Outlet Curves
Label: Composite Outlet Structure - 1
Scenario: Post-Development 100 year, Year 2100

Return Event: 100 years
Storm Event: NOAA-D 2100 (11.48)

RATING TABLE FOR ONE OUTLET TYPE
Structure ID = Weir - 2 (Rectangular Weir)

Upstream ID = (Pond Water Surface)
Downstream ID = Tailwater (Pond Outfall)

Computation Messages

H=1.30; Htw=.00; Qfree=3.67; H=1.40; Htw=.00; Qfree=4.10; H=1.45; Htw=.00; Qfree=4.32; H=1.50; Htw=.00; Qfree=4.55; H=1.60; Htw=.00; Qfree=5.01; H=1.70; Htw=.00; Qfree=5.49; H=1.80; Htw=.00; Qfree=5.98; H=1.90; Htw=.00; Qfree=6.48;
--

Subsection: Composite Rating Curve
 Label: Composite Outlet Structure - 1
 Scenario: Post-Development 100 year, Year 2100

Return Event: 100 years
 Storm Event: NOAA-D 2100 (11.48)

Composite Outflow Summary

Water Surface Elevation (ft)	Flow (ft ³ /s)	Tailwater Elevation (ft)	Convergence Error (ft)
81.00	0.00	(N/A)	0.00
81.10	0.03	(N/A)	0.00
81.20	0.11	(N/A)	0.00
81.30	0.23	(N/A)	0.00
81.40	0.39	(N/A)	0.00
81.50	0.58	(N/A)	0.00
81.60	0.79	(N/A)	0.00
81.70	1.02	(N/A)	0.00
81.80	1.15	(N/A)	0.00
81.90	1.26	(N/A)	0.00
82.00	1.37	(N/A)	0.00
82.10	1.47	(N/A)	0.00
82.20	1.64	(N/A)	0.00
82.30	1.87	(N/A)	0.00
82.40	2.14	(N/A)	0.00
82.50	2.44	(N/A)	0.00
82.60	2.77	(N/A)	0.00
82.70	3.11	(N/A)	0.00
82.80	3.48	(N/A)	0.00
82.90	3.87	(N/A)	0.00
83.00	4.28	(N/A)	0.00
83.10	4.71	(N/A)	0.00
83.20	5.15	(N/A)	0.00
83.30	5.61	(N/A)	0.00
83.40	6.08	(N/A)	0.00
83.50	6.57	(N/A)	0.00
83.55	6.82	(N/A)	0.00
83.60	7.21	(N/A)	0.00
83.70	8.31	(N/A)	0.00
83.80	9.66	(N/A)	0.00
83.90	11.21	(N/A)	0.00
84.00	12.92	(N/A)	0.00

Contributing Structures

None Contributing
 Orifice - 1
 Orifice - 1
 Orifice - 1
 Orifice - 1
 Orifice - 1
 Orifice - 1
 Orifice - 1
 Orifice - 1
 Orifice - 1
 Orifice - 1

Subsection: Composite Rating Curve
Label: Composite Outlet Structure - 1
Scenario: Post-Development 100 year, Year 2100

Return Event: 100 years
Storm Event: NOAA-D 2100 (11.48)

Composite Outflow Summary

Contributing Structures
Orifice - 1 + Weir - 2
Orifice - 1 + Weir - 2
Orifice - 1 + Weir - 2
Orifice - 1 + Weir - 2
Orifice - 1 + Weir - 2
Orifice - 1 + Weir - 2
Orifice - 1 + Weir - 2
Orifice - 1 + Weir - 2
Orifice - 1 + Weir - 2
Orifice - 1 + Weir - 2
Orifice - 1 + Weir - 2
Orifice - 1 + Weir - 2
Orifice - 1 + Weir - 2
Orifice - 1 + Weir - 2
Orifice - 1 + Weir - 2 + Weir - 1
Orifice - 1 + Weir - 2 + Weir - 1
Orifice - 1 + Weir - 2 + Weir - 1
Orifice - 1 + Weir - 2 + Weir - 1
Orifice - 1 + Weir - 2 + Weir - 1
Orifice - 1 + Weir - 2 + Weir - 1

Subsection: Level Pool Pond Routing Summary
Label: Basin (IN)
Scenario: Post-Development 2 year, Year 2100

Return Event: 2 years
Storm Event: NOAA-D 2100 (3.99)

Infiltration			
Infiltration Method (Computed)		No Infiltration	
Initial Conditions			
Elevation (Water Surface, Initial)		81.00 ft	
Volume (Initial)		0.000 ft ³	
Flow (Initial Outlet)		0.00 ft ³ /s	
Flow (Initial Infiltration)		0.00 ft ³ /s	
Flow (Initial, Total)		0.00 ft ³ /s	
Time Increment		1.000 min	
Inflow/Outflow Hydrograph Summary			
Flow (Peak In)		2.35 ft ³ /s	Time to Peak (Flow, In)
Flow (Peak Outlet)		1.44 ft ³ /s	Time to Peak (Flow, Outlet)
			726.000 min
			727.000 min
Elevation (Water Surface, Peak)		82.07 ft	
Volume (Peak)		841.210 ft ³	
Mass Balance (ft ³)			
Volume (Initial)		0.000 ft ³	
Volume (Total Inflow)		7,563.000 ft ³	
Volume (Total Infiltration)		0.000 ft ³	
Volume (Total Outlet Outflow)		7,513.000 ft ³	
Volume (Retained)		48.000 ft ³	
Volume (Unrouted)		-2.000 ft ³	
Error (Mass Balance)		0.023 %	

Subsection: Level Pool Pond Routing Summary
Label: Basin (IN)
Scenario: Post-Development 2 year

Return Event: 2 years
Storm Event: NOAA-D (3.35 in)

Infiltration			
Infiltration Method (Computed)		No Infiltration	
Initial Conditions			
Elevation (Water Surface, Initial)		81.00 ft	
Volume (Initial)		0.000 ft³	
Flow (Initial Outlet)		0.00 ft³/s	
Flow (Initial Infiltration)		0.00 ft³/s	
Flow (Initial, Total)		0.00 ft³/s	
Time Increment		1.000 min	
Inflow/Outflow Hydrograph Summary			
Flow (Peak In)		1.92 ft³/s	Time to Peak (Flow, In)
Flow (Peak Outlet)		1.28 ft³/s	Time to Peak (Flow, Outlet)
			726.000 min
			727.000 min
Elevation (Water Surface, Peak)			
		81.91 ft	
Volume (Peak)			
		671.578 ft³	
Mass Balance (ft³)			
Volume (Initial)		0.000 ft³	
Volume (Total Inflow)		6,170.000 ft³	
Volume (Total Infiltration)		0.000 ft³	
Volume (Total Outlet Outflow)		6,128.000 ft³	
Volume (Retained)		41.000 ft³	
Volume (Unrouted)		-2.000 ft³	
Error (Mass Balance)		0.028 %	

Subsection: Level Pool Pond Routing Summary
Label: Basin (IN)
Scenario: Post-Development 10 year, Year 2100

Return Event: 10 years
Storm Event: NOAA-D 2100 (6.20)

Infiltration			
Infiltration Method (Computed)		No Infiltration	
Initial Conditions			
Elevation (Water Surface, Initial)	81.00 ft		
Volume (Initial)	0.000 ft³		
Flow (Initial Outlet)	0.00 ft³/s		
Flow (Initial Infiltration)	0.00 ft³/s		
Flow (Initial, Total)	0.00 ft³/s		
Time Increment	1.000 min		
Inflow/Outflow Hydrograph Summary			
Flow (Peak In)	3.85 ft³/s	Time to Peak (Flow, In)	726.000 min
Flow (Peak Outlet)	2.51 ft³/s	Time to Peak (Flow, Outlet)	727.000 min
Elevation (Water Surface, Peak)	82.52 ft		
Volume (Peak)	1,436.418 ft³		
Mass Balance (ft³)			
Volume (Initial)	0.000 ft³		
Volume (Total Inflow)	12,507.000 ft³		
Volume (Total Infiltration)	0.000 ft³		
Volume (Total Outlet Outflow)	12,445.000 ft³		
Volume (Retained)	59.000 ft³		
Volume (Unrouted)	-3.000 ft³		
Error (Mass Balance)	0.023 %		

Subsection: Level Pool Pond Routing Summary
Label: Basin (IN)
Scenario: Post-Development 10 year

Return Event: 10 years
Storm Event: NOAA-D (5.17 in)

Infiltration			
Infiltration Method (Computed)		No Infiltration	
Initial Conditions			
Elevation (Water Surface, Initial)	81.00 ft		
Volume (Initial)	0.000 ft³		
Flow (Initial Outlet)	0.00 ft³/s		
Flow (Initial Infiltration)	0.00 ft³/s		
Flow (Initial, Total)	0.00 ft³/s		
Time Increment	1.000 min		
Inflow/Outflow Hydrograph Summary			
Flow (Peak In)	3.15 ft³/s	Time to Peak (Flow, In)	726.000 min
Flow (Peak Outlet)	1.96 ft³/s	Time to Peak (Flow, Outlet)	727.000 min
Elevation (Water Surface, Peak)	82.33 ft		
Volume (Peak)	1,167.827 ft³		
Mass Balance (ft³)			
Volume (Initial)	0.000 ft³		
Volume (Total Inflow)	10,183.000 ft³		
Volume (Total Infiltration)	0.000 ft³		
Volume (Total Outlet Outflow)	10,126.000 ft³		
Volume (Retained)	54.000 ft³		
Volume (Unrouted)	-2.000 ft³		
Error (Mass Balance)	0.022 %		

Subsection: Level Pool Pond Routing Summary
Label: Basin (IN)
Scenario: Post-Development 25 year

Return Event: 25 years
Storm Event: NOAA-D (6.36 in)

Infiltration			
Infiltration Method (Computed)		No Infiltration	
Initial Conditions			
Elevation (Water Surface, Initial)	81.00 ft		
Volume (Initial)	0.000 ft³		
Flow (Initial Outlet)	0.00 ft³/s		
Flow (Initial Infiltration)	0.00 ft³/s		
Flow (Initial, Total)	0.00 ft³/s		
Time Increment	1.000 min		
Inflow/Outflow Hydrograph Summary			
Flow (Peak In)	3.96 ft³/s	Time to Peak (Flow, In)	726.000 min
Flow (Peak Outlet)	2.59 ft³/s	Time to Peak (Flow, Outlet)	727.000 min
Elevation (Water Surface, Peak)			
		82.55 ft	
Volume (Peak)			
		1,476.702 ft³	
Mass Balance (ft³)			
Volume (Initial)	0.000 ft³		
Volume (Total Inflow)	12,870.000 ft³		
Volume (Total Infiltration)	0.000 ft³		
Volume (Total Outlet Outflow)	12,808.000 ft³		
Volume (Retained)	60.000 ft³		
Volume (Unrouted)	-3.000 ft³		
Error (Mass Balance)	0.023 %		

Subsection: Level Pool Pond Routing Summary
Label: Basin (IN)
Scenario: Post-Development 100 year, Year 2100

Return Event: 100 years
Storm Event: NOAA-D 2100 (11.48)

Infiltration			
Infiltration Method (Computed)		No Infiltration	
Initial Conditions			
Elevation (Water Surface, Initial)		81.00 ft	
Volume (Initial)		0.000 ft³	
Flow (Initial Outlet)		0.00 ft³/s	
Flow (Initial Infiltration)		0.00 ft³/s	
Flow (Initial, Total)		0.00 ft³/s	
Time Increment		1.000 min	
Inflow/Outflow Hydrograph Summary			
Flow (Peak In)		7.50 ft³/s	Time to Peak (Flow, In)
Flow (Peak Outlet)		5.26 ft³/s	Time to Peak (Flow, Outlet)
			726.000 min
			727.000 min
Elevation (Water Surface, Peak)		83.22 ft	
Volume (Peak)		2,725.608 ft³	
Mass Balance (ft³)			
Volume (Initial)		0.000 ft³	
Volume (Total Inflow)		24,686.000 ft³	
Volume (Total Infiltration)		0.000 ft³	
Volume (Total Outlet Outflow)		24,597.000 ft³	
Volume (Retained)		84.000 ft³	
Volume (Unrouted)		-5.000 ft³	
Error (Mass Balance)		0.022 %	

Subsection: Level Pool Pond Routing Summary
Label: Basin (IN)
Scenario: Post-Development 100 year

Return Event: 100 years
Storm Event: NOAA-D (8.89 in)

Infiltration			
Infiltration Method (Computed)		No Infiltration	
Initial Conditions			
Elevation (Water Surface, Initial)	81.00 ft		
Volume (Initial)	0.000 ft³		
Flow (Initial Outlet)	0.00 ft³/s		
Flow (Initial Infiltration)	0.00 ft³/s		
Flow (Initial, Total)	0.00 ft³/s		
Time Increment	1.000 min		
Inflow/Outflow Hydrograph Summary			
Flow (Peak In)	5.70 ft³/s	Time to Peak (Flow, In)	726.000 min
Flow (Peak Outlet)	3.93 ft³/s	Time to Peak (Flow, Outlet)	727.000 min
Elevation (Water Surface, Peak)	82.91 ft		
Volume (Peak)	2,103.142 ft³		
Mass Balance (ft³)			
Volume (Initial)	0.000 ft³		
Volume (Total Inflow)	18,674.000 ft³		
Volume (Total Infiltration)	0.000 ft³		
Volume (Total Outlet Outflow)	18,598.000 ft³		
Volume (Retained)	72.000 ft³		
Volume (Unrouted)	-4.000 ft³		
Error (Mass Balance)	0.023 %		

Index

B

Basin (Elevation-Area Volume Curve, 100 years (Post-Development 100 year, Year 2100))...82
Basin (IN) (Level Pool Pond Routing Summary, 10 years (Post-Development 10 year))...99
Basin (IN) (Level Pool Pond Routing Summary, 10 years (Post-Development 10 year, Year 2100))...98
Basin (IN) (Level Pool Pond Routing Summary, 100 years (Post-Development 100 year))...102
Basin (IN) (Level Pool Pond Routing Summary, 100 years (Post-Development 100 year, Year 2100))...101
Basin (IN) (Level Pool Pond Routing Summary, 2 years (Post-Development 2 year))...97
Basin (IN) (Level Pool Pond Routing Summary, 2 years (Post-Development 2 year, Year 2100))...96
Basin (IN) (Level Pool Pond Routing Summary, 25 years (Post-Development 25 year))...100
Basin (Volume Equations, 100 years (Post-Development 100 year, Year 2100))...83

C

Composite Outlet Structure - 1 (Composite Rating Curve, 100 years (Post-Development 100 year, Year 2100))...94, 95
Composite Outlet Structure - 1 (Individual Outlet Curves, 100 years (Post-Development 100 year, Year 2100))...86, 87, 88, 89, 90, 91, 92, 93
Composite Outlet Structure - 1 (Outlet Input Data, 100 years (Post-Development 100 year, Year 2100))...84, 85

D

DA2-PR Imp (Runoff CN-Area, 10 years (Post-Development 10 year))...8
DA2-PR Imp (Runoff CN-Area, 10 years (Post-Development 10 year, Year 2100))...7
DA2-PR Imp (Runoff CN-Area, 100 years (Post-Development 100 year))...11
DA2-PR Imp (Runoff CN-Area, 100 years (Post-Development 100 year, Year 2100))...10
DA2-PR Imp (Runoff CN-Area, 2 years (Post-Development 2 year))...6
DA2-PR Imp (Runoff CN-Area, 2 years (Post-Development 2 year, Year 2100))...5
DA2-PR Imp (Runoff CN-Area, 25 years (Post-Development 25 year))...9
DA2-PR Imp (Unit Hydrograph Summary, 10 years (Post-Development 10 year))...25, 26
DA2-PR Imp (Unit Hydrograph Summary, 10 years (Post-Development 10 year, Year 2100))...23, 24
DA2-PR Imp (Unit Hydrograph Summary, 100 years (Post-Development 100 year))...31, 32
DA2-PR Imp (Unit Hydrograph Summary, 100 years (Post-Development 100 year, Year 2100))...29, 30
DA2-PR Imp (Unit Hydrograph Summary, 2 years (Post-Development 2 year))...21, 22
DA2-PR Imp (Unit Hydrograph Summary, 2 years (Post-Development 2 year, Year 2100))...19, 20

DA2-PR Imp (Unit Hydrograph Summary, 25 years (Post-Development 25 year))...27, 28

DA2-PR Perv (Runoff CN-Area, 10 years (Post-Development 10 year))...15

DA2-PR Perv (Runoff CN-Area, 10 years (Post-Development 10 year, Year 2100))...14

DA2-PR Perv (Runoff CN-Area, 100 years (Post-Development 100 year))...18

DA2-PR Perv (Runoff CN-Area, 100 years (Post-Development 100 year, Year 2100))...17

DA2-PR Perv (Runoff CN-Area, 2 years (Post-Development 2 year))...13

DA2-PR Perv (Runoff CN-Area, 2 years (Post-Development 2 year, Year 2100))...12

DA2-PR Perv (Runoff CN-Area, 25 years (Post-Development 25 year))...16

DA2-PR Perv (Unit Hydrograph Summary, 10 years (Post-Development 10 year))...39, 40

DA2-PR Perv (Unit Hydrograph Summary, 10 years (Post-Development 10 year, Year 2100))...37, 38

DA2-PR Perv (Unit Hydrograph Summary, 100 years (Post-Development 100 year))...45, 46

DA2-PR Perv (Unit Hydrograph Summary, 100 years (Post-Development 100 year, Year 2100))...43, 44

DA2-PR Perv (Unit Hydrograph Summary, 2 years (Post-Development 2 year))...35, 36

DA2-PR Perv (Unit Hydrograph Summary, 2 years (Post-Development 2 year, Year 2100))...33, 34

DA2-PR Perv (Unit Hydrograph Summary, 25 years (Post-Development 25 year))...41, 42

I

Impervious to Basin (Unit Hydrograph Summary, 10 years (Post-Development 10 year))...53, 54

Impervious to Basin (Unit Hydrograph Summary, 10 years (Post-Development 10 year, Year 2100))...51, 52

Impervious to Basin (Unit Hydrograph Summary, 100 years (Post-Development 100 year))...59, 60

Impervious to Basin (Unit Hydrograph Summary, 100 years (Post-Development 100 year, Year 2100))...57, 58

Impervious to Basin (Unit Hydrograph Summary, 2 years (Post-Development 2 year))...49, 50

Impervious to Basin (Unit Hydrograph Summary, 2 years (Post-Development 2 year, Year 2100))...47, 48

Impervious to Basin (Unit Hydrograph Summary, 25 years (Post-Development 25 year))...55, 56

M

Master Network Summary...2, 3, 4

O

O-1 (Addition Summary, 10 years (Post-Development 10 year))...78

O-1 (Addition Summary, 10 years (Post-Development 10 year, Year 2100))...77

O-1 (Addition Summary, 100 years (Post-Development 100 year))...81

O-1 (Addition Summary, 100 years (Post-Development 100 year, Year 2100))...80

O-1 (Addition Summary, 2 years (Post-Development 2 year))...76

O-1 (Addition Summary, 2 years (Post-Development 2 year, Year 2100))...75

O-1 (Addition Summary, 25 years (Post-Development 25 year))...79

P

Pervious to basin (Unit Hydrograph Summary, 10 years (Post-Development 10 year))...67, 68

Pervious to basin (Unit Hydrograph Summary, 10 years (Post-Development 10 year, Year 2100))...65, 66

Pervious to basin (Unit Hydrograph Summary, 100 years (Post-Development 100 year))...73, 74

Pervious to basin (Unit Hydrograph Summary, 100 years (Post-Development 100 year, Year 2100))...71, 72

Pervious to basin (Unit Hydrograph Summary, 2 years (Post-Development 2 year))...63, 64

Pervious to basin (Unit Hydrograph Summary, 2 years (Post-Development 2 year, Year 2100))...61, 62

Pervious to basin (Unit Hydrograph Summary, 25 years (Post-Development 25 year))...69, 70

STORM SEWER DESIGN WORK SHEET																		
LOCATION		RUNOFF DATA									SEWER DESIGN DATA							
STRUCTURE		INCREMENTAL			TIME OF					PIPE MATERIAL : HDPE MANNINGS 'n' = 0.012								
NUMBER		AREA			CONCENTRATION													
UPSTREAM	DOWNSREAM	AREA	WEIGHTED RUNOFF COEFFICIENT	SUBAREA A _c x C	TOTAL AREA	OVERLAND THROUGH AREA T _b	THROUGH PIPE T _p	TOTAL T _c OR LONGEST ACCUMULATED T _c	RAINFALL INTENSITY		RUNOFF PEAK Q	DIAMETER	LENGTH	SLOPE	CAPACITY AT FULL FLOW Q ₁	VELOCITY AT FULL FLOW V ₁	VELOCITY ACTUAL V _a	
										A _c								C
GA 1	GA 3	0.02	0.20	0.00	0.00	5.0		5.0	7.20	0.02	12	56	0.50	2.7	3.5	0.8	1.2	
GA 2	GA 3	0.15	0.99	0.14	0.14	5.0	1.2	5.0	7.20	1.04	15	46	0.37	4.3	3.5	2.7	0.3	
GA 3	GA 4	0.09	0.25	0.02	0.17	5.0	1.4	5.0	7.20	1.22	15	83	1.80	9.4	7.6	4.9	0.3	
GA 4	GA 5	0.05	0.31	0.01	0.18	5.0	1.7	5.0	7.20	1.32	15	18	0.50	4.9	4.0	3.2	0.1	
GA 5	GA 6	0.30	0.99	0.30	0.48	5.0	1.8	5.0	7.20	3.47	18	7	0.50	8.0	4.6	4.1	0.0	
GA 7	GA 6	0.22	0.99	0.22	0.22	5.0	1.8	5.0	7.20	1.57	15	46	0.71	5.9	4.8	3.8	0.2	
G 1	A 1	0.09	0.48	0.04	0.74	5.0	2.0	5.0	7.20	5.35	18	83	1.42	13.6	7.7	6.7	0.2	
of Leaders	A 1	0.71	0.99	0.70	1.45	5.0		5.0	7.20	10.41	18	133	1.50	13.9	7.9	8.0	0.3	
h 1	h 2	0.07	0.37	0.03	0.03	5.0		5.0	7.20	0.18	12	71	1.00	3.9	4.9	2.2	0.5	
h 2	a 1	0.01	0.46	0.00	0.03	5.0	0.5	5.0	7.20	0.22	12	33	1.00	3.9	4.9	2.5	0.2	
A 1	A 2	0.07	0.70	0.05	1.53	5.0	2.0	5.0	7.20	10.98	36	29	0.50	51.1	7.2	5.5	0.1	
A 2	A 3	0.02	0.78	0.02	1.54	5.0	2.1	5.0	7.20	11.11	36	42	0.50	51.1	7.2	5.5	0.1	
PROJECT NAME : Penn Medicine Parking Garage																		
B 1	B 2	0.11	0.99	0.11	0.11	5.0		5.0	7.20	0.78	18	52	1.00	11.4	6.4	5.1	0.2	
B 2	B 3	0.21	0.94	0.20	0.31	5.0	0.2	5.0	7.20	2.21	18	17	1.00	11.4	6.4	5.6	0.1	
Z 4	B 3	0.96	0.42	0.40	0.40	5.0	0.2	5.0	7.20	2.90	15	87	1.80	9.4	7.6	6.3	0.2	
B 3	B 4	0.04	0.50	0.02	0.73	5.0	0.4	5.0	7.20	5.24	18	13	1.00	11.4	6.4	6.4	0.0	
B 4	A 4	0.85	0.93	0.79	1.51	5.0	0.5	5.0	7.20	10.90	24	67	1.00	24.5	7.8	7.4	0.2	
PROJECT NO. : 06C028T.003																		
STORM FREQUENCY 25 YEAR																		
A 3	A 4	0.04	0.90	0.03	3.09	5.0	2.1	5.0	7.20	22.26	36	87	0.50	51.1	7.2	6.7	0.2	
A 4	A 5	0.25	0.84	0.21	4.82	5.0	2.3	5.0	7.20	34.68	36	50	0.50	51.1	7.2	7.5	0.1	
F 2	A 5	0.29	0.99	0.29	0.29	5.0		5.0	7.20	2.06	18	13	1.00	11.4	6.4	5.2	0.0	
A 5	A 6	0.00	0.00	0.00	5.10	5.0	2.3	5.0	7.20	36.74	36	45	0.50	51.1	7.2	7.5	0.1	
A 6A	A 6	0.11	0.48	0.05	0.05	5.0		5.0	7.20	0.36	15	25	1.00	7.0	5.7	2.8	0.1	
a 6	a 7	0.00	0.00	0.00	5.15	5.0	2.3	5.0	7.20	37.10	36	83	0.50	51.1	7.2	7.6	0.2	
a 7	a 8	0.01	0.76	0.00	5.16	5.0	2.5	5.0	7.20	37.13	36	48	0.50	51.1	7.2	7.5	0.1	
COMPUTED BY : KAN DATE : 7-17-2024																		
inch Drain	A 8C	0.07	0.99	0.07	0.07	5.0		5.0	7.20	0.52	12	8	1.00	3.9	4.9	3.2	0.0	
Canopy Roof Drains	A 8C	0.02	0.99	0.02	0.02	5.0		5.0	7.20	0.17	12	35	1.00	3.9	4.9	2.3	0.3	
Canopy Roof Drains	A 8C	0.03	0.99	0.03	0.03	5.0		5.0	7.20	0.22	12	38	1.00	3.9	4.9	2.5	0.3	
a 8C	a 8D	0.11	0.32	0.04	0.11	5.0	0.0	5.0	7.20	0.77	15	55	1.00	7.0	5.7	3.5	0.3	
a 8D	a 8	0.04	0.74	0.03	0.14	5.0	0.3	5.0	7.20	0.99	15	49	1.00	7.0	5.7	3.6	0.2	
A 8	a 9	0.00	0.00	0.00	5.29	5.0	2.5	5.0	7.20	38.12	36	82	0.50	51.1	7.2	7.6	0.2	
a 9	a 10	0.19	0.86	0.16	5.46	5.0	2.7	5.0	7.20	39.30	36	47	0.50	51.1	7.2	7.6	0.1	
CHECKED BY : DATE :																		
R 1	R 2	0.48	0.99	0.47	0.47	5.0	0.0	5.0	7.20	3.41	18	49	0.50	8.0	4.6	4.0	0.2	
R 2	Basin	0.00	0.00	0.00	0.47	5.0	0.2	5.0	7.20	3.41	18	37	0.50	8.0	4.6	4.0	0.2	
OCS	E 2									1.9	18	11	1.00	11.4	6.4	4.5	0.0	
REVISED BY : KAN DATE : 10/1/2024																		
E 1	E 2	0.10	0.49	0.05	0.05	5.0	0.0	5.0	7.20	0.34	18	95	1.00	11.4	6.4	2.6	0.6	
E 2	A 10	0.00	0.00	0.00	0.05	5.0	0.6	5.0	7.20	2.28	18	34	1.00	11.4	6.4	4.7	0.1	
A 10	x 4	0.47	0.97	0.46	5.96	5.0	2.7	5.0	7.20	44.86	36	36	1.64	92.5	13.1	12.7	0.0	
FPA FRENCH & PARRELLO ASSOCIATES																		
c 1	c 2	0.43	0.88	0.38	0.85	5.0	0.0	5.0	7.20	6.13	18	138	1.00	11.4	6.4	6.1	0.4	
c 2	c 3	0.14	0.89	0.12	0.97	5.0	0.4	5.0	7.20	7.00	18	122	1.00	11.4	6.4	6.3	0.3	
y 6	c 3	0.38	0.89	0.34	0.34	5.0	0.7	5.0	7.20	2.43	15	41	0.73	6.0	4.9	4.8	0.1	
c 3	x 2	0.46	0.92	0.43	1.74	5.0	0.8	5.0	7.20	12.49	24	59	1.02	24.7	7.9	7.4	0.1	
d 4	d 5	0.26	0.99	0.26	0.26	5.0	0.0	5.0	7.20	1.87	12	106	1.00	3.9	4.9	4.5	0.4	
d 5	x 6	0.12	0.99	0.12	0.38	5.0	0.4	5.0	7.20	2.73	18	42	1.00	11.4	6.4	4.9	0.1	
Roof Leaders	G 1	0.19	0.99	0.19	0.19	5.0	0.0	5.0	7.20	1.37	12	22	1.00	3.9	4.9	4.2	0.1	
Roof Leaders	G 1	0.08	0.99	0.08	0.08	5.0	0.1	5.0	7.20	0.57	6	53	1.00	0.6	3.1	3.2	0.3	
G 1	EXISTING MH				0.27	5.0	0.4	5.0	7.20	1.94	12	52	2.56	6.2	7.9	6.4	0.1	

1. SEE CONSTRUCTION PLANS FOR

2.. SEE PLANS FOR PIPE PROFILE

INFORMATION.

PROJECT NAME : Penn Medicine Parking Garage

PROJECT NO. : 06C028T.003

STORM FREQUENCY 25 YEAR

COMPUTED BY : KAN DATE : 7-17-2024

CHECKED BY : DATE :

REVISED BY : KAN DATE : 10/1/2024



1800 ROUTE 34, SUITE 101 TELEPHONE : (732)-312-9800
WALL, NEW JERSEY NJ 07719 FAX : (732)-312-9801

Hydraulic Grade Line Analysis for the year 2100 100 year storm event

Line No.	Line ID	Invert Dn	Gmd/ Rim Elev Dn	HGL Dn	Invert Up	Gmd/ Rim Elev Up	HGL Up
		(ft)	(ft)	(ft)	(ft)	(ft)	(ft)
1	X4 TO X6	74.21	0.00	76.77	74.28	84.46	77.06
2	X3 TO X4	80.13	84.46	81.60	81.07	88.32	82.55
3	X2 TO X3	83.92	88.32	85.08	84.76	88.31	86.31
4	C3 TO X2	84.92	88.31	86.31	85.51	90.76	86.73 j
5	Y6 TO C3	87.91	90.76	88.53	88.21	91.95	88.90
6	Y5 TO Y6	88.21	91.95	88.90	88.56	92.14	89.30
7	Y3 TO Y5	88.56	92.14	89.56	88.65	92.50	89.72
8	Y2 TO Y3	88.70	92.50	89.77	90.39	92.84	90.82 j
9	Y1 TO Y2	90.39	92.84	90.82	91.50	95.35	91.79 j
10	A10 TO X4	74.28	84.46	79.08	74.87	83.67	79.20
11	A9 TO A10	74.87	83.67	79.84	75.34	85.42	79.95
12	A8 TO A9	75.39	85.42	80.11	75.79	87.99	80.28
13	A7 TO A8	75.79	87.99	80.55	76.03	89.66	80.64
14	A6 TO A7	76.03	89.66	81.02	76.45	88.41	81.16
15	A5 TO A6	76.45	88.41	81.42	76.67	86.07	81.50
16	A4 TO A5	76.67	86.07	81.76	76.92	86.10	81.83
17	B4 TO A4	81.61	86.10	82.72	82.28	89.91	83.60
18	B3 TO B4	82.78	89.91	83.67	82.91	89.48	83.93
19	A4 TO B2	84.23	89.48	84.62	85.79	91.09	86.32
20	Z3 TO Z4	88.34	91.09	88.55	90.05	92.85	90.39
21	Z2 TO Z3	90.05	92.85	90.39	90.86	93.46	91.18 j
22	Y4 TO Y5	89.74	92.14	89.93	91.99	95.19	92.28
23	C2 TO C3	85.59	90.76	86.73	86.80	91.62	87.58 j
24	C1 TO C2	86.80	91.62	87.58	88.18	91.43	88.86 j
25	Z1 TO Z4	85.94	91.09	86.32	88.54	91.54	88.91 j
26	X1 TO X2	84.96	88.31	86.31	85.21	88.71	86.39
27	8B TO 8	83.88	87.99	84.23	84.37	87.50	84.78
28	B2 TO B3	82.91	89.48	83.93	83.08	88.90	83.96 j
29	B1 TO B2	83.08	88.90	83.96	83.60	87.10	84.32 j
30	A8A TO A8B	82.37	87.50	84.78	82.92	85.28	84.79
31	TRENCH DRAIN TO A8A	82.92	85.28	84.80	83.00	85.21	84.80
32	A3 TO A4	76.92	86.10	82.01	77.36	86.60	82.03
33	A2 TO A3	77.36	86.60	82.06	77.57	86.57	82.07
34	A1 TO A2	77.57	86.57	82.10	77.72	84.17	82.10
35	h2 to a1	82.28	84.17	82.42	82.64	87.00	82.80
36	h1 to h2	82.65	87.00	82.80	83.34	85.55	83.48 j
37	A6A TO 6A	82.15	88.41	82.35	82.40	85.90	82.64
38	F2 TO A5	81.17	86.07	81.77	81.30	87.03	82.01
39	F1 TO F2	81.30	87.03	82.01	81.92	86.75	82.24
40	ROOF TO F2	81.30	87.03	82.13	81.43	87.50	82.33
41	E3 TO A10	79.18	83.67	79.84	79.52	84.17	80.16 j
42	OCS TO E-3	80.85	84.17	81.32	81.00	84.50	81.59
43	X5 TO X6	80.23	84.46	80.88	80.54	83.54	81.19
44	e1 to e2	79.52	84.17	80.16	80.47	84.90	80.71 j
45	X8 TO EX1	69.59	73.92	70.64	71.67	78.32	72.81
46	X6 TO X8	71.77	78.32	72.81	72.47	80.80	73.46 j
47	D5 TO X6	77.12	80.80	77.51	77.54	82.13	78.03
48	D4 TO D5	78.62	82.13	78.93	79.73	84.97	80.09
49	d3 to d4	81.80	84.97	82.10	81.84	84.93	82.20

Line No.	Line ID	Invert Dn	Gmd/ Rim Elev Dn	HGL Dn	Invert Up	Gmd/ Rim Elev Up	HGL Up
		(ft)	(ft)	(ft)	(ft)	(ft)	(ft)
50	D2 TO D3	81.84	84.93	82.20	82.15	84.97	82.51
51	D1 TO D2	82.15	84.97	82.51	82.47	85.44	82.83
52	X7 TO X6	76.92	80.80	77.33	77.57	81.90	78.09
53	L2 TO A13	75.88	78.32	76.62	76.30	79.55	77.13
54	L1 TO L2	76.70	79.55	77.13	77.70	81.25	78.20
55	Pipe (57)	80.62	83.97	81.22	82.02	85.03	82.67
56	TO X6	82.02	85.42	82.67	82.07	86.00	82.52
57	Pipe (56)	82.02	85.42	82.67	82.26	86.00	82.71 j
58	r2 to fes	81.00	82.65	81.74	81.22	85.89	81.98
59	r1 to r2	81.36	85.89	82.08	81.60	85.38	82.36
	Notes: j-Line contains hyd. jump						



TELEPHONE : (732) 312-9800
FAX : (732) 312-9801

1800 ROUTE 34, SUITE 101
WALL, NEW JERSEY 07719

PROJECT NUMBER : 06C028T.003
PROJECT NAME : Penn Medicine Cancer and Imaging Center
CALCULATED BY : KAN DATE: 7/18/2024
CHECKED BY : DATE:
REVISED BY : DATE:

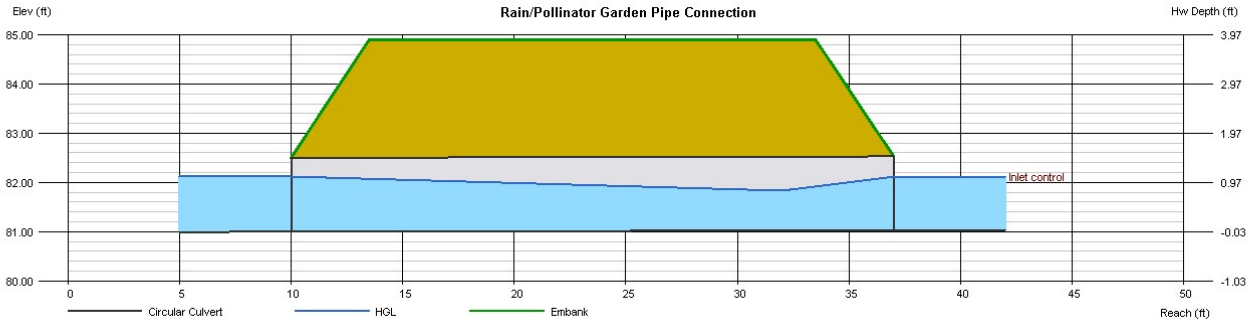
CONDUIT OUTLET PROTECTION WORKSHEET

STRUCTURE NUMBER	Q25 (CFS)	Do (INCH)	q=Q/Do	TW OR 0.2 D0 (Ft)*	FOR Y = 1/2 Do	FOR Y = Do	U S E : Y = 1/2 Do				
					$D50=(0.0125/Tw) * q^{1.33}$	$D50=(0.0082/Tw) * q^{1.33}$	Y, In.	d50, IN.	THICKNESS	L, FT.	W, FT.
A1 SCOUR HOLE	3.47	18	2.31	0.30	1.5	1.0	9.0	2.0	4.0 With Filter Fabric	9.00	7.50
							Calculated 2" d50 minimum, 3-4" Delaware River Rock to be used.				
					FOR Y=0.5*Do $d50=(0.0125/Tw) * q^{1.33}$	FOR Y=Do $d50=(0.0082/Tw) * q^{1.33}$	D= 3 * d50 WITHOUT FILTER FABRIC D= 2 * d50 WITH FILTER FABRIC				

Culvert Report

Rain/Pollinator Garden Pipe Connection

Invert Elev Dn (ft)	= 81.00	Calculations	
Pipe Length (ft)	= 27.00	Qmin (cfs)	= 0.00
Slope (%)	= 0.11	Qmax (cfs)	= 7.50
Invert Elev Up (ft)	= 81.03	Tailwater Elev (ft)	= (dc+D)/2
Rise (in)	= 18.0		
Shape	= Circular	Highlighted	
Span (in)	= 18.0	Qtotat (cfs)	= 7.50
No. Barrels	= 2	Qpipe (cfs)	= 7.50
n-Value	= 0.012	Qovertop (cfs)	= 0.00
Culvert Type	= Circular Culvert	Veloc Dn (ft/s)	= 2.65
Culvert Entrance	= Smooth tapered inlet throat	Veloc Up (ft/s)	= 4.32
Coeff. K,M,c,Y,k	= 0.534, 0.555, 0.0196, 0.9, 0.2	HGL Dn (ft)	= 82.12
		HGL Up (ft)	= 81.77
		Hw Elev (ft)	= 82.12
		Hw/D (ft)	= 0.72
		Flow Regime	= Inlet Control
Embankment			
Top Elevation (ft)	= 84.90		
Top Width (ft)	= 20.00		
Crest Width (ft)	= 50.00		



Q			Veloc		Depth		HGL			
Total	Pipe	Over	Dn	Up	Dn	Up	Dn	Up	Hw	Hw/D
(cfs)	(cfs)	(cfs)	(ft/s)	(ft/s)	(in)	(in)	(ft)	(ft)	(ft)	
0.50	0.50	0.00	0.24	2.02	10.10	2.21	81.84	81.21	81.27	0.16
1.00	1.00	0.00	0.46	2.42	10.57	3.14	81.88	81.29	81.39	0.24
1.50	1.50	0.00	0.67	2.70	10.93	3.86	81.91	81.35	81.47	0.30
2.00	2.00	0.00	0.86	2.92	11.24	4.47	81.94	81.40	81.55	0.35
2.50	2.50	0.00	1.05	3.11	11.51	5.01	81.96	81.45	81.62	0.39
3.00	3.00	0.00	1.23	3.27	11.75	5.51	81.98	81.49	81.68	0.44
3.50	3.50	0.00	1.40	3.42	11.98	5.97	82.00	81.53	81.74	0.47
4.00	4.00	0.00	1.57	3.56	12.20	6.39	82.02	81.56	81.80	0.51
4.50	4.50	0.00	1.73	3.68	12.40	6.80	82.03	81.60	81.85	0.55
5.00	5.00	0.00	1.89	3.80	12.59	7.18	82.05	81.63	81.90	0.58
5.50	5.50	0.00	2.05	3.91	12.77	7.55	82.06	81.66	81.94	0.61
6.00	6.00	0.00	2.20	4.02	12.95	7.90	82.08	81.69	81.99	0.64
6.50	6.50	0.00	2.36	4.13	13.12	8.23	82.09	81.72	82.03	0.67
7.00	7.00	0.00	2.50	4.23	13.28	8.56	82.11	81.74	82.08	0.70
7.50	7.50	0.00	2.65	4.32	13.44	8.87	82.12	81.77	82.12	0.72

The twin 18-inch pipes have been modeled using Hydraflow Express. The pipes were modeled with the total inflow equal to 7.5 cfs, which is the total inflow into the bioretention basin for the year 2100 100-year storm. The tailwater was modeled as the (critical depth + pipe diameter)/2, which is a conservative assumption, with the culvert flowing full for the most of it's length. Based on the calculations shown on this sheet and the previous sheet, the twin pipes can freely pass the design flow without overtopping or back up.



Appendix D **Delaware and Raritan Canal Commission**

NJDEP Nonstructural Strategies Points System (NSPS)

Version: January 31, 2006

Note: Input Values in Yellow Cells Only

Project:

Date:

User:

Notes:

Step 1 - Provide Basic Major Development Site Information

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

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

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

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

Step 2 - Describe Existing or Pre-Developed Site Conditions

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

Site Segment	Land Use/Land Cover Description	Specify Land Use/Land Cover in Acres for Each HSG				Use/Cover Subtotals	Points
		HSG A	HSG B	HSG C	HSG D		
1	Wetlands and Undisturbed Stream Buffers					0.0	0
2	Lawn and Open Space		1.0	0.4		1.4	90
3	Brush and Shrub					0.0	0
4	Meadow, Pasture, Grassland, or Range					0.0	0
5	Row Crop					0.0	0
6	Small Grain and Legumes					0.0	0
7	Woods - Indigenous					0.0	0
8	Woods - Planted					0.0	0
9	Woods and Grass Combination					0.0	0
10	Ponds, Lakes, and Other Open Water					0.0	0
11	Gravel and Dirt					0.0	0
12	Porous and Permeable Paving					0.0	0
13	Directly Connected Impervious		2.3	1.1		3.3	0
14	Unconnected Impervious with Small D/S Pervious					0.0	0
15	Unconnected Impervious with Large D/S Pervious					0.0	0
HSG Subtotals (Acres):		0.0	3.3	1.5	0.0		Total Area: 4.7
HSG Subtotals (%):		0.0%	69.1%	30.9%	0.0%		Total % Area: 100.0%
						Points Subtotal:	90
						Total Existing Site Points:	90

Step 3 - Describe Proposed or Post-Developed Site Conditions

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

Site		Specify Land Use/Land Cover in Acres for Each HSG				Use/Cover	
Segment	Land Use/Land Cover Description	HSG A	HSG B	HSG C	HSG D	Subtotals	Points
1	Wetlands and Undisturbed Stream Buffers					0.0	0
2	Lawn and Open Space		0.8	0.6		1.4	83
3	Brush and Shrub			0.1		0.1	3
4	Meadow, Pasture, Grassland, or Range					0.0	0
5	Row Crop					0.0	0
6	Small Grain and Legumes					0.0	0
7	Woods - Indigenous					0.0	0
8	Woods - Planted					0.0	0
9	Woods and Grass Combination					0.0	0
10	Ponds, Lakes, and Other Open Water					0.0	0
11	Gravel and Dirt					0.0	0
12	Porous and Permeable Paving					0.0	0
13	Directly Connected Impervious		2.5	0.9		3.3	0
14	Unconnected Impervious with Small D/S Pervious					0.0	0
15	Unconnected Impervious with Large D/S Pervious					0.0	0
HSG Subtotals (Acres):		0.0	3.3	1.5	0.0		Total Area: 4.7
HSG Subtotals (%):		0.0%	69.1%	30.9%	0.0%		Total % Area: 100.0%
							Points Subtotal: 86

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

Total Directly Connected Impervious Coverage =	70%	% of Site
Total Unconnected Impervious Coverage with Small D/S Pervious =	0%	% of Site
Total Unconnected Impervious Coverage with Large D/S Pervious =	0%	% of Site
Total Site Impervious Coverage =	70%	% of Site
Effective Site Impervious Coverage =	70%	% of Site

Specify Source of Maximum Allowable Impervious Coverage: None (None or Table)

Points Subtotal: 0

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

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

Points Subtotal: 0

D. Describe Proposed Runoff Conveyance System:

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

Points Subtotal: 0

E. Residential Lot Clustering:

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

Points Subtotal: 0

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

Proposed Lawn Areas will be Graded with Lightweight Construction Equipment:
Percent of Proposed Lawn Areas to be Graded with Such Equipment:

No
0%

(Yes or No)
% of Lawn Areas

Points Subtotal: **0**

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

Groundwater Recharge Standards (NJAC 7:8-5.4-a-2):
Stormwater Runoff Quality Standards (NJAC 7:8-5.5):
Stormwater Runoff Quantity Standards (NJAC 7:8-5.4-a-3):

No
No
No

(Yes or No)
(Yes or No)
(Yes or No)

Points Subtotal: **0**

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

Total Proposed Site Points: 86

Ratio of Proposed to Existing Site Points: 96%

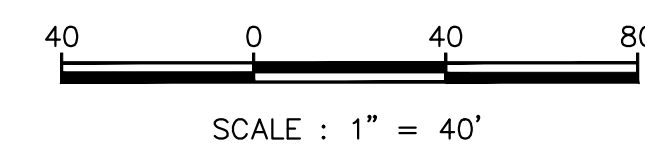
Required Site Points Ratio: 88%

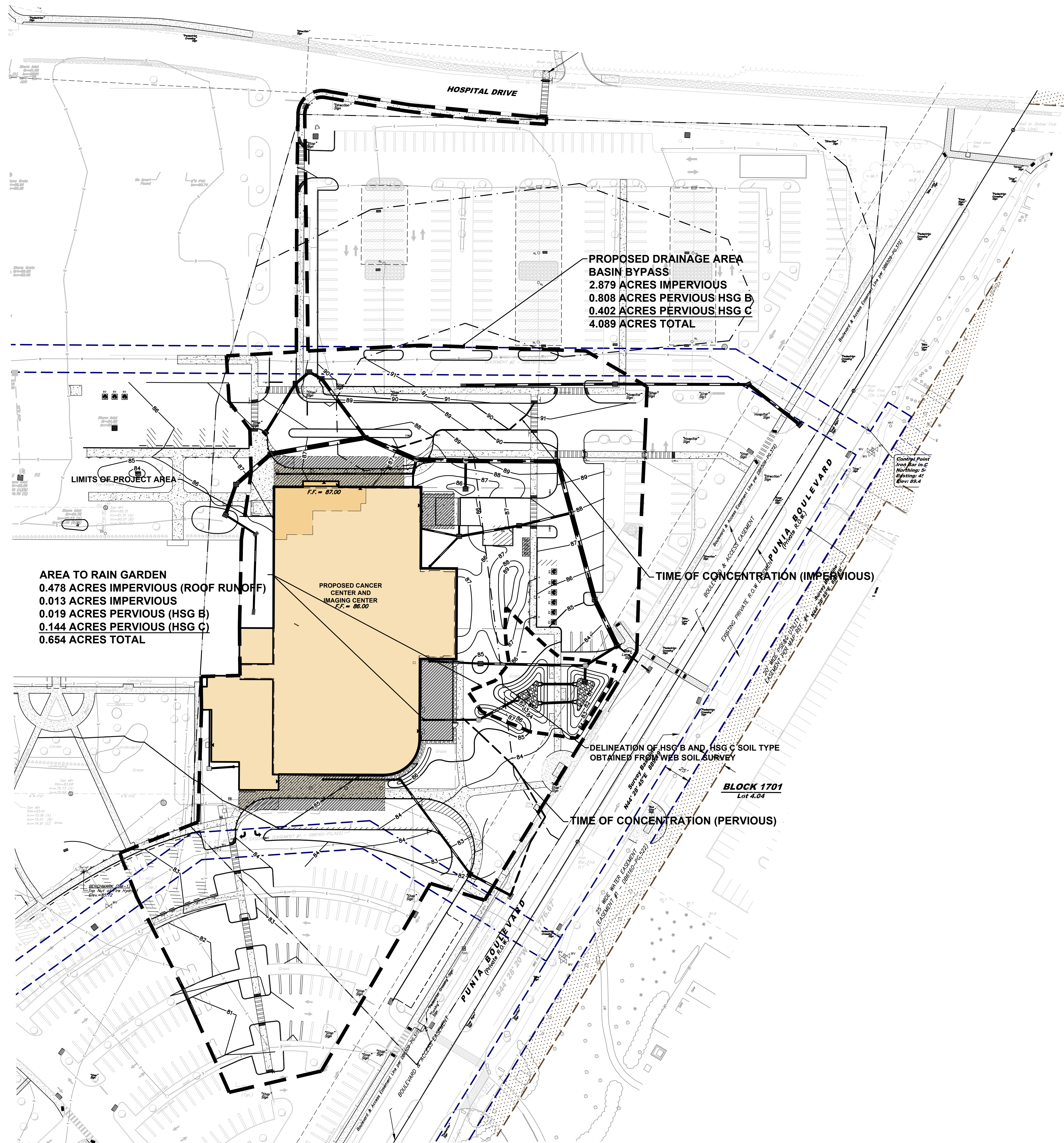
Nonstructural Point System Results:

Proposed Nonstructural Measures are Adequate



Appendix E **Drainage Area Maps**





NOTES:
LIMITS OF DRAINAGE AREA ANALYZED (4.7 AC) WERE
USED FOR DRCC SPREADSHEET CALCULATIONS



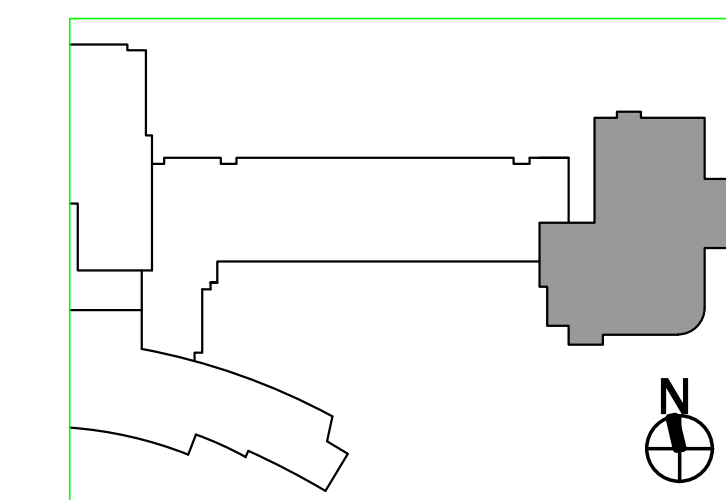
1 Plainsboro Road
Plainsboro, NJ 08536

**SHEPLEY
BULFINCH**

99 Chauncy Street 4th Floor
Boston, MA 02111
T:617.423.1700 | F:800.934.9691
shepleybulfinc.com



ANDREW L. FRENCH, P.E.
PROFESSIONAL ENGINEER, N.J. LIC. No. 42894

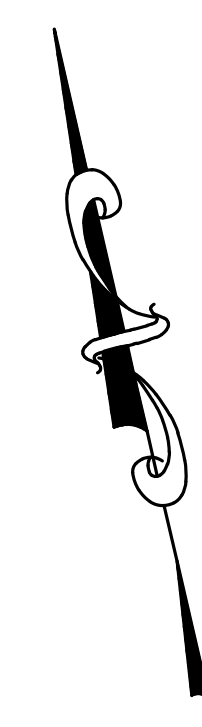
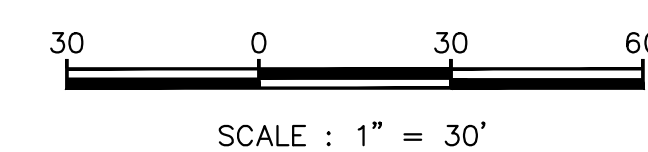
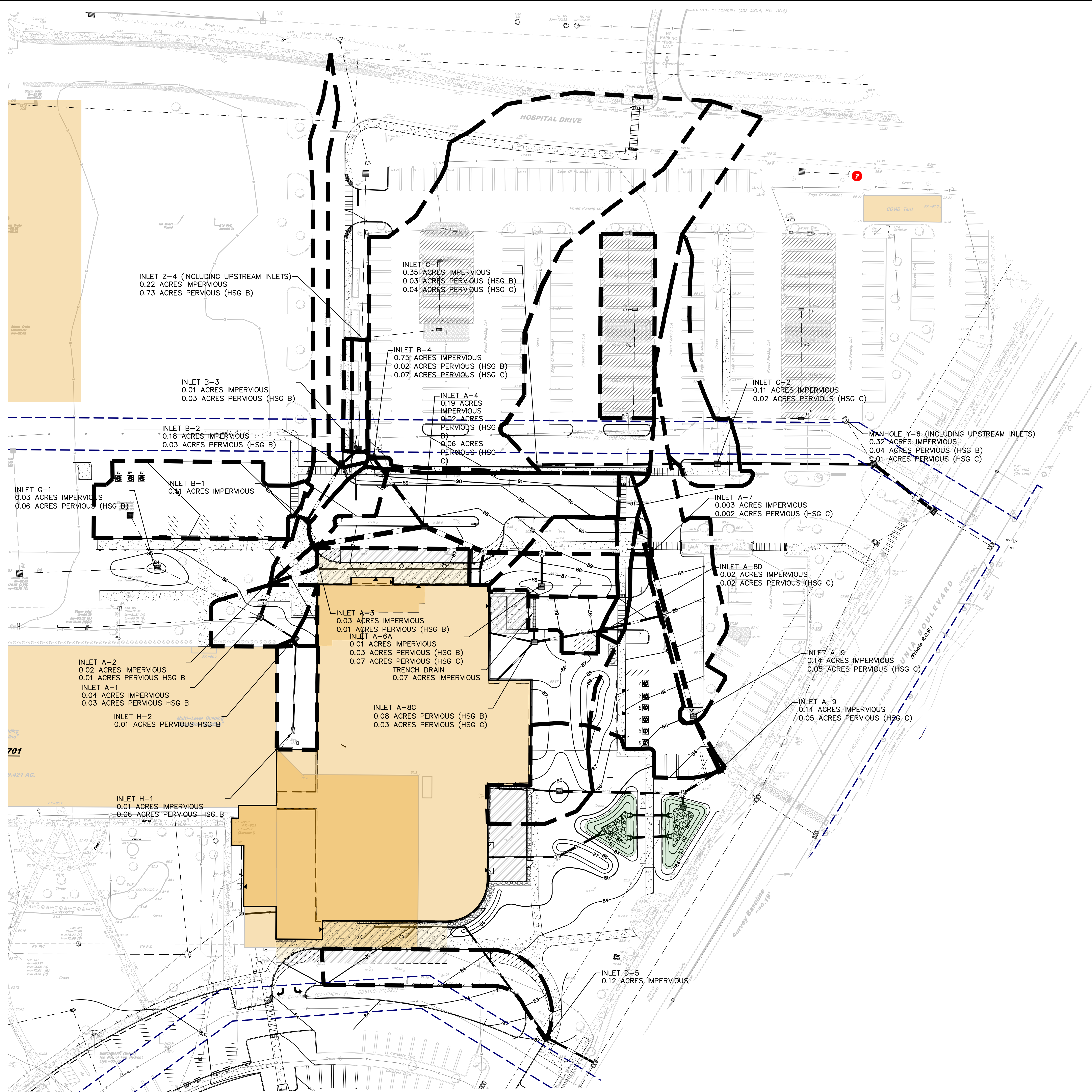
[illegible]

**PENN MEDICINE
PRINCETON
HEALTH CCIC**

1 Plainsboro Road
Plainsboro, NJ 08536
JOB NO: 5267.003

PROPOSED DRAINAGE AREA MAP

07/31/2024 PACKAGE 0



1 Plainsboro Road
Plainsboro, NJ 08536

**SHEPLEY
BULFINCH**

99 Chauncy Street 4th Floor
Boston, MA 02111
T:617.423.1700 | F:800.934.9691
shepleybulfinch.com

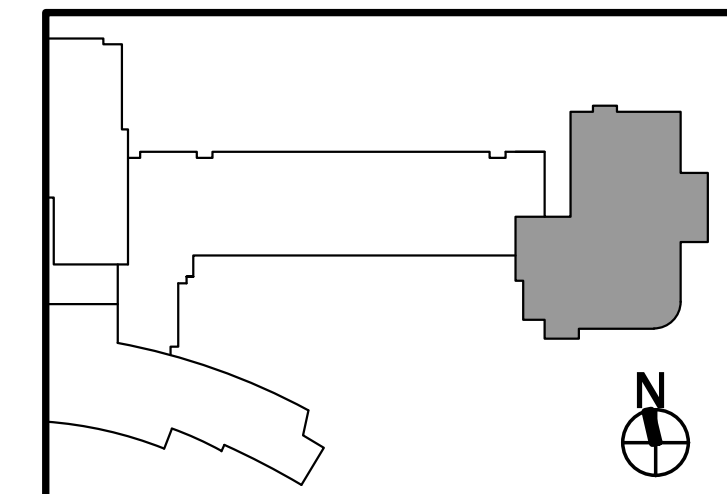
FPA
FRENCH & PARRELL
ASSOCIATES

Corporate Office
1800 Rt 34, Suite 10
Wall, New Jersey 07719
732.312.9800

FPAengineers.com

New Jersey ▲ New York ▲ Pennsylvania ▲ Georgia

ANDREW L. FRENCH, P.E.
PROFESSIONAL ENGINEER, N.J. LIC. No. 42894

[illegible]

**PENN MEDICINE
PRINCETON
HEALTH CCIC**

1 Plainsboro Road
Plainsboro, NJ 08536
JOB NO: 5267.003
Block 7401 Lot 3.01
Township of Plainsboro
Middlesex County, New Jersey 08536

INLET DRAINAGE AREA MAP

07/31/2024	PACKAGE 0
08/02/2024	PACKAGE 1

PACKAGE 0
PACKAGE 1