

STORMWATER MANAGEMENT REPORT

FOR PROPOSED

HANGAR EXPANSION

***PRINCETON AIRPORT
BLOCK 34001, LOT 57***

***MONTGOMERY TOWNSHIP
SOMERSET COUNTY, NEW JERSEY***

***D.S. Engineering, P.C.
PO Box 792
Rocky Hill, New Jersey 08553***

***November 2021
Project #2194-020***

David J. Schmidt, New Jersey P.E. # 39409

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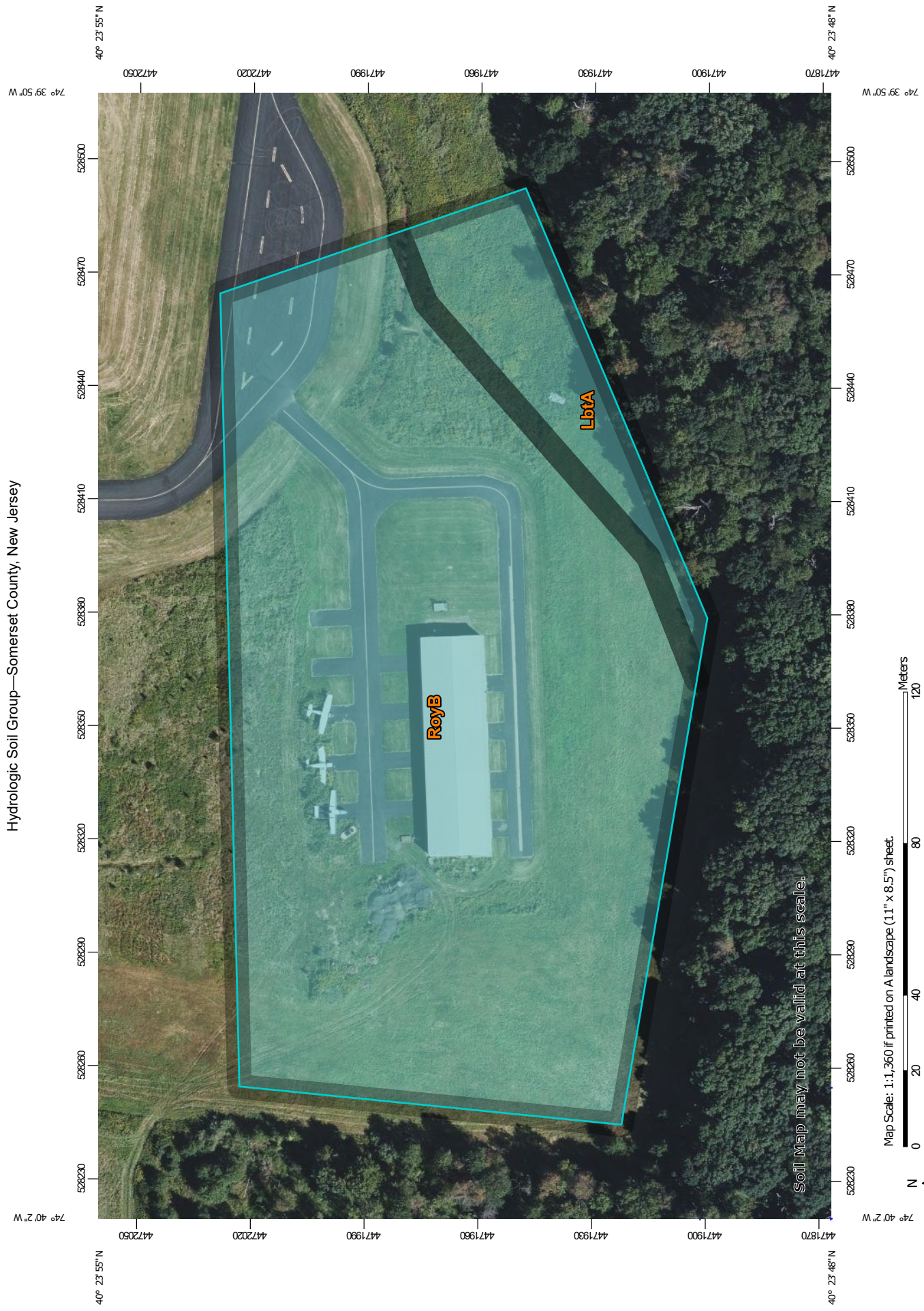
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This report addresses the stormwater management issues associated with the proposed improvements at the Princeton Airport. A hangar and tie down areas were previously approved and constructed in the south west corner of the property. The property owner now wishes to construct an addition hangar and additional tie down locations. The project will disturb more than one acre and increase the impervious coverage by more than $\frac{1}{4}$ acre, so the stormwater management system was designed in accordance with the regulations for a major development.

Two existing basins are located adjacent to the existing improvements. These are shallow depressions, with no known quantity control structures or water quality components. Soil testing was performed in these locations to determine the viability of repurposing the basin to meet the current standards. The eastern basin is the focus of the design and the attached calculations. The basin will be redesigned to provide quantity reductions and also water quality. The proposed improvements will increase both the impervious coverage of roofs and impervious coverage for vehicle traffic. An equivalent area of existing pavement will be collected and treated for water quality to compensate for small pockets which are spread out throughout the area of analysis.

The following pages contain all the calculations and information regarding the storm water management design for this project.



Soil Map may not be valid at this scale.

Map Scale: 1:1,360 if printed on A landscape (11" x 8.5") sheet.



Natural Resources
Conservation Service

Web Soil Survey
National Cooperative Soil Survey

Hydrologic Soil Group

Map unit symbol	Map unit name	Rating	Acres in AOI	Percent of AOI
LbtA	Lansdowne silt loam, 0 to 2 percent slopes	C	0.7	11.0%
RoyB	Royce silt loam, 2 to 6 percent slopes	C	5.6	89.0%
Totals for Area of Interest			6.3	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

***BASIN & STORM
SUMMARY REPORTS***



PAGE - MUELLER ENGINEERING
CONSULTANTS, P.C.

PO BOX 4619 • WARREN, NJ 07059

PEAK FLOW REDUCTION SUMMARY

Project: Princeton Airport
Location: Montgomery Township

Computed By: CAM
Date: 11/5/21

Area of Analysis

		A	B	C	D	
STORM EVENT	24 HOUR RAINFALL- SOMERSET COUNTY	Qpeak Exist to Remain (CFS)	Qpeak Lawn to Imp Reduction Required (CFS)	REQUIRED % REDUCTION	Qpeak ALLOWABLE (CFS)	Qpeak PROPOSED CONDITIONS (CFS)
2	3.3	4.51	2.11	50.0%	5.57	5.06
10	5.0	8.29	3.22	25.0%	10.71	9.24
100	8.2	15.86	5.30	20.0%	19.79	19.75

Allowable (D) = Existing (A) + ((B) * Reduction (C))

DETENTION BASIN SUMMARY SHEET

Project: Princeton Airport
Location: Montgomery Township

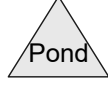
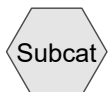
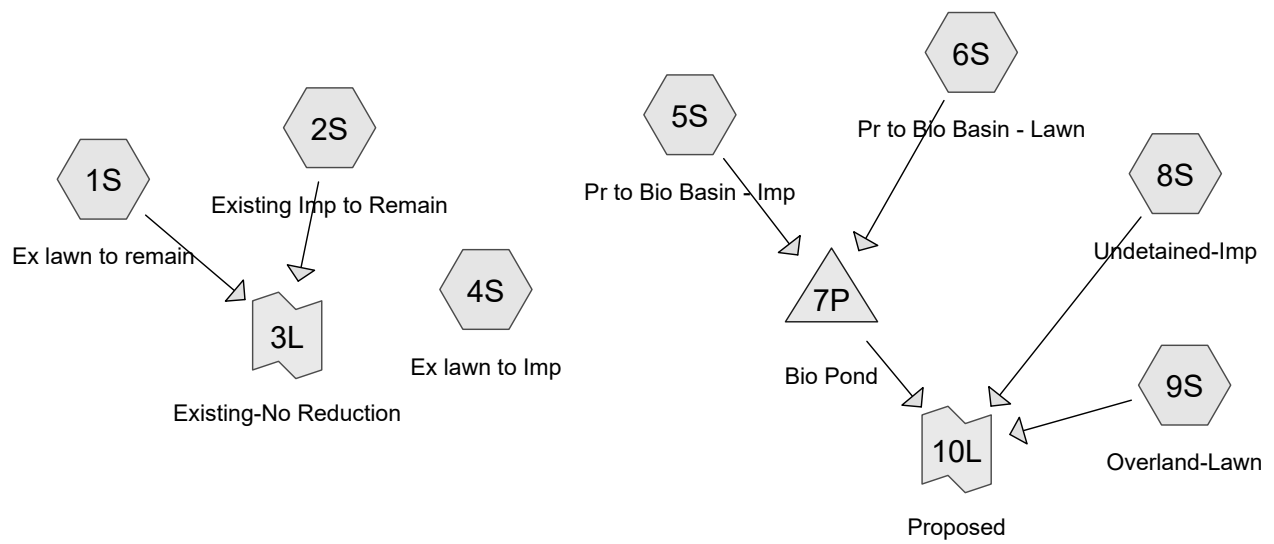
Computed By: TBB
Date: 11/5/21

PROPOSED BIORETENTION BASIN

Storm Event	Peak Inflow (cfs)	Peak Outflow (cfs)	Peak Elevation (ft)	Storage (cf)
2	1.75	0.47	120.44	3,209
10	3.02	1.61	120.67	4,501
100	5.54	4.67	120.84	5,446

Outlet Configuration:

12" Weir @ 120.15
2'x2' Grate @ 120.60



Routing Diagram for 2194-020 DSE Airport
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2-YEAR STORM EVENT

2194-020 DSE Airport

NOAA 24-hr C 2 yr somerset Rainfall=3.30"

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Summary for Subcatchment 1S: Ex lawn to remain

Runoff = 2.02 cfs @ 12.19 hrs, Volume= 6,816 cf, Depth= 1.10"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-36.00 hrs, dt= 0.05 hrs
NOAA 24-hr C 2 yr somerset Rainfall=3.30"

Area (sf)	CN	Description
74,088	74	>75% Grass cover, Good, HSG C
74,088		100.00% Pervious Area

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

Summary for Subcatchment 2S: Existing Imp to Remain

Runoff = 2.52 cfs @ 12.17 hrs, Volume= 9,407 cf, Depth= 3.07"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-36.00 hrs, dt= 0.05 hrs
NOAA 24-hr C 2 yr somerset Rainfall=3.30"

Area (sf)	CN	Description
* 27,354	98	vehicle surface
* 9,450	98	roof
36,804	98	Weighted Average
36,804		100.00% Impervious Area

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

Summary for Subcatchment 4S: Ex lawn to Imp

Runoff = 2.11 cfs @ 12.17 hrs, Volume= 7,871 cf, Depth= 3.07"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-36.00 hrs, dt= 0.05 hrs
NOAA 24-hr C 2 yr somerset Rainfall=3.30"

Area (sf)	CN	Description
30,793	98	Paved parking, HSG C
30,793		100.00% Impervious Area

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

2194-020 DSE Airport

NOAA 24-hr C 2 yr somerset Rainfall=3.30"

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Summary for Subcatchment 5S: Pr to Bio Basin - Imp

Runoff = 1.23 cfs @ 12.17 hrs, Volume= 4,601 cf, Depth= 3.07"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-36.00 hrs, dt= 0.05 hrs
NOAA 24-hr C 2 yr somerset Rainfall=3.30"

	Area (sf)	CN	Description
*	12,382	98	road middle
*	3,571	98	road from rear
*	2,050	98	bldg addition
	18,003	98	Weighted Average
	18,003		100.00% Impervious Area

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

Summary for Subcatchment 6S: Pr to Bio Basin - Lawn

Runoff = 0.52 cfs @ 12.19 hrs, Volume= 1,747 cf, Depth= 1.10"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-36.00 hrs, dt= 0.05 hrs
NOAA 24-hr C 2 yr somerset Rainfall=3.30"

	Area (sf)	CN	Description
*	18,147	74	lawn middle
*	841	74	lawn from rear
	18,988	74	Weighted Average
	18,988		100.00% Pervious Area

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

Summary for Subcatchment 8S: Undetained-Imp

Runoff = 3.40 cfs @ 12.17 hrs, Volume= 12,676 cf, Depth= 3.07"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-36.00 hrs, dt= 0.05 hrs
NOAA 24-hr C 2 yr somerset Rainfall=3.30"

	Area (sf)	CN	Description
*	9,450	98	exist bldg
*	0	98	bldg addition
*	12,960	98	new bldg
*	27,184	98	road surface
	49,594	98	Weighted Average
	49,594		100.00% Impervious Area

2194-020 DSE Airport

NOAA 24-hr C 2 yr somerset Rainfall=3.30"

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

Summary for Subcatchment 9S: Overland-Lawn

Runoff = 1.50 cfs @ 12.19 hrs, Volume= 5,069 cf, Depth= 1.10"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-36.00 hrs, dt= 0.05 hrs
NOAA 24-hr C 2 yr somerset Rainfall=3.30"

Area (sf)	CN	Description
55,100	74	>75% Grass cover, Good, HSG C
55,100		100.00% Pervious Area

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

Summary for Pond 7P: Bio Pond

Inflow Area = 36,991 sf, 48.67% Impervious, Inflow Depth = 2.06" for 2 yr somerset event
 Inflow = 1.75 cfs @ 12.17 hrs, Volume= 6,348 cf
 Outflow = 0.47 cfs @ 12.54 hrs, Volume= 4,616 cf, Atten= 73%, Lag= 22.0 min
 Primary = 0.47 cfs @ 12.54 hrs, Volume= 4,616 cf

Routing by Stor-Ind method, Time Span= 0.00-36.00 hrs, dt= 0.05 hrs
 Peak Elev= 120.44' @ 12.54 hrs Surf.Area= 5,349 sf Storage= 3,209 cf

Plug-Flow detention time= 247.7 min calculated for 4,616 cf (73% of inflow)
 Center-of-Mass det. time= 149.7 min (939.7 - 790.0)

Volume	Invert	Avail.Storage	Storage Description
#1	119.80'	9,445 cf	Custom Stage Data (Prismatic) Listed below (Recalc)

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
119.80	4,760	0	0
120.00	4,940	970	970
121.00	5,880	5,410	6,380
121.50	6,380	3,065	9,445

Device	Routing	Invert	Outlet Devices
#1	Primary	120.15'	1.0' long Sharp-Crested Rectangular Weir 2 End Contraction(s)
#2	Primary	120.60'	24.0" x 24.0" Horiz. Orifice/Grate C= 0.600 Limited to weir flow at low heads
#3	Primary	120.85'	40.0' long x 6.0' breadth Broad-Crested Rectangular Weir Head (feet) 0.20 0.40 0.60 0.80 1.00 1.20 1.40 1.60 1.80 2.00 2.50 3.00 3.50 4.00 4.50 5.00 5.50 Coef. (English) 2.37 2.51 2.70 2.68 2.68 2.67 2.65 2.65 2.65 2.65 2.66 2.66 2.67 2.69 2.72 2.76 2.83

Primary OutFlow Max=0.47 cfs @ 12.54 hrs HW=120.44' (Free Discharge)

1=Sharp-Crested Rectangular Weir (Weir Controls 0.47 cfs @ 1.75 fps)

2=Orifice/Grate (Controls 0.00 cfs)

3=Broad-Crested Rectangular Weir (Controls 0.00 cfs)

Summary for Link 3L: Existing-No Reduction

Inflow Area = 110,892 sf, 33.19% Impervious, Inflow Depth = 1.76" for 2 yr somerset event

Inflow = 4.51 cfs @ 12.18 hrs, Volume= 16,223 cf

Primary = 4.51 cfs @ 12.18 hrs, Volume= 16,223 cf, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 0.00-36.00 hrs, dt= 0.05 hrs

Summary for Link 10L: Proposed

Inflow Area = 141,685 sf, 47.71% Impervious, Inflow Depth > 1.89" for 2 yr somerset event

Inflow = 5.06 cfs @ 12.18 hrs, Volume= 22,361 cf

Primary = 5.06 cfs @ 12.18 hrs, Volume= 22,361 cf, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 0.00-36.00 hrs, dt= 0.05 hrs

10-YEAR STORM EVENT

2194-020 DSE Airport

NOAA 24-hr C 10 yr somerset Rainfall=5.00"

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Summary for Subcatchment 1S: Ex lawn to remain

Runoff = 4.44 cfs @ 12.18 hrs, Volume= 14,597 cf, Depth= 2.36"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-36.00 hrs, dt= 0.05 hrs
NOAA 24-hr C 10 yr somerset Rainfall=5.00"

Area (sf)	CN	Description
74,088	74	>75% Grass cover, Good, HSG C
74,088		100.00% Pervious Area

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

Summary for Subcatchment 2S: Existing Imp to Remain

Runoff = 3.85 cfs @ 12.17 hrs, Volume= 14,609 cf, Depth= 4.76"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-36.00 hrs, dt= 0.05 hrs
NOAA 24-hr C 10 yr somerset Rainfall=5.00"

Area (sf)	CN	Description
* 27,354	98	vehicle surface
* 9,450	98	roof
36,804	98	Weighted Average
36,804		100.00% Impervious Area

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

Summary for Subcatchment 4S: Ex lawn to Imp

Runoff = 3.22 cfs @ 12.17 hrs, Volume= 12,223 cf, Depth= 4.76"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-36.00 hrs, dt= 0.05 hrs
NOAA 24-hr C 10 yr somerset Rainfall=5.00"

Area (sf)	CN	Description
30,793	98	Paved parking, HSG C
30,793		100.00% Impervious Area

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

Summary for Subcatchment 5S: Pr to Bio Basin - Imp

Runoff = 1.88 cfs @ 12.17 hrs, Volume= 7,146 cf, Depth= 4.76"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-36.00 hrs, dt= 0.05 hrs
NOAA 24-hr C 10 yr somerset Rainfall=5.00"

	Area (sf)	CN	Description
*	12,382	98	road middle
*	3,571	98	road from rear
*	2,050	98	bldg addition
	18,003	98	Weighted Average
	18,003		100.00% Impervious Area

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

Summary for Subcatchment 6S: Pr to Bio Basin - Lawn

Runoff = 1.14 cfs @ 12.18 hrs, Volume= 3,741 cf, Depth= 2.36"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-36.00 hrs, dt= 0.05 hrs
NOAA 24-hr C 10 yr somerset Rainfall=5.00"

	Area (sf)	CN	Description
*	18,147	74	lawn middle
*	841	74	lawn from rear
	18,988	74	Weighted Average
	18,988		100.00% Pervious Area

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

Summary for Subcatchment 8S: Undetained-Imp

Runoff = 5.18 cfs @ 12.17 hrs, Volume= 19,685 cf, Depth= 4.76"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-36.00 hrs, dt= 0.05 hrs
NOAA 24-hr C 10 yr somerset Rainfall=5.00"

	Area (sf)	CN	Description
*	9,450	98	exist bldg
*	0	98	bldg addition
*	12,960	98	new bldg
*	27,184	98	road surface
	49,594	98	Weighted Average
	49,594		100.00% Impervious Area

2194-020 DSE Airport

NOAA 24-hr C 10 yr somerset Rainfall=5.00"

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

Summary for Subcatchment 9S: Overland-Lawn

Runoff = 3.30 cfs @ 12.18 hrs, Volume= 10,856 cf, Depth= 2.36"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-36.00 hrs, dt= 0.05 hrs
NOAA 24-hr C 10 yr somerset Rainfall=5.00"

Area (sf)	CN	Description
55,100	74	>75% Grass cover, Good, HSG C
55,100		100.00% Pervious Area

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

Summary for Pond 7P: Bio Pond

Inflow Area = 36,991 sf, 48.67% Impervious, Inflow Depth = 3.53" for 10 yr somerset event
 Inflow = 3.02 cfs @ 12.17 hrs, Volume= 10,887 cf
 Outflow = 1.61 cfs @ 12.33 hrs, Volume= 9,153 cf, Atten= 47%, Lag= 9.2 min
 Primary = 1.61 cfs @ 12.33 hrs, Volume= 9,153 cf

Routing by Stor-Ind method, Time Span= 0.00-36.00 hrs, dt= 0.05 hrs
 Peak Elev= 120.67' @ 12.33 hrs Surf.Area= 5,571 sf Storage= 4,501 cf

Plug-Flow detention time= 184.5 min calculated for 9,153 cf (84% of inflow)
 Center-of-Mass det. time= 112.4 min (896.5 - 784.2)

Volume	Invert	Avail.Storage	Storage Description
#1	119.80'	9,445 cf	Custom Stage Data (Prismatic) Listed below (Recalc)

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
119.80	4,760	0	0
120.00	4,940	970	970
121.00	5,880	5,410	6,380
121.50	6,380	3,065	9,445

Device	Routing	Invert	Outlet Devices
#1	Primary	120.15'	1.0' long Sharp-Crested Rectangular Weir 2 End Contraction(s)
#2	Primary	120.60'	24.0" x 24.0" Horiz. Orifice/Grate C= 0.600 Limited to weir flow at low heads
#3	Primary	120.85'	40.0' long x 6.0' breadth Broad-Crested Rectangular Weir Head (feet) 0.20 0.40 0.60 0.80 1.00 1.20 1.40 1.60 1.80 2.00 2.50 3.00 3.50 4.00 4.50 5.00 5.50 Coef. (English) 2.37 2.51 2.70 2.68 2.68 2.67 2.65 2.65 2.65 2.65 2.66 2.66 2.67 2.69 2.72 2.76 2.83

Primary OutFlow Max=1.59 cfs @ 12.33 hrs HW=120.67' (Free Discharge)

↑ **1=Sharp-Crested Rectangular Weir** (Weir Controls 1.10 cfs @ 2.36 fps)

└ **2=Orifice/Grate** (Weir Controls 0.49 cfs @ 0.87 fps)

└ **3=Broad-Crested Rectangular Weir** (Controls 0.00 cfs)

Summary for Link 3L: Existing-No Reduction

Inflow Area = 110,892 sf, 33.19% Impervious, Inflow Depth = 3.16" for 10 yr somerset event

Inflow = 8.29 cfs @ 12.17 hrs, Volume= 29,206 cf

Primary = 8.29 cfs @ 12.17 hrs, Volume= 29,206 cf, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 0.00-36.00 hrs, dt= 0.05 hrs

Summary for Link 10L: Proposed

Inflow Area = 141,685 sf, 47.71% Impervious, Inflow Depth = 3.36" for 10 yr somerset event

Inflow = 9.24 cfs @ 12.18 hrs, Volume= 39,695 cf

Primary = 9.24 cfs @ 12.18 hrs, Volume= 39,695 cf, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 0.00-36.00 hrs, dt= 0.05 hrs

100-YEAR STORM EVENT

Summary for Subcatchment 1S: Ex lawn to remain

Runoff = 9.54 cfs @ 12.17 hrs, Volume= 31,518 cf, Depth= 5.10"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-36.00 hrs, dt= 0.05 hrs
NOAA 24-hr C 100 yr somerset Rainfall=8.20"

Area (sf)	CN	Description
74,088	74	>75% Grass cover, Good, HSG C
74,088		100.00% Pervious Area

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

Summary for Subcatchment 2S: Existing Imp to Remain

Runoff = 6.33 cfs @ 12.17 hrs, Volume= 24,414 cf, Depth= 7.96"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-36.00 hrs, dt= 0.05 hrs
NOAA 24-hr C 100 yr somerset Rainfall=8.20"

Area (sf)	CN	Description
* 27,354	98	vehicle surface
* 9,450	98	roof
36,804	98	Weighted Average
36,804		100.00% Impervious Area

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

Summary for Subcatchment 4S: Ex lawn to Imp

Runoff = 5.30 cfs @ 12.17 hrs, Volume= 20,426 cf, Depth= 7.96"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-36.00 hrs, dt= 0.05 hrs
NOAA 24-hr C 100 yr somerset Rainfall=8.20"

Area (sf)	CN	Description
30,793	98	Paved parking, HSG C
30,793		100.00% Impervious Area

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

Summary for Subcatchment 5S: Pr to Bio Basin - Imp

Runoff = 3.10 cfs @ 12.17 hrs, Volume= 11,942 cf, Depth= 7.96"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-36.00 hrs, dt= 0.05 hrs
NOAA 24-hr C 100 yr somerset Rainfall=8.20"

	Area (sf)	CN	Description
*	12,382	98	road middle
*	3,571	98	road from rear
*	2,050	98	bldg addition
	18,003	98	Weighted Average
	18,003		100.00% Impervious Area

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

Summary for Subcatchment 6S: Pr to Bio Basin - Lawn

Runoff = 2.44 cfs @ 12.17 hrs, Volume= 8,078 cf, Depth= 5.10"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-36.00 hrs, dt= 0.05 hrs
NOAA 24-hr C 100 yr somerset Rainfall=8.20"

	Area (sf)	CN	Description
*	18,147	74	lawn middle
*	841	74	lawn from rear
	18,988	74	Weighted Average
	18,988		100.00% Pervious Area

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

Summary for Subcatchment 8S: Undetained-Imp

Runoff = 8.53 cfs @ 12.17 hrs, Volume= 32,898 cf, Depth= 7.96"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-36.00 hrs, dt= 0.05 hrs
NOAA 24-hr C 100 yr somerset Rainfall=8.20"

	Area (sf)	CN	Description
*	9,450	98	exist bldg
*	0	98	bldg addition
*	12,960	98	new bldg
*	27,184	98	road surface
	49,594	98	Weighted Average
	49,594		100.00% Impervious Area

2194-020 DSE Airport

NOAA 24-hr C 100 yr somerset Rainfall=8.20"

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

Summary for Subcatchment 9S: Overland-Lawn

Runoff = 7.09 cfs @ 12.17 hrs, Volume= 23,440 cf, Depth= 5.10"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-36.00 hrs, dt= 0.05 hrs
NOAA 24-hr C 100 yr somerset Rainfall=8.20"

Area (sf)	CN	Description
55,100	74	>75% Grass cover, Good, HSG C
55,100		100.00% Pervious Area

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

Summary for Pond 7P: Bio Pond

Inflow Area = 36,991 sf, 48.67% Impervious, Inflow Depth = 6.49" for 100 yr somerset event
 Inflow = 5.54 cfs @ 12.17 hrs, Volume= 20,020 cf
 Outflow = 4.67 cfs @ 12.24 hrs, Volume= 18,285 cf, Atten= 16%, Lag= 4.0 min
 Primary = 4.67 cfs @ 12.24 hrs, Volume= 18,285 cf

Routing by Stor-Ind method, Time Span= 0.00-36.00 hrs, dt= 0.05 hrs
 Peak Elev= 120.84' @ 12.24 hrs Surf.Area= 5,729 sf Storage= 5,446 cf

Plug-Flow detention time= 128.6 min calculated for 18,259 cf (91% of inflow)
 Center-of-Mass det. time= 83.1 min (859.3 - 776.2)

Volume	Invert	Avail.Storage	Storage Description
#1	119.80'	9,445 cf	Custom Stage Data (Prismatic) Listed below (Recalc)

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
119.80	4,760	0	0
120.00	4,940	970	970
121.00	5,880	5,410	6,380
121.50	6,380	3,065	9,445

Device	Routing	Invert	Outlet Devices
#1	Primary	120.15'	1.0' long Sharp-Crested Rectangular Weir 2 End Contraction(s)
#2	Primary	120.60'	24.0" x 24.0" Horiz. Orifice/Grate C= 0.600 Limited to weir flow at low heads
#3	Primary	120.85'	40.0' long x 6.0' breadth Broad-Crested Rectangular Weir Head (feet) 0.20 0.40 0.60 0.80 1.00 1.20 1.40 1.60 1.80 2.00 2.50 3.00 3.50 4.00 4.50 5.00 5.50 Coef. (English) 2.37 2.51 2.70 2.68 2.68 2.67 2.65 2.65 2.65 2.65 2.66 2.66 2.67 2.69 2.72 2.76 2.83

Primary OutFlow Max=4.61 cfs @ 12.24 hrs HW=120.84' (Free Discharge)

↑ **1=Sharp-Crested Rectangular Weir** (Weir Controls 1.60 cfs @ 2.71 fps)

└ **2=Orifice/Grate** (Weir Controls 3.01 cfs @ 1.59 fps)

└ **3=Broad-Crested Rectangular Weir** (Controls 0.00 cfs)

Summary for Link 3L: Existing-No Reduction

Inflow Area = 110,892 sf, 33.19% Impervious, Inflow Depth = 6.05" for 100 yr somerset event

Inflow = 15.86 cfs @ 12.17 hrs, Volume= 55,931 cf

Primary = 15.86 cfs @ 12.17 hrs, Volume= 55,931 cf, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 0.00-36.00 hrs, dt= 0.05 hrs

Summary for Link 10L: Proposed

Inflow Area = 141,685 sf, 47.71% Impervious, Inflow Depth = 6.32" for 100 yr somerset event

Inflow = 19.75 cfs @ 12.18 hrs, Volume= 74,622 cf

Primary = 19.75 cfs @ 12.18 hrs, Volume= 74,622 cf, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 0.00-36.00 hrs, dt= 0.05 hrs

WATER QUALITY STORM

Proposed motor vehicle surface increase = 15,783 sf

Proposed motor vehicle surface to bioretention basin (80% TSS removal) = 15,953 sf

Summary for Subcatchment 5S: Pr to Bio Basin - Imp

Runoff = 0.66 cfs @ 1.32 hrs, Volume= 1,552 cf, Depth= 1.03"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-36.00 hrs, dt= 0.05 hrs
NewJersey 2hr NJ-2hr-1.25Inch Rainfall=1.25"

	Area (sf)	CN	Description
*	12,382	98	road middle
*	3,571	98	road from rear
*	2,050	98	bldg addition
	18,003	98	Weighted Average
	18,003		100.00% Impervious Area

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

Summary for Subcatchment 6S: Pr to Bio Basin - Lawn

Runoff = 0.07 cfs @ 1.50 hrs, Volume= 117 cf, Depth= 0.07"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-36.00 hrs, dt= 0.05 hrs
NewJersey 2hr NJ-2hr-1.25Inch Rainfall=1.25"

	Area (sf)	CN	Description
*	18,147	74	lawn middle
*	841	74	lawn from rear
	18,988	74	Weighted Average
	18,988		100.00% Pervious Area

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

Summary for Pond 7P: Bio Pond

Inflow Area = 36,991 sf, 48.67% Impervious, Inflow Depth = 0.54" for NJ-2hr-1.25Inch event
Inflow = 0.69 cfs @ 1.35 hrs, Volume= 1,669 cf
Outflow = 0.00 cfs @ 0.00 hrs, Volume= 0 cf, Atten= 100%, Lag= 0.0 min
Primary = 0.00 cfs @ 0.00 hrs, Volume= 0 cf

Routing by Stor-Ind method, Time Span= 0.00-36.00 hrs, dt= 0.05 hrs
Peak Elev= 120.14' @ 2.60 hrs Surf.Area= 5,071 sf Storage= 1,669 cf

Plug-Flow detention time= (not calculated: initial storage exceeds outflow)
Center-of-Mass det. time= (not calculated: no outflow)

2194-020 DSE Airport

New Jersey 2hr NJ-2hr-1.25Inch Rainfall=1.25"

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Volume	Invert	Avail.Storage	Storage Description
#1	119.80'	9,445 cf	Custom Stage Data (Prismatic) Listed below (Recalc)

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
119.80	4,760	0	0
120.00	4,940	970	970
121.00	5,880	5,410	6,380
121.50	6,380	3,065	9,445

Device	Routing	Invert	Outlet Devices
#1	Primary	120.15'	1.0' long Sharp-Crested Rectangular Weir 2 End Contraction(s)
#2	Primary	120.60'	24.0" x 24.0" Horiz. Orifice/Grate C= 0.600 Limited to weir flow at low heads
#3	Primary	120.85'	40.0' long x 6.0' breadth Broad-Crested Rectangular Weir Head (feet) 0.20 0.40 0.60 0.80 1.00 1.20 1.40 1.60 1.80 2.00 2.50 3.00 3.50 4.00 4.50 5.00 5.50 Coef. (English) 2.37 2.51 2.70 2.68 2.68 2.67 2.65 2.65 2.65 2.65 2.66 2.66 2.67 2.69 2.72 2.76 2.83

Primary OutFlow Max=0.00 cfs @ 0.00 hrs HW=119.80' (Free Discharge)

1=Sharp-Crested Rectangular Weir (Controls 0.00 cfs)

2=Orifice/Grate (Controls 0.00 cfs)

3=Broad-Crested Rectangular Weir (Controls 0.00 cfs)

***NJDEP NONSTRUCTURAL
STRATEGIES POINTS WORKSHEET***

NJDEP Nonstructural Strategies Points System (NSPS)

Version: January 31, 2006

Note: Input Values in Yellow Cells Only

Project: Princeton Airport

Date: November 5, 2021

User: D.S. Engineering, P.C.

Notes: Block 34001, Lot 57
Montgomery Township

Step 1 - Provide Basic Major Development Site Information

A. Specify Total Area in Acres of Development Site Described in Steps 2 and 3 = 3.3 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
Percent of Each Planning Area within Site:					
	100.0%				100.0%

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

Step 2 - Describe Existing or Pre-Developed Site Conditions

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

Site Segment	Land Use/Land Cover Description	Specify Land Use/Land Cover in Acres for Each HSG				Use/Cover Subtotals	Points
		HSG A	HSG B	HSG C	HSG D		
1	Wetlands and Undisturbed Stream Buffers					0.0	0
2	Lawn and Open Space			2.4		2.4	170
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			0.9		0.9	0
14	Unconnected Impervious with Small D/S Pervious					0.0	0
15	Unconnected Impervious with Large D/S Pervious					0.0	0
HSG Subtotals (Acres):		0.0	0.0	3.3	0.0		Total Area: 3.3
HSG Subtotals (%):		0.0%	0.0%	100.0%	0.0%		Total % Area: 100.0%
Points Subtotal:							170
Total Existing Site Points:							170

Step 3 - Describe Proposed or Post-Developed Site Conditions

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

Site Segment	Land Use/Land Cover Description	Specify Land Use/Land Cover in Acres for Each HSG				Use/Cover Subtotals	Points
		HSG A	HSG B	HSG C	HSG D		
1	Wetlands and Undisturbed Stream Buffers					0.0	0
2	Lawn and Open Space			1.7		1.7	121
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			1.6		1.6	0
14	Unconnected Impervious with Small D/S Pervious					0.0	0
15	Unconnected Impervious with Large D/S Pervious					0.0	0
HSG Subtotals (Acres):		0.0	0.0	3.3	0.0		Total Area: 3.3
HSG Subtotals (%):		0.0%	0.0%	100.0%	0.0%		Total % Area: 100.0%
Points Subtotal:							121

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

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

48%	% of Site
0%	% of Site
0%	% of Site
48%	% of Site
48%	% of Site

Specify Source of Maximum Allowable Impervious Coverage:

Table	(None or Table)
-------	-----------------

Allowable Site Impervious Cover from Maximum Impervious Cover Table:
Note: See Maximum Impervious Cover Table Worksheet for Details

0%

Points Subtotal:

0

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

Total Proposed Site Disturbance =
Maximum Allowable Site Disturbance by Municipal Ordinance =

12%	% of Site
100%	% of Site

Points Subtotal:

41

D. Describe Proposed Runoff Conveyance System:

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

411	Feet
0	Feet
0%	

Points Subtotal:

0

E. Residential Lot Clustering:

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

	% of Site
	Acres
	Acres
	% of Clustered Site Portion

Points Subtotal:

0

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

Proposed Lawn Areas will be Graded with Lightweight Construction Equipment:		(Yes or No)
Percent of Proposed Lawn Areas to be Graded with Such Equipment:		% 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):	No	(Yes or No)
Stormwater Runoff Quality Standards (NJAC 7:8-5.5):	No	(Yes or No)
Stormwater Runoff Quantity Standards (NJAC 7:8-5.4-a-3):	No	(Yes or No)
Points Subtotal:		0

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

Total Proposed Site Points: 161

Ratio of Proposed to Existing Site Points: 95%

Required Site Points Ratio: 86%

Nonstructural Point System Results: Proposed Nonstructural Measures are Adequate

GROUNDWATER RECHARGE SPREADSHEET

Groundwater is provided by the 4" of gravel proposed below the underdrains within the bioretention basin.

**New Jersey
Groundwater
Recharge
Spreadsheet
Version 2.0
November 2003**

Procedure to fill the Pre-Development and Post-Development Conditions Tables

35

Project Name		Description		Analysis Date		BMP or LID Type	
Princeton Airport		Block 34001, Lot 57, Montgomery T		11/05/21		Stone	
Recharge BMP Input Parameters				Root Zone Water Capacity Calculated Parameters			
Parameter	Symbol	Value	Unit	Parameter	Symbol	Value	Unit
BMP Area	ABMP	4670.0	sq.ft	Empty Portion of RWC under Post-D Natural Recharge	ERWC	1.23	in
BMP Effective Depth, this is the design variable Upper level of the BMP surface (negative if above ground)	dBMP	1.6	in	ERWC Modified to consider dEXC	EDRWC	0.00	in
	dBMPu	31.0	in	Empty Portion of RWC under Infiltr. BMP	RERWC	0.00	in
Depth of lower surface of BMP, must be >= dBMPu	dEXC	35.0	in				
Post-development Land Segment Location of BMP, Input Zero if Location is distributed or undetermined	SegBMP	1	unitless				
Recharge Design Parameters				Recharge Design Parameters			
Parameter	Symbol	Value	Unit	Parameter	Symbol	Value	Unit
Inches of Runoff to capture				Inches of Runoff to capture	Qdesign	0.42	in
Inches of Rainfall to capture				Inches of Rainfall to capture	Pdesign	0.53	in
Recharge Provided Avg. over Imp. Area				Recharge Provided Avg. over Imp. Area		21.3	in
Runoff Captured Avg. over Imp. Area				Runoff Captured Avg. over Imp. Area		21.3	in
BMP Calculated Size Parameters				BMP Calculated Size Parameters			
ABMP/Aimp	Aratio	0.26	unitless	ABMP/Aimp	Aratio	0.26	unitless
BMP Volume	VBMP	623	cu.ft	BMP Volume	VBMP	623	cu.ft
System Performance Calculated Parameters				System Performance Calculated Parameters			
Annual BMP Recharge Volume		31,949	cu.ft	Annual BMP Recharge Volume		31,949	cu.ft
Avg BMP Recharge Efficiency		100.0%	Represents % Infiltration Recharged	Avg BMP Recharge Efficiency		100.0%	Represents % Infiltration Recharged
%Rainfall became Runoff		78.0%	%	%Rainfall became Runoff		78.0%	%
%Runoff Infiltrated		59.4%	%	%Runoff Infiltrated		59.4%	%
%Runoff Recharged		15.8%	%	%Runoff Recharged		15.8%	%
%Rainfall Recharged		12.3%	%	%Rainfall Recharged		12.3%	%
Parameters from Annual Recharge Worksheet				Parameters from Annual Recharge Worksheet			
Post-D Deficit Recharge (or desired recharge volume)	Vdef	31,267	cu.ft	Post-D Deficit Recharge (or desired recharge volume)	Vdef	31,267	cu.ft
Post-D Impervious Area (or target Impervious Area)	Aimp	18,003	sq.ft	Post-D Impervious Area (or target Impervious Area)	Aimp	18,003	sq.ft
Root Zone Water Capacity	RWC	4.90	in	Root Zone Water Capacity	RWC	4.90	in
RWC Modified to consider dEXC	DRWC	0.00	in	RWC Modified to consider dEXC	DRWC	0.00	in
Climatic Factor	C-factor	1.50	no units	Climatic Factor	C-factor	1.50	no units
Average Annual P	Pavg	46.0	in	Average Annual P	Pavg	46.0	in
Recharge Requirement over Imp. Area	dr	5.6	in	Recharge Requirement over Imp. Area	dr	5.6	in
How to solve for different recharge volumes: By default the spreadsheet assigns the values of total deficit recharge volume "Vdef" and "Aimp" on this page. This allows solution for a single BMP to handle the entire recharge requirement assuming the runoff from entire impervious area is available to the BMP. To solve for a smaller BMP or a LID-IMP to recharge only part of the recharge requirement, set Vdef to your target value and Aimp to impervious area directly connected to your infiltration facility and then solve for ABMP or dBMP. To go back to the default configuration click the "Default Vdef & Aimp" button.							
Calculation Check Messages				Calculation Check Messages			
Volume Balance-> Solve Problem to satisfy Annual Recharge				Volume Balance-> Solve Problem to satisfy Annual Recharge			
dBMP Check--> OK				dBMP Check--> OK			
dEXC Check--> OK				dEXC Check--> OK			
BMP Location--> OK				BMP Location--> OK			
Other Notes				Other Notes			
Pdesign is accurate only after BMP dimensions are updated to make rech volume= deficit volume. The portion of BMP infiltration prior to filling and the area occupied by BMP are ignored in these calculations. Results are sensitive to dBMP, make sure dBMP selected is small enough for BMP to empty in less than 3 days. For land Segment Location of BMP if you select "Impervious areas" RWC will be minimal but not zero as determined by the soil type and a shallow root zone for this Land Cover allowing consideration of lateral flow and other losses.				Pdesign is accurate only after BMP dimensions are updated to make rech volume= deficit volume. The portion of BMP infiltration prior to filling and the area occupied by BMP are ignored in these calculations. Results are sensitive to dBMP, make sure dBMP selected is small enough for BMP to empty in less than 3 days. For land Segment Location of BMP if you select "Impervious areas" RWC will be minimal but not zero as determined by the soil type and a shallow root zone for this Land Cover allowing consideration of lateral flow and other losses.			

EMERGENCY SPILLWAY

On-site soils: Silt Loam

Allowable velocity for seeded vegetation: 2.0 fps

Allowable velocity for sod: 3.0 fps

Velocity during failure: 0.91 fps

Spillway velocity calculations based on 100-year storm event with failure of all other outlets.

→ Spillway to be stabilized with sod

Water surface elevation: 121.00

Top of berm: 122.0 (>1' above the 100 year WSE during failure)

Summary for Subcatchment 5S: Pr to Bio Basin - Imp

Runoff = 3.10 cfs @ 12.17 hrs, Volume= 11,942 cf, Depth= 7.96"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-36.00 hrs, dt= 0.05 hrs
NOAA 24-hr C 100 yr somerset Rainfall=8.20"

	Area (sf)	CN	Description
*	12,382	98	road middle
*	3,571	98	road from rear
*	2,050	98	bldg addition
	18,003	98	Weighted Average
	18,003		100.00% Impervious Area

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

Summary for Subcatchment 6S: Pr to Bio Basin - Lawn

Runoff = 2.44 cfs @ 12.17 hrs, Volume= 8,078 cf, Depth= 5.10"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-36.00 hrs, dt= 0.05 hrs
NOAA 24-hr C 100 yr somerset Rainfall=8.20"

	Area (sf)	CN	Description
*	18,147	74	lawn middle
*	841	74	lawn from rear
	18,988	74	Weighted Average
	18,988		100.00% Pervious Area

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

Summary for Pond 7P: Bio Pond

Inflow Area = 36,991 sf, 48.67% Impervious, Inflow Depth = 6.49" for 100 yr somerset event
Inflow = 5.54 cfs @ 12.17 hrs, Volume= 20,020 cf
Outflow = 5.33 cfs @ 12.20 hrs, Volume= 14,511 cf, Atten= 4%, Lag= 1.9 min
Primary = 5.33 cfs @ 12.20 hrs, Volume= 14,511 cf

Routing by Stor-Ind method, Time Span= 0.00-36.00 hrs, dt= 0.05 hrs
Peak Elev= 121.00' @ 12.20 hrs Surf.Area= 5,877 sf Storage= 6,361 cf

Plug-Flow detention time= 173.1 min calculated for 14,491 cf (72% of inflow)
Center-of-Mass det. time= 78.7 min (855.0 - 776.2)

2194-020 DSE Airport

NOAA 24-hr C 100 yr somerset Rainfall=8.20"

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Volume	Invert	Avail.Storage	Storage Description
#1	119.80'	9,445 cf	Custom Stage Data (Prismatic) Listed below (Recalc)

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
119.80	4,760	0	0
120.00	4,940	970	970
121.00	5,880	5,410	6,380
121.50	6,380	3,065	9,445

Device	Routing	Invert	Outlet Devices
#1	Primary	120.15'	1.0' long Sharp-Crested Rectangular Weir X 0.00 2 End Contraction(s)
#2	Primary	120.60'	24.0" x 24.0" Horiz. Orifice/Grate X 0.00 C= 0.600 Limited to weir flow at low heads
#3	Primary	120.85'	40.0' long x 6.0' breadth Broad-Crested Rectangular Weir Head (feet) 0.20 0.40 0.60 0.80 1.00 1.20 1.40 1.60 1.80 2.00 2.50 3.00 3.50 4.00 4.50 5.00 5.50 Coef. (English) 2.37 2.51 2.70 2.68 2.68 2.67 2.65 2.65 2.65 2.65 2.66 2.66 2.67 2.69 2.72 2.76 2.83

Primary OutFlow Max=5.30 cfs @ 12.20 hrs HW=121.00' (Free Discharge)

1=Sharp-Crested Rectangular Weir (Controls 0.00 cfs)
2=Orifice/Grate (Controls 0.00 cfs)**3=Broad-Crested Rectangular Weir** (Weir Controls 5.30 cfs @ 0.91 fps)

DRAIN TIME CALCULATIONS

Drain time was modeled using **half** of the minimum design exfiltration rate of 2 inches per hour. Basin must drain within 72 hours after peak discharge.

Bioretention Basin:

Time at peak: 12.3 hours

Time at emptying: 27.6 hours

Drain time = $27.6 - 12.3 = \mathbf{15.3 \text{ hours}}$

Hydrograph for Pond 7P: Bio Pond (continued)

Time (hours)	Inflow (cfs)	Storage (cubic-feet)	Elevation (feet)	Outflow (cfs)	Discarded (cfs)	Primary (cfs)
10.60	0.25	431	119.89	0.11	0.11	0.00
10.70	0.27	484	119.90	0.11	0.11	0.00
10.80	0.30	546	119.91	0.11	0.11	0.00
10.90	0.33	619	119.93	0.11	0.11	0.00
11.00	0.36	703	119.95	0.11	0.11	0.00
11.10	0.40	800	119.97	0.11	0.11	0.00
11.20	0.46	913	119.99	0.11	0.11	0.00
11.30	0.52	1,046	120.02	0.11	0.11	0.00
11.40	0.58	1,202	120.05	0.12	0.12	0.00
11.50	0.64	1,379	120.08	0.12	0.12	0.00
11.60	0.78	1,587	120.12	0.12	0.12	0.00
11.70	1.02	1,869	120.18	0.13	0.12	0.02
11.80	1.25	2,212	120.25	0.21	0.12	0.10
11.90	1.69	2,634	120.33	0.36	0.12	0.23
12.00	2.58	3,217	120.44	0.60	0.12	0.47
12.10	4.41	4,154	120.61	1.08	0.13	0.95
12.20	5.35	5,156	120.79	3.72	0.13	3.59
12.30	3.24	5,235	120.80	4.01	0.13	3.87
12.40	2.08	4,924	120.75	2.94	0.13	2.81
12.50	1.53	4,657	120.70	2.14	0.13	2.01
12.60	1.24	4,475	120.67	1.68	0.13	1.55
12.70	0.94	4,321	120.64	1.35	0.13	1.22
12.80	0.81	4,190	120.62	1.12	0.13	0.99
12.90	0.73	4,082	120.60	1.01	0.13	0.89
13.00	0.65	3,975	120.58	0.96	0.13	0.83
13.10	0.59	3,862	120.56	0.90	0.13	0.78
13.20	0.52	3,746	120.53	0.85	0.13	0.72
13.30	0.48	3,632	120.51	0.79	0.13	0.67
13.40	0.44	3,523	120.49	0.74	0.13	0.61
13.50	0.40	3,419	120.47	0.69	0.12	0.56
13.60	0.37	3,318	120.46	0.64	0.12	0.52
13.70	0.34	3,221	120.44	0.60	0.12	0.48
13.80	0.32	3,131	120.42	0.56	0.12	0.44
13.90	0.31	3,050	120.41	0.52	0.12	0.40
14.00	0.30	2,977	120.39	0.49	0.12	0.37
14.10	0.29	2,911	120.38	0.47	0.12	0.34
14.20	0.28	2,851	120.37	0.44	0.12	0.32
14.30	0.27	2,796	120.36	0.42	0.12	0.30
14.40	0.26	2,745	120.35	0.40	0.12	0.28
14.50	0.25	2,698	120.34	0.38	0.12	0.26
14.60	0.24	2,653	120.33	0.36	0.12	0.24
14.70	0.23	2,611	120.32	0.35	0.12	0.23
14.80	0.22	2,571	120.31	0.33	0.12	0.21
14.90	0.21	2,532	120.31	0.32	0.12	0.20
15.00	0.20	2,495	120.30	0.31	0.12	0.18
15.10	0.19	2,459	120.29	0.29	0.12	0.17
15.20	0.19	2,424	120.29	0.28	0.12	0.16
15.30	0.18	2,391	120.28	0.27	0.12	0.15
15.40	0.18	2,360	120.27	0.26	0.12	0.14
15.50	0.18	2,332	120.27	0.25	0.12	0.13
15.60	0.17	2,306	120.26	0.24	0.12	0.12
15.70	0.17	2,282	120.26	0.24	0.12	0.12
15.80	0.17	2,260	120.25	0.23	0.12	0.11

Hydrograph for Pond 7P: Bio Pond (continued)

Time (hours)	Inflow (cfs)	Storage (cubic-feet)	Elevation (feet)	Outflow (cfs)	Discarded (cfs)	Primary (cfs)
26.50	0.00	255	119.85	0.11	0.11	0.00
26.60	0.00	215	119.85	0.11	0.11	0.00
26.70	0.00	175	119.84	0.11	0.11	0.00
26.80	0.00	136	119.83	0.11	0.11	0.00
26.90	0.00	96	119.82	0.11	0.11	0.00
27.00	0.00	60	119.81	0.08	0.08	0.00
27.10	0.00	36	119.81	0.05	0.05	0.00
27.20	0.00	22	119.80	0.03	0.03	0.00
27.30	0.00	14	119.80	0.02	0.02	0.00
27.40	0.00	8	119.80	0.01	0.01	0.00
27.50	0.00	5	119.80	0.01	0.01	0.00
27.60	0.00	3	119.80	0.00	0.00	0.00
27.70	0.00	2	119.80	0.00	0.00	0.00
27.80	0.00	1	119.80	0.00	0.00	0.00
27.90	0.00	1	119.80	0.00	0.00	0.00
28.00	0.00	0	119.80	0.00	0.00	0.00
28.10	0.00	0	119.80	0.00	0.00	0.00
28.20	0.00	0	119.80	0.00	0.00	0.00
28.30	0.00	0	119.80	0.00	0.00	0.00
28.40	0.00	0	119.80	0.00	0.00	0.00
28.50	0.00	0	119.80	0.00	0.00	0.00
28.60	0.00	0	119.80	0.00	0.00	0.00
28.70	0.00	0	119.80	0.00	0.00	0.00
28.80	0.00	0	119.80	0.00	0.00	0.00
28.90	0.00	0	119.80	0.00	0.00	0.00
29.00	0.00	0	119.80	0.00	0.00	0.00
29.10	0.00	0	119.80	0.00	0.00	0.00
29.20	0.00	0	119.80	0.00	0.00	0.00
29.30	0.00	0	119.80	0.00	0.00	0.00
29.40	0.00	0	119.80	0.00	0.00	0.00
29.50	0.00	0	119.80	0.00	0.00	0.00
29.60	0.00	0	119.80	0.00	0.00	0.00
29.70	0.00	0	119.80	0.00	0.00	0.00
29.80	0.00	0	119.80	0.00	0.00	0.00
29.90	0.00	0	119.80	0.00	0.00	0.00
30.00	0.00	0	119.80	0.00	0.00	0.00
30.10	0.00	0	119.80	0.00	0.00	0.00
30.20	0.00	0	119.80	0.00	0.00	0.00
30.30	0.00	0	119.80	0.00	0.00	0.00
30.40	0.00	0	119.80	0.00	0.00	0.00
30.50	0.00	0	119.80	0.00	0.00	0.00
30.60	0.00	0	119.80	0.00	0.00	0.00
30.70	0.00	0	119.80	0.00	0.00	0.00
30.80	0.00	0	119.80	0.00	0.00	0.00
30.90	0.00	0	119.80	0.00	0.00	0.00
31.00	0.00	0	119.80	0.00	0.00	0.00
31.10	0.00	0	119.80	0.00	0.00	0.00
31.20	0.00	0	119.80	0.00	0.00	0.00
31.30	0.00	0	119.80	0.00	0.00	0.00
31.40	0.00	0	119.80	0.00	0.00	0.00
31.50	0.00	0	119.80	0.00	0.00	0.00
31.60	0.00	0	119.80	0.00	0.00	0.00
31.70	0.00	0	119.80	0.00	0.00	0.00

ON-SITE SOILS

SOIL PERMEABILITY REPORT

**BLOCK 34001, LOT 57
MONTGOMERY TOWNSHIP
SOMERSET COUNTY
NEW JERSEY**

MAY 14, 2021

Prepared for:

**D.S. ENGINEERING, P.C.
P.O. BOX 792
ROCKY HILL, NEW JERSEY
08553**

Prepared by:

**P&W LAND CONSULTANTS, INC.
P.O. BOX 9944
TRENTON, NEW JERSEY
08650**

Montgomery Township, Somerset County, New Jersey
Soil Logs and Interpretation

Applicant's Name Princeton Airport **Block** 34001 **Lot** 57

Log ID = 1 **Date:** 3/30/21

Depth (inches) Top-Bottom	Munsell Color Name and Symbol; Estimated Textural Class; Estimated Volume % Coarse Fragment, If Present; Structure; Moist or Dry Consistence; Mottling - Abundance, Size and Contrast, If Present
--	--

0-10"	(7.5YR4/3) Loam; granular, friable
10-14"	(5YR4/4) Gravelly Loam, 15% Gravel, subangular blocky, friable
14-67"	(5YR4/4) Fractured Shale; 10% Loam

No Mottling, Groundwater @ 38"
Machine Refusal @ 67"

67" Total Depth

Depth in Inches:

1st Seepage _____

Infiltration _____

24 Hour Static 38"

SHWT 38" **Date:** 3/20/21

Highest Mottling _____

Non-soil _____

Soil Limiting Zones: Depths as Indicated (In Inches):

Fractured Rock Substratum (top) _____ 14"

Massive Rock Substratum (top) _____ 67"

Excessively Coarse Horizon (top to bottom) _____

Excessively Coarse Substratum (top) _____

Hydraulically Restrictive Horizon (top to bottom) _____

Hydraulically Restrictive Substratum (top) _____

Perched Zone of Saturation (top to bottom) _____

Regional Zone of Saturation – (top) _____

Soil Suitability Class (from table 10.1) _____ IIScSrWr

Type of Field (from table 10.1) _____ Rain Garden

I hereby certify that the information furnished on Form 2B 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. I further certify that all borings and excavations on this lot have been properly backfilled for safety purposes.

Signature of Site Evaluator Kyle Paterson **Date:** 3/21/21

Signature of Professional Engineer _____ **License No.** _____

County/ Municipality		Somerset/Montgomery	
Block:	34001	Lot:	57
Application for Permit to Construct/Alter/Repair An Individual Subsurface Sewage Disposal System			
Form 3f. Pit Bailing Test Data - Continued from previous page		Pit Bail # PB	
5. Record the following data:			
Final Depth of Pit in feet, Dpit :		5.58	
Depth to impermeable stratum in feet, Dstratum :		5.58	
Height of standpipe above reference level in feet, hpipe :		0	
Depth of water after 24 hour stabilization period in feet, Dwater :		3.17	
Height of static water level above imperm. stratum in feet, H :		2.41	
Average height of water level above imperm. stratum in feet, h :		1.35	
6. Re-calculation of K using data from section 5 above and from final time interval of section 4 :			
K = (hrise/t) x Aav/(2.27x(H2 - h2)) x 60 min/hr =		49.1 inches/hour	
where:			
12		= hrise	
13.58		= Aav	
2.41		= H	
1.35		= h	
22		= t	

Montgomery Township, Somerset County, New Jersey
Soil Logs and Interpretation

Applicant's Name Princeton Airport **Block** 34001 **Lot** 57

Log ID = 2 **Date:** 3/30/21

Depth (inches) Top-Bottom	Munsell Color Name and Symbol; Estimated Textural Class; Estimated Volume % Coarse Fragment, If Present; Structure; Moist or Dry Consistence; Mottling - Abundance, Size and Contrast, If Present
--	--

0-10"	(7.5YR4/3) Loam; granular, friable
10-40"	(5YR4/4) Loam, subangular blocky, friable
40-70"	(5YR4/4) Fractured Shale; 10% Loam

No Mottling, Groundwater @ 44"
Machine Refusal @ 70"

70" Total Depth

Depth in Inches:

1st Seepage _____

Infiltration _____

24 Hour Static 44"

SHWT 44" **Date:** 3/20/21

Highest Mottling _____

Non-soil _____

Soil Limiting Zones: Depths as Indicated (In Inches):

Fractured Rock Substratum (top) _____ 40"

Massive Rock Substratum (top) _____ 70"

Excessively Coarse Horizon (top to bottom) _____

Excessively Coarse Substratum (top) _____

Hydraulically Restrictive Horizon (top to bottom) _____

Hydraulically Restrictive Substratum (top) _____

Perched Zone of Saturation (top to bottom) _____

Regional Zone of Saturation – (top) _____

Soil Suitability Class (from table 10.1) _____ IIScSrWr

Type of Field (from table 10.1) _____ Rain Garden

I hereby certify that the information furnished on Form 2B 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. I further certify that all borings and excavations on this lot have been properly backfilled for safety purposes.

Signature of Site Evaluator Kyle Paterson **Date:** 3/21/21

Signature of Professional Engineer _____ **License No.** _____

County/ Municipality: Somerset/Montgomery									
Block: 34001		Lot: 57							
Pit Bailing Test Data:									
1.	Test PB PB	Soil Log # SL SL-2		Date Tested		3/30/21			
2. Record the following in feet:									
Depth to bottom of Pit, Dpit :		5.83							
Depth to water after 24 hr. stabilization period, Dwater :		3.66							
Depth to impermeable Stratum, (if unknown use 1.5 times depth of pit) Dstratum :		5.83							
Height of water level above impermeable stratum (Dstratum - Dwater), H :		2.17							
3. Record the following data in the table below:									
Time measurement in minutes, tn :									
Depth to water level below reference point in inches dn :									
Water surface dimensions in feet, l & w :									
4. Calculate the following values and enter in the table below:									
Water surface area in square feet, An :									
Water level rise in inches, hrise :									
Average water surface area in square feet, Aav :									
Average height of water level above impermeable stratum, h :									
Permeability in inches per hour, Ka :									
Time elapsed tn	Depth to water dn	Length l	Width w	Area An	Water Rise hrise	Average Area Aav	Height of Water h	Permeability Ka	
0	70.00	0.00	0.00	0.00					
5	(Interval Time)				4.00	4.67	0.16	21.1	
5	66.00	3.50	2.67	9.35					
3					1.00	9.79	0.37	18.9	
8	65.00	3.83	2.67	10.23					
8					2.50	10.89	0.52	20.3	
16	62.50	4.33	2.67	11.56					
32					7.25	14.02	0.92	21.8	
48	55.25	6.17	2.67	16.47					
Total Rise During Test =					14.75	inches			

County/ Municipality		Somerset/Montgomery	
Block:	34001	Lot:	57
Application for Permit to Construct/Alter/Repair An Individual Subsurface Sewage Disposal System			
Form 3f. Pit Bailing Test Data - Continued from previous page		Pit Bail # PB	
5. Record the following data:			
Final Depth of Pit in feet, Dpit :		5.83	
Depth to impermeable stratum in feet, Dstratum :		5.83	
Height of standpipe above reference level in feet, hpipe :		0	
Depth of water after 24 hour stabilization period in feet, Dwater :		3.66	
Height of static water level above imperm. stratum in feet, H :		2.17	
Average height of water level above imperm. stratum in feet, h :		0.92	
6. Re-calculation of K using data from section 5 above and from final time interval of section 4 :			
K = (hrise/t) x Aav/(2.27x(H2 - h2)) x 60 min/hr =		29.5 inches/hour	
where:			
14.75		= hrise	
14.02		= Aav	
2.17		= H	
0.92		= h	
48		= t	

Montgomery Township, Somerset County, New Jersey
Soil Logs and Interpretation

Applicant's Name Princeton Airport **Block** 34001 **Lot** 57

Log ID = 3 **Date:** 3/30/21

Depth (inches) Top-Bottom	Munsell Color Name and Symbol; Estimated Textural Class; Estimated Volume % Coarse Fragment, If Present; Structure; Moist or Dry Consistence; Mottling - Abundance, Size and Contrast, If Present
--	--

0-8" (7.5YR4/3) Silt Loam; granular, friable

8-60" (5YR4/4) Fractured Shale; 10% Loam

5YR 6/1 Mottling @ 8-16", Groundwater @ 16"

Machine Refusal @ 60"

60" **Total Depth**

Depth in Inches:

1st Seepage _____

Infiltration _____

24 Hour Static 16"

SHWT 16" **Date:** 3/20/21

Highest Mottling _____

Non-soil _____

Soil Limiting Zones: Depths as Indicated (In Inches):

Fractured Rock Substratum (top) 8"

Massive Rock Substratum (top) 67"

Excessively Coarse Horizon (top to bottom) _____

Excessively Coarse Substratum (top) _____

Hydraulically Restrictive Horizon (top to bottom) _____

Hydraulically Restrictive Substratum (top) _____

Perched Zone of Saturation (top to bottom) _____

Regional Zone of Saturation – (top) _____

Soil Suitability Class (from table 10.1) IIIWrIIIScSr

Type of Field (from table 10.1) Rain Garden

I hereby certify that the information furnished on Form 2B 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. I further certify that all borings and excavations on this lot have been properly backfilled for safety purposes.

Signature of Site Evaluator Kyle Paterson **Date:** 3/21/21

Signature of Professional Engineer _____ **License No.** _____

County/ Municipality: Somerset/Montgomery									
Block: 34001		Lot: 57							
Pit Bailing Test Data:									
1.	Test PB PB	Soil Log # SL SL-3		Date Tested		3/30/21			
2. Record the following in feet:									
Depth to bottom of Pit, Dpit :		5.00							
Depth to water after 24 hr. stabilization period, Dwater :		1.33							
Depth to impermeable Stratum, (if unknown use 1.5 times depth of pit) Dstratum :		5.00							
Height of water level above impermeable stratum (Dstratum - Dwater), H :		3.67							
3. Record the following data in the table below:									
Time measurement in minutes, tn :									
Depth to water level below reference point in inches dn :									
Water surface dimensions in feet, l & w :									
4. Calculate the following values and enter in the table below:									
Water surface area in square feet, An :									
Water level rise in inches, hrise :									
Average water surface area in square feet, Aav :									
Average height of water level above impermeable stratum, h :									
Permeability in inches per hour, Ka :									
Time elapsed	Depth to water	Length	Width	Area	Water Rise	Average Area	Height of Water	Permeability	
tn	dn	l	w	An	hrise	Aav	h	Ka	
0	50.00	3.00	0.00	0.00					
3	(Interval Time)				6.00	5.23	1.08	22.5	
3	44.00	3.92	2.67	10.47					
3					3.00	10.80	1.46	25.2	
6	41.00	4.17	2.67	11.13					
3					2.00	12.58	1.67	20.7	
9	39.00	5.25	2.67	14.02					
2					1.00	14.24	1.79	18.4	
11	38.00	5.42	2.67	14.47					
Total Rise During Test =					12.00	inches			

County/ Municipality		Somerset/Montgomery	
Block:	34001	Lot:	57
Application for Permit to Construct/Alter/Repair An Individual Subsurface Sewage Disposal System			
Form 3f. Pit Bailing Test Data - Continued from previous page			
			Pit Bail # PB
5. Record the following data:			
Final Depth of Pit in feet, Dpit :		5.00	
Depth to impermeable stratum in feet, Dstratum :		5.00	
Height of standpipe above reference level in feet, hpipe :		0	
Depth of water after 24 hour stabilization period in feet, Dwater :		1.33	
Height of static water level above imperm. stratum in feet, H :		3.67	
Average height of water level above imperm. stratum in feet, h :		1.79	
6. Re-calculation of K using data from section 5 above and from final time interval of section 4 :			
K = (hrise/t) x Aav/(2.27x(H2 - h2)) x 60 min/hr =		40.0	inches/hour
where:			
12		= hrise	
14.24		= Aav	
3.67		= H	
1.79		= h	
11		= t	

Montgomery Township, Somerset County, New Jersey
Soil Logs and Interpretation

Applicant's Name Princeton Airport **Block** 34001 **Lot** 57

Log ID = 4 **Date:** 3/30/21

Depth (inches) Top-Bottom	Munsell Color Name and Symbol; Estimated Textural Class; Estimated Volume % Coarse Fragment, If Present; Structure; Moist or Dry Consistence; Mottling - Abundance, Size and Contrast, If Present
--	--

0-8" (7.5YR4/4) Silt Loam; granular, friable

8-40" (5YR4/4) Silt Loam; granular, friable

40-68" (5YR4/4) Fractured Shale; 10% Loam

5YR 6/1 Mottling @ 8-40", Groundwater @ 18"

Machine Refusal @ 68"

68" **Total Depth**

Depth in Inches:

1st Seepage _____

Infiltration _____

24 Hour Static 18"

SHWT 18" **Date:** 3/20/21

Highest Mottling _____

Non-soil _____

Soil Limiting Zones: Depths as Indicated (In Inches):

Fractured Rock Substratum (top) 40"

Massive Rock Substratum (top) 68"

Excessively Coarse Horizon (top to bottom) _____

Excessively Coarse Substratum (top) _____

Hydraulically Restrictive Horizon (top to bottom) _____

Hydraulically Restrictive Substratum (top) _____

Perched Zone of Saturation (top to bottom) _____

Regional Zone of Saturation – (top) _____

Soil Suitability Class (from table 10.1) IIIWrIIIScSr

Type of Field (from table 10.1) Rain Garden

I hereby certify that the information furnished on Form 2B 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. I further certify that all borings and excavations on this lot have been properly backfilled for safety purposes.

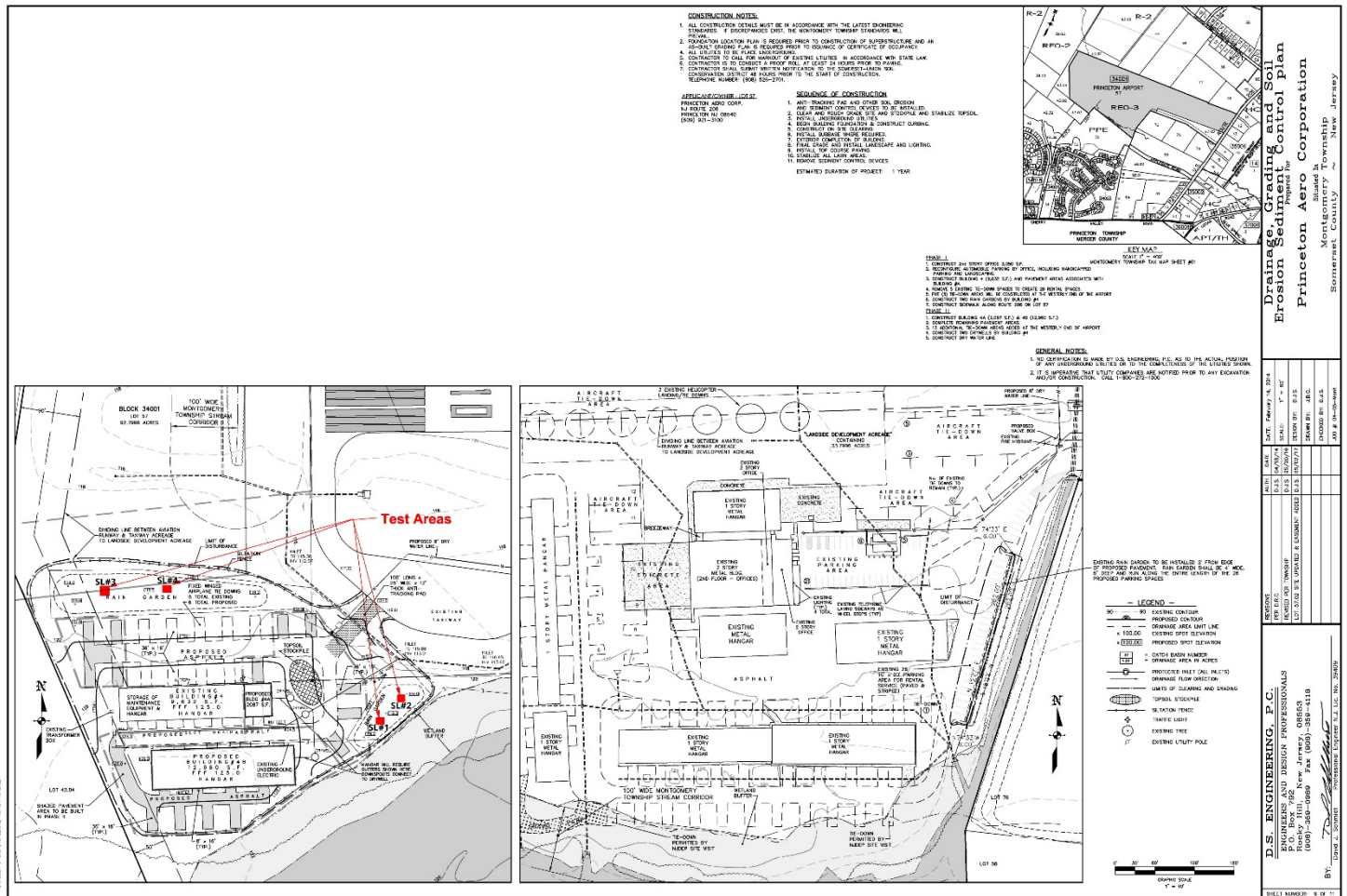
Signature of Site Evaluator Kyle Paterson **Date:** 3/21/21

Signature of Professional Engineer _____ **License No.** _____

County/ Municipality: Somerset/Montgomery									
Block: 34001		Lot: 57							
Pit Bailing Test Data:									
1.	Test PB PB	Soil Log # SL SL-4		Date Tested		3/30/21			
2. Record the following in feet:									
Depth to bottom of Pit, Dpit :		<u>5.67</u>							
Depth to water after 24 hr. stabilization period, Dwater :		<u>1.50</u>							
Depth to impermeable Stratum, (if unknown use 1.5 times depth of pit) Dstratum :								<u>5.67</u>	
Height of water level above impermeable stratum (Dstratum - Dwater), H :								<u>4.17</u>	
3. Record the following data in the table below:									
Time measurement in minutes, tn :									
Depth to water level below reference point in inches dn :									
Water surface dimensions in feet, l & w :									
4. Calculate the following values and enter in the table below:									
Water surface area in square feet, An :									
Water level rise in inches, hrise :									
Average water surface area in square feet, Aav :									
Average height of water level above impermeable stratum, h :									
Permeability in inches per hour, Ka :									
Time elapsed tn	Depth to water dn	Length l	Width w	Area An	Water Rise hrise	Average Area Aav	Height of Water h	Permeability Ka	
0	58.50	5.33	2.67	14.23					
2	(Interval Time)				1.50	14.69	0.86	17.5	
2	57.00	5.67	2.67	15.14					
9					6.50	15.58	1.19	18.6	
11	50.50	6.00	2.67	16.02					
20					10.75	16.46	1.91	17.0	
31	39.75	6.33	2.67	16.90					
60					16.25	18.80	3.03	16.4	
91	23.50	7.75	2.67	20.69					
Total Rise During Test =					35.00	inches			

County/ Municipality		Somerset/Montgomery	
Block:	34001	Lot:	57
Application for Permit to Construct/Alter/Repair An Individual Subsurface Sewage Disposal System			
Form 3f. Pit Bailing Test Data - Continued from previous page			
			Pit Bail # PB
5. Record the following data:			
Final Depth of Pit in feet, Dpit :		5.67	
Depth to impermeable stratum in feet, Dstratum :		5.67	
Height of standpipe above reference level in feet, hpipe :		0	
Depth of water after 24 hour stabilization period in feet, Dwater :		1.50	
Height of static water level above imperm. stratum in feet, H :		4.17	
Average height of water level above imperm. stratum in feet, h :		3.03	
6. Re-calculation of K using data from section 5 above and from final time interval of section 4 :			
K = (hrise/t) x Aav/(2.27x(H2 - h2)) x 60 min/hr =		23.4	inches/hour
where:			
35	= hrise		
18.80	= Aav		
4.17	= H		
3.03	= h		
91	= t		

SOIL TESTING LOCATION MAP



III. STORM DRAINAGE SYSTEM DESIGN

The proposed stormwater management collection system has been designed for the 25-year storm event. The 25-year storm was used to insure all proposed runoff would be collected and piped to the stormwater management system serving the site. The outlet pipe from the proposed detention basin and the pipe from the upper swale have been designed to convey the 100-year discharge. Runoff for the collection system was calculated using the Rational Method.

The Rational Method formula is $Q = C \times I \times A$; the following defines each variable:

Q = Peak runoff rate in cubic feet per second

C = Weighted coefficient of runoff

I = Rainfall intensity in inches per hour

A = Drainage area in acres

The time of concentrations were calculated for the individual drainage areas separately, with the required minimum of 10 minutes used for all areas.

All proposed pipe in the roadway is to be RCP (Reinforced Concrete Pipe) pipe with a minimum diameter of 12”.

The following pages contain these calculations.

PIPE CALCULATIONS

Project: Princeton Airport
Job #: 2194-020
Location: Montgomery

Computed By: TBB
Checked By: CAM
Date: 11/5/2021

NOTES:

- 1) Design method used is Rational Method
- 2) "EX" denotes existing structure
- 3) Weighted Runoff Coefficient based on C values of 0.25 for grassed areas and 0.99 for pavement
- 4) Adjusted C values used to determine equivalent Rational Method peak runoffs for basin outflows

- 5) Velocity percent (%V) from hydraulic elements table
- 6) All pipe shall be Class III reinforced concrete pipe unless otherwise noted

STRUCTURE		AREA (Acres)		RUNOFF COEFFICIENT "C"		"A" x "C"		STORM	I	PEAK RUNOFF	TIME OF CONCEN.		PIPING INPUT			PIPING DATA							INVERT ELEVATION		GRATE/RIM ELEVATION		GRATE TO INVERT ELEVATION		GRATE TO TOP OF PIPE CLEARANCE		
FROM	TO	Inc. Area	Total Area	% Impervious	Weighted Incremental "C"	Incremental	Total A x C	Year	in/hr.	Qa CFS	To Inlet Min.	To Upper End	Dia. (IN)	Length (FT)	Man. "n"	% Slope	Qf Full (CFS)	Vf Full (FPS)	%Q Qa/Qf x100	%V (Va/Vf) x 100	Vactual (FPS)	Upper End	Lower End	Upper End	Lower End	Upper End	Lower End	Upper End	Lower End	FROM	TO
Ex. Bldg	FES 2.0	0.28	0.28	76%	0.81	0.23	0.23	25	6.47	1.47	10.00	10.00	12	204	0.012	0.50	2.73	3.47	54	102.5	3.56	120.82	119.80	125.00	NA	4.18	NA	3.01	NA	Ex. Bldg	2
Pr. Bldg	FES 1.0	0.10	0.10	81%	0.85	0.08	0.08	25	6.47	0.55	10.00	10.00	12	165	0.012	0.50	2.74	3.48	20	78	2.72	120.63	119.80	125.00	NA	4.37	NA	3.20	NA	Pr. Bldg	1
OCS	Ex. Inlet	0.85	0.85	* 62%	0.71	0.60	0.60	100	7.78	4.67	10.00	10.00	12	42	0.012	5.00	8.63	10.99	54	102.5	11.26	115.20	113.10	120.50	NA	5.30	NA	4.13	NA	OCS	Ex. Inlet

* - Adjusted to reflect 100 year flow from basin

SOIL EROSION CALCULATIONS

CONDUIT OUTLET PROTECTION

Project: Princeton Airport
Job#: 2194-020

Computed by: TBB
Checked by:

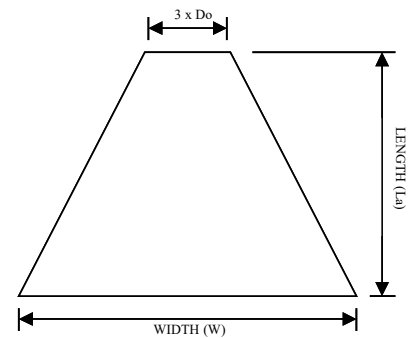
11/5/2021

FLARED END SECTION 1.0

Criteria: N.J. Soil Erosion and Sediment Control Standards (Section 12)

INPUT

25 year flow, $Q(25) = 0.550$ cfs
Pipe size, $D(o) = 12$ in 1.00
 $1/2 D(o) = 6.0$ in
 $0.2 * D(o) = 0.2$ ft
Tailwater, $T_w = 0.6$ ft (from basin routings-2 YR Stage)
Use $T_w = 0.6$ ft
Is apron confined? (yes/no) - no



OUTPUT

Since $T_w > 1/2 * D_o$, $La = 3Q/D_o^{1/2}$
 $= 1.7$ ft

Use $La = 2$ ft

$W = 3D_o + 0.4La$
 $= 3.7$ ft

Use $W = 4$ ft

$d(50) = (0.02/T_w)(Q/D_o)^{4/3}$
 $= 0.17$ in

Use $d(50) = 3$ in

$Th = 2 * d(50)$ w/filter fabric

$Th = 6$ in w/filter fabric

Bottom slope = 0.0%

Volume of rip-rap required = 0.2 cy
Area of filter fabric required = 5.7 sf

CONDUIT OUTLET PROTECTION

Project: Princeton Airport
Job#: 2194-020

Computed by: TBB
Checked by:

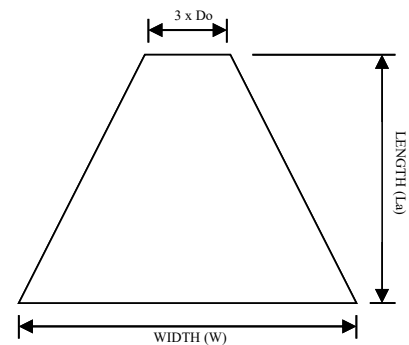
11/5/2021

FLARED END SECTION 2.0

Criteria: N.J. Soil Erosion and Sediment Control Standards (Section 12)

INPUT

25 year flow, $Q(25) = 1.470$ cfs
Pipe size, $D(o) = 12$ in 1.00
 $1/2 D(o) = 6.0$ in
 $0.2 * D(o) = 0.2$ ft
Tailwater, $T_w = 0.6$ ft (from basin routings-2 YR Stage)
Use $T_w = 0.6$ ft
Is apron confined? (yes/no) - no



OUTPUT

Since $T_w > 1/2 * D_o$, $La = 3Q/D_o^{(1/2)}$
= 4.4 ft

Use $La = 5$ ft

$W = 3D_o + 0.4La$
= 4.8 ft

Use $W = 5$ ft

$d(50) = (0.02/T_w)(Q/D_o)^{(4/3)}$
= 0.63 in

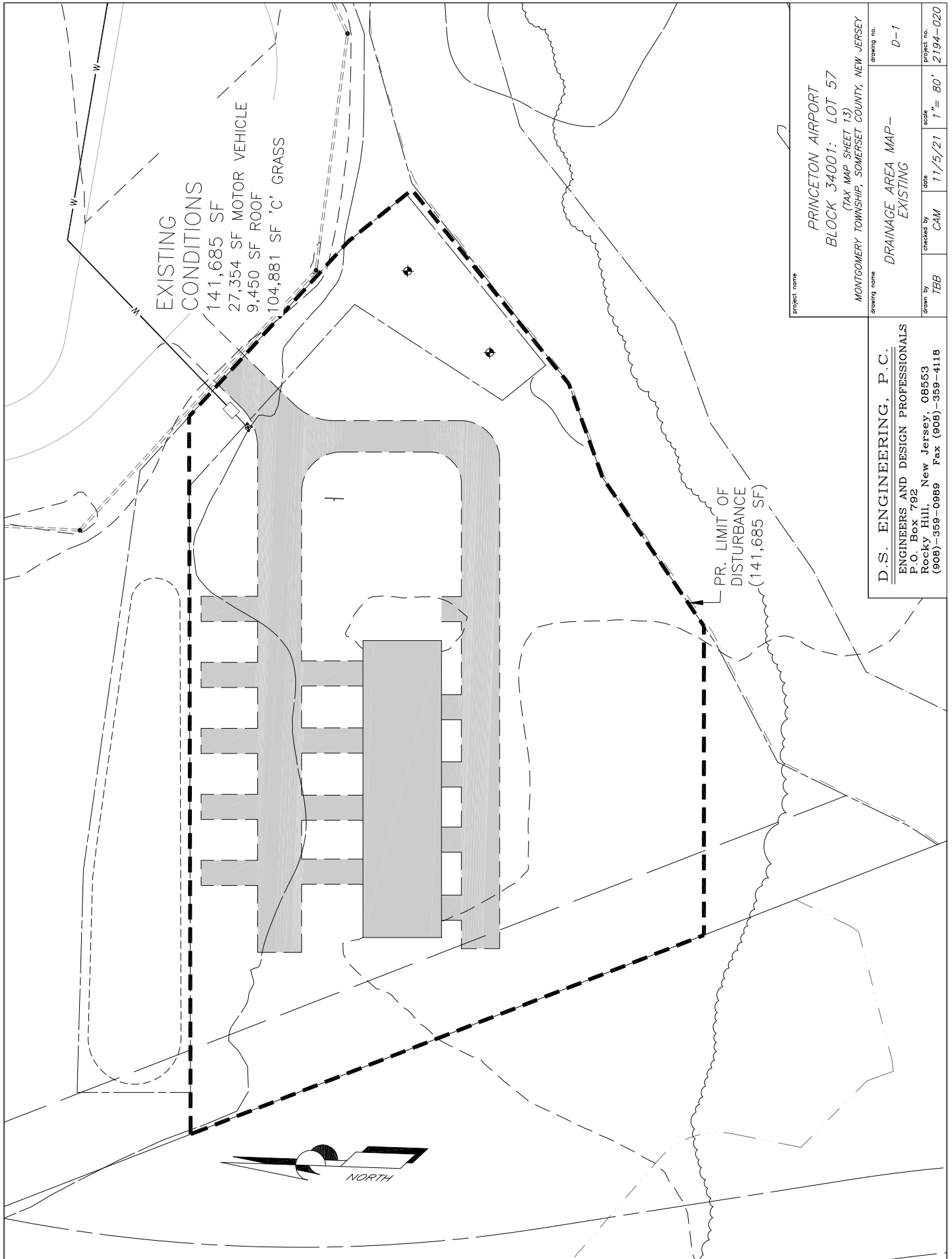
Use $d(50) = 3$ in

$Th = 2 * d(50)$ w/filter fabric

$Th = 6$ in w/filter fabric

Bottom slope = 0.0%

Volume of rip-rap required = 0.5 cy
Area of filter fabric required = 17.6 sf



project name				drawing no.			
PRINCETON AIRPORT				D-1			
BLOCK 34001: LOT 57				drawing no.			
(TAX MAP SHEET 13)				2194-020			
MONTGOMERY TOWNSHIP, SOMERSET COUNTY, NEW JERSEY				scale			
drawing name				1"= 80'			
DRAINAGE AREA MAP- EXISTING				date			
drawn by				11/5/21			
checked by				CAM			
TBB				project no.			
D.S. ENGINEERING, P.C.				2194-020			
ENGINEERS AND DESIGN PROFESSIONALS							
P.O. Box 792							
Rocky Hill, New Jersey, 08553							
(908)-359-0989							
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