

PRELIMINARY STORMWATER ANALYSIS, DESIGN, AND REPORT

FOR

STORAGE FACILITY

PATTEN MILLE LACS, LLC
24-134

AUGUST 2024


PREPARED BY:



www.starkengineer.com
320-249-2611
Sauk Rapids, Minnesota

Civil Engineering
Site Planning
Sustainable Design

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



Wayne C.B. Stark, P.E.
Registration Number 26093

Date: _____



PROJECT INFORMATION

The project site is located at the northeast corner of the intersection between US Highway 169 and State Highway 18 in Hazelton Township, Minnesota. The project site is bounded by these two roadways on the west and south side, County Road 37 on the east side and rural residential lots on the north side. This 7.15-acre project site is wooded and grass coverage with a 3.24-acre wetland on the east side. It has no existing impervious surface area.

According to the Web Soil Survey, the existing soils on this site are Cromwell fine sandy loam (268B), former gravel pits (GP), Bushville loamy fine sand (732B), and Watab fine sand (218) which are classified as hydrologic soil groups B, C/D and C/D, respectively. Site-specific soils borings have not been completed at this time. The proposed improvements include three storage buildings with adjacent gravel drive areas which will result in an impervious surface area of 22.6%.

RECOMMENDATIONS

The stormwater analysis and design for this site is presented for review and comment along with the preliminary plans. For the proposed improvements, an infiltration basin will be designed and constructed to treat and detain the stormwater flows from the project site.

ANALYSIS AND DESIGN

Procedurally, the surface water hydrological conditions for the proposed conditions on the site were analyzed against the existing site conditions using Atlas-14 rainfall data and the MSE-3 storm type. The events analyzed are:

- 2-year, 24-hour rainfall of 2.73 inches
- 10-year, 24-hour rainfall of 3.96 inches
- 100-year, 24-hour rainfall of 6.33 inches

The analysis is accomplished using the HydroCAD, Version 10.0, Stormwater Modeling System software by HydroCAD Software Solutions, LLC. Within the software, the user selects certain methods and techniques that are dependent upon the user preferences and the application. For the design of the proposed post-development systems, the following methods and preferences are used:

Site Specific Soil/Surface Cover Conditions:	SBUH* Methods
Time of Concentration:	SCS** TR-55 Methods
Unit Hydrograph:	SCS TR-20 Methods
Reach Routing / Pond Routing:	Dynamic-Storage-Indication Method

*SBUH (Santa Barbara Urban Hydrograph

**SCS (Soil Conservation Service) is now known as NRCS (Natural Resources Conservation Service).

Each of these methods or techniques is explained in detail in the National Engineering Handbook: Section 4 - Hydrology, as well as several additional references.

EXISTING SITE DRAINAGE

Based on the existing site conditions, two drainage areas were determined for the project site as defined below:

1E – This 2.07-acre area flows overland to the south side of the site. It is mostly grass with a small, wooded area and no impervious surface area.

2E – This area flows overland to the southeast corner of the site and includes the existing wetland. It is 5.08 acres in size with wooded as well as grass surfaces and no impervious surface area.

The analysis of the runoff rates and volumes from these drainage areas for the design rainfall events was confirmed using the HydroCAD model. This analysis showed that the peak stormwater runoff rates and volumes for this site are as follows:

- 2-year, 24-hour rainfall = 1.52 cubic feet per second (cfs), 12,707 CF
- 10-year, 24-hour rainfall = 4.31 cfs, 30,075 CF
- 100-year, 24-hour rainfall = 11.95 cfs, 73,189 CF

A copy of the Existing Conditions Summary Output is attached.

POST-DEVELOPMENT SITE DRAINAGE

With the previously described project improvements, the site has two (2) drainage areas as defined below:

S1 – This area consists of existing drainage area 1E which includes most of the site improvements. It flows overland to the proposed south infiltration basin, is 2.07 acres in size and will have an impervious surface area of 27.5% due to the proposed building roofs and gravel areas.

S2 – This 5.08-acre area consists of existing drainage area 2E and will remain mostly unchanged. It will overland flow to the southeast corner of the site with an impervious surface area of 2.8% from a portion of the proposed gravel driveway.

The south infiltration basin will have 3:1 side slopes, a bottom elevation of 1267.00 and a top elevation of 1069.5. This basin will discharge via a riprap-lined emergency overflow

at elevation 1069.10. Based on the Minnesota Stormwater Manual, the existing soils in the basin area are classified as hydrologic soils group B with a design infiltration rate of 0.45 inches per hour.

Analysis of the runoff rates and volumes for the design rainfall events were completed using the HydroCAD model. This analysis shows that the peak stormwater runoff rates and volumes from the site are as follows:

- 2-year, 24-hour rainfall = 1.38 cfs, 11,260 CF
- 10-year, 24-hour rainfall = 3.52 cfs, 25,221 CF
- 100-year, 24-hour rainfall = 11.47 cfs, 69,719 CF

The proposed peak runoff rates and volumes are less than the existing condition peak runoff rates and volumes for all three of the design rainfall events. At a depth of 1.5', this basin infiltrates a water quality volume of 8,862 CF, which is more than the required water quality volume of 7,921 CF (1" over the proposed impervious surface area of 96,018 SF). Therefore, the proposed infiltration basin meets the County's rate control, volume control and water quality requirements for this project.

A copy of the Post-Development Summary Output is attached.

**EXISTING
SUMMARY OUTPUT**



1E

To South

2E

To East

Subcat

Reach

Pond

Link

Routing Diagram for 24-134 Existing
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24-134 Existing

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MSE 24-hr 3 2-yr, 24-hr Rainfall=2.73"

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Summary for Subcatchment 1E: To South

Runoff = 0.15 cfs @ 12.48 hrs, Volume= 1,447 cf, Depth= 0.19"

Runoff by SBUH method, Split Pervious/Imperv., Time Span= 1.00-72.00 hrs, dt= 0.05 hrs
MSE 24-hr 3 2-yr, 24-hr Rainfall=2.73"

Area (sf)	CN	Description
90,058	58	Woods/grass comb., Good, HSG B
90,058	58	100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
14.1	150	0.0567	0.18		Sheet Flow, HP to SCF Grass: Dense n= 0.240 P2= 2.72"
5.0	223	0.0112	0.74		Shallow Concentrated Flow, Sheet to LP Short Grass Pasture Kv= 7.0 fps
19.1	373	Total			

Summary for Subcatchment 2E: To East

Runoff = 1.38 cfs @ 12.36 hrs, Volume= 11,260 cf, Depth= 0.61"

Runoff by SBUH method, Split Pervious/Imperv., Time Span= 1.00-72.00 hrs, dt= 0.05 hrs
MSE 24-hr 3 2-yr, 24-hr Rainfall=2.73"

Area (sf)	CN	Description
23,515	58	Woods/grass comb., Good, HSG B
197,912	72	Woods/grass comb., Good, HSG C
221,427	71	Weighted Average
221,427	71	100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
23.4	150	0.0160	0.11		Sheet Flow, HP to SCF Grass: Dense n= 0.240 P2= 2.72"
14.8	757	0.0148	0.85		Shallow Concentrated Flow, Sheet to LP Short Grass Pasture Kv= 7.0 fps
38.2	907	Total			

24-134 Existing

MSE 24-hr 3 10-yr, 24-hr Rainfall=3.96"

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Summary for Subcatchment 1E: To South

Runoff = 0.79 cfs @ 12.27 hrs, Volume= 4,854 cf, Depth= 0.65"

Runoff by SBUH method, Split Pervious/Imperv., Time Span= 1.00-72.00 hrs, dt= 0.05 hrs
MSE 24-hr 3 10-yr, 24-hr Rainfall=3.96"

Area (sf)	CN	Description
90,058	58	Woods/grass comb., Good, HSG B
90,058	58	100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
14.1	150	0.0567	0.18		Sheet Flow, HP to SCF Grass: Dense n= 0.240 P2= 2.72"
5.0	223	0.0112	0.74		Shallow Concentrated Flow, Sheet to LP Short Grass Pasture Kv= 7.0 fps
19.1	373	Total			

Summary for Subcatchment 2E: To East

Runoff = 3.52 cfs @ 12.29 hrs, Volume= 25,221 cf, Depth= 1.37"

Runoff by SBUH method, Split Pervious/Imperv., Time Span= 1.00-72.00 hrs, dt= 0.05 hrs
MSE 24-hr 3 10-yr, 24-hr Rainfall=3.96"

Area (sf)	CN	Description
23,515	58	Woods/grass comb., Good, HSG B
197,912	72	Woods/grass comb., Good, HSG C
221,427	71	Weighted Average
221,427	71	100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
23.4	150	0.0160	0.11		Sheet Flow, HP to SCF Grass: Dense n= 0.240 P2= 2.72"
14.8	757	0.0148	0.85		Shallow Concentrated Flow, Sheet to LP Short Grass Pasture Kv= 7.0 fps
38.2	907	Total			

24-134 Existing

MSE 24-hr 3 100-yr, 24-hr Rainfall=6.33"

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Summary for Subcatchment 1E: To South

Runoff = 3.18 cfs @ 12.17 hrs, Volume= 14,753 cf, Depth= 1.97"

Runoff by SBUH method, Split Pervious/Imperv., Time Span= 1.00-72.00 hrs, dt= 0.05 hrs
MSE 24-hr 3 100-yr, 24-hr Rainfall=6.33"

Area (sf)	CN	Description
90,058	58	Woods/grass comb., Good, HSG B
90,058	58	100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
14.1	150	0.0567	0.18		Sheet Flow, HP to SCF Grass: Dense n= 0.240 P2= 2.72"
5.0	223	0.0112	0.74		Shallow Concentrated Flow, Sheet to LP Short Grass Pasture Kv= 7.0 fps
19.1	373	Total			

Summary for Subcatchment 2E: To East

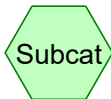
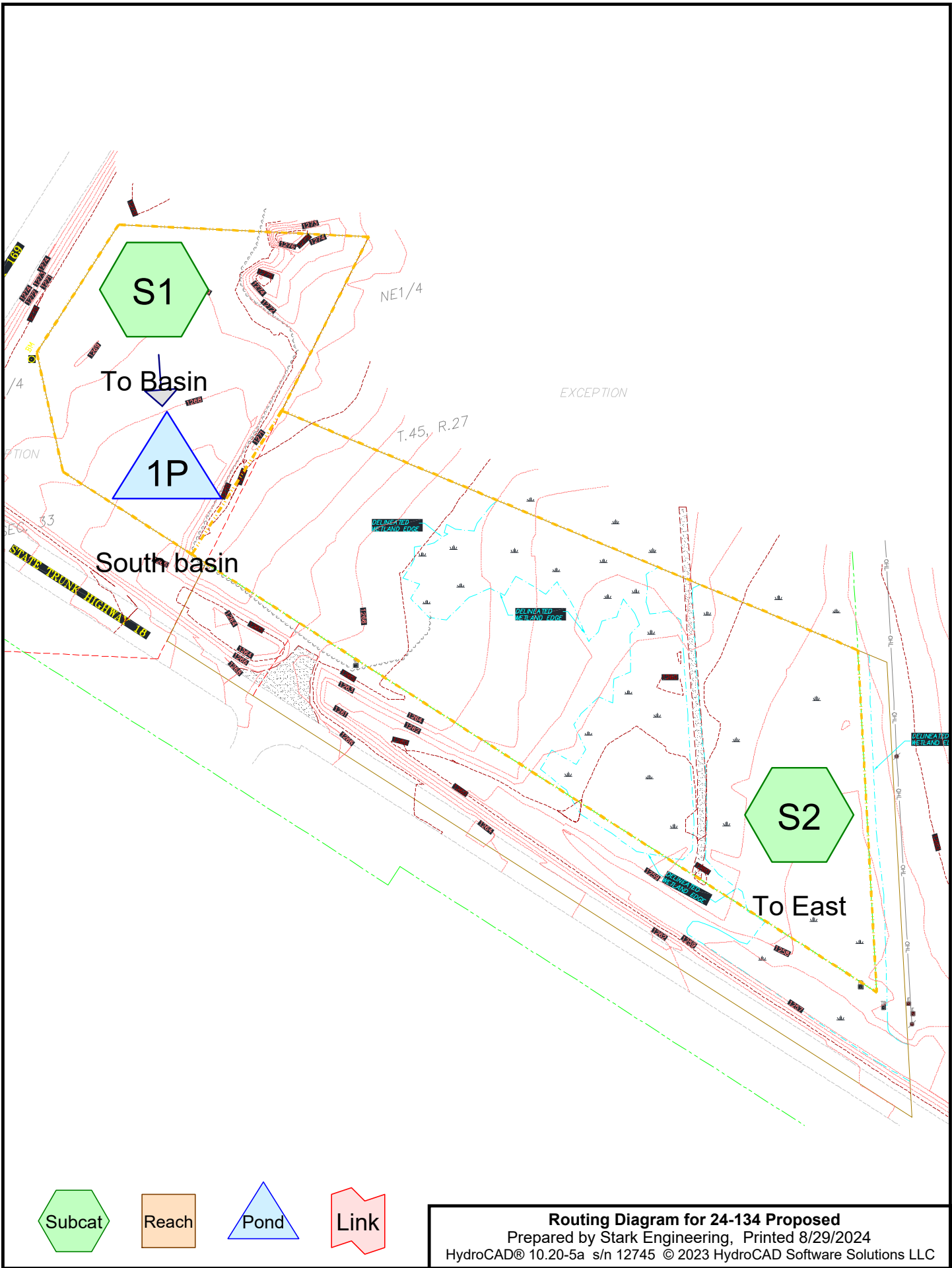
Runoff = 8.77 cfs @ 12.25 hrs, Volume= 58,436 cf, Depth= 3.17"

Runoff by SBUH method, Split Pervious/Imperv., Time Span= 1.00-72.00 hrs, dt= 0.05 hrs
MSE 24-hr 3 100-yr, 24-hr Rainfall=6.33"

Area (sf)	CN	Description
23,515	58	Woods/grass comb., Good, HSG B
197,912	72	Woods/grass comb., Good, HSG C
221,427	71	Weighted Average
221,427	71	100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
23.4	150	0.0160	0.11		Sheet Flow, HP to SCF Grass: Dense n= 0.240 P2= 2.72"
14.8	757	0.0148	0.85		Shallow Concentrated Flow, Sheet to LP Short Grass Pasture Kv= 7.0 fps
38.2	907	Total			

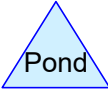
**POST-DEVELOPMENT
SUMMARY OUTPUT**



Subcat



Reach



Pond



Link

Routing Diagram for 24-134 Proposed
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24-134 Proposed

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MSE 24-hr 3 2-yr, 24-hr Rainfall=2.73"

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Summary for Subcatchment S1: To Basin

Runoff = 3.05 cfs @ 12.14 hrs, Volume= 9,860 cf, Depth= 1.45"
 Routed to Pond 1P : South basin

Runoff by SBUH method, Split Pervious/Imperv., Time Span= 1.00-72.00 hrs, dt= 0.05 hrs
 MSE 24-hr 3 2-yr, 24-hr Rainfall=2.73"

Area (sf)	CN	Description
* 24,800	98	Building roofs
30,961	96	Gravel surface
25,648	58	Woods/grass comb., Good, HSG B
81,409	85	Weighted Average
56,609	79	69.54% Pervious Area
24,800	98	30.46% Impervious Area

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

Summary for Subcatchment S2: To East

Runoff = 1.38 cfs @ 12.36 hrs, Volume= 11,260 cf, Depth= 0.61"

Runoff by SBUH method, Split Pervious/Imperv., Time Span= 1.00-72.00 hrs, dt= 0.05 hrs
 MSE 24-hr 3 2-yr, 24-hr Rainfall=2.73"

Area (sf)	CN	Description
6,137	96	Gravel surface
19,458	58	Woods/grass comb., Good, HSG B
195,832	72	Woods/grass comb., Good, HSG C
221,427	71	Weighted Average
221,427	71	100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
23.4	150	0.0160	0.11		Sheet Flow, HP to SCF
					Grass: Dense n= 0.240 P2= 2.72"
14.8	757	0.0148	0.85		Shallow Concentrated Flow, Sheet to LP
					Short Grass Pasture Kv= 7.0 fps
38.2	907	Total			

Summary for Pond 1P: South basin

Inflow Area = 81,409 sf, 30.46% Impervious, Inflow Depth = 1.45" for 2-yr, 24-hr event
 Inflow = 3.05 cfs @ 12.14 hrs, Volume= 9,860 cf
 Outflow = 0.08 cfs @ 15.79 hrs, Volume= 9,863 cf, Atten= 98%, Lag= 219.0 min
 Discarded = 0.08 cfs @ 15.79 hrs, Volume= 9,863 cf
 Primary = 0.00 cfs @ 1.00 hrs, Volume= 0 cf

Routing by Dyn-Stor-Ind method, Time Span= 1.00-72.00 hrs, dt= 0.05 hrs / 3

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MSE 24-hr 3 2-yr, 24-hr Rainfall=2.73"

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Peak Elev= 1,268.24' @ 15.79 hrs Surf.Area= 7,296 sf Storage= 6,866 cf

Plug-Flow detention time= (not calculated: outflow precedes inflow)

Center-of-Mass det. time= 964.8 min (1,757.9 - 793.1)

Volume	Invert	Avail.Storage	Storage Description
#1	1,267.00'	18,877 cf	Custom Stage Data (Prismatic) Listed below (Recalc)
Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
1,267.00	4,000	0	0
1,268.00	6,431	5,216	5,216
1,269.00	10,031	8,231	13,447
1,269.50	11,689	5,430	18,877

Device	Routing	Invert	Outlet Devices
#1	Primary	1,269.10'	10.0' long + 1.0 ' SideZ x 5.0' 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) 2.34 2.50 2.70 2.68 2.68 2.66 2.65 2.65 2.65 2.65 2.67 2.66 2.68 2.70 2.74 2.79 2.88
#2	Discarded	1,267.00'	0.450 in/hr Infiltration over Surface area

Discarded OutFlow Max=0.08 cfs @ 15.79 hrs HW=1,268.24' (Free Discharge)

↑**2=Infiltration** (Exfiltration Controls 0.08 cfs)

Primary OutFlow Max=0.00 cfs @ 1.00 hrs HW=1,267.00' (Free Discharge)

↑**1=Broad-Crested Rectangular Weir** (Controls 0.00 cfs)

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MSE 24-hr 3 10-yr, 24-hr Rainfall=3.96"

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Summary for Subcatchment S1: To Basin

Runoff = 5.28 cfs @ 12.14 hrs, Volume= 16,808 cf, Depth= 2.48"
 Routed to Pond 1P : South basin

Runoff by SBUH method, Split Pervious/Imperv., Time Span= 1.00-72.00 hrs, dt= 0.05 hrs
 MSE 24-hr 3 10-yr, 24-hr Rainfall=3.96"

Area (sf)	CN	Description
* 24,800	98	Building roofs
30,961	96	Gravel surface
25,648	58	Woods/grass comb., Good, HSG B
81,409	85	Weighted Average
56,609	79	69.54% Pervious Area
24,800	98	30.46% Impervious Area

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

Summary for Subcatchment S2: To East

Runoff = 3.52 cfs @ 12.29 hrs, Volume= 25,221 cf, Depth= 1.37"

Runoff by SBUH method, Split Pervious/Imperv., Time Span= 1.00-72.00 hrs, dt= 0.05 hrs
 MSE 24-hr 3 10-yr, 24-hr Rainfall=3.96"

Area (sf)	CN	Description
6,137	96	Gravel surface
19,458	58	Woods/grass comb., Good, HSG B
195,832	72	Woods/grass comb., Good, HSG C
221,427	71	Weighted Average
221,427	71	100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
23.4	150	0.0160	0.11		Sheet Flow, HP to SCF
					Grass: Dense n= 0.240 P2= 2.72"
14.8	757	0.0148	0.85		Shallow Concentrated Flow, Sheet to LP
					Short Grass Pasture Kv= 7.0 fps
38.2	907	Total			

Summary for Pond 1P: South basin

Inflow Area = 81,409 sf, 30.46% Impervious, Inflow Depth = 2.48" for 10-yr, 24-hr event
 Inflow = 5.28 cfs @ 12.14 hrs, Volume= 16,808 cf
 Outflow = 0.10 cfs @ 17.47 hrs, Volume= 16,761 cf, Atten= 98%, Lag= 319.9 min
 Discarded = 0.10 cfs @ 17.47 hrs, Volume= 16,761 cf
 Primary = 0.00 cfs @ 1.00 hrs, Volume= 0 cf

Routing by Dyn-Stor-Ind method, Time Span= 1.00-72.00 hrs, dt= 0.05 hrs / 3

24-134 Proposed

MSE 24-hr 3 10-yr, 24-hr Rainfall=3.96"

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Peak Elev= 1,268.91' @ 17.47 hrs Surf.Area= 9,702 sf Storage= 12,546 cf

Plug-Flow detention time= (not calculated: outflow precedes inflow)

Center-of-Mass det. time= 1,371.4 min (2,158.6 - 787.2)

Volume	Invert	Avail.Storage	Storage Description
#1	1,267.00'	18,877 cf	Custom Stage Data (Prismatic) Listed below (Recalc)
Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
1,267.00	4,000	0	0
1,268.00	6,431	5,216	5,216
1,269.00	10,031	8,231	13,447
1,269.50	11,689	5,430	18,877

Device	Routing	Invert	Outlet Devices
#1	Primary	1,269.10'	10.0' long + 1.0 ' SideZ x 5.0' 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) 2.34 2.50 2.70 2.68 2.68 2.66 2.65 2.65 2.65 2.65 2.67 2.66 2.68 2.70 2.74 2.79 2.88
#2	Discarded	1,267.00'	0.450 in/hr Infiltration over Surface area

Discarded OutFlow Max=0.10 cfs @ 17.47 hrs HW=1,268.91' (Free Discharge)

↑**2=Infiltration** (Exfiltration Controls 0.10 cfs)

Primary OutFlow Max=0.00 cfs @ 1.00 hrs HW=1,267.00' (Free Discharge)

↑**1=Broad-Crested Rectangular Weir** (Controls 0.00 cfs)

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MSE 24-hr 3 100-yr, 24-hr Rainfall=6.33"

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Summary for Subcatchment S1: To Basin

Runoff = 9.85 cfs @ 12.14 hrs, Volume= 31,344 cf, Depth= 4.62"
 Routed to Pond 1P : South basin

Runoff by SBUH method, Split Pervious/Imperv., Time Span= 1.00-72.00 hrs, dt= 0.05 hrs
 MSE 24-hr 3 100-yr, 24-hr Rainfall=6.33"

Area (sf)	CN	Description
* 24,800	98	Building roofs
30,961	96	Gravel surface
25,648	58	Woods/grass comb., Good, HSG B
81,409	85	Weighted Average
56,609	79	69.54% Pervious Area
24,800	98	30.46% Impervious Area

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

Summary for Subcatchment S2: To East

Runoff = 8.77 cfs @ 12.25 hrs, Volume= 58,436 cf, Depth= 3.17"

Runoff by SBUH method, Split Pervious/Imperv., Time Span= 1.00-72.00 hrs, dt= 0.05 hrs
 MSE 24-hr 3 100-yr, 24-hr Rainfall=6.33"

Area (sf)	CN	Description
6,137	96	Gravel surface
19,458	58	Woods/grass comb., Good, HSG B
195,832	72	Woods/grass comb., Good, HSG C
221,427	71	Weighted Average
221,427	71	100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
23.4	150	0.0160	0.11		Sheet Flow, HP to SCF
					Grass: Dense n= 0.240 P2= 2.72"
14.8	757	0.0148	0.85		Shallow Concentrated Flow, Sheet to LP
					Short Grass Pasture Kv= 7.0 fps
38.2	907	Total			

Summary for Pond 1P: South basin

Inflow Area = 81,409 sf, 30.46% Impervious, Inflow Depth = 4.62" for 100-yr, 24-hr event
 Inflow = 9.85 cfs @ 12.14 hrs, Volume= 31,344 cf
 Outflow = 2.81 cfs @ 12.58 hrs, Volume= 30,215 cf, Atten= 71%, Lag= 26.6 min
 Discarded = 0.12 cfs @ 12.58 hrs, Volume= 18,932 cf
 Primary = 2.70 cfs @ 12.58 hrs, Volume= 11,283 cf

Routing by Dyn-Stor-Ind method, Time Span= 1.00-72.00 hrs, dt= 0.05 hrs / 3

24-134 Proposed

MSE 24-hr 3 100-yr, 24-hr Rainfall=6.33"

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Peak Elev= 1,269.33' @ 12.58 hrs Surf.Area= 11,133 sf Storage= 16,962 cf

Plug-Flow detention time= 887.3 min calculated for 30,194 cf (96% of inflow)

Center-of-Mass det. time= 869.5 min (1,648.8 - 779.4)

Volume	Invert	Avail.Storage	Storage Description
#1	1,267.00'	18,877 cf	Custom Stage Data (Prismatic) Listed below (Recalc)
Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
1,267.00	4,000	0	0
1,268.00	6,431	5,216	5,216
1,269.00	10,031	8,231	13,447
1,269.50	11,689	5,430	18,877

Device	Routing	Invert	Outlet Devices
#1	Primary	1,269.10'	10.0' long + 1.0 ' SideZ x 5.0' 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) 2.34 2.50 2.70 2.68 2.68 2.66 2.65 2.65 2.65 2.65 2.67 2.66 2.68 2.70 2.74 2.79 2.88
#2	Discarded	1,267.00'	0.450 in/hr Infiltration over Surface area

Discarded OutFlow Max=0.12 cfs @ 12.58 hrs HW=1,269.33' (Free Discharge)
 ↑**2=Infiltration** (Exfiltration Controls 0.12 cfs)

Primary OutFlow Max=2.68 cfs @ 12.58 hrs HW=1,269.33' (Free Discharge)
 ↑**1=Broad-Crested Rectangular Weir** (Weir Controls 2.68 cfs @ 1.13 fps)