Stormwater Management Plan

Southtown Shopping Center
Bloomington, Minnesota

City of Bloomington
Nine Mile Creek Watershed District

Prepared for:
Kraus Anderson
501 S 8th St
Minneapolis, MN 55404

Prepared by:
Kimley-Horn
14800 Galaxie Ave Suite 200
Apple Valley, MN 55124
Contact: Arik Lokensgard, P.E. & Will Matzek, P.E.

Prepared on:
June 18, 2024

Revised on:
August 2, 2024

Table of Contents

1.0. Introduction

This stormwater management report was prepared in conjunction with the proposed site development plans the redevelopment of the Southtown Shopping Center (Southtown) in Bloomington, Minnesota. The project site is located on the southeast corner of the intersection of Interstate Highway 494 and Penn Avenue. The total area of the site is approximately 36.44 acres, and the proposed disturbed area is 15.08 acres.

The proposed project scope will include the demolition of a portion of the site's existing parking field, existing building, and subsequent construction of a new retail building. Along with the construction of the building, connecting sidewalks, parking stalls, supporting underground utilities, stormwater management, and landscaping is proposed to be constructed.

In concurrence with the production of the site development plans, hydrologic and hydraulic models were developed to generate the data presented within this report. This project will require review by Nine Mile Creed Watershed District and is subject to stormwater rate, water quality requirements, annual TP removals, and annual TSS removals.

Kimley-Horn has analyzed the drainage conditions of the Site and provides computations for applicable NMCWD and City of Bloomington stormwater requirements in this report. The analysis of the pre-development and post-development drainage models was completed using HydroCAD, Version 10.20, a computer aided design system for modeling the hydrology and hydraulics of stormwater runoff and MIDS Calculator GUI v2. These calculations are largely based on the hydrology techniques developed by the Soil Conservation Service (SCS/NRCS), combined with other hydrology and hydraulics calculations. All calculations, hydrographs, and drainage area maps are provided in the appendix of this report.

2.0. Pre-development Conditions

The existing site is comprised of buildings and associated parking lot areas. During the winter of 2024, the existing Toy's "R" Us and Herberger's buildings were demolished. These areas were restabilized as pervious surfaces. However, based on coordination with Nine Mile Creek Watershed staff, the "existing condition" of the site has been based on the condition prior to the demolition. Based on the geotechnical report, soils on-site are to be classified as Hydrologic Soil Group B. Type B soils have an acceptable infiltration rate and a medium-low runoff potential.

The existing site drainage area generally consists of three (3) drainage areas. The table below summarizes the characteristics of the drainage areas for the existing conditions as illustrated on the Pre-Development Drainage Area Map in the Appendices.

Pre-Development Drainage Area Summary			
Drainage Area	Impervious Area (ac)	Pervious Area (ac)	Total Area (ac)
EXDA-1	6.51	0.41	6.92
EXDA-2	7.66	0.31	7.97
EXDA-3	0.11	0.08	0.19
Total	14.28	0.80	15.08

3.0. Post-development Conditions

The proposed site will consist of a sporting goods retail building, associated athletic field, and reconstructed parking lot, sidewalk, as well as underground utilities, stormwater management, and landscaping. The proposed development will be approximately 88% impervious. The remaining 12% of the property is proposed to consist of lawn or landscaping. A large portion of the site (directly east of the sporting goods retail store's athletic field) is not proposed to be redeveloped as part of the first phase. However, to plan stormwater management BMPs to have sufficient capacity for this area, the entire unplanned area has been assumed to be 90% impervious surface coverage. Overall, the proposed drainage area is 15.08 acres and consists of six (6) separate drainage areas. The table below summarizes the characteristics of each drainage area as illustrated on the Post-Development Drainage Area Map in the Appendices. Proposed PDA-1 represents the drainage area that drains on-site into the proposed underground stormwater management BMP #1 while PDA-4 is comprised of the area that drains to the proposed underground stormwater management BMP #2. PDA-2, PDA-3, PDA-5 & PDA-6 represent drainage areas that drain off-site to various conveyance systems.

Post-Development Drainage Area Summary			
Drainage Area	Impervious Area (ac)	Pervious Area (ac)	Total Area (ac)
PDA-1	6.72	0.72	7.44
PDA-2	0.31	0.32	0.63
PDA-3	0.06	0.03	0.09
PDA-4	5.09	0.56	5.65
PDA-5	0.63	0.04	0.67
PDA-6	0.50	0.10	0.60
Total	13.31	1.77	15.08

4.0. Rate Attenuation Summary

NMCWD and the City of Bloomington require that the project limit peak runoff rates from the post-development condition to be less than or equal to that of the pre-development runoff rates for the 2-, 10-, and 100-year 24-hour rainfall events. The below table summarizes the rates to each of the site's outfalls, highlighting the reduction in rate for each outfall, and each storm event:

Rate Attenuation Summary			
	2 Year		
	Penn Ave.	American Blvd.	Knox Ave.
Pre-Development Rate	23.28 cfs	27.42 cfs	0.36 cfs
Post-Development Rate	1.02 cfs	4.56 cfs	0.21 cfs
	10 Year		
	Penn Ave.	American Blvd.	Knox Ave.
Pre-Development Rate	35.84 cfs	41.77 cfs	0.69 cfs
Post-Development Rate	2.07 cfs	23.97 cfs	0.37 cfs
	100 Year		
	Penn Ave.	American Blvd.	Knox Ave.
Pre-Development Rate	64.34 cfs	74.43 cfs	1.51 cfs
Post-Development Rate	4.73 cfs	55.72 cfs	0.76 cfs

5.0. Volume Reduction Summary

Per the geotechnical report, and the borings that were conducted and analyzed in the area of the proposed stormwater BMPs, the soils can be expected to be type B. Because of this, infiltration techniques are proposed be used to achieve the site's volume reduction requirements.

The City of Bloomington and NMCWD require that the stormwater runoff volume shall be reduced in the amount of 1.1 inches over the entire site if more than 50% of the site is being redeveloped. At only 15.08 acres of site disturbance, only approximately 41% of the site is proposed to be redeveloped. Thus, per NMCWD rules, the stormwater runoff volume shall be reduced in the amount of 1.1 inches over the newly created or reconstructed impervious surface coverage when implementing an infiltration stormwater practice.

The total full-depth reconstructed impervious area is 13.31 acres.

New Development required volume reduction = 1.1" x 13.31 acres = 53,147 cubic feet

The required runoff volume control is provided by on-site volume reduction through the following pair of best management practices:

- Extended Release underground infiltration (System #1)
  - 495, 60" chambers of (ADS Stormtech MC4500 or approved equal) with outlet at elevation 820.00
  - The system is designed to drawdown within 48 hours of the end of a storm event
  - Lowest Orifice in the Outlet Control Structure at elevation 821.80
  - Volume Reduction = 34,991 cubic feet

- Extended Release underground infiltration (System #2)
    - 320, 60" chambers of (ADS Stormtech MC4500 or approved equal) with outlet at elevation 821.00
    - The system is designed to drawdown within 48 hours of the end of a storm event
    - Lowest Orifice in the Outlet Control Structure at elevation 822.80
    - Volume Reduction = 22,694 cubic feet

Total volume reduction provided = ***57,685 cubic feet***

Reduction Provided > Reduction Required

Additionally, NMCWD and the City of Bloomington require pretreatment measures prior to stormwater entering the filtration system. To meet this requirement, structures with sumps and SAFL Baffles are proposed immediately upstream of the underground filtration systems.

Finally, 60% of the annual total phosphorus load and 90% of the annual total suspended solids leaving all point on the site must be removed. To meet this requirement, sumps and SAFL Baffles are provided in Structure 300 and Structure 72, along with the removal efficiencies from the Underground Infiltration system. This design removes 86% of the annual total phosphorus load and 93% of the TSS leaving the site as referenced in the MIDS Model and SHSAM Appendix.

Appendices

Appendix 1. Drainage Exhibits

EXDA-1
PENN AVE
6.51 AC IMPERVIOUS
0.41 AC PERVIOUS

EXDA-2
AMERICAN BLVD
7.66 AC IMPERVIOUS
0.31 AC PERVIOUS

EXDA-3
KNOX AVE
0.11 AC IMPERVIOUS
0.08 AC PERVIOUS

THIS AREA WAS EXISTING BUILDING, DEMOLISHED IN THE WINTER OF 2024. THROUGH COORDINATION WITH NMCWD, THIS AREA SHALL BE MODELED AS IMPERVIOUS PER THE PREVIOUS PRE-DEMOLITION CONDITION

TO PENN AVE

TO AMERICAN BLVD

TO KNOX AVE

1800 AMERICAN BOULEVARD
MINNEAPOLIS, MINNESOTA 55431

7800 SOUTHTOWN DRIVE
MINNEAPOLIS, MINNESOTA 55431

7961 SOUTHTOWN DRIVE
MINNEAPOLIS, MINNESOTA 55431

7995 SOUTHTOWN DRIVE
MINNEAPOLIS, MINNESOTA 55431

AMERICAN BOULEVARD NORTHWEST

KNOX AVENUE SOUTH

"8" DIP PER PLAN

4" DIP PER PLAN

F.F.E=836.65

F.F.E=836.68

F.F.E=835.16

F.F.E=835.11

F.F.E=833.17

F.F.E=835.15

RE=834.83
E=828.2(NW)
827.8(S)

LEGEND

- DRAINAGE AREA DIVIDE
- PROPERTY LINE
- 928 EXISTING CONTOUR

NORTH

GRAPHIC SCALE IN FEET
0 25 50 100

PRELIMINARY - NOT FOR CONSTRUCTION

No.	REVISIONS	DATE	BY

Kimley»Horn
2023 KIMLEY-HORN AND ASSOCIATES, INC.
767 EUSTIS STREET, SUITE 100, ST. PAUL, MN 55114
PHONE: 651-645-4197
WWW.KIMLEY-HORN.COM

KHA PROJECT	160551038
DATE	08/02/2024
SCALE	AS SHOWN
DESIGNED BY	MJB
DRAWN BY	AMZ
CHECKED BY	ACL

PRE-DEVELOPMENT DRAINAGE AREA MAP

SOUTHTOWN REDEVELOPMENT

PREPARED FOR

KRAUS ANDERSON

BLOOMINGTON MN

SHEET NUMBER
EX-1

PDA-1
UNDERGROUND SYSTEM #1
6.72 AC IMPERVIOUS
0.72 AC PERVIOUS

THIS AREA IS PLANNED FOR DEVELOPMENT. FOR MODELING PURPOSES, THIS AREA IS PLANNED AS 90% IMPERVIOUS.

PDA-2
PENN AVE (0.63)
0.31 AC IMPERVIOUS
0.32 AC PERVIOUS

PDA-3
KNOX AVE
0.06 AC IMPERVIOUS
0.03 AC PERVIOUS

PDA-4
UNDERGROUND SYSTEM #2
5.09 AC IMPERVIOUS
0.56 AC PERVIOUS

PDA-5
AMERICAN BLVD
0.63 AC IMPERVIOUS
0.04 AC PERVIOUS

PDA-6
AMERICAN BLVD
0.50 AC IMPERVIOUS
0.10 AC PERVIOUS

PROPOSED RETAIL
BUILDING
FFE: 834.50

7961 SOUTHTOWN DRIVE
MINNEAPOLIS, MINNESOTA 55431

7995 SOUTHTOWN DRIVE
MINNEAPOLIS, MINNESOTA 55431

1800 AMERICAN BOULEVARD
MINNEAPOLIS, MINNESOTA 55425

AMERICAN BOULEVARD NORTHWEST

NORTH

GRAPHIC SCALE IN FEET
0 ## ## ###

LEGEND

- PROPERTY LINE
- EXISTING CONTOUR
- PROPOSED CONTOUR
- DRAINAGE AREA DIVIDE

PRELIMINARY - NOT FOR CONSTRUCTION

No.	REVISIONS	DATE	BY

Kimley»Horn

767 EUSTIS STREET, SUITE 100, ST. PAUL, MN 55114
PHONE: 651-645-4197
WWW.KIMLEY-HORN.COM

KHA PROJECT	160551038
DATE	08/02/2024
SCALE	AS SHOWN
DESIGNED BY	MJB
DRAWN BY	AMZ
CHECKED BY	ACL

POST-DEVELOPMENT DRAINAGE AREA MAP

SOUTHTOWN REDEVELOPMENT

PREPARED FOR

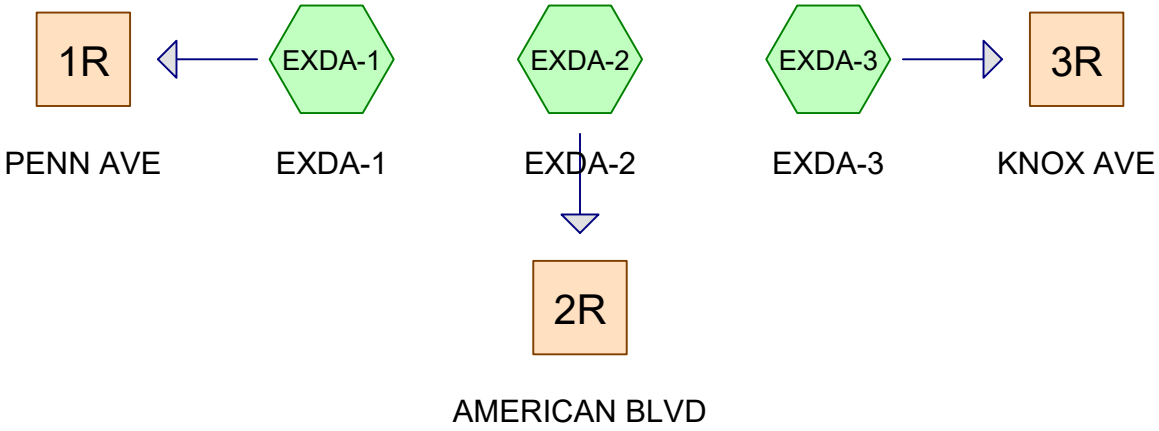
KRAUS ANDERSON

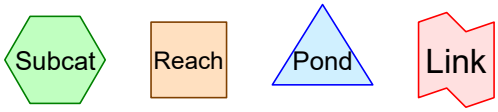
BLOOMINGTON MN

SHEET NUMBER
EX-2

Appendix 2. Pre-Development HydroCAD Model Analysis

EXISTING





Routing Diagram for Southtown
Prepared by Kimley-Horn & Associates, Printed 8/1/2024

Rainfall Events Listing

Event#	Event Name	Storm Type	Curve	Mode	Duration (hours)	B/B	Depth (inches)	AMC
1	2-yr	MSE 24-hr	3	Default	24.00	1	2.84	2
2	10-yr	MSE 24-hr	3	Default	24.00	1	4.25	2
3	100-yr	MSE 24-hr	3	Default	24.00	1	7.49	2

Area Listing (selected nodes)

Area (sq-ft)	CN	Description (subcatchment-numbers)
34,848	61	>75% Grass cover, Good, HSG B (EXDA-1, EXDA-2, EXDA-3)
622,037	98	Paved parking, HSG B (EXDA-1, EXDA-2, EXDA-3)
656,885	**96**	**TOTAL AREA**

Soil Listing (selected nodes)

Area (sq-ft)	Soil Group	Subcatchment Numbers
0	HSG A	
656,885	HSG B	EXDA-1, EXDA-2, EXDA-3
0	HSG C	
0	HSG D	
0	Other	
656,885		**TOTAL AREA**

Ground Covers (selected nodes)

HSG-A (sq-ft)	HSG-B (sq-ft)	HSG-C (sq-ft)	HSG-D (sq-ft)	Other (sq-ft)	Total (sq-ft)	Ground Cover	Su Nu
0	34,848	0	0	0	34,848	>75% Grass cover, Good	
0	622,037	0	0	0	622,037	Paved parking	
0	**656,885**	**0**	**0**	**0**	**656,885**	**TOTAL AREA**	

Time span=0.00-52.50 hrs, dt=0.05 hrs, 1051 points
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN
Reach routing by Dyn-Stor-Ind method - Pond routing by Dyn-Stor-Ind method

Subcatchment EXDA-1: EXDA-1 Runoff Area=6.920 ac 94.08% Impervious Runoff Depth=2.39"
Tc=10.0 min CN=96 Runoff=23.28 cfs 60,154 cf

Subcatchment EXDA-2: EXDA-2 Runoff Area=7.970 ac 96.11% Impervious Runoff Depth=2.50"
Tc=10.0 min CN=97 Runoff=27.42 cfs 72,323 cf

Subcatchment EXDA-3: EXDA-3 Runoff Area=0.190 ac 57.89% Impervious Runoff Depth=1.25"
Tc=10.0 min CN=82 Runoff=0.36 cfs 865 cf

Reach 1R: PENN AVE Inflow=23.28 cfs 60,154 cf
Outflow=23.28 cfs 60,154 cf

Reach 2R: AMERICAN BLVD Inflow=27.42 cfs 72,323 cf
Outflow=27.42 cfs 72,323 cf

Reach 3R: KNOX AVE Inflow=0.36 cfs 865 cf
Outflow=0.36 cfs 865 cf

Total Runoff Area = 656,885 sf Runoff Volume = 133,343 cf Average Runoff Depth = 2.44"
5.31% Pervious = 34,848 sf 94.69% Impervious = 622,037 sf

Summary for Subcatchment EXDA-1: EXDA-1

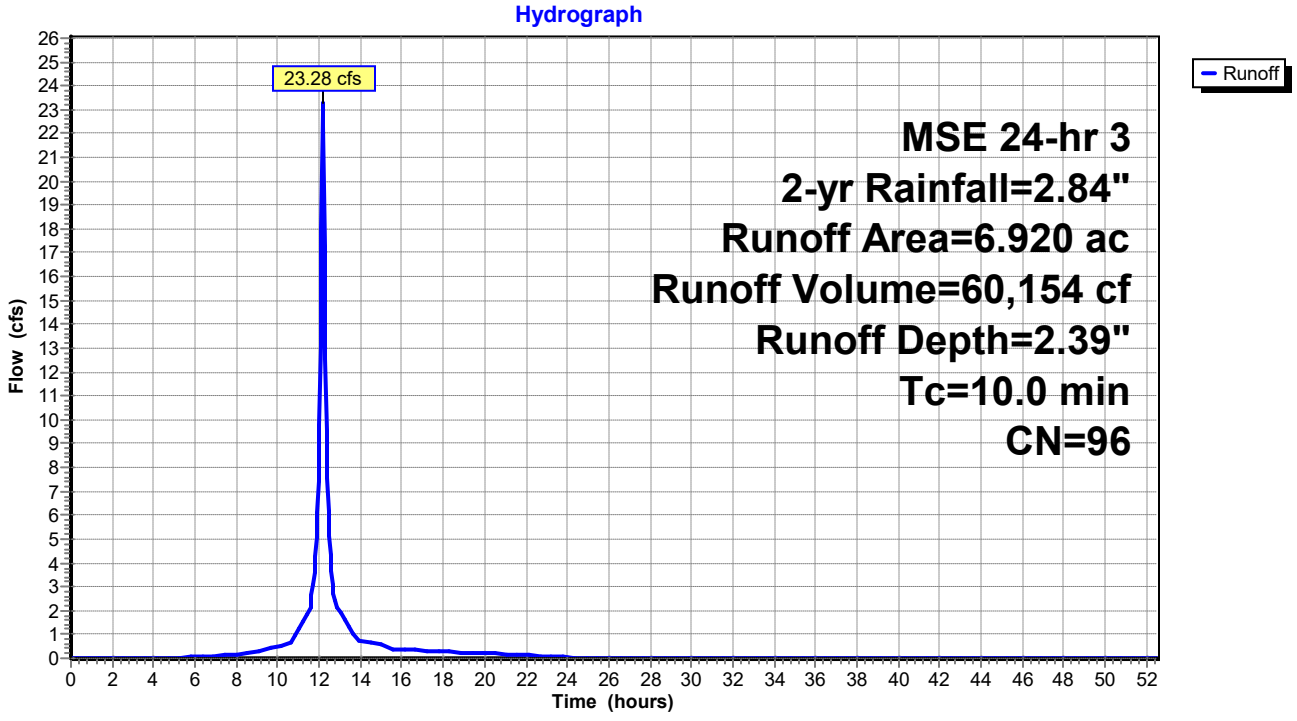
Runoff = 23.28 cfs @ 12.17 hrs, Volume= 60,154 cf, Depth= 2.39"
Routed to Reach 1R : PENN AVE

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-52.50 hrs, dt= 0.05 hrs
MSE 24-hr 3 2-yr Rainfall=2.84"

Area (ac)	CN	Description
6.510	98	Paved parking, HSG B
0.410	61	>75% Grass cover, Good, HSG B
6.920	96	Weighted Average
0.410		5.92% Pervious Area
6.510		94.08% Impervious Area

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

Subcatchment EXDA-1: EXDA-1



Summary for Subcatchment EXDA-2: EXDA-2

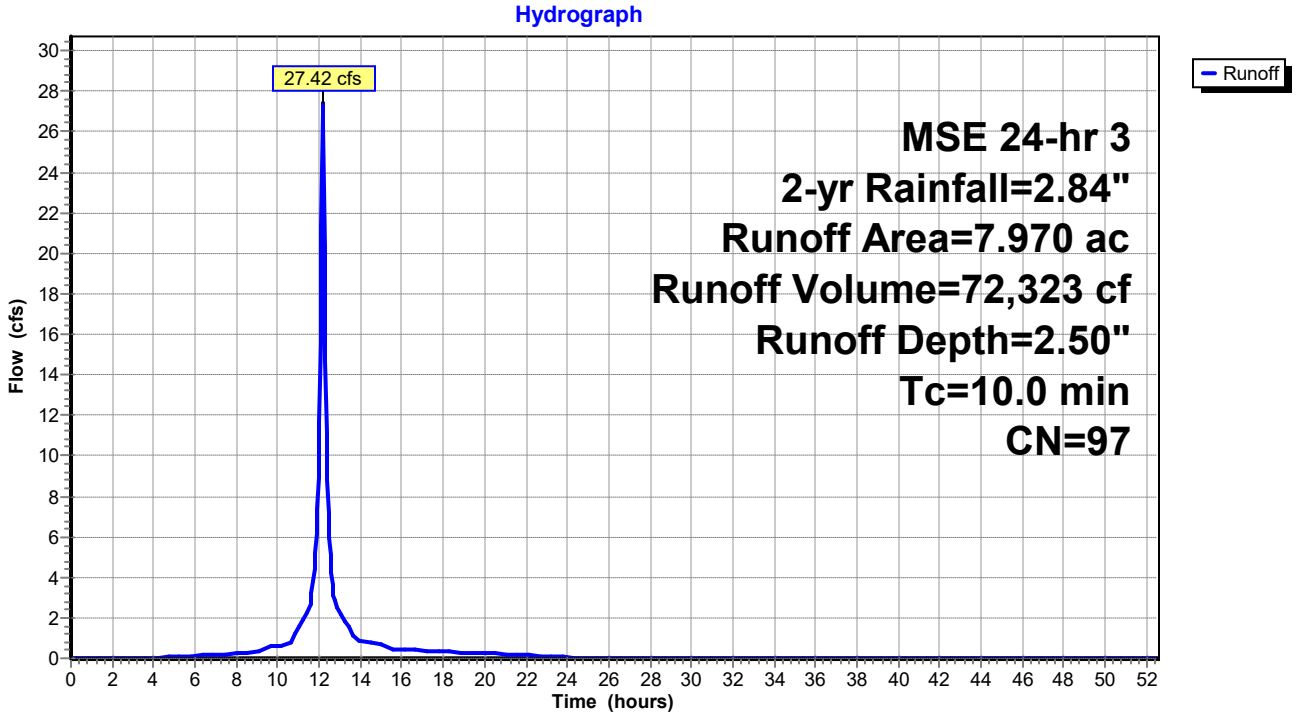
Runoff = 27.42 cfs @ 12.17 hrs, Volume= 72,323 cf, Depth= 2.50"
Routed to Reach 2R : AMERICAN BLVD

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-52.50 hrs, dt= 0.05 hrs
MSE 24-hr 3 2-yr Rainfall=2.84"

Area (ac)	CN	Description
7.660	98	Paved parking, HSG B
0.310	61	>75% Grass cover, Good, HSG B
7.970	97	Weighted Average
0.310		3.89% Pervious Area
7.660		96.11% Impervious Area

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

Subcatchment EXDA-2: EXDA-2



Summary for Subcatchment EXDA-3: EXDA-3

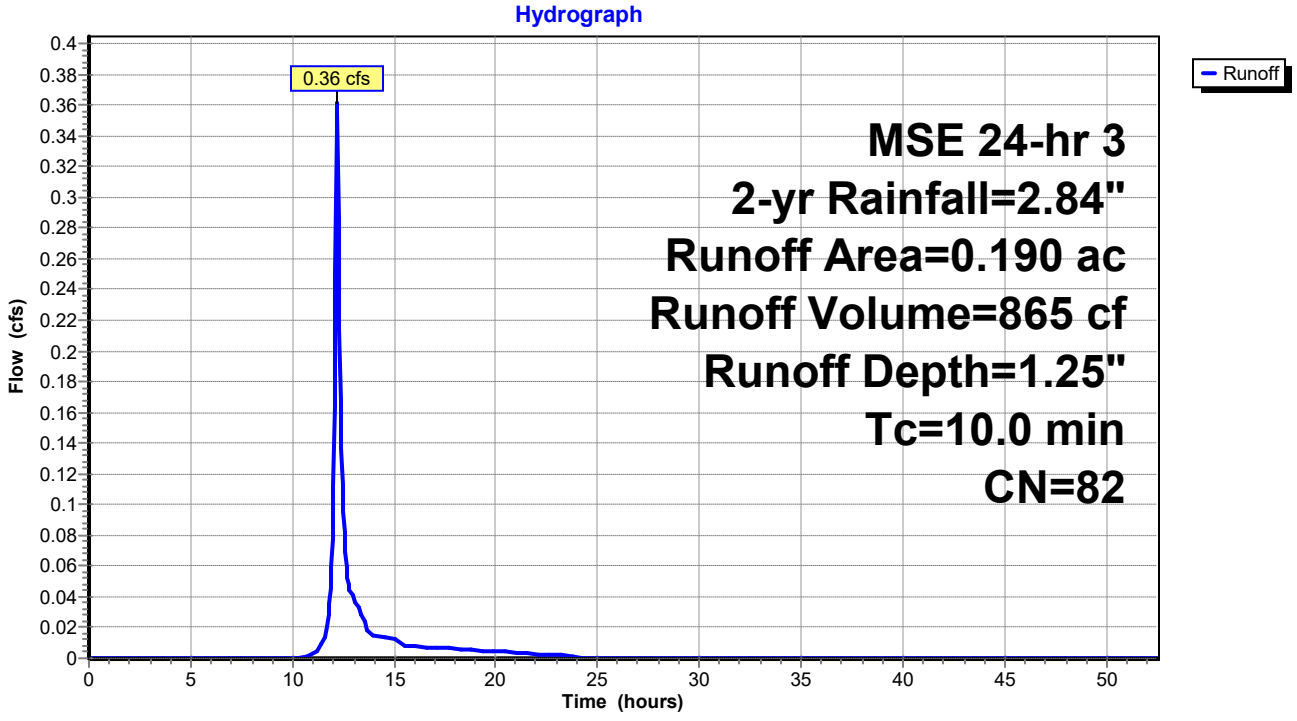
Runoff = 0.36 cfs @ 12.18 hrs, Volume= 865 cf, Depth= 1.25"
Routed to Reach 3R : KNOX AVE

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-52.50 hrs, dt= 0.05 hrs
MSE 24-hr 3 2-yr Rainfall=2.84"

Area (ac)	CN	Description
0.110	98	Paved parking, HSG B
0.080	61	>75% Grass cover, Good, HSG B
0.190	82	Weighted Average
0.080		42.11% Pervious Area
0.110		57.89% Impervious Area

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

Subcatchment EXDA-3: EXDA-3



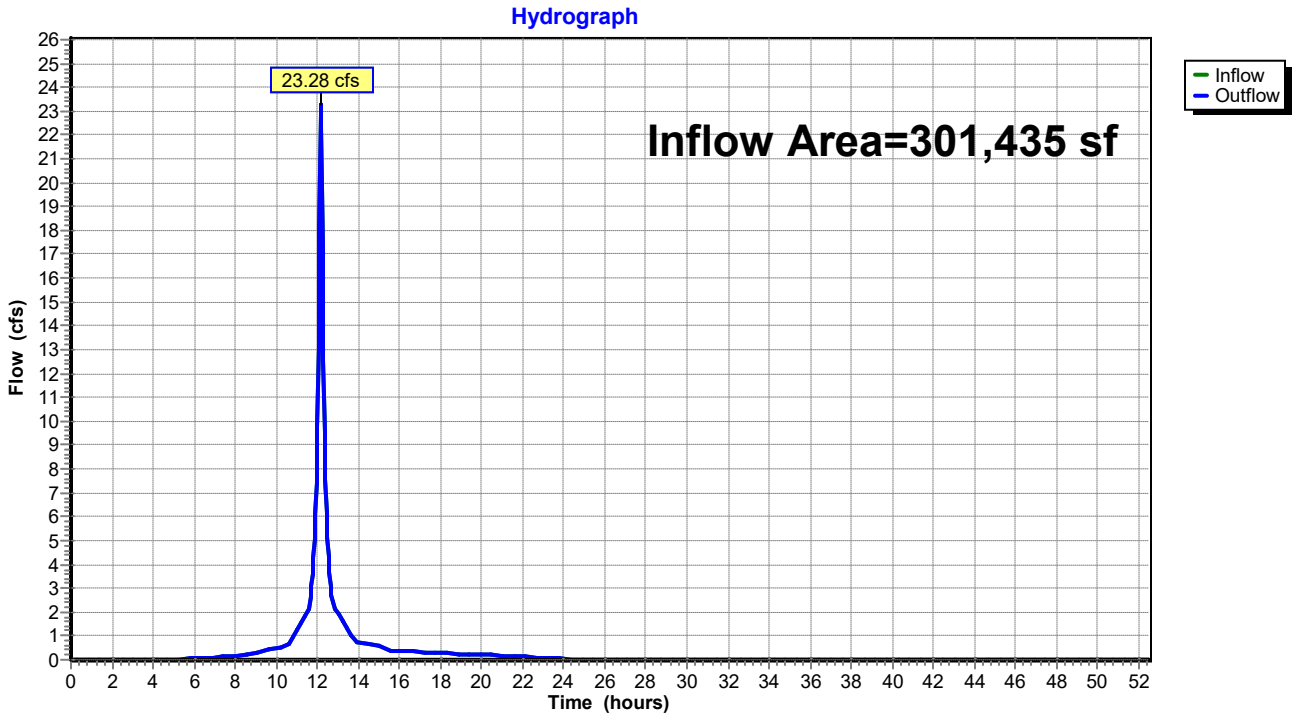
Summary for Reach 1R: PENN AVE

[40] Hint: Not Described (Outflow=Inflow)

Inflow Area = 301,435 sf, 94.08% Impervious, Inflow Depth = 2.39" for 2-yr event
Inflow = 23.28 cfs @ 12.17 hrs, Volume= 60,154 cf
Outflow = 23.28 cfs @ 12.17 hrs, Volume= 60,154 cf, Atten= 0%, Lag= 0.0 min
Routed to nonexistent node Energy Dr

Routing by Dyn-Stor-Ind method, Time Span= 0.00-52.50 hrs, dt= 0.05 hrs

Reach 1R: PENN AVE



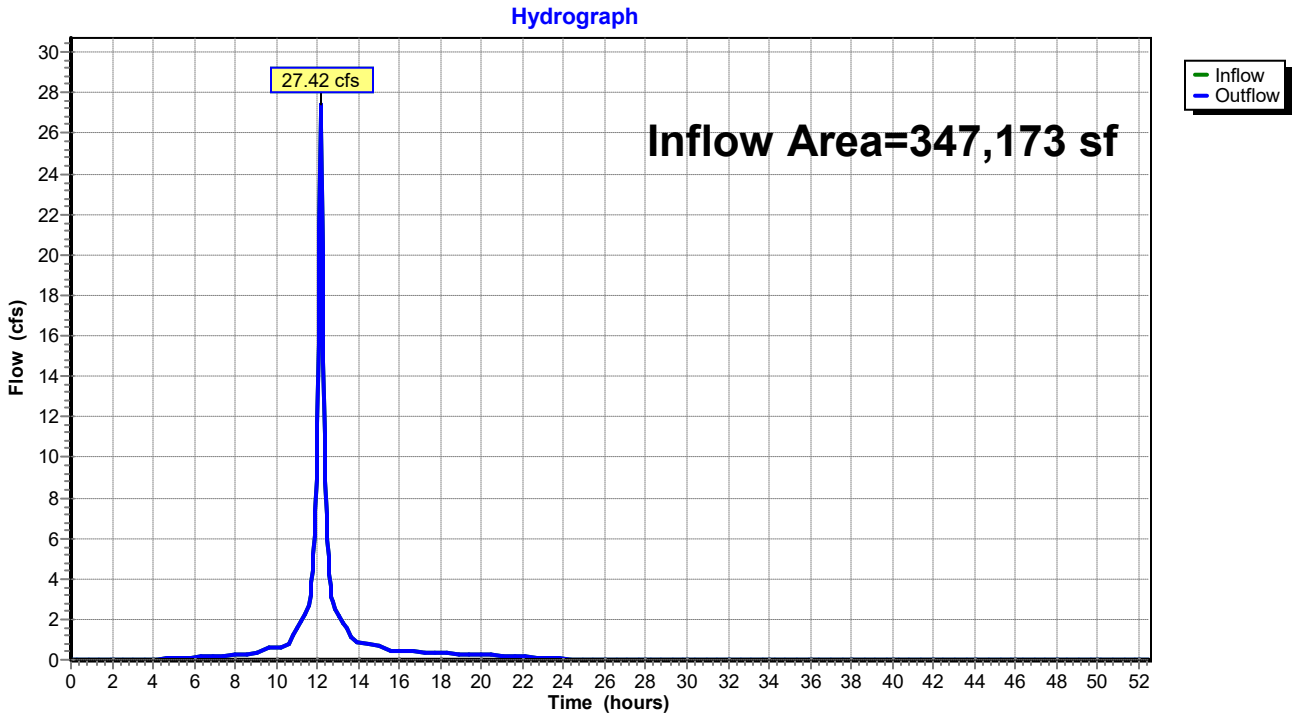
Summary for Reach 2R: AMERICAN BLVD

[40] Hint: Not Described (Outflow=Inflow)

Inflow Area = 347,173 sf, 96.11% Impervious, Inflow Depth = 2.50" for 2-yr event
Inflow = 27.42 cfs @ 12.17 hrs, Volume= 72,323 cf
Outflow = 27.42 cfs @ 12.17 hrs, Volume= 72,323 cf, Atten= 0%, Lag= 0.0 min
Routed to nonexistent node Energy Dr

Routing by Dyn-Stor-Ind method, Time Span= 0.00-52.50 hrs, dt= 0.05 hrs

Reach 2R: AMERICAN BLVD



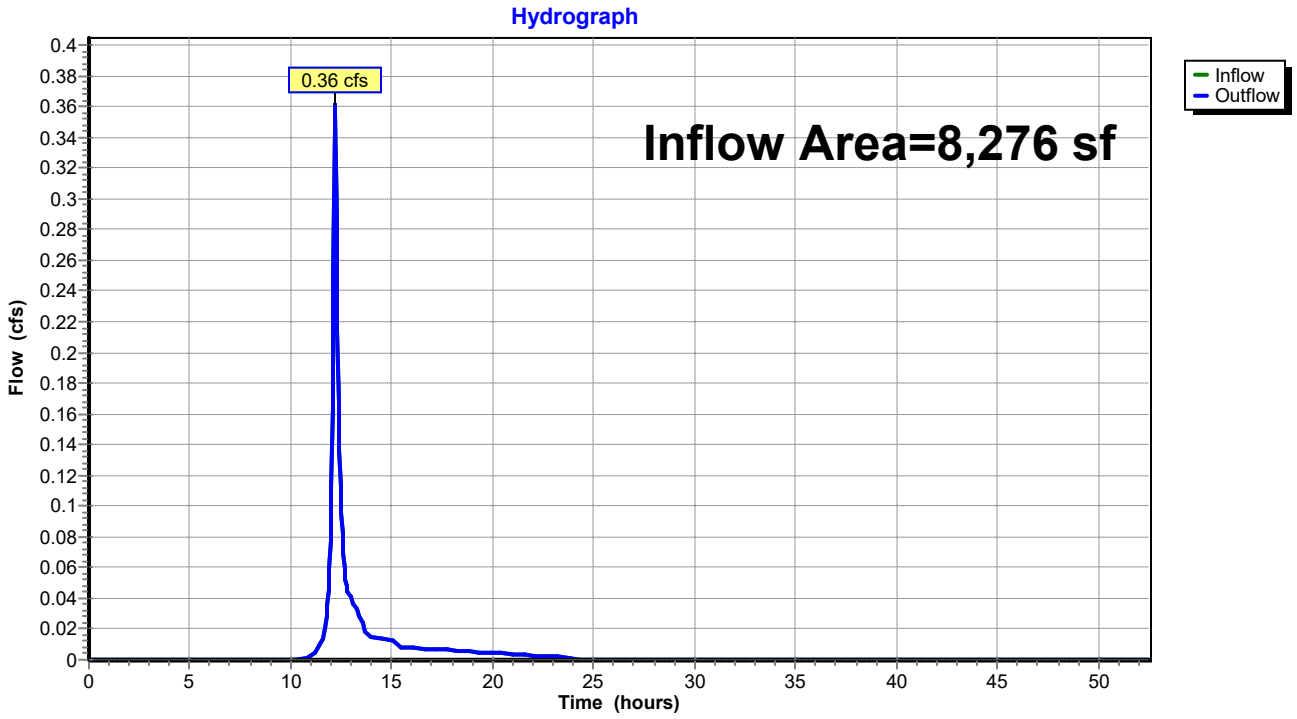
Summary for Reach 3R: KNOX AVE

[40] Hint: Not Described (Outflow=Inflow)

Inflow Area = 8,276 sf, 57.89% Impervious, Inflow Depth = 1.25" for 2-yr event
Inflow = 0.36 cfs @ 12.18 hrs, Volume= 865 cf
Outflow = 0.36 cfs @ 12.18 hrs, Volume= 865 cf, Atten= 0%, Lag= 0.0 min
Routed to nonexistent node Energy Dr

Routing by Dyn-Stor-Ind method, Time Span= 0.00-52.50 hrs, dt= 0.05 hrs

Reach 3R: KNOX AVE



Time span=0.00-52.50 hrs, dt=0.05 hrs, 1051 points
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN
Reach routing by Dyn-Stor-Ind method - Pond routing by Dyn-Stor-Ind method

Subcatchment EXDA-1: EXDA-1 Runoff Area=6.920 ac 94.08% Impervious Runoff Depth=3.79"
Tc=10.0 min CN=96 Runoff=35.84 cfs 95,150 cf

Subcatchment EXDA-2: EXDA-2 Runoff Area=7.970 ac 96.11% Impervious Runoff Depth=3.90"
Tc=10.0 min CN=97 Runoff=41.77 cfs 112,835 cf

Subcatchment EXDA-3: EXDA-3 Runoff Area=0.190 ac 57.89% Impervious Runoff Depth=2.42"
Tc=10.0 min CN=82 Runoff=0.69 cfs 1,668 cf

Reach 1R: PENN AVE Inflow=35.84 cfs 95,150 cf
Outflow=35.84 cfs 95,150 cf

Reach 2R: AMERICAN BLVD Inflow=41.77 cfs 112,835 cf
Outflow=41.77 cfs 112,835 cf

Reach 3R: KNOX AVE Inflow=0.69 cfs 1,668 cf
Outflow=0.69 cfs 1,668 cf

Total Runoff Area = 656,885 sf Runoff Volume = 209,653 cf Average Runoff Depth = 3.83"
5.31% Pervious = 34,848 sf 94.69% Impervious = 622,037 sf

Summary for Subcatchment EXDA-1: EXDA-1

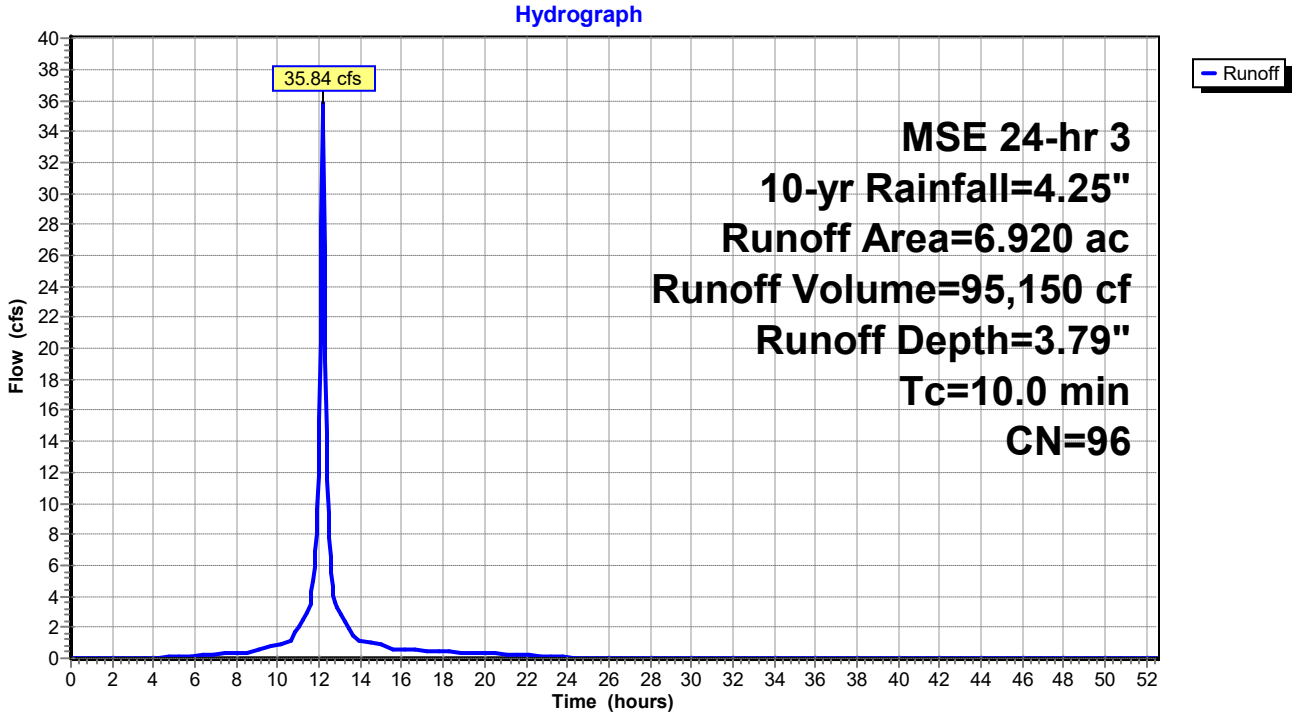
Runoff = 35.84 cfs @ 12.17 hrs, Volume= 95,150 cf, Depth= 3.79"
Routed to Reach 1R : PENN AVE

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-52.50 hrs, dt= 0.05 hrs
MSE 24-hr 3 10-yr Rainfall=4.25"

Area (ac)	CN	Description
6.510	98	Paved parking, HSG B
0.410	61	>75% Grass cover, Good, HSG B
6.920	96	Weighted Average
0.410		5.92% Pervious Area
6.510		94.08% Impervious Area

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

Subcatchment EXDA-1: EXDA-1



Summary for Subcatchment EXDA-2: EXDA-2

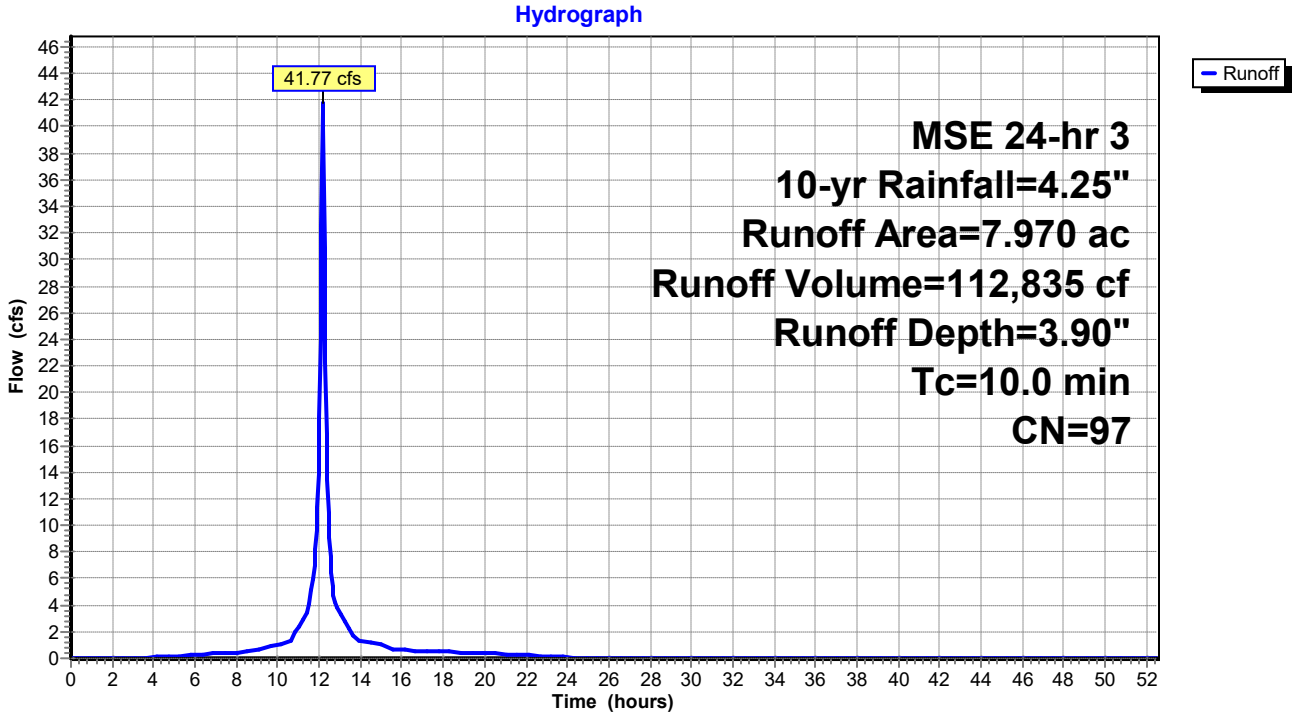
Runoff = 41.77 cfs @ 12.17 hrs, Volume= 112,835 cf, Depth= 3.90"
Routed to Reach 2R : AMERICAN BLVD

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-52.50 hrs, dt= 0.05 hrs
MSE 24-hr 3 10-yr Rainfall=4.25"

Area (ac)	CN	Description
7.660	98	Paved parking, HSG B
0.310	61	>75% Grass cover, Good, HSG B
7.970	97	Weighted Average
0.310		3.89% Pervious Area
7.660		96.11% Impervious Area

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

Subcatchment EXDA-2: EXDA-2



Summary for Subcatchment EXDA-3: EXDA-3

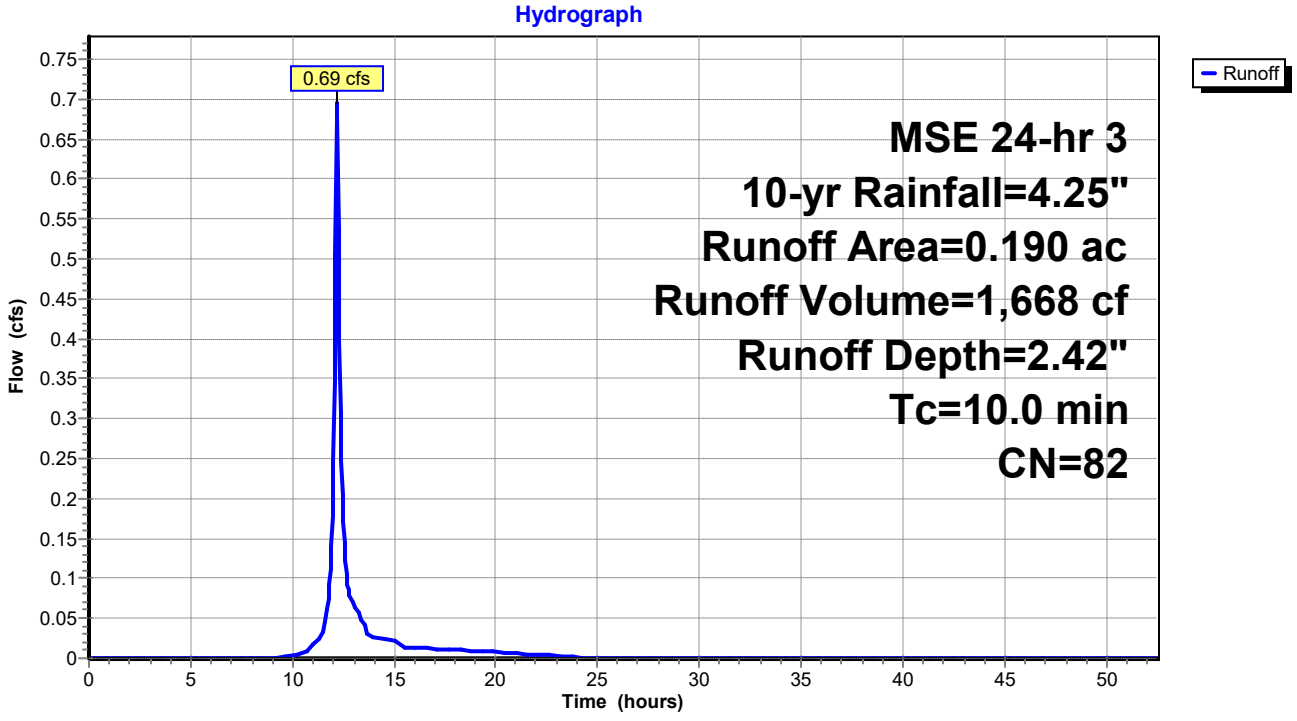
Runoff = 0.69 cfs @ 12.18 hrs, Volume= 1,668 cf, Depth= 2.42"
Routed to Reach 3R : KNOX AVE

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-52.50 hrs, dt= 0.05 hrs
MSE 24-hr 3 10-yr Rainfall=4.25"

Area (ac)	CN	Description
0.110	98	Paved parking, HSG B
0.080	61	>75% Grass cover, Good, HSG B
0.190	82	Weighted Average
0.080		42.11% Pervious Area
0.110		57.89% Impervious Area

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

Subcatchment EXDA-3: EXDA-3



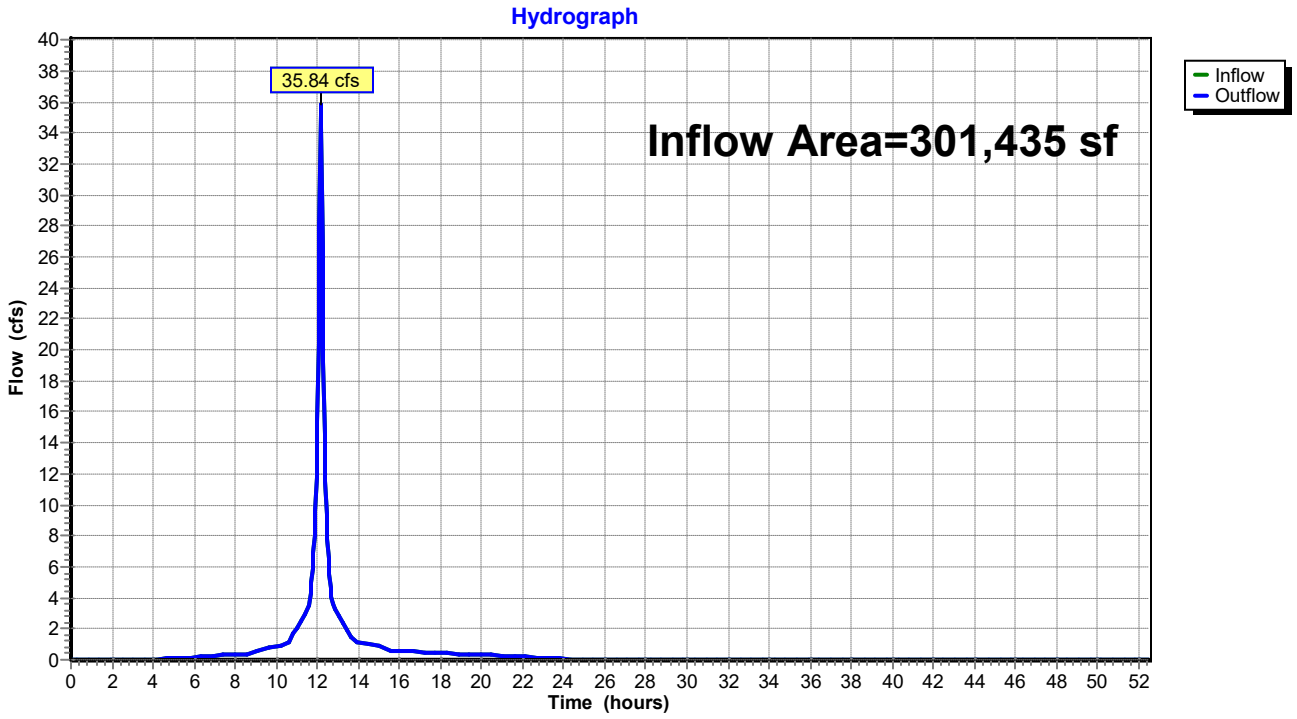
Summary for Reach 1R: PENN AVE

[40] Hint: Not Described (Outflow=Inflow)

Inflow Area = 301,435 sf, 94.08% Impervious, Inflow Depth = 3.79" for 10-yr event
Inflow = 35.84 cfs @ 12.17 hrs, Volume= 95,150 cf
Outflow = 35.84 cfs @ 12.17 hrs, Volume= 95,150 cf, Atten= 0%, Lag= 0.0 min
Routed to nonexistent node Energy Dr

Routing by Dyn-Stor-Ind method, Time Span= 0.00-52.50 hrs, dt= 0.05 hrs

Reach 1R: PENN AVE



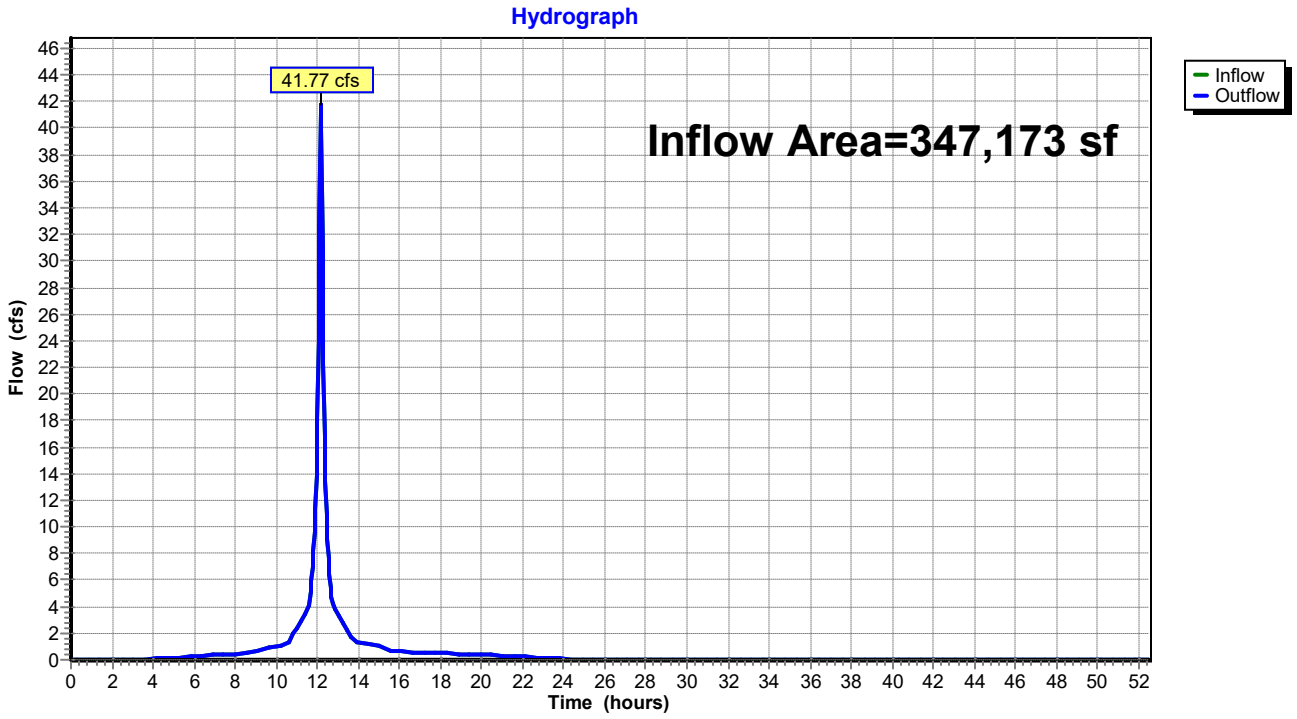
Summary for Reach 2R: AMERICAN BLVD

[40] Hint: Not Described (Outflow=Inflow)

Inflow Area = 347,173 sf, 96.11% Impervious, Inflow Depth = 3.90" for 10-yr event
Inflow = 41.77 cfs @ 12.17 hrs, Volume= 112,835 cf
Outflow = 41.77 cfs @ 12.17 hrs, Volume= 112,835 cf, Atten= 0%, Lag= 0.0 min
Routed to nonexistent node Energy Dr

Routing by Dyn-Stor-Ind method, Time Span= 0.00-52.50 hrs, dt= 0.05 hrs

Reach 2R: AMERICAN BLVD



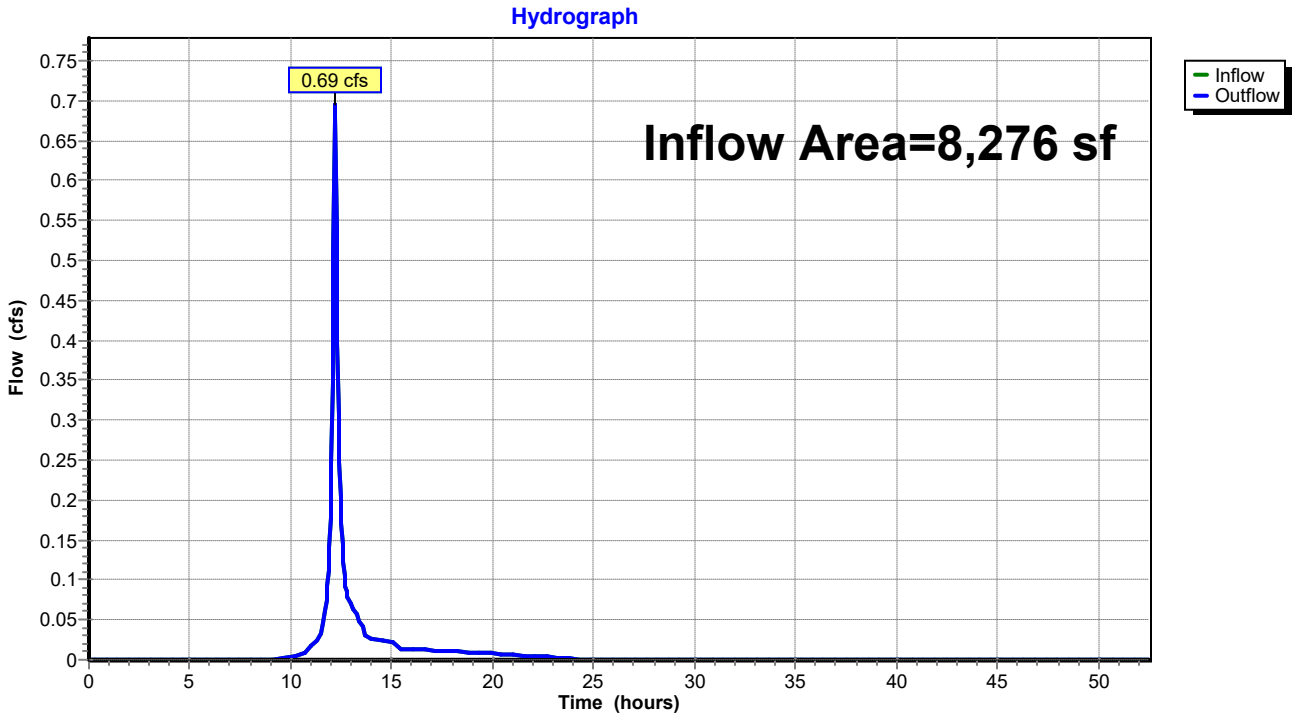
Summary for Reach 3R: KNOX AVE

[40] Hint: Not Described (Outflow=Inflow)

Inflow Area = 8,276 sf, 57.89% Impervious, Inflow Depth = 2.42" for 10-yr event
Inflow = 0.69 cfs @ 12.18 hrs, Volume= 1,668 cf
Outflow = 0.69 cfs @ 12.18 hrs, Volume= 1,668 cf, Atten= 0%, Lag= 0.0 min
Routed to nonexistent node Energy Dr

Routing by Dyn-Stor-Ind method, Time Span= 0.00-52.50 hrs, dt= 0.05 hrs

Reach 3R: KNOX AVE



Time span=0.00-52.50 hrs, dt=0.05 hrs, 1051 points
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN
Reach routing by Dyn-Stor-Ind method - Pond routing by Dyn-Stor-Ind method

Subcatchment EXDA-1: EXDA-1 Runoff Area=6.920 ac 94.08% Impervious Runoff Depth=7.01"
Tc=10.0 min CN=96 Runoff=64.34 cfs 176,143 cf

Subcatchment EXDA-2: EXDA-2 Runoff Area=7.970 ac 96.11% Impervious Runoff Depth=7.13"
Tc=10.0 min CN=97 Runoff=74.43 cfs 206,314 cf

Subcatchment EXDA-3: EXDA-3 Runoff Area=0.190 ac 57.89% Impervious Runoff Depth=5.38"
Tc=10.0 min CN=82 Runoff=1.51 cfs 3,709 cf

Reach 1R: PENN AVE Inflow=64.34 cfs 176,143 cf
Outflow=64.34 cfs 176,143 cf

Reach 2R: AMERICAN BLVD Inflow=74.43 cfs 206,314 cf
Outflow=74.43 cfs 206,314 cf

Reach 3R: KNOX AVE Inflow=1.51 cfs 3,709 cf
Outflow=1.51 cfs 3,709 cf

Total Runoff Area = 656,885 sf Runoff Volume = 386,166 cf Average Runoff Depth = 7.05"
5.31% Pervious = 34,848 sf 94.69% Impervious = 622,037 sf

Summary for Subcatchment EXDA-1: EXDA-1

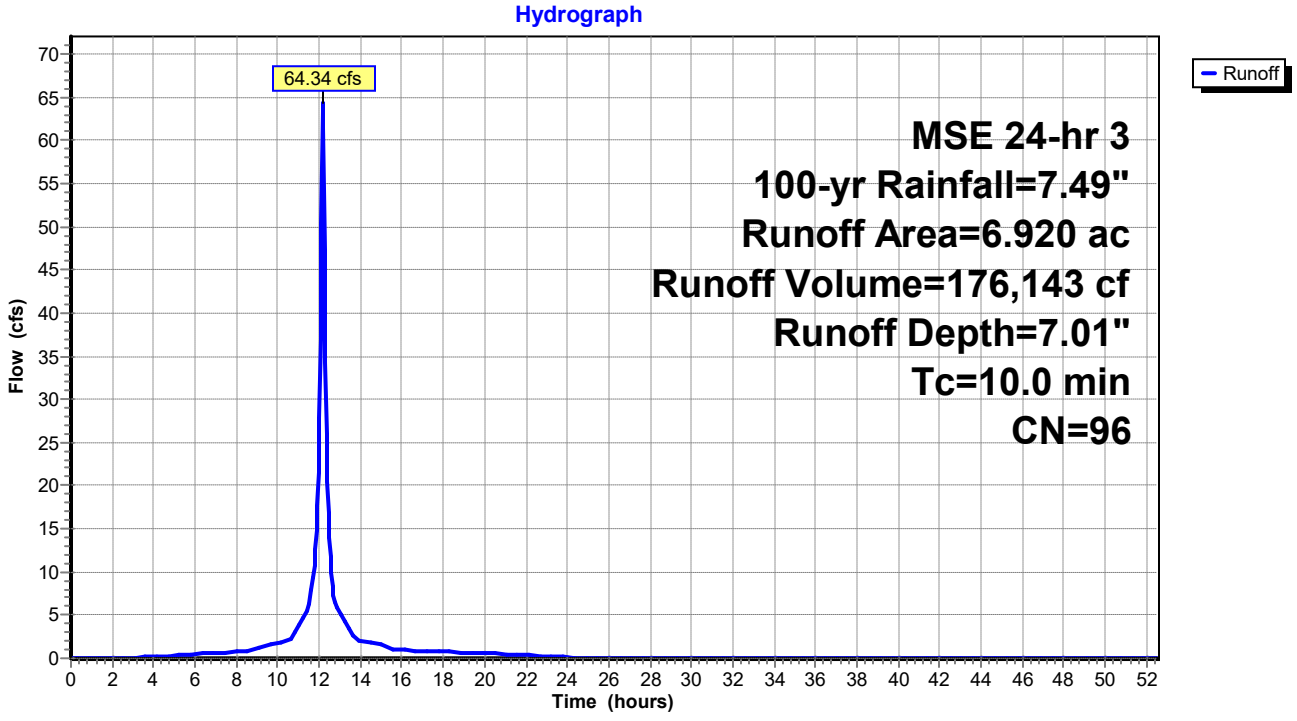
Runoff = 64.34 cfs @ 12.17 hrs, Volume= 176,143 cf, Depth= 7.01"
Routed to Reach 1R : PENN AVE

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-52.50 hrs, dt= 0.05 hrs
MSE 24-hr 3 100-yr Rainfall=7.49"

Area (ac)	CN	Description
6.510	98	Paved parking, HSG B
0.410	61	>75% Grass cover, Good, HSG B
6.920	96	Weighted Average
0.410		5.92% Pervious Area
6.510		94.08% Impervious Area

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

Subcatchment EXDA-1: EXDA-1



Summary for Subcatchment EXDA-2: EXDA-2

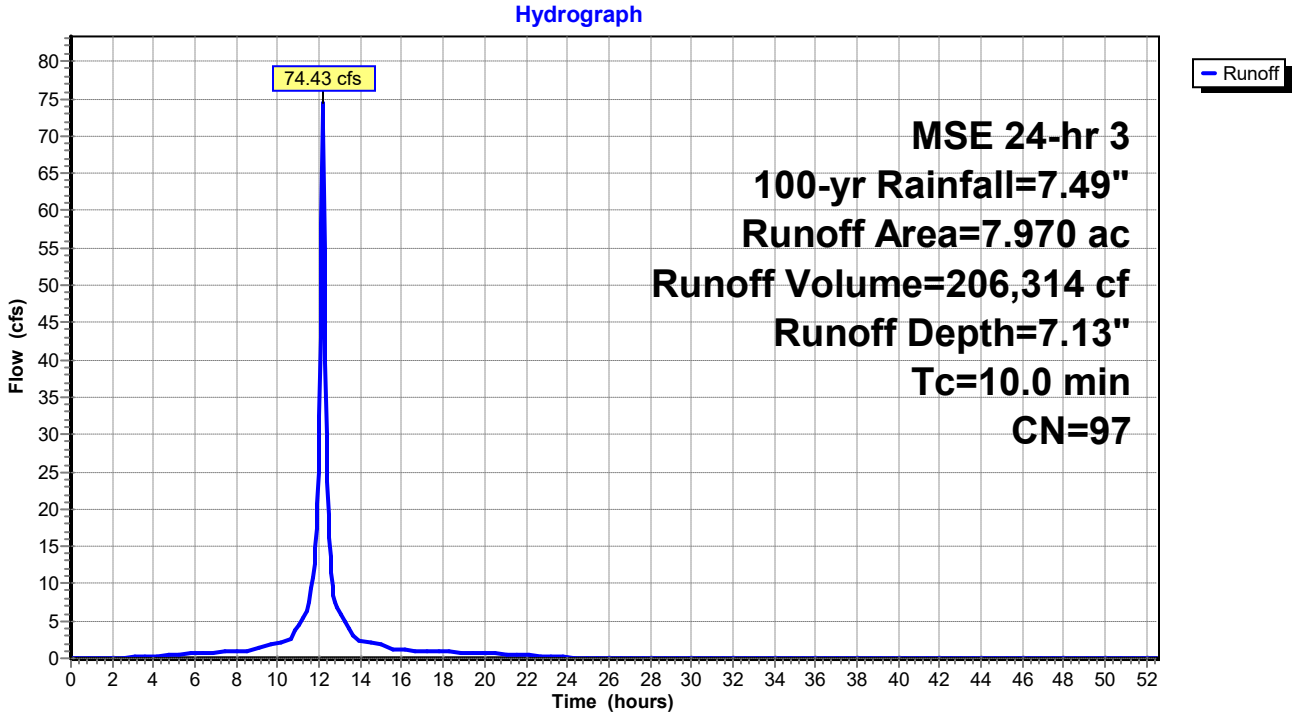
Runoff = 74.43 cfs @ 12.17 hrs, Volume= 206,314 cf, Depth= 7.13"
Routed to Reach 2R : AMERICAN BLVD

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-52.50 hrs, dt= 0.05 hrs
MSE 24-hr 3 100-yr Rainfall=7.49"

Area (ac)	CN	Description
7.660	98	Paved parking, HSG B
0.310	61	>75% Grass cover, Good, HSG B
7.970	97	Weighted Average
0.310		3.89% Pervious Area
7.660		96.11% Impervious Area

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

Subcatchment EXDA-2: EXDA-2



Summary for Subcatchment EXDA-3: EXDA-3

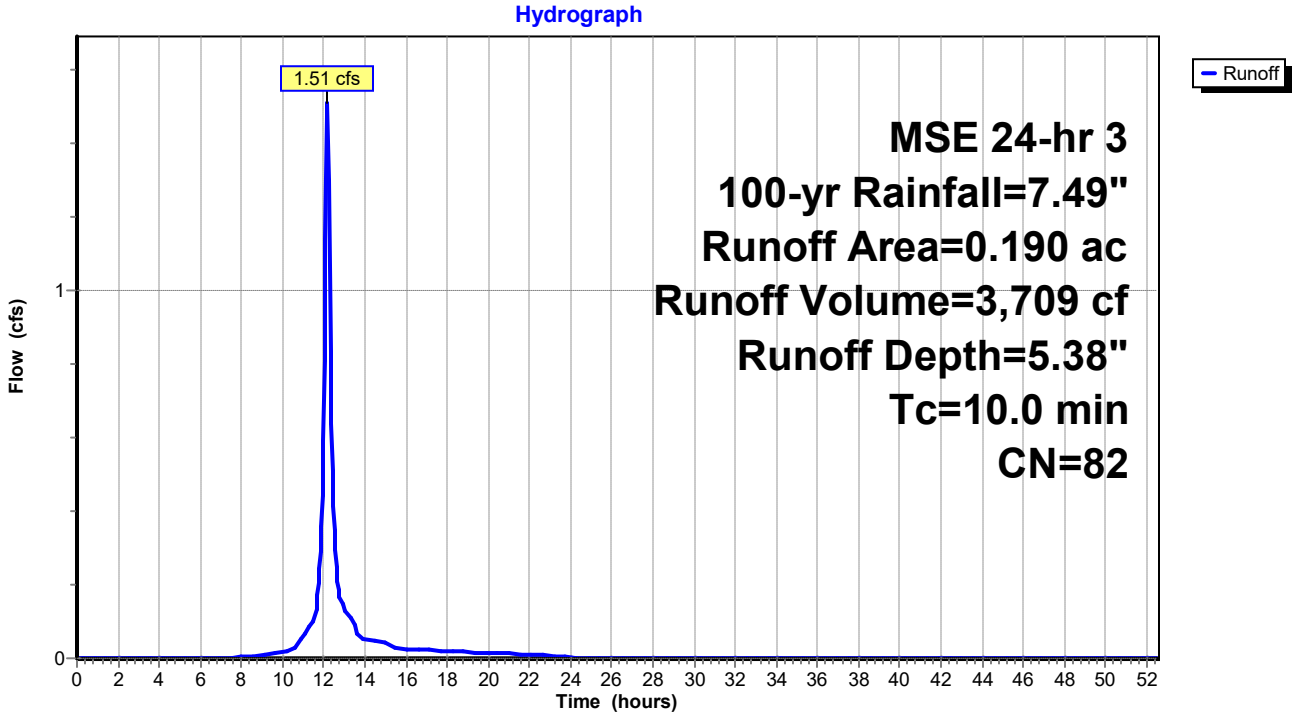
Runoff = 1.51 cfs @ 12.17 hrs, Volume= 3,709 cf, Depth= 5.38"
Routed to Reach 3R : KNOX AVE

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-52.50 hrs, dt= 0.05 hrs
MSE 24-hr 3 100-yr Rainfall=7.49"

Area (ac)	CN	Description
0.110	98	Paved parking, HSG B
0.080	61	>75% Grass cover, Good, HSG B
0.190	82	Weighted Average
0.080		42.11% Pervious Area
0.110		57.89% Impervious Area

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

Subcatchment EXDA-3: EXDA-3



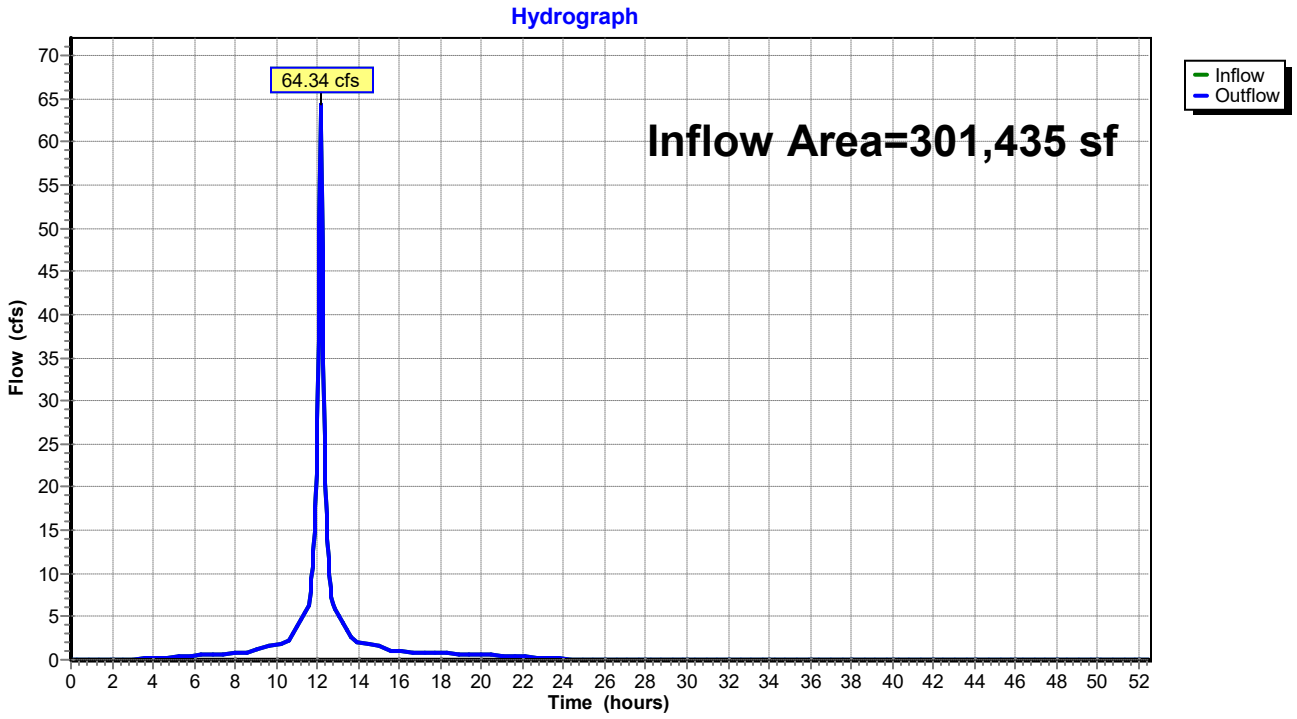
Summary for Reach 1R: PENN AVE

[40] Hint: Not Described (Outflow=Inflow)

Inflow Area = 301,435 sf, 94.08% Impervious, Inflow Depth = 7.01" for 100-yr event
Inflow = 64.34 cfs @ 12.17 hrs, Volume= 176,143 cf
Outflow = 64.34 cfs @ 12.17 hrs, Volume= 176,143 cf, Atten= 0%, Lag= 0.0 min
Routed to nonexistent node Energy Dr

Routing by Dyn-Stor-Ind method, Time Span= 0.00-52.50 hrs, dt= 0.05 hrs

Reach 1R: PENN AVE



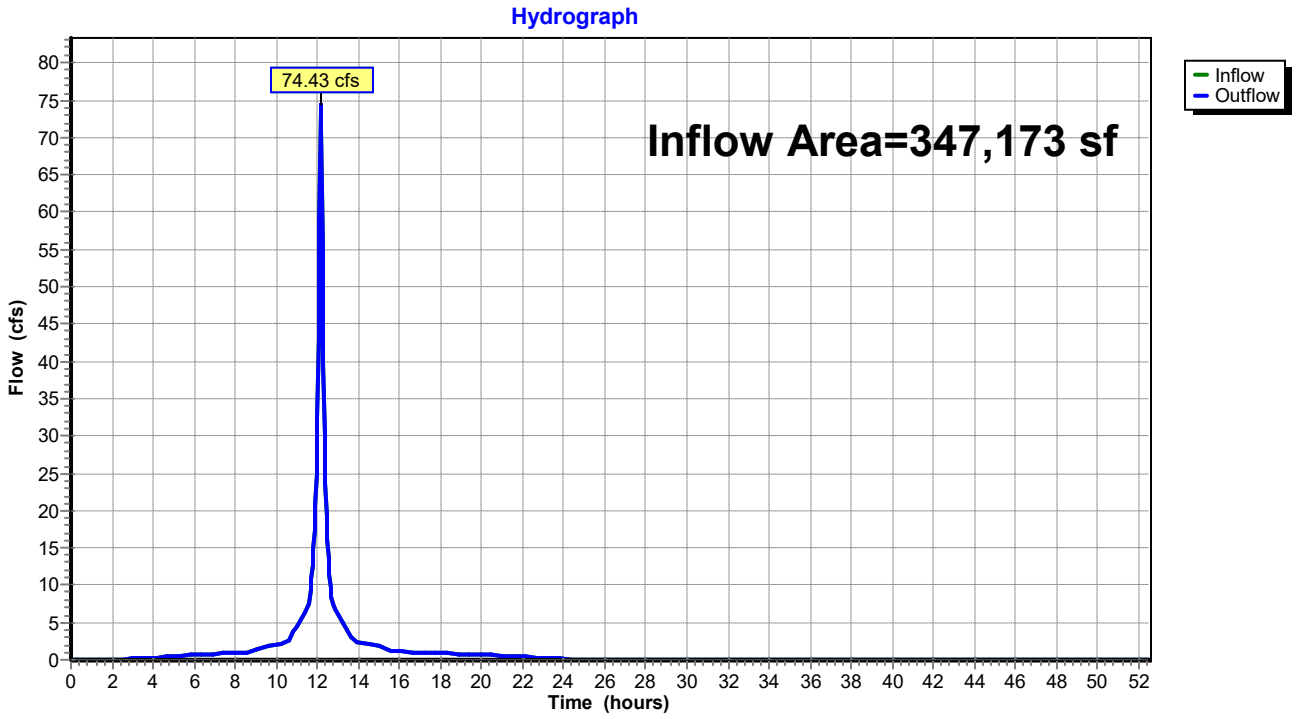
Summary for Reach 2R: AMERICAN BLVD

[40] Hint: Not Described (Outflow=Inflow)

Inflow Area = 347,173 sf, 96.11% Impervious, Inflow Depth = 7.13" for 100-yr event
Inflow = 74.43 cfs @ 12.17 hrs, Volume= 206,314 cf
Outflow = 74.43 cfs @ 12.17 hrs, Volume= 206,314 cf, Atten= 0%, Lag= 0.0 min
Routed to nonexistent node Energy Dr

Routing by Dyn-Stor-Ind method, Time Span= 0.00-52.50 hrs, dt= 0.05 hrs

Reach 2R: AMERICAN BLVD



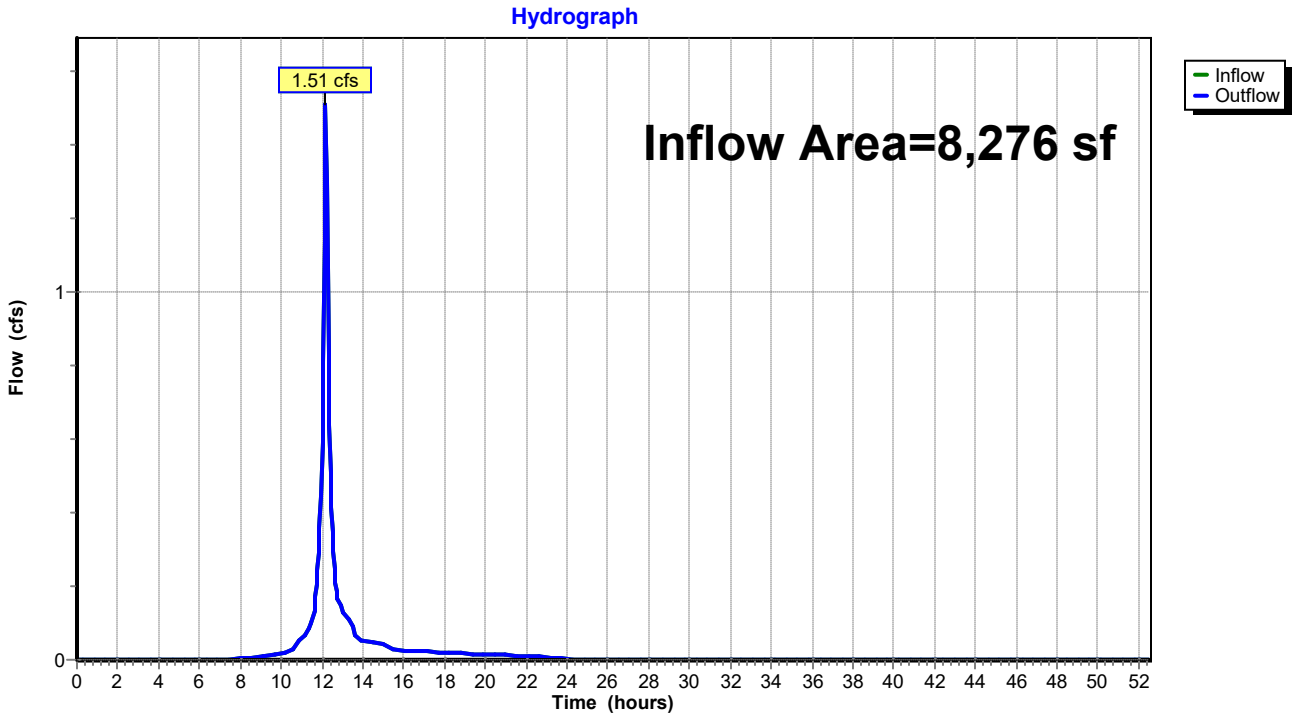
Summary for Reach 3R: KNOX AVE

[40] Hint: Not Described (Outflow=Inflow)

Inflow Area = 8,276 sf, 57.89% Impervious, Inflow Depth = 5.38" for 100-yr event
Inflow = 1.51 cfs @ 12.17 hrs, Volume= 3,709 cf
Outflow = 1.51 cfs @ 12.17 hrs, Volume= 3,709 cf, Atten= 0%, Lag= 0.0 min
Routed to nonexistent node Energy Dr

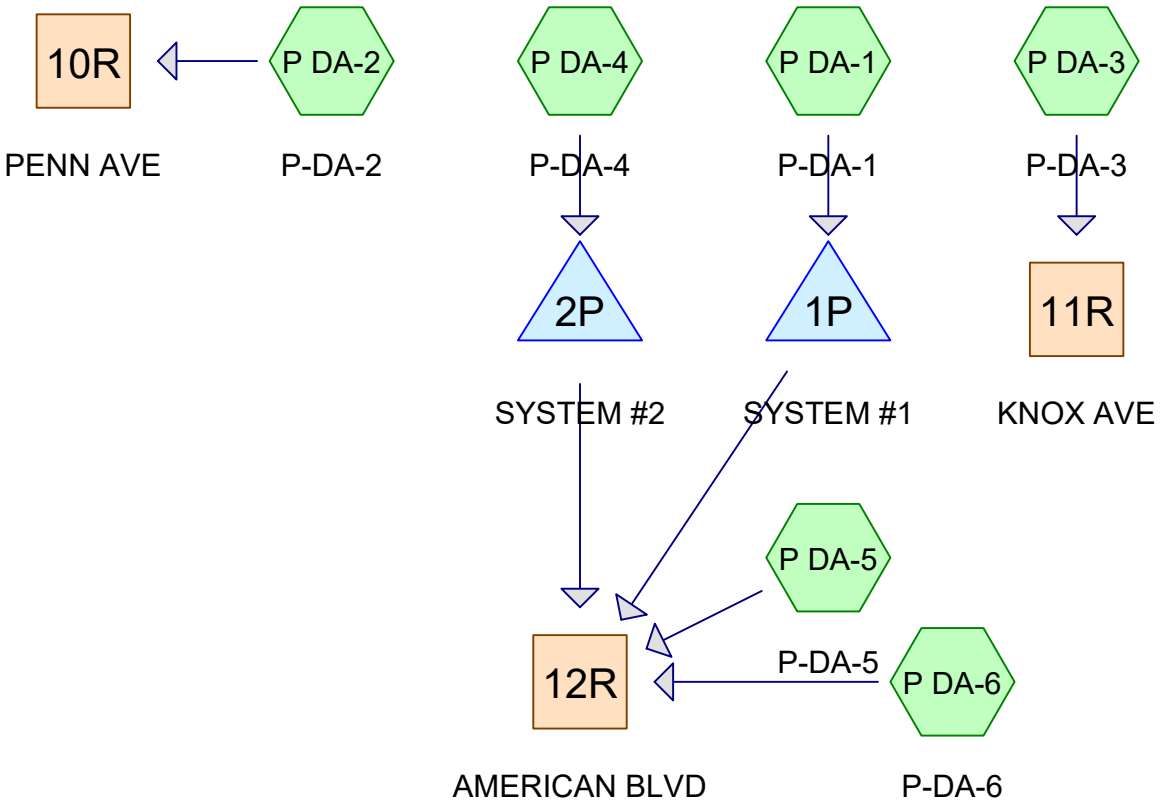
Routing by Dyn-Stor-Ind method, Time Span= 0.00-52.50 hrs, dt= 0.05 hrs

Reach 3R: KNOX AVE



Appendix 3. Post-Development HydroCAD Model Analysis

PROPOSED



Subcat Reach Pond Link

Routing Diagram for Southtown
Prepared by Kimley-Horn & Associates, Printed 8/1/2024

Rainfall Events Listing

Event#	Event Name	Storm Type	Curve	Mode	Duration (hours)	B/B	Depth (inches)	AMC
1	2-yr	MSE 24-hr	3	Default	24.00	1	2.84	2
2	10-yr	MSE 24-hr	3	Default	24.00	1	4.25	2
3	100-yr	MSE 24-hr	3	Default	24.00	1	7.49	2

Area Listing (selected nodes)

Area (sq-ft)	CN	Description (subcatchment-numbers)
77,101	61	>75% Grass cover, Good, HSG B (P DA-1, P DA-2, P DA-3, P DA-4, P DA-5, P DA-6)
579,784	98	Paved parking, HSG B (P DA-1, P DA-2, P DA-3, P DA-4, P DA-5, P DA-6)
656,885	**94**	**TOTAL AREA**

Soil Listing (selected nodes)

Area (sq-ft)	Soil Group	Subcatchment Numbers
0	HSG A	
656,885	HSG B	P DA-1, P DA-2, P DA-3, P DA-4, P DA-5, P DA-6
0	HSG C	
0	HSG D	
0	Other	
656,885		**TOTAL AREA**

Ground Covers (selected nodes)

HSG-A (sq-ft)	HSG-B (sq-ft)	HSG-C (sq-ft)	HSG-D (sq-ft)	Other (sq-ft)	Total (sq-ft)	Ground Cover	Su Nu
0	77,101	0	0	0	77,101	>75% Grass cover, Good	
0	579,784	0	0	0	579,784	Paved parking	
0	**656,885**	**0**	**0**	**0**	**656,885**	**TOTAL AREA**	

Pipe Listing (selected nodes)

Line#	Node Number	In-Invert (feet)	Out-Invert (feet)	Length (feet)	Slope (ft/ft)	n	Width (inches)	Diam/Height (inches)	Inside-Fill (inches)	Node Name
1	1P	820.00	817.50	500.0	0.0050	0.011	0.0	24.0	0.0	
2	2P	821.00	817.50	600.0	0.0058	0.011	0.0	24.0	0.0	

Time span=0.00-52.50 hrs, dt=0.05 hrs, 1051 points
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN
Reach routing by Dyn-Stor-Ind method - Pond routing by Dyn-Stor-Ind method

Subcatchment P DA-1: P-DA-1 Runoff Area=7.440 ac 90.32% Impervious Runoff Depth=2.20"
Tc=10.0 min CN=94 Runoff=23.65 cfs 59,298 cf

Subcatchment P DA-2: P-DA-2 Runoff Area=0.630 ac 49.21% Impervious Runoff Depth=1.07"
Tc=10.0 min CN=79 Runoff=1.02 cfs 2,454 cf

Subcatchment P DA-3: P-DA-3 Runoff Area=0.090 ac 66.67% Impervious Runoff Depth=1.53"
Tc=10.0 min CN=86 Runoff=0.21 cfs 499 cf

Subcatchment P DA-4: P-DA-4 Runoff Area=5.650 ac 90.09% Impervious Runoff Depth=2.20"
Tc=10.0 min CN=94 Runoff=17.96 cfs 45,031 cf

Subcatchment P DA-5: P-DA-5 Runoff Area=0.670 ac 94.03% Impervious Runoff Depth=2.39"
Tc=7.0 min CN=96 Runoff=2.54 cfs 5,824 cf

Subcatchment P DA-6: P-DA-6 Runoff Area=0.600 ac 83.33% Impervious Runoff Depth=2.01"
Tc=7.0 min CN=92 Runoff=2.02 cfs 4,379 cf

Reach 10R: PENN AVE Inflow=1.02 cfs 2,454 cf
Outflow=1.02 cfs 2,454 cf

Reach 11R: KNOX AVE Inflow=0.21 cfs 499 cf
Outflow=0.21 cfs 499 cf

Reach 12R: AMERICAN BLVD Inflow=4.56 cfs 38,351 cf
Outflow=4.56 cfs 38,351 cf

Pond 1P: SYSTEM #1 Peak Elev=822.05' Storage=38,879 cf Inflow=23.65 cfs 59,298 cf
Discarded=0.20 cfs 31,816 cf Primary=1.54 cfs 13,381 cf Outflow=1.74 cfs 45,196 cf

Pond 2P: SYSTEM #2 Peak Elev=823.24' Storage=27,129 cf Inflow=17.96 cfs 45,031 cf
Discarded=0.13 cfs 20,816 cf Primary=2.09 cfs 14,768 cf Outflow=2.22 cfs 35,584 cf

Total Runoff Area = 656,885 sf Runoff Volume = 117,484 cf Average Runoff Depth = 2.15"
11.74% Pervious = 77,101 sf 88.26% Impervious = 579,784 sf

Summary for Subcatchment P DA-1: P-DA-1

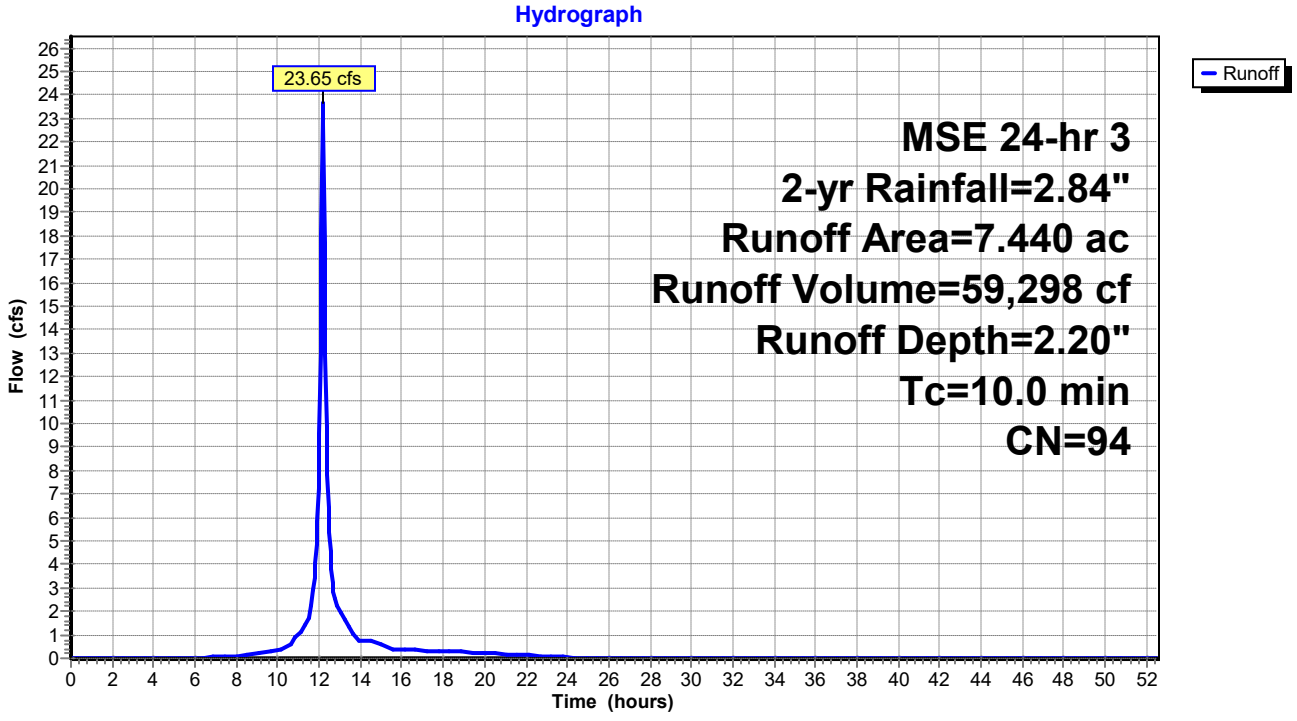
Runoff = 23.65 cfs @ 12.17 hrs, Volume= 59,298 cf, Depth= 2.20"
Routed to Pond 1P : SYSTEM #1

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-52.50 hrs, dt= 0.05 hrs
MSE 24-hr 3 2-yr Rainfall=2.84"

Area (ac)	CN	Description
6.720	98	Paved parking, HSG B
0.720	61	>75% Grass cover, Good, HSG B
7.440	94	Weighted Average
0.720		9.68% Pervious Area
6.720		90.32% Impervious Area

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

Subcatchment P DA-1: P-DA-1



Summary for Subcatchment P DA-2: P-DA-2

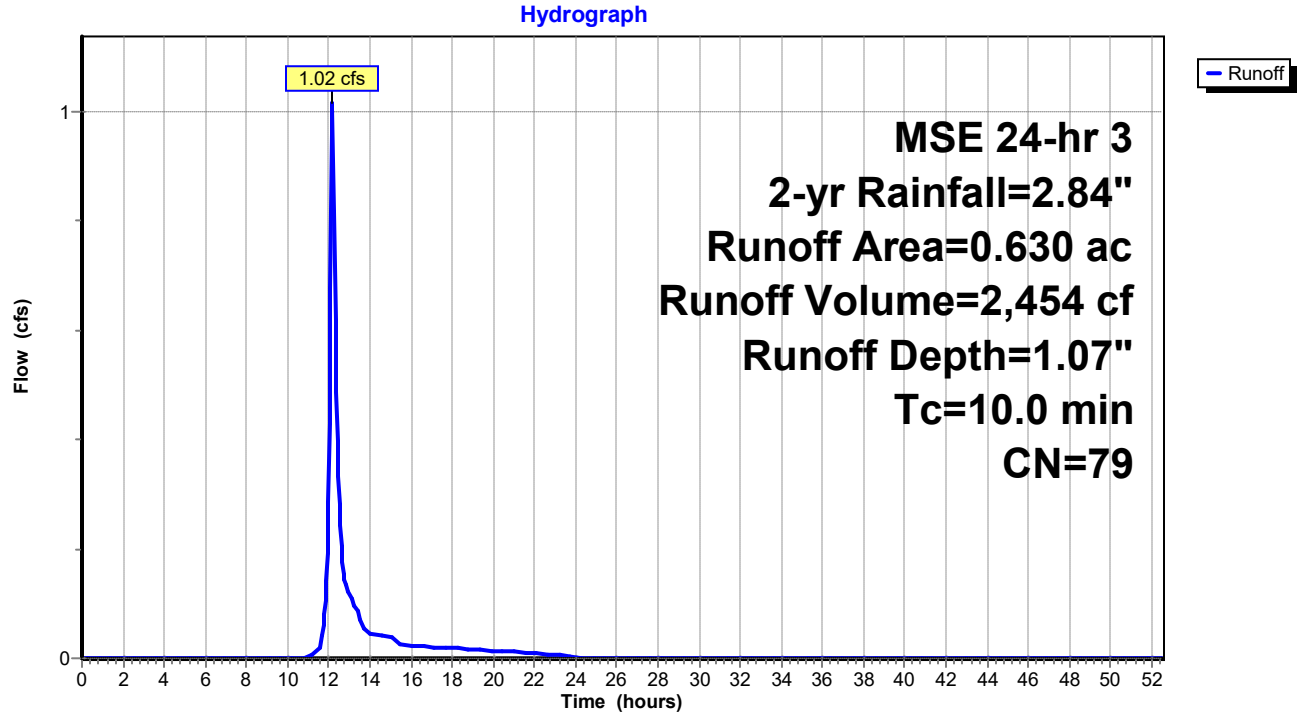
Runoff = 1.02 cfs @ 12.19 hrs, Volume= 2,454 cf, Depth= 1.07"
Routed to Reach 10R : PENN AVE

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-52.50 hrs, dt= 0.05 hrs
MSE 24-hr 3 2-yr Rainfall=2.84"

Area (ac)	CN	Description
0.310	98	Paved parking, HSG B
0.320	61	>75% Grass cover, Good, HSG B
0.630	79	Weighted Average
0.320		50.79% Pervious Area
0.310		49.21% Impervious Area

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

Subcatchment P DA-2: P-DA-2



Summary for Subcatchment P DA-3: P-DA-3

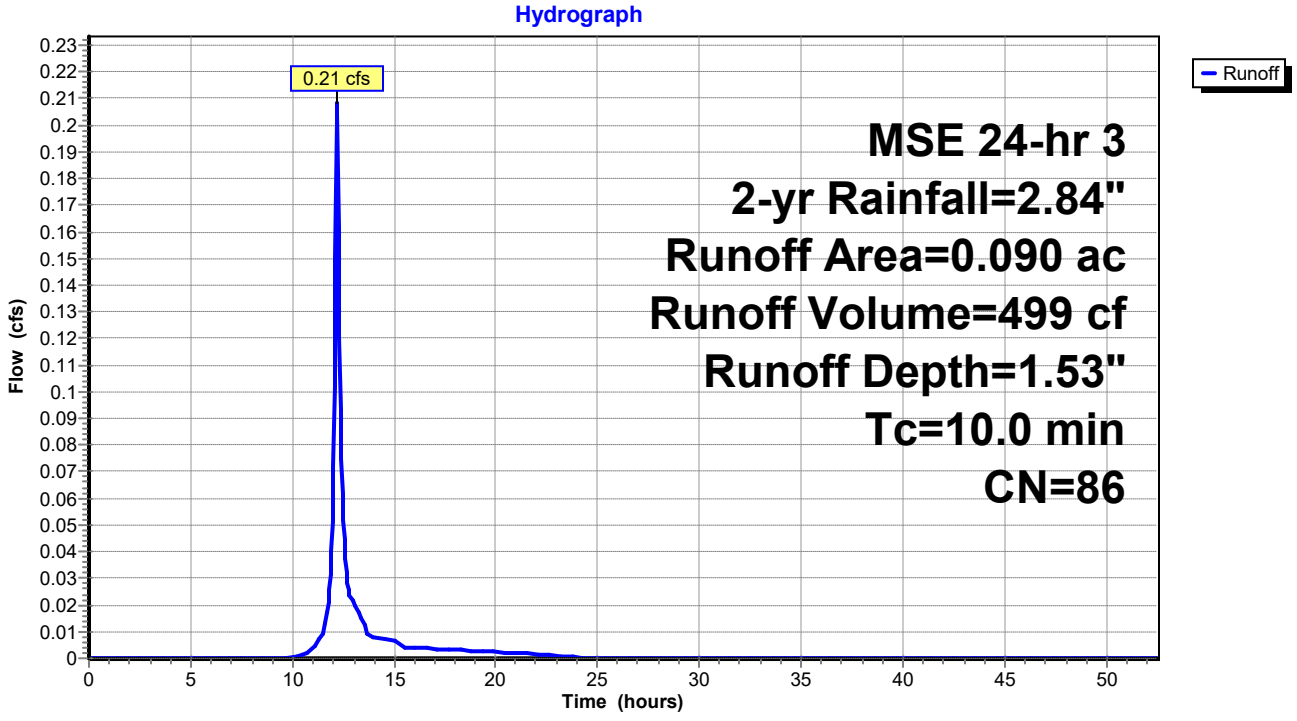
Runoff = 0.21 cfs @ 12.18 hrs, Volume= 499 cf, Depth= 1.53"
Routed to Reach 11R : KNOX AVE

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-52.50 hrs, dt= 0.05 hrs
MSE 24-hr 3 2-yr Rainfall=2.84"

Area (ac)	CN	Description
0.060	98	Paved parking, HSG B
0.030	61	>75% Grass cover, Good, HSG B
0.090	86	Weighted Average
0.030		33.33% Pervious Area
0.060		66.67% Impervious Area

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

Subcatchment P DA-3: P-DA-3



Summary for Subcatchment P DA-4: P-DA-4

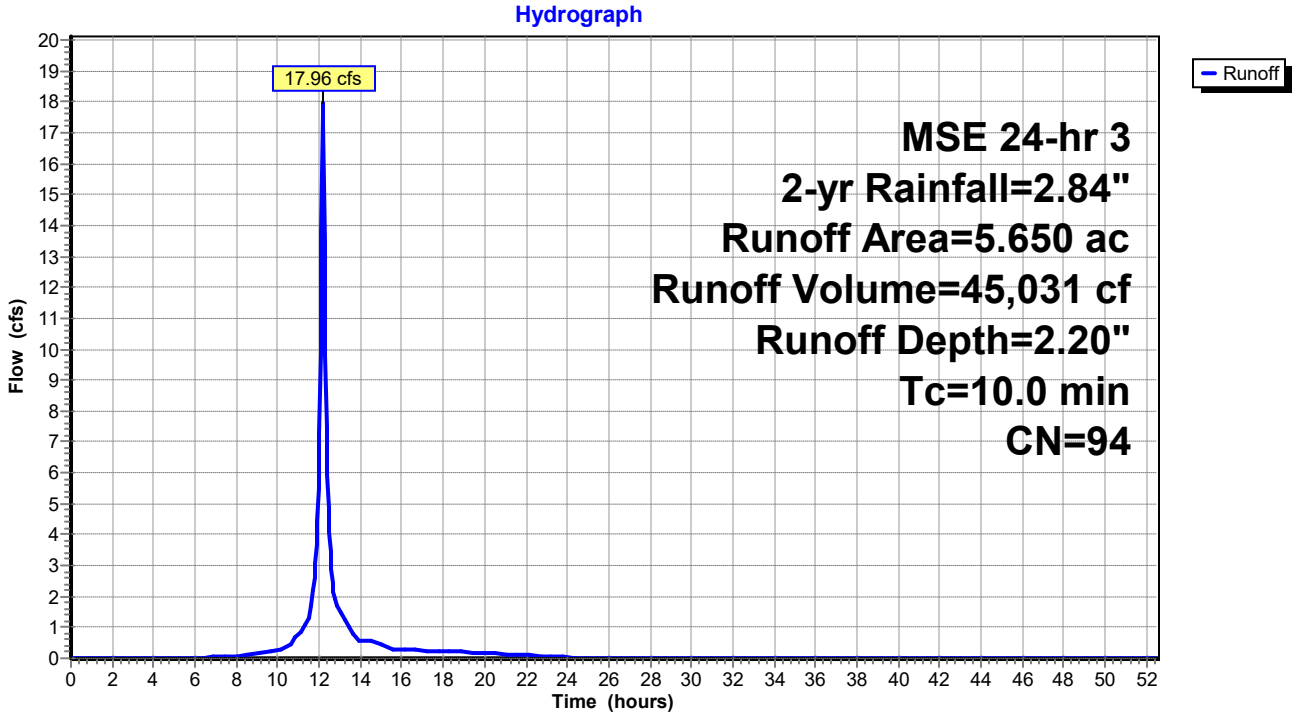
Runoff = 17.96 cfs @ 12.17 hrs, Volume= 45,031 cf, Depth= 2.20"
Routed to Pond 2P : SYSTEM #2

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-52.50 hrs, dt= 0.05 hrs
MSE 24-hr 3 2-yr Rainfall=2.84"

Area (ac)	CN	Description
5.090	98	Paved parking, HSG B
0.560	61	>75% Grass cover, Good, HSG B
5.650	94	Weighted Average
0.560		9.91% Pervious Area
5.090		90.09% Impervious Area

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

Subcatchment P DA-4: P-DA-4



Summary for Subcatchment P DA-5: P-DA-5

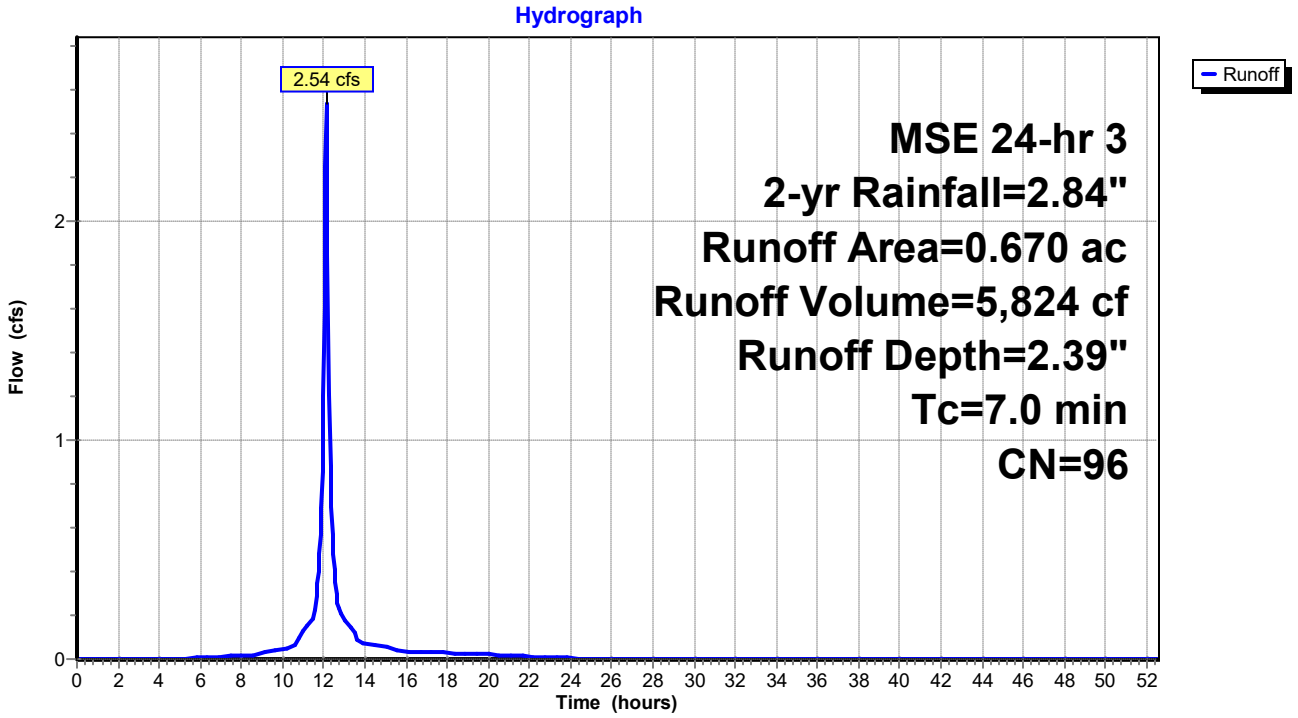
Runoff = 2.54 cfs @ 12.14 hrs, Volume= 5,824 cf, Depth= 2.39"
Routed to Reach 12R : AMERICAN BLVD

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-52.50 hrs, dt= 0.05 hrs
MSE 24-hr 3 2-yr Rainfall=2.84"

Area (ac)	CN	Description
0.630	98	Paved parking, HSG B
0.040	61	>75% Grass cover, Good, HSG B
0.670	96	Weighted Average
0.040		5.97% Pervious Area
0.630		94.03% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
6.0					**Direct Entry,**
6.0	0	Total, Increased to minimum Tc = 7.0 min			

Subcatchment P DA-5: P-DA-5



Summary for Subcatchment P DA-6: P-DA-6

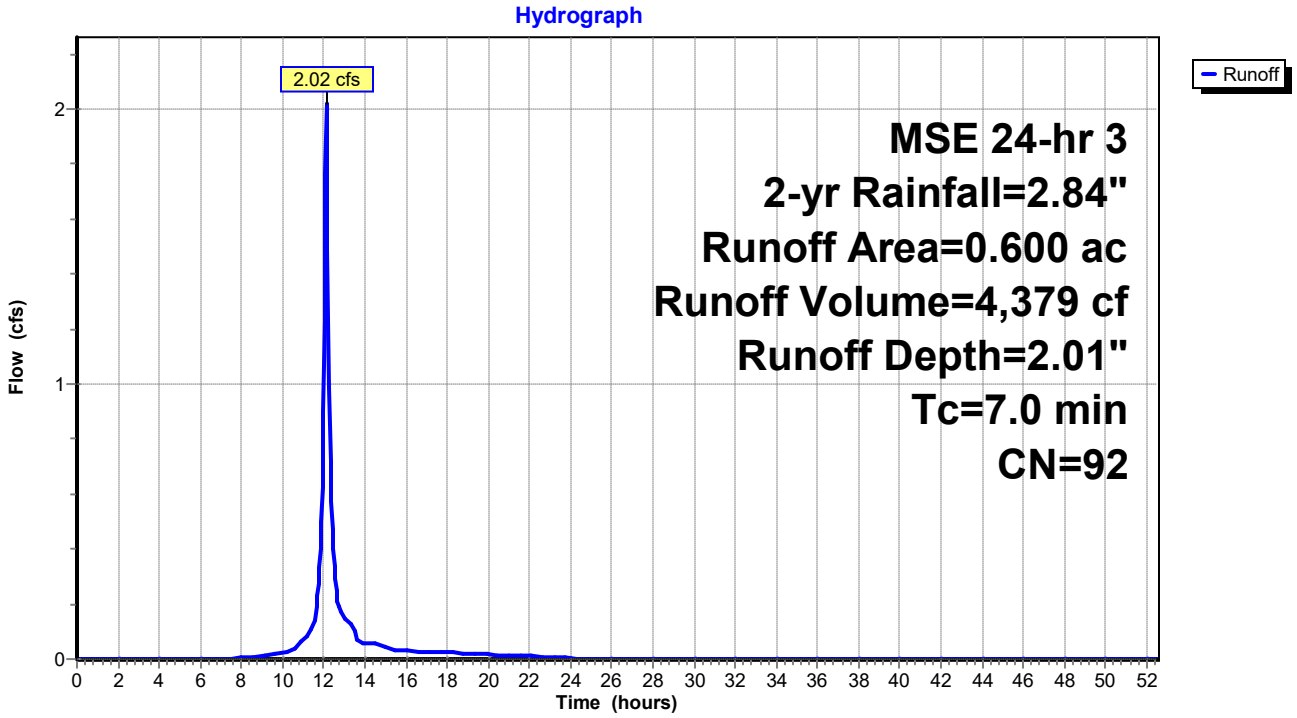
Runoff = 2.02 cfs @ 12.14 hrs, Volume= 4,379 cf, Depth= 2.01"
Routed to Reach 12R : AMERICAN BLVD

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-52.50 hrs, dt= 0.05 hrs
MSE 24-hr 3 2-yr Rainfall=2.84"

Area (ac)	CN	Description
0.500	98	Paved parking, HSG B
0.100	61	>75% Grass cover, Good, HSG B
0.600	92	Weighted Average
0.100		16.67% Pervious Area
0.500		83.33% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
6.0					**Direct Entry,**
6.0	0	Total, Increased to minimum Tc = 7.0 min			

Subcatchment P DA-6: P-DA-6



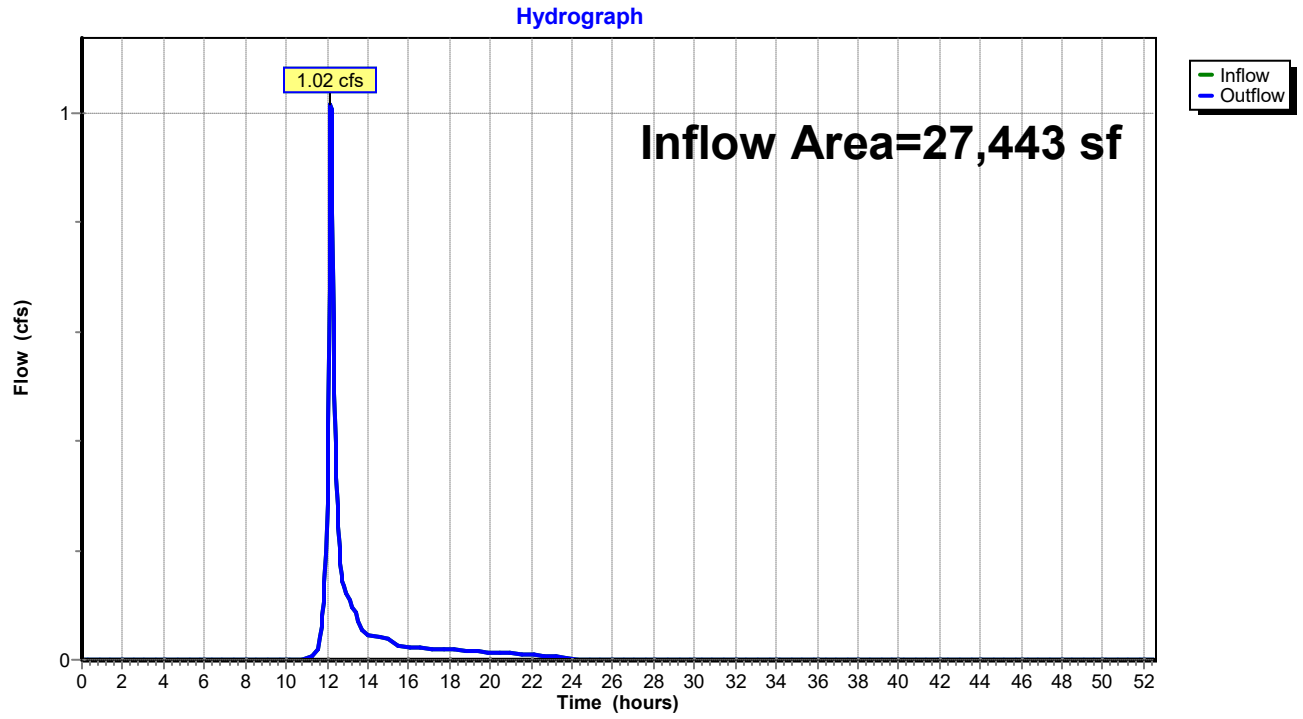
Summary for Reach 10R: PENN AVE

[40] Hint: Not Described (Outflow=Inflow)

Inflow Area = 27,443 sf, 49.21% Impervious, Inflow Depth = 1.07" for 2-yr event
Inflow = 1.02 cfs @ 12.19 hrs, Volume= 2,454 cf
Outflow = 1.02 cfs @ 12.19 hrs, Volume= 2,454 cf, Atten= 0%, Lag= 0.0 min
Routed to nonexistent node Energy Dr

Routing by Dyn-Stor-Ind method, Time Span= 0.00-52.50 hrs, dt= 0.05 hrs

Reach 10R: PENN AVE



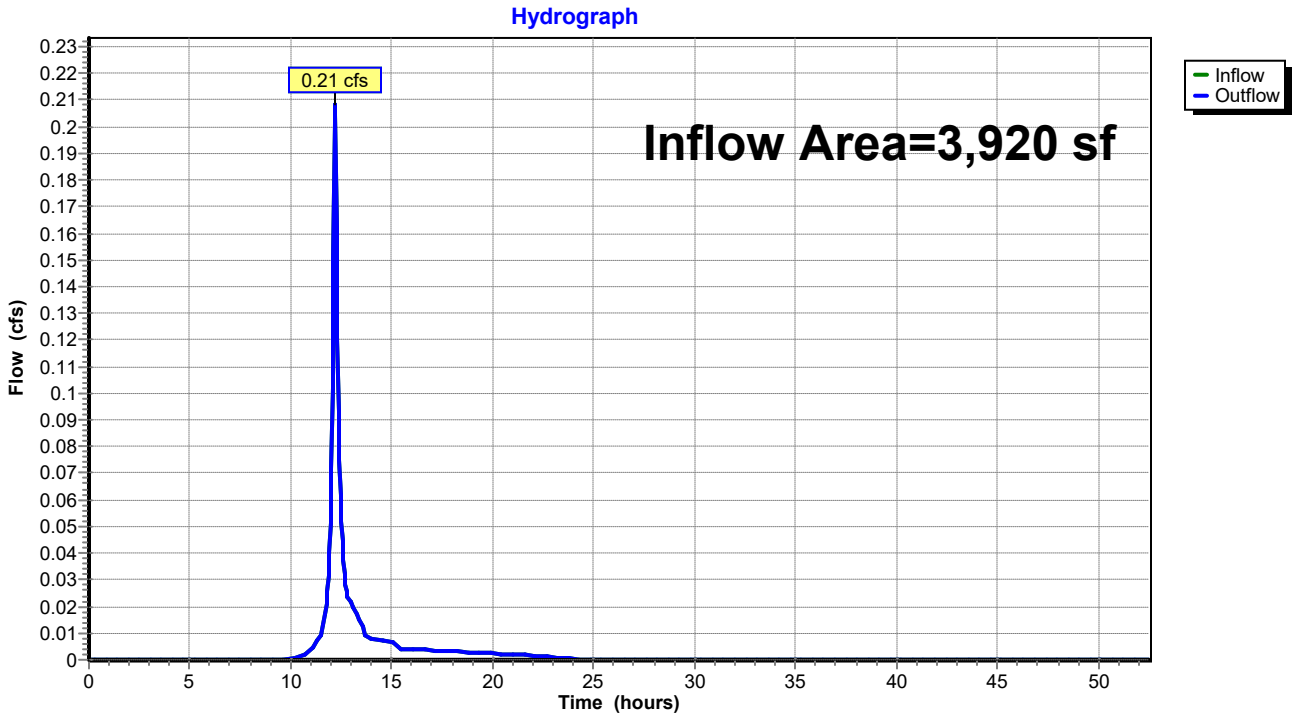
Summary for Reach 11R: KNOX AVE

[40] Hint: Not Described (Outflow=Inflow)

Inflow Area = 3,920 sf, 66.67% Impervious, Inflow Depth = 1.53" for 2-yr event
Inflow = 0.21 cfs @ 12.18 hrs, Volume= 499 cf
Outflow = 0.21 cfs @ 12.18 hrs, Volume= 499 cf, Atten= 0%, Lag= 0.0 min
Routed to nonexistent node Energy Dr

Routing by Dyn-Stor-Ind method, Time Span= 0.00-52.50 hrs, dt= 0.05 hrs

Reach 11R: KNOX AVE



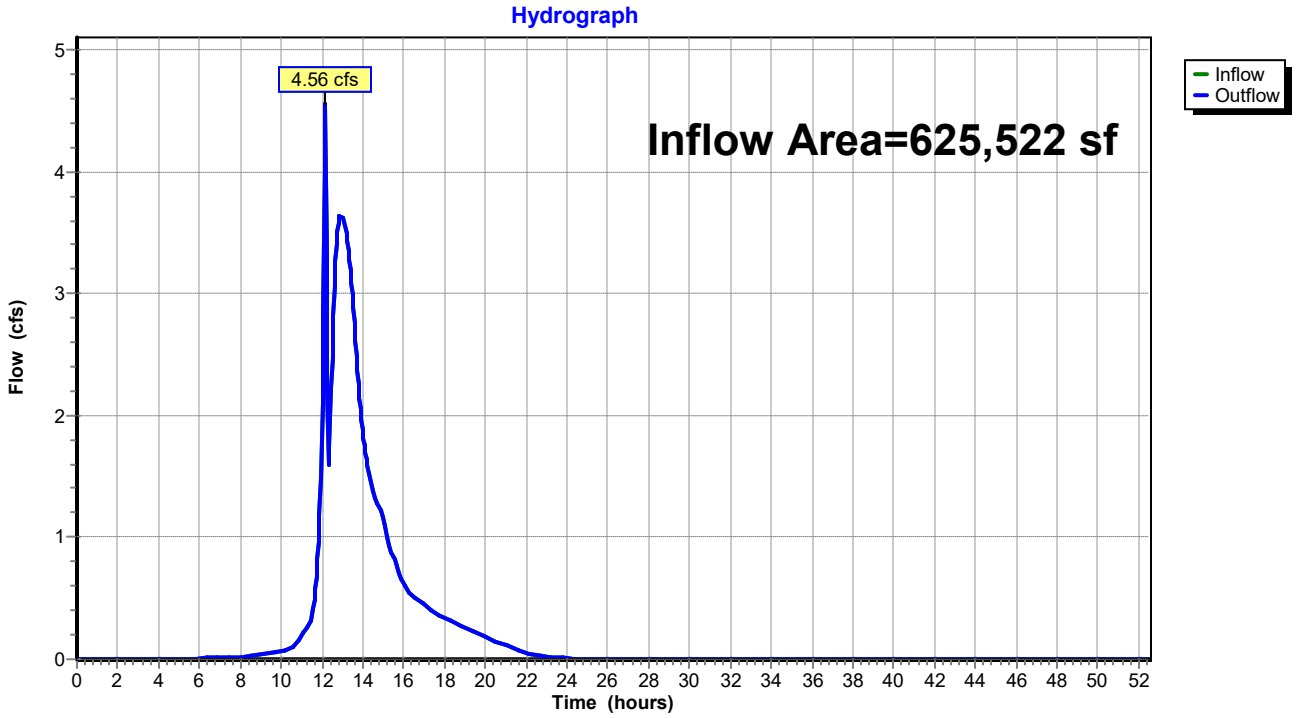
Summary for Reach 12R: AMERICAN BLVD

[40] Hint: Not Described (Outflow=Inflow)

Inflow Area = 625,522 sf, 90.11% Impervious, Inflow Depth = 0.74" for 2-yr event
Inflow = 4.56 cfs @ 12.14 hrs, Volume= 38,351 cf
Outflow = 4.56 cfs @ 12.14 hrs, Volume= 38,351 cf, Atten= 0%, Lag= 0.0 min

Routing by Dyn-Stor-Ind method, Time Span= 0.00-52.50 hrs, dt= 0.05 hrs

Reach 12R: AMERICAN BLVD



Summary for Pond 1P: SYSTEM #1

Inflow Area = 324,086 sf, 90.32% Impervious, Inflow Depth = 2.20" for 2-yr event
Inflow = 23.65 cfs @ 12.17 hrs, Volume= 59,298 cf
Outflow = 1.74 cfs @ 13.23 hrs, Volume= 45,196 cf, Atten= 93%, Lag= 63.3 min
Discarded = 0.20 cfs @ 10.30 hrs, Volume= 31,816 cf
Primary = 1.54 cfs @ 13.23 hrs, Volume= 13,381 cf
Routed to Reach 12R : AMERICAN BLVD

Routing by Dyn-Stor-Ind method, Time Span= 0.00-52.50 hrs, dt= 0.05 hrs
Peak Elev= 822.05' @ 13.23 hrs Surf.Area= 18,994 sf Storage= 38,879 cf

Plug-Flow detention time= (not calculated: outflow precedes inflow)
Center-of-Mass det. time= 753.7 min (1,535.3 - 781.5)

Volume	Invert	Avail.Storage	Storage Description
#1A	819.25'	29,914 cf	**83.00'W x 228.84'L x 6.75'H Field A** 128,209 cf Overall - 53,424 cf Embedded = 74,785 cf x 40.0% Voids
#2A	820.00'	53,424 cf	**ADS_StormTech MC-4500 b +Cap** x 495 Inside #1 Effective Size= 90.4"W x 60.0"H => 26.46 sf x 4.03'L = 106.5 cf Overall Size= 100.0"W x 60.0"H x 4.33'L with 0.31' Overlap 495 Chambers in 9 Rows Cap Storage= 39.5 cf x 2 x 9 rows = 711.0 cf
		83,338 cf	Total Available Storage

Storage Group A created with Chamber Wizard

Device	Routing	Invert	Outlet Devices
#1	Primary	820.00'	**24.0" Round Outlet to American Blvd** L= 500.0' CMP, projecting, no headwall, Ke= 0.900 Inlet / Outlet Invert= 820.00' / 817.50' S= 0.0050 '/' Cc= 0.900 n= 0.011 Concrete pipe, straight & clean, Flow Area= 3.14 sf
#2	Discarded	819.25'	**0.450 in/hr Infiltration over Surface area**
#3	Device 1	821.80'	**46.0" W x 6.0" H Vert. Orifice in Weir** C= 0.600 Limited to weir flow at low heads
#4	Device 1	822.72'	**5.0' long Weir** 2 End Contraction(s)

Discarded OutFlow Max=0.20 cfs @ 10.30 hrs HW=819.32' (Free Discharge)
└**2=Infiltration** (Exfiltration Controls 0.20 cfs)

Primary OutFlow Max=1.54 cfs @ 13.23 hrs HW=822.05' TW=0.00' (Dynamic Tailwater)
└**1=Outlet to American Blvd** (Passes 1.54 cfs of 12.24 cfs potential flow)
  ├**3=Orifice in Weir** (Orifice Controls 1.54 cfs @ 1.61 fps)
  └**4=Weir** (Controls 0.00 cfs)

Pond 1P: SYSTEM #1 - Chamber Wizard Field A

Chamber Model = ADS_StormTech MC-4500 b +Cap (ADS StormTech® MC-4500 with cap volume)
Effective Size= 90.4"W x 60.0"H => 26.46 sf x 4.03'L = 106.5 cf
Overall Size= 100.0"W x 60.0"H x 4.33'L with 0.31' Overlap
Cap Storage= 39.5 cf x 2 x 9 rows = 711.0 cf

100.0" Wide + 9.0" Spacing = 109.0" C-C Row Spacing

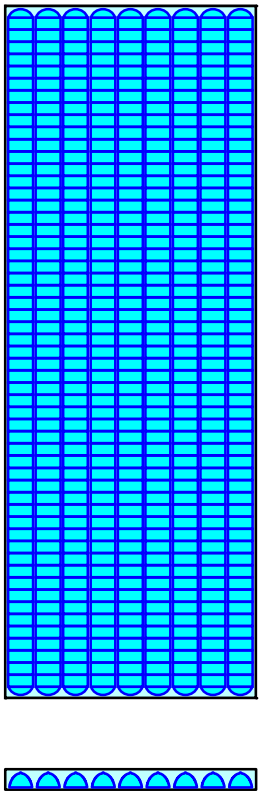
55 Chambers/Row x 4.02' Long +2.73' Cap Length x 2 = 226.84' Row Length +12.0" End Stone x 2 = 228.84' Base Length
9 Rows x 100.0" Wide + 9.0" Spacing x 8 + 12.0" Side Stone x 2 = 83.00' Base Width
9.0" Stone Base + 60.0" Chamber Height + 12.0" Stone Cover = 6.75' Field Height

495 Chambers x 106.5 cf + 39.5 cf Cap Volume x 2 x 9 Rows = 53,423.8 cf Chamber Storage

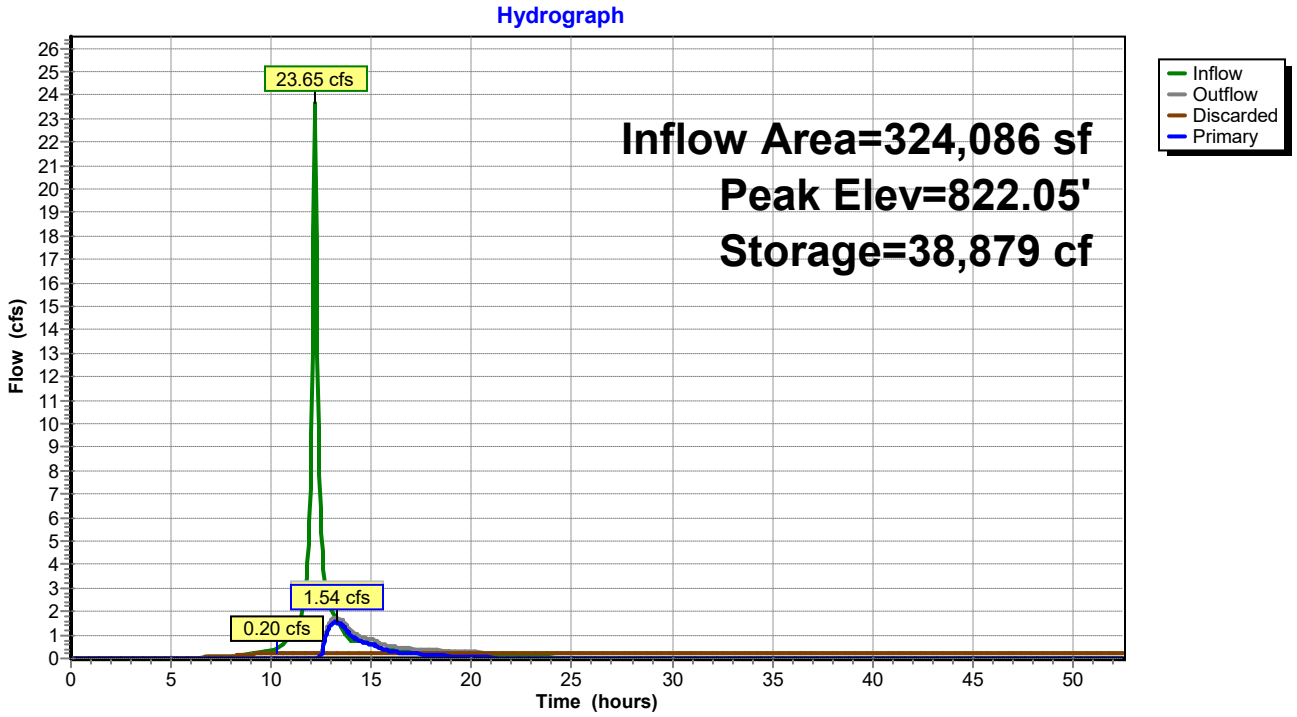
128,208.5 cf Field - 53,423.8 cf Chambers = 74,784.8 cf Stone x 40.0% Voids = 29,913.9 cf Stone Storage

Chamber Storage + Stone Storage = 83,337.7 cf = 1.913 af
Overall Storage Efficiency = 65.0%
Overall System Size = 228.84' x 83.00' x 6.75'

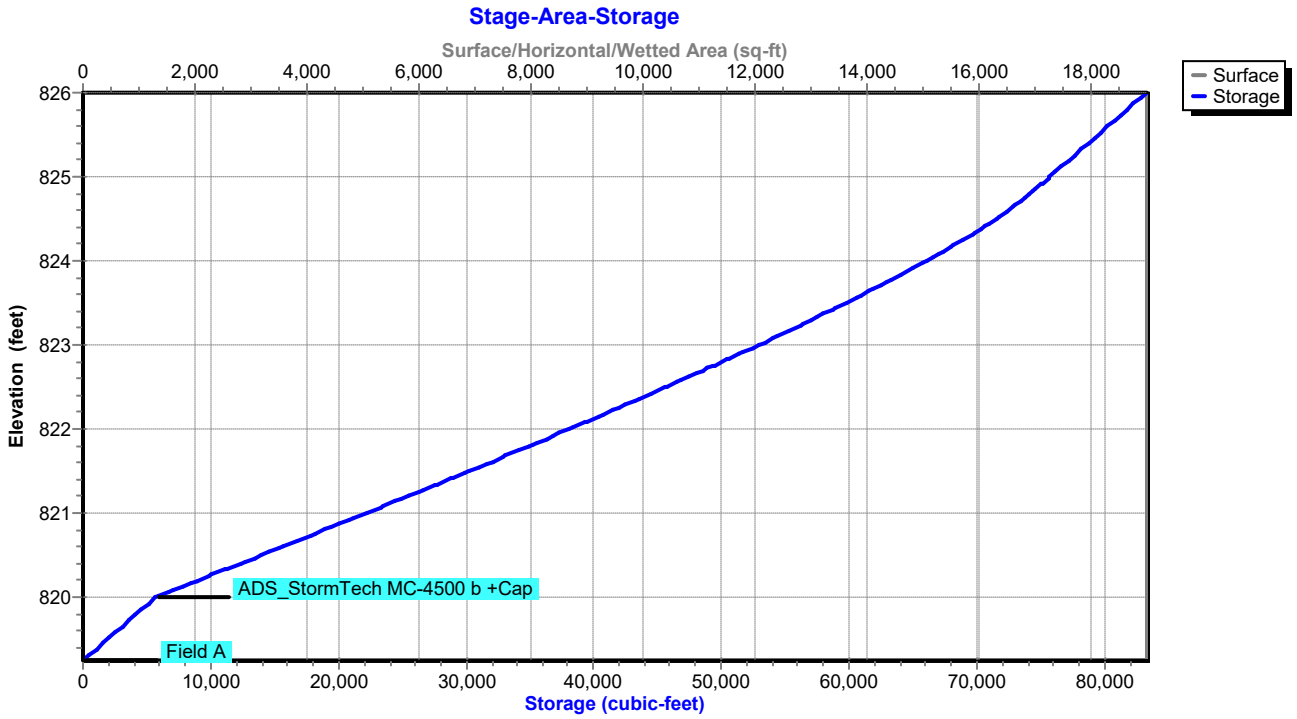
495 Chambers
4,748.5 cy Field
2,769.8 cy Stone



Pond 1P: SYSTEM #1



Pond 1P: SYSTEM #1



Summary for Pond 2P: SYSTEM #2

Inflow Area = 246,114 sf, 90.09% Impervious, Inflow Depth = 2.20" for 2-yr event
Inflow = 17.96 cfs @ 12.17 hrs, Volume= 45,031 cf
Outflow = 2.22 cfs @ 12.69 hrs, Volume= 35,584 cf, Atten= 88%, Lag= 31.2 min
Discarded = 0.13 cfs @ 10.05 hrs, Volume= 20,816 cf
Primary = 2.09 cfs @ 12.69 hrs, Volume= 14,768 cf
Routed to Reach 12R : AMERICAN BLVD

Routing by Dyn-Stor-Ind method, Time Span= 0.00-52.50 hrs, dt= 0.05 hrs
Peak Elev= 823.24' @ 12.69 hrs Surf.Area= 12,370 sf Storage= 27,129 cf

Plug-Flow detention time= (not calculated: outflow precedes inflow)
Center-of-Mass det. time= 631.2 min (1,412.7 - 781.5)

Volume	Invert	Avail.Storage	Storage Description
#1A	820.25'	19,610 cf	**46.67'W x 265.07'L x 6.75'H Field A** 83,496 cf Overall - 34,472 cf Embedded = 49,024 cf x 40.0% Voids
#2A	821.00'	34,472 cf	**ADS_StormTech MC-4500 b +Cap** x 320 Inside #1 Effective Size= 90.4"W x 60.0"H => 26.46 sf x 4.03'L = 106.5 cf Overall Size= 100.0"W x 60.0"H x 4.33'L with 0.31' Overlap 320 Chambers in 5 Rows Cap Storage= 39.5 cf x 2 x 5 rows = 395.0 cf
		54,082 cf	Total Available Storage

Storage Group A created with Chamber Wizard

Device	Routing	Invert	Outlet Devices
#1	Primary	821.00'	**24.0" Round Outlet to American Boulevard** L= 600.0' CMP, projecting, no headwall, Ke= 0.900 Inlet / Outlet Invert= 821.00' / 817.50' S= 0.0058 '/' Cc= 0.900 n= 0.011 Concrete pipe, straight & clean, Flow Area= 3.14 sf
#2	Discarded	820.25'	**0.450 in/hr Infiltration over Surface area**
#3	Device 1	822.80'	**6.0" Vert. Orifice in Weir X 5.00** C= 0.600 Limited to weir flow at low heads
#4	Device 1	823.37'	**5.0' long Sharp-Crested Rectangular Weir** 2 End Contraction(s)

Discarded OutFlow Max=0.13 cfs @ 10.05 hrs HW=820.32' (Free Discharge)
└**2=Infiltration** (Exfiltration Controls 0.13 cfs)

Primary OutFlow Max=2.09 cfs @ 12.69 hrs HW=823.24' TW=0.00' (Dynamic Tailwater)
└**1=Outlet to American Boulevard** (Passes 2.09 cfs of 13.32 cfs potential flow)
  ├**3=Orifice in Weir** (Orifice Controls 2.09 cfs @ 2.27 fps)
  └**4=Sharp-Crested Rectangular Weir** (Controls 0.00 cfs)

Pond 2P: SYSTEM #2 - Chamber Wizard Field A

Chamber Model = ADS_StormTech MC-4500 b +Cap (ADS StormTech® MC-4500 with cap volume)
Effective Size= 90.4"W x 60.0"H => 26.46 sf x 4.03'L = 106.5 cf
Overall Size= 100.0"W x 60.0"H x 4.33'L with 0.31' Overlap
Cap Storage= 39.5 cf x 2 x 5 rows = 395.0 cf

100.0" Wide + 9.0" Spacing = 109.0" C-C Row Spacing

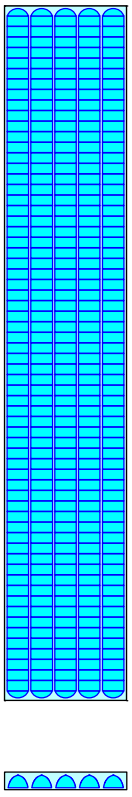
64 Chambers/Row x 4.02' Long +2.73' Cap Length x 2 = 263.07' Row Length +12.0" End Stone x 2 = 265.07' Base Length
5 Rows x 100.0" Wide + 9.0" Spacing x 4 + 12.0" Side Stone x 2 = 46.67' Base Width
9.0" Stone Base + 60.0" Chamber Height + 12.0" Stone Cover = 6.75' Field Height

320 Chambers x 106.5 cf + 39.5 cf Cap Volume x 2 x 5 Rows = 34,471.9 cf Chamber Storage

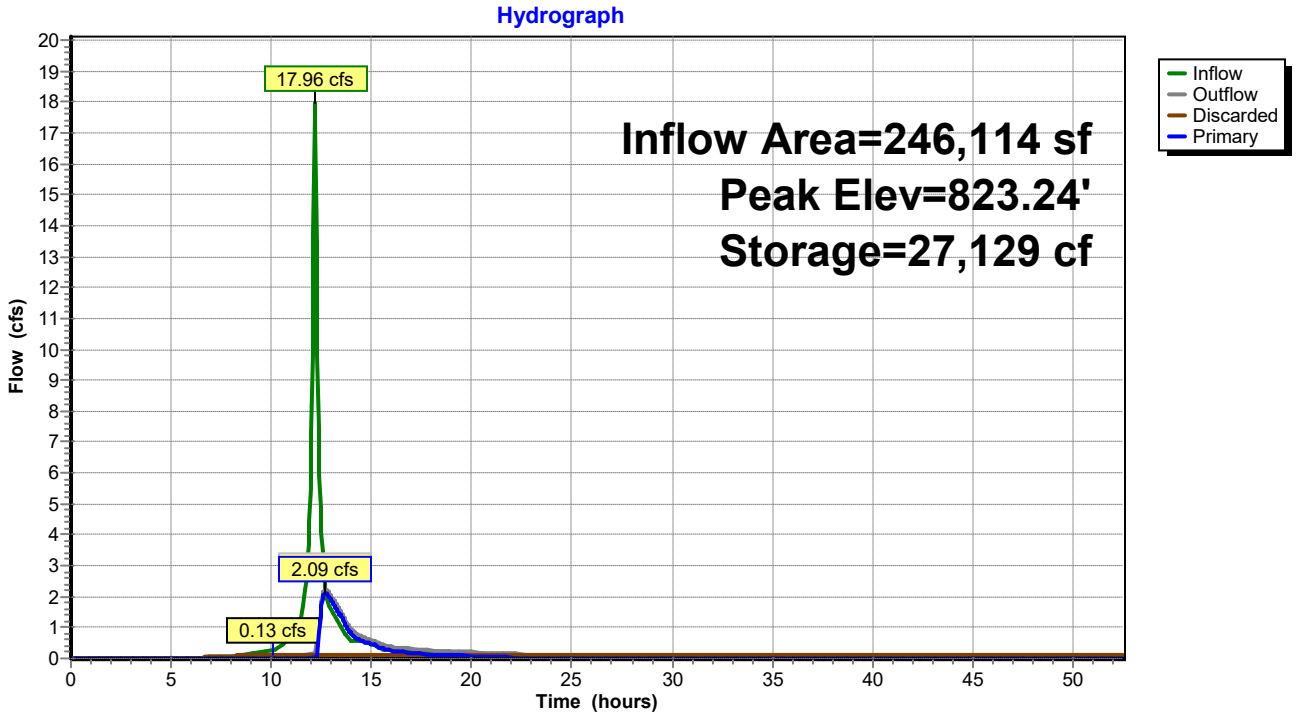
83,496.0 cf Field - 34,471.9 cf Chambers = 49,024.1 cf Stone x 40.0% Voids = 19,609.6 cf Stone Storage

Chamber Storage + Stone Storage = 54,081.6 cf = 1.242 af
Overall Storage Efficiency = 64.8%
Overall System Size = 265.07' x 46.67' x 6.75'

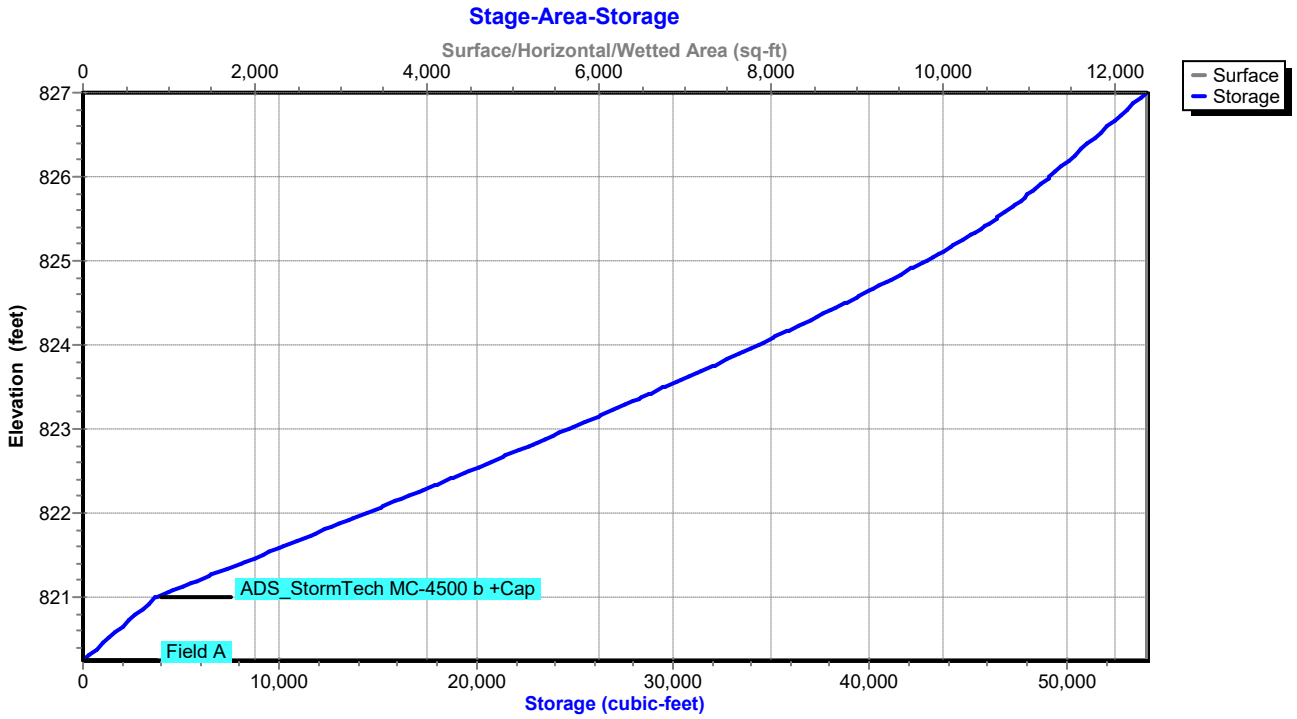
320 Chambers
3,092.4 cy Field
1,815.7 cy Stone



Pond 2P: SYSTEM #2



Pond 2P: SYSTEM #2



Time span=0.00-52.50 hrs, dt=0.05 hrs, 1051 points
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN
Reach routing by Dyn-Stor-Ind method - Pond routing by Dyn-Stor-Ind method

Subcatchment P DA-1: P-DA-1 Runoff Area=7.440 ac 90.32% Impervious Runoff Depth=3.57"
Tc=10.0 min CN=94 Runoff=37.36 cfs 96,406 cf

Subcatchment P DA-2: P-DA-2 Runoff Area=0.630 ac 49.21% Impervious Runoff Depth=2.17"
Tc=10.0 min CN=79 Runoff=2.07 cfs 4,959 cf

Subcatchment P DA-3: P-DA-3 Runoff Area=0.090 ac 66.67% Impervious Runoff Depth=2.77"
Tc=10.0 min CN=86 Runoff=0.37 cfs 906 cf

Subcatchment P DA-4: P-DA-4 Runoff Area=5.650 ac 90.09% Impervious Runoff Depth=3.57"
Tc=10.0 min CN=94 Runoff=28.37 cfs 73,211 cf

Subcatchment P DA-5: P-DA-5 Runoff Area=0.670 ac 94.03% Impervious Runoff Depth=3.79"
Tc=7.0 min CN=96 Runoff=3.90 cfs 9,213 cf

Subcatchment P DA-6: P-DA-6 Runoff Area=0.600 ac 83.33% Impervious Runoff Depth=3.36"
Tc=7.0 min CN=92 Runoff=3.27 cfs 7,317 cf

Reach 10R: PENN AVE Inflow=2.07 cfs 4,959 cf
Outflow=2.07 cfs 4,959 cf

Reach 11R: KNOX AVE Inflow=0.37 cfs 906 cf
Outflow=0.37 cfs 906 cf

Reach 12R: AMERICAN BLVD Inflow=23.97 cfs 106,875 cf
Outflow=23.97 cfs 106,875 cf

Pond 1P: SYSTEM #1 Peak Elev=822.90' Storage=51,479 cf Inflow=37.36 cfs 96,406 cf
Discarded=0.20 cfs 33,122 cf Primary=9.68 cfs 48,588 cf Outflow=9.88 cfs 81,711 cf

Pond 2P: SYSTEM #2 Peak Elev=824.05' Storage=34,788 cf Inflow=28.37 cfs 73,211 cf
Discarded=0.13 cfs 21,658 cf Primary=13.65 cfs 41,757 cf Outflow=13.78 cfs 63,416 cf

Total Runoff Area = 656,885 sf Runoff Volume = 192,011 cf Average Runoff Depth = 3.51"
11.74% Pervious = 77,101 sf 88.26% Impervious = 579,784 sf

Summary for Subcatchment P DA-1: P-DA-1

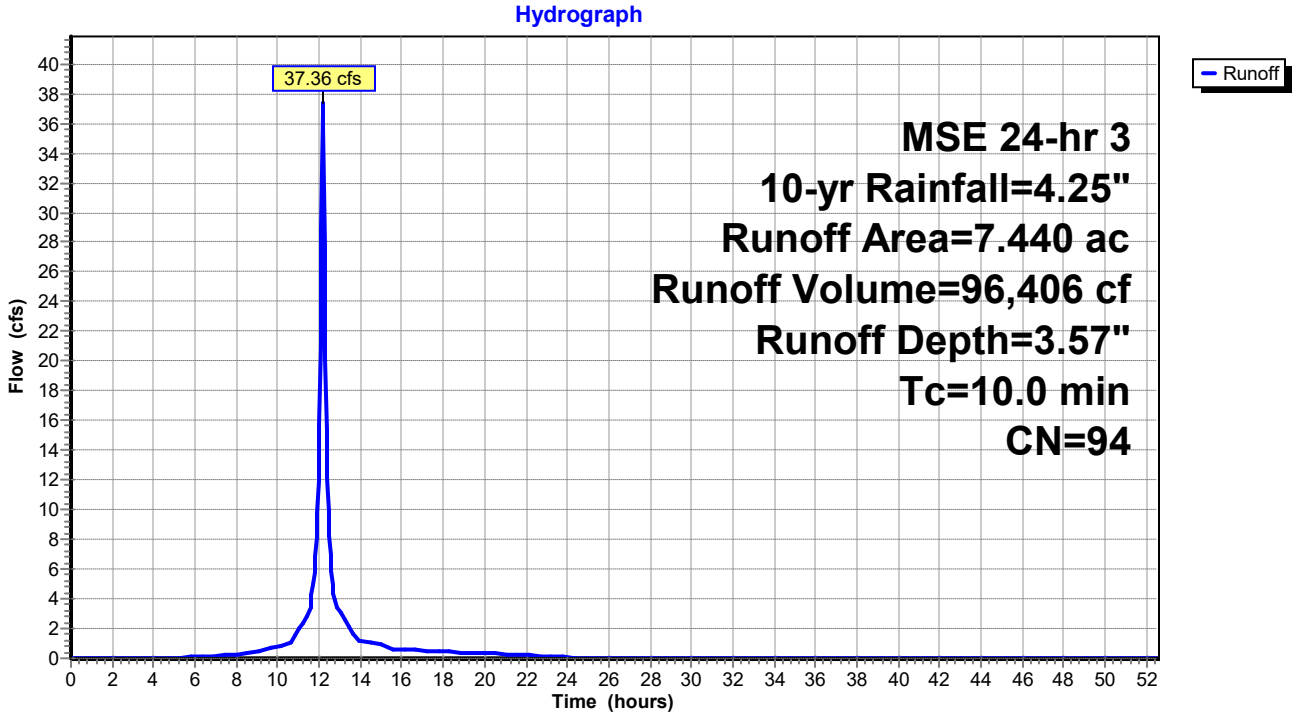
Runoff = 37.36 cfs @ 12.17 hrs, Volume= 96,406 cf, Depth= 3.57"
Routed to Pond 1P : SYSTEM #1

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-52.50 hrs, dt= 0.05 hrs
MSE 24-hr 3 10-yr Rainfall=4.25"

Area (ac)	CN	Description
6.720	98	Paved parking, HSG B
0.720	61	>75% Grass cover, Good, HSG B
7.440	94	Weighted Average
0.720		9.68% Pervious Area
6.720		90.32% Impervious Area

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

Subcatchment P DA-1: P-DA-1



Summary for Subcatchment P DA-2: P-DA-2

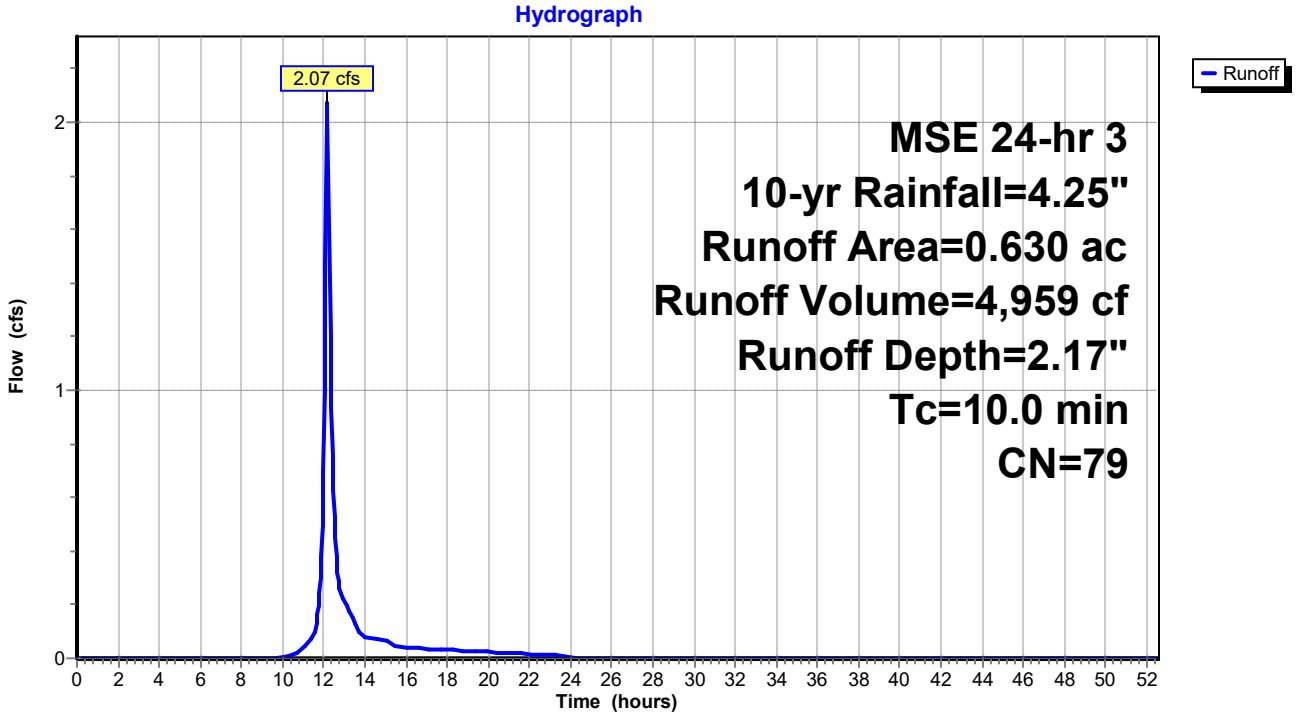
Runoff = 2.07 cfs @ 12.18 hrs, Volume= 4,959 cf, Depth= 2.17"
Routed to Reach 10R : PENN AVE

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-52.50 hrs, dt= 0.05 hrs
MSE 24-hr 3 10-yr Rainfall=4.25"

Area (ac)	CN	Description
0.310	98	Paved parking, HSG B
0.320	61	>75% Grass cover, Good, HSG B
0.630	79	Weighted Average
0.320		50.79% Pervious Area
0.310		49.21% Impervious Area

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

Subcatchment P DA-2: P-DA-2



Summary for Subcatchment P DA-3: P-DA-3

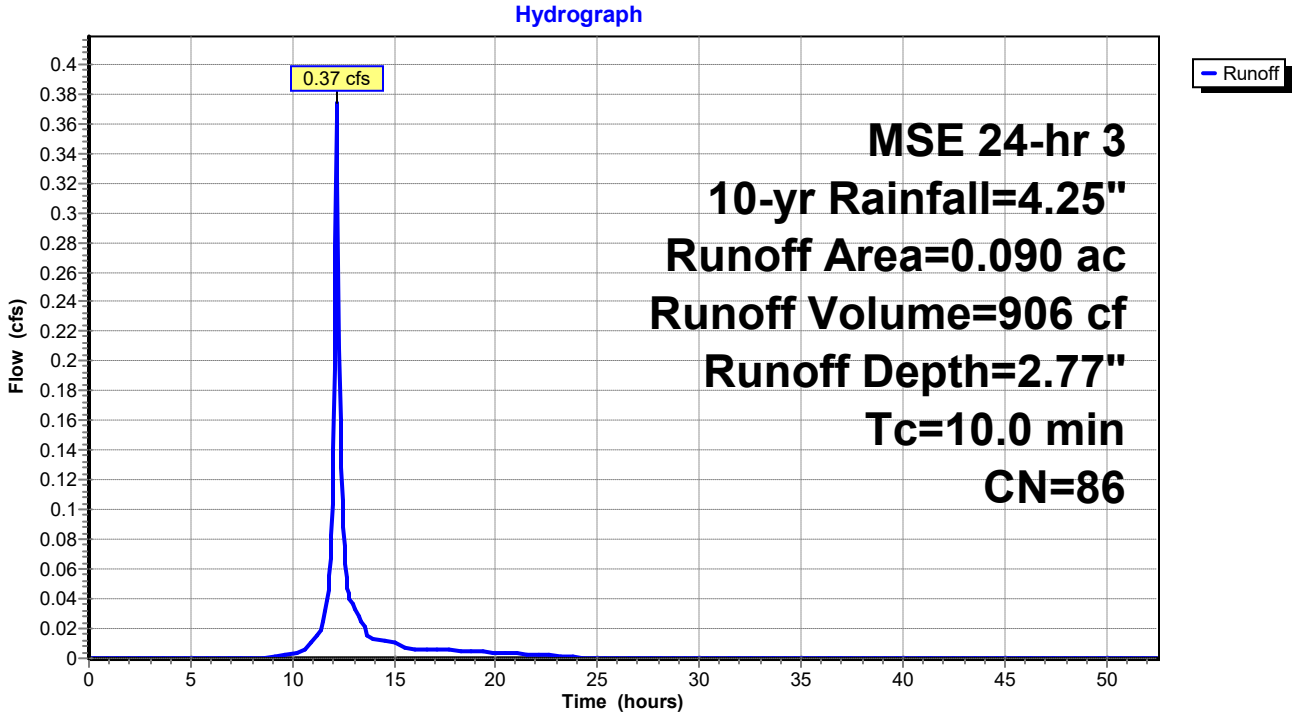
Runoff = 0.37 cfs @ 12.17 hrs, Volume= 906 cf, Depth= 2.77"
Routed to Reach 11R : KNOX AVE

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-52.50 hrs, dt= 0.05 hrs
MSE 24-hr 3 10-yr Rainfall=4.25"

Area (ac)	CN	Description
0.060	98	Paved parking, HSG B
0.030	61	>75% Grass cover, Good, HSG B
0.090	86	Weighted Average
0.030		33.33% Pervious Area
0.060		66.67% Impervious Area

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

Subcatchment P DA-3: P-DA-3



Summary for Subcatchment P DA-4: P-DA-4

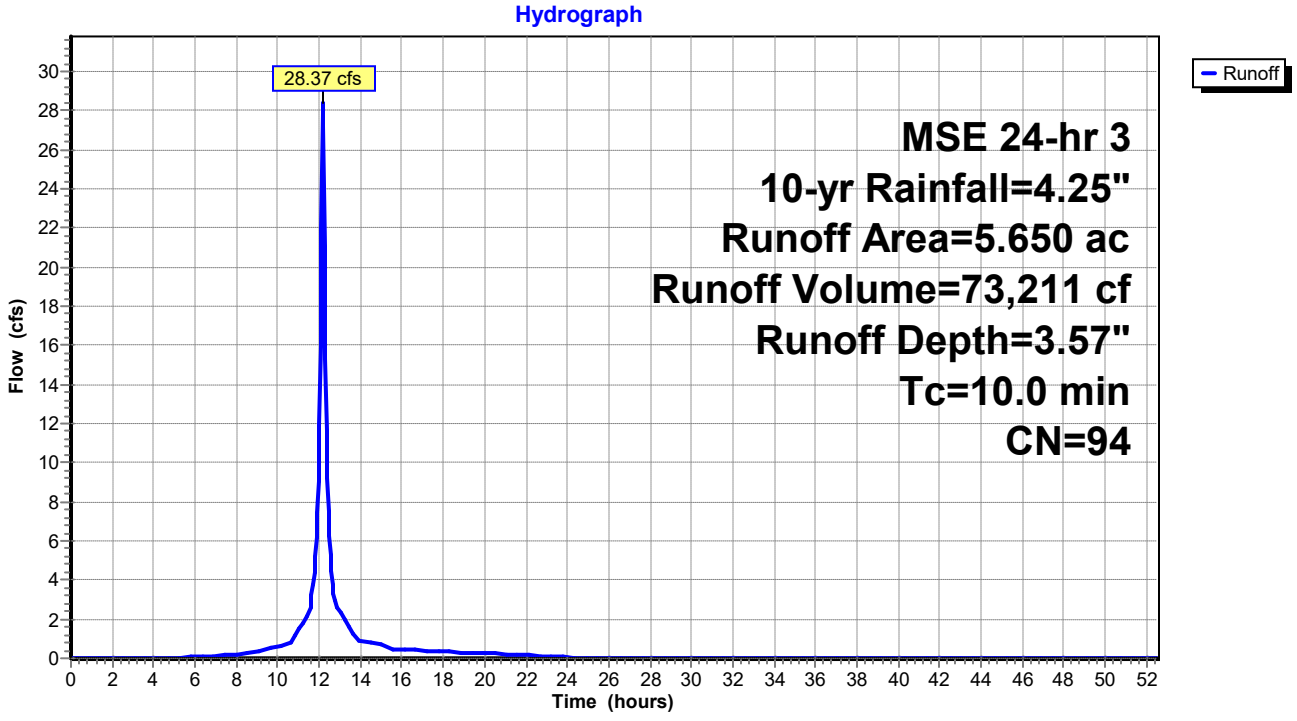
Runoff = 28.37 cfs @ 12.17 hrs, Volume= 73,211 cf, Depth= 3.57"
Routed to Pond 2P : SYSTEM #2

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-52.50 hrs, dt= 0.05 hrs
MSE 24-hr 3 10-yr Rainfall=4.25"

Area (ac)	CN	Description
5.090	98	Paved parking, HSG B
0.560	61	>75% Grass cover, Good, HSG B
5.650	94	Weighted Average
0.560		9.91% Pervious Area
5.090		90.09% Impervious Area

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

Subcatchment P DA-4: P-DA-4



Summary for Subcatchment P DA-5: P-DA-5

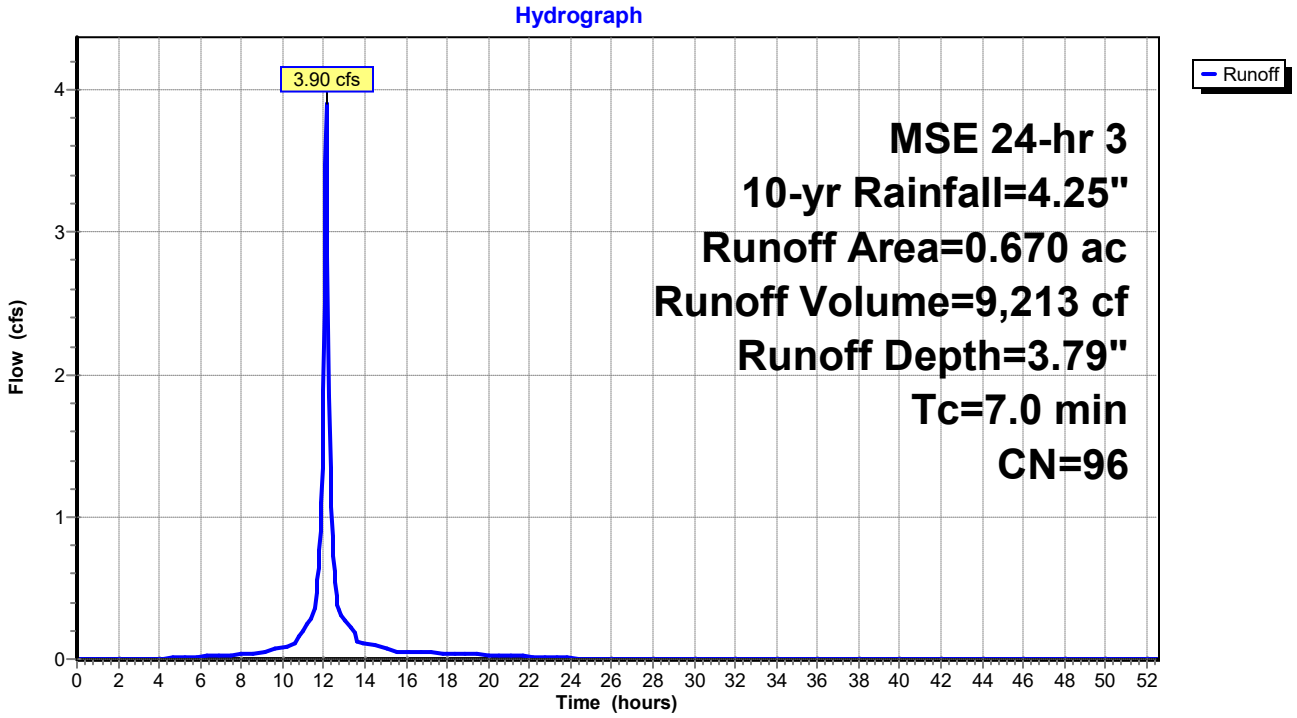
Runoff = 3.90 cfs @ 12.14 hrs, Volume= 9,213 cf, Depth= 3.79"
Routed to Reach 12R : AMERICAN BLVD

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-52.50 hrs, dt= 0.05 hrs
MSE 24-hr 3 10-yr Rainfall=4.25"

Area (ac)	CN	Description
0.630	98	Paved parking, HSG B
0.040	61	>75% Grass cover, Good, HSG B
0.670	96	Weighted Average
0.040		5.97% Pervious Area
0.630		94.03% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
6.0					**Direct Entry,**
6.0	0	Total, Increased to minimum Tc = 7.0 min			

Subcatchment P DA-5: P-DA-5



Summary for Subcatchment P DA-6: P-DA-6

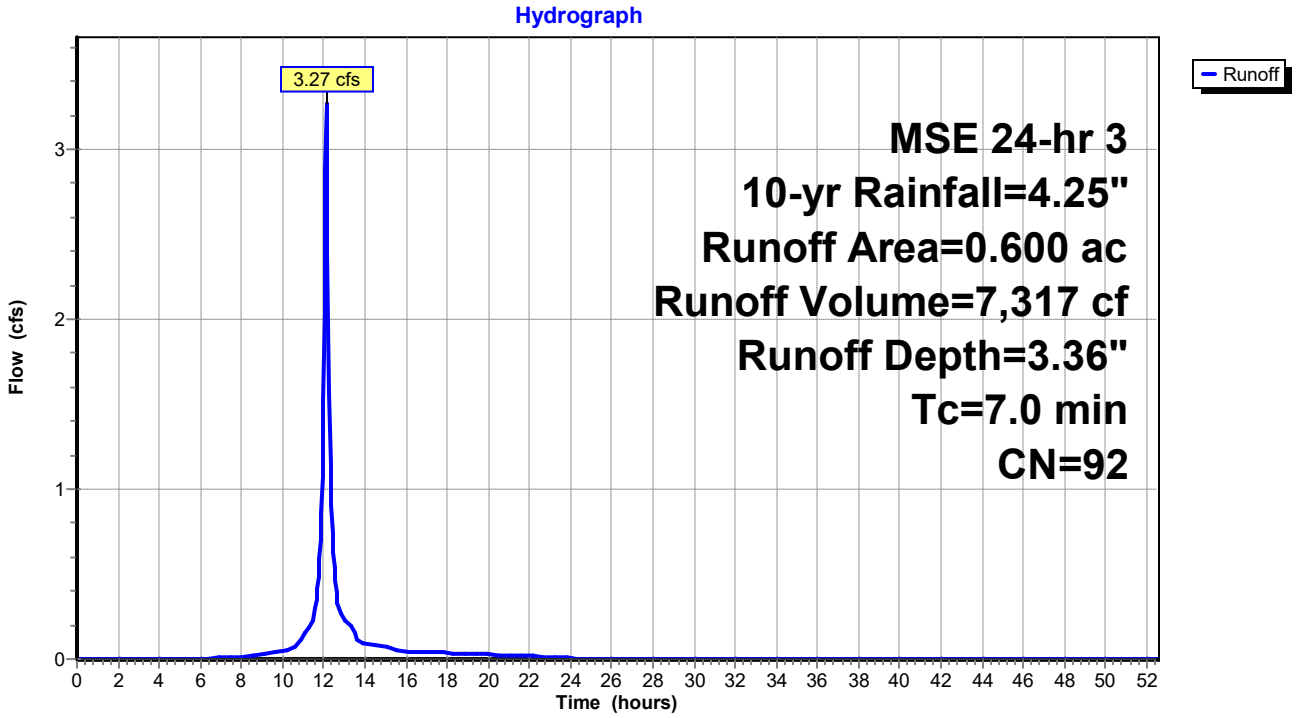
Runoff = 3.27 cfs @ 12.14 hrs, Volume= 7,317 cf, Depth= 3.36"
Routed to Reach 12R : AMERICAN BLVD

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-52.50 hrs, dt= 0.05 hrs
MSE 24-hr 3 10-yr Rainfall=4.25"

Area (ac)	CN	Description
0.500	98	Paved parking, HSG B
0.100	61	>75% Grass cover, Good, HSG B
0.600	92	Weighted Average
0.100		16.67% Pervious Area
0.500		83.33% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
6.0					**Direct Entry,**
6.0	0	Total, Increased to minimum Tc = 7.0 min			

Subcatchment P DA-6: P-DA-6



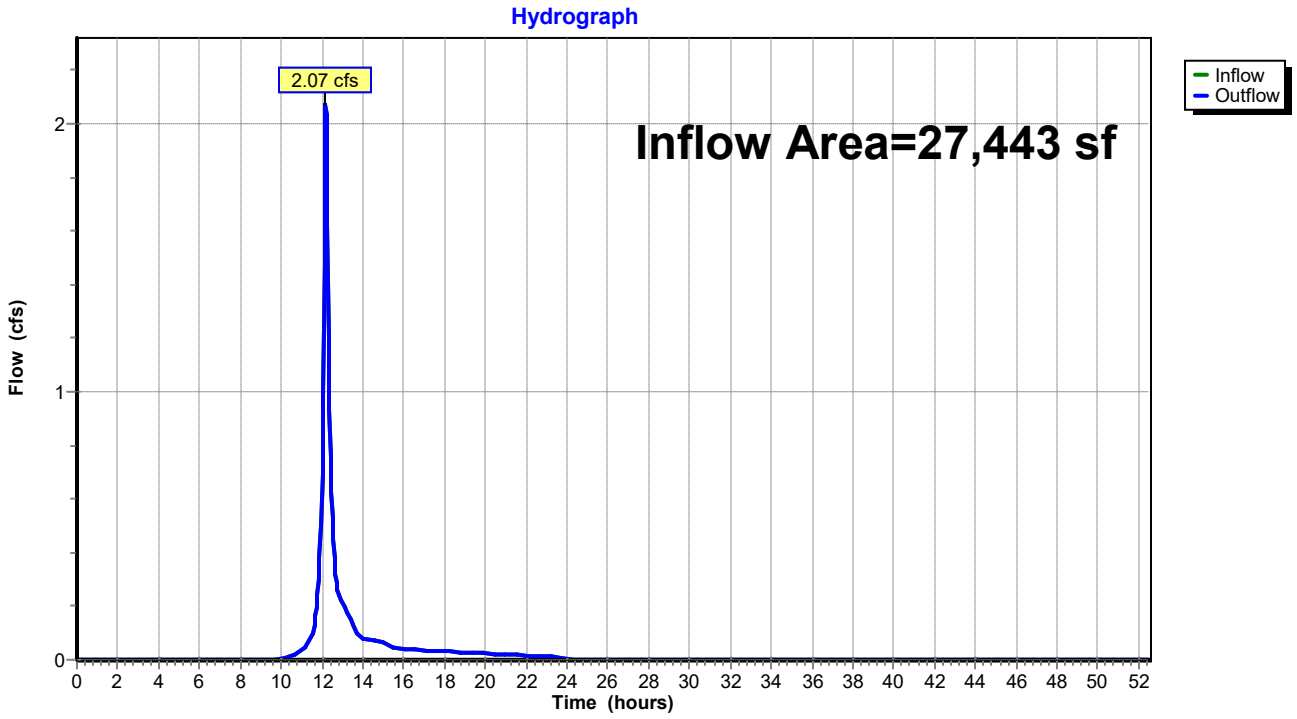
Summary for Reach 10R: PENN AVE

[40] Hint: Not Described (Outflow=Inflow)

Inflow Area = 27,443 sf, 49.21% Impervious, Inflow Depth = 2.17" for 10-yr event
Inflow = 2.07 cfs @ 12.18 hrs, Volume= 4,959 cf
Outflow = 2.07 cfs @ 12.18 hrs, Volume= 4,959 cf, Atten= 0%, Lag= 0.0 min
Routed to nonexistent node Energy Dr

Routing by Dyn-Stor-Ind method, Time Span= 0.00-52.50 hrs, dt= 0.05 hrs

Reach 10R: PENN AVE



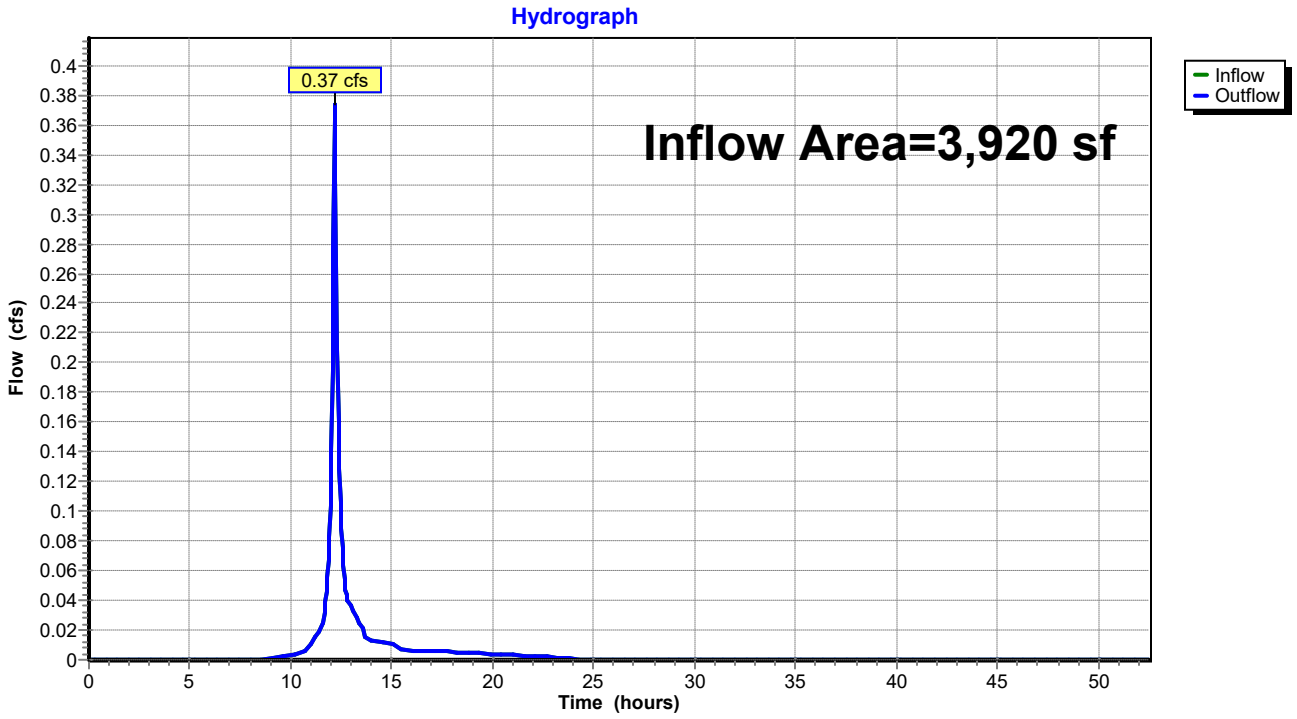
Summary for Reach 11R: KNOX AVE

[40] Hint: Not Described (Outflow=Inflow)

Inflow Area = 3,920 sf, 66.67% Impervious, Inflow Depth = 2.77" for 10-yr event
Inflow = 0.37 cfs @ 12.17 hrs, Volume= 906 cf
Outflow = 0.37 cfs @ 12.17 hrs, Volume= 906 cf, Atten= 0%, Lag= 0.0 min
Routed to nonexistent node Energy Dr

Routing by Dyn-Stor-Ind method, Time Span= 0.00-52.50 hrs, dt= 0.05 hrs

Reach 11R: KNOX AVE



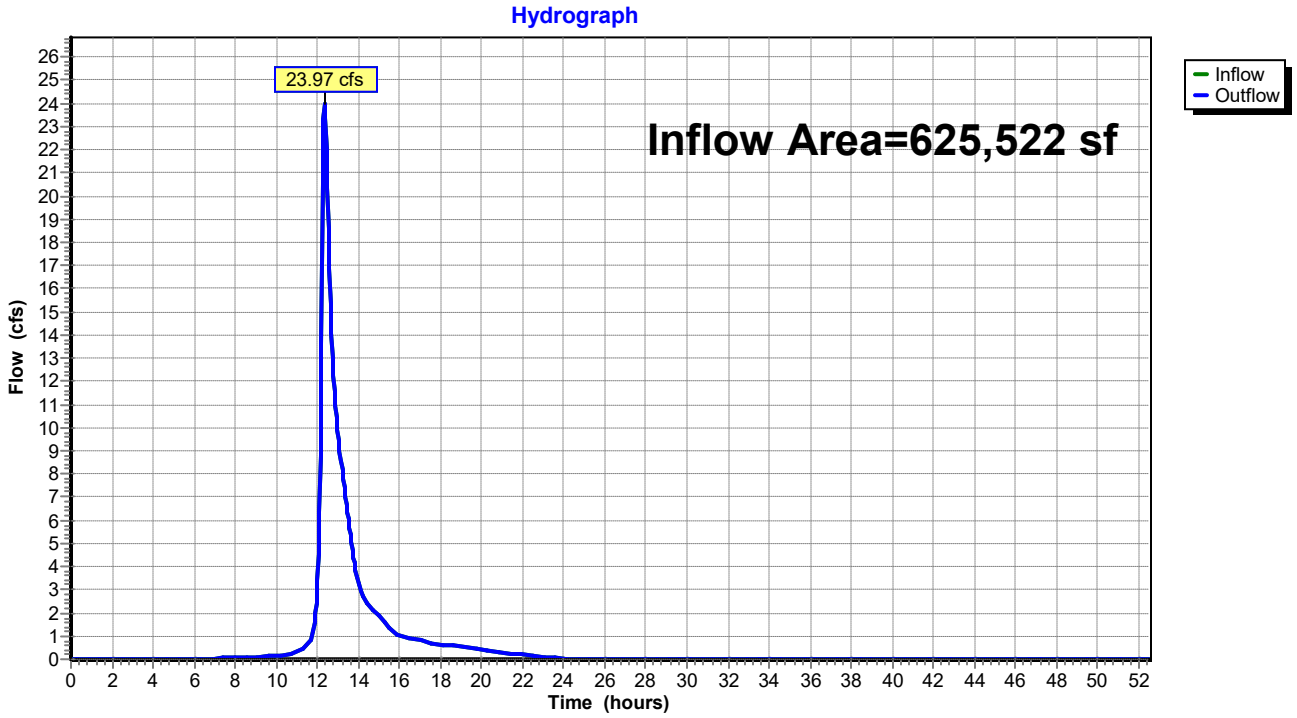
Summary for Reach 12R: AMERICAN BLVD

[40] Hint: Not Described (Outflow=Inflow)

Inflow Area = 625,522 sf, 90.11% Impervious, Inflow Depth = 2.05" for 10-yr event
Inflow = 23.97 cfs @ 12.35 hrs, Volume= 106,875 cf
Outflow = 23.97 cfs @ 12.35 hrs, Volume= 106,875 cf, Atten= 0%, Lag= 0.0 min

Routing by Dyn-Stor-Ind method, Time Span= 0.00-52.50 hrs, dt= 0.05 hrs

Reach 12R: AMERICAN BLVD



Summary for Pond 1P: SYSTEM #1

Inflow Area = 324,086 sf, 90.32% Impervious, Inflow Depth = 3.57" for 10-yr event
Inflow = 37.36 cfs @ 12.17 hrs, Volume= 96,406 cf
Outflow = 9.88 cfs @ 12.46 hrs, Volume= 81,711 cf, Atten= 74%, Lag= 17.2 min
Discarded = 0.20 cfs @ 9.15 hrs, Volume= 33,122 cf
Primary = 9.68 cfs @ 12.46 hrs, Volume= 48,588 cf
Routed to Reach 12R : AMERICAN BLVD

Routing by Dyn-Stor-Ind method, Time Span= 0.00-52.50 hrs, dt= 0.05 hrs
Peak Elev= 822.90' @ 12.46 hrs Surf.Area= 18,994 sf Storage= 51,479 cf

Plug-Flow detention time= (not calculated: outflow precedes inflow)
Center-of-Mass det. time= 433.8 min (1,206.0 - 772.1)

Volume	Invert	Avail.Storage	Storage Description
#1A	819.25'	29,914 cf	**83.00'W x 228.84'L x 6.75'H Field A** 128,209 cf Overall - 53,424 cf Embedded = 74,785 cf x 40.0% Voids
#2A	820.00'	53,424 cf	**ADS_StormTech MC-4500 b +Cap** x 495 Inside #1 Effective Size= 90.4"W x 60.0"H => 26.46 sf x 4.03'L = 106.5 cf Overall Size= 100.0"W x 60.0"H x 4.33'L with 0.31' Overlap 495 Chambers in 9 Rows Cap Storage= 39.5 cf x 2 x 9 rows = 711.0 cf
		83,338 cf	Total Available Storage

Storage Group A created with Chamber Wizard

Device	Routing	Invert	Outlet Devices
#1	Primary	820.00'	**24.0" Round Outlet to American Blvd** L= 500.0' CMP, projecting, no headwall, Ke= 0.900 Inlet / Outlet Invert= 820.00' / 817.50' S= 0.0050 '/' Cc= 0.900 n= 0.011 Concrete pipe, straight & clean, Flow Area= 3.14 sf
#2	Discarded	819.25'	**0.450 in/hr Infiltration over Surface area**
#3	Device 1	821.80'	**46.0" W x 6.0" H Vert. Orifice in Weir** C= 0.600 Limited to weir flow at low heads
#4	Device 1	822.72'	**5.0' long Weir** 2 End Contraction(s)

Discarded OutFlow Max=0.20 cfs @ 9.15 hrs HW=819.32' (Free Discharge)
└**2=Infiltration** (Exfiltration Controls 0.20 cfs)

Primary OutFlow Max=9.66 cfs @ 12.46 hrs HW=822.90' TW=0.00' (Dynamic Tailwater)
└**1=Outlet to American Blvd** (Passes 9.66 cfs of 16.45 cfs potential flow)
  ├**3=Orifice in Weir** (Orifice Controls 8.46 cfs @ 4.41 fps)
  └**4=Weir** (Weir Controls 1.20 cfs @ 1.37 fps)

Pond 1P: SYSTEM #1 - Chamber Wizard Field A

Chamber Model = ADS_StormTech MC-4500 b +Cap (ADS StormTech® MC-4500 with cap volume)
Effective Size= 90.4"W x 60.0"H => 26.46 sf x 4.03'L = 106.5 cf
Overall Size= 100.0"W x 60.0"H x 4.33'L with 0.31' Overlap
Cap Storage= 39.5 cf x 2 x 9 rows = 711.0 cf

100.0" Wide + 9.0" Spacing = 109.0" C-C Row Spacing

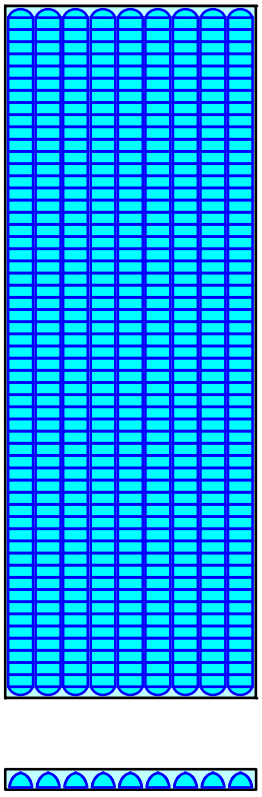
55 Chambers/Row x 4.02' Long +2.73' Cap Length x 2 = 226.84' Row Length +12.0" End Stone x 2 = 228.84' Base Length
9 Rows x 100.0" Wide + 9.0" Spacing x 8 + 12.0" Side Stone x 2 = 83.00' Base Width
9.0" Stone Base + 60.0" Chamber Height + 12.0" Stone Cover = 6.75' Field Height

495 Chambers x 106.5 cf + 39.5 cf Cap Volume x 2 x 9 Rows = 53,423.8 cf Chamber Storage

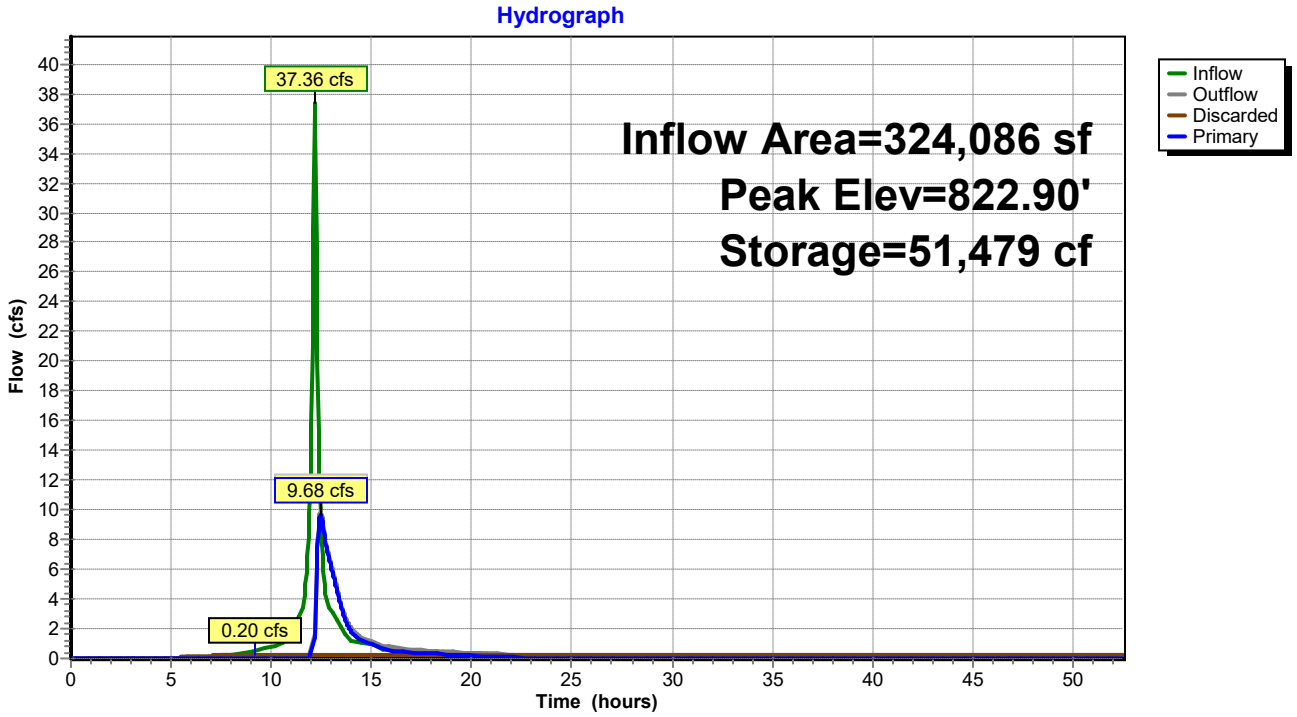
128,208.5 cf Field - 53,423.8 cf Chambers = 74,784.8 cf Stone x 40.0% Voids = 29,913.9 cf Stone Storage

Chamber Storage + Stone Storage = 83,337.7 cf = 1.913 af
Overall Storage Efficiency = 65.0%
Overall System Size = 228.84' x 83.00' x 6.75'

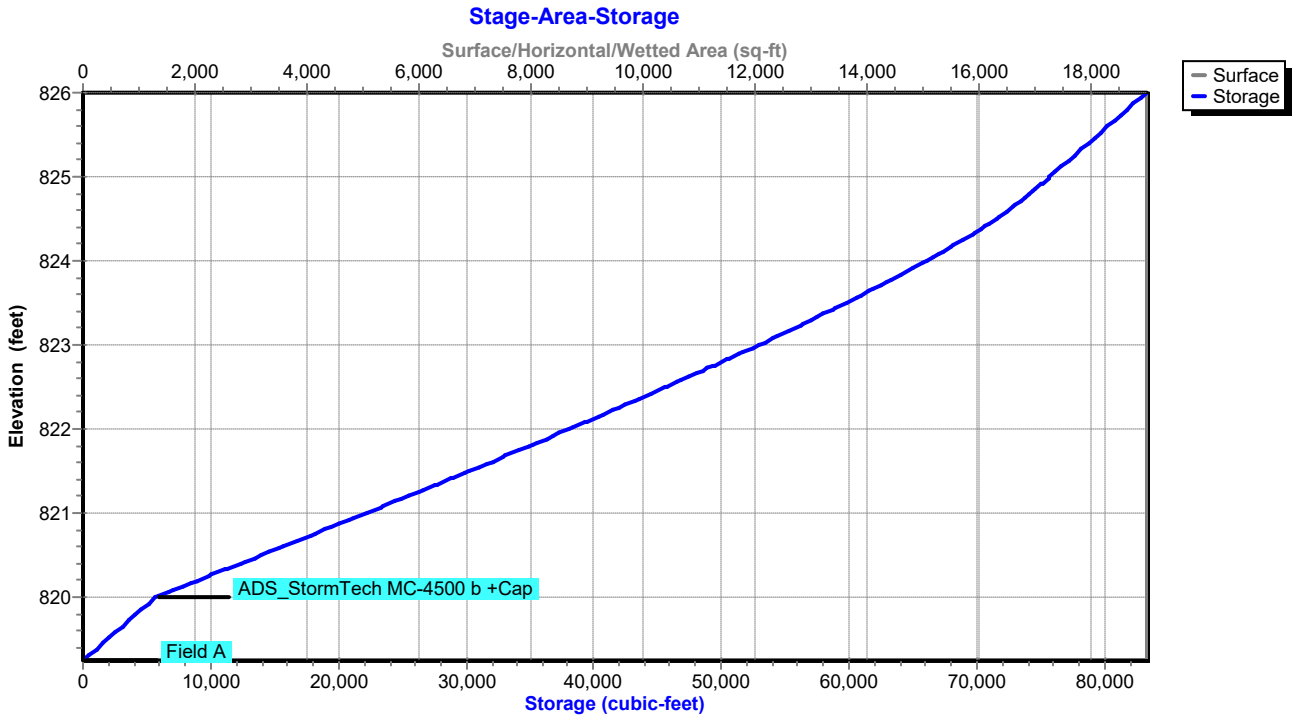
495 Chambers
4,748.5 cy Field
2,769.8 cy Stone



Pond 1P: SYSTEM #1



Pond 1P: SYSTEM #1



Summary for Pond 2P: SYSTEM #2

Inflow Area = 246,114 sf, 90.09% Impervious, Inflow Depth = 3.57" for 10-yr event
Inflow = 28.37 cfs @ 12.17 hrs, Volume= 73,211 cf
Outflow = 13.78 cfs @ 12.32 hrs, Volume= 63,416 cf, Atten= 51%, Lag= 9.3 min
Discarded = 0.13 cfs @ 8.70 hrs, Volume= 21,658 cf
Primary = 13.65 cfs @ 12.32 hrs, Volume= 41,757 cf
Routed to Reach 12R : AMERICAN BLVD

Routing by Dyn-Stor-Ind method, Time Span= 0.00-52.50 hrs, dt= 0.05 hrs
Peak Elev= 824.05' @ 12.32 hrs Surf.Area= 12,370 sf Storage= 34,788 cf

Plug-Flow detention time= 417.0 min calculated for 63,416 cf (87% of inflow)
Center-of-Mass det. time= 368.2 min (1,140.3 - 772.1)

Volume	Invert	Avail.Storage	Storage Description
#1A	820.25'	19,610 cf	**46.67'W x 265.07'L x 6.75'H Field A** 83,496 cf Overall - 34,472 cf Embedded = 49,024 cf x 40.0% Voids
#2A	821.00'	34,472 cf	**ADS_StormTech MC-4500 b +Cap** x 320 Inside #1 Effective Size= 90.4"W x 60.0"H => 26.46 sf x 4.03'L = 106.5 cf Overall Size= 100.0"W x 60.0"H x 4.33'L with 0.31' Overlap 320 Chambers in 5 Rows Cap Storage= 39.5 cf x 2 x 5 rows = 395.0 cf
		54,082 cf	Total Available Storage

Storage Group A created with Chamber Wizard

Device	Routing	Invert	Outlet Devices
#1	Primary	821.00'	**24.0" Round Outlet to American Boulevard** L= 600.0' CMP, projecting, no headwall, Ke= 0.900 Inlet / Outlet Invert= 821.00' / 817.50' S= 0.0058 '/' Cc= 0.900 n= 0.011 Concrete pipe, straight & clean, Flow Area= 3.14 sf
#2	Discarded	820.25'	**0.450 in/hr Infiltration over Surface area**
#3	Device 1	822.80'	**6.0" Vert. Orifice in Weir X 5.00** C= 0.600 Limited to weir flow at low heads
#4	Device 1	823.37'	**5.0' long Sharp-Crested Rectangular Weir** 2 End Contraction(s)

Discarded OutFlow Max=0.13 cfs @ 8.70 hrs HW=820.32' (Free Discharge)
└**2=Infiltration** (Exfiltration Controls 0.13 cfs)

Primary OutFlow Max=13.35 cfs @ 12.32 hrs HW=824.04' TW=0.00' (Dynamic Tailwater)
└**1=Outlet to American Boulevard** (Passes 13.35 cfs of 17.04 cfs potential flow)
  ├**3=Orifice in Weir** (Orifice Controls 4.69 cfs @ 4.78 fps)
  └**4=Sharp-Crested Rectangular Weir** (Weir Controls 8.65 cfs @ 2.67 fps)

Pond 2P: SYSTEM #2 - Chamber Wizard Field A

Chamber Model = ADS_StormTech MC-4500 b +Cap (ADS StormTech® MC-4500 with cap volume)
Effective Size= 90.4"W x 60.0"H => 26.46 sf x 4.03'L = 106.5 cf
Overall Size= 100.0"W x 60.0"H x 4.33'L with 0.31' Overlap
Cap Storage= 39.5 cf x 2 x 5 rows = 395.0 cf

100.0" Wide + 9.0" Spacing = 109.0" C-C Row Spacing

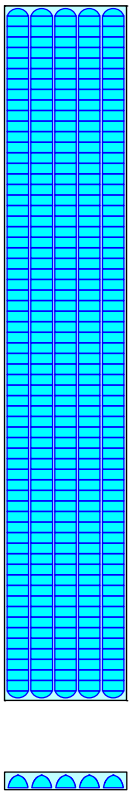
64 Chambers/Row x 4.02' Long +2.73' Cap Length x 2 = 263.07' Row Length +12.0" End Stone x 2 = 265.07' Base Length
5 Rows x 100.0" Wide + 9.0" Spacing x 4 + 12.0" Side Stone x 2 = 46.67' Base Width
9.0" Stone Base + 60.0" Chamber Height + 12.0" Stone Cover = 6.75' Field Height

320 Chambers x 106.5 cf + 39.5 cf Cap Volume x 2 x 5 Rows = 34,471.9 cf Chamber Storage

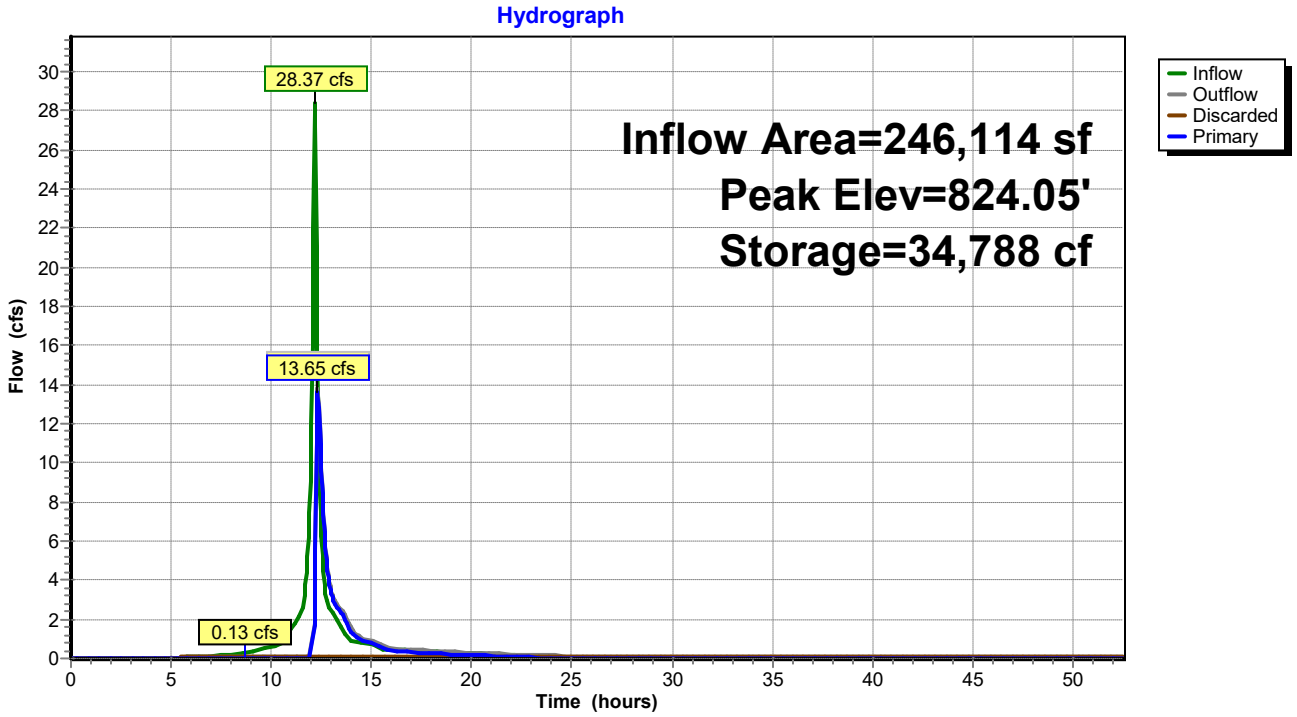
83,496.0 cf Field - 34,471.9 cf Chambers = 49,024.1 cf Stone x 40.0% Voids = 19,609.6 cf Stone Storage

Chamber Storage + Stone Storage = 54,081.6 cf = 1.242 af
Overall Storage Efficiency = 64.8%
Overall System Size = 265.07' x 46.67' x 6.75'

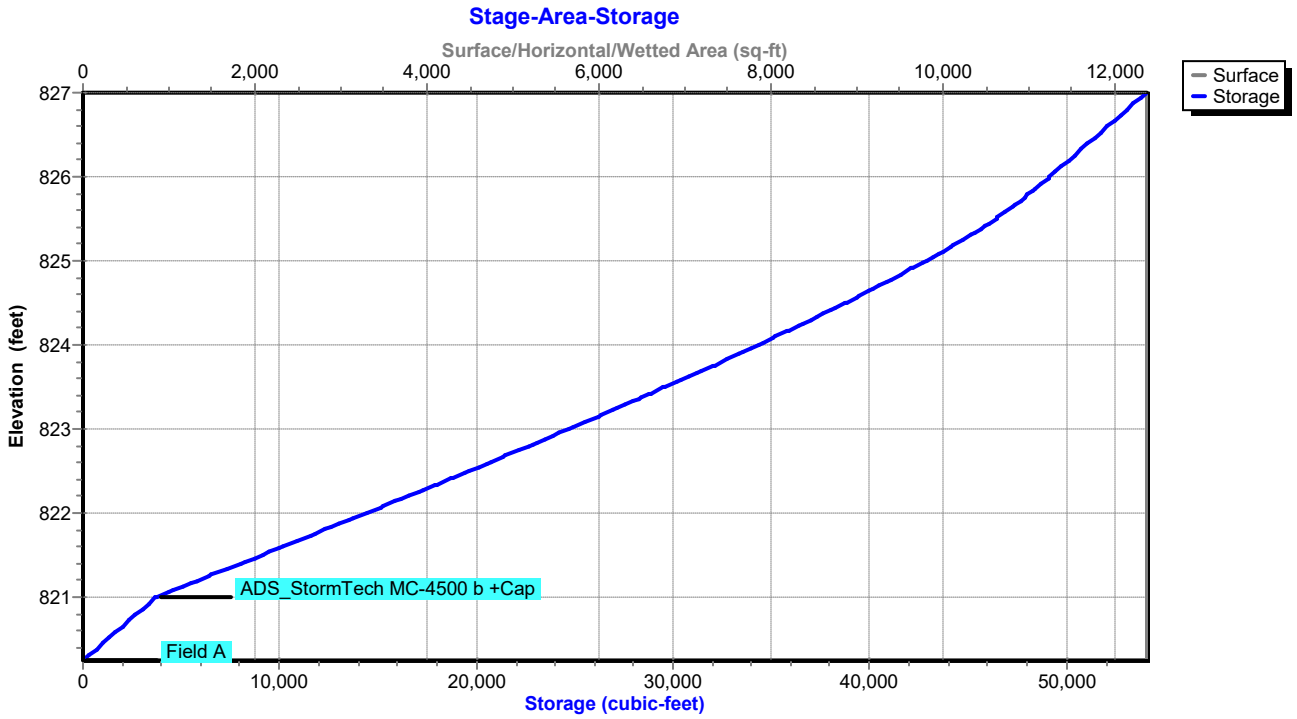
320 Chambers
3,092.4 cy Field
1,815.7 cy Stone



Pond 2P: SYSTEM #2



Pond 2P: SYSTEM #2



Time span=0.00-52.50 hrs, dt=0.05 hrs, 1051 points
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN
Reach routing by Dyn-Stor-Ind method - Pond routing by Dyn-Stor-Ind method

Subcatchment P DA-1: P-DA-1 Runoff Area=7.440 ac 90.32% Impervious Runoff Depth=6.77"
Tc=10.0 min CN=94 Runoff=68.34 cfs 182,973 cf

Subcatchment P DA-2: P-DA-2 Runoff Area=0.630 ac 49.21% Impervious Runoff Depth=5.03"
Tc=10.0 min CN=79 Runoff=4.73 cfs 11,514 cf

Subcatchment P DA-3: P-DA-3 Runoff Area=0.090 ac 66.67% Impervious Runoff Depth=5.84"
Tc=10.0 min CN=86 Runoff=0.76 cfs 1,907 cf

Subcatchment P DA-4: P-DA-4 Runoff Area=5.650 ac 90.09% Impervious Runoff Depth=6.77"
Tc=10.0 min CN=94 Runoff=51.90 cfs 138,951 cf

Subcatchment P DA-5: P-DA-5 Runoff Area=0.670 ac 94.03% Impervious Runoff Depth=7.01"
Tc=7.0 min CN=96 Runoff=7.00 cfs 17,054 cf

Subcatchment P DA-6: P-DA-6 Runoff Area=0.600 ac 83.33% Impervious Runoff Depth=6.54"
Tc=7.0 min CN=92 Runoff=6.10 cfs 14,242 cf

Reach 10R: PENN AVE Inflow=4.73 cfs 11,514 cf
Outflow=4.73 cfs 11,514 cf

Reach 11R: KNOX AVE Inflow=0.76 cfs 1,907 cf
Outflow=0.76 cfs 1,907 cf

Reach 12R: AMERICAN BLVD Inflow=55.72 cfs 270,861 cf
Outflow=55.72 cfs 270,861 cf

Pond 1P: SYSTEM #1 Peak Elev=826.00' Storage=83,338 cf Inflow=68.34 cfs 182,973 cf
Discarded=0.20 cfs 34,517 cf Primary=25.49 cfs 133,260 cf Outflow=25.69 cfs 167,777 cf

Pond 2P: SYSTEM #2 Peak Elev=826.89' Storage=53,560 cf Inflow=51.90 cfs 138,951 cf
Discarded=0.13 cfs 22,530 cf Primary=25.45 cfs 106,304 cf Outflow=25.58 cfs 128,834 cf

Total Runoff Area = 656,885 sf Runoff Volume = 366,642 cf Average Runoff Depth = 6.70"
11.74% Pervious = 77,101 sf 88.26% Impervious = 579,784 sf

Summary for Subcatchment P DA-1: P-DA-1

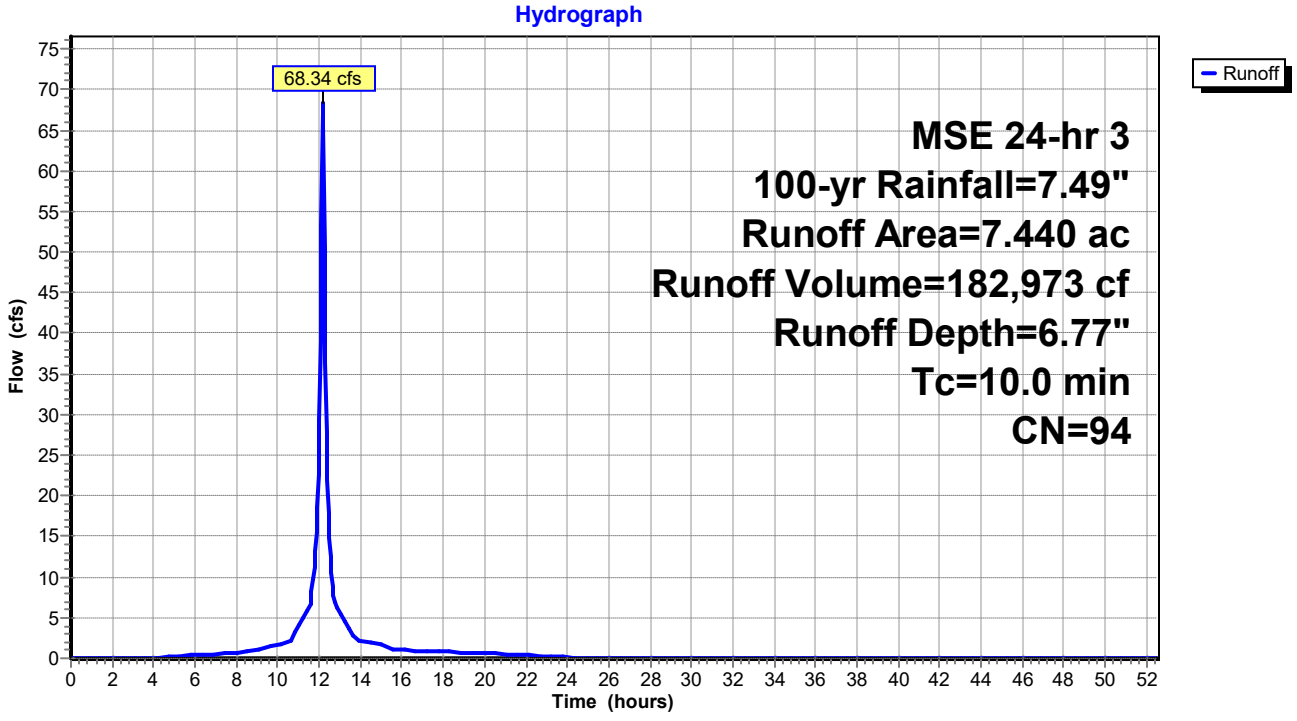
Runoff = 68.34 cfs @ 12.17 hrs, Volume= 182,973 cf, Depth= 6.77"
Routed to Pond 1P : SYSTEM #1

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-52.50 hrs, dt= 0.05 hrs
MSE 24-hr 3 100-yr Rainfall=7.49"

Area (ac)	CN	Description
6.720	98	Paved parking, HSG B
0.720	61	>75% Grass cover, Good, HSG B
7.440	94	Weighted Average
0.720		9.68% Pervious Area
6.720		90.32% Impervious Area

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

Subcatchment P DA-1: P-DA-1



Summary for Subcatchment P DA-2: P-DA-2

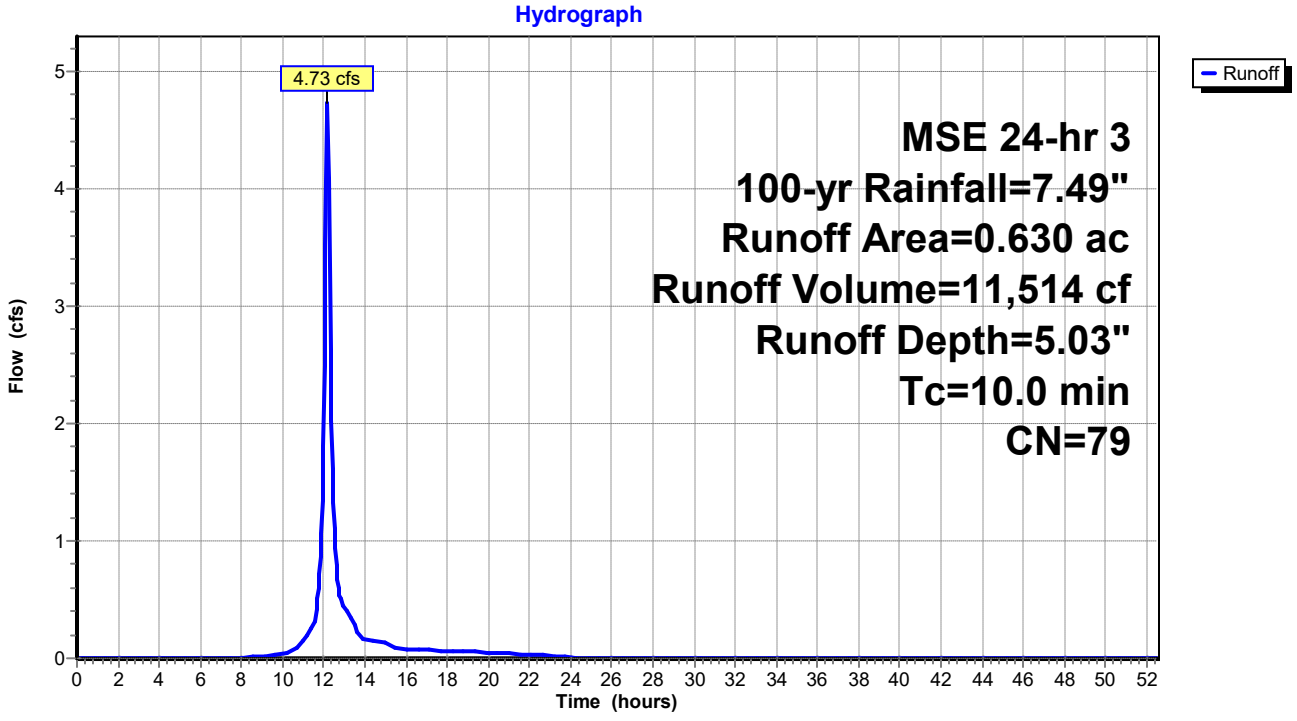
Runoff = 4.73 cfs @ 12.17 hrs, Volume= 11,514 cf, Depth= 5.03"
Routed to Reach 10R : PENN AVE

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-52.50 hrs, dt= 0.05 hrs
MSE 24-hr 3 100-yr Rainfall=7.49"

Area (ac)	CN	Description
0.310	98	Paved parking, HSG B
0.320	61	>75% Grass cover, Good, HSG B
0.630	79	Weighted Average
0.320		50.79% Pervious Area
0.310		49.21% Impervious Area

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

Subcatchment P DA-2: P-DA-2



Summary for Subcatchment P DA-3: P-DA-3

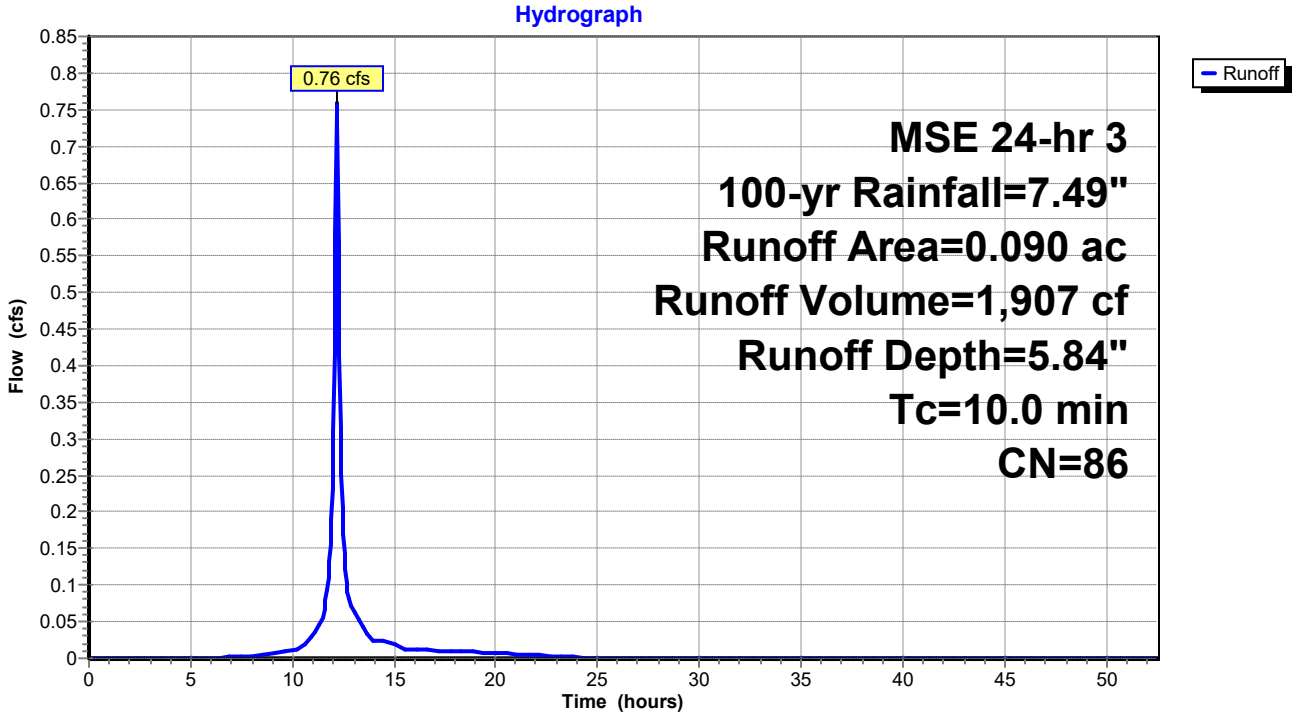
Runoff = 0.76 cfs @ 12.17 hrs, Volume= 1,907 cf, Depth= 5.84"
Routed to Reach 11R : KNOX AVE

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-52.50 hrs, dt= 0.05 hrs
MSE 24-hr 3 100-yr Rainfall=7.49"

Area (ac)	CN	Description
0.060	98	Paved parking, HSG B
0.030	61	>75% Grass cover, Good, HSG B
0.090	86	Weighted Average
0.030		33.33% Pervious Area
0.060		66.67% Impervious Area

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

Subcatchment P DA-3: P-DA-3



Summary for Subcatchment P DA-4: P-DA-4

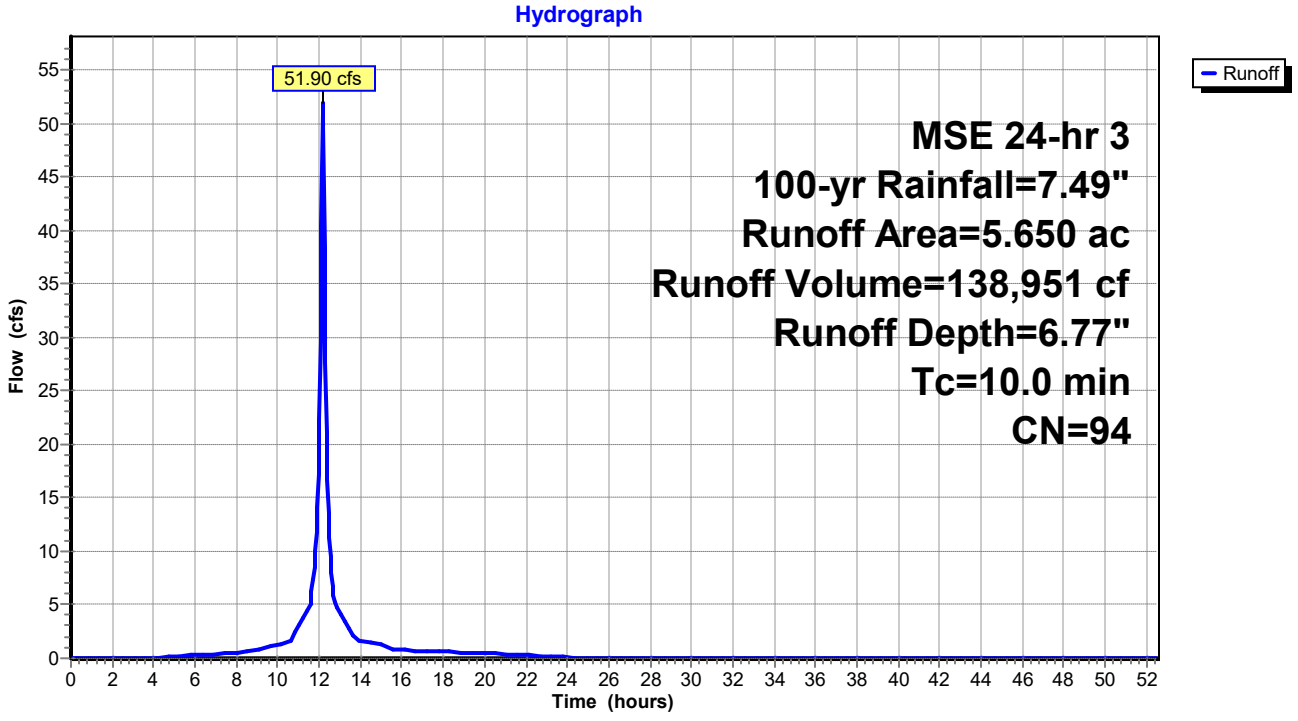
Runoff = 51.90 cfs @ 12.17 hrs, Volume= 138,951 cf, Depth= 6.77"
Routed to Pond 2P : SYSTEM #2

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-52.50 hrs, dt= 0.05 hrs
MSE 24-hr 3 100-yr Rainfall=7.49"

Area (ac)	CN	Description
5.090	98	Paved parking, HSG B
0.560	61	>75% Grass cover, Good, HSG B
5.650	94	Weighted Average
0.560		9.91% Pervious Area
5.090		90.09% Impervious Area

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

Subcatchment P DA-4: P-DA-4



Summary for Subcatchment P DA-5: P-DA-5

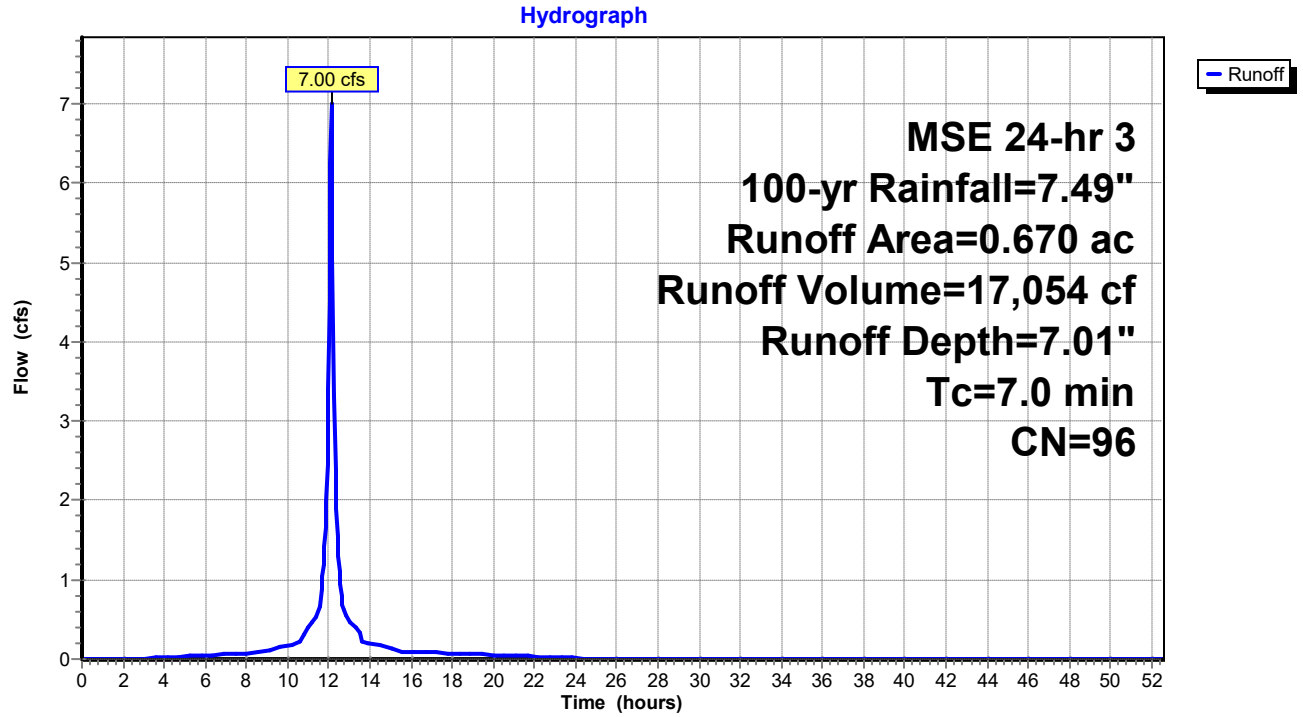
Runoff = 7.00 cfs @ 12.14 hrs, Volume= 17,054 cf, Depth= 7.01"
Routed to Reach 12R : AMERICAN BLVD

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-52.50 hrs, dt= 0.05 hrs
MSE 24-hr 3 100-yr Rainfall=7.49"

Area (ac)	CN	Description
0.630	98	Paved parking, HSG B
0.040	61	>75% Grass cover, Good, HSG B
0.670	96	Weighted Average
0.040		5.97% Pervious Area
0.630		94.03% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
6.0					**Direct Entry,**
6.0	0	Total, Increased to minimum Tc = 7.0 min			

Subcatchment P DA-5: P-DA-5



Summary for Subcatchment P DA-6: P-DA-6

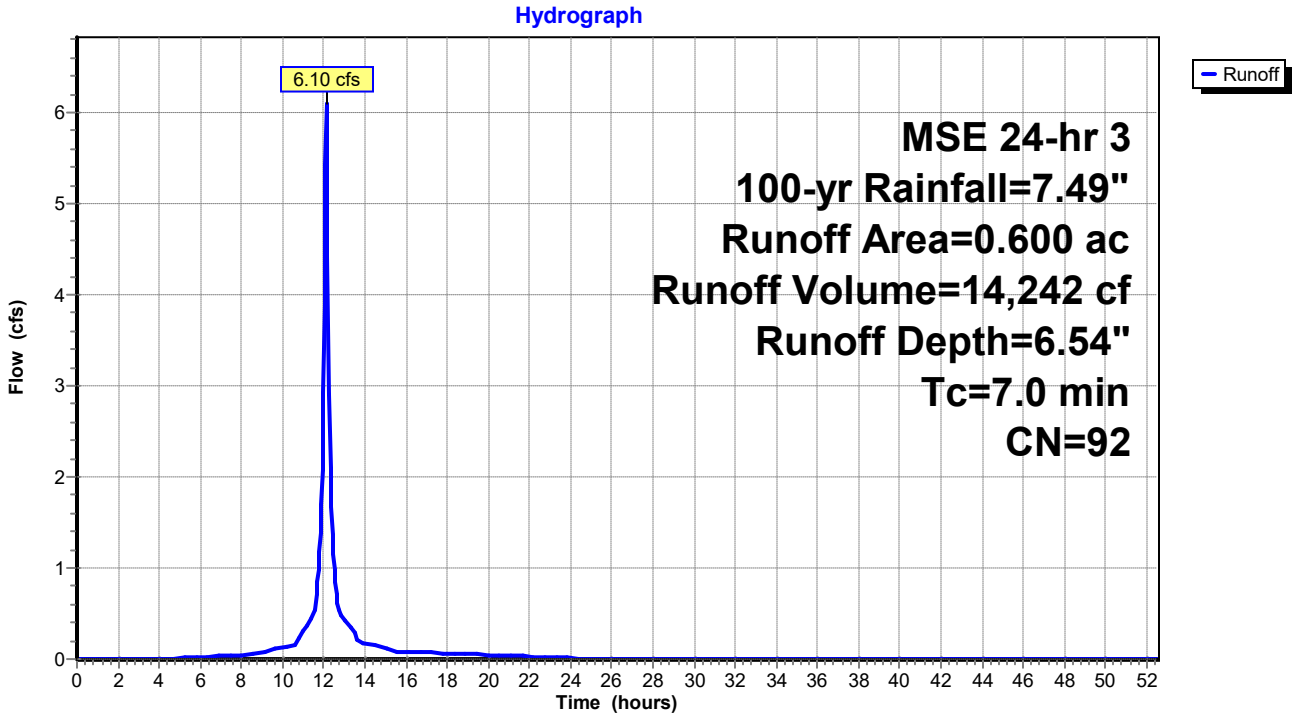
Runoff = 6.10 cfs @ 12.14 hrs, Volume= 14,242 cf, Depth= 6.54"
Routed to Reach 12R : AMERICAN BLVD

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-52.50 hrs, dt= 0.05 hrs
MSE 24-hr 3 100-yr Rainfall=7.49"

Area (ac)	CN	Description
0.500	98	Paved parking, HSG B
0.100	61	>75% Grass cover, Good, HSG B
0.600	92	Weighted Average
0.100		16.67% Pervious Area
0.500		83.33% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
6.0					**Direct Entry,**
6.0	0	Total, Increased to minimum Tc = 7.0 min			

Subcatchment P DA-6: P-DA-6



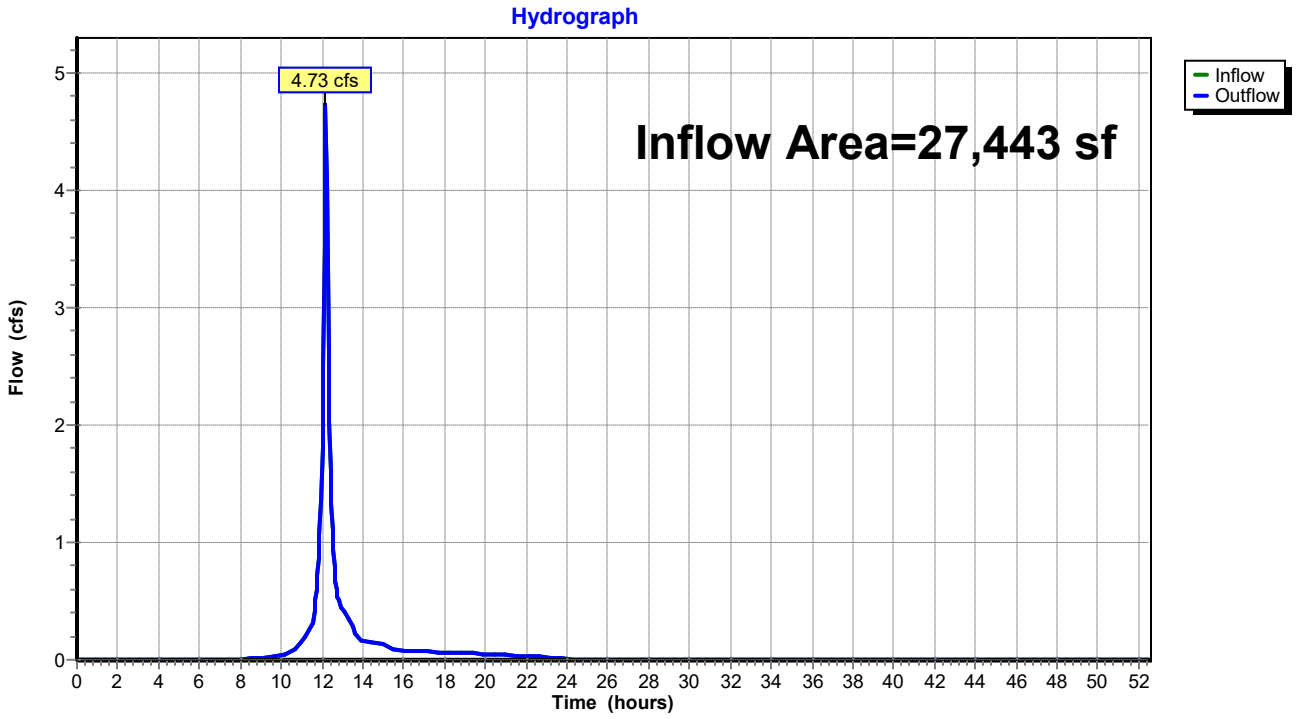
Summary for Reach 10R: PENN AVE

[40] Hint: Not Described (Outflow=Inflow)

Inflow Area = 27,443 sf, 49.21% Impervious, Inflow Depth = 5.03" for 100-yr event
Inflow = 4.73 cfs @ 12.17 hrs, Volume= 11,514 cf
Outflow = 4.73 cfs @ 12.17 hrs, Volume= 11,514 cf, Atten= 0%, Lag= 0.0 min
Routed to nonexistent node Energy Dr

Routing by Dyn-Stor-Ind method, Time Span= 0.00-52.50 hrs, dt= 0.05 hrs

Reach 10R: PENN AVE



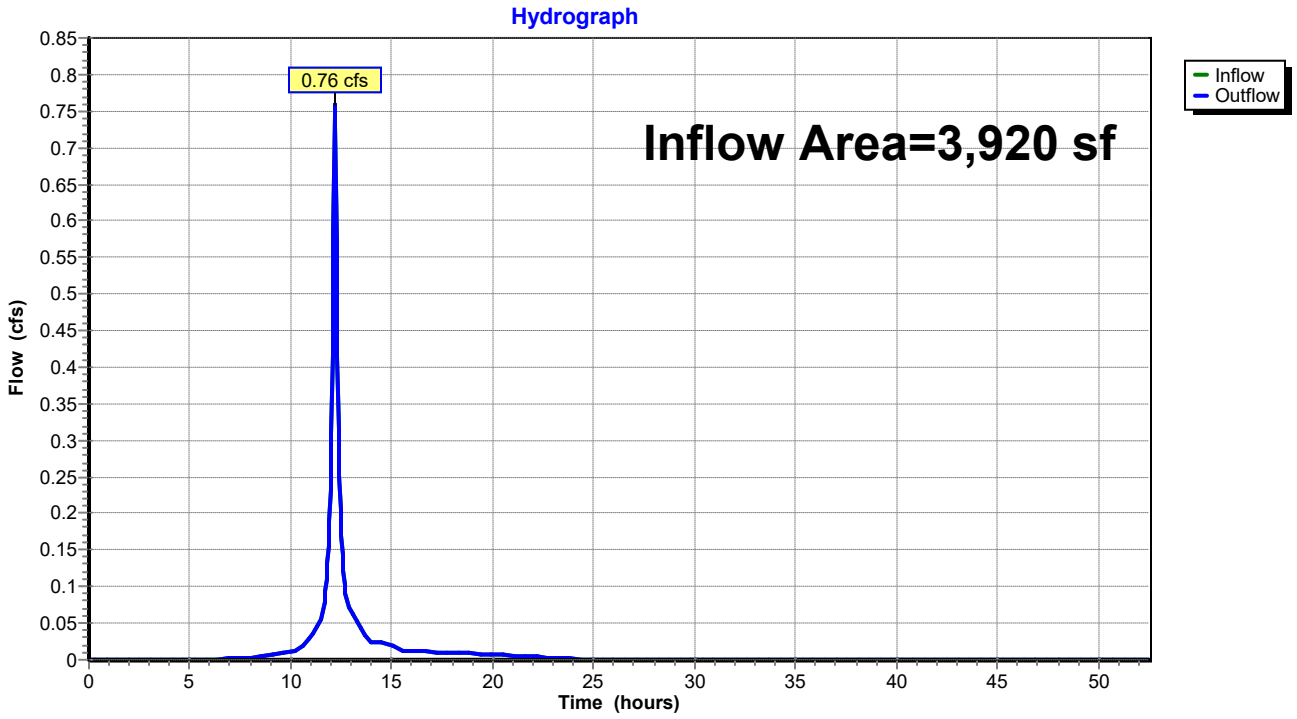
Summary for Reach 11R: KNOX AVE

[40] Hint: Not Described (Outflow=Inflow)

Inflow Area = 3,920 sf, 66.67% Impervious, Inflow Depth = 5.84" for 100-yr event
Inflow = 0.76 cfs @ 12.17 hrs, Volume= 1,907 cf
Outflow = 0.76 cfs @ 12.17 hrs, Volume= 1,907 cf, Atten= 0%, Lag= 0.0 min
Routed to nonexistent node Energy Dr

Routing by Dyn-Stor-Ind method, Time Span= 0.00-52.50 hrs, dt= 0.05 hrs

Reach 11R: KNOX AVE



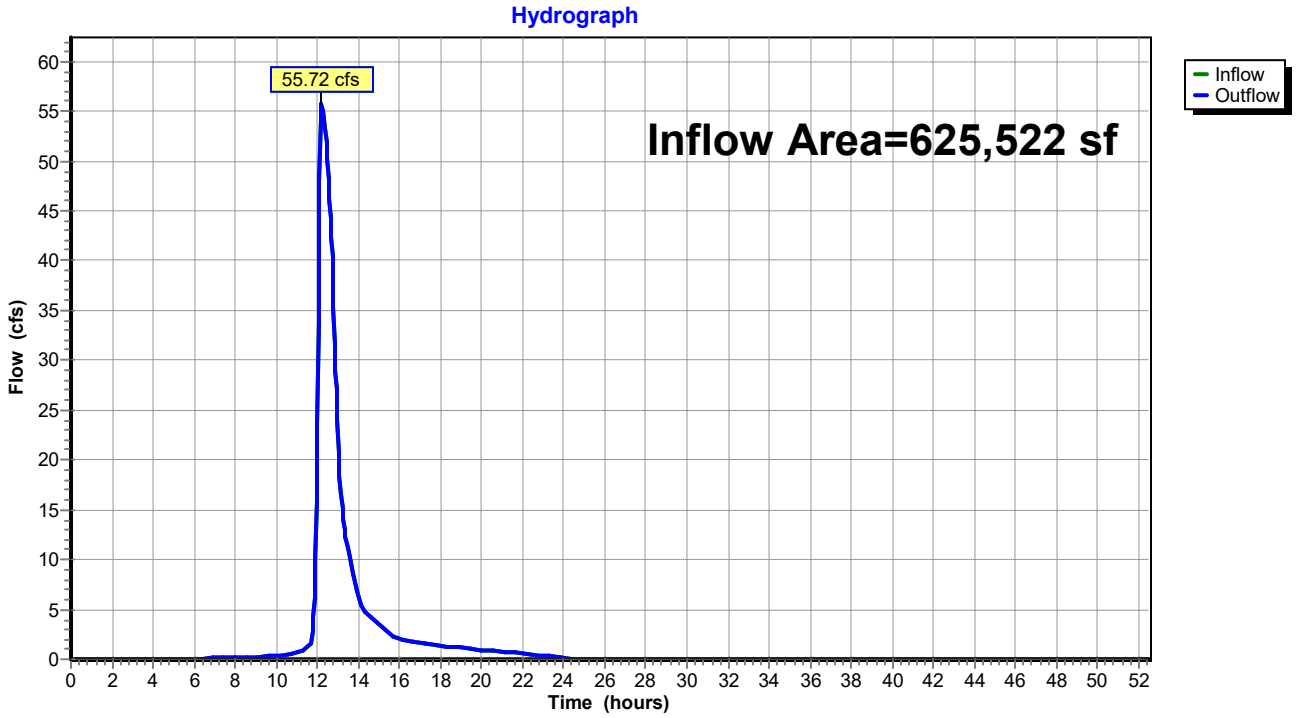
Summary for Reach 12R: AMERICAN BLVD

[40] Hint: Not Described (Outflow=Inflow)

Inflow Area = 625,522 sf, 90.11% Impervious, Inflow Depth = 5.20" for 100-yr event
Inflow = 55.72 cfs @ 12.22 hrs, Volume= 270,861 cf
Outflow = 55.72 cfs @ 12.22 hrs, Volume= 270,861 cf, Atten= 0%, Lag= 0.0 min

Routing by Dyn-Stor-Ind method, Time Span= 0.00-52.50 hrs, dt= 0.05 hrs

Reach 12R: AMERICAN BLVD



Summary for Pond 1P: SYSTEM #1

Inflow Area = 324,086 sf, 90.32% Impervious, Inflow Depth = 6.77" for 100-yr event
Inflow = 68.34 cfs @ 12.17 hrs, Volume= 182,973 cf
Outflow = 25.69 cfs @ 12.37 hrs, Volume= 167,777 cf, Atten= 62%, Lag= 12.0 min
Discarded = 0.20 cfs @ 6.25 hrs, Volume= 34,517 cf
Primary = 25.49 cfs @ 12.37 hrs, Volume= 133,260 cf
Routed to Reach 12R : AMERICAN BLVD

Routing by Dyn-Stor-Ind method, Time Span= 0.00-52.50 hrs, dt= 0.05 hrs
Peak Elev= 826.00' @ 12.37 hrs Surf.Area= 18,994 sf Storage= 83,338 cf

Plug-Flow detention time= 271.4 min calculated for 167,617 cf (92% of inflow)
Center-of-Mass det. time= 236.4 min (997.0 - 760.6)

Volume	Invert	Avail.Storage	Storage Description
#1A	819.25'	29,914 cf	**83.00'W x 228.84'L x 6.75'H Field A** 128,209 cf Overall - 53,424 cf Embedded = 74,785 cf x 40.0% Voids
#2A	820.00'	53,424 cf	**ADS_StormTech MC-4500 b +Cap** x 495 Inside #1 Effective Size= 90.4"W x 60.0"H => 26.46 sf x 4.03'L = 106.5 cf Overall Size= 100.0"W x 60.0"H x 4.33'L with 0.31' Overlap 495 Chambers in 9 Rows Cap Storage= 39.5 cf x 2 x 9 rows = 711.0 cf
		83,338 cf	Total Available Storage

Storage Group A created with Chamber Wizard

Device	Routing	Invert	Outlet Devices
#1	Primary	820.00'	**24.0" Round Outlet to American Blvd** L= 500.0' CMP, projecting, no headwall, Ke= 0.900 Inlet / Outlet Invert= 820.00' / 817.50' S= 0.0050 '/' Cc= 0.900 n= 0.011 Concrete pipe, straight & clean, Flow Area= 3.14 sf
#2	Discarded	819.25'	**0.450 in/hr Infiltration over Surface area**
#3	Device 1	821.80'	**46.0" W x 6.0" H Vert. Orifice in Weir** C= 0.600 Limited to weir flow at low heads
#4	Device 1	822.72'	**5.0' long Weir** 2 End Contraction(s)

Discarded OutFlow Max=0.20 cfs @ 6.25 hrs HW=819.32' (Free Discharge)
└**2=Infiltration** (Exfiltration Controls 0.20 cfs)

Primary OutFlow Max=25.45 cfs @ 12.37 hrs HW=825.98' TW=0.00' (Dynamic Tailwater)
└**1=Outlet to American Blvd** (Barrel Controls 25.45 cfs @ 8.10 fps)
  ├**3=Orifice in Weir** (Passes < 18.29 cfs potential flow)
  └**4=Weir** (Passes < 83.73 cfs potential flow)

Pond 1P: SYSTEM #1 - Chamber Wizard Field A

Chamber Model = ADS_StormTech MC-4500 b +Cap (ADS StormTech® MC-4500 with cap volume)
Effective Size= 90.4"W x 60.0"H => 26.46 sf x 4.03'L = 106.5 cf
Overall Size= 100.0"W x 60.0"H x 4.33'L with 0.31' Overlap
Cap Storage= 39.5 cf x 2 x 9 rows = 711.0 cf

100.0" Wide + 9.0" Spacing = 109.0" C-C Row Spacing

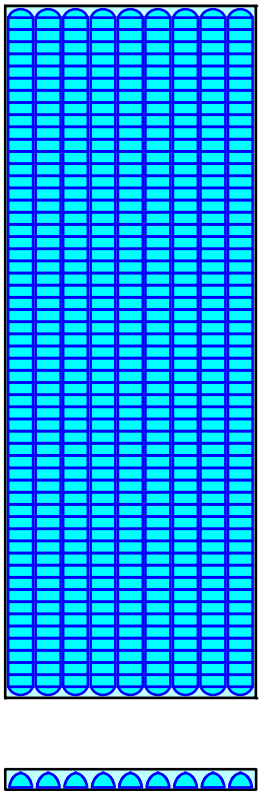
55 Chambers/Row x 4.02' Long +2.73' Cap Length x 2 = 226.84' Row Length +12.0" End Stone x 2 = 228.84' Base Length
9 Rows x 100.0" Wide + 9.0" Spacing x 8 + 12.0" Side Stone x 2 = 83.00' Base Width
9.0" Stone Base + 60.0" Chamber Height + 12.0" Stone Cover = 6.75' Field Height

495 Chambers x 106.5 cf + 39.5 cf Cap Volume x 2 x 9 Rows = 53,423.8 cf Chamber Storage

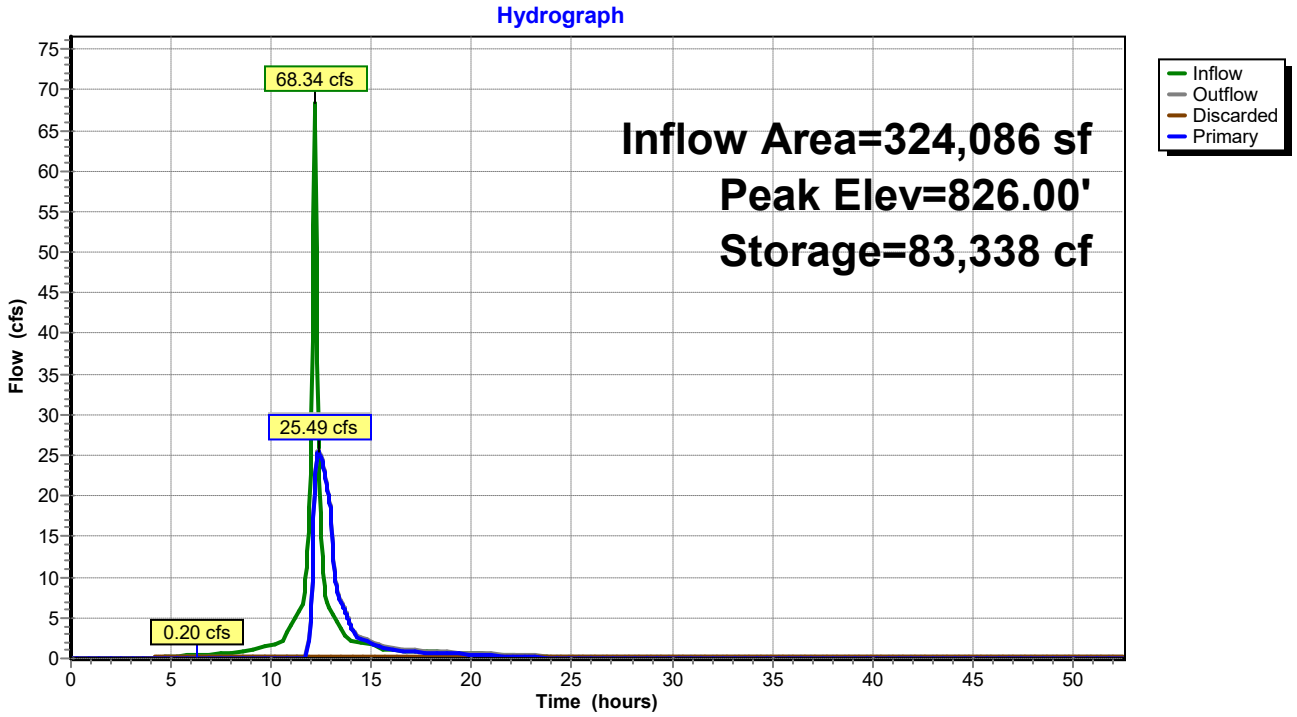
128,208.5 cf Field - 53,423.8 cf Chambers = 74,784.8 cf Stone x 40.0% Voids = 29,913.9 cf Stone Storage

Chamber Storage + Stone Storage = 83,337.7 cf = 1.913 af
Overall Storage Efficiency = 65.0%
Overall System Size = 228.84' x 83.00' x 6.75'

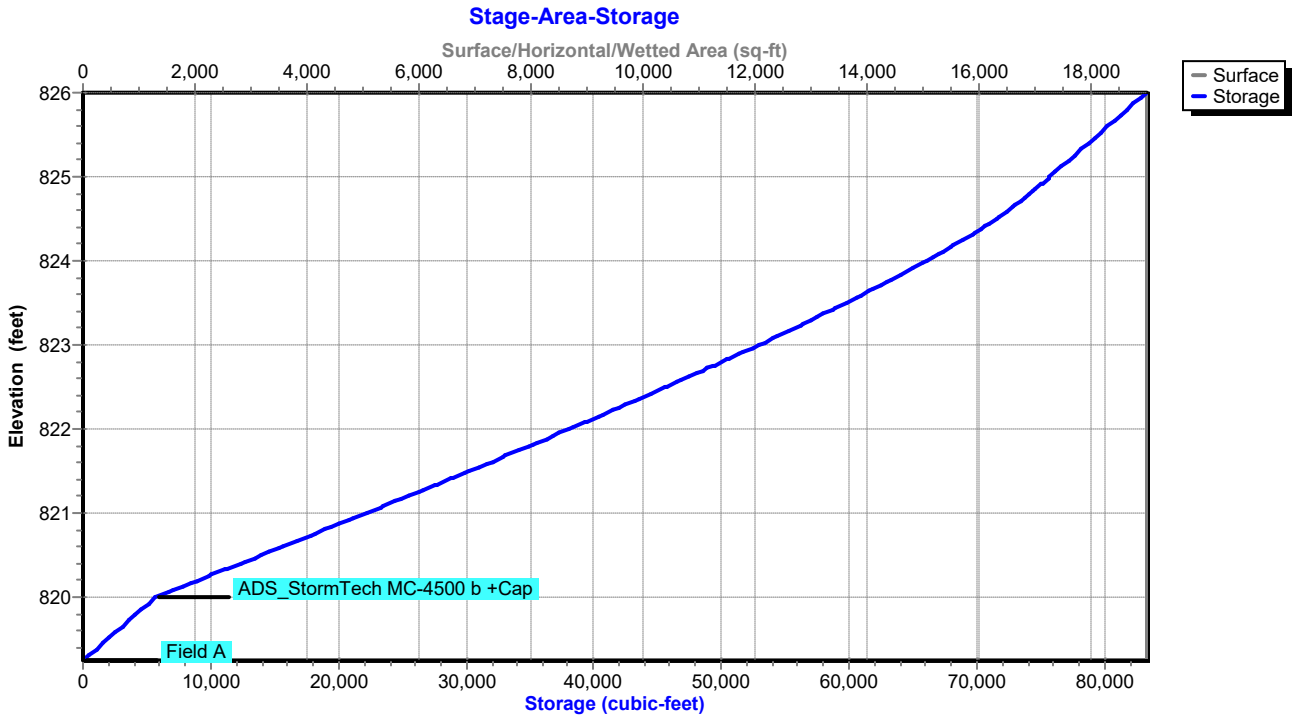
495 Chambers
4,748.5 cy Field
2,769.8 cy Stone



Pond 1P: SYSTEM #1



Pond 1P: SYSTEM #1



Summary for Pond 2P: SYSTEM #2

Inflow Area = 246,114 sf, 90.09% Impervious, Inflow Depth = 6.77" for 100-yr event
Inflow = 51.90 cfs @ 12.17 hrs, Volume= 138,951 cf
Outflow = 25.58 cfs @ 12.32 hrs, Volume= 128,834 cf, Atten= 51%, Lag= 9.0 min
Discarded = 0.13 cfs @ 5.95 hrs, Volume= 22,530 cf
Primary = 25.45 cfs @ 12.32 hrs, Volume= 106,304 cf
Routed to Reach 12R : AMERICAN BLVD

Routing by Dyn-Stor-Ind method, Time Span= 0.00-52.50 hrs, dt= 0.05 hrs
Peak Elev= 826.89' @ 12.32 hrs Surf.Area= 12,370 sf Storage= 53,560 cf

Plug-Flow detention time= 234.0 min calculated for 128,712 cf (93% of inflow)
Center-of-Mass det. time= 202.2 min (962.8 - 760.6)

Volume	Invert	Avail.Storage	Storage Description
#1A	820.25'	19,610 cf	**46.67'W x 265.07'L x 6.75'H Field A** 83,496 cf Overall - 34,472 cf Embedded = 49,024 cf x 40.0% Voids
#2A	821.00'	34,472 cf	**ADS_StormTech MC-4500 b +Cap** x 320 Inside #1 Effective Size= 90.4"W x 60.0"H => 26.46 sf x 4.03'L = 106.5 cf Overall Size= 100.0"W x 60.0"H x 4.33'L with 0.31' Overlap 320 Chambers in 5 Rows Cap Storage= 39.5 cf x 2 x 5 rows = 395.0 cf
		54,082 cf	Total Available Storage

Storage Group A created with Chamber Wizard

Device	Routing	Invert	Outlet Devices
#1	Primary	821.00'	**24.0" Round Outlet to American Boulevard** L= 600.0' CMP, projecting, no headwall, Ke= 0.900 Inlet / Outlet Invert= 821.00' / 817.50' S= 0.0058 '/' Cc= 0.900 n= 0.011 Concrete pipe, straight & clean, Flow Area= 3.14 sf
#2	Discarded	820.25'	**0.450 in/hr Infiltration over Surface area**
#3	Device 1	822.80'	**6.0" Vert. Orifice in Weir X 5.00** C= 0.600 Limited to weir flow at low heads
#4	Device 1	823.37'	**5.0' long Sharp-Crested Rectangular Weir** 2 End Contraction(s)

Discarded OutFlow Max=0.13 cfs @ 5.95 hrs HW=820.32' (Free Discharge)
└**2=Infiltration** (Exfiltration Controls 0.13 cfs)

Primary OutFlow Max=25.39 cfs @ 12.32 hrs HW=826.86' TW=0.00' (Dynamic Tailwater)
└**1=Outlet to American Boulevard** (Barrel Controls 25.39 cfs @ 8.08 fps)
├**3=Orifice in Weir** (Passes < 9.22 cfs potential flow)
└**4=Sharp-Crested Rectangular Weir** (Passes < 91.61 cfs potential flow)

Pond 2P: SYSTEM #2 - Chamber Wizard Field A

Chamber Model = ADS_StormTech MC-4500 b +Cap (ADS StormTech® MC-4500 with cap volume)
Effective Size= 90.4"W x 60.0"H => 26.46 sf x 4.03'L = 106.5 cf
Overall Size= 100.0"W x 60.0"H x 4.33'L with 0.31' Overlap
Cap Storage= 39.5 cf x 2 x 5 rows = 395.0 cf

100.0" Wide + 9.0" Spacing = 109.0" C-C Row Spacing

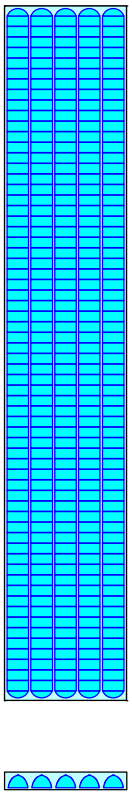
64 Chambers/Row x 4.02' Long +2.73' Cap Length x 2 = 263.07' Row Length +12.0" End Stone x 2 = 265.07' Base Length
5 Rows x 100.0" Wide + 9.0" Spacing x 4 + 12.0" Side Stone x 2 = 46.67' Base Width
9.0" Stone Base + 60.0" Chamber Height + 12.0" Stone Cover = 6.75' Field Height

320 Chambers x 106.5 cf + 39.5 cf Cap Volume x 2 x 5 Rows = 34,471.9 cf Chamber Storage

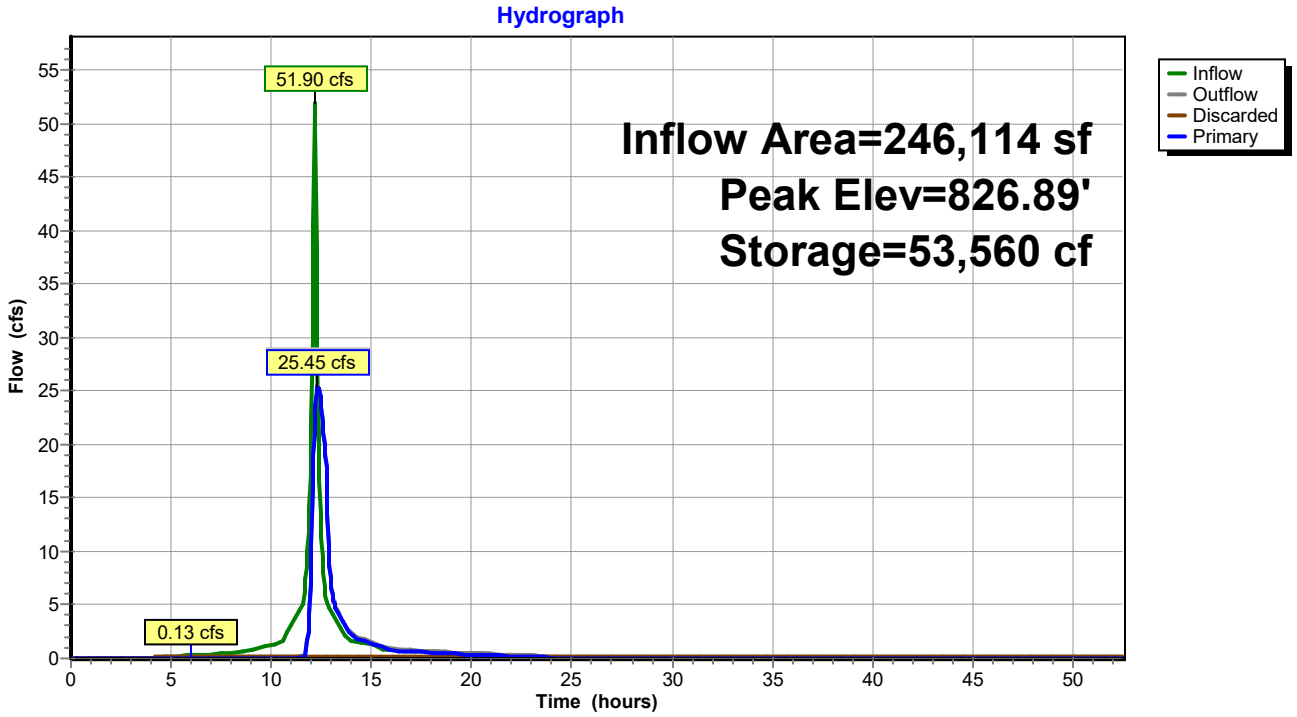
83,496.0 cf Field - 34,471.9 cf Chambers = 49,024.1 cf Stone x 40.0% Voids = 19,609.6 cf Stone Storage

Chamber Storage + Stone Storage = 54,081.6 cf = 1.242 af
Overall Storage Efficiency = 64.8%
Overall System Size = 265.07' x 46.67' x 6.75'

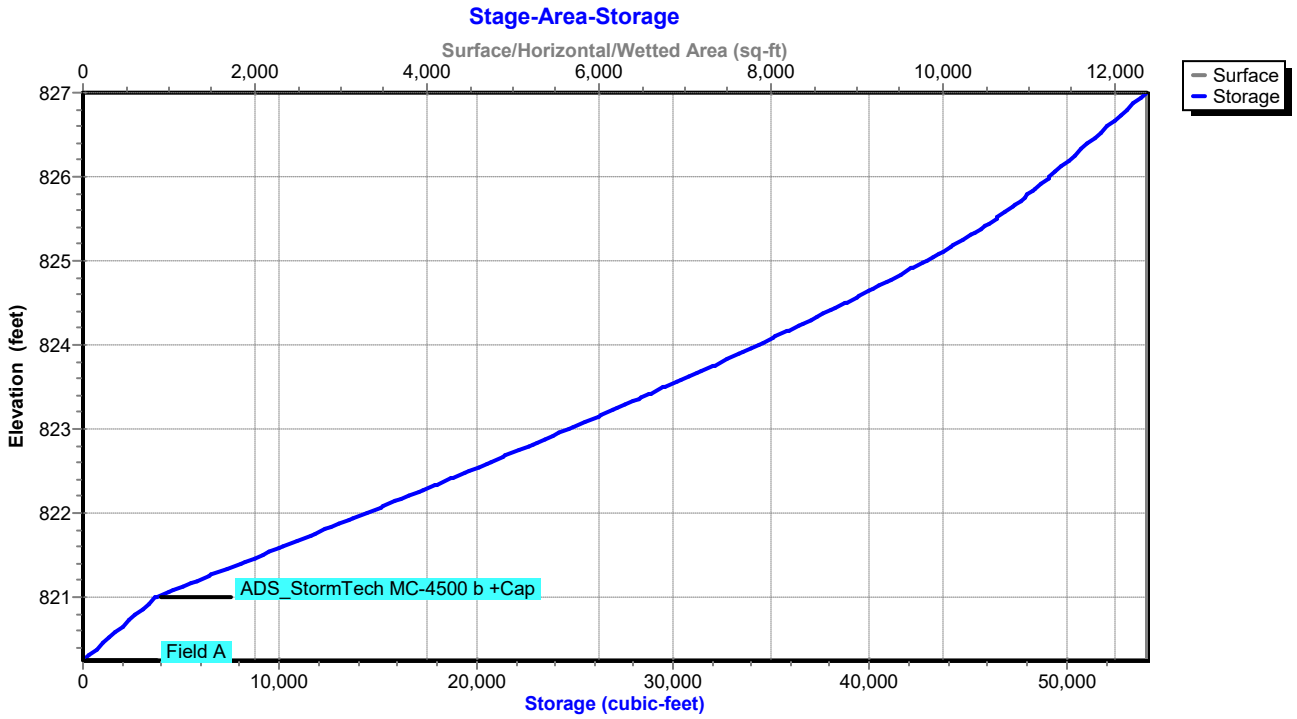
320 Chambers
3,092.4 cy Field
1,815.7 cy Stone



Pond 2P: SYSTEM #2



Pond 2P: SYSTEM #2



Appendix 4. Geotechnical Report

Geotechnical Evaluation Report

Southtown Redevelopment
Dick's House of Sports, Adjacent Retail Space and Site Improvements
7801-7997 Southtown Drive
Bloomington, Minnesota

Prepared for

Kraus Anderson Development Company

Professional Certification:
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.

Steven B. Martin, PE
Senior Engineer
License Number: 41271
May 31, 2024

Project B2304507

Braun Intertec Corporation

Braun Intertec Corporation
11001 Hampshire Avenue S
Minneapolis, MN 55438

Phone: 952.995.2000
Fax: 952.995.2020
Web: braunintertec.com

May 31, 2024 Project B2304507

Mr. John Dreher
Kraus-Anderson Development Company
501 South 8th Street
Minneapolis, MN 55404

Re: Geotechnical Evaluation
Southtown Redevelopment – Dick's House of Sports, Adjacent Retail Space and site Improvements
7801-7997 Southtown Drive
Bloomington, Minnesota

Dear Mr. Dreher:

We are pleased to present this Geotechnical Evaluation Report for the proposed Dick's House of Sports, adjacent retail space and site improvements.

Thank you for making Braun Intertec your geotechnical consultant for this project. If you have questions about this report, or if there are other services that we can provide in support of our work to date, please contact Steve Martin at 612.221.2504 (smartin@braunintertec.com) or Bob Janssen at 612.865.8786 (bjanssen@braunintertec.com).

Sincerely,

BRAUN INTERTEC CORPORATION

Steven B. Martin, PE
Senior Engineer

Robert. J. Janssen, PE
Senior Vice President, Principal Engineer

c: Bob Janssen Jr., Kraus Anderson

Table of Contents

Description **Page**

Table of Contents (continued)

Description **Page**

Appendix

A. Introduction

A.1. Project Description

This Geotechnical Evaluation Report addresses the proposed reconstruction of the existing Southtown Retail Development, located southwest of Interstate 35W and 494 in Bloomington, Minnesota. Currently, the first phase of the redevelopment is planned to consist of demolition of the former Herberger's building and construction of a 2-level Dick's House of Sports (Dick's) overlying much of that former building footprint. The Dick's building will be approximately 60,000 square feet per level. A portion of the sporting goods building will extend west of the existing building footprint. An outdoor, artificial turf field will be constructed to the northwest of the proposed building. A smaller retail building, approximately 20,000 square feet, will share a portion of the east wall of the proposed Dick's building. Site improvements during this phase of the redevelopment will include installation of below grade storm management systems below the existing power lines. Various portions of the site bituminous pavements will be reconstructed during this phase of redevelopment. We understand that Kraus Anderson will be responsible for delivering a prepared pad for the proposed buildings. Table 1 provides known and assumed project details.

Table 1. Project Details

Aspect	Description
Below grade levels	None (Provided)
Above grade levels	Two - Dick's Building (Provided) One – Adjacent Retail building (Assumed)
Finished floor elevation	835 -both buildings (Assumed)
Column loads (kips)	Max of 355 – Dick's building (Provided) Max of 200 – Adjacent Retail building (Assumed)
Wall loads (kips/ft)	Max of 10 – Dick's Building (Assumed) Max of 5 – Adjacent Retail building (Assumed)
Floor slab loads – both buildings (psf)	125 – stock area 100 – sales area (Provided for Dick's; assumed for adjacent retail)

Aspect	Description
Nature of construction	Spread footings with precast concrete walls and steel framing – both buildings (Assumed)
Cuts or fills for buildings	Within 3 feet of existing grades – both buildings (Assumed)
Tolerable building settlement	1 inch total; less than 1/2 inch differential (Assumed)
Assumed pavement loads	Automobile parking: 35,000 ESALs*
	Drive/Delivery Lanes: 150,000 ESALs*

*Equivalent 18,000-lb single axle loads based on 20-year design.

The figure below shows an illustration of the proposed site layout with the previous and current boring locations shown on the drawing. Note that aerial photograph was taken prior to the demolition of the former Herberger's space but the second round of borings, shown in blue, were performed after the demolition had taken place in the spring of 2024.

Figure 1. Site Layout

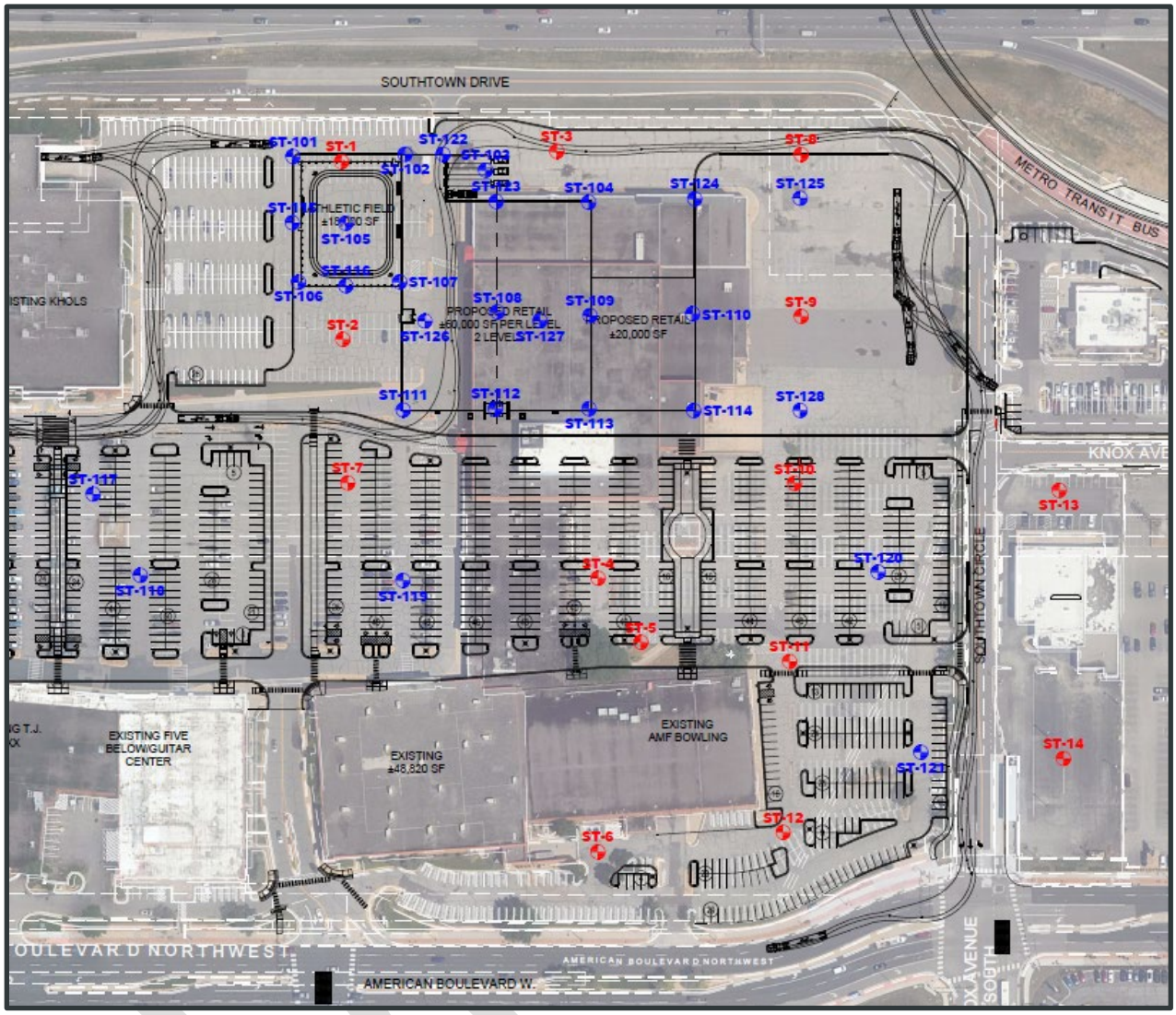


Figure provided by Kraus Anderson.

A.2. Site Conditions and History

Currently, the portion of the site located outside of the previous Herberger's building pad area is occupied by the existing pavements. The former Herberger's space was demolished this spring prior to us performing the recent round of borings. The demolition extended from the former Herberger's space south to the area near the overhead power lines. The existing ground surface for former Herberger's building pad area consists of sand soils.

Current grades at the boring locations range from 829 to 835. Generally, the site is gently sloping down and away from the proposed buildings. The lowest elevation occurred in parking lot south of the former automobile dealership in the southeastern portion of the site.

Photograph 1. Aerial Photograph of the Site in 2023

Photograph provided by Google.

A.3. Purpose

The purpose of our geotechnical evaluation will be to characterize subsurface geologic conditions at selected exploration locations, evaluate their impact on the project, and provide geotechnical recommendations for the design and construction of foundations, slabs, utilities, pavements, athletic field and stormwater management systems.

A.4. Background Information and Reference Documents

We reviewed the following information:

- Preliminary site plan prepared by Kimley-Horn and provided by Kraus Anderson.
- Previous geotechnical reports prepared by Braun Intertec for projects located throughout this site.
- Communications with Kraus Anderson Development regarding the planned project details.

We have described our understanding of the proposed construction and site to the extent others reported it to us. Depending on the extent of available information, we may have made assumptions based on our experience with similar projects. If we have not correctly recorded or interpreted the project details, the project team should notify us. New or changed information could require additional evaluation, analyses and/or recommendations.

A.5. Scope of Services

We performed our scope of services for the project in accordance with our Proposal QTB164728 to Kraus Anderson Development, dated May 3, 2023, and authorized on May 25, 2023. The following list describes the geotechnical tasks completed in accordance with our authorized scope of services.

- Reviewing the background information and reference documents previously cited.
- Staking and clearing the exploration location of underground utilities. Braun Intertec selected and staked the exploration locations. We acquired the surface elevations and locations with GPS technology using the State of Minnesota's permanent GPS base station network. The Soil Boring Location Sketch included in the Appendix shows the approximate locations of the borings.
- Performing 14 standard penetration test (SPT) borings in 2023, denoted as ST-1 to ST-14, to nominal depths of 14 to 24 1/2 feet below existing surface grades across the site.
- Performing 28 additional standard penetration test (SPT) borings in 2024, denoted as ST-101 to ST-128, to nominal depths of 16 to 31 feet below existing surface grades across the site.
- Performing laboratory testing on select samples to aid in soil classification and engineering analysis.

- Perform engineering analysis including bearing capacity and settlement estimates and pavement designs.

- Preparing this report containing a boring location sketch, logs of soil borings, a summary of the soils encountered, results of laboratory tests, and recommendations for structure and pavement subgrade preparation and the design of foundations, floor slabs, exterior slabs, utilities, athletic fiel, stormwater improvements and pavements.

Our scope of services did not include environmental services or testing and our geotechnical personnel performing this evaluation are not trained to provide environmental services or testing. We can provide environmental services or testing at your request.

B. Results

B.1. Geologic Overview

We based the geologic origins used in this report on the soil types, in-situ and laboratory testing, and available common knowledge of the geological history of the site. Because of the complex depositional history, geologic origins can be difficult to ascertain. We did not perform a detailed investigation of the geologic history for the site.

B.2. Previous Geotechnical Information

We reviewed several previous geotechnical reports that we prepared on sites south of American Boulevard. Those sites were located within the area bordered by American Boulevard on the north, Penn Avenue on the west, 82nd Avenue on the south and 35W on the east. Those sites generally had the same soil profile that was encountered on this site, consisting of sandy fill soils overlying localized deposits of organic soils prior to encountering and terminating alluvial sands. Groundwater was typically encountered at depths between about 15 and 20 feet below the current ground surface.

B.3. Boring Results

Table 2 provides a summary of the soil boring results, in the general order we encountered the strata. Please refer to the Log of Boring sheets in the Appendix for additional details. The Descriptive Terminology sheets in the Appendix include definitions of abbreviations used in Table 2.

Table 2. Subsurface Profile Summary*

Strata	Soil Type - ASTM Classification	Range of Penetration Resistances	Commentary and Details
Pavement section	--	--	▪ Encountered in areas outside of the previous building pad area ▪ Overall thicknesses range from 8 to 17 inches. ▪ Bituminous thicknesses were 3 to 10 inches. ▪ Apparent aggregate base thicknesses were 2 to 10 inches.
Fill	SP, SP-SM, SM	Weight of hammer to 31 BPF	▪ Moisture condition generally moist. ▪ Penetration resistance values generally between 6 and 9 BPF. ▪ The penetration resistance were noticeably higher in the fill encountered in the pavement areas as compared to the fill encountered in the previous building pad area. ▪ Thicknesses at boring locations varied from 1 to 11 feet, and appears to be thickest in the western portion of the site, and thinnest in the eastern and southern portions. ▪ Occasional layers of swamp deposited slightly organic to organic soils encountered below the fill, as encountered in Boring ST-14 in the far southeastern portion of the site. ▪ Buried topsoil encountered below the fill in Boring ST-1, performed in the northwestern portion of the site.
Alluvial – Silts and Clays	CL, ML	3 to 10 BPF	▪ Encountered interbedded within the predominate sandy alluvial sands in Borings ST-108, ST-110, ST-111, ST-114, ST-117 and ST-122. ▪ Brown and gray. ▪ Thickness was approximately to 2 to 3 feet.
Alluvial - Sands	SP, SP-SM, SM	3 to 66 BPF	▪ Moisture condition moist above the water table and becoming wet just above and below the water table. ▪

*Abbreviations defined in the attached Descriptive Terminology sheets.

We did not perform gradation analysis on the apparent aggregate base material encountered as part of the pavement section, in accordance with our scope of work. Therefore, we cannot conclusively determine if the encountered material satisfies a particular specification, and it should not be assumed it is suitable for reuse.

For simplicity in this report and based on the low penetration resistances recorded in much of the fill materials we define existing fill to mean existing, uncontrolled or undocumented fill.

B.4. Groundwater

Table 3 summarizes the depths where we observed groundwater; the attached Log of Boring sheets in the Appendix also include this information and additional details.

Table 3. Groundwater Summary

Location	Surface Elevation	Measured or Estimated Depth to Groundwater (ft)	Corresponding Groundwater Elevation (ft)
ST-1	831.2	20	811 1/2
ST-2	833.2	20	813
ST-3	832.7	20	812 1/2
ST-5	833.9	22	812
ST-6	832.7	18	815
ST-8	834.4	21	813 1/2
ST-9	834.9	22	813
ST-11	830.8	18	813
ST-12	830.8	20	810 1/2
ST-13	832.7	15	818*
ST-14	829.6	17	813
ST-101	831.0	20	811
ST-102	831.9	23	809
ST-104	834.7	25	810
ST-108	834.9	23	812
ST-111	832.9	25	808
ST-113	833.9	23	811

*-Water observed within the silt layer at 15 feet and is likely a perched condition

At the time of our observations, groundwater surface elevations appeared to be between about 818 to 808 feet, with most elevations between about 813 to 811. Project planning should expect groundwater will fluctuate in relation to seasonal and annual changes in precipitation, and it should be expected that higher groundwater levels will be encountered where groundwater is perched on top of the low-permeable silts within the predominate sandy soils.

B.5. Laboratory Test Results

The moisture contents of the fill soils varied from approximately 6 to 18 percent, indicating that the fill materials varied from below to above of its probable optimum moisture contents.

The moisture contents of the organic soils varied from approximately 20 to 46 percent, indicating that the organic soils were wet.

The moisture contents of the alluvial soils varied from approximately 6 to 37 percent, indicating that the alluvial soils varied from below to above of its probable optimum moisture contents.

Our mechanical analyses indicated that the samples tested contained 7 to 92 percent silt and clay by weight.

Organic content tests on the existing fill in Boring ST-3 were 2 percent indicating that fill tested was slightly organic. The organic content of the swamp deposits in Boring ST-14 ranged from 1 to 9 percent indicating those materials range from slightly organic to organic.

C. Recommendations

C.1. Site Grading and Subgrade Preparation

C.1.a. Soils Suitability

The soils encountered within the proposed building footprints generally consisted of 4 to 7 feet of existing sandy fill overlying native alluvial soils which primarily consist of sands. The penetration resistance values within the existing fill within the former Herberger's building pad area were typically between about weight of the hammer (WH) and 5 BPF, which are indicative of poor compaction. As compared to the penetration resistances of the fill encountered within the former Herberger's building

pad area, the penetration resistances of the fill in existing pavement areas were typically somewhat higher, with penetration resistances typically between 5 and 9 BPF. The existing fill also concealed buried topsoil in Boring ST-1 (which is located to the northwest of the proposed building pads) and concealed swamp deposited organic soils in Boring ST-14 (which is located in the far southeastern portion of the site).

Based on the low and variable penetration resistance values, it is our opinion that the existing fill, in particular the existing fill within the former Herberger's footprint, is considered to be somewhat compressible and we judged the existing fill to be unsuitable for support of the proposed Dick's building and adjacent retail building. We recommend that the existing fill be removed in its entirety below the proposed Dick's building and adjacent retail building, the exposed alluvial soils should then be surface compacted and the existing fill can be replaced in engineered lifts compacted to at least 98 percent of the standard Proctor maximum dry density.

Below the proposed athletic field, we recommend removing the existing pavements, utilities to be abandoned and the existing fill soils within 3 feet of the proposed athletic field surface. The remaining soils should then be surface compacted to at least 98 percent of the standard Proctor maximum dry density. We then recommend placing imported non-frost susceptible (NFS) soils in the upper 3 feet of the subgrade. NFS soils are soils with less than 50 percent passing the #40 sieve and less than 5 percent passing the #200 sieve.

C.1.b. Building Subgrade Excavations

We recommend removing unsuitable materials from the building pads. We define unsuitable materials as existing fill, frozen materials, organic soils, existing structures, existing utilities, vegetation and soft/loose native soils. Table 4 shows the anticipated excavation depths and bottom elevations for each of the borings near the planned building areas.

Table 4. Building Excavation Depths

Location	Approximate Surface Elevation (ft)	Anticipated Excavation Depth (ft)	Anticipated Bottom Elevation (ft)
ST-102	831.9	6	825 1/2
ST-103	832.4	7	825
ST-107	833.1	7	826
ST-108	834.9	7	827 ½
ST-109	834.6	6.5	828

Location	Approximate Surface Elevation (ft)	Anticipated Excavation Depth (ft)	Anticipated Bottom Elevation (ft)
ST-110	834.9	4	830 ½
ST-111	832.9	7	825 ½
ST-112	834.2	7	827
ST-113	833.9	7	826 ½
ST-114	831.7	4	827 ½
ST-122	832.3	7	825
ST-123	834.6	6	828 ½
ST-124	834.3	4	830
ST-126	833.8	7	826 ½
ST-127	834.8	7	827 ½

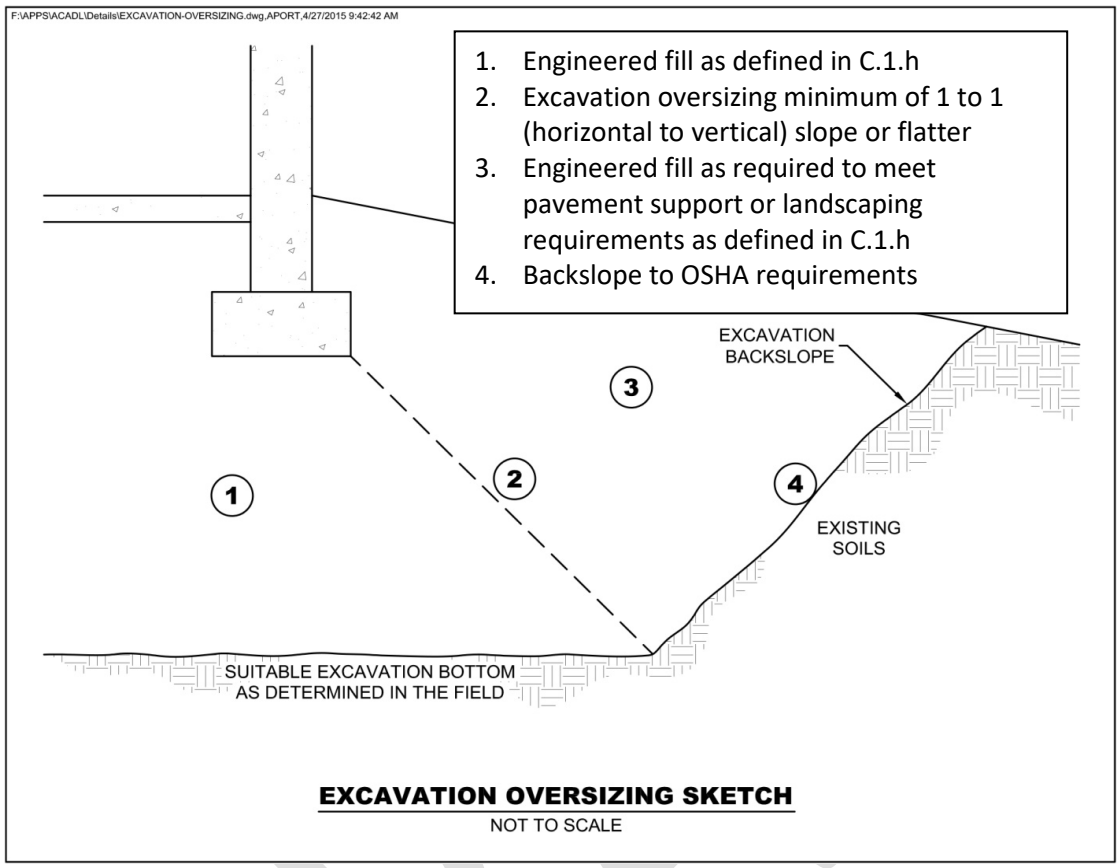
Excavation depths will vary between the borings. Portions of the excavations may also extend deeper than indicated by the borings. A geotechnical representative should observe the excavations to make the necessary field judgments regarding the suitability of the exposed soils.

The contractor should use equipment and techniques to minimize soil disturbance. If soils become disturbed or are wet, we recommend excavation and replacement, or the soils should be moisture conditioned and compacted.

C.1.c. Excavation Oversizing

When removing unsuitable materials below structures or pavements, we recommend the excavation extend outward and downward at a slope of 1H:1V (horizontal:vertical) or flatter. See Figure 2 for an illustration of excavation oversizing.

Figure 2. Generalized Illustration of Oversizing



C.1.d. Excavated Slopes

Based on the borings, we anticipate on-site soils in excavations will consist of fine-grained sands. These soils are typically considered Type C Soil under OSHA (Occupational Safety and Health Administration) guidelines. OSHA guidelines indicate unsupported excavations in Type C soils should have a gradient no steeper than 1 1/2H:1V. Slopes constructed in this manner may still exhibit surface sloughing. OSHA requires an engineer to evaluate slopes or excavations over 20 feet in depth.

An OSHA-approved qualified person should review the soil classification in the field. Excavations must comply with the requirements of OSHA 29 CFR, Part 1926, Subpart P, “Excavations and Trenches.” This document states excavation safety is the responsibility of the contractor. The project specifications should reference these OSHA requirements.

C.1.e. Excavation Dewatering

Excavations that extend near or below Elevation 818 will likely encounter wet soils and ground water. We recommend removing groundwater from the excavations. Dewatering of high-permeability soils (e.g., sands) from within the excavation with conventional pumps has the potential to loosen the soils, due to upward flow. A well contractor should develop a dewatering plan; the design team should review this plan.

C.1.f. Pavement and Exterior Slab Subgrade Preparation

We recommend the following steps for pavement and exterior slab subgrade preparation. Note that project planning may need to require additional subcuts to limit frost heave.

1. Strip unsuitable soils consisting of topsoil, organic soils, peat, vegetation, existing structures and pavements from the area, within 3 feet of the subgrade surface of the proposed pavement/slab grades.

2. Have a geotechnical representative observe the excavated subgrade to evaluate if additional subgrade improvements are necessary.

3. Slope subgrade soils to areas of sand or drain tile to allow the removal of accumulating water.

4. Scarify, moisture condition and surface compact the subgrade with at least 5 passes of a large roller with a minimum drum diameter of 3 1/2 feet.

5. Place pavement engineered fill to grade and compact in accordance with Section C.2.h to bottom of pavement and exterior slab section. See Section C.5 for additional considerations related to frost heave.

6. Proofroll the pavement or exterior slab subgrade as described in Section C.2.g.

C.1.g. Pavement Subgrade Proofroll

After preparing the subgrade as described above and prior to the placement of the aggregate base, we recommend proofrolling the subgrade soils with a fully loaded tandem-axle truck. We also recommend having a geotechnical representative observe the proofroll. Areas that fail the proofroll likely indicate soft or weak areas that will require additional soil correction work to support pavements.

The contractor should correct areas that display excessive yielding or rutting during the proofroll, as determined by the geotechnical representative. Possible options for subgrade correction include moisture conditioning and recompaction, subcutting and replacement with sands or crushed aggregate, and/or geotextiles. We recommend performing a second proofroll after the aggregate base material is in place, and just prior to placing bituminous or concrete pavement.

C.1.h. Engineered Fill Materials and Compaction

Table 5 below contains our recommendations for engineered fill materials.

Table 5. Engineered Fill Materials*

Locations To Be Used	Engineered Fill Classification	Possible Soil Type Descriptions	Gradation	Additional Requirements
▪ Below foundations ▪ Below interior slabs	Structural fill	SP, SP-SM, SM	100% passing 2-inch sieve < 20% passing #200 sieve	< 2% Organic Content (OC) Plasticity Index (PI) < 4%
▪ Drainage layer ▪ Non-frost-susceptible (NFS)	▪ Free-draining ▪ Non-frost-susceptible fill	GP, GW, SP, SW	100% passing 1-inch sieve < 50% passing #40 sieve < 5% passing #200 sieve	< 2% OC
Behind below-grade walls, beyond drainage layer	Retained fill	SP, SW, SP-SM, SW-SM, SM	100% passing 3-inch sieve < 20% passing #200 sieve	< 2% OC PI< 4%
Pavements	Pavement fill	SP, SP-SM, SM	100% passing 3-inch sieve < 20% passing #200 sieve	< 2% OC PI < 4%
Below landscaped surfaces, where subsidence is not a concern	Non-structural fill	SP, SP-SM, SM, SC, CL	100% passing 6-inch sieve	< 10% OC

* More select soils comprised of coarse sands with < 5% passing #200 sieve may be needed to accommodate work occurring in periods of wet or freezing weather.

We recommend spreading engineered fill in loose lifts of approximately 8 inches thick. We recommend moisture conditioning and compacting engineered fill in accordance with the criteria presented below in Table 6. The project documents should specify relative moisture content and compaction of engineered fill, based on the structure located above the engineered fill, and vertical proximity to that structure.

Table 6. Compaction Recommendations Summary

Reference	Relative Compaction, percent (ASTM D698 – Standard Proctor)	Moisture Content Variance from Optimum, percentage points	
		< 12% Passing #200 Sieve (typically SP, SP-SM)	> 12% Passing #200 Sieve (typically SM)
Below foundations and oversizing zones	98	±3	-1 to +3
Below interior slabs	98	±3	-1 to +3
Within 3 feet of pavement subgrade	100	±3	-2 to +2
More than 3 feet below pavement subgrade	95	±3	±3
Below landscaped surfaces	90	±5	±5
Adjacent to below-grade wall	95*	±3	-1 to +3

*Increase compaction requirement to meet compaction required for structure supported by this engineered fill.

The project documents should not allow the contractor to use frozen material as engineered fill or to place engineered fill on frozen material. Frost should not penetrate under foundations during construction.

We recommend performing moisture content and density tests in engineered fill to evaluate if the contractors are effectively moisture conditioning and compacting the soil and meeting project requirements.

C.1.i. Special Inspections of Soils

We recommend including the site grading and placement of engineered fill within the building pad under the requirements of Special Inspections, as provided in Chapter 17 of the International Building Code, which is part of the Minnesota State Building Code. Special Inspection requires observation of soil conditions below engineered fill or footings, evaluations to determine if excavations extend to the anticipated soils, and if engineered fill materials meet requirements for type of engineered fill and compaction condition of engineered fill. A licensed geotechnical engineer should direct the Special Inspections of site grading and engineered fill placement. The purpose of these Special Inspections is to evaluate whether the work is in accordance with the approved Geotechnical Report for the project. Special Inspections should include evaluation of the subgrade, observing preparation of the subgrade (surface compaction or dewatering, excavation oversizing, placement procedures and materials used for engineered fill, etc.) and compaction testing of the engineered fill.

C.2. Spread Footings

Table 7 below contains our recommended parameters for foundation design.

Table 7. Recommended Spread Footing Design Parameters

Item	Description
Maximum net allowable bearing pressure (psf)	4,000
Minimum factor of safety for bearing capacity failure	3.0
Minimum width (inches)	24 – strip footings 36 – column footings
Minimum embedment below final exterior grade for heated structures (inches)	42
Minimum embedment below final exterior grade for unheated structures or for footings not protected from freezing temperatures during construction (inches)	60
Total estimated settlement (inches)	Less than 1 inch
Differential settlement	Typically about 1/2 of total settlement*

* Actual differential settlement amounts will depend on final loads and foundation layout. We can evaluate differential settlement based on final foundation plans and loadings.

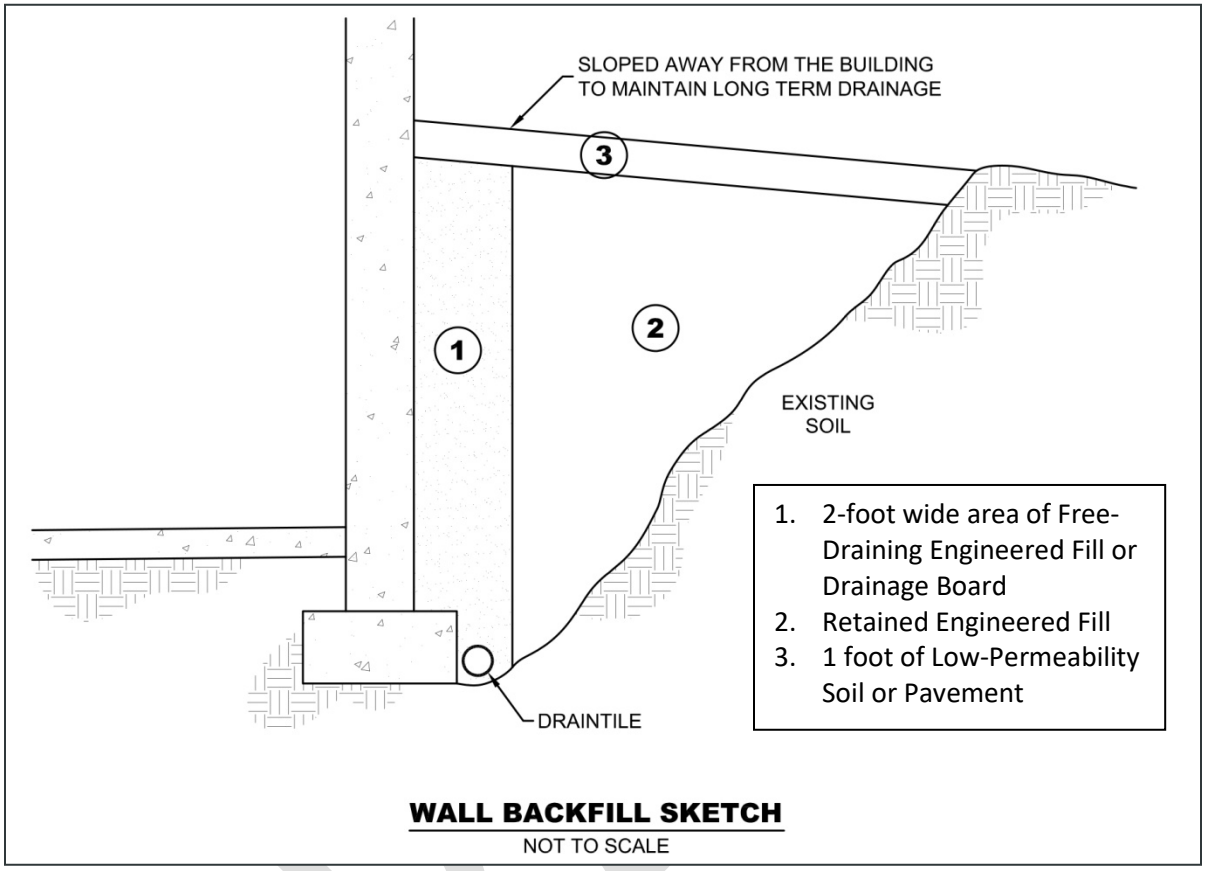
C.3. Below-Grade Walls

C.3.a. Drainage Control

We recommend installing drain tile to remove water behind the below-grade walls, at the location shown in Figure 3. The below-grade wall drainage system should also incorporate free-draining, engineered fill or a drainage board placed against the wall and connected to the drain tile.

Even with the use of free-draining, engineered fill, we recommend general waterproofing of below-grade walls that surround occupied or potentially occupied areas because of the potential cost impacts related to seepage after construction is complete.

Figure 3. Generalized Illustration of Wall Engineered Fill



The materials listed in the sketch should meet the definitions in Section C.1.h. Low-permeability is capable of directing water away from the wall, like clay, topsoil or pavement. The project documents should indicate if the contractor should brace the walls prior to filling and allowable unbalanced fill heights.

As shown in Figure 3, we recommend Zone 2 consist of retained, engineered fill, and this material will control lateral pressures on the wall.

C.3.b. Configuring and Resisting Lateral Loads

Below-grade wall design can use active earth pressure conditions, if the walls can rotate slightly. If the wall design cannot tolerate rotation, then design should use at-rest earth pressure conditions. Rotation up to 0.002 times the wall height is generally required for walls supporting sand.

Table 8 presents our recommended lateral coefficients and equivalent fluid pressures for wall design of active, at-rest and passive earth pressure conditions for sand backfill as defined and compacted in Section C.1.h. The table also provides recommended wet unit weights and internal friction angles. Designs should also consider the slope of any engineered fill and dead or live loads placed behind the walls within a horizontal distance that is equal to the height of the walls. Our recommended values assume the wall design provides drainage so water cannot accumulate behind the walls. The construction documents should clearly identify what soils the contractor should use for engineered fill of walls.

Table 8. Recommended Below-Grade Wall Design Parameters – Drained Conditions

Retained Soil	Wet Unit Weight (pcf)	Friction Angle (degrees)	Active Lateral Coefficient/ Equivalent Fluid Pressure (pcf)	At-Rest Lateral Coefficient/ Equivalent Fluid Pressure (pcf)	Passive Lateral Coefficient/ Equivalent Fluid Pressure* (pcf)
Retained Fill	120	30	0.4/48	0.5/60	3.0/360

* Based on Rankine model for soils in a region behind the wall extending at least 2 horizontal feet beyond the bottom outer edges of the wall footings and then rising up and away from the wall at an angle no steeper than 60 degrees from horizontal.

Sliding resistance between the bottom of the footing and the soil can also resist lateral pressures. We recommend assuming a sliding coefficient equal to 0.4 between the concrete and soil.

The values presented in this section are un-factored.

C.4. Interior Slabs

C.4.a. Subgrade Modulus

The anticipated floor subgrade is compacted fine-grained sands. We recommend using a modulus of subgrade reaction, k, of 150 pounds per square inch per inch of deflection (pci) to design the slabs. If the slab design requires placing 6 inches of compacted crushed aggregate base immediately below the slab, the slab design may increase the k-value by 50 pci. We recommend that the aggregate base materials be free of bituminous. In addition to improving the modulus of subgrade reaction, an aggregate base facilitates construction activities and is less weather sensitive.

C.4.b. Moisture Vapor Protection

Excess transmission of water vapor could cause floor dampness, certain types of floor bonding agents to separate, or mold to form under floor coverings. If project planning includes using floor coverings or coatings, we recommend placing a vapor retarder or vapor barrier immediately beneath the slab. We also recommend consulting with floor covering manufacturers regarding the appropriate type, use and installation of the vapor retarder or barrier to preserve warranty assurances.

C.5. Frost Protection

We consider the fine-grained sands and silty sands to be slightly to moderately frost susceptible. Unfavorable amounts of heaving could occur if these soils exist beneath the slab, and they become saturated and freeze. Grading to direct surface drainage away from buildings helps limit the potential for saturation and subsequent heaving to occur. Still, even limited amounts of movement can create tripping hazards.

One method to help limit the potential for heaving to occur is to remove frost-susceptible soils present below the overlying slab or pavement area down to bottom-of-footing grades, and replace the excavated material with non-frost-susceptible, engineered fill. We recommend providing drainage at the base of the subcut, as well as gradual transitions from this subcut (3H:1V or flatter gradient).

Figures 4a and 4b shows illustrations summarizing some of the recommendations above.

Figure 4a. Frost Protection Geometry Illustration

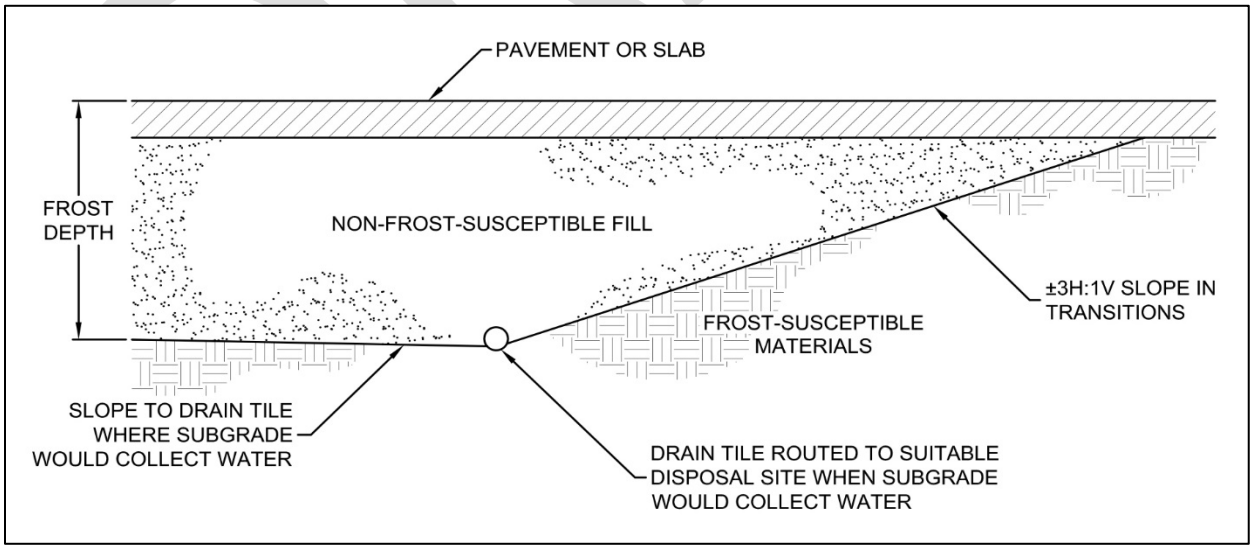
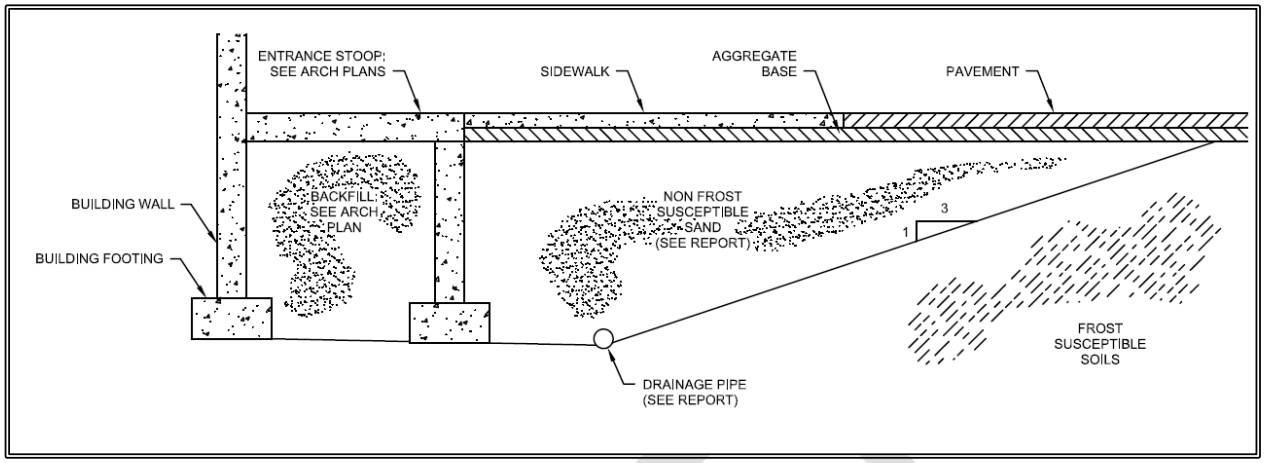


Figure 4b. Frost Protection Geometry Illustration with Stoop Alternative



Over the life of the pavement or slab, cracks may develop and joints may open up, which will expose the subgrade and allow water to enter the subgrade. This water entering the subgrade increases the likelihood of heave. It will be critical that the owner develop a detailed maintenance program to repair any cracks and joints that may develop during the useful life of the various surface features. The maintenance program should pay special attention to areas where dissimilar materials abut one another, where construction joints occur and where shrinkage cracks develop.

C.6. Pavements and Exterior Slabs

C.6.a. Design Sections

Our scope of services for this project did not include laboratory tests on subgrade soils to determine an R-value for pavement design. Based on our experience with similar fine-grained sands anticipated at pavement subgrade elevations, we recommend pavement design assume an R-value of 35. Note the contractor may need to perform limited removal of unsuitable or less suitable soils to achieve that value. Table 9 provides recommended pavement sections, based on the soils support value indicated above and the assumed traffic loads as indicated in Section A.1.

Table 9. Recommended Pavement Sections

Use	Light Duty	Heavy Duty	Concrete Loading Dock
Minimum asphalt thickness (inches)	3.5	4.5	---
Concrete thickness (inches)	--	--	6
Minimum aggregate base thickness (inches)	8	8	4

C.6.b. Bituminous Pavement Materials

We recommend that the bituminous wear and base courses meet the requirements of Specifications 2360, Type SP. With that, we recommend using the following mix designations for pavements:

- Wear: SPWEA340C
- Non-wear: SPNWB330C

We recommend that the bituminous pavement be compacted to an average of at least 92 percent of the maximum theoretical Rice density, with no individual result less than 90 percent.

C.6.c. Subgrade Drainage

We recommend installing perforated drainpipes throughout pavement areas at low points, around catch basins, and behind curb in landscaped areas. We also recommend installing drainpipes along pavement and exterior slab edges where exterior grades promote drainage toward those edge areas. The contractor should place drainpipes in small trenches, extended at least 8 inches below the granular subbase layer, or below the aggregate base material where no subbase is present.

C.6.d. Performance and Maintenance

We based the above pavement designs on a 20-year performance life for bituminous pavements. This is the amount of time before we anticipate the pavement will require reconstruction. This performance life assumes routine maintenance, such as seal coating and crack sealing. The actual pavement life will vary depending on variations in weather, traffic conditions and maintenance.

It is common to place the non-wear course of bituminous and then delay placement of wear course. For this situation, we recommend evaluating if the reduced pavement section will have sufficient structure to support construction traffic.

Many conditions affect the overall performance of the exterior slabs and pavements. Some of these conditions include the environment, loading conditions and the level of ongoing maintenance. With regard to bituminous pavements in particular, it is common to have thermal cracking develop within the first few years of placement, and continue throughout the life of the pavement. We recommend developing a regular maintenance plan for filling cracks in exterior slabs and pavements to lessen the potential impacts for cold weather distress due to frost heave or warm weather distress due to wetting and softening of the subgrade.

C.7. Utilities

C.7.a. Subgrade Stabilization

Earthwork activities associated with utility installations located inside the building area should adhere to the recommendations in Section C.1.h.

For exterior utilities, we anticipate the soils at typical invert elevations will be suitable for utility support. However, if construction encounters unfavorable conditions such as soft clay, organic soils or perched water at invert grades, the unsuitable soils may require some additional subcutting and replacement with sand or crushed rock to prepare a proper subgrade for pipe support. Project design and construction should not place utilities within the 1H:1V oversizing of foundations.

If utilities extend near or below Elevation 818, wet soils/groundwater will likely be encountered. Dewatering should be performed to facilitate installation of the utilities in those areas.

C.7.b. Corrosion Potential

A majority of the soil borings indicated the site predominantly consists of sandy soils. We consider these soils non- to slightly-corrosive to metallic conduits. If utilities extend through clay soils, we recommend bedding the utilities in sandy soil free of any clay lumps or constructing the utilities with non-corrosive materials.

C.8. Stormwater

We estimated infiltration rates for some of the soils we encountered in our soil borings, as listed in Table 10. These infiltration rates represent the long-term infiltration capacity of a practice and not the capacity of the soils in their natural state. Field testing, such as with a double-ring infiltrometer (ASTM D3385),

may justify the use of higher infiltration rates. However, we recommend adjusting field test rates by the appropriate correction factor, as provided for in the Minnesota Stormwater Manual or as allowed by the local watershed. We recommend consulting the Minnesota Stormwater Manual for stormwater design.

Table 10. Estimated Design Infiltration Rates Based on Soil Classification

Soil Type	Infiltration Rate * (inches/hour)
Fine-grained alluvial sands (SP, SP-SM)	0.45
Silts (ML) and fine-grained silty sand (SM)	0.2

* From Minnesota Stormwater Manual. Rates may differ at individual sites.

Fine-grained soils (silts and clays), topsoil or organic matter that mixes into or washes onto the soil will lower the permeability. The contractor should maintain and protect infiltration areas during construction. Furthermore, organic matter and silt washed into the system after construction can fill the soil pores and reduce permeability over time. Proper maintenance is important for long-term performance of infiltration systems.

This geotechnical evaluation does not constitute a review of site suitability for stormwater infiltration or evaluate the potential impacts, if any, from infiltration of large amounts of stormwater.

C.9. Equipment Support

The recommendations included in the report may not be applicable to equipment used for the construction and maintenance of this project. We recommend evaluating subgrade conditions in areas of shoring, scaffolding, cranes, pumps, lifts and other construction equipment prior to mobilization to determine if the exposed materials are suitable for equipment support, or require some form of subgrade improvement. We also recommend project planning consider the effect that loads applied by such equipment may have on structures they bear on or surcharge – including pavements, buried utilities, below-grade walls, etc. We can assist you in this evaluation.

D. Procedures

D.1. Penetration Test Borings

We drilled the penetration test borings with a truck-mounted core and auger drill equipped with hollow-stem auger. We performed the borings in general accordance with ASTM D6151 taking penetration test samples at 2 1/2- or 5-foot intervals in general accordance with ASTM D1586. The boring logs show the actual sample intervals and corresponding depths.

We sealed penetration test boreholes meeting the Minnesota Department of Health (MDH) Environmental Borehole criteria with an MDH-approved grout. We will forward/forwarded a sealing record (or sealing records) for those boreholes to the Minnesota Department of Health Well Management Section.

D.2. Exploration Logs

D.2.a. Log of Boring Sheets

The Appendix includes Log of Boring sheets for our penetration test borings. The logs identify and describe the penetrated geologic materials, and present the results of penetration resistance tests performed. The logs also present the results of laboratory tests performed on penetration test samples, and groundwater measurements.

We inferred strata boundaries from changes in the penetration test samples and the auger cuttings. Because we did not perform continuous sampling, the strata boundary depths are only approximate. The boundary depths likely vary away from the boring locations, and the boundaries themselves may occur as gradual rather than abrupt transitions.

D.2.b. Geologic Origins

We assigned geologic origins to the materials shown on the logs and referenced within this report, based on: (1) a review of the background information and reference documents cited above, (2) visual classification of the various geologic material samples retrieved during the course of our subsurface exploration, (3) penetration resistance testing performed for the project, (4) laboratory test results, and (5) available common knowledge of the geologic processes and environments that have impacted the site and surrounding area in the past.

D.3. Material Classification and Testing

D.3.a. Visual and Manual Classification

We visually and manually classified the geologic materials encountered based on ASTM D2488. When we performed laboratory classification tests, we used the results to classify the geologic materials in accordance with ASTM D2487. The Appendix includes a chart explaining the classification system we used.

D.3.b. Laboratory Testing

The exploration logs in the Appendix note most of the results of the laboratory tests performed on geologic material samples. The remaining laboratory test results follow the exploration logs. We performed the tests in general accordance with ASTM procedures.

D.4. Groundwater Measurements

The drillers checked for groundwater while advancing the penetration test borings, and again after auger withdrawal. We then filled the boreholes or allowed them to remain open for an extended period of observation, as noted on the boring logs.

E. Qualifications

E.1. Variations in Subsurface Conditions

E.1.a. Material Strata

We developed our evaluation, analyses and recommendations from a limited amount of site and subsurface information. It is not standard engineering practice to retrieve material samples from exploration locations continuously with depth. Therefore, we must infer strata boundaries and thicknesses to some extent. Strata boundaries may also be gradual transitions, and project planning should expect the strata to vary in depth, elevation and thickness, away from the exploration locations.

Variations in subsurface conditions present between exploration locations may not be revealed until performing additional exploration work, or starting construction. If future activity for this project reveals any such variations, you should notify us so that we may reevaluate our recommendations. Such variations could increase construction costs, and we recommend including a contingency to accommodate them.

E.1.b. Groundwater Levels

We made groundwater measurements under the conditions reported herein and shown on the exploration logs, and interpreted in the text of this report. Note that the observation periods were relatively short, and project planning can expect groundwater levels to fluctuate in response to rainfall, flooding, irrigation, seasonal freezing and thawing, surface drainage modifications and other seasonal and annual factors.

E.2. Continuity of Professional Responsibility

E.2.a. Plan Review

We based this report on a limited amount of information, and we made a number of assumptions to help us develop our recommendations. We should be retained to review the geotechnical aspects of the designs and specifications. This review will allow us to evaluate whether we anticipated the design correctly, if any design changes affect the validity of our recommendations, and if the design and specifications correctly interpret and implement our recommendations.

E.2.b. Construction Observations and Testing

We recommend retaining us to perform the required observations and testing during construction as part of the ongoing geotechnical evaluation. This will allow us to correlate the subsurface conditions exposed during construction with those encountered by the borings and provide professional continuity from the design phase to the construction phase. If we do not perform observations and testing during construction, it becomes the responsibility of others to validate the assumption made during the preparation of this report and to accept the construction-related geotechnical engineer-of-record responsibilities.

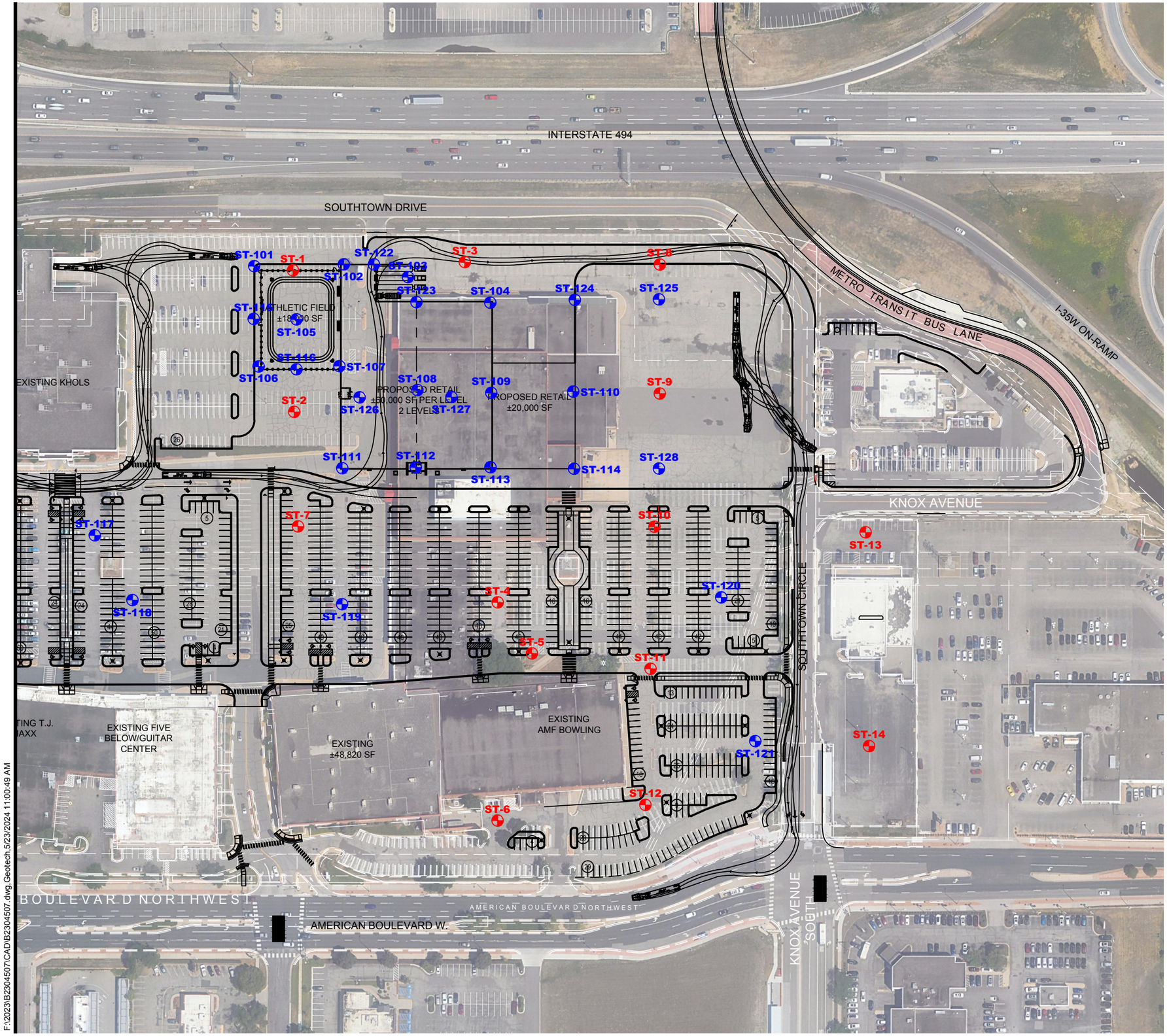
E.3. Use of Report

This report is for the exclusive use of the addressed parties. Without written approval, we assume no responsibility to other parties regarding this report. Our evaluation, analyses and recommendations may not be appropriate for other parties or projects.

E.4. Standard of Care

In performing its services, Braun Intertec used that degree of care and skill ordinarily exercised under similar circumstances by reputable members of its profession currently practicing in the same locality. No warranty, express or implied, is made.

Appendix



DENOTES APPROXIMATE LOCATION OF STANDARD PENETRATION TEST BORING

DENOTES APPROXIMATE LOCATION OF PREVIOUSLY PERFORMED SOIL BORING

N

75' 0 150'

SCALE: 1"= 150'

F:\2023\B2304507\CAD\B2304507.dwg,Geotech,5/23/2024 11:00:49 AM

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11001 Hampshire Avenue S
Minneapolis, MN 55438
952.995.2000
braunintertec.com

Drawing Information

Project No:	B2304507
Drawing No:	B2304507
Drawn By:	JAG
Date Drawn:	5/30/23
Checked By:	SBM
Last Modified:	5/23/24

Project Information

Southtown Development

7801-7997 Southtown Drive

Bloomington, Minnesota

Soil Boring Location Sketch

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LOG OF BORING

See Descriptive Terminology sheet for explanation of abbreviations

Project Number B2304507
Geotechnical Evaluation
Southtown Development
7801-7997 Southtown Drive
Bloomington, Minnesota

BORING: **ST-1**
LOCATION: See attached sketch
DATUM: NAD 1983 HARN Adj MN Hennepin (US Feet)
NORTHING: 125596 EASTING: 520368
DRILLER: C. McClain LOGGED BY: S. Martin
START DATE: 06/05/23 END DATE: 06/05/23
SURFACE ELEVATION: 831.2 ft RIG: 7514 METHOD: 3 1/4" HSA
SURFACING: Bituminous WEATHER: Clear

Elev./ Depth ft	Water Level	Description of Materials (Soil-ASTM D2488 or 2487; Rock-USACE EM 1110-1-2908)	Sample	Blows (N-Value) Recovery	q_p tsf	MC %	Tests or Remarks
830.2		PAVEMENT, 6 inches of bituminous over 6 inches of apparent aggregate base					
1.0		FILL: SILTY SAND (SM), fine to medium-grained, trace roots, dark brown to brown, moist		5-10-8 (18) 18"		11	
				5-3-4 (7) 18"			
824.2			5				
7.0		SANDY SILT (ML), trace roots, dark brown to brown, moist (BURIED TOPSOIL)		4-3-4 (7) 18"			
823.2							
8.0		SILTY SAND (SM), fine-grained, brown, moist to wet, loose to medium dense (ALLUVIUM)		4-5-6 (11) 18"			
			10	5-4-4 (8) 18"			
				4-4-5 (9) 17"			
	▽	*Becoming wet at 20 feet*	15				
				2-3-4 (7) 16"			
			20				
				3-6-7 (13) 18"			
806.7							
24.5		END OF BORING	25				Water observed at 20.0 feet while drilling.
		Boring immediately grouted					
			30				

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LOG OF BORING

See Descriptive Terminology sheet for explanation of abbreviations

Project Number B2304507
Geotechnical Evaluation
Southtown Development
7801-7997 Southtown Drive
Bloomington, Minnesota

BORING: **ST-2**
LOCATION: See attached sketch
DATUM: NAD 1983 HARN Adj MN Hennepin (US Feet)
NORTHING: 125382 EASTING: 520370
DRILLER: C. McClain LOGGED BY: S. Martin
START DATE: 06/05/23 END DATE: 06/05/23
SURFACE ELEVATION: 833.2 ft RIG: 7514 METHOD: 3 1/4" HSA
SURFACING: Bituminous WEATHER: Clear

Elev./ Depth ft	Water Level	Description of Materials (Soil-ASTM D2488 or 2487; Rock-USACE EM 1110-1-2908)	Sample	Blows (N-Value) Recovery	q_p tsf	MC %	Tests or Remarks
832.4		PAVEMENT, 5 inches of bituminous over 4 inches of apparent aggregate base					
0.8		FILL: SILTY SAND (SM), fine to medium-grained, trace Gravel, dark brown to brown, moist		5-14-17 (31) 15"		6	
			5	5-4-3 (7) 16"		8	
826.2							
7.0		SILTY SAND (SM), fine-grained, light brown to brown, moist to wet, loose to medium dense (ALLUVIUM)		3-4-5 (9) 18"			
			10	4-4-4 (8) 18"			
				5-5-5 (10) 18"			
			15	4-4-5 (9) 18"			
	▽	*Becoming wet at 20 feet*	20	7-10-11 (21) 18"			
				8-14-12 (26) 16"			
808.7							
24.5		END OF BORING	25				Water observed at 20.0 feet while drilling.
		Boring immediately grouted					
			30				

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LOG OF BORING

See Descriptive Terminology sheet for explanation of abbreviations

Project Number B2304507
Geotechnical Evaluation
Southtown Development
7801-7997 Southtown Drive
Bloomington, Minnesota

BORING: **ST-3**
LOCATION: See attached sketch
DATUM: NAD 1983 HARN Adj MN Hennepin (US Feet)
NORTHING: 125608 EASTING: 520628
DRILLER: C. McClain LOGGED BY: S. Martin START DATE: 06/08/23 END DATE: 06/08/23
SURFACE ELEVATION: 832.7 ft RIG: 7514 METHOD: 3 1/4" HSA SURFACING: Bituminous WEATHER: Clear

Elev./ Depth ft	Water Level	Description of Materials (Soil-ASTM D2488 or 2487; Rock-USACE EM 1110-1-2908)	Sample	Blows (N-Value) Recovery	q_p tsf	MC %	Tests or Remarks
831.9		PAVEMENT, 4 inches of bituminous over 6 inches of apparent aggregate base					
0.8		FILL: SILTY SAND (SM), fine to medium-grained, trace roots, dark brown, moist		3-3-4 (7) 14"		13	OC=2%
			5	4-3-3 (6) 17"		13	OC=2%
825.7							
7.0		POORLY GRADED SAND with SILT (SP-SM), fine to medium-grained, brown, moist, loose (ALLUVIUM)		5-5-5 (10) 15"			
			10	4-3-3 (6) 17"			
820.7							
12.0		SILTY SAND (SM), fine-grained, brown, moist to wet, loose to medium dense (ALLUVIUM)		7-6-8 (14) 17"			
			15	5-5-7 (12) 18"			
	▽	*Becoming wet at 20 feet*	20	6-6-8 (14) 15"			
				4-4-5 (9) 18"			
808.2							
24.5		END OF BORING	25				Water observed at 20.0 feet while drilling.
		Boring immediately grouted					
			30				

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LOG OF BORING

See Descriptive Terminology sheet for explanation of abbreviations

Project Number B2304507
Geotechnical Evaluation
Southtown Development
7801-7997 Southtown Drive
Bloomington, Minnesota

BORING: **ST-4**
LOCATION: See attached sketch
DATUM: NAD 1983 HARN Adj MN Hennepin (US Feet)
NORTHING: 125093 EASTING: 520678
DRILLER: C. McClain LOGGED BY: S. Martin START DATE: 06/08/23 END DATE: 06/08/23
SURFACE ELEVATION: 834.9 ft RIG: 7514 METHOD: 3 1/4" HSA SURFACING: Bituminous WEATHER: Clear

Elev./ Depth ft	Water Level	Description of Materials (Soil-ASTM D2488 or 2487; Rock-USACE EM 1110-1-2908)	Sample	Blows (N-Value) Recovery	q_p tsf	MC %	Tests or Remarks
834.1		PAVEMENT, 3 1/2 inches of bituminous over 6 inches of apparent aggregate base					
0.8		FILL: SILTY SAND (SM), fine to medium-grained, dark brown, moist		5-9-9 (18) 14"		12	
829.9				14-17-18 (35) 18"			
5.0		SILTY SAND (SM), fine-grained, light brown to brown, moist, medium dense to dense (ALLUVIUM)	5	5-6-7 (13) 17"			
				7-7-7 (14) 16"		11	P200=47%
820.9			10	6-7-9 (16) 17"			
14.0		END OF BORING Boring immediately backfilled	15				Water not observed while drilling.
			20				
			25				
			30				

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LOG OF BORING

See Descriptive Terminology sheet for explanation of abbreviations

Project Number B2304507
Geotechnical Evaluation
Southtown Development
7801-7997 Southtown Drive
Bloomington, Minnesota

BORING: **ST-5**
LOCATION: See attached sketch
DATUM: NAD 1983 HARN Adj MN Hennepin (US Feet)
NORTHING: 125016 EASTING: 520729
DRILLER: C. McClain LOGGED BY: S. Martin START DATE: 06/08/23 END DATE: 06/08/23
SURFACE ELEVATION: 833.9 ft RIG: 7514 METHOD: 3 1/4" HSA SURFACING: Bituminous WEATHER: Clear

Elev./ Depth ft	Water Level	Description of Materials (Soil-ASTM D2488 or 2487; Rock-USACE EM 1110-1-2908)	Sample	Blows (N-Value) Recovery	q_p tsf	MC %	Tests or Remarks
832.7		PAVEMENT, 8 inches of bituminous over 7 inches of apparent aggregate base					
1.2		FILL: POORLY GRADED SAND with SILT (SP-SM), fine to medium-grained, brown, moist		3-6-7 (13) 12"		7	
			5	4-3-4 (7) 15"		18	
827.9							
6.0		SILTY SAND (SM), fine-grained, brown, moist, medium dense to dense (ALLUVIUM)		5-5-7 (12) 15"		27	
			10	7-6-8 (14) 16"			
		Layer of wet Silt at 12 1/2 feet		7-7-8 (15) 18"		30	P200=92%
			15	9-11-13 (24) 15"			
			20	6-12-19 (31) 12"			
811.9	▽						
22.0		POORLY GRADED SAND with SILT (SP-SM), fine to medium-grained, trace Gravel, brown, wet, dense (ALLUVIUM)		21-23-15 (38) 11"			
809.4							
24.5		END OF BORING	25				Water observed at 22.0 feet while drilling.
		Boring immediately grouted					
			30				

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LOG OF BORING

See Descriptive Terminology sheet for explanation of abbreviations

Project Number B2304507
Geotechnical Evaluation
Southtown Development
7801-7997 Southtown Drive
Bloomington, Minnesota

BORING: **ST-6**
LOCATION: See attached sketch
DATUM: NAD 1983 HARN Adj MN Hennepin (US Feet)
NORTHING: 124763 EASTING: 520678
DRILLER: C. McClain LOGGED BY: S. Martin
START DATE: 06/06/23 END DATE: 06/06/23
SURFACE ELEVATION: 832.7 ft RIG: 7514 METHOD: 3 1/4" HSA
SURFACING: Bituminous WEATHER: Overcast

Elev./ Depth ft	Water Level	Description of Materials (Soil-ASTM D2488 or 2487; Rock-USACE EM 1110-1-2908)	Sample	Blows (N-Value) Recovery	q_p tsf	MC %	Tests or Remarks
831.9		PAVEMENT, 3 inches of bituminous over 7 inches of apparent aggregate base					
0.8		FILL: SILTY SAND (SM), fine to medium-grained, brown, moist		3-7-9 (16) 10"		8	
827.7			5	4-4-6 (10) 13"			
5.0		SILTY SAND (SM), fine-grained, light brown to brown, moist, loose to medium dense (ALLUVIUM)		5-4-5 (9) 15"			
			10	5-5-6 (11) 17"			
				9-8-10 (18) 17"			
			15	8-7-8 (15) 18"			
814.7	▽						
18.0		POORLY GRADED SAND (SP), fine to medium-grained, trace Gravel, brown, wet, loose to medium dense (ALLUVIUM)	20	8-9-7 (16) 10"			
				4-4-6 (10) 13"			
808.2							
24.5		END OF BORING	25				Water observed at 18.0 feet while drilling.
		Boring immediately grouted					
			30				

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See Descriptive Terminology sheet for explanation of abbreviations

Project Number B2304507
Geotechnical Evaluation
Southtown Development
7801-7997 Southtown Drive
Bloomington, Minnesota

BORING: **ST-7**
LOCATION: See attached sketch
DATUM: NAD 1983 HARN Adj MN Hennepin (US Feet)
NORTHING: 125208 EASTING: 520376
DRILLER: C. McClain LOGGED BY: S. Martin START DATE: 06/08/23 END DATE: 06/08/23
SURFACE ELEVATION: 832.2 ft RIG: 7514 METHOD: 3 1/4" HSA SURFACING: Bituminous WEATHER: Overcast

Elev./ Depth ft	Water Level	Description of Materials (Soil-ASTM D2488 or 2487; Rock-USACE EM 1110-1-2908)	Sample	Blows (N-Value) Recovery	q_p tsf	MC %	Tests or Remarks
830.8		PAVEMENT, 7 inches of bituminous over 10 inches of apparent aggregate base					
1.4		FILL: POORLY GRADED SAND with SILT (SP-SM), fine to medium-grained, brown, moist		2-4-6 (10) 13"			
828.2							
4.0		FILL: SILTY SAND (SM), fine to medium-grained, dark brown to brown, moist to wet		6-5-6 (11) 17"			
823.2				3-4-5 (9) 18"			
9.0		SILTY SAND (SM), fine-grained, brown, moist, loose to medium dense (ALLUVIUM)		3-4-6 (10) 13"			
818.2				5-5-7 (12) 17"			
14.0		END OF BORING Boring immediately backfilled					Water not observed while drilling.

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See Descriptive Terminology sheet for explanation of abbreviations

Project Number B2304507
Geotechnical Evaluation
Southtown Development
7801-7997 Southtown Drive
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BORING: **ST-8**
LOCATION: See attached sketch
DATUM: NAD 1983 HARN Adj MN Hennepin (US Feet)
NORTHING: 125605 EASTING: 520923
START DATE: 06/05/23 END DATE: 06/05/23
DRILLER: C. McClain LOGGED BY: S. Martin
SURFACE ELEVATION: 834.4 ft RIG: 7514 METHOD: 3 1/4" HSA
SURFACING: Bituminous WEATHER: Clear

Elev./ Depth ft	Water Level	Description of Materials (Soil-ASTM D2488 or 2487; Rock-USACE EM 1110-1-2908)	Sample	Blows (N-Value) Recovery	q_p tsf	MC %	Tests or Remarks
833.5		PAVEMENT, 5 inches of bituminous over 6 inches of apparent aggregate base					
0.9		FILL: SILTY SAND (SM), fine to medium-grained, brown, moist		2-5-5 (10) 15"			
830.4							
4.0	▽	SILTY SAND (SM), fine-grained, light brown to brown, moist to wet, loose to dense (ALLUVIUM)	5	3-3-5 (8) 18"		13	
				4-3-4 (7) 18"			
			10	3-3-4 (7) 18"			
				3-4-6 (10) 18"			
			15	3-6-6 (12) 18"			
		Becoming wet at 21 feet	20	11-14-18 (32) 16"			
809.9				8-14-18 (32) 18"			
24.5		END OF BORING	25				Water observed at 18.0 feet while drilling.
		Boring immediately grouted					
			30				

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See Descriptive Terminology sheet for explanation of abbreviations

Project Number B2304507
Geotechnical Evaluation
Southtown Development
7801-7997 Southtown Drive
Bloomington, Minnesota

BORING: **ST-9**
LOCATION: See attached sketch
DATUM: NAD 1983 HARN Adj MN Hennepin (US Feet)
NORTHING: 125409 EASTING: 520923
DRILLER: C. McClain LOGGED BY: S. Martin START DATE: 06/07/23 END DATE: 06/07/23
SURFACE ELEVATION: 834.9 ft RIG: 7514 METHOD: 3 1/4" HSA SURFACING: Bituminous WEATHER: Overcast

Elev./ Depth ft	Water Level	Description of Materials (Soil-ASTM D2488 or 2487; Rock-USACE EM 1110-1-2908)	Sample	Blows (N-Value) Recovery	q_p tsf	MC %	Tests or Remarks
834.1		PAVEMENT, 4 inches of bituminous over 6 inches of apparent aggregate base					
0.8							
832.9		FILL: SILTY SAND (SM), fine to medium-grained, brown, moist					
2.0		SILTY SAND (SM), fine-grained, light brown to brown, moist to wet, medium dense to dense (ALLUVIUM)		5-5-8 (13) 13"		6	
			5	9-10-11 (21) 17"			
				6-6-9 (15) 18"			
			10	8-6-7 (13) 18"			
				6-12-17 (29) 18"			
			15	11-16-19 (35) 18"			
	▽	*Becoming wet at 22 feet*	20	8-10-24 (34) 14"			
				5-7-9 (16) 15"			
810.4							
24.5		END OF BORING	25				Water observed at 22.0 feet while drilling.
		Boring immediately grouted					
			30				

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See Descriptive Terminology sheet for explanation of abbreviations

Project Number B2304507
Geotechnical Evaluation
Southtown Development
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Bloomington, Minnesota

BORING: **ST-10**
LOCATION: See attached sketch
DATUM: NAD 1983 HARN Adj MN Hennepin (US Feet)
NORTHING: 125208 EASTING: 520915
START DATE: 06/08/23 END DATE: 06/08/23
SURFACE ELEVATION: 833.0 ft
DRILLER: C. McClain LOGGED BY: S. Martin
RIG: 7514 METHOD: 3 1/4" HSA
SURFACING: Bituminous WEATHER: Clear

Elev./ Depth ft	Water Level	Description of Materials (Soil-ASTM D2488 or 2487; Rock-USACE EM 1110-1-2908)	Sample	Blows (N-Value) Recovery	q_p tsf	MC %	Tests or Remarks
832.0		PAVEMENT, 5 inches of bituminous over 7 inches of apparent aggregate base					
1.0		POORLY GRADED SAND with SILT (SP-SM), fine-grained, light brown, moist, loose to medium dense (ALLUVIUM)		2-5-6 (11) 13"			
				4-4-4 (8) 16"			
				4-4-5 (9) 15"		9	P200=7%
				8-7-6 (13) 17"			
				11-13-14 (27) 18"			
819.0							
14.0		END OF BORING Boring immediately backfilled					Water not observed while drilling.

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See Descriptive Terminology sheet for explanation of abbreviations

Project Number B2304507
Geotechnical Evaluation
Southtown Development
7801-7997 Southtown Drive
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BORING: **ST-11**
LOCATION: See attached sketch
DATUM: NAD 1983 HARN Adj MN Hennepin (US Feet)
NORTHING: 124993 EASTING: 520909
DRILLER: C. McClain LOGGED BY: S. Martin START DATE: 06/05/23 END DATE: 06/05/23
SURFACE ELEVATION: 830.8 ft RIG: 7514 METHOD: 3 1/4" HSA SURFACING: Bituminous WEATHER: Clear

Elev./ Depth ft	Water Level	Description of Materials (Soil-ASTM D2488 or 2487; Rock-USACE EM 1110-1-2908)	Sample	Blows (N-Value) Recovery	q_p tsf	MC %	Tests or Remarks
830.0		PAVEMENT, 4 inches of bituminous over 5 inches of apparent aggregate base					
0.8		FILL: SILTY SAND (SM), fine to medium-grained, brown, moist		1-4-4 (8) 13"			
828.3		SILTY SAND (SM), fine-grained, brown, moist to wet, loose to dense (ALLUVIUM)					
2.5			5	3-4-4 (8) 18"			
				6-4-6 (10) 18"			
			10	6-9-12 (21) 17"			
				8-9-14 (23) 17"			
	▽	*Becoming wet at 18 feet*	15	21-18-17 (35) 10"			
			20	7-8-12 (20) 14"			
				9-6-7 (13) 18"			
806.3							
24.5		END OF BORING	25				Water observed at 18.0 feet while drilling.
		Boring immediately grouted					
			30				

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LOG OF BORING

See Descriptive Terminology sheet for explanation of abbreviations

Project Number B2304507
Geotechnical Evaluation
Southtown Development
7801-7997 Southtown Drive
Bloomington, Minnesota

BORING: **ST-12**
LOCATION: See attached sketch
DATUM: NAD 1983 HARN Adj MN Hennepin (US Feet)
NORTHING: 124993 EASTING: 520909
DRILLER: C. McClain LOGGED BY: S. Martin
START DATE: 06/05/23 END DATE: 06/05/23
SURFACE ELEVATION: 830.8 ft RIG: 7514 METHOD: 3 1/4" HSA
SURFACING: Bituminous WEATHER: Clear

Elev./ Depth ft	Water Level	Description of Materials (Soil-ASTM D2488 or 2487; Rock-USACE EM 1110-1-2908)	Sample	Blows (N-Value) Recovery	q_p tsf	MC %	Tests or Remarks
830.0		PAVEMENT, 4 inches of bituminous over 5 inches of apparent aggregate base					
0.8		FILL: SILTY SAND (SM), fine to medium-grained, dark brown, moist		3-4-6 (10) 16"			
			5	2-3-3 (6) 18"		14	
823.8							
7.0		SILTY SAND (SM), fine-grained, brown, moist to wet, very loose to medium dense (ALLUVIUM)		5-4-5 (9) 18"			
			10	5-4-5 (9) 18"			
				4-4-6 (10) 18"			
			15	3-6-7 (13) 17"			
	▽	*Becoming wet at 20 feet*	20	3-2-2 (4) 16"			
				3-7-11 (18) 18"			
806.3							
24.5		END OF BORING	25				Water observed at 20.0 feet while drilling.
		Boring immediately grouted					
			30				

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LOG OF BORING

See Descriptive Terminology sheet for explanation of abbreviations

Project Number B2304507
Geotechnical Evaluation
Southtown Development
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BORING: **ST-13**
LOCATION: See attached sketch
DATUM: NAD 1983 HARN Adj MN Hennepin (US Feet)
NORTHING: 124876 EASTING: 521240
DRILLER: C. McClain LOGGED BY: S. Martin
START DATE: 06/07/23 END DATE: 06/07/23
SURFACE ELEVATION: 829.6 ft RIG: 7514 METHOD: 3 1/4" HSA
SURFACING: Bituminous WEATHER: Overcast

Elev./ Depth ft	Water Level	Description of Materials (Soil-ASTM D2488 or 2487; Rock-USACE EM 1110-1-2908)	Sample	Blows (N-Value) Recovery	q_p tsf	MC %	Tests or Remarks
828.9		PAVEMENT, 4 inches of bituminous over 4 inches of apparent aggregate base					
0.7		FILL: POORLY GRADED SAND (SP), fine to medium-grained, trace Gravel, brown, moist		1-4-5 (9) 12"			
			5	5-6-7 (13) 13"			
823.6							
6.0		SILTY SAND (SM), fine-grained, brown, moist to wet, loose to medium dense (ALLUVIUM)		5-5-6 (11) 14"			
			10	6-6-8 (14) 13"			
				5-4-6 (10) 15"			
	▽	*Becoming wet at 15 feet*	15	5-5-5 (10) 16"			
			20	12-13-16 (29) 17"			
807.6							
22.0		POORLY GRADED SAND (SP), fine to medium-grained, trace Gravel, brown, wet, loose (ALLUVIUM)		6-4-4 (8) 9"			
805.1							
24.5		END OF BORING	25				Water observed at 15.0 feet while drilling.
		Boring immediately grouted					
			30				

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See Descriptive Terminology sheet for explanation of abbreviations

Project Number B2304507
Geotechnical Evaluation
Southtown Development
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Bloomington, Minnesota

BORING: **ST-14**
LOCATION: See attached sketch
DATUM: NAD 1983 HARN Adj MN Hennepin (US Feet)
NORTHING: 125199 EASTING: 521235
DRILLER: C. McClain LOGGED BY: S. Martin START DATE: 06/07/23 END DATE: 06/07/23
SURFACE ELEVATION: 832.7 ft RIG: 7514 METHOD: 3 1/4" HSA SURFACING: Bituminous WEATHER: Overcast

Elev./ Depth ft	Water Level	Description of Materials (Soil-ASTM D2488 or 2487; Rock-USACE EM 1110-1-2908)	Sample	Blows (N-Value) Recovery	q_p tsf	MC %	Tests or Remarks
832.0		PAVEMENT, 3 inches of bituminous over 5 inches of apparent aggregate base					
0.7		FILL: SILTY SAND (SM), fine to medium-grained, intermixed with Lean Clay, dark brown, moist to wet		1-3-4 (7) 13"			
			5	2-1-1 (2) 15"		19	
826.7							
6.0		FILL: POORLY GRADED SAND with SILT (SP-SM), fine to medium-grained, trace Gravel, brown, moist		2-1-2 (3) 10"			
823.7							
9.0		ORGANIC CLAY (OL), with roots, black to dark gray, wet, soft (SWAMP DEPOSIT)	10	4-2-2 (4) 14"		46	OC=9%
				2-1-3 (4) 13"		20	OC=1%
818.7							
14.0	▽	SILTY SAND (SM), fine-grained, gray, moist to wet, medium dense (ALLUVIUM)	15	6-7-8 (15) 17"			
		Becoming wet at 17 feet	20	4-6-6 (12) 14"			
				4-6-7 (13) 18"			
808.2							
24.5		END OF BORING	25				Water observed at 17.0 feet while drilling.
		Boring immediately grouted					
			30				

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See Descriptive Terminology sheet for explanation of abbreviations

Project Number B2304507
Geotechnical Evaluation
Southtown Development
7801-7997 Southtown Drive
Bloomington, Minnesota

BORING: **ST-101**
LOCATION:
DATUM: NAD 1983 HARN Adj MN Hennepin (US Feet)
NORTHING: 125602 EASTING: 520309
START DATE: 04/23/24 END DATE: 04/23/24
SURFACE ELEVATION: 831.0 ft
DRILLER: C. McClain LOGGED BY: S. Martin
RIG: 7514 METHOD: 3 1/4" HSA
SURFACING: Bituminous WEATHER: Clear

Elev./ Depth ft	Water Level	Description of Materials (Soil-ASTM D2488 or 2487; Rock-USACE EM 1110-1-2908)	Sample	Blows (N-Value) Recovery	q_p tsf	MC %	Tests or Remarks
830.3		PAVEMENT, 4 inches of bituminous over 4 inches of apparent aggregate base					
0.7		FILL: SILTY SAND (SM), fine to medium-grained, trace Gravel, dark brown to brown, moist		4-7-6 (13) 12"			
			5	3-4-4 (8) 16"			
				2-4-3 (7) 14"			
822.0							
9.0		POORLY GRADED SAND with SILT (SP-SM), fine-grained, brown, moist to wet, very loose to loose (ALLUVIUM)	10	2-2-2 (4) 14"			
				1-3-3 (6) 16"			
			15	2-3-4 (7) 14"			
	▽	*Becoming wet at 20 feet*	20	3-5-4 (9) 16"			
810.0							
21.0		END OF BORING					Water observed at 20.0 feet while drilling.
		Boring immediately grouted					
			25				
			30				

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See Descriptive Terminology sheet for explanation of abbreviations

Project Number B2304507
Geotechnical Evaluation
Southtown Development
7801-7997 Southtown Drive
Bloomington, Minnesota

BORING: **ST-102**
LOCATION:
DATUM: NAD 1983 HARN Adj MN Hennepin (US Feet)
NORTHING: 125605 EASTING: 520445
START DATE: 04/23/24 END DATE: 04/23/24
SURFACE ELEVATION: 831.9 ft
DRILLER: C. McClain LOGGED BY: S. Martin
RIG: 7514 METHOD: 3 1/4" HSA
SURFACING: Bituminous WEATHER: Clear

Elev./ Depth ft	Water Level	Description of Materials (Soil-ASTM D2488 or 2487; Rock-USACE EM 1110-1-2908)	Sample	Blows (N-Value) Recovery	q_p tsf	MC %	Tests or Remarks
831.0		PAVEMENT, 7 inches of bituminous over 3 inches of apparent aggregate base					
0.9		FILL: SILTY SAND (SM), fine to medium-grained, dark brown to black, moist		4-10-8 (18) 12"		10	
825.9			5	4-4-4 (8) 18"			
6.0		SILTY SAND (SM), fine-grained, brown, moist, loose (ALLUVIUM)		2-3-3 (6) 14"			
820.9			10	3-2-3 (5) 18"			
11.0		POORLY GRADED SAND with SILT (SP-SM), fine-grained, brown, moist to wet, loose to dense (ALLUVIUM)		4-3-3 (6) 16"			
			15	2-3-3 (6) 16"			
	▽	*Becoming wet at 23 feet*	20	3-3-3 (6) 14"			
			25	3-3-5 (8) 12"			
			30	4-23-25 (48) 18"			
800.9							
31.0		END OF BORING					Water observed at 23.0 feet while drilling.

Boring immediately grouted.

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See Descriptive Terminology sheet for explanation of abbreviations

Project Number B2304507
Geotechnical Evaluation
Southtown Development
7801-7997 Southtown Drive
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BORING: **ST-103**
LOCATION:
DATUM: NAD 1983 HARN Adj MN Hennepin (US Feet)
NORTHING: 125585 EASTING: 520542
START DATE: 04/25/24 END DATE: 04/25/24
SURFACE ELEVATION: 832.4 ft
DRILLER: C. McClain LOGGED BY: S. Martin
RIG: 7514 METHOD: 3 1/4" HSA
SURFACING: Bituminous WEATHER: Clear

Elev./ Depth ft	Water Level	Description of Materials (Soil-ASTM D2488 or 2487; Rock-USACE EM 1110-1-2908)	Sample	Blows (N-Value) Recovery	q_p tsf	MC %	Tests or Remarks
831.5		PAVEMENT, 5 inches of bituminous over 5 1/2 inches of apparent aggregate base					
0.9		FILL: SILTY SAND (SM), fine to medium-grained, dark brown, moist		1-1-1 (2) 9"			
			5	2-3-3 (6) 16"			
825.4							
7.0		POORLY GRADED SAND with SILT (SP-SM), fine-grained, brown, moist, loose to medium dense (ALLUVIUM)		2-4-4 (8) 17"			
			10	4-4-4 (8) 18"			
				3-6-7 (13) 17"			
			15	5-5-5 (10) 18"			
			20	3-5-4 (9) 17"			
811.4							
21.0		END OF BORING Boring immediately grouted					Water not observed while drilling.
			25				
			30				

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See Descriptive Terminology sheet for explanation of abbreviations

Project Number B2304507
Geotechnical Evaluation
Southtown Development
7801-7997 Southtown Drive
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BORING: **ST-104**
LOCATION:
DATUM: NAD 1983 HARN Adj MN Hennepin (US Feet)
NORTHING: 125547 EASTING: 520666
START DATE: 04/25/24 END DATE: 04/25/24
SURFACE ELEVATION: 834.7 ft
DRILLER: C. McClain LOGGED BY: S. Martin
RIG: 7514 METHOD: 3 1/4" HSA
SURFACING: Soil WEATHER: Clear

Elev./ Depth ft	Water Level	Description of Materials (Soil-ASTM D2488 or 2487; Rock-USACE EM 1110-1-2908)	Sample	Blows (N-Value) Recovery	q_p tsf	MC %	Tests or Remarks
		FILL: POORLY GRADED SAND with SILT (SP-SM), fine-grained, brown, moist		1-2-3 (5) 11"			
			5	2-2-3 (5) 13"			
827.7 7.0		POORLY GRADED SAND with SILT (SP-SM), fine-grained, brown, moist to wet, loose to dense (ALLUVIUM)		2-3-3 (6) 17"			
			10	4-4-4 (8) 14"			
				2-5-6 (11) 18"			
			15	3-5-5 (10) 18"			
			20	4-7-6 (13) 18"			
	▽	*Becoming wet at 25 feet*	25	9-15-18 (33) 14"			
			30	9-16-27 (43) 18"			
803.7 31.0		END OF BORING					Water observed at 25.0 feet while drilling.

Boring immediately grouted

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See Descriptive Terminology sheet for explanation of abbreviations

Project Number B2304507
Geotechnical Evaluation
Southtown Development
7801-7997 Southtown Drive
Bloomington, Minnesota

BORING: **ST-105**
LOCATION:
DATUM: NAD 1983 HARN Adj MN Hennepin (US Feet)
NORTHING: 125522 EASTING: 520373
START DATE: 04/24/24 END DATE: 04/24/24
SURFACE ELEVATION: 832.1 ft RIG: 7514 METHOD: 3 1/4" HSA
SURFACING: Bituminous WEATHER: Clear
DRILLER: C. McClain LOGGED BY: S. Martin

Elev./ Depth ft	Water Level	Description of Materials (Soil-ASTM D2488 or 2487; Rock-USACE EM 1110-1-2908)	Sample	Blows (N-Value) Recovery	q_p tsf	MC %	Tests or Remarks
830.7		PAVEMENT, 7 inches of bituminous over 8 inches of apparent aggregate base					
1.4		FILL: SILTY SAND (SM), fine to medium-grained, dark brown brown, moist		3-10-10 (20) 16"			
			5	7-7-7 (14) 18"			
825.1							
7.0		SILTY SAND (SM), fine-grained, brown, moist, loose (ALLUVIUM)		2-4-4 (8) 18"			
823.1							
9.0		POORLY GRADED SAND with SILT (SP-SM), fine-grained, brown, moist, loose (ALLUVIUM)	10	4-3-5 (8) 18"			
				2-5-5 (10) 18"			
			15	2-3-3 (6) 18"			
816.1							
16.0		END OF BORING					Water not observed while drilling.
		Boring immediately grouted					
			20				
			25				
			30				

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LOG OF BORING

See Descriptive Terminology sheet for explanation of abbreviations

Project Number B2304507
Geotechnical Evaluation
Southtown Development
7801-7997 Southtown Drive
Bloomington, Minnesota

BORING: **ST-106**
LOCATION:
DATUM: NAD 1983 HARN Adj MN Hennepin (US Feet)
NORTHING: 125450 EASTING: 520316
START DATE: 04/23/24 END DATE: 04/23/24
SURFACE ELEVATION: 832.5 ft
DRILLER: C. McClain LOGGED BY: S. Martin
RIG: 7514 METHOD: 3 1/4" HSA
SURFACING: Bituminous WEATHER: Clear

Elev./ Depth ft	Water Level	Description of Materials (Soil-ASTM D2488 or 2487; Rock-USACE EM 1110-1-2908)	Sample	Blows (N-Value) Recovery	q_p tsf	MC %	Tests or Remarks
831.3		PAVEMENT, 8 inches of bituminous over 6 inches of apparent aggregate base					
1.2		FILL: SILTY SAND (SM), fine to medium-grained, dark brown, moist		5-10-10 (20) 14"			
			5	7-5-4 (9) 14"		18	
826.5							
6.0		SILTY SAND (SM), fine-grained, brown, moist, loose (ALLUVIUM)		2-3-3 (6) 16"			
			10	2-2-3 (5) 14"			
820.5							
12.0		POORLY GRADED SAND with SILT (SP-SM), fine-grained, light brown, moist, loose (ALLUVIUM)		3-4-4 (8) 18"			
			15	2-3-3 (6) 16"			
			20	3-3-3 (6) 16"			
811.5							
21.0		END OF BORING Boring immediately grouted					Water not observed while drilling.
			25				
			30				

BRAUN INTERTEC
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LOG OF BORING

See Descriptive Terminology sheet for explanation of abbreviations

Project Number B2304507
Geotechnical Evaluation
Southtown Development
7801-7997 Southtown Drive
Bloomington, Minnesota

BORING: **ST-107**
LOCATION:
DATUM: NAD 1983 HARN Adj MN Hennepin (US Feet)
NORTHING: 125451 EASTING: 520438
START DATE: 04/23/24 END DATE: 04/23/24
SURFACE ELEVATION: 833.1 ft
DRILLER: C. McClain LOGGED BY: S. Martin
RIG: 7514 METHOD: 3 1/4" HSA
SURFACING: Bituminous WEATHER: Clear

Elev./ Depth ft	Water Level	Description of Materials (Soil-ASTM D2488 or 2487; Rock-USACE EM 1110-1-2908)	Sample	Blows (N-Value) Recovery	q_p tsf	MC %	Tests or Remarks
832.3		PAVEMENT, 6 inches of bituminous over 4 inches of apparent aggregate base					
0.8		FILL: SILTY SAND (SM), fine to medium-grained, black, moist		3-6-7 (13) 12"		11	
			5	3-3-2 (5) 14"		17	OC=2%
826.1							
7.0		POORLY GRADED SAND with SILT (SP-SM), fine-grained, brown, moist, loose to medium dense (ALLUVIUM)		2-4-4 (8) 16"			
			10	3-4-4 (8) 16"			
				5-5-7 (12) 18"			
			15	4-3-3 (6) 18"			
815.1							
18.0		SILTY SAND (SM), fine-grained, brown, moist, loose (ALLUVIUM)					
			20	2-3-3 (6) 18"			
812.1							
21.0		END OF BORING					Water not observed while drilling.
		Boring immediately grouted					
			25				
			30				

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LOG OF BORING

See Descriptive Terminology sheet for explanation of abbreviations

Project Number B2304507
Geotechnical Evaluation
Southtown Development
7801-7997 Southtown Drive
Bloomington, Minnesota

BORING: **ST-108**
LOCATION:
DATUM: NAD 1983 HARN Adj MN Hennepin (US Feet)
NORTHING: 125415 EASTING: 520556
START DATE: 04/25/24 END DATE: 04/25/24
DRILLER: C. McClain LOGGED BY: S. Martin
SURFACE ELEVATION: 834.9 ft RIG: 7514 METHOD: 3 1/4" HSA
SURFACING: Soil WEATHER: Clear

Elev./ Depth ft	Water Level	Description of Materials (Soil-ASTM D2488 or 2487; Rock-USACE EM 1110-1-2908)	Sample	Blows (N-Value) Recovery	q_p tsf	MC %	Tests or Remarks
		FILL: SILTY SAND (SM), fine to medium-grained, trace Gravel, dark brown to brown, moist		1-1-1 (2) 11"			
			5	1-1-1 (2) 13"			
827.9 7.0		POORLY GRADED SAND with SILT (SP-SM), fine-grained, brown, moist, loose (ALLUVIUM)		2-4-3 (7) 14"			
825.9 9.0		SILT (ML), gray, wet, loose (ALLUVIUM)	10	4-2-4 (6) 16"			
823.9 11.0		POORLY GRADED SAND with SILT (SP-SM), fine-grained, brown, moist, medium dense (ALLUVIUM)		5-8-9 (17) 16"			
			15	6-12-10 (22) 16"			
			20	8-9-11 (20) 15"			
811.9 23.0	▽	POORLY GRADED SAND (SP), fine to medium-grained, trace Gravel, brown, wet, dense (ALLUVIUM)					
			25	11-14-18 (32) 18"			
			30	20-16-15 (31) 18"			
803.9 31.0		END OF BORING					Water observed at 23.0 feet while drilling.

Boring immediately grouted.

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LOG OF BORING

See Descriptive Terminology sheet for explanation of abbreviations

Project Number B2304507
Geotechnical Evaluation
Southtown Development
7801-7997 Southtown Drive
Bloomington, Minnesota

BORING: **ST-109**
LOCATION:
DATUM: NAD 1983 HARN Adj MN Hennepin (US Feet)
NORTHING: 125410 EASTING: 520668
START DATE: 04/24/24 END DATE: 04/24/24
SURFACING: Soil WEATHER: Sunny

DRILLER: C. McClain LOGGED BY: S. Martin
SURFACE ELEVATION: 834.6 ft RIG: 7514 METHOD: 3 1/4" HSA

Elev./ Depth ft	Water Level	Description of Materials (Soil-ASTM D2488 or 2487; Rock-USACE EM 1110-1-2908)	Sample	Blows (N-Value) Recovery	q_p tsf	MC %	Tests or Remarks
		FILL: SILTY SAND (SM), fine to medium-grained, trace Gravel, dark brown to brown, moist		1-1-1 (2) 18"			
			5	0-0-1 (1) 18"			
828.1 6.5		POORLY GRADED SAND with SILT (SP-SM), fine-grained, brown to light brown, moist, loose to medium dense (ALLUVIUM)		3-3-6 (9) 18"			
			10	9-8-7 (15) 18"			
				12-8-10 (18) 18"			
			15	10-6-6 (12) 18"			
			20	10-8-10 (18) 18"			
813.6 21.0		END OF BORING Boring immediately grouted					Water not observed while drilling.
			25				
			30				

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LOG OF BORING

See Descriptive Terminology sheet for explanation of abbreviations

Project Number B2304507
Geotechnical Evaluation
Southtown Development
7801-7997 Southtown Drive
Bloomington, Minnesota

BORING: **ST-110**
LOCATION:
DATUM: NAD 1983 HARN Adj MN Hennepin (US Feet)
NORTHING: 125455 EASTING: 520792
START DATE: 04/25/24 END DATE: 04/25/24
SURFACE ELEVATION: 834.9 ft RIG: 7514 METHOD: 3 1/4" HSA
SURFACING: Soil WEATHER: Clear
DRILLER: C. McClain LOGGED BY: S. Martin

Elev./ Depth ft	Water Level	Description of Materials (Soil-ASTM D2488 or 2487; Rock-USACE EM 1110-1-2908)	Sample	Blows (N-Value) Recovery	q_p tsf	MC %	Tests or Remarks
830.9		FILL: SILTY SAND (SM), fine to medium-grained, brown, moist		2-6-7 (13) 12"			
4.0		POORLY GRADED SAND with SILT (SP-SM), fine-grained, light brown, moist, loose (ALLUVIUM)	5	3-4-3 (7) 13"			
				3-4-6 (10) 14"			
823.9			10	3-4-4 (8) 17"			
11.0		SILT (ML), brown, wet, loose (ALLUVIUM)		1-1-4 (5) 18"			
820.9							
14.0		POORLY GRADED SAND with SILT (SP-SM), fine-grained, brown, moist, medium dense (ALLUVIUM)	15	3-7-9 (16) 17"			
813.9			20	6-11-12 (23) 15"			
21.0		END OF BORING Boring immediately grouted	25				Water not observed while drilling.
			30				

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LOG OF BORING

See Descriptive Terminology sheet for explanation of abbreviations

Project Number B2304507
Geotechnical Evaluation
Southtown Development
7801-7997 Southtown Drive
Bloomington, Minnesota

BORING: **ST-111**
LOCATION:
DATUM: NAD 1983 HARN Adj MN Hennepin (US Feet)
NORTHING: 125296 EASTING: 520443
START DATE: 04/23/24 END DATE: 04/23/24
DRILLER: C. McClain LOGGED BY: S. Martin
SURFACE ELEVATION: 832.9 ft RIG: 7514 METHOD: 3 1/4" HSA
SURFACING: Bituminous WEATHER: Clear

Elev./ Depth ft	Water Level	Description of Materials (Soil-ASTM D2488 or 2487; Rock-USACE EM 1110-1-2908)	Sample	Blows (N-Value) Recovery	q_p tsf	MC %	Tests or Remarks
831.7		PAVEMENT, 10 inches of bituminous over 4 inches of apparent aggregate base					
1.2		FILL: SILTY SAND (SM), fine to medium-grained, dark brown, moist		4-6-5 (11) 14"			
			5	2-2-2 (4) 14"			
825.9							
7.0		SILT (ML), brown, wet, very loose (ALLUVIUM)		1-2-1 (3) 16"		33	
823.9							
9.0		SILTY SAND (SM), fine-grained, brown, moist, medium dense (ALLUVIUM)	10	1-2-1 (3) 16"			
820.9							
12.0		SILT (ML), brown, wet, very loose (ALLUVIUM)		3-2-2 (4) 18"			
818.9							
14.0		POORLY GRADED SAND with SILT (SP-SM), fine-grained, brown, moist to wet, medium dense (ALLUVIUM)	15	3-6-6 (12) 14"			
			20	8-10-12 (22) 16"			
	▽	*Becoming wet at 25 feet*	25	10-10-11 (21) 14"			
804.9							
28.0		POORLY GRADED SAND (SP), fine to medium-grained, trace Gravel, brown, wet, medium dense (ALLUVIUM)	30	5-6-8 (14) 12"			
801.9							
31.0		END OF BORING					Water observed at 25.0 feet while drilling.
		Boring immediately grouted					

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See Descriptive Terminology sheet for explanation of abbreviations

Project Number B2304507
Geotechnical Evaluation
Southtown Development
7801-7997 Southtown Drive
Bloomington, Minnesota

BORING: **ST-112**
LOCATION:
DATUM: NAD 1983 HARN Adj MN Hennepin (US Feet)
NORTHING: 125298 EASTING: 520554
START DATE: 04/24/24 END DATE: 04/24/24
SURFACING: Soil WEATHER: Sunny

DRILLER: C. McClain LOGGED BY: S. Martin
SURFACE ELEVATION: 834.2 ft RIG: 7514 METHOD: 3 1/4" HSA

Elev./ Depth ft	Water Level	Description of Materials (Soil-ASTM D2488 or 2487; Rock-USACE EM 1110-1-2908)	Sample	Blows (N-Value) Recovery	q_p tsf	MC %	Tests or Remarks
		FILL: SILTY SAND (SM), fine to medium-grained, dark brown to brown, moist		3-3-3 (6) 10"			
		Wood stake at 2 1/2 feet		1-1-1 (2) 18"			
827.2			5				
7.0		SILTY SAND (SM), fine-grained, brown, moist, very loose to dense (ALLUVIUM)		7-6-8 (14) 18"			
			10	12-7-7 (14) 18"			
				4-3-1 (4) 181"			
			15	5-4-5 (9) 18"			
			20	20-20-17 (37) 18"			
813.2							
21.0		END OF BORING					Water not observed while drilling.
		Boring immediately grouted					
			25				
			30				

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LOG OF BORING

See Descriptive Terminology sheet for explanation of abbreviations

Project Number B2304507
Geotechnical Evaluation
Southtown Development
7801-7997 Southtown Drive
Bloomington, Minnesota

BORING: **ST-113**
LOCATION:
DATUM: NAD 1983 HARN Adj MN Hennepin (US Feet)
NORTHING: 125298 EASTING: 520667
START DATE: 04/24/24 END DATE: 04/24/24
DRILLER: C. McClain LOGGED BY: S. Martin
SURFACE ELEVATION: 833.9 ft RIG: 7514 METHOD: 3 1/4" HSA
SURFACING: Soil WEATHER: Sunny

Elev./ Depth ft	Water Level	Description of Materials (Soil-ASTM D2488 or 2487; Rock-USACE EM 1110-1-2908)	Sample	Blows (N-Value) Recovery	q_p tsf	MC %	Tests or Remarks
		FILL: SILTY SAND (SM), fine to medium-grained, brown, moist		4-3-2 (5) 16"		9	
			5	8-2-2 (4) 14"			
826.9 7.0		SILTY SAND (SM), fine-grained, brown, moist, dense (ALLUVIUM)		50-15-20 (35) 18"			
824.9 9.0		POORLY GRADED SAND with SILT (SP-SM), fine-grained, brown, moist, medium dense (ALLUVIUM)	10	11-7-11 (18) 16"			
				11-10-10 (20) 18"			
			15	4-6-8 (14) 18"			
			20	7-8-10 (18) 18"			
810.9 23.0	▽	POORLY GRADED SAND (SP), fine to medium-grained, trace Gravel, brown, wet, medium dense (ALLUVIUM)	25	35-6-12 (18) 18"			
			30	4-5-7 (12) 18"			
802.9 31.0		END OF BORING					Water observed at 23.0 feet while drilling.

Boring immediately grouted.

BRAUN INTERTEC
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LOG OF BORING

See Descriptive Terminology sheet for explanation of abbreviations

Project Number B2304507
Geotechnical Evaluation
Southtown Development
7801-7997 Southtown Drive
Bloomington, Minnesota

BORING: **ST-114**
LOCATION:
DATUM: NAD 1983 HARN Adj MN Hennepin (US Feet)
NORTHING: 125296 EASTING: 520793
START DATE: 04/24/24 END DATE: 04/24/24
SURFACE ELEVATION: 831.7 ft
DRILLER: C. McClain LOGGED BY: S. Martin
RIG: 7514 METHOD: 3 1/4" HSA
SURFACING: Soil WEATHER: Sunny

Elev./ Depth ft	Water Level	Description of Materials (Soil-ASTM D2488 or 2487; Rock-USACE EM 1110-1-2908)	Sample	Blows (N-Value) Recovery	q_p tsf	MC %	Tests or Remarks
831.2		SILTY SAND (SM), fine-grained, dark brown, moist (TOPSOIL FILL)					
0.5		FILL: SILTY SAND (SM), fine-grained, brown, moist		5-5-5 (10) 18"			
827.7							
4.0		POORLY GRADED SAND with SILT (SP-SM), fine-grained, brown, moist, loose (ALLUVIUM)	5	6-4-3 (7) 18"			
824.7							
7.0		SANDY SILT (ML), brown, wet, loose (ALLUVIUM)		4-2-4 (6) 18"		37	
821.7							
10.0		POORLY GRADED SAND with SILT (SP-SM), fine-grained, brown, moist, medium dense to dense (ALLUVIUM)	10	12-7-8 (15) 18"			
				26-20-18 (38) 18"			
			15	40-20-20 (40) 18"			
			20	20-22-44 (66) 18"			
810.7							
21.0		END OF BORING					Water not observed while drilling.
		Boring immediately grouted					
			25				
			30				

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See Descriptive Terminology sheet for explanation of abbreviations

Project Number B2304507
Geotechnical Evaluation
Southtown Development
7801-7997 Southtown Drive
Bloomington, Minnesota

BORING: **ST-115**
LOCATION:
DATUM: NAD 1983 HARN Adj MN Hennepin (US Feet)
NORTHING: 125553 EASTING: 520208
START DATE: 04/24/24 END DATE: 04/24/24
SURFACE ELEVATION: 831.5 ft
DRILLER: C. McClain LOGGED BY: S. Martin
RIG: 7514 METHOD: 3 1/4" HSA
SURFACING: Bituminous WEATHER: Clear

Elev./ Depth ft	Water Level	Description of Materials (Soil-ASTM D2488 or 2487; Rock-USACE EM 1110-1-2908)	Sample	Blows (N-Value) Recovery	q_p tsf	MC %	Tests or Remarks
830.6		PAVEMENT, 4 inches of bituminous over 7 inches of apparent aggregate base					
0.9		FILL: SILTY SAND (SM), fine to medium-grained, dark brown to black, moist		4-8-11 (19) 14"			
			5	7-9-5 (14) 16"			
				1-4-4 (8) 18"		18	
			10	4-4-4 (8) 17"			
820.5							
11.0		POORLY GRADED SAND with SILT (SP-SM), fine-grained, brown, moist, loose (ALLUVIUM)		2-4-4 (8) 17"			
			15	2-3-4 (7) 17"			
815.5							
16.0		END OF BORING					Water not observed while drilling.
		Boring immediately grouted					
			20				
			25				
			30				

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LOG OF BORING

See Descriptive Terminology sheet for explanation of abbreviations

Project Number B2304507
Geotechnical Evaluation
Southtown Development
7801-7997 Southtown Drive
Bloomington, Minnesota

BORING: **ST-116**
LOCATION:
DATUM: NAD 1983 HARN Adj MN Hennepin (US Feet)
NORTHING: 125361 EASTING: 520210
START DATE: 04/24/24 END DATE: 04/24/24
SURFACING: Bituminous WEATHER: Clear

DRILLER: C. McClain LOGGED BY: S. Martin
SURFACE ELEVATION: 832.0 ft RIG: 7514 METHOD: 3 1/4" HSA

Elev./ Depth ft	Description of Materials (Soil-ASTM D2488 or 2487; Rock-USACE EM 1110-1-2908)	Sample	Blows (N-Value) Recovery	q_p tsf	MC %	Tests or Remarks
830.6	PAVEMENT, 5 inches of bituminous over 10 inches of apparent aggregate base					
1.4	FILL: SILTY SAND (SM), fine to medium-grained, dark brown to black, moist		4-12-7 (19) 13"			
		5	3-3-4 (7) 18"		16	OC=3%
825.0						
7.0	SILTY SAND (SM), fine-grained, brown, moist, loose (ALLUVIUM)		3-3-2 (5) 17"			
		10	2-2-3 (5) 17"			
820.0						
12.0	POORLY GRADED SAND with SILT (SP-SM), fine-grained, light brown, moist, loose (ALLUVIUM)		2-3-4 (7) 17"			
		15	5-3-4 (7) 18"			
816.0						
16.0	END OF BORING					Water not observed while drilling.
	Boring immediately grouted					
		20				
		25				
		30				

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See Descriptive Terminology sheet for explanation of abbreviations

Project Number B2304507
Geotechnical Evaluation
Southtown Development
7801-7997 Southtown Drive
Bloomington, Minnesota

BORING: **ST-117**
LOCATION:
DATUM: NAD 1983 HARN Adj MN Hennepin (US Feet)
NORTHING: 125195 EASTING: 520068
START DATE: 04/24/24 END DATE: 04/24/24
SURFACE ELEVATION: 830.5 ft RIG: 7514 METHOD: 3 1/4" HSA
SURFACING: Bituminous WEATHER: Clear
DRILLER: C. McClain LOGGED BY: S. Martin

Elev./ Depth ft	Water Level	Description of Materials (Soil-ASTM D2488 or 2487; Rock-USACE EM 1110-1-2908)	Sample	Blows (N-Value) Recovery	q_p tsf	MC %	Tests or Remarks
829.6		PAVEMENT, 8 inches of bituminous over 3 inches of apparent aggregate base					
0.9		SILTY SAND (SM), fine-grained, brown, moist, loose (ALLUVIUM)		2-5-5 (10) 13"			
			5	2-4-5 (9) 17"			
824.5							
6.0		POORLY GRADED SAND with SILT (SP-SM), fine-grained, brown, moist, loose to medium dense (ALLUVIUM)		1-5-5 (10) 18"			
			10	4-7-16 (23) 16"			
				4-5-6 (11) 13"			
816.5							
14.0		SANDY SILT (ML), brown, moist, loose (ALLUVIUM)	15	2-3-4 (7) 16"			
814.5							
16.0		END OF BORING Boring immediately grouted					Water not observed while drilling.
			20				
			25				
			30				

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See Descriptive Terminology sheet for explanation of abbreviations

Project Number B2304507
Geotechnical Evaluation
Southtown Development
7801-7997 Southtown Drive
Bloomington, Minnesota

BORING: **ST-118**
LOCATION:
DATUM: NAD 1983 HARN Adj MN Hennepin (US Feet)
NORTHING: 125097 EASTING: 520125
START DATE: 04/24/24 END DATE: 04/24/24
SURFACE ELEVATION: 831.5 ft
DRILLER: C. McClain LOGGED BY: S. Martin
RIG: 7514 METHOD: 3 1/4" HSA
SURFACING: Bituminous WEATHER: Clear

Elev./ Depth ft	Water Level	Description of Materials (Soil-ASTM D2488 or 2487; Rock-USACE EM 1110-1-2908)	Sample	Blows (N-Value) Recovery	q_p tsf	MC %	Tests or Remarks
831.0		PAVEMENT, 4 1/2 inches of bituminous over 2 inches of apparent aggregate base					
0.5		POORLY GRADED SAND with SILT (SP-SM), fine-grained, light brown, moist, loose to medium dense (ALLUVIUM)		2-4-3 (7) 10"			
				4-7-7 (14) 14"			
				4-10-9 (19) 13"			
				4-7-6 (13) 14"			
				2-5-5 (10) 15"			
				4-6-7 (13) 17"			
815.5							
16.0		END OF BORING					Water not observed while drilling.
		Boring immediately grouted					

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See Descriptive Terminology sheet for explanation of abbreviations

Project Number B2304507
Geotechnical Evaluation
Southtown Development
7801-7997 Southtown Drive
Bloomington, Minnesota

BORING: **ST-119**
LOCATION:
DATUM: NAD 1983 HARN Adj MN Hennepin (US Feet)
NORTHING: 125091 EASTING: 520442
START DATE: 04/24/24 END DATE: 04/24/24
SURFACE ELEVATION: 833.5 ft
DRILLER: C. McClain LOGGED BY: S. Martin
RIG: 7514 METHOD: 3 1/4" HSA
SURFACING: Bituminous WEATHER: Clear

Elev./ Depth ft	Water Level	Description of Materials (Soil-ASTM D2488 or 2487; Rock-USACE EM 1110-1-2908)	Sample	Blows (N-Value) Recovery	q_p tsf	MC %	Tests or Remarks
832.8		PAVEMENT, 6 1/2 inches of bituminous over 3 inches of apparent aggregate base					
0.7		FILL: SILTY SAND (SM), fine-grained, brown, moist		1-4-5 (9) 13"			
830.5		POORLY GRADED SAND with SILT (SP-SM), fine-grained, brown, moist, loose to medium dense (ALLUVIUM)		2-4-4 (8) 15"			
3.0			5	2-4-6 (10) 17"			
			10	3-5-5 (10) 16"			
				2-5-6 (11) 16"			
			15	3-8-10 (18) 15"			
817.5							
16.0		END OF BORING					Water not observed while drilling.
		Boring immediately grouted	20				
			25				
			30				

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See Descriptive Terminology sheet for explanation of abbreviations

Project Number B2304507
Geotechnical Evaluation
Southtown Development
7801-7997 Southtown Drive
Bloomington, Minnesota

BORING: **ST-120**
LOCATION:
DATUM: NAD 1983 HARN Adj MN Hennepin (US Feet)
NORTHING: 125101 EASTING: 521016
START DATE: 05/03/24 END DATE: 05/03/24
SURFACING: Bituminous WEATHER: Clear

DRILLER: C. McClain LOGGED BY: S. Martin
SURFACE ELEVATION: 831.4 ft RIG: 7514 METHOD: 3 1/4" HSA

Elev./ Depth ft	Water Level	Description of Materials (Soil-ASTM D2488 or 2487; Rock-USACE EM 1110-1-2908)	Sample	Blows (N-Value) Recovery	q_p tsf	MC %	Tests or Remarks
830.8		PAVEMENT, 4 1/2 inches of bituminous over 3 inches of apparent aggregate base					
0.6		POORLY GRADED SAND with SILT (SP-SM), fine-grained, light brown, moist, loose to medium dense (ALLUVIUM)		2-3-4 (7) 12"			
			5	3-3-4 (7) 14"			
				3-3-6 (9) 16"			
			10	4-4-5 (9) 16"			
				5-6-7 (13) 14"			
			15	8-7-10 (17) 14"			
815.4							
16.0		END OF BORING					Water not observed while drilling.
		Boring immediately grouted	20				
			25				
			30				

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LOG OF BORING

See Descriptive Terminology sheet for explanation of abbreviations

Project Number B2304507
Geotechnical Evaluation
Southtown Development
7801-7997 Southtown Drive
Bloomington, Minnesota

BORING: **ST-121**
LOCATION:
DATUM: NAD 1983 HARN Adj MN Hennepin (US Feet)
NORTHING: 124883 EASTING: 521068
START DATE: 05/03/24 END DATE: 05/03/24
SURFACING: Bituminous WEATHER: Clear

DRILLER: C. McClain LOGGED BY: S. Martin
SURFACE ELEVATION: 830.4 ft RIG: 7514 METHOD: 3 1/4" HSA

Elev./ Depth ft	Water Level	Description of Materials (Soil-ASTM D2488 or 2487; Rock-USACE EM 1110-1-2908)	Sample	Blows (N-Value) Recovery	q_p tsf	MC %	Tests or Remarks
829.7		PAVEMENT, 5 inches of bituminous over 3 inches of apparent aggregate base					
0.7		SILTY SAND (SM), fine-grained, brown, moist, loose to medium dense (ALLUVIUM)		3-4-5 (9) 10"			
			5	7-5-6 (11) 14"			
823.4							
7.0		POORLY GRADED SAND with SILT (SP-SM), fine-grained, brown, moist, loose to medium dense (ALLUVIUM)		5-4-4 (8) 14"			
			10	3-4-7 (11) 16"			
				5-5-6 (11) 14"			
			15	5-6-8 (14) 16"			
814.4							
16.0		END OF BORING					Water not observed while drilling.
		Boring immediately grouted					
			20				
			25				
			30				

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See Descriptive Terminology sheet for explanation of abbreviations

Project Number B2304507
Geotechnical Evaluation
Southtown Development
7801-7997 Southtown Drive
Bloomington, Minnesota

BORING: **ST-122**
LOCATION:
DATUM: NAD 1983 HARN Adj MN Hennepin (US Feet)
NORTHING: 125605 EASTING: 520491
START DATE: 04/24/24 END DATE: 04/24/24
SURFACING: Bituminous WEATHER: Sunny

DRILLER: C. McClain LOGGED BY: S. Martin
SURFACE ELEVATION: 832.3 ft RIG: 7514 METHOD: 3 1/4" HSA

Elev./ Depth ft	Water Level	Description of Materials (Soil-ASTM D2488 or 2487; Rock-USACE EM 1110-1-2908)	Sample	Blows (N-Value) Recovery	q_p tsf	MC %	Tests or Remarks
		FILL: SILTY SAND (SM), fine to medium-grained, dark brown, moist		7-11-6 (17) 18"		13	OC=2%
			5	7-5-6 (11) 18"		11	
825.3 7.0		POORLY GRADED SAND with SILT (SP-SM), fine-grained, brown, moist, loose to medium dense (ALLUVIUM)		6-3-4 (7) 18"			
			10	6-5-5 (10) 18"			
				18-12-10 (22) 18"			
			15	6-4-5 (9) 16"			
813.3 19.0		SANDY SILT (ML), brown, wet, loose (ALLUVIUM)	20	7-5-5 (10) 18"			
811.3 21.0		END OF BORING Boring immediately grouted					Water not observed while drilling.
			25				
			30				

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LOG OF BORING

See Descriptive Terminology sheet for explanation of abbreviations

Project Number B2304507
Geotechnical Evaluation
Southtown Development
7801-7997 Southtown Drive
Bloomington, Minnesota

BORING: **ST-123**
LOCATION:
DATUM: NAD 1983 HARN Adj MN Hennepin (US Feet)
NORTHING: 125548 EASTING: 520555
START DATE: 04/24/24 END DATE: 04/24/24
SURFACE ELEVATION: 834.6 ft
DRILLER: C. McClain LOGGED BY: S. Martin
RIG: 7514 METHOD: 3 1/4" HSA
SURFACING: Soil WEATHER: Sunny

Elev./ Depth ft	Water Level	Description of Materials (Soil-ASTM D2488 or 2487; Rock-USACE EM 1110-1-2908)	Sample	Blows (N-Value) Recovery	q_p tsf	MC %	Tests or Remarks
		FILL: SILTY SAND (SM), fine to medium-grained, trace Gravel, dark brown, moist		5-6-4 (10) 18"		12	OC=1%
828.6			5	3-2-1 (3) 18"			
6.0		SILTY SAND (SM), fine-grained, brown, moist, loose to medium dense (ALLUVIUM)		4-7-7 (14) 18"			
823.6			10	4-2-5 (7) 18"			
11.0		POORLY GRADED SAND with SILT (SP-SM), fine-grained, brown, moist, medium dense (ALLUVIUM)		9-8-8 (16) 18"			
		SILTY SAND (SM), fine-grained, brown, moist, loose (ALLUVIUM)	15	12-10-10 (20) 18"			
816.6							
18.0							
813.6			20	4-2-4 (6) 18"			
21.0		END OF BORING Boring immediately grouted					Water not observed while drilling.
			25				
			30				

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See Descriptive Terminology sheet for explanation of abbreviations

Project Number B2304507
Geotechnical Evaluation
Southtown Development
7801-7997 Southtown Drive
Bloomington, Minnesota

BORING: **ST-124**
LOCATION:
DATUM: NAD 1983 HARN Adj MN Hennepin (US Feet)
NORTHING: 125551 EASTING: 520795
START DATE: 04/25/24 END DATE: 04/25/24
SURFACE ELEVATION: 834.3 ft RIG: 7514 METHOD: 3 1/4" HSA
SURFACING: Soil WEATHER: Clear
DRILLER: C. McClain LOGGED BY: S. Martin

Elev./ Depth ft	Water Level	Description of Materials (Soil-ASTM D2488 or 2487; Rock-USACE EM 1110-1-2908)	Sample	Blows (N-Value) Recovery	q_p tsf	MC %	Tests or Remarks
		FILL: SILTY SAND (SM), fine to medium-grained, trace Gravel, brown, moist		1-3-2 (5) 13"		12	P200=11%
830.3							
4.0		SILTY SAND (SM), fine-grained, brown, moist, loose (ALLUVIUM)	5	3-4-6 (10) 15"			
				3-6-4 (10) 16"			
825.3							
9.0		POORLY GRADED SAND with SILT (SP-SM), fine-grained, moist, very loose to medium dense (ALLUVIUM)	10	2-2-2 (4) 15"			
				2-2-2 (4) 17"			
			15	2-3-4 (7) 17"			
			20	4-7-7 (14) 18"			
813.3							
21.0		END OF BORING					Water not observed while drilling.
		Boring immediately grouted					
			25				
			30				

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See Descriptive Terminology sheet for explanation of abbreviations

Project Number B2304507
Geotechnical Evaluation
Southtown Development
7801-7997 Southtown Drive
Bloomington, Minnesota

BORING: **ST-125**
LOCATION:
DATUM: NAD 1983 HARN Adj MN Hennepin (US Feet)
NORTHING: 125552 EASTING: 520922
DRILLER: C. McClain LOGGED BY: S. Martin START DATE: 05/03/24 END DATE: 05/03/24
SURFACE ELEVATION: 834.6 ft RIG: 7514 METHOD: 3 1/4" HSA SURFACING: Bituminous WEATHER: Clear

Elev./ Depth ft	Water Level	Description of Materials (Soil-ASTM D2488 or 2487; Rock-USACE EM 1110-1-2908)	Sample	Blows (N-Value) Recovery	q_p tsf	MC %	Tests or Remarks
834.0		PAVEMENT, 6 inches of bituminous over 2 inches of apparent aggregate base					
0.6		SILTY SAND (SM), fine-grained, brown, moist, loose (ALLUVIUM)		3-3-3 (6) 12"			
			5	3-2-6 (8) 12"			
828.6							
6.0		POORLY GRADED SAND with SILT (SP-SM), fine-grained, light brown, moist, loose to medium dense (ALLUVIUM)		5-6-6 (12) 14"			
			10	3-4-8 (12) 16"			
				5-4-6 (10) 16"			
			15	8-10-13 (23) 16"			
			20	10-13-20 (33) 18"			
813.6							
21.0		END OF BORING Boring immediately grouted					Water not observed while drilling.
			25				
			30				

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See Descriptive Terminology sheet for explanation of abbreviations

Project Number B2304507
Geotechnical Evaluation
Southtown Development
7801-7997 Southtown Drive
Bloomington, Minnesota

BORING: **ST-126**
LOCATION:
DATUM: NAD 1983 HARN Adj MN Hennepin (US Feet)
NORTHING: 125404 EASTING: 520469
START DATE: 04/24/24 END DATE: 04/24/24
SURFACE ELEVATION: 833.8 ft
DRILLER: C. McClain LOGGED BY: S. Martin
RIG: 7514 METHOD: 3 1/4" HSA
SURFACING: Bituminous WEATHER: Clear

Elev./ Depth ft	Water Level	Description of Materials (Soil-ASTM D2488 or 2487; Rock-USACE EM 1110-1-2908)	Sample	Blows (N-Value) Recovery	q_p tsf	MC %	Tests or Remarks
833.3		PAVEMENT, 3 1/2 inches of bituminous over 3 inches of apparent aggregate base					
0.5		FILL: SILTY SAND (SM), fine to medium-grained, brown, moist		4-10-5 (15) 14"		8	
			5	2-3-3 (6) 13"		10	
826.8							
7.0		SILTY SAND (SM), fine-grained, brown, moist, medium dense (ALLUVIUM)		5-6-6 (12) 18"			
824.8							
9.0		POORLY GRADED SAND with SILT (SP-SM), fine-grained, brown, moist, loose to medium dense (ALLUVIUM)	10	3-3-4 (7) 15"			
				3-3-4 (7) 18"			
			15	4-4-3 (7) 16"			
			20	6-9-9 (18) 18"			
812.8							
21.0		END OF BORING					Water not observed while drilling.
		Boring immediately grouted					
			25				
			30				

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LOG OF BORING

See Descriptive Terminology sheet for explanation of abbreviations

Project Number B2304507
Geotechnical Evaluation
Southtown Development
7801-7997 Southtown Drive
Bloomington, Minnesota

BORING: **ST-127**
LOCATION:
DATUM: NAD 1983 HARN Adj MN Hennepin (US Feet)
NORTHING: 125404 EASTING: 520608
START DATE: 04/24/24 END DATE: 04/24/24
SURFACE ELEVATION: 834.8 ft
DRILLER: C. McClain LOGGED BY: S. Martin
RIG: 7514 METHOD: 3 1/4" HSA
SURFACING: Soil WEATHER: Sunny

Elev./ Depth ft	Water Level	Description of Materials (Soil-ASTM D2488 or 2487; Rock-USACE EM 1110-1-2908)	Sample	Blows (N-Value) Recovery	q_p tsf	MC %	Tests or Remarks
		FILL: SILTY SAND (SM), fine to medium-grained, trace Gravel, dark brown to brown, moist		2-1-1 (2) 18"			
			5	0-0-0 WOH/18" 18"		11	P200=15%
827.8 7.0		POORLY GRADED SAND with SILT (SP-SM), fine-grained, light brown to brown, moist, loose to medium dense (ALLUVIUM)		4-6-6 (12) 18"			
			10	11-9-9 (18) 18"			
				6-5-5 (10) 18"			
			15	9-7-8 (15) 18"			
			20	7-4-6 (10) 18"			
813.8 21.0		END OF BORING Boring immediately grouted					Water not observed while drilling.
			25				
			30				

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LOG OF BORING

See Descriptive Terminology sheet for explanation of abbreviations

Project Number B2304507
Geotechnical Evaluation
Southtown Development
7801-7997 Southtown Drive
Bloomington, Minnesota

BORING: **ST-128**
LOCATION:
DATUM: NAD 1983 HARN Adj MN Hennepin (US Feet)
NORTHING: 125296 EASTING: 520922
START DATE: 05/03/24 END DATE: 05/03/24
SURFACING: Bituminous WEATHER: Clear

DRILLER: C. McClain LOGGED BY: S. Martin
SURFACE ELEVATION: 834.4 ft RIG: 7514 METHOD: 3 1/4" HSA

Elev./ Depth ft	Water Level	Description of Materials (Soil-ASTM D2488 or 2487; Rock-USACE EM 1110-1-2908)	Sample	Blows (N-Value) Recovery	q_p tsf	MC %	Tests or Remarks
833.7		PAVEMENT, 5 inches of bituminous over 3 inches of apparent aggregate base					
0.7		POORLY GRADED SAND with SILT (SP-SM), fine-grained, light brown, moist, loose to medium dense (ALLUVIUM)		5-7-8 (15) 16"			
			5	3-5-4 (9) 14"			
				3-4-6 (10) 16"			
			10	3-4-6 (10) 14"			
				4-6-13 (19) 18"			
			15	8-9-16 (25) 16"			
			20	10-14-12 (26) 16"			
813.4							
21.0		END OF BORING					Water not observed while drilling.
		Boring immediately grouted					
			25				
			30				

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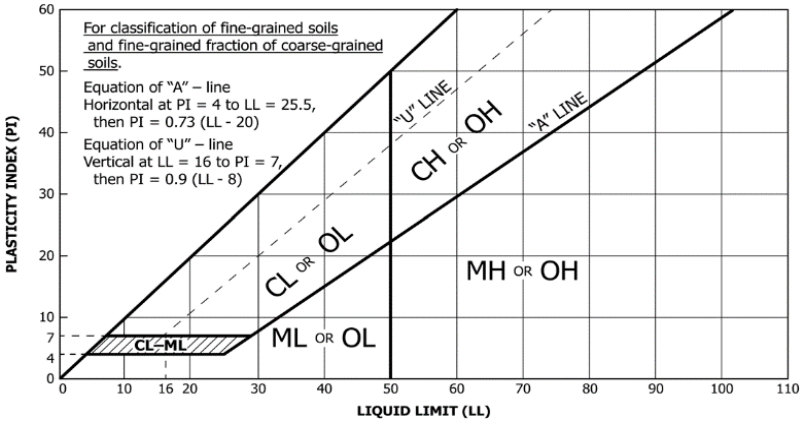
Descriptive Terminology of Soil

Based on Standards ASTM D2487/2488
(Unified Soil Classification System)

Criteria for Assigning Group Symbols and Group Names Using Laboratory Tests[A]				Soil Classification	
				Group Symbol	Group Name[B]
Coarse-grained Soils (more than 50% retained on No. 200 sieve)	Gravels (More than 50% of coarse fraction retained on No. 4 sieve)	Clean Gravels (Less than 5% fines[C])	$C_u \geq 4$ and $1 \leq C_c \leq 3$[D]	GW	Well-graded gravel[E]
			$C_u < 4$ and/or ($C_c < 1$ or $C_c > 3$)[D]	GP	Poorly graded gravel[E]
		Gravels with Fines (More than 12% fines[C])	Fines classify as ML or MH	GM	Silty gravel[E F G]
			Fines Classify as CL or CH	GC	Clayey gravel[E F G]
	Sands (50% or more coarse fraction passes No. 4 sieve)	Clean Sands (Less than 5% fines[H])	$C_u \geq 6$ and $1 \leq C_c \leq 3$[D]	SW	Well-graded sand[I]
			$C_u < 6$ and/or ($C_c < 1$ or $C_c > 3$)[D]	SP	Poorly graded sand[I]
		Sands with Fines (More than 12% fines[H])	Fines classify as ML or MH	SM	Silty sand[F G I]
			Fines classify as CL or CH	SC	Clayey sand[F G I]
Fine-grained Soils (50% or more passes the No. 200 sieve)	Silts and Clays (Liquid limit less than 50)	Inorganic	PI > 7 and plots on or above "A" line[J]	CL	Lean clay[K L M]
			PI < 4 or plots below "A" line[J]	ML	Silt[K L M]
		Organic	Liquid Limit – oven dried / Liquid Limit – not dried <0.75	OL	Organic clay[K L M N] / Organic silt[K L M O]
	Silts and Clays (Liquid limit 50 or more)	Inorganic	PI plots on or above "A" line	CH	Fat clay[K L M]
			PI plots below "A" line	MH	Elastic silt[K L M]
		Organic	Liquid Limit – oven dried / Liquid Limit – not dried <0.75	OH	Organic clay[K L M P] / Organic silt[K L M Q]
Highly Organic Soils		Primarily organic matter, dark in color, and organic odor		PT	Peat

A. Based on the material passing the 3-inch (75-mm) sieve.
B. If field sample contained cobbles or boulders, or both, add "with cobbles or boulders, or both" to group name.
C. Gravels with 5 to 12% fines require dual symbols:
   GW-GM well-graded gravel with silt
   GW-GC well-graded gravel with clay
   GP-GM poorly graded gravel with silt
   GP-GC poorly graded gravel with clay
D. $C_u = D_{60} / D_{10}$ $C_c = (D_{30})^2 / (D_{10} \times D_{60})$
E. If soil contains ≥ 15% sand, add "with sand" to group name.
F. If fines classify as CL-ML, use dual symbol GC-GM or SC-SM.
G. If fines are organic, add "with organic fines" to group name.
H. Sands with 5 to 12% fines require dual symbols:
   SW-SM well-graded sand with silt
   SW-SC well-graded sand with clay
   SP-SM poorly graded sand with silt
   SP-SC poorly graded sand with clay
I. If soil contains ≥ 15% gravel, add "with gravel" to group name.
J. If Atterberg limits plot in hatched area, soil is CL-ML, silty clay.
K. If soil contains 15 to < 30% plus No. 200, add "with sand" or "with gravel", whichever is predominant.
L. If soil contains ≥ 30% plus No. 200, predominantly sand, add "sandy" to group name.
M. If soil contains ≥ 30% plus No. 200 predominantly gravel, add "gravelly" to group name.
N. PI ≥ 4 and plots on or above "A" line.
O. PI < 4 or plots below "A" line.
P. PI plots on or above "A" line.
Q. PI plots below "A" line.



Laboratory Tests

DD	Dry density, pcf	**q_p**	Pocket penetrometer strength, tsf
WD	Wet density, pcf	**q_U**	Unconfined compression test, tsf
P200	% Passing #200 sieve	**LL**	Liquid limit
MC	Moisture content, %	**PL**	Plastic limit
OC	Organic content, %	**PI**	Plasticity index

Particle Size Identification

Boulders..... over 12"
Cobbles..... 3" to 12"
Gravel
  Coarse..... 3/4" to 3" (19.00 mm to 75.00 mm)
  Fine..... No. 4 to 3/4" (4.75 mm to 19.00 mm)
Sand
  Coarse..... No. 10 to No. 4 (2.00 mm to 4.75 mm)
  Medium..... No. 40 to No. 10 (0.425 mm to 2.00 mm)
  Fine..... No. 200 to No. 40 (0.075 mm to 0.425 mm)
Silt..... No. 200 (0.075 mm) to .005 mm
Clay..... < .005 mm

Relative Proportions[L, M]

trace..... 0 to 5%
little..... 6 to 14%
with..... ≥ 15%

Inclusion Thicknesses

lens..... 0 to 1/8"
seam..... 1/8" to 1"
layer..... over 1"

Apparent Relative Density of Cohesionless Soils

Very loose ..... 0 to 4 BPF
Loose ..... 5 to 10 BPF
Medium dense..... 11 to 30 BPF
Dense..... 31 to 50 BPF
Very dense..... over 50 BPF

Consistency of Cohesive Soils	Blows Per Foot	Approximate Unconfined Compressive Strength
Very soft	0 to 1 BPF	< 0.25 tsf
Soft	2 to 4 BPF	0.25 to 0.5 tsf
Medium	5 to 8 BPF	0.5 to 1 tsf
Stiff	9 to 15 BPF	1 to 2 tsf
Very Stiff	16 to 30 BPF	2 to 4 tsf
Hard	over 30 BPF	> 4 tsf

Moisture Content:

Dry: Absence of moisture, dusty, dry to the touch.
Moist: Damp but no visible water.
Wet: Visible free water, usually soil is below water table.

Drilling Notes:

Blows/N-value: Blows indicate the driving resistance recorded for each 6-inch interval. The reported N-value is the blows per foot recorded by summing the second and third interval in accordance with the Standard Penetration Test, ASTM D1586.

Partial Penetration: If the sampler could not be driven through a full 6-inch interval, the number of blows for that partial penetration is shown as #/x" (i.e. 50/2"). The N-value is reported as "REF" indicating refusal.

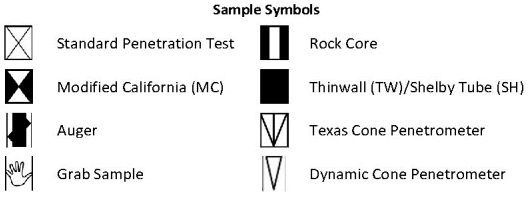
Recovery: Indicates the inches of sample recovered from the sampled interval. For a standard penetration test, full recovery is 18", and is 24" for a thinwall/shelby tube sample.

WOH: Indicates the sampler penetrated soil under weight of hammer and rods alone; driving not required.

WOR: Indicates the sampler penetrated soil under weight of rods alone; hammer weight and driving not required.

Water Level: Indicates the water level measured by the drillers either while drilling (▽), at the end of drilling (▼), or at some time after drilling (▼).

Sample Symbols



5/2021

Appendix 5. MIDS Analysis

Project Information

Calculator Version:	Version 2: June 2014
Project Name:	Southtown
User Name / Company Name:	Kimley-Horn
Date:	8/2/2024
Project Description:	Kraus Anderson proposed to redevelop the Southtown Shopping Center by adding a sporting goods building, and provideing space for additional, future building. All associated parking lot improvements, underground utilities, landscaping, stormwater management, and other appurtenances are proposed to be constructed.

Site Information

Retention Requirement (inches):	1.1
Site's Zip Code:	55431
Annual Rainfall (inches):	31.3
Phosphorus EMC (mg/l):	0.3
TSS EMC (mg/l):	54.5

Total Site Area

Land Cover	A Soils (acres)	B Soils (acres)	C Soils (acres)	D Soils (acres)	Total (acres)
Forest/Open Space - Undisturbed, protected forest/open space or reforested land					0
Managed Turf - disturbed, graded for yards or other turf to be mowed/managed		1.77			1.77
			Impervious Area (acres)		13.31
				Total Area (acres)	15.08

Site Areas Routed to BMPs

Land Cover	A Soils (acres)	B Soils (acres)	C Soils (acres)	D Soils (acres)	Total (acres)
Forest/Open Space - Undisturbed, protected forest/open space or reforested land					0
Managed Turf - disturbed, graded for yards or other turf to be mowed/managed		1.42			1.42
			Impervious Area (acres)		12.94
				Total Area (acres)	14.36

Summary Information

Performance Goal Requirement

Performance goal volume retention requirement:	53147	ft3
Volume removed by BMPs towards performance goal:	47157	ft^3
Percent volume removed towards performance goal	**89**	**%**

Annual Volume and Pollutant Load Reductions

Post development annual runoff volume	30.514	acre-ft
Annual runoff volume removed by BMPs:	26.1624	acre-ft
Percent annual runoff volume removed:	**86**	**%**
Post development annual particulate P load:	13.69	lbs
Annual particulate P removed by BMPs:	11.74	lbs
Post development annual dissolved P load:	11.2	lbs
Annual dissolved P removed by BMPs:	9.61	lbs
Percent annual total phosphorus removed:	**86**	**%**
Post development annual TSS load:	4523	lbs
Annual TSS removed by BMPs:	4184	lbs
Percent annual TSS removed:	**93**	**%**

BMP Summary

Performance Goal Summary

BMP Name	BMP Volume Capacity (ft3)	Volume Recieved (ft3)	Volume Retained (ft3)	Volume Outflow (ft3)	Percent Retained (%)
Underground Infiltration #1	41632	26833	26833	0	100
Underground Infiltration #2	26876	20324	20324	0	100
Structure 72	0	2516	0	2516	0
Structure 300	0	1996	0	1996	0

Annual Volume Summary

BMP Name	Volume From Direct Watershed (acre-ft)	Volume From Upstream BMPs (acre-ft)	Volume Retained (acre-ft)	Volume outflow (acre-ft)	Percent Retained (%)
Underground Infiltration #1	15.3245	0	14.931	0.3935000000	97
Underground Infiltration #2	11.6143	0	11.2314	0.3828999999	97
Structure 72	1.4238	0	0	1.4238	0
Structure 300	1.162	0	0	1.162	0

Particulate Phosphorus Summary

BMP Name	Load From Direct Watershed (lbs)	Load From Upstream BMPs (lbs)	Load Retained (lbs)	Outflow Load (lbs)	Percent Retained (%)
Underground Infiltration #1	6.88	0	6.7	0.18	97
Underground Infiltration #2	5.21	0	5.04	0.17	97
Structure 72	0.64	0	0	0.64	0
Structure 300	0.52	0	0	0.52	0

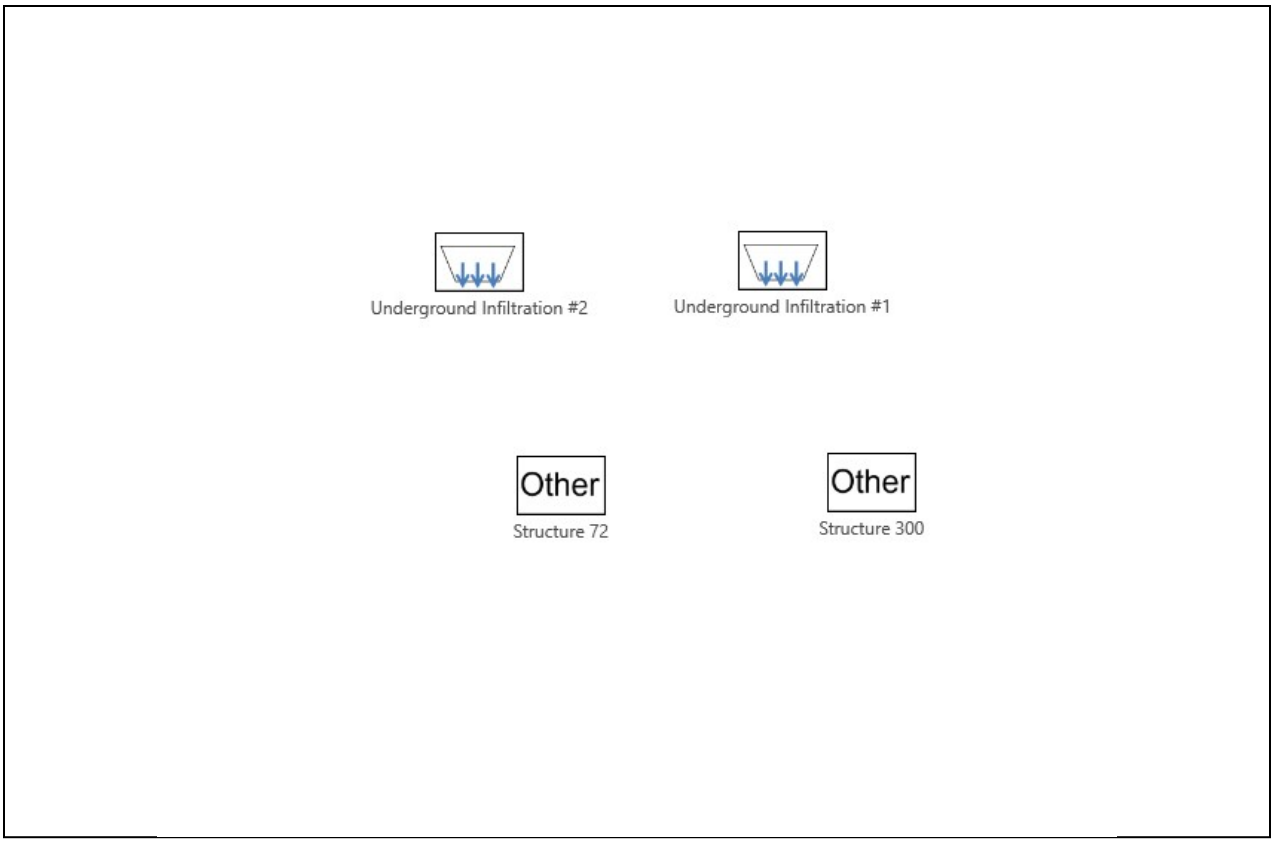
Dissolved Phosphorus Summary

BMP Name	Load From Direct Watershed (lbs)	Load From Upstream BMPs (lbs)	Load Retained (lbs)	Outflow Load (lbs)	Percent Retained (%)
Underground Infiltration #1	5.63	0	5.49	0.14	97
Underground Infiltration #2	4.26	0	4.12	0.14	97
Structure 72	0.52	0	0	0.52	0
Structure 300	0.43	0	0	0.43	0

TSS Summary

BMP Name	Load From Direct Watershed (lbs)	Load From Upstream BMPs (lbs)	Load Retained (lbs)	Outflow Load (lbs)	Percent Retained (%)
Underground Infiltration #1	2272	0	2214	58	97
Underground Infiltration #2	1722	0	1665	57	97
Structure 72	211	0	163	48	77
Structure 300	172	0	142	30	83

BMP Schematic


Underground Infiltration #2
Underground Infiltration #1
Other
Structure 72
Other
Structure 300

Appendix 6. SHSAM Results

Structure 72 Sump and SAFL SHSAM Analysis

Name	Model	Year	Output "Removal" Ef	Annual Load (lbs)	Load Removed	Deposit (in)
SAFLBaffl	42	1995	38	175.1	67.4	0.62
SAFLBaffl	44	1995	60	175.1	105.1	0.98
SAFLBaffl	55	1995	80	175.1	140.9	0.84
SAFLBaffl	63	1995	86	175.1	150	0.62
SAFLBaffl	66	1995	93	175.1	163.3	0.67
SAFLBaffl	86	1995	98	175.1	170.9	0.4
SAFLBaffl	106	1995	99	175.1	173.6	0.26
SAFLBaffl	42	1996	34	176.1	59.8	0.55
SAFLBaffl	44	1996	56	176.1	99.3	0.92
SAFLBaffl	55	1996	77	176.1	135.3	0.8
SAFLBaffl	63	1996	81	176.1	143.2	0.59
SAFLBaffl	66	1996	88	176.1	154.7	0.64
SAFLBaffl	86	1996	92	176.1	162.9	0.38
SAFLBaffl	106	1996	95	176.1	167.6	0.25
SAFLBaffl	42	1997	23	210.1	48.2	0.45
SAFLBaffl	44	1997	41	210.1	86.2	0.8
SAFLBaffl	55	1997	58	210.1	122.3	0.73
SAFLBaffl	63	1997	63	210.1	132.8	0.55
SAFLBaffl	66	1997	73	210.1	153.4	0.63
SAFLBaffl	86	1997	84	210.1	176.2	0.41
SAFLBaffl	106	1997	91	210.1	191.2	0.28
SAFLBaffl	42	1998	37	153.8	56.5	0.52
SAFLBaffl	44	1998	57	153.8	87.8	0.81
SAFLBaffl	55	1998	75	153.8	114.8	0.68
SAFLBaffl	63	1998	79	153.8	122.1	0.5
SAFLBaffl	66	1998	88	153.8	134.7	0.56
SAFLBaffl	86	1998	94	153.8	144.7	0.34
SAFLBaffl	106	1998	97	153.8	149.4	0.22
SAFLBaffl	42	1999	42	95.6	40.2	0.37
SAFLBaffl	44	1999	65	95.6	61.7	0.57
SAFLBaffl	55	1999	84	95.6	79.8	0.47
SAFLBaffl	63	1999	88	95.6	83.8	0.35
SAFLBaffl	66	1999	94	95.6	89.7	0.37
SAFLBaffl	86	1999	98	95.6	93.4	0.22
SAFLBaffl	106	1999	99	95.6	94.8	0.14
SAFLBaffl	42	2000	24	192.9	45.7	0.42
SAFLBaffl	44	2000	43	192.9	82.3	0.76
SAFLBaffl	55	2000	63	192.9	120.9	0.72
SAFLBaffl	63	2000	69	192.9	132.3	0.55
SAFLBaffl	66	2000	79	192.9	153.2	0.63
SAFLBaffl	86	2000	89	192.9	170.8	0.4
SAFLBaffl	106	2000	94	192.9	180.7	0.27
SAFLBaffl	42	2001	41	153.9	62.4	0.58

Structure 72 Sump and SAFL SHSAM Analysis

SAFLBaffl	44	2001	63	153.9	96.5	0.89
SAFLBaffl	55	2001	82	153.9	126.5	0.75
SAFLBaffl	63	2001	87	153.9	133.6	0.55
SAFLBaffl	66	2001	93	153.9	143.7	0.59
SAFLBaffl	86	2001	98	153.9	150	0.35
SAFLBaffl	106	2001	99	153.9	152.5	0.23
SAFLBaffl	42	2002	34	169.5	57	0.53
SAFLBaffl	44	2002	54	169.5	91.8	0.85
SAFLBaffl	55	2002	73	169.5	124.3	0.74
SAFLBaffl	63	2002	79	169.5	133.6	0.55
SAFLBaffl	66	2002	88	169.5	149.3	0.62
SAFLBaffl	86	2002	95	169.5	161.2	0.37
SAFLBaffl	106	2002	98	169.5	166.2	0.25
SAFLBaffl	42	2003	31	158.5	48.7	0.45
SAFLBaffl	44	2003	52	158.5	82.4	0.76
SAFLBaffl	55	2003	70	158.5	111.8	0.66
SAFLBaffl	63	2003	75	158.5	119.1	0.49
SAFLBaffl	66	2003	83	158.5	131.2	0.54
SAFLBaffl	86	2003	89	158.5	141.5	0.33
SAFLBaffl	106	2003	94	158.5	148.1	0.22
SAFLBaffl	42	2004	41	153.3	62.7	0.58
SAFLBaffl	44	2004	63	153.3	96.6	0.9
SAFLBaffl	55	2004	82	153.3	125.7	0.75
SAFLBaffl	63	2004	86	153.3	132.6	0.55
SAFLBaffl	66	2004	93	153.3	142.4	0.59
SAFLBaffl	86	2004	97	153.3	148.8	0.34
SAFLBaffl	106	2004	99	153.3	151.5	0.22
SAFLBaffl	42	2005	28	191.2	53.1	0.49
SAFLBaffl	44	2005	47	191.2	89.5	0.83
SAFLBaffl	55	2005	66	191.2	126.3	0.75
SAFLBaffl	63	2005	72	191.2	138	0.57
SAFLBaffl	66	2005	83	191.2	159.6	0.66
SAFLBaffl	86	2005	93	191.2	177.5	0.41
SAFLBaffl	106	2005	97	191.2	185.7	0.28
SAFLBaffl	42	2006	27	110.8	30.2	0.28
SAFLBaffl	44	2006	49	110.8	54.2	0.5
SAFLBaffl	55	2006	69	110.8	76.8	0.46
SAFLBaffl	63	2006	74	110.8	82.3	0.34
SAFLBaffl	66	2006	82	110.8	90.9	0.37
SAFLBaffl	86	2006	88	110.8	97.4	0.23
SAFLBaffl	106	2006	91	110.8	101	0.15
SAFLBaffl	42	2007	27	128.8	34.9	0.32
SAFLBaffl	44	2007	46	128.8	59.1	0.55
SAFLBaffl	55	2007	65	128.8	83.9	0.5

Structure 72 Sump and SAFL SHSAM Analysis

SAFLBaffl	63	2007	71	128.8	91.4	0.38	
SAFLBaffl	66	2007	81	128.8	104.9	0.43	
SAFLBaffl	86	2007	91	128.8	116.8	0.27	
SAFLBaffl	106	2007	96	128.8	123.1	0.18	
Name	Model	Total Load (lbs)	Total Load Removed	Removal Efficiency (	Model Height ('	Model Diam	Pipe Diam
SAFLBaffl	42	2070	667	32.2	2	4	15
SAFLBaffl	44	2070	1092	52.8	4	4	15
SAFLBaffl	55	2070	1489	72	5	5	18
SAFLBaffl	63	2070	1595	77.1	3	6	24
SAFLBaffl	66	2070	1771	85.6	6	6	24
SAFLBaffl	86	2070	1912	92.4	6	8	30
SAFLBaffl	106	2070	1985	95.9	6	10	36

Structure 300 Sump and SAFL SHSAM Analysis

Name	Model	Year	Output "Re	Annual Loa	Load Remo	Deposit (in)
SAFLBaffle	42	1995	52	139.8	73.2	0.68
SAFLBaffle	44	1995	72	139.8	100.3	0.93
SAFLBaffle	55	1995	87	139.8	122	0.72
SAFLBaffle	63	1995	91	139.8	127.2	0.52
SAFLBaffle	66	1995	96	139.8	134.3	0.55
SAFLBaffle	86	1995	99	139.8	138.1	0.32
SAFLBaffle	106	1995	100	139.8	139.2	0.21
SAFLBaffle	42	1996	48	141	67.7	0.63
SAFLBaffle	44	1996	68	141	96.3	0.89
SAFLBaffle	55	1996	82	141	116.3	0.69
SAFLBaffle	63	1996	86	141	120.9	0.5
SAFLBaffle	66	1996	91	141	127.7	0.53
SAFLBaffle	86	1996	94	141	133	0.31
SAFLBaffle	106	1996	97	141	136.3	0.2
SAFLBaffle	42	1997	34	169.1	58.3	0.54
SAFLBaffle	44	1997	50	169.1	84.9	0.79
SAFLBaffle	55	1997	65	169.1	109.4	0.65
SAFLBaffle	63	1997	69	169.1	117.1	0.48
SAFLBaffle	66	1997	79	169.1	133.5	0.55
SAFLBaffle	86	1997	89	169.1	150.2	0.35
SAFLBaffle	106	1997	94	169.1	159.7	0.24
SAFLBaffle	42	1998	50	122.6	61.5	0.57
SAFLBaffle	44	1998	67	122.6	82.4	0.76
SAFLBaffle	55	1998	81	122.6	99.2	0.59
SAFLBaffle	63	1998	85	122.6	104.1	0.43
SAFLBaffle	66	1998	92	122.6	112.3	0.46
SAFLBaffle	86	1998	96	122.6	118.2	0.27
SAFLBaffle	106	1998	98	122.6	120.7	0.18
SAFLBaffle	42	1999	57	76.4	43.3	0.4
SAFLBaffle	44	1999	76	76.4	58	0.54
SAFLBaffle	55	1999	89	76.4	68	0.4
SAFLBaffle	63	1999	92	76.4	70.3	0.29
SAFLBaffle	66	1999	96	76.4	73.6	0.3
SAFLBaffle	86	1999	99	76.4	75.5	0.18
SAFLBaffle	106	1999	100	76.4	76.1	0.11
SAFLBaffle	42	2000	35	154.4	54.3	0.5
SAFLBaffle	44	2000	54	154.4	82.7	0.77
SAFLBaffle	55	2000	70	154.4	108.6	0.64
SAFLBaffle	63	2000	76	154.4	116.7	0.48
SAFLBaffle	66	2000	85	154.4	130.8	0.54
SAFLBaffle	86	2000	92	154.4	142.3	0.33
SAFLBaffle	106	2000	96	154.4	148.5	0.22
SAFLBaffle	42	2001	55	122.8	67.5	0.63

Structure 300 Sump and SAFL SHSAM Analysis

SAFLBaffle	44	2001	74	122.8	91.1	0.84
SAFLBaffle	55	2001	88	122.8	108.3	0.64
SAFLBaffle	63	2001	91	122.8	112.2	0.46
SAFLBaffle	66	2001	96	122.8	117.9	0.49
SAFLBaffle	86	2001	99	122.8	121.2	0.28
SAFLBaffle	106	2001	100	122.8	122.3	0.18
SAFLBaffle	42	2002	46	136.2	63.4	0.59
SAFLBaffle	44	2002	64	136.2	87.8	0.81
SAFLBaffle	55	2002	80	136.2	109.3	0.65
SAFLBaffle	63	2002	85	136.2	115.4	0.48
SAFLBaffle	66	2002	92	136.2	125.6	0.52
SAFLBaffle	86	2002	97	136.2	132.3	0.31
SAFLBaffle	106	2002	99	136.2	134.8	0.2
SAFLBaffle	42	2003	43	127.9	55.2	0.51
SAFLBaffle	44	2003	62	127.9	79.4	0.74
SAFLBaffle	55	2003	76	127.9	97	0.58
SAFLBaffle	63	2003	80	127.9	101.8	0.42
SAFLBaffle	66	2003	86	127.9	109.9	0.45
SAFLBaffle	86	2003	92	127.9	117.3	0.27
SAFLBaffle	106	2003	95	127.9	122	0.18
SAFLBaffle	42	2004	55	122.6	67.6	0.63
SAFLBaffle	44	2004	74	122.6	90.8	0.84
SAFLBaffle	55	2004	88	122.6	107.6	0.64
SAFLBaffle	63	2004	91	122.6	111.5	0.46
SAFLBaffle	66	2004	96	122.6	117.1	0.48
SAFLBaffle	86	2004	98	122.6	120.6	0.28
SAFLBaffle	106	2004	99	122.6	121.9	0.18
SAFLBaffle	42	2005	40	152.9	61.1	0.57
SAFLBaffle	44	2005	57	152.9	87.1	0.81
SAFLBaffle	55	2005	74	152.9	113.2	0.67
SAFLBaffle	63	2005	79	152.9	121.4	0.5
SAFLBaffle	66	2005	89	152.9	136.2	0.56
SAFLBaffle	86	2005	96	152.9	146.8	0.34
SAFLBaffle	106	2005	99	152.9	150.8	0.22
SAFLBaffle	42	2006	41	88.7	36.7	0.34
SAFLBaffle	44	2006	61	88.7	53.8	0.5
SAFLBaffle	55	2006	76	88.7	67.1	0.4
SAFLBaffle	63	2006	79	88.7	70.4	0.29
SAFLBaffle	66	2006	86	88.7	75.9	0.31
SAFLBaffle	86	2006	90	88.7	80	0.19
SAFLBaffle	106	2006	93	88.7	82.6	0.12
SAFLBaffle	42	2007	39	102.7	40	0.37
SAFLBaffle	44	2007	56	102.7	58.1	0.54
SAFLBaffle	55	2007	73	102.7	74.9	0.44

Structure 300 Sump and SAFL SHSAM Analysis

SAFLBaffle	63	2007	78	102.7	80	0.33	
SAFLBaffle	66	2007	87	102.7	89.3	0.37	
SAFLBaffle	86	2007	94	102.7	96.9	0.22	
SAFLBaffle	106	2007	98	102.7	100.3	0.15	
Name	Model	Total Load (	Total Load I	Removal Ef	Model Heig	Model Dian	Pipe Diameter (inches)
SAFLBaffle	42	1657	750	45.2	2	4	15
SAFLBaffle	44	1657	1053	63.5	4	4	15
SAFLBaffle	55	1657	1301	78.5	5	5	18
SAFLBaffle	63	1657	1369	82.6	3	6	24
SAFLBaffle	66	1657	1484	89.6	6	6	24
SAFLBaffle	86	1657	1573	94.9	6	8	30
SAFLBaffle	106	1657	1615	97.5	6	10	36