www.JSDinc.com

Stormwater Management Plan Report

St. John's Evangelical Lutheran Church
7809 Hardwood Avenue
City of Wauwatosa, Wisconsin

Report Date: June 7th, 2023

Prepared for:

MSI General Corporation
P.O. Box 7
Oconomowoc, WI 53066

Prepared by:

JSD Professional Services, Inc.
W238 N1610 Busse Road, Suite 100
Waukesha, WI 53188

JSD Project No. 22-12061

TABLE OF CONTENTS

Questions and comments can be directed to:

Andrew P. Mertz, P.E.
Project Engineer
andrew.mertz@jsdinc.com

Rizal W. Iskandarsjach, P.E., P.L.S.
Senior Project Engineer
riz@jsdinc.com

Phone: 262.513.0666
Fax: 262.513.1232

Milwaukee Regional Office
W238 N1610 Busse Rd, Suite 100
Waukesha, WI 53188
www.jsdinc.com

APPENDICES

APPENDIX 1 - LOCATION MAP

APPENDIX 2 - SOIL DATA

- NRCS – WEB SOIL SURVEY
- CGC, INC. – BORING LOGS

APPENDIX 3 - GREEN INFRASTRUCTURE

- GREEN INFRASTRUCTURE DESIGN CALCULATIONS

APPENDIX 4 - EXISTING SITE HYDROLOGY

- EXISTING CONDITIONS HYDROLOGY EXHIBIT
- EXISTING CONDITIONS HYDROCAD MODELING

APPENDIX 5 - PROPOSED SITE HYDROLOGY

- PROPOSED CONDITIONS HYDROLOGY EXHIBIT
- PROPOSED CONDITIONS HYDROCAD MODELING

APPENDIX 6 - DESIGN DETAILS

- GRADING AND EROSION CONTROL PLAN
- DETAILS
- STORM SEWER CALCULATIONS

APPENDIX 7 - STORM WATER MAINTENANCE AGREEMENT

1.0 INTRODUCTION

The proposed St. John's Evangelical Church redevelopment is located at 7809 Harwood Avenue in the Southeast 1/4 of Section 21, Township 7 North, Range 21 East, in the City of Wauwatosa, Milwaukee County, Wisconsin. The site is generally bounded by Harwood Avenue to the north Dewey Avenue to the east and residential properties to the south and west. A location map can be found in **Appendix 1**.

This Stormwater Management Plan has been created to address runoff rate control, water quality treatment, infiltration, and green infrastructure requirements for the proposed St. John's Evangelical Church redevelopment.

The proposed redevelopment will consist of the demolition of the existing building, pavement, and other site features. The proposed construction will include an asphalt parking lot, a biofiltration, and storm sewer. The proposed biofiltration basin will be located at the northwest corner of the site to provide stormwater management/ green infrastructure. The biofiltration basin will be utilized to maintain the existing peak discharge rates and meet green infrastructure requirements in accordance with City of Wauwatosa and Milwaukee Metropolitan Sewerage District requirements. Please refer to **Section 3.0** and **Section 4.0** for design criteria and more details of the stormwater management facilities.

2.0 EXISTING CONDITIONS

The existing site is 1.553 acres consisting of church and residential home surrounded by asphalt pavement and vegetation. The existing eastern and northern portion the site overland flows into the right of ways of Harwood Avenue and Dewey Avenue. The southern and western portion of the site surface drains to inlets located in the existing parking lot and eventually enters a storm sewer system in Harwood Avenue.

No soil type information was available for the on-site soils data according to the United States Department of Agriculture – Natural Resources Conservation Service Web Soil Survey. The web soil survey is included in **Appendix 2**. However, based on the boring logs provided by CGS, Inc., dated May 17, 2023 lean clay soil are present on-site.

3.0 DESIGN CRITERIA

3.1 City of Wauwatosa

Chapter 24.13.040 – Storm Water Management

3.2 Wisconsin Department of Natural Resources

WDNR – Technical Standards (NR151 and NR216)

3.3 Milwaukee Metropolitan Sewerage District

MMSD – Chapter 13

Water Quantity: Per WDNR regulations and the City of Wauwatosa Municipal Ordinance water quantity management is exempt for this redevelopment since the overall project does not disturb more than one acre and the site does not increase impervious surface by more than one-half acre.

Water Quality: Per WDNR regulations and the City of Wauwatosa Municipal Ordinance water quantity management is exempt for this redevelopment since the overall project does not disturb more than one acre.

Infiltration: Redevelopment sites are exempt from City of Wauwatosa Municipal Ordinance, WDNR, and MMSD infiltration requirements.

Green Infrastructure: Whenever development or redevelopment will increase impervious surface by an area equal to or greater than 5,000 square feet but less than 21,780 square feet (one-half acre), on a net basis, then the development or redevelopment shall include green infrastructure with a detention volume equal to one-half inch multiplied by the area of the net new impervious surface in accordance with MMSD Chapter 13.

4.0 ANALYSIS & DESIGN

The proposed redevelopment will disturb approximately 0.941 acres and result in a net increase of roughly 0.146 acres (6,380 sq. ft.) of impervious surfaces. A portion of the existing building and the parking lot storm water runoff will be collected and conveyed through a series of catch basins and storm sewer to the proposed biofiltration basin. The proposed biofiltration basin will be utilized to meet the green infrastructure detention volume requirements. The basin features 2.0 feet of engineered soil layer and 2.0 feet of stone/sand layer. Discharge from the basin will be controlled by a 6" diameter draintile, a 3" high by 10" wide orifice, and the top of the 24" diameter standpipe. Runoff will ultimately discharge through a 12" diameter storm sewer to a proposed catch basin. The biofiltration basin and spillway have been designed in accordance with WDNR Technical Standards 1004. Please refer to **Appendix 6** for further details of the biofiltration basin.

4.1 Green Infrastructure

The green infrastructure has been designed to exceed the necessary detention volume requirements of MMSD as illustrated in the Green Infrastructure Design Calculations as part of **Appendix 3** and summarized in Table 1 below.

Table 1 – Storage Volumes (Gallons)

Required Volume	2005
Proposed Volume	2633

4.2 Runoff Rate Control

HydroCAD® Stormwater Modeling System (Version 10.20-2g) software has been used to analyze the stormwater characteristics for the St John's Evangelical Lutheran Church development. HydroCAD® uses the accepted TR-55 methodology for determining peak runoff discharge rates. Although the proposed redevelopment is not required to meet water quantity requirements stormwater modeling was conducted for the 1-year, 2-year, and 10-year storm events to confirm the post-development site will not increase the discharge rates compared to pre-development and to confirm the 100-year storm event will not overtop biofiltration basin. The rainfall depths utilized in the HydroCAD® models were obtained from City of Wauwatosa ordinance and are shown below in Table 2.

Table 2 – Rainfall Depths

Storm Event	Rainfall Depth
1-year	2.34"
2-year	2.64"
10-year	3.73"
100-year	6.06"

Table 3 summarizes the pre-development hydrologic characteristics of the site, and Tables 4 and 5 summarizes the post-development hydrologic characteristics of the site. A comparison of the pre-development and post-development peak discharge rates is provided in Table 6. Please refer to **Appendix 4** and **Appendix 5** for additional details of the HydroCAD® modeling.

Table 3 – Pre-Development Drainage Area Hydrologic Characteristics

Drainage Area (HydroCAD Node)		Area (acres)	Curve Number	Runoff (cfs)			
				1-yr	2-yr	10-yr	100-yr
A	Detained Existing	0.740	93	2.08	2.42	3.64	6.21
B	Undetained Existing	0.813	85	1.54	1.88	3.19	6.07

Table 4 – Proposed Drainage Area Hydrologic Characteristics

Drainage Area (HydroCAD Node)		Area (acres)	Curve Number	Runoff (cfs)			
				1-yr	2-yr	10-yr	100-yr
1S	Detained	0.877	92	2.36	2.76	4.21	7.28
2S	Court Yard	0.185	93	0.52	0.60	0.91	1.55
3S	Undetained	0.491	86	0.98	1.20	1.99	3.73

Table 5 – Proposed Stormwater Facility Characteristics

Stormwater Facility		**1-yr**	**2-yr**	**10-yr**	**100-yr**
1P	Peak Inflow (cfs)	2.36	2.76	4.21	7.28
	Peak Outflow (cfs)	1.62	1.97	3.44	5.51
	Peak Water Surface Elevation	104.27	104.45	105.03	105.41
	Top of Basin Elevation	105.50			

Table 6 – Peak Discharge Rates

	1-yr (cfs)	**2-yr** (cfs)	**10-yr** (cfs)	**100-yr** (cfs)
Pre-Development	3.62	4.30	6.83	12.28
Post-Development	2.96	3.54	5.95	12.32

4.3 Storm Sewer

Proposed storm sewer will be constructed to facilitate drainage for the paved parking areas. The storm sewers have been designed in accordance with the rational method and have been sized to accommodate runoff from the 10-year, 24-hour storm event. Complete storm sewer design computations are included in **Appendix 6**.

5.0 CONCLUSION

The stormwater management facilities for St. John's Evangelical Church have been designed to meet or exceed WDNR and City of Wauwatosa requirements. The proposed biofiltration basin has been designed to exceed the necessary green infrastructure detention volume requirements of MMSD.

(Appendices Follow)

APPENDIX 1

Location Map

St. John's Evangelical Lutheran Church

Location Map

City of Wauwatosa, Milwaukee County, WI

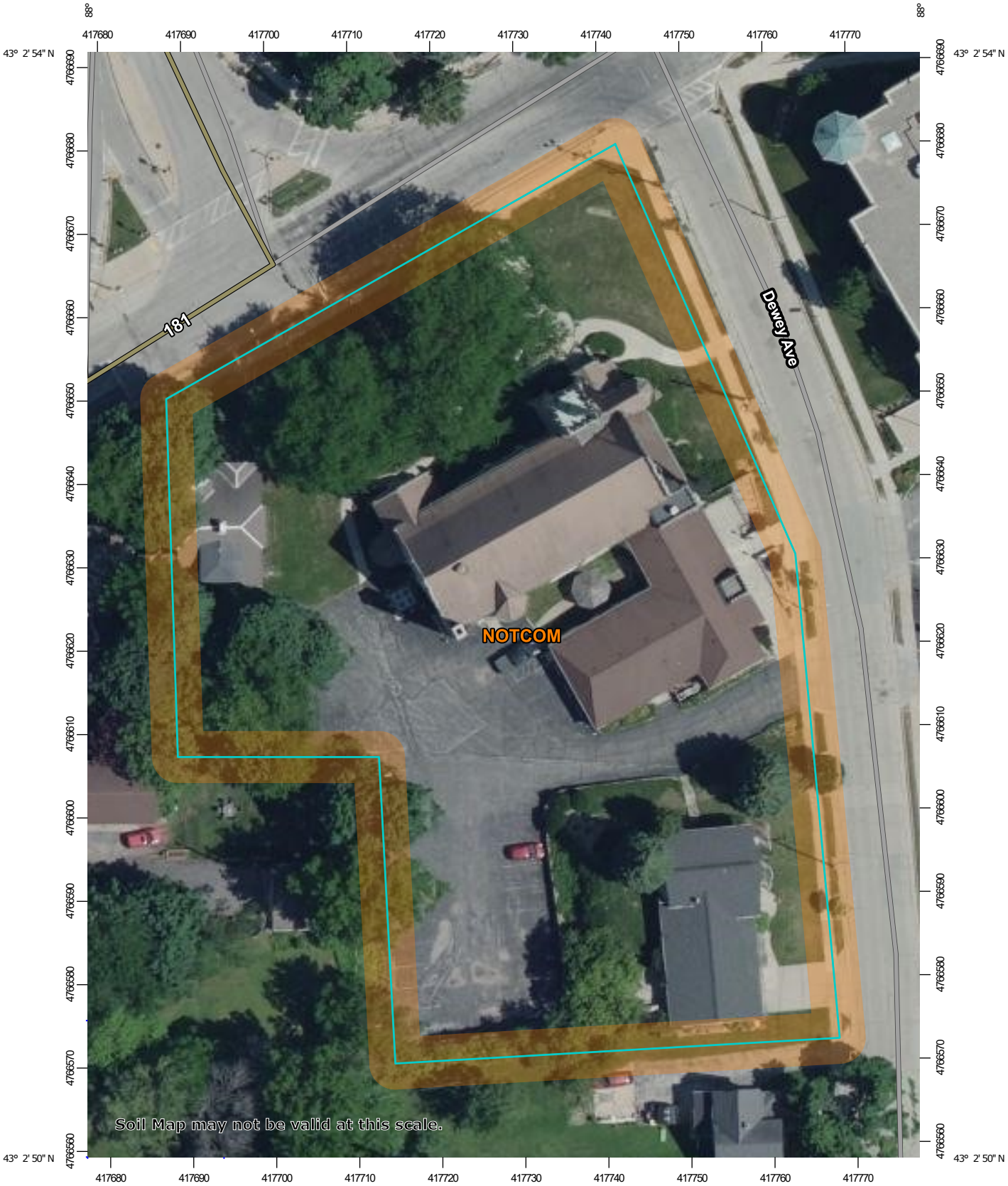
(SE 1/4 of Section 21, Township 7 North, Range 21 East)

APPENDIX 2

Soil Data

- NRCS – Web Soil Survey
- CGC, Inc – Boring Logs

Soil Map—Milwaukee and Waukesha Counties, Wisconsin



Map Scale: 1:646 if printed on A portrait (8.5" x 11") sheet.

N

Meters
0 5 10 20 30

Feet
0 30 60 120 180

Map projection: Web Mercator Corner coordinates: WGS84 Edge tics: UTM Zone 16N WGS84

MAP LEGEND

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

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

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

Water Features
- Streams and Canals

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

Background
- Aerial Photography

MAP INFORMATION

The soil surveys that comprise your AOI were mapped at 1:15,800.

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

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

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

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

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

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

Soil Survey Area: Milwaukee and Waukesha Counties, Wisconsin
Survey Area Data: Version 18, Sep 7, 2022

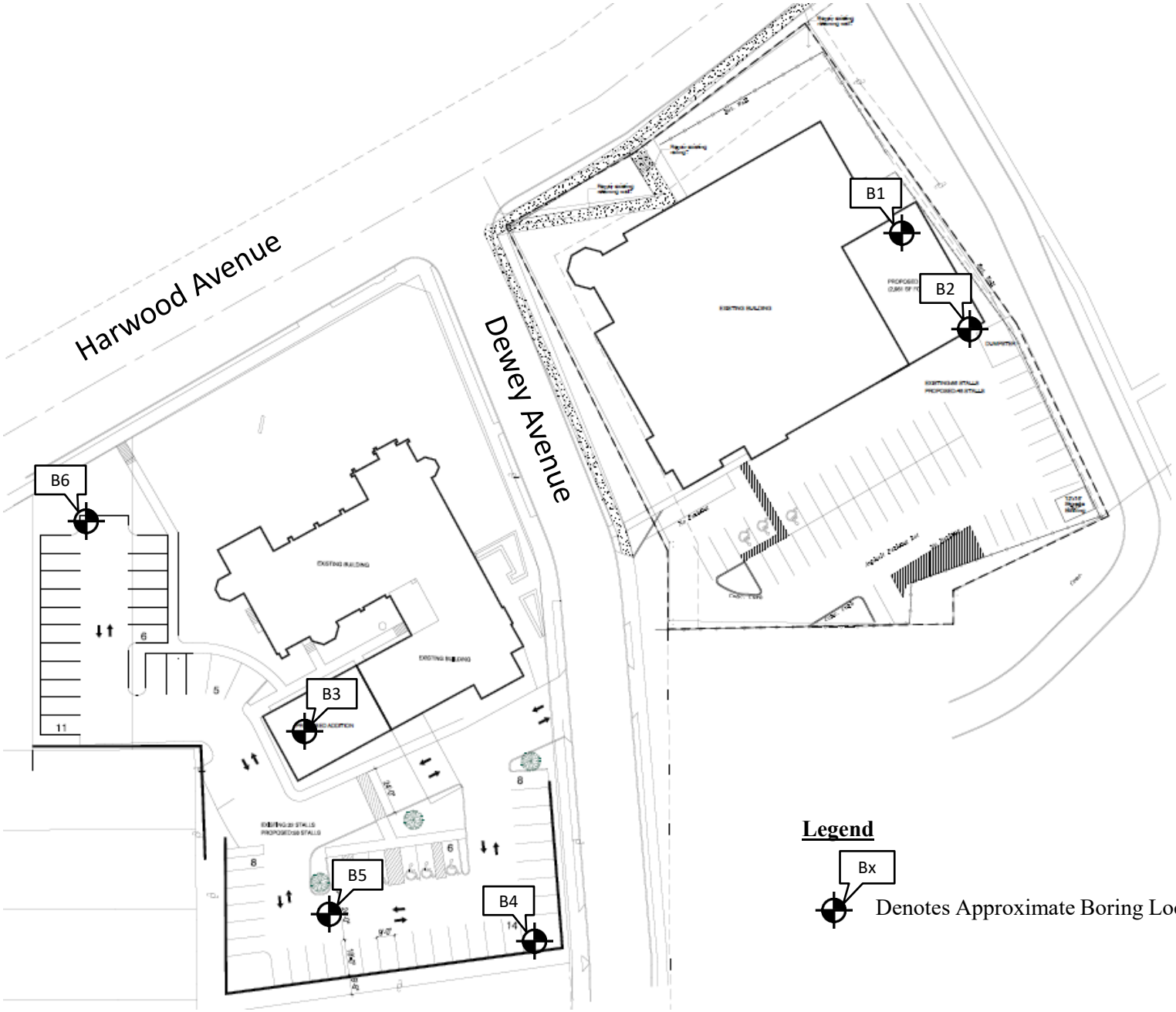
Soil map units are labeled (as space allows) for map scales 1:50,000 or larger.

Date(s) aerial images were photographed: May 20, 2020—Jul 1, 2020

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

Map Unit Legend

Map Unit Symbol	Map Unit Name	Acres in AOI	Percent of AOI
NOTCOM	No Digital Data Available	1.5	100.0%
Totals for Area of Interest		**1.5**	**100.0%**



Legend

Bx — Denotes Approximate Boring Location and Number

Scale: Reduced

N

Notes

1. Soil borings performed by J&J Soil Testing, Ltd. on April 25 and 26, 2023.
2. Base map provided by MSI General.
3. Boring locations are approximate. Offsets from locations shown (if any) are described on the individual boring logs.

Date: 5-17-23	CGC, Inc.	**SOIL BORING LOCATION EXHIBIT** **St. John's Lutheran Church and School** **7809 Harwood Avenue** **Wauwatosa, Wisconsin**
Job No. CM23072		

CGC Inc.

LOG OF TEST BORING

Project **St. John's Lutheran Church & School**
7809 Harwood Avenue
Location **Wauwatosa, Wisconsin**

Boring No. **B1**
Surface Elevation (ft) **110±**
Job No. **CM23072**
Sheet **1** of **1**

336 S. Curtis Rd, West Allis, WI 53214 (414) 443-2000, FAX (414) 443-2099

SAMPLE No.	TYPE	Rec (in.)	Moist	N	Depth (ft)	VISUAL CLASSIFICATION and Remarks	qu (qa) (tsf)	W	LL	PL	LOI
						2.5" ASPHALT / 8" Crushed Stone BASE COURSE					
1		15	M	10		FILL: Brown Mixed Lean Clay, Trace Sand and Gravel, Occasional Intermixed Topsoil	(1.5-4.0)				
2		18	M	6	5		(1.0)				
3		18	M	18			(2.5-4.5+)				
4A/B		18	M	14	10		(2.5)				
5		0	M	6		Dark Brown Silty CLAY; with Organics (OL) (BURIED TOPSOIL)		18.3			5.7
6		10	M	9	15	Stiff, Brown Mottled Sandy CLAY; Trace Gravel (CL)	(1.25-2.0)	20.3			
7A/B		18	M/W/M	20		Very Stiff, Brown and Gray Mottled Lean CLAY; Trace Sand and Gravel, Occasional Silt Seams and Layers (CL)	(4.0)				
8		18	M/W/M	16	20		(2.5-3.5)				
9A/B		18	M/W/M	46	25	Dense, Brown Sandy SILT; Little Gravel, Few Brown Sand Layers, Occasional Cobbles and Boulders (ML)					
10		18	M	46	30						
						End of Boring at 30 ft Backfilled with Bentonite Chips					
					35						

WATER LEVEL OBSERVATIONS

While Drilling ▽ **16.5'** Upon Completion of Drilling **25.0'**
Time After Drilling **(perched)**
Depth to Water
Depth to Cave in

The stratification lines represent the approximate boundary between soil types and the transition may be gradual.

GENERAL NOTES

Start **4/26/23** End **4/26/23**
Driller **J&J** Chief **JP** Rig **CME-45**
Logger **JP** Editor **TAC**
Drill Method **2.25" HSA**

CGC Inc.

LOG OF TEST BORING

Project **St. John's Lutheran Church & School**
7809 Harwood Avenue
Location **Wauwatosa, Wisconsin**

Boring No. **B2**
Surface Elevation (ft) **110±**
Job No. **CM23072**
Sheet **1** of **1**

336 S. Curtis Rd, West Allis, WI 53214 (414) 443-2000, FAX (414) 443-2099

SAMPLE No.	TYPE	Rec (in.)	Moist	N	Depth (ft)	VISUAL CLASSIFICATION and Remarks	qu (qa) (tsf)	W	LL	PL	LOI
						3" ASPHALT					
1		10	M	20		FILL: Gray Crushed Stone, Little Fines					
						FILL: Brown Mixed Lean Clay, Trace Sand and Gravel, Occasional Intermixed Topsoil					
2		13	M	18	5		(1.75-3.0)				
3A/B		14	M	17			(1.75-3.0)				
						Dark Gray Silty CLAY; with Organics (OL)		17.2			
4A/B		18	M	8		(BURIED TOPSOIL)	(2.25)	14.5			3.9
					10	Very Stiff, Brown Mottled Lean to Sandy CLAY; Trace Gravel (CL)					
5A/B		18	M	18		Very Stiff to Hard, Brown Lean CLAY; Trace Sand and Gravel (CL)	(2.0) (4.5+)				
6		18	M	16			(3.0-4.0)				
					15	Medium Stiff to Stiff, Grayish Brown Lean CLAY; Trace Fine Sand, Trace Thin Silt Lenses (CL)					
7		18	M	13			(0.75-1.5)				
					20	Very Dense, Brown Sandy SILT; Little Gravel, Few Brown Sand Layers, Occasional Cobbles and Boulders (ML)					
8		18	M	57							
					25						
9A/B		18	M	71							
					30	End of Boring at 30 ft Backfilled with Bentonite Chips					
					35						

WATER LEVEL OBSERVATIONS

While Drilling ▽ **NW** Upon Completion of Drilling **NW**
Time After Drilling
Depth to Water ▼
Depth to Cave in

The stratification lines represent the approximate boundary between soil types and the transition may be gradual.

GENERAL NOTES

Start **4/26/23** End **4/26/23**
Driller **J&J** Chief **JP** Rig **CME-45**
Logger **JP** Editor **TAC**
Drill Method **2.25" HSA**

CGC Inc.

LOG OF TEST BORING

Project **St. John's Lutheran Church & School**
7809 Harwood Avenue
Location **Wauwatosa, Wisconsin**

Boring No. **B3**
Surface Elevation (ft) **111.5±**
Job No. **CM23072**
Sheet **1** of **1**

336 S. Curtis Rd, West Allis, WI 53214 (414) 443-2000, FAX (414) 443-2099

SAMPLE					VISUAL CLASSIFICATION and Remarks	SOIL PROPERTIES				
No.	TYPE	Rec (in.)	Moist	N	Depth (ft)		qu (qa) (tsf)	W	LL	PL	LOI
						2" ASPHALT / 6" BASE COURSE					
1		15	M	18		Medium Dense to Dense, Brown Gravelly SAND; Trace Silt (SW) (POSSIBLE FILL)					
2		18	M	19	5						
3		9	M	34							
4A/B		18	M	17							
5A/B		18	M	19	10	Very Stiff to Hard, Brown Lean CLAY; Trace Sand and Gravel (CL)	(3.5-4.5)	23.0			
6		18	M	36			(4.5+)				
7		18	W	27	15 ▽	Medium Dense, Brown SILT; Trace Fine Sand (ML)					
8		12	M	44	20	Dense, Brown Gravelly SAND; Trace Silt (SW)					
					25	End of Boring at 25 ft Backfilled with Bentonite Chips					
					30						
					35						

WATER LEVEL OBSERVATIONS

While Drilling ▽ **18.0'** Upon Completion of Drilling **--**
Time After Drilling
Depth to Water ▼
Depth to Cave in

The stratification lines represent the approximate boundary between soil types and the transition may be gradual.

GENERAL NOTES

Start **4/25/23** End **4/25/23**
Driller **J&J** Chief **JP** Rig **CME-45**
Logger **JP** Editor **TAC**
Drill Method **2.25" HSA**

CGC Inc.

LOG OF TEST BORING

Project **St. John's Lutheran Church & School**
7809 Harwood Avenue
Location **Wauwatosa, Wisconsin**

Boring No. **B4**
Surface Elevation (ft) **127±**
Job No. **CM23072**
Sheet **1** of **1**

336 S. Curtis Rd, West Allis, WI 53214 (414) 443-2000, FAX (414) 443-2099

SAMPLE No.	TYPE	Rec (in.)	Moist	N	Depth (ft)	VISUAL CLASSIFICATION and Remarks	qu (qa) (tsf)	W	LL	PL	LOI
						FILL: Dark Brown Clayey Topsoil					
1	■	14	M	6							
						FILL: Brown Fine to Medium Sand, Trace to Little Gravel, Trace Silt					
2A/B	■	18	M	24			(4.5+)				
					5	Very Stiff to Hard, Brown and Gray Slightly Mottled Lean CLAY; Trace Sand and Gravel (CL)					
3	■	18	M	29			(3.0-4.5+)	24.5			
4	■	18	M	23	10		(3.75-4.25)				
						Very Stiff, Gray Lean CLAY; Trace Sand and Gravel (CL)					
5	■	18	M	14			(2.25)				
					15	End of Boring at 15 ft Backfilled with Bentonite Chips					
					20						
					25						
					30						
					35						

WATER LEVEL OBSERVATIONS

While Drilling ▽ **NW** Upon Completion of Drilling **NW**
Time After Drilling
Depth to Water ▼
Depth to Cave in

The stratification lines represent the approximate boundary between soil types and the transition may be gradual.

GENERAL NOTES

Start **4/25/23** End **4/25/23**
Driller **J&J** Chief **JP** Rig **CME-45**
Logger **JP** Editor **TAC**
Drill Method **2.25" HSA**

CGC Inc.

LOG OF TEST BORING

Project **St. John's Lutheran Church & School**
7809 Harwood Avenue
Location **Wauwatosa, Wisconsin**

Boring No. **B5**
Surface Elevation (ft) **114±**
Job No. **CM23072**
Sheet **1** of **1**

336 S. Curtis Rd, West Allis, WI 53214 (414) 443-2000, FAX (414) 443-2099

SAMPLE					VISUAL CLASSIFICATION and Remarks	SOIL PROPERTIES				
No.	TYPE	Rec (in.)	Moist	N	Depth (ft)		qu (qa) (tsf)	W	LL	PL	LOI
						2.5" ASPHALT / 10" BASE COURSE					
1		7	VM	4		Very Stiff, Brown Lean CLAY; Trace Sand and Gravel, Few Thin Silt and Fine Sand Lenses (CL)		27.0			
2A/B		18	M/W/M	18	5		(3.5)				
3		18	M/W/M	9		Stiff to Very Stiff, Gray Lean CLAY; Trace Sand and Gravel, Few Sand Seams (CL)	(2.0-2.5)				
4		18	M/W/M	35	10	Very Stiff to Hard, Brown Lean CLAY; Trace Sand and Gravel, Few Sand Seams and Layers (CL)	(3.5-4.5+)				
5		18	M	28	15	Medium Dense, Brown Fine to Medium SAND; Trace Silt (SP)					
						End of Boring at 15 ft Backfilled with Bentonite Chips					
					20						
					25						
					30						
					35						

WATER LEVEL OBSERVATIONS

While Drilling ▽ **4.0'±** Upon Completion of Drilling **NW**
Time After Drilling **(perched)**
Depth to Water
Depth to Cave in

The stratification lines represent the approximate boundary between soil types and the transition may be gradual.

GENERAL NOTES

Start **4/25/23** End **4/25/23**
Driller **J&J** Chief **JP** Rig **CME-45**
Logger **JP** Editor **TAC**
Drill Method **2.25" HSA**

CGC Inc.

LOG OF TEST BORING

Project **St. John's Lutheran Church & School**
7809 Harwood Avenue
Location **Wauwatosa, Wisconsin**

Boring No. **B6**
Surface Elevation (ft) **108±**
Job No. **CM23072**
Sheet **1** of **1**

336 S. Curtis Rd, West Allis, WI 53214 (414) 443-2000, FAX (414) 443-2099

SAMPLE No.	TYPE	Rec (in.)	Moist	N	Depth (ft)	VISUAL CLASSIFICATION and Remarks	SOIL PROPERTIES qu (qa) (tsf)	W	LL	PL	LOI
						FILL: 2" Dark Brown Clayey Topsoil					
1A/B	■	12	M	3		FILL: Mix of Brown Lean Clay and Dark Brown Topsoil		20.2			
2A/B	■	18	M	18		Very Stiff to Hard, Brown and Gray Mottled Lean CLAY; Trace Sand and Gravel (CL)	(3.75-4.5+)				
					5						
3	■	18	M	23			(4.5+)				
4	■	18	M	14			(2.5-3.5)				
					10	End of Boring at 10 ft Backfilled with Soil Cuttings					
					15						
					20						
					25						
					30						
					35						

WATER LEVEL OBSERVATIONS

While Drilling ▽ **NW** Upon Completion of Drilling **NW**
Time After Drilling
Depth to Water ▼
Depth to Cave in

The stratification lines represent the approximate boundary between soil types and the transition may be gradual.

GENERAL NOTES

Start **4/26/23** End **4/26/23**
Driller **J&J** Chief **JP** Rig **CME-45**
Logger **JP** Editor **TAC**
Drill Method **2.25" HSA**

APPENDIX 3

Green Infrastructure

- Green Infrastructure Design Calculations

Green Infrastructure Design Calculations

Site Information

Total Disturbed area = 40,970 sf

	Existing	*Proposed*	*Change*
Pervious(sf)	34691	28311	-6380
Impervious (sf)	32954	39334	**6380**

Biofiltration Basin Bottom area = **528 sf**

Required Detention Volume

1/2" x net new impervious area

.042 ft x 6380 sf = 267.96 cf **= 2005 gal**

Proposed Detention Volume

Stone Detention at bottom of Biofiltration basin

Assumed 1/3 voids within stone as storage volume

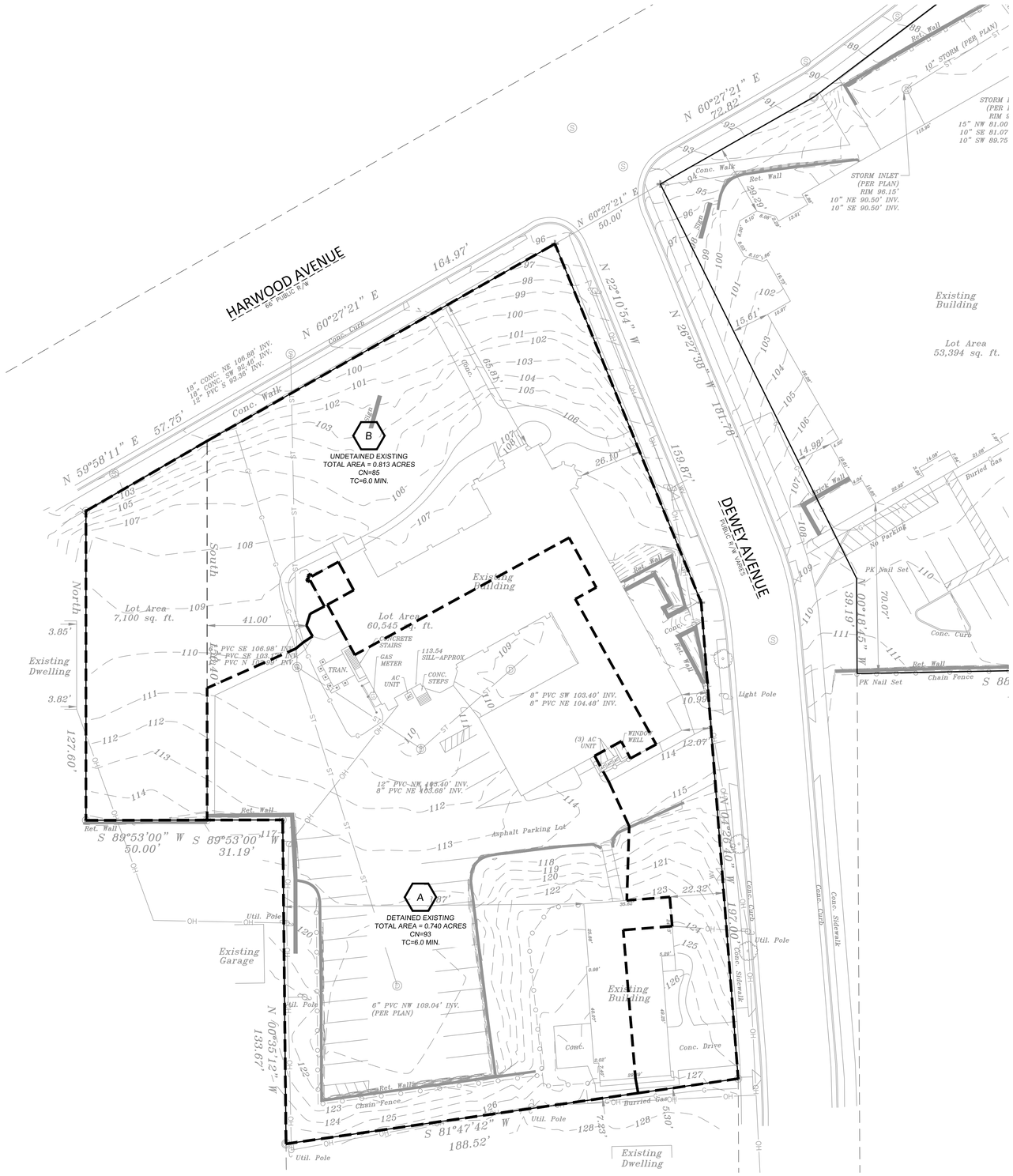
1/3 x 528 sf x 2.0 ft = 352 cf = **2633 gal**

Proposed		*Required*	*Proposed green infrastructure storage*
2633 gal	>	2005 gal	*volume exceeds required storage volume*

APPENDIX 4

Existing Site Hydrology

- Existing Hydrology Exhibit
- Existing HydroCAD Modeling



north

SCALE IN FEET

20' 0 20'

DRAFT - NOT FOR CONSTRUCTION

1 EXISTING HYDROLOGY 1"=20'-0"

DIGGERS HOTLINE
Call 811 or (800) 242-8511
Milwaukee Area (262) 432-7910
Hearing Impaired TDD (800) 542-2289
www.DiggersHotline.com

JSD
MILWAUKEE REGIONAL OFFICE
W238 N1610 BUSSE ROAD, SUITE 100
WAUKESHA, WISCONSIN 53188
P. 262.513.0666
JSD PROJ. NO.: 22-11646
JSD PROJ. MGR.: RWI

MSI GENERAL CORPORATION
P.O. BOX. 7
OCONOMOWOC, WI 53066
PHONE: 262-367-3661

WWW.MSIGENERAL.COM
SINGLE SOURCE RESPONSIBILITY ™

ISSUE DATES:	
Conditional Use Permit:	06/07/2023
Proposal:	XX/XX/XXXX
Bid:	XX/XX/XXXX
Contract:	XX/XX/XXXX
State Submittal / Permit:	XX/XX/XXXX
As-Built:	XX/XX/XXXX

REVISIONS:	
1	–
2	
3	
4	
5	
6	
7	
8	
9	
10	
11	
12	
13	
14	
15	
16	
17	
18	
19	
20	
21	
22	
23	
24	
25	
26	
27	
28	
29	
30	
31	
32	
33	
34	
35	
36	
37	
38	
39	
40	
41	

ST. JOHN'S WAUWATOSA

PROJECT ADDRESS:

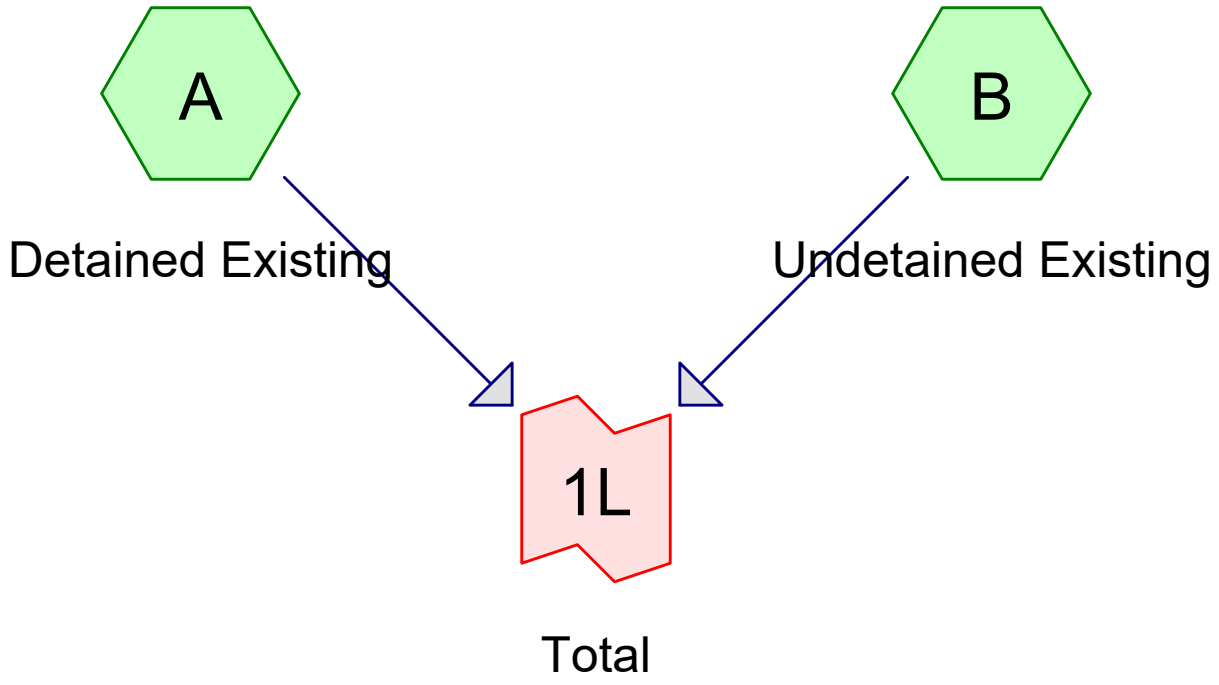
PROJECT NAME
St. John's Evangelical Lutheran Church
STREET ADDRESS
7809 Harwood Ave.
CITY/ STATE / ZIP
Wauwatosa, WI 53213

ALL WORK TO BE COMPLETED AS SHOWN, AND IN ACCORDANCE WITH THE LATEST EDITION OF THE MSI GENERAL MASTER SPECIFICATION

Architect:	Engineer:	Reviewed By:
AMH	RWI	RWI

Sheet Title:
EXISTING HYDROLOGY
Sheet Number:
H-100
Project Number:
P13586

MSI GENERAL · MANAGERS · ENGINEERS · CONTRACTORS · ARCHITECTS



Subcat Reach Pond Link

Routing Diagram for 22-11646 Existing
Prepared by JSD Professional Services Inc, Printed 5/31/2023

Time span=0.00-48.00 hrs, dt=0.05 hrs, 961 points
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN
Reach routing by Stor-Ind+Trans method - Pond routing by Stor-Ind method

Subcatchment A: Detained Existing Runoff Area=32,235 sf 70.73% Impervious Runoff Depth=1.63"
Tc=6.0 min CN=93 Runoff=2.08 cfs 0.100 af

Subcatchment B: Undetained Existing Runoff Area=35,410 sf 28.67% Impervious Runoff Depth=1.05"
Tc=6.0 min CN=85 Runoff=1.54 cfs 0.071 af

Link 1L: Total Inflow=3.62 cfs 0.172 af
Primary=3.62 cfs 0.172 af

Total Runoff Area = 1.553 ac Runoff Volume = 0.172 af Average Runoff Depth = 1.33"
51.29% Pervious = 0.796 ac 48.71% Impervious = 0.756 ac

Summary for Subcatchment A: Detained Existing

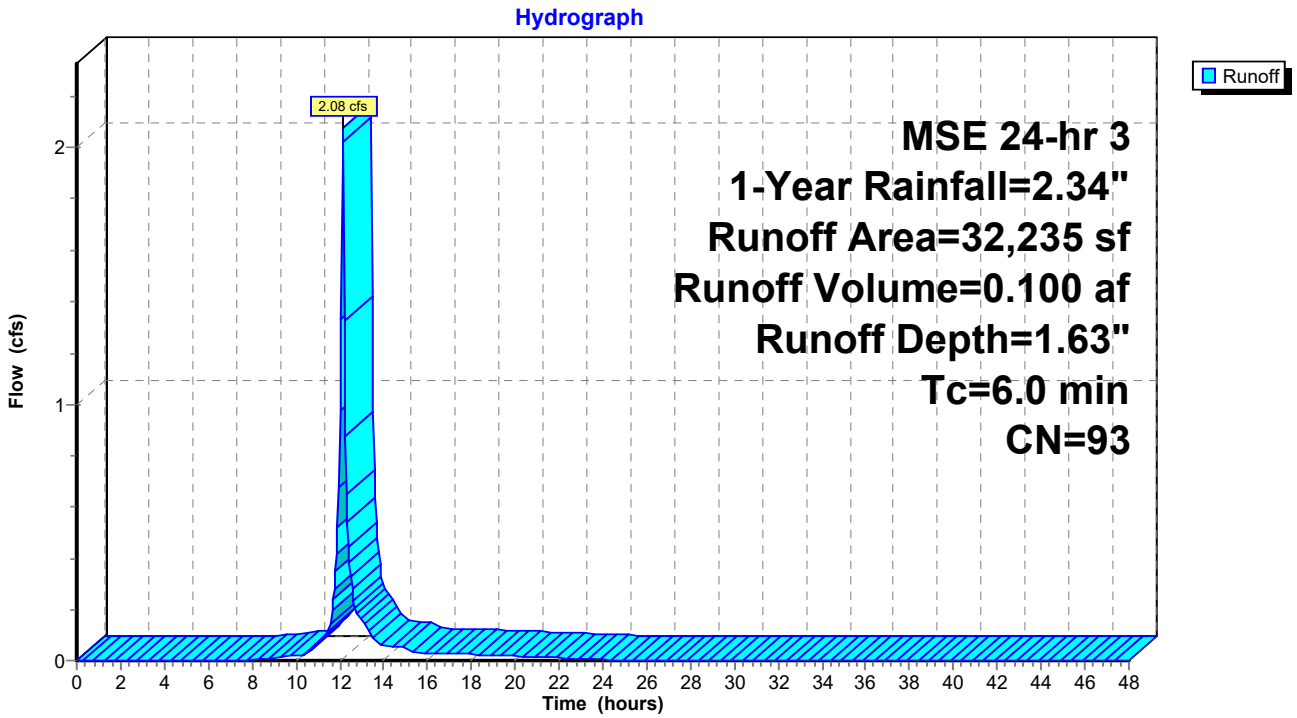
Runoff = 2.08 cfs @ 12.13 hrs, Volume= 0.100 af, Depth= 1.63"
Routed to Link 1L : Total

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-48.00 hrs, dt= 0.05 hrs
MSE 24-hr 3 1-Year Rainfall=2.34"

Area (sf)	CN	Description
16,061	98	Paved parking, HSG D
6,739	98	Roofs, HSG D
9,435	80	>75% Grass cover, Good, HSG D
32,235	93	Weighted Average
9,435		29.27% Pervious Area
22,800		70.73% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
6.0					**Direct Entry, TR-55**

Subcatchment A: Detained Existing



Summary for Subcatchment B: Undetained Existing

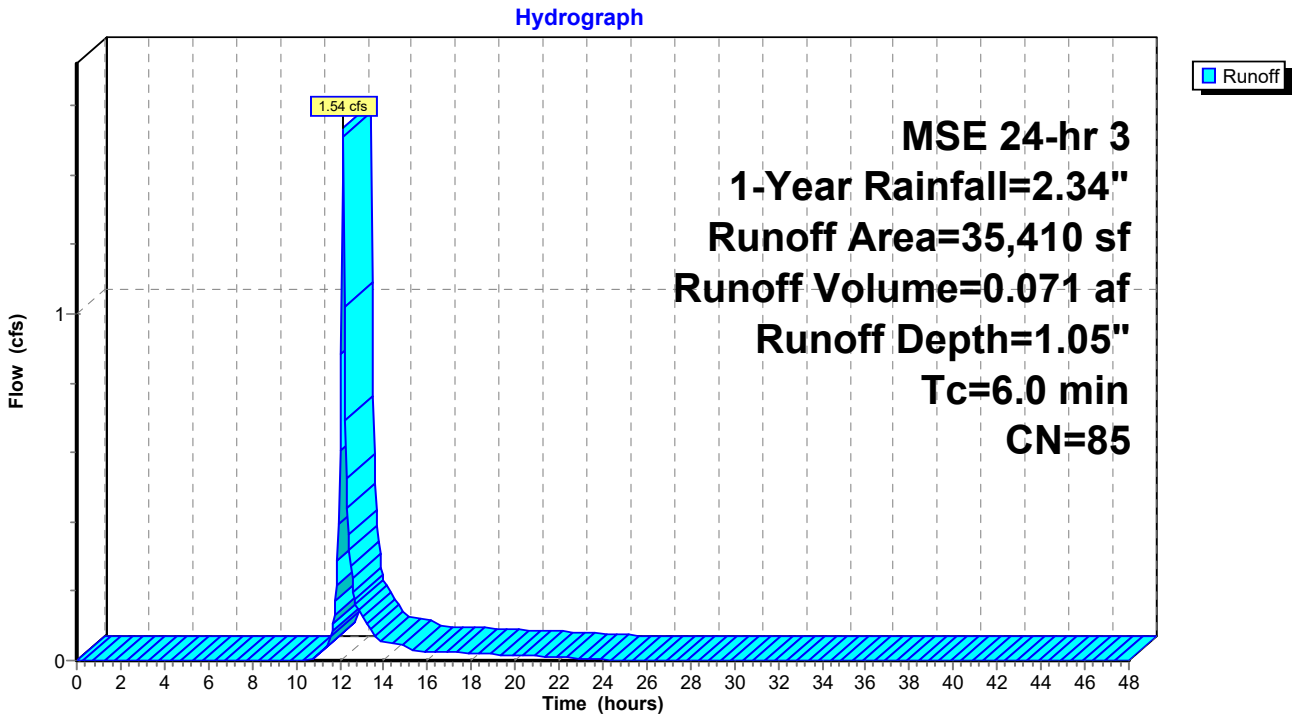
Runoff = 1.54 cfs @ 12.14 hrs, Volume= 0.071 af, Depth= 1.05"
Routed to Link 1L : Total

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-48.00 hrs, dt= 0.05 hrs
MSE 24-hr 3 1-Year Rainfall=2.34"

Area (sf)	CN	Description
4,346	98	Paved parking, HSG D
5,807	98	Roofs, HSG D
25,257	80	>75% Grass cover, Good, HSG D
35,410	85	Weighted Average
25,257		71.33% Pervious Area
10,153		28.67% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
6.0					**Direct Entry, TR-55**

Subcatchment B: Undetained Existing

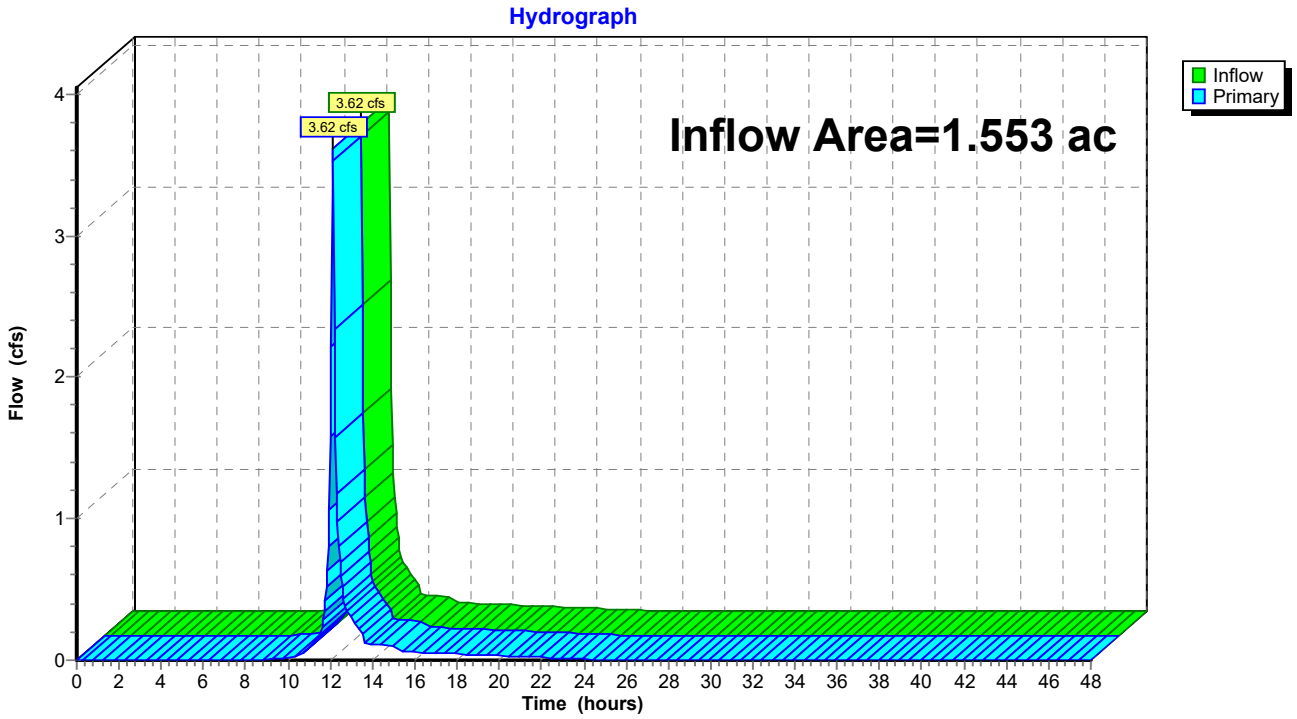


Summary for Link 1L: Total

Inflow Area = 1.553 ac, 48.71% Impervious, Inflow Depth = 1.33" for 1-Year event
Inflow = 3.62 cfs @ 12.13 hrs, Volume= 0.172 af
Primary = 3.62 cfs @ 12.13 hrs, Volume= 0.172 af, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 0.00-48.00 hrs, dt= 0.05 hrs

Link 1L: Total



Time span=0.00-48.00 hrs, dt=0.05 hrs, 961 points
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN
Reach routing by Stor-Ind+Trans method - Pond routing by Stor-Ind method

Subcatchment A: Detained Existing Runoff Area=32,235 sf 70.73% Impervious Runoff Depth=1.91"
Tc=6.0 min CN=93 Runoff=2.42 cfs 0.118 af

Subcatchment B: Undetained Existing Runoff Area=35,410 sf 28.67% Impervious Runoff Depth=1.29"
Tc=6.0 min CN=85 Runoff=1.88 cfs 0.087 af

Link 1L: Total Inflow=4.30 cfs 0.205 af
Primary=4.30 cfs 0.205 af

Total Runoff Area = 1.553 ac Runoff Volume = 0.205 af Average Runoff Depth = 1.59"
51.29% Pervious = 0.796 ac 48.71% Impervious = 0.756 ac

Summary for Subcatchment A: Detained Existing

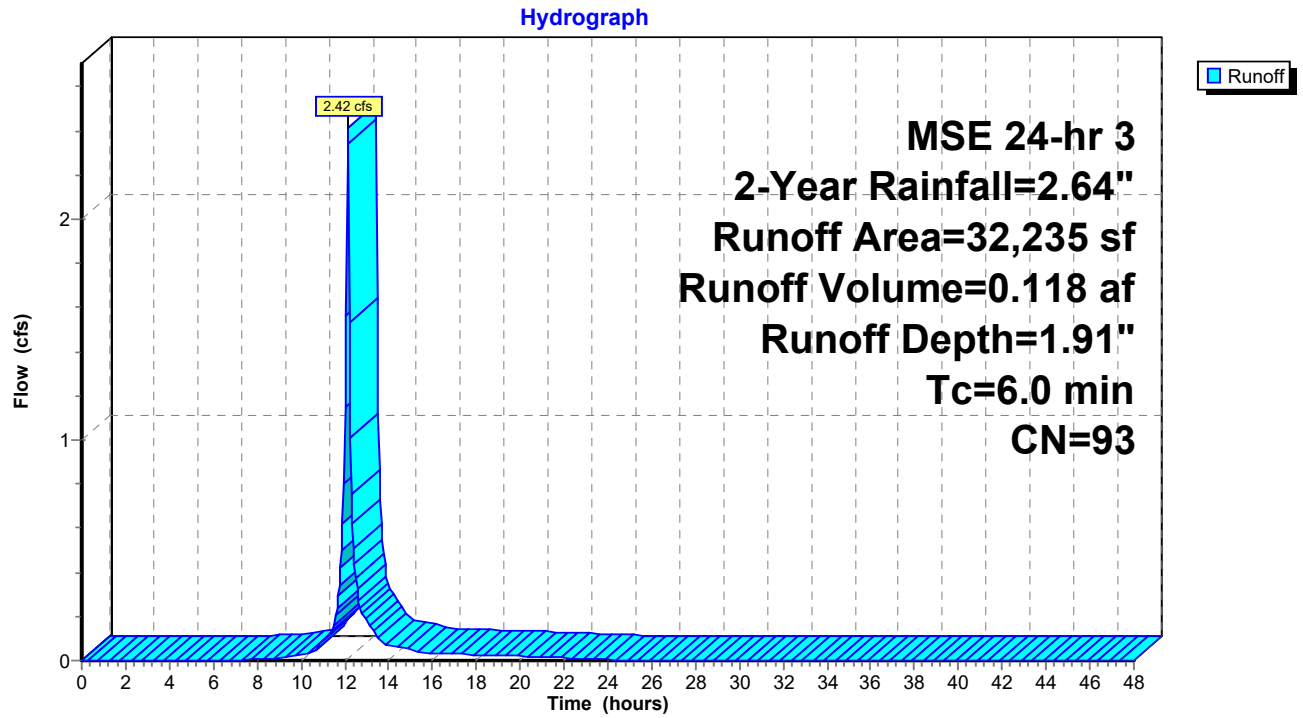
Runoff = 2.42 cfs @ 12.13 hrs, Volume= 0.118 af, Depth= 1.91"
Routed to Link 1L : Total

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-48.00 hrs, dt= 0.05 hrs
MSE 24-hr 3 2-Year Rainfall=2.64"

Area (sf)	CN	Description
16,061	98	Paved parking, HSG D
6,739	98	Roofs, HSG D
9,435	80	>75% Grass cover, Good, HSG D
32,235	93	Weighted Average
9,435		29.27% Pervious Area
22,800		70.73% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
6.0					**Direct Entry, TR-55**

Subcatchment A: Detained Existing



Summary for Subcatchment B: Undetained Existing

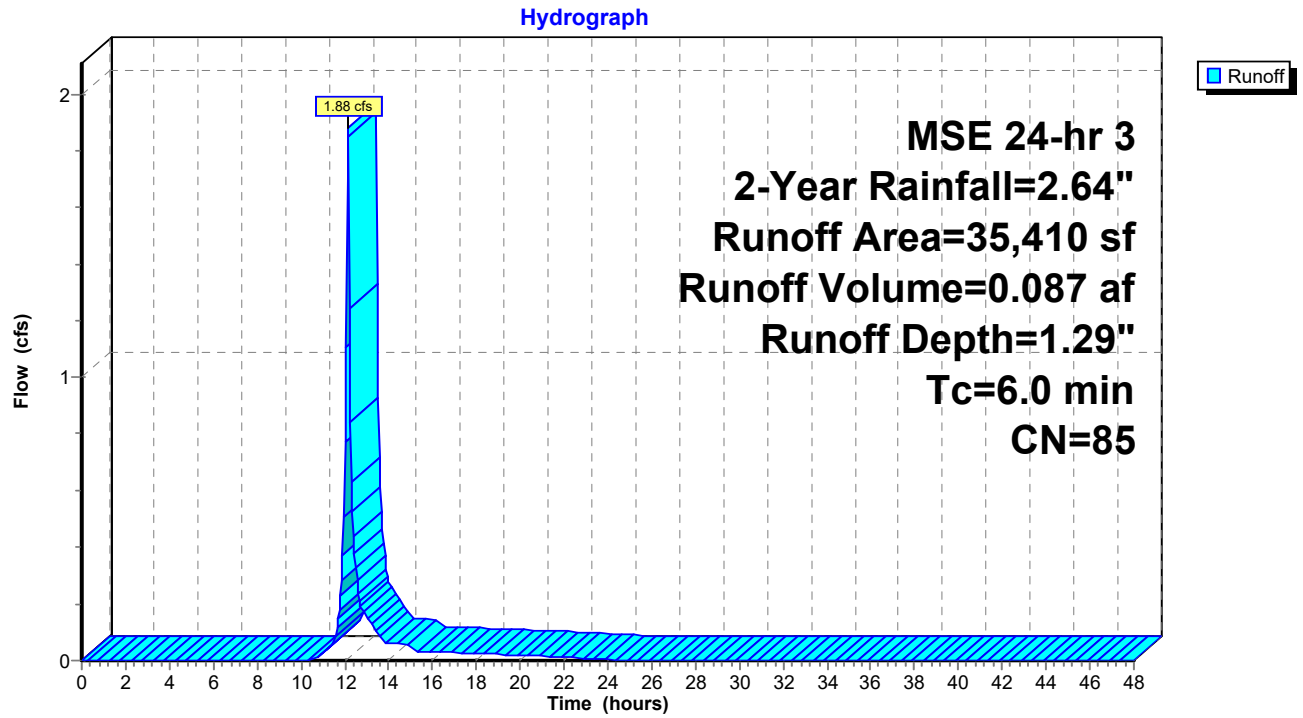
Runoff = 1.88 cfs @ 12.13 hrs, Volume= 0.087 af, Depth= 1.29"
Routed to Link 1L : Total

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-48.00 hrs, dt= 0.05 hrs
MSE 24-hr 3 2-Year Rainfall=2.64"

Area (sf)	CN	Description
4,346	98	Paved parking, HSG D
5,807	98	Roofs, HSG D
25,257	80	>75% Grass cover, Good, HSG D
35,410	85	Weighted Average
25,257		71.33% Pervious Area
10,153		28.67% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
6.0					**Direct Entry, TR-55**

Subcatchment B: Undetained Existing

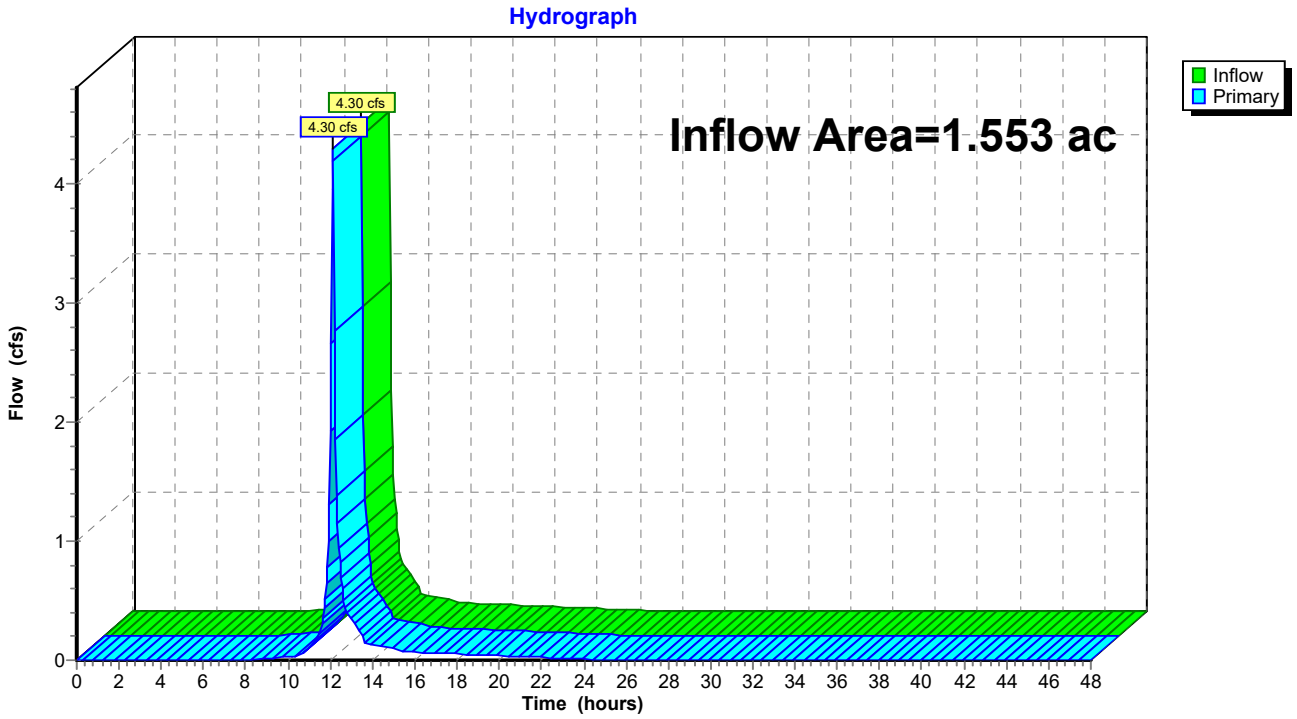


Summary for Link 1L: Total

Inflow Area = 1.553 ac, 48.71% Impervious, Inflow Depth = 1.59" for 2-Year event
Inflow = 4.30 cfs @ 12.13 hrs, Volume= 0.205 af
Primary = 4.30 cfs @ 12.13 hrs, Volume= 0.205 af, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 0.00-48.00 hrs, dt= 0.05 hrs

Link 1L: Total



Time span=0.00-48.00 hrs, dt=0.05 hrs, 961 points
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN
Reach routing by Stor-Ind+Trans method - Pond routing by Stor-Ind method

Subcatchment A: Detained Existing Runoff Area=32,235 sf 70.73% Impervious Runoff Depth=2.96"
Tc=6.0 min CN=93 Runoff=3.64 cfs 0.182 af

Subcatchment B: Undetained Existing Runoff Area=35,410 sf 28.67% Impervious Runoff Depth=2.22"
Tc=6.0 min CN=85 Runoff=3.19 cfs 0.150 af

Link 1L: Total Inflow=6.83 cfs 0.333 af
Primary=6.83 cfs 0.333 af

Total Runoff Area = 1.553 ac Runoff Volume = 0.333 af Average Runoff Depth = 2.57"
51.29% Pervious = 0.796 ac 48.71% Impervious = 0.756 ac

Summary for Subcatchment A: Detained Existing

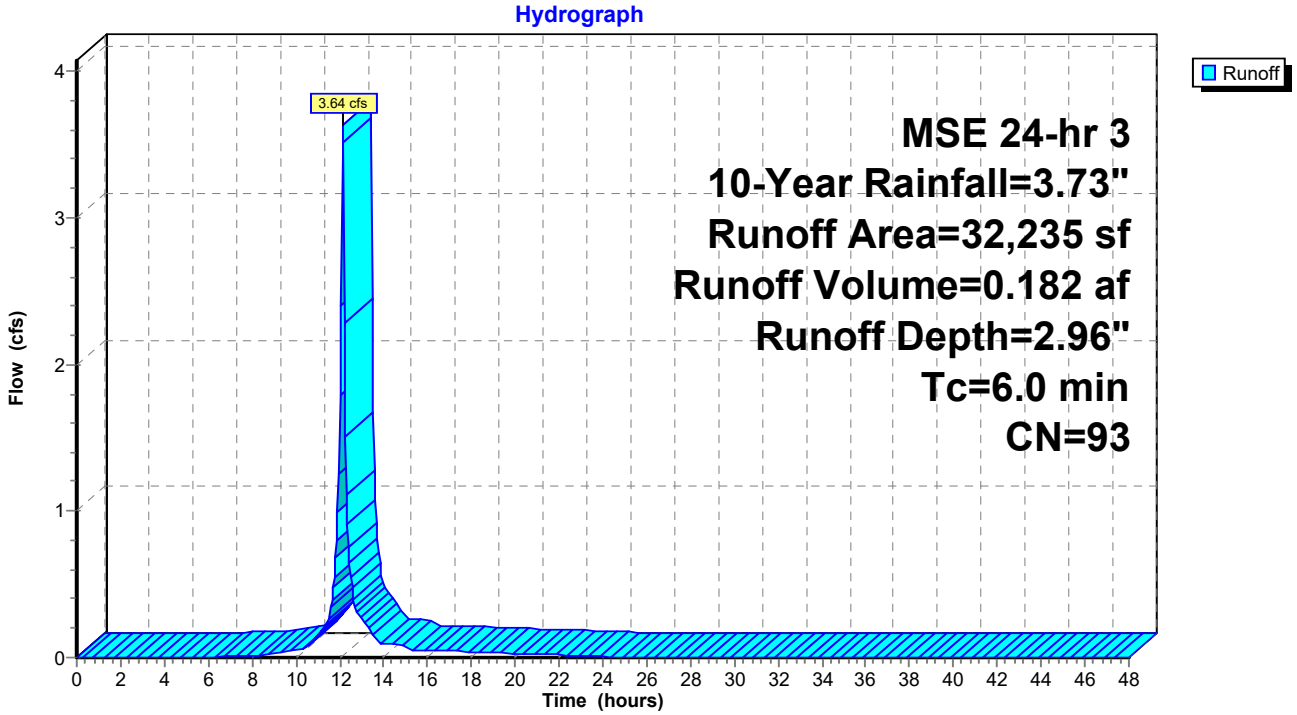
Runoff = 3.64 cfs @ 12.13 hrs, Volume= 0.182 af, Depth= 2.96"
Routed to Link 1L : Total

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-48.00 hrs, dt= 0.05 hrs
MSE 24-hr 3 10-Year Rainfall=3.73"

Area (sf)	CN	Description
16,061	98	Paved parking, HSG D
6,739	98	Roofs, HSG D
9,435	80	>75% Grass cover, Good, HSG D
32,235	93	Weighted Average
9,435		29.27% Pervious Area
22,800		70.73% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
6.0					**Direct Entry, TR-55**

Subcatchment A: Detained Existing



Summary for Subcatchment B: Undetained Existing

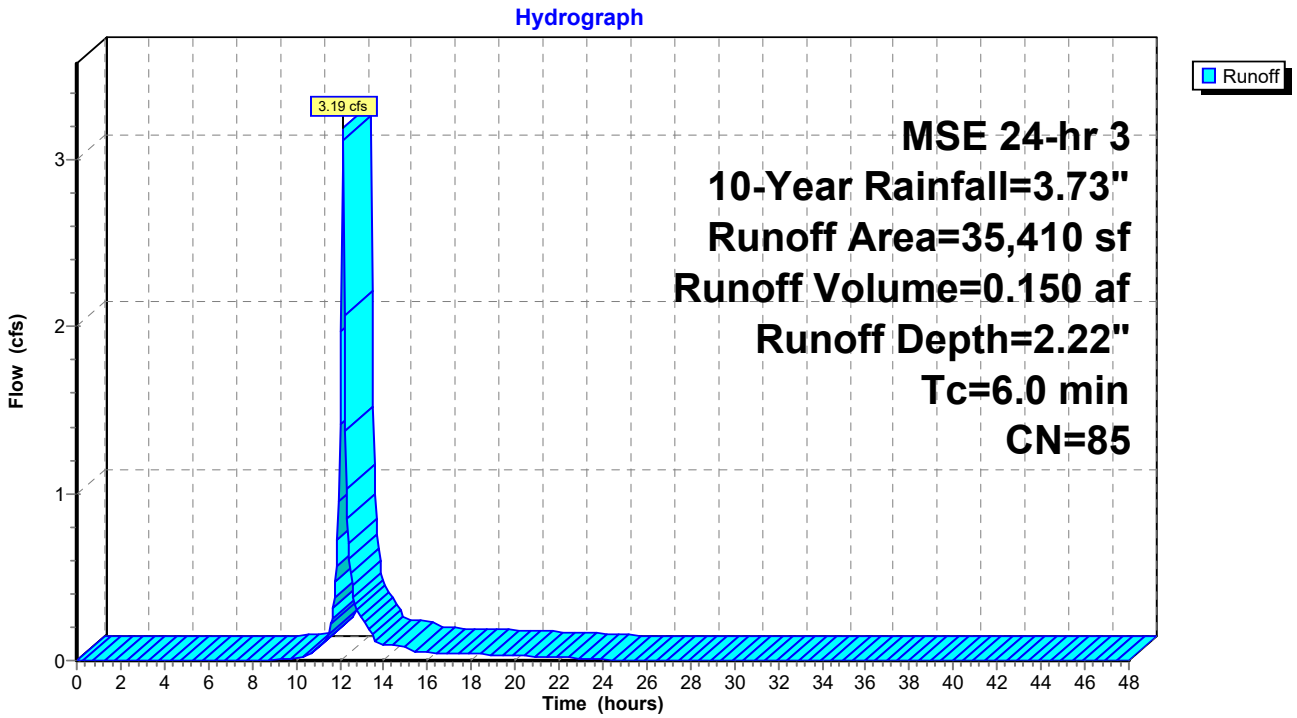
Runoff = 3.19 cfs @ 12.13 hrs, Volume= 0.150 af, Depth= 2.22"
Routed to Link 1L : Total

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-48.00 hrs, dt= 0.05 hrs
MSE 24-hr 3 10-Year Rainfall=3.73"

Area (sf)	CN	Description
4,346	98	Paved parking, HSG D
5,807	98	Roofs, HSG D
25,257	80	>75% Grass cover, Good, HSG D
35,410	85	Weighted Average
25,257		71.33% Pervious Area
10,153		28.67% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
6.0					**Direct Entry, TR-55**

Subcatchment B: Undetained Existing

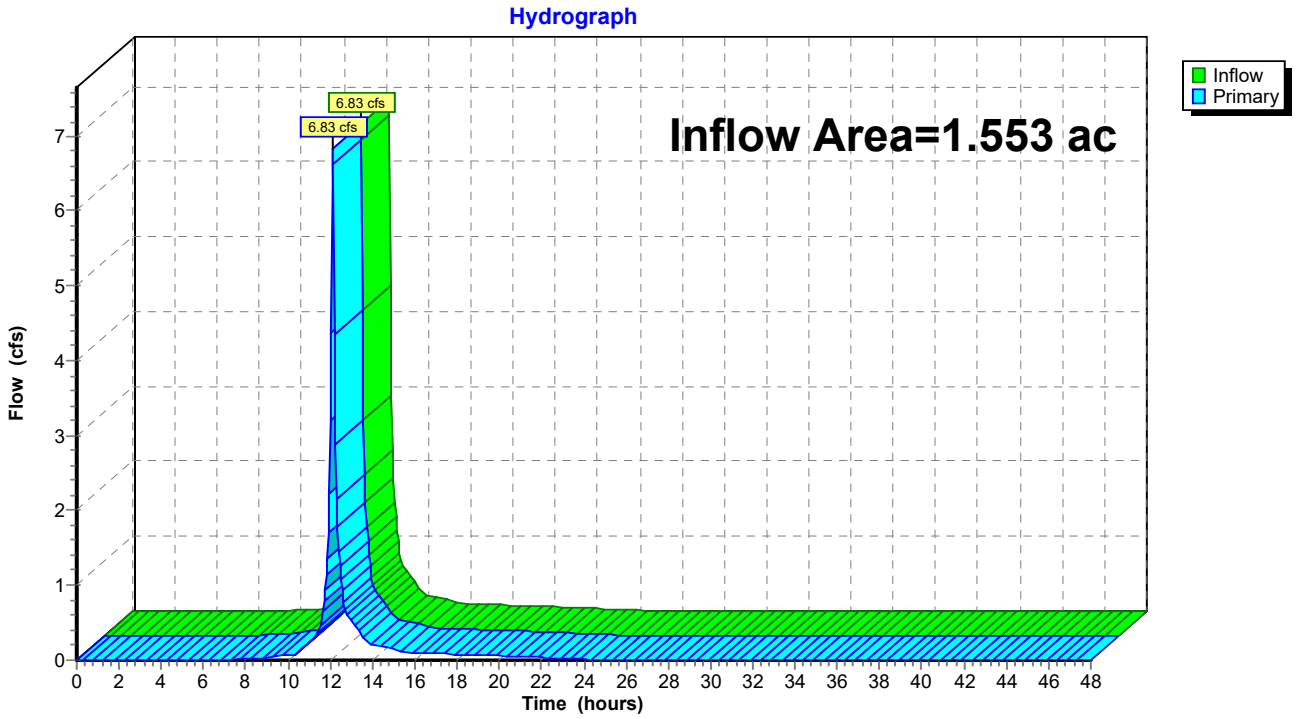


Summary for Link 1L: Total

Inflow Area = 1.553 ac, 48.71% Impervious, Inflow Depth = 2.57" for 10-Year event
Inflow = 6.83 cfs @ 12.13 hrs, Volume= 0.333 af
Primary = 6.83 cfs @ 12.13 hrs, Volume= 0.333 af, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 0.00-48.00 hrs, dt= 0.05 hrs

Link 1L: Total



Time span=0.00-48.00 hrs, dt=0.05 hrs, 961 points
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN
Reach routing by Stor-Ind+Trans method - Pond routing by Stor-Ind method

Subcatchment A: Detained Existing Runoff Area=32,235 sf 70.73% Impervious Runoff Depth=5.24"
Tc=6.0 min CN=93 Runoff=6.21 cfs 0.323 af

Subcatchment B: Undetained Existing Runoff Area=35,410 sf 28.67% Impervious Runoff Depth=4.36"
Tc=6.0 min CN=85 Runoff=6.07 cfs 0.295 af

Link 1L: Total Inflow=12.28 cfs 0.619 af
Primary=12.28 cfs 0.619 af

Total Runoff Area = 1.553 ac Runoff Volume = 0.619 af Average Runoff Depth = 4.78"
51.29% Pervious = 0.796 ac 48.71% Impervious = 0.756 ac

Summary for Subcatchment A: Detained Existing

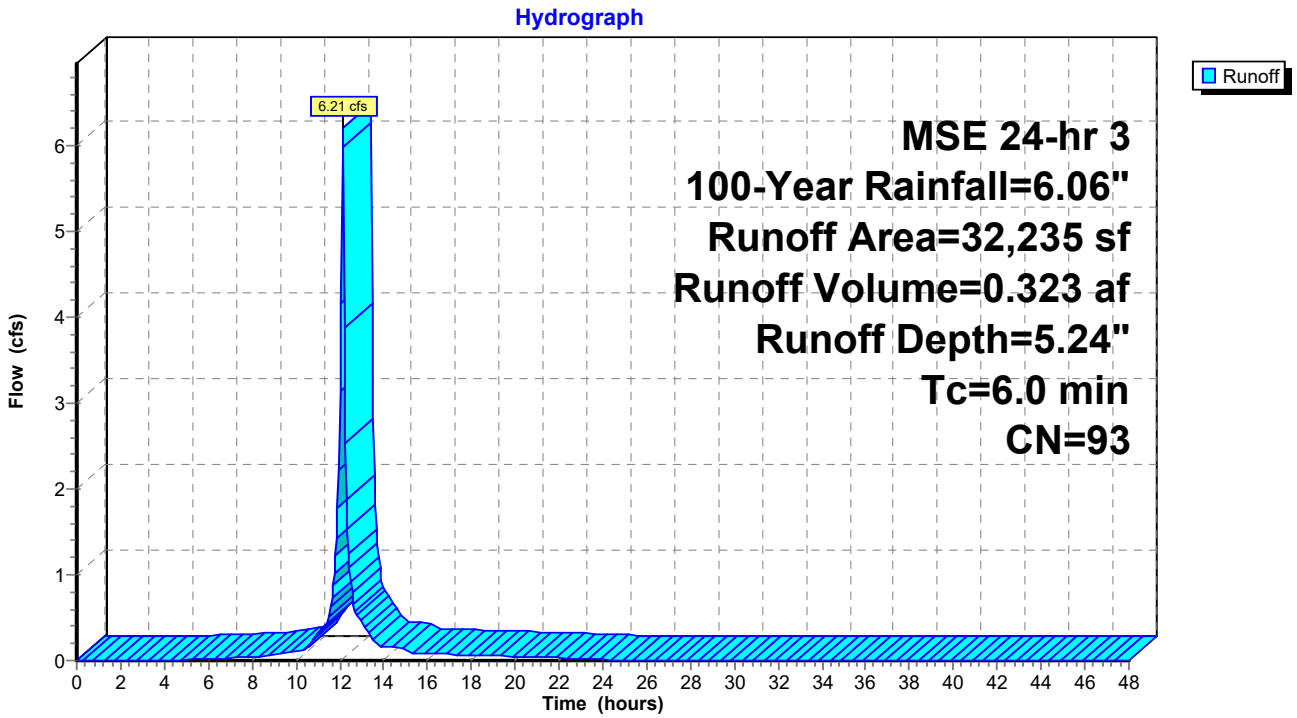
Runoff = 6.21 cfs @ 12.13 hrs, Volume= 0.323 af, Depth= 5.24"
Routed to Link 1L : Total

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-48.00 hrs, dt= 0.05 hrs
MSE 24-hr 3 100-Year Rainfall=6.06"

Area (sf)	CN	Description
16,061	98	Paved parking, HSG D
6,739	98	Roofs, HSG D
9,435	80	>75% Grass cover, Good, HSG D
32,235	93	Weighted Average
9,435		29.27% Pervious Area
22,800		70.73% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
6.0					**Direct Entry, TR-55**

Subcatchment A: Detained Existing



Summary for Subcatchment B: Undetained Existing

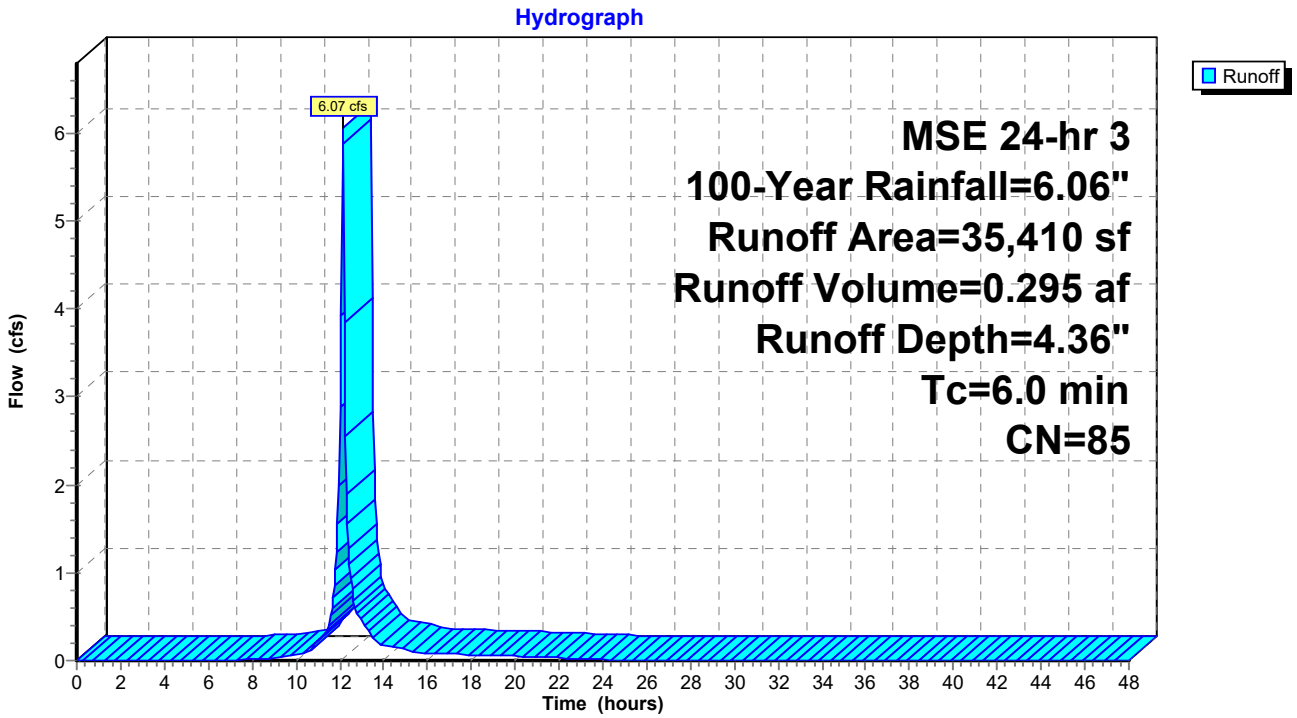
Runoff = 6.07 cfs @ 12.13 hrs, Volume= 0.295 af, Depth= 4.36"
Routed to Link 1L : Total

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-48.00 hrs, dt= 0.05 hrs
MSE 24-hr 3 100-Year Rainfall=6.06"

Area (sf)	CN	Description
4,346	98	Paved parking, HSG D
5,807	98	Roofs, HSG D
25,257	80	>75% Grass cover, Good, HSG D
35,410	85	Weighted Average
25,257		71.33% Pervious Area
10,153		28.67% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
6.0					**Direct Entry, TR-55**

Subcatchment B: Undetained Existing

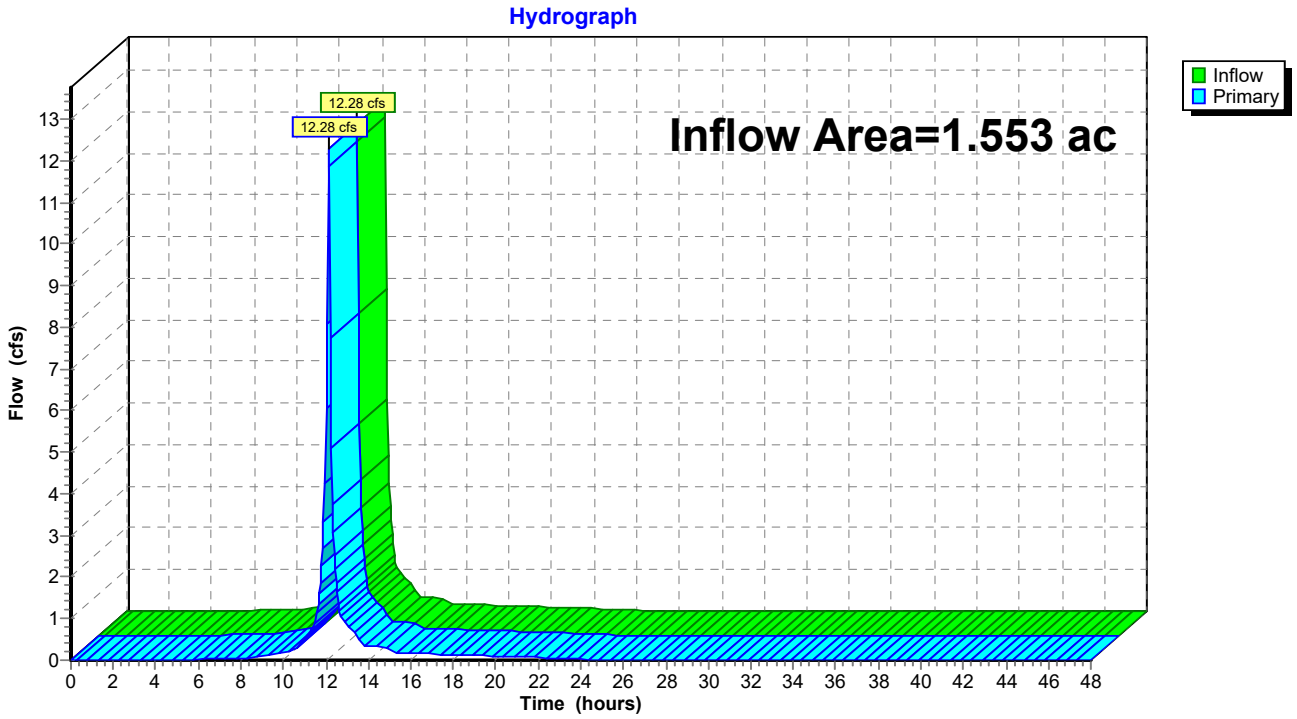


Summary for Link 1L: Total

Inflow Area = 1.553 ac, 48.71% Impervious, Inflow Depth = 4.78" for 100-Year event
Inflow = 12.28 cfs @ 12.13 hrs, Volume= 0.619 af
Primary = 12.28 cfs @ 12.13 hrs, Volume= 0.619 af, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 0.00-48.00 hrs, dt= 0.05 hrs

Link 1L: Total



Events for Subcatchment A: Detained Existing

Event	Rainfall (inches)	Runoff (cfs)	Volume (acre-feet)	Depth (inches)
1-Year	2.34	2.08	0.100	1.63
2-Year	2.64	2.42	0.118	1.91
10-Year	3.73	3.64	0.182	2.96
100-Year	**6.06**	**6.21**	**0.323**	**5.24**

Events for Subcatchment B: Undetained Existing

Event	Rainfall (inches)	Runoff (cfs)	Volume (acre-feet)	Depth (inches)
1-Year	2.34	1.54	0.071	1.05
2-Year	2.64	1.88	0.087	1.29
10-Year	3.73	3.19	0.150	2.22
100-Year	**6.06**	**6.07**	**0.295**	**4.36**

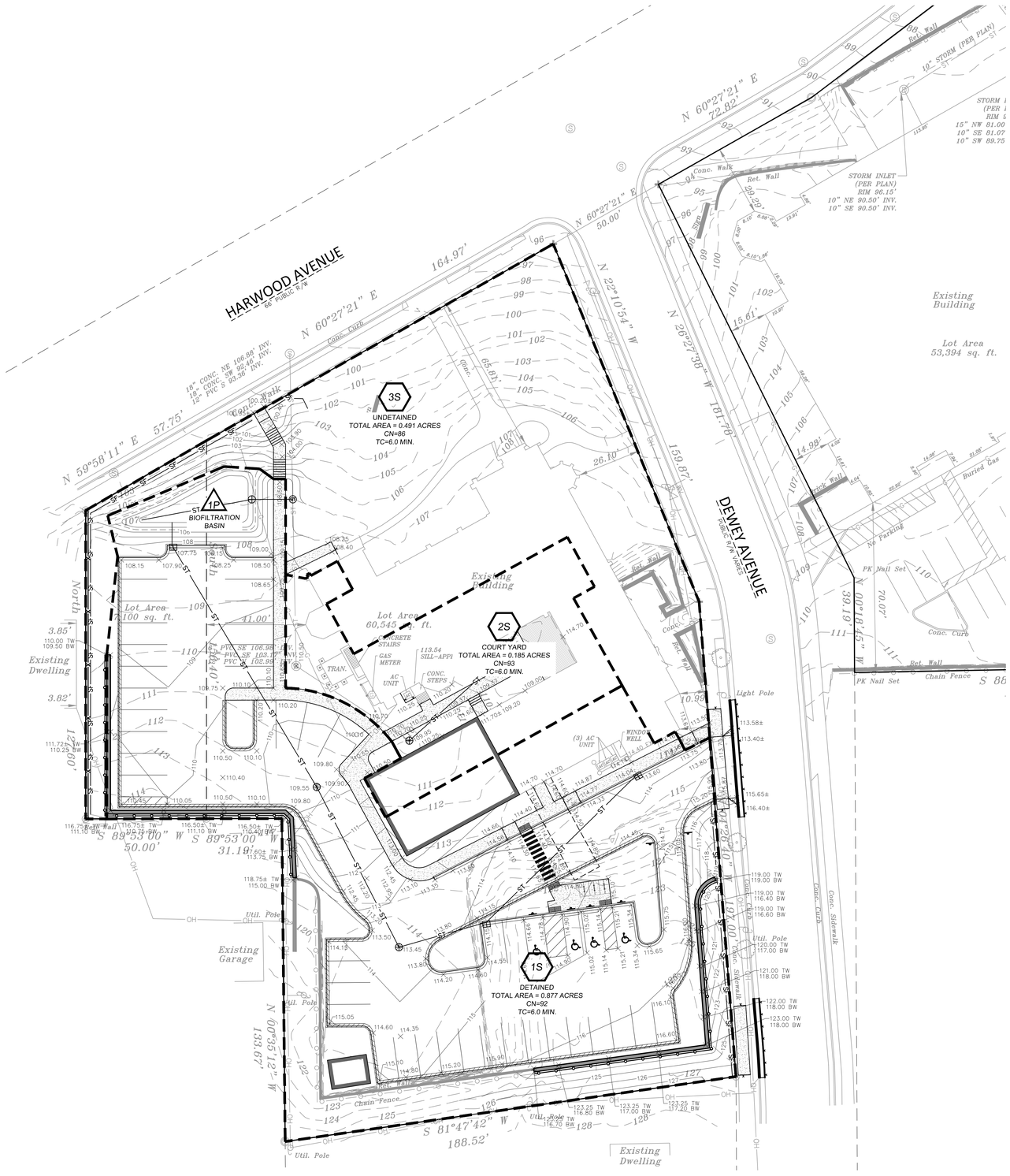
Events for Link 1L: Total

Event	Inflow (cfs)	Primary (cfs)	Elevation (feet)
1-Year	3.62	3.62	**0.00**
2-Year	4.30	4.30	0.00
10-Year	6.83	6.83	0.00
100-Year	**12.28**	**12.28**	0.00

APPENDIX 5

Proposed Site Hydrology

- Proposed Hydrology Exhibit
- Proposed HydroCAD Modeling



DRAFT - NOT FOR CONSTRUCTION

1 PROPOSED HYDROLOGY 1"=20'-0"

DIGGERS HOTLINE
Call 811 or (800) 242-8511
Milwaukee Area (262) 432-7910
Hearing Impaired TDD (800) 542-2289
www.DiggersHotline.com

JSD
MILWAUKEE REGIONAL OFFICE
W238 N1610 BUSSE ROAD, SUITE 100
WAUKESHA, WISCONSIN 53188
P. 262.513.0666
JSD PROJ. NO.: 22-11646
JSD PROJ. MGR.: RWI

MSI GENERAL CORPORATION
P.O. BOX. 7
OCONOMOWOC, WI 53066
PHONE: 262-367-3661

WWW.MSIGENERAL.COM
SINGLE SOURCE RESPONSIBILITY ™

ISSUE DATES:	
Proposal:	XX/XX/XXXX
Bid:	XX/XX/XXXX
Contract:	XX/XX/XXXX
State Submittal / Permit:	XX/XX/XXXX
As-Built:	XX/XX/XXXX
CITY SUBMITTAL:	06/07/2023

REVISIONS:	
1	–
2	
3	
4	
5	
6	
7	
8	
9	
10	
11	
12	
13	
14	
15	
16	
17	
18	
19	
20	
21	
22	
23	
24	
25	
26	
27	
28	
29	
30	
31	
32	
33	
34	
35	
36	
37	
38	
39	
40	
41	

ST. JOHN'S WAUWATOSA

PROJECT ADDRESS:

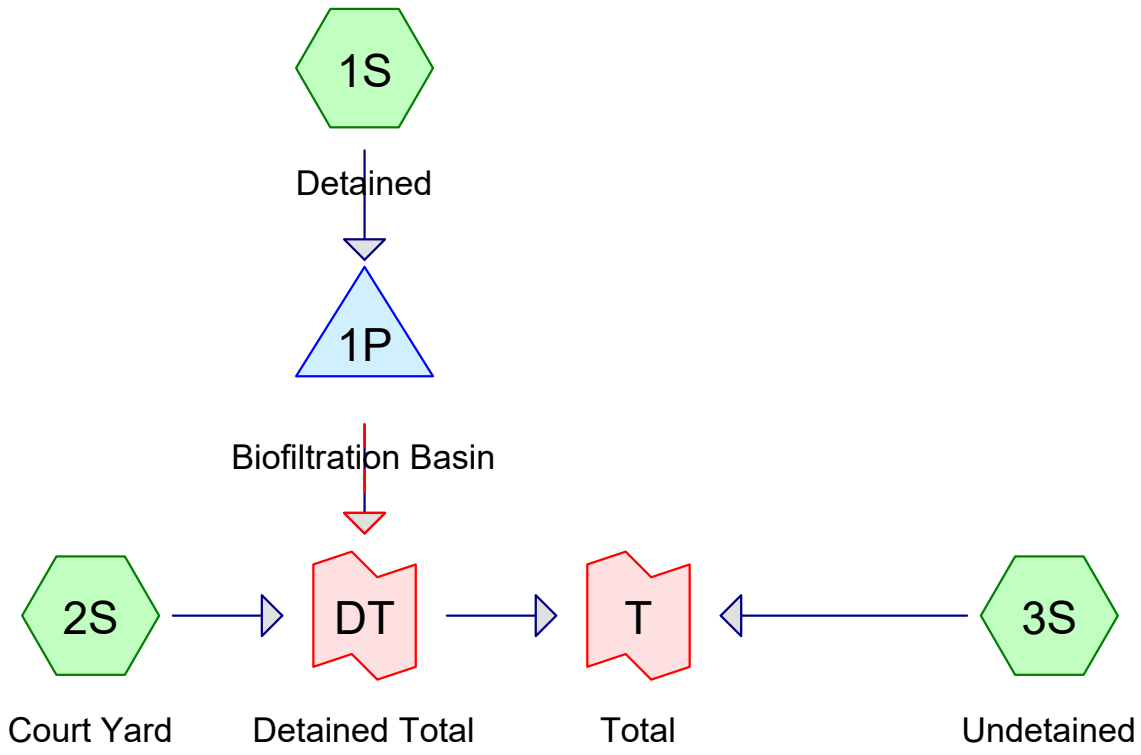
PROJECT NAME
St. John's Evangelical Lutheran Church
STREET ADDRESS
7809 Harwood Ave.
CITY/ STATE / ZIP
Wauwatosa, WI 53213

ALL WORK TO BE COMPLETED AS SHOWN, AND IN ACCORDANCE WITH THE LATEST EDITION OF THE MSI GENERAL MASTER SPECIFICATION

Architect:	Engineer:	Reviewed By:
AMH	APM	RWI

Sheet Title:
PROPOSED HYDROLOGY
Sheet Number:
H-200
Project Number:
P13586

MANAGERS . ENGINEERS . CONTRACTORS . ARCHITECTS



Subcat Reach Pond Link

Routing Diagram for 22-11646 Proposed
Prepared by JSD Professional Services Inc, Printed 5/31/2023

Time span=0.00-48.00 hrs, dt=0.05 hrs, 961 points
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN
Reach routing by Stor-Ind+Trans method - Pond routing by Stor-Ind method

Subcatchment1S: Detained Runoff Area=38,185 sf 67.63% Impervious Runoff Depth=1.55"
Tc=6.0 min CN=92 Runoff=2.36 cfs 0.113 af

Subcatchment2S: Court Yard Runoff Area=8,061 sf 72.79% Impervious Runoff Depth=1.63"
Tc=6.0 min CN=93 Runoff=0.52 cfs 0.025 af

Subcatchment3S: Undetained Runoff Area=21,399 sf 35.75% Impervious Runoff Depth=1.11"
Tc=6.0 min CN=86 Runoff=0.98 cfs 0.046 af

Pond 1P: Biofiltration Basin Peak Elev=104.27' Storage=813 cf Inflow=2.36 cfs 0.113 af
Primary=1.62 cfs 0.107 af Secondary=0.00 cfs 0.000 af Outflow=1.62 cfs 0.107 af

Link DT: Detained Total Inflow=2.00 cfs 0.132 af
Primary=2.00 cfs 0.132 af

Link T: Total Inflow=2.96 cfs 0.178 af
Primary=2.96 cfs 0.178 af

Total Runoff Area = 1.553 ac Runoff Volume = 0.184 af Average Runoff Depth = 1.42"
41.84% Pervious = 0.650 ac 58.16% Impervious = 0.903 ac

Summary for Subcatchment 1S: Detained

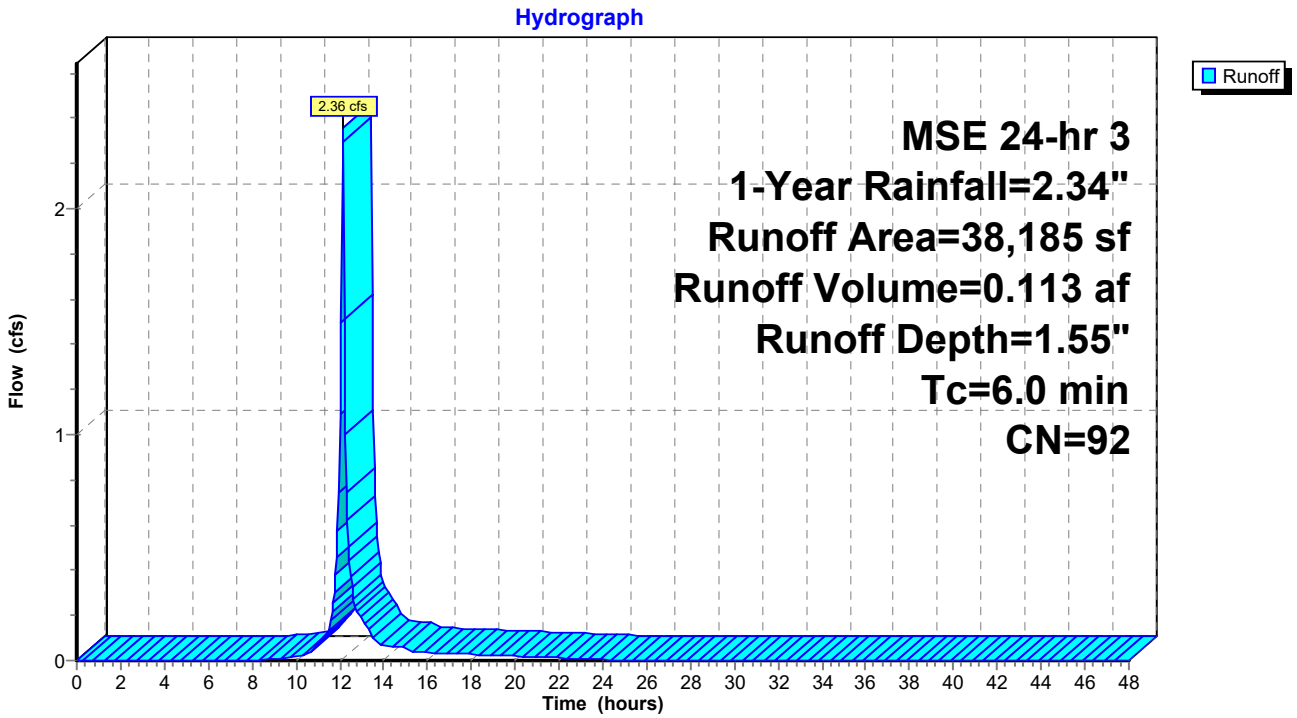
Runoff = 2.36 cfs @ 12.13 hrs, Volume= 0.113 af, Depth= 1.55"
Routed to Pond 1P : Biofiltration Basin

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-48.00 hrs, dt= 0.05 hrs
MSE 24-hr 3 1-Year Rainfall=2.34"

Area (sf)	CN	Description
23,417	98	Paved parking, HSG D
2,406	98	Roofs, HSG D
12,362	80	>75% Grass cover, Good, HSG D
38,185	92	Weighted Average
12,362		32.37% Pervious Area
25,823		67.63% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
6.0					**Direct Entry, TR-55 Min**

Subcatchment 1S: Detained



Summary for Subcatchment 2S: Court Yard

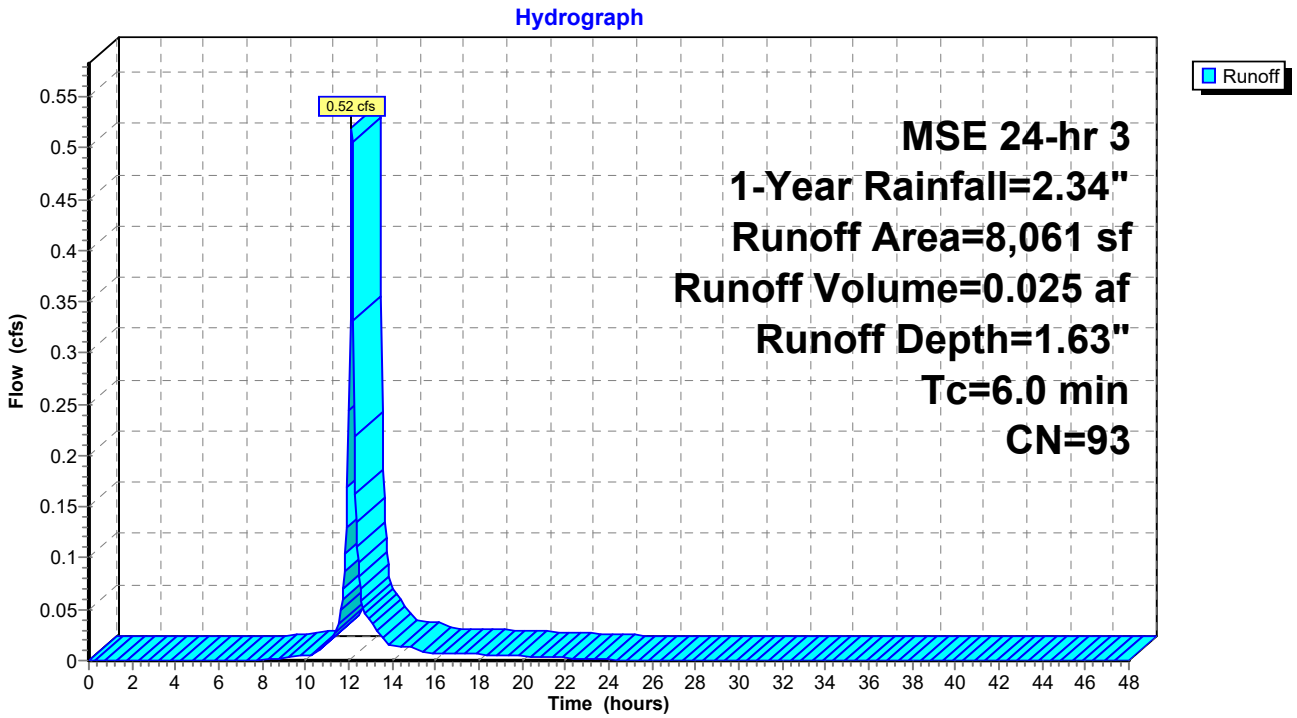
Runoff = 0.52 cfs @ 12.13 hrs, Volume= 0.025 af, Depth= 1.63"
Routed to Link DT : Detained Total

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-48.00 hrs, dt= 0.05 hrs
MSE 24-hr 3 1-Year Rainfall=2.34"

Area (sf)	CN	Description
795	98	Paved parking, HSG D
5,073	98	Roofs, HSG D
2,193	80	>75% Grass cover, Good, HSG D
8,061	93	Weighted Average
2,193		27.21% Pervious Area
5,868		72.79% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
6.0					**Direct Entry, TR-55 Min**

Subcatchment 2S: Court Yard



Summary for Subcatchment 3S: Undetained

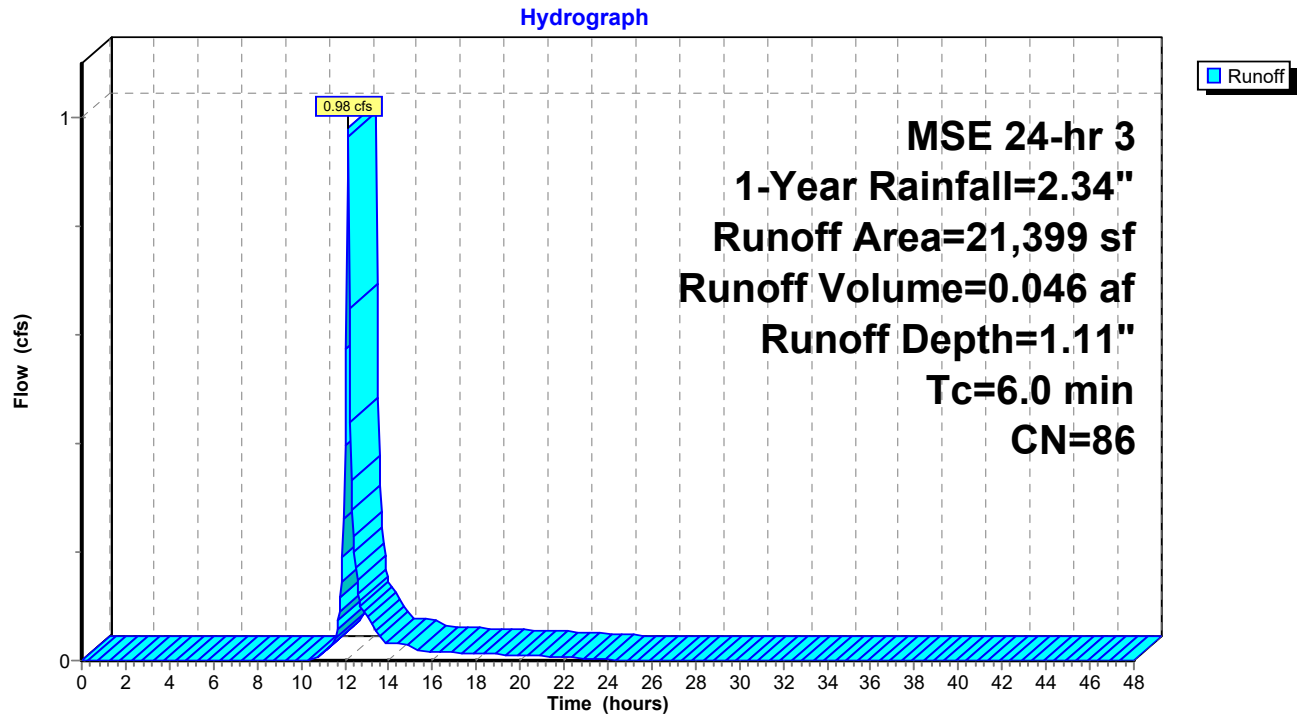
Runoff = 0.98 cfs @ 12.13 hrs, Volume= 0.046 af, Depth= 1.11"
Routed to Link T : Total

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-48.00 hrs, dt= 0.05 hrs
MSE 24-hr 3 1-Year Rainfall=2.34"

Area (sf)	CN	Description
2,817	98	Paved parking, HSG D
4,834	98	Roofs, HSG D
13,748	80	>75% Grass cover, Good, HSG D
21,399	86	Weighted Average
13,748		64.25% Pervious Area
7,651		35.75% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
6.0					**Direct Entry, TR-55 Min**

Subcatchment 3S: Undetained



Summary for Pond 1P: Biofiltration Basin

Inflow Area = 0.877 ac, 67.63% Impervious, Inflow Depth = 1.55" for 1-Year event
Inflow = 2.36 cfs @ 12.13 hrs, Volume= 0.113 af
Outflow = 1.62 cfs @ 12.20 hrs, Volume= 0.107 af, Atten= 32%, Lag= 4.2 min
Primary = 1.62 cfs @ 12.20 hrs, Volume= 0.107 af
Routed to Link DT : Detained Total
Secondary = 0.00 cfs @ 0.00 hrs, Volume= 0.000 af
Routed to Link DT : Detained Total

Routing by Stor-Ind method, Time Span= 0.00-48.00 hrs, dt= 0.05 hrs
Peak Elev= 104.27' @ 12.20 hrs Surf.Area= 599 sf Storage= 813 cf

Plug-Flow detention time= 40.5 min calculated for 0.107 af (95% of inflow)
Center-of-Mass det. time= 14.6 min (805.5 - 790.9)

Volume	Invert	Avail.Storage	Storage Description
#1	100.00'	1,724 cf	**Custom Stage Data (Prismatic)** Listed below

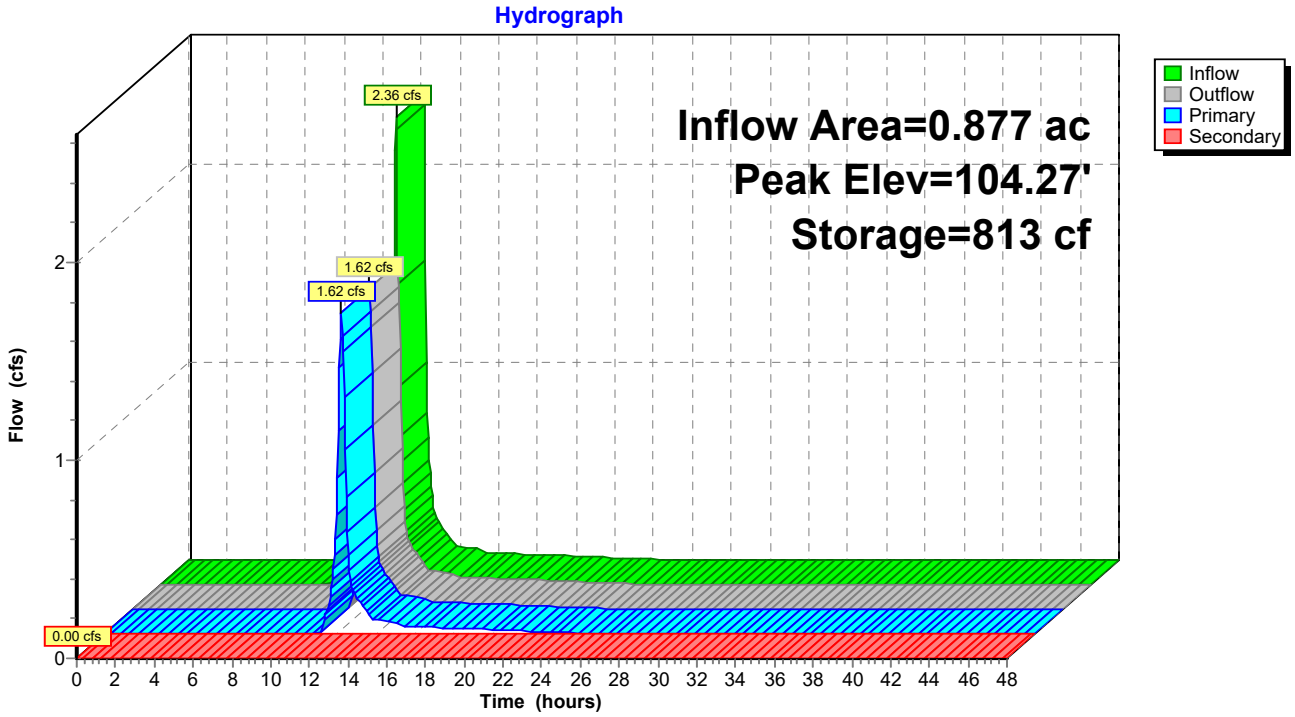
Elevation (feet)	Surf.Area (sq-ft)	Voids (%)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
100.00	528	0.0	0	0
102.00	528	33.0	348	348
104.00	528	27.0	285	634
105.00	790	100.0	659	1,293
105.50	935	100.0	431	1,724

Device	Routing	Invert	Outlet Devices
#1	Primary	101.50'	**12.0" Round Culvert** L= 17.0' CPP, projecting, no headwall, Ke= 0.900 Inlet / Outlet Invert= 101.50' / 101.30' S= 0.0118 '/' Cc= 0.900 n= 0.012 Corrugated PP, smooth interior, Flow Area= 0.79 sf
#2	Device 1	101.50'	**6.0" Vert. Draintile** C= 0.600 Limited to weir flow at low heads
#3	Device 1	104.15'	**10.0" W x 3.0" H Vert. Orifice/Grate** C= 0.600 Limited to weir flow at low heads
#4	Device 1	104.90'	**24.0" Horiz. Rim** C= 0.600 Limited to weir flow at low heads
#5	Secondary	105.25'	**10.0' long x 2.0' breadth Broad-Crested Rectangular Weir** Head (feet) 0.20 0.40 0.60 0.80 1.00 1.20 1.40 1.60 1.80 2.00 2.50 3.00 3.50 Coef. (English) 2.54 2.61 2.61 2.60 2.66 2.70 2.77 2.89 2.88 2.85 3.07 3.20 3.32

Primary OutFlow Max=1.61 cfs @ 12.20 hrs HW=104.27' (Free Discharge)
└**1=Culvert** (Passes 1.61 cfs of 4.50 cfs potential flow)
└**2=Draintile** (Orifice Controls 1.50 cfs @ 7.64 fps)
└**3=Orifice/Grate** (Orifice Controls 0.11 cfs @ 1.11 fps)
└**4=Rim** (Controls 0.00 cfs)

Secondary OutFlow Max=0.00 cfs @ 0.00 hrs HW=100.00' (Free Discharge)
└**5=Broad-Crested Rectangular Weir** (Controls 0.00 cfs)

Pond 1P: Biofiltration Basin

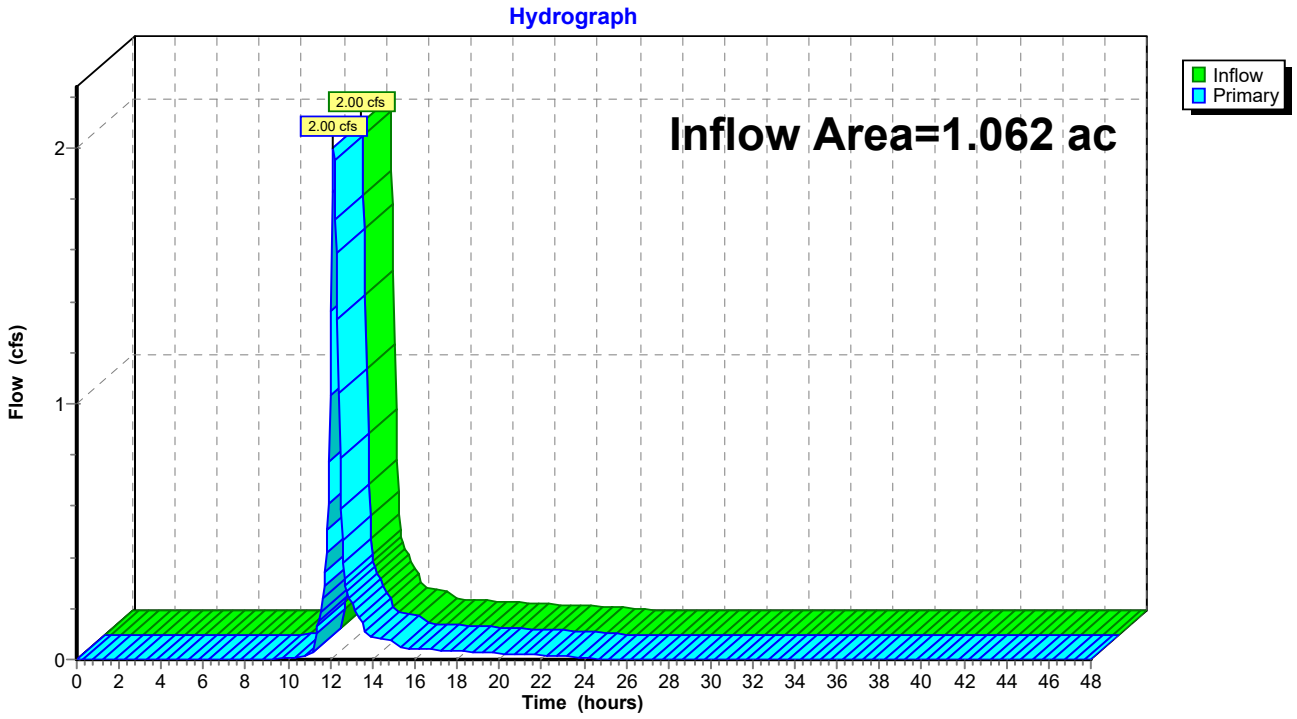


Summary for Link DT: Detained Total

Inflow Area = 1.062 ac, 68.53% Impervious, Inflow Depth = 1.49" for 1-Year event
Inflow = 2.00 cfs @ 12.16 hrs, Volume= 0.132 af
Primary = 2.00 cfs @ 12.16 hrs, Volume= 0.132 af, Atten= 0%, Lag= 0.0 min
Routed to Link T : Total

Primary outflow = Inflow, Time Span= 0.00-48.00 hrs, dt= 0.05 hrs

Link DT: Detained Total

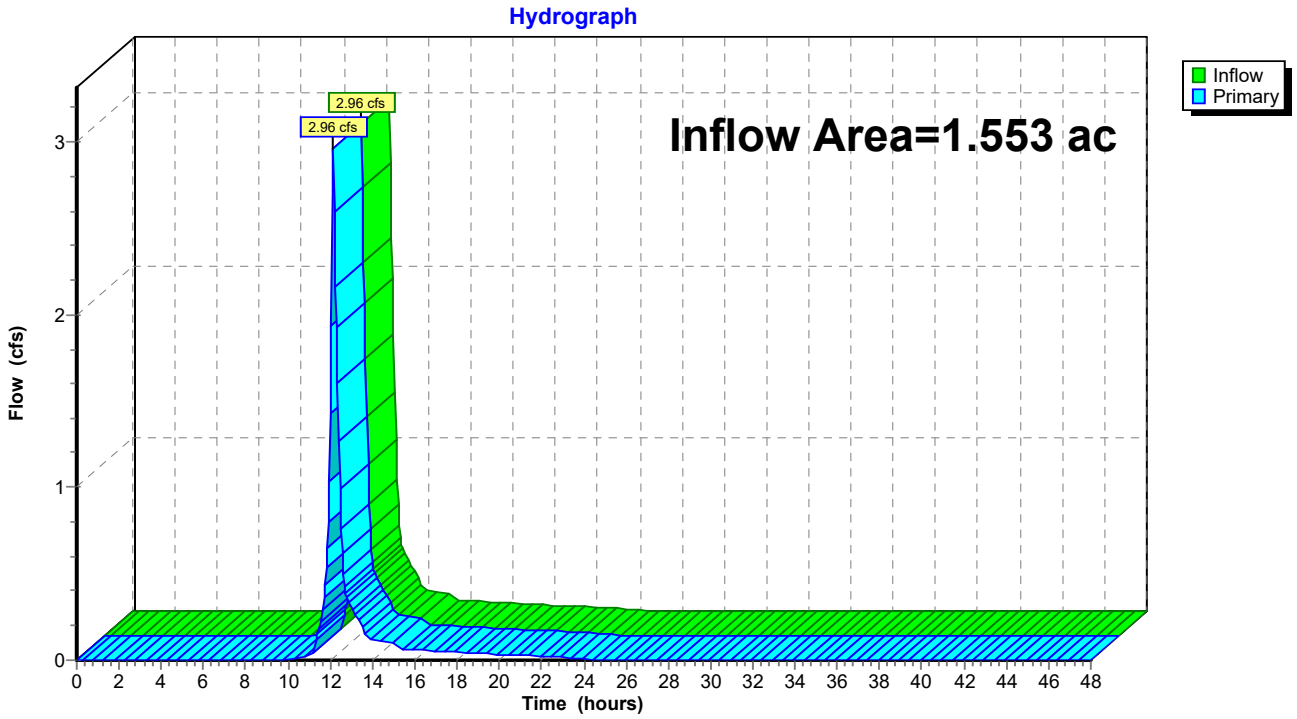


Summary for Link T: Total

Inflow Area = 1.553 ac, 58.16% Impervious, Inflow Depth = 1.37" for 1-Year event
Inflow = 2.96 cfs @ 12.15 hrs, Volume= 0.178 af
Primary = 2.96 cfs @ 12.15 hrs, Volume= 0.178 af, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 0.00-48.00 hrs, dt= 0.05 hrs

Link T: Total



Time span=0.00-48.00 hrs, dt=0.05 hrs, 961 points
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN
Reach routing by Stor-Ind+Trans method - Pond routing by Stor-Ind method

Subcatchment1S: Detained Runoff Area=38,185 sf 67.63% Impervious Runoff Depth=1.82"
Tc=6.0 min CN=92 Runoff=2.76 cfs 0.133 af

Subcatchment2S: Court Yard Runoff Area=8,061 sf 72.79% Impervious Runoff Depth=1.91"
Tc=6.0 min CN=93 Runoff=0.60 cfs 0.029 af

Subcatchment3S: Undetained Runoff Area=21,399 sf 35.75% Impervious Runoff Depth=1.36"
Tc=6.0 min CN=86 Runoff=1.20 cfs 0.056 af

Pond 1P: Biofiltration Basin Peak Elev=104.45' Storage=932 cf Inflow=2.76 cfs 0.133 af
Primary=1.97 cfs 0.127 af Secondary=0.00 cfs 0.000 af Outflow=1.97 cfs 0.127 af

Link DT: Detained Total Inflow=2.41 cfs 0.157 af
Primary=2.41 cfs 0.157 af

Link T: Total Inflow=3.54 cfs 0.212 af
Primary=3.54 cfs 0.212 af

Total Runoff Area = 1.553 ac Runoff Volume = 0.218 af Average Runoff Depth = 1.69"
41.84% Pervious = 0.650 ac 58.16% Impervious = 0.903 ac

Summary for Subcatchment 1S: Detained

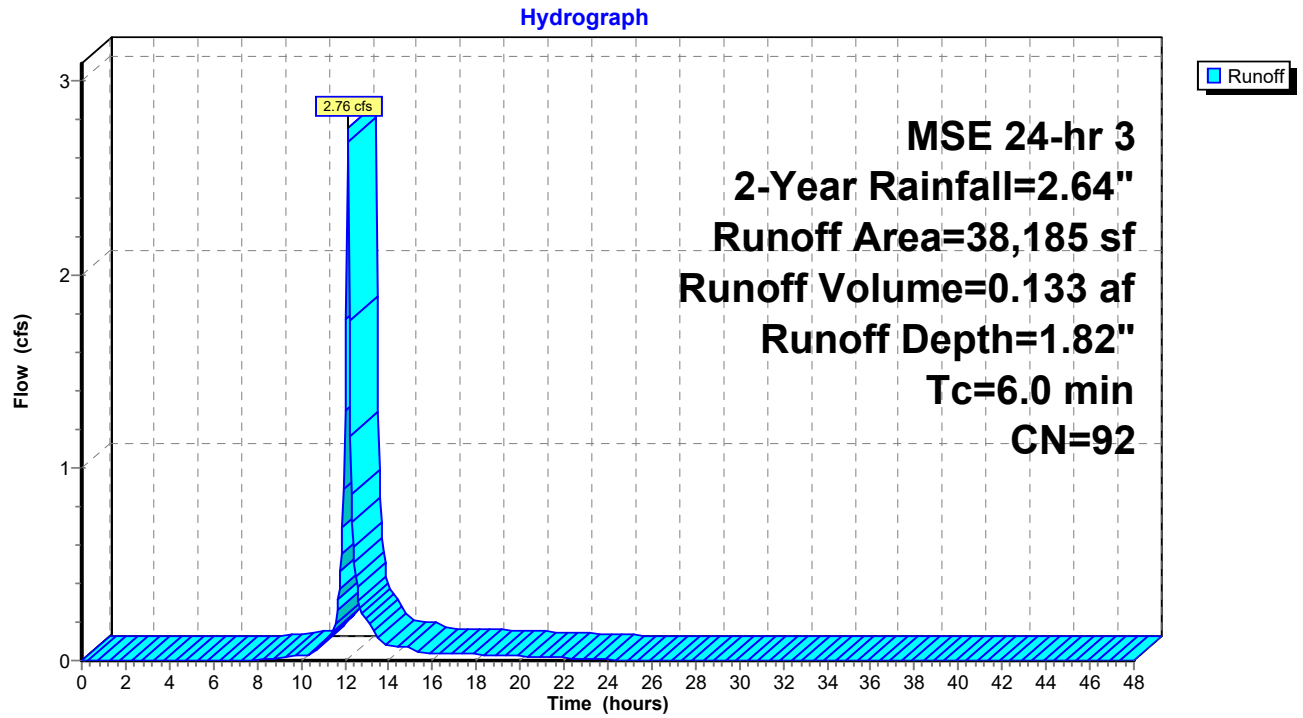
Runoff = 2.76 cfs @ 12.13 hrs, Volume= 0.133 af, Depth= 1.82"
Routed to Pond 1P : Biofiltration Basin

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-48.00 hrs, dt= 0.05 hrs
MSE 24-hr 3 2-Year Rainfall=2.64"

Area (sf)	CN	Description
23,417	98	Paved parking, HSG D
2,406	98	Roofs, HSG D
12,362	80	>75% Grass cover, Good, HSG D
38,185	92	Weighted Average
12,362		32.37% Pervious Area
25,823		67.63% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
6.0					**Direct Entry, TR-55 Min**

Subcatchment 1S: Detained



Summary for Subcatchment 2S: Court Yard

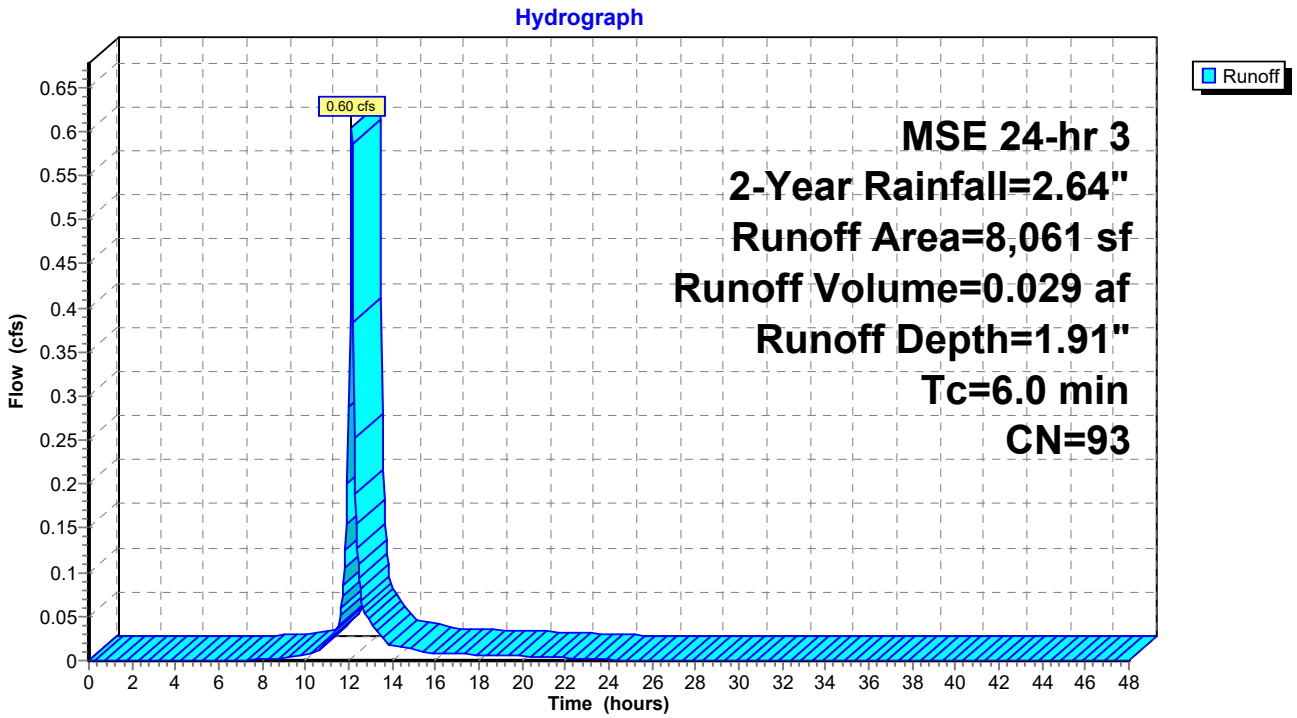
Runoff = 0.60 cfs @ 12.13 hrs, Volume= 0.029 af, Depth= 1.91"
Routed to Link DT : Detained Total

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-48.00 hrs, dt= 0.05 hrs
MSE 24-hr 3 2-Year Rainfall=2.64"

Area (sf)	CN	Description
795	98	Paved parking, HSG D
5,073	98	Roofs, HSG D
2,193	80	>75% Grass cover, Good, HSG D
8,061	93	Weighted Average
2,193		27.21% Pervious Area
5,868		72.79% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
6.0					**Direct Entry, TR-55 Min**

Subcatchment 2S: Court Yard



Summary for Subcatchment 3S: Undetained

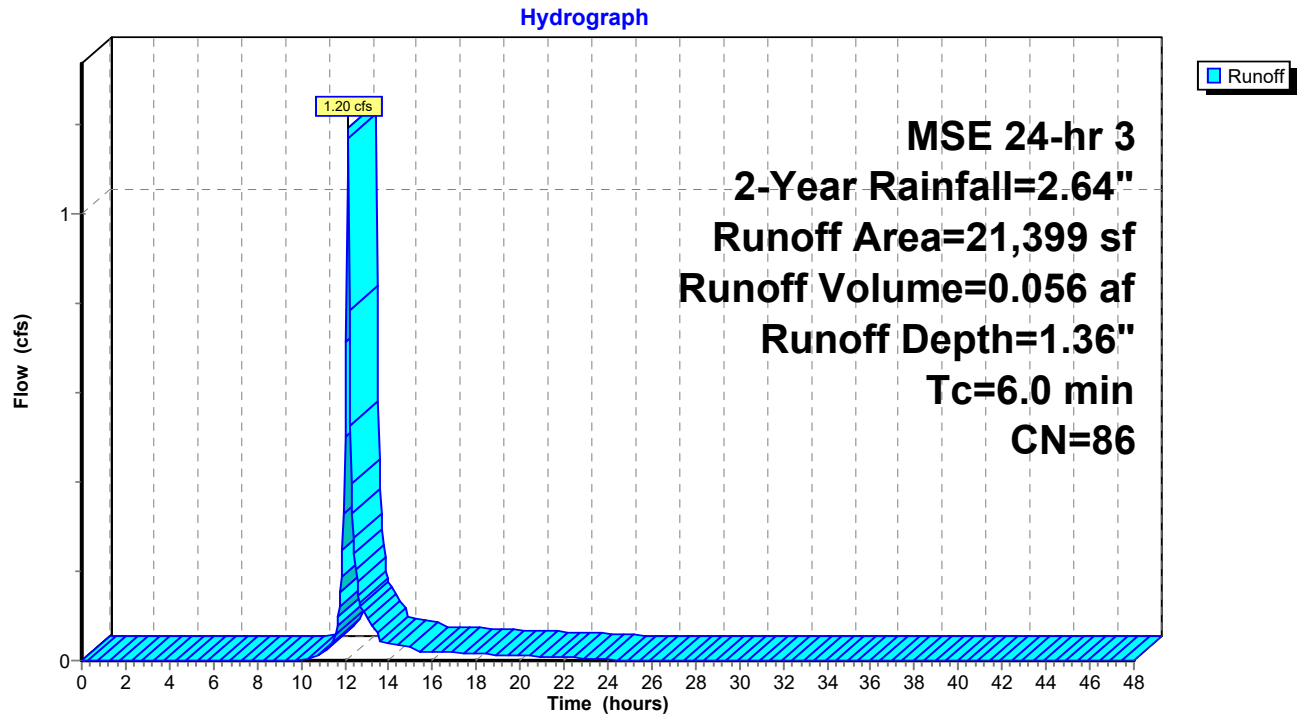
Runoff = 1.20 cfs @ 12.13 hrs, Volume= 0.056 af, Depth= 1.36"
Routed to Link T : Total

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-48.00 hrs, dt= 0.05 hrs
MSE 24-hr 3 2-Year Rainfall=2.64"

Area (sf)	CN	Description
2,817	98	Paved parking, HSG D
4,834	98	Roofs, HSG D
13,748	80	>75% Grass cover, Good, HSG D
21,399	86	Weighted Average
13,748		64.25% Pervious Area
7,651		35.75% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
6.0					**Direct Entry, TR-55 Min**

Subcatchment 3S: Undetained



Summary for Pond 1P: Biofiltration Basin

Inflow Area = 0.877 ac, 67.63% Impervious, Inflow Depth = 1.82" for 2-Year event
Inflow = 2.76 cfs @ 12.13 hrs, Volume= 0.133 af
Outflow = 1.97 cfs @ 12.20 hrs, Volume= 0.127 af, Atten= 29%, Lag= 4.1 min
Primary = 1.97 cfs @ 12.20 hrs, Volume= 0.127 af
Routed to Link DT : Detained Total
Secondary = 0.00 cfs @ 0.00 hrs, Volume= 0.000 af
Routed to Link DT : Detained Total

Routing by Stor-Ind method, Time Span= 0.00-48.00 hrs, dt= 0.05 hrs
Peak Elev= 104.45' @ 12.20 hrs Surf.Area= 647 sf Storage= 932 cf

Plug-Flow detention time= 37.2 min calculated for 0.127 af (95% of inflow)
Center-of-Mass det. time= 14.0 min (801.6 - 787.6)

Volume	Invert	Avail.Storage	Storage Description
#1	100.00'	1,724 cf	**Custom Stage Data (Prismatic)** Listed below

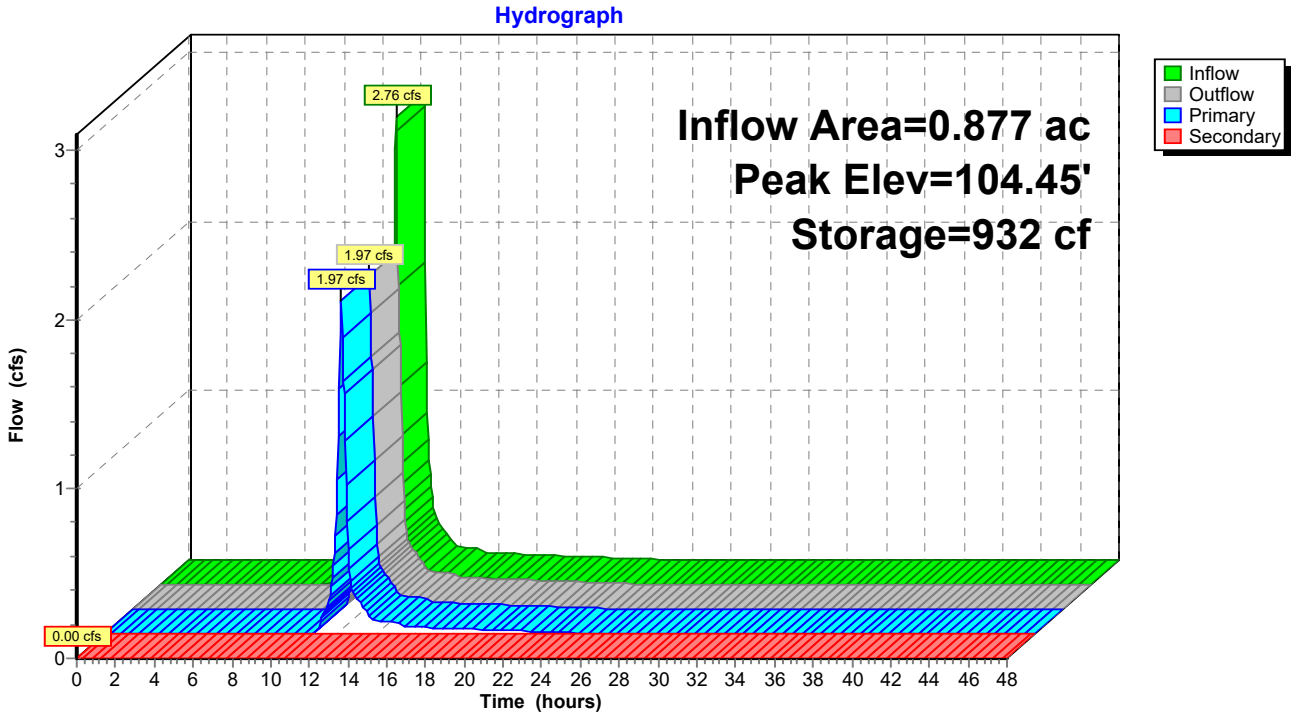
Elevation (feet)	Surf.Area (sq-ft)	Voids (%)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
100.00	528	0.0	0	0
102.00	528	33.0	348	348
104.00	528	27.0	285	634
105.00	790	100.0	659	1,293
105.50	935	100.0	431	1,724

Device	Routing	Invert	Outlet Devices
#1	Primary	101.50'	**12.0" Round Culvert** L= 17.0' CPP, projecting, no headwall, Ke= 0.900 Inlet / Outlet Invert= 101.50' / 101.30' S= 0.0118 '/' Cc= 0.900 n= 0.012 Corrugated PP, smooth interior, Flow Area= 0.79 sf
#2	Device 1	101.50'	**6.0" Vert. Draintile** C= 0.600 Limited to weir flow at low heads
#3	Device 1	104.15'	**10.0" W x 3.0" H Vert. Orifice/Grate** C= 0.600 Limited to weir flow at low heads
#4	Device 1	104.90'	**24.0" Horiz. Rim** C= 0.600 Limited to weir flow at low heads
#5	Secondary	105.25'	**10.0' long x 2.0' breadth Broad-Crested Rectangular Weir** Head (feet) 0.20 0.40 0.60 0.80 1.00 1.20 1.40 1.60 1.80 2.00 2.50 3.00 3.50 Coef. (English) 2.54 2.61 2.61 2.60 2.66 2.70 2.77 2.89 2.88 2.85 3.07 3.20 3.32

Primary OutFlow Max=1.96 cfs @ 12.20 hrs HW=104.45' (Free Discharge)
└**1=Culvert** (Passes 1.96 cfs of 4.67 cfs potential flow)
└**2=Draintile** (Orifice Controls 1.55 cfs @ 7.91 fps)
└**3=Orifice/Grate** (Orifice Controls 0.41 cfs @ 1.96 fps)
└**4=Rim** (Controls 0.00 cfs)

Secondary OutFlow Max=0.00 cfs @ 0.00 hrs HW=100.00' (Free Discharge)
└**5=Broad-Crested Rectangular Weir** (Controls 0.00 cfs)

Pond 1P: Biofiltration Basin

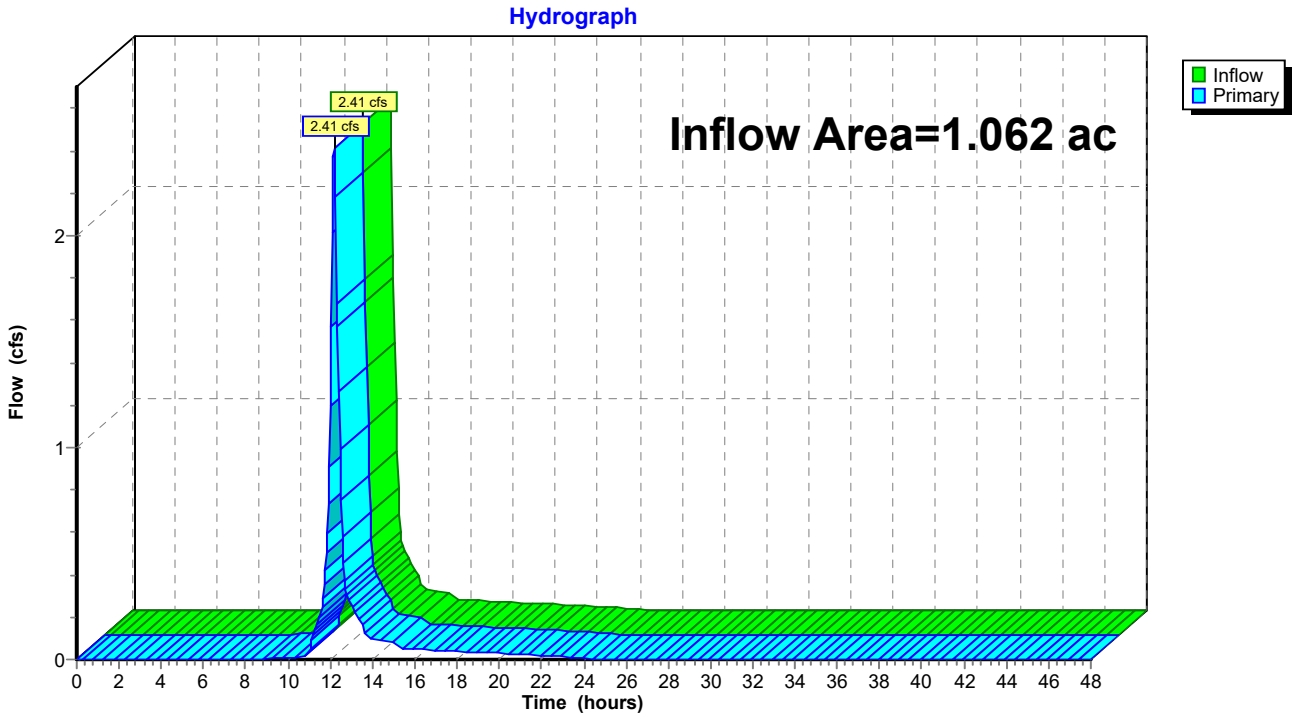


Summary for Link DT: Detained Total

Inflow Area = 1.062 ac, 68.53% Impervious, Inflow Depth = 1.77" for 2-Year event
Inflow = 2.41 cfs @ 12.17 hrs, Volume= 0.157 af
Primary = 2.41 cfs @ 12.17 hrs, Volume= 0.157 af, Atten= 0%, Lag= 0.0 min
Routed to Link T : Total

Primary outflow = Inflow, Time Span= 0.00-48.00 hrs, dt= 0.05 hrs

Link DT: Detained Total

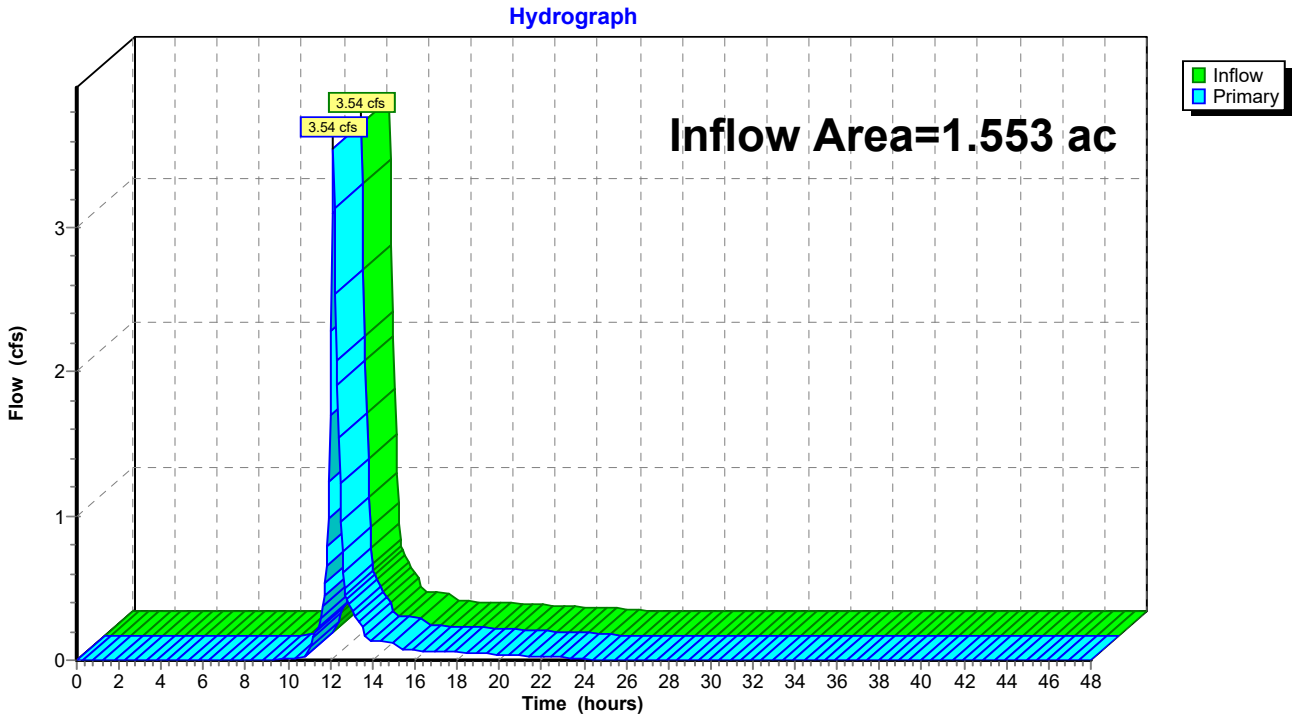


Summary for Link T: Total

Inflow Area = 1.553 ac, 58.16% Impervious, Inflow Depth = 1.64" for 2-Year event
Inflow = 3.54 cfs @ 12.15 hrs, Volume= 0.212 af
Primary = 3.54 cfs @ 12.15 hrs, Volume= 0.212 af, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 0.00-48.00 hrs, dt= 0.05 hrs

Link T: Total



Time span=0.00-48.00 hrs, dt=0.05 hrs, 961 points
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN
Reach routing by Stor-Ind+Trans method - Pond routing by Stor-Ind method

Subcatchment1S: Detained Runoff Area=38,185 sf 67.63% Impervious Runoff Depth=2.86"
Tc=6.0 min CN=92 Runoff=4.21 cfs 0.209 af

Subcatchment2S: Court Yard Runoff Area=8,061 sf 72.79% Impervious Runoff Depth=2.96"
Tc=6.0 min CN=93 Runoff=0.91 cfs 0.046 af

Subcatchment3S: Undetained Runoff Area=21,399 sf 35.75% Impervious Runoff Depth=2.30"
Tc=6.0 min CN=86 Runoff=1.99 cfs 0.094 af

Pond 1P: Biofiltration Basin Peak Elev=105.03' Storage=1,319 cf Inflow=4.21 cfs 0.209 af
Primary=3.44 cfs 0.203 af Secondary=0.00 cfs 0.000 af Outflow=3.44 cfs 0.203 af

Link DT: Detained Total Inflow=4.10 cfs 0.248 af
Primary=4.10 cfs 0.248 af

Link T: Total Inflow=5.95 cfs 0.343 af
Primary=5.95 cfs 0.343 af

Total Runoff Area = 1.553 ac Runoff Volume = 0.349 af Average Runoff Depth = 2.69"
41.84% Pervious = 0.650 ac 58.16% Impervious = 0.903 ac

Summary for Subcatchment 1S: Detained

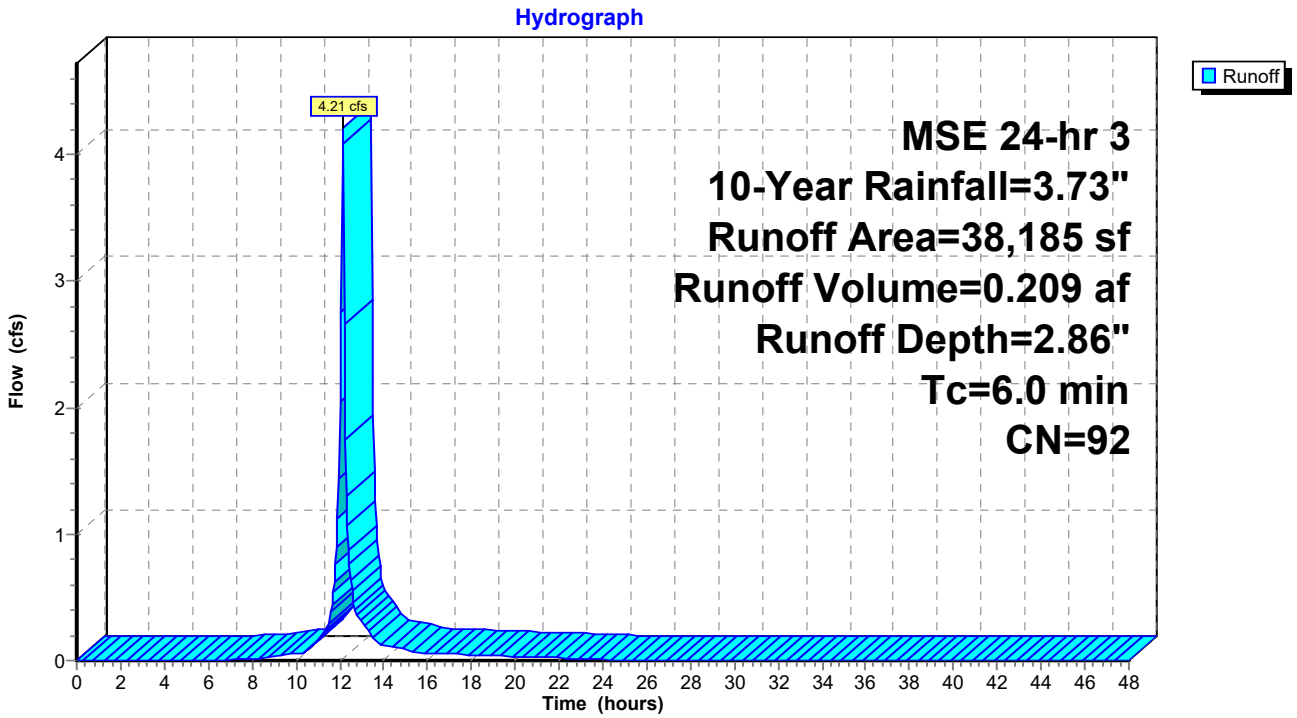
Runoff = 4.21 cfs @ 12.13 hrs, Volume= 0.209 af, Depth= 2.86"
Routed to Pond 1P : Biofiltration Basin

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-48.00 hrs, dt= 0.05 hrs
MSE 24-hr 3 10-Year Rainfall=3.73"

Area (sf)	CN	Description
23,417	98	Paved parking, HSG D
2,406	98	Roofs, HSG D
12,362	80	>75% Grass cover, Good, HSG D
38,185	92	Weighted Average
12,362		32.37% Pervious Area
25,823		67.63% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
6.0					**Direct Entry, TR-55 Min**

Subcatchment 1S: Detained



Summary for Subcatchment 2S: Court Yard

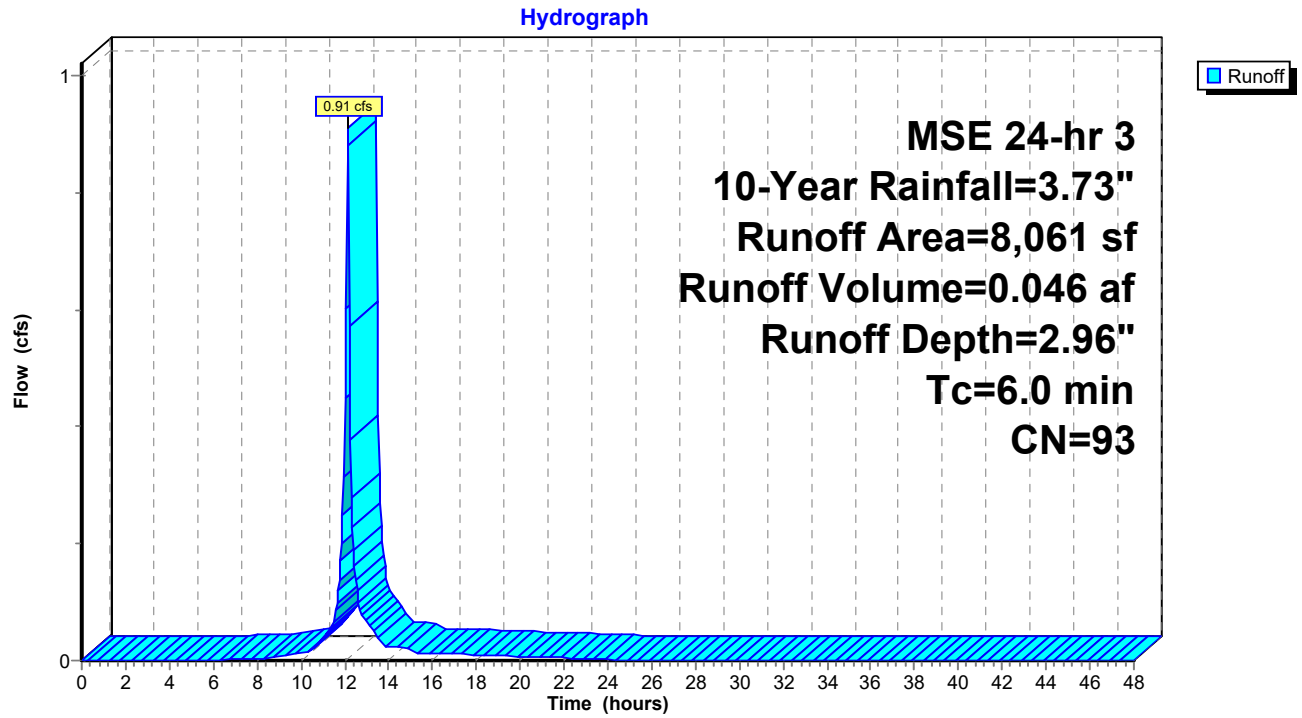
Runoff = 0.91 cfs @ 12.13 hrs, Volume= 0.046 af, Depth= 2.96"
Routed to Link DT : Detained Total

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-48.00 hrs, dt= 0.05 hrs
MSE 24-hr 3 10-Year Rainfall=3.73"

Area (sf)	CN	Description
795	98	Paved parking, HSG D
5,073	98	Roofs, HSG D
2,193	80	>75% Grass cover, Good, HSG D
8,061	93	Weighted Average
2,193		27.21% Pervious Area
5,868		72.79% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
6.0					**Direct Entry, TR-55 Min**

Subcatchment 2S: Court Yard



Summary for Subcatchment 3S: Undetained

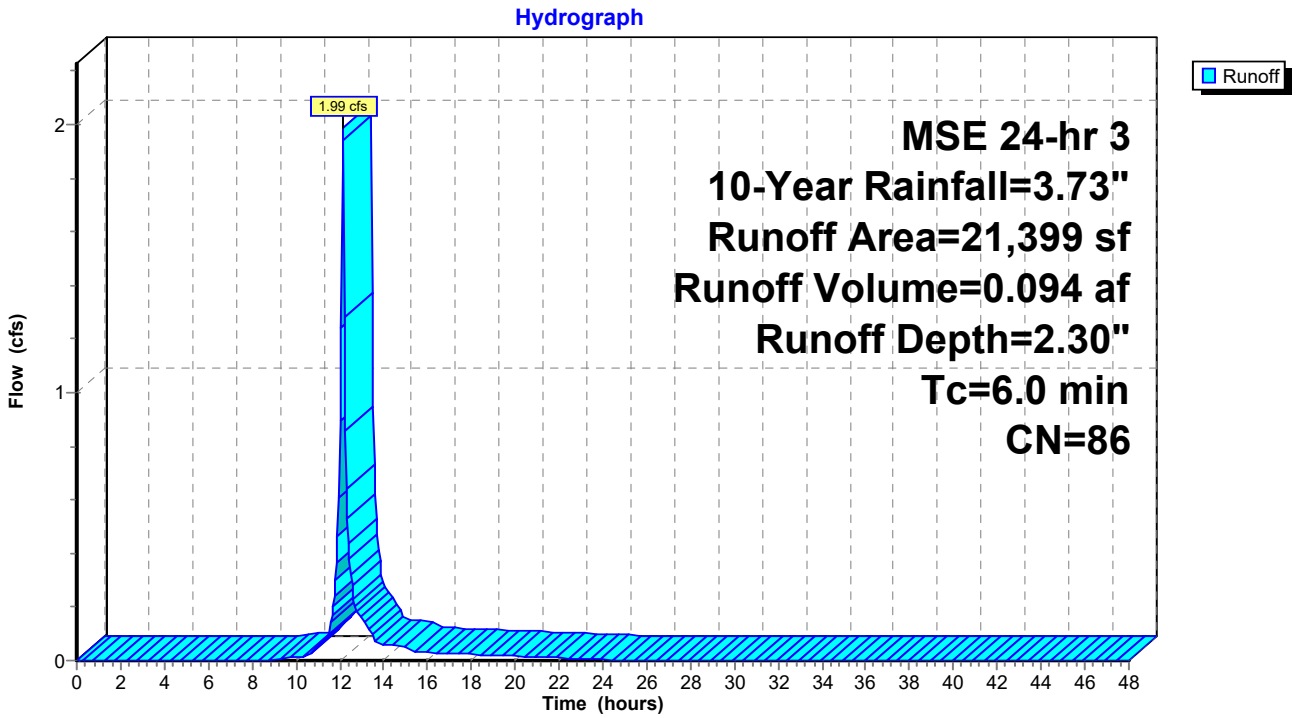
Runoff = 1.99 cfs @ 12.13 hrs, Volume= 0.094 af, Depth= 2.30"
Routed to Link T : Total

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-48.00 hrs, dt= 0.05 hrs
MSE 24-hr 3 10-Year Rainfall=3.73"

Area (sf)	CN	Description
2,817	98	Paved parking, HSG D
4,834	98	Roofs, HSG D
13,748	80	>75% Grass cover, Good, HSG D
21,399	86	Weighted Average
13,748		64.25% Pervious Area
7,651		35.75% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
6.0					**Direct Entry, TR-55 Min**

Subcatchment 3S: Undetained



Summary for Pond 1P: Biofiltration Basin

Inflow Area = 0.877 ac, 67.63% Impervious, Inflow Depth = 2.86" for 10-Year event
Inflow = 4.21 cfs @ 12.13 hrs, Volume= 0.209 af
Outflow = 3.44 cfs @ 12.19 hrs, Volume= 0.203 af, Atten= 18%, Lag= 3.4 min
Primary = 3.44 cfs @ 12.19 hrs, Volume= 0.203 af
Routed to Link DT : Detained Total
Secondary = 0.00 cfs @ 0.00 hrs, Volume= 0.000 af
Routed to Link DT : Detained Total

Routing by Stor-Ind method, Time Span= 0.00-48.00 hrs, dt= 0.05 hrs
Peak Elev= 105.03' @ 12.18 hrs Surf.Area= 799 sf Storage= 1,319 cf

Plug-Flow detention time= 28.6 min calculated for 0.203 af (97% of inflow)
Center-of-Mass det. time= 12.7 min (791.4 - 778.7)

Volume	Invert	Avail.Storage	Storage Description
#1	100.00'	1,724 cf	**Custom Stage Data (Prismatic)** Listed below

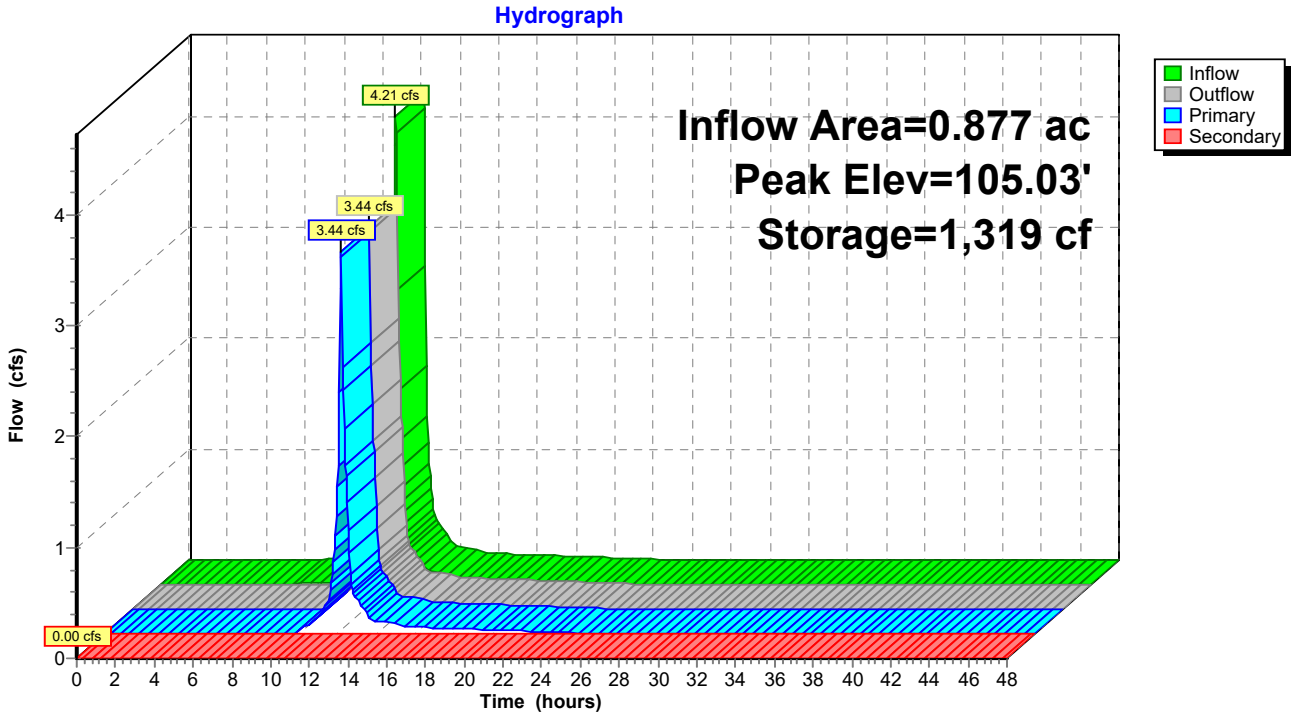
Elevation (feet)	Surf.Area (sq-ft)	Voids (%)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
100.00	528	0.0	0	0
102.00	528	33.0	348	348
104.00	528	27.0	285	634
105.00	790	100.0	659	1,293
105.50	935	100.0	431	1,724

Device	Routing	Invert	Outlet Devices
#1	Primary	101.50'	**12.0" Round Culvert** L= 17.0' CPP, projecting, no headwall, Ke= 0.900 Inlet / Outlet Invert= 101.50' / 101.30' S= 0.0118 '/' Cc= 0.900 n= 0.012 Corrugated PP, smooth interior, Flow Area= 0.79 sf
#2	Device 1	101.50'	**6.0" Vert. Draintile** C= 0.600 Limited to weir flow at low heads
#3	Device 1	104.15'	**10.0" W x 3.0" H Vert. Orifice/Grate** C= 0.600 Limited to weir flow at low heads
#4	Device 1	104.90'	**24.0" Horiz. Rim** C= 0.600 Limited to weir flow at low heads
#5	Secondary	105.25'	**10.0' long x 2.0' breadth Broad-Crested Rectangular Weir** Head (feet) 0.20 0.40 0.60 0.80 1.00 1.20 1.40 1.60 1.80 2.00 2.50 3.00 3.50 Coef. (English) 2.54 2.61 2.61 2.60 2.66 2.70 2.77 2.89 2.88 2.85 3.07 3.20 3.32

Primary OutFlow Max=3.30 cfs @ 12.19 hrs HW=105.01' (Free Discharge)
└**1=Culvert** (Passes 3.30 cfs of 5.18 cfs potential flow)
└**2=Draintile** (Orifice Controls 1.71 cfs @ 8.69 fps)
└**3=Orifice/Grate** (Orifice Controls 0.86 cfs @ 4.12 fps)
└**4=Rim** (Weir Controls 0.74 cfs @ 1.08 fps)

Secondary OutFlow Max=0.00 cfs @ 0.00 hrs HW=100.00' (Free Discharge)
└**5=Broad-Crested Rectangular Weir** (Controls 0.00 cfs)

Pond 1P: Biofiltration Basin

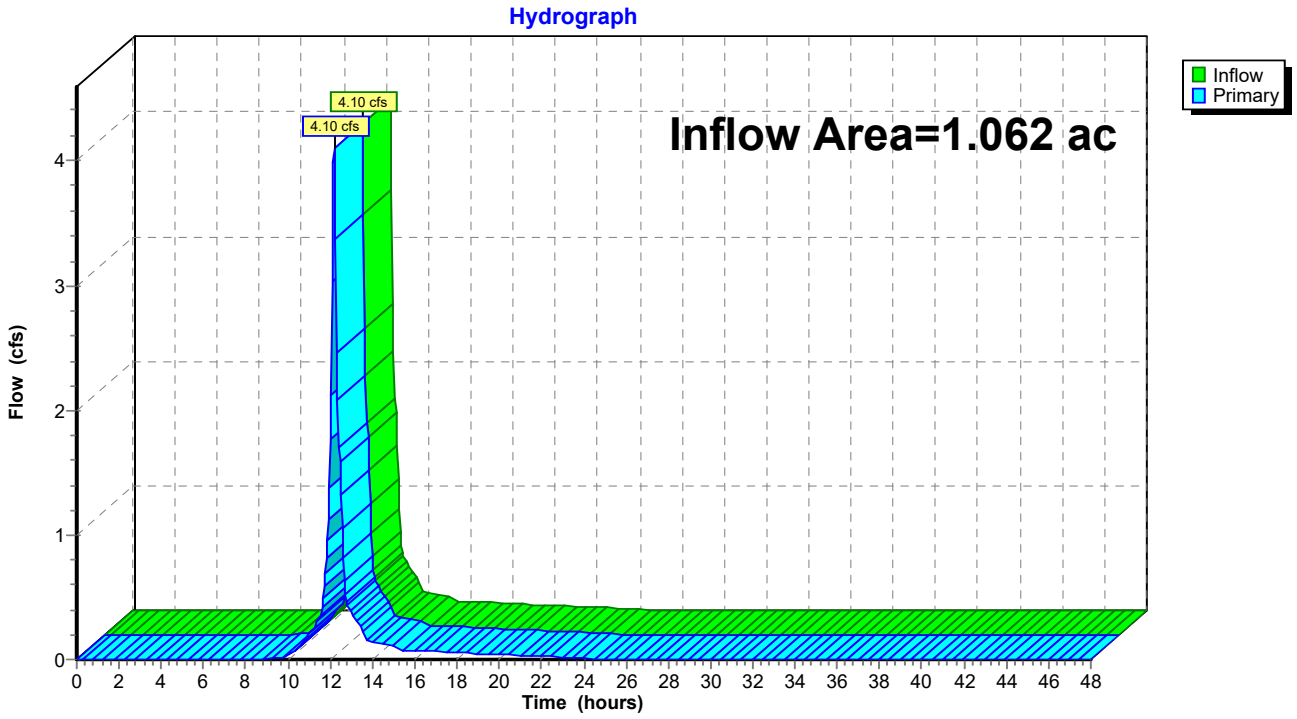


Summary for Link DT: Detained Total

Inflow Area = 1.062 ac, 68.53% Impervious, Inflow Depth = 2.81" for 10-Year event
Inflow = 4.10 cfs @ 12.17 hrs, Volume= 0.248 af
Primary = 4.10 cfs @ 12.17 hrs, Volume= 0.248 af, Atten= 0%, Lag= 0.0 min
Routed to Link T : Total

Primary outflow = Inflow, Time Span= 0.00-48.00 hrs, dt= 0.05 hrs

Link DT: Detained Total

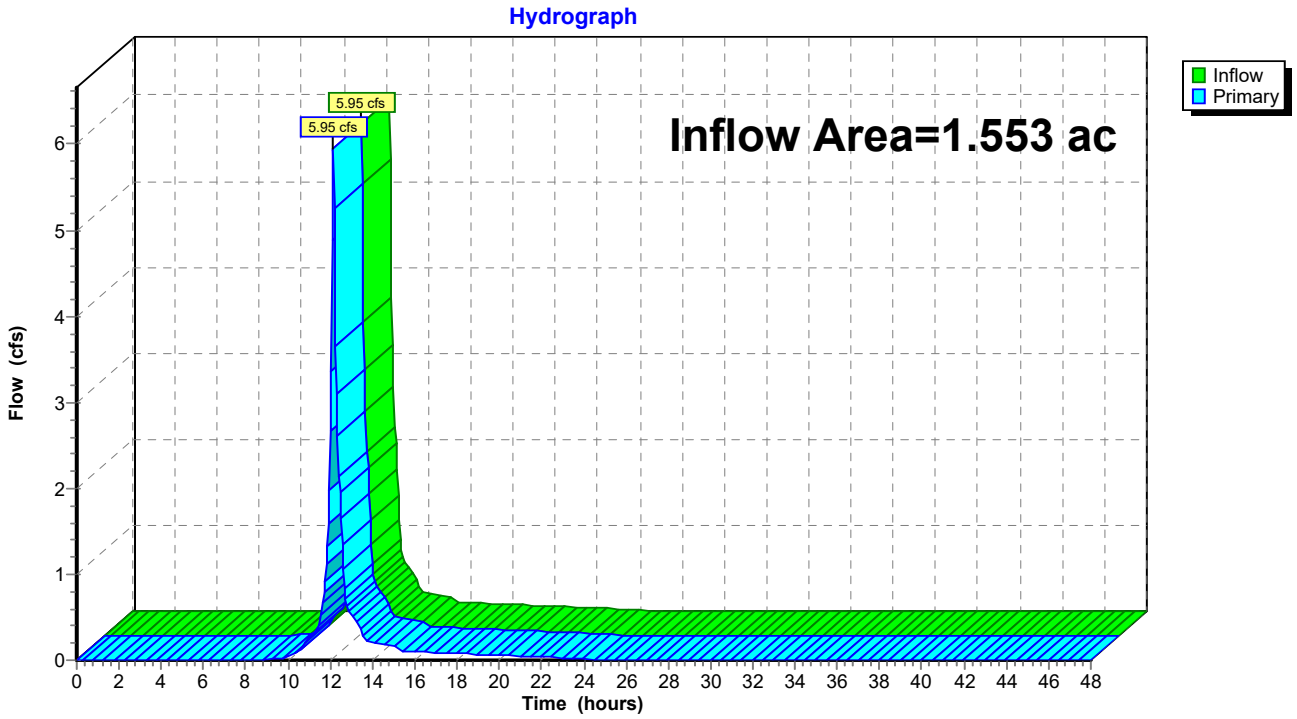


Summary for Link T: Total

Inflow Area = 1.553 ac, 58.16% Impervious, Inflow Depth = 2.65" for 10-Year event
Inflow = 5.95 cfs @ 12.16 hrs, Volume= 0.343 af
Primary = 5.95 cfs @ 12.16 hrs, Volume= 0.343 af, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 0.00-48.00 hrs, dt= 0.05 hrs

Link T: Total



Time span=0.00-48.00 hrs, dt=0.05 hrs, 961 points
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN
Reach routing by Stor-Ind+Trans method - Pond routing by Stor-Ind method

Subcatchment1S: Detained Runoff Area=38,185 sf 67.63% Impervious Runoff Depth=5.13"
Tc=6.0 min CN=92 Runoff=7.28 cfs 0.375 af

Subcatchment2S: Court Yard Runoff Area=8,061 sf 72.79% Impervious Runoff Depth=5.24"
Tc=6.0 min CN=93 Runoff=1.55 cfs 0.081 af

Subcatchment3S: Undetained Runoff Area=21,399 sf 35.75% Impervious Runoff Depth=4.47"
Tc=6.0 min CN=86 Runoff=3.73 cfs 0.183 af

Pond 1P: Biofiltration Basin Peak Elev=105.41' Storage=1,645 cf Inflow=7.28 cfs 0.375 af
Primary=5.51 cfs 0.360 af Secondary=1.61 cfs 0.009 af Outflow=7.13 cfs 0.369 af

Link DT: Detained Total Inflow=8.64 cfs 0.449 af
Primary=8.64 cfs 0.449 af

Link T: Total Inflow=12.32 cfs 0.632 af
Primary=12.32 cfs 0.632 af

Total Runoff Area = 1.553 ac Runoff Volume = 0.638 af Average Runoff Depth = 4.93"
41.84% Pervious = 0.650 ac 58.16% Impervious = 0.903 ac

Summary for Subcatchment 1S: Detained

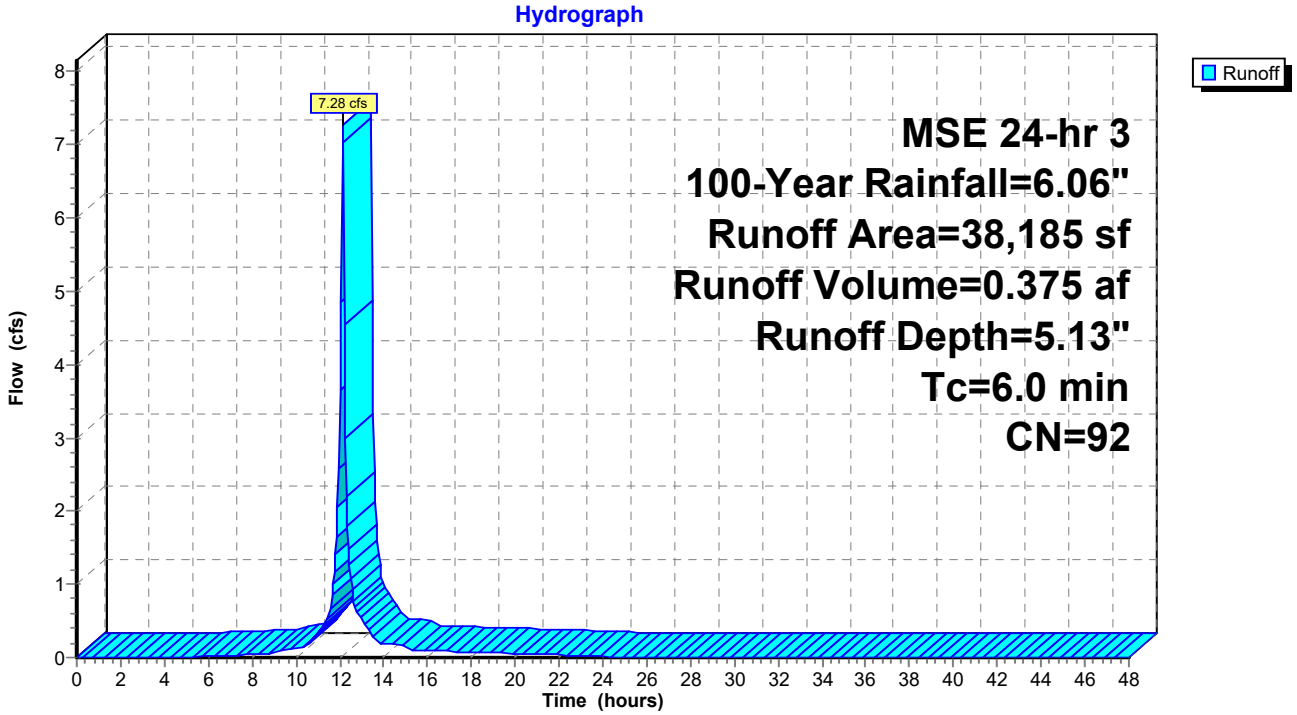
Runoff = 7.28 cfs @ 12.13 hrs, Volume= 0.375 af, Depth= 5.13"
Routed to Pond 1P : Biofiltration Basin

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-48.00 hrs, dt= 0.05 hrs
MSE 24-hr 3 100-Year Rainfall=6.06"

Area (sf)	CN	Description
23,417	98	Paved parking, HSG D
2,406	98	Roofs, HSG D
12,362	80	>75% Grass cover, Good, HSG D
38,185	92	Weighted Average
12,362		32.37% Pervious Area
25,823		67.63% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
6.0					**Direct Entry, TR-55 Min**

Subcatchment 1S: Detained



Summary for Subcatchment 2S: Court Yard

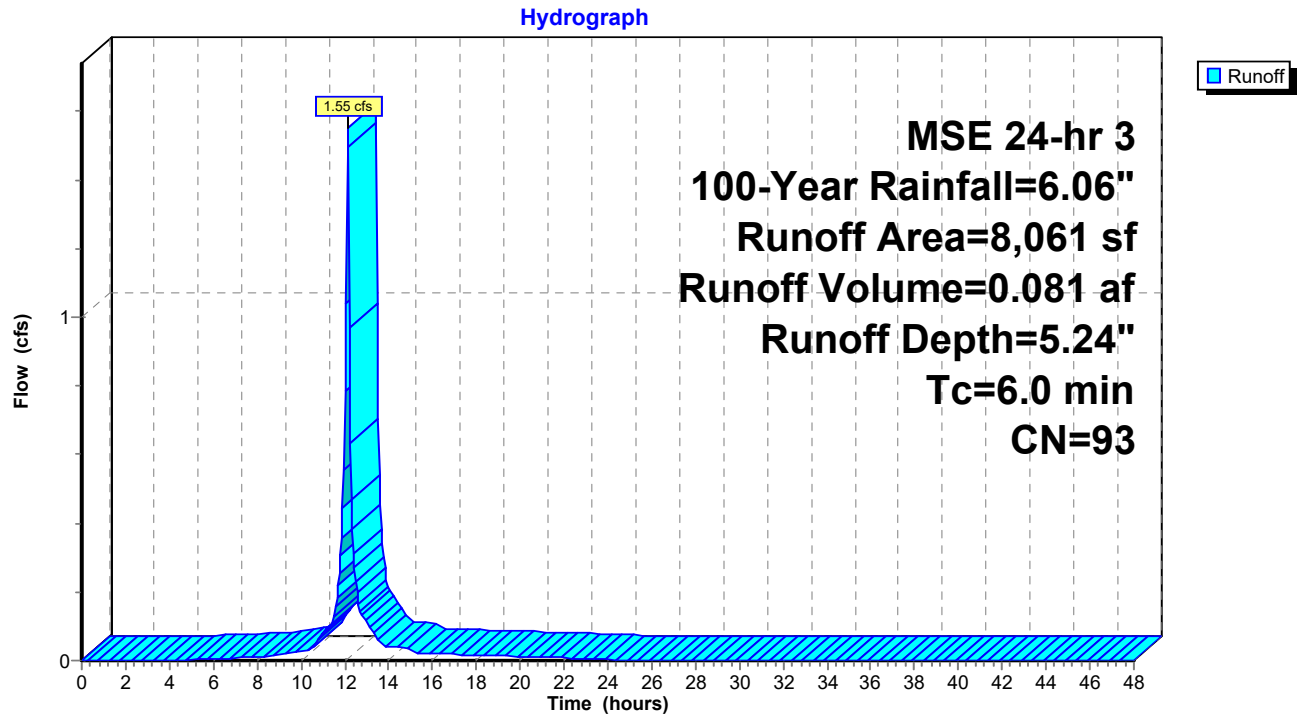
Runoff = 1.55 cfs @ 12.13 hrs, Volume= 0.081 af, Depth= 5.24"
Routed to Link DT : Detained Total

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-48.00 hrs, dt= 0.05 hrs
MSE 24-hr 3 100-Year Rainfall=6.06"

Area (sf)	CN	Description
795	98	Paved parking, HSG D
5,073	98	Roofs, HSG D
2,193	80	>75% Grass cover, Good, HSG D
8,061	93	Weighted Average
2,193		27.21% Pervious Area
5,868		72.79% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
6.0					**Direct Entry, TR-55 Min**

Subcatchment 2S: Court Yard



Summary for Subcatchment 3S: Undetained

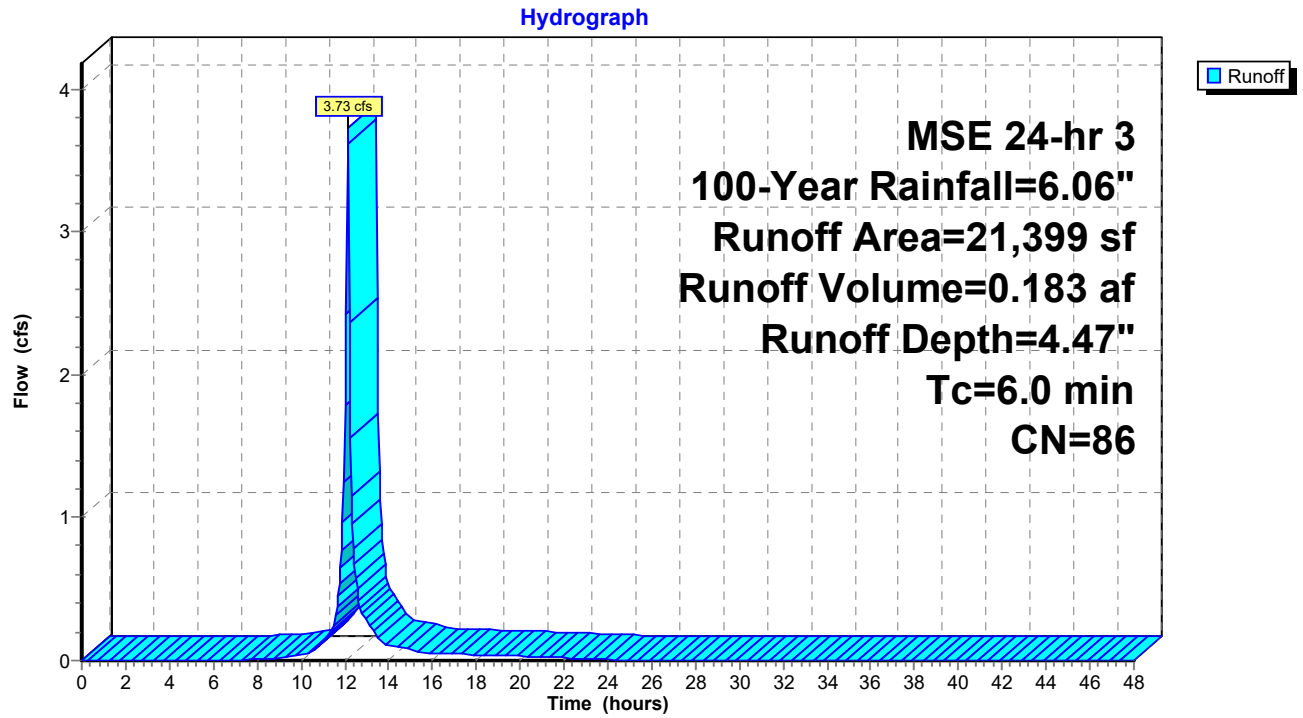
Runoff = 3.73 cfs @ 12.13 hrs, Volume= 0.183 af, Depth= 4.47"
Routed to Link T : Total

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-48.00 hrs, dt= 0.05 hrs
MSE 24-hr 3 100-Year Rainfall=6.06"

Area (sf)	CN	Description
2,817	98	Paved parking, HSG D
4,834	98	Roofs, HSG D
13,748	80	>75% Grass cover, Good, HSG D
21,399	86	Weighted Average
13,748		64.25% Pervious Area
7,651		35.75% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
6.0					**Direct Entry, TR-55 Min**

Subcatchment 3S: Undetained



Summary for Pond 1P: Biofiltration Basin

Inflow Area = 0.877 ac, 67.63% Impervious, Inflow Depth = 5.13" for 100-Year event
Inflow = 7.28 cfs @ 12.13 hrs, Volume= 0.375 af
Outflow = 7.13 cfs @ 12.15 hrs, Volume= 0.369 af, Atten= 2%, Lag= 1.3 min
Primary = 5.51 cfs @ 12.15 hrs, Volume= 0.360 af
Routed to Link DT : Detained Total
Secondary = 1.61 cfs @ 12.15 hrs, Volume= 0.009 af
Routed to Link DT : Detained Total

Routing by Stor-Ind method, Time Span= 0.00-48.00 hrs, dt= 0.05 hrs
Peak Elev= 105.41' @ 12.15 hrs Surf.Area= 908 sf Storage= 1,645 cf

Plug-Flow detention time= 19.7 min calculated for 0.368 af (98% of inflow)
Center-of-Mass det. time= 10.5 min (777.9 - 767.4)

Volume	Invert	Avail.Storage	Storage Description
#1	100.00'	1,724 cf	**Custom Stage Data (Prismatic)** Listed below

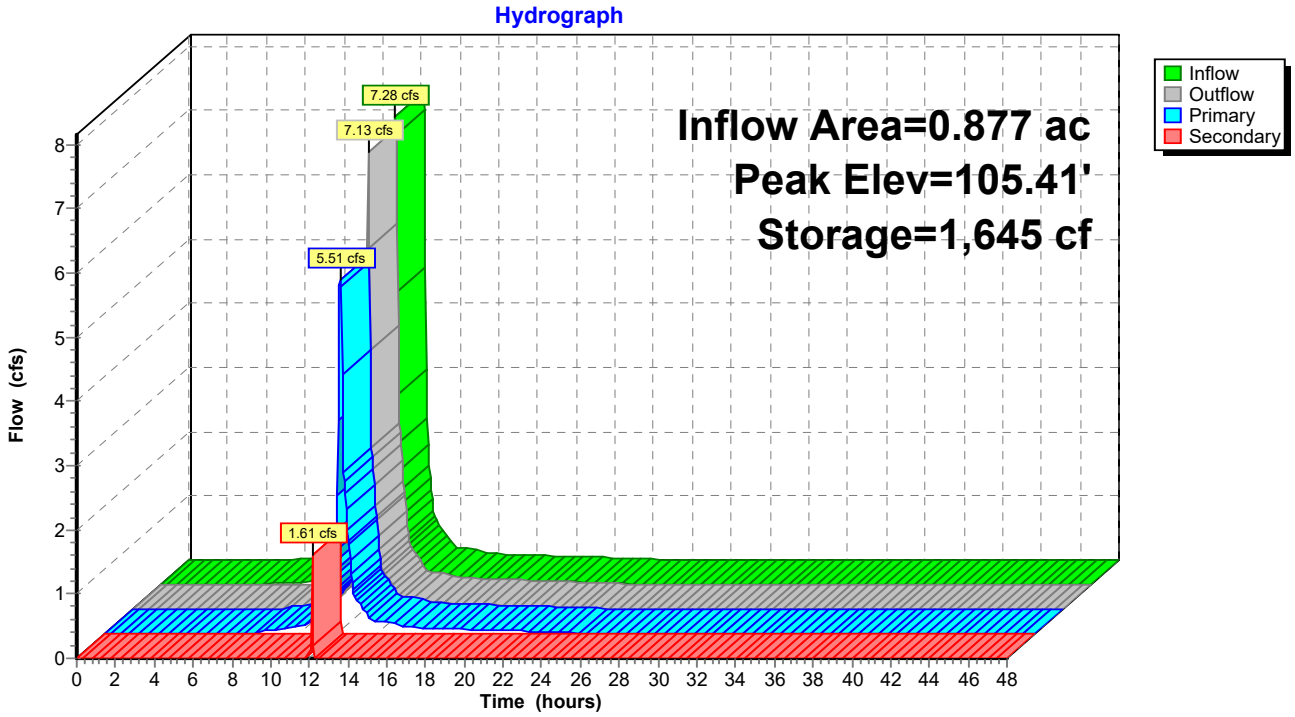
Elevation (feet)	Surf.Area (sq-ft)	Voids (%)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
100.00	528	0.0	0	0
102.00	528	33.0	348	348
104.00	528	27.0	285	634
105.00	790	100.0	659	1,293
105.50	935	100.0	431	1,724

Device	Routing	Invert	Outlet Devices
#1	Primary	101.50'	**12.0" Round Culvert** L= 17.0' CPP, projecting, no headwall, Ke= 0.900 Inlet / Outlet Invert= 101.50' / 101.30' S= 0.0118 '/' Cc= 0.900 n= 0.012 Corrugated PP, smooth interior, Flow Area= 0.79 sf
#2	Device 1	101.50'	**6.0" Vert. Draintile** C= 0.600 Limited to weir flow at low heads
#3	Device 1	104.15'	**10.0" W x 3.0" H Vert. Orifice/Grate** C= 0.600 Limited to weir flow at low heads
#4	Device 1	104.90'	**24.0" Horiz. Rim** C= 0.600 Limited to weir flow at low heads
#5	Secondary	105.25'	**10.0' long x 2.0' breadth Broad-Crested Rectangular Weir** Head (feet) 0.20 0.40 0.60 0.80 1.00 1.20 1.40 1.60 1.80 2.00 2.50 3.00 3.50 Coef. (English) 2.54 2.61 2.61 2.60 2.66 2.70 2.77 2.89 2.88 2.85 3.07 3.20 3.32

Primary OutFlow Max=5.51 cfs @ 12.15 hrs HW=105.41' (Free Discharge)
└**1=Culvert** (Inlet Controls 5.51 cfs @ 7.02 fps)
└**2=Draintile** (Passes < 1.81 cfs potential flow)
└**3=Orifice/Grate** (Passes < 1.07 cfs potential flow)
└**4=Rim** (Passes < 7.40 cfs potential flow)

Secondary OutFlow Max=1.58 cfs @ 12.15 hrs HW=105.41' (Free Discharge)
└**5=Broad-Crested Rectangular Weir** (Weir Controls 1.58 cfs @ 1.01 fps)

Pond 1P: Biofiltration Basin

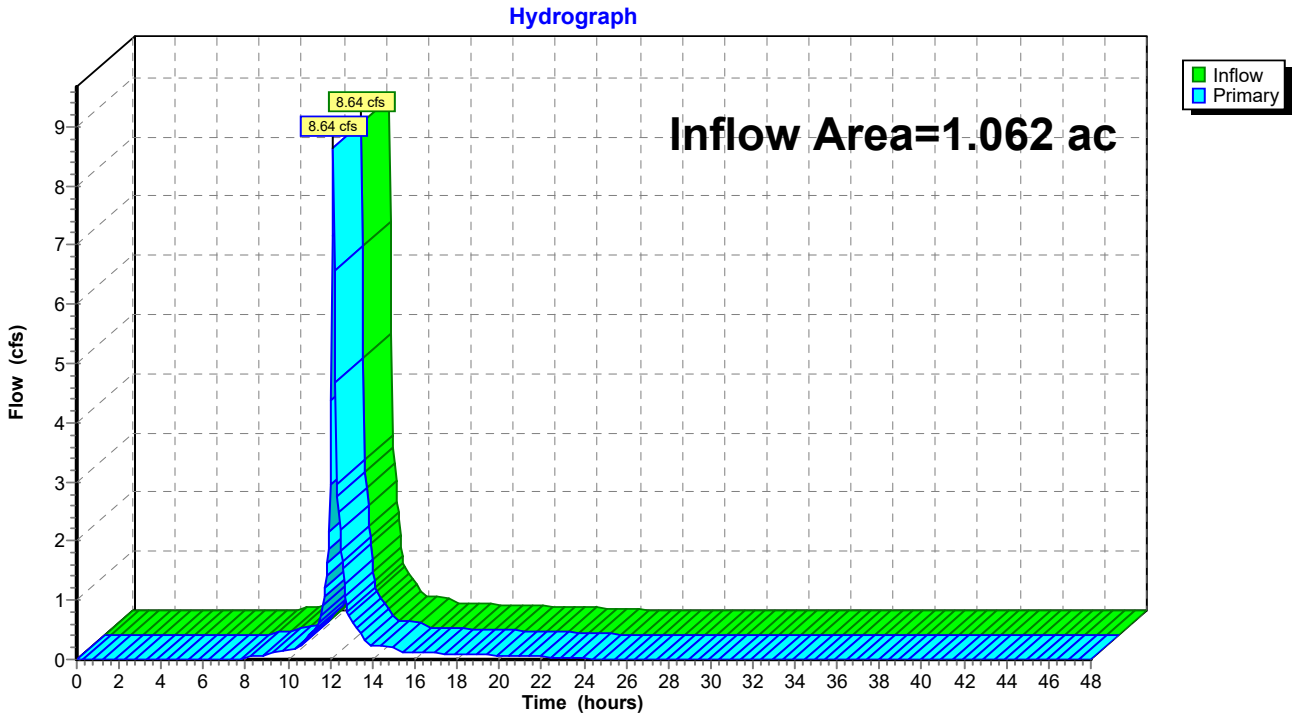


Summary for Link DT: Detained Total

Inflow Area = 1.062 ac, 68.53% Impervious, Inflow Depth = 5.08" for 100-Year event
Inflow = 8.64 cfs @ 12.15 hrs, Volume= 0.449 af
Primary = 8.64 cfs @ 12.15 hrs, Volume= 0.449 af, Atten= 0%, Lag= 0.0 min
Routed to Link T : Total

Primary outflow = Inflow, Time Span= 0.00-48.00 hrs, dt= 0.05 hrs

Link DT: Detained Total

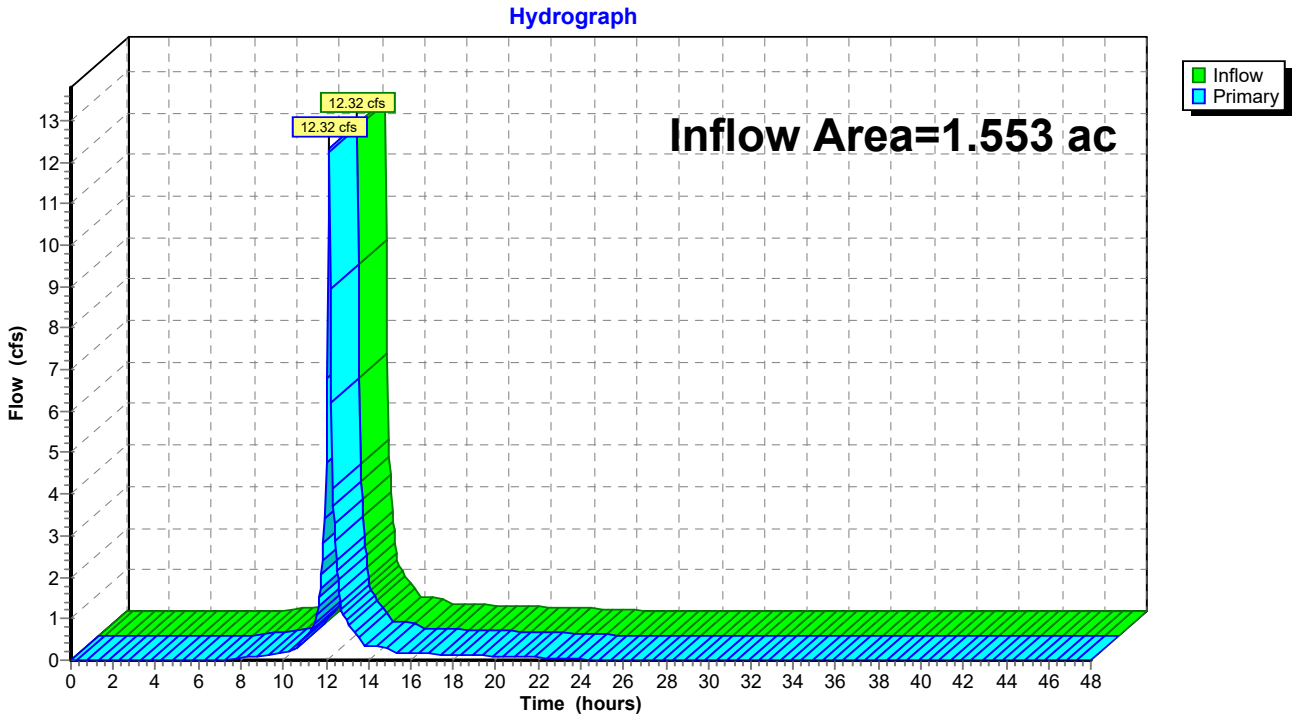


Summary for Link T: Total

Inflow Area = 1.553 ac, 58.16% Impervious, Inflow Depth = 4.89" for 100-Year event
Inflow = 12.32 cfs @ 12.14 hrs, Volume= 0.632 af
Primary = 12.32 cfs @ 12.14 hrs, Volume= 0.632 af, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 0.00-48.00 hrs, dt= 0.05 hrs

Link T: Total



Events for Subcatchment 1S: Detained

Event	Rainfall (inches)	Runoff (cfs)	Volume (acre-feet)	Depth (inches)
1-Year	2.34	2.36	0.113	1.55
2-Year	2.64	2.76	0.133	1.82
10-Year	3.73	4.21	0.209	2.86
100-Year	**6.06**	**7.28**	**0.375**	**5.13**

Events for Subcatchment 2S: Court Yard

Event	Rainfall (inches)	Runoff (cfs)	Volume (acre-feet)	Depth (inches)
1-Year	2.34	0.52	0.025	1.63
2-Year	2.64	0.60	0.029	1.91
10-Year	3.73	0.91	0.046	2.96
100-Year	**6.06**	**1.55**	**0.081**	**5.24**

Events for Subcatchment 3S: Undetained

Event	Rainfall (inches)	Runoff (cfs)	Volume (acre-feet)	Depth (inches)
1-Year	2.34	0.98	0.046	1.11
2-Year	2.64	1.20	0.056	1.36
10-Year	3.73	1.99	0.094	2.30
100-Year	**6.06**	**3.73**	**0.183**	**4.47**

Events for Pond 1P: Biofiltration Basin

Event	Inflow (cfs)	Outflow (cfs)	Primary (cfs)	Secondary (cfs)	Elevation (feet)	Storage (cubic-feet)
1-Year	2.36	1.62	1.62	0.00	104.27	813
2-Year	2.76	1.97	1.97	0.00	104.45	932
10-Year	4.21	3.44	3.44	0.00	105.03	1,319
100-Year	**7.28**	**7.13**	**5.51**	**1.61**	**105.41**	**1,645**

Events for Link DT: Detained Total

Event	Inflow (cfs)	Primary (cfs)	Elevation (feet)
1-Year	2.00	2.00	**0.00**
2-Year	2.41	2.41	0.00
10-Year	4.10	4.10	0.00
100-Year	**8.64**	**8.64**	0.00

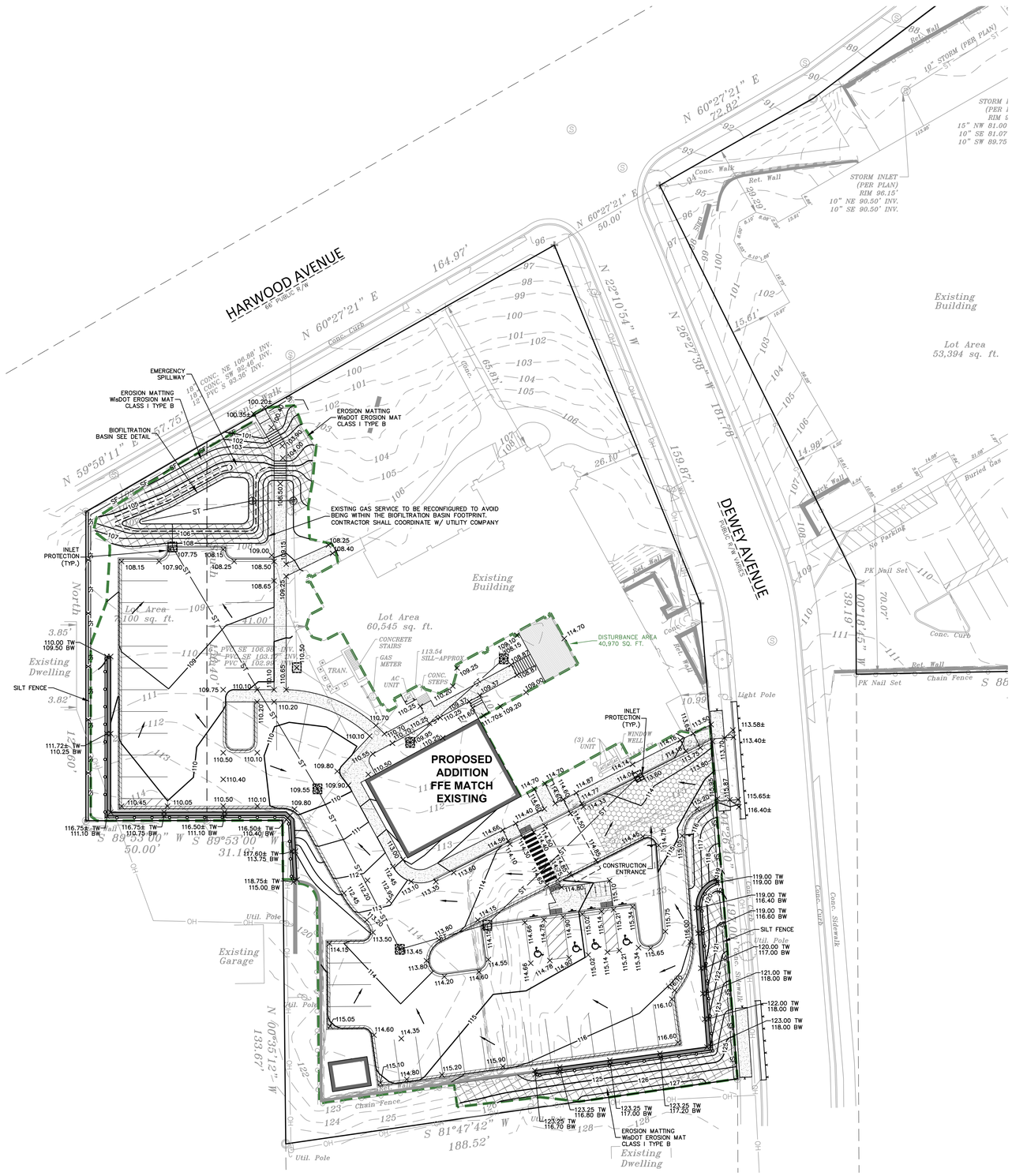
Events for Link T: Total

Event	Inflow (cfs)	Primary (cfs)	Elevation (feet)
1-Year	2.96	2.96	**0.00**
2-Year	3.54	3.54	0.00
10-Year	5.95	5.95	0.00
100-Year	**12.32**	**12.32**	0.00

APPENDIX 6

Design Details

- Grading and Erosion Control Plan
- Details
- Storm Sewer Sizing Calculations



EROSION AND SEDIMENT CONTROL NOTES

1. ALL CONSTRUCTION SHALL ADHERE TO THE REQUIREMENTS SET FORTH IN WISCONSIN'S NATIONAL POLLUTANT DISCHARGE ELIMINATION SYSTEM (NPDES) STORMWATER GENERAL PERMIT FOR CONSTRUCTION SITE LAND DISTURBANCE ACTIVITIES. ALL EROSION AND SEDIMENT CONTROL MEASURES ARE TO BE CONSTRUCTED AND MAINTAINED IN ACCORDANCE WITH THE WISCONSIN DEPARTMENT OF NATURAL RESOURCES (WDNR) TECHNICAL STANDARDS (REFERRED TO AS BMP'S) AND CITY OF WAUWATOSA ORDINANCE. THESE PROCEDURES AND STANDARDS SHALL BE REFERRED TO AS BEST MANAGEMENT PRACTICES (BMP'S). IT IS THE RESPONSIBILITY OF ALL CONTRACTORS ASSOCIATED WITH THE PROJECT TO OBTAIN A COPY OF, AND UNDERSTAND, THE BMP'S PRIOR TO THE START OF CONSTRUCTION ACTIVITIES.
2. THE EROSION CONTROL MEASURES INDICATED ON THE PLANS ARE THE MINIMUM REQUIREMENTS. ADDITIONAL CONTROL MEASURES AS DIRECTED BY JSD PROFESSIONAL SERVICES, INC. OR GOVERNING AGENCIES SHALL BE INSTALLED WITHIN 24 HOURS OF REQUEST.
3. MODIFICATIONS TO THE APPROVED EROSION CONTROL PLAN IN ORDER TO MEET UNFORESEEN FIELD CONDITIONS ARE ALLOWED IF MODIFICATIONS CONFORM TO BMP'S. ALL MODIFICATIONS MUST BE APPROVED BY JSD/MUNICIPALITY PRIOR TO DEVIATION OF THE APPROVED PLAN.
4. INSTALL PERIMETER EROSION CONTROL MEASURES (SUCH AS CONSTRUCTION ENTRANCES, SILT FENCE AND EXISTING INLET PROTECTION) PRIOR TO ANY SITE WORK, INCLUDING GRADING OR DISTURBANCE OF EXISTING SURFACE COVER, AS SHOWN ON PLAN IN ORDER TO PROTECT ADJACENT PROPERTIES/STORM SEWER SYSTEMS FROM SEDIMENT TRANSPORT.
5. CONSTRUCTION ENTRANCES SHALL BE INSTALLED AT ALL LOCATIONS OF VEHICLE INGRESS/EGRESS POINTS. CONTRACTOR IS RESPONSIBLE TO COORDINATE LOCATION(S) WITH THE PROPER AUTHORITIES, PROVIDE NECESSARY FEES AND OBTAIN ALL REQUIRED APPROVALS OR PERMITS. ADDITIONAL CONSTRUCTION ENTRANCES OTHER THAN AS SHOWN ON THE PLANS MUST BE PRIOR APPROVED BY THE APPLICABLE GOVERNING AGENCIES PRIOR TO INSTALLATION.
6. PAVED SURFACES ADJACENT TO CONSTRUCTION ENTRANCES SHALL BE SWEPT AND/OR SCRAPED TO REMOVE ACCUMULATED SOIL, DIRT AND/OR DUST AFTER THE END OF EACH WORK DAY AND AS REQUESTED BY THE GOVERNING AGENCIES.
7. ALL EXISTING STORM SEWER FACILITIES THAT WILL COLLECT RUNOFF FROM DISTURBED AREAS SHALL BE PROTECTED TO PREVENT SEDIMENT DEPOSITION WITHIN STORM SEWER SYSTEMS. INLET PROTECTION SHALL BE IMMEDIATELY FITTED AT THE INLET OF ALL INSTALLED STORM SEWER. ALL INLETS, STRUCTURES, PIPES, AND SWALES SHALL BE KEPT CLEAN AND FREE OF SEDIMENTATION AND DEBRIS.
8. EROSION CONTROL FOR UTILITY CONSTRUCTION (STORM SEWER, SANITARY SEWER, WATER MAIN, ETC.) OUTSIDE OF THE PERIMETER CONTROLS SHALL INCORPORATE THE FOLLOWING:
   - PLACE EXCAVATED TRENCH MATERIAL ON THE HIGH SIDE OF THE TRENCH.
   - BACKFILL, COMPACT, AND STABILIZE THE TRENCH IMMEDIATELY AFTER PIPE CONSTRUCTION.
   - DISCHARGE TRENCH WATER INTO A SEDIMENTATION BASIN OR FILTERING TANK IN ACCORDANCE WITH BMP'S PRIOR TO RELEASE INTO STORM SEWER OR DITCHES.
9. AT A MINIMUM, SEDIMENT BASINS AND NECESSARY TEMPORARY DRAINAGE PROVISIONS SHALL BE CONSTRUCTED AND OPERATIONAL BEFORE BEGINNING OF SIGNIFICANT MASS GRADING OPERATIONS TO PREVENT OFFSITE DISCHARGE OF UNTREATED RUNOFF.
10. ALL TEMPORARY AND PERMANENT EROSION CONTROL MEASURES MUST BE MAINTAINED AND REPAIRED AS NEEDED. THE GENERAL CONTRACTOR WILL BE RESPONSIBLE FOR INSPECTION AND REPAIR DURING CONSTRUCTION. THE OWNER WILL BE RESPONSIBLE IF EROSION CONTROL IS REQUIRED AFTER THE CONTRACTOR HAS COMPLETED THE PROJECT.
11. TOPSOIL STOCKPILES SHALL HAVE A BERM OR TRENCH AROUND THE CIRCUMFERENCE AND PERIMETER SILT FENCE TO CONTROL SILT. IF TOPSOIL STOCKPILE REMAINS UNDISTURBED FOR MORE THAN SEVEN (7) DAYS, TEMPORARY SEEDING AND STABILIZATION IS REQUIRED.
12. EROSION CONTROL MEASURES TEMPORARILY REMOVED FOR UNAVOIDABLE CONSTRUCTION ACTIVITIES SHALL BE IN WORKING ORDER PRIOR TO THE COMPLETION OF EACH WORK DAY.
13. MAINTAIN SOIL EROSION CONTROL DEVICES THROUGH THE DURATION OF THIS PROJECT. ALL TEMPORARY EROSION AND SEDIMENT CONTROL MEASURES SHALL BE REMOVED WITHIN THIRTY (30) DAYS AFTER FINAL SITE STABILIZATION IS ACHIEVED OR AFTER THE TEMPORARY MEASURES ARE NO LONGER NEEDED. DISTURBANCES ASSOCIATED WITH EROSION CONTROL REMOVAL SHALL BE IMMEDIATELY STABILIZED.
14. PUMPS MAY BE USED AS BYPASS DEVICES. IN NO CASE SHALL PUMPED WATER BE DIVERTED OUTSIDE THE PROJECT LIMITS.
15. GRADING EFFORTS SHALL BE CONDUCTED IN SUCH A MANNER AS TO MINIMIZE EROSION. EROSION AND SEDIMENT CONTROL MEASURES SHALL CONSIDER THE TIME OF YEAR, SITE CONDITIONS, AND THE USE OF TEMPORARY OR PERMANENT MEASURES. ALL DISTURBED AREAS THAT WILL NOT BE WORKED FOR A PERIOD OF THIRTY (30) DAYS REQUIRE TEMPORARY SEEDING FOR EROSION CONTROL. SEEDING FOR EROSION CONTROL SHALL BE IN ACCORDANCE WITH TECHNICAL STANDARDS.
16. ALL DISTURBED SLOPES EXCEEDING 4:1 YET LESS THAN 3:1, SHALL BE STABILIZED WITH NORTH AMERICAN GREEN S75BN EROSION MATTING (OR APPROVED EQUAL) AND DISTURBED SLOPES EXCEEDING 3:1 YET LESS THAN 2:1 SHALL BE STABILIZED WITH NORTH AMERICAN GREEN C125BN (OR APPROVED EQUAL) OR APPLICATION OF AN APPROVED POLYMER SOIL STABILIZATION TREATMENT OR A COMBINATION THEREOF, AS REQUIRED. EROSION MATTING AND/OR NETTING USED ONSITE SHALL BE INSTALLED IN ACCORDANCE WITH MANUFACTURER'S GUIDELINES.
17. DURING PERIODS OF EXTENDED DRY WEATHER, THE CONTRACTOR SHALL KEEP A WATER TRUCK ON SITE FOR THE PURPOSE OF WATERING SOILS WHICH MAY OTHERWISE BECOME AIRBORNE. THE CONTRACTOR IS RESPONSIBLE FOR CONTROLLING WIND EROSION (DUST) DURING CONSTRUCTION AT HIS/HER EXPENSE.
18. DISTURBED AREAS AND AREAS USED FOR STORAGE OF MATERIALS THAT ARE EXPOSED TO PRECIPITATION SHALL BE VISUALLY INSPECTED FOR EVIDENCE OF, OR THE POTENTIAL FOR, POLLUTANTS ENTERING THE DRAINAGE SYSTEM ON A DAILY BASIS.
19. QUALIFIED PERSONNEL (PROVIDED BY THE GENERAL/PRIME CONTRACTOR) SHALL INSPECT DISTURBED AREAS OF THE CONSTRUCTION SITE THAT HAVE NOT BEEN FINALLY STABILIZED AND EROSION AND SEDIMENT CONTROLS WITHIN 24 HOURS OF ALL 0.5-INCH, OR MORE, PRECIPITATION EVENTS WITH A MINIMUM INSPECTION INTERVAL OF ONCE EVERY SEVEN (7) CALENDAR DAYS IN THE ABSENCE OF A QUALIFYING RAIN OR SNOWFALL EVENT. REPORTING SHALL BE IN ACCORDANCE WITH PART IV D.4. (a–f). OF THE NPDES GENERAL PERMIT. CONTRACTOR SHALL IMMEDIATELY ARRANGE TO HAVE ANY DEFICIENT ITEMS REVEALED DURING INSPECTIONS REPAIRED/REPLACED.
20. THE FOLLOWING MAINTENANCE PRACTICES SHALL BE USED TO MAINTAIN, IN GOOD AND EFFECTIVE OPERATING CONDITIONS, VEGETATION, EROSION AND SEDIMENT CONTROL MEASURES, AND OTHER PROTECTIVE MEASURES IDENTIFIED IN THIS PLAN. UPON IDENTIFICATION, DEFICIENCIES IN STORMWATER CONTROLS SHALL BE ADDRESSED IMMEDIATELY. THE MAINTENANCE PROCEDURES FOR THIS DEVELOPMENT SHALL INCLUDE, BUT NOT BE LIMITED TO THE BELOW.
    - SILT FENCE – REPAIR OR REPLACE ANY DAMAGED FILTER FABRIC AND/OR STAKES. REMOVE ACCUMULATED SEDIMENT WHEN IT HAS REACHED ONE–HALF THE ABOVE GROUND HEIGHT OF THE FENCE.
    - CONSTRUCTION ENTRANCE – AS NEEDED, ADD STONE TO MAINTAIN CONSTRUCTION ENTRANCE DIMENSIONS AND EFFECTIVENESS.
    - DITCH CHECK (STRAW BALES) – RE–SECURE STAKES; ADJUST OR REPOSITION BALES TO ADDRESS PROPER FLOW OF STORMWATER; AND REMOVE ACCUMULATED SEDIMENT WHEN IT HAS REACHED ONE–HALF THE HEIGHT OF THE BALE.
    - EROSION CONTROL MATTING – REPAIR MATTING IMMEDIATELY IF INSPECTION REVEALS BREACHED OR FAILED CONDITIONS. REPAIR AND RE–GRADE SOIL WHERE CHANNELIZATION HAS OCCURRED.
    - DIVERSION BERM/SWALE – REPLACE OR RE–COMPACT THE CONSTRUCTION MATERIALS AS NECESSARY.
    - INLET PROTECTION – CLEAN, REPAIR OR REPLACE FILTER FABRIC AND/OR STONE WHEN CONTROL MEASURE IS CLOGGED. INLET FILTER BAGS SHALL BE REPLACED ONCE BAG BECOMES ONE–HALF FULL OF SEDIMENT.

    ADDITIONAL POLLUTANT CONTROL MEASURES TO BE IMPLEMENTED DURING CONSTRUCTION ACTIVITIES SHALL INCLUDE, BUT NOT BE LIMITED TO THE FOLLOWING.

    - CONSTRUCTION WASTE SHALL BE PROPERLY DISPOSED OF. THIS INCLUDES ALL CONSTRUCTION SITE WASTE MATERIAL, SANITARY WASTE, AND WASTE FROM VEHICLE TRACKING OF SEDIMENTS. THE CONTRACTOR SHALL ENSURE THAT NO MATERIAL WASTES OR UNUSED BUILDING MATERIALS SHALL BE BURIED, DUMPED, BURNED, OR DISCHARGED TO THE WATERS OF THE STATE, VEHICLES HAULING MATERIAL AWAY FROM THE SITE SHALL BE COVERED WITH A TARPAULIN TO PREVENT BLOWING DEBRIS.
    - DUST CONTROL SHALL BE ACCOMPLISHED BY ONE OR MORE OF THE FOLLOWING METHODS:
      A. COVERING 30% OR MORE OF THE SOIL SURFACE WITH A NON–ERODIBLE MATERIAL.
      B. ROUGHENING THE SOIL TO PRODUCE RIDGES PERPENDICULAR TO THE PREVAILING WIND. RIDGES SHALL BE AT LEAST SIX (6) INCHES IN HEIGHT.
      C. FREQUENT WATERING OF EXCAVATION AND FILL AREAS.
      D. PROVIDING GRAVEL OR PAVING AT ENTRANCE/EXIT DRIVES, PARKING AREAS AND TRANSIT PATHS.
    - STREET SWEEPING SHALL BE PERFORMED TO IMMEDIATELY REMOVE ANY SEDIMENT TRACKED ON PAVEMENTS.
21. NOTIFY THE CITY OF WAUWATOSA ENGINEERING DEPARTMENT ONCE ALL EROSION CONTROL IS INSTALLED FOR CITY INSPECTION AND APPROVAL PRIOR TO STARTING CONSTRUCTION ACTIVITIES.
22. REMOVE EROSION CONTROL DEVICES AFTER SITE IS FULLY ESTABLISHED AND THERE IS NO CHANCE EROSION CAN TAKE PLACE.
23. CONTRACTOR SHALL NOTIFY THE CITY OF WAUWATOSA OF ALL CHANGES TO THE EROSION CONTROL PLAN. CITY OF WAUWATOSA SHALL REVIEW AND APPROVE ALL CHANGES PRIOR TO COMMENCING WORK.
24. CONTRACTOR SHALL NOTIFY THE CITY OF WAUWATOSA WHEN THE SITE IS FULLY ESTABLISHED AND READY FOR FINAL INSPECTION. UPON CITY'S APPROVAL OF SITE, CONTRACTOR SHALL BE PERMITTED TO REMOVE ALL EROSION CONTROL.
25. ALL WORK WITHIN THE PUBLIC RIGHT OF WAY REQUIRES A STREET PERMIT FROM THE CITY.

LEGEND

SANITARY SEWER MANHOLE	SAN	SANITARY SEWER
STORM MANHOLE	W	WATER MAIN
CATCH BASIN ROUND	ST	STORM SEWER
CATCH BASIN SQUARE	RD	ROOF DRAIN
FIRE HYDRANT	G	UNDERGROUND GAS
WATER VALVE	E	UNDERGROUND ELECTRIC
GAS VALVE	T	UNDERGROUND TELEPHONE
LIGHT POLE	FIB	UNDERGROUND FIBER OPTICS
TELEPHONE PEDESTAL	OH	OVERHEAD UTILITY
ELECTRICAL MANHOLE	SF	SILT FENCE
SIGN		18" STANDARD CURB AND GUTTER
POWER POLE		18" HIGH SIDE CURB AND GUTTER
GUY WIRE		CONIFEROUS TREE
		DECIDUOUS TREE

CITY OF WAUWATOSA EROSION CONTROL NOTES

1. SITE DEWATERING. WATER PUMPED FROM THE SITE SHALL BE TREATED BY SEDIMENT BASINS OR OTHER APPROPRIATE BEST MANAGEMENT PRACTICES SPECIFIED IN THE WISCONSIN CONSTRUCTION SITE BEST MANAGEMENT PRACTICES (BMP) HANDBOOK. WATER MAY NOT BE DISCHARGED IN A MANNER THAT CAUSES EROSION OF THE SITE, ADJACENT SITES, OR RECEIVING CHANNELS.
2. WASTE AND MATERIAL DISPOSAL. ALL WASTE AND UNUSED BUILDING MATERIALS (INCLUDING GARBAGE, DEBRIS, CLEANING WASTES, WASTEWATER, TOXIC MATERIALS, OR HAZARDOUS MATERIALS) SHALL BE PROPERLY DISPOSED AND NOT ALLOWED TO BE CARRIED OFF–SITE BY RUNOFF OR WIND.
3. TRACKING. EACH SITE SHALL HAVE GRAVELED ROADS, ACCESS DRIVES AND PARKING AREAS OF SUFFICIENT WIDTH AND LENGTH TO PREVENT SEDIMENT FROM BEING TRACKED ONTO PUBLIC OR PRIVATE ROADWAYS. ANY SEDIMENT REACHING A PUBLIC OR PRIVATE ROAD SHALL BE REMOVED BY STREET CLEANING, TO THE SATISFACTION OF THE CITY, BEFORE THE END OF EACH WORKDAY. FLUSHING MAY NOT BE USED UNLESS SEDIMENT WILL BE CONTROLLED BY A SEDIMENT BASIN OR OTHER APPROPRIATE BEST MANAGEMENT PRACTICE SPECIFIED IN THE BMP HANDBOOK.
4. SEDIMENT CLEANUP. ALL OFF–SITE SEDIMENT DEPOSITS OCCURRING AS A RESULT OF A STORM EVENT SHALL BE CLEANED UP BY THE END OF THE NEXT WORK DAY. ALL OTHER OFF–SITE SEDIMENT DEPOSITS OCCURRING AS A RESULT OF CONSTRUCTION ACTIVITIES SHALL BE CLEANED UP BY THE END OF THE WORK DAY.
5. ALL ACTIVITIES ON THE SITE SHALL BE CONDUCTED IN A LOGICAL SEQUENCE TO MINIMIZE THE AREA OF BARE SOIL EXPOSED AT ANY ONE TIME.
6. ALL DISTURBED GROUND LEFT INACTIVE FOR SEVEN OR MORE DAYS SHALL BE STABILIZED BY TEMPORARY OR PERMANENT SEEDING, TEMPORARY OR PERMANENT SEEDING AND MULCHING, SODDING, COVERING WITH TARPS, OR EQUIVALENT BEST MANAGEMENT PRACTICES. IF TEMPORARY SEEDING IS USED, A PERMANENT COVER SHALL ALSO BE REQUIRED AS PART OF THE FINAL SITE STABILIZATION. SEEDING OR SODDING SHALL BE REQUIRED AS PART OF THE FINAL SITE STABILIZATION.
7. SOIL OR DIRT STORAGE PILES SHALL BE LOCATED A MINIMUM OF TWENTY–FIVE FEET FROM ANY DOWNSLOPE ROAD, LAKE, STREAM, WETLAND, OR DRAINAGE CHANNEL. STRAW BALE OR FILTER FABRIC FENCES SHALL BE PLACED ON THE DOWN SLOPE SIDE OF THE PILES. IF REMAINING FOR MORE THAN SEVEN DAYS, PILES SHALL BE STABILIZED BY MULCHING, VEGETATIVE COVER, TARPS OR OTHER MEANS.
8. WHEN THE DISTURBED AREA HAS BEEN STABILIZED BY PERMANENT VEGETATION OR OTHER MEANS, TEMPORARY BEST MANAGEMENT PRACTICES SUCH AS FILTER FABRIC FENCES, STRAW BALES, SEDIMENT AND SEDIMENT TRAPS SHALL BE REMOVED.
9. NOTIFY THE CITY ENGINEERING DEPARTMENT (479–8934) WITHIN TWO WORKING DAYS OF COMMENCING ANY LAND DEVELOPMENT OR LAND DISTURBING ACTIVITY.
10. NOTIFY THE CITY OF COMPLETION OF ANY BEST MANAGEMENT PRACTICES WITHIN THE NEXT WORKING DAY AFTER THEIR INSTALLATION.
11. OBTAIN PERMISSION IN WRITING FROM THE CITY OF WAUWATOSA ENGINEERING DEPARTMENT PRIOR TO MODIFYING THE EROSION CONTROL PLAN.
12. REPAIR ANY SILTATION OR EROSION DAMAGE TO ADJOINING SURFACES AND DRAINAGE WAYS RESULTING FROM LAND DEVELOPMENT OR LAND DISTURBING ACTIVITIES.
13. INSPECT THE BEST MANAGEMENT PRACTICES AFTER EACH RAIN OF 0.5 INCH OR MORE AND AT LEAST ONCE EACH WEEK AND MAKE NEEDED REPAIRS.
14. KEEP A COPY OF THE EROSION CONTROL PLAN ON THE SITE.

GRADING NOTES

1. CONTRACTOR SHALL VERIFY ALL GRADES, ENSURE ALL AREAS DRAIN PROPERLY AND REPORT ANY DISCREPANCIES TO JSD PROFESSIONAL SERVICES, INC. PRIOR TO THE START OF ANY CONSTRUCTION ACTIVITIES.
2. ALL EXISTING CONTOURS REPRESENT EXISTING SURFACE GRADES UNLESS OTHERWISE NOTED. ALL PROPOSED GRADES SHOWN ARE FINISH SURFACE GRADES UNLESS OTHERWISE NOTED.
3. ALL EXCAVATIONS AND MATERIAL PLACEMENT SHALL BE COMPLETED TO DESIGN ELEVATIONS AS DEPICTED IN THE PLANS.
   - CONTRACTOR SHALL ASSUME SOLE RESPONSIBILITY FOR THE COMPUTATION(S) OF ALL GRADING QUANTITIES. WHILE JSD ATTEMPTS TO PROVIDE A COST EFFECTIVE APPROACH TO BALANCE EARTHWORK, GRADING DESIGN IS BASED ON MANY FACTORS, INCLUDING SAFETY, AESTHETICS, AND NOT ENGINEERING STANDARD OF CARE, THEREFORE NO GUARANTEE CAN BE MADE FOR A BALANCED SITE.
   - THE CONTRACTOR MAY SOLICIT APPROVAL FROM ENGINEER/OWNER TO ADJUST FINAL GRADES FROM DESIGN GRADES TO PROVIDE AN OVERALL SITE BALANCE AS A RESULT OF FIELD CONDITIONS.
4. GRADING ACTIVITIES SHALL BE IN A MANNER TO ALLOW POSITIVE DRAINAGE ACROSS DISTURBED SOILS, WHICH MAY INCLUDE EXCAVATION OF TEMPORARY DITCHES TO PREVENT PONDING, AND IF NECESSARY PUMPING TO ALLEVIATE PONDING. CONTRACTOR SHALL PREVENT SURFACE WATER FROM ENTERING INTO EXCAVATIONS. IN NO WAY SHALL OWNER BE RESPONSIBLE FOR REMEDIATION OF UNSUITABLE SOILS CREATED/ORIGINATED AS A RESULT OF IMPROPER SITE GRADING OR SEQUENCING. CONTRACTOR SHALL SEQUENCE GRADING ACTIVITIES TO LIMIT EXPOSURE OF DISTURBED SOILS DUE TO WEATHER.
5. THE CONTRACTOR IS RESPONSIBLE FOR MEETING MINIMUM COMPACTION STANDARDS AS RECOMMENDED BY THE GEOTECHNICAL ENGINEER. CONTRACTOR SHALL REFER TO THE GEOTECHNICAL ENGINEERING SERVICES REPORT PREPARED BY _____ AND DATED _____, 2022 FOR SITE COMPACTION REQUIREMENTS. THE CONTRACTOR SHALL NOTIFY ENGINEER/OWNER IF PROPER COMPACTION CANNOT BE OBTAINED. THE PROJECT'S GEOTECHNICAL CONSULTANT SHALL DETERMINE WHICH IN–SITU SOILS ARE TO BE CONSIDERED UNSUITABLE SOILS. THE ENGINEER/OWNER AND GEOTECHNICAL TESTING CONSULTANT WILL DETERMINE IF REMEDIAL MEASURES WILL BE NECESSARY.
6. IN THE EVENT THAT ANY MOISTURE–DENSITY TEST(S) FAIL TO MEET SPECIFICATION REQUIREMENTS, THE CONTRACTOR SHALL PERFORM CORRECTIVE WORK AS NECESSARY TO BRING THE MATERIAL INTO COMPLIANCE AND RETEST THE FAILED AREA AT NO COST TO THE OWNER.
7. WITH THE AUTHORIZATION OF THE ENGINEER/OWNER, MATERIAL THAT IS TOO WET TO PERMIT PROPER COMPACTION MAY BE SPREAD IN FILL AREAS IN AN EFFORT TO DRY. CONTRACTOR SHALL CLEARLY FIELD MARK THE EXTERIOR LIMITS OF SPREAD MATERIAL WITH PAINTED LATH AND SUBMIT A PLAN TO THE ENGINEER/OWNER THAT IDENTIFIES THE LIMITS. UNDER NO CONDITION SHALL THE SPREAD MATERIAL DEPTH EXCEED THE MORE RESTRICTIVE OF: THE EFFECTIVE TREATMENT DEPTH OF MACHINERY THAT WILL BE USED TO TURNOVER THE SPREAD MATERIAL; OR THE MAXIMUM COMPACTION LIFT DEPTH.
8. THE CONTRACTOR SHALL IMMEDIATELY NOTIFY ENGINEER/OWNER IF GROUNDWATER IS ENCOUNTERED DURING EXCAVATION.
9. CONTRACTOR IS SOLELY RESPONSIBLE FOR THE DESIGN AND CONSTRUCTION OF ADEQUATE AND SAFE TEMPORARY SHORING, BRACING, RETENTION STRUCTURES, AND EXCAVATIONS.
10. THE SITE SHALL BE COMPLETED TO WITHIN 0.10–FT (+/–) OF THE PROPOSED GRADES AS INDICATED WITHIN THE PLANS PRIOR TO PLACEMENT OF TOPSOIL OR STONE. CONTRACTOR IS ENCOURAGED TO SEQUENCE CONSTRUCTION SUCH THAT THE SITE IS DIVIDED INTO SMALLER AREAS TO ALLOW STABILIZATION OF DISTURBED SOILS IMMEDIATELY UPON COMPLETION OF INDIVIDUAL SMALLER AREAS.
11. CONTRACTOR SHALL CONTACT "DIGGER'S HOTLINE" FOR LOCATIONS OF ALL EXISTING UTILITIES PRIOR TO COMMENCEMENT OF ANY CONSTRUCTION ACTIVITIES AND SHALL BE RESPONSIBLE FOR PROTECTING SAID UTILITIES FROM ANY DAMAGE DURING CONSTRUCTION.
12. CONTRACTOR SHALL PROTECT INLETS AND ADJACENT PROPERTIES WITH SILT FENCING OR APPROVED EROSION CONTROL METHODS UNTIL CONSTRUCTION IS COMPLETED. CONTRACTOR SHALL PLACE SILT FENCING AT DOWN SLOPE SIDE OF GRADING LIMITS.
13. CONTRACTOR SHALL BE RESPONSIBLE FOR DAMAGE TO ANY EXISTING FACILITIES OR UTILITIES. ANY DAMAGE SHALL BE REPAIRED TO THE OWNER'S SATISFACTION AT THE EXPENSE OF THE CONTRACTOR.
14. WORK WITHIN ANY ROADWAY RIGHT–OF–WAY SHALL BE COORDINATED WITH THE APPROPRIATE MUNICIPAL OFFICIAL PRIOR TO COMMENCEMENT OF ANY CONSTRUCTION ACTIVITIES. CONTRACTOR SHALL BE RESPONSIBLE FOR OBTAINING ALL NECESSARY PERMITS AND FEES. GRADING WITHIN RIGHT–OF–WAY IS SUBJECT TO APPROVAL BY SAID OFFICIALS. RESTORATION OF RIGHT–OF–WAY IS CONSIDERED INCIDENTAL AND SHALL BE INCLUDED IN THE COST OF GRADING. RESTORATION SHALL INCLUDE ALL ITEMS NECESSARY TO RESTORE RIGHT–OF–WAY IN–KIND INCLUDING LANDSCAPING.
15. CONTRACTOR SHALL COMPLY WITH ALL CITY AND/OR STATE CONSTRUCTION STANDARDS/ORDINANCES.
16. THE STORM WATER FACILITY SHALL BE INSPECTED BY A CITY OF WAUWATOSA INSPECTOR AT LEAST ONCE DURING CONSTRUCTION AND ONCE AFTER FINAL SITE STABILIZATION OF THE SITE.
17. ALL WORK WITHIN THE PUBLIC RIGHT OF WAY REQUIRES A STREET OCCUPANCY PERMIT FROM THE CITY.

CONSTRUCTION SITE SEQUENCING

1. INSTALL PERIMETER SILT FENCE, EXISTING INLET PROTECTION, AND TEMPORARY CONSTRUCTION ENTRANCE.
2. STRIP AND STOCKPILE TOPSOIL, INSTALL SILT FENCE AROUND PERIMETER OF STOCKPILE.
3. CONDUCT ROUGH GRADING EFFORTS.
4. INSTALL UTILITY PIPING AND STRUCTURES, IMMEDIATELY INSTALL INLET PROTECTION.
5. COMPLETE FINAL GRADING, INSTALLATION OF GRAVEL BASE COURSES, PLACEMENT OF CURBS, PAVEMENTS, WALKS, ETC.
6. PLACE TOPSOIL AND IMMEDIATELY STABILIZE DISTURBED AREAS WITH EROSION CONTROLS.
7. EROSION CONTROL MEASURES SHALL BE REMOVED ONLY AFTER SITE CONSTRUCTION IS COMPLETE WITH ALL SOIL SURFACES HAVING AN ESTABLISHED VEGETATIVE COVER THAT MEETS OR EXCEEDS THE WISCONSIN DEPARTMENT OF NATURAL RESOURCES DEFINITION OF 'FINAL STABILIZATION'.

CONTRACTOR MAY MODIFY SEQUENCING AFTER ITEM 1 AS NEEDED TO COMPLETE CONSTRUCTION IF EROSION CONTROLS ARE MAINTAINED IN ACCORDANCE WITH THE CONSTRUCTION SITE EROSION CONTROL REQUIREMENTS.

DIGGERS HOTLINE
Call 811 or (800) 242–8511
Milwaukee Area (262) 432–7910
Hearing Impaired TDD (800) 542–2289
www.DiggersHotline.com

JSD
MILWAUKEE REGIONAL OFFICE
W238 N1610 BUSSE ROAD, SUITE 100
WAUKESHA, WISCONSIN 53188
P. 262.513.0666
JSD PROJ. NO.: 22–11646
JSD PROJ. MGR.: RWI

DRAFT - NOT FOR CONSTRUCTION

1 GRADING & EROSION CONTROL PLAN 1"=20'-0"

MSI GENERAL CORPORATION
P.O. BOX. 7
OCONOMOWOC, WI 53066
PHONE: 262-367-3661

WWW.MSIGENERAL.COM
SINGLE SOURCE RESPONSIBILITY ™

ISSUE DATES:	
Proposal:	XX/XX/XXXX
Bid:	XX/XX/XXXX
Contract:	XX/XX/XXXX
State Submittal / Permit:	XX/XX/XXXX
As-Built:	XX/XX/XXXX
CITY SUBMITTAL:	06/07/2023

REVISIONS:
1 –
2
3
4
5
6
7
8
9
10
11
12
13
14
15
16
17
18
19
20
21
22
23
24
25
26
27
28
29
30
31
32
33
34
35
36
37
38
39
40
41

ST. JOHN'S WAUWATOSA

PROJECT ADDRESS:

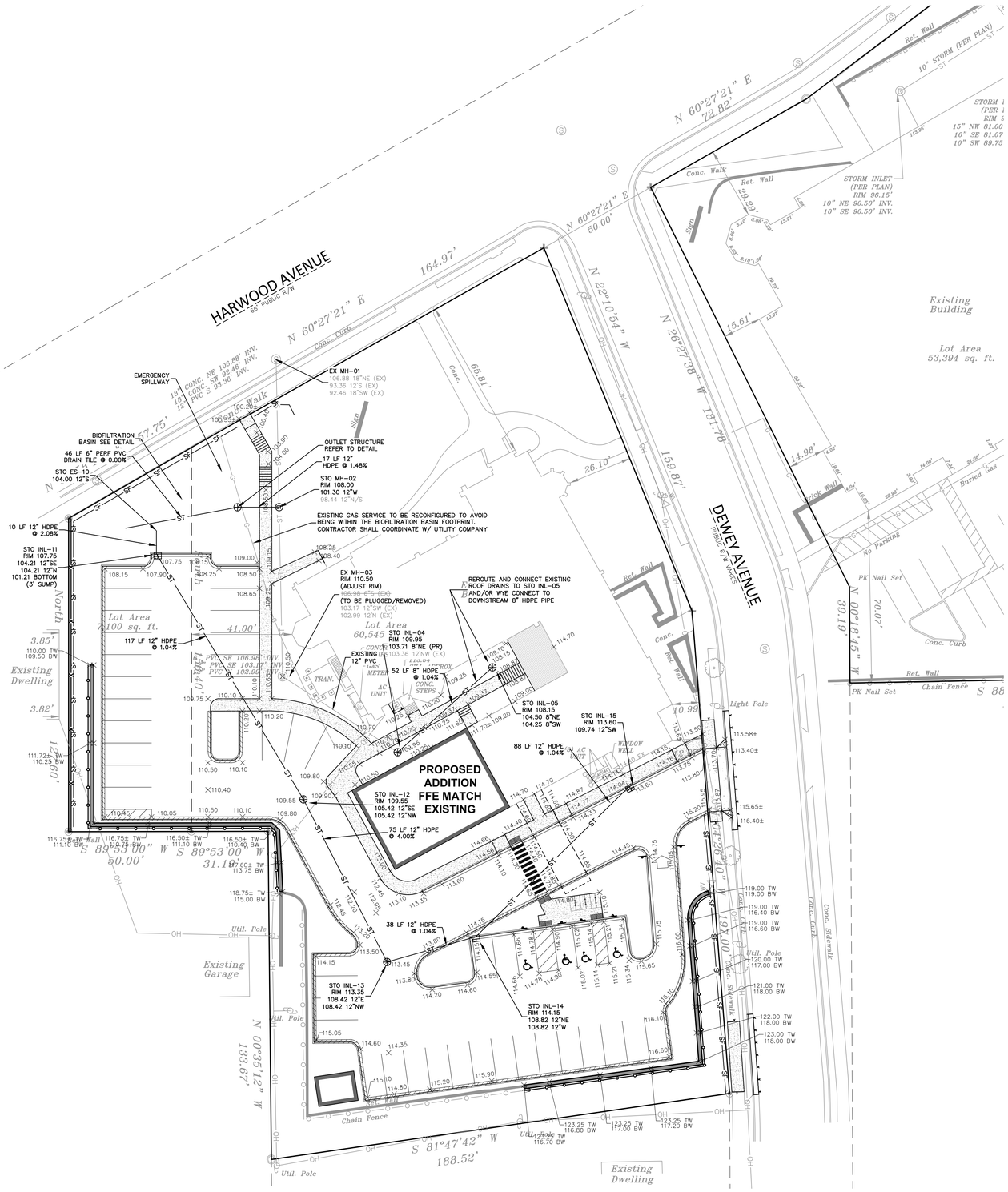
PROJECT NAME
St. John's Evangelical Lutheran Church
STREET ADDRESS
7809 Harwood Ave.
CITY/ STATE / ZIP
Wauwatosa, WI 53213

ALL WORK TO BE COMPLETED AS SHOWN, AND IN ACCORDANCE WITH THE LATEST EDITION OF THE MSI GENERAL MASTER SPECIFICATION

Architect:	Engineer:	Reviewed By:
AMH	APM	RWI

Sheet Title:
GRADING & EROSION CONTROL PLAN
Sheet Number:
C-300
Project Number:
P13586

MANAGERS · ENGINEERS · CONTRACTORS · ARCHITECTS



UTILITY NOTES

1. EXISTING UTILITIES ARE SHOWN FOR INFORMATIONAL PURPOSES ONLY AND ARE NOT GUARANTEED TO BE ACCURATE OR ALL INCLUSIVE. CONTRACTOR IS RESPONSIBLE FOR VERIFYING THE TYPE, LOCATION, SIZE AND ELEVATION OF UNDERGROUND UTILITIES AS THEY DEEM NECESSARY FOR PROPOSED UTILITY CONNECTIONS AND/OR TO AVOID DAMAGE THERETO. CONTRACTOR SHALL CALL "DIGGER'S HOTLINE" PRIOR TO ANY CONSTRUCTION.
2. ALL UTILITY WORK SHALL BE DONE IN ACCORDANCE WITH THE STANDARD SPECIFICATIONS FOR SEWER AND WATER CONSTRUCTION IN (WISCONSIN LATEST EDITION AND ADDENDUM) AND ALL STATE AND LOCAL CODES AND SPECIFICATIONS. IT IS THE CONTRACTORS RESPONSIBILITY TO DETERMINE WHICH SPECIFICATIONS AND CODES APPLY, AND TO COORDINATE ALL CONSTRUCTION ACTIVITIES WITH THE APPROPRIATE LOCAL AND STATE AUTHORITIES.
3. UTILITY CONSTRUCTION AND SPECIFICATIONS SHALL COMPLY WITH THE CITY OF WAUWATOSA MUNICIPAL CODE AND WISCONSIN DEPARTMENT OF SAFETY AND PROFESSIONAL SERVICES DSPS 382.
4. TRACER WIRES SHALL BE INSTALLED AS NECESSARY IN ACCORD WITH 182.0715(2R) OF THE STATE STATUTES AND CITY OF WAUWATOSA REQUIREMENTS.
5. LENGTHS OF PROPOSED UTILITIES ARE TO CENTER OF STRUCTURES OR FITTINGS AND MAY VARY SLIGHTLY FROM PLAN. LENGTHS ARE SHOWN FOR CONTRACTOR CONVENIENCE ONLY. CONTRACTOR IS SOLELY RESPONSIBLE FOR COMPUTATIONS OF MATERIALS REQUIRED TO COMPLETE WORK. LENGTHS SHALL BE FIELD VERIFIED DURING CONSTRUCTION.
6. CONTRACTOR SHALL ADJUST AND/OR RECONSTRUCT EXISTING UTILITY COVERS (SUCH AS MANHOLE COVERS, VALVE BOX COVERS, ETC.) TO MATCH FINISHED GRADES OF THE AREAS DISTURBED DURING CONSTRUCTION.
7. CONTRACTOR SHALL FIELD VERIFY LOCATIONS, ELEVATIONS, AND SIZES OF PROPOSED UTILITIES AND CHECK ALL UTILITY CROSSINGS FOR CONFLICTS PRIOR TO ATTEMPTING CONNECTIONS AND BEGINNING UTILITY CONSTRUCTION.
8. STORM SEWER SPECIFICATIONS –

   PIPE – REINFORCED CONCRETE PIPE (RCP) SHALL MEET THE REQUIREMENTS OF ASTO CLASS IV (MINIMUM) C–76 WITH RUBBER GASKET JOINTS CONFORMING TO ASTO C–443; HIGH DENSITY DUAL–WALL POLYETHYLENE N–12 CORRUGATED PIPE (HDPE) SHALL BE AS MANUFACTURED BY ADS OR EQUAL WITH WATER TIGHT JOINTS, AND SHALL MEET THE REQUIREMENTS OF AASHTO DESIGNATION M–294 TYPE "S", OR POLYVINYL CHLORIDE (PVC) – CLASS PS46 MEETING AASHTO M278, AS NOTED.

   INLETS/CATCH BASINS – INLETS/CATCH BASINS SHALL BE CONSTRUCTED IN ACCORDANCE WITH FILE NO. 25 OF THE "STANDARD SPECIFICATIONS" WITH A 1'–8" X 2'–6" MAXIMUM OPENING. FRAME & GRATE SHALL BE NEENAH R–2504 WITH TYPE G GRATE, OR EQUAL. CURB FRAME & GRATE SHALL BE NEENAH R–33228 WITH TYPE G GRATE, OR EQUAL.

   BACKFILL AND BEDDING – STORM SEWER SHALL BE CONSTRUCTED WITH GRAVEL BACKFILL AND CLASS "B" BEDDING IN ALL PAVED AREAS AND TO A POINT 5 FEET BEYOND THE EDGE OF PAVEMENT. TRENCHES RUNNING PARALLEL TO AND LESS THAN 5 FEET FROM THE EDGE OF PAVEMENT SHALL ALSO REQUIRE GRAVEL BACKFILL. LANDSCAPED AREAS MAY BE BACKFILLED WITH EXCAVATED MATERIAL IN CONFORMANCE WITH SECTION 8.43.5 OF THE "STANDARD SPECIFICATIONS".

   MANHOLE FRAMES AND COVERS – MANHOLE FRAMES AND COVERS SHALL BE NEENAH R–1713 WITH TYPE "B" SELF SEALING LIDS, NON–ROCKING OR EQUAL.

   FIELD TILE CONNECTION – ALL FIELD TILE ENCOUNTERED DURING CONSTRUCTION SHALL BE INCLUDED IN THE UNIT PRICE(S) FOR STORM SEWER. TILE LINES CROSSED BY THE TRENCH SHALL BE REPLACED WITH THE SAME MATERIAL AS THE STORM SEWER.
9. ALL NEW ON–SITE SANITARY, STORM AND WATER UTILITIES SHALL BE PRIVATELY OWNED AND MAINTAINED BY THE PROPERTY OWNER.
10. NOTIFY CITY PRIOR TO ANY UTILITY WORK IN THE RIGHT OF WAY AND ALL SANITARY SEWER CONNECTION.
11. ALL WORK WITHIN THE PUBLIC RIGHT OF WAY REQUIRES A STREET OCCUPANCY PERMIT FROM THE CITY.
12. THE PROPOSED STORM SEWER MANHOLE INSTALLATION WITHIN THE CITY RIGHT OF WAY REQUIRES FULL–TIME INSPECTION. ALL REQUIRED INSPECTION SHALL BE PAID FOR THE DEVELOPMENT.

LEGEND

SANITARY SEWER MANHOLE	SAN	SANITARY SEWER
STORM MANHOLE	W	WATER MAIN
CATCH BASIN ROUND	ST	STORM SEWER
CATCH BASIN SQUARE	RD	ROOF DRAIN
FIRE HYDRANT	G	UNDERGROUND GAS
WATER VALVE	E	UNDERGROUND ELECTRIC
GAS VALVE	T	UNDERGROUND TELEPHONE
LIGHT POLE	FIB	UNDERGROUND FIBER OPTICS
TELEPHONE PEDESTAL	OH	OVERHEAD UTILITY
ELECTRICAL MANHOLE	SF	SILT FENCE
SIGN		18" STANDARD CURB AND GUTTER
POWER POLE		18" HIGH SIDE CURB AND GUTTER
GUY WIRE		CONIFEROUS TREE
		DECIDUOUS TREE

north

SCALE IN FEET

20' 0 20'

DIGGERS HOTLINE
Call 811 or (800) 242-8511
Milwaukee Area (262) 432-7910
Hearing Impaired TDD (800) 542-2289
www.DiggersHotline.com

JSD
MILWAUKEE REGIONAL OFFICE
W238 N1610 BUSSE ROAD, SUITE 100
WAUKESHA, WISCONSIN 53188
P. 262.513.0666
JSD PROJ. NO.: 22-11646
JSD PROJ. MGR.: RWI

DRAFT - NOT FOR CONSTRUCTION

1 SITE UTILITY PLAN 1"=20'-0"

MSI GENERAL
MSI GENERAL CORPORATION
P.O. BOX. 7
OCONOMOWOC, WI 53066
PHONE: 262-367-3661
WWW.MSIGENERAL.COM
SINGLE SOURCE RESPONSIBILITY ™

ISSUE DATES:	
Proposal:	XX/XX/XXXX
Bid:	XX/XX/XXXX
Contract:	XX/XX/XXXX
State Submittal / Permit:	XX/XX/XXXX
As-Built:	XX/XX/XXXX
CITY SUBMITTAL:	06/07/2023

REVISIONS:	
1	–
2	
3	
4	
5	
6	
7	
8	
9	
10	
11	
12	
13	
14	
15	
16	
17	
18	
19	
20	
21	
22	
23	
24	
25	
26	
27	
28	
29	
30	
31	
32	
33	
34	
35	
36	
37	
38	
39	
40	
41	

ST. JOHN'S WAUWATOSA

PROJECT ADDRESS:

PROJECT NAME
St. John's Evangelical Lutheran Church
STREET ADDRESS
7809 Harwood Ave.
CITY/ STATE / ZIP
Wauwatosa, WI 53213

ALL WORK TO BE COMPLETED AS SHOWN, AND IN ACCORDANCE WITH THE LATEST EDITION OF THE MSI GENERAL MASTER SPECIFICATION

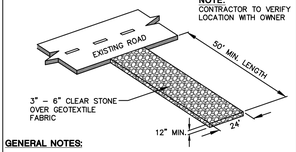
Architect:	Engineer:	Reviewed By:
AMH	APM	RWI

Sheet Title:
SITE UTILITY PLAN

Sheet Number:
C-400

Project Number:
P13586

MANAGERS . ENGINEERS . CONTRACTORS . ARCHITECTS

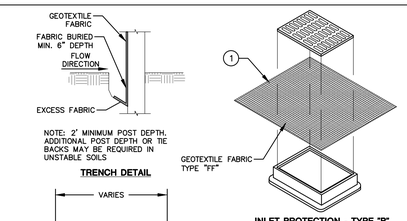


NOTE:
CONTRACTOR TO VERIFY LOCATION WITH OWNER

GENERAL NOTES:

1. TRACKING PADS SHALL BE INSTALLED PRIOR TO ANY TRAFFIC LEAVING THE SITE.
2. THE AGGREGATE FOR TRACKING PADS SHALL BE 3 TO 6–INCH CLEAR OR WASHED STONE. ALL MATERIAL TO BE RETAINED ON A 3–INCH SIEVE.
3. THE AGGREGATE SHALL BE PLACED IN A LAYER AT LEAST 12–INCHES THICK. ON SITES WHERE SATURATED CONDITIONS ARE EXPECTED DURING THE LIFE OF THE PAD, THE PAD SHALL BE UNDERLAIN WITH WisDOT TYPE "R" GEOTEXTILE FABRIC TO PREVENT MIGRATION OF UNDERLYING SOILS INTO THE STONE LAYER.
4. THE TRACKING PAD SHALL BE THE FULL WIDTH OF THE EGRESS POINT. THE TRACKING PAD SHALL BE A MINIMUM 50–FEET LONG.
5. ANY SEDIMENT TRACKED ONTO A PUBLIC OR PRIVATE ROAD SHOULD BE REMOVED BY STREET CLEANING, NOT FLUSHING, AT THE END OF EACH WORKING DAY.
6. TRACKING PADS SHALL, AT A MINIMUM, BE INSPECTED WEEKLY AND WITHIN 24–HOURS AFTER EVERY PRECIPITATION EVENT THAT PRODUCES 0.5–INCHES OF RAIN OR MORE DURING A 24–HOUR PERIOD.
7. THE TRACKING PAD PERFORMANCE SHALL BE MAINTAINED BY SCRAPING OR TOP–DRESSING WITH ADDITIONAL AGGREGATE.

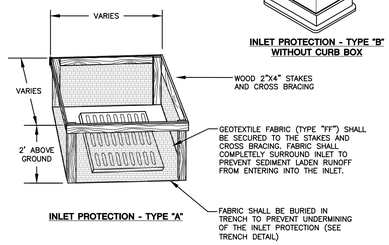
CONSTRUCTION ENTRANCE
N.T.S.



NOTE: 2' MINIMUM POST DEPTH. ADDITIONAL POST DEPTH OR TIE BACKS MAY BE REQUIRED IN UNSTABLE SOILS

TRENCH DETAIL

INLET PROTECTION – TYPE "B" WITHOUT CURB BOX



INLET PROTECTION – TYPE "A"

GENERAL NOTES:

TYPE "D" INLET PROTECTION INLET PROTECTION SHALL BE PROVIDED FOR ALL INLETS LOCATED WITHIN PAVEMENT UNLESS THE DEPTH OF THE INLET IS PROHIBITIVE TO INSTALL TYPE "D" PROTECTION.

INLET PROTECTION DEVICES SHALL BE MAINTAINED OR REPLACED AT THE DIRECTION OF THE ENGINEER.

MANUFACTURED ALTERNATIVES APPROVED AND LISTED ON THE DEPARTMENT'S EROSION CONTROL PRODUCT ACCEPTABILITY LIST MAY BE SUBSTITUTED.

WHEN REMOVING OR MAINTAINING INLET PROTECTION, CARE SHALL BE TAKEN SO THAT SEDIMENT TRAPPED ON THE GEOTEXTILE FABRIC DOES NOT FALL INTO THE INLET. ANY MATERIAL FALLING INTO THE INLET SHALL BE REMOVED IMMEDIATELY.

1. FINISHED SIZE, INCLUDING FLAP POCKETS WHERE REQUIRED, SHALL EXTEND A MINIMUM OF 10" AROUND THE PERIMETER OF FACILITATE MAINTENANCE OR REMOVAL.
2. FOR INLET PROTECTION, TYPE "C" (WITH CURB BOX), AN ADDITIONAL 18" OF FABRIC IS WRAPPED AROUND THE WOOD AND SECURED WITH STAPLES. THE WOOD SHALL NOT BLOCK THE ENTIRE HEIGHT OF THE CURB BOX OPENING.
3. FLAP POCKETS SHALL BE LARGE ENOUGH TO ACCEPT A WOOD 2X4

INSTALLATION NOTES:

TYPE "B" & "C"

TRIM EXCESS FABRIC IN THE FLOW LINE TO WITHIN 3 INCHES OF THE GRATE.

THE CONTRACTOR SHALL DEMONSTRATE A METHOD OF MAINTENANCE, USING A SEWN FLAP, HAND HOLDS OR OTHER METHODS TO PREVENT ACCUMULATED SEDIMENT FROM ENTERING THE INLET.

INSTALLATION NOTES:

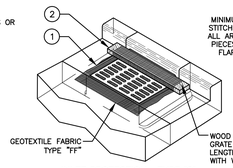
TYPE "D"

DO NOT INSTALL INLET PROTECTION TYPE "D" IN INLETS SHALLOWER THAN 30 INCHES, MEASURED FROM THE BOTTOM OF THE INLET TO THE TOP OF THE GRATE.

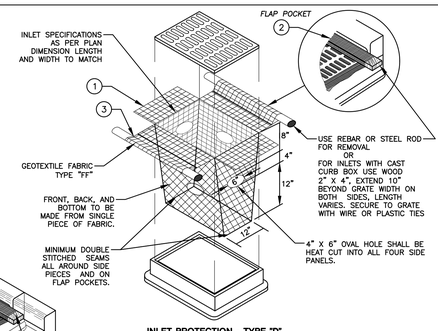
TRIM EXCESS FABRIC IN THE FLOW LINE TO WITHIN 3 INCHES OF THE GRATE.

THE INSTALLED BAG SHALL HAVE A MINIMUM SIDE CLEARANCE, BETWEEN THE INLET WALLS AND THE BAG, MEASURED AT THE BOTTOM OF THE OVERFLOW HOLES, OF 3 INCHES. WHERE NECESSARY THE CONTRACTOR SHALL CINCH THE BAG, USING PLASTIC ZIP TIES, TO ACHIEVE THE 3 INCHES CLEARANCE. THE TIES SHALL BE PLACED AT A MAXIMUM OF 4 INCHES FROM THE BOTTOM OF THE BAG.

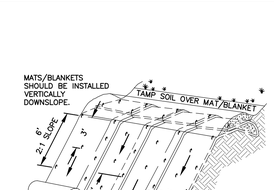
INLET PROTECTION
N.T.S.



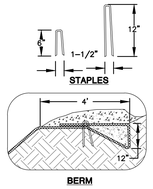
INLET PROTECTION – TYPE "C" WITH CURB BOX



INLET PROTECTION – TYPE "D"



ISOMETRIC VIEW



STAPLES

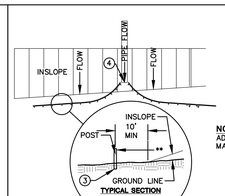
BERM

TYPICAL SLOPE SOIL STABILIZATION

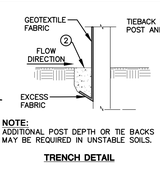
GENERAL NOTES:

1. EROSION MAT CONSTRUCTION SHALL BE IN ACCORDANCE WITH WISCONSIN DNR TECHNICAL STANDARD 1052 "NON–CHANNEL EROSION MAT".
2. ONLY WisDOT EROSION CONTROL PRODUCT ACCEPTABILITY LIST (PAL) APPROVED MATS SHALL BE ALLOWED. REFER TO EROSION CONTROL PLAN FOR EXACT MAT CLASSIFICATION.
3. APPLY PERMANENT SEEDING BEFORE PLACING BLANKETS.
4. LAY BLANKETS LOOSELY AND STAKE OR STAPLE TO MAINTAIN DIRECT CONTACT WITH THE SOIL. DO NOT STRETCH.
5. ONLY WisDOT EROSION CONTROL PRODUCT ACCEPTABILITY LIST (PAL) APPROVED MATS SHALL BE ALLOWED. REFER TO EROSION CONTROL PLAN FOR EXACT MAT CLASSIFICATION.

EROSION MATTING
N.T.S.

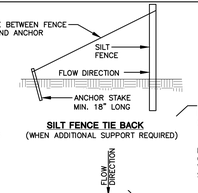


SILT FENCE ALONG SLOPES & OUTFALLS

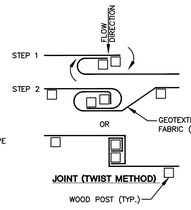


NOTE:
ADDITIONAL POST DEPTH OR TIE BACKS MAY BE REQUIRED IN UNSTABLE SOILS.

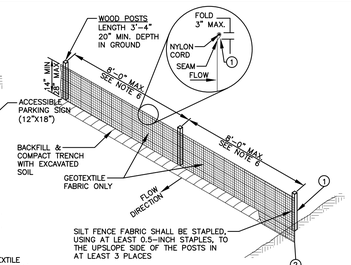
TRENCH DETAIL

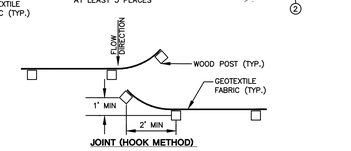


SILT FENCE TIE BACK
(WHEN ADDITIONAL SUPPORT REQUIRED)



JOINT (TWIST METHOD)



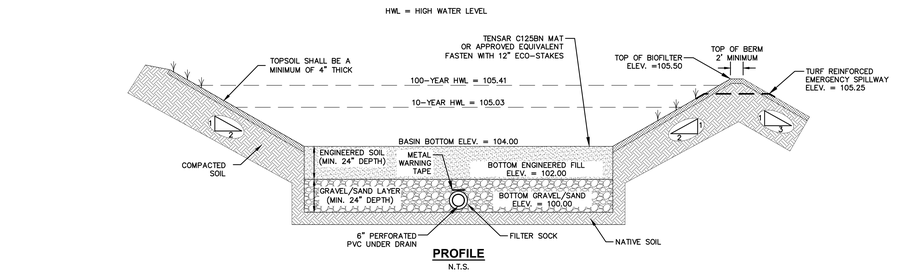


JOINT (HOOK METHOD)

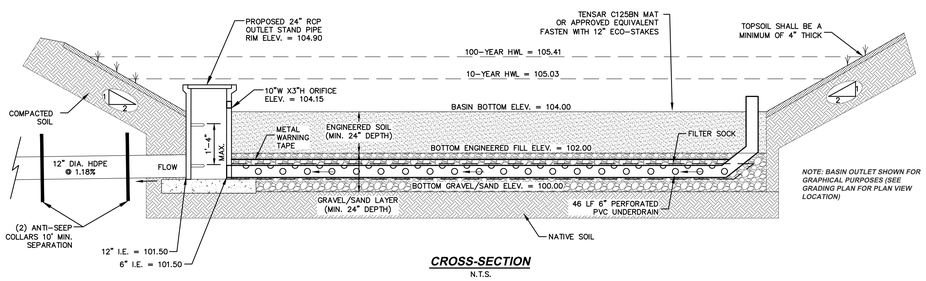
GENERAL NOTES:

1. SILT FENCE SHALL BE ANCHORED BY SPREADING AT LEAST 8–INCHES OF FABRIC IN A 4–INCH WIDE AND 6–INCH DEEP TRENCH OR 6–INCH DEEP V–TRENCH ON THE UPSLOPE SIDE OF THE FENCE. TRENCHES SHALL NOT BE EXCAVATED WIDER OR DEEPER THAN NECESSARY FOR PROPER INSTALLATION.
2. FOLD MATERIAL TO FIT TRENCH AND BACKFILL AND COMPACT TRENCH WITH EXCAVATED SOIL.
3. WOOD POSTS SHALL BE A MINIMUM SIZE OF 1.125–INCHES x 1.125–INCHES OF DRIED OAK OR HICKORY.
4. SILT FENCE TO EXTEND ABOVE THE TOP OF PIPE.
5. SILT FENCE CONSTRUCTION AND GEOTEXTILE FABRIC SHALL CONFORM TO WDNR TECHNICAL STANDARD 1056.
6. POST SPACING SHALL BE SELECTED BASED ON GEOTEXTILE FABRIC (8–FEET FOR WOVEN & 3–FEET FOR NON–WOVEN)

SILT FENCE
N.T.S.

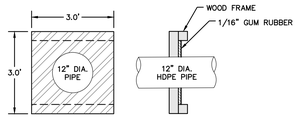


PROFILE
N.T.S.



NOTE: BASIN OUTLET SHOWN FOR GRAPHICAL PURPOSES (SEE GRADING PLAN FOR PLAN VIEW LOCATION)

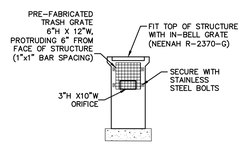
CROSS–SECTION
N.T.S.



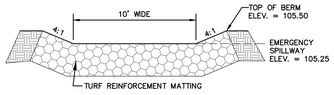
SECTION **PROFILE**

NOTE: ANTI–SEEP COLLAR TO BE AGRI DRAIN ASC03 OR EQUAL

GUM RUBBER ANTI–SEEP COLLAR
N.T.S.



OUTLET STRUCTURE DETAIL
N.T.S.



NOTES

1. EXTEND TURF REINFORCEMENT MATTING 2' BELOW THE ELEVATION OF THE EMERGENCY SPILLWAY ON THE INSIDE OF THE POND.
2. EXTEND TURF REINFORCEMENT MATTING TO THE TOE OF SLOPE ON THE OUTSIDE OF THE POND.

EMERGENCY SPILLWAY DETAIL
N.T.S.

BIOFILTRATION BASIN
N.T.S.

GENERAL NOTES:

1. ALL CONSTRUCTION PRACTICES SHALL MEET THE SPECIFICATIONS OF THE WDNR TECHNICAL STANDARD 1004 – BIORETENTION FOR INFILTRATION. IT IS THE CONTRACTOR'S RESPONSIBILITY TO OBTAIN A COPY OF THIS STANDARD AND CONSTRUCT THE BIO–FILTRATION DEVICE IN ACCORDANCE WITH THE REQUIREMENTS OUTLINED THEREIN.
2. CONTRACTOR SHALL INSTALL 18" OF ENGINEERED SOIL CONSISTING OF: 85% ASTM C33 SAND, 15% CERTIFIED COMPOST (SEE GENERAL NOTE 3).
3. CERTIFIED COMPOST SHALL CONSIST OF: >40% ORGANIC MATTER, <60% ASH CONTENT, pH OF 6–8, AND MOISTURE CONTENT OF 35–50% BY WEIGHT.
4. CONTRACTOR SHALL INSTALL 48" OF SAND/GRAVEL STORAGE LAYER SHALL CONSIST OF SAND OR GRAVEL MATERIAL MEETING THE SPECIFICATIONS IN SECTION V.B.7 OF WDNR TECHNICAL STANDARD 1004.
5. CONFIRM WITH GEOTECHNICAL ENGINEER THAT THE SILT LOAM SOIL PROFILE HAS BEEN REACHED PRIOR TO BACKFILLING THE BIO–FILTRATION BASIN.
6. IF ADDITIONAL EXCAVATION IS REQUIRED BELOW THE SAND SOIL PROFILE TO REACH THE LISTED NATIVE SOIL LAYER, THE BACKFILL USED TO RETURN THE BOTTOM OF THE BIO–FILTRATION SYSTEM TO THE BOTTOM OF THE SAND LAYER ELEVATION MUST HAVE AN EQUAL OR HIGHER INFILTRATION RATE THAN THE LISTED NATIVE SOIL LAYER AS CONFIRMED BY A GEOTECHNICAL ENGINEER.
7. FILTER FABRIC SHALL BE PLACED ABOVE AND ON THE SIDES OF THE PERFORATED PIPE, BETWEEN THE PEA GRAVEL AND THE ENGINEERED SOIL, A WIDTH OF 4 FEET CENTERED OVER THE FLOW LINE OF THE PIPE.
8. NO MOW FESCUE WITH ANNUAL RYE FROM PRAIRIE NURSERY COMPANY, OR EQUIVALENT, INSTALLED PER MANUFACTURER'S SPECIFICATIONS, IN THE AREAS SURROUNDING THE BASIN, ON SIDE SLOPES, AND OVER ANY LAND THAT DISCHARGES INTO THE BASIN FOR EROSION CONTROL WHEN BASIN IS BROUGHT ON–LINE. ROOTSTOP AND PLUGS ARE REQUIRED TO ESTABLISH VEGETATION AT THE INVERT OF THE BASIN. SEE PLANT LIST FOR PLUGS.
9. RUNOFF MUST INFILTRATE WITHIN 24–HOURS. BASINS UNABLE TO MAINTAIN THESE RATES MUST BE DEEP TILLED, REGRADED, AND IF NECESSARY REPLANTED TO RESTORE ORIGINAL INFILTRATION RATES.
10. ALL WORK TO BE CONDUCTED IN CONFORMANCE WITH APPLICABLE LOCAL, REGIONAL, AND STATE STORMWATER STANDARDS FOR THE PROJECT SITE AS APPROVED BY THE REGULATORY ENGINEER.
11. THE PLACING, CONSTRUCTION AND COMPOSITION OF THE TURF REINFORCEMENT MATTING, CLASS III, TYPE B SHALL BE IN ACCORDANCE WITH THE REQUIREMENTS OF SECTION 628 OF THE STATE OF WISCONSIN STANDARD SPECIFICATIONS FOR HIGHWAY AND STRUCTURE CONSTRUCTION, CURRENT EDITION. HEREAFTER, THIS PUBLICATION WILL BE REFERRED TO AS STATE HIGHWAY SPECIFICATIONS.
12. EROSION MATTING IS REQUIRED ON ALL SIDE SLOPES.

NOTE:

INFILTRATION DEVICES ARE DESIGNED IN ACCORDANCE WITH THE SPECIFICATIONS OF THE WISCONSIN DEPARTMENT OF NATURAL RESOURCES (WDNR), COUNTY, MUNICIPALITY, AND ENGINEERING STANDARD OF CARE. ALL DESIGNATED INFILTRATION AREAS (e.g. RAIN GARDENS, INFILTRATION BASINS, BIORETENTION DEVICES) SHALL BE FENCED PRIOR TO CONSTRUCTION AND REMAIN UNDISTURBED AND PROTECTED DURING THE CONSTRUCTION OF PROPOSED SITE IMPROVEMENTS. PROPOSED BIO–FILTRATION DEVICES SHALL NOT BE CONSTRUCTED UNTIL THE DEVICE'S CONTRIBUTING WATERSHED AREA MEETS ESTABLISHED VEGETATION REQUIREMENTS SET FORTH WITHIN THE RESPECTIVE WDNR TECHNICAL STANDARDS. IF THE LOCATION OF THE INFILTRATION AREA CONFLICTS WITH CONSTRUCTION STAGING AND/OR CONSTRUCTION TRAFFIC AND IS DISTURBED, COMPACTION MITIGATION WILL BE REQUIRED AT THE CONTRACTOR'S EXPENSE.

THE CONTRACTOR IS REQUIRED TO PROVIDE QUALIFIED STAFF FOR INSPECTION AND OBSERVATION OF THE CONSTRUCTION ACTIVITIES RELATING TO ALL JOB SITE REGULATORY COMPLIANCE INCLUDING THE PROTECTION AND CONSTRUCTION OF ALL STORMWATER MANAGEMENT FEATURES. ANY OBSERVATION OF PLAN OR SITE DISCREPANCIES SHALL BE REPORTED TO THE ENGINEER OF RECORD PRIOR TO CONSTRUCTION.

MSI GENERAL CORPORATION
P.O. BOX. 7
OCONOMOWOC, WI 53066
PHONE: 262-367-3661

WWW.MSIGENERAL.COM
SINGLE SOURCE RESPONSIBILITY ™

ISSUE DATES:	
Proposal:	XX/XX/XXXX
Bid:	XX/XX/XXXX
Contract:	XX/XX/XXXX
State Submittal / Permit:	XX/XX/XXXX
As-Built:	XX/XX/XXXX
CITY SUBMITTAL:	06/07/2023

REVISIONS:
1 –
2
3
4
5
6
7
8
9
10
11
12
13
14
15
16
17
18
19
20
21
22
23
24
25
26
27
28
29
30
31
32
33
34
35
36
37
38
39
40
41

ST. JOHN'S WAUWATOSA

PROJECT ADDRESS:

PROJECT NAME
St. John's Evangelical Lutheran Church
STREET ADDRESS
7809 Harwood Ave.
CITY/ STATE / ZIP
Wauwatosa, WI 53213

ALL WORK TO BE COMPLETED AS SHOWN, AND IN ACCORDANCE WITH THE LATEST EDITION OF THE MSI GENERAL MASTER SPECIFICATION

Architect:	Engineer:	Reviewed By:
AMH	APM	RWI

Sheet Title:
DETAILS

Sheet Number:
C-500

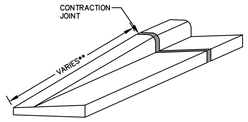
Project Number:
P13586

DIGGERS HOTLINE
Call 811 or (800) 242-8511
Milwaukee Area (262) 432-7910
Hearing Impaired TDD (800) 542-2289
www.DiggersHotline.com

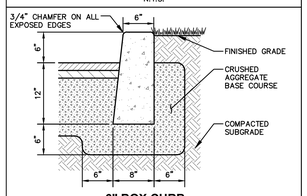
JSD
MILWAUKEE REGIONAL OFFICE
W238 N1610 BUSSE ROAD, SUITE 100
WAUKESHA, WISCONSIN 53188
P. 262.513.0666
JSD PROJ. NO.: 22-11646
JSD PROJ. MGR.: RWI

DRAFT - NOT FOR CONSTRUCTION

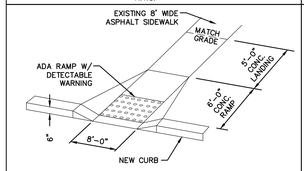
MANAGERS · ENGINEERS · CONTRACTORS · ARCHITECTS



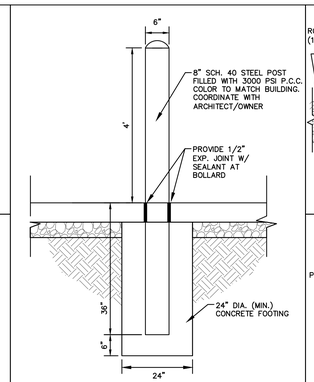
CURB TAPER
N.T.S.



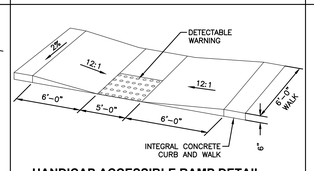
6" BOX CURB
N.T.S.



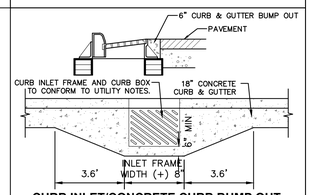
HANDICAP ACCESSIBLE RAMP DETAIL
N.T.S.



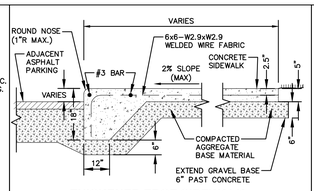
CONCRETE BOLLARD
N.T.S.



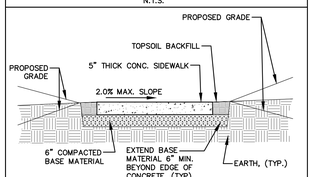
HANDICAP ACCESSIBLE RAMP DETAIL
N.T.S.



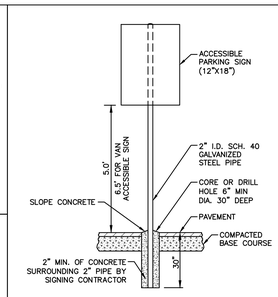
CURB INLET/CONCRETE CURB BUMP OUT
N.T.S.



THICKENED EDGE SIDEWALK
N.T.S.

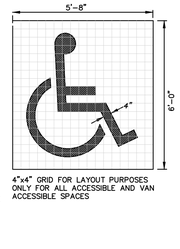


CONCRETE SIDEWALK
N.T.S.



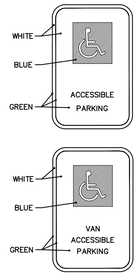
NOTE:
SIGNAGE DETAILS ARE SHOWN FOR INTENT ONLY. CONTRACTOR SHALL VERIFY EXACT REQUIREMENTS PRIOR TO CONSTRUCTION.

ACCESSIBLE PARKING SIGN AND POST INSTALLATION
N.T.S.



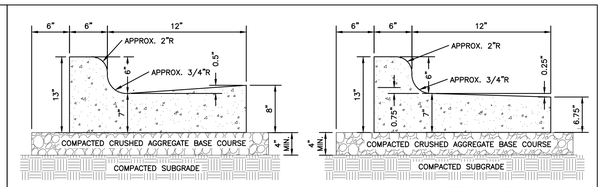
NOTE:
SYMBOL DETAILS ARE SHOWN FOR INTENT ONLY. CONTRACTOR SHALL VERIFY EXACT REQUIREMENTS PRIOR TO CONSTRUCTION.

PAINTED SYMBOL
N.T.S.



NOTE:
SIGNAGE AND SYMBOL DETAILS ARE SHOWN FOR INTENT ONLY. CONTRACTOR SHALL VERIFY EXACT REQUIREMENTS PRIOR TO CONSTRUCTION.

SIGN DETAILS
N.T.S.



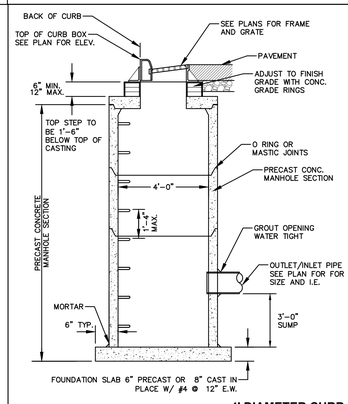
CONCRETE LOW SIDE (COLLECT) CURB & GUTTER

CONCRETE HIGH SIDE (RE/ECT) CURB & GUTTER

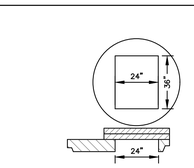
GENERAL NOTES

1. LATERAL CONTRACTION JOINTS SHALL BE PLACED AT INTERVALS OF NOT MORE THAN 15 FEET NOR LESS THAN 6 FEET. THE JOINTS SHALL BE A MINIMUM OF 3 INCHES IN DEPTH
2. EXPANSION JOINTS SHALL BE PLACED TRANSVERSELY AT RADIUS POINTS ON CURVES OF RADIUS 200 FEET OR LESS, AND AT ANGLE POINTS, OR AS DIRECTED BY THE ENGINEER OF RECORD. THE EXPANSION JOINT FILLER SHALL BE A ONE PIECE FIBER BOARD OR THE APPROVED EQUIVALENT MATERIAL HAVING THE SAME DIMENSIONS AS CURB & GUTTER AT THAT STATION AND BE 0.5 INCH THICK.
3. IN ALL CASES, CONCRETE CURB & GUTTER SHALL BE PLACED ON THOROUGHLY COMPACTED CRUSHED STONE

18" STANDARD CURB & GUTTER
N.T.S.
PRIVATE CURB AND GUTTER



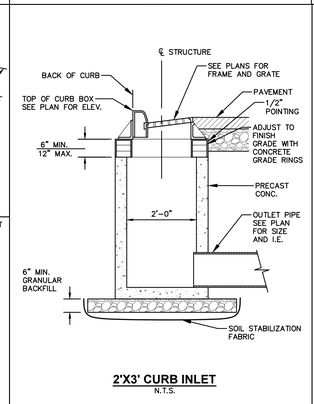
4' DIAMETER CURB INLET
N.T.S.



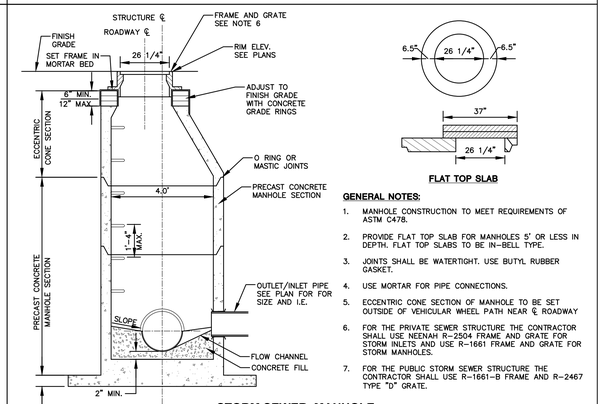
FLAT TOP SLAB

GENERAL NOTES:

1. MANHOLE CONSTRUCTION TO MEET REQUIREMENTS OF ASTM C478.
2. PROVIDE FLAT TOP SLAB FOR MANHOLES 5' OR LESS IN DEPTH. FLAT TOP SLABS TO BE IN-BELL TYPE.
3. JOINTS SHALL BE WATERTIGHT. USE BUTYL RUBBER GASKET.
4. USE MORTAR FOR PIPE CONNECTIONS.



2'X3' CURB INLET
N.T.S.



GENERAL NOTES:

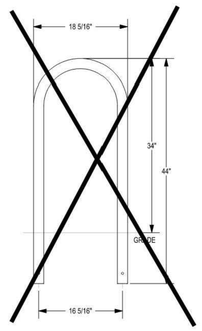
1. MANHOLE CONSTRUCTION TO MEET REQUIREMENTS OF ASTM C478.
2. PROVIDE FLAT TOP SLAB FOR MANHOLES 5' OR LESS IN DEPTH. FLAT TOP SLABS TO BE IN-BELL TYPE.
3. JOINTS SHALL BE WATERTIGHT. USE BUTYL RUBBER GASKET.
4. USE MORTAR FOR PIPE CONNECTIONS.
5. ECCENTRIC CONE SECTION OF MANHOLE TO BE SET OUTSIDE OF VEHICULAR WHEEL PATH NEAR ℄ ROADWAY
6. FOR THE PRIVATE SEWER STRUCTURE THE CONTRACTOR SHALL USE NEENAH R-2504 FRAME AND GRATE FOR STORM INLETS AND USE R-1661 FRAME AND GRATE FOR STORM MANHOLES.
7. FOR THE PUBLIC STORM SEWER STRUCTURE THE CONTRACTOR SHALL USE R-1661-B FRAME AND R-2467 TYPE "D" GRATE.

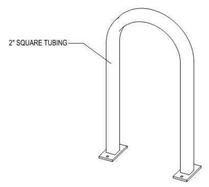
FLAT TOP SLAB

STORM SEWER MANHOLE
N.T.S.

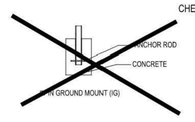
MADRAX

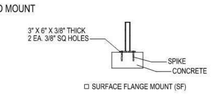
MADRAX DIVISION
GRABER MANUFACTURING, INC.
1080 UNIEK DRIVE
WAUNAKEE, WI 53597
P:(800) 448-7931, P:(608) 849-1060, F:(608) 849-1081
WWW.MADRAX.COM, E-MAIL: SALES@MADRAX.COM





CHECK DESIRED MOUNT

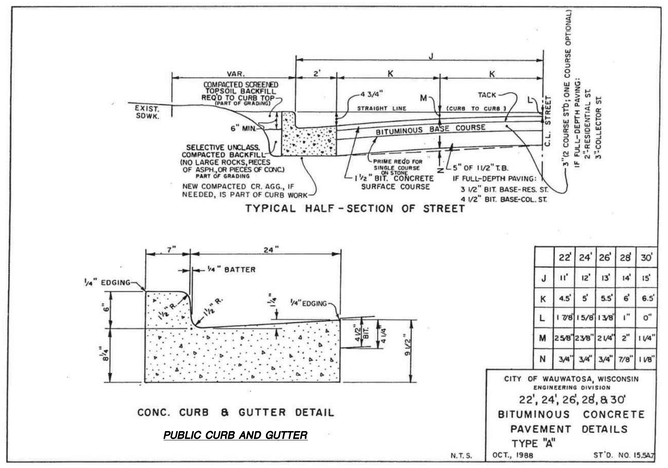




PRODUCT: U200-IG(SF)
DESCRIPTION: 'U' BIKE RACK
2 BIKE, SURFACE OR IN GROUND MOUNT

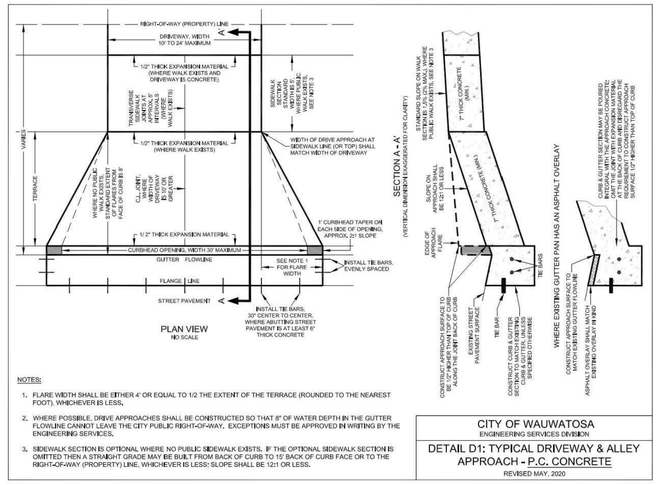
DATE: 10-22-18
ENG: SMC

NOTES:
1. INSTALL BIKE RACKS ACCORDING TO MANUFACTURER'S SPECIFICATIONS.
2. POWERED COATED BLACK, SEE MANUFACTURER'S SPECIFICATIONS.
3. SEE SITE PLAN FOR LOCATION OR CONSULT OWNER.



	22'	24'	26'	28'	30'
J	11'	12'	13'	14'	15'
K	4.5'	5'	5.5'	6'	6.5'
L	1 7/8	1 5/8	1 3/8	1"	0"
M	2 5/8"	2 3/8"	2 1/4"	2"	1 1/4"
N	3/4"	3/4"	3/4"	7/8"	1 1/8"

CITY OF WAUWATOSA, WISCONSIN
ENGINEERING DIVISION
22', 24', 26', 28', & 30'
BITUMINOUS CONCRETE PAVEMENT DETAILS
TYPE "A"
OCT., 1988 ST'D. NO. 1550



NOTES:
1. FLARE WIDTH SHALL BE EITHER 4' OR EQUAL TO 1/2 THE EXTENT OF THE TERRACE (ROUNDED TO THE NEAREST FOOT), WHICHEVER IS LESS.
2. WHERE POSSIBLE, DRIVE APPROACHES SHALL BE CONSTRUCTED SO THAT 8" OF WATER DEPTH IN THE GUTTER FLOWLINE CANNOT LEAVE THE CITY PUBLIC RIGHT-OF-WAY. EXCEPTIONS MUST BE APPROVED IN WRITING BY THE ENGINEERING SERVICES.
3. SIDEWALK SECTION IS OPTIONAL WHERE NO PUBLIC SIDEWALK EXISTS. IF THE OPTIONAL SIDEWALK SECTION IS OMITTED THEN A STRAIGHT GRADE MAY BE BUILT FROM BACK OF CURB TO 15' BACK OF CURB FACE OR TO THE RIGHT-OF-WAY (PROPERTY) LINE, WHICHEVER IS LESS; SLOPE SHALL BE 12:1 OR LESS.

CITY OF WAUWATOSA
ENGINEERING SERVICES DIVISION
DETAIL D1: TYPICAL DRIVEWAY & ALLEY APPROACH - P.C. CONCRETE
REVISED MAY, 2020

MSI GENERAL
MANAGERS . ENGINEERS . CONTRACTORS . ARCHITECTS

MSI GENERAL CORPORATION
P.O. BOX. 7
OCONOMOWOC, WI 53066
PHONE: 262-367-3661

WWW.MSIGENERAL.COM
SINGLE SOURCE RESPONSIBILITY ™

ISSUE DATES:	
Proposal:	XX/XX/XXXX
Bid:	XX/XX/XXXX
Contract:	XX/XX/XXXX
State Submittal / Permit:	XX/XX/XXXX
As-Built:	XX/XX/XXXX
CITY SUBMITTAL:	06/07/2023

REVISIONS:
1 –
2
3
4
5
6
7
8
9
10
11
12
13
14
15
16
17
18
19
20
21
22
23
24
25
26
27
28
29
30
31
32
33
34
35
36
37
38
39
40
41

ST. JOHN'S WAUWATOSA

PROJECT ADDRESS:

PROJECT NAME
St. John's Evangelical Lutheran Church
STREET ADDRESS
7809 Harwood Ave.
CITY/ STATE / ZIP
Wauwatosa, WI 53213

ALL WORK TO BE COMPLETED AS SHOWN, AND IN ACCORDANCE WITH THE LATEST EDITION OF THE MSI GENERAL MASTER SPECIFICATION

Architect:	Engineer:	Reviewed By:
AMH	APM	RWI

Sheet Title:
DETAILS

Sheet Number:
C-501

Project Number:
P13586

DIGGERS HOTLINE
Call 811 or (800) 242-8511
Milwaukee Area (262) 432-7910
Hearing Impaired TDD (800) 542-2289
www.DiggersHotline.com

JSD
MILWAUKEE REGIONAL OFFICE
W238 N1610 BUSSE ROAD, SUITE 100
WAUKESHA, WISCONSIN 53188
P. 262.513.0666
JSD PROJ. NO.: 22-11646
JSD PROJ. MGR.: RWI

DRAFT - NOT FOR CONSTRUCTION

RATIONAL METHOD STORM SEWER CALCULATIONS

Project Name: **St Johns Lutheran Church**

Project Location: Wauwatosa, WI
JSD Project Number: 22-11646

Performed by: APM
Date: 5/31/2023

MILWAUKEE REGIONAL OFFICE
W238 N1610 Busse Road, Suite 100
Waukesha, Wisconsin 53188
Ph: (262) 513-0666 Fax: (262) 513-1232

Structure abbreviations are as follows: ES - End Section, MH - Manhole, FI - Field Inlet, TD - Trench Drain, BC - Building Connection, RD - Roof Drain, STB - Stub

PIPE LOCATION		STRUCTURE CONTRIBUTING AREA					PIPE FLOW				PIPE DATA				PIPE CAPACITY INFORMATION							DROP	ELEVATIONS			COVER TO CROWN (FT)
															ACTUAL FLOW											
UP STRUCT	DOWN STRUCT	ROOF C = 0.95 (SQ FT)	PAVED C = 0.95 (SQ FT)	GRASS C = 0.20 (SQ FT)	INDIVID AREA (ACRES)	INDIV COMP C VALUE (UNITLESS)	STORM EVENT 2,5,10,25,50,100	INTENSITY I (IN/HR)	INDIV RUNOFF (CFS)	TOTAL FLOW (CFS)	LENGTH (FT)	DIA. (IN)	SLOPE (FT/FT)	Manning's n RCP=0.013 HDPE=0.012 PVC=0.011	REQD DROP	ACTUAL DROP	PARTS FULL	VEL (FPS)	FULL FLOW (CFS)	TIME TO STRUCT. (MIN)	TIME IN SEWER (MIN)	THRU STRUCT (FT)	RIM/(F/L) UP	INVERT UP	INVERT DOWN	
INL-15	**INL-14**	2,208	2,385	1,485	0.14	0.77	10	6.27	0.67	0.67	**88.0**	**12**	**0.0104**	**0.012**	0.03	0.92	0.32	4.29	3.93	5.00	5.34	0.00	**113.60**	**109.74**	**108.82**	2.76
INL-14	**INL-13**	0	4,560	2,555	0.16	0.68	10	6.18	0.69	1.36	**38.0**	**12**	**0.0104**	**0.012**	0.05	0.40	0.42	4.73	3.93	5.34	5.48	0.00	**114.15**	**108.82**	**108.42**	4.23
INL-13	**INL-12**	200	3,235	3,015	0.15	0.60	10	6.14	0.55	1.90	**75.0**	**12**	**0.0400**	**0.012**	0.18	3.00	0.55	10.14	7.72	5.48	5.60	0.00	**113.45**	**108.42**	**105.42**	3.93
INL-12	**INL-11**	0	6,900	2,740	0.22	0.74	10	6.11	1.00	2.90	**117.0**	**12**	**0.0104**	**0.012**	0.66	1.22	0.75	5.61	3.93	5.60	5.95	0.00	**109.55**	**105.42**	**104.21**	3.03
INL-11	**ES-10**	0	6,260	610	0.16	0.88	10	6.02	0.84	3.74	**10.0**	**12**	**0.0208**	**0.012**	0.09	0.21	0.84	8.07	5.56	5.95	5.97	0.00	**107.75**	**104.21**	**104.00**	2.44
INL-05	**INL-04**	4,755	630	730	0.14	0.86	10	6.27	0.76	0.76	**52.0**	**8**	**0.0104**	**0.012**	0.17	0.54	0.55	3.95	1.33	5.00	5.22	0.35	**108.15**	**104.27**	**103.73**	3.15
INL-04	**EX MH-03**	0	190	470	0.02	0.42	10	6.21	0.04	0.80	**56.0**	**12**	**0.0037**	**0.011**	0.02	0.21	0.37	2.93	2.55	5.22	5.54	0.18	**109.95**	**103.38**	**103.17**	5.47
EX MH-03	**MH-02**	317	0	969	0.03	0.38	10	6.13	0.07	0.87	**61.0**	**12**	**0.0747**	**0.011**	0.03	4.55	0.14	9.01	11.50	5.54	5.65	0.00	**110.50**	**102.99**	**98.44**	6.41
MH-02	**EX MH-01**	***10-YEAR FROM HYDROCAD**					10	6.10	3.55	4.42	**68.0**	**12**	**0.0747**	**0.011**	0.75	5.08	0.42	13.83	11.50	5.65	5.73	0.00	**108.00**	**98.44**	**93.36**	8.46

***The individual runoff for MH-02 is the 10-year peak cfs calculated from the HydroCAD output.**

APPENDIX 7

Storm Water Maintenance Agreement

Storm Water Management Practice Maintenance Agreement

St. Johns Evangelical Lutheran Church, as "Titleholder(s)" of the property described below, in accordance with the City of Wauwatosa's Municipal Code Chapter 24.13.040 Storm Water Management and Erosion Control Ordinance, agrees to install and maintain storm water management practice(s) on the subject property in accordance with approved plans and Storm Water Permit conditions. The Titleholder(s) further agrees to the terms stated in this document to ensure that the storm water management practice(s) continues serving the intended functions in perpetuity. This Agreement includes the following exhibits:

Exhibit A: Legal Description of the real estate for which this Agreement applies ("Property").
Exhibit B: Location Map(s) – shows an accurate location of each storm water management practice affected by this Agreement.
Exhibit C: Maintenance Plan – prescribes those activities that must be carried out to maintain compliance with this Agreement.

Note: After construction verification has been accepted by City of Wauwatosa for all planned storm water management practices, an addendum(s) to this agreement shall be recorded by the Titleholder(s) showing design and construction details. The addendum may contain several additional exhibits, including certification by City of Wauwatosa of Storm Water Permit termination, as described below.

(Titleholder(s)
St. John's Evangelical
Lutheran Church
7809 Harwood Avenue
Wauwatosa, WI 53213

371-017-3000 & 371-018-1000
Parcel Identification Number(s) – (PIN)

Through this Agreement, the Titleholder(s) hereby subjects the Property to the following covenants, conditions and restrictions:

1. The Titleholder(s) shall be responsible for the routine and extraordinary maintenance and repair of the storm water management practice(s) and drainage easements identified in Exhibit B until Storm Water Permit termination by the Wisconsin Department of Natural Resources and by the City of Wauwatosa pursuant to the City's Municipal Code Chapter 24.13.040, Stormwater Management and Erosion Control Ordinance.

2. After Storm Water Permit termination under 1. the current Titleholder(s) shall be solely responsible for maintenance and repair of the storm water management practices and drainage easements in accordance with the City of Wauwatosa's Municipal Code Chapter 24.13.040 Storm Water Management and Erosion Control ordinance and the maintenance plan contained in Exhibit C.

3. The City of Wauwatosa, or its designee, is authorized to access the property as necessary to conduct inspections of the storm water management practices or drainage easements to ascertain compliance with the intent of this Agreement and the activities prescribed in Exhibit C. Upon written notification by City of Wauwatosa or their designee, the Titleholder(s) shall, at their own cost and within a reasonable time period determined by the City of Wauwatosa and specified in the notification, have an inspection of the storm water management practice conducted by a qualified professional, file a report with the City of Wauwatosa and complete any maintenance or repair work recommended in the report. The Titleholder(s) shall be liable for the failure to undertake any maintenance or repairs.

4. Upon notification by the City of Wauwatosa of required maintenance or repairs, the Titleholder(s) shall complete the specified maintenance or repairs within a reasonable time frame determined by the City of Wauwatosa and specified in the notification.

5. If the Titleholder(s) does not complete an inspection under 3. above or required maintenance or repairs under 3 and 4 above within the specified time period, the City of Wauwatosa is authorized, but not required, to perform the specified inspections, maintenance or repairs. In the case of an emergency situation, as determined by the City of Wauwatosa, no notice shall be required prior to the City of Wauwatosa performing emergency maintenance or repairs. The City of Wauwatosa may levy the costs and expenses of such inspections, maintenance or repair related actions as a special charge against the Property and collected as such in accordance with the procedures under s. 66.0627 Wis. Stats. of subch. VI of ch. 66 Wis. Stats.

6. This Agreement shall run with the Property and be binding upon all heirs, successors and assigns. After the Titleholder(s) records this maintenance agreement and the addendum, the agreement and the addendum may be amended or modified by agreement between the City of Wauwatosa and the current Titleholder(s).

Dated this_____day of_____, 20___

Titleholder(s):

_____

- Owner

Acknowledgements

State of Wisconsin:
County of Milwaukee

Personally came before me this____day of_____, 20__, the above named Jon Zimmerman to be known to be the person who executed the foregoing instrument and acknowledged the same.

_____

Notary Public, _____ County, _____
My commission expires:_____

Dated this_____day of_____, 20__.

This document was drafted by:

Rizal W. Iskandarsjach
JSD Professional Services, Inc
W238N1610 Busse Road, Suite 100
Waukesha, WI 53188

Approved for recording: _____

Exhibit A – Legal Description

The following description and reduced copy map identifies the land parcel(s) affected by this Plan. For a larger scale view of any exhibit in the referenced document, contact City of Wauwatosa Engineering office.

Project Identifier: St. John's Evangelical Lutheran Church Acres**:** 1.553 ac **(survey)**

Map Produced By: Metropolitan Survey Service, Inc

Legal Description:

Parcel A
West 50 feet of Lot 1, in Douglas Heights, being in the Southeast 1/4 of Section 21 and the Northeast 1/4 of Section 28 in Township 7 North, Range 21 East, City of Wauwatosa, Milwaukee County.

Parcel B
Lot 9 of Assessor's Plat No. 26 and Lots 1 and 2 of Charles Fingado's Subdivision and the East 31.3 feet of Lot 1 of Douglas Heights Subdivision, being part of the Southeast 1/4 of Section 21 Township 7 North, Range 21 East, City of Wauwatosa, Milwaukee County, Wisconsin.

MSI General
St. John's Lutheran

PLAT OF SURVEY

LOCATION: 7827 Harwood Avenue, Wauwatosa, Wisconsin

(A) **LEGAL DESCRIPTION:**
West 50 feet of Lot 1, in **DOUGLAS HEIGHTS**, being in the Southeast 1/4 of Section 21 and the Northeast 1/4 of Section 28, in Township 7 North, Range 21 East, City of Wauwatosa, Milwaukee County, Wisconsin.

Survey No. 113429

PLAT OF SURVEY

LOCATION: 1249 Dewey Avenue, Wauwatosa, Wisconsin

(B) **LEGAL DESCRIPTION:**
Lot 9 of **ASSESSOR'S PLAT NO. 26** and Lots 1 and 2 of **CHARLES FINGADO'S SUBDIVISION** and the East 31.3 feet of Lot 1 of **DOUGLAS HEIGHTS SUBDIVISION**, being part of the Southeast 1/4 of Section 21, Town 7 North, Range 21 East, City of Wauwatosa, Milwaukee County, Wisconsin.

Survey No. 113427

PLAT OF SURVEY

LOCATION: 1278 Dewey Avenue, Wauwatosa, Wisconsin

(C) **LEGAL DESCRIPTION:**
Lot 22 in **FINGADO'S SUBDIVISION**, of 9.66 Acres of land in the Southeast 1/4 of Section 21, in the Township 7 North, of Range 21 East, in the Third Ward of the City of Wauwatosa, excepting therefrom that portion thereof conveyed by deed recorded in Volume 598 of Deeds, on page 34 (#647352) to the Milwaukee Sanitarium Association and further excepting therefrom that portion of said Lot 22, conveyed by deed recorded in Volume 556 of Deeds, on page 289 (#591009) to Johanna Rabenicht, also excepting therefrom the premises described in Deed Document #2343040.

Survey No. 113428

May 10, 2022
February 9, 2023 Revised Elevations / Added Topography

TO OBTAIN LOCATIONS OF PARTICIPATING UNDERGROUND FACILITIES BEFORE YOU EXCAVATE CALL DIGGERS HOTLINE 1-800-242-8511 TOLL FREE WIS STATUTE 182.0175(1974) REQUIRES MIN. 3 WORK DAYS NOTICE BEFORE YOU EXCAVATE 1-800-242-8511

N
W E
S

GRAPHIC SCALE
30 0 15 30 60 120
(IN FEET)
1 inch = 30 ft.

METROPOLITAN SURVEY SERVICE, INC.
PROFESSIONAL LAND SURVEYORS
9415 West Forest Home Avenue, Suite 202
Hales Corners, Wisconsin 53130
PH. (414) 529-5380
survey@metropolitansurvey.com
www.metropolitansurvey.com

● — Denotes Iron Pipe Found
○ — Denotes Iron Pipe Set

WISCONSIN DENNIS C. SAUER S-2421 Franklin, WI LAND SURVEYOR

I HEREBY CERTIFY THAT I HAVE SURVEYED THE ABOVE DESCRIBED PROPERTY AND THAT THE ABOVE MAP IS A TRUE REPRESENTATION THEREOF AND SHOWS THE SIZE AND LOCATION OF THE PROPERTY, ITS EXTERIOR BOUNDARIES, THE LOCATION OF ALL VISIBLE STRUCTURES AND DIMENSIONS OF ALL PRINCIPAL BUILDINGS THEREON, BOUNDARY FENCES, APPARENT EASEMENTS AND ROADWAYS AND VISIBLE ENCROACHMENT, IF ANY.

THIS SURVEY IS MADE FOR THE EXCLUSIVE USE OF THE PRESENT OWNERS OF THE PROPERTY, AND ALSO THOSE WHO PURCHASE, MORTGAGE, OR GUARANTEE THE TITLE THERETO WITHIN ONE (1) YEAR FROM THE DATE HEREOF.

SIGNED _____
Dennis C. Sauer
Professional Land Surveyor S-2421

Exhibit B – Location Map
Storm Water Management Practices Covered by this Agreement

The storm water management practices covered by this Agreement are depicted in the reduced copy of a portion of the construction plans, as shown below. The practices include biofiltration basin, catch basins, and all associated pipes and other components of these practices.

Project Name: **St. John's Evangelical Lutheran Church**
Storm water Practices: **Biofiltration Basin and Catch Basin**
Location of Practices: **Biofiltration Basin is located on northwest corner of the property.**

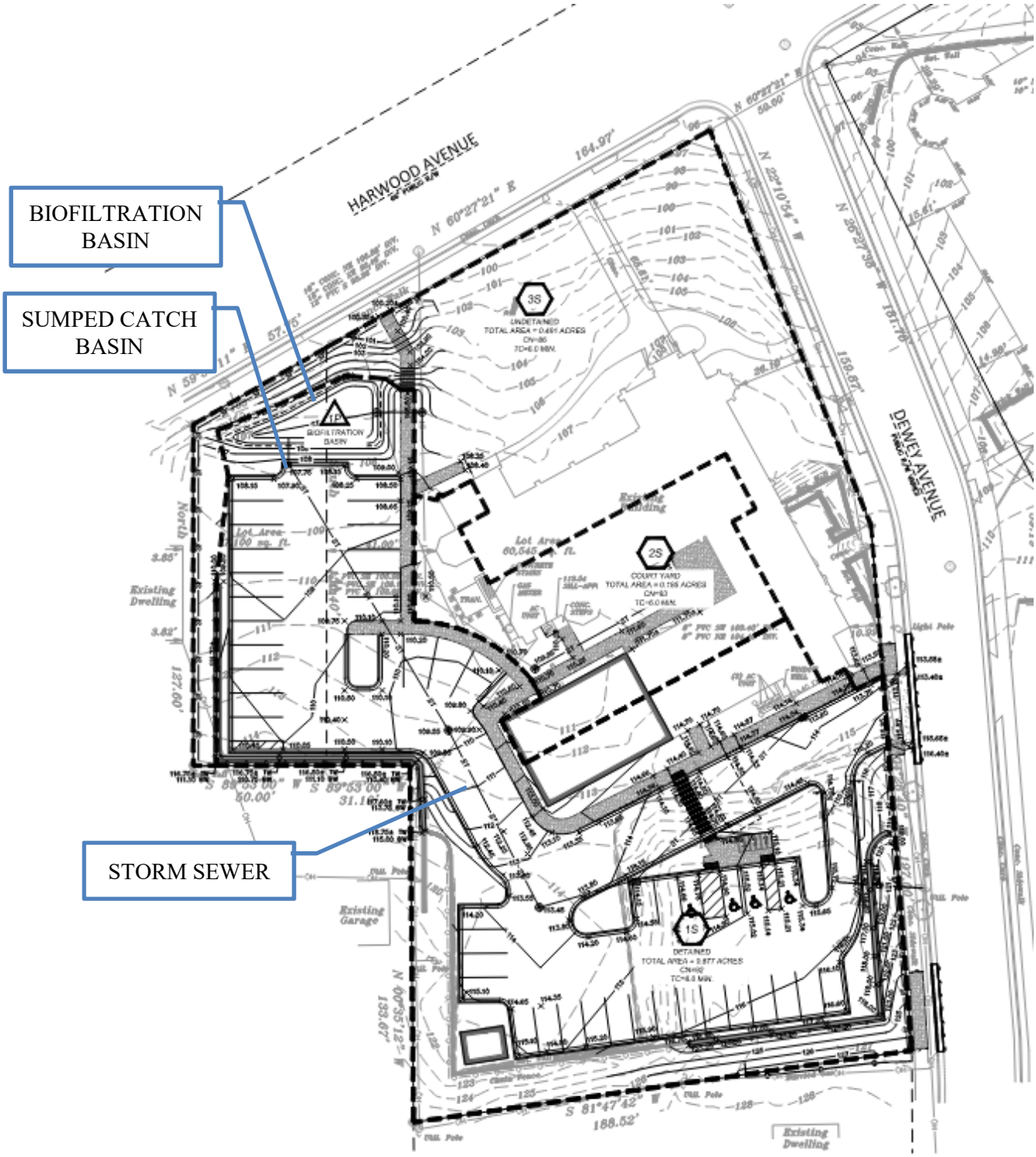


Exhibit C
Storm Water Practice Inspection/Maintenance Plan

This exhibit explains the basic function of each of the storm water practices listed in Exhibit B and prescribes the minimum maintenance requirements to remain compliant with this Agreement. The maintenance activities listed below are aimed to ensure these practices continue serving their intended functions in perpetuity. The list of activities is not all inclusive, but rather indicates the minimum type of maintenance that can be expected for this particular site. Access to the storm water practices for maintenance vehicles is shown in Exhibit B. Any failure of a storm water practice that is caused by a lack of maintenance will subject the Titleholder(s) to enforcement of the provisions listed on page 1 of this Agreement by the City of Wauwatosa.

System Description:

The biofiltration basin and catch basin are designed to meet the required green infrastructure detention volume and maintain pre-development 1-year, 2-year, and 10-year downstream peak flows. The biofiltration basin and catch basin will trap finer suspended sediment. To do this, the basin footprint, engineered soil mix, and outlet structure must be maintained as specified in proposed engineering plan.

The biofiltration basin receives runoff from a 0.877-acre drainage area. During high rainfall or snow melt events, water will temporarily rise before infiltrating into the soil and flowing through the top of the outlet control structure. Outflow from the basin is controlled by a 6-inch draintile within the sand storage layer, a 10" wide by 3" tall orifice above the bottom of the basin, and a 24-inch diameter standpipe at the northeast corner of the basin.

"As-built" design/construction drawings of the basins, showing actual dimensions, elevations, outlet structures, etc. will be recorded as an addendum(s) to this agreement within 60 days after City of Wauwatosa accepts verification of construction from the City of Wauwatosa Engineering Department.

Annual Storm Water Management Report:

The Titleholder(s) shall submit to the Engineering Department an annual report on the condition of the site's storm water management conveyance systems and devices/basins. This report shall be submitted by December 31st of each year following the termination of the Storm Water Permit by the Wisconsin DNR. The submitted annual report shall be completed and sealed by a Professional Engineer currently licensed in the State of Wisconsin, and shall contain but not limited to the following:

(a) Documentation of the completion of the required maintenance, including copies of receipts from agents hired to perform the word and the date the work was completed;
(b) Photos of the management conveyance systems and devices/basins after completion of the required maintenance.

Minimum Maintenance Requirements:

The Titleholder(s) shall submit a copy of every required inspection performed during each year, to the Engineering Department. The rough cost of annual cleaning/up keep will be as follows: $300 for the Biofiltration Basin, $100 per Catch Basin, and $50 for Misc. Structure Repairs. The responsible party is St. John's Evangelical Lutheran Church. 7809 Harwood Avenue, Wauwatosa, WI 53213.

Biofiltration Basin maintenance requirements:

1. The outlet pipe must be checked monthly to ensure there is no blockage from debris or ice.
2. Inspect the control orifice and the grate on top of the outlet structure for both of the basins a minimum of twice per year (May and October). Any blockage must be removed immediately.
3. The surface of the bio-filtration basin shall be protected from construction sediment with staging or through the use of erosion control measures. The facility shall be inspected upon completion to confirm that clogging due to construction sediment has not occurred.
4. In the first spring and summer after construction, the bio-filtration basin shall be watered once per week during the first 8 weeks if rainfall has not occurred within the previous 7 days. At least 1 inch of water is recommended per week.
5. After the initial growing season, the bio-filtration basin shall be watered as necessary during dry periods.

6. Landscaping vegetation in and around the bio-filtration basin shall be per the bio-filtration detail. Any plant replacement or reseeding shall be in accordance with the bio-filtration detail.
7. Maintenance of the bio-filtration basin shall be in accordance with Wisconsin Department of Natural Resources post construction standard 1004 – Bioretention for Infiltration.
8. Inspect the basin, outlet structure, and emergency spillway monthly for litter and debris accumulation. All litter and debris shall be removed immediately.
9. The bio-filtration basin shall be visually inspected annually, at a minimum, and maintenance shall be performed when standing water is present beyond 72 hours after a rain event.
10. If standing water is present beyond 72 hours, replacement of the engineered soil mix may be required. Replacement shall consist of removal of accumulated sediment, 18-inch undercut of engineered soil, engineered soil replacement with material consisting of 20% compost and 80% sand, and restoration in-kind. Restoration of plant material shall be by plugging, not seeding alone.
11. The engineered soil mix shall be free of rocks, stumps, roots, brush, or other material over 1 inch in diameter. Any material that may be a hindrance or harmful to plant growth shall be removed.
12. The engineered soil mix shall have adequate nutrient content to meet plant growth requirements. Periodic testing of the soil may be necessary to maintain a pH between 5.6 and 8.0.
13. Inspect the basin bottom and side slopes for erosion at inflow points and excessive input of chlorides and sodium. Sodium accumulation can be countered by adding gypsum to the engineered soil and/or allowing approximately 1" of clean water to percolate through the soil 3 to 4 times in the spring.
14. All pedestrian, vehicular and equipment is prohibited from driving onto or across the bio-filtration basin.
15. Avoid piling of snow directly onto the bio-filtration basin.
16. Inlets, and outlets must be checked after heavy rains (minimum of twice per year, May & October) for signs of erosion. Any eroding areas must be repaired immediately to prevent premature sediment build-up in the basin. Erosion matting is recommended for repairing grassed areas.
17. No trees are to be planted or allowed to grow on the earthen berms. Tree root systems can reduce soil compaction and cause berm failure. The berms must be inspected annually and any woody vegetation removed.
18. No grading or filling of the basin or berm other than for sediment removal is allowed, unless otherwise approved by the City.
19. Mowing of the bottom of the bio-filtration basin is prohibited.
20. All other repairs or maintenance needed to ensure the continued function of the basin as ordered by the City of Wauwatosa under the provisions previously listed in this Agreement.

Storm Water Conveyance System (Catch Basins/Manholes) maintenance requirements:

1. The Titleholder(s) is responsible for ensuring system inlets, outlets and any external runoff control structures remain clear of debris and blockage. The inlets and outlets shall be inspected semi-annually and/or after major storm events (more than 3.5 inches of rainfall in 24 hours). Maintenance activities/ procedure are required if the trash or debris located in front of basin is blocking more than 10% of the inletting capacity of basin, however it is recommended, that any debris or blockage found should be immediately removed.
2. Visual inspections from system access points shall be conducted semi-annually and/or after major storm events (more than 3.5 inches of rainfall in 24 hours) and, after extended periods of rainy weather (more than 3 days) and at least semi-annually. Major items to look for are excessive debris build-up at system inlets and outlets, proper system discharge, and check fractures, cracks, settlement or misalignment of structure.
3. Storm curb inlets shall be inspected semi-annually and/or after major storm events (more than 3.5 inches of rain fall in 24 hours). Any debris that is found, causing potential blockage, shall be cleaned immediately. All storm curb inlet and storm manhole sumps shall be cleaned annually, at a minimum, or when sediment in the sump has accumulated to an elevation of one foot below the outlet pipe elevation.
4. Cleanout of sediment accumulation should be based on manufacture recommendations. Cleanout shall be performed when the sediment accumulation does not allow the system to function as designed.

Inspection Form
Biofiltration Basin
Operation, Maintenance, & Management Report

Project: St. John's Evangelical Lutheran Church **Location:** 7809 Harwood Avenue, Wauwatosa, WI 53213
Site Status: **Inspector:**
Date: **Time:**

Item	Satisfactory (YES/NO)	Comments
Inspection – Required annually and after every major storm event		
Biofiltration – free of leaves, grass clippings, trash, and debris		
Basin drains within 24 hours after rainfall		
No sediment present in basin		
Surrounding areas stabilized		
No bare areas or signs of erosion within basin		
A minimum of 70% vegetation cover		
Inlet clean and working		
Other (describe)		
Maintenance		
Inlet cleaning -once per year		
Remove accumulated sediment -as needed		
If basin becomes crusted, sealed or compacted, till soil to loosen and improve infiltration – as needed		
Replace plants -as needed		
Repair eroding areas and replant -as needed		
Trash and debris removal -as needed		
Other (describe)		

Additional Comments – Actions to be Taken:

Inspection Form
Sumped Catch Basins
Operation, Maintenance, & Management Report

Project: St. John's Evangelical Lutheran Church **Location:** 7809 Harwood Avenue, Wauwatosa, WI 53213
Site Status: **Inspector:**
Date: **Time:**

Item	Satisfactory (YES/NO)	Comments
Inspection – Required annually and after every major storm event		
Inlet – free of leaves, grass clippings, trash, and debris		
Depth of water above accumulated sediment in the sump (measured by lowering a pole into the structure) > 0.5 ft Depth > 0.5 ft — cleaning is not required Depth < 0.5 ft — cleaning is required		
Surrounding areas stabilized		
Inlet clean and working		
Other (describe)		
Maintenance		
Vacuum cleaning for sediment removal -Typically every 5 years		
High pressure hose cleaning for remaining sediments -Typically every 5 years		
Disposal of polluted water, oils, sediment and trash		
Repair -as needed		
Trash and debris removal -as needed		
Other (describe)		

Additional Comments – Actions to be Taken: