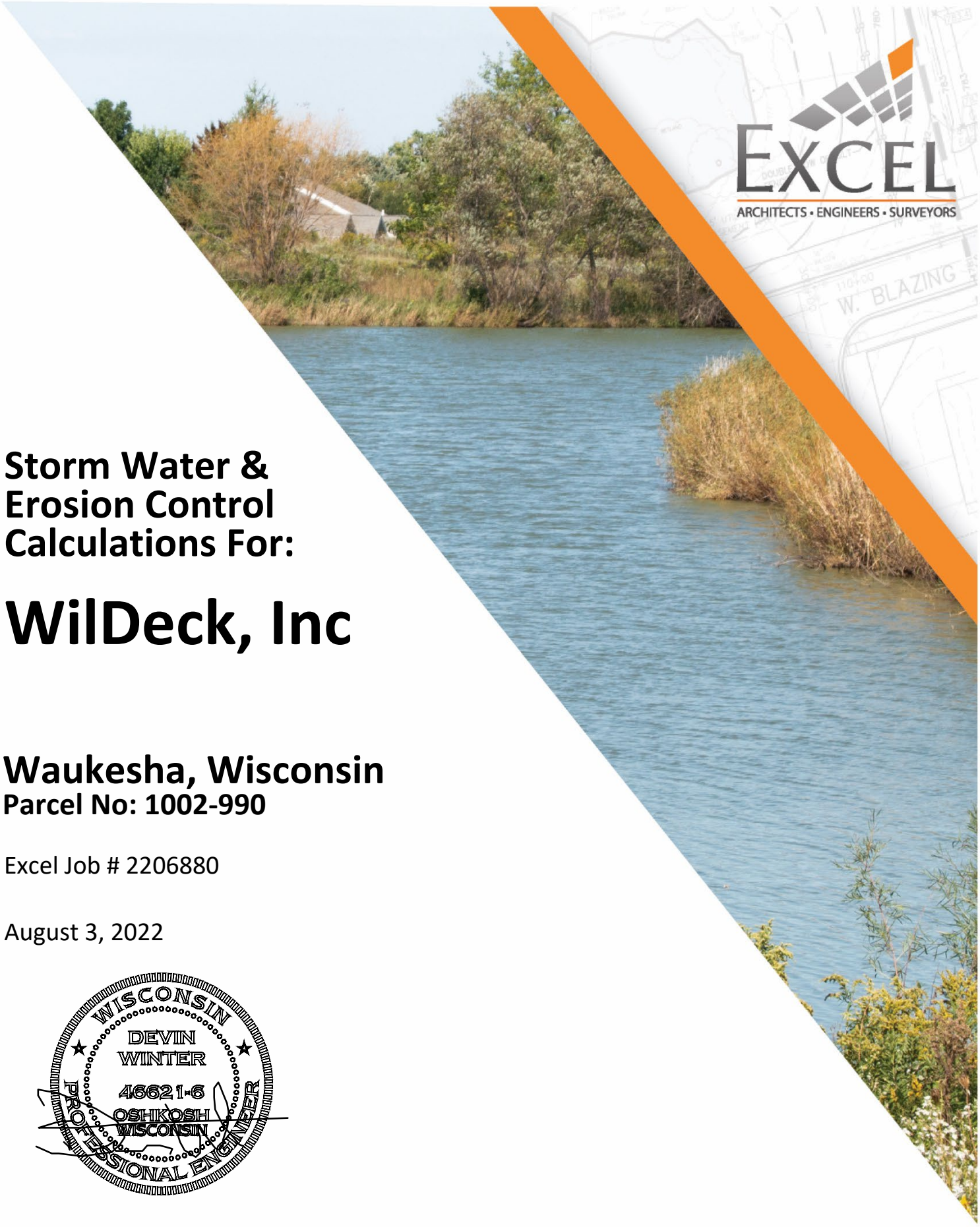

EXCEL
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Storm Water & Erosion Control Calculations For:

WilDeck, Inc

Waukesha, Wisconsin
Parcel No: 1002-990

Excel Job # 2206880

August 3, 2022

WISCONSIN
DEVIN
WINTER
46621-6
OSHKOSH
WISCONSIN
PROFESSIONAL ENGINEER

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Table of Contents

Appendices

0.0 Introduction

0.1 Existing Conditions

The proposed development is located on the west side of E. North Street in the City of Waukesha, Wisconsin. The project site is bound by additional ownership property to the north, E. North Street to the east, commercial property to the south, and residential properties to the west. The project site is east of additional existing property manufacturing facilities and will not be immediately adjacent to the residential property. The existing site currently contains various buildings, drive aisles/parking area, and electrical substations. The site currently drains from the west to the east. The existing site is built into a hill and contains approximately 70' of elevation change across the overall site. The project site contains approximately 35' of elevation change. The existing project site (limits of disturbance) contains 97.5% impervious surface coverage.

- Property Area: 13.88 acres

0.2 Proposed Project Overview

The proposed project will include the demolition of the buildings within the project limits, a new building addition, and additional parking lots for office employees. The proposed development will drain to inlets that will drain stormwater east to a proposed storm sewer that contributes to the existing storm sewer on site. The storm filter system will treat stormwater to meet local and state requirements. The site is considered a redevelopment project so the project will be exempt from peak discharge and infiltration requirements. The proposed project site (limits of disturbance) contains 64.5% impervious surface coverage. A reduction of approximately 0.90 acres of impervious surfaces is proposed.

- Disturbed Area: 2.72 acres

1.0 Design Criteria

1.1 Soils

Soil characteristics were determined using the web soil survey. See Table 1 for a summary of the soils and hydrologic ratings indicated by the web soil survey and Appendix A for web soil survey map.

Table 1: Web Soil Survey

MAP SYMBOL	SOIL TYPE	HYDROLOGIC RATING
Lu	Loamy Land	D

1.2 Rainfall Data

City of Waukesha rainfall depths with a MSE 3 distribution was used for stormwater calculations.

Table 2: City of Waukesha 24-hour Rainfall Depths

DESIGN STORM	RAINFALL DEPTH (INCHES)
10-YEAR	3.81
100-YEAR	6.18

2.0 Stormwater Management Requirements

2.1 Peak Discharge

City of Waukesha - The site is considered a redevelopment post construction site. Reduce post development runoff to pre development runoff rates.

Wisconsin DNR- The site is considered a redevelopment post construction site. Therefore, the project is exempt from peak discharge requirements.

In addition to the redevelopment classification of the site, the proposed redevelopment will increase open space within the limits of disturbance by 39,190 sf (0.90 acres) or 33%. As a result, post development discharge will be reduced below pre development runoff rates.

Therefore, peak discharge requirements are met.

2.2 Stormwater Quality

City of Waukesha- The site is considered a redevelopment project and will be required to remove 40% of total suspended solids (TSS) from runoff from parking areas and roads.

Wisconsin DNR- The site is considered a redevelopment project and will be required to remove 40% of total suspended solids (TSS) from runoff from parking areas and roads.

Table 3: Required Removal Summary

	TOTAL LOADING (LBS.)	REQUIRED TREATMENT	REQUIRED TSS REMOVAL (LBS.)
REDEVELOPMENT	1,211	40% of parking and roads	**484.4**

The site will treat stormwater using a storm filter structure (Hydro-International Upflo Structure or eq). A total of 859.1 lbs. of suspended solids will drain to the storm filter structure annually and 278.1 lbs. will be discharged offsite. See Table 4 for a summary of the stormwater quality requirements and the annual loading removed by the stormwater management BMP. See Appendix F for SLAMM input and output information.

Table 4: Stormwater Quality Summary

TSS REMOVAL REQUIRED (LBS)	TSS REMOVAL PROVIDED (LBS)
484.4	581.0

Therefore, stormwater quality requirements are met.

2.3 Infiltration

City of Waukesha - The site is considered a redevelopment post construction site. Provide 60% of the predevelopment infiltration rate.

Wisconsin DNR- The site is considered a redevelopment post construction site. Therefore, the project is exempt from infiltration requirements.

In addition to the redevelopment classification of the site, the proposed redevelopment will increase open space within the limits of disturbance by 39,190 sf (0.90 acres) or 33% and significantly increase the infiltration of the site. The post development infiltration rate will exceed the predevelopment infiltration rate.

Therefore, Infiltration requirements are met.

3.0 Storm Sewer Design

All storm sewer has been designed to convey the 10-year 24-hour post development storm.

See Appendix B, Appendix C, and Appendix D for pipe drainage areas and pipe sizing calculations.

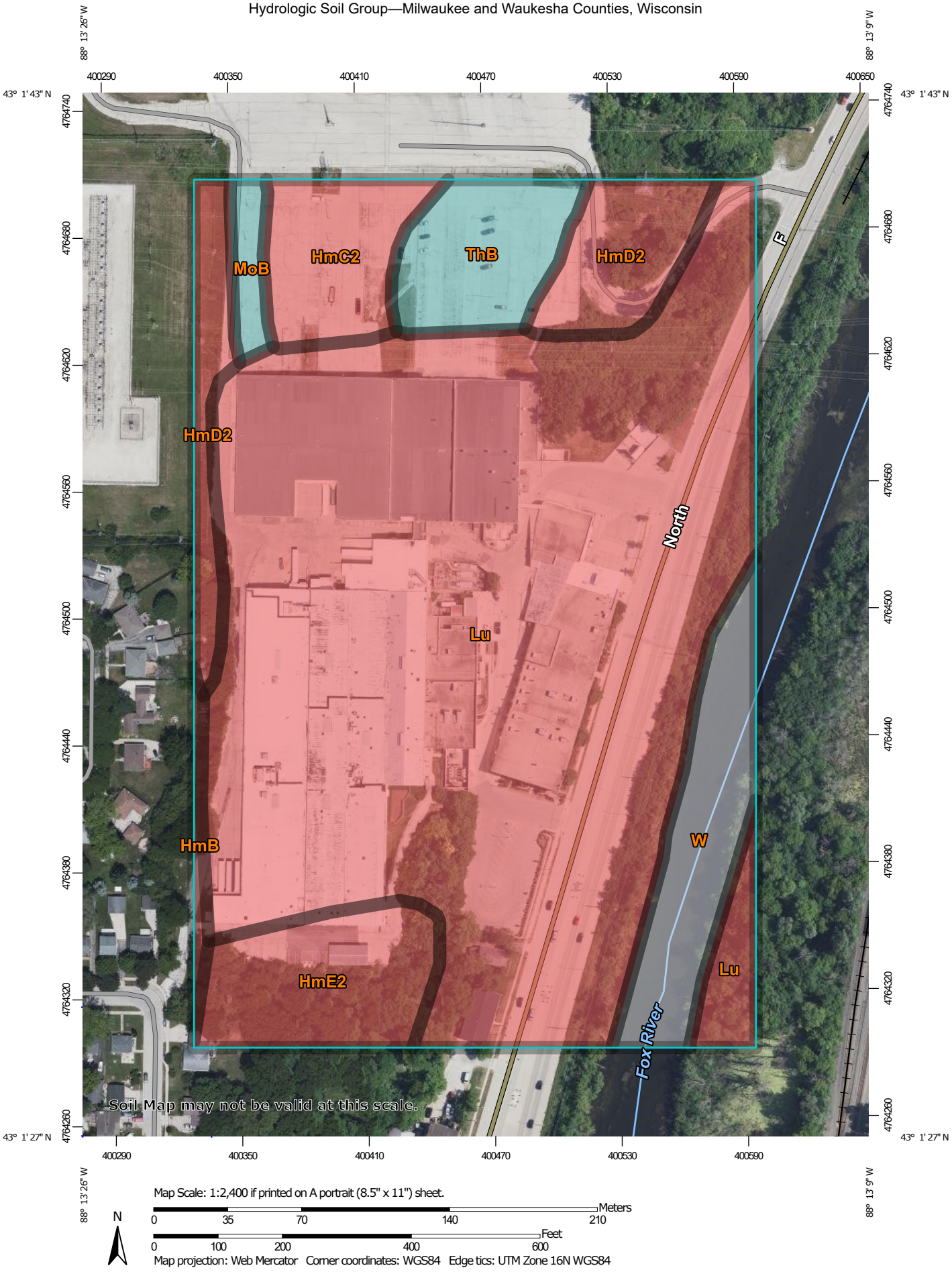
3.1 Emergency Overflow Route

The emergency overflow route is to the east, over the curb and gutter. Maximum ponding onsite will be 6” in drive aisles and 6” in parking stalls.

4.0 Erosion Control

The erosion control specifications, construction sequence, site stabilization notes, seeding notes, dewatering notes, and post construction and maintenance plan will be included on sheet C0.1 of the construction plan set.

Appendix A: Web Soil Survey Map



Map Scale: 1:2,400 if printed on A portrait (8.5" x 11") sheet.

N

Meters: 0 35 70 140 210

Feet: 0 100 200 400 600

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 Rating Polygons

- A
- A/D
- B
- B/D
- C
- C/D
- D
- Not rated or not available

Soil Rating Lines

- A
- A/D
- B
- B/D
- C
- C/D
- D
- Not rated or not available

Soil Rating Points

- A
- A/D
- B
- B/D
- C
- C/D
- D
- Not rated or not available

Water Features

- Streams and Canals

Transportation

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

Background

- Aerial Photography

MAP INFORMATION

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

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 17, Sep 10, 2021

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—Aug 20, 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.

Hydrologic Soil Group

Map unit symbol	Map unit name	Rating	Acres in AOI	Percent of AOI
HmB	Hochheim loam, 2 to 6 percent slopes	D	0.2	0.7%
HmC2	Hochheim loam, 6 to 12 percent slopes, eroded	D	1.3	4.6%
HmD2	Hochheim loam, 12 to 20 percent slopes, eroded	D	1.9	7.0%
HmE2	Hochheim loam, 20 to 30 percent slopes	D	1.7	6.1%
Lu	Loamy land	D	18.8	69.2%
MoB	Mayville silt loam, 2 to 6 percent slopes	C	0.3	1.2%
ThB	Theresa silt loam, 2 to 6 percent slopes	C	1.3	4.8%
W	Water		1.7	6.3%
Totals for Area of Interest			**27.1**	**100.0%**

Description

Hydrologic soil groups are based on estimates of runoff potential. Soils are assigned to one of four groups according to the rate of water infiltration when the soils are not protected by vegetation, are thoroughly wet, and receive precipitation from long-duration storms.

The soils in the United States are assigned to four groups (A, B, C, and D) and three dual classes (A/D, B/D, and C/D). The groups are defined as follows:

Group A. Soils having a high infiltration rate (low runoff potential) when thoroughly wet. These consist mainly of deep, well drained to excessively drained sands or gravelly sands. These soils have a high rate of water transmission.

Group B. Soils having a moderate infiltration rate when thoroughly wet. These consist chiefly of moderately deep or deep, moderately well drained or well drained soils that have moderately fine texture to moderately coarse texture. These soils have a moderate rate of water transmission.

Group C. Soils having a slow infiltration rate when thoroughly wet. These consist chiefly of soils having a layer that impedes the downward movement of water or soils of moderately fine texture or fine texture. These soils have a slow rate of water transmission.

Group D. Soils having a very slow infiltration rate (high runoff potential) when thoroughly wet. These consist chiefly of clays that have a high shrink-swell potential, soils that have a high water table, soils that have a claypan or clay layer at or near the surface, and soils that are shallow over nearly impervious material. These soils have a very slow rate of water transmission.

If a soil is assigned to a dual hydrologic group (A/D, B/D, or C/D), the first letter is for drained areas and the second is for undrained areas. Only the soils that in their natural condition are in group D are assigned to dual classes.

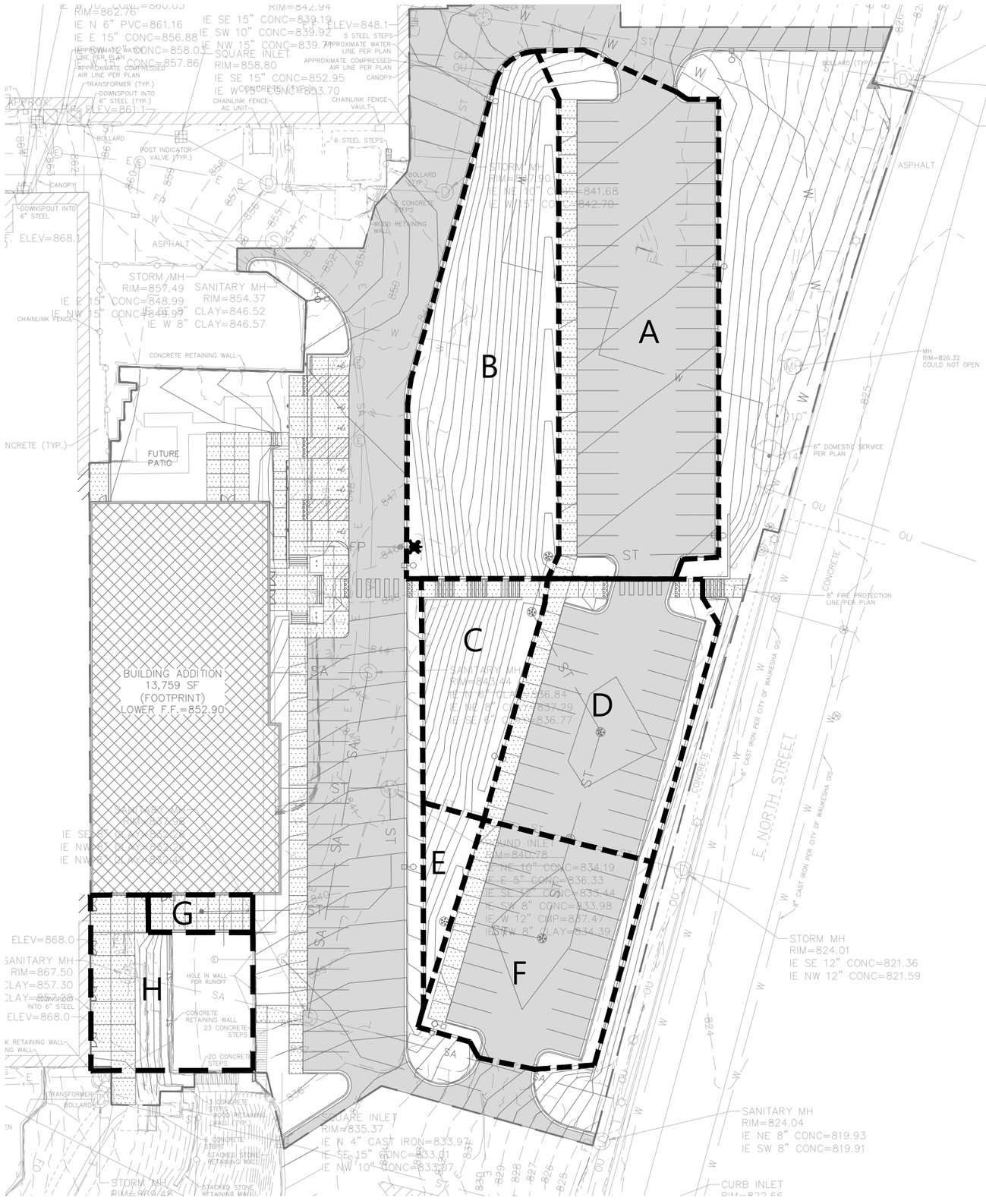
Rating Options

Aggregation Method: Dominant Condition

Component Percent Cutoff: None Specified

Tie-break Rule: Higher

Appendix B: Storm Sewer Basin Map



PIPE BASIN	TOTAL (SF)	TOTAL (AC)	PAVEMENT (SF)	PAVEMENT (AC)	OPEN (SF)	OPEN (AC)
A	15,195	0.35	14,472	0.33	723	0.02
B	11,813	0.27	0	0.00	11,813	0.27
C	4,236	0.10	450	0.01	3,786	0.09
D	8,744	0.20	8,004	0.18	740	0.02
E	1,175	0.03	0	0.00	1,175	0.03
F	7,465	0.17	6,805	0.16	660	0.02
G	740	0.02	740	0.02	0	0.00
H	4,636	0.11	3,701	0.08	935	0.02

NORTH

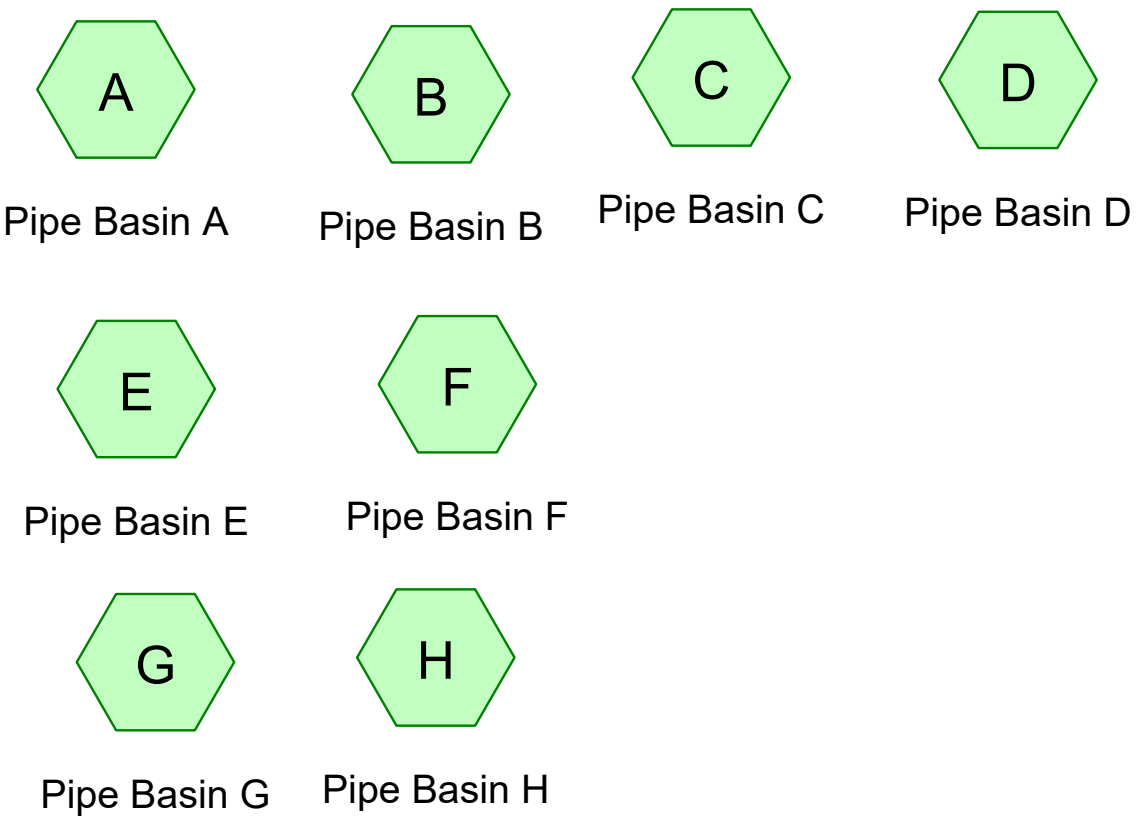
STORM SEWER BASIN MAP

1"= 50'

50' 0 50' 100'

SCALE 1"=50' (11X17) FEET

Appendix C: Storm Sewer TR-55 Calculations



Subcat Reach Pond Link

Routing Diagram for 2206860-Storm Runoff Calculations
Prepared by {enter your company name here}, Printed 6/23/2022
HydroCAD® 10.00-21 s/n 01178 © 2018 HydroCAD Software Solutions LLC

Area Listing (all nodes)

Area (acres)	CN	Description (subcatchment-numbers)
0.470	80	>75% Grass cover, Good, HSG D (A, B, C, D, E, F, H)
0.780	98	Paved parking, HSG D (A, C, D, F, G, H)
1.250	**91**	**TOTAL AREA**

Soil Listing (all nodes)

Area (acres)	Soil Group	Subcatchment Numbers
0.000	HSG A	
0.000	HSG B	
0.000	HSG C	
1.250	HSG D	A, B, C, D, E, F, G, H
0.000	Other	
1.250		**TOTAL AREA**

Ground Covers (all nodes)

HSG-A (acres)	HSG-B (acres)	HSG-C (acres)	HSG-D (acres)	Other (acres)	Total (acres)	Ground Cover	Subcatchment Numbers
0.000	0.000	0.000	0.470	0.000	0.470	>75% Grass cover, Good	A, B, C, D, E, F, H
0.000	0.000	0.000	0.780	0.000	0.780	Paved parking	A, C, D, F, G, H
0.000	**0.000**	**0.000**	**1.250**	**0.000**	**1.250**	**TOTAL AREA**	

Time span=5.00-20.00 hrs, dt=0.05 hrs, 301 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: Pipe Basin A Runoff Area=0.350 ac 94.29% Impervious Runoff Depth>3.35"
Tc=6.0 min CN=97 Runoff=1.89 cfs 0.098 af

Subcatchment B: Pipe Basin B Runoff Area=0.270 ac 0.00% Impervious Runoff Depth>1.80"
Tc=6.0 min CN=80 Runoff=0.91 cfs 0.041 af

Subcatchment C: Pipe Basin C Runoff Area=0.100 ac 10.00% Impervious Runoff Depth>1.96"
Tc=6.0 min CN=82 Runoff=0.36 cfs 0.016 af

Subcatchment D: Pipe Basin D Runoff Area=0.200 ac 90.00% Impervious Runoff Depth>3.24"
Tc=6.0 min CN=96 Runoff=1.06 cfs 0.054 af

Subcatchment E: Pipe Basin E Runoff Area=0.030 ac 0.00% Impervious Runoff Depth>1.80"
Tc=6.0 min CN=80 Runoff=0.10 cfs 0.005 af

Subcatchment F: Pipe Basin F Runoff Area=0.180 ac 88.89% Impervious Runoff Depth>3.24"
Tc=6.0 min CN=96 Runoff=0.96 cfs 0.049 af

Subcatchment G: Pipe Basin G Runoff Area=0.020 ac 100.00% Impervious Runoff Depth>3.44"
Tc=6.0 min CN=98 Runoff=0.11 cfs 0.006 af

Subcatchment H: Pipe Basin H Runoff Area=0.100 ac 80.00% Impervious Runoff Depth>3.04"
Tc=6.0 min CN=94 Runoff=0.51 cfs 0.025 af

Total Runoff Area = 1.250 ac Runoff Volume = 0.293 af Average Runoff Depth = 2.81"
37.60% Pervious = 0.470 ac 62.40% Impervious = 0.780 ac

Summary for Subcatchment A: Pipe Basin A

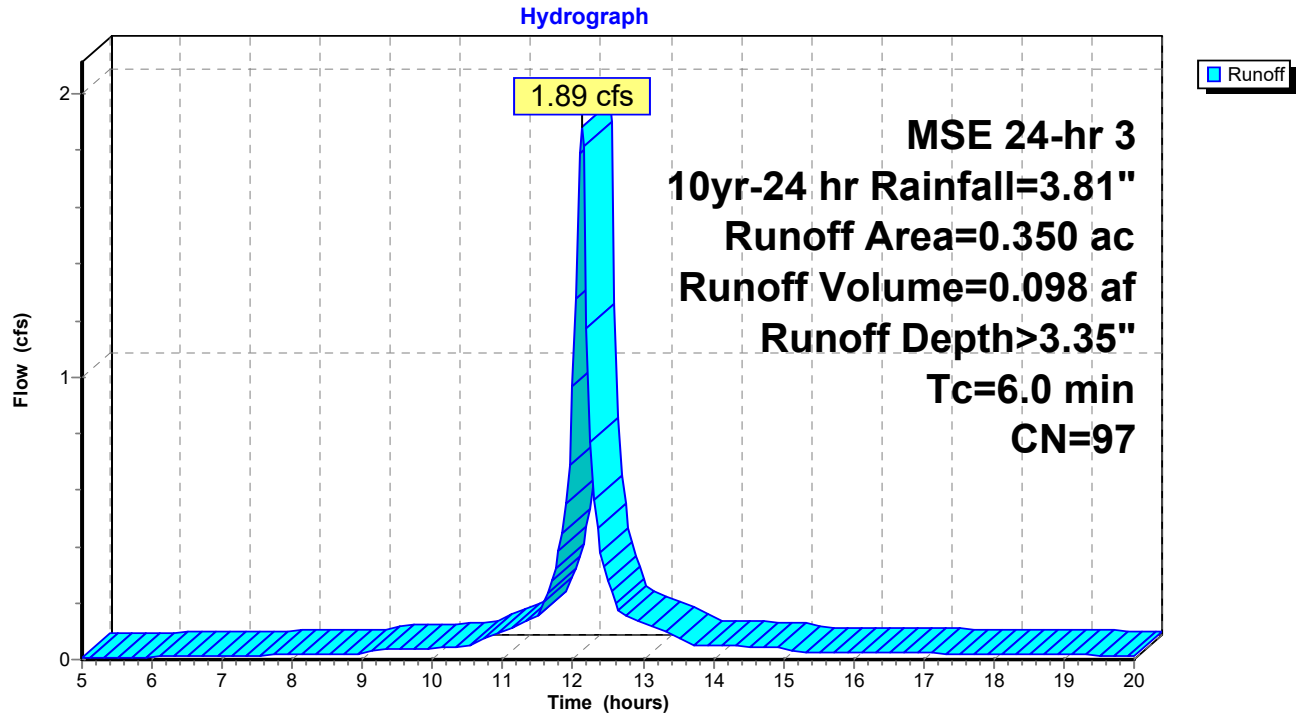
Runoff = 1.89 cfs @ 12.13 hrs, Volume= 0.098 af, Depth> 3.35"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
MSE 24-hr 3 10yr-24 hr Rainfall=3.81"

Area (ac)	CN	Description
0.330	98	Paved parking, HSG D
0.020	80	>75% Grass cover, Good, HSG D
0.350	97	Weighted Average
0.020		5.71% Pervious Area
0.330		94.29% Impervious Area

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

Subcatchment A: Pipe Basin A



Summary for Subcatchment B: Pipe Basin B

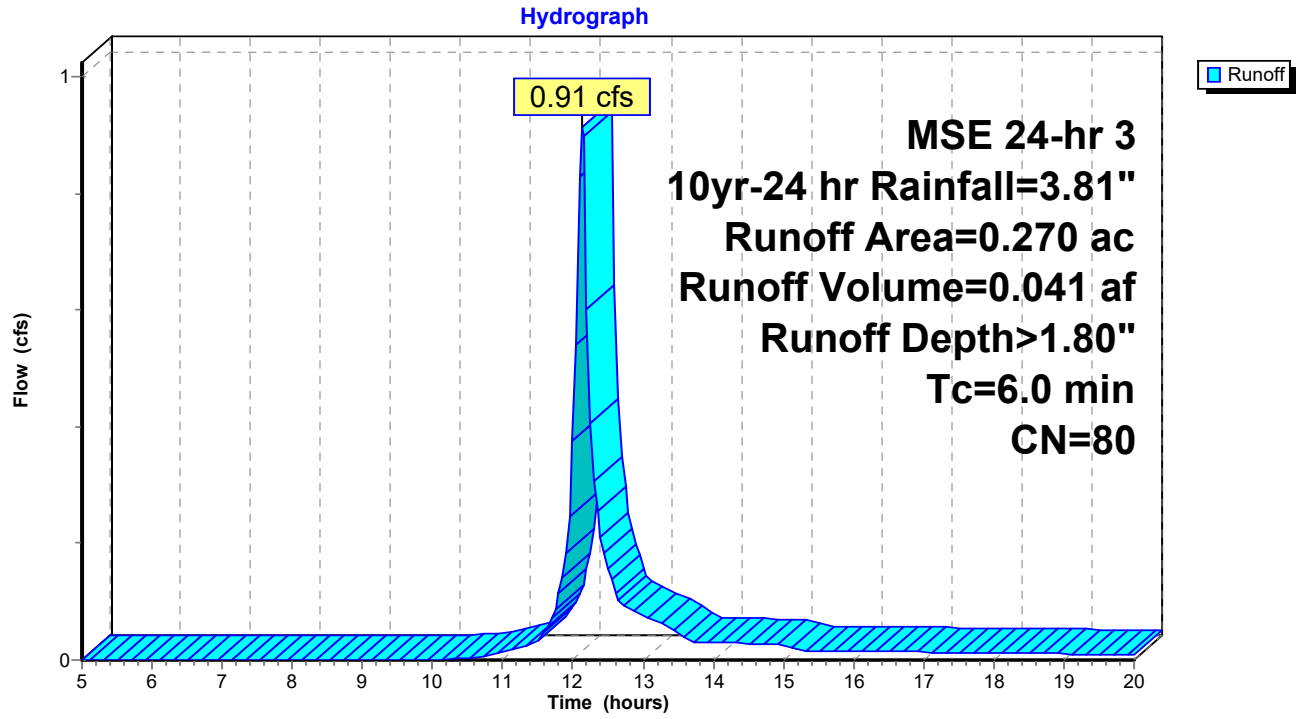
Runoff = 0.91 cfs @ 12.13 hrs, Volume= 0.041 af, Depth> 1.80"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
MSE 24-hr 3 10yr-24 hr Rainfall=3.81"

Area (ac)	CN	Description
0.000	98	Paved parking, HSG D
0.270	80	>75% Grass cover, Good, HSG D
0.270	80	Weighted Average
0.270		100.00% Pervious Area

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

Subcatchment B: Pipe Basin B



Summary for Subcatchment C: Pipe Basin C

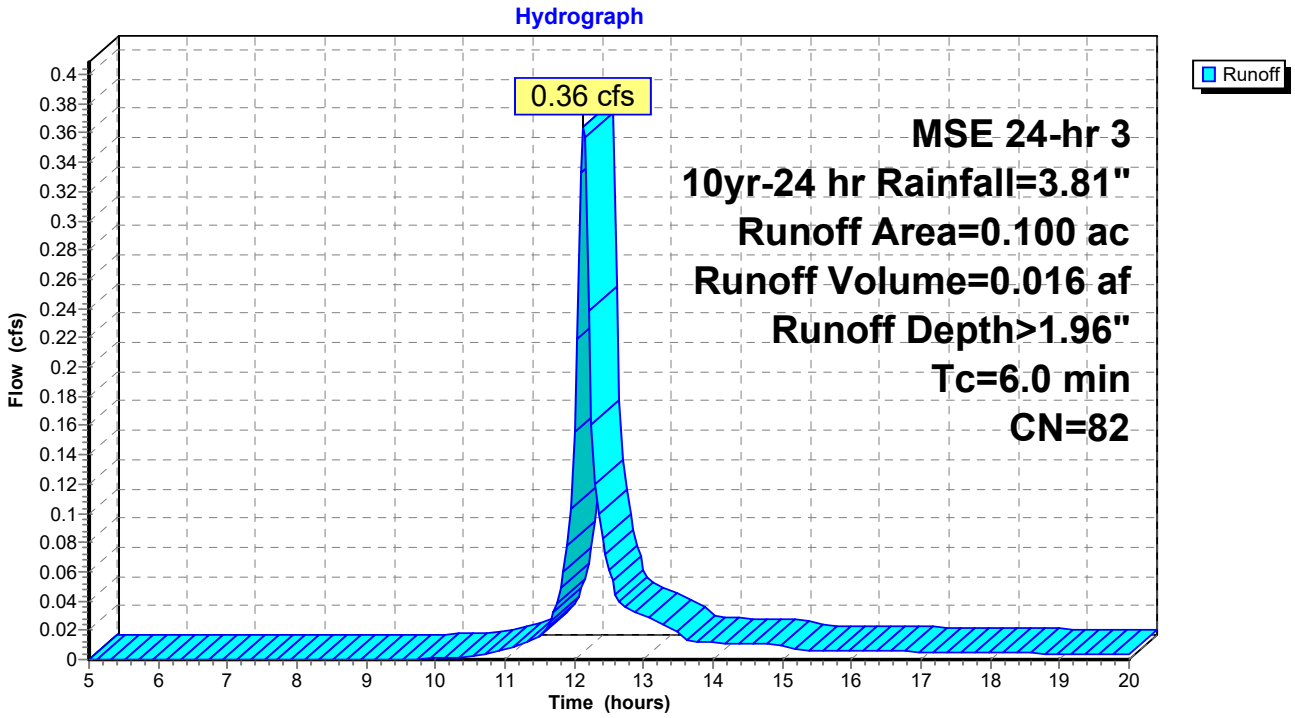
Runoff = 0.36 cfs @ 12.13 hrs, Volume= 0.016 af, Depth> 1.96"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
MSE 24-hr 3 10yr-24 hr Rainfall=3.81"

Area (ac)	CN	Description
0.010	98	Paved parking, HSG D
0.090	80	>75% Grass cover, Good, HSG D
0.100	82	Weighted Average
0.090		90.00% Pervious Area
0.010		10.00% Impervious Area

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

Subcatchment C: Pipe Basin C



Summary for Subcatchment D: Pipe Basin D

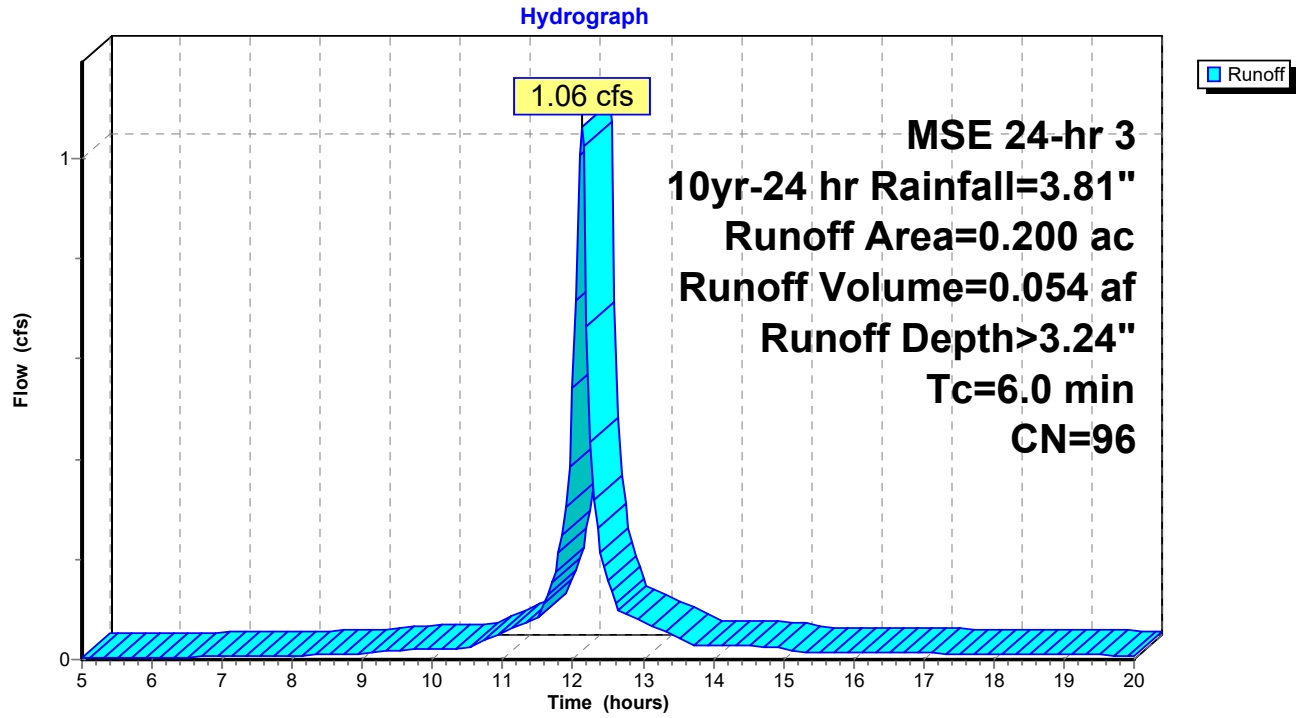
Runoff = 1.06 cfs @ 12.13 hrs, Volume= 0.054 af, Depth> 3.24"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
MSE 24-hr 3 10yr-24 hr Rainfall=3.81"

Area (ac)	CN	Description
0.180	98	Paved parking, HSG D
0.020	80	>75% Grass cover, Good, HSG D
0.200	96	Weighted Average
0.020		10.00% Pervious Area
0.180		90.00% Impervious Area

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

Subcatchment D: Pipe Basin D



Summary for Subcatchment E: Pipe Basin E

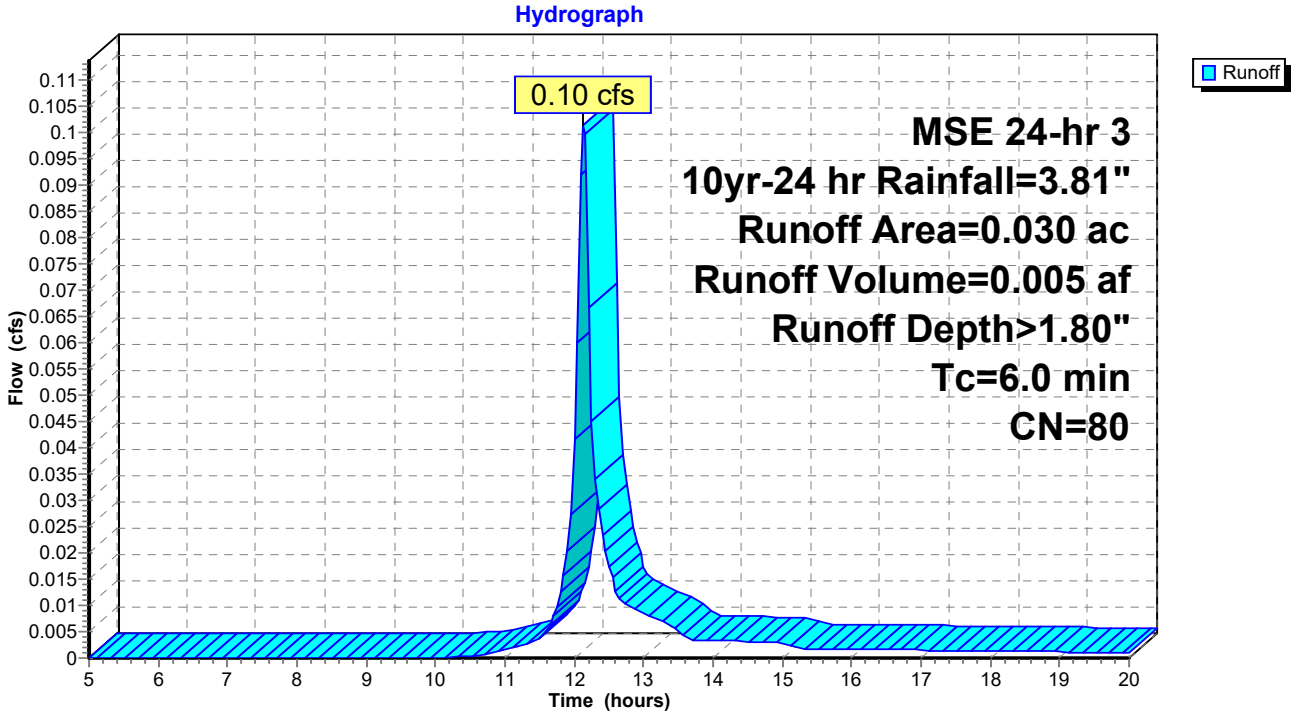
Runoff = 0.10 cfs @ 12.13 hrs, Volume= 0.005 af, Depth> 1.80"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
MSE 24-hr 3 10yr-24 hr Rainfall=3.81"

Area (ac)	CN	Description
0.000	98	Paved parking, HSG D
0.030	80	>75% Grass cover, Good, HSG D
0.030	80	Weighted Average
0.030		100.00% Pervious Area

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

Subcatchment E: Pipe Basin E



Summary for Subcatchment F: Pipe Basin F

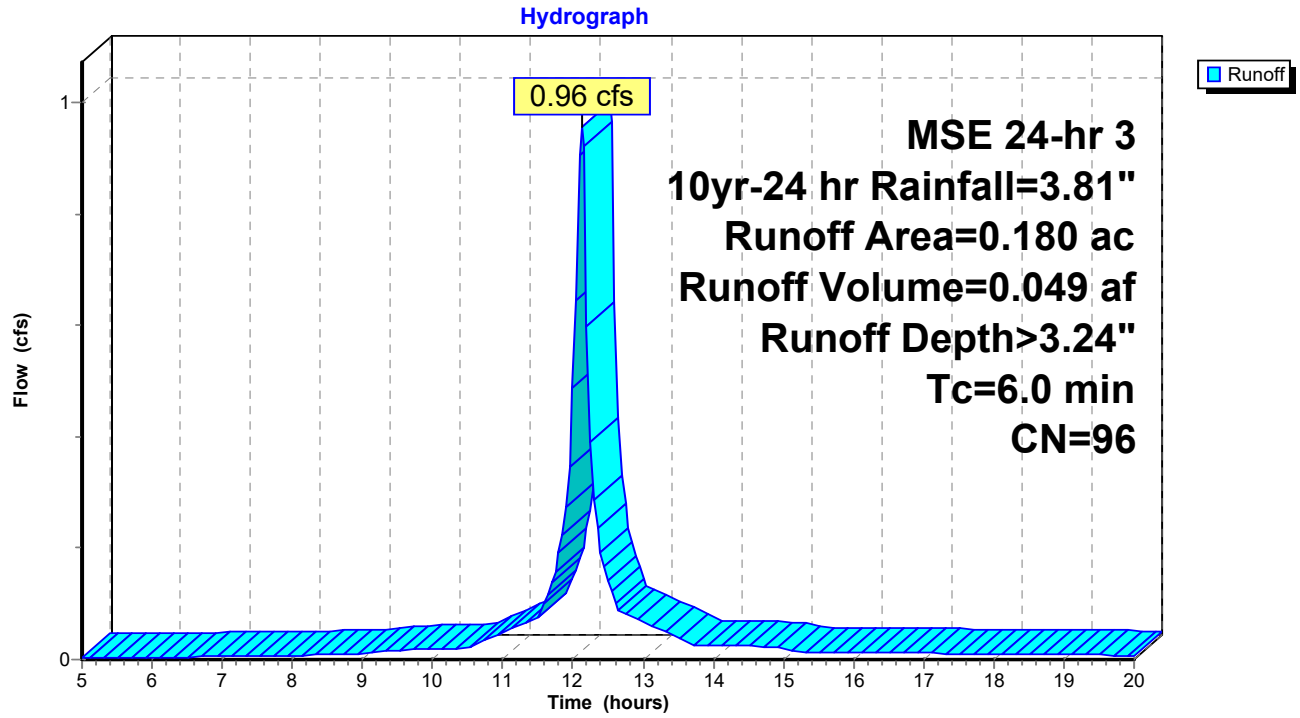
Runoff = 0.96 cfs @ 12.13 hrs, Volume= 0.049 af, Depth> 3.24"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
MSE 24-hr 3 10yr-24 hr Rainfall=3.81"

Area (ac)	CN	Description
0.160	98	Paved parking, HSG D
0.020	80	>75% Grass cover, Good, HSG D
0.180	96	Weighted Average
0.020		11.11% Pervious Area
0.160		88.89% Impervious Area

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

Subcatchment F: Pipe Basin F



Summary for Subcatchment G: Pipe Basin G

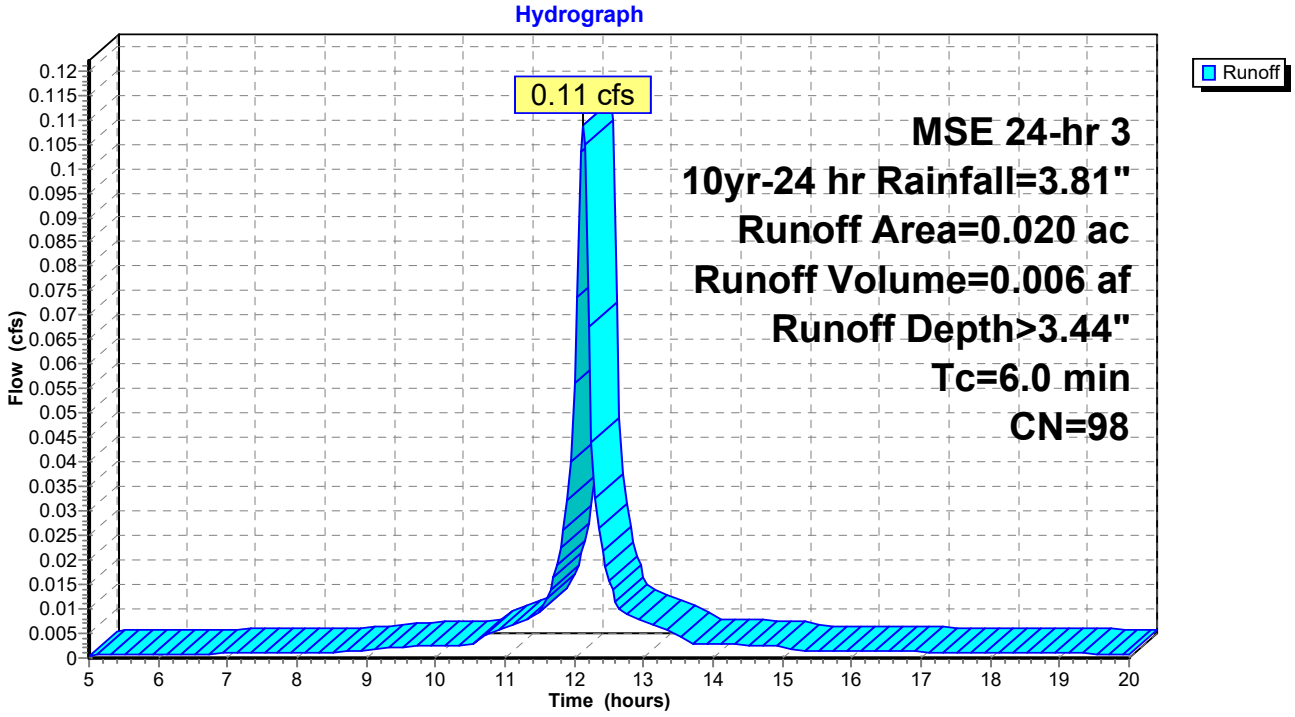
Runoff = 0.11 cfs @ 12.13 hrs, Volume= 0.006 af, Depth> 3.44"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
MSE 24-hr 3 10yr-24 hr Rainfall=3.81"

Area (ac)	CN	Description
0.020	98	Paved parking, HSG D
0.000	80	>75% Grass cover, Good, HSG D
0.020	98	Weighted Average
0.020		100.00% Impervious Area

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

Subcatchment G: Pipe Basin G



Summary for Subcatchment H: Pipe Basin H

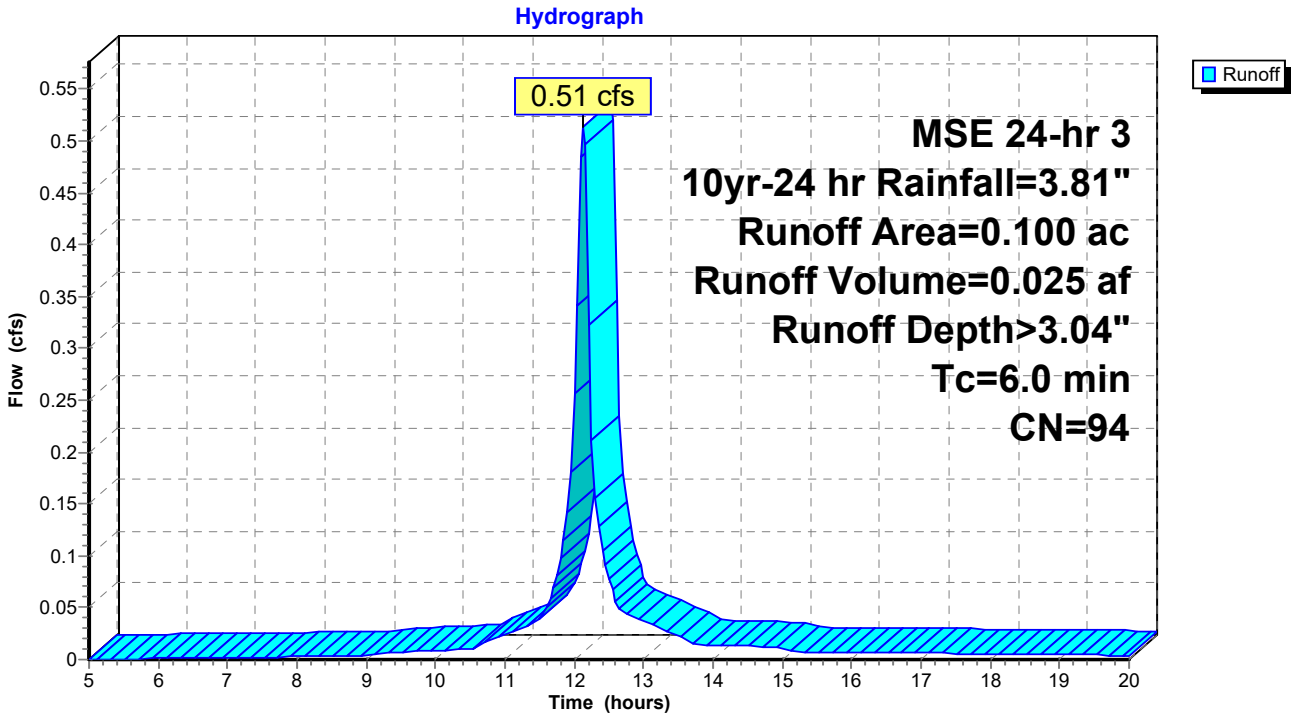
Runoff = 0.51 cfs @ 12.13 hrs, Volume= 0.025 af, Depth> 3.04"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
MSE 24-hr 3 10yr-24 hr Rainfall=3.81"

Area (ac)	CN	Description
0.080	98	Paved parking, HSG D
0.020	80	>75% Grass cover, Good, HSG D
0.100	94	Weighted Average
0.020		20.00% Pervious Area
0.080		80.00% Impervious Area

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

Subcatchment H: Pipe Basin H



Time span=5.00-20.00 hrs, dt=0.05 hrs, 301 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: Pipe Basin A Runoff Area=0.350 ac 94.29% Impervious Runoff Depth>5.60"
Tc=6.0 min CN=97 Runoff=3.10 cfs 0.163 af

Subcatchment B: Pipe Basin B Runoff Area=0.270 ac 0.00% Impervious Runoff Depth>3.79"
Tc=6.0 min CN=80 Runoff=1.87 cfs 0.085 af

Subcatchment C: Pipe Basin C Runoff Area=0.100 ac 10.00% Impervious Runoff Depth>4.00"
Tc=6.0 min CN=82 Runoff=0.72 cfs 0.033 af

Subcatchment D: Pipe Basin D Runoff Area=0.200 ac 90.00% Impervious Runoff Depth>5.51"
Tc=6.0 min CN=96 Runoff=1.76 cfs 0.092 af

Subcatchment E: Pipe Basin E Runoff Area=0.030 ac 0.00% Impervious Runoff Depth>3.79"
Tc=6.0 min CN=80 Runoff=0.21 cfs 0.009 af

Subcatchment F: Pipe Basin F Runoff Area=0.180 ac 88.89% Impervious Runoff Depth>5.51"
Tc=6.0 min CN=96 Runoff=1.58 cfs 0.083 af

Subcatchment G: Pipe Basin G Runoff Area=0.020 ac 100.00% Impervious Runoff Depth>5.69"
Tc=6.0 min CN=98 Runoff=0.18 cfs 0.009 af

Subcatchment H: Pipe Basin H Runoff Area=0.100 ac 80.00% Impervious Runoff Depth>5.30"
Tc=6.0 min CN=94 Runoff=0.87 cfs 0.044 af

Total Runoff Area = 1.250 ac Runoff Volume = 0.520 af Average Runoff Depth = 4.99"
37.60% Pervious = 0.470 ac 62.40% Impervious = 0.780 ac

Summary for Subcatchment A: Pipe Basin A

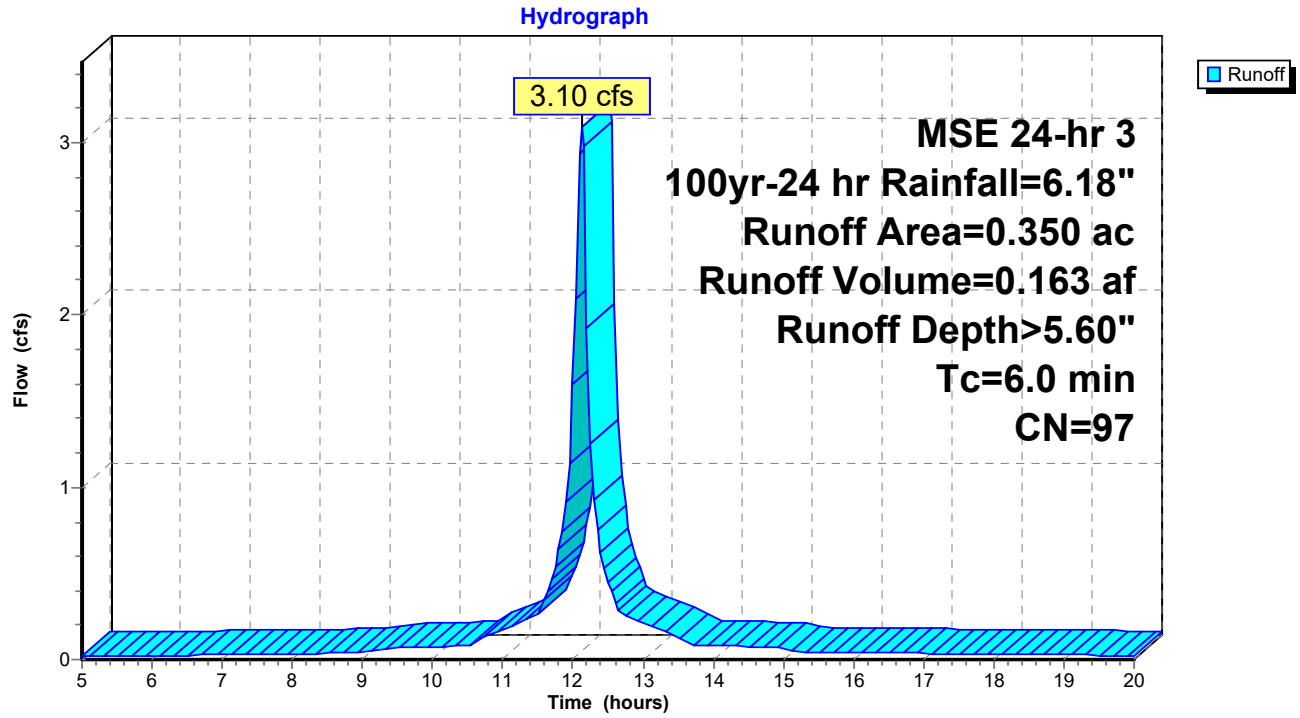
Runoff = 3.10 cfs @ 12.13 hrs, Volume= 0.163 af, Depth> 5.60"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
MSE 24-hr 3 100yr-24 hr Rainfall=6.18"

Area (ac)	CN	Description
0.330	98	Paved parking, HSG D
0.020	80	>75% Grass cover, Good, HSG D
0.350	97	Weighted Average
0.020		5.71% Pervious Area
0.330		94.29% Impervious Area

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

Subcatchment A: Pipe Basin A



Summary for Subcatchment B: Pipe Basin B

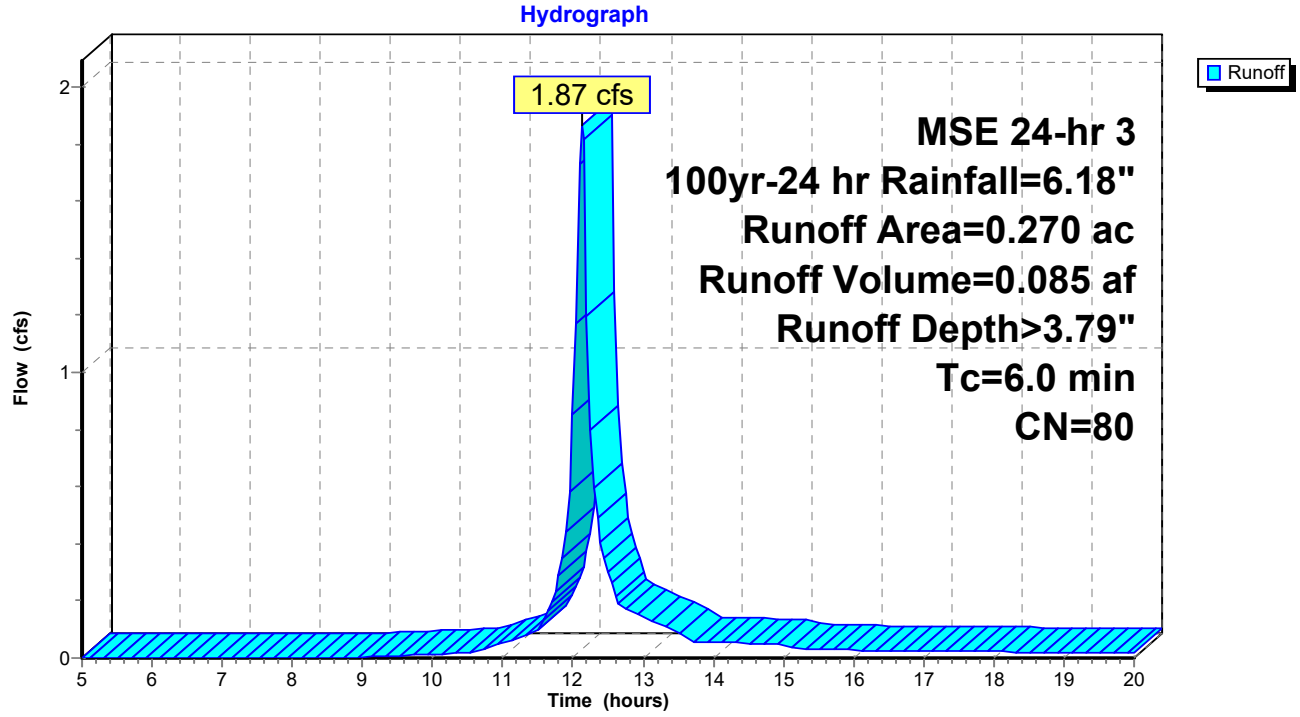
Runoff = 1.87 cfs @ 12.13 hrs, Volume= 0.085 af, Depth> 3.79"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
MSE 24-hr 3 100yr-24 hr Rainfall=6.18"

Area (ac)	CN	Description
0.000	98	Paved parking, HSG D
0.270	80	>75% Grass cover, Good, HSG D
0.270	80	Weighted Average
0.270		100.00% Pervious Area

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

Subcatchment B: Pipe Basin B



Summary for Subcatchment C: Pipe Basin C

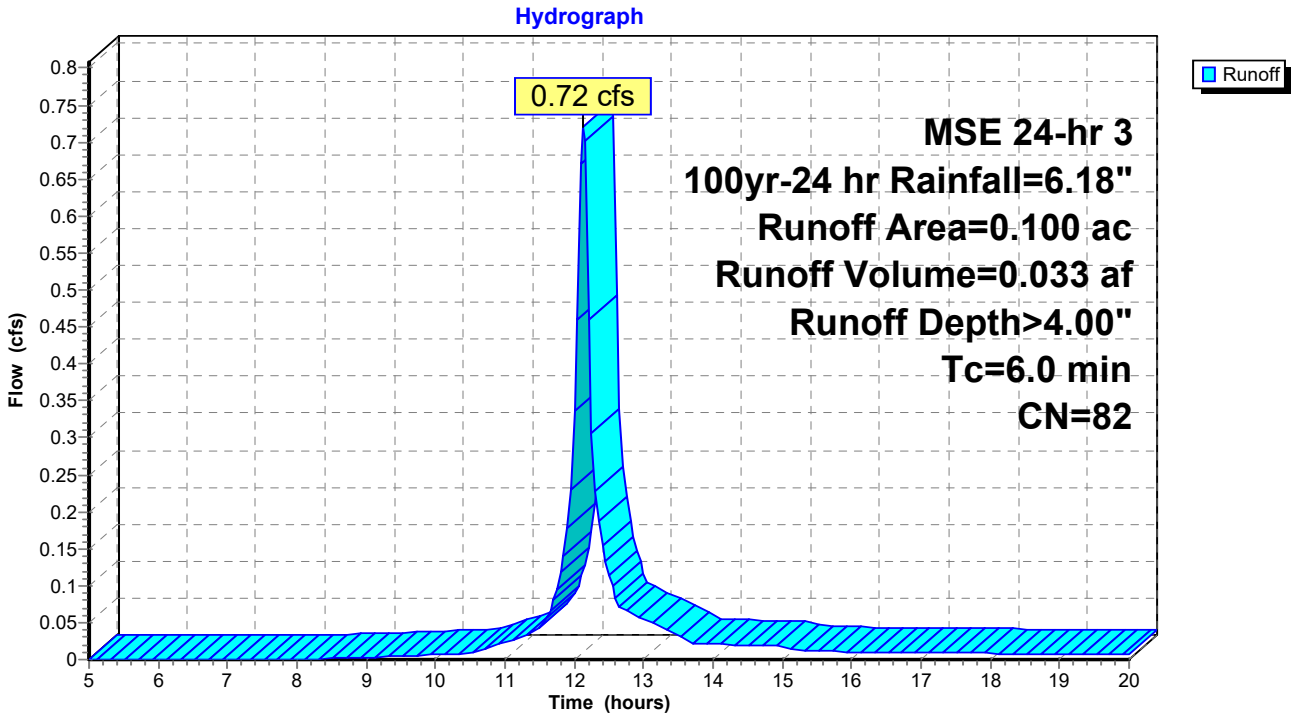
Runoff = 0.72 cfs @ 12.13 hrs, Volume= 0.033 af, Depth> 4.00"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
MSE 24-hr 3 100yr-24 hr Rainfall=6.18"

Area (ac)	CN	Description
0.010	98	Paved parking, HSG D
0.090	80	>75% Grass cover, Good, HSG D
0.100	82	Weighted Average
0.090		90.00% Pervious Area
0.010		10.00% Impervious Area

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

Subcatchment C: Pipe Basin C



Summary for Subcatchment D: Pipe Basin D

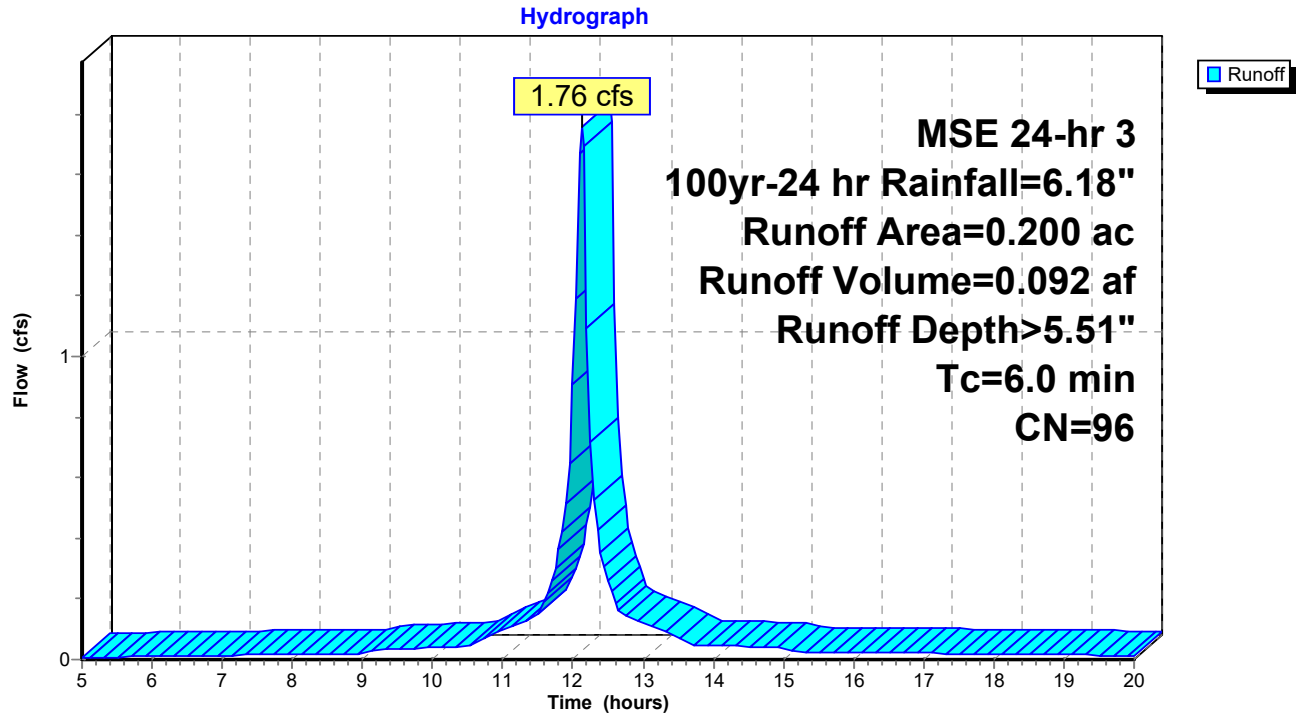
Runoff = 1.76 cfs @ 12.13 hrs, Volume= 0.092 af, Depth> 5.51"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
MSE 24-hr 3 100yr-24 hr Rainfall=6.18"

Area (ac)	CN	Description
0.180	98	Paved parking, HSG D
0.020	80	>75% Grass cover, Good, HSG D
0.200	96	Weighted Average
0.020		10.00% Pervious Area
0.180		90.00% Impervious Area

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

Subcatchment D: Pipe Basin D



Summary for Subcatchment E: Pipe Basin E

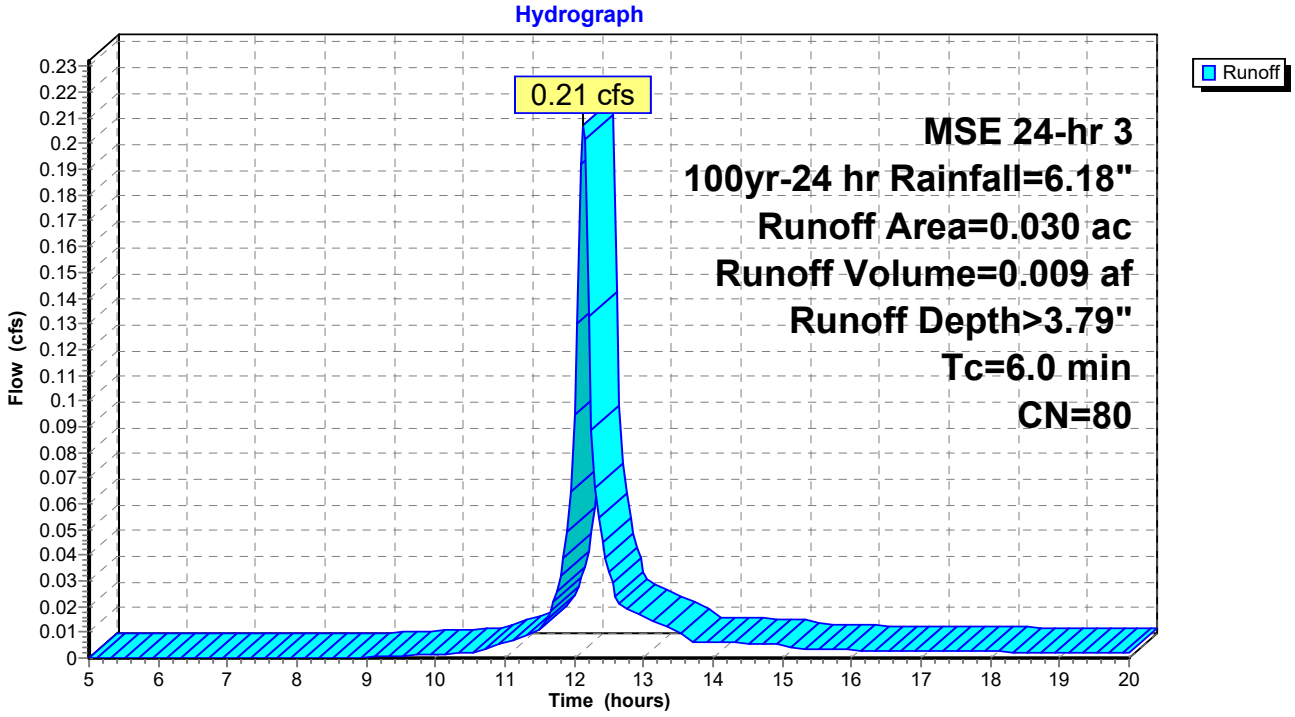
Runoff = 0.21 cfs @ 12.13 hrs, Volume= 0.009 af, Depth> 3.79"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
MSE 24-hr 3 100yr-24 hr Rainfall=6.18"

Area (ac)	CN	Description
0.000	98	Paved parking, HSG D
0.030	80	>75% Grass cover, Good, HSG D
0.030	80	Weighted Average
0.030		100.00% Pervious Area

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

Subcatchment E: Pipe Basin E



Summary for Subcatchment F: Pipe Basin F

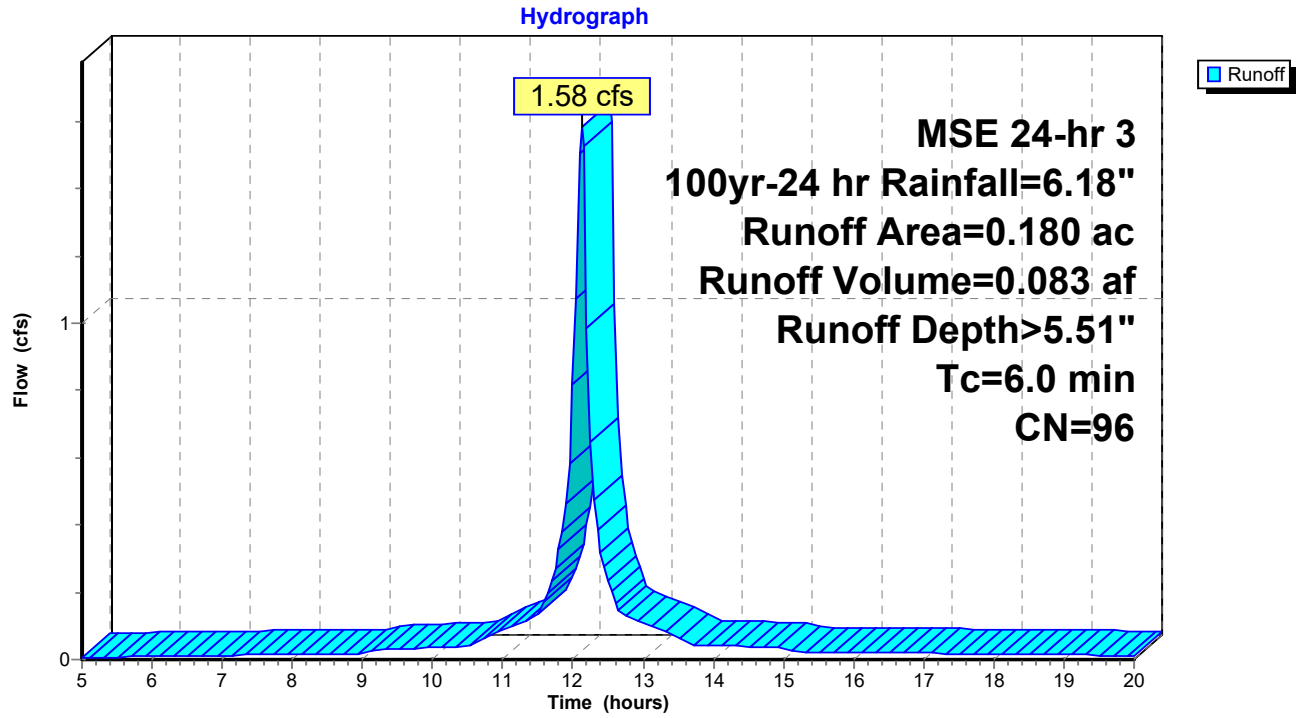
Runoff = 1.58 cfs @ 12.13 hrs, Volume= 0.083 af, Depth> 5.51"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
MSE 24-hr 3 100yr-24 hr Rainfall=6.18"

Area (ac)	CN	Description
0.160	98	Paved parking, HSG D
0.020	80	>75% Grass cover, Good, HSG D
0.180	96	Weighted Average
0.020		11.11% Pervious Area
0.160		88.89% Impervious Area

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

Subcatchment F: Pipe Basin F



Summary for Subcatchment G: Pipe Basin G

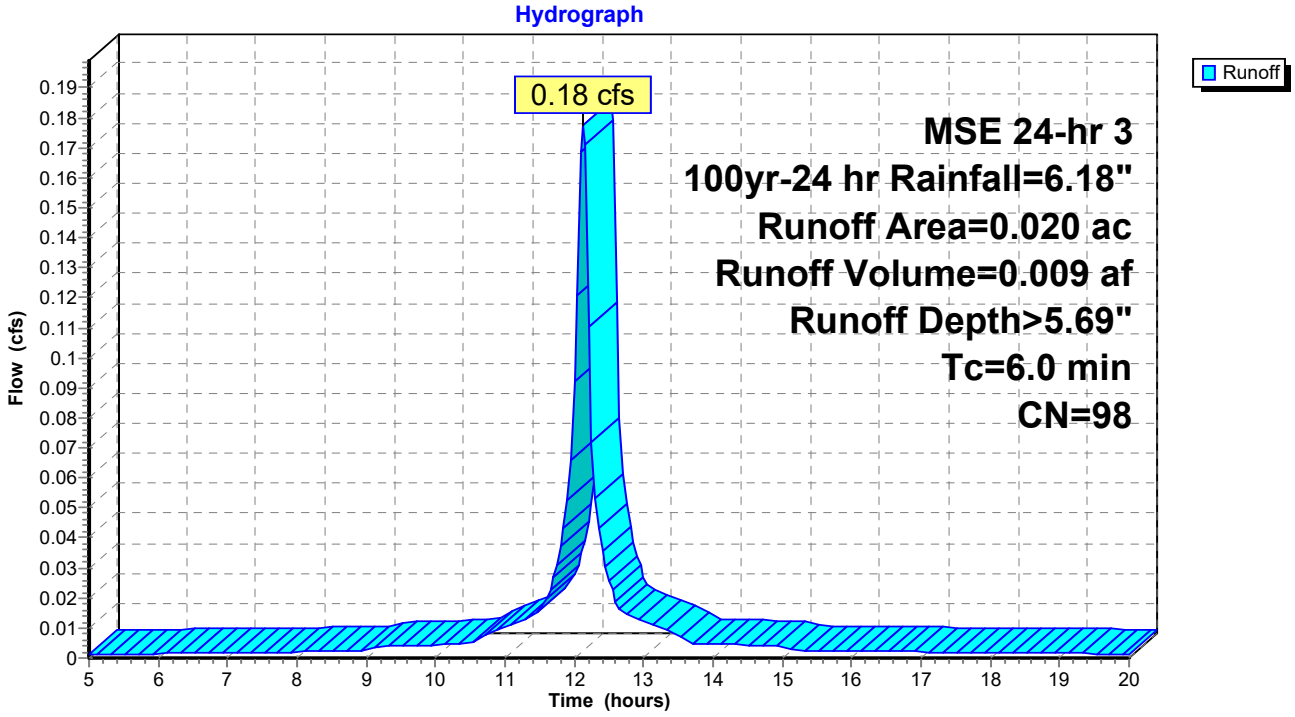
Runoff = 0.18 cfs @ 12.13 hrs, Volume= 0.009 af, Depth> 5.69"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
MSE 24-hr 3 100yr-24 hr Rainfall=6.18"

Area (ac)	CN	Description
0.020	98	Paved parking, HSG D
0.000	80	>75% Grass cover, Good, HSG D
0.020	98	Weighted Average
0.020		100.00% Impervious Area

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

Subcatchment G: Pipe Basin G



Summary for Subcatchment H: Pipe Basin H

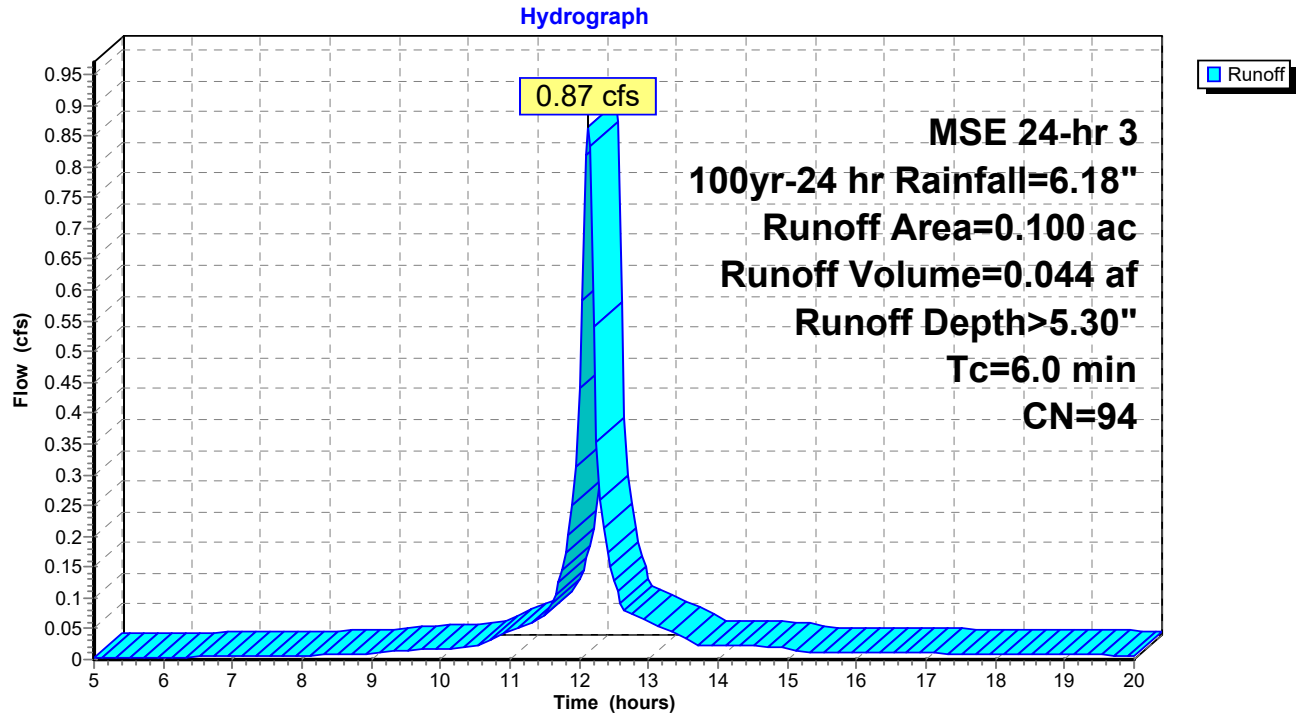
Runoff = 0.87 cfs @ 12.13 hrs, Volume= 0.044 af, Depth> 5.30"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
MSE 24-hr 3 100yr-24 hr Rainfall=6.18"

Area (ac)	CN	Description
0.080	98	Paved parking, HSG D
0.020	80	>75% Grass cover, Good, HSG D
0.100	94	Weighted Average
0.020		20.00% Pervious Area
0.080		80.00% Impervious Area

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

Subcatchment H: Pipe Basin H



Appendix D: Storm Sewer Manning's Spreadsheet

Excel Engineering Project No. 2206880 Project Name Office Addition-WilDeck, Inc

Pipe Data				Pipe Capacity (10-yr)				
Pipe ID	Diameter (FT)	Slope (FT/FT)	Manning's n	Basin No.	Total Flow (cfs)	Total Flow (gpm)	Full Flow Capacity (cfs)	Full Flow Capacity (gpm)
A	1	0.010	0.012	A	1.89	848	3.87	1737
B	1	0.010	0.012	A,B	2.80	1257	3.87	1737
C	1.25	0.005	0.012	A,B,C	3.16	1418	4.96	2227
D	1.25	0.005	0.012	A,B,C,D	4.22	1894	4.96	2227
E	0.67	0.010	0.012	E	0.10	45	1.33	597
F	1	0.010	0.012	E,F	1.06	476	3.87	1737
G	0.67	0.010	0.012	G,H	0.62	278	1.33	597
H	0.67	0.010	0.012	H	0.51	229	1.33	597

Full Flow Capacity based off Manning's Equation $Q = \frac{1.49}{n} R^{2/3} S^{1/2} a$

Where:
Q = Full Flow Capacity of Pipe (cfs)
n = manning's roughness coefficient
R = hydraulic radius (ft) (D/4)
s = hydraulic gradient, slope (ft/ft)
a = flow area (sq. ft.)

Typical Manning's n

HDPE	0.012
PVC	0.012
Concrete	0.013
CMP	0.024

*Total Flow calculated via TR-55 hydrologic calculations. Reference Storm Pipe Basin Map & TR-55 Calculations

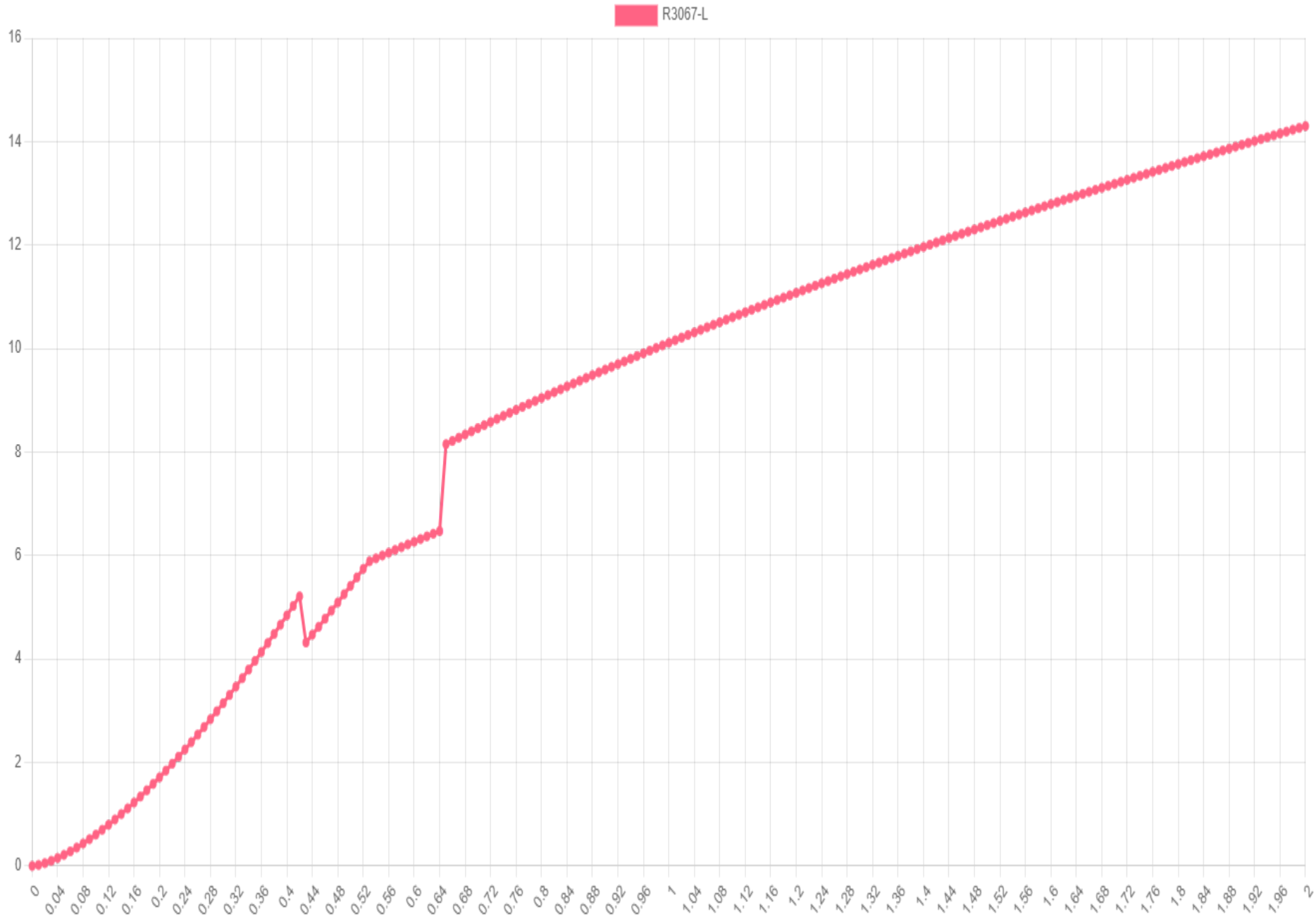
Appendix E: Storm Inlet Calculations

CALCULATORS

WEIR ORIFICE CALCULATOR

GRATE TYPE	OPEN AREA (SF)	PERIMETER
R3067-L	**2.1**	**5.8**

SUMP CONDITION CAPACITY CHART



Appendix F: SLAMM Basin Map & Input/ Output Information

WINSLAMM BASIN MAP

NORTH

1"= 50'

50' 0 50' 100'

SCALE 1"=50' (11X17) FEET

Data file name: F:\Job Files\2206880 1900 E North\2206884 Civil\storm water report and calculations\40% Required.mdb
WinSLAMM Version 10.4.1
Rain file name: J:\Programs\civil\WinSLAMM\v10.4.1\Parameter Files\WisReg - Milwaukee 1969.ran
Particulate Solids Concentration file name: J:\Programs\civil\WinSLAMM\v10.4.1\Parameter Files\v10.1 WI_AVG01.pscx
Runoff Coefficient file name: J:\Programs\civil\WinSLAMM\v10.4.1\Parameter Files\WI_SL06 Dec06.rsvx
Residential Street Delivery file name: J:\Programs\civil\WinSLAMM\v10.4.1\Parameter Files\WI_Res and Other Urban Dec06.std
Institutional Street Delivery file name: J:\Programs\civil\WinSLAMM\v10.4.1\Parameter Files\WI_Com Inst Indust Dec06.std
Commercial Street Delivery file name: J:\Programs\civil\WinSLAMM\v10.4.1\Parameter Files\WI_Com Inst Indust Dec06.std
Industrial Street Delivery file name: J:\Programs\civil\WinSLAMM\v10.4.1\Parameter Files\WI_Com Inst Indust Dec06.std
Other Urban Street Delivery file name: J:\Programs\civil\WinSLAMM\v10.4.1\Parameter Files\WI_Res and Other Urban Dec06.std
Freeway Street Delivery file name: J:\Programs\civil\WinSLAMM\v10.4.1\Parameter Files\Freeway Dec06.std
Apply Street Delivery Files to Adjust the After Event Load Street Dirt Mass Balance: False
Pollutant Relative Concentration file name: J:\Programs\civil\WinSLAMM\v10.4.1\Parameter Files\WI_GEO03.ppdx
Source Area PSD and Peak to Average Flow Ratio File: J:\Programs\civil\WinSLAMM\v10.4.1\Parameter Files\NURP Source Area PSD Files.csv
Cost Data file name:
If Other Device Pollutant Load Reduction Values = 1, Off-site Pollutant Loads are Removed from Pollutant Load % Reduction calculations
Seed for random number generator: -42
Study period starting date: 01/05/69 Study period ending date: 12/31/69
Start of Winter Season: 12/06 End of Winter Season: 03/28
Date: 06-23-2022 Time: 14:27:13
Site information:

LU# 1 - Industrial: Industrial 1 Total area (ac): 1.010
  13 - Paved Parking 1: 1.010 ac. Connected Source Area PSD File: C:\WinSLAMM Files\NURP.cpz

SLAMM for Windows Version 10.4.1
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Data file name: F:\Job Files\2206880 1900 E North\2206884 Civil\storm water report and calculations\40% Required.mdb
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Particulate Solids Concentration file name: J:\Programs\civil\WinSLAMM\v10.4.1\Parameter Files\v10.1 WI_AVG01.pscx
Runoff Coefficient file name: J:\Programs\civil\WinSLAMM\v10.4.1\Parameter Files\WI_SL06 Dec06.rsvx
Pollutant Relative Concentration file name: J:\Programs\civil\WinSLAMM\v10.4.1\Parameter Files\WI_GEO03.ppdx
Residential Street Delivery file name: J:\Programs\civil\WinSLAMM\v10.4.1\Parameter Files\WI_Res and Other Urban Dec06.std
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Commercial Street Delivery file name: J:\Programs\civil\WinSLAMM\v10.4.1\Parameter Files\WI_Com Inst Indust Dec06.std
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Freeway Street Delivery file name: J:\Programs\civil\WinSLAMM\v10.4.1\Parameter Files\Freeway Dec06.std
Apply Street Delivery Files to Adjust the After Event Load Street Dirt Mass Balance: False
Source Area PSD and Peak to Average Flow Ratio File: J:\Programs\civil\WinSLAMM\v10.4.1\Parameter Files\NURP Source Area PSD Files.csv
Cost Data file name:
If Other Device Pollutant Load Reduction Values = 1, Off-site Pollutant Loads are Removed from Pollutant Load % Reduction calculations
Seed for random number generator: -42
Start of Winter Season: 12/06 End of Winter Season: 03/28
Model Run Start Date: 01/05/69 Model Run End Date: 12/31/69
Date of run: 06-23-2022 Time of run: 14:27:06
Total Area Modeled (acres): 1.010
Years in Model Run: 0.99

	Runoff Volume (cu ft)	Percent Runoff Volume Reduction	Particulate Solids Conc. (mg/L)	Particulate Solids Yield (lbs)	Percent Solids Particulate Reduction
Total of all Land Uses without Controls:	77594	-	250.0	1211	-
Outfall Total with Controls:	77595	0.00%	250.0	1211	0.00%
Annualized Total After Outfall Controls:	78672			1228	

Data file name: F:\Job Files\2206880 1900 E North\2206884 Civil\storm water report and calculations\WinSlamm.mdb
WinSLAMM Version 10.4.1
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Runoff Coefficient file name: J:\Programs\civil\WinSLAMM\v10.4.1\Parameter Files\WI_SL06 Dec06.rsvx
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Other Urban Street Delivery file name: J:\Programs\civil\WinSLAMM\v10.4.1\Parameter Files\WI_Res and Other Urban Dec06.std
Freeway Street Delivery file name: J:\Programs\civil\WinSLAMM\v10.4.1\Parameter Files\Freeway Dec06.std
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Cost Data file name:
If Other Device Pollutant Load Reduction Values = 1, Off-site Pollutant Loads are Removed from Pollutant Load % Reduction calculations
Seed for random number generator: -42
Study period starting date: 01/05/69 Study period ending date: 12/31/69
Start of Winter Season: 12/06 End of Winter Season: 03/28
Date: 06-23-2022 Time: 14:27:44
Site information:

LU# 1 - Industrial: Basin A Total area (ac): 0.900
13 - Paved Parking 1: 0.510 ac. Connected Source Area PSD File: C:\WinSLAMM Files\NURP.cpz
45 - Large Landscaped Areas 1: 0.390 ac. Normal Clayey Low Density Source Area PSD File: C:\WinSLAMM Files\NURP.cpz

LU# 2 - Industrial: Basin B Total area (ac): 0.190
13 - Paved Parking 1: 0.170 ac. Connected Source Area PSD File: C:\WinSLAMM Files\NURP.cpz
45 - Large Landscaped Areas 1: 0.020 ac. Normal Clayey Low Density Source Area PSD File: C:\WinSLAMM Files\NURP.cpz

Control Practice 1: Upflo Filter CP# 1 (DS) - DS UpfloFilter # 1
Media Type: CPZ
Fraction of Area Served by Upflo Filters (0-1): 1.0
Height from Outlet Invert to Structure Top (ft): 3.7
Sump Depth (ft): 3.00
The program will determine the Sump Cleaning/Filter Replacement Frequency
Solve for Given Conditions
Number of filters: 6

Control Practice 2: Catchbasin Cleaning CP# 1 (DS) - DS Catchbasins # 1

1. Fraction of area served by catchbasins = 1.00
2. Number of catchbasins = 1
3. Average sump depth below catchbasin outlet invert (feet) = 2
4. Depth of sediment in catchbasin sump at beginning of study period (ft) = 0
5. Typical outlet pipe diameter (ft) = 1
6. Typical outlet pipe Mannings n = 0.012
7. Typical outlet pipe slope (ft/ft) = 0.01
8. Typical catchbasin sump surface area (square feet) = 12.6
9. Total catchbasin depth (feet) = 5
10. Inflow hydrograph peak to average flow ratio = 3.8
11. Leakage rate through sump bottom (in/hr) = 0
12. Catchbasin Critical Particle Size File Name: Not needed - calculated by program

SLAMM for Windows Version 10.4.1
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Data file name: F:\Job Files\2206880 1900 E North\2206884 Civil\storm water report and calculations\WinSlamm.mdb
Data file description:
Rain file name: J:\Programs\civil\WinSLAMM\v10.4.1\Parameter Files\WisReg - Milwaukee 1969.ran
Particulate Solids Concentration file name: J:\Programs\civil\WinSLAMM\v10.4.1\Parameter Files\v10.1 WI_AVG01.pscx
Runoff Coefficient file name: J:\Programs\civil\WinSLAMM\v10.4.1\Parameter Files\WI_SL06 Dec06.rsvx
Pollutant Relative Concentration file name: J:\Programs\civil\WinSLAMM\v10.4.1\Parameter Files\WI_GEO03.ppdx
Residential Street Delivery file name: J:\Programs\civil\WinSLAMM\v10.4.1\Parameter Files\WI_Res and Other Urban Dec06.std
Institutional Street Delivery file name: J:\Programs\civil\WinSLAMM\v10.4.1\Parameter Files\WI_Com Inst Indust Dec06.std
Commercial Street Delivery file name: J:\Programs\civil\WinSLAMM\v10.4.1\Parameter Files\WI_Com Inst Indust Dec06.std
Industrial Street Delivery file name: J:\Programs\civil\WinSLAMM\v10.4.1\Parameter Files\WI_Com Inst Indust Dec06.std
Other Urban Street Delivery file name: J:\Programs\civil\WinSLAMM\v10.4.1\Parameter Files\WI_Res and Other Urban Dec06.std
Freeway Street Delivery file name: J:\Programs\civil\WinSLAMM\v10.4.1\Parameter Files\Freeway Dec06.std
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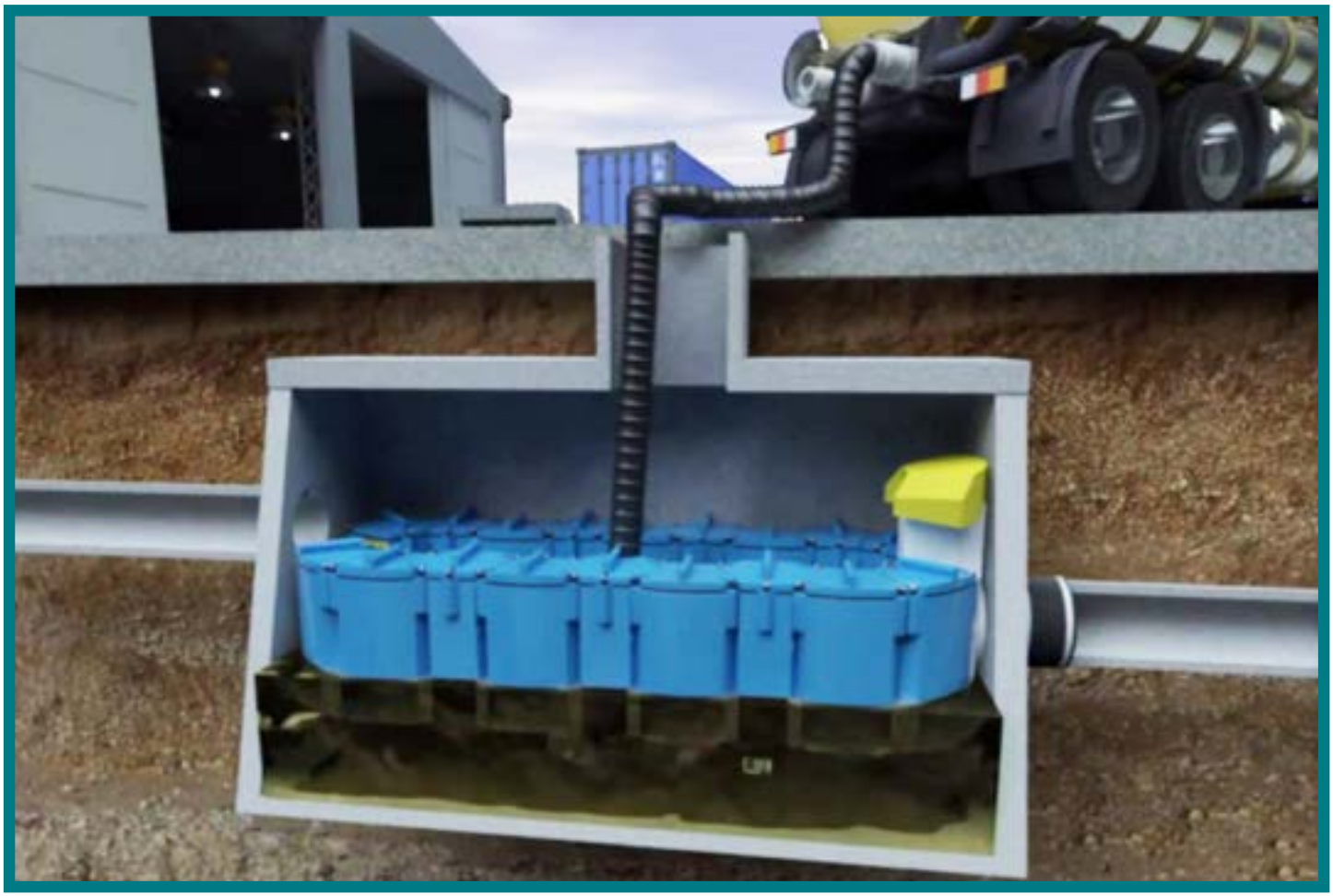
Cost Data file name:
If Other Device Pollutant Load Reduction Values = 1, Off-site Pollutant Loads are Removed from Pollutant Load % Reduction calculations
Seed for random number generator: -42
Start of Winter Season: 12/06 End of Winter Season: 03/28
Model Run Start Date: 01/05/69 Model Run End Date: 12/31/69
Date of run: 06-23-2022 Time of run: 14:27:37
Total Area Modeled (acres): 1.090
Years in Model Run: 0.99

	Runoff Volume (cu ft)	Percent Runoff Volume Reduction	Particulate Solids Conc. (mg/L)	Particulate Solids Yield (lbs)	Percent Particulate Solids Reduction
Total of all Land Uses without Controls:	55327	-	248.7	859.1	-
Outfall Total with Controls:	55373	-0.08%	80.46	278.1	67.63%
Annualized Total After Outfall Controls:	56143			282.0	

Appendix G: Upflo Filter Operation & Maintenance

Hydro International®



Operation and Maintenance Manual

Stormwater Solutions

Up-Flo® Filter

Filtration System for Stormwater Treatment

94 Hutchins Drive
Portland, ME 04102

Tel: (207) 756-6200
Fax: (207) 756-6212
stormwaterinquiry@hydro-int.com

www.hydro-int.com

Table of Contents

IMPORTANT - ORDER REPLACEMENT PARTS FOR MAINTENANCE - IMPORTANT

Annual maintenance requires replacement of the Media Packs and the Drain Down Filter. Contact Hydro International to order replacements. Allow 2-4 weeks for delivery.

Office hours Monday thru Friday 8:00 A.M. to 5:00 P.M. EST
Toll free: 1-888-382-7808
Phone: 207-756-6200
Fax: 207-756-6212
Email: services@hydro-int.com

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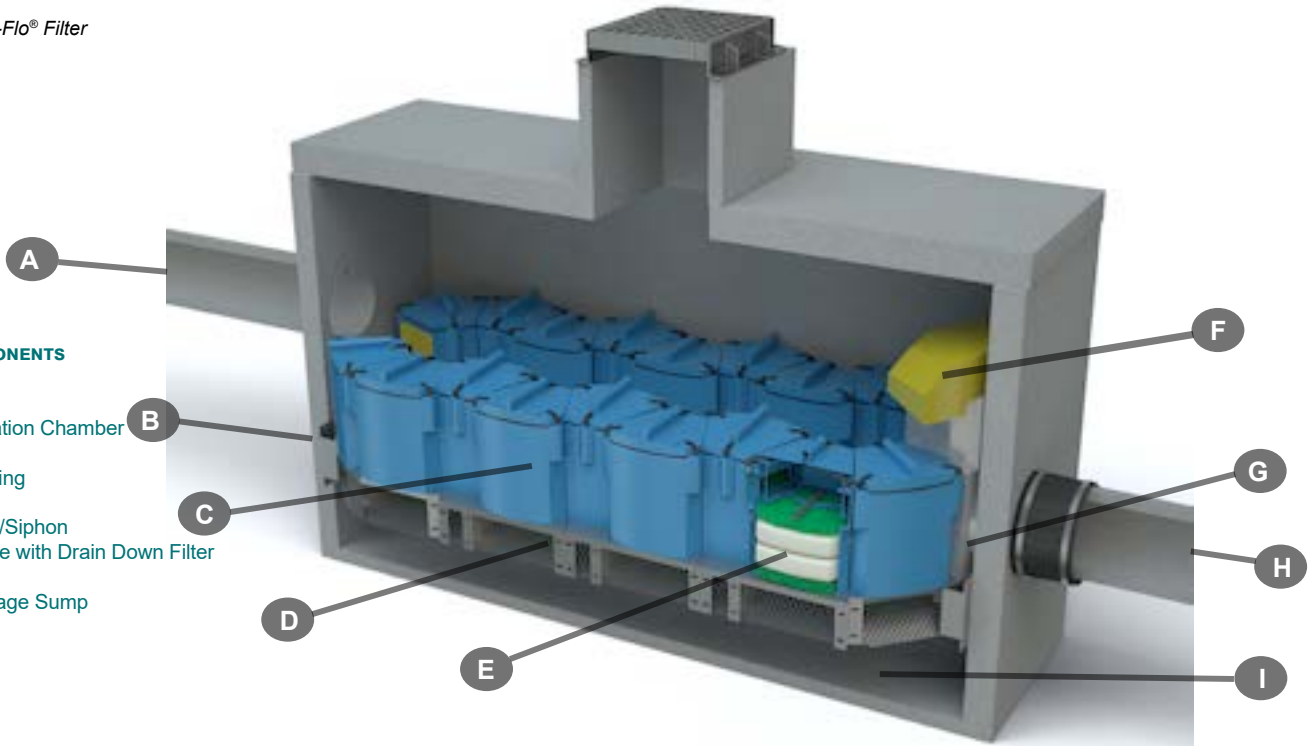
DISCLAIMER: Information and data contained in this manual is exclusively for the purpose of assisting in the operation and maintenance of Hydro International plc's Up-Flo®Filter. No warranty is given nor can liability be accepted for use of this information for any other purpose. Hydro International plc have a policy of continuous product development and reserve the right to amend specifications without notice.

Overview & Product Description

The Up-Flo® Filter is a modular high-rate stormwater filtration device designed to capture trash, oil, sediment and remove fine pollutants such as dissolved and particulate metals and nutrients from stormwater runoff. Designed with efficiency, longevity and upkeep in mind, this high performance, low maintenance filter option that offers higher loading rates and longer media life for higher quality stormwater for longer periods between servicings.

In general, a minimum of two inspections are required per year to monitor sediment and gross pollutant accumulations. In order to achieve an annual TSS removal rate of 80% for the Up-Flo® Filter, the minimum maintenance frequency specified in the maintenance section for replacement of the Media Pack and removal of accumulated sediment from the sump is mandatory.

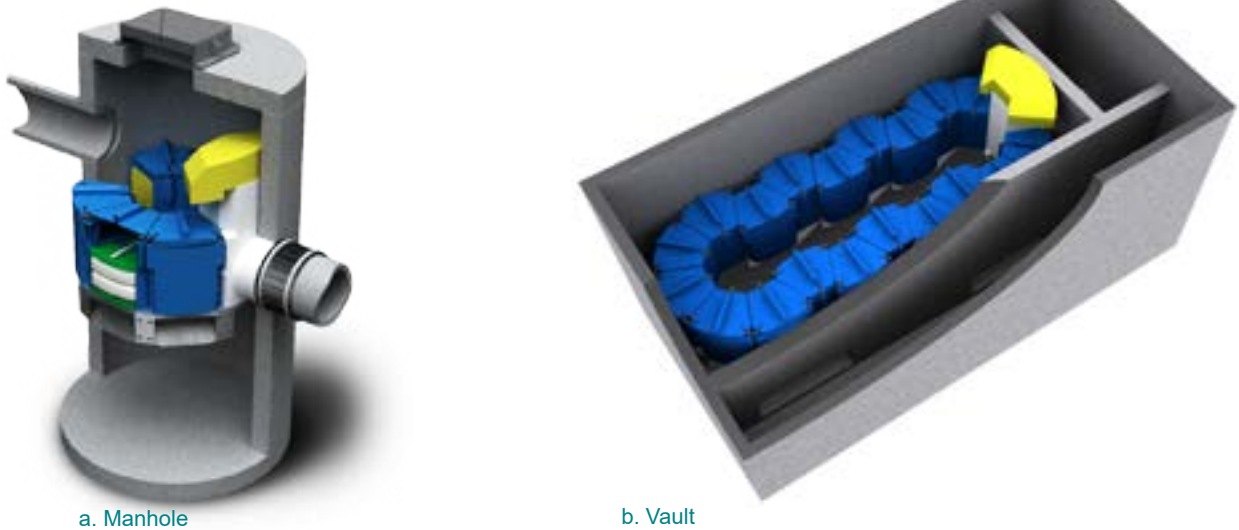
Fig.1 *The Up-Flo® Filter*



System Components

A. Inlet Pipe
B. Precast Filtration Chamber
C. Filter Module
D. 4mm Screening
E Media bag
F. Bypass Hood/Siphon
G. Outlet Module with Drain Down Filter
H. Outlet pipe
I. Pollutant Storage Sump

Product Configurations



a. Manhole

b. Vault

Fig.2 *The Up-Flo® Filter is installed in a) 4-ft (1.2m) round manholes or b) in rectangular precast vaults. Both configurations have a wide central opening in the Up-Flo® Filter.*

Operation

Introduction

The Up-Flo® Filter operates on simple fluid hydraulics. It is self-activating, has no moving parts, no external power requirements and is fabricated with durable non-corrosive components. Personnel are not required to operate the unit and maintenance is limited to periodic inspections, sediment and floatables removal, Media Pack replacement and Drain Down Filter replacement.

Pollutant Capture

The Up-Flo® Filter is designed to operate as a "treatment train" by incorporating multiple treatment technologies into a single device. Trash and gross debris are removed by sedimentation and screening before they are introduced to the filtration media, preventing surface blinding of the filter media. The Up-Flo® Filter is a wet-sump device. Between storm events, oil and floatables are stored on the water surface separate from the sediment storage volume in the sump (see **Fig.1**). The high-capacity bypass siphon acts as a floatables baffle to prevent washout of captured floatable pollutants during high intensity events.

Reduced Clogging

The Up-Flo® Filter has been designed to minimize the occurrence of clogging and blinding and employs a unique Drain Down Filter that allows the water level in the chamber to drop below the filter media between events. The Drain Down Filter mechanism creates a reverse flow that flushes captured pollutants off the surface of the Media Bag, helping to prevent blinding. By allowing the water to drain out, the Drain Down Filter also reduces the weight of the Media Bags. This makes the bags easier and safer to remove during maintenance operations.

Overflow Protection

The Angled Screens are designed to prevent ragging and blinding and are situated below the Filter Modules, sheltering them from the direct path of the influent. Coarse debris settles in the sump before the runoff flows up through the screens, protecting them from blinding. In the unlikely event of a blockage, the high capacity siphonic Bypass Hood is designed to convey high enough flow to minimize the risk of large storm creating upstream flooding.

Best Practices

Good housekeeping upstream of the Up-Flo® Filter can significantly extend Media Bag life. For example, sweeping paved surfaces, collecting leaves and grass trimmings, and protecting bare ground from erosion will reduce loading to the system. Media Packs should not be installed in the Filter Modules until construction activities are complete and site stabilization is effective.

Damage Due to Lack of Maintenance

Delayed maintenance would result in clogged Media Bags and/or blinded Angled Screens. In that situation, the Up-Flo® Filter would go into bypass and there would be no treatment of the incoming stormwater. Because the Bypass Weir can easily convey all of the flow to the Outlet Module, there would be no lasting damage to the system. Replacement of the Media Bags and removal of sediment from the sump would restore the Up-Flo® Filter to its original treatment efficiency. Establishing and adhering to a regular maintenance schedule ensures optimal performance of the system.

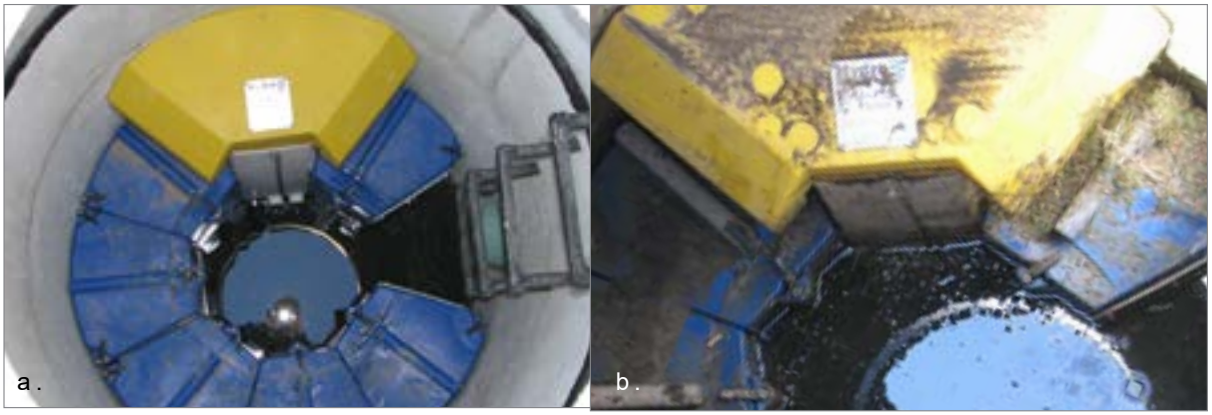


Fig.3 a) The water level in a properly functioning Up-Flo® Filter will drain down to the base of the Filter Modules. b) When the Drain Down Filter becomes clogged, the base of the Filter Modules will be submerged in standing water. Note, above right, that the Drain Down Filter is submerged in standing water.

Inspection & Maintenance

Overview

The Up-Flo® Filter protects the environment by removing a wide range of pollutants from stormwater runoff. Periodic removal of these captured pollutants is essential to the proper functioning of the Up-Flo® Filter.

Maintenance activities can be categorized as those that may be performed from outside the Up-Flo® vessel and those that are performed inside the vessel. Maintenance performed from outside the modules includes removal of floatables and oils that have accumulated on the water surface and removal of sediment from the sump. Maintenance performed inside the vessel includes removal and replacement of Media Bags, Flow Distribution Media and the Drain Down Filter. A vactor truck is required for removal of oils, water, sediment, and to completely pump out the vessel to allow for maintenance inside. If you are not using Hydro Internatioanl or a trained servcie provider you must follow OSHA Confined Space Entry procedures when entering the Up-Flo® vessel.

The Up-Flo® Filter design has a wide central opening between the Filter Modules for easy access to all of the components (see **Fig.3**). In the case of inspection and floatables removal, a vactor truck is not required. Otherwise, a vactor truck is normally required for oil removal, removal of sediment from the sump, and replacement of the Media Packs and Drain Down Filter. In most cases, entry into the Up-Flo® Filter vessel is required for replacement of the Media Packs and Drain Down Filter.

The minimum required frequency for replacement of the Media Pack is annually, whereas the minimum required frequency for removal of accumulated sediment from the sump is dependent on the Up-Flo® Filter configuration. Configurations with a larger sediment storage volume per module will require less frequent removal of accumulated sediment. Regardless, whenever sediment depth in the sump is found to be greater than 16 inches, sediment removal is required.

Fig.4 a) A new Media Bag of Hydro Filter Sand. b) A spent media bag of Hydro Filter Sand.

At a minimum, media bags must be replaced at least once a year.

Make Sure your System was Installed Correctly

First Year Inspection and Maintenance

The frequency of inspection and maintenance can be determined in the field after installation. The frequency of ongoing maintenance needs is based on site characteristics such as contributing area, types of surfaces (e.g., paved and/or landscaped), site activities (e.g., short-term or long-term parking), and other site maintenance (e.g., sanding and sweeping). At a minimum, inspection and maintenance should be conducted at intervals of no more than six months during the first year of operation. Maintenance personnel should observe and record pollutant accumulations during the first year of service in order to benchmark the maintenance intervals that will later be established for the site. Pollutant accumulations should be measured or monitored using the following procedures:

- Measurement of sediment depth in the sump: A minimum of 8 inches (20 cm) should separate the Drain Down Filter inlet from stored sediment in the sump in order to minimize sediment migration into the Drain Down Filter. A simple probe, such as the Sludge-Judge®, can be used to determine the depth of the solids in the sump. In a typical 4-ft (1.2m) diameter manhole installation, the sediment depth should be no more than 16 inches (41 cm).

- Maintenance personnel should then enter the structure, remove the Media Pack from one of the Filter Modules, and weigh the Media Bags. Media Bags with a wet weight of approximately 40 lbs (18 kg) or more are an indication that the filter media has become full and that the Media Packs in all of the Filter Modules will require replacement (Fig.4). Minimum filtration rate is generally reached when the Media Bags have accumulated approximately 20 lbs (9 kg) of sediment. Determining the amount of accumulated sediment will be accomplished by removing both of the Media Bags from one of the Media Packs and weighing the bags separately. Since a new Media Bag weighs approximately 30 lbs (14 kg) wet, the difference in weight will approximately equal the weight of solids that have accumulated in the bag. A spent Media Bag weighs approximately 50 lbs (23 kg) wet.

- Measurement of oil layer on water surface: Since water in the Up-Flo® vessel drains down to an elevation below the bottom of the Filter Modules when the system is idle, the amount of accumulated oil must be minimized so that oil is not entrained in the Media Pack when stormwater begins to fill the vessel at the start of a storm event. Oil accumulation should be limited to 1.5 inches (4 cm) or less. Probes can be used to measure oil thickness.

- Monitoring for Drain Down Filter clogging: The water level in the Up-Flo® Filter should be monitored to ensure that the Drain Down Filter is operating properly. The Drain Down Filter is designed to lower the water level in the Up-Flo® vessel to an elevation below the bottom of the Filter Modules between storm events. Periodically conduct an inspection one to two days after a storm event during the first year of operation. Approximately 36 hours after a 1-in (2.5-cm) rainfall, the water level inside the vessel should have dropped to a point where it is equal with the base of the Filter Modules. If the water level has not reached that point, then the Drain Down Filter has either become clogged or blinded by trash or debris (Fig.5 a and b). If there is no evidence of trash or debris around the Drain Down Filter inlet, then it has likely become clogged with particles.

- Monitoring for slime and debris covering the Flow Distribution Media or Angled Screens: After removal of the Media Bags, the bottom Flow Distribution Media should be removed and inspected to determine if it is coated with slime or debris. Similarly, the Angled Screen should be inspected for blockages and ragging.

Find out how Frequently your System Needs Maintenance

Monitoring for floatables on the water surface: Similar to oil, the amount of accumulated floatables must be minimized to prevent trash and loose debris from becoming trapped on the Angled Screens when stormwater begins to fill the Up-Flo® vessel at the start of a storm event. Visual inspection is adequate to determine the amount of floatables. Floatables should be removed before they form a mat on the surface of the water.

The solids loading rate in the sump will be calculated by measuring the sediment depth in the sump and dividing the depth by the correlating interval of time since the sump was last cleaned. Similarly, starting with fresh Media Bags, the solids loading rate in the Media Packs will be calculated by weighing the Media Bags and dividing the weights by the correlating interval of time since they were installed. The wet weight of the heaviest bag will be used to determine the loading rate. As previously mentioned, a spent Media Bag weighs approximately 50 lbs (23 kg) wet. The spent Media Bag weight estimate was based on calculations of sediment loading in an Up-Flo® Filter that was run to exhaustion during laboratory testing.

The rate of oil accumulation will be calculated by measuring the thickness of the oil layer and dividing the thickness by the correlating interval of time since the sump was last cleaned. Ordinarily, oil thickness will not be measurable unless a spill has occurred. Consequently, any oil will typically be removed along with water when cleaning the sump.

Monitoring the Drain Down Filter for clogging, monitoring the Flow Distribution Media and Angled Screens for slime and debris, and monitoring the accumulation of floatables will provide an estimate of how long the Up-Flo® Filter can operate before its performance can become impaired by one of these factors.

Routine Inspection and Maintenance

After completion of the first year of operation, determining and then following the established inspection and maintenance intervals will keep pollutant loadings within their respective limits. Removal of oils and floatables, replacement of the Drain Down Filter, replacement of Flow Distribution Media (see Fig.9, pg 11), and cleaning of Angled Screens will occur at the same frequency as cleaning of the sump and replacement of Media Bags unless the first year of operation indicates otherwise. Keeping to the established maintenance intervals will keep treatment flow rates at, or above, the design flow rate. Typically, annual maintenance is adequate.

In addition to scheduled maintenance, occasional checks for Up-Flo® Filter clogging can be performed by removing the manhole cover during a storm, monitoring the water level in the manhole or vault, and determining whether the filter is in bypass. A properly-sized filter (on-line or off-line) that is in bypass during a storm that is producing runoff at, or below, the filter's design filtration rate needs maintenance.

Don't want to go it alone? Call Hydro and we'll take care of inspection, replacement media and cleanout.

Call 1 (888) 382-7808 for a quote

Inspection & Maintenance

Routine Inspection

Inspection is a simple process that requires monitoring pollutant accumulations. Maintenance crews should be familiar with the Up-Flo® Filter and its components prior to inspection.

The following instructions are intended for non-Hydro maintenance service providers and/or those intending to maintain thier own Up-Flo® Filter:

Scheduling

- Inspection may be conducted during any season of the year but should occur shortly after a predicted rainfall to ensure components are operating properly.

Necessary Equipment

- Safety Equipment and Personal Protective Equipment (traffic cones, work gloves, etc.)
- Scale to measure the weight of the Media Bags
- Crow bar to remove grate or lid
- Pole with skimmer or net
- Sediment probe (such as a Sludge-Judge®)
- Hydro International Up-Flo® Filter Maintenance Log
- Trash bags for removed floatables

Routine Inspection Procedures

1. Set up any necessary safety equipment (such as traffic cones) to provide access to the Up-Flo® Filter. Safety equipment should notify passing pedestrian and road traffic that work is being done.
2. Remove the grate or lid to the manhole or vault.
3. Without entering the vessel, look down into the chamber to inspect the inside and to determine whether the high-water level indicator has been activated. Make note of any irregularities. See Fig.6 for a typical Inspection View.
4. Without entering the vessel, use the pole with the skimmer net to remove floatables and loose debris from the chamber.
5. Using a sediment probe such as a Sludge-Judge®, measure the depth of sediment that has collected in the sump of the vessel.
   Maximum sediment depth is 16 inches (41 cm).
6. If the high-water level indicator has been activated after two consecutive storms, remove the Filter Module lid by turning the cam latch and remove the Filter Media Pack (*refer to page 11 Replacement Procedures*). Weigh the Media Bags from one or two modules. Media Bags should be replaced if the wet weight exceeds 40 lbs (18 kg).
7. On the Maintenance Log provided by Hydro International, record the date, unit location, estimated volume of floatables and gross debris removed, and the depth of sediment measured. Also note any apparent irregularities such as damaged components or a high standing water level (see Fig.6 for the standard standing water level).
8. Securely replace the grate or lid.
9. Remove safety equipment.
10. Contact Hydro International at (800) 848-2706 to discuss any irregularities noted during inspection.

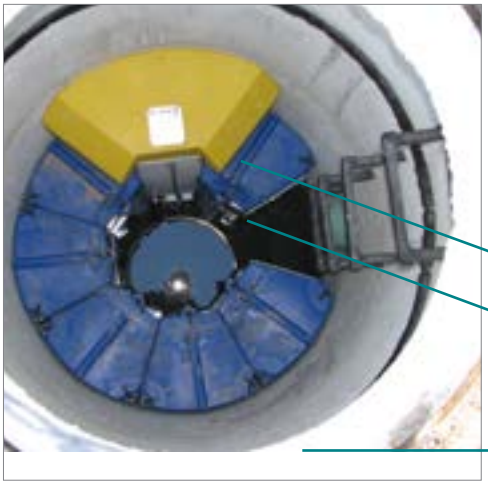


Fig.6 Inspection view of the Up-Flo® Filter.

Routine Maintenance

Maintenance activities are grouped into two categories:

- *Activities **Not Requiring** Man Entry Into the Up-Flo® Filter*
  These activities include floatables removal, oil removal and removal of sediment from the sump.
- *Activities **Requiring** Man Entry Into the Up-Flo® Filter*
  Media Pack replacement and Drain Down Filter replacement.

Maintenance intervals are determined from monitoring the Up-Flo® Filter during its first year of operation. Depending on the site, some maintenance activities may have to be performed on a more frequent basis than others. In the case of floatables removal, a vactor truck is not required. Floatables and loose debris can be netted with a skimmer and pole.

A vactor truck is normally required for oil removal, removal of sediment from the sump, and to dewater the vessel for replacement of the Media Packs and Drain Down Filter (Fig.7). All inspection and maintenance activities would be recorded in an Inspection and Maintenance Log.

Completion of all the maintenance activities for a typical 4-ft (1.2m) diameter manhole installation takes less than one hour. Approximately 360 gallons of water and up to 0.6 yd^3 (0.5 m^3) of sediment may be removed in the process. In an installation equipped with six Filter Modules, 12 Media Bags (2 bags per module) would be removed and replaced. Assuming a spent Media Bag weight of 50 lbs (23 kg), up to 600 lbs (272 kg) of spent Media Bags would be removed. All consumables, including Media Bags, Flow Distribution Media, and replacement Drain Down Filters are supplied by Hydro International.

The access port located at the top of the manhole provides unobstructed access for a vactor hose and/or skimmer pole to be lowered to the base of the sump.

Maintenance Activities Not Requiring Man Entry

These activities include floatables removal, oil removal and removal of sediment from the sump.

Scheduling

- Floatables and sump cleanout may typically be done during any season of the year - before and after rainy season
- Floatables and sump cleanout should occur as soon as possible following a contaminated spill in the contributing drainage area

Recommended Equipment

- Safety Equipment (traffic cones, etc)
- Crow bar to remove grate or lid
- Pole with skimmer or net (if only floatables are being removed)
- Sediment probe (such as a Sludge-Judge®)
- Vactor truck (flexible hose preferred)
- Pressure nozzle attachment or other screen-cleaning device

Fig.7 Sediment is removed from the sump with a vactor hose. Man entry is not required for this step.

No Man Entry Required: Floatables, Oil and Sediment:

1. Set up any necessary safety equipment (such as traffic cones) around the access of the Up-Flo® Filter. Safety equipment should notify passing pedestrian and road traffic that work is being done.

2. Remove the grate or lid to the manhole or vault.

3. Without entering the vessel, look down into the chamber to inspect the inside. Make note of any irregularities.

4. If the standing water level in the sump is above the base of the Filter Modules (see Fig.8), tug the Pull Chain(s) to release the Drain Down Filter plug(s). Allow the excess water to drain out of the chamber.

5. Use the skimmer pole to fit the Drain Down Filter plug back into the open port.

6. Once all floatables and oil have been removed, drop the vactor hose to the base of the sump. Vactor out the sediment and gross debris from the sump floor. Up to 0.3 yd^3 (0.2 m^3) of sediment and 360 gallons (1,363 L) of water will be removed from a typical manhole Up-Flo® Filter during this process.

7. Retract the vactor hose from the vessel.

8. Inspect the Angled Screens for blockages and ragging. If present, remove the obstruction or ragging materials from the surface using a hose or other screen-cleaning device.

9. On the Maintenance Log provided by Hydro International, record the date, unit location, estimated volume of floatables, oils, and gross debris removed, and the depth of sediment measured. Note any apparent irregularities such as damaged components or blockages.

10. Securely replace the grate or lid. Remove safety equipment.

11. Dispose of sediment and gross debris following local regulations.

12. Dispose of oil and sump water at a licensed water treatment facility or following local regulations.

13. Contact Hydro International at (800) 848-2706 to discuss any irregularities noted during cleanout.

Maintenance Activities Requiring Man Entry

These activities include replacement of the Media Packs and Drain Down Filter.

Unless the Up-Flo® Filter has been installed as a very shallow unit, it is necessary to have an OSHA-confined space entry trained person enter the vessel to replace Media Packs.

The access port located at the top of the manhole or vault provides access to the Up-Flo® vessel for maintenance personnel to enter the vessel and remove and replace Media Packs. The same access would be used for maintenance personnel working from the surface to net or skim debris and floatables or to vactor out sediment, oil, and water. Unless the Up-Flo® Filter has been installed in a very shallow configuration, it is necessary to have personnel with OSHA Confined Space Entry training performing the maintenance that occurs inside the vessel.

Scheduling

- Call Hydro International to order replacement Media Packs and Drain Down Filter prior to scheduling maintenance.

- Because Media Pack replacement requires entry into the Up-Flo® chamber, maintenance events should be scheduled during dry weather.

- Media Pack replacement should occur immediately after a contaminated spill in the contributing drainage area.

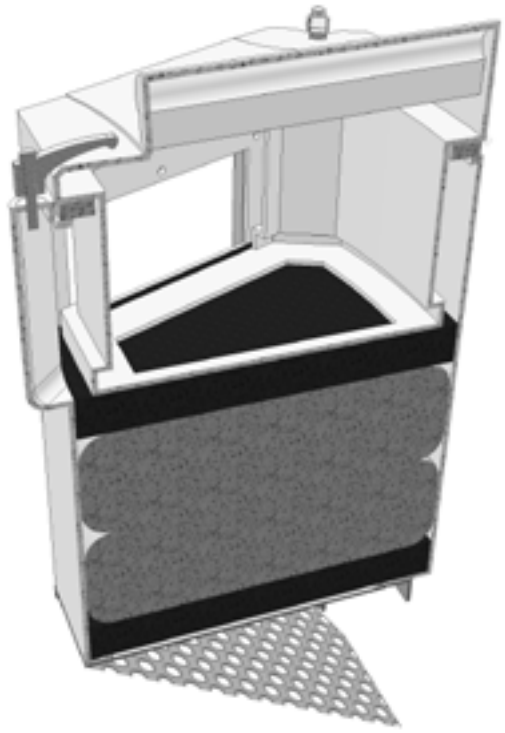


Fig.8 Cutaway view of the Filter Module

Recommended Equipment

- Safety Equipment (traffic cones, etc.)
- Crow bar to remove grate or lid
- Pole with skimmer or net (if floatables removal is not to be done with vactor hose)
- Sediment probe (such as a Sludge-Judge®)
- Vactor truck (flexible hose preferred)
- OSHA Confined Space Entry Equipment
- Up-Flo® Filter Replacement Media Packs (available from Hydro International)
- Hydro International Up-Flo® Filter Maintenance Log
- Screwdriver (flat head)
- Replacement Drain Down Filter components supplied by Hydro International

Man Entry Required: Media Pack and Drain Down Filter

1. Follow Floatables and Sump Cleanout Procedures, 1 – 13.
2. Following OSHA Confined Space Entry procedures, enter the Up-Flo® Filter Chamber.
3. Open the Filter Module by turning the three cam latches on the front and sides of the module. Remove the lid (1) to gain access to the Media Pack (Fig.9).
4. Remove and discard the spent Media Pack. The Media Pack contents include:
    - A top layer of (A) Flow Distributing Sheets
    - Two (2) Media Bags (B) equipped with nylon handles.
    - A bottom layer of (A) Flow Distributing Media.
5. Insert a new Media Pack, supplied by Hydro International.
    - First, insert a bottom layer of green Flow Distributing Media. Be sure that the media sits snugly and level at the bottom of the Filter Module.
    - Next, insert the first of two (2) replacement Media Bags. Smooth the bag out with your hands to make sure that the bag extends snugly to the walls and corners of the Filter Module.
    - Insert the second Media Bag, following the same procedure.
    - Insert the top layer of green Flow Distributing Media.

1. Filter Module Cover and Media Restraint

2. Replaceable Media Pack:
    a) Flow distribution sheets
    b) Filter Media Bags

3. Cam Latch

4. Conveyance Channel

5. Filter Module

6. Support Bracket / Angled Screen

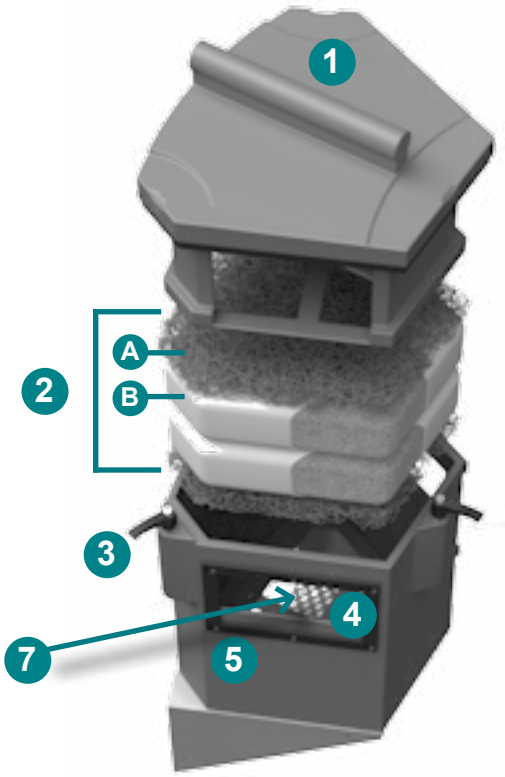


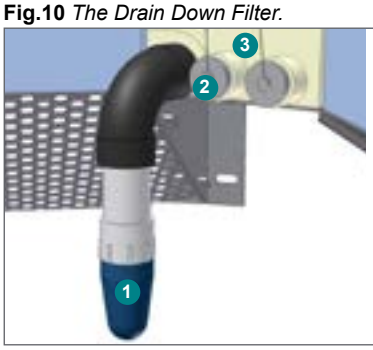
Fig.9 The Filter Module houses the Media Restraint and the Media Pack.

Be sure that the piece fits snugly against the walls and corners of the Filter Module.

- Put the lid on and secure the three latches. Check to make sure that the latches are closed properly.

6. Use a screwdriver to unscrew the Drain Down Filter from the face of the Outlet Module (see Fig.10). DO NOT DISCARD THIS PIECE.
7. Install new Drain Down Filter supplied by Hydro International.
8. Exit the Up-Flo® Filter chamber and securely replace the grate __or lid.
9. On the Maintenance Log provided by Hydro International, record the date, unit location, estimated volume of floatables, oil and gross debris removed, and the depth of sediment measured. Note the number of Media Packs replaced. Note any irregularities such as damaged components or blockages.

Fig.10 *The Drain Down Filter.*



1. Drain Down Filter
2. Drain Down Plug
3. Pull Chain for Drain Down

10. Remove safety equipment.
11. Dispose of spent media packs at your local landfill, following local regulations.
12. Return the spent Drain Down Filter to Hydro International.
13. Contact Hydro International to discuss any irregularities noted during annual maintenance.

Solids Disposal

Sediment, floatables, gross debris, and spent Media Bags can generally be disposed of at the local landfill in accordance with local regulations. The toxicity of the residues captured will depend on the activities in the contributing drainage area, and testing of the residues may be required if they are considered potentially hazardous.

Sump water can generally be disposed of at a licensed water treatment facility but the local sewer authority should be contacted for permission prior to discharging the liquid. Significant accumulations of oil removed separately from sump water should be transported to a licensed hazardous waste treatment facility for treatment or disposal. **In all cases, local regulators should be contacted about disposal requirements.**

Maintenance at a Glance

Activity	Frequency
Inspection	- Regularly during first year of installation - Every 6 months after the first year of installation
Floatables/Oils Removal	- Twice per year or as needed - Following a contaminated spill in the drainage area
Sediment Removal	- Every six to 12 months, depending on the Up-Flo® Filter Configuration - The maximum allowable sediment depth in any Up-Flo Filter configuration is 16 inches (41 cm) - Following a contaminated spill in the drainage area
Media Pack Replacement	- Once per year - Replacement is required anytime inspection reveals that the high-water level indicator has been activated after two consecutive storms and the subsequent weighing of the Media Bags shows a wet weight greater than 40 lbs - Following a contaminated spill in the drainage area
Drain Down Filter Replacement	- Once per year with Media Pack replacement - Replacement is required anytime inspection reveals that the water level inside the vessel has not reached a level equal with the base of the Filter Modules approximately 36 hours after a 1-inch (2.5 cm) rainfall - As needed, in the event of continuous base flow conditions

Up-Flo® Filter Installation Log

SITE REFERENCE NAME OR NUMBER FOR THIS UP-FLO® FILTER LOCATION:	
SITE NAME:	
SITE LOCATION:	
OWNER:	**SITE CONTRACTOR:**
CONTACT NAME:	**CONTACT NAME:**
COMPANY NAME:	**COMPANY NAME:**
ADDRESS:	**ADDRESS:**
TELEPHONE:	**TELEPHONE:**
FAX:	**FAX:**

INSTALLATION DATE: / /

CONFIGURATION (CIRCLE ONE): **MANHOLE** **VAULT SYSTEM**

TOTAL NUMBER OF UP-FLO® FILTER MODULES: _____

Hydro International (Stormwater), 94 Hutchins Drive, Portland ME 04102
Tel: (207) 756-6200 Fax: (207) 756-6212 Web: www.hydro-int.com

Up-Flo® Filter Inspection Log

Site Name: _____ Owner Change since last inspection? Y N

Location: _____

Owner Name: _____

Address: _____ Phone Number: _____

Site Status: _____

Date: _____ Time: _____ Site conditions*: _____

(Stable, Under Construction, Needing Maintenance, etc.)

Inspection Frequency Key: A=annual; M=monthly; S=after major storms

Inspection Items	Inspection Frequency	Inspected? (Yes/No)	Maintenance Needed? (Yes/No)	Comments/Description
Debris Removal				
Adjacent area free of debris?	M			
Inlets and Outlets free of debris?	M			
Facility (internally) free of debris?	M			
Vegetation				
Surrounding area fully stabilized? (no evidence of eroding material into Up-Flo® Filter)	A			
Grass mowed?	M			
Water retention where required				
Water holding chamber(s) at normal pool?	A			
Evidence of erosion?	A			
Sediment Deposition				
Filtration Chamber free of sediments?	A			
Sedimentation sump not more than 50% full?	A			
Structural Components				
Any evidence of structural deterioration?	A			
Grates in good condition?	A			
Spalling or cracking of structural parts?	A			
Outlet/Overflow Spillway	A			
Other				
Noticeable odors?	A			
Any evidence of filter(s) clogging?	M			
Evidence of flow bypassing facility?	A			

Inspector Comments: _____

_____

_____

_____

Overall Condition of Up-Flo® Filter**: ☐ Acceptable ☐ Unacceptable

***"Acceptable" would mean properly functioning; "unacceptable" would mean damaged or required further maintenance.*

If any of the above Inspection Items are checked "Yes" for "Maintenance Needed", list Maintenance actions and their completion dates below or on the Maintenance Log provided on page 15 of the Up-Flo® Filter Operation & Maintenance Manual:

Maintenance Action Needed	Due Date

The next routine inspection is schedule for approximately: (date) _____

Inspected by: (signature) _____

Inspected by: (printed) _____

Up-Flo® Filter Maintenance Log

Site Name: _____ Owner Change since last inspection? Y N

Location: _____

Owner Name: _____

Address: _____ Phone Number: _____

Site Status: _____

Date: _____ Time: _____ Site conditions: _____
**(Stable, Under Construction, Needing Maintenance, etc.)*

Estimated volume of oil/floatable trash removed: _____

Sediment depth measured in sump prior to removal: _____

Number of Filter Modules fitted with new media packs: _____

Inspector Comments: _____

_____

_____

_____

Overall Condition of Up-Flo® Filter: ☐ Acceptable ☐ Unacceptable
***"Acceptable" would mean properly functioning; "unacceptable" would mean damaged or required further maintenance.*

Maintained by: (signature) _____

Maintained by: (printed) _____

Hydro International (Stormwater), 94 Hutchins Drive, Portland ME 04102
Tel: (207) 756-6200 Fax: (207) 756-6212 Web: www.hydro-int.com

Stormwater Solutions

94 Hutchins Drive
Portland, ME 04102

Tel: (207) 756-6200
Fax: (207) 756-6212
stormwaterinquiry@hydro-int.com

www.hydro-int.com

Turning Water Around...®

UFF_OM_CPZ_E_2204

Appendix H: USLE Calculations

Soil Loss & Sediment Discharge Calculation Tool

for use on Construction Sites in the State of Wisconsin

WDNR Version 2.0 (06-29-2017)

WISCONSIN DEPT. OF NATURAL RESOURCES

YEAR 1

Developer: VJS Construction Services

Project: Wildeck, Inc

Date: 06/23/22

County: Waukesha

Version 1.0

Activity (1)	Begin Date (2)	End Date (3)	Period % R (4)	Annual R Factor (5)	Sub Soil Texture (6)	Soil Erodibility K Factor (7)	Slope (%) (8)	Slope Length (ft) (9)	LS Factor (10)	Land Cover C Factor (11)	Soil loss A (tons/acre) (12)	SDF (13)	Sediment Control Practice (14)	Sediment Discharge (t/ac) (15)
Bare Ground	10/01/22	12/01/22	8.0%	130	Loam	0.37	14.3%	78	2.13	1.00	8.2	0.755	Silt Fence	3.7
Seed with Mulch or Er	12/01/22	04/01/23	5.0%	130	Loam	0.37	14.3%	78	2.13	0.10	0.5	0.755	Silt Fence	0.2
Seed with Mulch or Er	04/01/23	06/01/23	16.0%	130	Loam	0.37	14.3%	78	2.13	0.10	1.6	0.755	Silt Fence	0.7
End	06/01/23	-----	-----	-----	-------	-----	14.3%	78	2.13	------	-----	0.000		0.0
		-----	-----	-----	-------	-----	14.3%	0	-----	-----	-----	0.000		0.0
		-----	-----	-----	-------	-----	0.0%	0	-----	-----	-----	0.000		0.0
										TOTAL	**10.3**		**TOTAL**	**4.7**
													% Reduction Required	**NONE**

Notes:

See Help Page for further descriptions of variables and items in drop-down boxes.
The last land disturbing activity on each sheet must be 'End'. This is either 12 months from the start of construction or final stabilization.
For periods of construction that exceed 12 months, please demonstrate that 5 tons/acre/year is not exceeded in any given 12 month period.

NOTE: THIS TOOL ONLY ADDRESSED SOIL EROSION DUE TO SHEET FLOW. MEASURES TO CONTROL CHANNEL EROSION MAY ALSO BE REQUIRED TO MEET SEDIMENT DISCHARGE REQUIREMENTS.

Recommended Permanent Seeding Dates:

4/1-5/15	and	8/7-8/29	Turf, introduced grasses and legumes
Thaw-6/30			Native Grasses, forbs, and legumes

Designed By:	Devin Winter, PE
Date	6/28/2022

Appendix I: Post Construction Operation and Maintenance Plan

The owner of the property affected shall inspect and maintain the following stormwater management systems frequently, especially after heavy rainfalls, but at least on an annual basis unless otherwise specified.	
STORMWATER FACILITY	**TYPE OF ACTION**
1. Lawn and Landscaped Areas	All lawn areas shall be kept clear of any materials that block the flow of stormwater. Rills and small gullies shall immediately be filled and seeded or have sod placed in them. The lawn shall be kept mowed, tree seedlings shall be removed, and litter shall be removed from landscaped areas.
2. Swales	All grassed swales showing signs of erosion, scour, or channelization shall be repaired, reinforced, and revegetated immediately. All swales shall be repaired to the original plan requirements. Mowing shall take place no less than twice per year at a height of no less than three inches. Grasses shall not be allowed to grow to a height that permits branching or bending. Mowing shall only take place when the ground is dry and able to support machinery.
3. Catch Basin/Curb Inlet Grates	The grate openings to these structures must be cleared of any clogging or the blocking of stormwater flow from getting into the stormwater conveyance system of any kind.
4. Catch Basin Sumps	Sumps shall visually be inspected every 3 months. Siltation shall be removed and disposed of offsite when the sump depth is within 3" of the outlet pipe invert elevation. The removal of siltation should occur a minimum of once per year.
5. Hydro-International Upflo Filter Structures (or equal)	Inspection of the structure shall be completed annually at a minimum by qualified maintenance personnel. Sediment in the bottom of the structure shall be inspected to verify sediment is less than 16" deep. If sediment is greater than 16" deep, the sediment shall be removed per Hydro-International requirements. Qualified maintenance personnel shall enter the structure to remove the Media Bag to be weighed. Media bags weighing more than 40 lbs are an indication that the bag is full and needs to be replaced. Replace per manufacturers specifications. Qualified maintenance personnel shall inspect the oil layer on the water surface to oil being entrained in the Media bags. If the oil accumulation is greater than 1.5", the structure shall be pumped per manufacturer's specifications. After storm events of greater than 1" of rainfall, the structure shall be inspected 48 hours after the rainfall even to verify the water level inside the structure has dropped the below the base of the filter modules. If the water level has not dropped, the filters are considered to be clogged and shall be replaced per manufacturer's specifications. For further information, see Appendix G for additional details.
6. Record of Maintenance	The operation and maintenance plan shall remain onsite and be available for inspection when requested by WDNR. When requested, the owner shall make available for inspection all maintenance records to the department or agent for the life of the system.