raSmith

CREATIVITY BEYOND ENGINEERING

Final Storm Water Management Plan

For

Waukesha Genesis
City of Waukesha, Wisconsin

raSmith Project No. 3210204.01

July 18, 2022

Final Storm Water Management Plan
For

Waukesha Genesis
City of Waukesha, Wisconsin

Prepared by:

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INTRODUCTION

R.A. Smith, Inc. was retained to prepare a storm water management report for the proposed car dealership located at 1503 E. Moreland Blvd in the City of Waukesha, WI. The site is further described as being in the Southwest 1/4 of the Southeast 1/4 of Section 36 and the southeast ¼ o section 35, all in Town 7 North, Range 19 East, in the City of Waukesha, Waukesha County, Wisconsin.

The hydrologic analysis (the "Site") is approximately 2.94 acres with Moreland Blvd. to the North, a private frontage road to the South, Manhattan Drive to the West and 'Boucher Hyundai of Waukesha' to the East. The proposed project consists of razing the existing 'Waukesha Smart Buy' at the Northwest corner of the Site and replacing it with a new building and asphalt pavement. Lot lines are to be divided per new CSM along the South side of the Site. Due to the current site conditions, the proposed site is considered redevelopment.

Storm water discharge control for this site is regulated by the City of Waukesha and Wisconsin Administrative Codes NR 151. The most stringent of the codes, City of Waukesha, requires post-development peak discharge rates resulting from the 1-, 2-, 10-, 100-year, 24 hour storm events maintain the same rates as the pre-developed conditions, respectively. Additionally, the City of Waukesha and DNR Code requires the reduction in total suspended solids (TSS) by 40% from parking lots and roads for re-development. Finally, the City of Waukesha requires developments with >80% of connected imperviousness to infiltrate sufficient runoff volume so that the post-development infiltration volume has at least 60% of the pre-developed infiltration volume, based on the average annual rainfall.

Infiltration rates of soils vary widely and are affected by subsurface permeability as well as surface intake rates. The Natural Resources Conservation Service (NRCS) has adopted a standard for classifying soils and their general characteristics relating to infiltration and runoff by classifying common soil textures into Hydrologic Soil Groups (HSG's). The HSG's are then used to determine runoff curve numbers (RCN). According to the NRCS Web Soil Survey, the site generally consists of 'Gravel pit' and a little bit of 'Fox Silt Loam'. According to the Waukesha County GIS system, 'Gravel pit' belongs to NRCS Hydrologic Soil Group A and 'Fox Silt Loam' belongs to NRCS Hydrologic Soil Group B (see Appendix B). These soils are soils having a high/moderate 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.

In order to satisfy both City of Waukesha and WDNR stormwater management requirements, the Site will use an ADS StormTech underground storage system to achieve water quantity and water quality standards. The StormTech system will have an impermeable pond liner on top of the subgrade to prevent possible oversaturation of the subbase causing pavement and structural failure. However, the City of Waukesha infiltration requirements will still be met due to WinSLAMM calculations (See Appendix E for supporting calculations). The design intent of the storm water drainage for this site is to collect and direct the runoff to the proposed underground system, which will temporarily detain the runoff and release the storm water volume generated at a controlled rate. In addition to controlling runoff rates, the detention facility will reduce the TSS loads from parking lots and roads by 40% based on the average annual rainfall, as compared to no runoff management controls

METHOD OF HYDROLOGIC ANALYSIS

A hydrologic analysis is required to determine peak storm water runoff from the subject property under existing and proposed conditions. The analysis was performed using the HydroCAD Version 10.10 hydrologic simulation computer model. The discharges were generated using the SCS Dimensionless Unit Hydrograph Method for a 24-hour duration storm. Model parameters include drainage area, SCS runoff curve number, average basin slope, hydraulic length, 24-hour precipitation (see Table 1) and time of concentration.

Table 1 – Design Storm Events
Chapter 32.11, Table 3 – Rainfall Depths

Frequency (years)	Duration (hours)	Rainfall Depth (inches)
1	24	2.40
2	24	2.70
10	24	3.81
100	24	6.18

The computer model used for water quality analysis is Source Loading and Management Model (SLAMM). SLAMM was adopted and calibrated by the Wisconsin Department of Natural Resources (WDNR). This model was originally developed to better understand the relationships between sources of urban runoff pollutants and runoff quality. Special emphasis has been placed on small storm hydrology and particulate wash-off, which are the most significant contributing factors to water quality.

EXISTING HYDROLOGY CONDITIONS

The storm water generated from the existing site drains offsite in three different directions. The majority of storm water drains on Site into the storm sewer network that drains west toward Manhattan Drive. Next there is a watershed that drains offsite to the North of the Site into the storm sewer network that drains west within Moreland Blvd. Finally, the smallest watershed, that is offsite, drains west into the commercial development's storm sewer network.

The information provided in Table 2 summarizes the parameters and peak flows generated for the 1-, 2-, 10-, and 100-year, 24 hour storm event under the existing conditions. The existing peak discharge rates are used to determine the allowable site release rates generated for the proposed conditions.

Table 2 – Existing Runoff Release Rates

Watershed	Area (acres)	Composite RCN	Tc (minutes)	Peak Discharge (cfs)			
				1-yr	2-yr	10-yr	100-yr
E-1	0.61	94	6	1.91	2.20	3.26	5.48
E-2	1.47	96	6	4.93	5.61	8.12	13.42
E-3	0.86	77	6	1.41	1.81	3.38	6.75
O-1	0.21	87	6	0.48	0.58	0.94	1.73
E-TOTAL	**3.15**	**---**	**---**	**7.74**	**9.01**	**13.95**	**24.73**

PROPOSED HYDROLOGY CONDITIONS (BEFORE DETENTION)

The proposed site has been graded and designed to maintain existing drainage patters as much as possible. Watershed P-1 receives runoff via storm sewer from parking lot pavement and landscaped green space, which ultimately is conveyed to 'UG Detention-West' system. Watershed P-2 receives runoff via overland flow and storm sewer from the building roof, parking lot pavement, and landscaped green space, which ultimately is conveyed to 'UG Detention-South' system. Watershed P-3 receives runoff via overland flow and storm sewer from the building roof, parking lot pavement, and landscaped green space, which ultimately is conveyed to 'UG Detention-North' system. Watershed O-1 is an offsite watershed that is conveyed to 'UG Detention-South', however this watershed has also been included as an existing watershed to create a 'pass-through' for the proposed site. Watershed PU-1 is not conveyed to either of the underground systems and flow from the site undetained.

The information provided in Table 3 summarizes the parameters and peak flows generated for the 1-, 2-, 10-, and 100-year, 24 hour storm under the proposed conditions, before detention.

Table 3 – Proposed Hydrology Summary (before detention)

Watershed	Area (acres)	Composite RCN	Tc (minutes)	Peak Discharge (cfs)			
				1-yr	2-yr	10-yr	100-yr
P-1	1.00	95	6	3.25	3.72	5.44	9.06
P-2	0.94	96	6	3.15	3.59	5.19	8.58
P-3	0.76	95	6	2.47	2.82	4.13	6.89
PU-1	0.24	47	6	0.00	0.00	0.02	0.38
O-1	0.21	87	6	0.48	0.58	0.94	1.73
P TOTAL (W/O DETENTION)	**3.15**	**---**	**---**	**9.35**	**10.71**	**15.72**	**26.64**

PROPOSED HYDROLOGY CONDITIONS (AFTER DETENTION)

Due to the increased impervious area for a proposed site, the resulting peak discharges for the proposed drainage conditions are greater than the existing conditions, thus requiring detention to regulate peak flows. This site also has to comply with TSS requirements, therefore, three ADS StormTech underground systems are being proposed for this project.

The information provided in Tables 4 and 5 summarizes the parameters and peak flows generated for the 1-, 2-, 10-, and 100-year, 24 hour storm event under the proposed conditions, after detention.

Table 4 – UG Detention - North

Storm Event	Discharge (cfs)	Maximum Elevation	Maximum Storage (af)
1-Year	2.03	94.61	0.015
2-Year	2.55	94.67	0.016
10-Year	3.37	95.02	0.022
100-Year	5.05	96.29	0.039

Table 4 – UG Detention - South

Storm Event	Discharge (cfs)	Maximum Elevation	Maximum Storage (af)
1-Year	1.05	95.83	0.053
2-Year	1.15	95.90	0.061
10-Year	1.46	96.19	0.091
100-Year	3.57	96.75	0.139

Table 4 – UG Detention - West

Storm Event	Discharge (cfs)	Maximum Elevation	Maximum Storage (af)
1-Year	1.12	95.55	0.048
2-Year	1.23	95.67	0.056
10-Year	1.61	96.13	0.086
100-Year	2.31	97.37	0.156

The information provided in Table 5 summarizes the peak flows generated for the 1-, 2-, 10-, and 100-year, 24 hour storm event for existing and proposed conditions, including the undetained areas.

Table 5 – Peak Discharge Summary

EXISTING | PROPOSED

1-yr

E-Total (cfs)	P-Total (cfs)
7.74	**4.50**

2-yr

E-Total (cfs)	P-Total (cfs)
9.01	**5.24**

10-yr

E-Total (cfs)	P-Total (cfs)
13.95	**6.99**

100-yr

E-Total (cfs)	P-Total (cfs)
24.73	**12.27**

STORM WATER QUALITY

Waukesha County and DNR Code requires water quality best management practices to reduce the post-construction total suspended solids (TSS) load by 40% for re-development based on the average annual rainfall, as compared to no runoff management controls.

Water quality TSS reduction goals are met by directing on site drainage through the proposed storm sewer systems directed to two underground ADS StormTech storage and cleaning systems. The cleaning mechanism of the underground systems occurs in an “Isolator Row” that is completely encased in a geotextile fabric and acts as a sediment trap. A strip of woven geotextile is placed under the entire length of the row between the chambers and the base stone. This provides a floor to the row that will allow water to pass, but will trap sediment and debris. The isolator row is the first row in the chamber bed at each inlet point. Only when the isolator row fills does the water build enough of to reach the manifold invert to the standard rows.

The information provided in Table 6 show the SLAMM input data tributary to the infiltration basin and also the undetained areas.

Table 6 – Proposed SLAMM Input

Source Area	P-1 (acres)	P-2 (acres)	P-3 (acres)	PU-1 (acres)	O-1 (acres)	Total Area (acres)
Grass	0.05	0.03	0.04	0.21	0.04	0.37
Pavement	0.88	0.72	0.44	0.03	0.17	2.24
Sidewalk	0.07	0.01	0.03	0.004	0.00	0.114
Roof	0.00	0.18	0.25	0.00	0.00	0.43
TOTAL	**1.00**	**0.94**	**0.76**	**0.244**	**0.21**	**3.15**

Table 7 – Proposed SLAMM Output

	Total Suspended Solids	Percent Reduction
Proposed Site w/o Controls	**1,915 lbs.**	
Proposed Site with Controls	**1,083 lbs.**	**43.45%**

INFILTRATION

This site is required to infiltrate sufficient runoff volume so that the post-development infiltration volume is at least 60% of the pre-development infiltration volume (or depth), based on an average annual rainfall. This Site's infiltration requirement is met considering the amount of green space in the post-developed condition is greater than the pre-developed condition. Below is a brief list of variables needed to calculate pre-developed and post-developed infiltration depths on an average annual basis. See Appendix E for supporting calculations.

Pre-Developed Stay-On Depth (Ave. Annual Basis on 3.15 Ac.) = 7.96 inches

60% Target Stay-On Depth = 7.96 x 60% = **4.78 inches**

Post-Developed Stay-On Depth (Ave. Annual Basis on 3.15 Ac.) = **9.14 inches**

The post-developed stay-on depth of 9.14 inches exceeds the required pre-developed stay-on depth of 4.78 inches.

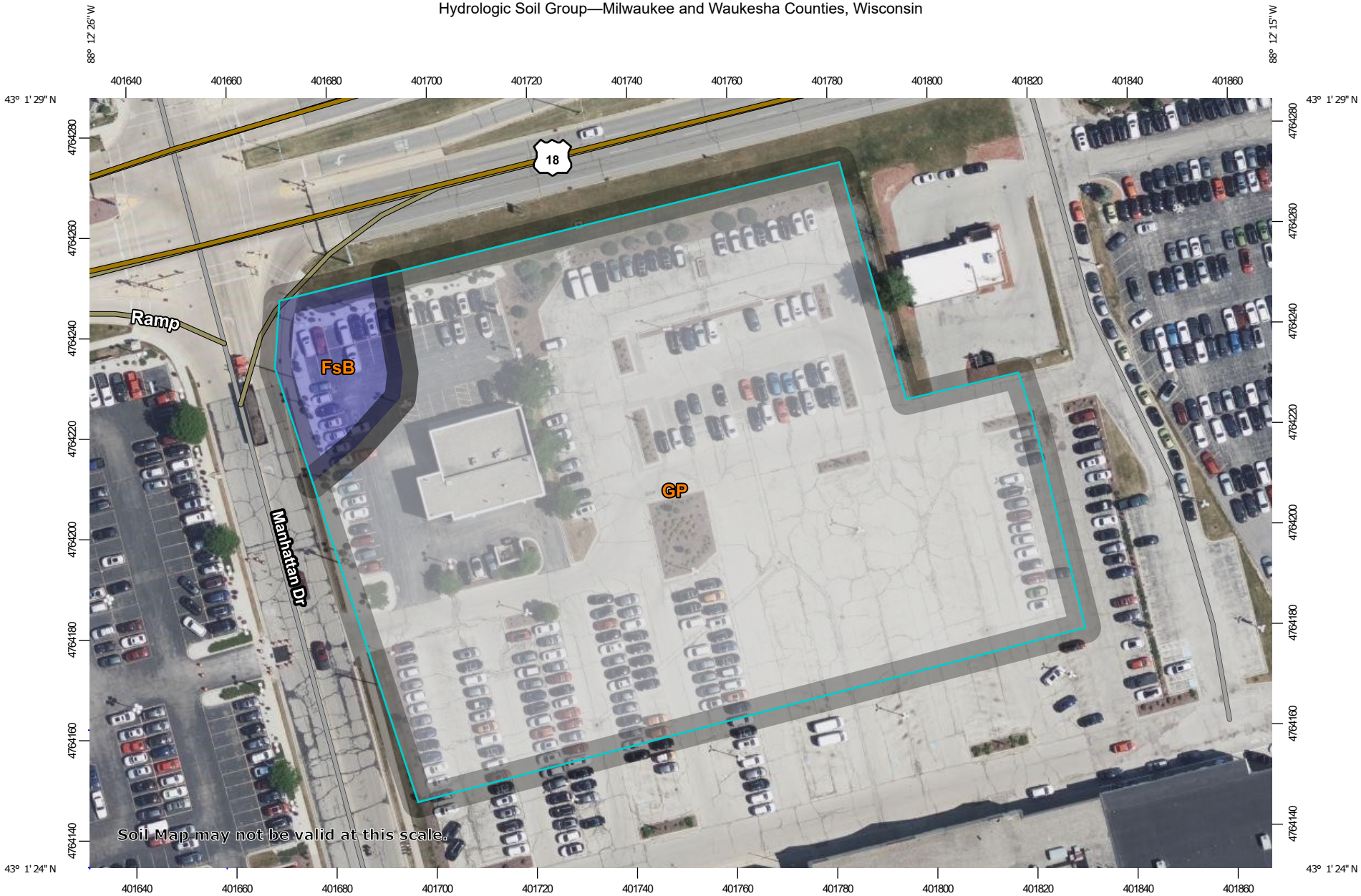
SUMMARY

Storm water requirements are regulated by the City of Waukesha and The Department of Natural Resources NR151. R.A. Smith, Inc. has completed a storm water management analysis for this site, which meets the applicable regulating agencies requirements.

APPENDIX A
LOCATION MAP

Location Map

APPENDIX B
NRCS Soil Map



Map Scale: 1:1,080 if printed on A landscape (11" x 8.5") sheet.

N

Meters: 0 15 30 60 90

Feet: 0 50 100 200 300

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
FsB	Fox silt loam, 2 to 6 percent slopes	B	0.2	5.5%
GP	Gravel pit		3.1	94.5%
Totals for Area of Interest			**3.3**	**100.0%**

Description

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

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

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

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

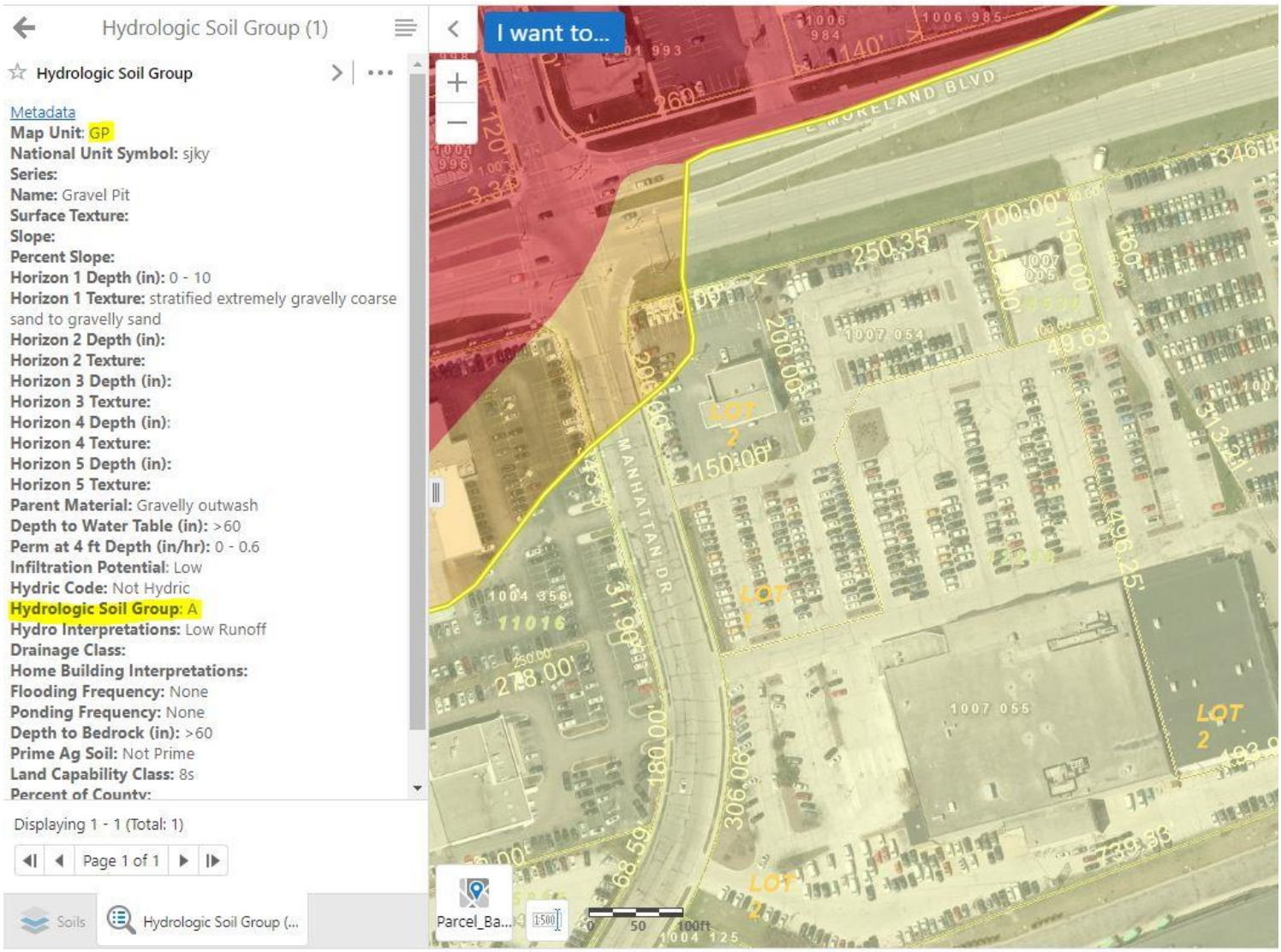
Group C. Soils having a slow infiltration rate when thoroughly wet. These consist chiefly of soils having a layer that impedes the downward movement of water or soils of moderately fine texture or fine texture. These soils have a slow rate of water transmission.

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

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

Rating Options

Aggregation Method: Dominant Condition


Hydrologic Soil Group (1)
Hydrologic Soil Group
Metadata
Map Unit: GP
National Unit Symbol: sjky
Series:
Name: Gravel Pit
Surface Texture:
Slope:
Percent Slope:
Horizon 1 Depth (in): 0 - 10
Horizon 1 Texture: stratified extremely gravelly coarse sand to gravelly sand
Horizon 2 Depth (in):
Horizon 2 Texture:
Horizon 3 Depth (in):
Horizon 3 Texture:
Horizon 4 Depth (in):
Horizon 4 Texture:
Horizon 5 Depth (in):
Horizon 5 Texture:
Parent Material: Gravelly outwash
Depth to Water Table (in): >60
Perm at 4 ft Depth (in/hr): 0 - 0.6
Infiltration Potential: Low
Hydric Code: Not Hydric
Hydrologic Soil Group: A
Hydro Interpretations: Low Runoff
Drainage Class:
Home Building Interpretations:
Flooding Frequency: None
Ponding Frequency: None
Depth to Bedrock (in): >60
Prime Ag Soil: Not Prime
Land Capability Class: 8s
Percent of County:
Displaying 1 - 1 (Total: 1)
Page 1 of 1
Soils
Hydrologic Soil Group (...
I want to...
E MORELAND BLVD
MANHATTAN DR
LOT 2
LOT 1
1007 054
1007 055
1004 356
Parcel_Ba...
0 50 100ft

APPENDIX C

Hydrology Calculations

(1-yr, 2-yr, 10-yr, 100-yr)

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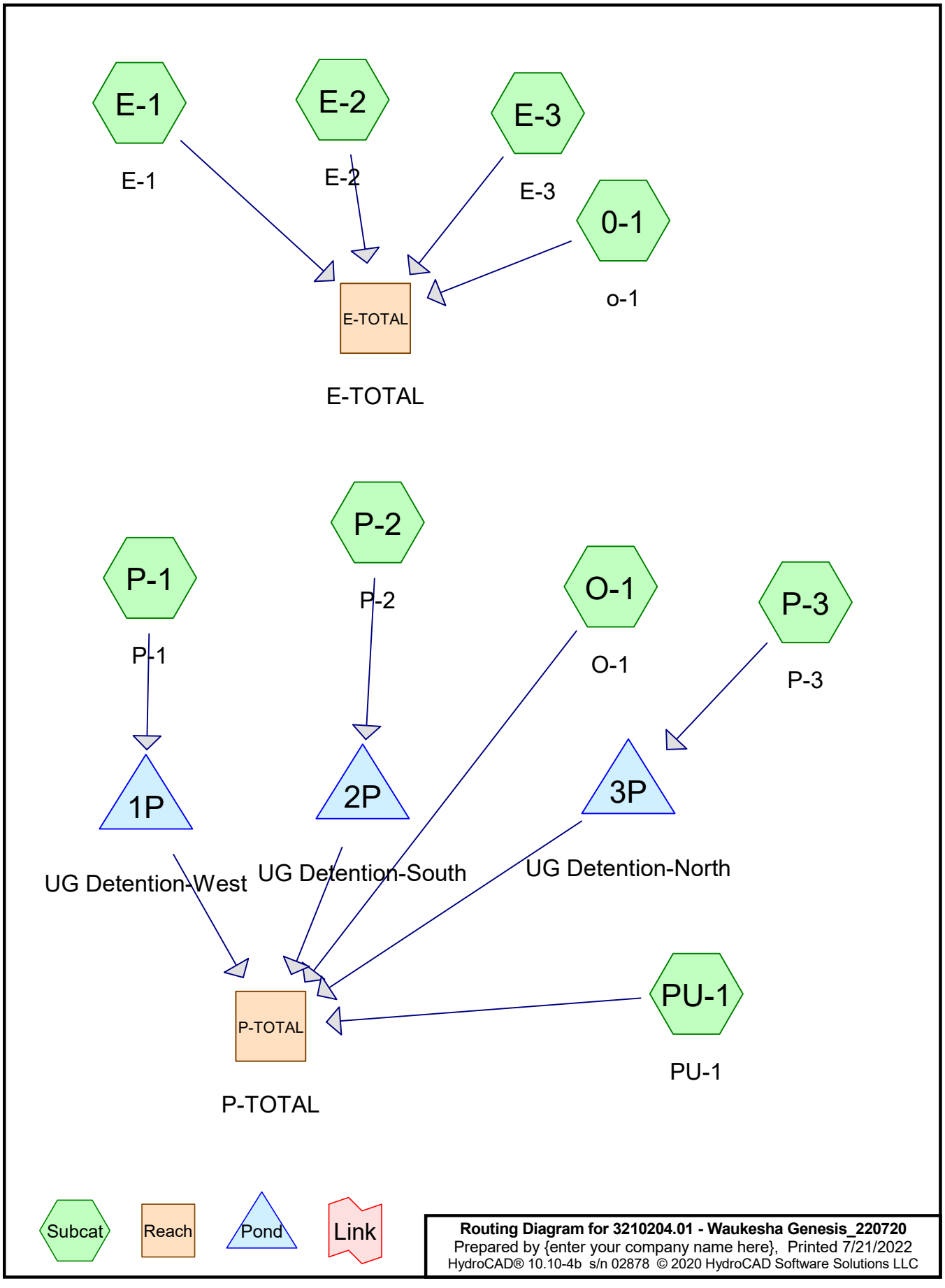

E-1
E-2
E-3
0-1
E-1
E-2
E-3
o-1
E-TOTAL
E-TOTAL
P-2
P-1
O-1
P-3
P-1
P-2
O-1
P-3
1P
2P
3P
UG Detention-West
UG Detention-South
UG Detention-North
PU-1
P-TOTAL
PU-1
P-TOTAL
Subcat
Reach
Pond
Link
Routing Diagram for 3210204.01 - Waukesha Genesis_220720
Prepared by {enter your company name here}, Printed 7/21/2022
HydroCAD® 10.10-4b s/n 02878 © 2020 HydroCAD Software Solutions LLC

Rainfall Events Listing

Event#	Event Name	Storm Type	Curve	Mode	Duration (hours)	B/B	Depth (inches)	AMC
1	1-yr	MSE 24-hr	3	Default	24.00	1	2.40	2
2	2-yr	MSE 24-hr	3	Default	24.00	1	2.70	2
3	10-yr	MSE 24-hr	3	Default	24.00	1	3.81	2
4	100-yr	MSE 24-hr	3	Default	24.00	1	6.18	2

Area Listing (all nodes)

Area (acres)	CN	Description (subcatchment-numbers)
0.810	39	>75% Grass cover, Good, HSG A (0-1, E-1, E-2, E-3, O-1, P-1, P-2, P-3, PU-1)
4.850	98	Paved parking, HSG A (0-1, E-1, E-2, E-3, O-1, P-1, P-2, P-3, PU-1)
0.280	98	Roofs, HSG A (E-1, P-2)
0.110	98	Unconnected pavement, HSG A (P-1, P-2, P-3)
0.254	98	Unconnected roofs, HSG A (P-3, PU-1)
6.304	**90**	**TOTAL AREA**

Soil Listing (all nodes)

Area (acres)	Soil Group	Subcatchment Numbers
6.304	HSG A	0-1, E-1, E-2, E-3, O-1, P-1, P-2, P-3, PU-1
0.000	HSG B	
0.000	HSG C	
0.000	HSG D	
0.000	Other	
6.304		**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
0.810	0.000	0.000	0.000	0.000	0.810	>75% Grass cover, Good	0-1, E-1, E-2, E-3, O-1, P-1, P-2, P-3, PU-1
4.850	0.000	0.000	0.000	0.000	4.850	Paved parking	0-1, E-1, E-2, E-3, O-1, P-1, P-2, P-3, PU-1
0.280	0.000	0.000	0.000	0.000	0.280	Roofs	E-1, P-2
0.110	0.000	0.000	0.000	0.000	0.110	Unconnected pavement	P-1, P-2, P-3
0.254	0.000	0.000	0.000	0.000	0.254	Unconnected roofs	P-3, PU-1
6.304	**0.000**	**0.000**	**0.000**	**0.000**	**6.304**	**TOTAL AREA**	

Pipe Listing (all nodes)

Line#	Node Number	In-Invert (feet)	Out-Invert (feet)	Length (feet)	Slope (ft/ft)	n	Width (inches)	Diam/Height (inches)	Inside-Fill (inches)
1	1P	94.61	94.35	36.3	0.0072	0.012	0.0	8.0	0.0
2	2P	95.10	93.01	208.4	0.0100	0.012	0.0	12.0	0.0
3	3P	93.50	92.43	35.8	0.0299	0.012	0.0	12.0	0.0

Time span=0.00-24.00 hrs, dt=0.01 hrs, 2401 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 0-1: o-1 Runoff Area=0.210 ac 80.95% Impervious Runoff Depth>1.23"
Tc=6.0 min CN=87 Runoff=0.48 cfs 0.021 af

Subcatchment E-1: E-1 Runoff Area=0.610 ac 93.44% Impervious Runoff Depth>1.77"
Tc=6.0 min CN=94 Runoff=1.91 cfs 0.090 af

Subcatchment E-2: E-2 Runoff Area=1.470 ac 95.92% Impervious Runoff Depth>1.96"
Tc=6.0 min CN=96 Runoff=4.93 cfs 0.240 af

Subcatchment E-3: E-3 Runoff Area=0.860 ac 65.12% Impervious Runoff Depth>0.68"
Tc=0.0 min CN=77 Runoff=1.41 cfs 0.049 af

Subcatchment O-1: O-1 Runoff Area=0.210 ac 80.95% Impervious Runoff Depth>1.23"
Tc=6.0 min CN=87 Runoff=0.48 cfs 0.021 af

Subcatchment P-1: P-1 Runoff Area=1.000 ac 95.00% Impervious Runoff Depth>1.87"
Tc=6.0 min CN=95 Runoff=3.25 cfs 0.156 af

Subcatchment P-2: P-2 Runoff Area=0.940 ac 96.81% Impervious Runoff Depth>1.96"
Tc=6.0 min CN=96 Runoff=3.15 cfs 0.154 af

Subcatchment P-3: P-3 Runoff Area=0.760 ac 94.74% Impervious Runoff Depth>1.87"
Tc=6.0 min CN=95 Runoff=2.47 cfs 0.118 af

Subcatchment PU-1: PU-1 Runoff Area=0.244 ac 13.93% Impervious Runoff Depth>0.00"
Tc=6.0 min CN=47 Runoff=0.00 cfs 0.000 af

Reach E-TOTAL: E-TOTAL Inflow=7.74 cfs 0.401 af
Outflow=7.74 cfs 0.401 af

Reach P-TOTAL: P-TOTAL Inflow=4.50 cfs 0.443 af
Outflow=4.50 cfs 0.443 af

Pond 1P: UG Detention-West Peak Elev=95.55' Storage=0.048 af Inflow=3.25 cfs 0.156 af
8.0" Round Culvert n=0.012 L=36.3' S=0.0072 '/' Outflow=1.12 cfs 0.153 af

Pond 2P: UG Detention-South Peak Elev=95.83' Storage=0.053 af Inflow=3.15 cfs 0.154 af
Outflow=1.05 cfs 0.151 af

Pond 3P: UG Detention-North Peak Elev=94.61' Storage=0.015 af Inflow=2.47 cfs 0.118 af
Outflow=2.03 cfs 0.118 af

Total Runoff Area = 6.304 ac Runoff Volume = 0.850 af Average Runoff Depth = 1.62"
12.85% Pervious = 0.810 ac 87.15% Impervious = 5.494 ac

Summary for Subcatchment 0-1: o-1

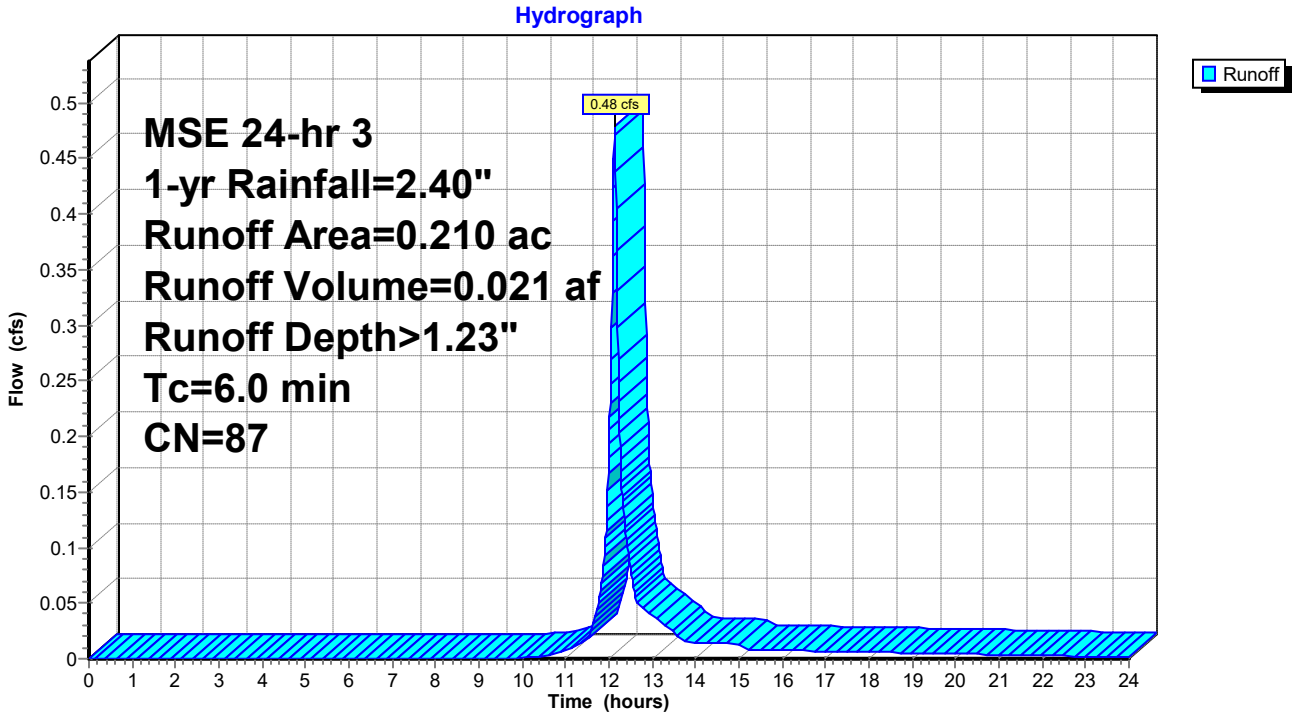
Runoff = 0.48 cfs @ 12.13 hrs, Volume= 0.021 af, Depth> 1.23"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs
MSE 24-hr 3 1-yr Rainfall=2.40"

Area (ac)	CN	Description
0.040	39	>75% Grass cover, Good, HSG A
0.170	98	Paved parking, HSG A
0.210	87	Weighted Average
0.040		19.05% Pervious Area
0.170		80.95% Impervious Area

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

Subcatchment 0-1: o-1



Summary for Subcatchment E-1: E-1

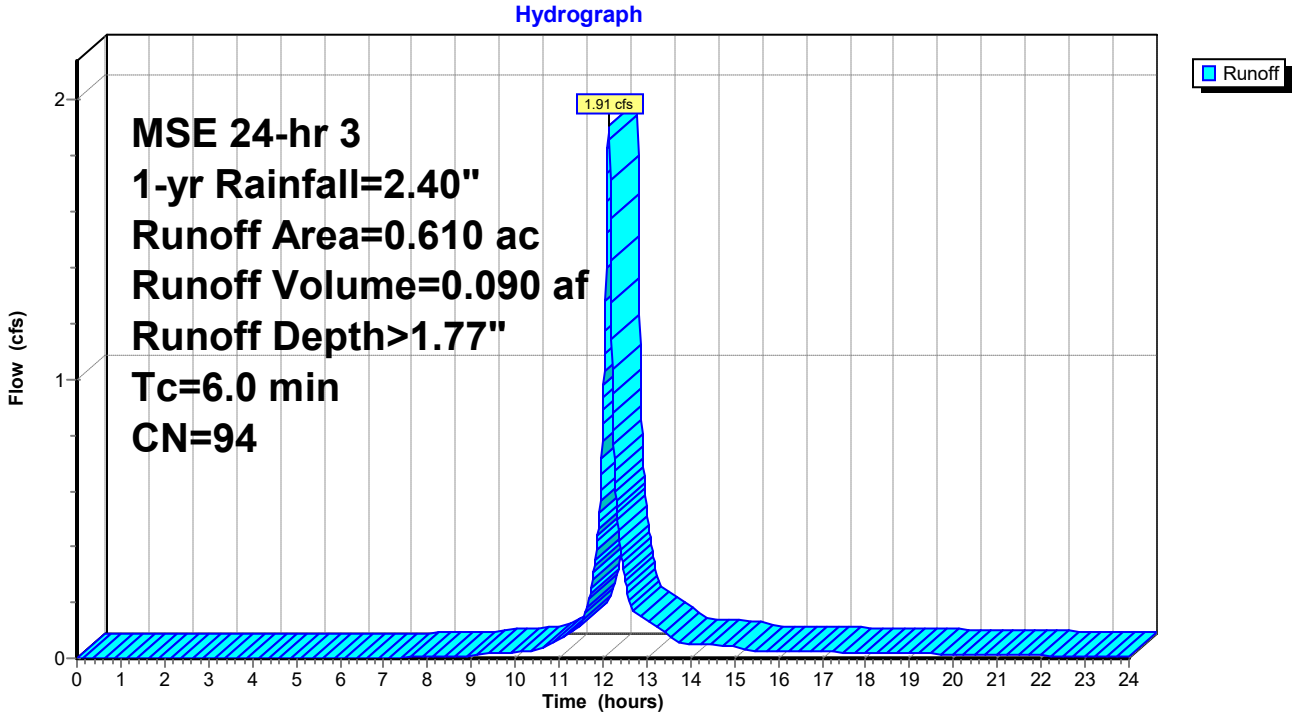
Runoff = 1.91 cfs @ 12.13 hrs, Volume= 0.090 af, Depth> 1.77"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs
MSE 24-hr 3 1-yr Rainfall=2.40"

Area (ac)	CN	Description
0.040	39	>75% Grass cover, Good, HSG A
0.100	98	Roofs, HSG A
0.470	98	Paved parking, HSG A
0.610	94	Weighted Average
0.040		6.56% Pervious Area
0.570		93.44% Impervious Area

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

Subcatchment E-1: E-1



Summary for Subcatchment E-2: E-2

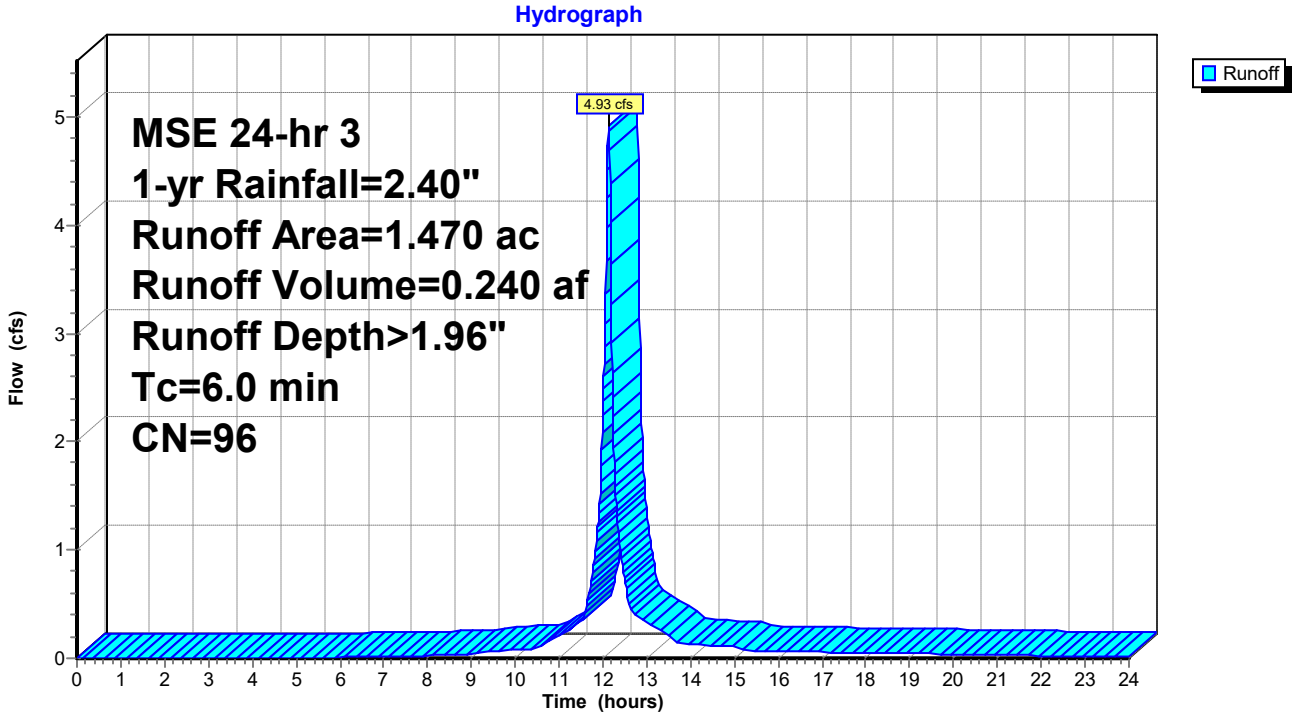
Runoff = 4.93 cfs @ 12.13 hrs, Volume= 0.240 af, Depth> 1.96"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs
MSE 24-hr 3 1-yr Rainfall=2.40"

Area (ac)	CN	Description
0.060	39	>75% Grass cover, Good, HSG A
1.410	98	Paved parking, HSG A
0.000	98	Roofs, HSG A
1.470	96	Weighted Average
0.060		4.08% Pervious Area
1.410		95.92% Impervious Area

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

Subcatchment E-2: E-2



Summary for Subcatchment E-3: E-3

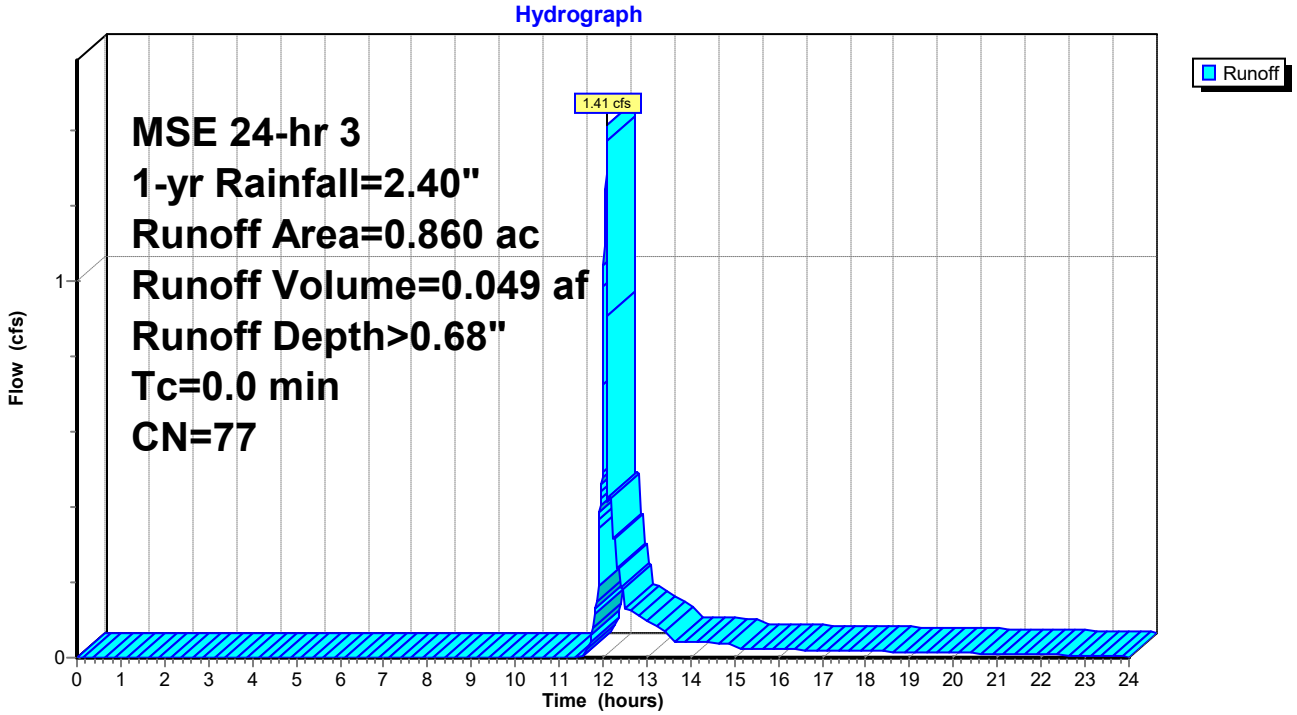
[46] Hint: Tc=0 (Instant runoff peak depends on dt)

Runoff = 1.41 cfs @ 12.09 hrs, Volume= 0.049 af, Depth> 0.68"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs
MSE 24-hr 3 1-yr Rainfall=2.40"

Area (ac)	CN	Description
0.300	39	>75% Grass cover, Good, HSG A
0.560	98	Paved parking, HSG A
0.860	77	Weighted Average
0.300		34.88% Pervious Area
0.560		65.12% Impervious Area

Subcatchment E-3: E-3



Summary for Subcatchment O-1: O-1

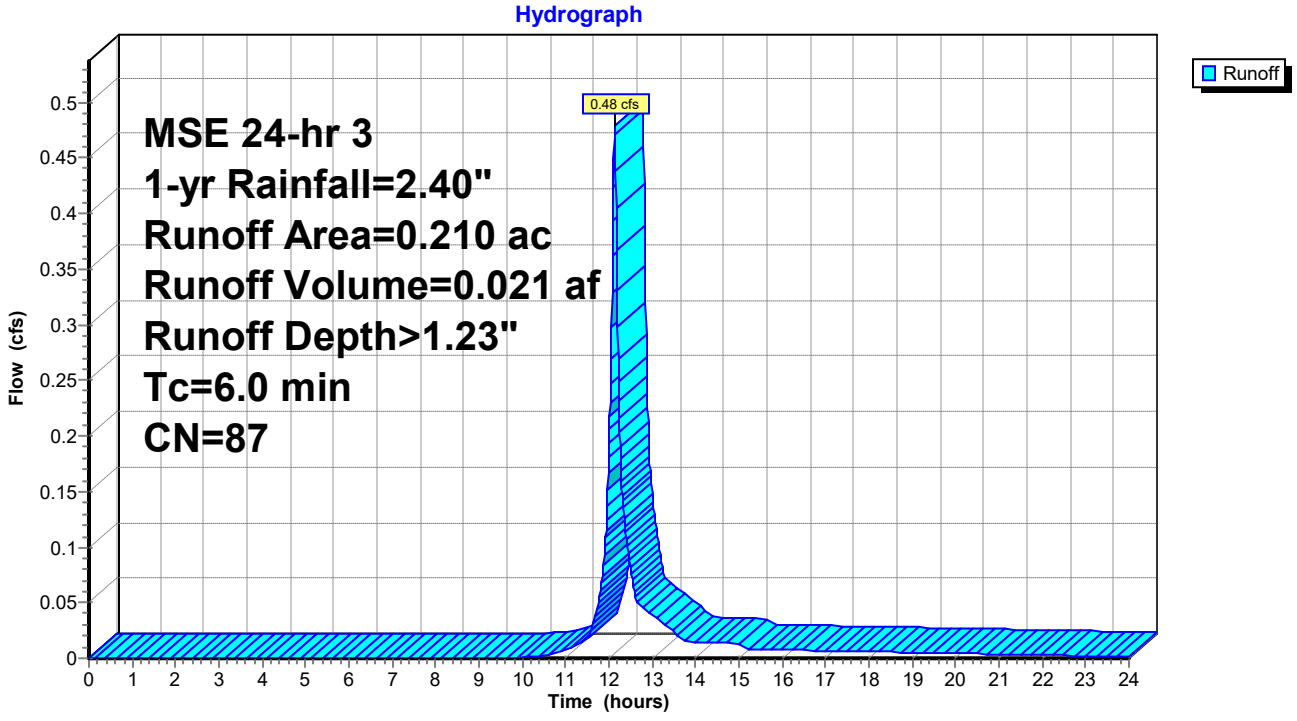
Runoff = 0.48 cfs @ 12.13 hrs, Volume= 0.021 af, Depth> 1.23"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs
MSE 24-hr 3 1-yr Rainfall=2.40"

Area (ac)	CN	Description
0.040	39	>75% Grass cover, Good, HSG A
0.170	98	Paved parking, HSG A
0.000	98	Roofs, HSG A
0.210	87	Weighted Average
0.040		19.05% Pervious Area
0.170		80.95% Impervious Area

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

Subcatchment O-1: O-1



Summary for Subcatchment P-1: P-1

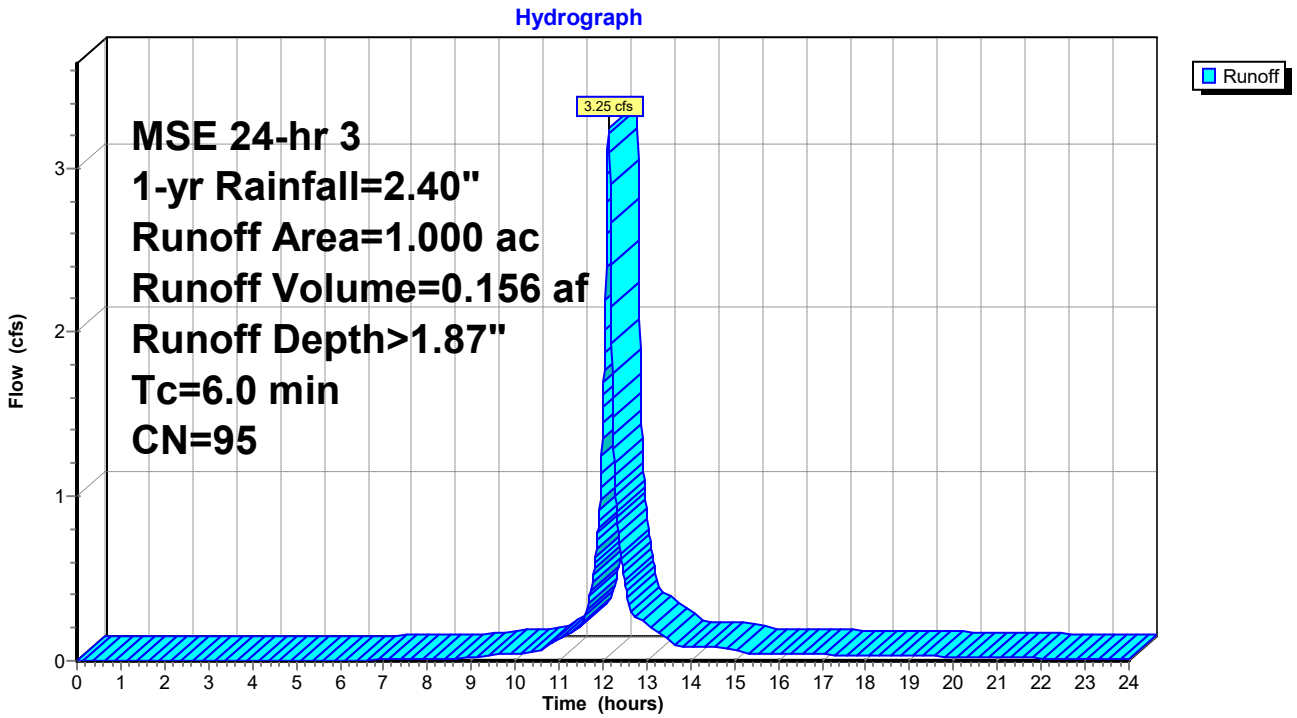
Runoff = 3.25 cfs @ 12.13 hrs, Volume= 0.156 af, Depth> 1.87"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs
MSE 24-hr 3 1-yr Rainfall=2.40"

Area (ac)	CN	Description
0.050	39	>75% Grass cover, Good, HSG A
0.880	98	Paved parking, HSG A
0.070	98	Unconnected pavement, HSG A
1.000	95	Weighted Average
0.050		5.00% Pervious Area
0.950		95.00% Impervious Area
0.070		7.37% Unconnected

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

Subcatchment P-1: P-1



Summary for Subcatchment P-2: P-2

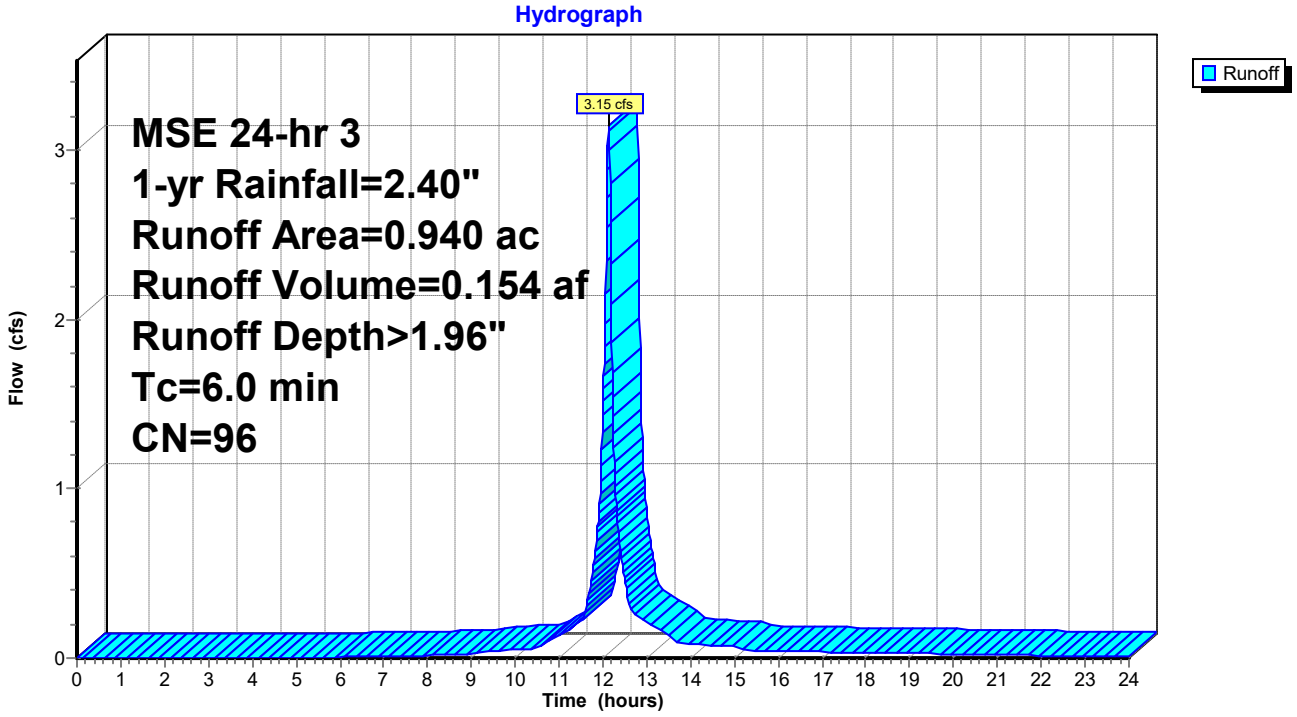
Runoff = 3.15 cfs @ 12.13 hrs, Volume= 0.154 af, Depth> 1.96"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs
MSE 24-hr 3 1-yr Rainfall=2.40"

Area (ac)	CN	Description
0.030	39	>75% Grass cover, Good, HSG A
0.720	98	Paved parking, HSG A
0.180	98	Roofs, HSG A
0.010	98	Unconnected pavement, HSG A
0.940	96	Weighted Average
0.030		3.19% Pervious Area
0.910		96.81% Impervious Area
0.010		1.10% Unconnected

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

Subcatchment P-2: P-2



Summary for Subcatchment P-3: P-3

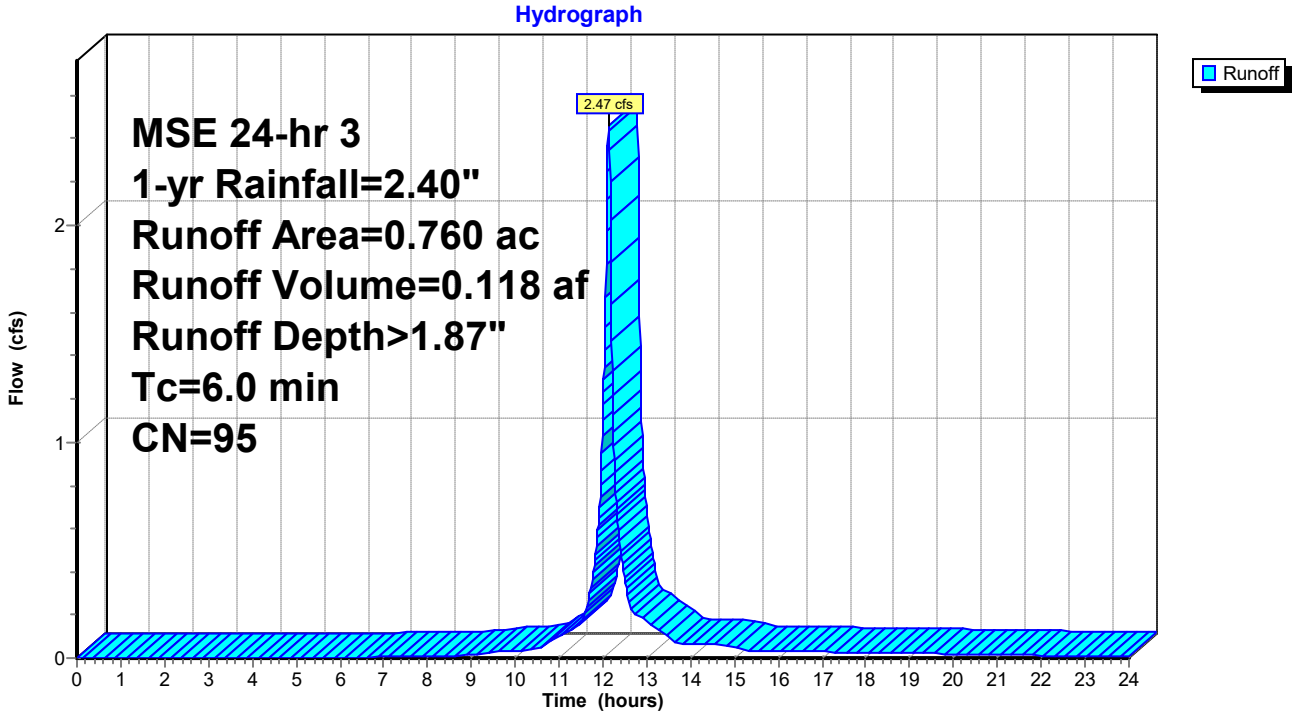
Runoff = 2.47 cfs @ 12.13 hrs, Volume= 0.118 af, Depth> 1.87"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs
MSE 24-hr 3 1-yr Rainfall=2.40"

Area (ac)	CN	Description
0.040	39	>75% Grass cover, Good, HSG A
0.440	98	Paved parking, HSG A
0.250	98	Unconnected roofs, HSG A
0.030	98	Unconnected pavement, HSG A
0.760	95	Weighted Average
0.040		5.26% Pervious Area
0.720		94.74% Impervious Area
0.280		38.89% Unconnected

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

Subcatchment P-3: P-3



Summary for Subcatchment PU-1: PU-1

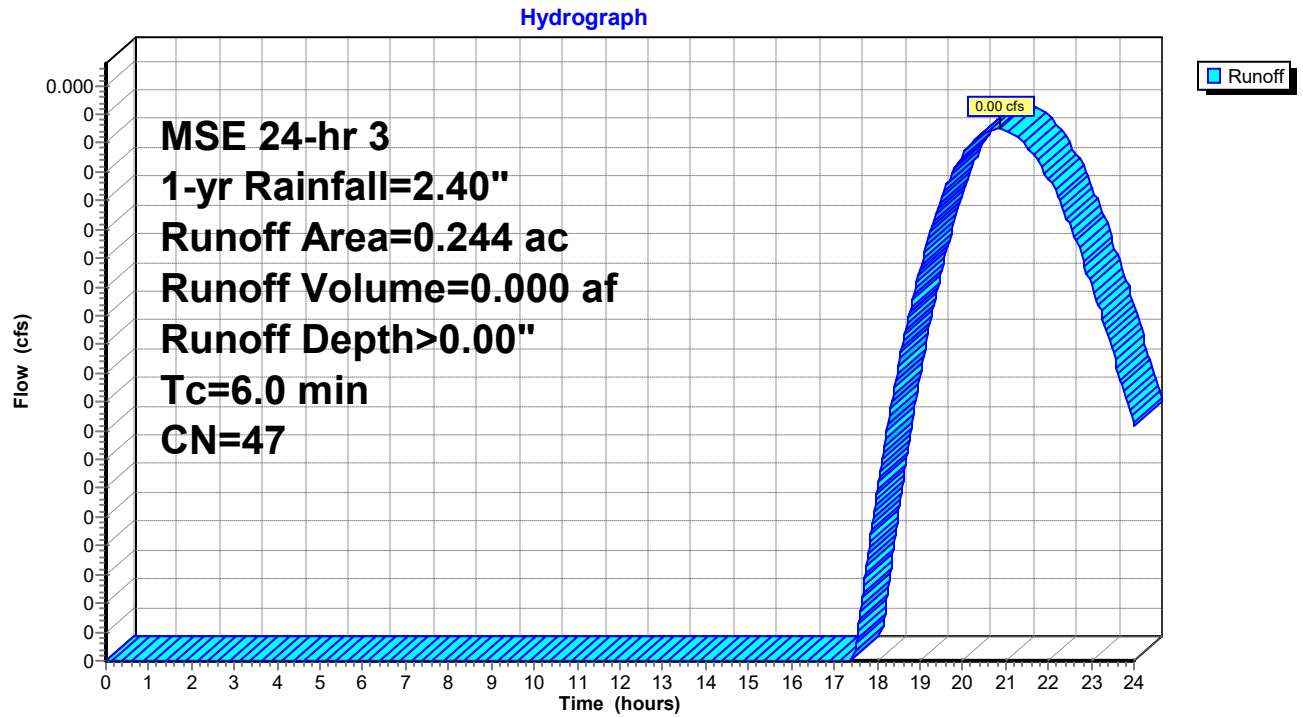
Runoff = 0.00 cfs @ 20.85 hrs, Volume= 0.000 af, Depth> 0.00"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs
MSE 24-hr 3 1-yr Rainfall=2.40"

Area (ac)	CN	Description
0.210	39	>75% Grass cover, Good, HSG A
0.030	98	Paved parking, HSG A
0.004	98	Unconnected roofs, HSG A
0.244	47	Weighted Average
0.210		86.07% Pervious Area
0.034		13.93% Impervious Area
0.004		11.76% Unconnected

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

Subcatchment PU-1: PU-1



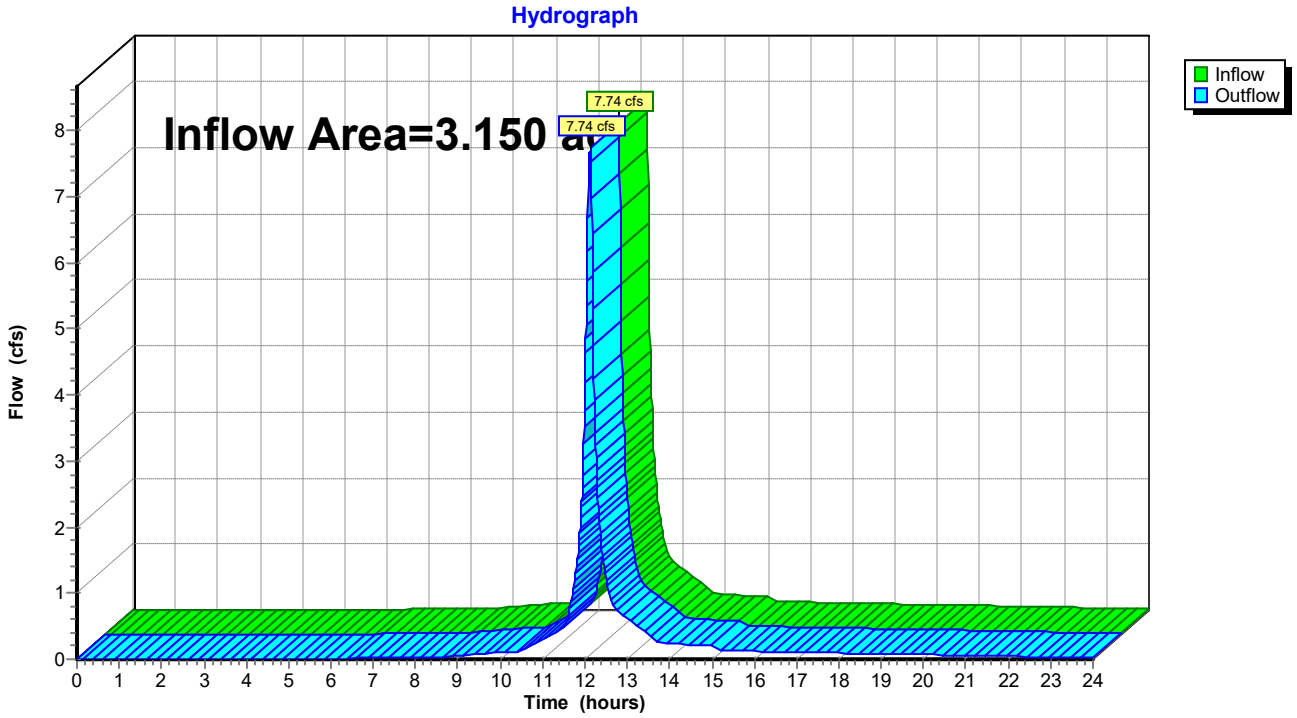
Summary for Reach E-TOTAL: E-TOTAL

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

Inflow Area = 3.150 ac, 86.03% Impervious, Inflow Depth > 1.53" for 1-yr event
Inflow = 7.74 cfs @ 12.13 hrs, Volume= 0.401 af
Outflow = 7.74 cfs @ 12.13 hrs, Volume= 0.401 af, Atten= 0%, Lag= 0.0 min

Routing by Stor-Ind+Trans method, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs

Reach E-TOTAL: E-TOTAL



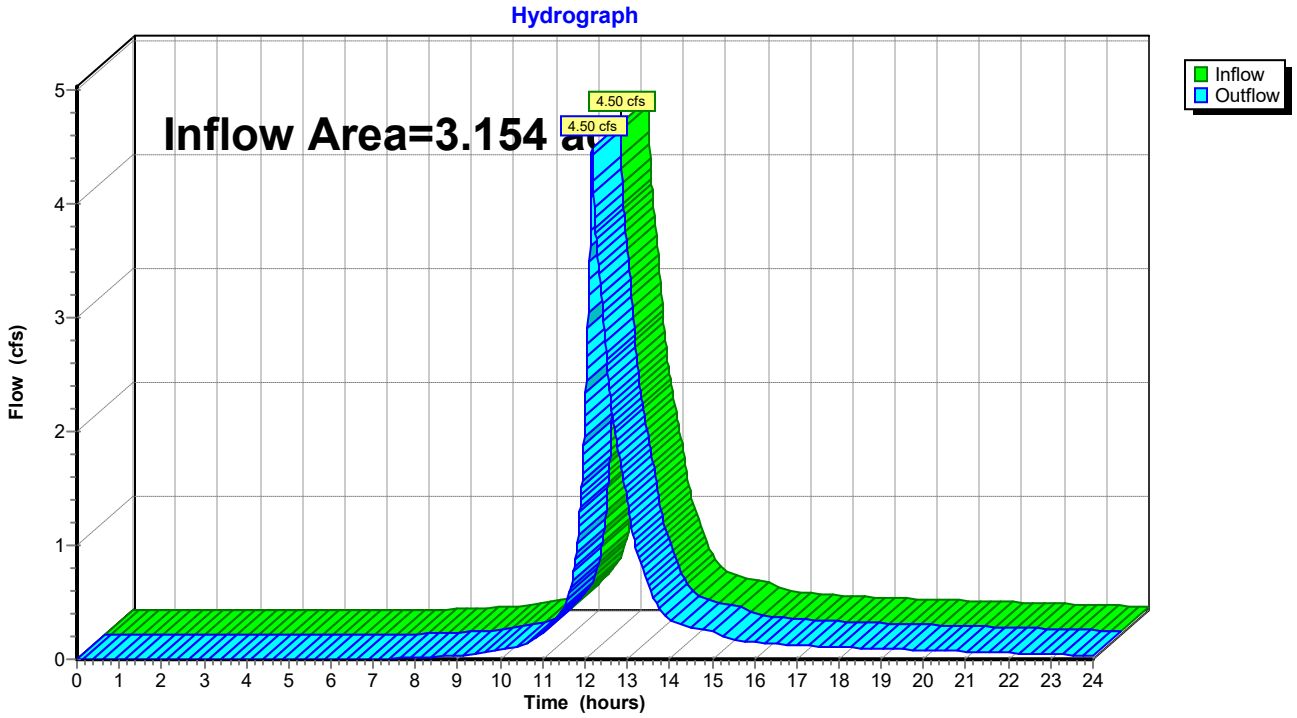
Summary for Reach P-TOTAL: P-TOTAL

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

Inflow Area = 3.154 ac, 88.27% Impervious, Inflow Depth > 1.69" for 1-yr event
Inflow = 4.50 cfs @ 12.17 hrs, Volume= 0.443 af
Outflow = 4.50 cfs @ 12.17 hrs, Volume= 0.443 af, Atten= 0%, Lag= 0.0 min

Routing by Stor-Ind+Trans method, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs

Reach P-TOTAL: P-TOTAL



Summary for Pond 1P: UG Detention-West

Inflow Area = 1.000 ac, 95.00% Impervious, Inflow Depth > 1.87" for 1-yr event
Inflow = 3.25 cfs @ 12.13 hrs, Volume= 0.156 af
Outflow = 1.12 cfs @ 12.27 hrs, Volume= 0.153 af, Atten= 66%, Lag= 8.5 min
Primary = 1.12 cfs @ 12.27 hrs, Volume= 0.153 af

Routing by Stor-Ind method, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs
Peak Elev= 95.55' @ 12.27 hrs Surf.Area= 0.084 ac Storage= 0.048 af

Plug-Flow detention time= 38.1 min calculated for 0.153 af (99% of inflow)
Center-of-Mass det. time= 30.2 min (807.2 - 777.0)

Volume	Invert	Avail.Storage	Storage Description
#1A	94.61'	0.076 af	**49.00'W x 74.82'L x 3.50'H Stone Bed** 0.295 af Overall - 0.105 af Embedded = 0.189 af x 40.0% Voids
#2A	95.11'	0.105 af	**ADS_StormTech SC-740 +Cap** x 100 Inside #1 Effective Size= 44.6"W x 30.0"H => 6.45 sf x 7.12'L = 45.9 cf Overall Size= 51.0"W x 30.0"H x 7.56'L with 0.44' Overlap 100 Chambers in 10 Rows
		0.181 af	Total Available Storage

Storage Group A created with Chamber Wizard

Device	Routing	Invert	Outlet Devices
#1	Primary	94.61'	**8.0" Round Culvert** L= 36.3' CMP, mitered to conform to fill, Ke= 0.700 Inlet / Outlet Invert= 94.61' / 94.35' S= 0.0072 '/' Cc= 0.900 n= 0.012 Corrugated PP, smooth interior, Flow Area= 0.35 sf

Primary OutFlow Max=1.12 cfs @ 12.27 hrs HW=95.55' (Free Discharge)
↑—**1=Culvert** (Barrel Controls 1.12 cfs @ 3.20 fps)

Pond 1P: UG Detention-West - Chamber Wizard Stone Bed

Chamber Model = ADS_StormTech SC-740 +Cap (ADS StormTech® SC-740 with cap length)
Effective Size= 44.6"W x 30.0"H => 6.45 sf x 7.12'L = 45.9 cf
Overall Size= 51.0"W x 30.0"H x 7.56'L with 0.44' Overlap

51.0" Wide + 6.0" Spacing = 57.0" C-C Row Spacing

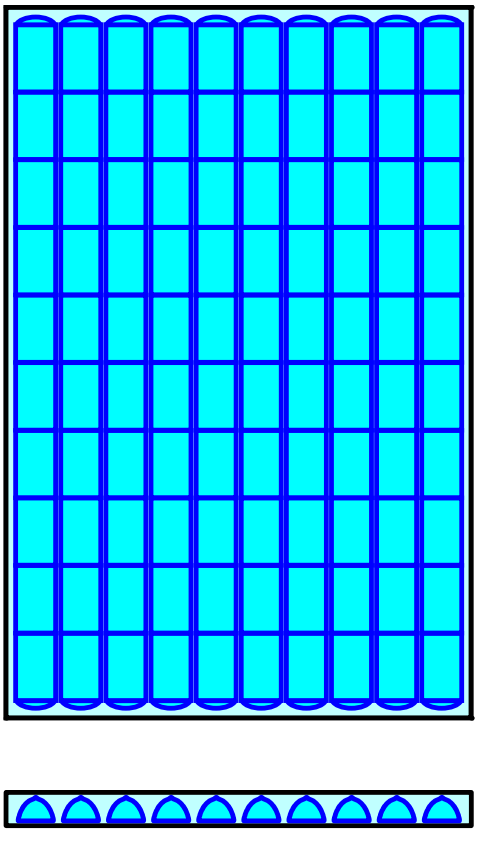
10 Chambers/Row x 7.12' Long +0.81' Cap Length x 2 = 72.82' Row Length +12.0" End Stone x 2 = 74.82' Base Length
10 Rows x 51.0" Wide + 6.0" Spacing x 9 + 12.0" Side Stone x 2 = 49.00' Base Width
6.0" Stone Base + 30.0" Chamber Height + 6.0" Stone Cover = 3.50' Field Height

100 Chambers x 45.9 cf = 4,594.0 cf Chamber Storage

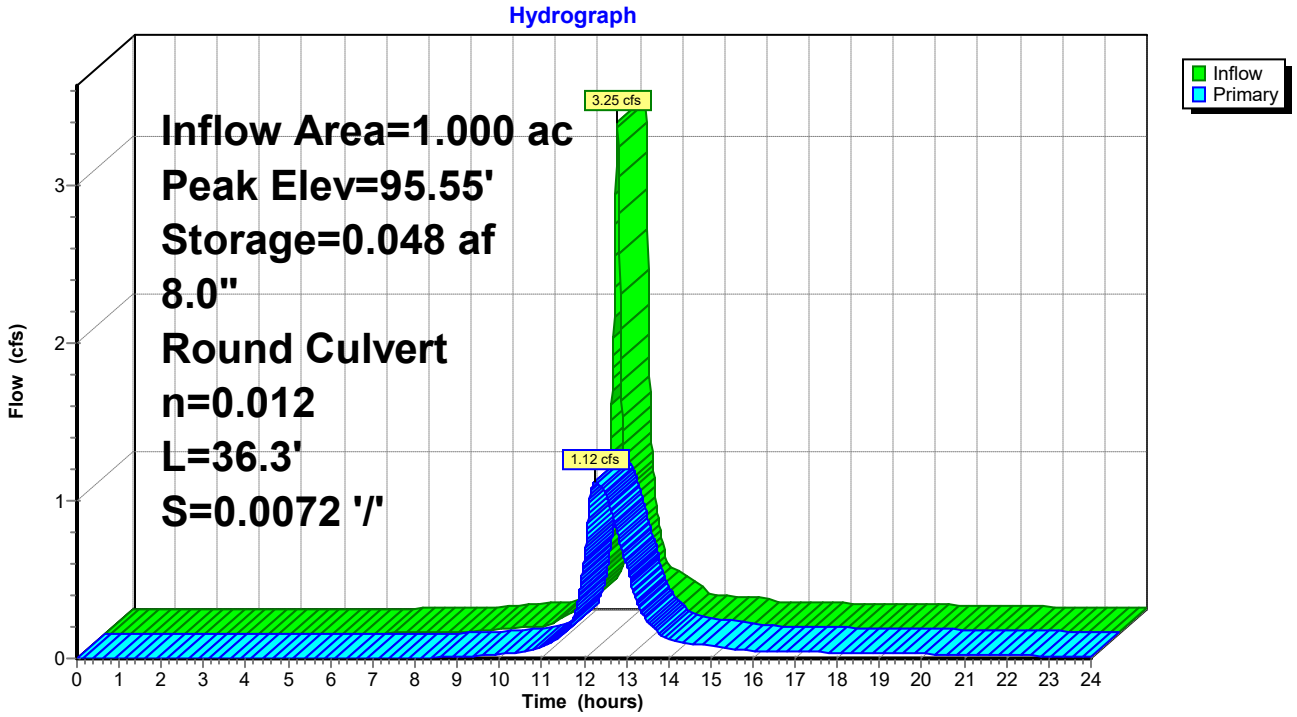
12,831.1 cf Field - 4,594.0 cf Chambers = 8,237.1 cf Stone x 40.0% Voids = 3,294.8 cf Stone Storage

Chamber Storage + Stone Storage = 7,888.8 cf = 0.181 af
Overall Storage Efficiency = 61.5%
Overall System Size = 74.82' x 49.00' x 3.50'

100 Chambers
475.2 cy Field
305.1 cy Stone



Pond 1P: UG Detention-West



Summary for Pond 2P: UG Detention-South

Inflow Area = 0.940 ac, 96.81% Impervious, Inflow Depth > 1.96" for 1-yr event
Inflow = 3.15 cfs @ 12.13 hrs, Volume= 0.154 af
Outflow = 1.05 cfs @ 12.27 hrs, Volume= 0.151 af, Atten= 67%, Lag= 8.7 min
Primary = 1.05 cfs @ 12.27 hrs, Volume= 0.151 af

Routing by Stor-Ind method, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs
Peak Elev= 95.83' @ 12.27 hrs Surf.Area= 0.140 ac Storage= 0.053 af

Plug-Flow detention time= 53.9 min calculated for 0.151 af (98% of inflow)
Center-of-Mass det. time= 41.9 min (813.4 - 771.5)

Volume	Invert	Avail.Storage	Storage Description
#1A	95.10'	0.084 af	**98.17'W x 53.04'L x 2.33'H Stone Bed** 0.279 af Overall - 0.069 af Embedded = 0.210 af x 40.0% Voids
#2A	95.60'	0.069 af	**ADS_StormTech SC-310 +Cap** x 203 Inside #1 Effective Size= 28.9"W x 16.0"H => 2.07 sf x 7.12'L = 14.7 cf Overall Size= 34.0"W x 16.0"H x 7.56'L with 0.44' Overlap 203 Chambers in 29 Rows
#3B	95.10'	0.015 af	**51.50'W x 17.44'L x 2.33'H Stone Bed** 0.048 af Overall - 0.010 af Embedded = 0.038 af x 40.0% Voids
#4B	95.60'	0.010 af	**ADS_StormTech RC-310 +Cap** x 30 Inside #3 Effective Size= 28.9"W x 16.0"H => 2.07 sf x 7.12'L = 14.7 cf Overall Size= 34.0"W x 16.0"H x 7.56'L with 0.44' Overlap 30 Chambers in 15 Rows
		0.178 af	Total Available Storage

Storage Group A created with Chamber Wizard
Storage Group B created with Chamber Wizard

Device	Routing	Invert	Outlet Devices
#1	Primary	95.10'	**12.0" Round Culvert** L= 208.4' CMP, mitered to conform to fill, Ke= 0.700 Inlet / Outlet Invert= 95.10' / 93.01' S= 0.0100 '/' Cc= 0.900 n= 0.012 Corrugated PP, smooth interior, Flow Area= 0.79 sf
#2	Device 1	95.10'	**8.0" Vert. Orifice/Grate** C= 0.600 Limited to weir flow at low heads
#3	Device 1	96.30'	**6.0' long x 0.5' breadth Broad-Crested Rectangular Weir** Head (feet) 0.20 0.40 0.60 0.80 1.00 Coef. (English) 2.80 2.92 3.08 3.30 3.32

Primary OutFlow Max=1.05 cfs @ 12.27 hrs HW=95.83' (Free Discharge)
└**1=Culvert** (Passes 1.05 cfs of 1.57 cfs potential flow)
  ├**2=Orifice/Grate** (Orifice Controls 1.05 cfs @ 3.02 fps)
  └**3=Broad-Crested Rectangular Weir** (Controls 0.00 cfs)

Pond 2P: UG Detention-South - Chamber Wizard Stone Bed

Chamber Model = ADS_StormTech SC-310 +Cap (ADS StormTech® SC-310 with cap length)
Effective Size= 28.9"W x 16.0"H => 2.07 sf x 7.12'L = 14.7 cf
Overall Size= 34.0"W x 16.0"H x 7.56'L with 0.44' Overlap

34.0" Wide + 6.0" Spacing = 40.0" C-C Row Spacing

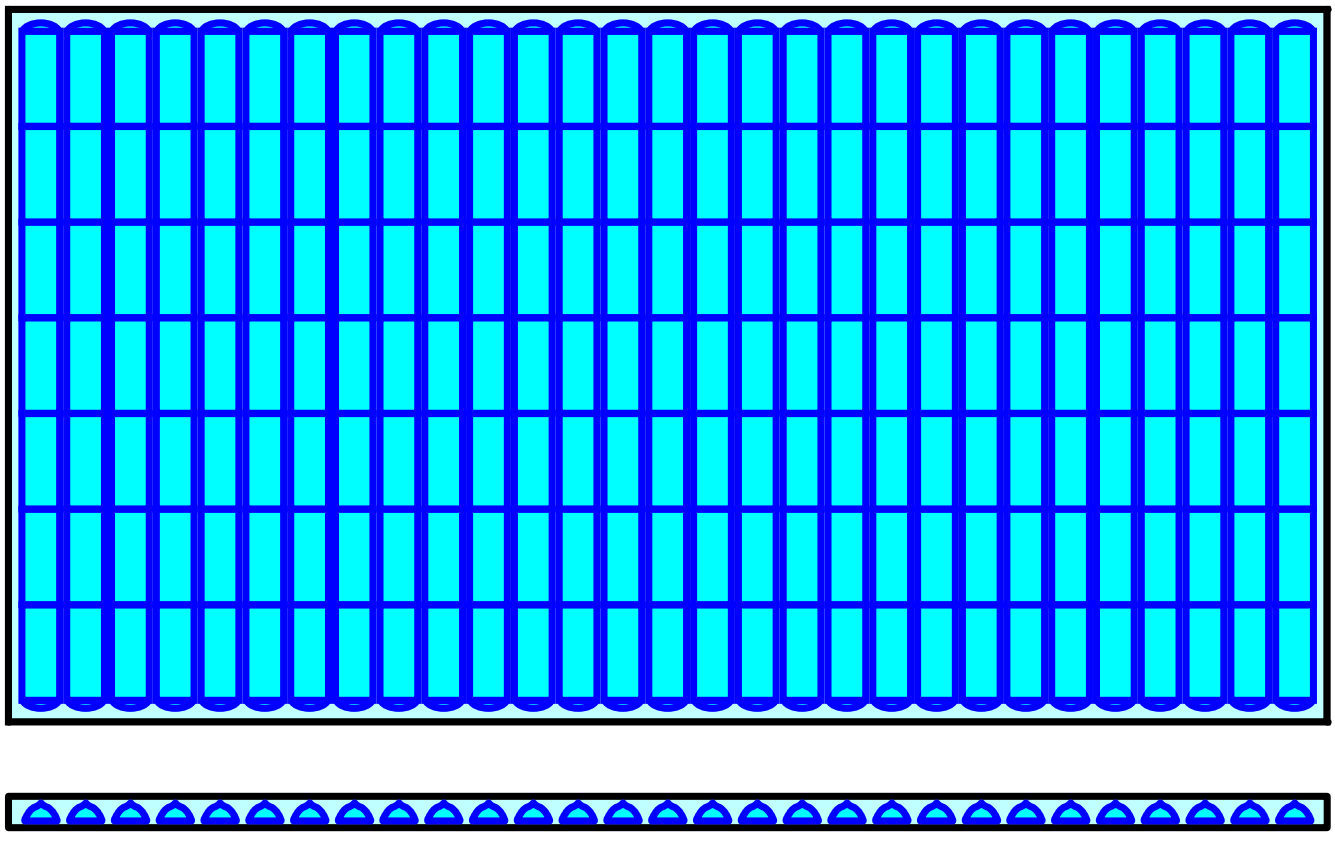
7 Chambers/Row x 7.12' Long +0.60' Cap Length x 2 = 51.04' Row Length +12.0" End Stone x 2 = 53.04' Base Length
29 Rows x 34.0" Wide + 6.0" Spacing x 28 + 12.0" Side Stone x 2 = 98.17' Base Width
6.0" Stone Base + 16.0" Chamber Height + 6.0" Stone Cover = 2.33' Field Height

203 Chambers x 14.7 cf = 2,992.6 cf Chamber Storage

12,149.1 cf Field - 2,992.6 cf Chambers = 9,156.5 cf Stone x 40.0% Voids = 3,662.6 cf Stone Storage

Chamber Storage + Stone Storage = 6,655.2 cf = 0.153 af
Overall Storage Efficiency = 54.8%
Overall System Size = 53.04' x 98.17' x 2.33'

203 Chambers
450.0 cy Field
339.1 cy Stone



Pond 2P: UG Detention-South - Chamber Wizard Stone Bed

Chamber Model = ADS_StormTech RC-310 +Cap (ADS StormTech® RC-310 with cap length)
Effective Size= 28.9"W x 16.0"H => 2.07 sf x 7.12'L = 14.7 cf
Overall Size= 34.0"W x 16.0"H x 7.56'L with 0.44' Overlap

34.0" Wide + 6.0" Spacing = 40.0" C-C Row Spacing

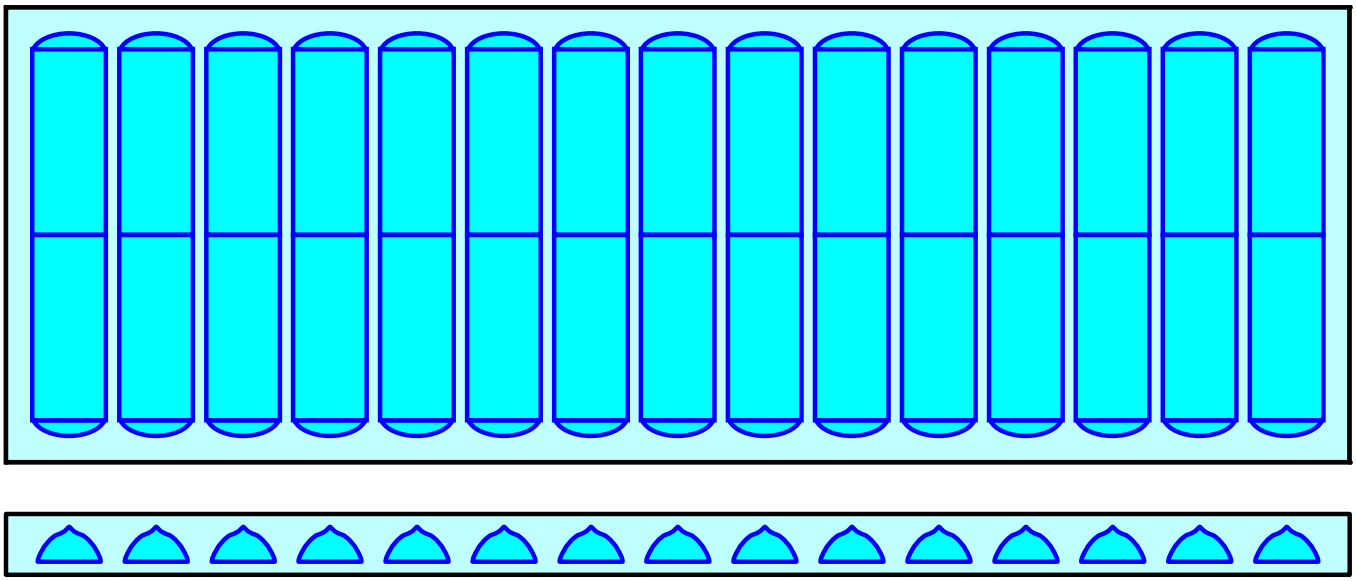
2 Chambers/Row x 7.12' Long +0.60' Cap Length x 2 = 15.44' Row Length +12.0" End Stone x 2 = 17.44' Base Length
15 Rows x 34.0" Wide + 6.0" Spacing x 14 + 12.0" Side Stone x 2 = 51.50' Base Width
6.0" Stone Base + 16.0" Chamber Height + 6.0" Stone Cover = 2.33' Field Height

30 Chambers x 14.7 cf = 442.3 cf Chamber Storage

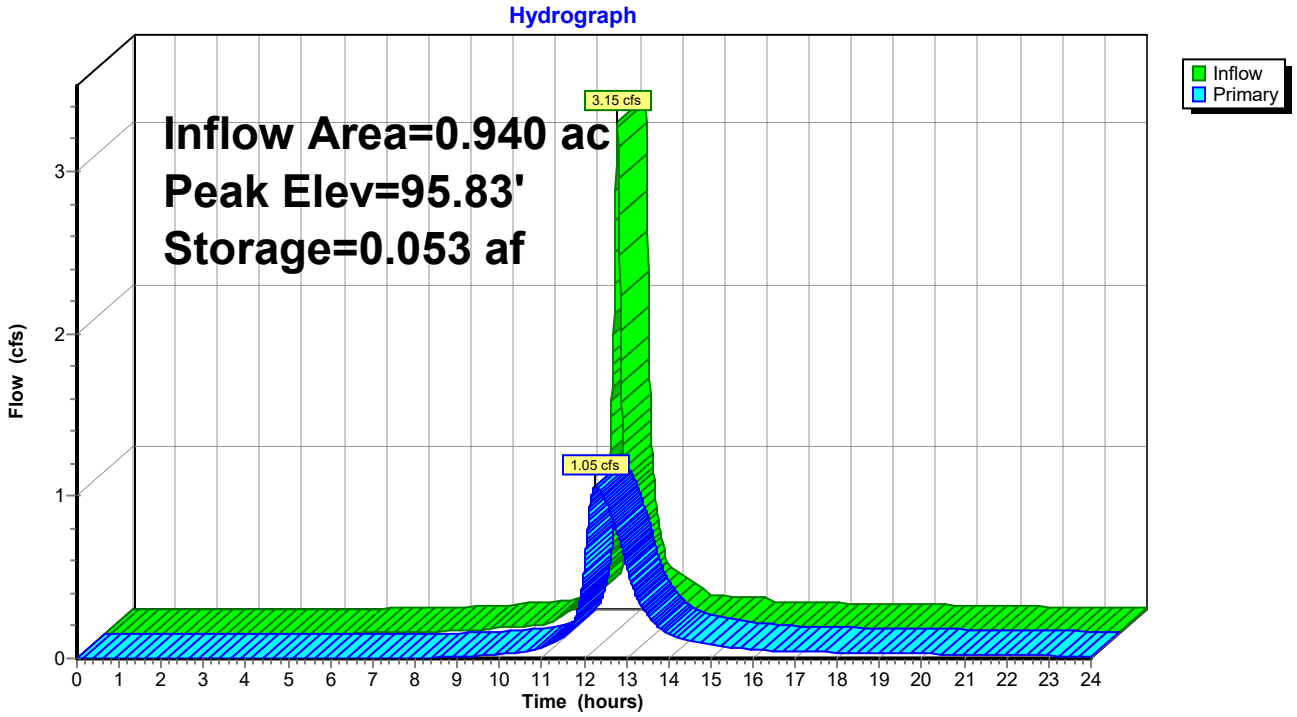
2,095.7 cf Field - 442.3 cf Chambers = 1,653.4 cf Stone x 40.0% Voids = 661.4 cf Stone Storage

Chamber Storage + Stone Storage = 1,103.6 cf = 0.025 af
Overall Storage Efficiency = 52.7%
Overall System Size = 17.44' x 51.50' x 2.33'

30 Chambers
77.6 cy Field
61.2 cy Stone



Pond 2P: UG Detention-South



Summary for Pond 3P: UG Detention-North

Inflow Area = 0.760 ac, 94.74% Impervious, Inflow Depth > 1.87" for 1-yr event
Inflow = 2.47 cfs @ 12.13 hrs, Volume= 0.118 af
Outflow = 2.03 cfs @ 12.17 hrs, Volume= 0.118 af, Atten= 18%, Lag= 2.4 min
Primary = 2.03 cfs @ 12.17 hrs, Volume= 0.118 af

Routing by Stor-Ind method, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs
Peak Elev= 94.61' @ 12.17 hrs Surf.Area= 0.022 ac Storage= 0.015 af

Plug-Flow detention time= 9.8 min calculated for 0.118 af (100% of inflow)
Center-of-Mass det. time= 8.0 min (785.0 - 777.0)

Volume	Invert	Avail.Storage	Storage Description
#1A	93.50'	0.020 af	**20.50'W x 46.34'L x 3.50'H Stone Bed** 0.076 af Overall - 0.025 af Embedded = 0.051 af x 40.0% Voids
#2A	94.00'	0.025 af	**ADS_StormTech SC-740 +Cap** x 24 Inside #1 Effective Size= 44.6"W x 30.0"H => 6.45 sf x 7.12'L = 45.9 cf Overall Size= 51.0"W x 30.0"H x 7.56'L with 0.44' Overlap 24 Chambers in 4 Rows
		0.046 af	Total Available Storage

Storage Group A created with Chamber Wizard

Device	Routing	Invert	Outlet Devices
#1	Primary	93.50'	**12.0" Round Culvert** L= 35.8' CMP, mitered to conform to fill, Ke= 0.700 Inlet / Outlet Invert= 93.50' / 92.43' S= 0.0299 '/' Cc= 0.900 n= 0.012 Concrete pipe, finished, Flow Area= 0.79 sf
#2	Device 1	93.50'	**8.0" Vert. Orifice/Grate** C= 0.600 Limited to weir flow at low heads
#3	Device 1	94.50'	**6.0' long x 5.0' breadth Broad-Crested Rectangular Weir** Head (feet) 0.20 0.40 0.60 0.80 1.00 1.20 1.40 1.60 1.80 2.00 2.50 3.00 3.50 4.00 4.50 5.00 5.50 Coef. (English) 2.34 2.50 2.70 2.68 2.68 2.66 2.65 2.65 2.65 2.65 2.67 2.66 2.68 2.70 2.74 2.79 2.88

Primary OutFlow Max=2.02 cfs @ 12.17 hrs HW=94.61' (Free Discharge)
└**1=Culvert** (Passes 2.02 cfs of 2.61 cfs potential flow)
  ├**2=Orifice/Grate** (Orifice Controls 1.48 cfs @ 4.25 fps)
  └**3=Broad-Crested Rectangular Weir** (Weir Controls 0.54 cfs @ 0.79 fps)

Pond 3P: UG Detention-North - Chamber Wizard Stone Bed

Chamber Model = ADS_StormTech SC-740 +Cap (ADS StormTech® SC-740 with cap length)
Effective Size= 44.6"W x 30.0"H => 6.45 sf x 7.12'L = 45.9 cf
Overall Size= 51.0"W x 30.0"H x 7.56'L with 0.44' Overlap

51.0" Wide + 6.0" Spacing = 57.0" C-C Row Spacing

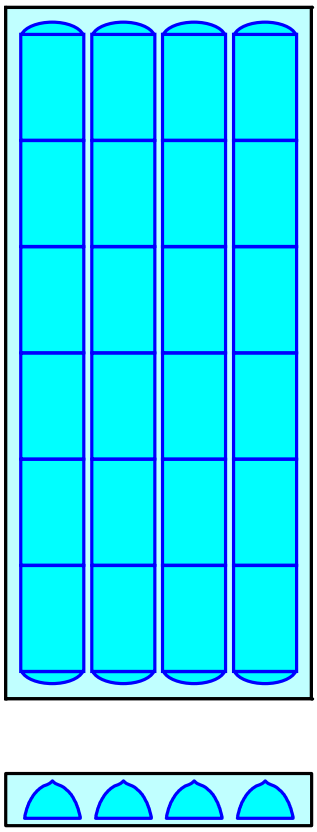
6 Chambers/Row x 7.12' Long +0.81' Cap Length x 2 = 44.34' Row Length +12.0" End Stone x 2 = 46.34' Base Length
4 Rows x 51.0" Wide + 6.0" Spacing x 3 + 12.0" Side Stone x 2 = 20.50' Base Width
6.0" Stone Base + 30.0" Chamber Height + 6.0" Stone Cover = 3.50' Field Height

24 Chambers x 45.9 cf = 1,102.6 cf Chamber Storage

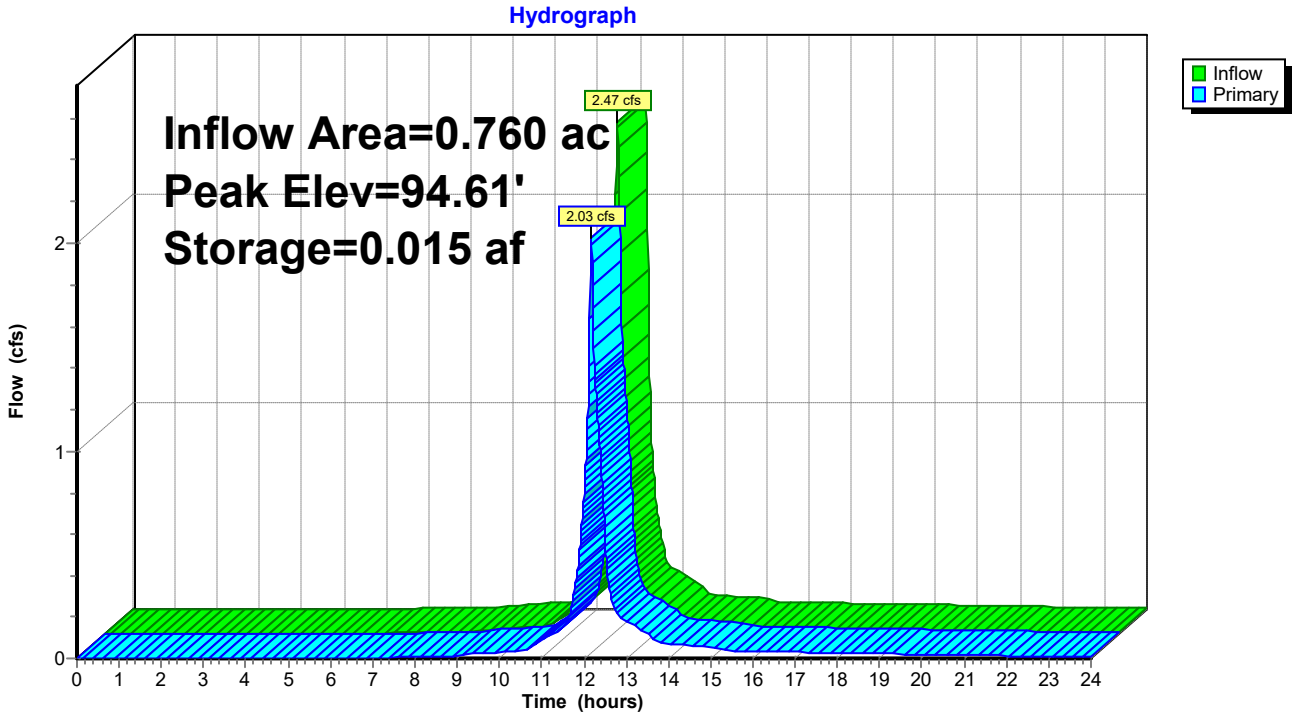
3,324.7 cf Field - 1,102.6 cf Chambers = 2,222.1 cf Stone x 40.0% Voids = 888.8 cf Stone Storage

Chamber Storage + Stone Storage = 1,991.4 cf = 0.046 af
Overall Storage Efficiency = 59.9%
Overall System Size = 46.34' x 20.50' x 3.50'

24 Chambers
123.1 cy Field
82.3 cy Stone



Pond 3P: UG Detention-North



Time span=0.00-24.00 hrs, dt=0.01 hrs, 2401 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 0-1: o-1 Runoff Area=0.210 ac 80.95% Impervious Runoff Depth>1.48"
Tc=6.0 min CN=87 Runoff=0.58 cfs 0.026 af

Subcatchment E-1: E-1 Runoff Area=0.610 ac 93.44% Impervious Runoff Depth>2.06"
Tc=6.0 min CN=94 Runoff=2.20 cfs 0.105 af

Subcatchment E-2: E-2 Runoff Area=1.470 ac 95.92% Impervious Runoff Depth>2.26"
Tc=6.0 min CN=96 Runoff=5.61 cfs 0.276 af

Subcatchment E-3: E-3 Runoff Area=0.860 ac 65.12% Impervious Runoff Depth>0.87"
Tc=0.0 min CN=77 Runoff=1.81 cfs 0.062 af

Subcatchment O-1: O-1 Runoff Area=0.210 ac 80.95% Impervious Runoff Depth>1.48"
Tc=6.0 min CN=87 Runoff=0.58 cfs 0.026 af

Subcatchment P-1: P-1 Runoff Area=1.000 ac 95.00% Impervious Runoff Depth>2.16"
Tc=6.0 min CN=95 Runoff=3.72 cfs 0.180 af

Subcatchment P-2: P-2 Runoff Area=0.940 ac 96.81% Impervious Runoff Depth>2.26"
Tc=6.0 min CN=96 Runoff=3.59 cfs 0.177 af

Subcatchment P-3: P-3 Runoff Area=0.760 ac 94.74% Impervious Runoff Depth>2.16"
Tc=6.0 min CN=95 Runoff=2.82 cfs 0.137 af

Subcatchment PU-1: PU-1 Runoff Area=0.244 ac 13.93% Impervious Runoff Depth>0.02"
Tc=6.0 min CN=47 Runoff=0.00 cfs 0.000 af

Reach E-TOTAL: E-TOTAL Inflow=9.01 cfs 0.469 af
Outflow=9.01 cfs 0.469 af

Reach P-TOTAL: P-TOTAL Inflow=5.24 cfs 0.513 af
Outflow=5.24 cfs 0.513 af

Pond 1P: UG Detention-West Peak Elev=95.67' Storage=0.056 af Inflow=3.72 cfs 0.180 af
8.0" Round Culvert n=0.012 L=36.3' S=0.0072 '/' Outflow=1.23 cfs 0.178 af

Pond 2P: UG Detention-South Peak Elev=95.90' Storage=0.061 af Inflow=3.59 cfs 0.177 af
Outflow=1.15 cfs 0.173 af

Pond 3P: UG Detention-North Peak Elev=94.67' Storage=0.016 af Inflow=2.82 cfs 0.137 af
Outflow=2.55 cfs 0.136 af

Total Runoff Area = 6.304 ac Runoff Volume = 0.989 af Average Runoff Depth = 1.88"
12.85% Pervious = 0.810 ac 87.15% Impervious = 5.494 ac

Summary for Subcatchment 0-1: o-1

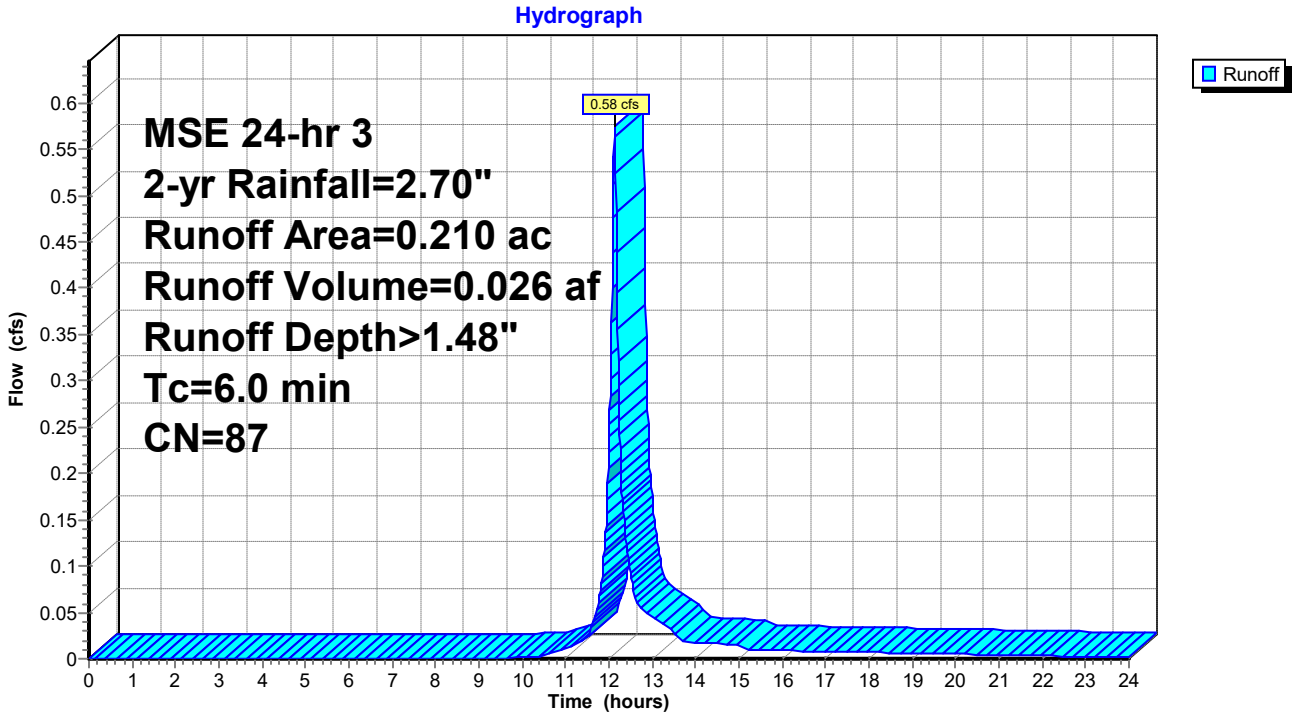
Runoff = 0.58 cfs @ 12.13 hrs, Volume= 0.026 af, Depth> 1.48"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs
MSE 24-hr 3 2-yr Rainfall=2.70"

Area (ac)	CN	Description
0.040	39	>75% Grass cover, Good, HSG A
0.170	98	Paved parking, HSG A
0.210	87	Weighted Average
0.040		19.05% Pervious Area
0.170		80.95% Impervious Area

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

Subcatchment 0-1: o-1



Summary for Subcatchment E-1: E-1

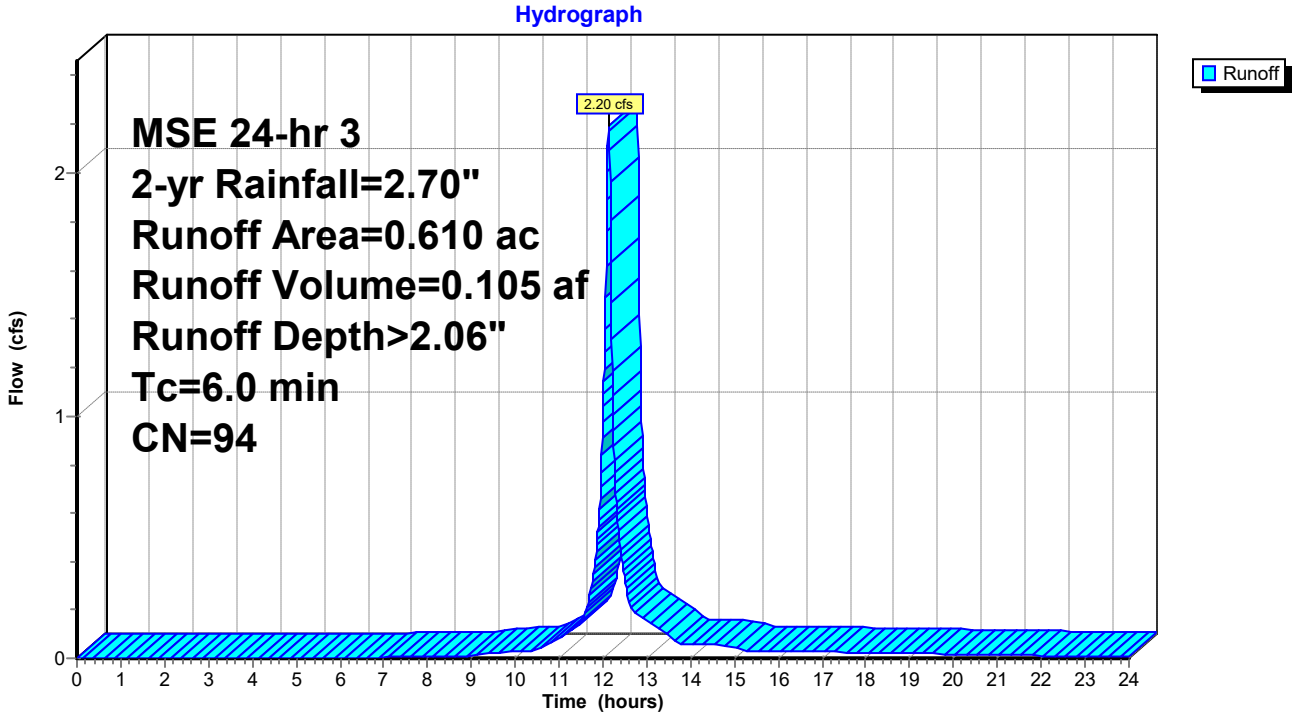
Runoff = 2.20 cfs @ 12.13 hrs, Volume= 0.105 af, Depth> 2.06"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs
MSE 24-hr 3 2-yr Rainfall=2.70"

Area (ac)	CN	Description
0.040	39	>75% Grass cover, Good, HSG A
0.100	98	Roofs, HSG A
0.470	98	Paved parking, HSG A
0.610	94	Weighted Average
0.040		6.56% Pervious Area
0.570		93.44% Impervious Area

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

Subcatchment E-1: E-1



Summary for Subcatchment E-2: E-2

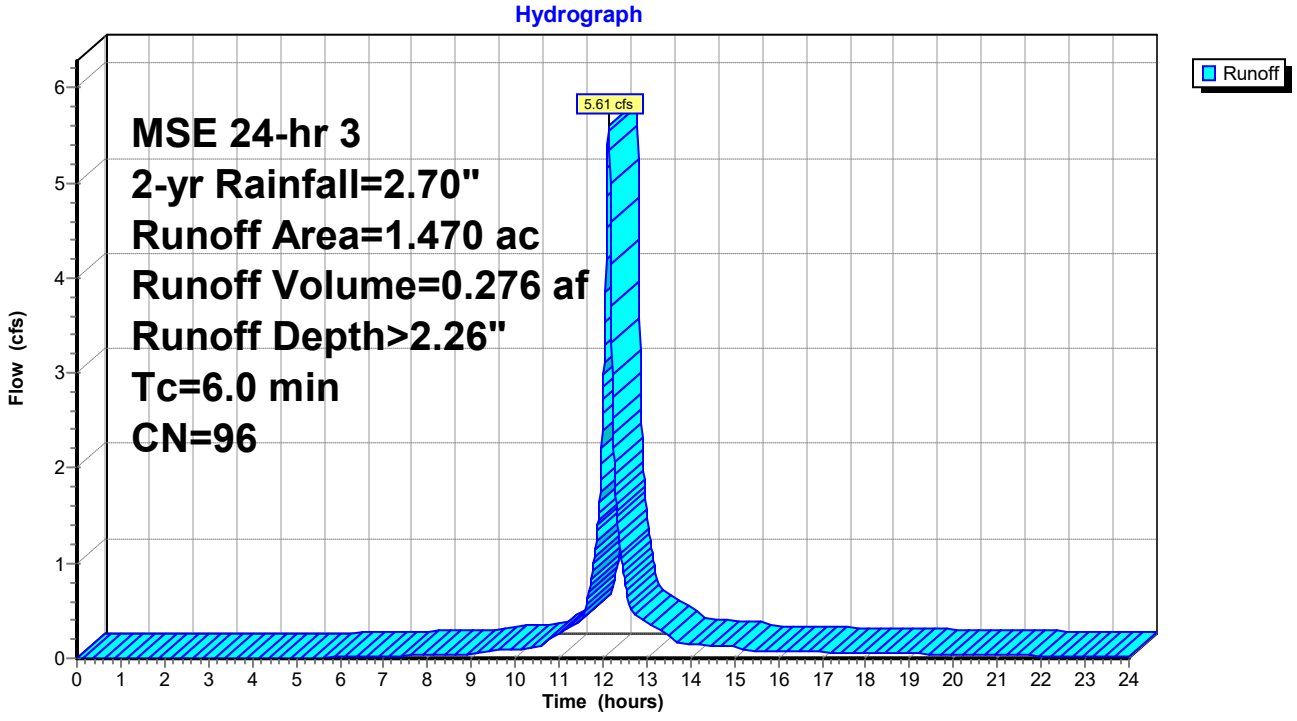
Runoff = 5.61 cfs @ 12.13 hrs, Volume= 0.276 af, Depth> 2.26"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs
MSE 24-hr 3 2-yr Rainfall=2.70"

Area (ac)	CN	Description
0.060	39	>75% Grass cover, Good, HSG A
1.410	98	Paved parking, HSG A
0.000	98	Roofs, HSG A
1.470	96	Weighted Average
0.060		4.08% Pervious Area
1.410		95.92% Impervious Area

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

Subcatchment E-2: E-2



Summary for Subcatchment E-3: E-3

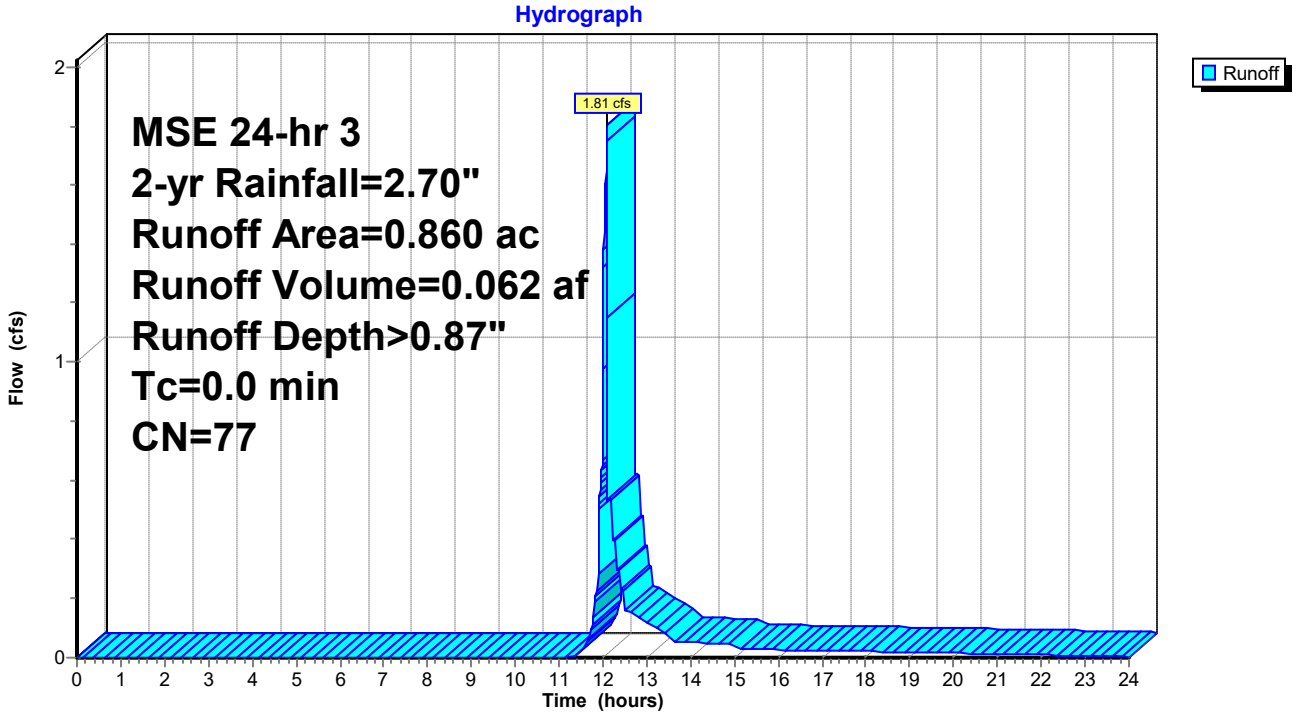
[46] Hint: Tc=0 (Instant runoff peak depends on dt)

Runoff = 1.81 cfs @ 12.09 hrs, Volume= 0.062 af, Depth> 0.87"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs
MSE 24-hr 3 2-yr Rainfall=2.70"

Area (ac)	CN	Description
0.300	39	>75% Grass cover, Good, HSG A
0.560	98	Paved parking, HSG A
0.860	77	Weighted Average
0.300		34.88% Pervious Area
0.560		65.12% Impervious Area

Subcatchment E-3: E-3



Summary for Subcatchment O-1: O-1

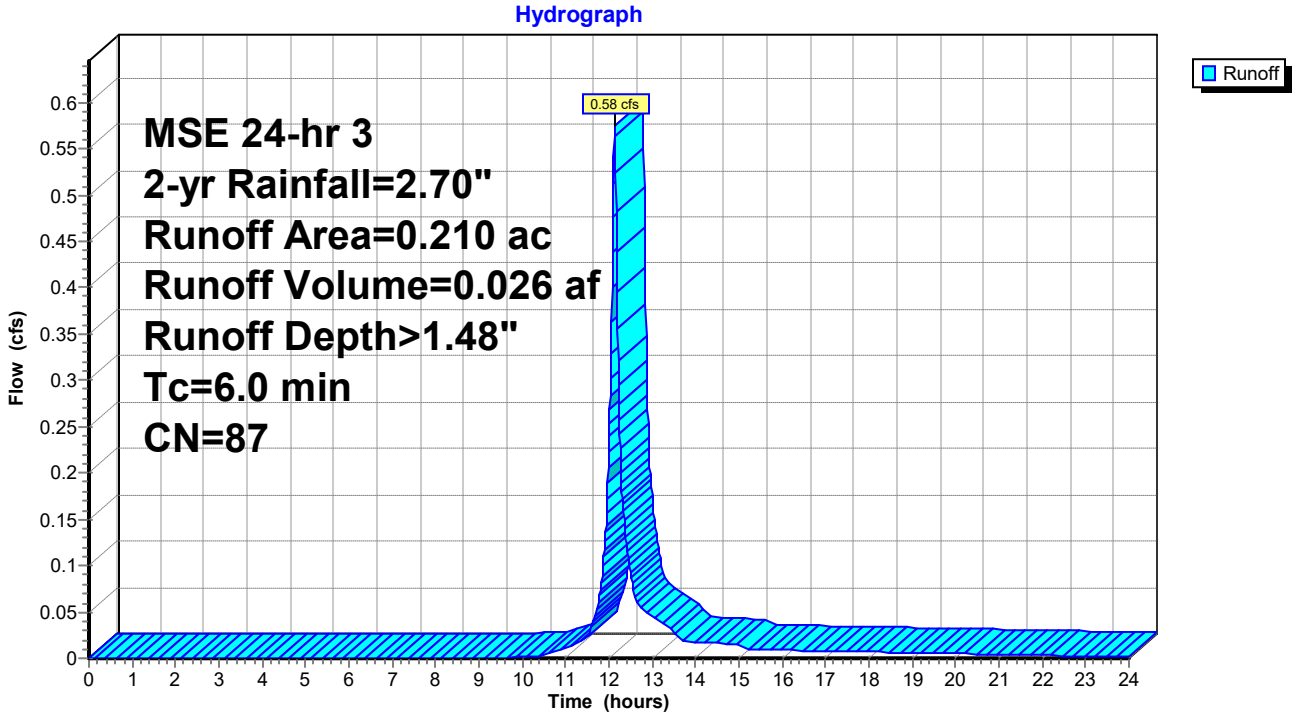
Runoff = 0.58 cfs @ 12.13 hrs, Volume= 0.026 af, Depth> 1.48"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs
MSE 24-hr 3 2-yr Rainfall=2.70"

Area (ac)	CN	Description
0.040	39	>75% Grass cover, Good, HSG A
0.170	98	Paved parking, HSG A
0.000	98	Roofs, HSG A
0.210	87	Weighted Average
0.040		19.05% Pervious Area
0.170		80.95% Impervious Area

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

Subcatchment O-1: O-1



Summary for Subcatchment P-1: P-1

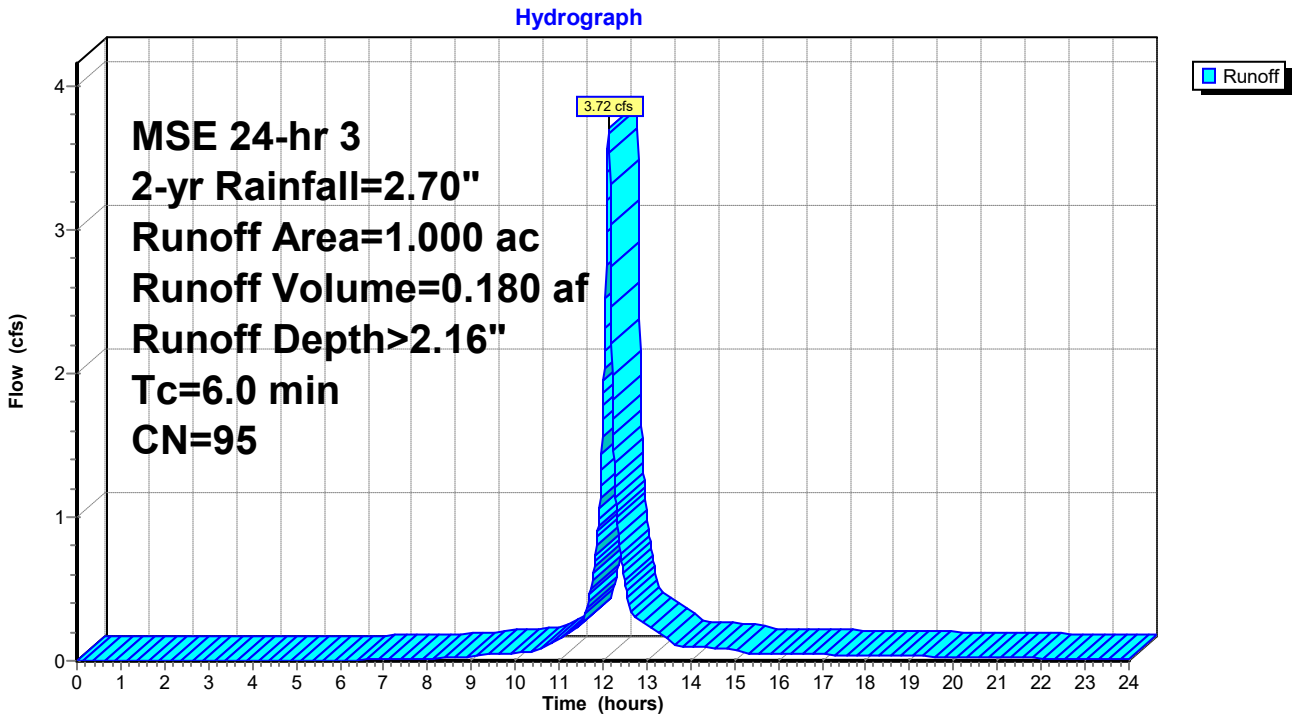
Runoff = 3.72 cfs @ 12.13 hrs, Volume= 0.180 af, Depth> 2.16"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs
MSE 24-hr 3 2-yr Rainfall=2.70"

Area (ac)	CN	Description
0.050	39	>75% Grass cover, Good, HSG A
0.880	98	Paved parking, HSG A
0.070	98	Unconnected pavement, HSG A
1.000	95	Weighted Average
0.050		5.00% Pervious Area
0.950		95.00% Impervious Area
0.070		7.37% Unconnected

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

Subcatchment P-1: P-1



Summary for Subcatchment P-2: P-2

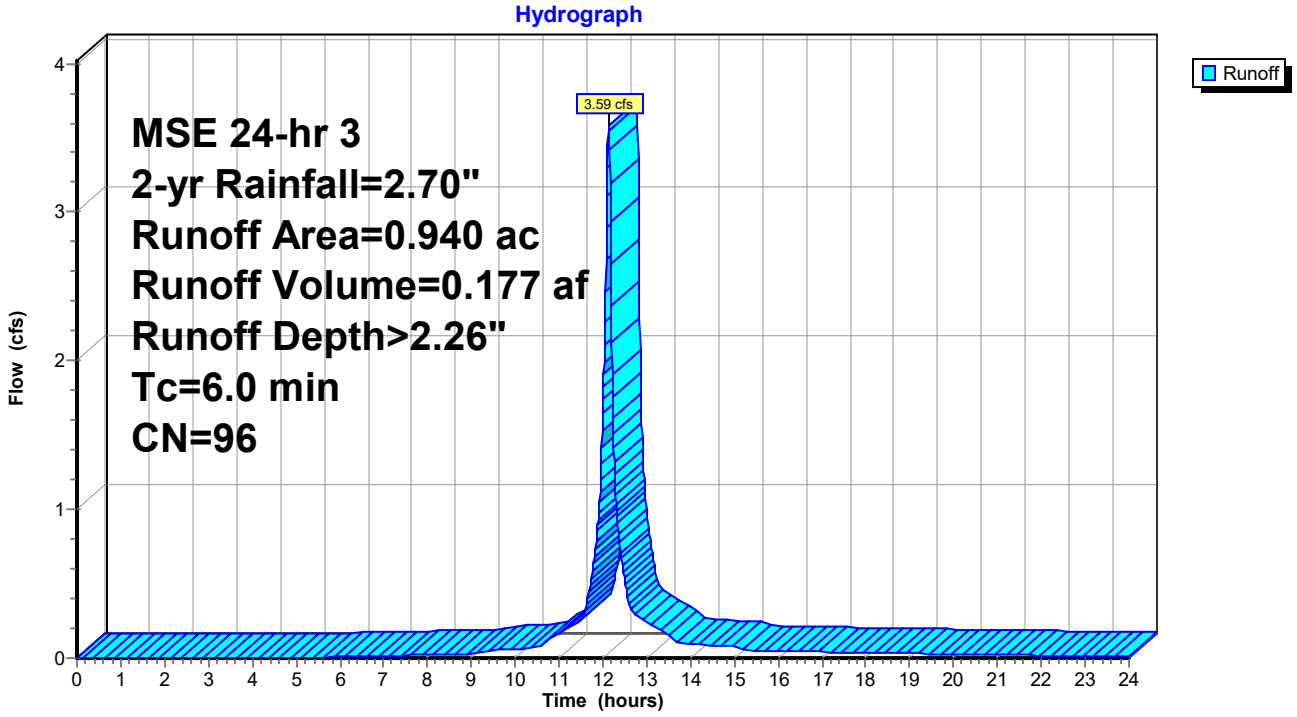
Runoff = 3.59 cfs @ 12.13 hrs, Volume= 0.177 af, Depth> 2.26"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs
MSE 24-hr 3 2-yr Rainfall=2.70"

Area (ac)	CN	Description
0.030	39	>75% Grass cover, Good, HSG A
0.720	98	Paved parking, HSG A
0.180	98	Roofs, HSG A
0.010	98	Unconnected pavement, HSG A
0.940	96	Weighted Average
0.030		3.19% Pervious Area
0.910		96.81% Impervious Area
0.010		1.10% Unconnected

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

Subcatchment P-2: P-2



Summary for Subcatchment P-3: P-3

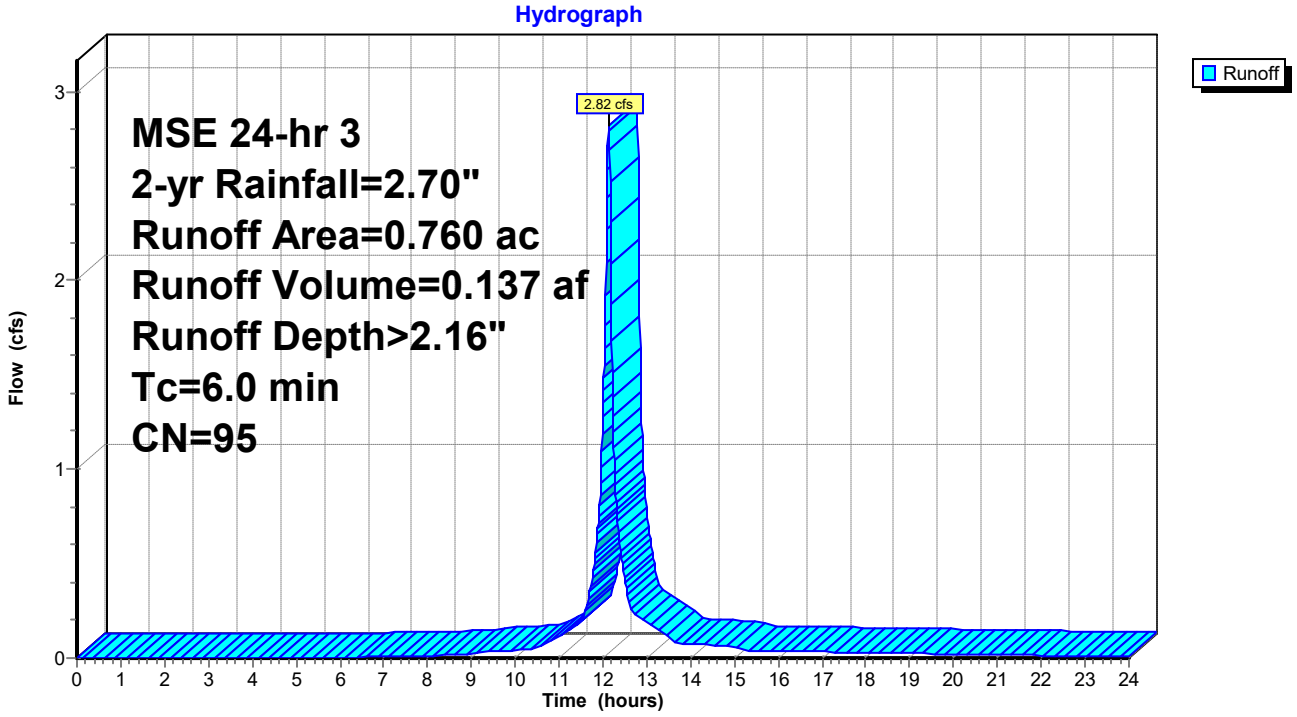
Runoff = 2.82 cfs @ 12.13 hrs, Volume= 0.137 af, Depth> 2.16"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs
MSE 24-hr 3 2-yr Rainfall=2.70"

Area (ac)	CN	Description
0.040	39	>75% Grass cover, Good, HSG A
0.440	98	Paved parking, HSG A
0.250	98	Unconnected roofs, HSG A
0.030	98	Unconnected pavement, HSG A
0.760	95	Weighted Average
0.040		5.26% Pervious Area
0.720		94.74% Impervious Area
0.280		38.89% Unconnected

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

Subcatchment P-3: P-3



Summary for Subcatchment PU-1: PU-1

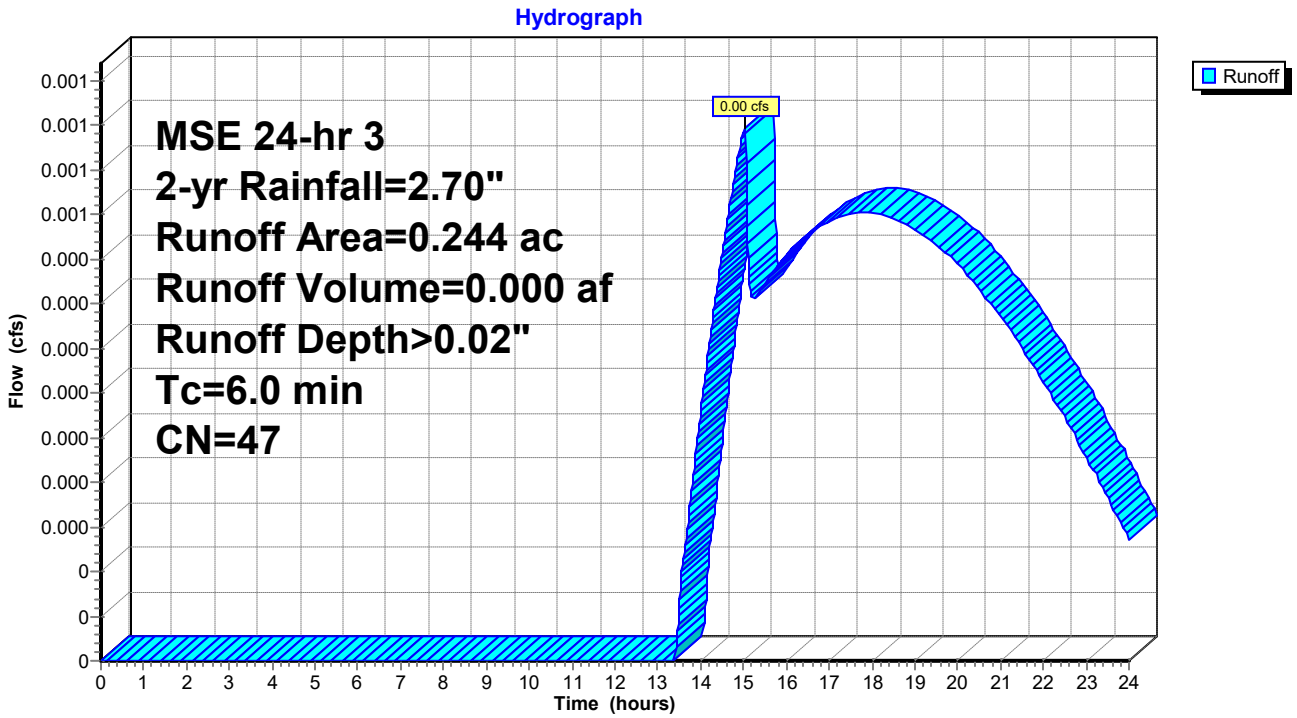
Runoff = 0.00 cfs @ 15.02 hrs, Volume= 0.000 af, Depth> 0.02"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs
MSE 24-hr 3 2-yr Rainfall=2.70"

Area (ac)	CN	Description
0.210	39	>75% Grass cover, Good, HSG A
0.030	98	Paved parking, HSG A
0.004	98	Unconnected roofs, HSG A
0.244	47	Weighted Average
0.210		86.07% Pervious Area
0.034		13.93% Impervious Area
0.004		11.76% Unconnected

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

Subcatchment PU-1: PU-1



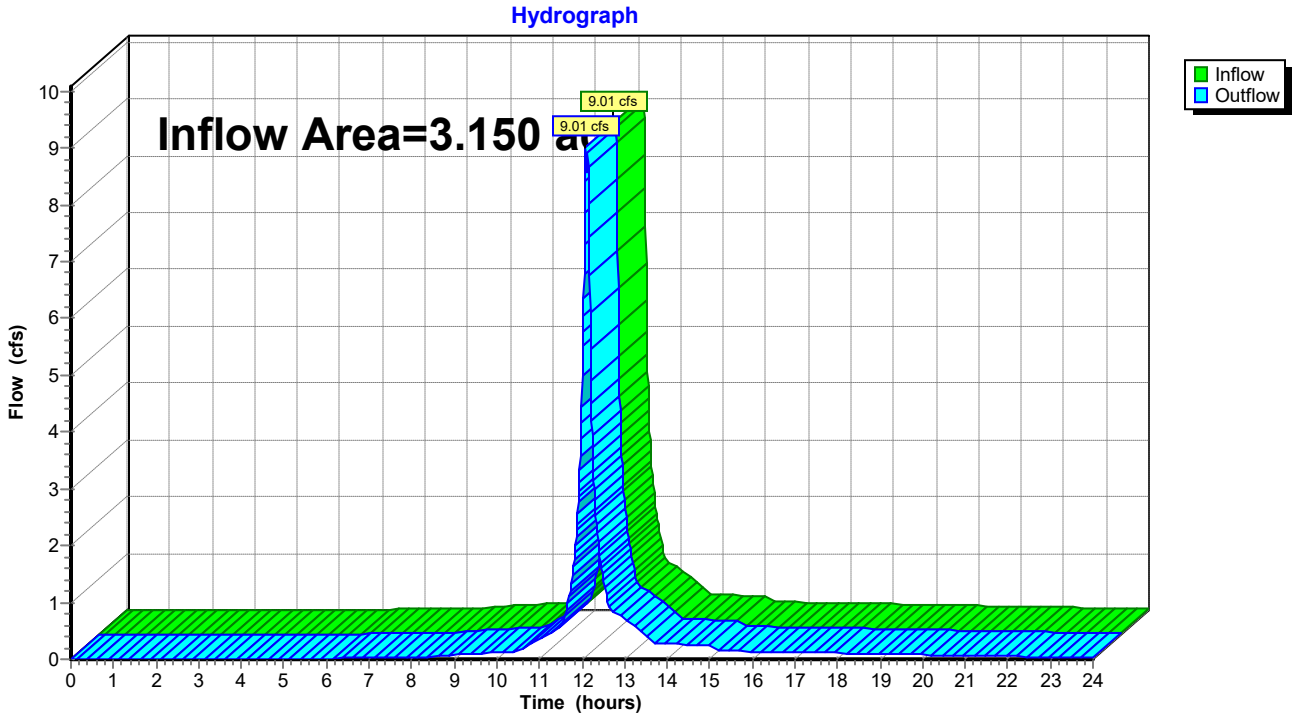
Summary for Reach E-TOTAL: E-TOTAL

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

Inflow Area = 3.150 ac, 86.03% Impervious, Inflow Depth > 1.79" for 2-yr event
Inflow = 9.01 cfs @ 12.09 hrs, Volume= 0.469 af
Outflow = 9.01 cfs @ 12.09 hrs, Volume= 0.469 af, Atten= 0%, Lag= 0.0 min

Routing by Stor-Ind+Trans method, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs

Reach E-TOTAL: E-TOTAL



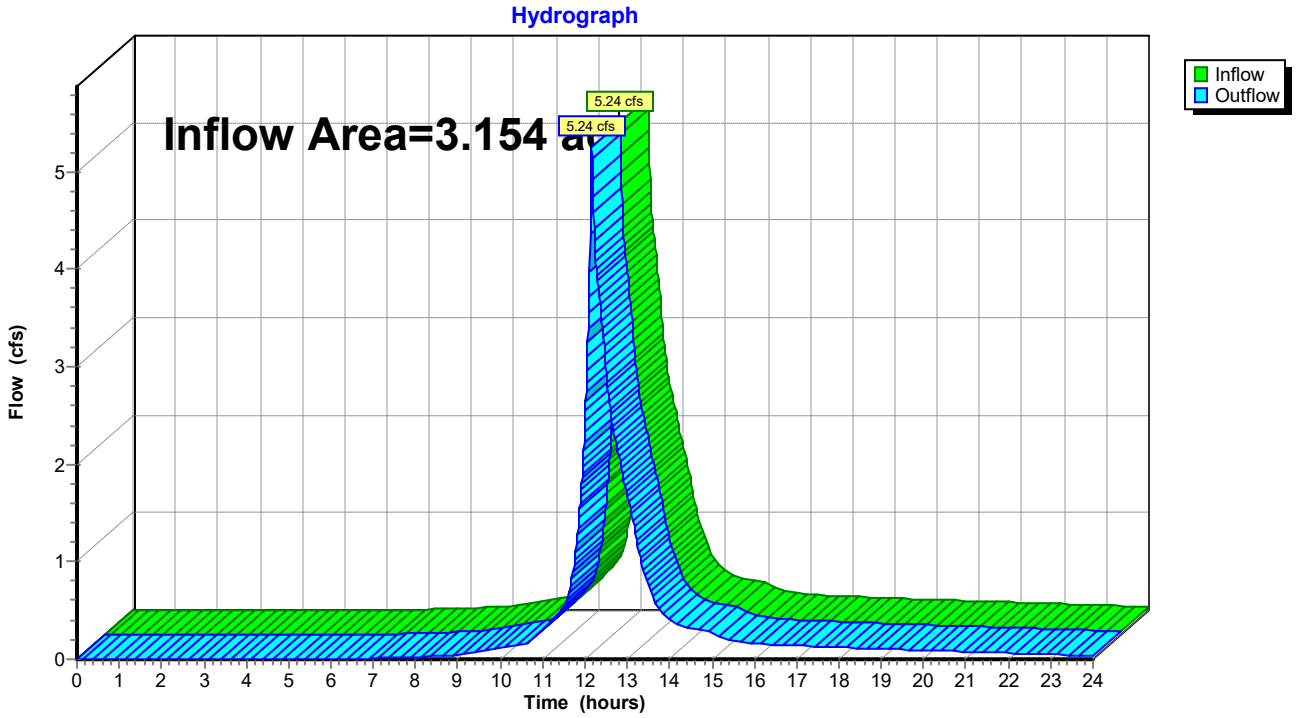
Summary for Reach P-TOTAL: P-TOTAL

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

Inflow Area = 3.154 ac, 88.27% Impervious, Inflow Depth > 1.95" for 2-yr event
Inflow = 5.24 cfs @ 12.16 hrs, Volume= 0.513 af
Outflow = 5.24 cfs @ 12.16 hrs, Volume= 0.513 af, Atten= 0%, Lag= 0.0 min

Routing by Stor-Ind+Trans method, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs

Reach P-TOTAL: P-TOTAL



Summary for Pond 1P: UG Detention-West

Inflow Area = 1.000 ac, 95.00% Impervious, Inflow Depth > 2.16" for 2-yr event
Inflow = 3.72 cfs @ 12.13 hrs, Volume= 0.180 af
Outflow = 1.23 cfs @ 12.28 hrs, Volume= 0.178 af, Atten= 67%, Lag= 8.8 min
Primary = 1.23 cfs @ 12.28 hrs, Volume= 0.178 af

Routing by Stor-Ind method, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs
Peak Elev= 95.67' @ 12.28 hrs Surf.Area= 0.084 ac Storage= 0.056 af

Plug-Flow detention time= 37.7 min calculated for 0.178 af (99% of inflow)
Center-of-Mass det. time= 30.3 min (804.5 - 774.2)

Volume	Invert	Avail.Storage	Storage Description
#1A	94.61'	0.076 af	**49.00'W x 74.82'L x 3.50'H Stone Bed** 0.295 af Overall - 0.105 af Embedded = 0.189 af x 40.0% Voids
#2A	95.11'	0.105 af	**ADS_StormTech SC-740 +Cap** x 100 Inside #1 Effective Size= 44.6"W x 30.0"H => 6.45 sf x 7.12'L = 45.9 cf Overall Size= 51.0"W x 30.0"H x 7.56'L with 0.44' Overlap 100 Chambers in 10 Rows
		0.181 af	Total Available Storage

Storage Group A created with Chamber Wizard

Device	Routing	Invert	Outlet Devices
#1	Primary	94.61'	**8.0" Round Culvert** L= 36.3' CMP, mitered to conform to fill, Ke= 0.700 Inlet / Outlet Invert= 94.61' / 94.35' S= 0.0072 '/' Cc= 0.900 n= 0.012 Corrugated PP, smooth interior, Flow Area= 0.35 sf

Primary OutFlow Max=1.23 cfs @ 12.28 hrs HW=95.67' (Free Discharge)
↑—**1=Culvert** (Barrel Controls 1.23 cfs @ 3.53 fps)

Pond 1P: UG Detention-West - Chamber Wizard Stone Bed

Chamber Model = ADS_StormTech SC-740 +Cap (ADS StormTech® SC-740 with cap length)
Effective Size= 44.6"W x 30.0"H => 6.45 sf x 7.12'L = 45.9 cf
Overall Size= 51.0"W x 30.0"H x 7.56'L with 0.44' Overlap

51.0" Wide + 6.0" Spacing = 57.0" C-C Row Spacing

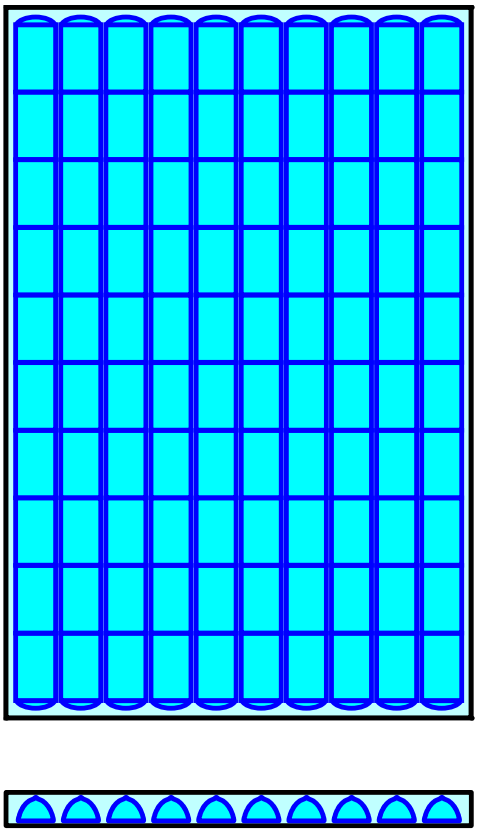
10 Chambers/Row x 7.12' Long +0.81' Cap Length x 2 = 72.82' Row Length +12.0" End Stone x 2 = 74.82' Base Length
10 Rows x 51.0" Wide + 6.0" Spacing x 9 + 12.0" Side Stone x 2 = 49.00' Base Width
6.0" Stone Base + 30.0" Chamber Height + 6.0" Stone Cover = 3.50' Field Height

100 Chambers x 45.9 cf = 4,594.0 cf Chamber Storage

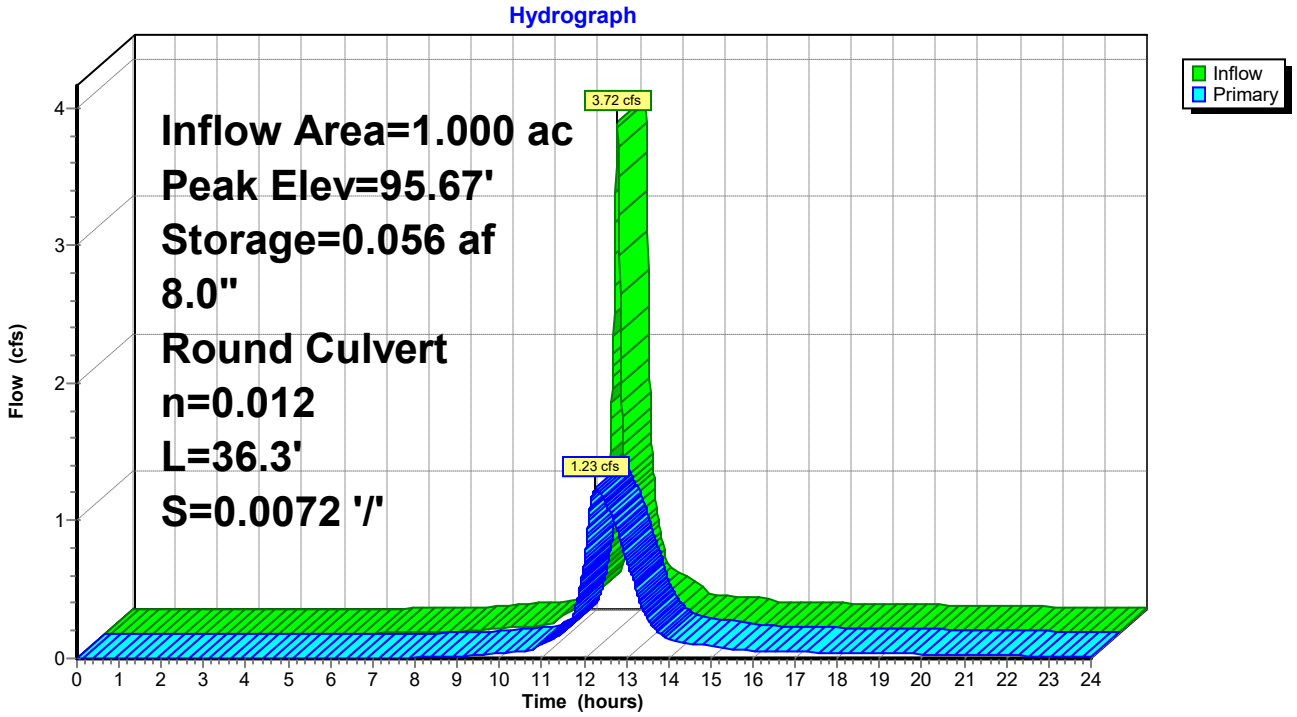
12,831.1 cf Field - 4,594.0 cf Chambers = 8,237.1 cf Stone x 40.0% Voids = 3,294.8 cf Stone Storage

Chamber Storage + Stone Storage = 7,888.8 cf = 0.181 af
Overall Storage Efficiency = 61.5%
Overall System Size = 74.82' x 49.00' x 3.50'

100 Chambers
475.2 cy Field
305.1 cy Stone



Pond 1P: UG Detention-West



Summary for Pond 2P: UG Detention-South

Inflow Area = 0.940 ac, 96.81% Impervious, Inflow Depth > 2.26" for 2-yr event
Inflow = 3.59 cfs @ 12.13 hrs, Volume= 0.177 af
Outflow = 1.15 cfs @ 12.28 hrs, Volume= 0.173 af, Atten= 68%, Lag= 9.1 min
Primary = 1.15 cfs @ 12.28 hrs, Volume= 0.173 af

Routing by Stor-Ind method, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs
Peak Elev= 95.90' @ 12.28 hrs Surf.Area= 0.140 ac Storage= 0.061 af

Plug-Flow detention time= 52.6 min calculated for 0.173 af (98% of inflow)
Center-of-Mass det. time= 41.5 min (810.3 - 768.8)

Volume	Invert	Avail.Storage	Storage Description
#1A	95.10'	0.084 af	**98.17'W x 53.04'L x 2.33'H Stone Bed** 0.279 af Overall - 0.069 af Embedded = 0.210 af x 40.0% Voids
#2A	95.60'	0.069 af	**ADS_StormTech SC-310 +Cap** x 203 Inside #1 Effective Size= 28.9"W x 16.0"H => 2.07 sf x 7.12'L = 14.7 cf Overall Size= 34.0"W x 16.0"H x 7.56'L with 0.44' Overlap 203 Chambers in 29 Rows
#3B	95.10'	0.015 af	**51.50'W x 17.44'L x 2.33'H Stone Bed** 0.048 af Overall - 0.010 af Embedded = 0.038 af x 40.0% Voids
#4B	95.60'	0.010 af	**ADS_StormTech RC-310 +Cap** x 30 Inside #3 Effective Size= 28.9"W x 16.0"H => 2.07 sf x 7.12'L = 14.7 cf Overall Size= 34.0"W x 16.0"H x 7.56'L with 0.44' Overlap 30 Chambers in 15 Rows
		0.178 af	Total Available Storage

Storage Group A created with Chamber Wizard
Storage Group B created with Chamber Wizard

Device	Routing	Invert	Outlet Devices
#1	Primary	95.10'	**12.0" Round Culvert** L= 208.4' CMP, mitered to conform to fill, Ke= 0.700 Inlet / Outlet Invert= 95.10' / 93.01' S= 0.0100 '/' Cc= 0.900 n= 0.012 Corrugated PP, smooth interior, Flow Area= 0.79 sf
#2	Device 1	95.10'	**8.0" Vert. Orifice/Grate** C= 0.600 Limited to weir flow at low heads
#3	Device 1	96.30'	**6.0' long x 0.5' breadth Broad-Crested Rectangular Weir** Head (feet) 0.20 0.40 0.60 0.80 1.00 Coef. (English) 2.80 2.92 3.08 3.30 3.32

Primary OutFlow Max=1.15 cfs @ 12.28 hrs HW=95.90' (Free Discharge)
└**1=Culvert** (Passes 1.15 cfs of 1.81 cfs potential flow)
  ├**2=Orifice/Grate** (Orifice Controls 1.15 cfs @ 3.29 fps)
  └**3=Broad-Crested Rectangular Weir** (Controls 0.00 cfs)

Pond 2P: UG Detention-South - Chamber Wizard Stone Bed

Chamber Model = ADS_StormTech SC-310 +Cap (ADS StormTech® SC-310 with cap length)
Effective Size= 28.9"W x 16.0"H => 2.07 sf x 7.12'L = 14.7 cf
Overall Size= 34.0"W x 16.0"H x 7.56'L with 0.44' Overlap

34.0" Wide + 6.0" Spacing = 40.0" C-C Row Spacing

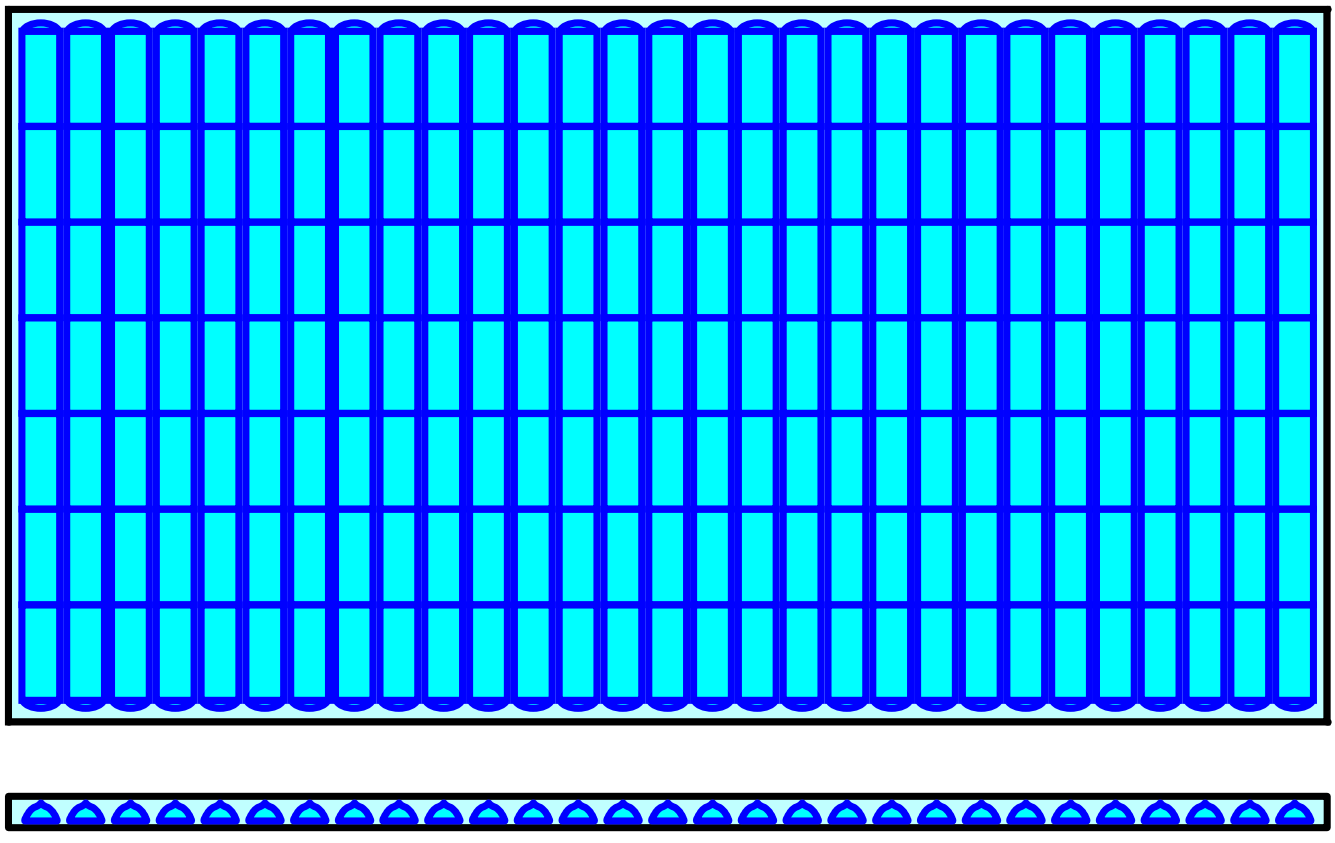
7 Chambers/Row x 7.12' Long +0.60' Cap Length x 2 = 51.04' Row Length +12.0" End Stone x 2 = 53.04' Base Length
29 Rows x 34.0" Wide + 6.0" Spacing x 28 + 12.0" Side Stone x 2 = 98.17' Base Width
6.0" Stone Base + 16.0" Chamber Height + 6.0" Stone Cover = 2.33' Field Height

203 Chambers x 14.7 cf = 2,992.6 cf Chamber Storage

12,149.1 cf Field - 2,992.6 cf Chambers = 9,156.5 cf Stone x 40.0% Voids = 3,662.6 cf Stone Storage

Chamber Storage + Stone Storage = 6,655.2 cf = 0.153 af
Overall Storage Efficiency = 54.8%
Overall System Size = 53.04' x 98.17' x 2.33'

203 Chambers
450.0 cy Field
339.1 cy Stone



Pond 2P: UG Detention-South - Chamber Wizard Stone Bed

Chamber Model = ADS_StormTech RC-310 +Cap (ADS StormTech® RC-310 with cap length)
Effective Size= 28.9"W x 16.0"H => 2.07 sf x 7.12'L = 14.7 cf
Overall Size= 34.0"W x 16.0"H x 7.56'L with 0.44' Overlap

34.0" Wide + 6.0" Spacing = 40.0" C-C Row Spacing

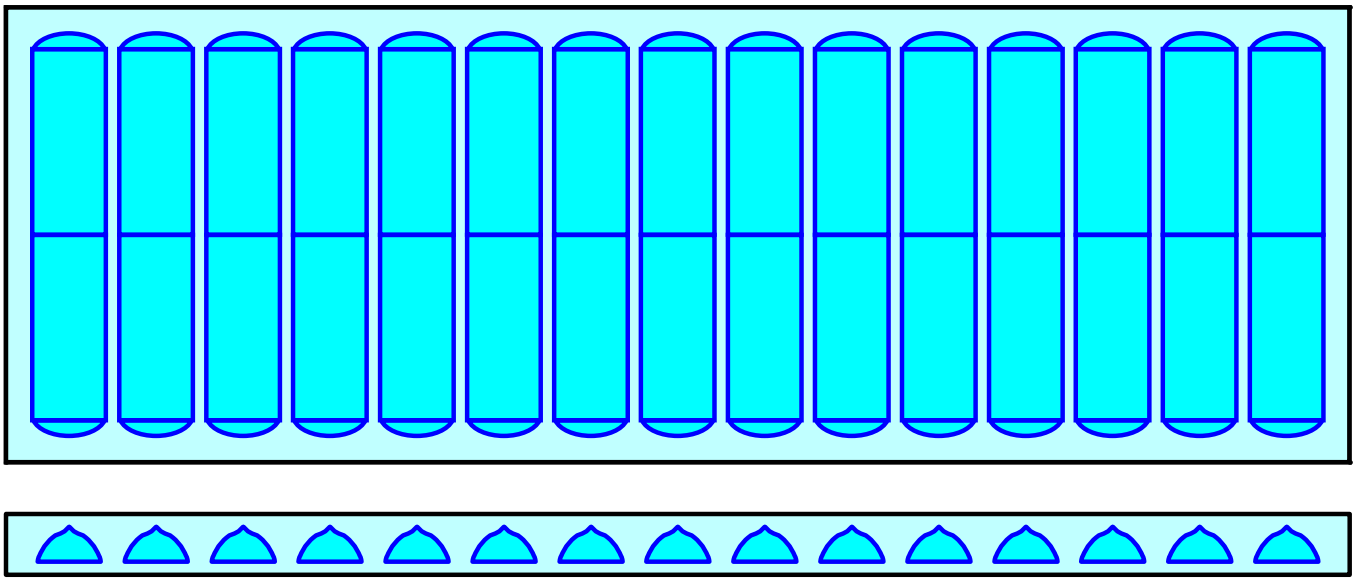
2 Chambers/Row x 7.12' Long +0.60' Cap Length x 2 = 15.44' Row Length +12.0" End Stone x 2 = 17.44' Base Length
15 Rows x 34.0" Wide + 6.0" Spacing x 14 + 12.0" Side Stone x 2 = 51.50' Base Width
6.0" Stone Base + 16.0" Chamber Height + 6.0" Stone Cover = 2.33' Field Height

30 Chambers x 14.7 cf = 442.3 cf Chamber Storage

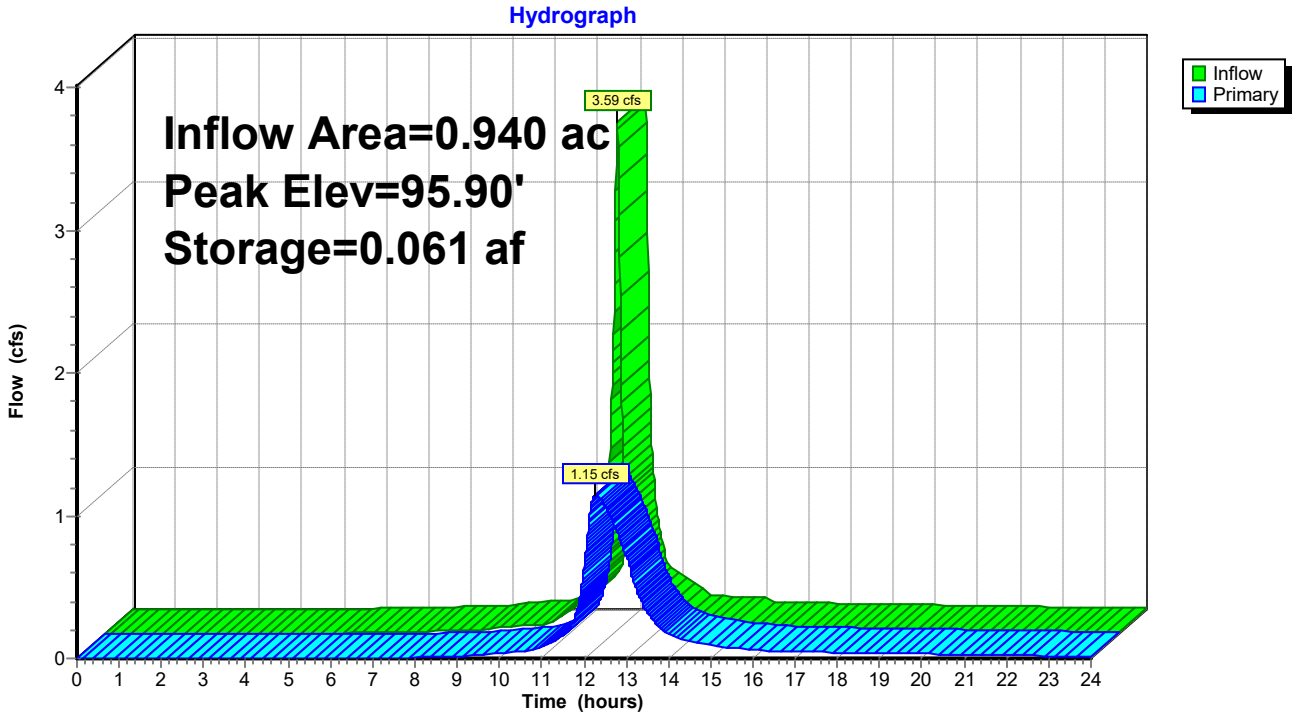
2,095.7 cf Field - 442.3 cf Chambers = 1,653.4 cf Stone x 40.0% Voids = 661.4 cf Stone Storage

Chamber Storage + Stone Storage = 1,103.6 cf = 0.025 af
Overall Storage Efficiency = 52.7%
Overall System Size = 17.44' x 51.50' x 2.33'

30 Chambers
77.6 cy Field
61.2 cy Stone



Pond 2P: UG Detention-South



Summary for Pond 3P: UG Detention-North

Inflow Area = 0.760 ac, 94.74% Impervious, Inflow Depth > 2.16" for 2-yr event
Inflow = 2.82 cfs @ 12.13 hrs, Volume= 0.137 af
Outflow = 2.55 cfs @ 12.16 hrs, Volume= 0.136 af, Atten= 10%, Lag= 1.7 min
Primary = 2.55 cfs @ 12.16 hrs, Volume= 0.136 af

Routing by Stor-Ind method, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs
Peak Elev= 94.67' @ 12.16 hrs Surf.Area= 0.022 ac Storage= 0.016 af

Plug-Flow detention time= 9.3 min calculated for 0.136 af (100% of inflow)
Center-of-Mass det. time= 7.7 min (781.9 - 774.2)

Volume	Invert	Avail.Storage	Storage Description
#1A	93.50'	0.020 af	**20.50'W x 46.34'L x 3.50'H Stone Bed** 0.076 af Overall - 0.025 af Embedded = 0.051 af x 40.0% Voids
#2A	94.00'	0.025 af	**ADS_StormTech SC-740 +Cap** x 24 Inside #1 Effective Size= 44.6"W x 30.0"H => 6.45 sf x 7.12'L = 45.9 cf Overall Size= 51.0"W x 30.0"H x 7.56'L with 0.44' Overlap 24 Chambers in 4 Rows
		0.046 af	Total Available Storage

Storage Group A created with Chamber Wizard

Device	Routing	Invert	Outlet Devices
#1	Primary	93.50'	**12.0" Round Culvert** L= 35.8' CMP, mitered to conform to fill, Ke= 0.700 Inlet / Outlet Invert= 93.50' / 92.43' S= 0.0299 '/' Cc= 0.900 n= 0.012 Concrete pipe, finished, Flow Area= 0.79 sf
#2	Device 1	93.50'	**8.0" Vert. Orifice/Grate** C= 0.600 Limited to weir flow at low heads
#3	Device 1	94.50'	**6.0' long x 5.0' breadth Broad-Crested Rectangular Weir** Head (feet) 0.20 0.40 0.60 0.80 1.00 1.20 1.40 1.60 1.80 2.00 2.50 3.00 3.50 4.00 4.50 5.00 5.50 Coef. (English) 2.34 2.50 2.70 2.68 2.68 2.66 2.65 2.65 2.65 2.65 2.67 2.66 2.68 2.70 2.74 2.79 2.88

Primary OutFlow Max=2.54 cfs @ 12.16 hrs HW=94.67' (Free Discharge)
└**1=Culvert** (Passes 2.54 cfs of 2.74 cfs potential flow)
  ├**2=Orifice/Grate** (Orifice Controls 1.54 cfs @ 4.41 fps)
  └**3=Broad-Crested Rectangular Weir** (Weir Controls 1.00 cfs @ 0.97 fps)

Pond 3P: UG Detention-North - Chamber Wizard Stone Bed

Chamber Model = ADS_StormTech SC-740 +Cap (ADS StormTech® SC-740 with cap length)
Effective Size= 44.6"W x 30.0"H => 6.45 sf x 7.12'L = 45.9 cf
Overall Size= 51.0"W x 30.0"H x 7.56'L with 0.44' Overlap

51.0" Wide + 6.0" Spacing = 57.0" C-C Row Spacing

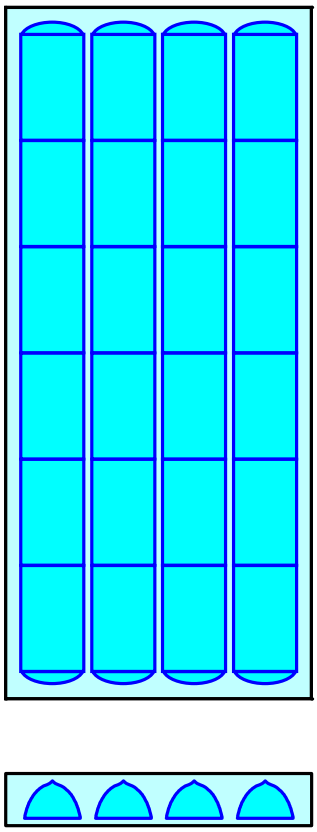
6 Chambers/Row x 7.12' Long +0.81' Cap Length x 2 = 44.34' Row Length +12.0" End Stone x 2 = 46.34' Base Length
4 Rows x 51.0" Wide + 6.0" Spacing x 3 + 12.0" Side Stone x 2 = 20.50' Base Width
6.0" Stone Base + 30.0" Chamber Height + 6.0" Stone Cover = 3.50' Field Height

24 Chambers x 45.9 cf = 1,102.6 cf Chamber Storage

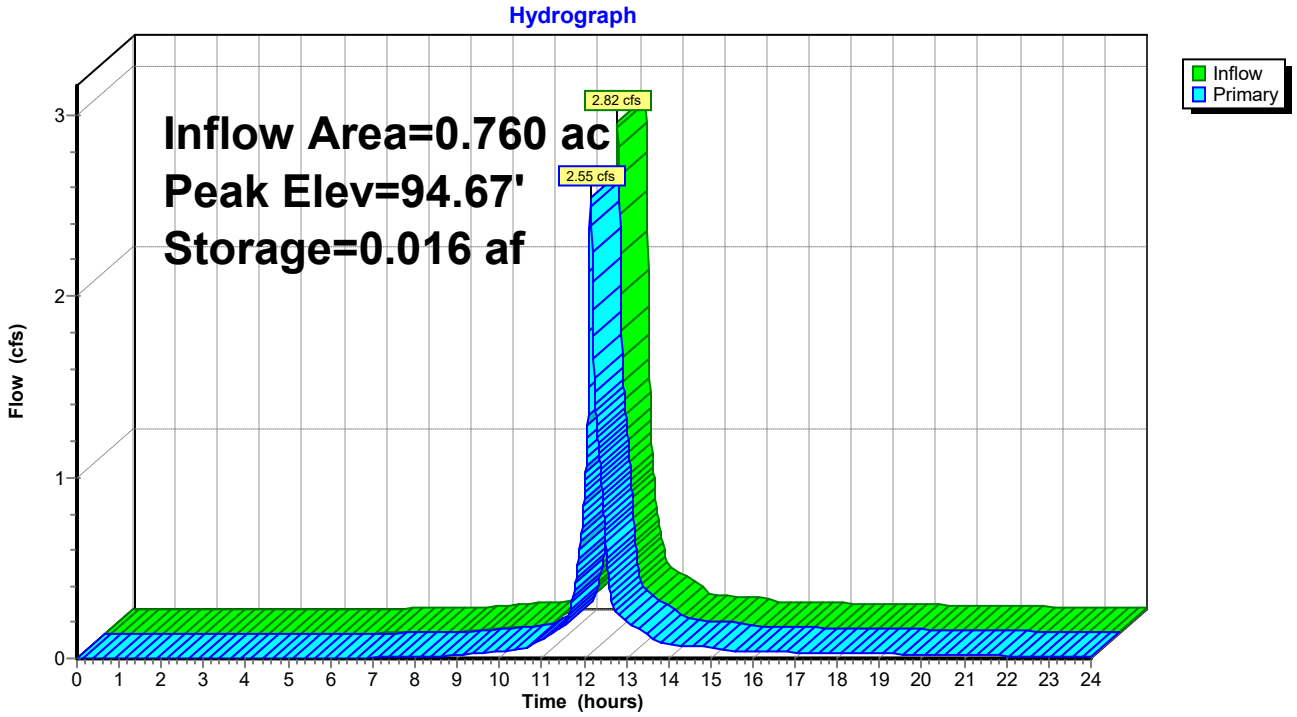
3,324.7 cf Field - 1,102.6 cf Chambers = 2,222.1 cf Stone x 40.0% Voids = 888.8 cf Stone Storage

Chamber Storage + Stone Storage = 1,991.4 cf = 0.046 af
Overall Storage Efficiency = 59.9%
Overall System Size = 46.34' x 20.50' x 3.50'

24 Chambers
123.1 cy Field
82.3 cy Stone



Pond 3P: UG Detention-North



Time span=0.00-24.00 hrs, dt=0.01 hrs, 2401 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 0-1: o-1 Runoff Area=0.210 ac 80.95% Impervious Runoff Depth>2.46"
Tc=6.0 min CN=87 Runoff=0.94 cfs 0.043 af

Subcatchment E-1: E-1 Runoff Area=0.610 ac 93.44% Impervious Runoff Depth>3.14"
Tc=6.0 min CN=94 Runoff=3.26 cfs 0.159 af

Subcatchment E-2: E-2 Runoff Area=1.470 ac 95.92% Impervious Runoff Depth>3.35"
Tc=6.0 min CN=96 Runoff=8.12 cfs 0.410 af

Subcatchment E-3: E-3 Runoff Area=0.860 ac 65.12% Impervious Runoff Depth>1.66"
Tc=0.0 min CN=77 Runoff=3.38 cfs 0.119 af

Subcatchment O-1: O-1 Runoff Area=0.210 ac 80.95% Impervious Runoff Depth>2.46"
Tc=6.0 min CN=87 Runoff=0.94 cfs 0.043 af

Subcatchment P-1: P-1 Runoff Area=1.000 ac 95.00% Impervious Runoff Depth>3.24"
Tc=6.0 min CN=95 Runoff=5.44 cfs 0.270 af

Subcatchment P-2: P-2 Runoff Area=0.940 ac 96.81% Impervious Runoff Depth>3.35"
Tc=6.0 min CN=96 Runoff=5.19 cfs 0.262 af

Subcatchment P-3: P-3 Runoff Area=0.760 ac 94.74% Impervious Runoff Depth>3.24"
Tc=6.0 min CN=95 Runoff=4.13 cfs 0.205 af

Subcatchment PU-1: PU-1 Runoff Area=0.244 ac 13.93% Impervious Runoff Depth>0.19"
Tc=6.0 min CN=47 Runoff=0.02 cfs 0.004 af

Reach E-TOTAL: E-TOTAL Inflow=13.95 cfs 0.732 af
Outflow=13.95 cfs 0.732 af

Reach P-TOTAL: P-TOTAL Inflow=6.99 cfs 0.778 af
Outflow=6.99 cfs 0.778 af

Pond 1P: UG Detention-West Peak Elev=96.13' Storage=0.086 af Inflow=5.44 cfs 0.270 af
8.0" Round Culvert n=0.012 L=36.3' S=0.0072 '/' Outflow=1.61 cfs 0.268 af

Pond 2P: UG Detention-South Peak Elev=96.19' Storage=0.091 af Inflow=5.19 cfs 0.262 af
Outflow=1.46 cfs 0.259 af

Pond 3P: UG Detention-North Peak Elev=95.02' Storage=0.022 af Inflow=4.13 cfs 0.205 af
Outflow=3.37 cfs 0.205 af

Total Runoff Area = 6.304 ac Runoff Volume = 1.517 af Average Runoff Depth = 2.89"
12.85% Pervious = 0.810 ac 87.15% Impervious = 5.494 ac

Summary for Subcatchment 0-1: o-1

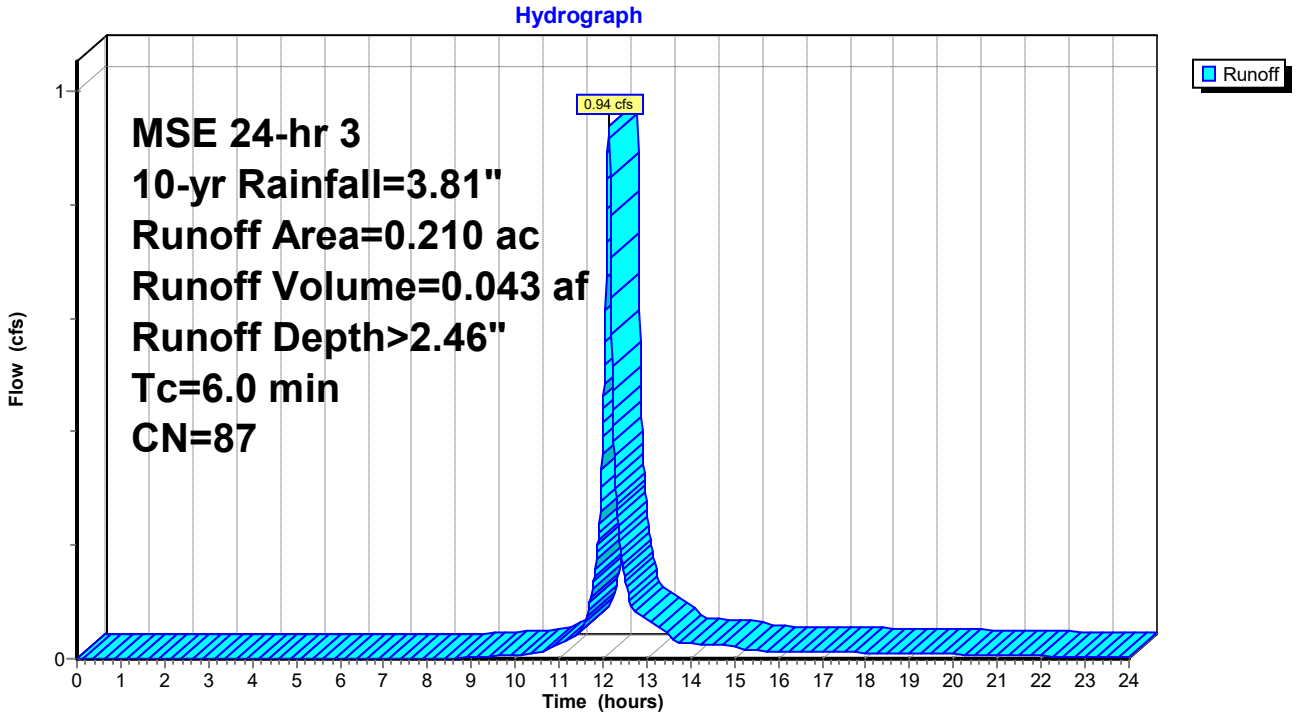
Runoff = 0.94 cfs @ 12.13 hrs, Volume= 0.043 af, Depth> 2.46"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs
MSE 24-hr 3 10-yr Rainfall=3.81"

Area (ac)	CN	Description
0.040	39	>75% Grass cover, Good, HSG A
0.170	98	Paved parking, HSG A
0.210	87	Weighted Average
0.040		19.05% Pervious Area
0.170		80.95% Impervious Area

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

Subcatchment 0-1: o-1



Summary for Subcatchment E-1: E-1

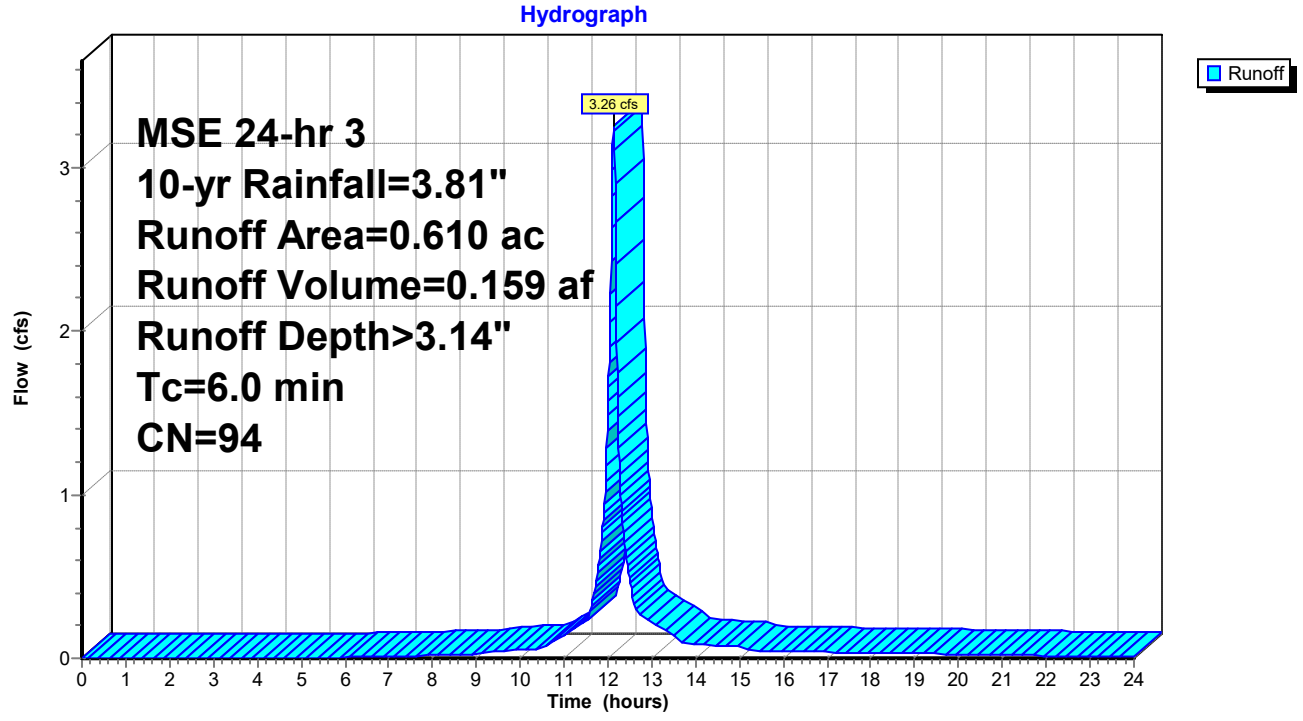
Runoff = 3.26 cfs @ 12.13 hrs, Volume= 0.159 af, Depth> 3.14"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs
MSE 24-hr 3 10-yr Rainfall=3.81"

Area (ac)	CN	Description
0.040	39	>75% Grass cover, Good, HSG A
0.100	98	Roofs, HSG A
0.470	98	Paved parking, HSG A
0.610	94	Weighted Average
0.040		6.56% Pervious Area
0.570		93.44% Impervious Area

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

Subcatchment E-1: E-1



Summary for Subcatchment E-2: E-2

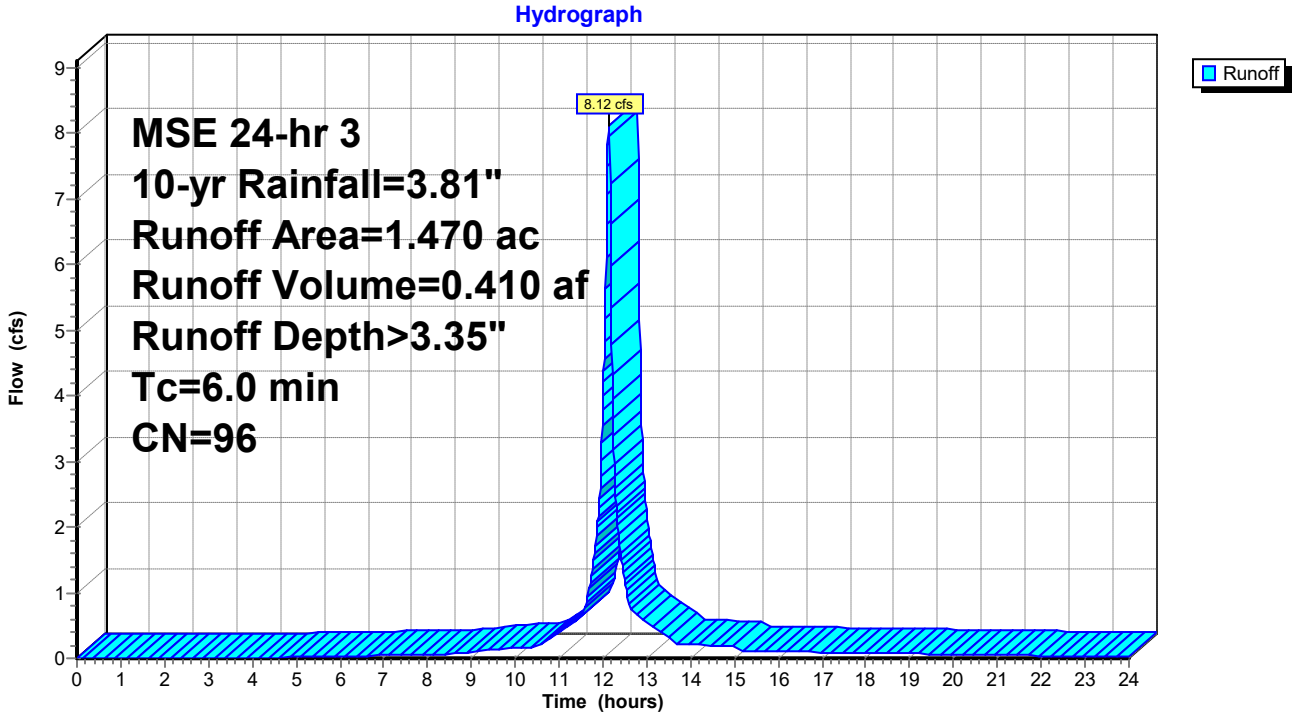
Runoff = 8.12 cfs @ 12.13 hrs, Volume= 0.410 af, Depth> 3.35"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs
MSE 24-hr 3 10-yr Rainfall=3.81"

Area (ac)	CN	Description
0.060	39	>75% Grass cover, Good, HSG A
1.410	98	Paved parking, HSG A
0.000	98	Roofs, HSG A
1.470	96	Weighted Average
0.060		4.08% Pervious Area
1.410		95.92% Impervious Area

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

Subcatchment E-2: E-2



Summary for Subcatchment E-3: E-3

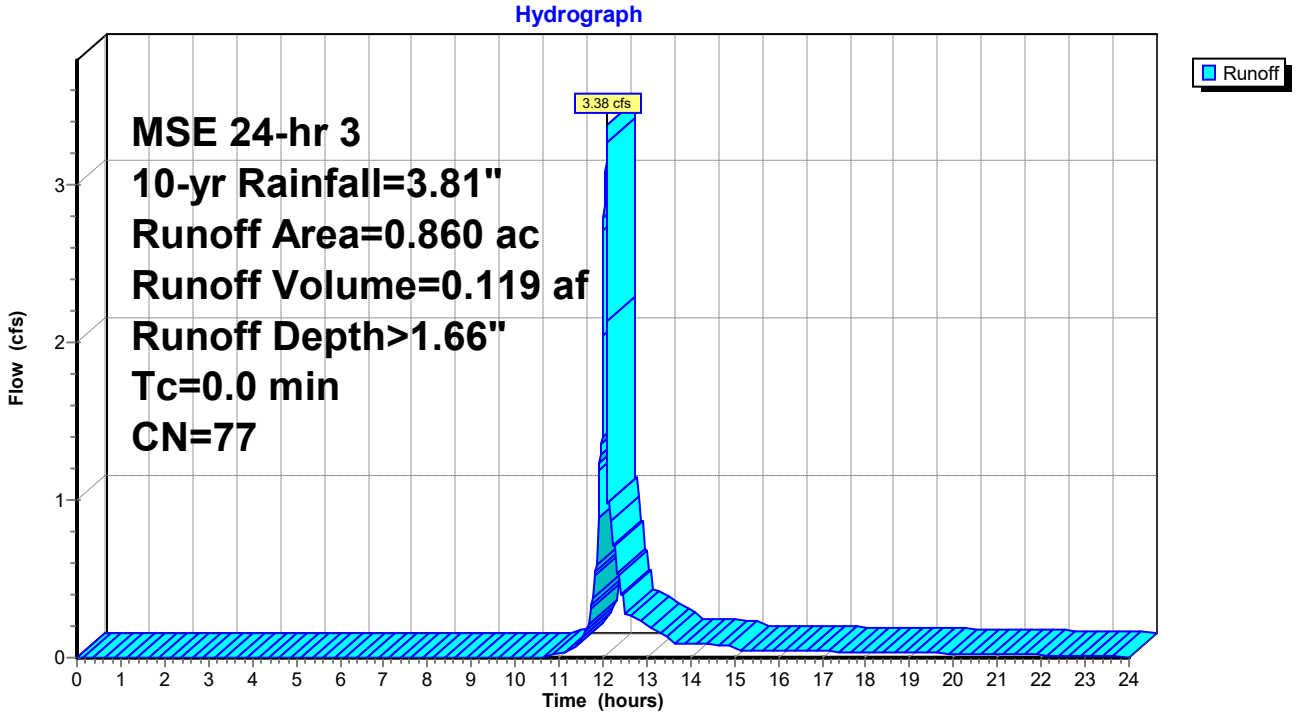
[46] Hint: Tc=0 (Instant runoff peak depends on dt)

Runoff = 3.38 cfs @ 12.09 hrs, Volume= 0.119 af, Depth> 1.66"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs
MSE 24-hr 3 10-yr Rainfall=3.81"

Area (ac)	CN	Description
0.300	39	>75% Grass cover, Good, HSG A
0.560	98	Paved parking, HSG A
0.860	77	Weighted Average
0.300		34.88% Pervious Area
0.560		65.12% Impervious Area

Subcatchment E-3: E-3



Summary for Subcatchment O-1: O-1

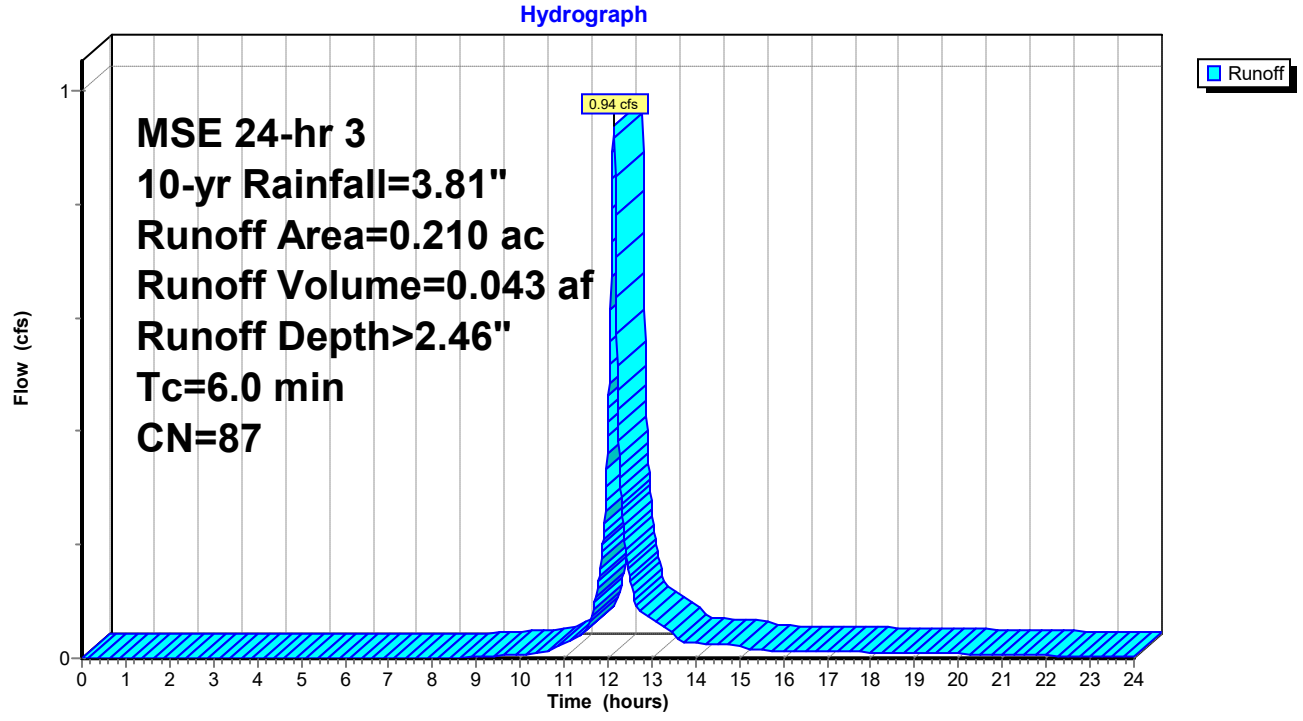
Runoff = 0.94 cfs @ 12.13 hrs, Volume= 0.043 af, Depth> 2.46"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs
MSE 24-hr 3 10-yr Rainfall=3.81"

Area (ac)	CN	Description
0.040	39	>75% Grass cover, Good, HSG A
0.170	98	Paved parking, HSG A
0.000	98	Roofs, HSG A
0.210	87	Weighted Average
0.040		19.05% Pervious Area
0.170		80.95% Impervious Area

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

Subcatchment O-1: O-1



Summary for Subcatchment P-1: P-1

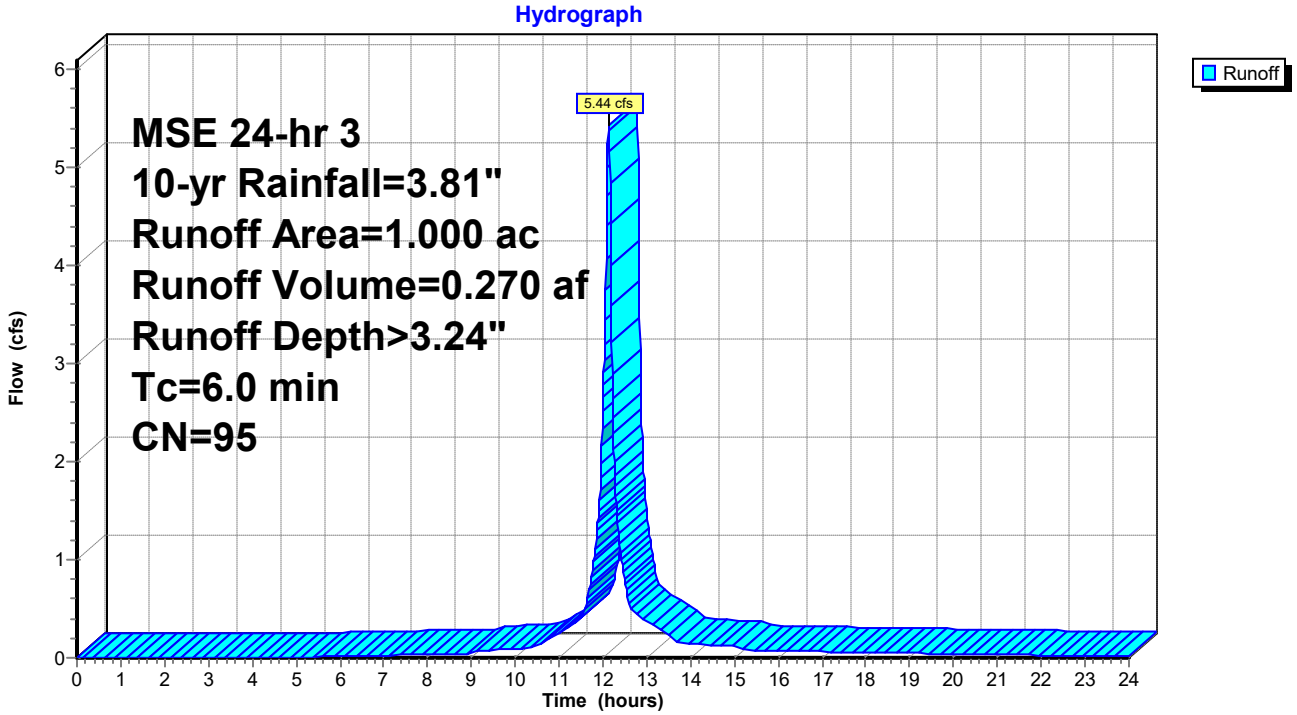
Runoff = 5.44 cfs @ 12.13 hrs, Volume= 0.270 af, Depth> 3.24"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs
MSE 24-hr 3 10-yr Rainfall=3.81"

Area (ac)	CN	Description
0.050	39	>75% Grass cover, Good, HSG A
0.880	98	Paved parking, HSG A
0.070	98	Unconnected pavement, HSG A
1.000	95	Weighted Average
0.050		5.00% Pervious Area
0.950		95.00% Impervious Area
0.070		7.37% Unconnected

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

Subcatchment P-1: P-1



Summary for Subcatchment P-2: P-2

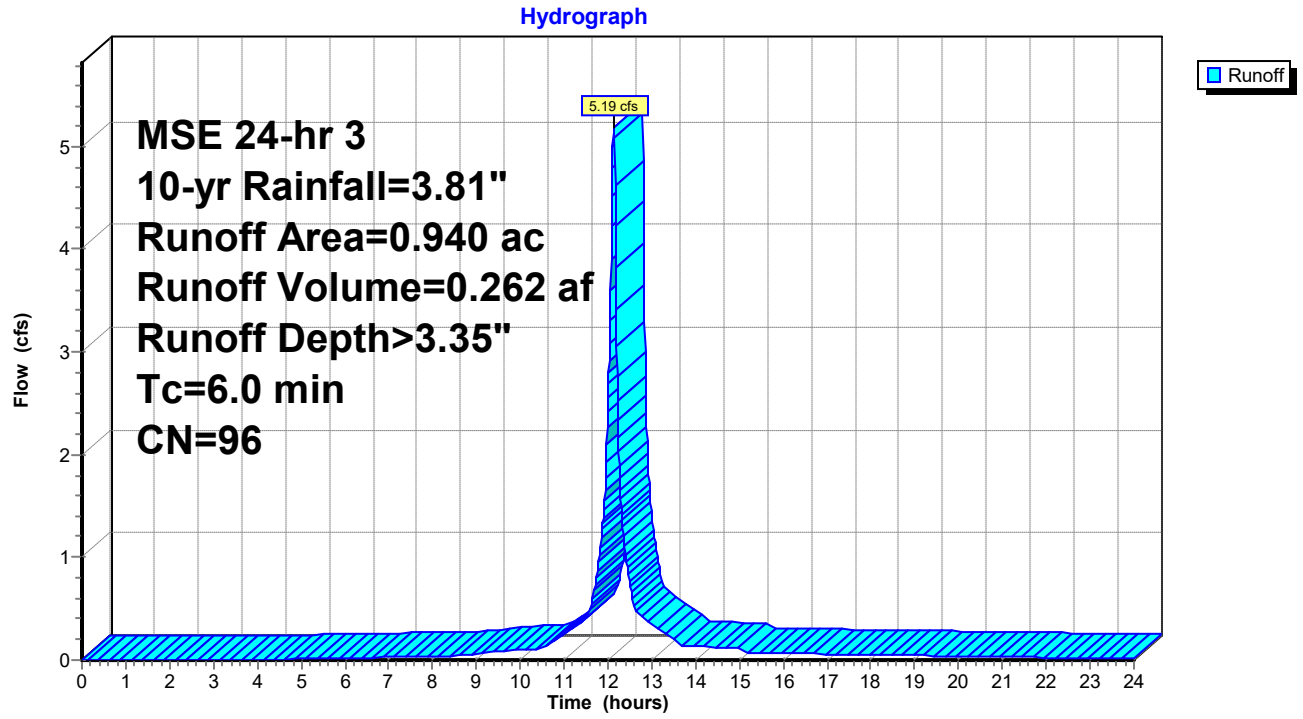
Runoff = 5.19 cfs @ 12.13 hrs, Volume= 0.262 af, Depth> 3.35"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs
MSE 24-hr 3 10-yr Rainfall=3.81"

Area (ac)	CN	Description
0.030	39	>75% Grass cover, Good, HSG A
0.720	98	Paved parking, HSG A
0.180	98	Roofs, HSG A
0.010	98	Unconnected pavement, HSG A
0.940	96	Weighted Average
0.030		3.19% Pervious Area
0.910		96.81% Impervious Area
0.010		1.10% Unconnected

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

Subcatchment P-2: P-2



Summary for Subcatchment P-3: P-3

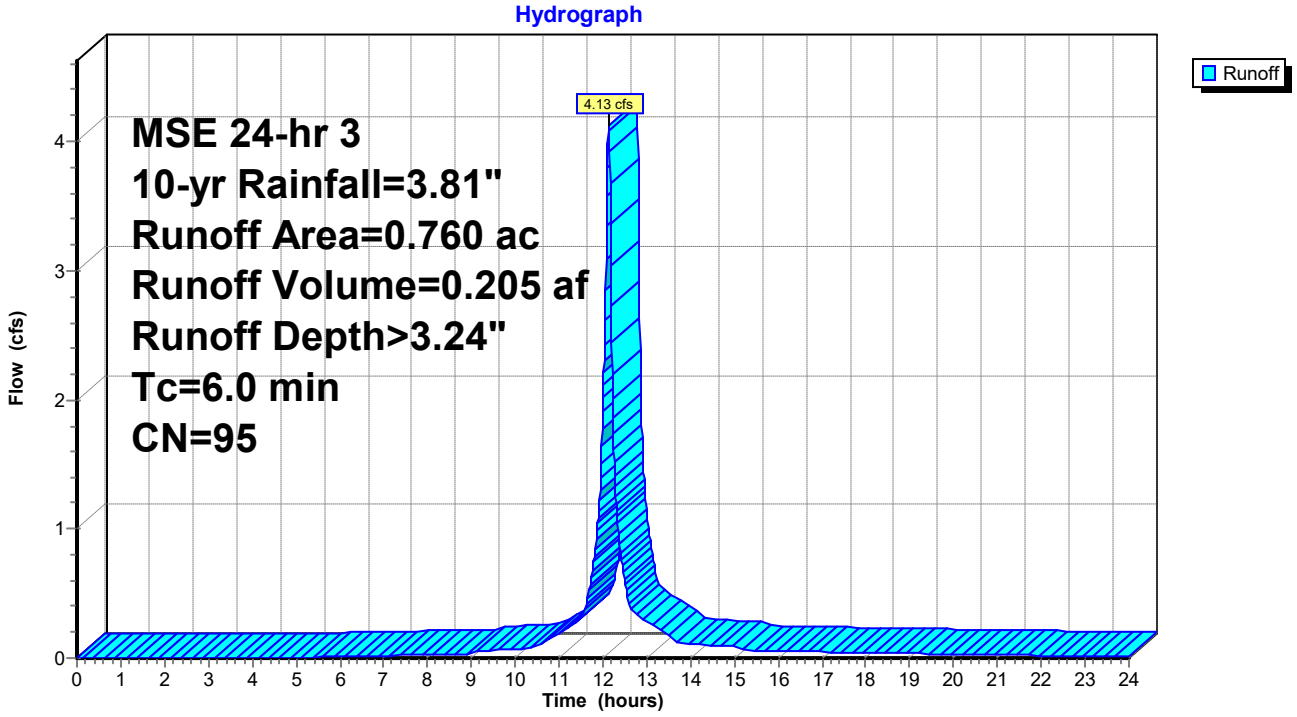
Runoff = 4.13 cfs @ 12.13 hrs, Volume= 0.205 af, Depth> 3.24"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs
MSE 24-hr 3 10-yr Rainfall=3.81"

Area (ac)	CN	Description
0.040	39	>75% Grass cover, Good, HSG A
0.440	98	Paved parking, HSG A
0.250	98	Unconnected roofs, HSG A
0.030	98	Unconnected pavement, HSG A
0.760	95	Weighted Average
0.040		5.26% Pervious Area
0.720		94.74% Impervious Area
0.280		38.89% Unconnected

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

Subcatchment P-3: P-3



Summary for Subcatchment PU-1: PU-1

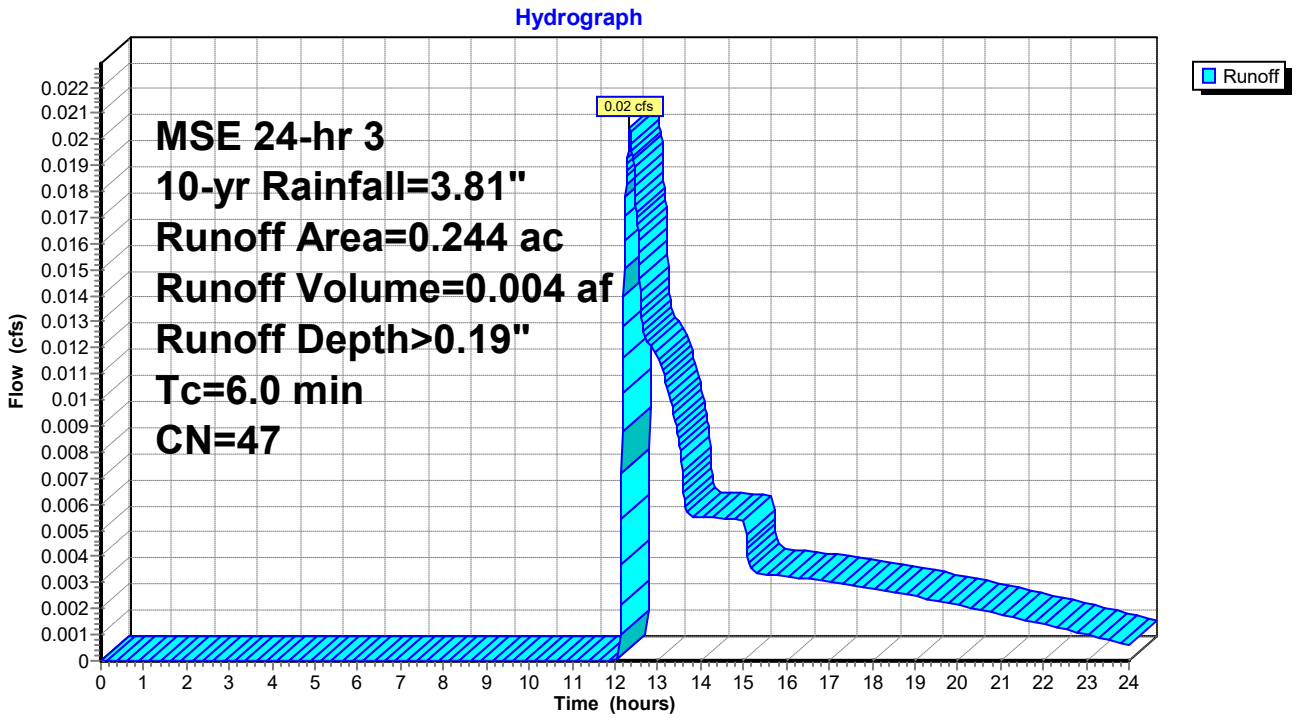
Runoff = 0.02 cfs @ 12.35 hrs, Volume= 0.004 af, Depth> 0.19"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs
MSE 24-hr 3 10-yr Rainfall=3.81"

Area (ac)	CN	Description
0.210	39	>75% Grass cover, Good, HSG A
0.030	98	Paved parking, HSG A
0.004	98	Unconnected roofs, HSG A
0.244	47	Weighted Average
0.210		86.07% Pervious Area
0.034		13.93% Impervious Area
0.004		11.76% Unconnected

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

Subcatchment PU-1: PU-1



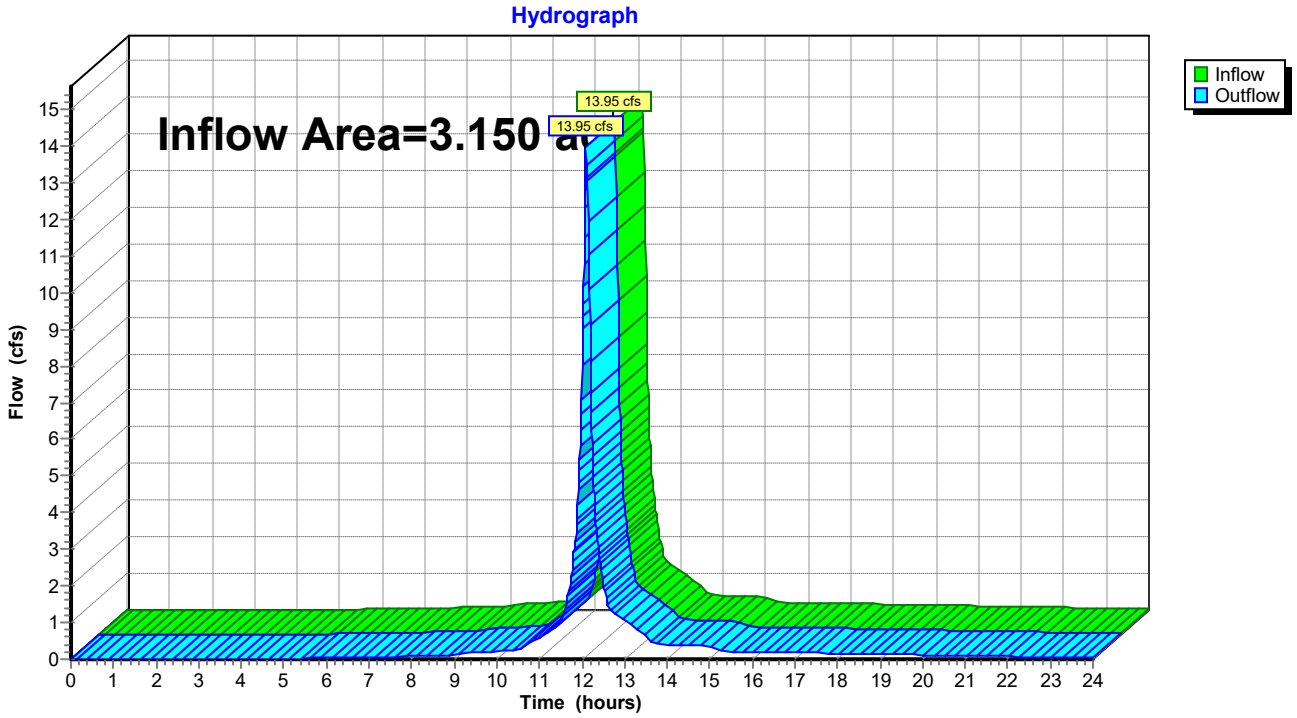
Summary for Reach E-TOTAL: E-TOTAL

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

Inflow Area = 3.150 ac, 86.03% Impervious, Inflow Depth > 2.79" for 10-yr event
Inflow = 13.95 cfs @ 12.09 hrs, Volume= 0.732 af
Outflow = 13.95 cfs @ 12.09 hrs, Volume= 0.732 af, Atten= 0%, Lag= 0.0 min

Routing by Stor-Ind+Trans method, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs

Reach E-TOTAL: E-TOTAL



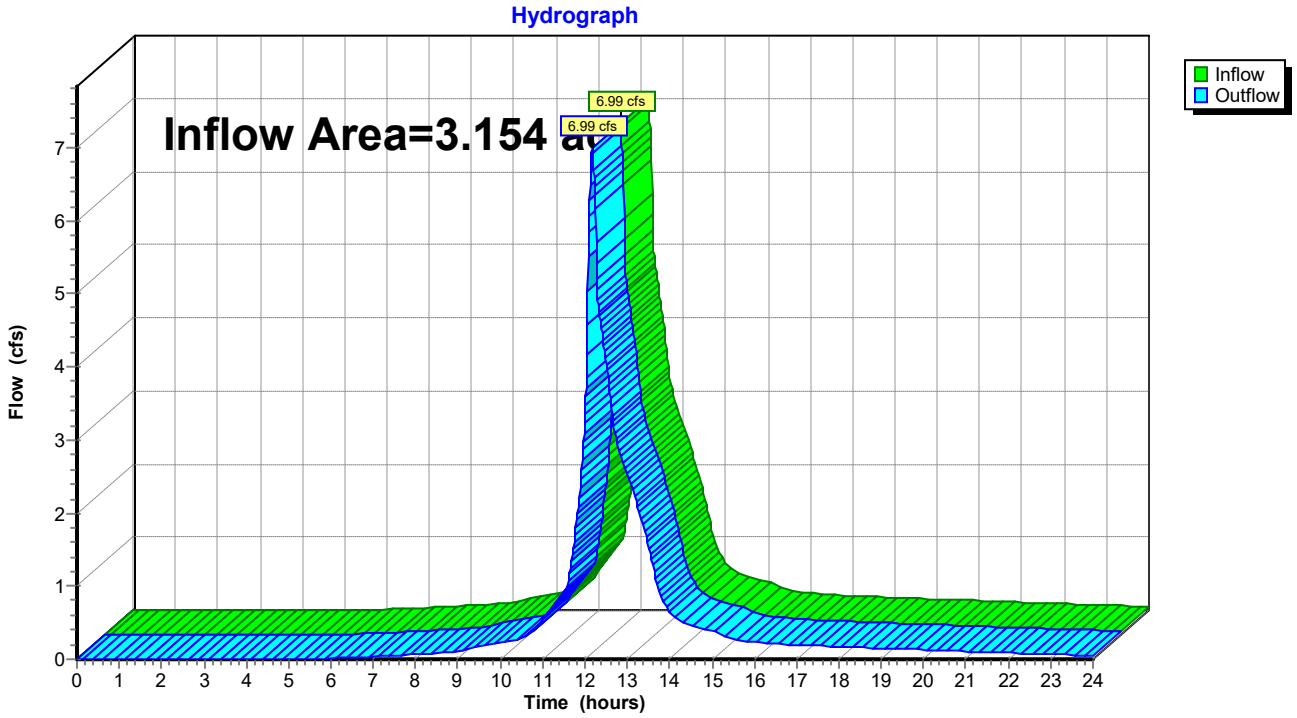
Summary for Reach P-TOTAL: P-TOTAL

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

Inflow Area = 3.154 ac, 88.27% Impervious, Inflow Depth > 2.96" for 10-yr event
Inflow = 6.99 cfs @ 12.17 hrs, Volume= 0.778 af
Outflow = 6.99 cfs @ 12.17 hrs, Volume= 0.778 af, Atten= 0%, Lag= 0.0 min

Routing by Stor-Ind+Trans method, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs

Reach P-TOTAL: P-TOTAL



Summary for Pond 1P: UG Detention-West

Inflow Area = 1.000 ac, 95.00% Impervious, Inflow Depth > 3.24" for 10-yr event
Inflow = 5.44 cfs @ 12.13 hrs, Volume= 0.270 af
Outflow = 1.61 cfs @ 12.29 hrs, Volume= 0.268 af, Atten= 70%, Lag= 9.9 min
Primary = 1.61 cfs @ 12.29 hrs, Volume= 0.268 af

Routing by Stor-Ind method, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs
Peak Elev= 96.13' @ 12.29 hrs Surf.Area= 0.084 ac Storage= 0.086 af

Plug-Flow detention time= 37.4 min calculated for 0.268 af (99% of inflow)
Center-of-Mass det. time= 31.6 min (798.0 - 766.4)

Volume	Invert	Avail.Storage	Storage Description
#1A	94.61'	0.076 af	**49.00'W x 74.82'L x 3.50'H Stone Bed** 0.295 af Overall - 0.105 af Embedded = 0.189 af x 40.0% Voids
#2A	95.11'	0.105 af	**ADS_StormTech SC-740 +Cap** x 100 Inside #1 Effective Size= 44.6"W x 30.0"H => 6.45 sf x 7.12'L = 45.9 cf Overall Size= 51.0"W x 30.0"H x 7.56'L with 0.44' Overlap 100 Chambers in 10 Rows
		0.181 af	Total Available Storage

Storage Group A created with Chamber Wizard

Device	Routing	Invert	Outlet Devices
#1	Primary	94.61'	**8.0" Round Culvert** L= 36.3' CMP, mitered to conform to fill, Ke= 0.700 Inlet / Outlet Invert= 94.61' / 94.35' S= 0.0072 '/' Cc= 0.900 n= 0.012 Corrugated PP, smooth interior, Flow Area= 0.35 sf

Primary OutFlow Max=1.61 cfs @ 12.29 hrs HW=96.13' (Free Discharge)
1=Culvert (Barrel Controls 1.61 cfs @ 4.61 fps)

Pond 1P: UG Detention-West - Chamber Wizard Stone Bed

Chamber Model = ADS_StormTech SC-740 +Cap (ADS StormTech® SC-740 with cap length)
Effective Size= 44.6"W x 30.0"H => 6.45 sf x 7.12'L = 45.9 cf
Overall Size= 51.0"W x 30.0"H x 7.56'L with 0.44' Overlap

51.0" Wide + 6.0" Spacing = 57.0" C-C Row Spacing

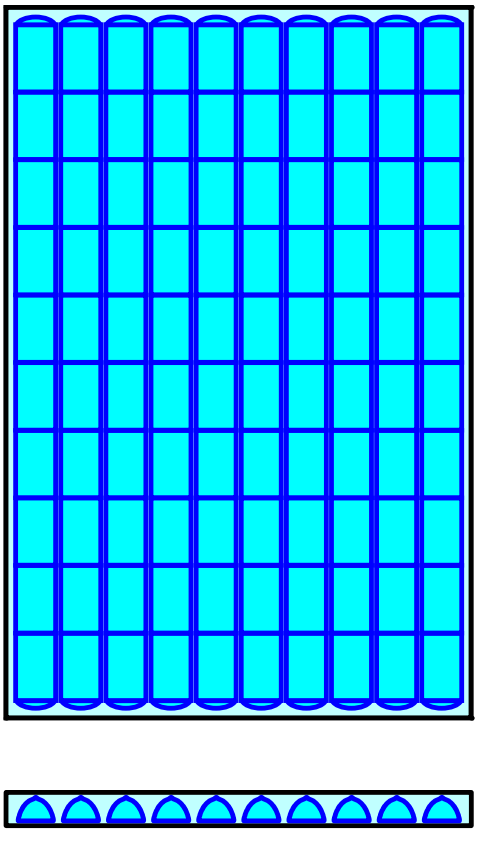
10 Chambers/Row x 7.12' Long +0.81' Cap Length x 2 = 72.82' Row Length +12.0" End Stone x 2 = 74.82' Base Length
10 Rows x 51.0" Wide + 6.0" Spacing x 9 + 12.0" Side Stone x 2 = 49.00' Base Width
6.0" Stone Base + 30.0" Chamber Height + 6.0" Stone Cover = 3.50' Field Height

100 Chambers x 45.9 cf = 4,594.0 cf Chamber Storage

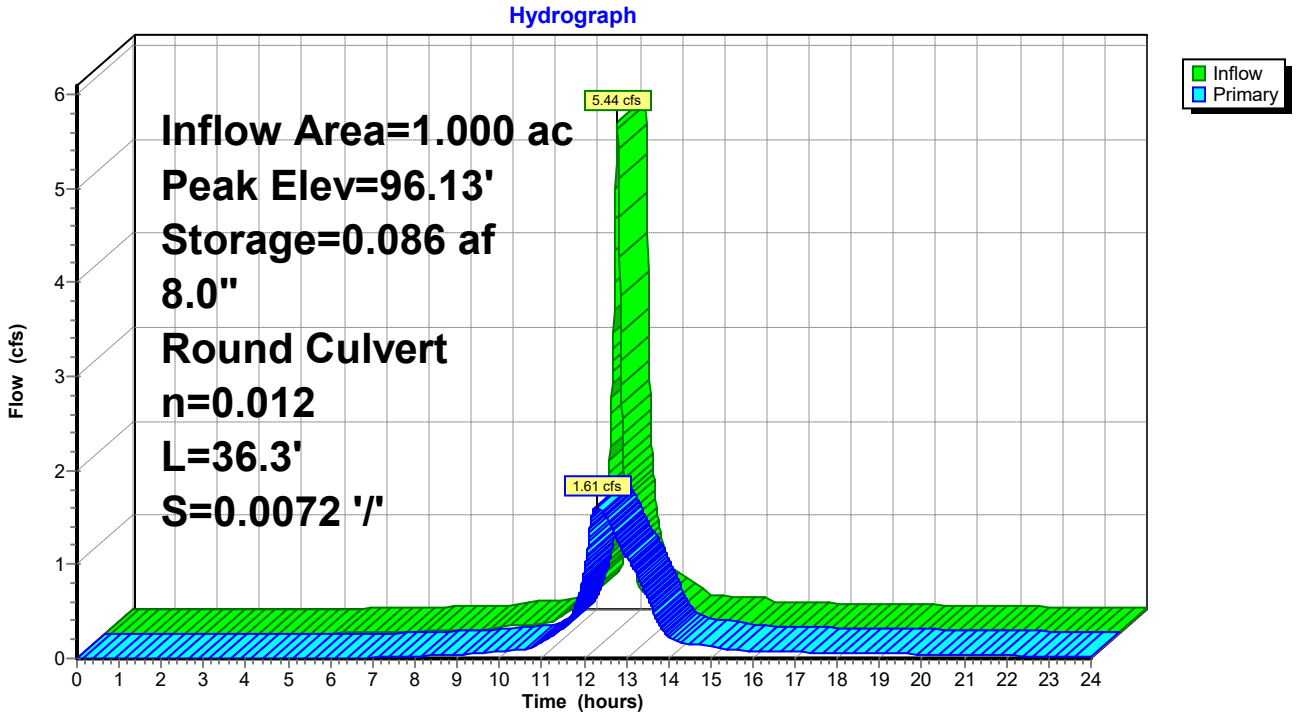
12,831.1 cf Field - 4,594.0 cf Chambers = 8,237.1 cf Stone x 40.0% Voids = 3,294.8 cf Stone Storage

Chamber Storage + Stone Storage = 7,888.8 cf = 0.181 af
Overall Storage Efficiency = 61.5%
Overall System Size = 74.82' x 49.00' x 3.50'

100 Chambers
475.2 cy Field
305.1 cy Stone



Pond 1P: UG Detention-West



Summary for Pond 2P: UG Detention-South

Inflow Area = 0.940 ac, 96.81% Impervious, Inflow Depth > 3.35" for 10-yr event
Inflow = 5.19 cfs @ 12.13 hrs, Volume= 0.262 af
Outflow = 1.46 cfs @ 12.30 hrs, Volume= 0.259 af, Atten= 72%, Lag= 10.5 min
Primary = 1.46 cfs @ 12.30 hrs, Volume= 0.259 af

Routing by Stor-Ind method, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs
Peak Elev= 96.19' @ 12.30 hrs Surf.Area= 0.140 ac Storage= 0.091 af

Plug-Flow detention time= 50.4 min calculated for 0.259 af (98% of inflow)
Center-of-Mass det. time= 41.4 min (802.9 - 761.5)

Volume	Invert	Avail.Storage	Storage Description
#1A	95.10'	0.084 af	**98.17'W x 53.04'L x 2.33'H Stone Bed** 0.279 af Overall - 0.069 af Embedded = 0.210 af x 40.0% Voids
#2A	95.60'	0.069 af	**ADS_StormTech SC-310 +Cap** x 203 Inside #1 Effective Size= 28.9"W x 16.0"H => 2.07 sf x 7.12'L = 14.7 cf Overall Size= 34.0"W x 16.0"H x 7.56'L with 0.44' Overlap 203 Chambers in 29 Rows
#3B	95.10'	0.015 af	**51.50'W x 17.44'L x 2.33'H Stone Bed** 0.048 af Overall - 0.010 af Embedded = 0.038 af x 40.0% Voids
#4B	95.60'	0.010 af	**ADS_StormTech RC-310 +Cap** x 30 Inside #3 Effective Size= 28.9"W x 16.0"H => 2.07 sf x 7.12'L = 14.7 cf Overall Size= 34.0"W x 16.0"H x 7.56'L with 0.44' Overlap 30 Chambers in 15 Rows
		0.178 af	Total Available Storage

Storage Group A created with Chamber Wizard
Storage Group B created with Chamber Wizard

Device	Routing	Invert	Outlet Devices
#1	Primary	95.10'	**12.0" Round Culvert** L= 208.4' CMP, mitered to conform to fill, Ke= 0.700 Inlet / Outlet Invert= 95.10' / 93.01' S= 0.0100 '/' Cc= 0.900 n= 0.012 Corrugated PP, smooth interior, Flow Area= 0.79 sf
#2	Device 1	95.10'	**8.0" Vert. Orifice/Grate** C= 0.600 Limited to weir flow at low heads
#3	Device 1	96.30'	**6.0' long x 0.5' breadth Broad-Crested Rectangular Weir** Head (feet) 0.20 0.40 0.60 0.80 1.00 Coef. (English) 2.80 2.92 3.08 3.30 3.32

Primary OutFlow Max=1.46 cfs @ 12.30 hrs HW=96.19' (Free Discharge)
└**1=Culvert** (Passes 1.46 cfs of 2.56 cfs potential flow)
  ├**2=Orifice/Grate** (Orifice Controls 1.46 cfs @ 4.18 fps)
  └**3=Broad-Crested Rectangular Weir** (Controls 0.00 cfs)

Pond 2P: UG Detention-South - Chamber Wizard Stone Bed

Chamber Model = ADS_StormTech SC-310 +Cap (ADS StormTech® SC-310 with cap length)
Effective Size= 28.9"W x 16.0"H => 2.07 sf x 7.12'L = 14.7 cf
Overall Size= 34.0"W x 16.0"H x 7.56'L with 0.44' Overlap

34.0" Wide + 6.0" Spacing = 40.0" C-C Row Spacing

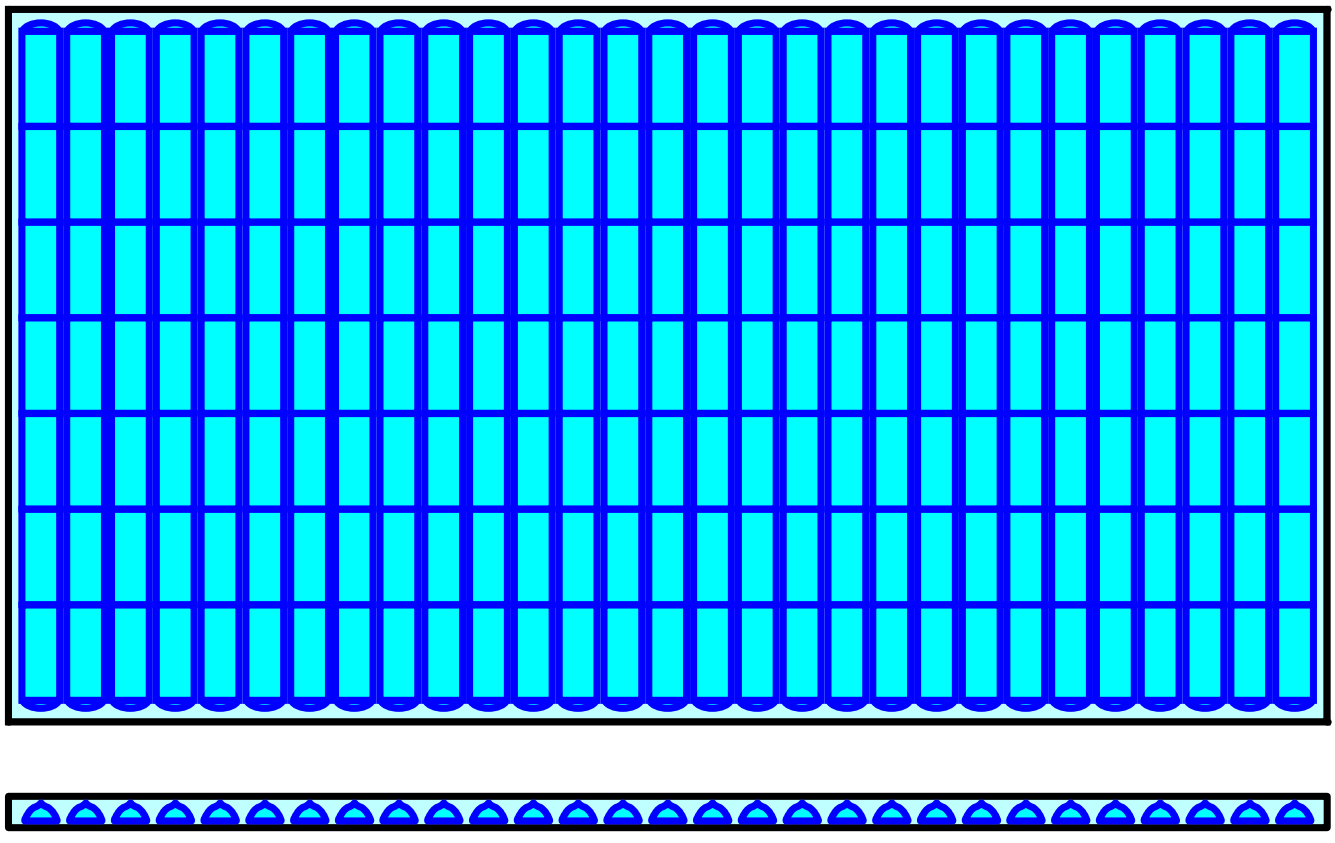
7 Chambers/Row x 7.12' Long +0.60' Cap Length x 2 = 51.04' Row Length +12.0" End Stone x 2 = 53.04' Base Length
29 Rows x 34.0" Wide + 6.0" Spacing x 28 + 12.0" Side Stone x 2 = 98.17' Base Width
6.0" Stone Base + 16.0" Chamber Height + 6.0" Stone Cover = 2.33' Field Height

203 Chambers x 14.7 cf = 2,992.6 cf Chamber Storage

12,149.1 cf Field - 2,992.6 cf Chambers = 9,156.5 cf Stone x 40.0% Voids = 3,662.6 cf Stone Storage

Chamber Storage + Stone Storage = 6,655.2 cf = 0.153 af
Overall Storage Efficiency = 54.8%
Overall System Size = 53.04' x 98.17' x 2.33'

203 Chambers
450.0 cy Field
339.1 cy Stone



Pond 2P: UG Detention-South - Chamber Wizard Stone Bed

Chamber Model = ADS_StormTech RC-310 +Cap (ADS StormTech® RC-310 with cap length)
Effective Size= 28.9"W x 16.0"H => 2.07 sf x 7.12'L = 14.7 cf
Overall Size= 34.0"W x 16.0"H x 7.56'L with 0.44' Overlap

34.0" Wide + 6.0" Spacing = 40.0" C-C Row Spacing

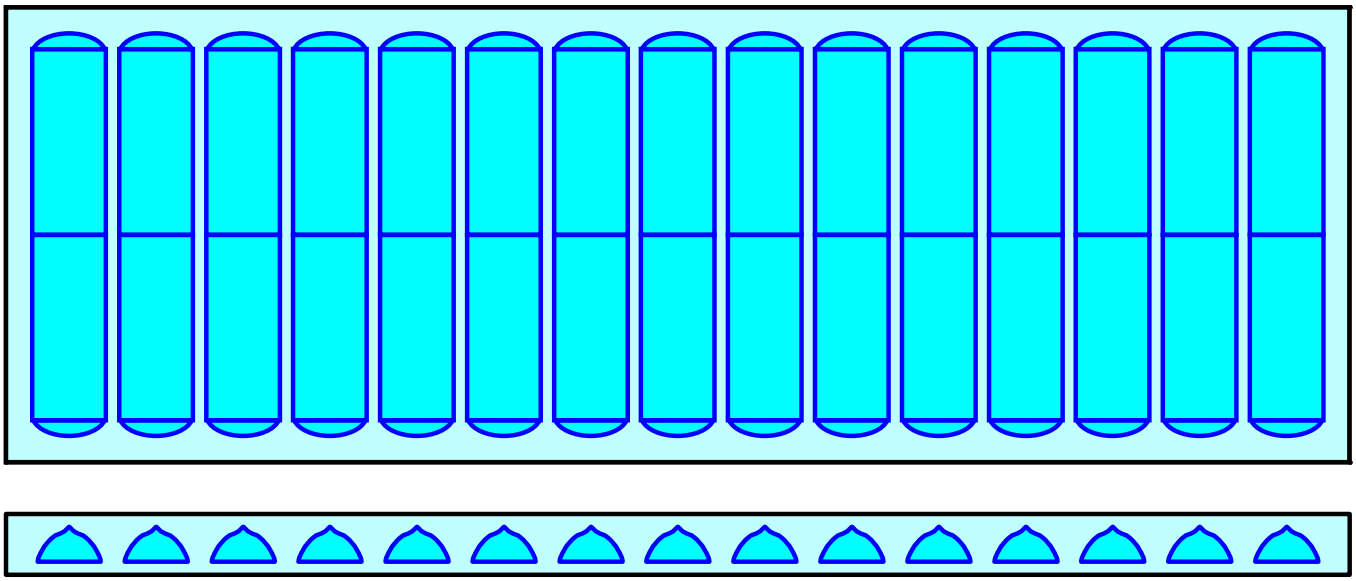
2 Chambers/Row x 7.12' Long +0.60' Cap Length x 2 = 15.44' Row Length +12.0" End Stone x 2 = 17.44' Base Length
15 Rows x 34.0" Wide + 6.0" Spacing x 14 + 12.0" Side Stone x 2 = 51.50' Base Width
6.0" Stone Base + 16.0" Chamber Height + 6.0" Stone Cover = 2.33' Field Height

30 Chambers x 14.7 cf = 442.3 cf Chamber Storage

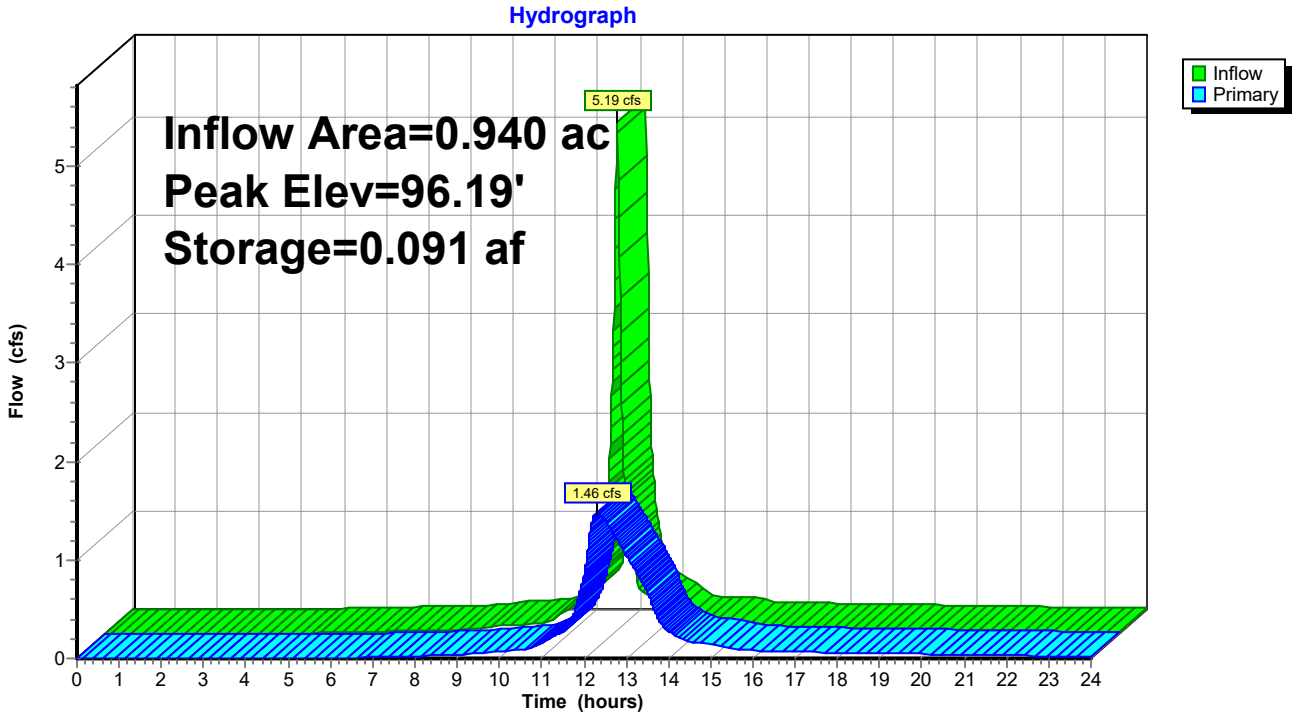
2,095.7 cf Field - 442.3 cf Chambers = 1,653.4 cf Stone x 40.0% Voids = 661.4 cf Stone Storage

Chamber Storage + Stone Storage = 1,103.6 cf = 0.025 af
Overall Storage Efficiency = 52.7%
Overall System Size = 17.44' x 51.50' x 2.33'

30 Chambers
77.6 cy Field
61.2 cy Stone



Pond 2P: UG Detention-South



Summary for Pond 3P: UG Detention-North

Inflow Area = 0.760 ac, 94.74% Impervious, Inflow Depth > 3.24" for 10-yr event
Inflow = 4.13 cfs @ 12.13 hrs, Volume= 0.205 af
Outflow = 3.37 cfs @ 12.17 hrs, Volume= 0.205 af, Atten= 18%, Lag= 2.4 min
Primary = 3.37 cfs @ 12.17 hrs, Volume= 0.205 af

Routing by Stor-Ind method, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs
Peak Elev= 95.02' @ 12.17 hrs Surf.Area= 0.022 ac Storage= 0.022 af

Plug-Flow detention time= 8.2 min calculated for 0.205 af (100% of inflow)
Center-of-Mass det. time= 6.9 min (773.3 - 766.4)

Volume	Invert	Avail.Storage	Storage Description
#1A	93.50'	0.020 af	**20.50'W x 46.34'L x 3.50'H Stone Bed** 0.076 af Overall - 0.025 af Embedded = 0.051 af x 40.0% Voids
#2A	94.00'	0.025 af	**ADS_StormTech SC-740 +Cap** x 24 Inside #1 Effective Size= 44.6"W x 30.0"H => 6.45 sf x 7.12'L = 45.9 cf Overall Size= 51.0"W x 30.0"H x 7.56'L with 0.44' Overlap 24 Chambers in 4 Rows
		0.046 af	Total Available Storage

Storage Group A created with Chamber Wizard

Device	Routing	Invert	Outlet Devices
#1	Primary	93.50'	**12.0" Round Culvert** L= 35.8' CMP, mitered to conform to fill, Ke= 0.700 Inlet / Outlet Invert= 93.50' / 92.43' S= 0.0299 '/' Cc= 0.900 n= 0.012 Concrete pipe, finished, Flow Area= 0.79 sf
#2	Device 1	93.50'	**8.0" Vert. Orifice/Grate** C= 0.600 Limited to weir flow at low heads
#3	Device 1	94.50'	**6.0' long x 5.0' breadth Broad-Crested Rectangular Weir** Head (feet) 0.20 0.40 0.60 0.80 1.00 1.20 1.40 1.60 1.80 2.00 2.50 3.00 3.50 4.00 4.50 5.00 5.50 Coef. (English) 2.34 2.50 2.70 2.68 2.68 2.66 2.65 2.65 2.65 2.65 2.67 2.66 2.68 2.70 2.74 2.79 2.88

Primary OutFlow Max=3.37 cfs @ 12.17 hrs HW=95.02' (Free Discharge)
└**1=Culvert** (Inlet Controls 3.37 cfs @ 4.29 fps)
  ├**2=Orifice/Grate** (Passes < 1.83 cfs potential flow)
  └**3=Broad-Crested Rectangular Weir** (Passes < 5.88 cfs potential flow)

Pond 3P: UG Detention-North - Chamber Wizard Stone Bed

Chamber Model = ADS_StormTech SC-740 +Cap (ADS StormTech® SC-740 with cap length)
Effective Size= 44.6"W x 30.0"H => 6.45 sf x 7.12'L = 45.9 cf
Overall Size= 51.0"W x 30.0"H x 7.56'L with 0.44' Overlap

51.0" Wide + 6.0" Spacing = 57.0" C-C Row Spacing

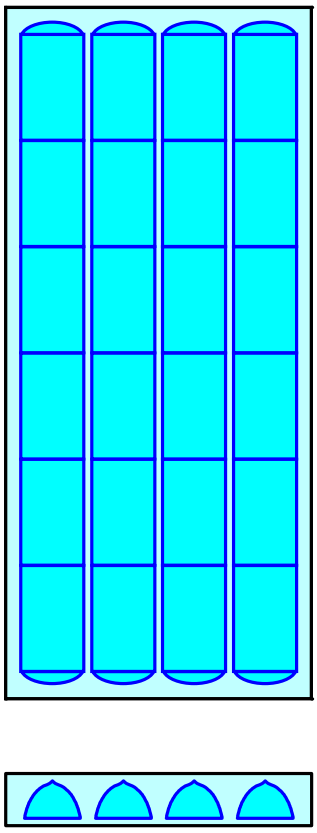
6 Chambers/Row x 7.12' Long +0.81' Cap Length x 2 = 44.34' Row Length +12.0" End Stone x 2 = 46.34' Base Length
4 Rows x 51.0" Wide + 6.0" Spacing x 3 + 12.0" Side Stone x 2 = 20.50' Base Width
6.0" Stone Base + 30.0" Chamber Height + 6.0" Stone Cover = 3.50' Field Height

24 Chambers x 45.9 cf = 1,102.6 cf Chamber Storage

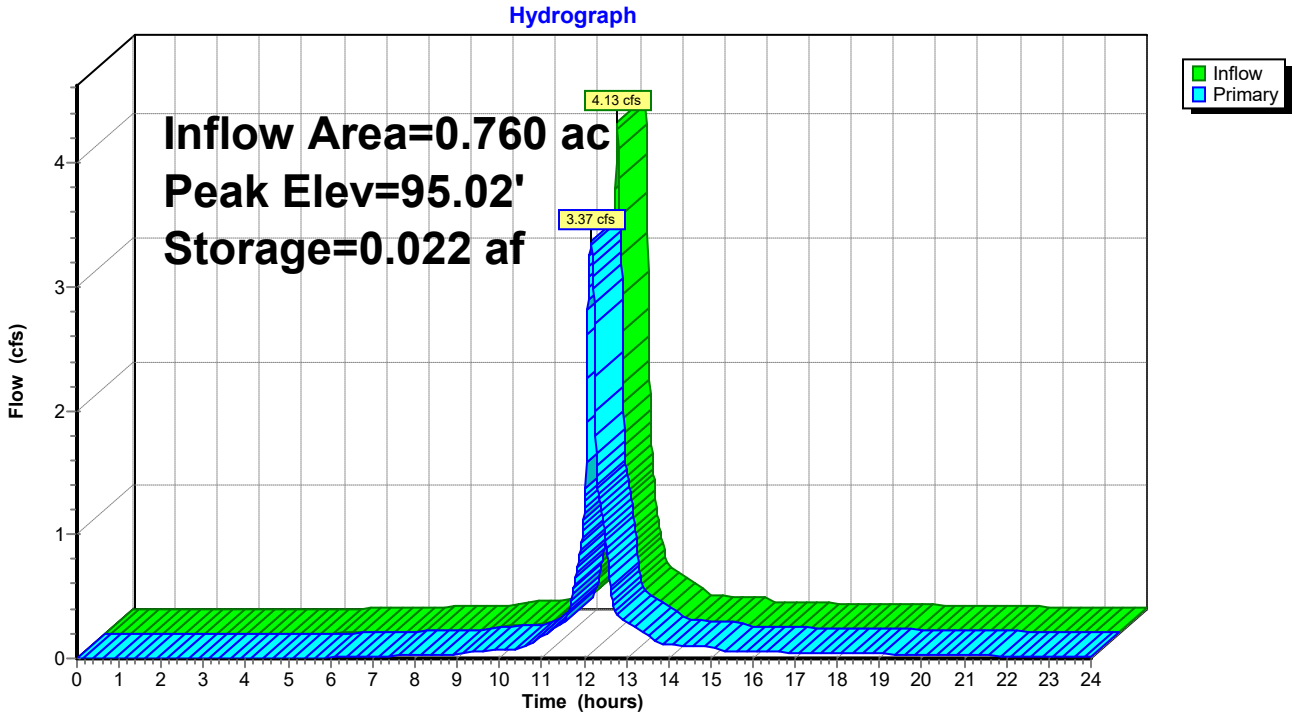
3,324.7 cf Field - 1,102.6 cf Chambers = 2,222.1 cf Stone x 40.0% Voids = 888.8 cf Stone Storage

Chamber Storage + Stone Storage = 1,991.4 cf = 0.046 af
Overall Storage Efficiency = 59.9%
Overall System Size = 46.34' x 20.50' x 3.50'

24 Chambers
123.1 cy Field
82.3 cy Stone



Pond 3P: UG Detention-North



Time span=0.00-24.00 hrs, dt=0.01 hrs, 2401 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 0-1: o-1 Runoff Area=0.210 ac 80.95% Impervious Runoff Depth>4.69"
Tc=6.0 min CN=87 Runoff=1.73 cfs 0.082 af

Subcatchment E-1: E-1 Runoff Area=0.610 ac 93.44% Impervious Runoff Depth>5.47"
Tc=6.0 min CN=94 Runoff=5.48 cfs 0.278 af

Subcatchment E-2: E-2 Runoff Area=1.470 ac 95.92% Impervious Runoff Depth>5.71"
Tc=6.0 min CN=96 Runoff=13.42 cfs 0.699 af

Subcatchment E-3: E-3 Runoff Area=0.860 ac 65.12% Impervious Runoff Depth>3.64"
Tc=0.0 min CN=77 Runoff=6.75 cfs 0.261 af

Subcatchment O-1: O-1 Runoff Area=0.210 ac 80.95% Impervious Runoff Depth>4.69"
Tc=6.0 min CN=87 Runoff=1.73 cfs 0.082 af

Subcatchment P-1: P-1 Runoff Area=1.000 ac 95.00% Impervious Runoff Depth>5.59"
Tc=6.0 min CN=95 Runoff=9.06 cfs 0.466 af

Subcatchment P-2: P-2 Runoff Area=0.940 ac 96.81% Impervious Runoff Depth>5.71"
Tc=6.0 min CN=96 Runoff=8.58 cfs 0.447 af

Subcatchment P-3: P-3 Runoff Area=0.760 ac 94.74% Impervious Runoff Depth>5.59"
Tc=6.0 min CN=95 Runoff=6.89 cfs 0.354 af

Subcatchment PU-1: PU-1 Runoff Area=0.244 ac 13.93% Impervious Runoff Depth>1.01"
Tc=6.0 min CN=47 Runoff=0.38 cfs 0.021 af

Reach E-TOTAL: E-TOTAL Inflow=24.73 cfs 1.320 af
Outflow=24.73 cfs 1.320 af

Reach P-TOTAL: P-TOTAL Inflow=12.27 cfs 1.361 af
Outflow=12.27 cfs 1.361 af

Pond 1P: UG Detention-West Peak Elev=97.37' Storage=0.156 af Inflow=9.06 cfs 0.466 af
8.0" Round Culvert n=0.012 L=36.3' S=0.0072 '/' Outflow=2.31 cfs 0.463 af

Pond 2P: UG Detention-South Peak Elev=96.75' Storage=0.139 af Inflow=8.58 cfs 0.447 af
Outflow=3.57 cfs 0.442 af

Pond 3P: UG Detention-North Peak Elev=96.29' Storage=0.039 af Inflow=6.89 cfs 0.354 af
Outflow=5.05 cfs 0.353 af

Total Runoff Area = 6.304 ac Runoff Volume = 2.689 af Average Runoff Depth = 5.12"
12.85% Pervious = 0.810 ac 87.15% Impervious = 5.494 ac

Summary for Subcatchment 0-1: o-1

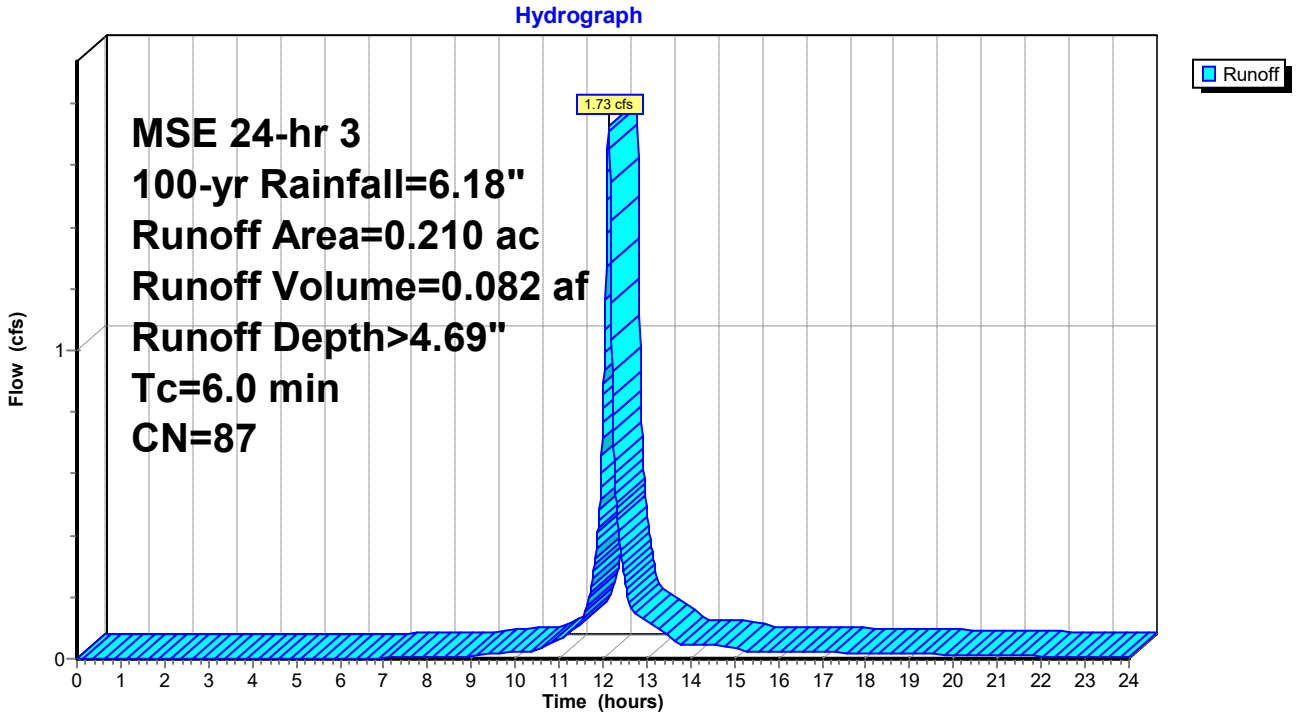
Runoff = 1.73 cfs @ 12.13 hrs, Volume= 0.082 af, Depth> 4.69"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs
MSE 24-hr 3 100-yr Rainfall=6.18"

Area (ac)	CN	Description
0.040	39	>75% Grass cover, Good, HSG A
0.170	98	Paved parking, HSG A
0.210	87	Weighted Average
0.040		19.05% Pervious Area
0.170		80.95% Impervious Area

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

Subcatchment 0-1: o-1



Summary for Subcatchment E-1: E-1

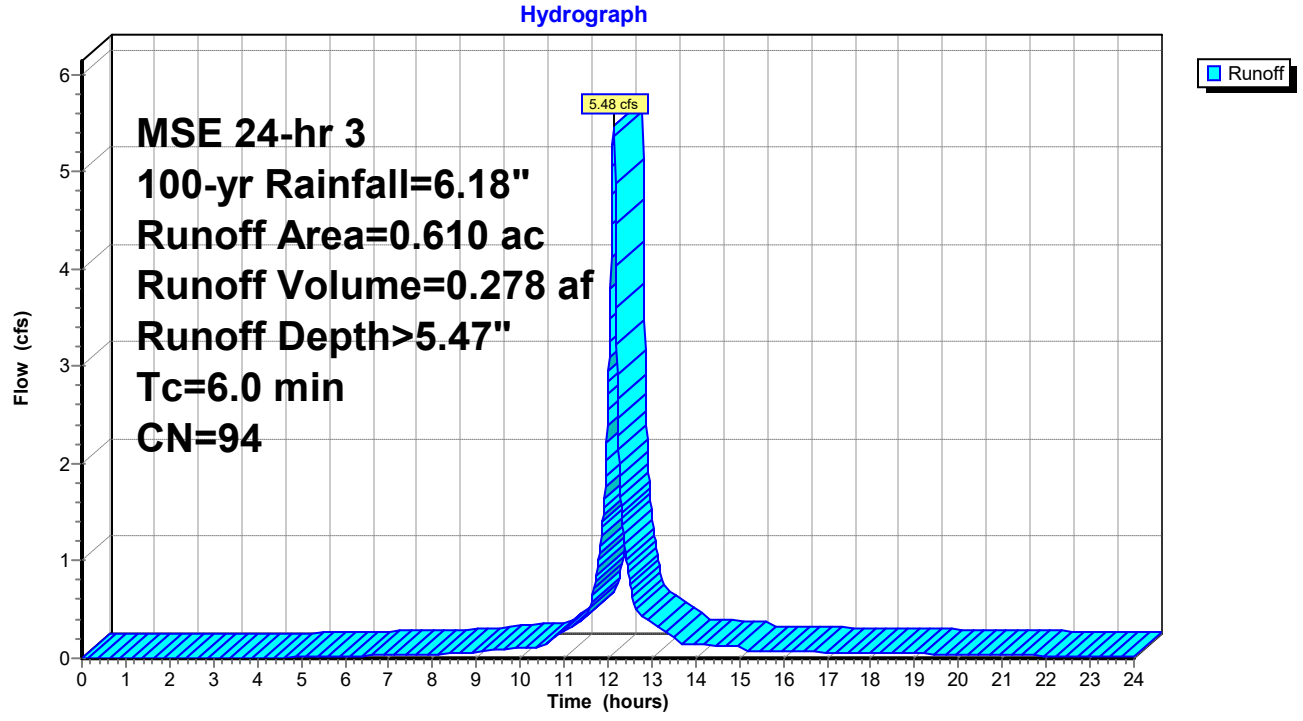
Runoff = 5.48 cfs @ 12.13 hrs, Volume= 0.278 af, Depth> 5.47"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs
MSE 24-hr 3 100-yr Rainfall=6.18"

Area (ac)	CN	Description
0.040	39	>75% Grass cover, Good, HSG A
0.100	98	Roofs, HSG A
0.470	98	Paved parking, HSG A
0.610	94	Weighted Average
0.040		6.56% Pervious Area
0.570		93.44% Impervious Area

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

Subcatchment E-1: E-1



Summary for Subcatchment E-2: E-2

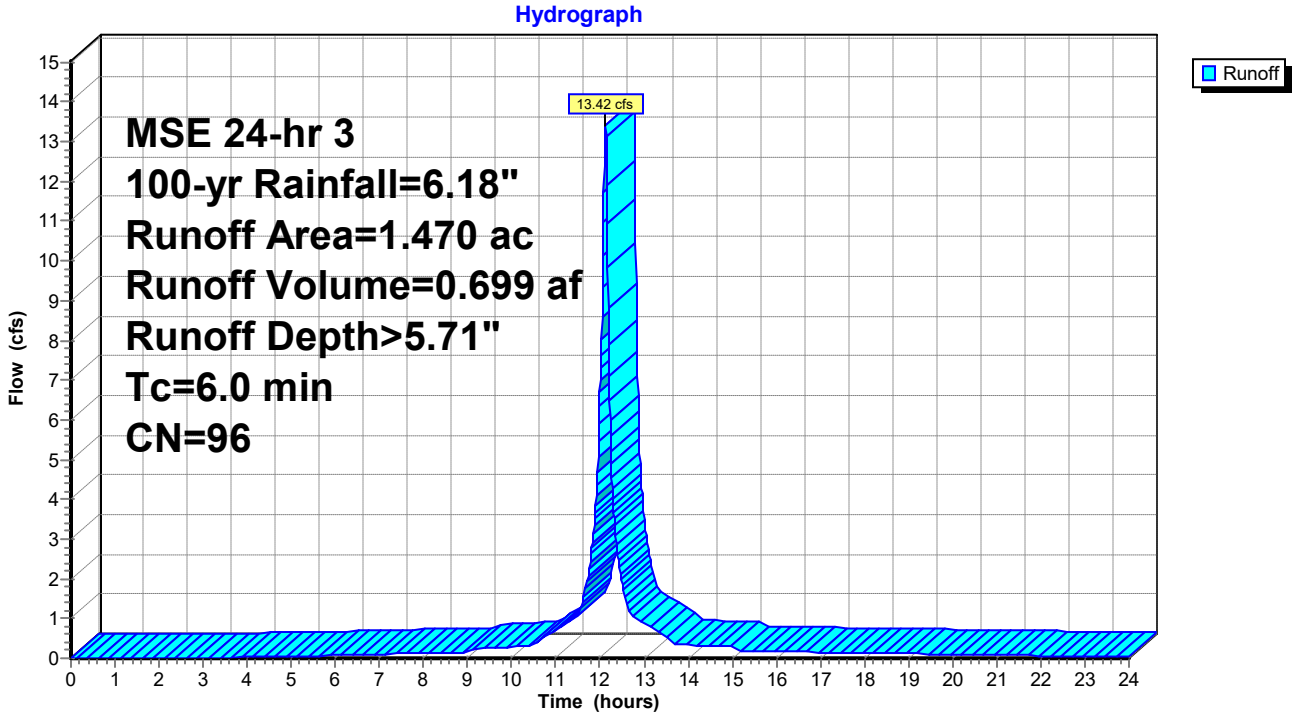
Runoff = 13.42 cfs @ 12.13 hrs, Volume= 0.699 af, Depth> 5.71"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs
MSE 24-hr 3 100-yr Rainfall=6.18"

Area (ac)	CN	Description
0.060	39	>75% Grass cover, Good, HSG A
1.410	98	Paved parking, HSG A
0.000	98	Roofs, HSG A
1.470	96	Weighted Average
0.060		4.08% Pervious Area
1.410		95.92% Impervious Area

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

Subcatchment E-2: E-2



Summary for Subcatchment E-3: E-3

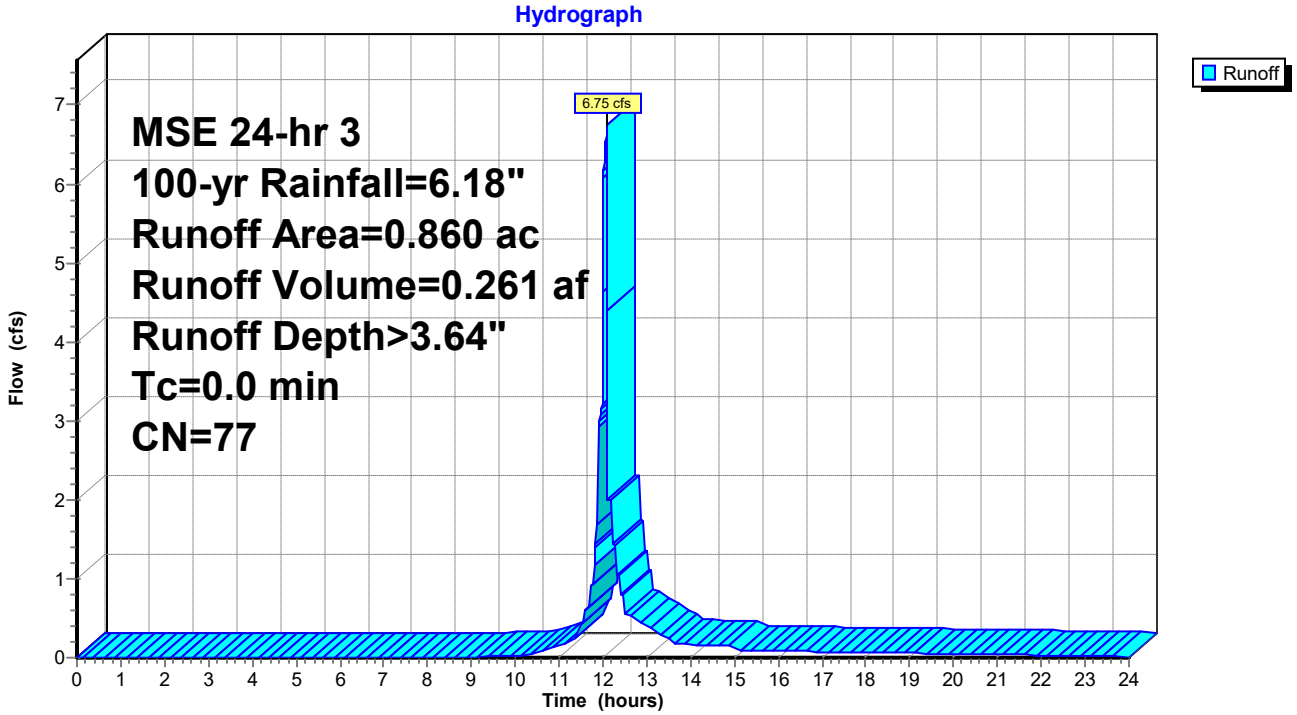
[46] Hint: Tc=0 (Instant runoff peak depends on dt)

Runoff = 6.75 cfs @ 12.09 hrs, Volume= 0.261 af, Depth> 3.64"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs
MSE 24-hr 3 100-yr Rainfall=6.18"

Area (ac)	CN	Description
0.300	39	>75% Grass cover, Good, HSG A
0.560	98	Paved parking, HSG A
0.860	77	Weighted Average
0.300		34.88% Pervious Area
0.560		65.12% Impervious Area

Subcatchment E-3: E-3



Summary for Subcatchment O-1: O-1

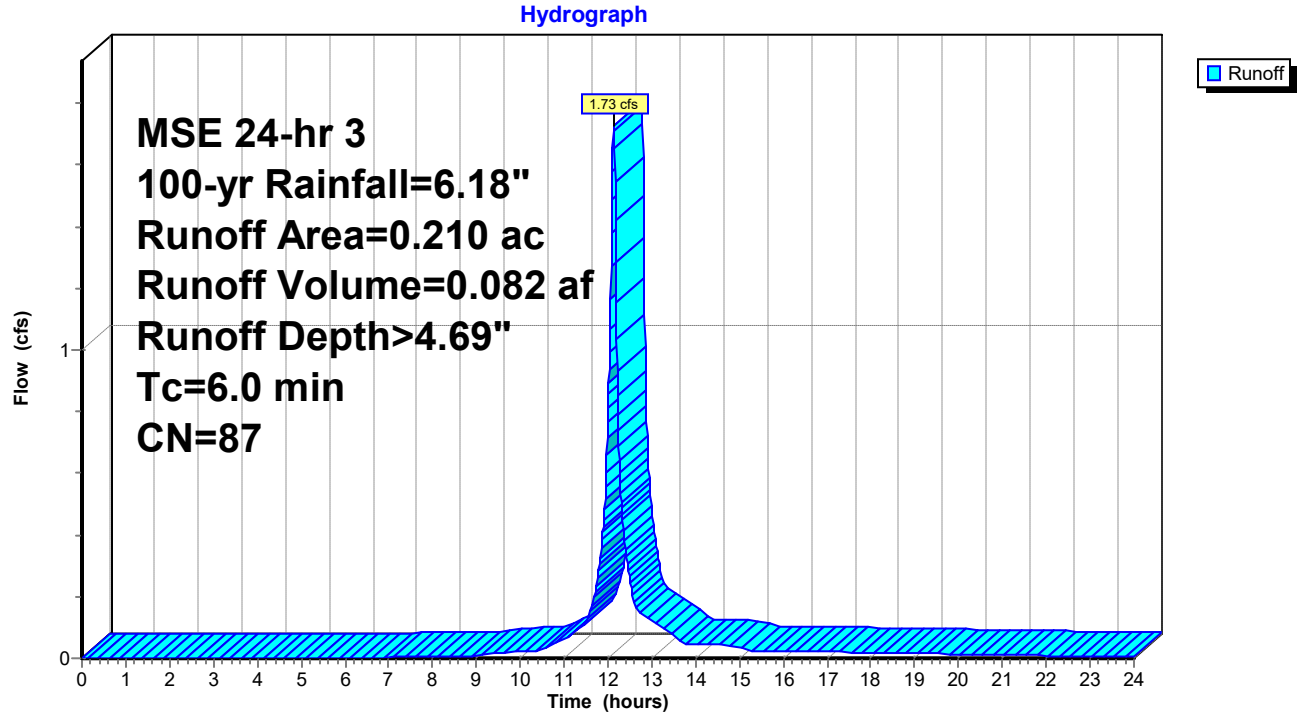
Runoff = 1.73 cfs @ 12.13 hrs, Volume= 0.082 af, Depth> 4.69"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs
MSE 24-hr 3 100-yr Rainfall=6.18"

Area (ac)	CN	Description
0.040	39	>75% Grass cover, Good, HSG A
0.170	98	Paved parking, HSG A
0.000	98	Roofs, HSG A
0.210	87	Weighted Average
0.040		19.05% Pervious Area
0.170		80.95% Impervious Area

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

Subcatchment O-1: O-1



Summary for Subcatchment P-1: P-1

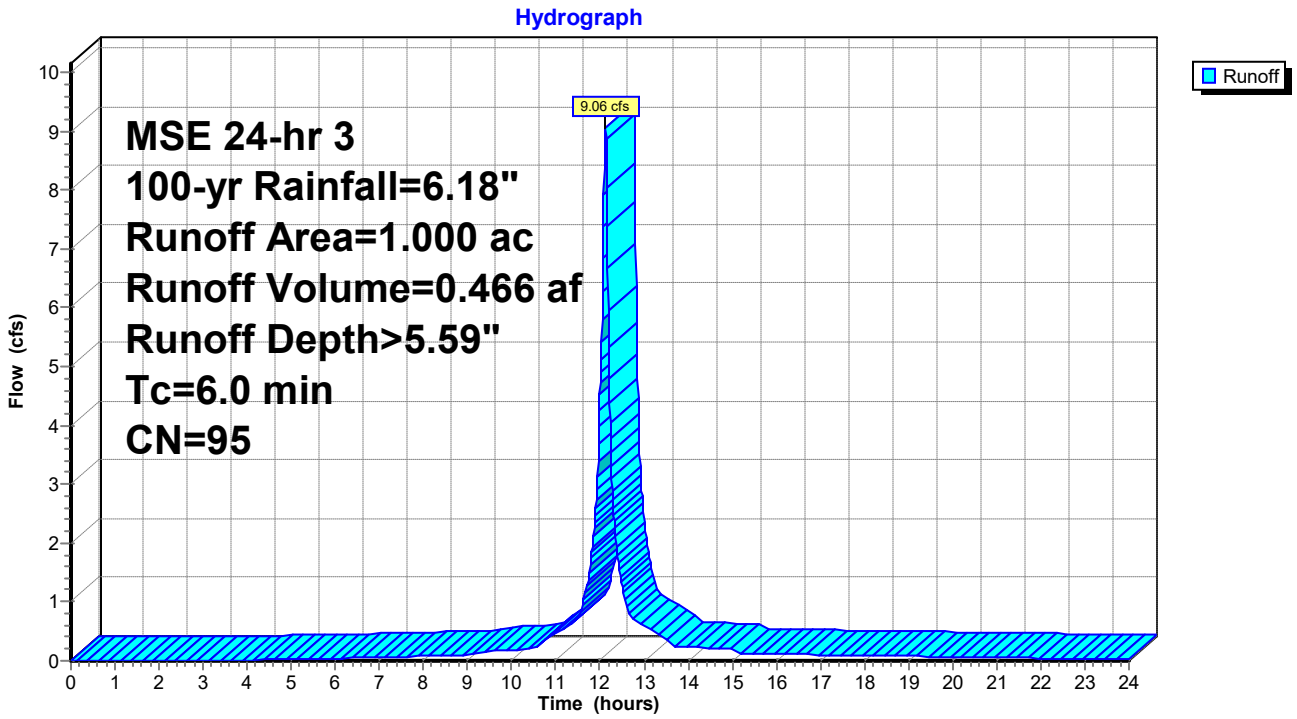
Runoff = 9.06 cfs @ 12.13 hrs, Volume= 0.466 af, Depth> 5.59"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs
MSE 24-hr 3 100-yr Rainfall=6.18"

Area (ac)	CN	Description
0.050	39	>75% Grass cover, Good, HSG A
0.880	98	Paved parking, HSG A
0.070	98	Unconnected pavement, HSG A
1.000	95	Weighted Average
0.050		5.00% Pervious Area
0.950		95.00% Impervious Area
0.070		7.37% Unconnected

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

Subcatchment P-1: P-1



Summary for Subcatchment P-2: P-2

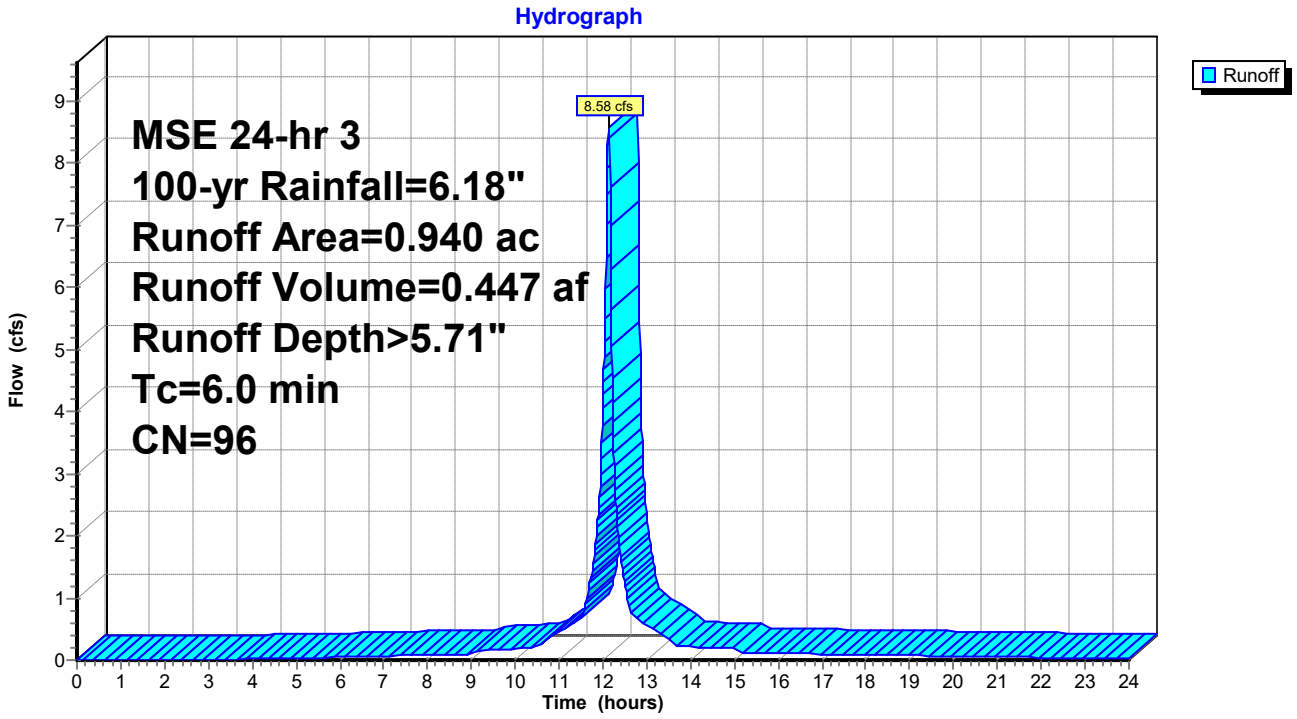
Runoff = 8.58 cfs @ 12.13 hrs, Volume= 0.447 af, Depth> 5.71"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs
MSE 24-hr 3 100-yr Rainfall=6.18"

Area (ac)	CN	Description
0.030	39	>75% Grass cover, Good, HSG A
0.720	98	Paved parking, HSG A
0.180	98	Roofs, HSG A
0.010	98	Unconnected pavement, HSG A
0.940	96	Weighted Average
0.030		3.19% Pervious Area
0.910		96.81% Impervious Area
0.010		1.10% Unconnected

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

Subcatchment P-2: P-2



Summary for Subcatchment P-3: P-3

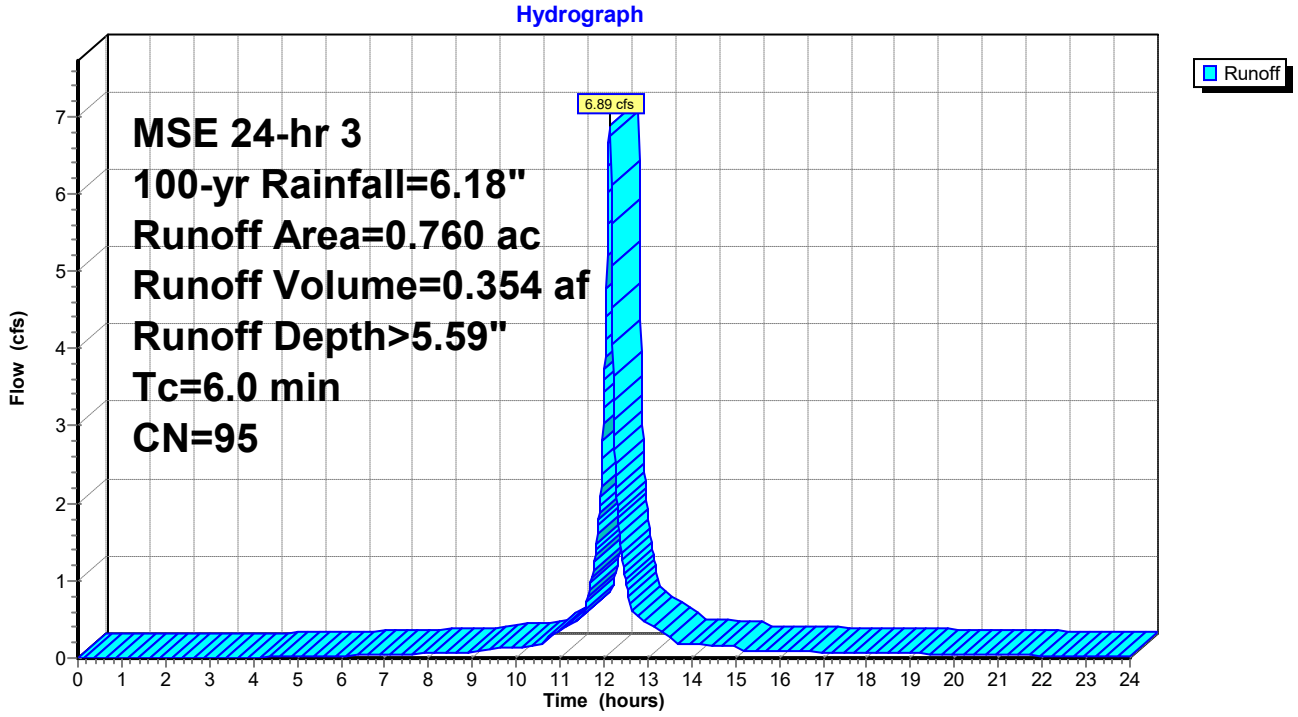
Runoff = 6.89 cfs @ 12.13 hrs, Volume= 0.354 af, Depth> 5.59"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs
MSE 24-hr 3 100-yr Rainfall=6.18"

Area (ac)	CN	Description
0.040	39	>75% Grass cover, Good, HSG A
0.440	98	Paved parking, HSG A
0.250	98	Unconnected roofs, HSG A
0.030	98	Unconnected pavement, HSG A
0.760	95	Weighted Average
0.040		5.26% Pervious Area
0.720		94.74% Impervious Area
0.280		38.89% Unconnected

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

Subcatchment P-3: P-3



Summary for Subcatchment PU-1: PU-1

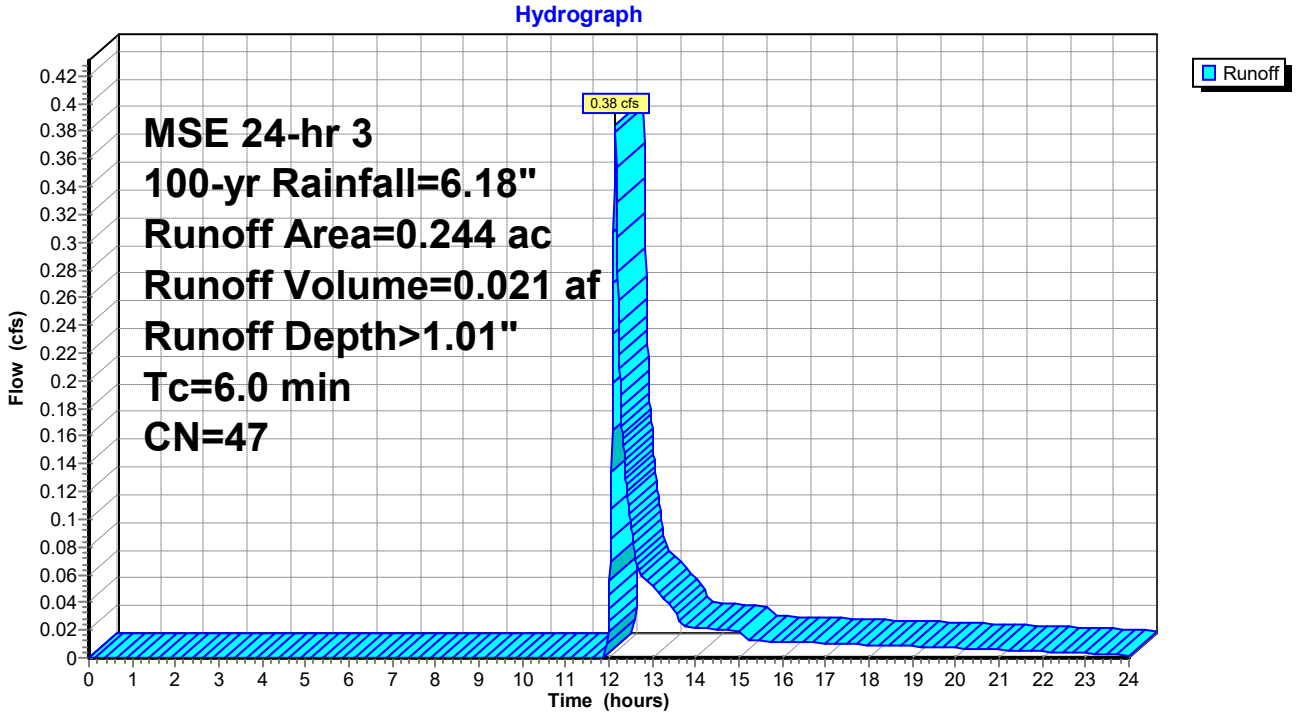
Runoff = 0.38 cfs @ 12.15 hrs, Volume= 0.021 af, Depth> 1.01"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs
MSE 24-hr 3 100-yr Rainfall=6.18"

Area (ac)	CN	Description
0.210	39	>75% Grass cover, Good, HSG A
0.030	98	Paved parking, HSG A
0.004	98	Unconnected roofs, HSG A
0.244	47	Weighted Average
0.210		86.07% Pervious Area
0.034		13.93% Impervious Area
0.004		11.76% Unconnected

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

Subcatchment PU-1: PU-1



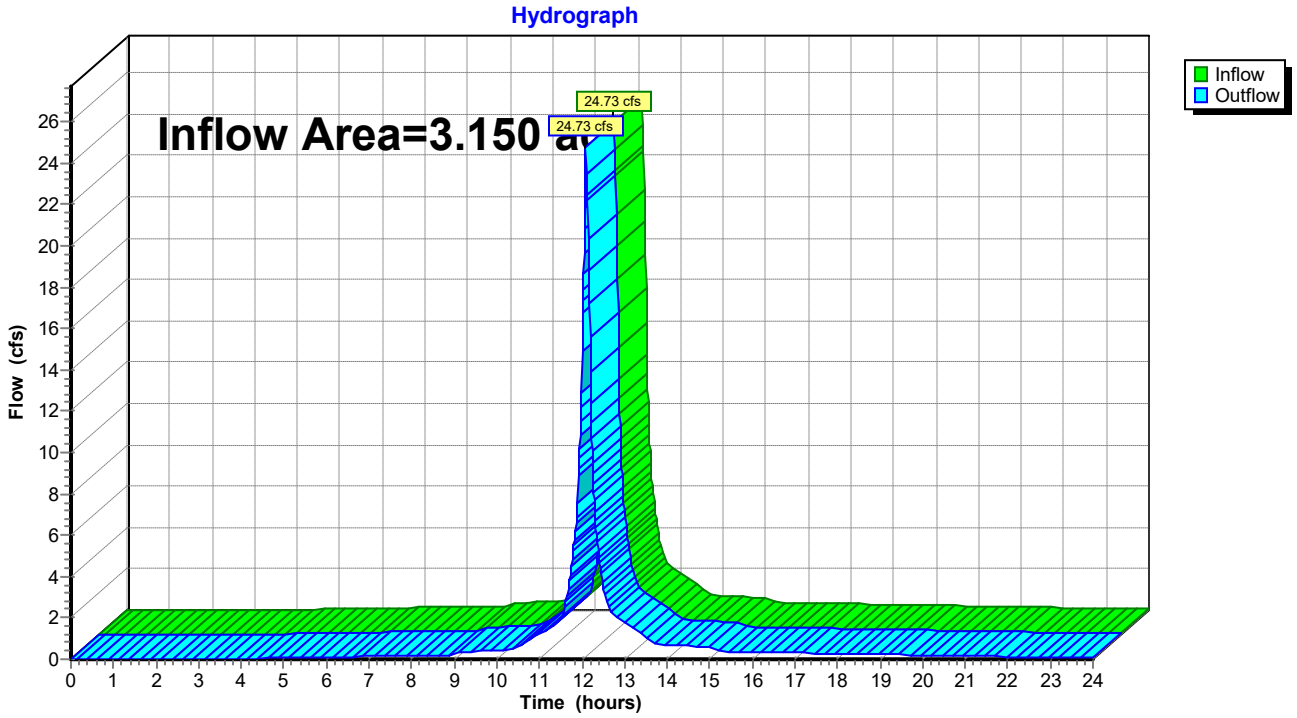
Summary for Reach E-TOTAL: E-TOTAL

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

Inflow Area = 3.150 ac, 86.03% Impervious, Inflow Depth > 5.03" for 100-yr event
Inflow = 24.73 cfs @ 12.09 hrs, Volume= 1.320 af
Outflow = 24.73 cfs @ 12.09 hrs, Volume= 1.320 af, Atten= 0%, Lag= 0.0 min

Routing by Stor-Ind+Trans method, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs

Reach E-TOTAL: E-TOTAL



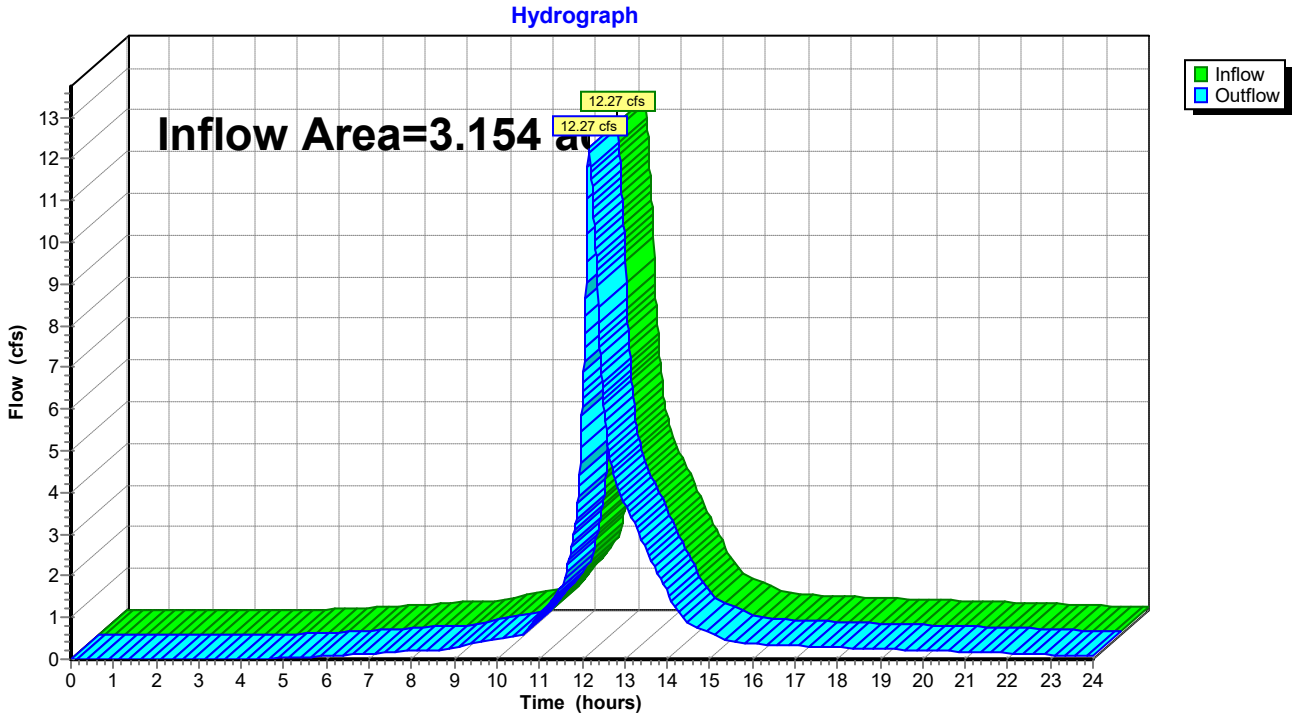
Summary for Reach P-TOTAL: P-TOTAL

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

Inflow Area = 3.154 ac, 88.27% Impervious, Inflow Depth > 5.18" for 100-yr event
Inflow = 12.27 cfs @ 12.17 hrs, Volume= 1.361 af
Outflow = 12.27 cfs @ 12.17 hrs, Volume= 1.361 af, Atten= 0%, Lag= 0.0 min

Routing by Stor-Ind+Trans method, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs

Reach P-TOTAL: P-TOTAL



Summary for Pond 1P: UG Detention-West

Inflow Area = 1.000 ac, 95.00% Impervious, Inflow Depth > 5.59" for 100-yr event
Inflow = 9.06 cfs @ 12.13 hrs, Volume= 0.466 af
Outflow = 2.31 cfs @ 12.33 hrs, Volume= 0.463 af, Atten= 75%, Lag= 12.0 min
Primary = 2.31 cfs @ 12.33 hrs, Volume= 0.463 af

Routing by Stor-Ind method, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs
Peak Elev= 97.37' @ 12.33 hrs Surf.Area= 0.084 ac Storage= 0.156 af

Plug-Flow detention time= 39.3 min calculated for 0.463 af (99% of inflow)
Center-of-Mass det. time= 35.0 min (791.7 - 756.7)

Volume	Invert	Avail.Storage	Storage Description
#1A	94.61'	0.076 af	**49.00'W x 74.82'L x 3.50'H Stone Bed** 0.295 af Overall - 0.105 af Embedded = 0.189 af x 40.0% Voids
#2A	95.11'	0.105 af	**ADS_StormTech SC-740 +Cap** x 100 Inside #1 Effective Size= 44.6"W x 30.0"H => 6.45 sf x 7.12'L = 45.9 cf Overall Size= 51.0"W x 30.0"H x 7.56'L with 0.44' Overlap 100 Chambers in 10 Rows
		0.181 af	Total Available Storage

Storage Group A created with Chamber Wizard

Device	Routing	Invert	Outlet Devices
#1	Primary	94.61'	**8.0" Round Culvert** L= 36.3' CMP, mitered to conform to fill, Ke= 0.700 Inlet / Outlet Invert= 94.61' / 94.35' S= 0.0072 '/' Cc= 0.900 n= 0.012 Corrugated PP, smooth interior, Flow Area= 0.35 sf

Primary OutFlow Max=2.31 cfs @ 12.33 hrs HW=97.37' (Free Discharge)
↑—**1=Culvert** (Inlet Controls 2.31 cfs @ 6.62 fps)

Pond 1P: UG Detention-West - Chamber Wizard Stone Bed

Chamber Model = ADS_StormTech SC-740 +Cap (ADS StormTech® SC-740 with cap length)
Effective Size= 44.6"W x 30.0"H => 6.45 sf x 7.12'L = 45.9 cf
Overall Size= 51.0"W x 30.0"H x 7.56'L with 0.44' Overlap

51.0" Wide + 6.0" Spacing = 57.0" C-C Row Spacing

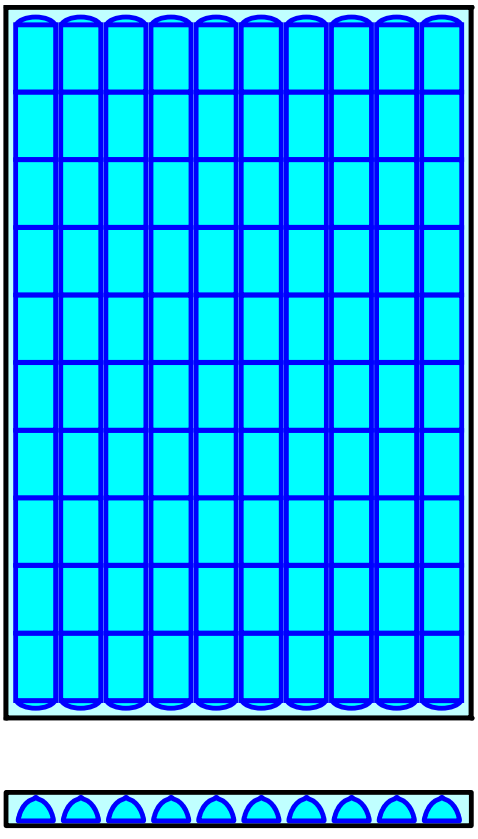
10 Chambers/Row x 7.12' Long +0.81' Cap Length x 2 = 72.82' Row Length +12.0" End Stone x 2 = 74.82' Base Length
10 Rows x 51.0" Wide + 6.0" Spacing x 9 + 12.0" Side Stone x 2 = 49.00' Base Width
6.0" Stone Base + 30.0" Chamber Height + 6.0" Stone Cover = 3.50' Field Height

100 Chambers x 45.9 cf = 4,594.0 cf Chamber Storage

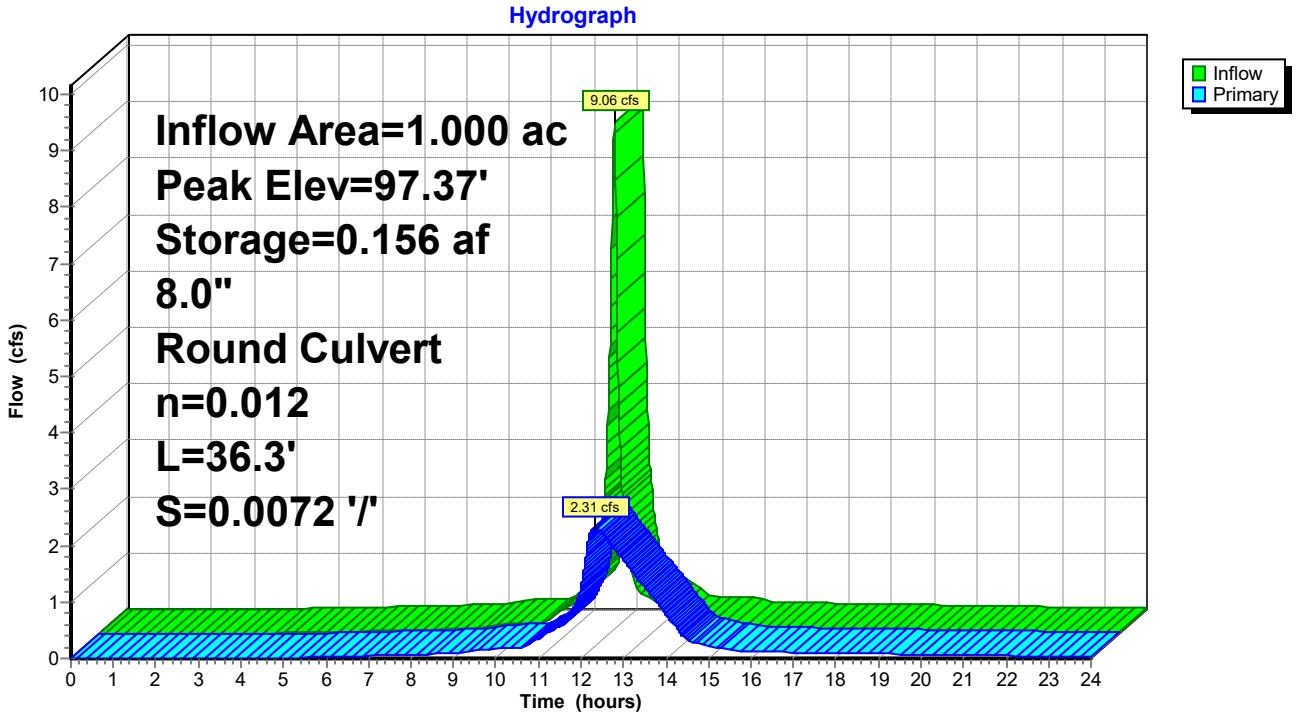
12,831.1 cf Field - 4,594.0 cf Chambers = 8,237.1 cf Stone x 40.0% Voids = 3,294.8 cf Stone Storage

Chamber Storage + Stone Storage = 7,888.8 cf = 0.181 af
Overall Storage Efficiency = 61.5%
Overall System Size = 74.82' x 49.00' x 3.50'

100 Chambers
475.2 cy Field
305.1 cy Stone



Pond 1P: UG Detention-West



Summary for Pond 2P: UG Detention-South

Inflow Area = 0.940 ac, 96.81% Impervious, Inflow Depth > 5.71" for 100-yr event
Inflow = 8.58 cfs @ 12.13 hrs, Volume= 0.447 af
Outflow = 3.57 cfs @ 12.24 hrs, Volume= 0.442 af, Atten= 58%, Lag= 6.7 min
Primary = 3.57 cfs @ 12.24 hrs, Volume= 0.442 af

Routing by Stor-Ind method, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs
Peak Elev= 96.75' @ 12.24 hrs Surf.Area= 0.140 ac Storage= 0.139 af

Plug-Flow detention time= 43.7 min calculated for 0.442 af (99% of inflow)
Center-of-Mass det. time= 36.9 min (789.5 - 752.6)

Volume	Invert	Avail.Storage	Storage Description
#1A	95.10'	0.084 af	**98.17'W x 53.04'L x 2.33'H Stone Bed** 0.279 af Overall - 0.069 af Embedded = 0.210 af x 40.0% Voids
#2A	95.60'	0.069 af	**ADS_StormTech SC-310 +Cap** x 203 Inside #1 Effective Size= 28.9"W x 16.0"H => 2.07 sf x 7.12'L = 14.7 cf Overall Size= 34.0"W x 16.0"H x 7.56'L with 0.44' Overlap 203 Chambers in 29 Rows
#3B	95.10'	0.015 af	**51.50'W x 17.44'L x 2.33'H Stone Bed** 0.048 af Overall - 0.010 af Embedded = 0.038 af x 40.0% Voids
#4B	95.60'	0.010 af	**ADS_StormTech RC-310 +Cap** x 30 Inside #3 Effective Size= 28.9"W x 16.0"H => 2.07 sf x 7.12'L = 14.7 cf Overall Size= 34.0"W x 16.0"H x 7.56'L with 0.44' Overlap 30 Chambers in 15 Rows
		0.178 af	Total Available Storage

Storage Group A created with Chamber Wizard
Storage Group B created with Chamber Wizard

Device	Routing	Invert	Outlet Devices
#1	Primary	95.10'	**12.0" Round Culvert** L= 208.4' CMP, mitered to conform to fill, Ke= 0.700 Inlet / Outlet Invert= 95.10' / 93.01' S= 0.0100 '/' Cc= 0.900 n= 0.012 Corrugated PP, smooth interior, Flow Area= 0.79 sf
#2	Device 1	95.10'	**8.0" Vert. Orifice/Grate** C= 0.600 Limited to weir flow at low heads
#3	Device 1	96.30'	**6.0' long x 0.5' breadth Broad-Crested Rectangular Weir** Head (feet) 0.20 0.40 0.60 0.80 1.00 Coef. (English) 2.80 2.92 3.08 3.30 3.32

Primary OutFlow Max=3.57 cfs @ 12.24 hrs HW=96.75' (Free Discharge)
└**1=Culvert** (Inlet Controls 3.57 cfs @ 4.55 fps)
└**2=Orifice/Grate** (Passes < 1.93 cfs potential flow)
└**3=Broad-Crested Rectangular Weir** (Passes < 5.29 cfs potential flow)

Pond 2P: UG Detention-South - Chamber Wizard Stone Bed

Chamber Model = ADS_StormTech SC-310 +Cap (ADS StormTech® SC-310 with cap length)
Effective Size= 28.9"W x 16.0"H => 2.07 sf x 7.12'L = 14.7 cf
Overall Size= 34.0"W x 16.0"H x 7.56'L with 0.44' Overlap

34.0" Wide + 6.0" Spacing = 40.0" C-C Row Spacing

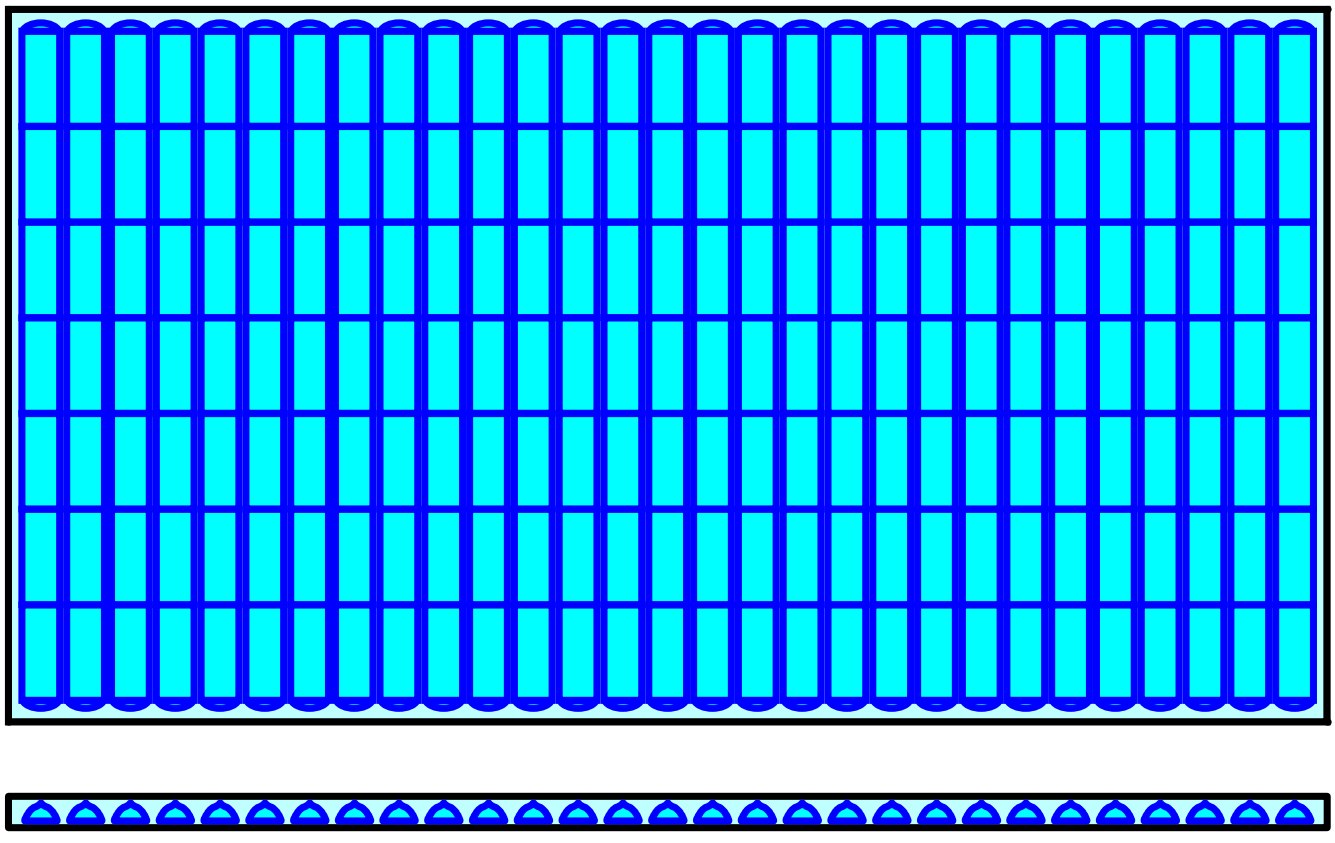
7 Chambers/Row x 7.12' Long +0.60' Cap Length x 2 = 51.04' Row Length +12.0" End Stone x 2 = 53.04' Base Length
29 Rows x 34.0" Wide + 6.0" Spacing x 28 + 12.0" Side Stone x 2 = 98.17' Base Width
6.0" Stone Base + 16.0" Chamber Height + 6.0" Stone Cover = 2.33' Field Height

203 Chambers x 14.7 cf = 2,992.6 cf Chamber Storage

12,149.1 cf Field - 2,992.6 cf Chambers = 9,156.5 cf Stone x 40.0% Voids = 3,662.6 cf Stone Storage

Chamber Storage + Stone Storage = 6,655.2 cf = 0.153 af
Overall Storage Efficiency = 54.8%
Overall System Size = 53.04' x 98.17' x 2.33'

203 Chambers
450.0 cy Field
339.1 cy Stone



Pond 2P: UG Detention-South - Chamber Wizard Stone Bed

Chamber Model = ADS_StormTech RC-310 +Cap (ADS StormTech® RC-310 with cap length)
Effective Size= 28.9"W x 16.0"H => 2.07 sf x 7.12'L = 14.7 cf
Overall Size= 34.0"W x 16.0"H x 7.56'L with 0.44' Overlap

34.0" Wide + 6.0" Spacing = 40.0" C-C Row Spacing

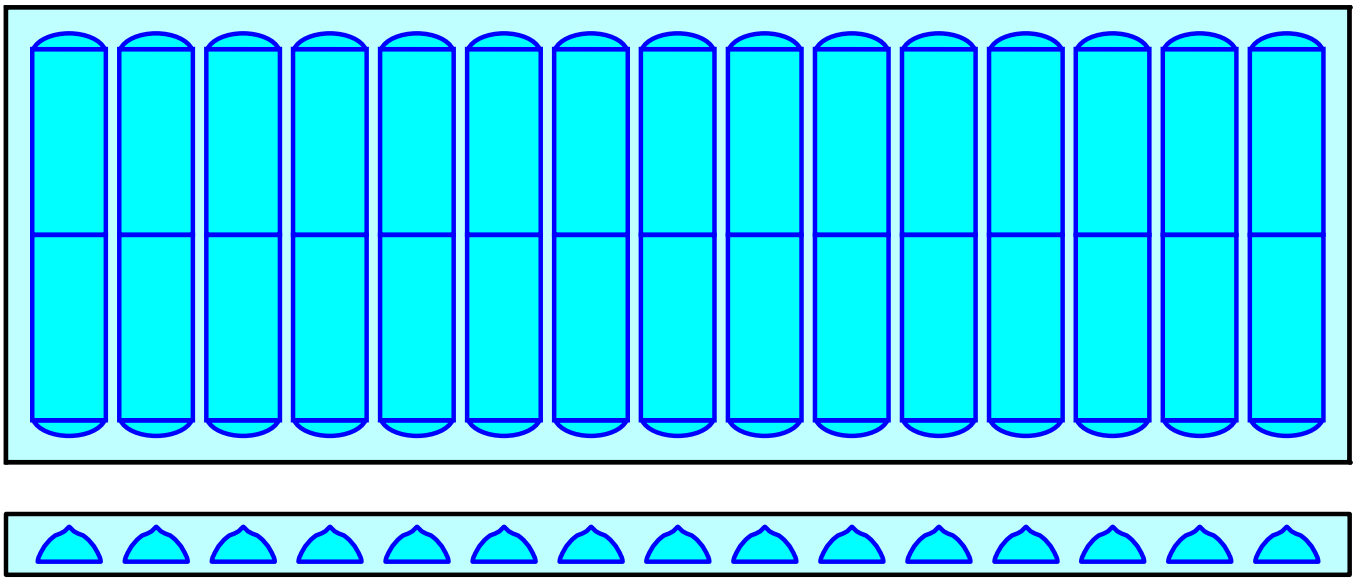
2 Chambers/Row x 7.12' Long +0.60' Cap Length x 2 = 15.44' Row Length +12.0" End Stone x 2 = 17.44' Base Length
15 Rows x 34.0" Wide + 6.0" Spacing x 14 + 12.0" Side Stone x 2 = 51.50' Base Width
6.0" Stone Base + 16.0" Chamber Height + 6.0" Stone Cover = 2.33' Field Height

30 Chambers x 14.7 cf = 442.3 cf Chamber Storage

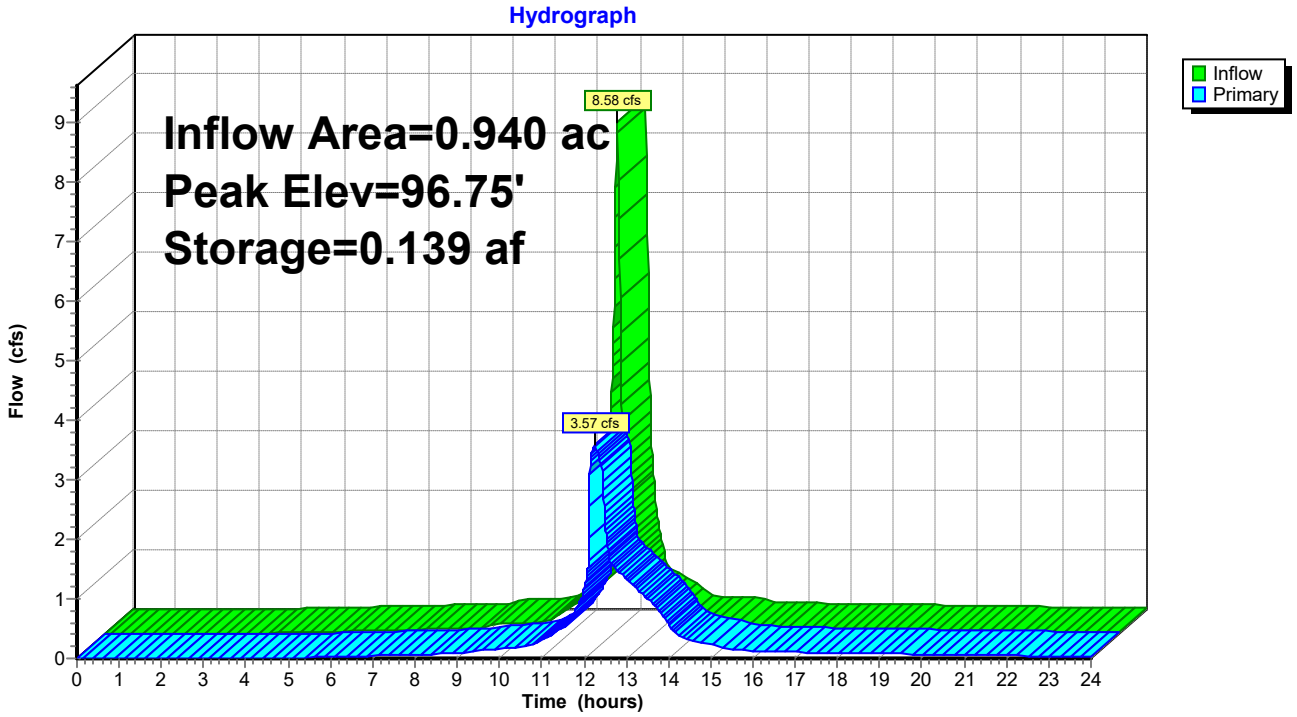
2,095.7 cf Field - 442.3 cf Chambers = 1,653.4 cf Stone x 40.0% Voids = 661.4 cf Stone Storage

Chamber Storage + Stone Storage = 1,103.6 cf = 0.025 af
Overall Storage Efficiency = 52.7%
Overall System Size = 17.44' x 51.50' x 2.33'

30 Chambers
77.6 cy Field
61.2 cy Stone



Pond 2P: UG Detention-South



Summary for Pond 3P: UG Detention-North

Inflow Area = 0.760 ac, 94.74% Impervious, Inflow Depth > 5.59" for 100-yr event
Inflow = 6.89 cfs @ 12.13 hrs, Volume= 0.354 af
Outflow = 5.05 cfs @ 12.18 hrs, Volume= 0.353 af, Atten= 27%, Lag= 3.1 min
Primary = 5.05 cfs @ 12.18 hrs, Volume= 0.353 af

Routing by Stor-Ind method, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs
Peak Elev= 96.29' @ 12.18 hrs Surf.Area= 0.022 ac Storage= 0.039 af

Plug-Flow detention time= 7.3 min calculated for 0.353 af (100% of inflow)
Center-of-Mass det. time= 6.2 min (762.9 - 756.7)

Volume	Invert	Avail.Storage	Storage Description
#1A	93.50'	0.020 af	**20.50'W x 46.34'L x 3.50'H Stone Bed** 0.076 af Overall - 0.025 af Embedded = 0.051 af x 40.0% Voids
#2A	94.00'	0.025 af	**ADS_StormTech SC-740 +Cap** x 24 Inside #1 Effective Size= 44.6"W x 30.0"H => 6.45 sf x 7.12'L = 45.9 cf Overall Size= 51.0"W x 30.0"H x 7.56'L with 0.44' Overlap 24 Chambers in 4 Rows
		0.046 af	Total Available Storage

Storage Group A created with Chamber Wizard

Device	Routing	Invert	Outlet Devices
#1	Primary	93.50'	**12.0" Round Culvert** L= 35.8' CMP, mitered to conform to fill, Ke= 0.700 Inlet / Outlet Invert= 93.50' / 92.43' S= 0.0299 '/' Cc= 0.900 n= 0.012 Concrete pipe, finished, Flow Area= 0.79 sf
#2	Device 1	93.50'	**8.0" Vert. Orifice/Grate** C= 0.600 Limited to weir flow at low heads
#3	Device 1	94.50'	**6.0' long x 5.0' breadth Broad-Crested Rectangular Weir** Head (feet) 0.20 0.40 0.60 0.80 1.00 1.20 1.40 1.60 1.80 2.00 2.50 3.00 3.50 4.00 4.50 5.00 5.50 Coef. (English) 2.34 2.50 2.70 2.68 2.68 2.66 2.65 2.65 2.65 2.65 2.67 2.66 2.68 2.70 2.74 2.79 2.88

Primary OutFlow Max=5.05 cfs @ 12.18 hrs HW=96.29' (Free Discharge)
└**1=Culvert** (Inlet Controls 5.05 cfs @ 6.43 fps)
└**2=Orifice/Grate** (Passes < 2.64 cfs potential flow)
└**3=Broad-Crested Rectangular Weir** (Passes < 38.15 cfs potential flow)

Pond 3P: UG Detention-North - Chamber Wizard Stone Bed

Chamber Model = ADS_StormTech SC-740 +Cap (ADS StormTech® SC-740 with cap length)
Effective Size= 44.6"W x 30.0"H => 6.45 sf x 7.12'L = 45.9 cf
Overall Size= 51.0"W x 30.0"H x 7.56'L with 0.44' Overlap

51.0" Wide + 6.0" Spacing = 57.0" C-C Row Spacing

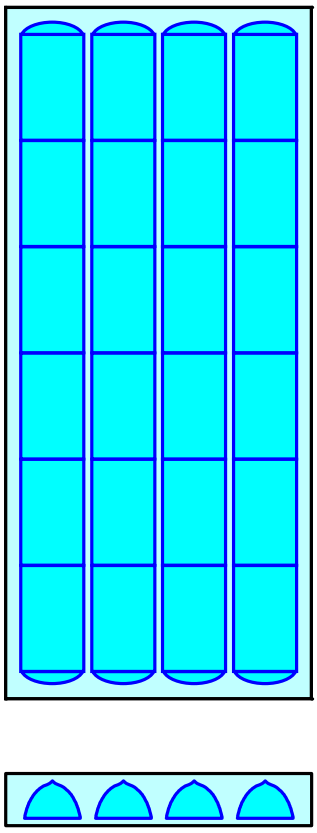
6 Chambers/Row x 7.12' Long +0.81' Cap Length x 2 = 44.34' Row Length +12.0" End Stone x 2 = 46.34' Base Length
4 Rows x 51.0" Wide + 6.0" Spacing x 3 + 12.0" Side Stone x 2 = 20.50' Base Width
6.0" Stone Base + 30.0" Chamber Height + 6.0" Stone Cover = 3.50' Field Height

24 Chambers x 45.9 cf = 1,102.6 cf Chamber Storage

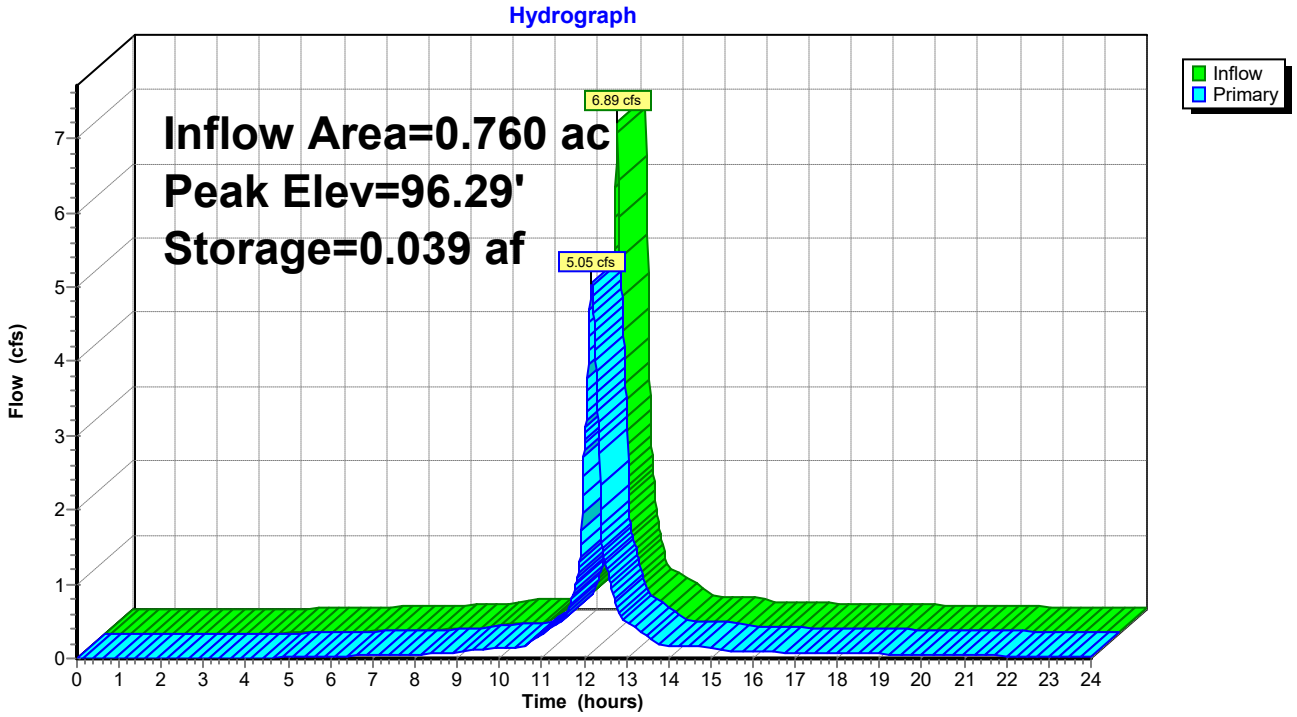
3,324.7 cf Field - 1,102.6 cf Chambers = 2,222.1 cf Stone x 40.0% Voids = 888.8 cf Stone Storage

Chamber Storage + Stone Storage = 1,991.4 cf = 0.046 af
Overall Storage Efficiency = 59.9%
Overall System Size = 46.34' x 20.50' x 3.50'

24 Chambers
123.1 cy Field
82.3 cy Stone



Pond 3P: UG Detention-North



Events for Subcatchment 0-1: o-1

Event	Rainfall (inches)	Runoff (cfs)	Volume (acre-feet)	Depth (inches)
1-yr	2.40	0.48	0.021	1.23
2-yr	2.70	0.58	0.026	1.48
10-yr	3.81	0.94	0.043	2.46
100-yr	**6.18**	**1.73**	**0.082**	**4.69**

Events for Subcatchment E-1: E-1

Event	Rainfall (inches)	Runoff (cfs)	Volume (acre-feet)	Depth (inches)
1-yr	2.40	1.91	0.090	1.77
2-yr	2.70	2.20	0.105	2.06
10-yr	3.81	3.26	0.159	3.14
100-yr	**6.18**	**5.48**	**0.278**	**5.47**

Events for Subcatchment E-2: E-2

Event	Rainfall (inches)	Runoff (cfs)	Volume (acre-feet)	Depth (inches)
1-yr	2.40	4.93	0.240	1.96
2-yr	2.70	5.61	0.276	2.26
10-yr	3.81	8.12	0.410	3.35
100-yr	**6.18**	**13.42**	**0.699**	**5.71**

Events for Subcatchment E-3: E-3

Event	Rainfall (inches)	Runoff (cfs)	Volume (acre-feet)	Depth (inches)
1-yr	2.40	1.41	0.049	0.68
2-yr	2.70	1.81	0.062	0.87
10-yr	3.81	3.38	0.119	1.66
100-yr	**6.18**	**6.75**	**0.261**	**3.64**

Events for Subcatchment O-1: O-1

Event	Rainfall (inches)	Runoff (cfs)	Volume (acre-feet)	Depth (inches)
1-yr	2.40	0.48	0.021	1.23
2-yr	2.70	0.58	0.026	1.48
10-yr	3.81	0.94	0.043	2.46
100-yr	**6.18**	**1.73**	**0.082**	**4.69**

Events for Subcatchment P-1: P-1

Event	Rainfall (inches)	Runoff (cfs)	Volume (acre-feet)	Depth (inches)
1-yr	2.40	3.25	0.156	1.87
2-yr	2.70	3.72	0.180	2.16
10-yr	3.81	5.44	0.270	3.24
100-yr	**6.18**	**9.06**	**0.466**	**5.59**

Events for Subcatchment P-2: P-2

Event	Rainfall (inches)	Runoff (cfs)	Volume (acre-feet)	Depth (inches)
1-yr	2.40	3.15	0.154	1.96
2-yr	2.70	3.59	0.177	2.26
10-yr	3.81	5.19	0.262	3.35
100-yr	**6.18**	**8.58**	**0.447**	**5.71**

Events for Subcatchment P-3: P-3

Event	Rainfall (inches)	Runoff (cfs)	Volume (acre-feet)	Depth (inches)
1-yr	2.40	2.47	0.118	1.87
2-yr	2.70	2.82	0.137	2.16
10-yr	3.81	4.13	0.205	3.24
100-yr	**6.18**	**6.89**	**0.354**	**5.59**

Events for Subcatchment PU-1: PU-1

Event	Rainfall (inches)	Runoff (cfs)	Volume (acre-feet)	Depth (inches)
1-yr	2.40	0.00	0.000	0.00
2-yr	2.70	0.00	0.000	0.02
10-yr	3.81	0.02	0.004	0.19
100-yr	**6.18**	**0.38**	**0.021**	**1.01**

Events for Reach E-TOTAL: E-TOTAL

Event	Inflow (cfs)	Outflow (cfs)	Elevation (feet)	Storage (cubic-feet)
1-yr	7.74	7.74	**0.00**	**0**
2-yr	9.01	9.01	0.00	0
10-yr	13.95	13.95	0.00	0
100-yr	**24.73**	**24.73**	0.00	0

Events for Reach P-TOTAL: P-TOTAL

Event	Inflow (cfs)	Outflow (cfs)	Elevation (feet)	Storage (cubic-feet)
1-yr	4.50	4.50	**0.00**	**0**
2-yr	5.24	5.24	0.00	0
10-yr	6.99	6.99	0.00	0
100-yr	**12.27**	**12.27**	0.00	0

Events for Pond 1P: UG Detention-West

Event	Inflow (cfs)	Primary (cfs)	Elevation (feet)	Storage (acre-feet)
1-yr	3.25	1.12	95.55	0.048
2-yr	3.72	1.23	95.67	0.056
10-yr	5.44	1.61	96.13	0.086
100-yr	**9.06**	**2.31**	**97.37**	**0.156**

Events for Pond 2P: UG Detention-South

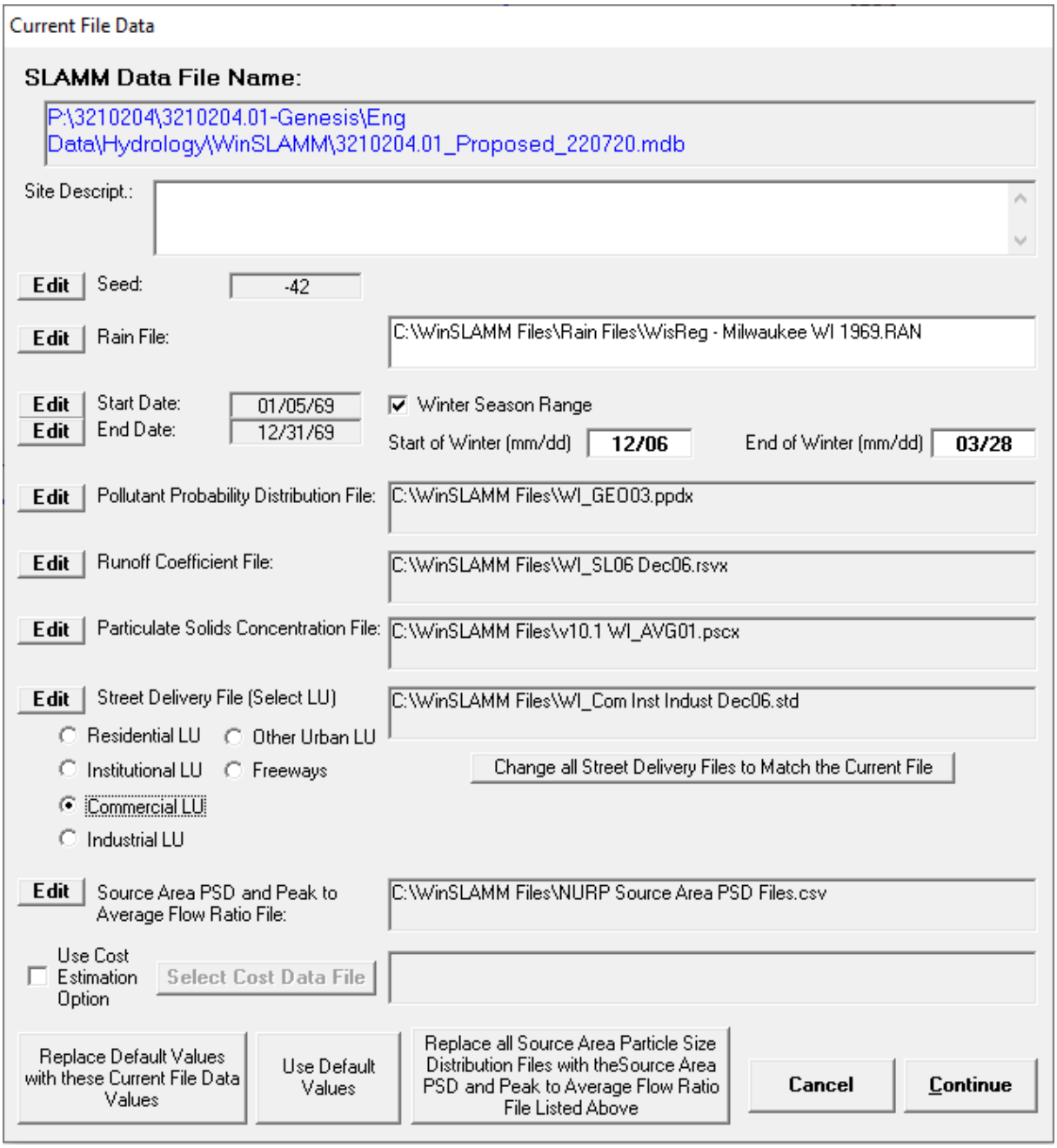
Event	Inflow (cfs)	Primary (cfs)	Elevation (feet)	Storage (acre-feet)
1-yr	3.15	1.05	95.83	0.053
2-yr	3.59	1.15	95.90	0.061
10-yr	5.19	1.46	96.19	0.091
100-yr	**8.58**	**3.57**	**96.75**	**0.139**

Events for Pond 3P: UG Detention-North

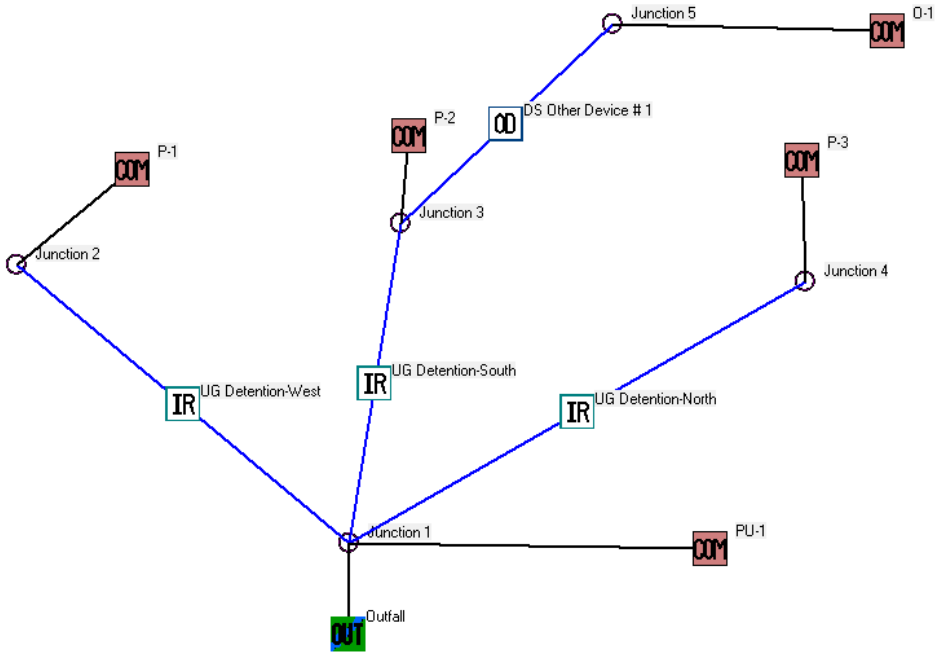
Event	Inflow (cfs)	Primary (cfs)	Elevation (feet)	Storage (acre-feet)
1-yr	2.47	2.03	94.61	0.015
2-yr	2.82	2.55	94.67	0.016
10-yr	4.13	3.37	95.02	0.022
100-yr	**6.89**	**5.05**	**96.29**	**0.039**

APPENDIX D
SLAMM Water Quality Analysis

SLAMM FILE DATA



PROPOSED SLAMM NETWORK



P-1 LAND USE INPUT

Land Use:
P-1

Source Area #	Source Area	Area (acres)	Source Area Parameters	First Control Practice	Second Control Practice
	Roofs	0.000			
	Parking	0.880			
13	Paved Parking 1	0.880	Entered	--	--
	Driveways/Sidewalks	0.070			
31	Sidewalks 1	0.070	Entered	--	--
	Streets	0.000			
	Landscaped Areas	0.050			
51	Small Landscaped Areas 1	0.050	Entered	--	--
	Other Areas	0.000			

P-2 LAND USE INPUT

Land Use:
P-2

Source Area #	Source Area	Area (acres)	Source Area Parameters	First Control Practice	Second Control Practice
	Roofs	0.180			
1	Roofs 1	0.180	Entered	--	--
	Parking	0.720			
13	Paved Parking 1	0.720	Entered	--	--
	Driveways/Sidewalks	0.010			
31	Sidewalks 1	0.010	Entered	--	--
	Streets	0.000			
	Landscaped Areas	0.030			
51	Small Landscaped Areas 1	0.030	Entered	--	--
	Other Areas	0.000			

P-3 LAND USE INPUT

Land Use:
P-3

Source Area #	Source Area	Area (acres)	Source Area Parameters	First Control Practice	Second Control Practice
	Roofs	0.250			
1	Roofs 1	0.250	Entered	--	--
	Parking	0.440			
13	Paved Parking 1	0.440	Entered	--	--
	Driveways/Sidewalks	0.030			
31	Sidewalks 1	0.030	Entered	--	--
	Streets	0.000			
	Landscaped Areas	0.040			
51	Small Landscaped Areas 1	0.040	Entered	--	--
	Other Areas	0.000			

PU-1 LAND USE INPUT

Land Use:
PU-1

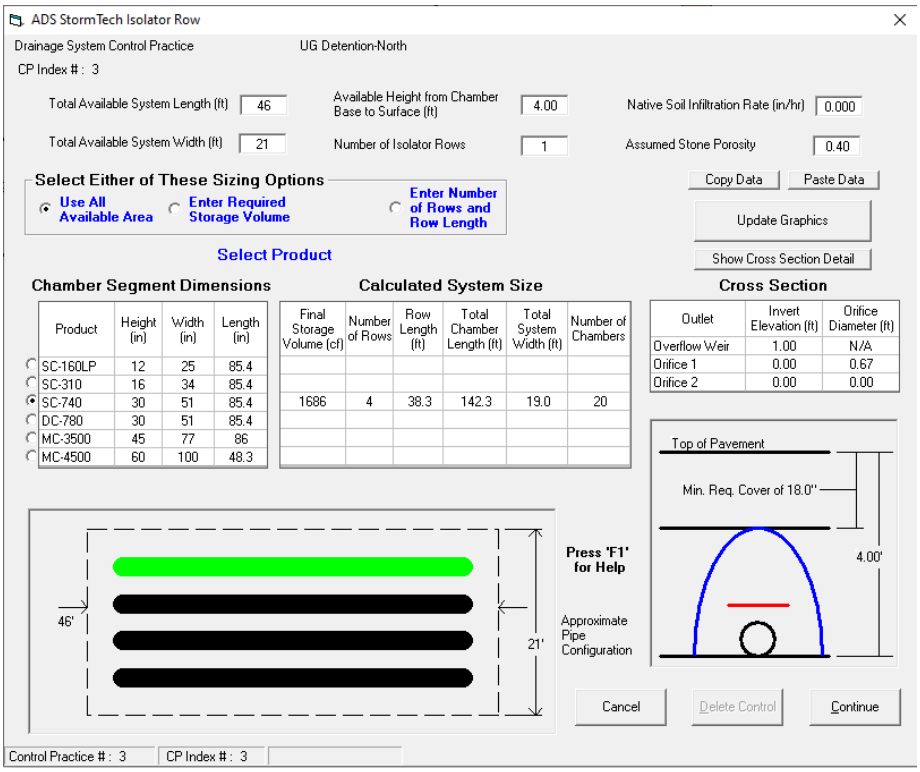
Source Area #	Source Area	Area (acres)	Source Area Parameters	First Control Practice	Second Control Practice
	Roofs	0.000			
	Parking	0.030			
13	Paved Parking 1	0.030	Entered	--	--
	Driveways/Sidewalks	0.004			
31	Sidewalks 1	0.004	Entered	--	--
	Streets	0.000			
	Landscaped Areas	0.210			
51	Small Landscaped Areas 1	0.210	Entered	--	--
	Other Areas	0.000			

O-1 LAND USE INPUT

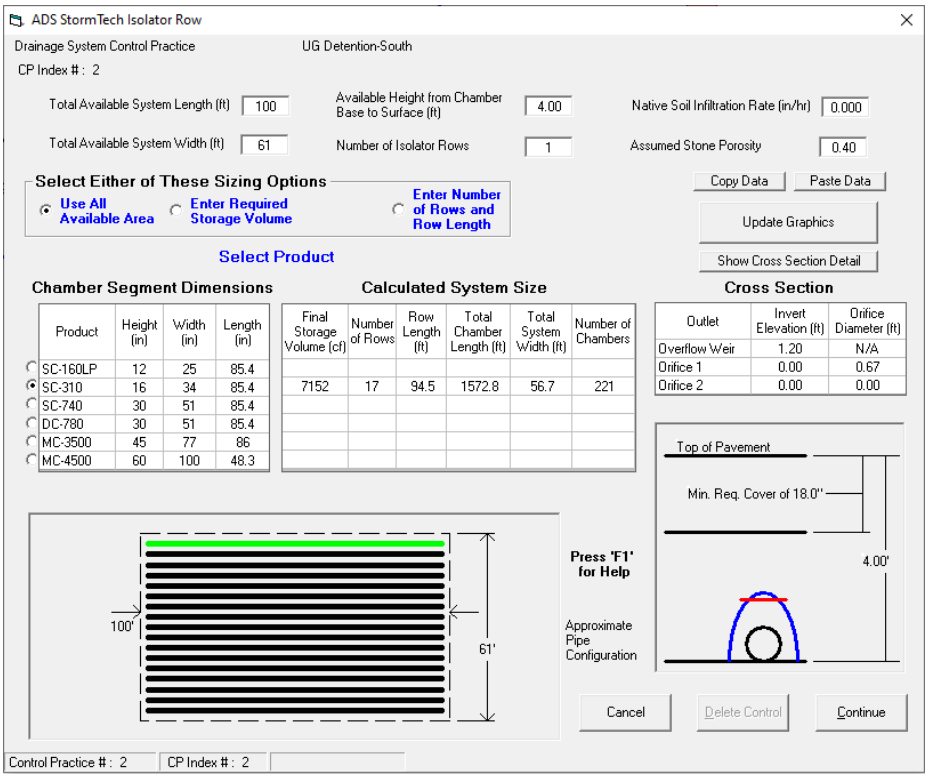
Land Use:
O-1

Source Area #	Source Area	Area (acres)	Source Area Parameters	First Control Practice	Second Control Practice
	Roofs	0.000			
	Parking	0.170			
13	Paved Parking 1	0.170	Entered	--	--
	Driveways/Sidewalks	0.000			
	Streets	0.000			
	Landscaped Areas	0.040			
51	Small Landscaped Areas 1	0.040	Entered	--	--
	Other Areas	0.000			

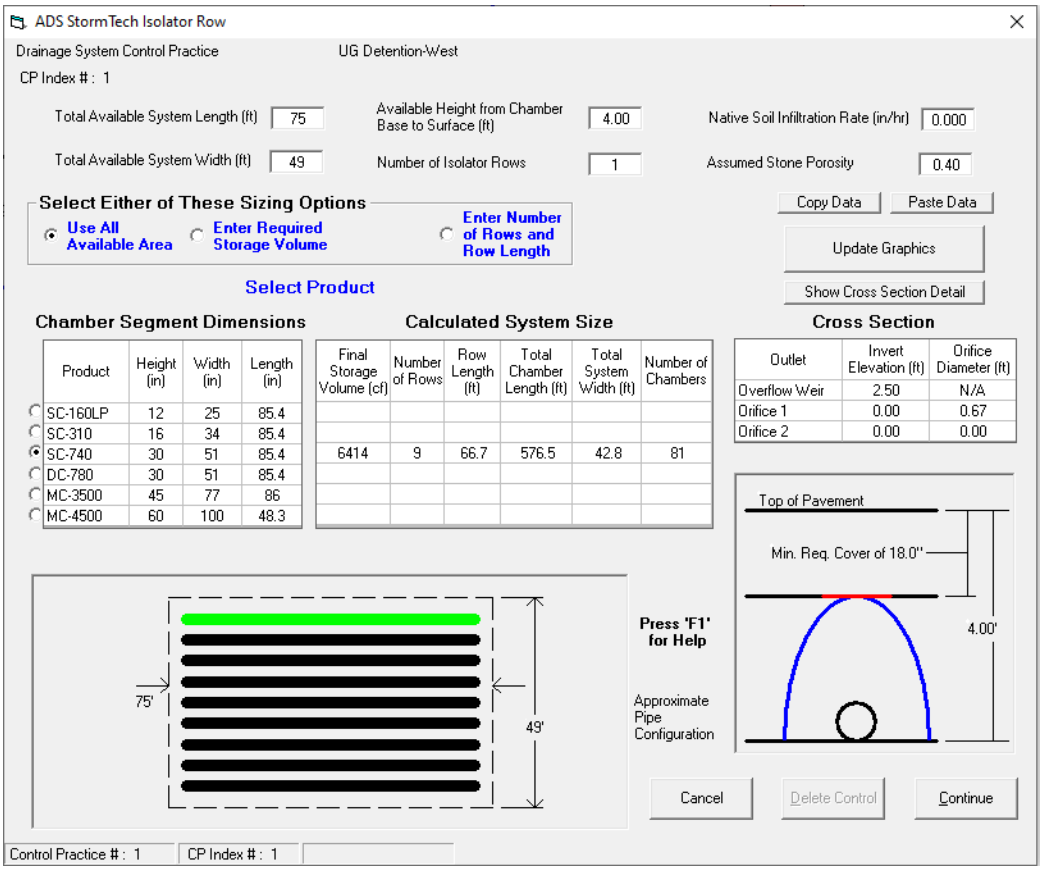
UG DETENTION - NORTH – CONTROL DEVICE INPUT



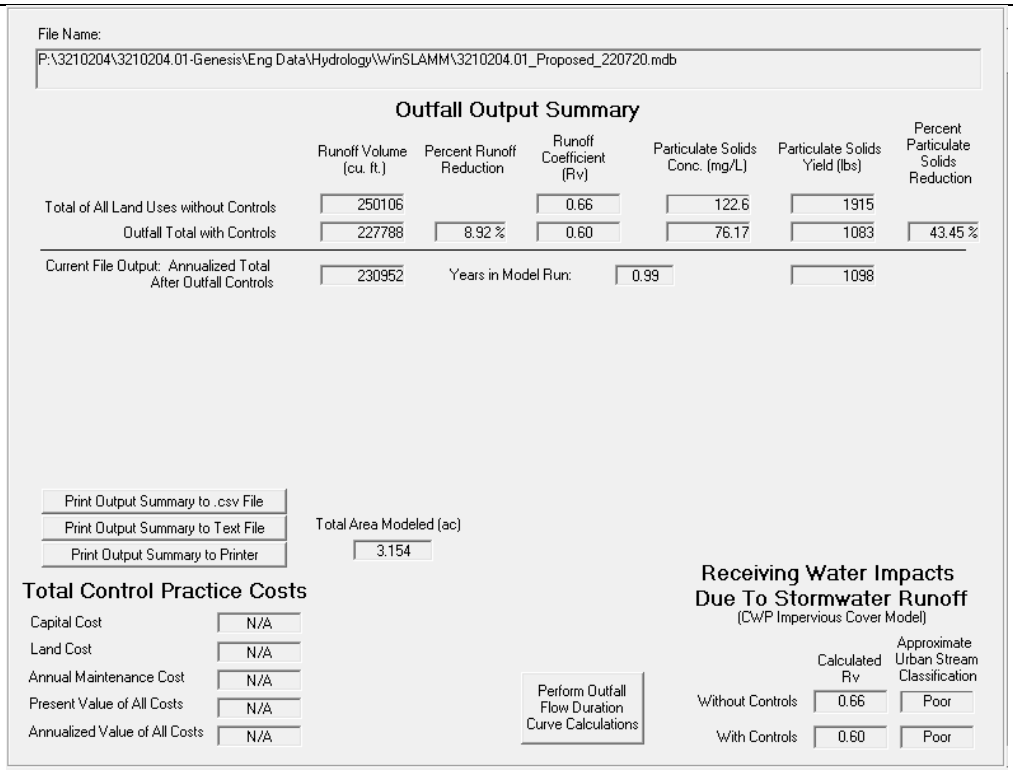
UG DETENTION - SOUTH – CONTROL DEVICE INPUT



UG DETENTION - WEST – CONTROL DEVICE INPUT

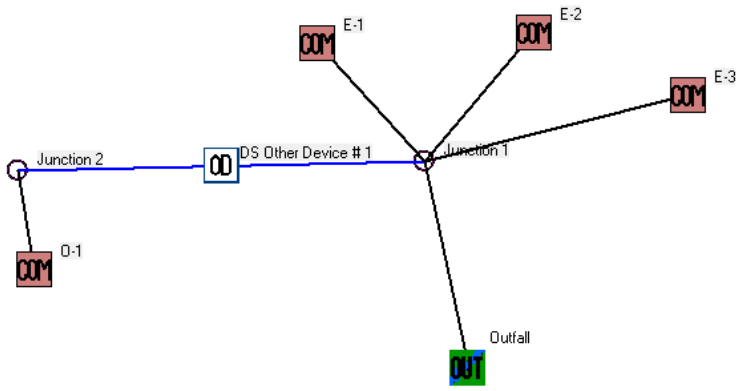


SLAMM TSS RESULTS



APPENDIX E
SLAMM Infiltration Analysis

EXISTING SLAMM NETWORK



E-1 LAND USE INPUT

Land Use:

E-1

Source Area #	Source Area	Area (acres)	Source Area Parameters	First Control Practice	Second Control Practice
	Roofs	0.100			
1	Roofs 1	0.100	Entered	--	--
	Parking	0.470			
13	Paved Parking 1	0.470	Entered	--	--
	Driveways/Sidewalks	0.000			
	Streets	0.000			
	Landscaped Areas	0.040			
51	Small Landscaped Areas 1	0.040	Entered	--	--
	Other Areas	0.000			

E-2 LAND USE INPUT

Land Use:

E-2

Source Area #	Source Area	Area (acres)	Source Area Parameters	First Control Practice	Second Control Practice
	Roofs	0.000			
	Parking	1.420			
13	Paved Parking 1	1.420	Entered	--	--
	Driveways/Sidewalks	0.000			
	Streets	0.000			
	Landscaped Areas	0.060			
51	Small Landscaped Areas 1	0.060	Entered	--	--
	Other Areas	0.000			

E-3 LAND USE INPUT

Land Use:
E-3

Source Area #	Source Area	Area (acres)	Source Area Parameters	First Control Practice	Second Control Practice
	Roofs	0.000			
	Parking	0.560			
13	Paved Parking 1	0.560	Entered	--	--
	Driveways/Sidewalks	0.000			
	Streets	0.000			
	Landscaped Areas	0.300			
51	Small Landscaped Areas 1	0.300	Entered	--	--
	Other Areas	0.000			

O-1 LAND USE INPUT

Land Use:
O-1

Source Area #	Source Area	Area (acres)	Source Area Parameters	First Control Practice	Second Control Practice
	Roofs	0.000			
	Parking	0.040			
13	Paved Parking 1	0.040	Entered	--	--
	Driveways/Sidewalks	0.000			
	Streets	0.000			
	Landscaped Areas	0.170			
51	Small Landscaped Areas 1	0.170	Entered	--	--
	Other Areas	0.000			

PRE-DEVELOPED STAY-ON DEPTH

Land Uses | Junctions

Runoff Volume (cf) | Part. Solids Yield (lbs)

Data File: P:\3210204\3210204.01-Genesis\Eng Data\Hydrology\WinSLAMM\3210204.01_Existing_220708.mdb
Rain File: WisReg - Milwaukee WI 1969.RAN
Date: 07-21-22 Time: 11:18:02 AM
Site Description:

Runoff Volume Total (cf) at the Outfall

Rain Number	Start Date	Rain Total (in)	Outfall Total (cf)	Rv	Total Losses (in.)	Calculated CN*	Event Peak Flow (cfs)
80	09/05/69	0.74	6142	0.724	0.20	97.9	2.701
81	09/14/69	0.01	9.875	0.086	0.01	99.8	0.009
82	09/15/69	0.03	88.87	0.258	0.02	99.6	0.078
83	09/16/69	0.03	88.87	0.258	0.02	99.6	0.039
84	09/23/69	0.16	969.0	0.528	0.08	99.1	0.170
85	09/25/69	0.01	9.875	0.086	0.01	99.8	0.009
86	09/29/69	0.84	7165	0.744	0.22	97.9	1.260
87	10/06/69	0.01	9.875	0.086	0.01	99.8	0.009
88	10/06/69	0.01	9.875	0.086	0.01	99.8	0.009
89	10/09/69	0.05	208.6	0.364	0.03	99.5	0.061
90	10/10/69	0.14	817.8	0.509	0.07	99.1	0.180
91	10/10/69	1.34	12704	0.826	0.23	97.8	0.798
92	10/12/69	1.63	15964	0.854	0.24	97.8	0.562
93	10/15/69	0.16	969.0	0.528	0.08	99.1	0.085
94	10/19/69	0.44	3309	0.656	0.15	98.4	0.265
95	10/19/69	0.35	2513	0.626	0.13	98.5	0.316
96	10/21/69	0.02	39.50	0.172	0.02	99.6	0.035
97	10/24/69	0.01	9.875	0.086	0.01	99.8	0.009
98	10/30/69	0.32	2252	0.614	0.12	98.6	0.124
99	11/02/69	0.77	6444	0.730	0.21	97.9	0.162
100	11/11/69	0.05	208.6	0.364	0.03	99.5	0.046
101	11/11/69	0.04	156.2	0.340	0.03	99.6	0.069
102	11/13/69	0.03	88.87	0.258	0.02	99.6	0.026
103	11/17/69	0.15	892.4	0.519	0.07	99.1	0.262
104	11/18/69	0.02	39.50	0.172	0.02	99.6	0.006
105	11/19/69	0.01	9.875	0.086	0.01	99.8	0.009
106	11/26/69	0.07	329.6	0.410	0.04	99.4	0.097
107	12/07/69	-	-	-	-	-	-
108	12/11/69	-	-	-	-	-	-
109	12/16/69	-	-	-	-	-	-
110	12/21/69	-	-	-	-	-	-
111	12/23/69	-	-	-	-	-	-
112	12/24/69	-	-	-	-	-	-
113	12/24/69	-	-	-	-	-	-
114	12/27/69	-	-	-	-	-	-
115	12/28/69	-	-	-	-	-	-
116	12/31/69	-	-	-	-	-	-
Minimum:		0.00	0	0.086	0.01	97.8	0.006
Maximum:		1.96	19655	0.874	0.25	99.8	5.733
Average:		0.25	2086	0.355	0.07	98.1	1.315
Total:		29.02	241964		7.96		

* Note: NRCS does not recommend using CN method for rains < 0.5 in.
See 'PreDevelopment Areas and CN' Help for more info.

Pre-Developed Stay-On Depth = 7.96 inches

60% Target Stay-On Depth = 4.78 inches

POST-DEVELOPED STAY-ON DEPTH

Land Uses | Junctions

Runoff Volume (cf) | Part. Solids Yield (lbs)

Data File: P:\3210204\3210204.01-Genesis\Eng Data\Hydrology\WinSLAMM\3210204.01_Proposed_220720.mdb
Rain File: WisReg - Milwaukee WI 1969.RAN
Date: 07-21-22 Time: 11:19:51 AM
Site Description:

Runoff Volume Total (cf) at the Outfall

Rain Number	Start Date	Rain Total (in)	Outfall Total (cf)	Rv	Total Losses (in.)	Calculated CN*	Event Peak Flow (cfs)
80	09/05/69	0.74	6384	0.753	0.18	98.2	2.144
81	09/14/69	0.01	7.112	0.062	0.01	99.7	0.007
82	09/15/69	0.03	64.01	0.186	0.02	99.5	0.064
83	09/16/69	0.03	60.11	0.175	0.02	99.5	0.035
84	09/23/69	0.16	723.5	0.395	0.10	98.6	0.176
85	09/25/69	0.01	7.112	0.062	0.01	99.7	0.007
86	09/29/69	0.84	7163	0.745	0.21	97.9	1.189
87	10/06/69	0.01	7.112	0.062	0.01	99.7	0.007
88	10/06/69	0.01	7.112	0.062	0.01	99.7	0.007
89	10/09/69	0.05	149.8	0.262	0.04	99.3	0.059
90	10/10/69	0.14	602.0	0.376	0.09	98.7	0.185
91	10/10/69	1.34	12131	0.791	0.28	97.3	0.794
92	10/12/69	1.63	14656	0.785	0.35	96.7	0.567
93	10/15/69	0.16	715.2	0.390	0.10	98.6	0.090
94	10/19/69	0.44	2603	0.517	0.21	97.4	0.274
95	10/19/69	0.35	2080	0.519	0.17	97.9	0.325
96	10/21/69	0.02	28.45	0.124	0.02	99.6	0.028
97	10/24/69	0.01	7.112	0.062	0.01	99.7	0.007
98	10/30/69	0.32	1632	0.445	0.18	97.6	0.129
99	11/02/69	0.77	4585	0.520	0.37	95.5	0.167
100	11/11/69	0.05	146.6	0.256	0.04	99.3	0.045
101	11/11/69	0.04	105.8	0.231	0.03	99.4	0.062
102	11/13/69	0.03	62.10	0.181	0.02	99.5	0.024
103	11/17/69	0.15	752.6	0.438	0.08	98.8	0.264
104	11/18/69	0.02	26.99	0.118	0.02	99.6	0.006
105	11/19/69	0.01	7.112	0.062	0.01	99.7	0.007
106	11/26/69	0.07	246.6	0.308	0.05	99.2	0.097
107	12/07/69	-	-	-	-	-	-
108	12/11/69	-	-	-	-	-	-
109	12/16/69	-	-	-	-	-	-
110	12/21/69	-	-	-	-	-	-
111	12/23/69	-	-	-	-	-	-
112	12/24/69	-	-	-	-	-	-
113	12/24/69	-	-	-	-	-	-
114	12/27/69	-	-	-	-	-	-
115	12/28/69	-	-	-	-	-	-
116	12/31/69	-	-	-	-	-	-
Minimum:		0.00	0	0.062	0.01	95.5	0.006
Maximum:		1.96	19879	0.886	0.43	99.7	4.031
Average:		0.25	1919	0.299	0.08	97.6	1.220
Total:		29.02	222582		9.59		

* Note: NRCS does not recommend using CN method for rains < 0.5 in.
See 'PreDevelopment Areas and CN' Help for more info.

Post-Developed Stay-On Depth = 9.59nches.

APPENDIX F

Operations and Maintenance Manual and Checklist

Storm Water Management Practice Maintenance Agreement

Document Number

Boucher Holdings LLC, as "Owner" of the property described below, in accordance with Chapter 32 City of Waukesha Storm Water Management and Erosion Control, agrees to install and maintain storm water management practice(s) on the subject property in accordance with approved plans and Storm Water Management Plan conditions. The owner 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 the City of Waukesha, for all planned storm water management practices, an addendum(s) to this agreement shall be recorded by the Owner showing design and construction details. The addendum(s) may contain several additional exhibits, including certification by City of Waukesha of Storm Water and Erosion Control Permit termination, as described below.

Name and Return Address

City of Waukesha
130 Delafield Street
Waukesha, WI 53188

Parcel Identification Number(s) – (PIN)

Through this Agreement, the Owner hereby subjects the Property to the following covenants, conditions and restrictions:

1. The Owner 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 and Erosion Control Permit termination by the City of Waukesha in accordance with Chapter 32 of the City Code of Ordinances.
2. After Storm Water and Erosion Control Permit termination under 1., the current Owner(s) shall be solely responsible for maintenance and repair of the storm water management practices and drainage easements in accordance with the maintenance plan contained in Exhibit C.
3. The Owner(s) shall, at their own cost, complete inspections of the storm water management practices at the time intervals listed in Exhibit C, and conduct the inspections by a a qualified professional, file the reports with the City of Waukesha after each inspection and complete any maintenance or repair work recommended in the report. The Owner(s) shall be liable for the failure to undertake any maintenance or repairs. After the work is completed by the Contractor, the qualified professional shall verify that the work was properly completed and submit the follow-up report to the City within 30 days.
4. In addition, and independent of the requirements under paragraph 3 above, the City of Waukesha, 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. The City of Waukesha may require work to be done which differs from the report described in paragraph 3 above, if the City of Waukesha reasonably concludes that such work is necessary and consistent with the intent of this agreement. Upon notification by the City of Waukesha of required maintenance or repairs, the Owner(s) shall complete the specified maintenance or repairs within a reasonable time frame determined by the City of Waukesha.
5. If the Owner(s) do not complete an inspection under 3. above or required maintenance or repairs under 4. above within the specified time period, the City of Waukesha 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 Waukesha, no notice shall be required prior to the City of Waukesha performing emergency maintenance or repairs. The City of Waukesha 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. or subch. VII of ch. 66 Wis. Stats.

6. This Agreement shall run with the Property and be binding upon all heirs, successors and assigns. After the Owner records the addendum noted above, the City of Waukesha shall have the sole authority to modify this agreement upon a 30-day notice to the current Owner(s).

Dated this ___ day of _____, 202_.

Owner:

_____
(Owners Signature)

Daniel G. Nienhuis, General Counsel, Boucher Holdings, LLC.
_____
(Owners Typed Name)

Acknowledgements

State of Wisconsin:
County of Waukesha

Personally came before me this ____ day of _____, 202_, the above named _Daniel G. Nienhuis_ to me known to be the person who executed the foregoing instrument and acknowledged the same.

_____.
[Name]
Notary Public, Waukesha County, WI
My commission expires:_____.

This document was drafted by:

____Jeremy Jeffery, P.E._____

_16745 W Bluemound Road,
_Brookfield, WI 53005 ____

[Name and address of drafter]

For Certification Stamp

City of Waukesha Common Council Approval

Dated this ___ day of _____, 202_.

_____

Shawn N. Reilly, Mayor

_____

Gina Kozlik, City Clerk

Acknowledgements

State of Wisconsin:
County of Waukesha

Personally came before me this ____ day of _____, 202_, the above named _ Daniel G. Nienhuis to me known to be the person who executed the foregoing instrument and acknowledged the same.

_____.
[Name]
Notary Public, Waukesha County, WI
My commission expires:_____.

Exhibit A – Legal Description

The following description and reduced copy map identifies the land parcel(s) affected by this Agreement. For a larger scale view of the referenced document, contact the Waukesha County Register of Deeds office.

Project Identifier: **Waukesha Genesis** Acres**: 2.94**
Date of Recording: **July 22, 2022**
Map Produced By: **raSmith, Brookfield, WI**
Legal Description: **Recorded as CSM TBD, on 07/22/2022**
A redivision of Lot 1 and Lot 2 of the Certified Survey Map No. 12248, being part of the Northeast ¼ of the Southeast ¼ of Section 35, the Northwest ¼ of the Southwest ¼, and the Southwest ¼ of the Northwest ¼ of Section 36, all in Township 7 North, Range 19 East, in the City of Waukesha, Waukesha County, WI. TO BEGIN; N74°53'05"E 443.77', N15°03"38"W 153.73, S74°53'05"W 50.36', N15°06'55"W 150', S74°53'05"W 388.72', S01°15'5905"E 44.65', S16°23'45"E 260.58' TO BEGIN. 2.9406 ACRES

Waukesha Genesis

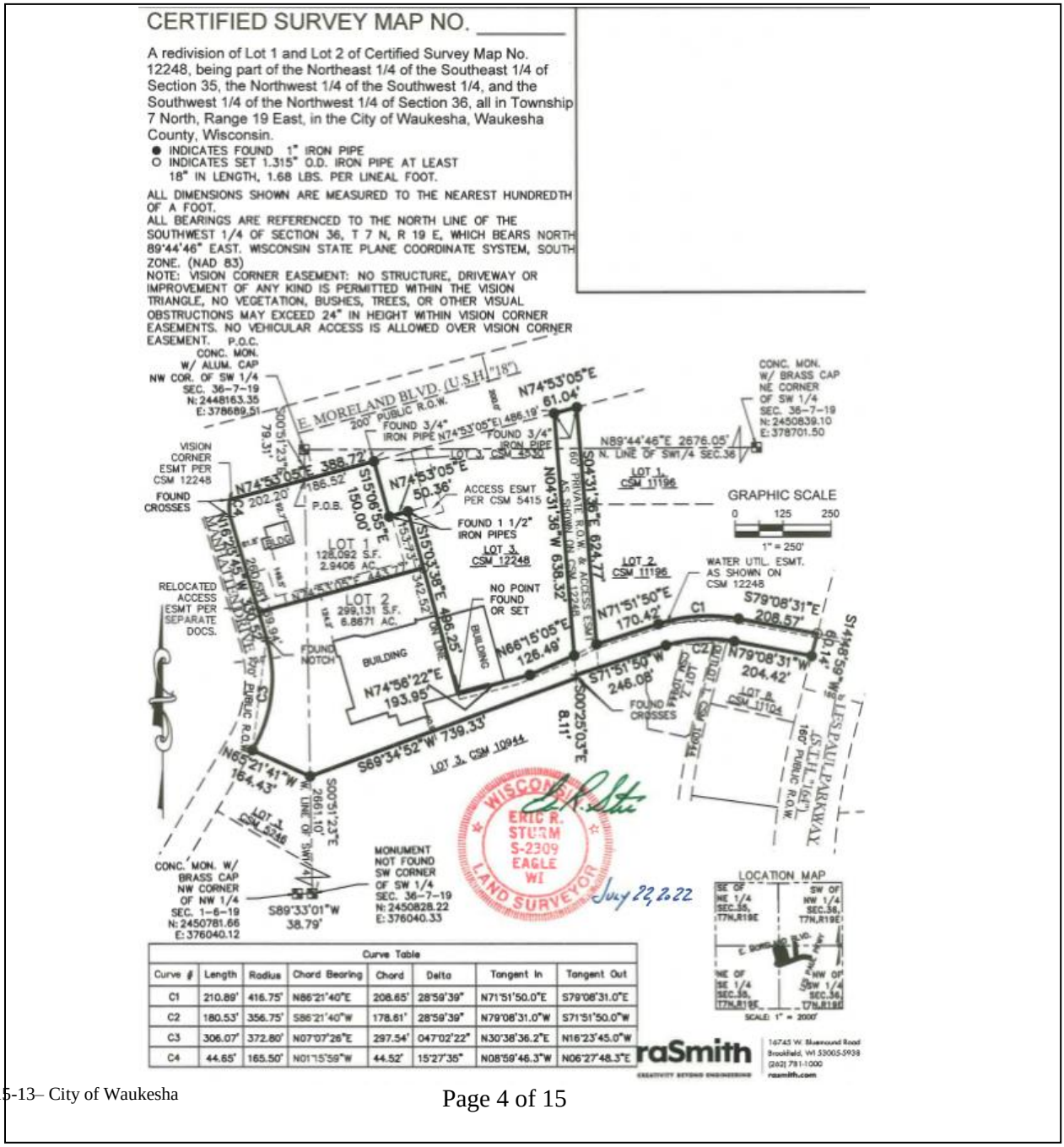


Exhibit B - Location Map
Storm Water Management Practices Covered by this Agreement

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 two independent underground detention tanks.

Project Name: **Waukesha Genesis**
Storm water Practices: **Underground Detention Tank – North, South & West**
Location of Practices: **Under parking lot**

Figure 1
Plan View of Storm Water Practices

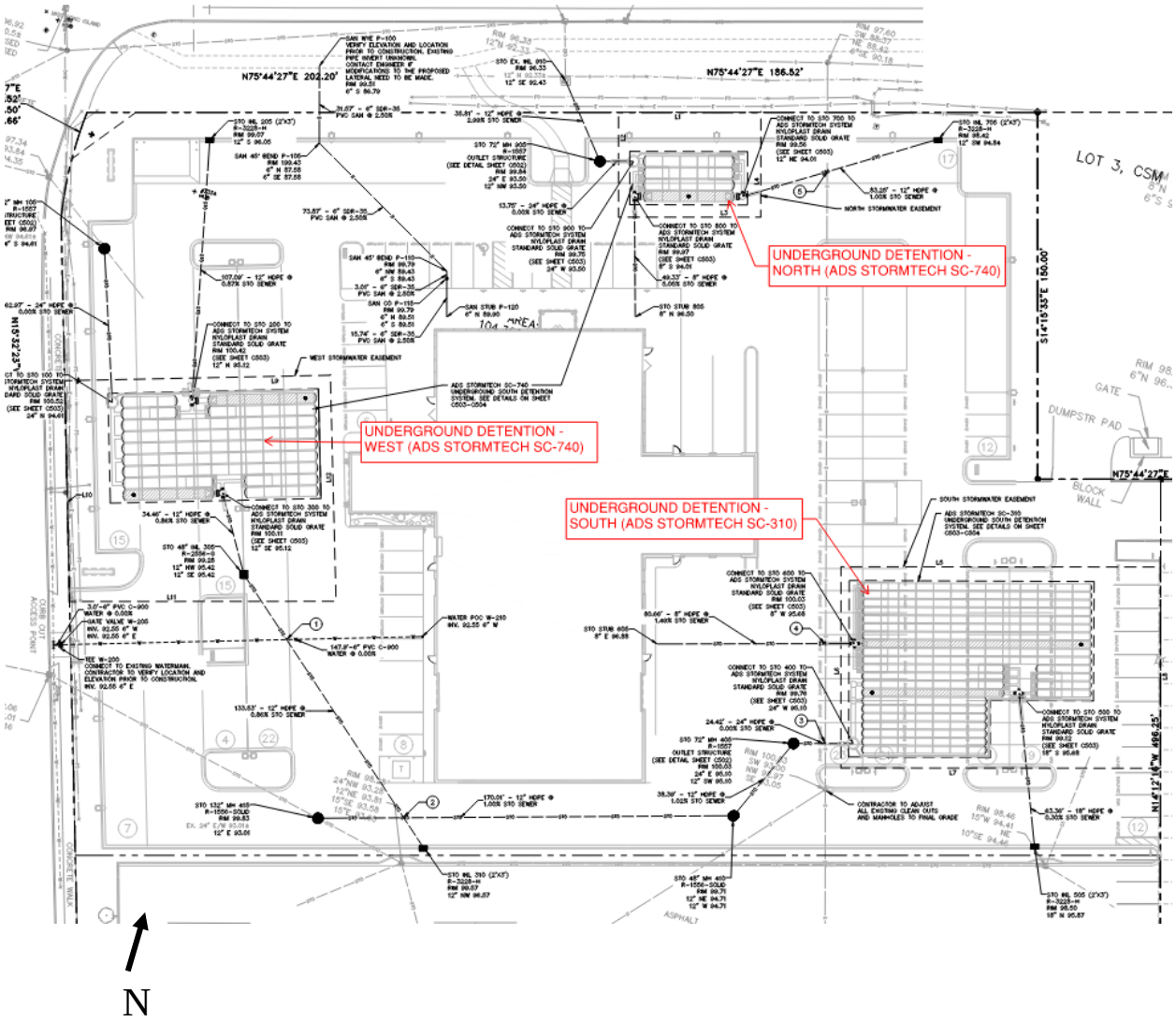


Exhibit C
Storm Water Practice Maintenance Plan

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. The titleholder(s) or their designee must document all inspections as specified above. Documentation shall include as a minimum: (a) Inspectors Name, Address and Telephone Number, (b) Date of Inspections, (c) Condition Report of the Storm Water Management Practice, (d) Corrective Actions to be Taken and Time Frame for Completion, (e) Follow-up Documentation after Completion of the Maintenance Activities. All documentation is to be delivered to the attention of the City Engineer at the City of Waukesha Engineering Department on January 10th and July 10th each year. Any repair, maintenance, or failure of a storm water practice that is caused by a lack of maintenance will subject the Owner(s) to enforcement of the provisions listed on page 1 of this Agreement by the City of Waukesha.

I. ROUTINE MAINTENANCE

A. Inspections (A competent inspector or inspection service qualified to review drainage systems shall be chosen and hired by the Owner.)
   1. Inspection priorities include visual observation and documentation of:
      a. Accumulation of sediment and debris in the storm sewer inlets, wet underground detention systems, and outlet control structures.
      b. Any modification to the contributory watershed. Confirm and document any modifications.
      c. Inspect underground detention systems for settling, cracking, erosion, leakage, and structural condition of outlet control structure. Make repairs as necessary.
      d. Inspect site for areas of erosion. If present, eroded areas shall be repaired using low-impact earth moving techniques commensurate with the scale of the repair task. Any bare soil areas shall be revegetated according to the original design specifications.
   2. Inspect all storm sewer structures, underground detention system basins, and outlet control structures after significant rainfall events and at least twice annually, once in the Spring and once in the Fall. Conduct inspections during wet weather conditions to determine if the storm sewer system is functioning properly.

B. Debris and Litter Removal.
   1. Remove debris and litter from the area, including the storm sewer system, underground detention systems, and outlet control structures.
   2. Remove debris and litter from the grates and inverts of all the storm sewer inlets, catch basins, and manholes.
   3. Remove accumulated sediment from all storm sewer inlets, catch basins, and manholes.

II. NON-ROUTINE MAINTENANCE

A. Post Construction Monitoring
   1. For the first 12 months following installation of the underground detention systems and storm sewers, the system is to be inspected on a quarterly basis to verify the integrity of the conveyance system. Following the initial 12 months, the system is to be inspected at least every 6 months or more frequently as determined by the initial 12-month monitoring period.

B. Structural Repairs and Replacement.
   1. Conduct routine inspection and maintenance of all storm sewer structures to promote longevity.

III. DOCUMENTATION OF MAINTENANCE

A. Complete attached "Inspection Form for Storm Water Management Systems" The Owner will maintain the records.

E. MORELAND BLVD.

N

GRAPHIC SCALE
10 0 10 20 40
(IN FEET)

North SW Easement Line Table		
Line #	Length	Direction
L1	58.23	S75° 44' 27.34"W
L2	42.85	S14° 15' 32.66"E
L3	58.15	N75° 44' 27.34"E
L4	42.85	N14° 08' 53.41"W

South SW Easement Line Table		
Line #	Length	Direction
L5	130.72	N75° 47' 44.34"E
L6	82.27	N14° 14' 36.22"W
L7	130.67	S75° 47' 44.34"W
L8	82.27	S14° 12' 15.66"E

West SW Easement Line Table		
Line #	Length	Direction
L9	108.70	S74° 34' 35.34"W
L10	90.28	S15° 32' 25.57"E
L11	108.96	N75° 44' 27.54"E
L12	92.50	N15° 41' 11.34"W

CB=S00°24'37"E
CH=44.52'
R=165.50'
L=44.66'

N75°44'27"E 202.20'

N75°44'27"E 186.52'

N75°44'27"E 100.00'

S14°15'33"E 150.00'

N14°12'16"W 496.25'

N15°32'23"W 330.52'

NORTH STORMWATER EASEMENT

SOUTH STORMWATER EASEMENT

WEST STORMWATER EASEMENT

RELOCATED ACCESS EASEMENT

LOT 3, CSM 4530

AREA: 104,36[illegible]

MANHATTEN DRIVE
70' PUBLIC R.O.W.

CONCRETE WALK

CURB CUT ACCESS POINT

ASPHALT

BLOCK WALL

GATE

DUMPSTR PAD

RIM 96.69 12"SE 93.49
RIM 96.92 30"NE 90.5± 12"NW RECESSED 30"SW RECESSED
RIM 97.34 12"W 93.84 8"SE 94.35
RIM 96.06 30"SW 91.21 30"NE 91.21 12"S 91.71
RIM 96.10 NE 91.42 30"SW 91.38
RIM 96.33 12"N 92.33
RIM 97.60 SW 88.37 NE 88.42 6"SE 90.18
RIM 99.06 24"W 92.01 24"SE 92.16
RIM 98.[illegible] 24"NW 93.25 12"NE 93.81 15"SE 93.58 15"[illegible]
RIM 100.03 SW 93.00 NW 93.97 SE 95.05
RIM 98.46 15"W 94.41 NE 10"SE 94.46
RIM 99.97 SW 94.12 S 94.27 NE 94.14
RIM 98.79 6"N 96.3±
RIM [illegible] 8"N 95.89 6"S 95.9±
RIM [illegible] 24"W 92.0[illegible] 12"S 92.6±

#334 HUB
#80 HUB

Know what's below.
Call before you dig.

DESCRIPTION | DATE

raSmith
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Cedarburg, WI | Naperville, IL | Irvine, CA

WAUKESHA GENESIS
CITY OF WAUKESHA, WISCONSIN

EXHIBIT C
STORMWATER EASEMENT EXHIBIT

DATE: 07/22/2022
SCALE: 1" = 20'
JOB NO. 3210204.01
PROJECT MANAGER: RYAN J. LANCOUR, P.E.
DESIGNED BY: JJJ
CHECKED BY: RJL

SHEET NUMBER

StormTech®
Detention • Retention • Water Quality
An ADS company

Isolator® Row PLUS O&M Manual

THE MOST **ADVANCED** NAME IN WATER MANAGEMENT SOLUTIONS®

ADS®

THE ISOLATOR® ROW PLUS

INTRODUCTION

An important component of any Stormwater Pollution Prevention Plan is inspection and maintenance. The StormTech Isolator Row PLUS is a technique to inexpensively enhance Total Suspended Solids (TSS) and Total Phosphorus (TP) removal with easy access for inspection and maintenance.

THE ISOLATOR ROW PLUS

The Isolator Row PLUS is a row of StormTech chambers, either SC-160, SC-310, SC-310-3, SC-740, DC-780, MC-3500 or MC-4500 models, that is surrounded with filter fabric and connected to a closely located manhole for easy access. The fabric-wrapped chambers provide for settling and filtration of sediment as storm water rises in the Isolator Row PLUS and ultimately passes through the filter fabric. The open bottom chambers and perforated sidewalls (SC-310, SC- 310-3 and SC-740 models) allow storm water to flow both vertically and horizontally out of the chambers. Sediments are captured in the Isolator Row PLUS protecting the storage areas of the adjacent stone and chambers from sediment accumulation.

ADS geotextile fabric is placed between the stone and the Isolator Row PLUS chambers. The woven geotextile provides a media for stormwater filtration, a durable surface for maintenance, prevents scour of the underlying stone and remains intact during high pressure jetting. A non-woven fabric is placed over the chambers to provide a filter media for flows passing through the perforations in the sidewall of the chamber. The non-woven fabric is not required over the SC-160, DC-780, MC-3500 or MC-4500 models as these chambers do not have perforated side walls.

The Isolator Row PLUS is designed to capture the "first flush" runoff and offers the versatility to be sized on a volume basis or a flow-rate basis. An upstream manhole not only provides access to the Isolator Row PLUS but includes a high/low concept such that stormwater flow rates or volumes that exceed the capacity of the Isolator Row PLUS bypass through a manifold to the other chambers. This is achieved with either an elevated bypass manifold or a high-flow weir. This creates a differential between the Isolator Row PLUS row of chambers and the manifold to the rest of the system, thus allowing for settlement time in the Isolator Row PLUS. After Stormwater flows through the Isolator Row PLUS and into the rest of the StormTech chamber system it is either exfiltrated into the soils below or passed at a controlled rate through an outlet manifold and outlet control structure.

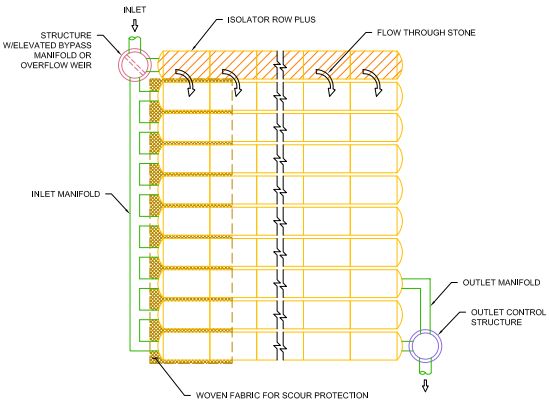
The Isolator Row FLAMP™ (patent pending) is a flared end ramp apparatus that is attached to the inlet pipe on the inside of the chamber end cap. The FLAMP provides a smooth transition from pipe invert to fabric bottom. It is configured to improve chamber function performance over time by enhancing outflow of solid debris that would otherwise collect at an end of the chamber. It also serves to improve the fluid and solid flow into the access pipe during maintenance and cleaning and to guide cleaning and inspection equipment back into the inlet pipe when complete.

The Isolator Row PLUS may be part of a treatment train system. The design of the treatment train and selection of pretreatment devices by the design engineer is often driven by regulatory requirements. Whether pretreatment is used or not, the Isolator Row PLUS is recommended by StormTech as an effective means to minimize maintenance requirements and maintenance costs.

Note: See the StormTech Design Manual for detailed information on designing inlets for a StormTech system, including the Isolator Row PLUS.

Looking down the Isolator Row PLUS from the manhole opening, ADS PLUS Fabric is shown between the chamber and stone base.

StormTech Isolator Row PLUS with Overflow Spillway (not to scale)



ISOLATOR ROW PLUS INSPECTION/MAINTENANCE

INSPECTION

The frequency of inspection and maintenance varies by location. A routine inspection schedule needs to be established for each individual location based upon site specific variables. The type of land use (i.e. industrial, commercial, residential), anticipated pollutant load, percent imperviousness, climate, etc. all play a critical role in determining the actual frequency of inspection and maintenance practices.

At a minimum, StormTech recommends annual inspections. Initially, the Isolator Row PLUS should be inspected every 6 months for the first year of operation. For subsequent years, the inspection should be adjusted based upon previous observation of sediment deposition.

The Isolator Row PLUS incorporates a combination of standard manhole(s) and strategically located inspection ports (as needed). The inspection ports allow for easy access to the system from the surface, eliminating the need to perform a confined space entry for inspection purposes.

If upon visual inspection it is found that sediment has accumulated, a stadia rod should be inserted to determine the depth of sediment. When the average depth of sediment exceeds 3 inches throughout the length of the Isolator Row PLUS, clean-out should be performed.

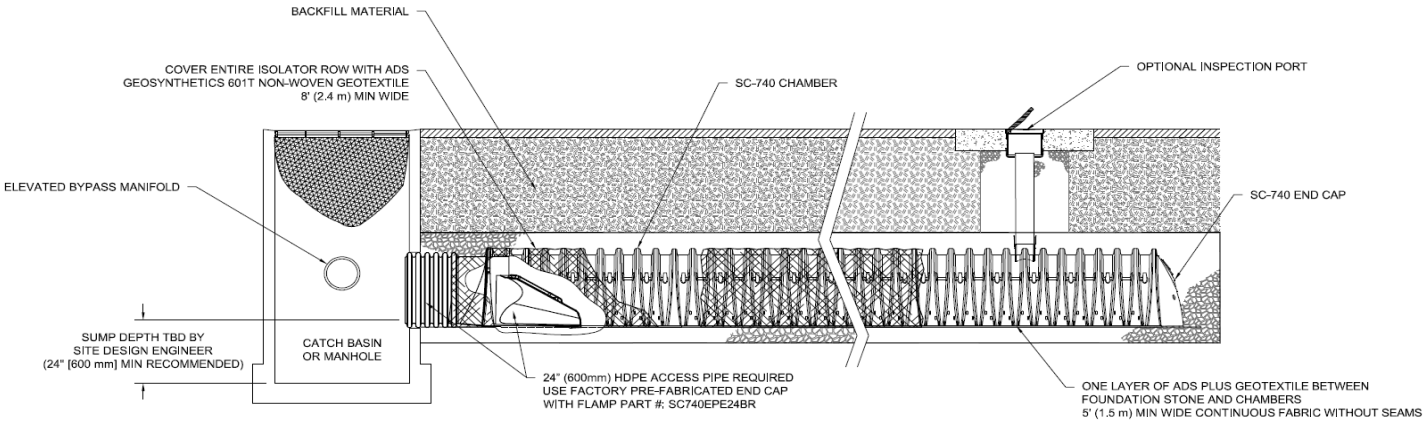
MAINTENANCE

The Isolator Row PLUS was designed to reduce the cost of periodic maintenance. By “isolating” sediments to just one row, costs are dramatically reduced by eliminating the need to clean out each row of the entire storage bed. If inspection indicates the potential need for maintenance, access is provided via a manhole(s) located on the end(s) of the row for cleanout. If entry into the manhole is required, please follow local and OSHA rules for a confined space entries.

Maintenance is accomplished with the JetVac process. The JetVac process utilizes a high pressure water nozzle to propel itself down the Isolator Row PLUS while scouring and suspending sediments. As the nozzle is retrieved, the captured pollutants are flushed back into the manhole for vacuuming. Most sewer and pipe maintenance companies have vacuum/JetVac combination vehicles. Selection of an appropriate JetVac nozzle will improve maintenance efficiency. Fixed nozzles designed for culverts or large diameter pipe cleaning are preferable. Rear facing jets with an effective spread of at least 45” are best. StormTech recommends a maximum nozzle pressure of 2000 psi be utilized during cleaning. Most JetVac reels have 400 feet of hose allowing maintenance of an Isolator Row PLUS up to 50 chambers long. **The JetVac process shall only be performed on StormTech Isolator Row PLUS that have ADS PLUS Fabric (as specified by StormTech) over their angular base stone.**

StormTech Isolator Row PLUS (not to scale)

Note: Non-woven fabric is only required over the inlet pipe connection into the end cap for SC-160LP, DC-780, MC-3500 and MC-4500 chamber models and is not required over the entire Isolator Row PLUS.



ISOLATOR ROW PLUS STEP BY STEP MAINTENANCE PROCEDURES

STEP 1

Inspect Isolator Row PLUS for sediment.

A) Inspection ports (if present)
   i. Remove lid from floor box frame
   ii. Remove cap from inspection riser
   iii. Using a flashlight and stadia rod,measure depth of sediment and record results on maintenance log.
   iv. If sediment is at or above 3 inch depth, proceed to Step 2. If not, proceed to Step 3.

B) All Isolator Row PLUS
   i. Remove cover from manhole at upstream end of Isolator Row PLUS
   ii. Using a flashlight, inspect down Isolator Row PLUS through outlet pipe
      1. Mirrors on poles or cameras may be used to avoid a confined space entry
      2. Follow OSHA regulations for confined space entry if entering manhole
   iii. If sediment is at or above the lower row of sidewall holes (approximately 3 inches), proceed to Step 2. If not, proceed to Step 3.

STEP 2

Clean out Isolator Row PLUS using the JetVac process.

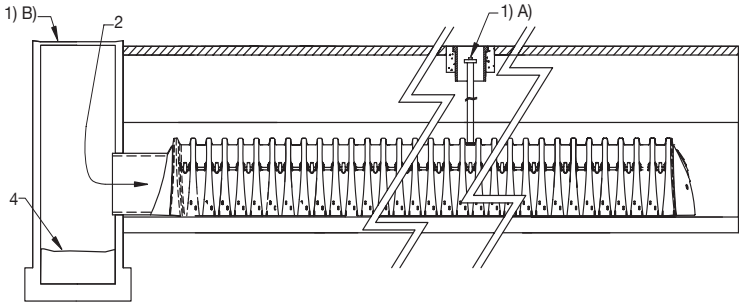
A) A fixed floor cleaning nozzle with rear facing nozzle spread of 45 inches or more is preferable
B) Apply multiple passes of JetVac until backflush water is clean
C) Vacuum manhole sump as required

STEP 3

Replace all caps, lids and covers, record observations and actions.

STEP 4

Inspect & clean catch basins and manholes upstream of the StormTech system.



SAMPLE MAINTENANCE LOG

Date	Stadia Rod Readings		Sediment Depth (1)–(2)	Observations/Actions	Inspector
	Fixed point to chamber bottom (1)	Fixed point to top of sediment (2)			
3/15/11	6.3 ft	none		New installation. Fixed point is CI frame at grade	DJM
9/24/11		6.2	0.1 ft	Some grit felt	SM
6/20/13		5.8	0.5 ft	Mucky feel, debris visible in manhole and in Isolator Row PLUS, maintenance due	NV
7/7/13	6.3 ft		0	System jetted and vacuumed	DJM

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Advanced Drainage Systems, Inc.
4640 Trueman Blvd., Hilliard, OH 43026
1-800-821-6710 www.ads-pipe.com

1. Document Number

Document number

Addendum 1
Storm Water Management Practice Maintenance Agreement

The purpose of this addendum is to record verified "as-built" construction details, supporting design data and permit termination documentation for the storm water management practice(s) located at Waukesha Genesis, a redivision of Lots 1 and 2 of Certified Survey Map No. 5415, and part of Lot 2 of Certified Survey Map No. 4530, and lands, in the Northeast 1/4 of the Southeast 1/4 of Section 35, the Northwest 1/4 of the Southwest 1/4, and Southwest 1/4 of the Northwest 1/4 of Section 36, all in Town 7 North, Range 19 East, in the City of Waukesha, Waukesha County, Wisconsin. This document shall serve as an addendum to document # _____, herein referred to as the "Maintenance Agreement". This addendum includes all of the following exhibits:

Exhibit D: Design Summary – contains a summary of key engineering calculations and other data used to design the wet detention basin.
Exhibit E: As-built Survey – shows detailed "as-built" cross-section and plan view of the wet detention basin.
Exhibit F: Engineering/Construction Verification – provides verification from the project engineer that the design and construction of the wet detention basin complies with all applicable technical standards and Waukesha County ordinance requirements.
Exhibit G: Storm Water Management & Erosion Control Permit Termination – provides certification by the City of Waukesha that the Storm Water and Erosion Control Permit for the above noted site has been terminated.

Name and Return Address

_____
Parcel Identification Number(s) – (PIN)

Dated this ___ day of _____, 202_.

Owner:

_____
[Owners Signature – per the Maintenance Agreement]

_____
[Owners Typed Name]

Acknowledgements

State of Wisconsin County of Waukesha

Personally came before me this ____ day of _____, 202_, the above named _Daniel G. Nienhuis to me known to be the person who executed the foregoing instrument and acknowledged the same.

_____.
[Name]
Notary Public, Waukesha County, WI
My commission expires:_____.

This document was drafted by:

____ Jeremy Jeffery, P.E._____

_16745 W Bluemound Road,
_Brookfield, WI 53005 ___
[Name and address of drafter]

Exhibit D
Design Summaries for Underground Detention Tank - North

Project Identifier: Waukesha Genesis **Project Size:** 2.94 Acres **No. of Lots:** N/A
Number of Runoff Discharge Points: 1 **Watershed (ultimate discharge**): Fox River
Watershed Area (including off-site runoff traveling through project area): 3.15 acres

Watershed Data Summary. The following table summarizes the watershed data used to determine peak flows and runoff volumes required to design Underground Detention Tank - West

Summary Data Elements	E-1 and P-1	
	Pre-develop (E-1)	**Post-develop (P-1)**
Watershed Areas *(in acres) (see attached map)*	0.61	1.00
Average Watershed Slopes (%)	2-4%	2-4%
Land Uses *(% of each) (see attached map)*	0.04ac Grass 0.47ac Pavement 0.10ac Roof	0.05ac Grass 0.88ac Pavement 0.07ac Sidewalk
Runoff Curve Numbers	RCN = 94	RCN = 95
Conveyance Systems Types	50% overland 50% storm sewer	50% overland 50% storm sewer
Time of Concentration *(Tc) (see attached map & worksheets)*	6 min.	6 min.
1-year/24 hour Runoff Volume	1.91 cfs	1.12 cfs
2-yr./24 hour Peak Flow *(see attached hydrographs)*	2.20 cfs	1.23 cfs
10-yr./24 hour Peak Flow	3.26 cfs	1.61cfs
100-yr./24 hour Peak Flow	5.48 cfs	2.31 cfs

Watershed Data Summary. The following table summarizes the watershed data used to determine peak flows and runoff volumes required to design Underground Detention Tank - South

Summary Data Elements	E-2 and P-2	
	Pre-develop (E-2)	**Post-develop (P-2)**
Watershed Areas *(in acres) (see attached map)*	1.47	0.94
Average Watershed Slopes (%)	2-4%	2-4%

Land Uses *(% of each)* *(see attached map)*	0.06ac Grass 1.41ac Pavement 0.00ac Roof	0.03ac Grass 0.72ac Pavement 0.18ac Roof 0.01 Sidewalk
Runoff Curve Numbers	RCN = 96	RCN = 96
Conveyance Systems Types	50% overland 50% storm sewer	50% overland 50% storm sewer
Time of Concentration *(Tc)* *(see attached map & worksheets)*	6 min.	6 min.
1-year/24 hour Runoff Volume	4.93 cfs	1.05 cfs
2-yr./24 hour Peak Flow *(see attached hydrographs)*	5.61 cfs	1.15 cfs
10-yr./24 hour Peak Flow	8.12 cfs	1.46 cfs
100-yr./24 hour Peak Flow	13.42 cfs	3.57 cfs

Watershed Data Summary. The following table summarizes the watershed data used to determine peak flows and runoff volumes required to design Underground Detention Tank - North

Summary Data Elements	**E-3 and P-3**	
	Pre-develop (E-3)	**Post-develop (P-3)**
Watershed Areas *(in acres)* *(see attached map)*	0.86	0.76
Average Watershed Slopes (%)	2-4%	2-4%
Land Uses *(% of each)* *(see attached map)*	0.30ac Grass 0.56ac Pavement 0.00ac Roof	0.04ac Grass 0.44ac Pavement 0.25ac Roof 0.03 Sidewalk
Runoff Curve Numbers	RCN = 77	RCN = 95
Conveyance Systems Types	Overland	50% overland 50% storm sewer
Time of Concentration *(Tc)* *(see attached map & worksheets)*	6 min.	6 min.
1-year/24 hour Runoff Volume	1.41 cfs	2.03 cfs
2-yr./24 hour Peak Flow *(see attached hydrographs)*	1.81 cfs	2.55 cfs
10-yr./24 hour Peak Flow	3.38 cfs	3.37 cfs
100-yr./24 hour Peak Flow	6.75 cfs	5.05 cfs

Practice Design Summary. The following table summarizes the data used to design Underground Detention Tank - North

Design Element	Design Data
Site assessment data: (see attached maps)	
Contributing drainage area to basin	0.76 acres
Distance to nearest private well (including off-site wells)	> 100 feet
Distance to municipal well (including off-site wells)	> 1200 feet
Wellhead protection area involved?	No
Ground slope at site of proposed basin	average 2-3%
Any buried or overhead utilities in the area?	No
Proposed outfall conveyance system/discharge (w/ distances)	35.81' – 12 HDPE pipe into back of existing Inlet along Moreland
Any downstream roads or other structures? (describe)	No
Floodplain, shoreland or wetlands?	No
General basin design data (see attached detailed drawings):	
Top of Stone	97.00
Top of Chamber	96.50
Chamber Invert	94.00
Bottom of Stone	93.50

Design Basin Inflow, Outflow & Storage Data
(see attached hydrographs and detail drawings)

Inflow Peak/Volume	Maximum Outflow Rate	Max. Water Elevation	Storage Volume at Max. Elev. (above perm. pool)	Outflow Control Structures*
1-yr./24 hr.	2.03	94.61	0.015 af	#1, #2 and #3
2-yr./24 hr.	2.55	94.67	0.016 af	#1, #2 and #3
10-yr./24 hr.	3.37	95.02	0.022 af	#1, #2 and #3
100-yr./24 hr.	5.05	96.29	0.039 af	#1, #2 and #3

*#1 = 8 inch orifice in water level control weir plate – flow line elev. @ 93.50'
#2 = 6 foot wide rectangular weir – flow line elev. @ 94.50'
#3 = 12 inch diameter hdpe pipe – flow line elev. @ 93.50'

Practice Design Summary. The following table summarizes the data used to design Underground Detention Tank - South

Design Element	Design Data
Site assessment data: (see attached maps)	
Contributing drainage area to basin	0.94 acres
Distance to nearest private well (including off-site wells)	> 100 feet
Distance to municipal well (including off-site wells)	> 1200 feet
Wellhead protection area involved?	No
Ground slope at site of proposed basin	average 2-3%
Any buried or overhead utilities in the area?	No
Proposed outfall conveyance system/discharge (w/ distances)	38.39' – 12 HDPE pipe into proposed MH
Any downstream roads or other structures? (describe)	No
Floodplain, shoreland or wetlands?	No
General basin design data (see attached detailed drawings):	
Top of Stone	97.43
Top of Chamber	96.93
Chamber Invert	95.60
Bottom of Stone	95.10

Design Basin Inflow, Outflow & Storage Data
(see attached hydrographs and detail drawings)

Inflow Peak/Volume	Maximum Outflow Rate	Max. Water Elevation	Storage Volume at Max. Elev. (above perm. pool)	Outflow Control Structures*
1-yr./24 hr.	1.05	95.83	0.053 af	#1
2-yr./24 hr.	1.15	95.90	0.061 af	#1
10-yr./24 hr.	1.46	96.19	0.091 af	#1
100-yr./24 hr.	3.57	96.75	0.139 af	#1, #2 and #3

*#1 = 8 inch orifice in water level control weir plate – flow line elev. @ 95.10
#2 = 6 foot wide rectangular weir – flow line elev. @ 96.30
#3 = 12 inch diameter hdpe pipe – flow line elev. @ 95.10

Practice Design Summary. The following table summarizes the data used to design Underground Detention Tank - West

Design Element	Design Data
Site assessment data: (see attached maps)	
Contributing drainage area to basin	1.00 acres
Distance to nearest private well (including off-site wells)	> 100 feet
Distance to municipal well (including off-site wells)	> 1200 feet
Wellhead protection area involved?	No
Ground slope at site of proposed basin	average 2-3%
Any buried or overhead utilities in the area?	No
Proposed outfall conveyance system/discharge (w/ distances)	36.9' – 8" ex. RCP pipe into back of existing Inlet along Manhattan
Any downstream roads or other structures? (describe)	No
Floodplain, shoreland or wetlands?	No
General basin design data (see attached detailed drawings):	
Top of Stone	98.11
Top of Chamber	97.61
Chamber Invert	95.11
Bottom of Stone	94.61

Design Basin Inflow, Outflow & Storage Data
(see attached hydrographs and detail drawings)

Inflow Peak/Volume	Maximum Outflow Rate	Max. Water Elevation	Storage Volume at Max. Elev. (above perm. pool)	Outflow Control Structures*
1-yr./24 hr.	1.12	95.55	0.048 af	#1
2-yr./24 hr.	1.23	95.67	0.056 af	#1
10-yr./24 hr.	1.61	96.13	0.086 af	#1
100-yr./24 hr.	2.31	97.37	0.156 af	#1

*#1 = 8 inch diameter rcp pipe – flow line elev. @ 94.61

Exhibit D (continued)

Watershed Map. The watershed map shown below was used to determine the post-development data contained in this exhibit.

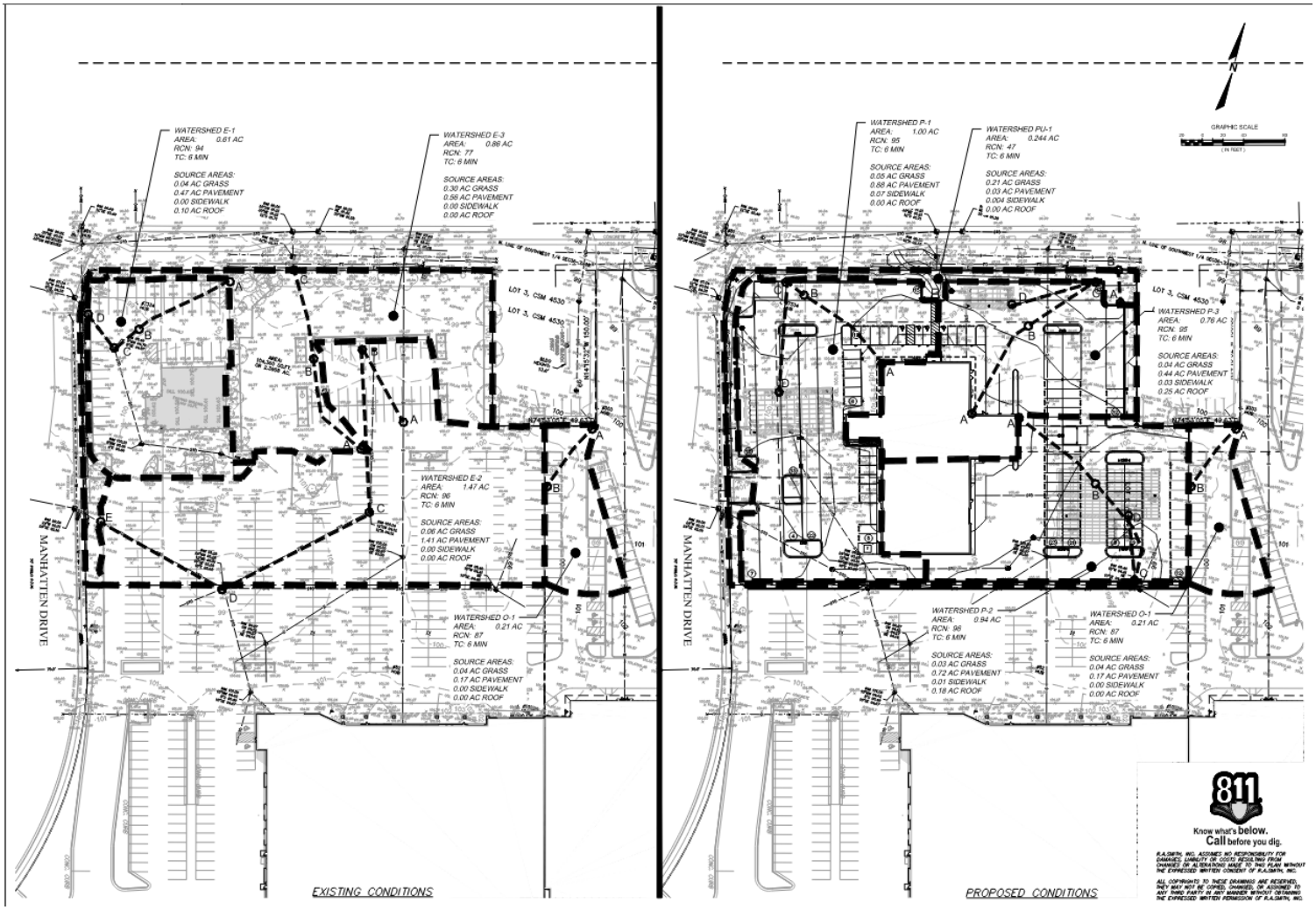


Exhibit E
As-built Survey for Underground Detention Tank – North, South & West

The underground detention basin depicted in Figure 1 is a reduced copy of the as-built plan.

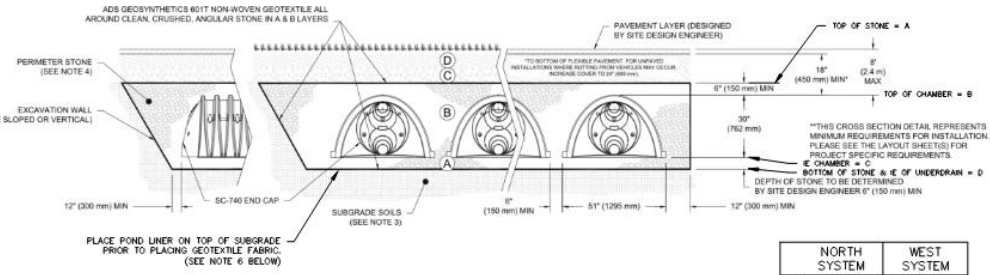
Project Identifier**:** **Waukesha Genesis**
Storm water Practice**:** **Underground Detention Tanks North, South and West**
Location of Practice**:** **Under parking lot**

Cross-Section A – A'

ACCEPTABLE FILL MATERIALS: STORMTECH SC-740 CHAMBER SYSTEMS

MATERIAL LOCATION		DESCRIPTION	AASHTO MATERIAL CLASSIFICATIONS	COMPACTION / DENSITY REQUIREMENT
D	**FINAL FILL:** FILL MATERIAL FOR LAYER 'D' STARTS FROM THE TOP OF THE 'C' LAYER TO THE BOTTOM OF FLEXIBLE PAVEMENT OR UNPAVED FINISHED GRADE ABOVE. NOTE THAT PAVEMENT SUBBASE MAY BE PART OF THE 'D' LAYER.	ANY SOIL/ROCK MATERIALS, NATIVE SOILS, OR PER ENGINEER'S PLANS. CHECK PLANS FOR PAVEMENT SUBGRADE REQUIREMENTS.	N/A	PREPARE PER SITE DESIGN ENGINEER'S PLANS. PAVED INSTALLATIONS MAY HAVE STRINGENT MATERIAL AND PREPARATION REQUIREMENTS.
C	**INITIAL FILL:** FILL MATERIAL FOR LAYER 'C' STARTS FROM THE TOP OF THE EMBEDMENT STONE ('B' LAYER) TO 18" (450 mm) ABOVE THE TOP OF THE CHAMBER. NOTE THAT PAVEMENT SUBBASE MAY BE A PART OF THE 'C' LAYER.	GRANULAR WELL-GRADED SOIL/AGGREGATE MIXTURES, <35% FINES OR PROCESSED AGGREGATE. MOST PAVEMENT SUBBASE MATERIALS CAN BE USED IN LIEU OF THIS LAYER.	AASHTO M145[1] A-1, A-2-4, A-3 OR AASHTO M43[1] 3, 357, 4, 467, 5, 56, 57, 6, 67, 68, 7, 78, 8, 89, 9, 10	BEGIN COMPACTIONS AFTER 12" (300 mm) OF MATERIAL OVER THE CHAMBERS IS REACHED. COMPACT ADDITIONAL LAYERS IN 6" (150 mm) MAX LIFTS TO A MIN. 95% PROCTOR DENSITY FOR WELL GRADED MATERIAL AND 95% RELATIVE DENSITY FOR PROCESSED AGGREGATE MATERIALS. ROLLER GROSS VEHICLE WEIGHT NOT TO EXCEED 12,000 lbs (53 kN). DYNAMIC FORCE NOT TO EXCEED 20,000 lbs (89 kN).
B	**EMBEDMENT STONE:** FILL SURROUNDING THE CHAMBERS FROM THE FOUNDATION STONE ('A' LAYER) TO THE 'C' LAYER ABOVE.	CLEAN, CRUSHED, ANGULAR STONE	AASHTO M43[1] 3, 357, 4, 467, 5, 56, 57	NO COMPACTION REQUIRED.
A	**FOUNDATION STONE:** FILL BELOW CHAMBERS FROM THE SUBGRADE UP TO THE FOOT (BOTTOM) OF THE CHAMBER.	CLEAN, CRUSHED, ANGULAR STONE	AASHTO M43[1] 3, 357, 4, 467, 5, 56, 57	PLATE COMPACT OR ROLL TO ACHIEVE A FLAT SURFACE.[2,3]

PLEASE NOTE:
1. THE LISTED AASHTO DESIGNATIONS ARE FOR GRADATIONS ONLY. THE STONE MUST ALSO BE CLEAN, CRUSHED, ANGULAR. FOR EXAMPLE, A SPECIFICATION FOR #4 STONE WOULD STATE: "CLEAN, CRUSHED, ANGULAR NO. 4 (AASHTO M43) STONE".
2. STORMTECH COMPACTION REQUIREMENTS ARE MET FOR 'A' LOCATION MATERIALS WHEN PLACED AND COMPACTED IN 6" (150 mm) (MAX) LIFTS USING TWO FULL COVERAGES WITH A VIBRATORY COMPACTOR.
3. WHERE INFILTRATION SURFACES MAY BE COMPROMISED BY COMPACTION, FOR STANDARD DESIGN LOAD CONDITIONS, A FLAT SURFACE MAY BE ACHIEVED BY RAKING OR DRAGGING WITHOUT COMPACTION EQUIPMENT. FOR SPECIAL LOAD DESIGNS, CONTACT STORMTECH FOR COMPACTION REQUIREMENTS.
4. ONCE LAYER 'C' IS PLACED, ANY SOIL/MATERIAL CAN BE PLACED IN LAYER 'D' UP TO THE FINISHED GRADE. MOST PAVEMENT SUBBASE SOILS CAN BE USED TO REPLACE THE MATERIAL REQUIREMENTS OF LAYER 'C' OR 'D' AT THE SITE DESIGN ENGINEER'S DISCRETION.



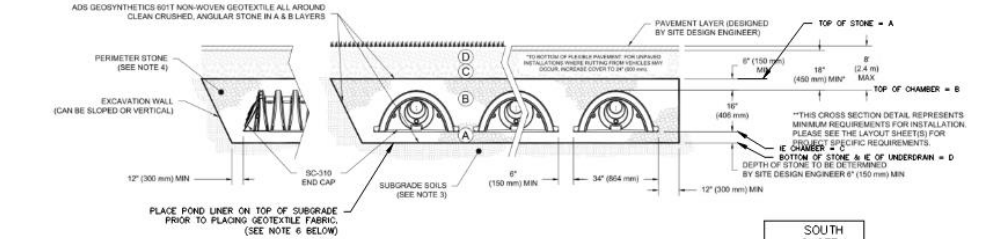
	NORTH SYSTEM	WEST SYSTEM
A	97.00	98.11
B	96.50	97.61
C	94.00	95.11
D	93.50	94.61

NOTES:
1. CHAMBERS SHALL MEET THE REQUIREMENTS OF ASTM F2418, "STANDARD SPECIFICATION FOR POLYPROPYLENE (PP) CORRUGATED WALL STORMWATER COLLECTION CHAMBERS".
2. SC-740 CHAMBERS SHALL BE DESIGNED IN ACCORDANCE WITH ASTM F2787 "STANDARD PRACTICE FOR STRUCTURAL DESIGN OF THERMOPLASTIC CORRUGATED WALL STORMWATER COLLECTION CHAMBERS".
3. THE SITE DESIGN ENGINEER IS RESPONSIBLE FOR ASSESSING THE BEARING RESISTANCE (ALLOWABLE BEARING CAPACITY) OF THE SUBGRADE SOILS AND THE DEPTH OF FOUNDATION STONE WITH CONSIDERATION FOR THE RANGE OF EXPECTED SOIL MOISTURE CONDITIONS.
4. PERIMETER STONE MUST BE EXTENDED HORIZONTALLY TO THE EXCAVATION WALL FOR BOTH VERTICAL AND SLOPED EXCAVATION WALLS.
5. REQUIREMENTS FOR HANDLING AND INSTALLATION:
   - TO MAINTAIN THE WIDTH OF CHAMBERS DURING SHIPPING AND HANDLING, CHAMBERS SHALL HAVE INTEGRAL, INTERLOCKING STACKING LUGS.
   - TO ENSURE A SECURE JOINT DURING INSTALLATION AND BACKFILL, THE HEIGHT OF THE CHAMBER JOINT SHALL NOT BE LESS THAN 2".
   - TO ENSURE THE INTEGRITY OF THE ARCH SHAPE DURING INSTALLATION, a) THE ARCH STIFFNESS CONSTANT AS DEFINED IN SECTION 6.2.6 OF ASTM F2418 SHALL BE GREATER THAN OR EQUAL TO 550 LBS/FT/% AND b) TO RESIST CHAMBER DEFORMATION DURING INSTALLATION AT ELEVATED TEMPERATURES (ABOVE 73° F / 23° C), CHAMBERS SHALL BE PRODUCED FROM REFLECTIVE GOLD OR YELLOW COLORS.
6. PLACE 40 MIL (HDPE) POND AND CANAL LINER OR EQUAL ON SUBGRADE EXTENDING THE ENTIRE EXCAVATED AREA AND UP EXCAVATED WALLS ONE FOOT PRIOR TO PLACING GEOSYNTHETIC FABRIC.

ACCEPTABLE FILL MATERIALS: STORMTECH SC-310 CHAMBER SYSTEMS

MATERIAL LOCATION		DESCRIPTION	AASHTO MATERIAL CLASSIFICATIONS	COMPACTION / DENSITY REQUIREMENT
D	**FINAL FILL:** FILL MATERIAL FOR LAYER 'D' STARTS FROM THE TOP OF THE 'C' LAYER TO THE BOTTOM OF FLEXIBLE PAVEMENT OR UNPAVED FINISHED GRADE ABOVE. NOTE THAT PAVEMENT SUBBASE MAY BE PART OF THE 'D' LAYER.	ANY SOIL/ROCK MATERIALS, NATIVE SOILS, OR PER ENGINEER'S PLANS. CHECK PLANS FOR PAVEMENT SUBGRADE REQUIREMENTS.	N/A	PREPARE PER SITE DESIGN ENGINEER'S PLANS. PAVED INSTALLATIONS MAY HAVE STRINGENT MATERIAL AND PREPARATION REQUIREMENTS.
C	**INITIAL FILL:** FILL MATERIAL FOR LAYER 'C' STARTS FROM THE TOP OF THE EMBEDMENT STONE ('B' LAYER) TO 18" (450 mm) ABOVE THE TOP OF THE CHAMBER. NOTE THAT PAVEMENT SUBBASE MAY BE A PART OF THE 'C' LAYER.	GRANULAR WELL-GRADED SOIL/AGGREGATE MIXTURES, <35% FINES OR PROCESSED AGGREGATE. MOST PAVEMENT SUBBASE MATERIALS CAN BE USED IN LIEU OF THIS LAYER.	AASHTO M145[1] A-1, A-2-4, A-3 OR AASHTO M43[1] 3, 357, 4, 467, 5, 56, 57, 6, 67, 68, 7, 78, 8, 89, 9, 10	BEGIN COMPACTIONS AFTER 12" (300 mm) OF MATERIAL OVER THE CHAMBERS IS REACHED. COMPACT ADDITIONAL LAYERS IN 6" (150 mm) MAX LIFTS TO A MIN. 95% PROCTOR DENSITY FOR WELL GRADED MATERIAL AND 95% RELATIVE DENSITY FOR PROCESSED AGGREGATE MATERIALS. ROLLER GROSS VEHICLE WEIGHT NOT TO EXCEED 12,000 lbs (53 kN). DYNAMIC FORCE NOT TO EXCEED 20,000 lbs (89 kN).
B	**EMBEDMENT STONE:** FILL SURROUNDING THE CHAMBERS FROM THE FOUNDATION STONE ('A' LAYER) TO THE 'C' LAYER ABOVE.	CLEAN, CRUSHED, ANGULAR STONE	AASHTO M43[1] 3, 357, 4, 467, 5, 56, 57	NO COMPACTION REQUIRED.
A	**FOUNDATION STONE:** FILL BELOW CHAMBERS FROM THE SUBGRADE UP TO THE FOOT (BOTTOM) OF THE CHAMBER.	CLEAN, CRUSHED, ANGULAR STONE	AASHTO M43[1] 3, 357, 4, 467, 5, 56, 57	PLATE COMPACT OR ROLL TO ACHIEVE A FLAT SURFACE.[2,3]

PLEASE NOTE:
1. THE LISTED AASHTO DESIGNATIONS ARE FOR GRADATIONS ONLY. THE STONE MUST ALSO BE CLEAN, CRUSHED, ANGULAR. FOR EXAMPLE, A SPECIFICATION FOR #4 STONE WOULD STATE: "CLEAN, CRUSHED, ANGULAR NO. 4 (AASHTO M43) STONE".
2. STORMTECH COMPACTION REQUIREMENTS ARE MET FOR 'A' LOCATION MATERIALS WHEN PLACED AND COMPACTED IN 6" (150 mm) (MAX) LIFTS USING TWO FULL COVERAGES WITH A VIBRATORY COMPACTOR.
3. WHERE INFILTRATION SURFACES MAY BE COMPROMISED BY COMPACTION, FOR STANDARD DESIGN LOAD CONDITIONS, A FLAT SURFACE MAY BE ACHIEVED BY RAKING OR DRAGGING WITHOUT COMPACTION EQUIPMENT. FOR SPECIAL LOAD DESIGNS, CONTACT STORMTECH FOR COMPACTION REQUIREMENTS.
4. ONCE LAYER 'C' IS PLACED, ANY SOIL/MATERIAL CAN BE PLACED IN LAYER 'D' UP TO THE FINISHED GRADE. MOST PAVEMENT SUBBASE SOILS CAN BE USED TO REPLACE THE MATERIAL REQUIREMENTS OF LAYER 'C' OR 'D' AT THE SITE DESIGN ENGINEER'S DISCRETION.



	SOUTH SYSTEM
A	97.43
B	96.93
C	95.60
D	95.10

NOTES:
1. CHAMBERS SHALL MEET THE REQUIREMENTS OF ASTM F2922 (POLETHYLENE) OR ASTM F2418 (POLYPROPYLENE), "STANDARD SPECIFICATION FOR CORRUGATED WALL STORMWATER COLLECTION CHAMBERS".
2. SC-310 CHAMBERS SHALL BE DESIGNED IN ACCORDANCE WITH ASTM F2787 "STANDARD PRACTICE FOR STRUCTURAL DESIGN OF THERMOPLASTIC CORRUGATED WALL STORMWATER COLLECTION CHAMBERS".
3. THE SITE DESIGN ENGINEER IS RESPONSIBLE FOR ASSESSING THE BEARING RESISTANCE (ALLOWABLE BEARING CAPACITY) OF THE SUBGRADE SOILS AND THE DEPTH OF FOUNDATION STONE WITH CONSIDERATION FOR THE RANGE OF EXPECTED SOIL MOISTURE CONDITIONS.
4. PERIMETER STONE MUST BE EXTENDED HORIZONTALLY TO THE EXCAVATION WALL FOR BOTH VERTICAL AND SLOPED EXCAVATION WALLS.
5. REQUIREMENTS FOR HANDLING AND INSTALLATION:
   - TO MAINTAIN THE WIDTH OF CHAMBERS DURING SHIPPING AND HANDLING, CHAMBERS SHALL HAVE INTEGRAL, INTERLOCKING STACKING LUGS.
   - TO ENSURE A SECURE JOINT DURING INSTALLATION AND BACKFILL, THE HEIGHT OF THE CHAMBER JOINT SHALL NOT BE LESS THAN 2".
   - TO ENSURE THE INTEGRITY OF THE ARCH SHAPE DURING INSTALLATION, a) THE ARCH STIFFNESS CONSTANT AS DEFINED IN SECTION 6.2.8 OF ASTM F2922 SHALL BE GREATER THAN OR EQUAL TO 400 LBS/FT/% AND b) TO RESIST CHAMBER DEFORMATION DURING INSTALLATION AT ELEVATED TEMPERATURES (ABOVE 73° F / 23° C), CHAMBERS SHALL BE PRODUCED FROM REFLECTIVE GOLD OR YELLOW COLORS.
6. PLACE 40 MIL (HDPE) POND AND CANAL LINER OR EQUAL ON SUBGRADE EXTENDING THE ENTIRE EXCAVATED AREA AND UP EXCAVATED WALLS ONE FOOT PRIOR TO PLACING GEOSYNTHETIC FABRIC.

Exhibit "F"
Engineering/Construction Verification

DATE: _____

TO: City of Waukesha

FROM: _____[Project Engineer's Name/Company]

RE: Engineering/Construction Verification for the following project:

Project Name: _____

Section _____, Town of _____

Storm Water Management & Erosion Control Permit # _____

Storm Water Management Practices: _____

_____

For the above-referenced project and storm water management practices, this correspondence shall serve as verification that: 1) all site inspections outlined in approved inspection plans have been successfully completed; and 2) the storm water management practice design data presented in Exhibit D, and the "as-built" construction documentation presented in Exhibit E comply with all applicable state and local technical standards, in accordance with the City of Waukesha Storm Water Management and Erosion Control Ordinance.

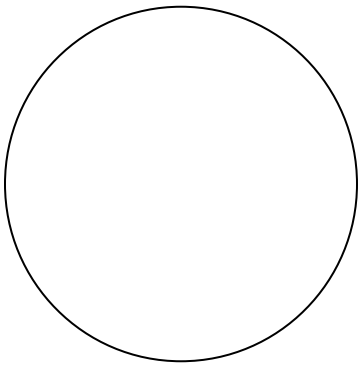
[Must include one of the following two statements:]

1. Any variations from the originally approved construction plans are noted in Exhibit E. These variations are considered to be within the tolerances of standard construction techniques and do not affect the original design as presented in Exhibit D in any way.
[Note: The City may request additional documentation to support this statement depending on the extent of deviations from the approved plans.]

Or

2. Any design or construction changes from the originally approved construction plans are documented in Exhibits D and E and have been approved by the City of Waukesha.

[Note: If warm season and wetland planting verification is required, it may be included in this exhibit.]



(Signed P.E. stamp must be included)

Exhibit G
Storm Water Management and Erosion Control Permit Termination

Project Identifier: Waukesha Genesis

Location: **Recorded as CSM TBD, on 07/22/2022**

A redivision of Lot 1 and Lot 2 of the Certified Survey Map No. 12248, being part of the Northeast ¼ of the Southeast ¼ of Section 35, the Northwest ¼ of the Southwest ¼, and the Southwest ¼ of the Northwest ¼ of Section 36, all in Township 7 North, Range 19 East, in the City of Waukesha, Waukesha County, WI.

Storm Water Management and Erosion Control Permit Holder's Name:

_____

Storm Water Management & Erosion Control Permit #: _____

Chapter 32 – City of Waukesha Storm Water Management and Erosion Control requires that all newly constructed storm water management practices be maintained by the Storm Water and Erosion Control Permit Holder until permit termination, after which maintenance responsibilities shall be transferred to the responsible party identified on the subdivision plat [or CSM] and referenced in this Maintenance Agreement.

Upon execution below, this exhibit shall serve to certify that the Storm Water Permit Holder has satisfied all requirements of the Storm Water Management and Erosion Control Ordinance and that the City of Waukesha has terminated the Storm Water Management and Erosion Control Permit for the property covered by this Maintenance Agreement.

Dated this ___ day of _____, 202_.

City of Waukesha representative:

_____

(Signature)

_____

(Typed Name and Title)

Acknowledgements

State of Wisconsin
County of Waukesha

Personally came before me this ____ day of _____, 202_, the above named _____ to me known to be the person who executed the foregoing instrument and acknowledged the same.

_____.
[Name]
Notary Public, Waukesha County, WI
My commission expires: _____

City of Waukesha
Underground Detention System Inspection and Maintenance Checklist

Facility:			
Location/Address:			
Date:	**Time:**	**Weather Conditions:**	**Date of Last Inspection:**
Inspector:		**Title:**	
Rain in Last 48 Hours: ☐ **Yes** ☐ **No**		**If yes, list amount and timing:**	
Pretreatment: ☐ **vegetated filter strip** ☐ **swale** ☐ **turf grass** ☐ **forebay** ☐ **other, specify:** ☐ **none**			
Site Plan or As-Built Plan Available: ☐ **Yes** ☐ **No**			

*Do not enter underground detention chambers to inspect system unless Occupational Safety & Health Administration (OSHA) regulations for confined space entry are followed.
*Follow inspection and maintenance instructions and schedules provided by system manufacturer and installer.
*Properly dispose of all wastes.

Inspection Item		**Comment**	**Action Needed**
1. PRETREATMENT			
Sediment has accumulated.	☐ Yes ☐ No ☐ N/A		☐ Yes ☐ No
Trash and debris have accumulated.	☐ Yes ☐ No ☐ N/A		☐ Yes ☐ No
2. INLETS			
Inlets are in poor structural condition.	☐ Yes ☐ No ☐ N/A		☐ Yes ☐ No
Sediment, trash, or debris have accumulated and/or is blocking the inlets.	☐ Yes ☐ No ☐ N/A		☐ Yes ☐ No
3. CHAMBERS			
Sediment accumulation threshold has been reached.	☐ Yes ☐ No ☐ N/A		☐ Yes ☐ No
Trash and debris have accumulated in chambers.	☐ Yes ☐ No ☐ N/A		☐ Yes ☐ No
4. CHAMBERS			
Structural deterioration is evident.	☐ Yes ☐ No ☐ N/A		☐ Yes ☐ No
5. OUTLETS			
Outlets in poor structural condition.	☐ Yes ☐ No ☐ N/A		☐ Yes ☐ No
Sediment, trash or debris are blocking outlets.	☐ Yes ☐ No ☐ N/A		☐ Yes ☐ No
Erosion is occurring around outlets.	☐ Yes ☐ No ☐ N/A		☐ Yes ☐ No
6. OTHER			
Evidence of ponding water on area draining to system.	☐ Yes ☐ No ☐ N/A		☐ Yes ☐ No
Evidence that water is not being conveyed through the system.	☐ Yes ☐ No ☐ N/A		☐ Yes ☐ No
Additional Notes			

Rev. Date _____

Wet Weather inspection needed ☐ **Yes** ☐ **No**

Photo 1: Click or tap here to enter text.

Photo 2: Click or tap here to enter text.

Photo 3: Click or tap here to enter text.

Photo 4: Click or tap here to enter text.

APPENDIX G
Hydrology Exhibit

WATERSHED E-1
AREA: 0.61 AC
RCN: 94
TC: 6 MIN

SOURCE AREAS:
0.04 AC GRASS
0.47 AC PAVEMENT
0.00 SIDEWALK
0.10 AC ROOF

WATERSHED E-3
AREA: 0.86 AC
RCN: 77
TC: 6 MIN

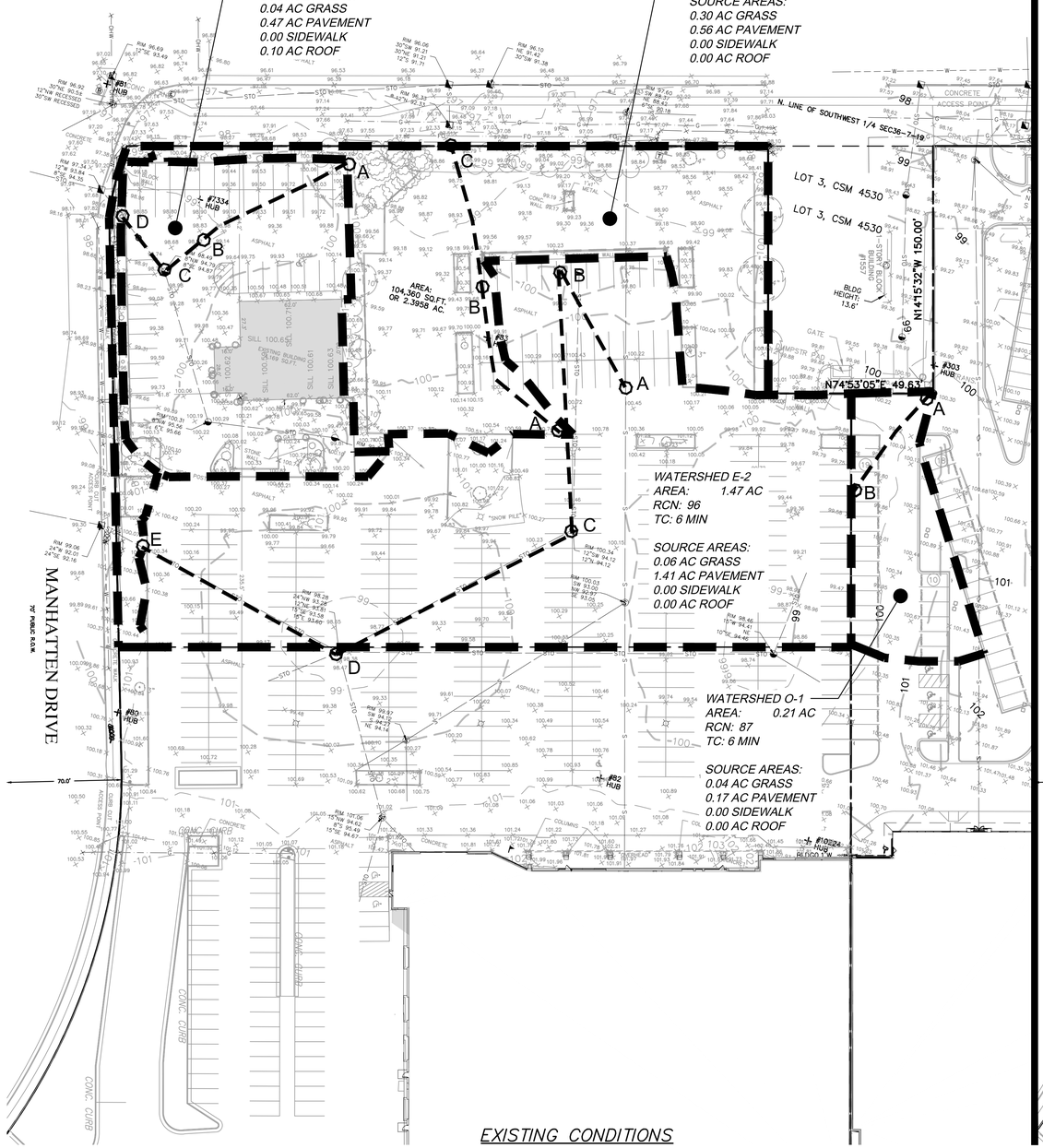
SOURCE AREAS:
0.30 AC GRASS
0.56 AC PAVEMENT
0.00 SIDEWALK
0.00 AC ROOF

WATERSHED E-2
AREA: 1.47 AC
RCN: 96
TC: 6 MIN

SOURCE AREAS:
0.06 AC GRASS
1.41 AC PAVEMENT
0.00 SIDEWALK
0.00 AC ROOF

WATERSHED O-1
AREA: 0.21 AC
RCN: 87
TC: 6 MIN

SOURCE AREAS:
0.04 AC GRASS
0.17 AC PAVEMENT
0.00 SIDEWALK
0.00 AC ROOF



EXISTING CONDITIONS

WATERSHED P-1
AREA: 1.00 AC
RCN: 95
TC: 6 MIN

SOURCE AREAS:
0.05 AC GRASS
0.88 AC PAVEMENT
0.07 SIDEWALK
0.00 AC ROOF

WATERSHED PU-1
AREA: 0.244 AC
RCN: 47
TC: 6 MIN

SOURCE AREAS:
0.21 AC GRASS
0.03 AC PAVEMENT
0.004 SIDEWALK
0.00 AC ROOF

WATERSHED P-3
AREA: 0.76 AC
RCN: 95
TC: 6 MIN

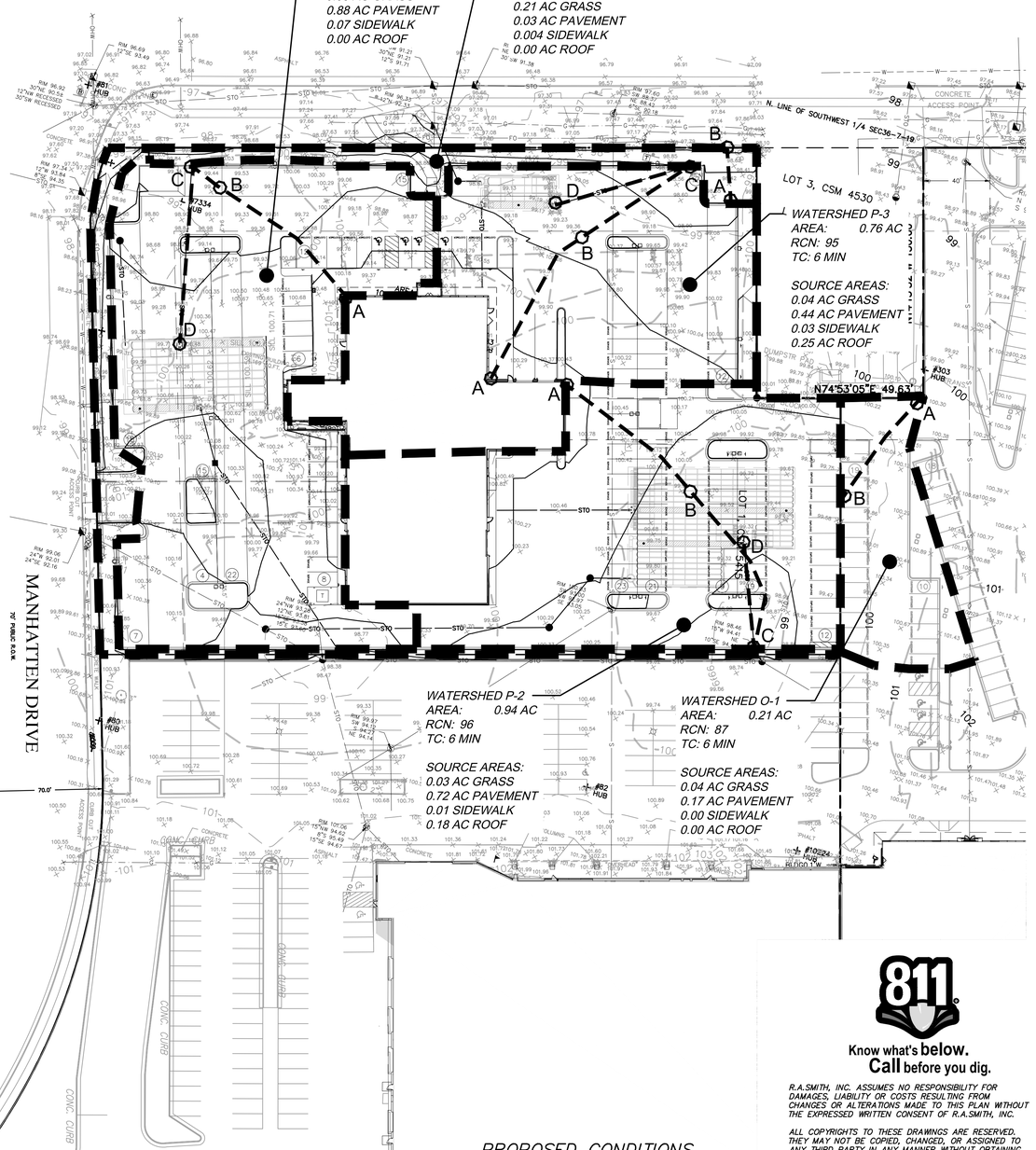
SOURCE AREAS:
0.04 AC GRASS
0.44 AC PAVEMENT
0.03 SIDEWALK
0.25 AC ROOF

WATERSHED P-2
AREA: 0.94 AC
RCN: 96
TC: 6 MIN

SOURCE AREAS:
0.03 AC GRASS
0.72 AC PAVEMENT
0.01 SIDEWALK
0.18 AC ROOF

WATERSHED O-1
AREA: 0.21 AC
RCN: 87
TC: 6 MIN

SOURCE AREAS:
0.04 AC GRASS
0.17 AC PAVEMENT
0.00 SIDEWALK
0.00 AC ROOF



PROPOSED CONDITIONS

GRAPHIC SCALE
20 0 20 40 80
(IN FEET)

Know what's **below.**
Call before you dig.

DATE	DESCRIPTION

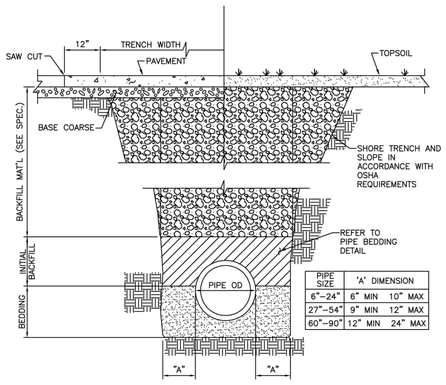
raSmith
CREATIVITY BEYOND ENGINEERING
16745 W. Bluemound Road
Brookfield, WI 53005-5938
(262) 781-1000
rasmith.com
Brookfield, WI | Milwaukee, WI | Appleton, WI | Madison, WI
Cedarburg, WI | Naperville, IL | Irvine, CA

WAUKESHA GENESIS
CITY OF WAUKESHA, WISCONSIN

HYDROLOGY EXHIBIT

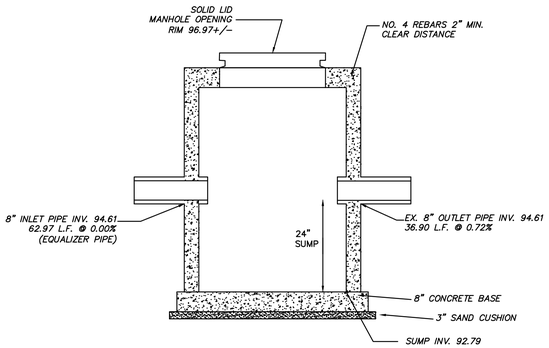
DATE: 07/22/2022
SCALE: 1" = 40'
JOB NO. 3210204.01
PROJECT MANAGER: RYAN J. LANCOUR, P.E.
DESIGNED BY: JJJ
CHECKED BY: RJL

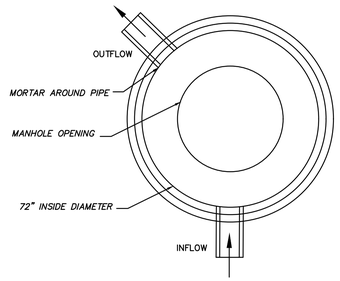
SHEET NUMBER
HX1.0



PIPE SIZE	'A' DIMENSION	
6"–24"	6" MIN	10" MAX
27"–54"	9" MIN	12" MAX
60"–90"	12" MIN	24" MAX

CITY OF WAUKESHA DEPARTMENT OF PUBLIC WORKS	STANDARD CONSTRUCTION DETAIL --PIPE TRENCH DETAIL--			
APPROVED: ALEX DAMITEN DATE:	DRAWN BY: JMETL DATE: 12/13/18	PLOT SCALE: 0.75:1	DETAIL NUMBER:	**05-0008**
APPROVED: DATE:	CHECKED BY: DATE:	PLOT DATE : 12/13/2018 8:16 AM	PROJECT NO:	

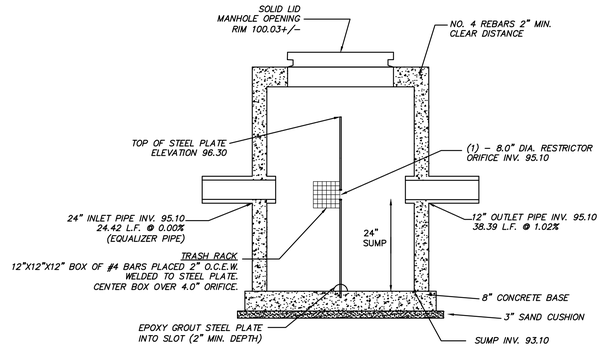


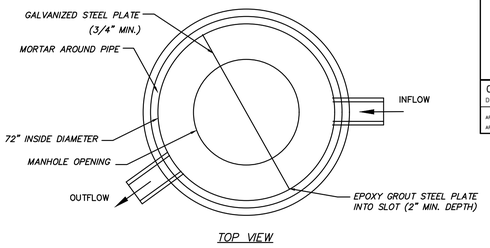


TOP VIEW

NOTES:
1. STRUCTURE SHALL BE CONSTRUCTED CONFORMING TO THE REQUIREMENTS OF ASTM C-478.
2. REINFORCING STEEL NOT SHOWN

STO 105 OUTLET STRUCTURE DETAIL

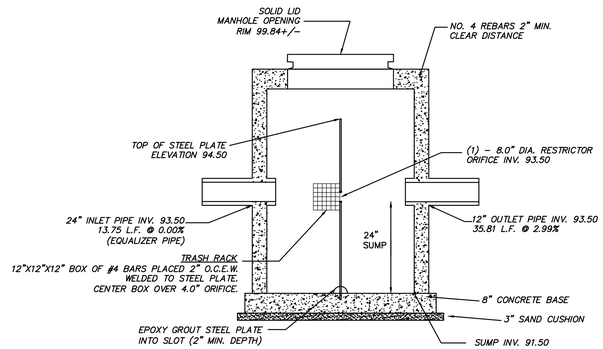


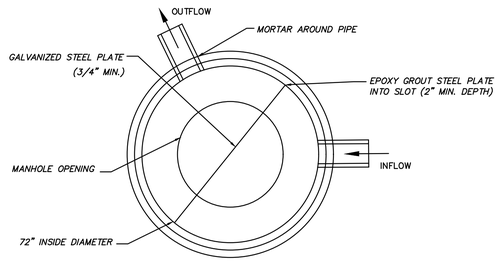


TOP VIEW

NOTES:
1. STRUCTURE SHALL BE CONSTRUCTED CONFORMING TO THE REQUIREMENTS OF ASTM C-478.
2. REINFORCING STEEL NOT SHOWN

STO 410 OUTLET STRUCTURE DETAIL

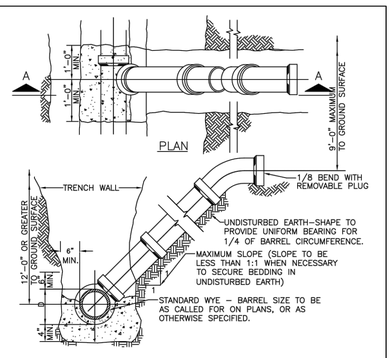


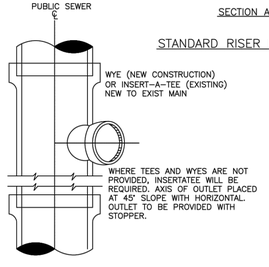


TOP VIEW

NOTES:
1. STRUCTURE SHALL BE CONSTRUCTED CONFORMING TO THE REQUIREMENTS OF ASTM C-478.
2. REINFORCING STEEL NOT SHOWN

STO 905 OUTLET STRUCTURE DETAIL



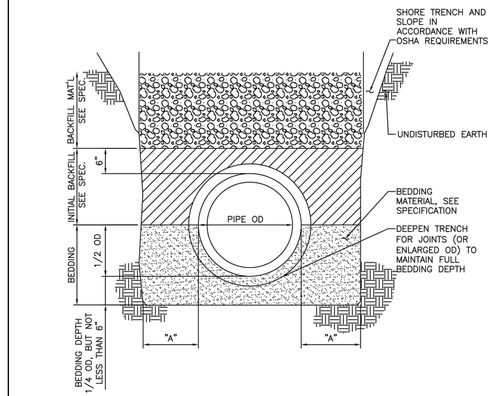


STANDARD RISER FOR SERVICE CONNECTION

NOTE:
1. RISERS TO BE CONSTRUCTED WHERE SEWER DEPTH EXCEEDS 12'-0".

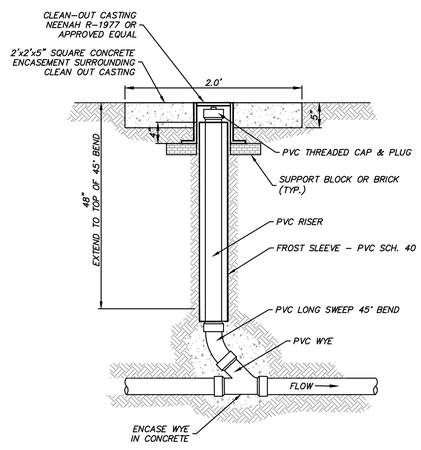
STANDARD SERVICE CONNECTION

CITY OF WAUKESHA DEPARTMENT OF PUBLIC WORKS	STANDARD CONSTRUCTION DETAIL -STANDARD SERVICE CONNECTION -			
APPROVED: ALEX DAMITEN DATE:	DRAWN BY: JMETL DATE: 12/13/18	PLOT SCALE: 1"=1'	DETAIL NUMBER:	**05-0156**
APPROVED: DATE:	CHECKED BY: DATE:	PLOT DATE : 12/13/2018 8:19 AM	PROJECT NO:	



NOTES:
1. REFER TO PIPE TRENCH DETAIL.
2. TRANSITION OF BEDDING TYPES SHALL ONLY BE MADE AT PIPE JOINTS.
3. COMPACTION SHALL NOT BE DONE IN LAYERS MORE THAN 12" THICK.
4. BACKFILL SHALL BE COMPACTED TO NOT LESS THAN 90% STANDARD PROCTOR.

CITY OF WAUKESHA DEPARTMENT OF PUBLIC WORKS	STANDARD CONSTRUCTION DETAIL --PIPE BEDDING DETAIL--			
APPROVED: ALEX DAMITEN DATE:	DRAWN BY: JMETL DATE: 12/13/18	PLOT SCALE: 0.800000	DETAIL NUMBER:	**05-0011**
APPROVED: DATE:	CHECKED BY: DATE:	PLOT DATE : 12/13/2018 8:17 AM	PROJECT NO:	



CLEAN-OUT STRUCTURE
SECTION VIEW

811 Know what's below. Call before you dig.

DATE	DESCRIPTION

raSmith
CREATIVITY BEYOND ENGINEERING
16745 W. Bluemound Road
Brookfield, WI 53005-5938
(262) 781-1000
rasmith.com
Brookfield, WI | Milwaukee, WI | Appleton, WI | Madison, WI
Cedarburg, WI | Naperville, IL | Irvine, CA

WAUKESHA GENESIS
CITY OF WAUKESHA, WISCONSIN

UTILITY DETAILS

DATE: 07/22/2022
SCALE: N.T.S.
JOB NO. 3210204.01
PROJECT MANAGER: RYAN J. LANCOUR, P.E.
DESIGNED BY: JJJ
CHECKED BY: RJL

SHEET NUMBER
C502

PROJECT INFORMATION	
ENGINEERED PRODUCT MANAGER:	JAKE BRUNOEHLER 262-794-2306 JAKE.BRUNOEHLER@ADSPIPE.COM
ADS SALES REP:	THEO TAYLOR 608-518-1254 THEO.TAYLOR@ADSPIPE.COM
PROJECT NO:	S307399

Advanced Drainage Systems, Inc.

SiteAssist™ FOR STORMTECH INSTALLATION INSTRUCTIONS VISIT OUR APP

WAUKESHA GENESIS

WAUKESHA, WI

SC-740 STORMTECH CHAMBER SPECIFICATIONS

1. CHAMBERS SHALL BE STORMTECH SC-740.
2. CHAMBERS SHALL BE ARCH-SHAPED AND SHALL BE MANUFACTURED FROM VIRGIN, IMPACT-MODIFIED POLYPROPYLENE COPOLYMERS.
3. CHAMBERS SHALL MEET THE REQUIREMENTS OF ASTM F2418, "STANDARD SPECIFICATION FOR POLYPROPYLENE (PP) CORRUGATED WALL STORMWATER COLLECTION CHAMBERS".
4. CHAMBER ROWS SHALL PROVIDE CONTINUOUS, UNOBSTRUCTED INTERNAL SPACE WITH NO INTERNAL SUPPORTS THAT WOULD IMPEDE FLOW OR LIMIT ACCESS FOR INSPECTION.
5. THE STRUCTURAL DESIGN OF THE CHAMBERS, THE STRUCTURAL BACKFILL, AND THE INSTALLATION REQUIREMENTS SHALL ENSURE THAT THE LOAD FACTORS SPECIFIED IN THE AASHTO LRFD BRIDGE DESIGN SPECIFICATIONS, SECTION 12.12, ARE MET FOR: 1) LONG-DURATION DEAD LOADS AND 2) SHORT-DURATION LIVE LOADS, BASED ON THE AASHTO DESIGN TRUCK WITH CONSIDERATION FOR IMPACT AND MULTIPLE VEHICLE PRESENCES.
6. CHAMBERS SHALL BE DESIGNED, TESTED AND ALLOWABLE LOAD CONFIGURATIONS DETERMINED IN ACCORDANCE WITH ASTM F2787, "STANDARD PRACTICE FOR STRUCTURAL DESIGN OF THERMOPLASTIC CORRUGATED WALL STORMWATER COLLECTION CHAMBERS". LOAD CONFIGURATIONS SHALL INCLUDE: 1) INSTANTANEOUS (<1 MIN) AASHTO DESIGN TRUCK LIVE LOAD ON MINIMUM COVER 2) MAXIMUM PERMANENT (75-YR) COVER LOAD AND 3) ALLOWABLE COVER WITH PARKED (1-WEEK) AASHTO DESIGN TRUCK.
7. REQUIREMENTS FOR HANDLING AND INSTALLATION:
   - TO MAINTAIN THE WIDTH OF CHAMBERS DURING SHIPPING AND HANDLING, CHAMBERS SHALL HAVE INTEGRAL, INTERLOCKING STACKING LUGS.
   - TO ENSURE A SECURE JOINT DURING INSTALLATION AND BACKFILL, THE HEIGHT OF THE CHAMBER JOINT SHALL NOT BE LESS THAN 2".
   - TO ENSURE THE INTEGRITY OF THE ARCH SHAPE DURING INSTALLATION, a) THE ARCH STIFFNESS CONSTANT SHALL BE GREATER THAN OR EQUAL TO 550 LBS/FT/%. THE ASC IS DEFINED IN SECTION 6.2.8 OF ASTM F2418. AND b) TO RESIST CHAMBER DEFORMATION DURING INSTALLATION AT ELEVATED TEMPERATURES (ABOVE 73° F / 23° C), CHAMBERS SHALL BE PRODUCED FROM REFLECTIVE GOLD OR YELLOW COLORS.
8. ONLY CHAMBERS THAT ARE APPROVED BY THE SITE DESIGN ENGINEER WILL BE ALLOWED. UPON REQUEST BY THE SITE DESIGN ENGINEER OR OWNER, THE CHAMBER MANUFACTURER SHALL SUBMIT A STRUCTURAL EVALUATION FOR APPROVAL BEFORE DELIVERING CHAMBERS TO THE PROJECT SITE AS FOLLOWS:
   - THE STRUCTURAL EVALUATION SHALL BE SEALED BY A REGISTERED PROFESSIONAL ENGINEER.
   - THE STRUCTURAL EVALUATION SHALL DEMONSTRATE THAT THE SAFETY FACTORS ARE GREATER THAN OR EQUAL TO 1.95 FOR DEAD LOAD AND 1.75 FOR LIVE LOAD, THE MINIMUM REQUIRED BY ASTM F2787 AND BY SECTIONS 3 AND 12.12 OF THE AASHTO LRFD BRIDGE DESIGN SPECIFICATIONS FOR THERMOPLASTIC PIPE.
   - THE TEST DERIVED CREEP MODULUS AS SPECIFIED IN ASTM F2418 SHALL BE USED FOR PERMANENT DEAD LOAD DESIGN EXCEPT THAT IT SHALL BE THE 75-YEAR MODULUS USED FOR DESIGN.
9. CHAMBERS AND END CAPS SHALL BE PRODUCED AT AN ISO 9001 CERTIFIED MANUFACTURING FACILITY.

IMPORTANT - NOTES FOR THE BIDDING AND INSTALLATION OF THE SC-740 SYSTEM

1. STORMTECH SC-740 CHAMBERS SHALL NOT BE INSTALLED UNTIL THE MANUFACTURER'S REPRESENTATIVE HAS COMPLETED A PRE-CONSTRUCTION MEETING WITH THE INSTALLERS.
2. STORMTECH SC-740 CHAMBERS SHALL BE INSTALLED IN ACCORDANCE WITH THE "STORMTECH SC-310/SC-740/DC-780 CONSTRUCTION GUIDE".
3. CHAMBERS ARE NOT TO BE BACKFILLED WITH A DOZER OR AN EXCAVATOR SITUATED OVER THE CHAMBERS. STORMTECH RECOMMENDS 3 BACKFILL METHODS:
   - STONESHOOTER LOCATED OFF THE CHAMBER BED.
   - BACKFILL AS ROWS ARE BUILT USING AN EXCAVATOR ON THE FOUNDATION STONE OR SUBGRADE.
   - BACKFILL FROM OUTSIDE THE EXCAVATION USING A LONG BOOM HOE OR EXCAVATOR.
4. THE FOUNDATION STONE SHALL BE LEVELED AND COMPACTED PRIOR TO PLACING CHAMBERS.
5. JOINTS BETWEEN CHAMBERS SHALL BE PROPERLY SEATED PRIOR TO PLACING STONE.
6. MAINTAIN MINIMUM - 6" (150 mm) SPACING BETWEEN THE CHAMBER ROWS.
7. EMBEDMENT STONE SURROUNDING CHAMBERS MUST BE A CLEAN, CRUSHED, ANGULAR STONE 3/4-2" (20-50 mm).
8. THE CONTRACTOR MUST REPORT ANY DISCREPANCIES WITH CHAMBER FOUNDATION MATERIALS BEARING CAPACITIES TO THE SITE DESIGN ENGINEER.
9. ADS RECOMMENDS THE USE OF "FLEXSTORM CATCH IT" INSERTS DURING CONSTRUCTION FOR ALL INLETS TO PROTECT THE SUBSURFACE STORMWATER MANAGEMENT SYSTEM FROM CONSTRUCTION SITE RUNOFF.

NOTES FOR CONSTRUCTION EQUIPMENT

1. STORMTECH SC-740 CHAMBERS SHALL BE INSTALLED IN ACCORDANCE WITH THE "STORMTECH SC-310/SC-740/DC-780 CONSTRUCTION GUIDE".
2. THE USE OF CONSTRUCTION EQUIPMENT OVER SC-740 CHAMBERS IS LIMITED:
   - NO EQUIPMENT IS ALLOWED ON BARE CHAMBERS.
   - NO RUBBER TIRED LOADERS, DUMP TRUCKS, OR EXCAVATORS ARE ALLOWED UNTIL PROPER FILL DEPTHS ARE REACHED IN ACCORDANCE WITH THE "STORMTECH SC-310/SC-740/DC-780 CONSTRUCTION GUIDE".
   - WEIGHT LIMITS FOR CONSTRUCTION EQUIPMENT CAN BE FOUND IN THE "STORMTECH SC-310/SC-740/DC-780 CONSTRUCTION GUIDE".
3. FULL 36" (900 mm) OF STABILIZED COVER MATERIALS OVER THE CHAMBERS IS REQUIRED FOR DUMP TRUCK TRAVEL OR DUMPING.

USE OF A DOZER TO PUSH EMBEDMENT STONE BETWEEN THE ROWS OF CHAMBERS MAY CAUSE DAMAGE TO THE CHAMBERS AND IS NOT AN ACCEPTABLE BACKFILL METHOD. ANY CHAMBERS DAMAGED BY THE "DUMP AND PUSH" METHOD ARE NOT COVERED UNDER THE STORMTECH STANDARD WARRANTY.

CONTACT STORMTECH AT 1-888-892-2694 WITH ANY QUESTIONS ON INSTALLATION REQUIREMENTS OR WEIGHT LIMITS FOR CONSTRUCTION EQUIPMENT.

SiteAssist™ FOR STORMTECH INSTALLATION INSTRUCTIONS VISIT OUR APP

SC-310 STORMTECH CHAMBER SPECIFICATIONS

1. CHAMBERS SHALL BE STORMTECH SC-310.
2. CHAMBERS SHALL BE ARCH-SHAPED AND SHALL BE MANUFACTURED FROM VIRGIN, IMPACT-MODIFIED POLYPROPYLENE OR POLYETHYLENE COPOLYMERS.
3. CHAMBERS SHALL MEET THE REQUIREMENTS OF ASTM F2922 (POLETHYLENE) OR ASTM F2418 (POLYPROPYLENE), "STANDARD SPECIFICATION FOR CORRUGATED WALL STORMWATER COLLECTION CHAMBERS".
4. CHAMBER ROWS SHALL PROVIDE CONTINUOUS, UNOBSTRUCTED INTERNAL SPACE WITH NO INTERNAL SUPPORTS THAT WOULD IMPEDE FLOW OR LIMIT ACCESS FOR INSPECTION.
5. THE STRUCTURAL DESIGN OF THE CHAMBERS, THE STRUCTURAL BACKFILL AND THE INSTALLATION REQUIREMENTS SHALL ENSURE THAT THE LOAD FACTORS SPECIFIED IN THE AASHTO LRFD BRIDGE DESIGN SPECIFICATIONS, SECTION 12.12, ARE MET FOR: 1) LONG-DURATION DEAD LOADS AND 2) SHORT-DURATION LIVE LOADS, BASED ON THE AASHTO DESIGN TRUCK WITH CONSIDERATION FOR IMPACT AND MULTIPLE VEHICLE PRESENCES.
6. CHAMBERS SHALL BE DESIGNED, TESTED AND ALLOWABLE LOAD CONFIGURATIONS DETERMINED IN ACCORDANCE WITH ASTM F2787, "STANDARD PRACTICE FOR STRUCTURAL DESIGN OF THERMOPLASTIC CORRUGATED WALL STORMWATER COLLECTION CHAMBERS". LOAD CONFIGURATIONS SHALL INCLUDE: 1) INSTANTANEOUS (<1 MIN) AASHTO DESIGN TRUCK LIVE LOAD ON MINIMUM COVER 2) MAXIMUM PERMANENT (75-YR) COVER LOAD AND 3) ALLOWABLE COVER WITH PARKED (1-WEEK) AASHTO DESIGN TRUCK.
7. REQUIREMENTS FOR HANDLING AND INSTALLATION:
   - TO MAINTAIN THE WIDTH OF CHAMBERS DURING SHIPPING AND HANDLING, CHAMBERS SHALL HAVE INTEGRAL, INTERLOCKING STACKING LUGS.
   - TO ENSURE A SECURE JOINT DURING INSTALLATION AND BACKFILL, THE HEIGHT OF THE CHAMBER JOINT SHALL NOT BE LESS THAN 2".
   - TO ENSURE THE INTEGRITY OF THE ARCH SHAPE DURING INSTALLATION, a) THE ARCH STIFFNESS CONSTANT SHALL BE GREATER THAN OR EQUAL TO 400 LBS/FT/%. THE ASC IS DEFINED IN SECTION 6.2.8 OF ASTM F2418. AND b) TO RESIST CHAMBER DEFORMATION DURING INSTALLATION AT ELEVATED TEMPERATURES (ABOVE 73° F / 23° C), CHAMBERS SHALL BE PRODUCED FROM REFLECTIVE GOLD OR YELLOW COLORS.
8. ONLY CHAMBERS THAT ARE APPROVED BY THE SITE DESIGN ENGINEER WILL BE ALLOWED. UPON REQUEST BY THE SITE DESIGN ENGINEER OR OWNER, THE CHAMBER MANUFACTURER SHALL SUBMIT A STRUCTURAL EVALUATION FOR APPROVAL BEFORE DELIVERING CHAMBERS TO THE PROJECT SITE AS FOLLOWS:
   - THE STRUCTURAL EVALUATION SHALL BE SEALED BY A REGISTERED PROFESSIONAL ENGINEER.
   - THE STRUCTURAL EVALUATION SHALL DEMONSTRATE THAT THE SAFETY FACTORS ARE GREATER THAN OR EQUAL TO 1.95 FOR DEAD LOAD AND 1.75 FOR LIVE LOAD, THE MINIMUM REQUIRED BY ASTM F2787 AND BY SECTIONS 3 AND 12.12 OF THE AASHTO LRFD BRIDGE DESIGN SPECIFICATIONS FOR THERMOPLASTIC PIPE.
   - THE TEST DERIVED CREEP MODULUS AS SPECIFIED IN ASTM F2922 SHALL BE USED FOR PERMANENT DEAD LOAD DESIGN EXCEPT THAT IT SHALL BE THE 75-YEAR MODULUS USED FOR DESIGN.
9. CHAMBERS AND END CAPS SHALL BE PRODUCED AT AN ISO 9001 CERTIFIED MANUFACTURING FACILITY.

IMPORTANT - NOTES FOR THE BIDDING AND INSTALLATION OF THE SC-310 SYSTEM

1. STORMTECH SC-310 CHAMBERS SHALL NOT BE INSTALLED UNTIL THE MANUFACTURER'S REPRESENTATIVE HAS COMPLETED A PRE-CONSTRUCTION MEETING WITH THE INSTALLERS.
2. STORMTECH SC-310 CHAMBERS SHALL BE INSTALLED IN ACCORDANCE WITH THE "STORMTECH SC-310/SC-740/DC-780 CONSTRUCTION GUIDE".
3. CHAMBERS ARE NOT TO BE BACKFILLED WITH A DOZER OR AN EXCAVATOR SITUATED OVER THE CHAMBERS. STORMTECH RECOMMENDS 3 BACKFILL METHODS:
   - STONESHOOTER LOCATED OFF THE CHAMBER BED.
   - BACKFILL AS ROWS ARE BUILT USING AN EXCAVATOR ON THE FOUNDATION STONE OR SUBGRADE.
   - BACKFILL FROM OUTSIDE THE EXCAVATION USING A LONG BOOM HOE OR EXCAVATOR.
4. THE FOUNDATION STONE SHALL BE LEVELED AND COMPACTED PRIOR TO PLACING CHAMBERS.
5. JOINTS BETWEEN CHAMBERS SHALL BE PROPERLY SEATED PRIOR TO PLACING STONE.
6. MAINTAIN MINIMUM - 6" (150 mm) SPACING BETWEEN THE CHAMBER ROWS.
7. EMBEDMENT STONE SURROUNDING CHAMBERS MUST BE A CLEAN, CRUSHED, ANGULAR STONE 3/4-2" (20-50 mm).
8. THE CONTRACTOR MUST REPORT ANY DISCREPANCIES WITH CHAMBER FOUNDATION MATERIALS BEARING CAPACITIES TO THE SITE DESIGN ENGINEER.
9. ADS RECOMMENDS THE USE OF "FLEXSTORM CATCH IT" INSERTS DURING CONSTRUCTION FOR ALL INLETS TO PROTECT THE SUBSURFACE STORMWATER MANAGEMENT SYSTEM FROM CONSTRUCTION SITE RUNOFF.

NOTES FOR CONSTRUCTION EQUIPMENT

1. STORMTECH SC-310 CHAMBERS SHALL BE INSTALLED IN ACCORDANCE WITH THE "STORMTECH SC-310/SC-740/DC-780 CONSTRUCTION GUIDE".
2. THE USE OF CONSTRUCTION EQUIPMENT OVER SC-310 & SC-740 CHAMBERS IS LIMITED:
   - NO EQUIPMENT IS ALLOWED ON BARE CHAMBERS.
   - NO RUBBER TIRED LOADERS, DUMP TRUCKS, OR EXCAVATORS ARE ALLOWED UNTIL PROPER FILL DEPTHS ARE REACHED IN ACCORDANCE WITH THE "STORMTECH SC-310/SC-740/DC-780 CONSTRUCTION GUIDE".
   - WEIGHT LIMITS FOR CONSTRUCTION EQUIPMENT CAN BE FOUND IN THE "STORMTECH SC-310/SC-740/DC-780 CONSTRUCTION GUIDE".
3. FULL 36" (900 mm) OF STABILIZED COVER MATERIALS OVER THE CHAMBERS IS REQUIRED FOR DUMP TRUCK TRAVEL OR DUMPING.

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CONTACT STORMTECH AT 1-888-892-2694 WITH ANY QUESTIONS ON INSTALLATION REQUIREMENTS OR WEIGHT LIMITS FOR CONSTRUCTION EQUIPMENT.

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PROPOSED LAYOUT - NORTH SYSTEM

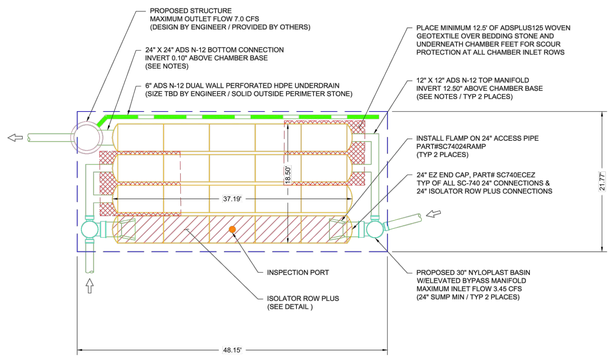
20	STORMTECH SC-740 CHAMBERS
8	STORMTECH SC-740 END CAPS
6	STONE ABOVE (in)
6	STONE BELOW (in)
40	% STONE VOID
2,019	**INSTALLED SYSTEM VOLUME (CF) (PERIMETER STONE INCLUDED)**
1048	SYSTEM AREA (ft²)
140	SYSTEM PERIMETER (ft)

PROPOSED ELEVATIONS - NORTH SYSTEM

104.50	MAXIMUM ALLOWABLE GRADE (TOP OF PAVEMENT/UNPAVED)
98.50	MINIMUM ALLOWABLE GRADE (UNPAVED WITH TRAFFIC)
98.00	MINIMUM ALLOWABLE GRADE (UNPAVED NO TRAFFIC)
98.00	MINIMUM ALLOWABLE GRADE (BASE OF FLEXIBLE PAVEMENT)
98.00	MINIMUM ALLOWABLE GRADE (TOP OF RIGID PAVEMENT)
97.00	TOP OF STONE
96.50	TOP OF SC-740 CHAMBER
95.04	12" TOP MANIFOLD INVERT
94.01	24" BOTTOM CONNECTION INVERT
94.01	24" ISOLATOR ROW PLUS CONNECTION INVERT
94.00	BOTTOM OF SC-740 CHAMBER
93.50	UNDERDRAIN INVERT
93.50	BOTTOM OF STONE

NOTES

- MANIFOLD SIZE TO BE DETERMINED BY SITE DESIGN ENGINEER. SEE TECHNICAL NOTE 6.32 FOR MANIFOLD SIZING GUIDANCE.
- DUE TO THE ADAPTATION OF THIS CHAMBER SYSTEM TO SPECIFIC SITE AND DESIGN CONSTRAINTS, IT MAY BE NECESSARY TO CUT AND COUPLE ADDITIONAL PIPE TO STANDARD MANIFOLD COMPONENTS IN THE FIELD.
- THIS CHAMBER SYSTEM WAS DESIGNED WITHOUT SITE-SPECIFIC INFORMATION ON SOIL CONDITIONS OR BEARING CAPACITY. THE SITE DESIGN ENGINEER IS RESPONSIBLE FOR DETERMINING THE SUITABILITY OF THE SOIL AND PROVIDING THE BEARING CAPACITY OF THE INSITU SOILS. THE BASE STONE DEPTH MAY BE INCREASED OR DECREASED ONCE THIS INFORMATION IS PROVIDED.



WAUKESHA GENESIS
WAUKESHA, WI
DATE: 07/18/22 DRAWN: MPV
PROJECT #: S307399 CHECKED: JPR

DATE	BY	DESCRIPTION
07/21/22	MPV	REVISE PER MARKUP
07/22/22	MPV	DRAWING CHKD

THIS DRAWING HAS BEEN PREPARED BASED ON INFORMATION PROVIDED TO ADS UNDER THE DIRECTION OF THE SITE DESIGN ENGINEER WHO, THE SITE DESIGN ENGINEER SHALL BE ULTIMATELY RESPONSIBLE FOR THE SITE DESIGN ENGINEERING TO ENSURE THAT THE PRODUCTS DEPICTED ARE ALL APPLICABLE LAWS, REGULATIONS, AND PROJECT REQUIREMENTS.

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4640 TRUEMAN BLVD
HILLIARD, OH 43026

0 10' 20'

SHEET 3 OF 12

PROPOSED LAYOUT - WEST SYSTEM

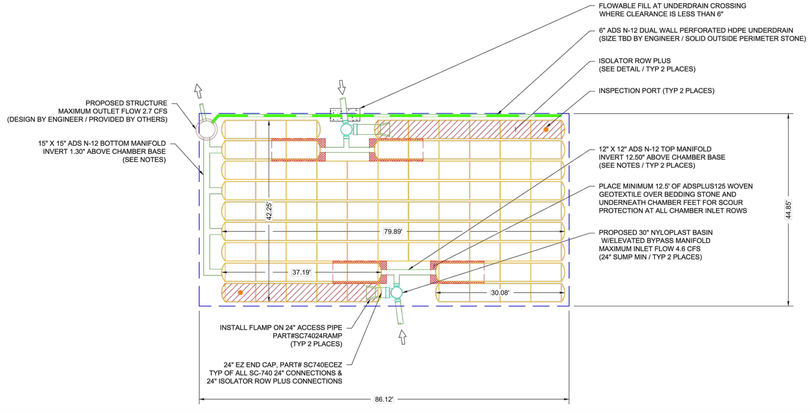
91	STORMTECH SC-740 CHAMBERS
26	STORMTECH SC-740 END CAPS
6	STONE ABOVE (in)
6	STONE BELOW (in)
40	% STONE VOID
7,917	**INSTALLED SYSTEM VOLUME (CF) (PERIMETER STONE INCLUDED)**
3863	SYSTEM AREA (ft²)
262	SYSTEM PERIMETER (ft)

PROPOSED ELEVATIONS - WEST SYSTEM

105.61	MAXIMUM ALLOWABLE GRADE (TOP OF PAVEMENT/UNPAVED)
99.61	MINIMUM ALLOWABLE GRADE (UNPAVED WITH TRAFFIC)
99.11	MINIMUM ALLOWABLE GRADE (UNPAVED NO TRAFFIC)
99.11	MINIMUM ALLOWABLE GRADE (BASE OF FLEXIBLE PAVEMENT)
99.11	MINIMUM ALLOWABLE GRADE (TOP OF RIGID PAVEMENT)
98.11	TOP OF STONE
97.61	TOP OF SC-740 CHAMBER
96.15	12" TOP MANIFOLD INVERT
95.22	15" BOTTOM MANIFOLD INVERT
95.12	24" ISOLATOR ROW PLUS CONNECTION INVERT
95.11	BOTTOM OF SC-740 CHAMBER
94.61	UNDERDRAIN INVERT
94.61	BOTTOM OF STONE

NOTES

- MANIFOLD SIZE TO BE DETERMINED BY SITE DESIGN ENGINEER. SEE TECHNICAL NOTE 6.32 FOR MANIFOLD SIZING GUIDANCE.
- DUE TO THE ADAPTATION OF THIS CHAMBER SYSTEM TO SPECIFIC SITE AND DESIGN CONSTRAINTS, IT MAY BE NECESSARY TO CUT AND COUPLE ADDITIONAL PIPE TO STANDARD MANIFOLD COMPONENTS IN THE FIELD.
- THIS CHAMBER SYSTEM WAS DESIGNED WITHOUT SITE-SPECIFIC INFORMATION ON SOIL CONDITIONS OR BEARING CAPACITY. THE SITE DESIGN ENGINEER IS RESPONSIBLE FOR DETERMINING THE SUITABILITY OF THE SOIL AND PROVIDING THE BEARING CAPACITY OF THE INSITU SOILS. THE BASE STONE DEPTH MAY BE INCREASED OR DECREASED ONCE THIS INFORMATION IS PROVIDED.



WAUKESHA GENESIS
WAUKESHA, WI
DATE: 07/18/22 DRAWN: MPV
PROJECT #: S307399 CHECKED: JPR

DATE	BY	DESCRIPTION
07/21/22	MPV	REVISE PER MARKUP
07/22/22	MPV	DRAWING CHKD

THIS DRAWING HAS BEEN PREPARED BASED ON INFORMATION PROVIDED TO ADS UNDER THE DIRECTION OF THE SITE DESIGN ENGINEER WHO, THE SITE DESIGN ENGINEER SHALL BE ULTIMATELY RESPONSIBLE FOR THE SITE DESIGN ENGINEERING TO ENSURE THAT THE PRODUCTS DEPICTED ARE ALL APPLICABLE LAWS, REGULATIONS, AND PROJECT REQUIREMENTS.

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HILLIARD, OH 43026

0 15' 30'

SHEET 4 OF 12

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DATE	DESCRIPTION

raSmith
CREATIVITY BEYOND ENGINEERING
16745 W. Bluemound Road
Brookfield, WI 53005-5938
(262) 781-1000
rasmith.com
Brookfield, WI | Milwaukee, WI | Appleton, WI | Madison, WI
Cedarburg, WI | Naperville, IL | Irvine, CA

WAUKESHA GENESIS
CITY OF WAUKESHA, WISCONSIN

UNDERGROUND STORAGE DETAILS

DATE: 07/22/2022
SCALE: N.T.S.
JOB NO. 3210204.01
PROJECT MANAGER: RYAN J. LANCOUR, P.E.
DESIGNED BY: JJJ
CHECKED BY: RJL

SHEET NUMBER
C503

PROPOSED LAYOUT - SOUTH SYSTEM

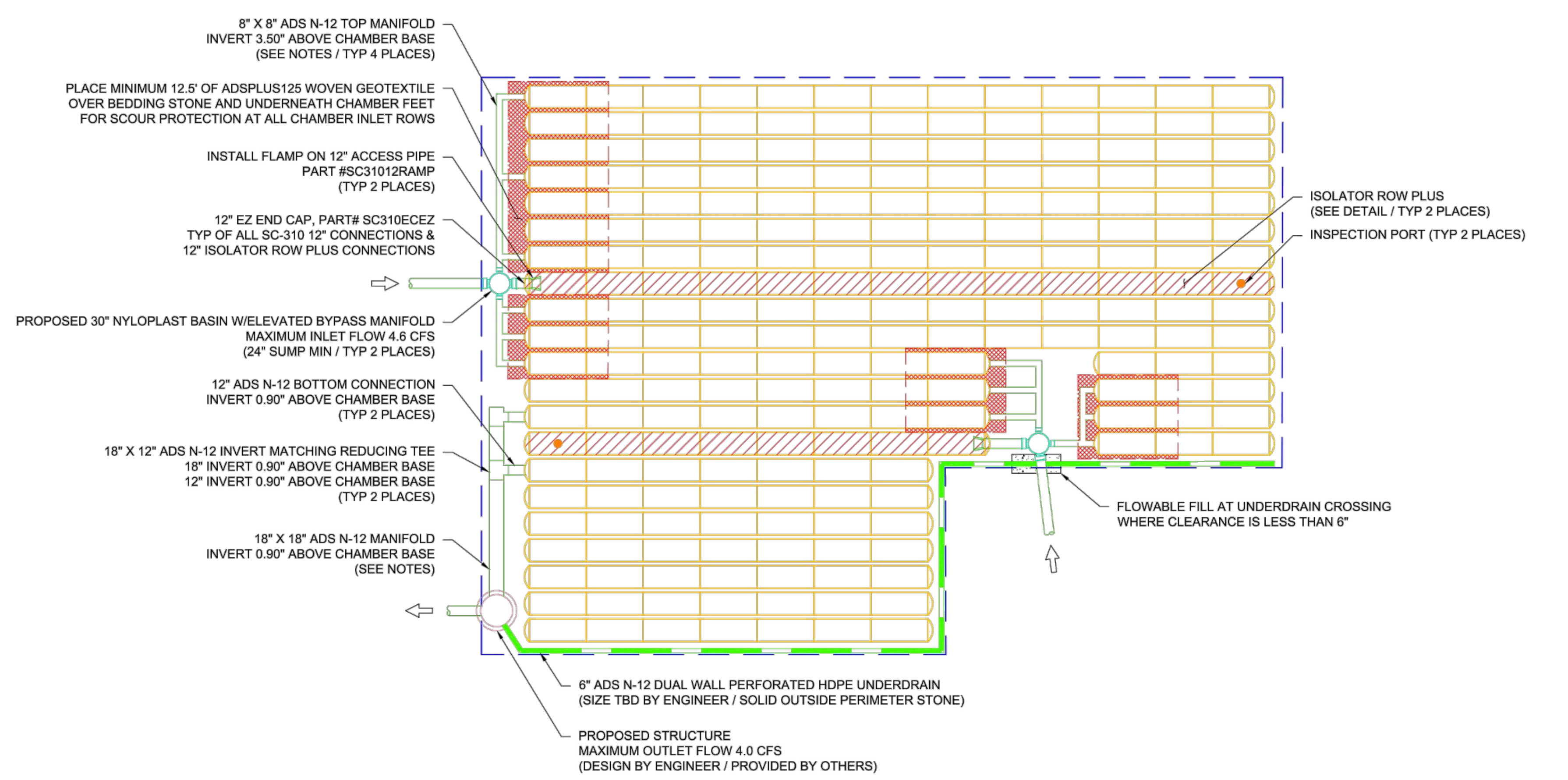
223	STORMTECH SC-310 CHAMBERS
50	STORMTECH SC-310 END CAPS
6	STONE ABOVE (in)
6	STONE BELOW (in)
40	% STONE VOID
7,794	**INSTALLED SYSTEM VOLUME (CF) (PERIMETER STONE INCLUDED)**
6235	SYSTEM AREA (ft²)
344	SYSTEM PERIMETER (ft)

PROPOSED ELEVATIONS - SOUTH SYSTEM

104.93	MAXIMUM ALLOWABLE GRADE (TOP OF PAVEMENT/UNPAVED)
98.93	MINIMUM ALLOWABLE GRADE (UNPAVED WITH TRAFFIC)
98.43	MINIMUM ALLOWABLE GRADE (UNPAVED NO TRAFFIC)
98.43	MINIMUM ALLOWABLE GRADE (BASE OF FLEXIBLE PAVEMENT)
98.43	MINIMUM ALLOWABLE GRADE (TOP OF RIGID PAVEMENT)
97.43	TOP OF STONE
96.93	TOP OF SC-310 CHAMBER
95.89	8" TOP MANIFOLD INVERT
95.68	12" ISOLATOR ROW PLUS CONNECTION INVERT
95.68	12" BOTTOM CONNECTION INVERT
95.68	18" BOTTOM MANIFOLD INVERT
95.60	BOTTOM OF SC-310 CHAMBER
95.10	UNDERDRAIN INVERT
95.10	BOTTOM OF STONE

NOTES

- MANIFOLD SIZE TO BE DETERMINED BY SITE DESIGN ENGINEER. SEE TECHNICAL NOTE 6.32 FOR MANIFOLD SIZING GUIDANCE.
- DUE TO THE ADAPTATION OF THIS CHAMBER SYSTEM TO SPECIFIC SITE AND DESIGN CONSTRAINTS, IT MAY BE NECESSARY TO CUT AND COUPLE ADDITIONAL PIPE TO STANDARD MANIFOLD COMPONENTS IN THE FIELD.
- THIS CHAMBER SYSTEM WAS DESIGNED WITHOUT SITE-SPECIFIC INFORMATION ON SOIL CONDITIONS OR BEARING CAPACITY. THE SITE DESIGN ENGINEER IS RESPONSIBLE FOR DETERMINING THE SUITABILITY OF THE SOIL AND PROVIDING THE BEARING CAPACITY OF THE INSITU SOILS. THE BASE STONE DEPTH MAY BE INCREASED OR DECREASED ONCE THIS INFORMATION IS PROVIDED.



8" X 8" ADS N-12 TOP MANIFOLD INVERT 3.50" ABOVE CHAMBER BASE (SEE NOTES / TYP 4 PLACES)
PLACE MINIMUM 12.5' OF ADSPLUS125 WOVEN GEOTEXTILE OVER BEDDING STONE AND UNDERNEATH CHAMBER FEET FOR SCOUR PROTECTION AT ALL CHAMBER INLET ROWS
INSTALL FLAMP ON 12" ACCESS PIPE PART #SC31012RAMP (TYP 2 PLACES)
12" EZ END CAP, PART# SC310ECEZ TYP OF ALL SC-310 12" CONNECTIONS & 12" ISOLATOR ROW PLUS CONNECTIONS
PROPOSED 30" NYLOPLAST BASIN W/ELEVATED BYPASS MANIFOLD MAXIMUM INLET FLOW 4.6 CFS (24" SUMP MIN / TYP 2 PLACES)
12" ADS N-12 BOTTOM CONNECTION INVERT 0.90" ABOVE CHAMBER BASE (TYP 2 PLACES)
18" X 12" ADS N-12 INVERT MATCHING REDUCING TEE 18" INVERT 0.90" ABOVE CHAMBER BASE 12" INVERT 0.90" ABOVE CHAMBER BASE (TYP 2 PLACES)
18" X 18" ADS N-12 MANIFOLD INVERT 0.90" ABOVE CHAMBER BASE (SEE NOTES)
ISOLATOR ROW PLUS (SEE DETAIL / TYP 2 PLACES)
INSPECTION PORT (TYP 2 PLACES)
FLOWABLE FILL AT UNDERDRAIN CROSSING WHERE CLEARANCE IS LESS THAN 6"
6" ADS N-12 DUAL WALL PERFORATED HDPE UNDERDRAIN (SIZE TBD BY ENGINEER / SOLID OUTSIDE PERIMETER STONE)
PROPOSED STRUCTURE MAXIMUM OUTLET FLOW 4.0 CFS (DESIGN BY ENGINEER / PROVIDED BY OTHERS)

WAUKESHA GENESIS
WAUKESHA, WI
DATE: 07/19/22 DRAWN: MPV
PROJECT #: S307399 CHECKED: JPR
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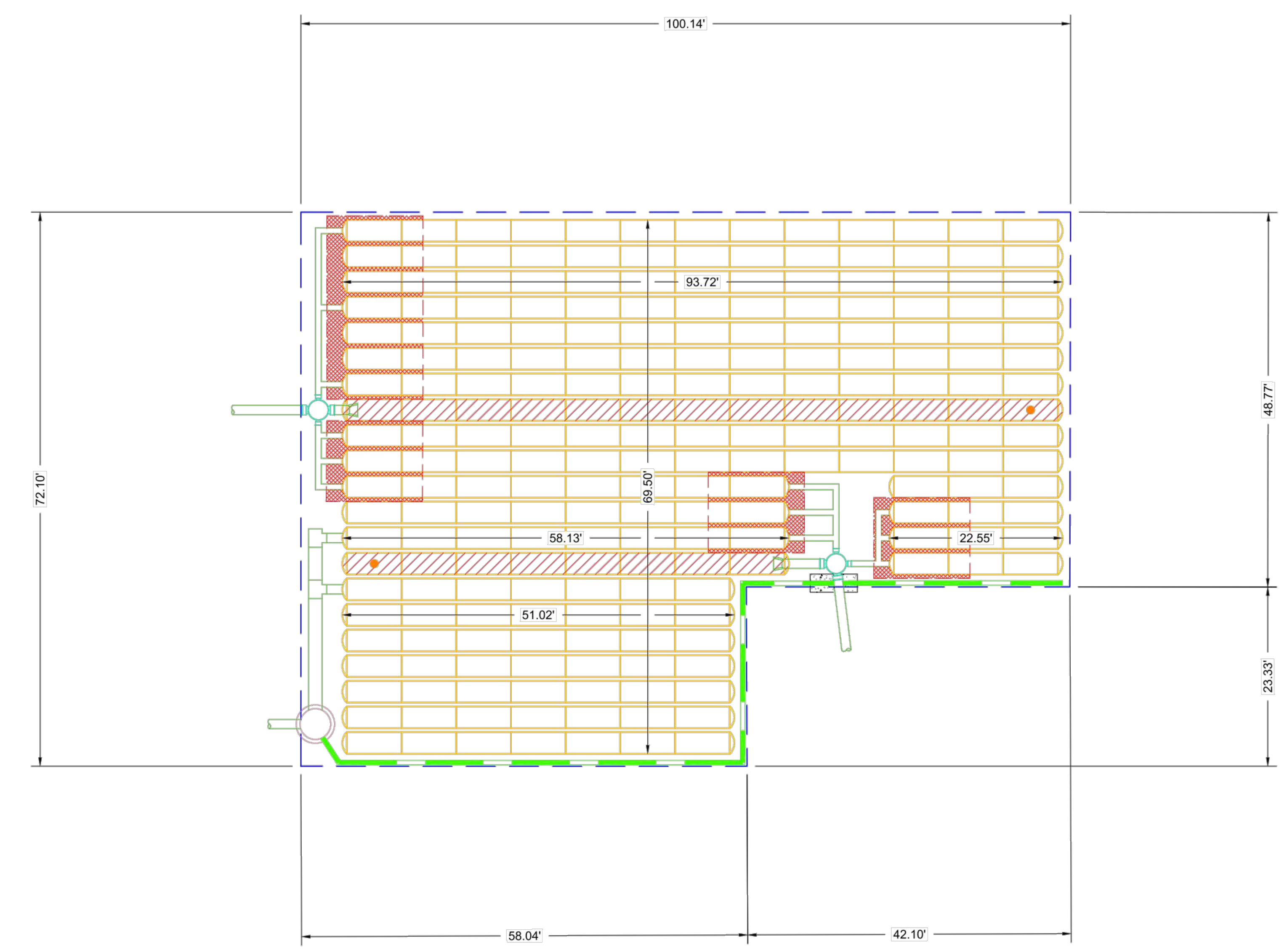

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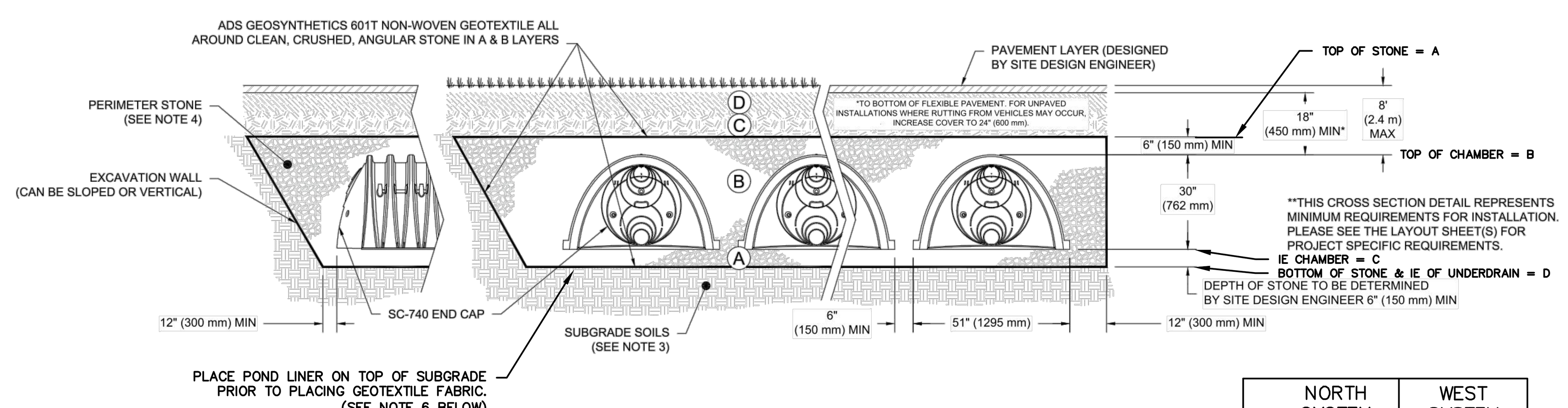
SHEET 6 OF 12

ACCEPTABLE FILL MATERIALS: STORMTECH SC-740 CHAMBER SYSTEMS

MATERIAL LOCATION		DESCRIPTION	AASHTO MATERIAL CLASSIFICATIONS	COMPACTION / DENSITY REQUIREMENT
D	**FINAL FILL:** FILL MATERIAL FOR LAYER 'D' STARTS FROM THE TOP OF THE 'C' LAYER TO THE BOTTOM OF FLEXIBLE PAVEMENT OR UNPAVED FINISHED GRADE ABOVE. NOTE THAT PAVEMENT SUBBASE MAY BE PART OF THE 'D' LAYER.	ANY SOIL/ROCK MATERIALS, NATIVE SOILS, OR PER ENGINEER'S PLANS. CHECK PLANS FOR PAVEMENT SUBGRADE REQUIREMENTS.	N/A	PREPARE PER SITE DESIGN ENGINEER'S PLANS. PAVED INSTALLATIONS MAY HAVE STRINGENT MATERIAL AND PREPARATION REQUIREMENTS.
C	**INITIAL FILL:** FILL MATERIAL FOR LAYER 'C' STARTS FROM THE TOP OF THE EMBEDMENT STONE ('B' LAYER) TO 18" (450 mm) ABOVE THE TOP OF THE CHAMBER. NOTE THAT PAVEMENT SUBBASE MAY BE A PART OF THE 'C' LAYER.	GRANULAR WELL-GRADED SOIL/AGGREGATE MIXTURES, <35% FINES OR PROCESSED AGGREGATE. MOST PAVEMENT SUBBASE MATERIALS CAN BE USED IN LIEU OF THIS LAYER.	AASHTO M145[1] A-1, A-2-4, A-3 OR AASHTO M43[1] 3, 357, 4, 467, 5, 56, 57, 6, 67, 68, 7, 78, 8, 89, 9, 10	BEGIN COMPACTIONS AFTER 12" (300 mm) OF MATERIAL OVER THE CHAMBERS IS REACHED. COMPACT ADDITIONAL LAYERS IN 6" (150 mm) MAX LIFTS TO A MIN. 95% PROCTOR DENSITY FOR WELL GRADED MATERIAL AND 95% RELATIVE DENSITY FOR PROCESSED AGGREGATE MATERIALS. ROLLER GROSS VEHICLE WEIGHT NOT TO EXCEED 12,000 lbs (53 kN). DYNAMIC FORCE NOT TO EXCEED 20,000 lbs (89 kN).
B	**EMBEDMENT STONE:** FILL SURROUNDING THE CHAMBERS FROM THE FOUNDATION STONE ('A' LAYER) TO THE 'C' LAYER ABOVE.	CLEAN, CRUSHED, ANGULAR STONE	AASHTO M43[1] 3, 357, 4, 467, 5, 56, 57	NO COMPACTION REQUIRED.
A	**FOUNDATION STONE:** FILL BELOW CHAMBERS FROM THE SUBGRADE UP TO THE FOOT (BOTTOM) OF THE CHAMBER.	CLEAN, CRUSHED, ANGULAR STONE	AASHTO M43[1] 3, 357, 4, 467, 5, 56, 57	PLATE COMPACT OR ROLL TO ACHIEVE A FLAT SURFACE.[2,3]

PLEASE NOTE:
1. THE LISTED AASHTO DESIGNATIONS ARE FOR GRADATIONS ONLY. THE STONE MUST ALSO BE CLEAN, CRUSHED, ANGULAR. FOR EXAMPLE, A SPECIFICATION FOR #4 STONE WOULD STATE: "CLEAN, CRUSHED, ANGULAR NO. 4 (AASHTO M43) STONE".
2. STORMTECH COMPACTION REQUIREMENTS ARE MET FOR 'A' LOCATION MATERIALS WHEN PLACED AND COMPACTED IN 6" (150 mm) (MAX) LIFTS USING TWO FULL COVERAGES WITH A VIBRATORY COMPACTOR.
3. WHERE INFILTRATION SURFACES MAY BE COMPROMISED BY COMPACTION, FOR STANDARD DESIGN LOAD CONDITIONS, A FLAT SURFACE MAY BE ACHIEVED BY RAKING OR DRAGGING WITHOUT COMPACTION EQUIPMENT. FOR SPECIAL LOAD DESIGNS, CONTACT STORMTECH FOR COMPACTION REQUIREMENTS.
4. ONCE LAYER 'C' IS PLACED, ANY SOIL/MATERIAL CAN BE PLACED IN LAYER 'D' UP TO THE FINISHED GRADE. MOST PAVEMENT SUBBASE SOILS CAN BE USED TO REPLACE THE MATERIAL REQUIREMENTS OF LAYER 'C' OR 'D' AT THE SITE DESIGN ENGINEER'S DISCRETION.



ADS GEOSYNTHETICS 601T NON-WOVEN GEOTEXTILE ALL AROUND CLEAN, CRUSHED, ANGULAR STONE IN A & B LAYERS
PAVEMENT LAYER (DESIGNED BY SITE DESIGN ENGINEER)
TOP OF STONE = A
PERIMETER STONE (SEE NOTE 4)
EXCAVATION WALL (CAN BE SLOPED OR VERTICAL)
*TO BOTTOM OF FLEXIBLE PAVEMENT. FOR UNPAVED INSTALLATIONS WHERE RUTTING FROM VEHICLES MAY OCCUR, INCREASE COVER TO 24" (600 mm).
18" (450 mm) MIN*
8' (2.4 m) MAX
6" (150 mm) MIN
TOP OF CHAMBER = B
30" (762 mm)
**THIS CROSS SECTION DETAIL REPRESENTS MINIMUM REQUIREMENTS FOR INSTALLATION. PLEASE SEE THE LAYOUT SHEET(S) FOR PROJECT SPECIFIC REQUIREMENTS.
IE CHAMBER = C
BOTTOM OF STONE & IE OF UNDERDRAIN = D
DEPTH OF STONE TO BE DETERMINED BY SITE DESIGN ENGINEER 6" (150 mm) MIN
12" (300 mm) MIN
SC-740 END CAP
SUBGRADE SOILS (SEE NOTE 3)
6" (150 mm) MIN
51" (1295 mm)
12" (300 mm) MIN
PLACE POND LINER ON TOP OF SUBGRADE PRIOR TO PLACING GEOTEXTILE FABRIC. (SEE NOTE 6 BELOW)

	NORTH SYSTEM	WEST SYSTEM
A	97.00	98.11
B	96.50	97.61
C	94.00	95.11
D	93.50	94.61

NOTES:

1. CHAMBERS SHALL MEET THE REQUIREMENTS OF ASTM F2418, "STANDARD SPECIFICATION FOR POLYPROPYLENE (PP) CORRUGATED WALL STORMWATER COLLECTION CHAMBERS".
2. SC-740 CHAMBERS SHALL BE DESIGNED IN ACCORDANCE WITH ASTM F2787 "STANDARD PRACTICE FOR STRUCTURAL DESIGN OF THERMOPLASTIC CORRUGATED WALL STORMWATER COLLECTION CHAMBERS".
3. THE SITE DESIGN ENGINEER IS RESPONSIBLE FOR ASSESSING THE BEARING RESISTANCE (ALLOWABLE BEARING CAPACITY) OF THE SUBGRADE SOILS AND THE DEPTH OF FOUNDATION STONE WITH CONSIDERATION FOR THE RANGE OF EXPECTED SOIL MOISTURE CONDITIONS.
4. PERIMETER STONE MUST BE EXTENDED HORIZONTALLY TO THE EXCAVATION WALL FOR BOTH VERTICAL AND SLOPED EXCAVATION WALLS.
5. REQUIREMENTS FOR HANDLING AND INSTALLATION:
   - TO MAINTAIN THE WIDTH OF CHAMBERS DURING SHIPPING AND HANDLING, CHAMBERS SHALL HAVE INTEGRAL, INTERLOCKING STACKING LUGS.
   - TO ENSURE A SECURE JOINT DURING INSTALLATION AND BACKFILL, THE HEIGHT OF THE CHAMBER JOINT SHALL NOT BE LESS THAN 2".
   - TO ENSURE THE INTEGRITY OF THE ARCH SHAPE DURING INSTALLATION, a) THE ARCH STIFFNESS CONSTANT AS DEFINED IN SECTION 6.2.8 OF ASTM F2418 SHALL BE GREATER THAN OR EQUAL TO 550 LBS/FT/%. AND b) TO RESIST CHAMBER DEFORMATION DURING INSTALLATION AT ELEVATED TEMPERATURES (ABOVE 73° F / 23° C), CHAMBERS SHALL BE PRODUCED FROM REFLECTIVE GOLD OR YELLOW COLORS.
6. PLACE 40 MIL (HDPE) POND AND CANAL LINER OR EQUAL ON SUBGRADE EXTENDING THE ENTIRE EXCAVATED AREA AND UP EXCAVATED WALLS ONE FOOT PRIOR TO PLACING GEOSYNTHETIC FABRIC.

WAUKESHA GENESIS
WAUKESHA, WI
DATE: 07/19/22 DRAWN: MPV
PROJECT #: S307399 CHECKED: JPR
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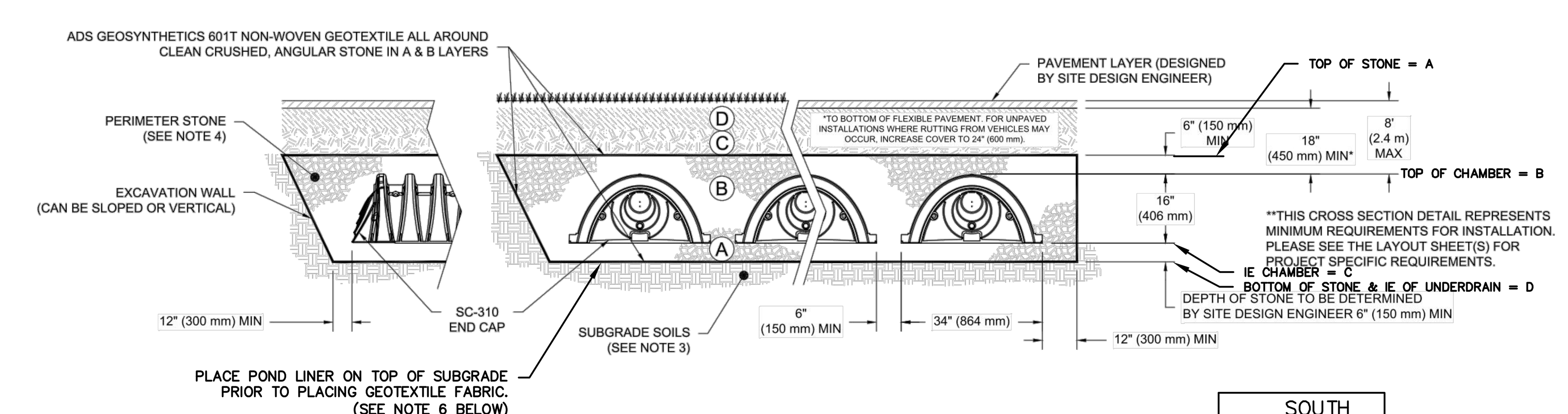
4640 TRUEMAN BLVD HILLIARD, OH 43026
ADS
SHEET 7 OF 12

ACCEPTABLE FILL MATERIALS: STORMTECH SC-310 CHAMBER SYSTEMS

MATERIAL LOCATION		DESCRIPTION	AASHTO MATERIAL CLASSIFICATIONS	COMPACTION / DENSITY REQUIREMENT
D	**FINAL FILL:** FILL MATERIAL FOR LAYER 'D' STARTS FROM THE TOP OF THE 'C' LAYER TO THE BOTTOM OF FLEXIBLE PAVEMENT OR UNPAVED FINISHED GRADE ABOVE. NOTE THAT PAVEMENT SUBBASE MAY BE PART OF THE 'D' LAYER.	ANY SOIL/ROCK MATERIALS, NATIVE SOILS, OR PER ENGINEER'S PLANS. CHECK PLANS FOR PAVEMENT SUBGRADE REQUIREMENTS.	N/A	PREPARE PER SITE DESIGN ENGINEER'S PLANS. PAVED INSTALLATIONS MAY HAVE STRINGENT MATERIAL AND PREPARATION REQUIREMENTS.
C	**INITIAL FILL:** FILL MATERIAL FOR LAYER 'C' STARTS FROM THE TOP OF THE EMBEDMENT STONE ('B' LAYER) TO 18" (450 mm) ABOVE THE TOP OF THE CHAMBER. NOTE THAT PAVEMENT SUBBASE MAY BE A PART OF THE 'C' LAYER.	GRANULAR WELL-GRADED SOIL/AGGREGATE MIXTURES, <35% FINES OR PROCESSED AGGREGATE. MOST PAVEMENT SUBBASE MATERIALS CAN BE USED IN LIEU OF THIS LAYER.	AASHTO M145[1] A-1, A-2-4, A-3 OR AASHTO M43[1] 3, 357, 4, 467, 5, 56, 57, 6, 67, 68, 7, 78, 8, 89, 9, 10	BEGIN COMPACTIONS AFTER 12" (300 mm) OF MATERIAL OVER THE CHAMBERS IS REACHED. COMPACT ADDITIONAL LAYERS IN 6" (150 mm) MAX LIFTS TO A MIN. 95% PROCTOR DENSITY FOR WELL GRADED MATERIAL AND 95% RELATIVE DENSITY FOR PROCESSED AGGREGATE MATERIALS. ROLLER GROSS VEHICLE WEIGHT NOT TO EXCEED 12,000 lbs (53 kN). DYNAMIC FORCE NOT TO EXCEED 20,000 lbs (89 kN).
B	**EMBEDMENT STONE:** FILL SURROUNDING THE CHAMBERS FROM THE FOUNDATION STONE ('A' LAYER) TO THE 'C' LAYER ABOVE.	CLEAN, CRUSHED, ANGULAR STONE	AASHTO M43[1] 3, 357, 4, 467, 5, 56, 57	NO COMPACTION REQUIRED.
A	**FOUNDATION STONE:** FILL BELOW CHAMBERS FROM THE SUBGRADE UP TO THE FOOT (BOTTOM) OF THE CHAMBER.	CLEAN, CRUSHED, ANGULAR STONE	AASHTO M43[1] 3, 357, 4, 467, 5, 56, 57	PLATE COMPACT OR ROLL TO ACHIEVE A FLAT SURFACE.[2,3]

PLEASE NOTE:
1. THE LISTED AASHTO DESIGNATIONS ARE FOR GRADATIONS ONLY. THE STONE MUST ALSO BE CLEAN, CRUSHED, ANGULAR. FOR EXAMPLE, A SPECIFICATION FOR #4 STONE WOULD STATE: "CLEAN, CRUSHED, ANGULAR NO. 4 (AASHTO M43) STONE".
2. STORMTECH COMPACTION REQUIREMENTS ARE MET FOR 'A' LOCATION MATERIALS WHEN PLACED AND COMPACTED IN 6" (150 mm) (MAX) LIFTS USING TWO FULL COVERAGES WITH A VIBRATORY COMPACTOR.
3. WHERE INFILTRATION SURFACES MAY BE COMPROMISED BY COMPACTION, FOR STANDARD DESIGN LOAD CONDITIONS, A FLAT SURFACE MAY BE ACHIEVED BY RAKING OR DRAGGING WITHOUT COMPACTION EQUIPMENT. FOR SPECIAL LOAD DESIGNS, CONTACT STORMTECH FOR COMPACTION REQUIREMENTS.
4. ONCE LAYER 'C' IS PLACED, ANY SOIL/MATERIAL CAN BE PLACED IN LAYER 'D' UP TO THE FINISHED GRADE. MOST PAVEMENT SUBBASE SOILS CAN BE USED TO REPLACE THE MATERIAL REQUIREMENTS OF LAYER 'C' OR 'D' AT THE SITE DESIGN ENGINEER'S DISCRETION.



ADS GEOSYNTHETICS 601T NON-WOVEN GEOTEXTILE ALL AROUND CLEAN CRUSHED, ANGULAR STONE IN A & B LAYERS
PAVEMENT LAYER (DESIGNED BY SITE DESIGN ENGINEER)
TOP OF STONE = A
PERIMETER STONE (SEE NOTE 4)
EXCAVATION WALL (CAN BE SLOPED OR VERTICAL)
18" (450 mm) MIN*
8' (2.4 m) MAX
TOP OF CHAMBER = B
16" (406 mm)
**THIS CROSS SECTION DETAIL REPRESENTS MINIMUM REQUIREMENTS FOR INSTALLATION. PLEASE SEE THE LAYOUT SHEET(S) FOR PROJECT SPECIFIC REQUIREMENTS.
IE CHAMBER = C
BOTTOM OF STONE & IE OF UNDERDRAIN = D
DEPTH OF STONE TO BE DETERMINED BY SITE DESIGN ENGINEER 6" (150 mm) MIN
12" (300 mm) MIN
SC-310 END CAP
SUBGRADE SOILS (SEE NOTE 3)
6" (150 mm) MIN
34" (864 mm)
12" (300 mm) MIN
PLACE POND LINER ON TOP OF SUBGRADE PRIOR TO PLACING GEOTEXTILE FABRIC. (SEE NOTE 6 BELOW)

	SOUTH SYSTEM
A	97.43
B	96.93
C	95.60
D	95.10

NOTES:

1. CHAMBERS SHALL MEET THE REQUIREMENTS OF ASTM F2922 (POLETHYLENE) OR ASTM F2418 (POLYPROPYLENE), "STANDARD SPECIFICATION FOR CORRUGATED WALL STORMWATER COLLECTION CHAMBERS".
2. SC-310 CHAMBERS SHALL BE DESIGNED IN ACCORDANCE WITH ASTM F2787 "STANDARD PRACTICE FOR STRUCTURAL DESIGN OF THERMOPLASTIC CORRUGATED WALL STORMWATER COLLECTION CHAMBERS".
3. THE SITE DESIGN ENGINEER IS RESPONSIBLE FOR ASSESSING THE BEARING RESISTANCE (ALLOWABLE BEARING CAPACITY) OF THE SUBGRADE SOILS AND THE DEPTH OF FOUNDATION STONE WITH CONSIDERATION FOR THE RANGE OF EXPECTED SOIL MOISTURE CONDITIONS.
4. PERIMETER STONE MUST BE EXTENDED HORIZONTALLY TO THE EXCAVATION WALL FOR BOTH VERTICAL AND SLOPED EXCAVATION WALLS.
5. REQUIREMENTS FOR HANDLING AND INSTALLATION:
   - TO MAINTAIN THE WIDTH OF CHAMBERS DURING SHIPPING AND HANDLING, CHAMBERS SHALL HAVE INTEGRAL, INTERLOCKING STACKING LUGS.
   - TO ENSURE A SECURE JOINT DURING INSTALLATION AND BACKFILL, THE HEIGHT OF THE CHAMBER JOINT SHALL NOT BE LESS THAN 2".
   - TO ENSURE THE INTEGRITY OF THE ARCH SHAPE DURING INSTALLATION, a) THE ARCH STIFFNESS CONSTANT AS DEFINED IN SECTION 6.2.8 OF ASTM F2922 SHALL BE GREATER THAN OR EQUAL TO 400 LBS/FT/%. AND b) TO RESIST CHAMBER DEFORMATION DURING INSTALLATION AT ELEVATED TEMPERATURES (ABOVE 73° F / 23° C), CHAMBERS SHALL BE PRODUCED FROM REFLECTIVE GOLD OR YELLOW COLORS.
6. PLACE 40 MIL (HDPE) POND AND CANAL LINER OR EQUAL ON SUBGRADE EXTENDING THE ENTIRE EXCAVATED AREA AND UP EXCAVATED WALLS ONE FOOT PRIOR TO PLACING GEOSYNTHETIC FABRIC.

WAUKESHA GENESIS
WAUKESHA, WI
DATE: 07/19/22 DRAWN: MPV
PROJECT #: S307399 CHECKED: JPR
StormTech® Chamber System
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4640 TRUEMAN BLVD HILLIARD, OH 43026
ADS
SHEET 8 OF 12

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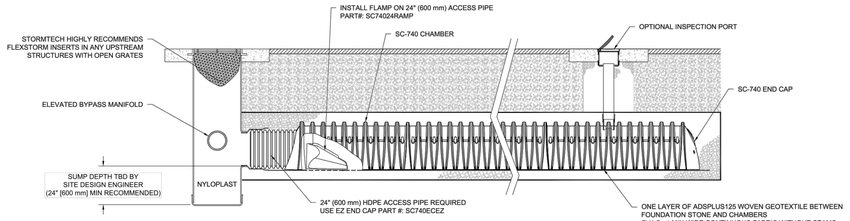
DESCRIPTION | DATE

raSmith
CREATIVITY BEYOND ENGINEERING
16745 W. Bluemound Road
Brookfield, WI 53005-5938
(262) 781-1000
rasmith.com
Brookfield, WI | Milwaukee, WI | Appleton, WI | Madison, WI
Cedarburg, WI | Naperville, IL | Irvine, CA

WAUKESHA GENESIS
CITY OF WAUKESHA, WISCONSIN
UNDERGROUND STORAGE DETAILS

DATE: 07/22/2022
SCALE: N.T.S.
JOB NO. 3210204.01
PROJECT MANAGER: RYAN J. LANCOUR, P.E.
DESIGNED BY: JJJ
CHECKED BY: RJL
SHEET NUMBER
C504



SC-740 ISOLATOR ROW PLUS DETAIL
NTS

INSPECTION & MAINTENANCE

STEP 1) INSPECT ISOLATOR ROW PLUS FOR SEDIMENT
- A. INSPECTION PORTS (IF PRESENT)
  - A.1. REMOVE/OPEN LID ON NYLOPLAST INLINE DRAIN
  - A.2. REMOVE AND CLEAN FLEXSTORM FILTER IF INSTALLED
  - A.3. USING A FLASHLIGHT AND STADIA ROD, MEASURE DEPTH OF SEDIMENT AND RECORD ON MAINTENANCE LOG
  - A.4. LOWER A CAMERA INTO ISOLATOR ROW PLUS FOR VISUAL INSPECTION OF SEDIMENT LEVELS (OPTIONAL)
  - A.5. IF SEDIMENT IS AT, OR ABOVE, 3" (80 mm) PROCEED TO STEP 2. IF NOT, PROCEED TO STEP 3.
- B. ALL ISOLATOR PLUS ROWS
  - B.1. REMOVE COVER FROM STRUCTURE AT UPSTREAM END OF ISOLATOR ROW PLUS
  - B.2. USING A FLASHLIGHT, INSPECT DOWN THE ISOLATOR ROW PLUS THROUGH OUTLET PIPE
    - i) MIRRORS ON POLES OR CAMERAS MAY BE USED TO AVOID A CONFINED SPACE ENTRY
    - ii) FOLLOW OSHA REGULATIONS FOR CONFINED SPACE ENTRY IF ENTERING MANHOLE
  - B.3. IF SEDIMENT IS AT, OR ABOVE, 3" (80 mm) PROCEED TO STEP 2. IF NOT, PROCEED TO STEP 3.

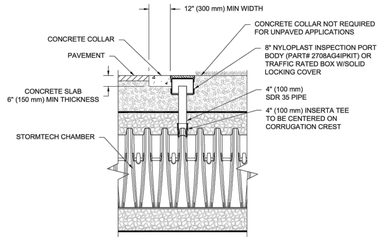
STEP 2) CLEAN OUT ISOLATOR ROW PLUS USING THE JETVAC PROCESS
- A. A FIXED CULVERT CLEANING NOZZLE WITH REAR FACING SPREAD OF 45° (1.1 m) OR MORE IS PREFERRED
- B. APPLY MULTIPLE PASSES OF JETVAC UNTIL BACKFLUSH WATER IS CLEAN
- C. VACUUM STRUCTURE SUMP AS REQUIRED

STEP 3) REPLACE ALL COVERS, GRATES, FILTERS, AND LIDS; RECORD OBSERVATIONS AND ACTIONS.

STEP 4) INSPECT AND CLEAN BASINS AND MANHOLES UPSTREAM OF THE STORMTECH SYSTEM.

NOTES

1. INSPECT EVERY 6 MONTHS DURING THE FIRST YEAR OF OPERATION. ADJUST THE INSPECTION INTERVAL BASED ON PREVIOUS OBSERVATIONS OF SEDIMENT ACCUMULATION AND HIGH WATER ELEVATIONS.
2. CONDUCT JETTING AND VACTORING ANNUALLY OR WHEN INSPECTION SHOWS THAT MAINTENANCE IS NECESSARY.



NOTE:
INSPECTION PORTS MAY BE CONNECTED THROUGH ANY CHAMBER CORRUGATION CREST.

4" PVC INSPECTION PORT DETAIL
(SC SERIES CHAMBER)
NTS

WAUKESHA GENESIS
WAUKESHA, WI
DATE: 07/19/22 | DRAWN: MPV
PROJECT #: 53073B9 | CHECKED: JPR
THESE PLANS WERE PREPARED BASED ON INFORMATION PROVIDED TO ADS UNDER THE DIRECTION OF THE SITE DESIGN ENGINEER (SDE). THE SDE IS RESPONSIBLE FOR REVIEWING THESE PLANS AND ASSOCIATED DETAILS TO ENSURE THAT THE PRODUCTS DEPICTED ARE ALL APPLICABLE LAWS, REGULATIONS, AND PROJECT REQUIREMENTS.
REVIEW THIS DRAWING PRIOR TO CONSTRUCTION. IT IS THE ULTIMATE RESPONSIBILITY OF THE SITE DESIGN ENGINEER TO ENSURE THAT THE PRODUCTS SPECIFIED MEET ALL APPLICABLE LAWS, REGULATIONS, AND PROJECT REQUIREMENTS.
DESCRIPTION: ISSUED FOR PERMIT
DATE: 07/21/22 | BY: MPV | ISSUED FOR MARKUP
DESCRIPTION: ISSUED FOR PERMIT
DATE: 07/27/22 | BY: MPV | REVISE PER MARKUP

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ULTIMATE RESPONSIBILITY OF THE SITE DESIGN ENGINEER TO ENSURE THAT THE PRODUCTS DEPICTED MEET ALL APPLICABLE LAWS, REGULATIONS, AND PROJECT REQUIREMENTS.
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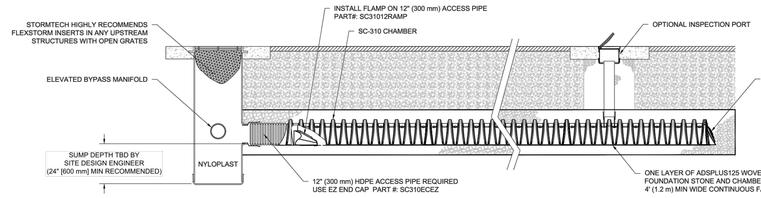
ADS
4640 TRUEMAN BLVD
HILLIARD, OH 43026

9 SHEET OF 12



SC-310 ISOLATOR ROW PLUS DETAIL
NTS

INSPECTION & MAINTENANCE

STEP 1) INSPECT ISOLATOR ROW PLUS FOR SEDIMENT
- A. INSPECTION PORTS (IF PRESENT)
  - A.1. REMOVE/OPEN LID ON NYLOPLAST INLINE DRAIN
  - A.2. REMOVE AND CLEAN FLEXSTORM FILTER IF INSTALLED
  - A.3. USING A FLASHLIGHT AND STADIA ROD, MEASURE DEPTH OF SEDIMENT AND RECORD ON MAINTENANCE LOG
  - A.4. LOWER A CAMERA INTO ISOLATOR ROW PLUS FOR VISUAL INSPECTION OF SEDIMENT LEVELS (OPTIONAL)
  - A.5. IF SEDIMENT IS AT, OR ABOVE, 3" (80 mm) PROCEED TO STEP 2. IF NOT, PROCEED TO STEP 3.
- B. ALL ISOLATOR PLUS ROWS
  - B.1. REMOVE COVER FROM STRUCTURE AT UPSTREAM END OF ISOLATOR ROW PLUS
  - B.2. USING A FLASHLIGHT, INSPECT DOWN THE ISOLATOR ROW PLUS THROUGH OUTLET PIPE
    - i) MIRRORS ON POLES OR CAMERAS MAY BE USED TO AVOID A CONFINED SPACE ENTRY
    - ii) FOLLOW OSHA REGULATIONS FOR CONFINED SPACE ENTRY IF ENTERING MANHOLE
  - B.3. IF SEDIMENT IS AT, OR ABOVE, 3" (80 mm) PROCEED TO STEP 2. IF NOT, PROCEED TO STEP 3.

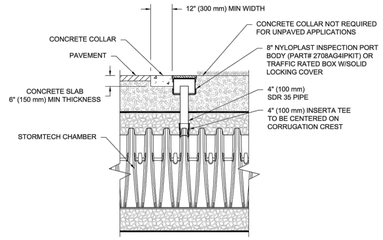
STEP 2) CLEAN OUT ISOLATOR ROW PLUS USING THE JETVAC PROCESS
- A. A FIXED CULVERT CLEANING NOZZLE WITH REAR FACING SPREAD OF 45° (1.1 m) OR MORE IS PREFERRED
- B. APPLY MULTIPLE PASSES OF JETVAC UNTIL BACKFLUSH WATER IS CLEAN
- C. VACUUM STRUCTURE SUMP AS REQUIRED

STEP 3) REPLACE ALL COVERS, GRATES, FILTERS, AND LIDS; RECORD OBSERVATIONS AND ACTIONS.

STEP 4) INSPECT AND CLEAN BASINS AND MANHOLES UPSTREAM OF THE STORMTECH SYSTEM.

NOTES

1. INSPECT EVERY 6 MONTHS DURING THE FIRST YEAR OF OPERATION. ADJUST THE INSPECTION INTERVAL BASED ON PREVIOUS OBSERVATIONS OF SEDIMENT ACCUMULATION AND HIGH WATER ELEVATIONS.
2. CONDUCT JETTING AND VACTORING ANNUALLY OR WHEN INSPECTION SHOWS THAT MAINTENANCE IS NECESSARY.



NOTE:
INSPECTION PORTS MAY BE CONNECTED THROUGH ANY CHAMBER CORRUGATION CREST.

4" PVC INSPECTION PORT DETAIL
(SC SERIES CHAMBER)
NTS

WAUKESHA GENESIS
WAUKESHA, WI
DATE: 07/19/22 | DRAWN: MPV
PROJECT #: 53073B9 | CHECKED: JPR
THESE PLANS WERE PREPARED BASED ON INFORMATION PROVIDED TO ADS UNDER THE DIRECTION OF THE SITE DESIGN ENGINEER (SDE). THE SDE IS RESPONSIBLE FOR REVIEWING THESE PLANS AND ASSOCIATED DETAILS TO ENSURE THAT THE PRODUCTS DEPICTED ARE ALL APPLICABLE LAWS, REGULATIONS, AND PROJECT REQUIREMENTS.
REVIEW THIS DRAWING PRIOR TO CONSTRUCTION. IT IS THE ULTIMATE RESPONSIBILITY OF THE SITE DESIGN ENGINEER TO ENSURE THAT THE PRODUCTS SPECIFIED MEET ALL APPLICABLE LAWS, REGULATIONS, AND PROJECT REQUIREMENTS.
DESCRIPTION: ISSUED FOR PERMIT
DATE: 07/21/22 | BY: MPV | ISSUED FOR MARKUP
DESCRIPTION: ISSUED FOR PERMIT
DATE: 07/27/22 | BY: MPV | REVISE PER MARKUP

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ULTIMATE RESPONSIBILITY OF THE SITE DESIGN ENGINEER TO ENSURE THAT THE PRODUCTS DEPICTED MEET ALL APPLICABLE LAWS, REGULATIONS, AND PROJECT REQUIREMENTS.
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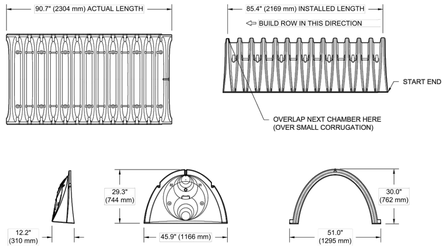
10 SHEET OF 12

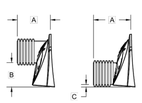
SC-740 TECHNICAL SPECIFICATION
NTS



NOMINAL CHAMBER SPECIFICATIONS

SIZE (W X H X INSTALLED LENGTH)	51.0" X 30.0" X 85.4"	(1295 mm X 762 mm X 2169 mm)
CHAMBER STORAGE	45.9 CUBIC FEET	(1.30 m³)
MINIMUM INSTALLED STORAGE*	74.9 CUBIC FEET	(2.12 m³)
WEIGHT	75.0 lbs.	(33.6 kg)

*ASSUMES 6" (152 mm) STONE ABOVE, BELOW, AND BETWEEN CHAMBERS



PRE-FAB STUBS AT BOTTOM OF END CAP FOR PART NUMBERS ENDING WITH "B"
PRE-FAB STUBS AT TOP OF END CAP FOR PART NUMBERS ENDING WITH "T"
PRE-CORED END CAPS END WITH "PC"

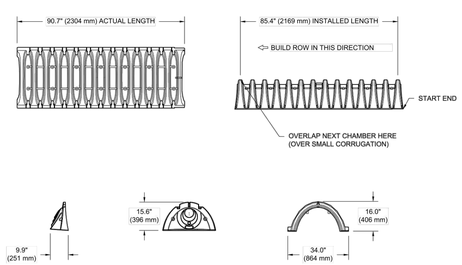
PART #	STUB	A	B	C
SC740EPE06T / SC740EPE06TPC	6" (150 mm)	10.9" (277 mm)	18.5" (470 mm)	---
SC740EPE06B / SC740EPE06BPC			---	0.5" (13 mm)
SC740EPE08T /SC740EPE08TPC	8" (200 mm)	12.2" (310 mm)	16.5" (419 mm)	---
SC740EPE08B / SC740EPE08BPC			---	0.6" (15 mm)
SC740EPE10T / SC740EPE10TPC	10" (250 mm)	13.4" (340 mm)	14.5" (368 mm)	---
SC740EPE10B / SC740EPE10BPC			---	0.7" (18 mm)
SC740EPE12T / SC740EPE12TPC	12" (300 mm)	14.7" (373 mm)	12.5" (318 mm)	---
SC740EPE12B / SC740EPE12BPC			---	1.2" (30 mm)
SC740EPE15T / SC740EPE15TPC	15" (375 mm)	18.4" (467 mm)	9.0" (229 mm)	---
SC740EPE15B / SC740EPE15BPC			---	1.3" (33 mm)
SC740EPE18T / SC740EPE18TPC	18" (450 mm)	19.7" (500 mm)	5.0" (127 mm)	---
SC740EPE18B / SC740EPE18BPC			---	1.6" (41 mm)
SC740ECEZ*	24" (600 mm)	18.5" (470 mm)	---	0.1" (3 mm)

ALL STUBS, EXCEPT FOR THE SC740ECEZ ARE PLACED AT BOTTOM OF END CAP SUCH THAT THE OUTSIDE DIAMETER OF THE STUB IS FLUSH WITH THE BOTTOM OF THE END CAP. FOR ADDITIONAL INFORMATION CONTACT STORMTECH AT 1-888-892-2694.

* FOR THE SC740ECEZ THE 24" (600 mm) STUB LIES BELOW THE BOTTOM OF THE END CAP APPROXIMATELY 1.75" (44 mm). BACKFILL MATERIAL SHOULD BE REMOVED FROM BELOW THE N-12 STUB SO THAT THE FITTING SITS LEVEL.

NOTE: ALL DIMENSIONS ARE NOMINAL

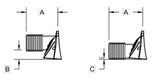
SC-310 TECHNICAL SPECIFICATION
NTS



NOMINAL CHAMBER SPECIFICATIONS

SIZE (W X H X INSTALLED LENGTH)	34.0" X 16.0" X 85.4"	(864 mm X 406 mm X 2169 mm)
CHAMBER STORAGE	14.7 CUBIC FEET	(0.42 m³)
MINIMUM INSTALLED STORAGE*	31.0 CUBIC FEET	(0.88 m³)
WEIGHT	35.0 lbs.	(16.8 kg)

*ASSUMES 6" (152 mm) ABOVE, BELOW, AND BETWEEN CHAMBERS



PRE-FAB STUBS AT BOTTOM OF END CAP FOR PART NUMBERS ENDING WITH "B"
PRE-FAB STUBS AT TOP OF END CAP FOR PART NUMBERS ENDING WITH "T"
PRE CORED END CAPS END WITH "PC"

PART #	STUB	A	B	C
SC310EPE06T / SC310EPE06TPC	6" (150 mm)	9.6" (244 mm)	5.8" (147 mm)	---
SC310EPE06B / SC310EPE06BPC			---	0.5" (13 mm)
SC310EPE08T / SC310EPE08TPC	8" (200 mm)	11.9" (302 mm)	3.5" (89 mm)	---
SC310EPE08B / SC310EPE08BPC			---	0.6" (15 mm)
SC310EPE10T / SC310EPE10TPC	10" (250 mm)	12.7" (323 mm)	1.4" (36 mm)	---
SC310EPE10B / SC310EPE10BPC			---	0.7" (18 mm)
SC310ECEZ*	12" (300 mm)	13.5" (343 mm)	---	0.9" (23 mm)

ALL STUBS, EXCEPT FOR THE SC310ECEZ ARE PLACED AT BOTTOM OF END CAP SUCH THAT THE OUTSIDE DIAMETER OF THE STUB IS FLUSH WITH THE BOTTOM OF THE END CAP. FOR ADDITIONAL INFORMATION CONTACT STORMTECH AT 1-888-892-2694.

* FOR THE SC310ECEZ THE 12" (300 mm) STUB LIES BELOW THE BOTTOM OF THE END CAP APPROXIMATELY 0.25" (6 mm). BACKFILL MATERIAL SHOULD BE REMOVED FROM BELOW THE N-12 STUB SO THAT THE FITTING SITS LEVEL.

NOTE: ALL DIMENSIONS ARE NOMINAL

WAUKESHA GENESIS
WAUKESHA, WI
DATE: 07/19/22 | DRAWN: MPV
PROJECT #: 53073B9 | CHECKED: JPR
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11 SHEET OF 12

NYLOPLAST DRAIN BASIN
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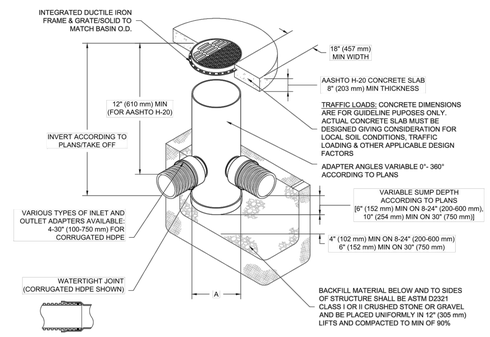
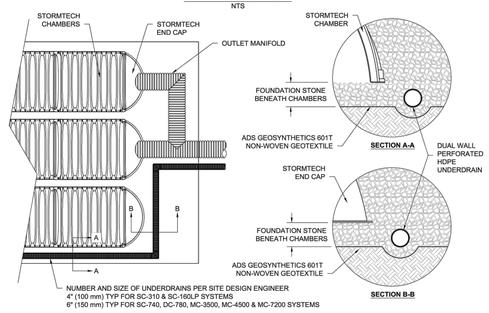


UNDERDRAIN DETAIL
NTS



NOTES

1. 8-30" (200-750 mm) GRATES/SOLID COVERS SHALL BE DUCTILE IRON PER ASTM A536 GRADE 70-50-05
2. 12-30" (300-750 mm) FRAMES SHALL BE DUCTILE IRON PER ASTM A536 GRADE 70-50-05
3. DRAIN BASIN TO BE CUSTOM MANUFACTURED ACCORDING TO PLAN DETAILS
4. DRAINAGE CONNECTION STUB JOINT TIGHTNESS SHALL CONFORM TO ASTM D3212 FOR CORRUGATED HDPE (ADS & HANCOR DUAL WALL) & SDR 35 PVC
5. FOR COMPLETE DESIGN AND PRODUCT INFORMATION: **WWW.NYLOPLAST-US.COM**
6. TO ORDER CALL: **800-821-6710**

A	PART #	GRATE/SOLID COVER OPTIONS		
8" (200 mm)	2808AG	PEDESTRIAN LIGHT DUTY	STANDARD LIGHT DUTY	SOLID LIGHT DUTY
10" (250 mm)	2810AG	PEDESTRIAN LIGHT DUTY	STANDARD LIGHT DUTY	SOLID LIGHT DUTY
12" (300 mm)	2812AG	PEDESTRIAN AASHTO H-10	STANDARD AASHTO H-20	SOLID AASHTO H-20
15" (375 mm)	2815AG	PEDESTRIAN AASHTO H-10	STANDARD AASHTO H-20	SOLID AASHTO H-20
18" (450 mm)	2818AG	PEDESTRIAN AASHTO H-10	STANDARD AASHTO H-20	SOLID AASHTO H-20
24" (600 mm)	2824AG	PEDESTRIAN AASHTO H-10	STANDARD AASHTO H-20	SOLID AASHTO H-20
30" (750 mm)	2830AG	PEDESTRIAN AASHTO H-20	STANDARD AASHTO H-20	SOLID AASHTO H-20

WAUKESHA GENESIS
WAUKESHA, WI
DATE: 07/19/22 | DRAWN: MPV
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12 SHEET OF 12

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DATE	DESCRIPTION

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CREATIVITY BEYOND ENGINEERING
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Brookfield, WI 53005-5938
(262) 781-1000
rasmith.com
Brookfield, WI | Milwaukee, WI | Appleton, WI | Madison, WI
Cedarburg, WI | Naperville, IL | Irvine, CA

WAUKESHA GENESIS
CITY OF WAUKESHA, WISCONSIN
UNDERGROUND STORAGE DETAILS

DATE: 07/22/2022
SCALE: N.T.S.
JOB NO. 3210204.01
PROJECT MANAGER: RYAN J. LANCOUR, P.E.
DESIGNED BY: JJJ
CHECKED BY: RJL

SHEET NUMBER
C505