STORMWATER MANAGEMENT REPORT

Fields-Jaguar-Land Rover-Volvo
City of Waukesha, Wisconsin

Prepared For:
Fields-Jaguar-Land Rover-Volvo
Waukesha, WI

Prepared By:
Vierbicher Associates, Inc.
999 Fourier Drive, Suite 201
Madison, Wisconsin 53717

Prepared On:
January 20, 2017
Revised On:

Project #160333

vierbicher
planners | engineers | advisors

TABLE OF CONTENTS

NARRATIVE

1.1 Introduction

The project is located in the City of Waukesha on the south side of E Moreland Road, southwest of Interstate 94 at 1901 E Moreland Boulevard. The site is currently developed. The project will include removal of an existing single family home, removal of existing pavement, grading, utility construction including an underground stormwater management facility, building construction and remodel, and associated parking, sidewalk and drive construction.

The approximate area of disturbance is 114,545 sq. ft. and the project will create approximately 27,000 sq. ft. (0.622 acres) of additional impervious surface. The site will be required to meet the City of Waukesha's re-development standards.

The goals will be met with the construction of an underground stormwater treatment/detention facility. The stormwater management facility will meet the City's re-development requirements for sediment control and peak rate control.

For purposes of stormwater management, the proposed stormwater management facilities will meet the City's requirements for sediment reduction based on the disturbed limits of the site (114,545 sq. ft. or 2.630 acres). The stormwater management facilities will meet the City's requirements for peak rate control based on the entire property limits of the site (194,495 sq. ft. or 4.465 acres).

The DNR Surface Water Data Viewer does not indicate hydric soils on the site or existing wetland.

1.2 Soils Description

Subsurface soils are Hochheim loam. According to the USDA NRCS subsurface soil report, the soil has a hydrologic soil rating of D. Soil borings in the location of the proposed underground stormwater facility will be conducted at a later date. For the purpose of modeling, a design infiltration rate of 0.03 inches/hour was used.

1.3 Design Criteria

For the purpose of this report pre-developed conditions refer to as the site exists before the proposed re-development. The stormwater goals the site will be required to meet are summarized in the table below:

Table 1 Stormwater Management Requirements

Stormwater Management Requirements	
Requirement	**Goal**
Peak Runoff Rate Control	Pre-Developed to Post-Developed 1, 2, 10, and 100-year, 24-hour events
Sediment Control: TSS	40% TSS Removal
Infiltration	Exempt

Table 2 Design Inputs

Design Inputs	
	Peak Runoff Rate Control (City of Waukesha)
Rainfall (24-hour design storm) MSE3 Distribution	1-year = 2.40 inches 2-year = 2.70 inches 10-year = 3.81 inches 100-year = 6.18 inches
Pre-developed /Pre-settlement Runoff Curve Number	Roofs = 98 Parking = 98 Sidewalks = 98 Gravel Access = 96 Landscaped Area/Lawn (HSG D) = 84

1.4 Summary of Results

Peak runoff control will be handled at the underground stormwater management facility. The runoff will be conveyed through existing storm sewer with a proposed connection to an existing storm structure within the right-of-way.

Peak Runoff Control

The City requires new re-development sites to design storm water management practices to maintain post-development peak runoff discharge rates for the 1, 2, 10 and 100- year, 24-hour design storms under pre-settlement conditions, so as not to exceed those rates for each respective design storm under pre-settlement conditions.

Peak runoff control will be handled onsite with the underground stormwater management facility. Table 3 illustrates the pre-settlement and post-developed with the stormwater management facilities peak rates. The calculations were performed with HydroCAD and are in section 4 of the report.

Table 3 Peak Runoff Control

Storm Event (year)	Pre-Settlement (cfs)	Post-Developed w/ controls (cfs)
1	12.25	8.77
2	14.12	10.46
10	20.99	19.04
100	35.46	34.49

The site meets the City's re-development requirements for peak runoff rate control onsite for the 1, 2, 10, and 100-year, 24-hour storm events.

Table 4 summarizes the routing through the underground stormwater management facility.

Table 4 Underground Stormwater Management Facility Routing

Storm Frequency (Year)	Post-Developed CFS	Routed Through Basin		
		Discharge (CFS)	Elevation (Feet)	Volume (AF)
1	8.77	2.15	915.47	0.166
2	10.46	3.44	915.83	0.175
10	19.04	8.51	916.50	0.189
100	34.49	13.97	917.10	0.200

Sediment Control

The site is required to reduce by 40% the total suspended solids load within storm water runoff based on the average annual rainfall record, as compared to no runoff management controls. The calculations were completed with WinSLAMM 10.2 and are located in section 5 of the report. With the use of the underground stormwater management facility the site will reduce the TSS load by 40.32%.

Table 6 TSS Reduction Summary

No Controls	After Stormwater Controls	% Reduction
1,218 lbs.	726.9 lbs.	40.32%

Infiltration

The site is exempt from meeting infiltration requirements due to the project being a re-development project.

Erosion Control

The site will meet the City's erosion control requirements. Silt fence, inlet protection, erosion matting, the permanent underground stormwater management facility and gravel tracking pad will be required on the site. USLE worksheets are provided in section 6 of the report.

1.5 Conclusions

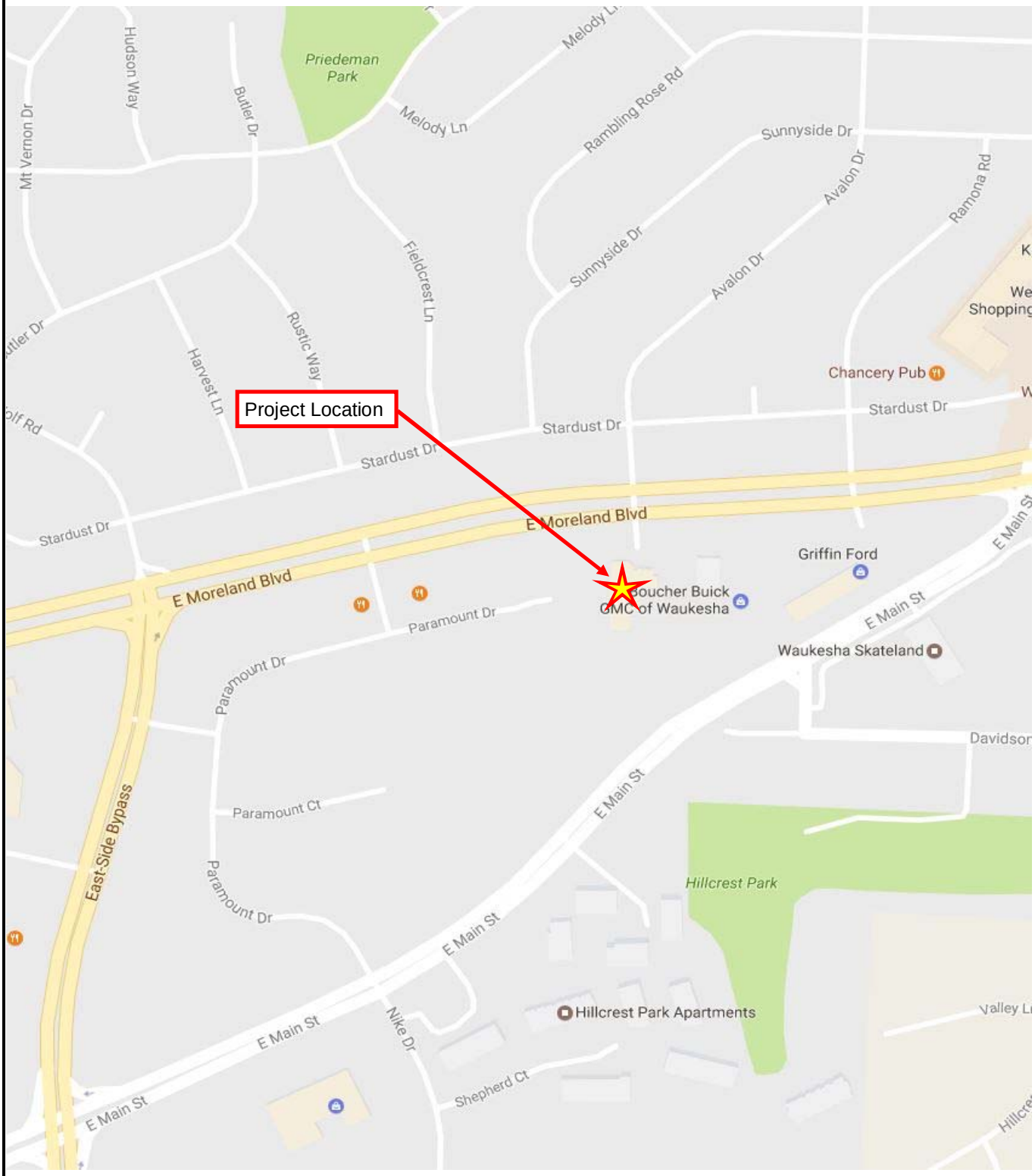
The site will meet the City's requirements for re-development for peak runoff rate control and sediment control with the construction of an underground stormwater management facility.

1.6 Permits

The following is a list of anticipated stormwater permits and reviews that have been or will be applied for:

- ✓ City of Waukesha - Erosion Control/Stormwater Permit Application
- ✓ City of Waukesha – Construction Permit Application
- ✓ City of Waukesha – Utility Permit Application
- ✓ Wisconsin Department of Natural Resources Notice of Intent
- ✓ Wisconsin Department of Safety and Professional Services Plumbing Permit

2.1 Location Map



vierbicher
planners | engineers | advisors

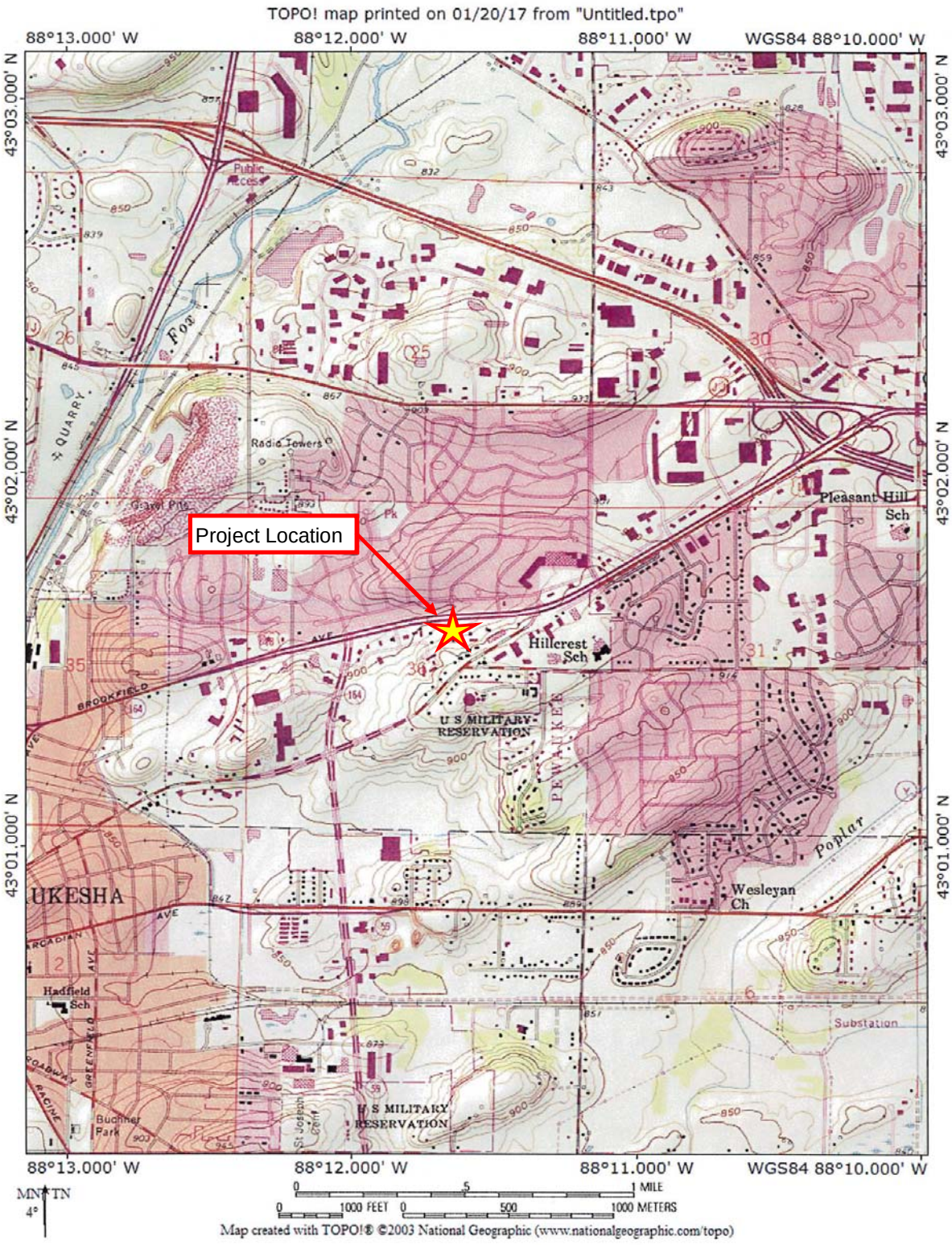
Figure 2.1 - Location Map
Project Name: Fields Jaguar-Land Rover-Volvo-Waukesha
Project Location: City of Waukesha, Wisconsin

2.2 Aerial Map

vierbicher
planners | engineers | advisors

Figure 2.2 - Aerial Map
Project Name: Fields Jaguar-Land Rover-Volvo-Waukesha
Project Location: City of Waukesha, Wisconsin

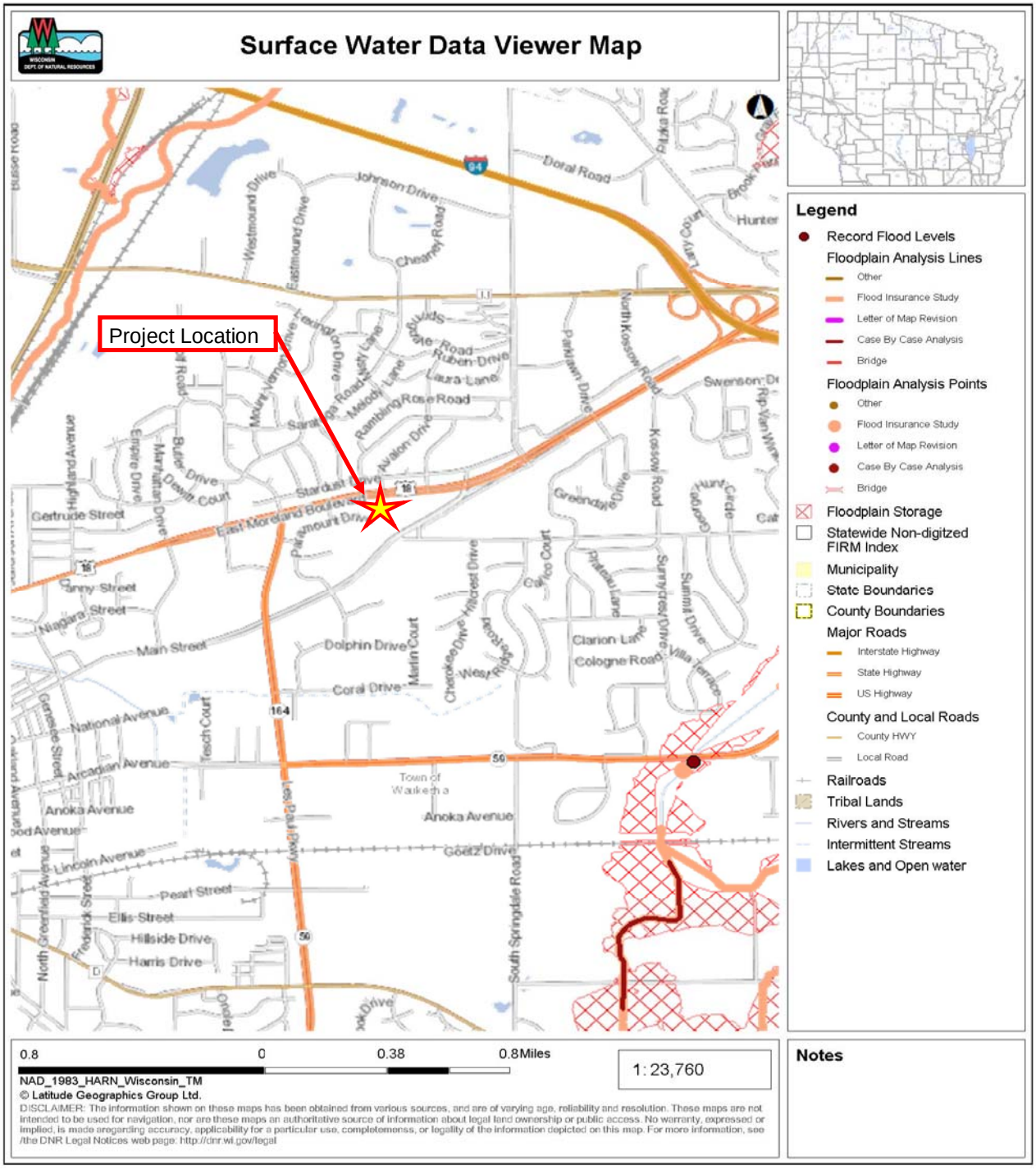
2.3 USGS Quad Map



vierbicher
planners | engineers | advisors

Figure 2.3 - USGS Quad Map
Project Name: Fields Jaguar-Land Rover-Volvo-Waukesha
Project Location: City of Waukesha, Wisconsin

2.4 FEMA Map



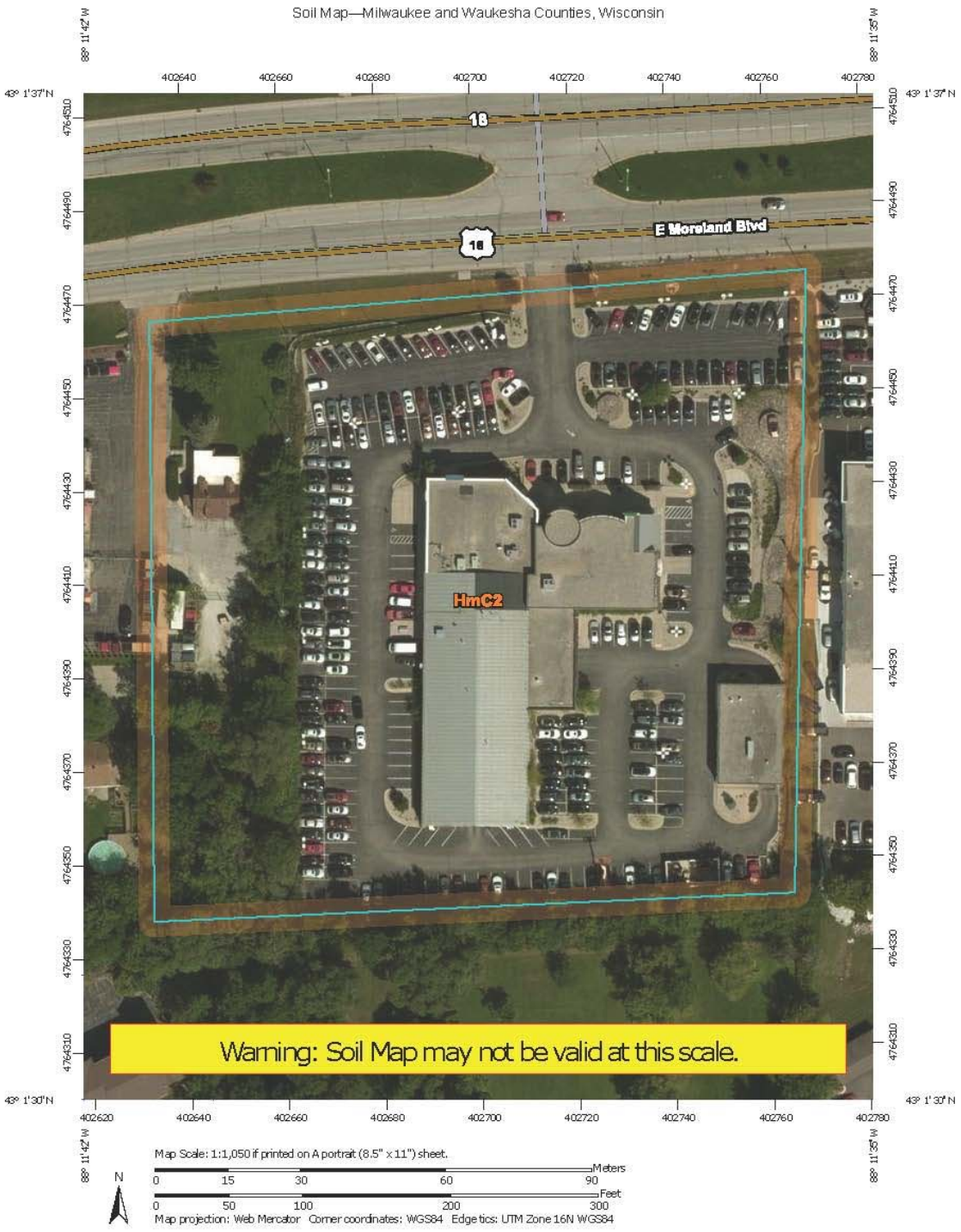
vierbicher
planners | engineers | advisors

Figure 2.4 - Floodplain Map
Project Name: Fields Jaguar-Land Rover-Volvo-Waukesha
Project Location: City of Waukesha, Wisconsin

2.5 Wetland Indicator Map

Figure 2.5 - WDNR Surface Water Wetland Map
Project Name: Fields Jaguar-Land Rover-Volvo-Waukesha
Project Location: City of Waukesha, Wisconsin

3.1 County Soils Map



Tables — Hydrologic Soil Group — Summary By Map Unit

Summary by Map Unit — Milwaukee and Waukesha Counties, Wisconsin (WI602)

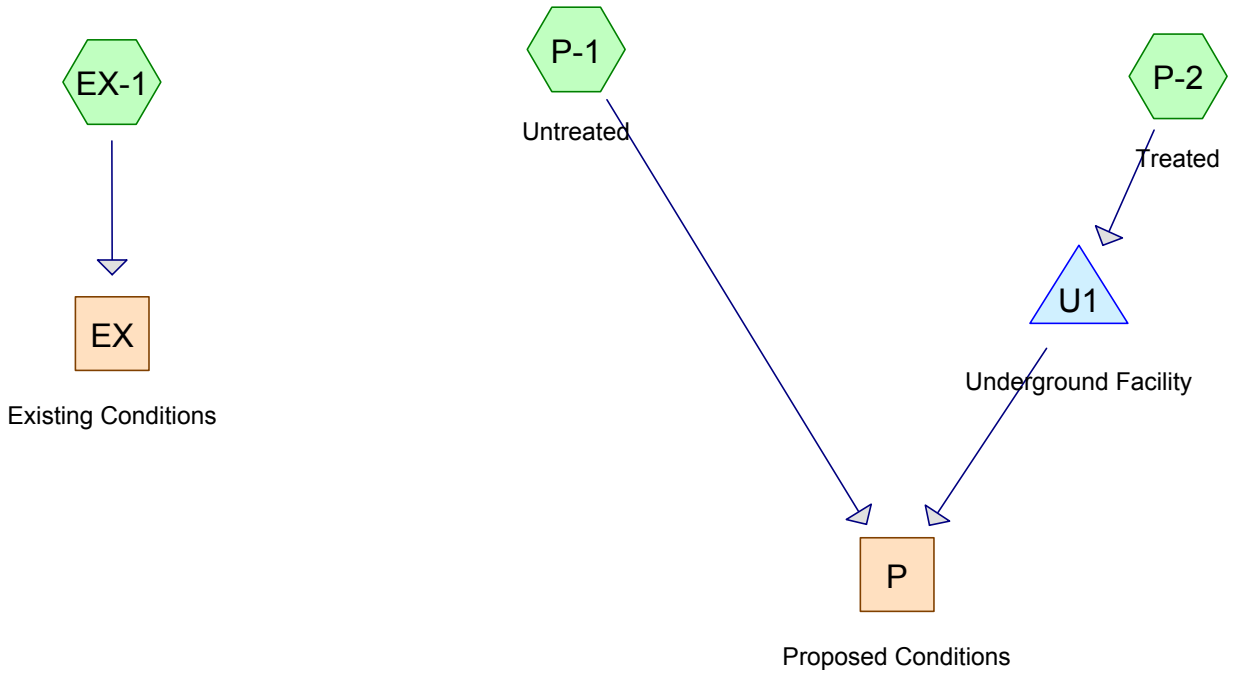
Map unit symbol	Map unit name	Rating	Acres in AOI	Percent of AOI
HmC2	Hochheim loam, 6 to 12 percent slopes, eroded	D	4.3	100.0%
Totals for Area of Interest			**4.3**	**100.0%**

vierbicher
planners | engineers | advisors

Figure 3.1 - County Soils Map
Project Name: Fields Jaguar-Land Rover-Volvo-Waukesha
Project Location: City of Waukesha, Wisconsin

3.2 Soil Borings

4 Peak Runoff Control



Subcat Reach Pond Link

Routing Diagram for 2017-01-03 - Redmond_FieldsVolvo
Prepared by Brunoehler, Printed 1/3/2017

Area Listing (all nodes)

Area (acres)	CN	Description (subcatchment-numbers)
1.461	84	50-75% Grass cover, Fair, HSG D (EX-1, P-2)
0.126	98	Concrete Sidewalk, HSG D (P-1, P-2)
0.228	98	Concrete Sidewalks, HSG D (EX-1)
0.125	96	Gravel surface, HSG D (EX-1)
0.529	84	Landscaped/Lawn - 50-75% Grass cover, Fair, HSG D (P-1)
4.953	98	Paved parking, HSG D (EX-1, P-1, P-2)
1.508	98	Roofs, HSG D (EX-1, P-1, P-2)
8.930	**95**	**TOTAL AREA**

Soil Listing (all nodes)

Area (acres)	Soil Group	Subcatchment Numbers
0.000	HSG A	
0.000	HSG B	
0.000	HSG C	
8.930	HSG D	EX-1, P-1, P-2
0.000	Other	
8.930		**TOTAL AREA**

Ground Covers (all nodes)

HSG-A (acres)	HSG-B (acres)	HSG-C (acres)	HSG-D (acres)	Other (acres)	Total (acres)	Ground Cover
0.000	0.000	0.000	1.461	0.000	1.461	50-75% Grass cover, Fair
0.000	0.000	0.000	0.126	0.000	0.126	Concrete Sidewalk
0.000	0.000	0.000	0.228	0.000	0.228	Concrete Sidewalks
0.000	0.000	0.000	0.125	0.000	0.125	Gravel surface
0.000	0.000	0.000	0.529	0.000	0.529	Landscaped/Lawn - 50-75% Grass cover, Fair
0.000	0.000	0.000	4.953	0.000	4.953	Paved parking
0.000	0.000	0.000	1.508	0.000	1.508	Roofs
0.000	**0.000**	**0.000**	**8.930**	**0.000**	**8.930**	**TOTAL AREA**

Time span=0.00-60.00 hrs, dt=0.10 hrs, 601 points x 3
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN
Reach routing by Dyn-Stor-Ind method - Pond routing by Dyn-Stor-Ind method

Subcatchment EX-1: Runoff Area=4.465 ac 67.95% Impervious Runoff Depth=1.77"
Tc=6.0 min CN=94 Runoff=12.25 cfs 0.660 af

Subcatchment P-1: Untreated Runoff Area=2.590 ac 79.58% Impervious Runoff Depth=1.87"
Tc=6.0 min CN=95 Runoff=7.38 cfs 0.403 af

Subcatchment P-2: Treated Runoff Area=1.875 ac 91.73% Impervious Runoff Depth=2.06"
Tc=6.0 min CN=97 Runoff=5.70 cfs 0.323 af

Reach EX: Existing Conditions Inflow=12.25 cfs 0.660 af
Outflow=12.25 cfs 0.660 af

Reach P: Proposed Conditions Inflow=8.77 cfs 0.621 af
Outflow=8.77 cfs 0.621 af

Pond U1: Underground Facility Peak Elev=915.47' Storage=0.166 af Inflow=5.70 cfs 0.323 af
Discarded=0.00 cfs 0.007 af Primary=2.15 cfs 0.218 af Outflow=2.15 cfs 0.224 af

Total Runoff Area = 8.930 ac Runoff Volume = 1.386 af Average Runoff Depth = 1.86"
23.68% Pervious = 2.115 ac 76.32% Impervious = 6.815 ac

Summary for Subcatchment EX-1:

[49] Hint: Tc<2dt may require smaller dt

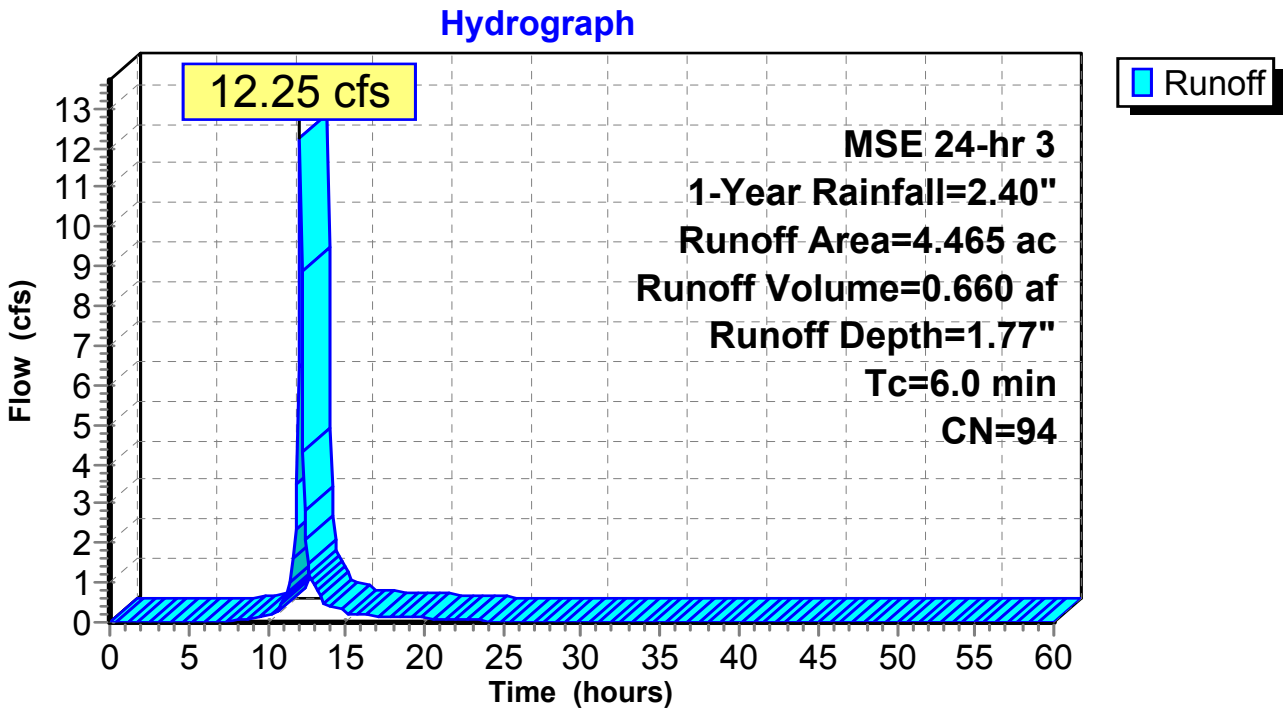
Runoff = 12.25 cfs @ 12.11 hrs, Volume= 0.660 af, Depth= 1.77"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-60.00 hrs, dt= 0.10 hrs
MSE 24-hr 3 1-Year Rainfall=2.40"

	Area (ac)	CN	Description
	0.676	98	Roofs, HSG D
	2.130	98	Paved parking, HSG D
*	0.228	98	Concrete Sidewalks, HSG D
	0.125	96	Gravel surface, HSG D
	1.306	84	50-75% Grass cover, Fair, HSG D
	4.465	94	Weighted Average
	1.431		32.05% Pervious Area
	3.034		67.95% Impervious Area

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

Subcatchment EX-1:



Summary for Subcatchment P-1: Untreated

[49] Hint: Tc<2dt may require smaller dt

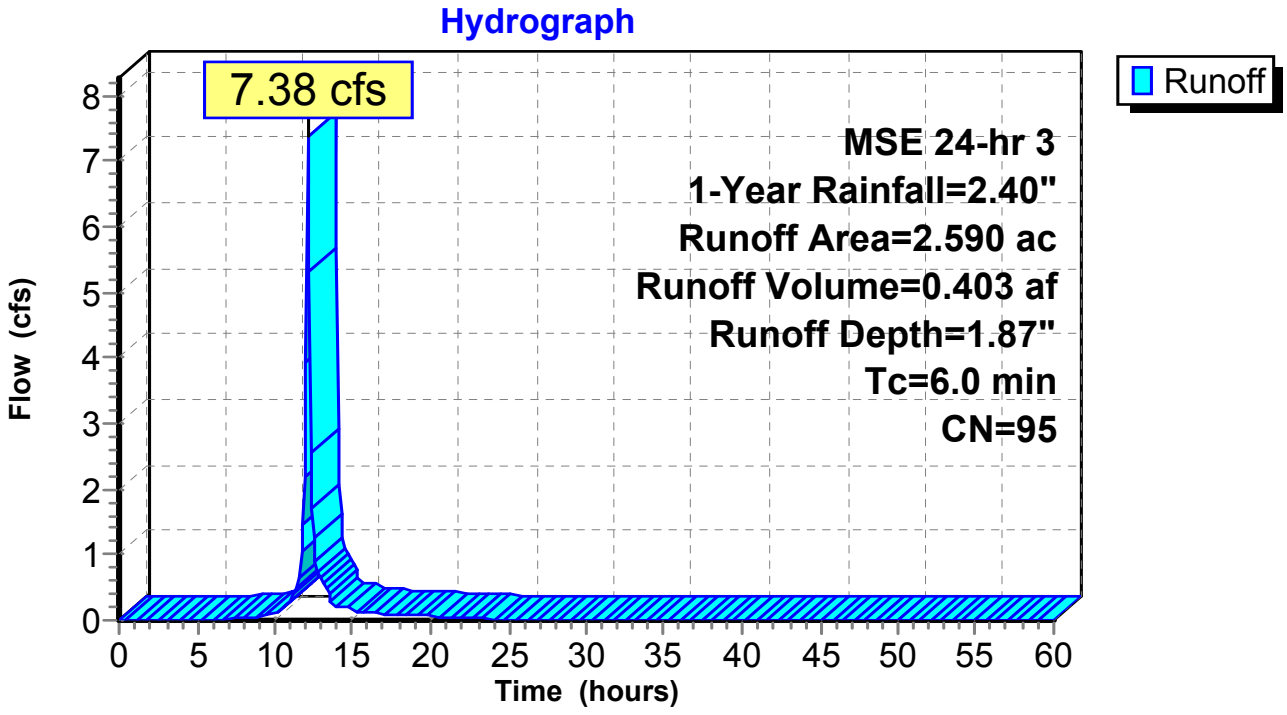
Runoff = 7.38 cfs @ 12.11 hrs, Volume= 0.403 af, Depth= 1.87"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-60.00 hrs, dt= 0.10 hrs
MSE 24-hr 3 1-Year Rainfall=2.40"

	Area (ac)	CN	Description
	0.489	98	Roofs, HSG D
	1.483	98	Paved parking, HSG D
*	0.089	98	Concrete Sidewalk, HSG D
*	0.529	84	Landscaped/Lawn - 50-75% Grass cover, Fair, HSG D
	2.590	95	Weighted Average
	0.529		20.42% Pervious Area
	2.061		79.58% Impervious Area

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

Subcatchment P-1: Untreated



Summary for Subcatchment P-2: Treated

[49] Hint: Tc<2dt may require smaller dt

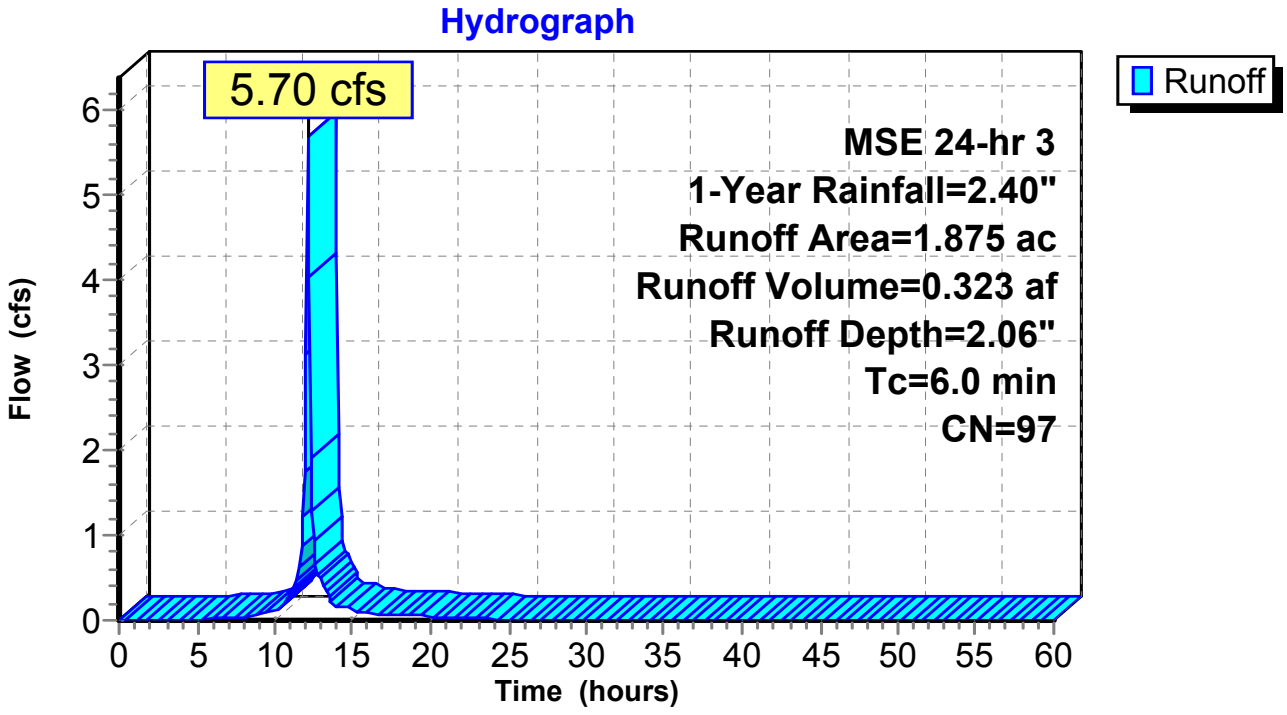
Runoff = 5.70 cfs @ 12.11 hrs, Volume= 0.323 af, Depth= 2.06"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-60.00 hrs, dt= 0.10 hrs
MSE 24-hr 3 1-Year Rainfall=2.40"

	Area (ac)	CN	Description
	0.343	98	Roofs, HSG D
	1.340	98	Paved parking, HSG D
*	0.037	98	Concrete Sidewalk, HSG D
	0.155	84	50-75% Grass cover, Fair, HSG D
	1.875	97	Weighted Average
	0.155		8.27% Pervious Area
	1.720		91.73% Impervious Area

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

Subcatchment P-2: Treated



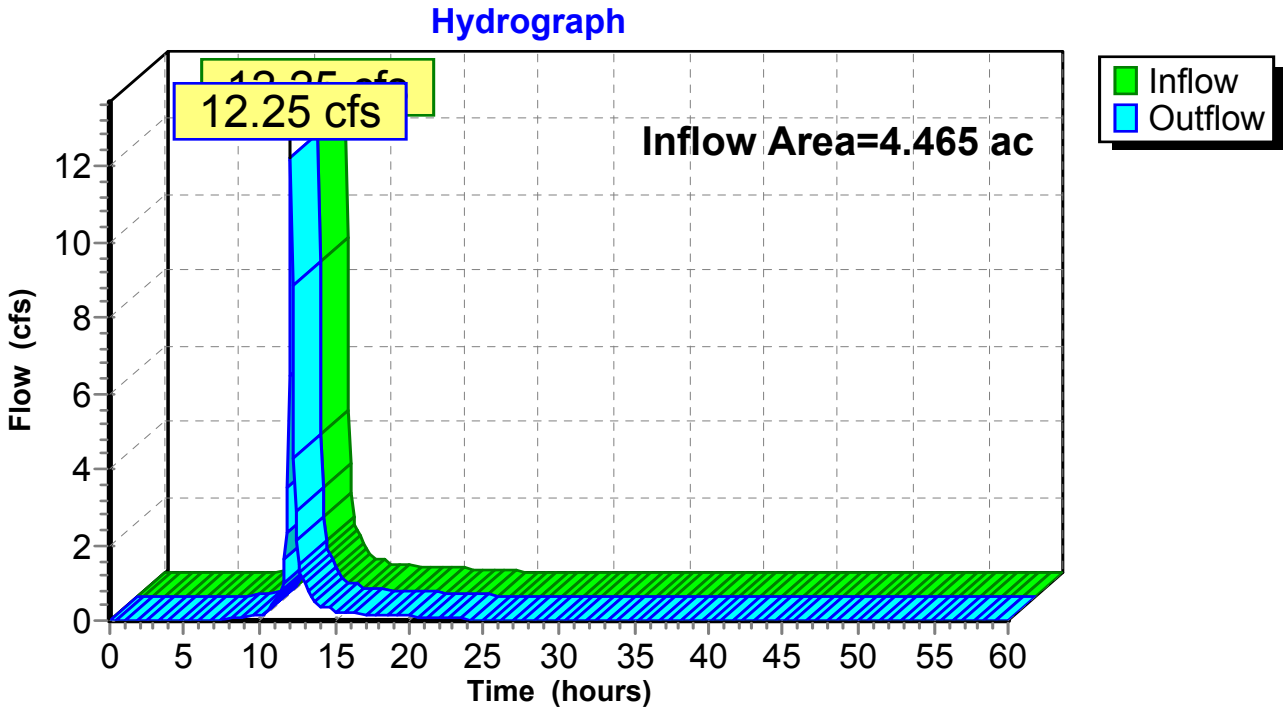
Summary for Reach EX: Existing Conditions

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

Inflow Area = 4.465 ac, 67.95% Impervious, Inflow Depth = 1.77" for 1-Year event
Inflow = 12.25 cfs @ 12.11 hrs, Volume= 0.660 af
Outflow = 12.25 cfs @ 12.11 hrs, Volume= 0.660 af, Atten= 0%, Lag= 0.0 min

Routing by Dyn-Stor-Ind method, Time Span= 0.00-60.00 hrs, dt= 0.10 hrs / 3

Reach EX: Existing Conditions



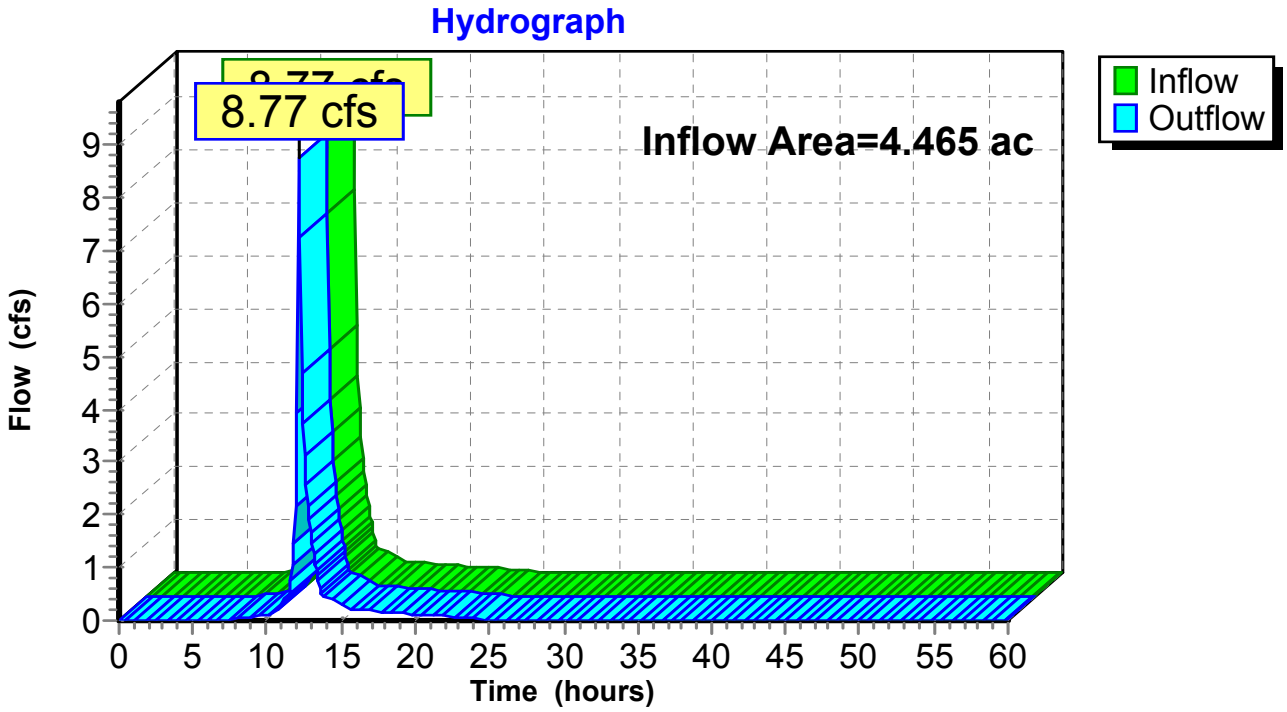
Summary for Reach P: Proposed Conditions

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

Inflow Area = 4.465 ac, 84.68% Impervious, Inflow Depth = 1.67" for 1-Year event
Inflow = 8.77 cfs @ 12.13 hrs, Volume= 0.621 af
Outflow = 8.77 cfs @ 12.13 hrs, Volume= 0.621 af, Atten= 0%, Lag= 0.0 min

Routing by Dyn-Stor-Ind method, Time Span= 0.00-60.00 hrs, dt= 0.10 hrs / 3

Reach P: Proposed Conditions



Summary for Pond U1: Underground Facility

Inflow Area = 1.875 ac, 91.73% Impervious, Inflow Depth = 2.06" for 1-Year event
Inflow = 5.70 cfs @ 12.11 hrs, Volume= 0.323 af
Outflow = 2.15 cfs @ 12.32 hrs, Volume= 0.224 af, Atten= 62%, Lag= 12.3 min
Discarded = 0.00 cfs @ 12.31 hrs, Volume= 0.007 af
Primary = 2.15 cfs @ 12.32 hrs, Volume= 0.218 af

Routing by Dyn-Stor-Ind method, Time Span= 0.00-60.00 hrs, dt= 0.10 hrs / 3
Peak Elev= 915.47' @ 12.31 hrs Surf.Area= 0.048 ac Storage= 0.166 af

Plug-Flow detention time= 176.5 min calculated for 0.224 af (70% of inflow)
Center-of-Mass det. time= 108.3 min (873.4 - 765.1)

Volume	Invert	Avail.Storage	Storage Description
#1A	910.51'	0.061 af	**28.50'W x 55.42'L x 6.75'H Field A** 0.245 af Overall - 0.093 af Embedded = 0.152 af x 40.0% Voids
#2A	911.26'	0.093 af	**ADS_StormTech MC-4500 +Cap** x 36 Inside #1 Effective Size= 90.4"W x 60.0"H => 26.46 sf x 4.02'L = 106.5 cf Overall Size= 100.0"W x 60.0"H x 4.33'L with 0.31' Overlap 3 Rows of 12 Chambers Cap Storage= +35.7 cf x 2 x 3 rows = 214.2 cf
#3B	910.51'	0.022 af	**10.33'W x 51.39'L x 6.75'H Field B** 0.082 af Overall - 0.029 af Embedded = 0.054 af x 40.0% Voids
#4B	911.26'	0.029 af	**ADS_StormTech MC-4500 +Cap** x 11 Inside #3 Effective Size= 90.4"W x 60.0"H => 26.46 sf x 4.02'L = 106.5 cf Overall Size= 100.0"W x 60.0"H x 4.33'L with 0.31' Overlap Cap Storage= +35.7 cf x 2 x 1 rows = 71.4 cf
		0.204 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	915.51'	**2.0' long Sharp-Crested Rectangular Weir** 2 End Contraction(s)
#2	Primary	913.51'	**8.0" Vert. Orifice/Grate** C= 0.600
#3	Discarded	910.51'	**0.030 in/hr Exfiltration over Surface area** Conductivity to Groundwater Elevation = 1.00'

Discarded OutFlow Max=0.00 cfs @ 12.31 hrs HW=915.45' (Free Discharge)
└**3=Exfiltration** (Controls 0.00 cfs)

Primary OutFlow Max=2.13 cfs @ 12.32 hrs HW=915.45' TW=0.00' (Dynamic Tailwater)
├**1=Sharp-Crested Rectangular Weir** (Controls 0.00 cfs)
└**2=Orifice/Grate** (Orifice Controls 2.13 cfs @ 6.10 fps)

Pond U1: Underground Facility - Chamber Wizard Field A

Chamber Model = ADS_StormTechMC-4500 +Cap (ADS StormTech®MC-4500 with cap volume)
Effective Size= 90.4"W x 60.0"H => 26.46 sf x 4.02'L = 106.5 cf
Overall Size= 100.0"W x 60.0"H x 4.33'L with 0.31' Overlap
Cap Storage= +35.7 cf x 2 x 3 rows = 214.2 cf

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

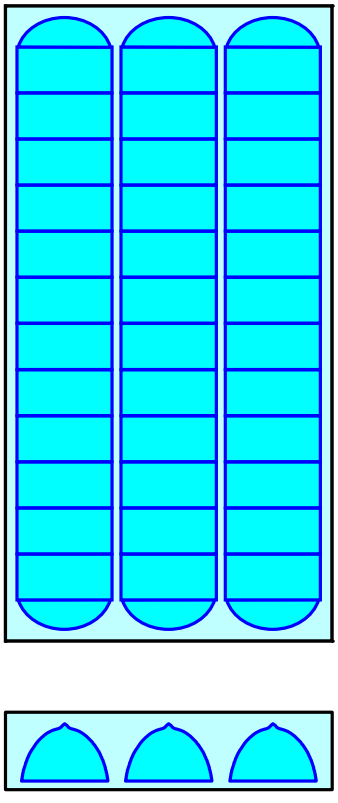
12 Chambers/Row x 4.02' Long +2.56' Cap Length x 2 = 53.42' Row Length +12.0" End Stone x 2 = 55.42' Base Length
3 Rows x 100.0" Wide + 9.0" Spacing x 2 + 12.0" Side Stone x 2 = 28.50' Base Width
9.0" Base + 60.0" Chamber Height + 12.0" Cover = 6.75' Field Height

36 Chambers x 106.5 cf + 35.7 cf Cap Volume x 2 x 3 Rows = 4,047.9 cf Chamber Storage

10,660.8 cf Field - 4,047.9 cf Chambers = 6,612.9 cf Stone x 40.0% Voids = 2,645.2 cf Stone Storage

Chamber Storage + Stone Storage = 6,693.0 cf = 0.154 af
Overall Storage Efficiency = 62.8%
Overall System Size = 55.42' x 28.50' x 6.75'

36 Chambers
394.8 cy Field
244.9 cy Stone



Pond U1: Underground Facility - Chamber Wizard Field B

Chamber Model = ADS_StormTechMC-4500 +Cap (ADS StormTech®MC-4500 with cap volume)
Effective Size= 90.4"W x 60.0"H => 26.46 sf x 4.02'L = 106.5 cf
Overall Size= 100.0"W x 60.0"H x 4.33'L with 0.31' Overlap
Cap Storage= +35.7 cf x 2 x 1 rows = 71.4 cf

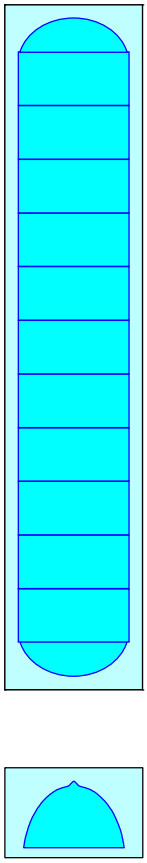
11 Chambers/Row x 4.02' Long +2.56' Cap Length x 2 = 49.39' Row Length +12.0" End Stone x 2 = 51.39' Base Length
1 Rows x 100.0" Wide + 12.0" Side Stone x 2 = 10.33' Base Width
9.0" Base + 60.0" Chamber Height + 12.0" Cover = 6.75' Field Height

11 Chambers x 106.5 cf + 35.7 cf Cap Volume x 2 x 1 Rows = 1,242.8 cf Chamber Storage

3,584.6 cf Field - 1,242.8 cf Chambers = 2,341.8 cf Stone x 40.0% Voids = 936.7 cf Stone Storage

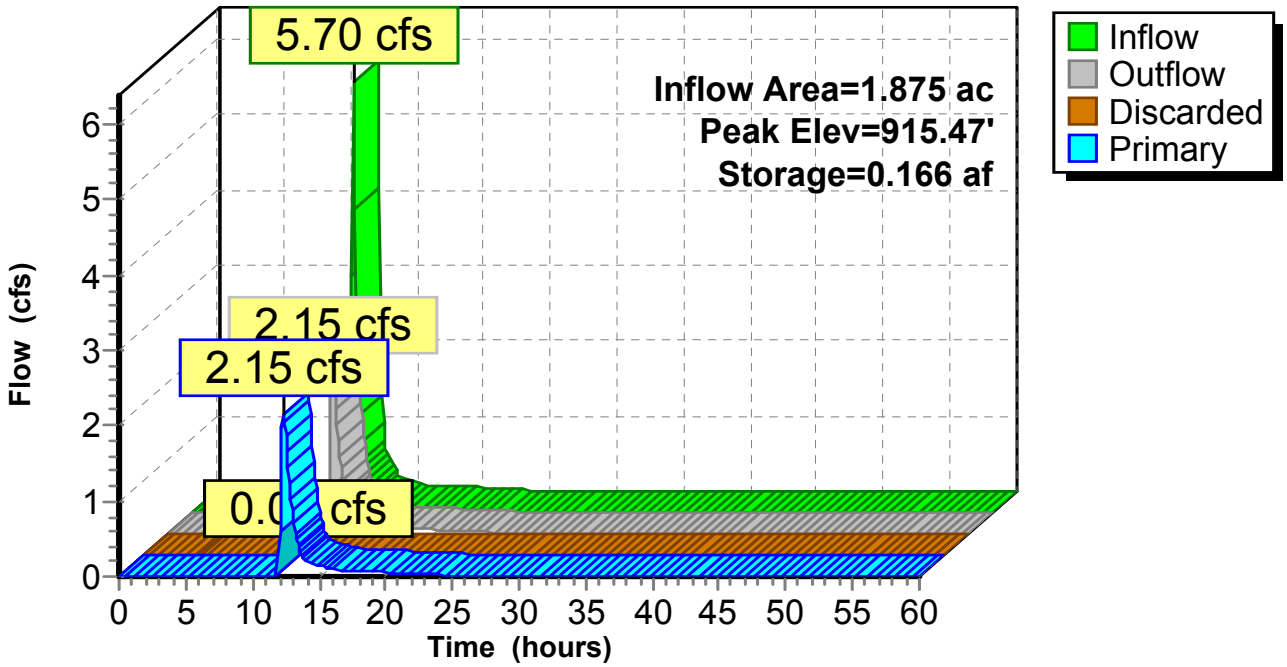
Chamber Storage + Stone Storage = 2,179.5 cf = 0.050 af
Overall Storage Efficiency = 60.8%
Overall System Size = 51.39' x 10.33' x 6.75'

11 Chambers
132.8 cy Field
86.7 cy Stone



Pond U1: Underground Facility

Hydrograph



Stage-Area-Storage for Pond U1: Underground Facility

Elevation (feet)	Surface (acres)	Storage (acre-feet)
910.51	**0.048**	0.000
910.61	0.048	0.002
910.71	0.048	0.004
910.81	0.048	0.006
910.91	0.048	0.008
911.01	0.048	0.010
911.11	0.048	0.012
911.21	0.048	0.014
911.31	0.048	0.017
911.41	0.048	0.021
911.51	0.048	0.025
911.61	0.048	0.029
911.71	0.048	0.033
911.81	0.048	0.036
911.91	0.048	0.040
912.01	0.048	0.044
912.11	0.048	0.048
912.21	0.048	0.052
912.31	0.048	0.056
912.41	0.048	0.060
912.51	0.048	0.064
912.61	0.048	0.068
912.71	0.048	0.072
912.81	0.048	0.075
912.91	0.048	0.079
913.01	0.048	0.083
913.11	0.048	0.087
913.21	0.048	0.091
913.31	0.048	0.094
913.41	0.048	0.098
913.51	0.048	0.102
913.61	0.048	0.105
913.71	0.048	0.109
913.81	0.048	0.112
913.91	0.048	0.116
914.01	0.048	0.120
914.11	0.048	0.123
914.21	0.048	0.127
914.31	0.048	0.130
914.41	0.048	0.133
914.51	0.048	0.137
914.61	0.048	0.140
914.71	0.048	0.143
914.81	0.048	0.146
914.91	0.048	0.150
915.01	0.048	0.153
915.11	0.048	0.156
915.21	0.048	0.159
915.31	0.048	0.162
915.41	0.048	0.165
915.51	0.048	0.167
915.61	0.048	0.170
915.71	0.048	0.173
915.81	0.048	0.175
915.91	0.048	0.177
916.01	0.048	0.179
916.11	0.048	0.181
916.21	0.048	0.183
916.31	0.048	0.185
916.41	0.048	0.187
916.51	0.048	0.189
916.61	0.048	0.191
916.71	0.048	0.193
916.81	0.048	0.195
916.91	0.048	0.197
917.01	0.048	0.199
917.11	0.048	0.201
917.21	0.048	**0.203**

Time span=0.00-60.00 hrs, dt=0.10 hrs, 601 points x 3
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN
Reach routing by Dyn-Stor-Ind method - Pond routing by Dyn-Stor-Ind method

Subcatchment EX-1: Runoff Area=4.465 ac 67.95% Impervious Runoff Depth=2.06"
Tc=6.0 min CN=94 Runoff=14.12 cfs 0.767 af

Subcatchment P-1: Untreated Runoff Area=2.590 ac 79.58% Impervious Runoff Depth=2.16"
Tc=6.0 min CN=95 Runoff=8.46 cfs 0.466 af

Subcatchment P-2: Treated Runoff Area=1.875 ac 91.73% Impervious Runoff Depth=2.36"
Tc=6.0 min CN=97 Runoff=6.46 cfs 0.369 af

Reach EX: Existing Conditions Inflow=14.12 cfs 0.767 af
Outflow=14.12 cfs 0.767 af

Reach P: Proposed Conditions Inflow=10.46 cfs 0.730 af
Outflow=10.46 cfs 0.730 af

Pond U1: Underground Facility Peak Elev=915.83' Storage=0.175 af Inflow=6.46 cfs 0.369 af
Discarded=0.00 cfs 0.007 af Primary=3.44 cfs 0.264 af Outflow=3.44 cfs 0.271 af

Total Runoff Area = 8.930 ac Runoff Volume = 1.601 af Average Runoff Depth = 2.15"
23.68% Pervious = 2.115 ac 76.32% Impervious = 6.815 ac

Summary for Subcatchment EX-1:

[49] Hint: Tc<2dt may require smaller dt

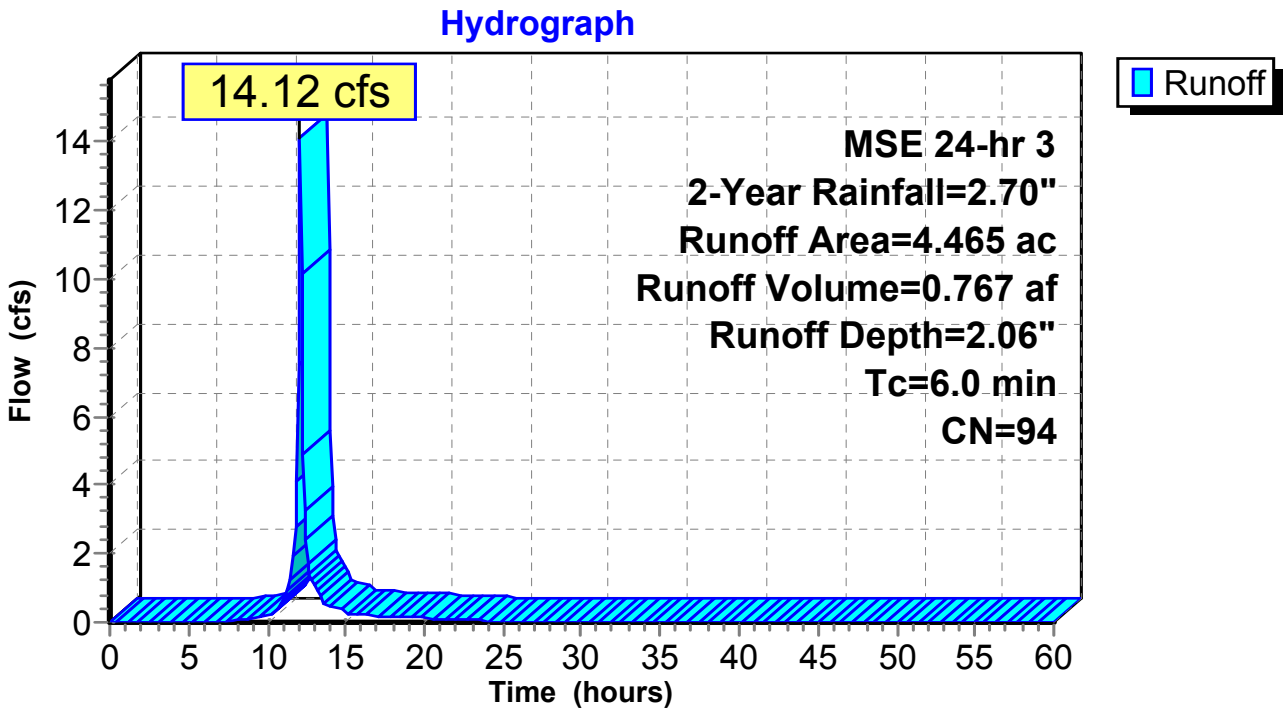
Runoff = 14.12 cfs @ 12.11 hrs, Volume= 0.767 af, Depth= 2.06"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-60.00 hrs, dt= 0.10 hrs
MSE 24-hr 3 2-Year Rainfall=2.70"

	Area (ac)	CN	Description
	0.676	98	Roofs, HSG D
	2.130	98	Paved parking, HSG D
*	0.228	98	Concrete Sidewalks, HSG D
	0.125	96	Gravel surface, HSG D
	1.306	84	50-75% Grass cover, Fair, HSG D
	4.465	94	Weighted Average
	1.431		32.05% Pervious Area
	3.034		67.95% Impervious Area

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

Subcatchment EX-1:



Summary for Subcatchment P-1: Untreated

[49] Hint: Tc<2dt may require smaller dt

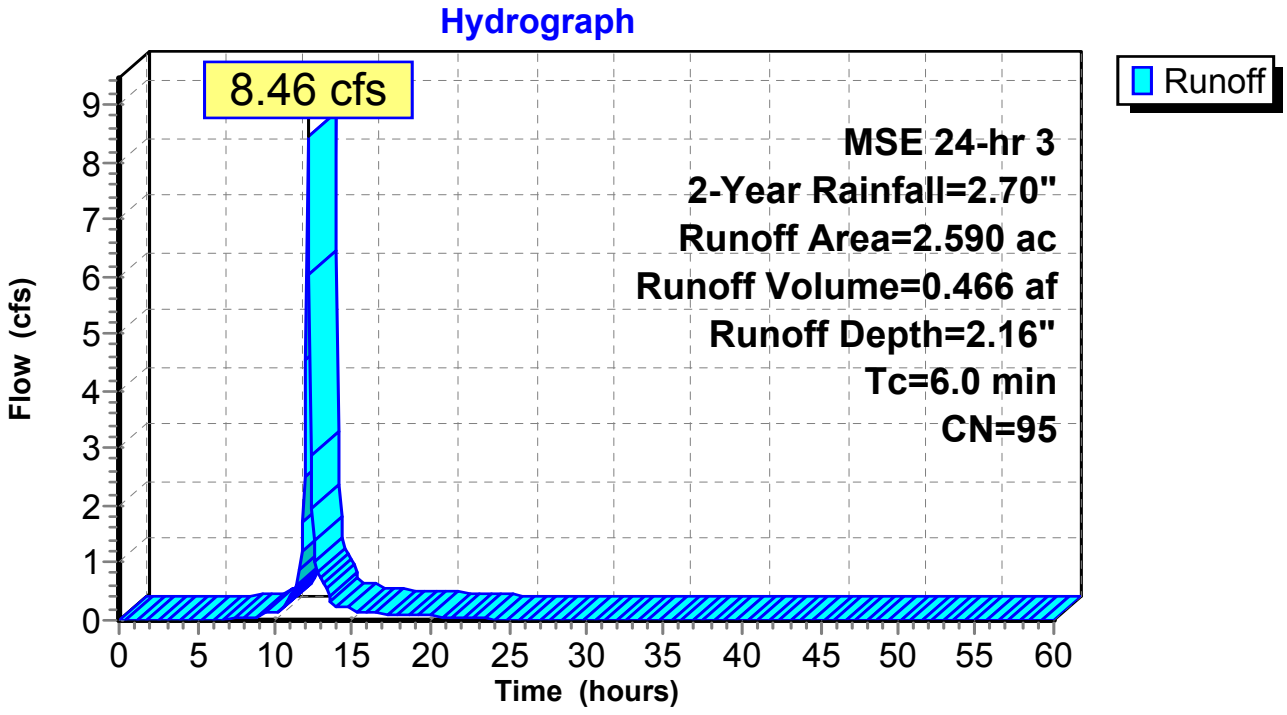
Runoff = 8.46 cfs @ 12.11 hrs, Volume= 0.466 af, Depth= 2.16"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-60.00 hrs, dt= 0.10 hrs
MSE 24-hr 3 2-Year Rainfall=2.70"

	Area (ac)	CN	Description
	0.489	98	Roofs, HSG D
	1.483	98	Paved parking, HSG D
*	0.089	98	Concrete Sidewalk, HSG D
*	0.529	84	Landscaped/Lawn - 50-75% Grass cover, Fair, HSG D
	2.590	95	Weighted Average
	0.529		20.42% Pervious Area
	2.061		79.58% Impervious Area

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

Subcatchment P-1: Untreated



Summary for Subcatchment P-2: Treated

[49] Hint: Tc<2dt may require smaller dt

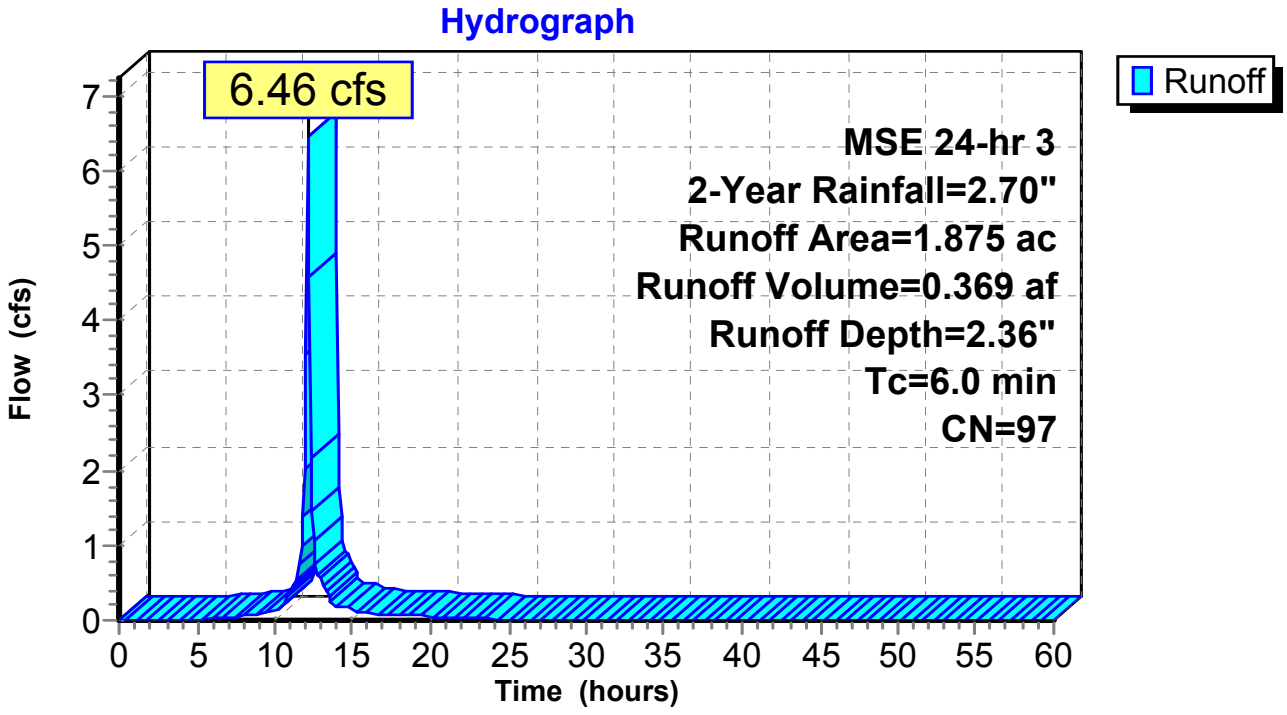
Runoff = 6.46 cfs @ 12.11 hrs, Volume= 0.369 af, Depth= 2.36"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-60.00 hrs, dt= 0.10 hrs
MSE 24-hr 3 2-Year Rainfall=2.70"

	Area (ac)	CN	Description
	0.343	98	Roofs, HSG D
	1.340	98	Paved parking, HSG D
*	0.037	98	Concrete Sidewalk, HSG D
	0.155	84	50-75% Grass cover, Fair, HSG D
	1.875	97	Weighted Average
	0.155		8.27% Pervious Area
	1.720		91.73% Impervious Area

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

Subcatchment P-2: Treated



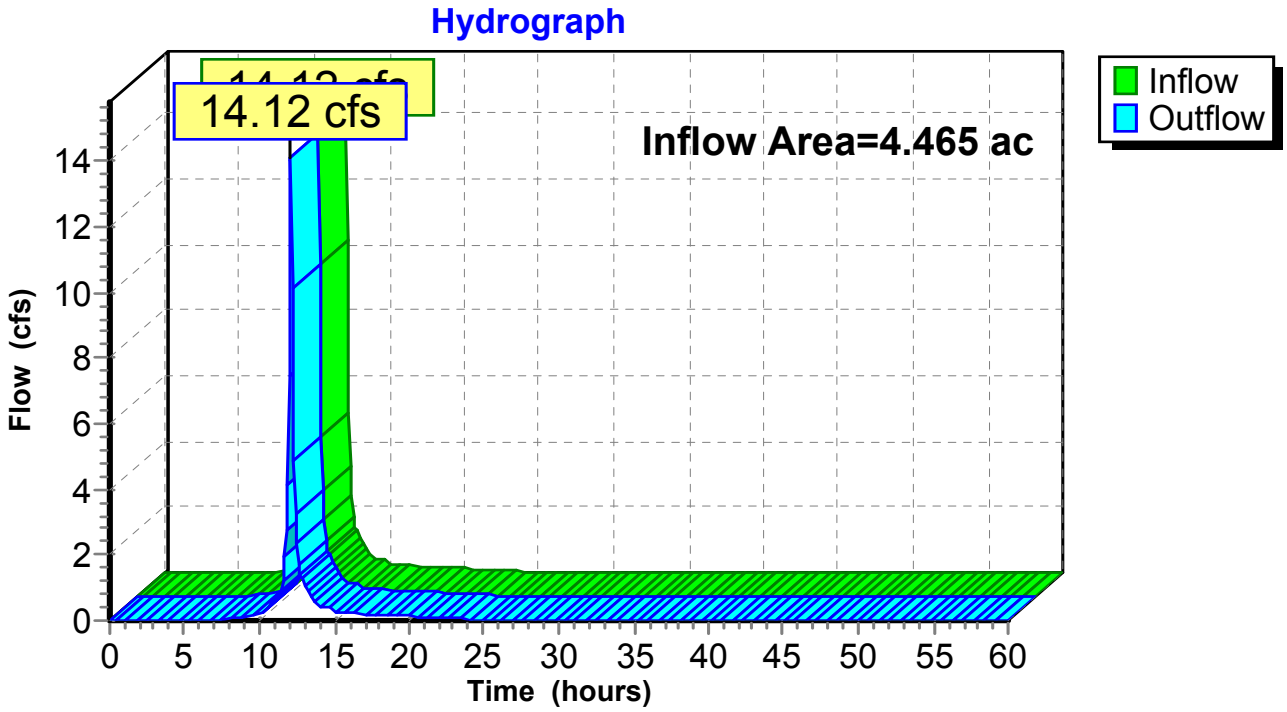
Summary for Reach EX: Existing Conditions

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

Inflow Area = 4.465 ac, 67.95% Impervious, Inflow Depth = 2.06" for 2-Year event
Inflow = 14.12 cfs @ 12.11 hrs, Volume= 0.767 af
Outflow = 14.12 cfs @ 12.11 hrs, Volume= 0.767 af, Atten= 0%, Lag= 0.0 min

Routing by Dyn-Stor-Ind method, Time Span= 0.00-60.00 hrs, dt= 0.10 hrs / 3

Reach EX: Existing Conditions



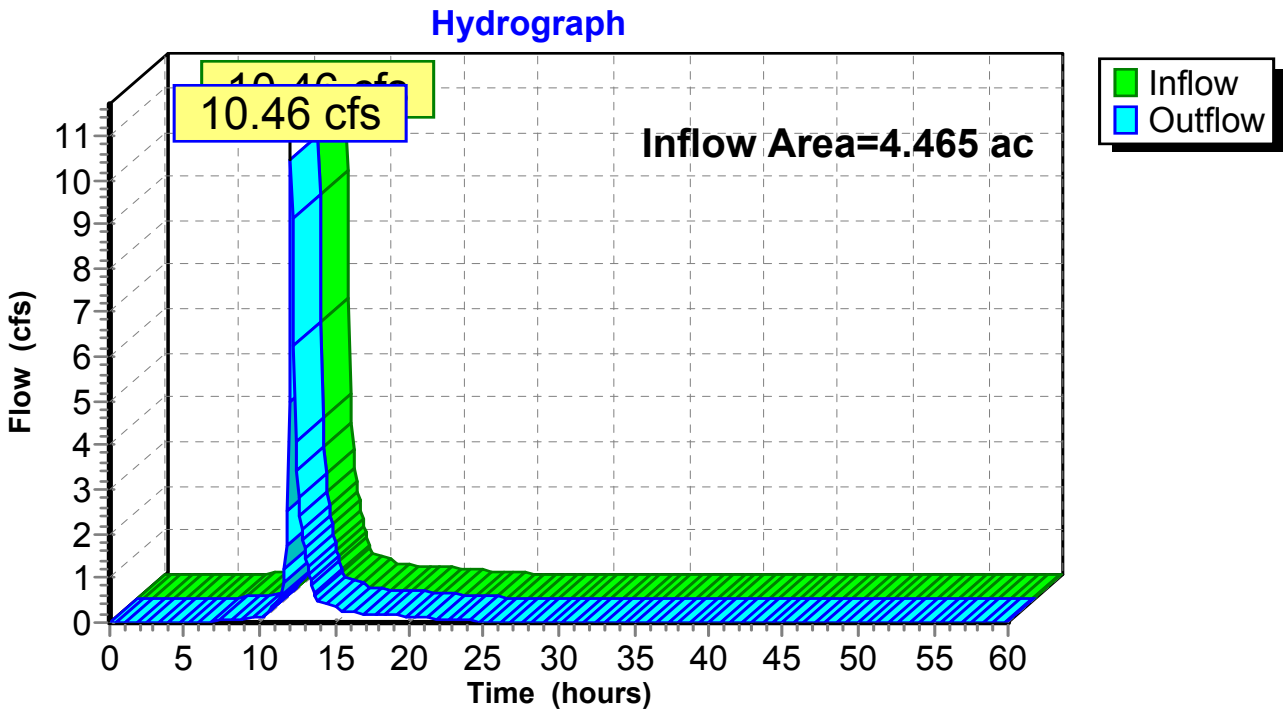
Summary for Reach P: Proposed Conditions

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

Inflow Area = 4.465 ac, 84.68% Impervious, Inflow Depth = 1.96" for 2-Year event
Inflow = 10.46 cfs @ 12.13 hrs, Volume= 0.730 af
Outflow = 10.46 cfs @ 12.13 hrs, Volume= 0.730 af, Atten= 0%, Lag= 0.0 min

Routing by Dyn-Stor-Ind method, Time Span= 0.00-60.00 hrs, dt= 0.10 hrs / 3

Reach P: Proposed Conditions



Summary for Pond U1: Underground Facility

Inflow Area = 1.875 ac, 91.73% Impervious, Inflow Depth = 2.36" for 2-Year event
Inflow = 6.46 cfs @ 12.11 hrs, Volume= 0.369 af
Outflow = 3.44 cfs @ 12.27 hrs, Volume= 0.271 af, Atten= 47%, Lag= 9.5 min
Discarded = 0.00 cfs @ 12.26 hrs, Volume= 0.007 af
Primary = 3.44 cfs @ 12.27 hrs, Volume= 0.264 af

Routing by Dyn-Stor-Ind method, Time Span= 0.00-60.00 hrs, dt= 0.10 hrs / 3
Peak Elev= 915.83' @ 12.26 hrs Surf.Area= 0.048 ac Storage= 0.175 af

Plug-Flow detention time= 158.0 min calculated for 0.270 af (73% of inflow)
Center-of-Mass det. time= 97.1 min (859.8 - 762.7)

Volume	Invert	Avail.Storage	Storage Description
#1A	910.51'	0.061 af	**28.50'W x 55.42'L x 6.75'H Field A** 0.245 af Overall - 0.093 af Embedded = 0.152 af x 40.0% Voids
#2A	911.26'	0.093 af	**ADS_StormTech MC-4500 +Cap** x 36 Inside #1 Effective Size= 90.4"W x 60.0"H => 26.46 sf x 4.02'L = 106.5 cf Overall Size= 100.0"W x 60.0"H x 4.33'L with 0.31' Overlap 3 Rows of 12 Chambers Cap Storage= +35.7 cf x 2 x 3 rows = 214.2 cf
#3B	910.51'	0.022 af	**10.33'W x 51.39'L x 6.75'H Field B** 0.082 af Overall - 0.029 af Embedded = 0.054 af x 40.0% Voids
#4B	911.26'	0.029 af	**ADS_StormTech MC-4500 +Cap** x 11 Inside #3 Effective Size= 90.4"W x 60.0"H => 26.46 sf x 4.02'L = 106.5 cf Overall Size= 100.0"W x 60.0"H x 4.33'L with 0.31' Overlap Cap Storage= +35.7 cf x 2 x 1 rows = 71.4 cf
		0.204 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	915.51'	**2.0' long Sharp-Crested Rectangular Weir** 2 End Contraction(s)
#2	Primary	913.51'	**8.0" Vert. Orifice/Grate** C= 0.600
#3	Discarded	910.51'	**0.030 in/hr Exfiltration over Surface area** Conductivity to Groundwater Elevation = 1.00'

Discarded OutFlow Max=0.00 cfs @ 12.26 hrs HW=915.79' (Free Discharge)
└**3=Exfiltration** (Controls 0.00 cfs)

Primary OutFlow Max=3.28 cfs @ 12.27 hrs HW=915.79' TW=0.00' (Dynamic Tailwater)
├**1=Sharp-Crested Rectangular Weir** (Weir Controls 0.93 cfs @ 1.72 fps)
└**2=Orifice/Grate** (Orifice Controls 2.34 cfs @ 6.71 fps)

Pond U1: Underground Facility - Chamber Wizard Field A

Chamber Model = ADS_StormTechMC-4500 +Cap (ADS StormTech®MC-4500 with cap volume)
Effective Size= 90.4"W x 60.0"H => 26.46 sf x 4.02'L = 106.5 cf
Overall Size= 100.0"W x 60.0"H x 4.33'L with 0.31' Overlap
Cap Storage= +35.7 cf x 2 x 3 rows = 214.2 cf

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

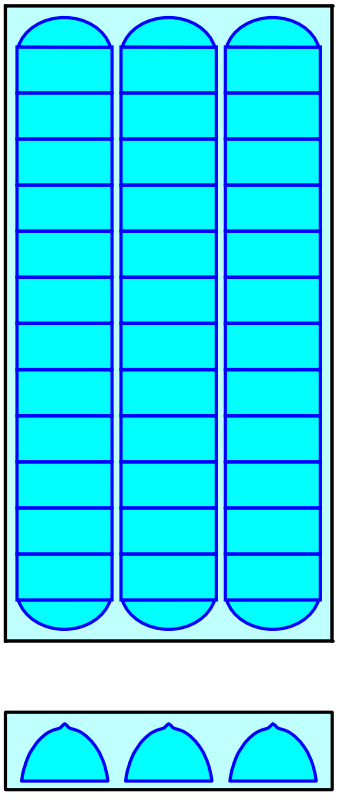
12 Chambers/Row x 4.02' Long +2.56' Cap Length x 2 = 53.42' Row Length +12.0" End Stone x 2 = 55.42' Base Length
3 Rows x 100.0" Wide + 9.0" Spacing x 2 + 12.0" Side Stone x 2 = 28.50' Base Width
9.0" Base + 60.0" Chamber Height + 12.0" Cover = 6.75' Field Height

36 Chambers x 106.5 cf + 35.7 cf Cap Volume x 2 x 3 Rows = 4,047.9 cf Chamber Storage

10,660.8 cf Field - 4,047.9 cf Chambers = 6,612.9 cf Stone x 40.0% Voids = 2,645.2 cf Stone Storage

Chamber Storage + Stone Storage = 6,693.0 cf = 0.154 af
Overall Storage Efficiency = 62.8%
Overall System Size = 55.42' x 28.50' x 6.75'

36 Chambers
394.8 cy Field
244.9 cy Stone



Pond U1: Underground Facility - Chamber Wizard Field B

Chamber Model = ADS_StormTechMC-4500 +Cap (ADS StormTech®MC-4500 with cap volume)
Effective Size= 90.4"W x 60.0"H => 26.46 sf x 4.02'L = 106.5 cf
Overall Size= 100.0"W x 60.0"H x 4.33'L with 0.31' Overlap
Cap Storage= +35.7 cf x 2 x 1 rows = 71.4 cf

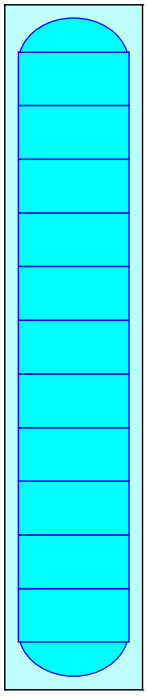
11 Chambers/Row x 4.02' Long +2.56' Cap Length x 2 = 49.39' Row Length +12.0" End Stone x 2 = 51.39' Base Length
1 Rows x 100.0" Wide + 12.0" Side Stone x 2 = 10.33' Base Width
9.0" Base + 60.0" Chamber Height + 12.0" Cover = 6.75' Field Height

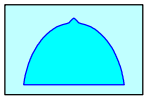
11 Chambers x 106.5 cf + 35.7 cf Cap Volume x 2 x 1 Rows = 1,242.8 cf Chamber Storage

3,584.6 cf Field - 1,242.8 cf Chambers = 2,341.8 cf Stone x 40.0% Voids = 936.7 cf Stone Storage

Chamber Storage + Stone Storage = 2,179.5 cf = 0.050 af
Overall Storage Efficiency = 60.8%
Overall System Size = 51.39' x 10.33' x 6.75'

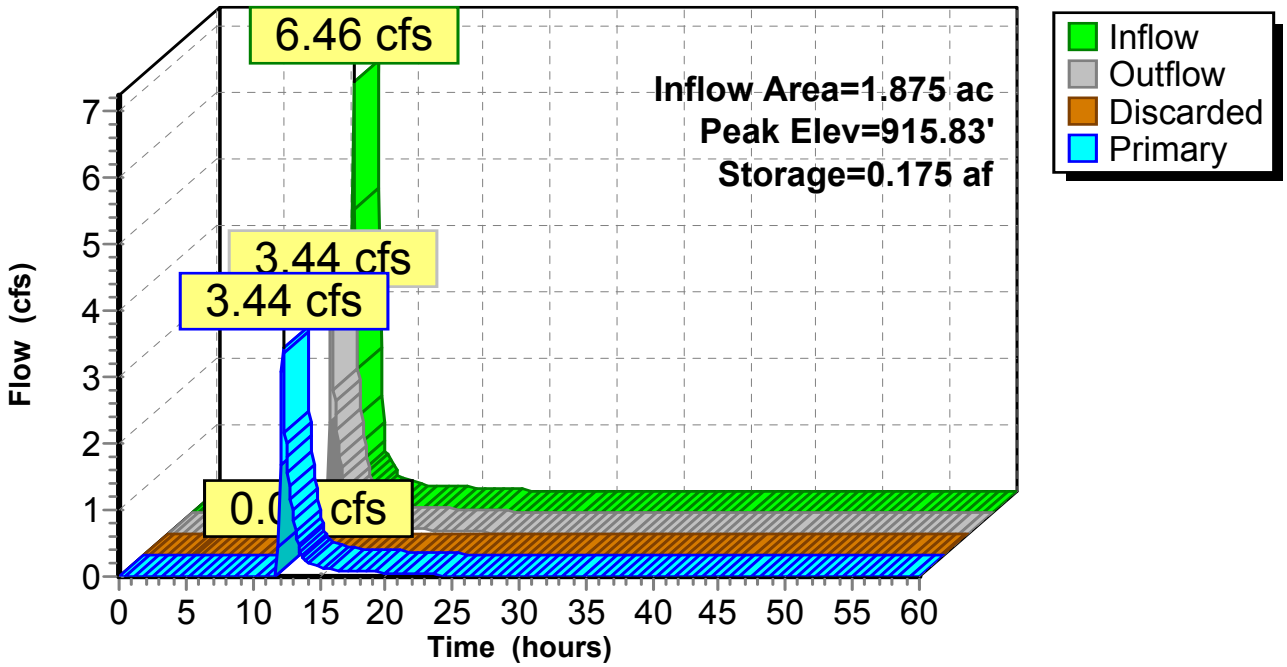
11 Chambers
132.8 cy Field
86.7 cy Stone





Pond U1: Underground Facility

Hydrograph



Stage-Area-Storage for Pond U1: Underground Facility

Elevation (feet)	Surface (acres)	Storage (acre-feet)
910.51	**0.048**	0.000
910.61	0.048	0.002
910.71	0.048	0.004
910.81	0.048	0.006
910.91	0.048	0.008
911.01	0.048	0.010
911.11	0.048	0.012
911.21	0.048	0.014
911.31	0.048	0.017
911.41	0.048	0.021
911.51	0.048	0.025
911.61	0.048	0.029
911.71	0.048	0.033
911.81	0.048	0.036
911.91	0.048	0.040
912.01	0.048	0.044
912.11	0.048	0.048
912.21	0.048	0.052
912.31	0.048	0.056
912.41	0.048	0.060
912.51	0.048	0.064
912.61	0.048	0.068
912.71	0.048	0.072
912.81	0.048	0.075
912.91	0.048	0.079
913.01	0.048	0.083
913.11	0.048	0.087
913.21	0.048	0.091
913.31	0.048	0.094
913.41	0.048	0.098
913.51	0.048	0.102
913.61	0.048	0.105
913.71	0.048	0.109
913.81	0.048	0.112
913.91	0.048	0.116
914.01	0.048	0.120
914.11	0.048	0.123
914.21	0.048	0.127
914.31	0.048	0.130
914.41	0.048	0.133
914.51	0.048	0.137
914.61	0.048	0.140
914.71	0.048	0.143
914.81	0.048	0.146
914.91	0.048	0.150
915.01	0.048	0.153
915.11	0.048	0.156
915.21	0.048	0.159
915.31	0.048	0.162
915.41	0.048	0.165
915.51	0.048	0.167
915.61	0.048	0.170
915.71	0.048	0.173
915.81	0.048	0.175
915.91	0.048	0.177
916.01	0.048	0.179
916.11	0.048	0.181
916.21	0.048	0.183
916.31	0.048	0.185
916.41	0.048	0.187
916.51	0.048	0.189
916.61	0.048	0.191
916.71	0.048	0.193
916.81	0.048	0.195
916.91	0.048	0.197
917.01	0.048	0.199
917.11	0.048	0.201
917.21	0.048	**0.203**

Time span=0.00-60.00 hrs, dt=0.10 hrs, 601 points x 3
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN
Reach routing by Dyn-Stor-Ind method - Pond routing by Dyn-Stor-Ind method

Subcatchment EX-1: Runoff Area=4.465 ac 67.95% Impervious Runoff Depth=2.61"
Tc=6.0 min CN=94 Runoff=17.66 cfs 0.972 af

Subcatchment P-1: Untreated Runoff Area=2.590 ac 79.58% Impervious Runoff Depth=2.71"
Tc=6.0 min CN=95 Runoff=10.50 cfs 0.586 af

Subcatchment P-2: Treated Runoff Area=1.875 ac 91.73% Impervious Runoff Depth=2.93"
Tc=6.0 min CN=97 Runoff=7.91 cfs 0.457 af

Reach EX: Existing Conditions Inflow=17.66 cfs 0.972 af
Outflow=17.66 cfs 0.972 af

Reach P: Proposed Conditions Inflow=15.27 cfs 0.938 af
Outflow=15.27 cfs 0.938 af

Pond U1: Underground Facility Peak Elev=916.35' Storage=0.186 af Inflow=7.91 cfs 0.457 af
Discarded=0.00 cfs 0.007 af Primary=7.29 cfs 0.352 af Outflow=7.29 cfs 0.359 af

Total Runoff Area = 8.930 ac Runoff Volume = 2.015 af Average Runoff Depth = 2.71"
23.68% Pervious = 2.115 ac 76.32% Impervious = 6.815 ac

Summary for Subcatchment EX-1:

[49] Hint: Tc<2dt may require smaller dt

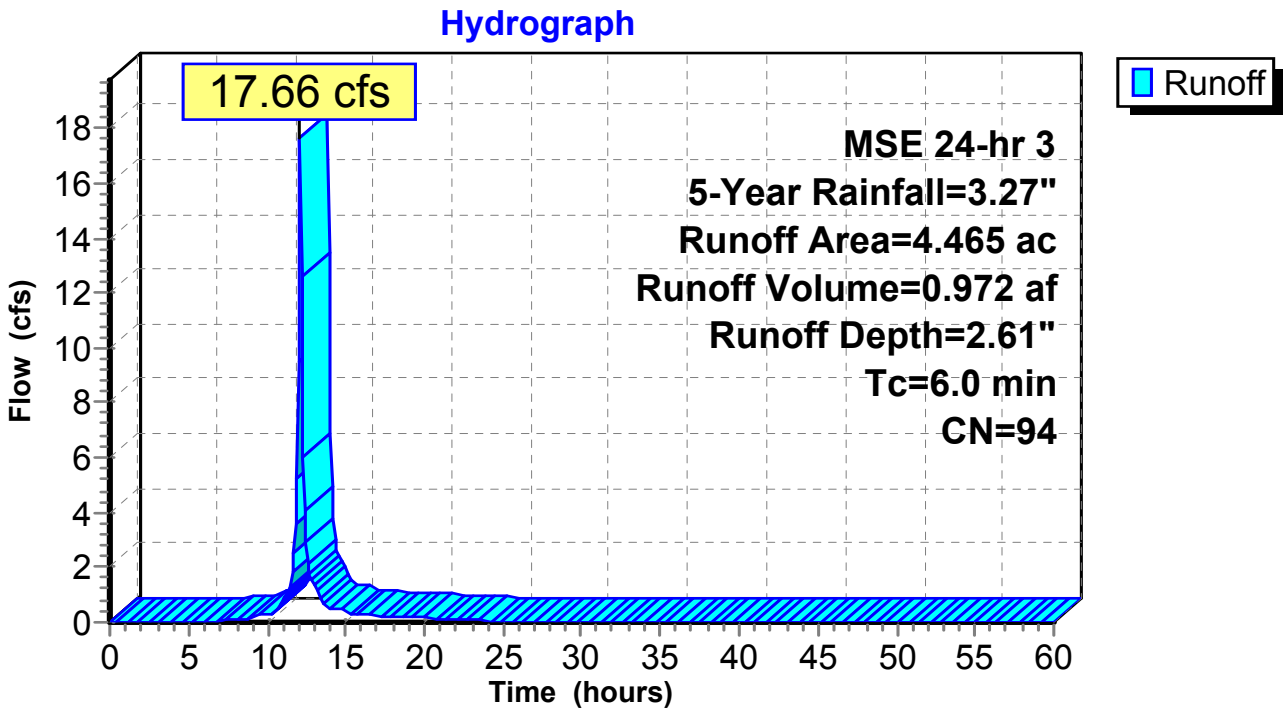
Runoff = 17.66 cfs @ 12.11 hrs, Volume= 0.972 af, Depth= 2.61"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-60.00 hrs, dt= 0.10 hrs
MSE 24-hr 3 5-Year Rainfall=3.27"

	Area (ac)	CN	Description
	0.676	98	Roofs, HSG D
	2.130	98	Paved parking, HSG D
*	0.228	98	Concrete Sidewalks, HSG D
	0.125	96	Gravel surface, HSG D
	1.306	84	50-75% Grass cover, Fair, HSG D
	4.465	94	Weighted Average
	1.431		32.05% Pervious Area
	3.034		67.95% Impervious Area

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

Subcatchment EX-1:



Summary for Subcatchment P-1: Untreated

[49] Hint: Tc<2dt may require smaller dt

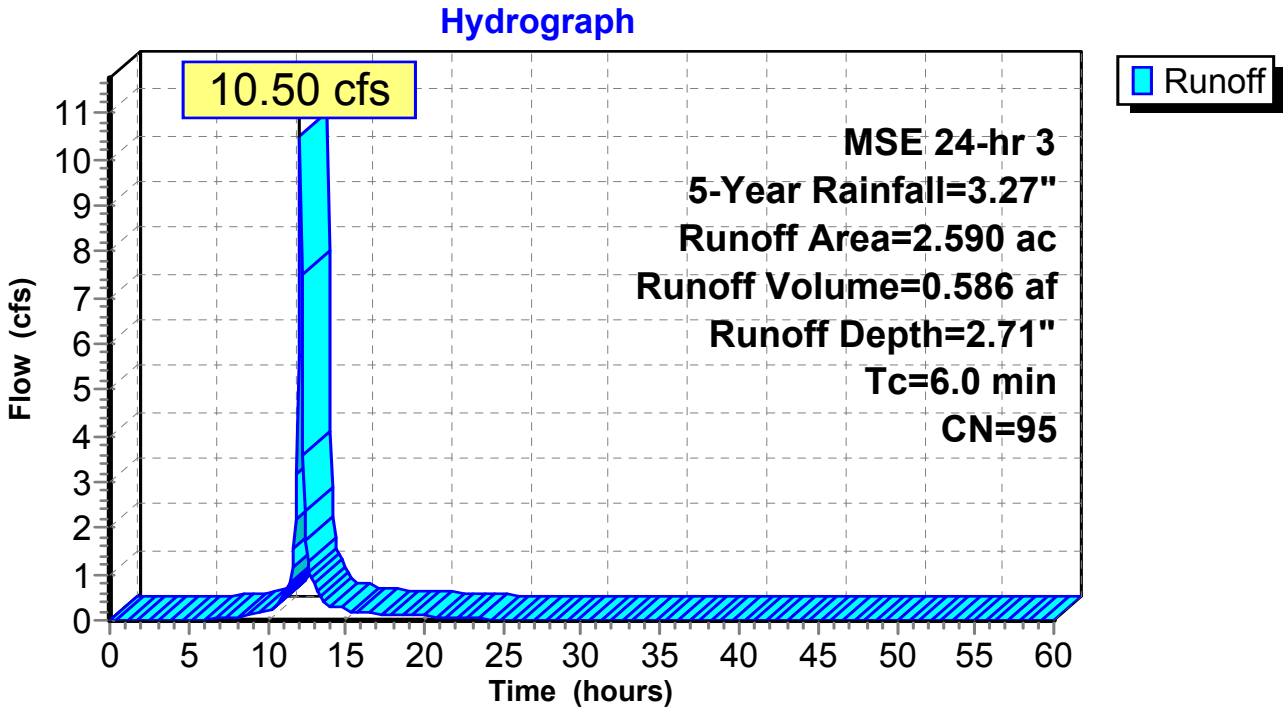
Runoff = 10.50 cfs @ 12.11 hrs, Volume= 0.586 af, Depth= 2.71"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-60.00 hrs, dt= 0.10 hrs
MSE 24-hr 3 5-Year Rainfall=3.27"

	Area (ac)	CN	Description
	0.489	98	Roofs, HSG D
	1.483	98	Paved parking, HSG D
*	0.089	98	Concrete Sidewalk, HSG D
*	0.529	84	Landscaped/Lawn - 50-75% Grass cover, Fair, HSG D
	2.590	95	Weighted Average
	0.529		20.42% Pervious Area
	2.061		79.58% Impervious Area

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

Subcatchment P-1: Untreated



Summary for Subcatchment P-2: Treated

[49] Hint: Tc<2dt may require smaller dt

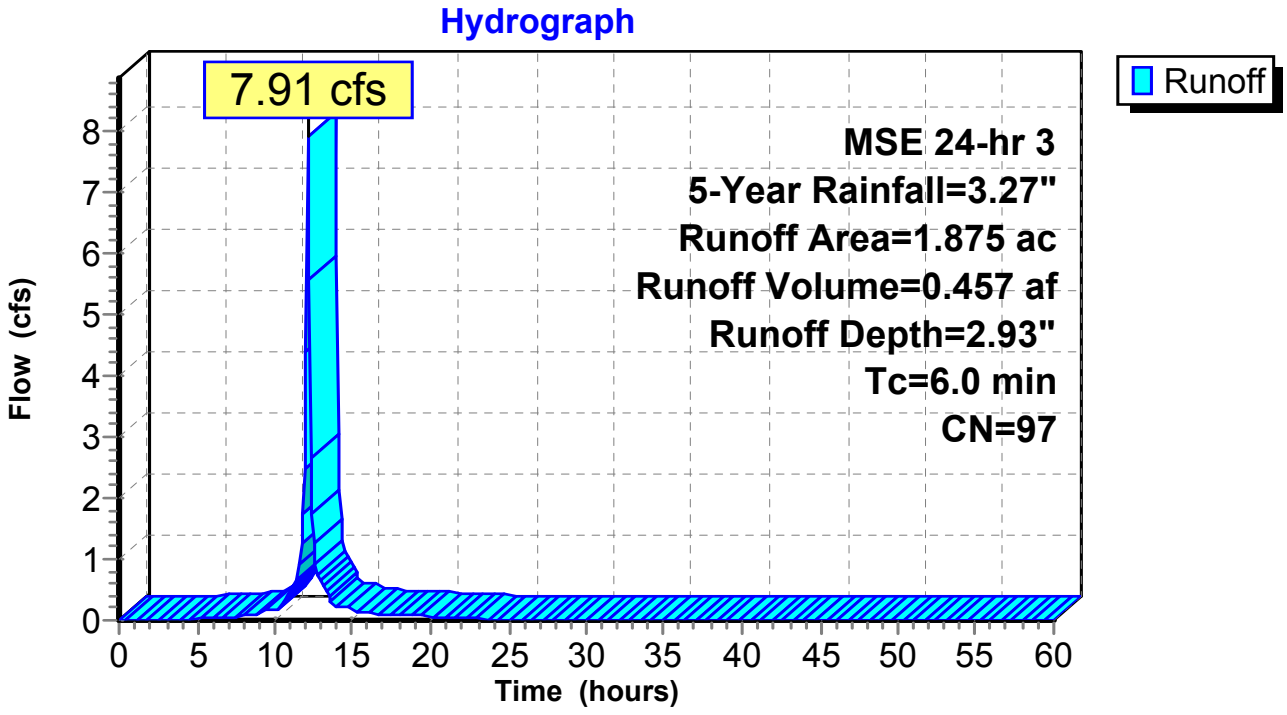
Runoff = 7.91 cfs @ 12.11 hrs, Volume= 0.457 af, Depth= 2.93"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-60.00 hrs, dt= 0.10 hrs
MSE 24-hr 3 5-Year Rainfall=3.27"

	Area (ac)	CN	Description
	0.343	98	Roofs, HSG D
	1.340	98	Paved parking, HSG D
*	0.037	98	Concrete Sidewalk, HSG D
	0.155	84	50-75% Grass cover, Fair, HSG D
	1.875	97	Weighted Average
	0.155		8.27% Pervious Area
	1.720		91.73% Impervious Area

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

Subcatchment P-2: Treated



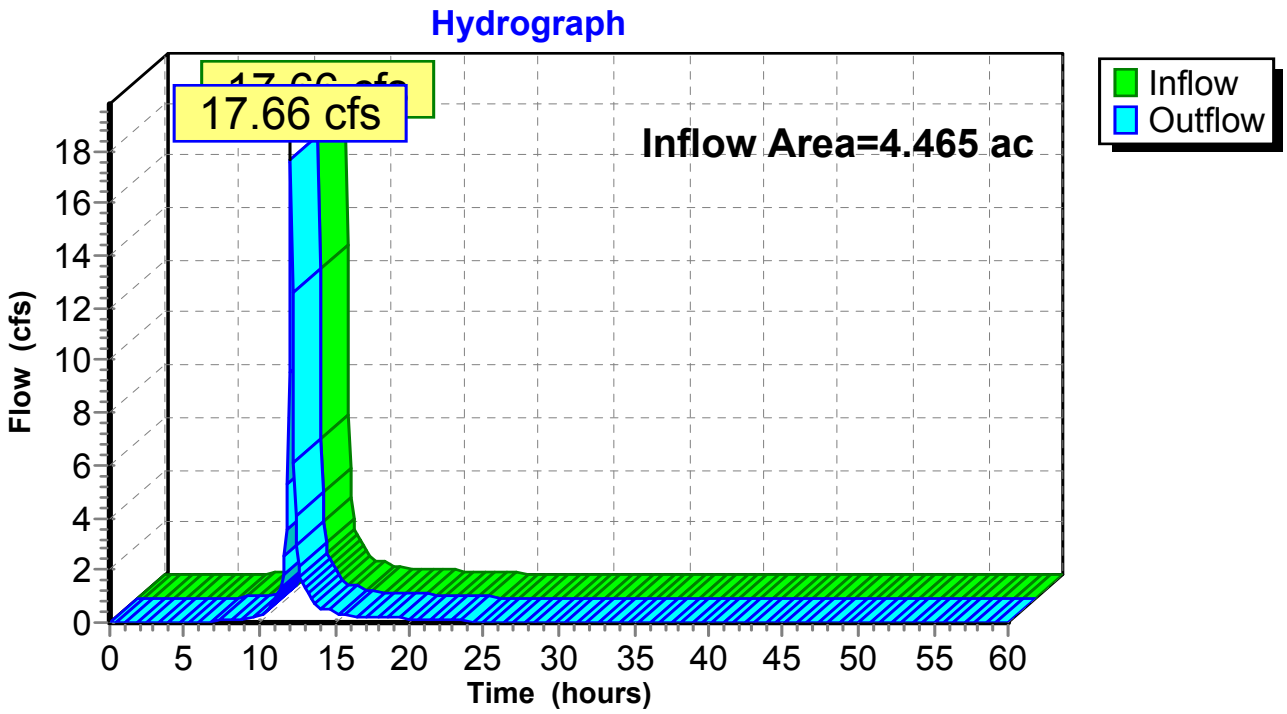
Summary for Reach EX: Existing Conditions

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

Inflow Area = 4.465 ac, 67.95% Impervious, Inflow Depth = 2.61" for 5-Year event
Inflow = 17.66 cfs @ 12.11 hrs, Volume= 0.972 af
Outflow = 17.66 cfs @ 12.11 hrs, Volume= 0.972 af, Atten= 0%, Lag= 0.0 min

Routing by Dyn-Stor-Ind method, Time Span= 0.00-60.00 hrs, dt= 0.10 hrs / 3

Reach EX: Existing Conditions



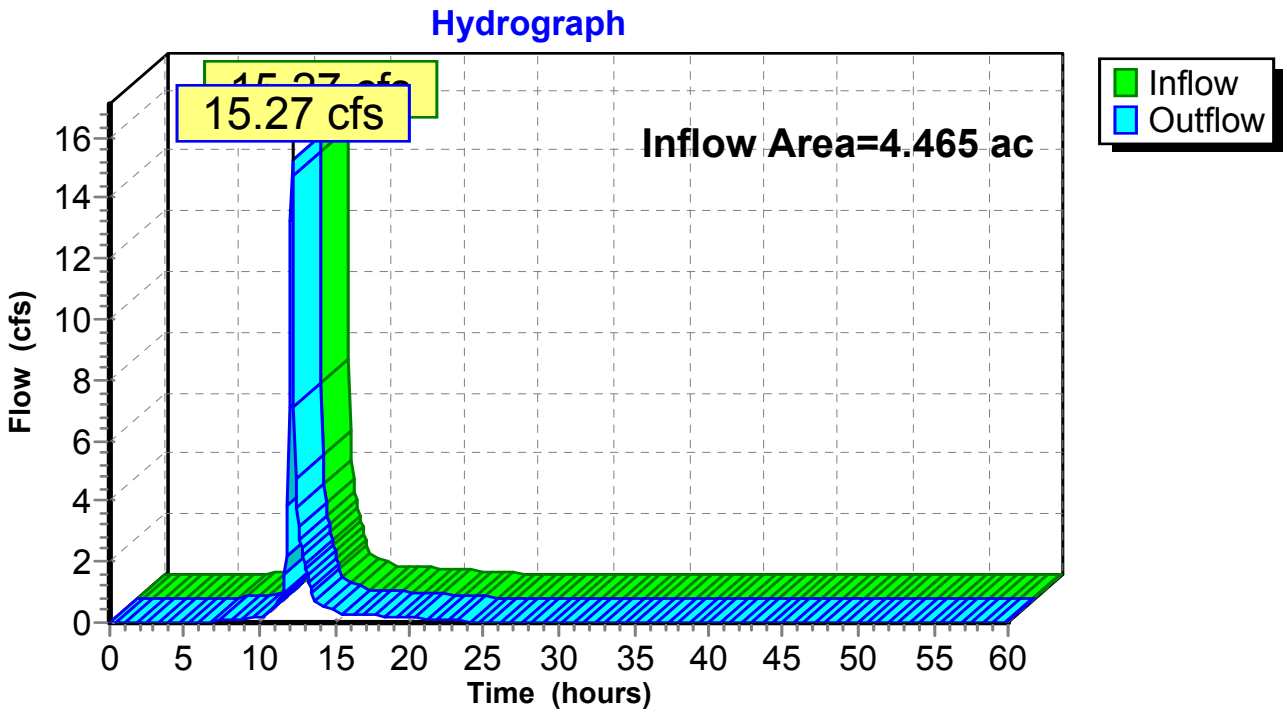
Summary for Reach P: Proposed Conditions

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

Inflow Area = 4.465 ac, 84.68% Impervious, Inflow Depth = 2.52" for 5-Year event
Inflow = 15.27 cfs @ 12.17 hrs, Volume= 0.938 af
Outflow = 15.27 cfs @ 12.17 hrs, Volume= 0.938 af, Atten= 0%, Lag= 0.0 min

Routing by Dyn-Stor-Ind method, Time Span= 0.00-60.00 hrs, dt= 0.10 hrs / 3

Reach P: Proposed Conditions



Summary for Pond U1: Underground Facility

Inflow Area = 1.875 ac, 91.73% Impervious, Inflow Depth = 2.93" for 5-Year event
Inflow = 7.91 cfs @ 12.11 hrs, Volume= 0.457 af
Outflow = 7.29 cfs @ 12.20 hrs, Volume= 0.359 af, Atten= 8%, Lag= 5.7 min
Discarded = 0.00 cfs @ 12.21 hrs, Volume= 0.007 af
Primary = 7.29 cfs @ 12.20 hrs, Volume= 0.352 af

Routing by Dyn-Stor-Ind method, Time Span= 0.00-60.00 hrs, dt= 0.10 hrs / 3
Peak Elev= 916.35' @ 12.21 hrs Surf.Area= 0.048 ac Storage= 0.186 af

Plug-Flow detention time= 143.3 min calculated for 0.359 af (79% of inflow)
Center-of-Mass det. time= 83.2 min (842.1 - 758.9)

Volume	Invert	Avail.Storage	Storage Description
#1A	910.51'	0.061 af	**28.50'W x 55.42'L x 6.75'H Field A** 0.245 af Overall - 0.093 af Embedded = 0.152 af x 40.0% Voids
#2A	911.26'	0.093 af	**ADS_StormTech MC-4500 +Cap** x 36 Inside #1 Effective Size= 90.4"W x 60.0"H => 26.46 sf x 4.02'L = 106.5 cf Overall Size= 100.0"W x 60.0"H x 4.33'L with 0.31' Overlap 3 Rows of 12 Chambers Cap Storage= +35.7 cf x 2 x 3 rows = 214.2 cf
#3B	910.51'	0.022 af	**10.33'W x 51.39'L x 6.75'H Field B** 0.082 af Overall - 0.029 af Embedded = 0.054 af x 40.0% Voids
#4B	911.26'	0.029 af	**ADS_StormTech MC-4500 +Cap** x 11 Inside #3 Effective Size= 90.4"W x 60.0"H => 26.46 sf x 4.02'L = 106.5 cf Overall Size= 100.0"W x 60.0"H x 4.33'L with 0.31' Overlap Cap Storage= +35.7 cf x 2 x 1 rows = 71.4 cf
		0.204 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	915.51'	**2.0' long Sharp-Crested Rectangular Weir** 2 End Contraction(s)
#2	Primary	913.51'	**8.0" Vert. Orifice/Grate** C= 0.600
#3	Discarded	910.51'	**0.030 in/hr Exfiltration over Surface area** Conductivity to Groundwater Elevation = 1.00'

Discarded OutFlow Max=0.00 cfs @ 12.21 hrs HW=916.32' (Free Discharge)
└**3=Exfiltration** (Controls 0.00 cfs)

Primary OutFlow Max=7.09 cfs @ 12.20 hrs HW=916.33' TW=0.00' (Dynamic Tailwater)
├**1=Sharp-Crested Rectangular Weir** (Weir Controls 4.44 cfs @ 2.96 fps)
└**2=Orifice/Grate** (Orifice Controls 2.65 cfs @ 7.59 fps)

Pond U1: Underground Facility - Chamber Wizard Field A

Chamber Model = ADS_StormTechMC-4500 +Cap (ADS StormTech®MC-4500 with cap volume)
Effective Size= 90.4"W x 60.0"H => 26.46 sf x 4.02'L = 106.5 cf
Overall Size= 100.0"W x 60.0"H x 4.33'L with 0.31' Overlap
Cap Storage= +35.7 cf x 2 x 3 rows = 214.2 cf

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

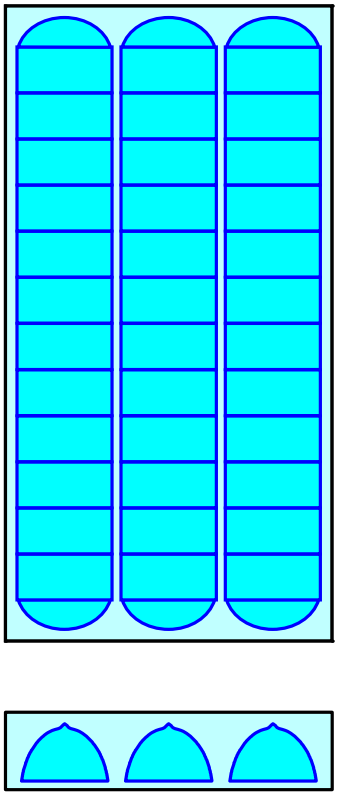
12 Chambers/Row x 4.02' Long +2.56' Cap Length x 2 = 53.42' Row Length +12.0" End Stone x 2 = 55.42' Base Length
3 Rows x 100.0" Wide + 9.0" Spacing x 2 + 12.0" Side Stone x 2 = 28.50' Base Width
9.0" Base + 60.0" Chamber Height + 12.0" Cover = 6.75' Field Height

36 Chambers x 106.5 cf + 35.7 cf Cap Volume x 2 x 3 Rows = 4,047.9 cf Chamber Storage

10,660.8 cf Field - 4,047.9 cf Chambers = 6,612.9 cf Stone x 40.0% Voids = 2,645.2 cf Stone Storage

Chamber Storage + Stone Storage = 6,693.0 cf = 0.154 af
Overall Storage Efficiency = 62.8%
Overall System Size = 55.42' x 28.50' x 6.75'

36 Chambers
394.8 cy Field
244.9 cy Stone



Pond U1: Underground Facility - Chamber Wizard Field B

Chamber Model = ADS_StormTechMC-4500 +Cap (ADS StormTech®MC-4500 with cap volume)
Effective Size= 90.4"W x 60.0"H => 26.46 sf x 4.02'L = 106.5 cf
Overall Size= 100.0"W x 60.0"H x 4.33'L with 0.31' Overlap
Cap Storage= +35.7 cf x 2 x 1 rows = 71.4 cf

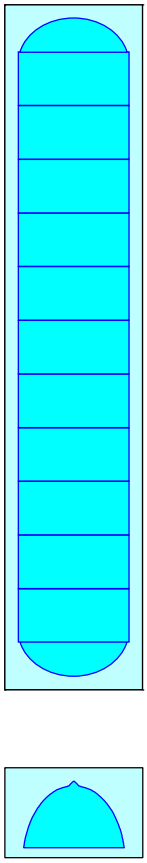
11 Chambers/Row x 4.02' Long +2.56' Cap Length x 2 = 49.39' Row Length +12.0" End Stone x 2 = 51.39' Base Length
1 Rows x 100.0" Wide + 12.0" Side Stone x 2 = 10.33' Base Width
9.0" Base + 60.0" Chamber Height + 12.0" Cover = 6.75' Field Height

11 Chambers x 106.5 cf + 35.7 cf Cap Volume x 2 x 1 Rows = 1,242.8 cf Chamber Storage

3,584.6 cf Field - 1,242.8 cf Chambers = 2,341.8 cf Stone x 40.0% Voids = 936.7 cf Stone Storage

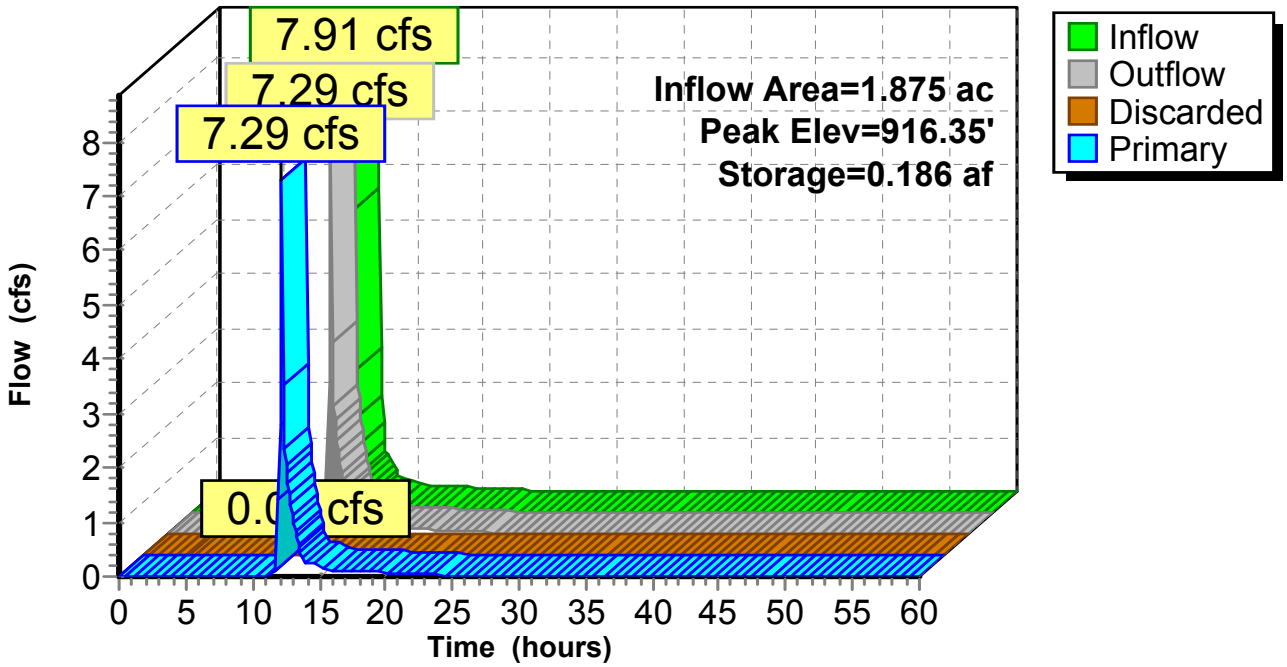
Chamber Storage + Stone Storage = 2,179.5 cf = 0.050 af
Overall Storage Efficiency = 60.8%
Overall System Size = 51.39' x 10.33' x 6.75'

11 Chambers
132.8 cy Field
86.7 cy Stone



Pond U1: Underground Facility

Hydrograph



Stage-Area-Storage for Pond U1: Underground Facility

Elevation (feet)	Surface (acres)	Storage (acre-feet)
910.51	**0.048**	0.000
910.61	0.048	0.002
910.71	0.048	0.004
910.81	0.048	0.006
910.91	0.048	0.008
911.01	0.048	0.010
911.11	0.048	0.012
911.21	0.048	0.014
911.31	0.048	0.017
911.41	0.048	0.021
911.51	0.048	0.025
911.61	0.048	0.029
911.71	0.048	0.033
911.81	0.048	0.036
911.91	0.048	0.040
912.01	0.048	0.044
912.11	0.048	0.048
912.21	0.048	0.052
912.31	0.048	0.056
912.41	0.048	0.060
912.51	0.048	0.064
912.61	0.048	0.068
912.71	0.048	0.072
912.81	0.048	0.075
912.91	0.048	0.079
913.01	0.048	0.083
913.11	0.048	0.087
913.21	0.048	0.091
913.31	0.048	0.094
913.41	0.048	0.098
913.51	0.048	0.102
913.61	0.048	0.105
913.71	0.048	0.109
913.81	0.048	0.112
913.91	0.048	0.116
914.01	0.048	0.120
914.11	0.048	0.123
914.21	0.048	0.127
914.31	0.048	0.130
914.41	0.048	0.133
914.51	0.048	0.137
914.61	0.048	0.140
914.71	0.048	0.143
914.81	0.048	0.146
914.91	0.048	0.150
915.01	0.048	0.153
915.11	0.048	0.156
915.21	0.048	0.159
915.31	0.048	0.162
915.41	0.048	0.165
915.51	0.048	0.167
915.61	0.048	0.170
915.71	0.048	0.173
915.81	0.048	0.175
915.91	0.048	0.177
916.01	0.048	0.179
916.11	0.048	0.181
916.21	0.048	0.183
916.31	0.048	0.185
916.41	0.048	0.187
916.51	0.048	0.189
916.61	0.048	0.191
916.71	0.048	0.193
916.81	0.048	0.195
916.91	0.048	0.197
917.01	0.048	0.199
917.11	0.048	0.201
917.21	0.048	**0.203**

Time span=0.00-60.00 hrs, dt=0.10 hrs, 601 points x 3
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN
Reach routing by Dyn-Stor-Ind method - Pond routing by Dyn-Stor-Ind method

Subcatchment EX-1: Runoff Area=4.465 ac 67.95% Impervious Runoff Depth=3.14"
Tc=6.0 min CN=94 Runoff=20.99 cfs 1.168 af

Subcatchment P-1: Untreated Runoff Area=2.590 ac 79.58% Impervious Runoff Depth=3.24"
Tc=6.0 min CN=95 Runoff=12.42 cfs 0.700 af

Subcatchment P-2: Treated Runoff Area=1.875 ac 91.73% Impervious Runoff Depth=3.46"
Tc=6.0 min CN=97 Runoff=9.28 cfs 0.541 af

Reach EX: Existing Conditions Inflow=20.99 cfs 1.168 af
Outflow=20.99 cfs 1.168 af

Reach P: Proposed Conditions Inflow=19.04 cfs 1.136 af
Outflow=19.04 cfs 1.136 af

Pond U1: Underground Facility Peak Elev=916.50' Storage=0.189 af Inflow=9.28 cfs 0.541 af
Discarded=0.00 cfs 0.007 af Primary=8.51 cfs 0.436 af Outflow=8.51 cfs 0.443 af

Total Runoff Area = 8.930 ac Runoff Volume = 2.409 af Average Runoff Depth = 3.24"
23.68% Pervious = 2.115 ac 76.32% Impervious = 6.815 ac

Summary for Subcatchment EX-1:

[49] Hint: Tc<2dt may require smaller dt

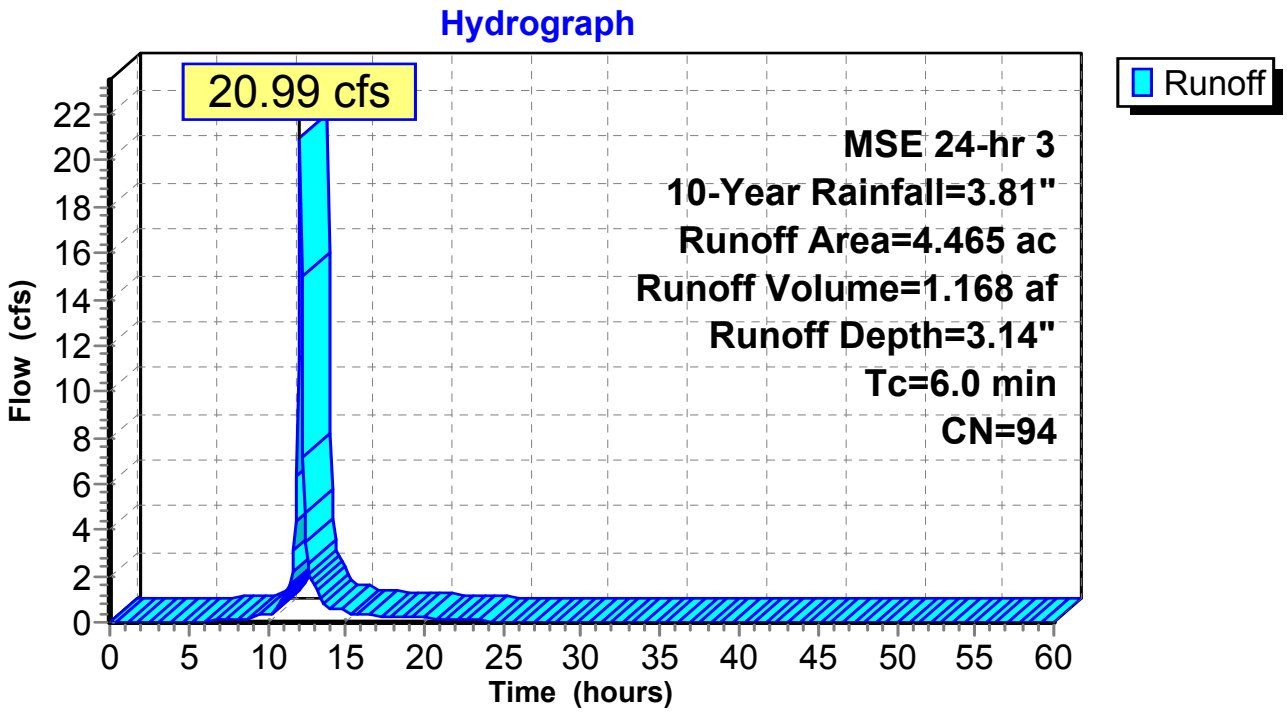
Runoff = 20.99 cfs @ 12.11 hrs, Volume= 1.168 af, Depth= 3.14"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-60.00 hrs, dt= 0.10 hrs
MSE 24-hr 3 10-Year Rainfall=3.81"

	Area (ac)	CN	Description
	0.676	98	Roofs, HSG D
	2.130	98	Paved parking, HSG D
*	0.228	98	Concrete Sidewalks, HSG D
	0.125	96	Gravel surface, HSG D
	1.306	84	50-75% Grass cover, Fair, HSG D
	4.465	94	Weighted Average
	1.431		32.05% Pervious Area
	3.034		67.95% Impervious Area

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

Subcatchment EX-1:



Summary for Subcatchment P-1: Untreated

[49] Hint: Tc<2dt may require smaller dt

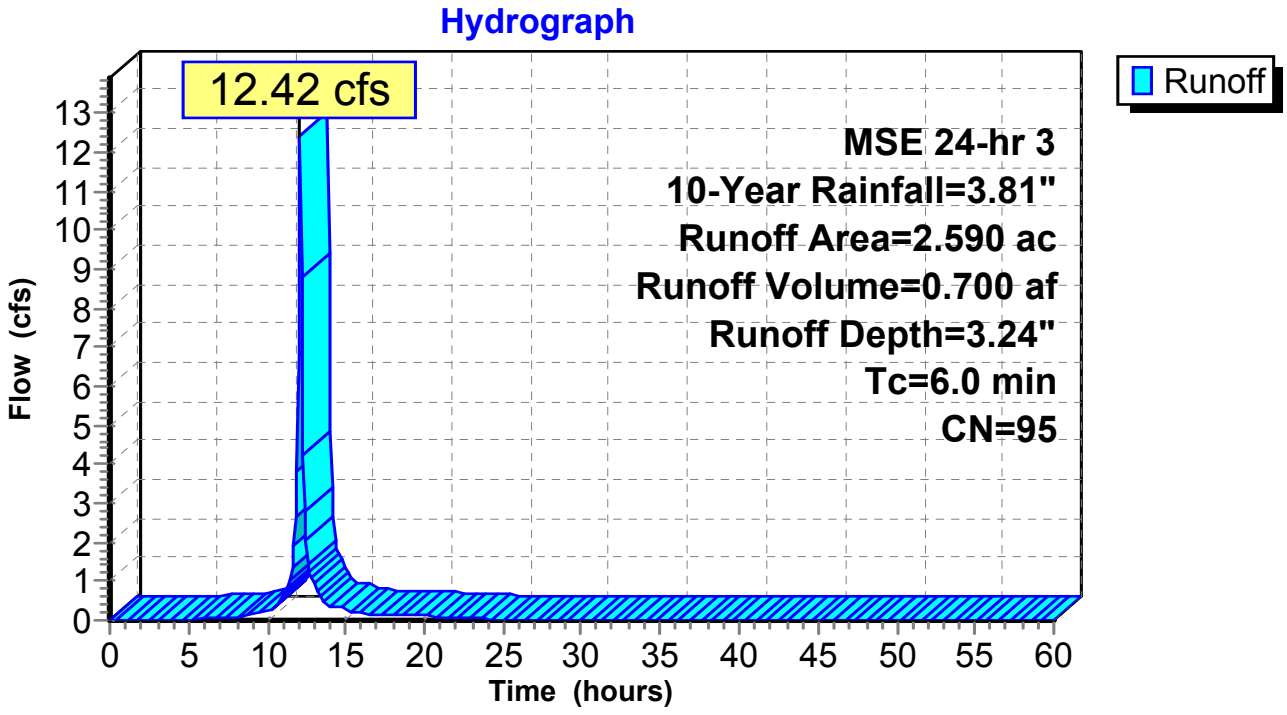
Runoff = 12.42 cfs @ 12.11 hrs, Volume= 0.700 af, Depth= 3.24"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-60.00 hrs, dt= 0.10 hrs
MSE 24-hr 3 10-Year Rainfall=3.81"

	Area (ac)	CN	Description
	0.489	98	Roofs, HSG D
	1.483	98	Paved parking, HSG D
*	0.089	98	Concrete Sidewalk, HSG D
*	0.529	84	Landscaped/Lawn - 50-75% Grass cover, Fair, HSG D
	2.590	95	Weighted Average
	0.529		20.42% Pervious Area
	2.061		79.58% Impervious Area

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

Subcatchment P-1: Untreated



Summary for Subcatchment P-2: Treated

[49] Hint: Tc<2dt may require smaller dt

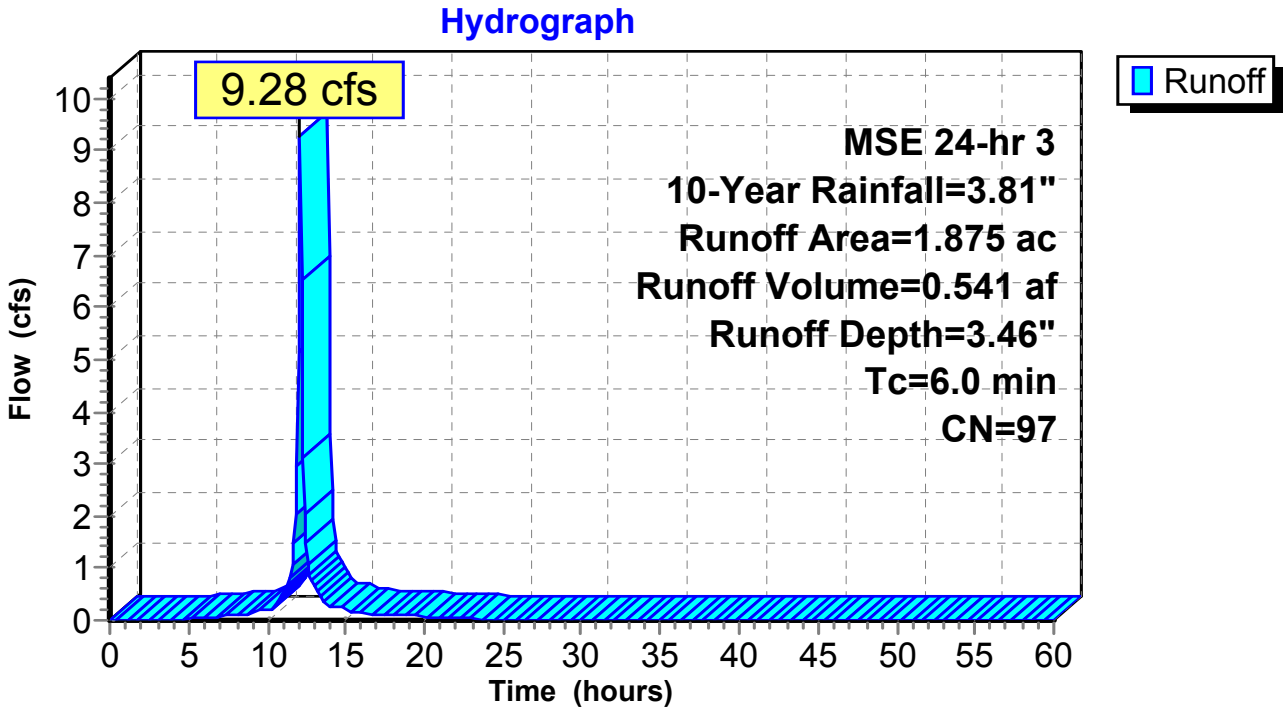
Runoff = 9.28 cfs @ 12.11 hrs, Volume= 0.541 af, Depth= 3.46"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-60.00 hrs, dt= 0.10 hrs
MSE 24-hr 3 10-Year Rainfall=3.81"

	Area (ac)	CN	Description
	0.343	98	Roofs, HSG D
	1.340	98	Paved parking, HSG D
*	0.037	98	Concrete Sidewalk, HSG D
	0.155	84	50-75% Grass cover, Fair, HSG D
	1.875	97	Weighted Average
	0.155		8.27% Pervious Area
	1.720		91.73% Impervious Area

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

Subcatchment P-2: Treated



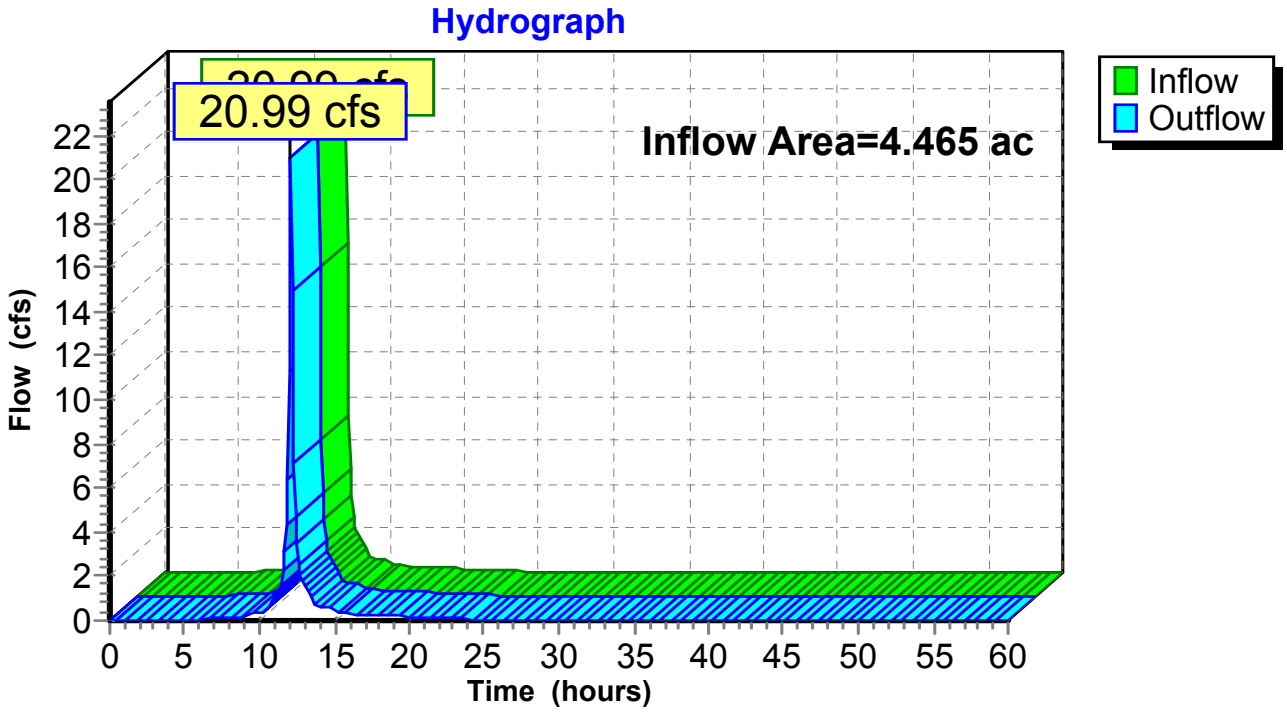
Summary for Reach EX: Existing Conditions

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

Inflow Area = 4.465 ac, 67.95% Impervious, Inflow Depth = 3.14" for 10-Year event
Inflow = 20.99 cfs @ 12.11 hrs, Volume= 1.168 af
Outflow = 20.99 cfs @ 12.11 hrs, Volume= 1.168 af, Atten= 0%, Lag= 0.0 min

Routing by Dyn-Stor-Ind method, Time Span= 0.00-60.00 hrs, dt= 0.10 hrs / 3

Reach EX: Existing Conditions



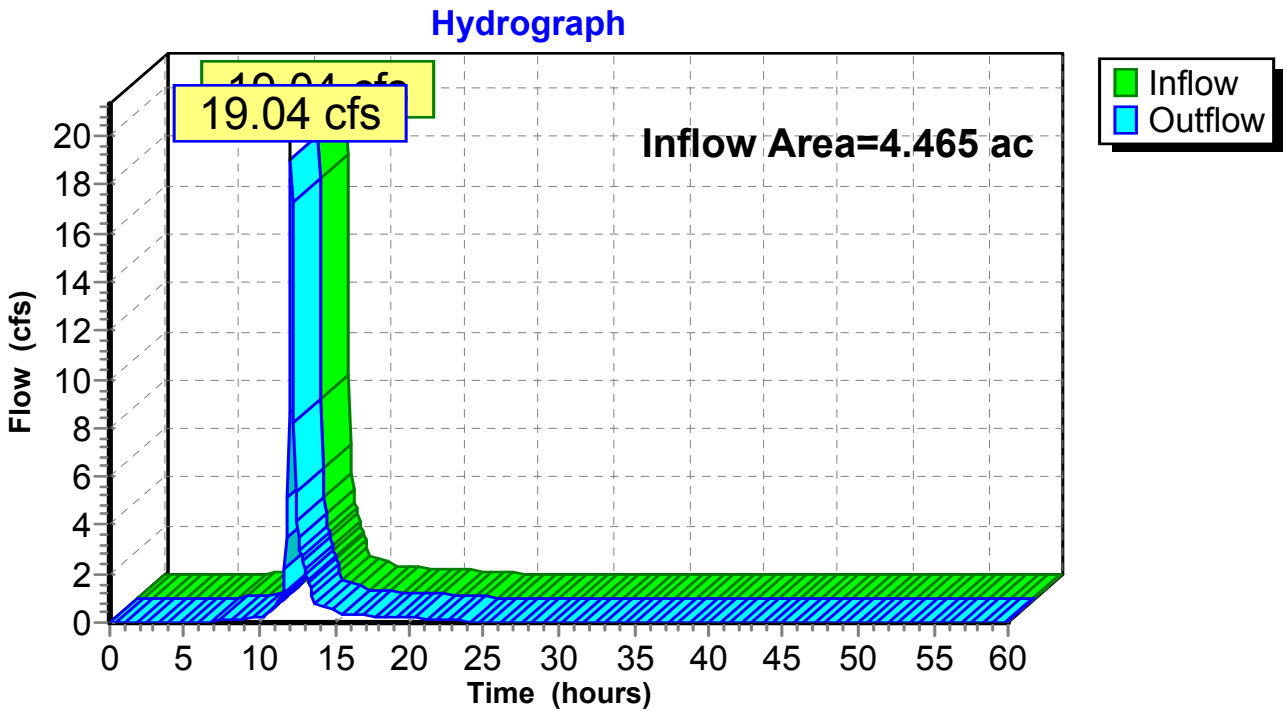
Summary for Reach P: Proposed Conditions

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

Inflow Area = 4.465 ac, 84.68% Impervious, Inflow Depth = 3.05" for 10-Year event
Inflow = 19.04 cfs @ 12.14 hrs, Volume= 1.136 af
Outflow = 19.04 cfs @ 12.14 hrs, Volume= 1.136 af, Atten= 0%, Lag= 0.0 min

Routing by Dyn-Stor-Ind method, Time Span= 0.00-60.00 hrs, dt= 0.10 hrs / 3

Reach P: Proposed Conditions



Summary for Pond U1: Underground Facility

Inflow Area = 1.875 ac, 91.73% Impervious, Inflow Depth = 3.46" for 10-Year event
Inflow = 9.28 cfs @ 12.11 hrs, Volume= 0.541 af
Outflow = 8.51 cfs @ 12.19 hrs, Volume= 0.443 af, Atten= 8%, Lag= 4.6 min
Discarded = 0.00 cfs @ 12.19 hrs, Volume= 0.007 af
Primary = 8.51 cfs @ 12.19 hrs, Volume= 0.436 af

Routing by Dyn-Stor-Ind method, Time Span= 0.00-60.00 hrs, dt= 0.10 hrs / 3
Peak Elev= 916.50' @ 12.19 hrs Surf.Area= 0.048 ac Storage= 0.189 af

Plug-Flow detention time= 127.1 min calculated for 0.442 af (82% of inflow)
Center-of-Mass det. time= 75.1 min (831.1 - 756.0)

Volume	Invert	Avail.Storage	Storage Description
#1A	910.51'	0.061 af	**28.50'W x 55.42'L x 6.75'H Field A** 0.245 af Overall - 0.093 af Embedded = 0.152 af x 40.0% Voids
#2A	911.26'	0.093 af	**ADS_StormTech MC-4500 +Cap** x 36 Inside #1 Effective Size= 90.4"W x 60.0"H => 26.46 sf x 4.02'L = 106.5 cf Overall Size= 100.0"W x 60.0"H x 4.33'L with 0.31' Overlap 3 Rows of 12 Chambers Cap Storage= +35.7 cf x 2 x 3 rows = 214.2 cf
#3B	910.51'	0.022 af	**10.33'W x 51.39'L x 6.75'H Field B** 0.082 af Overall - 0.029 af Embedded = 0.054 af x 40.0% Voids
#4B	911.26'	0.029 af	**ADS_StormTech MC-4500 +Cap** x 11 Inside #3 Effective Size= 90.4"W x 60.0"H => 26.46 sf x 4.02'L = 106.5 cf Overall Size= 100.0"W x 60.0"H x 4.33'L with 0.31' Overlap Cap Storage= +35.7 cf x 2 x 1 rows = 71.4 cf
		0.204 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	915.51'	**2.0' long Sharp-Crested Rectangular Weir** 2 End Contraction(s)
#2	Primary	913.51'	**8.0" Vert. Orifice/Grate** C= 0.600
#3	Discarded	910.51'	**0.030 in/hr Exfiltration over Surface area** Conductivity to Groundwater Elevation = 1.00'

Discarded OutFlow Max=0.00 cfs @ 12.19 hrs HW=916.44' (Free Discharge)
└**3=Exfiltration** (Controls 0.00 cfs)

Primary OutFlow Max=8.10 cfs @ 12.19 hrs HW=916.45' TW=0.00' (Dynamic Tailwater)
├**1=Sharp-Crested Rectangular Weir** (Weir Controls 5.39 cfs @ 3.17 fps)
└**2=Orifice/Grate** (Orifice Controls 2.71 cfs @ 7.77 fps)

Pond U1: Underground Facility - Chamber Wizard Field A

Chamber Model = ADS_StormTechMC-4500 +Cap (ADS StormTech®MC-4500 with cap volume)
Effective Size= 90.4"W x 60.0"H => 26.46 sf x 4.02'L = 106.5 cf
Overall Size= 100.0"W x 60.0"H x 4.33'L with 0.31' Overlap
Cap Storage= +35.7 cf x 2 x 3 rows = 214.2 cf

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

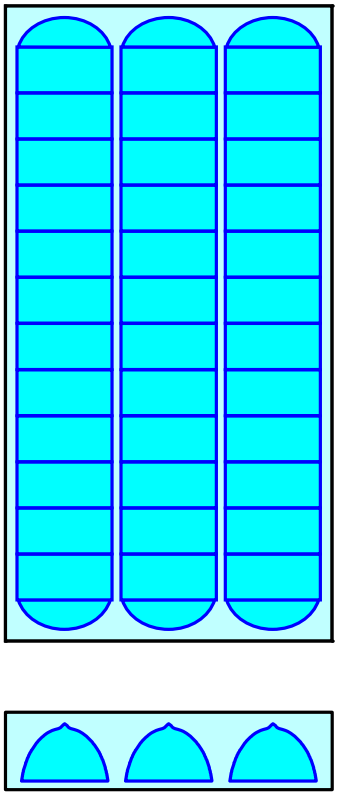
12 Chambers/Row x 4.02' Long +2.56' Cap Length x 2 = 53.42' Row Length +12.0" End Stone x 2 = 55.42' Base Length
3 Rows x 100.0" Wide + 9.0" Spacing x 2 + 12.0" Side Stone x 2 = 28.50' Base Width
9.0" Base + 60.0" Chamber Height + 12.0" Cover = 6.75' Field Height

36 Chambers x 106.5 cf + 35.7 cf Cap Volume x 2 x 3 Rows = 4,047.9 cf Chamber Storage

10,660.8 cf Field - 4,047.9 cf Chambers = 6,612.9 cf Stone x 40.0% Voids = 2,645.2 cf Stone Storage

Chamber Storage + Stone Storage = 6,693.0 cf = 0.154 af
Overall Storage Efficiency = 62.8%
Overall System Size = 55.42' x 28.50' x 6.75'

36 Chambers
394.8 cy Field
244.9 cy Stone



Pond U1: Underground Facility - Chamber Wizard Field B

Chamber Model = ADS_StormTechMC-4500 +Cap (ADS StormTech®MC-4500 with cap volume)
Effective Size= 90.4"W x 60.0"H => 26.46 sf x 4.02'L = 106.5 cf
Overall Size= 100.0"W x 60.0"H x 4.33'L with 0.31' Overlap
Cap Storage= +35.7 cf x 2 x 1 rows = 71.4 cf

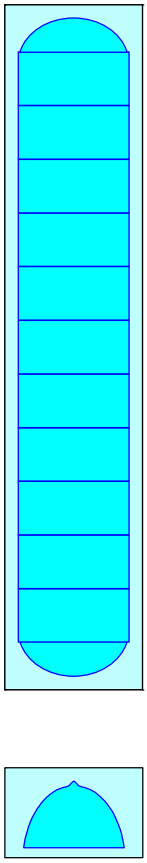
11 Chambers/Row x 4.02' Long +2.56' Cap Length x 2 = 49.39' Row Length +12.0" End Stone x 2 = 51.39' Base Length
1 Rows x 100.0" Wide + 12.0" Side Stone x 2 = 10.33' Base Width
9.0" Base + 60.0" Chamber Height + 12.0" Cover = 6.75' Field Height

11 Chambers x 106.5 cf + 35.7 cf Cap Volume x 2 x 1 Rows = 1,242.8 cf Chamber Storage

3,584.6 cf Field - 1,242.8 cf Chambers = 2,341.8 cf Stone x 40.0% Voids = 936.7 cf Stone Storage

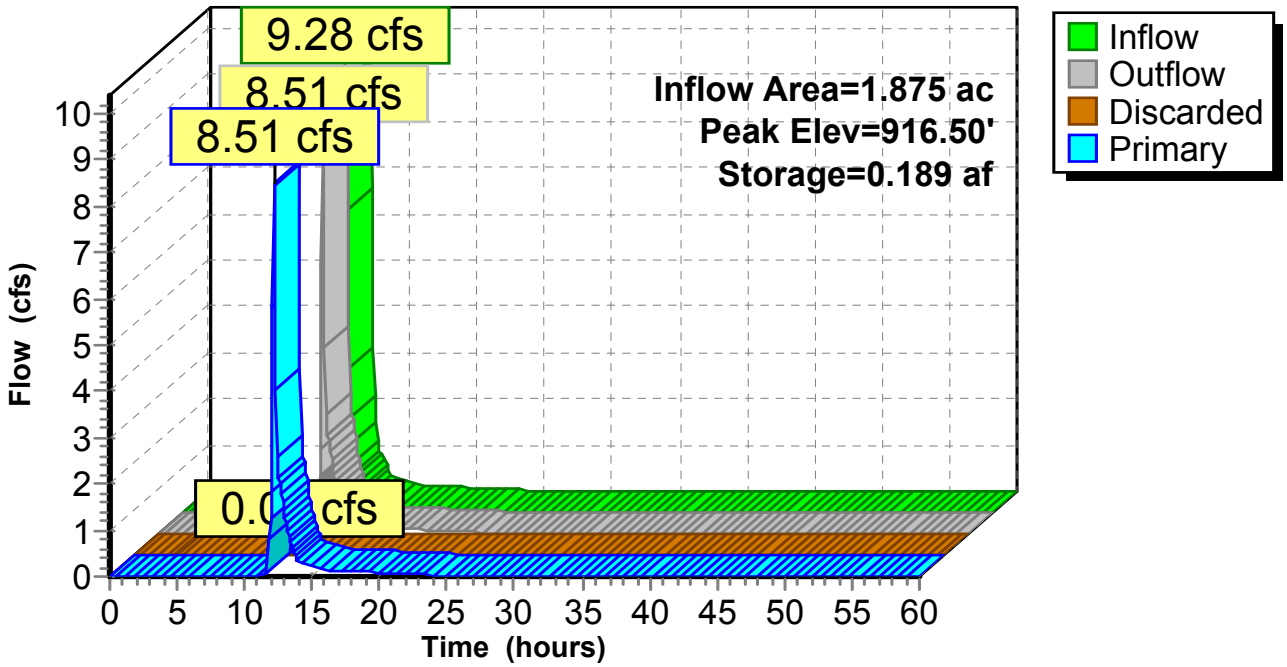
Chamber Storage + Stone Storage = 2,179.5 cf = 0.050 af
Overall Storage Efficiency = 60.8%
Overall System Size = 51.39' x 10.33' x 6.75'

11 Chambers
132.8 cy Field
86.7 cy Stone



Pond U1: Underground Facility

Hydrograph



Stage-Area-Storage for Pond U1: Underground Facility

Elevation (feet)	Surface (acres)	Storage (acre-feet)
910.51	**0.048**	0.000
910.61	0.048	0.002
910.71	0.048	0.004
910.81	0.048	0.006
910.91	0.048	0.008
911.01	0.048	0.010
911.11	0.048	0.012
911.21	0.048	0.014
911.31	0.048	0.017
911.41	0.048	0.021
911.51	0.048	0.025
911.61	0.048	0.029
911.71	0.048	0.033
911.81	0.048	0.036
911.91	0.048	0.040
912.01	0.048	0.044
912.11	0.048	0.048
912.21	0.048	0.052
912.31	0.048	0.056
912.41	0.048	0.060
912.51	0.048	0.064
912.61	0.048	0.068
912.71	0.048	0.072
912.81	0.048	0.075
912.91	0.048	0.079
913.01	0.048	0.083
913.11	0.048	0.087
913.21	0.048	0.091
913.31	0.048	0.094
913.41	0.048	0.098
913.51	0.048	0.102
913.61	0.048	0.105
913.71	0.048	0.109
913.81	0.048	0.112
913.91	0.048	0.116
914.01	0.048	0.120
914.11	0.048	0.123
914.21	0.048	0.127
914.31	0.048	0.130
914.41	0.048	0.133
914.51	0.048	0.137
914.61	0.048	0.140
914.71	0.048	0.143
914.81	0.048	0.146
914.91	0.048	0.150
915.01	0.048	0.153
915.11	0.048	0.156
915.21	0.048	0.159
915.31	0.048	0.162
915.41	0.048	0.165
915.51	0.048	0.167
915.61	0.048	0.170
915.71	0.048	0.173
915.81	0.048	0.175
915.91	0.048	0.177
916.01	0.048	0.179
916.11	0.048	0.181
916.21	0.048	0.183
916.31	0.048	0.185
916.41	0.048	0.187
916.51	0.048	0.189
916.61	0.048	0.191
916.71	0.048	0.193
916.81	0.048	0.195
916.91	0.048	0.197
917.01	0.048	0.199
917.11	0.048	0.201
917.21	0.048	**0.203**

Time span=0.00-60.00 hrs, dt=0.10 hrs, 601 points x 3
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN
Reach routing by Dyn-Stor-Ind method - Pond routing by Dyn-Stor-Ind method

Subcatchment EX-1: Runoff Area=4.465 ac 67.95% Impervious Runoff Depth=3.97"
Tc=6.0 min CN=94 Runoff=26.21 cfs 1.478 af

Subcatchment P-1: Untreated Runoff Area=2.590 ac 79.58% Impervious Runoff Depth=4.08"
Tc=6.0 min CN=95 Runoff=15.43 cfs 0.881 af

Subcatchment P-2: Treated Runoff Area=1.875 ac 91.73% Impervious Runoff Depth=4.31"
Tc=6.0 min CN=97 Runoff=11.42 cfs 0.673 af

Reach EX: Existing Conditions Inflow=26.21 cfs 1.478 af
Outflow=26.21 cfs 1.478 af

Reach P: Proposed Conditions Inflow=25.98 cfs 1.449 af
Outflow=25.98 cfs 1.449 af

Pond U1: Underground Facility Peak Elev=916.78' Storage=0.194 af Inflow=11.42 cfs 0.673 af
Discarded=0.00 cfs 0.007 af Primary=10.81 cfs 0.568 af Outflow=10.81 cfs 0.575 af

Total Runoff Area = 8.930 ac Runoff Volume = 3.033 af Average Runoff Depth = 4.08"
23.68% Pervious = 2.115 ac 76.32% Impervious = 6.815 ac

Summary for Subcatchment EX-1:

[49] Hint: Tc<2dt may require smaller dt

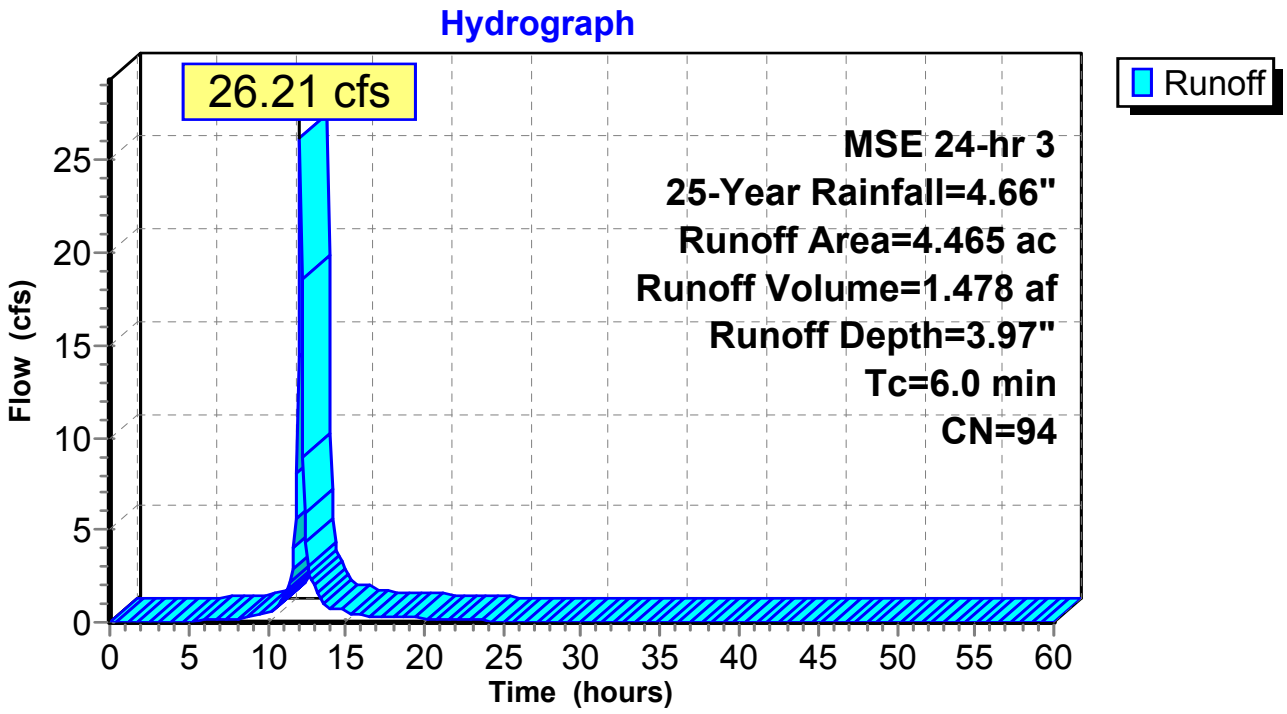
Runoff = 26.21 cfs @ 12.11 hrs, Volume= 1.478 af, Depth= 3.97"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-60.00 hrs, dt= 0.10 hrs
MSE 24-hr 3 25-Year Rainfall=4.66"

	Area (ac)	CN	Description
	0.676	98	Roofs, HSG D
	2.130	98	Paved parking, HSG D
*	0.228	98	Concrete Sidewalks, HSG D
	0.125	96	Gravel surface, HSG D
	1.306	84	50-75% Grass cover, Fair, HSG D
	4.465	94	Weighted Average
	1.431		32.05% Pervious Area
	3.034		67.95% Impervious Area

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

Subcatchment EX-1:



Summary for Subcatchment P-1: Untreated

[49] Hint: Tc<2dt may require smaller dt

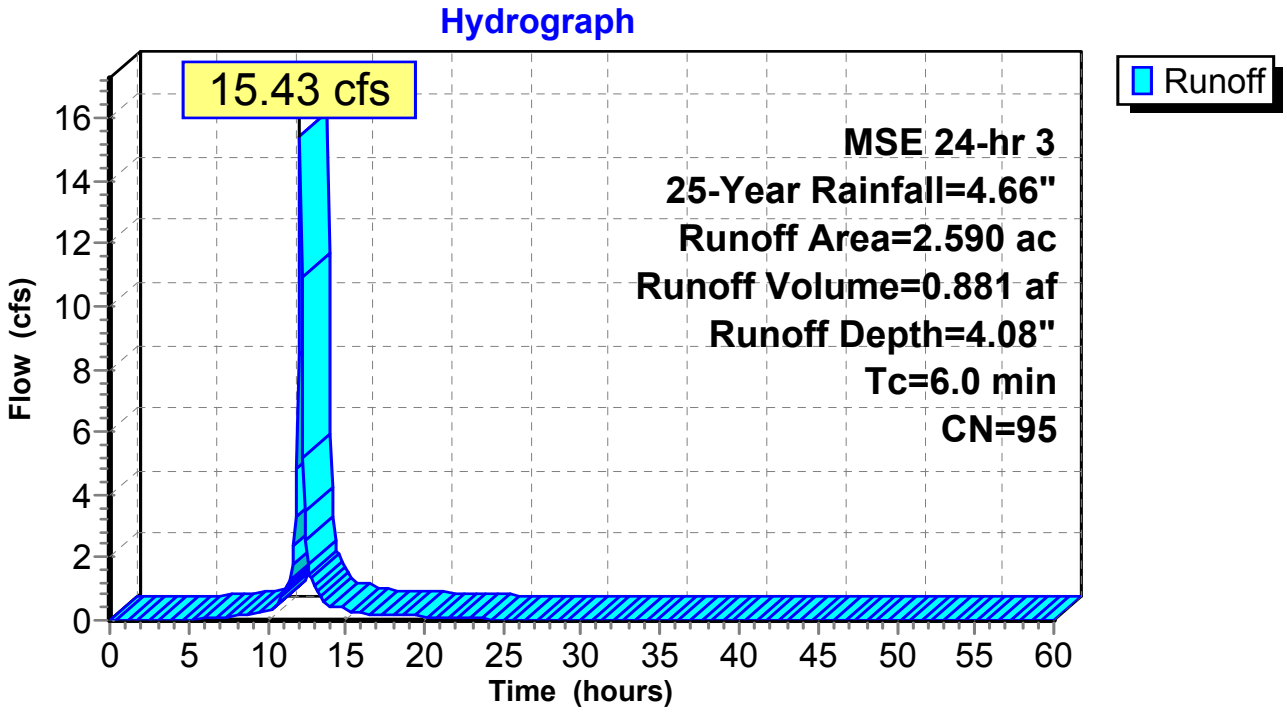
Runoff = 15.43 cfs @ 12.11 hrs, Volume= 0.881 af, Depth= 4.08"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-60.00 hrs, dt= 0.10 hrs
MSE 24-hr 3 25-Year Rainfall=4.66"

	Area (ac)	CN	Description
	0.489	98	Roofs, HSG D
	1.483	98	Paved parking, HSG D
*	0.089	98	Concrete Sidewalk, HSG D
*	0.529	84	Landscaped/Lawn - 50-75% Grass cover, Fair, HSG D
	2.590	95	Weighted Average
	0.529		20.42% Pervious Area
	2.061		79.58% Impervious Area

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

Subcatchment P-1: Untreated



Summary for Subcatchment P-2: Treated

[49] Hint: Tc<2dt may require smaller dt

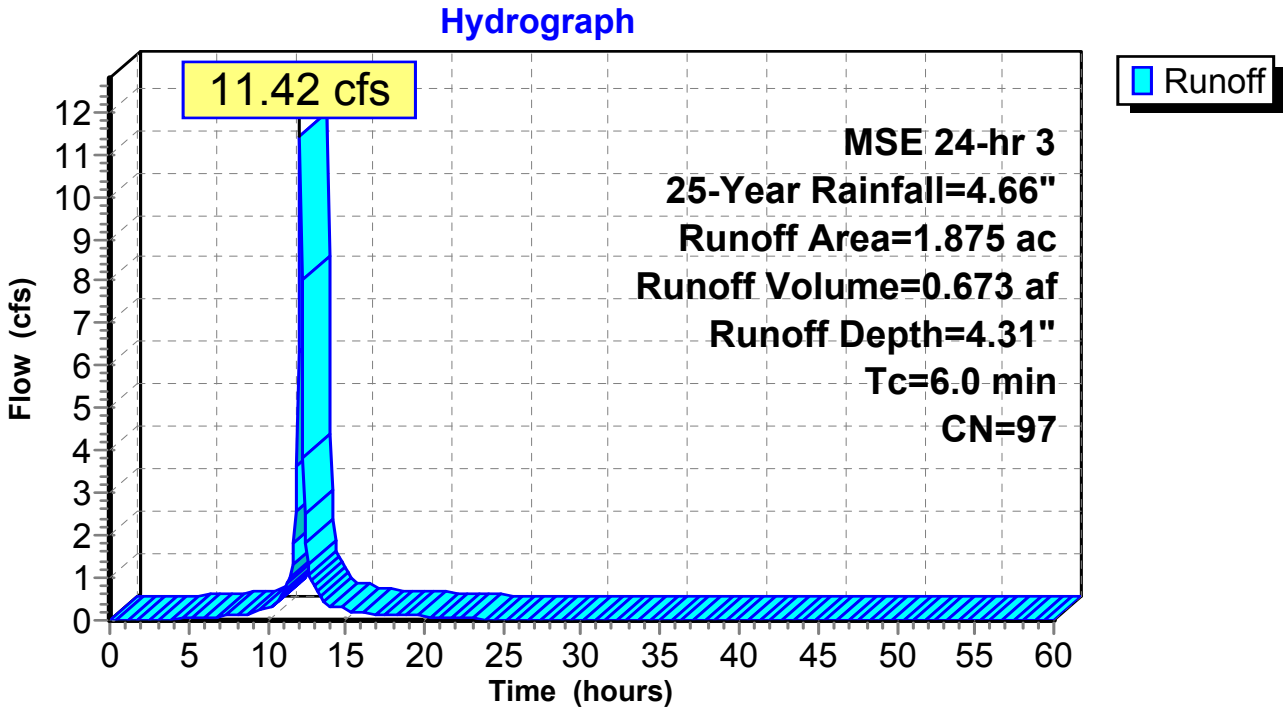
Runoff = 11.42 cfs @ 12.11 hrs, Volume= 0.673 af, Depth= 4.31"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-60.00 hrs, dt= 0.10 hrs
MSE 24-hr 3 25-Year Rainfall=4.66"

	Area (ac)	CN	Description
	0.343	98	Roofs, HSG D
	1.340	98	Paved parking, HSG D
*	0.037	98	Concrete Sidewalk, HSG D
	0.155	84	50-75% Grass cover, Fair, HSG D
	1.875	97	Weighted Average
	0.155		8.27% Pervious Area
	1.720		91.73% Impervious Area

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

Subcatchment P-2: Treated



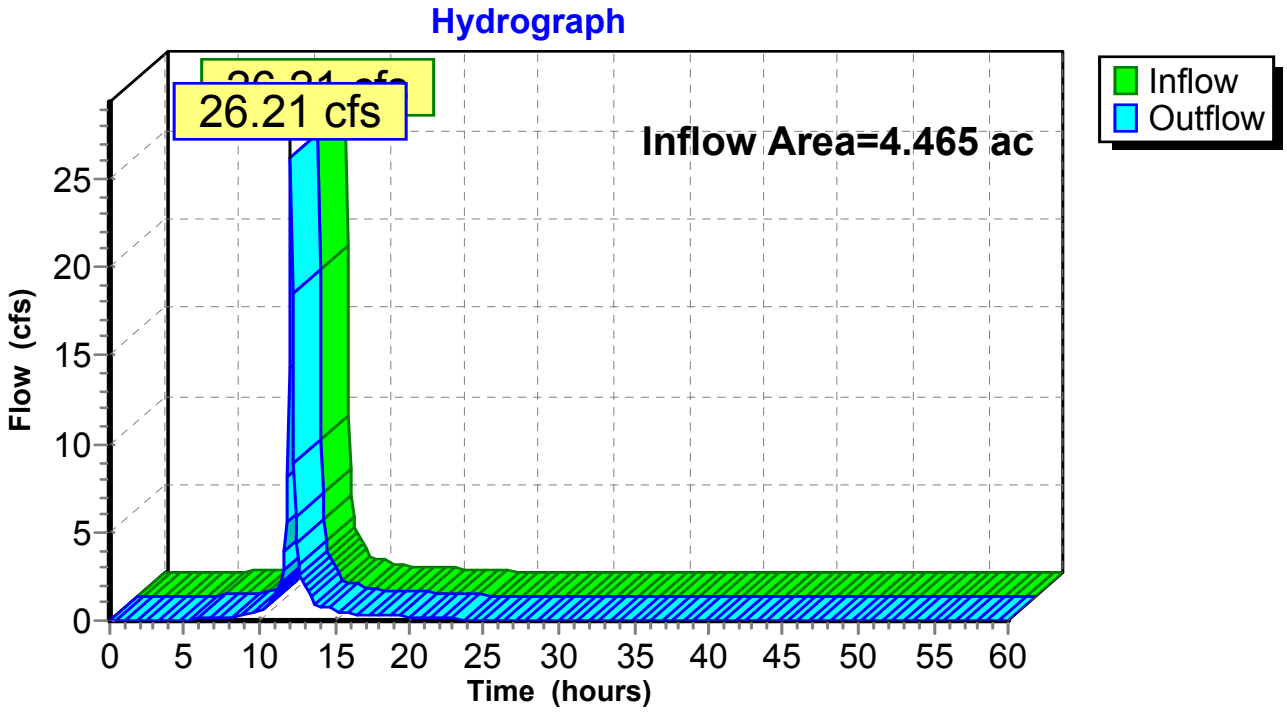
Summary for Reach EX: Existing Conditions

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

Inflow Area = 4.465 ac, 67.95% Impervious, Inflow Depth = 3.97" for 25-Year event
Inflow = 26.21 cfs @ 12.11 hrs, Volume= 1.478 af
Outflow = 26.21 cfs @ 12.11 hrs, Volume= 1.478 af, Atten= 0%, Lag= 0.0 min

Routing by Dyn-Stor-Ind method, Time Span= 0.00-60.00 hrs, dt= 0.10 hrs / 3

Reach EX: Existing Conditions



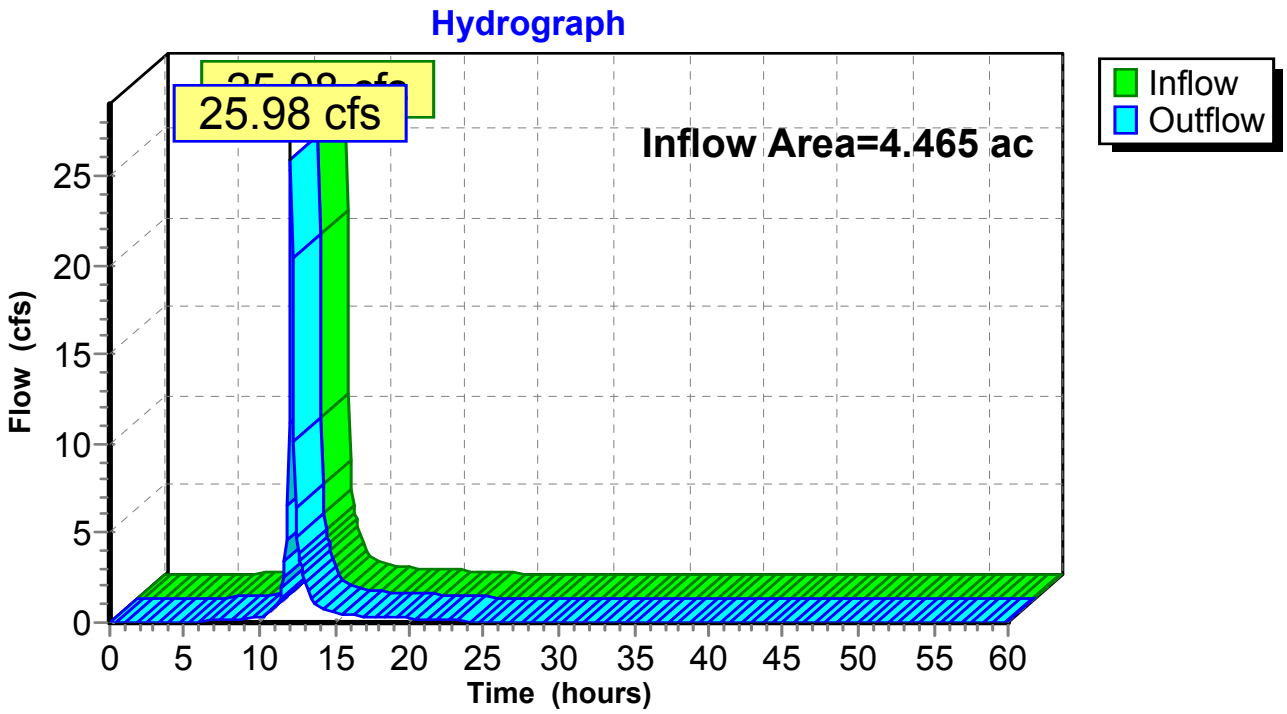
Summary for Reach P: Proposed Conditions

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

Inflow Area = 4.465 ac, 84.68% Impervious, Inflow Depth = 3.89" for 25-Year event
Inflow = 25.98 cfs @ 12.12 hrs, Volume= 1.449 af
Outflow = 25.98 cfs @ 12.12 hrs, Volume= 1.449 af, Atten= 0%, Lag= 0.0 min

Routing by Dyn-Stor-Ind method, Time Span= 0.00-60.00 hrs, dt= 0.10 hrs / 3

Reach P: Proposed Conditions



Summary for Pond U1: Underground Facility

Inflow Area = 1.875 ac, 91.73% Impervious, Inflow Depth = 4.31" for 25-Year event
Inflow = 11.42 cfs @ 12.11 hrs, Volume= 0.673 af
Outflow = 10.81 cfs @ 12.14 hrs, Volume= 0.575 af, Atten= 5%, Lag= 2.1 min
Discarded = 0.00 cfs @ 12.15 hrs, Volume= 0.007 af
Primary = 10.81 cfs @ 12.14 hrs, Volume= 0.568 af

Routing by Dyn-Stor-Ind method, Time Span= 0.00-60.00 hrs, dt= 0.10 hrs / 3
Peak Elev= 916.78' @ 12.15 hrs Surf.Area= 0.048 ac Storage= 0.194 af

Plug-Flow detention time= 113.8 min calculated for 0.574 af (85% of inflow)
Center-of-Mass det. time= 66.8 min (819.3 - 752.5)

Volume	Invert	Avail.Storage	Storage Description
#1A	910.51'	0.061 af	**28.50'W x 55.42'L x 6.75'H Field A** 0.245 af Overall - 0.093 af Embedded = 0.152 af x 40.0% Voids
#2A	911.26'	0.093 af	**ADS_StormTech MC-4500 +Cap** x 36 Inside #1 Effective Size= 90.4"W x 60.0"H => 26.46 sf x 4.02'L = 106.5 cf Overall Size= 100.0"W x 60.0"H x 4.33'L with 0.31' Overlap 3 Rows of 12 Chambers Cap Storage= +35.7 cf x 2 x 3 rows = 214.2 cf
#3B	910.51'	0.022 af	**10.33'W x 51.39'L x 6.75'H Field B** 0.082 af Overall - 0.029 af Embedded = 0.054 af x 40.0% Voids
#4B	911.26'	0.029 af	**ADS_StormTech MC-4500 +Cap** x 11 Inside #3 Effective Size= 90.4"W x 60.0"H => 26.46 sf x 4.02'L = 106.5 cf Overall Size= 100.0"W x 60.0"H x 4.33'L with 0.31' Overlap Cap Storage= +35.7 cf x 2 x 1 rows = 71.4 cf
		0.204 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	915.51'	**2.0' long Sharp-Crested Rectangular Weir** 2 End Contraction(s)
#2	Primary	913.51'	**8.0" Vert. Orifice/Grate** C= 0.600
#3	Discarded	910.51'	**0.030 in/hr Exfiltration over Surface area** Conductivity to Groundwater Elevation = 1.00'

Discarded OutFlow Max=0.00 cfs @ 12.15 hrs HW=916.65' (Free Discharge)
└**3=Exfiltration** (Controls 0.00 cfs)

Primary OutFlow Max=9.85 cfs @ 12.14 hrs HW=916.65' TW=0.00' (Dynamic Tailwater)
├**1=Sharp-Crested Rectangular Weir** (Weir Controls 7.03 cfs @ 3.49 fps)
└**2=Orifice/Grate** (Orifice Controls 2.81 cfs @ 8.06 fps)

Pond U1: Underground Facility - Chamber Wizard Field A

Chamber Model = ADS_StormTechMC-4500 +Cap (ADS StormTech®MC-4500 with cap volume)
Effective Size= 90.4"W x 60.0"H => 26.46 sf x 4.02'L = 106.5 cf
Overall Size= 100.0"W x 60.0"H x 4.33'L with 0.31' Overlap
Cap Storage= +35.7 cf x 2 x 3 rows = 214.2 cf

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

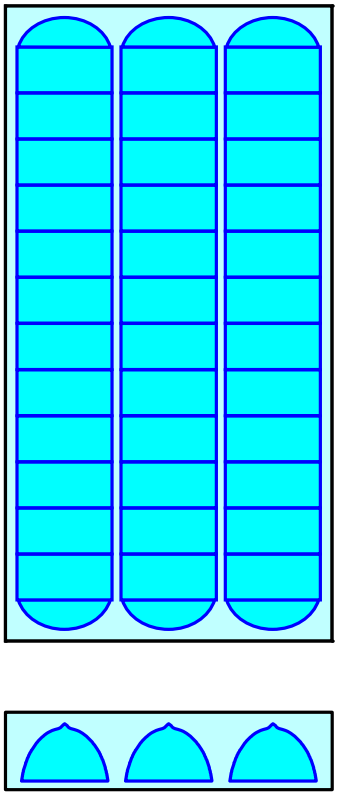
12 Chambers/Row x 4.02' Long +2.56' Cap Length x 2 = 53.42' Row Length +12.0" End Stone x 2 = 55.42' Base Length
3 Rows x 100.0" Wide + 9.0" Spacing x 2 + 12.0" Side Stone x 2 = 28.50' Base Width
9.0" Base + 60.0" Chamber Height + 12.0" Cover = 6.75' Field Height

36 Chambers x 106.5 cf + 35.7 cf Cap Volume x 2 x 3 Rows = 4,047.9 cf Chamber Storage

10,660.8 cf Field - 4,047.9 cf Chambers = 6,612.9 cf Stone x 40.0% Voids = 2,645.2 cf Stone Storage

Chamber Storage + Stone Storage = 6,693.0 cf = 0.154 af
Overall Storage Efficiency = 62.8%
Overall System Size = 55.42' x 28.50' x 6.75'

36 Chambers
394.8 cy Field
244.9 cy Stone



Pond U1: Underground Facility - Chamber Wizard Field B

Chamber Model = ADS_StormTechMC-4500 +Cap (ADS StormTech®MC-4500 with cap volume)
Effective Size= 90.4"W x 60.0"H => 26.46 sf x 4.02'L = 106.5 cf
Overall Size= 100.0"W x 60.0"H x 4.33'L with 0.31' Overlap
Cap Storage= +35.7 cf x 2 x 1 rows = 71.4 cf

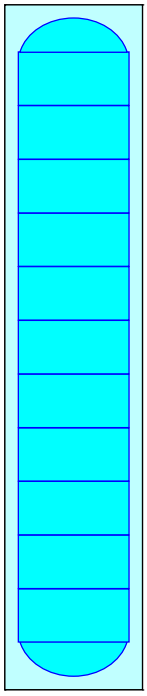
11 Chambers/Row x 4.02' Long +2.56' Cap Length x 2 = 49.39' Row Length +12.0" End Stone x 2 = 51.39' Base Length
1 Rows x 100.0" Wide + 12.0" Side Stone x 2 = 10.33' Base Width
9.0" Base + 60.0" Chamber Height + 12.0" Cover = 6.75' Field Height

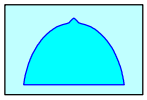
11 Chambers x 106.5 cf + 35.7 cf Cap Volume x 2 x 1 Rows = 1,242.8 cf Chamber Storage

3,584.6 cf Field - 1,242.8 cf Chambers = 2,341.8 cf Stone x 40.0% Voids = 936.7 cf Stone Storage

Chamber Storage + Stone Storage = 2,179.5 cf = 0.050 af
Overall Storage Efficiency = 60.8%
Overall System Size = 51.39' x 10.33' x 6.75'

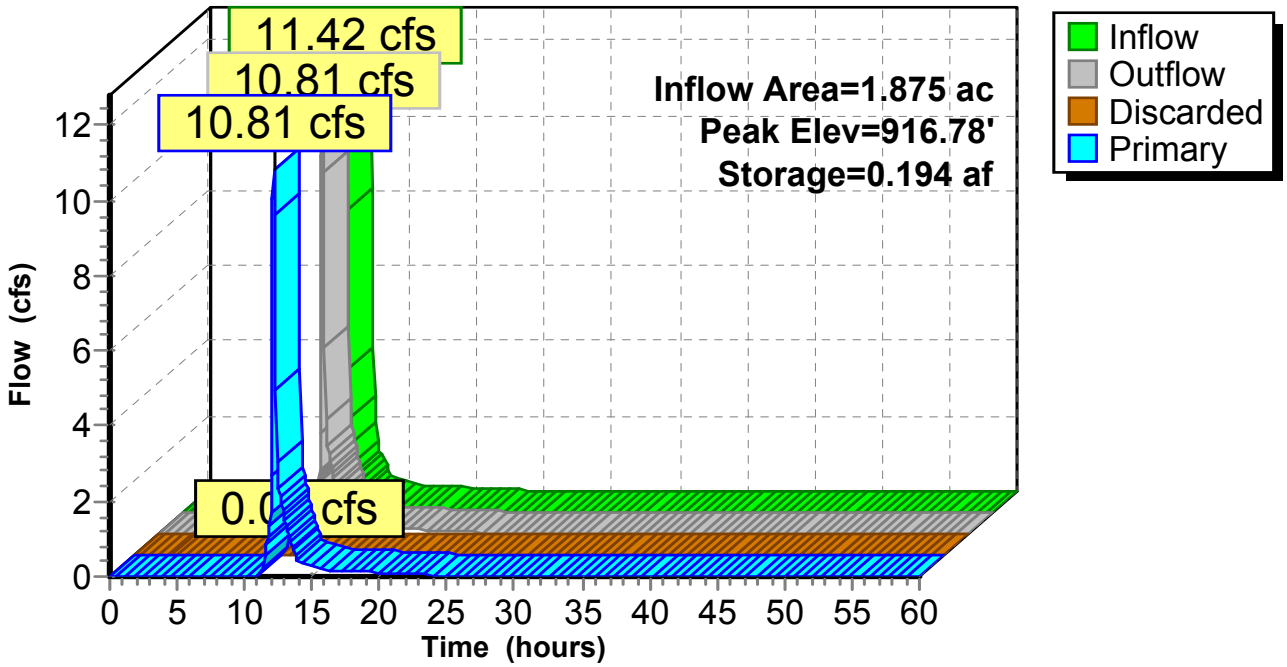
11 Chambers
132.8 cy Field
86.7 cy Stone





Pond U1: Underground Facility

Hydrograph



Stage-Area-Storage for Pond U1: Underground Facility

Elevation (feet)	Surface (acres)	Storage (acre-feet)
910.51	**0.048**	0.000
910.61	0.048	0.002
910.71	0.048	0.004
910.81	0.048	0.006
910.91	0.048	0.008
911.01	0.048	0.010
911.11	0.048	0.012
911.21	0.048	0.014
911.31	0.048	0.017
911.41	0.048	0.021
911.51	0.048	0.025
911.61	0.048	0.029
911.71	0.048	0.033
911.81	0.048	0.036
911.91	0.048	0.040
912.01	0.048	0.044
912.11	0.048	0.048
912.21	0.048	0.052
912.31	0.048	0.056
912.41	0.048	0.060
912.51	0.048	0.064
912.61	0.048	0.068
912.71	0.048	0.072
912.81	0.048	0.075
912.91	0.048	0.079
913.01	0.048	0.083
913.11	0.048	0.087
913.21	0.048	0.091
913.31	0.048	0.094
913.41	0.048	0.098
913.51	0.048	0.102
913.61	0.048	0.105
913.71	0.048	0.109
913.81	0.048	0.112
913.91	0.048	0.116
914.01	0.048	0.120
914.11	0.048	0.123
914.21	0.048	0.127
914.31	0.048	0.130
914.41	0.048	0.133
914.51	0.048	0.137
914.61	0.048	0.140
914.71	0.048	0.143
914.81	0.048	0.146
914.91	0.048	0.150
915.01	0.048	0.153
915.11	0.048	0.156
915.21	0.048	0.159
915.31	0.048	0.162
915.41	0.048	0.165
915.51	0.048	0.167
915.61	0.048	0.170
915.71	0.048	0.173
915.81	0.048	0.175
915.91	0.048	0.177
916.01	0.048	0.179
916.11	0.048	0.181
916.21	0.048	0.183
916.31	0.048	0.185
916.41	0.048	0.187
916.51	0.048	0.189
916.61	0.048	0.191
916.71	0.048	0.193
916.81	0.048	0.195
916.91	0.048	0.197
917.01	0.048	0.199
917.11	0.048	0.201
917.21	0.048	**0.203**

Time span=0.00-60.00 hrs, dt=0.10 hrs, 601 points x 3
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN
Reach routing by Dyn-Stor-Ind method - Pond routing by Dyn-Stor-Ind method

Subcatchment EX-1: Runoff Area=4.465 ac 67.95% Impervious Runoff Depth=4.68"
Tc=6.0 min CN=94 Runoff=30.60 cfs 1.743 af

Subcatchment P-1: Untreated Runoff Area=2.590 ac 79.58% Impervious Runoff Depth=4.80"
Tc=6.0 min CN=95 Runoff=17.96 cfs 1.035 af

Subcatchment P-2: Treated Runoff Area=1.875 ac 91.73% Impervious Runoff Depth=5.03"
Tc=6.0 min CN=97 Runoff=13.23 cfs 0.785 af

Reach EX: Existing Conditions Inflow=30.60 cfs 1.743 af
Outflow=30.60 cfs 1.743 af

Reach P: Proposed Conditions Inflow=30.23 cfs 1.715 af
Outflow=30.23 cfs 1.715 af

Pond U1: Underground Facility Peak Elev=916.95' Storage=0.198 af Inflow=13.23 cfs 0.785 af
Discarded=0.00 cfs 0.007 af Primary=12.49 cfs 0.680 af Outflow=12.49 cfs 0.687 af

Total Runoff Area = 8.930 ac Runoff Volume = 3.563 af Average Runoff Depth = 4.79"
23.68% Pervious = 2.115 ac 76.32% Impervious = 6.815 ac

Summary for Subcatchment EX-1:

[49] Hint: Tc<2dt may require smaller dt

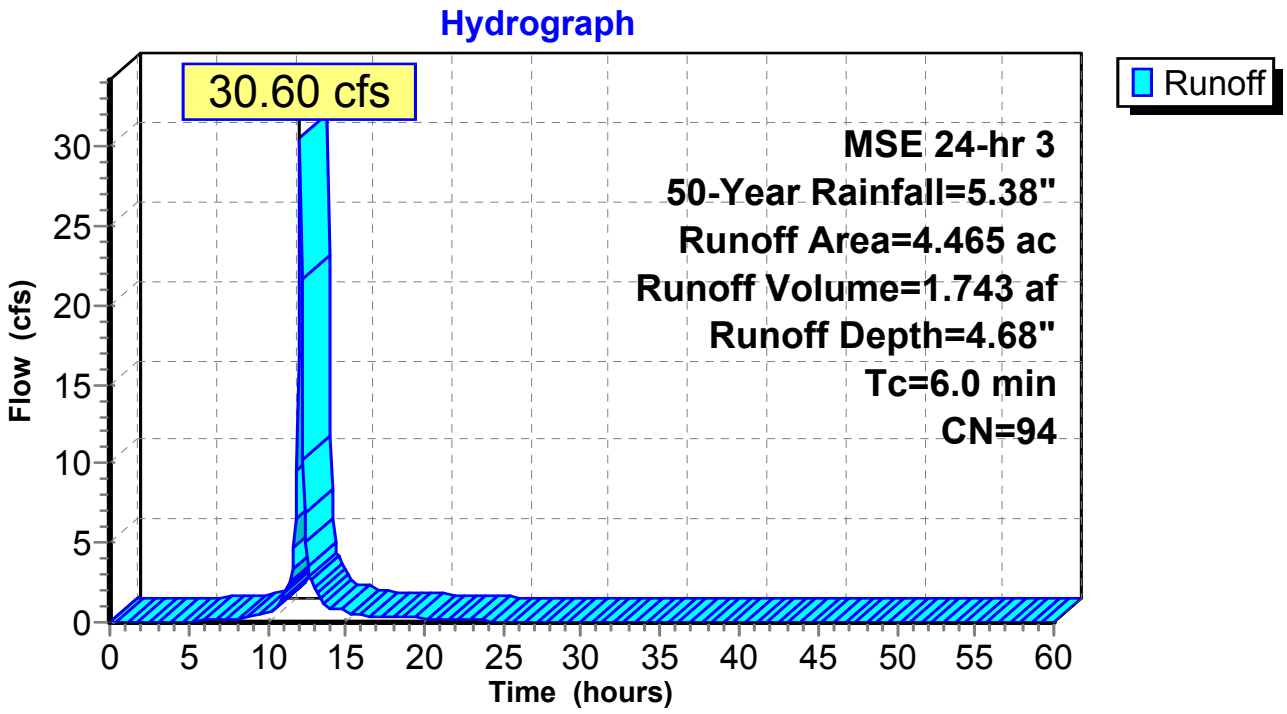
Runoff = 30.60 cfs @ 12.11 hrs, Volume= 1.743 af, Depth= 4.68"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-60.00 hrs, dt= 0.10 hrs
MSE 24-hr 3 50-Year Rainfall=5.38"

	Area (ac)	CN	Description
	0.676	98	Roofs, HSG D
	2.130	98	Paved parking, HSG D
*	0.228	98	Concrete Sidewalks, HSG D
	0.125	96	Gravel surface, HSG D
	1.306	84	50-75% Grass cover, Fair, HSG D
	4.465	94	Weighted Average
	1.431		32.05% Pervious Area
	3.034		67.95% Impervious Area

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

Subcatchment EX-1:



Summary for Subcatchment P-1: Untreated

[49] Hint: Tc<2dt may require smaller dt

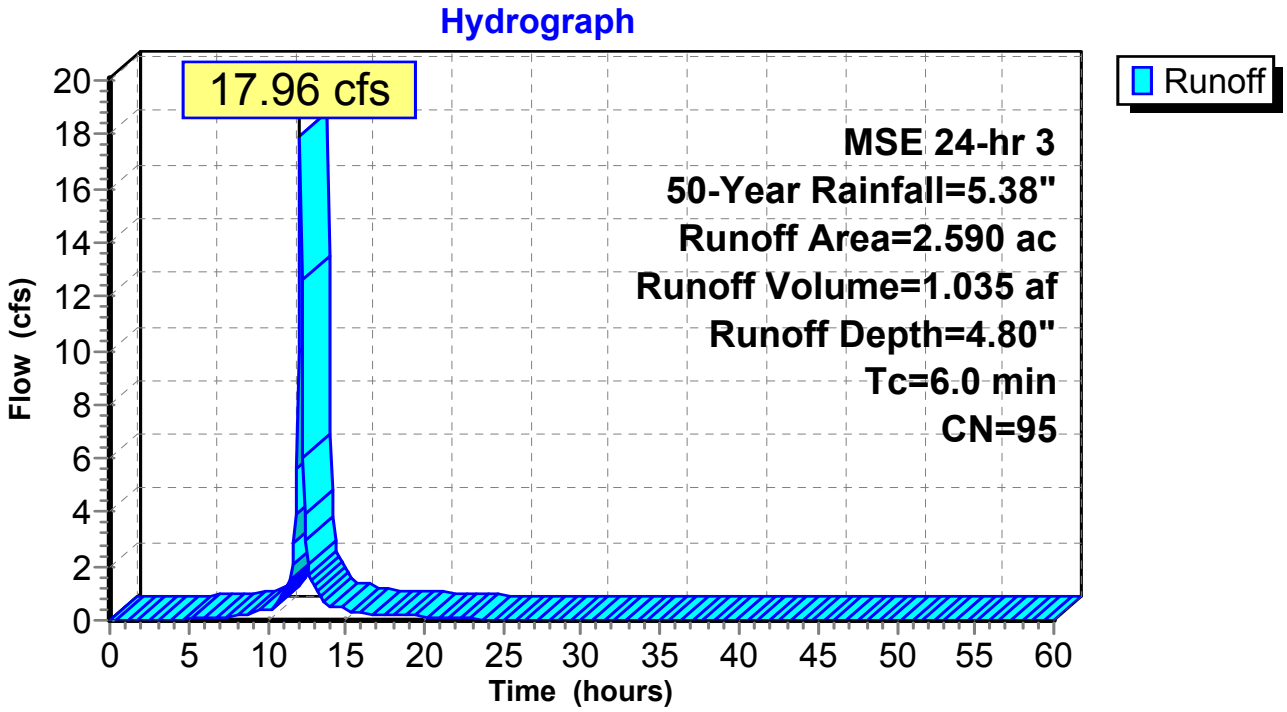
Runoff = 17.96 cfs @ 12.11 hrs, Volume= 1.035 af, Depth= 4.80"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-60.00 hrs, dt= 0.10 hrs
MSE 24-hr 3 50-Year Rainfall=5.38"

	Area (ac)	CN	Description
	0.489	98	Roofs, HSG D
	1.483	98	Paved parking, HSG D
*	0.089	98	Concrete Sidewalk, HSG D
*	0.529	84	Landscaped/Lawn - 50-75% Grass cover, Fair, HSG D
	2.590	95	Weighted Average
	0.529		20.42% Pervious Area
	2.061		79.58% Impervious Area

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

Subcatchment P-1: Untreated



Summary for Subcatchment P-2: Treated

[49] Hint: Tc<2dt may require smaller dt

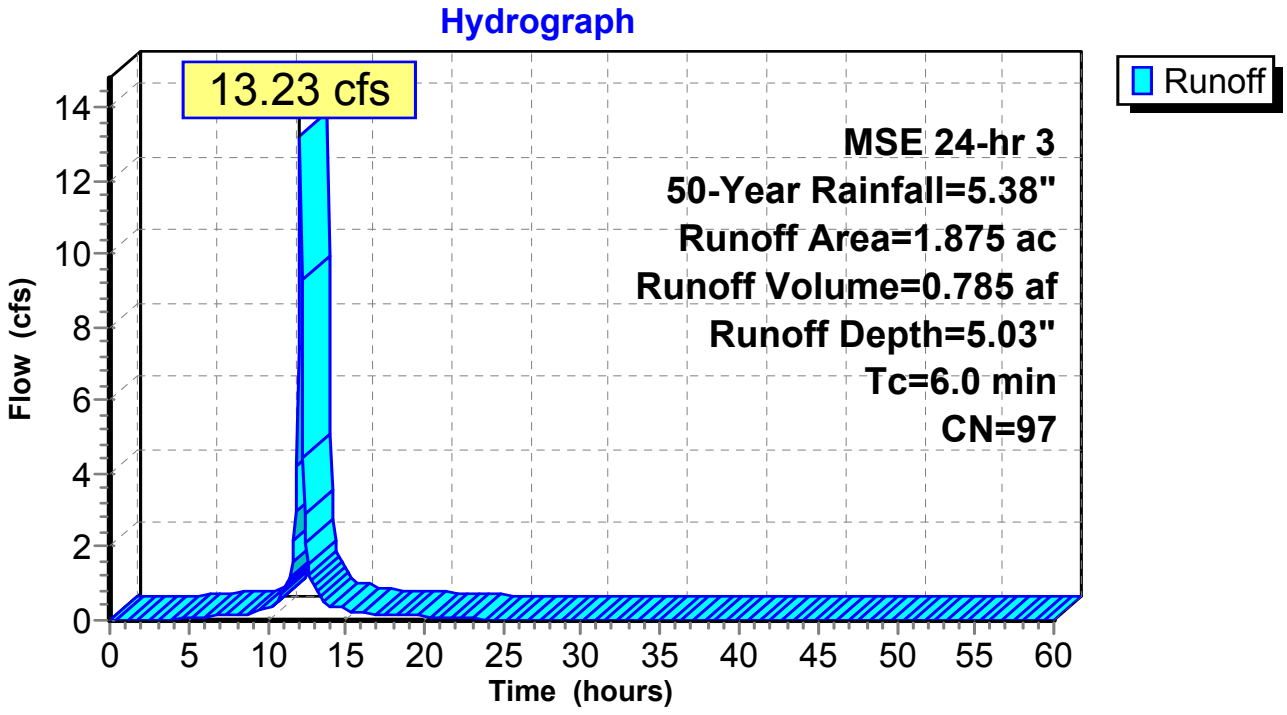
Runoff = 13.23 cfs @ 12.11 hrs, Volume= 0.785 af, Depth= 5.03"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-60.00 hrs, dt= 0.10 hrs
MSE 24-hr 3 50-Year Rainfall=5.38"

	Area (ac)	CN	Description
	0.343	98	Roofs, HSG D
	1.340	98	Paved parking, HSG D
*	0.037	98	Concrete Sidewalk, HSG D
	0.155	84	50-75% Grass cover, Fair, HSG D
	1.875	97	Weighted Average
	0.155		8.27% Pervious Area
	1.720		91.73% Impervious Area

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

Subcatchment P-2: Treated



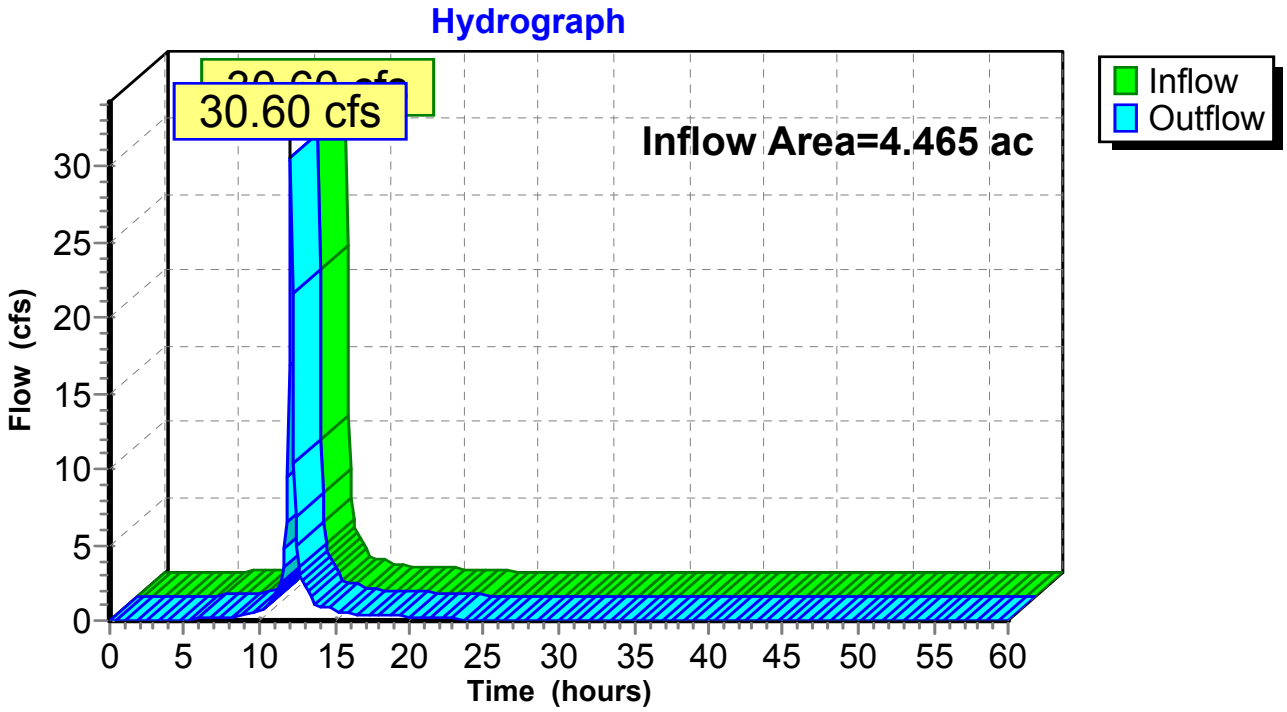
Summary for Reach EX: Existing Conditions

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

Inflow Area = 4.465 ac, 67.95% Impervious, Inflow Depth = 4.68" for 50-Year event
Inflow = 30.60 cfs @ 12.11 hrs, Volume= 1.743 af
Outflow = 30.60 cfs @ 12.11 hrs, Volume= 1.743 af, Atten= 0%, Lag= 0.0 min

Routing by Dyn-Stor-Ind method, Time Span= 0.00-60.00 hrs, dt= 0.10 hrs / 3

Reach EX: Existing Conditions



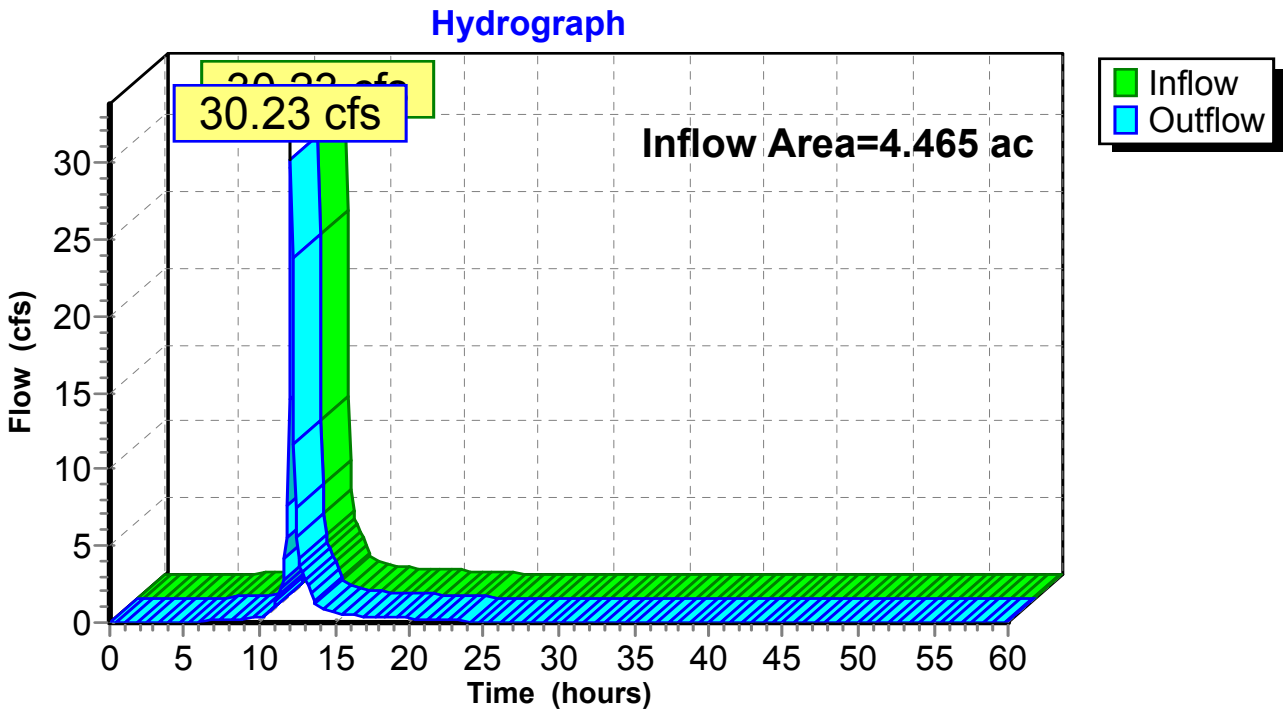
Summary for Reach P: Proposed Conditions

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

Inflow Area = 4.465 ac, 84.68% Impervious, Inflow Depth = 4.61" for 50-Year event
Inflow = 30.23 cfs @ 12.12 hrs, Volume= 1.715 af
Outflow = 30.23 cfs @ 12.12 hrs, Volume= 1.715 af, Atten= 0%, Lag= 0.0 min

Routing by Dyn-Stor-Ind method, Time Span= 0.00-60.00 hrs, dt= 0.10 hrs / 3

Reach P: Proposed Conditions



Summary for Pond U1: Underground Facility

Inflow Area = 1.875 ac, 91.73% Impervious, Inflow Depth = 5.03" for 50-Year event
Inflow = 13.23 cfs @ 12.11 hrs, Volume= 0.785 af
Outflow = 12.49 cfs @ 12.14 hrs, Volume= 0.687 af, Atten= 6%, Lag= 1.8 min
Discarded = 0.00 cfs @ 12.14 hrs, Volume= 0.007 af
Primary = 12.49 cfs @ 12.14 hrs, Volume= 0.680 af

Routing by Dyn-Stor-Ind method, Time Span= 0.00-60.00 hrs, dt= 0.10 hrs / 3
Peak Elev= 916.95' @ 12.14 hrs Surf.Area= 0.048 ac Storage= 0.198 af

Plug-Flow detention time= 105.2 min calculated for 0.686 af (87% of inflow)
Center-of-Mass det. time= 61.9 min (812.0 - 750.2)

Volume	Invert	Avail.Storage	Storage Description
#1A	910.51'	0.061 af	**28.50'W x 55.42'L x 6.75'H Field A** 0.245 af Overall - 0.093 af Embedded = 0.152 af x 40.0% Voids
#2A	911.26'	0.093 af	**ADS_StormTech MC-4500 +Cap** x 36 Inside #1 Effective Size= 90.4"W x 60.0"H => 26.46 sf x 4.02'L = 106.5 cf Overall Size= 100.0"W x 60.0"H x 4.33'L with 0.31' Overlap 3 Rows of 12 Chambers Cap Storage= +35.7 cf x 2 x 3 rows = 214.2 cf
#3B	910.51'	0.022 af	**10.33'W x 51.39'L x 6.75'H Field B** 0.082 af Overall - 0.029 af Embedded = 0.054 af x 40.0% Voids
#4B	911.26'	0.029 af	**ADS_StormTech MC-4500 +Cap** x 11 Inside #3 Effective Size= 90.4"W x 60.0"H => 26.46 sf x 4.02'L = 106.5 cf Overall Size= 100.0"W x 60.0"H x 4.33'L with 0.31' Overlap Cap Storage= +35.7 cf x 2 x 1 rows = 71.4 cf
		0.204 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	915.51'	**2.0' long Sharp-Crested Rectangular Weir** 2 End Contraction(s)
#2	Primary	913.51'	**8.0" Vert. Orifice/Grate** C= 0.600
#3	Discarded	910.51'	**0.030 in/hr Exfiltration over Surface area** Conductivity to Groundwater Elevation = 1.00'

Discarded OutFlow Max=0.00 cfs @ 12.14 hrs HW=916.83' (Free Discharge)
└**3=Exfiltration** (Controls 0.00 cfs)

Primary OutFlow Max=11.52 cfs @ 12.14 hrs HW=916.83' TW=0.00' (Dynamic Tailwater)
├**1=Sharp-Crested Rectangular Weir** (Weir Controls 8.62 cfs @ 3.76 fps)
└**2=Orifice/Grate** (Orifice Controls 2.91 cfs @ 8.32 fps)

Pond U1: Underground Facility - Chamber Wizard Field A

Chamber Model = ADS_StormTechMC-4500 +Cap (ADS StormTech®MC-4500 with cap volume)
Effective Size= 90.4"W x 60.0"H => 26.46 sf x 4.02'L = 106.5 cf
Overall Size= 100.0"W x 60.0"H x 4.33'L with 0.31' Overlap
Cap Storage= +35.7 cf x 2 x 3 rows = 214.2 cf

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

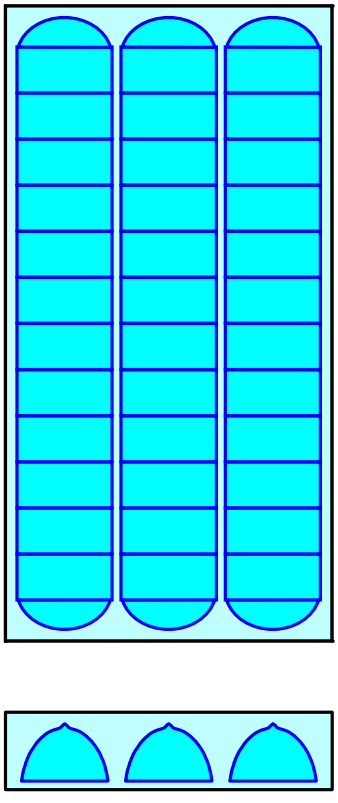
12 Chambers/Row x 4.02' Long +2.56' Cap Length x 2 = 53.42' Row Length +12.0" End Stone x 2 = 55.42' Base Length
3 Rows x 100.0" Wide + 9.0" Spacing x 2 + 12.0" Side Stone x 2 = 28.50' Base Width
9.0" Base + 60.0" Chamber Height + 12.0" Cover = 6.75' Field Height

36 Chambers x 106.5 cf + 35.7 cf Cap Volume x 2 x 3 Rows = 4,047.9 cf Chamber Storage

10,660.8 cf Field - 4,047.9 cf Chambers = 6,612.9 cf Stone x 40.0% Voids = 2,645.2 cf Stone Storage

Chamber Storage + Stone Storage = 6,693.0 cf = 0.154 af
Overall Storage Efficiency = 62.8%
Overall System Size = 55.42' x 28.50' x 6.75'

36 Chambers
394.8 cy Field
244.9 cy Stone



Pond U1: Underground Facility - Chamber Wizard Field B

Chamber Model = ADS_StormTechMC-4500 +Cap (ADS StormTech®MC-4500 with cap volume)
Effective Size= 90.4"W x 60.0"H => 26.46 sf x 4.02'L = 106.5 cf
Overall Size= 100.0"W x 60.0"H x 4.33'L with 0.31' Overlap
Cap Storage= +35.7 cf x 2 x 1 rows = 71.4 cf

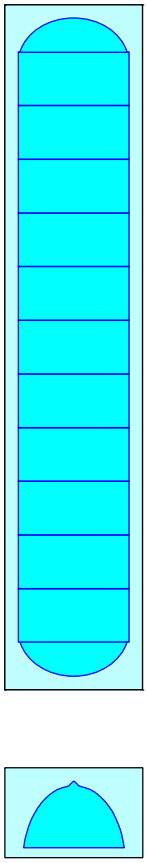
11 Chambers/Row x 4.02' Long +2.56' Cap Length x 2 = 49.39' Row Length +12.0" End Stone x 2 = 51.39' Base Length
1 Rows x 100.0" Wide + 12.0" Side Stone x 2 = 10.33' Base Width
9.0" Base + 60.0" Chamber Height + 12.0" Cover = 6.75' Field Height

11 Chambers x 106.5 cf + 35.7 cf Cap Volume x 2 x 1 Rows = 1,242.8 cf Chamber Storage

3,584.6 cf Field - 1,242.8 cf Chambers = 2,341.8 cf Stone x 40.0% Voids = 936.7 cf Stone Storage

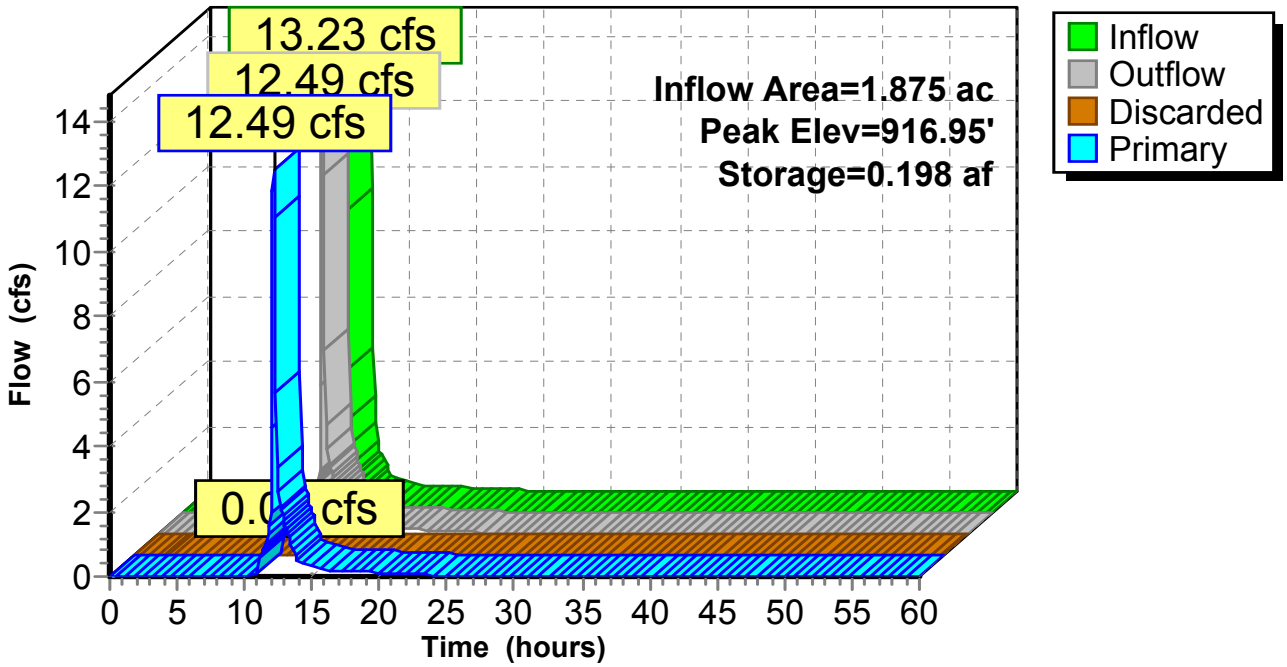
Chamber Storage + Stone Storage = 2,179.5 cf = 0.050 af
Overall Storage Efficiency = 60.8%
Overall System Size = 51.39' x 10.33' x 6.75'

11 Chambers
132.8 cy Field
86.7 cy Stone



Pond U1: Underground Facility

Hydrograph



Stage-Area-Storage for Pond U1: Underground Facility

Elevation (feet)	Surface (acres)	Storage (acre-feet)
910.51	**0.048**	0.000
910.61	0.048	0.002
910.71	0.048	0.004
910.81	0.048	0.006
910.91	0.048	0.008
911.01	0.048	0.010
911.11	0.048	0.012
911.21	0.048	0.014
911.31	0.048	0.017
911.41	0.048	0.021
911.51	0.048	0.025
911.61	0.048	0.029
911.71	0.048	0.033
911.81	0.048	0.036
911.91	0.048	0.040
912.01	0.048	0.044
912.11	0.048	0.048
912.21	0.048	0.052
912.31	0.048	0.056
912.41	0.048	0.060
912.51	0.048	0.064
912.61	0.048	0.068
912.71	0.048	0.072
912.81	0.048	0.075
912.91	0.048	0.079
913.01	0.048	0.083
913.11	0.048	0.087
913.21	0.048	0.091
913.31	0.048	0.094
913.41	0.048	0.098
913.51	0.048	0.102
913.61	0.048	0.105
913.71	0.048	0.109
913.81	0.048	0.112
913.91	0.048	0.116
914.01	0.048	0.120
914.11	0.048	0.123
914.21	0.048	0.127
914.31	0.048	0.130
914.41	0.048	0.133
914.51	0.048	0.137
914.61	0.048	0.140
914.71	0.048	0.143
914.81	0.048	0.146
914.91	0.048	0.150
915.01	0.048	0.153
915.11	0.048	0.156
915.21	0.048	0.159
915.31	0.048	0.162
915.41	0.048	0.165
915.51	0.048	0.167
915.61	0.048	0.170
915.71	0.048	0.173
915.81	0.048	0.175
915.91	0.048	0.177
916.01	0.048	0.179
916.11	0.048	0.181
916.21	0.048	0.183
916.31	0.048	0.185
916.41	0.048	0.187
916.51	0.048	0.189
916.61	0.048	0.191
916.71	0.048	0.193
916.81	0.048	0.195
916.91	0.048	0.197
917.01	0.048	0.199
917.11	0.048	0.201
917.21	0.048	**0.203**

Time span=0.00-60.00 hrs, dt=0.10 hrs, 601 points x 3
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN
Reach routing by Dyn-Stor-Ind method - Pond routing by Dyn-Stor-Ind method

Subcatchment EX-1: Runoff Area=4.465 ac 67.95% Impervious Runoff Depth=5.47"
Tc=6.0 min CN=94 Runoff=35.46 cfs 2.037 af

Subcatchment P-1: Untreated Runoff Area=2.590 ac 79.58% Impervious Runoff Depth=5.59"
Tc=6.0 min CN=95 Runoff=20.76 cfs 1.207 af

Subcatchment P-2: Treated Runoff Area=1.875 ac 91.73% Impervious Runoff Depth=5.82"
Tc=6.0 min CN=97 Runoff=15.24 cfs 0.910 af

Reach EX: Existing Conditions Inflow=35.46 cfs 2.037 af
Outflow=35.46 cfs 2.037 af

Reach P: Proposed Conditions Inflow=34.49 cfs 2.011 af
Outflow=34.49 cfs 2.011 af

Pond U1: Underground Facility Peak Elev=917.10' Storage=0.200 af Inflow=15.24 cfs 0.910 af
Discarded=0.00 cfs 0.007 af Primary=13.97 cfs 0.805 af Outflow=13.97 cfs 0.812 af

Total Runoff Area = 8.930 ac Runoff Volume = 4.154 af Average Runoff Depth = 5.58"
23.68% Pervious = 2.115 ac 76.32% Impervious = 6.815 ac

Summary for Subcatchment EX-1:

[49] Hint: Tc<2dt may require smaller dt

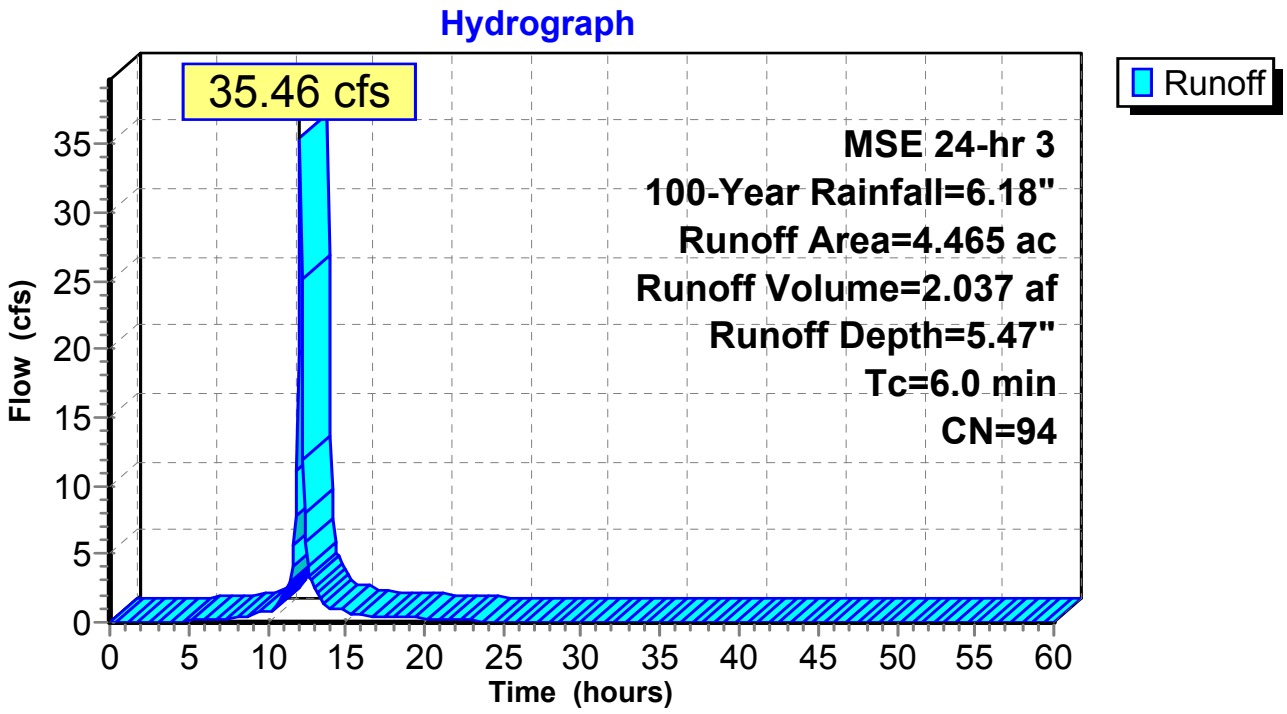
Runoff = 35.46 cfs @ 12.11 hrs, Volume= 2.037 af, Depth= 5.47"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-60.00 hrs, dt= 0.10 hrs
MSE 24-hr 3 100-Year Rainfall=6.18"

	Area (ac)	CN	Description
	0.676	98	Roofs, HSG D
	2.130	98	Paved parking, HSG D
*	0.228	98	Concrete Sidewalks, HSG D
	0.125	96	Gravel surface, HSG D
	1.306	84	50-75% Grass cover, Fair, HSG D
	4.465	94	Weighted Average
	1.431		32.05% Pervious Area
	3.034		67.95% Impervious Area

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

Subcatchment EX-1:



Summary for Subcatchment P-1: Untreated

[49] Hint: Tc<2dt may require smaller dt

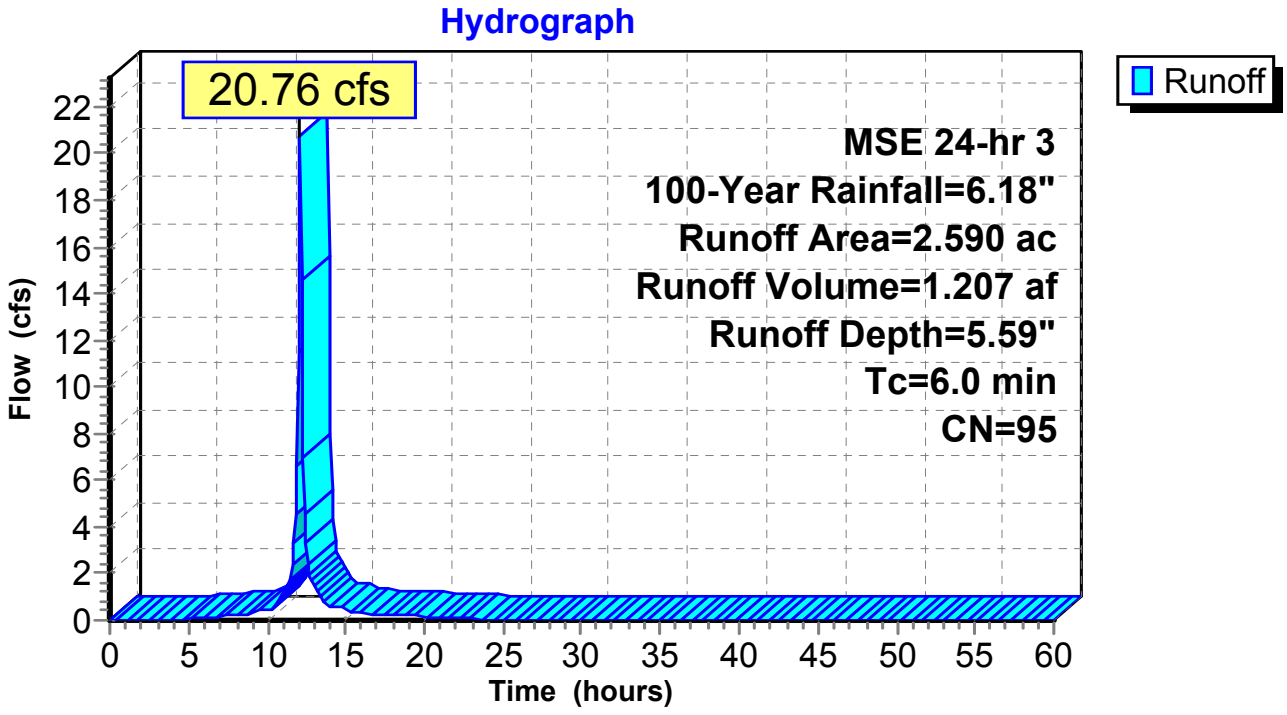
Runoff = 20.76 cfs @ 12.11 hrs, Volume= 1.207 af, Depth= 5.59"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-60.00 hrs, dt= 0.10 hrs
MSE 24-hr 3 100-Year Rainfall=6.18"

	Area (ac)	CN	Description
	0.489	98	Roofs, HSG D
	1.483	98	Paved parking, HSG D
*	0.089	98	Concrete Sidewalk, HSG D
*	0.529	84	Landscaped/Lawn - 50-75% Grass cover, Fair, HSG D
	2.590	95	Weighted Average
	0.529		20.42% Pervious Area
	2.061		79.58% Impervious Area

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

Subcatchment P-1: Untreated



Summary for Subcatchment P-2: Treated

[49] Hint: Tc<2dt may require smaller dt

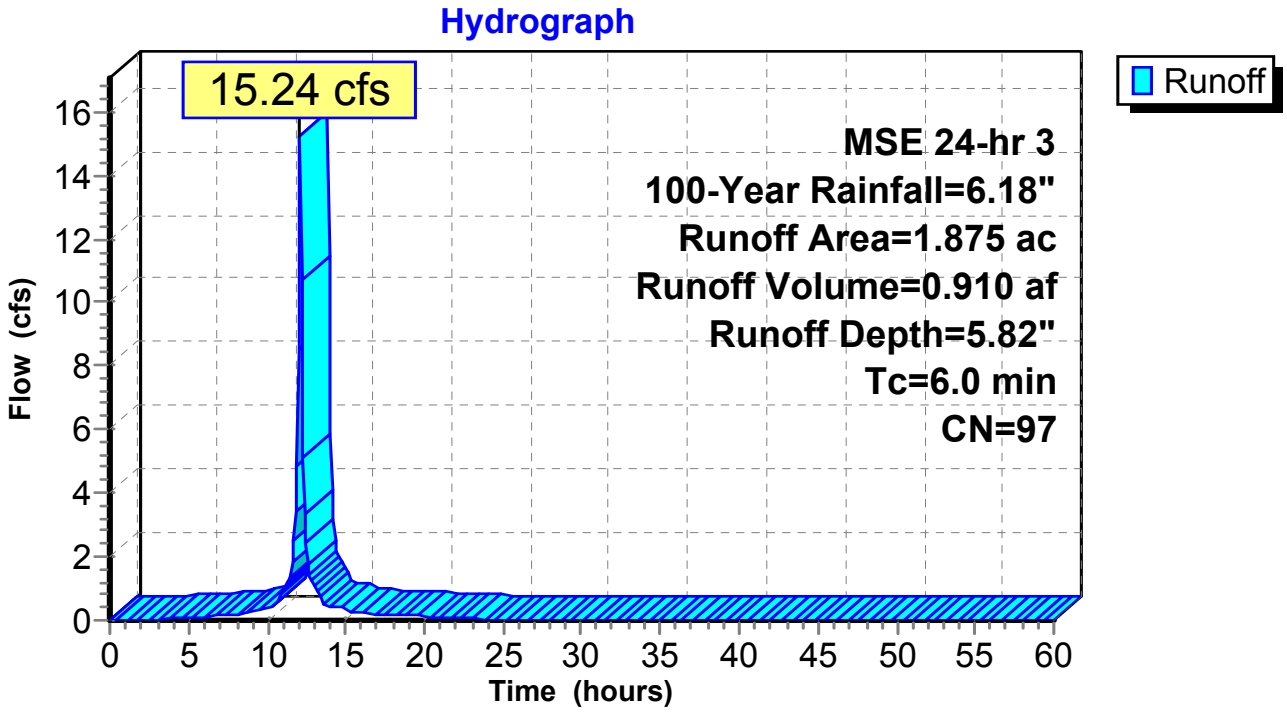
Runoff = 15.24 cfs @ 12.11 hrs, Volume= 0.910 af, Depth= 5.82"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-60.00 hrs, dt= 0.10 hrs
MSE 24-hr 3 100-Year Rainfall=6.18"

	Area (ac)	CN	Description
	0.343	98	Roofs, HSG D
	1.340	98	Paved parking, HSG D
*	0.037	98	Concrete Sidewalk, HSG D
	0.155	84	50-75% Grass cover, Fair, HSG D
	1.875	97	Weighted Average
	0.155		8.27% Pervious Area
	1.720		91.73% Impervious Area

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

Subcatchment P-2: Treated



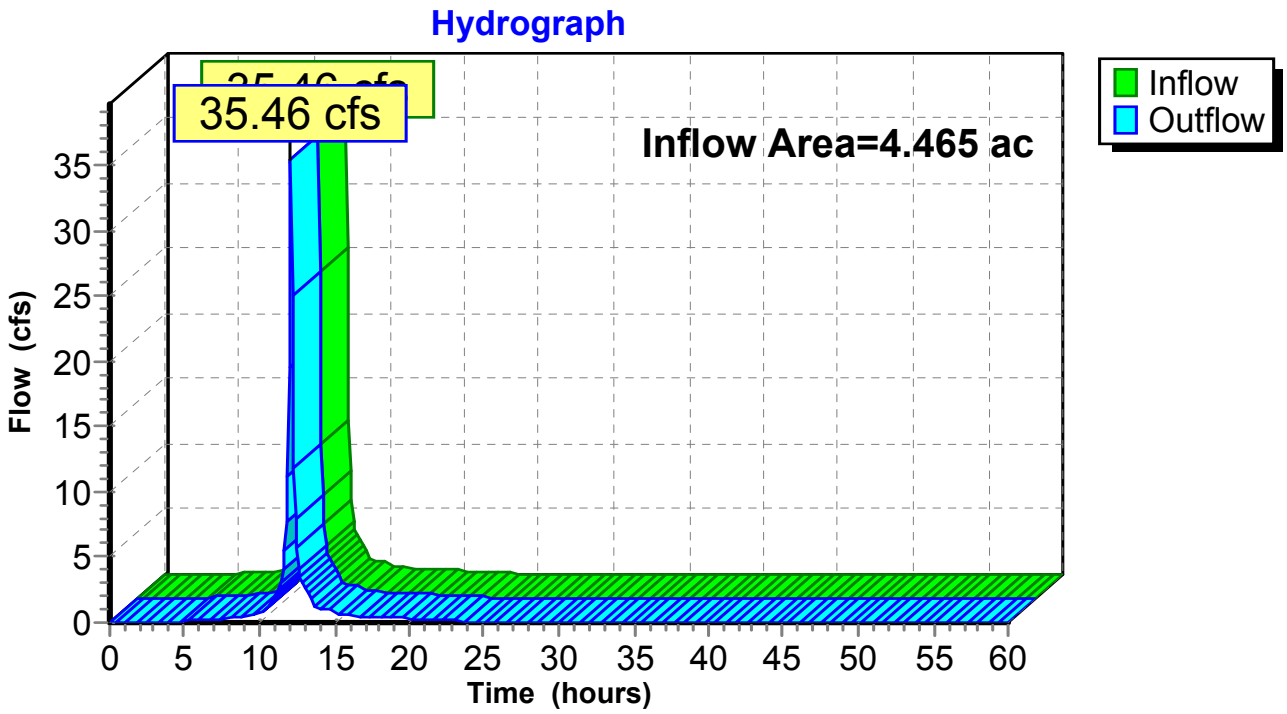
Summary for Reach EX: Existing Conditions

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

Inflow Area = 4.465 ac, 67.95% Impervious, Inflow Depth = 5.47" for 100-Year event
Inflow = 35.46 cfs @ 12.11 hrs, Volume= 2.037 af
Outflow = 35.46 cfs @ 12.11 hrs, Volume= 2.037 af, Atten= 0%, Lag= 0.0 min

Routing by Dyn-Stor-Ind method, Time Span= 0.00-60.00 hrs, dt= 0.10 hrs / 3

Reach EX: Existing Conditions



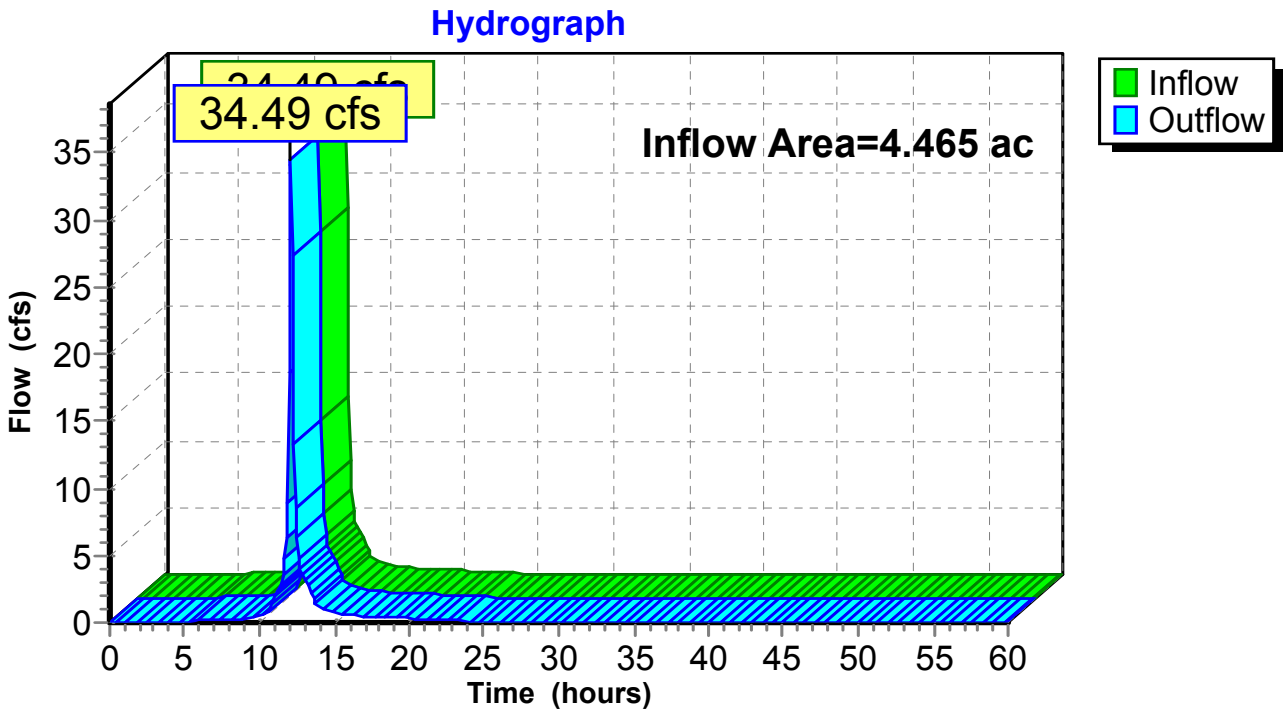
Summary for Reach P: Proposed Conditions

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

Inflow Area = 4.465 ac, 84.68% Impervious, Inflow Depth = 5.41" for 100-Year event
Inflow = 34.49 cfs @ 12.12 hrs, Volume= 2.011 af
Outflow = 34.49 cfs @ 12.12 hrs, Volume= 2.011 af, Atten= 0%, Lag= 0.0 min

Routing by Dyn-Stor-Ind method, Time Span= 0.00-60.00 hrs, dt= 0.10 hrs / 3

Reach P: Proposed Conditions



Summary for Pond U1: Underground Facility

Inflow Area = 1.875 ac, 91.73% Impervious, Inflow Depth = 5.82" for 100-Year event
Inflow = 15.24 cfs @ 12.11 hrs, Volume= 0.910 af
Outflow = 13.97 cfs @ 12.14 hrs, Volume= 0.812 af, Atten= 8%, Lag= 1.9 min
Discarded = 0.00 cfs @ 12.14 hrs, Volume= 0.007 af
Primary = 13.97 cfs @ 12.14 hrs, Volume= 0.805 af

Routing by Dyn-Stor-Ind method, Time Span= 0.00-60.00 hrs, dt= 0.10 hrs / 3
Peak Elev= 917.10' @ 12.14 hrs Surf.Area= 0.048 ac Storage= 0.200 af

Plug-Flow detention time= 97.5 min calculated for 0.810 af (89% of inflow)
Center-of-Mass det. time= 57.7 min (805.8 - 748.1)

Volume	Invert	Avail.Storage	Storage Description
#1A	910.51'	0.061 af	**28.50'W x 55.42'L x 6.75'H Field A** 0.245 af Overall - 0.093 af Embedded = 0.152 af x 40.0% Voids
#2A	911.26'	0.093 af	**ADS_StormTech MC-4500 +Cap** x 36 Inside #1 Effective Size= 90.4"W x 60.0"H => 26.46 sf x 4.02'L = 106.5 cf Overall Size= 100.0"W x 60.0"H x 4.33'L with 0.31' Overlap 3 Rows of 12 Chambers Cap Storage= +35.7 cf x 2 x 3 rows = 214.2 cf
#3B	910.51'	0.022 af	**10.33'W x 51.39'L x 6.75'H Field B** 0.082 af Overall - 0.029 af Embedded = 0.054 af x 40.0% Voids
#4B	911.26'	0.029 af	**ADS_StormTech MC-4500 +Cap** x 11 Inside #3 Effective Size= 90.4"W x 60.0"H => 26.46 sf x 4.02'L = 106.5 cf Overall Size= 100.0"W x 60.0"H x 4.33'L with 0.31' Overlap Cap Storage= +35.7 cf x 2 x 1 rows = 71.4 cf
		0.204 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	915.51'	**2.0' long Sharp-Crested Rectangular Weir** 2 End Contraction(s)
#2	Primary	913.51'	**8.0" Vert. Orifice/Grate** C= 0.600
#3	Discarded	910.51'	**0.030 in/hr Exfiltration over Surface area** Conductivity to Groundwater Elevation = 1.00'

Discarded OutFlow Max=0.00 cfs @ 12.14 hrs HW=917.00' (Free Discharge)
└**3=Exfiltration** (Controls 0.00 cfs)

Primary OutFlow Max=13.13 cfs @ 12.14 hrs HW=917.00' TW=0.00' (Dynamic Tailwater)
├**1=Sharp-Crested Rectangular Weir** (Weir Controls 10.14 cfs @ 3.99 fps)
└**2=Orifice/Grate** (Orifice Controls 2.99 cfs @ 8.56 fps)

Pond U1: Underground Facility - Chamber Wizard Field A

Chamber Model = ADS_StormTechMC-4500 +Cap (ADS StormTech®MC-4500 with cap volume)
Effective Size= 90.4"W x 60.0"H => 26.46 sf x 4.02'L = 106.5 cf
Overall Size= 100.0"W x 60.0"H x 4.33'L with 0.31' Overlap
Cap Storage= +35.7 cf x 2 x 3 rows = 214.2 cf

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

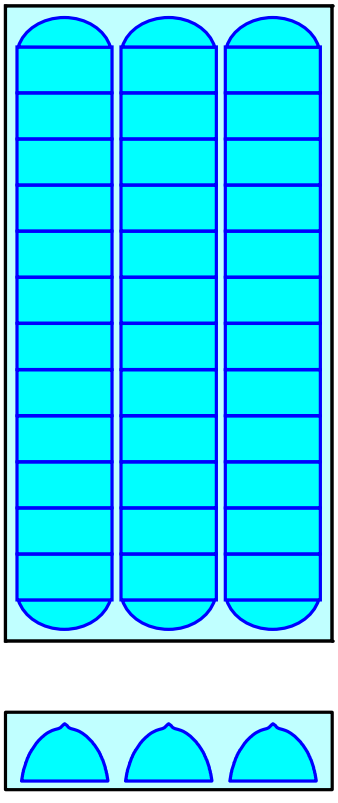
12 Chambers/Row x 4.02' Long +2.56' Cap Length x 2 = 53.42' Row Length +12.0" End Stone x 2 = 55.42' Base Length
3 Rows x 100.0" Wide + 9.0" Spacing x 2 + 12.0" Side Stone x 2 = 28.50' Base Width
9.0" Base + 60.0" Chamber Height + 12.0" Cover = 6.75' Field Height

36 Chambers x 106.5 cf + 35.7 cf Cap Volume x 2 x 3 Rows = 4,047.9 cf Chamber Storage

10,660.8 cf Field - 4,047.9 cf Chambers = 6,612.9 cf Stone x 40.0% Voids = 2,645.2 cf Stone Storage

Chamber Storage + Stone Storage = 6,693.0 cf = 0.154 af
Overall Storage Efficiency = 62.8%
Overall System Size = 55.42' x 28.50' x 6.75'

36 Chambers
394.8 cy Field
244.9 cy Stone



Pond U1: Underground Facility - Chamber Wizard Field B

Chamber Model = ADS_StormTechMC-4500 +Cap (ADS StormTech®MC-4500 with cap volume)
Effective Size= 90.4"W x 60.0"H => 26.46 sf x 4.02'L = 106.5 cf
Overall Size= 100.0"W x 60.0"H x 4.33'L with 0.31' Overlap
Cap Storage= +35.7 cf x 2 x 1 rows = 71.4 cf

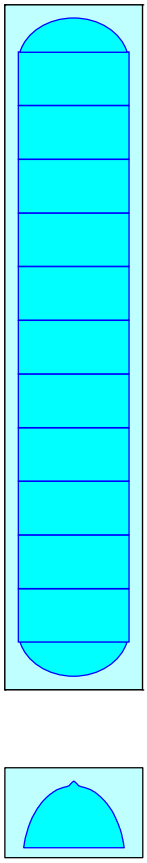
11 Chambers/Row x 4.02' Long +2.56' Cap Length x 2 = 49.39' Row Length +12.0" End Stone x 2 = 51.39' Base Length
1 Rows x 100.0" Wide + 12.0" Side Stone x 2 = 10.33' Base Width
9.0" Base + 60.0" Chamber Height + 12.0" Cover = 6.75' Field Height

11 Chambers x 106.5 cf + 35.7 cf Cap Volume x 2 x 1 Rows = 1,242.8 cf Chamber Storage

3,584.6 cf Field - 1,242.8 cf Chambers = 2,341.8 cf Stone x 40.0% Voids = 936.7 cf Stone Storage

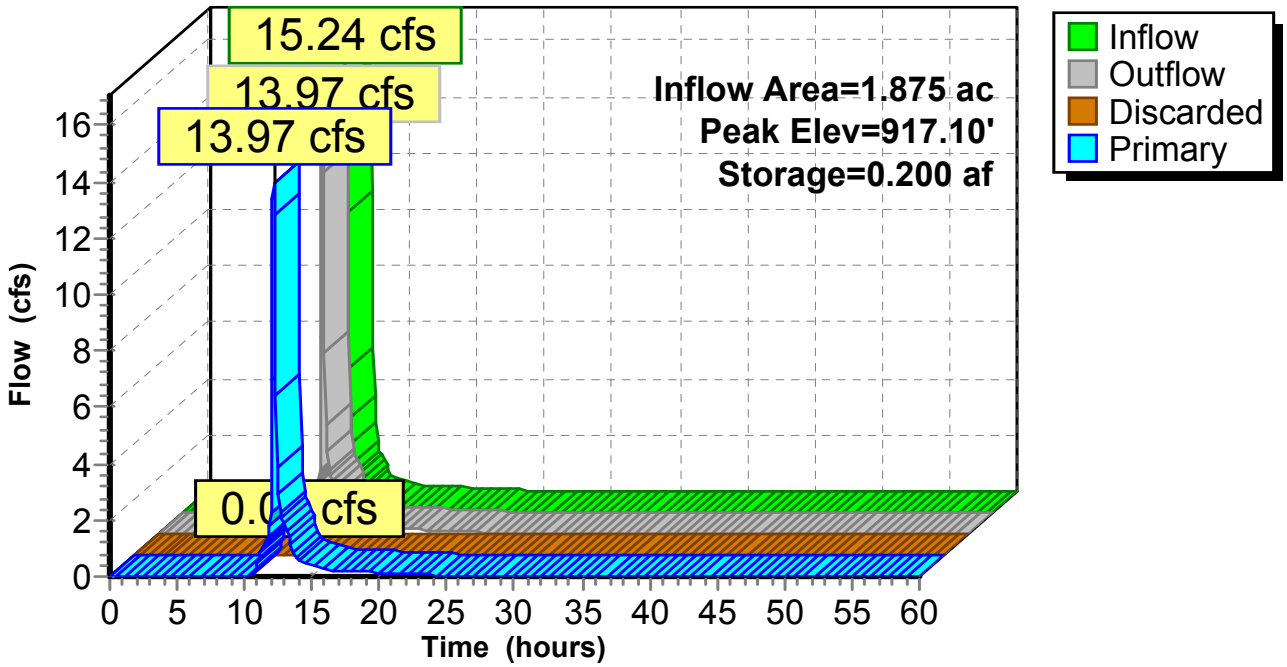
Chamber Storage + Stone Storage = 2,179.5 cf = 0.050 af
Overall Storage Efficiency = 60.8%
Overall System Size = 51.39' x 10.33' x 6.75'

11 Chambers
132.8 cy Field
86.7 cy Stone



Pond U1: Underground Facility

Hydrograph



Stage-Area-Storage for Pond U1: Underground Facility

Elevation (feet)	Surface (acres)	Storage (acre-feet)
910.51	**0.048**	0.000
910.61	0.048	0.002
910.71	0.048	0.004
910.81	0.048	0.006
910.91	0.048	0.008
911.01	0.048	0.010
911.11	0.048	0.012
911.21	0.048	0.014
911.31	0.048	0.017
911.41	0.048	0.021
911.51	0.048	0.025
911.61	0.048	0.029
911.71	0.048	0.033
911.81	0.048	0.036
911.91	0.048	0.040
912.01	0.048	0.044
912.11	0.048	0.048
912.21	0.048	0.052
912.31	0.048	0.056
912.41	0.048	0.060
912.51	0.048	0.064
912.61	0.048	0.068
912.71	0.048	0.072
912.81	0.048	0.075
912.91	0.048	0.079
913.01	0.048	0.083
913.11	0.048	0.087
913.21	0.048	0.091
913.31	0.048	0.094
913.41	0.048	0.098
913.51	0.048	0.102
913.61	0.048	0.105
913.71	0.048	0.109
913.81	0.048	0.112
913.91	0.048	0.116
914.01	0.048	0.120
914.11	0.048	0.123
914.21	0.048	0.127
914.31	0.048	0.130
914.41	0.048	0.133
914.51	0.048	0.137
914.61	0.048	0.140
914.71	0.048	0.143
914.81	0.048	0.146
914.91	0.048	0.150
915.01	0.048	0.153
915.11	0.048	0.156
915.21	0.048	0.159
915.31	0.048	0.162
915.41	0.048	0.165
915.51	0.048	0.167
915.61	0.048	0.170
915.71	0.048	0.173
915.81	0.048	0.175
915.91	0.048	0.177
916.01	0.048	0.179
916.11	0.048	0.181
916.21	0.048	0.183
916.31	0.048	0.185
916.41	0.048	0.187
916.51	0.048	0.189
916.61	0.048	0.191
916.71	0.048	0.193
916.81	0.048	0.195
916.91	0.048	0.197
917.01	0.048	0.199
917.11	0.048	0.201
917.21	0.048	**0.203**

5 Sediment Reduction Calculations

SLAMM for Windows Version 10.2.1

Data file name: C:\Users\jbrunoehler\Documents\StormTech\Volvo - Waukesha\2017-01-03 - Redmond-Fields Volvo Waukesha.mdb
Data file description:
Rain file name: C:\WinSLAMM Files\Rain Files\WisReg - Milwaukee WI 1969.RAN
Particulate Solids Concentration file name: C:\WinSLAMM Files\v10.1 WI_AVG01.pscx
Runoff Coefficient file name: C:\WinSLAMM Files\WI_SL06 Dec06.rsvx
Residential Street Delivery file name: C:\WinSLAMM Files\WI_Res and Other Urban Dec06.std
Institutional Street Delivery file name: C:\WinSLAMM Files\WI_Com Inst Indust Dec06.std
Commercial Street Delivery file name: C:\WinSLAMM Files\WI_Com Inst Indust Dec06.std
Industrial Street Delivery file name: C:\WinSLAMM Files\WI_Com Inst Indust Dec06.std
Other Urban Street Delivery file name: C:\WinSLAMM Files\WI_Res and Other Urban Dec06.std
Freeway Street Delivery file name: C:\WinSLAMM Files\Freeway Dec06.std
Pollutant Relative Concentration file name: C:\WinSLAMM Files\WI_GEO03.ppdx
Start of Winter Season: 12/02 End of Winter Season: 03/12
Model Run Start Date: 01/05/69 Model Run End Date: 12/31/69
Date of run: 01-03-2017 Time of run: 14:21:59
Total Area Modeled (acres): 2.442
Years in Model Run: 0.99

	Runoff Volume (cu ft)	Percent Runoff Volume Reduction	Particulate Solids Conc. (mg/L)	Particulate Solids Yield (lbs)	Percent Particulate Solids Reduction
Total of all Land Uses without Controls:	162820	-	119.8	1218	-
Outfall Total with Controls:	145765	10.47%	79.88	726.9	40.32%
Annualized Total After Outfall Controls:	147790			737.0	

Data file name: C:\Users\jbrunoehler\Documents\StormTech\Volvo - Waukesha\2017-01-03 - Redmond-Fields Volvo Waukesha.mdb
WinSLAMM Version 10.2.1
Rain file name: C:\WinSLAMM Files\Rain Files\WisReg - Milwaukee WI 1969.RAN
Particulate Solids Concentration file name: C:\WinSLAMM Files\v10.1 WI_AVG01.pscx
Runoff Coefficient file name: C:\WinSLAMM Files\WI_SL06 Dec06.rsvx
Residential Street Delivery file name: C:\WinSLAMM Files\WI_Res and Other Urban Dec06.std
Institutional Street Delivery file name: C:\WinSLAMM Files\WI_Com Inst Indust Dec06.std
Commercial Street Delivery file name: C:\WinSLAMM Files\WI_Com Inst Indust Dec06.std
Industrial Street Delivery file name: C:\WinSLAMM Files\WI_Com Inst Indust Dec06.std
Other Urban Street Delivery file name: C:\WinSLAMM Files\WI_Res and Other Urban Dec06.std
Freeway Street Delivery file name: C:\WinSLAMM Files\Freeway Dec06.std
Apply Street Delivery Files to Adjust the After Event Load Street Dirt Mass Balance: False
Pollutant Relative Concentration file name: C:\WinSLAMM Files\WI_GEO03.ppdx
Source Area PSD and Peak to Average Flow Ratio File: C:\WinSLAMM Files\NURP Source Area PSD Files.csv
Cost Data file name:
Seed for random number generator: -42
Study period starting date: 01/05/69 Study period ending date: 12/31/69
Start of Winter Season: 12/02 End of Winter Season: 03/12
Date: 01-03-2017 Time: 14:22:08
Site information:

LU# 1 - Commercial: Untreated Total area (ac): 0.843
13 - Paved Parking 1: 0.556 ac. Connected Source Area PSD File: C:\WinSLAMM Files\NURP.cpz
31 - Sidewalks 1: 0.022 ac. Connected Source Area PSD File: C:\WinSLAMM Files\NURP.cpz
51 - Small Landscaped Areas 1: 0.265 ac. Normal Silty Source Area PSD File: C:\WinSLAMM Files\NURP.cpz

LU# 2 - Commercial: Treated Total area (ac): 1.599
1 - Roofs 1: 0.199 ac. Flat Connected Source Area PSD File: C:\WinSLAMM Files\NURP.cpz
13 - Paved Parking 1: 1.207 ac. Connected Source Area PSD File: C:\WinSLAMM Files\NURP.cpz
31 - Sidewalks 1: 0.037 ac. Connected Source Area PSD File: C:\WinSLAMM Files\NURP.cpz
51 - Small Landscaped Areas 1: 0.156 ac. Normal Silty Source Area PSD File: C:\WinSLAMM Files\NURP.cpz

Control Practice 1: Wet Detention Pond CP# 1 (DS) - DS Wet Pond # 1
Particle Size Distribution file name: Not needed - calculated by program
Initial stage elevation (ft): 0
Peak to Average Flow Ratio: 3.8
Maximum flow allowed into pond (cfs): No maximum value entered
Outlet Characteristics:
Outlet type: Orifice 1
1. Orifice diameter (ft): 0.67
2. Number of orifices: 1

3. Invert elevation above datum (ft): 3

Outlet type: Broad Crested Weir

1. Weir crest length (ft): 16
2. Weir crest width (ft): 0.5
3. Height from datum to bottom of weir opening: 6

Pond stage and surface area

Entry Number	Stage (ft)	Pond Area (acres)	Natural Seepage (in/hr)	Other Outflow (cfs)
0	0.00	0.0000	0.00	0.00
1	0.01	0.0225	0.03	0.00
2	1.00	0.0225	0.03	0.00
3	2.00	0.0225	0.00	0.00
4	3.00	0.0225	0.00	0.00
5	4.00	0.0225	0.00	0.00
6	5.00	0.0225	0.00	0.00
7	6.00	0.0225	0.00	0.00

6 Erosion Control Calculations

7.1 Stormwater Maintenance Agreement

7.2 Pre-Developed Drainage Area Map

E. MORELAND BLVD.
VARYING WIDTH PUBLIC R.O.W.

EX-1
4.465 AC
CN 94

GRAPHIC SCALE FEET
0 15 30 60

vierbicher
planners | engineers | advisors
REEDSBURG • MADISON • PRAIRIE DU CHIEN
999 Fourier Drive, Suite 201, Madison, WI 53717
Phone: (608) 826-0532 Fax: (608) 826-0530

Fields Jaguar-Land Rover-Volvo-Waukesha

Pre Re-Development Watershed Drainage Map
City of Waukesha
Waukesha County, Wisconsin

REVISIONS NO.	DATE	REMARKS

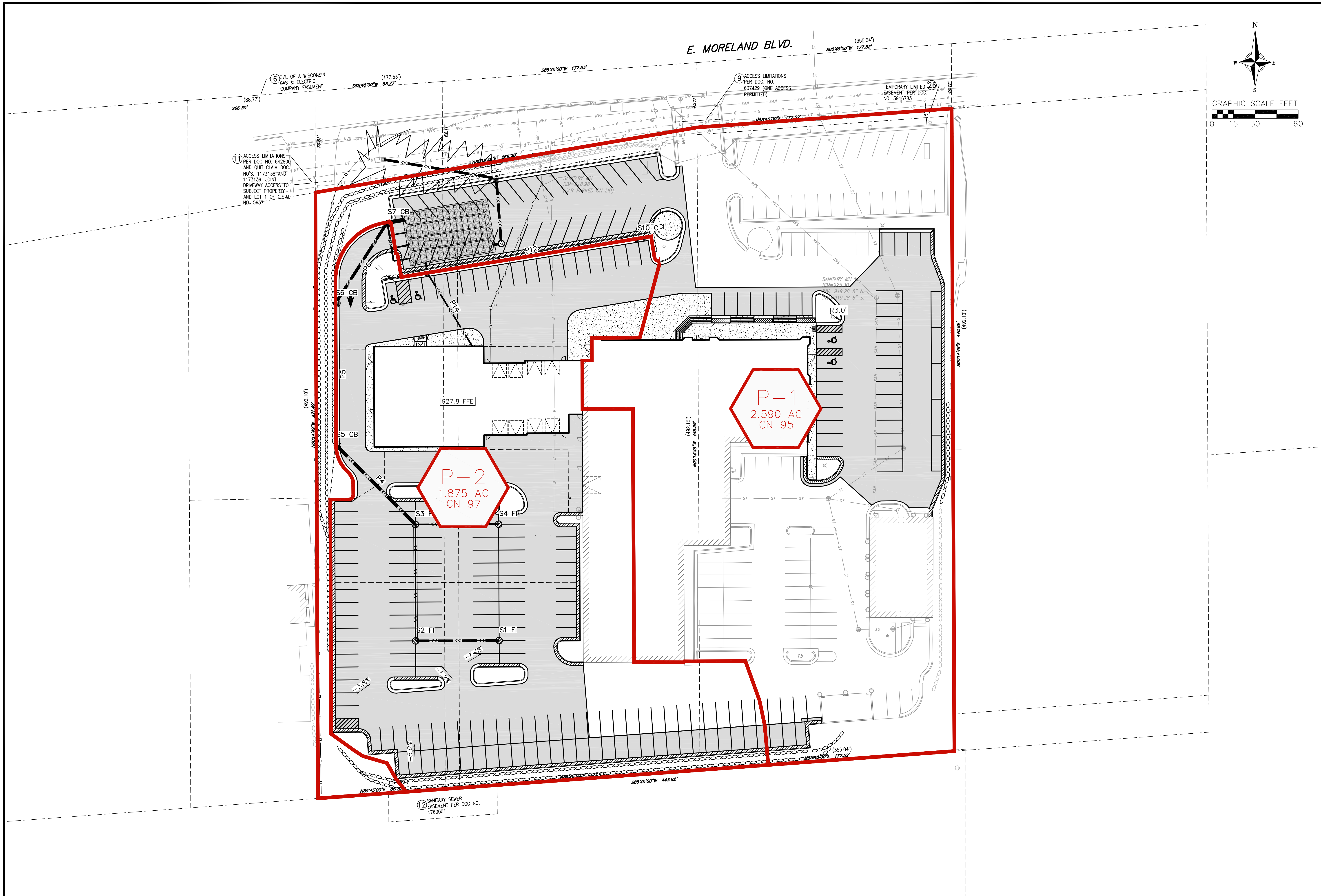
REVISIONS NO.	DATE	REMARKS

SCALE: AS SHOWN
DATE: 1/20/2017
DRAFTER: ACAR
CHECKED:
PROJECT NO.: 160333
SHEET: 1 OF 1
DWG. NO.: 7.2

20 Jan 2017 - 2:38p M:\Redmond Company\160333 - Fields Volvo Waukesha\CADD\160333 - Stormwater.dwg by: ocar

7.3 Developed Drainage Area Map

20 Jan 2017 - 2:39p M:\Redmond Company\160333 - Fields Volvo Waukesha\CADD\160333 - Stormwater.dwg by: acar


E. MORELAND BLVD.
GRAPHIC SCALE FEET
0 15 30 60
N
P-1
2.590 AC
CN 95
P-2
1.875 AC
CN 97
927.8 FFE
S1 FI
S2 FI
S3 FI
S4 FI
S5 CB
S6 CB
S7 CB
S10 CI
P4
P5
P6
P12
P14
R3.0'
ACCESS LIMITATIONS PER DOC NO. 642800 AND QUIT CLAIM DOC. NO'S. 1173138 AND 1173139. JOINT DRIVEWAY ACCESS TO SUBJECT PROPERTY AND LOT 1 OF C.S.M. NO. 5637.
C/L OF A WISCONSIN GAS & ELECTRIC COMPANY EASEMENT
ACCESS LIMITATIONS PER DOC. NO. 637429 (ONE ACCESS PERMITTED)
TEMPORARY LIMITED EASEMENT PER DOC. NO. 3916783
SANITARY SEWER EASEMENT PER DOC NO. 1760001

vierbicher
planners | engineers | advisors
REEDSBURG - MADISON - PRAIRIE DU CHIEN
999 Fourier Drive, Suite 201 Madison, Wisconsin 53717
Phone: (608) 826-0532 Fax: (608) 826-0530

Fields Jaguar-Land Rover-Volvo-Waukesha

Re-Developed Watershed Drainage Map

City of Waukesha
Waukesha County, Wisconsin

REVISIONS		
NO.	DATE	REMARKS

REVISIONS		
NO.	DATE	REMARKS

SCALE: AS SHOWN

DATE: 1/20/2017

DRAFTER: ACAR

CHECKED:

PROJECT NO.: 160333

SHEET: 1 OF 1

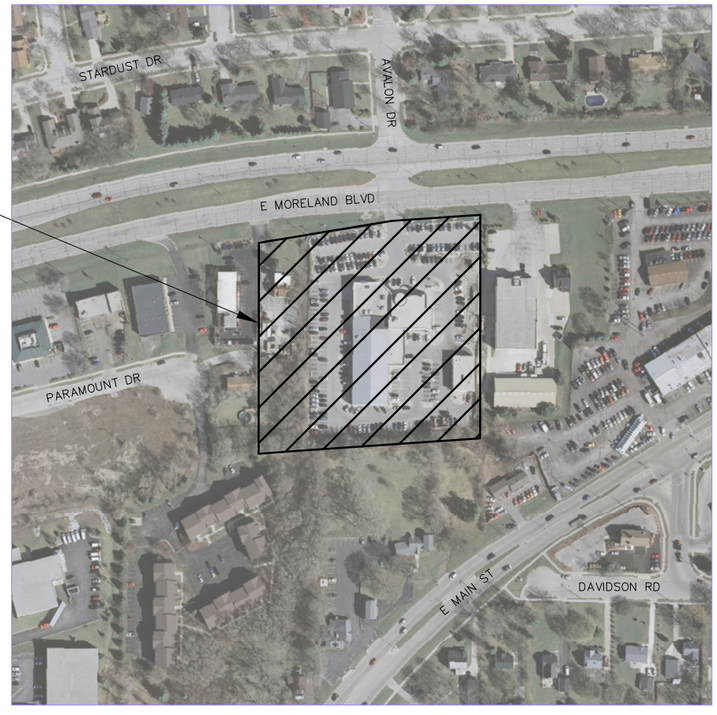
DWG. NO.: 7.3

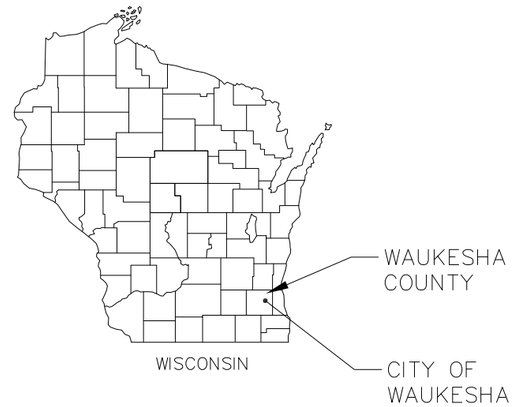
7.4 Construction Plans

Fields Jaguar-Land Rover-Volvo-Waukesha

Civil Engineering Plans

City of Waukesha, Wisconsin





DIGGERS HOTLINE
Dial 811 or (800) 242-8511
www.DiggersHotline.com

CALL DIGGER'S HOTLINE
1-800-242-8511
TOLL FREE
TELEFAX: 1-800-338-3860
TDC (FOR HEARING IMPAIRED):
1-800-542-2289
WIS. STATUTE 182.0175 (1979)
REQUIRES MINIMUM OF 3 WORKING DAYS
NOTICE BEFORE YOU EXCAVATE.

THE LOCATION OF EXISTING UTILITIES, BOTH UNDERGROUND AND OVERHEAD ARE APPROXIMATE ONLY AND HAVE NOT BEEN INDEPENDENTLY VERIFIED BY THE OWNER OR ITS REPRESENTATIVE. THE CONTRACTOR SHALL BE RESPONSIBLE FOR DETERMINING THE EXACT LOCATION OF ALL EXISTING UTILITIES WHETHER SHOWN ON THESE PLANS OR NOT, BEFORE COMMENCING WORK, AND SHALL BE FULLY RESPONSIBLE FOR ANY AND ALL DAMAGES WHICH MIGHT BE CAUSED BY THE CONTRACTOR'S FAILURE TO EXACTLY LOCATE AND PRESERVE ANY AND ALL UTILITIES.

CALL DIGGER'S HOTLINE
1-800-242-8511

SITE BENCHMARKS

CONC. MONUMENT
W/BRASS CAP
SW CORNER OF NE 1/4
SEC. 36, T7N R19E.
ELEV = 929.69

SHEET NO.	DESCRIPTION
T1.0	TITLE SHEET
C1.0	EXISTING CONDITIONS PLAN
C2.0	DEMOLITION PLAN
C3.0	SITE PLAN
C4.0	GRADING PLAN
C4.1	EROSION CONTROL PLAN
C5.0	UTILITY PLAN
C6.0–C6.4	CONSTRUCTION DETAILS

vierbicher
planners | engineers | advisors
REEDSBURG • MADISON • PRAIRIE DU CHIEN
999 Fourier Drive, Suite 201, Madison, WI 53717
Phone: (608) 826-0532 Fax: (608) 826-0530

Fields Jaguar-Land Rover-Volvo-Waukesha
Title Sheet
City of Waukesha
Waukesha County, Wisconsin

REVISIONS
NO. DATE REMARKS

REVISIONS
NO. DATE REMARKS

SCALE
AS SHOWN

DATE
1/20/2017

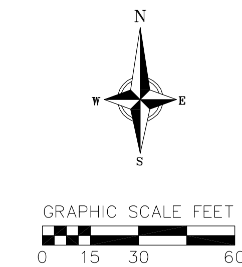
DRAFTER
JGOL

CHECKED
GBLA

PROJECT NO.
160333

T
1.0

19 Jan 2017 - 3:57p M:\Redmond Company\160333 - Fields Volvo Waukesha\CADD\160333 - BaseEng.dwg by: acar



LEGEND

- INDICATES FOUND 1" IRON PIPE
- INDICATES SET 1" IRON PIPE
- INDICATES FOUND CHISELED CROSS
- SANITARY MANHOLE
- SANITARY CLEANOUT OR VENT
- M.I.S. MANHOLE
- UNKNOWN MANHOLE
- STORM MANHOLE
- INLET (ROUND)
- INLET (SQUARE)
- CURB INLET
- STORM SEWER END SECTION
- GAS VALVE
- GAS METER
- WATER VALVE
- HYDRANT
- WATER MANHOLE
- WATER SERVICE CURB STOP
- WELL HEAD
- STAND PIPE
- WALL INDICATOR VALVE
- POST INDICATOR VALVE
- LIGHT POLE
- SPOT/YARD LIGHT
- UTILITY POLE
- GUY POLE
- GUY WIRE
- ELECTRIC MANHOLE
- ELECTRIC PEDESTAL
- ELECTRIC METER
- TELEPHONE MANHOLE
- TELEPHONE PEDESTAL
- CABLE PEDESTAL
- CONTROL BOX
- FIBER OPTIC SIGN
- TRAFFIC LIGHT
- COMMUNICATION MANHOLE
- BOLLARD
- SOIL BORING/MONITORING WELL
- WATER SURFACE
- WETLANDS FLAG
- MARSH
- FLAGPOLE
- PARKING METER
- SIGN
- MAILBOX
- RAILROAD CROSSING SIGNAL
- HANDICAP SPACE
- CONIFEROUS TREE
- DECIDUOUS TREE
- SAN — SANITARY SEWER
- ST — STORM SEWER
- W/M — WATERLINE
- G — MARKED GAS MAIN
- UE — MARKED ELECTRIC
- OHT — OVERHEAD WIRES
- UT — MARKED TELEPHONE
- UTV — MARKED CABLE TV LINE
- FO — MARKED FIBER OPTIC
- X — FENCE

REVISIONS		
NO.	DATE	REMARKS

REVISIONS		
NO.	DATE	REMARKS

vierbicher
planners | engineers | advisors
REEDSBURG - MADISON - PRAIRIE DU CHIEN
999 Fourier Drive, Suite 201 Madison, Wisconsin 53717
Phone: (608) 826-0532 Fax: (608) 826-0530

Fields Jaguar-Land Rover-Volvo-Waukesha

Existing Conditions Plan

City of Waukesha
Waukesha County, Wisconsin

SCALE: AS SHOWN
DATE: 1/20/2017
DRAFTER: JGOL/ACAR
CHECKED: GBLA
PROJECT NO.: 160333

C 1.0

LEGEND

- INDICATES FOUND 1" IRON PIPE
- INDICATES SET 1" IRON PIPE
- INDICATES FOUND CHISELED CROSS
- SANITARY MANHOLE
- SANITARY CLEANOUT OR VENT
- M.I.S. MANHOLE
- UNKNOWN MANHOLE
- STORM MANHOLE
- INLET (ROUND)
- INLET (SQUARE)
- CURB INLET
- STORM SEWER END SECTION
- GAS VALVE
- GAS METER
- WATER VALVE
- HYDRANT
- WATER MANHOLE
- WATER SERVICE CURB STOP
- WELL HEAD
- STAND PIPE
- WALL INDICATOR VALVE
- POST INDICATOR VALVE
- LIGHT POLE
- SPOT/YARD LIGHT
- UTILITY POLE
- GUY POLE
- GUY WIRE
- ELECTRIC MANHOLE
- ELECTRIC PEDESTAL
- ELECTRIC METER
- TELEPHONE MANHOLE
- TELEPHONE PEDESTAL
- CABLE PEDESTAL
- CONTROL BOX
- FIBER OPTIC SIGN
- TRAFFIC LIGHT
- COMMUNICATION MANHOLE
- BOLLARD
- SOIL BORING/MONITORING WELL
- WATER SURFACE
- WETLANDS FLAG
- MARSH
- FLAGPOLE
- PARKING METER
- SIGN
- MAILBOX
- RAILROAD CROSSING SIGNAL
- HANDICAP SPACE
- CONIFEROUS TREE
- DECIDUOUS TREE
- SAN — SANITARY SEWER
- ST — STORM SEWER
- WM — WATERLINE
- G — MARKED GAS MAIN
- UE — MARKED ELECTRIC
- OHT — OVERHEAD WIRES
- UT — MARKED TELEPHONE
- UTV — MARKED CABLE TV LINE
- FO — FO — MARKED FIBER OPTIC
- X — FENCE

- CURB AND GUTTER REMOVAL
- ASPHALT REMOVAL
- CONCRETE REMOVAL
- BUILDING REMOVAL
- STONE PATH/PAD REMOVAL
- TREE REMOVAL
- SAWCUT
- UTILITY STRUCTURE REMOVAL
- UTILITY LINE REMOVAL
- FENCE REMOVAL
- FENCE REMOVAL

DEMOLITION NOTES:

1. CONTRACTOR SHALL KEEP ALL CITY STREETS FREE AND CLEAR OF CONSTRUCTION RELATED DIRT/DUST/DEBRIS.
2. COORDINATE EXISTING UTILITY REMOVAL/ABANDONMENT WITH LOCAL AUTHORITIES AND UTILITY COMPANIES HAVING JURISDICTION.
3. ALL SAWCUTTING SHALL BE FULL DEPTH TO PROVIDE A CLEAN EDGE TO MATCH NEW CONSTRUCTION. MATCH EXISTING ELEVATIONS AT POINTS OF CONNECTION FOR NEW AND EXISTING PAVEMENT, CURB, SIDEWALKS, ETC. ALL SAWCUT LOCATIONS SHOWN ARE APPROXIMATE AND MAY BE FIELD ADJUSTED TO ACCOMMODATE CONDITIONS, JOINTS, MATERIAL TYPE, ETC. REMOVE MINIMUM AMOUNT NECESSARY FOR INSTALLATION OF PROPOSED IMPROVEMENTS.
4. THE CONTRACTOR IS RESPONSIBLE FOR ANY DAMAGE CAUSED DURING CONSTRUCTION TO PUBLIC PROPERTY, PRIVATE PROPERTY OR UTILITIES.
5. EXISTING TOPOGRAPHIC INFORMATION IS BASED ON ALTA/NSPS LAND TITLE SURVEY BY CHAPUT LAND SURVEYS LLC DATED APRIL 7, 2016. CONTRACTOR SHALL VERIFY TOPOGRAPHIC INFORMATION PRIOR TO STARTING CONSTRUCTION.
6. CONTRACTOR SHALL PROVIDE AND SHALL BE RESPONSIBLE FOR ANY NECESSARY TRAFFIC CONTROL SIGNAGE AND SAFETY MEASURES DURING DEMOLITION AND CONSTRUCTION OPERATIONS WITHIN OR NEAR THE PUBLIC ROADWAY.
7. IF APPLICABLE, PROVIDE TREE PROTECTION FENCING PRIOR TO CONSTRUCTION OPERATIONS. MAINTAIN THROUGHOUT CONSTRUCTION.
8. CONTRACTOR SHALL OBTAIN ANY NECESSARY DEMOLITION AND UTILITY PLUGGING PERMITS.
9. THE LOCATION OF EXISTING UNDERGROUND UTILITIES AS SHOWN ON THE PLANS HAS BEEN DETERMINED FROM THE BEST AVAILABLE INFORMATION AND IS GIVEN FOR THE CONVENIENCE OF THE CONTRACTOR. THE OWNER AND THE ENGINEER DO NOT ASSUME RESPONSIBILITY IN THE EVENT THAT DURING CONSTRUCTION, UTILITIES OTHER THAN THOSE SHOWN MAY BE ENCOUNTERED, AND THAT THE ACTUAL LOCATION OF THOSE WHICH ARE SHOWN MAY BE DIFFERENT FROM THE LOCATION AS SHOWN ON THE PLANS. CONTRACTOR SHALL BE RESPONSIBLE FOR CONTACTING DIGGERS HOTLINE AND LOCATING ALL EXISTING UTILITIES TO ENSURE PROPER CLEARANCES FOR NEW UTILITIES.
10. ANY DAMAGE TO THE CITY PAVEMENT, INCLUDING DAMAGE RESULTING FROM CURB REPLACEMENT, WILL REQUIRE RESTORATION IN ACCORDANCE WITH THE CITY ENGINEERING PATCHING CRITERIA.
11. RIGHT OF WAY (ROW) AND PROPERTY LINES ARE APPROXIMATE. CONTRACTOR SHALL BE RESPONSIBLE FOR PROTECTING EXISTING PROPERTY CORNER MONUMENTATION. ANY MONUMENTS DISTURBED BY CONTRACTOR SHALL BE REPLACED AT THE CONTRACTORS EXPENSE.
12. CONTRACTOR SHALL COORDINATE WITH DRY UTILITY COMPANY'S REGARDING ANY POTENTIAL CONFLICTS AND COORDINATE RELOCATIONS AS MAY BE REQUIRED. CONTRACTOR SHALL ALSO COORDINATE THE PROPOSED INSTALLATION OF NEW FACILITIES AS REQUIRED.

vierbicher
planners | engineers | advisors
REEDSBURG • MADISON • PRAIRIE DU CHIEN
999 Fourier Drive, Suite 201, Madison, WI 53717
Phone: (608) 826-0532 Fax: (608) 826-0530

Fields Jaguar-Land Rover-Volvo-Waukesha

Existing Conditions and Demolition Plan
City of Waukesha
Waukesha County, Wisconsin

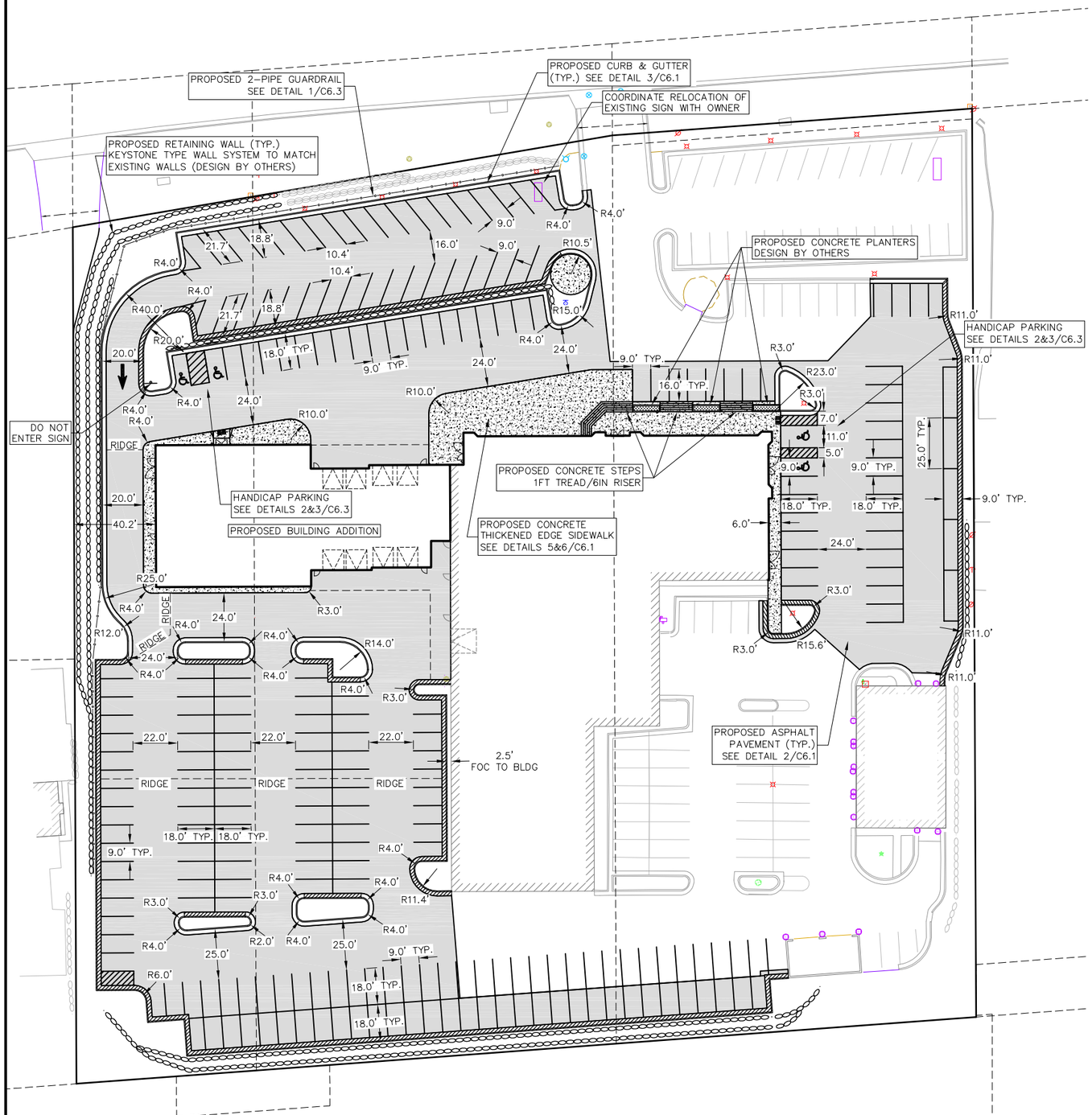
REVISIONS NO.	DATE	REMARKS

REVISIONS NO.	DATE	REMARKS

SCALE: AS SHOWN
DATE: 1/20/2017
DRAFTER: JGOL/ACAR
CHECKED: GBLA
PROJECT NO.: 160333

C
2.0

19 Jan 2017 - 4:30p M:\Redmond Company\160333 - Fields Volvo Waukesha\CADD\160333 - BaseEng.dwg by: acar



LEGEND

- PROPERTY BOUNDARY
- CURB AND GUTTER (REJECT CURB SHOWN HATCHED)
- PROPOSED 2-PIPE GUARDRAIL
- PROPOSED WOOD FENCE
- PROPOSED CONCRETE
- PROPOSED ASPHALT PAVEMENT
- PROPOSED SIGN
- PROPOSED LIGHT POLE
- PROPOSED BOLLARD
- PROPOSED ADA DETECTABLE WARNING FIELD
- PROPOSED HANDICAP PARKING

N W E S

GRAPHIC SCALE FEET
0 15 30 60

SITE CONSTRUCTION NOTES:

1. SEE DETAILS FOR SPECIFIC INFORMATION PERTAINING TO CONCRETE, BASE COURSE, CURB & GUTTER AND PAVEMENT DETAILS.
2. CONTRACTOR TO OBTAIN ANY NECESSARY UTILITY CONNECTION, DEMOLITION, DRIVEWAY CONNECTION, RIGHT-OF-WAY AND EXCAVATION PERMITS PRIOR TO CONSTRUCTION.
3. DIMENSIONS RELATING TO CURB ARE TO FACE OF CURB.

vierbicher
planners | engineers | advisors
REEDSBURG • MADISON • PRAIRIE DU CHIEN
999 Fourier Drive, Suite 201, Madison, WI 53717
Phone: (608) 826-0532 Fax: (608) 826-0530

Fields Jaguar-Land Rover-Volvo-Waukesha
Site Plan
City of Waukesha
Waukesha County, Wisconsin

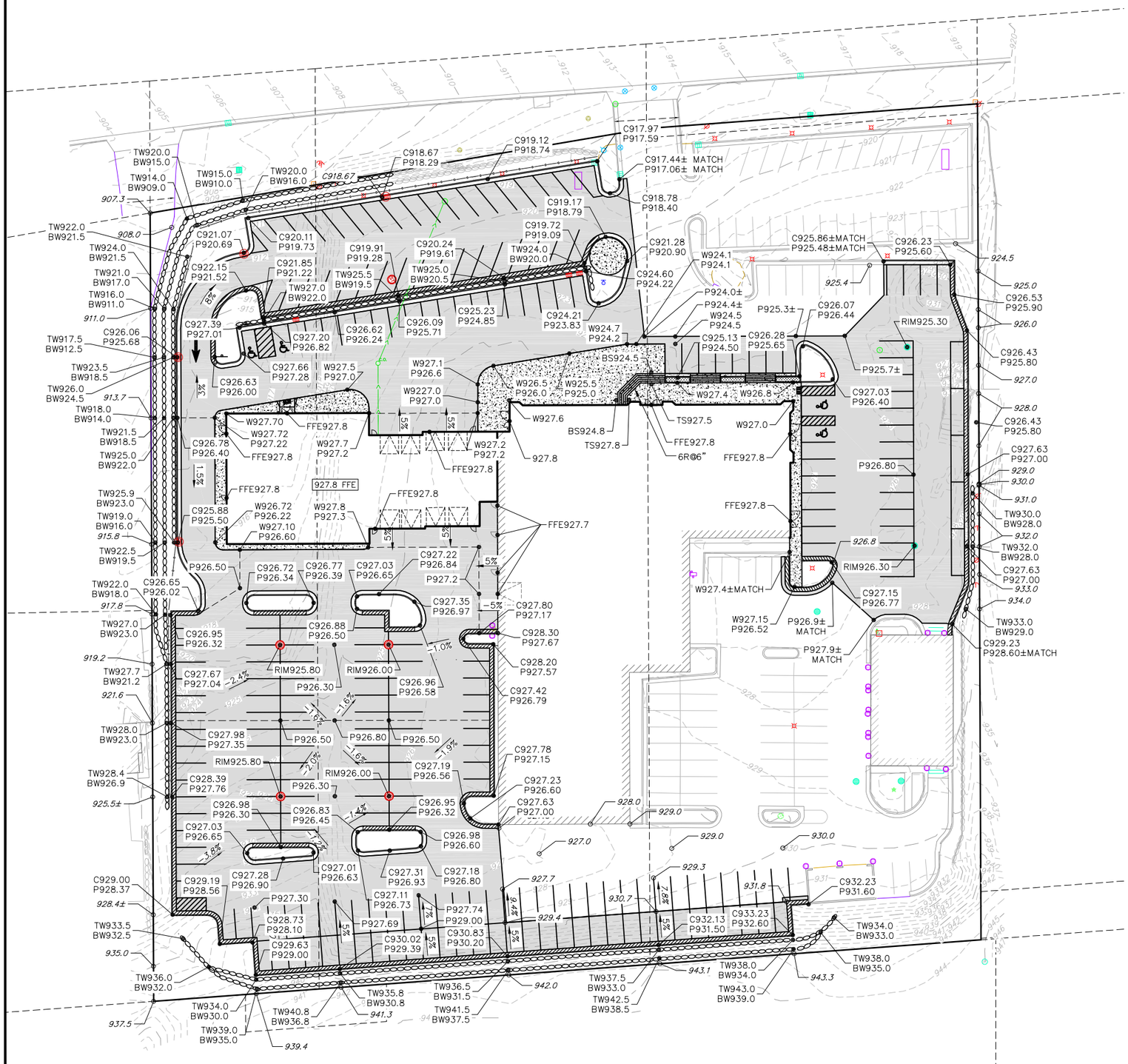
REVISIONS		
NO.	DATE	REMARKS

REVISIONS		
NO.	DATE	REMARKS

SCALE: AS SHOWN
DATE: 1/20/2017
DRAFTER: JGOL/ACAR
CHECKED: GBLA
PROJECT NO.: 160333

C
3.0

19 Jan 2017 - 3:56p M:\Redmond Company\160333 - Fields Volvo Waukesha\CADD\160333 - BaseEng.dwg by: acar



LEGEND

820	EXISTING MAJOR CONTOURS
818	EXISTING MINOR CONTOURS
820	PROPOSED MAJOR CONTOURS
818	PROPOSED MINOR CONTOURS
2.92%	PROPOSED SLOPE ARROWS
1048.61	EXISTING SPOT ELEVATIONS
1048.61	PROPOSED SPOT ELEVATIONS

N

W E

S

GRAPHIC SCALE FEET

0 15 30 60

GRADING AND EROSION CONTROL NOTES:

1. INSTALL A 50'L X 20'W X 1.0'D TRACKING PAD PER DETAIL AT THE SITE ENTRANCE. THE TRACKING PAD SHALL BE MAINTAINED/REPAIRED AS NECESSARY TO ACCOMMODATE CONSTRUCTION.
2. THE CONTRACTOR IS REQUIRED TO MAKE EROSION CONTROL INSPECTIONS AT THE END OF EACH WEEK AND WHEN 0.5 INCHES OF RAIN FALLS WITHIN 24 HOURS. INSPECTION REPORTS SHALL BE PREPARED AND FILED AS REQUIRED BY THE DNR AND/OR CITY. ALL MAINTENANCE/REPAIR WILL FOLLOW AN INSPECTION WITHIN 24 HOURS.
3. INSTALL INLET FILTERS IN EXISTING CURB INLETS AND INLET PROTECTION AROUND FIELD INLETS.
4. UTILITY STRUCTURE RIM AND TOP OF CURB ELEVATIONS ON PLANS ARE APPROXIMATE. UTILITY STRUCTURES SHALL BE SET TO FINAL ELEVATIONS AFTER THE CURB & GUTTER AND BASE COURSE HAVE BEEN INSTALLED.
5. EXISTING TOPOGRAPHIC INFORMATION IS BASED ON ALTA/NSPS LAND TITLE SURVEY BY CHAPUT LAND SURVEYS LLC DATED APRIL 7, 2016. CONTRACTOR SHALL VERIFY TOPOGRAPHIC INFORMATION PRIOR TO STARTING CONSTRUCTION.
6. SEE DETAIL SHEETS FOR EROSION CONTROL NOTES AND CONSTRUCTION SEQUENCE.
7. THE CONTRACTOR SHALL REMOVE ANY SEDIMENT TRACKED ONTO ADJACENT ROADS BY MEANS OF STREET SWEEPING (NOT FLUSHING) AT A MINIMUM OF THE END OF EACH WORK DAY OR MORE AS NEEDED.
8. RIGHT OF WAY (ROW) AND PROPERTY LINES ARE APPROXIMATE. CONTRACTOR SHALL BE RESPONSIBLE FOR PROTECTING EXISTING PROPERTY CORNER MONUMENTATION. ANY MONUMENTS DISTURBED BY CONTRACTOR SHALL BE REPLACED AT THE CONTRACTORS EXPENSE.
9. FINAL GRADES SHALL BE ESTABLISHED ON PAVED SURFACES BY USING SPOT GRADES ONLY.
10. CROSS-SLOPE OF SIDEWALKS SHALL BE 2% (MAX) UNLESS OTHERWISE NOTED.
11. LONGITUDINAL GRADE OF SIDEWALK RAMPS SHALL NOT EXCEED 8.33% (1:12) AND SHALL BE IN ACCORDANCE WITH ADA REQUIREMENTS.
12. LONGITUDINAL GRADE OF SIDEWALK SHALL NOT EXCEED 5.0% OR THE ADJACENT STREET GRADE WHICHEVER IS GREATER.
13. ACCESSIBLE ROUTES SHALL BE 5% MAX LONGITUDINAL SLOPE AND 2% MAX CROSS SLOPE. ACCESSIBLE LOADING AREAS OR LANDINGS SHALL BE 2% MAX SLOPE IN ANY DIRECTION. RAMPS SHALL BE 8.33% MAX SLOPE.

vierbicher
planners | engineers | advisors
REEDSBURG • MADISON • PRAIRIE DU CHIEN
999 Fourier Drive, Suite 201, Madison, WI 53717
Phone: (608) 826-0532 Fax: (608) 826-0530

Fields Jaguar-Land Rover-Volvo-Waukesha
Grading Plan
City of Waukesha
Waukesha County, Wisconsin

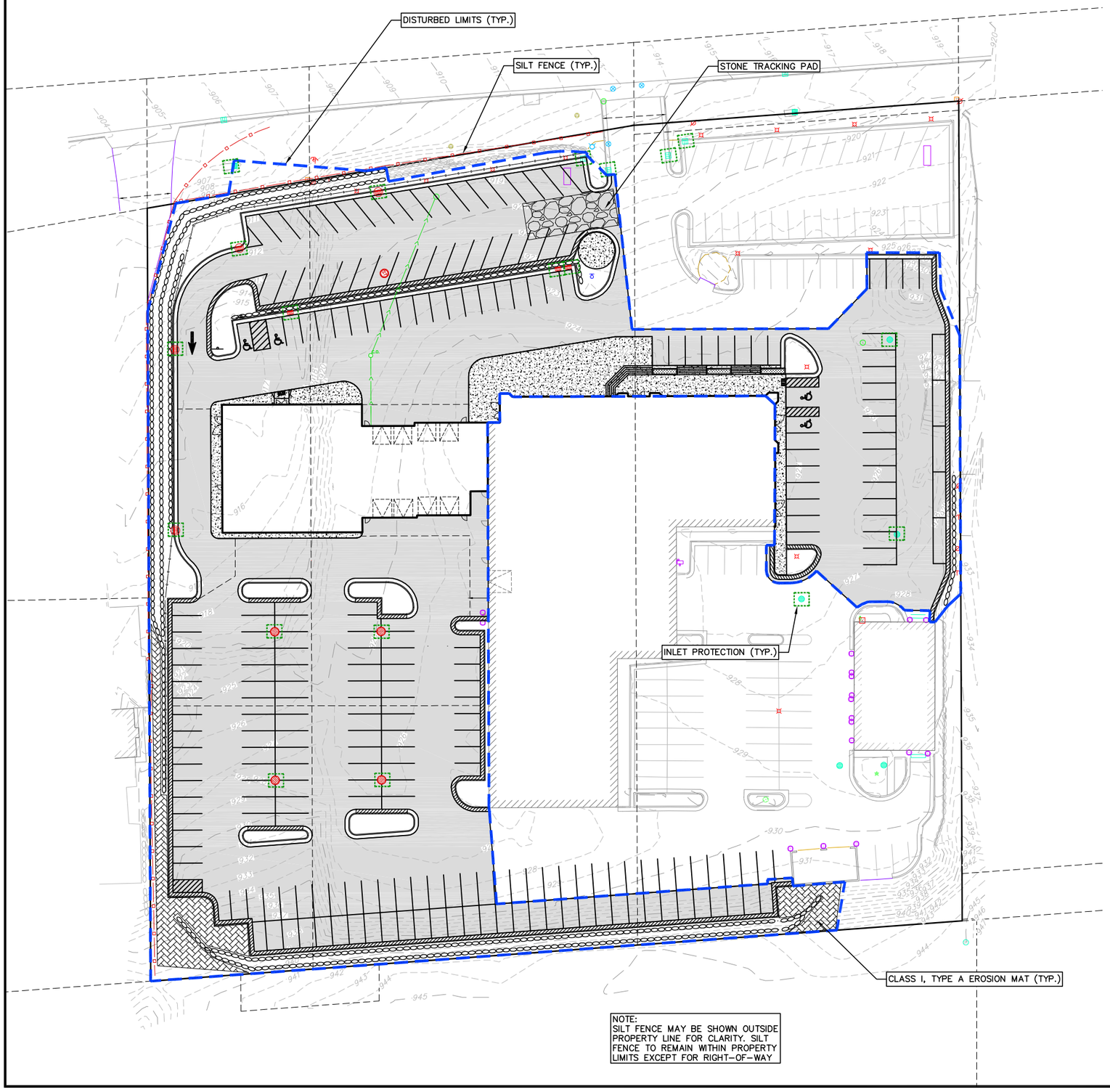
REVISIONS		
NO.	DATE	REMARKS

REVISIONS		
NO.	DATE	REMARKS

SCALE: AS SHOWN
DATE: 1/20/2017
DRAFTER: JGOL/ACAR
CHECKED: GBLA
PROJECT NO.: 160333

C
4.0

20 Jan 2017 - 11:35a M:\Redmond Company\160333 - Fields Volvo Waukesha\CADD\160333 - BaseEng.dwg by: acar



NOTE:
SILT FENCE MAY BE SHOWN OUTSIDE PROPERTY LINE FOR CLARITY. SILT FENCE TO REMAIN WITHIN PROPERTY LIMITS EXCEPT FOR RIGHT-OF-WAY

LEGEND

- EXISTING MAJOR CONTOURS
- EXISTING MINOR CONTOURS
- PROPOSED MAJOR CONTOURS
- PROPOSED MINOR CONTOURS
- SILT FENCE
- DISTURBED LIMITS
- INLET PROTECTION
- EROSION MAT CLASS I, TYPE A
- EROSION MAT CLASS I, TYPE B
- TRACKING PAD

N W E S

GRAPHIC SCALE FEET
0 15 30 60

GRADING AND EROSION CONTROL NOTES:

1. INSTALL A 50'L X 20'W X 1.0'D TRACKING PAD PER DETAIL AT THE SITE ENTRANCE. THE TRACKING PAD SHALL BE MAINTAINED/REPAIRED AS NECESSARY TO ACCOMMODATE CONSTRUCTION.
2. THE CONTRACTOR IS REQUIRED TO MAKE EROSION CONTROL INSPECTIONS AT THE END OF EACH WEEK AND WHEN 0.5 INCHES OF RAIN FALLS WITHIN 24 HOURS. INSPECTION REPORTS SHALL BE PREPARED AND FILED AS REQUIRED BY THE DNR AND/OR CITY. ALL MAINTENANCE/REPAIR WILL FOLLOW AN INSPECTION WITHIN 24 HOURS.
3. INSTALL INLET FILTERS IN EXISTING CURB INLETS AND INLET PROTECTION AROUND FIELD INLETS.
4. UTILITY STRUCTURE RIM AND TOP OF CURB ELEVATIONS ON PLANS ARE APPROXIMATE. UTILITY STRUCTURES SHALL BE SET TO FINAL ELEVATIONS AFTER THE CURB & GUTTER AND BASE COURSE HAVE BEEN INSTALLED.
5. EXISTING TOPOGRAPHIC INFORMATION IS BASED ON ALTA/NSPS LAND TITLE SURVEY BY CHAPUT LAND SURVEYS LLC DATED APRIL 7, 2016. CONTRACTOR SHALL VERIFY TOPOGRAPHIC INFORMATION PRIOR TO STARTING CONSTRUCTION.
6. SEE DETAIL SHEETS FOR EROSION CONTROL NOTES AND CONSTRUCTION SEQUENCE.
7. THE CONTRACTOR SHALL REMOVE ANY SEDIMENT TRACKED ONTO ADJACENT ROADS BY MEANS OF STREET SWEEPING (NOT FLUSHING) AT A MINIMUM OF THE END OF EACH WORK DAY OR MORE AS NEEDED.
8. RIGHT OF WAY (ROW) AND PROPERTY LINES ARE APPROXIMATE. CONTRACTOR SHALL BE RESPONSIBLE FOR PROTECTING EXISTING PROPERTY CORNER MONUMENTATION. ANY MONUMENTS DISTURBED BY CONTRACTOR SHALL BE REPLACED AT THE CONTRACTORS EXPENSE.
9. FINAL GRADES SHALL BE ESTABLISHED ON PAVED SURFACES BY USING SPOT GRADES ONLY.
10. CROSS-SLOPE OF SIDEWALKS SHALL BE 2% (MAX) UNLESS OTHERWISE NOTED.
11. LONGITUDINAL GRADE OF SIDEWALK RAMPS SHALL NOT EXCEED 8.33% (1:12) AND SHALL BE IN ACCORDANCE WITH ADA REQUIREMENTS.
12. LONGITUDINAL GRADE OF SIDEWALK SHALL NOT EXCEED 5.0% OR THE ADJACENT STREET GRADE WHICHEVER IS GREATER.
13. ACCESSIBLE ROUTES SHALL BE 5% MAX LONGITUDINAL SLOPE AND 2% MAX CROSS SLOPE. ACCESSIBLE LOADING AREAS OR LANDINGS SHALL BE 2% MAX SLOPE IN ANY DIRECTION. RAMPS SHALL BE 8.33% MAX SLOPE.

vierbicher
planners | engineers | advisors
REEDSBURG • MADISON • PRAIRIE DU CHIEN
999 Fourier Drive, Suite 201, Madison, WI 53717
Phone: (608) 826-0532 Fax: (608) 826-0530

REVISIONS

NO.	DATE	REMARKS

REVISIONS

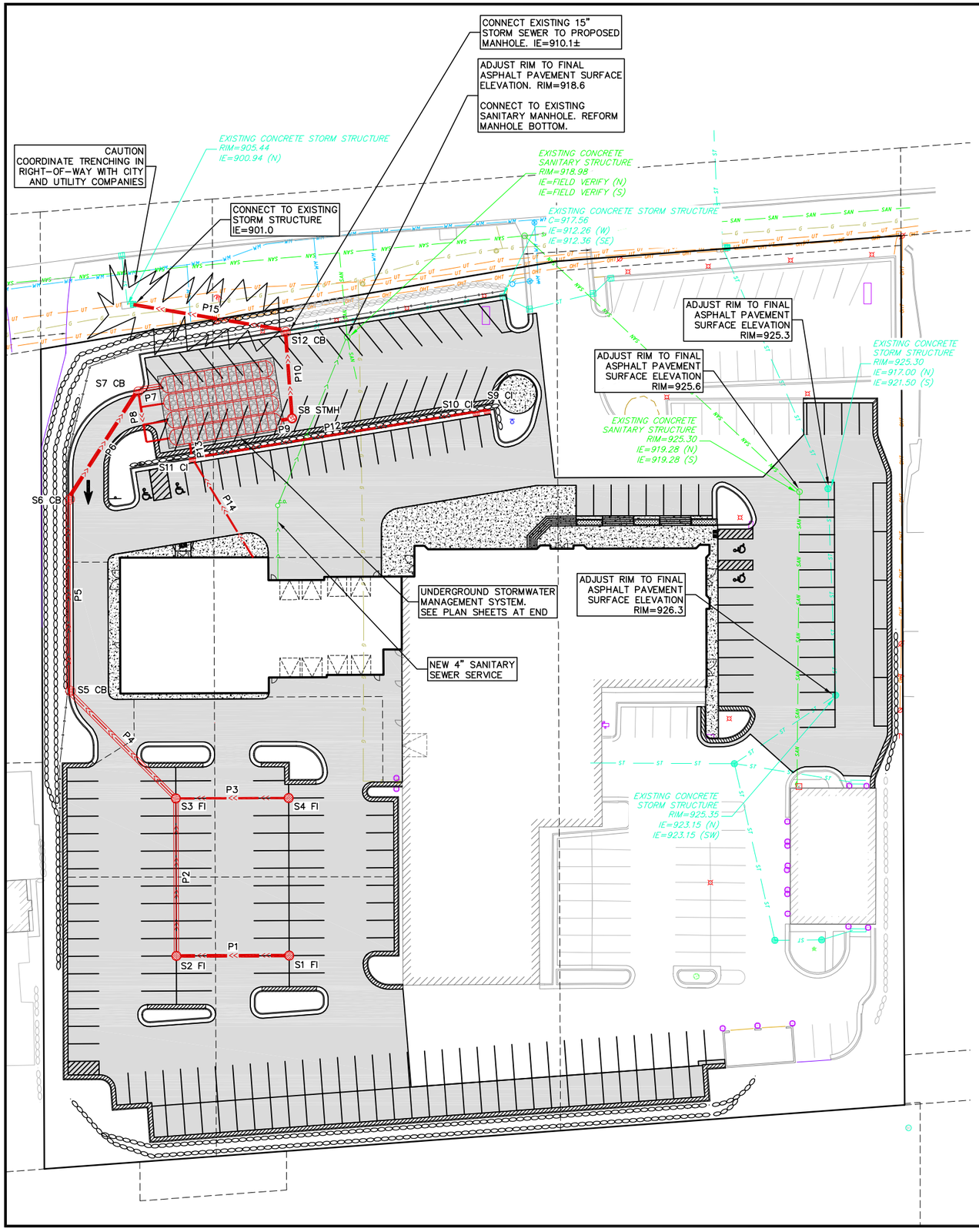
NO.	DATE	REMARKS

Fields Jaguar-Land Rover-Volvo-Waukesha
Erosion Control Plan
City of Waukesha
Waukesha County, Wisconsin

SCALE: AS SHOWN
DATE: 1/20/2017
DRAFTER: JGOL/ACAR
CHECKED: GBLA
PROJECT NO.: 160333

C
4.1

20 Jan 2017 - 11:33a M:\Redmond Company\160333 - Fields Volvo Waukesha\CADD\160333 - BaseEng.dwg by: acar



STORM PIPE TABLE								
PIPE NAME	PIPE TYPE	SIZE (IN.)	FROM	TO	LENGTH (FT)	START INV	END INV	SLOPE
P1	HDPE	18	S2	S1	58	920.24	920.99	1.29%
P2	HDPE	24	S3	S2	81	919.87	920.24	0.46%
P3	HDPE	12	S3	S4	58	919.87	921.49	2.79%
P4	HDPE	24	S5	S3	78	919.25	919.87	0.79%
P5	HDPE	24	S6	S5	99	918.41	919.25	0.85%
P6	HDPE	21	S7	S6	67	916.00	918.41	3.60%
P7	HDPE	24		S7	12	910.75	910.81	0.50%
P8	HDPE	12		S7	27	913.72	913.72	0.00%
P9	HDPE	18	S8		6	910.91	910.81	1.80%
P10	HDPE	18	S12	S8	45	909.90	910.81	2.00%
P11	HDPE	12	S10	S9	6	919.66	919.71	0.88%
P12	HDPE	12	S11	S10	148	918.55	919.66	0.75%
P13	HDPE	12		S11	8	913.72	913.89	2.21%
P14	PVC	12	S11		60	919.40	921.80	4.00%
P15	HDPE	18		S12	79	901.00	908.92	10.00%

STORM STRUCTURE TABLE					
STRUCTURE NAME	STRUCTURE TYPE	FRAME	COVER	RIM/TC	INVERT
S1	48" CONC FI	R-2578	TYPE C GRATE	926.00	920.99
S2	48" CONC FI	R-2578	TYPE C GRATE	925.80	920.24
S3	48" CONC FI	R-2578	TYPE C GRATE	925.80	919.87
S4	48" CONC FI	R-2578	TYPE C GRATE	926.00	921.49
S5	48" CONC CB	R-3065	TYPE A GRATE	925.88	919.25
S6	48" CONC CB	R-3065	TYPE A GRATE	926.06	918.41
S7	48" CONC CB	R-3065	Type A GRATE	921.07	910.81
S8	48" CONC STMH	R-1550	SOLID LID	919.14	910.81
S9	2' x 3' CI	R-3067	TYPE A GRATE	924.62	919.71
S10	2' x 3' CI	R-3067	TYPE A GRATE	924.71	919.66
S11	2' x 3' CI	R-3067	TYPE A GRATE	926.94	913.89
S12	48" CONC CB	R-3065	TYPE A GRATE	918.67	908.92

GRAPHIC SCALE FEET
0 15 30 60

N W E S

LEGEND

- STORM SEWER PIPE
- STORM SEWER MANHOLE
- STORM SEWER CURB INLET
- STORM SEWER CURB INLET W/MANHOLE
- STORM SEWER FIELD INLET
- ROOF DRAIN CLEANOUT
- SANITARY SEWER PIPE (GRAVITY)
- SANITARY SEWER CLEANOUT
- WATER MAIN
- FIRE HYDRANT
- WATER VALVE
- PROPOSED PIPE INSULATION
- GAS MAIN
- ELECTRIC SERVICE

ABBREVIATIONS

STMH – STORM MANHOLE
FI – FIELD INLET
CI – CURB INLET
CB – CATCH BASIN
EW – ENDWALL
SMH – SANITARY MANHOLE

UTILITY NOTES:

1. SANITARY & STORM SEWER LENGTHS SHOWN ARE FROM CENTER OF STRUCTURE TO CENTER OF STRUCTURE. STORM SEWER END SECTIONS ARE INCLUDED IN THE LENGTH AND SLOPE OF THE PIPE.
2. CONTRACTOR SHALL INVESTIGATE ALL UTILITY CROSSINGS PRIOR TO CONSTRUCTION AND NOTIFY ENGINEER OF ANY CONFLICTS.
3. CONTRACTOR SHALL BE RESPONSIBLE FOR ADJUSTING ALL UTILITY STRUCTURES (MANHOLE RIMS, WATER VALVES, AND CURB STOPS), IF NECESSARY.
4. CONTRACTOR SHALL OBTAIN ANY NECESSARY WORK IN RIGHT-OF WAY, EXCAVATION, UTILITY CONNECTION, PLUGGING, ABANDONMENT, AND DRIVEWAY CONNECTION PERMITS PRIOR TO CONSTRUCTION.
5. FOR ALL SEWER AND WATER MAIN CROSSINGS: PROVIDE MINIMUM 18" SEPARATION WHEN WATER MAIN CROSSES BELOW SEWER AND MINIMUM 6" SEPARATION WHEN WATER MAIN CROSSES ABOVE SEWER.
6. INSTALL 1 SHEET OF 4'x8'x4" HIGH DENSITY STYROFOAM INSULATION AT ALL LOCATIONS WHERE STORM SEWER CROSSES WATER MAIN OR WATER LATERALS.
7. IF DEWATERING OPERATIONS EXCEED 70 GALLONS PER MINUTE OF PUMPING CAPACITY, A DEWATERING WELL PERMIT SHALL BE OBTAINED FROM THE DNR PRIOR TO STARTING ANY DEWATERING ACTIVITIES.
8. A COPY OF THE APPROVED UTILITY PLANS, SPECIFICATIONS AND PLUMBING PERMIT APPROVAL LETTER SHALL BE ON-SITE DURING CONSTRUCTION AND OPEN TO INSPECTION BY AUTHORIZED REPRESENTATIVES AND OTHER LOCAL INSPECTORS.
9. STORM BUILDING SEWER PIPE SHALL CONFORM TO ONE OF THE STANDARDS LISTED IN WISCONSIN PLUMBING CODE.
10. PRIVATE WATER SERVICES AND PRIVATE WATER MAINS SHALL CONFORM TO ONE OF THE STANDARDS LISTED IN WISCONSIN PLUMBING CODE.
11. PRIVATE WATER HYDRANTS SHALL BE YELLOW IN COLOR.
12. PRIVATE SANITARY SEWER AND LATERALS SHALL BE POLYVINYL CHLORIDE (PVC) ASTM D3034 – SDR 35 OR APPROVED EQUAL MATERIAL THAT CONFORMS TO ONE OF THE STANDARDS LISTED IN WISCONSIN PLUMBING CODE.
13. A MEANS TO LOCATE BURIED UNDERGROUND EXTERIOR NON METALLIC SEWERS/MAINS AND WATER SERVICES/MAINS MUST BE PROVIDED WITH TRACER WIRE OR OTHER METHODS IN ORDER TO BE LOCATED PER WISCONSIN PLUMBING CODE.
14. EXTERIOR WATER SUPPLY PIPING SETBACKS AND CROSSINGS SHALL BE IN ACCORDANCE WITH WISCONSIN PLUMBING CODE.
15. NO PERSON MAY ENGAGE IN PLUMBING WORK IN THE STATE UNLESS LICENSED TO DO SO.
16. SITE CONTRACTOR SHALL LEAVE SANITARY AND WATER LATERALS FIVE (5) FEET SHORT (HORIZONTALLY) FROM THE BUILDING. BUILDING PLUMBER SHALL VERIFY SIZE, LOCATION, AND INVERT ELEVATION OF PROPOSED SANITARY AND WATER LATERALS.
17. CONTRACTOR SHALL FIELD VERIFY THE SIZE, TYPE, LOCATION, AND ELEVATION OF EXISTING UTILITIES PRIOR TO INSTALLING ANY ON-SITE UTILITIES OR STRUCTURES. CONTACT ENGINEER PRIOR TO INSTALLATION IF DISCREPANCY EXISTS WITHIN THESE PLANS.
18. PROPOSED UTILITY SERVICE LINES SHOWN ARE APPROXIMATE. COORDINATE THE EXACT LOCATIONS WITH THE PLUMBING DRAWINGS. COORDINATE THE LOCATIONS WITH THE PLUMBING CONTRACTOR AND/OR OWNER'S CONSTRUCTION REPRESENTATIVE PRIOR TO INSTALLATION OF ANY NEW UTILITIES.
19. CONTRACTOR SHALL BE RESPONSIBLE FOR COORDINATING THE RELOCATION OF ANY UTILITIES ENCOUNTERED AND REPLACEMENT OF ANY UTILITIES DAMAGED WITHIN INFLUENCE ZONE OF NEW CONSTRUCTION. CONTACT ENGINEER IF THE EXISTING UTILITIES VARY APPRECIABLY FROM THE PLANS.
20. ALL WATER MAIN AND SERVICES SHALL BE INSTALLED AT A MINIMUM DEPTH OF 6.5' FROM TOP OF FINISHED GROUND ELEVATION TO TOP OF MAIN.
21. IT IS THE CONTRACTOR'S RESPONSIBILITY TO VERIFY THAT THE EXISTING VALVES WILL HOLD THE PRESSURE TEST PRIOR TO CONNECTION. THE CITY IS NOT RESPONSIBLE FOR ANY COSTS INCURRED DUE TO THE CONTRACTOR NOT VERIFYING THAT THE EXISTING VALVE WILL HOLD THE PRESSURE TEST PRIOR TO CONNECTION. IF A NEW VALVE IS REQUIRED, THE APPLICANT WILL BE REQUIRED TO INSTALL ONE AT THEIR EXPENSE, AT THE POINT OF CONNECTION.
22. CLEAN OUT ALL EXISTING AND PROPOSED STORM INLETS AND CATCH BASINS AT THE COMPLETION OF CONSTRUCTION.
23. CONTRACTOR SHALL COORDINATE WITH DRY UTILITY COMPANY'S REGARDING ANY POTENTIAL CONFLICTS AND COORDINATE RELOCATIONS AS MAY BE REQUIRED. CONTRACTOR SHALL ALSO COORDINATE THE PROPOSED INSTALLATION OF NEW FACILITIES AS REQUIRED.
24. THE CONTRACTOR SHALL SUBMIT SHOP DRAWINGS FOR REVIEW BY THE ENGINEER, PRIOR TO PLACING AN ORDER OF ANY SUCH ITEM.
25. CONTRACTOR SHALL FIELD VERIFY LOCATION OF EXISTING SANITARY SEWER, STORM SEWER AND WATER MAIN PRIOR TO CONSTRUCTION TO ENSURE PROPER CLEARANCE OF THE NEW UTILITIES. CONTRACTOR MUST TAKE ALL NECESSARY PRECAUTIONS TO PROTECT THE EXISTING UTILITIES DURING CONSTRUCTION. ANY DAMAGE TO THE EXISTING UTILITIES AND ANY REPAIRS NEEDED AS A RESULT OF THE DAMAGE SHALL BE AT THE EXPENSE OF THE CONTRACTOR REGARDLESS OF THE LOCATION MARKED IN THE FIELD OR SHOWN ON THE PLANS.
26. THE LOCATIONS OF EXISTING UTILITY INSTALLATIONS AS SHOWN ON THE PLAN ARE APPROXIMATE. THERE MAY BE OTHER UTILITY INSTALLATIONS WITHIN THE PROJECT AREA THAT ARE NOT SHOWN. CONTRACTOR SHALL BE RESPONSIBLE FOR CONTACTING DIGGERS HOTLINE AND LOCATING ALL EXISTING UTILITIES AND ENSURE PROPER CLEARANCE OF NEW UTILITIES.

vierbicher
planners | engineers | advisors
REEDSBURG • MADISON • PRAIRIE DU CHIEN
999 Fourier Drive, Suite 201, Madison, WI 53717
Phone: (608) 826-0532 Fax: (608) 826-0530

Fields Jaguar-Land Rover-Volvo-Waukesha
Utility Plan
City of Waukesha
Waukesha County, Wisconsin

REVISIONS			
NO.	DATE	REMARKS	

REVISIONS			
NO.	DATE	REMARKS	

SCALE: AS SHOWN
DATE: 1/20/2017
DRAFTER: JGOL/ACAR
CHECKED: GBLA
PROJECT NO.: 160333

C
5.0

EROSION CONTROL MEASURES

1. EROSION CONTROL SHALL BE IN ACCORDANCE WITH THE **CITY OF WAUKESHA** EROSION CONTROL ORDINANCE AND CHAPTER NR 216 OF THE WISCONSIN ADMINISTRATIVE CODE.
2. CONSTRUCT AND MAINTAIN ALL EROSION AND SEDIMENT CONTROL MEASURES IN ACCORDANCE WITH WISCONSIN DNR TECHNICAL STANDARDS (http://dnr.wi.gov/runoff/stormwater/techstds.htm) AND WISCONSIN CONSTRUCTION SITE BEST MANAGEMENT PRACTICE HANDBOOK.
3. INSTALL SEDIMENT CONTROL PRACTICES (TRACKING PAD, PERIMETER SILT FENCE, SEDIMENT BASINS, ETC.) PRIOR TO INITIATING OTHER LAND DISTURBING CONSTRUCTION ACTIVITIES.
4. THE CONTRACTOR IS REQUIRED TO MAKE EROSION CONTROL INSPECTIONS AT THE END OF EACH WEEK AND WHEN 0.5 INCHES OF RAIN FALLS WITHIN 24 HOURS. INSPECTION REPORTS SHALL BE PREPARED AND FILED AS REQUIRED BY THE DNR AND/OR **CITY**. ALL MAINTENANCE WILL FOLLOW AN INSPECTION WITHIN 24 HOURS.
5. EROSION CONTROL IS THE RESPONSIBILITY OF THE CONTRACTOR UNTIL ACCEPTANCE OF THIS PROJECT. EROSION CONTROL MEASURES AS SHOWN SHALL BE THE MINIMUM PRECAUTIONS THAT WILL BE ALLOWED. ADDITIONAL EROSION CONTROL MEASURES, AS REQUESTED IN WRITING BY THE STATE OR LOCAL INSPECTORS, OR THE DEVELOPER'S ENGINEER, SHALL BE INSTALLED WITHIN 24 HOURS.
6. A 3" CLEAR STONE TRACKING PAD SHALL BE INSTALLED AT THE END OF ROAD CONSTRUCTION LIMITS TO PREVENT SEDIMENT FROM BEING TRACKED ONTO THE ADJACENT PAVED PUBLIC ROADWAY. SEDIMENT TRACKING PAD SHALL CONFORM TO WisDNR TECHNICAL STANDARD 1057. SEDIMENT REACHING THE PUBLIC ROAD SHALL BE REMOVED BY STREET CLEANING (NOT HYDRAULIC FLUSHING) BEFORE THE END OF EACH WORK DAY.
7. CHANNELIZED RUNOFF: FROM ADJACENT AREAS PASSING THROUGH THE SITE SHALL BE DIVERTED AROUND DISTURBED AREAS.
8. STABILIZED DISTURBED GROUND: ANY SOIL OR DIRT PILES WHICH WILL REMAIN IN EXISTENCE FOR MORE THAN 7-CONSECUTIVE DAYS, WHETHER TO BE WORKED DURING THAT PERIOD OR NOT, SHALL NOT BE LOCATED WITHIN 25-FEET OF ANY ROADWAY, PARKING LOT, PAVED AREA, OR DRAINAGE STRUCTURE OR CHANNEL (UNLESS INTENDED TO BE USED AS PART OF THE EROSION CONTROL MEASURES). TEMPORARY STABILIZATION AND CONTROL MEASURES (SEEDING, MULCHING, TARPING, EROSION MATTING, BARRIER FENCING, ETC.) ARE REQUIRED FOR THE PROTECTION OF DISTURBED AREAS AND SOIL PILES, WHICH WILL REMAIN UN-WORKED FOR A PERIOD OF MORE THAN 14-CONSECUTIVE CALENDAR DAYS. THESE MEASURES SHALL REMAIN IN PLACE UNTIL SITE HAS STABILIZED.
9. SITE DE-WATERING: WATER PUMPED FROM THE SITE SHALL BE TREATED BY TEMPORARY SEDIMENTATION BASINS OR OTHER APPROPRIATE CONTROL MEASURES. SEDIMENTATION BASINS SHALL HAVE A DEPTH OF AT LEAST 3 FEET, BE SURROUNDED BY SNOWFENCE OR EQUIVALENT BARRIER AND HAVE SUFFICIENT SURFACE AREA TO PROVIDE A SURFACE SETTLING RATE OF NO MORE THAN 750 GALLONS PER SQUARE FOOT PER DAY AT THE HIGHEST DEWATERING PUMPING RATE. WATER MAY NOT BE DISCHARGED IN A MANNER THAT CAUSES EROSION OF THE SITE, A NEIGHBORING SITE, OR THE BED OR BANKS OF THE RECEIVING WATER. POLYMERS MAY BE USED AS DIRECTED BY DNR TECHNICAL STANDARD 1061 (DE-WATERING).
10. WASHED STONE WEEPERS OR TEMPORARY EARTH BERMS SHALL BE BUILT PER PLAN BY CONTRACTOR TO TRAP SEDIMENT OR SLOW THE VELOCITY OF STORM WATER.
11. SEE DETAIL SHEETS FOR RIP-RAP SIZING. IN NO CASE WILL RIP-RAP BE SMALLER THAN 3" TO 6".
12. INLET FILTERS ARE TO BE PLACED IN STORMWATER INLET STRUCTURES AS SOON AS THEY ARE INSTALLED. ALL PROJECT AREA STORM INLETS NEED WISCONSIN D.O.T. TYPE D INLET PROTECTION. THE FILTERS SHALL BE MAINTAINED UNTIL THE **OWNER** HAS ACCEPTED THE BINDER COURSE OF ASPHALT.
13. RESTORATION (SEED, FERTILIZE AND MULCH) SHALL BE PER SPECIFICATIONS ON THIS SHEET UNLESS SPECIAL RESTORATION IS CALLED FOR ON THE LANDSCAPE PLAN.
14. SEED, FERTILIZER AND MULCH SHALL BE APPLIED WITHIN 7 DAYS AFTER FINAL GRADE HAS BEEN ESTABLISHED. IF DISTURBED AREAS WILL NOT BE RESTORED IMMEDIATELY AFTER ROUGH GRADING, TEMPORARY SEED SHALL BE PLACED.
15. FOR THE FIRST SIX WEEKS AFTER RESTORATION (E.G. SEED & MULCH, EROSION MAT, SOD) OF A DISTURBED AREA, INCLUDE SUMMER WATERING PROVISIONS OF ALL NEWLY SEEDED AND MULCHED AREAS WHENEVER 7 DAYS ELAPSE WITHOUT A RAIN EVENT.
16. EROSION MAT (CLASS I, TYPE A URBAN PER WISCONSIN D.O.T. P.A.L.) SHALL BE INSTALLED ON ALL SLOPES 3:1 OR GREATER BUT LESS THAN 1:1.
17. EROSION MAT (CLASS I, TYPE B URBAN PER WISCONSIN D.O.T. P.A.L.) SHALL BE INSTALLED ON THE BOTTOM (INVERT) OF ROADSIDE DITCHES/SWALES AS SHOWN ON THIS PLAN, 1 ROLL WIDTH.
18. SILT FENCE OR EROSION MAT SHALL BE INSTALLED ALONG THE CONTOURS AT 100 FOOT INTERVALS DOWN THE SLOPE ON THE DISTURBED SLOPES STEEPER THAN 5% AND MORE THAN 100 FEET LONG THAT SHEET FLOW TO THE ROADWAY UNLESS SOIL STABILIZERS ARE USED.
19. INSTALL MINIMUM 6'-7' WIDE EROSION MAT ALONG THE BACK OF CURB AFTER TOPSOIL HAS BEEN PLACED IF THIS AREA WILL NOT BE SEEDED AND MULCHED WITHIN 48 HOURS OF PLACING TOPSOIL.
20. SILT FENCE TO BE USED ACROSS AREAS OF THE LOT THAT SLOPE TOWARDS A PUBLIC STREET OR WATERWAY. SEE DETAILS.
21. SEDIMENT SHALL BE CLEANED FROM CURB AND GUTTER AFTER EACH RAINFALL AND PRIOR TO PROJECT ACCEPTANCE.
22. ALL CONSTRUCTION ENTRANCES SHALL HAVE TEMPORARY ROAD CLOSED SIGNS THAT WILL BE IN PLACE WHEN THE ENTRANCE IS NOT IN USE AND AT THE END OF EACH DAY.
23. ANY PROPOSED CHANGES TO THE EROSION CONTROL PLAN MUST BE SUBMITTED AND APPROVED BY ENGINEER, THE CITY OF WAUKESHA OR PERMITTING MUNICIPALITY.
24. THE **CITY,** OWNER AND/OR ENGINEER MAY REQUIRE ADDITIONAL EROSION CONTROL MEASURES AT ANY TIME DURING CONSTRUCTION.

SEEDING RATES:

TEMPORARY:
1. USE ANNUAL OATS AT 3.0 LB./1,000 S.F. FOR SPRING AND SUMMER PLANTINGS.
2. USE WINTER WHEAT OR RYE AT 3.0 LB./1,000 SF FOR FALL PLANTINGS STARTED AFTER SEPTEMBER 15.

PERMANENT:
1. USE WISCONSIN D.O.T. SEED MIX #40 AT 2 LB./1,000 S.F.

FERTILIZING RATES:

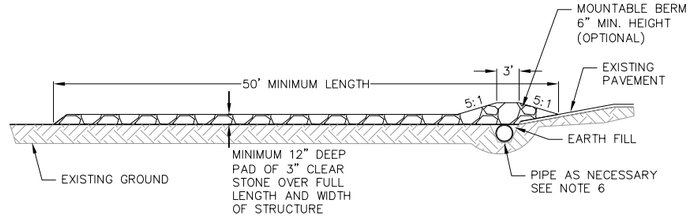
TEMPORARY AND PERMANENT:
USE WISCONSIN D.O.T. TYPE A OR B AT 7 LB./1,000 S.F.

MULCHING RATES:

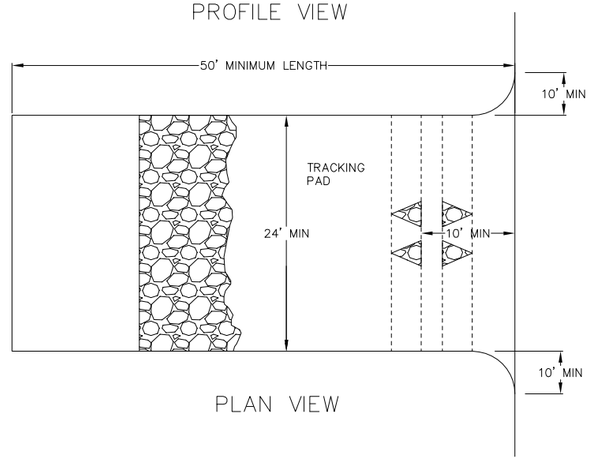
TEMPORARY AND PERMANENT:
USE ½" TO 1-½" STRAW OR HAY MULCH, CRIMPED PER SECTION 607.3.2.3, OR OTHER RATE AND METHOD PER SECTION 627, WISCONSIN D.O.T. STANDARD SPECIFICATIONS FOR HIGHWAY AND STRUCTURE CONSTRUCTION

CONSTRUCTION SEQUENCE:

1. INSTALL SILT FENCE, TRACKING PAD & INLET PROTECTION.
2. STRIP & STOCKPILE TOPSOIL.
3. INSTALL SILT FENCE AROUND PERIMETER OF TOPSOIL STOCK PILE
4. ROUGH GRADE SITE
5. CONSTRUCT UNDERGROUND UTILITIES
6. INSTALL INLET PROTECTION WHERE NECESSARY
7. INSTALL TOPSOIL & RESTORE
8. CONSTRUCT PARKING LOT (STONE BASE, CURB & GUTTER AND SIDEWALK).
9. REMOVE TRACKING PAD, SILT FENCE & INLET PROTECTION AFTER DISTURBED AREAS ARE RESTORED



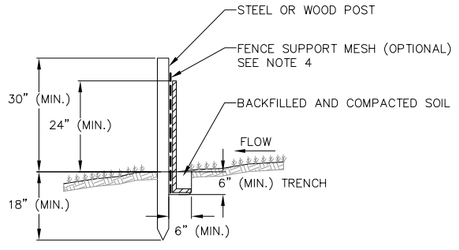
PROFILE VIEW



PLAN VIEW

1. FOLLOW WISCONSIN DNR TECHNICAL STANDARD 1057 FOR FURTHER DETAILS AND INSTALLATION.
2. LENGTH – MINIMUM OF 50'.
3. WIDTH – 24' MINIMUM, SHOULD BE FLARED AT THE EXISTING ROAD TO PROVIDE A TURNING RADIUS.
4. ON SITES WITH A HIGH GROUND WATER TABLE OR WHERE SATURATED CONDITIONS EXIST, GEOTEXTILE FABRIC SHALL BE PLACED OVER EXISTING GROUND PRIOR TO PLACING STONE. FABRIC SHALL BE WISDOT TYPE-HR GEOTEXTILE FABRIC.
5. STONE – CRUSHED 3" CLEAR STONE SHALL BE PLACED AT LEAST 12" DEEP OVER THE ENTIRE LENGTH AND WIDTH OF ENTRANCE.
6. SURFACE WATER – ALL SURFACE WATER FLOWING TO OR DIVERTED TOWARDS CONSTRUCTION ENTRANCES SHALL BE PIPED THROUGH THE ENTRANCE. MAINTAINING POSITIVE DRAINAGE. PIPE INSTALLED THROUGH THE STABILIZED CONSTRUCTION ENTRANCE SHALL BE PROTECTED WITH A MOUNTABLE BERM WITH 5:1 SLOPES AND MINIMUM OF 6" STONE OVER THE PIPE. PIPE SHALL BE SIZED ACCORDING TO THE DRAINAGE REQUIREMENTS. WHEN THE ENTRANCE IS LOCATED AT A HIGH SPOT AND HAS NO DRAINAGE TO CONVEY A PIPE SHALL NOT BE NECESSARY. THE MINIMUM PIPE DIAMETER SHALL BE 6". CONTRACTOR SHALL BE RESPONSIBLE FOR THE MAINTENANCE OF SAID PIPE.
7. LOCATION – A STABILIZED CONSTRUCTION ENTRANCE SHALL BE LOCATED WHERE CONSTRUCTION TRAFFIC ENTERS AND/OR LEAVES THE CONSTRUCTION SITE. VEHICLES LEAVING THE SITE MUST TRAVEL OVER THE ENTIRE LENGTH OF THE TRACKING PAD.

1 / C6.0 TRACKING PAD
NOT TO SCALE



NOTES:

1. INSTALL SILT FENCE TO FOLLOW THE GROUND CONTOURS AS CLOSELY AS POSSIBLE.
2. CURVE THE SILT FENCE UP THE SLOPE TO PREVENT WATER FROM RUNNING AROUND THE ENDS.
3. POST SPACING WITH FENCE SUPPORT MESH = 10 FT. (MAX.)

   POST SPACING WITHOUT FENCE SUPPORT MESH = 6 FT. (MAX.)
4. SILT FENCE SUPPORT MESH CONSISTS OF 14-GAUGE STEEL WIRE WITH A MESH SPACING OF 6 IN. X 6 IN. OR PREFABRICATED POLYMERIC MESH OF EQUIVALENT STRENGTH

2 / C6.0 SILT FENCE
NOT TO SCALE

vierbicher
planners | engineers | advisors
REEDSBURG • MADISON • PRAIRIE DU CHIEN
999 Fourier Drive, Suite 201, Madison, WI 53717
Phone: (608) 826-0532 Fax: (608) 826-0530

Fields Jaguar-Land Rover-Volvo-Waukesha
Construction Details
City of Waukesha
Waukesha County, Wisconsin

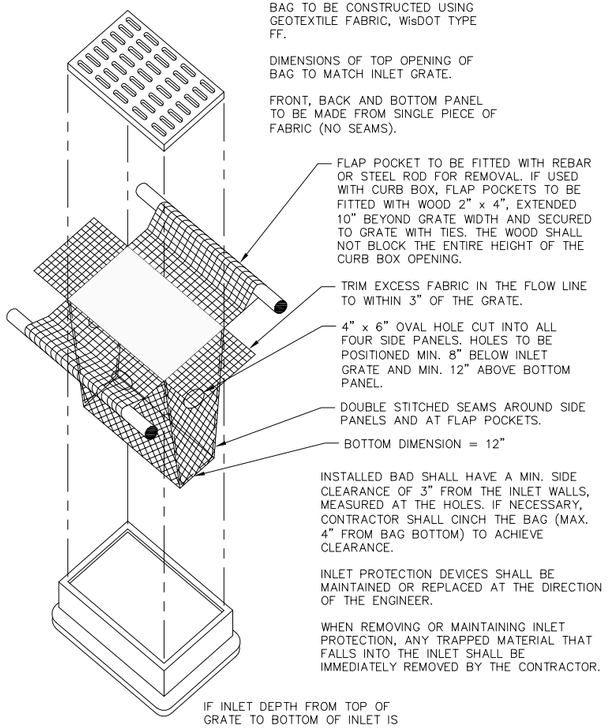
REVISIONS		
NO.	DATE	REMARKS

REVISIONS		
NO.	DATE	REMARKS

SCALE: AS SHOWN
DATE: 1/20/2017
DRAFTER: JGOL
CHECKED: GBLA
PROJECT NO.: 160333

C
6.0

19 Jan 2017 - 1:23p M:\Redmond Company\160333 - Fields Volvo Waukesha\CADD\160333 - Title and Details.dwg by: acar



BAG TO BE CONSTRUCTED USING GEOTEXTILE FABRIC, WisDOT TYPE FF.

DIMENSIONS OF TOP OPENING OF BAG TO MATCH INLET GRATE.

FRONT, BACK AND BOTTOM PANEL TO BE MADE FROM SINGLE PIECE OF FABRIC (NO SEAMS).

FLAP POCKET TO BE FITTED WITH REBAR OR STEEL ROD FOR REMOVAL. IF USED WITH CURB BOX, FLAP POCKETS TO BE FITTED WITH WOOD 2" x 4", EXTENDED 10" BEYOND GRATE WIDTH AND SECURED TO GRATE WITH TIES. THE WOOD SHALL NOT BLOCK THE ENTIRE HEIGHT OF THE CURB BOX OPENING.

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

4" x 6" OVAL HOLE CUT INTO ALL FOUR SIDE PANELS. HOLES TO BE POSITIONED MIN. 8" BELOW INLET GRATE AND MIN. 12" ABOVE BOTTOM PANEL.

DOUBLE STITCHED SEAMS AROUND SIDE PANELS AND AT FLAP POCKETS.

BOTTOM DIMENSION = 12"

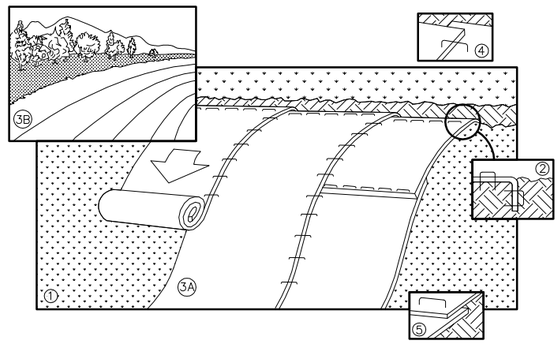
INSTALLED BAD SHALL HAVE A MIN. SIDE CLEARANCE OF 3" FROM THE INLET WALLS, MEASURED AT THE HOLES. IF NECESSARY, CONTRACTOR SHALL CINCH THE BAG (MAX. 4" FROM BAG BOTTOM) TO ACHIEVE CLEARANCE.

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

WHEN REMOVING OR MAINTAINING INLET PROTECTION, ANY TRAPPED MATERIAL THAT FALLS INTO THE INLET SHALL BE IMMEDIATELY REMOVED BY THE CONTRACTOR.

IF INLET DEPTH FROM TOP OF GRATE TO BOTTOM OF INLET IS LESS THAN 30", CONTRACTOR SHALL SUBSTITUTE WisDOT TYPE C INLET PROTECTION.

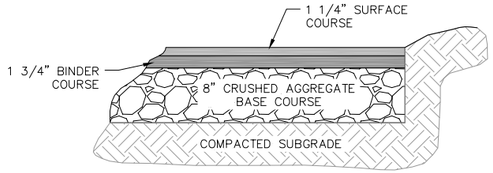
1 C6.1 INLET PROTECTION TYPE D
NOT TO SCALE



NOTE: REFER TO GENERAL STAPLE PATTERN GUIDE FOR CORRECT STAPLE PATTERN RECOMMENDATIONS FOR SLOPE INSTALLATIONS.

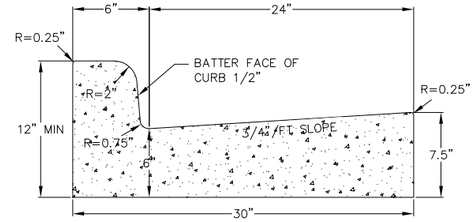
1. PREPARE SOIL BEFORE INSTALLING BLANKETS, INCLUDING APPLICATION OF FERTILIZER AND SEED.
   NOTE: WHEN USING CELL-O-SEED, DO NOT SEED PREPARED AREA.
CELL-O-SEED MUST BE INSTALLED WITH PAPER SIDE DOWN.
2. BEGIN AT THE TOP OF THE SLOPE BY ANCHORING THE BLANKET IN 6" DEEP BY 6" WIDE TRENCH. BACKFILL AND COMPACT THE TRENCH AFTER STAPLING.
3. ROLL THE BLANKETS <A.> DOWN, OR <B.> HORIZONTALLY ACROSS THE SLOPE.
4. THE EDGES OF PARALLEL BLANKETS MUST BE STAPLED WITH APPROXIMATELY 2" OVERLAP.
5. WHEN BLANKETS MUST BE SPLICED DOWN THE SLOPE, PLACE BLANKETS END OVER END (SHINGLE STYLE) WITH APPROXIMATELY 4" OVERLAP. STAPLE THROUGH OVERLAPPED AREA, APPROXIMATELY 12" APART.
6. ALL BLANKETS MUST BE SECURELY FASTENED TO THE SLOPE BY PLACING STAPLES/STAKES IN APPROPRIATE LOCATIONS AS RECOMMENDED BY THE MANUFACTURER.

4 C6.1 EROSION MAT
NOT TO SCALE

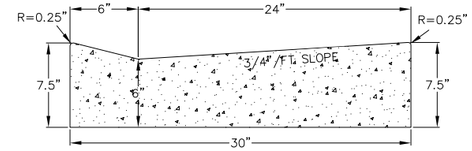


BITUMINOUS PAVEMENT
PARKING LOT

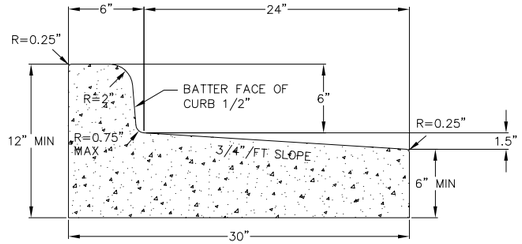
2 C6.1 SITE PAVEMENT
NOT TO SCALE



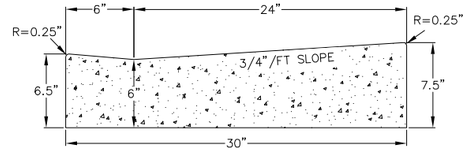
CURB AND GUTTER
CROSS SECTION



DRIVEWAY GUTTER
CROSS SECTION

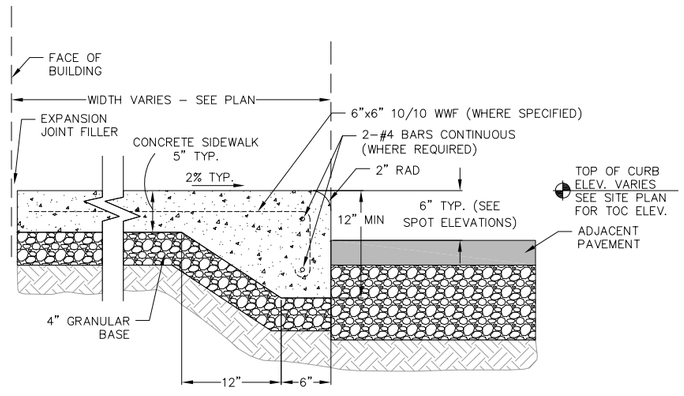


CURB AND GUTTER
REJECT SECTION

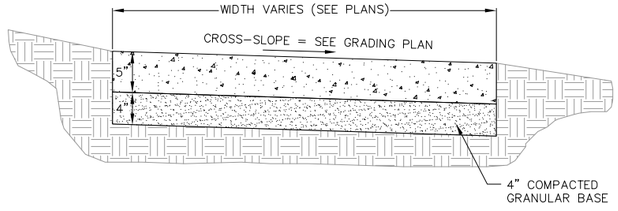


HANDICAP RAMP
GUTTER CROSS SECTION

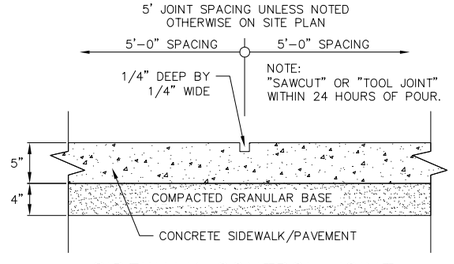
3 C6.1 30" CONCRETE CURB AND GUTTER
NOT TO SCALE



5 C6.1 THICKENED EDGE SIDEWALK DETAIL
NOT TO SCALE



5" SITE CONCRETE SIDEWALK/PAVEMENT



SIDEWALK CONTROL JOINT

6 C6.1 5" CONCRETE SIDEWALK/PAVEMENT
NOT TO SCALE

vierbicher
planners | engineers | advisors
REEDSBURG • MADISON • PRAIRIE DU CHIEN
999 Fourier Drive, Suite 201, Madison, WI 53717
Phone: (608) 826-0532 Fax: (608) 826-0530

Fields Jaguar-Land Rover-Volvo-Waukesha
Construction Details
City of Waukesha
Waukesha County, Wisconsin

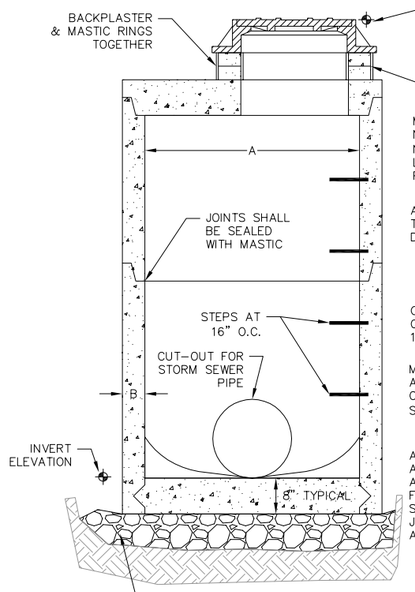
REVISIONS NO.	DATE	REMARKS

REVISIONS NO.	DATE	REMARKS

SCALE: AS SHOWN
DATE: 1/20/2017
DRAFTER: JGOL
CHECKED: GBLA
PROJECT NO.: 160333

C
6.1

19 Jan 2017 - 1:24p M:\Redmond Company\160333 - Fields Volvo Waukesha\CADD\160333 - Title and Details.dwg by: acar



MANHOLE CASTING SHALL BE HEAVY DUTY, NEENAH FOUNDRY CO. CATALOG LISTING NO. R-1550, WITH TYPE "B" NON-ROCKING LID, GASKET SEAL AND CONCEALED PICKHOLES

ADJUST FRAME TO GRADE WITH AT LEAST TWO PRECAST CONCRETE RINGS OF DIFFERENT THICKNESSES.

CONCRETE SHALL BE 4000 PSI, 28 DAY COMPRESSIVE STRENGTH, 6.5 BAG MIX WITH 1~2% AIR ENTRAINMENT.

MANHOLE STEPS SHALL CONFORM TO ASTM-C478 & SHALL BE NEENAH FOUNDRY CO. R-1981-N OR APPROVED EQUAL. STEPS SHALL BE SPACED 16" ON CENTER.

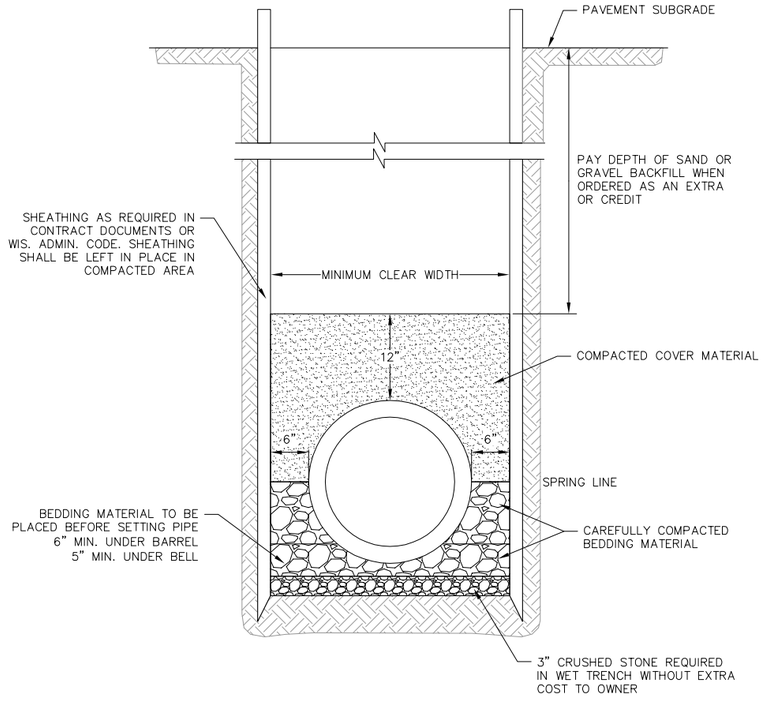
A MINIMUM OF 3" TO A MAXIMUM OF 9" OF ADJUSTING RINGS SHALL BE USED TO ADJUST THE MANHOLE CASTING TO THE FINISHED GRADE. ALL RINGS SHALL BE SEALED TOGETHER USING MASTIC AND ALL JOINTS SHALL BE BACK PLASTERED INSIDE AND OUT WITH CEMENT MORTAR.

2x3 OPENING IS REQUIRED FOR STORM INLET MANHOLES WITH CASTING AND RINGS AS SPECIFIED IN DETAIL 02721-A.

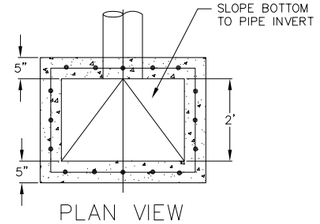
STORM MANHOLE DIMENSIONS

MANHOLE SIZE	DIMENSION	
	A	B (MIN.)
48"	48"	5"
60"	60"	6"
72"	72"	7"
84"	84"	7"
96"	96"	9"

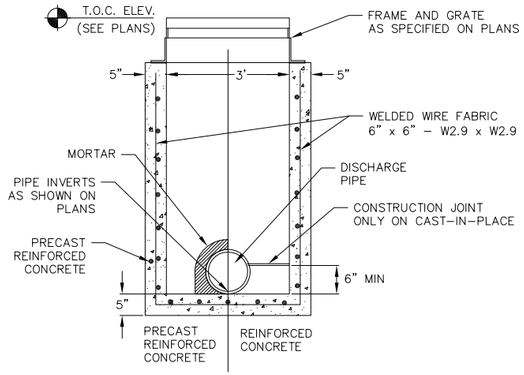
1 C6.2 **STORM SEWER MANHOLE**
NOT TO SCALE



2 C6.2 **CLASS B BEDDING COMPACTED SECTION**
NOT TO SCALE

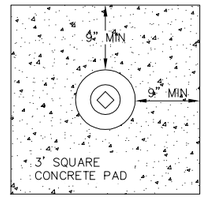


PLAN VIEW

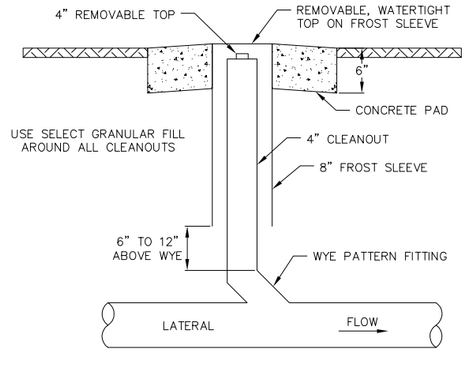


CROSS SECTION

3 C6.2 **CURB INLET - TYPE 3, 2' x 3' BASIN**
NOT TO SCALE



PLAN



SECTION

4 C6.2 **SANITARY CLEANOUT**
NOT TO SCALE

vierbicher
planners | engineers | advisors
REEDSBURG • MADISON • PRAIRIE DU CHIEN
999 Fourier Drive, Suite 201, Madison, WI 53717
Phone: (608) 826-0532 Fax: (608) 826-0530

Fields Jaguar-Land Rover-Volvo-Waukesha
Construction Details
City of Waukesha
Waukesha County, Wisconsin

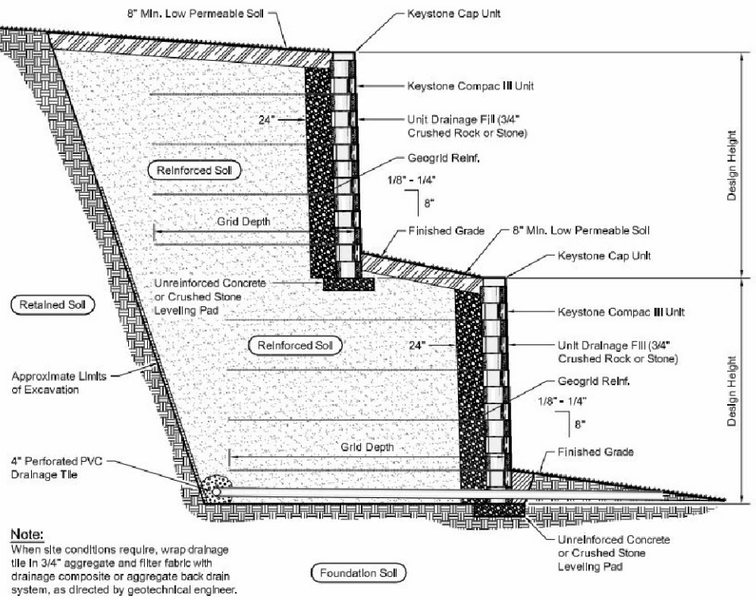
REVISIONS NO.	DATE	REMARKS

REVISIONS NO.	DATE	REMARKS

SCALE: AS SHOWN
DATE: 1/20/2017
DRAFTER: JGOL
CHECKED: GBLA
PROJECT NO.: 160333

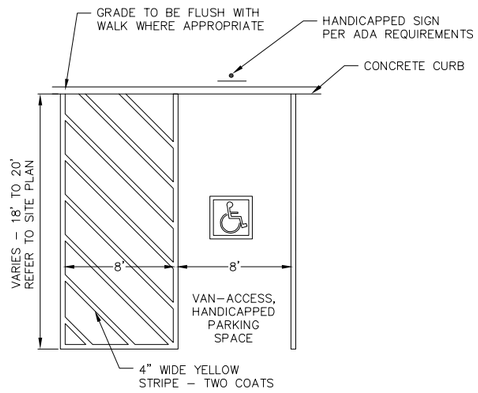
C

6.2

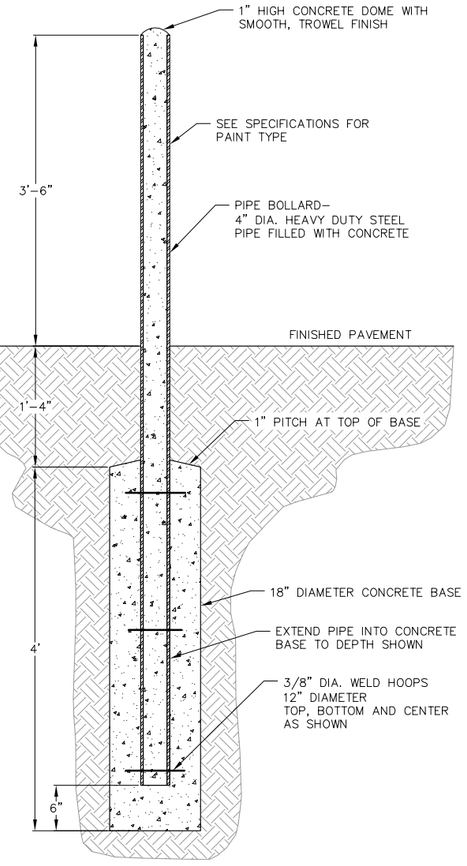


Note:
When site conditions require, wrap drainage tile in 3/4" aggregate and filter fabric with drainage composite or aggregate back drain system, as directed by geotechnical engineer.

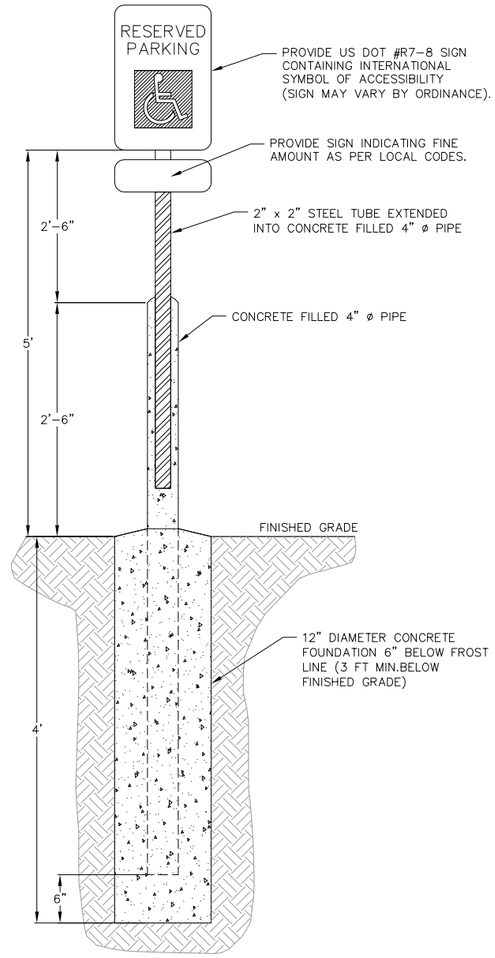
1 / C6.3 KEYSTONE RETAINING WALL SYSTEM
NOT TO SCALE



2 / C6.3 HANDICAP STRIPING
NOT TO SCALE



1 / 1 PIPE BOLLARD
NOT TO SCALE



3 / C6.3 HANDICAP PARKING SIGN
NOT TO SCALE

vierbicher
planners | engineers | advisors
REEDSBURG • MADISON • PRAIRIE DU CHIEN
999 Fourier Drive, Suite 201, Madison, WI 53717
Phone: (608) 826-0532 Fax: (608) 826-0530

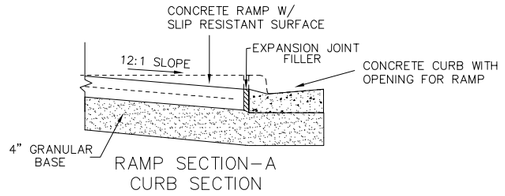
Fields Jaguar-Land Rover-Volvo-Waukesha
Construction Details
City of Waukesha
Waukesha County, Wisconsin

REVISIONS NO.	DATE	REMARKS

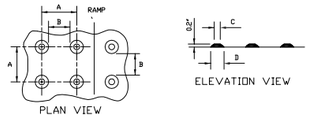
REVISIONS NO.	DATE	REMARKS

SCALE: AS SHOWN
DATE: 1/20/2017
DRAFTER: JGOL
CHECKED: GBLA
PROJECT NO.: 160333

C
6.3

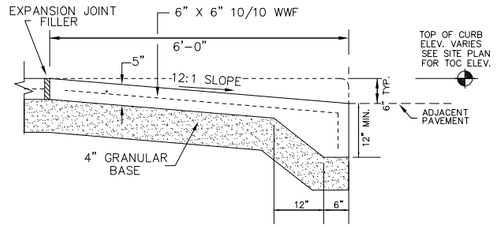


RAMP SECTION–A
CURB SECTION

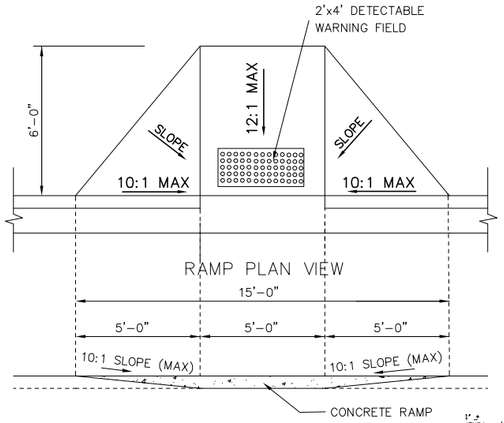


TRUNCATED DOMES
DETECTABLE WARNING
PATTERN DETAIL

NOTE: 1) MATERIALS AND METHOD OF CONSTRUCTION FOR TRUNCATED DOMES SHALL BE SPECIFIED IN SPECIAL PROVISIONS OR AS REQUIRED BY THE VILLAGE ENGINEER
2) COLOR SHALL BE A DISSIMILAR COLOR FROM THE ADJACENT PAVED SURFACE AND APPROVED BY THE OWNER AND ENGINEER

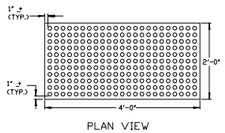


RAMP SECTION–A
SIDEWALK / CURB COMBINATION



RAMP PROFILE VIEW

GENERAL NOTES
RAMPS SHALL BE BUILT AT 12:1 OR FLATTER. WHEN NECESSARY, THE SIDEWALK ELEVATION MAY BE LOWERED TO MEET THE HIGH POINT ON THE RAMP.



DETECTABLE WARNING
FIELD (TYPICAL)

1 / C6.4 SIDEWALK/CURB RAMP DETAIL
NOT TO SCALE

vierbicher
planners | engineers | advisors
REEDSBURG • MADISON • PRAIRIE DU CHIEN
999 Fourier Drive, Suite 201, Madison, WI 53717
Phone: (608) 826-0532 Fax: (608) 826-0530

Fields Jaguar-Land Rover-Volvo-Waukesha
Construction Details
City of Waukesha
Waukesha County, Wisconsin

REVISIONS			
NO.	DATE	REMARKS	

REVISIONS			
NO.	DATE	REMARKS	

SCALE: AS SHOWN
DATE: 1/20/2017
DRAFTER: JGOL
CHECKED: GBLA
PROJECT NO.: 160333

C
6.4

ADVANCED DRAINAGE SYSTEMS, INC.

Redmond-Fields Volvo

Waukesha

STORMWATER CHAMBER SPECIFICATIONS

1. CHAMBERS SHALL BE STORMTECH MC-4500 OR APPROVED EQUAL.
2. CHAMBERS SHALL BE MANUFACTURED FROM VIRGIN, IMPACT-MODIFIED POLYPROPYLENE COPOLYMERS.
3. CHAMBER ROWS SHALL PROVIDE CONTINUOUS, UNOBSTRUCTED INTERNAL SPACE WITH NO INTERNAL SUPPORT PANELS THAT WOULD IMPEDE FLOW OR LIMIT ACCESS FOR INSPECTION.
4. 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.
5. CHAMBERS SHALL MEET THE REQUIREMENTS OF ASTM F2418, "STANDARD SPECIFICATION FOR POLYPROPYLENE (PP) CORRUGATED WALL STORMWATER COLLECTION CHAMBERS".
6. CHAMBERS SHALL BE DESIGNED AND ALLOWABLE LOADS DETERMINED IN ACCORDANCE WITH ASTM F2787, "STANDARD PRACTICE FOR STRUCTURAL DESIGN OF THERMOPLASTIC CORRUGATED WALL STORMWATER COLLECTION CHAMBERS".
7. ONLY CHAMBERS THAT ARE APPROVED BY THE SITE DESIGN ENGINEER WILL BE ALLOWED. THE CHAMBER MANUFACTURER SHALL SUBMIT THE FOLLOWING UPON REQUEST TO THE SITE DESIGN ENGINEER FOR APPROVAL BEFORE DELIVERING CHAMBERS TO THE PROJECT SITE:
   a. A STRUCTURAL EVALUATION SEALED BY A REGISTERED PROFESSIONAL ENGINEER THAT DEMONSTRATES 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 AASHTO FOR THERMOPLASTIC PIPE.
   b. A STRUCTURAL EVALUATION SEALED BY A REGISTERED PROFESSIONAL ENGINEER THAT DEMONSTRATES THAT THE LOAD FACTORS SPECIFIED IN THE AASHTO LRFD BRIDGE DESIGN SPECIFICATIONS, SECTION 12.12, ARE MET. THE 50 YEAR CREEP MODULUS DATA SPECIFIED IN ASTM F2418 MUST BE USED AS PART OF THE AASHTO STRUCTURAL EVALUATION TO VERIFY LONG-TERM PERFORMANCE.
   c. STRUCTURAL CROSS SECTION DETAIL ON WHICH THE STRUCTURAL EVALUATION IS BASED.
8. CHAMBERS AND END CAPS SHALL BE PRODUCED AT AN ISO 9001 CERTIFIED MANUFACTURING FACILITY.

IMPORTANT - NOTES FOR THE BIDDING AND INSTALLATION OF MC-4500 CHAMBER SYSTEM

1. STORMTECH MC-4500 CHAMBERS SHALL NOT BE INSTALLED UNTIL THE MANUFACTURER'S REPRESENTITIVE HAS COMPLETED A PRE-CONSTRUCTION MEETING WITH THE INSTALLERS.
2. STORMTECH MC-4500 CHAMBERS SHALL BE INSTALLED IN ACCORDANCE WITH THE "STORMTECH MC-3500/MC-4500 CONSTRUCTION GUIDE".
3. CHAMBERS ARE NOT TO BE BACKFILLED WITH A DOZER OR 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 - 9" (230 mm) SPACING BETWEEN THE CHAMBER ROWS.
7. INLET AND OUTLET MANIFOLDS MUST BE INSERTED A MINIMUM OF 12" (300 mm) INTO CHAMBER END CAPS.
8. EMBEDMENT STONE SURROUNDING CHAMBERS MUST BE A CLEAN, CRUSHED, ANGULAR STONE 3/4-2" (20-50 mm) MEETING THE AASHTO M43 DESIGNATION OF #3 OR #4.
9. STONE SHALL BE BROUGHT UP EVENLY AROUND CHAMBERS SO AS NOT TO DISTORT THE CHAMBER SHAPE. STONE DEPTHS SHOULD NEVER DIFFER BY MORE THAN 12" (300 mm) BETWEEN ADJACENT CHAMBER ROWS.
10. STONE MUST BE PLACED ON THE TOP CENTER OF THE CHAMBER TO ANCHOR THE CHAMBERS IN PLACE AND PRESERVE ROW SPACING.
11. 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 MC-4500 CHAMBERS SHALL BE INSTALLED IN ACCORDANCE WITH THE "STORMTECH MC-3500/MC-4500 CONSTRUCTION GUIDE".
2. THE USE OF EQUIPMENT OVER MC-4500 CHAMBERS IS LIMITED:
   - NO EQUIPMENT IS ALLOWED ON BARE CHAMBERS.
   - NO RUBBER TIRED LOADER, DUMP TRUCK, OR EXCAVATORS ARE ALLOWED UNTIL PROPER FILL DEPTHS ARE REACHED IN ACCORDANCE WITH THE "STORMTECH MC-3500/MC-4500 CONSTRUCTION GUIDE".
   - WEIGHT LIMITS FOR CONSRUCTION EQUIPMENT CAN BE FOUND IN THE "STORMTECH MC-3500/MC-4500 CONSTRUCTION GUIDE".
3. FULL 36" (900 mm) OF STABILIZED COVER MATERIALS OVER THE CHAMBERS IS REQUIRED FOR DUMP TRUCK TRAVEL OR DUMPING.

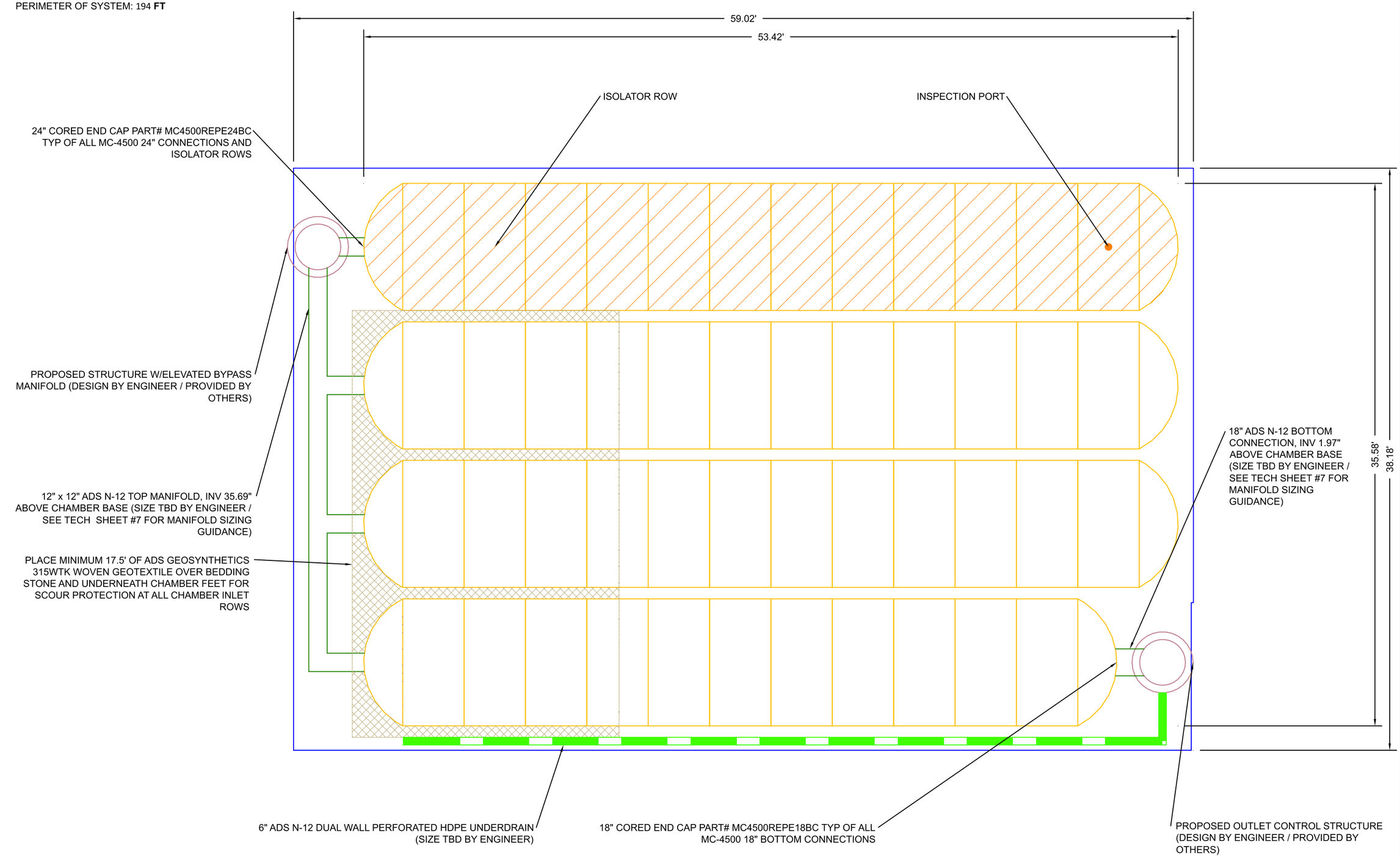
USE OF A DOZER TO PUSH EMBEDMENT STONE BETWEEN THE ROWS OF CHAMBERS MAY CAUSE DAMAGE TO CHAMBERS AND IS NOT AN ACCEPTABLE BACKFILL METHOD. ANY CHAMBERS DAMAGED BY USING THE "DUMP AND PUSH" METHOD ARE NOT COVERED UNDER THE STORMTECH STANDARD WARRANTY.

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

CONCEPTUAL LAYOUT

(47) STORMTECH MC-4500 CHAMBERS
(8) STORMTECH MC-4500 END CAPS
INSTALLED WITH 12 " COVER STONE, 9 " BASE STONE, 40% STONE VOID
INSTALLED SYSTEM VOLUME: 8511 CF
AREA OF SYSTEM: 2252 **FT²**
PERIMETER OF SYSTEM: 194 **FT**

COMPUTER GENERATED CONCEPTUAL LAYOUT - NOT FOR CONSTRUCTION



Redmond-Fields Volvo
Waukesha

DATE: 01/03/2017 | DRAWN: JB | CHECKED: ---
PROJECT #: Tool

REV	DRW	CHK	DESCRIPTION

StormTech®
Detention- Retention- Water Quality
70 INWOOD ROAD, SUITE 3 | ROCKY HILL | CT | 06067
860-529-8188 |888-892-2694 | WWW.STORMTECH.COM

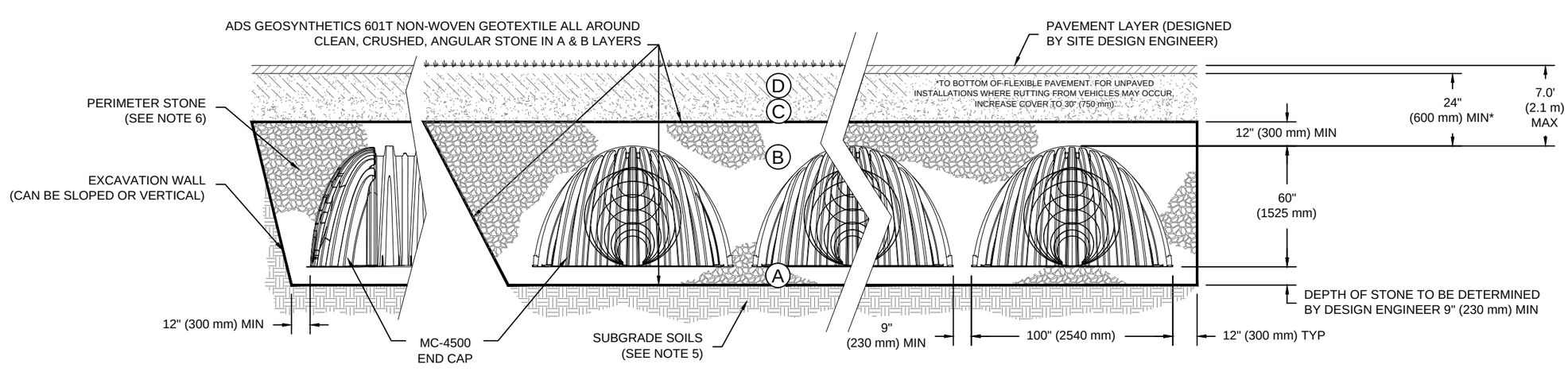
ADS®
ADVANCED DRAINAGE SYSTEMS, INC.
4640 TRUEMAN BLVD
HILLIARD, OH 43026
1-800-733-7473

NOT TO SCALE

ACCEPTABLE FILL MATERIALS: STORMTECH MC-4500 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 24" (600 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 24" (600 mm) OF MATERIAL OVER THE CHAMBERS IS REACHED. COMPACT ADDITIONAL LAYERS IN 12" (300 mm) MAX LIFTS TO A MIN. 95% PROCTOR DENSITY FOR WELL GRADED MATERIAL AND 95% RELATIVE DENSITY FOR PROCESSED AGGREGATE MATERIALS.
B	**EMBEDMENT STONE:** FILL SURROUNDING THE CHAMBERS FROM THE FOUNDATION STONE ('A' LAYER) TO THE 'C' LAYER ABOVE.	CLEAN, CRUSHED, ANGULAR STONE, NOMINAL SIZE DISTRIBUTION BETWEEN 3/4-2 INCH (20-50 mm)	AASHTO M43[1] 3, 4	NO COMPACTION REQUIRED.
A	**FOUNDATION STONE:** FILL BELOW CHAMBERS FROM THE SUBGRADE UP TO THE FOOT (BOTTOM) OF THE CHAMBER.	CLEAN, CRUSHED, ANGULAR STONE, NOMINAL SIZE DISTRIBUTION BETWEEN 3/4-2 INCH (20-50 mm)	AASHTO M43[1] 3, 4	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 9" (230 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.



NOTES:

1. MC-4500 CHAMBERS SHALL CONFORM TO THE REQUIREMENTS OF ASTM F2418 "STANDARD SPECIFICATION FOR POLYPROPYLENE (PP) CORRUGATED WALL STORMWATER COLLECTION CHAMBERS".
2. MC-4500 CHAMBERS SHALL BE DESIGNED IN ACCORDANCE WITH ASTM F2787 "STANDARD PRACTICE FOR STRUCTURAL DESIGN OF THERMOPLASTIC CORRUGATED WALL STORMWATER COLLECTION CHAMBERS".
3. "ACCEPTABLE FILL MATERIALS" TABLE ABOVE PROVIDES MATERIAL LOCATIONS, DESCRIPTIONS, GRADATIONS, AND COMPACTION REQUIREMENTS FOR FOUNDATION, EMBEDMENT, AND FILL MATERIALS.
4. THE "SITE DESIGN ENGINEER" REFERS TO THE ENGINEER RESPONSIBLE FOR THE DESIGN AND LAYOUT OF THE STORMTECH CHAMBERS FOR THIS PROJECT.
5. 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.
6. PERIMETER STONE MUST BE EXTENDED HORIZONTALLY TO THE EXCAVATION WALL FOR BOTH VERTICAL AND SLOPED EXCAVATION WALLS.
7. 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.

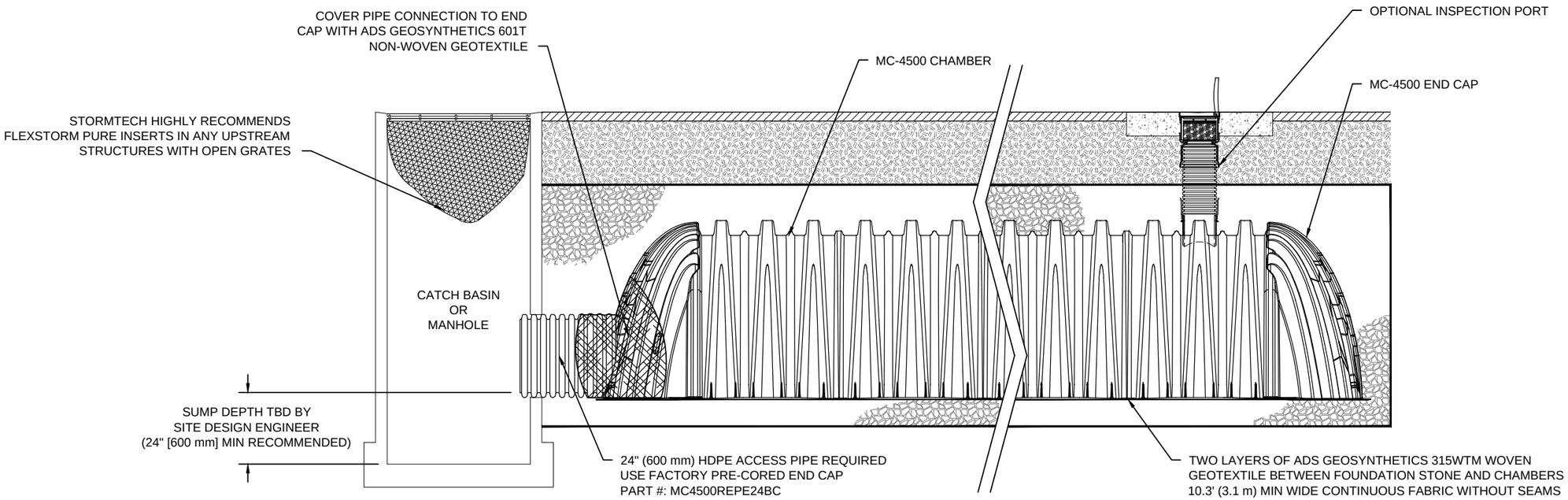
Redmond-Fields Volvo
Waukesha

DATE: 01/03/2017 | DRAWN: JB | CHECKED: ---
PROJECT #: Tool

REV	DRW	CHK	DESCRIPTION

StormTech
Detention•Retention•Water Quality
70 INWOOD ROAD, SUITE 3 | ROCKY HILL | CT | 06067
860-529-8188 | 888-892-2694 | WWW.STORMTECH.COM

ADS
ADVANCED DRAINAGE SYSTEMS, INC.
4640 TRUEMAN BLVD
HILLIARD, OH 43026
1-800-733-7473



MC-4500 ISOLATOR ROW DETAIL
NTS

INSPECTION & MAINTENANCE

STEP 1) INSPECT ISOLATOR ROW 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 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 ROWS
  - B.1. REMOVE COVER FROM STRUCTURE AT UPSTREAM END OF ISOLATOR ROW
  - B.2. USING A FLASHLIGHT, INSPECT DOWN THE ISOLATOR ROW 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 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

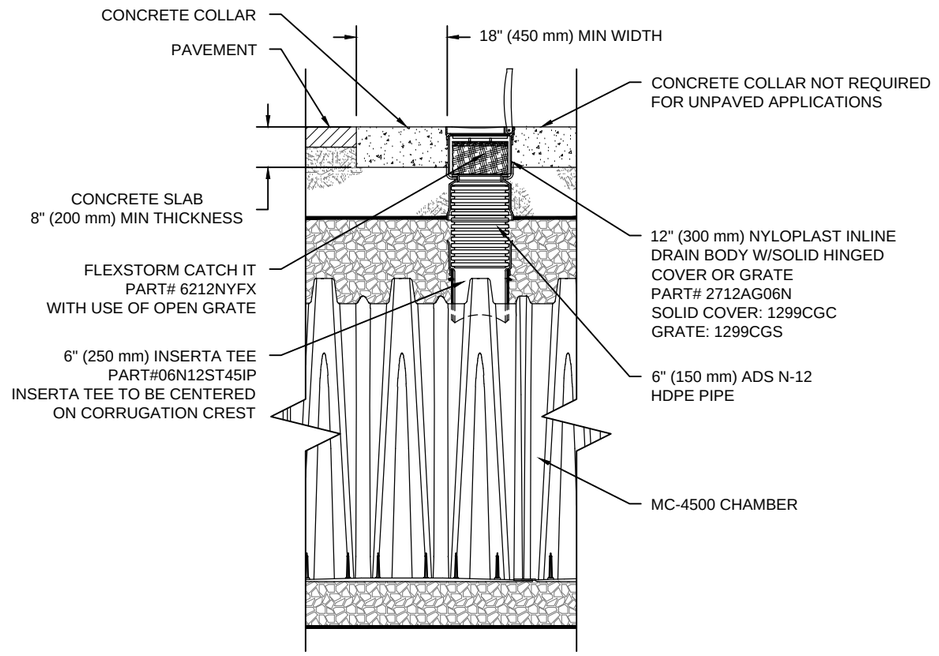
STEP 3) REPLACE ALL COVERS, GRATES, FILTERS, AND LIDS; RECORD OBSERVATIONS AND ACTIONS.

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.



MC-4500 6" INSPECTION PORT DETAIL
NTS

Redmond-Fields Volvo
Waukesha

DATE: 01/03/2017 | DRAWN: JB | CHECKED: ---
PROJECT #: Tool

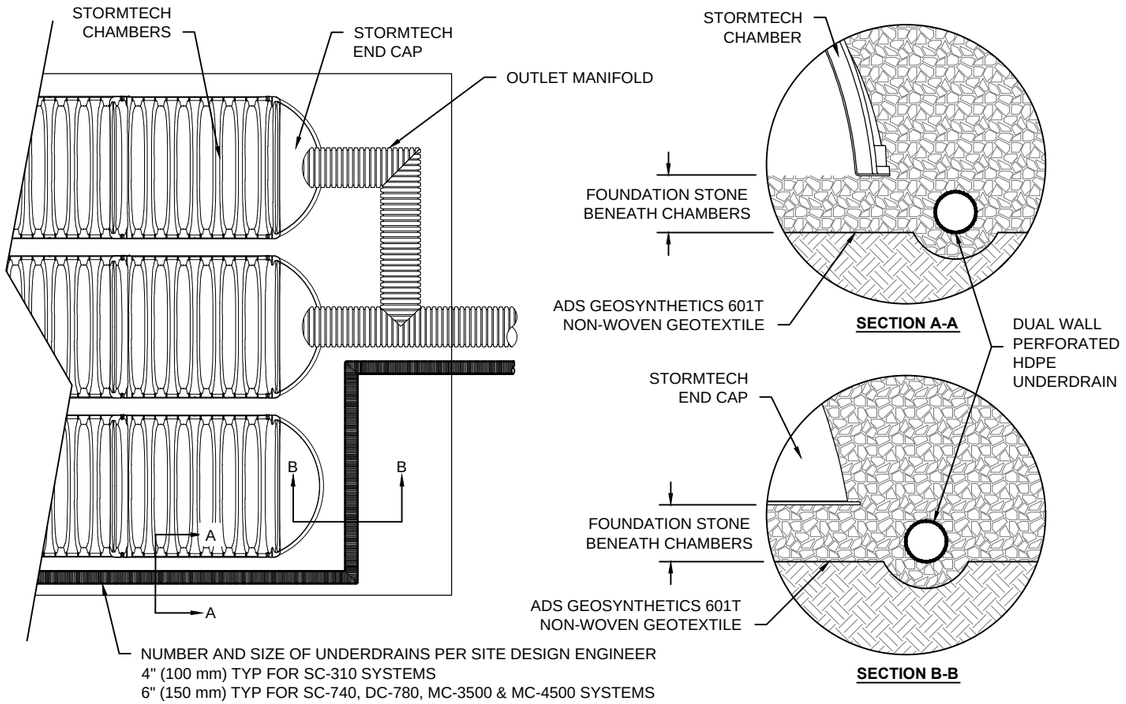
REV	DRW	CHK	DESCRIPTION

StormTech
Detention+Retention+Water Quality
70 INWOOD ROAD, SUITE 3 | ROCKY HILL | CT | 06067
860-529-8188 | 888-892-2694 | WWW.STORMTECH.COM

ADS
ADVANCED DRAINAGE SYSTEMS, INC.
4640 TRUEMAN BLVD
HILLIARD, OH 43026
1-800-733-7473

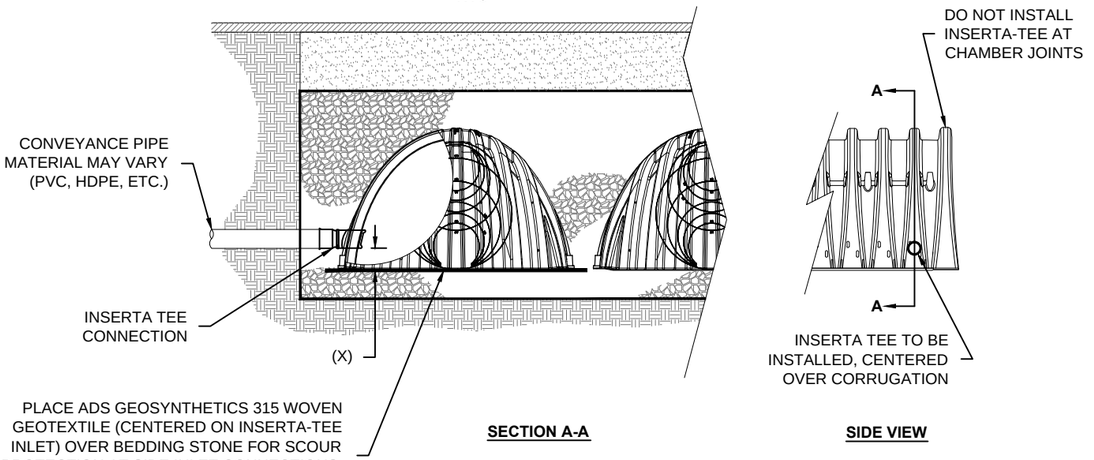
UNDERDRAIN DETAIL

NTS



INSERTA TEE DETAIL

NTS

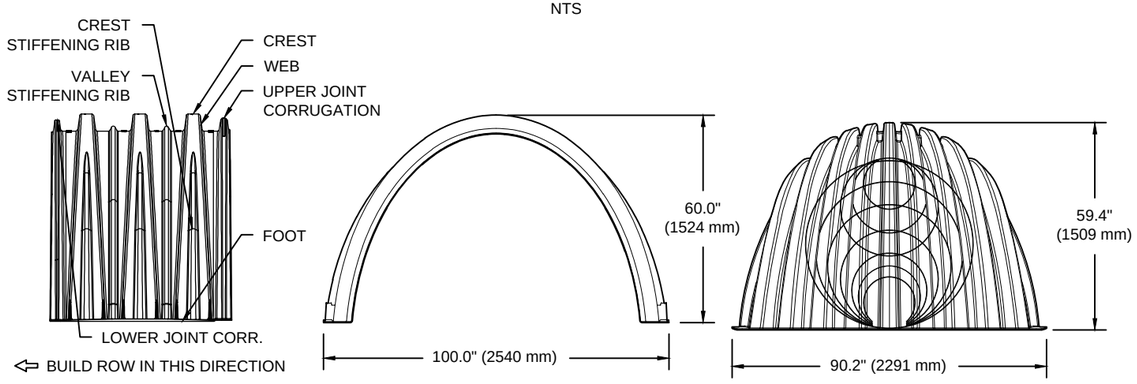


NOTE:
PART NUMBERS WILL VARY BASED ON INLET PIPE MATERIALS. CONTACT STORMTECH FOR MORE INFORMATION.

CHAMBER	MAX DIAMETER OF INSERTA TEE	HEIGHT FROM BASE OF CHAMBER (X)
SC-310	6" (150 mm)	4" (100 mm)
SC-740	10" (250 mm)	4" (100 mm)
DC-780	10" (250 mm)	4" (100 mm)
MC-3500	12" (300 mm)	6" (150 mm)
MC-4500	12" (300 mm)	8" (200 mm)
INSERTA TEE FITTINGS AVAILABLE FOR SDR 26, SDR 35, SCH 40 IPS GASKETED & SOLVENT WELD, N-12, HP STORM, C-900 OR DUCTILE IRON		

MC-4500 TECHNICAL SPECIFICATION

NTS



NOMINAL CHAMBER SPECIFICATIONS

SIZE (W X H X INSTALLED LENGTH)	100.0" X 60.0" X 48.3"	(2540 mm X 1524 mm X 1227 mm)
CHAMBER STORAGE	106.5 CUBIC FEET	(3.01 m³)
MINIMUM INSTALLED STORAGE*	162.6 CUBIC FEET	(4.60 m³)
WEIGHT	130.0 lbs.	(59.0 kg)

NOMINAL END CAP SPECIFICATIONS

SIZE (W X H X INSTALLED LENGTH)	90.2" X 59.4" X 30.7"	(2291 mm X 1509 mm X 781 mm)
END CAP STORAGE	35.7 CUBIC FEET	(1.01 m³)
MINIMUM INSTALLED STORAGE*	108.7 CUBIC FEET	(3.08 m³)
WEIGHT	135.0 lbs.	(61.2 kg)

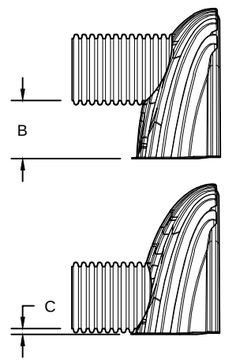
*ASSUMES 12" (305 mm) STONE ABOVE, 9" (229 mm) STONE FOUNDATION AND BETWEEN CHAMBERS, 12" (305 mm) STONE PERIMETER IN FRONT OF END CAPS AND 40% STONE POROSITY.

STUBS AT BOTTOM OF END CAP FOR PART NUMBERS ENDING WITH "B"
STUBS AT TOP OF END CAP FOR PART NUMBERS ENDING WITH "T"

PART #	STUB	B	C
MC4500REPE06T	6" (150 mm)	42.54" (1.081 m)	---
MC4500REPE06B		---	0.86" (22 mm)
MC4500REPE08T	8" (200 mm)	40.50" (1.029 m)	---
MC4500REPE08B		---	1.01" (26 mm)
MC4500REPE10T	10" (250 mm)	38.37" (975 mm)	---
MC4500REPE10B		---	1.33" (34 mm)
MC4500REPE12T	12" (300 mm)	35.69" (907 mm)	---
MC4500REPE12B		---	1.55" (39 mm)
MC4500REPE15T	15" (375 mm)	32.72" (831 mm)	---
MC4500REPE15B		---	1.70" (43 mm)
MC4500REPE18TC	18" (450 mm)	29.36" (746 mm)	---
MC4500REPE18BC		---	1.97" (50 mm)
MC4500REPE24TC	24" (600 mm)	23.05" (585 mm)	---
MC4500REPE24BC		---	2.26" (57 mm)
MC4500REPE30BC	30" (750 mm)	---	2.95" (75 mm)
MC4500REPE36BC	36" (900 mm)	---	3.25" (83 mm)
MC4500REPE42BC	42" (1050 mm)	---	3.55" (90 mm)

NOTE: ALL DIMENSIONS ARE NOMINAL

CUSTOM PRECORED INVERTS ARE AVAILABLE UPON REQUEST. INVENTORIED MANIFOLDS INCLUDE 12-24" (300-600 mm) SIZE ON SIZE AND 15-48" (375-1200 mm) ECCENTRIC MANIFOLDS.
CUSTOM INVERT LOCATIONS ON THE MC-4500 END CAP CUT IN THE FIELD ARE NOT RECOMMENDED FOR PIPE SIZES GREATER THAN 10" (250 mm)
THE INVERT LOCATION IN COLUMN 'B' ARE THE HIGHTEST POSSIBLE FOR THE PIPE SIZE.



Redmond-Fields Volvo
Waukesha

DATE: 01/03/2017 | DRAWN: JB | CHECKED: ---
PROJECT #: Tool

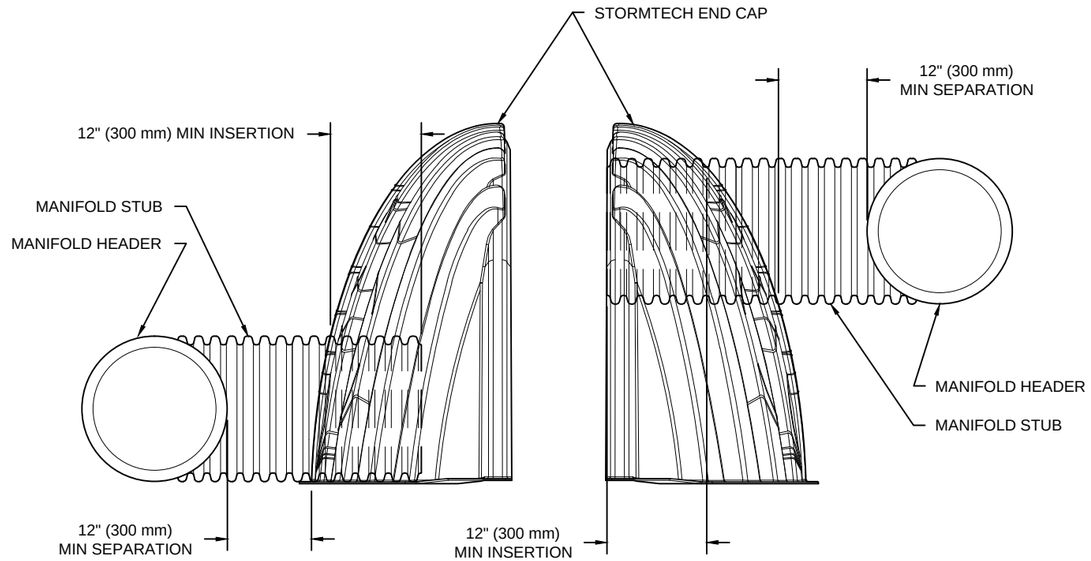
REV	DRW	CHK	DESCRIPTION

StormTech
Detention • Retention • Water Quality
70 INWOOD ROAD, SUITE 3 | ROCKY HILL | CT | 06067
860-529-8188 | 888-892-2694 | WWW.STORMTECH.COM

ADS
ADVANCED DRAINAGE SYSTEMS, INC.
4640 TRUEMAN BLVD
HILLIARD, OH 43026
1-800-733-7473

MC-SERIES END CAP INSERTION DETAIL

NTS



NOTE: MANIFOLD STUB MUST BE LAID HORIZONTAL
FOR A PROPER FIT IN END CAP OPENING.

Redmond-Fields Volvo
Waukesha

DATE: 01/03/2017 | DRAWN: JB | PROJECT #: Tool | CHECKED: ---

REV	DRW	CHK	DESCRIPTION

StormTech
Detention+Retention+Water Quality
70 INWOOD ROAD, SUITE 3 | ROCKY HILL | CT | 06067
860-529-8188 | 888-892-2694 | WWW.STORMTECH.COM

ADS
ADVANCED DRAINAGE SYSTEMS, INC.
4640 TRUEMAN BLVD
HILLIARD, OH 43026
1-800-733-7473