ALLEN ENGINEERING
& ASSOCIATES, INC.

DRAINAGE ANALYSIS REPORT

For

#1603 - #1605 Main Street

In

Leicester, Massachusetts

Date: 9/23/21

September 23, 2021

Prepared For:

Leicester Main, LLC
One Charlesview Road, Suite 1
Hopedale, MA 01747

TABLE OF CONTENTS

Drainage Analysis Report
#1603-#1605 Main Street
Leicester, MA

SUMMARY OF PRE-DEVELOPMENT DRAINAGE CONDITIONS

Site Description:

The project for which this analysis has been prepared lies on the southwesterly side of Route 9 (state highway) and numbered 1603 & 1605 Main Street in Leicester, MA. The site being shown on Leicester assessor's maps 18, block A, parcel 8.1, and map 18A, block A, parcels 14 & 15. The site has been cleared with the exception of the westerly corner of the property which is adjacent to a wetland located off of the site to the west. The site slopes southwesterly from Main Street (Rte. 9) toward the rear of the property. Previous earthwork on the site created a temporary sediment trap roughly parallel to the rear property line. The disturbed portion of the site has little to no vegetation.

Allen Engineering & Associates, Inc. has reviewed the Soil Survey for Worcester County, prepared by the USDA/NRCS and has performed on-site soil test pits. The southerly corner of the project is identified as Paxton fine sandy loam having a hydrologic soil group (HSG) of "C". The remainder of the site soils are designated as Woodbridge fine sandy loam having a published hydrologic soil group (HSG) of "C/D". The published soil texture appears to agree with test pits performed by Allen Engineering & Associates, Inc. on the site. For the purpose of a conservative Pre/Post-Development comparison analysis, the existing site conditions within the calculations are modelled as an undisturbed "Wooded-good" condition.

Hydrology Background:

Allen Engineering & Associates, Inc. has utilized AutoCAD and HydroCAD software to perform this drainage analysis. AutoCAD was used to generate the existing and proposed drainage plan that can be found appended to this report. These plans were used to define such items as subcatchment areas, times of concentration and ground cover. An evaluation point (1EV) has been designated within the calculations corresponding to the existing surface runoff collection area at the most westerly corner of the site adjacent to the off-site wetland. HydroCAD software program has been utilized to calculate the peak rate of storm water runoff during various storm events at this evaluation point for Pre-Development/Post-Development analysis. These rates are summarized for existing and proposed site conditions in tabular form on page iii.
The total land area reviewed under "Pre-Development" conditions comprises 171,617 square feet. The total land area reviewed under "Post-Development" conditions comprises 171,766 square feet; the small increase (149 sf) is the result of realignment of the curbing within the state highway layout.

SUMMARY OF POST-DEVELOPMENT DRAINAGE CONDITIONS

Site Description:
The project consists of construction of two commercial buildings with appurtenant parking, access drives and utilities. The easterly building (#1603) is proposed as a three-story self-storage building having a footprint area of 10,000 square. The westerly building (#1605), as proposed, has a footprint area of 4,996 square feet and will contain a one-story fast-food restaurant with a drive-through, and a gas station/convenience store.

Stormwater Management:
Stormwater runoff will be collected by deep-sump/hooded catch basins and conveyed by pipe to an infiltration basin at the rear of the property. The use of building #1605 (gas station) as well as the anticipated vehicle trips/day (>1000) defines this portion of the site as a "Land Use with Higher Potential Pollution Loads" (LUHPPL). The proposed self-storage building at #1603 does not meet the same threshold and is not designated as such. Site grading, as well as stormwater collection points, and pipe networks have been developed to hydraulically separate flows from each use so that appropriate treatment measures/Best Management Practices (BMP) may be employed. Pretreatment BMP's utilized in the treatment train for the self-storage building site include deep-sump/hooded catch basins and a sediment forebay prior to discharge into the infiltration basin. Pretreatment BMP's for building #1605 site includes a hydrodynamic separator as well as deep-sump/hooded catch basins and sediment forebay. Stormwater treatment requirements, calculations and compliance documentation are provided in section 3 of this report.

SUMMARY OF HYDROLOGY

#1603-#1605 Main Street

Using HydroCAD Software

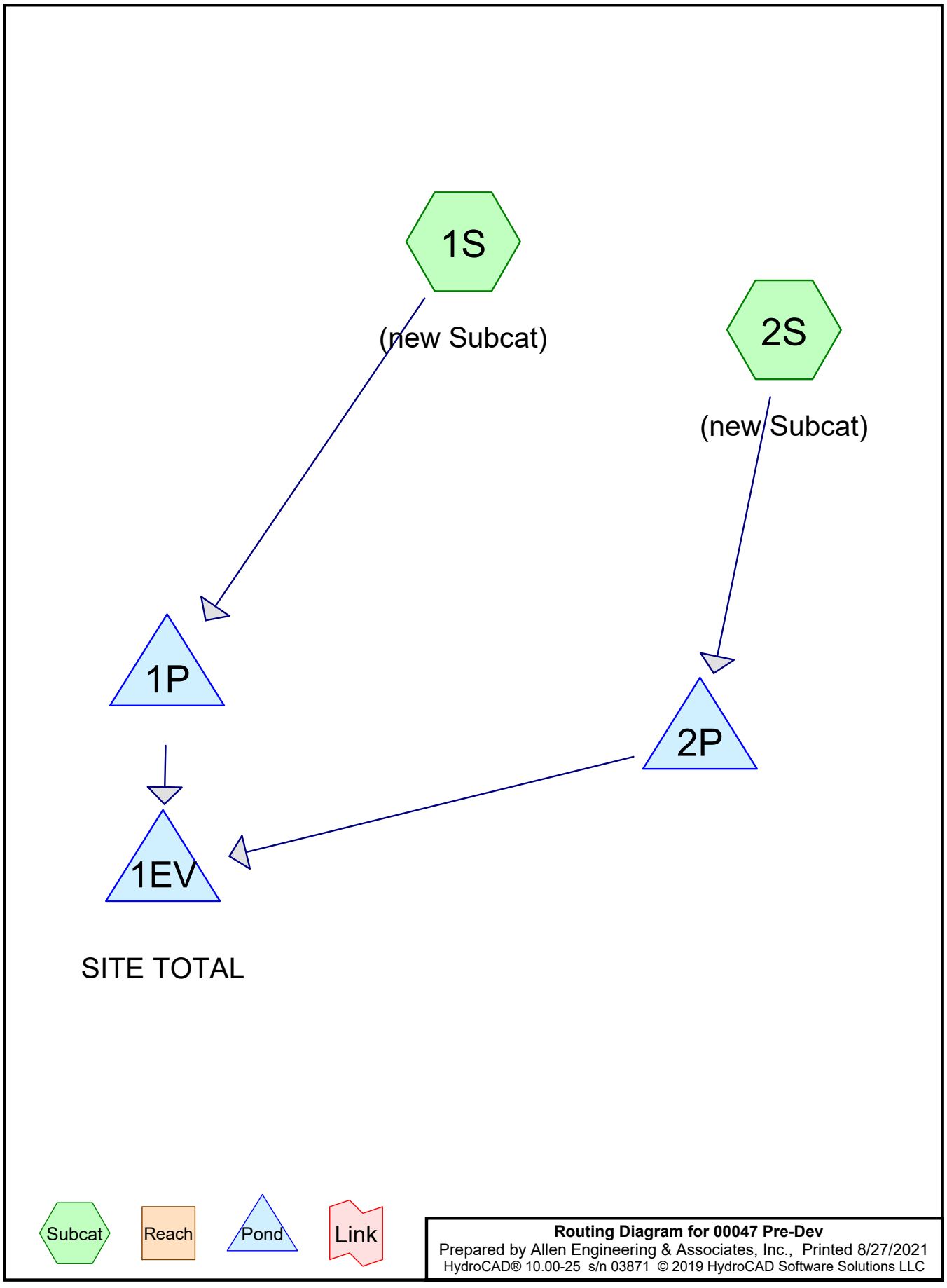
Job No.:	00047	Calced By:	BSW
Client:	Leicester Main, LLC	Date:	9/23/2021
Location:	Bellingham, MA	Revised:	

TABLE 1: SUMMARY OF PEAK RATES OF STORMWATER RUNOFF

Evaluation Point	HydroCAD symbols	Existing Conditions Runoff (CFS)				HydroCAD symbols	Proposed Conditions Runoff (CFS)			
		2-Yr	10-Yr	25-Yr	100-Yr		2-Yr	10-Yr	25-Yr	100-Yr
W'ly Wetland	1EV	3.75	8.10	11.76	19.51	1EV	3.07	6.13	10.75	17.19
TOTAL		**3.75**	**8.10**	**11.76**	**19.51**		**3.07**	**6.13**	**10.75**	**17.19**

* **NOTE:** All drain piping is designed to handle the 25-year storm event.

Pre-Development Drainage Calculations



Routing Diagram for 00047 Pre-Dev
Prepared by Allen Engineering & Associates, Inc., Printed 8/27/2021

Area Listing (all nodes)

Area (sq-ft)	CN	Description (subcatchment-numbers)
2,404	80	>75% Grass cover, Good, HSG D (1S)
37,914	70	Woods, Good, HSG C (1S, 2S)
131,299	77	Woods, Good, HSG D (1S, 2S)
171,617	**75**	**TOTAL AREA**

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

Subcatchment 1S: (new Subcat) Runoff Area=154,518 sf 0.00% Impervious Runoff Depth=1.17"
Flow Length=621' Tc=15.8 min CN=76 Runoff=3.45 cfs 15,103 cf

Subcatchment 2S: (new Subcat) Runoff Area=17,099 sf 0.00% Impervious Runoff Depth=0.95"
Flow Length=434' Tc=14.4 min CN=72 Runoff=0.31 cfs 1,351 cf

Pond 1EV: SITE TOTAL Inflow=3.75 cfs 16,455 cf
Primary=3.75 cfs 16,455 cf

Pond 1P: Inflow=3.45 cfs 15,103 cf
Primary=3.45 cfs 15,103 cf

Pond 2P: Inflow=0.31 cfs 1,351 cf
Primary=0.31 cfs 1,351 cf

Total Runoff Area = 171,617 sf Runoff Volume = 16,455 cf Average Runoff Depth = 1.15"
100.00% Pervious = 171,617 sf 0.00% Impervious = 0 sf

Summary for Subcatchment 1S: (new Subcat)

Runoff = 3.45 cfs @ 12.23 hrs, Volume= 15,103 cf, Depth= 1.17"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-48.00 hrs, dt= 0.05 hrs
Type III 24-hr 2YR Rainfall=3.23"

Area (sf)	CN	Description
2,404	80	>75% Grass cover, Good, HSG D
126,371	77	Woods, Good, HSG D
25,743	70	Woods, Good, HSG C
154,518	76	Weighted Average
154,518		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
7.0	50	0.0800	0.12		**Sheet Flow,** Woods: Light underbrush n= 0.400 P2= 3.26"
8.8	571	0.0466	1.08		**Shallow Concentrated Flow,** Woodland Kv= 5.0 fps
15.8	621	Total			

Summary for Subcatchment 2S: (new Subcat)

Runoff = 0.31 cfs @ 12.22 hrs, Volume= 1,351 cf, Depth= 0.95"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-48.00 hrs, dt= 0.05 hrs
Type III 24-hr 2YR Rainfall=3.23"

Area (sf)	CN	Description
4,928	77	Woods, Good, HSG D
12,171	70	Woods, Good, HSG C
17,099	72	Weighted Average
17,099		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
8.5	50	0.0500	0.10		**Sheet Flow,** Woods: Light underbrush n= 0.400 P2= 3.26"
5.9	384	0.0469	1.08		**Shallow Concentrated Flow,** Woodland Kv= 5.0 fps
14.4	434	Total			

Summary for Pond 1EV: SITE TOTAL

Inflow Area = 171,617 sf, 0.00% Impervious, Inflow Depth = 1.15" for 2YR event
Inflow = 3.75 cfs @ 12.23 hrs, Volume= 16,455 cf
Primary = 3.75 cfs @ 12.23 hrs, Volume= 16,455 cf, Atten= 0%, Lag= 0.0 min

Routing by Stor-Ind method, Time Span= 0.00-48.00 hrs, dt= 0.05 hrs

Summary for Pond 1P:

Inflow Area = 154,518 sf, 0.00% Impervious, Inflow Depth = 1.17" for 2YR event
Inflow = 3.45 cfs @ 12.23 hrs, Volume= 15,103 cf
Primary = 3.45 cfs @ 12.23 hrs, Volume= 15,103 cf, Atten= 0%, Lag= 0.0 min

Routing by Stor-Ind method, Time Span= 0.00-48.00 hrs, dt= 0.05 hrs

Summary for Pond 2P:

Inflow Area = 17,099 sf, 0.00% Impervious, Inflow Depth = 0.95" for 2YR event
Inflow = 0.31 cfs @ 12.22 hrs, Volume= 1,351 cf
Primary = 0.31 cfs @ 12.22 hrs, Volume= 1,351 cf, Atten= 0%, Lag= 0.0 min

Routing by Stor-Ind method, Time Span= 0.00-48.00 hrs, dt= 0.05 hrs

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

Subcatchment 1S: (new Subcat) Runoff Area=154,518 sf 0.00% Impervious Runoff Depth=2.41"
Flow Length=621' Tc=15.8 min CN=76 Runoff=7.38 cfs 31,064 cf

Subcatchment 2S: (new Subcat) Runoff Area=17,099 sf 0.00% Impervious Runoff Depth=2.08"
Flow Length=434' Tc=14.4 min CN=72 Runoff=0.72 cfs 2,968 cf

Pond 1EV: SITE TOTAL Inflow=8.10 cfs 34,032 cf
Primary=8.10 cfs 34,032 cf

Pond 1P: Inflow=7.38 cfs 31,064 cf
Primary=7.38 cfs 31,064 cf

Pond 2P: Inflow=0.72 cfs 2,968 cf
Primary=0.72 cfs 2,968 cf

Total Runoff Area = 171,617 sf Runoff Volume = 34,032 cf Average Runoff Depth = 2.38"
100.00% Pervious = 171,617 sf 0.00% Impervious = 0 sf

Summary for Subcatchment 1S: (new Subcat)

Runoff = 7.38 cfs @ 12.22 hrs, Volume= 31,064 cf, Depth= 2.41"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-48.00 hrs, dt= 0.05 hrs
Type III 24-hr 10YR Rainfall=4.85"

Area (sf)	CN	Description
2,404	80	>75% Grass cover, Good, HSG D
126,371	77	Woods, Good, HSG D
25,743	70	Woods, Good, HSG C
154,518	76	Weighted Average
154,518		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
7.0	50	0.0800	0.12		**Sheet Flow,** Woods: Light underbrush n= 0.400 P2= 3.26"
8.8	571	0.0466	1.08		**Shallow Concentrated Flow,** Woodland Kv= 5.0 fps
15.8	621	Total			

Summary for Subcatchment 2S: (new Subcat)

Runoff = 0.72 cfs @ 12.21 hrs, Volume= 2,968 cf, Depth= 2.08"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-48.00 hrs, dt= 0.05 hrs
Type III 24-hr 10YR Rainfall=4.85"

Area (sf)	CN	Description
4,928	77	Woods, Good, HSG D
12,171	70	Woods, Good, HSG C
17,099	72	Weighted Average
17,099		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
8.5	50	0.0500	0.10		**Sheet Flow,** Woods: Light underbrush n= 0.400 P2= 3.26"
5.9	384	0.0469	1.08		**Shallow Concentrated Flow,** Woodland Kv= 5.0 fps
14.4	434	Total			

Summary for Pond 1EV: SITE TOTAL

Inflow Area = 171,617 sf, 0.00% Impervious, Inflow Depth = 2.38" for 10YR event
Inflow = 8.10 cfs @ 12.22 hrs, Volume= 34,032 cf
Primary = 8.10 cfs @ 12.22 hrs, Volume= 34,032 cf, Atten= 0%, Lag= 0.0 min

Routing by Stor-Ind method, Time Span= 0.00-48.00 hrs, dt= 0.05 hrs

Summary for Pond 1P:

Inflow Area = 154,518 sf, 0.00% Impervious, Inflow Depth = 2.41" for 10YR event
Inflow = 7.38 cfs @ 12.22 hrs, Volume= 31,064 cf
Primary = 7.38 cfs @ 12.22 hrs, Volume= 31,064 cf, Atten= 0%, Lag= 0.0 min

Routing by Stor-Ind method, Time Span= 0.00-48.00 hrs, dt= 0.05 hrs

Summary for Pond 2P:

Inflow Area = 17,099 sf, 0.00% Impervious, Inflow Depth = 2.08" for 10YR event
Inflow = 0.72 cfs @ 12.21 hrs, Volume= 2,968 cf
Primary = 0.72 cfs @ 12.21 hrs, Volume= 2,968 cf, Atten= 0%, Lag= 0.0 min

Routing by Stor-Ind method, Time Span= 0.00-48.00 hrs, dt= 0.05 hrs

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

Subcatchment 1S: (new Subcat) Runoff Area=154,518 sf 0.00% Impervious Runoff Depth=3.48"
Flow Length=621' Tc=15.8 min CN=76 Runoff=10.68 cfs 44,749 cf

Subcatchment 2S: (new Subcat) Runoff Area=17,099 sf 0.00% Impervious Runoff Depth=3.08"
Flow Length=434' Tc=14.4 min CN=72 Runoff=1.08 cfs 4,394 cf

Pond 1EV: SITE TOTAL Inflow=11.76 cfs 49,142 cf
Primary=11.76 cfs 49,142 cf

Pond 1P: Inflow=10.68 cfs 44,749 cf
Primary=10.68 cfs 44,749 cf

Pond 2P: Inflow=1.08 cfs 4,394 cf
Primary=1.08 cfs 4,394 cf

Total Runoff Area = 171,617 sf Runoff Volume = 49,142 cf Average Runoff Depth = 3.44"
100.00% Pervious = 171,617 sf 0.00% Impervious = 0 sf

Summary for Subcatchment 1S: (new Subcat)

Runoff = 10.68 cfs @ 12.22 hrs, Volume= 44,749 cf, Depth= 3.48"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-48.00 hrs, dt= 0.05 hrs
Type III 24-hr 25YR Rainfall=6.11"

Area (sf)	CN	Description
2,404	80	>75% Grass cover, Good, HSG D
126,371	77	Woods, Good, HSG D
25,743	70	Woods, Good, HSG C
154,518	76	Weighted Average
154,518		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
7.0	50	0.0800	0.12		**Sheet Flow,** Woods: Light underbrush n= 0.400 P2= 3.26"
8.8	571	0.0466	1.08		**Shallow Concentrated Flow,** Woodland Kv= 5.0 fps
15.8	621	Total			

Summary for Subcatchment 2S: (new Subcat)

Runoff = 1.08 cfs @ 12.20 hrs, Volume= 4,394 cf, Depth= 3.08"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-48.00 hrs, dt= 0.05 hrs
Type III 24-hr 25YR Rainfall=6.11"

Area (sf)	CN	Description
4,928	77	Woods, Good, HSG D
12,171	70	Woods, Good, HSG C
17,099	72	Weighted Average
17,099		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
8.5	50	0.0500	0.10		**Sheet Flow,** Woods: Light underbrush n= 0.400 P2= 3.26"
5.9	384	0.0469	1.08		**Shallow Concentrated Flow,** Woodland Kv= 5.0 fps
14.4	434	Total			

Summary for Pond 1EV: SITE TOTAL

Inflow Area = 171,617 sf, 0.00% Impervious, Inflow Depth = 3.44" for 25YR event
Inflow = 11.76 cfs @ 12.22 hrs, Volume= 49,142 cf
Primary = 11.76 cfs @ 12.22 hrs, Volume= 49,142 cf, Atten= 0%, Lag= 0.0 min

Routing by Stor-Ind method, Time Span= 0.00-48.00 hrs, dt= 0.05 hrs

Summary for Pond 1P:

Inflow Area = 154,518 sf, 0.00% Impervious, Inflow Depth = 3.48" for 25YR event
Inflow = 10.68 cfs @ 12.22 hrs, Volume= 44,749 cf
Primary = 10.68 cfs @ 12.22 hrs, Volume= 44,749 cf, Atten= 0%, Lag= 0.0 min

Routing by Stor-Ind method, Time Span= 0.00-48.00 hrs, dt= 0.05 hrs

Summary for Pond 2P:

Inflow Area = 17,099 sf, 0.00% Impervious, Inflow Depth = 3.08" for 25YR event
Inflow = 1.08 cfs @ 12.20 hrs, Volume= 4,394 cf
Primary = 1.08 cfs @ 12.20 hrs, Volume= 4,394 cf, Atten= 0%, Lag= 0.0 min

Routing by Stor-Ind method, Time Span= 0.00-48.00 hrs, dt= 0.05 hrs

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

Subcatchment 1S: (new Subcat) Runoff Area=154,518 sf 0.00% Impervious Runoff Depth=5.78"
Flow Length=621' Tc=15.8 min CN=76 Runoff=17.65 cfs 74,431 cf

Subcatchment 2S: (new Subcat) Runoff Area=17,099 sf 0.00% Impervious Runoff Depth=5.30"
Flow Length=434' Tc=14.4 min CN=72 Runoff=1.86 cfs 7,546 cf

Pond 1EV: SITE TOTAL Inflow=19.51 cfs 81,978 cf
Primary=19.51 cfs 81,978 cf

Pond 1P: Inflow=17.65 cfs 74,431 cf
Primary=17.65 cfs 74,431 cf

Pond 2P: Inflow=1.86 cfs 7,546 cf
Primary=1.86 cfs 7,546 cf

Total Runoff Area = 171,617 sf Runoff Volume = 81,978 cf Average Runoff Depth = 5.73"
100.00% Pervious = 171,617 sf 0.00% Impervious = 0 sf

Summary for Subcatchment 1S: (new Subcat)

Runoff = 17.65 cfs @ 12.21 hrs, Volume= 74,431 cf, Depth= 5.78"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-48.00 hrs, dt= 0.05 hrs
Type III 24-hr 100YR Rainfall=8.68"

Area (sf)	CN	Description
2,404	80	>75% Grass cover, Good, HSG D
126,371	77	Woods, Good, HSG D
25,743	70	Woods, Good, HSG C
154,518	76	Weighted Average
154,518		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
7.0	50	0.0800	0.12		**Sheet Flow,** Woods: Light underbrush n= 0.400 P2= 3.26"
8.8	571	0.0466	1.08		**Shallow Concentrated Flow,** Woodland Kv= 5.0 fps
15.8	621	Total			

Summary for Subcatchment 2S: (new Subcat)

Runoff = 1.86 cfs @ 12.20 hrs, Volume= 7,546 cf, Depth= 5.30"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-48.00 hrs, dt= 0.05 hrs
Type III 24-hr 100YR Rainfall=8.68"

Area (sf)	CN	Description
4,928	77	Woods, Good, HSG D
12,171	70	Woods, Good, HSG C
17,099	72	Weighted Average
17,099		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
8.5	50	0.0500	0.10		**Sheet Flow,** Woods: Light underbrush n= 0.400 P2= 3.26"
5.9	384	0.0469	1.08		**Shallow Concentrated Flow,** Woodland Kv= 5.0 fps
14.4	434	Total			

Summary for Pond 1EV: SITE TOTAL

Inflow Area = 171,617 sf, 0.00% Impervious, Inflow Depth = 5.73" for 100YR event
Inflow = 19.51 cfs @ 12.21 hrs, Volume= 81,978 cf
Primary = 19.51 cfs @ 12.21 hrs, Volume= 81,978 cf, Atten= 0%, Lag= 0.0 min

Routing by Stor-Ind method, Time Span= 0.00-48.00 hrs, dt= 0.05 hrs

Summary for Pond 1P:

Inflow Area = 154,518 sf, 0.00% Impervious, Inflow Depth = 5.78" for 100YR event
Inflow = 17.65 cfs @ 12.21 hrs, Volume= 74,431 cf
Primary = 17.65 cfs @ 12.21 hrs, Volume= 74,431 cf, Atten= 0%, Lag= 0.0 min

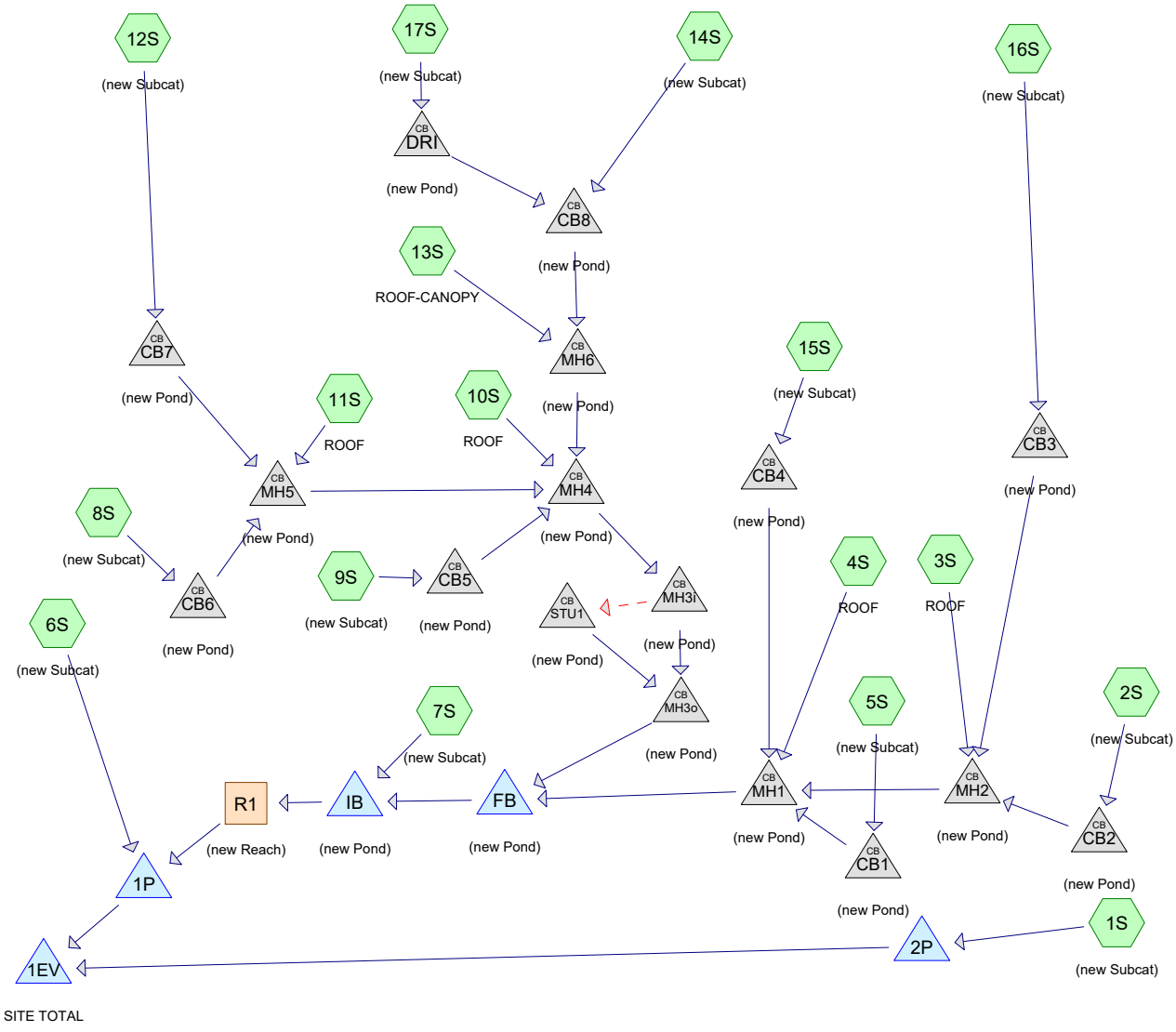
Routing by Stor-Ind method, Time Span= 0.00-48.00 hrs, dt= 0.05 hrs

Summary for Pond 2P:

Inflow Area = 17,099 sf, 0.00% Impervious, Inflow Depth = 5.30" for 100YR event
Inflow = 1.86 cfs @ 12.20 hrs, Volume= 7,546 cf
Primary = 1.86 cfs @ 12.20 hrs, Volume= 7,546 cf, Atten= 0%, Lag= 0.0 min

Routing by Stor-Ind method, Time Span= 0.00-48.00 hrs, dt= 0.05 hrs

Post-Development Drainage Calculations



Routing Diagram for 00047 Post-Dev

Prepared by Allen Engineering & Associates, Inc., Printed 8/27/2021

Area Listing (all nodes)

Area (sq-ft)	CN	Description (subcatchment-numbers)
12,630	74	>75% Grass cover, Good, HSG C (1S, 2S, 5S, 15S, 16S)
47,087	80	>75% Grass cover, Good, HSG D (1S, 5S, 6S, 7S, 8S, 9S, 12S, 14S, 15S, 16S, 17S)
580	91	Gravel roads, HSG D (7S)
16,452	98	Paved parking, HSG C (2S, 5S, 14S, 15S, 16S)
55,150	98	Paved parking, HSG D (5S, 8S, 9S, 12S, 14S, 15S, 16S, 17S)
8,300	98	Roofs, HSG C (3S, 4S)
10,042	98	Roofs, HSG D (4S, 10S, 11S, 13S)
906	98	Unconnected pavement, HSG C (2S, 5S, 15S, 16S)
3,092	98	Unconnected pavement, HSG D (5S, 8S, 9S, 12S, 14S)
5,880	98	Water Surface, HSG D (7S)
10,802	77	Woods, Good, HSG D (6S)
845	98	riprap (6S, 7S)
171,766	**90**	**TOTAL AREA**

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

Subcatchment 1S: (new Subcat) Runoff Area=12,290 sf 0.00% Impervious Runoff Depth=1.17"
Flow Length=40' Slope=0.2750 '/' Tc=1.6 min CN=76 Runoff=0.41 cfs 1,201 cf

Subcatchment 2S: (new Subcat) Runoff Area=5,956 sf 64.05% Impervious Runoff Depth=2.11"
Flow Length=186' Tc=1.6 min CN=89 Runoff=0.37 cfs 1,047 cf

Subcatchment 3S: ROOF Runoff Area=5,000 sf 100.00% Impervious Runoff Depth=3.00"
Tc=1.0 min CN=98 Runoff=0.40 cfs 1,249 cf

Subcatchment 4S: ROOF Runoff Area=5,000 sf 100.00% Impervious Runoff Depth=3.00"
Tc=1.0 min CN=98 Runoff=0.40 cfs 1,249 cf

Subcatchment 5S: (new Subcat) Runoff Area=10,067 sf 81.72% Impervious Runoff Depth=2.57"
Flow Length=157' Tc=1.0 min CN=94 Runoff=0.74 cfs 2,158 cf

Subcatchment 6S: (new Subcat) Runoff Area=26,955 sf 2.64% Impervious Runoff Depth=1.36"
Flow Length=208' Tc=3.9 min CN=79 Runoff=1.02 cfs 3,053 cf

Subcatchment 7S: (new Subcat) Runoff Area=13,165 sf 45.68% Impervious Runoff Depth=2.11"
Flow Length=42' Slope=0.1857 '/' Tc=2.0 min CN=89 Runoff=0.81 cfs 2,314 cf

Subcatchment 8S: (new Subcat) Runoff Area=8,734 sf 81.55% Impervious Runoff Depth=2.67"
Flow Length=125' Tc=0.9 min CN=95 Runoff=0.67 cfs 1,946 cf

Subcatchment 9S: (new Subcat) Runoff Area=8,042 sf 87.19% Impervious Runoff Depth=2.78"
Flow Length=112' Tc=0.8 min CN=96 Runoff=0.63 cfs 1,862 cf

Subcatchment 10S: ROOF Runoff Area=2,640 sf 100.00% Impervious Runoff Depth=3.00"
Tc=1.0 min CN=98 Runoff=0.21 cfs 659 cf

Subcatchment 11S: ROOF Runoff Area=2,822 sf 100.00% Impervious Runoff Depth=3.00"
Tc=1.0 min CN=98 Runoff=0.23 cfs 705 cf

Subcatchment12S: (new Subcat) Runoff Area=16,498 sf 91.30% Impervious Runoff Depth=2.78"
Flow Length=126' Tc=0.8 min CN=96 Runoff=1.29 cfs 3,820 cf

Subcatchment13S: ROOF-CANOPY Runoff Area=2,880 sf 100.00% Impervious Runoff Depth=3.00"
Tc=2.0 min CN=98 Runoff=0.23 cfs 719 cf

Subcatchment14S: (new Subcat) Runoff Area=15,482 sf 73.05% Impervious Runoff Depth=2.47"
Flow Length=208' Tc=5.0 min CN=93 Runoff=1.00 cfs 3,193 cf

Subcatchment15S: (new Subcat) Runoff Area=7,846 sf 70.75% Impervious Runoff Depth=2.38"
Flow Length=142' Tc=1.0 min CN=92 Runoff=0.55 cfs 1,556 cf

Subcatchment16S: (new Subcat) Runoff Area=14,478 sf 84.51% Impervious Runoff Depth=2.67"
Flow Length=224' Tc=4.9 min CN=95 Runoff=0.99 cfs 3,227 cf

Subcatchment17S: (new Subcat) Runoff Area=13,911 sf 37.85% Impervious Runoff Depth=1.94"
Flow Length=111' Tc=3.8 min CN=87 Runoff=0.77 cfs 2,251 cf

Reach R1: (new Reach) Avg. Flow Depth=0.19' Max Vel=1.84 fps Inflow=1.88 cfs 24,608 cf
n=0.069 L=20.0' S=0.0750 '/' Capacity=125.86 cfs Outflow=1.88 cfs 24,608 cf

Pond 1EV: SITE TOTAL Inflow=3.07 cfs 28,863 cf
Primary=3.07 cfs 28,863 cf

Pond 1P: Inflow=2.67 cfs 27,661 cf
Primary=2.67 cfs 27,661 cf

Pond 2P: Inflow=0.41 cfs 1,201 cf
Primary=0.41 cfs 1,201 cf

Pond CB1: (new Pond) Peak Elev=1,036.96' Inflow=0.74 cfs 2,158 cf
12.0" Round Culvert n=0.013 L=8.0' S=0.0150 '/' Outflow=0.74 cfs 2,158 cf

Pond CB2: (new Pond) Peak Elev=1,038.26' Inflow=0.37 cfs 1,047 cf
12.0" Round Culvert n=0.013 L=12.0' S=0.0150 '/' Outflow=0.37 cfs 1,047 cf

Pond CB3: (new Pond) Peak Elev=1,040.46' Inflow=0.99 cfs 3,227 cf
12.0" Round Culvert n=0.013 L=165.0' S=0.0135 '/' Outflow=0.99 cfs 3,227 cf

Pond CB4: (new Pond) Peak Elev=1,040.33' Inflow=0.55 cfs 1,556 cf
12.0" Round Culvert n=0.013 L=165.0' S=0.0219 '/' Outflow=0.55 cfs 1,556 cf

Pond CB5: (new Pond) Peak Elev=1,040.67' Inflow=0.63 cfs 1,862 cf
12.0" Round Culvert n=0.013 L=42.0' S=0.0150 '/' Outflow=0.63 cfs 1,862 cf

Pond CB6: (new Pond) Peak Elev=1,041.17' Inflow=0.67 cfs 1,946 cf
12.0" Round Culvert n=0.013 L=36.0' S=0.0100 '/' Outflow=0.67 cfs 1,946 cf

Pond CB7: (new Pond) Peak Elev=1,042.08' Inflow=1.29 cfs 3,820 cf
12.0" Round Culvert n=0.013 L=128.0' S=0.0100 '/' Outflow=1.29 cfs 3,820 cf

Pond CB8: (new Pond) Peak Elev=1,041.44' Inflow=1.77 cfs 5,443 cf
18.0" Round Culvert n=0.013 L=7.0' S=0.0143 '/' Outflow=1.77 cfs 5,443 cf

Pond DRI: (new Pond) Peak Elev=1,044.14' Inflow=0.77 cfs 2,251 cf
12.0" Round Culvert n=0.013 L=74.0' S=0.0196 '/' Outflow=0.77 cfs 2,251 cf

Pond FB: (new Pond) Peak Elev=1,036.55' Storage=2,785 cf Inflow=7.92 cfs 25,641 cf
Outflow=6.88 cfs 24,242 cf

Pond IB: (new Pond) Peak Elev=1,036.55' Storage=9,041 cf Inflow=7.64 cfs 26,555 cf
Outflow=1.88 cfs 24,608 cf

Pond MH1: (new Pond) Peak Elev=1,036.58' Inflow=3.25 cfs 10,485 cf
18.0" Round Culvert n=0.013 L=52.0' S=0.0148 '/' Outflow=3.25 cfs 10,485 cf

Pond MH2: (new Pond) Peak Elev=1,038.10' Inflow=1.68 cfs 5,522 cf
15.0" Round Culvert n=0.013 L=120.0' S=0.0125 '/' Outflow=1.68 cfs 5,522 cf

Pond MH3i: (new Pond) Peak Elev=1,037.13' Inflow=4.67 cfs 15,156 cf
Primary=3.36 cfs 4,091 cf Secondary=1.41 cfs 11,065 cf Outflow=4.67 cfs 15,156 cf

Pond MH3o: (new Pond) Peak Elev=1,036.69' Inflow=4.67 cfs 15,156 cf
24.0" Round Culvert n=0.013 L=50.0' S=0.0172 '/' Outflow=4.67 cfs 15,156 cf

Pond MH4: (new Pond) Peak Elev=1,038.19' Inflow=4.67 cfs 15,156 cf
24.0" Round Culvert n=0.013 L=57.0' S=0.0172 '/' Outflow=4.67 cfs 15,156 cf

Pond MH5: (new Pond) Peak Elev=1,040.52' Inflow=2.18 cfs 6,472 cf
18.0" Round Culvert n=0.013 L=132.0' S=0.0110 '/' Outflow=2.18 cfs 6,472 cf

Pond MH6: (new Pond) Peak Elev=1,041.15' Inflow=1.98 cfs 6,163 cf
18.0" Round Culvert n=0.013 L=116.0' S=0.0150 '/' Outflow=1.98 cfs 6,163 cf

Pond STU1: (new Pond) Peak Elev=1,036.97' Inflow=1.41 cfs 11,065 cf
12.0" Round Culvert n=0.013 L=5.0' S=0.0200 '/' Outflow=1.41 cfs 11,065 cf

Total Runoff Area = 171,766 sf Runoff Volume = 32,209 cf Average Runoff Depth = 2.25"
41.39% Pervious = 71,099 sf 58.61% Impervious = 100,667 sf

Summary for Subcatchment 1S: (new Subcat)

Runoff = 0.41 cfs @ 12.04 hrs, Volume= 1,201 cf, Depth= 1.17"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-48.00 hrs, dt= 0.05 hrs
Type III 24-hr 2YR Rainfall=3.23"

Area (sf)	CN	Description
4,440	80	>75% Grass cover, Good, HSG D
7,850	74	>75% Grass cover, Good, HSG C
12,290	76	Weighted Average
12,290		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
1.6	40	0.2750	0.41		**Sheet Flow,** Grass: Short n= 0.150 P2= 3.26"

Summary for Subcatchment 2S: (new Subcat)

Runoff = 0.37 cfs @ 12.03 hrs, Volume= 1,047 cf, Depth= 2.11"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-48.00 hrs, dt= 0.05 hrs
Type III 24-hr 2YR Rainfall=3.23"

Area (sf)	CN	Description
26	98	Unconnected pavement, HSG C
3,789	98	Paved parking, HSG C
2,141	74	>75% Grass cover, Good, HSG C
5,956	89	Weighted Average
2,141		35.95% Pervious Area
3,815		64.05% Impervious Area
26		0.68% Unconnected

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
0.6	44	0.0227	1.24		**Sheet Flow,** Smooth surfaces n= 0.011 P2= 3.26"
1.0	142	0.0134	2.35		**Shallow Concentrated Flow,** Paved Kv= 20.3 fps
1.6	186	Total			

Summary for Subcatchment 3S: ROOF

Runoff = 0.40 cfs @ 12.01 hrs, Volume= 1,249 cf, Depth= 3.00"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-48.00 hrs, dt= 0.05 hrs
Type III 24-hr 2YR Rainfall=3.23"

Area (sf)	CN	Description
5,000	98	Roofs, HSG C
5,000		100.00% Impervious Area

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

Summary for Subcatchment 4S: ROOF

Runoff = 0.40 cfs @ 12.01 hrs, Volume= 1,249 cf, Depth= 3.00"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-48.00 hrs, dt= 0.05 hrs
Type III 24-hr 2YR Rainfall=3.23"

Area (sf)	CN	Description
3,300	98	Roofs, HSG C
1,700	98	Roofs, HSG D
5,000	98	Weighted Average
5,000		100.00% Impervious Area

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

Summary for Subcatchment 5S: (new Subcat)

Runoff = 0.74 cfs @ 12.01 hrs, Volume= 2,158 cf, Depth= 2.57"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-48.00 hrs, dt= 0.05 hrs
Type III 24-hr 2YR Rainfall=3.23"

Area (sf)	CN	Description
395	74	>75% Grass cover, Good, HSG C
1,445	80	>75% Grass cover, Good, HSG D
309	98	Unconnected pavement, HSG C
790	98	Unconnected pavement, HSG D
5,597	98	Paved parking, HSG D
1,531	98	Paved parking, HSG C
10,067	94	Weighted Average
1,840		18.28% Pervious Area
8,227		81.72% Impervious Area
1,099		13.36% Unconnected

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
0.5	50	0.0540	1.80		**Sheet Flow,** Smooth surfaces n= 0.011 P2= 3.26"
0.5	107	0.0308	3.56		**Shallow Concentrated Flow,** Paved Kv= 20.3 fps
1.0	157	Total			

Summary for Subcatchment 6S: (new Subcat)

Runoff = 1.02 cfs @ 12.06 hrs, Volume= 3,053 cf, Depth= 1.36"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-48.00 hrs, dt= 0.05 hrs
Type III 24-hr 2YR Rainfall=3.23"

Area (sf)	CN	Description
* 711	98	riprap
15,442	80	>75% Grass cover, Good, HSG D
10,802	77	Woods, Good, HSG D
26,955	79	Weighted Average
26,244		97.36% Pervious Area
711		2.64% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
2.5	50	0.1460	0.33		**Sheet Flow,** Grass: Short n= 0.150 P2= 3.26"
0.1	54	0.1815	6.86		**Shallow Concentrated Flow,** Unpaved Kv= 16.1 fps
1.3	104	0.0769	1.39		**Shallow Concentrated Flow,** Woodland Kv= 5.0 fps
3.9	208	Total			

Summary for Subcatchment 7S: (new Subcat)

Runoff = 0.81 cfs @ 12.04 hrs, Volume= 2,314 cf, Depth= 2.11"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-48.00 hrs, dt= 0.05 hrs
Type III 24-hr 2YR Rainfall=3.23"

Area (sf)	CN	Description
5,880	98	Water Surface, HSG D
* 134	98	riprap
6,571	80	>75% Grass cover, Good, HSG D
580	91	Gravel roads, HSG D
13,165	89	Weighted Average
7,151		54.32% Pervious Area
6,014		45.68% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
2.0	42	0.1857	0.35		**Sheet Flow,** Grass: Short n= 0.150 P2= 3.26"

Summary for Subcatchment 8S: (new Subcat)

Runoff = 0.67 cfs @ 12.01 hrs, Volume= 1,946 cf, Depth= 2.67"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-48.00 hrs, dt= 0.05 hrs
Type III 24-hr 2YR Rainfall=3.23"

Area (sf)	CN	Description
1,611	80	>75% Grass cover, Good, HSG D
459	98	Unconnected pavement, HSG D
6,664	98	Paved parking, HSG D
8,734	95	Weighted Average
1,611		18.45% Pervious Area
7,123		81.55% Impervious Area
459		6.44% Unconnected

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
0.5	50	0.0411	1.61		**Sheet Flow,** Smooth surfaces n= 0.011 P2= 3.26"
0.4	75	0.0260	3.27		**Shallow Concentrated Flow,** Paved Kv= 20.3 fps
0.9	125	Total			

Summary for Subcatchment 9S: (new Subcat)

Runoff = 0.63 cfs @ 12.01 hrs, Volume= 1,862 cf, Depth= 2.78"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-48.00 hrs, dt= 0.05 hrs
Type III 24-hr 2YR Rainfall=3.23"

Area (sf)	CN	Description
1,030	80	>75% Grass cover, Good, HSG D
194	98	Unconnected pavement, HSG D
6,818	98	Paved parking, HSG D
8,042	96	Weighted Average
1,030		12.81% Pervious Area
7,012		87.19% Impervious Area
194		2.77% Unconnected

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
0.5	50	0.0380	1.56		**Sheet Flow,** Smooth surfaces n= 0.011 P2= 3.26"
0.3	62	0.0274	3.36		**Shallow Concentrated Flow,** Paved Kv= 20.3 fps
0.8	112	Total			

Summary for Subcatchment 10S: ROOF

Runoff = 0.21 cfs @ 12.01 hrs, Volume= 659 cf, Depth= 3.00"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-48.00 hrs, dt= 0.05 hrs
Type III 24-hr 2YR Rainfall=3.23"

Area (sf)	CN	Description
2,640	98	Roofs, HSG D
2,640		100.00% Impervious Area

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

Summary for Subcatchment 11S: ROOF

Runoff = 0.23 cfs @ 12.01 hrs, Volume= 705 cf, Depth= 3.00"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-48.00 hrs, dt= 0.05 hrs
Type III 24-hr 2YR Rainfall=3.23"

Area (sf)	CN	Description
2,822	98	Roofs, HSG D
2,822		100.00% Impervious Area

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

Summary for Subcatchment 12S: (new Subcat)

Runoff = 1.29 cfs @ 12.01 hrs, Volume= 3,820 cf, Depth= 2.78"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-48.00 hrs, dt= 0.05 hrs
Type III 24-hr 2YR Rainfall=3.23"

Area (sf)	CN	Description
1,435	80	>75% Grass cover, Good, HSG D
1,035	98	Unconnected pavement, HSG D
14,028	98	Paved parking, HSG D
16,498	96	Weighted Average
1,435		8.70% Pervious Area
15,063		91.30% Impervious Area
1,035		6.87% Unconnected

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
0.5	50	0.0500	1.74		**Sheet Flow,** Smooth surfaces n= 0.011 P2= 3.26"
0.3	76	0.0329	3.68		**Shallow Concentrated Flow,** Paved Kv= 20.3 fps
0.8	126	Total			

Summary for Subcatchment 13S: ROOF-CANOPY

Runoff = 0.23 cfs @ 12.03 hrs, Volume= 719 cf, Depth= 3.00"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-48.00 hrs, dt= 0.05 hrs
Type III 24-hr 2YR Rainfall=3.23"

Area (sf)	CN	Description
2,880	98	Roofs, HSG D
2,880		100.00% Impervious Area

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

Summary for Subcatchment 14S: (new Subcat)

Runoff = 1.00 cfs @ 12.07 hrs, Volume= 3,193 cf, Depth= 2.47"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-48.00 hrs, dt= 0.05 hrs
Type III 24-hr 2YR Rainfall=3.23"

Area (sf)	CN	Description
614	98	Unconnected pavement, HSG D
211	98	Paved parking, HSG C
10,484	98	Paved parking, HSG D
4,173	80	>75% Grass cover, Good, HSG D
15,482	93	Weighted Average
4,173		26.95% Pervious Area
11,309		73.05% Impervious Area
614		5.43% Unconnected

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
4.2	50	0.0400	0.20		**Sheet Flow,** Grass: Short n= 0.150 P2= 3.26"
0.8	158	0.0282	3.41		**Shallow Concentrated Flow,** Paved Kv= 20.3 fps
5.0	208	Total			

Summary for Subcatchment 15S: (new Subcat)

Runoff = 0.55 cfs @ 12.01 hrs, Volume= 1,556 cf, Depth= 2.38"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-48.00 hrs, dt= 0.05 hrs
Type III 24-hr 2YR Rainfall=3.23"

Area (sf)	CN	Description
1,155	74	>75% Grass cover, Good, HSG C
1,140	80	>75% Grass cover, Good, HSG D
174	98	Unconnected pavement, HSG C
2,097	98	Paved parking, HSG D
3,280	98	Paved parking, HSG C
7,846	92	Weighted Average
2,295		29.25% Pervious Area
5,551		70.75% Impervious Area
174		3.13% Unconnected

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
0.5	50	0.0377	1.56		**Sheet Flow,** Smooth surfaces n= 0.011 P2= 3.26"
0.5	92	0.0250	3.21		**Shallow Concentrated Flow,** Paved Kv= 20.3 fps
1.0	142	Total			

Summary for Subcatchment 16S: (new Subcat)

Runoff = 0.99 cfs @ 12.07 hrs, Volume= 3,227 cf, Depth= 2.67"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-48.00 hrs, dt= 0.05 hrs
Type III 24-hr 2YR Rainfall=3.23"

Area (sf)	CN	Description
397	98	Unconnected pavement, HSG C
1,089	74	>75% Grass cover, Good, HSG C
1,154	80	>75% Grass cover, Good, HSG D
7,641	98	Paved parking, HSG C
4,197	98	Paved parking, HSG D
14,478	95	Weighted Average
2,243		15.49% Pervious Area
12,235		84.51% Impervious Area
397		3.24% Unconnected

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
4.2	50	0.0400	0.20		**Sheet Flow,** Grass: Short n= 0.150 P2= 3.26"
0.7	174	0.0374	3.93		**Shallow Concentrated Flow,** Paved Kv= 20.3 fps
4.9	224	Total			

Summary for Subcatchment 17S: (new Subcat)

Runoff = 0.77 cfs @ 12.06 hrs, Volume= 2,251 cf, Depth= 1.94"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-48.00 hrs, dt= 0.05 hrs
Type III 24-hr 2YR Rainfall=3.23"

Area (sf)	CN	Description
8,646	80	>75% Grass cover, Good, HSG D
5,265	98	Paved parking, HSG D
13,911	87	Weighted Average
8,646		62.15% Pervious Area
5,265		37.85% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
3.5	50	0.0660	0.24		**Sheet Flow,** Grass: Short n= 0.150 P2= 3.26"
0.3	61	0.0205	2.91		**Shallow Concentrated Flow,** Paved Kv= 20.3 fps
3.8	111	Total			

Summary for Reach R1: (new Reach)

Inflow Area = 132,521 sf, 75.43% Impervious, Inflow Depth = 2.23" for 2YR event
Inflow = 1.88 cfs @ 12.36 hrs, Volume= 24,608 cf
Outflow = 1.88 cfs @ 12.36 hrs, Volume= 24,608 cf, Atten= 0%, Lag= 0.1 min

Routing by Dyn-Stor-Ind method, Time Span= 0.00-48.00 hrs, dt= 0.05 hrs
Max. Velocity= 1.84 fps, Min. Travel Time= 0.2 min
Avg. Velocity = 0.63 fps, Avg. Travel Time= 0.5 min

Peak Storage= 20 cf @ 12.36 hrs
Average Depth at Peak Storage= 0.19'
Bank-Full Depth= 2.00' Flow Area= 18.0 sf, Capacity= 125.86 cfs

5.00' x 2.00' deep channel, n= 0.069 Riprap, 6-inch
Side Slope Z-value= 2.0 '/' Top Width= 13.00'
Length= 20.0' Slope= 0.0750 '/'
Inlet Invert= 1,031.00', Outlet Invert= 1,029.50'

Summary for Pond 1EV: SITE TOTAL

Inflow Area = 171,766 sf, 58.61% Impervious, Inflow Depth = 2.02" for 2YR event
Inflow = 3.07 cfs @ 12.07 hrs, Volume= 28,863 cf
Primary = 3.07 cfs @ 12.07 hrs, Volume= 28,863 cf, Atten= 0%, Lag= 0.0 min

Routing by Dyn-Stor-Ind method, Time Span= 0.00-48.00 hrs, dt= 0.05 hrs

Summary for Pond 1P:

Inflow Area = 159,476 sf, 63.12% Impervious, Inflow Depth = 2.08" for 2YR event
Inflow = 2.67 cfs @ 12.08 hrs, Volume= 27,661 cf
Primary = 2.67 cfs @ 12.08 hrs, Volume= 27,661 cf, Atten= 0%, Lag= 0.0 min

Routing by Dyn-Stor-Ind method, Time Span= 0.00-48.00 hrs, dt= 0.05 hrs

Summary for Pond 2P:

Inflow Area = 12,290 sf, 0.00% Impervious, Inflow Depth = 1.17" for 2YR event
Inflow = 0.41 cfs @ 12.04 hrs, Volume= 1,201 cf
Primary = 0.41 cfs @ 12.04 hrs, Volume= 1,201 cf, Atten= 0%, Lag= 0.0 min

Routing by Dyn-Stor-Ind method, Time Span= 0.00-48.00 hrs, dt= 0.05 hrs

Summary for Pond CB1: (new Pond)

Inflow Area = 10,067 sf, 81.72% Impervious, Inflow Depth = 2.57" for 2YR event
Inflow = 0.74 cfs @ 12.01 hrs, Volume= 2,158 cf
Outflow = 0.74 cfs @ 12.01 hrs, Volume= 2,158 cf, Atten= 0%, Lag= 0.0 min
Primary = 0.74 cfs @ 12.01 hrs, Volume= 2,158 cf

Routing by Dyn-Stor-Ind method, Time Span= 0.00-48.00 hrs, dt= 0.05 hrs
Peak Elev= 1,036.96' @ 12.01 hrs

Device	Routing	Invert	Outlet Devices
#1	Primary	1,036.50'	**12.0" Round Culvert** L= 8.0' Ke= 0.200 Inlet / Outlet Invert= 1,036.50' / 1,036.38' S= 0.0150 '/' Cc= 0.900 n= 0.013 Corrugated PE, smooth interior, Flow Area= 0.79 sf

Primary OutFlow Max=0.71 cfs @ 12.01 hrs HW=1,036.95' TW=1,036.53' (Dynamic Tailwater)
1=Culvert (Barrel Controls 0.71 cfs @ 3.08 fps)

Summary for Pond CB2: (new Pond)

Inflow Area = 5,956 sf, 64.05% Impervious, Inflow Depth = 2.11" for 2YR event
Inflow = 0.37 cfs @ 12.03 hrs, Volume= 1,047 cf
Outflow = 0.37 cfs @ 12.03 hrs, Volume= 1,047 cf, Atten= 0%, Lag= 0.0 min
Primary = 0.37 cfs @ 12.03 hrs, Volume= 1,047 cf

Routing by Dyn-Stor-Ind method, Time Span= 0.00-48.00 hrs, dt= 0.05 hrs
Peak Elev= 1,038.26' @ 12.05 hrs

Device	Routing	Invert	Outlet Devices
#1	Primary	1,037.95'	**12.0" Round Culvert** L= 12.0' Ke= 0.200 Inlet / Outlet Invert= 1,037.95' / 1,037.77' S= 0.0150 '/' Cc= 0.900 n= 0.013 Corrugated PE, smooth interior, Flow Area= 0.79 sf

Primary OutFlow Max=0.30 cfs @ 12.03 hrs HW=1,038.25' TW=1,038.08' (Dynamic Tailwater)
1=Culvert (Outlet Controls 0.30 cfs @ 2.32 fps)

Summary for Pond CB3: (new Pond)

Inflow Area = 14,478 sf, 84.51% Impervious, Inflow Depth = 2.67" for 2YR event
Inflow = 0.99 cfs @ 12.07 hrs, Volume= 3,227 cf
Outflow = 0.99 cfs @ 12.07 hrs, Volume= 3,227 cf, Atten= 0%, Lag= 0.0 min
Primary = 0.99 cfs @ 12.07 hrs, Volume= 3,227 cf

Routing by Dyn-Stor-Ind method, Time Span= 0.00-48.00 hrs, dt= 0.05 hrs
Peak Elev= 1,040.46' @ 12.07 hrs

Device	Routing	Invert	Outlet Devices
#1	Primary	1,040.00'	**12.0" Round Culvert** L= 165.0' Ke= 0.200 Inlet / Outlet Invert= 1,040.00' / 1,037.77' S= 0.0135 '/' Cc= 0.900 n= 0.013 Corrugated PE, smooth interior, Flow Area= 0.79 sf

Primary OutFlow Max=0.96 cfs @ 12.07 hrs HW=1,040.45' TW=1,038.08' (Dynamic Tailwater)
1=Culvert (Barrel Controls 0.96 cfs @ 4.14 fps)

Summary for Pond CB4: (new Pond)

Inflow Area = 7,846 sf, 70.75% Impervious, Inflow Depth = 2.38" for 2YR event
Inflow = 0.55 cfs @ 12.01 hrs, Volume= 1,556 cf
Outflow = 0.55 cfs @ 12.01 hrs, Volume= 1,556 cf, Atten= 0%, Lag= 0.0 min
Primary = 0.55 cfs @ 12.01 hrs, Volume= 1,556 cf

Routing by Dyn-Stor-Ind method, Time Span= 0.00-48.00 hrs, dt= 0.05 hrs
Peak Elev= 1,040.33' @ 12.01 hrs

Device	Routing	Invert	Outlet Devices
#1	Primary	1,040.00'	**12.0" Round Culvert** L= 165.0' Ke= 0.200 Inlet / Outlet Invert= 1,040.00' / 1,036.38' S= 0.0219 '/' Cc= 0.900 n= 0.013 Corrugated PE, smooth interior, Flow Area= 0.79 sf

Primary OutFlow Max=0.52 cfs @ 12.01 hrs HW=1,040.32' TW=1,036.53' (Dynamic Tailwater)
1=Culvert (Inlet Controls 0.52 cfs @ 2.41 fps)

Summary for Pond CB5: (new Pond)

Inflow Area = 8,042 sf, 87.19% Impervious, Inflow Depth = 2.78" for 2YR event
Inflow = 0.63 cfs @ 12.01 hrs, Volume= 1,862 cf
Outflow = 0.63 cfs @ 12.01 hrs, Volume= 1,862 cf, Atten= 0%, Lag= 0.0 min
Primary = 0.63 cfs @ 12.01 hrs, Volume= 1,862 cf

Routing by Dyn-Stor-Ind method, Time Span= 0.00-48.00 hrs, dt= 0.05 hrs
Peak Elev= 1,040.67' @ 12.01 hrs

Device	Routing	Invert	Outlet Devices
#1	Primary	1,040.30'	**12.0" Round Culvert** L= 42.0' Ke= 0.200 Inlet / Outlet Invert= 1,040.30' / 1,039.67' S= 0.0150 '/' Cc= 0.900 n= 0.013 Corrugated PE, smooth interior, Flow Area= 0.79 sf

Primary OutFlow Max=0.61 cfs @ 12.01 hrs HW=1,040.66' TW=1,038.16' (Dynamic Tailwater)
1=Culvert (Barrel Controls 0.61 cfs @ 3.56 fps)

Summary for Pond CB6: (new Pond)

Inflow Area = 8,734 sf, 81.55% Impervious, Inflow Depth = 2.67" for 2YR event
Inflow = 0.67 cfs @ 12.01 hrs, Volume= 1,946 cf
Outflow = 0.67 cfs @ 12.01 hrs, Volume= 1,946 cf, Atten= 0%, Lag= 0.0 min
Primary = 0.67 cfs @ 12.01 hrs, Volume= 1,946 cf

Routing by Dyn-Stor-Ind method, Time Span= 0.00-48.00 hrs, dt= 0.05 hrs
Peak Elev= 1,041.17' @ 12.01 hrs

Device	Routing	Invert	Outlet Devices
#1	Primary	1,040.75'	**12.0" Round Culvert** L= 36.0' Ke= 0.200 Inlet / Outlet Invert= 1,040.75' / 1,040.39' S= 0.0100 '/' Cc= 0.900 n= 0.013 Corrugated PE, smooth interior, Flow Area= 0.79 sf

Primary OutFlow Max=0.64 cfs @ 12.01 hrs HW=1,041.16' TW=1,040.51' (Dynamic Tailwater)
1=Culvert (Barrel Controls 0.64 cfs @ 3.13 fps)

Summary for Pond CB7: (new Pond)

Inflow Area = 16,498 sf, 91.30% Impervious, Inflow Depth = 2.78" for 2YR event
Inflow = 1.29 cfs @ 12.01 hrs, Volume= 3,820 cf
Outflow = 1.29 cfs @ 12.01 hrs, Volume= 3,820 cf, Atten= 0%, Lag= 0.0 min
Primary = 1.29 cfs @ 12.01 hrs, Volume= 3,820 cf

Routing by Dyn-Stor-Ind method, Time Span= 0.00-48.00 hrs, dt= 0.05 hrs
Peak Elev= 1,042.08' @ 12.01 hrs

Device	Routing	Invert	Outlet Devices
#1	Primary	1,041.50'	**12.0" Round Culvert** L= 128.0' Ke= 0.200 Inlet / Outlet Invert= 1,041.50' / 1,040.22' S= 0.0100 '/' Cc= 0.900 n= 0.013 Corrugated PE, smooth interior, Flow Area= 0.79 sf

Primary OutFlow Max=1.24 cfs @ 12.01 hrs HW=1,042.06' TW=1,040.51' (Dynamic Tailwater)
1=Culvert (Barrel Controls 1.24 cfs @ 3.94 fps)

Summary for Pond CB8: (new Pond)

Inflow Area = 29,393 sf, 56.39% Impervious, Inflow Depth = 2.22" for 2YR event
Inflow = 1.77 cfs @ 12.07 hrs, Volume= 5,443 cf
Outflow = 1.77 cfs @ 12.07 hrs, Volume= 5,443 cf, Atten= 0%, Lag= 0.0 min
Primary = 1.77 cfs @ 12.07 hrs, Volume= 5,443 cf

Routing by Dyn-Stor-Ind method, Time Span= 0.00-48.00 hrs, dt= 0.05 hrs
Peak Elev= 1,041.44' @ 12.07 hrs

Device	Routing	Invert	Outlet Devices
#1	Primary	1,040.78'	**18.0" Round Culvert** L= 7.0' Ke= 0.200 Inlet / Outlet Invert= 1,040.78' / 1,040.68' S= 0.0143 '/' Cc= 0.900 n= 0.013 Corrugated PE, smooth interior, Flow Area= 1.77 sf

Primary OutFlow Max=1.70 cfs @ 12.07 hrs HW=1,041.42' TW=1,041.14' (Dynamic Tailwater)
1=Culvert (Barrel Controls 1.70 cfs @ 3.47 fps)

Summary for Pond DRI: (new Pond)

Inflow Area = 13,911 sf, 37.85% Impervious, Inflow Depth = 1.94" for 2YR event
Inflow = 0.77 cfs @ 12.06 hrs, Volume= 2,251 cf
Outflow = 0.77 cfs @ 12.06 hrs, Volume= 2,251 cf, Atten= 0%, Lag= 0.0 min
Primary = 0.77 cfs @ 12.06 hrs, Volume= 2,251 cf

Routing by Dyn-Stor-Ind method, Time Span= 0.00-48.00 hrs, dt= 0.05 hrs
Peak Elev= 1,044.14' @ 12.06 hrs

Device	Routing	Invert	Outlet Devices
#1	Primary	1,043.75'	**12.0" Round Culvert** L= 74.0' Ke= 0.200 Inlet / Outlet Invert= 1,043.75' / 1,042.30' S= 0.0196 '/' Cc= 0.900 n= 0.013 Cast iron, coated, Flow Area= 0.79 sf

Primary OutFlow Max=0.75 cfs @ 12.06 hrs HW=1,044.14' TW=1,041.43' (Dynamic Tailwater)
1=Culvert (Inlet Controls 0.75 cfs @ 2.65 fps)

Summary for Pond FB: (new Pond)

Inflow Area = 119,356 sf, 78.71% Impervious, Inflow Depth = 2.58" for 2YR event
Inflow = 7.92 cfs @ 12.03 hrs, Volume= 25,641 cf
Outflow = 6.88 cfs @ 12.01 hrs, Volume= 24,242 cf, Atten= 13%, Lag= 0.0 min
Primary = 6.88 cfs @ 12.01 hrs, Volume= 24,242 cf

Routing by Dyn-Stor-Ind method, Time Span= 0.00-48.00 hrs, dt= 0.05 hrs
Peak Elev= 1,036.55' @ 12.41 hrs Surf.Area= 1,136 sf Storage= 2,785 cf

Plug-Flow detention time= 54.7 min calculated for 24,242 cf (95% of inflow)
Center-of-Mass det. time= 24.3 min (803.2 - 778.8)

Volume	Invert	Avail.Storage	Storage Description
#1	1,033.30'	7,896 cf	**Custom Stage Data (Irregular)** Listed below (Recalc)

Elevation (feet)	Surf.Area (sq-ft)	Perim. (feet)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)	Wet.Area (sq-ft)
1,033.30	579	98.5	0	0	579
1,034.00	712	108.0	451	451	751
1,036.00	1,036	129.0	1,738	2,189	1,213
1,038.00	1,422	151.0	2,448	4,637	1,777
1,040.00	1,846	172.0	3,259	7,896	2,406

Device	Routing	Invert	Outlet Devices
#1	Primary	1,035.00'	**153.0 deg x 37.0' long Sharp-Crested Vee/Trap Weir** Cv= 2.47 (C= 3.09)

Primary OutFlow Max=0.00 cfs @ 12.01 hrs HW=1,035.44' TW=1,035.72' (Dynamic Tailwater)
└─**1=Sharp-Crested Vee/Trap Weir** (Controls 0.00 cfs)

Summary for Pond IB: (new Pond)

Inflow Area = 132,521 sf, 75.43% Impervious, Inflow Depth = 2.40" for 2YR event
Inflow = 7.64 cfs @ 12.01 hrs, Volume= 26,555 cf
Outflow = 1.88 cfs @ 12.36 hrs, Volume= 24,608 cf, Atten= 75%, Lag= 20.7 min
Primary = 1.88 cfs @ 12.36 hrs, Volume= 24,608 cf

Routing by Dyn-Stor-Ind method, Time Span= 0.00-48.00 hrs, dt= 0.05 hrs
Peak Elev= 1,036.55' @ 12.36 hrs Surf.Area= 3,485 sf Storage= 9,041 cf

Plug-Flow detention time= 101.0 min calculated for 24,608 cf (93% of inflow)
Center-of-Mass det. time= 63.1 min (866.6 - 803.5)

Volume	Invert	Avail.Storage	Storage Description
#1	1,033.30'	23,761 cf	**Custom Stage Data (Irregular)** Listed below (Recalc)

Elevation (feet)	Surf.Area (sq-ft)	Perim. (feet)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)	Wet.Area (sq-ft)
1,033.30	2,117	216.0	0	0	2,117
1,034.00	2,388	227.0	1,576	1,576	2,535
1,036.00	3,250	253.5	5,616	7,192	3,656
1,038.00	4,145	275.0	7,377	14,569	4,703
1,040.00	5,063	295.0	9,193	23,761	5,775

Device	Routing	Invert	Outlet Devices
#1	Primary	1,033.50'	**18.0" Round Culvert** L= 56.0' Ke= 0.200 Inlet / Outlet Invert= 1,033.50' / 1,031.00' S= 0.0446 '/' Cc= 0.900 n= 0.013 Corrugated PE, smooth interior, Flow Area= 1.77 sf
#2	Device 1	1,038.80'	**24.0" x 24.0" Horiz. Orifice/Grate** C= 0.600 Limited to weir flow at low heads
#3	Primary	1,038.80'	**153.0 deg x 6.0' long x 2.00' rise Sharp-Crested Vee/Trap Weir** Cv= 2.47 (C= 3.09)
#4	Device 1	1,034.15'	**4.0" Vert. Orifice/Grate X 3.00** C= 0.600
#5	Device 1	1,036.94'	**8.0" Vert. Orifice/Grate X 4.00** C= 0.600

Primary OutFlow Max=1.88 cfs @ 12.36 hrs HW=1,036.55' TW=1,031.19' (Dynamic Tailwater)
└─**1=Culvert** (Passes 1.88 cfs of 16.12 cfs potential flow)
  └─**2=Orifice/Grate** (Controls 0.00 cfs)
  └─**4=Orifice/Grate** (Orifice Controls 1.88 cfs @ 7.19 fps)
  └─**5=Orifice/Grate** (Controls 0.00 cfs)
└─**3=Sharp-Crested Vee/Trap Weir** (Controls 0.00 cfs)

Summary for Pond MH1: (new Pond)

Inflow Area = 48,347 sf, 82.38% Impervious, Inflow Depth = 2.60" for 2YR event
Inflow = 3.25 cfs @ 12.03 hrs, Volume= 10,485 cf
Outflow = 3.25 cfs @ 12.03 hrs, Volume= 10,485 cf, Atten= 0%, Lag= 0.0 min
Primary = 3.25 cfs @ 12.03 hrs, Volume= 10,485 cf

Routing by Dyn-Stor-Ind method, Time Span= 0.00-48.00 hrs, dt= 0.05 hrs
Peak Elev= 1,036.58' @ 12.44 hrs
Flood Elev= 1,040.82'

Device	Routing	Invert	Outlet Devices
#1	Primary	1,035.77'	**18.0" Round Culvert** L= 52.0' Ke= 0.200 Inlet / Outlet Invert= 1,035.77' / 1,035.00' S= 0.0148 '/' Cc= 0.900 n= 0.013 Corrugated PE, smooth interior, Flow Area= 1.77 sf

Primary OutFlow Max=3.14 cfs @ 12.03 hrs HW=1,036.53' TW=1,035.55' (Dynamic Tailwater)
1=Culvert (Barrel Controls 3.14 cfs @ 5.06 fps)

Summary for Pond MH2: (new Pond)

Inflow Area = 25,434 sf, 82.76% Impervious, Inflow Depth = 2.61" for 2YR event
Inflow = 1.68 cfs @ 12.05 hrs, Volume= 5,522 cf
Outflow = 1.68 cfs @ 12.05 hrs, Volume= 5,522 cf, Atten= 0%, Lag= 0.0 min
Primary = 1.68 cfs @ 12.05 hrs, Volume= 5,522 cf

Routing by Dyn-Stor-Ind method, Time Span= 0.00-48.00 hrs, dt= 0.05 hrs
Peak Elev= 1,038.10' @ 12.05 hrs

Device	Routing	Invert	Outlet Devices
#1	Primary	1,037.52'	**15.0" Round Culvert** L= 120.0' Ke= 0.200 Inlet / Outlet Invert= 1,037.52' / 1,036.02' S= 0.0125 '/' Cc= 0.900 n= 0.013 Corrugated PE, smooth interior, Flow Area= 1.23 sf

Primary OutFlow Max=1.66 cfs @ 12.05 hrs HW=1,038.10' TW=1,036.54' (Dynamic Tailwater)
1=Culvert (Outlet Controls 1.66 cfs @ 4.40 fps)

Summary for Pond MH3i: (new Pond)

Inflow Area = 71,009 sf, 76.21% Impervious, Inflow Depth = 2.56" for 2YR event
Inflow = 4.67 cfs @ 12.03 hrs, Volume= 15,156 cf
Outflow = 4.67 cfs @ 12.03 hrs, Volume= 15,156 cf, Atten= 0%, Lag= 0.0 min
Primary = 3.36 cfs @ 12.04 hrs, Volume= 4,091 cf
Secondary = 1.41 cfs @ 12.01 hrs, Volume= 11,065 cf

Routing by Dyn-Stor-Ind method, Time Span= 0.00-48.00 hrs, dt= 0.05 hrs
Peak Elev= 1,037.13' @ 12.04 hrs

Device	Routing	Invert	Outlet Devices
#1	Primary	1,036.75'	**5.0' long x 0.5' breadth Broad-Crested Rectangular Weir** Head (feet) 0.20 0.40 0.60 0.80 1.00 Coef. (English) 2.80 2.92 3.08 3.30 3.32
#2	Secondary	1,036.37'	**12.0" Round Culvert** L= 5.0' Ke= 0.200 Inlet / Outlet Invert= 1,036.37' / 1,036.30' S= 0.0140 '/' Cc= 0.900 n= 0.013 Corrugated PE, smooth interior, Flow Area= 0.79 sf

Primary OutFlow Max=3.24 cfs @ 12.04 hrs HW=1,037.12' TW=1,036.68' (Dynamic Tailwater)
1=Broad-Crested Rectangular Weir (Weir Controls 3.24 cfs @ 1.76 fps)

Secondary OutFlow Max=1.15 cfs @ 12.01 hrs HW=1,037.11' TW=1,036.97' (Dynamic Tailwater)
2=Culvert (Outlet Controls 1.15 cfs @ 2.59 fps)

Summary for Pond MH3o: (new Pond)

Inflow Area = 71,009 sf, 76.21% Impervious, Inflow Depth = 2.56" for 2YR event
Inflow = 4.67 cfs @ 12.03 hrs, Volume= 15,156 cf
Outflow = 4.67 cfs @ 12.03 hrs, Volume= 15,156 cf, Atten= 0%, Lag= 0.0 min
Primary = 4.67 cfs @ 12.03 hrs, Volume= 15,156 cf

Routing by Dyn-Stor-Ind method, Time Span= 0.00-48.00 hrs, dt= 0.05 hrs
Peak Elev= 1,036.69' @ 12.03 hrs

Device	Routing	Invert	Outlet Devices
#1	Primary	1,035.86'	**24.0" Round Culvert** L= 50.0' Ke= 0.200

Inlet / Outlet Invert= 1,035.86' / 1,035.00' S= 0.0172 '/' Cc= 0.900
n= 0.013 Corrugated PE, smooth interior, Flow Area= 3.14 sf

Primary OutFlow Max=4.51 cfs @ 12.03 hrs HW=1,036.67' TW=1,035.55' (Dynamic Tailwater)
1=Culvert (Barrel Controls 4.51 cfs @ 5.56 fps)

Summary for Pond MH4: (new Pond)

Inflow Area = 71,009 sf, 76.21% Impervious, Inflow Depth = 2.56" for 2YR event
Inflow = 4.67 cfs @ 12.03 hrs, Volume= 15,156 cf
Outflow = 4.67 cfs @ 12.03 hrs, Volume= 15,156 cf, Atten= 0%, Lag= 0.0 min
Primary = 4.67 cfs @ 12.03 hrs, Volume= 15,156 cf

Routing by Dyn-Stor-Ind method, Time Span= 0.00-48.00 hrs, dt= 0.05 hrs
Peak Elev= 1,038.19' @ 12.04 hrs

Device	Routing	Invert	Outlet Devices
#1	Primary	1,037.35'	**24.0" Round Culvert** L= 57.0' Ke= 0.200 Inlet / Outlet Invert= 1,037.35' / 1,036.37' S= 0.0172 '/' Cc= 0.900 n= 0.013 Corrugated PE, smooth interior, Flow Area= 3.14 sf

Primary OutFlow Max=4.41 cfs @ 12.03 hrs HW=1,038.17' TW=1,037.12' (Dynamic Tailwater)
1=Culvert (Outlet Controls 4.41 cfs @ 5.38 fps)

Summary for Pond MH5: (new Pond)

Inflow Area = 28,054 sf, 89.14% Impervious, Inflow Depth = 2.77" for 2YR event
Inflow = 2.18 cfs @ 12.01 hrs, Volume= 6,472 cf
Outflow = 2.18 cfs @ 12.01 hrs, Volume= 6,472 cf, Atten= 0%, Lag= 0.0 min
Primary = 2.18 cfs @ 12.01 hrs, Volume= 6,472 cf

Routing by Dyn-Stor-Ind method, Time Span= 0.00-48.00 hrs, dt= 0.05 hrs
Peak Elev= 1,040.52' @ 12.01 hrs

Device	Routing	Invert	Outlet Devices
#1	Primary	1,039.89'	**18.0" Round Culvert** L= 132.0' Ke= 0.200

Inlet / Outlet Invert= 1,039.89' / 1,038.44' S= 0.0110 '/' Cc= 0.900
n= 0.013 Corrugated PE, smooth interior, Flow Area= 1.77 sf

Primary OutFlow Max=2.10 cfs @ 12.01 hrs HW=1,040.51' TW=1,038.16' (Dynamic Tailwater)
1=Culvert (Barrel Controls 2.10 cfs @ 4.51 fps)

Summary for Pond MH6: (new Pond)

Inflow Area = 32,273 sf, 60.28% Impervious, Inflow Depth = 2.29" for 2YR event
Inflow = 1.98 cfs @ 12.06 hrs, Volume= 6,163 cf
Outflow = 1.98 cfs @ 12.06 hrs, Volume= 6,163 cf, Atten= 0%, Lag= 0.0 min
Primary = 1.98 cfs @ 12.06 hrs, Volume= 6,163 cf

Routing by Dyn-Stor-Ind method, Time Span= 0.00-48.00 hrs, dt= 0.05 hrs
Peak Elev= 1,041.15' @ 12.06 hrs

Device	Routing	Invert	Outlet Devices
#1	Primary	1,040.58'	**18.0" Round Culvert** L= 116.0' Ke= 0.200 Inlet / Outlet Invert= 1,040.58' / 1,038.84' S= 0.0150 '/' Cc= 0.900 n= 0.013 Corrugated PE, smooth interior, Flow Area= 1.77 sf

Primary OutFlow Max=1.91 cfs @ 12.06 hrs HW=1,041.14' TW=1,038.16' (Dynamic Tailwater)
1=Culvert (Inlet Controls 1.91 cfs @ 3.18 fps)

Summary for Pond STU1: (new Pond)

Inflow = 1.41 cfs @ 12.01 hrs, Volume= 11,065 cf
Outflow = 1.41 cfs @ 12.01 hrs, Volume= 11,065 cf, Atten= 0%, Lag= 0.0 min
Primary = 1.41 cfs @ 12.01 hrs, Volume= 11,065 cf

Routing by Dyn-Stor-Ind method, Time Span= 0.00-48.00 hrs, dt= 0.05 hrs
Peak Elev= 1,036.97' @ 12.01 hrs

Device	Routing	Invert	Outlet Devices
#1	Primary	1,036.30'	**12.0" Round Culvert** L= 5.0' Ke= 0.200 Inlet / Outlet Invert= 1,036.30' / 1,036.20' S= 0.0200 '/' Cc= 0.900

n= 0.013 Corrugated PE, smooth interior, Flow Area= 0.79 sf

Primary OutFlow Max=1.39 cfs @ 12.01 hrs HW=1,036.97' TW=1,036.67' (Dynamic Tailwater)
↑**1=Culvert** (Barrel Controls 1.39 cfs @ 3.55 fps)

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

Subcatchment 1S: (new Subcat) Runoff Area=12,290 sf 0.00% Impervious Runoff Depth=2.41"
Flow Length=40' Slope=0.2750 '/' Tc=1.6 min CN=76 Runoff=0.87 cfs 2,471 cf

Subcatchment 2S: (new Subcat) Runoff Area=5,956 sf 64.05% Impervious Runoff Depth=3.63"
Flow Length=186' Tc=1.6 min CN=89 Runoff=0.61 cfs 1,801 cf

Subcatchment 3S: ROOF Runoff Area=5,000 sf 100.00% Impervious Runoff Depth=4.61"
Tc=1.0 min CN=98 Runoff=0.61 cfs 1,922 cf

Subcatchment 4S: ROOF Runoff Area=5,000 sf 100.00% Impervious Runoff Depth=4.61"
Tc=1.0 min CN=98 Runoff=0.61 cfs 1,922 cf

Subcatchment 5S: (new Subcat) Runoff Area=10,067 sf 81.72% Impervious Runoff Depth=4.16"
Flow Length=157' Tc=1.0 min CN=94 Runoff=1.17 cfs 3,490 cf

Subcatchment 6S: (new Subcat) Runoff Area=26,955 sf 2.64% Impervious Runoff Depth=2.67"
Flow Length=208' Tc=3.9 min CN=79 Runoff=2.05 cfs 6,004 cf

Subcatchment 7S: (new Subcat) Runoff Area=13,165 sf 45.68% Impervious Runoff Depth=3.63"
Flow Length=42' Slope=0.1857 '/' Tc=2.0 min CN=89 Runoff=1.36 cfs 3,981 cf

Subcatchment 8S: (new Subcat) Runoff Area=8,734 sf 81.55% Impervious Runoff Depth=4.27"
Flow Length=125' Tc=0.9 min CN=95 Runoff=1.03 cfs 3,109 cf

Subcatchment 9S: (new Subcat) Runoff Area=8,042 sf 87.19% Impervious Runoff Depth=4.38"
Flow Length=112' Tc=0.8 min CN=96 Runoff=0.97 cfs 2,938 cf

Subcatchment 10S: ROOF Runoff Area=2,640 sf 100.00% Impervious Runoff Depth=4.61"
Tc=1.0 min CN=98 Runoff=0.32 cfs 1,015 cf

Subcatchment 11S: ROOF Runoff Area=2,822 sf 100.00% Impervious Runoff Depth=4.61"
Tc=1.0 min CN=98 Runoff=0.34 cfs 1,085 cf

Subcatchment12S: (new Subcat) Runoff Area=16,498 sf 91.30% Impervious Runoff Depth=4.38"
Flow Length=126' Tc=0.8 min CN=96 Runoff=1.99 cfs 6,027 cf

Subcatchment13S: ROOF-CANOPY Runoff Area=2,880 sf 100.00% Impervious Runoff Depth=4.61"
Tc=2.0 min CN=98 Runoff=0.34 cfs 1,107 cf

Subcatchment14S: (new Subcat) Runoff Area=15,482 sf 73.05% Impervious Runoff Depth=4.05"
Flow Length=208' Tc=5.0 min CN=93 Runoff=1.60 cfs 5,226 cf

Subcatchment15S: (new Subcat) Runoff Area=7,846 sf 70.75% Impervious Runoff Depth=3.94"
Flow Length=142' Tc=1.0 min CN=92 Runoff=0.88 cfs 2,578 cf

Subcatchment16S: (new Subcat) Runoff Area=14,478 sf 84.51% Impervious Runoff Depth=4.27"
Flow Length=224' Tc=4.9 min CN=95 Runoff=1.55 cfs 5,153 cf

Subcatchment17S: (new Subcat) Runoff Area=13,911 sf 37.85% Impervious Runoff Depth=3.43"
Flow Length=111' Tc=3.8 min CN=87 Runoff=1.34 cfs 3,972 cf

Reach R1: (new Reach) Avg. Flow Depth=0.34' Max Vel=2.60 fps Inflow=4.93 cfs 41,704 cf
n=0.069 L=20.0' S=0.0750 '/' Capacity=125.86 cfs Outflow=4.94 cfs 41,704 cf

Pond 1EV: SITE TOTAL Inflow=6.13 cfs 50,179 cf
Primary=6.13 cfs 50,179 cf

Pond 1P: Inflow=5.79 cfs 47,708 cf
Primary=5.79 cfs 47,708 cf

Pond 2P: Inflow=0.87 cfs 2,471 cf
Primary=0.87 cfs 2,471 cf

Pond CB1: (new Pond) Peak Elev=1,037.46' Inflow=1.17 cfs 3,490 cf
12.0" Round Culvert n=0.013 L=8.0' S=0.0150 '/' Outflow=1.17 cfs 3,490 cf

Pond CB2: (new Pond) Peak Elev=1,038.39' Inflow=0.61 cfs 1,801 cf
12.0" Round Culvert n=0.013 L=12.0' S=0.0150 '/' Outflow=0.61 cfs 1,801 cf

Pond CB3: (new Pond) Peak Elev=1,040.59' Inflow=1.55 cfs 5,153 cf
12.0" Round Culvert n=0.013 L=165.0' S=0.0135 '/' Outflow=1.55 cfs 5,153 cf

Pond CB4: (new Pond) Peak Elev=1,040.43' Inflow=0.88 cfs 2,578 cf
12.0" Round Culvert n=0.013 L=165.0' S=0.0219 '/' Outflow=0.88 cfs 2,578 cf

Pond CB5: (new Pond) Peak Elev=1,040.77' Inflow=0.97 cfs 2,938 cf
12.0" Round Culvert n=0.013 L=42.0' S=0.0150 '/' Outflow=0.97 cfs 2,938 cf

Pond CB6: (new Pond) Peak Elev=1,041.29' Inflow=1.03 cfs 3,109 cf
12.0" Round Culvert n=0.013 L=36.0' S=0.0100 '/' Outflow=1.03 cfs 3,109 cf

Pond CB7: (new Pond) Peak Elev=1,042.25' Inflow=1.99 cfs 6,027 cf
12.0" Round Culvert n=0.013 L=128.0' S=0.0100 '/' Outflow=1.99 cfs 6,027 cf

Pond CB8: (new Pond) Peak Elev=1,041.66' Inflow=2.92 cfs 9,198 cf
18.0" Round Culvert n=0.013 L=7.0' S=0.0143 '/' Outflow=2.92 cfs 9,198 cf

Pond DRI: (new Pond) Peak Elev=1,044.29' Inflow=1.34 cfs 3,972 cf
12.0" Round Culvert n=0.013 L=74.0' S=0.0196 '/' Outflow=1.34 cfs 3,972 cf

Pond FB: (new Pond) Peak Elev=1,037.43' Storage=3,866 cf Inflow=12.49 cfs 41,344 cf
Outflow=10.34 cfs 39,670 cf

Pond IB: (new Pond) Peak Elev=1,037.44' Storage=12,318 cf Inflow=11.63 cfs 43,651 cf
Outflow=4.93 cfs 41,704 cf

Pond MH1: (new Pond) Peak Elev=1,037.46' Inflow=5.11 cfs 16,866 cf
18.0" Round Culvert n=0.013 L=52.0' S=0.0148 '/' Outflow=5.11 cfs 16,866 cf

Pond MH2: (new Pond) Peak Elev=1,038.29' Inflow=2.64 cfs 8,876 cf
15.0" Round Culvert n=0.013 L=120.0' S=0.0125 '/' Outflow=2.64 cfs 8,876 cf

Pond MH3i: (new Pond) Peak Elev=1,037.47' Inflow=7.38 cfs 24,478 cf
Primary=5.54 cfs 9,629 cf Secondary=1.88 cfs 14,849 cf Outflow=7.38 cfs 24,478 cf

Pond MH3o: (new Pond) Peak Elev=1,037.46' Inflow=7.38 cfs 24,478 cf
24.0" Round Culvert n=0.013 L=50.0' S=0.0172 '/' Outflow=7.38 cfs 24,478 cf

Pond MH4: (new Pond) Peak Elev=1,038.43' Inflow=7.38 cfs 24,478 cf
24.0" Round Culvert n=0.013 L=57.0' S=0.0172 '/' Outflow=7.38 cfs 24,478 cf

Pond MH5: (new Pond) Peak Elev=1,040.69' Inflow=3.36 cfs 10,220 cf
18.0" Round Culvert n=0.013 L=132.0' S=0.0110 '/' Outflow=3.36 cfs 10,220 cf

Pond MH6: (new Pond) Peak Elev=1,041.33' Inflow=3.24 cfs 10,305 cf
18.0" Round Culvert n=0.013 L=116.0' S=0.0150 '/' Outflow=3.24 cfs 10,305 cf

Pond STU1: (new Pond) Peak Elev=1,037.47' Inflow=1.88 cfs 14,849 cf
12.0" Round Culvert n=0.013 L=5.0' S=0.0200 '/' Outflow=1.88 cfs 14,849 cf

Total Runoff Area = 171,766 sf Runoff Volume = 53,800 cf Average Runoff Depth = 3.76"
41.39% Pervious = 71,099 sf 58.61% Impervious = 100,667 sf

Summary for Subcatchment 1S: (new Subcat)

Runoff = 0.87 cfs @ 12.03 hrs, Volume= 2,471 cf, Depth= 2.41"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-48.00 hrs, dt= 0.05 hrs
Type III 24-hr 10YR Rainfall=4.85"

Area (sf)	CN	Description
4,440	80	>75% Grass cover, Good, HSG D
7,850	74	>75% Grass cover, Good, HSG C
12,290	76	Weighted Average
12,290		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
1.6	40	0.2750	0.41		**Sheet Flow,** Grass: Short n= 0.150 P2= 3.26"

Summary for Subcatchment 2S: (new Subcat)

Runoff = 0.61 cfs @ 12.03 hrs, Volume= 1,801 cf, Depth= 3.63"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-48.00 hrs, dt= 0.05 hrs
Type III 24-hr 10YR Rainfall=4.85"

Area (sf)	CN	Description
26	98	Unconnected pavement, HSG C
3,789	98	Paved parking, HSG C
2,141	74	>75% Grass cover, Good, HSG C
5,956	89	Weighted Average
2,141		35.95% Pervious Area
3,815		64.05% Impervious Area
26		0.68% Unconnected

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
0.6	44	0.0227	1.24		**Sheet Flow,** Smooth surfaces n= 0.011 P2= 3.26"
1.0	142	0.0134	2.35		**Shallow Concentrated Flow,** Paved Kv= 20.3 fps
1.6	186	Total			

Summary for Subcatchment 3S: ROOF

Runoff = 0.61 cfs @ 12.01 hrs, Volume= 1,922 cf, Depth= 4.61"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-48.00 hrs, dt= 0.05 hrs
Type III 24-hr 10YR Rainfall=4.85"

Area (sf)	CN	Description
5,000	98	Roofs, HSG C
5,000		100.00% Impervious Area

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

Summary for Subcatchment 4S: ROOF

Runoff = 0.61 cfs @ 12.01 hrs, Volume= 1,922 cf, Depth= 4.61"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-48.00 hrs, dt= 0.05 hrs
Type III 24-hr 10YR Rainfall=4.85"

Area (sf)	CN	Description
3,300	98	Roofs, HSG C
1,700	98	Roofs, HSG D
5,000	98	Weighted Average
5,000		100.00% Impervious Area

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

Summary for Subcatchment 5S: (new Subcat)

Runoff = 1.17 cfs @ 12.01 hrs, Volume= 3,490 cf, Depth= 4.16"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-48.00 hrs, dt= 0.05 hrs
Type III 24-hr 10YR Rainfall=4.85"

Area (sf)	CN	Description
395	74	>75% Grass cover, Good, HSG C
1,445	80	>75% Grass cover, Good, HSG D
309	98	Unconnected pavement, HSG C
790	98	Unconnected pavement, HSG D
5,597	98	Paved parking, HSG D
1,531	98	Paved parking, HSG C
10,067	94	Weighted Average
1,840		18.28% Pervious Area
8,227		81.72% Impervious Area
1,099		13.36% Unconnected

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
0.5	50	0.0540	1.80		**Sheet Flow,** Smooth surfaces n= 0.011 P2= 3.26"
0.5	107	0.0308	3.56		**Shallow Concentrated Flow,** Paved Kv= 20.3 fps
1.0	157	Total			

Summary for Subcatchment 6S: (new Subcat)

Runoff = 2.05 cfs @ 12.06 hrs, Volume= 6,004 cf, Depth= 2.67"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-48.00 hrs, dt= 0.05 hrs
Type III 24-hr 10YR Rainfall=4.85"

Area (sf)	CN	Description
* 711	98	riprap
15,442	80	>75% Grass cover, Good, HSG D
10,802	77	Woods, Good, HSG D
26,955	79	Weighted Average
26,244		97.36% Pervious Area
711		2.64% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
2.5	50	0.1460	0.33		**Sheet Flow,** Grass: Short n= 0.150 P2= 3.26"
0.1	54	0.1815	6.86		**Shallow Concentrated Flow,** Unpaved Kv= 16.1 fps
1.3	104	0.0769	1.39		**Shallow Concentrated Flow,** Woodland Kv= 5.0 fps
3.9	208	Total			

Summary for Subcatchment 7S: (new Subcat)

Runoff = 1.36 cfs @ 12.03 hrs, Volume= 3,981 cf, Depth= 3.63"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-48.00 hrs, dt= 0.05 hrs
Type III 24-hr 10YR Rainfall=4.85"

Area (sf)	CN	Description
5,880	98	Water Surface, HSG D
* 134	98	riprap
6,571	80	>75% Grass cover, Good, HSG D
580	91	Gravel roads, HSG D
13,165	89	Weighted Average
7,151		54.32% Pervious Area
6,014		45.68% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
2.0	42	0.1857	0.35		**Sheet Flow,** Grass: Short n= 0.150 P2= 3.26"

Summary for Subcatchment 8S: (new Subcat)

Runoff = 1.03 cfs @ 12.01 hrs, Volume= 3,109 cf, Depth= 4.27"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-48.00 hrs, dt= 0.05 hrs
Type III 24-hr 10YR Rainfall=4.85"

Area (sf)	CN	Description
1,611	80	>75% Grass cover, Good, HSG D
459	98	Unconnected pavement, HSG D
6,664	98	Paved parking, HSG D
8,734	95	Weighted Average
1,611		18.45% Pervious Area
7,123		81.55% Impervious Area
459		6.44% Unconnected

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
0.5	50	0.0411	1.61		**Sheet Flow,** Smooth surfaces n= 0.011 P2= 3.26"
0.4	75	0.0260	3.27		**Shallow Concentrated Flow,** Paved Kv= 20.3 fps
0.9	125	Total			

Summary for Subcatchment 9S: (new Subcat)

Runoff = 0.97 cfs @ 12.01 hrs, Volume= 2,938 cf, Depth= 4.38"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-48.00 hrs, dt= 0.05 hrs
Type III 24-hr 10YR Rainfall=4.85"

Area (sf)	CN	Description
1,030	80	>75% Grass cover, Good, HSG D
194	98	Unconnected pavement, HSG D
6,818	98	Paved parking, HSG D
8,042	96	Weighted Average
1,030		12.81% Pervious Area
7,012		87.19% Impervious Area
194		2.77% Unconnected

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
0.5	50	0.0380	1.56		**Sheet Flow,** Smooth surfaces n= 0.011 P2= 3.26"
0.3	62	0.0274	3.36		**Shallow Concentrated Flow,** Paved Kv= 20.3 fps
0.8	112	Total			

Summary for Subcatchment 10S: ROOF

Runoff = 0.32 cfs @ 12.01 hrs, Volume= 1,015 cf, Depth= 4.61"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-48.00 hrs, dt= 0.05 hrs
Type III 24-hr 10YR Rainfall=4.85"

Area (sf)	CN	Description
2,640	98	Roofs, HSG D
2,640		100.00% Impervious Area

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

Summary for Subcatchment 11S: ROOF

Runoff = 0.34 cfs @ 12.01 hrs, Volume= 1,085 cf, Depth= 4.61"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-48.00 hrs, dt= 0.05 hrs
Type III 24-hr 10YR Rainfall=4.85"

Area (sf)	CN	Description
2,822	98	Roofs, HSG D
2,822		100.00% Impervious Area

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

Summary for Subcatchment 12S: (new Subcat)

Runoff = 1.99 cfs @ 12.01 hrs, Volume= 6,027 cf, Depth= 4.38"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-48.00 hrs, dt= 0.05 hrs
Type III 24-hr 10YR Rainfall=4.85"

Area (sf)	CN	Description
1,435	80	>75% Grass cover, Good, HSG D
1,035	98	Unconnected pavement, HSG D
14,028	98	Paved parking, HSG D
16,498	96	Weighted Average
1,435		8.70% Pervious Area
15,063		91.30% Impervious Area
1,035		6.87% Unconnected

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
0.5	50	0.0500	1.74		**Sheet Flow,** Smooth surfaces n= 0.011 P2= 3.26"
0.3	76	0.0329	3.68		**Shallow Concentrated Flow,** Paved Kv= 20.3 fps
0.8	126	Total			

Summary for Subcatchment 13S: ROOF-CANOPY

Runoff = 0.34 cfs @ 12.03 hrs, Volume= 1,107 cf, Depth= 4.61"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-48.00 hrs, dt= 0.05 hrs
Type III 24-hr 10YR Rainfall=4.85"

Area (sf)	CN	Description
2,880	98	Roofs, HSG D
2,880		100.00% Impervious Area

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

Summary for Subcatchment 14S: (new Subcat)

Runoff = 1.60 cfs @ 12.07 hrs, Volume= 5,226 cf, Depth= 4.05"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-48.00 hrs, dt= 0.05 hrs
Type III 24-hr 10YR Rainfall=4.85"

Area (sf)	CN	Description
614	98	Unconnected pavement, HSG D
211	98	Paved parking, HSG C
10,484	98	Paved parking, HSG D
4,173	80	>75% Grass cover, Good, HSG D
15,482	93	Weighted Average
4,173		26.95% Pervious Area
11,309		73.05% Impervious Area
614		5.43% Unconnected

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
4.2	50	0.0400	0.20		**Sheet Flow,** Grass: Short n= 0.150 P2= 3.26"
0.8	158	0.0282	3.41		**Shallow Concentrated Flow,** Paved Kv= 20.3 fps
5.0	208	Total			

Summary for Subcatchment 15S: (new Subcat)

Runoff = 0.88 cfs @ 12.01 hrs, Volume= 2,578 cf, Depth= 3.94"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-48.00 hrs, dt= 0.05 hrs
Type III 24-hr 10YR Rainfall=4.85"

Area (sf)	CN	Description
1,155	74	>75% Grass cover, Good, HSG C
1,140	80	>75% Grass cover, Good, HSG D
174	98	Unconnected pavement, HSG C
2,097	98	Paved parking, HSG D
3,280	98	Paved parking, HSG C
7,846	92	Weighted Average
2,295		29.25% Pervious Area
5,551		70.75% Impervious Area
174		3.13% Unconnected

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
0.5	50	0.0377	1.56		**Sheet Flow,** Smooth surfaces n= 0.011 P2= 3.26"
0.5	92	0.0250	3.21		**Shallow Concentrated Flow,** Paved Kv= 20.3 fps
1.0	142	Total			

Summary for Subcatchment 16S: (new Subcat)

Runoff = 1.55 cfs @ 12.07 hrs, Volume= 5,153 cf, Depth= 4.27"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-48.00 hrs, dt= 0.05 hrs
Type III 24-hr 10YR Rainfall=4.85"

Area (sf)	CN	Description
397	98	Unconnected pavement, HSG C
1,089	74	>75% Grass cover, Good, HSG C
1,154	80	>75% Grass cover, Good, HSG D
7,641	98	Paved parking, HSG C
4,197	98	Paved parking, HSG D
14,478	95	Weighted Average
2,243		15.49% Pervious Area
12,235		84.51% Impervious Area
397		3.24% Unconnected

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
4.2	50	0.0400	0.20		**Sheet Flow,** Grass: Short n= 0.150 P2= 3.26"
0.7	174	0.0374	3.93		**Shallow Concentrated Flow,** Paved Kv= 20.3 fps
4.9	224	Total			

Summary for Subcatchment 17S: (new Subcat)

Runoff = 1.34 cfs @ 12.06 hrs, Volume= 3,972 cf, Depth= 3.43"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-48.00 hrs, dt= 0.05 hrs
Type III 24-hr 10YR Rainfall=4.85"

Area (sf)	CN	Description
8,646	80	>75% Grass cover, Good, HSG D
5,265	98	Paved parking, HSG D
13,911	87	Weighted Average
8,646		62.15% Pervious Area
5,265		37.85% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
3.5	50	0.0660	0.24		**Sheet Flow,** Grass: Short n= 0.150 P2= 3.26"
0.3	61	0.0205	2.91		**Shallow Concentrated Flow,** Paved Kv= 20.3 fps
3.8	111	Total			

Summary for Reach R1: (new Reach)

Inflow Area = 132,521 sf, 75.43% Impervious, Inflow Depth = 3.78" for 10YR event
Inflow = 4.93 cfs @ 12.27 hrs, Volume= 41,704 cf
Outflow = 4.94 cfs @ 12.27 hrs, Volume= 41,704 cf, Atten= 0%, Lag= 0.0 min

Routing by Dyn-Stor-Ind method, Time Span= 0.00-48.00 hrs, dt= 0.05 hrs
Max. Velocity= 2.60 fps, Min. Travel Time= 0.1 min
Avg. Velocity = 0.71 fps, Avg. Travel Time= 0.5 min

Peak Storage= 38 cf @ 12.27 hrs
Average Depth at Peak Storage= 0.34'
Bank-Full Depth= 2.00' Flow Area= 18.0 sf, Capacity= 125.86 cfs

5.00' x 2.00' deep channel, n= 0.069 Riprap, 6-inch
Side Slope Z-value= 2.0 '/' Top Width= 13.00'
Length= 20.0' Slope= 0.0750 '/'
Inlet Invert= 1,031.00', Outlet Invert= 1,029.50'

Summary for Pond 1EV: SITE TOTAL

Inflow Area = 171,766 sf, 58.61% Impervious, Inflow Depth = 3.51" for 10YR event
Inflow = 6.13 cfs @ 12.25 hrs, Volume= 50,179 cf
Primary = 6.13 cfs @ 12.25 hrs, Volume= 50,179 cf, Atten= 0%, Lag= 0.0 min

Routing by Dyn-Stor-Ind method, Time Span= 0.00-48.00 hrs, dt= 0.05 hrs

Summary for Pond 1P:

Inflow Area = 159,476 sf, 63.12% Impervious, Inflow Depth = 3.59" for 10YR event
Inflow = 5.79 cfs @ 12.25 hrs, Volume= 47,708 cf
Primary = 5.79 cfs @ 12.25 hrs, Volume= 47,708 cf, Atten= 0%, Lag= 0.0 min

Routing by Dyn-Stor-Ind method, Time Span= 0.00-48.00 hrs, dt= 0.05 hrs

Summary for Pond 2P:

Inflow Area = 12,290 sf, 0.00% Impervious, Inflow Depth = 2.41" for 10YR event
Inflow = 0.87 cfs @ 12.03 hrs, Volume= 2,471 cf
Primary = 0.87 cfs @ 12.03 hrs, Volume= 2,471 cf, Atten= 0%, Lag= 0.0 min

Routing by Dyn-Stor-Ind method, Time Span= 0.00-48.00 hrs, dt= 0.05 hrs

Summary for Pond CB1: (new Pond)

Inflow Area = 10,067 sf, 81.72% Impervious, Inflow Depth = 4.16" for 10YR event
Inflow = 1.17 cfs @ 12.01 hrs, Volume= 3,490 cf
Outflow = 1.17 cfs @ 12.01 hrs, Volume= 3,490 cf, Atten= 0%, Lag= 0.0 min
Primary = 1.17 cfs @ 12.01 hrs, Volume= 3,490 cf

Routing by Dyn-Stor-Ind method, Time Span= 0.00-48.00 hrs, dt= 0.05 hrs
Peak Elev= 1,037.46' @ 12.41 hrs

Device	Routing	Invert	Outlet Devices
#1	Primary	1,036.50'	**12.0" Round Culvert** L= 8.0' Ke= 0.200 Inlet / Outlet Invert= 1,036.50' / 1,036.38' S= 0.0150 '/' Cc= 0.900 n= 0.013 Corrugated PE, smooth interior, Flow Area= 0.79 sf

Primary OutFlow Max=1.12 cfs @ 12.01 hrs HW=1,037.08' TW=1,036.82' (Dynamic Tailwater)
1=Culvert (Barrel Controls 1.12 cfs @ 3.40 fps)

Summary for Pond CB2: (new Pond)

Inflow Area = 5,956 sf, 64.05% Impervious, Inflow Depth = 3.63" for 10YR event
Inflow = 0.61 cfs @ 12.03 hrs, Volume= 1,801 cf
Outflow = 0.61 cfs @ 12.03 hrs, Volume= 1,801 cf, Atten= 0%, Lag= 0.0 min
Primary = 0.61 cfs @ 12.03 hrs, Volume= 1,801 cf

Routing by Dyn-Stor-Ind method, Time Span= 0.00-48.00 hrs, dt= 0.05 hrs
Peak Elev= 1,038.39' @ 12.07 hrs

Device	Routing	Invert	Outlet Devices
#1	Primary	1,037.95'	**12.0" Round Culvert** L= 12.0' Ke= 0.200 Inlet / Outlet Invert= 1,037.95' / 1,037.77' S= 0.0150 '/' Cc= 0.900 n= 0.013 Corrugated PE, smooth interior, Flow Area= 0.79 sf

Primary OutFlow Max=0.43 cfs @ 12.03 hrs HW=1,038.36' TW=1,038.25' (Dynamic Tailwater)
1=Culvert (Outlet Controls 0.43 cfs @ 2.05 fps)

Summary for Pond CB3: (new Pond)

Inflow Area = 14,478 sf, 84.51% Impervious, Inflow Depth = 4.27" for 10YR event
Inflow = 1.55 cfs @ 12.07 hrs, Volume= 5,153 cf
Outflow = 1.55 cfs @ 12.07 hrs, Volume= 5,153 cf, Atten= 0%, Lag= 0.0 min
Primary = 1.55 cfs @ 12.07 hrs, Volume= 5,153 cf

Routing by Dyn-Stor-Ind method, Time Span= 0.00-48.00 hrs, dt= 0.05 hrs
Peak Elev= 1,040.59' @ 12.07 hrs

Device	Routing	Invert	Outlet Devices
#1	Primary	1,040.00'	**12.0" Round Culvert** L= 165.0' Ke= 0.200 Inlet / Outlet Invert= 1,040.00' / 1,037.77' S= 0.0135 '/' Cc= 0.900 n= 0.013 Corrugated PE, smooth interior, Flow Area= 0.79 sf

Primary OutFlow Max=1.48 cfs @ 12.07 hrs HW=1,040.57' TW=1,038.26' (Dynamic Tailwater)
1=Culvert (Outlet Controls 1.48 cfs @ 4.57 fps)

Summary for Pond CB4: (new Pond)

Inflow Area = 7,846 sf, 70.75% Impervious, Inflow Depth = 3.94" for 10YR event
Inflow = 0.88 cfs @ 12.01 hrs, Volume= 2,578 cf
Outflow = 0.88 cfs @ 12.01 hrs, Volume= 2,578 cf, Atten= 0%, Lag= 0.0 min
Primary = 0.88 cfs @ 12.01 hrs, Volume= 2,578 cf

Routing by Dyn-Stor-Ind method, Time Span= 0.00-48.00 hrs, dt= 0.05 hrs
Peak Elev= 1,040.43' @ 12.01 hrs

Device	Routing	Invert	Outlet Devices
#1	Primary	1,040.00'	**12.0" Round Culvert** L= 165.0' Ke= 0.200 Inlet / Outlet Invert= 1,040.00' / 1,036.38' S= 0.0219 '/' Cc= 0.900 n= 0.013 Corrugated PE, smooth interior, Flow Area= 0.79 sf

Primary OutFlow Max=0.85 cfs @ 12.01 hrs HW=1,040.42' TW=1,036.82' (Dynamic Tailwater)
1=Culvert (Inlet Controls 0.85 cfs @ 2.74 fps)

Summary for Pond CB5: (new Pond)

Inflow Area = 8,042 sf, 87.19% Impervious, Inflow Depth = 4.38" for 10YR event
Inflow = 0.97 cfs @ 12.01 hrs, Volume= 2,938 cf
Outflow = 0.97 cfs @ 12.01 hrs, Volume= 2,938 cf, Atten= 0%, Lag= 0.0 min
Primary = 0.97 cfs @ 12.01 hrs, Volume= 2,938 cf

Routing by Dyn-Stor-Ind method, Time Span= 0.00-48.00 hrs, dt= 0.05 hrs
Peak Elev= 1,040.77' @ 12.01 hrs

Device	Routing	Invert	Outlet Devices
#1	Primary	1,040.30'	**12.0" Round Culvert** L= 42.0' Ke= 0.200 Inlet / Outlet Invert= 1,040.30' / 1,039.67' S= 0.0150 '/' Cc= 0.900 n= 0.013 Corrugated PE, smooth interior, Flow Area= 0.79 sf

Primary OutFlow Max=0.93 cfs @ 12.01 hrs HW=1,040.76' TW=1,038.40' (Dynamic Tailwater)
1=Culvert (Barrel Controls 0.93 cfs @ 3.93 fps)

Summary for Pond CB6: (new Pond)

Inflow Area = 8,734 sf, 81.55% Impervious, Inflow Depth = 4.27" for 10YR event
Inflow = 1.03 cfs @ 12.01 hrs, Volume= 3,109 cf
Outflow = 1.03 cfs @ 12.01 hrs, Volume= 3,109 cf, Atten= 0%, Lag= 0.0 min
Primary = 1.03 cfs @ 12.01 hrs, Volume= 3,109 cf

Routing by Dyn-Stor-Ind method, Time Span= 0.00-48.00 hrs, dt= 0.05 hrs
Peak Elev= 1,041.29' @ 12.01 hrs

Device	Routing	Invert	Outlet Devices
#1	Primary	1,040.75'	**12.0" Round Culvert** L= 36.0' Ke= 0.200 Inlet / Outlet Invert= 1,040.75' / 1,040.39' S= 0.0100 '/' Cc= 0.900 n= 0.013 Corrugated PE, smooth interior, Flow Area= 0.79 sf

Primary OutFlow Max=0.99 cfs @ 12.01 hrs HW=1,041.27' TW=1,040.68' (Dynamic Tailwater)
1=Culvert (Barrel Controls 0.99 cfs @ 3.48 fps)

Summary for Pond CB7: (new Pond)

Inflow Area = 16,498 sf, 91.30% Impervious, Inflow Depth = 4.38" for 10YR event
Inflow = 1.99 cfs @ 12.01 hrs, Volume= 6,027 cf
Outflow = 1.99 cfs @ 12.01 hrs, Volume= 6,027 cf, Atten= 0%, Lag= 0.0 min
Primary = 1.99 cfs @ 12.01 hrs, Volume= 6,027 cf

Routing by Dyn-Stor-Ind method, Time Span= 0.00-48.00 hrs, dt= 0.05 hrs
Peak Elev= 1,042.25' @ 12.01 hrs

Device	Routing	Invert	Outlet Devices
#1	Primary	1,041.50'	**12.0" Round Culvert** L= 128.0' Ke= 0.200 Inlet / Outlet Invert= 1,041.50' / 1,040.22' S= 0.0100 '/' Cc= 0.900 n= 0.013 Corrugated PE, smooth interior, Flow Area= 0.79 sf

Primary OutFlow Max=1.92 cfs @ 12.01 hrs HW=1,042.23' TW=1,040.68' (Dynamic Tailwater)
1=Culvert (Barrel Controls 1.92 cfs @ 4.37 fps)

Summary for Pond CB8: (new Pond)

Inflow Area = 29,393 sf, 56.39% Impervious, Inflow Depth = 3.76" for 10YR event
Inflow = 2.92 cfs @ 12.06 hrs, Volume= 9,198 cf
Outflow = 2.92 cfs @ 12.06 hrs, Volume= 9,198 cf, Atten= 0%, Lag= 0.0 min
Primary = 2.92 cfs @ 12.06 hrs, Volume= 9,198 cf

Routing by Dyn-Stor-Ind method, Time Span= 0.00-48.00 hrs, dt= 0.05 hrs
Peak Elev= 1,041.66' @ 12.07 hrs

Device	Routing	Invert	Outlet Devices
#1	Primary	1,040.78'	**18.0" Round Culvert** L= 7.0' Ke= 0.200 Inlet / Outlet Invert= 1,040.78' / 1,040.68' S= 0.0143 '/' Cc= 0.900 n= 0.013 Corrugated PE, smooth interior, Flow Area= 1.77 sf

Primary OutFlow Max=2.84 cfs @ 12.06 hrs HW=1,041.64' TW=1,041.31' (Dynamic Tailwater)
1=Culvert (Barrel Controls 2.84 cfs @ 3.89 fps)

Summary for Pond DRI: (new Pond)

Inflow Area = 13,911 sf, 37.85% Impervious, Inflow Depth = 3.43" for 10YR event
Inflow = 1.34 cfs @ 12.06 hrs, Volume= 3,972 cf
Outflow = 1.34 cfs @ 12.06 hrs, Volume= 3,972 cf, Atten= 0%, Lag= 0.0 min
Primary = 1.34 cfs @ 12.06 hrs, Volume= 3,972 cf

Routing by Dyn-Stor-Ind method, Time Span= 0.00-48.00 hrs, dt= 0.05 hrs
Peak Elev= 1,044.29' @ 12.06 hrs

Device	Routing	Invert	Outlet Devices
#1	Primary	1,043.75'	**12.0" Round Culvert** L= 74.0' Ke= 0.200 Inlet / Outlet Invert= 1,043.75' / 1,042.30' S= 0.0196 '/' Cc= 0.900 n= 0.013 Cast iron, coated, Flow Area= 0.79 sf

Primary OutFlow Max=1.30 cfs @ 12.06 hrs HW=1,044.28' TW=1,041.65' (Dynamic Tailwater)
1=Culvert (Inlet Controls 1.30 cfs @ 3.09 fps)

Summary for Pond FB: (new Pond)

Inflow Area = 119,356 sf, 78.71% Impervious, Inflow Depth = 4.16" for 10YR event
Inflow = 12.49 cfs @ 12.03 hrs, Volume= 41,344 cf
Outflow = 10.34 cfs @ 12.01 hrs, Volume= 39,670 cf, Atten= 17%, Lag= 0.0 min
Primary = 10.34 cfs @ 12.01 hrs, Volume= 39,670 cf

Routing by Dyn-Stor-Ind method, Time Span= 0.00-48.00 hrs, dt= 0.05 hrs
Peak Elev= 1,037.43' @ 12.33 hrs Surf.Area= 1,307 sf Storage= 3,866 cf

Plug-Flow detention time= 45.1 min calculated for 39,670 cf (96% of inflow)
Center-of-Mass det. time= 21.4 min (789.2 - 767.8)

Volume	Invert	Avail.Storage	Storage Description
#1	1,033.30'	7,896 cf	**Custom Stage Data (Irregular)** Listed below (Recalc)

Elevation (feet)	Surf.Area (sq-ft)	Perim. (feet)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)	Wet.Area (sq-ft)
1,033.30	579	98.5	0	0	579
1,034.00	712	108.0	451	451	751
1,036.00	1,036	129.0	1,738	2,189	1,213
1,038.00	1,422	151.0	2,448	4,637	1,777
1,040.00	1,846	172.0	3,259	7,896	2,406

Device	Routing	Invert	Outlet Devices
#1	Primary	1,035.00'	**153.0 deg x 37.0' long Sharp-Crested Vee/Trap Weir** Cv= 2.47 (C= 3.09)

Primary OutFlow Max=0.00 cfs @ 12.01 hrs HW=1,036.20' TW=1,036.61' (Dynamic Tailwater)
└─**1=Sharp-Crested Vee/Trap Weir** (Controls 0.00 cfs)

Summary for Pond IB: (new Pond)

Inflow Area = 132,521 sf, 75.43% Impervious, Inflow Depth = 3.95" for 10YR event
Inflow = 11.63 cfs @ 12.01 hrs, Volume= 43,651 cf
Outflow = 4.93 cfs @ 12.27 hrs, Volume= 41,704 cf, Atten= 58%, Lag= 15.3 min
Primary = 4.93 cfs @ 12.27 hrs, Volume= 41,704 cf

Routing by Dyn-Stor-Ind method, Time Span= 0.00-48.00 hrs, dt= 0.05 hrs
Peak Elev= 1,037.44' @ 12.27 hrs Surf.Area= 3,883 sf Storage= 12,318 cf

Plug-Flow detention time= 84.8 min calculated for 41,704 cf (96% of inflow)
Center-of-Mass det. time= 59.3 min (848.7 - 789.4)

Volume	Invert	Avail.Storage	Storage Description
#1	1,033.30'	23,761 cf	**Custom Stage Data (Irregular)** Listed below (Recalc)

Elevation (feet)	Surf.Area (sq-ft)	Perim. (feet)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)	Wet.Area (sq-ft)
1,033.30	2,117	216.0	0	0	2,117
1,034.00	2,388	227.0	1,576	1,576	2,535
1,036.00	3,250	253.5	5,616	7,192	3,656
1,038.00	4,145	275.0	7,377	14,569	4,703
1,040.00	5,063	295.0	9,193	23,761	5,775

Device	Routing	Invert	Outlet Devices
#1	Primary	1,033.50'	**18.0" Round Culvert** L= 56.0' Ke= 0.200 Inlet / Outlet Invert= 1,033.50' / 1,031.00' S= 0.0446 '/' Cc= 0.900 n= 0.013 Corrugated PE, smooth interior, Flow Area= 1.77 sf
#2	Device 1	1,038.80'	**24.0" x 24.0" Horiz. Orifice/Grate** C= 0.600 Limited to weir flow at low heads
#3	Primary	1,038.80'	**153.0 deg x 6.0' long x 2.00' rise Sharp-Crested Vee/Trap Weir** Cv= 2.47 (C= 3.09)
#4	Device 1	1,034.15'	**4.0" Vert. Orifice/Grate X 3.00** C= 0.600
#5	Device 1	1,036.94'	**8.0" Vert. Orifice/Grate X 4.00** C= 0.600

Primary OutFlow Max=4.89 cfs @ 12.27 hrs HW=1,037.44' TW=1,031.33' (Dynamic Tailwater)
└─**1=Culvert** (Passes 4.89 cfs of 18.98 cfs potential flow)
  └─**2=Orifice/Grate** (Controls 0.00 cfs)
  └─**4=Orifice/Grate** (Orifice Controls 2.23 cfs @ 8.50 fps)
  └─**5=Orifice/Grate** (Orifice Controls 2.67 cfs @ 2.40 fps)
└─**3=Sharp-Crested Vee/Trap Weir** (Controls 0.00 cfs)

Summary for Pond MH1: (new Pond)

Inflow Area = 48,347 sf, 82.38% Impervious, Inflow Depth = 4.19" for 10YR event
Inflow = 5.11 cfs @ 12.03 hrs, Volume= 16,866 cf
Outflow = 5.11 cfs @ 12.03 hrs, Volume= 16,866 cf, Atten= 0%, Lag= 0.0 min
Primary = 5.11 cfs @ 12.03 hrs, Volume= 16,866 cf

Routing by Dyn-Stor-Ind method, Time Span= 0.00-48.00 hrs, dt= 0.05 hrs
Peak Elev= 1,037.46' @ 12.36 hrs
Flood Elev= 1,040.82'

Device	Routing	Invert	Outlet Devices
#1	Primary	1,035.77'	**18.0" Round Culvert** L= 52.0' Ke= 0.200 Inlet / Outlet Invert= 1,035.77' / 1,035.00' S= 0.0148 '/' Cc= 0.900 n= 0.013 Corrugated PE, smooth interior, Flow Area= 1.77 sf

Primary OutFlow Max=3.84 cfs @ 12.03 hrs HW=1,036.84' TW=1,036.33' (Dynamic Tailwater)
1=Culvert (Outlet Controls 3.84 cfs @ 3.97 fps)

Summary for Pond MH2: (new Pond)

Inflow Area = 25,434 sf, 82.76% Impervious, Inflow Depth = 4.19" for 10YR event
Inflow = 2.64 cfs @ 12.05 hrs, Volume= 8,876 cf
Outflow = 2.64 cfs @ 12.05 hrs, Volume= 8,876 cf, Atten= 0%, Lag= 0.0 min
Primary = 2.64 cfs @ 12.05 hrs, Volume= 8,876 cf

Routing by Dyn-Stor-Ind method, Time Span= 0.00-48.00 hrs, dt= 0.05 hrs
Peak Elev= 1,038.29' @ 12.05 hrs

Device	Routing	Invert	Outlet Devices
#1	Primary	1,037.52'	**15.0" Round Culvert** L= 120.0' Ke= 0.200 Inlet / Outlet Invert= 1,037.52' / 1,036.02' S= 0.0125 '/' Cc= 0.900 n= 0.013 Corrugated PE, smooth interior, Flow Area= 1.23 sf

Primary OutFlow Max=2.53 cfs @ 12.05 hrs HW=1,038.28' TW=1,036.88' (Dynamic Tailwater)
1=Culvert (Outlet Controls 2.53 cfs @ 4.63 fps)

Summary for Pond MH3i: (new Pond)

Inflow Area = 71,009 sf, 76.21% Impervious, Inflow Depth = 4.14" for 10YR event
Inflow = 7.38 cfs @ 12.03 hrs, Volume= 24,478 cf
Outflow = 7.38 cfs @ 12.03 hrs, Volume= 24,478 cf, Atten= 0%, Lag= 0.0 min
Primary = 5.54 cfs @ 12.04 hrs, Volume= 9,629 cf
Secondary = 1.88 cfs @ 12.01 hrs, Volume= 14,849 cf

Routing by Dyn-Stor-Ind method, Time Span= 0.00-48.00 hrs, dt= 0.05 hrs
Peak Elev= 1,037.47' @ 12.41 hrs

Device	Routing	Invert	Outlet Devices
#1	Primary	1,036.75'	**5.0' long x 0.5' breadth Broad-Crested Rectangular Weir** Head (feet) 0.20 0.40 0.60 0.80 1.00 Coef. (English) 2.80 2.92 3.08 3.30 3.32
#2	Secondary	1,036.37'	**12.0" Round Culvert** L= 5.0' Ke= 0.200 Inlet / Outlet Invert= 1,036.37' / 1,036.30' S= 0.0140 '/' Cc= 0.900 n= 0.013 Corrugated PE, smooth interior, Flow Area= 0.79 sf

Primary OutFlow Max=4.95 cfs @ 12.04 hrs HW=1,037.27' TW=1,036.99' (Dynamic Tailwater)
1=Broad-Crested Rectangular Weir (Weir Controls 4.95 cfs @ 1.90 fps)

Secondary OutFlow Max=1.45 cfs @ 12.01 hrs HW=1,037.25' TW=1,037.11' (Dynamic Tailwater)
2=Culvert (Outlet Controls 1.45 cfs @ 2.62 fps)

Summary for Pond MH3o: (new Pond)

Inflow Area = 71,009 sf, 76.21% Impervious, Inflow Depth = 4.14" for 10YR event
Inflow = 7.38 cfs @ 12.03 hrs, Volume= 24,478 cf
Outflow = 7.38 cfs @ 12.03 hrs, Volume= 24,478 cf, Atten= 0%, Lag= 0.0 min
Primary = 7.38 cfs @ 12.03 hrs, Volume= 24,478 cf

Routing by Dyn-Stor-Ind method, Time Span= 0.00-48.00 hrs, dt= 0.05 hrs
Peak Elev= 1,037.46' @ 12.36 hrs

Device	Routing	Invert	Outlet Devices
#1	Primary	1,035.86'	**24.0" Round Culvert** L= 50.0' Ke= 0.200

Inlet / Outlet Invert= 1,035.86' / 1,035.00' S= 0.0172 '/' Cc= 0.900
n= 0.013 Corrugated PE, smooth interior, Flow Area= 3.14 sf

Primary OutFlow Max=5.75 cfs @ 12.03 hrs HW=1,036.98' TW=1,036.34' (Dynamic Tailwater)
1=Culvert (Outlet Controls 5.75 cfs @ 4.60 fps)

Summary for Pond MH4: (new Pond)

Inflow Area = 71,009 sf, 76.21% Impervious, Inflow Depth = 4.14" for 10YR event
Inflow = 7.38 cfs @ 12.03 hrs, Volume= 24,478 cf
Outflow = 7.38 cfs @ 12.03 hrs, Volume= 24,478 cf, Atten= 0%, Lag= 0.0 min
Primary = 7.38 cfs @ 12.03 hrs, Volume= 24,478 cf

Routing by Dyn-Stor-Ind method, Time Span= 0.00-48.00 hrs, dt= 0.05 hrs
Peak Elev= 1,038.43' @ 12.04 hrs

Device	Routing	Invert	Outlet Devices
#1	Primary	1,037.35'	**24.0" Round Culvert** L= 57.0' Ke= 0.200 Inlet / Outlet Invert= 1,037.35' / 1,036.37' S= 0.0172 '/' Cc= 0.900 n= 0.013 Corrugated PE, smooth interior, Flow Area= 3.14 sf

Primary OutFlow Max=6.94 cfs @ 12.03 hrs HW=1,038.41' TW=1,037.27' (Dynamic Tailwater)
1=Culvert (Outlet Controls 6.94 cfs @ 5.96 fps)

Summary for Pond MH5: (new Pond)

Inflow Area = 28,054 sf, 89.14% Impervious, Inflow Depth = 4.37" for 10YR event
Inflow = 3.36 cfs @ 12.01 hrs, Volume= 10,220 cf
Outflow = 3.36 cfs @ 12.01 hrs, Volume= 10,220 cf, Atten= 0%, Lag= 0.0 min
Primary = 3.36 cfs @ 12.01 hrs, Volume= 10,220 cf

Routing by Dyn-Stor-Ind method, Time Span= 0.00-48.00 hrs, dt= 0.05 hrs
Peak Elev= 1,040.69' @ 12.01 hrs

Device	Routing	Invert	Outlet Devices
#1	Primary	1,039.89'	**18.0" Round Culvert** L= 132.0' Ke= 0.200

Inlet / Outlet Invert= 1,039.89' / 1,038.44' S= 0.0110 '/' Cc= 0.900
n= 0.013 Corrugated PE, smooth interior, Flow Area= 1.77 sf

Primary OutFlow Max=3.24 cfs @ 12.01 hrs HW=1,040.68' TW=1,038.40' (Dynamic Tailwater)
1=Culvert (Barrel Controls 3.24 cfs @ 5.02 fps)

Summary for Pond MH6: (new Pond)

Inflow Area = 32,273 sf, 60.28% Impervious, Inflow Depth = 3.83" for 10YR event
Inflow = 3.24 cfs @ 12.06 hrs, Volume= 10,305 cf
Outflow = 3.24 cfs @ 12.06 hrs, Volume= 10,305 cf, Atten= 0%, Lag= 0.0 min
Primary = 3.24 cfs @ 12.06 hrs, Volume= 10,305 cf

Routing by Dyn-Stor-Ind method, Time Span= 0.00-48.00 hrs, dt= 0.05 hrs
Peak Elev= 1,041.33' @ 12.06 hrs

Device	Routing	Invert	Outlet Devices
#1	Primary	1,040.58'	**18.0" Round Culvert** L= 116.0' Ke= 0.200 Inlet / Outlet Invert= 1,040.58' / 1,038.84' S= 0.0150 '/' Cc= 0.900 n= 0.013 Corrugated PE, smooth interior, Flow Area= 1.77 sf

Primary OutFlow Max=3.15 cfs @ 12.06 hrs HW=1,041.32' TW=1,038.40' (Dynamic Tailwater)
1=Culvert (Inlet Controls 3.15 cfs @ 3.65 fps)

Summary for Pond STU1: (new Pond)

Inflow = 1.88 cfs @ 12.01 hrs, Volume= 14,849 cf
Outflow = 1.88 cfs @ 12.01 hrs, Volume= 14,849 cf, Atten= 0%, Lag= 0.0 min
Primary = 1.88 cfs @ 12.01 hrs, Volume= 14,849 cf

Routing by Dyn-Stor-Ind method, Time Span= 0.00-48.00 hrs, dt= 0.05 hrs
Peak Elev= 1,037.47' @ 12.37 hrs

Device	Routing	Invert	Outlet Devices
#1	Primary	1,036.30'	**12.0" Round Culvert** L= 5.0' Ke= 0.200 Inlet / Outlet Invert= 1,036.30' / 1,036.20' S= 0.0200 '/' Cc= 0.900

n= 0.013 Corrugated PE, smooth interior, Flow Area= 0.79 sf

Primary OutFlow Max=1.40 cfs @ 12.01 hrs HW=1,037.11' TW=1,036.95' (Dynamic Tailwater)
↑**1=Culvert** (Outlet Controls 1.40 cfs @ 2.81 fps)

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

Subcatchment 1S: (new Subcat) Runoff Area=12,290 sf 0.00% Impervious Runoff Depth=3.48"
Flow Length=40' Slope=0.2750 '/' Tc=1.6 min CN=76 Runoff=1.26 cfs 3,559 cf

Subcatchment 2S: (new Subcat) Runoff Area=5,956 sf 64.05% Impervious Runoff Depth=4.84"
Flow Length=186' Tc=1.6 min CN=89 Runoff=0.81 cfs 2,403 cf

Subcatchment 3S: ROOF Runoff Area=5,000 sf 100.00% Impervious Runoff Depth=5.87"
Tc=1.0 min CN=98 Runoff=0.77 cfs 2,447 cf

Subcatchment 4S: ROOF Runoff Area=5,000 sf 100.00% Impervious Runoff Depth=5.87"
Tc=1.0 min CN=98 Runoff=0.77 cfs 2,447 cf

Subcatchment 5S: (new Subcat) Runoff Area=10,067 sf 81.72% Impervious Runoff Depth=5.41"
Flow Length=157' Tc=1.0 min CN=94 Runoff=1.50 cfs 4,535 cf

Subcatchment 6S: (new Subcat) Runoff Area=26,955 sf 2.64% Impervious Runoff Depth=3.78"
Flow Length=208' Tc=3.9 min CN=79 Runoff=2.88 cfs 8,486 cf

Subcatchment 7S: (new Subcat) Runoff Area=13,165 sf 45.68% Impervious Runoff Depth=4.84"
Flow Length=42' Slope=0.1857 '/' Tc=2.0 min CN=89 Runoff=1.79 cfs 5,312 cf

Subcatchment 8S: (new Subcat) Runoff Area=8,734 sf 81.55% Impervious Runoff Depth=5.52"
Flow Length=125' Tc=0.9 min CN=95 Runoff=1.32 cfs 4,018 cf

Subcatchment 9S: (new Subcat) Runoff Area=8,042 sf 87.19% Impervious Runoff Depth=5.64"
Flow Length=112' Tc=0.8 min CN=96 Runoff=1.23 cfs 3,778 cf

Subcatchment 10S: ROOF Runoff Area=2,640 sf 100.00% Impervious Runoff Depth=5.87"
Tc=1.0 min CN=98 Runoff=0.40 cfs 1,292 cf

Subcatchment 11S: ROOF Runoff Area=2,822 sf 100.00% Impervious Runoff Depth=5.87"
Tc=1.0 min CN=98 Runoff=0.43 cfs 1,381 cf

Subcatchment12S: (new Subcat) Runoff Area=16,498 sf 91.30% Impervious Runoff Depth=5.64"
Flow Length=126' Tc=0.8 min CN=96 Runoff=2.52 cfs 7,750 cf

Subcatchment13S: ROOF-CANOPY Runoff Area=2,880 sf 100.00% Impervious Runoff Depth=5.87"
Tc=2.0 min CN=98 Runoff=0.43 cfs 1,409 cf

Subcatchment14S: (new Subcat) Runoff Area=15,482 sf 73.05% Impervious Runoff Depth=5.29"
Flow Length=208' Tc=5.0 min CN=93 Runoff=2.06 cfs 6,827 cf

Subcatchment15S: (new Subcat) Runoff Area=7,846 sf 70.75% Impervious Runoff Depth=5.18"
Flow Length=142' Tc=1.0 min CN=92 Runoff=1.14 cfs 3,385 cf

Subcatchment16S: (new Subcat) Runoff Area=14,478 sf 84.51% Impervious Runoff Depth=5.52"
Flow Length=224' Tc=4.9 min CN=95 Runoff=1.97 cfs 6,661 cf

Subcatchment17S: (new Subcat) Runoff Area=13,911 sf 37.85% Impervious Runoff Depth=4.62"
Flow Length=111' Tc=3.8 min CN=87 Runoff=1.78 cfs 5,359 cf

Reach R1: (new Reach) Avg. Flow Depth=0.44' Max Vel=3.04 fps Inflow=7.73 cfs 55,714 cf
n=0.069 L=20.0' S=0.0750 '/' Capacity=125.86 cfs Outflow=7.80 cfs 55,714 cf

Pond 1EV: SITE TOTAL Inflow=10.75 cfs 67,760 cf
Primary=10.75 cfs 67,760 cf

Pond 1P: Inflow=9.95 cfs 64,200 cf
Primary=9.95 cfs 64,200 cf

Pond 2P: Inflow=1.26 cfs 3,559 cf
Primary=1.26 cfs 3,559 cf

Pond CB1: (new Pond) Peak Elev=1,037.97' Inflow=1.50 cfs 4,535 cf
12.0" Round Culvert n=0.013 L=8.0' S=0.0150 '/' Outflow=1.50 cfs 4,535 cf

Pond CB2: (new Pond) Peak Elev=1,038.52' Inflow=0.81 cfs 2,403 cf
12.0" Round Culvert n=0.013 L=12.0' S=0.0150 '/' Outflow=0.81 cfs 2,403 cf

Pond CB3: (new Pond) Peak Elev=1,040.68' Inflow=1.97 cfs 6,661 cf
12.0" Round Culvert n=0.013 L=165.0' S=0.0135 '/' Outflow=1.97 cfs 6,661 cf

Pond CB4: (new Pond) Peak Elev=1,040.49' Inflow=1.14 cfs 3,385 cf
12.0" Round Culvert n=0.013 L=165.0' S=0.0219 '/' Outflow=1.14 cfs 3,385 cf

Pond CB5: (new Pond) Peak Elev=1,040.83' Inflow=1.23 cfs 3,778 cf
12.0" Round Culvert n=0.013 L=42.0' S=0.0150 '/' Outflow=1.23 cfs 3,778 cf

Pond CB6: (new Pond) Peak Elev=1,041.37' Inflow=1.32 cfs 4,018 cf
12.0" Round Culvert n=0.013 L=36.0' S=0.0100 '/' Outflow=1.32 cfs 4,018 cf

Pond CB7: (new Pond) Peak Elev=1,042.37' Inflow=2.52 cfs 7,750 cf
12.0" Round Culvert n=0.013 L=128.0' S=0.0100 '/' Outflow=2.52 cfs 7,750 cf

Pond CB8: (new Pond) Peak Elev=1,041.81' Inflow=3.82 cfs 12,185 cf
18.0" Round Culvert n=0.013 L=7.0' S=0.0143 '/' Outflow=3.82 cfs 12,185 cf

Pond DRI: (new Pond) Peak Elev=1,044.38' Inflow=1.78 cfs 5,359 cf
12.0" Round Culvert n=0.013 L=74.0' S=0.0196 '/' Outflow=1.78 cfs 5,359 cf

Pond FB: (new Pond) Peak Elev=1,037.90' Storage=4,501 cf Inflow=16.02 cfs 53,690 cf
Outflow=12.95 cfs 52,349 cf

Pond IB: (new Pond) Peak Elev=1,037.90' Storage=14,174 cf Inflow=14.67 cfs 57,661 cf
Outflow=7.73 cfs 55,714 cf

Pond MH1: (new Pond) Peak Elev=1,037.97' Inflow=6.55 cfs 21,877 cf
18.0" Round Culvert n=0.013 L=52.0' S=0.0148 '/' Outflow=6.55 cfs 21,877 cf

Pond MH2: (new Pond) Peak Elev=1,038.45' Inflow=3.38 cfs 11,511 cf
15.0" Round Culvert n=0.013 L=120.0' S=0.0125 '/' Outflow=3.38 cfs 11,511 cf

Pond MH3i: (new Pond) Peak Elev=1,037.95' Inflow=9.47 cfs 31,813 cf
Primary=7.09 cfs 13,844 cf Secondary=2.33 cfs 17,969 cf Outflow=9.47 cfs 31,813 cf

Pond MH3o: (new Pond) Peak Elev=1,037.95' Inflow=9.47 cfs 31,813 cf
24.0" Round Culvert n=0.013 L=50.0' S=0.0172 '/' Outflow=9.47 cfs 31,813 cf

Pond MH4: (new Pond) Peak Elev=1,038.61' Inflow=9.47 cfs 31,813 cf
24.0" Round Culvert n=0.013 L=57.0' S=0.0172 '/' Outflow=9.47 cfs 31,813 cf

Pond MH5: (new Pond) Peak Elev=1,040.82' Inflow=4.27 cfs 13,149 cf
18.0" Round Culvert n=0.013 L=132.0' S=0.0110 '/' Outflow=4.27 cfs 13,149 cf

Pond MH6: (new Pond) Peak Elev=1,041.45' Inflow=4.22 cfs 13,594 cf
18.0" Round Culvert n=0.013 L=116.0' S=0.0150 '/' Outflow=4.22 cfs 13,594 cf

Pond STU1: (new Pond) Peak Elev=1,038.16' Inflow=2.33 cfs 17,969 cf
12.0" Round Culvert n=0.013 L=5.0' S=0.0200 '/' Outflow=2.33 cfs 17,969 cf

Total Runoff Area = 171,766 sf Runoff Volume = 71,048 cf Average Runoff Depth = 4.96"
41.39% Pervious = 71,099 sf 58.61% Impervious = 100,667 sf

Summary for Subcatchment 1S: (new Subcat)

Runoff = 1.26 cfs @ 12.03 hrs, Volume= 3,559 cf, Depth= 3.48"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-48.00 hrs, dt= 0.05 hrs
Type III 24-hr 25YR Rainfall=6.11"

Area (sf)	CN	Description
4,440	80	>75% Grass cover, Good, HSG D
7,850	74	>75% Grass cover, Good, HSG C
12,290	76	Weighted Average
12,290		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
1.6	40	0.2750	0.41		**Sheet Flow,** Grass: Short n= 0.150 P2= 3.26"

Summary for Subcatchment 2S: (new Subcat)

Runoff = 0.81 cfs @ 12.03 hrs, Volume= 2,403 cf, Depth= 4.84"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-48.00 hrs, dt= 0.05 hrs
Type III 24-hr 25YR Rainfall=6.11"

Area (sf)	CN	Description
26	98	Unconnected pavement, HSG C
3,789	98	Paved parking, HSG C
2,141	74	>75% Grass cover, Good, HSG C
5,956	89	Weighted Average
2,141		35.95% Pervious Area
3,815		64.05% Impervious Area
26		0.68% Unconnected

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
0.6	44	0.0227	1.24		**Sheet Flow,** Smooth surfaces n= 0.011 P2= 3.26"
1.0	142	0.0134	2.35		**Shallow Concentrated Flow,** Paved Kv= 20.3 fps
1.6	186	Total			

Summary for Subcatchment 3S: ROOF

Runoff = 0.77 cfs @ 12.01 hrs, Volume= 2,447 cf, Depth= 5.87"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-48.00 hrs, dt= 0.05 hrs
Type III 24-hr 25YR Rainfall=6.11"

Area (sf)	CN	Description
5,000	98	Roofs, HSG C
5,000		100.00% Impervious Area

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

Summary for Subcatchment 4S: ROOF

Runoff = 0.77 cfs @ 12.01 hrs, Volume= 2,447 cf, Depth= 5.87"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-48.00 hrs, dt= 0.05 hrs
Type III 24-hr 25YR Rainfall=6.11"

Area (sf)	CN	Description
3,300	98	Roofs, HSG C
1,700	98	Roofs, HSG D
5,000	98	Weighted Average
5,000		100.00% Impervious Area

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

Summary for Subcatchment 5S: (new Subcat)

Runoff = 1.50 cfs @ 12.01 hrs, Volume= 4,535 cf, Depth= 5.41"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-48.00 hrs, dt= 0.05 hrs
Type III 24-hr 25YR Rainfall=6.11"

Area (sf)	CN	Description
395	74	>75% Grass cover, Good, HSG C
1,445	80	>75% Grass cover, Good, HSG D
309	98	Unconnected pavement, HSG C
790	98	Unconnected pavement, HSG D
5,597	98	Paved parking, HSG D
1,531	98	Paved parking, HSG C
10,067	94	Weighted Average
1,840		18.28% Pervious Area
8,227		81.72% Impervious Area
1,099		13.36% Unconnected

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
0.5	50	0.0540	1.80		**Sheet Flow,** Smooth surfaces n= 0.011 P2= 3.26"
0.5	107	0.0308	3.56		**Shallow Concentrated Flow,** Paved Kv= 20.3 fps
1.0	157	Total			

Summary for Subcatchment 6S: (new Subcat)

Runoff = 2.88 cfs @ 12.06 hrs, Volume= 8,486 cf, Depth= 3.78"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-48.00 hrs, dt= 0.05 hrs
Type III 24-hr 25YR Rainfall=6.11"

Area (sf)	CN	Description
* 711	98	riprap
15,442	80	>75% Grass cover, Good, HSG D
10,802	77	Woods, Good, HSG D
26,955	79	Weighted Average
26,244		97.36% Pervious Area
711		2.64% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
2.5	50	0.1460	0.33		**Sheet Flow,** Grass: Short n= 0.150 P2= 3.26"
0.1	54	0.1815	6.86		**Shallow Concentrated Flow,** Unpaved Kv= 16.1 fps
1.3	104	0.0769	1.39		**Shallow Concentrated Flow,** Woodland Kv= 5.0 fps
3.9	208	Total			

Summary for Subcatchment 7S: (new Subcat)

Runoff = 1.79 cfs @ 12.03 hrs, Volume= 5,312 cf, Depth= 4.84"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-48.00 hrs, dt= 0.05 hrs
Type III 24-hr 25YR Rainfall=6.11"

Area (sf)	CN	Description
5,880	98	Water Surface, HSG D
* 134	98	riprap
6,571	80	>75% Grass cover, Good, HSG D
580	91	Gravel roads, HSG D
13,165	89	Weighted Average
7,151		54.32% Pervious Area
6,014		45.68% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
2.0	42	0.1857	0.35		**Sheet Flow,** Grass: Short n= 0.150 P2= 3.26"

Summary for Subcatchment 8S: (new Subcat)

Runoff = 1.32 cfs @ 12.01 hrs, Volume= 4,018 cf, Depth= 5.52"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-48.00 hrs, dt= 0.05 hrs
Type III 24-hr 25YR Rainfall=6.11"

Area (sf)	CN	Description
1,611	80	>75% Grass cover, Good, HSG D
459	98	Unconnected pavement, HSG D
6,664	98	Paved parking, HSG D
8,734	95	Weighted Average
1,611		18.45% Pervious Area
7,123		81.55% Impervious Area
459		6.44% Unconnected

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
0.5	50	0.0411	1.61		**Sheet Flow,** Smooth surfaces n= 0.011 P2= 3.26"
0.4	75	0.0260	3.27		**Shallow Concentrated Flow,** Paved Kv= 20.3 fps
0.9	125	Total			

Summary for Subcatchment 9S: (new Subcat)

Runoff = 1.23 cfs @ 12.01 hrs, Volume= 3,778 cf, Depth= 5.64"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-48.00 hrs, dt= 0.05 hrs
Type III 24-hr 25YR Rainfall=6.11"

Area (sf)	CN	Description
1,030	80	>75% Grass cover, Good, HSG D
194	98	Unconnected pavement, HSG D
6,818	98	Paved parking, HSG D
8,042	96	Weighted Average
1,030		12.81% Pervious Area
7,012		87.19% Impervious Area
194		2.77% Unconnected

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
0.5	50	0.0380	1.56		**Sheet Flow,** Smooth surfaces n= 0.011 P2= 3.26"
0.3	62	0.0274	3.36		**Shallow Concentrated Flow,** Paved Kv= 20.3 fps
0.8	112	Total			

Summary for Subcatchment 10S: ROOF

Runoff = 0.40 cfs @ 12.01 hrs, Volume= 1,292 cf, Depth= 5.87"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-48.00 hrs, dt= 0.05 hrs
Type III 24-hr 25YR Rainfall=6.11"

Area (sf)	CN	Description
2,640	98	Roofs, HSG D
2,640		100.00% Impervious Area

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

Summary for Subcatchment 11S: ROOF

Runoff = 0.43 cfs @ 12.01 hrs, Volume= 1,381 cf, Depth= 5.87"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-48.00 hrs, dt= 0.05 hrs
Type III 24-hr 25YR Rainfall=6.11"

Area (sf)	CN	Description
2,822	98	Roofs, HSG D
2,822		100.00% Impervious Area

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

Summary for Subcatchment 12S: (new Subcat)

Runoff = 2.52 cfs @ 12.01 hrs, Volume= 7,750 cf, Depth= 5.64"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-48.00 hrs, dt= 0.05 hrs
Type III 24-hr 25YR Rainfall=6.11"

Area (sf)	CN	Description
1,435	80	>75% Grass cover, Good, HSG D
1,035	98	Unconnected pavement, HSG D
14,028	98	Paved parking, HSG D
16,498	96	Weighted Average
1,435		8.70% Pervious Area
15,063		91.30% Impervious Area
1,035		6.87% Unconnected

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
0.5	50	0.0500	1.74		**Sheet Flow,** Smooth surfaces n= 0.011 P2= 3.26"
0.3	76	0.0329	3.68		**Shallow Concentrated Flow,** Paved Kv= 20.3 fps
0.8	126	Total			

Summary for Subcatchment 13S: ROOF-CANOPY

Runoff = 0.43 cfs @ 12.03 hrs, Volume= 1,409 cf, Depth= 5.87"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-48.00 hrs, dt= 0.05 hrs
Type III 24-hr 25YR Rainfall=6.11"

Area (sf)	CN	Description
2,880	98	Roofs, HSG D
2,880		100.00% Impervious Area

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

Summary for Subcatchment 14S: (new Subcat)

Runoff = 2.06 cfs @ 12.07 hrs, Volume= 6,827 cf, Depth= 5.29"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-48.00 hrs, dt= 0.05 hrs
Type III 24-hr 25YR Rainfall=6.11"

Area (sf)	CN	Description
614	98	Unconnected pavement, HSG D
211	98	Paved parking, HSG C
10,484	98	Paved parking, HSG D
4,173	80	>75% Grass cover, Good, HSG D
15,482	93	Weighted Average
4,173		26.95% Pervious Area
11,309		73.05% Impervious Area
614		5.43% Unconnected

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
4.2	50	0.0400	0.20		**Sheet Flow,** Grass: Short n= 0.150 P2= 3.26"
0.8	158	0.0282	3.41		**Shallow Concentrated Flow,** Paved Kv= 20.3 fps
5.0	208	Total			

Summary for Subcatchment 15S: (new Subcat)

Runoff = 1.14 cfs @ 12.01 hrs, Volume= 3,385 cf, Depth= 5.18"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-48.00 hrs, dt= 0.05 hrs
Type III 24-hr 25YR Rainfall=6.11"

Area (sf)	CN	Description
1,155	74	>75% Grass cover, Good, HSG C
1,140	80	>75% Grass cover, Good, HSG D
174	98	Unconnected pavement, HSG C
2,097	98	Paved parking, HSG D
3,280	98	Paved parking, HSG C
7,846	92	Weighted Average
2,295		29.25% Pervious Area
5,551		70.75% Impervious Area
174		3.13% Unconnected

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
0.5	50	0.0377	1.56		**Sheet Flow,** Smooth surfaces n= 0.011 P2= 3.26"
0.5	92	0.0250	3.21		**Shallow Concentrated Flow,** Paved Kv= 20.3 fps
1.0	142	Total			

Summary for Subcatchment 16S: (new Subcat)

Runoff = 1.97 cfs @ 12.07 hrs, Volume= 6,661 cf, Depth= 5.52"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-48.00 hrs, dt= 0.05 hrs
Type III 24-hr 25YR Rainfall=6.11"

Area (sf)	CN	Description
397	98	Unconnected pavement, HSG C
1,089	74	>75% Grass cover, Good, HSG C
1,154	80	>75% Grass cover, Good, HSG D
7,641	98	Paved parking, HSG C
4,197	98	Paved parking, HSG D
14,478	95	Weighted Average
2,243		15.49% Pervious Area
12,235		84.51% Impervious Area
397		3.24% Unconnected

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
4.2	50	0.0400	0.20		**Sheet Flow,** Grass: Short n= 0.150 P2= 3.26"
0.7	174	0.0374	3.93		**Shallow Concentrated Flow,** Paved Kv= 20.3 fps
4.9	224	Total			

Summary for Subcatchment 17S: (new Subcat)

Runoff = 1.78 cfs @ 12.06 hrs, Volume= 5,359 cf, Depth= 4.62"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-48.00 hrs, dt= 0.05 hrs
Type III 24-hr 25YR Rainfall=6.11"

Area (sf)	CN	Description
8,646	80	>75% Grass cover, Good, HSG D
5,265	98	Paved parking, HSG D
13,911	87	Weighted Average
8,646		62.15% Pervious Area
5,265		37.85% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
3.5	50	0.0660	0.24		**Sheet Flow,** Grass: Short n= 0.150 P2= 3.26"
0.3	61	0.0205	2.91		**Shallow Concentrated Flow,** Paved Kv= 20.3 fps
3.8	111	Total			

Summary for Reach R1: (new Reach)

Inflow Area = 132,521 sf, 75.43% Impervious, Inflow Depth = 5.05" for 25YR event
Inflow = 7.73 cfs @ 12.19 hrs, Volume= 55,714 cf
Outflow = 7.80 cfs @ 12.20 hrs, Volume= 55,714 cf, Atten= 0%, Lag= 0.6 min

Routing by Dyn-Stor-Ind method, Time Span= 0.00-48.00 hrs, dt= 0.05 hrs
Max. Velocity= 3.04 fps, Min. Travel Time= 0.1 min
Avg. Velocity = 0.76 fps, Avg. Travel Time= 0.4 min

Peak Storage= 51 cf @ 12.20 hrs
Average Depth at Peak Storage= 0.44'
Bank-Full Depth= 2.00' Flow Area= 18.0 sf, Capacity= 125.86 cfs

5.00' x 2.00' deep channel, n= 0.069 Riprap, 6-inch
Side Slope Z-value= 2.0 '/' Top Width= 13.00'
Length= 20.0' Slope= 0.0750 '/'
Inlet Invert= 1,031.00', Outlet Invert= 1,029.50'

Summary for Pond 1EV: SITE TOTAL

Inflow Area = 171,766 sf, 58.61% Impervious, Inflow Depth = 4.73" for 25YR event
Inflow = 10.75 cfs @ 12.10 hrs, Volume= 67,760 cf
Primary = 10.75 cfs @ 12.10 hrs, Volume= 67,760 cf, Atten= 0%, Lag= 0.0 min

Routing by Dyn-Stor-Ind method, Time Span= 0.00-48.00 hrs, dt= 0.05 hrs

Summary for Pond 1P:

Inflow Area = 159,476 sf, 63.12% Impervious, Inflow Depth = 4.83" for 25YR event
Inflow = 9.95 cfs @ 12.11 hrs, Volume= 64,200 cf
Primary = 9.95 cfs @ 12.11 hrs, Volume= 64,200 cf, Atten= 0%, Lag= 0.0 min

Routing by Dyn-Stor-Ind method, Time Span= 0.00-48.00 hrs, dt= 0.05 hrs

Summary for Pond 2P:

Inflow Area = 12,290 sf, 0.00% Impervious, Inflow Depth = 3.48" for 25YR event
Inflow = 1.26 cfs @ 12.03 hrs, Volume= 3,559 cf
Primary = 1.26 cfs @ 12.03 hrs, Volume= 3,559 cf, Atten= 0%, Lag= 0.0 min

Routing by Dyn-Stor-Ind method, Time Span= 0.00-48.00 hrs, dt= 0.05 hrs

Summary for Pond CB1: (new Pond)

Inflow Area = 10,067 sf, 81.72% Impervious, Inflow Depth = 5.41" for 25YR event
Inflow = 1.50 cfs @ 12.01 hrs, Volume= 4,535 cf
Outflow = 1.50 cfs @ 12.01 hrs, Volume= 4,535 cf, Atten= 0%, Lag= 0.0 min
Primary = 1.50 cfs @ 12.01 hrs, Volume= 4,535 cf

Routing by Dyn-Stor-Ind method, Time Span= 0.00-48.00 hrs, dt= 0.05 hrs
Peak Elev= 1,037.97' @ 12.32 hrs

Device	Routing	Invert	Outlet Devices
#1	Primary	1,036.50'	**12.0" Round Culvert** L= 8.0' Ke= 0.200 Inlet / Outlet Invert= 1,036.50' / 1,036.38' S= 0.0150 '/' Cc= 0.900 n= 0.013 Corrugated PE, smooth interior, Flow Area= 0.79 sf

Primary OutFlow Max=0.74 cfs @ 12.01 hrs HW=1,037.21' TW=1,037.14' (Dynamic Tailwater)
1=Culvert (Outlet Controls 0.74 cfs @ 1.73 fps)

Summary for Pond CB2: (new Pond)

Inflow Area = 5,956 sf, 64.05% Impervious, Inflow Depth = 4.84" for 25YR event
Inflow = 0.81 cfs @ 12.03 hrs, Volume= 2,403 cf
Outflow = 0.81 cfs @ 12.03 hrs, Volume= 2,403 cf, Atten= 0%, Lag= 0.0 min
Primary = 0.81 cfs @ 12.03 hrs, Volume= 2,403 cf

Routing by Dyn-Stor-Ind method, Time Span= 0.00-48.00 hrs, dt= 0.05 hrs
Peak Elev= 1,038.52' @ 12.08 hrs

Device	Routing	Invert	Outlet Devices
#1	Primary	1,037.95'	**12.0" Round Culvert** L= 12.0' Ke= 0.200 Inlet / Outlet Invert= 1,037.95' / 1,037.77' S= 0.0150 '/' Cc= 0.900 n= 0.013 Corrugated PE, smooth interior, Flow Area= 0.79 sf

Primary OutFlow Max=0.44 cfs @ 12.03 hrs HW=1,038.46' TW=1,038.39' (Dynamic Tailwater)
1=Culvert (Outlet Controls 0.44 cfs @ 1.60 fps)

Summary for Pond CB3: (new Pond)

Inflow Area = 14,478 sf, 84.51% Impervious, Inflow Depth = 5.52" for 25YR event
Inflow = 1.97 cfs @ 12.07 hrs, Volume= 6,661 cf
Outflow = 1.97 cfs @ 12.07 hrs, Volume= 6,661 cf, Atten= 0%, Lag= 0.0 min
Primary = 1.97 cfs @ 12.07 hrs, Volume= 6,661 cf

Routing by Dyn-Stor-Ind method, Time Span= 0.00-48.00 hrs, dt= 0.05 hrs
Peak Elev= 1,040.68' @ 12.07 hrs

Device	Routing	Invert	Outlet Devices
#1	Primary	1,040.00'	**12.0" Round Culvert** L= 165.0' Ke= 0.200 Inlet / Outlet Invert= 1,040.00' / 1,037.77' S= 0.0135 '/' Cc= 0.900 n= 0.013 Corrugated PE, smooth interior, Flow Area= 0.79 sf

Primary OutFlow Max=1.88 cfs @ 12.07 hrs HW=1,040.67' TW=1,038.43' (Dynamic Tailwater)
1=Culvert (Outlet Controls 1.88 cfs @ 4.76 fps)

Summary for Pond CB4: (new Pond)

Inflow Area = 7,846 sf, 70.75% Impervious, Inflow Depth = 5.18" for 25YR event
Inflow = 1.14 cfs @ 12.01 hrs, Volume= 3,385 cf
Outflow = 1.14 cfs @ 12.01 hrs, Volume= 3,385 cf, Atten= 0%, Lag= 0.0 min
Primary = 1.14 cfs @ 12.01 hrs, Volume= 3,385 cf

Routing by Dyn-Stor-Ind method, Time Span= 0.00-48.00 hrs, dt= 0.05 hrs
Peak Elev= 1,040.49' @ 12.01 hrs

Device	Routing	Invert	Outlet Devices
#1	Primary	1,040.00'	**12.0" Round Culvert** L= 165.0' Ke= 0.200 Inlet / Outlet Invert= 1,040.00' / 1,036.38' S= 0.0219 '/' Cc= 0.900 n= 0.013 Corrugated PE, smooth interior, Flow Area= 0.79 sf

Primary OutFlow Max=1.09 cfs @ 12.01 hrs HW=1,040.48' TW=1,037.14' (Dynamic Tailwater)
1=Culvert (Inlet Controls 1.09 cfs @ 2.94 fps)

Summary for Pond CB5: (new Pond)

Inflow Area = 8,042 sf, 87.19% Impervious, Inflow Depth = 5.64" for 25YR event
Inflow = 1.23 cfs @ 12.01 hrs, Volume= 3,778 cf
Outflow = 1.23 cfs @ 12.01 hrs, Volume= 3,778 cf, Atten= 0%, Lag= 0.0 min
Primary = 1.23 cfs @ 12.01 hrs, Volume= 3,778 cf

Routing by Dyn-Stor-Ind method, Time Span= 0.00-48.00 hrs, dt= 0.05 hrs
Peak Elev= 1,040.83' @ 12.01 hrs

Device	Routing	Invert	Outlet Devices
#1	Primary	1,040.30'	**12.0" Round Culvert** L= 42.0' Ke= 0.200 Inlet / Outlet Invert= 1,040.30' / 1,039.67' S= 0.0150 '/' Cc= 0.900 n= 0.013 Corrugated PE, smooth interior, Flow Area= 0.79 sf

Primary OutFlow Max=1.19 cfs @ 12.01 hrs HW=1,040.82' TW=1,038.57' (Dynamic Tailwater)
1=Culvert (Barrel Controls 1.19 cfs @ 4.15 fps)

Summary for Pond CB6: (new Pond)

Inflow Area = 8,734 sf, 81.55% Impervious, Inflow Depth = 5.52" for 25YR event
Inflow = 1.32 cfs @ 12.01 hrs, Volume= 4,018 cf
Outflow = 1.32 cfs @ 12.01 hrs, Volume= 4,018 cf, Atten= 0%, Lag= 0.0 min
Primary = 1.32 cfs @ 12.01 hrs, Volume= 4,018 cf

Routing by Dyn-Stor-Ind method, Time Span= 0.00-48.00 hrs, dt= 0.05 hrs
Peak Elev= 1,041.37' @ 12.01 hrs

Device	Routing	Invert	Outlet Devices
#1	Primary	1,040.75'	**12.0" Round Culvert** L= 36.0' Ke= 0.200 Inlet / Outlet Invert= 1,040.75' / 1,040.39' S= 0.0100 '/' Cc= 0.900 n= 0.013 Corrugated PE, smooth interior, Flow Area= 0.79 sf

Primary OutFlow Max=1.27 cfs @ 12.01 hrs HW=1,041.35' TW=1,040.79' (Dynamic Tailwater)
1=Culvert (Barrel Controls 1.27 cfs @ 3.68 fps)

Summary for Pond CB7: (new Pond)

Inflow Area = 16,498 sf, 91.30% Impervious, Inflow Depth = 5.64" for 25YR event
Inflow = 2.52 cfs @ 12.01 hrs, Volume= 7,750 cf
Outflow = 2.52 cfs @ 12.01 hrs, Volume= 7,750 cf, Atten= 0%, Lag= 0.0 min
Primary = 2.52 cfs @ 12.01 hrs, Volume= 7,750 cf

Routing by Dyn-Stor-Ind method, Time Span= 0.00-48.00 hrs, dt= 0.05 hrs
Peak Elev= 1,042.37' @ 12.01 hrs

Device	Routing	Invert	Outlet Devices
#1	Primary	1,041.50'	**12.0" Round Culvert** L= 128.0' Ke= 0.200 Inlet / Outlet Invert= 1,041.50' / 1,040.22' S= 0.0100 '/' Cc= 0.900 n= 0.013 Corrugated PE, smooth interior, Flow Area= 0.79 sf

Primary OutFlow Max=2.44 cfs @ 12.01 hrs HW=1,042.35' TW=1,040.80' (Dynamic Tailwater)
1=Culvert (Barrel Controls 2.44 cfs @ 4.59 fps)

Summary for Pond CB8: (new Pond)

Inflow Area = 29,393 sf, 56.39% Impervious, Inflow Depth = 4.97" for 25YR event
Inflow = 3.82 cfs @ 12.06 hrs, Volume= 12,185 cf
Outflow = 3.82 cfs @ 12.06 hrs, Volume= 12,185 cf, Atten= 0%, Lag= 0.0 min
Primary = 3.82 cfs @ 12.06 hrs, Volume= 12,185 cf

Routing by Dyn-Stor-Ind method, Time Span= 0.00-48.00 hrs, dt= 0.05 hrs
Peak Elev= 1,041.81' @ 12.07 hrs

Device	Routing	Invert	Outlet Devices
#1	Primary	1,040.78'	**18.0" Round Culvert** L= 7.0' Ke= 0.200 Inlet / Outlet Invert= 1,040.78' / 1,040.68' S= 0.0143 '/' Cc= 0.900 n= 0.013 Corrugated PE, smooth interior, Flow Area= 1.77 sf

Primary OutFlow Max=3.72 cfs @ 12.06 hrs HW=1,041.79' TW=1,041.43' (Dynamic Tailwater)
1=Culvert (Barrel Controls 3.72 cfs @ 4.14 fps)

Summary for Pond DRI: (new Pond)

Inflow Area = 13,911 sf, 37.85% Impervious, Inflow Depth = 4.62" for 25YR event
Inflow = 1.78 cfs @ 12.06 hrs, Volume= 5,359 cf
Outflow = 1.78 cfs @ 12.06 hrs, Volume= 5,359 cf, Atten= 0%, Lag= 0.0 min
Primary = 1.78 cfs @ 12.06 hrs, Volume= 5,359 cf

Routing by Dyn-Stor-Ind method, Time Span= 0.00-48.00 hrs, dt= 0.05 hrs
Peak Elev= 1,044.38' @ 12.06 hrs

Device	Routing	Invert	Outlet Devices
#1	Primary	1,043.75'	**12.0" Round Culvert** L= 74.0' Ke= 0.200 Inlet / Outlet Invert= 1,043.75' / 1,042.30' S= 0.0196 '/' Cc= 0.900 n= 0.013 Cast iron, coated, Flow Area= 0.79 sf

Primary OutFlow Max=1.74 cfs @ 12.06 hrs HW=1,044.37' TW=1,041.80' (Dynamic Tailwater)
1=Culvert (Inlet Controls 1.74 cfs @ 3.36 fps)

Summary for Pond FB: (new Pond)

Inflow Area = 119,356 sf, 78.71% Impervious, Inflow Depth = 5.40" for 25YR event
Inflow = 16.02 cfs @ 12.03 hrs, Volume= 53,690 cf
Outflow = 12.95 cfs @ 12.01 hrs, Volume= 52,349 cf, Atten= 19%, Lag= 0.0 min
Primary = 12.95 cfs @ 12.01 hrs, Volume= 52,349 cf

Routing by Dyn-Stor-Ind method, Time Span= 0.00-48.00 hrs, dt= 0.05 hrs
Peak Elev= 1,037.90' @ 12.24 hrs Surf.Area= 1,402 sf Storage= 4,501 cf

Plug-Flow detention time= 34.1 min calculated for 52,295 cf (97% of inflow)
Center-of-Mass det. time= 18.8 min (780.9 - 762.1)

Volume	Invert	Avail.Storage	Storage Description
#1	1,033.30'	7,896 cf	**Custom Stage Data (Irregular)** Listed below (Recalc)

Elevation (feet)	Surf.Area (sq-ft)	Perim. (feet)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)	Wet.Area (sq-ft)
1,033.30	579	98.5	0	0	579
1,034.00	712	108.0	451	451	751
1,036.00	1,036	129.0	1,738	2,189	1,213
1,038.00	1,422	151.0	2,448	4,637	1,777
1,040.00	1,846	172.0	3,259	7,896	2,406

Device	Routing	Invert	Outlet Devices
#1	Primary	1,035.00'	**153.0 deg x 37.0' long Sharp-Crested Vee/Trap Weir** Cv= 2.47 (C= 3.09)

Primary OutFlow Max=0.00 cfs @ 12.01 hrs HW=1,036.80' TW=1,037.27' (Dynamic Tailwater)
└─**1=Sharp-Crested Vee/Trap Weir** (Controls 0.00 cfs)

Summary for Pond IB: (new Pond)

Inflow Area = 132,521 sf, 75.43% Impervious, Inflow Depth = 5.22" for 25YR event
Inflow = 14.67 cfs @ 12.02 hrs, Volume= 57,661 cf
Outflow = 7.73 cfs @ 12.19 hrs, Volume= 55,714 cf, Atten= 47%, Lag= 10.3 min
Primary = 7.73 cfs @ 12.19 hrs, Volume= 55,714 cf

Routing by Dyn-Stor-Ind method, Time Span= 0.00-48.00 hrs, dt= 0.05 hrs
Peak Elev= 1,037.90' @ 12.19 hrs Surf.Area= 4,100 sf Storage= 14,174 cf

Plug-Flow detention time= 74.1 min calculated for 55,714 cf (97% of inflow)
Center-of-Mass det. time= 53.8 min (835.0 - 781.2)

Volume	Invert	Avail.Storage	Storage Description
#1	1,033.30'	23,761 cf	**Custom Stage Data (Irregular)** Listed below (Recalc)

Elevation (feet)	Surf.Area (sq-ft)	Perim. (feet)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)	Wet.Area (sq-ft)
1,033.30	2,117	216.0	0	0	2,117
1,034.00	2,388	227.0	1,576	1,576	2,535
1,036.00	3,250	253.5	5,616	7,192	3,656
1,038.00	4,145	275.0	7,377	14,569	4,703
1,040.00	5,063	295.0	9,193	23,761	5,775

Device	Routing	Invert	Outlet Devices
#1	Primary	1,033.50'	**18.0" Round Culvert** L= 56.0' Ke= 0.200 Inlet / Outlet Invert= 1,033.50' / 1,031.00' S= 0.0446 '/' Cc= 0.900 n= 0.013 Corrugated PE, smooth interior, Flow Area= 1.77 sf
#2	Device 1	1,038.80'	**24.0" x 24.0" Horiz. Orifice/Grate** C= 0.600 Limited to weir flow at low heads
#3	Primary	1,038.80'	**153.0 deg x 6.0' long x 2.00' rise Sharp-Crested Vee/Trap Weir** Cv= 2.47 (C= 3.09)
#4	Device 1	1,034.15'	**4.0" Vert. Orifice/Grate X 3.00** C= 0.600
#5	Device 1	1,036.94'	**8.0" Vert. Orifice/Grate X 4.00** C= 0.600

Primary OutFlow Max=7.72 cfs @ 12.19 hrs HW=1,037.90' TW=1,031.44' (Dynamic Tailwater)
└─**1=Culvert** (Passes 7.72 cfs of 20.32 cfs potential flow)
  └─**2=Orifice/Grate** (Controls 0.00 cfs)
  └─**4=Orifice/Grate** (Orifice Controls 2.39 cfs @ 9.12 fps)
  └─**5=Orifice/Grate** (Orifice Controls 5.33 cfs @ 3.82 fps)
└─**3=Sharp-Crested Vee/Trap Weir** (Controls 0.00 cfs)

Summary for Pond MH1: (new Pond)

Inflow Area = 48,347 sf, 82.38% Impervious, Inflow Depth = 5.43" for 25YR event
Inflow = 6.55 cfs @ 12.03 hrs, Volume= 21,877 cf
Outflow = 6.55 cfs @ 12.03 hrs, Volume= 21,877 cf, Atten= 0%, Lag= 0.0 min
Primary = 6.55 cfs @ 12.03 hrs, Volume= 21,877 cf

Routing by Dyn-Stor-Ind method, Time Span= 0.00-48.00 hrs, dt= 0.05 hrs
Peak Elev= 1,037.97' @ 12.27 hrs
Flood Elev= 1,040.82'

Device	Routing	Invert	Outlet Devices
#1	Primary	1,035.77'	**18.0" Round Culvert** L= 52.0' Ke= 0.200 Inlet / Outlet Invert= 1,035.77' / 1,035.00' S= 0.0148 '/' Cc= 0.900 n= 0.013 Corrugated PE, smooth interior, Flow Area= 1.77 sf

Primary OutFlow Max=4.00 cfs @ 12.03 hrs HW=1,037.19' TW=1,036.92' (Dynamic Tailwater)
1=Culvert (Outlet Controls 4.00 cfs @ 2.97 fps)

Summary for Pond MH2: (new Pond)

Inflow Area = 25,434 sf, 82.76% Impervious, Inflow Depth = 5.43" for 25YR event
Inflow = 3.38 cfs @ 12.05 hrs, Volume= 11,511 cf
Outflow = 3.38 cfs @ 12.05 hrs, Volume= 11,511 cf, Atten= 0%, Lag= 0.0 min
Primary = 3.38 cfs @ 12.05 hrs, Volume= 11,511 cf

Routing by Dyn-Stor-Ind method, Time Span= 0.00-48.00 hrs, dt= 0.05 hrs
Peak Elev= 1,038.45' @ 12.06 hrs

Device	Routing	Invert	Outlet Devices
#1	Primary	1,037.52'	**15.0" Round Culvert** L= 120.0' Ke= 0.200 Inlet / Outlet Invert= 1,037.52' / 1,036.02' S= 0.0125 '/' Cc= 0.900 n= 0.013 Corrugated PE, smooth interior, Flow Area= 1.23 sf

Primary OutFlow Max=3.13 cfs @ 12.05 hrs HW=1,038.44' TW=1,037.26' (Dynamic Tailwater)
1=Culvert (Outlet Controls 3.13 cfs @ 4.50 fps)

Summary for Pond MH3i: (new Pond)

Inflow Area = 71,009 sf, 76.21% Impervious, Inflow Depth = 5.38" for 25YR event
Inflow = 9.47 cfs @ 12.03 hrs, Volume= 31,813 cf
Outflow = 9.47 cfs @ 12.03 hrs, Volume= 31,813 cf, Atten= 0%, Lag= 0.0 min
Primary = 7.09 cfs @ 12.04 hrs, Volume= 13,844 cf
Secondary = 2.33 cfs @ 12.02 hrs, Volume= 17,969 cf

Routing by Dyn-Stor-Ind method, Time Span= 0.00-48.00 hrs, dt= 0.05 hrs
Peak Elev= 1,037.95' @ 12.32 hrs

Device	Routing	Invert	Outlet Devices
#1	Primary	1,036.75'	**5.0' long x 0.5' breadth Broad-Crested Rectangular Weir** Head (feet) 0.20 0.40 0.60 0.80 1.00 Coef. (English) 2.80 2.92 3.08 3.30 3.32
#2	Secondary	1,036.37'	**12.0" Round Culvert** L= 5.0' Ke= 0.200 Inlet / Outlet Invert= 1,036.37' / 1,036.30' S= 0.0140 '/' Cc= 0.900 n= 0.013 Corrugated PE, smooth interior, Flow Area= 0.79 sf

Primary OutFlow Max=4.91 cfs @ 12.04 hrs HW=1,037.42' TW=1,037.32' (Dynamic Tailwater)
1=Broad-Crested Rectangular Weir (Weir Controls 4.91 cfs @ 1.46 fps)

Secondary OutFlow Max=1.25 cfs @ 12.02 hrs HW=1,037.39' TW=1,037.32' (Dynamic Tailwater)
2=Culvert (Outlet Controls 1.25 cfs @ 1.93 fps)

Summary for Pond MH3o: (new Pond)

Inflow Area = 71,009 sf, 76.21% Impervious, Inflow Depth = 5.38" for 25YR event
Inflow = 9.47 cfs @ 12.03 hrs, Volume= 31,813 cf
Outflow = 9.47 cfs @ 12.03 hrs, Volume= 31,813 cf, Atten= 0%, Lag= 0.0 min
Primary = 9.47 cfs @ 12.03 hrs, Volume= 31,813 cf

Routing by Dyn-Stor-Ind method, Time Span= 0.00-48.00 hrs, dt= 0.05 hrs
Peak Elev= 1,037.95' @ 12.27 hrs

Device	Routing	Invert	Outlet Devices
#1	Primary	1,035.86'	**24.0" Round Culvert** L= 50.0' Ke= 0.200

Inlet / Outlet Invert= 1,035.86' / 1,035.00' S= 0.0172 '/' Cc= 0.900
n= 0.013 Corrugated PE, smooth interior, Flow Area= 3.14 sf

Primary OutFlow Max=6.25 cfs @ 12.03 hrs HW=1,037.30' TW=1,036.94' (Dynamic Tailwater)
1=Culvert (Outlet Controls 6.25 cfs @ 3.60 fps)

Summary for Pond MH4: (new Pond)

Inflow Area = 71,009 sf, 76.21% Impervious, Inflow Depth = 5.38" for 25YR event
Inflow = 9.47 cfs @ 12.03 hrs, Volume= 31,813 cf
Outflow = 9.47 cfs @ 12.03 hrs, Volume= 31,813 cf, Atten= 0%, Lag= 0.0 min
Primary = 9.47 cfs @ 12.03 hrs, Volume= 31,813 cf

Routing by Dyn-Stor-Ind method, Time Span= 0.00-48.00 hrs, dt= 0.05 hrs
Peak Elev= 1,038.61' @ 12.03 hrs

Device	Routing	Invert	Outlet Devices
#1	Primary	1,037.35'	**24.0" Round Culvert** L= 57.0' Ke= 0.200 Inlet / Outlet Invert= 1,037.35' / 1,036.37' S= 0.0172 '/' Cc= 0.900 n= 0.013 Corrugated PE, smooth interior, Flow Area= 3.14 sf

Primary OutFlow Max=8.82 cfs @ 12.03 hrs HW=1,038.58' TW=1,037.41' (Dynamic Tailwater)
1=Culvert (Outlet Controls 8.82 cfs @ 6.20 fps)

Summary for Pond MH5: (new Pond)

Inflow Area = 28,054 sf, 89.14% Impervious, Inflow Depth = 5.62" for 25YR event
Inflow = 4.27 cfs @ 12.01 hrs, Volume= 13,149 cf
Outflow = 4.27 cfs @ 12.01 hrs, Volume= 13,149 cf, Atten= 0%, Lag= 0.0 min
Primary = 4.27 cfs @ 12.01 hrs, Volume= 13,149 cf

Routing by Dyn-Stor-Ind method, Time Span= 0.00-48.00 hrs, dt= 0.05 hrs
Peak Elev= 1,040.82' @ 12.01 hrs

Device	Routing	Invert	Outlet Devices
#1	Primary	1,039.89'	**18.0" Round Culvert** L= 132.0' Ke= 0.200

Inlet / Outlet Invert= 1,039.89' / 1,038.44' S= 0.0110 '/' Cc= 0.900
n= 0.013 Corrugated PE, smooth interior, Flow Area= 1.77 sf

Primary OutFlow Max=4.12 cfs @ 12.01 hrs HW=1,040.79' TW=1,038.57' (Dynamic Tailwater)
1=Culvert (Barrel Controls 4.12 cfs @ 5.30 fps)

Summary for Pond MH6: (new Pond)

Inflow Area = 32,273 sf, 60.28% Impervious, Inflow Depth = 5.05" for 25YR event
Inflow = 4.22 cfs @ 12.06 hrs, Volume= 13,594 cf
Outflow = 4.22 cfs @ 12.06 hrs, Volume= 13,594 cf, Atten= 0%, Lag= 0.0 min
Primary = 4.22 cfs @ 12.06 hrs, Volume= 13,594 cf

Routing by Dyn-Stor-Ind method, Time Span= 0.00-48.00 hrs, dt= 0.05 hrs
Peak Elev= 1,041.45' @ 12.06 hrs

Device	Routing	Invert	Outlet Devices
#1	Primary	1,040.58'	**18.0" Round Culvert** L= 116.0' Ke= 0.200 Inlet / Outlet Invert= 1,040.58' / 1,038.84' S= 0.0150 '/' Cc= 0.900 n= 0.013 Corrugated PE, smooth interior, Flow Area= 1.77 sf

Primary OutFlow Max=4.10 cfs @ 12.06 hrs HW=1,041.44' TW=1,038.57' (Dynamic Tailwater)
1=Culvert (Inlet Controls 4.10 cfs @ 3.94 fps)

Summary for Pond STU1: (new Pond)

Inflow = 2.33 cfs @ 12.02 hrs, Volume= 17,969 cf
Outflow = 2.33 cfs @ 12.02 hrs, Volume= 17,969 cf, Atten= 0%, Lag= 0.0 min
Primary = 2.33 cfs @ 12.02 hrs, Volume= 17,969 cf

Routing by Dyn-Stor-Ind method, Time Span= 0.00-48.00 hrs, dt= 0.05 hrs
Peak Elev= 1,038.16' @ 12.47 hrs

Device	Routing	Invert	Outlet Devices
#1	Primary	1,036.30'	**12.0" Round Culvert** L= 5.0' Ke= 0.200 Inlet / Outlet Invert= 1,036.30' / 1,036.20' S= 0.0200 '/' Cc= 0.900

n= 0.013 Corrugated PE, smooth interior, Flow Area= 0.79 sf

Primary OutFlow Max=0.90 cfs @ 12.02 hrs HW=1,037.32' TW=1,037.28' (Dynamic Tailwater)
↑**1=Culvert** (Outlet Controls 0.90 cfs @ 1.41 fps)

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

Subcatchment 1S: (new Subcat) Runoff Area=12,290 sf 0.00% Impervious Runoff Depth=5.78"
Flow Length=40' Slope=0.2750 '/' Tc=1.6 min CN=76 Runoff=2.06 cfs 5,920 cf

Subcatchment 2S: (new Subcat) Runoff Area=5,956 sf 64.05% Impervious Runoff Depth=7.35"
Flow Length=186' Tc=1.6 min CN=89 Runoff=1.20 cfs 3,650 cf

Subcatchment 3S: ROOF Runoff Area=5,000 sf 100.00% Impervious Runoff Depth=8.44"
Tc=1.0 min CN=98 Runoff=1.09 cfs 3,517 cf

Subcatchment 4S: ROOF Runoff Area=5,000 sf 100.00% Impervious Runoff Depth=8.44"
Tc=1.0 min CN=98 Runoff=1.09 cfs 3,517 cf

Subcatchment 5S: (new Subcat) Runoff Area=10,067 sf 81.72% Impervious Runoff Depth=7.96"
Flow Length=157' Tc=1.0 min CN=94 Runoff=2.16 cfs 6,676 cf

Subcatchment 6S: (new Subcat) Runoff Area=26,955 sf 2.64% Impervious Runoff Depth=6.14"
Flow Length=208' Tc=3.9 min CN=79 Runoff=4.62 cfs 13,801 cf

Subcatchment 7S: (new Subcat) Runoff Area=13,165 sf 45.68% Impervious Runoff Depth=7.35"
Flow Length=42' Slope=0.1857 '/' Tc=2.0 min CN=89 Runoff=2.65 cfs 8,069 cf

Subcatchment 8S: (new Subcat) Runoff Area=8,734 sf 81.55% Impervious Runoff Depth=8.08"
Flow Length=125' Tc=0.9 min CN=95 Runoff=1.89 cfs 5,880 cf

Subcatchment 9S: (new Subcat) Runoff Area=8,042 sf 87.19% Impervious Runoff Depth=8.20"
Flow Length=112' Tc=0.8 min CN=96 Runoff=1.76 cfs 5,495 cf

Subcatchment 10S: ROOF Runoff Area=2,640 sf 100.00% Impervious Runoff Depth=8.44"
Tc=1.0 min CN=98 Runoff=0.58 cfs 1,857 cf

Subcatchment 11S: ROOF Runoff Area=2,822 sf 100.00% Impervious Runoff Depth=8.44"
Tc=1.0 min CN=98 Runoff=0.62 cfs 1,985 cf

Subcatchment12S: (new Subcat) Runoff Area=16,498 sf 91.30% Impervious Runoff Depth=8.20"
Flow Length=126' Tc=0.8 min CN=96 Runoff=3.61 cfs 11,273 cf

Subcatchment13S: ROOF-CANOPY Runoff Area=2,880 sf 100.00% Impervious Runoff Depth=8.44"
Tc=2.0 min CN=98 Runoff=0.61 cfs 2,026 cf

Subcatchment14S: (new Subcat) Runoff Area=15,482 sf 73.05% Impervious Runoff Depth=7.84"
Flow Length=208' Tc=5.0 min CN=93 Runoff=2.98 cfs 10,112 cf

Subcatchment15S: (new Subcat) Runoff Area=7,846 sf 70.75% Impervious Runoff Depth=7.72"
Flow Length=142' Tc=1.0 min CN=92 Runoff=1.66 cfs 5,046 cf

Subcatchment16S: (new Subcat) Runoff Area=14,478 sf 84.51% Impervious Runoff Depth=8.08"
Flow Length=224' Tc=4.9 min CN=95 Runoff=2.83 cfs 9,747 cf

Subcatchment17S: (new Subcat) Runoff Area=13,911 sf 37.85% Impervious Runoff Depth=7.11"
Flow Length=111' Tc=3.8 min CN=87 Runoff=2.67 cfs 8,246 cf

Reach R1: (new Reach) Avg. Flow Depth=0.59' Max Vel=3.59 fps Inflow=12.95 cfs 82,596 cf
n=0.069 L=20.0' S=0.0750 '/' Capacity=125.86 cfs Outflow=12.95 cfs 82,596 cf

Pond 1EV: SITE TOTAL Inflow=17.19 cfs 102,317 cf
Primary=17.19 cfs 102,317 cf

Pond 1P: Inflow=15.91 cfs 96,397 cf
Primary=15.91 cfs 96,397 cf

Pond 2P: Inflow=2.06 cfs 5,920 cf
Primary=2.06 cfs 5,920 cf

Pond CB1: (new Pond) Peak Elev=1,039.09' Inflow=2.16 cfs 6,676 cf
12.0" Round Culvert n=0.013 L=8.0' S=0.0150 '/' Outflow=2.16 cfs 6,676 cf

Pond CB2: (new Pond) Peak Elev=1,039.21' Inflow=1.20 cfs 3,650 cf
12.0" Round Culvert n=0.013 L=12.0' S=0.0150 '/' Outflow=1.20 cfs 3,650 cf

Pond CB3: (new Pond) Peak Elev=1,040.92' Inflow=2.83 cfs 9,747 cf
12.0" Round Culvert n=0.013 L=165.0' S=0.0135 '/' Outflow=2.83 cfs 9,747 cf

Pond CB4: (new Pond) Peak Elev=1,040.61' Inflow=1.66 cfs 5,046 cf
12.0" Round Culvert n=0.013 L=165.0' S=0.0219 '/' Outflow=1.66 cfs 5,046 cf

Pond CB5: (new Pond) Peak Elev=1,040.96' Inflow=1.76 cfs 5,495 cf
12.0" Round Culvert n=0.013 L=42.0' S=0.0150 '/' Outflow=1.76 cfs 5,495 cf

Pond CB6: (new Pond) Peak Elev=1,041.53' Inflow=1.89 cfs 5,880 cf
12.0" Round Culvert n=0.013 L=36.0' S=0.0100 '/' Outflow=1.89 cfs 5,880 cf

Pond CB7: (new Pond) Peak Elev=1,042.70' Inflow=3.61 cfs 11,273 cf
12.0" Round Culvert n=0.013 L=128.0' S=0.0100 '/' Outflow=3.61 cfs 11,273 cf

Pond CB8: (new Pond) Peak Elev=1,042.10' Inflow=5.63 cfs 18,358 cf
18.0" Round Culvert n=0.013 L=7.0' S=0.0143 '/' Outflow=5.63 cfs 18,358 cf

Pond DRI: (new Pond) Peak Elev=1,044.57' Inflow=2.67 cfs 8,246 cf
12.0" Round Culvert n=0.013 L=74.0' S=0.0196 '/' Outflow=2.67 cfs 8,246 cf

Pond FB: (new Pond) Peak Elev=1,038.91' Storage=6,013 cf Inflow=23.17 cfs 79,025 cf
Outflow=19.74 cfs 76,474 cf

Pond IB: (new Pond) Peak Elev=1,038.91' Storage=18,520 cf Inflow=22.31 cfs 84,543 cf
Outflow=12.95 cfs 82,596 cf

Pond MH1: (new Pond) Peak Elev=1,039.05' Inflow=9.46 cfs 32,153 cf
18.0" Round Culvert n=0.013 L=52.0' S=0.0148 '/' Outflow=9.46 cfs 32,153 cf

Pond MH2: (new Pond) Peak Elev=1,039.21' Inflow=4.88 cfs 16,914 cf
15.0" Round Culvert n=0.013 L=120.0' S=0.0125 '/' Outflow=4.88 cfs 16,914 cf

Pond MH3i: (new Pond) Peak Elev=1,038.99' Inflow=13.71 cfs 46,872 cf
Primary=11.31 cfs 23,296 cf Secondary=2.75 cfs 23,576 cf Outflow=13.71 cfs 46,872 cf

Pond MH3o: (new Pond) Peak Elev=1,038.99' Inflow=13.71 cfs 46,872 cf
24.0" Round Culvert n=0.013 L=50.0' S=0.0172 '/' Outflow=13.71 cfs 46,872 cf

Pond MH4: (new Pond) Peak Elev=1,039.11' Inflow=13.71 cfs 46,872 cf
24.0" Round Culvert n=0.013 L=57.0' S=0.0172 '/' Outflow=13.71 cfs 46,872 cf

Pond MH5: (new Pond) Peak Elev=1,041.05' Inflow=6.12 cfs 19,137 cf
18.0" Round Culvert n=0.013 L=132.0' S=0.0110 '/' Outflow=6.12 cfs 19,137 cf

Pond MH6: (new Pond) Peak Elev=1,041.68' Inflow=6.21 cfs 20,383 cf
18.0" Round Culvert n=0.013 L=116.0' S=0.0150 '/' Outflow=6.21 cfs 20,383 cf

Pond STU1: (new Pond) Peak Elev=1,039.26' Inflow=2.75 cfs 23,576 cf
12.0" Round Culvert n=0.013 L=5.0' S=0.0200 '/' Outflow=2.75 cfs 23,576 cf

Total Runoff Area = 171,766 sf Runoff Volume = 106,815 cf Average Runoff Depth = 7.46"
41.39% Pervious = 71,099 sf 58.61% Impervious = 100,667 sf

Summary for Subcatchment 1S: (new Subcat)

Runoff = 2.06 cfs @ 12.03 hrs, Volume= 5,920 cf, Depth= 5.78"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-48.00 hrs, dt= 0.05 hrs
Type III 24-hr 100YR Rainfall=8.68"

Area (sf)	CN	Description
4,440	80	>75% Grass cover, Good, HSG D
7,850	74	>75% Grass cover, Good, HSG C
12,290	76	Weighted Average
12,290		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
1.6	40	0.2750	0.41		**Sheet Flow,** Grass: Short n= 0.150 P2= 3.26"

Summary for Subcatchment 2S: (new Subcat)

Runoff = 1.20 cfs @ 12.02 hrs, Volume= 3,650 cf, Depth= 7.35"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-48.00 hrs, dt= 0.05 hrs
Type III 24-hr 100YR Rainfall=8.68"

Area (sf)	CN	Description
26	98	Unconnected pavement, HSG C
3,789	98	Paved parking, HSG C
2,141	74	>75% Grass cover, Good, HSG C
5,956	89	Weighted Average
2,141		35.95% Pervious Area
3,815		64.05% Impervious Area
26		0.68% Unconnected

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
0.6	44	0.0227	1.24		**Sheet Flow,** Smooth surfaces n= 0.011 P2= 3.26"
1.0	142	0.0134	2.35		**Shallow Concentrated Flow,** Paved Kv= 20.3 fps
1.6	186	Total			

Summary for Subcatchment 3S: ROOF

Runoff = 1.09 cfs @ 12.01 hrs, Volume= 3,517 cf, Depth= 8.44"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-48.00 hrs, dt= 0.05 hrs
Type III 24-hr 100YR Rainfall=8.68"

Area (sf)	CN	Description
5,000	98	Roofs, HSG C
5,000		100.00% Impervious Area

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

Summary for Subcatchment 4S: ROOF

Runoff = 1.09 cfs @ 12.01 hrs, Volume= 3,517 cf, Depth= 8.44"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-48.00 hrs, dt= 0.05 hrs
Type III 24-hr 100YR Rainfall=8.68"

Area (sf)	CN	Description
3,300	98	Roofs, HSG C
1,700	98	Roofs, HSG D
5,000	98	Weighted Average
5,000		100.00% Impervious Area

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

Summary for Subcatchment 5S: (new Subcat)

Runoff = 2.16 cfs @ 12.01 hrs, Volume= 6,676 cf, Depth= 7.96"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-48.00 hrs, dt= 0.05 hrs
Type III 24-hr 100YR Rainfall=8.68"

Area (sf)	CN	Description
395	74	>75% Grass cover, Good, HSG C
1,445	80	>75% Grass cover, Good, HSG D
309	98	Unconnected pavement, HSG C
790	98	Unconnected pavement, HSG D
5,597	98	Paved parking, HSG D
1,531	98	Paved parking, HSG C
10,067	94	Weighted Average
1,840		18.28% Pervious Area
8,227		81.72% Impervious Area
1,099		13.36% Unconnected

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
0.5	50	0.0540	1.80		**Sheet Flow,** Smooth surfaces n= 0.011 P2= 3.26"
0.5	107	0.0308	3.56		**Shallow Concentrated Flow,** Paved Kv= 20.3 fps
1.0	157	Total			

Summary for Subcatchment 6S: (new Subcat)

Runoff = 4.62 cfs @ 12.06 hrs, Volume= 13,801 cf, Depth= 6.14"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-48.00 hrs, dt= 0.05 hrs
Type III 24-hr 100YR Rainfall=8.68"

	Area (sf)	CN	Description
*	711	98	riprap
	15,442	80	>75% Grass cover, Good, HSG D
	10,802	77	Woods, Good, HSG D
	26,955	79	Weighted Average
	26,244		97.36% Pervious Area
	711		2.64% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
2.5	50	0.1460	0.33		**Sheet Flow,** Grass: Short n= 0.150 P2= 3.26"
0.1	54	0.1815	6.86		**Shallow Concentrated Flow,** Unpaved Kv= 16.1 fps
1.3	104	0.0769	1.39		**Shallow Concentrated Flow,** Woodland Kv= 5.0 fps
3.9	208	Total			

Summary for Subcatchment 7S: (new Subcat)

Runoff = 2.65 cfs @ 12.03 hrs, Volume= 8,069 cf, Depth= 7.35"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-48.00 hrs, dt= 0.05 hrs
Type III 24-hr 100YR Rainfall=8.68"

	Area (sf)	CN	Description
	5,880	98	Water Surface, HSG D
*	134	98	riprap
	6,571	80	>75% Grass cover, Good, HSG D
	580	91	Gravel roads, HSG D
	13,165	89	Weighted Average
	7,151		54.32% Pervious Area
	6,014		45.68% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
2.0	42	0.1857	0.35		**Sheet Flow,** Grass: Short n= 0.150 P2= 3.26"

Summary for Subcatchment 8S: (new Subcat)

Runoff = 1.89 cfs @ 12.01 hrs, Volume= 5,880 cf, Depth= 8.08"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-48.00 hrs, dt= 0.05 hrs
Type III 24-hr 100YR Rainfall=8.68"

Area (sf)	CN	Description
1,611	80	>75% Grass cover, Good, HSG D
459	98	Unconnected pavement, HSG D
6,664	98	Paved parking, HSG D
8,734	95	Weighted Average
1,611		18.45% Pervious Area
7,123		81.55% Impervious Area
459		6.44% Unconnected

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
0.5	50	0.0411	1.61		**Sheet Flow,** Smooth surfaces n= 0.011 P2= 3.26"
0.4	75	0.0260	3.27		**Shallow Concentrated Flow,** Paved Kv= 20.3 fps
0.9	125	Total			

Summary for Subcatchment 9S: (new Subcat)

Runoff = 1.76 cfs @ 12.01 hrs, Volume= 5,495 cf, Depth= 8.20"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-48.00 hrs, dt= 0.05 hrs
Type III 24-hr 100YR Rainfall=8.68"

Area (sf)	CN	Description
1,030	80	>75% Grass cover, Good, HSG D
194	98	Unconnected pavement, HSG D
6,818	98	Paved parking, HSG D
8,042	96	Weighted Average
1,030		12.81% Pervious Area
7,012		87.19% Impervious Area
194		2.77% Unconnected

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
0.5	50	0.0380	1.56		**Sheet Flow,** Smooth surfaces n= 0.011 P2= 3.26"
0.3	62	0.0274	3.36		**Shallow Concentrated Flow,** Paved Kv= 20.3 fps
0.8	112	Total			

Summary for Subcatchment 10S: ROOF

Runoff = 0.58 cfs @ 12.01 hrs, Volume= 1,857 cf, Depth= 8.44"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-48.00 hrs, dt= 0.05 hrs
Type III 24-hr 100YR Rainfall=8.68"

Area (sf)	CN	Description
2,640	98	Roofs, HSG D
2,640		100.00% Impervious Area

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

Summary for Subcatchment 11S: ROOF

Runoff = 0.62 cfs @ 12.01 hrs, Volume= 1,985 cf, Depth= 8.44"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-48.00 hrs, dt= 0.05 hrs
Type III 24-hr 100YR Rainfall=8.68"

Area (sf)	CN	Description
2,822	98	Roofs, HSG D
2,822		100.00% Impervious Area

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

Summary for Subcatchment 12S: (new Subcat)

Runoff = 3.61 cfs @ 12.01 hrs, Volume= 11,273 cf, Depth= 8.20"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-48.00 hrs, dt= 0.05 hrs
Type III 24-hr 100YR Rainfall=8.68"

Area (sf)	CN	Description
1,435	80	>75% Grass cover, Good, HSG D
1,035	98	Unconnected pavement, HSG D
14,028	98	Paved parking, HSG D
16,498	96	Weighted Average
1,435		8.70% Pervious Area
15,063		91.30% Impervious Area
1,035		6.87% Unconnected

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
0.5	50	0.0500	1.74		**Sheet Flow,** Smooth surfaces n= 0.011 P2= 3.26"
0.3	76	0.0329	3.68		**Shallow Concentrated Flow,** Paved Kv= 20.3 fps
0.8	126	Total			

Summary for Subcatchment 13S: ROOF-CANOPY

Runoff = 0.61 cfs @ 12.03 hrs, Volume= 2,026 cf, Depth= 8.44"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-48.00 hrs, dt= 0.05 hrs
Type III 24-hr 100YR Rainfall=8.68"

Area (sf)	CN	Description
2,880	98	Roofs, HSG D
2,880		100.00% Impervious Area

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

Summary for Subcatchment 14S: (new Subcat)

Runoff = 2.98 cfs @ 12.07 hrs, Volume= 10,112 cf, Depth= 7.84"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-48.00 hrs, dt= 0.05 hrs
Type III 24-hr 100YR Rainfall=8.68"

Area (sf)	CN	Description
614	98	Unconnected pavement, HSG D
211	98	Paved parking, HSG C
10,484	98	Paved parking, HSG D
4,173	80	>75% Grass cover, Good, HSG D
15,482	93	Weighted Average
4,173		26.95% Pervious Area
11,309		73.05% Impervious Area
614		5.43% Unconnected

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
4.2	50	0.0400	0.20		**Sheet Flow,** Grass: Short n= 0.150 P2= 3.26"
0.8	158	0.0282	3.41		**Shallow Concentrated Flow,** Paved Kv= 20.3 fps
5.0	208	Total			

Summary for Subcatchment 15S: (new Subcat)

Runoff = 1.66 cfs @ 12.01 hrs, Volume= 5,046 cf, Depth= 7.72"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-48.00 hrs, dt= 0.05 hrs
Type III 24-hr 100YR Rainfall=8.68"

Area (sf)	CN	Description
1,155	74	>75% Grass cover, Good, HSG C
1,140	80	>75% Grass cover, Good, HSG D
174	98	Unconnected pavement, HSG C
2,097	98	Paved parking, HSG D
3,280	98	Paved parking, HSG C
7,846	92	Weighted Average
2,295		29.25% Pervious Area
5,551		70.75% Impervious Area
174		3.13% Unconnected

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
0.5	50	0.0377	1.56		**Sheet Flow,** Smooth surfaces n= 0.011 P2= 3.26"
0.5	92	0.0250	3.21		**Shallow Concentrated Flow,** Paved Kv= 20.3 fps
1.0	142	Total			

Summary for Subcatchment 16S: (new Subcat)

Runoff = 2.83 cfs @ 12.07 hrs, Volume= 9,747 cf, Depth= 8.08"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-48.00 hrs, dt= 0.05 hrs
Type III 24-hr 100YR Rainfall=8.68"

Area (sf)	CN	Description
397	98	Unconnected pavement, HSG C
1,089	74	>75% Grass cover, Good, HSG C
1,154	80	>75% Grass cover, Good, HSG D
7,641	98	Paved parking, HSG C
4,197	98	Paved parking, HSG D
14,478	95	Weighted Average
2,243		15.49% Pervious Area
12,235		84.51% Impervious Area
397		3.24% Unconnected

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
4.2	50	0.0400	0.20		**Sheet Flow,** Grass: Short n= 0.150 P2= 3.26"
0.7	174	0.0374	3.93		**Shallow Concentrated Flow,** Paved Kv= 20.3 fps
4.9	224	Total			

Summary for Subcatchment 17S: (new Subcat)

Runoff = 2.67 cfs @ 12.06 hrs, Volume= 8,246 cf, Depth= 7.11"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-48.00 hrs, dt= 0.05 hrs
Type III 24-hr 100YR Rainfall=8.68"

Area (sf)	CN	Description
8,646	80	>75% Grass cover, Good, HSG D
5,265	98	Paved parking, HSG D
13,911	87	Weighted Average
8,646		62.15% Pervious Area
5,265		37.85% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
3.5	50	0.0660	0.24		**Sheet Flow,** Grass: Short n= 0.150 P2= 3.26"
0.3	61	0.0205	2.91		**Shallow Concentrated Flow,** Paved Kv= 20.3 fps
3.8	111	Total			

Summary for Reach R1: (new Reach)

Inflow Area = 132,521 sf, 75.43% Impervious, Inflow Depth = 7.48" for 100YR event
Inflow = 12.95 cfs @ 12.15 hrs, Volume= 82,596 cf
Outflow = 12.95 cfs @ 12.15 hrs, Volume= 82,596 cf, Atten= 0%, Lag= 0.1 min

Routing by Dyn-Stor-Ind method, Time Span= 0.00-48.00 hrs, dt= 0.05 hrs
Max. Velocity= 3.59 fps, Min. Travel Time= 0.1 min
Avg. Velocity = 0.84 fps, Avg. Travel Time= 0.4 min

Peak Storage= 72 cf @ 12.15 hrs
Average Depth at Peak Storage= 0.59'
Bank-Full Depth= 2.00' Flow Area= 18.0 sf, Capacity= 125.86 cfs

5.00' x 2.00' deep channel, n= 0.069 Riprap, 6-inch
Side Slope Z-value= 2.0 '/' Top Width= 13.00'
Length= 20.0' Slope= 0.0750 '/'
Inlet Invert= 1,031.00', Outlet Invert= 1,029.50'

Summary for Pond 1EV: SITE TOTAL

Inflow Area = 171,766 sf, 58.61% Impervious, Inflow Depth = 7.15" for 100YR event
Inflow = 17.19 cfs @ 12.09 hrs, Volume= 102,317 cf
Primary = 17.19 cfs @ 12.09 hrs, Volume= 102,317 cf, Atten= 0%, Lag= 0.0 min

Routing by Dyn-Stor-Ind method, Time Span= 0.00-48.00 hrs, dt= 0.05 hrs

Summary for Pond 1P:

Inflow Area = 159,476 sf, 63.12% Impervious, Inflow Depth = 7.25" for 100YR event
Inflow = 15.91 cfs @ 12.12 hrs, Volume= 96,397 cf
Primary = 15.91 cfs @ 12.12 hrs, Volume= 96,397 cf, Atten= 0%, Lag= 0.0 min

Routing by Dyn-Stor-Ind method, Time Span= 0.00-48.00 hrs, dt= 0.05 hrs

Summary for Pond 2P:

Inflow Area = 12,290 sf, 0.00% Impervious, Inflow Depth = 5.78" for 100YR event
Inflow = 2.06 cfs @ 12.03 hrs, Volume= 5,920 cf
Primary = 2.06 cfs @ 12.03 hrs, Volume= 5,920 cf, Atten= 0%, Lag= 0.0 min

Routing by Dyn-Stor-Ind method, Time Span= 0.00-48.00 hrs, dt= 0.05 hrs

Summary for Pond CB1: (new Pond)

Inflow Area = 10,067 sf, 81.72% Impervious, Inflow Depth = 7.96" for 100YR event
Inflow = 2.16 cfs @ 12.01 hrs, Volume= 6,676 cf
Outflow = 2.16 cfs @ 12.01 hrs, Volume= 6,676 cf, Atten= 0%, Lag= 0.0 min
Primary = 2.16 cfs @ 12.01 hrs, Volume= 6,676 cf

Routing by Dyn-Stor-Ind method, Time Span= 0.00-48.00 hrs, dt= 0.05 hrs
Peak Elev= 1,039.09' @ 12.27 hrs

Device	Routing	Invert	Outlet Devices
#1	Primary	1,036.50'	**12.0" Round Culvert** L= 8.0' Ke= 0.200 Inlet / Outlet Invert= 1,036.50' / 1,036.38' S= 0.0150 '/' Cc= 0.900 n= 0.013 Corrugated PE, smooth interior, Flow Area= 0.79 sf

Primary OutFlow Max=0.00 cfs @ 12.01 hrs HW=1,037.84' TW=1,038.28' (Dynamic Tailwater)
1=Culvert (Controls 0.00 cfs)

Summary for Pond CB2: (new Pond)

Inflow Area = 5,956 sf, 64.05% Impervious, Inflow Depth = 7.35" for 100YR event
Inflow = 1.20 cfs @ 12.02 hrs, Volume= 3,650 cf
Outflow = 1.20 cfs @ 12.02 hrs, Volume= 3,650 cf, Atten= 0%, Lag= 0.0 min
Primary = 1.20 cfs @ 12.02 hrs, Volume= 3,650 cf

Routing by Dyn-Stor-Ind method, Time Span= 0.00-48.00 hrs, dt= 0.05 hrs
Peak Elev= 1,039.21' @ 12.31 hrs

Device	Routing	Invert	Outlet Devices
#1	Primary	1,037.95'	**12.0" Round Culvert** L= 12.0' Ke= 0.200 Inlet / Outlet Invert= 1,037.95' / 1,037.77' S= 0.0150 '/' Cc= 0.900 n= 0.013 Corrugated PE, smooth interior, Flow Area= 0.79 sf

Primary OutFlow Max=0.00 cfs @ 12.02 hrs HW=1,038.69' TW=1,038.88' (Dynamic Tailwater)
1=Culvert (Controls 0.00 cfs)

Summary for Pond CB3: (new Pond)

Inflow Area = 14,478 sf, 84.51% Impervious, Inflow Depth = 8.08" for 100YR event
Inflow = 2.83 cfs @ 12.07 hrs, Volume= 9,747 cf
Outflow = 2.83 cfs @ 12.07 hrs, Volume= 9,747 cf, Atten= 0%, Lag= 0.0 min
Primary = 2.83 cfs @ 12.07 hrs, Volume= 9,747 cf

Routing by Dyn-Stor-Ind method, Time Span= 0.00-48.00 hrs, dt= 0.05 hrs
Peak Elev= 1,040.92' @ 12.09 hrs

Device	Routing	Invert	Outlet Devices
#1	Primary	1,040.00'	**12.0" Round Culvert** L= 165.0' Ke= 0.200 Inlet / Outlet Invert= 1,040.00' / 1,037.77' S= 0.0135 '/' Cc= 0.900 n= 0.013 Corrugated PE, smooth interior, Flow Area= 0.79 sf

Primary OutFlow Max=2.54 cfs @ 12.07 hrs HW=1,040.89' TW=1,039.11' (Dynamic Tailwater)
1=Culvert (Outlet Controls 2.54 cfs @ 4.58 fps)

Summary for Pond CB4: (new Pond)

Inflow Area = 7,846 sf, 70.75% Impervious, Inflow Depth = 7.72" for 100YR event
Inflow = 1.66 cfs @ 12.01 hrs, Volume= 5,046 cf
Outflow = 1.66 cfs @ 12.01 hrs, Volume= 5,046 cf, Atten= 0%, Lag= 0.0 min
Primary = 1.66 cfs @ 12.01 hrs, Volume= 5,046 cf

Routing by Dyn-Stor-Ind method, Time Span= 0.00-48.00 hrs, dt= 0.05 hrs
Peak Elev= 1,040.61' @ 12.01 hrs

Device	Routing	Invert	Outlet Devices
#1	Primary	1,040.00'	**12.0" Round Culvert** L= 165.0' Ke= 0.200 Inlet / Outlet Invert= 1,040.00' / 1,036.38' S= 0.0219 '/' Cc= 0.900 n= 0.013 Corrugated PE, smooth interior, Flow Area= 0.79 sf

Primary OutFlow Max=1.57 cfs @ 12.01 hrs HW=1,040.59' TW=1,038.28' (Dynamic Tailwater)
1=Culvert (Outlet Controls 1.57 cfs @ 4.64 fps)

Summary for Pond CB5: (new Pond)

Inflow Area = 8,042 sf, 87.19% Impervious, Inflow Depth = 8.20" for 100YR event
Inflow = 1.76 cfs @ 12.01 hrs, Volume= 5,495 cf
Outflow = 1.76 cfs @ 12.01 hrs, Volume= 5,495 cf, Atten= 0%, Lag= 0.0 min
Primary = 1.76 cfs @ 12.01 hrs, Volume= 5,495 cf

Routing by Dyn-Stor-Ind method, Time Span= 0.00-48.00 hrs, dt= 0.05 hrs
Peak Elev= 1,040.96' @ 12.01 hrs

Device	Routing	Invert	Outlet Devices
#1	Primary	1,040.30'	**12.0" Round Culvert** L= 42.0' Ke= 0.200 Inlet / Outlet Invert= 1,040.30' / 1,039.67' S= 0.0150 '/' Cc= 0.900 n= 0.013 Corrugated PE, smooth interior, Flow Area= 0.79 sf

Primary OutFlow Max=1.70 cfs @ 12.01 hrs HW=1,040.95' TW=1,038.91' (Dynamic Tailwater)
1=Culvert (Barrel Controls 1.70 cfs @ 4.47 fps)

Summary for Pond CB6: (new Pond)

Inflow Area = 8,734 sf, 81.55% Impervious, Inflow Depth = 8.08" for 100YR event
Inflow = 1.89 cfs @ 12.01 hrs, Volume= 5,880 cf
Outflow = 1.89 cfs @ 12.01 hrs, Volume= 5,880 cf, Atten= 0%, Lag= 0.0 min
Primary = 1.89 cfs @ 12.01 hrs, Volume= 5,880 cf

Routing by Dyn-Stor-Ind method, Time Span= 0.00-48.00 hrs, dt= 0.05 hrs
Peak Elev= 1,041.53' @ 12.02 hrs

Device	Routing	Invert	Outlet Devices
#1	Primary	1,040.75'	**12.0" Round Culvert** L= 36.0' Ke= 0.200 Inlet / Outlet Invert= 1,040.75' / 1,040.39' S= 0.0100 '/' Cc= 0.900 n= 0.013 Corrugated PE, smooth interior, Flow Area= 0.79 sf

Primary OutFlow Max=1.76 cfs @ 12.01 hrs HW=1,041.51' TW=1,041.02' (Dynamic Tailwater)
1=Culvert (Outlet Controls 1.76 cfs @ 3.79 fps)

Summary for Pond CB7: (new Pond)

Inflow Area = 16,498 sf, 91.30% Impervious, Inflow Depth = 8.20" for 100YR event
Inflow = 3.61 cfs @ 12.01 hrs, Volume= 11,273 cf
Outflow = 3.61 cfs @ 12.01 hrs, Volume= 11,273 cf, Atten= 0%, Lag= 0.0 min
Primary = 3.61 cfs @ 12.01 hrs, Volume= 11,273 cf

Routing by Dyn-Stor-Ind method, Time Span= 0.00-48.00 hrs, dt= 0.05 hrs
Peak Elev= 1,042.70' @ 12.01 hrs

Device	Routing	Invert	Outlet Devices
#1	Primary	1,041.50'	**12.0" Round Culvert** L= 128.0' Ke= 0.200 Inlet / Outlet Invert= 1,041.50' / 1,040.22' S= 0.0100 '/' Cc= 0.900 n= 0.013 Corrugated PE, smooth interior, Flow Area= 0.79 sf

Primary OutFlow Max=3.52 cfs @ 12.01 hrs HW=1,042.66' TW=1,041.02' (Dynamic Tailwater)
1=Culvert (Barrel Controls 3.52 cfs @ 4.83 fps)

Summary for Pond CB8: (new Pond)

Inflow Area = 29,393 sf, 56.39% Impervious, Inflow Depth = 7.49" for 100YR event
Inflow = 5.63 cfs @ 12.06 hrs, Volume= 18,358 cf
Outflow = 5.63 cfs @ 12.06 hrs, Volume= 18,358 cf, Atten= 0%, Lag= 0.0 min
Primary = 5.63 cfs @ 12.06 hrs, Volume= 18,358 cf

Routing by Dyn-Stor-Ind method, Time Span= 0.00-48.00 hrs, dt= 0.05 hrs
Peak Elev= 1,042.10' @ 12.07 hrs

Device	Routing	Invert	Outlet Devices
#1	Primary	1,040.78'	**18.0" Round Culvert** L= 7.0' Ke= 0.200 Inlet / Outlet Invert= 1,040.78' / 1,040.68' S= 0.0143 '/' Cc= 0.900 n= 0.013 Corrugated PE, smooth interior, Flow Area= 1.77 sf

Primary OutFlow Max=5.48 cfs @ 12.06 hrs HW=1,042.07' TW=1,041.66' (Dynamic Tailwater)
1=Culvert (Outlet Controls 5.48 cfs @ 4.53 fps)

Summary for Pond DRI: (new Pond)

Inflow Area = 13,911 sf, 37.85% Impervious, Inflow Depth = 7.11" for 100YR event
Inflow = 2.67 cfs @ 12.06 hrs, Volume= 8,246 cf
Outflow = 2.67 cfs @ 12.06 hrs, Volume= 8,246 cf, Atten= 0%, Lag= 0.0 min
Primary = 2.67 cfs @ 12.06 hrs, Volume= 8,246 cf

Routing by Dyn-Stor-Ind method, Time Span= 0.00-48.00 hrs, dt= 0.05 hrs
Peak Elev= 1,044.57' @ 12.06 hrs

Device	Routing	Invert	Outlet Devices
#1	Primary	1,043.75'	**12.0" Round Culvert** L= 74.0' Ke= 0.200 Inlet / Outlet Invert= 1,043.75' / 1,042.30' S= 0.0196 '/' Cc= 0.900 n= 0.013 Cast iron, coated, Flow Area= 0.79 sf

Primary OutFlow Max=2.62 cfs @ 12.06 hrs HW=1,044.56' TW=1,042.08' (Dynamic Tailwater)
1=Culvert (Inlet Controls 2.62 cfs @ 3.83 fps)

Summary for Pond FB: (new Pond)

Inflow Area = 119,356 sf, 78.71% Impervious, Inflow Depth = 7.95" for 100YR event
Inflow = 23.17 cfs @ 12.03 hrs, Volume= 79,025 cf
Outflow = 19.74 cfs @ 12.02 hrs, Volume= 76,474 cf, Atten= 15%, Lag= 0.0 min
Primary = 19.74 cfs @ 12.02 hrs, Volume= 76,474 cf

Routing by Dyn-Stor-Ind method, Time Span= 0.00-48.00 hrs, dt= 0.05 hrs
Peak Elev= 1,038.91' @ 12.20 hrs Surf.Area= 1,608 sf Storage= 6,013 cf

Plug-Flow detention time= 36.1 min calculated for 76,474 cf (97% of inflow)
Center-of-Mass det. time= 16.3 min (770.7 - 754.4)

Volume	Invert	Avail.Storage	Storage Description
#1	1,033.30'	7,896 cf	**Custom Stage Data (Irregular)** Listed below (Recalc)

Elevation (feet)	Surf.Area (sq-ft)	Perim. (feet)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)	Wet.Area (sq-ft)
1,033.30	579	98.5	0	0	579
1,034.00	712	108.0	451	451	751
1,036.00	1,036	129.0	1,738	2,189	1,213
1,038.00	1,422	151.0	2,448	4,637	1,777
1,040.00	1,846	172.0	3,259	7,896	2,406

Device	Routing	Invert	Outlet Devices
#1	Primary	1,035.00'	**153.0 deg x 37.0' long Sharp-Crested Vee/Trap Weir** Cv= 2.47 (C= 3.09)

Primary OutFlow Max=0.00 cfs @ 12.02 hrs HW=1,037.79' TW=1,038.27' (Dynamic Tailwater)
└─**1=Sharp-Crested Vee/Trap Weir** (Controls 0.00 cfs)

Summary for Pond IB: (new Pond)

Inflow Area = 132,521 sf, 75.43% Impervious, Inflow Depth = 7.66" for 100YR event
Inflow = 22.31 cfs @ 12.02 hrs, Volume= 84,543 cf
Outflow = 12.95 cfs @ 12.15 hrs, Volume= 82,596 cf, Atten= 42%, Lag= 8.1 min
Primary = 12.95 cfs @ 12.15 hrs, Volume= 82,596 cf

Routing by Dyn-Stor-Ind method, Time Span= 0.00-48.00 hrs, dt= 0.05 hrs
Peak Elev= 1,038.91' @ 12.15 hrs Surf.Area= 4,551 sf Storage= 18,520 cf

Plug-Flow detention time= 63.6 min calculated for 82,596 cf (98% of inflow)
Center-of-Mass det. time= 48.9 min (819.8 - 770.9)

Volume	Invert	Avail.Storage	Storage Description
#1	1,033.30'	23,761 cf	**Custom Stage Data (Irregular)** Listed below (Recalc)

Elevation (feet)	Surf.Area (sq-ft)	Perim. (feet)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)	Wet.Area (sq-ft)
1,033.30	2,117	216.0	0	0	2,117
1,034.00	2,388	227.0	1,576	1,576	2,535
1,036.00	3,250	253.5	5,616	7,192	3,656
1,038.00	4,145	275.0	7,377	14,569	4,703
1,040.00	5,063	295.0	9,193	23,761	5,775

Device	Routing	Invert	Outlet Devices
#1	Primary	1,033.50'	**18.0" Round Culvert** L= 56.0' Ke= 0.200 Inlet / Outlet Invert= 1,033.50' / 1,031.00' S= 0.0446 '/' Cc= 0.900 n= 0.013 Corrugated PE, smooth interior, Flow Area= 1.77 sf
#2	Device 1	1,038.80'	**24.0" x 24.0" Horiz. Orifice/Grate** C= 0.600 Limited to weir flow at low heads
#3	Primary	1,038.80'	**153.0 deg x 6.0' long x 2.00' rise Sharp-Crested Vee/Trap Weir** Cv= 2.47 (C= 3.09)
#4	Device 1	1,034.15'	**4.0" Vert. Orifice/Grate X 3.00** C= 0.600
#5	Device 1	1,036.94'	**8.0" Vert. Orifice/Grate X 4.00** C= 0.600

Primary OutFlow Max=12.88 cfs @ 12.15 hrs HW=1,038.91' TW=1,031.58' (Dynamic Tailwater)
└─**1=Culvert** (Passes 12.20 cfs of 22.95 cfs potential flow)
  └─**2=Orifice/Grate** (Weir Controls 0.91 cfs @ 1.07 fps)
  └─**4=Orifice/Grate** (Orifice Controls 2.70 cfs @ 10.32 fps)
  └─**5=Orifice/Grate** (Orifice Controls 8.59 cfs @ 6.15 fps)
└─**3=Sharp-Crested Vee/Trap Weir** (Weir Controls 0.68 cfs @ 0.99 fps)

Summary for Pond MH1: (new Pond)

Inflow Area = 48,347 sf, 82.38% Impervious, Inflow Depth = 7.98" for 100YR event
Inflow = 9.46 cfs @ 12.03 hrs, Volume= 32,153 cf
Outflow = 9.46 cfs @ 12.03 hrs, Volume= 32,153 cf, Atten= 0%, Lag= 0.0 min
Primary = 9.46 cfs @ 12.03 hrs, Volume= 32,153 cf

Routing by Dyn-Stor-Ind method, Time Span= 0.00-48.00 hrs, dt= 0.05 hrs
Peak Elev= 1,039.05' @ 12.23 hrs
Flood Elev= 1,040.82'

Device	Routing	Invert	Outlet Devices
#1	Primary	1,035.77'	**18.0" Round Culvert** L= 52.0' Ke= 0.200 Inlet / Outlet Invert= 1,035.77' / 1,035.00' S= 0.0148 '/' Cc= 0.900 n= 0.013 Corrugated PE, smooth interior, Flow Area= 1.77 sf

Primary OutFlow Max=6.77 cfs @ 12.03 hrs HW=1,038.38' TW=1,037.89' (Dynamic Tailwater)
1=Culvert (Outlet Controls 6.77 cfs @ 3.83 fps)

Summary for Pond MH2: (new Pond)

Inflow Area = 25,434 sf, 82.76% Impervious, Inflow Depth = 7.98" for 100YR event
Inflow = 4.88 cfs @ 12.05 hrs, Volume= 16,914 cf
Outflow = 4.88 cfs @ 12.05 hrs, Volume= 16,914 cf, Atten= 0%, Lag= 0.0 min
Primary = 4.88 cfs @ 12.05 hrs, Volume= 16,914 cf

Routing by Dyn-Stor-Ind method, Time Span= 0.00-48.00 hrs, dt= 0.05 hrs
Peak Elev= 1,039.21' @ 12.26 hrs

Device	Routing	Invert	Outlet Devices
#1	Primary	1,037.52'	**15.0" Round Culvert** L= 120.0' Ke= 0.200 Inlet / Outlet Invert= 1,037.52' / 1,036.02' S= 0.0125 '/' Cc= 0.900 n= 0.013 Corrugated PE, smooth interior, Flow Area= 1.23 sf

Primary OutFlow Max=3.80 cfs @ 12.05 hrs HW=1,039.06' TW=1,038.51' (Dynamic Tailwater)
1=Culvert (Outlet Controls 3.80 cfs @ 3.20 fps)

Summary for Pond MH3i: (new Pond)

Inflow Area = 71,009 sf, 76.21% Impervious, Inflow Depth = 7.92" for 100YR event
Inflow = 13.71 cfs @ 12.03 hrs, Volume= 46,872 cf
Outflow = 13.71 cfs @ 12.03 hrs, Volume= 46,872 cf, Atten= 0%, Lag= 0.0 min
Primary = 11.31 cfs @ 12.04 hrs, Volume= 23,296 cf
Secondary = 2.75 cfs @ 12.45 hrs, Volume= 23,576 cf

Routing by Dyn-Stor-Ind method, Time Span= 0.00-48.00 hrs, dt= 0.05 hrs
Peak Elev= 1,038.99' @ 12.29 hrs

Device	Routing	Invert	Outlet Devices
#1	Primary	1,036.75'	**5.0' long x 0.5' breadth Broad-Crested Rectangular Weir** Head (feet) 0.20 0.40 0.60 0.80 1.00 Coef. (English) 2.80 2.92 3.08 3.30 3.32
#2	Secondary	1,036.37'	**12.0" Round Culvert** L= 5.0' Ke= 0.200 Inlet / Outlet Invert= 1,036.37' / 1,036.30' S= 0.0140 '/' Cc= 0.900 n= 0.013 Corrugated PE, smooth interior, Flow Area= 0.79 sf

Primary OutFlow Max=0.00 cfs @ 12.04 hrs HW=1,037.98' TW=1,038.13' (Dynamic Tailwater)
1=Broad-Crested Rectangular Weir (Controls 0.00 cfs)

Secondary OutFlow Max=0.00 cfs @ 12.45 hrs HW=1,037.44' TW=1,039.06' (Dynamic Tailwater)
2=Culvert (Controls 0.00 cfs)

Summary for Pond MH3o: (new Pond)

Inflow Area = 71,009 sf, 76.21% Impervious, Inflow Depth = 7.92" for 100YR event
Inflow = 13.71 cfs @ 12.03 hrs, Volume= 46,872 cf
Outflow = 13.71 cfs @ 12.03 hrs, Volume= 46,872 cf, Atten= 0%, Lag= 0.0 min
Primary = 13.71 cfs @ 12.03 hrs, Volume= 46,872 cf

Routing by Dyn-Stor-Ind method, Time Span= 0.00-48.00 hrs, dt= 0.05 hrs
Peak Elev= 1,038.99' @ 12.24 hrs

Device	Routing	Invert	Outlet Devices
#1	Primary	1,035.86'	**24.0" Round Culvert** L= 50.0' Ke= 0.200

Inlet / Outlet Invert= 1,035.86' / 1,035.00' S= 0.0172 '/' Cc= 0.900
n= 0.013 Corrugated PE, smooth interior, Flow Area= 3.14 sf

Primary OutFlow Max=7.33 cfs @ 12.03 hrs HW=1,038.09' TW=1,037.91' (Dynamic Tailwater)
1=Culvert (Outlet Controls 7.33 cfs @ 2.61 fps)

Summary for Pond MH4: (new Pond)

Inflow Area = 71,009 sf, 76.21% Impervious, Inflow Depth = 7.92" for 100YR event
Inflow = 13.71 cfs @ 12.03 hrs, Volume= 46,872 cf
Outflow = 13.71 cfs @ 12.03 hrs, Volume= 46,872 cf, Atten= 0%, Lag= 0.0 min
Primary = 13.71 cfs @ 12.03 hrs, Volume= 46,872 cf

Routing by Dyn-Stor-Ind method, Time Span= 0.00-48.00 hrs, dt= 0.05 hrs
Peak Elev= 1,039.11' @ 12.32 hrs

Device	Routing	Invert	Outlet Devices
#1	Primary	1,037.35'	**24.0" Round Culvert** L= 57.0' Ke= 0.200 Inlet / Outlet Invert= 1,037.35' / 1,036.37' S= 0.0172 '/' Cc= 0.900 n= 0.013 Corrugated PE, smooth interior, Flow Area= 3.14 sf

Primary OutFlow Max=11.76 cfs @ 12.03 hrs HW=1,038.95' TW=1,037.93' (Dynamic Tailwater)
1=Culvert (Outlet Controls 11.76 cfs @ 6.00 fps)

Summary for Pond MH5: (new Pond)

Inflow Area = 28,054 sf, 89.14% Impervious, Inflow Depth = 8.19" for 100YR event
Inflow = 6.12 cfs @ 12.01 hrs, Volume= 19,137 cf
Outflow = 6.12 cfs @ 12.01 hrs, Volume= 19,137 cf, Atten= 0%, Lag= 0.0 min
Primary = 6.12 cfs @ 12.01 hrs, Volume= 19,137 cf

Routing by Dyn-Stor-Ind method, Time Span= 0.00-48.00 hrs, dt= 0.05 hrs
Peak Elev= 1,041.05' @ 12.01 hrs

Device	Routing	Invert	Outlet Devices
#1	Primary	1,039.89'	**18.0" Round Culvert** L= 132.0' Ke= 0.200

Inlet / Outlet Invert= 1,039.89' / 1,038.44' S= 0.0110 '/' Cc= 0.900
n= 0.013 Corrugated PE, smooth interior, Flow Area= 1.77 sf

Primary OutFlow Max=5.90 cfs @ 12.01 hrs HW=1,041.02' TW=1,038.91' (Dynamic Tailwater)
1=Culvert (Barrel Controls 5.90 cfs @ 5.74 fps)

Summary for Pond MH6: (new Pond)

Inflow Area = 32,273 sf, 60.28% Impervious, Inflow Depth = 7.58" for 100YR event
Inflow = 6.21 cfs @ 12.06 hrs, Volume= 20,383 cf
Outflow = 6.21 cfs @ 12.06 hrs, Volume= 20,383 cf, Atten= 0%, Lag= 0.0 min
Primary = 6.21 cfs @ 12.06 hrs, Volume= 20,383 cf

Routing by Dyn-Stor-Ind method, Time Span= 0.00-48.00 hrs, dt= 0.05 hrs
Peak Elev= 1,041.68' @ 12.06 hrs

Device	Routing	Invert	Outlet Devices
#1	Primary	1,040.58'	**18.0" Round Culvert** L= 116.0' Ke= 0.200 Inlet / Outlet Invert= 1,040.58' / 1,038.84' S= 0.0150 '/' Cc= 0.900 n= 0.013 Corrugated PE, smooth interior, Flow Area= 1.77 sf

Primary OutFlow Max=6.04 cfs @ 12.06 hrs HW=1,041.66' TW=1,038.96' (Dynamic Tailwater)
1=Culvert (Inlet Controls 6.04 cfs @ 4.43 fps)

Summary for Pond STU1: (new Pond)

Inflow = 2.75 cfs @ 12.45 hrs, Volume= 23,576 cf
Outflow = 2.75 cfs @ 12.45 hrs, Volume= 23,576 cf, Atten= 0%, Lag= 0.0 min
Primary = 2.75 cfs @ 12.45 hrs, Volume= 23,576 cf

Routing by Dyn-Stor-Ind method, Time Span= 0.00-48.00 hrs, dt= 0.05 hrs
Peak Elev= 1,039.26' @ 12.47 hrs

Device	Routing	Invert	Outlet Devices
#1	Primary	1,036.30'	**12.0" Round Culvert** L= 5.0' Ke= 0.200 Inlet / Outlet Invert= 1,036.30' / 1,036.20' S= 0.0200 '/' Cc= 0.900

n= 0.013 Corrugated PE, smooth interior, Flow Area= 0.79 sf

Primary OutFlow Max=3.13 cfs @ 12.45 hrs HW=1,039.06' TW=1,038.62' (Dynamic Tailwater)
↑**1=Culvert** (Inlet Controls 3.13 cfs @ 3.98 fps)

Massachusetts Department of Environmental Protection
Bureau of Resource Protection - Wetlands Program

Checklist for Stormwater Report

B. Stormwater Checklist and Certification

The following checklist is intended to serve as a guide for applicants as to the elements that ordinarily need to be addressed in a complete Stormwater Report. The checklist is also intended to provide conservation commissions and other reviewing authorities with a summary of the components necessary for a comprehensive Stormwater Report that addresses the ten Stormwater Standards.

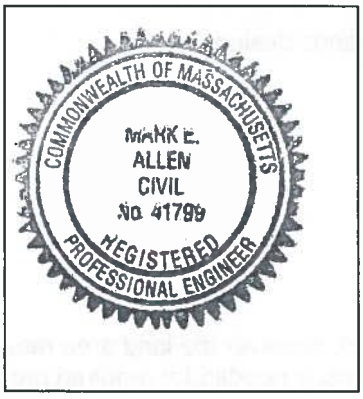
Note: Because stormwater requirements vary from project to project, it is possible that a complete Stormwater Report may not include information on some of the subjects specified in the Checklist. If it is determined that a specific item does not apply to the project under review, please note that the item is not applicable (N.A.) and provide the reasons for that determination.

A complete checklist must include the Certification set forth below signed by the Registered Professional Engineer who prepared the Stormwater Report.

Registered Professional Engineer's Certification

I have reviewed the Stormwater Report, including the soil evaluation, computations, Long-term Pollution Prevention Plan, the Construction Period Erosion and Sedimentation Control Plan (if included), the Long-term Post-Construction Operation and Maintenance Plan, the Illicit Discharge Compliance Statement (if included) and the plans showing the stormwater management system, and have determined that they have been prepared in accordance with the requirements of the Stormwater Management Standards as further elaborated by the Massachusetts Stormwater Handbook. I have also determined that the information presented in the Stormwater Checklist is accurate and that the information presented in the Stormwater Report accurately reflects conditions at the site as of the date of this permit application.

Registered Professional Engineer Block and Signature



Signature and Date 9/23/21

Checklist

Project Type: Is the application for new development, redevelopment, or a mix of new and redevelopment?

☒ New development

☐ Redevelopment

☐ Mix of New Development and Redevelopment

Checklist for Stormwater Report

Checklist (continued)

LID Measures: Stormwater Standards require LID measures to be considered. Document what environmentally sensitive design and LID Techniques were considered during the planning and design of the project:

☒ No disturbance to any Wetland Resource Areas

☐ Site Design Practices (e.g. clustered development, reduced frontage setbacks)

☐ Reduced Impervious Area (Redevelopment Only)

☒ Minimizing disturbance to existing trees and shrubs

☐ LID Site Design Credit Requested:

- ☐ Credit 1
- ☐ Credit 2
- ☐ Credit 3

☒ Use of "country drainage" versus curb and gutter conveyance and pipe

☐ Bioretention Cells (includes Rain Gardens)

☐ Constructed Stormwater Wetlands (includes Gravel Wetlands designs)

☐ Treebox Filter

☐ Water Quality Swale

☐ Grass Channel

☐ Green Roof

☒ Other (describe): Country drainage was considered, however the land area required to implement it conflicted with the space needed for required parking

Standard 1: No New Untreated Discharges

☒ No new untreated discharges

☒ Outlets have been designed so there is no erosion or scour to wetlands and waters of the Commonwealth

☒ Supporting calculations specified in Volume 3 of the Massachusetts Stormwater Handbook included.

Checklist for Stormwater Report

Checklist (continued)

Standard 2: Peak Rate Attenuation

☐ Standard 2 waiver requested because the project is located in land subject to coastal storm flowage and stormwater discharge is to a wetland subject to coastal flooding.

☒ Evaluation provided to determine whether off-site flooding increases during the 100-year 24-hour storm.

☒ Calculations provided to show that post-development peak discharge rates do not exceed pre-development rates for the 2-year and 10-year 24-hour storms. If evaluation shows that off-site flooding increases during the 100-year 24-hour storm, calculations are also provided to show that post-development peak discharge rates do not exceed pre-development rates for the 100-year 24-hour storm.

Standard 3: Recharge

☒ Soil Analysis provided.

☒ Required Recharge Volume calculation provided.

☐ Required Recharge volume reduced through use of the LID site Design Credits.

☒ Sizing the infiltration, BMPs is based on the following method: Check the method used.

☒ Static ☐ Simple Dynamic ☐ Dynamic Field[1]

☒ Runoff from all impervious areas at the site discharging to the infiltration BMP.

☐ Runoff from all impervious areas at the site is *not* discharging to the infiltration BMP and calculations are provided showing that the drainage area contributing runoff to the infiltration BMPs is sufficient to generate the required recharge volume.

☒ Recharge BMPs have been sized to infiltrate the Required Recharge Volume.

☐ Recharge BMPs have been sized to infiltrate the Required Recharge Volume *only* to the maximum extent practicable for the following reason:

- ☐ Site is comprised solely of C and D soils and/or bedrock at the land surface
- ☐ M.G.L. c. 21E sites pursuant to 310 CMR 40.0000
- ☐ Solid Waste Landfill pursuant to 310 CMR 19.000
- ☐ Project is otherwise subject to Stormwater Management Standards only to the maximum extent practicable.

☒ Calculations showing that the infiltration BMPs will drain in 72 hours are provided.

☐ Property includes a M.G.L. c. 21E site or a solid waste landfill and a mounding analysis is included.

[1] 80% TSS removal is required prior to discharge to infiltration BMP if Dynamic Field method is used.

Checklist for Stormwater Report

Checklist (continued)

Standard 3: Recharge (continued)

☐ The infiltration BMP is used to attenuate peak flows during storms greater than or equal to the 10-year 24-hour storm and separation to seasonal high groundwater is less than 4 feet and a mounding analysis is provided.

☒ Documentation is provided showing that infiltration BMPs do not adversely impact nearby wetland resource areas.

Standard 4: Water Quality

The Long-Term Pollution Prevention Plan typically includes the following:

- Good housekeeping practices;
- Provisions for storing materials and waste products inside or under cover;
- Vehicle washing controls;
- Requirements for routine inspections and maintenance of stormwater BMPs;
- Spill prevention and response plans;
- Provisions for maintenance of lawns, gardens, and other landscaped areas;
- Requirements for storage and use of fertilizers, herbicides, and pesticides;
- Pet waste management provisions;
- Provisions for operation and management of septic systems;
- Provisions for solid waste management;
- Snow disposal and plowing plans relative to Wetland Resource Areas;
- Winter Road Salt and/or Sand Use and Storage restrictions;
- Street sweeping schedules;
- Provisions for prevention of illicit discharges to the stormwater management system;
- Documentation that Stormwater BMPs are designed to provide for shutdown and containment in the event of a spill or discharges to or near critical areas or from LUHPPL;
- Training for staff or personnel involved with implementing Long-Term Pollution Prevention Plan;
- List of Emergency contacts for implementing Long-Term Pollution Prevention Plan.

☐ A Long-Term Pollution Prevention Plan is attached to Stormwater Report and is included as an attachment to the Wetlands Notice of Intent.

☒ Treatment BMPs subject to the 44% TSS removal pretreatment requirement and the one inch rule for calculating the water quality volume are included, and discharge:

- ☐ is within the Zone II or Interim Wellhead Protection Area
- ☐ is near or to other critical areas
- ☐ is within soils with a rapid infiltration rate (greater than 2.4 inches per hour)
- ☒ involves runoff from land uses with higher potential pollutant loads.

☐ The Required Water Quality Volume is reduced through use of the LID site Design Credits.

☒ Calculations documenting that the treatment train meets the 80% TSS removal requirement and, if applicable, the 44% TSS removal pretreatment requirement, are provided.

Checklist for Stormwater Report

Checklist (continued)

Standard 4: Water Quality (continued)

☒ The BMP is sized (and calculations provided) based on:

- ☒ The ½" or 1" Water Quality Volume or
- ☒ The equivalent flow rate associated with the Water Quality Volume and documentation is provided showing that the BMP treats the required water quality volume.

☒ The applicant proposes to use proprietary BMPs, and documentation supporting use of proprietary BMP and proposed TSS removal rate is provided. This documentation may be in the form of the propriety BMP checklist found in Volume 2, Chapter 4 of the Massachusetts Stormwater Handbook and submitting copies of the TARP Report, STEP Report, and/or other third party studies verifying performance of the proprietary BMPs.

☐ A TMDL exists that indicates a need to reduce pollutants other than TSS and documentation showing that the BMPs selected are consistent with the TMDL is provided.

Standard 5: Land Uses With Higher Potential Pollutant Loads (LUHPPLs)

☐ The NPDES Multi-Sector General Permit covers the land use and the Stormwater Pollution Prevention Plan (SWPPP) has been included with the Stormwater Report.

☐ The NPDES Multi-Sector General Permit covers the land use and the SWPPP will be submitted ***prior to*** the discharge of stormwater to the post-construction stormwater BMPs.

☒ The NPDES Multi-Sector General Permit does ***not*** cover the land use.

☒ LUHPPLs are located at the site and industry specific source control and pollution prevention measures have been proposed to reduce or eliminate the exposure of LUHPPLs to rain, snow, snow melt and runoff, and been included in the long term Pollution Prevention Plan.

☐ All exposure has been eliminated.

☒ All exposure has ***not*** been eliminated and all BMPs selected are on MassDEP LUHPPL list.

☒ The LUHPPL has the potential to generate runoff with moderate to higher concentrations of oil and grease (e.g. all parking lots with >1000 vehicle trips per day) and the treatment train includes an oil grit separator, a filtering bioretention area, a sand filter or equivalent.

Standard 6: Critical Areas

☐ The discharge is near or to a critical area and the treatment train includes only BMPs that MassDEP has approved for stormwater discharges to or near that particular class of critical area.

☐ Critical areas and BMPs are identified in the Stormwater Report.

Checklist for Stormwater Report

Checklist (continued)

Standard 7: Redevelopments and Other Projects Subject to the Standards only to the maximum extent practicable

☐ The project is subject to the Stormwater Management Standards only to the maximum Extent Practicable as a:

- ☐ Limited Project
- ☐ Small Residential Projects: 5-9 single family houses or 5-9 units in a multi-family development provided there is no discharge that may potentially affect a critical area.
- ☐ Small Residential Projects: 2-4 single family houses or 2-4 units in a multi-family development with a discharge to a critical area
- ☐ Marina and/or boatyard provided the hull painting, service and maintenance areas are protected from exposure to rain, snow, snow melt and runoff
- ☐ Bike Path and/or Foot Path
- ☐ Redevelopment Project
- ☐ Redevelopment portion of mix of new and redevelopment.

☐ Certain standards are not fully met (Standard No. 1, 8, 9, and 10 must always be fully met) and an explanation of why these standards are not met is contained in the Stormwater Report.

☐ The project involves redevelopment and a description of all measures that have been taken to improve existing conditions is provided in the Stormwater Report. The redevelopment checklist found in Volume 2 Chapter 3 of the Massachusetts Stormwater Handbook may be used to document that the proposed stormwater management system (a) complies with Standards 2, 3 and the pretreatment and structural BMP requirements of Standards 4-6 to the maximum extent practicable and (b) improves existing conditions.

Standard 8: Construction Period Pollution Prevention and Erosion and Sedimentation Control

A Construction Period Pollution Prevention and Erosion and Sedimentation Control Plan must include the following information:

- Narrative;
- Construction Period Operation and Maintenance Plan;
- Names of Persons or Entity Responsible for Plan Compliance;
- Construction Period Pollution Prevention Measures;
- Erosion and Sedimentation Control Plan Drawings;
- Detail drawings and specifications for erosion control BMPs, including sizing calculations;
- Vegetation Planning;
- Site Development Plan;
- Construction Sequencing Plan;
- Sequencing of Erosion and Sedimentation Controls;
- Operation and Maintenance of Erosion and Sedimentation Controls;
- Inspection Schedule;
- Maintenance Schedule;
- Inspection and Maintenance Log Form.

☐ A Construction Period Pollution Prevention and Erosion and Sedimentation Control Plan containing the information set forth above has been included in the Stormwater Report.

Checklist for Stormwater Report

Checklist (continued)

Standard 8: Construction Period Pollution Prevention and Erosion and Sedimentation Control (continued)

☒ The project is highly complex and information is included in the Stormwater Report that explains why it is not possible to submit the Construction Period Pollution Prevention and Erosion and Sedimentation Control Plan with the application. A Construction Period Pollution Prevention and Erosion and Sedimentation Control has ***not*** been included in the Stormwater Report but will be submitted ***before*** land disturbance begins.

☐ The project is ***not*** covered by a NPDES Construction General Permit.

☐ The project is covered by a NPDES Construction General Permit and a copy of the SWPPP is in the Stormwater Report.

☒ The project is covered by a NPDES Construction General Permit but no SWPPP been submitted. The SWPPP will be submitted BEFORE land disturbance begins.

Standard 9: Operation and Maintenance Plan

☒ The Post Construction Operation and Maintenance Plan is included in the Stormwater Report and includes the following information:

- ☒ Name of the stormwater management system owners;
- ☒ Party responsible for operation and maintenance;
- ☒ Schedule for implementation of routine and non-routine maintenance tasks;
- ☒ Plan showing the location of all stormwater BMPs maintenance access areas;
- ☐ Description and delineation of public safety features;
- ☐ Estimated operation and maintenance budget; and
- ☒ Operation and Maintenance Log Form.

☐ The responsible party is ***not*** the owner of the parcel where the BMP is located and the Stormwater Report includes the following submissions:

- ☐ A copy of the legal instrument (deed, homeowner's association, utility trust or other legal entity) that establishes the terms of and legal responsibility for the operation and maintenance of the project site stormwater BMPs;
- ☐ A plan and easement deed that allows site access for the legal entity to operate and maintain BMP functions.

Standard 10: Prohibition of Illicit Discharges

☒ The Long-Term Pollution Prevention Plan includes measures to prevent illicit discharges;

☒ An Illicit Discharge Compliance Statement is attached;

☐ NO Illicit Discharge Compliance Statement is attached but will be submitted ***prior to*** the discharge of any stormwater to post-construction BMPs.

STORMWATER MANAGEMENT COMPLIANCE

Standard #1 No new stormwater conveyances (e.g., outfalls) may discharge untreated stormwater directly to or cause erosion in wetlands or waters of the Commonwealth.

- No new conveyances will discharge untreated stormwater directly to or cause erosion in wetlands or waters of the Commonwealth. The new stormwater discharges are treated and provided with hardened outfalls to avoid surface erosion.

Standard #2 Stormwater management systems shall be designed so that post-development peak discharge rates do not exceed pre-development peak discharge rates. This Standard may be waived for discharges to land subject to coastal storm flowage as defined in 310 CMR 10.04.

- See table, Page iii, "Summary of Peak Rates of Stormwater Runoff"
  Site post-development peak discharge rates do not exceed existing peak discharge rates. The peak rate/HydroCAD calculations herein do not include any dynamic infiltration/exfiltration discharges for peak rate attenuation.

Standard #3 Loss of annual recharge to groundwater shall be eliminated or minimized through the use of infiltration measures including environmentally sensitive site design, low impact development techniques, stormwater best management practices, and good operation and maintenance. At a minimum, the annual recharge from the post-development site shall approximate the annual recharge from pre-development conditions based on soil type. This Standard is met when the stormwater management system is designed to infiltrate the required recharge volume as determined in accordance with the Massachusetts Stormwater Handbook.

- **Recharge Volume**
  (Impervious area = proposed buildings, walkways, paved parking, and driveways)
  Impervious area HSG-C (0.25") = 25,658 sf Required Recharge = 535 cf
  Impervious area HSG-D (0.10") = 68,284 sf Required Recharge = 570 cf

  Total Recharge Required 1,105 cf
  Total Recharge Provided 1,940 cf (Basin volume at lowest outlet)

- **Recharge Drawdown (Static)**
  Infiltration Basin – Bottom Area = 2,117 sf, Volume at lowest outlet = 1,940 cf
  1,940 cf/2,117 sf = 0.92 ft or 11 inches
  1982 Rawls Rate = 0.27" per hour (Silt Loam)
  11"/0.27" per hour = 40.7 hours

  Recharge Drawdown Required 72 hours Maximum
  Recharge Drawdown Provided 41 hours

Standard #4 Stormwater management systems shall be designed to remove 80% of the average annual post-construction load of Total Suspended Solids (TSS). This Standard is met when:

a. Suitable practices for source control and pollution prevention are identified in a long-term pollution prevention plan, and thereafter are implemented and maintained;

b. Structural stormwater best management practices are sized to capture the required water quality volume determined in accordance with the Massachusetts Stormwater Handbook; and

c. Pretreatment is provided in accordance with the Massachusetts Stormwater Handbook.

Water Quality Volume (WQV)

Building #1603 Site (1/2" Treatment)

Required volume = 0.5" (0.04167') x Impervious Paved Area (Driveway/Parking)

Impervious Paved Area (sf) = 28,132 sf

WQV Required = 1,173 cf

WQV Provided = 1,940 cf

Building #1605 Site (LUHPPL-1.0" Treatment)

WQV Conversion to Water Quality Flow (WQF) Q_1 Discharge Rate

Q_1=(qu)(A)(WQV)

qu=831 csm/in (Tc=0.05hr, Ia/P=0.034)

A=0.00156 sm (43,470 sf impervious paved area=0.00156 sm)

WQV=1"

Q_1=(831)(0.00156)(1)=1.31 cfs

WQF Required = 1.30 cfs

WQF Provided = 1.88 cfs*

(*Hydro International First Defense High-Capacity FD-4HC, max. treatment flow rate)

Sediment Forebay Volume

Required volume = 0.1" (0.0083') x Impervious Paved Area (Roads/Driveways)

Total Paved Area = 71,602 sf

71,602 x .0083 = **597 cf Required**

1,239 cf Provided

Total Suspended Solids Removal (TSS)

TSS Removal Required = 80%

TSS Removal Provided

Building #1603 Site = 85%**

Building #1605 Site = 88%**

(**TSS Worksheets follow)

INSTRUCTIONS:

Version 1, Automated: Mar. 4, 2008

1. In BMP Column, click on Blue Cell to Activate Drop Down Menu
2. Select BMP from Drop Down Menu
3. After BMP is selected, TSS Removal and other Columns are automatically completed.

Location: #1603 Main Street, Leicester, MA

TSS Removal Calculation Worksheet

B BMP[1]	C TSS Removal Rate[1]	D Starting TSS Load*	E Amount Removed (C*D)	F Remaining Load (D-E)
Deep Sump and Hooded Catch Basin	**0.25**	**1.00**	**0.25**	**0.75**
Infiltration Basin	**0.80**	**0.75**	**0.60**	**0.15**
	0.00	**0.15**	**0.00**	**0.15**
	0.00	**0.15**	**0.00**	**0.15**
	0.00	**0.15**	**0.00**	**0.15**

Total TSS Removal = **85%**

Separate Form Needs to be Completed for Each Outlet or BMP Train

Project: 47

Prepared By: **B. Williams**

Date: **4/5/2021**

*Equals remaining load from previous BMP (E) which enters the BMP

Non-automated TSS Calculation Sheet must be used if Proprietary BMP Proposed

1. From MassDEP Stormwater Handbook Vol. 1

INSTRUCTIONS:

Non-automated: Mar. 4, 2008

1. Sheet is nonautomated. Print sheet and complete using hand calculations. Column A and B: See MassDEP Structural BMP Table
2. The calculations must be completed using the Column Headings specified in Chart and Not the Excel Column Headings
3. To complete Chart Column D, multiple Column B value within Row x Column C value within Row
4. To complete Chart Column E value, subtract Column D value within Row from Column C within Row
5. Total TSS Removal = Sum All Values in Column D

Location: #1605 Main Street, Leicester, MA (LUHPPL)

TSS Removal Calculation Worksheet

A BMP[1]	B TSS Removal Rate[1]	C Starting TSS Load*	D Amount Removed (B*C)	E Remaining Load (C-D)
Deep Sump Catch Basin	0.25	1.00	0.25	0.75
Proprietary Separator	0.80*	0.75	0.60	0.15
Sediment Forebay	0.25	0.15	0.03	0.12

*Manufacturer's Data Follows

Total TSS Removal = 88%

Separate Form Needs to be Completed for Each Outlet or BMP Train

Project: 00047

Prepared By: B.Williams

Date: 04-05-2021

*Equals remaining load from previous BMP (E) which enters the BMP

Non-automated TSS Calculation Sheet must be used if Proprietary BMP Proposed

1. From MassDEP Stormwater Handbook Vol. 1

Standard #5 For land uses with higher potential pollutant loads, source control and pollution prevention shall be implemented in accordance with the Massachusetts Stormwater Handbook to eliminate or reduce the discharge of stormwater runoff from such land uses to the maximum extent practicable.

- The #1605 Building site does meet the criteria to be designated as a "LUHPPL as it has an auto fueling facility and parking lot with high intensity use. The fueling area shall be protected from precipitation and runoff by an overhead canopy. A positive Limiting Barrier will be installed as required to contain fuel spills. All surface runoff from this portion of the site will be routed through an off-line oil grit separator. Water quality calculations and BMP's for this area are based on the "1 inch rule" and 44% TSS removal pre-treatment requirement (see Standard 4).

Standard #6 Stormwater discharges within the Zone II or Interim Wellhead Protection Area of a public water supply, and stormwater discharges near or to any other critical area, require the use of the specific source control and pollution prevention measures and the specific structural stormwater best management practices determined by the Department to be suitable for managing discharges to such areas, as provided in the Massachusetts Stormwater Handbook.

- Stormwater does not discharge within the Zone II or Interim Wellhead Protection Area of a public water supply or to any other critical area.

Standard #7 A redevelopment project is required to meet the following Stormwater Management Standards only to the maximum extent practicable: Standard 2, Standard 3, and the pretreatment and structural best management practice requirements of Standards 4, 5, and 6. Existing stormwater discharges shall comply with Standard 1 only to the maximum extent practicable. A redevelopment project shall also comply with all other requirements of the Stormwater Management Standards and improve existing conditions.

- The site is not a redevelopment project.

Standard #8 A plan to control construction-related impacts including erosion, sedimentation and other pollutant sources during construction and land disturbance activities (construction period erosion, sedimentation, and pollution prevention plan) shall be developed and implemented.

- The plan set includes an Erosion Control Plan (Sheet 7). Notes and construction details are provided to avoid sediment migration and construction period erosion. Additional detailed methods and schedules to be incorporated into the Storm Water Pollution Prevention Plan as required by the EPA/NPDES Construction Activities Permit prior to construction.

Standard #9 A long-term operation and maintenance plan shall be developed and implemented to ensure that stormwater management systems function as designed.

- **Long-term operation and maintenance plan**

The proposed stormwater management system and the Best Management Practices (BMP's) are to be constructed in accordance with the approved site design plans. During the construction process the

general site contractor and property owner shall be designated as the owners of the BMP's and will be responsible for their operation and maintenance. Once the BMP's are constructed, they are to be protected from sedimentation until the site is stabilized and vegetated. Inspections should be performed routinely and after every major storm event. Any accumulated sediments and debris are to be removed and any eroded areas are to be re-graded and re-vegetated.

Post-Development Phase Ownership:

After the completion of the site construction, the entire drainage system will be the responsibility of the property owner, currently Leicester Main, LLC.

Emergency Fuel Spill Response:

In the event of a fuel spill the responsible party shall call 9-1-1. They shall follow local and state removal procedures for the contaminant. The responsible contractor shall also call the Leicester Board of Health at (508) 892-7008, and the Mass DEP at (508) 792-7650. Any contaminated soil must be completely removed from the property and be delivered to a certified land fill.

Operation & Maintenance:

The following are the minimum maintenance criteria for the proposed BMP's. Responsible parties should however review the Mass DEP Stormwater Handbook for further explanation.

Deep Sump Hooded Catch Basins and Manholes

The catch basin shall be inspected and cleaned twice per year (early spring/late fall) and after each major storm event. Also, any catch basin or manhole shall be cleaned out if 12 inches of sediment has accumulated. Inspections shall include structural integrity of hood, depth of sediment in sump and amount of trash and/or debris around grate. Any leaf litter and/or debris shall be removed from catch basin grates after each major storm event.

Stormwater Treatment Unit

The operation and maintenance of the First Defense High Capacity vortex separator shall be performed per the owner's manual found in Section 4 of this report.

Sediment Forebay and Infiltration Basin

In the first few months of use inspect the basin after every major storm to ensure it is stabilized and functioning properly. Thereafter mow grass and inspect at least twice per year. Remove grass clippings and any accumulated organic matter and debris. Remove sediment within forebay when within six inches of weir crest. Perform maintenance only when dry – do not compact the basin bottom.

Standard #10

Illicit Discharge Compliance Statement

Owner: Leicester Main, LLC
Address: One Charlesview Road, Suite 1, Hopedale, MA 01747
Tel. (508) 478-6235

Responsibility

Owners are responsible for ultimate compliance with all provisions of the Massachusetts Stormwater Management Policy, the USEPA NPDES Construction General Permit and responsible for identifying and eliminating illicit discharges (as defined by the USEPA).

Engineer's Compliance Statement:

To the best of my knowledge, the submitted plans, computations and specifications meet the requirements of Standard 10 of the Massachusetts Stormwater Handbook regarding illicit discharges to the stormwater management system and that no detectable illicit discharges exist on the site. All documents and attachments were prepared under my direction and qualified personnel properly gathered and evaluated the information submitted, to the best of my knowledge.

Included with this statement are site plans, drawn to scale, that identify the location of systems for conveying stormwater on the site and show that these systems do not allow the entry of any illicit discharges into the stormwater management system. The plans also show any systems for conveying wastewater and/or groundwater on the site and show that there are no connections between the stormwater and wastewater systems.

For a redevelopment project (if applicable), all actions taken to identify and remove illicit discharges, including without limitation, visual screening, dye or smoke testing, and the removal of any sources of illicit discharges to the stormwater management system are documented and included with this statement.

Professional Engineer

9/23/21
Date

Supplemental Information

LOCUS MAP

(USGS QUADRANGLE)

#1603–#1605 Main Street

Leicester, MA

0 1000 2000 3000

SCALE: 1 INCH = 2000 FT.

Project: 00047 | Date: 04/06/2021

Allen Engineering & Associates, Inc.

Civil Engineers • Surveyors

Land Development Consultants

One Charlesview Road Suite 2

Hopedale, Ma 01747

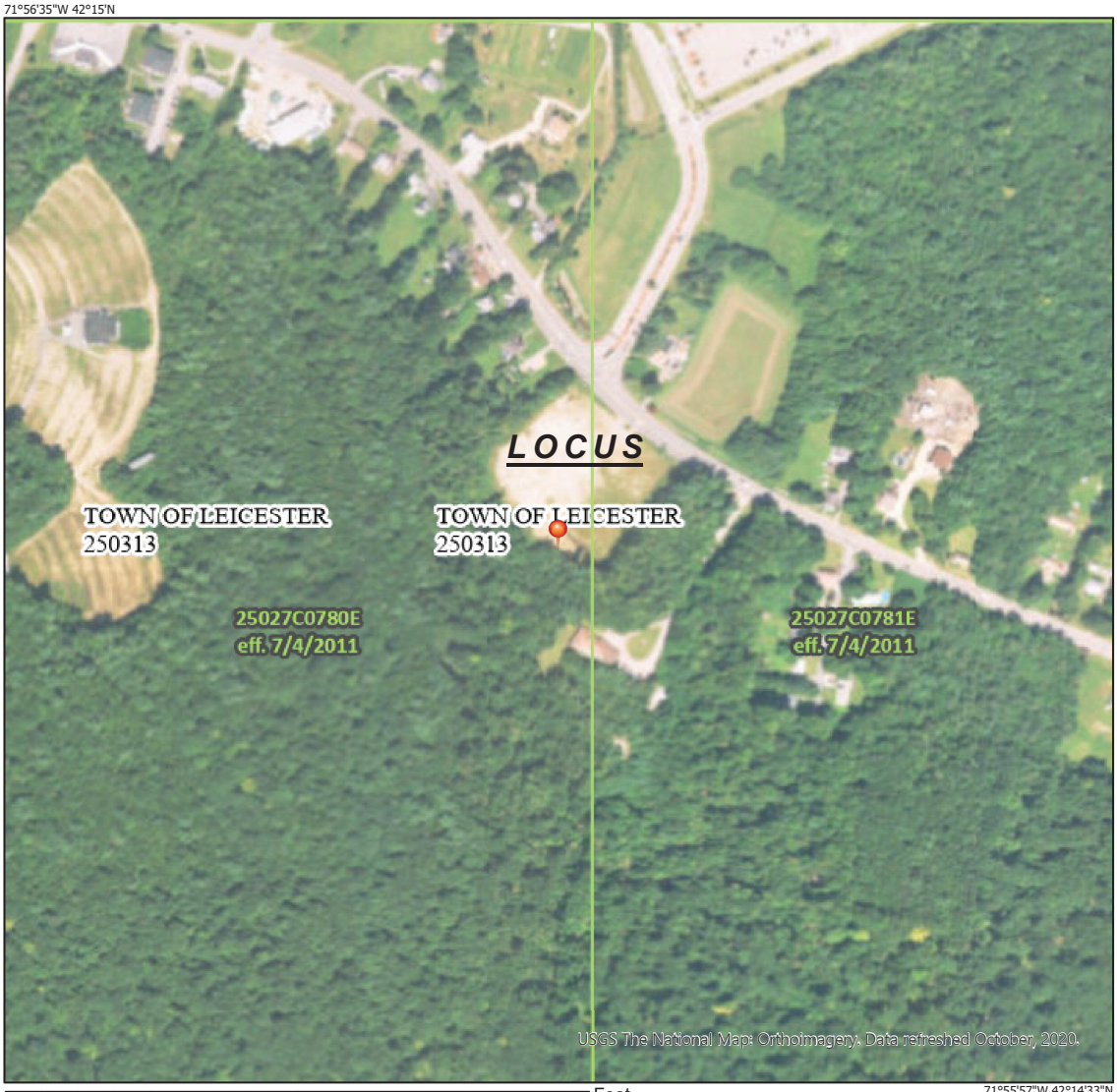
(508) 381-3212 • Phone

www.allen-ea.com

National Flood Hazard Layer FIRMette

FEMA

71°56'35"W 42°15'N



71°55'57"W 42°14'33"N

0 250 500 1,000 1,500 2,000 Feet

1:6,000

Legend

SEE FIS REPORT FOR DETAILED LEGEND AND INDEX MAP FOR FIRM PANEL LAYOUT

SPECIAL FLOOD HAZARD AREAS
- Without Base Flood Elevation (BFE) *Zone A, V, A99*
- With BFE or Depth *Zone AE, AO, AH, VE, AR*
- Regulatory Floodway

OTHER AREAS OF FLOOD HAZARD
- 0.2% Annual Chance Flood Hazard, Areas of 1% annual chance flood with average depth less than one foot or with drainage areas of less than one square mile *Zone X*
- Future Conditions 1% Annual Chance Flood Hazard *Zone X*
- Area with Reduced Flood Risk due to Levee. See Notes. *Zone X*
- Area with Flood Risk due to Levee *Zone D*

OTHER AREAS
- NO SCREEN Area of Minimal Flood Hazard *Zone X*
- Effective LOMRs
- Area of Undetermined Flood Hazard *Zone D*

GENERAL STRUCTURES
- Channel, Culvert, or Storm Sewer
- Levee, Dike, or Floodwall

OTHER FEATURES
- 20.2 / 17.5 Cross Sections with 1% Annual Chance Water Surface Elevation
- Coastal Transect
- 513 Base Flood Elevation Line (BFE)
- Limit of Study
- Jurisdiction Boundary
- Coastal Transect Baseline
- Profile Baseline
- Hydrographic Feature

MAP PANELS
- Digital Data Available
- No Digital Data Available
- Unmapped

N

The pin displayed on the map is an approximate point selected by the user and does not represent an authoritative property location.

This map complies with FEMA's standards for the use of digital flood maps if it is not void as described below. The basemap shown complies with FEMA's basemap accuracy standards

The flood hazard information is derived directly from the authoritative NFHL web services provided by FEMA. This map was exported on 12/2/2020 at 7:55 AM and does not reflect changes or amendments subsequent to this date and time. The NFHL and effective information may change or become superseded by new data over time.

This map image is void if the one or more of the following map elements do not appear: basemap imagery, flood zone labels, legend, scale bar, map creation date, community identifiers, FIRM panel number, and FIRM effective date. Map images for unmapped and unmodernized areas cannot be used for regulatory purposes.

Location Address or Lot No.: 1603 & 1605 Main St
Leicester, Massachusetts

On-site Review

Deep Hole Number: DTH-3 Date: 7/25/13 Time: 11:00 am Weather: Clouds 65°F
Location (identify on site plan):
Land Use: Wooded Residential Slope (%): 3-5% Surface Stones: Few
Vegetation: Wooded with Pines, Maple, Oaks
Landform: Outwash Plain
Position on landscape: (sketch on the back): See Attached Plan
Distances from:

Open Water Body: ≥100 feet	Drainage Way: ≥100 feet
Possible Wet Area: ≥100 feet	Property Line: 65± feet
Drinking Water Well: N/A	Other:

DEEP OBSERVATION HOLE LOG*

Depth from Surface (Inches)	Soil Horizon	Soil Texture (USDA)	Soil Color (Munsell)	Soil Mottling	Other (Structure, Stones, Boulders, Consistency, & Gravel)
0-10”	O/A	SL	10 YR 3/2		
10”-30”	B	SL	10 YR 6/8		
30”-96”	C	Sandy Loam	10 YR 4/4	@52” 5 Y 5/8	Small & Large Stones Throughout 2” – 12” diam., sharp angular

MINIMUM OF 2 HOLES REQUIRED AT EVERY PROPOSED DISPOSAL AREA

Parent Material (geologic): glacial outwash Depth to Bedrock: 96”

Depth to Groundwater: Standing Water in the Hole: None Found Weeping from Pit Face: None Found

Estimated Seasonal High Groundwater: 52” to mottles

DEP APPROVED FORM – 12/07/95

Location Address or Lot No.: 1603 & 1605 Main St
Leicester, Massachusetts

On-site Review

Deep Hole Number: DTH-4 Date: 7/25/13 Time: 11:00 am Weather: Clouds 65°F
Location (identify on site plan):
Land Use: Wooded Residential Slope (%): 3-5% Surface Stones: Few
Vegetation: Wooded with Pines, Maple, Oaks
Landform: Outwash Plain
Position on landscape: (sketch on the back): See Attached Plan
Distances from:

Open Water Body: ≥100 feet	Drainage Way: ≥100 feet
Possible Wet Area: ≥100 feet	Property Line: 110± feet
Drinking Water Well: N/A	Other:

DEEP OBSERVATION HOLE LOG*

Depth from Surface (Inches)	Soil Horizon	Soil Texture (USDA)	Soil Color (Munsell)	Soil Mottling	Other (Structure, Stones, Boulders, Consistency, & Gravel)
0-8”	O/A	SL	10 YR 3/2		
8”-26”	B	SL	10 YR 6/8		
26”-120”	C	Sandy Loam	10 YR 4/4	@56” 5 Y 5/8	Small & Large Stones Throughout 2” – 12” diam., sharp angular

MINIMUM OF 2 HOLES REQUIRED AT EVERY PROPOSED DISPOSAL AREA

Parent Material (geologic): glacial outwash Depth to Bedrock: 120”

Depth to Groundwater: Standing Water in the Hole: None Found Weeping from Pit Face: None Found

Estimated Seasonal High Groundwater: 56” to mottles

DEP APPROVED FORM – 12/07/95

United States Department of Agriculture

NRCS

Natural Resources Conservation Service

A product of the National Cooperative Soil Survey, a joint effort of the United States Department of Agriculture and other Federal agencies, State agencies including the Agricultural Experiment Stations, and local participants

Custom Soil Resource Report for Worcester County, Massachusetts, Southern Part

December 28, 2020

Preface

Soil surveys contain information that affects land use planning in survey areas. They highlight soil limitations that affect various land uses and provide information about the properties of the soils in the survey areas. Soil surveys are designed for many different users, including farmers, ranchers, foresters, agronomists, urban planners, community officials, engineers, developers, builders, and home buyers. Also, conservationists, teachers, students, and specialists in recreation, waste disposal, and pollution control can use the surveys to help them understand, protect, or enhance the environment.

Various land use regulations of Federal, State, and local governments may impose special restrictions on land use or land treatment. Soil surveys identify soil properties that are used in making various land use or land treatment decisions. The information is intended to help the land users identify and reduce the effects of soil limitations on various land uses. The landowner or user is responsible for identifying and complying with existing laws and regulations.

Although soil survey information can be used for general farm, local, and wider area planning, onsite investigation is needed to supplement this information in some cases. Examples include soil quality assessments (http://www.nrcs.usda.gov/wps/portal/nrcs/main/soils/health/) and certain conservation and engineering applications. For more detailed information, contact your local USDA Service Center (https://offices.sc.egov.usda.gov/locator/app?agency=nrcs) or your NRCS State Soil Scientist (http://www.nrcs.usda.gov/wps/portal/nrcs/detail/soils/contactus/?cid=nrcs142p2_053951).

Great differences in soil properties can occur within short distances. Some soils are seasonally wet or subject to flooding. Some are too unstable to be used as a foundation for buildings or roads. Clayey or wet soils are poorly suited to use as septic tank absorption fields. A high water table makes a soil poorly suited to basements or underground installations.

The National Cooperative Soil Survey is a joint effort of the United States Department of Agriculture and other Federal agencies, State agencies including the Agricultural Experiment Stations, and local agencies. The Natural Resources Conservation Service (NRCS) has leadership for the Federal part of the National Cooperative Soil Survey.

Information about soils is updated periodically. Updated information is available through the NRCS Web Soil Survey, the site for official soil survey information.

The U.S. Department of Agriculture (USDA) prohibits discrimination in all its programs and activities on the basis of race, color, national origin, age, disability, and where applicable, sex, marital status, familial status, parental status, religion, sexual orientation, genetic information, political beliefs, reprisal, or because all or a part of an individual's income is derived from any public assistance program. (Not all prohibited bases apply to all programs.) Persons with disabilities who require

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Contents

How Soil Surveys Are Made

Soil surveys are made to provide information about the soils and miscellaneous areas in a specific area. They include a description of the soils and miscellaneous areas and their location on the landscape and tables that show soil properties and limitations affecting various uses. Soil scientists observed the steepness, length, and shape of the slopes; the general pattern of drainage; the kinds of crops and native plants; and the kinds of bedrock. They observed and described many soil profiles. A soil profile is the sequence of natural layers, or horizons, in a soil. The profile extends from the surface down into the unconsolidated material in which the soil formed or from the surface down to bedrock. The unconsolidated material is devoid of roots and other living organisms and has not been changed by other biological activity.

Currently, soils are mapped according to the boundaries of major land resource areas (MLRAs). MLRAs are geographically associated land resource units that share common characteristics related to physiography, geology, climate, water resources, soils, biological resources, and land uses (USDA, 2006). Soil survey areas typically consist of parts of one or more MLRA.

The soils and miscellaneous areas in a survey area occur in an orderly pattern that is related to the geology, landforms, relief, climate, and natural vegetation of the area. Each kind of soil and miscellaneous area is associated with a particular kind of landform or with a segment of the landform. By observing the soils and miscellaneous areas in the survey area and relating their position to specific segments of the landform, a soil scientist develops a concept, or model, of how they were formed. Thus, during mapping, this model enables the soil scientist to predict with a considerable degree of accuracy the kind of soil or miscellaneous area at a specific location on the landscape.

Commonly, individual soils on the landscape merge into one another as their characteristics gradually change. To construct an accurate soil map, however, soil scientists must determine the boundaries between the soils. They can observe only a limited number of soil profiles. Nevertheless, these observations, supplemented by an understanding of the soil-vegetation-landscape relationship, are sufficient to verify predictions of the kinds of soil in an area and to determine the boundaries.

Soil scientists recorded the characteristics of the soil profiles that they studied. They noted soil color, texture, size and shape of soil aggregates, kind and amount of rock fragments, distribution of plant roots, reaction, and other features that enable them to identify soils. After describing the soils in the survey area and determining their properties, the soil scientists assigned the soils to taxonomic classes (units). Taxonomic classes are concepts. Each taxonomic class has a set of soil characteristics with precisely defined limits. The classes are used as a basis for comparison to classify soils systematically. Soil taxonomy, the system of taxonomic classification used in the United States, is based mainly on the kind and character of soil properties and the arrangement of horizons within the profile. After the soil

scientists classified and named the soils in the survey area, they compared the individual soils with similar soils in the same taxonomic class in other areas so that they could confirm data and assemble additional data based on experience and research.

The objective of soil mapping is not to delineate pure map unit components; the objective is to separate the landscape into landforms or landform segments that have similar use and management requirements. Each map unit is defined by a unique combination of soil components and/or miscellaneous areas in predictable proportions. Some components may be highly contrasting to the other components of the map unit. The presence of minor components in a map unit in no way diminishes the usefulness or accuracy of the data. The delineation of such landforms and landform segments on the map provides sufficient information for the development of resource plans. If intensive use of small areas is planned, onsite investigation is needed to define and locate the soils and miscellaneous areas.

Soil scientists make many field observations in the process of producing a soil map. The frequency of observation is dependent upon several factors, including scale of mapping, intensity of mapping, design of map units, complexity of the landscape, and experience of the soil scientist. Observations are made to test and refine the soil-landscape model and predictions and to verify the classification of the soils at specific locations. Once the soil-landscape model is refined, a significantly smaller number of measurements of individual soil properties are made and recorded. These measurements may include field measurements, such as those for color, depth to bedrock, and texture, and laboratory measurements, such as those for content of sand, silt, clay, salt, and other components. Properties of each soil typically vary from one point to another across the landscape.

Observations for map unit components are aggregated to develop ranges of characteristics for the components. The aggregated values are presented. Direct measurements do not exist for every property presented for every map unit component. Values for some properties are estimated from combinations of other properties.

While a soil survey is in progress, samples of some of the soils in the area generally are collected for laboratory analyses and for engineering tests. Soil scientists interpret the data from these analyses and tests as well as the field-observed characteristics and the soil properties to determine the expected behavior of the soils under different uses. Interpretations for all of the soils are field tested through observation of the soils in different uses and under different levels of management. Some interpretations are modified to fit local conditions, and some new interpretations are developed to meet local needs. Data are assembled from other sources, such as research information, production records, and field experience of specialists. For example, data on crop yields under defined levels of management are assembled from farm records and from field or plot experiments on the same kinds of soil.

Predictions about soil behavior are based not only on soil properties but also on such variables as climate and biological activity. Soil conditions are predictable over long periods of time, but they are not predictable from year to year. For example, soil scientists can predict with a fairly high degree of accuracy that a given soil will have a high water table within certain depths in most years, but they cannot predict that a high water table will always be at a specific level in the soil on a specific date.

After soil scientists located and identified the significant natural bodies of soil in the survey area, they drew the boundaries of these bodies on aerial photographs and

identified each as a specific map unit. Aerial photographs show trees, buildings, fields, roads, and rivers, all of which help in locating boundaries accurately.

Soil Map

The soil map section includes the soil map for the defined area of interest, a list of soil map units on the map and extent of each map unit, and cartographic symbols displayed on the map. Also presented are various metadata about data used to produce the map, and a description of each soil map unit.

Custom Soil Resource Report
Soil Map (00047)

Map Scale: 1:1,550 if printed on A landscape (11" x 8.5") sheet.

N

Meters
0 20 40 80 120

Feet
0 50 100 200 300

Map projection: Web Mercator Corner coordinates: WGS84 Edge tics: UTM Zone 19N WGS84

MAP LEGEND

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

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

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

Water Features
- Streams and Canals

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

Background
- Aerial Photography

MAP INFORMATION

The soil surveys that comprise your AOI were mapped at 1:25,000.

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

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

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

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

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

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

Soil Survey Area: Worcester County, Massachusetts, Southern Part
Survey Area Data: Version 13, Jun 11, 2020

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

Date(s) aerial images were photographed: May 18, 2019—Jul 9, 2019

The orthophoto or other base map on which the soil lines were compiled and digitized probably differs from the background

MAP LEGEND	MAP INFORMATION
	imagery displayed on these maps. As a result, some minor shifting of map unit boundaries may be evident.

Map Unit Descriptions (00047)

The map units delineated on the detailed soil maps in a soil survey represent the soils or miscellaneous areas in the survey area. The map unit descriptions, along with the maps, can be used to determine the composition and properties of a unit.

A map unit delineation on a soil map represents an area dominated by one or more major kinds of soil or miscellaneous areas. A map unit is identified and named according to the taxonomic classification of the dominant soils. Within a taxonomic class there are precisely defined limits for the properties of the soils. On the landscape, however, the soils are natural phenomena, and they have the characteristic variability of all natural phenomena. Thus, the range of some observed properties may extend beyond the limits defined for a taxonomic class. Areas of soils of a single taxonomic class rarely, if ever, can be mapped without including areas of other taxonomic classes. Consequently, every map unit is made up of the soils or miscellaneous areas for which it is named and some minor components that belong to taxonomic classes other than those of the major soils.

Most minor soils have properties similar to those of the dominant soil or soils in the map unit, and thus they do not affect use and management. These are called noncontrasting, or similar, components. They may or may not be mentioned in a particular map unit description. Other minor components, however, have properties and behavioral characteristics divergent enough to affect use or to require different management. These are called contrasting, or dissimilar, components. They generally are in small areas and could not be mapped separately because of the scale used. Some small areas of strongly contrasting soils or miscellaneous areas are identified by a special symbol on the maps. If included in the database for a given area, the contrasting minor components are identified in the map unit descriptions along with some characteristics of each. A few areas of minor components may not have been observed, and consequently they are not mentioned in the descriptions, especially where the pattern was so complex that it was impractical to make enough observations to identify all the soils and miscellaneous areas on the landscape.

The presence of minor components in a map unit in no way diminishes the usefulness or accuracy of the data. The objective of mapping is not to delineate pure taxonomic classes but rather to separate the landscape into landforms or landform segments that have similar use and management requirements. The delineation of such segments on the map provides sufficient information for the development of resource plans. If intensive use of small areas is planned, however, onsite investigation is needed to define and locate the soils and miscellaneous areas.

An identifying symbol precedes the map unit name in the map unit descriptions. Each description includes general facts about the unit and gives important soil properties and qualities.

Soils that have profiles that are almost alike make up a *soil series*. Except for differences in texture of the surface layer, all the soils of a series have major horizons that are similar in composition, thickness, and arrangement.

Soils of one series can differ in texture of the surface layer, slope, stoniness, salinity, degree of erosion, and other characteristics that affect their use. On the basis of such differences, a soil series is divided into *soil phases*. Most of the areas

shown on the detailed soil maps are phases of soil series. The name of a soil phase commonly indicates a feature that affects use or management. For example, Alpha silt loam, 0 to 2 percent slopes, is a phase of the Alpha series.

Some map units are made up of two or more major soils or miscellaneous areas. These map units are complexes, associations, or undifferentiated groups.

A *complex* consists of two or more soils or miscellaneous areas in such an intricate pattern or in such small areas that they cannot be shown separately on the maps. The pattern and proportion of the soils or miscellaneous areas are somewhat similar in all areas. Alpha-Beta complex, 0 to 6 percent slopes, is an example.

An *association* is made up of two or more geographically associated soils or miscellaneous areas that are shown as one unit on the maps. Because of present or anticipated uses of the map units in the survey area, it was not considered practical or necessary to map the soils or miscellaneous areas separately. The pattern and relative proportion of the soils or miscellaneous areas are somewhat similar. Alpha-Beta association, 0 to 2 percent slopes, is an example.

An *undifferentiated group* is made up of two or more soils or miscellaneous areas that could be mapped individually but are mapped as one unit because similar interpretations can be made for use and management. The pattern and proportion of the soils or miscellaneous areas in a mapped area are not uniform. An area can be made up of only one of the major soils or miscellaneous areas, or it can be made up of all of them. Alpha and Beta soils, 0 to 2 percent slopes, is an example.

Some surveys include *miscellaneous areas*. Such areas have little or no soil material and support little or no vegetation. Rock outcrop is an example.

Worcester County, Massachusetts, Southern Part

307B—Paxton fine sandy loam, 0 to 8 percent slopes, extremely stony

Map Unit Setting

National map unit symbol: 2w675
Elevation: 0 to 1,580 feet
Mean annual precipitation: 36 to 71 inches
Mean annual air temperature: 39 to 55 degrees F
Frost-free period: 140 to 240 days
Farmland classification: Not prime farmland

Map Unit Composition

Paxton, extremely stony, and similar soils: 80 percent
Minor components: 20 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Paxton, Extremely Stony

Setting

Landform: Drumlins, hills, ground moraines
Landform position (two-dimensional): Summit, shoulder, backslope
Landform position (three-dimensional): Crest, side slope
Down-slope shape: Linear, convex
Across-slope shape: Convex, linear
Parent material: Coarse-loamy lodgment till derived from gneiss, granite, and/or schist

Typical profile

Oe - 0 to 2 inches: moderately decomposed plant material
A - 2 to 10 inches: fine sandy loam
Bw1 - 10 to 17 inches: fine sandy loam
Bw2 - 17 to 28 inches: fine sandy loam
Cd - 28 to 67 inches: gravelly fine sandy loam

Properties and qualities

Slope: 0 to 8 percent
Surface area covered with cobbles, stones or boulders: 9.0 percent
Depth to restrictive feature: 20 to 43 inches to densic material
Drainage class: Well drained
Runoff class: Medium
Capacity of the most limiting layer to transmit water (Ksat): Very low to moderately low (0.00 to 0.14 in/hr)
Depth to water table: About 18 to 37 inches
Frequency of flooding: None
Frequency of ponding: None
Maximum salinity: Nonsaline (0.0 to 1.9 mmhos/cm)
Available water capacity: Low (about 4.7 inches)

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 7s
Hydrologic Soil Group: C
Ecological site: F144AY007CT - Well Drained Dense Till Uplands
Hydric soil rating: No

Minor Components

Woodbridge, extremely stony
Percent of map unit: 10 percent
Landform: Ground moraines, drumlins, hills
Landform position (two-dimensional): Backslope, footslope, summit
Landform position (three-dimensional): Side slope, crest
Down-slope shape: Concave
Across-slope shape: Linear
Hydric soil rating: No

Charlton, extremely stony
Percent of map unit: 5 percent
Landform: Hills
Landform position (two-dimensional): Shoulder, summit, backslope
Landform position (three-dimensional): Crest, side slope
Down-slope shape: Convex
Across-slope shape: Convex
Hydric soil rating: No

Ridgebury, extremely stony
Percent of map unit: 4 percent
Landform: Hills, ground moraines, depressions, drainageways, drumlins
Landform position (two-dimensional): Toeslope, footslope
Landform position (three-dimensional): Base slope, head slope
Down-slope shape: Concave
Across-slope shape: Concave
Hydric soil rating: Yes

Whitman, extremely stony
Percent of map unit: 1 percent
Landform: Depressions
Down-slope shape: Concave
Across-slope shape: Concave
Hydric soil rating: Yes

310B—Woodbridge fine sandy loam, 3 to 8 percent slopes

Map Unit Setting
National map unit symbol: 2t2ql
Elevation: 0 to 1,470 feet
Mean annual precipitation: 36 to 71 inches
Mean annual air temperature: 39 to 55 degrees F
Frost-free period: 140 to 240 days
Farmland classification: All areas are prime farmland

Map Unit Composition
Woodbridge, fine sandy loam, and similar soils: 82 percent
Minor components: 18 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Woodbridge, Fine Sandy Loam

Setting

Landform: Hills, drumlins, ground moraines
Landform position (two-dimensional): Backslope, footslope, summit
Landform position (three-dimensional): Side slope
Down-slope shape: Concave
Across-slope shape: Linear
Parent material: Coarse-loamy lodgment till derived from gneiss, granite, and/or schist

Typical profile

Ap - 0 to 7 inches: fine sandy loam
Bw1 - 7 to 18 inches: fine sandy loam
Bw2 - 18 to 30 inches: fine sandy loam
Cd - 30 to 65 inches: gravelly fine sandy loam

Properties and qualities

Slope: 3 to 8 percent
Depth to restrictive feature: 20 to 39 inches to densic material
Drainage class: Moderately well drained
Runoff class: Medium
Capacity of the most limiting layer to transmit water (Ksat): Very low to moderately low (0.00 to 0.14 in/hr)
Depth to water table: About 18 to 30 inches
Frequency of flooding: None
Frequency of ponding: None
Maximum salinity: Nonsaline (0.0 to 1.9 mmhos/cm)
Available water capacity: Low (about 3.6 inches)

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 2w
Hydrologic Soil Group: C/D
Ecological site: F144AY037MA - Moist Dense Till Uplands
Hydric soil rating: No

Minor Components

Paxton

Percent of map unit: 10 percent
Landform: Drumlins, hills, ground moraines
Landform position (two-dimensional): Backslope, summit, shoulder
Landform position (three-dimensional): Side slope, crest, nose slope
Down-slope shape: Linear, convex
Across-slope shape: Convex
Hydric soil rating: No

Ridgebury

Percent of map unit: 8 percent
Landform: Drainageways, hills, ground moraines, depressions
Landform position (two-dimensional): Backslope, footslope, toeslope
Landform position (three-dimensional): Head slope, base slope, dip
Down-slope shape: Concave
Across-slope shape: Concave
Hydric soil rating: Yes

Soil Information for All Uses

Soil Properties and Qualities

The Soil Properties and Qualities section includes various soil properties and qualities displayed as thematic maps with a summary table for the soil map units in the selected area of interest. A single value or rating for each map unit is generated by aggregating the interpretive ratings of individual map unit components. This aggregation process is defined for each property or quality.

Soil Qualities and Features

Soil qualities are behavior and performance attributes that are not directly measured, but are inferred from observations of dynamic conditions and from soil properties. Example soil qualities include natural drainage, and frost action. Soil features are attributes that are not directly part of the soil. Example soil features include slope and depth to restrictive layer. These features can greatly impact the use and management of the soil.

Hydrologic Soil Group (00047)

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

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

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

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

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

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

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

Table—Hydrologic Soil Group (00047)

Map unit symbol	Map unit name	Rating	Acres in AOI	Percent of AOI
307B	Paxton fine sandy loam, 0 to 8 percent slopes, extremely stony	C	1.0	20.2%
310B	Woodbridge fine sandy loam, 3 to 8 percent slopes	C/D	4.0	79.8%
Totals for Area of Interest			**5.0**	**100.0%**

Rating Options—Hydrologic Soil Group (00047)

Aggregation Method: Dominant Condition

Component Percent Cutoff: None Specified

Tie-break Rule: Higher

Depth to Any Soil Restrictive Layer (00047)

A "restrictive layer" is a nearly continuous layer that has one or more physical, chemical, or thermal properties that significantly impede the movement of water and air through the soil or that restrict roots or otherwise provide an unfavorable root environment. Examples are bedrock, cemented layers, dense layers, and frozen layers.

This theme presents the depth to any type of restrictive layer that is described for each map unit. If more than one type of restrictive layer is described for an individual soil type, the depth to the shallowest one is presented. If no restrictive layer is described in a map unit, it is represented by the "> 200" depth class.

This attribute is actually recorded as three separate values in the database. A low value and a high value indicate the range of this attribute for the soil component. A "representative" value indicates the expected value of this attribute for the component. For this soil property, only the representative value is used.

Table—Depth to Any Soil Restrictive Layer (00047)

Map unit symbol	Map unit name	Rating (centimeters)	Acres in AOI	Percent of AOI
307B	Paxton fine sandy loam, 0 to 8 percent slopes, extremely stony	71	1.0	20.2%
310B	Woodbridge fine sandy loam, 3 to 8 percent slopes	76	4.0	79.8%
Totals for Area of Interest			**5.0**	**100.0%**

Rating Options—Depth to Any Soil Restrictive Layer (00047)

Units of Measure: centimeters

Aggregation Method: Dominant Component

Component Percent Cutoff: None Specified

Tie-break Rule: Lower

Interpret Nulls as Zero: No

References

American Association of State Highway and Transportation Officials (AASHTO). 2004. Standard specifications for transportation materials and methods of sampling and testing. 24th edition.

American Society for Testing and Materials (ASTM). 2005. Standard classification of soils for engineering purposes. ASTM Standard D2487-00.

Cowardin, L.M., V. Carter, F.C. Golet, and E.T. LaRoe. 1979. Classification of wetlands and deep-water habitats of the United States. U.S. Fish and Wildlife Service FWS/OBS-79/31.

Federal Register. July 13, 1994. Changes in hydric soils of the United States.

Federal Register. September 18, 2002. Hydric soils of the United States.

Hurt, G.W., and L.M. Vasilas, editors. Version 6.0, 2006. Field indicators of hydric soils in the United States.

National Research Council. 1995. Wetlands: Characteristics and boundaries.

Soil Survey Division Staff. 1993. Soil survey manual. Soil Conservation Service. U.S. Department of Agriculture Handbook 18. http://www.nrcs.usda.gov/wps/portal/nrcs/detail/national/soils/?cid=nrcs142p2_054262

Soil Survey Staff. 1999. Soil taxonomy: A basic system of soil classification for making and interpreting soil surveys. 2nd edition. Natural Resources Conservation Service, U.S. Department of Agriculture Handbook 436. http://www.nrcs.usda.gov/wps/portal/nrcs/detail/national/soils/?cid=nrcs142p2_053577

Soil Survey Staff. 2010. Keys to soil taxonomy. 11th edition. U.S. Department of Agriculture, Natural Resources Conservation Service. http://www.nrcs.usda.gov/wps/portal/nrcs/detail/national/soils/?cid=nrcs142p2_053580

Tiner, R.W., Jr. 1985. Wetlands of Delaware. U.S. Fish and Wildlife Service and Delaware Department of Natural Resources and Environmental Control, Wetlands Section.

United States Army Corps of Engineers, Environmental Laboratory. 1987. Corps of Engineers wetlands delineation manual. Waterways Experiment Station Technical Report Y-87-1.

United States Department of Agriculture, Natural Resources Conservation Service. National forestry manual. http://www.nrcs.usda.gov/wps/portal/nrcs/detail/soils/home/?cid=nrcs142p2_053374

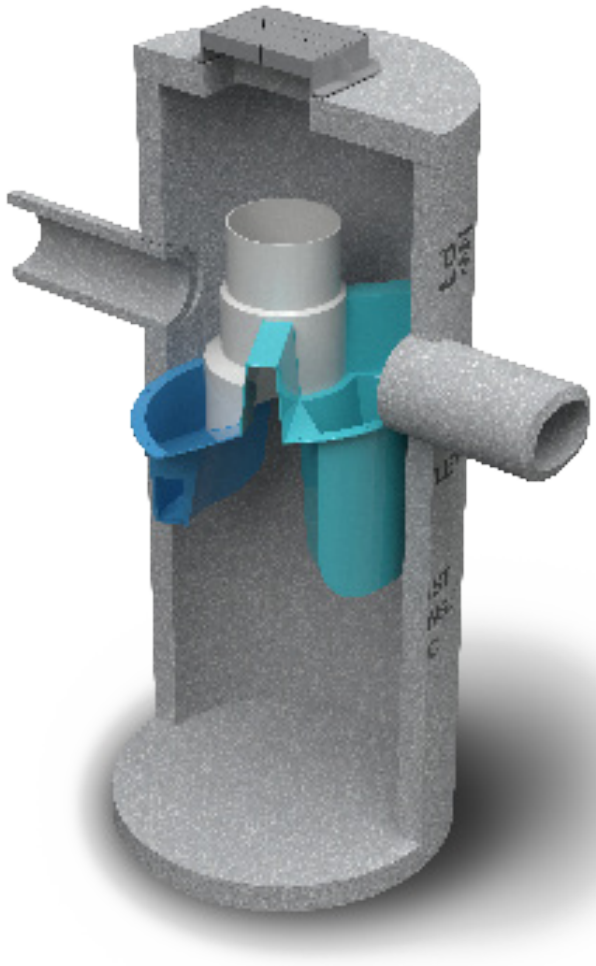
United States Department of Agriculture, Natural Resources Conservation Service. National range and pasture handbook. http://www.nrcs.usda.gov/wps/portal/nrcs/detail/national/landuse/rangepasture/?cid=stelprdb1043084

United States Department of Agriculture, Natural Resources Conservation Service. National soil survey handbook, title 430-VI. http://www.nrcs.usda.gov/wps/portal/nrcs/detail/soils/scientists/?cid=nrcs142p2_054242

United States Department of Agriculture, Natural Resources Conservation Service. 2006. Land resource regions and major land resource areas of the United States, the Caribbean, and the Pacific Basin. U.S. Department of Agriculture Handbook 296. http://www.nrcs.usda.gov/wps/portal/nrcs/detail/national/soils/?cid=nrcs142p2_053624

United States Department of Agriculture, Soil Conservation Service. 1961. Land capability classification. U.S. Department of Agriculture Handbook 210. http://www.nrcs.usda.gov/Internet/FSE_DOCUMENTS/nrcs142p2_052290.pdf

Hydro International



Operation and Maintenance Manual

First Defense® High Capacity and First Defense®Optimum

Vortex Separator for Stormwater Treatment

Table of Contents

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

I. First Defense® by Hydro International

Introduction

The First Defense® is an enhanced vortex separator that combines an effective and economical stormwater treatment chamber with an integral peak flow bypass. It efficiently removes total suspended solids (TSS), trash and hydrocarbons from stormwater runoff without washing out previously captured pollutants. The First Defense® is available in several model configurations to accommodate a wide range of pipe sizes, peak flows and depth constraints.

The two product models described in this guide are the First Defense® High Capacity and the First Defense® Optimum; they are inspected and maintained identically.

Operation

The First Defense® operates on simple fluid hydraulics. It is self-activating, has no moving parts, no external power requirement and is fabricated with durable non-corrosive components. No manual procedures are required to operate the unit and maintenance is limited to monitoring accumulations of stored pollutants and periodic clean-outs. The First Defense® has been designed to allow for easy and safe access for inspection, monitoring and clean-out procedures. Neither entry into the unit nor removal of the internal components is necessary for maintenance, thus safety concerns related to confined-space-entry are avoided.

Pollutant Capture and Retention

The internal components of the First Defense® have been designed to optimize pollutant capture. Sediment is captured and retained in the base of the unit, while oil and floatables are stored on the water surface in the inner volume (Fig.1).

The pollutant storage volumes are isolated from the built-in bypass chamber to prevent washout during high-flow storm events. The sump of the First Defense® retains a standing water level between storm events. This ensures a quiescent flow regime at the onset of a storm, preventing resuspension and washout of pollutants captured during previous events.

Accessories such as oil absorbent pads are available for enhanced oil removal and storage. Due to the separation of the oil and floatable storage volume from the outlet, the potential for washout of stored pollutants between clean-outs is minimized.

Applications

- Stormwater treatment at the point of entry into the drainage line
- Sites constrained by space, topography or drainage profiles with limited slope and depth of cover
- Retrofit installations where stormwater treatment is placed on or tied into an existing storm drain line
- Pretreatment for filters, infiltration and storage

Advantages

- Inlet options include surface grate or multiple inlet pipes
- Integral high capacity bypass conveys large peak flows without the need for “offline” arrangements using separate junction manholes
- Long flow path through the device ensures a long residence time within the treatment chamber, enhancing pollutant settling
- Delivered to site pre-assembled and ready for installation

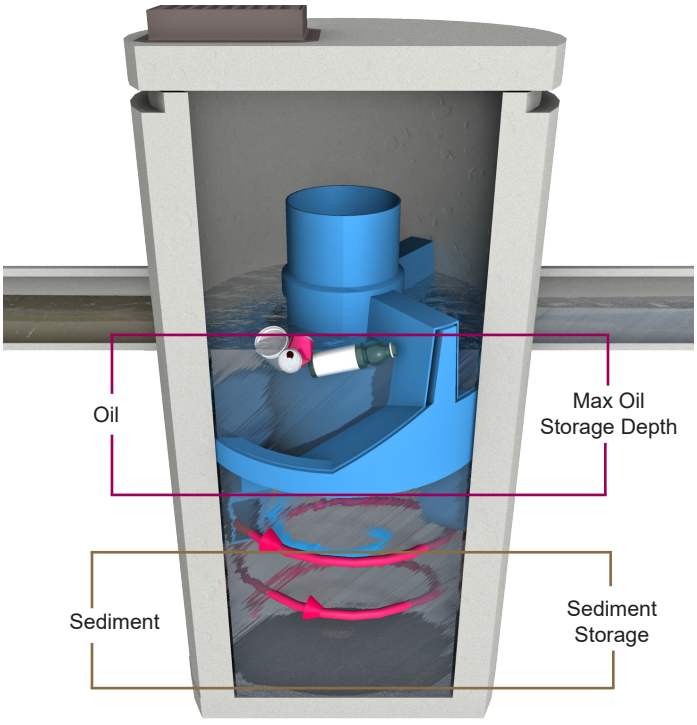


Fig.1 Pollutant storage volumes in the First Defense®.

II. Model Sizes & Configurations

The First Defense® inlet and internal bypass arrangements are available in several model sizes and configurations. The components have modified geometries allowing greater design flexibility to accommodate various site constraints.

All First Defense® models include the internal components that are designed to remove and retain total suspended solids (TSS), gross solids, floatable trash and hydrocarbons (Fig.2). First Defense® model sizes (diameter) are shown in Table 1.

III. Maintenance

First Defense® Components

1. **Built-In Bypass**
2. **Inlet Pipe**
3. **Inlet Chute**
4. **Floatables Draw-off Port**
5. **Outlet Pipe**
6. **Floatables Storage**
7. **Sediment Storage**
8. **Inlet Grate or Cover**

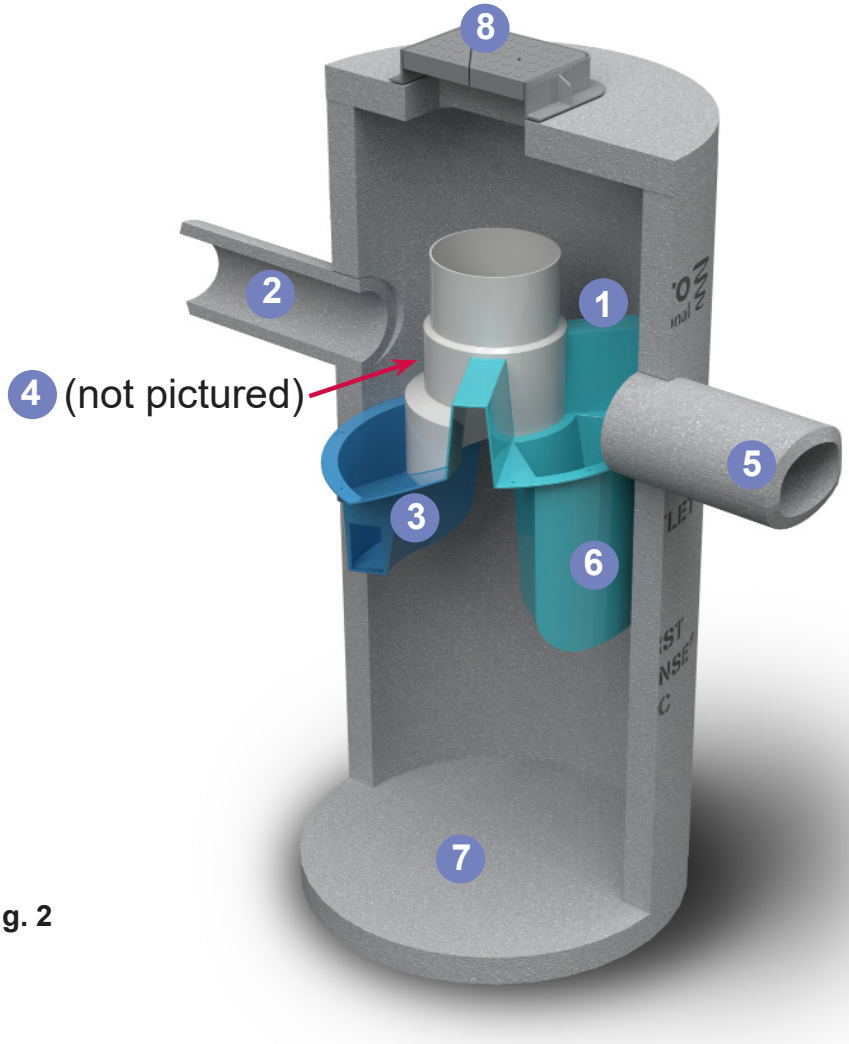


Fig. 2

First Defense® Model Sizes
(ft / m) diameter
3 / 0.9
4 / 1.2
5 / 1.5
6 / 1.8
8 / 2.4
10 / 3.0

Table 1

Overview

The First Defense® protects the environment by removing a wide range of pollutants from stormwater runoff. Periodic removal of these captured pollutants is essential to the continuous, long-term functioning of the First Defense®. The First Defense® will capture and retain sediment and oil until the sediment and oil storage volumes are full to capacity. When sediment and oil storage capacities are reached, the First Defense® will no longer be able to store removed sediment and oil.

The First Defense® allows for easy and safe inspection, monitoring and clean-out procedures. A commercially or municipally owned sump-vac is used to remove captured sediment and floatables. Access ports are located in the top of the manhole.

Maintenance events may include Inspection, Oil & Floatables Removal, and Sediment Removal. Maintenance events do not require entry into the First Defense®, nor do they require the internal components of the First Defense® to be removed. In the case of inspection and floatables removal, a vactor truck is not required. However, a vactor truck is required if the maintenance event is to include oil removal and/or sediment removal.

Maintenance Equipment Considerations

The internal components of the First Defense® have a centrally located circular shaft through which the sediment storage sump can be accessed with a sump vac hose. The open diameter of this access shaft is 15 inches in diameter (Fig.3). Therefore, the nozzle fitting of any vactor hose used for maintenance should be less than 15 inches in diameter.

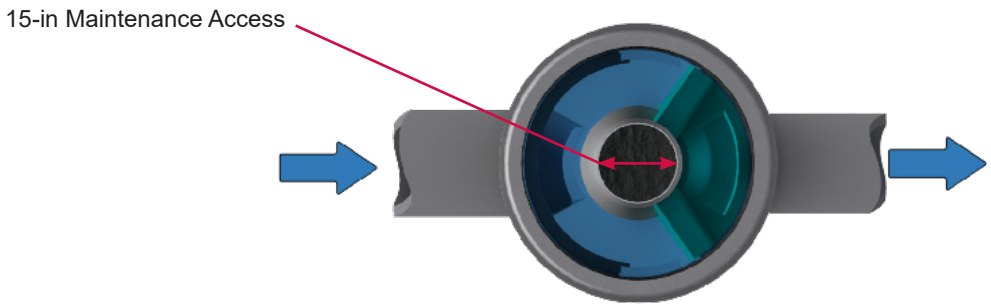


Fig.3 The central opening to the sump of the First Defense®is 15 inches in diameter.

Determining Your Maintenance Schedule

The frequency of clean out is determined in the field after installation. During the first year of operation, the unit should be inspected every six months to determine the rate of sediment and floatables accumulation. A simple probe such as a Sludge-Judge® can be used to determine the level of accumulated solids stored in the sump. This information can be recorded in the maintenance log (see page 9) to establish a routine maintenance schedule.

The vactor procedure, including both sediment and oil / flotables removal, for First Defense® typically takes less than 30 minutes and removes a combined water/oil volume of about 765 gallons.

Inspection Procedures

1. Set up any necessary safety equipment around the access port or grate of the First Defense® as stipulated by local ordinances. Safety equipment should notify passing pedestrian and road traffic that work is being done.

2. Remove the grate or lid to the manhole.

3. Without entering the vessel, look down into the chamber to inspect the inside. Make note of any irregularities. Fig.4 shows the standing water level that should be observed.

4. Without entering the vessel, use the pole with the skimmer net to remove floatables and loose debris from the components and water surface.

5. Using a sediment probe such as a Sludge Judge®, measure the depth of sediment that has collected in the sump of the vessel.

6. On the Maintenance Log (see page 9), record the date, unit location, estimated volume of floatables and gross debris removed, and the depth of sediment measured. Also note any apparent irregularities such as damaged components or blockages.

7. Securely replace the grate or lid.

8. Take down safety equipment.

9. Notify Hydro International of any irregularities noted during inspection.

Floatables and Sediment Clean Out

Floatables clean out is typically done in conjunction with sediment removal. A commercially or municipally owned sump-vac is used to remove captured sediment and floatables (Fig.4).

Floatables and loose debris can also be netted with a skimmer and pole. The access port located at the top of the manhole provides unobstructed access for a vactor hose to be lowered to the base of the sump.

Scheduling

- Floatables and sump clean out are typically conducted once a year during any season.

- Floatables and sump clean out should occur as soon as possible following a spill in the contributing drainage area.

Fig.4 Floatables are removed with a vactor hose

Recommended Equipment

- Safety Equipment (traffic cones, etc)
- Crow bar or other tool to remove grate or lid
- Pole with skimmer or net (if only floatables are being removed)
- Sediment probe (such as a Sludge Judge®)
- Vactor truck (flexible hose recommended)
- First Defense® Maintenance Log

Floatables and Sediment Clean Out Procedures

1. Set up any necessary safety equipment around the access port or grate of the First Defense® as stipulated by local ordinances. Safety equipment should notify passing pedestrian and road traffic that work is being done.

2. Remove the grate or lid to the manhole.

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

4. Remove oil and floatables stored on the surface of the water with the vactor hose or with the skimmer or net

5. Using a sediment probe such as a Sludge Judge®, measure the depth of sediment that has collected in the sump of the vessel and record it in the Maintenance Log (page 9).

6. Once all floatables have been removed, drop the vactor hose to the base of the sump. Vactor out the sediment and gross debris off the sump floor

7. Retract the vactor hose from the vessel.

8. On the Maintenance Log provided by Hydro International, record the date, unit location, estimated volume of floatables and gross debris removed, and the depth of sediment measured. Also note any apparent irregularities such as damaged components, blockages, or irregularly high or low water levels.

9. Securely replace the grate or lid.

Maintenance at a Glance

Inspection	- Regularly during first year of installation - Every 6 months after the first year of installation
Oil and Floatables Removal	- Once per year, with sediment removal - Following a spill in the drainage area
Sediment Removal	- Once per year or as needed - Following a spill in the drainage area
NOTE: For most clean outs the entire volume of liquid does not need to be removed from the manhole. Only remove the first few inches of oils and floatables from the water surface to reduce the total volume of liquid removed during a clean out.	

First Defense® Installation Log

HYDRO INTERNATIONAL REFERENCE NUMBER:	
SITE NAME:	
SITE LOCATION:	
OWNER:	CONTRACTOR:
CONTACT NAME:	CONTACT NAME:
COMPANY NAME:	COMPANY NAME:
ADDRESS:	ADDRESS:
TELEPHONE:	TELEPHONE:
FAX:	FAX:

INSTALLATION DATE: / /

MODEL SIZE (CIRCLE ONE): [3-FT] [4-FT] [5-FT] [6-FT] [8-FT] [10-FT]

INLET (CIRCLE ALL THAT APPLY): GRATED INLET (CATCH BASIN) INLET PIPE (FLOW THROUGH)

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

First Defense® Inspection and Maintenance Log

Date	Initials	Depth of Floatables and Oils	Sediment Depth Measured	Volume of Sediment Removed	Site Activity and Comments

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

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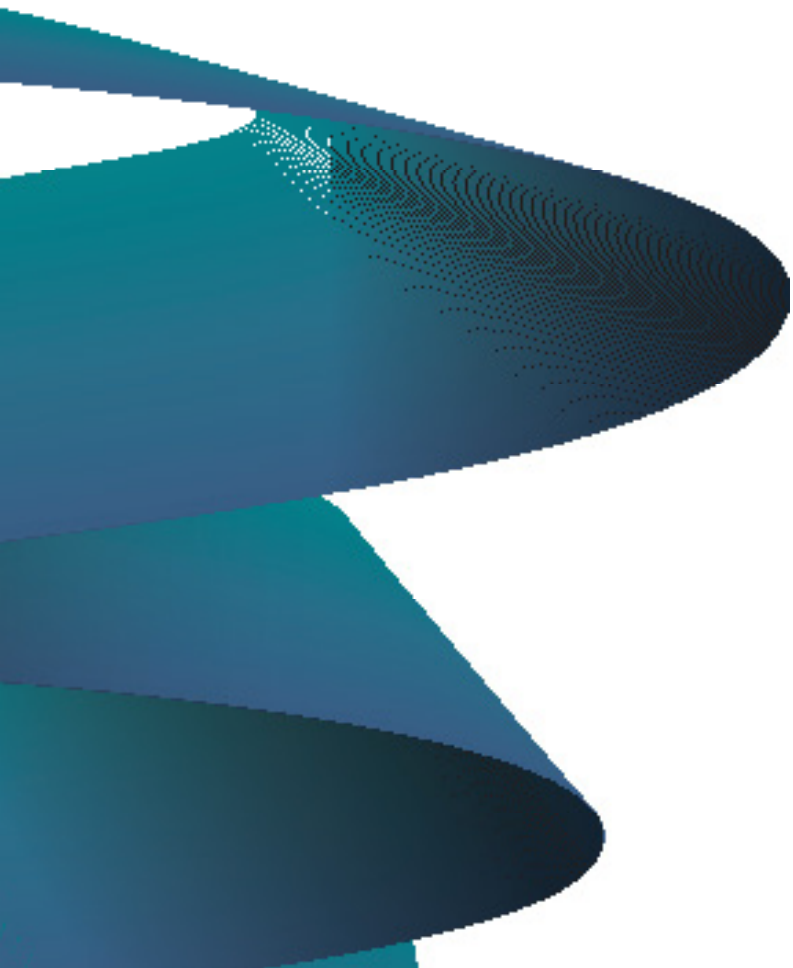
Tel: (207) 756-6200 Fax: (207) 756-6212 Web: www.hydro-int.com

Hydro International®



Stormwater Solutions

94 Hutchins Drive
Portland, ME 04102

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

www.hydro-int.com

Turning Water Around...®

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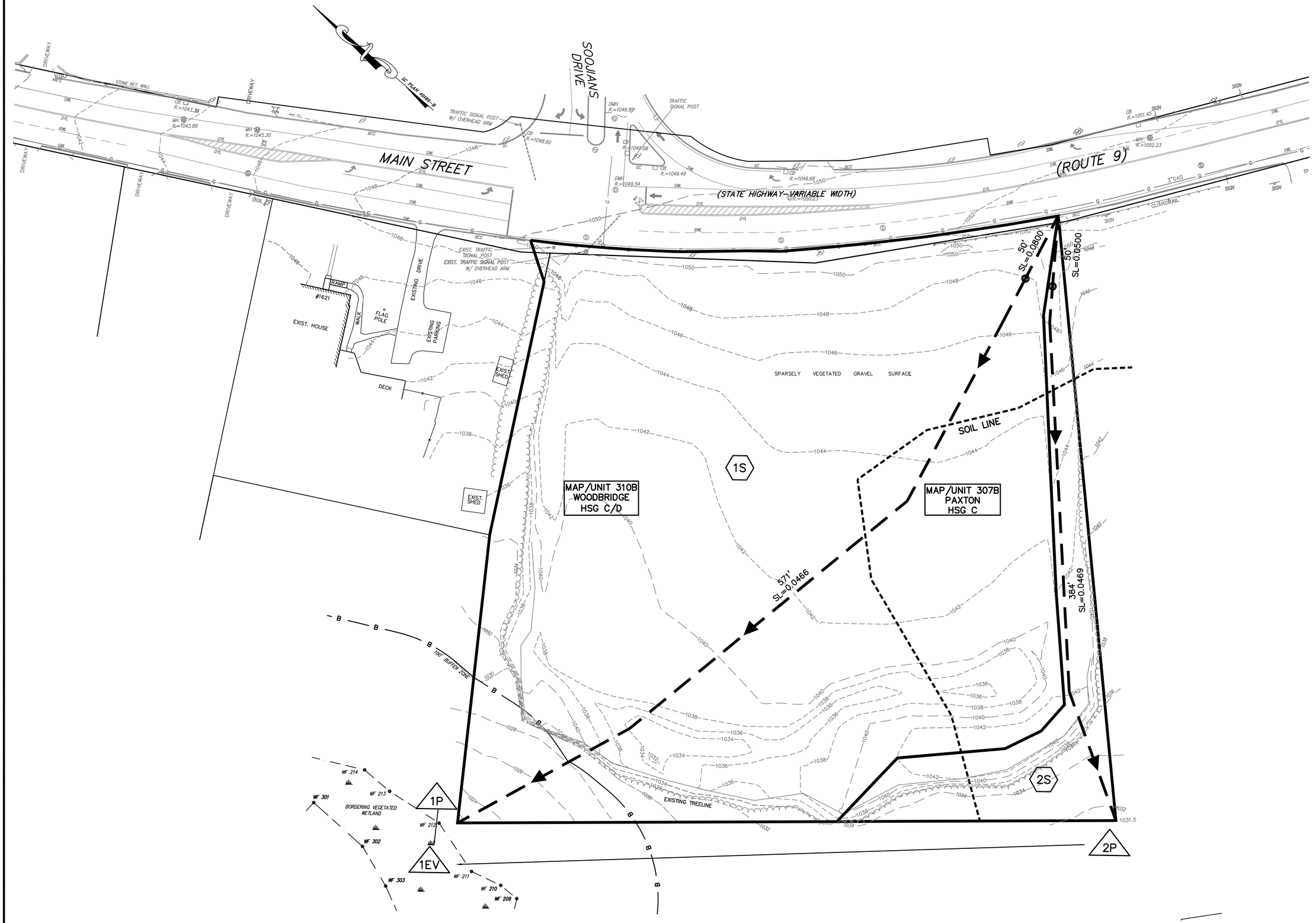

LOCUS REFERENCES
ASSESSORS PARCEL: 18-8.1
#1603 MAIN STREET
OWNER: LEICESTER MAIN, LLC
LAND COURT CERT. 16956
LAND COURT PLAN 40185-B, LOT 1
2.83 Acres

ASSESSORS PARCEL: 18A-14 & 15
0 & #1605 MAIN STREET
OWNER: LEICESTER MAIN, LLC
DEED BOOK 41309, PAGE 153
1.05 Acres

LOCUS LOTS ARE LOCATED WITHIN THE HIGHWAY BUSINESS-INDUSTRIAL 1 DISTRICT.

NOTES
1. THIS PLAN IS BASED ON A FIELD SURVEY PERFORMED BY ODONE SURVEY & MAPPING IN DECEMBER 2012, AND UPDATED BY ALLEN ENGINEERING & ASSOCIATES, INC. IN DECEMBER 2020.

2. ELEVATIONS REFER TO NAD 88 VERTICAL DATUM.

3. THE SITE FALLS WITHIN A FLOOD ZONE X (AREA OF MINIMAL FLOOD HAZARD) ACCORDING TO FLOOD INSURANCE RATE MAP PANEL NUMBER 25027C0780E.

4. THIS SITE DOES NOT CONTAIN CERTIFIED VERNAL POOLS OR HABITATS OF RARE SPECIES ACCORDING TO THE MASSACHUSETTS NATURAL HERITAGE WEB SITE AS OF DECEMBER 2020.

5. EXISTING UTILITY LINES SHOWN ON THESE DRAWINGS ARE BASED ON AVAILABLE RECORD INFORMATION OF UTILITY COMPANIES AND PUBLIC AGENCIES AND ARE APPROXIMATE ONLY. EXISTING UTILITY LINES OTHER THAN THOSE SHOWN MAY BE ON THE SITE. CALL "DIG SAFE" AT 811.

6. THERE SHALL BE NO USE OF FILL CONTAINING HAZARDOUS MATERIALS.

7. APPLICANT SHALL PROVIDE CONSTRUCTION DRAWINGS FOR UNDERGROUND STORAGE TANKS WITH APPLICATION FOR BUILDING PERMIT. DEPTH OF LEDGE/REFUSAL TO BE DETERMINED PRIOR TO DESIGN.

PROFESSIONAL ENGINEER

PREPARED FOR:
Leicester Main, LLC
One Charlesview Road
Suite 1
Hopedale, MA 01747

TITLE:
PRE-DEVELOPMENT DRAINAGE PLAN
For
#1603 - #1605 Main Street
In
Leicester, MA

PREPARED BY:

ALLEN ENGINEERING & ASSOCIATES, INC.
Civil Engineers · Surveyors
Land Development Consultants
One Charlesview Road
Suite 2
Hopedale, Ma 01747
(508) 381-3212 · Phone
www.allen-ea.com

SCALE: 1"=30 FEET
0 30 60 90

DATE: September 23, 2021

REVISIONS

#	DATE	DESCRIPTION	INIT

JOB NO: 00047

SHEET: 1 of 2

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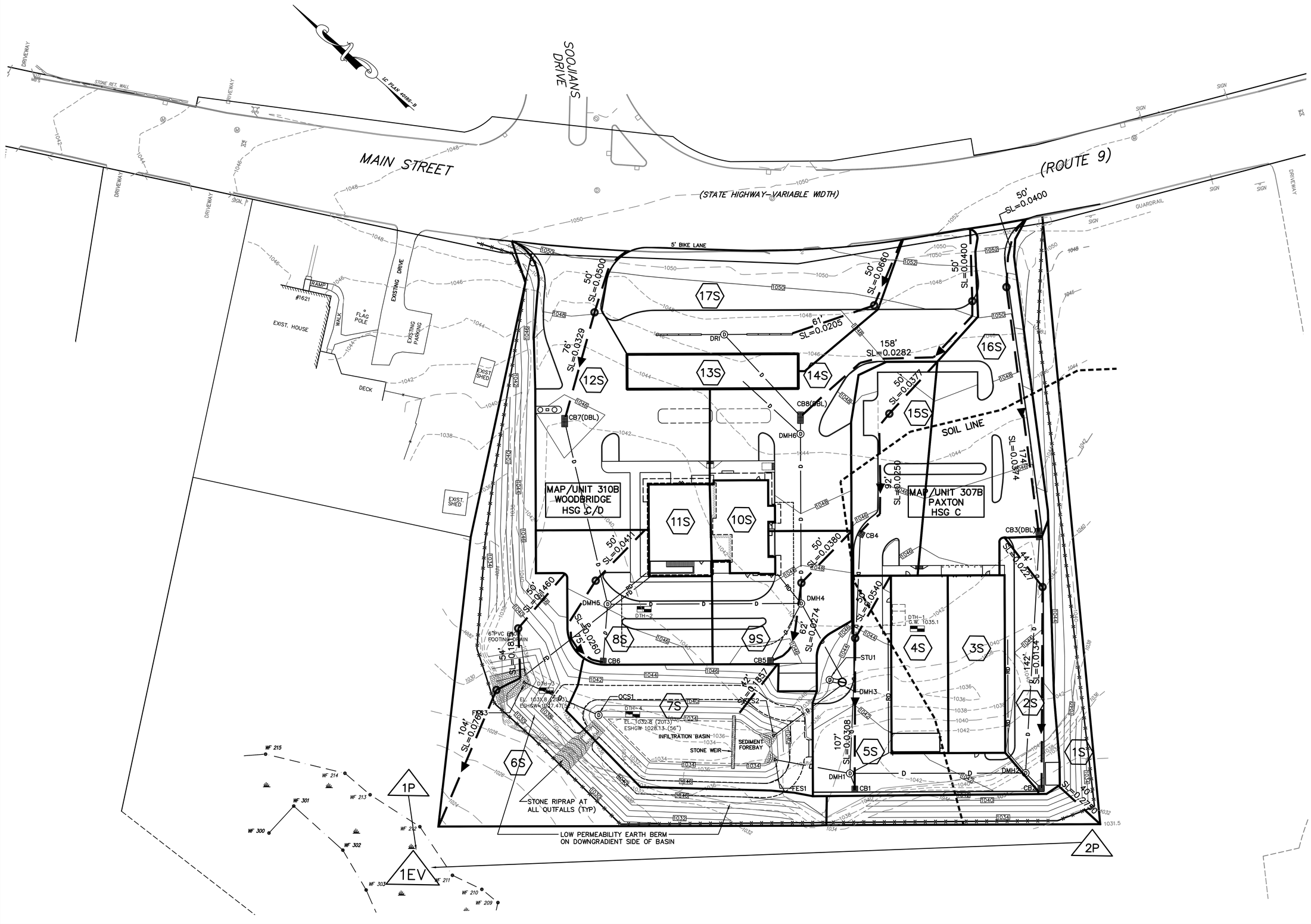

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PROFESSIONAL ENGINEER

PREPARED FOR:
Skaff Petroleum, Inc.
334 Grafton Street,
Worcester, MA 01604

TITLE:
POST-DEVELOPMENT DRAINAGE PLAN
For
#1603 - #1605 Main Street
In
Leicester, MA

PREPARED BY:

ALLEN ENGINEERING & ASSOCIATES, INC.
Civil Engineers · Surveyors
Land Development Consultants
One Charlesview Road
Suite 2
Hopedale, Ma 01747
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SCALE: 1"=30 FEET
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REVISIONS

#	DATE	DESCRIPTION	INIT

JOB NO: 00047

SHEET: 2 of 2

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