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SUPPLEMENTAL STORMWATER REPORT

For

Custom Woodwork Facility Expansion

55 Charlotte Furnace Road
W. Wareham, MA 02576

Prepared for

Master Millwork, Inc.

55 Charlotte Furnace Road
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Prepared by

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8/10/20

COMMONWEALTH OF MASSACHUSETTS
WILLIAM F. MADDEN
CIVIL
NO. 32883
REGISTERED PROFESSIONAL ENGINEER

August 10, 2020

G.A.F. Job No.: 18-9179

Table of Contents

DRAINAGE NARRATIVE

Description of Revisions:

This supplemental drainage report was prepared as part of our response to the engineering peer review letter prepared by Charles L. Rowley, PE, PLS dated August 4, 2020. The drainage basin design and calculations were also affected by the request of the Wareham Fire Dept. to include a turnaround at the northern end of the fire access drive which is located on the east side of the proposed new building.

A summary of the changes to the design and calculations is as follows.

- A turnaround was added to the north end of the fire dept. access drive. This eliminated the need for the prior turnaround adjacent to the southeast corner of the building. This resulted in an increase in storage for the drainage basin.

- The loam and seed specified previously on the basin bottom has been replaced with medium-coarse sand consistent with the Rawls rate for HSG A soils of 8.27 in/hr.

- Post-development watershed areas 1S and 3S were adjusted due to the location and grading of the new access drive turnaround.

- Post-development watershed 1S and the stone trench 2P were adjusted to account for the concrete stairs and landings which have been added to the north, east, and south sides of the building.

The summary sheet that follows and the updated post-development calculations confirm that the drainage system as designed will prevent any potential negative impacts to adjacent downgradient properties.

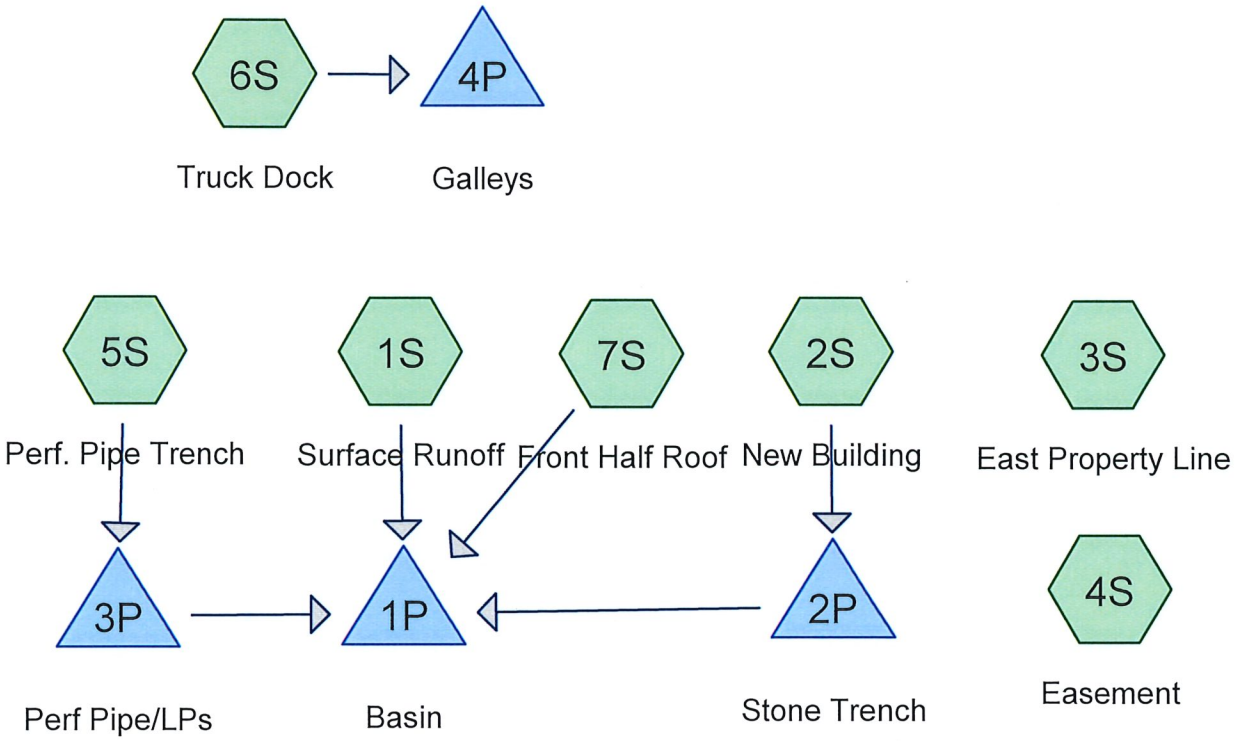
Drainage Summary

Table 1 – Pre-Development vs. Post-Development to East (1S/3S)

Storm Event	Pre		Post		Pre vs. Post changes	
	Peak Discharge (cfs)	Volume (ac-ft.)	Peak Discharge (cfs)	Volume (ac-ft.)	Peak Discharge (cfs)	Volume (ac-ft.)
2 yr	0	0	0	0	0	0
10 yr	0	0	0	0	0	0
25 yr	.01	.006	0	.001	-.01	-.005
100 yr	.06	.027	.01	.003	-.05	-.024

Table 2 – Pre-Development vs. Post-Development to Easement (1L/4S)

Storm Event	Pre		Post		Pre vs. Post changes	
	Peak Discharge (cfs)	Volume (ac-ft.)	Peak Discharge (cfs)	Volume (ac-ft.)	Peak Discharge (cfs)	Volume (ac-ft.)
2 yr	0	0	0	0	0	0
10 yr	0	.001	0	.001	0	0
25 yr	1.13	.040	.01	.004	-1.12	-.036
100 yr	3.73	.140	.05	.009	-3.68	-.131



Subcat Reach Pond Link

Routing Diagram for 9342 Post Rev1
Prepared by G.A.F. Engineering, Inc., Printed 8/10/2020

Area Listing (all nodes)

Area (acres)	CN	Description (subcatchment-numbers)
1.224	39	>75% Grass cover, Good, HSG A (1S, 3S, 4S, 5S)
0.199	98	Basin Bottom (1S)
0.035	98	Building Facade at Dock (6S)
0.012	98	Conc Pads & Steps (1S)
1.270	98	Pavement (1S, 5S, 6S)
0.162	96	Rap surface, HSG A (1S)
0.728	98	Roof (5S, 7S)
0.498	98	Roofs, HSG A (2S)
0.120	30	Woods, Good, HSG A (1S, 3S, 4S)
4.246	**79**	**TOTAL AREA**

Soil Listing (all nodes)

Area (acres)	Soil Group	Subcatchment Numbers
2.003	HSG A	1S, 2S, 3S, 4S, 5S
0.000	HSG B	
0.000	HSG C	
0.000	HSG D	
2.243	Other	1S, 5S, 6S, 7S
4.246		**TOTAL AREA**

Ground Covers (all nodes)

HSG-A (acres)	HSG-B (acres)	HSG-C (acres)	HSG-D (acres)	Other (acres)	Total (acres)	Ground Cover	Subcatchment Numbers
1.224	0.000	0.000	0.000	0.000	1.224	>75% Grass cover, Good	1S, 3S, 4S, 5S
0.000	0.000	0.000	0.000	0.199	0.199	Basin Bottom	1S
0.000	0.000	0.000	0.000	0.035	0.035	Building Facade at Dock	6S
0.000	0.000	0.000	0.000	0.012	0.012	Conc Pads & Steps	1S
0.000	0.000	0.000	0.000	1.270	1.270	Pavement	1S, 5S, 6S
0.162	0.000	0.000	0.000	0.000	0.162	Rap surface	1S
0.000	0.000	0.000	0.000	0.728	0.728	Roof	5S, 7S
0.498	0.000	0.000	0.000	0.000	0.498	Roofs	2S
0.120	0.000	0.000	0.000	0.000	0.120	Woods, Good	1S, 3S, 4S
2.003	**0.000**	**0.000**	**0.000**	**2.243**	**4.246**	**TOTAL AREA**	

Pipe Listing (all nodes)

Line#	Node Number	In-Invert (feet)	Out-Invert (feet)	Length (feet)	Slope (ft/ft)	n	Diam/Width (inches)	Height (inches)	Inside-Fill (inches)
1	3P	72.00	71.80	10.0	0.0200	0.012	18.0	0.0	0.0

Time span=0.00-36.00 hrs, dt=0.01 hrs, 3601 points
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN
Reach routing by Stor-Ind method - Pond routing by Stor-Ind method

Subcatchment 1S: Surface Runoff Runoff Area=46,810 sf 39.78% Impervious Runoff Depth=1.02"
Flow Length=230' Tc=15.7 min CN=71 Runoff=0.88 cfs 0.091 af

Subcatchment 2S: New Building Runoff Area=21,700 sf 100.00% Impervious Runoff Depth=3.20"
Tc=6.0 min CN=98 Runoff=1.66 cfs 0.133 af

Subcatchment 3S: East Property Line Runoff Area=3,540 sf 0.00% Impervious Runoff Depth=0.00"
Flow Length=200' Tc=8.2 min CN=32 Runoff=0.00 cfs 0.000 af

Subcatchment 4S: Easement Runoff Area=6,200 sf 0.00% Impervious Runoff Depth=0.00"
Flow Length=200' Tc=16.6 min CN=36 Runoff=0.00 cfs 0.000 af

Subcatchment 5S: Perf. Pipe Trench Runoff Area=81,220 sf 65.97% Impervious Runoff Depth=1.44"
Tc=6.0 min CN=78 Runoff=3.11 cfs 0.224 af

Subcatchment 6S: Truck Dock Runoff Area=3,800 sf 100.00% Impervious Runoff Depth=3.20"
Tc=6.0 min CN=98 Runoff=0.29 cfs 0.023 af

Subcatchment 7S: Front Half Roof Runoff Area=21,700 sf 100.00% Impervious Runoff Depth=3.20"
Tc=6.0 min CN=98 Runoff=1.66 cfs 0.133 af

Pond 1P: Basin Peak Elev=71.52' Storage=786 cf Inflow=2.16 cfs 0.226 af
Outflow=1.77 cfs 0.225 af

Pond 2P: Stone Trench Peak Elev=74.96' Storage=1,231 cf Inflow=1.66 cfs 0.133 af
Discarded=0.48 cfs 0.133 af Primary=0.00 cfs 0.000 af Outflow=0.48 cfs 0.133 af

Pond 3P: Perf Pipe/LPs Peak Elev=72.14' Storage=2,710 cf Inflow=3.11 cfs 0.224 af
Discarded=0.69 cfs 0.223 af Primary=0.11 cfs 0.002 af Outflow=0.80 cfs 0.224 af

Pond 4P: Galleys Peak Elev=68.39' Storage=198 cf Inflow=0.29 cfs 0.023 af
Outflow=0.08 cfs 0.023 af

Total Runoff Area = 4.246 ac Runoff Volume = 0.604 af Average Runoff Depth = 1.71"
35.45% Pervious = 1.505 ac 64.55% Impervious = 2.741 ac

Summary for Subcatchment 1S: Surface Runoff

Runoff = 0.88 cfs @ 12.23 hrs, Volume= 0.091 af, Depth= 1.02"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-36.00 hrs, dt= 0.01 hrs
Type III 24-hr 2 Year Storm Rainfall=3.43"

	Area (sf)	CN	Description
*	9,450	98	Pavement
*	520	98	Conc Pads & Steps
*	8,650	98	Basin Bottom
*	7,050	96	Rap surface, HSG A
	20,890	39	>75% Grass cover, Good, HSG A
	250	30	Woods, Good, HSG A
	46,810	71	Weighted Average
	28,190		60.22% Pervious Area
	18,620		39.78% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
14.6	50	0.0120	0.06		**Sheet Flow,** Woods: Light underbrush n= 0.400 P2= 3.43"
1.1	180	0.0270	2.65		**Shallow Concentrated Flow,** Unpaved Kv= 16.1 fps
15.7	230	Total			

Summary for Subcatchment 2S: New Building

Runoff = 1.66 cfs @ 12.08 hrs, Volume= 0.133 af, Depth= 3.20"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-36.00 hrs, dt= 0.01 hrs
Type III 24-hr 2 Year Storm Rainfall=3.43"

Area (sf)	CN	Description
21,700	98	Roofs, HSG A
21,700		100.00% Impervious Area

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

Summary for Subcatchment 3S: East Property Line

[45] Hint: Runoff=Zero

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

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-36.00 hrs, dt= 0.01 hrs
Type III 24-hr 2 Year Storm Rainfall=3.43"

Area (sf)	CN	Description
930	39	>75% Grass cover, Good, HSG A
2,610	30	Woods, Good, HSG A
3,540	32	Weighted Average
3,540		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
7.4	50	0.0660	0.11		**Sheet Flow,** Woods: Light underbrush n= 0.400 P2= 3.43"
0.8	150	0.0340	2.97		**Shallow Concentrated Flow,** Unpaved Kv= 16.1 fps
8.2	200	Total			

Summary for Subcatchment 4S: Easement

[45] Hint: Runoff=Zero

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

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-36.00 hrs, dt= 0.01 hrs
Type III 24-hr 2 Year Storm Rainfall=3.43"

Area (sf)	CN	Description
3,850	39	>75% Grass cover, Good, HSG A
2,350	30	Woods, Good, HSG A
6,200	36	Weighted Average
6,200		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
15.7	50	0.0100	0.05		**Sheet Flow,** Woods: Light underbrush n= 0.400 P2= 3.43"
0.9	150	0.0300	2.79		**Shallow Concentrated Flow,** Unpaved Kv= 16.1 fps
16.6	200	Total			

Summary for Subcatchment 5S: Perf. Pipe Trench

Runoff = 3.11 cfs @ 12.09 hrs, Volume= 0.224 af, Depth= 1.44"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-36.00 hrs, dt= 0.01 hrs
Type III 24-hr 2 Year Storm Rainfall=3.43"

	Area (sf)	CN	Description
*	43,580	98	Pavement
*	10,000	98	Roof
	27,640	39	>75% Grass cover, Good, HSG A
	81,220	78	Weighted Average
	27,640		34.03% Pervious Area
	53,580		65.97% Impervious Area

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

Summary for Subcatchment 6S: Truck Dock

Runoff = 0.29 cfs @ 12.08 hrs, Volume= 0.023 af, Depth= 3.20"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-36.00 hrs, dt= 0.01 hrs
Type III 24-hr 2 Year Storm Rainfall=3.43"

	Area (sf)	CN	Description
*	2,280	98	Pavement
*	1,520	98	Building Facade at Dock
	3,800	98	Weighted Average
	3,800		100.00% Impervious Area

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

Summary for Subcatchment 7S: Front Half Roof

Runoff = 1.66 cfs @ 12.08 hrs, Volume= 0.133 af, Depth= 3.20"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-36.00 hrs, dt= 0.01 hrs
Type III 24-hr 2 Year Storm Rainfall=3.43"

	Area (sf)	CN	Description
*	21,700	98	Roof
	21,700		100.00% Impervious Area

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

Summary for Pond 1P: Basin

Inflow Area = 3.935 ac, 67.43% Impervious, Inflow Depth = 0.69" for 2 Year Storm event
Inflow = 2.16 cfs @ 12.10 hrs, Volume= 0.226 af
Outflow = 1.77 cfs @ 12.20 hrs, Volume= 0.225 af, Atten= 18%, Lag= 6.2 min
Discarded = 1.77 cfs @ 12.20 hrs, Volume= 0.225 af

Routing by Stor-Ind method, Time Span= 0.00-36.00 hrs, dt= 0.01 hrs / 2
Peak Elev= 71.52' @ 12.20 hrs Surf.Area= 9,227 sf Storage= 786 cf

Plug-Flow detention time= 31.4 min calculated for 0.225 af (100% of inflow)
Center-of-Mass det. time= 30.0 min (834.0 - 804.1)

Volume	Invert	Avail.Storage	Storage Description
#1	68.50'	648 cf	**2.00'W x 270.00'L x 3.00'H Prismatoid** 1,620 cf Overall x 40.0% Voids
#2	71.50'	28,302 cf	**Custom Stage Data (Prismatic)** Listed below (Recalc)
		28,950 cf	Total Available Storage

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
71.50	8,650	0	0
72.00	9,821	4,618	4,618
73.00	11,351	10,586	15,204
74.00	14,845	13,098	28,302

Device	Routing	Invert	Outlet Devices
#1	Discarded	68.50'	**8.270 in/hr Exfiltration over Surface area**

Discarded OutFlow Max=1.77 cfs @ 12.20 hrs HW=71.52' (Free Discharge)
↑**1=Exfiltration** (Exfiltration Controls 1.77 cfs)

Summary for Pond 2P: Stone Trench

Inflow Area = 0.498 ac,100.00% Impervious, Inflow Depth = 3.20" for 2 Year Storm event
Inflow = 1.66 cfs @ 12.08 hrs, Volume= 0.133 af
Outflow = 0.48 cfs @ 12.41 hrs, Volume= 0.133 af, Atten= 71%, Lag= 19.6 min
Discarded = 0.48 cfs @ 12.41 hrs, Volume= 0.133 af
Primary = 0.00 cfs @ 0.00 hrs, Volume= 0.000 af

Routing by Stor-Ind method, Time Span= 0.00-36.00 hrs, dt= 0.01 hrs / 2
Peak Elev= 74.96' @ 12.41 hrs Surf.Area= 1,250 sf Storage= 1,231 cf

Plug-Flow detention time= 15.5 min calculated for 0.133 af (100% of inflow)
Center-of-Mass det. time= 15.5 min (770.4 - 755.0)

Volume	Invert	Avail.Storage	Storage Description
#1	72.50'	1,500 cf	**5.00'W x 250.00'L x 3.00'H Prismatoid** 3,750 cf Overall x 40.0% Voids

Device	Routing	Invert	Outlet Devices
#1	Discarded	72.50'	**8.270 in/hr Exfiltration over Wetted area**
#2	Primary	75.30'	**250.0' long x 5.0' breadth Broad-Crested Rectangular Weir** Head (feet) 0.20 0.40 0.60 0.80 1.00 1.20 1.40 1.60 1.80 2.00 2.50 3.00 3.50 4.00 4.50 5.00 5.50 Coef. (English) 2.34 2.50 2.70 2.68 2.68 2.66 2.65 2.65 2.65 2.65 2.67 2.66 2.68 2.70 2.74 2.79 2.88

Discarded OutFlow Max=0.48 cfs @ 12.41 hrs HW=74.96' (Free Discharge)
↑—**1=Exfiltration** (Exfiltration Controls 0.48 cfs)

Primary OutFlow Max=0.00 cfs @ 0.00 hrs HW=72.50' (Free Discharge)
↑—**2=Broad-Crested Rectangular Weir** (Controls 0.00 cfs)

Summary for Pond 3P: Perf Pipe/LPs

Inflow Area = 1.865 ac, 65.97% Impervious, Inflow Depth = 1.44" for 2 Year Storm event
Inflow = 3.11 cfs @ 12.09 hrs, Volume= 0.224 af
Outflow = 0.80 cfs @ 12.50 hrs, Volume= 0.224 af, Atten= 74%, Lag= 24.7 min
Discarded = 0.69 cfs @ 12.50 hrs, Volume= 0.223 af
Primary = 0.11 cfs @ 12.50 hrs, Volume= 0.002 af

Routing by Stor-Ind method, Time Span= 0.00-36.00 hrs, dt= 0.01 hrs / 2
Peak Elev= 72.14' @ 12.50 hrs Surf.Area= 1,687 sf Storage= 2,710 cf

Plug-Flow detention time= 34.0 min calculated for 0.224 af (100% of inflow)
Center-of-Mass det. time= 33.9 min (879.4 - 845.4)

Volume	Invert	Avail.Storage	Storage Description
#1	69.00'	2,740 cf	**6.00'W x 255.00'L x 5.00'H Excavation/Crushed Stone** 7,650 cf Overall - 801 cf Embedded = 6,849 cf x 40.0% Voids
#2	70.50'	801 cf	**24.0" Round Pipe Storage** Inside #1 L= 255.0'
#3	68.00'	336 cf	**10.00'D x 7.50'H Excavation/Crushed Stone** x 2 1,178 cf Overall - 339 cf Embedded = 839 cf x 40.0% Voids
#4	69.00'	339 cf	**6.00'D x 6.00'H Leaching Pit** x 2 Inside #3
		4,215 cf	Total Available Storage

Device	Routing	Invert	Outlet Devices
#1	Discarded	68.00'	**8.270 in/hr Exfiltration over Wetted area**
#2	Primary	72.00'	**18.0" Round Culvert** L= 10.0' Ke= 0.500 Inlet / Outlet Invert= 72.00' / 71.80' S= 0.0200 '/' Cc= 0.900 n= 0.012, Flow Area= 1.77 sf

Discarded OutFlow Max=0.69 cfs @ 12.50 hrs HW=72.14' (Free Discharge)
↑**1=Exfiltration** (Exfiltration Controls 0.69 cfs)

Primary OutFlow Max=0.10 cfs @ 12.50 hrs HW=72.14' (Free Discharge)
↑**2=Culvert** (Inlet Controls 0.10 cfs @ 1.27 fps)

Summary for Pond 4P: Galleys

Inflow Area = 0.087 ac,100.00% Impervious, Inflow Depth = 3.20" for 2 Year Storm event
Inflow = 0.29 cfs @ 12.08 hrs, Volume= 0.023 af
Outflow = 0.08 cfs @ 12.42 hrs, Volume= 0.023 af, Atten= 72%, Lag= 20.4 min
Discarded = 0.08 cfs @ 12.42 hrs, Volume= 0.023 af

Routing by Stor-Ind method, Time Span= 0.00-36.00 hrs, dt= 0.01 hrs
Peak Elev= 68.39' @ 12.42 hrs Surf.Area= 320 sf Storage= 198 cf

Plug-Flow detention time= 13.1 min calculated for 0.023 af (100% of inflow)
Center-of-Mass det. time= 13.1 min (768.1 - 755.0)

Volume	Invert	Avail.Storage	Storage Description
#1	67.00'	516 cf	**16.00'W x 20.00'L x 5.50'H Excavation/Crushed Stone** 1,760 cf Overall - 471 cf Embedded = 1,289 cf x 40.0% Voids
#2	68.00'	355 cf	**Concrete Galley 4x4x4** x 8 Inside #1 Inside= 42.0"W x 43.0"H => 12.67 sf x 3.50'L = 44.3 cf Outside= 52.8"W x 48.0"H => 14.72 sf x 4.00'L = 58.9 cf 8 Chambers in 2 Rows
		870 cf	Total Available Storage

Device	Routing	Invert	Outlet Devices
#1	Discarded	67.00'	**8.270 in/hr Exfiltration over Wetted area**

Discarded OutFlow Max=0.08 cfs @ 12.42 hrs HW=68.39' (Free Discharge)
↑**1=Exfiltration** (Exfiltration Controls 0.08 cfs)

Time span=0.00-36.00 hrs, dt=0.01 hrs, 3601 points
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN
Reach routing by Stor-Ind method - Pond routing by Stor-Ind method

Subcatchment 1S: Surface Runoff Runoff Area=46,810 sf 39.78% Impervious Runoff Depth=2.15"
Flow Length=230' Tc=15.7 min CN=71 Runoff=1.98 cfs 0.192 af

Subcatchment 2S: New Building Runoff Area=21,700 sf 100.00% Impervious Runoff Depth=4.80"
Tc=6.0 min CN=98 Runoff=2.46 cfs 0.199 af

Subcatchment 3S: East Property Line Runoff Area=3,540 sf 0.00% Impervious Runoff Depth=0.03"
Flow Length=200' Tc=8.2 min CN=32 Runoff=0.00 cfs 0.000 af

Subcatchment 4S: Easement Runoff Area=6,200 sf 0.00% Impervious Runoff Depth=0.11"
Flow Length=200' Tc=16.6 min CN=36 Runoff=0.00 cfs 0.001 af

Subcatchment 5S: Perf. Pipe Trench Runoff Area=81,220 sf 65.97% Impervious Runoff Depth=2.75"
Tc=6.0 min CN=78 Runoff=6.01 cfs 0.427 af

Subcatchment 6S: Truck Dock Runoff Area=3,800 sf 100.00% Impervious Runoff Depth=4.80"
Tc=6.0 min CN=98 Runoff=0.43 cfs 0.035 af

Subcatchment 7S: Front Half Roof Runoff Area=21,700 sf 100.00% Impervious Runoff Depth=4.80"
Tc=6.0 min CN=98 Runoff=2.46 cfs 0.199 af

Pond 1P: Basin Peak Elev=72.15' Storage=6,728 cf Inflow=9.11 cfs 0.505 af
Outflow=2.03 cfs 0.504 af

Pond 2P: Stone Trench Peak Elev=75.32' Storage=1,410 cf Inflow=2.46 cfs 0.199 af
Discarded=0.51 cfs 0.181 af Primary=1.68 cfs 0.019 af Outflow=2.19 cfs 0.199 af

Pond 3P: Perf Pipe/LPs Peak Elev=73.05' Storage=3,414 cf Inflow=6.01 cfs 0.427 af
Discarded=0.79 cfs 0.332 af Primary=4.00 cfs 0.094 af Outflow=4.79 cfs 0.427 af

Pond 4P: Galleys Peak Elev=69.33' Storage=368 cf Inflow=0.43 cfs 0.035 af
Outflow=0.09 cfs 0.035 af

Total Runoff Area = 4.246 ac Runoff Volume = 1.054 af Average Runoff Depth = 2.98"
35.45% Pervious = 1.505 ac 64.55% Impervious = 2.741 ac

Summary for Subcatchment 1S: Surface Runoff

Runoff = 1.98 cfs @ 12.23 hrs, Volume= 0.192 af, Depth= 2.15"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-36.00 hrs, dt= 0.01 hrs
Type III 24-hr 10 Year Storm Rainfall=5.04"

	Area (sf)	CN	Description
*	9,450	98	Pavement
*	520	98	Conc Pads & Steps
*	8,650	98	Basin Bottom
*	7,050	96	Rap surface, HSG A
	20,890	39	>75% Grass cover, Good, HSG A
	250	30	Woods, Good, HSG A
	46,810	71	Weighted Average
	28,190		60.22% Pervious Area
	18,620		39.78% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
14.6	50	0.0120	0.06		**Sheet Flow,** Woods: Light underbrush n= 0.400 P2= 3.43"
1.1	180	0.0270	2.65		**Shallow Concentrated Flow,** Unpaved Kv= 16.1 fps
15.7	230	Total			

Summary for Subcatchment 2S: New Building

Runoff = 2.46 cfs @ 12.08 hrs, Volume= 0.199 af, Depth= 4.80"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-36.00 hrs, dt= 0.01 hrs
Type III 24-hr 10 Year Storm Rainfall=5.04"

Area (sf)	CN	Description
21,700	98	Roofs, HSG A
21,700		100.00% Impervious Area

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

Summary for Subcatchment 3S: East Property Line

Runoff = 0.00 cfs @ 20.91 hrs, Volume= 0.000 af, Depth= 0.03"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-36.00 hrs, dt= 0.01 hrs
Type III 24-hr 10 Year Storm Rainfall=5.04"

Area (sf)	CN	Description
930	39	>75% Grass cover, Good, HSG A
2,610	30	Woods, Good, HSG A
3,540	32	Weighted Average
3,540		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
7.4	50	0.0660	0.11		**Sheet Flow,** Woods: Light underbrush n= 0.400 P2= 3.43"
0.8	150	0.0340	2.97		**Shallow Concentrated Flow,** Unpaved Kv= 16.1 fps
8.2	200	Total			

Summary for Subcatchment 4S: Easement

Runoff = 0.00 cfs @ 14.96 hrs, Volume= 0.001 af, Depth= 0.11"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-36.00 hrs, dt= 0.01 hrs
Type III 24-hr 10 Year Storm Rainfall=5.04"

Area (sf)	CN	Description
3,850	39	>75% Grass cover, Good, HSG A
2,350	30	Woods, Good, HSG A
6,200	36	Weighted Average
6,200		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
15.7	50	0.0100	0.05		**Sheet Flow,** Woods: Light underbrush n= 0.400 P2= 3.43"
0.9	150	0.0300	2.79		**Shallow Concentrated Flow,** Unpaved Kv= 16.1 fps
16.6	200	Total			

Summary for Subcatchment 5S: Perf. Pipe Trench

Runoff = 6.01 cfs @ 12.09 hrs, Volume= 0.427 af, Depth= 2.75"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-36.00 hrs, dt= 0.01 hrs
Type III 24-hr 10 Year Storm Rainfall=5.04"

	Area (sf)	CN	Description
*	43,580	98	Pavement
*	10,000	98	Roof
	27,640	39	>75% Grass cover, Good, HSG A
	81,220	78	Weighted Average
	27,640		34.03% Pervious Area
	53,580		65.97% Impervious Area

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

Summary for Subcatchment 6S: Truck Dock

Runoff = 0.43 cfs @ 12.08 hrs, Volume= 0.035 af, Depth= 4.80"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-36.00 hrs, dt= 0.01 hrs
Type III 24-hr 10 Year Storm Rainfall=5.04"

	Area (sf)	CN	Description
*	2,280	98	Pavement
*	1,520	98	Building Facade at Dock
	3,800	98	Weighted Average
	3,800		100.00% Impervious Area

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

Summary for Subcatchment 7S: Front Half Roof

Runoff = 2.46 cfs @ 12.08 hrs, Volume= 0.199 af, Depth= 4.80"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-36.00 hrs, dt= 0.01 hrs
Type III 24-hr 10 Year Storm Rainfall=5.04"

	Area (sf)	CN	Description
*	21,700	98	Roof
	21,700		100.00% Impervious Area

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

Summary for Pond 1P: Basin

[79] Warning: Submerged Pond 3P Primary device # 2 INLET by 0.15'

Inflow Area = 3.935 ac, 67.43% Impervious, Inflow Depth = 1.54" for 10 Year Storm event
Inflow = 9.11 cfs @ 12.14 hrs, Volume= 0.505 af
Outflow = 2.03 cfs @ 12.56 hrs, Volume= 0.504 af, Atten= 78%, Lag= 25.6 min
Discarded = 2.03 cfs @ 12.56 hrs, Volume= 0.504 af

Routing by Stor-Ind method, Time Span= 0.00-36.00 hrs, dt= 0.01 hrs / 2
Peak Elev= 72.15' @ 12.56 hrs Surf.Area= 10,586 sf Storage= 6,728 cf

Plug-Flow detention time= 38.6 min calculated for 0.504 af (100% of inflow)
Center-of-Mass det. time= 38.1 min (823.9 - 785.8)

Volume	Invert	Avail.Storage	Storage Description
#1	68.50'	648 cf	**2.00'W x 270.00'L x 3.00'H Prismatoid** 1,620 cf Overall x 40.0% Voids
#2	71.50'	28,302 cf	**Custom Stage Data (Prismatic)** Listed below (Recalc)
		28,950 cf	Total Available Storage

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
71.50	8,650	0	0
72.00	9,821	4,618	4,618
73.00	11,351	10,586	15,204
74.00	14,845	13,098	28,302

Device	Routing	Invert	Outlet Devices
#1	Discarded	68.50'	**8.270 in/hr Exfiltration over Surface area**

Discarded OutFlow Max=2.03 cfs @ 12.56 hrs HW=72.15' (Free Discharge)
↑**1=Exfiltration** (Exfiltration Controls 2.03 cfs)

Summary for Pond 2P: Stone Trench

Inflow Area = 0.498 ac,100.00% Impervious, Inflow Depth = 4.80" for 10 Year Storm event
Inflow = 2.46 cfs @ 12.08 hrs, Volume= 0.199 af
Outflow = 2.19 cfs @ 12.12 hrs, Volume= 0.199 af, Atten= 11%, Lag= 2.5 min
Discarded = 0.51 cfs @ 12.12 hrs, Volume= 0.181 af
Primary = 1.68 cfs @ 12.12 hrs, Volume= 0.019 af

Routing by Stor-Ind method, Time Span= 0.00-36.00 hrs, dt= 0.01 hrs / 2
Peak Elev= 75.32' @ 12.12 hrs Surf.Area= 1,250 sf Storage= 1,410 cf

Plug-Flow detention time= 15.1 min calculated for 0.199 af (100% of inflow)
Center-of-Mass det. time= 15.2 min (763.1 - 747.9)

Volume	Invert	Avail.Storage	Storage Description
#1	72.50'	1,500 cf	**5.00'W x 250.00'L x 3.00'H Prismatoid** 3,750 cf Overall x 40.0% Voids

Device	Routing	Invert	Outlet Devices
#1	Discarded	72.50'	**8.270 in/hr Exfiltration over Wetted area**
#2	Primary	75.30'	**250.0' long x 5.0' breadth Broad-Crested Rectangular Weir** Head (feet) 0.20 0.40 0.60 0.80 1.00 1.20 1.40 1.60 1.80 2.00 2.50 3.00 3.50 4.00 4.50 5.00 5.50 Coef. (English) 2.34 2.50 2.70 2.68 2.68 2.66 2.65 2.65 2.65 2.65 2.67 2.66 2.68 2.70 2.74 2.79 2.88

Discarded OutFlow Max=0.51 cfs @ 12.12 hrs HW=75.32' (Free Discharge)
↑—**1=Exfiltration** (Exfiltration Controls 0.51 cfs)

Primary OutFlow Max=1.61 cfs @ 12.12 hrs HW=75.32' (Free Discharge)
↑—**2=Broad-Crested Rectangular Weir** (Weir Controls 1.61 cfs @ 0.33 fps)

Summary for Pond 3P: Perf Pipe/LPs

Inflow Area = 1.865 ac, 65.97% Impervious, Inflow Depth = 2.75" for 10 Year Storm event
Inflow = 6.01 cfs @ 12.09 hrs, Volume= 0.427 af
Outflow = 4.79 cfs @ 12.15 hrs, Volume= 0.427 af, Atten= 20%, Lag= 3.7 min
Discarded = 0.79 cfs @ 12.15 hrs, Volume= 0.332 af
Primary = 4.00 cfs @ 12.15 hrs, Volume= 0.094 af

Routing by Stor-Ind method, Time Span= 0.00-36.00 hrs, dt= 0.01 hrs / 2
Peak Elev= 73.05' @ 12.15 hrs Surf.Area= 1,687 sf Storage= 3,414 cf

Plug-Flow detention time= 28.5 min calculated for 0.427 af (100% of inflow)
Center-of-Mass det. time= 28.5 min (855.3 - 826.8)

Volume	Invert	Avail.Storage	Storage Description
#1	69.00'	2,740 cf	**6.00'W x 255.00'L x 5.00'H Excavation/Crushed Stone** 7,650 cf Overall - 801 cf Embedded = 6,849 cf x 40.0% Voids
#2	70.50'	801 cf	**24.0" Round Pipe Storage** Inside #1 L= 255.0'
#3	68.00'	336 cf	**10.00'D x 7.50'H Excavation/Crushed Stone** x 2 1,178 cf Overall - 339 cf Embedded = 839 cf x 40.0% Voids
#4	69.00'	339 cf	**6.00'D x 6.00'H Leaching Pit** x 2 Inside #3
		4,215 cf	Total Available Storage

Device	Routing	Invert	Outlet Devices
#1	Discarded	68.00'	**8.270 in/hr Exfiltration over Wetted area**
#2	Primary	72.00'	**18.0" Round Culvert** L= 10.0' Ke= 0.500 Inlet / Outlet Invert= 72.00' / 71.80' S= 0.0200 '/' Cc= 0.900 n= 0.012, Flow Area= 1.77 sf

Discarded OutFlow Max=0.79 cfs @ 12.15 hrs HW=73.05' (Free Discharge)
↑—**1=Exfiltration** (Exfiltration Controls 0.79 cfs)

Primary OutFlow Max=4.00 cfs @ 12.15 hrs HW=73.05' (Free Discharge)
↑—**2=Culvert** (Barrel Controls 4.00 cfs @ 4.25 fps)

Summary for Pond 4P: Galleys

Inflow Area = 0.087 ac,100.00% Impervious, Inflow Depth = 4.80" for 10 Year Storm event
Inflow = 0.43 cfs @ 12.08 hrs, Volume= 0.035 af
Outflow = 0.09 cfs @ 12.49 hrs, Volume= 0.035 af, Atten= 78%, Lag= 24.3 min
Discarded = 0.09 cfs @ 12.49 hrs, Volume= 0.035 af

Routing by Stor-Ind method, Time Span= 0.00-36.00 hrs, dt= 0.01 hrs
Peak Elev= 69.33' @ 12.49 hrs Surf.Area= 320 sf Storage= 368 cf

Plug-Flow detention time= 23.0 min calculated for 0.035 af (100% of inflow)
Center-of-Mass det. time= 23.0 min (770.9 - 747.9)

Volume	Invert	Avail.Storage	Storage Description
#1	67.00'	516 cf	**16.00'W x 20.00'L x 5.50'H Excavation/Crushed Stone** 1,760 cf Overall - 471 cf Embedded = 1,289 cf x 40.0% Voids
#2	68.00'	355 cf	**Concrete Galley 4x4x4** x 8 Inside #1 Inside= 42.0"W x 43.0"H => 12.67 sf x 3.50'L = 44.3 cf Outside= 52.8"W x 48.0"H => 14.72 sf x 4.00'L = 58.9 cf 8 Chambers in 2 Rows
		870 cf	Total Available Storage

Device	Routing	Invert	Outlet Devices
#1	Discarded	67.00'	**8.270 in/hr Exfiltration over Wetted area**

Discarded OutFlow Max=0.09 cfs @ 12.49 hrs HW=69.33' (Free Discharge)
↑—**1=Exfiltration** (Exfiltration Controls 0.09 cfs)

Time span=0.00-36.00 hrs, dt=0.01 hrs, 3601 points
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN
Reach routing by Stor-Ind method - Pond routing by Stor-Ind method

Subcatchment 1S: Surface Runoff Runoff Area=46,810 sf 39.78% Impervious Runoff Depth=2.93"
Flow Length=230' Tc=15.7 min CN=71 Runoff=2.73 cfs 0.262 af

Subcatchment 2S: New Building Runoff Area=21,700 sf 100.00% Impervious Runoff Depth=5.80"
Tc=6.0 min CN=98 Runoff=2.95 cfs 0.241 af

Subcatchment 3S: East Property Line Runoff Area=3,540 sf 0.00% Impervious Runoff Depth=0.14"
Flow Length=200' Tc=8.2 min CN=32 Runoff=0.00 cfs 0.001 af

Subcatchment 4S: Easement Runoff Area=6,200 sf 0.00% Impervious Runoff Depth=0.30"
Flow Length=200' Tc=16.6 min CN=36 Runoff=0.01 cfs 0.004 af

Subcatchment 5S: Perf. Pipe Trench Runoff Area=81,220 sf 65.97% Impervious Runoff Depth=3.61"
Tc=6.0 min CN=78 Runoff=7.89 cfs 0.562 af

Subcatchment 6S: Truck Dock Runoff Area=3,800 sf 100.00% Impervious Runoff Depth=5.80"
Tc=6.0 min CN=98 Runoff=0.52 cfs 0.042 af

Subcatchment 7S: Front Half Roof Runoff Area=21,700 sf 100.00% Impervious Runoff Depth=5.80"
Tc=6.0 min CN=98 Runoff=2.95 cfs 0.241 af

Pond 1P: Basin Peak Elev=72.63' Storage=11,737 cf Inflow=13.47 cfs 0.704 af
Outflow=2.17 cfs 0.704 af

Pond 2P: Stone Trench Peak Elev=75.32' Storage=1,412 cf Inflow=2.95 cfs 0.241 af
Discarded=0.52 cfs 0.206 af Primary=2.43 cfs 0.035 af Outflow=2.94 cfs 0.240 af

Pond 3P: Perf Pipe/LPs Peak Elev=73.45' Storage=3,694 cf Inflow=7.89 cfs 0.562 af
Discarded=0.83 cfs 0.396 af Primary=6.46 cfs 0.166 af Outflow=7.29 cfs 0.562 af

Pond 4P: Galleys Peak Elev=69.94' Storage=478 cf Inflow=0.52 cfs 0.042 af
Outflow=0.10 cfs 0.042 af

Total Runoff Area = 4.246 ac Runoff Volume = 1.352 af Average Runoff Depth = 3.82"
35.45% Pervious = 1.505 ac 64.55% Impervious = 2.741 ac

Summary for Subcatchment 1S: Surface Runoff

Runoff = 2.73 cfs @ 12.22 hrs, Volume= 0.262 af, Depth= 2.93"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-36.00 hrs, dt= 0.01 hrs
Type III 24-hr 25 Year Storm Rainfall=6.04"

	Area (sf)	CN	Description
*	9,450	98	Pavement
*	520	98	Conc Pads & Steps
*	8,650	98	Basin Bottom
*	7,050	96	Rap surface, HSG A
	20,890	39	>75% Grass cover, Good, HSG A
	250	30	Woods, Good, HSG A
	46,810	71	Weighted Average
	28,190		60.22% Pervious Area
	18,620		39.78% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
14.6	50	0.0120	0.06		**Sheet Flow,** Woods: Light underbrush n= 0.400 P2= 3.43"
1.1	180	0.0270	2.65		**Shallow Concentrated Flow,** Unpaved Kv= 16.1 fps
15.7	230	Total			

Summary for Subcatchment 2S: New Building

Runoff = 2.95 cfs @ 12.08 hrs, Volume= 0.241 af, Depth= 5.80"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-36.00 hrs, dt= 0.01 hrs
Type III 24-hr 25 Year Storm Rainfall=6.04"

Area (sf)	CN	Description
21,700	98	Roofs, HSG A
21,700		100.00% Impervious Area

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

Summary for Subcatchment 3S: East Property Line

Runoff = 0.00 cfs @ 14.84 hrs, Volume= 0.001 af, Depth= 0.14"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-36.00 hrs, dt= 0.01 hrs
Type III 24-hr 25 Year Storm Rainfall=6.04"

Area (sf)	CN	Description
930	39	>75% Grass cover, Good, HSG A
2,610	30	Woods, Good, HSG A
3,540	32	Weighted Average
3,540		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
7.4	50	0.0660	0.11		**Sheet Flow,** Woods: Light underbrush n= 0.400 P2= 3.43"
0.8	150	0.0340	2.97		**Shallow Concentrated Flow,** Unpaved Kv= 16.1 fps
8.2	200	Total			

Summary for Subcatchment 4S: Easement

Runoff = 0.01 cfs @ 12.59 hrs, Volume= 0.004 af, Depth= 0.30"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-36.00 hrs, dt= 0.01 hrs
Type III 24-hr 25 Year Storm Rainfall=6.04"

Area (sf)	CN	Description
3,850	39	>75% Grass cover, Good, HSG A
2,350	30	Woods, Good, HSG A
6,200	36	Weighted Average
6,200		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
15.7	50	0.0100	0.05		**Sheet Flow,** Woods: Light underbrush n= 0.400 P2= 3.43"
0.9	150	0.0300	2.79		**Shallow Concentrated Flow,** Unpaved Kv= 16.1 fps
16.6	200	Total			

Summary for Subcatchment 5S: Perf. Pipe Trench

Runoff = 7.89 cfs @ 12.09 hrs, Volume= 0.562 af, Depth= 3.61"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-36.00 hrs, dt= 0.01 hrs
Type III 24-hr 25 Year Storm Rainfall=6.04"

	Area (sf)	CN	Description
*	43,580	98	Pavement
*	10,000	98	Roof
	27,640	39	>75% Grass cover, Good, HSG A
	81,220	78	Weighted Average
	27,640		34.03% Pervious Area
	53,580		65.97% Impervious Area

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

Summary for Subcatchment 6S: Truck Dock

Runoff = 0.52 cfs @ 12.08 hrs, Volume= 0.042 af, Depth= 5.80"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-36.00 hrs, dt= 0.01 hrs
Type III 24-hr 25 Year Storm Rainfall=6.04"

	Area (sf)	CN	Description
*	2,280	98	Pavement
*	1,520	98	Building Facade at Dock
	3,800	98	Weighted Average
	3,800		100.00% Impervious Area

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

Summary for Subcatchment 7S: Front Half Roof

Runoff = 2.95 cfs @ 12.08 hrs, Volume= 0.241 af, Depth= 5.80"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-36.00 hrs, dt= 0.01 hrs
Type III 24-hr 25 Year Storm Rainfall=6.04"

	Area (sf)	CN	Description
*	21,700	98	Roof
	21,700		100.00% Impervious Area

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

Summary for Pond 1P: Basin

[81] Warning: Exceeded Pond 3P by 0.35' @ 12.88 hrs

Inflow Area = 3.935 ac, 67.43% Impervious, Inflow Depth = 2.15" for 25 Year Storm event
Inflow = 13.47 cfs @ 12.11 hrs, Volume= 0.704 af
Outflow = 2.17 cfs @ 12.62 hrs, Volume= 0.704 af, Atten= 84%, Lag= 30.2 min
Discarded = 2.17 cfs @ 12.62 hrs, Volume= 0.704 af

Routing by Stor-Ind method, Time Span= 0.00-36.00 hrs, dt= 0.01 hrs / 2
Peak Elev= 72.63' @ 12.62 hrs Surf.Area= 11,322 sf Storage= 11,737 cf

Plug-Flow detention time= 52.2 min calculated for 0.704 af (100% of inflow)
Center-of-Mass det. time= 52.2 min (831.9 - 779.6)

Volume	Invert	Avail.Storage	Storage Description
#1	68.50'	648 cf	**2.00'W x 270.00'L x 3.00'H Prismatoid** 1,620 cf Overall x 40.0% Voids
#2	71.50'	28,302 cf	**Custom Stage Data (Prismatic)** Listed below (Recalc)
		28,950 cf	Total Available Storage

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
71.50	8,650	0	0
72.00	9,821	4,618	4,618
73.00	11,351	10,586	15,204
74.00	14,845	13,098	28,302

Device	Routing	Invert	Outlet Devices
#1	Discarded	68.50'	**8.270 in/hr Exfiltration over Surface area**

Discarded OutFlow Max=2.17 cfs @ 12.62 hrs HW=72.63' (Free Discharge)
↑**1=Exfiltration** (Exfiltration Controls 2.17 cfs)

Summary for Pond 2P: Stone Trench

Inflow Area = 0.498 ac,100.00% Impervious, Inflow Depth = 5.80" for 25 Year Storm event
Inflow = 2.95 cfs @ 12.08 hrs, Volume= 0.241 af
Outflow = 2.94 cfs @ 12.08 hrs, Volume= 0.240 af, Atten= 0%, Lag= 0.0 min
Discarded = 0.52 cfs @ 12.08 hrs, Volume= 0.206 af
Primary = 2.43 cfs @ 12.08 hrs, Volume= 0.035 af

Routing by Stor-Ind method, Time Span= 0.00-36.00 hrs, dt= 0.01 hrs / 2
Peak Elev= 75.32' @ 12.08 hrs Surf.Area= 1,250 sf Storage= 1,412 cf

Plug-Flow detention time= 15.9 min calculated for 0.240 af (100% of inflow)
Center-of-Mass det. time= 14.5 min (759.5 - 745.0)

Volume	Invert	Avail.Storage	Storage Description
#1	72.50'	1,500 cf	**5.00'W x 250.00'L x 3.00'H Prismatoid** 3,750 cf Overall x 40.0% Voids

Device	Routing	Invert	Outlet Devices
#1	Discarded	72.50'	**8.270 in/hr Exfiltration over Wetted area**
#2	Primary	75.30'	**250.0' long x 5.0' breadth Broad-Crested Rectangular Weir** Head (feet) 0.20 0.40 0.60 0.80 1.00 1.20 1.40 1.60 1.80 2.00 2.50 3.00 3.50 4.00 4.50 5.00 5.50 Coef. (English) 2.34 2.50 2.70 2.68 2.68 2.66 2.65 2.65 2.65 2.65 2.67 2.66 2.68 2.70 2.74 2.79 2.88

Discarded OutFlow Max=0.52 cfs @ 12.08 hrs HW=75.32' (Free Discharge)
↑—**1=Exfiltration** (Exfiltration Controls 0.52 cfs)

Primary OutFlow Max=2.28 cfs @ 12.08 hrs HW=75.32' (Free Discharge)
↑—**2=Broad-Crested Rectangular Weir** (Weir Controls 2.28 cfs @ 0.37 fps)

Summary for Pond 3P: Perf Pipe/LPs

Inflow Area = 1.865 ac, 65.97% Impervious, Inflow Depth = 3.61" for 25 Year Storm event
Inflow = 7.89 cfs @ 12.09 hrs, Volume= 0.562 af
Outflow = 7.29 cfs @ 12.12 hrs, Volume= 0.562 af, Atten= 8%, Lag= 2.0 min
Discarded = 0.83 cfs @ 12.12 hrs, Volume= 0.396 af
Primary = 6.46 cfs @ 12.12 hrs, Volume= 0.166 af

Routing by Stor-Ind method, Time Span= 0.00-36.00 hrs, dt= 0.01 hrs / 2
Peak Elev= 73.45' @ 12.12 hrs Surf.Area= 1,687 sf Storage= 3,694 cf

Plug-Flow detention time= 26.7 min calculated for 0.561 af (100% of inflow)
Center-of-Mass det. time= 26.8 min (845.6 - 818.9)

Volume	Invert	Avail.Storage	Storage Description
#1	69.00'	2,740 cf	**6.00'W x 255.00'L x 5.00'H Excavation/Crushed Stone** 7,650 cf Overall - 801 cf Embedded = 6,849 cf x 40.0% Voids
#2	70.50'	801 cf	**24.0" Round Pipe Storage** Inside #1 L= 255.0'
#3	68.00'	336 cf	**10.00'D x 7.50'H Excavation/Crushed Stone** x 2 1,178 cf Overall - 339 cf Embedded = 839 cf x 40.0% Voids
#4	69.00'	339 cf	**6.00'D x 6.00'H Leaching Pit** x 2 Inside #3
		4,215 cf	Total Available Storage

Device	Routing	Invert	Outlet Devices
#1	Discarded	68.00'	**8.270 in/hr Exfiltration over Wetted area**
#2	Primary	72.00'	**18.0" Round Culvert** L= 10.0' Ke= 0.500 Inlet / Outlet Invert= 72.00' / 71.80' S= 0.0200 '/' Cc= 0.900 n= 0.012, Flow Area= 1.77 sf

Discarded OutFlow Max=0.83 cfs @ 12.12 hrs HW=73.44' (Free Discharge)
↑—**1=Exfiltration** (Exfiltration Controls 0.83 cfs)

Primary OutFlow Max=6.45 cfs @ 12.12 hrs HW=73.44' (Free Discharge)
↑—**2=Culvert** (Barrel Controls 6.45 cfs @ 4.72 fps)

Summary for Pond 4P: Galleys

Inflow Area = 0.087 ac,100.00% Impervious, Inflow Depth = 5.80" for 25 Year Storm event
Inflow = 0.52 cfs @ 12.08 hrs, Volume= 0.042 af
Outflow = 0.10 cfs @ 12.51 hrs, Volume= 0.042 af, Atten= 80%, Lag= 25.6 min
Discarded = 0.10 cfs @ 12.51 hrs, Volume= 0.042 af

Routing by Stor-Ind method, Time Span= 0.00-36.00 hrs, dt= 0.01 hrs
Peak Elev= 69.94' @ 12.51 hrs Surf.Area= 320 sf Storage= 478 cf

Plug-Flow detention time= 28.9 min calculated for 0.042 af (100% of inflow)
Center-of-Mass det. time= 28.9 min (774.0 - 745.0)

Volume	Invert	Avail.Storage	Storage Description
#1	67.00'	516 cf	**16.00'W x 20.00'L x 5.50'H Excavation/Crushed Stone** 1,760 cf Overall - 471 cf Embedded = 1,289 cf x 40.0% Voids
#2	68.00'	355 cf	**Concrete Galley 4x4x4** x 8 Inside #1 Inside= 42.0"W x 43.0"H => 12.67 sf x 3.50'L = 44.3 cf Outside= 52.8"W x 48.0"H => 14.72 sf x 4.00'L = 58.9 cf 8 Chambers in 2 Rows
		870 cf	Total Available Storage

Device	Routing	Invert	Outlet Devices
#1	Discarded	67.00'	**8.270 in/hr Exfiltration over Wetted area**

Discarded OutFlow Max=0.10 cfs @ 12.51 hrs HW=69.94' (Free Discharge)
↑**1=Exfiltration** (Exfiltration Controls 0.10 cfs)

Time span=0.00-36.00 hrs, dt=0.01 hrs, 3601 points
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN
Reach routing by Stor-Ind method - Pond routing by Stor-Ind method

Subcatchment 1S: Surface Runoff Runoff Area=46,810 sf 39.78% Impervious Runoff Depth=4.22"
Flow Length=230' Tc=15.7 min CN=71 Runoff=3.95 cfs 0.378 af

Subcatchment 2S: New Building Runoff Area=21,700 sf 100.00% Impervious Runoff Depth=7.34"
Tc=6.0 min CN=98 Runoff=3.71 cfs 0.305 af

Subcatchment 3S: East Property Line Runoff Area=3,540 sf 0.00% Impervious Runoff Depth=0.45"
Flow Length=200' Tc=8.2 min CN=32 Runoff=0.01 cfs 0.003 af

Subcatchment 4S: Easement Runoff Area=6,200 sf 0.00% Impervious Runoff Depth=0.74"
Flow Length=200' Tc=16.6 min CN=36 Runoff=0.05 cfs 0.009 af

Subcatchment 5S: Perf. Pipe Trench Runoff Area=81,220 sf 65.97% Impervious Runoff Depth=5.00"
Tc=6.0 min CN=78 Runoff=10.85 cfs 0.778 af

Subcatchment 6S: Truck Dock Runoff Area=3,800 sf 100.00% Impervious Runoff Depth=7.34"
Tc=6.0 min CN=98 Runoff=0.65 cfs 0.053 af

Subcatchment 7S: Front Half Roof Runoff Area=21,700 sf 100.00% Impervious Runoff Depth=7.34"
Tc=6.0 min CN=98 Runoff=3.71 cfs 0.305 af

Pond 1P: Basin Peak Elev=73.37' Storage=20,253 cf Inflow=18.58 cfs 1.038 af
Outflow=2.52 cfs 1.038 af

Pond 2P: Stone Trench Peak Elev=75.33' Storage=1,415 cf Inflow=3.71 cfs 0.305 af
Discarded=0.52 cfs 0.243 af Primary=3.19 cfs 0.062 af Outflow=3.70 cfs 0.304 af

Pond 3P: Perf Pipe/LPs Peak Elev=73.96' Storage=4,057 cf Inflow=10.85 cfs 0.778 af
Discarded=0.89 cfs 0.484 af Primary=9.12 cfs 0.294 af Outflow=10.01 cfs 0.778 af

Pond 4P: Galleys Peak Elev=70.92' Storage=654 cf Inflow=0.65 cfs 0.053 af
Outflow=0.12 cfs 0.053 af

Total Runoff Area = 4.246 ac Runoff Volume = 1.830 af Average Runoff Depth = 5.17"
35.45% Pervious = 1.505 ac 64.55% Impervious = 2.741 ac

Summary for Subcatchment 1S: Surface Runoff

Runoff = 3.95 cfs @ 12.22 hrs, Volume= 0.378 af, Depth= 4.22"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-36.00 hrs, dt= 0.01 hrs
Type III 24-hr 100 Year Storm Rainfall=7.58"

	Area (sf)	CN	Description
*	9,450	98	Pavement
*	520	98	Conc Pads & Steps
*	8,650	98	Basin Bottom
*	7,050	96	Rap surface, HSG A
	20,890	39	>75% Grass cover, Good, HSG A
	250	30	Woods, Good, HSG A
	46,810	71	Weighted Average
	28,190		60.22% Pervious Area
	18,620		39.78% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
14.6	50	0.0120	0.06		**Sheet Flow,** Woods: Light underbrush n= 0.400 P2= 3.43"
1.1	180	0.0270	2.65		**Shallow Concentrated Flow,** Unpaved Kv= 16.1 fps
15.7	230	Total			

Summary for Subcatchment 2S: New Building

Runoff = 3.71 cfs @ 12.08 hrs, Volume= 0.305 af, Depth= 7.34"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-36.00 hrs, dt= 0.01 hrs
Type III 24-hr 100 Year Storm Rainfall=7.58"

Area (sf)	CN	Description
21,700	98	Roofs, HSG A
21,700		100.00% Impervious Area

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

Summary for Subcatchment 3S: East Property Line

Runoff = 0.01 cfs @ 12.42 hrs, Volume= 0.003 af, Depth= 0.45"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-36.00 hrs, dt= 0.01 hrs
Type III 24-hr 100 Year Storm Rainfall=7.58"

Area (sf)	CN	Description
930	39	>75% Grass cover, Good, HSG A
2,610	30	Woods, Good, HSG A
3,540	32	Weighted Average
3,540		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
7.4	50	0.0660	0.11		**Sheet Flow,** Woods: Light underbrush n= 0.400 P2= 3.43"
0.8	150	0.0340	2.97		**Shallow Concentrated Flow,** Unpaved Kv= 16.1 fps
8.2	200	Total			

Summary for Subcatchment 4S: Easement

Runoff = 0.05 cfs @ 12.45 hrs, Volume= 0.009 af, Depth= 0.74"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-36.00 hrs, dt= 0.01 hrs
Type III 24-hr 100 Year Storm Rainfall=7.58"

Area (sf)	CN	Description
3,850	39	>75% Grass cover, Good, HSG A
2,350	30	Woods, Good, HSG A
6,200	36	Weighted Average
6,200		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
15.7	50	0.0100	0.05		**Sheet Flow,** Woods: Light underbrush n= 0.400 P2= 3.43"
0.9	150	0.0300	2.79		**Shallow Concentrated Flow,** Unpaved Kv= 16.1 fps
16.6	200	Total			

Summary for Subcatchment 5S: Perf. Pipe Trench

Runoff = 10.85 cfs @ 12.09 hrs, Volume= 0.778 af, Depth= 5.00"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-36.00 hrs, dt= 0.01 hrs
Type III 24-hr 100 Year Storm Rainfall=7.58"

	Area (sf)	CN	Description
*	43,580	98	Pavement
*	10,000	98	Roof
	27,640	39	>75% Grass cover, Good, HSG A
	81,220	78	Weighted Average
	27,640		34.03% Pervious Area
	53,580		65.97% Impervious Area

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

Summary for Subcatchment 6S: Truck Dock

Runoff = 0.65 cfs @ 12.08 hrs, Volume= 0.053 af, Depth= 7.34"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-36.00 hrs, dt= 0.01 hrs
Type III 24-hr 100 Year Storm Rainfall=7.58"

	Area (sf)	CN	Description
*	2,280	98	Pavement
*	1,520	98	Building Facade at Dock
	3,800	98	Weighted Average
	3,800		100.00% Impervious Area

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

Summary for Subcatchment 7S: Front Half Roof

Runoff = 3.71 cfs @ 12.08 hrs, Volume= 0.305 af, Depth= 7.34"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-36.00 hrs, dt= 0.01 hrs
Type III 24-hr 100 Year Storm Rainfall=7.58"

	Area (sf)	CN	Description
*	21,700	98	Roof
	21,700		100.00% Impervious Area

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

Summary for Pond 1P: Basin

[81] Warning: Exceeded Pond 3P by 1.03' @ 13.07 hrs

Inflow Area = 3.935 ac, 67.43% Impervious, Inflow Depth = 3.16" for 100 Year Storm event
Inflow = 18.58 cfs @ 12.11 hrs, Volume= 1.038 af
Outflow = 2.52 cfs @ 12.67 hrs, Volume= 1.038 af, Atten= 86%, Lag= 33.9 min
Discarded = 2.52 cfs @ 12.67 hrs, Volume= 1.038 af

Routing by Stor-Ind method, Time Span= 0.00-36.00 hrs, dt= 0.01 hrs / 2
Peak Elev= 73.37' @ 12.67 hrs Surf.Area= 13,173 sf Storage= 20,253 cf

Plug-Flow detention time= 75.7 min calculated for 1.038 af (100% of inflow)
Center-of-Mass det. time= 76.0 min (849.5 - 773.5)

Volume	Invert	Avail.Storage	Storage Description
#1	68.50'	648 cf	**2.00'W x 270.00'L x 3.00'H Prismatoid** 1,620 cf Overall x 40.0% Voids
#2	71.50'	28,302 cf	**Custom Stage Data (Prismatic)** Listed below (Recalc)
		28,950 cf	Total Available Storage

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
71.50	8,650	0	0
72.00	9,821	4,618	4,618
73.00	11,351	10,586	15,204
74.00	14,845	13,098	28,302

Device	Routing	Invert	Outlet Devices
#1	Discarded	68.50'	**8.270 in/hr Exfiltration over Surface area**

Discarded OutFlow Max=2.52 cfs @ 12.67 hrs HW=73.37' (Free Discharge)
↑**1=Exfiltration** (Exfiltration Controls 2.52 cfs)

Summary for Pond 2P: Stone Trench

Inflow Area = 0.498 ac,100.00% Impervious, Inflow Depth = 7.34" for 100 Year Storm event
Inflow = 3.71 cfs @ 12.08 hrs, Volume= 0.305 af
Outflow = 3.70 cfs @ 12.08 hrs, Volume= 0.304 af, Atten= 0%, Lag= 0.1 min
Discarded = 0.52 cfs @ 12.08 hrs, Volume= 0.243 af
Primary = 3.19 cfs @ 12.08 hrs, Volume= 0.062 af

Routing by Stor-Ind method, Time Span= 0.00-36.00 hrs, dt= 0.01 hrs / 2
Peak Elev= 75.33' @ 12.08 hrs Surf.Area= 1,250 sf Storage= 1,415 cf

Plug-Flow detention time= 14.4 min calculated for 0.304 af (100% of inflow)
Center-of-Mass det. time= 13.8 min (755.7 - 741.9)

Volume	Invert	Avail.Storage	Storage Description
#1	72.50'	1,500 cf	**5.00'W x 250.00'L x 3.00'H Prismatoid** 3,750 cf Overall x 40.0% Voids

Device	Routing	Invert	Outlet Devices
#1	Discarded	72.50'	**8.270 in/hr Exfiltration over Wetted area**
#2	Primary	75.30'	**250.0' long x 5.0' breadth Broad-Crested Rectangular Weir** Head (feet) 0.20 0.40 0.60 0.80 1.00 1.20 1.40 1.60 1.80 2.00 2.50 3.00 3.50 4.00 4.50 5.00 5.50 Coef. (English) 2.34 2.50 2.70 2.68 2.68 2.66 2.65 2.65 2.65 2.65 2.67 2.66 2.68 2.70 2.74 2.79 2.88

Discarded OutFlow Max=0.52 cfs @ 12.08 hrs HW=75.33' (Free Discharge)
↑—**1=Exfiltration** (Exfiltration Controls 0.52 cfs)

Primary OutFlow Max=2.94 cfs @ 12.08 hrs HW=75.33' (Free Discharge)
↑—**2=Broad-Crested Rectangular Weir** (Weir Controls 2.94 cfs @ 0.40 fps)

Summary for Pond 3P: Perf Pipe/LPs

Inflow Area = 1.865 ac, 65.97% Impervious, Inflow Depth = 5.00" for 100 Year Storm event
Inflow = 10.85 cfs @ 12.09 hrs, Volume= 0.778 af
Outflow = 10.01 cfs @ 12.12 hrs, Volume= 0.778 af, Atten= 8%, Lag= 2.0 min
Discarded = 0.89 cfs @ 12.12 hrs, Volume= 0.484 af
Primary = 9.12 cfs @ 12.12 hrs, Volume= 0.294 af

Routing by Stor-Ind method, Time Span= 0.00-36.00 hrs, dt= 0.01 hrs / 2
Peak Elev= 73.96' @ 12.12 hrs Surf.Area= 1,687 sf Storage= 4,057 cf

Plug-Flow detention time= 25.0 min calculated for 0.777 af (100% of inflow)
Center-of-Mass det. time= 25.0 min (834.6 - 809.6)

Volume	Invert	Avail.Storage	Storage Description
#1	69.00'	2,740 cf	**6.00'W x 255.00'L x 5.00'H Excavation/Crushed Stone** 7,650 cf Overall - 801 cf Embedded = 6,849 cf x 40.0% Voids
#2	70.50'	801 cf	**24.0" Round Pipe Storage** Inside #1 L= 255.0'
#3	68.00'	336 cf	**10.00'D x 7.50'H Excavation/Crushed Stone** x 2 1,178 cf Overall - 339 cf Embedded = 839 cf x 40.0% Voids
#4	69.00'	339 cf	**6.00'D x 6.00'H Leaching Pit** x 2 Inside #3
		4,215 cf	Total Available Storage

Device	Routing	Invert	Outlet Devices
#1	Discarded	68.00'	**8.270 in/hr Exfiltration over Wetted area**
#2	Primary	72.00'	**18.0" Round Culvert** L= 10.0' Ke= 0.500 Inlet / Outlet Invert= 72.00' / 71.80' S= 0.0200 '/' Cc= 0.900 n= 0.012, Flow Area= 1.77 sf

Discarded OutFlow Max=0.89 cfs @ 12.12 hrs HW=73.96' (Free Discharge)
↑—**1=Exfiltration** (Exfiltration Controls 0.89 cfs)

Primary OutFlow Max=9.15 cfs @ 12.12 hrs HW=73.96' (Free Discharge)
↑—**2=Culvert** (Barrel Controls 9.15 cfs @ 5.21 fps)

Summary for Pond 4P: Galleys

Inflow Area = 0.087 ac,100.00% Impervious, Inflow Depth = 7.34" for 100 Year Storm event
Inflow = 0.65 cfs @ 12.08 hrs, Volume= 0.053 af
Outflow = 0.12 cfs @ 12.53 hrs, Volume= 0.053 af, Atten= 82%, Lag= 26.9 min
Discarded = 0.12 cfs @ 12.53 hrs, Volume= 0.053 af

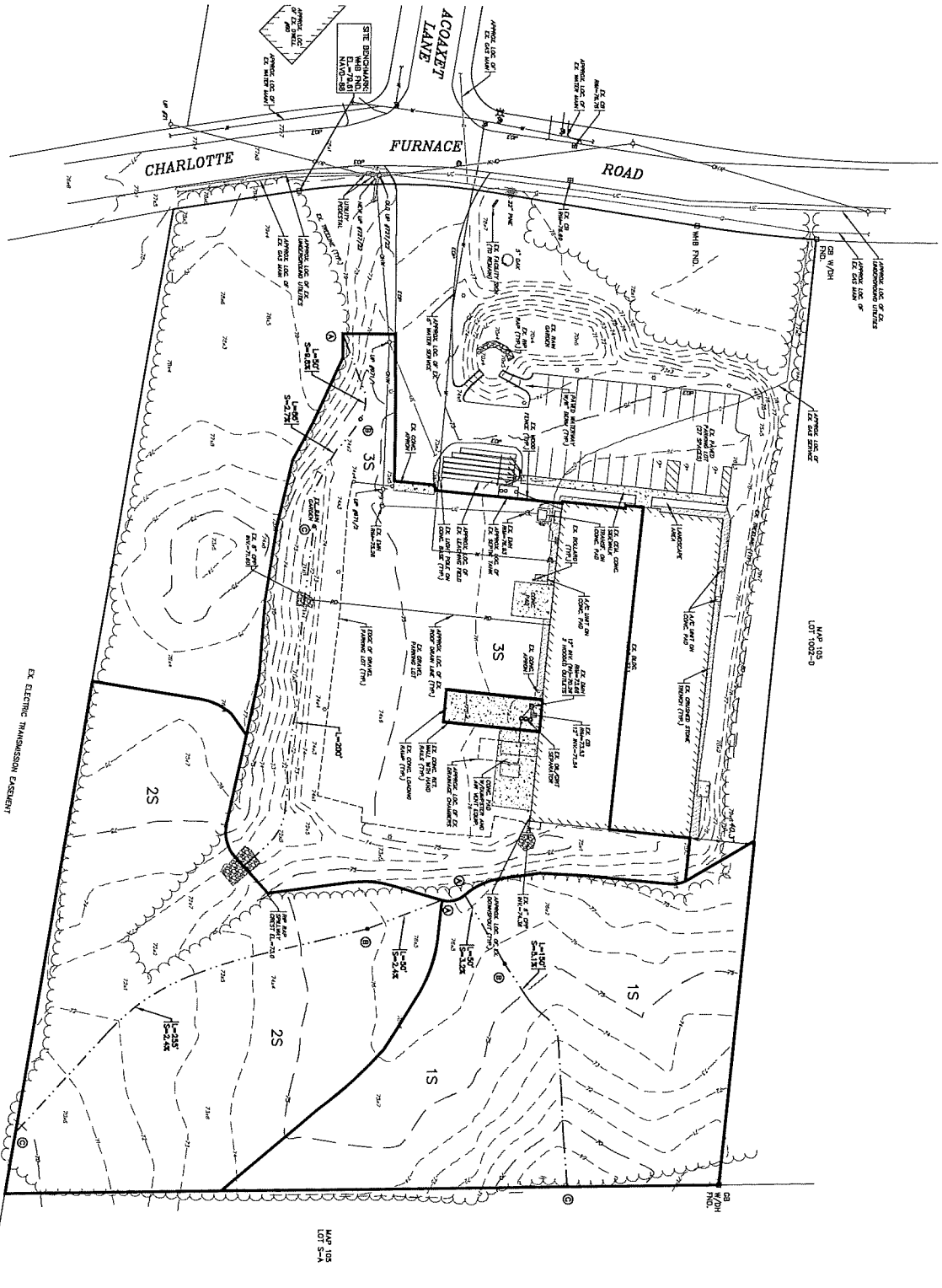
Routing by Stor-Ind method, Time Span= 0.00-36.00 hrs, dt= 0.01 hrs
Peak Elev= 70.92' @ 12.53 hrs Surf.Area= 320 sf Storage= 654 cf

Plug-Flow detention time= 37.7 min calculated for 0.053 af (100% of inflow)
Center-of-Mass det. time= 37.7 min (779.5 - 741.9)

Volume	Invert	Avail.Storage	Storage Description
#1	67.00'	516 cf	**16.00'W x 20.00'L x 5.50'H Excavation/Crushed Stone** 1,760 cf Overall - 471 cf Embedded = 1,289 cf x 40.0% Voids
#2	68.00'	355 cf	**Concrete Galley 4x4x4** x 8 Inside #1 Inside= 42.0"W x 43.0"H => 12.67 sf x 3.50'L = 44.3 cf Outside= 52.8"W x 48.0"H => 14.72 sf x 4.00'L = 58.9 cf 8 Chambers in 2 Rows
		870 cf	Total Available Storage

Device	Routing	Invert	Outlet Devices
#1	Discarded	67.00'	**8.270 in/hr Exfiltration over Wetted area**

Discarded OutFlow Max=0.12 cfs @ 12.53 hrs HW=70.92' (Free Discharge)
↑—**1=Exfiltration** (Exfiltration Controls 0.12 cfs)



PRE-DEVELOPMENT
SCALE: 1"=30'
0 30 60 120

PERMIT SET
(NOT FOR CONSTRUCTION)

JOB NO.: 19-9342
DWG. 1 OF 2

PRE-DEVELOPMENT WATERSHED PLAN
55 CHARLOTTE FURNACE ROAD WAREHAM, MA
PREPARED FOR:
MASTER MILLWORK, INC.
41 MEETING HOUSE LANE, SUITE 11 SAGAMORE BEACH, MA

G.A.F. ENGINEERING, INC.
PROFESSIONAL ENGINEERS & LAND SURVEYORS
265 MAIN STREET -- WAREHAM, MA 02571
TEL: (508) 295-6600 FAX: (508) 295-6634
E-MAIL: gaf@gaf-eng.com

APPROVED BY:

APPROVED BY:

DATE: JULY 8, 2020
DRAWN BY: JMP
CHECKED BY: WFM
JOB NO.: 19-9342
SCALE: 1" = 30'

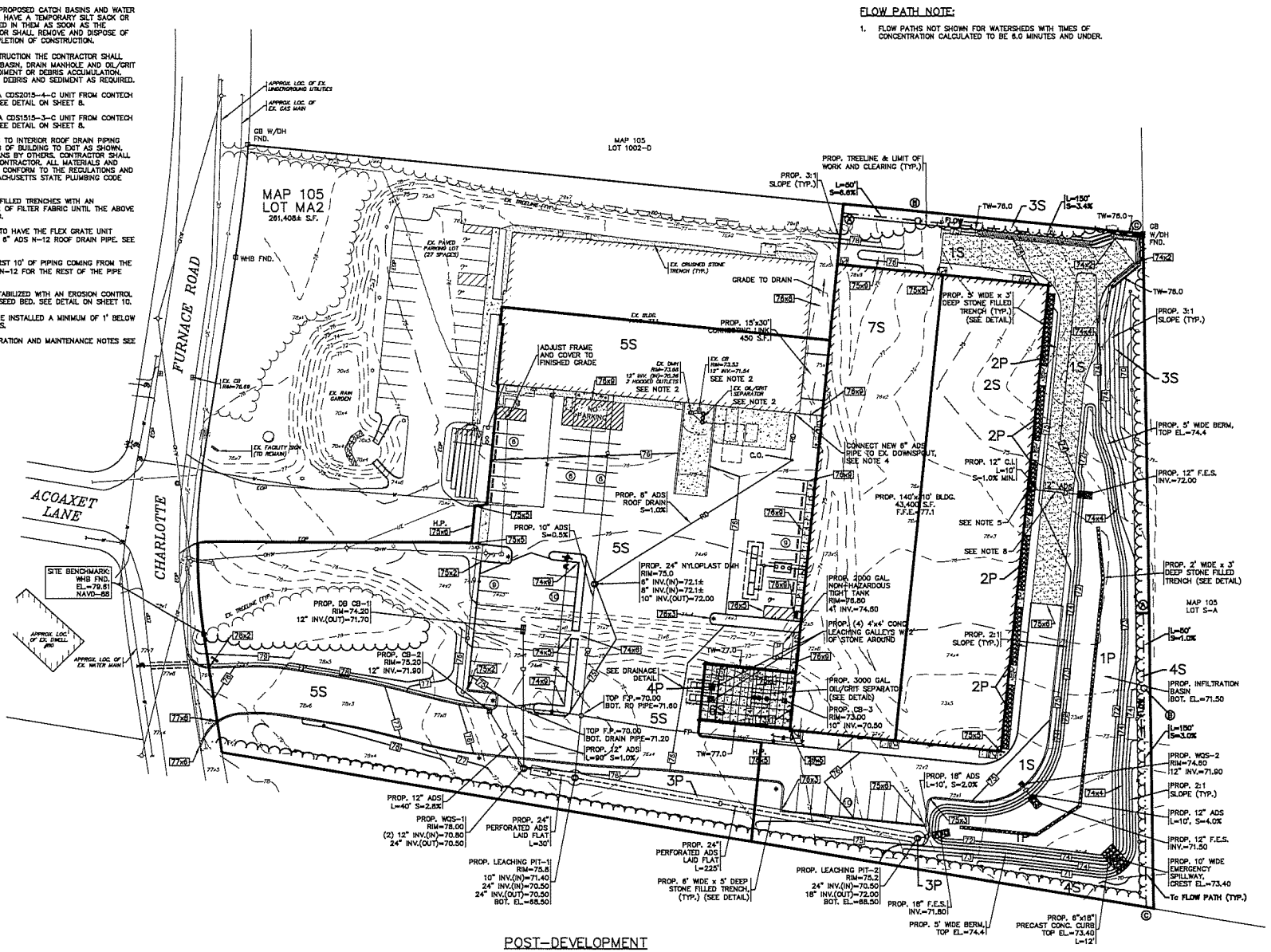
REV.	DATE	BY	APP'D	DESCRIPTION
1	8/10/20	JMP	WFM	NO CHANGES THIS SHEET

NOTES:

1. ALL EXISTING CATCH BASINS, PROPOSED CATCH BASINS AND WATER QUALITY CATCH BASINS SHALL HAVE A TEMPORARY SILT SACK OR AN APPROVED EQUAL INSTALLED IN THEM AS SOON AS THE STRUCTURE IS SET. CONTRACTOR SHALL REMOVE AND DISPOSE OF THE SILT SACKS AT THE COMPLETION OF CONSTRUCTION.
2. AT THE COMPLETION OF CONSTRUCTION THE CONTRACTOR SHALL INSPECT THE EXISTING CATCH BASIN, DRAIN MANHOLE AND OIL/GRIT SEPARATOR FOR EVIDENCE SEDIMENT OR DEBRIS ACCUMULATION. REMOVE AND DISPOSE OF ANY DEBRIS AND SEDIMENT AS REQUIRED.
3. PROPOSED WQS-1 SHALL BE A CDS2015-4-C UNIT FROM CONTECH ENGINEERED SOLUTIONS LLC. SEE DETAIL ON SHEET 8.
4. PROPOSED WQS-2 SHALL BE A CDS1515-3-C UNIT FROM CONTECH ENGINEERED SOLUTIONS LLC. SEE DETAIL ON SHEET 8.
5. INSTALL FRONT ROOF GUTTERS TO INTERIOR ROOF DRAIN PIPING AND INSTALL UNDER THE SLAB OF BUILDING TO EXIT AS SHOWN. REFER TO ARCHITECTURAL PLANS BY OTHERS. CONTRACTOR SHALL COORDINATE WITH PLUMBING CONTRACTOR. ALL MATERIALS AND INSTALLATION METHODS SHALL CONFORM TO THE REGULATIONS AND SPECIFICATIONS OF THE MASSACHUSETTS STATE PLUMBING CODE (248 CMR 10.00).
6. COVER ALL PROPOSED STONE FILLED TRENCHES WITH AN ADDITIONAL TEMPORARY LAYER OF FILTER FABRIC UNTIL THE ABOVE GRADIENT SLOPE IS STABILIZED.
7. MODIFY EXISTING DOWNSPOUT TO HAVE THE FLEX GRATE UNIT INSTALLED AND CONNECT NEW 8" ADS N-12 ROOF DRAIN PIPE. SEE DOWNSPOUT DETAIL.
8. USE 12" C.I. PIPE FOR THE FIRST 10' OF PIPING COMING FROM THE BUILDING, THEN USE 12" ADS N-12 FOR THE REST OF THE PIPE LENGTH.
9. 2:1 SIDE SLOPES SHALL BE STABILIZED WITH AN EROSION CONTROL BLANKET OVER THE PLANTED SEED BED. SEE DETAIL ON SHEET 10.
10. WATER MAIN/SERVICE SHALL BE INSTALLED A MINIMUM OF 1' BELOW ALL PROPOSED DRAINAGE LINES.
11. FOR COMPLETE DRAINAGE OPERATION AND MAINTENANCE NOTES SEE SHEET 2.

FLOW PATH NOTE:

1. FLOW PATHS NOT SHOWN FOR WATERSHEDS WITH TIMES OF CONCENTRATION CALCULATED TO BE 6.0 MINUTES AND UNDER.



POST-DEVELOPMENT

SCALE: 1"=30'

0 30 60 120

PERMIT SET
(NOT FOR CONSTRUCTION)

NO.	DESCRIPTION	DATE	BY	APP'D
1	WATERSHED 1S/2S BOUNDARY	8/10/20	MTJ	JMP

DATE: JULY 8, 2020
DRAWN BY: JMP
CHECKED BY: MTM
JOB NO.: 19-9342
SCALE: 1" = 30'

APPROVED BY:

APPROVED BY:

G.A.F. ENGINEERING, INC.
PROFESSIONAL ENGINEERS & LAND SURVEYORS
269 MAIN STREET • WAREHAM, MA 02571
TEL: (508) 295-4005 FAX: (508) 295-6834

POST-DEVELOPMENT
WATERSHED PLAN
55 CHARLOTTE FURNACE ROAD WAREHAM, MA.

PREPARED FOR:
MASTER MILLWORK, INC.
41 MEETING HOUSE LANE, SUITE 11 SAGAMORE BEACH, MA

JOB NO.: 19-9342
DWG. 2 OF 2