

# REVISED DRAINAGE CALCULATIONS

For

## Custom Woodwork Facility Expansion

55 Charlotte Furnace Road  
W. Wareham, MA 02576

Prepared for

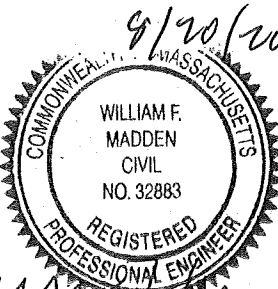
### Master Millwork, Inc.

55 Charlotte Furnace Road  
W. Wareham, MA 02576

Prepared by

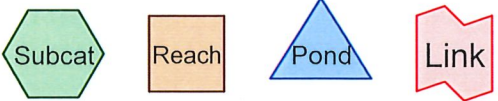
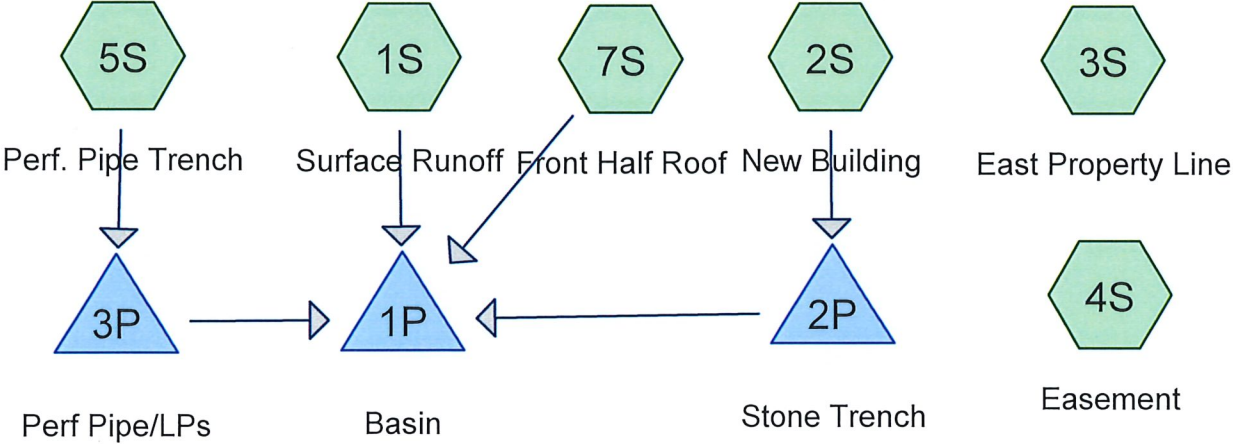
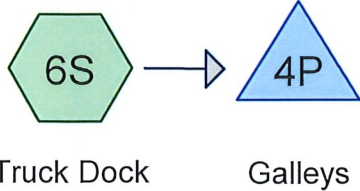
### G.A.F. Engineering, Inc.

266 Main Street  
Wareham, MA 02571



August 20, 2020

G.A.F. Job No.: 19-9342



**9342 Post Rev2**

Prepared by G.A.F. Engineering, Inc.

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**Area Listing (all nodes)**

Area (acres)	CN	Description (subcatchment-numbers)
1.256	39	>75% Grass cover, Good, HSG A (1S, 3S, 4S, 5S)
0.199	39	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)
0.712	98	Roof (5S, 7S)
0.482	98	Roofs, HSG A (2S)
0.120	30	Woods, Good, HSG A (1S, 3S, 4S)
<b>4.246</b>	<b>76</b>	<b>TOTAL AREA</b>

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**Soil Listing (all nodes)**

Area (acres)	Soil Group	Subcatchment Numbers
2.020	HSG A	1S, 2S, 3S, 4S, 5S
0.000	HSG B	
0.000	HSG C	
0.000	HSG D	
2.227	Other	1S, 5S, 6S, 7S
<b>4.246</b>		<b>TOTAL AREA</b>

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**Ground Covers (all nodes)**

HSG-A (acres)	HSG-B (acres)	HSG-C (acres)	HSG-D (acres)	Other (acres)	Total (acres)	Ground Cover	Subcatchment Numbers
1.256	0.000	0.000	0.000	0.000	1.256	>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	0.712	0.712	Roof	5S, 7S
0.482	0.000	0.000	0.000	0.000	0.482	Roofs	2S
0.120	0.000	0.000	0.000	0.000	0.120	Woods, Good	1S, 3S, 4S
<b>2.020</b>	<b>0.000</b>	<b>0.000</b>	<b>0.000</b>	<b>2.227</b>	<b>4.246</b>	<b>TOTAL AREA</b>	

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**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=48,210 sf 20.68% Impervious Runoff Depth=0.46"  
 Flow Length=230' Tc=15.7 min CN=59 Runoff=0.28 cfs 0.043 af

**Subcatchment 2S: New Building** Runoff Area=21,000 sf 100.00% Impervious Runoff Depth=3.20"  
 Tc=6.0 min CN=98 Runoff=1.61 cfs 0.128 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=21,000 sf 100.00% Impervious Runoff Depth=3.20"  
 Tc=6.0 min CN=98 Runoff=1.61 cfs 0.128 af

**Pond 1P: Basin** Peak Elev=71.50' Storage=648 cf Inflow=1.66 cfs 0.173 af  
 Outflow=1.66 cfs 0.173 af

**Pond 2P: Stone Trench** Peak Elev=75.21' Storage=1,224 cf Inflow=1.61 cfs 0.128 af  
 Discarded=0.46 cfs 0.128 af Primary=0.00 cfs 0.000 af Outflow=0.46 cfs 0.128 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 = 0.547 af Average Runoff Depth = 1.55"**  
**40.88% Pervious = 1.736 ac 59.12% Impervious = 2.510 ac**

**Summary for Subcatchment 1S: Surface Runoff**

Runoff = 0.28 cfs @ 12.32 hrs, Volume= 0.043 af, Depth= 0.46"

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	39	Basin Bottom
* 7,050	96	Rap surface, HSG A
22,290	39	>75% Grass cover, Good, HSG A
250	30	Woods, Good, HSG A
48,210	59	Weighted Average
38,240		79.32% Pervious Area
9,970		20.68% Impervious Area

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



**Summary for Subcatchment 2S: New Building**

Runoff = 1.61 cfs @ 12.08 hrs, Volume= 0.128 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
21,000	98	Roofs, HSG A
21,000		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		<b>Sheet Flow,</b> Woods: Light underbrush n= 0.400 P2= 3.43"
0.8	150	0.0340	2.97		<b>Shallow Concentrated Flow,</b> 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		<b>Sheet Flow,</b> Woods: Light underbrush n= 0.400 P2= 3.43"
0.9	150	0.0300	2.79		<b>Shallow Concentrated Flow,</b> 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 = 1.61 cfs @ 12.08 hrs, Volume= 0.128 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
*	21,000	98	Roof
	21,000		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, 61.57% Impervious, Inflow Depth = 0.53" for 2 Year Storm event  
 Inflow = 1.66 cfs @ 12.09 hrs, Volume= 0.173 af  
 Outflow = 1.66 cfs @ 12.09 hrs, Volume= 0.173 af, Atten= 0%, Lag= 0.1 min  
 Discarded = 1.66 cfs @ 12.09 hrs, Volume= 0.173 af

Routing by Stor-Ind method, Time Span= 0.00-36.00 hrs, dt= 0.01 hrs / 2  
 Peak Elev= 71.50' @ 12.09 hrs Surf.Area= 540 sf Storage= 648 cf

Plug-Flow detention time= 33.2 min calculated for 0.172 af (100% of inflow)  
 Center-of-Mass det. time= 32.7 min ( 829.8 - 797.1 )

Volume	Invert	Avail.Storage	Storage Description
#1	68.50'	648 cf	<b>2.00'W x 270.00'L x 3.00'H Prismatic</b> 1,620 cf Overall x 40.0% Voids
#2	71.50'	28,302 cf	<b>Custom Stage Data (Prismatic)</b> 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'	<b>8.270 in/hr Exfiltration over Horizontal area</b>

**Discarded OutFlow** Max=0.10 cfs @ 12.09 hrs HW=71.50' (Free Discharge)  
 ↳1=Exfiltration (Exfiltration Controls 0.10 cfs)

**Summary for Pond 2P: Stone Trench**

Inflow Area = 0.482 ac, 100.00% Impervious, Inflow Depth = 3.20" for 2 Year Storm event  
 Inflow = 1.61 cfs @ 12.08 hrs, Volume= 0.128 af  
 Outflow = 0.46 cfs @ 12.42 hrs, Volume= 0.128 af, Atten= 72%, Lag= 19.9 min  
 Discarded = 0.46 cfs @ 12.42 hrs, Volume= 0.128 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= 75.21' @ 12.42 hrs Surf.Area= 1,130 sf Storage= 1,224 cf

Plug-Flow detention time= 16.6 min calculated for 0.128 af (100% of inflow)  
 Center-of-Mass det. time= 16.6 min ( 771.5 - 755.0 )

Volume	Invert	Avail.Storage	Storage Description
#1	72.50'	1,356 cf	<b>5.00'W x 226.00'L x 3.00'H Prismaoid</b> 3,390 cf Overall x 40.0% Voids

Device	Routing	Invert	Outlet Devices
#1	Discarded	72.50'	<b>8.270 in/hr Exfiltration over Wetted area</b>
#2	Primary	75.30'	<b>250.0' long x 5.0' breadth Broad-Crested Rectangular Weir</b> 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=0.46 cfs @ 12.42 hrs HW=75.21' (Free Discharge)

↑1=Exfiltration (Exfiltration Controls 0.46 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	<b>6.00'W x 255.00'L x 5.00'H Excavation/Crushed Stone</b> 7,650 cf Overall - 801 cf Embedded = 6,849 cf x 40.0% Voids
#2	70.50'	801 cf	<b>24.0" Round Pipe Storage</b> Inside #1 L= 255.0'
#3	68.00'	336 cf	<b>10.00'D x 7.50'H Excavation/Crushed Stone</b> x 2 1,178 cf Overall - 339 cf Embedded = 839 cf x 40.0% Voids
#4	69.00'	339 cf	<b>6.00'D x 6.00'H Leaching Pit</b> x 2 Inside #3
		4,215 cf	Total Available Storage

Device	Routing	Invert	Outlet Devices
#1	Discarded	68.00'	<b>8.270 in/hr Exfiltration over Wetted area</b>
#2	Primary	72.00'	<b>18.0" Round Culvert</b> 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	<b>16.00'W x 20.00'L x 5.50'H Excavation/Crushed Stone</b> 1,760 cf Overall - 471 cf Embedded = 1,289 cf x 40.0% Voids
#2	68.00'	355 cf	<b>Concrete Galley 4x4x4 x 8 Inside #1</b> 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'	<b>8.270 in/hr Exfiltration over Wetted area</b>

**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

<b>Subcatchment 1S: Surface Runoff</b>	Runoff Area=48,210 sf 20.68% Impervious Runoff Depth=1.26" Flow Length=230' Tc=15.7 min CN=59 Runoff=1.06 cfs 0.116 af
<b>Subcatchment 2S: New Building</b>	Runoff Area=21,000 sf 100.00% Impervious Runoff Depth=4.80" Tc=6.0 min CN=98 Runoff=2.38 cfs 0.193 af
<b>Subcatchment 3S: East Property Line</b>	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
<b>Subcatchment 4S: Easement</b>	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
<b>Subcatchment 5S: Perf. Pipe Trench</b>	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
<b>Subcatchment 6S: Truck Dock</b>	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
<b>Subcatchment 7S: Front Half Roof</b>	Runoff Area=21,000 sf 100.00% Impervious Runoff Depth=4.80" Tc=6.0 min CN=98 Runoff=2.38 cfs 0.193 af
<b>Pond 1P: Basin</b>	Peak Elev=72.02' Storage=5,464 cf Inflow=8.20 cfs 0.425 af Outflow=1.99 cfs 0.424 af
<b>Pond 2P: Stone Trench</b>	Peak Elev=75.32' Storage=1,275 cf Inflow=2.38 cfs 0.193 af Discarded=0.47 cfs 0.171 af Primary=1.73 cfs 0.022 af Outflow=2.20 cfs 0.192 af
<b>Pond 3P: Perf Pipe/LPs</b>	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
<b>Pond 4P: Galleys</b>	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 = 0.965 af Average Runoff Depth = 2.73"**  
**40.88% Pervious = 1.736 ac 59.12% Impervious = 2.510 ac**

**Summary for Subcatchment 1S: Surface Runoff**

Runoff = 1.06 cfs @ 12.24 hrs, Volume= 0.116 af, Depth= 1.26"

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	39	Basin Bottom
* 7,050	96	Rap surface, HSG A
22,290	39	>75% Grass cover, Good, HSG A
250	30	Woods, Good, HSG A
48,210	59	Weighted Average
38,240		79.32% Pervious Area
9,970		20.68% Impervious Area

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

**Summary for Subcatchment 2S: New Building**

Runoff = 2.38 cfs @ 12.08 hrs, Volume= 0.193 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
21,000	98	Roofs, HSG A
21,000		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		<b>Sheet Flow,</b> Woods: Light underbrush n= 0.400 P2= 3.43"
0.8	150	0.0340	2.97		<b>Shallow Concentrated Flow,</b> 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		<b>Sheet Flow,</b> Woods: Light underbrush n= 0.400 P2= 3.43"
0.9	150	0.0300	2.79		<b>Shallow Concentrated Flow,</b> 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 = 2.38 cfs @ 12.08 hrs, Volume= 0.193 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
*	21,000	98	Roof
	21,000		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 0.02'

Inflow Area = 3.935 ac, 61.57% Impervious, Inflow Depth = 1.29" for 10 Year Storm event  
 Inflow = 8.20 cfs @ 12.13 hrs, Volume= 0.425 af  
 Outflow = 1.99 cfs @ 12.52 hrs, Volume= 0.424 af, Atten= 76%, Lag= 23.4 min  
 Discarded = 1.99 cfs @ 12.52 hrs, Volume= 0.424 af

Routing by Stor-Ind method, Time Span= 0.00-36.00 hrs, dt= 0.01 hrs / 2  
 Peak Elev= 72.02' @ 12.52 hrs Surf.Area= 10,392 sf Storage= 5,464 cf

Plug-Flow detention time= 35.3 min calculated for 0.424 af (100% of inflow)  
 Center-of-Mass det. time= 34.6 min ( 817.6 - 783.0 )

Volume	Invert	Avail.Storage	Storage Description
#1	68.50'	648 cf	<b>2.00'W x 270.00'L x 3.00'H Prismatic</b> 1,620 cf Overall x 40.0% Voids
#2	71.50'	28,302 cf	<b>Custom Stage Data (Prismatic)</b> 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'	<b>8.270 in/hr Exfiltration over Horizontal area</b>

**Discarded OutFlow** Max=1.99 cfs @ 12.52 hrs HW=72.02' (Free Discharge)  
 ↑**1=Exfiltration** (Exfiltration Controls 1.99 cfs)

**Summary for Pond 2P: Stone Trench**

Inflow Area = 0.482 ac, 100.00% Impervious, Inflow Depth = 4.80" for 10 Year Storm event  
 Inflow = 2.38 cfs @ 12.08 hrs, Volume= 0.193 af  
 Outflow = 2.20 cfs @ 12.11 hrs, Volume= 0.192 af, Atten= 7%, Lag= 1.7 min  
 Discarded = 0.47 cfs @ 12.11 hrs, Volume= 0.171 af  
 Primary = 1.73 cfs @ 12.11 hrs, Volume= 0.022 af

Routing by Stor-Ind method, Time Span= 0.00-36.00 hrs, dt= 0.01 hrs / 2  
 Peak Elev= 75.32' @ 12.11 hrs Surf.Area= 1,130 sf Storage= 1,275 cf

Plug-Flow detention time= 17.1 min calculated for 0.192 af (100% of inflow)  
 Center-of-Mass det. time= 15.0 min ( 762.9 - 747.9 )

Volume	Invert	Avail.Storage	Storage Description
#1	72.50'	1,356 cf	<b>5.00'W x 226.00'L x 3.00'H Prismaoid</b> 3,390 cf Overall x 40.0% Voids

Device	Routing	Invert	Outlet Devices
#1	Discarded	72.50'	<b>8.270 in/hr Exfiltration over Wetted area</b>
#2	Primary	75.30'	<b>250.0' long x 5.0' breadth Broad-Crested Rectangular Weir</b> 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=0.47 cfs @ 12.11 hrs HW=75.32' (Free Discharge)  
 ↑1=Exfiltration (Exfiltration Controls 0.47 cfs)

**Primary OutFlow** Max=1.71 cfs @ 12.11 hrs HW=75.32' (Free Discharge)  
 ↑2=Broad-Crested Rectangular Weir (Weir Controls 1.71 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	<b>6.00'W x 255.00'L x 5.00'H Excavation/Crushed Stone</b> 7,650 cf Overall - 801 cf Embedded = 6,849 cf x 40.0% Voids
#2	70.50'	801 cf	<b>24.0" Round Pipe Storage</b> Inside #1 L= 255.0'
#3	68.00'	336 cf	<b>10.00'D x 7.50'H Excavation/Crushed Stone</b> x 2 1,178 cf Overall - 339 cf Embedded = 839 cf x 40.0% Voids
#4	69.00'	339 cf	<b>6.00'D x 6.00'H Leaching Pit</b> x 2 Inside #3
		4,215 cf	Total Available Storage

Device	Routing	Invert	Outlet Devices
#1	Discarded	68.00'	<b>8.270 in/hr Exfiltration over Wetted area</b>
#2	Primary	72.00'	<b>18.0" Round Culvert</b> 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	<b>16.00'W x 20.00'L x 5.50'H Excavation/Crushed Stone</b> 1,760 cf Overall - 471 cf Embedded = 1,289 cf x 40.0% Voids
#2	68.00'	355 cf	<b>Concrete Galley 4x4x4 x 8 Inside #1</b> 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'	<b>8.270 in/hr Exfiltration over Wetted area</b>

**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

<b>Subcatchment 1S: Surface Runoff</b>	Runoff Area=48,210 sf 20.68% Impervious Runoff Depth=1.86" Flow Length=230' Tc=15.7 min CN=59 Runoff=1.67 cfs 0.172 af
<b>Subcatchment 2S: New Building</b>	Runoff Area=21,000 sf 100.00% Impervious Runoff Depth=5.80" Tc=6.0 min CN=98 Runoff=2.85 cfs 0.233 af
<b>Subcatchment 3S: East Property Line</b>	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
<b>Subcatchment 4S: Easement</b>	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
<b>Subcatchment 5S: Perf. Pipe Trench</b>	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
<b>Subcatchment 6S: Truck Dock</b>	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
<b>Subcatchment 7S: Front Half Roof</b>	Runoff Area=21,000 sf 100.00% Impervious Runoff Depth=5.80" Tc=6.0 min CN=98 Runoff=2.85 cfs 0.233 af
<b>Pond 1P: Basin</b>	Peak Elev=72.48' Storage=10,161 cf Inflow=12.45 cfs 0.610 af Outflow=2.12 cfs 0.610 af
<b>Pond 2P: Stone Trench</b>	Peak Elev=75.33' Storage=1,278 cf Inflow=2.85 cfs 0.233 af Discarded=0.47 cfs 0.195 af Primary=3.08 cfs 0.039 af Outflow=3.55 cfs 0.234 af
<b>Pond 3P: Perf Pipe/LPs</b>	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
<b>Pond 4P: Galleys</b>	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 = 1.246 af Average Runoff Depth = 3.52"**  
**40.88% Pervious = 1.736 ac 59.12% Impervious = 2.510 ac**

**Summary for Subcatchment 1S: Surface Runoff**

Runoff = 1.67 cfs @ 12.23 hrs, Volume= 0.172 af, Depth= 1.86"

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	39	Basin Bottom
* 7,050	96	Rap surface, HSG A
22,290	39	>75% Grass cover, Good, HSG A
250	30	Woods, Good, HSG A
48,210	59	Weighted Average
38,240		79.32% Pervious Area
9,970		20.68% Impervious Area

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



**Summary for Subcatchment 2S: New Building**

Runoff = 2.85 cfs @ 12.08 hrs, Volume= 0.233 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
21,000	98	Roofs, HSG A
21,000		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		<b>Sheet Flow,</b> Woods: Light underbrush n= 0.400 P2= 3.43"
0.8	150	0.0340	2.97		<b>Shallow Concentrated Flow,</b> 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		<b>Sheet Flow,</b> Woods: Light underbrush n= 0.400 P2= 3.43"
0.9	150	0.0300	2.79		<b>Shallow Concentrated Flow,</b> 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 = 2.85 cfs @ 12.08 hrs, Volume= 0.233 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
*	21,000	98	Roof
	21,000		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 0.18' @ 12.84 hrs

Inflow Area = 3.935 ac, 61.57% Impervious, Inflow Depth = 1.86" for 25 Year Storm event  
 Inflow = 12.45 cfs @ 12.11 hrs, Volume= 0.610 af  
 Outflow = 2.12 cfs @ 12.58 hrs, Volume= 0.610 af, Atten= 83%, Lag= 28.3 min  
 Discarded = 2.12 cfs @ 12.58 hrs, Volume= 0.610 af

Routing by Stor-Ind method, Time Span= 0.00-36.00 hrs, dt= 0.01 hrs / 2  
 Peak Elev= 72.48' @ 12.58 hrs Surf.Area= 11,096 sf Storage= 10,161 cf

Plug-Flow detention time= 48.7 min calculated for 0.610 af (100% of inflow)  
 Center-of-Mass det. time= 48.4 min ( 826.7 - 778.4 )

Volume	Invert	Avail.Storage	Storage Description
#1	68.50'	648 cf	<b>2.00'W x 270.00'L x 3.00'H Prismatic</b> 1,620 cf Overall x 40.0% Voids
#2	71.50'	28,302 cf	<b>Custom Stage Data (Prismatic)</b> 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'	<b>8.270 in/hr Exfiltration over Horizontal area</b>

**Discarded OutFlow** Max=2.12 cfs @ 12.58 hrs HW=72.48' (Free Discharge)  
 ↑1=Exfiltration (Exfiltration Controls 2.12 cfs)

**Summary for Pond 2P: Stone Trench**

[88] Warning: Qout>Qin may require smaller dt or Finer Routing

Inflow Area = 0.482 ac, 100.00% Impervious, Inflow Depth = 5.80" for 25 Year Storm event  
 Inflow = 2.85 cfs @ 12.08 hrs, Volume= 0.233 af  
 Outflow = 3.55 cfs @ 12.05 hrs, Volume= 0.234 af, Atten= 0%, Lag= 0.0 min  
 Discarded = 0.47 cfs @ 12.05 hrs, Volume= 0.195 af  
 Primary = 3.08 cfs @ 12.05 hrs, Volume= 0.039 af

Routing by Stor-Ind method, Time Span= 0.00-36.00 hrs, dt= 0.01 hrs / 2  
 Peak Elev= 75.33' @ 12.05 hrs Surf.Area= 1,130 sf Storage= 1,278 cf

Plug-Flow detention time= (not calculated: outflow precedes inflow)  
 Center-of-Mass det. time= 14.0 min ( 759.0 - 745.0 )

Volume	Invert	Avail.Storage	Storage Description
#1	72.50'	1,356 cf	<b>5.00'W x 226.00'L x 3.00'H Prismatic</b> 3,390 cf Overall x 40.0% Voids

Device	Routing	Invert	Outlet Devices
#1	Discarded	72.50'	<b>8.270 in/hr Exfiltration over Wetted area</b>
#2	Primary	75.30'	<b>250.0' long x 5.0' breadth Broad-Crested Rectangular Weir</b> 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=0.47 cfs @ 12.05 hrs HW=75.33' (Free Discharge)  
 ↑1=Exfiltration (Exfiltration Controls 0.47 cfs)

**Primary OutFlow** Max=2.51 cfs @ 12.05 hrs HW=75.33' (Free Discharge)  
 ↑2=Broad-Crested Rectangular Weir (Weir Controls 2.51 cfs @ 0.38 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	<b>6.00'W x 255.00'L x 5.00'H Excavation/Crushed Stone</b> 7,650 cf Overall - 801 cf Embedded = 6,849 cf x 40.0% Voids
#2	70.50'	801 cf	<b>24.0" Round Pipe Storage</b> Inside #1 L= 255.0'
#3	68.00'	336 cf	<b>10.00'D x 7.50'H Excavation/Crushed Stone</b> x 2 1,178 cf Overall - 339 cf Embedded = 839 cf x 40.0% Voids
#4	69.00'	339 cf	<b>6.00'D x 6.00'H Leaching Pit</b> x 2 Inside #3
		4,215 cf	Total Available Storage

Device	Routing	Invert	Outlet Devices
#1	Discarded	68.00'	<b>8.270 in/hr Exfiltration over Wetted area</b>
#2	Primary	72.00'	<b>18.0" Round Culvert</b> 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	<b>16.00'W x 20.00'L x 5.50'H Excavation/Crushed Stone</b> 1,760 cf Overall - 471 cf Embedded = 1,289 cf x 40.0% Voids
#2	68.00'	355 cf	<b>Concrete Galley 4x4x4 x 8 Inside #1</b> 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'	<b>8.270 in/hr Exfiltration over Wetted area</b>

**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

<b>Subcatchment 1S: Surface Runoff</b>	Runoff Area=48,210 sf 20.68% Impervious Runoff Depth=2.92" Flow Length=230' Tc=15.7 min CN=59 Runoff=2.73 cfs 0.269 af
<b>Subcatchment 2S: New Building</b>	Runoff Area=21,000 sf 100.00% Impervious Runoff Depth=7.34" Tc=6.0 min CN=98 Runoff=3.59 cfs 0.295 af
<b>Subcatchment 3S: East Property Line</b>	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
<b>Subcatchment 4S: Easement</b>	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
<b>Subcatchment 5S: Perf. Pipe Trench</b>	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
<b>Subcatchment 6S: Truck Dock</b>	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
<b>Subcatchment 7S: Front Half Roof</b>	Runoff Area=21,000 sf 100.00% Impervious Runoff Depth=7.34" Tc=6.0 min CN=98 Runoff=3.59 cfs 0.295 af
<b>Pond 1P: Basin</b>	Peak Elev=73.20' Storage=18,156 cf Inflow=17.38 cfs 0.922 af Outflow=2.41 cfs 0.922 af
<b>Pond 2P: Stone Trench</b>	Peak Elev=75.33' Storage=1,279 cf Inflow=3.59 cfs 0.295 af Discarded=0.47 cfs 0.230 af Primary=3.12 cfs 0.065 af Outflow=3.58 cfs 0.295 af
<b>Pond 3P: Perf Pipe/LPs</b>	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
<b>Pond 4P: Galleys</b>	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 = 1.702 af Average Runoff Depth = 4.81"**  
**40.88% Pervious = 1.736 ac 59.12% Impervious = 2.510 ac**

**Summary for Subcatchment 1S: Surface Runoff**

Runoff = 2.73 cfs @ 12.23 hrs, Volume= 0.269 af, Depth= 2.92"

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	39	Basin Bottom
* 7,050	96	Rap surface, HSG A
22,290	39	>75% Grass cover, Good, HSG A
250	30	Woods, Good, HSG A
48,210	59	Weighted Average
38,240		79.32% Pervious Area
9,970		20.68% Impervious Area

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

**Summary for Subcatchment 2S: New Building**

Runoff = 3.59 cfs @ 12.08 hrs, Volume= 0.295 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
21,000	98	Roofs, HSG A
21,000		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		<b>Sheet Flow,</b> Woods: Light underbrush n= 0.400 P2= 3.43"
0.8	150	0.0340	2.97		<b>Shallow Concentrated Flow,</b> 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		<b>Sheet Flow,</b>
					Woods: Light underbrush n= 0.400 P2= 3.43"
0.9	150	0.0300	2.79		<b>Shallow Concentrated Flow,</b>
					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 = 3.59 cfs @ 12.08 hrs, Volume= 0.295 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
*	21,000	98	Roof
	21,000		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 0.84' @ 12.99 hrs

Inflow Area = 3.935 ac, 61.57% Impervious, Inflow Depth = 2.81" for 100 Year Storm event  
 Inflow = 17.38 cfs @ 12.10 hrs, Volume= 0.922 af  
 Outflow = 2.41 cfs @ 12.65 hrs, Volume= 0.922 af, Atten= 86%, Lag= 32.6 min  
 Discarded = 2.41 cfs @ 12.65 hrs, Volume= 0.922 af

Routing by Stor-Ind method, Time Span= 0.00-36.00 hrs, dt= 0.01 hrs / 2  
 Peak Elev= 73.20' @ 12.65 hrs Surf.Area= 12,579 sf Storage= 18,156 cf

Plug-Flow detention time= 72.0 min calculated for 0.922 af (100% of inflow)  
 Center-of-Mass det. time= 72.1 min ( 846.3 - 774.2 )

Volume	Invert	Avail.Storage	Storage Description
#1	68.50'	648 cf	<b>2.00'W x 270.00'L x 3.00'H Prismatic</b> 1,620 cf Overall x 40.0% Voids
#2	71.50'	28,302 cf	<b>Custom Stage Data (Prismatic)</b> 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'	<b>8.270 in/hr Exfiltration over Horizontal area</b>

**Discarded OutFlow** Max=2.41 cfs @ 12.65 hrs HW=73.20' (Free Discharge)

↑-1=Exfiltration (Exfiltration Controls 2.41 cfs)

**Summary for Pond 2P: Stone Trench**

Inflow Area = 0.482 ac, 100.00% Impervious, Inflow Depth = 7.34" for 100 Year Storm event  
 Inflow = 3.59 cfs @ 12.08 hrs, Volume= 0.295 af  
 Outflow = 3.58 cfs @ 12.08 hrs, Volume= 0.295 af, Atten= 0%, Lag= 0.0 min  
 Discarded = 0.47 cfs @ 12.08 hrs, Volume= 0.230 af  
 Primary = 3.12 cfs @ 12.08 hrs, Volume= 0.065 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= 1,130 sf Storage= 1,279 cf

Plug-Flow detention time= 13.8 min calculated for 0.295 af (100% of inflow)  
 Center-of-Mass det. time= 13.7 min ( 755.6 - 741.9 )

Volume	Invert	Avail.Storage	Storage Description
#1	72.50'	1,356 cf	<b>5.00'W x 226.00'L x 3.00'H Prismaoid</b> 3,390 cf Overall x 40.0% Voids

Device	Routing	Invert	Outlet Devices
#1	Discarded	72.50'	<b>8.270 in/hr Exfiltration over Wetted area</b>
#2	Primary	75.30'	<b>250.0' long x 5.0' breadth Broad-Crested Rectangular Weir</b> 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=0.47 cfs @ 12.08 hrs HW=75.33' (Free Discharge)  
 ↑1=Exfiltration (Exfiltration Controls 0.47 cfs)

**Primary OutFlow** Max=2.88 cfs @ 12.08 hrs HW=75.33' (Free Discharge)  
 ↑2=Broad-Crested Rectangular Weir (Weir Controls 2.88 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	<b>6.00'W x 255.00'L x 5.00'H Excavation/Crushed Stone</b> 7,650 cf Overall - 801 cf Embedded = 6,849 cf x 40.0% Voids
#2	70.50'	801 cf	<b>24.0" Round Pipe Storage</b> Inside #1 L= 255.0'
#3	68.00'	336 cf	<b>10.00'D x 7.50'H Excavation/Crushed Stone</b> x 2 1,178 cf Overall - 339 cf Embedded = 839 cf x 40.0% Voids
#4	69.00'	339 cf	<b>6.00'D x 6.00'H Leaching Pit</b> x 2 Inside #3
		4,215 cf	Total Available Storage

Device	Routing	Invert	Outlet Devices
#1	Discarded	68.00'	<b>8.270 in/hr Exfiltration over Wetted area</b>
#2	Primary	72.00'	<b>18.0" Round Culvert</b> 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	<b>16.00'W x 20.00'L x 5.50'H Excavation/Crushed Stone</b> 1,760 cf Overall - 471 cf Embedded = 1,289 cf x 40.0% Voids
#2	68.00'	355 cf	<b>Concrete Galley 4x4x4 x 8 Inside #1</b> 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'	<b>8.270 in/hr Exfiltration over Wetted area</b>

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