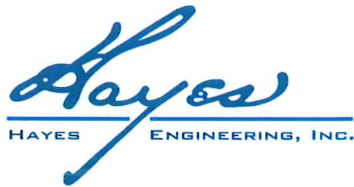


# **SUPPLEMENTAL STORMWATER CALCULATIONS**

**Vallis Way  
Lynnfield, Massachusetts**

**October 26, 2021**



**Civil Engineers & Land Surveyors  
603 Salem Street, Wakefield, MA 01880  
(781) 246-2800 phone  
(781) 246-7596 fax**

SUPPLEMENTAL STORMWATER CALCULATIONS  
VALLIS WAY  
LYNNFIELD, MASSACHUSETTS

October 26, 2021

**PREFACE**

The Lynnfield Planning Board in its review of the Vallis Way Subdivision has asked for a number of changes in the approach to the runoff calculations.

First, the September 2, 2021 letter from Linden Engineering requested that computations be made based on the NOAA Atlas 14 rainfall amounts, and that computations be done simulating a 100-year rainfall immediately on top of a 25-year rainfall.

Second, the Planning Board has requested that anticipated development on the Vallis property be included in the hydraulic calculations (Note: the property itself with its existing development has always been included in the calculations). In order to do this it was presumed that one additional lot would be created on an Approval-Not-Required basis (Note: any additional lots would require the removal of the existing Vallis residence), and that no stormwater management would be included as part of that development. That would result in an additional 4,321 square feet of impervious, including house and driveway.

Third, in accordance with the requirements of Section FF.2 of the September 2, 2021 letter, the applicant hired an independent geotechnical testing firm, Lahlaf Geotechnical Consulting, Inc., to conduct permeability testing and grain-size analysis in the area of the proposed infiltration pond. They further excavated to the groundwater level which was determined to be 13.5 feet and 13.0 feet in test holes 1 and 2, respectively. The results of the permeability testing, test hole logs and grain-size analysis are included in the Appendix of this report.

The permeability testing yielded an absolute minimum infiltration rate of 35.2 cm/hr., which equates to 13.85 in/hr. The Stormwater Management Regulations require that that infiltration rate be halved in order to be used, resulting in a 6.93 in/hr. infiltration rate. This is slightly slower than the 8.27 in/hr. from the Rawls Rate, so that number was used in the original calculations.

In addition, the question was asked as to where ledge might be encountered on Lot 5. On October 22, a single boring was done at the top of the knoll and bedrock was encountered at approximately elevation 154.0, 6 inches above the proposed cellar floor grade on the definitive plan.

**CONCLUSION**

Based on this analysis, it appears that the above design criteria can be met but it requires increasing the dike and spillway elevation and also increasing the size of the retention pond.

The conclusion of the boring on Lot 5 is that ledge might be encountered in the cellar excavation on the lot although, depending on how regular and extensive the ledge is, the cellar floor elevation might be slightly adjusted to eliminate the need for blasting.

**BMP Performance**  
**Vallis Way W/1 Extra Lot (4,321 S.F. House typical Driveway)**  
**Lynnfield, MA**

**BMP Houses based on 4,321 S.F. house**

Storm	Q in (C.F.S.)	Q out Primary (C.F.S.)	Q out Infiltration (C.F.S.)	Water Level above bottom of stone (Ft.)
2 Year	0.31	0	0.06	1.40
10 Year	0.49	0	0.06	2.49
25 Year	0.61	0	0.06	3.31
100 Year	0.78	0	0.06	5.27

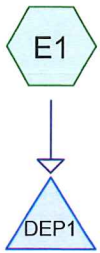
Available Depth 5.50'

**BMP 2P Infiltration Pond**

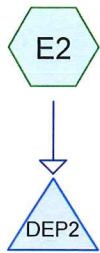
Storm	Q in (C.F.S.)	Q out Spillway (C.F.S.)	Q out Infiltration (C.F.S.)	Water Level (Ft.)
2 Year	0.36	0	0.33	140.06
10 Year	2.31	0	0.5	141.57
25 Year	4.98	0	0.86	143.25
100 Year	11.52	0	1.22	145.58

**BMP 2Pa Inf. Pond if 25 Year Storm Had Just Occured**

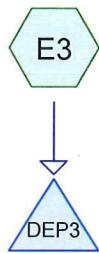
Storm	Q in (C.F.S.)	Q out Spillway (C.F.S.)	Q out Infiltration (C.F.S.)	Water Level above bottom of stone (Ft.)
2 Year	0.36	0	0.35	143.27
10 Year	2.31	0	0.91	143.62
25 Year	4.98	0	1.08	144.74
100 Year	11.52	0	1.40	146.66



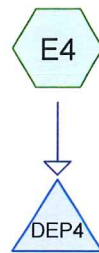
Depression Front 109



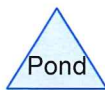
Depression Front 7



Depression Mohawk



Depression Mohawk  
Cul-De-Sac



**Routing Diagram for EX-VallisNOAA**

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**EX-VallisNOAA**

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**Area Listing (all nodes)**

Area (sq-ft)	CN	Description (subcatchment-numbers)
120,531	39	>75% Grass cover, Good, HSG A (E1, E2, E3, E4)
11,587	98	Paved parking, HSG A (E1, E4)
8,843	98	Paved parking,(tennis ct, pool) HSG A (E2)
11,543	98	Roofs, HSG A (E1, E2)
429,676	30	Woods, Good, HSG A (E1, E2, E3, E4, E5)
<b>582,179</b>	<b>36</b>	<b>TOTAL AREA</b>

**EX-VallisNOAA**

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**Soil Listing (all nodes)**

Area (sq-ft)	Soil Group	Subcatchment Numbers
582,179	HSG A	E1, E2, E3, E4, E5
0	HSG B	
0	HSG C	
0	HSG D	
0	Other	
<b>582,179</b>		<b>TOTAL AREA</b>

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**Ground Covers (all nodes)**

HSG-A (sq-ft)	HSG-B (sq-ft)	HSG-C (sq-ft)	HSG-D (sq-ft)	Other (sq-ft)	Total (sq-ft)	Ground Cover
120,531	0	0	0	0	120,531	>75% Grass cover, Good
11,587	0	0	0	0	11,587	Paved parking
8,843	0	0	0	0	8,843	Paved parking,(tennis ct, pool)
11,543	0	0	0	0	11,543	Roofs
429,676	0	0	0	0	429,676	Woods, Good
<b>582,179</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>582,179</b>	<b>TOTAL AREA</b>

**EX-VallisNOAA**

Type III 24-hr 2 Year Rainfall=3.31"

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Time span=0.00-48.00 hrs, dt=0.05 hrs, 961 points

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN

Reach routing by Stor-Ind+Trans method - Pond routing by Stor-Ind method

**Subcatchment E1:**Runoff Area=1.482 ac 15.65% Impervious Runoff Depth=0.02"  
Flow Length=300' Tc=14.3 min CN=42 Runoff=0.00 cfs 113 cf**Subcatchment E2:**Runoff Area=4.488 ac 7.87% Impervious Runoff Depth=0.01"  
Flow Length=620' Tc=24.1 min CN=40 Runoff=0.01 cfs 102 cf**Subcatchment E3:**Runoff Area=2.210 ac 0.00% Impervious Runoff Depth=0.00"  
Flow Length=475' Tc=24.1 min CN=31 Runoff=0.00 cfs 0 cf**Subcatchment E4:**Runoff Area=2.433 ac 6.12% Impervious Runoff Depth=0.00"  
Flow Length=150' Tc=15.2 min CN=35 Runoff=0.00 cfs 0 cf**Subcatchment E5:**Runoff Area=2.752 ac 0.00% Impervious Runoff Depth=0.00"  
Flow Length=365' Tc=20.1 min CN=30 Runoff=0.00 cfs 0 cf**Pond DEP1: Depression Front 109**Peak Elev=151.00' Storage=0 cf Inflow=0.00 cfs 113 cf  
Outflow=0.00 cfs 113 cf**Pond DEP2: Depression Front 7**Peak Elev=148.00' Storage=0 cf Inflow=0.01 cfs 102 cf  
Outflow=0.01 cfs 102 cf**Pond DEP3: Depression Mohawk**Peak Elev=149.00' Storage=0 cf Inflow=0.00 cfs 0 cf  
Outflow=0.00 cfs 0 cf**Pond DEP4: Depression Mohawk Cul-De-Sac**Peak Elev=149.00' Storage=0 cf Inflow=0.00 cfs 0 cf  
Outflow=0.00 cfs 0 cf**Total Runoff Area = 582,179 sf Runoff Volume = 215 cf Average Runoff Depth = 0.00"**  
**94.51% Pervious = 550,206 sf 5.49% Impervious = 31,973 sf**

**Summary for Subcatchment E1:**

Runoff = 0.00 cfs @ 17.35 hrs, Volume= 113 cf, Depth= 0.02"  
 Routed to Pond DEP1 : Depression Front 109

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-48.00 hrs, dt= 0.05 hrs  
 Type III 24-hr 2 Year Rainfall=3.31"

Area (ac)	CN	Description
0.115	98	Roofs, HSG A
0.117	98	Paved parking, HSG A
0.230	39	>75% Grass cover, Good, HSG A
1.020	30	Woods, Good, HSG A
1.482	42	Weighted Average
1.250		84.35% Pervious Area
0.232		15.65% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
9.5	50	0.0400	0.09		<b>Sheet Flow, sheet</b>
					Woods: Light underbrush n= 0.400 P2= 3.10"
4.8	250	0.0300	0.87		<b>Shallow Concentrated Flow, shallow</b>
					Woodland Kv= 5.0 fps
14.3	300	Total			

**Summary for Subcatchment E2:**

Runoff = 0.01 cfs @ 23.21 hrs, Volume= 102 cf, Depth= 0.01"  
 Routed to Pond DEP2 : Depression Front 7

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-48.00 hrs, dt= 0.05 hrs  
 Type III 24-hr 2 Year Rainfall=3.31"

Area (ac)	CN	Description
0.150	98	Roofs, HSG A
* 0.203	98	Paved parking,(tennis ct, pool) HSG A
2.245	39	>75% Grass cover, Good, HSG A
1.890	30	Woods, Good, HSG A
4.488	40	Weighted Average
4.135		92.13% Pervious Area
0.353		7.87% Impervious Area

**EX-VallisNOAA**

Type III 24-hr 2 Year Rainfall=3.31"

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Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
12.5	50	0.0200	0.07		<b>Sheet Flow, sheet</b> Woods: Light underbrush n= 0.400 P2= 3.10"
5.4	200	0.0150	0.61		<b>Shallow Concentrated Flow, shallow</b> Woodland Kv= 5.0 fps
6.2	370	0.0200	0.99		<b>Shallow Concentrated Flow, shallow grass</b> Short Grass Pasture Kv= 7.0 fps
24.1	620	Total			

**Summary for Subcatchment E3:**

Runoff = 0.00 cfs @ 0.00 hrs, Volume= 0 cf, Depth= 0.00"  
 Routed to Pond DEP3 : Depression Mohawk

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-48.00 hrs, dt= 0.05 hrs  
 Type III 24-hr 2 Year Rainfall=3.31"

Area (ac)	CN	Description
0.197	39	>75% Grass cover, Good, HSG A
2.013	30	Woods, Good, HSG A
2.210	31	Weighted Average
2.210		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
12.5	50	0.0200	0.07		<b>Sheet Flow, sheet</b> Woods: Light underbrush n= 0.400 P2= 3.10"
11.6	425	0.0150	0.61		<b>Shallow Concentrated Flow, shallow</b> Woodland Kv= 5.0 fps
24.1	475	Total			

**Summary for Subcatchment E4:**

Runoff = 0.00 cfs @ 0.00 hrs, Volume= 0 cf, Depth= 0.00"  
 Routed to Pond DEP4 : Depression Mohawk Cul-De-Sac

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-48.00 hrs, dt= 0.05 hrs  
 Type III 24-hr 2 Year Rainfall=3.31"

Area (ac)	CN	Description
0.095	39	>75% Grass cover, Good, HSG A
2.189	30	Woods, Good, HSG A
0.149	98	Paved parking, HSG A
2.433	35	Weighted Average
2.284		93.88% Pervious Area
0.149		6.12% Impervious Area

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Type III 24-hr 2 Year Rainfall=3.31"

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Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
12.5	50	0.0200	0.07		<b>Sheet Flow, sheet</b> Woods: Light underbrush n= 0.400 P2= 3.10"
2.7	100	0.0150	0.61		<b>Shallow Concentrated Flow, shallow</b> Woodland Kv= 5.0 fps
15.2	150	Total			

**Summary for Subcatchment E5:**

Runoff = 0.00 cfs @ 0.00 hrs, Volume= 0 cf, Depth= 0.00"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-48.00 hrs, dt= 0.05 hrs  
Type III 24-hr 2 Year Rainfall=3.31"

Area (ac)	CN	Description
2.752	30	Woods, Good, HSG A
2.752		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
12.5	50	0.0200	0.07		<b>Sheet Flow, sheet</b> Woods: Light underbrush n= 0.400 P2= 3.10"
6.5	240	0.0150	0.61		<b>Shallow Concentrated Flow, shallow</b> Woodland Kv= 5.0 fps
1.1	75	0.0500	1.12		<b>Shallow Concentrated Flow, shallow</b> Woodland Kv= 5.0 fps
20.1	365	Total			

**Summary for Pond DEP1: Depression Front 109**

Inflow Area = 64,556 sf, 15.65% Impervious, Inflow Depth = 0.02" for 2 Year event  
 Inflow = 0.00 cfs @ 17.35 hrs, Volume= 113 cf  
 Outflow = 0.00 cfs @ 17.41 hrs, Volume= 113 cf, Atten= 0%, Lag= 3.3 min  
 Discarded = 0.00 cfs @ 17.41 hrs, Volume= 113 cf

Routing by Stor-Ind method, Time Span= 0.00-48.00 hrs, dt= 0.05 hrs  
 Peak Elev= 151.00' @ 17.41 hrs Surf.Area= 2,270 sf Storage= 0 cf

Plug-Flow detention time= 0.5 min calculated for 112 cf (100% of inflow)  
 Center-of-Mass det. time= 0.5 min ( 1,184.9 - 1,184.4 )

Volume #1	Invert	Avail.Storage	Storage Description
	151.00'	1,818 cf	<b>Custom Stage Data (Prismatic)</b> Listed below (Recalc)

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
151.00	2,270	0	0
151.50	5,000	1,818	1,818

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Type III 24-hr 2 Year Rainfall=3.31"

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Device	Routing	Invert	Outlet Devices
#1	Discarded	151.00'	<b>6.930 in/hr Exfiltration over Surface area</b>

**Discarded OutFlow** Max=0.36 cfs @ 17.41 hrs HW=151.00' (Free Discharge)

↑1=Exfiltration (Exfiltration Controls 0.36 cfs)

**Summary for Pond DEP2: Depression Front 7**

Inflow Area = 195,497 sf, 7.87% Impervious, Inflow Depth = 0.01" for 2 Year event  
 Inflow = 0.01 cfs @ 23.21 hrs, Volume= 102 cf  
 Outflow = 0.01 cfs @ 23.23 hrs, Volume= 102 cf, Atten= 0%, Lag= 1.0 min  
 Discarded = 0.01 cfs @ 23.23 hrs, Volume= 102 cf

Routing by Stor-Ind method, Time Span= 0.00-48.00 hrs, dt= 0.05 hrs  
 Peak Elev= 148.00' @ 23.23 hrs Surf.Area= 8,500 sf Storage= 0 cf

Plug-Flow detention time= 1.0 min calculated for 102 cf (100% of inflow)  
 Center-of-Mass det. time= 1.0 min ( 1,289.3 - 1,288.2 )

Volume	Invert	Avail.Storage	Storage Description
#1	148.00'	10,800 cf	<b>Custom Stage Data (Prismatic)</b> Listed below (Recalc)

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
148.00	8,500	0	0
149.00	13,100	10,800	10,800

Device	Routing	Invert	Outlet Devices
#1	Discarded	148.00'	<b>6.930 in/hr Exfiltration over Surface area</b>

**Discarded OutFlow** Max=1.36 cfs @ 23.23 hrs HW=148.00' (Free Discharge)

↑1=Exfiltration (Exfiltration Controls 1.36 cfs)

**Summary for Pond DEP3: Depression Mohawk**

Inflow Area = 96,268 sf, 0.00% Impervious, Inflow Depth = 0.00" for 2 Year event  
 Inflow = 0.00 cfs @ 0.00 hrs, Volume= 0 cf  
 Outflow = 0.00 cfs @ 0.00 hrs, Volume= 0 cf, Atten= 0%, Lag= 0.0 min  
 Discarded = 0.00 cfs @ 0.00 hrs, Volume= 0 cf

Routing by Stor-Ind method, Time Span= 0.00-48.00 hrs, dt= 0.05 hrs  
 Peak Elev= 149.00' @ 0.00 hrs Surf.Area= 2,900 sf Storage= 0 cf

Plug-Flow detention time= (not calculated: initial storage exceeds outflow)  
 Center-of-Mass det. time= (not calculated: no inflow)

Volume	Invert	Avail.Storage	Storage Description
#1	149.00'	1,475 cf	<b>Custom Stage Data (Prismatic)</b> Listed below (Recalc)

**EX-VallisNOAA**

Type III 24-hr 2 Year Rainfall=3.31"

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Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
149.00	2,900	0	0
149.50	3,000	1,475	1,475

Device	Routing	Invert	Outlet Devices
#1	Discarded	149.00'	<b>6.930 in/hr Exfiltration over Surface area</b>

**Discarded OutFlow** Max=0.00 cfs @ 0.00 hrs HW=149.00' (Free Discharge)↑**1=Exfiltration** (Passes 0.00 cfs of 0.47 cfs potential flow)**Summary for Pond DEP4: Depression Mohawk Cul-De-Sac**

Inflow Area = 105,981 sf, 6.12% Impervious, Inflow Depth = 0.00" for 2 Year event  
 Inflow = 0.00 cfs @ 0.00 hrs, Volume= 0 cf  
 Outflow = 0.00 cfs @ 0.00 hrs, Volume= 0 cf, Atten= 0%, Lag= 0.0 min  
 Discarded = 0.00 cfs @ 0.00 hrs, Volume= 0 cf

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

Peak Elev= 149.00' @ 0.00 hrs Surf.Area= 7,000 sf Storage= 0 cf

Plug-Flow detention time= (not calculated: initial storage exceeds outflow)

Center-of-Mass det. time= (not calculated: no inflow)

Volume	Invert	Avail.Storage	Storage Description
#1	149.00'	4,250 cf	<b>Custom Stage Data (Prismatic)</b> Listed below (Recalc)

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
149.00	7,000	0	0
149.50	10,000	4,250	4,250

Device	Routing	Invert	Outlet Devices
#1	Discarded	149.00'	<b>6.930 in/hr Exfiltration over Surface area</b>

**Discarded OutFlow** Max=0.00 cfs @ 0.00 hrs HW=149.00' (Free Discharge)↑**1=Exfiltration** (Passes 0.00 cfs of 1.12 cfs potential flow)

**EX-VallisNOAA**

Type III 24-hr 10 Year Rainfall=5.22"

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

<b>Subcatchment E1:</b>	Runoff Area=1.482 ac 15.65% Impervious Runoff Depth=0.37" Flow Length=300' Tc=14.3 min CN=42 Runoff=0.19 cfs 1,998 cf
<b>Subcatchment E2:</b>	Runoff Area=4.488 ac 7.87% Impervious Runoff Depth=0.29" Flow Length=620' Tc=24.1 min CN=40 Runoff=0.29 cfs 4,663 cf
<b>Subcatchment E3:</b>	Runoff Area=2.210 ac 0.00% Impervious Runoff Depth=0.03" Flow Length=475' Tc=24.1 min CN=31 Runoff=0.01 cfs 206 cf
<b>Subcatchment E4:</b>	Runoff Area=2.433 ac 6.12% Impervious Runoff Depth=0.11" Flow Length=150' Tc=15.2 min CN=35 Runoff=0.04 cfs 997 cf
<b>Subcatchment E5:</b>	Runoff Area=2.752 ac 0.00% Impervious Runoff Depth=0.01" Flow Length=365' Tc=20.1 min CN=30 Runoff=0.01 cfs 128 cf
<b>Pond DEP1: Depression Front 109</b>	Peak Elev=151.00' Storage=6 cf Inflow=0.19 cfs 1,998 cf Outflow=0.19 cfs 1,998 cf
<b>Pond DEP2: Depression Front 7</b>	Peak Elev=148.00' Storage=18 cf Inflow=0.29 cfs 4,663 cf Outflow=0.29 cfs 4,663 cf
<b>Pond DEP3: Depression Mohawk</b>	Peak Elev=149.00' Storage=0 cf Inflow=0.01 cfs 206 cf Outflow=0.01 cfs 206 cf
<b>Pond DEP4: Depression Mohawk Cul-De-Sac</b>	Peak Elev=149.00' Storage=1 cf Inflow=0.04 cfs 997 cf Outflow=0.04 cfs 997 cf

**Total Runoff Area = 582,179 sf Runoff Volume = 7,992 cf Average Runoff Depth = 0.16"**  
**94.51% Pervious = 550,206 sf 5.49% Impervious = 31,973 sf**

**EX-VallisNOAA**

Type III 24-hr 25 Year Rainfall=6.41"

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

<b>Subcatchment E1:</b>	Runoff Area=1.482 ac 15.65% Impervious Runoff Depth=0.76" Flow Length=300' Tc=14.3 min CN=42 Runoff=0.57 cfs 4,101 cf
<b>Subcatchment E2:</b>	Runoff Area=4.488 ac 7.87% Impervious Runoff Depth=0.63" Flow Length=620' Tc=24.1 min CN=40 Runoff=1.11 cfs 10,290 cf
<b>Subcatchment E3:</b>	Runoff Area=2.210 ac 0.00% Impervious Runoff Depth=0.16" Flow Length=475' Tc=24.1 min CN=31 Runoff=0.05 cfs 1,271 cf
<b>Subcatchment E4:</b>	Runoff Area=2.433 ac 6.12% Impervious Runoff Depth=0.34" Flow Length=150' Tc=15.2 min CN=35 Runoff=0.21 cfs 3,018 cf
<b>Subcatchment E5:</b>	Runoff Area=2.752 ac 0.00% Impervious Runoff Depth=0.12" Flow Length=365' Tc=20.1 min CN=30 Runoff=0.04 cfs 1,211 cf
<b>Pond DEP1: Depression Front 109</b>	Peak Elev=151.07' Storage=183 cf Inflow=0.57 cfs 4,101 cf Outflow=0.43 cfs 4,101 cf
<b>Pond DEP2: Depression Front 7</b>	Peak Elev=148.01' Storage=69 cf Inflow=1.11 cfs 10,290 cf Outflow=1.11 cfs 10,290 cf
<b>Pond DEP3: Depression Mohawk</b>	Peak Elev=149.00' Storage=1 cf Inflow=0.05 cfs 1,271 cf Outflow=0.05 cfs 1,271 cf
<b>Pond DEP4: Depression Mohawk Cul-De-Sac</b>	Peak Elev=149.00' Storage=6 cf Inflow=0.21 cfs 3,018 cf Outflow=0.21 cfs 3,018 cf

**Total Runoff Area = 582,179 sf Runoff Volume = 19,890 cf Average Runoff Depth = 0.41"**  
**94.51% Pervious = 550,206 sf 5.49% Impervious = 31,973 sf**

**EX-VallisNOAA**

Type III 24-hr 100 Year Rainfall=8.24"

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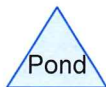
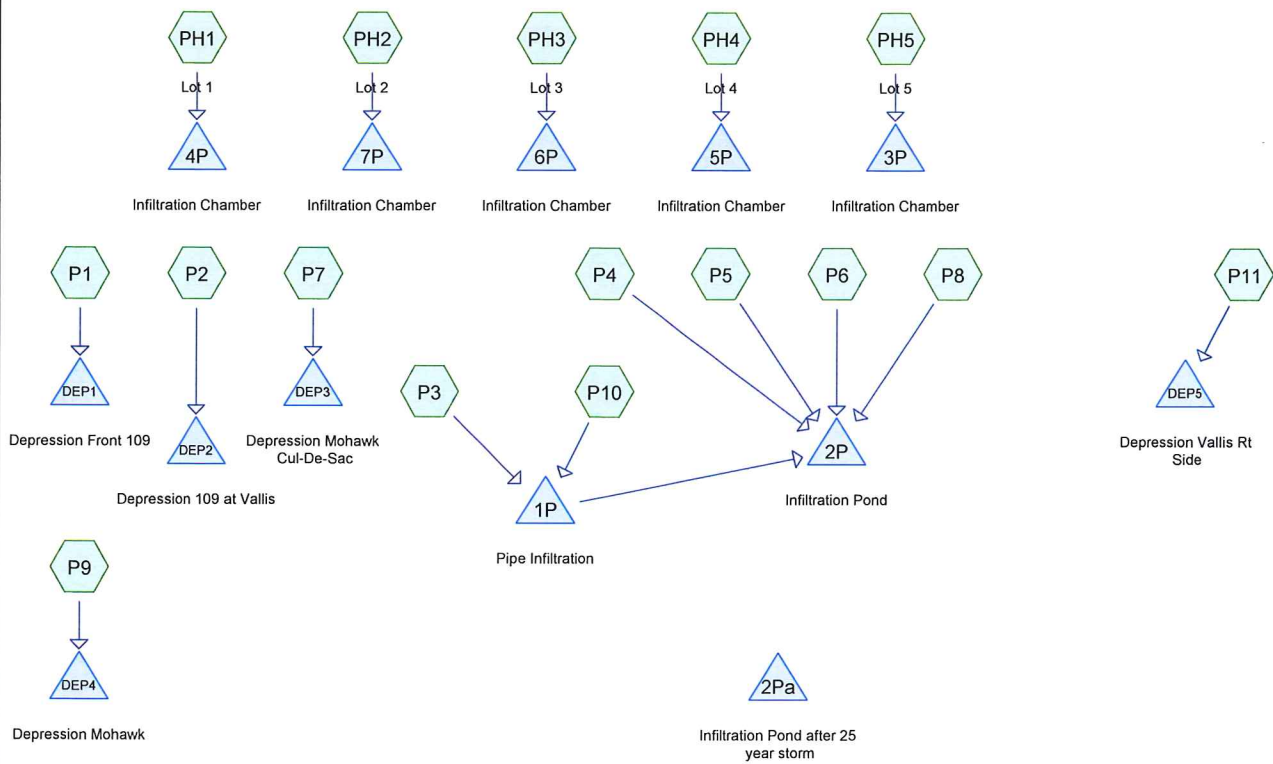
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Time span=0.00-48.00 hrs, dt=0.05 hrs, 961 points  
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN  
Reach routing by Stor-Ind+Trans method - Pond routing by Stor-Ind method

<b>Subcatchment E1:</b>	Runoff Area=1.482 ac 15.65% Impervious Runoff Depth=1.56" Flow Length=300' Tc=14.3 min CN=42 Runoff=1.60 cfs 8,370 cf
<b>Subcatchment E2:</b>	Runoff Area=4.488 ac 7.87% Impervious Runoff Depth=1.36" Flow Length=620' Tc=24.1 min CN=40 Runoff=3.28 cfs 22,101 cf
<b>Subcatchment E3:</b>	Runoff Area=2.210 ac 0.00% Impervious Runoff Depth=0.55" Flow Length=475' Tc=24.1 min CN=31 Runoff=0.34 cfs 4,420 cf
<b>Subcatchment E4:</b>	Runoff Area=2.433 ac 6.12% Impervious Runoff Depth=0.89" Flow Length=150' Tc=15.2 min CN=35 Runoff=1.01 cfs 7,832 cf
<b>Subcatchment E5:</b>	Runoff Area=2.752 ac 0.00% Impervious Runoff Depth=0.47" Flow Length=365' Tc=20.1 min CN=30 Runoff=0.33 cfs 4,741 cf
<b>Pond DEP1: Depression Front 109</b>	Peak Elev=151.40' Storage=1,337 cf Inflow=1.60 cfs 8,370 cf Outflow=0.71 cfs 8,370 cf
<b>Pond DEP2: Depression Front 7</b>	Peak Elev=148.31' Storage=2,817 cf Inflow=3.28 cfs 22,101 cf Outflow=1.59 cfs 22,101 cf
<b>Pond DEP3: Depression Mohawk</b>	Peak Elev=149.00' Storage=11 cf Inflow=0.34 cfs 4,420 cf Outflow=0.34 cfs 4,420 cf
<b>Pond DEP4: Depression Mohawk Cul-De-Sac</b>	Peak Elev=149.00' Storage=31 cf Inflow=1.01 cfs 7,832 cf Outflow=1.01 cfs 7,832 cf

**Total Runoff Area = 582,179 sf Runoff Volume = 47,464 cf Average Runoff Depth = 0.98"**  
**94.51% Pervious = 550,206 sf 5.49% Impervious = 31,973 sf**



### Routing Diagram for PR-VallisNOAA

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**PR-VallisNOAA**

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**Area Listing (all nodes)**

Area (sq-ft)	CN	Description (subcatchment-numbers)
266,369	39	>75% Grass cover, Good, HSG A (P1, P10, P11, P2, P3, P4, P5, P6, P7, P8, P9)
56,192	98	Paved parking, HSG A (P1, P10, P2, P4, P6, P7, P8)
7,318	98	Paved parking, HSG A additional lot on vallis property (P3)
8,451	98	Paved parking,(roadway) HSG A (P3)
8,843	98	Paved parking,(tennis ct, pool) HSG A (P3)
31,991	98	Roofs, HSG A (P1, P2, P3, PH1, PH2, PH3, PH4, PH5)
4,312	98	Roofs, HSG A additional house next to vallis property (P3)
162,348	30	Woods, Good, HSG A (P1, P10, P11, P2, P4, P5, P7, P9)
36,373	30	Woods, Good, HSG A (removed area of new house, drive on Vallis Property) (P3)
<b>582,198</b>	<b>48</b>	<b>TOTAL AREA</b>

**PR-VallisNOAA**

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**Soil Listing (all nodes)**

Area (sq-ft)	Soil Group	Subcatchment Numbers
582,198	HSG A	P1, P10, P11, P2, P3, P4, P5, P6, P7, P8, P9, PH1, PH2, PH3, PH4, PH5
0	HSG B	
0	HSG C	
0	HSG D	
0	Other	
<b>582,198</b>		<b>TOTAL AREA</b>

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**Ground Covers (all nodes)**

HSG-A (sq-ft)	HSG-B (sq-ft)	HSG-C (sq-ft)	HSG-D (sq-ft)	Other (sq-ft)	Total (sq-ft)	Ground Cover
266,369	0	0	0	0	266,369	>75% Grass cover, Good
63,510	0	0	0	0	63,510	Paved parking
8,451	0	0	0	0	8,451	Paved parking,(roadway )
8,843	0	0	0	0	8,843	Paved parking,(tennis ct, pool)
36,304	0	0	0	0	36,304	Roofs
198,721	0	0	0	0	198,721	Woods, Good
<b>582,198</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>582,198</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	Width (inches)	Diam/Height (inches)	Inside-Fill (inches)
1	1P	145.60	145.60	1.0	0.0000	0.011	0.0	18.0	6.0

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

<b>Subcatchment P1:</b>	Runoff Area=1.482 ac 15.65% Impervious Runoff Depth=0.02" Flow Length=300' Tc=14.3 min CN=42 Runoff=0.00 cfs 113 cf
<b>Subcatchment P10:</b>	Runoff Area=0.454 ac 42.51% Impervious Runoff Depth=0.53" Tc=6.0 min CN=62 Runoff=0.20 cfs 872 cf
<b>Subcatchment P11:</b>	Runoff Area=0.809 ac 0.00% Impervious Runoff Depth=0.00" Flow Length=275' Tc=9.0 min CN=37 Runoff=0.00 cfs 0 cf
<b>Subcatchment P2:</b>	Runoff Area=1.279 ac 12.04% Impervious Runoff Depth=0.04" Flow Length=415' Tc=15.9 min CN=44 Runoff=0.01 cfs 201 cf
<b>Subcatchment P3:</b>	Runoff Area=2.240 ac 30.94% Impervious Runoff Depth=0.25" Flow Length=566' Tc=22.6 min CN=54 Runoff=0.19 cfs 2,072 cf
<b>Subcatchment P4:</b>	Runoff Area=1.081 ac 15.54% Impervious Runoff Depth=0.09" Flow Length=455' Tc=16.5 min CN=47 Runoff=0.01 cfs 354 cf
<b>Subcatchment P5:</b>	Runoff Area=1.048 ac 0.00% Impervious Runoff Depth=0.00" Flow Length=225' Tc=12.7 min CN=37 Runoff=0.00 cfs 0 cf
<b>Subcatchment P6:</b>	Runoff Area=1.134 ac 30.95% Impervious Runoff Depth=0.35" Flow Length=455' Tc=10.3 min CN=57 Runoff=0.19 cfs 1,429 cf
<b>Subcatchment P7:</b>	Runoff Area=1.898 ac 7.85% Impervious Runoff Depth=0.00" Flow Length=100' Tc=6.0 min CN=37 Runoff=0.00 cfs 0 cf
<b>Subcatchment P8:</b>	Runoff Area=0.868 ac 32.14% Impervious Runoff Depth=0.38" Flow Length=305' Tc=10.5 min CN=58 Runoff=0.17 cfs 1,200 cf
<b>Subcatchment P9:</b>	Runoff Area=0.603 ac 0.00% Impervious Runoff Depth=0.00" Flow Length=200' Tc=8.8 min CN=35 Runoff=0.00 cfs 0 cf
<b>Subcatchment PH1: Lot 1</b>	Runoff Area=4,321 sf 100.00% Impervious Runoff Depth=3.08" Tc=6.0 min CN=98 Runoff=0.31 cfs 1,108 cf
<b>Subcatchment PH2: Lot 2</b>	Runoff Area=3,732 sf 100.00% Impervious Runoff Depth=3.08" Tc=6.0 min CN=98 Runoff=0.27 cfs 957 cf
<b>Subcatchment PH3: Lot 3</b>	Runoff Area=4,037 sf 100.00% Impervious Runoff Depth=3.08" Tc=6.0 min CN=98 Runoff=0.29 cfs 1,035 cf
<b>Subcatchment PH4: Lot 4</b>	Runoff Area=4,037 sf 100.00% Impervious Runoff Depth=3.08" Tc=6.0 min CN=98 Runoff=0.29 cfs 1,035 cf
<b>Subcatchment PH5: Lot 5</b>	Runoff Area=4,321 sf 100.00% Impervious Runoff Depth=3.08" Tc=6.0 min CN=98 Runoff=0.31 cfs 1,108 cf

**PR-VallisNOAA**

Type III 24-hr 2 Year Rainfall=3.31"

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<b>Pond 1P: Pipe Infiltration</b>	Peak Elev=141.68' Storage=45 cf Inflow=0.26 cfs 2,944 cf Discarded=0.24 cfs 2,944 cf Primary=0.00 cfs 0 cf Outflow=0.24 cfs 2,944 cf
<b>Pond 2P: Infiltration Pond</b>	Peak Elev=140.06' Storage=123 cf Inflow=0.36 cfs 2,983 cf Outflow=0.33 cfs 2,983 cf
<b>Pond 2Pa: Infiltration Pond after 25 year storm</b>	Peak Elev=0.00' Storage=0 cf Discarded=0.00 cfs 0 cf
<b>Pond 3P: Infiltration Chamber</b>	Peak Elev=1.40' Storage=281 cf Inflow=0.31 cfs 1,108 cf Outflow=0.06 cfs 1,108 cf
<b>Pond 4P: Infiltration Chamber</b>	Peak Elev=1.40' Storage=281 cf Inflow=0.31 cfs 1,108 cf Outflow=0.06 cfs 1,108 cf
<b>Pond 5P: Infiltration Chamber</b>	Peak Elev=1.29' Storage=252 cf Inflow=0.29 cfs 1,035 cf Outflow=0.06 cfs 1,035 cf
<b>Pond 6P: Infiltration Chamber</b>	Peak Elev=1.29' Storage=252 cf Inflow=0.29 cfs 1,035 cf Outflow=0.06 cfs 1,035 cf
<b>Pond 7P: Infiltration Chamber</b>	Peak Elev=1.18' Storage=220 cf Inflow=0.27 cfs 957 cf Outflow=0.06 cfs 957 cf
<b>Pond DEP1: Depression Front 109</b>	Peak Elev=151.00' Storage=0 cf Inflow=0.00 cfs 113 cf Outflow=0.00 cfs 113 cf
<b>Pond DEP2: Depression 109 at Vallis</b>	Peak Elev=149.00' Storage=1 cf Inflow=0.01 cfs 201 cf Outflow=0.01 cfs 201 cf
<b>Pond DEP3: Depression Mohawk Cul-De-Sac</b>	Peak Elev=149.00' Storage=0 cf Inflow=0.00 cfs 0 cf Outflow=0.00 cfs 0 cf
<b>Pond DEP4: Depression Mohawk</b>	Peak Elev=149.00' Storage=0 cf Inflow=0.00 cfs 0 cf Outflow=0.00 cfs 0 cf
<b>Pond DEP5: Depression Vallis Rt Side</b>	Peak Elev=148.00' Storage=0 cf Inflow=0.00 cfs 0 cf Outflow=0.00 cfs 0 cf

**Total Runoff Area = 582,198 sf Runoff Volume = 11,484 cf Average Runoff Depth = 0.24"**  
**79.89% Pervious = 465,090 sf 20.11% Impervious = 117,108 sf**

**Summary for Subcatchment P1:**

Runoff = 0.00 cfs @ 17.35 hrs, Volume= 113 cf, Depth= 0.02"

Routed to Pond DEP1 : Depression Front 109

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-48.00 hrs, dt= 0.05 hrs  
Type III 24-hr 2 Year Rainfall=3.31"

Area (ac)	CN	Description
0.115	98	Roofs, HSG A
0.117	98	Paved parking, HSG A
0.230	39	>75% Grass cover, Good, HSG A
1.020	30	Woods, Good, HSG A
1.482	42	Weighted Average
1.250		84.35% Pervious Area
0.232		15.65% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
9.5	50	0.0400	0.09		<b>Sheet Flow, sheet</b>
					Woods: Light underbrush n= 0.400 P2= 3.10"
4.8	250	0.0300	0.87		<b>Shallow Concentrated Flow, shallow</b>
					Woodland Kv= 5.0 fps
14.3	300	Total			

**Summary for Subcatchment P10:**

Runoff = 0.20 cfs @ 12.12 hrs, Volume= 872 cf, Depth= 0.53"

Routed to Pond 1P : Pipe Infiltration

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-48.00 hrs, dt= 0.05 hrs  
Type III 24-hr 2 Year Rainfall=3.31"

Area (ac)	CN	Description
0.193	98	Paved parking, HSG A
0.163	39	>75% Grass cover, Good, HSG A
0.098	30	Woods, Good, HSG A
0.454	62	Weighted Average
0.261		57.49% Pervious Area
0.193		42.51% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
6.0					<b>Direct Entry, Direct (calc 4.5 min.)</b>

**PR-VallisNOAA**

Type III 24-hr 2 Year Rainfall=3.31"

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**Summary for Subcatchment P11:**

Runoff = 0.00 cfs @ 0.00 hrs, Volume= 0 cf, Depth= 0.00"  
 Routed to Pond DEP5 : Depression Vallis Rt Side

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-48.00 hrs, dt= 0.05 hrs  
 Type III 24-hr 2 Year Rainfall=3.31"

Area (ac)	CN	Description
0.596	39	>75% Grass cover, Good, HSG A
0.213	30	Woods, Good, HSG A
0.809	37	Weighted Average
0.809		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
5.2	50	0.1800	0.16		<b>Sheet Flow, Sheet</b> Woods: Light underbrush n= 0.400 P2= 3.10"
0.2	25	0.1800	2.12		<b>Shallow Concentrated Flow, Shallow</b> Woodland Kv= 5.0 fps
1.2	100	0.0400	1.40		<b>Shallow Concentrated Flow, Shallow grass</b> Short Grass Pasture Kv= 7.0 fps
2.4	100	0.0100	0.70		<b>Shallow Concentrated Flow, shallow grass</b> Short Grass Pasture Kv= 7.0 fps
9.0	275	Total			

**Summary for Subcatchment P2:**

Runoff = 0.01 cfs @ 15.56 hrs, Volume= 201 cf, Depth= 0.04"  
 Routed to Pond DEP2 : Depression 109 at Vallis

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-48.00 hrs, dt= 0.05 hrs  
 Type III 24-hr 2 Year Rainfall=3.31"

Area (ac)	CN	Description
0.121	98	Roofs, HSG A
0.033	98	Paved parking, HSG A
0.769	39	>75% Grass cover, Good, HSG A
0.356	30	Woods, Good, HSG A
1.279	44	Weighted Average
1.125		87.96% Pervious Area
0.154		12.04% Impervious Area

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Type III 24-hr 2 Year Rainfall=3.31"

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Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
9.5	50	0.0400	0.09		<b>Sheet Flow, sheet</b> Woods: Light underbrush n= 0.400 P2= 3.10"
1.7	90	0.0300	0.87		<b>Shallow Concentrated Flow, shallow</b> Woodland Kv= 5.0 fps
3.2	135	0.0100	0.70		<b>Shallow Concentrated Flow, shallow grass</b> Short Grass Pasture Kv= 7.0 fps
1.5	140	0.0500	1.57		<b>Shallow Concentrated Flow, shallow</b> Short Grass Pasture Kv= 7.0 fps
15.9	415	Total			

**Summary for Subcatchment P3:**

Runoff = 0.19 cfs @ 12.58 hrs, Volume= 2,072 cf, Depth= 0.25"  
 Routed to Pond 1P : Pipe Infiltration

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-48.00 hrs, dt= 0.05 hrs  
 Type III 24-hr 2 Year Rainfall=3.31"

Area (ac)	CN	Description
0.029	98	Roofs, HSG A
* 0.194	98	Paved parking,(roadway) HSG A
* 0.203	98	Paved parking,(tennis ct, pool) HSG A
0.712	39	>75% Grass cover, Good, HSG A
* 0.835	30	Woods, Good, HSG A (removed area of new house, drive on Vallis Property)
* 0.168	98	Paved parking, HSG A additional lot on vallis property
* 0.099	98	Roofs, HSG A additional house next to vallis property
2.240	54	Weighted Average
1.547		69.06% Pervious Area
0.693		30.94% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
12.5	50	0.0200	0.07		<b>Sheet Flow, sheet</b> Woods: Light underbrush n= 0.400 P2= 3.10"
5.4	200	0.0150	0.61		<b>Shallow Concentrated Flow, shallow</b> Woodland Kv= 5.0 fps
4.2	250	0.0200	0.99		<b>Shallow Concentrated Flow, shallow grass</b> Short Grass Pasture Kv= 7.0 fps
0.5	66	0.0100	2.03		<b>Shallow Concentrated Flow, gutter</b> Paved Kv= 20.3 fps
22.6	566	Total			

**Summary for Subcatchment P4:**

Runoff = 0.01 cfs @ 14.74 hrs, Volume= 354 cf, Depth= 0.09"  
 Routed to Pond 2P : Infiltration Pond

**PR-VallisNOAA**

Type III 24-hr 2 Year Rainfall=3.31"

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Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-48.00 hrs, dt= 0.05 hrs  
 Type III 24-hr 2 Year Rainfall=3.31"

Area (ac)	CN	Description
0.168	98	Paved parking, HSG A
0.732	39	>75% Grass cover, Good, HSG A
0.181	30	Woods, Good, HSG A
1.081	47	Weighted Average
0.913		84.46% Pervious Area
0.168		15.54% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
9.5	50	0.0400	0.09		<b>Sheet Flow, sheet</b> Woods: Light underbrush n= 0.400 P2= 3.10"
5.0	150	0.0100	0.50		<b>Shallow Concentrated Flow, shallow</b> Woodland Kv= 5.0 fps
0.8	75	0.0500	1.57		<b>Shallow Concentrated Flow, shallow grass</b> Short Grass Pasture Kv= 7.0 fps
1.2	180	0.0150	2.49		<b>Shallow Concentrated Flow, gutter</b> Paved Kv= 20.3 fps
16.5	455	Total			

**Summary for Subcatchment P5:**

Runoff = 0.00 cfs @ 0.00 hrs, Volume= 0 cf, Depth= 0.00"  
 Routed to Pond 2P : Infiltration Pond

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-48.00 hrs, dt= 0.05 hrs  
 Type III 24-hr 2 Year Rainfall=3.31"

Area (ac)	CN	Description
0.783	39	>75% Grass cover, Good, HSG A
0.265	30	Woods, Good, HSG A
1.048	37	Weighted Average
1.048		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
9.5	50	0.0400	0.09		<b>Sheet Flow, sheet</b> Woods: Light underbrush n= 0.400 P2= 3.10"
1.7	50	0.0100	0.50		<b>Shallow Concentrated Flow, shallow</b> Woodland Kv= 5.0 fps
1.5	125	0.0400	1.40		<b>Shallow Concentrated Flow, shallow grass</b> Short Grass Pasture Kv= 7.0 fps
12.7	225	Total			

**Summary for Subcatchment P6:**

Runoff = 0.19 cfs @ 12.32 hrs, Volume= 1,429 cf, Depth= 0.35"  
 Routed to Pond 2P : Infiltration Pond

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-48.00 hrs, dt= 0.05 hrs  
 Type III 24-hr 2 Year Rainfall=3.31"

Area (ac)	CN	Description
0.351	98	Paved parking, HSG A
0.783	39	>75% Grass cover, Good, HSG A
1.134	57	Weighted Average
0.783		69.05% Pervious Area
0.351		30.95% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
3.3	50	0.0800	0.25		<b>Sheet Flow, sheet</b> Grass: Short n= 0.150 P2= 3.10"
5.0	150	0.0100	0.50		<b>Shallow Concentrated Flow, shallow</b> Woodland Kv= 5.0 fps
0.8	75	0.0500	1.57		<b>Shallow Concentrated Flow, shallow grass</b> Short Grass Pasture Kv= 7.0 fps
1.2	180	0.0150	2.49		<b>Shallow Concentrated Flow, gutter</b> Paved Kv= 20.3 fps
10.3	455	Total			

**Summary for Subcatchment P7:**

Runoff = 0.00 cfs @ 0.00 hrs, Volume= 0 cf, Depth= 0.00"  
 Routed to Pond DEP3 : Depression Mohawk Cul-De-Sac

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-48.00 hrs, dt= 0.05 hrs  
 Type III 24-hr 2 Year Rainfall=3.31"

Area (ac)	CN	Description
0.149	98	Paved parking, HSG A
0.413	39	>75% Grass cover, Good, HSG A
1.336	30	Woods, Good, HSG A
1.898	37	Weighted Average
1.749		92.15% Pervious Area
0.149		7.85% Impervious Area

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Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
4.4	30	0.1000	0.11		<b>Sheet Flow, sheet</b> Woods: Light underbrush n= 0.400 P2= 3.10"
0.4	20	0.0100	0.74		<b>Sheet Flow, sheet</b> Smooth surfaces n= 0.011 P2= 3.10"
1.2	50	0.0100	0.70		<b>Shallow Concentrated Flow, shallow grass</b> Short Grass Pasture Kv= 7.0 fps
6.0	100	Total			

**Summary for Subcatchment P8:**

Runoff = 0.17 cfs @ 12.27 hrs, Volume= 1,200 cf, Depth= 0.38"  
 Routed to Pond 2P : Infiltration Pond

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-48.00 hrs, dt= 0.05 hrs  
 Type III 24-hr 2 Year Rainfall=3.31"

Area (ac)	CN	Description
0.279	98	Paved parking, HSG A
0.589	39	>75% Grass cover, Good, HSG A
0.868	58	Weighted Average
0.589		67.86% Pervious Area
0.279		32.14% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
7.5	50	0.0100	0.11		<b>Sheet Flow, sheet</b> Grass: Short n= 0.150 P2= 3.10"
1.8	75	0.0100	0.70		<b>Shallow Concentrated Flow, shallow grass</b> Short Grass Pasture Kv= 7.0 fps
1.2	180	0.0150	2.49		<b>Shallow Concentrated Flow, gutter</b> Paved Kv= 20.3 fps
10.5	305	Total			

**Summary for Subcatchment P9:**

Runoff = 0.00 cfs @ 0.00 hrs, Volume= 0 cf, Depth= 0.00"  
 Routed to Pond DEP4 : Depression Mohawk

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-48.00 hrs, dt= 0.05 hrs  
 Type III 24-hr 2 Year Rainfall=3.31"

Area (ac)	CN	Description
0.345	39	>75% Grass cover, Good, HSG A
0.258	30	Woods, Good, HSG A
0.603	35	Weighted Average
0.603		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
7.5	50	0.0100	0.11		<b>Sheet Flow, sheet</b> Grass: Short n= 0.150 P2= 3.10"
1.3	150	0.0800	1.98		<b>Shallow Concentrated Flow, shallow grass</b> Short Grass Pasture Kv= 7.0 fps
8.8	200	Total			

**Summary for Subcatchment PH1: Lot 1**

Runoff = 0.31 cfs @ 12.09 hrs, Volume= 1,108 cf, Depth= 3.08"  
 Routed to Pond 4P : Infiltration Chamber

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-48.00 hrs, dt= 0.05 hrs  
 Type III 24-hr 2 Year Rainfall=3.31"

Area (sf)	CN	Description
4,321	98	Roofs, HSG A
4,321		100.00% Impervious Area

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

**Summary for Subcatchment PH2: Lot 2**

Runoff = 0.27 cfs @ 12.09 hrs, Volume= 957 cf, Depth= 3.08"  
 Routed to Pond 7P : Infiltration Chamber

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-48.00 hrs, dt= 0.05 hrs  
 Type III 24-hr 2 Year Rainfall=3.31"

Area (sf)	CN	Description
3,732	98	Roofs, HSG A
3,732		100.00% Impervious Area

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

**Summary for Subcatchment PH3: Lot 3**

Runoff = 0.29 cfs @ 12.09 hrs, Volume= 1,035 cf, Depth= 3.08"  
 Routed to Pond 6P : Infiltration Chamber

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-48.00 hrs, dt= 0.05 hrs  
 Type III 24-hr 2 Year Rainfall=3.31"

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Area (sf)	CN	Description
4,037	98	Roofs, HSG A
4,037		100.00% Impervious Area

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

**Summary for Subcatchment PH4: Lot 4**

Runoff = 0.29 cfs @ 12.09 hrs, Volume= 1,035 cf, Depth= 3.08"  
 Routed to Pond 5P : Infiltration Chamber

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-48.00 hrs, dt= 0.05 hrs  
 Type III 24-hr 2 Year Rainfall=3.31"

Area (sf)	CN	Description
4,037	98	Roofs, HSG A
4,037		100.00% Impervious Area

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

**Summary for Subcatchment PH5: Lot 5**

Runoff = 0.31 cfs @ 12.09 hrs, Volume= 1,108 cf, Depth= 3.08"  
 Routed to Pond 3P : Infiltration Chamber

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-48.00 hrs, dt= 0.05 hrs  
 Type III 24-hr 2 Year Rainfall=3.31"

Area (sf)	CN	Description
4,321	98	Roofs, HSG A
4,321		100.00% Impervious Area

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

**Summary for Pond 1P: Pipe Infiltration**

Inflow Area = 117,351 sf, 32.89% Impervious, Inflow Depth = 0.30" for 2 Year event  
 Inflow = 0.26 cfs @ 12.49 hrs, Volume= 2,944 cf  
 Outflow = 0.24 cfs @ 12.45 hrs, Volume= 2,944 cf, Atten= 8%, Lag= 0.0 min  
 Discarded = 0.24 cfs @ 12.45 hrs, Volume= 2,944 cf  
 Primary = 0.00 cfs @ 0.00 hrs, Volume= 0 cf  
 Routed to Pond 2P : Infiltration Pond

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

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Peak Elev= 141.68' @ 12.62 hrs Surf.Area= 1,491 sf Storage= 45 cf

Plug-Flow detention time= 2.5 min calculated for 2,941 cf (100% of inflow)

Center-of-Mass det. time= 2.5 min ( 955.0 - 952.4 )

Volume	Invert	Avail.Storage	Storage Description
#1	141.60'	3,387 cf	<b>Custom Stage Data (Prismatic)</b> Listed below (Recalc) 8,946 cf Overall - 479 cf Embedded = 8,467 cf x 40.0% Voids
#2	145.60'	479 cf	<b>18.0" Round Pipe Storage</b> Inside #1 L= 271.0'
		3,866 cf	Total Available Storage

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
141.60	1,491	0	0
147.60	1,491	8,946	8,946

Device	Routing	Invert	Outlet Devices
#1	Primary	146.10'	<b>18.0" Round Culvert w/ 6.0" inside fill</b> L= 1.0' CPP, end-section conforming to fill, Ke= 0.500 Inlet / Outlet Invert= 145.60' / 145.60' S= 0.0000 ' S= 0.0000 ' Cc= 0.900 n= 0.011 PVC, smooth interior, Flow Area= 1.25 sf
#2	Discarded	141.60'	<b>6.930 in/hr Exfiltration over Surface area</b>

**Discarded OutFlow** Max=0.24 cfs @ 12.45 hrs HW=141.66' (Free Discharge)↳ **2=Exfiltration** (Exfiltration Controls 0.24 cfs)**Primary OutFlow** Max=0.00 cfs @ 0.00 hrs HW=141.60' (Free Discharge)↳ **1=Culvert** ( Controls 0.00 cfs)**Summary for Pond 2P: Infiltration Pond**

Inflow Area = 297,297 sf, 24.67% Impervious, Inflow Depth = 0.12" for 2 Year event  
 Inflow = 0.36 cfs @ 12.29 hrs, Volume= 2,983 cf  
 Outflow = 0.33 cfs @ 12.43 hrs, Volume= 2,983 cf, Atten= 8%, Lag= 8.1 min  
 Discarded = 0.33 cfs @ 12.43 hrs, Volume= 2,983 cf

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

Peak Elev= 140.06' @ 12.43 hrs Surf.Area= 2,230 sf Storage= 123 cf

Plug-Flow detention time= 6.2 min calculated for 2,980 cf (100% of inflow)

Center-of-Mass det. time= 6.2 min ( 955.4 - 949.2 )

Volume	Invert	Avail.Storage	Storage Description
#1	140.00'	29,469 cf	<b>Custom Stage Data (Prismatic)</b> Listed below (Recalc)

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
140.00	2,198	0	0
141.00	2,778	2,488	2,488
142.00	3,412	3,095	5,583
143.00	5,142	4,277	9,860
144.00	6,042	5,592	15,452
145.00	6,998	6,520	21,972
145.50	7,497	3,624	25,596
146.00	7,995	3,873	29,469

Device	Routing	Invert	Outlet Devices
#1	Discarded	140.00'	<b>6.930 in/hr Exfiltration over Surface area</b>

**Discarded OutFlow** Max=0.36 cfs @ 12.43 hrs HW=140.06' (Free Discharge)

↑**1=Exfiltration** (Exfiltration Controls 0.36 cfs)

### Summary for Pond 2Pa: Infiltration Pond after 25 year storm

Volume	Invert	Avail.Storage	Storage Description
#1	143.25'	26,825 cf	<b>Custom Stage Data (Prismatic)</b> Listed below (Recalc)

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
143.25	5,362	0	0
144.00	6,042	4,277	4,277
145.00	6,998	6,520	10,797
145.50	7,497	3,624	14,420
146.00	7,995	3,873	18,293
147.00	9,068	8,532	26,825

Device	Routing	Invert	Outlet Devices
#1	Discarded	143.25'	<b>6.930 in/hr Exfiltration over Surface area</b>

**Discarded OutFlow** Max=0.00 cfs @ 0.00 hrs HW=0.00' (Free Discharge)

↑**1=Exfiltration** ( Controls 0.00 cfs)

### Summary for Pond 3P: Infiltration Chamber

Inflow Area = 4,321 sf, 100.00% Impervious, Inflow Depth = 3.08" for 2 Year event  
 Inflow = 0.31 cfs @ 12.09 hrs, Volume= 1,108 cf  
 Outflow = 0.06 cfs @ 11.70 hrs, Volume= 1,108 cf, Atten= 82%, Lag= 0.0 min  
 Discarded = 0.06 cfs @ 11.70 hrs, Volume= 1,108 cf

Routing by Stor-Ind method, Time Span= 0.00-48.00 hrs, dt= 0.05 hrs  
 Peak Elev= 1.40' @ 12.54 hrs Surf.Area= 350 sf Storage= 281 cf

Plug-Flow detention time= 27.4 min calculated for 1,107 cf (100% of inflow)  
 Center-of-Mass det. time= 27.3 min ( 783.0 - 755.7 )

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Volume	Invert	Avail.Storage	Storage Description
#1A	0.00'	538 cf	<b>8.42'W x 41.55'L x 5.50'H Field A</b> 1,923 cf Overall - 580 cf Embedded = 1,344 cf x 40.0% Voids
#2A	0.75'	580 cf	<b>ADS_StormTech MC-3500 d +Cap</b> x 5 Inside #1 Effective Size= 70.4"W x 45.0"H => 15.33 sf x 7.17'L = 110.0 cf Overall Size= 77.0"W x 45.0"H x 7.50'L with 0.33' Overlap Cap Storage= 14.9 cf x 2 x 1 rows = 29.8 cf
		1,117 cf	Total Available Storage

Storage Group A created with Chamber Wizard

Device	Routing	Invert	Outlet Devices
#1	Discarded	0.00'	<b>6.930 in/hr Exfiltration over Surface area</b>

**Discarded OutFlow** Max=0.06 cfs @ 11.70 hrs HW=0.06' (Free Discharge)

↑1=Exfiltration (Exfiltration Controls 0.06 cfs)

**Summary for Pond 4P: Infiltration Chamber**

Inflow Area = 4,321 sf, 100.00% Impervious, Inflow Depth = 3.08" for 2 Year event  
 Inflow = 0.31 cfs @ 12.09 hrs, Volume= 1,108 cf  
 Outflow = 0.06 cfs @ 11.70 hrs, Volume= 1,108 cf, Atten= 82%, Lag= 0.0 min  
 Discarded = 0.06 cfs @ 11.70 hrs, Volume= 1,108 cf

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

Peak Elev= 1.40' @ 12.54 hrs Surf.Area= 350 sf Storage= 281 cf

Plug-Flow detention time= 27.4 min calculated for 1,107 cf (100% of inflow)

Center-of-Mass det. time= 27.3 min ( 783.0 - 755.7 )

Volume	Invert	Avail.Storage	Storage Description
#1A	0.00'	538 cf	<b>8.42'W x 41.55'L x 5.50'H Field A</b> 1,923 cf Overall - 580 cf Embedded = 1,344 cf x 40.0% Voids
#2A	0.75'	580 cf	<b>ADS_StormTech MC-3500 d +Cap</b> x 5 Inside #1 Effective Size= 70.4"W x 45.0"H => 15.33 sf x 7.17'L = 110.0 cf Overall Size= 77.0"W x 45.0"H x 7.50'L with 0.33' Overlap Cap Storage= 14.9 cf x 2 x 1 rows = 29.8 cf
		1,117 cf	Total Available Storage

Storage Group A created with Chamber Wizard

Device	Routing	Invert	Outlet Devices
#1	Discarded	0.00'	<b>6.930 in/hr Exfiltration over Surface area</b>

**Discarded OutFlow** Max=0.06 cfs @ 11.70 hrs HW=0.06' (Free Discharge)

↑1=Exfiltration (Exfiltration Controls 0.06 cfs)

**Summary for Pond 5P: Infiltration Chamber**

Inflow Area = 4,037 sf, 100.00% Impervious, Inflow Depth = 3.08" for 2 Year event  
 Inflow = 0.29 cfs @ 12.09 hrs, Volume= 1,035 cf  
 Outflow = 0.06 cfs @ 11.75 hrs, Volume= 1,035 cf, Atten= 81%, Lag= 0.0 min  
 Discarded = 0.06 cfs @ 11.75 hrs, Volume= 1,035 cf

Routing by Stor-Ind method, Time Span= 0.00-48.00 hrs, dt= 0.05 hrs  
 Peak Elev= 1.29' @ 12.52 hrs Surf.Area= 350 sf Storage= 252 cf

Plug-Flow detention time= 23.9 min calculated for 1,034 cf (100% of inflow)  
 Center-of-Mass det. time= 23.9 min ( 779.6 - 755.7 )

Volume	Invert	Avail.Storage	Storage Description
#1A	0.00'	538 cf	<b>8.42'W x 41.55'L x 5.50'H Field A</b> 1,923 cf Overall - 580 cf Embedded = 1,344 cf x 40.0% Voids
#2A	0.75'	580 cf	<b>ADS_StormTech MC-3500 d +Cap</b> x 5 Inside #1 Effective Size= 70.4"W x 45.0"H => 15.33 sf x 7.17'L = 110.0 cf Overall Size= 77.0"W x 45.0"H x 7.50'L with 0.33' Overlap Cap Storage= 14.9 cf x 2 x 1 rows = 29.8 cf
		1,117 cf	Total Available Storage

Storage Group A created with Chamber Wizard

Device	Routing	Invert	Outlet Devices
#1	Discarded	0.00'	<b>6.930 in/hr Exfiltration over Surface area</b>

**Discarded OutFlow** Max=0.06 cfs @ 11.75 hrs HW=0.07' (Free Discharge)  
 ↑ **1=Exfiltration** (Exfiltration Controls 0.06 cfs)

**Summary for Pond 6P: Infiltration Chamber**

Inflow Area = 4,037 sf, 100.00% Impervious, Inflow Depth = 3.08" for 2 Year event  
 Inflow = 0.29 cfs @ 12.09 hrs, Volume= 1,035 cf  
 Outflow = 0.06 cfs @ 11.75 hrs, Volume= 1,035 cf, Atten= 81%, Lag= 0.0 min  
 Discarded = 0.06 cfs @ 11.75 hrs, Volume= 1,035 cf

Routing by Stor-Ind method, Time Span= 0.00-48.00 hrs, dt= 0.05 hrs  
 Peak Elev= 1.29' @ 12.52 hrs Surf.Area= 350 sf Storage= 252 cf

Plug-Flow detention time= 23.9 min calculated for 1,034 cf (100% of inflow)  
 Center-of-Mass det. time= 23.9 min ( 779.6 - 755.7 )

Volume	Invert	Avail.Storage	Storage Description
#1A	0.00'	538 cf	<b>8.42'W x 41.55'L x 5.50'H Field A</b> 1,923 cf Overall - 580 cf Embedded = 1,344 cf x 40.0% Voids
#2A	0.75'	580 cf	<b>ADS_StormTech MC-3500 d +Cap</b> x 5 Inside #1 Effective Size= 70.4"W x 45.0"H => 15.33 sf x 7.17'L = 110.0 cf Overall Size= 77.0"W x 45.0"H x 7.50'L with 0.33' Overlap Cap Storage= 14.9 cf x 2 x 1 rows = 29.8 cf
		1,117 cf	Total Available Storage

Storage Group A created with Chamber Wizard

Device	Routing	Invert	Outlet Devices
#1	Discarded	0.00'	<b>6.930 in/hr Exfiltration over Surface area</b>

**Discarded OutFlow** Max=0.06 cfs @ 11.75 hrs HW=0.07' (Free Discharge)

↑**1=Exfiltration** (Exfiltration Controls 0.06 cfs)

### Summary for Pond 7P: Infiltration Chamber

Inflow Area = 3,732 sf, 100.00% Impervious, Inflow Depth = 3.08" for 2 Year event  
 Inflow = 0.27 cfs @ 12.09 hrs, Volume= 957 cf  
 Outflow = 0.06 cfs @ 11.75 hrs, Volume= 957 cf, Atten= 79%, Lag= 0.0 min  
 Discarded = 0.06 cfs @ 11.75 hrs, Volume= 957 cf

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

Peak Elev= 1.18' @ 12.50 hrs Surf.Area= 350 sf Storage= 220 cf

Plug-Flow detention time= 20.5 min calculated for 956 cf (100% of inflow)

Center-of-Mass det. time= 20.5 min ( 776.2 - 755.7 )

Volume	Invert	Avail.Storage	Storage Description
#1A	0.00'	538 cf	<b>8.42'W x 41.55'L x 5.50'H Field A</b> 1,923 cf Overall - 580 cf Embedded = 1,344 cf x 40.0% Voids
#2A	0.75'	580 cf	<b>ADS_StormTech MC-3500 d +Cap x 5 Inside #1</b> Effective Size= 70.4"W x 45.0"H => 15.33 sf x 7.17'L = 110.0 cf Overall Size= 77.0"W x 45.0"H x 7.50'L with 0.33' Overlap Cap Storage= 14.9 cf x 2 x 1 rows = 29.8 cf
1,117 cf			Total Available Storage

Storage Group A created with Chamber Wizard

Device	Routing	Invert	Outlet Devices
#1	Discarded	0.00'	<b>6.930 in/hr Exfiltration over Surface area</b>

**Discarded OutFlow** Max=0.06 cfs @ 11.75 hrs HW=0.07' (Free Discharge)

↑**1=Exfiltration** (Exfiltration Controls 0.06 cfs)

### Summary for Pond DEP1: Depression Front 109

Inflow Area = 64,556 sf, 15.65% Impervious, Inflow Depth = 0.02" for 2 Year event  
 Inflow = 0.00 cfs @ 17.35 hrs, Volume= 113 cf  
 Outflow = 0.00 cfs @ 17.41 hrs, Volume= 113 cf, Atten= 0%, Lag= 3.3 min  
 Discarded = 0.00 cfs @ 17.41 hrs, Volume= 113 cf

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

Peak Elev= 151.00' @ 17.41 hrs Surf.Area= 2,270 sf Storage= 0 cf

Plug-Flow detention time= 0.5 min calculated for 112 cf (100% of inflow)

Center-of-Mass det. time= 0.5 min ( 1,184.9 - 1,184.4 )

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Volume	Invert	Avail.Storage	Storage Description
#1	151.00'	1,818 cf	<b>Custom Stage Data (Prismatic)</b> Listed below (Recalc)

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
151.00	2,270	0	0
151.50	5,000	1,818	1,818

Device	Routing	Invert	Outlet Devices
#1	Discarded	151.00'	<b>6.930 in/hr Exfiltration over Surface area</b>

**Discarded OutFlow** Max=0.36 cfs @ 17.41 hrs HW=151.00' (Free Discharge)

↑1=Exfiltration (Exfiltration Controls 0.36 cfs)

**Summary for Pond DEP2: Depression 109 at Vallis**

Inflow Area = 55,713 sf, 12.04% Impervious, Inflow Depth = 0.04" for 2 Year event  
 Inflow = 0.01 cfs @ 15.56 hrs, Volume= 201 cf  
 Outflow = 0.01 cfs @ 15.58 hrs, Volume= 201 cf, Atten= 0%, Lag= 1.6 min  
 Discarded = 0.01 cfs @ 15.58 hrs, Volume= 201 cf

Routing by Stor-Ind method, Time Span= 0.00-48.00 hrs, dt= 0.05 hrs  
 Peak Elev= 149.00' @ 15.58 hrs Surf.Area= 150 sf Storage= 1 cf

Plug-Flow detention time= 1.4 min calculated for 201 cf (100% of inflow)  
 Center-of-Mass det. time= 1.4 min ( 1,122.1 - 1,120.7 )

Volume	Invert	Avail.Storage	Storage Description
#1	149.00'	2,696 cf	<b>Custom Stage Data (Prismatic)</b> Listed below (Recalc)

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
149.00	141	0	0
150.00	2,500	1,321	1,321
150.50	3,000	1,375	2,696

Device	Routing	Invert	Outlet Devices
#1	Discarded	149.00'	<b>6.930 in/hr Exfiltration over Surface area</b>

**Discarded OutFlow** Max=0.02 cfs @ 15.58 hrs HW=149.00' (Free Discharge)

↑1=Exfiltration (Exfiltration Controls 0.02 cfs)

**Summary for Pond DEP3: Depression Mohawk Cul-De-Sac**

Inflow Area = 82,677 sf, 7.85% Impervious, Inflow Depth = 0.00" for 2 Year event  
 Inflow = 0.00 cfs @ 0.00 hrs, Volume= 0 cf  
 Outflow = 0.00 cfs @ 0.00 hrs, Volume= 0 cf, Atten= 0%, Lag= 0.0 min  
 Discarded = 0.00 cfs @ 0.00 hrs, Volume= 0 cf

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Routing by Stor-Ind method, Time Span= 0.00-48.00 hrs, dt= 0.05 hrs  
 Peak Elev= 149.00' @ 0.00 hrs Surf.Area= 7,000 sf Storage= 0 cf

Plug-Flow detention time= (not calculated: initial storage exceeds outflow)  
 Center-of-Mass det. time= (not calculated: no inflow)

Volume	Invert	Avail.Storage	Storage Description
#1	149.00'	4,250 cf	<b>Custom Stage Data (Prismatic)</b> Listed below (Recalc)

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
149.00	7,000	0	0
149.50	10,000	4,250	4,250

Device	Routing	Invert	Outlet Devices
#1	Discarded	149.00'	<b>6.930 in/hr Exfiltration over Surface area</b>

**Discarded OutFlow** Max=0.00 cfs @ 0.00 hrs HW=149.00' (Free Discharge)  
 ↑1=Exfiltration (Passes 0.00 cfs of 1.12 cfs potential flow)

**Summary for Pond DEP4: Depression Mohawk**

Inflow Area = 26,267 sf, 0.00% Impervious, Inflow Depth = 0.00" for 2 Year event  
 Inflow = 0.00 cfs @ 0.00 hrs, Volume= 0 cf  
 Outflow = 0.00 cfs @ 0.00 hrs, Volume= 0 cf, Atten= 0%, Lag= 0.0 min  
 Discarded = 0.00 cfs @ 0.00 hrs, Volume= 0 cf

Routing by Stor-Ind method, Time Span= 0.00-48.00 hrs, dt= 0.05 hrs  
 Peak Elev= 149.00' @ 0.00 hrs Surf.Area= 2,900 sf Storage= 0 cf

Plug-Flow detention time= (not calculated: initial storage exceeds outflow)  
 Center-of-Mass det. time= (not calculated: no inflow)

Volume	Invert	Avail.Storage	Storage Description
#1	149.00'	1,475 cf	<b>Custom Stage Data (Prismatic)</b> Listed below (Recalc)

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
149.00	2,900	0	0
149.50	3,000	1,475	1,475

Device	Routing	Invert	Outlet Devices
#1	Discarded	149.00'	<b>6.930 in/hr Exfiltration over Surface area</b>

**Discarded OutFlow** Max=0.00 cfs @ 0.00 hrs HW=149.00' (Free Discharge)  
 ↑1=Exfiltration (Passes 0.00 cfs of 0.47 cfs potential flow)

**Summary for Pond DEP5: Depression Vallis Rt Side**

Inflow Area = 35,240 sf, 0.00% Impervious, Inflow Depth = 0.00" for 2 Year event  
 Inflow = 0.00 cfs @ 0.00 hrs, Volume= 0 cf  
 Outflow = 0.00 cfs @ 0.00 hrs, Volume= 0 cf, Atten= 0%, Lag= 0.0 min  
 Discarded = 0.00 cfs @ 0.00 hrs, Volume= 0 cf

Routing by Stor-Ind method, Time Span= 0.00-48.00 hrs, dt= 0.05 hrs  
 Peak Elev= 148.00' @ 0.00 hrs Surf.Area= 2,800 sf Storage= 0 cf

Plug-Flow detention time= (not calculated: initial storage exceeds outflow)  
 Center-of-Mass det. time= (not calculated: no inflow)

Volume	Invert	Avail.Storage	Storage Description
#1	148.00'	4,050 cf	<b>Custom Stage Data (Prismatic)</b> Listed below (Recalc)

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
148.00	2,800	0	0
149.00	5,300	4,050	4,050

Device	Routing	Invert	Outlet Devices
#1	Discarded	148.00'	<b>6.930 in/hr Exfiltration over Surface area</b>

**Discarded OutFlow** Max=0.00 cfs @ 0.00 hrs HW=148.00' (Free Discharge)

↑ **1=Exfiltration** (Passes 0.00 cfs of 0.45 cfs potential flow)

**PR-VallisNOAA**

Type III 24-hr 10 Year Rainfall=5.22"

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

<b>Subcatchment P1:</b>	Runoff Area=1.482 ac 15.65% Impervious Runoff Depth=0.37" Flow Length=300' Tc=14.3 min CN=42 Runoff=0.19 cfs 1,998 cf
<b>Subcatchment P10:</b>	Runoff Area=0.454 ac 42.51% Impervious Runoff Depth=1.58" Tc=6.0 min CN=62 Runoff=0.77 cfs 2,597 cf
<b>Subcatchment P11:</b>	Runoff Area=0.809 ac 0.00% Impervious Runoff Depth=0.17" Flow Length=275' Tc=9.0 min CN=37 Runoff=0.02 cfs 513 cf
<b>Subcatchment P2:</b>	Runoff Area=1.279 ac 12.04% Impervious Runoff Depth=0.46" Flow Length=415' Tc=15.9 min CN=44 Runoff=0.24 cfs 2,156 cf
<b>Subcatchment P3:</b>	Runoff Area=2.240 ac 30.94% Impervious Runoff Depth=1.03" Flow Length=566' Tc=22.6 min CN=54 Runoff=1.38 cfs 8,354 cf
<b>Subcatchment P4:</b>	Runoff Area=1.081 ac 15.54% Impervious Runoff Depth=0.62" Flow Length=455' Tc=16.5 min CN=47 Runoff=0.33 cfs 2,422 cf
<b>Subcatchment P5:</b>	Runoff Area=1.048 ac 0.00% Impervious Runoff Depth=0.17" Flow Length=225' Tc=12.7 min CN=37 Runoff=0.03 cfs 665 cf
<b>Subcatchment P6:</b>	Runoff Area=1.134 ac 30.95% Impervious Runoff Depth=1.22" Flow Length=455' Tc=10.3 min CN=57 Runoff=1.20 cfs 5,037 cf
<b>Subcatchment P7:</b>	Runoff Area=1.898 ac 7.85% Impervious Runoff Depth=0.17" Flow Length=100' Tc=6.0 min CN=37 Runoff=0.05 cfs 1,204 cf
<b>Subcatchment P8:</b>	Runoff Area=0.868 ac 32.14% Impervious Runoff Depth=1.29" Flow Length=305' Tc=10.5 min CN=58 Runoff=0.98 cfs 4,070 cf
<b>Subcatchment P9:</b>	Runoff Area=0.603 ac 0.00% Impervious Runoff Depth=0.11" Flow Length=200' Tc=8.8 min CN=35 Runoff=0.01 cfs 247 cf
<b>Subcatchment PH1: Lot 1</b>	Runoff Area=4,321 sf 100.00% Impervious Runoff Depth=4.98" Tc=6.0 min CN=98 Runoff=0.49 cfs 1,794 cf
<b>Subcatchment PH2: Lot 2</b>	Runoff Area=3,732 sf 100.00% Impervious Runoff Depth=4.98" Tc=6.0 min CN=98 Runoff=0.43 cfs 1,550 cf
<b>Subcatchment PH3: Lot 3</b>	Runoff Area=4,037 sf 100.00% Impervious Runoff Depth=4.98" Tc=6.0 min CN=98 Runoff=0.46 cfs 1,676 cf
<b>Subcatchment PH4: Lot 4</b>	Runoff Area=4,037 sf 100.00% Impervious Runoff Depth=4.98" Tc=6.0 min CN=98 Runoff=0.46 cfs 1,676 cf
<b>Subcatchment PH5: Lot 5</b>	Runoff Area=4,321 sf 100.00% Impervious Runoff Depth=4.98" Tc=6.0 min CN=98 Runoff=0.49 cfs 1,794 cf

**PR-VallisNOAA**

Type III 24-hr 10 Year Rainfall=5.22"

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**Pond 1P: Pipe Infiltration** Peak Elev=146.37' Storage=2,997 cf Inflow=1.73 cfs 10,951 cf  
Discarded=0.24 cfs 9,445 cf Primary=0.51 cfs 1,506 cf Outflow=0.75 cfs 10,951 cf

**Pond 2P: Infiltration Pond** Peak Elev=141.57' Storage=4,175 cf Inflow=2.31 cfs 13,700 cf  
Outflow=0.50 cfs 13,700 cf

**Pond 2Pa: Infiltration Pond after 25 year storm** Peak Elev=0.00' Storage=0 cf  
Discarded=0.00 cfs 0 cf

**Pond 3P: Infiltration Chamber** Peak Elev=2.49' Storage=562 cf Inflow=0.49 cfs 1,794 cf  
Outflow=0.06 cfs 1,794 cf

**Pond 4P: Infiltration Chamber** Peak Elev=2.49' Storage=562 cf Inflow=0.49 cfs 1,794 cf  
Outflow=0.06 cfs 1,794 cf

**Pond 5P: Infiltration Chamber** Peak Elev=2.28' Storage=510 cf Inflow=0.46 cfs 1,676 cf  
Outflow=0.06 cfs 1,676 cf

**Pond 6P: Infiltration Chamber** Peak Elev=2.28' Storage=510 cf Inflow=0.46 cfs 1,676 cf  
Outflow=0.06 cfs 1,676 cf

**Pond 7P: Infiltration Chamber** Peak Elev=2.07' Storage=456 cf Inflow=0.43 cfs 1,550 cf  
Outflow=0.06 cfs 1,550 cf

**Pond DEP1: Depression Front 109** Peak Elev=151.00' Storage=6 cf Inflow=0.19 cfs 1,998 cf  
Outflow=0.19 cfs 1,998 cf

**Pond DEP2: Depression 109 at Vallis** Peak Elev=149.33' Storage=178 cf Inflow=0.24 cfs 2,156 cf  
Outflow=0.15 cfs 2,156 cf

**Pond DEP3: Depression Mohawk Cul-De-Sac** Peak Elev=149.00' Storage=1 cf Inflow=0.05 cfs 1,204 cf  
Outflow=0.05 cfs 1,204 cf

**Pond DEP4: Depression Mohawk** Peak Elev=149.00' Storage=0 cf Inflow=0.01 cfs 247 cf  
Outflow=0.01 cfs 247 cf

**Pond DEP5: Depression Vallis Rt Side** Peak Elev=148.00' Storage=1 cf Inflow=0.02 cfs 513 cf  
Outflow=0.02 cfs 513 cf

**Total Runoff Area = 582,198 sf Runoff Volume = 37,755 cf Average Runoff Depth = 0.78"**  
**79.89% Pervious = 465,090 sf 20.11% Impervious = 117,108 sf**

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

<b>Subcatchment P1:</b>	Runoff Area=1.482 ac 15.65% Impervious Runoff Depth=0.76" Flow Length=300' Tc=14.3 min CN=42 Runoff=0.57 cfs 4,101 cf
<b>Subcatchment P10:</b>	Runoff Area=0.454 ac 42.51% Impervious Runoff Depth=2.38" Tc=6.0 min CN=62 Runoff=1.21 cfs 3,915 cf
<b>Subcatchment P11:</b>	Runoff Area=0.809 ac 0.00% Impervious Runoff Depth=0.45" Flow Length=275' Tc=9.0 min CN=37 Runoff=0.13 cfs 1,323 cf
<b>Subcatchment P2:</b>	Runoff Area=1.279 ac 12.04% Impervious Runoff Depth=0.90" Flow Length=415' Tc=15.9 min CN=44 Runoff=0.64 cfs 4,179 cf
<b>Subcatchment P3:</b>	Runoff Area=2.240 ac 30.94% Impervious Runoff Depth=1.67" Flow Length=566' Tc=22.6 min CN=54 Runoff=2.51 cfs 13,618 cf
<b>Subcatchment P4:</b>	Runoff Area=1.081 ac 15.54% Impervious Runoff Depth=1.12" Flow Length=455' Tc=16.5 min CN=47 Runoff=0.76 cfs 4,389 cf
<b>Subcatchment P5:</b>	Runoff Area=1.048 ac 0.00% Impervious Runoff Depth=0.45" Flow Length=225' Tc=12.7 min CN=37 Runoff=0.17 cfs 1,714 cf
<b>Subcatchment P6:</b>	Runoff Area=1.134 ac 30.95% Impervious Runoff Depth=1.93" Flow Length=455' Tc=10.3 min CN=57 Runoff=2.04 cfs 7,946 cf
<b>Subcatchment P7:</b>	Runoff Area=1.898 ac 7.85% Impervious Runoff Depth=0.45" Flow Length=100' Tc=6.0 min CN=37 Runoff=0.33 cfs 3,105 cf
<b>Subcatchment P8:</b>	Runoff Area=0.868 ac 32.14% Impervious Runoff Depth=2.02" Flow Length=305' Tc=10.5 min CN=58 Runoff=1.64 cfs 6,357 cf
<b>Subcatchment P9:</b>	Runoff Area=0.603 ac 0.00% Impervious Runoff Depth=0.34" Flow Length=200' Tc=8.8 min CN=35 Runoff=0.06 cfs 748 cf
<b>Subcatchment PH1: Lot 1</b>	Runoff Area=4,321 sf 100.00% Impervious Runoff Depth=6.17" Tc=6.0 min CN=98 Runoff=0.61 cfs 2,222 cf
<b>Subcatchment PH2: Lot 2</b>	Runoff Area=3,732 sf 100.00% Impervious Runoff Depth=6.17" Tc=6.0 min CN=98 Runoff=0.53 cfs 1,919 cf
<b>Subcatchment PH3: Lot 3</b>	Runoff Area=4,037 sf 100.00% Impervious Runoff Depth=6.17" Tc=6.0 min CN=98 Runoff=0.57 cfs 2,076 cf
<b>Subcatchment PH4: Lot 4</b>	Runoff Area=4,037 sf 100.00% Impervious Runoff Depth=6.17" Tc=6.0 min CN=98 Runoff=0.57 cfs 2,076 cf
<b>Subcatchment PH5: Lot 5</b>	Runoff Area=4,321 sf 100.00% Impervious Runoff Depth=6.17" Tc=6.0 min CN=98 Runoff=0.61 cfs 2,222 cf

**PR-VallisNOAA**

Type III 24-hr 25 Year Rainfall=6.41"

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**Pond 1P: Pipe Infiltration** Peak Elev=146.86' Storage=3,396 cf Inflow=3.04 cfs 17,533 cf  
Discarded=0.24 cfs 11,029 cf Primary=2.37 cfs 6,505 cf Outflow=2.61 cfs 17,533 cf

**Pond 2P: Infiltration Pond** Peak Elev=143.25' Storage=11,185 cf Inflow=4.98 cfs 26,911 cf  
Outflow=0.86 cfs 26,911 cf

**Pond 2Pa: Infiltration Pond after 25 year storm** Peak Elev=0.00' Storage=0 cf  
Discarded=0.00 cfs 0 cf

**Pond 3P: Infiltration Chamber** Peak Elev=3.31' Storage=757 cf Inflow=0.61 cfs 2,222 cf  
Outflow=0.06 cfs 2,222 cf

**Pond 4P: Infiltration Chamber** Peak Elev=3.31' Storage=757 cf Inflow=0.61 cfs 2,222 cf  
Outflow=0.06 cfs 2,222 cf

**Pond 5P: Infiltration Chamber** Peak Elev=3.01' Storage=687 cf Inflow=0.57 cfs 2,076 cf  
Outflow=0.06 cfs 2,076 cf

**Pond 6P: Infiltration Chamber** Peak Elev=3.01' Storage=687 cf Inflow=0.57 cfs 2,076 cf  
Outflow=0.06 cfs 2,076 cf

**Pond 7P: Infiltration Chamber** Peak Elev=2.70' Storage=613 cf Inflow=0.53 cfs 1,919 cf  
Outflow=0.06 cfs 1,919 cf

**Pond DEP1: Depression Front 109** Peak Elev=151.07' Storage=183 cf Inflow=0.57 cfs 4,101 cf  
Outflow=0.43 cfs 4,101 cf

**Pond DEP2: Depression 109 at Vallis** Peak Elev=149.70' Storage=677 cf Inflow=0.64 cfs 4,179 cf  
Outflow=0.29 cfs 4,179 cf

**Pond DEP3: Depression Mohawk Cul-De-Sac** Peak Elev=149.00' Storage=10 cf Inflow=0.33 cfs 3,105 cf  
Outflow=0.33 cfs 3,105 cf

**Pond DEP4: Depression Mohawk** Peak Elev=149.00' Storage=2 cf Inflow=0.06 cfs 748 cf  
Outflow=0.06 cfs 748 cf

**Pond DEP5: Depression Vallis Rt Side** Peak Elev=148.00' Storage=8 cf Inflow=0.13 cfs 1,323 cf  
Outflow=0.13 cfs 1,323 cf

**Total Runoff Area = 582,198 sf Runoff Volume = 61,912 cf Average Runoff Depth = 1.28"**  
**79.89% Pervious = 465,090 sf 20.11% Impervious = 117,108 sf**

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

<b>Subcatchment P1:</b>	Runoff Area=1.482 ac 15.65% Impervious Runoff Depth=1.56" Flow Length=300' Tc=14.3 min CN=42 Runoff=1.60 cfs 8,370 cf
<b>Subcatchment P10:</b>	Runoff Area=0.454 ac 42.51% Impervious Runoff Depth=3.74" Tc=6.0 min CN=62 Runoff=1.94 cfs 6,169 cf
<b>Subcatchment P11:</b>	Runoff Area=0.809 ac 0.00% Impervious Runoff Depth=1.07" Flow Length=275' Tc=9.0 min CN=37 Runoff=0.52 cfs 3,140 cf
<b>Subcatchment P2:</b>	Runoff Area=1.279 ac 12.04% Impervious Runoff Depth=1.76" Flow Length=415' Tc=15.9 min CN=44 Runoff=1.60 cfs 8,173 cf
<b>Subcatchment P3:</b>	Runoff Area=2.240 ac 30.94% Impervious Runoff Depth=2.84" Flow Length=566' Tc=22.6 min CN=54 Runoff=4.54 cfs 23,075 cf
<b>Subcatchment P4:</b>	Runoff Area=1.081 ac 15.54% Impervious Runoff Depth=2.07" Flow Length=455' Tc=16.5 min CN=47 Runoff=1.68 cfs 8,142 cf
<b>Subcatchment P5:</b>	Runoff Area=1.048 ac 0.00% Impervious Runoff Depth=1.07" Flow Length=225' Tc=12.7 min CN=37 Runoff=0.62 cfs 4,067 cf
<b>Subcatchment P6:</b>	Runoff Area=1.134 ac 30.95% Impervious Runoff Depth=3.17" Flow Length=455' Tc=10.3 min CN=57 Runoff=3.52 cfs 13,066 cf
<b>Subcatchment P7:</b>	Runoff Area=1.898 ac 7.85% Impervious Runoff Depth=1.07" Flow Length=100' Tc=6.0 min CN=37 Runoff=1.34 cfs 7,366 cf
<b>Subcatchment P8:</b>	Runoff Area=0.868 ac 32.14% Impervious Runoff Depth=3.29" Flow Length=305' Tc=10.5 min CN=58 Runoff=2.79 cfs 10,357 cf
<b>Subcatchment P9:</b>	Runoff Area=0.603 ac 0.00% Impervious Runoff Depth=0.89" Flow Length=200' Tc=8.8 min CN=35 Runoff=0.27 cfs 1,941 cf
<b>Subcatchment PH1: Lot 1</b>	Runoff Area=4,321 sf 100.00% Impervious Runoff Depth=8.00" Tc=6.0 min CN=98 Runoff=0.78 cfs 2,881 cf
<b>Subcatchment PH2: Lot 2</b>	Runoff Area=3,732 sf 100.00% Impervious Runoff Depth=8.00" Tc=6.0 min CN=98 Runoff=0.68 cfs 2,488 cf
<b>Subcatchment PH3: Lot 3</b>	Runoff Area=4,037 sf 100.00% Impervious Runoff Depth=8.00" Tc=6.0 min CN=98 Runoff=0.73 cfs 2,691 cf
<b>Subcatchment PH4: Lot 4</b>	Runoff Area=4,037 sf 100.00% Impervious Runoff Depth=8.00" Tc=6.0 min CN=98 Runoff=0.73 cfs 2,691 cf
<b>Subcatchment PH5: Lot 5</b>	Runoff Area=4,321 sf 100.00% Impervious Runoff Depth=8.00" Tc=6.0 min CN=98 Runoff=0.78 cfs 2,881 cf

**PR-VallisNOAA**

Type III 24-hr 100 Year Rainfall=8.24"

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<b>Pond 1P: Pipe Infiltration</b>	Peak Elev=147.49' Storage=3,802 cf Inflow=5.39 cfs 29,244 cf Discarded=0.24 cfs 13,062 cf Primary=5.11 cfs 16,182 cf Outflow=5.35 cfs 29,244 cf
<b>Pond 2P: Infiltration Pond</b>	Peak Elev=145.58' Storage=26,235 cf Inflow=11.52 cfs 51,814 cf Outflow=1.22 cfs 51,814 cf
<b>Pond 2Pa: Infiltration Pond after 25 year storm</b>	Peak Elev=0.00' Storage=0 cf Discarded=0.00 cfs 0 cf
<b>Pond 3P: Infiltration Chamber</b>	Peak Elev=5.27' Storage=1,085 cf Inflow=0.78 cfs 2,881 cf Outflow=0.06 cfs 2,881 cf
<b>Pond 4P: Infiltration Chamber</b>	Peak Elev=5.27' Storage=1,085 cf Inflow=0.78 cfs 2,881 cf Outflow=0.06 cfs 2,881 cf
<b>Pond 5P: Infiltration Chamber</b>	Peak Elev=4.56' Storage=985 cf Inflow=0.73 cfs 2,691 cf Outflow=0.06 cfs 2,691 cf
<b>Pond 6P: Infiltration Chamber</b>	Peak Elev=4.56' Storage=985 cf Inflow=0.73 cfs 2,691 cf Outflow=0.06 cfs 2,691 cf
<b>Pond 7P: Infiltration Chamber</b>	Peak Elev=3.91' Storage=882 cf Inflow=0.68 cfs 2,488 cf Outflow=0.06 cfs 2,488 cf
<b>Pond DEP1: Depression Front 109</b>	Peak Elev=151.40' Storage=1,337 cf Inflow=1.60 cfs 8,370 cf Outflow=0.71 cfs 8,370 cf
<b>Pond DEP2: Depression 109 at Vallis</b>	Peak Elev=150.29' Storage=2,087 cf Inflow=1.60 cfs 8,173 cf Outflow=0.45 cfs 8,173 cf
<b>Pond DEP3: Depression Mohawk Cul-De-Sac</b>	Peak Elev=149.01' Storage=104 cf Inflow=1.34 cfs 7,366 cf Outflow=1.14 cfs 7,366 cf
<b>Pond DEP4: Depression Mohawk</b>	Peak Elev=149.00' Storage=8 cf Inflow=0.27 cfs 1,941 cf Outflow=0.27 cfs 1,941 cf
<b>Pond DEP5: Depression Vallis Rt Side</b>	Peak Elev=148.02' Storage=55 cf Inflow=0.52 cfs 3,140 cf Outflow=0.46 cfs 3,140 cf

**Total Runoff Area = 582,198 sf Runoff Volume = 107,498 cf Average Runoff Depth = 2.22"**  
**79.89% Pervious = 465,090 sf 20.11% Impervious = 117,108 sf**

# APPENDIX



**LGCI**

Lahlaif Geotechnical Consulting, Inc.

100 Chelmsford Road, Suite 2  
Billerica, MA 01862  
Telephone: (978) 330-5912  
Fax: (978) 330-5056

# TEST PIT LOG

**DRAFT**

**TP-1**

PAGE 1 OF 1

CLIENT: Mr. Paul Caggiano

PROJECT NAME: Proposed Residential Development

LGCI PROJECT NUMBER: 2131

PROJECT LOCATION: Lynnfield, MA

DATE STARTED: 10/12/21

DATE COMPLETED: 10/12/21

EXCAVATION SUBCONTRACTOR: J. Wyman Excavation

TEST PIT LOCATION: Near the NE corner of the site

EXCAVATION FOREMAN: Mark McCormick

COORDINATES: NA

EXCAVATOR TYPE/MODEL: CAT 420E

SURFACE EL.: NA

TOTAL DEPTH: 14 ft.

WEATHER: 70's / Sunny

GROUNDWATER LEVELS:

TEST PIT DIMENSIONS: 11' x 5'

▽ DURING EXCAVATION: -

LOGGED BY: TG / HO

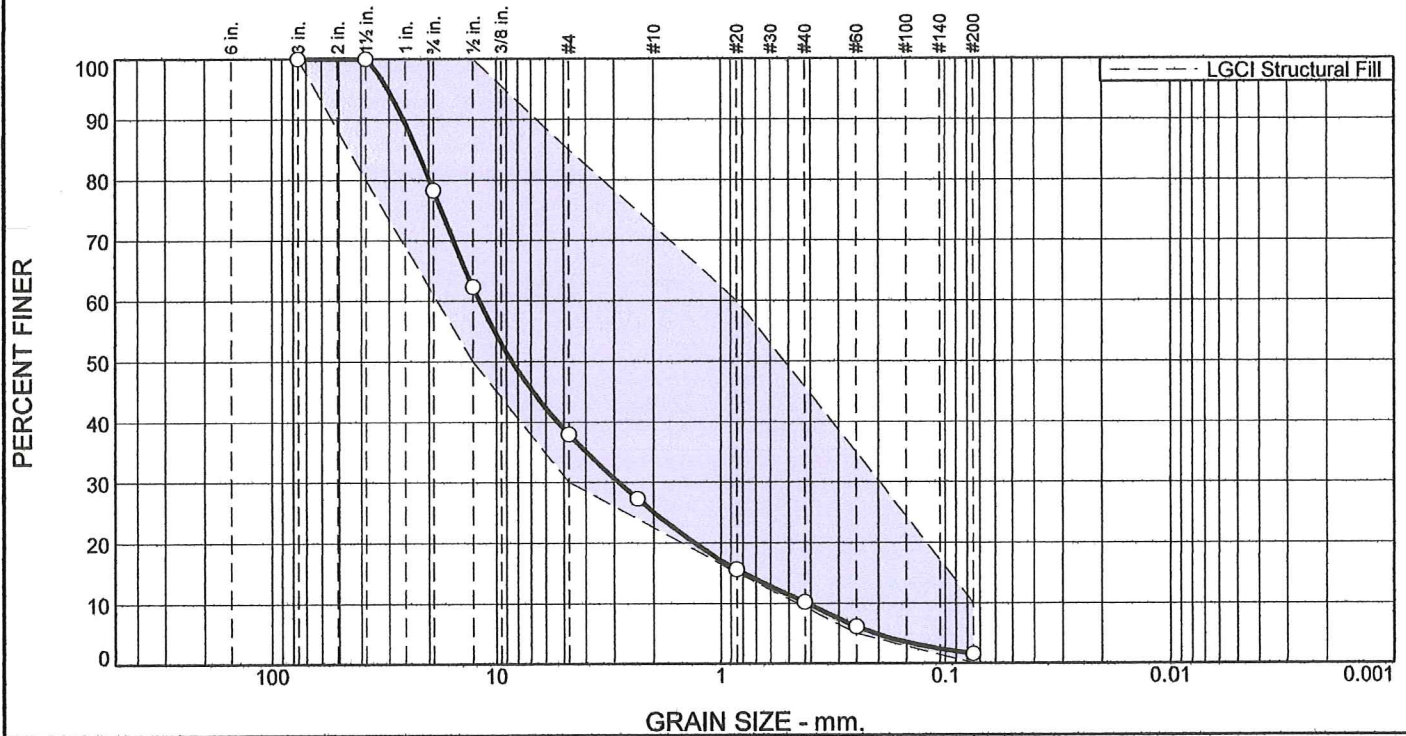
CHECKED BY: NP

▽ AT END OF EXCAVATION: 13.5 ft.

Depth (ft)	El. (ft)	Excavation Effort	Remark	Strata	Material Description
		E		Forest Mat	0 ft. - 1 ft.: Forest Mat
		E		Subsoil	1 ft. - 2.3 ft.: Silty SAND (SM), fine to medium, 20-25% fines, trace fine rounded to subrounded gravel, trace of organic soil, trace of roots, orange-brown, moist
2.5			1		2.3 ft. - 11 ft.: Well Graded GRAVEL with Sand (GW), fine to coarse, subangular, 0-5% fines, 35-40% fine to coarse sand, 15-20% cobbles and boulders up to 3' in diameter, light brown, moist REMARK 1: Infiltrometer test performed at depth of 2.8'.
5.0		M			
7.5					
10.0				Sand and Gravel	
12.5		E			11 ft. - 14 ft.: Silty SAND (SM), fine, 35-40% fines, gray, moist to wet
					Bottom of test pit at 14.0 feet. Test pit backfilled with excavated material and tamped in 18-inch lifts with the excavator bucket.

GENERAL COMMENTS: E = Easy, M - Moderate, D = Difficult, V = Very Difficult

# Particle Size Distribution Report



% +3"	% Gravel		% Sand			% Fines	
	Coarse	Fine	Coarse	Medium	Fine	Silt	Clay
0.0	21.7	40.3	12.9	14.9	8.6	1.6	

TEST RESULTS			
Opening Size	Percent Finer	Spec.* (Percent)	Pass? (X=Fail)
3"	100.0	100.0	
1.5"	100.0	80.0 - 100.0	
0.75"	78.3		
0.5"	62.3	50.0 - 100.0	
#4	38.0	30.0 - 85.0	
#8	27.3		
#20	15.6	15.0 - 60.0	
#40	10.2		
#60	6.1	5.0 - 35.0	
#200	1.6	0.0 - 10.0	

\* LGC Structural Fill

## Material Description

ASTM (D 2488) Classification: Well Graded GRAVEL with Sand (GW), fine to coarse, subangular, 0-5% fines, 35-40% fine to coarse sand, light brown

## Atterberg Limits (ASTM D 4318)

PL= LL= PI=

## Classification

USCS (D 2487)= GW AASHTO (M 145)=

## Coefficients

D<sub>90</sub>= 25.8915 D<sub>85</sub>= 22.5685 D<sub>60</sub>= 11.8843  
D<sub>50</sub>= 8.4641 D<sub>30</sub>= 2.8653 D<sub>15</sub>= 0.7956  
D<sub>10</sub>= 0.4156 C<sub>u</sub>= 28.60 C<sub>c</sub>= 1.66

## Remarks

Natural gravel sample

Date Received: 10/12/21 Date Tested: 10/12/21

Tested By: NP

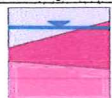
Checked By: TG

Location: Test Pit TP-1

Sample Number: Infiltrometer Test 1

Depth: 2.8'

Date Sampled: 10/12/21



**LGC**

Lahlaf Geotechnical Consulting, Inc.

Client: Mr. Paul Caggiano

Project: Proposed Residential Development, Lynnfield, MA

Project No: 2131

Figure



# LGCI

Lahlaf Geotechnical Consulting, Inc.

## Double Ring Infiltrometer Test

**Project:** Name: Proposed Residential Development  
 Location: Lynnfield, MA  
 LGCI Project Number: 2131

**Test Location:** Near the northeast corner of site TP-1 Test #4

**Test Procedure:** General accordance with ASTM D 3385

**Test Date** 10/12/2021

**LGCI Representative:** HO / TG

**Weather Conditions:** Sunny, 70's

**Test Depth:** 2.8 feet

**Groundwater Depth:** 13.5 feet

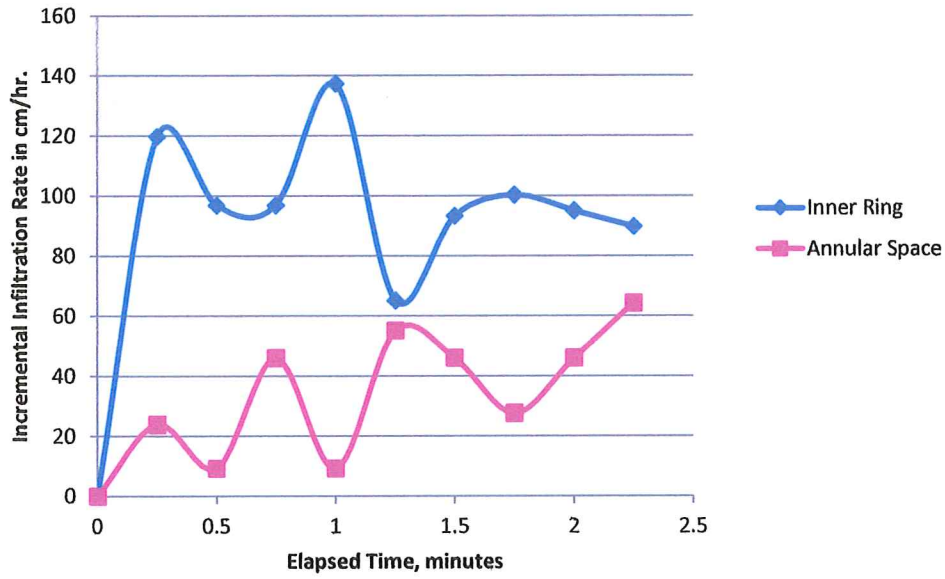
**Soil Stratum:** ASTM (D 2488) Classification: Well Graded GRAVEL with Sand (GW), fine to coarse, subangular, 0-5% fines, 35-40% fine to coarse sand, light brown, moist

	Inner Ring	Annular Space
Area (sq. cm)	730	2189
Depth Driven (in)	3	3
Water Depth (in)	3	3
Mariotte tube (cc/div.)	53.52	167.53

Elapsed Time (min)	Time Increment (min)	Inner Ring			Annular Space		
		Reading (div)	Volume (cc)	Infiltration Rate (cm/hr.)	Reading (div)	Volume (cc)	Infiltration Rate (cm/hr.)
0	0	58.3	0	0	58.3	0	0
0.25	0.25	37.5	1113	366.0	57.5	134	14.7
0.5	0.25	30.5	375	123.2	54.5	503	55.1
0.75	0.25	27.0	187	61.6	52.5	335	36.7
1	0.25	22.0	268	88.0	50.5	335	36.7
1.5	0.5	15.0	375	61.6	44.5	1005	55.1
1.75	0.25	10.5	241	79.2	42.3	369	40.4
2.25	0.5	6.5	214	35.2	41.0	218	11.9
2.5	0.25	2.3	225	73.9	38.5	419	45.9
2.75	0.25	0.0	123	40.5	36.5	335	36.7

Notes:

## Infiltrometer TP-2 Test #2



Estimated  $K = 22 \times 10^{-3}$  cm/sec at depth of 3.0 feet



**LGCI**  
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# TEST PIT LOG

**DRAFT**

**TP-2**

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CLIENT: Mr. Paul Caggiano  
LGCI PROJECT NUMBER: 2131

PROJECT NAME: Proposed Residential Development  
PROJECT LOCATION: Lynnfield, MA

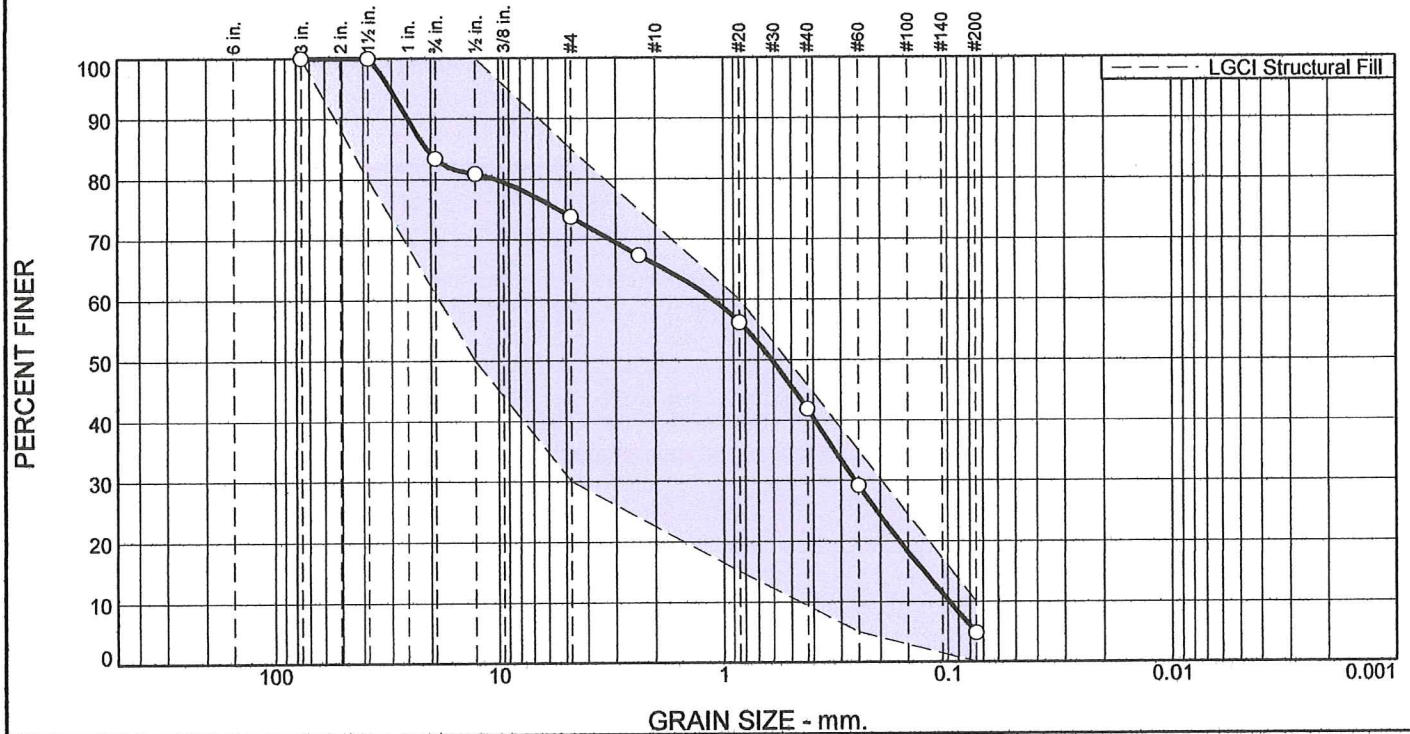
DATE STARTED: 10/12/21 DATE COMPLETED: 10/12/21  
TEST PIT LOCATION: Near the NE corner of the site  
COORDINATES: NA  
SURFACE EL.: NA TOTAL DEPTH: 13.5 ft.  
GROUNDWATER LEVELS:  
▽ DURING EXCAVATION: -  
▽ AT END OF EXCAVATION: 13.0 ft.

EXCAVATION SUBCONTRACTOR: J. Wyman Excavation  
EXCAVATION FOREMAN: Mark McCormick  
EXCAVATOR TYPE/MODEL: CAT 420E  
WEATHER: 70's / Sunny  
TEST PIT DIMENSIONS: 14' x 7.5'  
LOGGED BY: TG / HO CHECKED BY: NP

Depth (ft)	El. (ft)	Excavation Effort	Remark	Strata	Material Description
		E		Forest Mat	0 ft. - 0.9 ft.: Forest Mat
		E		Subsoil	0.9 ft. - 2.2 ft.: Silty SAND (SM), fine, 20-25% fines, trace of organic soil, trace of roots, orange-brown, moist
2.5			1		2.2 ft. - 13.5 ft.: Well Graded SAND with Gravel (SW), fine to coarse, 0-5% fines, 25-30% fine to coarse subrounded gravel, 10-15% cobbles and boulders up to 10' in diameter, gray, moist to wet
5.0					REMARK 1: Infiltrometer test performed at depth of 3'.
7.5		E		Sand	
10.0					
12.5					
					Bottom of test pit at 13.5 feet. Test pit backfilled with excavated material and tamped in 18-inch lifts with the excavator bucket.

GENERAL COMMENTS: E = Easy, M - Moderate, D = Difficult, V = Very Difficult

# Particle Size Distribution Report



% +3"	% Gravel		% Sand			% Fines	
	Coarse	Fine	Coarse	Medium	Fine	Silt	Clay
0.0	16.5	9.8	7.8	24.0	37.1	4.8	

TEST RESULTS			
Opening Size	Percent Finer	Spec.* (Percent)	Pass? (X=Fail)
3"	100.0	100.0	
1.5"	100.0	80.0 - 100.0	
0.75"	83.5		
0.5"	80.9	50.0 - 100.0	
#4	73.7	30.0 - 85.0	
#8	67.3		
#20	56.2	15.0 - 60.0	
#40	41.9		
#60	29.2	5.0 - 35.0	
#200	4.8	0.0 - 10.0	

\* LGCI Structural Fill

## Material Description

ASTM (D 2488) Classification: Well Graded SAND with Gravel (SW), fine to coarse, 0-5% fines, 25-30% fine to coarse subrounded gravel, gray

## Atterberg Limits (ASTM D 4318)

PL= LL= PI=

## Classification

USCS (D 2487)= AASHTO (M 145)=

## Coefficients

D<sub>90</sub>= 25.3879 D<sub>85</sub>= 20.7510 D<sub>60</sub>= 1.1076  
D<sub>50</sub>= 0.6102 D<sub>30</sub>= 0.2588 D<sub>15</sub>= 0.1276  
D<sub>10</sub>= 0.0985 C<sub>u</sub>= 11.24 C<sub>c</sub>= 0.61

## Remarks

Natural sand sample

Date Received: 10/12/21 Date Tested: 10/12/21

Tested By: NP

Checked By: TG

Location: Test Pit TP-2  
Sample Number: Infiltrator Test 2

Depth: 3.0'

Date Sampled: 10/12/21



**LGCI**

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Project: Proposed Residential Development, Lynnfield, MA

Project No: 2131

Figure

## Double Ring Infiltrometer Test

**Project:** Name: Proposed Residential Development  
 Location: Lynnfield, MA  
 LGCI Project Number: 2131

**Test Location:** Near the northeast corner of site TP-2 Test #2

**Test Procedure:** General accordance with ASTM D 3385

**Test Date** 10/12/2021

**LGCI Representative:** HO / TG

**Weather Conditions:** Sunny, 70's

**Test Depth:** 3.0 feet

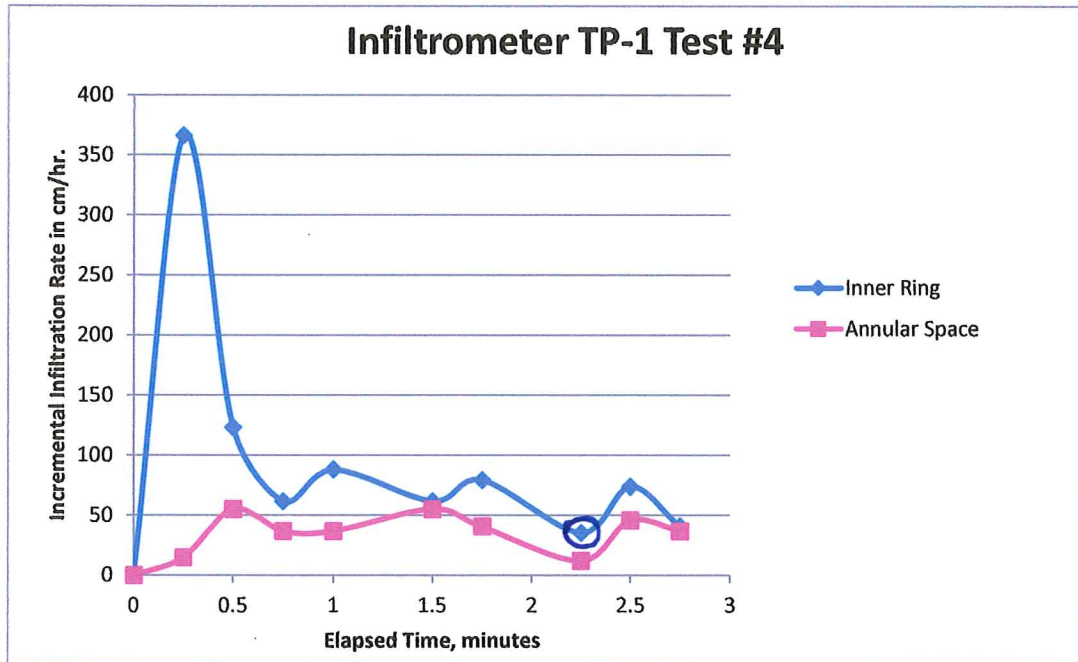
**Groundwater Depth:** 13 feet

**Soil Stratum:** ASTM (D 2488) Classification: Well Graded SAND with Gravel (SW), fine to coarse, 0-5% fines, 25-30% fine to coarse, subrounded gravel, gray, moist

	Inner	Annular
	Ring	Space
Area (sq. cm)	730	2189
Depth Driven (in)	3	3
Water Depth (in)	3	3
Mariotte tube (cc/div.)	53.52	167.53

Elapsed Time	Time Increment	Inner Ring			Annular Space		
		Reading	Volume	Infiltration Rate	Reading	Volume	Infiltration Rate
(min)	(min)	(div)	(cc)	(cm/hr.)	(div)	(cc)	(cm/hr.)
0	0	58.3	0	0	58.3	0	0
0.25	0.25	51.5	364	119.7	57.0	218	23.9
0.5	0.25	46.0	294	96.8	56.5	84	9.2
0.75	0.25	40.5	294	96.8	54.0	419	45.9
1	0.25	32.7	417	137.2	53.5	84	9.2
1.25	0.25	29.0	198	65.1	50.5	503	55.1
1.5	0.25	23.7	284	93.3	48.0	419	45.9
1.75	0.25	18.0	305	100.3	46.5	251	27.6
2	0.25	12.6	289	95.0	44.0	419	45.9
2.25	0.25	7.5	273	89.7	40.5	586	64.3
2.5	0.25	3.0	241	79.2	39.0	251	27.6
2.75	0.25	0.0	161	52.8	38.0	168	18.4

Notes:



Estimated  $K = 10 \times 10^{-3}$  cm/sec at depth of 2.8 feet

$$\frac{35.2}{2.54} = 13.85, \frac{1}{2} = 6.93 \text{ in/hr}$$