APPENDIX M

Engineering Reports

M.1 | SIGNATURE EAST – ENGINEER'S REPORT

M.2 | SIGNATURE EAST – SITE DRAWINGS

M.3 | SIGNATURE SOUTH – ENGINEER'S REPORT

M.4 | SIGNATURE SOUTH – SITE DRAWINGS

APPENDIX M.3

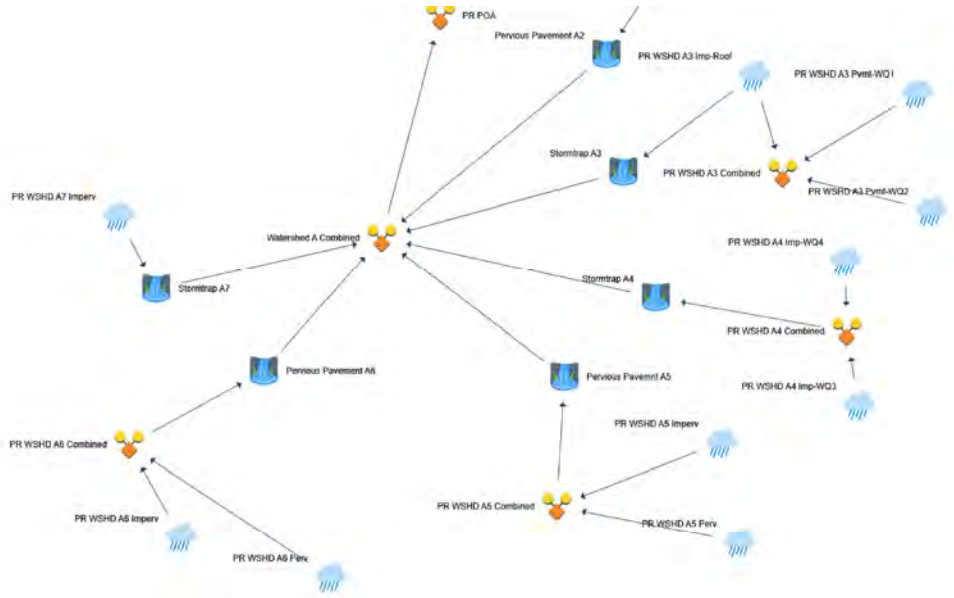
Signature South – Engineer's Report

APPENDIX E
Water Quality Calculations

Basin Model

Hydrology Studio v 3.0.0.38

File: Proposed HydrologyWater Quality.hys
07-31-2025



Hydrograph by Return Period

Hydrology Studio v 3.0.0.38

File: Proposed HydrologyWater Quality.hys
07-31-2025

Hyd. No.	Hydrograph Type	Hydrograph Name	Peak Outflow (cfs)							
			WQ	2-yr	3-yr	5-yr	10-yr	25-yr	50-yr	100-yr
1	NRCS Runoff	PR WSDH A2 Imperv	3.320							
2	Pond Route	Pervious Pavement A2	0.136							
4	NRCS Runoff	PR WSHD A3 Pvmt-WQ1	2.685							
5	NRCS Runoff	PR WSHD A3 Pvmt-WQ2	2.777							
6	NRCS Runoff	PR WSHD A3 Imp-Roof	1.709							
7	Junction	PR WSHD A3 Combined	7.170							
8	Pond Route	Stormtrap A3	0.000							
10	NRCS Runoff	PR WSHD A4 Imp-WQ3	3.082							
11	NRCS Runoff	PR WSHD A4 Imp-WQ4	3.356							
12	Junction	PR WSHD A4 Combined	6.438							
13	Pond Route	Stormtrap A4	0.000							
15	NRCS Runoff	PR WSHD A5 Imperv	2.223							
16	NRCS Runoff	PR WSHD A5 Perv	0.030							
17	Junction	PR WSHD A5 Combined	2.253							
18	Pond Route	Pervious Pavemnt A5	0.119							
20	NRCS Runoff	PR WSHD A6 Imperv	1.184							
21	NRCS Runoff	PR WSHD A6 Perv	0.077							
22	Junction	PR WSHD A6 Combined	1.230							
23	Pond Route	Pervious Pavement A6	0.090							
25	NRCS Runoff	PR WSHD A7 Imperv	4.821							
26	Pond Route	Stormtrap A7	0.000							
28	Junction	Watershed A Combined	0.346							
30	NRCS Runoff	PR WSHD B Perv	0.535							
31	NRCS Runoff	PR WSHD B Imperv	1.244							
32	Junction	PR WSHD B Combined	1.517							
34	Junction	PR POA - 1	1.860							
35	NRCS Runoff	PR WSHD C PervPOA-2	0.021							

Hydrograph WQ Summary

Hydrology Studio v 3.0.0.38

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07-31-2025

Hyd. No.	Hydrograph Type	Hydrograph Name	Peak Flow (cfs)	Time to Peak (min)	Hydrograph Volume (cuft)	Inflow Hyd(s)	Maximum Elevation (ft)	Maximum Storage (cuft)
1	NRCS Runoff	PR WSDH A2 Imperv	3.320	65	4,049	----		
2	Pond Route	Pervious Pavement A2	0.136	108	3,939	1	0.99	3,592
4	NRCS Runoff	PR WSHD A3 Pvmt-WQ1	2.685	65	3,305	----		
5	NRCS Runoff	PR WSHD A3 Pvmt-WQ2	2.777	65	3,417	----		
6	NRCS Runoff	PR WSHD A3 Imp-Roof	1.709	65	2,103	----		
7	Junction	PR WSHD A3 Combined	7.170	65	8,825	4, 5, 6		
8	Pond Route	Stormtrap A3	0.000	0	0.000	6	1.67	2,103
10	NRCS Runoff	PR WSHD A4 Imp-WQ3	3.082	65	3,793	----		
11	NRCS Runoff	PR WSHD A4 Imp-WQ4	3.356	65	4,131	----		
12	Junction	PR WSHD A4 Combined	6.438	65	7,924	10, 11		
13	Pond Route	Stormtrap A4	0.000	0	0.000	12	1.86	7,924
15	NRCS Runoff	PR WSHD A5 Imperv	2.223	65	2,711	----		
16	NRCS Runoff	PR WSHD A5 Perv	0.030	65	29.4	----		
17	Junction	PR WSHD A5 Combined	2.253	65	2,740	15, 16		
18	Pond Route	Pervious Pavemnt A5	0.119	107	2,719	17	4.03	2,343
20	NRCS Runoff	PR WSHD A6 Imperv	1.184	65	1,444	----		
21	NRCS Runoff	PR WSHD A6 Perv	0.077	69	104	----		
22	Junction	PR WSHD A6 Combined	1.230	65	1,548	20, 21		
23	Pond Route	Pervious Pavement A6	0.090	107	1,531	22	2.96	1,257
25	NRCS Runoff	PR WSHD A7 Imperv	4.821	65	5,880	----		
26	Pond Route	Stormtrap A7	0.000	0	0.000	25	4.15	5,880
28	Junction	Watershed A Combined	0.346	107	8,189	2, 8, 13, 18, 23, 26		
30	NRCS Runoff	PR WSHD B Perv	0.535	164	4,034	----		
31	NRCS Runoff	PR WSHD B Imperv	1.244	113	6,024	----		
32	Junction	PR WSHD B Combined	1.517	120	10,058	30, 31		
34	Junction	PR POA - 1	1.860	120	18,246	28, 32		
35	NRCS Runoff	PR WSHD C PervPOA-2	0.021	70	31.4	----		

Hydrograph Report

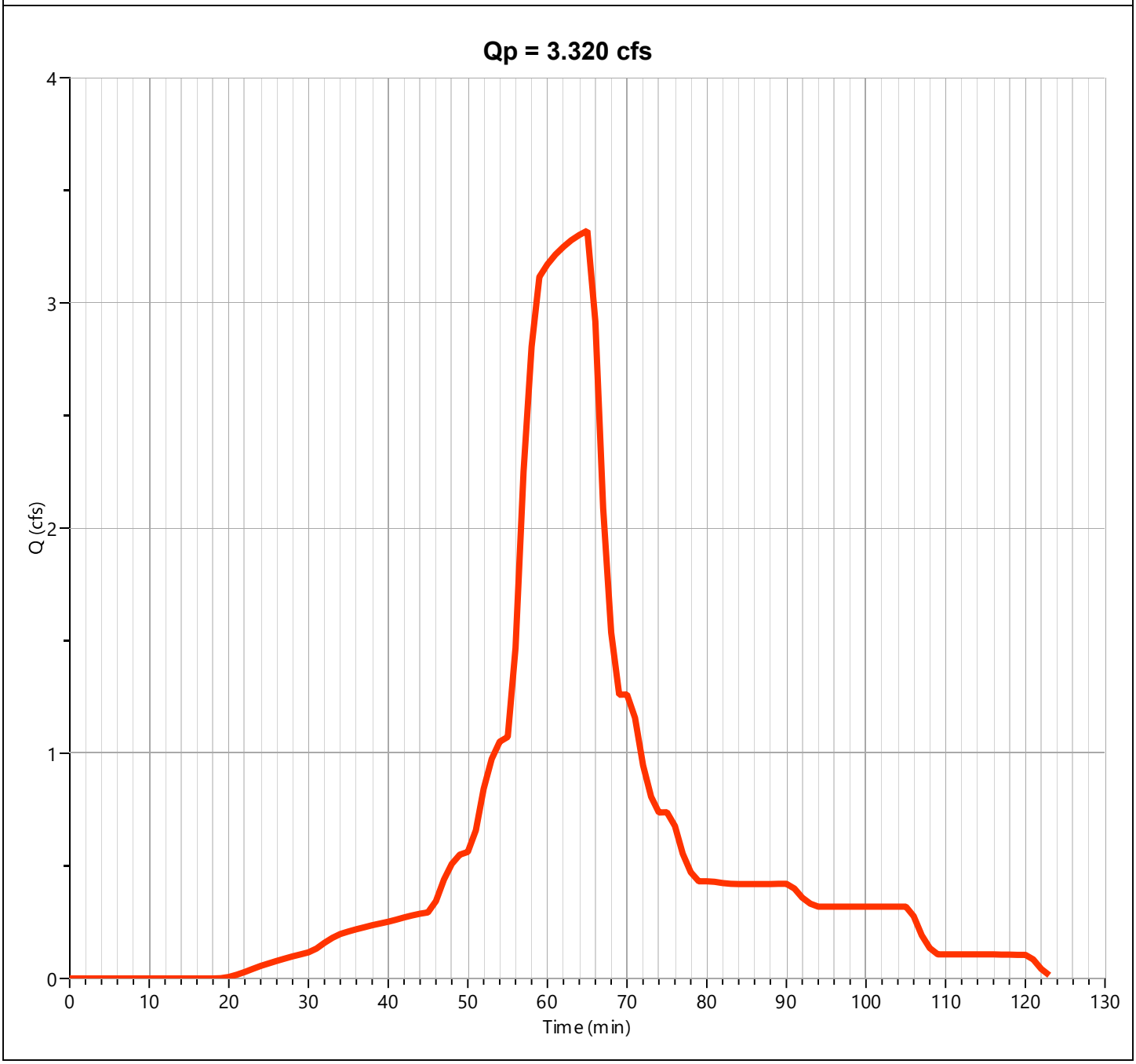
Hydrology Studio v 3.0.0.38

File: Proposed HydrologyWater Quality.hys
07-31-2025

PR WSDH A2 Imperv

Hyd. No. 1

Hydrograph Type	= NRCS Runoff	Peak Flow	= 3.320 cfs
Storm Frequency	= 1-yr	Time to Peak	= 65 min
Time Interval	= 1 min	Runoff Volume	= 4,049 cuft
Drainage Area	= 1.15 ac	Curve Number	= 98.00
Tc Method	= User	Time of Conc. (Tc)	= 3.0 min
Total Rainfall	= 1.25 in	Design Storm	= NJ WQ Storm
Storm Duration	= 2 hrs	Shape Factor	= 484



Hydrograph Report

Hydrology Studio v 3.0.0.38

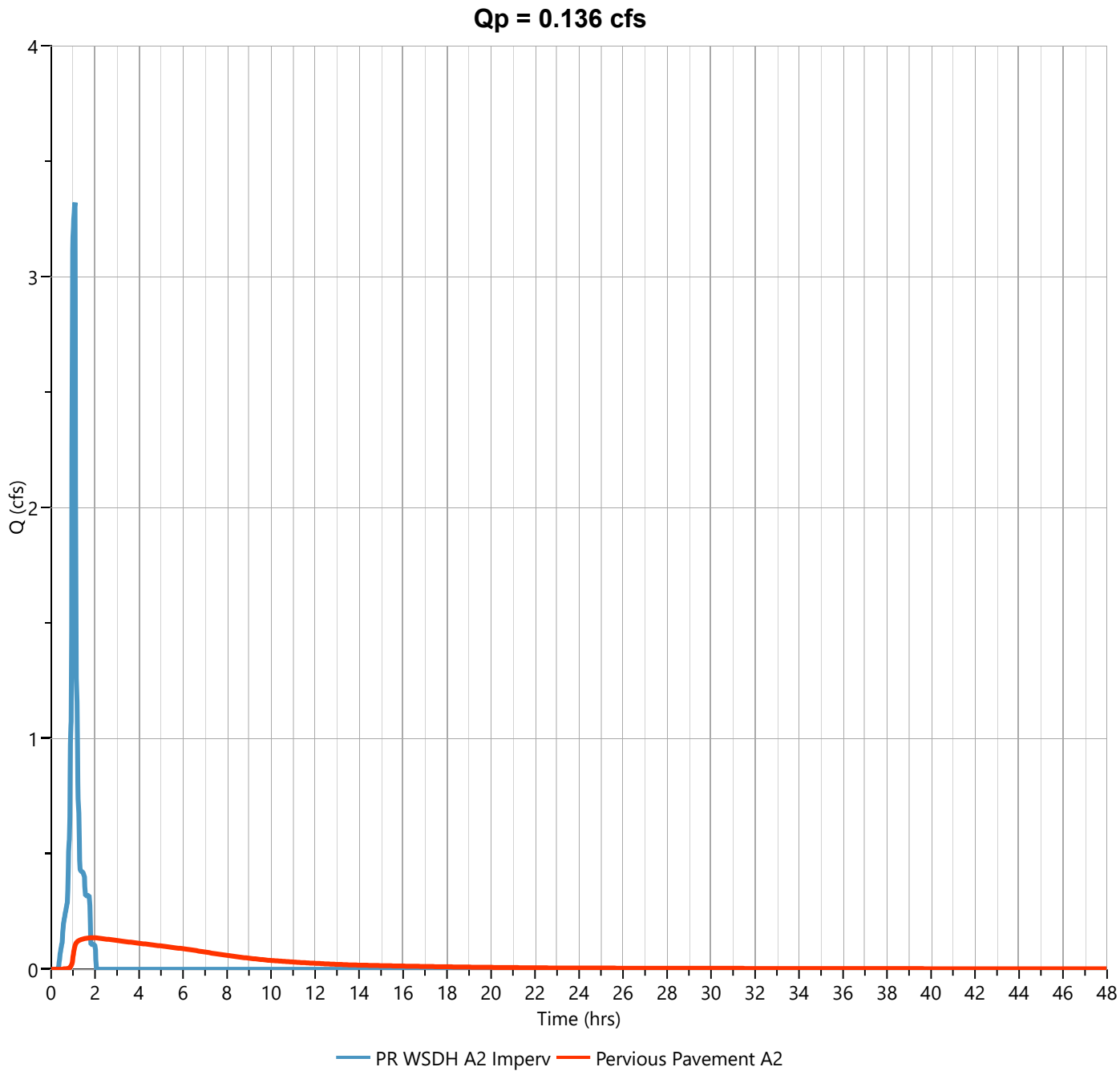
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07-31-2025

Pervious Pavement A2 — Hyd. No. 2

Hydrograph Type	= Pond Route	Peak Flow	= 0.136 cfs
Storm Frequency	= 1-yr	Time to Peak	= 108 min
Time Interval	= 1 min	Hydrograph Volume	= 3,939 cuft
Inflow Hydrograph	= 1 - PR WSDH A2 Imperv	Max. Elevation	= 0.99 ft
Pond Name	= Pervious Pavement A2	Max. Storage	= 3,592 cuft

Pond Routing by Storage Indication Method

Center of mass detention time = 7.21 hrs



Pond Report

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07-31-2025

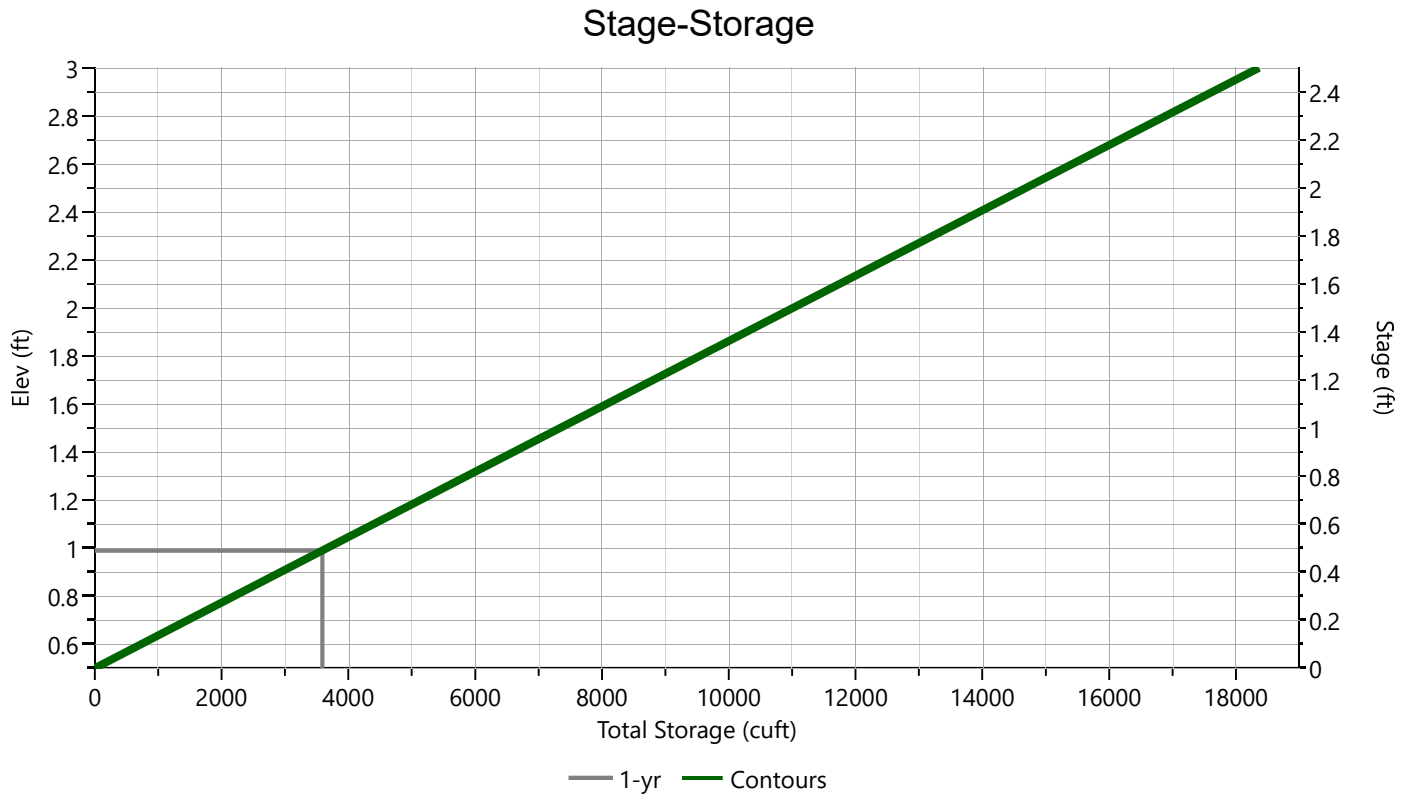
Pervious Pavement A2

Stage-Storage

User Defined Contours	
Description	**Input**
Bottom Elevation, ft	0.50
Voids (%)	40.00
Volume Calc	None

Stage / Storage Table

Stage (ft)	Elevation (ft)	Contour Area (sqft)	Incr. Storage (cuft)	Total Storage (cuft)
0.00	0.50	18,362	0.000	0.000
0.50	1.00	18,362	3,672	3,672
1.00	1.50	18,362	3,672	7,345
1.50	2.00	18,362	3,672	11,017
2.00	2.50	18,362	3,672	14,690
2.50	3.00	18,362	3,672	18,362



Pond Report

File: Proposed HydrologyWater Quality.hys

Hydrology Studio v 3.0.0.38

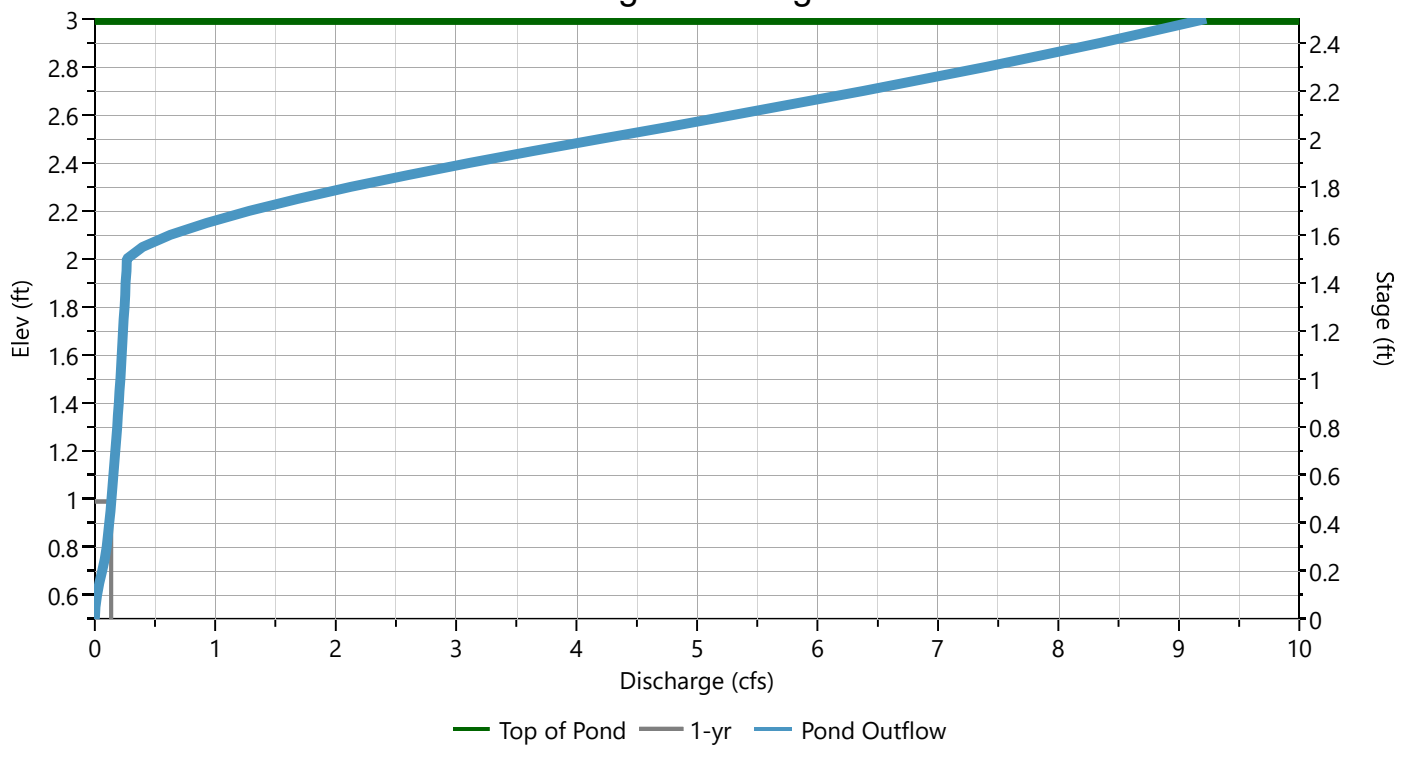
07-31-2025

Pervious Pavement A2

Stage-Discharge

Culvert / Orifices	Cir Culvert	Orifice			Perforated Riser	
		1 (m)	2	3		
Rise, in	18	3			Hole Diameter, in	
Span, in	18	3			No. holes	
No. Barrels	1	1			Invert Elevation, ft	
Invert Elevation, ft	0.50	0.50			Height, ft	
Orifice Coefficient, Co	0.60	0.60			Orifice Coefficient, Co	
Length, ft	10					
Barrel Slope, %	1					
N-Value, n	0.012					
Weirs	**Riser**	**Weir**			**Ancillary**	
		1 (m)	2	3		
Shape / Type		Rectangular			Exfiltration, in/hr	
Crest Elevation, ft		2				
Crest Length, ft		3.5				
Angle, deg						
Weir Coefficient, Cw		3.3				

m = Flows through Culvert, i = Independent



Pond Report

File: Proposed HydrologyWater Quality.hys

Hydrology Studio v 3.0.0.38

07-31-2025

Pervious Pavement A2

Stage-Storage-Discharge Summary

Stage (ft)	Elev. (ft)	Storage (cuft)	Culvert (cfs)	Orifices, cfs			Riser (cfs)	Weirs, cfs			Pf Riser (cfs)	Exfil (cfs)	User (cfs)	Total (cfs)
				1	2	3		1	2	3				
0.00	0.50	0.000	0.000	0.000				0.000						0.000
0.50	1.00	3,672	0.138 ic	0.138				0.000						0.138
1.00	1.50	7,345	0.212 ic	0.212				0.000						0.212
1.50	2.00	11,017	0.267 ic	0.267				0.000						0.267
2.00	2.50	14,690	4.200 oc	0.159				4.040 s						4.200
2.50	3.00	18,362	9.226 oc	0.149				9.077 s						9.226

Suffix key: ic = inlet control, oc = outlet control, s = submerged weir

Pond Report

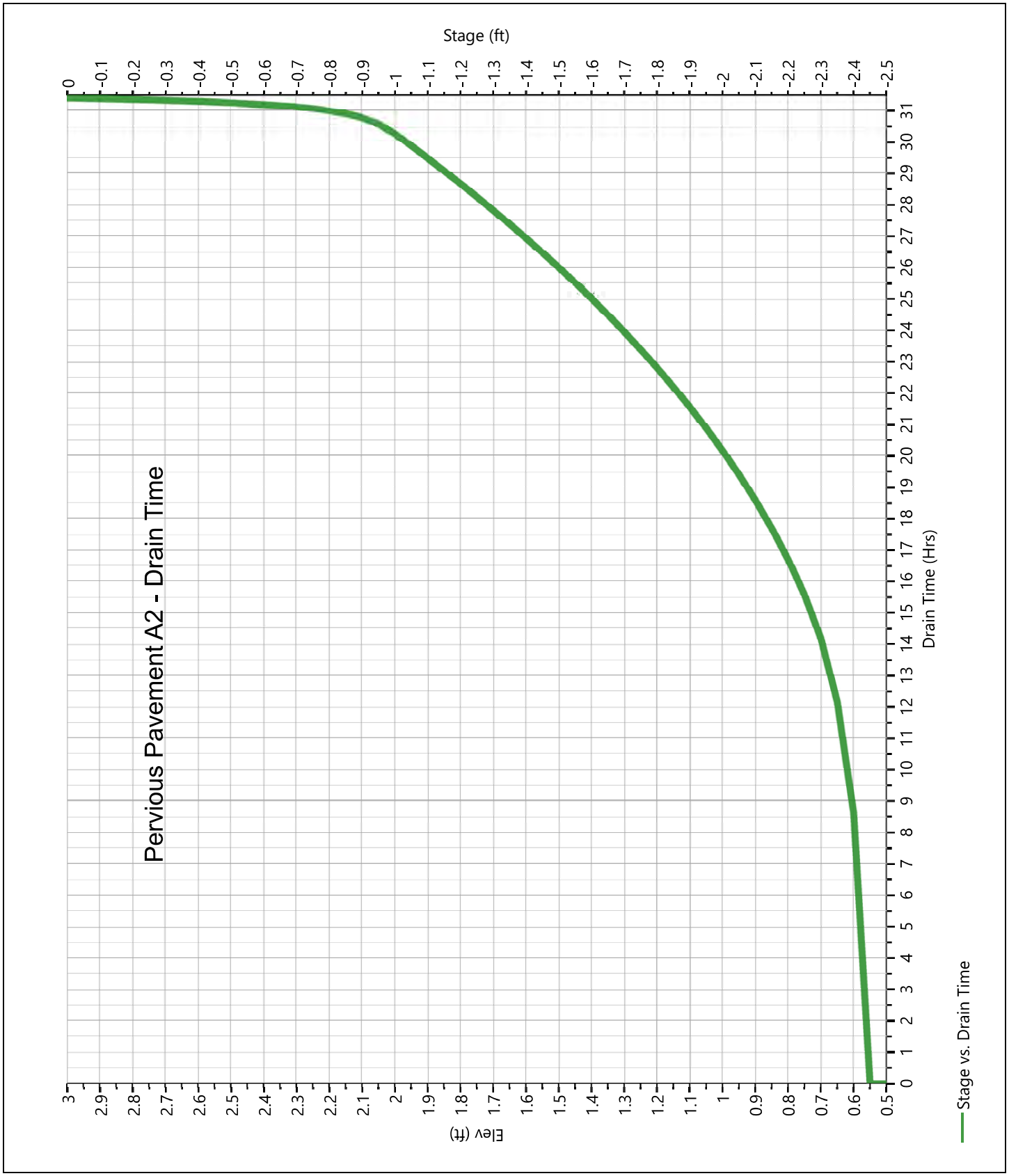
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Hydrology Studio v 3.0.0.38

07-31-2025

Pervious Pavement A2

Pond Drawdown



Hydrograph Report

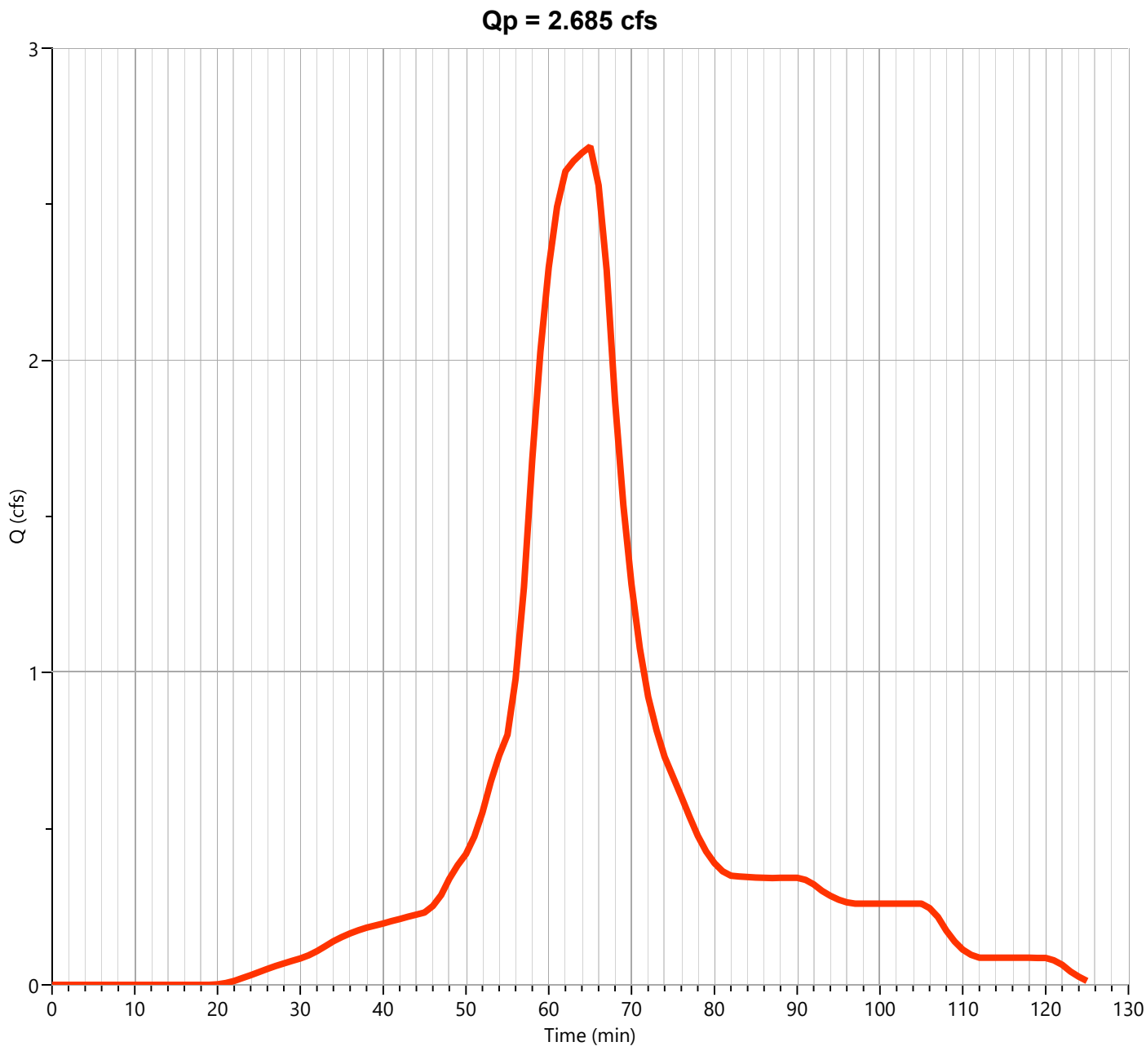
Hydrology Studio v 3.0.0.38

File: Proposed HydrologyWater Quality.hys
07-31-2025

PR WSHD A3 Pvmt-WQ1

Hyd. No. 4

Hydrograph Type	= NRCS Runoff	Peak Flow	= 2.685 cfs
Storm Frequency	= 1-yr	Time to Peak	= 65 min
Time Interval	= 1 min	Runoff Volume	= 3,305 cuft
Drainage Area	= 0.88 ac	Curve Number	= 98.00
Tc Method	= User	Time of Conc. (Tc)	= 4.0 min
Total Rainfall	= 1.25 in	Design Storm	= NJ WQ Storm
Storm Duration	= 2 hrs	Shape Factor	= 484



Hydrograph Report

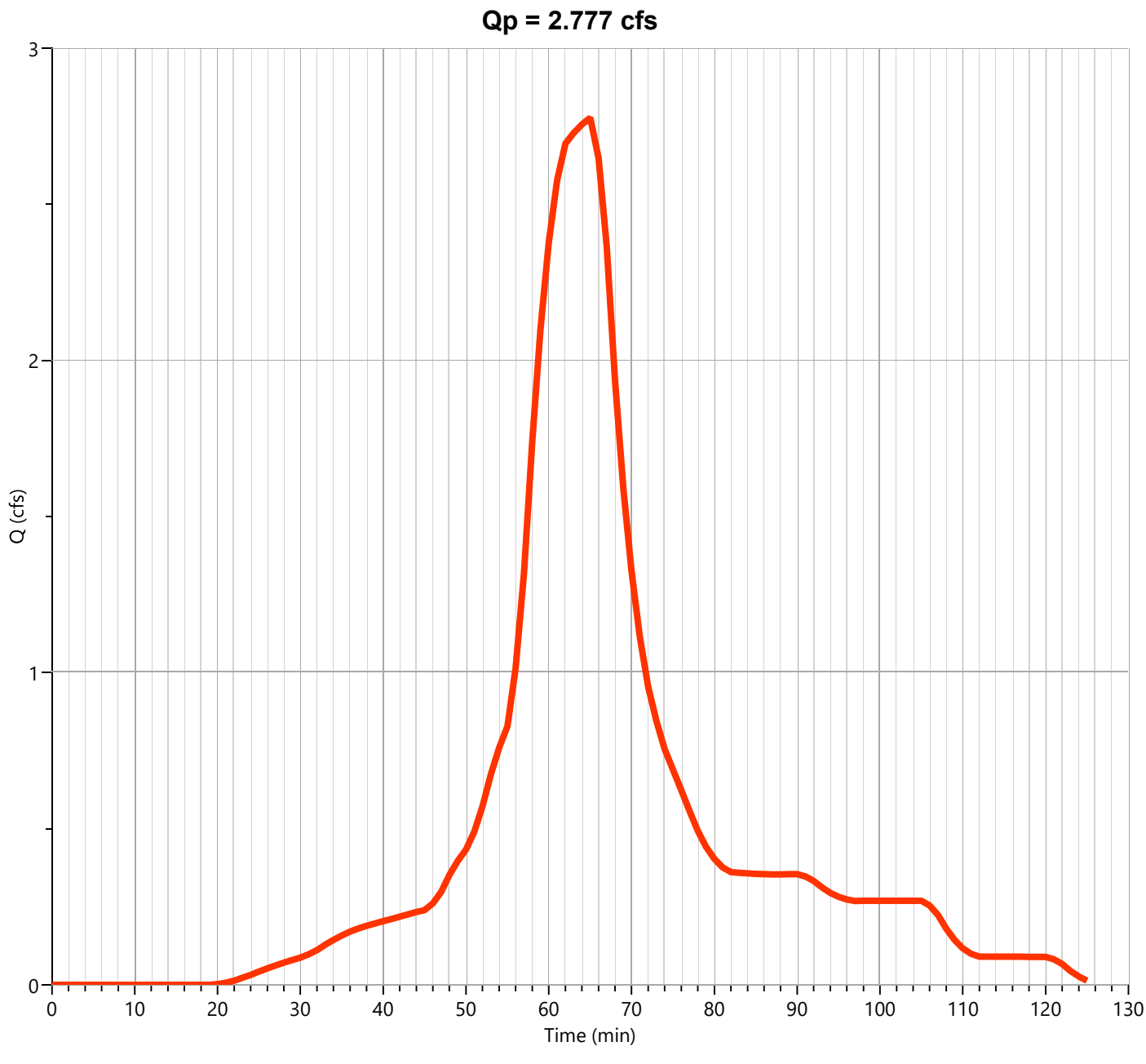
Hydrology Studio v 3.0.0.38

File: Proposed HydrologyWater Quality.hys
07-31-2025

PR WSHD A3 Pvmt-WQ2

Hyd. No. 5

Hydrograph Type	= NRCS Runoff	Peak Flow	= 2.777 cfs
Storm Frequency	= 1-yr	Time to Peak	= 65 min
Time Interval	= 1 min	Runoff Volume	= 3,417 cuft
Drainage Area	= 0.91 ac	Curve Number	= 98.00
Tc Method	= User	Time of Conc. (Tc)	= 4.0 min
Total Rainfall	= 1.25 in	Design Storm	= NJ WQ Storm
Storm Duration	= 2 hrs	Shape Factor	= 484



Hydrograph Report

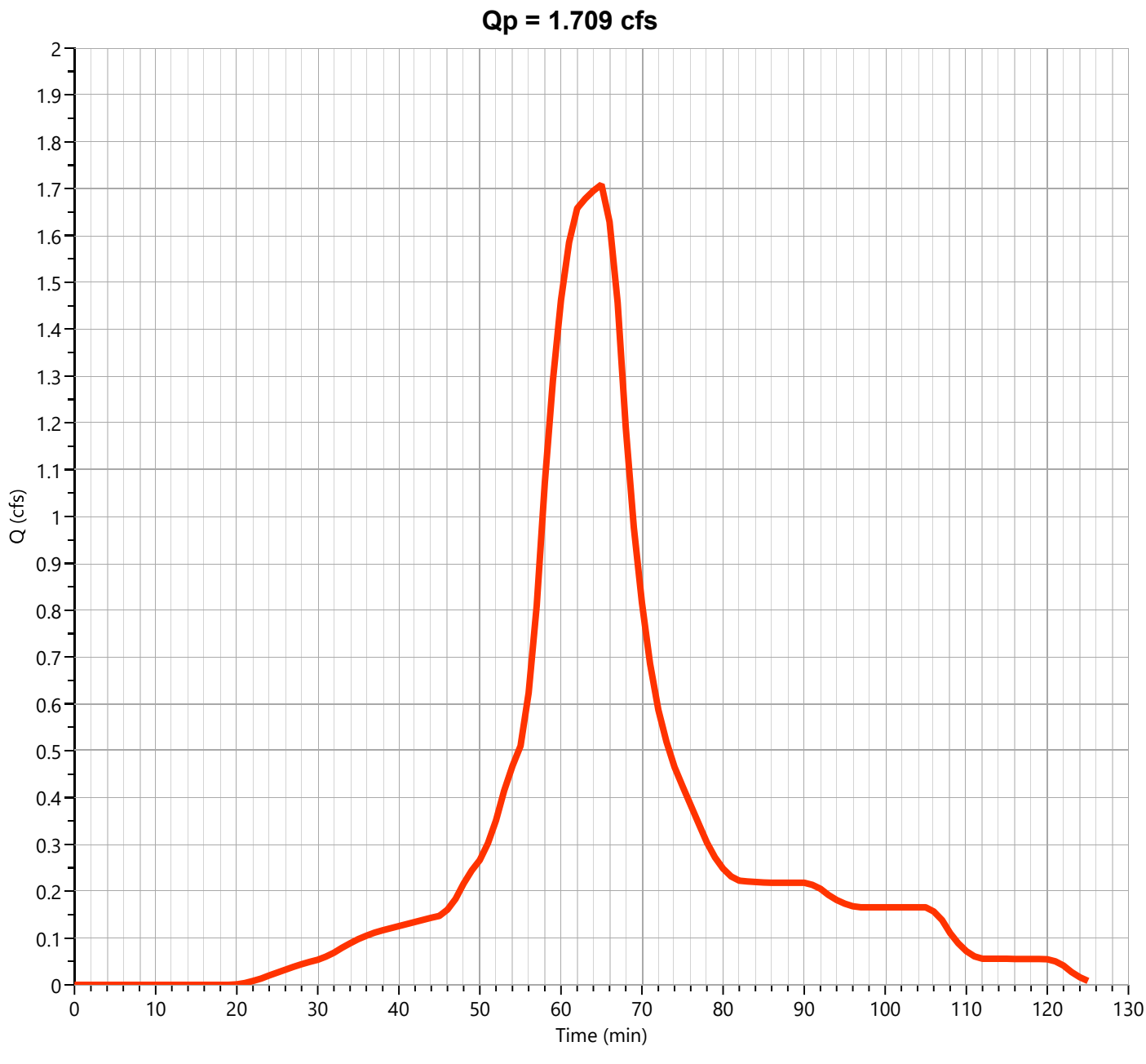
Hydrology Studio v 3.0.0.38

File: Proposed HydrologyWater Quality.hys
07-31-2025

PR WSHD A3 Imp-Roof

Hyd. No. 6

Hydrograph Type	= NRCS Runoff	Peak Flow	= 1.709 cfs
Storm Frequency	= 1-yr	Time to Peak	= 65 min
Time Interval	= 1 min	Runoff Volume	= 2,103 cuft
Drainage Area	= 0.56 ac	Curve Number	= 98.00
Tc Method	= User	Time of Conc. (Tc)	= 4.0 min
Total Rainfall	= 1.25 in	Design Storm	= NJ WQ Storm
Storm Duration	= 2 hrs	Shape Factor	= 484



Hydrograph Report

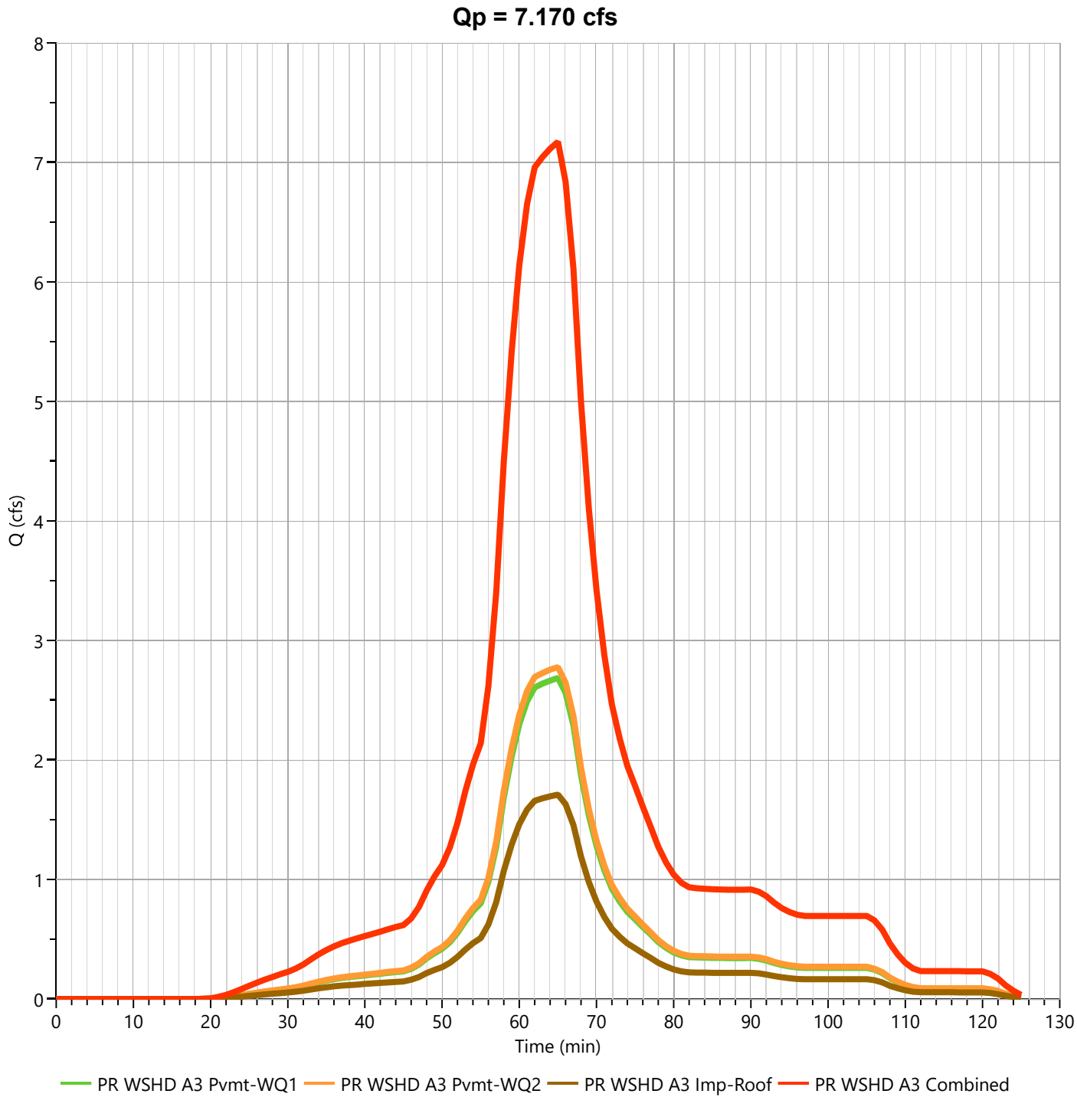
Hydrology Studio v 3.0.0.38

File: Proposed HydrologyWater Quality.hys
07-31-2025

PR WSHD A3 Combined

Hyd. No. 7

Hydrograph Type	= Junction	Peak Flow	= 7.170 cfs
Storm Frequency	= 1-yr	Time to Peak	= 65 min
Time Interval	= 1 min	Hydrograph Volume	= 8,825 cuft
Inflow Hydrographs	= 4, 5, 6	Total Contrib. Area	= 2.35 ac



Stormtrap A3 — Hyd. No. 8

Hydrograph Type	= Pond Route	Peak Flow	= 0.000 cfs
Storm Frequency	= 1-yr	Time to Peak	= 0 min
Time Interval	= 1 min	Hydrograph Volume	= 0.000 cuft
Inflow Hydrograph	= 6 - PR WSHD A3 Imp-Roof	Max. Elevation	= 1.67 ft
Pond Name	= Stormtrap A3	Max. Storage	= 2,103 cuft

Pond Routing by Storage Indication Method

Qp = 0.000 cfs

Pond Report

File: Proposed HydrologyWater Quality.hys

Hydrology Studio v 3.0.0.38

07-31-2025

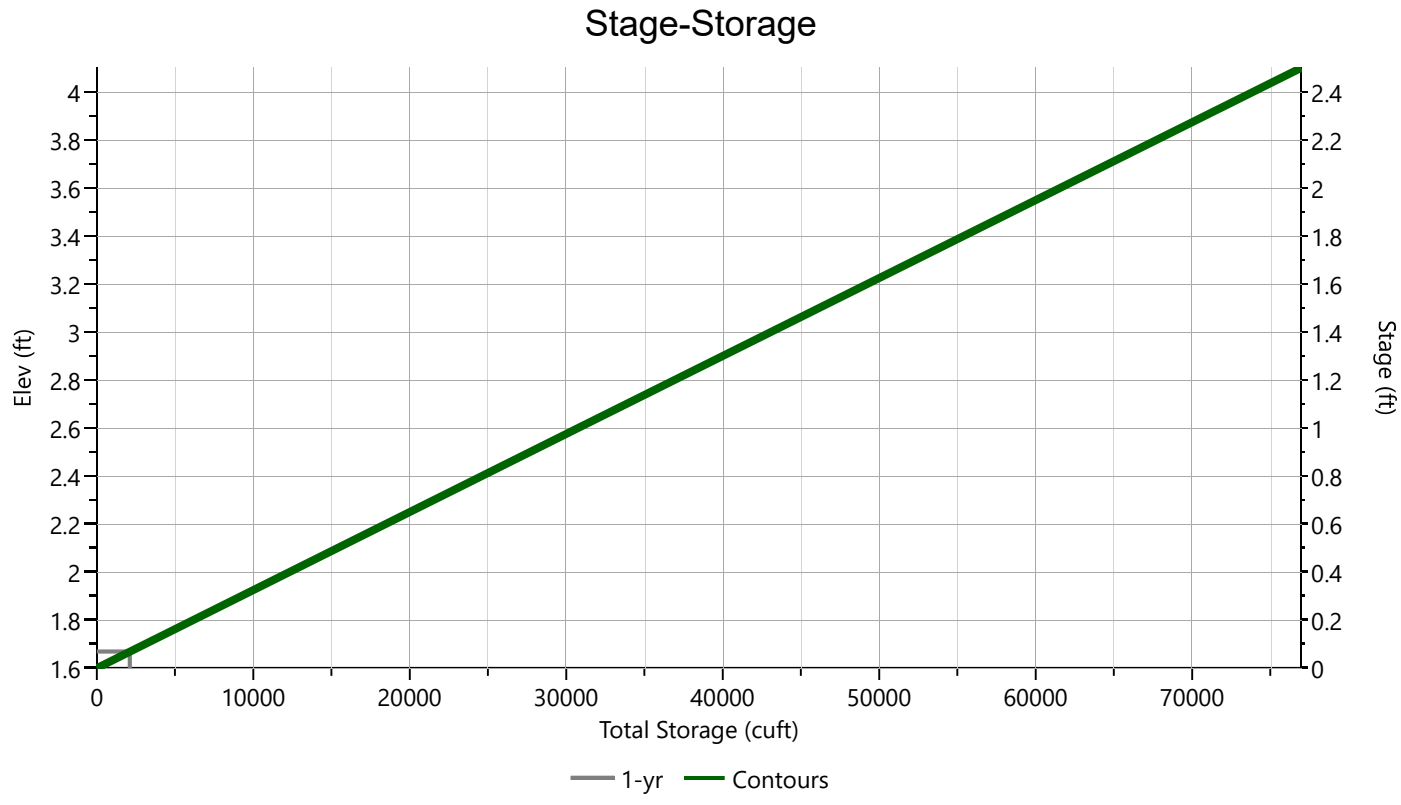
Stormtrap A3

Stage-Storage

User Defined Contours	
Description	**Input**
Bottom Elevation, ft	1.60
Voids (%)	100.00
Volume Calc	Conic

Stage / Storage Table

Stage (ft)	Elevation (ft)	Contour Area (sqft)	Incr. Storage (cuft)	Total Storage (cuft)
0.00	1.60	30,793	0.000	0.000
1.00	2.60	30,793	30,790	30,790
2.00	3.60	30,793	30,790	61,580
2.50	4.10	30,793	15,395	76,975



Pond Report

File: Proposed HydrologyWater Quality.hys

Hydrology Studio v 3.0.0.38

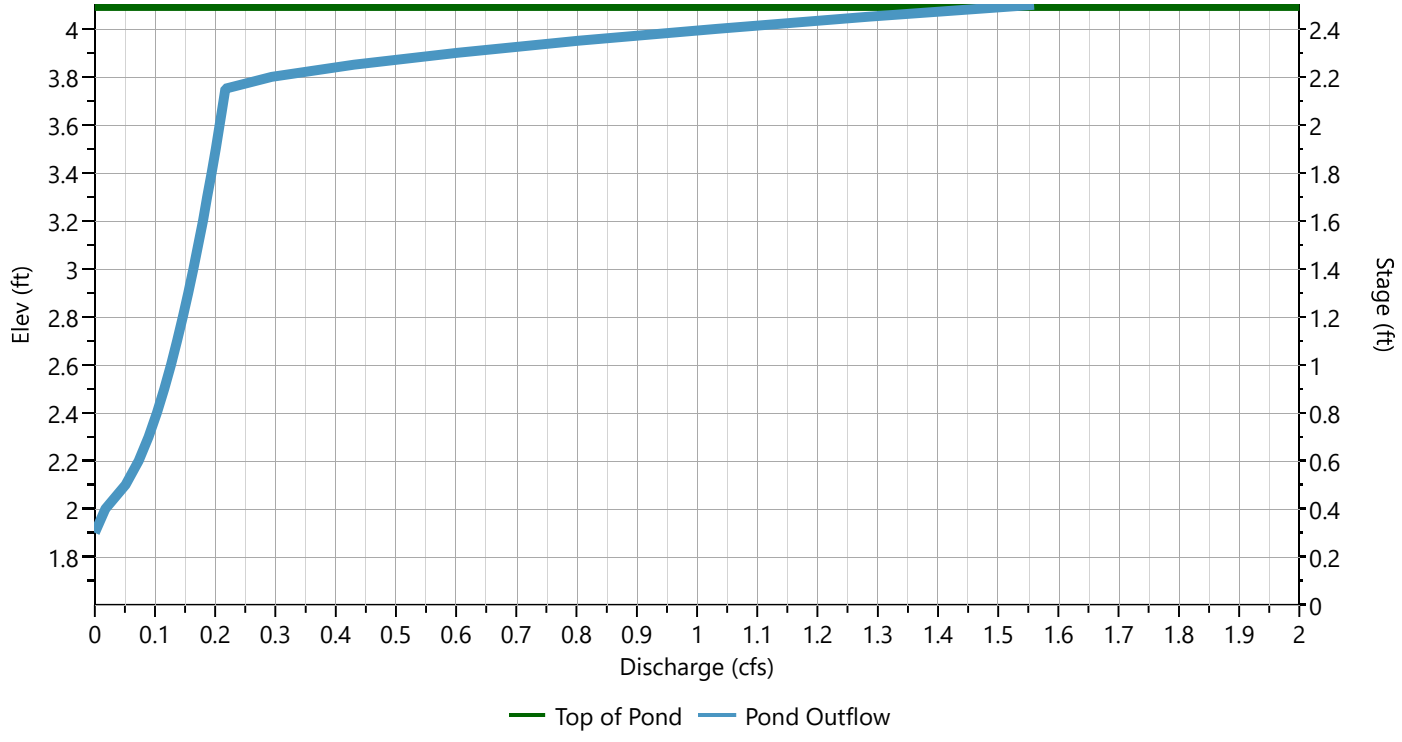
07-31-2025

Stormtrap A3

Stage-Discharge

Culvert / Orifices	Cir Culvert	Orifice			Perforated Riser	
		1 (m)	2	3		
Rise, in	18	2.5			Hole Diameter, in	
Span, in	18	2.5			No. holes	
No. Barrels	1	1			Invert Elevation, ft	
Invert Elevation, ft	1.60	1.90			Height, ft	
Orifice Coefficient, Co	0.60	0.60			Orifice Coefficient, Co	
Length, ft	10					
Barrel Slope, %	.3					
N-Value, n	0.012					
Weirs	**Riser**	**Weir**			**Ancillary**	
		1 (m)	2	3		
Shape / Type		Rectangular			Exfiltration, in/hr	
Crest Elevation, ft		3.75				
Crest Length, ft		2				
Angle, deg						
Weir Coefficient, Cw		3.3				

m = Flows through Culvert, i = Independent



Pond Report

File: Proposed HydrologyWater Quality.hys

Hydrology Studio v 3.0.0.38

07-31-2025

Stormtrap A3

Stage-Storage-Discharge Summary

Stage (ft)	Elev. (ft)	Storage (cuft)	Culvert (cfs)	Orifices, cfs			Riser (cfs)	Weirs, cfs			Pf Riser (cfs)	Exfil (cfs)	User (cfs)	Total (cfs)
				1	2	3		1	2	3				
0.00	1.60	0.000	0.000	0.000				0.000						0.000
1.00	2.60	30,790	0.127 oc	0.127				0.000						0.127
2.00	3.60	61,580	0.207 oc	0.207				0.000						0.207
2.50	4.10	76,975	1.559 oc	0.193				1.367						1.559

Suffix key: ic = inlet control, oc = outlet control, s = submerged weir

Pond Report

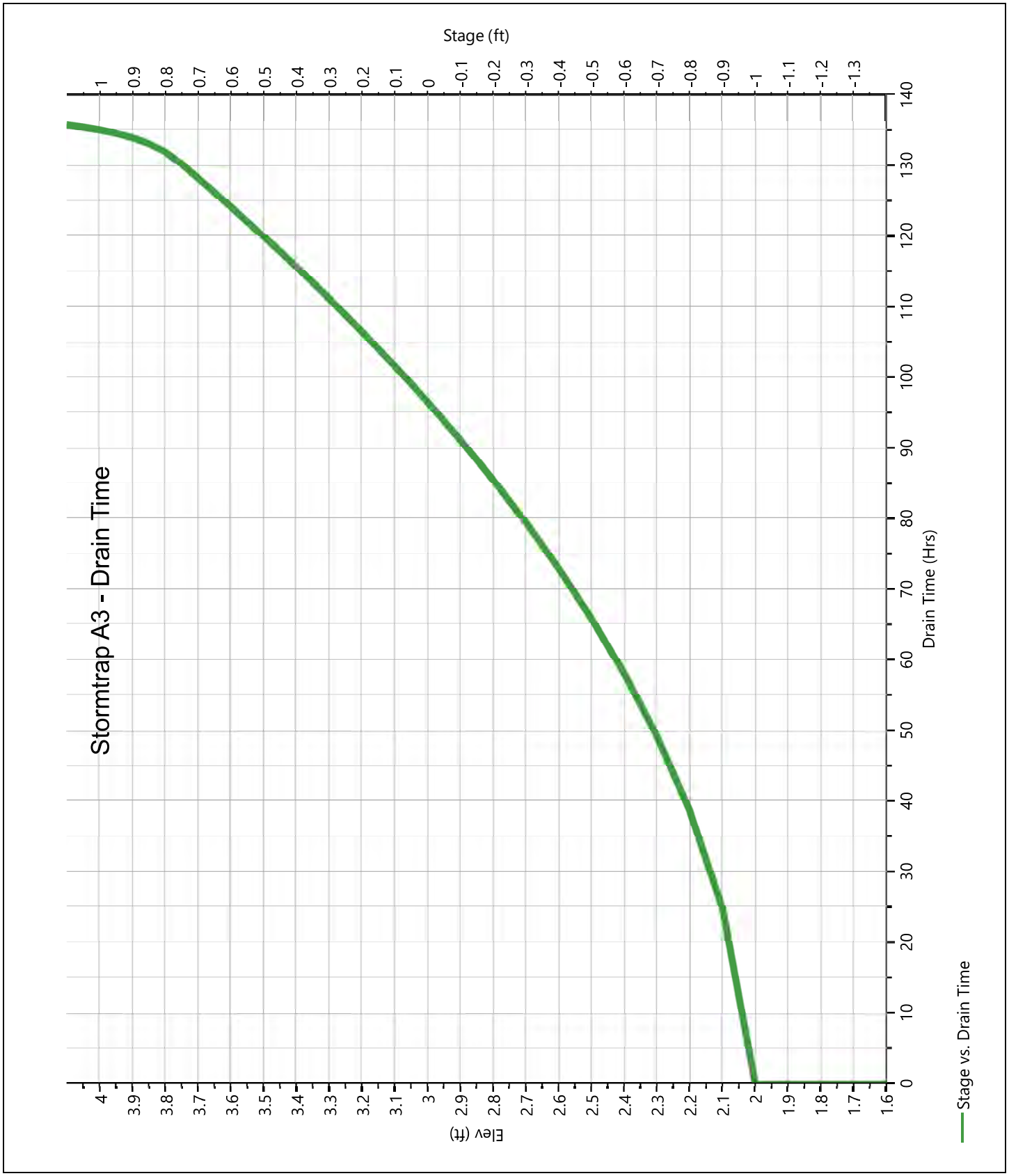
File: Proposed HydrologyWater Quality.hys

Hydrology Studio v 3.0.0.38

07-31-2025

Stormtrap A3

Pond Drawdown



Hydrograph Report

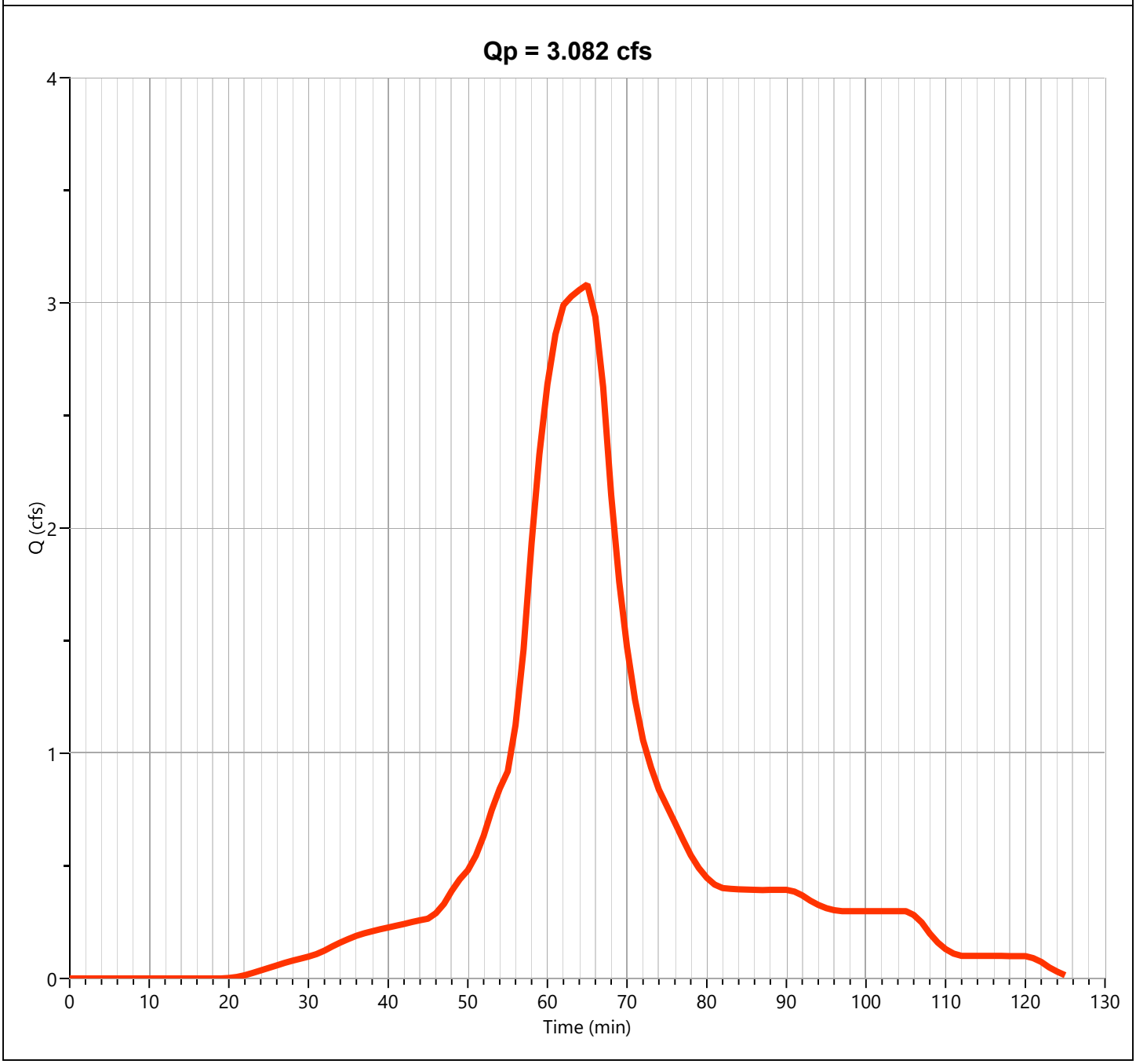
Hydrology Studio v 3.0.0.38

File: Proposed HydrologyWater Quality.hys
07-31-2025

PR WSHD A4 Imp-WQ3

Hyd. No. 10

Hydrograph Type	= NRCS Runoff	Peak Flow	= 3.082 cfs
Storm Frequency	= 1-yr	Time to Peak	= 65 min
Time Interval	= 1 min	Runoff Volume	= 3,793 cuft
Drainage Area	= 1.01 ac	Curve Number	= 98.00
Tc Method	= User	Time of Conc. (Tc)	= 4.0 min
Total Rainfall	= 1.25 in	Design Storm	= NJ WQ Storm
Storm Duration	= 2 hrs	Shape Factor	= 484



Hydrograph Report

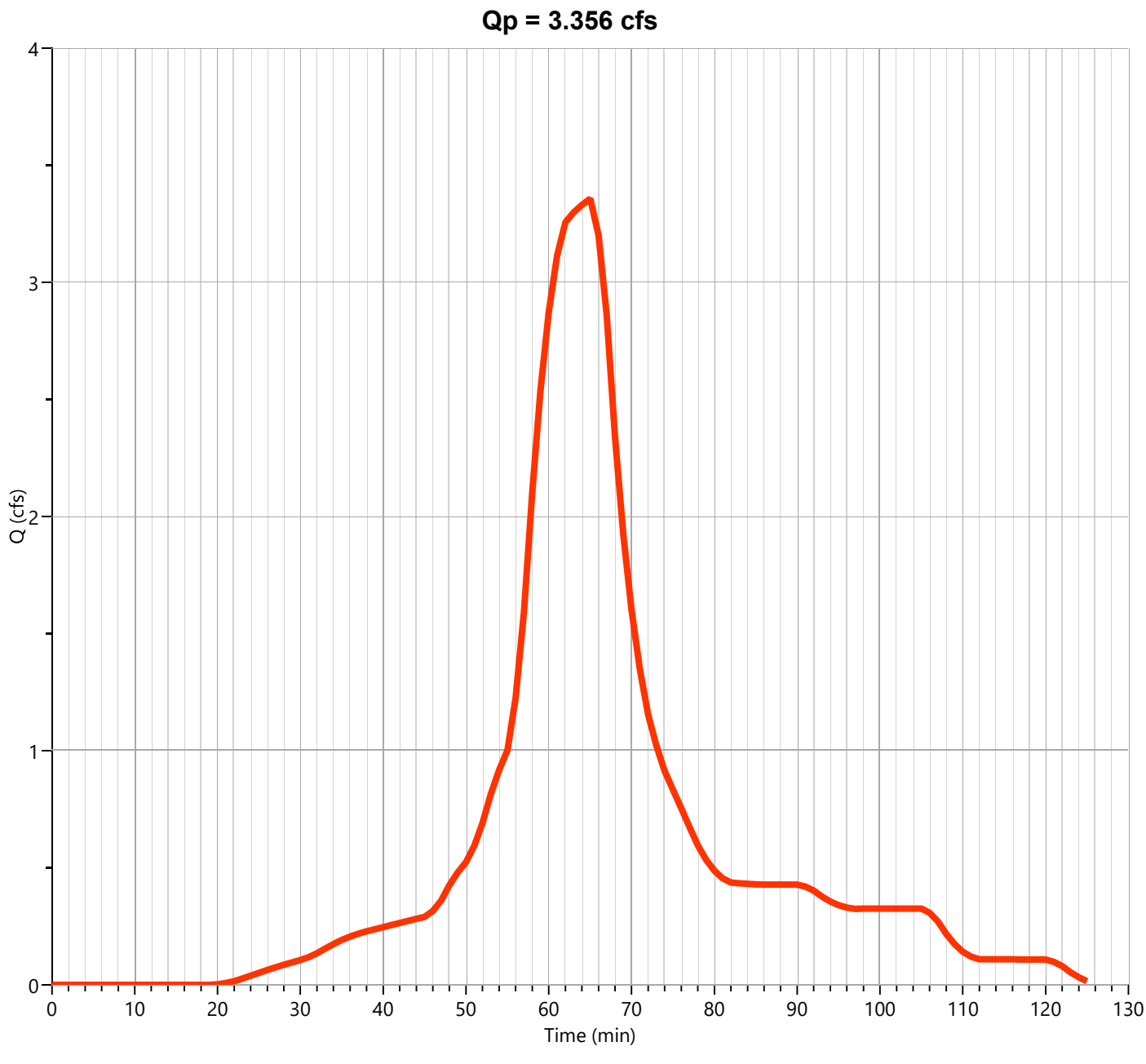
Hydrology Studio v 3.0.0.38

File: Proposed HydrologyWater Quality.hys
07-31-2025

PR WSHD A4 Imp-WQ4

Hyd. No. 11

Hydrograph Type	= NRCS Runoff	Peak Flow	= 3.356 cfs
Storm Frequency	= 1-yr	Time to Peak	= 65 min
Time Interval	= 1 min	Runoff Volume	= 4,131 cuft
Drainage Area	= 1.1 ac	Curve Number	= 98.00
Tc Method	= User	Time of Conc. (Tc)	= 4.0 min
Total Rainfall	= 1.25 in	Design Storm	= NJ WQ Storm
Storm Duration	= 2 hrs	Shape Factor	= 484



Hydrograph Report

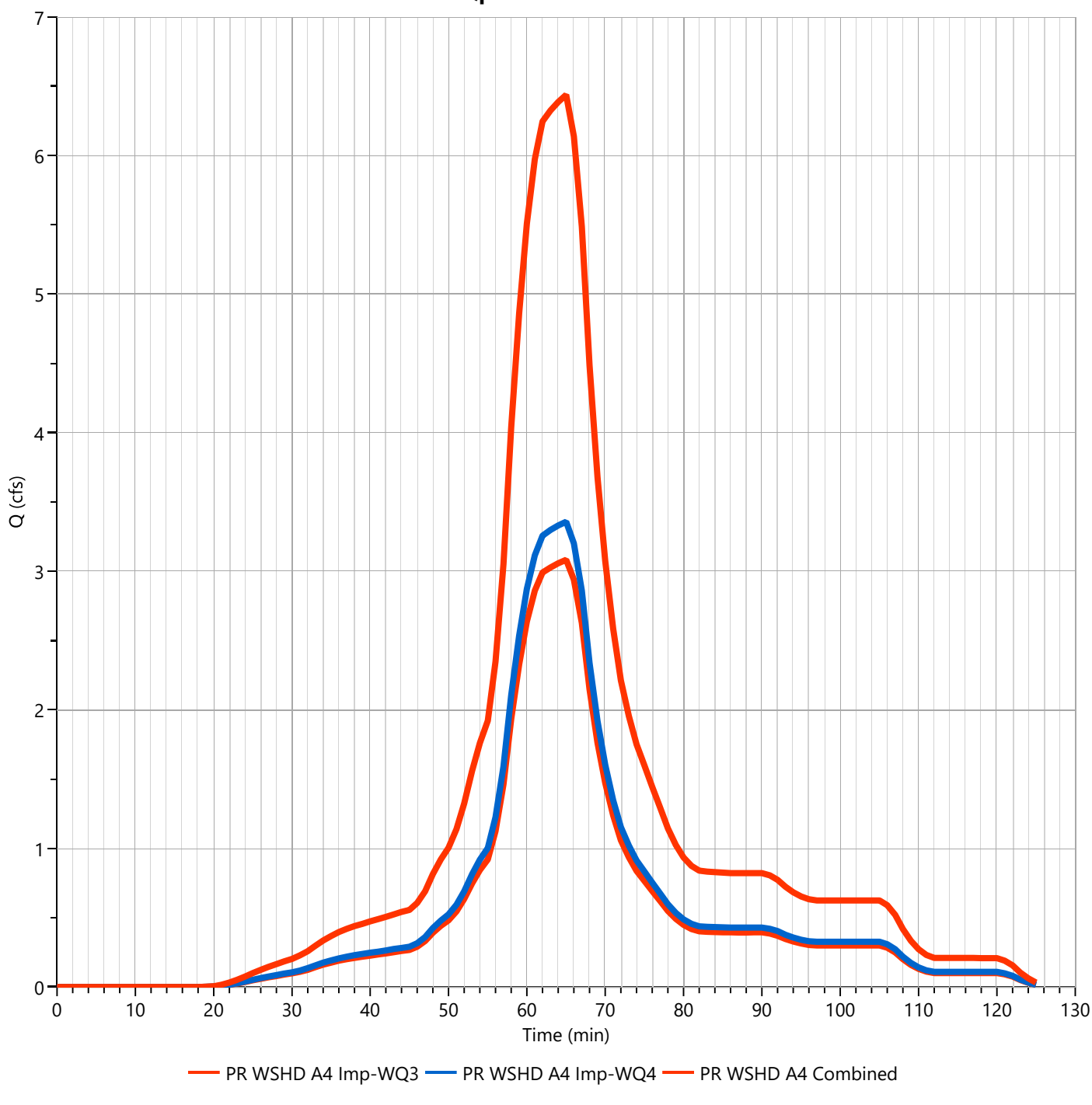
Hydrology Studio v 3.0.0.38

File: Proposed HydrologyWater Quality.hys
07-31-2025

PR WSHD A4 Combined

Hyd. No. 12

Hydrograph Type	= Junction	Peak Flow	= 6.438 cfs
Storm Frequency	= 1-yr	Time to Peak	= 65 min
Time Interval	= 1 min	Hydrograph Volume	= 7,924 cuft
Inflow Hydrographs	= 10, 11	Total Contrib. Area	= 2.11 ac



Stormtrap A4 — Hyd. No. 13

Hydrograph Type	= Pond Route	Peak Flow	= 0.000 cfs
Storm Frequency	= 1-yr	Time to Peak	= 0 min
Time Interval	= 1 min	Hydrograph Volume	= 0.000 cuft
Inflow Hydrograph	= 12 - PR WSHD A4 Combined	Max. Elevation	= 1.86 ft
Pond Name	= Stormtrap A4	Max. Storage	= 7,924 cuft

Pond Routing by Storage Indication Method

Qp = 0.000 cfs

Pond Report

File: Proposed HydrologyWater Quality.hys

Hydrology Studio v 3.0.0.38

07-31-2025

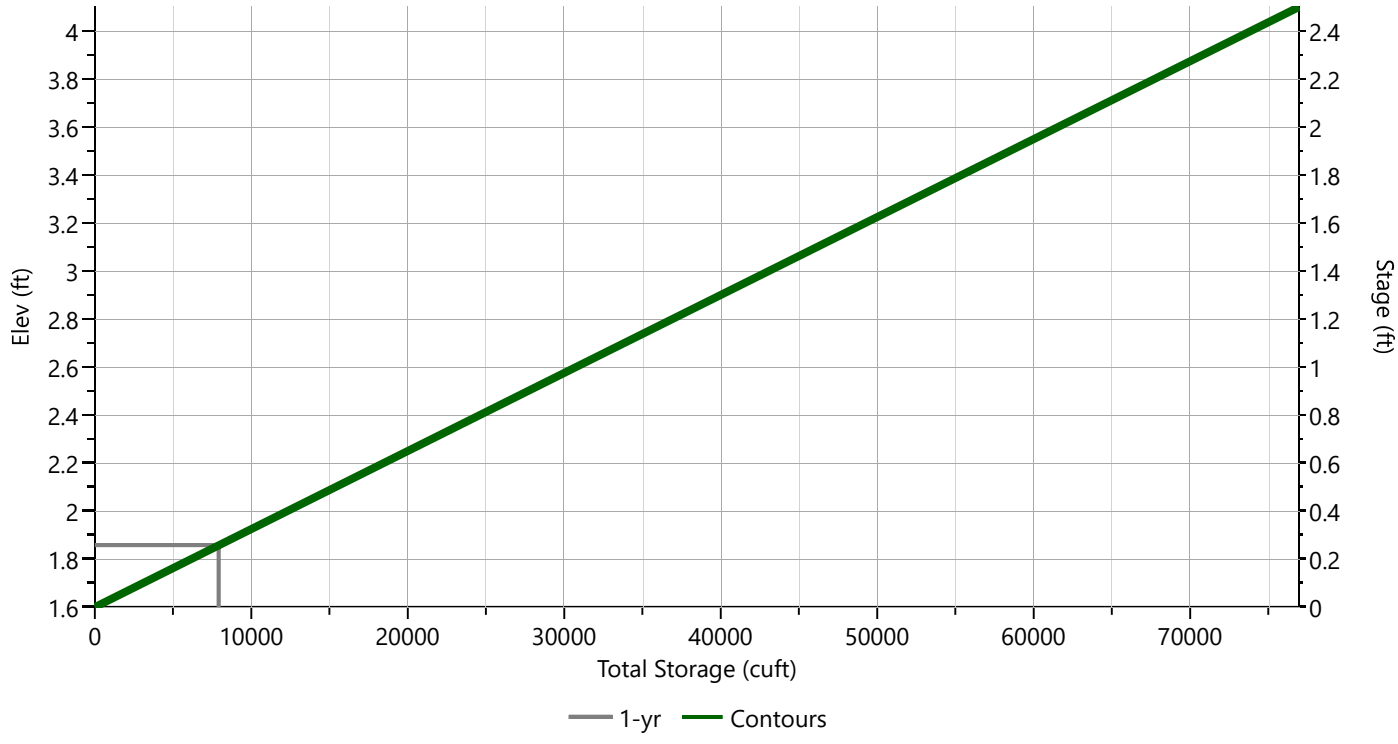
Stormtrap A4

Stage-Storage

User Defined Contours	
Description	**Input**
Bottom Elevation, ft	1.60
Voids (%)	100.00
Volume Calc	Ave End Area

Stage / Storage Table

Stage (ft)	Elevation (ft)	Contour Area (sqft)	Incr. Storage (cuft)	Total Storage (cuft)
0.00	1.60	30,793	0.000	0.000
1.00	2.60	30,793	30,793	30,793
2.00	3.60	30,793	30,793	61,586
2.50	4.10	30,793	15,397	76,983



Pond Report

File: Proposed HydrologyWater Quality.hys

Hydrology Studio v 3.0.0.38

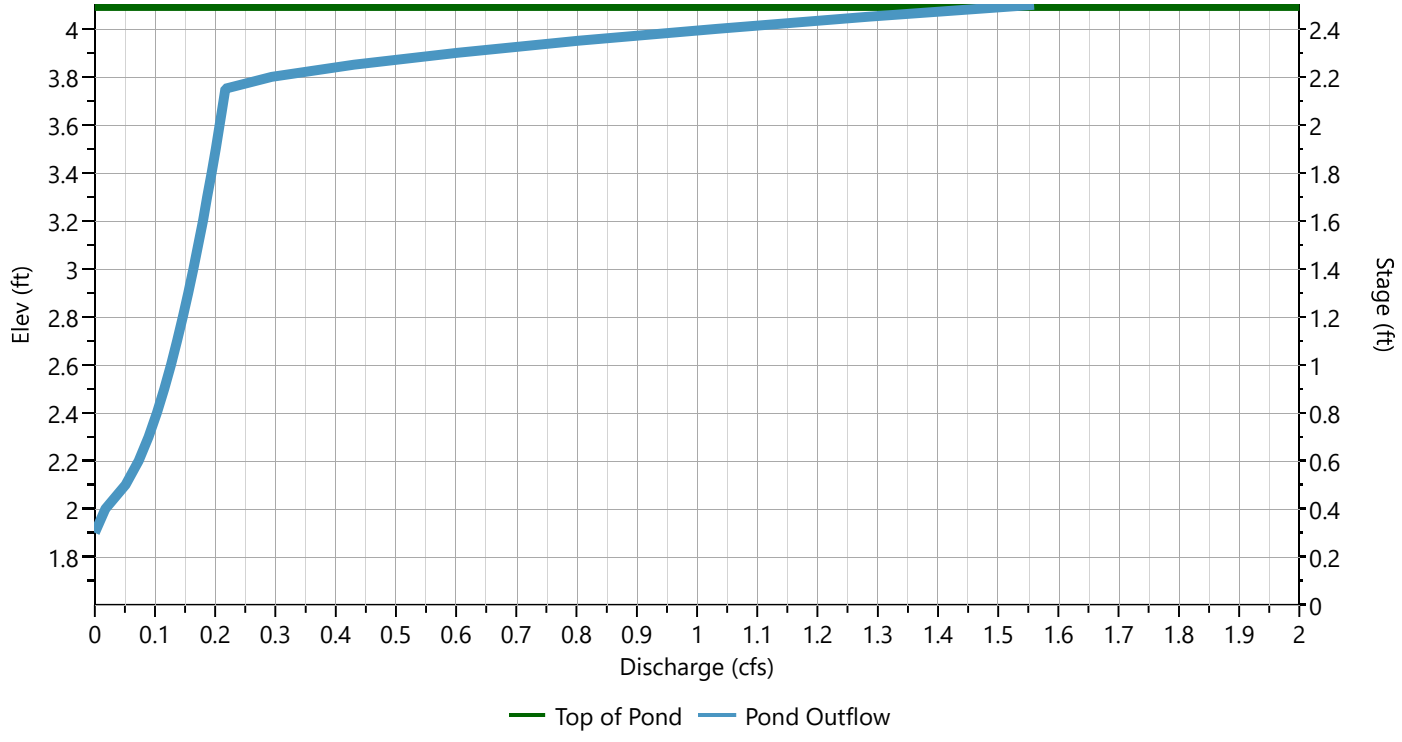
07-31-2025

Stormtrap A4

Stage-Discharge

Culvert / Orifices	Cir Culvert	Orifice			Perforated Riser	
		1 (m)	2	3		
Rise, in	18	2.5			Hole Diameter, in	
Span, in	18	2.5			No. holes	
No. Barrels	1	1			Invert Elevation, ft	
Invert Elevation, ft	1.60	1.90			Height, ft	
Orifice Coefficient, Co	0.60	0.60			Orifice Coefficient, Co	
Length, ft	10					
Barrel Slope, %	.3					
N-Value, n	0.012					
Weirs	**Riser**	**Weir**			**Ancillary**	
		1 (m)	2	3		
Shape / Type		Rectangular			Exfiltration, in/hr	
Crest Elevation, ft		3.75				
Crest Length, ft		2				
Angle, deg						
Weir Coefficient, Cw		3.3				

m = Flows through Culvert, i = Independent



Pond Report

File: Proposed HydrologyWater Quality.hys

Hydrology Studio v 3.0.0.38

07-31-2025

Stormtrap A4

Stage-Storage-Discharge Summary

Stage (ft)	Elev. (ft)	Storage (cuft)	Culvert (cfs)	Orifices, cfs			Riser (cfs)	Weirs, cfs			Pf Riser (cfs)	Exfil (cfs)	User (cfs)	Total (cfs)
				1	2	3		1	2	3				
0.00	1.60	0.000	0.000	0.000				0.000						0.000
1.00	2.60	30,793	0.127 oc	0.127				0.000						0.127
2.00	3.60	61,586	0.207 oc	0.207				0.000						0.207
2.50	4.10	76,983	1.559 oc	0.193				1.367						1.559

Suffix key: ic = inlet control, oc = outlet control, s = submerged weir

Pond Report

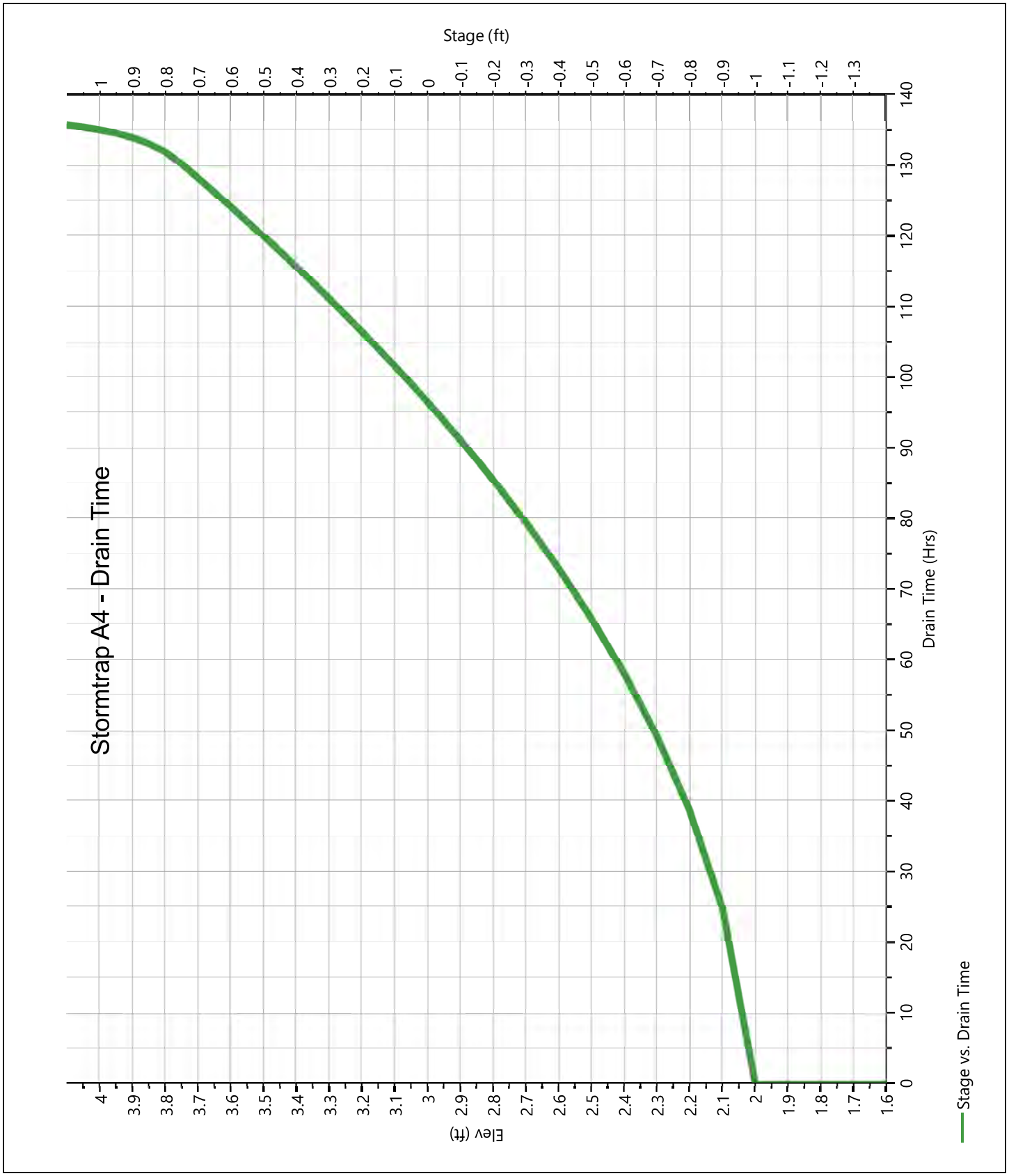
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Hydrology Studio v 3.0.0.38

07-31-2025

Stormtrap A4

Pond Drawdown



Hydrograph Report

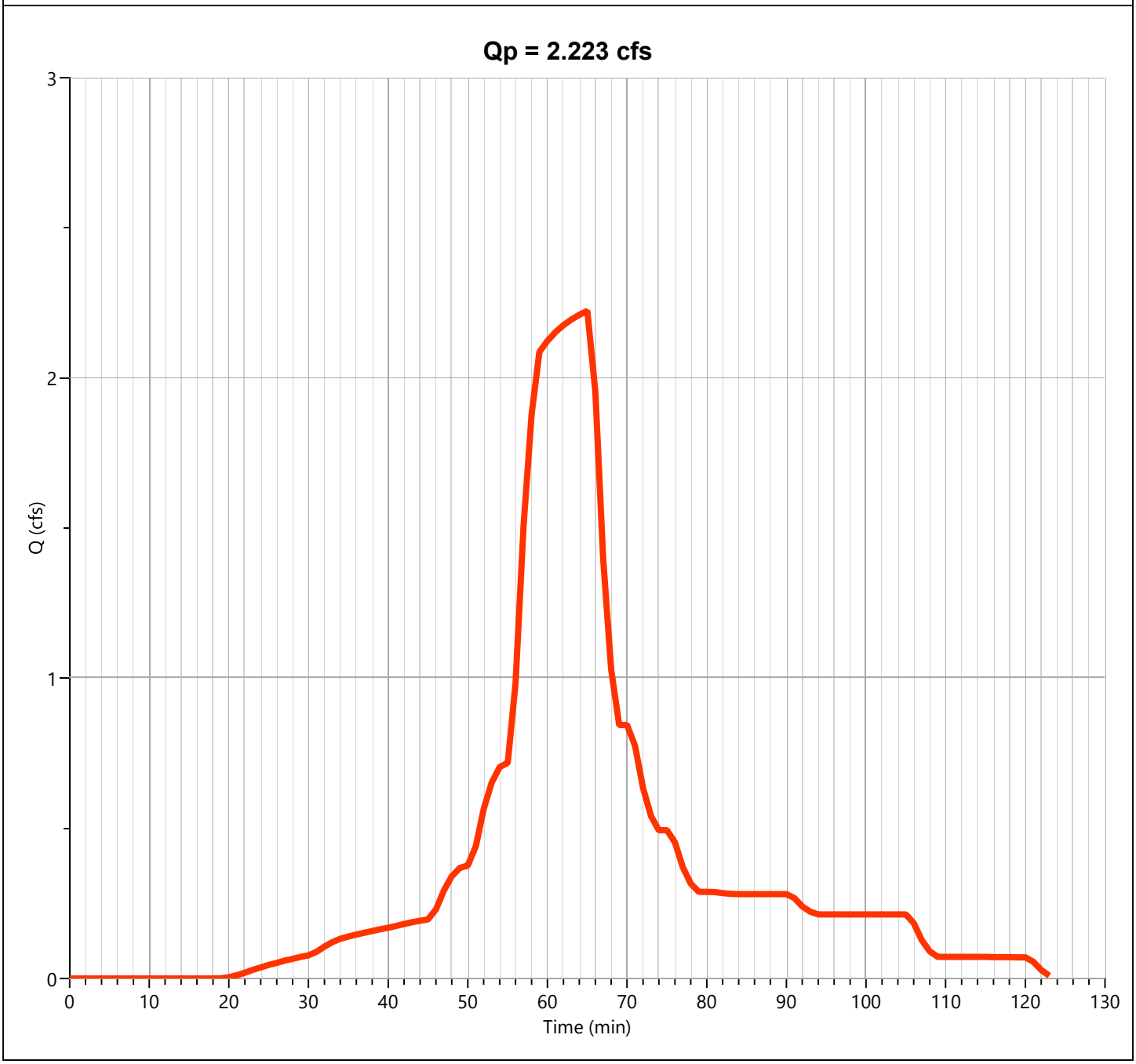
Hydrology Studio v 3.0.0.38

File: Proposed HydrologyWater Quality.hys
07-31-2025

PR WSHD A5 Imperv

Hyd. No. 15

Hydrograph Type	= NRCS Runoff	Peak Flow	= 2.223 cfs
Storm Frequency	= 1-yr	Time to Peak	= 65 min
Time Interval	= 1 min	Runoff Volume	= 2,711 cuft
Drainage Area	= 0.77 ac	Curve Number	= 98.00
Tc Method	= User	Time of Conc. (Tc)	= 2.0 min
Total Rainfall	= 1.25 in	Design Storm	= NJ WQ Storm
Storm Duration	= 2 hrs	Shape Factor	= 484



Hydrograph Report

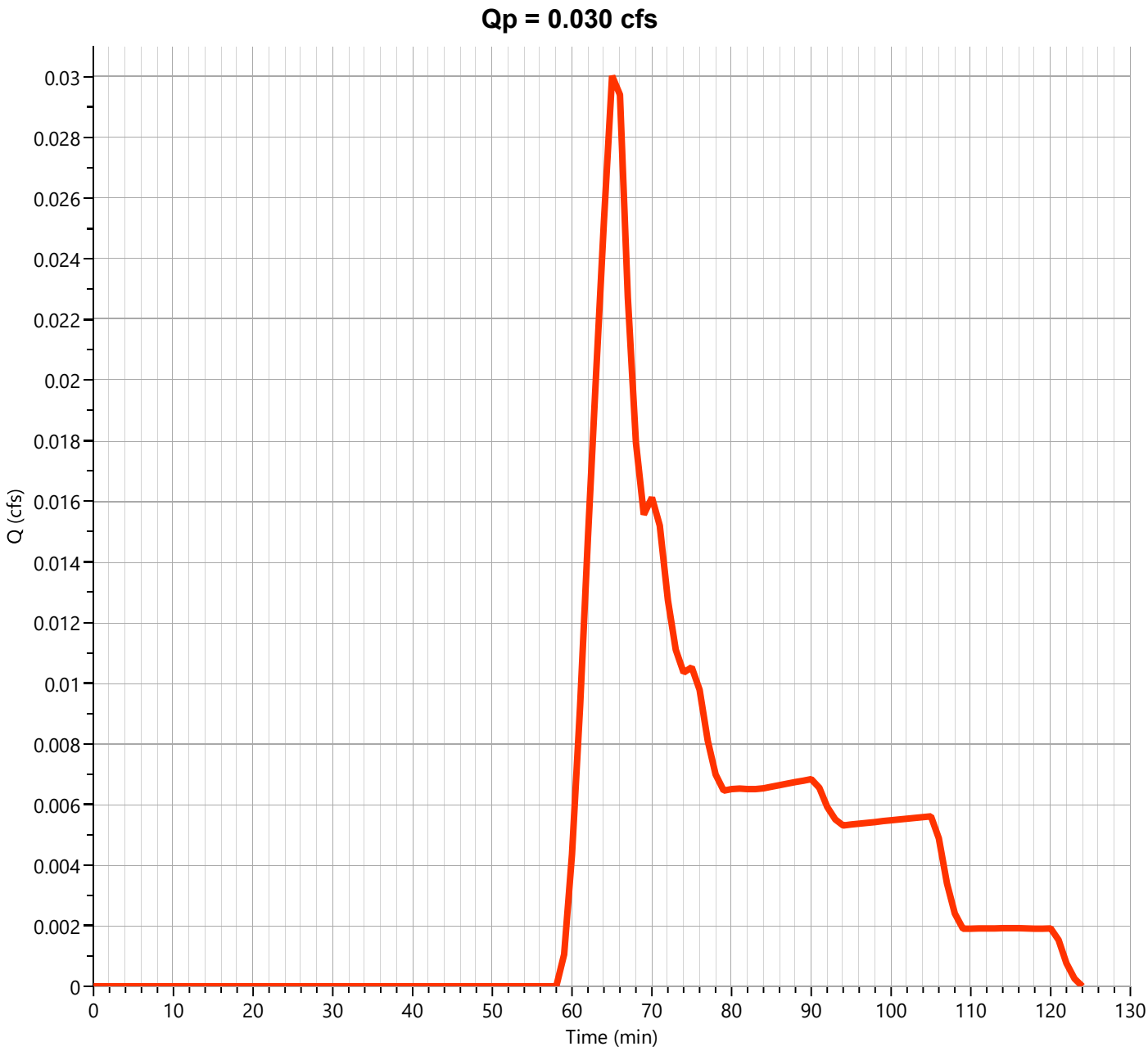
Hydrology Studio v 3.0.0.38

File: Proposed HydrologyWater Quality.hys
07-31-2025

PR WSHD A5 Perv

Hyd. No. 16

Hydrograph Type	= NRCS Runoff	Peak Flow	= 0.030 cfs
Storm Frequency	= 1-yr	Time to Peak	= 65 min
Time Interval	= 1 min	Runoff Volume	= 29.4 cuft
Drainage Area	= 0.05 ac	Curve Number	= 80.00
Tc Method	= User	Time of Conc. (Tc)	= 2.0 min
Total Rainfall	= 1.25 in	Design Storm	= NJ WQ Storm
Storm Duration	= 2 hrs	Shape Factor	= 484



Hydrograph Report

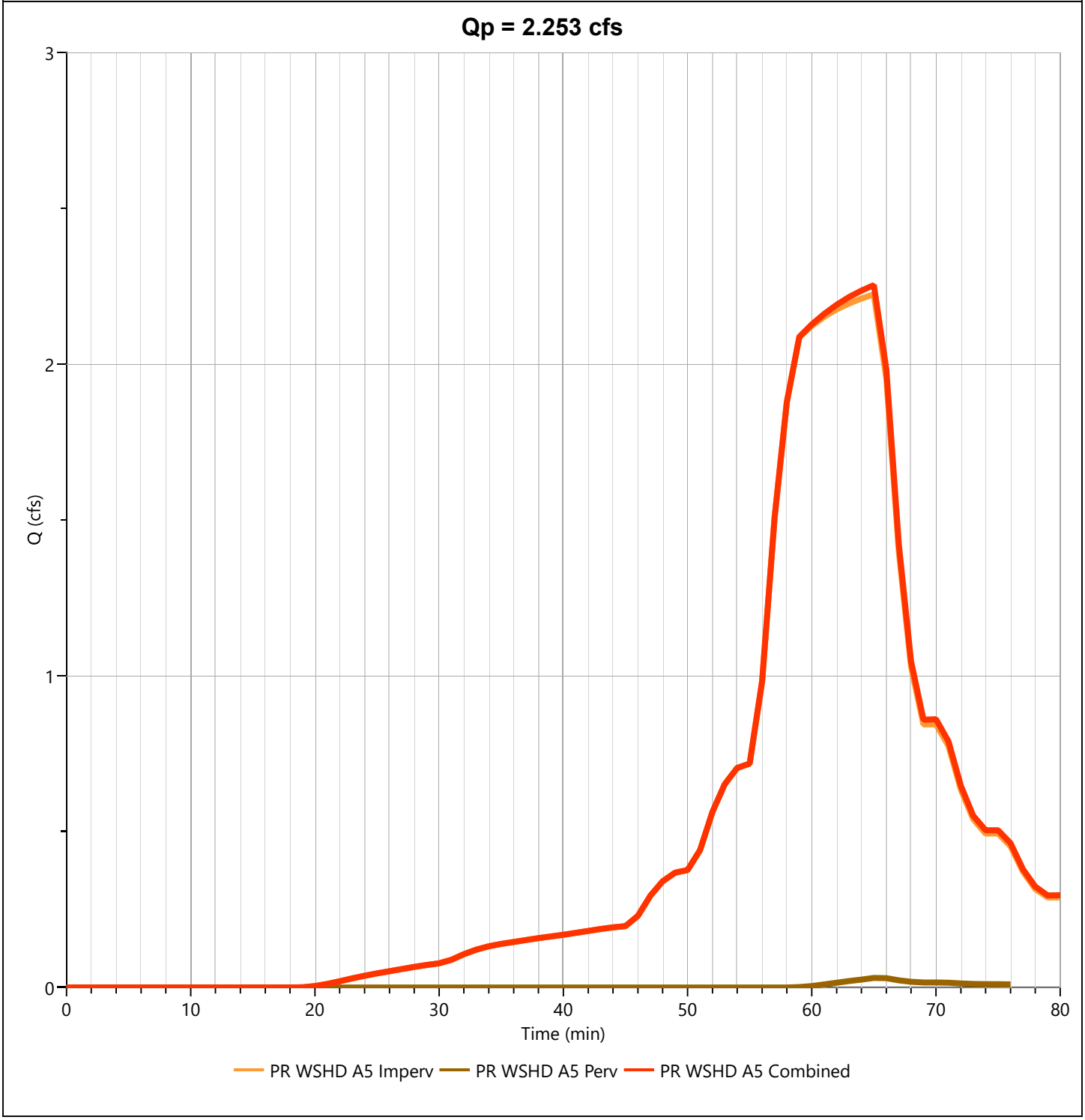
Hydrology Studio v 3.0.0.38

File: Proposed HydrologyWater Quality.hys
07-31-2025

PR WSHD A5 Combined

Hyd. No. 17

Hydrograph Type	= Junction	Peak Flow	= 2.253 cfs
Storm Frequency	= 1-yr	Time to Peak	= 65 min
Time Interval	= 1 min	Hydrograph Volume	= 2,740 cuft
Inflow Hydrographs	= 15, 16	Total Contrib. Area	= 0.82 ac



Hydrograph Report

Hydrology Studio v 3.0.0.38

File: Proposed HydrologyWater Quality.hys
07-31-2025

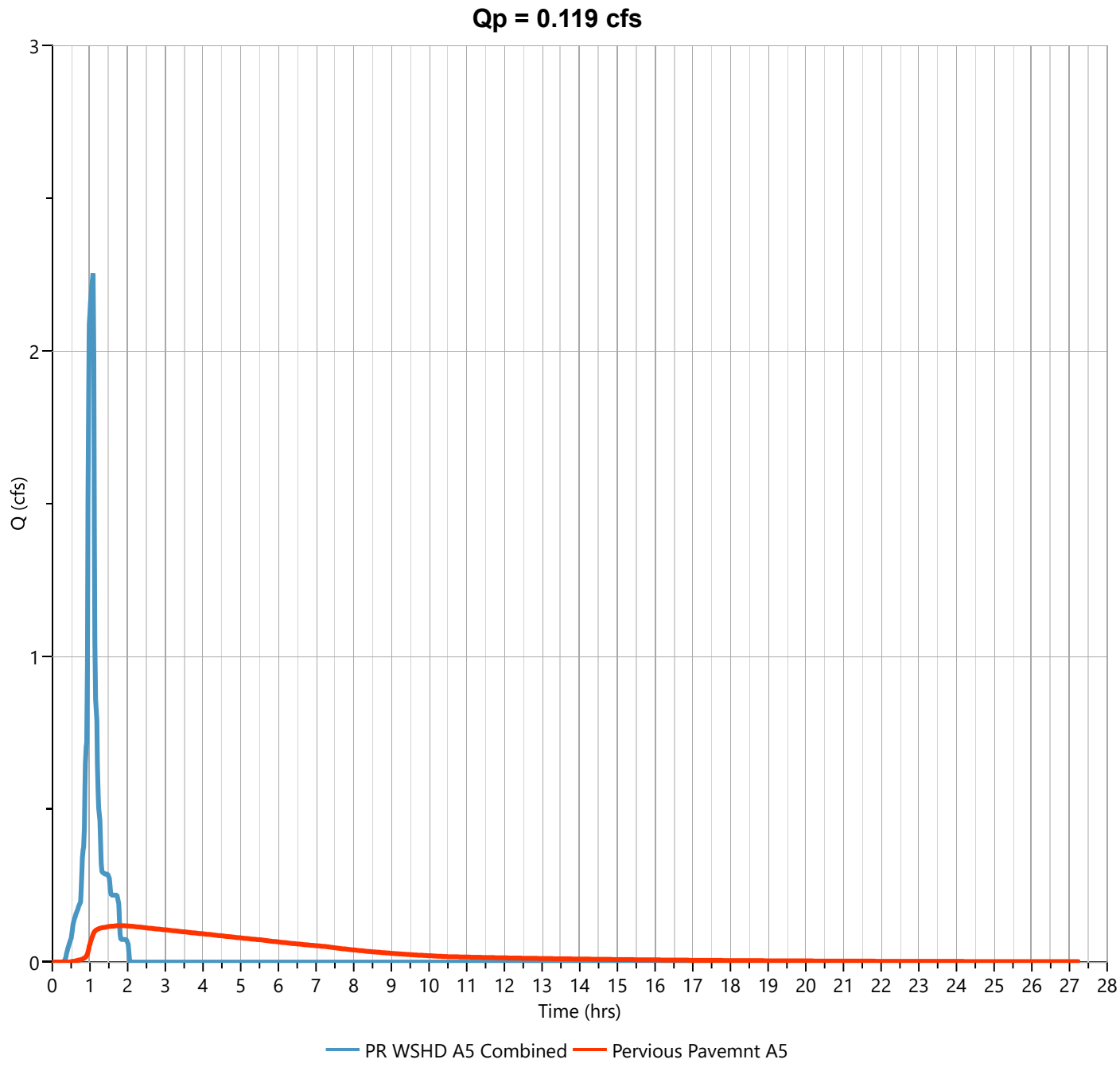
Pervious Pavemnt A5

Hyd. No. 18

Hydrograph Type	= Pond Route	Peak Flow	= 0.119 cfs
Storm Frequency	= 1-yr	Time to Peak	= 107 min
Time Interval	= 1 min	Hydrograph Volume	= 2,719 cuft
Inflow Hydrograph	= 17 - PR WSHD A5 Combined	Max. Elevation	= 4.03 ft
Pond Name	= Pervious Pavement A5	Max. Storage	= 2,343 cuft

Pond Routing by Storage Indication Method

Center of mass detention time = 4.69 hrs



Pond Report

File: Proposed HydrologyWater Quality.hys

Hydrology Studio v 3.0.0.38

07-31-2025

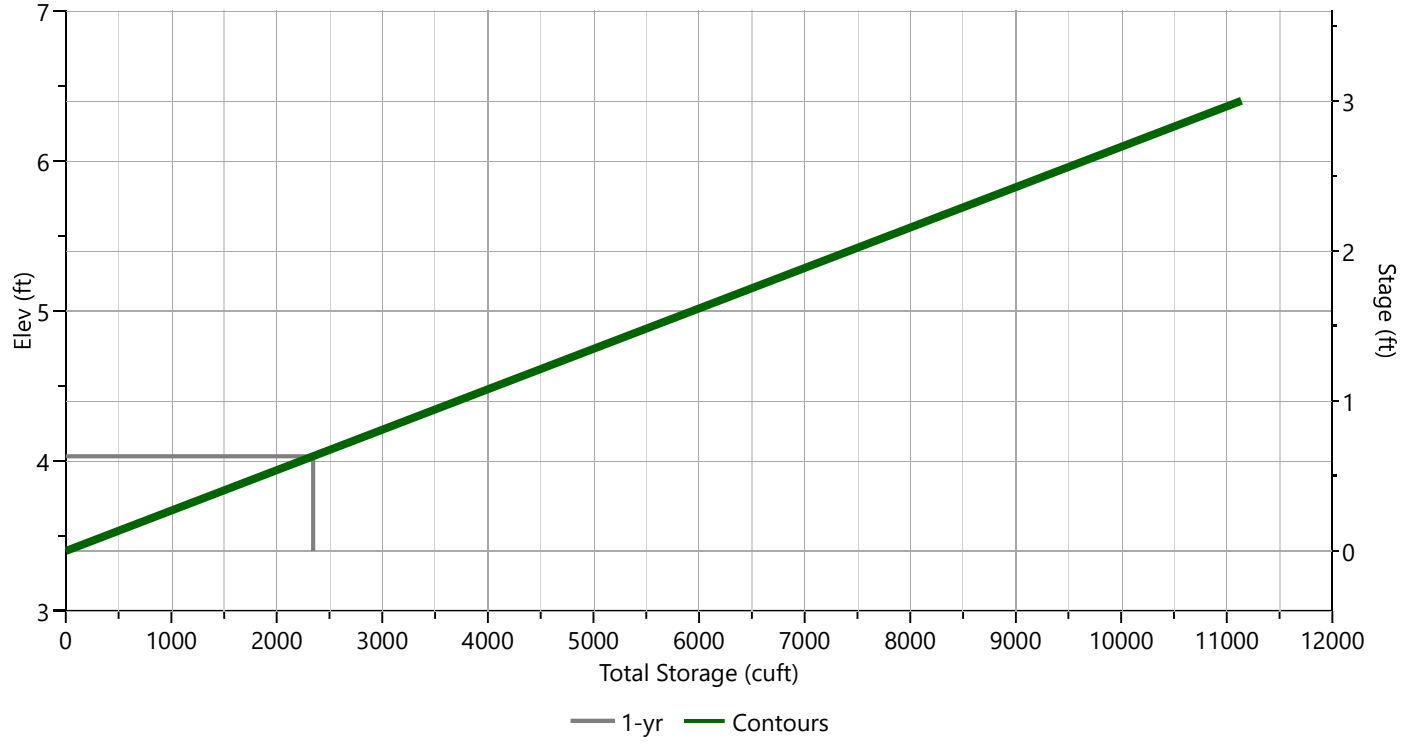
Pervious Pavement A5

Stage-Storage

User Defined Contours	
Description	**Input**
Bottom Elevation, ft	3.40
Voids (%)	40.00
Volume Calc	Ave End Area

Stage / Storage Table

Stage (ft)	Elevation (ft)	Contour Area (sqft)	Incr. Storage (cuft)	Total Storage (cuft)
0.00	3.40	9,282	0.000	0.000
1.00	4.40	9,282	3,713	3,713
2.00	5.40	9,282	3,713	7,426
3.00	6.40	9,282	3,713	11,138



Pond Report

File: Proposed HydrologyWater Quality.hys

Hydrology Studio v 3.0.0.38

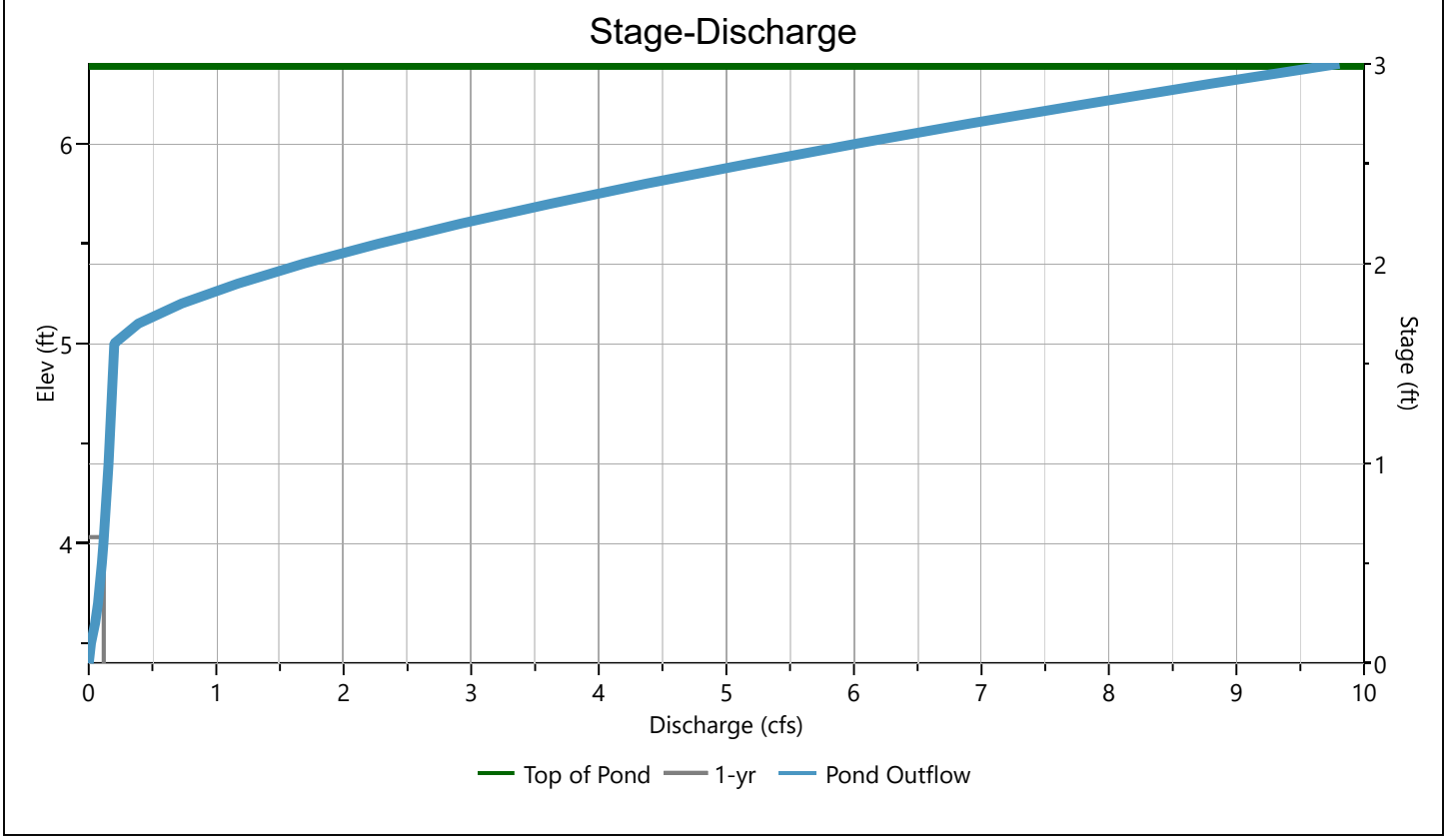
07-31-2025

Pervious Pavement A5

Stage-Discharge

Culvert / Orifices	Cir Culvert	Orifice			Perforated Riser	
		1 (m)	2	3		
Rise, in	18	2.5			Hole Diameter, in	
Span, in	18	2.5			No. holes	
No. Barrels	1	1			Invert Elevation, ft	
Invert Elevation, ft	2.00	3.40			Height, ft	
Orifice Coefficient, Co	0.60	0.60			Orifice Coefficient, Co	
Length, ft	10					
Barrel Slope, %	.3					
N-Value, n	0.012					
Weirs	**Riser**	**Weir**			**Ancillary**	
		1 (m)	2	3		
Shape / Type		Rectangular			Exfiltration, in/hr	
Crest Elevation, ft		5				
Crest Length, ft		1.75				
Angle, deg						
Weir Coefficient, Cw		3.3				

m = Flows through Culvert, i = Independent



Pond Report

File: Proposed HydrologyWater Quality.hys

Hydrology Studio v 3.0.0.38

07-31-2025

Pervious Pavement A5

Stage-Storage-Discharge Summary

Stage (ft)	Elev. (ft)	Storage (cuft)	Culvert (cfs)	Orifices, cfs			Riser (cfs)	Weirs, cfs			Pf Riser (cfs)	Exfil (cfs)	User (cfs)	Total (cfs)
				1	2	3		1	2	3				
0.00	3.40	0.000	0.000	0.000				0.000						0.000
1.00	4.40	3,713	0.155 oc	0.155				0.000						0.155
2.00	5.40	7,426	1.687 oc	0.226				1.461						1.687
3.00	6.40	11,138	9.806 oc	0.240				9.566						9.806

Suffix key: ic = inlet control, oc = outlet control, s = submerged weir

Pond Report

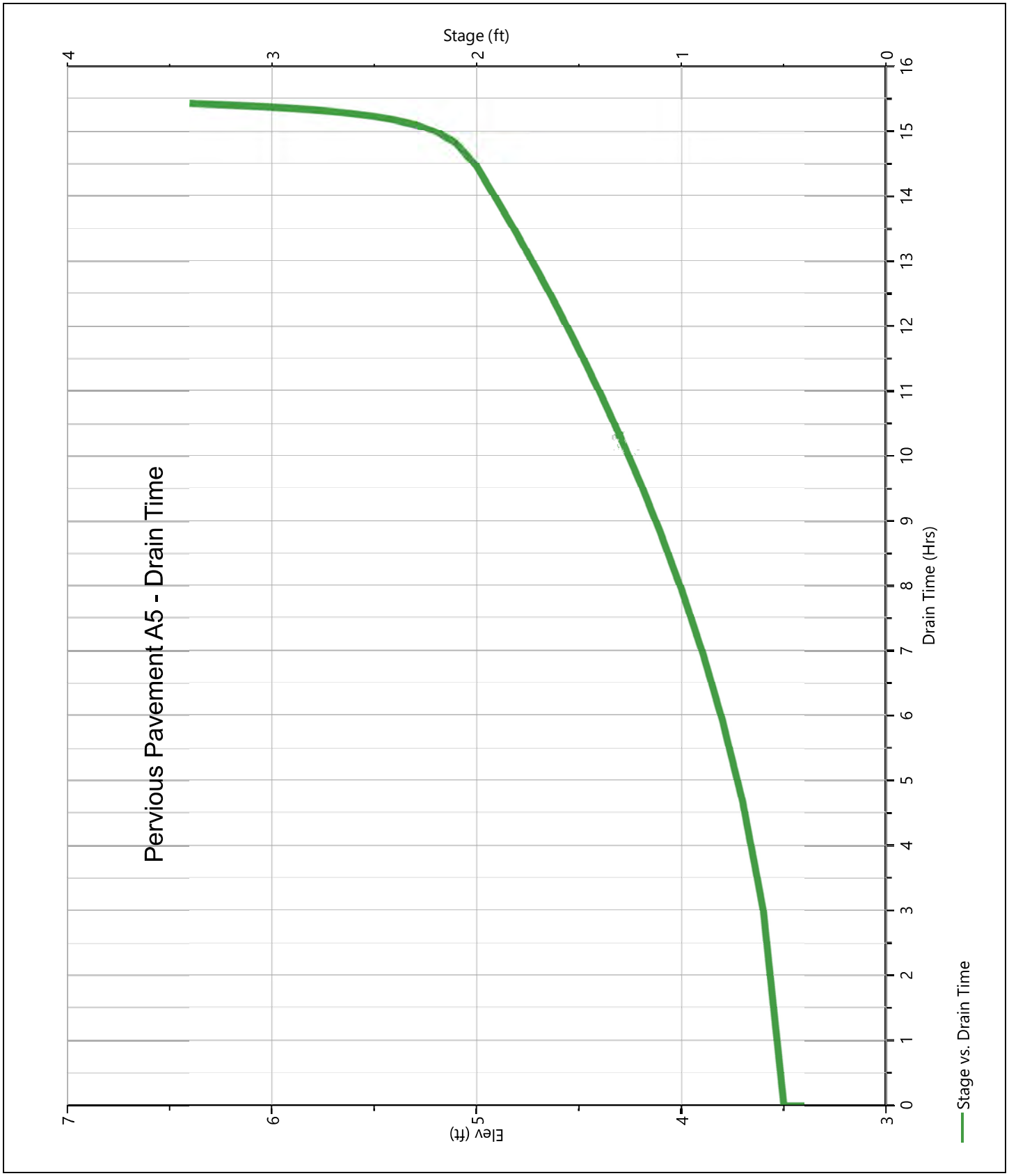
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Hydrology Studio v 3.0.0.38

07-31-2025

Pervious Pavement A5

Pond Drawdown



Hydrograph Report

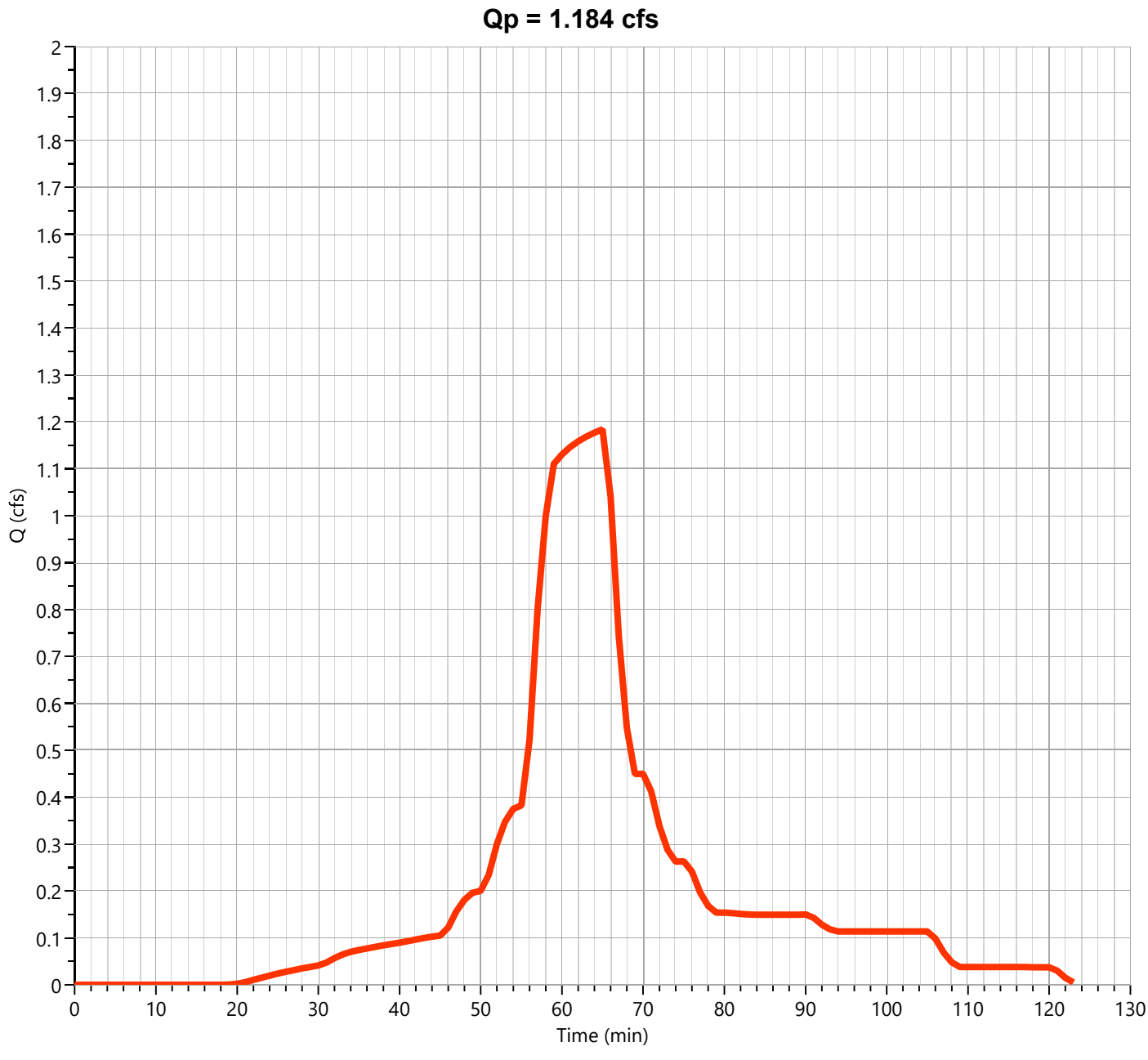
Hydrology Studio v 3.0.0.38

File: Proposed HydrologyWater Quality.hys
07-31-2025

PR WSHD A6 Imperv

Hyd. No. 20

Hydrograph Type	= NRCS Runoff	Peak Flow	= 1.184 cfs
Storm Frequency	= 1-yr	Time to Peak	= 65 min
Time Interval	= 1 min	Runoff Volume	= 1,444 cuft
Drainage Area	= 0.41 ac	Curve Number	= 98.00
Tc Method	= User	Time of Conc. (Tc)	= 2.0 min
Total Rainfall	= 1.25 in	Design Storm	= NJ WQ Storm
Storm Duration	= 2 hrs	Shape Factor	= 484



Hydrograph Report

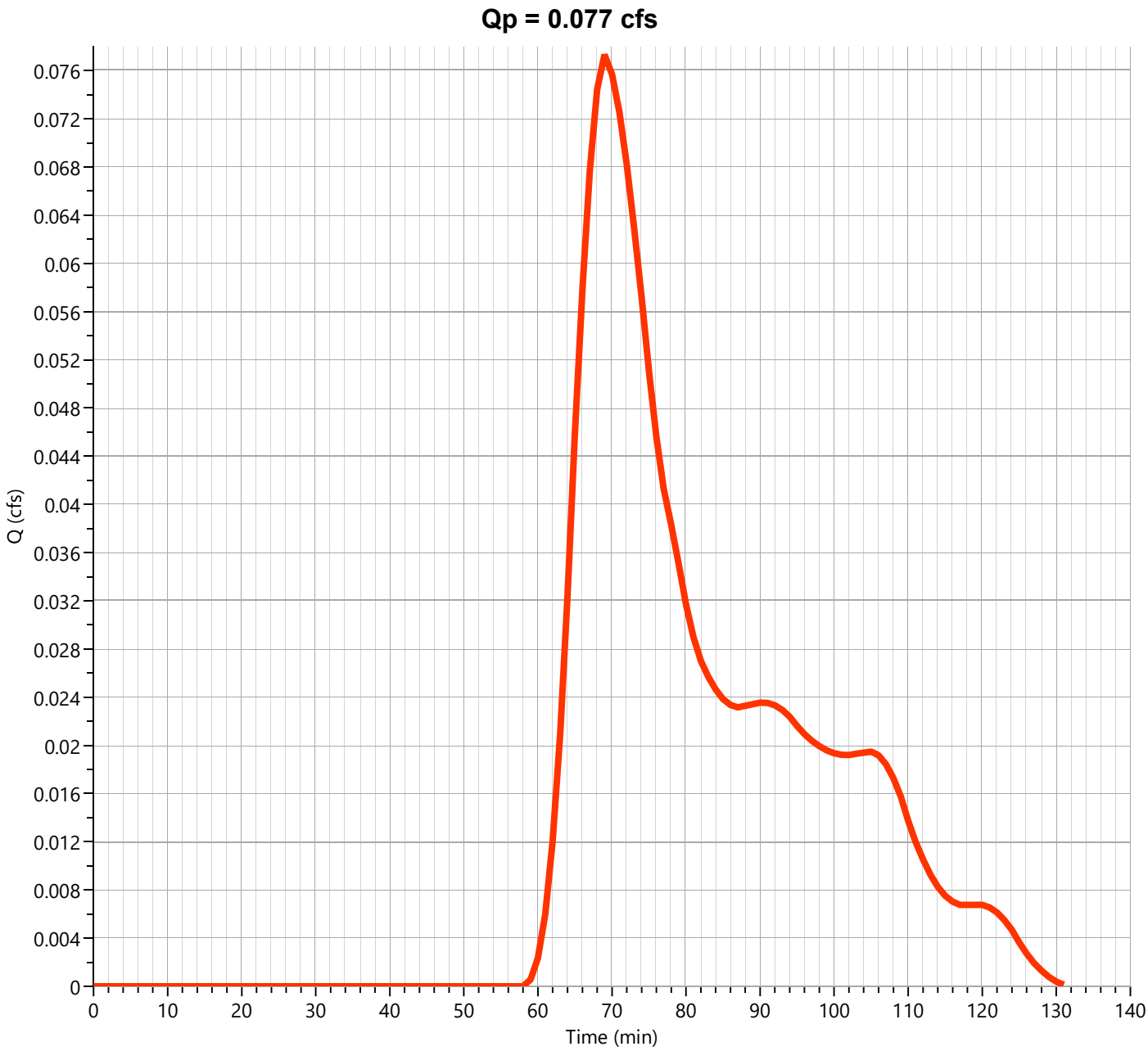
Hydrology Studio v 3.0.0.38

File: Proposed HydrologyWater Quality.hys
07-31-2025

PR WSHD A6 Perv

Hyd. No. 21

Hydrograph Type	= NRCS Runoff	Peak Flow	= 0.077 cfs
Storm Frequency	= 1-yr	Time to Peak	= 69 min
Time Interval	= 1 min	Runoff Volume	= 104 cuft
Drainage Area	= 0.17 ac	Curve Number	= 80.00
Tc Method	= User	Time of Conc. (Tc)	= 8.0 min
Total Rainfall	= 1.25 in	Design Storm	= NJ WQ Storm
Storm Duration	= 2 hrs	Shape Factor	= 484



Hydrograph Report

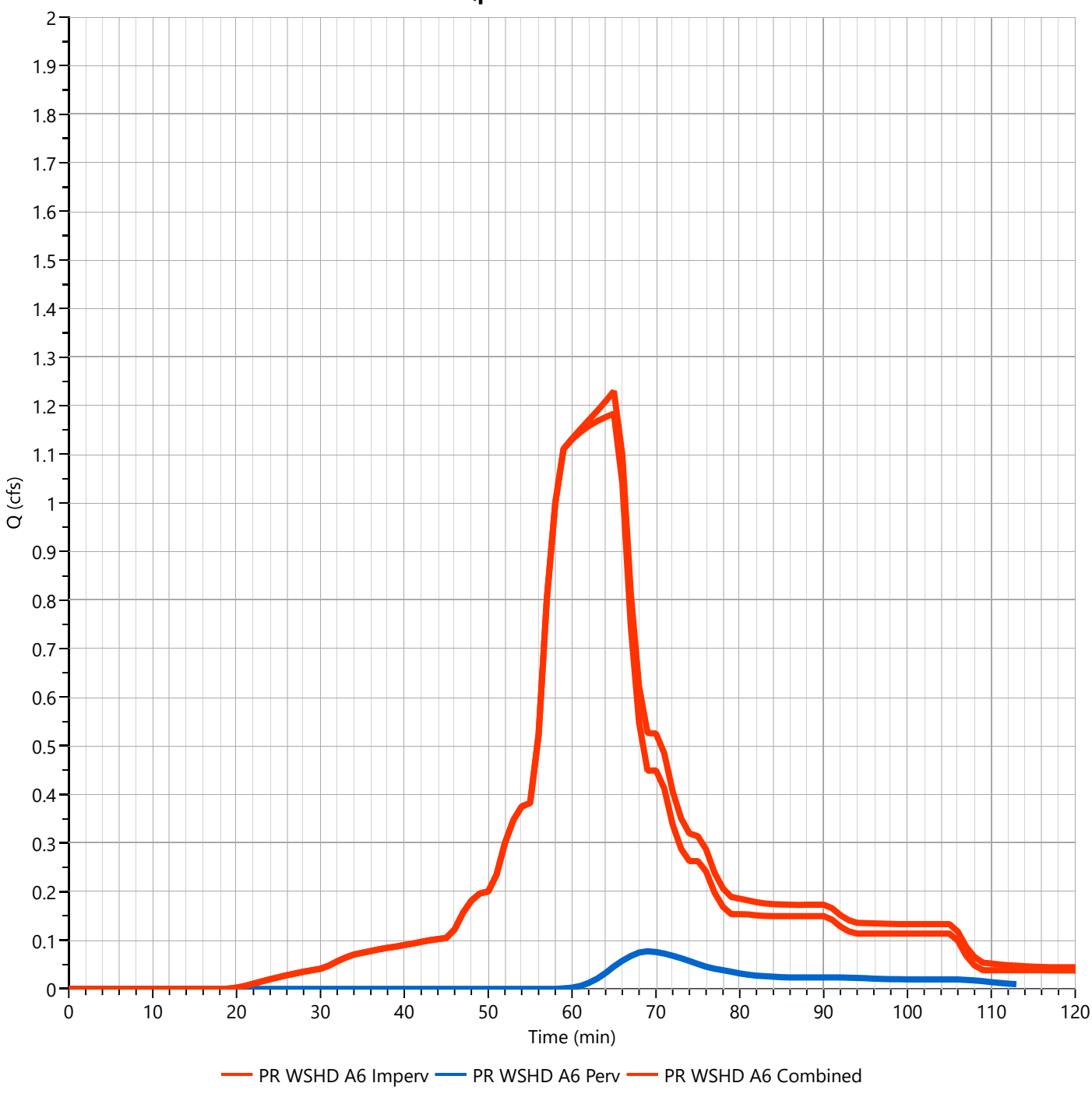
Hydrology Studio v 3.0.0.38

File: Proposed HydrologyWater Quality.hys
07-31-2025

PR WSHD A6 Combined

Hyd. No. 22

Hydrograph Type	= Junction	Peak Flow	= 1.230 cfs
Storm Frequency	= 1-yr	Time to Peak	= 65 min
Time Interval	= 1 min	Hydrograph Volume	= 1,548 cuft
Inflow Hydrographs	= 20, 21	Total Contrib. Area	= 0.58 ac



Hydrograph Report

Hydrology Studio v 3.0.0.38

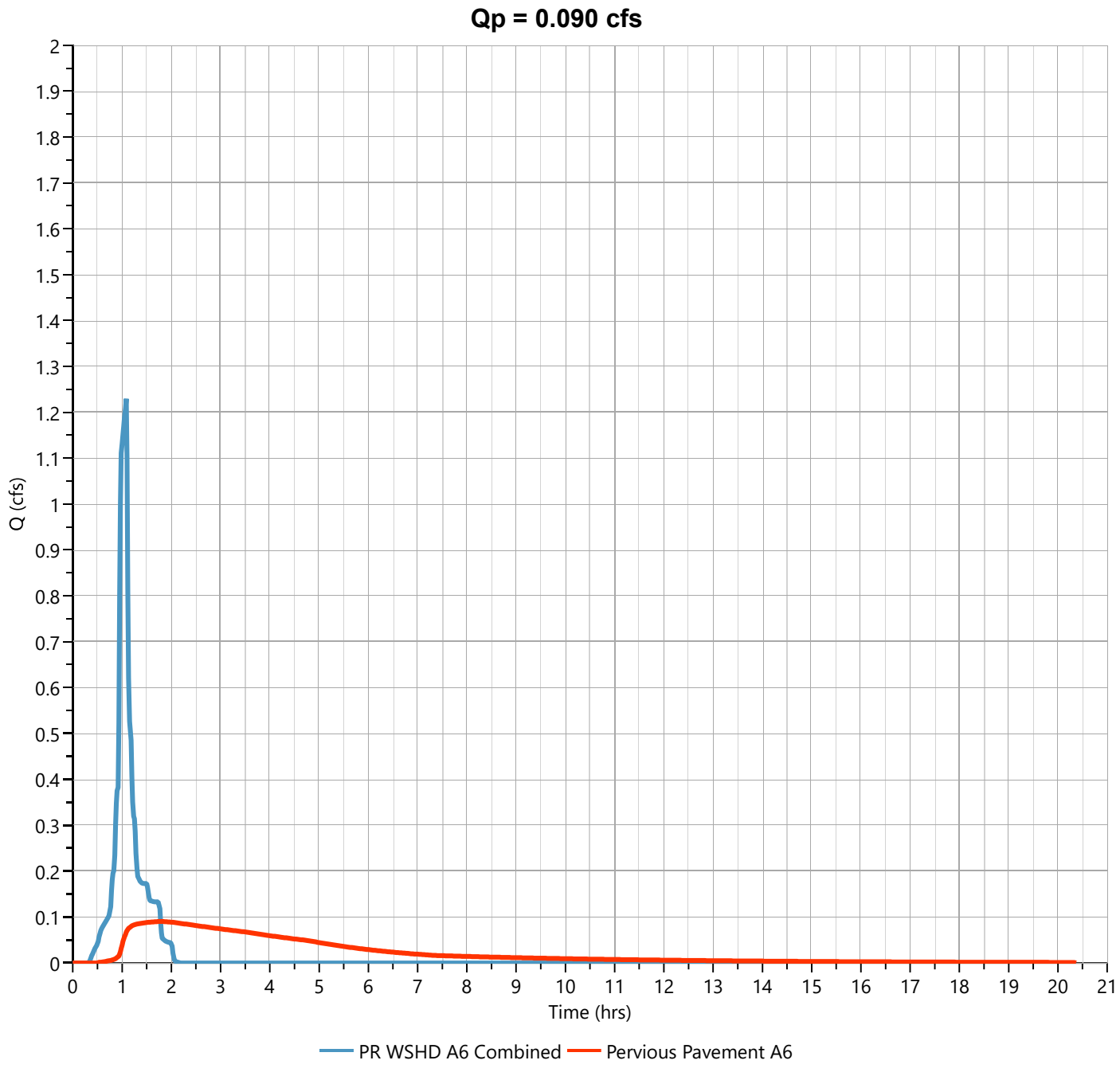
File: Proposed HydrologyWater Quality.hys
07-31-2025

Pervious Pavement A6 — Hyd. No. 23

Hydrograph Type	= Pond Route	Peak Flow	= 0.090 cfs
Storm Frequency	= 1-yr	Time to Peak	= 107 min
Time Interval	= 1 min	Hydrograph Volume	= 1,531 cuft
Inflow Hydrograph	= 22 - PR WSHD A6 Combined	Max. Elevation	= 2.96 ft
Pond Name	= Pervious Pavement A6	Max. Storage	= 1,257 cuft

Pond Routing by Storage Indication Method

Center of mass detention time = 3.55 hrs



Pond Report

File: Proposed HydrologyWater Quality.hys

Hydrology Studio v 3.0.0.38

07-31-2025

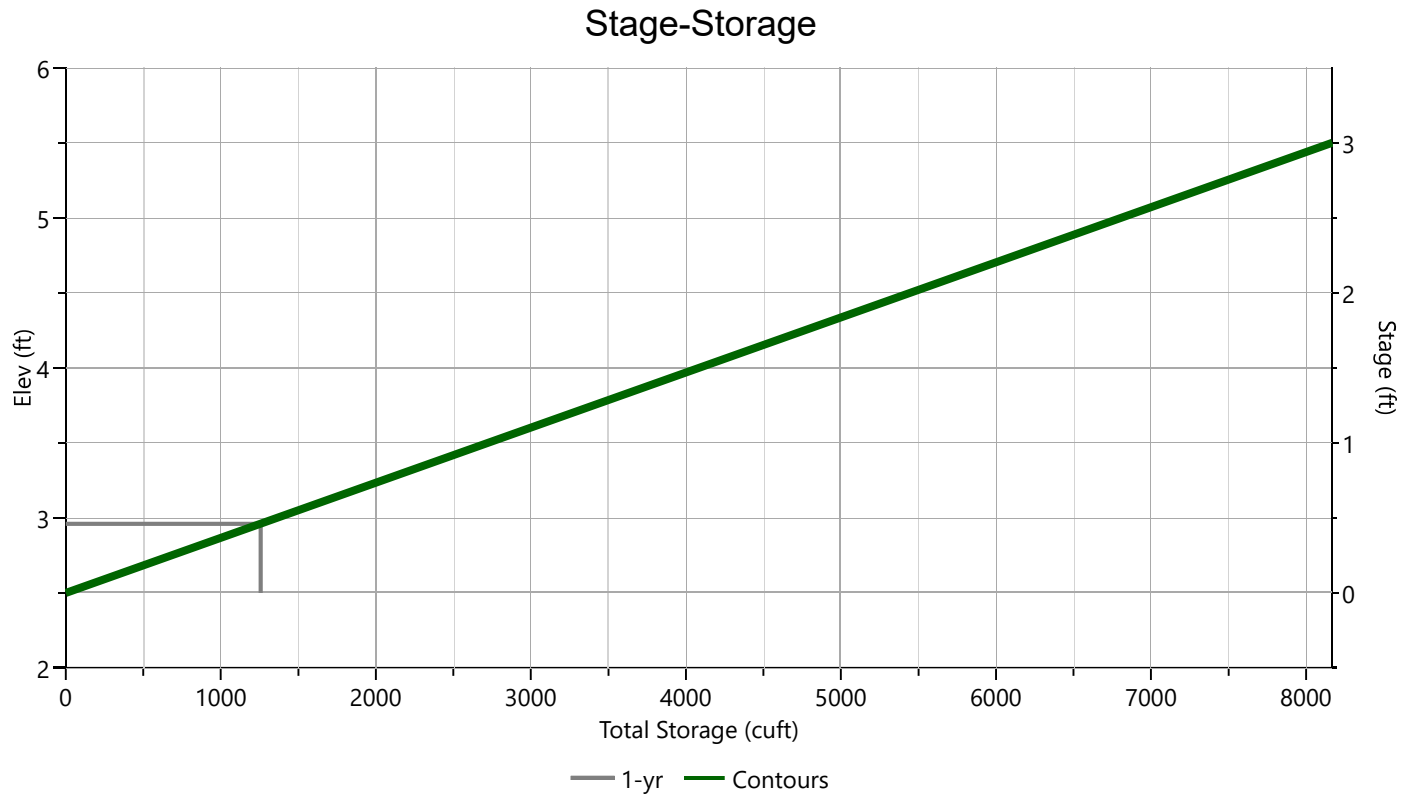
Pervious Pavement A6

Stage-Storage

User Defined Contours	
Description	**Input**
Bottom Elevation, ft	2.50
Voids (%)	40.00
Volume Calc	Ave End Area

Stage / Storage Table

Stage (ft)	Elevation (ft)	Contour Area (sqft)	Incr. Storage (cuft)	Total Storage (cuft)
0.00	2.50	6,808	0.000	0.000
1.00	3.50	6,808	2,723	2,723
2.00	4.50	6,808	2,723	5,446
3.00	5.50	6,808	2,723	8,170



Pond Report

File: Proposed HydrologyWater Quality.hys

Hydrology Studio v 3.0.0.38

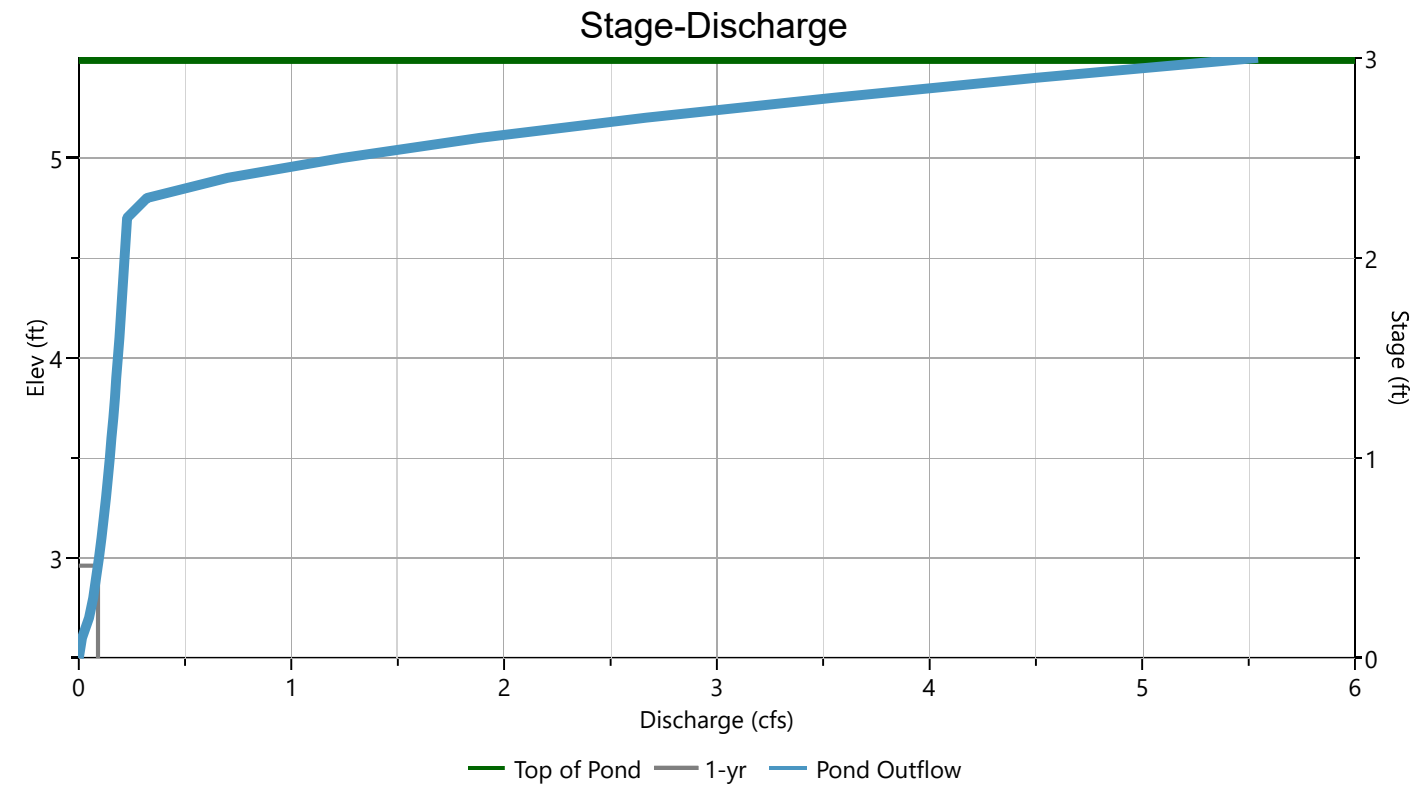
07-31-2025

Pervious Pavement A6

Stage-Discharge

Culvert / Orifices	Cir Culvert	Orifice			Perforated Riser	
		1 (m)	2	3		
Rise, in	18	2.5			Hole Diameter, in	
Span, in	18	2.5			No. holes	
No. Barrels	1	1			Invert Elevation, ft	
Invert Elevation, ft	2.50	2.50			Height, ft	
Orifice Coefficient, Co	0.60	0.60			Orifice Coefficient, Co	
Length, ft	10					
Barrel Slope, %	.3					
N-Value, n	0.012					
Weirs	**Riser**	**Weir**			**Ancillary**	
		1 (m)	2	3		
Shape / Type		Rectangular			Exfiltration, in/hr	
Crest Elevation, ft		4.75				
Crest Length, ft		2.5				
Angle, deg						
Weir Coefficient, Cw		3.3				

m = Flows through Culvert, i = Independent



Pond Report

File: Proposed HydrologyWater Quality.hys

Hydrology Studio v 3.0.0.38

07-31-2025

Pervious Pavement A6

Stage-Storage-Discharge Summary

Stage (ft)	Elev. (ft)	Storage (cuft)	Culvert (cfs)	Orifices, cfs			Riser (cfs)	Weirs, cfs			Pf Riser (cfs)	Exfil (cfs)	User (cfs)	Total (cfs)
				1	2	3		1	2	3				
0.00	2.50	0.000	0.000	0.000				0.000						0.000
1.00	3.50	2,723	0.146 oc	0.146				0.000						0.146
2.00	4.50	5,446	0.216 oc	0.216				0.000						0.216
3.00	5.50	8,170	5.544 oc	0.185				5.359						5.544

Suffix key: ic = inlet control, oc = outlet control, s = submerged weir

Pond Report

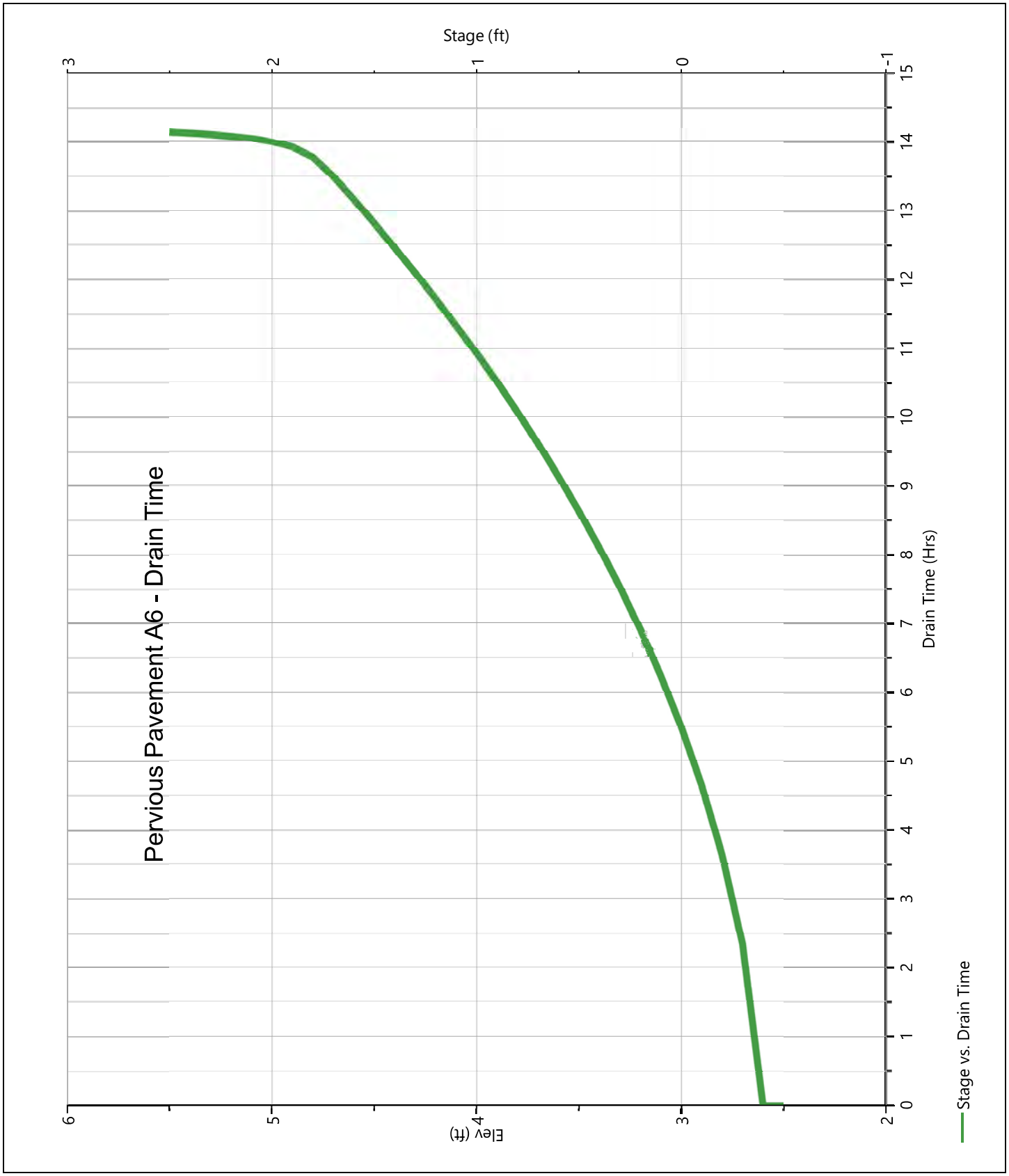
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Hydrology Studio v 3.0.0.38

07-31-2025

Pervious Pavement A6

Pond Drawdown



Hydrograph Report

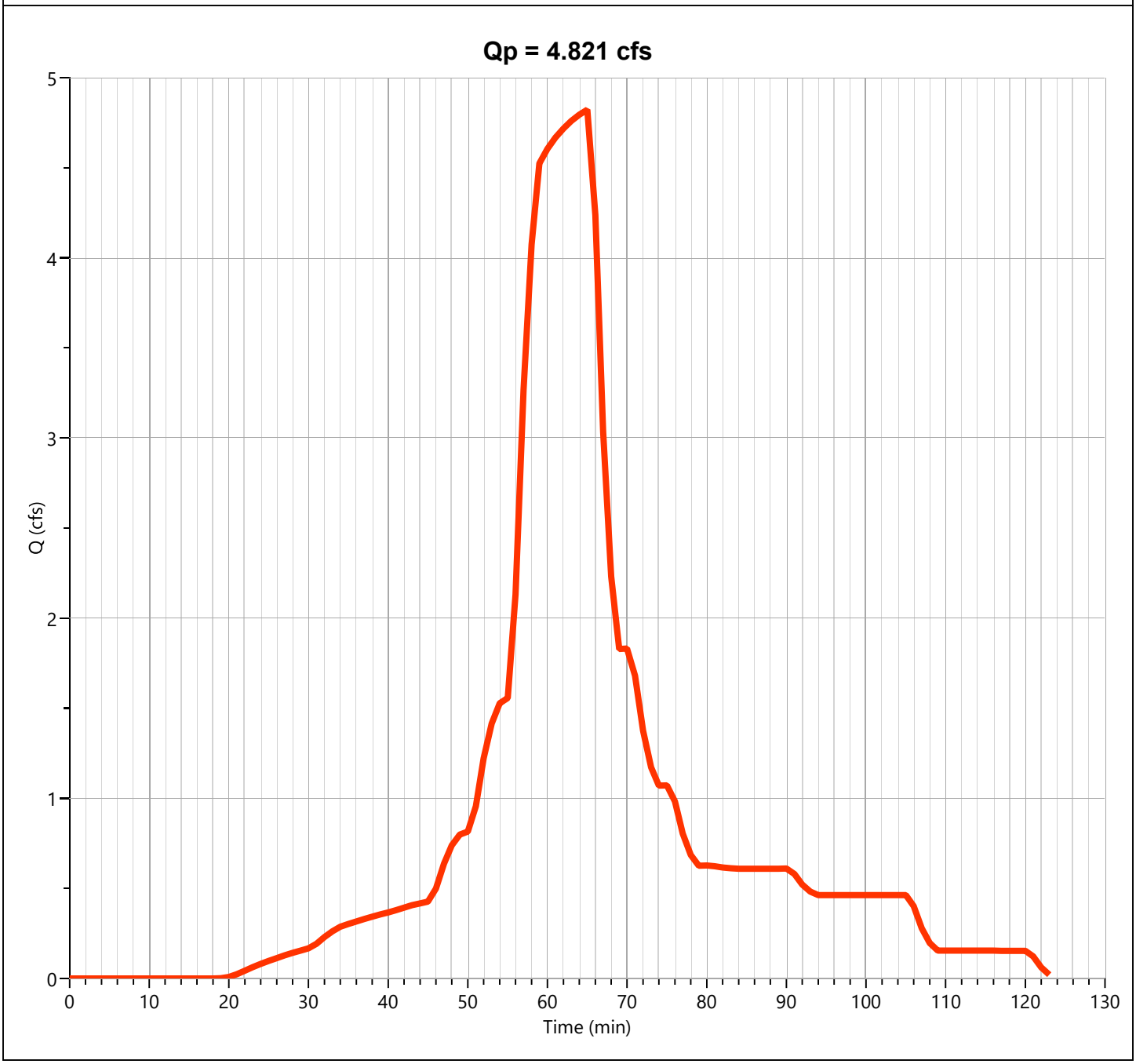
Hydrology Studio v 3.0.0.38

File: Proposed HydrologyWater Quality.hys
07-31-2025

PR WSHD A7 Imperv

Hyd. No. 25

Hydrograph Type	= NRCS Runoff	Peak Flow	= 4.821 cfs
Storm Frequency	= 1-yr	Time to Peak	= 65 min
Time Interval	= 1 min	Runoff Volume	= 5,880 cuft
Drainage Area	= 1.67 ac	Curve Number	= 98.00
Tc Method	= User	Time of Conc. (Tc)	= 2.0 min
Total Rainfall	= 1.25 in	Design Storm	= NJ WQ Storm
Storm Duration	= 2 hrs	Shape Factor	= 484



Stormtrap A7 — Hyd. No. 26

Hydrograph Type	= Pond Route	Peak Flow	= 0.000 cfs
Storm Frequency	= 1-yr	Time to Peak	= 0 min
Time Interval	= 1 min	Hydrograph Volume	= 0.000 cuft
Inflow Hydrograph	= 25 - PR WSHD A7 Imperv	Max. Elevation	= 4.15 ft
Pond Name	= Stormtrap A7	Max. Storage	= 5,880 cuft

Pond Routing by Storage Indication Method

Qp = 0.000 cfs

Pond Report

File: Proposed HydrologyWater Quality.hys

Hydrology Studio v 3.0.0.38

07-31-2025

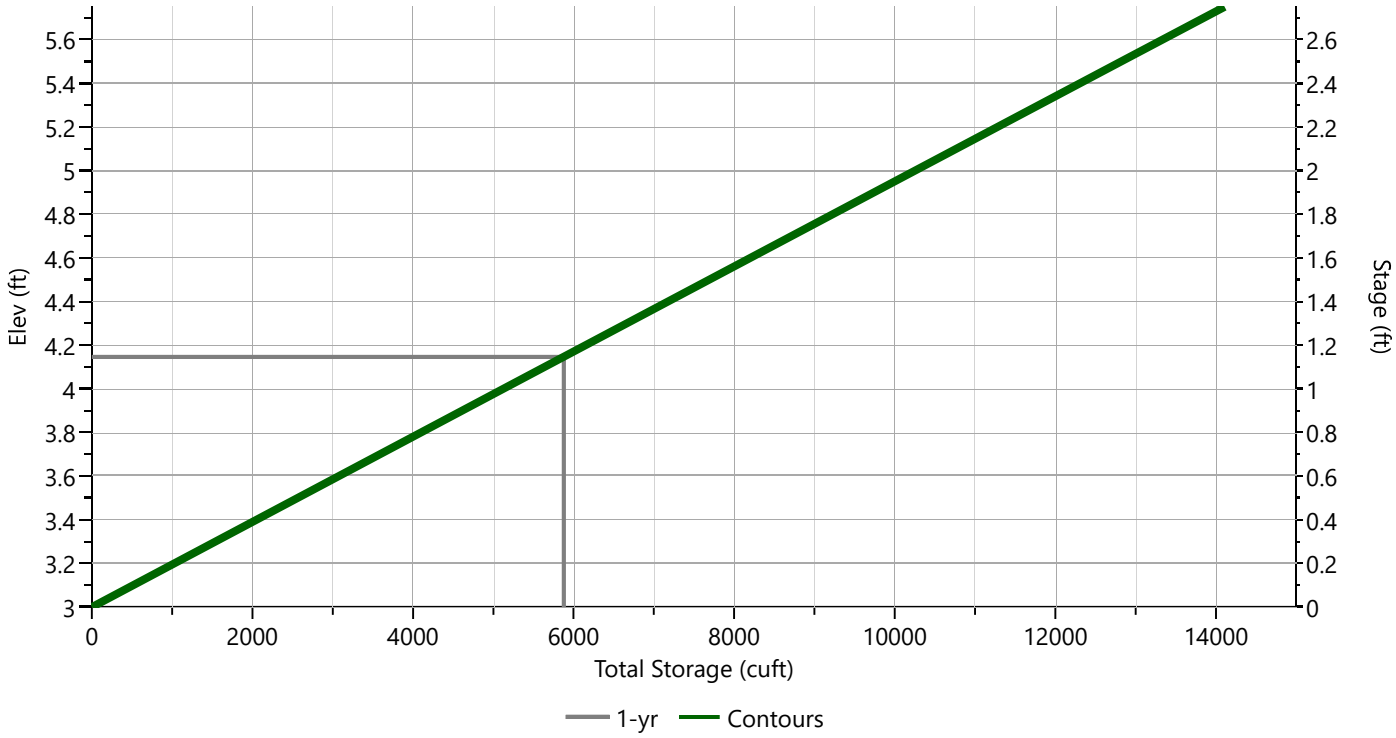
Stormtrap A7

Stage-Storage

User Defined Contours	
Description	**Input**
Bottom Elevation, ft	3.00
Voids (%)	100.00
Volume Calc	Conic

Stage / Storage Table

Stage (ft)	Elevation (ft)	Contour Area (sqft)	Incr. Storage (cuft)	Total Storage (cuft)
0.00	3.00	5,130	0.000	0.000
1.00	4.00	5,130	5,129	5,129
2.00	5.00	5,130	5,129	10,259
2.50	5.50	5,130	2,565	12,824
2.75	5.75	5,130	1,282	14,106



Pond Report

File: Proposed HydrologyWater Quality.hys

Hydrology Studio v 3.0.0.38

07-31-2025

Stormtrap A7

Stage-Discharge

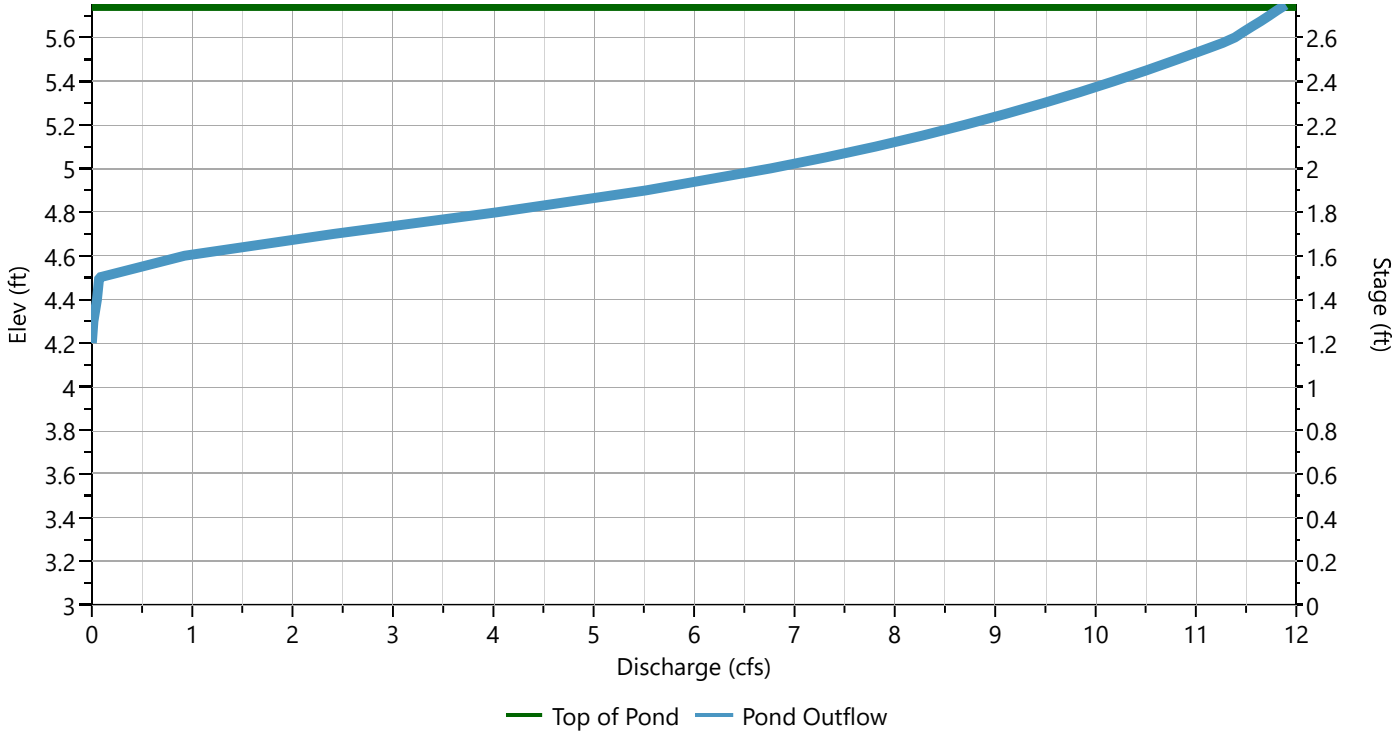
Culvert / Orifices	Cir Culvert	Orifice		
		1 (m)	2	3
Rise, in	18	2.5		
Span, in	18	2.5		
No. Barrels	1	1		
Invert Elevation, ft	3.00	4.20		
Orifice Coefficient, Co	0.60	0.60		
Length, ft	10			
Barrel Slope, %	.3			
N-Value, n	0.012			

Perforated Riser	
Hole Diameter, in	
No. holes	
Invert Elevation, ft	
Height, ft	
Orifice Coefficient, Co	

Weirs	Riser	Weir		
		1 (m)	2	3
Shape / Type		Rectangular		
Crest Elevation, ft		4.5		
Crest Length, ft		8		
Angle, deg				
Weir Coefficient, Cw		3.3		

Ancillary	
Exfiltration, in/hr	

m = Flows through Culvert, i = Independent



Pond Report

File: Proposed HydrologyWater Quality.hys

Hydrology Studio v 3.0.0.38

07-31-2025

Stormtrap A7

Stage-Storage-Discharge Summary

Stage (ft)	Elev. (ft)	Storage (cuft)	Culvert (cfs)	Orifices, cfs			Riser (cfs)	Weirs, cfs			Pf Riser (cfs)	Exfil (cfs)	User (cfs)	Total (cfs)
				1	2	3		1	2	3				
0.00	3.00	0.000	0.000	0.000				0.000						0.000
1.00	4.00	5,129	0.000	0.000				0.000						0.000
2.00	5.00	10,259	6.765 oc	0.064				6.701 s						6.765
2.50	5.50	12,824	10.82 oc	0.042				10.78 s						10.82
2.75	5.75	14,106	11.89 ic	0.034				11.86 s						11.89

Suffix key: ic = inlet control, oc = outlet control, s = submerged weir

Pond Report

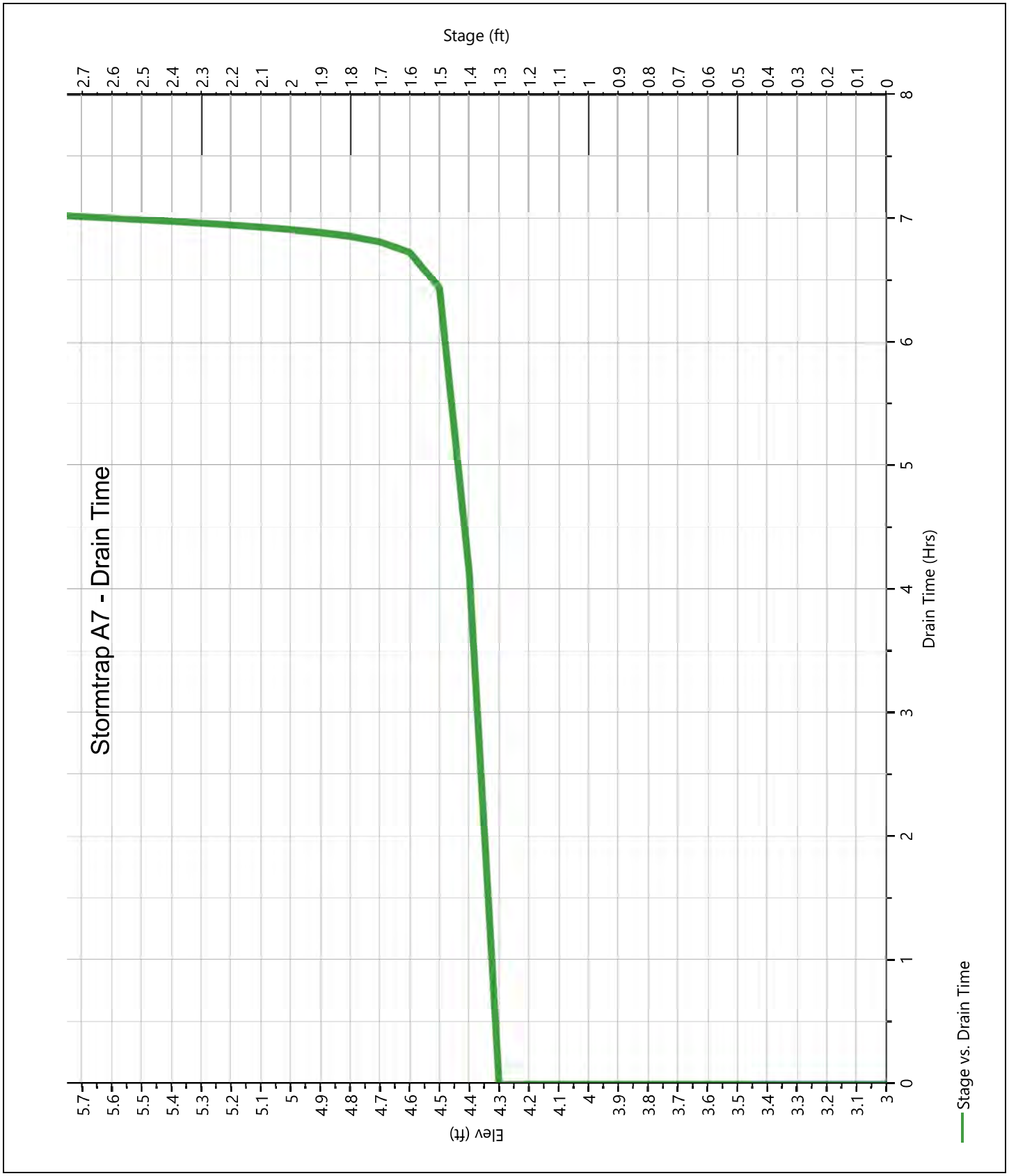
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Hydrology Studio v 3.0.0.38

07-31-2025

Stormtrap A7

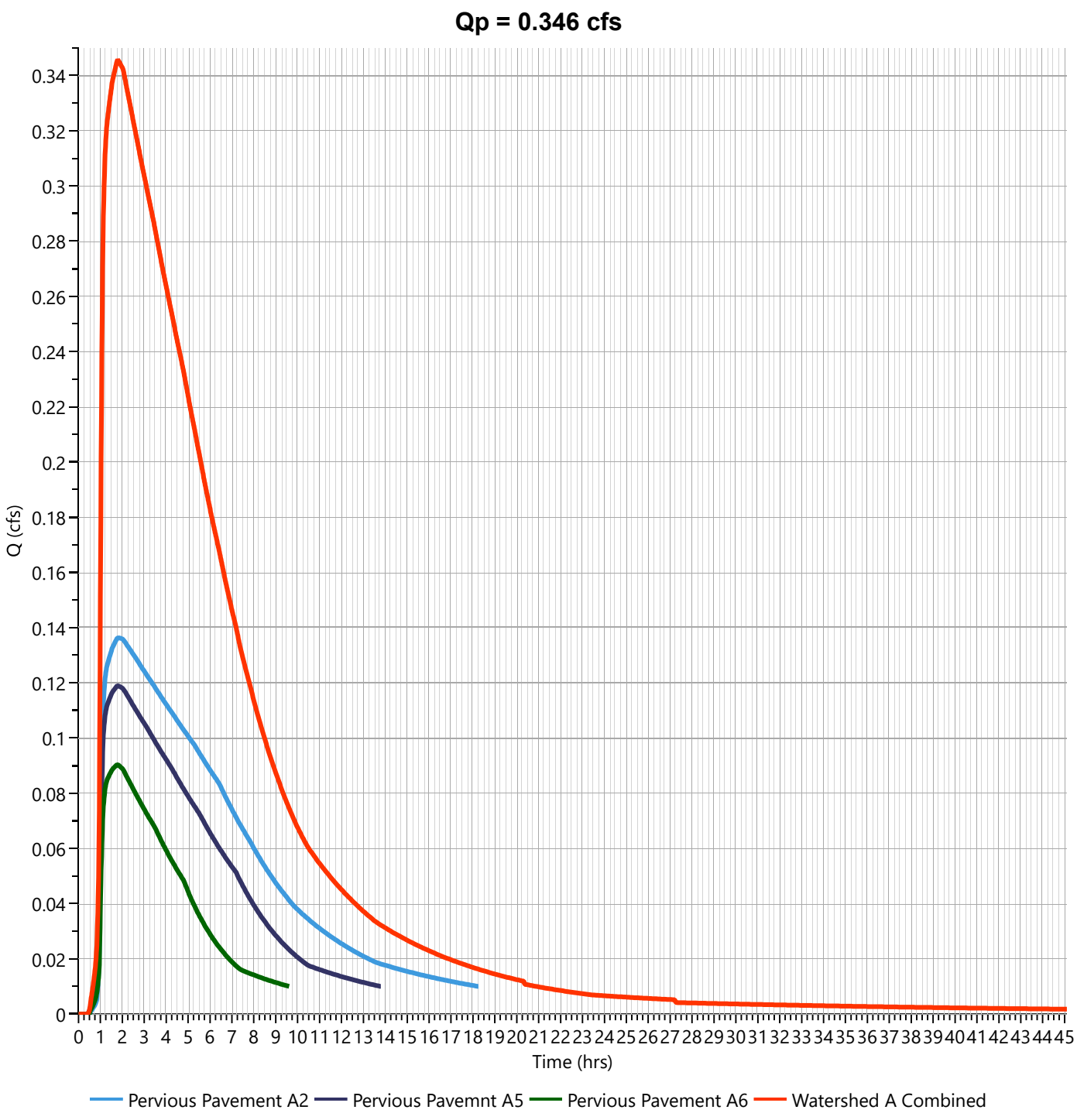
Pond Drawdown



Watershed A Combined

Hyd. No. 28

Hydrograph Type	= Junction	Peak Flow	= 0.346 cfs
Storm Frequency	= 1-yr	Time to Peak	= 107 min
Time Interval	= 1 min	Hydrograph Volume	= 8,189 cuft
Inflow Hydrographs		Total Contrib. Area	= 0.0 ac



Hydrograph Report

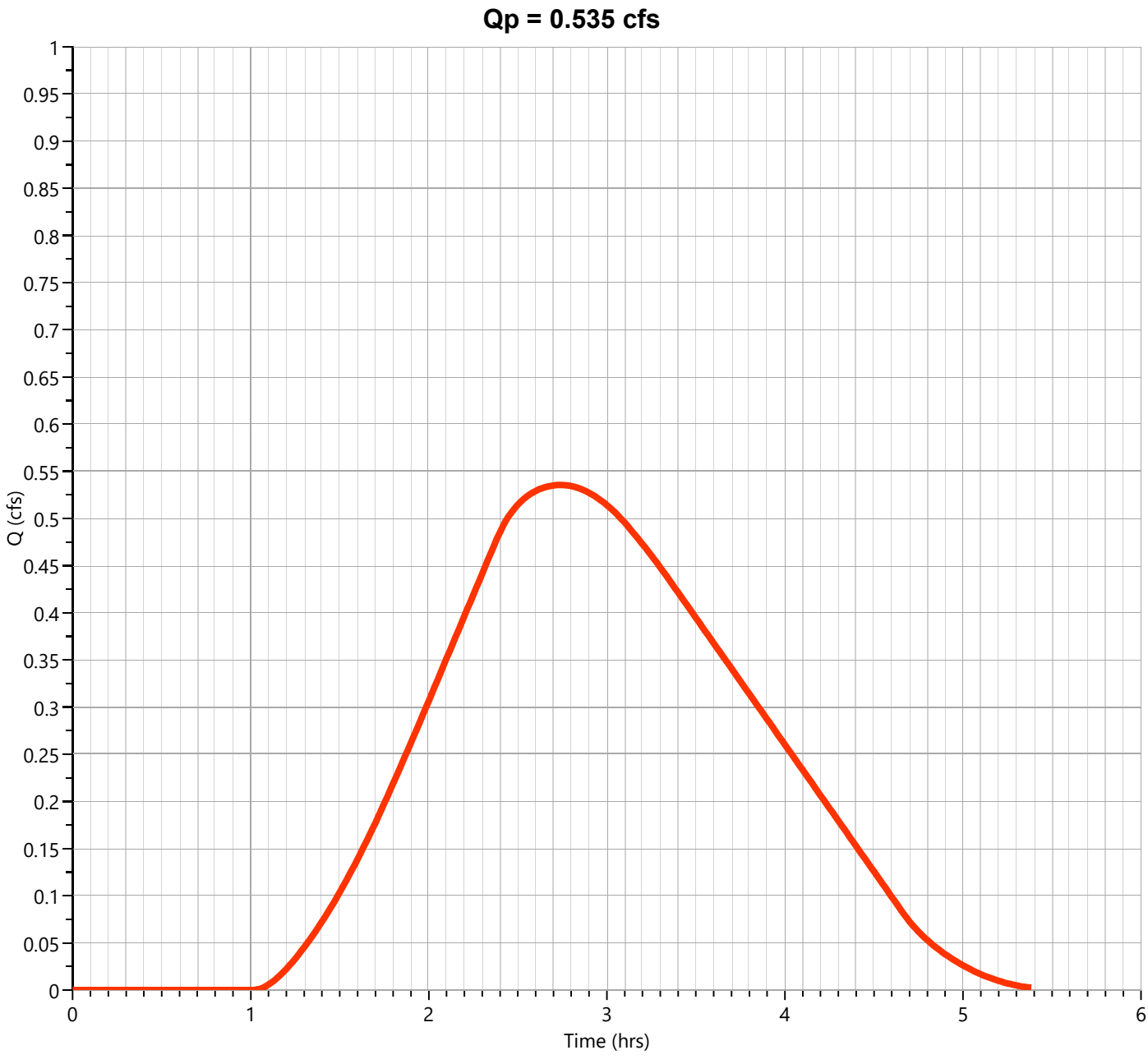
Hydrology Studio v 3.0.0.38

File: Proposed HydrologyWater Quality.hys
07-31-2025

PR WSHD B Perv

Hyd. No. 30

Hydrograph Type	= NRCS Runoff	Peak Flow	= 0.535 cfs
Storm Frequency	= 1-yr	Time to Peak	= 164 min
Time Interval	= 1 min	Runoff Volume	= 4,034 cuft
Drainage Area	= 9.5 ac	Curve Number	= 77.00
Tc Method	= User	Time of Conc. (Tc)	= 138.0 min
Total Rainfall	= 1.25 in	Design Storm	= NJ WQ Storm
Storm Duration	= 2 hrs	Shape Factor	= 484



Hydrograph Report

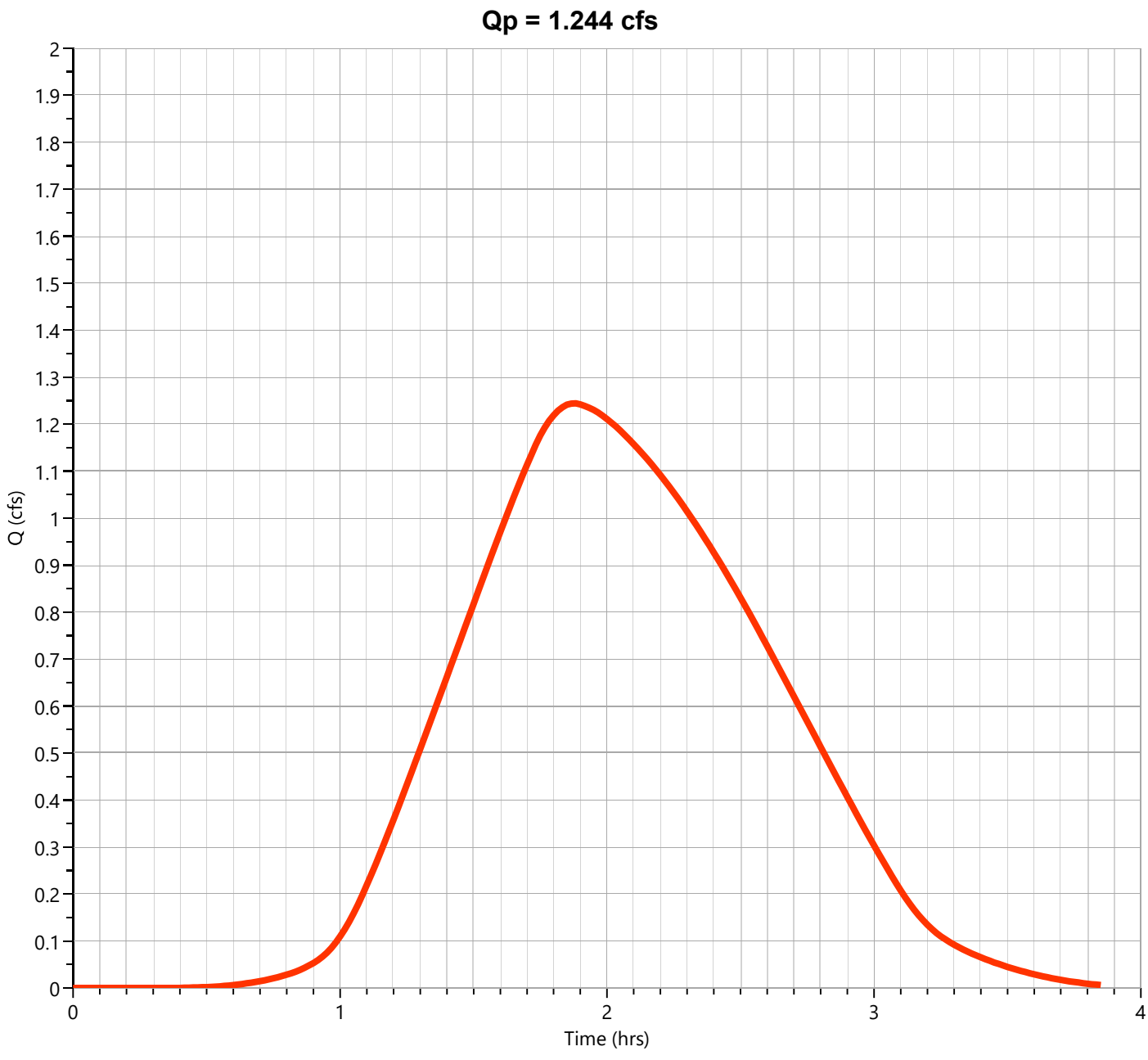
Hydrology Studio v 3.0.0.38

File: Proposed HydrologyWater Quality.hys
07-31-2025

PR WSHD B Imperv

Hyd. No. 31

Hydrograph Type	= NRCS Runoff	Peak Flow	= 1.244 cfs
Storm Frequency	= 1-yr	Time to Peak	= 113 min
Time Interval	= 1 min	Runoff Volume	= 6,024 cuft
Drainage Area	= 1.6 ac	Curve Number	= 98.00
Tc Method	= User	Time of Conc. (Tc)	= 82.0 min
Total Rainfall	= 1.25 in	Design Storm	= NJ WQ Storm
Storm Duration	= 2 hrs	Shape Factor	= 484



Hydrograph Report

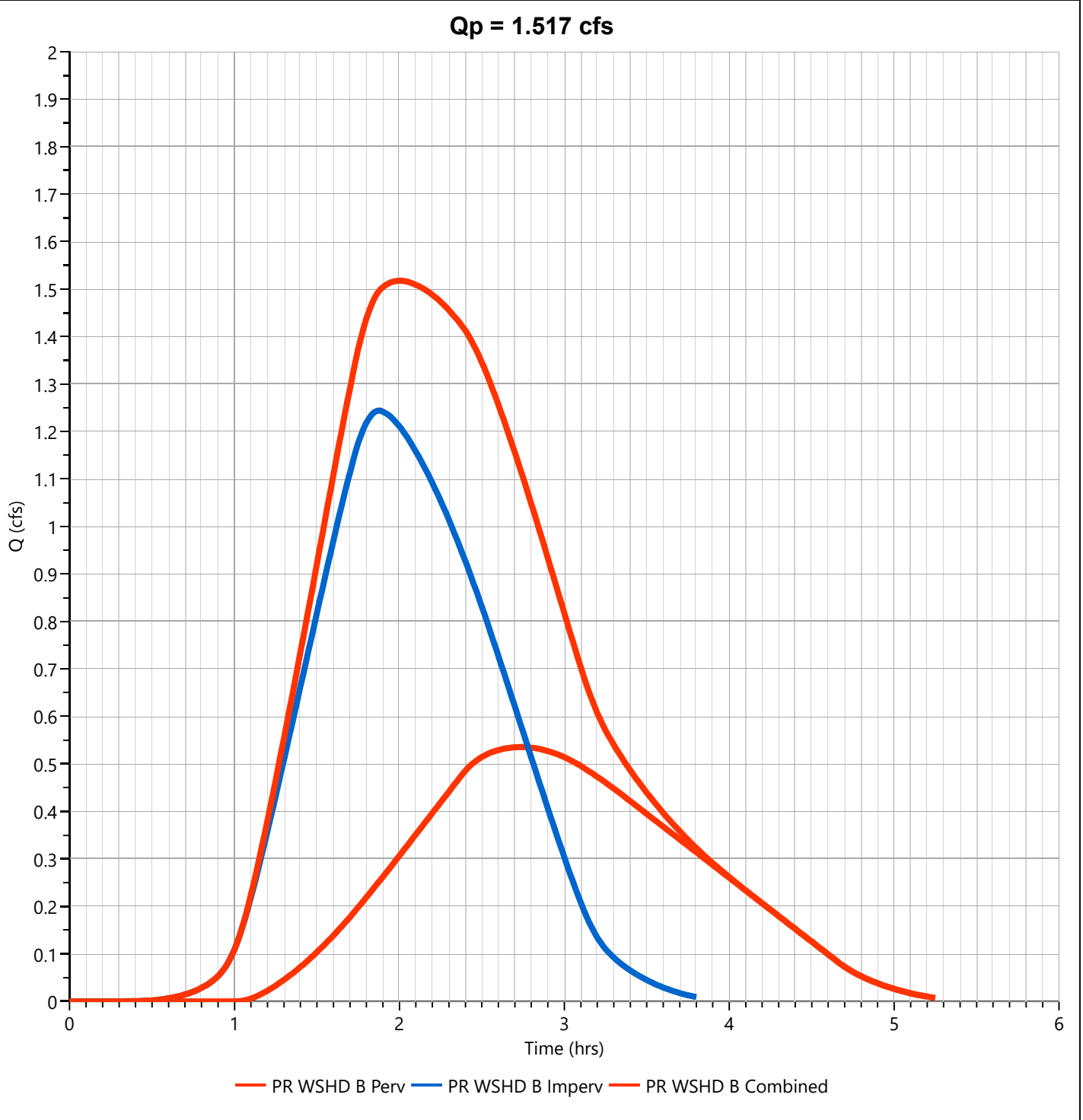
Hydrology Studio v 3.0.0.38

File: Proposed HydrologyWater Quality.hys
07-31-2025

PR WSHD B Combined

Hyd. No. 32

Hydrograph Type	= Junction	Peak Flow	= 1.517 cfs
Storm Frequency	= 1-yr	Time to Peak	= 120 min
Time Interval	= 1 min	Hydrograph Volume	= 10,058 cuft
Inflow Hydrographs	= 30, 31	Total Contrib. Area	= 11.1 ac



Hydrograph Report

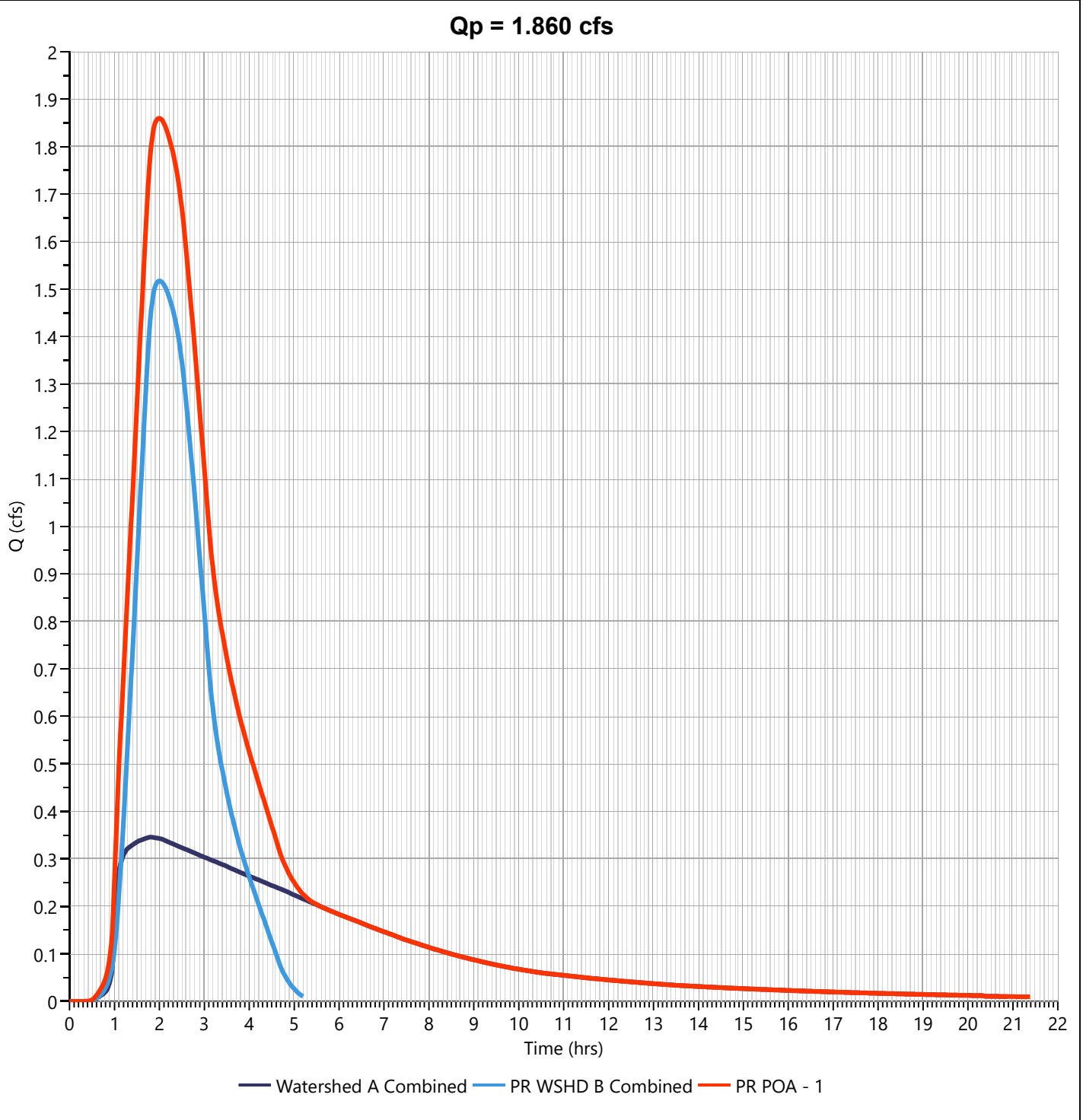
Hydrology Studio v 3.0.0.38

File: Proposed HydrologyWater Quality.hys
07-31-2025

PR POA - 1

Hyd. No. 34

Hydrograph Type	= Junction	Peak Flow	= 1.860 cfs
Storm Frequency	= 1-yr	Time to Peak	= 120 min
Time Interval	= 1 min	Hydrograph Volume	= 18,246 cuft
Inflow Hydrographs		Total Contrib. Area	= 0.0 ac



Hydrograph Report

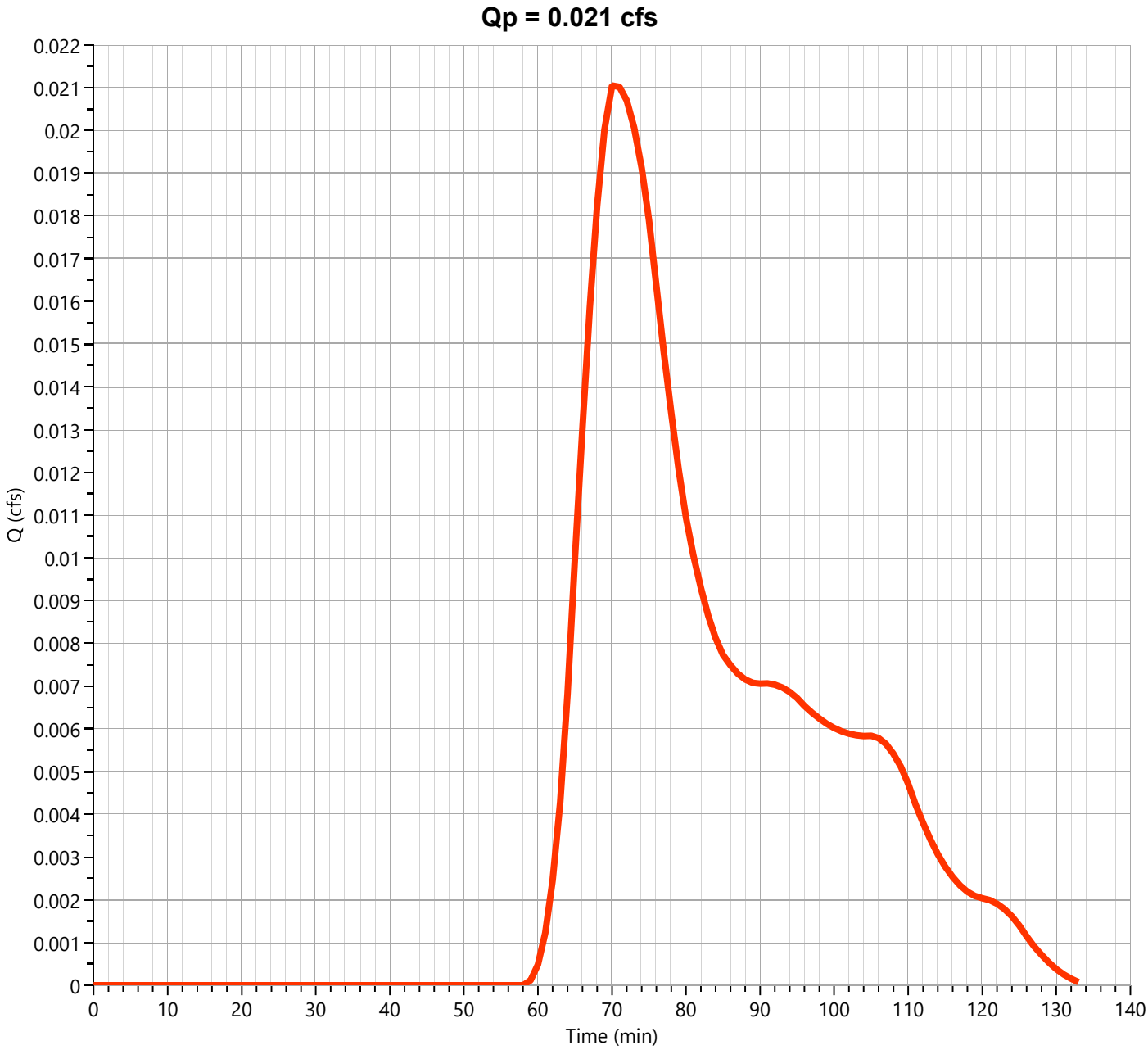
Hydrology Studio v 3.0.0.38

File: Proposed HydrologyWater Quality.hys
07-31-2025

PR WSHD C PervPOA-2

Hyd. No. 35

Hydrograph Type	= NRCS Runoff	Peak Flow	= 0.021 cfs
Storm Frequency	= 1-yr	Time to Peak	= 70 min
Time Interval	= 1 min	Runoff Volume	= 31.4 cuft
Drainage Area	= 0.05 ac	Curve Number	= 80.00
Tc Method	= User	Time of Conc. (Tc)	= 10.0 min
Total Rainfall	= 1.25 in	Design Storm	= NJ WQ Storm
Storm Duration	= 2 hrs	Shape Factor	= 484



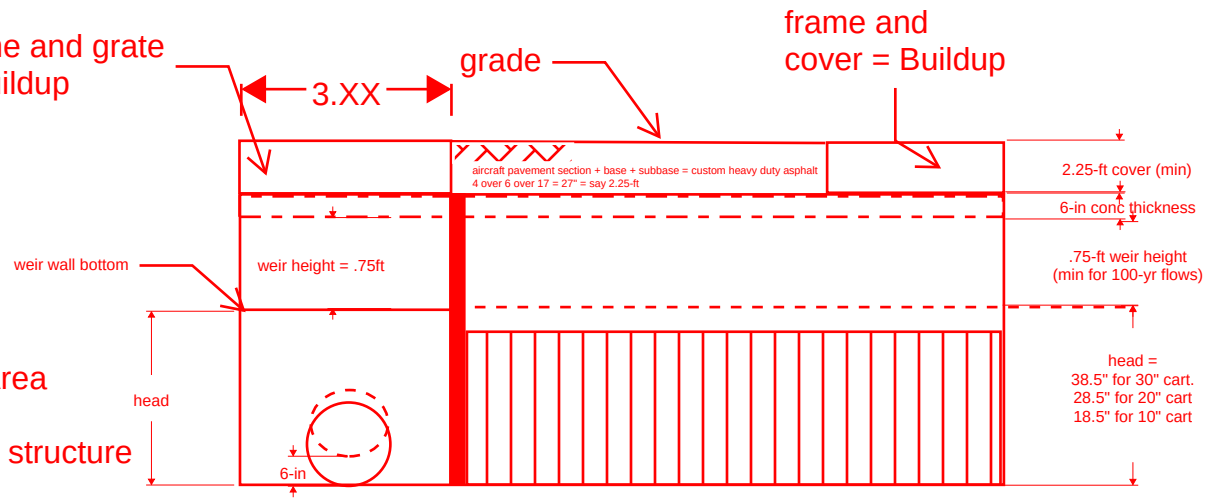
Hydrograph WQ Summary

Hydrology Studio v 3.0.0.38

File: Proposed HydrologyWater Quality.hys
07-31-2025

Hyd. No.	Hydrograph Type	Hydrograph Name	Peak Flow (cfs)	Time to Peak (min)	Hydrograph Volume (cuft)	Inflow Hyd(s)	Maximum Elevation (ft)	Maximum Storage (cuft)
1	NRCS Runoff	PR WSDH A2 Imperv	3.320	65	4,049	----		
2	Pond Route	Pervious Pavement A2	0.136	108	3,939	1	0.99	3,592
4	NRCS Runoff	PR WSHD A3 Pvmt-WQ1	2.685	65	3,305	----		
5	NRCS Runoff	PR WSHD A3 Pvmt-WQ2	2.777	65	3,417	----		
6	NRCS Runoff	PR WSHD A3 Imp-Roof	1.709	65	2,103	----		
7	Junction	PR WSHD A3 Combined	7.170	65	8,825	4, 5, 6		
8	Pond Route	Stormtrap A3	0.000	0	0.000	6	1.67	2,103
10	NRCS Runoff	PR WSHD A4 Imp-WQ3	3.082	65	3,793	----		
11	NRCS Runoff	PR WSHD A4 Imp-WQ4	3.356	65	4,131	----		
12	Junction	PR WSHD A4 Combined	6.438	65	7,924	10, 11		
13	Pond Route	Stormtrap A4	0.000	0	0.000	12	1.86	7,924
15	NRCS Runoff	PR WSHD A5 Imperv	2.223	65	2,711	----		
16	NRCS Runoff	PR WSHD A5 Perv	0.030	65	29.4	----		
17	Junction	PR WSHD A5 Combined	2.253	65	2,740	15, 16		
18	Pond Route	Pervious Pavemnt A5	0.119	107	2,719	17	4.03	2,343
20	NRCS Runoff	PR WSHD A6 Imperv	1.184	65	1,444	----		
21	NRCS Runoff	PR WSHD A6 Perv	0.077	69	104	----		
22	Junction	PR WSHD A6 Combined	1.230	65	1,548	20, 21		
23	Pond Route	Pervious Pavement A6	0.090	107	1,531	22	2.96	1,257
25	NRCS Runoff	PR WSHD A7 Imperv	4.821	65	5,880	----		
26	Pond Route	Stormtrap A7	0.000	0	0.000	25	4.15	5,880
28	Junction	Watershed A Combined	0.346	107	8,189	2, 8, 13, 18, 23, 26		
30	NRCS Runoff	PR WSHD B Perv	0.535	164	4,034	----		
31	NRCS Runoff	PR WSHD B Imperv	1.244	113	6,024	----		
32	Junction	PR WSHD B Combined	1.517	120	10,058	30, 31		
34	Junction	PR POA - 1	1.860	120	18,246	28, 32		
35	NRCS Runoff	PR WSHD C PervPOA-2	0.021	70	31.4	----		

WQ-1 A&B



0.88 AC Contributory Area

2.685 cfs into diversion structure
WQ Flow = 1.343 cfs

# of Cartridges

A. 30"

1.343/.038 cfs = 36 catridges

B. 20"

1.343/ .024 = 56 cartridges

C. 10"

1.343/ 0.011 = 123 cartridges

Unit Selection

6 x 8 Vault = 54 max cartridges
6 x 12 Vault = 94 max cartridges
8 x 14 Vault = 152 max cartridges
8 x 16 Vault = 185 max cartridges

Min. Grade to Outlet Invert / bottom of Inside of Structure

A. 30" Cart

2.25 + .5 +.75 + 3.21' = 6.71'

B. 20" Cart

2.25 + .5 +.75 + 2.375 = 5.875'

C. 10" Cart

2.25 + .5 + .75 + 1.542 = 5.042

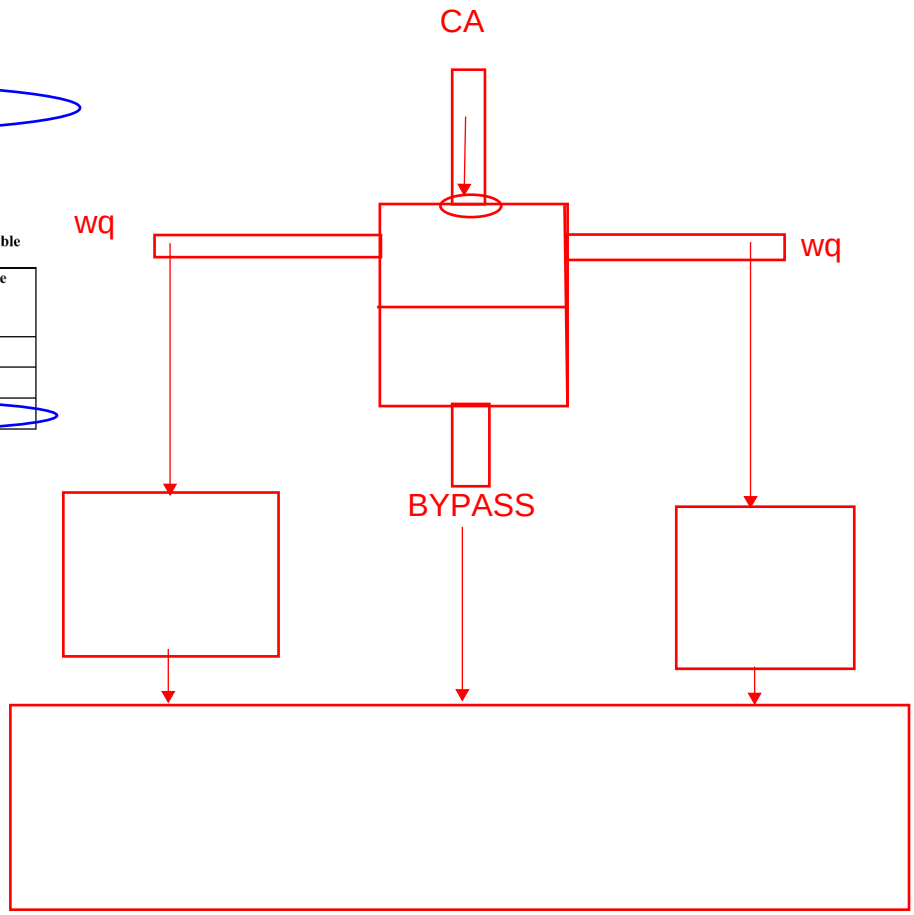
Table 1. High Capacity Kraken Filter Cartridge MTFRs and Maximum Allowable Drainage Area

Cartridge Height (in)	Cartridge Maximum Treatment Flow Rate (MTFR) (cfs)	Maximum Allowable Drainage Area (acres)
30	0.038	0.032
20	0.024	0.020
10	0.011	0.009

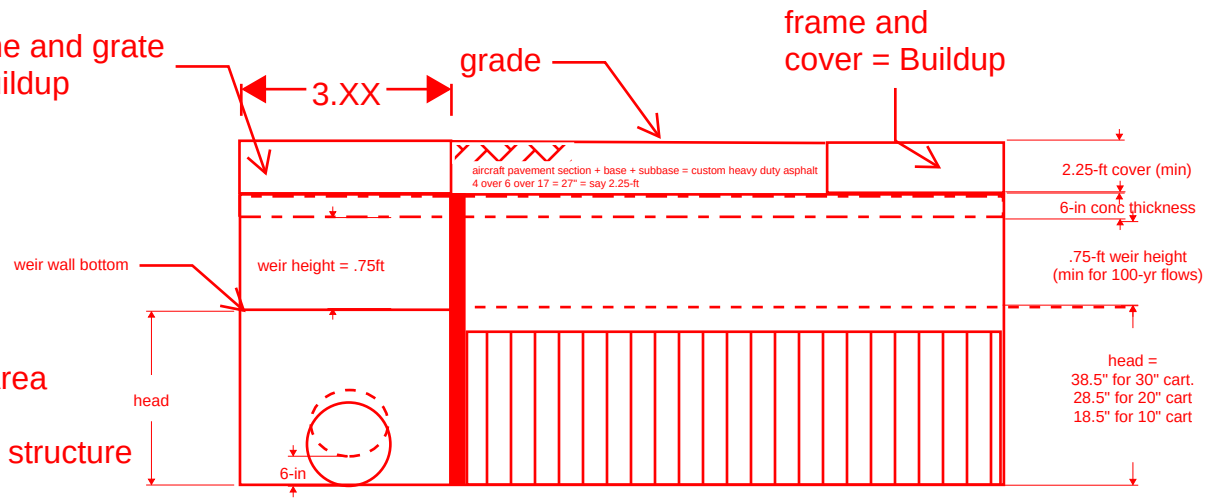
Max. Allowable Drainage Area

123 Cartridges X 0.009 = 1.107 ac

> 0.88 AC OK



WQ-2 A&B



0.91 AC Contributory Area

2.777 cfs into diversion structure
WQ Flow = 1.389 cfs

# of Cartridges

A. 30"

1.389/.038 cfs = 37 catridges

B. 20"

1.389/ .024 = 59 cartridges

C. 10"

1.389/ 0.011 = 128 cartridges

Unit Selection

6 x 8 Vault = 54 max cartridges
6 x 12 Vault = 94 max cartridges
8 x 14 Vault = 152 max cartridges
8 x 16 Vault = 185 max cartridges

Min. Grade to Outlet Invert /
bottom of Inside of Structure

A. 30" Cart

2.25 + .5 +.75 + 3.21' = 6.71'

B. 20" Cart

2.25 + .5 +.75 + 2.375 = 5.875'

C. 10" Cart

2.25 + .5 + .75 + 1.542 = 5.042

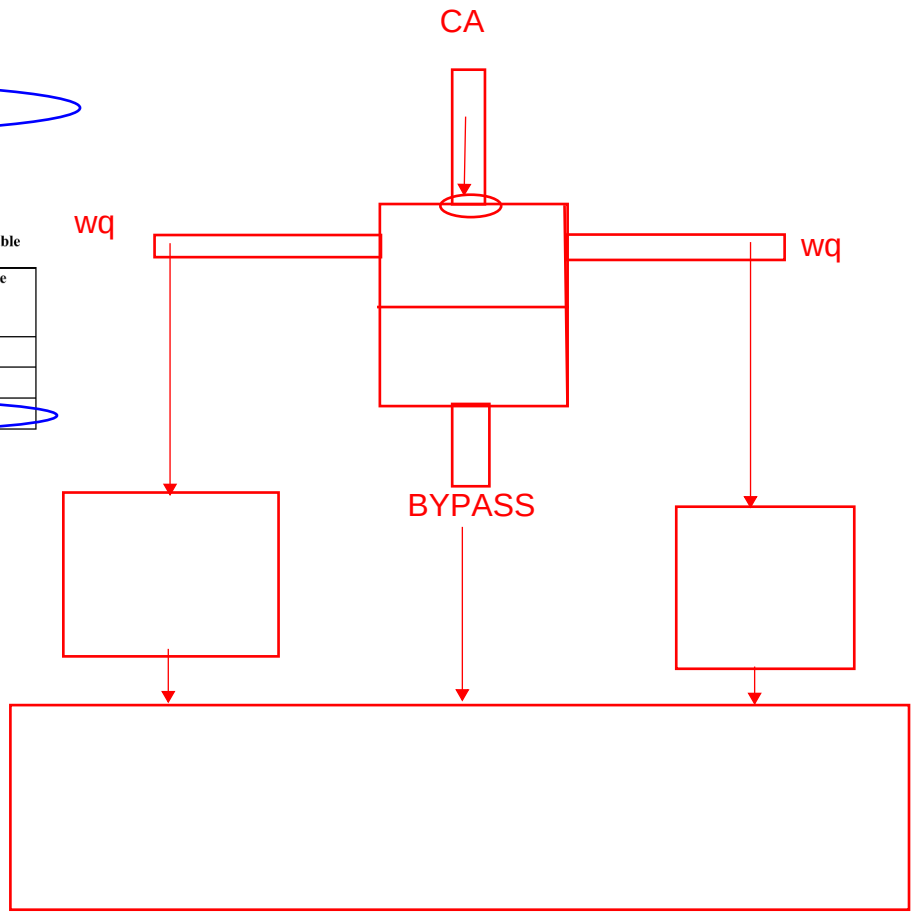
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Cartridge Height (in)	Cartridge Maximum Treatment Flow Rate (MTFR) (cfs)	Maximum Allowable Drainage Area (acres)
30	0.038	0.032
20	0.024	0.020
10	0.011	0.009

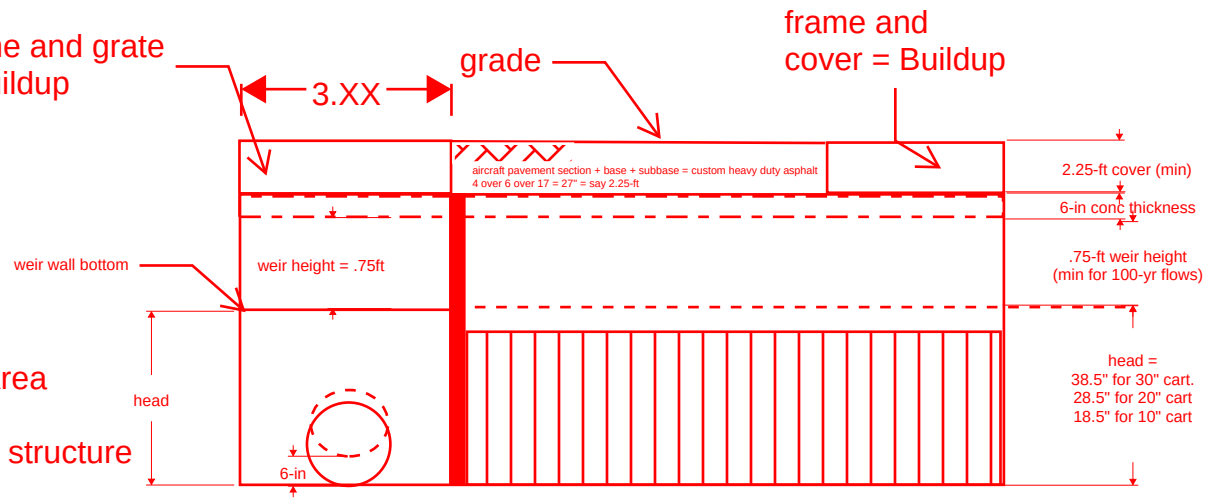
Max. Allowable Drainage Area

128 Cartridges X 0.009 = 1.152 ac

> 0.91 AC OK



WQ-3 A&B



1.01 AC Contributory Area

3.082 cfs into diversion structure
WQ Flow = 1.541 cfs

# of Cartridges

A. 30"

1.541/.038 cfs = 41 catridges

B. 20"

1.541/ .024 = 65 cartridges

C. 10"

1.541/ 0.011 = 141 cartridges

Unit Selection

6 x 8 Vault = 54 max cartridges
6 x 12 Vault = 94 max cartridges
8 x 14 Vault = 152 max cartridges
8 x 16 Vault = 185 max cartridges

Min. Grade to Outlet Invert / bottom of Inside of Structure

A. 30" Cart

2.25 + .5 +.75 + 3.21' = 6.71'

B. 20" Cart

2.25 + .5 +.75 + 2.375 = 5.875'

C. 10" Cart

2.25 + .5 + .75 + 1.542 = 5.042

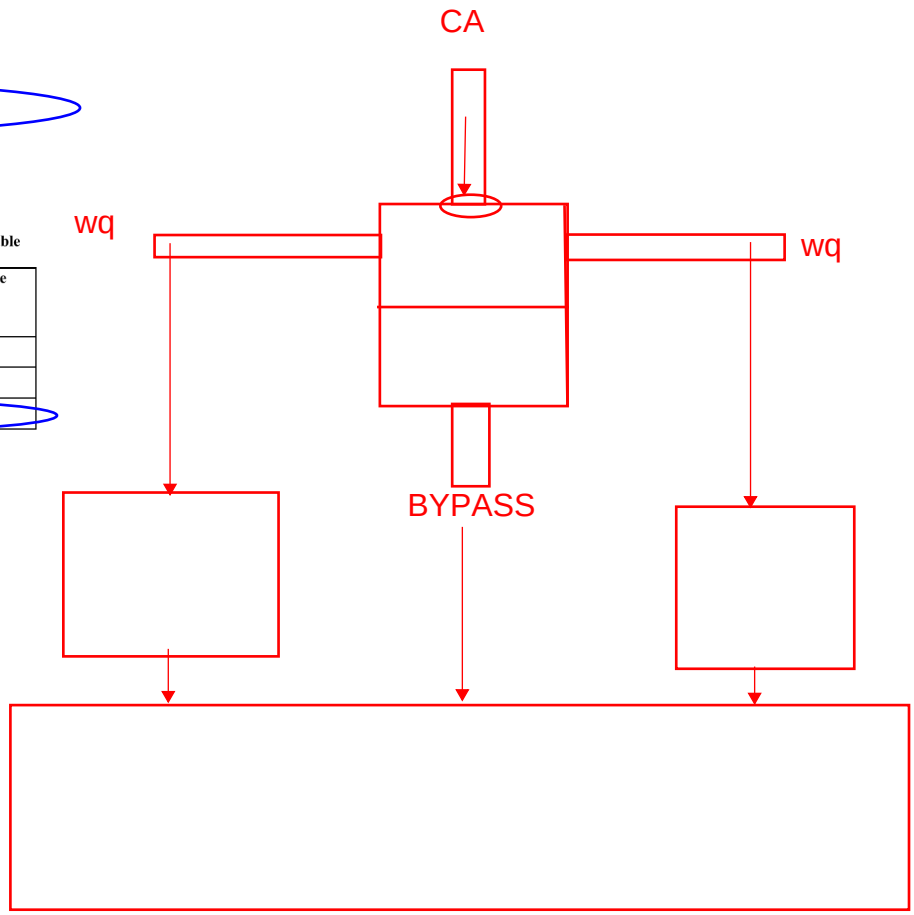
Table 1. High Capacity Kraken Filter Cartridge MTFRs and Maximum Allowable Drainage Area

Cartridge Height (in)	Cartridge Maximum Treatment Flow Rate (MTFR) (cfs)	Maximum Allowable Drainage Area (acres)
30	0.038	0.032
20	0.024	0.020
10	0.011	0.009

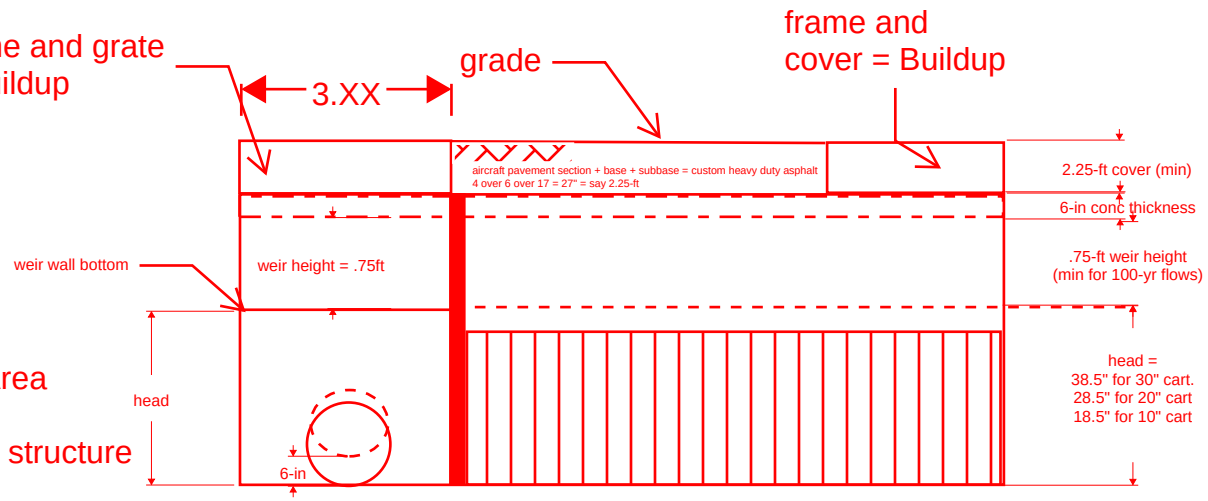
Max. Allowable Drainage Area

141 Cartridges X 0.009 = 1.269 ac

> 1.01 AC OK



WQ-4 A&B



1.10 AC Contributory Area

3.356 cfs into diversion structure
WQ Flow = 1.678 cfs

# of Cartridges

A. 30"

1.678/.038 cfs = 45 catridges

B. 20"

1.678/ .024 = 70 cartridges

C. 10"

1.678/ 0.011 = 153 cartridges

Unit Selection

6 x 8 Vault = 54 max cartridges
6 x 12 Vault = 94 max cartridges
8 x 14 Vault = 152 max cartridges
8 x 16 Vault = 185 max cartridges

Min. Grade to Outlet Invert / bottom of Inside of Structure

A. 30" Cart

2.25 + .5 +.75 + 3.21' = 6.71'

B. 20" Cart

2.25 + .5 +.75 + 2.375 = 5.875'

C. 10" Cart

2.25 + .5 + .75 + 1.542 = 5.042

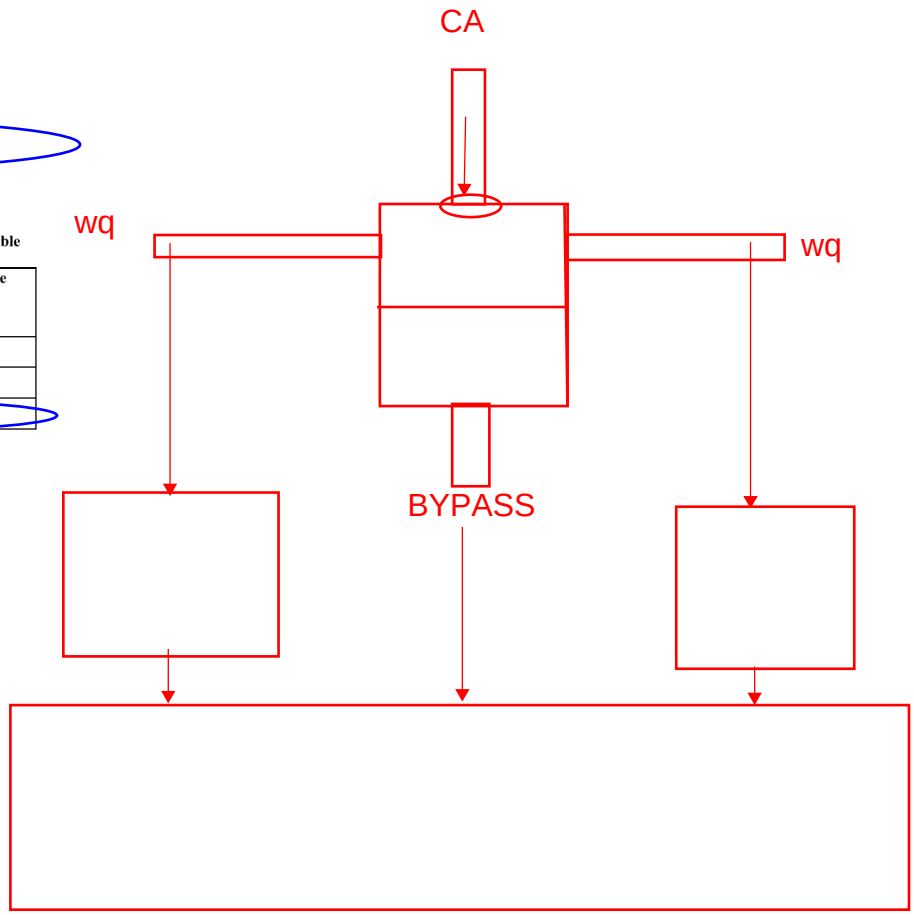
Table 1. High Capacity Kraken Filter Cartridge MTFRs and Maximum Allowable Drainage Area

Cartridge Height (in)	Cartridge Maximum Treatment Flow Rate (MTFR) (cfs)	Maximum Allowable Drainage Area (acres)
30	0.038	0.032
20	0.024	0.020
10	0.011	0.009

Max. Allowable Drainage Area

153 Cartridges X 0.009 = 1.377 ac

> 1.10 AC OK



State of New Jersey
DEPARTMENT OF ENVIRONMENTAL PROTECTION
PHILIP D. MURPHY
Governor
SHEILA Y. OLIVER
Lt. Governor
DIVISION OF WATERSHED PROTECTION AND RESTORATION
BUREAU OF NJPDES STORMWATER PERMITTING & WATER QUALITY MANAGEMENT
P.O. Box 420 Mail Code 501-02A
Trenton, New Jersey 08625-0420
609-633-7021 / Fax: 609-777-0432
www.njstormwater.org
SHAWN M. LATOURETTE
Commissioner

November 18, 2022

Zachariha J. Kent
Vice President of Product Management
Bio Clean Environmental Services, Inc., a Quikrete Company
398 Via El Centro
Oceanside, CA 92058

Re: MTD Lab Certification
Bio Clean High Capacity Kraken Filter Stormwater Treatment Device
Online Installation

TSS Removal Rate 80%

Dear Mr. Kent:

The Stormwater Management rules under N.J.A.C. 7:8-5.2(f) and 5.2(j) allow the use of manufactured treatment devices (MTDs) for compliance with the design and performance standards at N.J.A.C. 7:8-5 if the pollutant removal rates have been verified by the New Jersey Corporation for Advanced Technology (NJCAT) and have been certified by the New Jersey Department of Environmental Protection (NJDEP). Bio Clean Environmental Services, Inc., a Quikrete company, has requested a Laboratory Certification for the Bio Clean High Capacity Kraken Filter Stormwater Treatment Device (High Capacity Kraken Filter).

The project falls under the "Procedure for Obtaining Verification of a Stormwater Manufactured Treatment Device from New Jersey Corporation for Advance Technology" dated January 25, 2013. The applicable protocol is the "New Jersey Department of Environmental Protection Laboratory Protocol to Assess Total Suspended Solids Removal by a Filtration Manufactured Treatment Device" dated January 25, 2013.

NJCAT verification documents submitted to the NJDEP indicate that the requirements of the aforementioned protocol have been met or exceeded. The NJCAT letter also included a recommended certification TSS removal rate and the required maintenance plan. The NJCAT Verification Report with the Verification Appendix (dated October 2022) for this device is published online at http://www.njcat.org/uploads/newDocs/HCKrakenFilterNJCATFinalReport.pdf.

The NJDEP certifies the use of the High Capacity Kraken Filter by Bio Clean Environmental Services, Inc. at a TSS removal rate of 80% when designed, operated, and maintained in accordance with the information provided in the Verification Appendix and the following conditions:

1. The maximum treatment flow rate (MTFR) for the manufactured treatment device (MTD) is calculated using the New Jersey Water Quality Design Storm (1.25 inches in 2 hrs) in N.J.A.C. 7:8-

5.5. The MTFR is calculated based on a verified loading rate of 0.101 gpm/ft^2 of effective membrane filter area.

2. The High Capacity Kraken Filter shall be installed using the same configuration reviewed by NJCAT, and sized in accordance with the criteria specified in item 6 below.

3. This device cannot be used in series with another MTD or a media filter (such as a sand filter) to achieve an enhanced removal rate for total suspended solids (TSS) removal under N.J.A.C. 7:8-5.5.

4. Additional design criteria for MTDs can be found in Chapter 11.3 of the New Jersey Stormwater Best Management Practices (NJ Stormwater BMP) Manual, which can be found online at www.njstormwater.org.

5. The maintenance plan for a site using this device shall incorporate, at a minimum, the maintenance requirements for the High Capacity Kraken Filter. A copy of the maintenance plan is attached to this certification. However, it is recommended to review the maintenance website at https://www.conteches.com/kraken for any changes to the maintenance requirements.

6. Sizing Requirement:

The example below demonstrates the sizing procedure for the High Capacity Kraken Filter:

Example: A 0.25-acre impervious site is to be treated to 80% TSS removal using a High Capacity Kraken Filter. The impervious site runoff (Q) based on the New Jersey Water Quality Design Storm was determined to be 0.79 cfs or 354.58 gpm.

The selection of the appropriate model of a High Capacity Kraken Filter is based upon both the maximum inflow drainage area and the MTFR. It is necessary to calculate the required model using both methods and to use the largest model determined by the two methods.

Inflow Drainage Area Evaluation:

The drainage area to the High Capacity Kraken Filter in this example is 0.25 acres. Based upon the information in Table 1 below, the following number of cartridges are required in a High Capacity Kraken Filter to treat the impervious area without exceeding the maximum allowable drainage area:

a. Twenty-eight (28) 10" cartridges;
b. Thirteen (13) 20" cartridges; or
c. Eight (8) 30" cartridges.

Maximum Treatment Flow Rate (MTFR) Evaluation:

The site runoff (Q) was based on the following:
time of concentration = 10 minutes
i = 3.2 in/hr (page 74, Fig. 5-16 of Chapter 5 of the NJ Stormwater BMP Manual)
c = 0.99 (runoff coefficient for impervious)
Q = ciA = 0.99 x 3.2 x 0.25 = 0.79 cfs (354.58 gpm)
(Note: 1 cfs = 448.83 gpm)

Given the site runoff is 0.79 cfs and based on Table 1 below, the following minimum numbers of cartridges are required in a High Capacity Kraken Filter without exceeding the MTFR of the individual model:

a. Seventy-two (72) 10" cartridges;
b. Thirty-three (33) 20" cartridges; or
c. Twenty-one (21) 30" cartridges.

The MTFR evaluation results will be used since that method results in the highest minimum configuration determined by the two methods.

The sizing table corresponding to the available system models is noted below. Additional specifications regarding each model can be found in the NJCAT Verification Report in the Verification Appendix under Table A-1.

Table 1. High Capacity Kraken Filter Cartridge MTFRs and Maximum Allowable Drainage Area

Cartridge Height (in)	Cartridge Maximum Treatment Flow Rate (MTFR) (cfs)	Maximum Allowable Drainage Area (acres)
30	0.038	0.032
20	0.024	0.020
10	0.011	0.009

Be advised a detailed maintenance plan is mandatory for any project with a Stormwater BMP subject to the Stormwater Management Rules, N.J.A.C. 7:8. The plan must include all of the items identified in the Stormwater Management Rules, N.J.A.C. 7:8-5.8. Such items include, but are not limited to, the list of inspection and maintenance equipment and tools, specific corrective and preventative maintenance tasks, indication of problems in the system, and training of maintenance personnel. Additional information can be found in Chapter 8: Maintenance and Retrofit of Stormwater Management Measures.

If you have any questions regarding the above information, please contact Changi Wu of my office at chang.i.wu@dep.nj.gov.

Sincerely,

Gabriel Mahon

Gabriel Mahon, Chief
Bureau of NJPDES Stormwater Permitting & Water Quality Management
Division of Watershed Protection and Restoration
New Jersey Department of Environmental Protection

Attachment: Maintenance Plan

cc: Richard Magee, NJCAT

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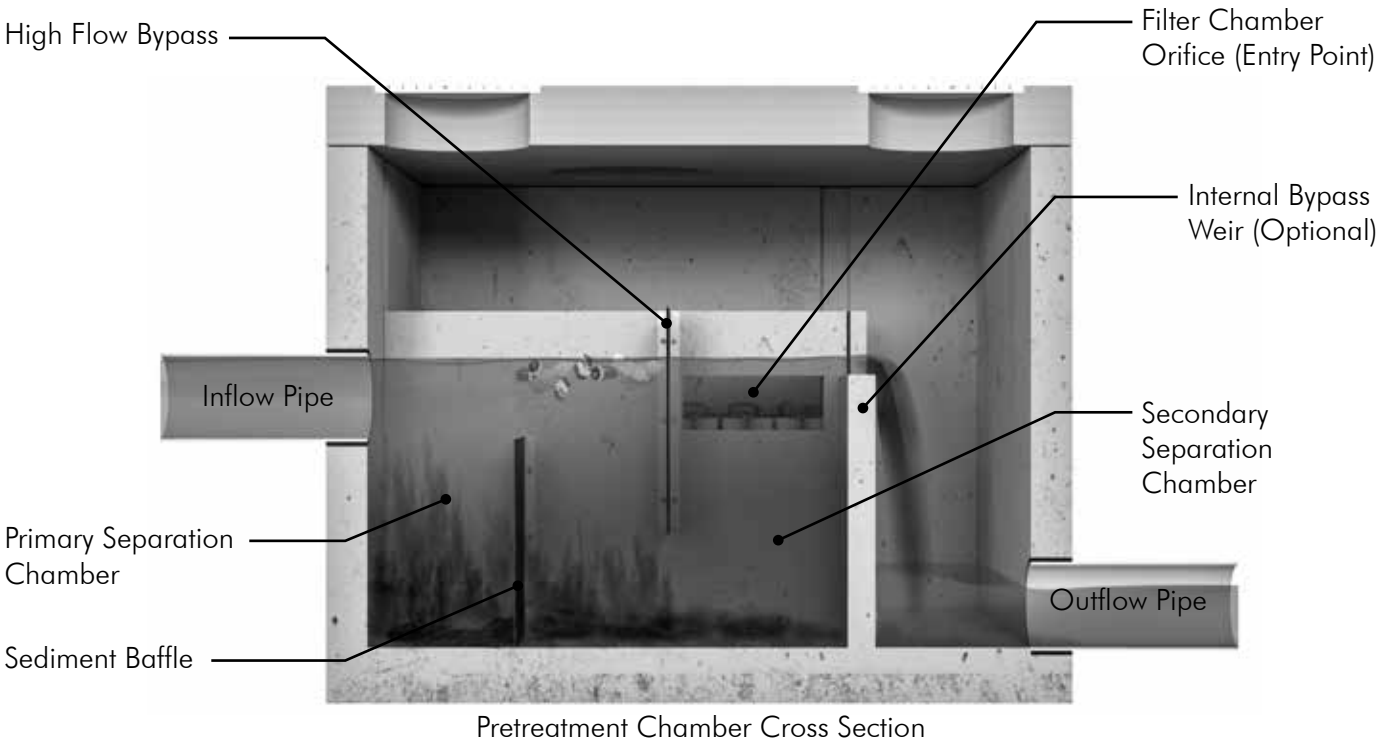
Kraken® Filter
Operation & Maintenance Manual



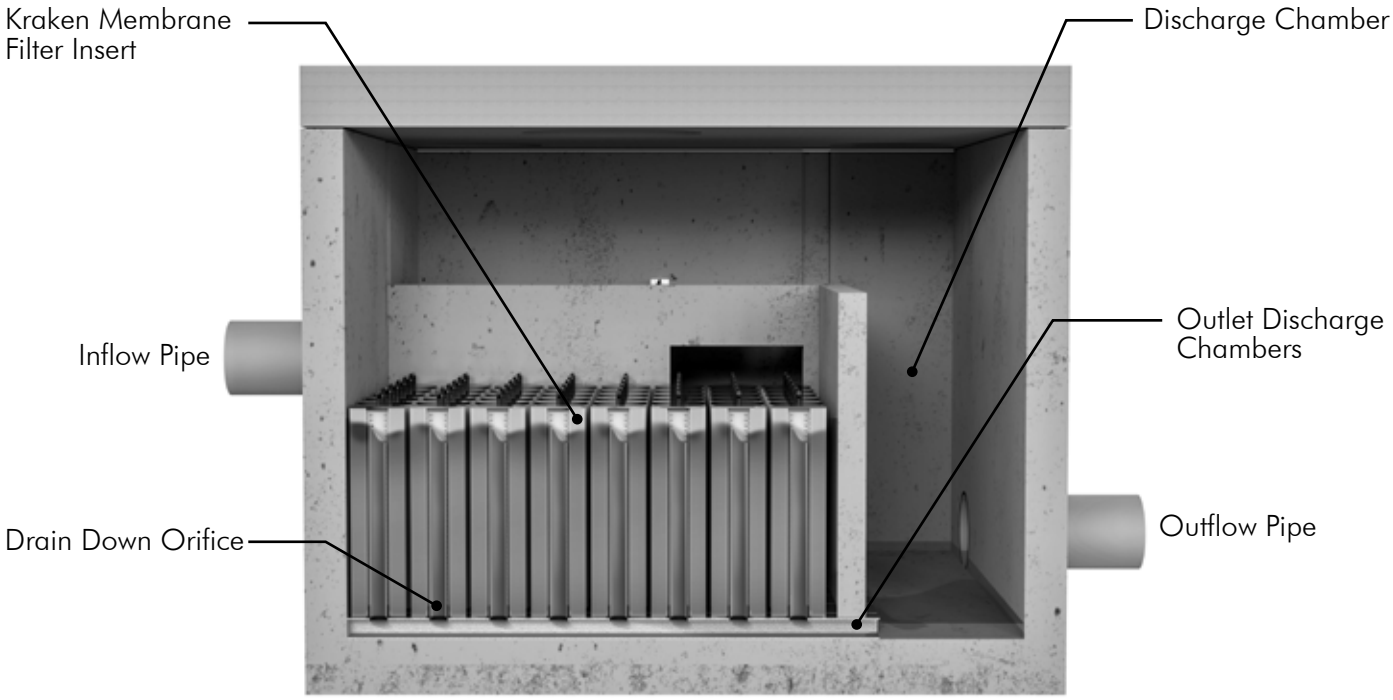
Operation & Maintenance

The Kraken® Filter is designed at a minimal loading rate of only 0.05 gpm/sq ft of media surface to maximize longevity and minimize maintenance requirements. Passive backwash and pretreatment also help to minimize system maintenance requirements. The Kraken® Filter is estimated to be able to handle up to at least 18 months sediment loading with no maintenance or loss of treatment capacity assuming 600 pounds of sediment per acre of impervious surface annually.

Yet, as with all stormwater BMPs, inspection and maintenance on the Kraken® Filter is necessary. Stormwater regulations require that all BMPs be inspected and maintained to ensure they are operating as designed to allow for effective pollutant removal and to provide protection to receiving water bodies. It is recommended that inspections be performed multiple times during the first year to assess the site specific loading conditions. This is recommended because pollutant loading and pollutant characteristics can vary greatly from site to site. Variables such as nearby soil erosion or construction sites, winter sanding on roads, amount of daily traffic and land use can increase pollutant loading on the system. Observations made during the first year of inspections can be used to estimate inspection and maintenance intervals for subsequent years to ensure appropriate maintenance is provided. Without appropriate maintenance, a BMP will exceed its storage capacity which can negatively affect its continued performance in removing and retaining captured pollutants.



Pre-Treatment Chamber Diagram



Filter Chamber Diagram

Inspection Equipment

Following is a list of equipment to allow for simple and effective inspection of the Kraken® Filter:

- Contech Inspection Form
- Flashlight
- Manhole hook or appropriate tools to access hatches and covers
- Appropriate traffic control signage and procedures
- Measuring pole and/or tape measure
- Protective clothing and eye protection



Inspection Steps

The core to any successful stormwater BMP maintenance program is routine inspections. The inspection steps required on the Kraken® Filter are quick and easy. As mentioned above, the first year should be seen as the maintenance interval establishment phase. During the first year, more frequent inspections should occur in order to gather loading data and maintenance requirements for that specific site. This information can be used to plan future inspection and maintenance intervals.

The Kraken® Filter can be inspected through visual observation without entry into the system. All necessary pre-inspection steps must be carried out before inspection occurs, especially traffic control and other safety measures to protect the inspector and near-by pedestrians from any dangers associated with an open access hatch or manhole. Note: entering a confined space requires appropriate safety and certification. It is generally not required for routine inspections of the system. Once these access covers have been safely opened the inspection process can proceed:

- Prepare the inspection form by writing in the necessary information including project name, location, date & time, unit number and other info (see inspection form).
- Observe the inside of the system through the access hatches. If minimal light is available and vision into the unit is impaired, utilize a flashlight to see inside the system and all of its chambers.
- Look for any obstructions in the inflow pipe, pre-treatment chamber, filter chambers, discharge chamber or outflow pipe. Write down any observations on the inspection form.
- Through observation and/or digital photographs, estimate the amount of floatable debris accumulated in the pre-treatment chamber. Record this information on the inspection form. Next, utilizing a tape measure or measuring stick, estimate the amount of sediment accumulated in the primary and secondary sedimentation chambers. Record this depth on the inspection form. Through visual observation, inspect the condition of the filter cartridges. Look for excessive build-up of sediments on the surface and any build-up on the top of the cartridges. Record this information on the inspection form.
- Finalize inspection report for analysis by the maintenance manager to determine if maintenance is required.

Maintenance Indicators

Based upon observations made during inspection, maintenance of the system may be required based on the following indicators:

- Missing or damaged internal components or cartridges
- Obstructions in the system or its inlet or outlet
- Accumulation of floatables in the pre-treatment chambers in which the length and width of the chamber behind oil/floatables skimmer is fully impacted
- Accumulation of sediment in the primary sedimentation chamber of more than 18” in depth
- Accumulation of sediment in the secondary sedimentation chamber of more than 6” in depth
- Accumulation of sediment in the filter chambers of more than 3” on average
- Substantial build-up of sediments on the filter membrane of the filter cartridges which will have a very dark appearance indicating the membrane may be fully saturated with sediment

The Kraken Filter vault is a robust system and is designed for treating and bypassing (when required) flow rates calculated by the Engineer of Record. Under the designed conditions with routine maintenance and inspections, the Kraken Filter should function for many years. The Kraken Filter can fail under certain conditions, such as: severe damage and cracking through the vault walls, internal weir and baffle walls falling out of place, blockages of the flow path such as inlet or outlet, filters not reset properly, excessive debris or sediment accumulation within the vault and on the filters. With proper maintenance these risks can be avoided. Contech representatives are also available for troubleshooting.

Maintenance Equipment

While maintenance can be done fully by hand, it is recommended that a vacuum truck be utilized to minimize time required to maintain the Kraken® Filter:

- Contech Maintenance Form
- Flashlight
- Manhole hook or appropriate tools to access hatches and covers
- Appropriate traffic control signage and procedures
- Measuring pole and/or tape measure
- Protective clothing and eye protection
- Vacuum truck
- Trash can
- Pressure washer

Note: entering a confined space requires appropriate safety and certification. It is generally not required for routine inspections of the system. Entry into the system will be required if it is determined the cartridge filters need washing/cleaning

Maintenance Procedures

It is recommended that maintenance occurs at least three days after the most recent rain event to allow for drain down of the system and any upstream detention systems designed to drain down over an extended period of time. Maintaining the system while flows are still entering it will increase the time and complexity required for maintenance. Cleaning of the pre-treatment chamber can be performed from finish surface without entry into the vault utilizing a vacuum truck. Once all safety measures have been set up, cleaning of the pre-treatment chamber can proceed as follows:

- Following rules for confined space entry, use a gas meter to detect the presence of any hazardous gases. If hazardous gases are present, do not enter the vault. Following appropriate confined space procedures, take steps, such as utilizing a venting system, to address the hazard. Once it is determined to be safe, enter utilizing appropriate entry equipment such as a ladder and tripod with harness.
- Once entry into the system has been established the maintenance technician should position themselves to stand in the pre-treatment chamber. From here, the removal of the cartridges can commence.
- Threaded couplings are used now, but old systems will have the pressure fitted coupling. Each cartridge that is pressure fitted in place will include a handle for easy removal. To remove a cartridge, simply grab the handle and pull straight up. It may be required to gently shift pressure from side to side while pulling up to break the pressure seal. Removal of the cartridge should be done by hand with minimal effort and requires no tools.
- Once the cartridges are removed, they should be lifted out from the vault and brought up to finish surface for cleaning. Using a large garbage can and a standard garden hose (low pressure nozzle), each cartridge should be rinsed off from the outside to remove accumulated sediments and debris. Once each cartridge is rinsed, it should be placed to the side for re-installation.

- Each filter chamber should be power washed and vacuumed clean before re-inserting the cleaned cartridges.
- After all cartridges have been washed, they can be replaced back into the vault. To replace each cartridge, simply slide cartridge over each pressure fitted coupler. Threaded couplings are used now, but old systems will have the pressure fitted coupling. Push down on the handle to ensure the cartridge has been fully seated and the bottom of the cartridge is making contact with the floor.
- The last step is to replace all access hatch lids and remove all traffic control.
- All removed debris and pollutants shall be disposed of following local and state requirements.

Maintenance Sequence



1. Remove access hatches set up vacuum truck to clean the pretreatment chamber.



2. Insert vacuum hose in the sedimentation chamber and vacuum out all trash, sediment and standing water.



3. Assess the condition of the filter cartridges and determine if cleaning is required.



4. To wash cartridges, remove from vault. Place over trash can and use a garden hose to spray clean.



5. Once cleaned, install back into the vault. This completes maintenance. Ensure access lids are properly replaced.



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ENGINEERED SOLUTIONS

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SUPPORT

DRAWINGS AND SPECIFICATIONS ARE AVAILABLE AT WWW.CONTECHES.COM

Kraken Maintenance Guide 08/22

Signature South Expansion Project
Teterboro and Moonachie

Within LOD

Existing Wshd A, C, & D	
Total Area	9.66 AC
Other Area	8.78 AC
Buildings	0.00 AC
Vehicular Pavement Area	0.87 AC

Proposed Pavement Area	6.32 AC

Area of Treatment	TSS Removal Rate Required	Acreage-Removal Rate
0.87 AC	50%	43.72
5.44 AC	80%	435.57
	Total	479.29
	TSS Removal Required	75.85%

PROVIDED TSS REMOVAL

Signature South Expansion
Teterboro and Moonachie, NJ
Langan Project No. 001642424
7/29/2025

Watershed	Area of Treatment	BMP Method	TSS Removal Rate	BMP Method	TSS Removal Rate	Total TSS Removal Rate	Acreage-Removal Rate
A2, A5, A6	2.21	Pervious Pavement	80%	----	0%	80%	176.7
A3 & A4	3.90	MTD	80%	----	0%	80%	311.7
B (Portion of)	0.20	Untreated	0%	----	0%	0%	0.0
Total Area	6.30 AC					Total Acreage-Removal Rate	488.3
						Average TSS Provided	**77.5 %**
						Average TSS Required	**75.85%**

* Please note that "Area of Treatment" excludes landscaping, sidewalks, and roof areas.

Hydrograph 100-yr Summary

Hydrology Studio v 3.0.0.43

File: Proposed HydrologyProjected Precipitation TW2.60 plus conveyance.hys

03-19-2026

Hyd. No.	Hydrograph Type	Hydrograph Name	Peak Flow (cfs)	Time to Peak (hrs)	Hydrograph Volume (cuft)	Inflow Hyd(s)	Maximum Elevation (ft)	Maximum Storage (cuft)
1	NRCS Runoff	PR WSDH A2 Imperv	12.90	12.10	43,592	----		
2	Pond Route	Pervious Pavement A2	3.905	12.23	20,456	1	3.90	24,961
4	NRCS Runoff	PR WSHD A3 Imperv	27.43	12.10	94,614	----		
5	Pond Route	Stormtrap A3	0.904	14.93	30,142	4	4.00	73,838
7	NRCS Runoff	PR WSHD A4 Imperv	24.74	12.10	85,315	----		
8	Pond Route	Stormtrap A4	0.538	17.05	20,855	7	3.92	71,393
9	Junction	A3 &A4 outflow	1.352	16.03	50,998	5, 8		
11	NRCS Runoff	PR WSHD A5 Imperv	8.637	12.10	29,188	----		
12	NRCS Runoff	PR WSHD A5 Perv	0.510	12.10	1,505	----		
13	Junction	PR WSHD A5 Combined	9.147	12.10	30,693	11, 12		
14	Pond Route	Pervious Pavemnt A5	6.404	12.13	26,601	13	6.07	9,883
16	NRCS Runoff	PR WSHD A6 Imperv	4.599	12.10	15,542	----		
17	NRCS Runoff	PR WSHD A6 Perv	1.543	12.13	5,323	----		
18	Junction	PR WSHD A6 Combined	6.086	12.10	20,865	16, 17		
19	Pond Route	Pervious Pavement A6	4.747	12.13	15,412	18	5.45	8,030
21	NRCS Runoff	PR WSHD A7 Imperv	18.73	12.10	63,304	----		
22	Pond Route	Stormtrap A7	12.83	12.13	57,075	21	5.54	12,996
24	Junction	Watershed A Combined	27.39	12.13	170,542	2, 5, 8, 14, 19, 22		
26	NRCS Runoff	PR WSHD B Perv	21.85	13.40	291,637	----		
27	NRCS Runoff	PR WSHD B Imperv	5.904	12.85	64,694	----		
28	Junction	PR WSHD B Combined	26.38	13.35	356,330	26, 27		
30	Junction	PR POA - 1	36.81	12.13	526,872	24, 28		
33	NRCS Runoff	PR WSHD C PerPOA-2	0.438	12.15	1,606	----		

Pond Report

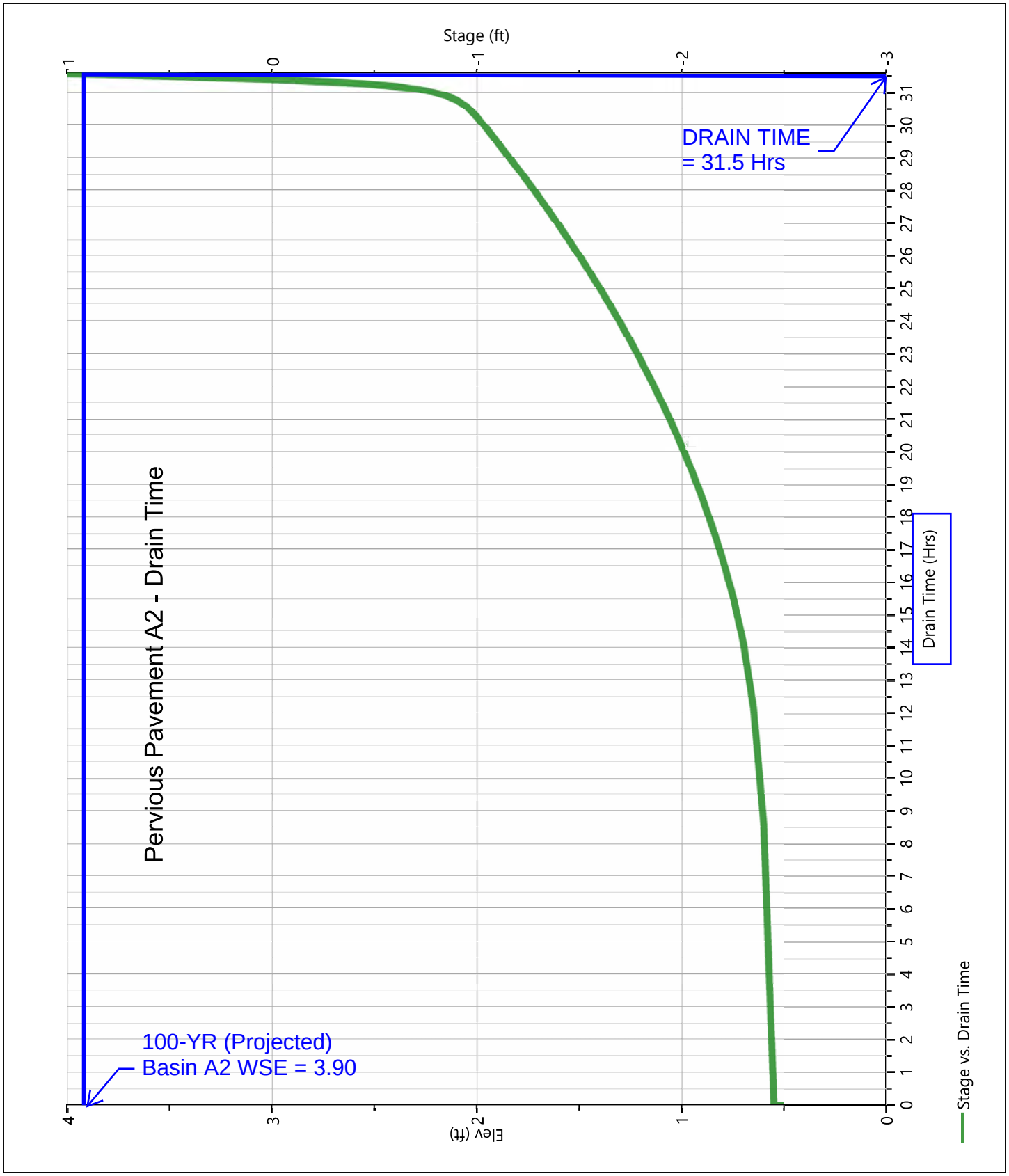
File: Proposed HydrologyProjected Precipitation TW2.60 plus conveyance.hys

Hydrology Studio v 3.0.0.43

03-19-2026

Pervious Pavement A2

Pond Drawdown



Pond Report

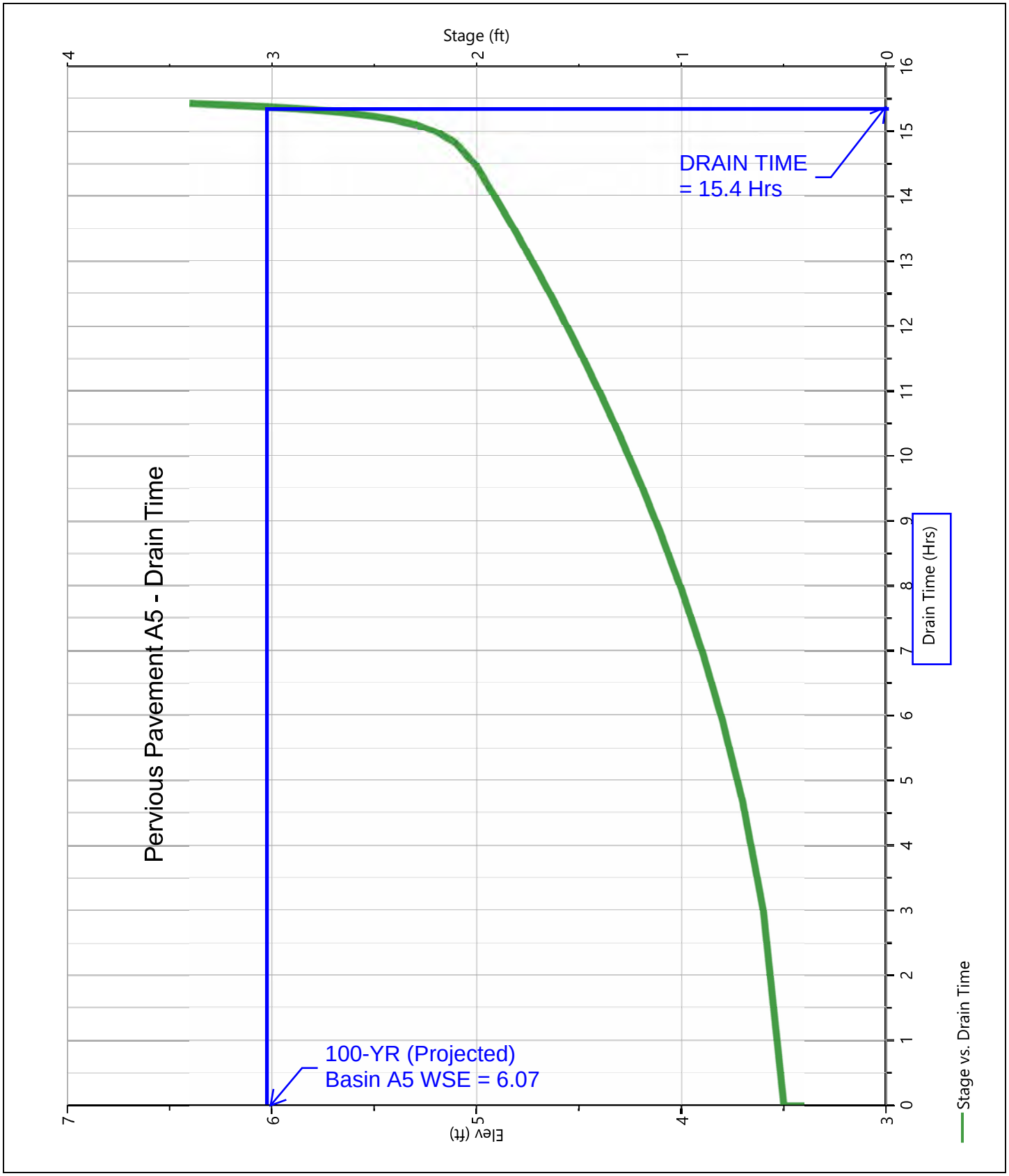
File: Proposed HydrologyProjected Precipitation TW2.60 plus conveyance.hys

Hydrology Studio v 3.0.0.43

03-19-2026

Pervious Pavement A5

Pond Drawdown



Pond Report

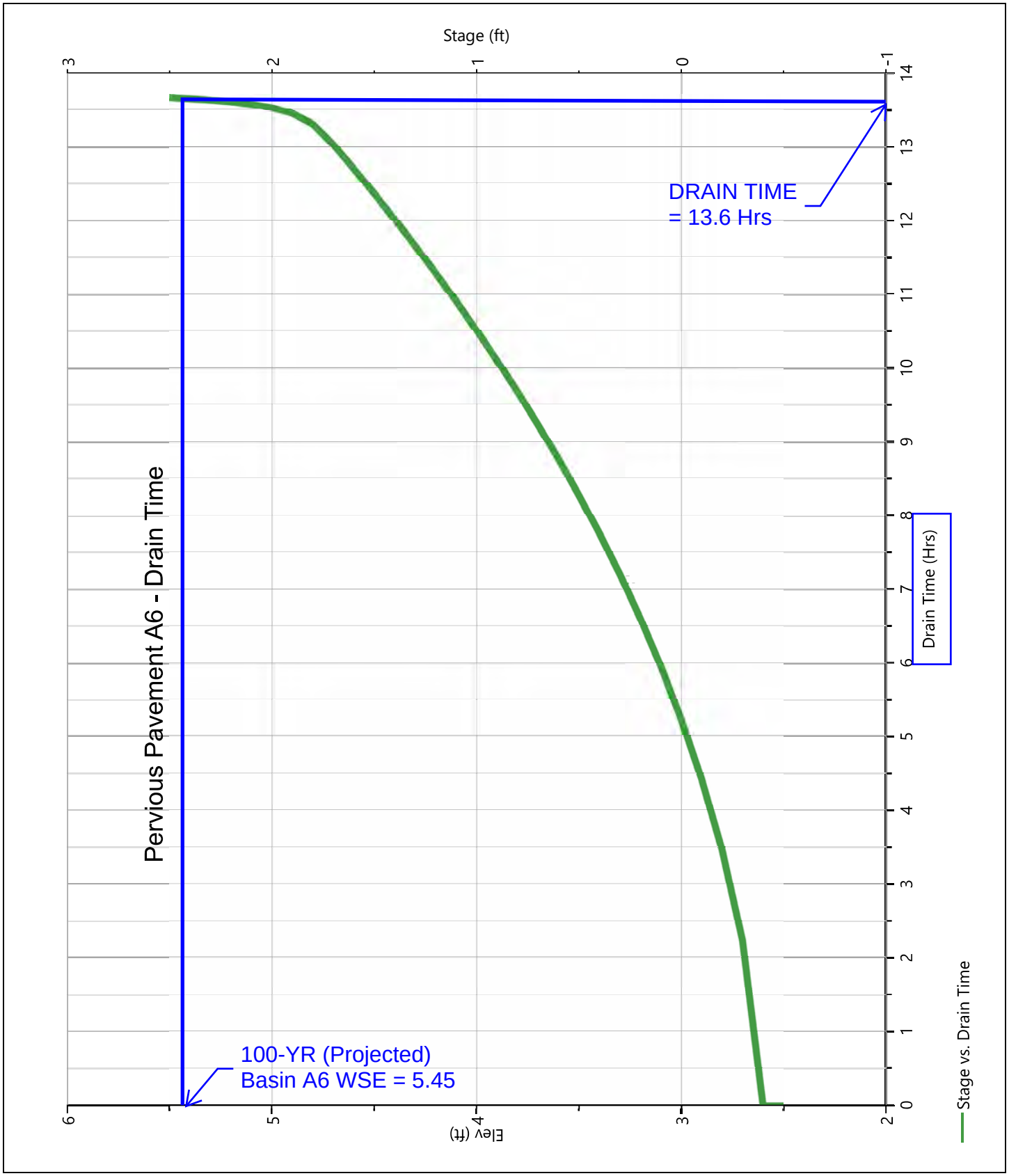
File: Proposed HydrologyProjected Precipitation TW2.60 plus conveyance.hys

Hydrology Studio v 3.0.0.43

03-19-2026

Pervious Pavement A6

Pond Drawdown



APPENDIX F
Stormwater Conveyance Calculations

Hydrograph 25-yr Summary

Hydrology Studio v 3.0.0.38

File: Proposed Hydrology25yr Storm.hys
07-31-2025

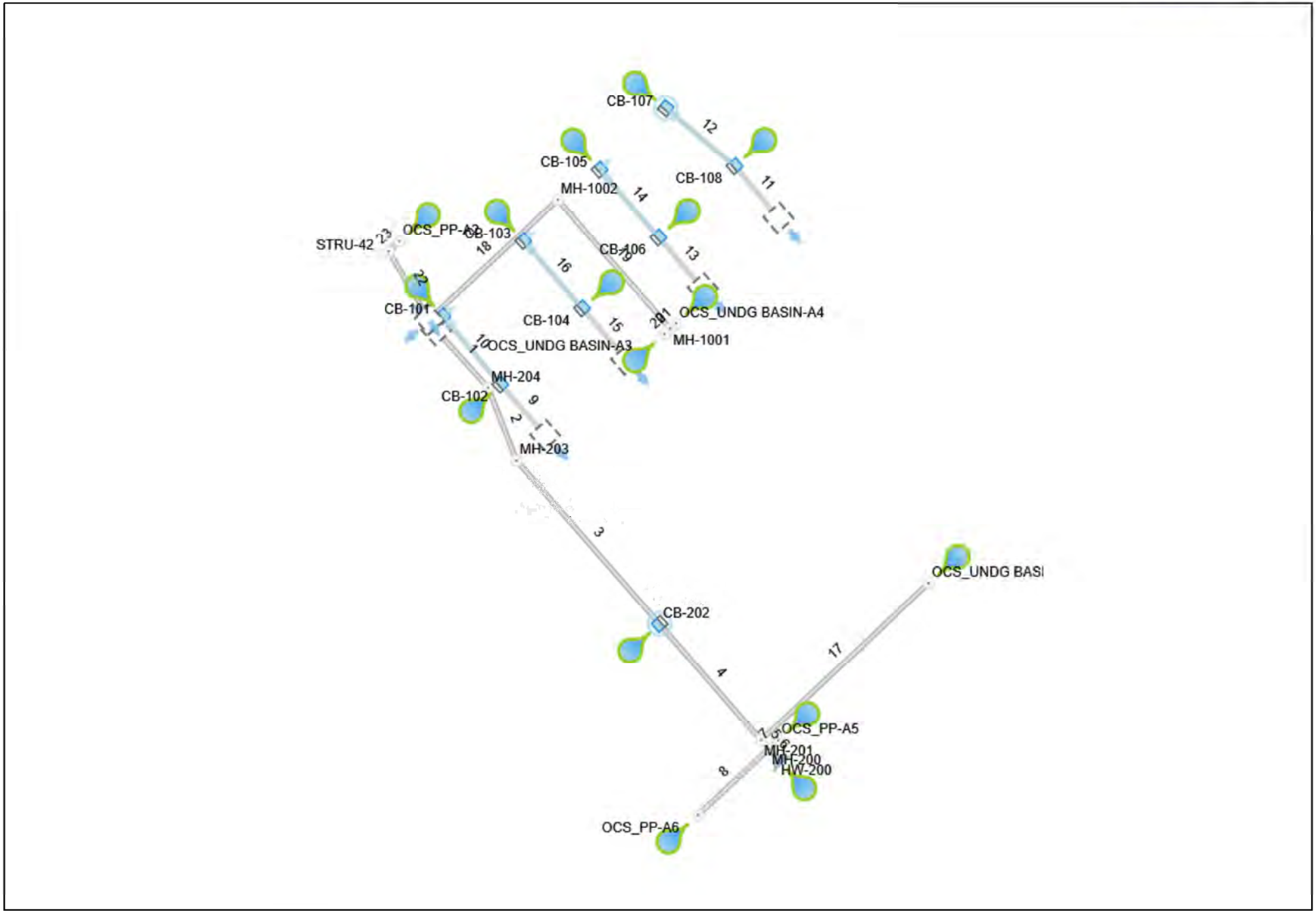
Hyd. No.	Hydrograph Type	Hydrograph Name	Peak Flow (cfs)	Time to Peak (hrs)	Hydrograph Volume (cuft)	Inflow Hyd(s)	Maximum Elevation (ft)	Maximum Storage (cuft)
1	NRCS Runoff	PR WSDH A2 Imperv	7.000	12.10	23,292	----		
2	Pond Route	Pervious Pavement A2	0.983	12.55	22,855	1	2.16	12,176
4	NRCS Runoff	PR WSHD A3 Imperv	14.89	12.10	50,555	----		
5	Pond Route	Stormtrap A3	0.175	23.12	22,041	4	2.97	42,069
7	NRCS Runoff	PR WSHD A4 Imperv	13.42	12.10	45,586	----		
8	Pond Route	Stormtrap A4	0.164	22.62	20,573	7	2.82	37,671
10	NRCS Runoff	PR WSHD A5 Imperv	4.687	12.10	15,596	----		
11	NRCS Runoff	PR WSHD A5 Perv	0.240	12.10	673	----		
12	Junction	PR WSHD A5 Combined	4.927	12.10	16,268	10, 11		
13	Pond Route	Pervious Pavemnt A5	1.287	12.25	16,234	12	5.32	7,139
15	NRCS Runoff	PR WSHD A6 Imperv	2.496	12.10	8,304	----		
16	NRCS Runoff	PR WSHD A6 Perv	0.692	12.15	2,439	----		
17	Junction	PR WSHD A6 Combined	3.124	12.10	10,744	15, 16		
18	Pond Route	Pervious Pavement A6	0.218	13.42	10,727	17	4.52	5,513
20	NRCS Runoff	PR WSHD A7 Imperv	10.17	12.10	33,824	----		
21	Pond Route	Stormtrap A7	7.800	12.12	33,534	20	5.21	11,300
23	Junction	Watershed A Combined	9.417	12.13	125,964	2, 5, 8, 13, 18, 21		
25	NRCS Runoff	PR WSHD B Perv	9.274	13.50	125,907	----		
26	NRCS Runoff	PR WSHD B Imperv	3.166	12.87	34,655	----		
27	Junction	PR WSHD B Combined	11.64	13.40	160,563	25, 26		
29	Junction	PR POA - 1	13.96	13.35	286,526	23, 27		
32	NRCS Runoff	PR WSHD C PerPOA 2	0.195	12.17	730	----		

Plan View

Stormwater Studio 2025 v 3.0.0.39

Project Name: 01642424 - 2024 Prelim SW - Scenario 1A

25-YR 08-22-2025



Storm Sewer Tabulation

Stormwater Studio 2025 v 3.0.0.39

Project Name: 01642424 - 2024 Prelim SW - Scenario 1A

25-YR 08-22-2025

Line ID	Length	Drng Area		Rational	C x A		Tc		Intensity	Total Q	Capacity	Velocity	Line		Invert Elev		HGL Elev		Surface Elev		Line No
		Incr	Total		Incr	Total	Inlet	Syst					Size	Slope	Up	Dn	Up	Dn	Up	Dn	
	(ft)	(ac)	(ac)	(C)			(min)	(min)	(in/hr)	(cfs)	(cfs)	(ft/s)	(in)	(%)	(ft)	(ft)	(ft)	(ft)	(ft)	(ft)	
PIPE-18	91.27	0.000	11.120	0.00	0.00	8.03	0.0	101.75	1.62	22.35	39.57	3.21	36	0.30	0.60	0.33	3.40	3.33	5.84	4.99	1
PIPE-17	91.21	0.000	11.120	0.00	0.00	8.03	0.0	101.28	1.63	22.39	39.57	3.24	36	0.30	0.87	0.60	3.62	3.55	6.92	5.84	2
PIPE-16 (1) (1)	256.15	0.120	11.120	0.92	0.11	8.03	6.0	100.06	1.64	22.49	39.57	3.52	36	0.30	1.64	0.87	3.96	3.78	8.16	6.92	3
PIPE-16 (1) (2)	181.89	0.000	11.000	0.00	0.00	7.92	0.0	99.24	1.65	22.39	39.61	3.68	36	0.30	2.19	1.64	4.41	4.30	7.81	8.16	4
PIPE-16 (1)	13.86	0.000	11.000	0.00	0.00	7.92	0.0	99.14	1.65	14.60	39.61	2.21	36	0.30	2.23	2.19	4.86	4.86	8.22	7.81	5
PIPE-16	16.20	11.000	11.000	0.72	7.92	7.92	99.0	99.00	1.65	13.10	39.57	1.97	36	0.30	2.28	2.23	4.92	4.92	5.89	8.22	6
PIPE-26	15.00	0.000	0.000	0.00	0.00	0.00	0.0	0.00	7.27	1.29	11.38	0.73	18	1.00	2.38	2.23	4.97	4.97	7.59	8.22	7
PIPE-27	115.00	0.000	0.000	0.00	0.00	0.00	0.0	0.00	7.27	0.22	5.51	0.12	18	0.23	2.50	2.23	4.98	4.98	7.18	8.22	8
PIPE-4	79.58	0.590	0.880	0.99	0.58	0.87	6.0	7.59	6.45	5.62	7.71	3.71	14x23r	0.30	2.39	2.15	3.16	2.97	5.81	3.63	9
PIPE-3	105.43	0.290	0.290	0.99	0.29	0.29	6.0	6.00	6.93	1.99	7.71	1.10	14x23r	0.30	2.71	2.39	3.52	3.51	4.81	5.81	10
PIPE-10	79.58	0.560	1.110	0.99	0.55	1.10	6.0	6.98	6.63	7.28	7.73	4.42	14x23r	0.30	2.39	2.15	3.37	2.92	5.88	3.63	11
PIPE-9	106.71	0.550	0.550	0.99	0.54	0.54	6.0	6.00	6.93	3.77	7.71	1.82	14x23r	0.30	2.71	2.39	3.72	3.66	4.81	5.88	12
PIPE-8	79.57	0.560	1.010	0.99	0.55	1.00	6.0	7.11	6.59	6.59	7.73	4.29	14x23r	0.30	2.39	2.15	3.30	2.87	5.88	3.63	13
PIPE-7	105.42	0.450	0.450	0.99	0.45	0.45	6.0	6.00	6.93	3.09	7.76	1.58	14x23r	0.30	2.71	2.39	3.61	3.58	4.81	5.88	14
PIPE-6	79.58	0.560	0.910	0.99	0.55	0.90	6.0	7.29	6.54	5.89	7.73	3.80	14x23r	0.30	2.39	2.15	3.19	2.97	5.88	3.63	15
PIPE-5	105.42	0.350	0.350	0.99	0.35	0.35	6.0	6.00	6.93	2.40	7.76	1.36	14x23r	0.30	2.71	2.39	3.50	3.48	4.81	5.88	16
PIPE-33	272.03	0.000	0.000	0.00	0.00	0.00	0.0	0.00	7.27	7.80	13.37	2.48	24	0.30	3.00	2.19	5.11	4.84	7.80	7.81	17
PIPE-12	207.88	0.000	0.000	0.00	0.00	0.00	0.0	17.13	4.66	0.34	13.42	0.13	24	0.30	0.95	0.33	2.33	2.33	5.17	4.88	18
PIPE-11	201.73	0.000	0.000	0.00	0.00	0.00	0.0	0.98	7.27	0.34	13.42	0.21	24	0.30	1.56	0.95	2.39	2.39	7.24	5.17	19
PIPE-13	9.26	0.000	0.000	0.00	0.00	0.00	0.0	0.00	7.27	0.18	7.57	0.17	18	0.44	1.60	1.56	2.44	2.44	7.18	7.24	20
PIPE-14	9.26	0.000	0.000	0.00	0.00	0.00	0.0	0.00	7.27	0.16	7.57	0.16	18	0.44	1.60	1.56	2.44	2.44	7.17	7.24	21
PIPE-25 (1)	93.33	0.000	0.000	0.00	0.00	0.00	0.0	0.50	7.27	0.98	4.41	0.57	18	0.15	0.47	0.33	1.84	1.83	4.00	4.88	22

Notes: IDF File = Teterboro IDF Values.IDF, Return Period = 25-yrs. r = rectangular e = elliptical a = arch

Storm Sewer Tabulation

Stormwater Studio 2025 v 3.0.0.39

Project Name: 01642424 - 2024 Prelim SW - Scenario 1A

25-YR 08-22-2025

Line ID	Length	Drng Area		Rational	C x A		Tc		Intensity	Total Q	Capacity	Velocity	Line		Invert Elev		HGL Elev		Surface Elev		Line No
		Incr	Total		Incr	Total	Inlet	Syst					Size	Slope	Up	Dn	Up	Dn	Up	Dn	
	(ft)	(ac)	(ac)	(C)			(min)	(min)	(in/hr)	(cfs)	(cfs)	(ft/s)	(in)	(%)	(ft)	(ft)	(ft)	(ft)	(ft)	(ft)	
PIPE-28	17.53	0.000	0.000	0.00	0.00	0.00	0.0	0.00	7.27	0.98	4.71	0.58	18	0.17	0.50	0.47	1.84	1.84	3.96	4.00	23

Notes: IDF File = Teterboro IDF Values.IDF, Return Period = 25-yrs.

Hydrograph 100-yr Summary

Hydrology Studio v 3.0.0.38

File: Proposed HydrologyCurrent Precipitation.hys

07-31-2025

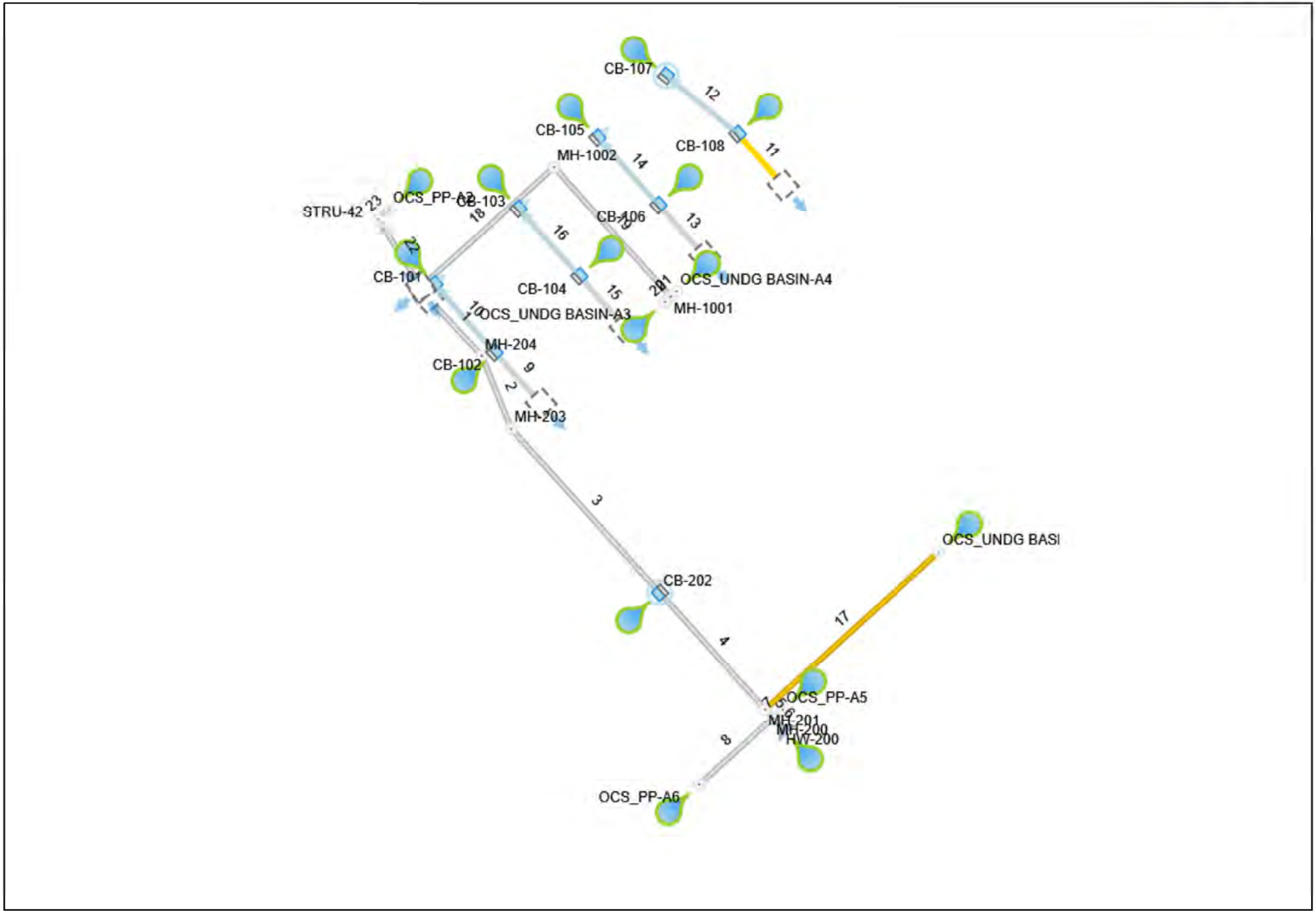
Hyd. No.	Hydrograph Type	Hydrograph Name	Peak Flow (cfs)	Time to Peak (hrs)	Hydrograph Volume (cuft)	Inflow Hyd(s)	Maximum Elevation (ft)	Maximum Storage (cuft)
1	NRCS Runoff	PR WSDH A2 Imperv	9.979	12.10	33,539	----		
2	Pond Route	Pervious Pavement A2	4.237	12.15	33,054	1	2.50	14,714
4	NRCS Runoff	PR WSHD A3 Imperv	21.22	12.10	72,793	----		
5	Pond Route	Stormtrap A3	0.217	24.02	27,953	4	3.61	61,986
7	NRCS Runoff	PR WSHD A4 Imperv	19.14	12.10	65,638	----		
8	Pond Route	Stormtrap A4	0.204	24.00	26,179	7	3.40	55,506
10	NRCS Runoff	PR WSHD A5 Imperv	6.682	12.10	22,456	----		
11	NRCS Runoff	PR WSHD A5 Perv	0.377	12.10	1,087	----		
12	Junction	PR WSHD A5 Combined	7.059	12.10	23,543	10, 11		
13	Pond Route	Pervious Pavemnt A5	4.200	12.13	23,499	12	5.78	8,825
15	NRCS Runoff	PR WSHD A6 Imperv	3.558	12.10	11,957	----		
16	NRCS Runoff	PR WSHD A6 Perv	1.095	12.15	3,942	----		
17	Junction	PR WSHD A6 Combined	4.560	12.10	15,899	15, 16		
18	Pond Route	Pervious Pavement A6	1.284	12.32	15,883	17	5.01	6,828
20	NRCS Runoff	PR WSHD A7 Imperv	14.49	12.10	48,704	----		
21	Pond Route	Stormtrap A7	11.71	12.12	48,369	20	5.43	12,419
23	Junction	Watershed A Combined	20.49	12.13	174,935	2, 5, 8, 13, 18, 21		
25	NRCS Runoff	PR WSHD B Perv	15.31	13.45	207,994	----		
26	NRCS Runoff	PR WSHD B Imperv	4.517	12.87	49,900	----		
27	Junction	PR WSHD B Combined	18.71	13.40	257,894	25, 26		
29	Junction	PR POA - 1	26.86	12.13	432,829	23, 27		
32	NRCS Runoff	PR WSHD C PerPOA 2	0.309	12.17	1,180	----		

Plan View

Stormwater Studio 2025 v 3.0.0.39

Project Name: 01642424 - 2024 Prelim SW - Scenario 1A

100-YR 08-22-2025



Storm Sewer Tabulation

Stormwater Studio 2025 v 3.0.0.39

Project Name: 01642424 - 2024 Prelim SW - Scenario 1A

100-YR 08-22-2025

Line ID	Length	Drng Area		Rational	C x A		Tc		Intensity	Total Q	Capacity	Velocity	Line		Invert Elev		HGL Elev		Surface Elev		Line No
		Incr	Total		Incr	Total	Inlet	Syst					Size	Slope	Up	Dn	Up	Dn	Up	Dn	
	(ft)	(ac)	(ac)	(C)			(min)	(min)	(in/hr)	(cfs)	(cfs)	(ft/s)	(in)	(%)	(ft)	(ft)	(ft)	(ft)	(ft)	(ft)	
PIPE-18	91.27	0.000	11.120	0.00	0.00	8.03	0.0	101.02	2.09	33.95	39.57	4.83	36	0.30	0.60	0.33	3.51	3.33	5.84	4.99	1
PIPE-17	91.21	0.000	11.120	0.00	0.00	8.03	0.0	100.71	2.09	33.98	39.57	4.81	36	0.30	0.87	0.60	4.05	3.84	6.92	5.84	2
PIPE-16 (1) (1)	256.15	0.120	11.120	0.92	0.11	8.03	6.0	99.82	2.10	34.07	39.57	4.82	36	0.30	1.64	0.87	4.94	4.37	8.16	6.92	3
PIPE-16 (1) (2)	181.89	0.000	11.000	0.00	0.00	7.92	0.0	99.19	2.11	33.91	39.61	4.80	36	0.30	2.19	1.64	5.58	5.18	7.81	8.16	4
PIPE-16 (1)	13.86	0.000	11.000	0.00	0.00	7.92	0.0	99.11	2.11	22.20	39.61	3.14	36	0.30	2.23	2.19	6.09	6.08	8.22	7.81	5
PIPE-16	16.20	11.000	11.000	0.72	7.92	7.92	99.0	99.00	2.11	16.73	39.57	2.37	36	0.30	2.28	2.23	6.30	6.29	5.89	8.22	6
PIPE-26	15.00	0.000	0.000	0.00	0.00	0.00	0.0	0.00	8.51	4.20	11.38	2.38	18	1.00	2.38	2.23	6.31	6.29	7.59	8.22	7
PIPE-27	115.00	0.000	0.000	0.00	0.00	0.00	0.0	0.00	8.51	1.28	5.51	0.73	18	0.23	2.50	2.23	6.38	6.37	7.18	8.22	8
PIPE-4	79.58	0.590	0.880	0.99	0.58	0.87	6.0	7.69	7.49	6.53	7.71	2.92	14x23r	0.30	2.39	2.15	3.78	3.61	5.81	3.63	9
PIPE-3	105.43	0.290	0.290	0.99	0.29	0.29	6.0	6.00	8.09	2.32	7.71	1.04	14x23r	0.30	2.71	2.39	3.98	3.95	4.81	5.81	10
PIPE-10	79.58	0.560	1.110	0.99	0.55	1.10	6.0	6.90	7.76	8.52	7.73	3.81	14x23r	0.30	2.39	2.15	3.69	3.40	5.88	3.63	11
PIPE-9	106.71	0.550	0.550	0.99	0.54	0.54	6.0	6.00	8.09	4.41	7.71	1.97	14x23r	0.30	2.71	2.39	4.07	3.97	4.81	5.88	12
PIPE-8	79.57	0.560	1.010	0.99	0.55	1.00	6.0	7.07	7.70	7.70	7.73	3.45	14x23r	0.30	2.39	2.15	3.55	3.40	5.88	3.63	13
PIPE-7	105.42	0.450	0.450	0.99	0.45	0.45	6.0	6.00	8.09	3.60	7.76	1.65	14x23r	0.30	2.71	2.39	3.83	3.78	4.81	5.88	14
PIPE-6	79.58	0.560	0.910	0.99	0.55	0.90	6.0	7.40	7.59	6.83	7.73	3.06	14x23r	0.30	2.39	2.15	3.80	3.61	5.88	3.63	15
PIPE-5	105.42	0.350	0.350	0.99	0.35	0.35	6.0	6.00	8.09	2.80	7.76	1.25	14x23r	0.30	2.71	2.39	4.02	3.98	4.81	5.88	16
PIPE-33	272.03	0.000	0.000	0.00	0.00	0.00	0.0	0.00	8.51	11.71	13.42	3.73	24	0.30	3.01	2.19	6.64	6.02	7.80	7.81	17
PIPE-12	207.88	0.000	0.000	0.00	0.00	0.00	0.0	13.86	6.00	0.42	13.42	0.16	24	0.30	0.95	0.33	2.33	2.33	5.17	4.88	18
PIPE-11	201.73	0.000	0.000	0.00	0.00	0.00	0.0	0.80	8.51	0.42	13.42	0.26	24	0.30	1.56	0.95	2.39	2.39	7.24	5.17	19
PIPE-13	9.26	0.000	0.000	0.00	0.00	0.00	0.0	0.00	8.51	0.22	7.57	0.20	18	0.44	1.60	1.56	2.45	2.45	7.18	7.24	20
PIPE-14	9.26	0.000	0.000	0.00	0.00	0.00	0.0	0.00	8.51	0.20	7.57	0.19	18	0.44	1.60	1.56	2.45	2.45	7.17	7.24	21
PIPE-25 (1)	93.33	0.000	0.000	0.00	0.00	0.00	0.0	0.12	8.51	4.24	4.41	2.40	18	0.15	0.47	0.33	1.95	1.83	4.00	4.88	22

Notes: IDF File = Teterboro IDF Values.IDF, Return Period = 100-yrs. r = rectangular e = elliptical a = arch

Storm Sewer Tabulation

Stormwater Studio 2025 v 3.0.0.39

Project Name: 01642424 - 2024 Prelim SW - Scenario 1A

100-YR 08-22-2025

Line ID	Length	Drng Area		Rational	C x A		Tc		Intensity	Total Q	Capacity	Velocity	Line		Invert Elev		HGL Elev		Surface Elev		Line No
		Incr	Total		Incr	Total	Inlet	Syst					Size	Slope	Up	Dn	Up	Dn	Up	Dn	
	(ft)	(ac)	(ac)	(C)			(min)	(min)	(in/hr)	(cfs)	(cfs)	(ft/s)	(in)	(%)	(ft)	(ft)	(ft)	(ft)	(ft)	(ft)	
PIPE-28	17.53	0.000	0.000	0.00	0.00	0.00	0.0	0.00	8.51	4.24	4.71	2.40	18	0.17	0.50	0.47	2.09	2.07	3.96	4.00	23

Notes: IDF File = Teterboro IDF Values.IDF, Return Period = 100-yrs.

IDF Report

IDF filename: Teterboro IDF Values.IDF

Stormwater Studio 2025 v 3.0.0.38

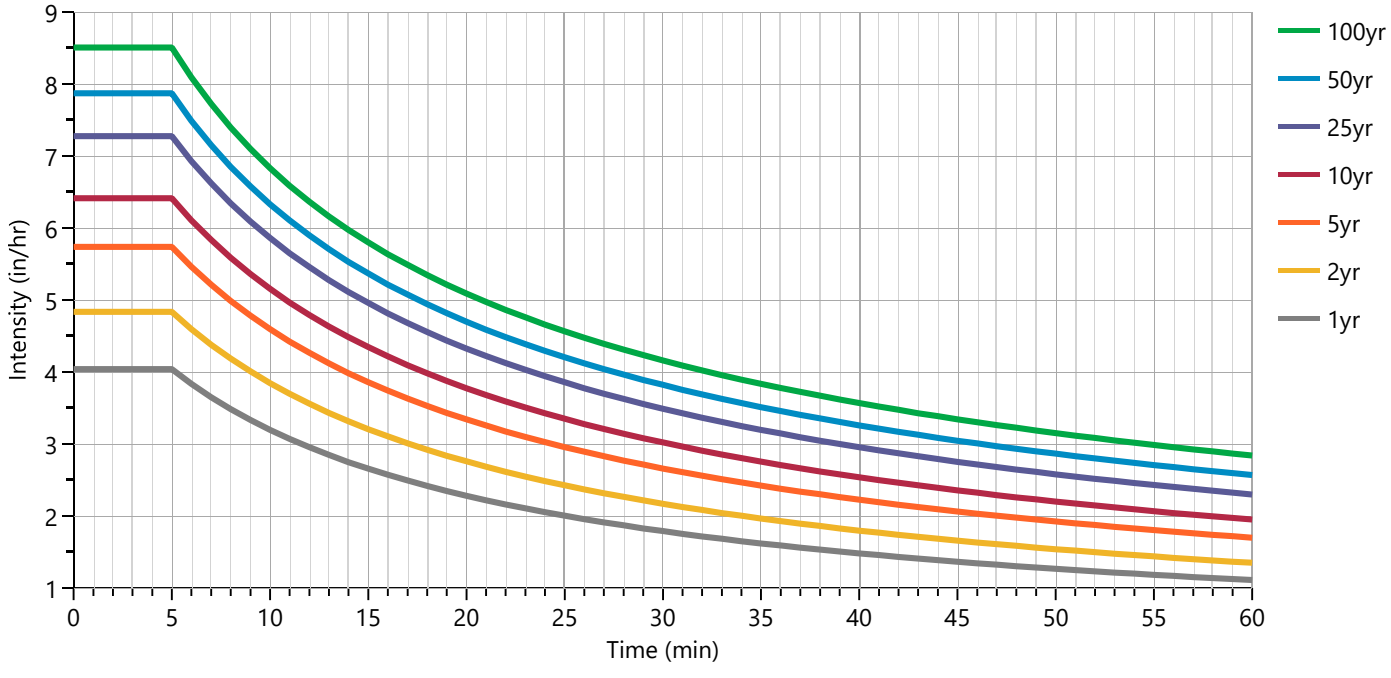
07-31-2025

Equation Coefficients	Intensity = B / (Tc + D)^E (in/hr)								
	1-yr	2-yr	3-yr	5-yr	10-yr	25-yr	50-yr	100-yr	
B	46.4552	56.9141	0.0000	54.5109	57.3148	53.7525	46.7471	43.4974	
D	11.3000	11.7000	0.0000	10.9000	10.8000	9.8000	8.4000	7.4000	
E	0.8751	0.8757	0.0000	0.8138	0.7936	0.7423	0.6865	0.6481	

Minimum Tc = 5 minutes

Tc (min)	Intensity Values (in/hr)								
	1-yr	2-yr	3-yr	5-yr	10-yr	25-yr	50-yr	100-yr	
Cf	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	
5	4.04	4.84	0	5.74	6.41	7.27	7.87	8.51	
10	3.20	3.84	0	4.59	5.15	5.86	6.33	6.83	
15	2.66	3.21	0	3.86	4.34	4.96	5.37	5.80	
20	2.28	2.76	0	3.34	3.77	4.33	4.70	5.09	
25	2.00	2.43	0	2.96	3.35	3.86	4.20	4.57	
30	1.79	2.17	0	2.66	3.02	3.49	3.82	4.16	
35	1.62	1.97	0	2.42	2.76	3.20	3.51	3.84	
40	1.48	1.80	0	2.23	2.54	2.96	3.26	3.57	
45	1.36	1.66	0	2.06	2.36	2.75	3.05	3.34	
50	1.27	1.54	0	1.92	2.20	2.58	2.86	3.15	
55	1.18	1.44	0	1.80	2.07	2.43	2.71	2.99	
60	1.11	1.35	0	1.70	1.95	2.30	2.57	2.84	

Cf = Correction Factor applied to Rational Method runoff coefficient.



APPENDIX G
StormTrap Details

StormTrap A3 & A4
(Aircraft Apron)

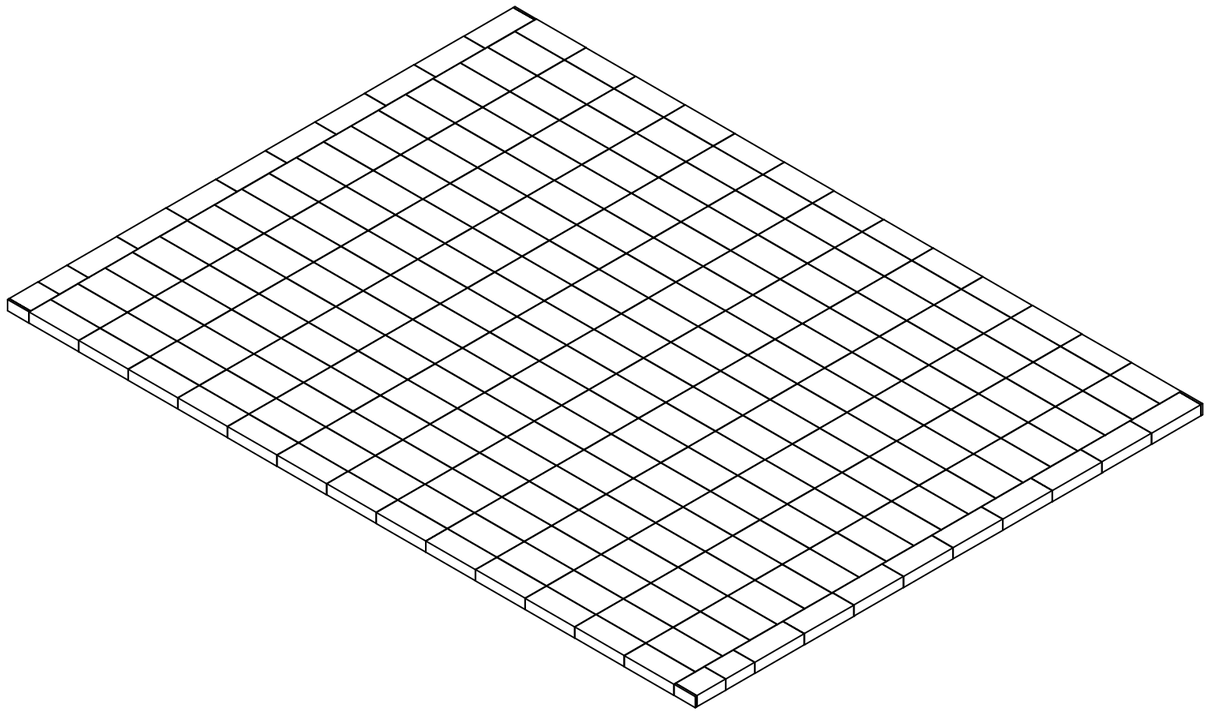
StormTrap®

MODULAR CONCRETE
STORMWATER MANAGEMENT

SHEET INDEX	
PAGE	DESCRIPTION
0.0	COVER SHEET
1.0	GENERAL NOTES
1.1	SINGLETRAP DESIGN CRITERIA
2.0	SINGLETRAP SYSTEM LAYOUT
2.1	SINGLETRAP FOUNDATION LAYOUT
3.0	SINGLETRAP INSTALLATION SPECIFICATION
3.1	SINGLETRAP INSTALLATION SPECIFICATION
4.0	SINGLETRAP BACKFILL SPECIFICATION
5.0	PIPE/ACCESS OPENING SPECIFICATION
6.0	SINGLETRAP MODULE TYPES

THE STORMTRAP DRAWINGS SHALL NOT BE ALTERED OR MANIPULATED IN WHOLE OR IN PART WITHOUT WRITTEN CONSENT OF STORMTRAP. USE OF THESE DRAWINGS IS STRICTLY GRANTED TO YOU, OUR CLIENT, FOR THE SPECIFIED AND NAMED PROJECT ONLY. THESE DRAWINGS ARE FOR YOUR REFERENCE ONLY AND SHALL NOT BE USED FOR MANUFACTURING PURPOSES.

STORMTRAP CONTACT INFORMATION	
STORMTRAP SUPPLIER:	STORMTRAP
CONTACT NAME:	Kent Porter
CELL PHONE:	(973) 557-6280
SALES EMAIL:	kporter@stormtrap.com



Signature South Expansion
Teterboro, NJ

StormTrap®
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ENGINEER INFORMATION:

Langan
Engineering –
Parsippany NJ
(HQ) –
Parsippany, NJ

PROJECT INFORMATION:

Signature South
Expansion

Teterboro, NJ

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NTS

SHEET TITLE:

COVER SHEET

SHEET NUMBER:

0.0

GENERAL NOTES:

1. STRUCTURE PROXIMITY LOADING DISCLAIMER:

   STORMTRAP MODULES AND FOUNDATION ARE NOT DESIGNED TO ACCEPT ANY ADDITIONAL LOADING FROM ANY NEARBY STRUCTURES NEXT TO OR OVER THE TOP OF STORMTRAP. EXAMPLES OF NEARBY STRUCTURES MAY INCLUDE BUT ARE NOT LIMITED TO BUILDINGS, FOUNDATION ELEMENTS, RETAINING WALLS, LIGHT POLES, BOLLARDS, SIGNPOSTS, FENCES. ADDITIONALLY, STORMTRAP IS NOT RESPONSIBLE FOR INSTALLATION CONFLICTS ARISING FROM ANY OF THESE NEARBY STRUCTURES. IF ADDITIONAL LOADING CONSIDERATIONS ARE REQUIRED FOR STRUCTURAL DESIGN OF STORMTRAP, PLEASE CONTACT STORMTRAP IMMEDIATELY. FOR LIGHT POLES SHOWN OVER THE TOP OF THE SYSTEM, STORMTRAP WILL PROVIDE A 5'-0" LATERAL DISTANCE CAVITY AROUND THE LIGHT POLE TO ACCOMMODATE IT. THE EOR TO TAKE RESPONSIBILITY FOR ENSURING THE LIGHT POLE IS NOT INFLICTING ANY LOADING ON THE STORMTRAP MODULES AND FOUNDATION.

2. TREE LOADING DISCLAIMER:

   THE NUMBER OF TREES OR WEIGHT OF TOTAL PLANT MATERIAL PRESENT ON TOP OF A SINGLE STORMTRAP MODULE SHALL NOT EXCEED 16,000 LBS. THE REQUIREMENTS LISTED HERE APPLY AT BOTH THE TIME OF INSTALLATION AND FOR THE LIFE OF THE TREES AND PLANTS IN QUESTION. THE EOR AND LANDSCAPE ARCHITECT ARE RESPONSIBLE FOR ENSURING THAT TREE AND OTHER PLANT ROOTS DO NOT INTERFERE WITH OR COMPROMISE THE FUNCTIONAL AND STRUCTURAL INTEGRITY OF STORMTRAP'S UNDERGROUND MODULES. APPROPRIATE MEASURES SHOULD BE TAKEN TO PREVENT ROOT GROWTH INTO THE STORMTRAP SYSTEM FROM ADJACENT OR OVERHEAD TREES. FURTHERMORE, THE ROOTS OF THE TREES MUST BE CONTAINED TO PREVENT FUTURE DAMAGE TO THE STORMTRAP SYSTEM. STORMTRAP ACCEPTS NO LIABILITY FOR DAMAGES CAUSED BY TREES OR OTHER VEGETATION PLACED AROUND OR ON TOP OF THE SYSTEM.

3. PRE-TREATMENT/SEDIMENT/FILTER CHAMBER DISCLAIMER:

   FOR SYSTEMS CONTAINING PRE-TREATMENT, SEDIMENTATION AND/OR FILTER CHAMBERS; IF REQUIRED TO BE SEALED TO PREVENT SAND AND/OR PRE-TREATED WATER FROM MIGRATING INTO ADJOINING MODULES, IT IS THE SOLE RESPONSIBILITY OF THE INSTALLING CONTRACTOR TO ENSURE THAT THOSE MODULES ARE SEALED.

4. OUTLET CONTROL STRUCTURE DISCLAIMER (IF SHOWN ON THESE PLANS):

   IF A WATERTIGHT SOLUTION IS REQUIRED FOR AN OUTLET CONTROL STRUCTURE, ALL EXTERIOR COLD JOINTS, INCLUDING JOINT BETWEEN TOP AND BASE MODULES, BETWEEN TOP AND BASE OF ADJOINING SYMONS WALLS, AND JOINTS BETWEEN MODULE AND ADJACENT END PANELS WILL BE THE SOLE RESPONSIBILITY OF THE INSTALLING CONTRACTOR TO PROVIDE AND INSTALL THE WATERTIGHT APPLICATION PER THE EOR'S SPECIFICATION.

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1287 WINDHAM PARKWAY
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ENGINEER INFORMATION:

Langan Engineering - Parsippany NJ (HQ) - Parsippany, NJ

PROJECT INFORMATION:

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Teterboro, NJ

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GENERAL NOTES

SHEET NUMBER:

1.0

STRUCTURAL DESIGN LOADING CRITERIA

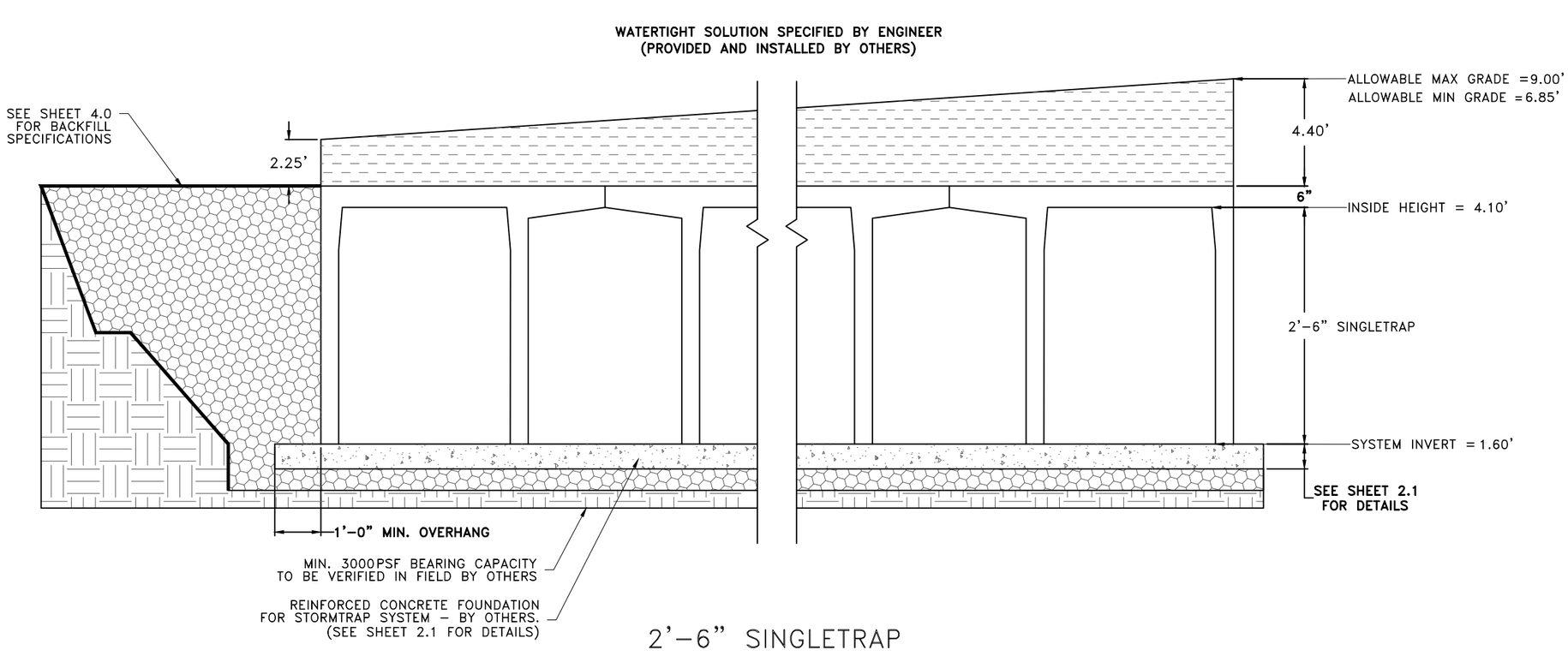
LIVE LOADING:	FIRE TRUCK OUTRIGGER LOADING 75 PSI ON A 2'x2' PAD
GROUND WATER TABLE:	ABOVE INVERT OF SYSTEM
SOIL BEARING PRESSURE:	3000 PSF
SOIL DENSITY:	120 PCF
EQUIVALENT UNSATURATED LATERAL ACTIVE EARTH PRESSURE:	35 PSF / FT.
EQUIVALENT SATURATED LATERAL ACTIVE EARTH PRESSURE:	80 PSF/FT. (IF WATER TABLE PRESENT)
APPLICABLE CODES:	ASTM C857 ACI-318
BACKFILL TYPE:	SEE SHEET 4.0 FOR BACKFILL OPTIONS

STORMTRAP SYSTEM INFORMATION

UNIT HEADROOM:	2'-6" SINGLETRAP
TOTAL STORAGE PROV:	74188.19 CUBIC FEET

SITE SPECIFIC DESIGN CRITERIA

1. STORMTRAP UNITS SHALL BE MANUFACTURED AND INSTALLED ACCORDING TO SHOP DRAWINGS APPROVED BY THE INSTALLING CONTRACTOR AND ENGINEER OF RECORD. THE SHOP DRAWINGS SHALL INDICATE SIZE AND LOCATION OF ROOF OPENINGS AND INLET/ OUTLET PIPE TYPES, SIZES, INVERT ELEVATIONS AND SIZE OF OPENINGS.
2. COVER RANGE: MIN. 2.25' MAX. 4.40' CONSULT STORMTRAP FOR ADDITIONAL COVER OPTIONS.
3. ALL DIMENSIONS AND SOIL CONDITIONS, INCLUDING BUT NOT LIMITED TO GROUNDWATER AND SOIL BEARING CAPACITY ARE REQUIRED TO BE VERIFIED IN THE FIELD BY OTHERS PRIOR TO STORMTRAP INSTALLATION.
4. FOR STRUCTURAL CALCULATIONS THE GROUND WATER TABLE IS ASSUMED TO BE ABOVE INVERT OF SYSTEM IF WATER TABLE IS DIFFERENT THAN ASSUMED, CONTACT STORMTRAP.
5. SYSTEM DESIGN INTENT IS TO CONTAIN WATER AND / OR PREVENT GROUNDWATER MIGRATION INTO THE SYSTEM AND WILL NOT BE SUBJECT TO LEAKAGE TESTING. A THIRD PARTY WATER PROOFING SOLUTION IS REQUIRED FOR SEALING OF SYSTEM / MODULE JOINTS AND SEAMS. SOLUTION TO BE PROVIDED AND INSTALLED BY CONTRACTOR IN ACCORDANCE WITH THIRD PARTY WATER-PROOFING SUPPLIER'S PRODUCT SPECIFICATIONS.



2'-6" SINGLETRAP

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SHEET TITLE:

SINGLETRAP DESIGN CRITERIA

SHEET NUMBER:

1.1

BILL OF MATERIALS

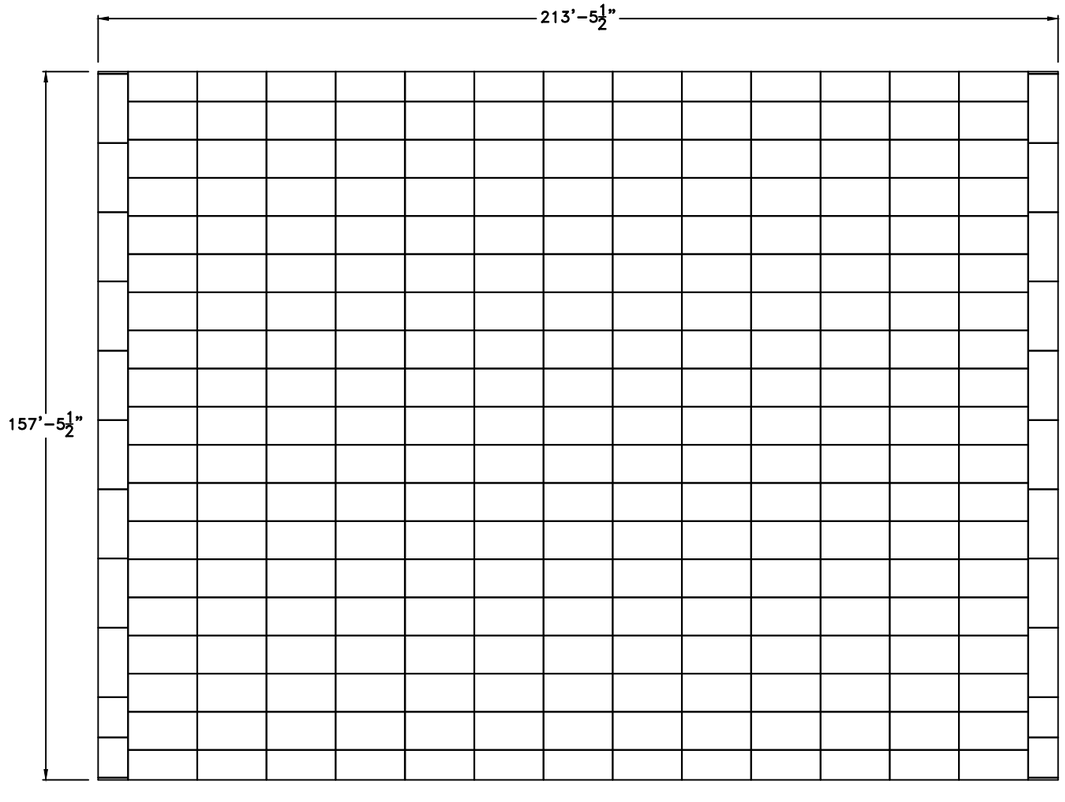
QTY.	UNIT TYPE	DESCRIPTION	WEIGHT
0	I	2'-6" SINGLETRAP	0
221	II	2'-6" SINGLETRAP	14606
0	III	2'-6" SINGLETRAP	0
44	IV	2'-6" SINGLETRAP	12569
0	VII	2'-6" SINGLETRAP	0
0	VII-1	2'-6" SINGLETRAP	0
0	VII-2	2'-6" SINGLETRAP	0
0	VII-3	2'-6" SINGLETRAP	0
0	VII-4	2'-6" SINGLETRAP	0
0	SPIII	2'-6" SINGLETRAP	VARIES
4	SPIV	2'-6" SINGLETRAP	VARIES
0	T2 PANEL	6" THICK PANEL	0
4	T4 PANEL	6" THICK PANEL	1491
0	T7 PANEL	6" THICK PANEL	0
48	JOINTWRAP	150' PER ROLL	
56	JOINTTAPE	14.5' PER ROLL	
TOTAL PIECES = 269			
TOTAL PANELS = 4			
HEAVIEST PICK WEIGHT = 14606			

DESIGN CRITERIA

ALLOWABLE MAX GRADE = 9.00'
ALLOWABLE MIN GRADE = 6.85'
INSIDE HEIGHT ELEVATION = 4.10'
SYSTEM INVERT = 1.60'

NOTES:

1. DIMENSIONING OF STORMTRAP SYSTEM SHOWN BELOW ALLOW FOR A 3/4" GAP BETWEEN EACH MODULE.
2. ALL DIMENSIONS TO BE VERIFIED IN THE FIELD BY OTHERS.
3. SEE SHEET 3.0 FOR INSTALLATION SPECIFICATIONS.
4. SP – INDICATES A MODULE WITH MODIFICATIONS.
5. P – INDICATES A MODULE WITH A PANEL ATTACHMENT.
6. CONTRACTORS RESPONSIBILITY TO ENSURE CONSISTENCY/ACCURACY TO FINAL ENGINEER OF RECORD PLAN SET.
7. IN ORDER FOR STORMTRAP TO GENERATE APPROVAL DRAWINGS, CIVIL ENGINEERING DRAWINGS MUST BE PROVIDED TO STORMTRAP AND SHALL INCLUDE ALL PIPE SIZES, PIPE MATERIAL, PIPE INVERT ELEVATIONS, ACCESS OPENING SIZE AND SHAPE. IN ADDITION, FINAL GRADING PLANS SHALL ALSO INCLUDE MINIMUM AND MAXIMUM GRADES OVER THE TOP OF THE STORMTRAP SYSTEM.





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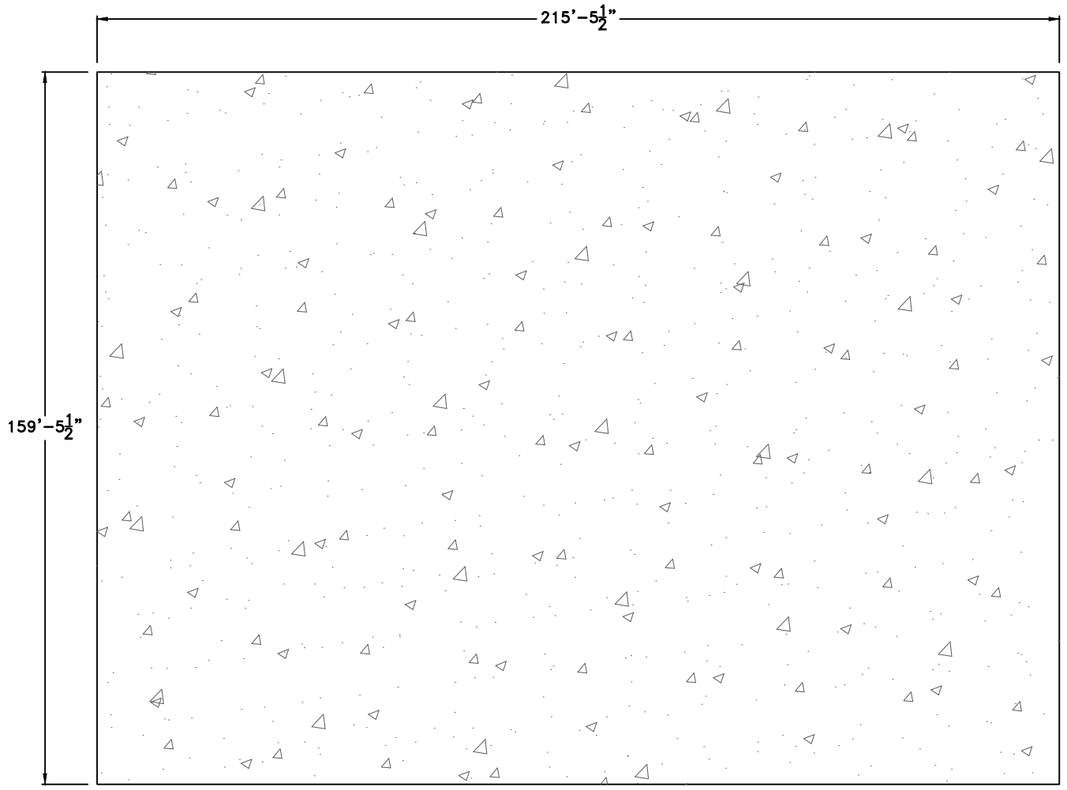
NTS

SHEET TITLE:

SINGLETRAP SYSTEM LAYOUT

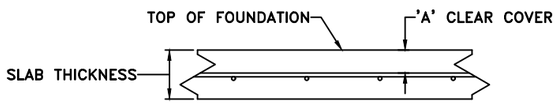
SHEET NUMBER:

2.0



CONCRETE FOUNDATION NOTES:

1. CONCRETE FOUNDATION TO BE SUPPLIED AND INSTALLED BY OTHERS.
2. CONCRETE STRENGTH @ 28 DAYS, 5%-8% ENTRAINED AIR, 3"-5" MAX SLUMP.
3. NET ALLOWABLE SOIL PRESSURE AS INDICATED ON SHEET 1.1.
4. SOIL CONDITIONS TO BE VERIFIED ON SITE BY OTHERS.
5. REBAR: ASTM A615 GRADE 60, BLACK BAR.
6. DIMENSION OF FOUNDATION MUST HAVE 1'-0" OVERHANG BEYOND EXTERNAL FACE OF MODULE.
7. DIMENSION OF STORMTRAP SYSTEM ALLOW FOR A 3/4" GAP BETWEEN EACH MODULE.
8. ALL DIMENSIONS TO BE VERIFIED IN THE FIELD BY OTHERS.
9. SEE SHEET 3.0 FOR INSTALLATION SPECIFICATIONS.



STORMTRAP FOUNDATION DETAIL

FIRETRUCK OUTRIGGER LOADING – (ACI 318, ST2) 75 PSI ON 24"x24" PAD				
MAXIMUM SYSTEM COVER	SLAB THICKNESS	CONCRETE STRENGTH	REINFORCEMENT (BOTH DIRECTIONS)	'A' CLEAR COVER
1'-6" – 2'-0"	8"	4000 PSI	#4 @ 12" O.C.	3.5"
2'-1" – 3'-0"	8"	4000 PSI	#4 @ 12" O.C.	3.5"
3'-1" – 4'-0"	8"	4000 PSI	#5 @ 18" O.C.	3.375"
4'-1" – 5'-0"	8"	4000 PSI	#5 @ 18" O.C.	3.375"
5'-1" – 6'-0"	8"	4000 PSI	#5 @ 16" O.C.	3.375"
6'-1" – 7'-0"	8"	4000 PSI	#5 @ 12" O.C.	3.375"
7'-1" – 8'-0"	9"	4000 PSI	#5 @ 12" O.C.	3.875"
8'-1" – 9'-0"	9"	4000 PSI	#5 @ 12" O.C.	3.875"
9'-1" – 10'-0"	9"	4000 PSI	#5 @ 12" O.C.	3.875"

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SHEET TITLE:

SINGLETRAP FOUNDATION LAYOUT

SHEET NUMBER:

2.1

STORMTRAP INSTALLATION SPECIFICATION

1. STORMTRAP SHALL BE INSTALLED IN ACCORDANCE WITH ASTM C891 (STANDARD PRACTICE FOR INSTALLATION OF UNDERGROUND PRECAST CONCRETE UTILITY STRUCTURES). THE FOLLOWING ADDITIONS AND/OR EXCEPTIONS ARE PROVIDED FOR EMPHASIS. THE MENTION OF THESE ITEMS DOES NOT PRECLUDE THE INSTALLING CONTRACTOR FROM FOLLOWING ASTM C891 IN ITS ENTIRETY AND IMPLEMENTING ALL APPROPRIATE MEASURES. THE INSTALLING CONTRACTOR OWNS AND IS RESPONSIBLE FOR THE STORMTRAP SYSTEM UPON REMOVAL OF THE MODULES FROM THE DELIVERY TRUCK THROUGH 'FINAL CONSTRUCTION'. FINAL CONSTRUCTION IS ACHIEVED WHEN ALL MODULES ARE SET, FULLY BACKFILLED, AND WHEN FINAL FINISHED GRADES ARE REACHED. THE CONTRACTOR IS RESPONSIBLE FOR ANY COUNTERMEASURES NECESSARY TO RESIST UPLIFT/BUOYANCY BEFORE 'FINAL CONSTRUCTION' IS ACHIEVED.

2. IT IS THE RESPONSIBILITY OF THE INSTALLING CONTRACTOR TO ENSURE THAT PROPER/ADEQUATE EQUIPMENT IS USED TO SET/INSTALL THE MODULES.

3. STORMTRAP MODULES SHALL BE PLACED ON A LEVEL CONCRETE FOUNDATION (SEE SHEET 2.1) WITH A 1'-0" OVERHANG ON ALL SIDES THAT SHALL BE POURED IN PLACE BY INSTALLING CONTRACTOR. A QUALIFIED GEOTECHNICAL ENGINEER WILL BE EMPLOYED, BY OWNER, TO PROVIDE ASSISTANCE IN EVALUATING THE EXISTING SOIL CONDITIONS TO ENSURE THAT THE SOIL BEARING PRESSURE MEETS OR EXCEEDS THE STRUCTURAL DESIGN LOADING CRITERIA AS SPECIFIED ON SHEET 1.1.

4. THE STORMTRAP MODULES SHALL BE PLACED SUCH THAT THE MAXIMUM SPACE BETWEEN ADJACENT MODULES DOES NOT EXCEED ¾" (SEE DETAIL 2). IF THE SPACE EXCEEDS ¾", THE MODULES SHALL BE RESET WITH APPROPRIATE ADJUSTMENT MADE TO LINE AND GRADE TO BRING THE SPACE INTO SPECIFICATION.

5. STORMTRAP MODULES ARE NOT WATERTIGHT. **WATERTIGHT SOLUTION SPECIFIED BY ENGINEER (PROVIDED AND INSTALLED BY OTHERS).**

6. THE PERIMETER HORIZONTAL JOINT BETWEEN THE STORMTRAP MODULES AND THE CONCRETE FOUNDATION SHALL BE SEALED TO THE FOUNDATION WITH PRE-FORMED MASTIC JOINT SEALER ACCORDING TO ASTM C891, 8.8 AND 8.12 (SEE DETAIL 1). THE MASTIC JOINT TAPE DOES NOT PROVIDE A WATERTIGHT SEAL.

7. ALL EXTERIOR ROOF AND EXTERIOR VERTICAL WALL JOINTS BETWEEN ADJACENT STORMTRAP MODULES SHALL BE SEALED WITH 8" WIDE PRE-FORMED, COLD-APPLIED, SELF-ADHERING ELASTOMERIC RESIN, BONDED TO A WOVEN , HIGHLY PUNCTURE RESISTANT POLYMER WRAP, CONFORMING TO ASTM C891 AND SHALL BE INTEGRATED WITH PRIMER SEALANT AS APPROVED BY STORMTRAP (SEE DETAILS 2, 3, & 4). THE JOINT WRAP DOES NOT PROVIDE A WATERTIGHT SEAL. THE SOLE PURPOSE OF THE JOINT WRAP IS TO PROVIDE A SILT AND SOIL TIGHT SYSTEM. THE ADHESIVE EXTERIOR JOINT WRAP SHALL BE INSTALLED ACCORDING TO THE FOLLOWING INSTALLATION INSTRUCTIONS:

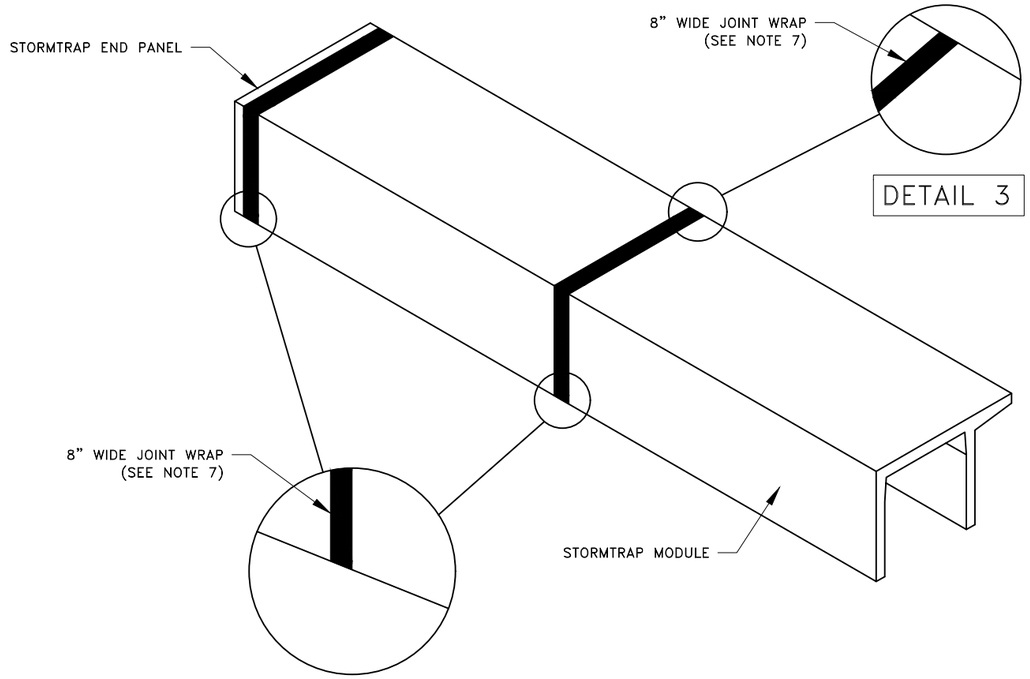
   7.1. USE A BRUSH OR WET CLOTH TO THOROUGHLY CLEAN THE OUTSIDE SURFACE AT THE POINT WHERE JOINT WRAP IS TO BE APPLIED.

   7.2. A RELEASE PAPER PROTECTS THE ADHESIVE SIDE OF THE JOINT WRAP. PLACE THE ADHESIVE TAPE (ADHESIVE SIDE DOWN) AROUND THE STRUCTURE, REMOVING THE RELEASE PAPER AS YOU GO. PRESS THE JOINT WRAP FIRMLY AGAINST THE STORMTRAP MODULE SURFACE WHEN APPLYING.

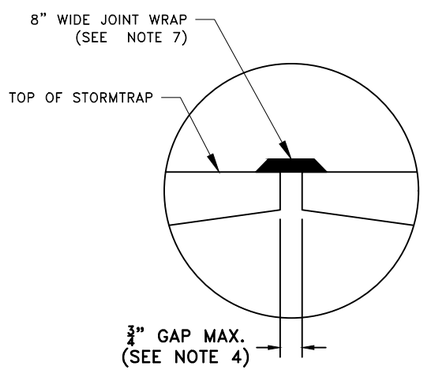
8. IF THE CONTRACTOR NEEDS TO CANCEL ANY SHIPMENTS, THEY MUST DO SO 48 HOURS PRIOR TO THEIR SCHEDULED ARRIVAL AT THE JOB SITE. IF CANCELED AFTER THAT TIME, PLEASE CONTACT THE PROJECT MANAGER.

9. IF THE STORMTRAP MODULE(S) IS DAMAGED IN ANY WAY PRIOR, DURING, OR AFTER INSTALL, STORMTRAP MUST BE CONTACTED IMMEDIATELY TO ASSESS THE DAMAGE AND DETERMINE WHETHER OR NOT THE MODULE(S) WILL NEED TO BE REPLACED. IF ANY MODULE ARRIVES AT THE JOBSITE DAMAGED DO NOT UNLOAD IT; CONTACT STORMTRAP IMMEDIATELY. ANY DAMAGE NOT REPORTED BEFORE THE TRUCK IS UNLOADED WILL BE THE CONTRACTOR'S RESPONSIBILITY.

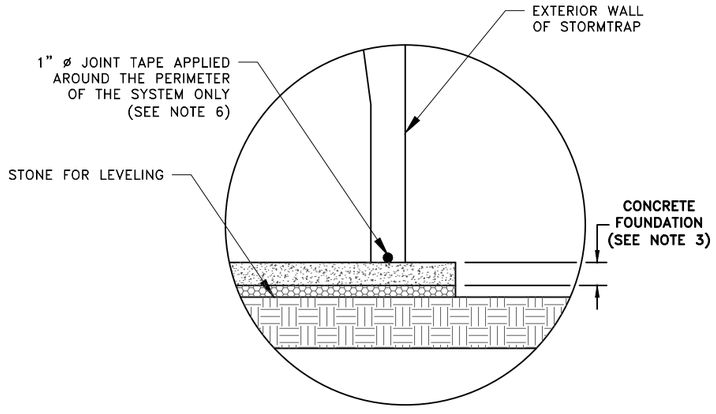
10. STORMTRAP MODULES CANNOT BE ALTERED IN ANY WAY AFTER MANUFACTURING WITHOUT WRITTEN CONSENT FROM STORMTRAP.



DETAIL 4



DETAIL 2



DETAIL 1

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ENGINEER INFORMATION:

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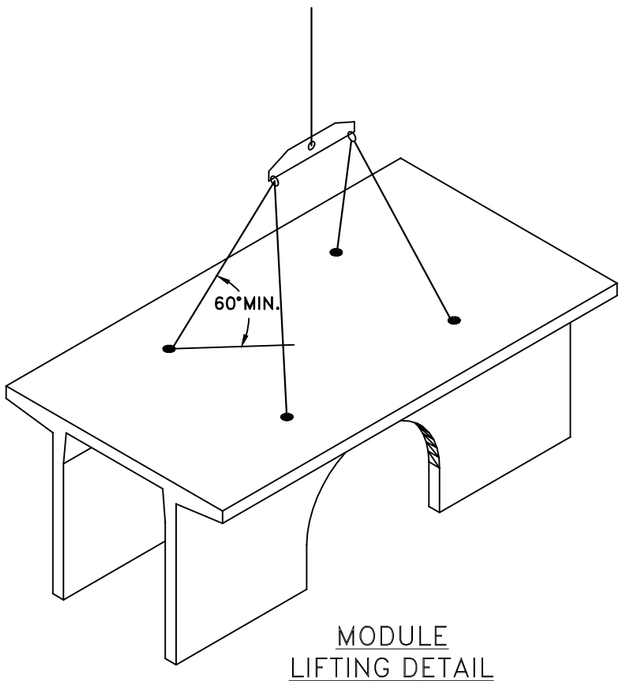
SINGLETRAP INSTALLATION SPECIFICATION

SHEET NUMBER:

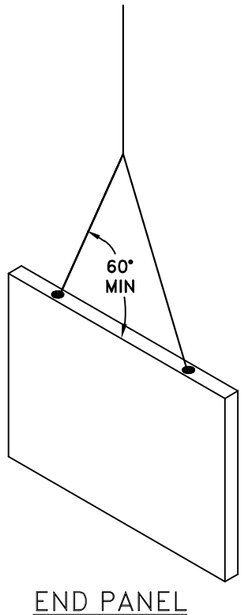
3.0

STORMTRAP MODULE LIFTING SPECIFICATION

1. IT IS THE CONTRACTOR'S RESPONSIBILITY TO ENSURE THAT ALL (4) CHAINS/CABLES ARE SECURED PROPERLY TO THE LIFTING ANCHORS AND IN EQUAL TENSION WHEN LIFTING THE STORMTRAP MODULE.
2. MINIMUM 7'-0" CHAIN/CABLE LENGTH TO BE USED TO LIFT STORMTRAP MODULES (SUPPLIED BY CONTRACTOR).
3. CONTRACTOR TO ENSURE MINIMUM LIFTING ANGLE IS 60° FROM TOP SURFACE OF STORMTRAP MODULE. SEE DETAIL.
4. IT IS UNDERSTOOD AND AGREED THAT AT ALL TIMES DURING WHICH HOISTING AND RIGGING EQUIPMENT IS BEING SUPPLIED TO THE PURCHASER, OPERATOR OF SUCH EQUIPMENT SHALL BE IN CHARGE OF HIS ENTIRE EQUIPMENT AND SHALL AT ALL TIMES BE THE JUDGE OF THE SAFETY AND PROPERTY OF ANY SUGGESTION TO HIM FROM THE SELLER, ITS AGENTS OR EMPLOYEES. PURCHASER AGREES TO SAVE, INDEMNIFY AND HOLD HARMLESS SELLER FROM ALL LOSS, CLAIMS, DEMANDS OR CAUSES OF ACTION, WHICH MAY ARISE FROM THE EXISTENCE OR OPERATION OF SAID EQUIPMENT.



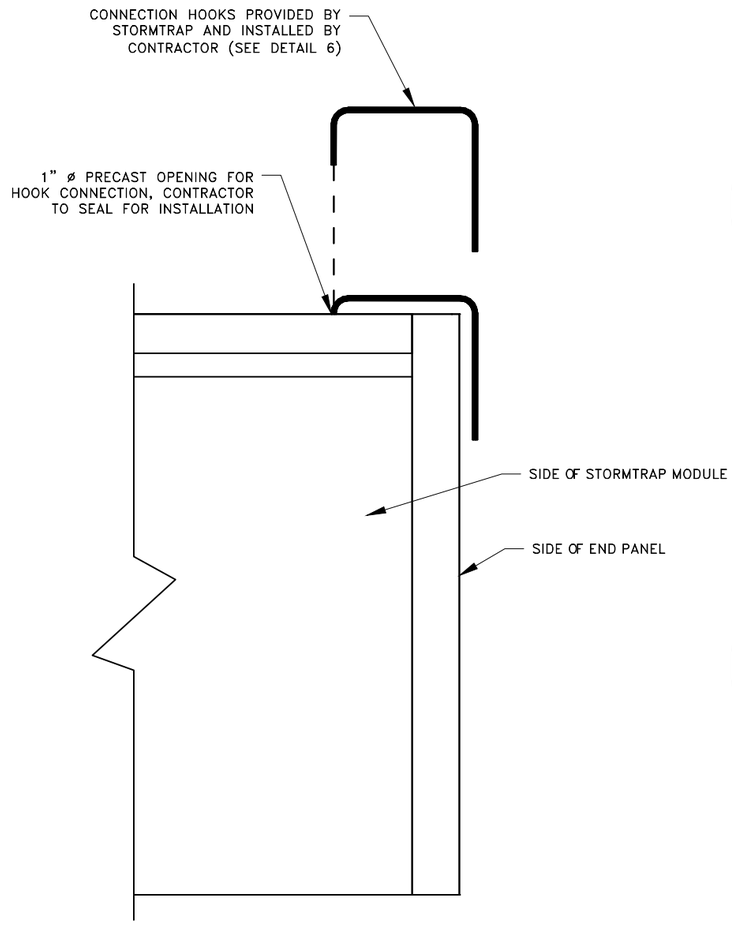
MODULE
LIFTING DETAIL



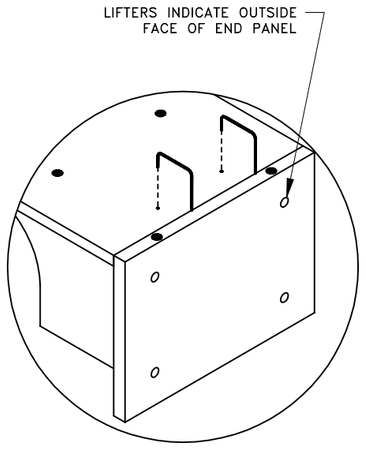
END PANEL
LIFTING DETAIL

END PANEL ERECTION/INSTALLATION SPECIFICATION

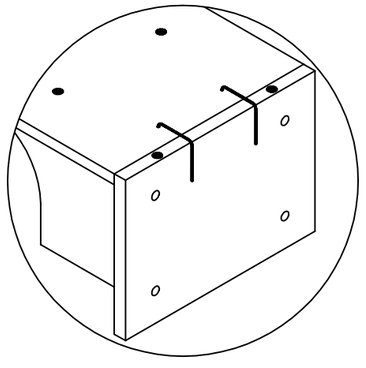
1. END PANELS WILL BE SUPPLIED TO CLOSE OFF OPEN ENDS OF ROWS.
2. PANELS SHALL BE INSTALLED IN A TILT UP FASHION DIRECTLY ADJACENT TO OPEN END OF MODULE (REFER TO SHEET 2.0 FOR END PANEL LOCATIONS). SIDE WITH LIFTERS INDICATES OUTSIDE FACE.
3. CONNECTION HOOKS WILL BE SUPPLIED WITH END PANELS TO SECURELY CONNECT PANEL TO ADJACENT STORMTRAP MODULE (SEE PANEL CONNECTION ELEVATION VIEW).
4. ONCE CONNECTION HOOK IS ATTACHED, LIFTING CLUTCHES MAY BE REMOVED.
5. JOINT WRAP SHALL BE PLACED AROUND PERIMETER JOINT PANEL (SEE SHEET 3.0).



PANEL CONNECTION
ELEVATION VIEW



STEP 1



STEP 2

DETAIL 6

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SINGLETRAP INSTALLATION SPECIFICATION

SHEET NUMBER:

3.1

ZONE CHART

ZONES	ZONE DESCRIPTIONS	REMARKS
ZONE 1	FOUNDATION AGGREGATE	#5 (¾") STONE ANGULAR AGGREGATE (SEE NOTE 4)
ZONE 2	BACKFILL	UNIFIED SOILS CLASSIFICATION (GW, GP, SW, SP) OR SEE BELOW FOR APPROVED BACKFILL OPTIONS
ZONE 3	FINAL COVER OVERTOP	MATERIALS NOT TO EXCEED 120 PCF

APPROVED ZONE 2 BACKFILL OPTIONS

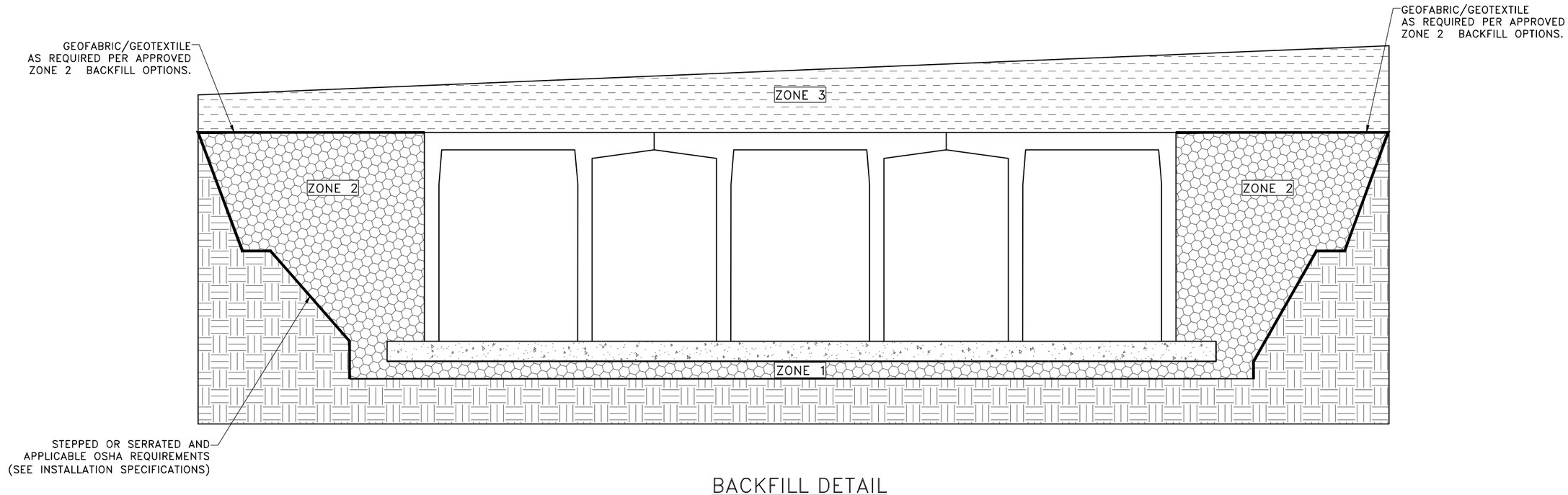
OPTION	REMARKS
¾" STONE AGGREGATE	THE STONE AGGREGATE SHALL CONSIST OF CLEAN AND FREE DRAINING ANGULAR MATERIAL. THE SIZE OF THIS MATERIAL SHALL HAVE 100% PASSING THE 1" SIEVE WITH 0% TO 5% PASSING THE #8 SIEVE. THIS MATERIAL SHALL BE SEPARATED FROM NATIVE MATERIAL USING GEOFABRIC AROUND THE PERIMETER OF THE BACKFILL (ASTM SIZE #57) AS DETERMINED BY THE GEOTECHNICAL ENGINEER.
SAND	IMPORTED PURE SAND IS PERMITTED TO BE USED AS BACKFILL IF IT IS CLEAN AND FREE DRAINING. THE SAND USED FOR BACKFILLING SHALL HAVE LESS THAN 40% PASSING #40 SIEVE AND LESS THAN 5% PASSING #200 SIEVE. THIS MATERIAL SHALL BE SEPARATED FROM NATIVE MATERIAL USING GEOFABRIC AROUND THE PERIMETER OF THE SAND BACKFILL.
CRUSHED CONCRETE AGGREGATE	CLEAN, FREE DRAINING CRUSHED CONCRETE AGGREGATE MATERIAL CAN BE USED AS BACKFILL FOR STORMTRAP'S MODULES. THE SIZE OF THIS MATERIAL SHALL HAVE 100% PASSING THE 1" SIEVE WITH 0% TO 5% PASSING THE #8 SIEVE. THIS MATERIAL SHALL BE SEPARATED FROM NATIVE MATERIAL USING GEOFABRIC AROUND THE PERIMETER OF THE BACKFILL.
ROAD PACK	STONE AGGREGATE 100% PASSING THE 1-1/2" SIEVE WITH LESS THAN 12% PASSING THE #200 SIEVE (ASTM SIZE #467). GEOFABRIC AS PER GEOTECHNICAL ENGINEER RECOMMENDATION.

FILL DEPTH	TRACK WIDTH	MAX VEHICLE WEIGHT (KIPS)	MAX GROUND PRESSURE
12"	12"	51.8	1690 psf
	18"	56.1	1219 psf
	24"	68.1	1111 psf
	30"	76.7	1000 psf
	36"	85.0	924 psf

NOTE:
TRACK LENGTH NOT TO EXCEED 15'-4".
ONLY TWO TRACKS PER VEHICLE.

STORMTRAP ZONE INSTALLATION SPECIFICATION/PROCEDURE

1. THE FILL PLACED AROUND THE STORMTRAP MODULES MUST BE DEPOSITED ON BOTH SIDES AT THE SAME TIME AND TO APPROXIMATELY THE SAME ELEVATION. AT NO TIME SHALL THE FILL BEHIND ONE SIDE WALL BE MORE THAN 2'-0" HIGHER THAN THE FILL ON THE OPPOSITE SIDE. BACKFILL SHALL EITHER BE COMPACTED AND/OR VIBRATED TO ENSURE THAT BACKFILL AGGREGATE/STONE MATERIAL IS WELL SEATED AND PROPERLY INTER LOCKED. CARE SHALL BE TAKEN TO PREVENT ANY WEDGING ACTION AGAINST THE STRUCTURE, AND ALL SLOPES WITHIN THE AREA TO BE BACKFILLED MUST BE STEPPED OR SERRATED TO PREVENT WEDGING ACTION. CARE SHALL ALSO BE TAKEN AS NOT TO DISRUPT THE JOINT WRAP FROM THE JOINT DURING THE BACKFILL PROCESS. BACKFILL MUST BE FREE-DRAINING MATERIAL. SEE ZONE 2 BACKFILL CHART ON THIS PAGE FOR APPROVED BACKFILL OPTIONS. IF NATIVE EARTH IS SUSCEPTIBLE TO MIGRATION, CONFIRM WITH GEOTECHNICAL ENGINEER AND PROVIDE PROTECTION AS REQUIRED (PROVIDED BY OTHERS). ALL MODULES MUST BE SET AND ALL SIDES MUST BE FULLY BACKFILLED BEFORE TRAVEL OVERTOP THE SYSTEM IS PERMITTED. SEE NOTE 2 FOR EXCEPTIONS AND LIMITATIONS.
2. THE FILL PLACED OVERTOP THE SYSTEM SHALL BE PLACED IN MINIMUM 6" LIFTS. AT NO TIME SHALL MACHINERY OR VEHICLES GREATER THAN THE DESIGN LIVE LOAD LISTED ON SHEET 1.1 TRAVEL OVERTOP THE SYSTEM. IF TRAVEL OVER THE SYSTEM OCCURS BEFORE THE MINIMUM DESIGN COVER IS ACHIEVED, IT MAY BE NECESSARY TO REDUCE THE ULTIMATE LOAD/BURDEN OF THE OPERATING MACHINERY SO AS TO NOT EXCEED THE DESIGN CAPACITY OF THE SYSTEM. VEHICLES AND MACHINERY USED TO PLACE FILL MATERIAL ON TOP OF THE SYSTEM SHALL TRAVEL PARALLEL TO THE LONGITUDINAL AXIS OF THE STORMTRAP MODULES WHENEVER POSSIBLE.
3. THE VIBRATORY FUNCTION OF ANY ROLLER, COMPACTOR, VEHICLE, ETC. SHALL NOT BE USED OVERTOP THE SYSTEM WITHOUT PRIOR APPROVAL FROM STORMTRAP. IN SOME CASES, HAND COMPACTION MAY BE NECESSARY TO ENSURE THAT THE ALLOWABLE DESIGN LOADING IS NOT EXCEEDED.
4. STONE AGGREGATE FOUNDATION IN ZONE 1 IS FOR LEVELING PURPOSES.



BACKFILL DETAIL

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SINGLETRAP BACKFILL SPECIFICATION

SHEET NUMBER:

4.0

ACCESS OPENING SPECIFICATION

1. A TYPICAL ACCESS OPENING FOR THE STORMTRAP SYSTEM ARE 2'–0" IN DIAMETER. ACCESS OPENINGS LARGER THAN 4'–0" IN DIAMETER NEED TO BE APPROVED BY STORMTRAP. ALL OPENINGS MUST RETAIN AT LEAST 2'–0" OF CLEARANCE FROM THE END OF THE STORMTRAP MODULE UNLESS NOTED OTHERWISE. ALL ACCESS OPENINGS TO BE LOCATED ON INSIDE LEG UNLESS OTHERWISE SPECIFIED. SEE SHEET 2.0 FOR SIZES AND LOCATIONS.

2. UNLESS OTHERWISE SPECIFIED, PLASTIC COATED STEPS ARE PROVIDED INSIDE ANY MODULE WHERE DEEMED NECESSARY. THE HIGHEST STEP IN THE MODULE IS TO BE PLACED A DISTANCE OF 1'–0" FROM THE INSIDE EDGE OF THE STORMTRAP MODULES. ALL ENSUING STEPS SHALL BE PLACED AT A DISTANCE BETWEEN 10" MIN AND 14" MAX BETWEEN THEM. STEPS MAY BE MOVED OR ALTERED TO AVOID OPENINGS OR OTHER IRREGULARITIES IN THE MODULE.

3. STORMTRAP LIFTING INSERTS MAY BE RELOCATED TO AVOID INTERFERENCE WITH ACCESS OPENINGS OR THE CENTER OF GRAVITY OF THE MODULE AS NEEDED.

4. STORMTRAP ACCESS OPENINGS MAY BE RELOCATED TO AVOID INTERFERENCE WITH INLET AND/OR OUTLET PIPE OPENINGS SO PLACEMENT OF STEPS IS ATTAINABLE.

5. ACCESS OPENINGS SHOULD BE LOCATED IN ORDER TO MEET THE APPROPRIATE MUNICIPAL REQUIREMENTS. STORMTRAP RECOMMENDS AT LEAST TWO ACCESS OPENINGS PER SYSTEM FOR ACCESS AND INSPECTION.

6. USE PRECAST ADJUSTING RINGS AS NEEDED TO MEET GRADE. STORMTRAP RECOMMENDS FOR COVER OVER 2' TO USE PRECAST BARREL OR CONE SECTIONS. (PROVIDED BY OTHERS)

PIPE OPENING SPECIFICATION

1. MINIMUM EDGE DISTANCE FOR AN OPENING ON THE OUTSIDE WALL SHALL BE NO LESS THAN 1'–0".

2. CONNECTING PIPES MAY BE INSTALLED WITH A 1'–0" CONCRETE COLLAR AND AN AGGREGATE CRADLE (AS REQUIRED) FOR AT LEAST ONE PIPE LENGTH (SEE PIPE CONNECTION DETAIL). A STRUCTURAL GRADE CONCRETE OR HIGH STRENGTH, NON–SHRINK GROUT WITH A MINIMUM 28 DAY COMPRESSIVE STRENGTH OF 3000 PSI MAY BE USED.

3. THE ANNULAR SPACE BETWEEN THE PIPE AND THE HOLE SHALL BE FILLED WITH HIGH STRENGTH NON–SHRINK GROUT.

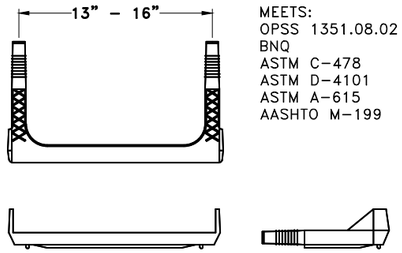
PIPE INSTALLATION INSTRUCTIONS

1. CLEAN AND LIGHTLY LUBRICATE ALL OF THE PIPE TO BE INSERTED INTO STORMTRAP.

2. IF PIPE IS CUT, CARE SHOULD BE TAKEN TO ALLOW NO SHARP EDGES. BEVEL AND LUBRICATE LEAD END OF PIPE.

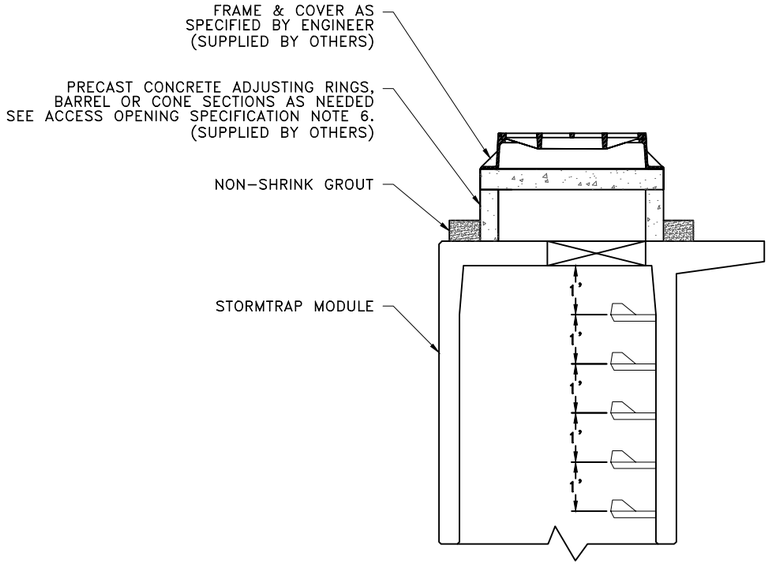
3. ALIGN CENTER OF PIPE TO CORRECT ELEVATION AND INSERT INTO OPENING.

NOTE: ALL ANCILLARY PRODUCTS/SPECIFICATIONS RECOMMENDED AND SHOWN ON THIS SHEET INCLUDING BUT NOT LIMITED TO CONCRETE COLLARS, AGGREGATE CRADLES, GRADE RINGS, RISER SECTIONS, ETC., ARE RECOMMENDATIONS ONLY AND SUBJECT TO CHANGE PER THE INSTALLING CONTRACTOR AND/OR PER LOCAL MUNICIPAL CODE/REQUIREMENTS.

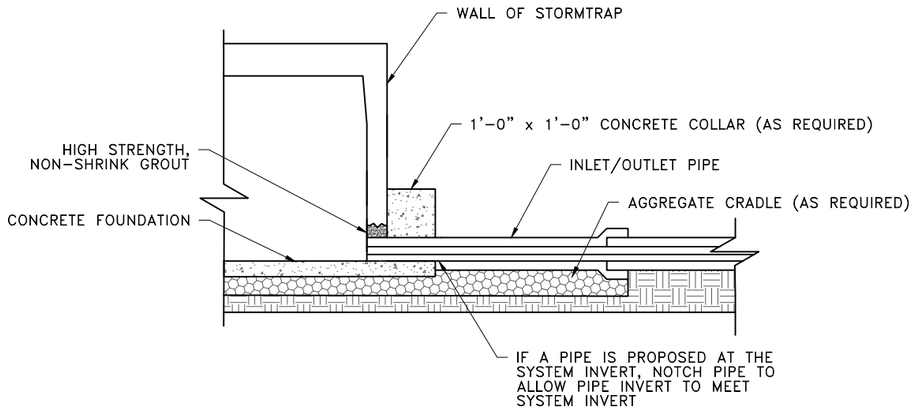


MEETS:
OPSS 1351.08.02
BNQ
ASTM C–478
ASTM D–4101
ASTM A–615
AASHTO M–199

STEP DETAIL



RISER/STAIR DETAIL



NOTCHED PIPE CONNECTION DETAIL
WHEN PIPE INVERT IS AT
INVERT OF STORMTRAP SYSTEM

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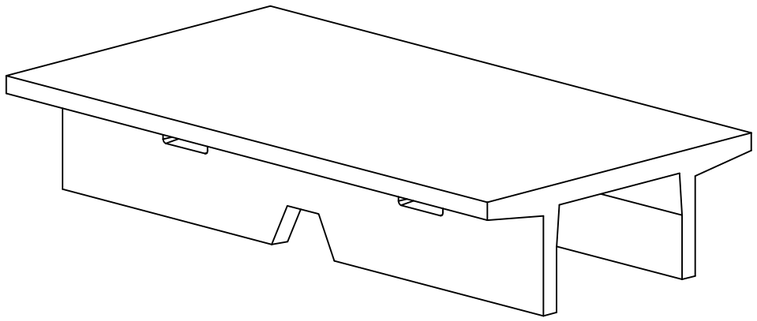
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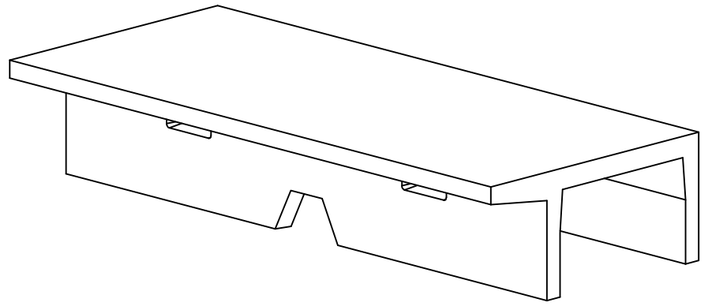
PIPE / ACCESS OPENING SPECIFICATION

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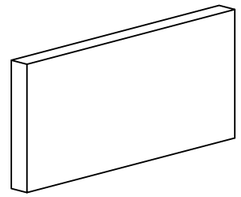
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TYPE II



TYPE IV



TYPE IV END PANEL

NOTES:
1. OPENING LOCATIONS AND SHAPES MAY VARY.
2. SP – INDICATES A MODULE WITH MODIFICATIONS.
3. P – INDICATES A MODULE WITH A PANEL ATTACHMENT.
4. POCKET WINDOW OPENINGS ARE OPTIONAL.

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SINGLETRAP
MODULE TYPES

SHEET NUMBER:

6.0

StormTrap A7
(Car Parking Area)

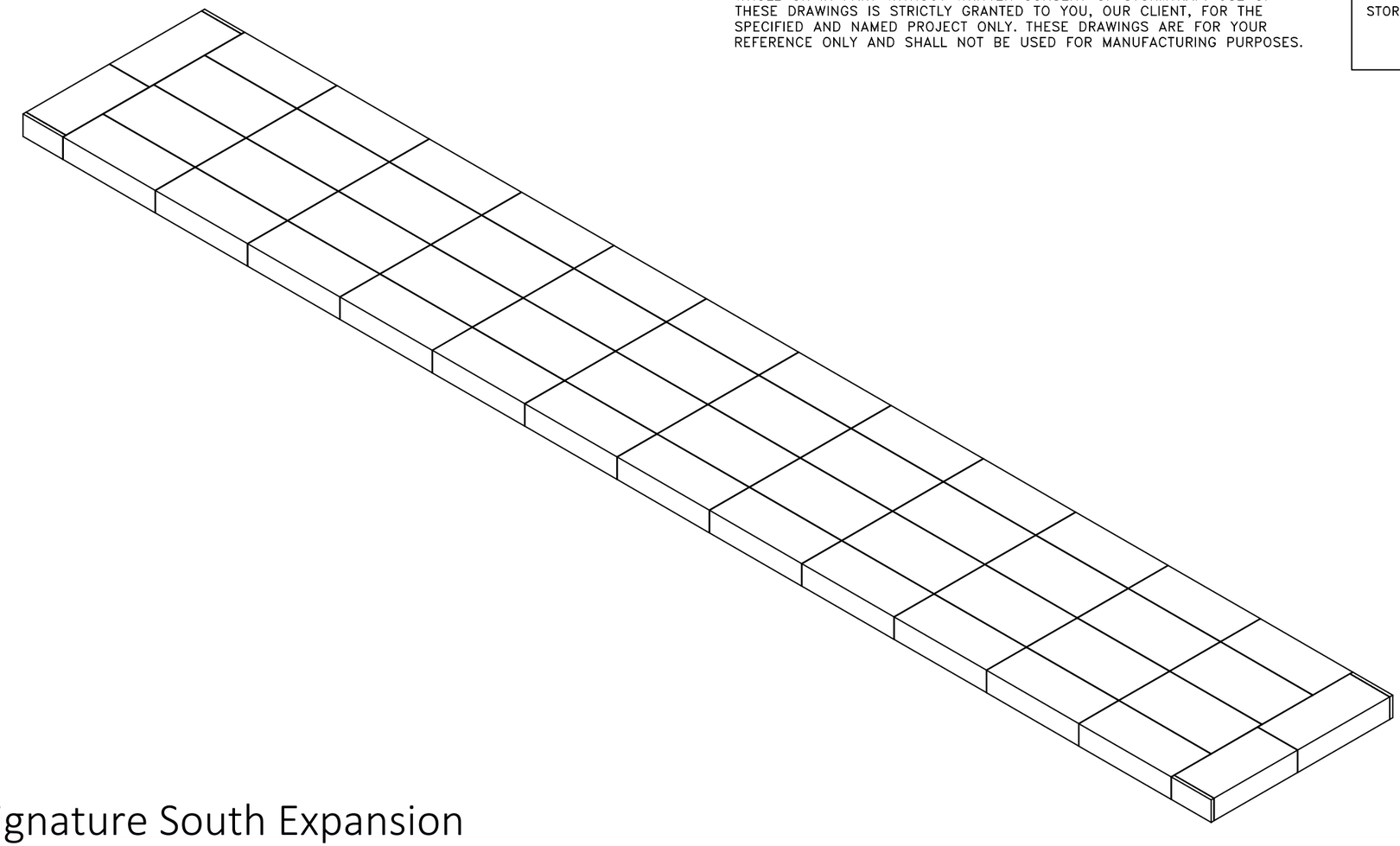
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MODULAR CONCRETE
STORMWATER MANAGEMENT

SHEET INDEX	
PAGE	DESCRIPTION
0.0	COVER SHEET
1.0	GENERAL NOTES
1.1	SINGLETRAP DESIGN CRITERIA
2.0	SINGLETRAP SYSTEM LAYOUT
2.1	SINGLETRAP FOUNDATION LAYOUT
3.0	SINGLETRAP INSTALLATION SPECIFICATION
3.1	SINGLETRAP INSTALLATION SPECIFICATION
4.0	SINGLETRAP BACKFILL SPECIFICATION
5.0	PIPE/ACCESS OPENING SPECIFICATION
6.0	SINGLETRAP MODULE TYPES

THE STORMTRAP DRAWINGS SHALL NOT BE ALTERED OR MANIPULATED IN WHOLE OR IN PART WITHOUT WRITTEN CONSENT OF STORMTRAP. USE OF THESE DRAWINGS IS STRICTLY GRANTED TO YOU, OUR CLIENT, FOR THE SPECIFIED AND NAMED PROJECT ONLY. THESE DRAWINGS ARE FOR YOUR REFERENCE ONLY AND SHALL NOT BE USED FOR MANUFACTURING PURPOSES.

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CONTACT NAME:	Kent Porter
CELL PHONE:	(973) 557-6280
SALES EMAIL:	kporter@stormtrap.com



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Teterboro, NJ

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P:815-941-4549 / F:331-318-5347

ENGINEER INFORMATION:

Langan Engineering – Parsippany NJ (HQ) – Parsippany, NJ

PROJECT INFORMATION:

Signature South Expansion

Teterboro, NJ

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SHEET NUMBER:

0.0

GENERAL NOTES:

1. STRUCTURE PROXIMITY LOADING DISCLAIMER:

   STORMTRAP MODULES AND FOUNDATION ARE NOT DESIGNED TO ACCEPT ANY ADDITIONAL LOADING FROM ANY NEARBY STRUCTURES NEXT TO OR OVER THE TOP OF STORMTRAP. EXAMPLES OF NEARBY STRUCTURES MAY INCLUDE BUT ARE NOT LIMITED TO BUILDINGS, FOUNDATION ELEMENTS, RETAINING WALLS, LIGHT POLES, BOLLARDS, SIGNPOSTS, FENCES. ADDITIONALLY, STORMTRAP IS NOT RESPONSIBLE FOR INSTALLATION CONFLICTS ARISING FROM ANY OF THESE NEARBY STRUCTURES. IF ADDITIONAL LOADING CONSIDERATIONS ARE REQUIRED FOR STRUCTURAL DESIGN OF STORMTRAP, PLEASE CONTACT STORMTRAP IMMEDIATELY. FOR LIGHT POLES SHOWN OVER THE TOP OF THE SYSTEM, STORMTRAP WILL PROVIDE A 5'-0" LATERAL DISTANCE CAVITY AROUND THE LIGHT POLE TO ACCOMMODATE IT. THE EOR TO TAKE RESPONSIBILITY FOR ENSURING THE LIGHT POLE IS NOT INFLICTING ANY LOADING ON THE STORMTRAP MODULES AND FOUNDATION.

2. TREE LOADING DISCLAIMER:

   THE NUMBER OF TREES OR WEIGHT OF TOTAL PLANT MATERIAL PRESENT ON TOP OF A SINGLE STORMTRAP MODULE SHALL NOT EXCEED 16,000 LBS. THE REQUIREMENTS LISTED HERE APPLY AT BOTH THE TIME OF INSTALLATION AND FOR THE LIFE OF THE TREES AND PLANTS IN QUESTION. THE EOR AND LANDSCAPE ARCHITECT ARE RESPONSIBLE FOR ENSURING THAT TREE AND OTHER PLANT ROOTS DO NOT INTERFERE WITH OR COMPROMISE THE FUNCTIONAL AND STRUCTURAL INTEGRITY OF STORMTRAP'S UNDERGROUND MODULES. APPROPRIATE MEASURES SHOULD BE TAKEN TO PREVENT ROOT GROWTH INTO THE STORMTRAP SYSTEM FROM ADJACENT OR OVERHEAD TREES. FURTHERMORE, THE ROOTS OF THE TREES MUST BE CONTAINED TO PREVENT FUTURE DAMAGE TO THE STORMTRAP SYSTEM. STORMTRAP ACCEPTS NO LIABILITY FOR DAMAGES CAUSED BY TREES OR OTHER VEGETATION PLACED AROUND OR ON TOP OF THE SYSTEM.

3. PRE-TREATMENT/SEDIMENT/FILTER CHAMBER DISCLAIMER:

   FOR SYSTEMS CONTAINING PRE-TREATMENT, SEDIMENTATION AND/OR FILTER CHAMBERS; IF REQUIRED TO BE SEALED TO PREVENT SAND AND/OR PRE-TREATED WATER FROM MIGRATING INTO ADJOINING MODULES, IT IS THE SOLE RESPONSIBILITY OF THE INSTALLING CONTRACTOR TO ENSURE THAT THOSE MODULES ARE SEALED.

4. OUTLET CONTROL STRUCTURE DISCLAIMER (IF SHOWN ON THESE PLANS):

   IF A WATERTIGHT SOLUTION IS REQUIRED FOR AN OUTLET CONTROL STRUCTURE, ALL EXTERIOR COLD JOINTS, INCLUDING JOINT BETWEEN TOP AND BASE MODULES, BETWEEN TOP AND BASE OF ADJOINING SYMONS WALLS, AND JOINTS BETWEEN MODULE AND ADJACENT END PANELS WILL BE THE SOLE RESPONSIBILITY OF THE INSTALLING CONTRACTOR TO PROVIDE AND INSTALL THE WATERTIGHT APPLICATION PER THE EOR'S SPECIFICATION.

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GENERAL NOTES

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STRUCTURAL DESIGN LOADING CRITERIA

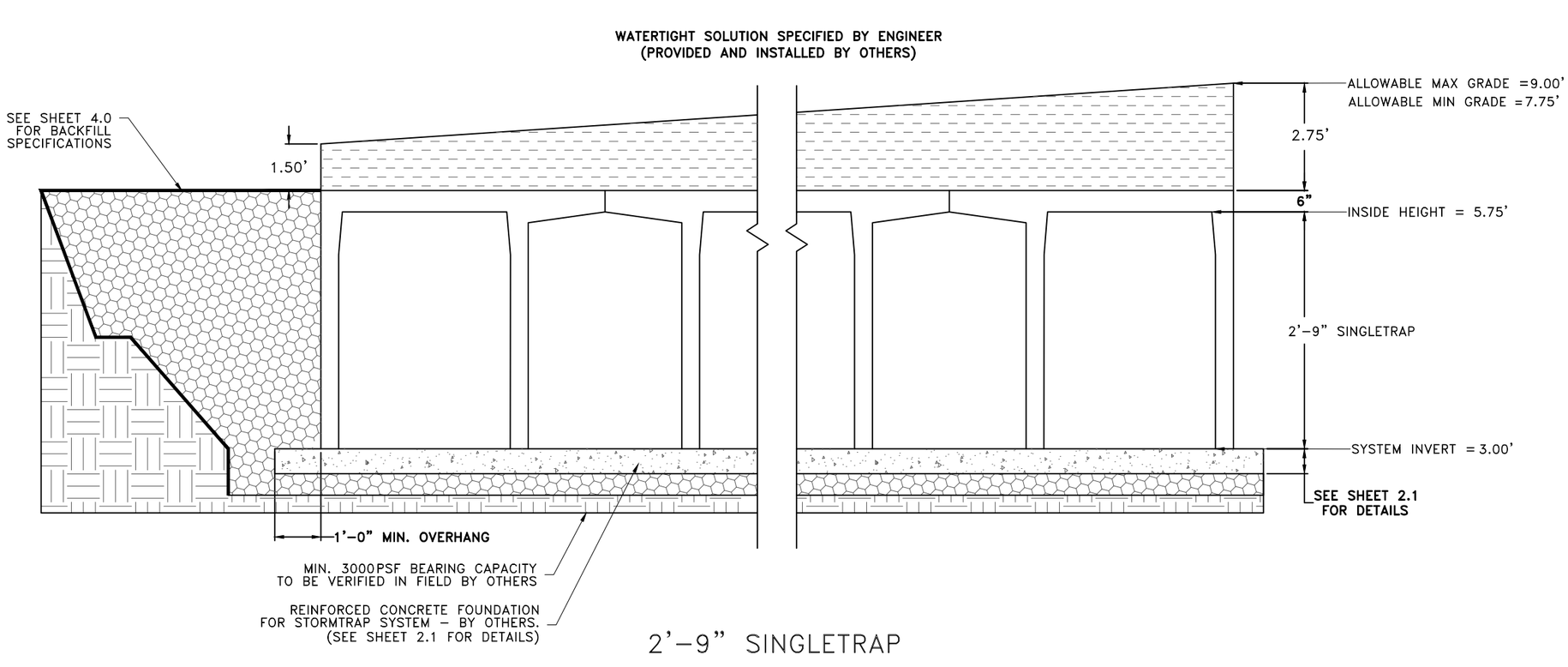
LIVE LOADING:	AASHTO HS-20 HIGHWAY LOADING
GROUND WATER TABLE:	BELOW INVERT OF SYSTEM
SOIL BEARING PRESSURE:	3000 PSF
SOIL DENSITY:	120 PCF
EQUIVALENT UNSATURATED LATERAL ACTIVE EARTH PRESSURE:	35 PSF / FT.
EQUIVALENT SATURATED LATERAL ACTIVE EARTH PRESSURE:	80 PSF/FT. (IF WATER TABLE PRESENT)
APPLICABLE CODES:	ASTM C857 ACI-318
BACKFILL TYPE:	SEE SHEET 4.0 FOR BACKFILL OPTIONS

STORMTRAP SYSTEM INFORMATION

UNIT HEADROOM:	2'-9" SINGLETRAP
TOTAL STORAGE PROV:	14410.25 CUBIC FEET

SITE SPECIFIC DESIGN CRITERIA

1. STORMTRAP UNITS SHALL BE MANUFACTURED AND INSTALLED ACCORDING TO SHOP DRAWINGS APPROVED BY THE INSTALLING CONTRACTOR AND ENGINEER OF RECORD. THE SHOP DRAWINGS SHALL INDICATE SIZE AND LOCATION OF ROOF OPENINGS AND INLET/ OUTLET PIPE TYPES, SIZES, INVERT ELEVATIONS AND SIZE OF OPENINGS.
2. COVER RANGE: MIN. 1.50' MAX. 2.75' CONSULT STORMTRAP FOR ADDITIONAL COVER OPTIONS.
3. ALL DIMENSIONS AND SOIL CONDITIONS, INCLUDING BUT NOT LIMITED TO GROUNDWATER AND SOIL BEARING CAPACITY ARE REQUIRED TO BE VERIFIED IN THE FIELD BY OTHERS PRIOR TO STORMTRAP INSTALLATION.
4. FOR STRUCTURAL CALCULATIONS THE GROUND WATER TABLE IS ASSUMED TO BE BELOW INVERT OF SYSTEM IF WATER TABLE IS DIFFERENT THAN ASSUMED, CONTACT STORMTRAP.
5. SYSTEM DESIGN INTENT IS TO CONTAIN WATER AND / OR PREVENT GROUNDWATER MIGRATION INTO THE SYSTEM AND WILL NOT BE SUBJECT TO LEAKAGE TESTING. A THIRD PARTY WATER PROOFING SOLUTION IS REQUIRED FOR SEALING OF SYSTEM / MODULE JOINTS AND SEAMS. SOLUTION TO BE PROVIDED AND INSTALLED BY CONTRACTOR IN ACCORDANCE WITH THIRD PARTY WATER-PROOFING SUPPLIER'S PRODUCT SPECIFICATIONS.



2'-9" SINGLETRAP

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SINGLETRAP DESIGN CRITERIA

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1.1

BILL OF MATERIALS			
QTY.	UNIT TYPE	DESCRIPTION	WEIGHT
0	I	2'-9" SINGLETRAP	0
24	II	2'-9" SINGLETRAP	15085
0	III	2'-9" SINGLETRAP	0
26	IV	2'-9" SINGLETRAP	13048
0	VII	2'-9" SINGLETRAP	0
0	VII-1	2'-9" SINGLETRAP	0
0	VII-2	2'-9" SINGLETRAP	0
0	VII-3	2'-9" SINGLETRAP	0
0	VII-4	2'-9" SINGLETRAP	0
0	SPIII	2'-9" SINGLETRAP	VARIES
2	SPIV	2'-9" SINGLETRAP	VARIES
0	T2 PANEL	6" THICK PANEL	0
4	T4 PANEL	6" THICK PANEL	1615
0	T7 PANEL	6" THICK PANEL	0
10	JOINTWRAP	150' PER ROLL	
40	JOINTTAPE	14.5' PER ROLL	
TOTAL PIECES = 52			
TOTAL PANELS = 4			
HEAVIEST PICK WEIGHT = 15085			

DESIGN CRITERIA

ALLOWABLE MAX GRADE = 9.00'

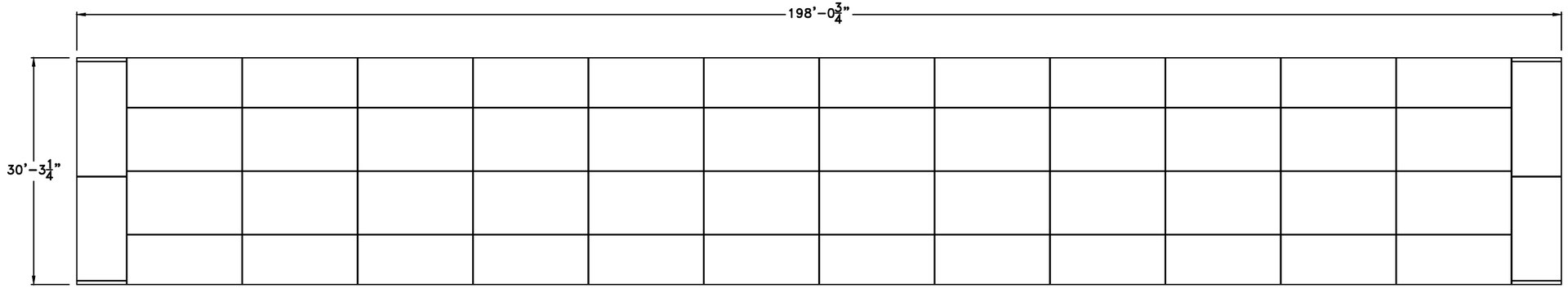
ALLOWABLE MIN GRADE = 7.75'

INSIDE HEIGHT ELEVATION = 5.75'

SYSTEM INVERT = 3.00'

NOTES:

1. DIMENSIONING OF STORMTRAP SYSTEM SHOWN BELOW ALLOW FOR A 3/4" GAP BETWEEN EACH MODULE.
2. ALL DIMENSIONS TO BE VERIFIED IN THE FIELD BY OTHERS.
3. SEE SHEET 3.0 FOR INSTALLATION SPECIFICATIONS.
4. SP – INDICATES A MODULE WITH MODIFICATIONS.
5. P – INDICATES A MODULE WITH A PANEL ATTACHMENT.
6. CONTRACTORS RESPONSIBILITY TO ENSURE CONSISTENCY/ACCURACY TO FINAL ENGINEER OF RECORD PLAN SET.
7. IN ORDER FOR STORMTRAP TO GENERATE APPROVAL DRAWINGS, CIVIL ENGINEERING DRAWINGS MUST BE PROVIDED TO STORMTRAP AND SHALL INCLUDE ALL PIPE SIZES, PIPE MATERIAL, PIPE INVERT ELEVATIONS, ACCESS OPENING SIZE AND SHAPE. IN ADDITION, FINAL GRADING PLANS SHALL ALSO INCLUDE MINIMUM AND MAXIMUM GRADES OVER THE TOP OF THE STORMTRAP SYSTEM.





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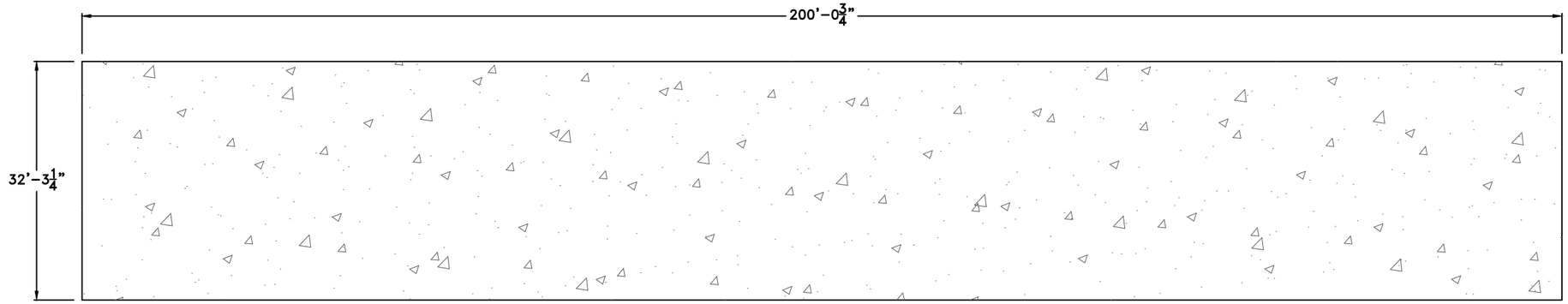
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SHEET TITLE:

SINGLETRAP SYSTEM LAYOUT

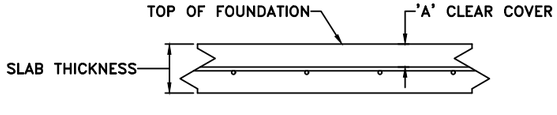
SHEET NUMBER:

2.0



CONCRETE FOUNDATION NOTES:

1. CONCRETE FOUNDATION TO BE SUPPLIED AND INSTALLED BY OTHERS.
2. CONCRETE STRENGTH @ 28 DAYS, 5%-8% ENTRAINED AIR, 3"-5" MAX SLUMP.
3. NET ALLOWABLE SOIL PRESSURE AS INDICATED ON SHEET 1.1.
4. SOIL CONDITIONS TO BE VERIFIED ON SITE BY OTHERS.
5. REBAR: ASTM A615 GRADE 60, BLACK BAR.
6. DIMENSION OF FOUNDATION MUST HAVE 1'-0" OVERHANG BEYOND EXTERNAL FACE OF MODULE.
7. DIMENSION OF STORMTRAP SYSTEM ALLOW FOR A 3/4" GAP BETWEEN EACH MODULE.
8. ALL DIMENSIONS TO BE VERIFIED IN THE FIELD BY OTHERS.
9. SEE SHEET 3.0 FOR INSTALLATION SPECIFICATIONS.



STORMTRAP FOUNDATION DETAIL

HS-20 & HS-25 LOADING - (ACI 318, ST2)				
MAXIMUM SYSTEM COVER	SLAB THICKNESS	CONCRETE STRENGTH	REINFORCEMENT (BOTH DIRECTIONS)	'A' CLEAR COVER
0'-6" - 1'-0"	8"	4000 PSI	#4 @ 18" O.C.	3.5"
1'-1" - 2'-0"	8"	4000 PSI	#4 @ 16" O.C.	3.5"
2'-1" - 3'-0"	8"	4000 PSI	#4 @ 12" O.C.	3.5"
3'-1" - 4'-0"	8"	4000 PSI	#4 @ 12" O.C.	3.5"
4'-1" - 5'-0"	8"	4000 PSI	#5 @ 18" O.C.	3.375"
5'-1" - 6'-0"	8"	4000 PSI	#5 @ 16" O.C.	3.375"
6'-1" - 7'-0"	8"	4000 PSI	#5 @ 12" O.C.	3.375"
7'-1" - 8'-0"	9"	4000 PSI	#5 @ 12" O.C.	3.875"
8'-1" - 9'-0"	9"	4000 PSI	#5 @ 12" O.C.	3.875"
9'-1" - 10'-0"	9"	4000 PSI	#5 @ 12" O.C.	3.875"

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SINGLETRAP
FOUNDATION
LAYOUT

SHEET NUMBER:

2.1

STORMTRAP INSTALLATION SPECIFICATION

1. STORMTRAP SHALL BE INSTALLED IN ACCORDANCE WITH ASTM C891 (STANDARD PRACTICE FOR INSTALLATION OF UNDERGROUND PRECAST CONCRETE UTILITY STRUCTURES). THE FOLLOWING ADDITIONS AND/OR EXCEPTIONS ARE PROVIDED FOR EMPHASIS. THE MENTION OF THESE ITEMS DOES NOT PRECLUDE THE INSTALLING CONTRACTOR FROM FOLLOWING ASTM C891 IN ITS ENTIRETY AND IMPLEMENTING ALL APPROPRIATE MEASURES. THE INSTALLING CONTRACTOR OWNS AND IS RESPONSIBLE FOR THE STORMTRAP SYSTEM UPON REMOVAL OF THE MODULES FROM THE DELIVERY TRUCK THROUGH 'FINAL CONSTRUCTION'. FINAL CONSTRUCTION IS ACHIEVED WHEN ALL MODULES ARE SET, FULLY BACKFILLED, AND WHEN FINAL FINISHED GRADES ARE REACHED. THE CONTRACTOR IS RESPONSIBLE FOR ANY COUNTERMEASURES NECESSARY TO RESIST UPLIFT/BUOYANCY BEFORE 'FINAL CONSTRUCTION' IS ACHIEVED.

2. IT IS THE RESPONSIBILITY OF THE INSTALLING CONTRACTOR TO ENSURE THAT PROPER/ADEQUATE EQUIPMENT IS USED TO SET/INSTALL THE MODULES.

3. STORMTRAP MODULES SHALL BE PLACED ON A LEVEL CONCRETE FOUNDATION (SEE SHEET 2.1) WITH A 1'-0" OVERHANG ON ALL SIDES THAT SHALL BE POURED IN PLACE BY INSTALLING CONTRACTOR. A QUALIFIED GEOTECHNICAL ENGINEER WILL BE EMPLOYED, BY OWNER, TO PROVIDE ASSISTANCE IN EVALUATING THE EXISTING SOIL CONDITIONS TO ENSURE THAT THE SOIL BEARING PRESSURE MEETS OR EXCEEDS THE STRUCTURAL DESIGN LOADING CRITERIA AS SPECIFIED ON SHEET 1.1.

4. THE STORMTRAP MODULES SHALL BE PLACED SUCH THAT THE MAXIMUM SPACE BETWEEN ADJACENT MODULES DOES NOT EXCEED ¾" (SEE DETAIL 2). IF THE SPACE EXCEEDS ¾", THE MODULES SHALL BE RESET WITH APPROPRIATE ADJUSTMENT MADE TO LINE AND GRADE TO BRING THE SPACE INTO SPECIFICATION.

5. STORMTRAP MODULES ARE NOT WATERTIGHT. **WATERTIGHT SOLUTION SPECIFIED BY ENGINEER (PROVIDED AND INSTALLED BY OTHERS).**

6. THE PERIMETER HORIZONTAL JOINT BETWEEN THE STORMTRAP MODULES AND THE CONCRETE FOUNDATION SHALL BE SEALED TO THE FOUNDATION WITH PRE-FORMED MASTIC JOINT SEALER ACCORDING TO ASTM C891, 8.8 AND 8.12 (SEE DETAIL 1). THE MASTIC JOINT TAPE DOES NOT PROVIDE A WATERTIGHT SEAL.

7. ALL EXTERIOR ROOF AND EXTERIOR VERTICAL WALL JOINTS BETWEEN ADJACENT STORMTRAP MODULES SHALL BE SEALED WITH 8" WIDE PRE-FORMED, COLD-APPLIED, SELF-ADHERING ELASTOMERIC RESIN, BONDED TO A WOVEN , HIGHLY PUNCTURE RESISTANT POLYMER WRAP, CONFORMING TO ASTM C891 AND SHALL BE INTEGRATED WITH PRIMER SEALANT AS APPROVED BY STORMTRAP (SEE DETAILS 2, 3, & 4). THE JOINT WRAP DOES NOT PROVIDE A WATERTIGHT SEAL. THE SOLE PURPOSE OF THE JOINT WRAP IS TO PROVIDE A SILT AND SOIL TIGHT SYSTEM. THE ADHESIVE EXTERIOR JOINT WRAP SHALL BE INSTALLED ACCORDING TO THE FOLLOWING INSTALLATION INSTRUCTIONS:

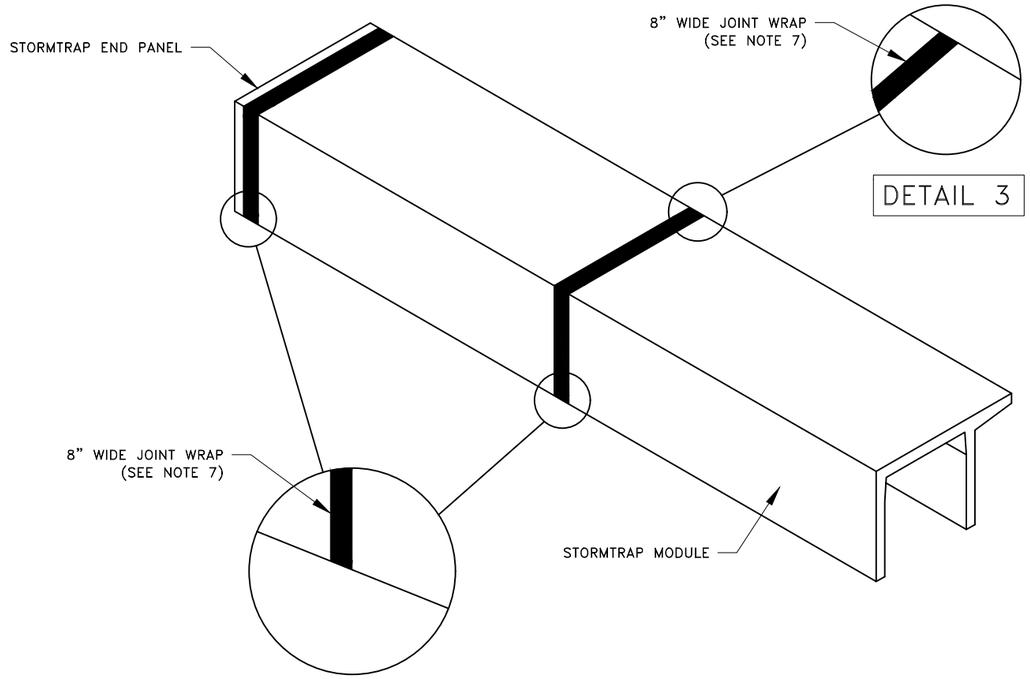
   7.1. USE A BRUSH OR WET CLOTH TO THOROUGHLY CLEAN THE OUTSIDE SURFACE AT THE POINT WHERE JOINT WRAP IS TO BE APPLIED.

   7.2. A RELEASE PAPER PROTECTS THE ADHESIVE SIDE OF THE JOINT WRAP. PLACE THE ADHESIVE TAPE (ADHESIVE SIDE DOWN) AROUND THE STRUCTURE, REMOVING THE RELEASE PAPER AS YOU GO. PRESS THE JOINT WRAP FIRMLY AGAINST THE STORMTRAP MODULE SURFACE WHEN APPLYING.

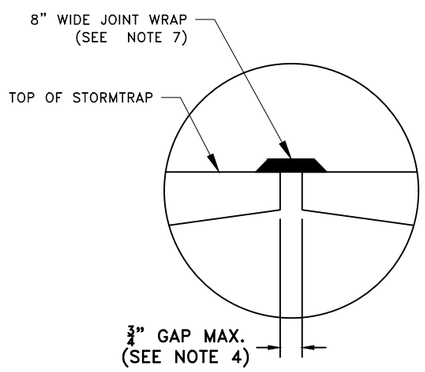
8. IF THE CONTRACTOR NEEDS TO CANCEL ANY SHIPMENTS, THEY MUST DO SO 48 HOURS PRIOR TO THEIR SCHEDULED ARRIVAL AT THE JOB SITE. IF CANCELED AFTER THAT TIME, PLEASE CONTACT THE PROJECT MANAGER.

9. IF THE STORMTRAP MODULE(S) IS DAMAGED IN ANY WAY PRIOR, DURING, OR AFTER INSTALL, STORMTRAP MUST BE CONTACTED IMMEDIATELY TO ASSESS THE DAMAGE AND DETERMINE WHETHER OR NOT THE MODULE(S) WILL NEED TO BE REPLACED. IF ANY MODULE ARRIVES AT THE JOBSITE DAMAGED DO NOT UNLOAD IT; CONTACT STORMTRAP IMMEDIATELY. ANY DAMAGE NOT REPORTED BEFORE THE TRUCK IS UNLOADED WILL BE THE CONTRACTOR'S RESPONSIBILITY.

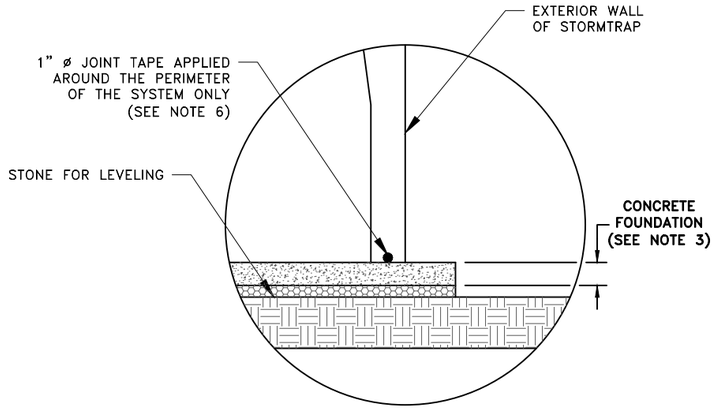
10. STORMTRAP MODULES CANNOT BE ALTERED IN ANY WAY AFTER MANUFACTURING WITHOUT WRITTEN CONSENT FROM STORMTRAP.



DETAIL 4



DETAIL 2



DETAIL 1

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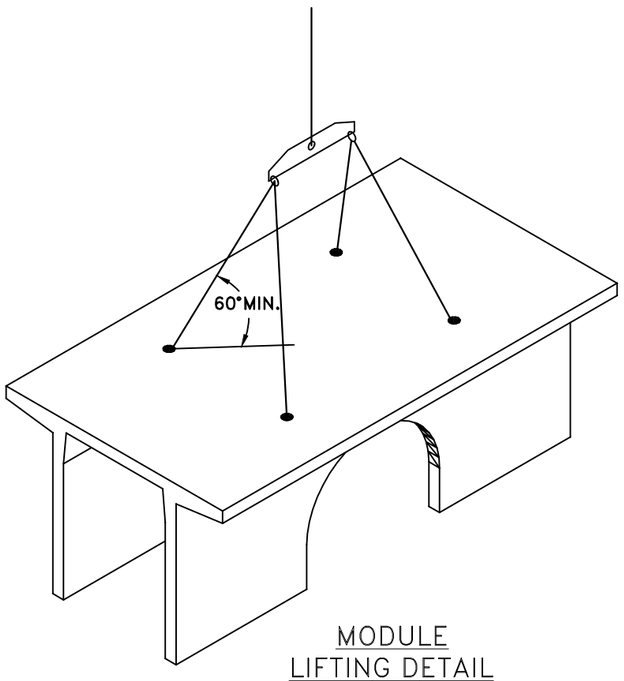
SINGLETRAP INSTALLATION SPECIFICATION

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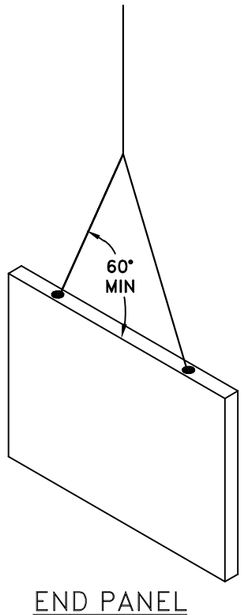
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STORMTRAP MODULE LIFTING SPECIFICATION

1. IT IS THE CONTRACTOR'S RESPONSIBILITY TO ENSURE THAT ALL (4) CHAINS/CABLES ARE SECURED PROPERLY TO THE LIFTING ANCHORS AND IN EQUAL TENSION WHEN LIFTING THE STORMTRAP MODULE.
2. MINIMUM 7'-0" CHAIN/CABLE LENGTH TO BE USED TO LIFT STORMTRAP MODULES (SUPPLIED BY CONTRACTOR).
3. CONTRACTOR TO ENSURE MINIMUM LIFTING ANGLE IS 60° FROM TOP SURFACE OF STORMTRAP MODULE. SEE DETAIL.
4. IT IS UNDERSTOOD AND AGREED THAT AT ALL TIMES DURING WHICH HOISTING AND RIGGING EQUIPMENT IS BEING SUPPLIED TO THE PURCHASER, OPERATOR OF SUCH EQUIPMENT SHALL BE IN CHARGE OF HIS ENTIRE EQUIPMENT AND SHALL AT ALL TIMES BE THE JUDGE OF THE SAFETY AND PROPERTY OF ANY SUGGESTION TO HIM FROM THE SELLER, ITS AGENTS OR EMPLOYEES. PURCHASER AGREES TO SAVE, INDEMNIFY AND HOLD HARMLESS SELLER FROM ALL LOSS, CLAIMS, DEMANDS OR CAUSES OF ACTION, WHICH MAY ARISE FROM THE EXISTENCE OR OPERATION OF SAID EQUIPMENT.



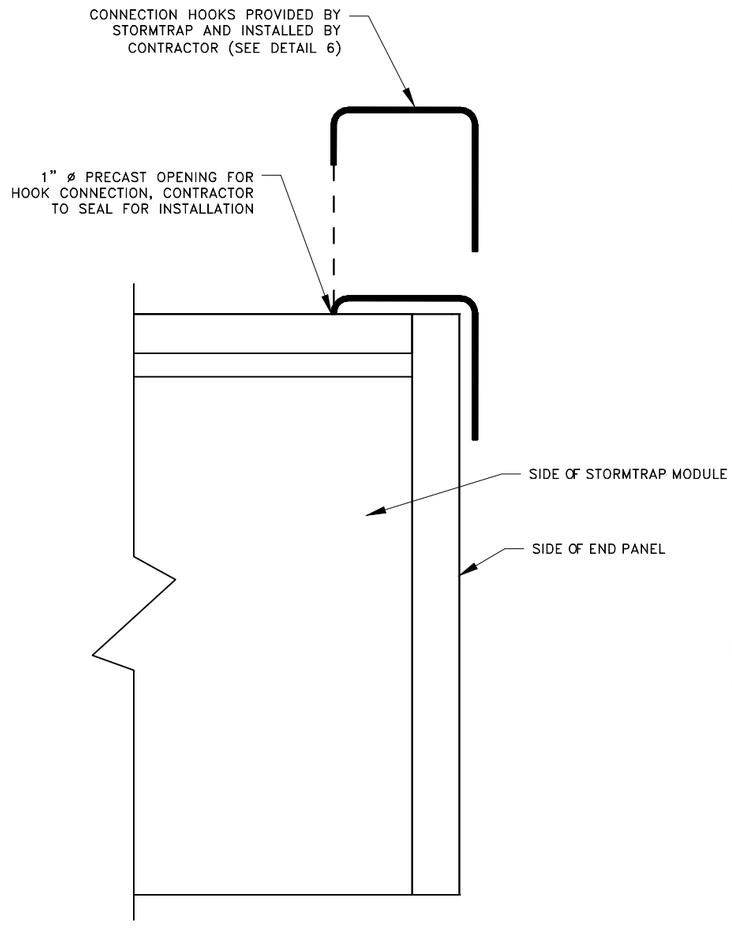
MODULE
LIFTING DETAIL



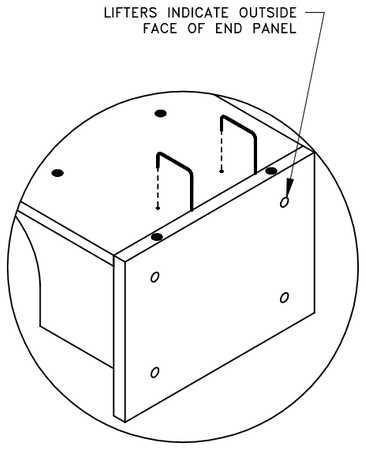
END PANEL
LIFTING DETAIL

END PANEL ERECTION/INSTALLATION SPECIFICATION

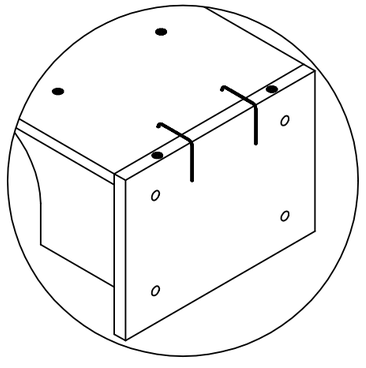
1. END PANELS WILL BE SUPPLIED TO CLOSE OFF OPEN ENDS OF ROWS.
2. PANELS SHALL BE INSTALLED IN A TILT UP FASHION DIRECTLY ADJACENT TO OPEN END OF MODULE (REFER TO SHEET 2.0 FOR END PANEL LOCATIONS). SIDE WITH LIFTERS INDICATES OUTSIDE FACE.
3. CONNECTION HOOKS WILL BE SUPPLIED WITH END PANELS TO SECURELY CONNECT PANEL TO ADJACENT STORMTRAP MODULE (SEE PANEL CONNECTION ELEVATION VIEW).
4. ONCE CONNECTION HOOK IS ATTACHED, LIFTING CLUTCHES MAY BE REMOVED.
5. JOINT WRAP SHALL BE PLACED AROUND PERIMETER JOINT PANEL (SEE SHEET 3.0).



PANEL CONNECTION
ELEVATION VIEW



STEP 1



STEP 2

DETAIL 6

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3.1

ZONE CHART

ZONES	ZONE DESCRIPTIONS	REMARKS
ZONE 1	FOUNDATION AGGREGATE	#5 (¾") STONE ANGULAR AGGREGATE (SEE NOTE 4)
ZONE 2	BACKFILL	UNIFIED SOILS CLASSIFICATION (GW, GP, SW, SP) OR SEE BELOW FOR APPROVED BACKFILL OPTIONS
ZONE 3	FINAL COVER OVERTOP	MATERIALS NOT TO EXCEED 120 PCF

APPROVED ZONE 2 BACKFILL OPTIONS

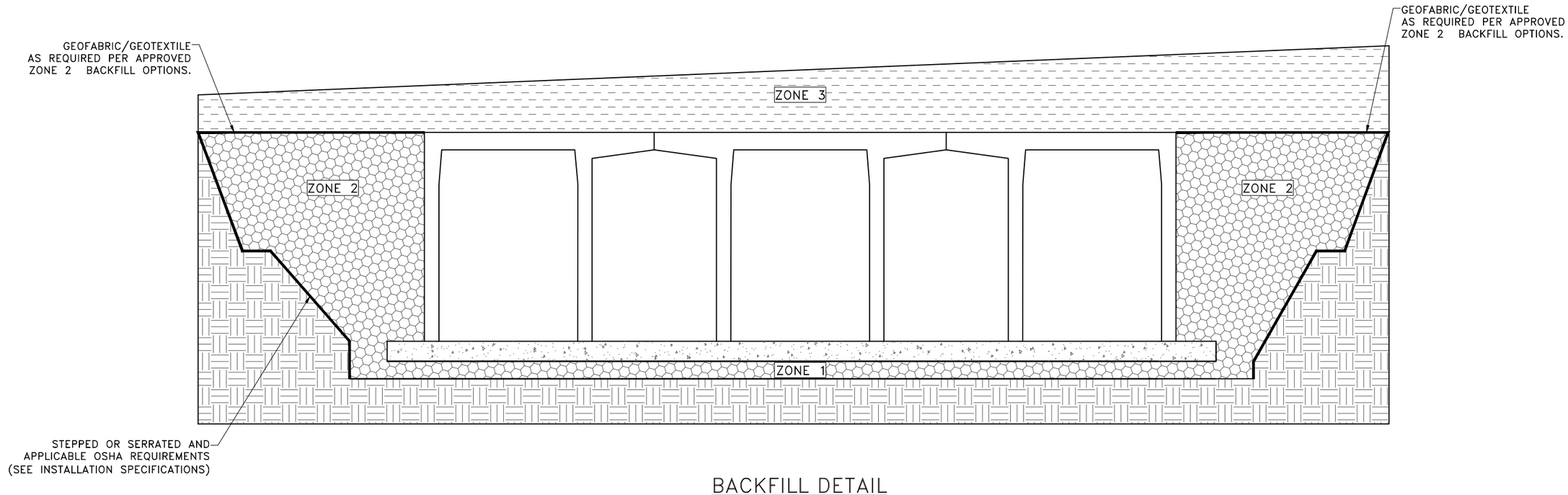
OPTION	REMARKS
¾" STONE AGGREGATE	THE STONE AGGREGATE SHALL CONSIST OF CLEAN AND FREE DRAINING ANGULAR MATERIAL. THE SIZE OF THIS MATERIAL SHALL HAVE 100% PASSING THE 1" SIEVE WITH 0% TO 5% PASSING THE #8 SIEVE. THIS MATERIAL SHALL BE SEPARATED FROM NATIVE MATERIAL USING GEOFABRIC AROUND THE PERIMETER OF THE BACKFILL (ASTM SIZE #57) AS DETERMINED BY THE GEOTECHNICAL ENGINEER.
SAND	IMPORTED PURE SAND IS PERMITTED TO BE USED AS BACKFILL IF IT IS CLEAN AND FREE DRAINING. THE SAND USED FOR BACKFILLING SHALL HAVE LESS THAN 40% PASSING #40 SIEVE AND LESS THAN 5% PASSING #200 SIEVE. THIS MATERIAL SHALL BE SEPARATED FROM NATIVE MATERIAL USING GEOFABRIC AROUND THE PERIMETER OF THE SAND BACKFILL.
CRUSHED CONCRETE AGGREGATE	CLEAN, FREE DRAINING CRUSHED CONCRETE AGGREGATE MATERIAL CAN BE USED AS BACKFILL FOR STORMTRAP'S MODULES. THE SIZE OF THIS MATERIAL SHALL HAVE 100% PASSING THE 1" SIEVE WITH 0% TO 5% PASSING THE #8 SIEVE. THIS MATERIAL SHALL BE SEPARATED FROM NATIVE MATERIAL USING GEOFABRIC AROUND THE PERIMETER OF THE BACKFILL.
ROAD PACK	STONE AGGREGATE 100% PASSING THE 1-1/2" SIEVE WITH LESS THAN 12% PASSING THE #200 SIEVE (ASTM SIZE #467). GEOFABRIC AS PER GEOTECHNICAL ENGINEER RECOMMENDATION.

FILL DEPTH	TRACK WIDTH	MAX VEHICLE WEIGHT (KIPS)	MAX GROUND PRESSURE
12"	12"	51.8	1690 psf
	18"	56.1	1219 psf
	24"	68.1	1111 psf
	30"	76.7	1000 psf
	36"	85.0	924 psf

NOTE:
TRACK LENGTH NOT TO EXCEED 15'-4".
ONLY TWO TRACKS PER VEHICLE.

STORMTRAP ZONE INSTALLATION SPECIFICATION/PROCEDURE

1. THE FILL PLACED AROUND THE STORMTRAP MODULES MUST BE DEPOSITED ON BOTH SIDES AT THE SAME TIME AND TO APPROXIMATELY THE SAME ELEVATION. AT NO TIME SHALL THE FILL BEHIND ONE SIDE WALL BE MORE THAN 2'-0" HIGHER THAN THE FILL ON THE OPPOSITE SIDE. BACKFILL SHALL EITHER BE COMPACTED AND/OR VIBRATED TO ENSURE THAT BACKFILL AGGREGATE/STONE MATERIAL IS WELL SEATED AND PROPERLY INTER LOCKED. CARE SHALL BE TAKEN TO PREVENT ANY WEDGING ACTION AGAINST THE STRUCTURE, AND ALL SLOPES WITHIN THE AREA TO BE BACKFILLED MUST BE STEPPED OR SERRATED TO PREVENT WEDGING ACTION. CARE SHALL ALSO BE TAKEN AS NOT TO DISRUPT THE JOINT WRAP FROM THE JOINT DURING THE BACKFILL PROCESS. BACKFILL MUST BE FREE-DRAINING MATERIAL. SEE ZONE 2 BACKFILL CHART ON THIS PAGE FOR APPROVED BACKFILL OPTIONS. IF NATIVE EARTH IS SUSCEPTIBLE TO MIGRATION, CONFIRM WITH GEOTECHNICAL ENGINEER AND PROVIDE PROTECTION AS REQUIRED (PROVIDED BY OTHERS). ALL MODULES MUST BE SET AND ALL SIDES MUST BE FULLY BACKFILLED BEFORE TRAVEL OVERTOP THE SYSTEM IS PERMITTED. SEE NOTE 2 FOR EXCEPTIONS AND LIMITATIONS.
2. THE FILL PLACED OVERTOP THE SYSTEM SHALL BE PLACED IN MINIMUM 6" LIFTS. AT NO TIME SHALL MACHINERY OR VEHICLES GREATER THAN THE DESIGN LIVE LOAD LISTED ON SHEET 1.1 TRAVEL OVERTOP THE SYSTEM. IF TRAVEL OVER THE SYSTEM OCCURS BEFORE THE MINIMUM DESIGN COVER IS ACHIEVED, IT MAY BE NECESSARY TO REDUCE THE ULTIMATE LOAD/BURDEN OF THE OPERATING MACHINERY SO AS TO NOT EXCEED THE DESIGN CAPACITY OF THE SYSTEM. VEHICLES AND MACHINERY USED TO PLACE FILL MATERIAL ON TOP OF THE SYSTEM SHALL TRAVEL PARALLEL TO THE LONGITUDINAL AXIS OF THE STORMTRAP MODULES WHENEVER POSSIBLE.
3. THE VIBRATORY FUNCTION OF ANY ROLLER, COMPACTOR, VEHICLE, ETC. SHALL NOT BE USED OVERTOP THE SYSTEM WITHOUT PRIOR APPROVAL FROM STORMTRAP. IN SOME CASES, HAND COMPACTION MAY BE NECESSARY TO ENSURE THAT THE ALLOWABLE DESIGN LOADING IS NOT EXCEEDED.
4. STONE AGGREGATE FOUNDATION IN ZONE 1 IS FOR LEVELING PURPOSES.



BACKFILL DETAIL

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1287 WINDHAM PARKWAY
ROMEOVILLE, IL 60446
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ENGINEER INFORMATION:

Langan Engineering - Parsippany NJ (HQ) - Parsippany, NJ

PROJECT INFORMATION:

Signature South Expansion

Teterboro, NJ

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SCALE:

NTS

SHEET TITLE:

SINGLETRAP BACKFILL SPECIFICATION

SHEET NUMBER:

4.0

ACCESS OPENING SPECIFICATION

1. A TYPICAL ACCESS OPENING FOR THE STORMTRAP SYSTEM ARE 2'–0" IN DIAMETER. ACCESS OPENINGS LARGER THAN 4'–0" IN DIAMETER NEED TO BE APPROVED BY STORMTRAP. ALL OPENINGS MUST RETAIN AT LEAST 2'–0" OF CLEARANCE FROM THE END OF THE STORMTRAP MODULE UNLESS NOTED OTHERWISE. ALL ACCESS OPENINGS TO BE LOCATED ON INSIDE LEG UNLESS OTHERWISE SPECIFIED. SEE SHEET 2.0 FOR SIZES AND LOCATIONS.

2. UNLESS OTHERWISE SPECIFIED, PLASTIC COATED STEPS ARE PROVIDED INSIDE ANY MODULE WHERE DEEMED NECESSARY. THE HIGHEST STEP IN THE MODULE IS TO BE PLACED A DISTANCE OF 1'–0" FROM THE INSIDE EDGE OF THE STORMTRAP MODULES. ALL ENSUING STEPS SHALL BE PLACED AT A DISTANCE BETWEEN 10" MIN AND 14" MAX BETWEEN THEM. STEPS MAY BE MOVED OR ALTERED TO AVOID OPENINGS OR OTHER IRREGULARITIES IN THE MODULE.

3. STORMTRAP LIFTING INSERTS MAY BE RELOCATED TO AVOID INTERFERENCE WITH ACCESS OPENINGS OR THE CENTER OF GRAVITY OF THE MODULE AS NEEDED.

4. STORMTRAP ACCESS OPENINGS MAY BE RELOCATED TO AVOID INTERFERENCE WITH INLET AND/OR OUTLET PIPE OPENINGS SO PLACEMENT OF STEPS IS ATTAINABLE.

5. ACCESS OPENINGS SHOULD BE LOCATED IN ORDER TO MEET THE APPROPRIATE MUNICIPAL REQUIREMENTS. STORMTRAP RECOMMENDS AT LEAST TWO ACCESS OPENINGS PER SYSTEM FOR ACCESS AND INSPECTION.

6. USE PRECAST ADJUSTING RINGS AS NEEDED TO MEET GRADE. STORMTRAP RECOMMENDS FOR COVER OVER 2' TO USE PRECAST BARREL OR CONE SECTIONS. (PROVIDED BY OTHERS)

PIPE OPENING SPECIFICATION

1. MINIMUM EDGE DISTANCE FOR AN OPENING ON THE OUTSIDE WALL SHALL BE NO LESS THAN 1'–0".

2. CONNECTING PIPES MAY BE INSTALLED WITH A 1'–0" CONCRETE COLLAR AND AN AGGREGATE CRADLE (AS REQUIRED) FOR AT LEAST ONE PIPE LENGTH (SEE PIPE CONNECTION DETAIL). A STRUCTURAL GRADE CONCRETE OR HIGH STRENGTH, NON–SHRINK GROUT WITH A MINIMUM 28 DAY COMPRESSIVE STRENGTH OF 3000 PSI MAY BE USED.

3. THE ANNULAR SPACE BETWEEN THE PIPE AND THE HOLE SHALL BE FILLED WITH HIGH STRENGTH NON–SHRINK GROUT.

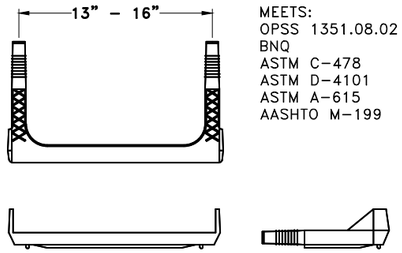
PIPE INSTALLATION INSTRUCTIONS

1. CLEAN AND LIGHTLY LUBRICATE ALL OF THE PIPE TO BE INSERTED INTO STORMTRAP.

2. IF PIPE IS CUT, CARE SHOULD BE TAKEN TO ALLOW NO SHARP EDGES. BEVEL AND LUBRICATE LEAD END OF PIPE.

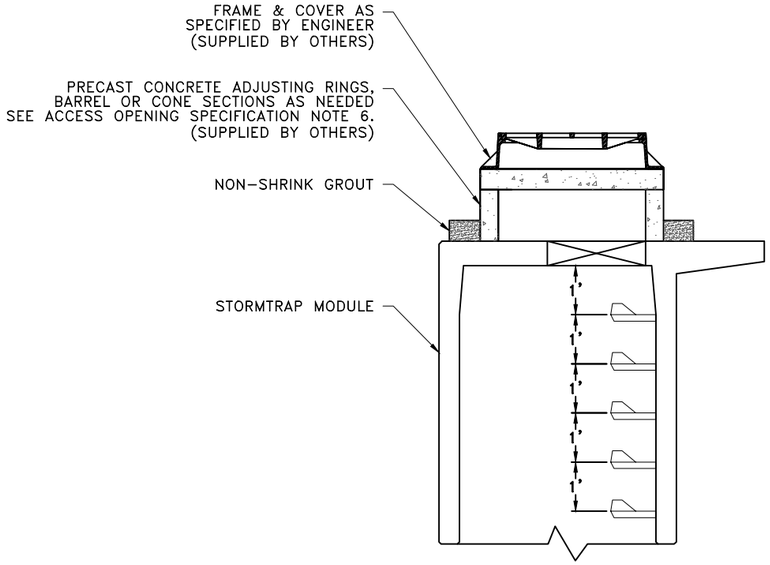
3. ALIGN CENTER OF PIPE TO CORRECT ELEVATION AND INSERT INTO OPENING.

NOTE: ALL ANCILLARY PRODUCTS/SPECIFICATIONS RECOMMENDED AND SHOWN ON THIS SHEET INCLUDING BUT NOT LIMITED TO CONCRETE COLLARS, AGGREGATE CRADLES, GRADE RINGS, RISER SECTIONS, ETC., ARE RECOMMENDATIONS ONLY AND SUBJECT TO CHANGE PER THE INSTALLING CONTRACTOR AND/OR PER LOCAL MUNICIPAL CODE/REQUIREMENTS.

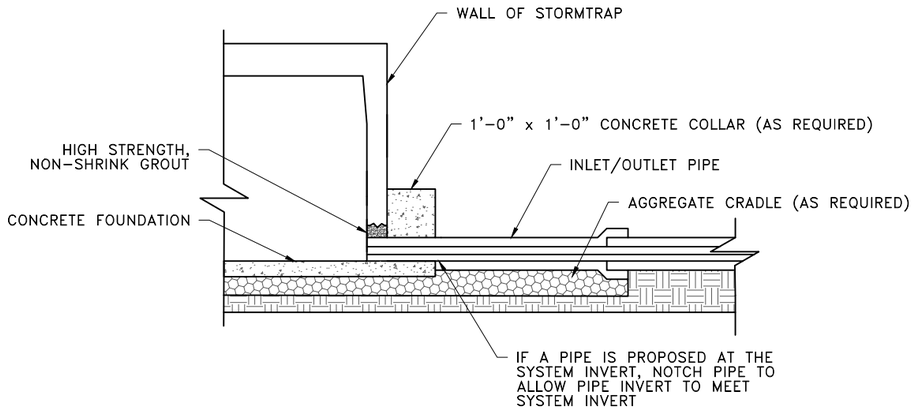


MEETS:
OPSS 1351.08.02
BNQ
ASTM C–478
ASTM D–4101
ASTM A–615
AASHTO M–199

STEP DETAIL



RISER/STAIR DETAIL



NOTCHED PIPE CONNECTION DETAIL
WHEN PIPE INVERT IS AT
INVERT OF STORMTRAP SYSTEM

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1287 WINDHAM PARKWAY
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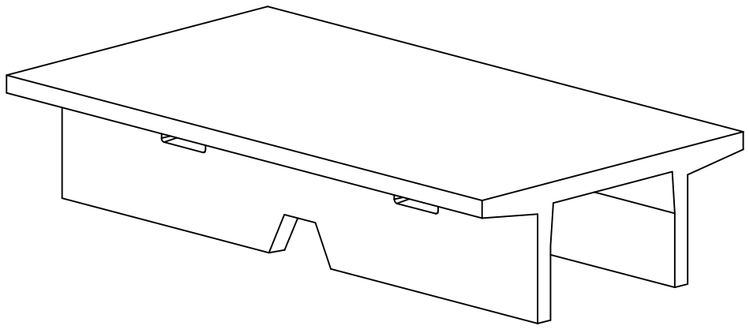
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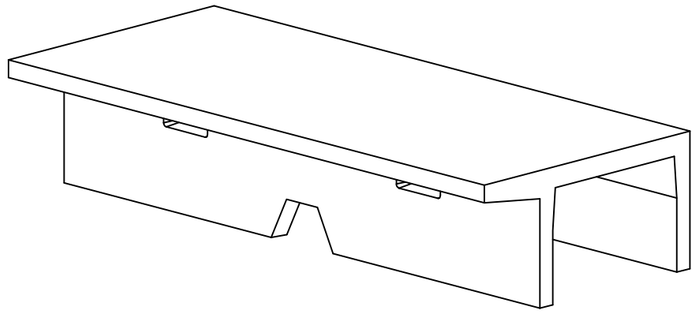
PIPE / ACCESS OPENING SPECIFICATION

SHEET NUMBER:

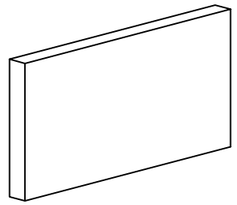
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TYPE II



TYPE IV



TYPE IV END PANEL

NOTES:
1. OPENING LOCATIONS AND SHAPES MAY VARY.
2. SP – INDICATES A MODULE WITH MODIFICATIONS.
3. P – INDICATES A MODULE WITH A PANEL ATTACHMENT.
4. POCKET WINDOW OPENINGS ARE OPTIONAL.

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SINGLETRAP MODULE TYPES

SHEET NUMBER:

6.0