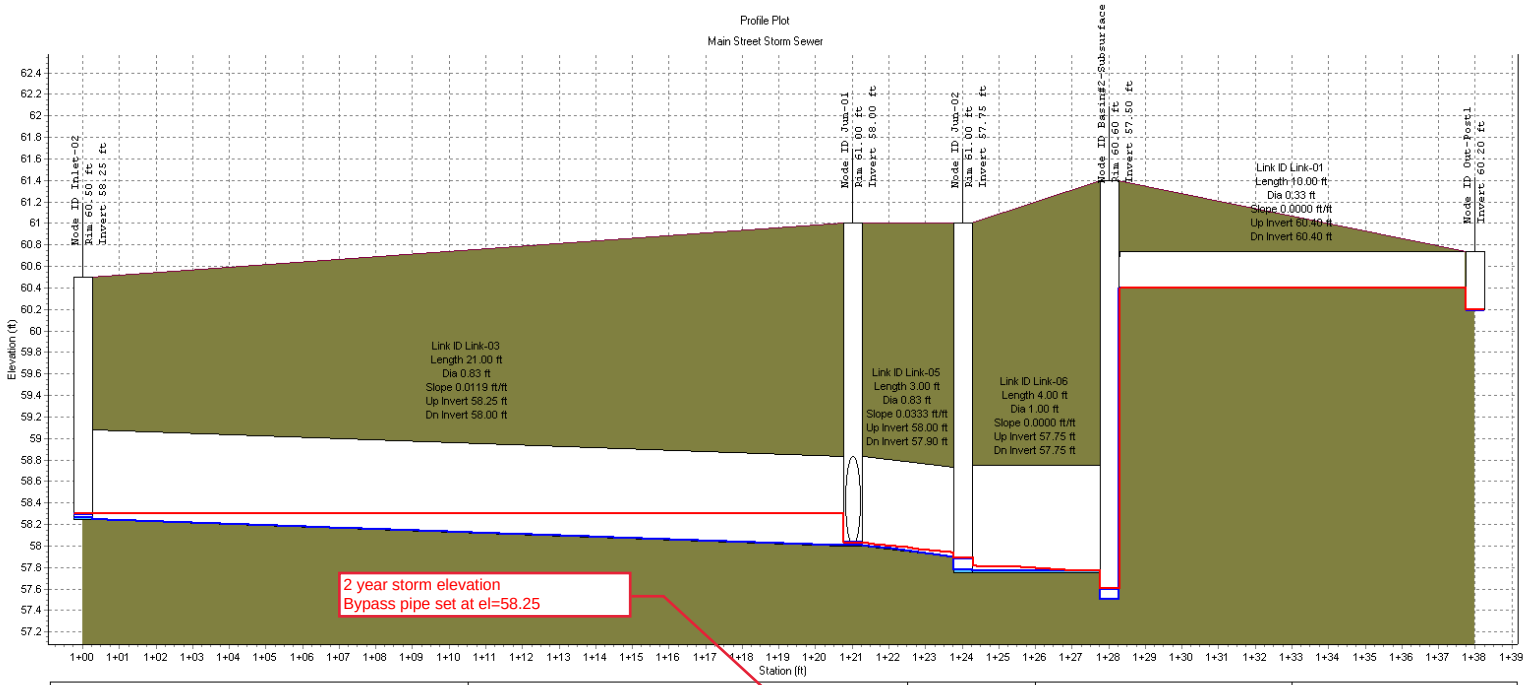


Node ID:	Inlet-02	Jun-01	Jun-02	Basin#2-Subsurface	Out-Post1
Rim (ft):	60.50	61.00	61.00	60.60	
Invert (ft):	58.25	58.00	57.75	57.50	60.20
Min Pipe Cover (ft):		1.75	2.25		
Max HGL (ft):	58.30	58.04	57.89	57.61	60.20

Link ID:	Link-03	Link-05	Link-06	Link-01
Length (ft):	21.00	3.00	4.00	10.00
Dia (ft):	0.83	0.83	1.00	0.33
Slope (ft/ft):	0.0119	0.0333	0.0000	0.0000
Up Invert (ft):	58.25	58.00	57.75	60.40
Dn Invert (ft):	58.00	57.90	57.75	60.40
Max Q (cfs):	0.02	0.06	0.02	0.00
Max Vel (ft/s):	3.00	39.60	0.87	0.00
Max Depth (ft):	0.04	0.04	0.06	0.00

Project Description

File Name ..... Stormwater Post 1 Bypass.SPF

Project Options

Flow Units ..... CFS
Elevation Type ..... Elevation
Hydrology Method ..... SCS TR-20
Time of Concentration (TOC) Method ..... SCS TR-55
Link Routing Method ..... Hydrodynamic
Enable Overflow Ponding at Nodes ..... YES
Skip Steady State Analysis Time Periods .... YES

Analysis Options

Start Analysis On ..... Oct 30, 2019 00:00:00
End Analysis On ..... Oct 31, 2019 00:00:00
Start Reporting On ..... Oct 30, 2019 00:00:00
Antecedent Dry Days ..... 0 days
Runoff (Dry Weather) Time Step ..... 0 01:00:00 days hh:mm:ss
Runoff (Wet Weather) Time Step ..... 0 00:05:00 days hh:mm:ss
Reporting Time Step ..... 0 00:05:00 days hh:mm:ss
Routing Time Step ..... 60 seconds

Number of Elements

	Qty
Rain Gages	1
Subbasins	2
Nodes	6
Junctions	2
Outfalls	1
Flow Diversions	0
Inlets	2
Storage Nodes	1
Links	6
Channels	0
Pipes	6
Pumps	0
Orifices	0
Weirs	0
Outlets	0
Pollutants	0
Land Uses	0

Rainfall Details

SN	Rain Gage ID	Data Source	Data Source ID	Rainfall Type	Rain Units	State	County	Return Period (years)	Rainfall Depth (inches)	Rainfall Distribution
1		Time Series	2 Year Storm	Intensity	inches	Massachusetts	Plymouth	2	3.40	SCS Type III 24-hr

Subbasin Summary

SN	Subbasin ID	Area (ft^2)	Weighted Curve Number	Total Rainfall (in)	Total Runoff (in)	Total Runoff Volume (ac-in)	Peak Runoff (cfs)	Time of Concentration (days hh:mm:ss)
1	Sub-33	5328.00	53.04	3.40	0.25	0.03	0.01	0 00:08:57
2	Sub-Post1	3401.99	60.71	3.40	0.51	0.04	0.03	0 00:08:57

Node Summary

SN	Element ID	Element Type	Invert Elevation (ft)	Ground/Rim (Max) Elevation (ft)	Initial Water Elevation (ft)	Surcharge Elevation (ft)	Ponded Area (ft^2)	Peak Inflow (cfs)	Max HGL Elevation Attained (ft)	Max Surcharge Depth Attained (ft)	Min Freeboard Attained (ft)	Time of Peak Flooding Occurrence (days hh:mm)	Total Flooded Volume (ac-in)	Total Time Flooded (min)
1	Jun-01	Junction	58.00	61.00	57.50	62.00	5000.00	0.02	58.04	0.00	2.96	0 00:00	0.00	0.00
2	Jun-02	Junction	57.75	61.00	57.25	62.00	5000.00	0.06	57.89	0.00	3.11	0 00:00	0.00	0.00
3	Out-Post1	Outfall	60.20					0.03	60.20					
4	Basin#2-Subsurface	Storage Node	57.50	60.60	54.60		5000.00	0.02	57.61				0.00	0.00

Link Summary

SN	Element ID	Element Type	From (Inlet) Node	To (Outlet) Node	Length	Inlet Invert Elevation	Outlet Invert Elevation	Average Slope	Diameter or Height	Manning's Roughness	Peak Flow	Design Flow Capacity	Peak Flow/ Design Flow Ratio	Peak Flow Velocity	Peak Flow Depth	Peak Flow Depth/ Total Depth Ratio	Total Time Surcharged	Reported Condition
					(ft)	(ft)	(ft)	(%)	(in)		(cfs)	(cfs)		(ft/sec)	(ft)		(min)	
1	Link-01	Pipe	Basin#2-Subsurface	Out-Post1	10.00	60.40	60.40	0.0000	4.000	0.0150	0.00	0.02	0.00	0.00	0.00	0.00	0.00	Calculated
2	Link-03	Pipe	Inlet-02	Jun-01	21.00	58.25	58.00	1.1900	10.000	0.0150	0.02	2.07	0.01	3.00	0.04	0.05	0.00	Calculated
3	Link-04	Pipe	Inlet-03	Jun-01	3.00	58.25	58.00	8.3300	10.000	0.0150	0.00	5.48	0.00	0.00	0.02	0.02	0.00	Calculated
4	Link-05	Pipe	Jun-01	Jun-02	3.00	58.00	57.90	3.3300	10.000	0.0150	0.06	3.47	0.02	39.60	0.04	0.05	0.00	Calculated
5	Link-06	Pipe	Jun-02	Basin#2-Subsurface	4.00	57.75	57.75	0.0000	12.000	0.0150	0.02	0.49	0.05	0.87	0.06	0.07	0.00	Calculated
6	Link-08	Pipe	Jun-01	Basin#2-Subsurface	126.51	58.25	57.75	0.4000	12.000	0.0150	0.00	1.94	0.00	0.00	0.00	0.00	0.00	Calculated

Inlet Summary

SN	Element ID	Inlet Manufacturer	Manufacturer Part Number	Inlet Location	Number of Inlets	Catchbasin Invert Elevation (ft)	Max (Rim) Elevation (ft)	Initial Water Elevation (ft)	Ponded Area (ft^2)	Peak Flow (cfs)	Peak Flow Intercepted by Inlet (cfs)	Peak Flow Bypassing Inlet (cfs)	Inlet Efficiency during Peak Flow (%)	Allowable Spread (ft)	Max Gutter Spread during Peak Flow (ft)	Max Gutter Water Elev. during Peak Flow (ft)
1	Inlet-02	NEENAH FOUNDRY	R-2420-A	On Sag	1	58.25	60.50	54.25	400.00	0.01	N/A	N/A	N/A	7.00	0.00	60.50
2	Inlet-03	NEENAH FOUNDRY	R-2420-A	On Sag	1	58.25	60.50	54.25	400.00	0.00	N/A	N/A	N/A	7.00	0.00	60.50

Subbasin Hydrology

Subbasin : Sub-33

Input Data

Area (ft²) 5328.00
Weighted Curve Number 53.04
Rain Gage ID ..... Rain Gage-01

Composite Curve Number

Soil/Surface Description	Area (ft²)	Soil Group	Curve Number
> 75% grass cover, Good	2118.02	A	39.00
Paved parking & roofs	1524.99	A	98.00
Woods, Good	1684.99	A	30.00
Composite Area & Weighted CN	5328.00		53.04

Time of Concentration

TOC Method : SCS TR-55

Sheet Flow Equation :

Tc = (0.007 * ((n * Lf)^0.8)) / ((P^0.5) * (Sf^0.4))

Where :

Tc = Time of Concentration (hr)
n = Manning's roughness
Lf = Flow Length (ft)
P = 2 yr, 24 hr Rainfall (inches)
Sf = Slope (ft/ft)

Shallow Concentrated Flow Equation :

V = 16.1345 * (Sf^0.5) (unpaved surface)
V = 20.3282 * (Sf^0.5) (paved surface)
V = 15.0 * (Sf^0.5) (grassed waterway surface)
V = 10.0 * (Sf^0.5) (nearly bare & untilled surface)
V = 9.0 * (Sf^0.5) (cultivated straight rows surface)
V = 7.0 * (Sf^0.5) (short grass pasture surface)
V = 5.0 * (Sf^0.5) (woodland surface)
V = 2.5 * (Sf^0.5) (forest w/heavy litter surface)
Tc = (Lf / V) / (3600 sec/hr)

Where:

Tc = Time of Concentration (hr)
Lf = Flow Length (ft)
V = Velocity (ft/sec)
Sf = Slope (ft/ft)

Channel Flow Equation :

V = (1.49 * (R^(2/3)) * (Sf^0.5)) / n
R = Aq / Wp
Tc = (Lf / V) / (3600 sec/hr)

Where :

Tc = Time of Concentration (hr)
Lf = Flow Length (ft)
R = Hydraulic Radius (ft)
Aq = Flow Area (ft²)
Wp = Wetted Perimeter (ft)
V = Velocity (ft/sec)
Sf = Slope (ft/ft)
n = Manning's roughness

Sheet Flow Computations	Subarea A	Subarea B	Subarea C
Manning's Roughness :	0.4	0	0.00
Flow Length (ft) :	50	0	0.00
Slope (%) :	4.8	0	0.00
2 yr, 24 hr Rainfall (in) :	3.40	0	0.00
Velocity (ft/sec) :	0.10	0	0.00
Computed Flow Time (min) :	8.43	0.00	0.00

Shallow Concentrated Flow Computations	Subarea A	Subarea B	Subarea C
Flow Length (ft) :	38	21	0.00
Slope (%) :	10	2	0.00
Surface Type :	Woodland	Paved	Unpaved
Velocity (ft/sec) :	1.58	2.87	0.00
Computed Flow Time (min) :	0.40	0.12	0.00

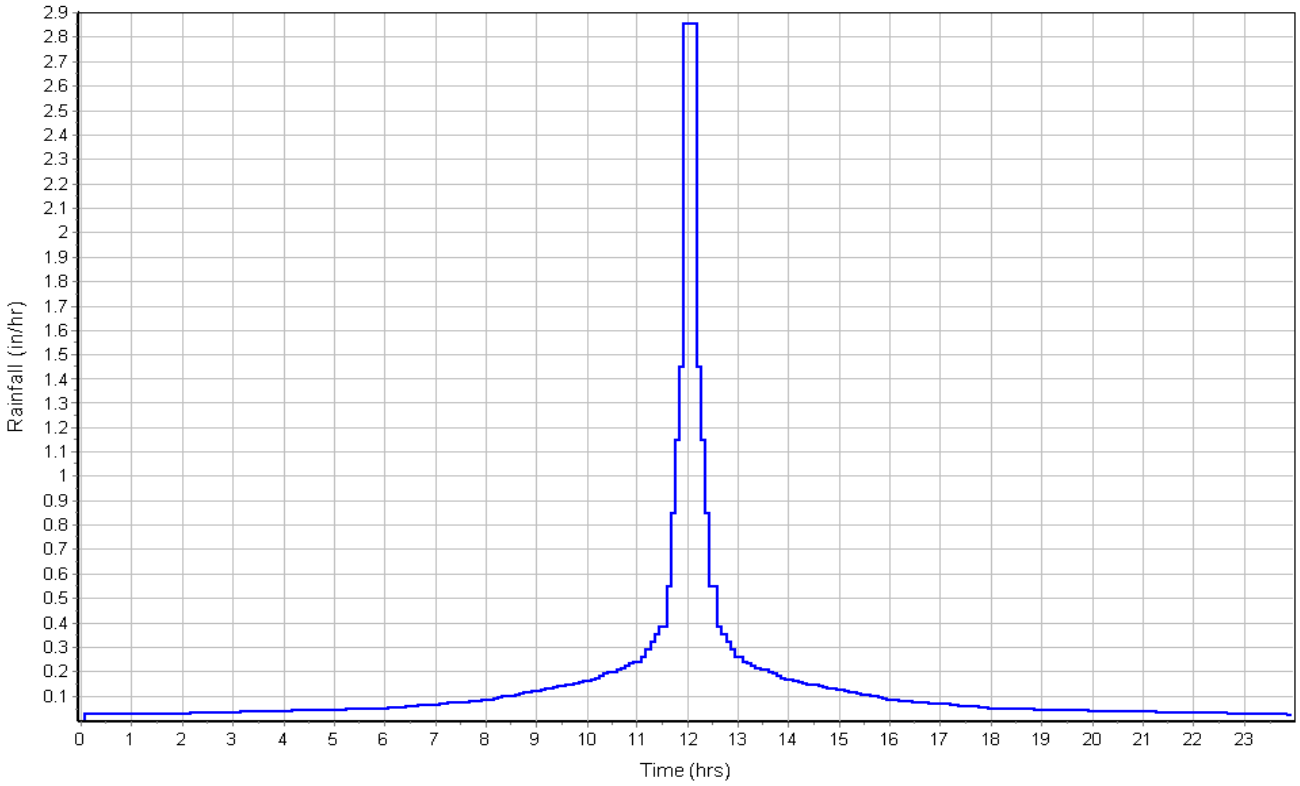
Total TOC (min) 8.95

Subbasin Runoff Results

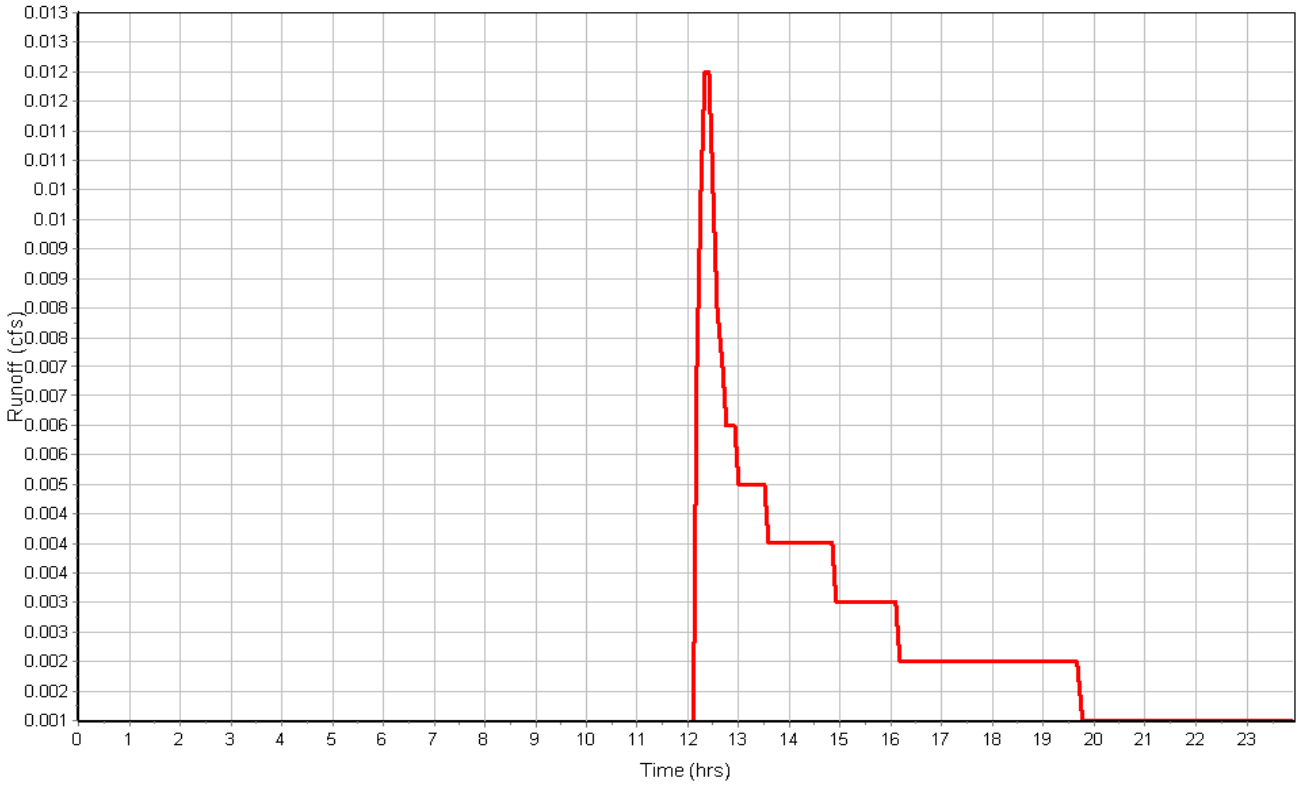
Total Rainfall (in)	3.40
Total Runoff (in)	0.25
Peak Runoff (cfs)	0.01
Weighted Curve Number	53.04
Time of Concentration (days hh:mm:ss)	0 00:08:57

Subbasin : Sub-33

Rainfall Intensity Graph



Runoff Hydrograph



Subbasin : Sub-Post1

Input Data

Area (ft²) 3401.99
Weighted Curve Number 60.71
Rain Gage ID ..... Rain Gage-01

Composite Curve Number

Soil/Surface Description	Area (ft²)	Soil Group	Curve Number
> 75% grass cover, Good	2149.99	A	39.00
Paved parking & roofs	1252.00	A	98.00
Composite Area & Weighted CN	3401.99		60.71

Time of Concentration

Sheet Flow Computations	Subarea A	Subarea B	Subarea C
Manning's Roughness :	0.4	0	0.00
Flow Length (ft) :	50	0	0.00
Slope (%) :	4.8	0	0.00
2 yr, 24 hr Rainfall (in) :	3.40	0	0.00
Velocity (ft/sec) :	0.10	0	0.00
Computed Flow Time (min) :	8.43	0.00	0.00

Shallow Concentrated Flow Computations	Subarea A	Subarea B	Subarea C
Flow Length (ft) :	38	21	0.00
Slope (%) :	10	2	0.00
Surface Type :	Woodland	Paved	Unpaved
Velocity (ft/sec) :	1.58	2.87	0.00
Computed Flow Time (min) :	0.40	0.12	0.00

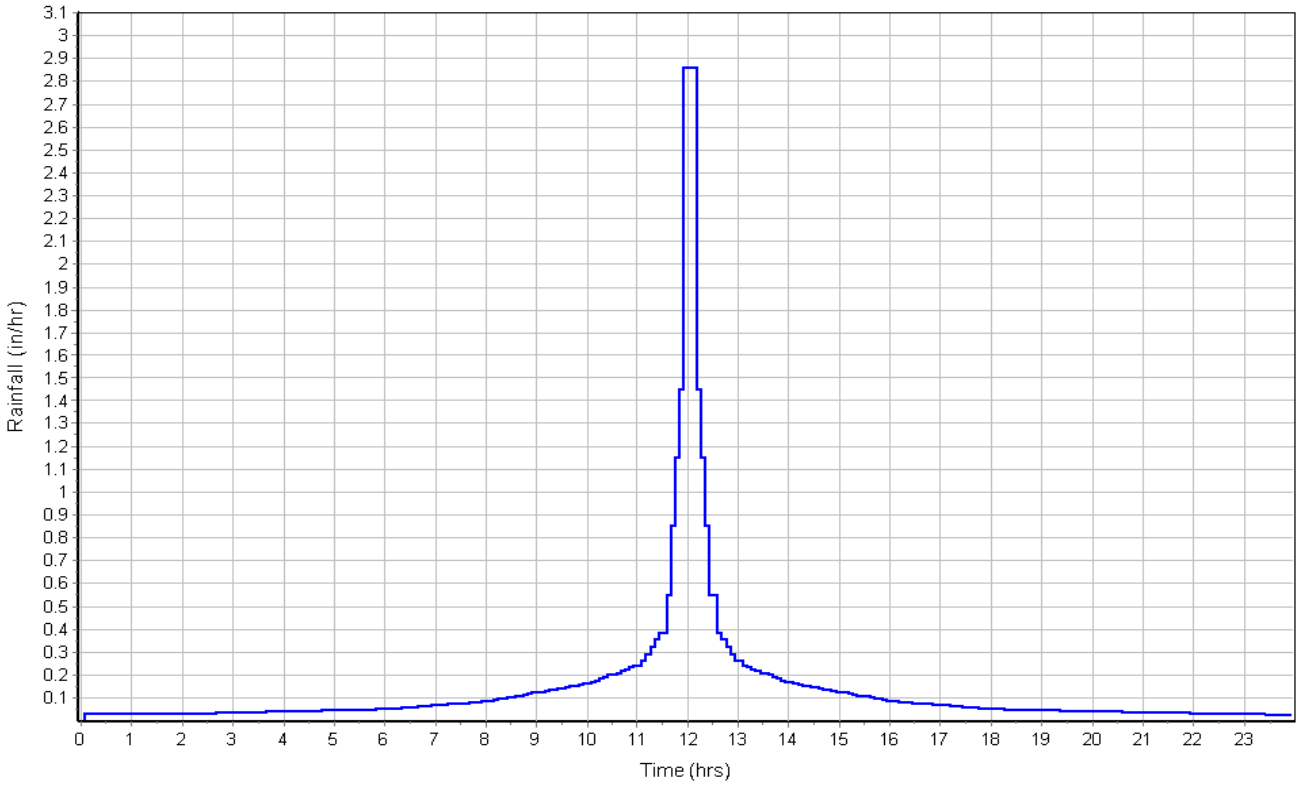
Total TOC (min) 8.95

Subbasin Runoff Results

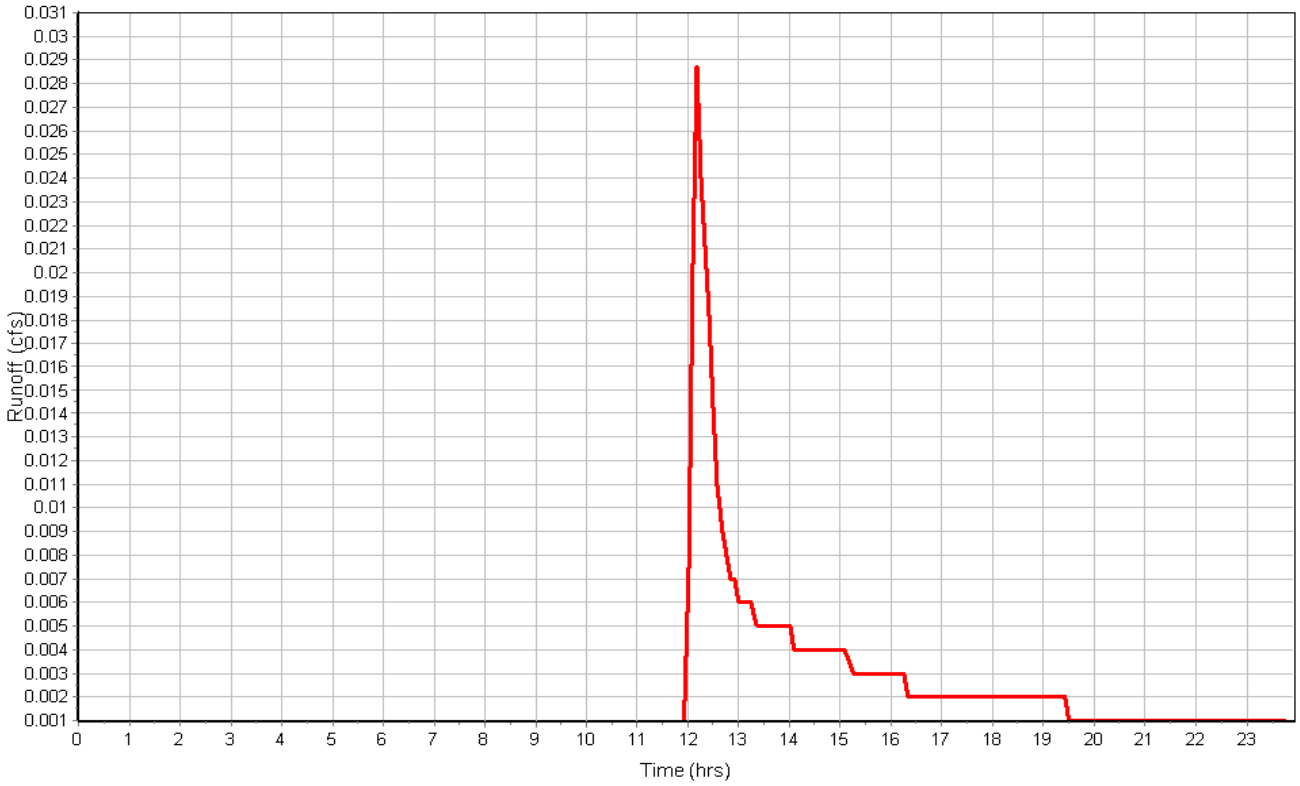
Total Rainfall (in) 3.40
Total Runoff (in) 0.51
Peak Runoff (cfs) 0.03
Weighted Curve Number 60.71
Time of Concentration (days hh:mm:ss) 0 00:08:57

Subbasin : Sub-Post1

Rainfall Intensity Graph



Runoff Hydrograph



Junction Input

SN	Element ID	Invert Elevation (ft)	Ground/Rim (Max) Elevation (ft)	Ground/Rim (Max) Offset (ft)	Initial Water Elevation (ft)	Initial Water Depth (ft)	Surcharge Elevation (ft)	Surcharge Depth (ft)	Ponded Area (ft^2)	Minimum Pipe Cover (in)
1	Jun-01	58.00	61.00	3.00	57.50	-0.50	62.00	1.00	5000.00	21.00
2	Jun-02	57.75	61.00	3.25	57.25	-0.50	62.00	1.00	5000.00	27.00

Junction Results

SN	Element ID	Peak Inflow (cfs)	Peak Lateral Inflow (cfs)	Max HGL Elevation Attained (ft)	Max HGL Depth Attained (ft)	Max Surcharge Depth Attained (ft)	Min Freeboard Attained (ft)	Average HGL Elevation Attained (ft)	Average HGL Depth Attained (ft)	Time of Max HGL Occurrence (days hh:mm)	Time of Peak Flooding Occurrence (days hh:mm)	Total Flooded Volume (ac-in)	Total Time Flooded (min)
1	Jun-01	0.02	0.00	58.04	0.04	0.00	2.96	58.01	0.01	0 12:27	0 00:00	0.00	0.00
2	Jun-02	0.06	0.00	57.89	0.14	0.00	3.11	57.77	0.02	0 12:25	0 00:00	0.00	0.00

Pipe Input

SN	Element ID	Length (ft)	Inlet Invert Elevation (ft)	Inlet Invert Offset (ft)	Outlet Invert Elevation (ft)	Outlet Invert Offset (ft)	Total Drop (ft)	Average Slope (%)	Pipe Shape	Pipe Diameter or Height (in)	Pipe Width (in)	Manning's Roughness	Entrance Losses	Exit/Bend Losses	Additional Losses	Initial Flow (cfs)	Flap Gate	No. of Barrels
1	Link-01	10.00	60.40	2.90	60.40	0.20	0.00	0.0000	CIRCULAR	3.960	3.960	0.0150	0.5000	0.5000	0.0000	0.00	No	1
2	Link-03	21.00	58.25	0.00	58.00	0.00	0.25	1.1900	CIRCULAR	9.960	9.960	0.0150	0.5000	0.5000	0.0000	0.00	No	1
3	Link-04	3.00	58.25	0.00	58.00	0.00	0.25	8.3300	CIRCULAR	9.960	9.960	0.0150	0.5000	0.5000	0.0000	0.00	No	1
4	Link-05	3.00	58.00	0.00	57.90	0.15	0.10	3.3300	CIRCULAR	9.960	9.960	0.0150	0.5000	0.5000	0.0000	0.00	No	1
5	Link-06	4.00	57.75	0.00	57.75	0.25	0.00	0.0000	CIRCULAR	12.000	12.000	0.0150	0.5000	0.5000	0.0000	0.00	No	1
6	Link-08	126.51	58.25	0.25	57.75	0.25	0.50	0.4000	CIRCULAR	12.000	12.000	0.0150	0.5000	0.5000	0.0000	0.00	No	1

Pipe Results

SN	Element ID	Peak Flow (cfs)	Time of Peak Flow Occurrence (days hh:mm)	Design Flow Capacity (cfs)	Peak Flow/ Design Flow Ratio	Peak Flow Velocity (ft/sec)	Travel Time (min)	Peak Flow Depth (ft)	Peak Flow Depth/ Total Depth Ratio	Total Time Surcharged (min)	Froude Number	Reported Condition
1	Link-01	0.00	0 00:00	0.02	0.00	0.00		0.00	0.00	0.00		Calculated
2	Link-03	0.02	0 12:23	2.07	0.01	3.00	0.12	0.04	0.05	0.00		Calculated
3	Link-04	0.00	0 00:00	5.48	0.00	0.00		0.02	0.02	0.00		Calculated
4	Link-05	0.06	0 12:24	3.47	0.02	39.60	0.00	0.04	0.05	0.00		Calculated
5	Link-06	0.02	0 12:26	0.49	0.05	0.87	0.08	0.06	0.07	0.00		Calculated
6	Link-08	0.00	0 00:00	1.94	0.00	0.00		0.00	0.00	0.00		Calculated

Inlet Input

SN	Element ID	Inlet Manufacturer	Manufacturer Part Number	Inlet Location	Number of Inlets	Catchbasin Invert Elevation (ft)	Max (Rim) Elevation (ft)	Inlet Depth (ft)	Initial Water Elevation (ft)	Initial Water Depth (ft)	Ponded Area (ft^2)	Grate Clogging Factor (%)
1	Inlet-02	NEENAH FOUNDRY	R-2420-A	On Sag	1	58.25	60.50	2.25	54.25	-4.00	400.00	0.00
2	Inlet-03	NEENAH FOUNDRY	R-2420-A	On Sag	1	58.25	60.50	2.25	54.25	-4.00	400.00	0.00

Roadway & Gutter Input

SN	Element ID	Roadway Longitudinal Slope (ft/ft)	Roadway Cross Slope (ft/ft)	Roadway Manning's Roughness	Gutter Cross Slope (ft/ft)	Gutter Width (ft)	Gutter Depression (in)	Allowable Spread (ft)
1	Inlet-02	N/A	0.0200	0.0160	0.0620	2.00	0.0656	7.00
2	Inlet-03	N/A	0.0200	0.0160	0.0620	2.00	0.0656	7.00

Inlet Results

SN	Element ID	Peak Flow (cfs)	Peak Lateral Inflow (cfs)	Peak Flow Intercepted by Inlet (cfs)	Peak Flow Bypassing Inlet (cfs)	Inlet Efficiency during Peak Flow (%)	Max Gutter Spread during Peak Flow (ft)	Max Gutter Water Elev. during Peak Flow (ft)	Max Gutter Water Depth during Peak Flow (ft)	Time of Max Depth Occurrence (days hh:mm)	Total Flooded Volume (ac-in)	Total Time Flooded (min)
1	Inlet-02	0.01	0.01	N/A	N/A	N/A	0.00	60.50	0.00	0 12:26	0.00	0.00
2	Inlet-03	0.00	0.00	N/A	N/A	N/A	0.00	60.50	0.00	0 00:00	0.00	0.00

Storage Nodes

Storage Node : Basin#2-Subsurface

Input Data

Invert Elevation (ft)	57.50
Max (Rim) Elevation (ft)	60.60
Max (Rim) Offset (ft)	3.10
Initial Water Elevation (ft)	54.60
Initial Water Depth (ft)	-2.90
Ponded Area (ft²)	5000.00
Evaporation Loss	0.00

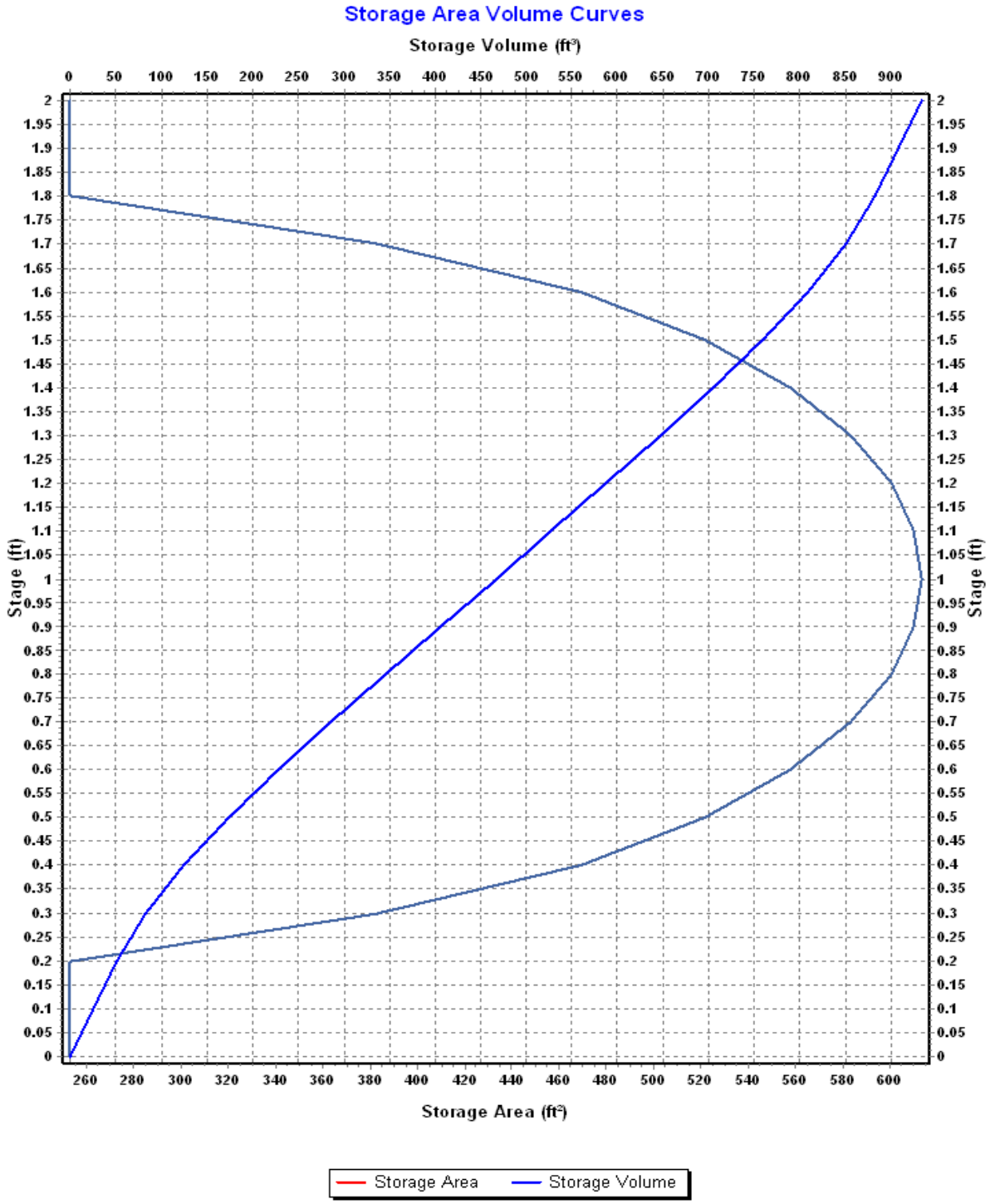
Infiltration/Exfiltration

Exfiltration Rate (in/hr)	2.4100

Storage Area Volume Curves

Storage Curve : Storage-13

Stage (ft)	Storage Area (ft²)	Storage Volume (ft³)
0	253.3333	0.000
0.1	253.3333	25.33
0.2	253.3333	50.66
0.3	382.5772	82.46
0.4	469.3333	125.06
0.5	521.6614	174.61
0.6	557.8591	228.59
0.7	583.2787	285.65
0.8	600.2973	344.83
0.9	610.1189	405.35
1	613.3333	466.52
1.1	610.1189	527.69
1.2	600.2973	588.21
1.3	583.2787	647.39
1.4	557.8591	704.45
1.5	521.6614	758.43
1.6	469.3333	807.98
1.7	382.5772	850.58
1.8	253.3333	882.38
1.9	253.3333	907.71
2	253.3333	933.04


Storage Area Volume Curves
Storage Volume (ft³)
0 50 100 150 200 250 300 350 400 450 500 550 600 650 700 750 800 850 900
Stage (ft)
0 0.05 0.1 0.15 0.2 0.25 0.3 0.35 0.4 0.45 0.5 0.55 0.6 0.65 0.7 0.75 0.8 0.85 0.9 0.95 1 1.05 1.1 1.15 1.2 1.25 1.3 1.35 1.4 1.45 1.5 1.55 1.6 1.65 1.7 1.75 1.8 1.85 1.9 1.95 2
Storage Area (ft²)
260 280 300 320 340 360 380 400 420 440 460 480 500 520 540 560 580 600
Storage Area
Storage Volume

Storage Node : Basin#2-Subsurface (continued)

Output Summary Results

Peak Inflow (cfs)	0.02
Peak Lateral Inflow (cfs)	0.00
Peak Outflow (cfs)	0.00
Peak Exfiltration Flow Rate (cfm)	1.62
Max HGL Elevation Attained (ft)	57.61
Max HGL Depth Attained (ft)	0.11
Average HGL Elevation Attained (ft)	57.50
Average HGL Depth Attained (ft)	0
Time of Max HGL Occurrence (days hh:mm)	0 12:27
Total Exfiltration Volume (1000-ft³)	0.138
Total Flooded Volume (ac-in)	0
Total Time Flooded (min)	0
Total Retention Time (sec)	0.00