

Project:

Proposed Stormwater Improvements
Thayer Nursery
Milton, MA 02186

Prepared for:

Thayer Nursery
Hillside Street
Milton, MA 02186

Revised:

August 20, 2015

DeCELLE



Stormwater Runoff Comparison for Pre- and Post-Improvements

2-Year Storm (3.2")

Existing Conditions		Proposed Conditions	
Area Description	Flow (CFS)	Area Description	Flow (CFS)
Flow off-site	8.48	Flow off-site	6.33

10-Year Storm (4.7")

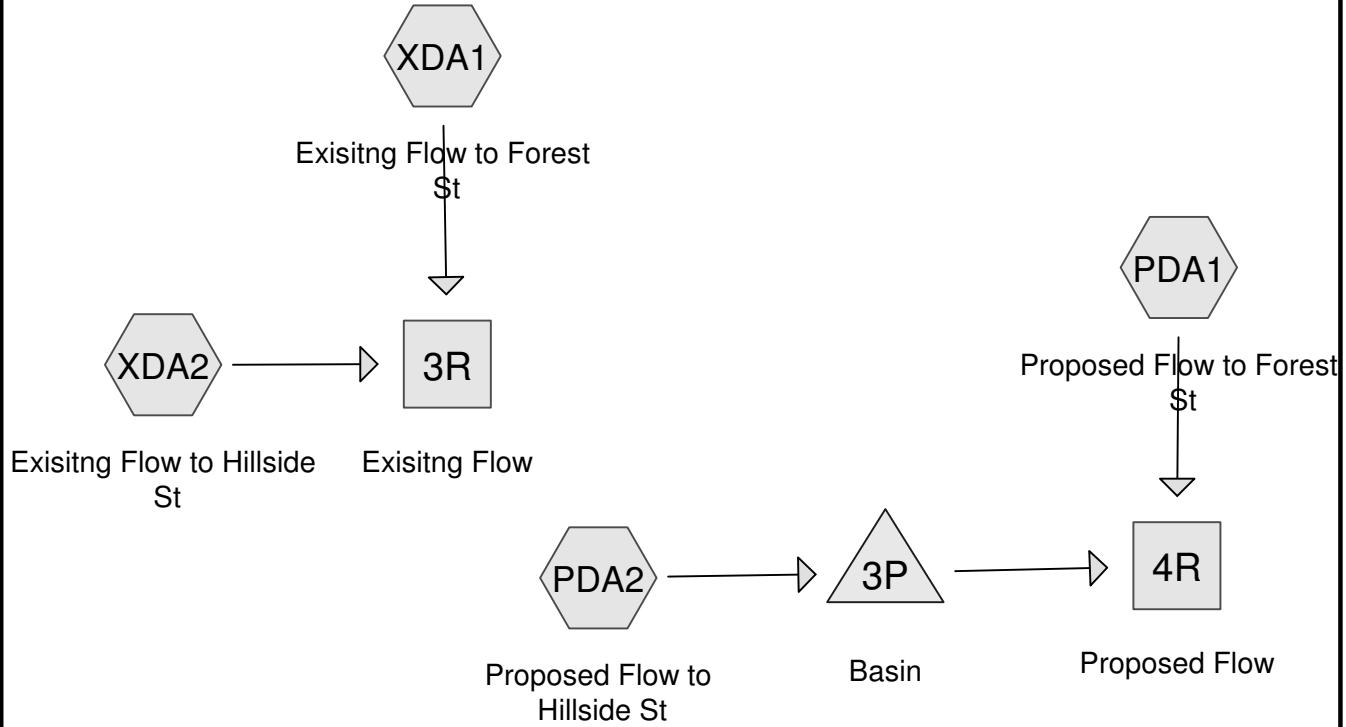
Existing Conditions		Proposed Conditions	
Area Description	Flow (CFS)	Area Description	Flow (CFS)
Flow off-site	18.46	Flow off-site	9.45

25-Year Storm (5.6")

Existing Conditions		Proposed Conditions	
Area Description	Flow (CFS)	Area Description	Flow (CFS)
Flow off-site	22.80	Flow off-site	11.11

100-Year Storm (7.0")

Existing Conditions		Proposed Conditions	
Area Description	Flow (CFS)	Area Description	Flow (CFS)
Flow off-site	29.50	Flow off-site	13.60



Routing Diagram for Thayer Nursery-JWB

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Summary for Subcatchment PDA1: Proposed Flow to Forest St

Runoff = 2.83 cfs @ 12.12 hrs, Volume= 0.206 af, Depth> 1.71"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
Type III 24-hr Rainfall=3.20"

Area (sf)	CN	Description
1,634	98	Roofs, HSG C
24,128	83	Small grain, straight row, Good, HSG C
15,948	74	>75% Grass cover, Good, HSG C
302	98	Paved parking, HSG C
20,936	96	Gravel surface, HSG C
62,948	86	Weighted Average
61,012		96.92% Pervious Area
1,936		3.08% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
4.3	50	0.0400	0.20		Sheet Flow, Grass: Short n= 0.150 P2= 3.20"
2.4	200	0.0400	1.40		Shallow Concentrated Flow, Short Grass Pasture Kv= 7.0 fps
1.6	250	0.0250	2.55		Shallow Concentrated Flow, Unpaved Kv= 16.1 fps
8.3	500	Total			

Summary for Subcatchment PDA2: Proposed Flow to Hillside St

Runoff = 8.18 cfs @ 12.15 hrs, Volume= 0.640 af, Depth> 1.95"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
Type III 24-hr Rainfall=3.20"

Area (sf)	CN	Description
19,007	98	Roofs, HSG C
6,400	98	Paved parking, HSG C
25,505	74	>75% Grass cover, Good, HSG C
39,394	81	Small grain, contoured, Good, HSG C
5,021	73	Woods, Fair, HSG C
76,011	96	Gravel surface, HSG C
171,338	89	Weighted Average
145,931		85.17% Pervious Area
25,407		14.83% Impervious Area

Thayer Nursery-JWB

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Type III 24-hr Rainfall=3.20"

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Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
4.3	50	0.0400	0.20		Sheet Flow, Grass: Short n= 0.150 P2= 3.20"
0.6	110	0.0400	3.22		Shallow Concentrated Flow, Unpaved Kv= 16.1 fps
2.8	270	0.0100	1.61		Shallow Concentrated Flow, Unpaved Kv= 16.1 fps
0.3	85	0.0600	4.97		Shallow Concentrated Flow, Paved Kv= 20.3 fps
2.3	225	0.0100	1.61		Shallow Concentrated Flow, Unpaved Kv= 16.1 fps
10.3	740	Total			

Summary for Subcatchment XDA1: Existing Flow to Forest St

Runoff = 2.83 cfs @ 12.12 hrs, Volume= 0.206 af, Depth> 1.71"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
Type III 24-hr Rainfall=3.20"

Area (sf)	CN	Description
1,634	98	Roofs, HSG C
24,128	83	Small grain, straight row, Good, HSG C
15,948	74	>75% Grass cover, Good, HSG C
302	98	Paved parking, HSG C
20,936	96	Gravel surface, HSG C
62,948	86	Weighted Average
61,012		96.92% Pervious Area
1,936		3.08% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
4.3	50	0.0400	0.20		Sheet Flow, Grass: Short n= 0.150 P2= 3.20"
2.4	200	0.0400	1.40		Shallow Concentrated Flow, Short Grass Pasture Kv= 7.0 fps
1.6	250	0.0250	2.55		Shallow Concentrated Flow, Unpaved Kv= 16.1 fps
8.3	500	Total			

Summary for Subcatchment XDA2: Existing Flow to Hillside St

Runoff = 8.48 cfs @ 12.14 hrs, Volume= 0.667 af, Depth> 2.04"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
Type III 24-hr Rainfall=3.20"

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Type III 24-hr Rainfall=3.20"

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Area (sf)	CN	Description			
19,007	98	Roofs, HSG C			
9,809	98	Paved parking, HSG C			
25,505	74	>75% Grass cover, Good, HSG C			
35,985	83	Small grain, straight row, Good, HSG C			
5,021	73	Woods, Fair, HSG C			
76,011	96	Gravel surface, HSG C			
171,338	90	Weighted Average			
142,522		83.18% Pervious Area			
28,816		16.82% Impervious Area			
Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
4.3	50	0.0400	0.20		Sheet Flow, Grass: Short n= 0.150 P2= 3.20"
0.6	110	0.0400	3.22		Shallow Concentrated Flow, Unpaved Kv= 16.1 fps
2.8	270	0.0100	1.61		Shallow Concentrated Flow, Unpaved Kv= 16.1 fps
0.3	85	0.0600	4.97		Shallow Concentrated Flow, Paved Kv= 20.3 fps
2.3	225	0.0100	1.61		Shallow Concentrated Flow, Unpaved Kv= 16.1 fps
10.3	740	Total			

Summary for Reach 3R: Existing Flow

Inflow Area = 5.378 ac, 13.13% Impervious, Inflow Depth > 1.95"

Inflow = 11.23 cfs @ 12.14 hrs, Volume= 0.874 af

Outflow = 11.23 cfs @ 12.14 hrs, Volume= 0.874 af, Atten= 0%, Lag= 0.0 min

Routing by Stor-Ind+Trans method, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs

Summary for Reach 4R: Proposed Flow

Inflow Area = 5.378 ac, 11.67% Impervious, Inflow Depth > 1.87"

Inflow = 6.33 cfs @ 12.16 hrs, Volume= 0.837 af

Outflow = 6.33 cfs @ 12.16 hrs, Volume= 0.837 af, Atten= 0%, Lag= 0.0 min

Routing by Stor-Ind+Trans method, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs

Summary for Pond 3P: Basin

Inflow Area = 3.933 ac, 14.83% Impervious, Inflow Depth > 1.95"

Inflow = 8.18 cfs @ 12.15 hrs, Volume= 0.640 af

Outflow = 4.28 cfs @ 12.36 hrs, Volume= 0.631 af, Atten= 48%, Lag= 12.9 min

Primary = 4.28 cfs @ 12.36 hrs, Volume= 0.631 af

Routing by Stor-Ind method, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs

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Type III 24-hr Rainfall=3.20"

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Peak Elev= 179.78' @ 12.36 hrs Surf.Area= 4,341 sf Storage= 5,513 cf

Plug-Flow detention time= 22.5 min calculated for 0.631 af (99% of inflow)

Center-of-Mass det. time= 17.0 min (798.6 - 781.6)

Volume	Invert	Avail.Storage	Storage Description
#1	178.00'	29,526 cf	Custom Stage Data (Prismatic) Listed below (Recalc)

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
178.00	1,850	0	0
180.00	4,647	6,497	6,497
182.00	18,382	23,029	29,526

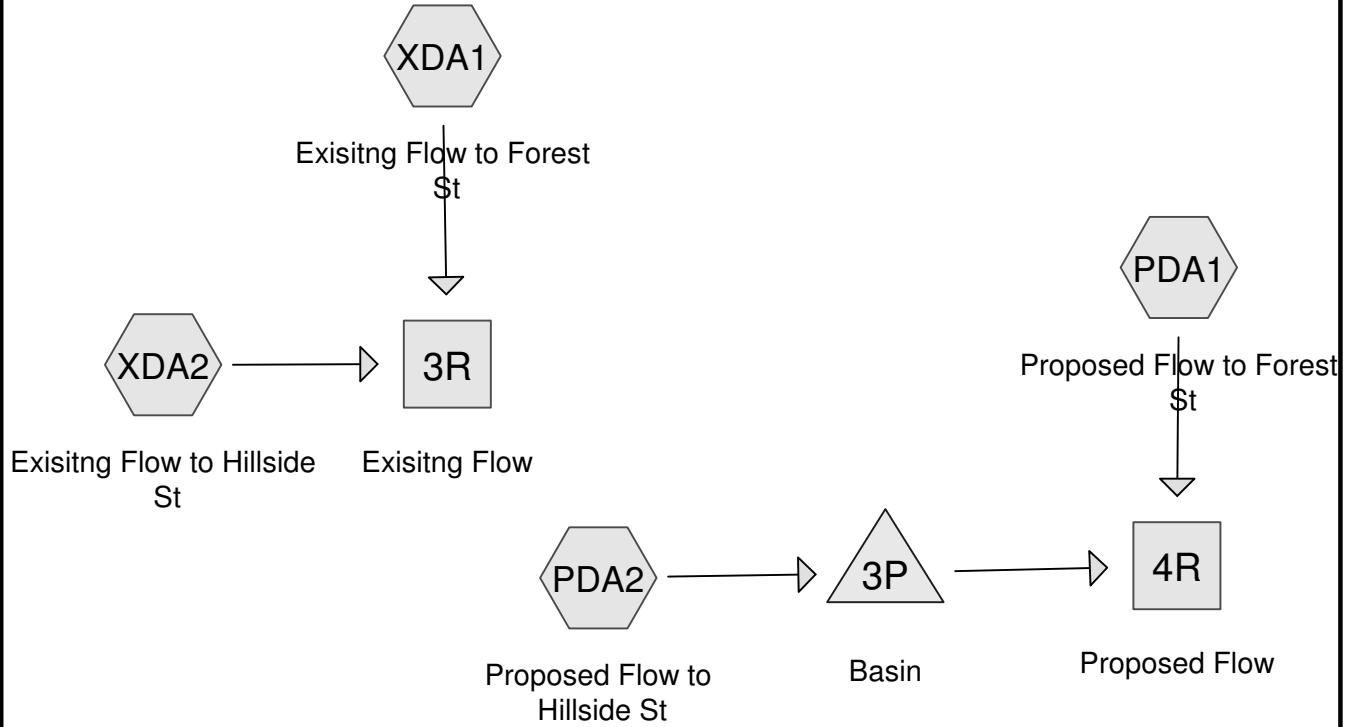
Device	Routing	Invert	Outlet Devices
#1	Primary	178.00'	12.0" Vert. Orifice/Grate C= 0.600
#2	Primary	181.00'	12.0" Vert. Orifice/Grate C= 0.600
#3	Primary	181.50'	80.0' long x 0.5' breadth Broad-Crested Rectangular Weir Head (feet) 0.20 0.40 0.60 0.80 1.00 Coef. (English) 2.80 2.92 3.08 3.30 3.32

Primary OutFlow Max=4.28 cfs @ 12.36 hrs HW=179.78' (Free Discharge)

↑ 1=Orifice/Grate (Orifice Controls 4.28 cfs @ 5.45 fps)

2=Orifice/Grate (Controls 0.00 cfs)

3=Broad-Crested Rectangular Weir (Controls 0.00 cfs)



Routing Diagram for Thayer Nursery-JWB

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Summary for Subcatchment PDA1: Proposed Flow to Forest St

Runoff = 4.87 cfs @ 12.12 hrs, Volume= 0.361 af, Depth> 3.00"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
Type III 24-hr Rainfall=4.70"

Area (sf)	CN	Description
1,634	98	Roofs, HSG C
24,128	83	Small grain, straight row, Good, HSG C
15,948	74	>75% Grass cover, Good, HSG C
302	98	Paved parking, HSG C
20,936	96	Gravel surface, HSG C
62,948	86	Weighted Average
61,012		96.92% Pervious Area
1,936		3.08% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
4.3	50	0.0400	0.20		Sheet Flow, Grass: Short n= 0.150 P2= 3.20"
2.4	200	0.0400	1.40		Shallow Concentrated Flow, Short Grass Pasture Kv= 7.0 fps
1.6	250	0.0250	2.55		Shallow Concentrated Flow, Unpaved Kv= 16.1 fps
8.3	500	Total			

Summary for Subcatchment PDA2: Proposed Flow to Hillside St

Runoff = 13.44 cfs @ 12.14 hrs, Volume= 1.077 af, Depth> 3.29"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
Type III 24-hr Rainfall=4.70"

Area (sf)	CN	Description
19,007	98	Roofs, HSG C
6,400	98	Paved parking, HSG C
25,505	74	>75% Grass cover, Good, HSG C
39,394	81	Small grain, contoured, Good, HSG C
5,021	73	Woods, Fair, HSG C
76,011	96	Gravel surface, HSG C
171,338	89	Weighted Average
145,931		85.17% Pervious Area
25,407		14.83% Impervious Area

Thayer Nursery-JWB

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Type III 24-hr Rainfall=4.70"

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Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
4.3	50	0.0400	0.20		Sheet Flow, Grass: Short n= 0.150 P2= 3.20"
0.6	110	0.0400	3.22		Shallow Concentrated Flow, Unpaved Kv= 16.1 fps
2.8	270	0.0100	1.61		Shallow Concentrated Flow, Unpaved Kv= 16.1 fps
0.3	85	0.0600	4.97		Shallow Concentrated Flow, Paved Kv= 20.3 fps
2.3	225	0.0100	1.61		Shallow Concentrated Flow, Unpaved Kv= 16.1 fps
10.3	740	Total			

Summary for Subcatchment XDA1: Existing Flow to Forest St

Runoff = 4.87 cfs @ 12.12 hrs, Volume= 0.361 af, Depth> 3.00"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
Type III 24-hr Rainfall=4.70"

Area (sf)	CN	Description
1,634	98	Roofs, HSG C
24,128	83	Small grain, straight row, Good, HSG C
15,948	74	>75% Grass cover, Good, HSG C
302	98	Paved parking, HSG C
20,936	96	Gravel surface, HSG C
62,948	86	Weighted Average
61,012		96.92% Pervious Area
1,936		3.08% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
4.3	50	0.0400	0.20		Sheet Flow, Grass: Short n= 0.150 P2= 3.20"
2.4	200	0.0400	1.40		Shallow Concentrated Flow, Short Grass Pasture Kv= 7.0 fps
1.6	250	0.0250	2.55		Shallow Concentrated Flow, Unpaved Kv= 16.1 fps
8.3	500	Total			

Summary for Subcatchment XDA2: Existing Flow to Hillside St

Runoff = 13.75 cfs @ 12.14 hrs, Volume= 1.110 af, Depth> 3.38"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
Type III 24-hr Rainfall=4.70"

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Type III 24-hr Rainfall=4.70"

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Area (sf)	CN	Description			
19,007	98	Roofs, HSG C			
9,809	98	Paved parking, HSG C			
25,505	74	>75% Grass cover, Good, HSG C			
35,985	83	Small grain, straight row, Good, HSG C			
5,021	73	Woods, Fair, HSG C			
76,011	96	Gravel surface, HSG C			
171,338	90	Weighted Average			
142,522		83.18% Pervious Area			
28,816		16.82% Impervious Area			
Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
4.3	50	0.0400	0.20		Sheet Flow, Grass: Short n= 0.150 P2= 3.20"
0.6	110	0.0400	3.22		Shallow Concentrated Flow, Unpaved Kv= 16.1 fps
2.8	270	0.0100	1.61		Shallow Concentrated Flow, Unpaved Kv= 16.1 fps
0.3	85	0.0600	4.97		Shallow Concentrated Flow, Paved Kv= 20.3 fps
2.3	225	0.0100	1.61		Shallow Concentrated Flow, Unpaved Kv= 16.1 fps
10.3	740	Total			

Summary for Reach 3R: Existing Flow

Inflow Area = 5.378 ac, 13.13% Impervious, Inflow Depth > 3.28"

Inflow = 18.46 cfs @ 12.14 hrs, Volume= 1.470 af

Outflow = 18.46 cfs @ 12.14 hrs, Volume= 1.470 af, Atten= 0%, Lag= 0.0 min

Routing by Stor-Ind+Trans method, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs

Summary for Reach 4R: Proposed Flow

Inflow Area = 5.378 ac, 11.67% Impervious, Inflow Depth > 3.18"

Inflow = 9.45 cfs @ 12.14 hrs, Volume= 1.426 af

Outflow = 9.45 cfs @ 12.14 hrs, Volume= 1.426 af, Atten= 0%, Lag= 0.0 min

Routing by Stor-Ind+Trans method, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs

Summary for Pond 3P: Basin

Inflow Area = 3.933 ac, 14.83% Impervious, Inflow Depth > 3.29"

Inflow = 13.44 cfs @ 12.14 hrs, Volume= 1.077 af

Outflow = 5.52 cfs @ 12.43 hrs, Volume= 1.066 af, Atten= 59%, Lag= 17.4 min

Primary = 5.52 cfs @ 12.43 hrs, Volume= 1.066 af

Routing by Stor-Ind method, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs

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Type III 24-hr Rainfall=4.70"

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Peak Elev= 180.63' @ 12.43 hrs Surf.Area= 8,963 sf Storage= 10,774 cf

Plug-Flow detention time= 24.2 min calculated for 1.062 af (99% of inflow)

Center-of-Mass det. time= 19.9 min (789.1 - 769.1)

Volume	Invert	Avail.Storage	Storage Description
#1	178.00'	29,526 cf	Custom Stage Data (Prismatic) Listed below (Recalc)
Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
178.00	1,850	0	0
180.00	4,647	6,497	6,497
182.00	18,382	23,029	29,526

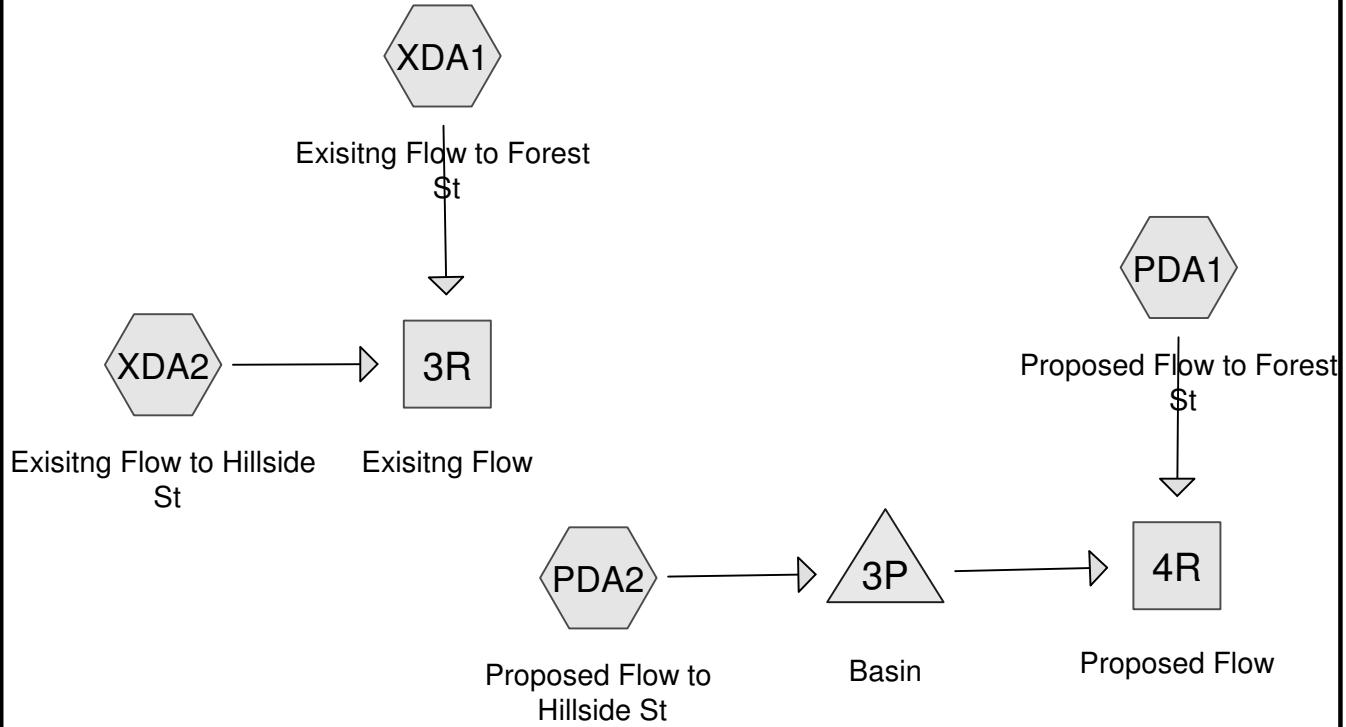
Device	Routing	Invert	Outlet Devices
#1	Primary	178.00'	12.0" Vert. Orifice/Grate C= 0.600
#2	Primary	181.00'	12.0" Vert. Orifice/Grate C= 0.600
#3	Primary	181.50'	80.0' long x 0.5' breadth Broad-Crested Rectangular Weir Head (feet) 0.20 0.40 0.60 0.80 1.00 Coef. (English) 2.80 2.92 3.08 3.30 3.32

Primary OutFlow Max=5.51 cfs @ 12.43 hrs HW=180.63' (Free Discharge)

↑ 1=Orifice/Grate (Orifice Controls 5.51 cfs @ 7.02 fps)

2=Orifice/Grate (Controls 0.00 cfs)

3=Broad-Crested Rectangular Weir (Controls 0.00 cfs)



Routing Diagram for Thayer Nursery-JWB

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Summary for Subcatchment PDA1: Proposed Flow to Forest St

Runoff = 6.11 cfs @ 12.12 hrs, Volume= 0.457 af, Depth> 3.80"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
Type III 24-hr Rainfall=5.60"

Area (sf)	CN	Description
1,634	98	Roofs, HSG C
24,128	83	Small grain, straight row, Good, HSG C
15,948	74	>75% Grass cover, Good, HSG C
302	98	Paved parking, HSG C
20,936	96	Gravel surface, HSG C
62,948	86	Weighted Average
61,012		96.92% Pervious Area
1,936		3.08% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
4.3	50	0.0400	0.20		Sheet Flow, Grass: Short n= 0.150 P2= 3.20"
2.4	200	0.0400	1.40		Shallow Concentrated Flow, Short Grass Pasture Kv= 7.0 fps
1.6	250	0.0250	2.55		Shallow Concentrated Flow, Unpaved Kv= 16.1 fps
8.3	500	Total			

Summary for Subcatchment PDA2: Proposed Flow to Hillside St

Runoff = 16.59 cfs @ 12.14 hrs, Volume= 1.345 af, Depth> 4.10"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
Type III 24-hr Rainfall=5.60"

Area (sf)	CN	Description
19,007	98	Roofs, HSG C
6,400	98	Paved parking, HSG C
25,505	74	>75% Grass cover, Good, HSG C
39,394	81	Small grain, contoured, Good, HSG C
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Type III 24-hr Rainfall=5.60"

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Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
4.3	50	0.0400	0.20		Sheet Flow, Grass: Short n= 0.150 P2= 3.20"
0.6	110	0.0400	3.22		Shallow Concentrated Flow, Unpaved Kv= 16.1 fps
2.8	270	0.0100	1.61		Shallow Concentrated Flow, Unpaved Kv= 16.1 fps
0.3	85	0.0600	4.97		Shallow Concentrated Flow, Paved Kv= 20.3 fps
2.3	225	0.0100	1.61		Shallow Concentrated Flow, Unpaved Kv= 16.1 fps
10.3	740	Total			

Summary for Subcatchment XDA1: Existing Flow to Forest St

Runoff = 6.11 cfs @ 12.12 hrs, Volume= 0.457 af, Depth> 3.80"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
Type III 24-hr Rainfall=5.60"

Area (sf)	CN	Description
1,634	98	Roofs, HSG C
24,128	83	Small grain, straight row, Good, HSG C
15,948	74	>75% Grass cover, Good, HSG C
302	98	Paved parking, HSG C
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Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
4.3	50	0.0400	0.20		Sheet Flow, Grass: Short n= 0.150 P2= 3.20"
2.4	200	0.0400	1.40		Shallow Concentrated Flow, Short Grass Pasture Kv= 7.0 fps
1.6	250	0.0250	2.55		Shallow Concentrated Flow, Unpaved Kv= 16.1 fps
8.3	500	Total			

Summary for Subcatchment XDA2: Existing Flow to Hillside St

Runoff = 16.89 cfs @ 12.14 hrs, Volume= 1.379 af, Depth> 4.21"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
Type III 24-hr Rainfall=5.60"

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Type III 24-hr Rainfall=5.60"

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Area (sf)	CN	Description			
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9,809	98	Paved parking, HSG C			
25,505	74	>75% Grass cover, Good, HSG C			
35,985	83	Small grain, straight row, Good, HSG C			
5,021	73	Woods, Fair, HSG C			
76,011	96	Gravel surface, HSG C			
171,338	90	Weighted Average			
142,522		83.18% Pervious Area			
28,816		16.82% Impervious Area			
Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
4.3	50	0.0400	0.20		Sheet Flow, Grass: Short n= 0.150 P2= 3.20"
0.6	110	0.0400	3.22		Shallow Concentrated Flow, Unpaved Kv= 16.1 fps
2.8	270	0.0100	1.61		Shallow Concentrated Flow, Unpaved Kv= 16.1 fps
0.3	85	0.0600	4.97		Shallow Concentrated Flow, Paved Kv= 20.3 fps
2.3	225	0.0100	1.61		Shallow Concentrated Flow, Unpaved Kv= 16.1 fps
10.3	740	Total			

Summary for Reach 3R: Existing Flow

Inflow Area = 5.378 ac, 13.13% Impervious, Inflow Depth > 4.10"

Inflow = 22.80 cfs @ 12.13 hrs, Volume= 1.837 af

Outflow = 22.80 cfs @ 12.13 hrs, Volume= 1.837 af, Atten= 0%, Lag= 0.0 min

Routing by Stor-Ind+Trans method, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs

Summary for Reach 4R: Proposed Flow

Inflow Area = 5.378 ac, 11.67% Impervious, Inflow Depth > 3.99"

Inflow = 11.11 cfs @ 12.13 hrs, Volume= 1.790 af

Outflow = 11.11 cfs @ 12.13 hrs, Volume= 1.790 af, Atten= 0%, Lag= 0.0 min

Routing by Stor-Ind+Trans method, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs

Summary for Pond 3P: Basin

Inflow Area = 3.933 ac, 14.83% Impervious, Inflow Depth > 4.10"

Inflow = 16.59 cfs @ 12.14 hrs, Volume= 1.345 af

Outflow = 5.98 cfs @ 12.47 hrs, Volume= 1.333 af, Atten= 64%, Lag= 19.7 min

Primary = 5.98 cfs @ 12.47 hrs, Volume= 1.333 af

Routing by Stor-Ind method, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs

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Type III 24-hr Rainfall=5.60"

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Peak Elev= 181.00' @ 12.47 hrs Surf.Area= 11,509 sf Storage= 14,568 cf

Plug-Flow detention time= 26.4 min calculated for 1.329 af (99% of inflow)

Center-of-Mass det. time= 22.5 min (786.5 - 764.1)

Volume	Invert	Avail.Storage	Storage Description
#1	178.00'	29,526 cf	Custom Stage Data (Prismatic) Listed below (Recalc)
Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
178.00	1,850	0	0
180.00	4,647	6,497	6,497
182.00	18,382	23,029	29,526

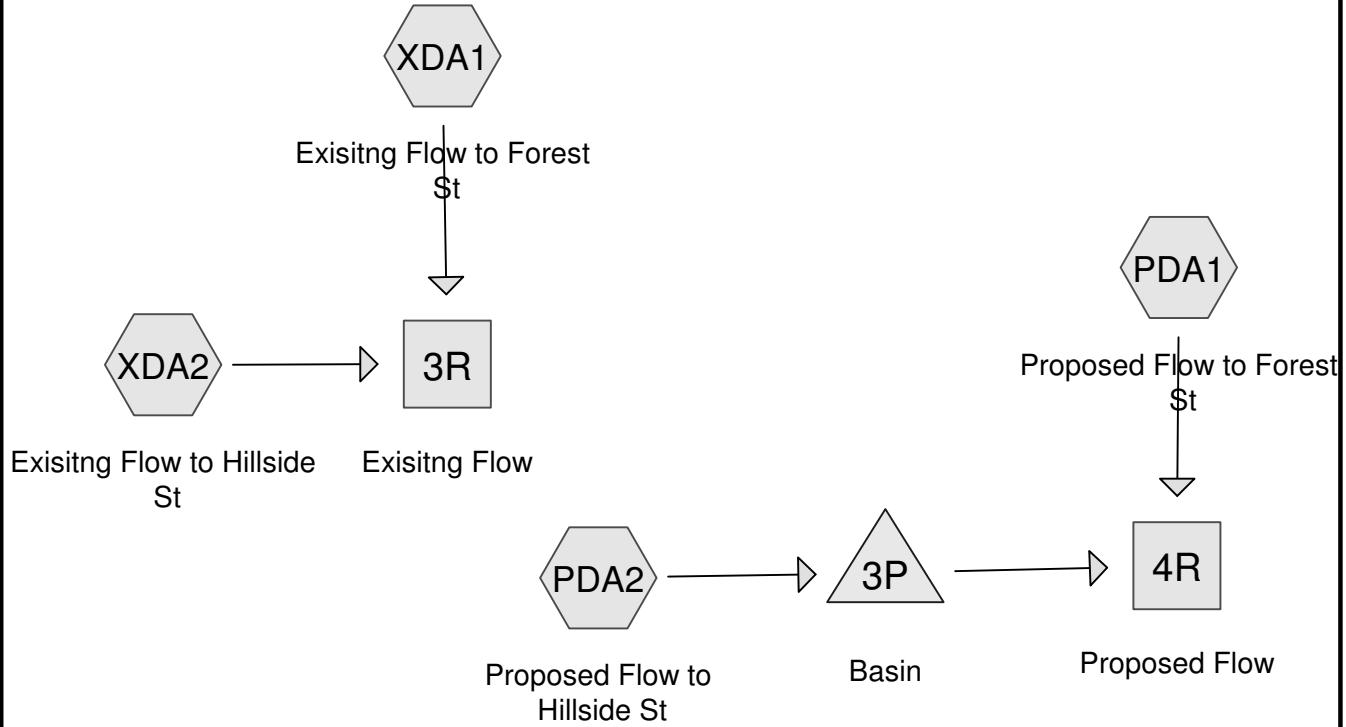
Device	Routing	Invert	Outlet Devices
#1	Primary	178.00'	12.0" Vert. Orifice/Grate C= 0.600
#2	Primary	181.00'	12.0" Vert. Orifice/Grate C= 0.600
#3	Primary	181.50'	80.0' long x 0.5' breadth Broad-Crested Rectangular Weir Head (feet) 0.20 0.40 0.60 0.80 1.00 Coef. (English) 2.80 2.92 3.08 3.30 3.32

Primary OutFlow Max=5.98 cfs @ 12.47 hrs HW=181.00' (Free Discharge)

↑ 1=Orifice/Grate (Orifice Controls 5.98 cfs @ 7.61 fps)

2=Orifice/Grate (Controls 0.00 cfs)

3=Broad-Crested Rectangular Weir (Controls 0.00 cfs)



Routing Diagram for Thayer Nursery-JWB

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Summary for Subcatchment PDA1: Proposed Flow to Forest St

Runoff = 8.03 cfs @ 12.12 hrs, Volume= 0.610 af, Depth> 5.07"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
Type III 24-hr Rainfall=7.00"

Area (sf)	CN	Description
1,634	98	Roofs, HSG C
24,128	83	Small grain, straight row, Good, HSG C
15,948	74	>75% Grass cover, Good, HSG C
302	98	Paved parking, HSG C
20,936	96	Gravel surface, HSG C
62,948	86	Weighted Average
61,012		96.92% Pervious Area
1,936		3.08% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
4.3	50	0.0400	0.20		Sheet Flow, Grass: Short n= 0.150 P2= 3.20"
2.4	200	0.0400	1.40		Shallow Concentrated Flow, Short Grass Pasture Kv= 7.0 fps
1.6	250	0.0250	2.55		Shallow Concentrated Flow, Unpaved Kv= 16.1 fps
8.3	500	Total			

Summary for Subcatchment PDA2: Proposed Flow to Hillside St

Runoff = 21.47 cfs @ 12.14 hrs, Volume= 1.767 af, Depth> 5.39"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
Type III 24-hr Rainfall=7.00"

Area (sf)	CN	Description
19,007	98	Roofs, HSG C
6,400	98	Paved parking, HSG C
25,505	74	>75% Grass cover, Good, HSG C
39,394	81	Small grain, contoured, Good, HSG C
5,021	73	Woods, Fair, HSG C
76,011	96	Gravel surface, HSG C
171,338	89	Weighted Average
145,931		85.17% Pervious Area
25,407		14.83% Impervious Area

Thayer Nursery-JWB

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Type III 24-hr Rainfall=7.00"

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Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
4.3	50	0.0400	0.20		Sheet Flow, Grass: Short n= 0.150 P2= 3.20"
0.6	110	0.0400	3.22		Shallow Concentrated Flow, Unpaved Kv= 16.1 fps
2.8	270	0.0100	1.61		Shallow Concentrated Flow, Unpaved Kv= 16.1 fps
0.3	85	0.0600	4.97		Shallow Concentrated Flow, Paved Kv= 20.3 fps
2.3	225	0.0100	1.61		Shallow Concentrated Flow, Unpaved Kv= 16.1 fps
10.3	740	Total			

Summary for Subcatchment XDA1: Existing Flow to Forest St

Runoff = 8.03 cfs @ 12.12 hrs, Volume= 0.610 af, Depth> 5.07"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
Type III 24-hr Rainfall=7.00"

Area (sf)	CN	Description
1,634	98	Roofs, HSG C
24,128	83	Small grain, straight row, Good, HSG C
15,948	74	>75% Grass cover, Good, HSG C
302	98	Paved parking, HSG C
20,936	96	Gravel surface, HSG C
62,948	86	Weighted Average
61,012		96.92% Pervious Area
1,936		3.08% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
4.3	50	0.0400	0.20		Sheet Flow, Grass: Short n= 0.150 P2= 3.20"
2.4	200	0.0400	1.40		Shallow Concentrated Flow, Short Grass Pasture Kv= 7.0 fps
1.6	250	0.0250	2.55		Shallow Concentrated Flow, Unpaved Kv= 16.1 fps
8.3	500	Total			

Summary for Subcatchment XDA2: Existing Flow to Hillside St

Runoff = 21.75 cfs @ 12.14 hrs, Volume= 1.802 af, Depth> 5.50"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
Type III 24-hr Rainfall=7.00"

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Type III 24-hr Rainfall=7.00"

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Area (sf)	CN	Description			
19,007	98	Roofs, HSG C			
9,809	98	Paved parking, HSG C			
25,505	74	>75% Grass cover, Good, HSG C			
35,985	83	Small grain, straight row, Good, HSG C			
5,021	73	Woods, Fair, HSG C			
76,011	96	Gravel surface, HSG C			
171,338	90	Weighted Average			
142,522		83.18% Pervious Area			
28,816		16.82% Impervious Area			
Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
4.3	50	0.0400	0.20		Sheet Flow, Grass: Short n= 0.150 P2= 3.20"
0.6	110	0.0400	3.22		Shallow Concentrated Flow, Unpaved Kv= 16.1 fps
2.8	270	0.0100	1.61		Shallow Concentrated Flow, Unpaved Kv= 16.1 fps
0.3	85	0.0600	4.97		Shallow Concentrated Flow, Paved Kv= 20.3 fps
2.3	225	0.0100	1.61		Shallow Concentrated Flow, Unpaved Kv= 16.1 fps
10.3	740	Total			

Summary for Reach 3R: Existing Flow

Inflow Area = 5.378 ac, 13.13% Impervious, Inflow Depth > 5.38"

Inflow = 29.50 cfs @ 12.13 hrs, Volume= 2.412 af

Outflow = 29.50 cfs @ 12.13 hrs, Volume= 2.412 af, Atten= 0%, Lag= 0.0 min

Routing by Stor-Ind+Trans method, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs

Summary for Reach 4R: Proposed Flow

Inflow Area = 5.378 ac, 11.67% Impervious, Inflow Depth > 5.27"

Inflow = 13.60 cfs @ 12.12 hrs, Volume= 2.363 af

Outflow = 13.60 cfs @ 12.12 hrs, Volume= 2.363 af, Atten= 0%, Lag= 0.0 min

Routing by Stor-Ind+Trans method, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs

Summary for Pond 3P: Basin

Inflow Area = 3.933 ac, 14.83% Impervious, Inflow Depth > 5.39"

Inflow = 21.47 cfs @ 12.14 hrs, Volume= 1.767 af

Outflow = 7.29 cfs @ 12.49 hrs, Volume= 1.753 af, Atten= 66%, Lag= 20.7 min

Primary = 7.29 cfs @ 12.49 hrs, Volume= 1.753 af

Routing by Stor-Ind method, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs

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Type III 24-hr Rainfall=7.00"

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Peak Elev= 181.45' @ 12.49 hrs Surf.Area= 14,620 sf Storage= 20,486 cf

Plug-Flow detention time= 29.5 min calculated for 1.747 af (99% of inflow)

Center-of-Mass det. time= 26.0 min (784.3 - 758.4)

Volume	Invert	Avail.Storage	Storage Description
#1	178.00'	29,526 cf	Custom Stage Data (Prismatic) Listed below (Recalc)
Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
178.00	1,850	0	0
180.00	4,647	6,497	6,497
182.00	18,382	23,029	29,526

Device	Routing	Invert	Outlet Devices
#1	Primary	178.00'	12.0" Vert. Orifice/Grate C= 0.600
#2	Primary	181.00'	12.0" Vert. Orifice/Grate C= 0.600
#3	Primary	181.50'	80.0' long x 0.5' breadth Broad-Crested Rectangular Weir Head (feet) 0.20 0.40 0.60 0.80 1.00 Coef. (English) 2.80 2.92 3.08 3.30 3.32

Primary OutFlow Max=7.28 cfs @ 12.49 hrs HW=181.45' (Free Discharge)

- ↑ 1=Orifice/Grate (Orifice Controls 6.50 cfs @ 8.27 fps)
- 2=Orifice/Grate (Orifice Controls 0.79 cfs @ 2.29 fps)
- 3=Broad-Crested Rectangular Weir (Controls 0.00 cfs)