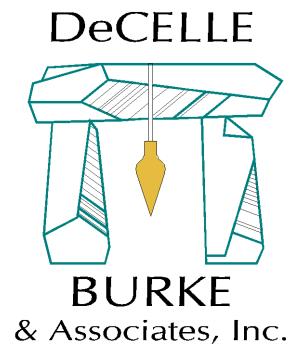


September 21, 2015

Milton Planning Board
Milton Town Hall
525 Canton Avenue
Milton, MA 02186
Attn: Tim Czerwinski



Re: Thayer Nursery Site Improvements

Dear Members of the Board:

DeCelle-Burke & Associates, Inc. (DBA) recently received a letter prepared by Eaglebrook Engineering & Survey, LLC (EES) dated September 17, 2015 regarding the proposed site improvements for Thayer Nursery located off of Hillside Street in Milton, Massachusetts. EES raised multiple concerns regarding the recent submission prepared by this office. DBA offers the following responses to EES's letter:

Existing Conditions

- The existing stone swale was shown on an earlier site plan as a possible stormwater control feature. Thayer Nursery constructed the underground stone swale but it collected no runoff and therefore was ineffective. It shall be abandoned. A note was added to the plan.
- The watershed maps are attached to this letter.
- We stand by our evaluation of test pit. No evidence of groundwater found in test pit #2.

Proposed Conditions

- The watershed Maps are attached to this letter.
- The stone swale does not capture any stormwater however we propose to abandon the swale to alleviate the concern raised by EES.
- It is our belief that the berm as designed fully protects the northeast abutting properties given the proposed grades shown on the plan as well as the exiting grades along this property line that we propose to maintain. However, to provide additional clarity we have revised the plans to include proposed spot grades of 183 along this edge.
- A note stating the berm shall be a minimum of 18" has been added to the plans
- A note was added to the plans to state the swale shall be loamed and hydroseeded to assist in sediment removal and minimize erosion.
- The 24" outlet in the HydroCAD model was revised to model in the horizontal plane which correctly references the outlet control structure detail on Sheet 3 of 3. The result was a slight increase in offsite flow for the 100-year storm event but the stormwater management system continues to significantly reduce the current condition of 29.50 cfs to 14.27 cfs. The revised HydroCAD calculations and the Flow Summary Sheet are attached to this letter.

It is our belief that with the suggested revisions by EES the plan continues to protect the interests of the abutter and provide the Planning Board to render a positive vote for the proposed site improvements. We look forward to discussing these changes at your next scheduled public hearing.

Sincerely,
DeCelle-Burke & Associates, Inc.

James W. Burke, P.E.

Project:

Proposed Stormwater Improvements
Thayer Nursery
Milton, MA 02186

Prepared for:

Thayer Nursery
Hillside Street
Milton, MA 02186

Revised:

September 21, 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	11.23	Flow off-site	6.33

10-Year Storm (4.7")

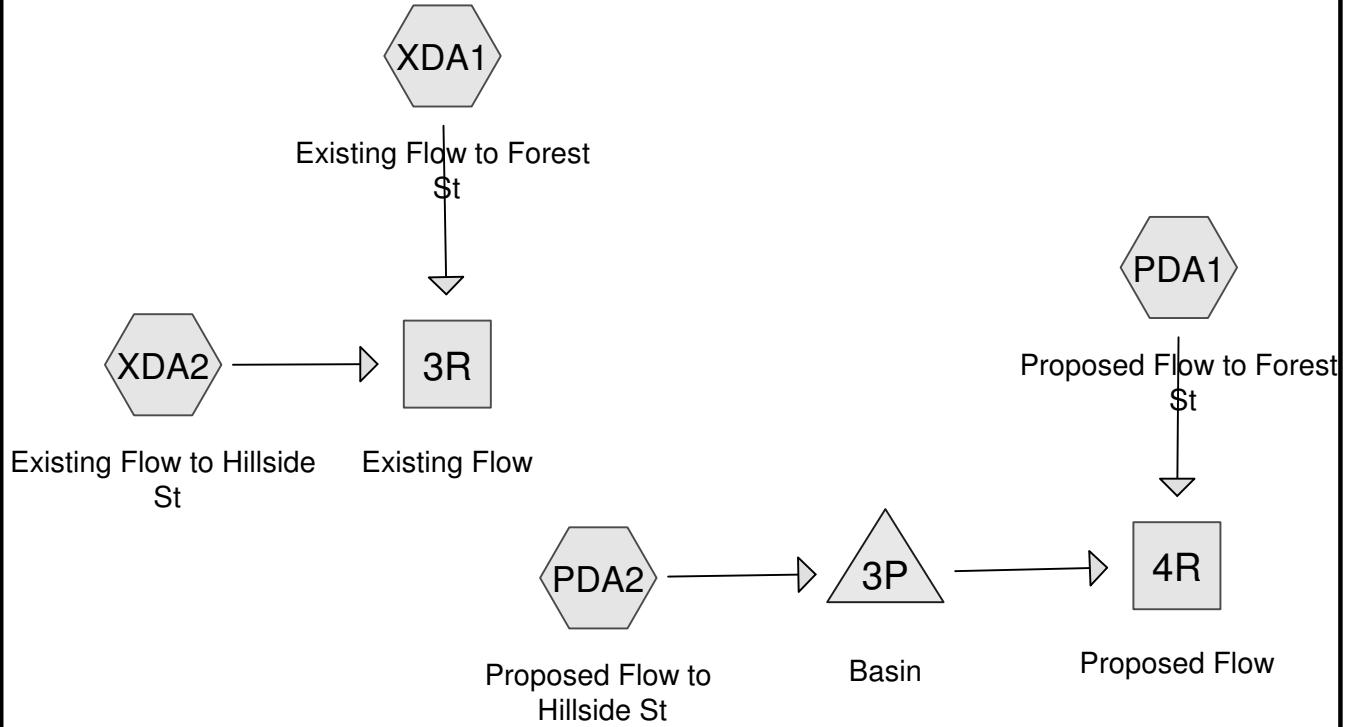
Existing Conditions		Proposed Conditions	
Area Description	Flow (CFS)	Area Description	Flow (CFS)
Flow off-site	18.46	Flow off-site	9.45

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	11.12

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	14.27



Routing Diagram for Thayer Nursery-JWB

Prepared by DeCelle-Burke & Associates, Printed 9/21/2015
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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"

Thayer Nursery-JWB

Prepared by DeCelle-Burke & Associates

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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

Thayer Nursery-JWB

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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

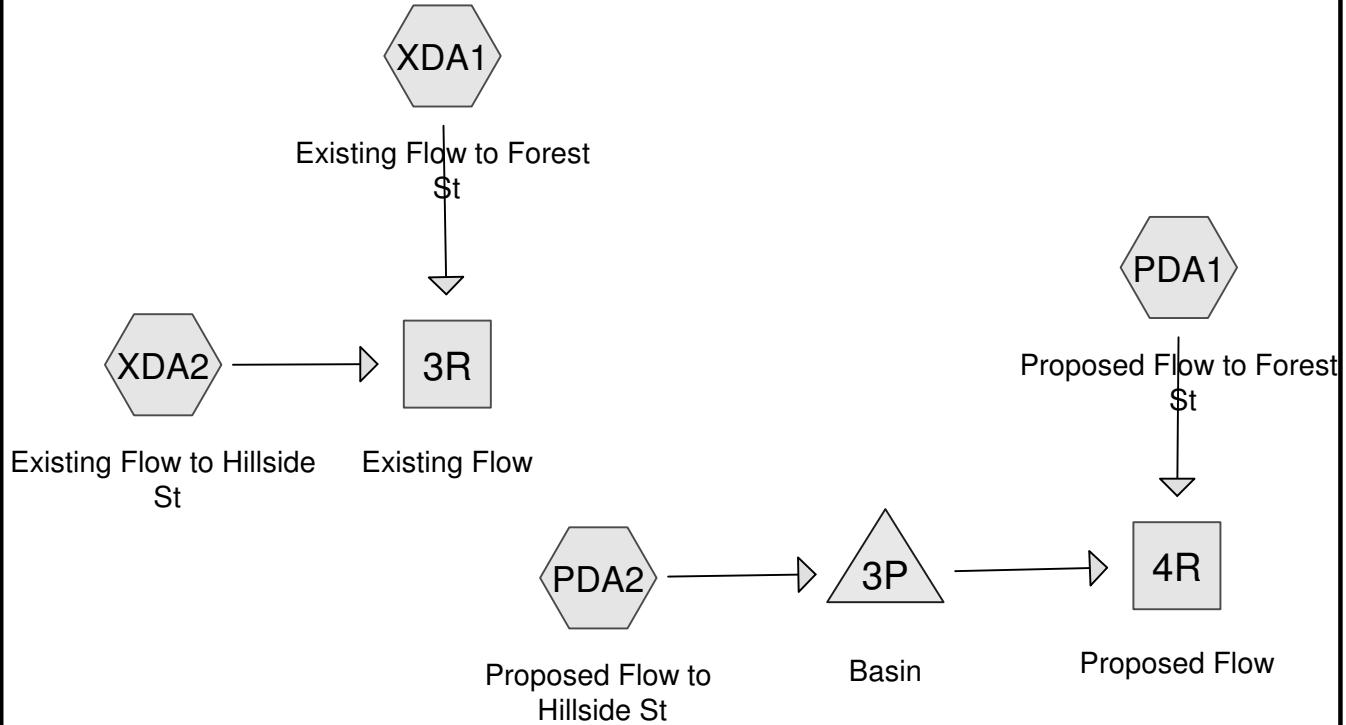
Plug-Flow detention time= 22.5 min calculated for 0.631 af (99% of inflow)
Center-of-Mass det. time= 17.0 min (798.6 - 781.6)

Volume	Invert	Avail.Storage	Storage Description
#1	178.00'	27,370 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	16,226	20,873	27,370

Device	Routing	Invert	Outlet Devices
#1	Primary	178.00'	12.0" Vert. Orifice/Grate C= 0.600
#2	Primary	181.00'	24.0" Horiz. Orifice/Grate C= 0.600 Limited to weir flow at low heads
#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"

Thayer Nursery-JWB

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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 = 5.55 cfs @ 12.43 hrs, Volume= 1.066 af, Atten= 59%, Lag= 17.3 min

Primary = 5.55 cfs @ 12.43 hrs, Volume= 1.066 af

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

Thayer Nursery-JWB

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Type III 24-hr Rainfall=4.70"

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Peak Elev= 180.65' @ 12.43 hrs Surf.Area= 8,418 sf Storage= 10,752 cf

Plug-Flow detention time= 24.2 min calculated for 1.066 af (99% of inflow)

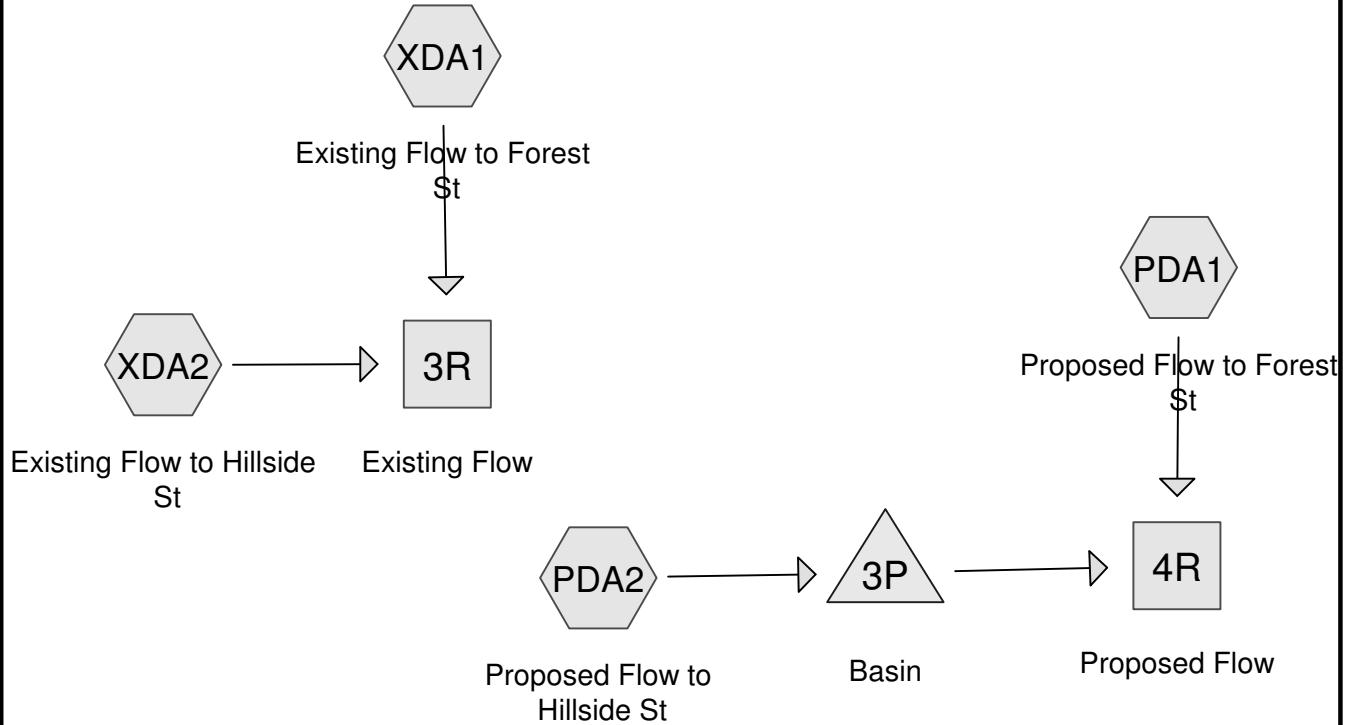
Center-of-Mass det. time= 19.9 min (789.0 - 769.1)

Volume	Invert	Avail.Storage	Storage Description
#1	178.00'	27,370 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	16,226	20,873	27,370

Device	Routing	Invert	Outlet Devices
#1	Primary	178.00'	12.0" Vert. Orifice/Grate C= 0.600
#2	Primary	181.00'	24.0" Horiz. Orifice/Grate C= 0.600 Limited to weir flow at low heads
#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=5.54 cfs @ 12.43 hrs HW=180.65' (Free Discharge)

- ↑ 1=Orifice/Grate (Orifice Controls 5.54 cfs @ 7.06 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
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

Prepared by DeCelle-Burke & Associates

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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
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 = 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"

Thayer Nursery-JWB

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Type III 24-hr Rainfall=5.60"

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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 > 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 = 11.12 cfs @ 12.13 hrs, Volume= 1.790 af

Outflow = 11.12 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 = 6.20 cfs @ 12.46 hrs, Volume= 1.333 af, Atten= 63%, Lag= 19.1 min

Primary = 6.20 cfs @ 12.46 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= 181.04' @ 12.46 hrs Surf.Area= 10,673 sf Storage= 14,469 cf

Plug-Flow detention time= 26.2 min calculated for 1.333 af (99% of inflow)

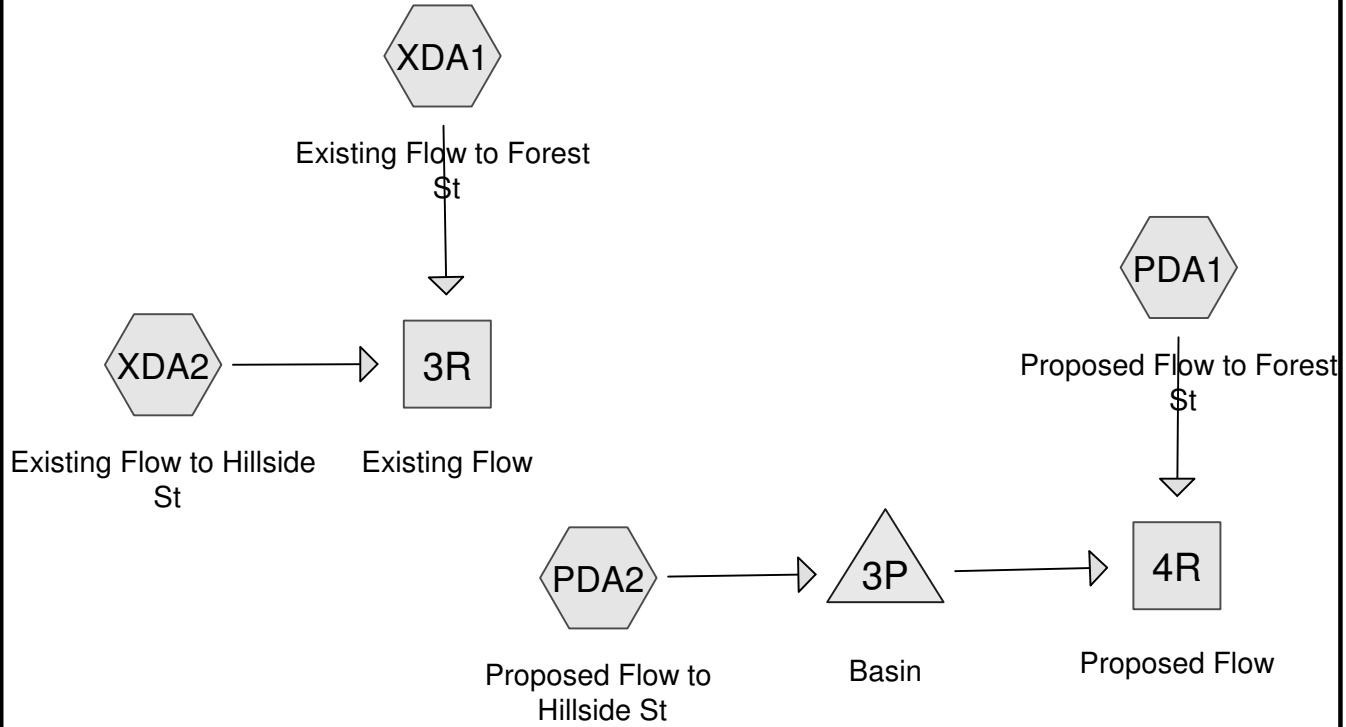
Center-of-Mass det. time= 22.3 min (786.3 - 764.1)

Volume	Invert	Avail.Storage	Storage Description
#1	178.00'	27,370 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	16,226	20,873	27,370

Device	Routing	Invert	Outlet Devices
#1	Primary	178.00'	12.0" Vert. Orifice/Grate C= 0.600
#2	Primary	181.00'	24.0" Horiz. Orifice/Grate C= 0.600 Limited to weir flow at low heads
#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=6.19 cfs @ 12.46 hrs HW=181.04' (Free Discharge)

- ↑ 1=Orifice/Grate (Orifice Controls 6.03 cfs @ 7.67 fps)
- 2=Orifice/Grate (Weir Controls 0.16 cfs @ 0.65 fps)
- 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 = 14.27 cfs @ 12.31 hrs, Volume= 2.363 af

Outflow = 14.27 cfs @ 12.31 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 = 10.63 cfs @ 12.37 hrs, Volume= 1.753 af, Atten= 50%, Lag= 13.5 min

Primary = 10.63 cfs @ 12.37 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= 181.35' @ 12.37 hrs Surf.Area= 12,459 sf Storage= 18,037 cf

Plug-Flow detention time= 25.5 min calculated for 1.747 af (99% of inflow)

Center-of-Mass det. time= 22.0 min (780.4 - 758.4)

Volume	Invert	Avail.Storage	Storage Description
#1	178.00'	27,370 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	16,226	20,873	27,370

Device	Routing	Invert	Outlet Devices
#1	Primary	178.00'	12.0" Vert. Orifice/Grate C= 0.600
#2	Primary	181.00'	24.0" Horiz. Orifice/Grate C= 0.600 Limited to weir flow at low heads
#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=10.57 cfs @ 12.37 hrs HW=181.35' (Free Discharge)

- ↑ 1=Orifice/Grate (Orifice Controls 6.38 cfs @ 8.12 fps)
- 2=Orifice/Grate (Weir Controls 4.19 cfs @ 1.92 fps)
- 3=Broad-Crested Rectangular Weir (Controls 0.00 cfs)