Supplemental Stormwater Report

Special Residential Townhouse Development
Prospect Hill Village
Bellingham, Massachusetts

April 28, 2025

Prepared for:

Wall Street Development Corp
P.O. Box 272
Westwood, MA 02090

Prepared by:

GLM Engineering Consultants, Inc.
19 Exchange Street
Holliston, Massachusetts 01746
(508) 429 - 1100

Robert S. Truax, P.E.
Professional Engineer

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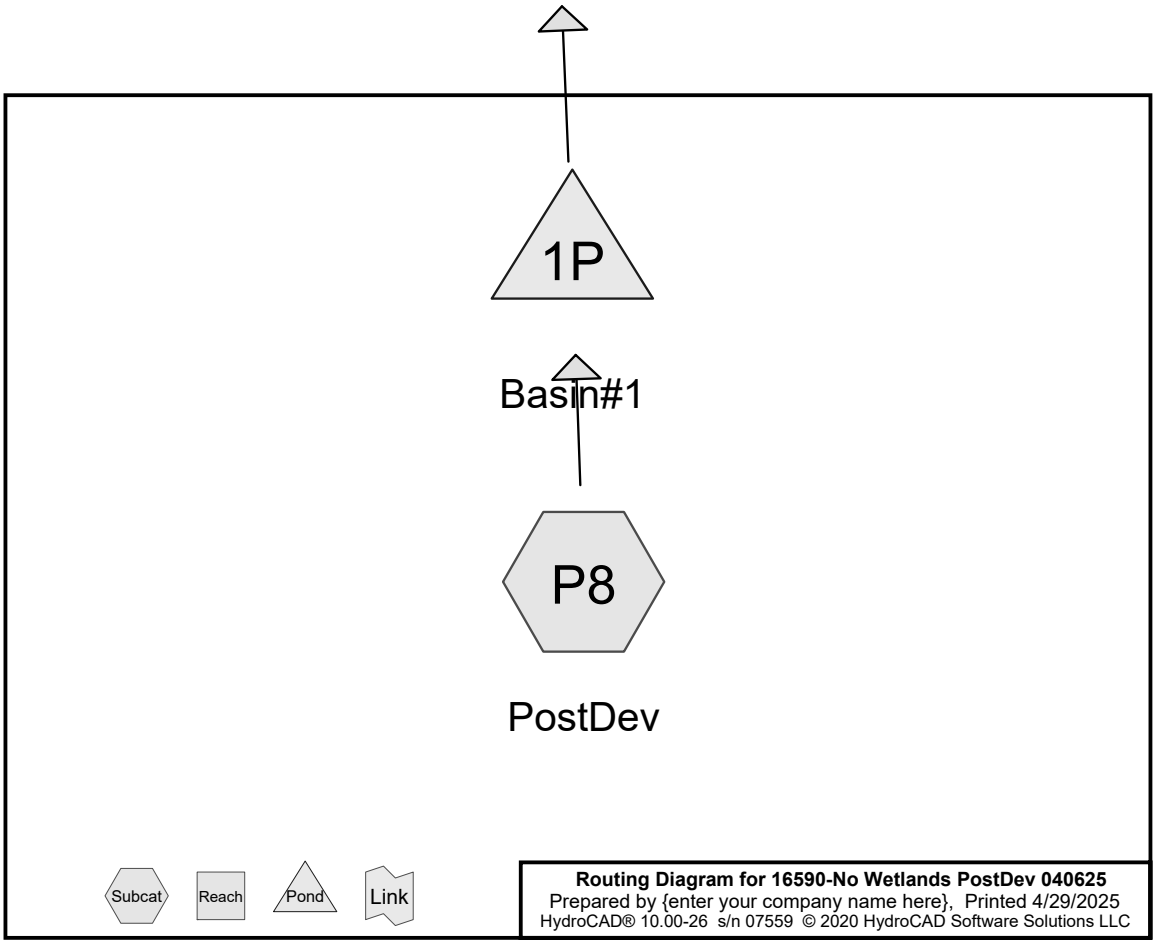
DESCRIPTION



Summary for Subcatchment P8: PostDev

Runoff = 0.93 cfs @ 12.51 hrs, Volume= 0.203 af, Depth> 0.27"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs
Type III 24-hr 2-year Rainfall=3.27"

	Area (sf)	CN	Description
*	10,763	98	Sidewalk
*	92,401	98	Roadway/Drives
*	2,870	98	Emergencey Access Road
	288,601	39	>75% Grass cover, Good, HSG A
	394,635	55	Weighted Average
	288,601		73.13% Pervious Area
	106,034		26.87% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
10.8	50	0.0100	0.1		**Sheet Flow, A-B** Grass: Dense n= 0.240 P2= 3.20"
3.7	155	0.0100	0.7		**Shallow Concentrated Flow, B-C** Short Grass Pasture Kv= 7.0 fps
0.4	50	0.0100	2.0		**Shallow Concentrated Flow, C-D** Paved Kv= 20.3 fps
3.0	825	0.0100	4.5	3.6	**Pipe Channel, D-E** 12.0" Round Area= 0.8 sf Perim= 3.1' r= 0.25' n= 0.013
17.9	1,080	Total			

Summary for Pond 1P: Basin#1

Inflow Area = 9.060 ac, 26.87% Impervious, Inflow Depth > 0.27" for 2-year event
Inflow = 0.93 cfs @ 12.51 hrs, Volume= 0.203 af
Outflow = 0.69 cfs @ 12.71 hrs, Volume= 0.203 af, Atten= 25.56%, Lag= 12.4 min
Discarded = 0.69 cfs @ 12.71 hrs, Volume= 0.203 af
Primary = 0.00 cfs @ 0.00 hrs, Volume= 0.000 af

Routing by Stor-Ind method, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs
Peak Elev= 228.32' @ 12.71 hrs Surf.Area= 2,374 sf Storage= 515 cf

Plug-Flow detention time= 6.4 min calculated for 0.203 af (100% of inflow)
Center-of-Mass det. time= 5.5 min (963.2 - 957.7)

Volume	Invert	Avail.Storage	Storage Description
#1	228.00'	49,089 cf	**Custom Stage Data (Irregular)** Listed below (Recalc)

Elevation (feet)	Surf.Area (sq-ft)	Perim. (feet)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)	Wet.Area (sq-ft)
228.00	993	123.0	0	0	993
229.00	7,415	404.0	3,707	3,707	12,780
230.00	10,180	432.0	8,761	12,468	14,689
232.00	12,890	470.0	23,017	35,485	17,562
233.00	14,330	489.0	13,604	49,089	19,089

Device	Routing	Invert	Outlet Devices
#1	Discarded	228.00'	**8.270 in/hr Exfiltration over Wetted area** Conductivity to Groundwater Elevation = 225.70'
#2	Primary	232.00'	**10.0' long x 10.0' breadth Broad-Crested Rectangular Weir** Head (feet) 0.20 0.40 0.60 0.80 1.00 1.20 1.40 1.60 Coef. (English) 2.49 2.56 2.70 2.69 2.68 2.69 2.67 2.64

Discarded OutFlow Max=0.69 cfs @ 12.71 hrs HW=228.32' (Free Discharge)
1=Exfiltration (Controls 0.69 cfs)

Primary OutFlow Max=0.00 cfs @ 0.00 hrs HW=228.00' (Free Discharge)
2=Broad-Crested Rectangular Weir (Controls 0.00 cfs)

Summary for Subcatchment P8: PostDev

Runoff = 5.41 cfs @ 12.31 hrs, Volume= 0.695 af, Depth> 0.92"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs
Type III 24-hr 10-year Rainfall=4.89"

	Area (sf)	CN	Description
*	10,763	98	Sidewalk
*	92,401	98	Roadway/Drives
*	2,870	98	Emergencey Access Road
	288,601	39	>75% Grass cover, Good, HSG A
	394,635	55	Weighted Average
	288,601		73.13% Pervious Area
	106,034		26.87% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
10.8	50	0.0100	0.1		**Sheet Flow, A-B** Grass: Dense n= 0.240 P2= 3.20"
3.7	155	0.0100	0.7		**Shallow Concentrated Flow, B-C** Short Grass Pasture Kv= 7.0 fps
0.4	50	0.0100	2.0		**Shallow Concentrated Flow, C-D** Paved Kv= 20.3 fps
3.0	825	0.0100	4.5	3.6	**Pipe Channel, D-E** 12.0" Round Area= 0.8 sf Perim= 3.1' r= 0.25' n= 0.013
17.9	1,080	Total			

Summary for Pond 1P: Basin#1

Inflow Area = 9.060 ac, 26.87% Impervious, Inflow Depth > 0.92" for 10-year event
Inflow = 5.41 cfs @ 12.31 hrs, Volume= 0.695 af
Outflow = 2.99 cfs @ 12.66 hrs, Volume= 0.694 af, Atten= 44.64%, Lag= 21.4 min
Discarded = 2.99 cfs @ 12.66 hrs, Volume= 0.694 af
Primary = 0.00 cfs @ 0.00 hrs, Volume= 0.000 af

Routing by Stor-Ind method, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs
Peak Elev= 229.12' @ 12.66 hrs Surf.Area= 7,711 sf Storage= 4,579 cf

Plug-Flow detention time= 15.1 min calculated for 0.694 af (100% of inflow)
Center-of-Mass det. time= 14.4 min (916.9 - 902.5)

Volume	Invert	Avail.Storage	Storage Description
#1	228.00'	49,089 cf	**Custom Stage Data (Irregular)** Listed below (Recalc)

Elevation (feet)	Surf.Area (sq-ft)	Perim. (feet)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)	Wet.Area (sq-ft)
228.00	993	123.0	0	0	993
229.00	7,415	404.0	3,707	3,707	12,780
230.00	10,180	432.0	8,761	12,468	14,689
232.00	12,890	470.0	23,017	35,485	17,562
233.00	14,330	489.0	13,604	49,089	19,089

Device	Routing	Invert	Outlet Devices
#1	Discarded	228.00'	**8.270 in/hr Exfiltration over Wetted area** Conductivity to Groundwater Elevation = 225.70'
#2	Primary	232.00'	**10.0' long x 10.0' breadth Broad-Crested Rectangular Weir** Head (feet) 0.20 0.40 0.60 0.80 1.00 1.20 1.40 1.60 Coef. (English) 2.49 2.56 2.70 2.69 2.68 2.69 2.67 2.64

Discarded OutFlow Max=2.99 cfs @ 12.66 hrs HW=229.12' (Free Discharge)
1=Exfiltration (Controls 2.99 cfs)

Primary OutFlow Max=0.00 cfs @ 0.00 hrs HW=228.00' (Free Discharge)
2=Broad-Crested Rectangular Weir (Controls 0.00 cfs)

Summary for Subcatchment P8: PostDev

Runoff = 10.73 cfs @ 12.27 hrs, Volume= 1.210 af, Depth> 1.60"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs
Type III 24-hr 25-year Rainfall=6.16"

	Area (sf)	CN	Description
*	10,763	98	Sidewalk
*	92,401	98	Roadway/Drives
*	2,870	98	Emergencey Access Road
	288,601	39	>75% Grass cover, Good, HSG A
	394,635	55	Weighted Average
	288,601		73.13% Pervious Area
	106,034		26.87% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
10.8	50	0.0100	0.1		**Sheet Flow, A-B** Grass: Dense n= 0.240 P2= 3.20"
3.7	155	0.0100	0.7		**Shallow Concentrated Flow, B-C** Short Grass Pasture Kv= 7.0 fps
0.4	50	0.0100	2.0		**Shallow Concentrated Flow, C-D** Paved Kv= 20.3 fps
3.0	825	0.0100	4.5	3.6	**Pipe Channel, D-E** 12.0" Round Area= 0.8 sf Perim= 3.1' r= 0.25' n= 0.013
17.9	1,080	Total			

Summary for Pond 1P: Basin#1

Inflow Area = 9.060 ac, 26.87% Impervious, Inflow Depth > 1.60" for 25-year event
Inflow = 10.73 cfs @ 12.27 hrs, Volume= 1.210 af
Outflow = 4.07 cfs @ 12.75 hrs, Volume= 1.207 af, Atten= 62.06%, Lag= 28.3 min
Discarded = 4.07 cfs @ 12.75 hrs, Volume= 1.207 af
Primary = 0.00 cfs @ 0.00 hrs, Volume= 0.000 af

Routing by Stor-Ind method, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs
Peak Elev= 229.96' @ 12.75 hrs Surf.Area= 10,053 sf Storage= 12,038 cf

Plug-Flow detention time= 26.7 min calculated for 1.207 af (100% of inflow)
Center-of-Mass det. time= 25.7 min (908.8 - 883.2)

Volume	Invert	Avail.Storage	Storage Description
#1	228.00'	49,089 cf	**Custom Stage Data (Irregular)** Listed below (Recalc)

Elevation (feet)	Surf.Area (sq-ft)	Perim. (feet)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)	Wet.Area (sq-ft)
228.00	993	123.0	0	0	993
229.00	7,415	404.0	3,707	3,707	12,780
230.00	10,180	432.0	8,761	12,468	14,689
232.00	12,890	470.0	23,017	35,485	17,562
233.00	14,330	489.0	13,604	49,089	19,089

Device	Routing	Invert	Outlet Devices
#1	Discarded	228.00'	**8.270 in/hr Exfiltration over Wetted area** Conductivity to Groundwater Elevation = 225.70'
#2	Primary	232.00'	**10.0' long x 10.0' breadth Broad-Crested Rectangular Weir** Head (feet) 0.20 0.40 0.60 0.80 1.00 1.20 1.40 1.60 Coef. (English) 2.49 2.56 2.70 2.69 2.68 2.69 2.67 2.64

Discarded OutFlow Max=4.07 cfs @ 12.75 hrs HW=229.96' (Free Discharge)
1=Exfiltration (Controls 4.07 cfs)

Primary OutFlow Max=0.00 cfs @ 0.00 hrs HW=228.00' (Free Discharge)
2=Broad-Crested Rectangular Weir (Controls 0.00 cfs)

Summary for Subcatchment P8: PostDev

Runoff = 24.01 cfs @ 12.26 hrs, Volume= 2.492 af, Depth> 3.30"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs
Type III 24-hr 100-year Rainfall=8.76"

	Area (sf)	CN	Description
*	10,763	98	Sidewalk
*	92,401	98	Roadway/Drives
*	2,870	98	Emergencey Access Road
	288,601	39	>75% Grass cover, Good, HSG A
	394,635	55	Weighted Average
	288,601		73.13% Pervious Area
	106,034		26.87% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
10.8	50	0.0100	0.1		**Sheet Flow, A-B** Grass: Dense n= 0.240 P2= 3.20"
3.7	155	0.0100	0.7		**Shallow Concentrated Flow, B-C** Short Grass Pasture Kv= 7.0 fps
0.4	50	0.0100	2.0		**Shallow Concentrated Flow, C-D** Paved Kv= 20.3 fps
3.0	825	0.0100	4.5	3.6	**Pipe Channel, D-E** 12.0" Round Area= 0.8 sf Perim= 3.1' r= 0.25' n= 0.013
17.9	1,080	Total			

Summary for Pond 1P: Basin#1

Inflow Area = 9.060 ac, 26.87% Impervious, Inflow Depth > 3.30" for 100-year event
Inflow = 24.01 cfs @ 12.26 hrs, Volume= 2.492 af
Outflow = 6.53 cfs @ 12.83 hrs, Volume= 2.484 af, Atten= 72.81%, Lag= 33.9 min
Discarded = 6.53 cfs @ 12.83 hrs, Volume= 2.484 af
Primary = 0.00 cfs @ 0.00 hrs, Volume= 0.000 af

Routing by Stor-Ind method, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs
Peak Elev= 231.87' @ 12.83 hrs Surf.Area= 12,701 sf Storage= 33,796 cf

Plug-Flow detention time= 52.3 min calculated for 2.483 af (100% of inflow)
Center-of-Mass det. time= 50.5 min (911.3 - 860.8)

Volume	Invert	Avail.Storage	Storage Description
#1	228.00'	49,089 cf	**Custom Stage Data (Irregular)** Listed below (Recalc)

Elevation (feet)	Surf.Area (sq-ft)	Perim. (feet)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)	Wet.Area (sq-ft)
228.00	993	123.0	0	0	993
229.00	7,415	404.0	3,707	3,707	12,780
230.00	10,180	432.0	8,761	12,468	14,689
232.00	12,890	470.0	23,017	35,485	17,562
233.00	14,330	489.0	13,604	49,089	19,089

Device	Routing	Invert	Outlet Devices
#1	Discarded	228.00'	**8.270 in/hr Exfiltration over Wetted area** Conductivity to Groundwater Elevation = 225.70'
#2	Primary	232.00'	**10.0' long x 10.0' breadth Broad-Crested Rectangular Weir** Head (feet) 0.20 0.40 0.60 0.80 1.00 1.20 1.40 1.60 Coef. (English) 2.49 2.56 2.70 2.69 2.68 2.69 2.67 2.64

Discarded OutFlow Max=6.53 cfs @ 12.83 hrs HW=231.87' (Free Discharge)
↑**1=Exfiltration** (Controls 6.53 cfs)

Primary OutFlow Max=0.00 cfs @ 0.00 hrs HW=228.00' (Free Discharge)
↑**2=Broad-Crested Rectangular Weir** (Controls 0.00 cfs)

Stormwater Recharge & Water Quality Volume and Forebay Calulations
Standard 3:

Project:
Prospect Hill Village
Bellingham, Massachusetts
Date: November 30, 2023
Revised: January 30, 2025, April 9, 2025, April 28, 2025

Water Quality Volume (WQV): Based on 1.0 inch rainfall
Recharge Volume(Rv): Based on Soil Classification
Rv = F * Impervious Area
Rv = Required Recharge Volume
F = Depth Factor
Soil Type A – 0.60 inch
K Factor = 8.27 in/hr (Soil type A)
Sediment Forebay Volume: 0.1 inch rainfall

Roof Runoff (See Subcatchment PR):
Each dwelling shall be required to provide individual recharge systems to accommodate a 100 year storm event. The proposal is to provide to leaching systems at each dwelling. Each recharge system will capture ½ of the roof area. (Total Roof Area: 4,260 s.f.)

Imp. Area roof: 2,130 s.f. (1/2 roof)
Recharge Volume Required: (Soil Type A – 0.60 inch)
Rv = (2,130 sf * 0.60 in)/12 = 107 c.f.

Recharge Galley's
Total storage provided: 424 c.f.
424 c.f. > 107 c.f.

Time to drain(Static Method):
Drawdown time = Volume/(K*Bottom Area)
Volume = 424 cf
K = 8.27/hr = 0.67 ft/hr
Bottom Area = 261 sf

Drawdown time = 424 c.f./(0.67 ft/hr x 261 sf)
Drawdown time = 2.4 hr < 72 hr ***ok***

Drainage Basin #1(See Subcatchment P8):
Imp. Area Pavement: 103,164 s.f.
WQV = (103,164 sf * 1.0 in)/12 = 8,597 c.f.

Recharge Volume Required: (Soil Type A – 0.60 inch)
Tot. Imp Area: 103,164 s.f.
Rv = (103,164 sf * 0.60 in)/12 = 5,158 c.f.

Basin Storage Provided:
Elev. 229.60: Storage Capacity Provided=8,630 cu.ft.

Forebay Sizing Required (Outlet #21):
Impervious Area: 17,556 s.f.
(0.1 in * 17,556)/12 = 146 c.f.
Forebay Provided:

Elev.	Area(sf)	Avg.	Depth	Vol.
229	306			
230	559	432	1.0	432 c.f > 146 c.f.

Forebay Sizing Required (Outlet #42 & 71):
Impervious Area: 97,877 s.f.
(0.1 in * 97,877)/12 = 816 c.f.
Forebay Provided:

Elev.	Area(sf)	Avg.	Depth	Vol.
229	700			
230	1106	903	1.0	903 c.f > 816 c.f.

Time to drain basin (Static Method):
Drawdown time = Volume/(K*Bottom Area)
Volume = 32,093 cf (100 year storm volume see hydroCAD Pond 3P)
K = 8.27 in/hr = 0.67 ft/hr (Soil Type A)
Bottom Area = 7415 sf (El. 229)

Drawdown time = 32,093 c.f./(0.67 ft/hr x 7415 sf)
Drawdown time = 6.5 hrs < 72 hr ***ok***

Drainage Basin #2(See Subcatchment P7):
Imp. Area Pavement: 50,303 s.f.
WQV = (50,303 sf * 1.0 in)/12 = 4,192 c.f.

Recharge Volume Required: (Soil Type A – 0.60 inch)
Tot. Imp Area: 50,303 s.f.
Rv = (50,303 sf * 0.60 in)/12 = 2,515 c.f.

Basin Storage Provided:
Elev. 232.40: Storage Capacity Provided=4,371 cu.ft.

Forebay Sizing Required (Outlet #67):
Impervious Area: 50,303 s.f.
(0.1 in * 50,303)/12 = 419 c.f.
Forebay Provided:

Elev.	Area(sf)	Avg.	Depth	Vol.
232	5100			
233	870	690	1.0	690 c.f > 419 c.f.

Time to drain basin (Static Method):
Drawdown time = Volume/(K*Bottom Area)
Volume = 13,506 cf (100 year storm volume see hydroCAD Pond 2P)
K = 8.27 in/hr = 0.67 ft/hr (Soil Type A)
Bottom Area = 4,205 sf (El. 232.0)

Drawdown time = 13,506 c.f./(0.67 ft/hr x 4205 sf)
Drawdown time = 4.8 hrs < 72 hr ***ok***

Drainage Basin #3(See Subcatchment P11):
Imp. Area Pavement: 58,510 s.f.
WQV = (58,510 sf * 1.0 in)/12 = 4,875 c.f.

Recharge Volume Required: (Soil Type A – 0.60 inch)
Tot. Imp Area: 58,510 s.f.
Rv = (58,510 sf * 0.60 in)/12 = 2,926 c.f.

Basin Storage Provided:
Elev. 228.50: Storage Capacity Provided=5,007 cu.ft.

Forebay Sizing Required (Outlet #17):
Impervious Area: 34,552 s.f.
(0.1 in * 34,552)/12 = 289 c.f.
Forebay Provided:

Elev.	Area(sf)	Avg.	Depth	Vol.
228	346			
229	598	472	1.0	472 c.f > 289 c.f.

Forebay Sizing Required (Outlet #77):
Impervious Area: 26,632 s.f.
(0.1 in * 26,632)/12 = 222 c.f.
Forebay Provided:

Elev.	Area(sf)	Avg.	Depth	Vol.
228	300			
229	531	415	1.0	415 c.f > 222 c.f.

Time to drain basin (Static Method):
Drawdown time = Volume/(K*Bottom Area)
Volume = 19,020 cf (100 year storm volume see hydroCAD Pond 6P)
K = 8.27 in/hr = 0.67 ft/hr (Soil Type A)
Bottom Area = 4724 sf (El. 228)

Drawdown time = 19,020 c.f./(0.67 ft/hr x 4724 sf)
Drawdown time = 6.1 hrs < 72 hr ***ok***

Drainage Basin #4(See Subcatchment P18):
Imp. Area Pavement: 35,886 s.f.
WQV = (35,886 sf * 1.0 in)/12 = 2,991 c.f.

Recharge Volume Required: (Soil Type A – 0.60 inch)
Tot. Imp Area: 35,886 s.f.
Rv = (35,886 sf * 0.60 in)/12 = 1,795 c.f.

Basin Storage Provided:
Elev. 220.4: Storage Capacity Provided = 3,386 cu.ft.

Forebay Sizing Required (Outlets #93):
Impervious Area: 35,886 s.f.
(0.1 in * 35,886)/12 = 299 c.f.
Forebay Provided:

Elev.	Area(sf)	Avg.	Depth	Vol.
221	1860			
222	3062	2461	1.0	2461 c.f > 299 c.f.

Time to drain basin (Static Method):
Drawdown time = Volume/(K*Bottom Area)
Volume = 29,201 cf (100 year storm volume see hydroCAD Pond 4P)
K = 2.41 in/hr = 0.21 ft/hr (Soil Type A)
Bottom Area = 4,950 sf (El. 220.0)

Drawdown time = 29,201 c.f./(0.21 ft/hr x 4,950 sf)
Drawdown time = 28.1 hrs < 72 hr ***ok***

Drainage Basin #5(See Subcatchment P24):
Imp. Area Pavement: 15,639 s.f.
WQV = (15,639 sf * 1.0 in)/12 = 1,303 c.f.

Recharge Volume Required: (Soil Type A – 0.60 inch)
Tot. Imp Area: 35,886 s.f.
Rv = (15,639 sf * 0.60 in)/12 = 781 c.f.

Basin Storage Provided:
Elev. 217.1: Storage Capacity Provided = 1,576 cu.ft.

Forebay Sizing Required:
Impervious Area: 15,639 s.f.
(0.1 in * 15,639)/12 = 130 c.f.
Forebay Provided:

Elev.	Area(sf)	Avg.	Depth	Vol.
216.5	340			
217.5	540	440	1.0	440 c.f > 130 c.f.

Time to drain basin (Static Method):
Drawdown time = Volume/(K*Bottom Area)
Volume = 5,457 cf (100 year storm volume see hydroCAD Pond 10P)
K = 8.27 in/hr = 0.68 ft/hr (Soil Type A)
Bottom Area = 3,935 sf (El. 218.0)

Drawdown time = 5,457 c.f./(0.68 ft/hr x 3,935 sf)
Drawdown time = 2.0 hrs < 72 hr ***ok***

Drainage Basin Chambers #6(See Subcatchment P10):
Imp. Area Pavement: 6,015 s.f.
WQV = (6,015 sf * 1.0 in)/12 = 501 c.f.

Recharge Volume Required: (Soil Type A – 0.60 inch)
Tot. Imp Area: 6015 s.f.
Rv = (6015 sf * 0.60 in)/12 = 301 c.f.

Infiltration System #8P(Galley's)
"Static" Storage Volume Provided**:**
Total storage volume provided = 1,518 cf
1,518 cf > 501 cf ***ok***

Time to drain (Static Method):
Drawdown time = Volume/(K*Bottom Area)
Volume = 1518 cf
K = 8.27 in/hr = 0.67 ft/hr (Soil Type A)
Bottom Area = 630 sf

Drawdown time = 1518 c.f./(0.67 ft/hr x 630 sf)
Drawdown time = 3.6 hr < 72 hr ***ok***

Catch Basin #94 & #95 Forebay Sizing:

Imp. Area Pavement: 9,784 s.f.
WQV = (9,784 sf * 1.0 in)/12 = 815 c.f.

Forebay Sizing Required (Outlets #94):
Impervious Area: 9,784 s.f.
(0.1 in * 9,784)/12 = 82 c.f.
Forebay Provided:

Elev.	Area(sf)	Avg.	Depth	Vol.
219	916			
220	1443	1180	1.0	1180 c.f > 815 c.f.

Project:
Prospect Hill Village Residential Development
Bellingham, MA

Date: April 28, 2025

Water Quality Volume conversion to Discharge Rate:

Date: April 26, 2025

Subcatchment P10
Impervious Area: 6,015 s.f. = 0.00216 sq.mi.
Time of Concentration: 6.0 min = 0.10 hrs
WQV: 1.0 inch
Qu = 752 csm/in

Water Quality flow:

Q = (qu)(A)(WQV)

Q = Peak flow rate associated with 1.0 inch of runoff
Qu = Unit peak discharge, in csm/in (See Figure 2)
A = Impervious surface area (in square mile)
WQV = water quality volume (1.0 inches)

Q = (752 csm/in)(0.00216 sq mi)(1.0 inches)
Q = 0.16 cfs

CDS ESTIMATED NET ANNUAL SOLIDS LOAD REDUCTION BASED ON THE RATIONAL RAINFALL METHOD

Prospect Hill
Bellingham, MA

Area	0.21 ac	Unit Site Designation	Treatment Unit #4
Weighted C	0.8	Rainfall Station #	68
t_c	6 min		
CDS Model	1515-3	CDS Treatment Capacity	1.0 cfs

Rainfall Intensity[1] (in/hr)	Percent Rainfall Volume[1]	Cumulative Rainfall Volume	Total Flowrate (cfs)	Treated Flowrate (cfs)	Incremental Removal (%)
0.02	9.3%	9.3%	0.00	0.00	9.0
0.04	9.5%	18.8%	0.01	0.01	9.2
0.06	8.7%	27.5%	0.01	0.01	8.4
0.08	10.1%	37.6%	0.02	0.02	9.7
0.10	7.2%	44.8%	0.02	0.02	6.9
0.12	6.0%	50.8%	0.02	0.02	5.7
0.14	6.3%	57.1%	0.03	0.03	6.0
0.16	5.6%	62.7%	0.03	0.03	5.3
0.18	4.7%	67.4%	0.04	0.04	4.4
0.20	3.6%	71.0%	0.04	0.04	3.4
0.25	8.2%	79.1%	0.05	0.05	7.6
0.50	14.9%	94.0%	0.10	0.10	13.4
0.75	3.2%	97.3%	0.16	0.16	2.8
1.00	1.2%	98.5%	0.21	0.21	1.0
1.50	0.7%	99.2%	0.31	0.31	0.5
2.00	0.8%	100.0%	0.41	0.41	0.5
0.00	0.0%	100.0%	0.00	0.00	0.0
0.00	0.0%	100.0%	0.00	0.00	0.0
0.00	0.0%	100.0%	0.00	0.00	0.0
0.00	0.0%	100.0%	0.00	0.00	0.0
0.00	0.0%	100.0%	0.00	0.00	0.0
					94.0
				Removal Efficiency Adjustment[2] =	6.5%
				Predicted % Annual Rainfall Treated =	93.5%
				Predicted Net Annual Load Removal Efficiency =	**87.6%**

1 - Based on 10 years of rainfall data from NCDC station 736, Blue Hill, Norfolk County, MA
2 - Reduction due to use of 60-minute data for a site that has a time of concentration less than 30-minutes.

Project:
Prospect Hill Village Residential Development
Bellingham, MA

Date: April 28, 2025

Weighted Average TSS Removal:

Weighted Average = 85%

$$\frac{394{,}635\ (85\%) + 165{,}868\ (85\%) + 150{,}457\ (85\%) + 134{,}631\ (85\%) + 85{,}544\ (90\%) + 16{,}177\ (83\%) + 9{,}060\ (90\%)}{394{,}635 + 165{,}868 + 150{,}457 + 134{,}631 + 85{,}544 + 16{,}177 + 9{,}060}$$

= 85%