CIVIL DESIGN CONSULTANTS, INC

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April 24, 2024

Denise M. Gaffey
Director & City Planner
562 Main Street
Melrose, MA 02176

CDCI File #: 20-10201
22 Montvale Street
Melrose, MA 02176

Civil Design Consultants, Inc. (CDCI) is pleased to provide the following revised drainage information to address a review letter from the Department of Public Works, dated April 17, 2024, for the proposed construction of a two-story, single-family house located at 22 Montvale Street. The site is currently undeveloped with approximately 60% of the lot having slopes greater than 25%. The goal of the project is to preserve and enhance the landscape by maintaining the surrounding features to the maximum extent practicable and minimize impacts to steep slopes. The proposed house has a footprint of approximately 1,360-SF and will have a stepped foundation, with an area of 542-SF, to follow the contour of the land.

The total lot area is approximately 7,750-SF and provides 108-FT± of frontage on Montvale Street. On-site slopes are steep, with elevations ranging from a high of approximately 146-FT at the northwestern corner of the lot, to a low of approximately 111-FT at the southeastern corner of the lot.

According to the Natural Resource Conservation Service Soil Survey, on-site and surrounding soils consist of Charlton-Urban land-Hollis Complex (631C) with a Hydraulic Soil Group (HSG) A and Rock Outcrop-Hollis Complex (105E). For the purposes of drainage calculations, the on-site map unit was considered to be HSG-D due to the large amount of ledge outcrops throughout the project site area.

The pre-development condition consists of one sub-watershed area contributing to one design point. Design Point-1 (DP-1) receives runoff from drainage area EWA-1, which consists of overland flow from the entire lot flowing towards Montvale Street.

TABLE 1: EXISTING WATERSHED DESIGN POINT DETAILS

DESIGN POINT	AREA NAME	AREA (Acres)	Tc (min.)	CN
DP-1	EWA-1	0.18	6	86

The proposed construction results in two sub-watershed areas contributing to the same design point (DP-1) as the pre-development condition. In post-development conditions, the project has been designed to maintain the current drainage patterns. DP-1 will receive runoff from PWA-1A and overflows from the proposed two (2) rain barrels, containing the rooftop runoff. Proposed rip rap will be located along a portion of the southern property line for the purpose of protecting soil from erosion due to any concentrated runoff, and to slow velocities of runoff prior to off-site discharge.

TABLE 2: PROPOSED WATERSHED DESIGN POINT DETAILS

DESIGN POINT	AREA NAME	AREA (Acres)	Tc (min.)	CN
DP-1	PWA-1A	0.15	6	86
	PWA-1B	0.03	6	98

Peak Discharge Comparison

As illustrated in the following table, the impact of the proposed improvements has been mitigated through the use of best management practices including rain barrel systems for up to and including the 100-year, 24-hour storm event.

Design Point #1

	2-YR (3.30-IN)	10-YR (5.17-IN)	25-YR (6.34-IN)	100-YR (8.16-IN)
Pre-Development	0.39-CFS	0.73-CFS	0.94-CFS	1.27-CFS
Post-Development	0.39-CFS	0.70-CFS	0.92-CFS	1.23-CFS

Drainage calculations were performed using the computer program HydroCAD by HydroCAD Software Solutions, LLC based upon Technical Release 20 (TR-20), developed by the NRCS, formerly the Soils Conservation Service. Drainage calculations were prepared for the 2-YR, 10-YR, 25-YR, and 100-YR Type III 24-hour storm events. Rainfall data corresponds with NOAA Atlas 14. Curve numbers were generated using the information provided in TR-55 and the SCS Soils Survey.

If you have any additional questions or comments, or require additional information, please do not hesitate to contact this office.

Very Truly Yours,

CIVIL DESIGN CONSULTANTS, INC.

Meera A. Cousens
Project Manager

OPERATIONS AND MAINTENANCE PLAN

Rev: April 9, 2024

This Operations and Maintenance (O&M) Plan has been prepared in accordance with the Stormwater Management Policy issued by the Department of Environmental Protection (DEP).

Project Summary

The applicant proposes to develop a vacant lot with an area of 7,750-SF at 22 Montvale Street in Melrose, MA. The proposed project consists of a two-story single-family house with associated infrastructure.

Property Owner / Responsible Party:

Armando Plata
11 Landry Road
Medford, MA 02155

Above Ground Water Tank

The Owner is responsible for draining the water tank containing the rooftop runoff 72 hours after a rainstorm event. The maintenance of the water tank shall be performed according to the manufacturer's manual.

Erosion Control

1. Prior to the commencement of construction activities, the contractor shall install all erosion and sediment control device as shown on the plan. All erosion control devices shall be maintained in effective condition during construction.

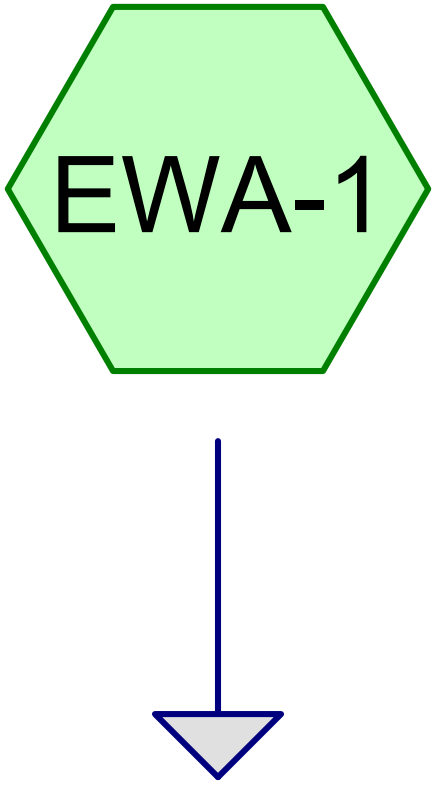
2. The contractor is responsible for the timely installation, inspection, maintenance, and/or replacement of all temporary and permanent erosion control devices to ensure proper operation throughout the life of the project. The contractor is responsible for maintenance of permanent measures until construction of the project is completed or until it is accepted by the owner. The owner is responsible thereafter.

3. It shall be the contractor's responsibility to clean roads, control dust, and take all necessary measures to ensure that the site and all roads be maintained in a mud and dust-free condition at all times throughout the life of the contract. Dust control shall include, but is not limited to, water, calcium chloride, and/or crushed stone or coarse gravel.

4. The contractor shall restore disturbed areas as closely as possible. Areas damaged during construction shall be resodded, reseeded, or otherwise restored to their original state. Trees and other existing vegetation shall be retained wherever feasible.

5. Permanent vegetative cover shall be applied to all disturbed areas that have reached finished grade as soon as possible, but not more than fourteen (14) days after the construction activity in that area has permanently ceased. The recommended permanent seeding dates are April 1 to June 15 and August 15 to October 1. Slope stabilization fabric shall be placed on all disturbed slopes greater than 25%, or as directed by the City Engineer.

6. If dewatering is necessary, the contractor shall design, provide, install, and operate the Dewatering System. Additionally, a temporary 5-ft wide by 2-ft deep stone trench shall be placed where the driveway meets the property line to collect runoff and sediment.



Subcat Reach Pond Link

Routing Diagram for Pre-Development R4
Prepared by Civil Design Consultants, Inc, Printed 4/24/2024

Rainfall Events Listing

Event#	Event Name	Storm Type	Curve	Mode	Duration (hours)	B/B	Depth (inches)	AMC
1	2-Year	Type III 24-hr		Default	24.00	1	3.30	2
2	10-Year	Type III 24-hr		Default	24.00	1	5.17	2
3	25-Year	Type III 24-hr		Default	24.00	1	6.34	2
4	100-Year	Type III 24-hr		Default	24.00	1	8.16	2

Area Listing (selected nodes)

Area (sq-ft)	CN	Description (subcatchment-numbers)
852	98	Rock Outcrop, HSG D (EWA-1)
6,898	85	Woods, Good, HSG D (EWA-1)
7,750	**86**	**TOTAL AREA**

Soil Listing (selected nodes)

Area (sq-ft)	Soil Group	Subcatchment Numbers
0	HSG A	
0	HSG B	
0	HSG C	
7,750	HSG D	EWA-1
0	Other	
7,750		**TOTAL AREA**

Ground Covers (selected nodes)

HSG-A (sq-ft)	HSG-B (sq-ft)	HSG-C (sq-ft)	HSG-D (sq-ft)	Other (sq-ft)	Total (sq-ft)	Ground Cover	Subcatchment Numbers
0	0	0	852	0	852	Rock Outcrop	E
0	0	0	6,898	0	6,898	Woods, Good	E
0	**0**	**0**	**7,750**	**0**	**7,750**	**TOTAL AREA**	

Time span=1.00-30.00 hrs, dt=0.05 hrs, 581 points
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN
Reach routing by Stor-Ind+Trans method - Pond routing by Stor-Ind method

Subcatchment EWA-1: EWP-1 Runoff Area=7,750 sf 10.99% Impervious Runoff Depth=1.92"
Tc=6.0 min CN=86 Runoff=0.39 cfs 1,242 cf

Reach DP-1: DP-1 Inflow=0.39 cfs 1,242 cf
Outflow=0.39 cfs 1,242 cf

Total Runoff Area = 7,750 sf Runoff Volume = 1,242 cf Average Runoff Depth = 1.92"
89.01% Pervious = 6,898 sf 10.99% Impervious = 852 sf

Summary for Subcatchment EWA-1: EWP-1

Runoff = 0.39 cfs @ 12.09 hrs, Volume= 1,242 cf, Depth= 1.92"
Routed to Reach DP-1 : DP-1

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 1.00-30.00 hrs, dt= 0.05 hrs
Type III 24-hr 2-Year Rainfall=3.30"

	Area (sf)	CN	Description
*	852	98	Rock Outcrop, HSG D
*	6,898	85	Woods, Good, HSG D
	7,750	86	Weighted Average
	6,898		89.01% Pervious Area
	852		10.99% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
6.0					**Direct Entry,**

Summary for Reach DP-1: DP-1

Inflow Area = 7,750 sf, 10.99% Impervious, Inflow Depth = 1.92" for 2-Year event
Inflow = 0.39 cfs @ 12.09 hrs, Volume= 1,242 cf
Outflow = 0.39 cfs @ 12.09 hrs, Volume= 1,242 cf, Atten= 0%, Lag= 0.0 min

Routing by Stor-Ind+Trans method, Time Span= 1.00-30.00 hrs, dt= 0.05 hrs

Time span=1.00-30.00 hrs, dt=0.05 hrs, 581 points
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN
Reach routing by Stor-Ind+Trans method - Pond routing by Stor-Ind method

Subcatchment EWA-1: EWP-1 Runoff Area=7,750 sf 10.99% Impervious Runoff Depth=3.63"
Tc=6.0 min CN=86 Runoff=0.73 cfs 2,342 cf

Reach DP-1: DP-1 Inflow=0.73 cfs 2,342 cf
Outflow=0.73 cfs 2,342 cf

Total Runoff Area = 7,750 sf Runoff Volume = 2,342 cf Average Runoff Depth = 3.63"
89.01% Pervious = 6,898 sf 10.99% Impervious = 852 sf

Summary for Subcatchment EWA-1: EWP-1

Runoff = 0.73 cfs @ 12.09 hrs, Volume= 2,342 cf, Depth= 3.63"
Routed to Reach DP-1 : DP-1

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 1.00-30.00 hrs, dt= 0.05 hrs
Type III 24-hr 10-Year Rainfall=5.17"

	Area (sf)	CN	Description
*	852	98	Rock Outcrop, HSG D
*	6,898	85	Woods, Good, HSG D
	7,750	86	Weighted Average
	6,898		89.01% Pervious Area
	852		10.99% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
6.0					**Direct Entry,**

Summary for Reach DP-1: DP-1

Inflow Area = 7,750 sf, 10.99% Impervious, Inflow Depth = 3.63" for 10-Year event
Inflow = 0.73 cfs @ 12.09 hrs, Volume= 2,342 cf
Outflow = 0.73 cfs @ 12.09 hrs, Volume= 2,342 cf, Atten= 0%, Lag= 0.0 min

Routing by Stor-Ind+Trans method, Time Span= 1.00-30.00 hrs, dt= 0.05 hrs

Time span=1.00-30.00 hrs, dt=0.05 hrs, 581 points
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN
Reach routing by Stor-Ind+Trans method - Pond routing by Stor-Ind method

Subcatchment EWA-1: EWP-1 Runoff Area=7,750 sf 10.99% Impervious Runoff Depth=4.73"
Tc=6.0 min CN=86 Runoff=0.94 cfs 3,057 cf

Reach DP-1: DP-1 Inflow=0.94 cfs 3,057 cf
Outflow=0.94 cfs 3,057 cf

Total Runoff Area = 7,750 sf Runoff Volume = 3,057 cf Average Runoff Depth = 4.73"
89.01% Pervious = 6,898 sf 10.99% Impervious = 852 sf

Summary for Subcatchment EWA-1: EWP-1

Runoff = 0.94 cfs @ 12.09 hrs, Volume= 3,057 cf, Depth= 4.73"
Routed to Reach DP-1 : DP-1

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 1.00-30.00 hrs, dt= 0.05 hrs
Type III 24-hr 25-Year Rainfall=6.34"

	Area (sf)	CN	Description
*	852	98	Rock Outcrop, HSG D
*	6,898	85	Woods, Good, HSG D
	7,750	86	Weighted Average
	6,898		89.01% Pervious Area
	852		10.99% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
6.0					**Direct Entry,**

Summary for Reach DP-1: DP-1

Inflow Area = 7,750 sf, 10.99% Impervious, Inflow Depth = 4.73" for 25-Year event
Inflow = 0.94 cfs @ 12.09 hrs, Volume= 3,057 cf
Outflow = 0.94 cfs @ 12.09 hrs, Volume= 3,057 cf, Atten= 0%, Lag= 0.0 min

Routing by Stor-Ind+Trans method, Time Span= 1.00-30.00 hrs, dt= 0.05 hrs

Time span=1.00-30.00 hrs, dt=0.05 hrs, 581 points
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN
Reach routing by Stor-Ind+Trans method - Pond routing by Stor-Ind method

Subcatchment EWA-1: EWP-1 Runoff Area=7,750 sf 10.99% Impervious Runoff Depth=6.49"
Tc=6.0 min CN=86 Runoff=1.27 cfs 4,189 cf

Reach DP-1: DP-1 Inflow=1.27 cfs 4,189 cf
Outflow=1.27 cfs 4,189 cf

Total Runoff Area = 7,750 sf Runoff Volume = 4,189 cf Average Runoff Depth = 6.49"
89.01% Pervious = 6,898 sf 10.99% Impervious = 852 sf

Summary for Subcatchment EWA-1: EWP-1

Runoff = 1.27 cfs @ 12.09 hrs, Volume= 4,189 cf, Depth= 6.49"
Routed to Reach DP-1 : DP-1

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 1.00-30.00 hrs, dt= 0.05 hrs
Type III 24-hr 100-Year Rainfall=8.16"

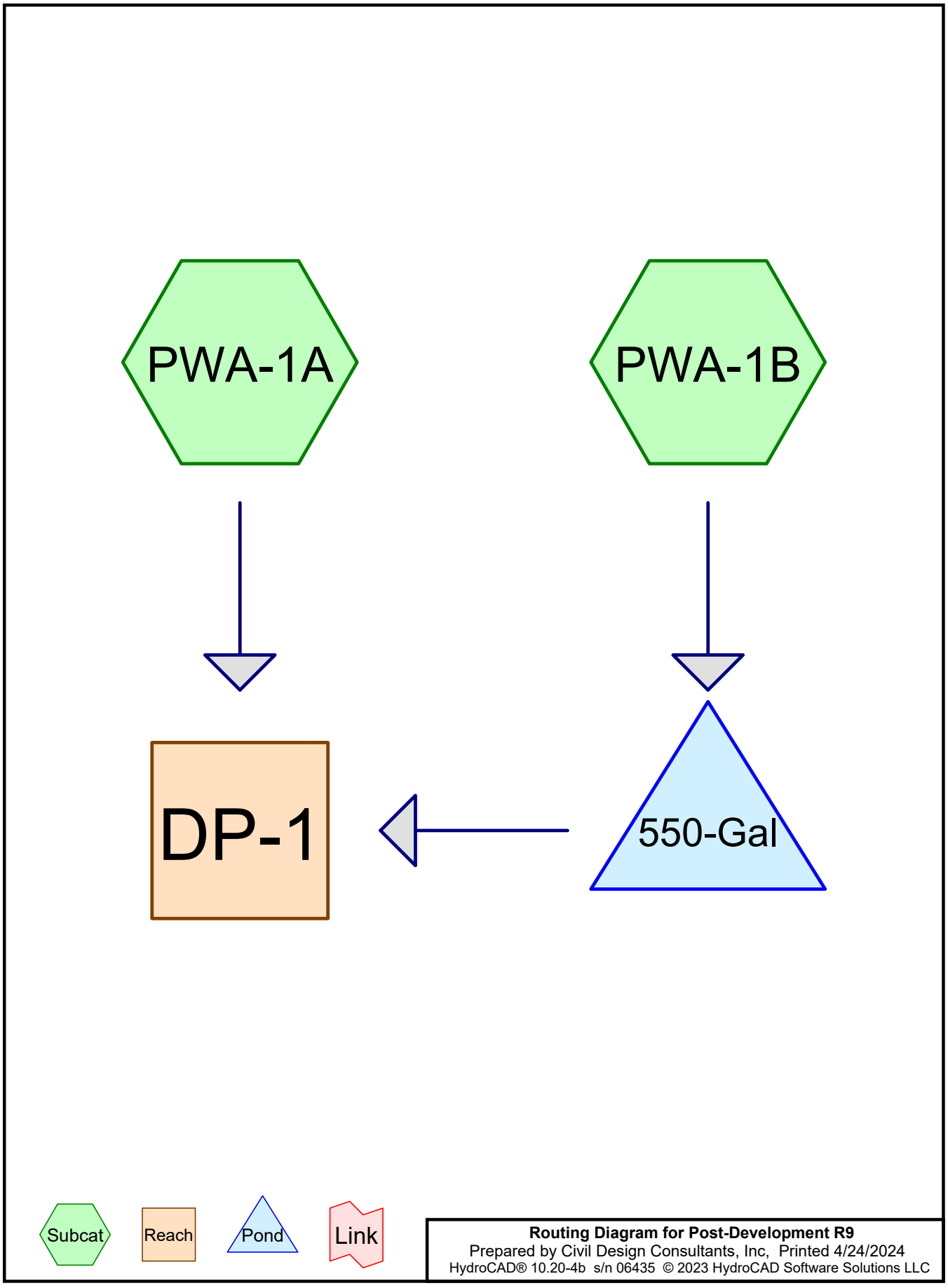
	Area (sf)	CN	Description
*	852	98	Rock Outcrop, HSG D
*	6,898	85	Woods, Good, HSG D
	7,750	86	Weighted Average
	6,898		89.01% Pervious Area
	852		10.99% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
6.0					**Direct Entry,**

Summary for Reach DP-1: DP-1

Inflow Area = 7,750 sf, 10.99% Impervious, Inflow Depth = 6.49" for 100-Year event
Inflow = 1.27 cfs @ 12.09 hrs, Volume= 4,189 cf
Outflow = 1.27 cfs @ 12.09 hrs, Volume= 4,189 cf, Atten= 0%, Lag= 0.0 min

Routing by Stor-Ind+Trans method, Time Span= 1.00-30.00 hrs, dt= 0.05 hrs



Routing Diagram for Post-Development R9
Prepared by Civil Design Consultants, Inc, Printed 4/24/2024

Rainfall Events Listing

Event#	Event Name	Storm Type	Curve	Mode	Duration (hours)	B/B	Depth (inches)	AMC
1	2-Year	Type III 24-hr		Default	24.00	1	3.30	2
2	10-Year	Type III 24-hr		Default	24.00	1	5.17	2
3	25-Year	Type III 24-hr		Default	24.00	1	6.34	2
4	100-Year	Type III 24-hr		Default	24.00	1	8.16	2

Area Listing (selected nodes)

Area (sq-ft)	CN	Description (subcatchment-numbers)
50	80	Permeable Paver, HSG D (PWA-1A)
684	98	Rock Outcrop, HSG D (PWA-1A)
1,360	98	Roofs, HSG D (PWA-1B)
86	98	Unconnected pavement, HSG D (PWA-1A)
5,570	85	Woods, Good, HSG D (PWA-1A)
7,750	**89**	**TOTAL AREA**

Soil Listing (selected nodes)

Area (sq-ft)	Soil Group	Subcatchment Numbers
0	HSG A	
0	HSG B	
0	HSG C	
7,750	HSG D	PWA-1A, PWA-1B
0	Other	
7,750		**TOTAL AREA**

Ground Covers (selected nodes)

HSG-A (sq-ft)	HSG-B (sq-ft)	HSG-C (sq-ft)	HSG-D (sq-ft)	Other (sq-ft)	Total (sq-ft)	Ground Cover	Sub Num
0	0	0	50	0	50	Permeable Paver	
0	0	0	684	0	684	Rock Outcrop	
0	0	0	1,360	0	1,360	Roofs	
0	0	0	86	0	86	Unconnected pavement	
0	0	0	5,570	0	5,570	Woods, Good	
0	**0**	**0**	**7,750**	**0**	**7,750**	**TOTAL AREA**	

Time span=1.00-30.00 hrs, dt=0.05 hrs, 581 points
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN
Reach routing by Stor-Ind+Trans method - Pond routing by Stor-Ind method

Subcatchment PWA-1A: PWP-1 Runoff Area=6,390 sf 12.05% Impervious Runoff Depth=1.92"
Tc=6.0 min UI Adjusted CN=86 Runoff=0.32 cfs 1,024 cf

Subcatchment PWA-1B: PWP-1 Runoff Area=1,360 sf 100.00% Impervious Runoff Depth=3.07"
Tc=6.0 min CN=98 Runoff=0.10 cfs 348 cf

Reach DP-1: DP-1 Inflow=0.39 cfs 1,332 cf
Outflow=0.39 cfs 1,332 cf

Pond 550-Gal: Peak Elev=122.59' Storage=63 cf Inflow=0.10 cfs 348 cf
Outflow=0.07 cfs 308 cf

Total Runoff Area = 7,750 sf Runoff Volume = 1,371 cf Average Runoff Depth = 2.12"
72.52% Pervious = 5,620 sf 27.48% Impervious = 2,130 sf

Summary for Subcatchment PWA-1A: PWP-1

Runoff = 0.32 cfs @ 12.09 hrs, Volume= 1,024 cf, Depth= 1.92"
Routed to Reach DP-1 : DP-1

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 1.00-30.00 hrs, dt= 0.05 hrs
Type III 24-hr 2-Year Rainfall=3.30"

	Area (sf)	CN	Adj	Description
*	684	98		Rock Outcrop, HSG D
*	5,570	85		Woods, Good, HSG D
	86	98		Unconnected pavement, HSG D
*	50	80		Permeable Paver, HSG D
	6,390	87	86	Weighted Average, UI Adjusted
	5,620			87.95% Pervious Area
	770			12.05% Impervious Area
	86			11.17% Unconnected

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
6.0					**Direct Entry,**

Summary for Subcatchment PWA-1B: PWP-1

Runoff = 0.10 cfs @ 12.09 hrs, Volume= 348 cf, Depth= 3.07"
Routed to Pond 550-Gal :

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 1.00-30.00 hrs, dt= 0.05 hrs
Type III 24-hr 2-Year Rainfall=3.30"

Area (sf)	CN	Description
1,360	98	Roofs, HSG D
1,360		100.00% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
6.0					**Direct Entry,**

Summary for Reach DP-1: DP-1

Inflow Area = 7,750 sf, 27.48% Impervious, Inflow Depth = 2.06" for 2-Year event
Inflow = 0.39 cfs @ 12.10 hrs, Volume= 1,332 cf
Outflow = 0.39 cfs @ 12.10 hrs, Volume= 1,332 cf, Atten= 0%, Lag= 0.0 min

Routing by Stor-Ind+Trans method, Time Span= 1.00-30.00 hrs, dt= 0.05 hrs

Summary for Pond 550-Gal:

Inflow Area = 1,360 sf,100.00% Impervious, Inflow Depth = 3.07" for 2-Year event
Inflow = 0.10 cfs @ 12.09 hrs, Volume= 348 cf
Outflow = 0.07 cfs @ 12.16 hrs, Volume= 308 cf, Atten= 23%, Lag= 4.3 min
Primary = 0.07 cfs @ 12.16 hrs, Volume= 308 cf
Routed to Reach DP-1 : DP-1

Routing by Stor-Ind method, Time Span= 1.00-30.00 hrs, dt= 0.05 hrs
Peak Elev= 122.59' @ 12.16 hrs Surf.Area= 39 sf Storage= 63 cf

Plug-Flow detention time= 101.8 min calculated for 308 cf (89% of inflow)
Center-of-Mass det. time= 48.1 min (803.8 - 755.8)

Volume	Invert	Avail.Storage	Storage Description
#1	121.00'	141 cf	**5.00'D x 3.60'H Vertical Cone/Cylinder** x 2

Device	Routing	Invert	Outlet Devices		
#1	Primary	122.00'	**2.0" Vert. Orifice/Grate**	C= 0.600	Limited to weir flow at low heads
#2	Primary	123.00'	**2.0" Vert. Orifice/Grate**	C= 0.600	Limited to weir flow at low heads

Primary OutFlow Max=0.07 cfs @ 12.16 hrs HW=122.59' (Free Discharge)
└─**1=Orifice/Grate** (Orifice Controls 0.07 cfs @ 3.41 fps)
└─**2=Orifice/Grate** (Controls 0.00 cfs)

Time span=1.00-30.00 hrs, dt=0.05 hrs, 581 points
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN
Reach routing by Stor-Ind+Trans method - Pond routing by Stor-Ind method

Subcatchment PWA-1A: PWP-1 Runoff Area=6,390 sf 12.05% Impervious Runoff Depth=3.63"
Tc=6.0 min UI Adjusted CN=86 Runoff=0.60 cfs 1,931 cf

Subcatchment PWA-1B: PWP-1 Runoff Area=1,360 sf 100.00% Impervious Runoff Depth>4.93"
Tc=6.0 min CN=98 Runoff=0.15 cfs 559 cf

Reach DP-1: DP-1 Inflow=0.70 cfs 2,451 cf
Outflow=0.70 cfs 2,451 cf

Pond 550-Gal: Peak Elev=123.10' Storage=82 cf Inflow=0.15 cfs 559 cf
Outflow=0.12 cfs 520 cf

Total Runoff Area = 7,750 sf Runoff Volume = 2,490 cf Average Runoff Depth = 3.86"
72.52% Pervious = 5,620 sf 27.48% Impervious = 2,130 sf

Summary for Subcatchment PWA-1A: PWP-1

Runoff = 0.60 cfs @ 12.09 hrs, Volume= 1,931 cf, Depth= 3.63"
Routed to Reach DP-1 : DP-1

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 1.00-30.00 hrs, dt= 0.05 hrs
Type III 24-hr 10-Year Rainfall=5.17"

	Area (sf)	CN	Adj	Description
*	684	98		Rock Outcrop, HSG D
*	5,570	85		Woods, Good, HSG D
	86	98		Unconnected pavement, HSG D
*	50	80		Permeable Paver, HSG D
	6,390	87	86	Weighted Average, UI Adjusted
	5,620			87.95% Pervious Area
	770			12.05% Impervious Area
	86			11.17% Unconnected

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
6.0					**Direct Entry,**

Summary for Subcatchment PWA-1B: PWP-1

Runoff = 0.15 cfs @ 12.09 hrs, Volume= 559 cf, Depth> 4.93"
Routed to Pond 550-Gal :

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 1.00-30.00 hrs, dt= 0.05 hrs
Type III 24-hr 10-Year Rainfall=5.17"

Area (sf)	CN	Description
1,360	98	Roofs, HSG D
1,360		100.00% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
6.0					**Direct Entry,**

Summary for Reach DP-1: DP-1

Inflow Area = 7,750 sf, 27.48% Impervious, Inflow Depth = 3.79" for 10-Year event
Inflow = 0.70 cfs @ 12.09 hrs, Volume= 2,451 cf
Outflow = 0.70 cfs @ 12.09 hrs, Volume= 2,451 cf, Atten= 0%, Lag= 0.0 min

Routing by Stor-Ind+Trans method, Time Span= 1.00-30.00 hrs, dt= 0.05 hrs

Summary for Pond 550-Gal:

Inflow Area = 1,360 sf,100.00% Impervious, Inflow Depth > 4.93" for 10-Year event
Inflow = 0.15 cfs @ 12.09 hrs, Volume= 559 cf
Outflow = 0.12 cfs @ 12.16 hrs, Volume= 520 cf, Atten= 23%, Lag= 4.3 min
Primary = 0.12 cfs @ 12.16 hrs, Volume= 520 cf
Routed to Reach DP-1 : DP-1

Routing by Stor-Ind method, Time Span= 1.00-30.00 hrs, dt= 0.05 hrs
Peak Elev= 123.10' @ 12.16 hrs Surf.Area= 39 sf Storage= 82 cf

Plug-Flow detention time= 77.0 min calculated for 520 cf (93% of inflow)
Center-of-Mass det. time= 38.2 min (785.7 - 747.5)

Volume	Invert	Avail.Storage	Storage Description
#1	121.00'	141 cf	**5.00'D x 3.60'H Vertical Cone/Cylinder**x 2

Device	Routing	Invert	Outlet Devices		
#1	Primary	122.00'	**2.0" Vert. Orifice/Grate**	C= 0.600	Limited to weir flow at low heads
#2	Primary	123.00'	**2.0" Vert. Orifice/Grate**	C= 0.600	Limited to weir flow at low heads

Primary OutFlow Max=0.12 cfs @ 12.16 hrs HW=123.09' (Free Discharge)
└**1=Orifice/Grate** (Orifice Controls 0.11 cfs @ 4.83 fps)
└**2=Orifice/Grate** (Orifice Controls 0.01 cfs @ 1.01 fps)

Time span=1.00-30.00 hrs, dt=0.05 hrs, 581 points
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN
Reach routing by Stor-Ind+Trans method - Pond routing by Stor-Ind method

Subcatchment PWA-1A: PWP-1 Runoff Area=6,390 sf 12.05% Impervious Runoff Depth=4.73"
Tc=6.0 min UI Adjusted CN=86 Runoff=0.77 cfs 2,520 cf

Subcatchment PWA-1B: PWP-1 Runoff Area=1,360 sf 100.00% Impervious Runoff Depth>6.10"
Tc=6.0 min CN=98 Runoff=0.19 cfs 691 cf

Reach DP-1: DP-1 Inflow=0.92 cfs 3,173 cf
Outflow=0.92 cfs 3,173 cf

Pond 550-Gal: Peak Elev=123.27' Storage=89 cf Inflow=0.19 cfs 691 cf
Outflow=0.16 cfs 652 cf

Total Runoff Area = 7,750 sf Runoff Volume = 3,212 cf Average Runoff Depth = 4.97"
72.52% Pervious = 5,620 sf 27.48% Impervious = 2,130 sf

Summary for Subcatchment PWA-1A: PWP-1

Runoff = 0.77 cfs @ 12.09 hrs, Volume= 2,520 cf, Depth= 4.73"
Routed to Reach DP-1 : DP-1

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 1.00-30.00 hrs, dt= 0.05 hrs
Type III 24-hr 25-Year Rainfall=6.34"

	Area (sf)	CN	Adj	Description
*	684	98		Rock Outcrop, HSG D
*	5,570	85		Woods, Good, HSG D
	86	98		Unconnected pavement, HSG D
*	50	80		Permeable Paver, HSG D
	6,390	87	86	Weighted Average, UI Adjusted
	5,620			87.95% Pervious Area
	770			12.05% Impervious Area
	86			11.17% Unconnected

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
6.0					**Direct Entry,**

Summary for Subcatchment PWA-1B: PWP-1

Runoff = 0.19 cfs @ 12.09 hrs, Volume= 691 cf, Depth> 6.10"
Routed to Pond 550-Gal :

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 1.00-30.00 hrs, dt= 0.05 hrs
Type III 24-hr 25-Year Rainfall=6.34"

Area (sf)	CN	Description
1,360	98	Roofs, HSG D
1,360		100.00% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
6.0					**Direct Entry,**

Summary for Reach DP-1: DP-1

Inflow Area = 7,750 sf, 27.48% Impervious, Inflow Depth = 4.91" for 25-Year event
Inflow = 0.92 cfs @ 12.10 hrs, Volume= 3,173 cf
Outflow = 0.92 cfs @ 12.10 hrs, Volume= 3,173 cf, Atten= 0%, Lag= 0.0 min

Routing by Stor-Ind+Trans method, Time Span= 1.00-30.00 hrs, dt= 0.05 hrs

Summary for Pond 550-Gal:

Inflow Area = 1,360 sf,100.00% Impervious, Inflow Depth > 6.10" for 25-Year event
Inflow = 0.19 cfs @ 12.09 hrs, Volume= 691 cf
Outflow = 0.16 cfs @ 12.14 hrs, Volume= 652 cf, Atten= 16%, Lag= 3.4 min
Primary = 0.16 cfs @ 12.14 hrs, Volume= 652 cf
Routed to Reach DP-1 : DP-1

Routing by Stor-Ind method, Time Span= 1.00-30.00 hrs, dt= 0.05 hrs
Peak Elev= 123.27' @ 12.14 hrs Surf.Area= 39 sf Storage= 89 cf

Plug-Flow detention time= 66.2 min calculated for 651 cf (94% of inflow)
Center-of-Mass det. time= 33.9 min (778.3 - 744.5)

Volume	Invert	Avail.Storage	Storage Description
#1	121.00'	141 cf	**5.00'D x 3.60'H Vertical Cone/Cylinder** x 2

Device	Routing	Invert	Outlet Devices		
#1	Primary	122.00'	**2.0" Vert. Orifice/Grate**	C= 0.600	Limited to weir flow at low heads
#2	Primary	123.00'	**2.0" Vert. Orifice/Grate**	C= 0.600	Limited to weir flow at low heads

Primary OutFlow Max=0.16 cfs @ 12.14 hrs HW=123.26' (Free Discharge)
└─**1=Orifice/Grate** (Orifice Controls 0.11 cfs @ 5.23 fps)
└─**2=Orifice/Grate** (Orifice Controls 0.04 cfs @ 2.03 fps)

Time span=1.00-30.00 hrs, dt=0.05 hrs, 581 points
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN
Reach routing by Stor-Ind+Trans method - Pond routing by Stor-Ind method

Subcatchment PWA-1A: PWP-1 Runoff Area=6,390 sf 12.05% Impervious Runoff Depth=6.49"
Tc=6.0 min UI Adjusted CN=86 Runoff=1.04 cfs 3,454 cf

Subcatchment PWA-1B: PWP-1 Runoff Area=1,360 sf 100.00% Impervious Runoff Depth>7.92"
Tc=6.0 min CN=98 Runoff=0.24 cfs 897 cf

Reach DP-1: DP-1 Inflow=1.23 cfs 4,312 cf
Outflow=1.23 cfs 4,312 cf

Pond 550-Gal: Peak Elev=123.59' Storage=102 cf Inflow=0.24 cfs 897 cf
Outflow=0.20 cfs 858 cf

Total Runoff Area = 7,750 sf Runoff Volume = 4,351 cf Average Runoff Depth = 6.74"
72.52% Pervious = 5,620 sf 27.48% Impervious = 2,130 sf

Summary for Subcatchment PWA-1A: PWP-1

Runoff = 1.04 cfs @ 12.09 hrs, Volume= 3,454 cf, Depth= 6.49"
Routed to Reach DP-1 : DP-1

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 1.00-30.00 hrs, dt= 0.05 hrs
Type III 24-hr 100-Year Rainfall=8.16"

	Area (sf)	CN	Adj	Description
*	684	98		Rock Outcrop, HSG D
*	5,570	85		Woods, Good, HSG D
	86	98		Unconnected pavement, HSG D
*	50	80		Permeable Paver, HSG D
	6,390	87	86	Weighted Average, UI Adjusted
	5,620			87.95% Pervious Area
	770			12.05% Impervious Area
	86			11.17% Unconnected

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
6.0					**Direct Entry,**

Summary for Subcatchment PWA-1B: PWP-1

Runoff = 0.24 cfs @ 12.09 hrs, Volume= 897 cf, Depth> 7.92"
Routed to Pond 550-Gal :

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 1.00-30.00 hrs, dt= 0.05 hrs
Type III 24-hr 100-Year Rainfall=8.16"

Area (sf)	CN	Description
1,360	98	Roofs, HSG D
1,360		100.00% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
6.0					**Direct Entry,**

Summary for Reach DP-1: DP-1

Inflow Area = 7,750 sf, 27.48% Impervious, Inflow Depth = 6.68" for 100-Year event
Inflow = 1.23 cfs @ 12.09 hrs, Volume= 4,312 cf
Outflow = 1.23 cfs @ 12.09 hrs, Volume= 4,312 cf, Atten= 0%, Lag= 0.0 min

Routing by Stor-Ind+Trans method, Time Span= 1.00-30.00 hrs, dt= 0.05 hrs

Summary for Pond 550-Gal:

Inflow Area = 1,360 sf,100.00% Impervious, Inflow Depth > 7.92" for 100-Year event
Inflow = 0.24 cfs @ 12.09 hrs, Volume= 897 cf
Outflow = 0.20 cfs @ 12.14 hrs, Volume= 858 cf, Atten= 16%, Lag= 3.4 min
Primary = 0.20 cfs @ 12.14 hrs, Volume= 858 cf
Routed to Reach DP-1 : DP-1

Routing by Stor-Ind method, Time Span= 1.00-30.00 hrs, dt= 0.05 hrs
Peak Elev= 123.59' @ 12.14 hrs Surf.Area= 39 sf Storage= 102 cf

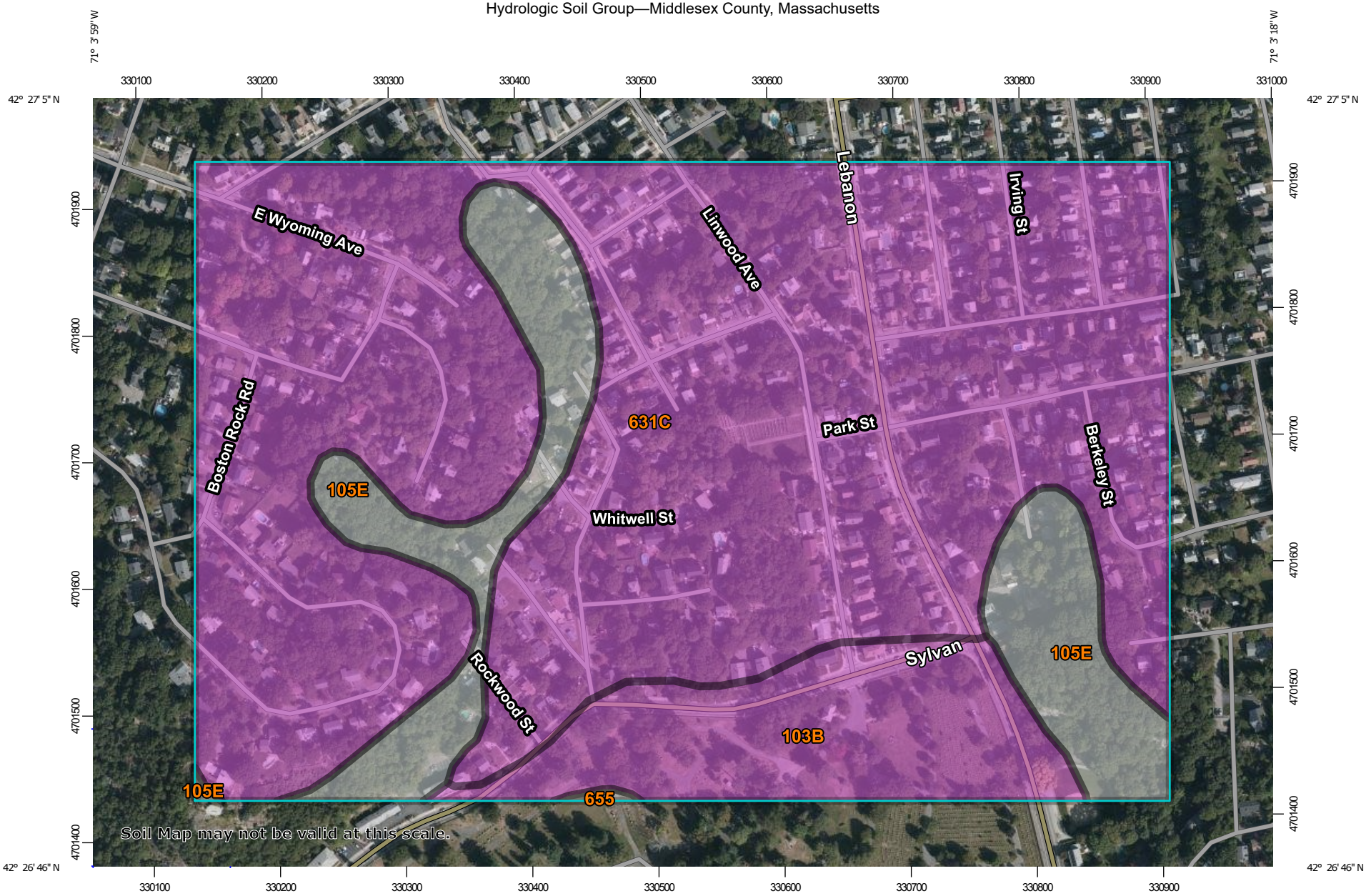
Plug-Flow detention time= 55.6 min calculated for 858 cf (96% of inflow)
Center-of-Mass det. time= 28.9 min (770.2 - 741.3)

Volume	Invert	Avail.Storage	Storage Description
#1	121.00'	141 cf	**5.00'D x 3.60'H Vertical Cone/Cylinder** x 2

Device	Routing	Invert	Outlet Devices		
#1	Primary	122.00'	**2.0" Vert. Orifice/Grate**	C= 0.600	Limited to weir flow at low heads
#2	Primary	123.00'	**2.0" Vert. Orifice/Grate**	C= 0.600	Limited to weir flow at low heads

Primary OutFlow Max=0.20 cfs @ 12.14 hrs HW=123.58' (Free Discharge)
└─**1=Orifice/Grate** (Orifice Controls 0.13 cfs @ 5.89 fps)
└─**2=Orifice/Grate** (Orifice Controls 0.07 cfs @ 3.39 fps)

Hydrologic Soil Group—Middlesex County, Massachusetts



Map Scale: 1:4,280 if printed on A landscape (11" x 8.5") sheet.

N

Meters: 0 50 100 200 300

Feet: 0 200 400 800 1200

Map projection: Web Mercator Corner coordinates: WGS84 Edge tics: UTM Zone 19N WGS84

MAP LEGEND

Area of Interest (AOI)

- Area of Interest (AOI)

Soils

Soil Rating Polygons

- A
- A/D
- B
- B/D
- C
- C/D
- D
- Not rated or not available

Soil Rating Lines

- A
- A/D
- B
- B/D
- C
- C/D
- D
- Not rated or not available

Soil Rating Points

- A
- A/D
- B
- B/D
- C
- C/D
- D
- Not rated or not available

Water Features

- Streams and Canals

Transportation

- Rails
- Interstate Highways
- US Routes
- Major Roads
- Local Roads

Background

- Aerial Photography

MAP INFORMATION

The soil surveys that comprise your AOI were mapped at 1:25,000.

Warning: Soil Map may not be valid at this scale.

Enlargement of maps beyond the scale of mapping can cause misunderstanding of the detail of mapping and accuracy of soil line placement. The maps do not show the small areas of contrasting soils that could have been shown at a more detailed scale.

Please rely on the bar scale on each map sheet for map measurements.

Source of Map: Natural Resources Conservation Service
Web Soil Survey URL:
Coordinate System: Web Mercator (EPSG:3857)

Maps from the Web Soil Survey are based on the Web Mercator projection, which preserves direction and shape but distorts distance and area. A projection that preserves area, such as the Albers equal-area conic projection, should be used if more accurate calculations of distance or area are required.

This product is generated from the USDA-NRCS certified data as of the version date(s) listed below.

Soil Survey Area: Middlesex County, Massachusetts
Survey Area Data: Version 19, Sep 12, 2019

Soil map units are labeled (as space allows) for map scales 1:50,000 or larger.

Date(s) aerial images were photographed: Sep 11, 2019—Oct 5, 2019

The orthophoto or other base map on which the soil lines were compiled and digitized probably differs from the background imagery displayed on these maps. As a result, some minor shifting of map unit boundaries may be evident.

Hydrologic Soil Group

Map unit symbol	Map unit name	Rating	Acres in AOI	Percent of AOI
103B	Charlton-Hollis-Rock outcrop complex, 3 to 8 percent slopes	A	10.8	11.1%
105E	Rock outcrop-Hollis complex, 3 to 35 percent slopes		12.4	12.9%
631C	Charlton-Urban land-Hollis complex, 3 to 15 percent slopes, rocky	A	73.5	75.9%
655	Udorthents, wet substratum		0.1	0.1%
Totals for Area of Interest			**96.8**	**100.0%**

Description

Hydrologic soil groups are based on estimates of runoff potential. Soils are assigned to one of four groups according to the rate of water infiltration when the soils are not protected by vegetation, are thoroughly wet, and receive precipitation from long-duration storms.

The soils in the United States are assigned to four groups (A, B, C, and D) and three dual classes (A/D, B/D, and C/D). The groups are defined as follows:

Group A. Soils having a high infiltration rate (low runoff potential) when thoroughly wet. These consist mainly of deep, well drained to excessively drained sands or gravelly sands. These soils have a high rate of water transmission.

Group B. Soils having a moderate infiltration rate when thoroughly wet. These consist chiefly of moderately deep or deep, moderately well drained or well drained soils that have moderately fine texture to moderately coarse texture. These soils have a moderate rate of water transmission.

Group C. Soils having a slow infiltration rate when thoroughly wet. These consist chiefly of soils having a layer that impedes the downward movement of water or soils of moderately fine texture or fine texture. These soils have a slow rate of water transmission.

Group D. Soils having a very slow infiltration rate (high runoff potential) when thoroughly wet. These consist chiefly of clays that have a high shrink-swell potential, soils that have a high water table, soils that have a claypan or clay layer at or near the surface, and soils that are shallow over nearly impervious material. These soils have a very slow rate of water transmission.

If a soil is assigned to a dual hydrologic group (A/D, B/D, or C/D), the first letter is for drained areas and the second is for undrained areas. Only the soils that in their natural condition are in group D are assigned to dual classes.

Rating Options

Aggregation Method: Dominant Condition

Component Percent Cutoff: None Specified

Tie-break Rule: Higher

LEGEND

PROPERTY LINE	
ABUTTERS PROPERTY LINE	
EXISTING EDGE OF PAVEMENT	
LIMIT OF BORDERING VEGETATED WETLAND (BVW)	
WETLAND FLAG	WF 8D
WETLAND	
50 FT BUFFER ZONE TO BVW	
100 FT BUFFER ZONE TO BVW	
EXISTING CONTOUR	
EXISTING WATERSHED BOUNDARY	
EXISTING TC	
HYDROLOGIC SOILS GROUP A	
HYDROLOGIC SOILS GROUP B	
HYDROLOGIC SOILS GROUP C	
HYDROLOGIC SOILS GROUP D	

HORIZONTAL SCALE

10 0 5 10

(IN FEET)
1"=10'

POOL

RETAINING WALL

RETAINING WALL

RETAINING WALL

EWA-1
A: 0.18-AC
CN: 86
TC: 6.0-MIN

HSG-D
105E

CHAIN LINK FENCE

STONE WALL

MONTVALE STREET
(40' WIDE PRIVATE WAY)

DATE	DESCRIPTION
DATE	DESCRIPTION
REVISIONS	

OWNER / APPLICANT:

ARMANDO PLATA
11 LANDRY ROAD
MEDFORD, MA 02155

PROJECT:

22 MONTVALE STREET
MELROSE, MA 02176

DATE ISSUED:	FEBRUARY 29, 2024
PROJECT #:	20-10201
PREPARED BY:	MAC

PROFESSIONAL ENGINEER FOR CIVIL DESIGN CONSULTANTS, INC.

CIVIL DESIGN CONSULTANTS, INC
344 North Main Street | Andover - MA 01810
(978) 416-0920 | www.civildcc.com

DRAWING TITLE:

EXISTING WATERSHED PLAN

DRAWING #:

EWP

LEGEND

PROPERTY LINE	
PROPOSED BUILDING	
PROPOSED CONTOUR	146
PROPOSED SPOT GRADE	161.00
PROPOSED SPOT GRADE (TW/BW)	TW: 159.57 BW: 155.67
PROPOSED DRAIN	
PROPOSED CATCH BASIN	
PROPOSED DRAIN MANHOLE	
PROPOSED RETAINING WALL	
PROPOSED WATERSHED BOUNDARY	
PROPOSED TC	
PROPOSED IMPERVIOUS SURFACE	
HYDROLOGIC SOILS GROUP A	
HYDROLOGIC SOILS GROUP B	
HYDROLOGIC SOILS GROUP C	
HYDROLOGIC SOILS GROUP D	

HORIZONTAL SCALE

10 0 5 10

(IN FEET)
1"=10'

PWA-1A
A: 0.15-AC
CN: 86
TC: 6.0-MIN

PWA-1B
A: 0.03-AC
CN: 98
TC: 6.0-MIN

PROP. DWELLING
LOWER LEVEL: 715-SF (FFE: 138.00)
UPPER LEVEL: 1,360-SF (FFE: 138.00)

MONTVALE STREET
(40' WIDE PRIVATE WAY)

04/24/24	REV. PER CITY COMMENTS
04/09/24	REV. PER CITY COMMENTS
DATE	DESCRIPTION
REVISIONS	

OWNER / APPLICANT:

ARMANDO PLATA
11 LANDRY ROAD
MEDFORD, MA 02155

PROJECT:

22 MONTVALE STREET
MELROSE, MA 02176

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04/24/24

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344 North Main Street | Andover - MA 01810
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DRAWING TITLE:

PROPOSED
WATERSHED PLAN

DRAWING #:

PWP