



Project Design Report 80% Design

Palmer Avenue Detention Basin Retrofit Portland, Maine

Prepared for

City of Portland
Department of Public Works
212 Canco Road, Suite B
Portland, Maine 04103

January 20, 2026

TABLE OF CONTENTS

1. Introduction	2
2. Existing Conditions.....	3
Project Area	3
Land Cover	3
Site Topography	3
3. Soils	4
4. Proposed Site Improvements	4
Alternatives Analysis.....	4
Recommended Retrofit Approach.....	5
Selected Retrofit Option	6
5. Existing Conditions Model	6
6. Proposed Conditions Model	7
7. Stormwater Management	7
Maine DEP Standards	7
HydroCAD Stormwater Analysis	7

Appendices

Appendix 1:	Alternatives Analysis Exhibit
Appendix 2:	Stormwater Quality Calculations
Appendix 3A:	Hydrologic Modeling– Existing Conditions (HydroCAD) Summary
Appendix 3B:	Hydrologic Modeling– Proposed Conditions (HydroCAD) Summary
Appendix 4:	Inspection, Maintenance, and Housekeeping Plan
Appendix 5:	Watershed Plans
Appendix 6:	Geotechnical Report
Appendix 7:	Maine DEP Correspondence
Appendix 8:	Original Stormwater Calculations

Project Design Report

Palmer Avenue Detention Basin Retrofit

1. Introduction

Sebago Technics, Inc. has prepared this report to present analyses performed to address the City of Portland's goal to retrofit the existing Palmer Avenue detention basin to meet current Maine DEP stormwater standards and the requirements of the MS4 General Permit. The detention basin is tributary to Dole Brook which is subject to the Maine Impervious Cover TMDL for Impaired Streams. The City identified this project in coordination with the Maine DEP to address several of the specific impairments listed in the impervious cover TMDL. The City indicated in their request for proposal that their preferred project approach would be to convert the existing detention basin into a gravel wetland or a wet pond.

The existing detention basin was installed as part of a subdivision development known as the Deering Run subdivision in the 1980s and was designed to control peak rates of stormwater runoff to meet the State of Maine development flooding standard in place at that time. As a part of the proposed project a watershed study for the drainage area tributary to the existing detention basin was completed along with an assessment of the existing detention pond's functionality which was provided to the City on October 30, 2024. The watershed study has been updated as part of this submission based on historical records obtained for the original subdivision as designed by Sebago Technics.

An alternatives analysis for six (6) retrofit options, including a gravel wetland and wet pond, was completed and discussed with the City on December 2, 2024. The City selected two (2) options located within the existing detention basin footprint to be further evaluated as a part of the 30% conceptual design plans. The conceptual design plans and opinions of cost for the selected retrofit options were provided to the City on December 11, 2024, and followed by a preliminary project design report on December 17, 2024.

Upon review of the 30% design deliverable, the City of Portland selected to move forward with the design of a gravel wetland system that stayed within the existing detention basin footprint, most similar to Option 3 of the Alternatives Analysis.

The analysis presented does not include any evaluation of hydraulic modeling for the existing storm drains. This report is based on GIS information, LiDAR data, aerial photography, City of Portland vault plans, field survey in the existing detention basin area, and historical records obtained for the original subdivision. The analysis is based on commonly accepted engineering methods and intended for the purpose of supporting an 80% design of the proposed gravel wetland to replace the existing detention basin.

2. Existing Conditions

Project Area

The project area is identified on the Existing and Proposed Conditions Watershed Plans attached in Appendix 5 and described in Section 5 of this report.

The study area tributary to the existing Palmer Avenue detention basin is serviced by a separated storm drain system which collects stormwater runoff from the neighborhood and provides conveyance to the detention basin via a 42" storm drain pipe in Palmer Avenue near Continental Drive. The tributary area includes Palmer Avenue, Allison Avenue, W. Lynne Avenue, Deering Run Drive, and a small section of Washington Avenue. Additional area is included in the stormwater model that bypasses the detention basin and is tributary to the existing box culvert.

The existing detention basin consists of a 4-foot diameter outlet control structure with a catch basin frame and grate that is built into the side slope of the basin. The outlet control structure has a 12" RCP pipe inlet from the detention basin and a 30" RCP pipe outfall that discharges towards a 46" x 46" stone box culvert before ultimately being discharged into a tributary branch of Dole Brook. The existing 12" RCP pipe inlet was not observed as it is likely covered by sediment that has accumulated in the bottom of the basin over the years. A 10-foot-wide emergency spillway is located along the southerly berm to provide overflow relief during large storm events.

At the time the existing detention basin was constructed, the Maine DEP Chapter 500 regulations were not in existence. The detention basin was originally designed and constructed to provide stormwater detention mitigating the difference between the pre- and post-development conditions and was not constructed to provide water quality treatment other than some limited settling capacity for settleable solids.

Land Cover

The project area is comprised of a fully developed residential neighborhood which consists of local street rights-of-way and single-family house lots. The watershed boundary is generally defined by Palmer Avenue to the north, CSX Transportation railroad to the west, Washington Avenue to the east, and Continental Drive to the south.

The residential areas are located within the City's R2 and R3 zoning districts. Residential properties generally average around 1/4 acre lots with a few larger properties. Impervious coverage averages around 25% for the lots within the study area.

Site Topography

The study area generally slopes from east to west, ranging from approximately 2% to 12% on residential properties and approximately 1% to 7% on existing roadways.

3. Soils

Soil characteristics were obtained from the United States Department of Agriculture and Natural Resource Conservation Services (NRCS) Web Soil Survey. The Hydrologic Groups (HSG) of the soils on site as classified by Technical Release TR 55 of the Soil Conservation Service are delineated on the existing conditions watershed plan and are identified below in Table 3-1.

Table 3-1 Soil Types and Characteristics		
Soil Type	Symbol	HSG
Nicholville Very Fine Sandy Loam	BgC2	B
Lamoine Silt Loam	BuB	C/D
Deerfield Loamy Fine Sand	DeB	A
Hinckley Loamy Sand	HIB	A
Hinckley Loamy Sand	HIC	A
Hinckley-Suffield Complex	HnC	A
Scantic Silt Loam	Sn	D
Swanton Fine Sandy Loam	Sz	C/D

The hydrologic soil group (HSG) designation is based on a rating of the relative permeability of a soil, with Group “A” being extremely permeable such as coarse sand, to Group “D” having low permeability such as clay.

Test boring information was obtained in the area of the proposed improvements to support the final design plans. A geotechnical report was prepared by S.W. Cole that includes recommendations relative to earthwork associated with the proposed construction and analysis of the subsurface findings. The geotechnical report is included in Appendix 6.

4. Proposed Site Improvements

Alternatives Analysis

An alternatives analysis was completed to compare potential alternatives for the retrofit of the existing detention basin into a gravel wetland or wet pond. A total of six (6) options were evaluated, consisting of three (3) options for a gravel wetland and three (3) options for a wet pond. All options involved excavating below the existing detention basin bottom to maintain an equal or greater flood storage volume than the existing detention basin. Three (3) of the options involved expanding the footprint of the existing detention basin.

The retrofit options were compared based on Maine DEP stormwater treatment standards and criteria outlined in the New England Stormwater Retrofit Manual. The Maine DEP stormwater treatment standards evaluated in the alternative analysis included the water quality volume for both BMPs, gravel

wetland surface area, and wet pond permanent pool volume. The Stormwater Retrofit Manual was used as a tool to compare the effectiveness of each solution based on published performance curves that relate the runoff depth from impervious areas of various BMPs to pollutant reduction. The performance curves also help understand when it is less effective to continue to make a given BMP bigger.

The alternatives analysis for the six (6) retrofit options was discussed with the City on December 2, 2024. The alternatives analysis exhibit that was presented is attached in Appendix 1. The exhibit describes the differences between retrofit options and provides a summary table to compare criteria from the Maine DEP and correlate the BMPs with the performance curves from the Stormwater Retrofit Manual. It is noted that the gravel wetland generally provides a greater percent pollutant removal and the wet pond provides a greater percent reduction of effective impervious cover and runoff.

The City indicated that retrofit Options 1 and 3 are preferred due to the limited disturbance required within the existing detention basin area, the diminishing returns on pollutant reduction as the BMP size is expanded, and cost to construct the improvements. Option 2 was eliminated due to the proposed depth of excavation and concerns related to constructability adjacent to the existing railroad track and residential homes. Options 4, 5, and 6 were eliminated due to the increased disturbance required to expand the BMP to the south, the associated loss of the existing wooded buffer screening the residential homes from the railroad track, and additional construction costs.

Recommended Retrofit Approach

The City selected Options 1 and 3, consisting of a gravel wetland and a wet pond, to be further evaluated as a part of the 30% conceptual design plans. Both options involved excavating below the existing detention basin bottom to maintain an equal or greater flood storage volume than the existing detention basin. An outlet control structure was provided for each option and controlled the channel protection volume as well as the volume from larger storms.

The proposed gravel wetland sizing resulted in a provided surface area and water quality volume that was approximately 25% of the Maine DEP BMP standards based on the tributary area. The proposed gravel wetland had a runoff depth from impervious area of approximately 0.63 inches. The runoff depth from impervious areas is the amount of volume the BMP can store and hold normalized to the contributing impervious drainage areas. The performance curves from the New England Stormwater Retrofit Manual showed an approximate percent pollutant reduction of 52, 58, 73, 92, and 88 achieved by the proposed gravel wetland for total phosphorous, total nitrogen, bacteria, total suspended solids, and metals, respectively. In addition, the proposed gravel wetland has a minimal hydraulic head requirement as the invert of the primary inlet is only 4 inches below the gravel wetland soil surface (the primary outlet invert). A minimal hydraulic head requirement is beneficial given the existing inlet and outlet elevations of the detention basin.

The proposed wet pond sizing resulted in a provided permanent pool volume and channel protection volume that was approximately 15-16% of the Maine DEP BMP standards based on tributary area. The proposed wet pond did not meet the minimum mean depth requirement of 3 feet as only 1.75 feet was provided. A mean depth of 3 feet or more is suggested to prevent turbulent re-suspension of sediments. The required minimum depth of the underdrain pipe in the gravel bench is 30 inches which cannot be achieved given the limited elevation difference between the existing inlet and outlet elevations of the

detention basin. The gravel bench underdrain outlet was set below the 30-inch pipe outfall from the outlet control structure, which is not recommended to allow the gravel bench to drain properly. The elevation of the perforated pipe would have to be set at approximately 12 inches of depth to be above the pond outfall, which does not meet the Maine DEP BMP standards. The proposed wet pond had a runoff depth from impervious area of approximately 0.81 inches. The performance curves from the New England Stormwater Retrofit Manual showed an approximate percent pollutant reduction of 48, 31, 58, 74, and 87 achieved by the proposed wet pond for total phosphorous, total nitrogen, bacteria, total suspended solids, and metals, respectively.

We recommended the construction of the gravel wetland to retrofit the existing stormwater detention basin given the constraints of the site, the level of adherence with Maine DEP BMP standards, and the anticipated pollutant removal benefits based on the New England Stormwater Retrofit Manual performance curves. Gravel wetland systems are well suited for retrofitting stormwater detention systems primarily because older stormwater ponds were typically sized for the 10-year or larger events whereas green stormwater infrastructure like the gravel wetland is designed for much more frequent, smaller events.

Selected Retrofit Option

After reviewing the existing site constraints and the construction feasibility of the options provided in the Alternatives Analysis, the City decided to proceed with the design of the gravel wetland system. Option 3 of the Alternatives Analysis was selected which proposes the gravel wetland constructed within the existing limits of the detention basin. Since the 30% design report, the gravel wetland was further modified to provide only one treatment cell to maximize the Best Management Practice's treatment area. This approach was selected based on discussions with the Long Creek Watershed Management District, past precedent projects in the local area, and given that this is a retrofit project.

We based the design of the proposed gravel wetland sized per the Maine Department of Environmental Protection standards for impervious and landscaped area. The gravel wetland was sized based on the limited area of the stormwater treatment facility provided. The stormwater quality calculations (Appendix 2) summarize the Maine DEP requirements compared to the actual sizing of the proposed gravel wetland.

5. Existing Conditions Model

The existing condition watershed plan contains 2 subcatchments identified as 1.0S and 1.1S in the HydroCAD model. Subcatchment 1.0S represents the overall area of the existing subdivision that drains to the detention basin (1.0P) at Palmer Avenue which provides stormwater quantity attenuation. Subcatchment 1.1S represents area to the south of the existing subdivision that bypasses the detention basin. The subcatchments encompass a land area of approximately 38.6 acres. One location was identified as a point of analysis (POA) for comparing peak runoff rates.

POA-1 represents the downstream point of the existing Palmer Avenue detention basin where stormwater discharges are routed towards a stone box culvert which crosses underneath the existing railroad right-of-way before ultimately being discharged into a tributary branch of Dole Brook.

6. Proposed Conditions Model

The proposed condition watershed plan consists of the same overall area as the existing conditions watershed plan and contains 2 subcatchments identified as 10.0S and 10.1S. Two (2) options were evaluated to retrofit the existing detention basin as a part of the 30% design deliverable. These options included a proposed wet pond and gravel wetland (10.0P) which both provide quantity and quality treatment of the stormwater runoff. The selected retrofit option of the gravel wetland has been further modified and evaluated as a part of the 80% design.

The proposed Best Management Practice (gravel wetland) has been designed and sized to meet DEP BMP standards to the greatest extent practicable contained within Chapter 500 and the BMP Manual. Sizing calculations can be found in Appendix 2. Calculations for both the 30% and 80% design options are included for reference.

7. Stormwater Management

Maine DEP Standards

The existing detention basin was approved in 1987 as a part of the Deering Run Subdivision under Site Location of Development Act (SLODA) permit number L-013776-86-A-N. An exemption from a SLODA Amendment is available under MRSA §488.29 as defined below.

“29. Exemption for new construction at or modification of existing development. New construction at or modification of an existing licensed development that is permitted pursuant to this article is exempt from review under this article if:

- A. The additional disturbed area not to be revegetated does not exceed 10,000 square feet ground area in any calendar year and does not exceed 20,000 square feet ground area in total; and
- B. The construction or modification does not involve a division of the parcel of land.

The permittee shall annually notify the department of any new construction or modification undertaken during the previous 12 months that is governed by this subsection. The notice must identify the type, location and ground area of the new construction or modification. At the time of the annual notification, the permittee shall provide to the department development plans, certified by a professional engineer, for new construction or modification governed by this subsection.”

The project is exempt from a Site Law amendment as it will not exceed the above noted thresholds to complete the conversion of the existing stormwater detention basin to a gravel wetland. A copy of the email correspondence from Maine DEP confirming this exemption is included as Appendix 7. The proposed is designed to address Chapter 500 requirements including Basic, General, and Flooding Standards. As this is a retrofit project, the General Standards are met to the greatest extent practicable.

HydroCAD Stormwater Analysis

A runoff evaluation was performed using the methodology outlined in the USDA Soil Conservation Service's "Urban Hydrology for Small Watersheds - Technical Release #55 (TR-55)". HydroCAD computer software was utilized to perform the calculations.

For modeling purposes, the existing conditions and proposed conditions models were prepared by utilizing a total curve number value of 77 and a time of concentration of 0.21 hours (12.6 minutes). This is in alignment with the calculations that were previously completed as a part of original subdivision design by Sebago Technics in 1985. Original report and calculations are included in Appendix 8.

The peak runoff rates were then calculated using the 24-hour rainfall values from Appendix H of MDEP's Chapter 500: Stormwater Management (effective date August 2015). Rainfall values for Cumberland County are listed in the table below.

Storm Frequency	24-hr Duration Rainfall (in.)
2-yr	3.1
10-yr	4.6
25-yr	5.8
50-yr	6.9
100-yr	8.1

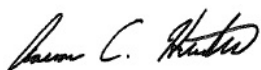
The HydroCAD Data output sheets for the existing condition watershed model is provided in Appendix 3A for the 2, 10, 25, 50, and 100-year storm events. The following table presents the results of the peak runoff calculations at the analysis point for the existing and proposed conditions with the retrofit of the existing detention basin into a gravel wetland.

Analysis Point	Storm Event	Existing Conditions (cfs)	Gravel Wetland Proposed Conditions (cfs)
POA-1	2-year	11.8	10.3
	10-year	21.7	21.7
	25-year	39.4	36.3
	50-year	77.9	75.0
	100-year	125.6	124.4

The HydroCAD Data output sheets for the proposed condition watershed model for the selected gravel wetland option is provided in Appendix 3B. The HydroCAD Data output sheets for the 30% design options, including the wet pond and gravel wetland, are also included for reference. The model predicts that the peak runoff rates in the proposed condition at Point of Analysis 1 are below the existing condition runoff rates for the 2, 10, 25, 50 and 100-year storm events with implementation of the proposed BMP retrofit.

Prepared by,

SEBAGO TECHNICS, INC.



Aaron C. Hunter, P.E.
Project Manager



Dylan J. Stuart
Senior Civil Engineer

Appendix 1

Alternative Analysis Exhibit

PALMER AVENUE STORMWATER RETROFIT 30% ALTERNATIVES OPTIONS

SEBAGO TECHNICS, INC.

30% Alternatives Analysis Summary Table

30% Alternatives Analysis Summary Table								
		Required	Provided					
			Inside Existing Pond Footprint			Outside Existing Pond Footprint		
			Option 1	Option 2	Option 3	Option 4	Option 5	Option 6*
Wetpond	Permanent Pool Volume (CF)	150,860	22,971	127,082		154,545		
	Percent PPV Met		15%	84%		102%		
	Water Quality Volume (CF)	75,430	12,393	12,393		24,734		
	Percent CPV Met		16%	16%		33%		
Gravel Wetland	Surface Area (SF)	45,258			11,330		14,598	59,000
	Percent Surface Area Met				25%		32%	130%
	Water Quality Volume (CF)	75,430			18,447		25,505	78,144
	Percent CPV Met				24%		34%	104%
Misc.	Depth Below Existing Bottom (FT)		5	14	5	10	5	5
N.E. SWM Retrofit Manual	Design Storage Volume (CF)		35,364	139,475	27,511	179,279	37,183	125,344
	Contributing Impervious Area (SF)		524,485	524,485	524,485	524,485	524,485	683,162
	Runoff Depth from Impervious Area (IN)		0.81	3.19	0.63	4.10	0.85	2.20
	Percent Total Phosphorus Removal		48%	63%	52%	63%	58%	66%
	Percent Total Nitrogen Removal		31%	40%	58%	40%	65%	79%
	Percent Bacteria Removal		58%	79%	73%	79%	75%	81%
	Percent Total Suspended Solids Removal		74%	86%	92%	86%	96%	99%
	Percent Metals Removal		87%	93%	88%	93%	90%	92%
	Percent Reduction for Effective Impervious Cover		47%	83%	45%	83%	48%	54%
	Percent Reduction for Runoff		2%	81%	1%	81%	2%	5%
*Incorporates Continental Drive Watershed Area					SELECTED OPTION			

TAKEAWAYS

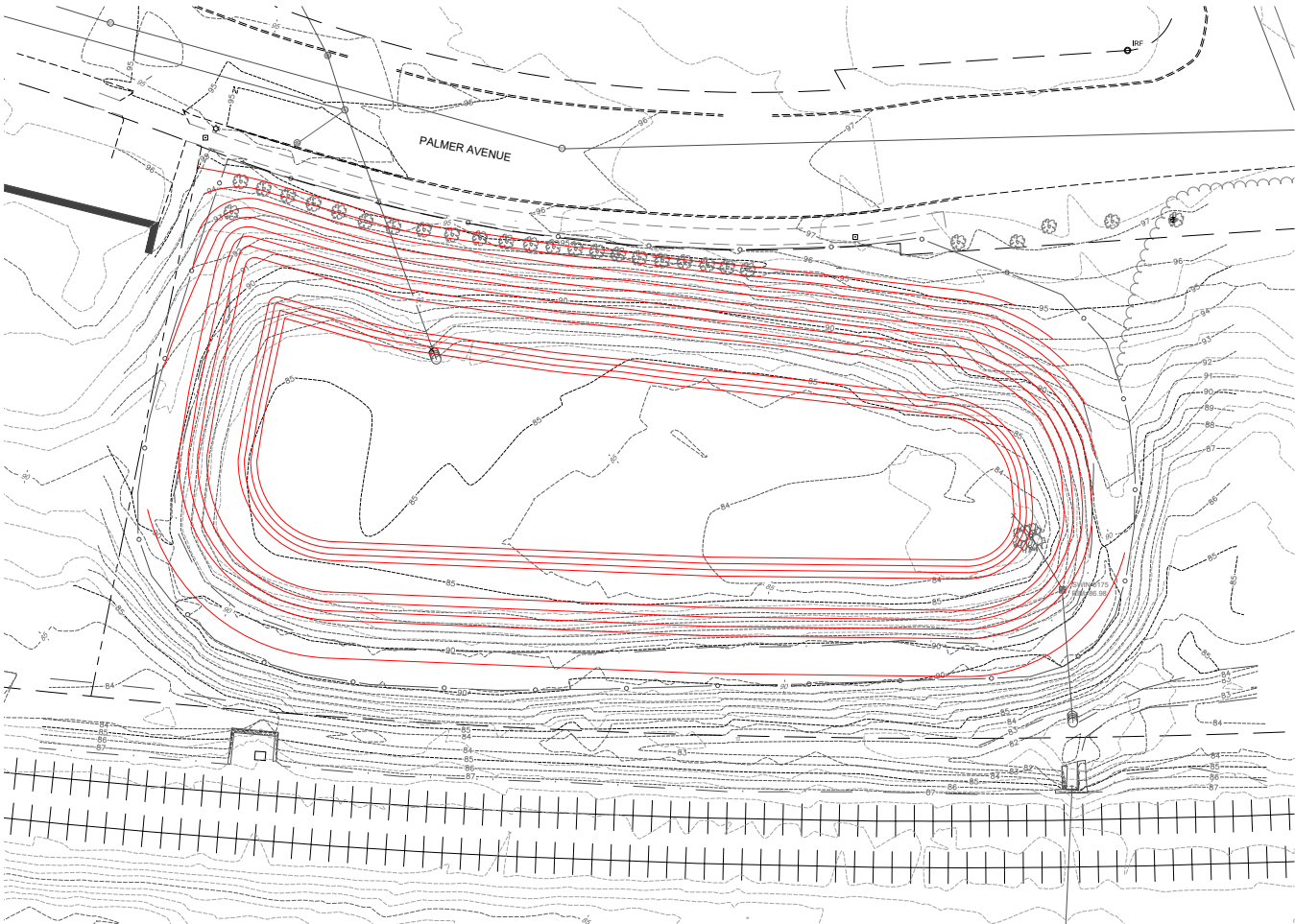
Both options listed below maintain equal or greater flood storage volume as existing detention basin.

- Wetpond
 - Requires approx. 10'+ deep excavation below existing BMP bottom to meet MDEP PPV standards
 - Concerns with depth of excavation and proximity to railroad track and adjacent properties
 - Recommend subsurface investigations before moving forward
 - Provides greater percent reduction for effective impervious cover and runoff
- Gravel Wetland
 - Requires approx. 3' deep excavation for cross section below existing BMP bottom
 - MDEP Surface area standards is difficult to meet
 - Provides greater percent pollutant removal

QUESTIONS

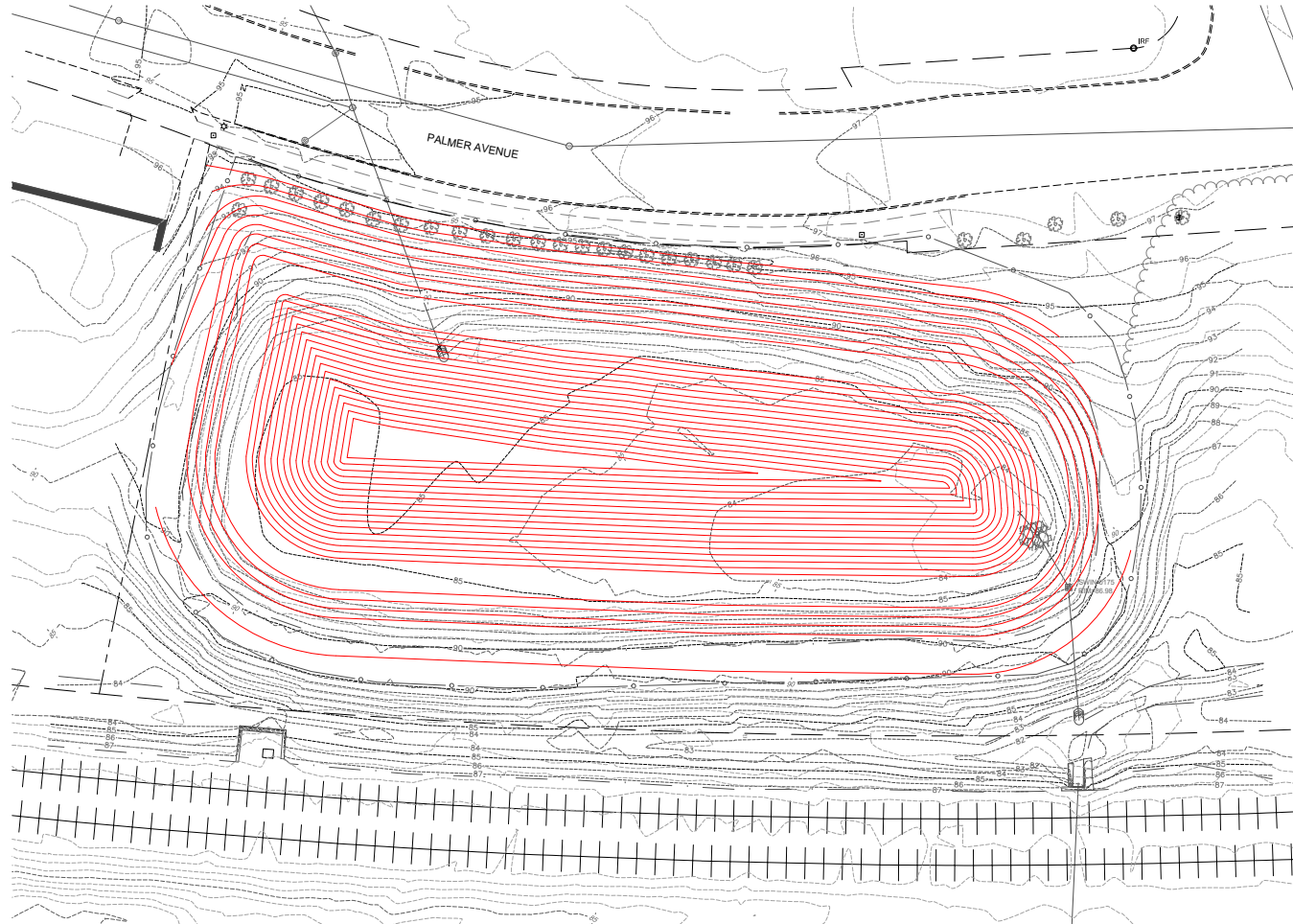
- Preferred maintenance option for City
- Has City confirmed ownership of land to south of existing detention basin
- Is it desirable to expand BMP to incorporate Continental Drive watershed
- Need to schedule SW Cole for subsurface investigations

INSIDE EXISTING POND FOOTPRINT



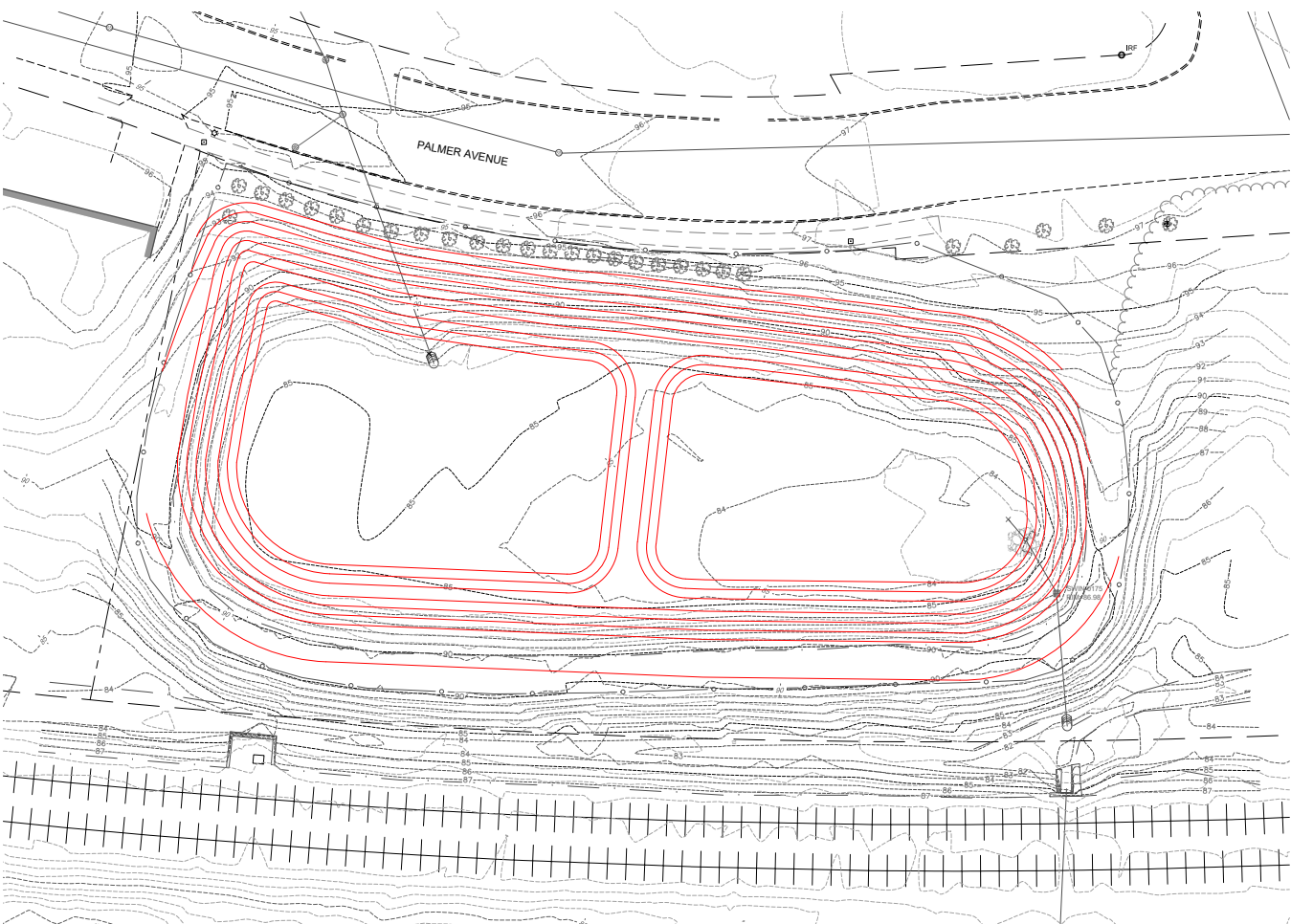
OPTION 1 - WET POND

- Wet pond stays within limits of current detention basin
- Provides least amount of impact and excavation
- Provides 15% of required permanent pool volume per MDEP standards
- Provides 16% of required water quality volume per MDEP standards



OPTION 2 - WET POND

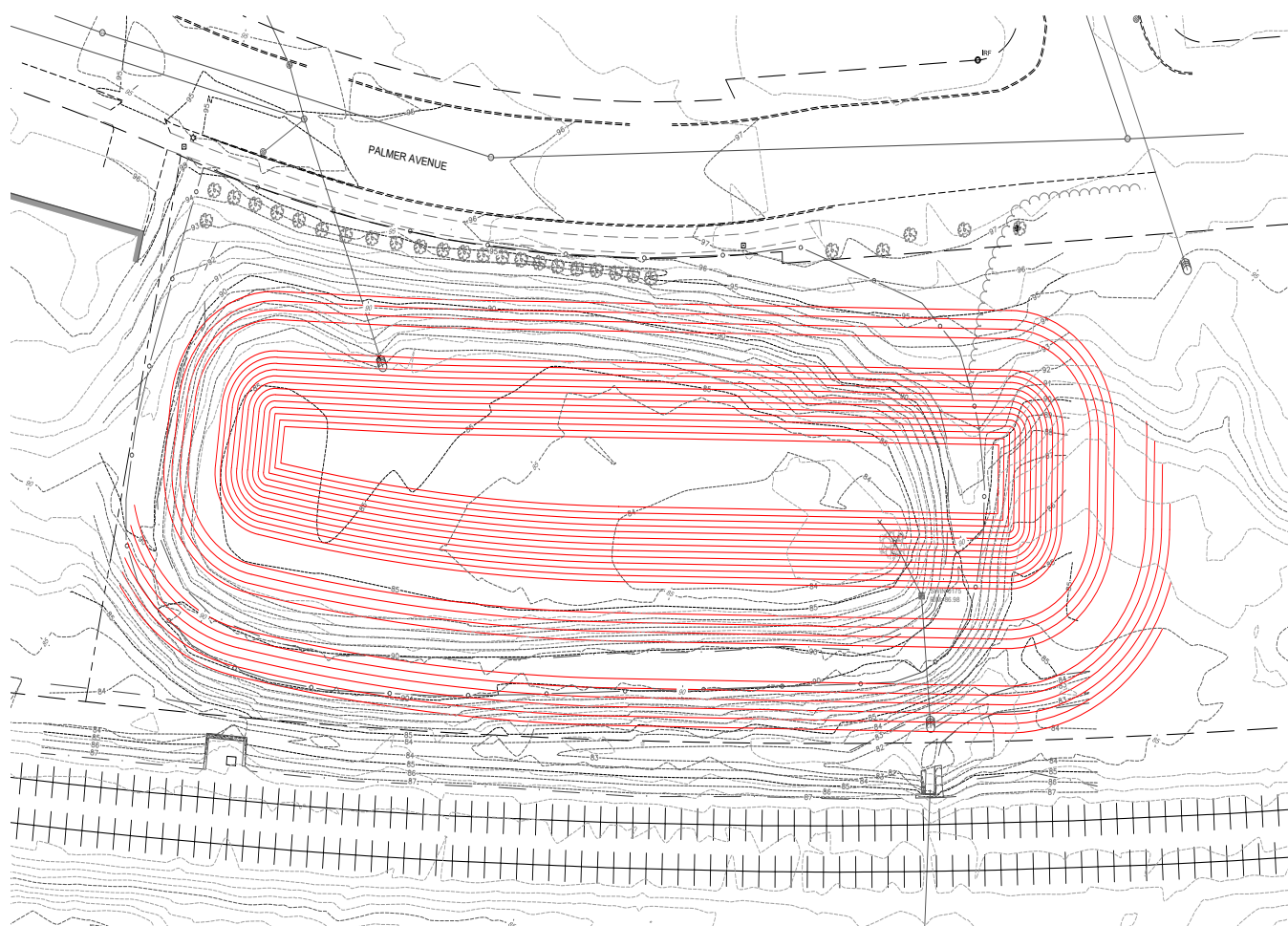
- Wet pond stays within limits of current detention basin
- Excavated 14' below the existing detention basin at 2:1 slope which is a concern with existing railroad track and adjacent properties. Recommend subsurface investigation
- Provides 84% of required permanent pool volume per MDEP Standards
- Provides 16% of required water quality volume per MDEP standards



OPTION 3 - GRAVEL WETLAND

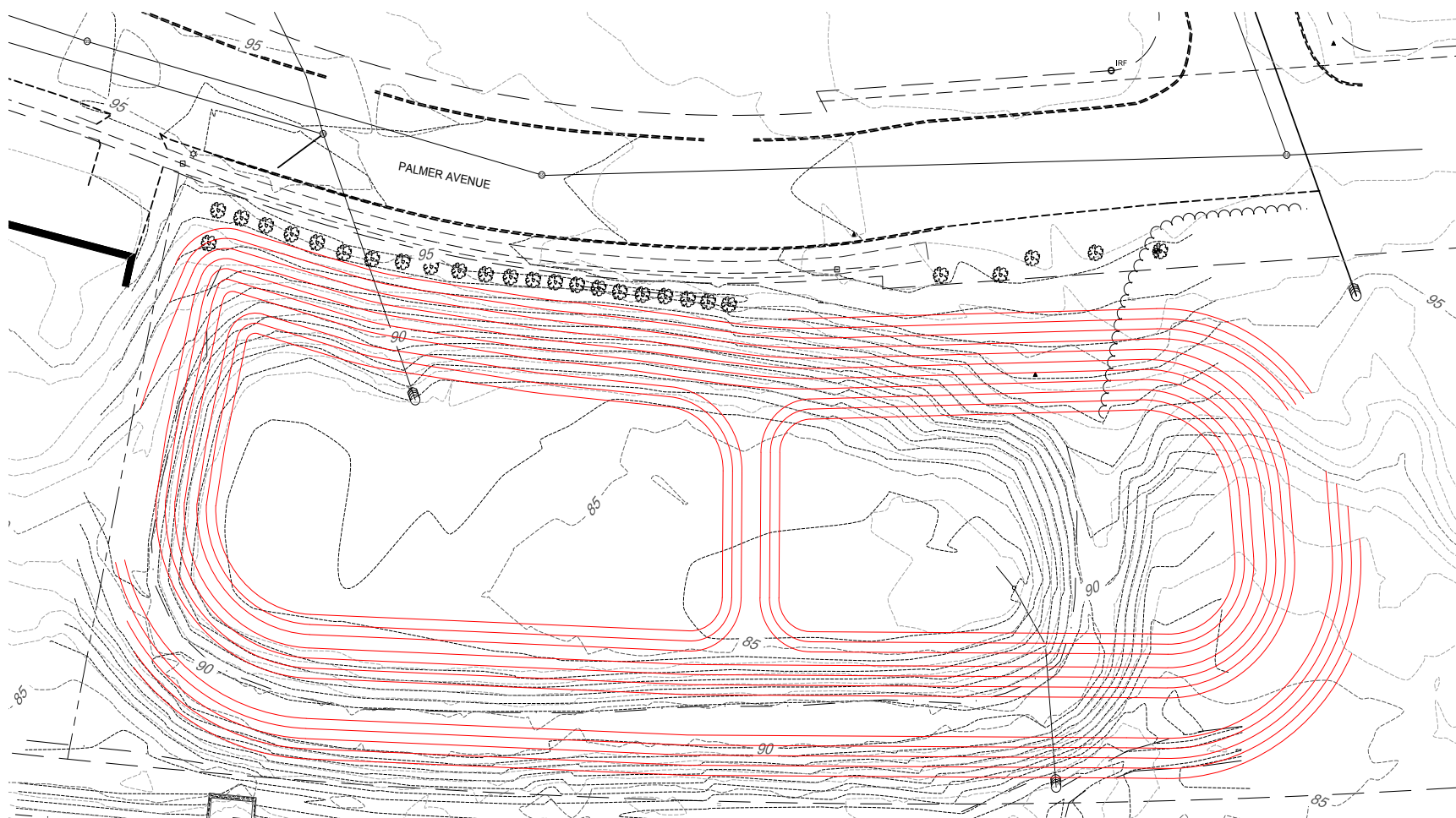
- Gravel wetland stays within limits of current detention basin
- Bottom of gravel wetland set at current depth of existing detention basin
- Provides 25% of required surface area per MDEP standards
- Provides 24% of required water quality volume per MDEP standards

OUTSIDE EXISTING POND FOOTPRINT



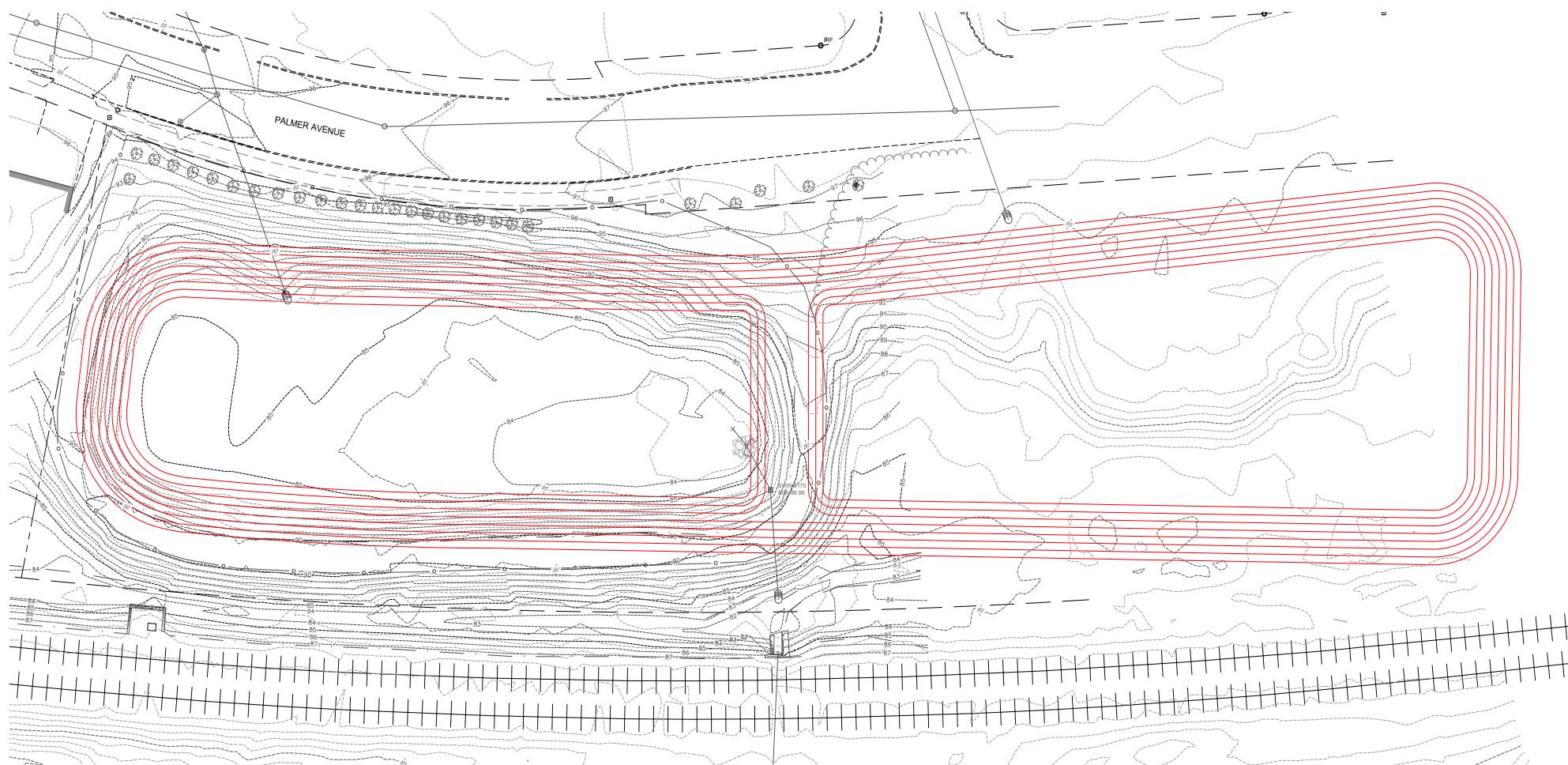
OPTION 4 - WET POND

- Limits of pond area is extended approximately 80' south up to Continental Drive outfall
- Excavated 10' below the existing detention basin at 2:1 slope which is a concern with existing rail road track and adjacent properties. Recommend subsurface investigation
- Provides the required permanent pool volume per MDEP standards
- Provides 33% of required water quality volume per MDEP standards



OPTION 5 - GRAVEL WETLAND

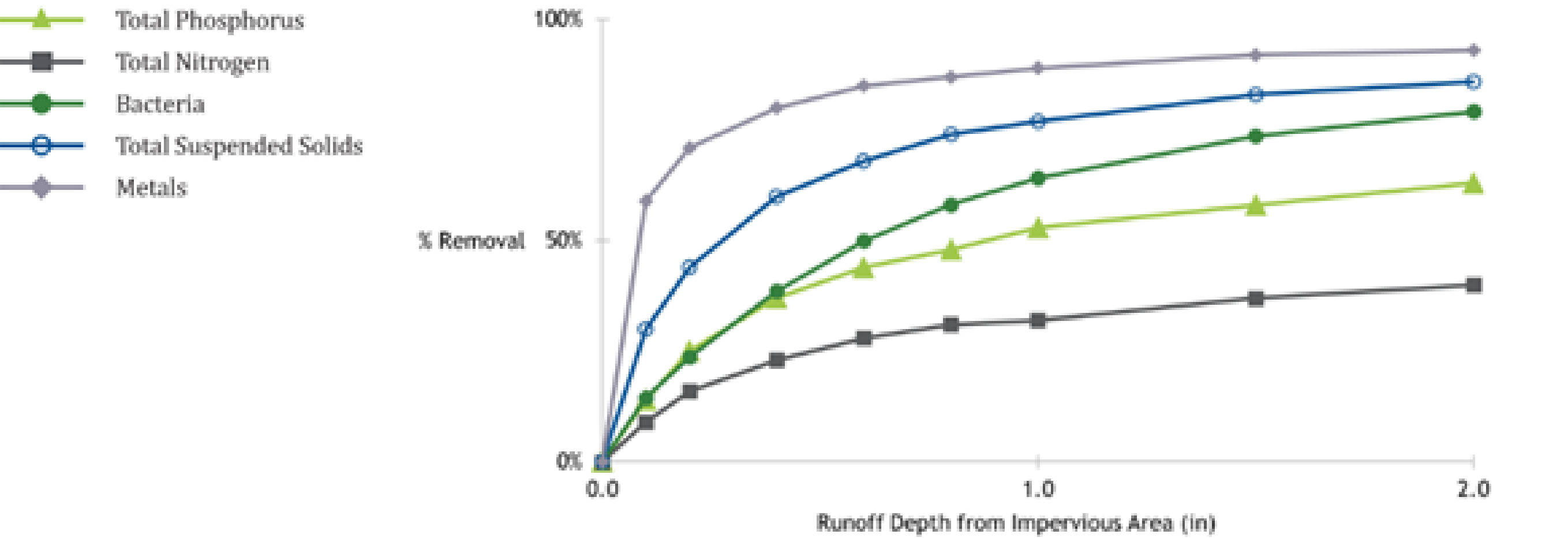
- Gravel wetland is extended approximately 80' south up to Continental Drive outfall
- Bottom of gravel wetland set at current depth of existing detention basin
- Provides 32% of required surface area per MDEP standards
- Provides 34% of required water quality volume per MDEP standards



OPTION 6 - GRAVEL WETLAND

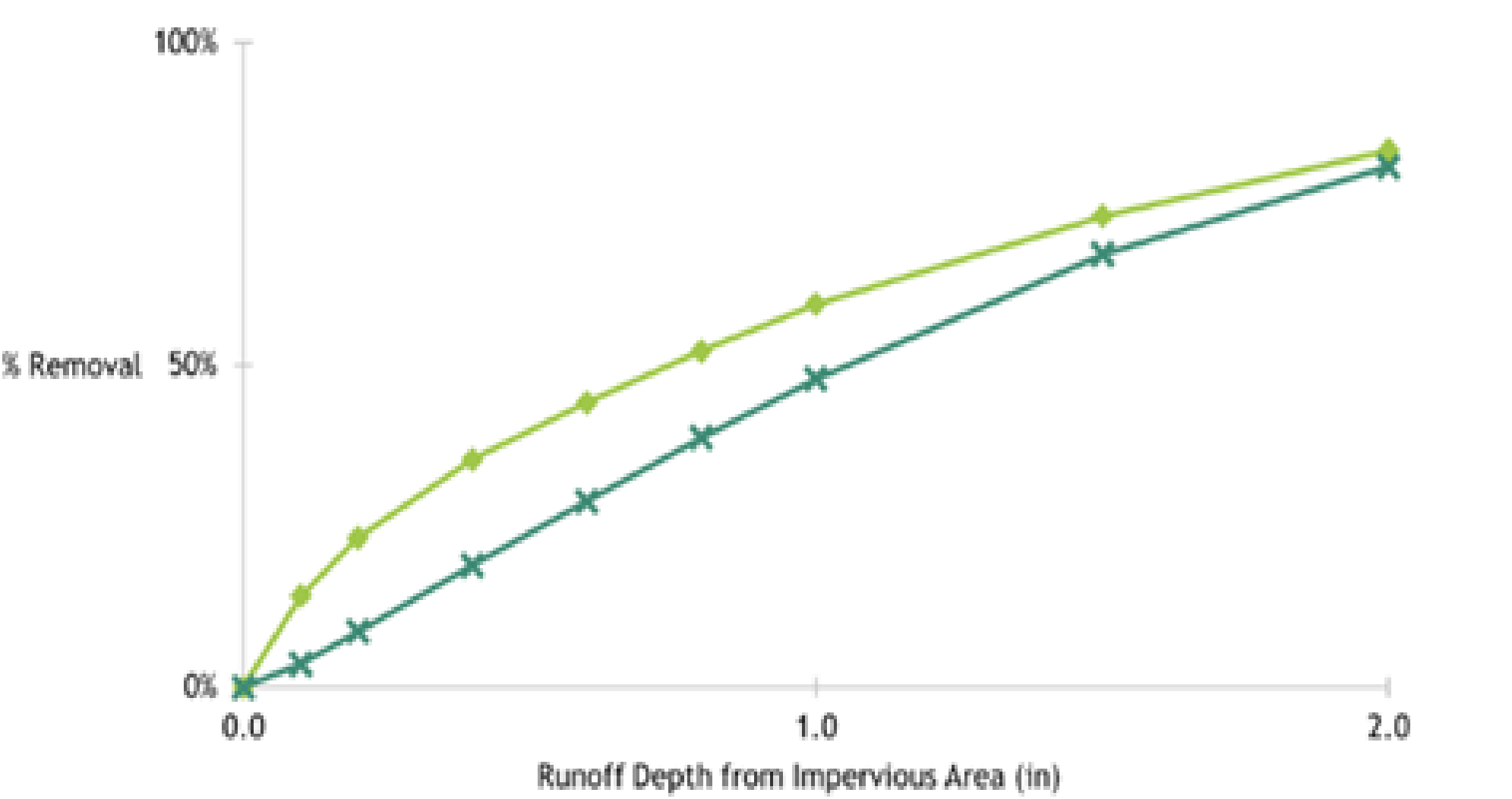
- Gravel wetland extended south to double in size of current layout and incorporate Continental Drive watershed area
- Provides the required surface area per MDEP standards
- Challenges with maintaining existing outfall to railroad and having two outfalls from Palmer Ave due to two cell requirement for BMP
- Provides required water quality volume per MDEP standards

Wet Pond



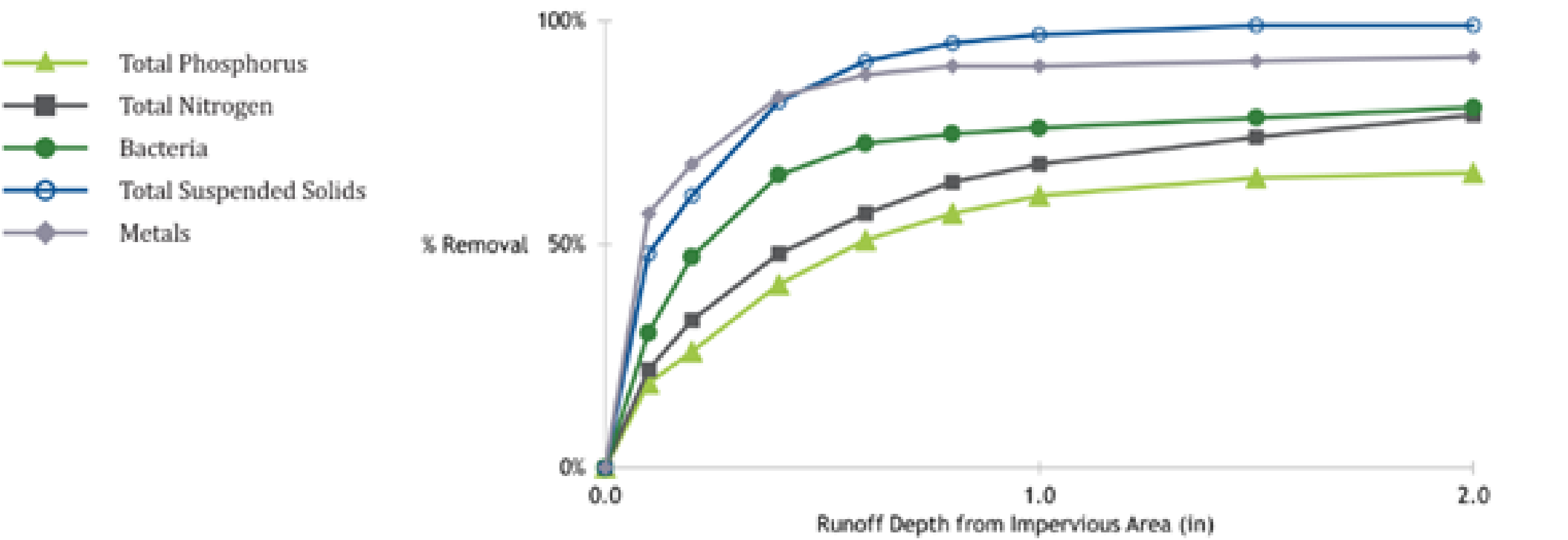
Pollutant	Design Storage Volume: Runoff Depth from Impervious Area (in)								
	0	0.10	0.20	0.40	0.60	0.80	1.00	1.50	2.00
TP	0%	14%	25%	37%	44%	48%	53%	58%	63%
TN	0%	9%	16%	23%	28%	31%	32%	37%	40%
Bacteria	0%	15%	24%	39%	50%	58%	64%	74%	79%
TSS	0%	30%	44%	60%	68%	74%	77%	83%	86%
Metals	0%	59%	71%	80%	85%	87%	89%	92%	93%

Wet Pond



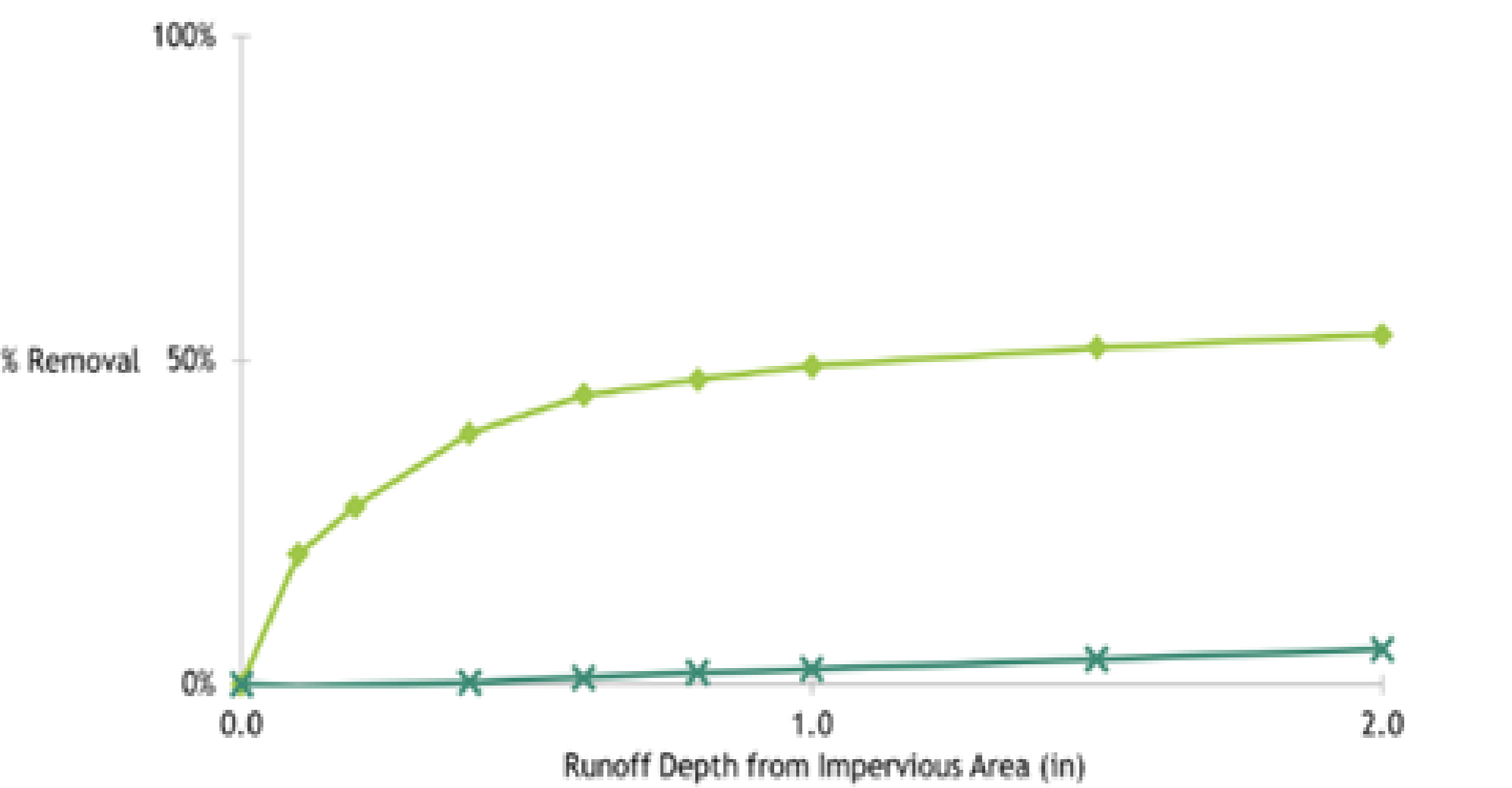
Pollutant	Design Storage Volume: Runoff Depth from Impervious Area (in)								
	0	0.10	0.20	0.40	0.60	0.80	1.00	1.50	2.00
Effective IA	0%	14%	23%	35%	44%	52%	59%	73%	83%
Runoff	0%	4%	9%	19%	29%	39%	48%	67%	81%

Gravel Wetland



Pollutant	Design Storage Volume: Runoff Depth from Impervious Area (in)								
	0	0.10	0.20	0.40	0.60	0.80	1.00	1.50	2.00
TP	0%	19%	26%	41%	51%	57%	61%	65%	66%
TN	0%	22%	33%	48%	57%	64%	68%	74%	79%
Bacteria	0%	30%	47%	66%	73%	75%	76%	78%	81%
TSS	0%	48%	61%	82%	91%	95%	97%	99%	99%
Metals	0%	57%	68%	83%	88%	90%	90%	91%	92%

Gravel Wetland



Pollutant	Design Storage Volume: Runoff Depth from Impervious Area (in)								
	0	0.10	0.20	0.40	0.60	0.80	1.00	1.50	2.00
Effective IA	0%	20%	27%	39%	45%	47%	49%	52%	54%
Runoff	0%	0%	0%	0%	1%	2%	2%	4%	5%

Appendix 2

Stormwater Quality Calculations

75 John Roberts Road Suite 4A

South Portland, Maine 04106

Tel. (207) 200-2100

JOB

240361

SHEET NO.

1

OF

3

CALCULATED BY

DJS

DATE _____

12/13/2024

FILE NAME

240361_WQC

PRNT DATE

12/13/2024

																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																					</
--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	----

SEBAGO TECHNICS, INC.

75 John Roberts Road Suite 4A

South Portland, Maine 04106

Tel. (207) 200-2100

JOB

240361

SHEET NO.

2

OF

3

CALCULATED BY

DJS

DATE

12/13/2024

FILE NAME

240361_WQC

PRNT DATE

12/13/2024

References	2. Maine DEP BMP Manual, Volume III, May 2016													
Mean Depth	Per Chapter 4 of Reference 2,		Mean depth shall be the pond volume one foot below the											
			permanent pool elevation divided by the pond surface area one foot below permanent pool elevation											
	Permanent Pool Elevation:		82.0											
	Pond Volume at Elevation		81.0	Volume:	14,300.0	CF								
	Pond Area at Elevation		81.0	Area:	8,154.0	SF								
				Mean Depth:	1.75	Feet								
Length to Width														
			"a minimum length to width ratio of 3:1" (Reference 1)											
	Wetpond Length		235.0	FT										
	Wetpond Width		50.0	FT										
	Length to Width Ratio		4.70											
Sediment Pre-Treatment														
	Per Reference 2, Chapter 7.1		"Pretreatment devices shall be provided to minimize discharge of sediment to the soil filter"											
	Annual Sediment Load:		55 cubic feet per acre per year of sanded area											
	Area to be sanded:		524,485.00	SF										
	Sediment Volume		662	CF										
	Provided		810	CF	12	Inch Deep Forebay	with area of	810	sf					

SEBAGO TECHNICS, INC.

75 John Roberts Road Suite 4A

South Portland, Maine 04106

Tel. (207) 200-2100

JOB

240361

SHEET NO.

3

OF

3

CALCULATED BY

DJS

DATE

12/13/2024

FILE NAME

240361_WQC

PRINT DATE

12/13/2024

GRAVEL WETLAND

Task: Calculate water quality volume per MDEP chapter 500 regulations

References 1. Maine DEP Chapter 500, Section 4.C.(3)(b)

"must detain a runoff volume equal to 1.0 inch times

the subcatchment's impervious area plus 0.4 inch times the subcatchment's landscaped area"

2. Maine DEP Best Management Practices Stormwater Manual, Section 7.4

a. "two wetland cells must be capable of holding 45% of the water quality volume each."

b. "forebay and any swale or discharge pipe to the system....holding 10% of the water quality volume"

c. "surface should represent 5% of impervious area and 2% of landscaped area"

Tributary to Gravel Wetland

GW-1

Landscaped Area

951,686.00 SF

Impervious Area

524,485.00 SF

Minimum Surface Area

Required

(2% X Landscaped + 5% X Impervious)

Total Landscaped Area

951,686.00 SF

Area

19,033.7 SF

Total Impervious Area

524,485.00 SF

Area

26,224.3 SF

Required Minimum Surface Area

45,258.0 SF

Provided Surface Area

11,330.0 SF

Treatment Volume

Required

(0.4" X Landscaped + 1.0" X Impervious)

Landscaped Area

951,686.00 SF

Volume

31,722.9

Impervious Area

524,485.00 SF

Volume

43,707.1

Treatment Volume Required

75,430.0 CF

1.732 AF

Minimum Treatment Cell Volume (45%)

33,943.5 CF

0.779 AF

Provided Treatment Volume (Bay 1)

8,420.0 CF

Provided Treatment Volume (Bay 2)

8,974.0 CF

Minimum "Forebay" Cell Volume (10%)

7,543.0 CF

Provided Treatment Volume (Forebay)

1,053.0 CF

SEBAGO TECHNICS, INC.

75 John Roberts Road Suite 4A
South Portland, Maine 04106
Tel. (207) 200-2100

JOB	240361		
SHEET NO.	1	OF	1
CALCULATED BY	DJS	DATE	4/17/2025
FILE NAME	240361_WQC	PRINT DATE	4/17/2025

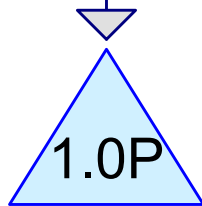
--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--

Appendix 3A

Hydrologic Modeling – Existing Conditions (HydroCAD) Summary



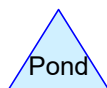
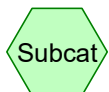
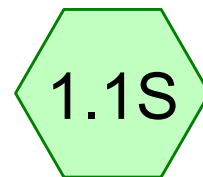
Deering Ridge
Subdivision



Existing Detention Basin



Railroad Box Culvert



240361 Existing Conditions

Prepared by Sebago Technics

HydroCAD® 10.20-5c s/n 00643 © 2023 HydroCAD Software Solutions LLC

Printed 1/20/2026

Page 2

Area Listing (all nodes)

Area (acres)	CN	Description (subcatchment-numbers)
38.580	77	General Area (1.0S, 1.1S)
38.580	77	TOTAL AREA

240361 Existing Conditions

Type III 24-hr 2-Year Rainfall=3.10"

Prepared by Sebago Technics

Printed 1/20/2026

HydroCAD® 10.20-5c s/n 00643 © 2023 HydroCAD Software Solutions LLC

Page 3

Time span=0.00-48.00 hrs, dt=0.01 hrs, 4801 points
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN
Reach routing by Dyn-Stor-Ind method - Pond routing by Dyn-Stor-Ind method

Subcatchment1.0S: Deering Ridge

Runoff Area=1,476,171 sf 0.00% Impervious Runoff Depth=1.14"
Tc=12.6 min CN=77 Runoff=35.3 cfs 3.222 af

Subcatchment1.1S:

Runoff Area=204,370 sf 0.00% Impervious Runoff Depth=1.14"
Tc=12.6 min CN=77 Runoff=4.9 cfs 0.446 af

Pond 1.0P: Existing Detention Basin

Peak Elev=86.94' Storage=40,378 cf Inflow=35.3 cfs 3.222 af
Primary=8.0 cfs 3.222 af Secondary=0.0 cfs 0.000 af Outflow=8.0 cfs 3.222 af

Link POA-1: Railroad Box Culvert

Inflow=11.8 cfs 3.668 af
Primary=11.8 cfs 3.668 af

Total Runoff Area = 38.580 ac Runoff Volume = 3.668 af Average Runoff Depth = 1.14"
100.00% Pervious = 38.580 ac 0.00% Impervious = 0.000 ac

240361 Existing Conditions

Prepared by Sebago Technics

HydroCAD® 10.20-5c s/n 00643 © 2023 HydroCAD Software Solutions LLC

Type III 24-hr 2-Year Rainfall=3.10"

Printed 1/20/2026

Page 4

Summary for Subcatchment 1.0S: Deering Ridge Subdivision

Runoff = 35.3 cfs @ 12.18 hrs, Volume= 3.222 af, Depth= 1.14"
 Routed to Pond 1.0P : Existing Detention Basin

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-48.00 hrs, dt= 0.01 hrs
 Type III 24-hr 2-Year Rainfall=3.10"

Area (sf)	CN	Description
* 1,476,171	77	General Area
1,476,171		100.00% Pervious Area

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

Summary for Subcatchment 1.1S:

Runoff = 4.9 cfs @ 12.18 hrs, Volume= 0.446 af, Depth= 1.14"
 Routed to Link POA-1 : Railroad Box Culvert

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-48.00 hrs, dt= 0.01 hrs
 Type III 24-hr 2-Year Rainfall=3.10"

Area (sf)	CN	Description
* 204,370	77	General Area
204,370		100.00% Pervious Area

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

Summary for Pond 1.0P: Existing Detention Basin

Inflow Area = 33.888 ac, 0.00% Impervious, Inflow Depth = 1.14" for 2-Year event
 Inflow = 35.3 cfs @ 12.18 hrs, Volume= 3.222 af
 Outflow = 8.0 cfs @ 12.74 hrs, Volume= 3.222 af, Atten= 77%, Lag= 33.2 min
 Primary = 8.0 cfs @ 12.74 hrs, Volume= 3.222 af
 Routed to Link POA-1 : Railroad Box Culvert
 Secondary = 0.0 cfs @ 0.00 hrs, Volume= 0.000 af
 Routed to Link POA-1 : Railroad Box Culvert

Routing by Dyn-Stor-Ind method, Time Span= 0.00-48.00 hrs, dt= 0.01 hrs
 Peak Elev= 86.94' @ 12.74 hrs Surf.Area= 22,185 sf Storage= 40,378 cf

Plug-Flow detention time= 39.4 min calculated for 3.221 af (100% of inflow)
 Center-of-Mass det. time= 39.4 min (899.7 - 860.3)

240361 Existing Conditions

Prepared by Sebago Technics

HydroCAD® 10.20-5c s/n 00643 © 2023 HydroCAD Software Solutions LLC

Type III 24-hr 2-Year Rainfall=3.10"

Printed 1/20/2026

Page 5

Volume	Invert	Avail.Storage	Storage Description
#1	82.00'	196,730 cf	Custom Stage Data (Prismatic) Listed below (Recalc)

Elevation (feet)	Surf.Area (sq-ft)	Voids (%)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
82.00	100	0.0	0	0
83.00	800	100.0	450	450
84.00	1,327	100.0	1,064	1,514
85.00	8,784	100.0	5,056	6,569
86.00	19,679	100.0	14,232	20,801
87.00	22,358	100.0	21,019	41,819
88.00	24,575	100.0	23,467	65,286
89.00	26,715	100.0	25,645	90,931
90.00	29,406	100.0	28,061	118,991
90.50	31,249	100.0	15,164	134,155
91.00	31,275	100.0	15,631	149,786
91.50	31,300	100.0	15,644	165,430
92.50	31,300	100.0	31,300	196,730

Device	Routing	Invert	Outlet Devices
#1	Primary	81.40'	30.0" Round Culvert L= 40.0' RCP, sq.cut end projecting, Ke= 0.500 Inlet / Outlet Invert= 81.27' / 81.40' S= -0.0033 '/' Cc= 0.900 n= 0.013, Flow Area= 4.91 sf
#2	Device 1	82.00'	12.0" Round Culvert L= 20.0' CPP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 82.00' / 81.41' S= 0.0295 '/' Cc= 0.900 n= 0.013 Concrete, trowel finish, Flow Area= 0.79 sf
#3	Device 1	86.98'	2.0" W x 2.0" H 18.4° Catch Basin Grate X 6.00 columns X 6 rows with 1.5" cc spacing C= 0.600 Limited to weir flow at low heads
#4	Secondary	90.00'	10.0' long + 3.0 '/' SideZ x 12.0' 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) 2.57 2.62 2.70 2.67 2.66 2.67 2.66 2.64

Primary OutFlow Max=8.0 cfs @ 12.74 hrs HW=86.94' TW=0.00' (Dynamic Tailwater)↑ **1=Culvert** (Passes 8.0 cfs of 48.9 cfs potential flow)↑ **2=Culvert** (Inlet Controls 8.0 cfs @ 10.14 fps)↑ **3=Catch Basin Grate** (Controls 0.0 cfs)**Secondary OutFlow** Max=0.0 cfs @ 0.00 hrs HW=82.00' TW=0.00' (Dynamic Tailwater)↑ **4=Broad-Crested Rectangular Weir**(Controls 0.0 cfs)**Summary for Link POA-1: Railroad Box Culvert**

Inflow Area = 38.580 ac, 0.00% Impervious, Inflow Depth = 1.14" for 2-Year event
 Inflow = 11.8 cfs @ 12.20 hrs, Volume= 3.668 af
 Primary = 11.8 cfs @ 12.20 hrs, Volume= 3.668 af, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 0.00-48.00 hrs, dt= 0.01 hrs

240361 Existing Conditions

Prepared by Sebago Technics

HydroCAD® 10.20-5c s/n 00643 © 2023 HydroCAD Software Solutions LLC

Type III 24-hr 10-Year Rainfall=4.60"

Printed 1/20/2026

Page 6

Time span=0.00-48.00 hrs, dt=0.01 hrs, 4801 points

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN

Reach routing by Dyn-Stor-Ind method - Pond routing by Dyn-Stor-Ind method

Subcatchment1.0S: Deering Ridge

Runoff Area=1,476,171 sf 0.00% Impervious Runoff Depth=2.29"

Tc=12.6 min CN=77 Runoff=73.3 cfs 6.473 af

Subcatchment1.1S:

Runoff Area=204,370 sf 0.00% Impervious Runoff Depth=2.29"

Tc=12.6 min CN=77 Runoff=10.1 cfs 0.896 af

Pond 1.0P: Existing Detention Basin

Peak Elev=89.11' Storage=93,999 cf Inflow=73.3 cfs 6.473 af

Primary=16.5 cfs 6.473 af Secondary=0.0 cfs 0.000 af Outflow=16.5 cfs 6.473 af

Link POA-1: Railroad Box Culvert

Inflow=21.7 cfs 7.369 af

Primary=21.7 cfs 7.369 af

Total Runoff Area = 38.580 ac Runoff Volume = 7.369 af Average Runoff Depth = 2.29"
100.00% Pervious = 38.580 ac 0.00% Impervious = 0.000 ac

240361 Existing Conditions

Prepared by Sebago Technics

HydroCAD® 10.20-5c s/n 00643 © 2023 HydroCAD Software Solutions LLC

Type III 24-hr 10-Year Rainfall=4.60"

Printed 1/20/2026

Page 7

Summary for Subcatchment 1.0S: Deering Ridge Subdivision

Runoff = 73.3 cfs @ 12.17 hrs, Volume= 6.473 af, Depth= 2.29"
 Routed to Pond 1.0P : Existing Detention Basin

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-48.00 hrs, dt= 0.01 hrs
 Type III 24-hr 10-Year Rainfall=4.60"

Area (sf)	CN	Description
* 1,476,171	77	General Area
1,476,171		100.00% Pervious Area

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

Summary for Subcatchment 1.1S:

Runoff = 10.1 cfs @ 12.17 hrs, Volume= 0.896 af, Depth= 2.29"
 Routed to Link POA-1 : Railroad Box Culvert

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-48.00 hrs, dt= 0.01 hrs
 Type III 24-hr 10-Year Rainfall=4.60"

Area (sf)	CN	Description
* 204,370	77	General Area
204,370		100.00% Pervious Area

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

Summary for Pond 1.0P: Existing Detention Basin

Inflow Area = 33.888 ac, 0.00% Impervious, Inflow Depth = 2.29" for 10-Year event
 Inflow = 73.3 cfs @ 12.17 hrs, Volume= 6.473 af
 Outflow = 16.5 cfs @ 12.69 hrs, Volume= 6.473 af, Atten= 77%, Lag= 31.2 min
 Primary = 16.5 cfs @ 12.69 hrs, Volume= 6.473 af
 Routed to Link POA-1 : Railroad Box Culvert
 Secondary = 0.0 cfs @ 0.00 hrs, Volume= 0.000 af
 Routed to Link POA-1 : Railroad Box Culvert

Routing by Dyn-Stor-Ind method, Time Span= 0.00-48.00 hrs, dt= 0.01 hrs
 Peak Elev= 89.11' @ 12.69 hrs Surf.Area= 27,022 sf Storage= 93,999 cf

Plug-Flow detention time= 59.8 min calculated for 6.473 af (100% of inflow)
 Center-of-Mass det. time= 59.6 min (899.4 - 839.7)

240361 Existing Conditions

Prepared by Sebago Technics

HydroCAD® 10.20-5c s/n 00643 © 2023 HydroCAD Software Solutions LLC

Type III 24-hr 10-Year Rainfall=4.60"

Printed 1/20/2026

Page 8

Volume	Invert	Avail.Storage	Storage Description
#1	82.00'	196,730 cf	Custom Stage Data (Prismatic) Listed below (Recalc)

Elevation (feet)	Surf.Area (sq-ft)	Voids (%)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
82.00	100	0.0	0	0
83.00	800	100.0	450	450
84.00	1,327	100.0	1,064	1,514
85.00	8,784	100.0	5,056	6,569
86.00	19,679	100.0	14,232	20,801
87.00	22,358	100.0	21,019	41,819
88.00	24,575	100.0	23,467	65,286
89.00	26,715	100.0	25,645	90,931
90.00	29,406	100.0	28,061	118,991
90.50	31,249	100.0	15,164	134,155
91.00	31,275	100.0	15,631	149,786
91.50	31,300	100.0	15,644	165,430
92.50	31,300	100.0	31,300	196,730

Device	Routing	Invert	Outlet Devices
#1	Primary	81.40'	30.0" Round Culvert L= 40.0' RCP, sq.cut end projecting, Ke= 0.500 Inlet / Outlet Invert= 81.27' / 81.40' S= -0.0033 '/' Cc= 0.900 n= 0.013, Flow Area= 4.91 sf
#2	Device 1	82.00'	12.0" Round Culvert L= 20.0' CPP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 82.00' / 81.41' S= 0.0295 '/' Cc= 0.900 n= 0.013 Concrete, trowel finish, Flow Area= 0.79 sf
#3	Device 1	86.98'	2.0" W x 2.0" H 18.4° Catch Basin Grate X 6.00 columns X 6 rows with 1.5" cc spacing C= 0.600 Limited to weir flow at low heads
#4	Secondary	90.00'	10.0' long + 3.0 '/' SideZ x 12.0' 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) 2.57 2.62 2.70 2.67 2.66 2.67 2.66 2.64

Primary OutFlow Max=16.5 cfs @ 12.69 hrs HW=89.11' TW=0.00' (Dynamic Tailwater)

↑ **1=Culvert** (Passes 16.5 cfs of 60.1 cfs potential flow)
 ↑ **2=Culvert** (Inlet Controls 9.7 cfs @ 12.38 fps)
 ↑ **3=Catch Basin Grate** (Orifice Controls 6.8 cfs @ 6.82 fps)

Secondary OutFlow Max=0.0 cfs @ 0.00 hrs HW=82.00' TW=0.00' (Dynamic Tailwater)↑ **4=Broad-Crested Rectangular Weir** (Controls 0.0 cfs)**Summary for Link POA-1: Railroad Box Culvert**

Inflow Area = 38.580 ac, 0.00% Impervious, Inflow Depth = 2.29" for 10-Year event
 Inflow = 21.7 cfs @ 12.26 hrs, Volume= 7.369 af
 Primary = 21.7 cfs @ 12.26 hrs, Volume= 7.369 af, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 0.00-48.00 hrs, dt= 0.01 hrs

240361 Existing Conditions

Prepared by Sebago Technics

HydroCAD® 10.20-5c s/n 00643 © 2023 HydroCAD Software Solutions LLC

Type III 24-hr 25-Year Rainfall=5.80"

Printed 1/20/2026

Page 9

Time span=0.00-48.00 hrs, dt=0.01 hrs, 4801 points
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN
Reach routing by Dyn-Stor-Ind method - Pond routing by Dyn-Stor-Ind method

Subcatchment1.0S: Deering Ridge

Runoff Area=1,476,171 sf 0.00% Impervious Runoff Depth=3.31"
Tc=12.6 min CN=77 Runoff=106.1 cfs 9.334 af

Subcatchment1.1S:

Runoff Area=204,370 sf 0.00% Impervious Runoff Depth=3.31"
Tc=12.6 min CN=77 Runoff=14.7 cfs 1.292 af

Pond 1.0P: Existing Detention Basin

Peak Elev=90.61' Storage=137,467 cf Inflow=106.1 cfs 9.334 af
Primary=19.8 cfs 8.838 af Secondary=14.6 cfs 0.495 af Outflow=34.4 cfs 9.334 af

Link POA-1: Railroad Box Culvert

Inflow=39.4 cfs 10.626 af
Primary=39.4 cfs 10.626 af

Total Runoff Area = 38.580 ac Runoff Volume = 10.626 af Average Runoff Depth = 3.31"
100.00% Pervious = 38.580 ac 0.00% Impervious = 0.000 ac

240361 Existing Conditions

Prepared by Sebago Technics

HydroCAD® 10.20-5c s/n 00643 © 2023 HydroCAD Software Solutions LLC

Type III 24-hr 25-Year Rainfall=5.80"

Printed 1/20/2026

Page 10

Summary for Subcatchment 1.0S: Deering Ridge Subdivision

Runoff = 106.1 cfs @ 12.17 hrs, Volume= 9.334 af, Depth= 3.31"
 Routed to Pond 1.0P : Existing Detention Basin

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-48.00 hrs, dt= 0.01 hrs
 Type III 24-hr 25-Year Rainfall=5.80"

Area (sf)	CN	Description
* 1,476,171	77	General Area
1,476,171		100.00% Pervious Area

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

Summary for Subcatchment 1.1S:

Runoff = 14.7 cfs @ 12.17 hrs, Volume= 1.292 af, Depth= 3.31"
 Routed to Link POA-1 : Railroad Box Culvert

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-48.00 hrs, dt= 0.01 hrs
 Type III 24-hr 25-Year Rainfall=5.80"

Area (sf)	CN	Description
* 204,370	77	General Area
204,370		100.00% Pervious Area

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

Summary for Pond 1.0P: Existing Detention Basin

Inflow Area = 33.888 ac, 0.00% Impervious, Inflow Depth = 3.31" for 25-Year event
 Inflow = 106.1 cfs @ 12.17 hrs, Volume= 9.334 af
 Outflow = 34.4 cfs @ 12.58 hrs, Volume= 9.334 af, Atten= 68%, Lag= 24.4 min
 Primary = 19.8 cfs @ 12.58 hrs, Volume= 8.838 af
 Routed to Link POA-1 : Railroad Box Culvert
 Secondary = 14.6 cfs @ 12.58 hrs, Volume= 0.495 af
 Routed to Link POA-1 : Railroad Box Culvert

Routing by Dyn-Stor-Ind method, Time Span= 0.00-48.00 hrs, dt= 0.01 hrs
 Peak Elev= 90.61' @ 12.58 hrs Surf.Area= 31,255 sf Storage= 137,467 cf

Plug-Flow detention time= 66.6 min calculated for 9.332 af (100% of inflow)
 Center-of-Mass det. time= 66.6 min (895.8 - 829.2)

240361 Existing Conditions

Prepared by Sebago Technics

HydroCAD® 10.20-5c s/n 00643 © 2023 HydroCAD Software Solutions LLC

Type III 24-hr 25-Year Rainfall=5.80"

Printed 1/20/2026

Page 11

Volume	Invert	Avail.Storage	Storage Description
#1	82.00'	196,730 cf	Custom Stage Data (Prismatic) Listed below (Recalc)

Elevation (feet)	Surf.Area (sq-ft)	Voids (%)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
82.00	100	0.0	0	0
83.00	800	100.0	450	450
84.00	1,327	100.0	1,064	1,514
85.00	8,784	100.0	5,056	6,569
86.00	19,679	100.0	14,232	20,801
87.00	22,358	100.0	21,019	41,819
88.00	24,575	100.0	23,467	65,286
89.00	26,715	100.0	25,645	90,931
90.00	29,406	100.0	28,061	118,991
90.50	31,249	100.0	15,164	134,155
91.00	31,275	100.0	15,631	149,786
91.50	31,300	100.0	15,644	165,430
92.50	31,300	100.0	31,300	196,730

Device	Routing	Invert	Outlet Devices
#1	Primary	81.40'	30.0" Round Culvert L= 40.0' RCP, sq.cut end projecting, Ke= 0.500 Inlet / Outlet Invert= 81.27' / 81.40' S= -0.0033 '/' Cc= 0.900 n= 0.013, Flow Area= 4.91 sf
#2	Device 1	82.00'	12.0" Round Culvert L= 20.0' CPP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 82.00' / 81.41' S= 0.0295 '/' Cc= 0.900 n= 0.013 Concrete, trowel finish, Flow Area= 0.79 sf
#3	Device 1	86.98'	2.0" W x 2.0" H 18.4° Catch Basin Grate X 6.00 columns X 6 rows with 1.5" cc spacing C= 0.600 Limited to weir flow at low heads
#4	Secondary	90.00'	10.0' long + 3.0 '/' SideZ x 12.0' 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) 2.57 2.62 2.70 2.67 2.66 2.67 2.66 2.64

Primary OutFlow Max=19.8 cfs @ 12.58 hrs HW=90.61' TW=0.00' (Dynamic Tailwater)

↑ **1=Culvert** (Passes 19.8 cfs of 66.7 cfs potential flow)
 ↑ **2=Culvert** (Inlet Controls 10.8 cfs @ 13.71 fps)
 ↑ **3=Catch Basin Grate** (Orifice Controls 9.0 cfs @ 9.01 fps)

Secondary OutFlow Max=14.6 cfs @ 12.58 hrs HW=90.61' TW=0.00' (Dynamic Tailwater)↑ **4=Broad-Crested Rectangular Weir**(Weir Controls 14.6 cfs @ 2.04 fps)**Summary for Link POA-1: Railroad Box Culvert**

Inflow Area = 38.580 ac, 0.00% Impervious, Inflow Depth = 3.31" for 25-Year event
 Inflow = 39.4 cfs @ 12.55 hrs, Volume= 10.626 af
 Primary = 39.4 cfs @ 12.55 hrs, Volume= 10.626 af, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 0.00-48.00 hrs, dt= 0.01 hrs

240361 Existing Conditions

Type III 24-hr 50-Year Rainfall=6.90"

Prepared by Sebago Technics

Printed 1/20/2026

HydroCAD® 10.20-5c s/n 00643 © 2023 HydroCAD Software Solutions LLC

Page 12

Time span=0.00-48.00 hrs, dt=0.01 hrs, 4801 points
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN
Reach routing by Dyn-Stor-Ind method - Pond routing by Dyn-Stor-Ind method

Subcatchment1.0S: Deering Ridge

Runoff Area=1,476,171 sf 0.00% Impervious Runoff Depth=4.28"
Tc=12.6 min CN=77 Runoff=137.0 cfs 12.076 af

Subcatchment1.1S:

Runoff Area=204,370 sf 0.00% Impervious Runoff Depth=4.28"
Tc=12.6 min CN=77 Runoff=19.0 cfs 1.672 af

Pond 1.0P: Existing Detention Basin

Peak Elev=91.23' Storage=157,039 cf Inflow=137.0 cfs 12.076 af
Primary=21.0 cfs 10.210 af Secondary=47.3 cfs 1.865 af Outflow=68.2 cfs 12.076 af

Link POA-1: Railroad Box Culvert

Inflow=77.9 cfs 13.747 af
Primary=77.9 cfs 13.747 af

Total Runoff Area = 38.580 ac Runoff Volume = 13.747 af Average Runoff Depth = 4.28"
100.00% Pervious = 38.580 ac 0.00% Impervious = 0.000 ac

240361 Existing Conditions

Prepared by Sebago Technics

HydroCAD® 10.20-5c s/n 00643 © 2023 HydroCAD Software Solutions LLC

Type III 24-hr 50-Year Rainfall=6.90"

Printed 1/20/2026

Page 13

Summary for Subcatchment 1.0S: Deering Ridge Subdivision

Runoff = 137.0 cfs @ 12.17 hrs, Volume= 12.076 af, Depth= 4.28"
 Routed to Pond 1.0P : Existing Detention Basin

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-48.00 hrs, dt= 0.01 hrs
 Type III 24-hr 50-Year Rainfall=6.90"

	Area (sf)	CN	Description
*	1,476,171	77	General Area
	1,476,171		100.00% Pervious Area

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

Summary for Subcatchment 1.1S:

Runoff = 19.0 cfs @ 12.17 hrs, Volume= 1.672 af, Depth= 4.28"
 Routed to Link POA-1 : Railroad Box Culvert

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-48.00 hrs, dt= 0.01 hrs
 Type III 24-hr 50-Year Rainfall=6.90"

	Area (sf)	CN	Description
*	204,370	77	General Area
	204,370		100.00% Pervious Area

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

Summary for Pond 1.0P: Existing Detention Basin

Inflow Area = 33.888 ac, 0.00% Impervious, Inflow Depth = 4.28" for 50-Year event
 Inflow = 137.0 cfs @ 12.17 hrs, Volume= 12.076 af
 Outflow = 68.2 cfs @ 12.44 hrs, Volume= 12.076 af, Atten= 50%, Lag= 16.0 min
 Primary = 21.0 cfs @ 12.44 hrs, Volume= 10.210 af
 Routed to Link POA-1 : Railroad Box Culvert
 Secondary = 47.3 cfs @ 12.44 hrs, Volume= 1.865 af
 Routed to Link POA-1 : Railroad Box Culvert

Routing by Dyn-Stor-Ind method, Time Span= 0.00-48.00 hrs, dt= 0.01 hrs
 Peak Elev= 91.23' @ 12.44 hrs Surf.Area= 31,287 sf Storage= 157,039 cf

Plug-Flow detention time= 61.8 min calculated for 12.073 af (100% of inflow)
 Center-of-Mass det. time= 61.8 min (883.6 - 821.8)

240361 Existing Conditions

Prepared by Sebago Technics

HydroCAD® 10.20-5c s/n 00643 © 2023 HydroCAD Software Solutions LLC

Type III 24-hr 50-Year Rainfall=6.90"

Printed 1/20/2026

Page 14

Volume	Invert	Avail.Storage	Storage Description
#1	82.00'	196,730 cf	Custom Stage Data (Prismatic) Listed below (Recalc)

Elevation (feet)	Surf.Area (sq-ft)	Voids (%)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
82.00	100	0.0	0	0
83.00	800	100.0	450	450
84.00	1,327	100.0	1,064	1,514
85.00	8,784	100.0	5,056	6,569
86.00	19,679	100.0	14,232	20,801
87.00	22,358	100.0	21,019	41,819
88.00	24,575	100.0	23,467	65,286
89.00	26,715	100.0	25,645	90,931
90.00	29,406	100.0	28,061	118,991
90.50	31,249	100.0	15,164	134,155
91.00	31,275	100.0	15,631	149,786
91.50	31,300	100.0	15,644	165,430
92.50	31,300	100.0	31,300	196,730

Device	Routing	Invert	Outlet Devices
#1	Primary	81.40'	30.0" Round Culvert L= 40.0' RCP, sq.cut end projecting, Ke= 0.500 Inlet / Outlet Invert= 81.27' / 81.40' S= -0.0033 '/' Cc= 0.900 n= 0.013, Flow Area= 4.91 sf
#2	Device 1	82.00'	12.0" Round Culvert L= 20.0' CPP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 82.00' / 81.41' S= 0.0295 '/' Cc= 0.900 n= 0.013 Concrete, trowel finish, Flow Area= 0.79 sf
#3	Device 1	86.98'	2.0" W x 2.0" H 18.4° Catch Basin Grate X 6.00 columns X 6 rows with 1.5" cc spacing C= 0.600 Limited to weir flow at low heads
#4	Secondary	90.00'	10.0' long + 3.0 '/' SideZ x 12.0' 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) 2.57 2.62 2.70 2.67 2.66 2.67 2.66 2.64

Primary OutFlow Max=21.0 cfs @ 12.44 hrs HW=91.23' TW=0.00' (Dynamic Tailwater)

↑ **1=Culvert** (Passes 21.0 cfs of 69.2 cfs potential flow)
 ↑ **2=Culvert** (Inlet Controls 11.2 cfs @ 14.23 fps)
 ↑ **3=Catch Basin Grate** (Orifice Controls 9.8 cfs @ 9.78 fps)

Secondary OutFlow Max=47.3 cfs @ 12.44 hrs HW=91.23' TW=0.00' (Dynamic Tailwater)↑ **4=Broad-Crested Rectangular Weir**(Weir Controls 47.3 cfs @ 2.80 fps)**Summary for Link POA-1: Railroad Box Culvert**

Inflow Area = 38.580 ac, 0.00% Impervious, Inflow Depth = 4.28" for 50-Year event
 Inflow = 77.9 cfs @ 12.42 hrs, Volume= 13.747 af
 Primary = 77.9 cfs @ 12.42 hrs, Volume= 13.747 af, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 0.00-48.00 hrs, dt= 0.01 hrs

240361 Existing Conditions

Type III 24-hr 100-Year Rainfall=8.10"

Prepared by Sebago Technics

Printed 1/20/2026

HydroCAD® 10.20-5c s/n 00643 © 2023 HydroCAD Software Solutions LLC

Page 15

Time span=0.00-48.00 hrs, dt=0.01 hrs, 4801 points
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN
Reach routing by Dyn-Stor-Ind method - Pond routing by Dyn-Stor-Ind method

Subcatchment1.0S: Deering Ridge

Runoff Area=1,476,171 sf 0.00% Impervious Runoff Depth=5.37"
Tc=12.6 min CN=77 Runoff=171.2 cfs 15.154 af

Subcatchment1.1S:

Runoff Area=204,370 sf 0.00% Impervious Runoff Depth=5.37"
Tc=12.6 min CN=77 Runoff=23.7 cfs 2.098 af

Pond 1.0P: Existing Detention Basin

Peak Elev=91.77' Storage=173,747 cf Inflow=171.2 cfs 15.154 af
Primary=21.9 cfs 11.584 af Secondary=88.2 cfs 3.570 af Outflow=110.1 cfs 15.154 af

Link POA-1: Railroad Box Culvert

Inflow=125.6 cfs 17.252 af
Primary=125.6 cfs 17.252 af

Total Runoff Area = 38.580 ac Runoff Volume = 17.252 af Average Runoff Depth = 5.37"
100.00% Pervious = 38.580 ac 0.00% Impervious = 0.000 ac

240361 Existing Conditions

Prepared by Sebago Technics

HydroCAD® 10.20-5c s/n 00643 © 2023 HydroCAD Software Solutions LLC

Type III 24-hr 100-Year Rainfall=8.10"

Printed 1/20/2026

Page 16

Summary for Subcatchment 1.0S: Deering Ridge Subdivision

Runoff = 171.2 cfs @ 12.17 hrs, Volume= 15.154 af, Depth= 5.37"
 Routed to Pond 1.0P : Existing Detention Basin

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-48.00 hrs, dt= 0.01 hrs
 Type III 24-hr 100-Year Rainfall=8.10"

Area (sf)	CN	Description
* 1,476,171	77	General Area
1,476,171		100.00% Pervious Area

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

Summary for Subcatchment 1.1S:

Runoff = 23.7 cfs @ 12.17 hrs, Volume= 2.098 af, Depth= 5.37"
 Routed to Link POA-1 : Railroad Box Culvert

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-48.00 hrs, dt= 0.01 hrs
 Type III 24-hr 100-Year Rainfall=8.10"

Area (sf)	CN	Description
* 204,370	77	General Area
204,370		100.00% Pervious Area

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

Summary for Pond 1.0P: Existing Detention Basin

Inflow Area = 33.888 ac, 0.00% Impervious, Inflow Depth = 5.37" for 100-Year event
 Inflow = 171.2 cfs @ 12.17 hrs, Volume= 15.154 af
 Outflow = 110.1 cfs @ 12.34 hrs, Volume= 15.154 af, Atten= 36%, Lag= 10.2 min
 Primary = 21.9 cfs @ 12.34 hrs, Volume= 11.584 af
 Routed to Link POA-1 : Railroad Box Culvert
 Secondary = 88.2 cfs @ 12.34 hrs, Volume= 3.570 af
 Routed to Link POA-1 : Railroad Box Culvert

Routing by Dyn-Stor-Ind method, Time Span= 0.00-48.00 hrs, dt= 0.01 hrs
 Peak Elev= 91.77' @ 12.34 hrs Surf.Area= 31,300 sf Storage= 173,747 cf

Plug-Flow detention time= 58.1 min calculated for 15.154 af (100% of inflow)
 Center-of-Mass det. time= 57.9 min (873.3 - 815.4)

240361 Existing Conditions

Type III 24-hr 100-Year Rainfall=8.10"

Prepared by Sebago Technics

Printed 1/20/2026

HydroCAD® 10.20-5c s/n 00643 © 2023 HydroCAD Software Solutions LLC

Page 17

Volume	Invert	Avail.Storage	Storage Description
#1	82.00'	196,730 cf	Custom Stage Data (Prismatic) Listed below (Recalc)

Elevation (feet)	Surf.Area (sq-ft)	Voids (%)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
82.00	100	0.0	0	0
83.00	800	100.0	450	450
84.00	1,327	100.0	1,064	1,514
85.00	8,784	100.0	5,056	6,569
86.00	19,679	100.0	14,232	20,801
87.00	22,358	100.0	21,019	41,819
88.00	24,575	100.0	23,467	65,286
89.00	26,715	100.0	25,645	90,931
90.00	29,406	100.0	28,061	118,991
90.50	31,249	100.0	15,164	134,155
91.00	31,275	100.0	15,631	149,786
91.50	31,300	100.0	15,644	165,430
92.50	31,300	100.0	31,300	196,730

Device	Routing	Invert	Outlet Devices
#1	Primary	81.40'	30.0" Round Culvert L= 40.0' RCP, sq.cut end projecting, Ke= 0.500 Inlet / Outlet Invert= 81.27' / 81.40' S= -0.0033 '/' Cc= 0.900 n= 0.013, Flow Area= 4.91 sf
#2	Device 1	82.00'	12.0" Round Culvert L= 20.0' CPP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 82.00' / 81.41' S= 0.0295 '/' Cc= 0.900 n= 0.013 Concrete, trowel finish, Flow Area= 0.79 sf
#3	Device 1	86.98'	2.0" W x 2.0" H 18.4° Catch Basin Grate X 6.00 columns X 6 rows with 1.5" cc spacing C= 0.600 Limited to weir flow at low heads
#4	Secondary	90.00'	10.0' long + 3.0 '/' SideZ x 12.0' 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) 2.57 2.62 2.70 2.67 2.66 2.67 2.66 2.64

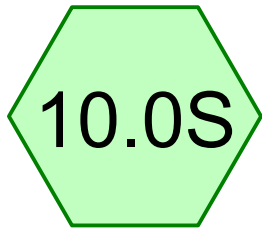
Primary OutFlow Max=21.9 cfs @ 12.34 hrs HW=91.77' TW=0.00' (Dynamic Tailwater)↑ **1=Culvert** (Passes 21.9 cfs of 71.4 cfs potential flow)↑ **2=Culvert** (Inlet Controls 11.5 cfs @ 14.66 fps)↑ **3=Catch Basin Grate** (Orifice Controls 10.4 cfs @ 10.39 fps)**Secondary OutFlow** Max=88.2 cfs @ 12.34 hrs HW=91.77' TW=0.00' (Dynamic Tailwater)↑ **4=Broad-Crested Rectangular Weir**(Weir Controls 88.2 cfs @ 3.27 fps)**Summary for Link POA-1: Railroad Box Culvert**

Inflow Area = 38.580 ac, 0.00% Impervious, Inflow Depth = 5.37" for 100-Year event
 Inflow = 125.6 cfs @ 12.33 hrs, Volume= 17.252 af
 Primary = 125.6 cfs @ 12.33 hrs, Volume= 17.252 af, Atten= 0%, Lag= 0.0 min

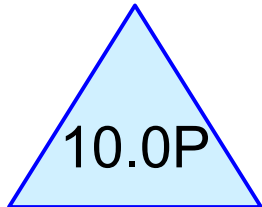
Primary outflow = Inflow, Time Span= 0.00-48.00 hrs, dt= 0.01 hrs

Appendix 3B

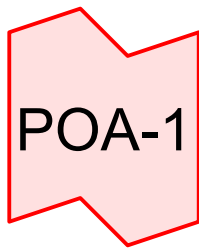
Hydrologic Modeling – Proposed Conditions (HydroCAD) Summary



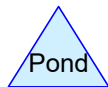
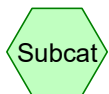
Deering Ridge
Subdivision



Proposed Gravel
Wetland



Railroad Box Culvert



240361 Proposed Conditions GW

Prepared by Sebago Technics

HydroCAD® 10.20-5c s/n 00643 © 2023 HydroCAD Software Solutions LLC

Printed 12/12/2024

Page 2

Area Listing (all nodes)

Area (acres)	CN	Description (subcatchment-numbers)
14.189	54	1/4 acre lots, 25% imp, HSG A (10.0S)
0.234	70	1/4 acre lots, 25% imp, HSG B (10.0S)
7.607	80	1/4 acre lots, 25% imp, HSG C (10.0S)
4.265	85	1/4 acre lots, 25% imp, HSG D (10.0S)
0.583	39	>75% Grass cover, Good, HSG A (10.0S)
0.212	74	>75% Grass cover, Good, HSG C (10.0S)
1.331	80	>75% Grass cover, Good, HSG D (10.0S)
5.467	98	Paved road and sidewalk (10.0S)
33.888	72	TOTAL AREA

240361 Proposed Conditions GW*Type III 24-hr 2-Year Rainfall=3.10"*

Prepared by Sebago Technics

Printed 12/12/2024

HydroCAD® 10.20-5c s/n 00643 © 2023 HydroCAD Software Solutions LLC

Page 3

Time span=0.00-48.00 hrs, dt=0.01 hrs, 4801 points

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN

Reach routing by Dyn-Stor-Ind method - Pond routing by Dyn-Stor-Ind method

Subcatchment 10.0S: Deering RidgeRunoff Area=1,476,171 sf 35.53% Impervious Runoff Depth=0.87"
Flow Length=2,858' Tc=18.5 min CN=72 Runoff=21.8 cfs 2.452 af**Pond 10.0P: Proposed Gravel Wetland**Peak Elev=84.48' Storage=43,742 cf Inflow=21.8 cfs 2.452 af
Primary=3.8 cfs 2.015 af Secondary=0.0 cfs 0.000 af Outflow=3.8 cfs 2.015 af**Link POA-1: Railroad Box Culvert**Inflow=3.8 cfs 2.015 af
Primary=3.8 cfs 2.015 af**Total Runoff Area = 33.888 ac Runoff Volume = 2.452 af Average Runoff Depth = 0.87"**
64.47% Pervious = 21.848 ac 35.53% Impervious = 12.041 ac

240361 Proposed Conditions GW

Type III 24-hr 2-Year Rainfall=3.10"

Prepared by Sebago Technics

Printed 12/12/2024

HydroCAD® 10.20-5c s/n 00643 © 2023 HydroCAD Software Solutions LLC

Page 4

Summary for Subcatchment 10.0S: Deering Ridge Subdivision

Runoff = 21.8 cfs @ 12.28 hrs, Volume= 2.452 af, Depth= 0.87"
 Routed to Pond 10.0P : Proposed Gravel Wetland

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-48.00 hrs, dt= 0.01 hrs
 Type III 24-hr 2-Year Rainfall=3.10"

	Area (sf)	CN	Description
*	238,133	98	Paved road and sidewalk
	25,415	39	>75% Grass cover, Good, HSG A
	9,249	74	>75% Grass cover, Good, HSG C
	57,965	80	>75% Grass cover, Good, HSG D
*	618,069	54	1/4 acre lots, 25% imp, HSG A
*	10,206	70	1/4 acre lots, 25% imp, HSG B
*	331,364	80	1/4 acre lots, 25% imp, HSG C
*	185,770	85	1/4 acre lots, 25% imp, HSG D
	1,476,171	72	Weighted Average
	951,686		64.47% Pervious Area
	524,485		35.53% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
8.7	119	0.0400	0.23		Sheet Flow, A to B Grass: Short n= 0.150 P2= 3.10"
0.4	97	0.0500	4.54		Shallow Concentrated Flow, B to C Paved Kv= 20.3 fps
3.6	368	0.0600	1.71		Shallow Concentrated Flow, C to D Short Grass Pasture Kv= 7.0 fps
0.6	378	0.0500	10.99	8.63	Pipe Channel, D to E 12.0" Round Area= 0.8 sf Perim= 3.1' r= 0.25' n= 0.012
0.3	200	0.0400	12.88	22.76	Pipe Channel, E to F 18.0" Round Area= 1.8 sf Perim= 4.7' r= 0.38' n= 0.012
2.1	610	0.0040	4.93	15.50	Pipe Channel, F to G 24.0" Round Area= 3.1 sf Perim= 6.3' r= 0.50' n= 0.012
2.5	986	0.0040	6.47	45.70	Pipe Channel, G to H 36.0" Round Area= 7.1 sf Perim= 9.4' r= 0.75' n= 0.012
0.3	100	0.0030	6.20	59.70	Pipe Channel, H to I 42.0" Round Area= 9.6 sf Perim= 11.0' r= 0.88' n= 0.012
18.5	2,858	Total			

240361 Proposed Conditions GW

Type III 24-hr 2-Year Rainfall=3.10"

Prepared by Sebago Technics

Printed 12/12/2024

HydroCAD® 10.20-5c s/n 00643 © 2023 HydroCAD Software Solutions LLC

Page 5

Summary for Pond 10.0P: Proposed Gravel Wetland

Inflow Area = 33.888 ac, 35.53% Impervious, Inflow Depth = 0.87" for 2-Year event
 Inflow = 21.8 cfs @ 12.28 hrs, Volume= 2.452 af
 Outflow = 3.8 cfs @ 13.39 hrs, Volume= 2.015 af, Atten= 83%, Lag= 66.8 min
 Primary = 3.8 cfs @ 13.39 hrs, Volume= 2.015 af
 Routed to Link POA-1 : Railroad Box Culvert
 Secondary = 0.0 cfs @ 0.00 hrs, Volume= 0.000 af
 Routed to Link POA-1 : Railroad Box Culvert

Routing by Dyn-Stor-Ind method, Time Span= 0.00-48.00 hrs, dt= 0.01 hrs
 Peak Elev= 84.48' @ 13.39 hrs Surf.Area= 18,711 sf Storage= 43,742 cf
 Flood Elev= 84.80' Surf.Area= 19,310 sf Storage= 49,755 cf

Plug-Flow detention time= 229.0 min calculated for 2.015 af (82% of inflow)
 Center-of-Mass det. time= 152.9 min (1,035.4 - 882.6)

Volume	Invert	Avail.Storage	Storage Description
#1	81.60'	223,852 cf	Custom Stage Data (Prismatic) Listed below (Recalc)

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
81.60	11,330	0	0
82.00	12,303	4,727	4,727
83.00	15,137	13,720	18,447
84.00	17,796	16,467	34,913
85.00	19,688	18,742	53,655
86.00	21,638	20,663	74,318
87.00	23,645	22,642	96,960
88.00	25,710	24,678	121,637
89.00	27,831	26,771	148,408
90.00	30,009	28,920	177,328
90.50	31,119	15,282	192,610
91.00	31,275	15,599	208,208
91.50	31,300	15,644	223,852

Device	Routing	Invert	Outlet Devices
#1	Primary	81.27'	30.0" Round Culvert L= 38.0' CPP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 81.27' / 81.10' S= 0.0045 '/' Cc= 0.900 n= 0.013, Flow Area= 4.91 sf
#2	Device 1	83.00'	12.0" Round Culvert L= 20.0' CPP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 83.00' / 82.40' S= 0.0300 '/' Cc= 0.900 n= 0.013, Flow Area= 0.79 sf
#3	Device 1	86.98'	2.0" W x 2.0" H 18.4° Orifice/Grate X 6.00 columns X 6 rows with 1.5" cc spacing C= 0.600 Limited to weir flow at low heads
#4	Secondary	89.50'	10.0' long + 3.0 ' SideZ x 12.0' breadth Emergency Spillway Head (feet) 0.20 0.40 0.60 0.80 1.00 1.20 1.40 1.60 Coef. (English) 2.57 2.62 2.70 2.67 2.66 2.67 2.66 2.64

240361 Proposed Conditions GW

Prepared by Sebago Technics

HydroCAD® 10.20-5c s/n 00643 © 2023 HydroCAD Software Solutions LLC

Type III 24-hr 2-Year Rainfall=3.10"

Printed 12/12/2024

Page 6

Primary OutFlow Max=3.8 cfs @ 13.39 hrs HW=84.48' TW=0.00' (Dynamic Tailwater)

↑ **1=Culvert** (Passes 3.8 cfs of 28.6 cfs potential flow)

↑ **2=Culvert** (Inlet Controls 3.8 cfs @ 4.78 fps)

↑ **3=Orifice/Grate** (Controls 0.0 cfs)

Secondary OutFlow Max=0.0 cfs @ 0.00 hrs HW=81.60' TW=0.00' (Dynamic Tailwater)

↑ **4=Emergency Spillway** (Controls 0.0 cfs)

Summary for Link POA-1: Railroad Box Culvert

Inflow Area = 33.888 ac, 35.53% Impervious, Inflow Depth > 0.71" for 2-Year event

Inflow = 3.8 cfs @ 13.39 hrs, Volume= 2.015 af

Primary = 3.8 cfs @ 13.39 hrs, Volume= 2.015 af, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 0.00-48.00 hrs, dt= 0.01 hrs

240361 Proposed Conditions GW*Type III 24-hr 10-Year Rainfall=4.60"*

Prepared by Sebago Technics

Printed 12/12/2024

HydroCAD® 10.20-5c s/n 00643 © 2023 HydroCAD Software Solutions LLC

Page 7

Time span=0.00-48.00 hrs, dt=0.01 hrs, 4801 points

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN

Reach routing by Dyn-Stor-Ind method - Pond routing by Dyn-Stor-Ind method

Subcatchment 10.0S: Deering Ridge

Runoff Area=1,476,171 sf 35.53% Impervious Runoff Depth=1.89"

Flow Length=2,858' Tc=18.5 min CN=72 Runoff=51.3 cfs 5.350 af

Pond 10.0P: Proposed Gravel Wetland

Peak Elev=87.29' Storage=103,855 cf Inflow=51.3 cfs 5.350 af

Primary=9.4 cfs 4.913 af Secondary=0.0 cfs 0.000 af Outflow=9.4 cfs 4.913 af

Link POA-1: Railroad Box Culvert

Inflow=9.4 cfs 4.913 af

Primary=9.4 cfs 4.913 af

Total Runoff Area = 33.888 ac Runoff Volume = 5.350 af Average Runoff Depth = 1.89"**64.47% Pervious = 21.848 ac 35.53% Impervious = 12.041 ac**

240361 Proposed Conditions GW

Type III 24-hr 10-Year Rainfall=4.60"

Prepared by Sebago Technics

Printed 12/12/2024

HydroCAD® 10.20-5c s/n 00643 © 2023 HydroCAD Software Solutions LLC

Page 8

Summary for Subcatchment 10.0S: Deering Ridge Subdivision

Runoff = 51.3 cfs @ 12.27 hrs, Volume= 5.350 af, Depth= 1.89"
 Routed to Pond 10.0P : Proposed Gravel Wetland

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-48.00 hrs, dt= 0.01 hrs
 Type III 24-hr 10-Year Rainfall=4.60"

	Area (sf)	CN	Description
*	238,133	98	Paved road and sidewalk
	25,415	39	>75% Grass cover, Good, HSG A
	9,249	74	>75% Grass cover, Good, HSG C
	57,965	80	>75% Grass cover, Good, HSG D
*	618,069	54	1/4 acre lots, 25% imp, HSG A
*	10,206	70	1/4 acre lots, 25% imp, HSG B
*	331,364	80	1/4 acre lots, 25% imp, HSG C
*	185,770	85	1/4 acre lots, 25% imp, HSG D
	1,476,171	72	Weighted Average
	951,686		64.47% Pervious Area
	524,485		35.53% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
8.7	119	0.0400	0.23		Sheet Flow, A to B Grass: Short n= 0.150 P2= 3.10"
0.4	97	0.0500	4.54		Shallow Concentrated Flow, B to C Paved Kv= 20.3 fps
3.6	368	0.0600	1.71		Shallow Concentrated Flow, C to D Short Grass Pasture Kv= 7.0 fps
0.6	378	0.0500	10.99	8.63	Pipe Channel, D to E 12.0" Round Area= 0.8 sf Perim= 3.1' r= 0.25' n= 0.012
0.3	200	0.0400	12.88	22.76	Pipe Channel, E to F 18.0" Round Area= 1.8 sf Perim= 4.7' r= 0.38' n= 0.012
2.1	610	0.0040	4.93	15.50	Pipe Channel, F to G 24.0" Round Area= 3.1 sf Perim= 6.3' r= 0.50' n= 0.012
2.5	986	0.0040	6.47	45.70	Pipe Channel, G to H 36.0" Round Area= 7.1 sf Perim= 9.4' r= 0.75' n= 0.012
0.3	100	0.0030	6.20	59.70	Pipe Channel, H to I 42.0" Round Area= 9.6 sf Perim= 11.0' r= 0.88' n= 0.012
18.5	2,858	Total			

240361 Proposed Conditions GW

Type III 24-hr 10-Year Rainfall=4.60"

Prepared by Sebago Technics

Printed 12/12/2024

HydroCAD® 10.20-5c s/n 00643 © 2023 HydroCAD Software Solutions LLC

Page 9

Summary for Pond 10.0P: Proposed Gravel Wetland

Inflow Area = 33.888 ac, 35.53% Impervious, Inflow Depth = 1.89" for 10-Year event
 Inflow = 51.3 cfs @ 12.27 hrs, Volume= 5.350 af
 Outflow = 9.4 cfs @ 13.10 hrs, Volume= 4.913 af, Atten= 82%, Lag= 49.7 min
 Primary = 9.4 cfs @ 13.10 hrs, Volume= 4.913 af
 Routed to Link POA-1 : Railroad Box Culvert
 Secondary = 0.0 cfs @ 0.00 hrs, Volume= 0.000 af
 Routed to Link POA-1 : Railroad Box Culvert

Routing by Dyn-Stor-Ind method, Time Span= 0.00-48.00 hrs, dt= 0.01 hrs
 Peak Elev= 87.29' @ 13.10 hrs Surf.Area= 24,240 sf Storage= 103,855 cf
 Flood Elev= 84.80' Surf.Area= 19,310 sf Storage= 49,755 cf

Plug-Flow detention time= 204.0 min calculated for 4.912 af (92% of inflow)
 Center-of-Mass det. time= 163.0 min (1,021.5 - 858.5)

Volume	Invert	Avail.Storage	Storage Description
#1	81.60'	223,852 cf	Custom Stage Data (Prismatic) Listed below (Recalc)

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
81.60	11,330	0	0
82.00	12,303	4,727	4,727
83.00	15,137	13,720	18,447
84.00	17,796	16,467	34,913
85.00	19,688	18,742	53,655
86.00	21,638	20,663	74,318
87.00	23,645	22,642	96,960
88.00	25,710	24,678	121,637
89.00	27,831	26,771	148,408
90.00	30,009	28,920	177,328
90.50	31,119	15,282	192,610
91.00	31,275	15,599	208,208
91.50	31,300	15,644	223,852

Device	Routing	Invert	Outlet Devices
#1	Primary	81.27'	30.0" Round Culvert L= 38.0' CPP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 81.27' / 81.10' S= 0.0045 '/' Cc= 0.900 n= 0.013, Flow Area= 4.91 sf
#2	Device 1	83.00'	12.0" Round Culvert L= 20.0' CPP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 83.00' / 82.40' S= 0.0300 '/' Cc= 0.900 n= 0.013, Flow Area= 0.79 sf
#3	Device 1	86.98'	2.0" W x 2.0" H 18.4° Orifice/Grate X 6.00 columns X 6 rows with 1.5" cc spacing C= 0.600 Limited to weir flow at low heads
#4	Secondary	89.50'	10.0' long + 3.0 '/' SideZ x 12.0' breadth Emergency Spillway Head (feet) 0.20 0.40 0.60 0.80 1.00 1.20 1.40 1.60 Coef. (English) 2.57 2.62 2.70 2.67 2.66 2.67 2.66 2.64

240361 Proposed Conditions GW

Prepared by Sebago Technics

HydroCAD® 10.20-5c s/n 00643 © 2023 HydroCAD Software Solutions LLC

Type III 24-hr 10-Year Rainfall=4.60"

Printed 12/12/2024

Page 10

Primary OutFlow Max=9.4 cfs @ 13.10 hrs HW=87.29' TW=0.00' (Dynamic Tailwater)

↑ **1=Culvert** (Passes 9.4 cfs of 51.6 cfs potential flow)

↑ **2=Culvert** (Inlet Controls 7.4 cfs @ 9.37 fps)

↑ **3=Orifice/Grate** (Orifice Controls 2.0 cfs @ 2.02 fps)

Secondary OutFlow Max=0.0 cfs @ 0.00 hrs HW=81.60' TW=0.00' (Dynamic Tailwater)

↑ **4=Emergency Spillway** (Controls 0.0 cfs)

Summary for Link POA-1: Railroad Box Culvert

Inflow Area = 33.888 ac, 35.53% Impervious, Inflow Depth > 1.74" for 10-Year event

Inflow = 9.4 cfs @ 13.10 hrs, Volume= 4.913 af

Primary = 9.4 cfs @ 13.10 hrs, Volume= 4.913 af, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 0.00-48.00 hrs, dt= 0.01 hrs

240361 Proposed Conditions GW

Type III 24-hr 25-Year Rainfall=5.80"

Prepared by Sebago Technics

Printed 12/12/2024

HydroCAD® 10.20-5c s/n 00643 © 2023 HydroCAD Software Solutions LLC

Page 11

Time span=0.00-48.00 hrs, dt=0.01 hrs, 4801 points

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN

Reach routing by Dyn-Stor-Ind method - Pond routing by Dyn-Stor-Ind method

Subcatchment10.0S: Deering Ridge

Runoff Area=1,476,171 sf 35.53% Impervious Runoff Depth=2.83"
Flow Length=2,858' Tc=18.5 min CN=72 Runoff=77.8 cfs 7.993 af

Pond 10.0P: Proposed Gravel Wetland

Peak Elev=89.21' Storage=154,210 cf Inflow=77.8 cfs 7.993 af
Primary=16.0 cfs 7.556 af Secondary=0.0 cfs 0.000 af Outflow=16.0 cfs 7.556 af

Link POA-1: Railroad Box Culvert

Inflow=16.0 cfs 7.556 af
Primary=16.0 cfs 7.556 af

Total Runoff Area = 33.888 ac Runoff Volume = 7.993 af Average Runoff Depth = 2.83"
64.47% Pervious = 21.848 ac 35.53% Impervious = 12.041 ac

240361 Proposed Conditions GW

Type III 24-hr 25-Year Rainfall=5.80"

Prepared by Sebago Technics

Printed 12/12/2024

HydroCAD® 10.20-5c s/n 00643 © 2023 HydroCAD Software Solutions LLC

Page 12

Summary for Subcatchment 10.0S: Deering Ridge Subdivision

Runoff = 77.8 cfs @ 12.26 hrs, Volume= 7.993 af, Depth= 2.83"
 Routed to Pond 10.0P : Proposed Gravel Wetland

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-48.00 hrs, dt= 0.01 hrs
 Type III 24-hr 25-Year Rainfall=5.80"

	Area (sf)	CN	Description
*	238,133	98	Paved road and sidewalk
	25,415	39	>75% Grass cover, Good, HSG A
	9,249	74	>75% Grass cover, Good, HSG C
	57,965	80	>75% Grass cover, Good, HSG D
*	618,069	54	1/4 acre lots, 25% imp, HSG A
*	10,206	70	1/4 acre lots, 25% imp, HSG B
*	331,364	80	1/4 acre lots, 25% imp, HSG C
*	185,770	85	1/4 acre lots, 25% imp, HSG D
	1,476,171	72	Weighted Average
	951,686		64.47% Pervious Area
	524,485		35.53% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
8.7	119	0.0400	0.23		Sheet Flow, A to B Grass: Short n= 0.150 P2= 3.10"
0.4	97	0.0500	4.54		Shallow Concentrated Flow, B to C Paved Kv= 20.3 fps
3.6	368	0.0600	1.71		Shallow Concentrated Flow, C to D Short Grass Pasture Kv= 7.0 fps
0.6	378	0.0500	10.99	8.63	Pipe Channel, D to E 12.0" Round Area= 0.8 sf Perim= 3.1' r= 0.25' n= 0.012
0.3	200	0.0400	12.88	22.76	Pipe Channel, E to F 18.0" Round Area= 1.8 sf Perim= 4.7' r= 0.38' n= 0.012
2.1	610	0.0040	4.93	15.50	Pipe Channel, F to G 24.0" Round Area= 3.1 sf Perim= 6.3' r= 0.50' n= 0.012
2.5	986	0.0040	6.47	45.70	Pipe Channel, G to H 36.0" Round Area= 7.1 sf Perim= 9.4' r= 0.75' n= 0.012
0.3	100	0.0030	6.20	59.70	Pipe Channel, H to I 42.0" Round Area= 9.6 sf Perim= 11.0' r= 0.88' n= 0.012
18.5	2,858	Total			

240361 Proposed Conditions GW

Type III 24-hr 25-Year Rainfall=5.80"

Prepared by Sebago Technics

Printed 12/12/2024

HydroCAD® 10.20-5c s/n 00643 © 2023 HydroCAD Software Solutions LLC

Page 13

Summary for Pond 10.0P: Proposed Gravel Wetland

Inflow Area = 33.888 ac, 35.53% Impervious, Inflow Depth = 2.83" for 25-Year event
 Inflow = 77.8 cfs @ 12.26 hrs, Volume= 7.993 af
 Outflow = 16.0 cfs @ 12.96 hrs, Volume= 7.556 af, Atten= 79%, Lag= 41.7 min
 Primary = 16.0 cfs @ 12.96 hrs, Volume= 7.556 af
 Routed to Link POA-1 : Railroad Box Culvert
 Secondary = 0.0 cfs @ 0.00 hrs, Volume= 0.000 af
 Routed to Link POA-1 : Railroad Box Culvert

Routing by Dyn-Stor-Ind method, Time Span= 0.00-48.00 hrs, dt= 0.01 hrs
 Peak Elev= 89.21' @ 12.96 hrs Surf.Area= 28,281 sf Storage= 154,210 cf
 Flood Elev= 84.80' Surf.Area= 19,310 sf Storage= 49,755 cf

Plug-Flow detention time= 181.6 min calculated for 7.554 af (95% of inflow)
 Center-of-Mass det. time= 152.4 min (999.2 - 846.7)

Volume	Invert	Avail.Storage	Storage Description
#1	81.60'	223,852 cf	Custom Stage Data (Prismatic) Listed below (Recalc)

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
81.60	11,330	0	0
82.00	12,303	4,727	4,727
83.00	15,137	13,720	18,447
84.00	17,796	16,467	34,913
85.00	19,688	18,742	53,655
86.00	21,638	20,663	74,318
87.00	23,645	22,642	96,960
88.00	25,710	24,678	121,637
89.00	27,831	26,771	148,408
90.00	30,009	28,920	177,328
90.50	31,119	15,282	192,610
91.00	31,275	15,599	208,208
91.50	31,300	15,644	223,852

Device	Routing	Invert	Outlet Devices
#1	Primary	81.27'	30.0" Round Culvert L= 38.0' CPP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 81.27' / 81.10' S= 0.0045 '/' Cc= 0.900 n= 0.013, Flow Area= 4.91 sf
#2	Device 1	83.00'	12.0" Round Culvert L= 20.0' CPP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 83.00' / 82.40' S= 0.0300 '/' Cc= 0.900 n= 0.013, Flow Area= 0.79 sf
#3	Device 1	86.98'	2.0" W x 2.0" H 18.4° Orifice/Grate X 6.00 columns X 6 rows with 1.5" cc spacing C= 0.600 Limited to weir flow at low heads
#4	Secondary	89.50'	10.0' long + 3.0 '/' SideZ x 12.0' breadth Emergency Spillway Head (feet) 0.20 0.40 0.60 0.80 1.00 1.20 1.40 1.60 Coef. (English) 2.57 2.62 2.70 2.67 2.66 2.67 2.66 2.64

240361 Proposed Conditions GW

Prepared by Sebago Technics

HydroCAD® 10.20-5c s/n 00643 © 2023 HydroCAD Software Solutions LLC

Type III 24-hr 25-Year Rainfall=5.80"

Printed 12/12/2024

Page 14

Primary OutFlow Max=16.0 cfs @ 12.96 hrs HW=89.21' TW=0.00' (Dynamic Tailwater)

↑ **1=Culvert** (Passes 16.0 cfs of 61.1 cfs potential flow)

↑ **2=Culvert** (Inlet Controls 9.0 cfs @ 11.50 fps)

↑ **3=Orifice/Grate** (Orifice Controls 7.0 cfs @ 6.98 fps)

Secondary OutFlow Max=0.0 cfs @ 0.00 hrs HW=81.60' TW=0.00' (Dynamic Tailwater)

↑ **4=Emergency Spillway** (Controls 0.0 cfs)

Summary for Link POA-1: Railroad Box Culvert

Inflow Area = 33.888 ac, 35.53% Impervious, Inflow Depth > 2.68" for 25-Year event

Inflow = 16.0 cfs @ 12.96 hrs, Volume= 7.556 af

Primary = 16.0 cfs @ 12.96 hrs, Volume= 7.556 af, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 0.00-48.00 hrs, dt= 0.01 hrs

240361 Proposed Conditions GW

Type III 24-hr 50-Year Rainfall=6.90"

Prepared by Sebago Technics

Printed 12/12/2024

HydroCAD® 10.20-5c s/n 00643 © 2023 HydroCAD Software Solutions LLC

Page 15

Time span=0.00-48.00 hrs, dt=0.01 hrs, 4801 points

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN

Reach routing by Dyn-Stor-Ind method - Pond routing by Dyn-Stor-Ind method

Subcatchment10.0S: Deering Ridge Runoff Area=1,476,171 sf 35.53% Impervious Runoff Depth=3.74"
Flow Length=2,858' Tc=18.5 min CN=72 Runoff=103.4 cfs 10.573 af

Pond 10.0P: Proposed Gravel Wetland Peak Elev=90.32' Storage=186,976 cf Inflow=103.4 cfs 10.573 af
Primary=18.5 cfs 9.172 af Secondary=23.6 cfs 0.964 af Outflow=42.1 cfs 10.136 af

Link POA-1: Railroad Box Culvert Inflow=42.1 cfs 10.136 af
Primary=42.1 cfs 10.136 af

Total Runoff Area = 33.888 ac Runoff Volume = 10.573 af Average Runoff Depth = 3.74"
64.47% Pervious = 21.848 ac 35.53% Impervious = 12.041 ac

240361 Proposed Conditions GW

Type III 24-hr 50-Year Rainfall=6.90"

Prepared by Sebago Technics

Printed 12/12/2024

HydroCAD® 10.20-5c s/n 00643 © 2023 HydroCAD Software Solutions LLC

Page 16

Summary for Subcatchment 10.0S: Deering Ridge Subdivision

Runoff = 103.4 cfs @ 12.26 hrs, Volume= 10.573 af, Depth= 3.74"
 Routed to Pond 10.0P : Proposed Gravel Wetland

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-48.00 hrs, dt= 0.01 hrs
 Type III 24-hr 50-Year Rainfall=6.90"

	Area (sf)	CN	Description
*	238,133	98	Paved road and sidewalk
	25,415	39	>75% Grass cover, Good, HSG A
	9,249	74	>75% Grass cover, Good, HSG C
	57,965	80	>75% Grass cover, Good, HSG D
*	618,069	54	1/4 acre lots, 25% imp, HSG A
*	10,206	70	1/4 acre lots, 25% imp, HSG B
*	331,364	80	1/4 acre lots, 25% imp, HSG C
*	185,770	85	1/4 acre lots, 25% imp, HSG D
	1,476,171	72	Weighted Average
	951,686		64.47% Pervious Area
	524,485		35.53% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
8.7	119	0.0400	0.23		Sheet Flow, A to B Grass: Short n= 0.150 P2= 3.10"
0.4	97	0.0500	4.54		Shallow Concentrated Flow, B to C Paved Kv= 20.3 fps
3.6	368	0.0600	1.71		Shallow Concentrated Flow, C to D Short Grass Pasture Kv= 7.0 fps
0.6	378	0.0500	10.99	8.63	Pipe Channel, D to E 12.0" Round Area= 0.8 sf Perim= 3.1' r= 0.25' n= 0.012
0.3	200	0.0400	12.88	22.76	Pipe Channel, E to F 18.0" Round Area= 1.8 sf Perim= 4.7' r= 0.38' n= 0.012
2.1	610	0.0040	4.93	15.50	Pipe Channel, F to G 24.0" Round Area= 3.1 sf Perim= 6.3' r= 0.50' n= 0.012
2.5	986	0.0040	6.47	45.70	Pipe Channel, G to H 36.0" Round Area= 7.1 sf Perim= 9.4' r= 0.75' n= 0.012
0.3	100	0.0030	6.20	59.70	Pipe Channel, H to I 42.0" Round Area= 9.6 sf Perim= 11.0' r= 0.88' n= 0.012
18.5	2,858	Total			

240361 Proposed Conditions GW

Type III 24-hr 50-Year Rainfall=6.90"

Prepared by Sebago Technics

Printed 12/12/2024

HydroCAD® 10.20-5c s/n 00643 © 2023 HydroCAD Software Solutions LLC

Page 17

Summary for Pond 10.0P: Proposed Gravel Wetland

Inflow Area = 33.888 ac, 35.53% Impervious, Inflow Depth = 3.74" for 50-Year event
 Inflow = 103.4 cfs @ 12.26 hrs, Volume= 10.573 af
 Outflow = 42.1 cfs @ 12.66 hrs, Volume= 10.136 af, Atten= 59%, Lag= 24.2 min
 Primary = 18.5 cfs @ 12.66 hrs, Volume= 9.172 af
 Routed to Link POA-1 : Railroad Box Culvert
 Secondary = 23.6 cfs @ 12.66 hrs, Volume= 0.964 af
 Routed to Link POA-1 : Railroad Box Culvert

Routing by Dyn-Stor-Ind method, Time Span= 0.00-48.00 hrs, dt= 0.01 hrs
 Peak Elev= 90.32' @ 12.66 hrs Surf.Area= 30,715 sf Storage= 186,976 cf
 Flood Elev= 84.80' Surf.Area= 19,310 sf Storage= 49,755 cf

Plug-Flow detention time= 161.8 min calculated for 10.133 af (96% of inflow)
 Center-of-Mass det. time= 139.0 min (977.6 - 838.7)

Volume	Invert	Avail.Storage	Storage Description
#1	81.60'	223,852 cf	Custom Stage Data (Prismatic) Listed below (Recalc)

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
81.60	11,330	0	0
82.00	12,303	4,727	4,727
83.00	15,137	13,720	18,447
84.00	17,796	16,467	34,913
85.00	19,688	18,742	53,655
86.00	21,638	20,663	74,318
87.00	23,645	22,642	96,960
88.00	25,710	24,678	121,637
89.00	27,831	26,771	148,408
90.00	30,009	28,920	177,328
90.50	31,119	15,282	192,610
91.00	31,275	15,599	208,208
91.50	31,300	15,644	223,852

Device	Routing	Invert	Outlet Devices
#1	Primary	81.27'	30.0" Round Culvert L= 38.0' CPP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 81.27' / 81.10' S= 0.0045 '/' Cc= 0.900 n= 0.013, Flow Area= 4.91 sf
#2	Device 1	83.00'	12.0" Round Culvert L= 20.0' CPP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 83.00' / 82.40' S= 0.0300 '/' Cc= 0.900 n= 0.013, Flow Area= 0.79 sf
#3	Device 1	86.98'	2.0" W x 2.0" H 18.4° Orifice/Grate X 6.00 columns X 6 rows with 1.5" cc spacing C= 0.600 Limited to weir flow at low heads
#4	Secondary	89.50'	10.0' long + 3.0 '/' SideZ x 12.0' breadth Emergency Spillway Head (feet) 0.20 0.40 0.60 0.80 1.00 1.20 1.40 1.60 Coef. (English) 2.57 2.62 2.70 2.67 2.66 2.67 2.66 2.64

240361 Proposed Conditions GW

Type III 24-hr 50-Year Rainfall=6.90"

Prepared by Sebago Technics

Printed 12/12/2024

HydroCAD® 10.20-5c s/n 00643 © 2023 HydroCAD Software Solutions LLC

Page 18

Primary OutFlow Max=18.5 cfs @ 12.66 hrs HW=90.32' TW=0.00' (Dynamic Tailwater)

↑ **1=Culvert** (Passes 18.5 cfs of 66.0 cfs potential flow)

↑ **2=Culvert** (Inlet Controls 9.9 cfs @ 12.57 fps)

↑ **3=Orifice/Grate** (Orifice Controls 8.6 cfs @ 8.63 fps)

Secondary OutFlow Max=23.6 cfs @ 12.66 hrs HW=90.32' TW=0.00' (Dynamic Tailwater)

↑ **4=Emergency Spillway** (Weir Controls 23.6 cfs @ 2.32 fps)

Summary for Link POA-1: Railroad Box Culvert

Inflow Area = 33.888 ac, 35.53% Impervious, Inflow Depth > 3.59" for 50-Year event

Inflow = 42.1 cfs @ 12.66 hrs, Volume= 10.136 af

Primary = 42.1 cfs @ 12.66 hrs, Volume= 10.136 af, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 0.00-48.00 hrs, dt= 0.01 hrs

240361 Proposed Conditions GW*Type III 24-hr 100-Year Rainfall=8.10"*

Prepared by Sebago Technics

Printed 12/12/2024

HydroCAD® 10.20-5c s/n 00643 © 2023 HydroCAD Software Solutions LLC

Page 19

Time span=0.00-48.00 hrs, dt=0.01 hrs, 4801 points

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN

Reach routing by Dyn-Stor-Ind method - Pond routing by Dyn-Stor-Ind method

Subcatchment10.0S: Deering Ridge Runoff Area=1,476,171 sf 35.53% Impervious Runoff Depth=4.78"
Flow Length=2,858' Tc=18.5 min CN=72 Runoff=132.2 cfs 13.505 af

Pond 10.0P: Proposed Gravel Wetland Peak Elev=90.92' Storage=205,715 cf Inflow=132.2 cfs 13.505 af
Primary=19.7 cfs 10.415 af Secondary=60.3 cfs 2.653 af Outflow=80.0 cfs 13.067 af

Link POA-1: Railroad Box Culvert Inflow=80.0 cfs 13.067 af
Primary=80.0 cfs 13.067 af

Total Runoff Area = 33.888 ac Runoff Volume = 13.505 af Average Runoff Depth = 4.78"
64.47% Pervious = 21.848 ac 35.53% Impervious = 12.041 ac

240361 Proposed Conditions GW

Type III 24-hr 100-Year Rainfall=8.10"

Prepared by Sebago Technics

Printed 12/12/2024

HydroCAD® 10.20-5c s/n 00643 © 2023 HydroCAD Software Solutions LLC

Page 20

Summary for Subcatchment 10.0S: Deering Ridge Subdivision

Runoff = 132.2 cfs @ 12.25 hrs, Volume= 13.505 af, Depth= 4.78"
 Routed to Pond 10.0P : Proposed Gravel Wetland

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-48.00 hrs, dt= 0.01 hrs
 Type III 24-hr 100-Year Rainfall=8.10"

	Area (sf)	CN	Description
*	238,133	98	Paved road and sidewalk
	25,415	39	>75% Grass cover, Good, HSG A
	9,249	74	>75% Grass cover, Good, HSG C
	57,965	80	>75% Grass cover, Good, HSG D
*	618,069	54	1/4 acre lots, 25% imp, HSG A
*	10,206	70	1/4 acre lots, 25% imp, HSG B
*	331,364	80	1/4 acre lots, 25% imp, HSG C
*	185,770	85	1/4 acre lots, 25% imp, HSG D
	1,476,171	72	Weighted Average
	951,686		64.47% Pervious Area
	524,485		35.53% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
8.7	119	0.0400	0.23		Sheet Flow, A to B Grass: Short n= 0.150 P2= 3.10"
0.4	97	0.0500	4.54		Shallow Concentrated Flow, B to C Paved Kv= 20.3 fps
3.6	368	0.0600	1.71		Shallow Concentrated Flow, C to D Short Grass Pasture Kv= 7.0 fps
0.6	378	0.0500	10.99	8.63	Pipe Channel, D to E 12.0" Round Area= 0.8 sf Perim= 3.1' r= 0.25' n= 0.012
0.3	200	0.0400	12.88	22.76	Pipe Channel, E to F 18.0" Round Area= 1.8 sf Perim= 4.7' r= 0.38' n= 0.012
2.1	610	0.0040	4.93	15.50	Pipe Channel, F to G 24.0" Round Area= 3.1 sf Perim= 6.3' r= 0.50' n= 0.012
2.5	986	0.0040	6.47	45.70	Pipe Channel, G to H 36.0" Round Area= 7.1 sf Perim= 9.4' r= 0.75' n= 0.012
0.3	100	0.0030	6.20	59.70	Pipe Channel, H to I 42.0" Round Area= 9.6 sf Perim= 11.0' r= 0.88' n= 0.012
18.5	2,858	Total			

240361 Proposed Conditions GW

Type III 24-hr 100-Year Rainfall=8.10"

Prepared by Sebago Technics

Printed 12/12/2024

HydroCAD® 10.20-5c s/n 00643 © 2023 HydroCAD Software Solutions LLC

Page 21

Summary for Pond 10.0P: Proposed Gravel Wetland

Inflow Area = 33.888 ac, 35.53% Impervious, Inflow Depth = 4.78" for 100-Year event
 Inflow = 132.2 cfs @ 12.25 hrs, Volume= 13.505 af
 Outflow = 80.0 cfs @ 12.51 hrs, Volume= 13.067 af, Atten= 39%, Lag= 15.7 min
 Primary = 19.7 cfs @ 12.51 hrs, Volume= 10.415 af
 Routed to Link POA-1 : Railroad Box Culvert
 Secondary = 60.3 cfs @ 12.51 hrs, Volume= 2.653 af
 Routed to Link POA-1 : Railroad Box Culvert

Routing by Dyn-Stor-Ind method, Time Span= 0.00-48.00 hrs, dt= 0.01 hrs
 Peak Elev= 90.92' @ 12.51 hrs Surf.Area= 31,250 sf Storage= 205,715 cf
 Flood Elev= 84.80' Surf.Area= 19,310 sf Storage= 49,755 cf

Plug-Flow detention time= 141.8 min calculated for 13.065 af (97% of inflow)
 Center-of-Mass det. time= 123.4 min (955.1 - 831.6)

Volume	Invert	Avail.Storage	Storage Description
#1	81.60'	223,852 cf	Custom Stage Data (Prismatic) Listed below (Recalc)

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
81.60	11,330	0	0
82.00	12,303	4,727	4,727
83.00	15,137	13,720	18,447
84.00	17,796	16,467	34,913
85.00	19,688	18,742	53,655
86.00	21,638	20,663	74,318
87.00	23,645	22,642	96,960
88.00	25,710	24,678	121,637
89.00	27,831	26,771	148,408
90.00	30,009	28,920	177,328
90.50	31,119	15,282	192,610
91.00	31,275	15,599	208,208
91.50	31,300	15,644	223,852

Device	Routing	Invert	Outlet Devices
#1	Primary	81.27'	30.0" Round Culvert L= 38.0' CPP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 81.27' / 81.10' S= 0.0045 '/' Cc= 0.900 n= 0.013, Flow Area= 4.91 sf
#2	Device 1	83.00'	12.0" Round Culvert L= 20.0' CPP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 83.00' / 82.40' S= 0.0300 '/' Cc= 0.900 n= 0.013, Flow Area= 0.79 sf
#3	Device 1	86.98'	2.0" W x 2.0" H 18.4° Orifice/Grate X 6.00 columns X 6 rows with 1.5" cc spacing C= 0.600 Limited to weir flow at low heads
#4	Secondary	89.50'	10.0' long + 3.0 '/' SideZ x 12.0' breadth Emergency Spillway Head (feet) 0.20 0.40 0.60 0.80 1.00 1.20 1.40 1.60 Coef. (English) 2.57 2.62 2.70 2.67 2.66 2.67 2.66 2.64

240361 Proposed Conditions GW

Type III 24-hr 100-Year Rainfall=8.10"

Prepared by Sebago Technics

Printed 12/12/2024

HydroCAD® 10.20-5c s/n 00643 © 2023 HydroCAD Software Solutions LLC

Page 22

Primary OutFlow Max=19.7 cfs @ 12.51 hrs HW=90.92' TW=0.00' (Dynamic Tailwater)

↑ **1=Culvert** (Passes 19.7 cfs of 68.5 cfs potential flow)

↑ **2=Culvert** (Inlet Controls 10.3 cfs @ 13.12 fps)

↑ **3=Orifice/Grate** (Orifice Controls 9.4 cfs @ 9.40 fps)

Secondary OutFlow Max=60.3 cfs @ 12.51 hrs HW=90.92' TW=0.00' (Dynamic Tailwater)

↑ **4=Emergency Spillway** (Weir Controls 60.3 cfs @ 2.98 fps)

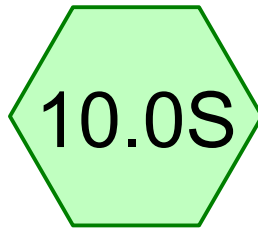
Summary for Link POA-1: Railroad Box Culvert

Inflow Area = 33.888 ac, 35.53% Impervious, Inflow Depth = 4.63" for 100-Year event

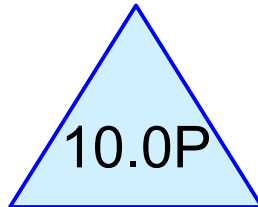
Inflow = 80.0 cfs @ 12.51 hrs, Volume= 13.067 af

Primary = 80.0 cfs @ 12.51 hrs, Volume= 13.067 af, Atten= 0%, Lag= 0.0 min

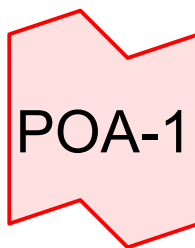
Primary outflow = Inflow, Time Span= 0.00-48.00 hrs, dt= 0.01 hrs



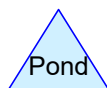
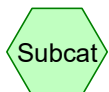
Deering Ridge
Subdivision



Proposed Wet Pond



Railroad Box Culvert



Routing Diagram for 240361 Proposed Conditions WP

Prepared by Sebago Technics, Printed 12/12/2024

HydroCAD® 10.20-5c s/n 00643 © 2023 HydroCAD Software Solutions LLC

240361 Proposed Conditions WP

Prepared by Sebago Technics

HydroCAD® 10.20-5c s/n 00643 © 2023 HydroCAD Software Solutions LLC

Printed 12/12/2024

Page 2

Area Listing (all nodes)

Area (acres)	CN	Description (subcatchment-numbers)
14.189	54	1/4 acre lots, 25% imp, HSG A (10.0S)
0.234	70	1/4 acre lots, 25% imp, HSG B (10.0S)
7.607	80	1/4 acre lots, 25% imp, HSG C (10.0S)
4.265	85	1/4 acre lots, 25% imp, HSG D (10.0S)
0.583	39	>75% Grass cover, Good, HSG A (10.0S)
0.212	74	>75% Grass cover, Good, HSG C (10.0S)
1.331	80	>75% Grass cover, Good, HSG D (10.0S)
5.467	98	Paved road and sidewalk (10.0S)
33.888	72	TOTAL AREA

240361 Proposed Conditions WP*Type III 24-hr 2-Year Rainfall=3.10"*

Prepared by Sebago Technics

Printed 12/12/2024

HydroCAD® 10.20-5c s/n 00643 © 2023 HydroCAD Software Solutions LLC

Page 3

Time span=0.00-48.00 hrs, dt=0.01 hrs, 4801 points

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN

Reach routing by Dyn-Stor-Ind method - Pond routing by Dyn-Stor-Ind method

Subcatchment10.0S: Deering Ridge

Runoff Area=1,476,171 sf 35.53% Impervious Runoff Depth=0.87"

Flow Length=2,858' Tc=18.5 min CN=72 Runoff=21.8 cfs 2.452 af

Pond 10.0P: Proposed Wet Pond

Peak Elev=84.62' Storage=40,673 cf Inflow=21.8 cfs 2.452 af

Primary=4.4 cfs 2.289 af Secondary=0.0 cfs 0.000 af Outflow=4.4 cfs 2.289 af

Link POA-1: Railroad Box Culvert

Inflow=4.4 cfs 2.289 af

Primary=4.4 cfs 2.289 af

Total Runoff Area = 33.888 ac Runoff Volume = 2.452 af Average Runoff Depth = 0.87"**64.47% Pervious = 21.848 ac 35.53% Impervious = 12.041 ac**

240361 Proposed Conditions WP

Type III 24-hr 2-Year Rainfall=3.10"

Prepared by Sebago Technics

Printed 12/12/2024

HydroCAD® 10.20-5c s/n 00643 © 2023 HydroCAD Software Solutions LLC

Page 4

Summary for Subcatchment 10.0S: Deering Ridge Subdivision

Runoff = 21.8 cfs @ 12.28 hrs, Volume= 2.452 af, Depth= 0.87"
 Routed to Pond 10.0P : Proposed Wet Pond

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-48.00 hrs, dt= 0.01 hrs
 Type III 24-hr 2-Year Rainfall=3.10"

	Area (sf)	CN	Description
*	238,133	98	Paved road and sidewalk
	25,415	39	>75% Grass cover, Good, HSG A
	9,249	74	>75% Grass cover, Good, HSG C
	57,965	80	>75% Grass cover, Good, HSG D
*	618,069	54	1/4 acre lots, 25% imp, HSG A
*	10,206	70	1/4 acre lots, 25% imp, HSG B
*	331,364	80	1/4 acre lots, 25% imp, HSG C
*	185,770	85	1/4 acre lots, 25% imp, HSG D
	1,476,171	72	Weighted Average
	951,686		64.47% Pervious Area
	524,485		35.53% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
8.7	119	0.0400	0.23		Sheet Flow, A to B Grass: Short n= 0.150 P2= 3.10"
0.4	97	0.0500	4.54		Shallow Concentrated Flow, B to C Paved Kv= 20.3 fps
3.6	368	0.0600	1.71		Shallow Concentrated Flow, C to D Short Grass Pasture Kv= 7.0 fps
0.6	378	0.0500	10.99	8.63	Pipe Channel, D to E 12.0" Round Area= 0.8 sf Perim= 3.1' r= 0.25' n= 0.012
0.3	200	0.0400	12.88	22.76	Pipe Channel, E to F 18.0" Round Area= 1.8 sf Perim= 4.7' r= 0.38' n= 0.012
2.1	610	0.0040	4.93	15.50	Pipe Channel, F to G 24.0" Round Area= 3.1 sf Perim= 6.3' r= 0.50' n= 0.012
2.5	986	0.0040	6.47	45.70	Pipe Channel, G to H 36.0" Round Area= 7.1 sf Perim= 9.4' r= 0.75' n= 0.012
0.3	100	0.0030	6.20	59.70	Pipe Channel, H to I 42.0" Round Area= 9.6 sf Perim= 11.0' r= 0.88' n= 0.012
18.5	2,858	Total			

240361 Proposed Conditions WP

Type III 24-hr 2-Year Rainfall=3.10"

Prepared by Sebago Technics

Printed 12/12/2024

HydroCAD® 10.20-5c s/n 00643 © 2023 HydroCAD Software Solutions LLC

Page 5

Summary for Pond 10.0P: Proposed Wet Pond

Inflow Area = 33.888 ac, 35.53% Impervious, Inflow Depth = 0.87" for 2-Year event
 Inflow = 21.8 cfs @ 12.28 hrs, Volume= 2.452 af
 Outflow = 4.4 cfs @ 13.17 hrs, Volume= 2.289 af, Atten= 80%, Lag= 53.4 min
 Primary = 4.4 cfs @ 13.17 hrs, Volume= 2.289 af
 Routed to Link POA-1 : Railroad Box Culvert
 Secondary = 0.0 cfs @ 0.00 hrs, Volume= 0.000 af
 Routed to Link POA-1 : Railroad Box Culvert

Routing by Dyn-Stor-Ind method, Time Span= 0.00-48.00 hrs, dt= 0.01 hrs
 Peak Elev= 84.62' @ 13.17 hrs Surf.Area= 18,965 sf Storage= 40,673 cf
 Flood Elev= 70.00' Storage= 0 cf

Plug-Flow detention time= 222.9 min calculated for 2.288 af (93% of inflow)
 Center-of-Mass det. time= 189.1 min (1,071.6 - 882.6)

Volume	Invert	Avail.Storage	Storage Description
#1	82.00'	218,128 cf	CPV (Prismatic) Listed below

Elevation (feet)	Surf.Area (sq-ft)	Voids (%)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
82.00	9,188	0.0	0	0
83.00	15,597	100.0	12,393	12,393
84.00	17,796	100.0	16,697	29,089
85.00	19,688	100.0	18,742	47,831
86.00	21,638	100.0	20,663	68,494
87.00	23,645	100.0	22,642	91,136
88.00	25,710	100.0	24,678	115,813
89.00	27,931	100.0	26,821	142,634
90.00	30,009	100.0	28,970	171,604
90.50	31,119	100.0	15,282	186,886
91.00	31,275	100.0	15,599	202,484
91.50	31,300	100.0	15,644	218,128

Device	Routing	Invert	Outlet Devices
#1	Primary	81.27'	30.0" Round Outlet L= 38.0' CPP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 81.27' / 81.10' S= 0.0045 '/' Cc= 0.900 n= 0.013 Corrugated PE, smooth interior, Flow Area= 4.91 sf
#2	Device 1	83.00'	12.0" Round Culvert L= 20.0' CPP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 83.00' / 82.40' S= 0.0300 '/' Cc= 0.900 n= 0.013, Flow Area= 0.79 sf
#3	Device 1	82.50'	2.410 in/hr Gravel Trench over Surface area above 82.50' Excluded Surface area = 12,393 sf
#4	Device 1	86.98'	2.0" W x 2.0" H 18.4° Catch Basin Grate X 6.00 columns X 6 rows with 1.5" cc spacing C= 0.600 Limited to weir flow at low heads
#5	Secondary	89.50'	10.0' long + 3.0 ' SideZ x 12.0' breadth Broad-Crested Rectangular Weir Head (feet) 0.20 0.40 0.60 0.80 1.00 1.20 1.40 1.60

240361 Proposed Conditions WP

Prepared by Sebago Technics

HydroCAD® 10.20-5c s/n 00643 © 2023 HydroCAD Software Solutions LLC

Type III 24-hr 2-Year Rainfall=3.10"

Printed 12/12/2024

Page 6

Coef. (English) 2.57 2.62 2.70 2.67 2.66 2.67 2.66 2.64

Primary OutFlow Max=4.4 cfs @ 13.17 hrs HW=84.62' TW=0.00' (Dynamic Tailwater)

↑ **1=Outlet** (Passes 4.4 cfs of 29.2 cfs potential flow)

↑ **2=Culvert** (Inlet Controls 4.0 cfs @ 5.09 fps)

↑ **3=Gravel Trench** (Exfiltration Controls 0.4 cfs)

↑ **4=Catch Basin Grate** (Controls 0.0 cfs)

Secondary OutFlow Max=0.0 cfs @ 0.00 hrs HW=82.00' TW=0.00' (Dynamic Tailwater)

↑ **5=Broad-Crested Rectangular Weir** (Controls 0.0 cfs)

Summary for Link POA-1: Railroad Box Culvert

Inflow Area = 33.888 ac, 35.53% Impervious, Inflow Depth > 0.81" for 2-Year event

Inflow = 4.4 cfs @ 13.17 hrs, Volume= 2.289 af

Primary = 4.4 cfs @ 13.17 hrs, Volume= 2.289 af, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 0.00-48.00 hrs, dt= 0.01 hrs

240361 Proposed Conditions WP*Type III 24-hr 10-Year Rainfall=4.60"*

Prepared by Sebago Technics

Printed 12/12/2024

HydroCAD® 10.20-5c s/n 00643 © 2023 HydroCAD Software Solutions LLC

Page 7

Time span=0.00-48.00 hrs, dt=0.01 hrs, 4801 points

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN

Reach routing by Dyn-Stor-Ind method - Pond routing by Dyn-Stor-Ind method

Subcatchment 10.0S: Deering Ridge

Runoff Area=1,476,171 sf 35.53% Impervious Runoff Depth=1.89"

Flow Length=2,858' Tc=18.5 min CN=72 Runoff=51.3 cfs 5.350 af

Pond 10.0P: Proposed Wet Pond

Peak Elev=87.34' Storage=99,537 cf Inflow=51.3 cfs 5.350 af

Primary=10.4 cfs 5.185 af Secondary=0.0 cfs 0.000 af Outflow=10.4 cfs 5.185 af

Link POA-1: Railroad Box Culvert

Inflow=10.4 cfs 5.185 af

Primary=10.4 cfs 5.185 af

Total Runoff Area = 33.888 ac Runoff Volume = 5.350 af Average Runoff Depth = 1.89"**64.47% Pervious = 21.848 ac 35.53% Impervious = 12.041 ac**

240361 Proposed Conditions WP

Type III 24-hr 10-Year Rainfall=4.60"

Prepared by Sebago Technics

Printed 12/12/2024

HydroCAD® 10.20-5c s/n 00643 © 2023 HydroCAD Software Solutions LLC

Page 8

Summary for Subcatchment 10.0S: Deering Ridge Subdivision

Runoff = 51.3 cfs @ 12.27 hrs, Volume= 5.350 af, Depth= 1.89"
 Routed to Pond 10.0P : Proposed Wet Pond

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-48.00 hrs, dt= 0.01 hrs
 Type III 24-hr 10-Year Rainfall=4.60"

	Area (sf)	CN	Description
*	238,133	98	Paved road and sidewalk
	25,415	39	>75% Grass cover, Good, HSG A
	9,249	74	>75% Grass cover, Good, HSG C
	57,965	80	>75% Grass cover, Good, HSG D
*	618,069	54	1/4 acre lots, 25% imp, HSG A
*	10,206	70	1/4 acre lots, 25% imp, HSG B
*	331,364	80	1/4 acre lots, 25% imp, HSG C
*	185,770	85	1/4 acre lots, 25% imp, HSG D
	1,476,171	72	Weighted Average
	951,686		64.47% Pervious Area
	524,485		35.53% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
8.7	119	0.0400	0.23		Sheet Flow, A to B Grass: Short n= 0.150 P2= 3.10"
0.4	97	0.0500	4.54		Shallow Concentrated Flow, B to C Paved Kv= 20.3 fps
3.6	368	0.0600	1.71		Shallow Concentrated Flow, C to D Short Grass Pasture Kv= 7.0 fps
0.6	378	0.0500	10.99	8.63	Pipe Channel, D to E 12.0" Round Area= 0.8 sf Perim= 3.1' r= 0.25' n= 0.012
0.3	200	0.0400	12.88	22.76	Pipe Channel, E to F 18.0" Round Area= 1.8 sf Perim= 4.7' r= 0.38' n= 0.012
2.1	610	0.0040	4.93	15.50	Pipe Channel, F to G 24.0" Round Area= 3.1 sf Perim= 6.3' r= 0.50' n= 0.012
2.5	986	0.0040	6.47	45.70	Pipe Channel, G to H 36.0" Round Area= 7.1 sf Perim= 9.4' r= 0.75' n= 0.012
0.3	100	0.0030	6.20	59.70	Pipe Channel, H to I 42.0" Round Area= 9.6 sf Perim= 11.0' r= 0.88' n= 0.012
18.5	2,858	Total			

240361 Proposed Conditions WP

Type III 24-hr 10-Year Rainfall=4.60"

Prepared by Sebago Technics

Printed 12/12/2024

HydroCAD® 10.20-5c s/n 00643 © 2023 HydroCAD Software Solutions LLC

Page 9

Summary for Pond 10.0P: Proposed Wet Pond

Inflow Area = 33.888 ac, 35.53% Impervious, Inflow Depth = 1.89" for 10-Year event
 Inflow = 51.3 cfs @ 12.27 hrs, Volume= 5.350 af
 Outflow = 10.4 cfs @ 13.01 hrs, Volume= 5.185 af, Atten= 80%, Lag= 44.8 min
 Primary = 10.4 cfs @ 13.01 hrs, Volume= 5.185 af
 Routed to Link POA-1 : Railroad Box Culvert
 Secondary = 0.0 cfs @ 0.00 hrs, Volume= 0.000 af
 Routed to Link POA-1 : Railroad Box Culvert

Routing by Dyn-Stor-Ind method, Time Span= 0.00-48.00 hrs, dt= 0.01 hrs
 Peak Elev= 87.34' @ 13.01 hrs Surf.Area= 24,348 sf Storage= 99,537 cf
 Flood Elev= 70.00' Storage= 0 cf

Plug-Flow detention time= 189.8 min calculated for 5.184 af (97% of inflow)
 Center-of-Mass det. time= 172.8 min (1,031.3 - 858.5)

Volume	Invert	Avail.Storage	Storage Description
#1	82.00'	218,128 cf	CPV (Prismatic) Listed below

Elevation (feet)	Surf.Area (sq-ft)	Voids (%)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
82.00	9,188	0.0	0	0
83.00	15,597	100.0	12,393	12,393
84.00	17,796	100.0	16,697	29,089
85.00	19,688	100.0	18,742	47,831
86.00	21,638	100.0	20,663	68,494
87.00	23,645	100.0	22,642	91,136
88.00	25,710	100.0	24,678	115,813
89.00	27,931	100.0	26,821	142,634
90.00	30,009	100.0	28,970	171,604
90.50	31,119	100.0	15,282	186,886
91.00	31,275	100.0	15,599	202,484
91.50	31,300	100.0	15,644	218,128

Device	Routing	Invert	Outlet Devices
#1	Primary	81.27'	30.0" Round Outlet L= 38.0' CPP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 81.27' / 81.10' S= 0.0045 '/' Cc= 0.900 n= 0.013 Corrugated PE, smooth interior, Flow Area= 4.91 sf
#2	Device 1	83.00'	12.0" Round Culvert L= 20.0' CPP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 83.00' / 82.40' S= 0.0300 '/' Cc= 0.900 n= 0.013, Flow Area= 0.79 sf
#3	Device 1	82.50'	2.410 in/hr Gravel Trench over Surface area above 82.50' Excluded Surface area = 12,393 sf
#4	Device 1	86.98'	2.0" W x 2.0" H 18.4° Catch Basin Grate X 6.00 columns X 6 rows with 1.5" cc spacing C= 0.600 Limited to weir flow at low heads
#5	Secondary	89.50'	10.0' long + 3.0 ' SideZ x 12.0' breadth Broad-Crested Rectangular Weir Head (feet) 0.20 0.40 0.60 0.80 1.00 1.20 1.40 1.60

240361 Proposed Conditions WP

Prepared by Sebago Technics

HydroCAD® 10.20-5c s/n 00643 © 2023 HydroCAD Software Solutions LLC

Type III 24-hr 10-Year Rainfall=4.60"

Printed 12/12/2024

Page 10

Coef. (English) 2.57 2.62 2.70 2.67 2.66 2.67 2.66 2.64

Primary OutFlow Max=10.4 cfs @ 13.01 hrs HW=87.34' TW=0.00' (Dynamic Tailwater)

- ↑ **1=Outlet** (Passes 10.4 cfs of 51.9 cfs potential flow)
- ↑ **2=Culvert** (Inlet Controls 7.4 cfs @ 9.44 fps)
- ↑ **3=Gravel Trench** (Exfiltration Controls 0.7 cfs)
- ↑ **4=Catch Basin Grate** (Orifice Controls 2.3 cfs @ 2.31 fps)

Secondary OutFlow Max=0.0 cfs @ 0.00 hrs HW=82.00' TW=0.00' (Dynamic Tailwater)

- ↑ **5=Broad-Crested Rectangular Weir** (Controls 0.0 cfs)

Summary for Link POA-1: Railroad Box Culvert

Inflow Area = 33.888 ac, 35.53% Impervious, Inflow Depth > 1.84" for 10-Year event
Inflow = 10.4 cfs @ 13.01 hrs, Volume= 5.185 af
Primary = 10.4 cfs @ 13.01 hrs, Volume= 5.185 af, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 0.00-48.00 hrs, dt= 0.01 hrs

240361 Proposed Conditions WP*Type III 24-hr 25-Year Rainfall=5.80"*

Prepared by Sebago Technics

Printed 12/12/2024

HydroCAD® 10.20-5c s/n 00643 © 2023 HydroCAD Software Solutions LLC

Page 11

Time span=0.00-48.00 hrs, dt=0.01 hrs, 4801 points

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN

Reach routing by Dyn-Stor-Ind method - Pond routing by Dyn-Stor-Ind method

Subcatchment 10.0S: Deering Ridge

Runoff Area=1,476,171 sf 35.53% Impervious Runoff Depth=2.83"

Flow Length=2,858' Tc=18.5 min CN=72 Runoff=77.8 cfs 7.993 af

Pond 10.0P: Proposed Wet Pond

Peak Elev=89.22' Storage=149,078 cf Inflow=77.8 cfs 7.993 af

Primary=16.9 cfs 7.827 af Secondary=0.0 cfs 0.000 af Outflow=16.9 cfs 7.827 af

Link POA-1: Railroad Box Culvert

Inflow=16.9 cfs 7.827 af

Primary=16.9 cfs 7.827 af

Total Runoff Area = 33.888 ac Runoff Volume = 7.993 af Average Runoff Depth = 2.83"**64.47% Pervious = 21.848 ac 35.53% Impervious = 12.041 ac**

240361 Proposed Conditions WP

Type III 24-hr 25-Year Rainfall=5.80"

Prepared by Sebago Technics

Printed 12/12/2024

HydroCAD® 10.20-5c s/n 00643 © 2023 HydroCAD Software Solutions LLC

Page 12

Summary for Subcatchment 10.0S: Deering Ridge Subdivision

Runoff = 77.8 cfs @ 12.26 hrs, Volume= 7.993 af, Depth= 2.83"
 Routed to Pond 10.0P : Proposed Wet Pond

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-48.00 hrs, dt= 0.01 hrs
 Type III 24-hr 25-Year Rainfall=5.80"

	Area (sf)	CN	Description
*	238,133	98	Paved road and sidewalk
	25,415	39	>75% Grass cover, Good, HSG A
	9,249	74	>75% Grass cover, Good, HSG C
	57,965	80	>75% Grass cover, Good, HSG D
*	618,069	54	1/4 acre lots, 25% imp, HSG A
*	10,206	70	1/4 acre lots, 25% imp, HSG B
*	331,364	80	1/4 acre lots, 25% imp, HSG C
*	185,770	85	1/4 acre lots, 25% imp, HSG D
	1,476,171	72	Weighted Average
	951,686		64.47% Pervious Area
	524,485		35.53% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
8.7	119	0.0400	0.23		Sheet Flow, A to B Grass: Short n= 0.150 P2= 3.10"
0.4	97	0.0500	4.54		Shallow Concentrated Flow, B to C Paved Kv= 20.3 fps
3.6	368	0.0600	1.71		Shallow Concentrated Flow, C to D Short Grass Pasture Kv= 7.0 fps
0.6	378	0.0500	10.99	8.63	Pipe Channel, D to E 12.0" Round Area= 0.8 sf Perim= 3.1' r= 0.25' n= 0.012
0.3	200	0.0400	12.88	22.76	Pipe Channel, E to F 18.0" Round Area= 1.8 sf Perim= 4.7' r= 0.38' n= 0.012
2.1	610	0.0040	4.93	15.50	Pipe Channel, F to G 24.0" Round Area= 3.1 sf Perim= 6.3' r= 0.50' n= 0.012
2.5	986	0.0040	6.47	45.70	Pipe Channel, G to H 36.0" Round Area= 7.1 sf Perim= 9.4' r= 0.75' n= 0.012
0.3	100	0.0030	6.20	59.70	Pipe Channel, H to I 42.0" Round Area= 9.6 sf Perim= 11.0' r= 0.88' n= 0.012
18.5	2,858	Total			

240361 Proposed Conditions WP

Type III 24-hr 25-Year Rainfall=5.80"

Prepared by Sebago Technics

Printed 12/12/2024

HydroCAD® 10.20-5c s/n 00643 © 2023 HydroCAD Software Solutions LLC

Page 13

Summary for Pond 10.0P: Proposed Wet Pond

Inflow Area = 33.888 ac, 35.53% Impervious, Inflow Depth = 2.83" for 25-Year event
 Inflow = 77.8 cfs @ 12.26 hrs, Volume= 7.993 af
 Outflow = 16.9 cfs @ 12.92 hrs, Volume= 7.827 af, Atten= 78%, Lag= 39.5 min
 Primary = 16.9 cfs @ 12.92 hrs, Volume= 7.827 af
 Routed to Link POA-1 : Railroad Box Culvert
 Secondary = 0.0 cfs @ 0.00 hrs, Volume= 0.000 af
 Routed to Link POA-1 : Railroad Box Culvert

Routing by Dyn-Stor-Ind method, Time Span= 0.00-48.00 hrs, dt= 0.01 hrs
 Peak Elev= 89.22' @ 12.92 hrs Surf.Area= 28,393 sf Storage= 149,078 cf
 Flood Elev= 70.00' Storage= 0 cf

Plug-Flow detention time= 169.5 min calculated for 7.826 af (98% of inflow)
 Center-of-Mass det. time= 157.7 min (1,004.5 - 846.7)

Volume	Invert	Avail.Storage	Storage Description
#1	82.00'	218,128 cf	CPV (Prismatic) Listed below

Elevation (feet)	Surf.Area (sq-ft)	Voids (%)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
82.00	9,188	0.0	0	0
83.00	15,597	100.0	12,393	12,393
84.00	17,796	100.0	16,697	29,089
85.00	19,688	100.0	18,742	47,831
86.00	21,638	100.0	20,663	68,494
87.00	23,645	100.0	22,642	91,136
88.00	25,710	100.0	24,678	115,813
89.00	27,931	100.0	26,821	142,634
90.00	30,009	100.0	28,970	171,604
90.50	31,119	100.0	15,282	186,886
91.00	31,275	100.0	15,599	202,484
91.50	31,300	100.0	15,644	218,128

Device	Routing	Invert	Outlet Devices
#1	Primary	81.27'	30.0" Round Outlet L= 38.0' CPP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 81.27' / 81.10' S= 0.0045 '/' Cc= 0.900 n= 0.013 Corrugated PE, smooth interior, Flow Area= 4.91 sf
#2	Device 1	83.00'	12.0" Round Culvert L= 20.0' CPP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 83.00' / 82.40' S= 0.0300 '/' Cc= 0.900 n= 0.013, Flow Area= 0.79 sf
#3	Device 1	82.50'	2.410 in/hr Gravel Trench over Surface area above 82.50' Excluded Surface area = 12,393 sf
#4	Device 1	86.98'	2.0" W x 2.0" H 18.4° Catch Basin Grate X 6.00 columns X 6 rows with 1.5" cc spacing C= 0.600 Limited to weir flow at low heads
#5	Secondary	89.50'	10.0' long + 3.0 '/' SideZ x 12.0' breadth Broad-Crested Rectangular Weir Head (feet) 0.20 0.40 0.60 0.80 1.00 1.20 1.40 1.60

240361 Proposed Conditions WP

Prepared by Sebago Technics

HydroCAD® 10.20-5c s/n 00643 © 2023 HydroCAD Software Solutions LLC

Type III 24-hr 25-Year Rainfall=5.80"

Printed 12/12/2024

Page 14

Coef. (English) 2.57 2.62 2.70 2.67 2.66 2.67 2.66 2.64

Primary OutFlow Max=16.9 cfs @ 12.92 hrs HW=89.22' TW=0.00' (Dynamic Tailwater)

- ↑ **1=Outlet** (Passes 16.9 cfs of 61.2 cfs potential flow)
- ↑ **2=Culvert** (Inlet Controls 9.0 cfs @ 11.52 fps)
- ↑ **3=Gravel Trench** (Exfiltration Controls 0.9 cfs)
- ↑ **4=Catch Basin Grate** (Orifice Controls 7.0 cfs @ 7.01 fps)

Secondary OutFlow Max=0.0 cfs @ 0.00 hrs HW=82.00' TW=0.00' (Dynamic Tailwater)

- ↑ **5=Broad-Crested Rectangular Weir** (Controls 0.0 cfs)

Summary for Link POA-1: Railroad Box Culvert

Inflow Area = 33.888 ac, 35.53% Impervious, Inflow Depth > 2.77" for 25-Year event
Inflow = 16.9 cfs @ 12.92 hrs, Volume= 7.827 af
Primary = 16.9 cfs @ 12.92 hrs, Volume= 7.827 af, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 0.00-48.00 hrs, dt= 0.01 hrs

240361 Proposed Conditions WP

Type III 24-hr 50-Year Rainfall=6.90"

Prepared by Sebago Technics

Printed 12/12/2024

HydroCAD® 10.20-5c s/n 00643 © 2023 HydroCAD Software Solutions LLC

Page 15

Time span=0.00-48.00 hrs, dt=0.01 hrs, 4801 points
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN
Reach routing by Dyn-Stor-Ind method - Pond routing by Dyn-Stor-Ind method

Subcatchment 10.0S: Deering Ridge Runoff Area=1,476,171 sf 35.53% Impervious Runoff Depth=3.74"
Flow Length=2,858' Tc=18.5 min CN=72 Runoff=103.4 cfs 10.573 af

Pond 10.0P: Proposed Wet Pond Peak Elev=90.31' Storage=181,147 cf Inflow=103.4 cfs 10.573 af
Primary=19.5 cfs 9.483 af Secondary=23.4 cfs 0.923 af Outflow=42.9 cfs 10.406 af

Link POA-1: Railroad Box Culvert Inflow=42.9 cfs 10.406 af
Primary=42.9 cfs 10.406 af

Total Runoff Area = 33.888 ac Runoff Volume = 10.573 af Average Runoff Depth = 3.74"
64.47% Pervious = 21.848 ac 35.53% Impervious = 12.041 ac

240361 Proposed Conditions WP

Prepared by Sebago Technics

HydroCAD® 10.20-5c s/n 00643 © 2023 HydroCAD Software Solutions LLC

Type III 24-hr 50-Year Rainfall=6.90"

Printed 12/12/2024

Page 16

Summary for Subcatchment 10.0S: Deering Ridge Subdivision

Runoff = 103.4 cfs @ 12.26 hrs, Volume= 10.573 af, Depth= 3.74"
 Routed to Pond 10.0P : Proposed Wet Pond

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-48.00 hrs, dt= 0.01 hrs
 Type III 24-hr 50-Year Rainfall=6.90"

	Area (sf)	CN	Description
*	238,133	98	Paved road and sidewalk
	25,415	39	>75% Grass cover, Good, HSG A
	9,249	74	>75% Grass cover, Good, HSG C
	57,965	80	>75% Grass cover, Good, HSG D
*	618,069	54	1/4 acre lots, 25% imp, HSG A
*	10,206	70	1/4 acre lots, 25% imp, HSG B
*	331,364	80	1/4 acre lots, 25% imp, HSG C
*	185,770	85	1/4 acre lots, 25% imp, HSG D
	1,476,171	72	Weighted Average
	951,686		64.47% Pervious Area
	524,485		35.53% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
8.7	119	0.0400	0.23		Sheet Flow, A to B Grass: Short n= 0.150 P2= 3.10"
0.4	97	0.0500	4.54		Shallow Concentrated Flow, B to C Paved Kv= 20.3 fps
3.6	368	0.0600	1.71		Shallow Concentrated Flow, C to D Short Grass Pasture Kv= 7.0 fps
0.6	378	0.0500	10.99	8.63	Pipe Channel, D to E 12.0" Round Area= 0.8 sf Perim= 3.1' r= 0.25' n= 0.012
0.3	200	0.0400	12.88	22.76	Pipe Channel, E to F 18.0" Round Area= 1.8 sf Perim= 4.7' r= 0.38' n= 0.012
2.1	610	0.0040	4.93	15.50	Pipe Channel, F to G 24.0" Round Area= 3.1 sf Perim= 6.3' r= 0.50' n= 0.012
2.5	986	0.0040	6.47	45.70	Pipe Channel, G to H 36.0" Round Area= 7.1 sf Perim= 9.4' r= 0.75' n= 0.012
0.3	100	0.0030	6.20	59.70	Pipe Channel, H to I 42.0" Round Area= 9.6 sf Perim= 11.0' r= 0.88' n= 0.012
18.5	2,858	Total			

240361 Proposed Conditions WP

Type III 24-hr 50-Year Rainfall=6.90"

Prepared by Sebago Technics

Printed 12/12/2024

HydroCAD® 10.20-5c s/n 00643 © 2023 HydroCAD Software Solutions LLC

Page 17

Summary for Pond 10.0P: Proposed Wet Pond

Inflow Area = 33.888 ac, 35.53% Impervious, Inflow Depth = 3.74" for 50-Year event
 Inflow = 103.4 cfs @ 12.26 hrs, Volume= 10.573 af
 Outflow = 42.9 cfs @ 12.65 hrs, Volume= 10.406 af, Atten= 59%, Lag= 23.8 min
 Primary = 19.5 cfs @ 12.65 hrs, Volume= 9.483 af
 Routed to Link POA-1 : Railroad Box Culvert
 Secondary = 23.4 cfs @ 12.65 hrs, Volume= 0.923 af
 Routed to Link POA-1 : Railroad Box Culvert

Routing by Dyn-Stor-Ind method, Time Span= 0.00-48.00 hrs, dt= 0.01 hrs
 Peak Elev= 90.31' @ 12.65 hrs Surf.Area= 30,702 sf Storage= 181,147 cf
 Flood Elev= 70.00' Storage= 0 cf

Plug-Flow detention time= 151.3 min calculated for 10.404 af (98% of inflow)
 Center-of-Mass det. time= 142.2 min (980.9 - 838.7)

Volume	Invert	Avail.Storage	Storage Description
#1	82.00'	218,128 cf	CPV (Prismatic) Listed below

Elevation (feet)	Surf.Area (sq-ft)	Voids (%)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
82.00	9,188	0.0	0	0
83.00	15,597	100.0	12,393	12,393
84.00	17,796	100.0	16,697	29,089
85.00	19,688	100.0	18,742	47,831
86.00	21,638	100.0	20,663	68,494
87.00	23,645	100.0	22,642	91,136
88.00	25,710	100.0	24,678	115,813
89.00	27,931	100.0	26,821	142,634
90.00	30,009	100.0	28,970	171,604
90.50	31,119	100.0	15,282	186,886
91.00	31,275	100.0	15,599	202,484
91.50	31,300	100.0	15,644	218,128

Device	Routing	Invert	Outlet Devices
#1	Primary	81.27'	30.0" Round Outlet L= 38.0' CPP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 81.27' / 81.10' S= 0.0045 '/' Cc= 0.900 n= 0.013 Corrugated PE, smooth interior, Flow Area= 4.91 sf
#2	Device 1	83.00'	12.0" Round Culvert L= 20.0' CPP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 83.00' / 82.40' S= 0.0300 '/' Cc= 0.900 n= 0.013, Flow Area= 0.79 sf
#3	Device 1	82.50'	2.410 in/hr Gravel Trench over Surface area above 82.50' Excluded Surface area = 12,393 sf
#4	Device 1	86.98'	2.0" W x 2.0" H 18.4° Catch Basin Grate X 6.00 columns X 6 rows with 1.5" cc spacing C= 0.600 Limited to weir flow at low heads
#5	Secondary	89.50'	10.0' long + 3.0 ' SideZ x 12.0' breadth Broad-Crested Rectangular Weir Head (feet) 0.20 0.40 0.60 0.80 1.00 1.20 1.40 1.60

240361 Proposed Conditions WP

Prepared by Sebago Technics

HydroCAD® 10.20-5c s/n 00643 © 2023 HydroCAD Software Solutions LLC

Type III 24-hr 50-Year Rainfall=6.90"

Printed 12/12/2024

Page 18

Coef. (English) 2.57 2.62 2.70 2.67 2.66 2.67 2.66 2.64

Primary OutFlow Max=19.5 cfs @ 12.65 hrs HW=90.31' TW=0.00' (Dynamic Tailwater)

- ↑ **1=Outlet** (Passes 19.5 cfs of 66.0 cfs potential flow)
- ↑ **2=Culvert** (Inlet Controls 9.9 cfs @ 12.57 fps)
- ↑ **3=Gravel Trench** (Exfiltration Controls 1.0 cfs)
- ↑ **4=Catch Basin Grate** (Orifice Controls 8.6 cfs @ 8.62 fps)

Secondary OutFlow Max=23.3 cfs @ 12.65 hrs HW=90.31' TW=0.00' (Dynamic Tailwater)

- ↑ **5=Broad-Crested Rectangular Weir** (Weir Controls 23.3 cfs @ 2.31 fps)

Summary for Link POA-1: Railroad Box Culvert

Inflow Area = 33.888 ac, 35.53% Impervious, Inflow Depth > 3.68" for 50-Year event
Inflow = 42.9 cfs @ 12.65 hrs, Volume= 10.406 af
Primary = 42.9 cfs @ 12.65 hrs, Volume= 10.406 af, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 0.00-48.00 hrs, dt= 0.01 hrs

240361 Proposed Conditions WP*Type III 24-hr 100-Year Rainfall=8.10"*

Prepared by Sebago Technics

Printed 12/12/2024

HydroCAD® 10.20-5c s/n 00643 © 2023 HydroCAD Software Solutions LLC

Page 19

Time span=0.00-48.00 hrs, dt=0.01 hrs, 4801 points

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN

Reach routing by Dyn-Stor-Ind method - Pond routing by Dyn-Stor-Ind method

Subcatchment10.0S: Deering Ridge Runoff Area=1,476,171 sf 35.53% Impervious Runoff Depth=4.78"
Flow Length=2,858' Tc=18.5 min CN=72 Runoff=132.2 cfs 13.505 af

Pond 10.0P: Proposed Wet Pond Peak Elev=90.91' Storage=199,660 cf Inflow=132.2 cfs 13.505 af
Primary=20.7 cfs 10.775 af Secondary=59.5 cfs 2.562 af Outflow=80.3 cfs 13.337 af

Link POA-1: Railroad Box Culvert Inflow=80.3 cfs 13.337 af
Primary=80.3 cfs 13.337 af

Total Runoff Area = 33.888 ac Runoff Volume = 13.505 af Average Runoff Depth = 4.78"
64.47% Pervious = 21.848 ac 35.53% Impervious = 12.041 ac

240361 Proposed Conditions WP

Type III 24-hr 100-Year Rainfall=8.10"

Prepared by Sebago Technics

Printed 12/12/2024

HydroCAD® 10.20-5c s/n 00643 © 2023 HydroCAD Software Solutions LLC

Page 20

Summary for Subcatchment 10.0S: Deering Ridge Subdivision

Runoff = 132.2 cfs @ 12.25 hrs, Volume= 13.505 af, Depth= 4.78"
 Routed to Pond 10.0P : Proposed Wet Pond

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-48.00 hrs, dt= 0.01 hrs
 Type III 24-hr 100-Year Rainfall=8.10"

	Area (sf)	CN	Description
*	238,133	98	Paved road and sidewalk
	25,415	39	>75% Grass cover, Good, HSG A
	9,249	74	>75% Grass cover, Good, HSG C
	57,965	80	>75% Grass cover, Good, HSG D
*	618,069	54	1/4 acre lots, 25% imp, HSG A
*	10,206	70	1/4 acre lots, 25% imp, HSG B
*	331,364	80	1/4 acre lots, 25% imp, HSG C
*	185,770	85	1/4 acre lots, 25% imp, HSG D
	1,476,171	72	Weighted Average
	951,686		64.47% Pervious Area
	524,485		35.53% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
8.7	119	0.0400	0.23		Sheet Flow, A to B Grass: Short n= 0.150 P2= 3.10"
0.4	97	0.0500	4.54		Shallow Concentrated Flow, B to C Paved Kv= 20.3 fps
3.6	368	0.0600	1.71		Shallow Concentrated Flow, C to D Short Grass Pasture Kv= 7.0 fps
0.6	378	0.0500	10.99	8.63	Pipe Channel, D to E 12.0" Round Area= 0.8 sf Perim= 3.1' r= 0.25' n= 0.012
0.3	200	0.0400	12.88	22.76	Pipe Channel, E to F 18.0" Round Area= 1.8 sf Perim= 4.7' r= 0.38' n= 0.012
2.1	610	0.0040	4.93	15.50	Pipe Channel, F to G 24.0" Round Area= 3.1 sf Perim= 6.3' r= 0.50' n= 0.012
2.5	986	0.0040	6.47	45.70	Pipe Channel, G to H 36.0" Round Area= 7.1 sf Perim= 9.4' r= 0.75' n= 0.012
0.3	100	0.0030	6.20	59.70	Pipe Channel, H to I 42.0" Round Area= 9.6 sf Perim= 11.0' r= 0.88' n= 0.012
18.5	2,858	Total			

240361 Proposed Conditions WP

Type III 24-hr 100-Year Rainfall=8.10"

Prepared by Sebago Technics

Printed 12/12/2024

HydroCAD® 10.20-5c s/n 00643 © 2023 HydroCAD Software Solutions LLC

Page 21

Summary for Pond 10.0P: Proposed Wet Pond

Inflow Area = 33.888 ac, 35.53% Impervious, Inflow Depth = 4.78" for 100-Year event
 Inflow = 132.2 cfs @ 12.25 hrs, Volume= 13.505 af
 Outflow = 80.3 cfs @ 12.51 hrs, Volume= 13.337 af, Atten= 39%, Lag= 15.7 min
 Primary = 20.7 cfs @ 12.51 hrs, Volume= 10.775 af
 Routed to Link POA-1 : Railroad Box Culvert
 Secondary = 59.5 cfs @ 12.51 hrs, Volume= 2.562 af
 Routed to Link POA-1 : Railroad Box Culvert

Routing by Dyn-Stor-Ind method, Time Span= 0.00-48.00 hrs, dt= 0.01 hrs
 Peak Elev= 90.91' @ 12.51 hrs Surf.Area= 31,247 sf Storage= 199,660 cf
 Flood Elev= 70.00' Storage= 0 cf

Plug-Flow detention time= 133.4 min calculated for 13.337 af (99% of inflow)
 Center-of-Mass det. time= 125.8 min (957.5 - 831.6)

Volume	Invert	Avail.Storage	Storage Description
#1	82.00'	218,128 cf	CPV (Prismatic) Listed below

Elevation (feet)	Surf.Area (sq-ft)	Voids (%)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
82.00	9,188	0.0	0	0
83.00	15,597	100.0	12,393	12,393
84.00	17,796	100.0	16,697	29,089
85.00	19,688	100.0	18,742	47,831
86.00	21,638	100.0	20,663	68,494
87.00	23,645	100.0	22,642	91,136
88.00	25,710	100.0	24,678	115,813
89.00	27,931	100.0	26,821	142,634
90.00	30,009	100.0	28,970	171,604
90.50	31,119	100.0	15,282	186,886
91.00	31,275	100.0	15,599	202,484
91.50	31,300	100.0	15,644	218,128

Device	Routing	Invert	Outlet Devices
#1	Primary	81.27'	30.0" Round Outlet L= 38.0' CPP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 81.27' / 81.10' S= 0.0045 '/' Cc= 0.900 n= 0.013 Corrugated PE, smooth interior, Flow Area= 4.91 sf
#2	Device 1	83.00'	12.0" Round Culvert L= 20.0' CPP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 83.00' / 82.40' S= 0.0300 '/' Cc= 0.900 n= 0.013, Flow Area= 0.79 sf
#3	Device 1	82.50'	2.410 in/hr Gravel Trench over Surface area above 82.50' Excluded Surface area = 12,393 sf
#4	Device 1	86.98'	2.0" W x 2.0" H 18.4° Catch Basin Grate X 6.00 columns X 6 rows with 1.5" cc spacing C= 0.600 Limited to weir flow at low heads
#5	Secondary	89.50'	10.0' long + 3.0 '/' SideZ x 12.0' breadth Broad-Crested Rectangular Weir Head (feet) 0.20 0.40 0.60 0.80 1.00 1.20 1.40 1.60

240361 Proposed Conditions WP

Prepared by Sebago Technics

HydroCAD® 10.20-5c s/n 00643 © 2023 HydroCAD Software Solutions LLC

Type III 24-hr 100-Year Rainfall=8.10"

Printed 12/12/2024

Page 22

Coef. (English) 2.57 2.62 2.70 2.67 2.66 2.67 2.66 2.64

Primary OutFlow Max=20.7 cfs @ 12.51 hrs HW=90.91' TW=0.00' (Dynamic Tailwater)

- ↑ **1=Outlet** (Passes 20.7 cfs of 68.5 cfs potential flow)
- ↑ **2=Culvert** (Inlet Controls 10.3 cfs @ 13.11 fps)
- ↑ **3=Gravel Trench** (Exfiltration Controls 1.1 cfs)
- ↑ **4=Catch Basin Grate** (Orifice Controls 9.4 cfs @ 9.39 fps)

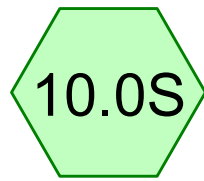
Secondary OutFlow Max=59.5 cfs @ 12.51 hrs HW=90.91' TW=0.00' (Dynamic Tailwater)

- ↑ **5=Broad-Crested Rectangular Weir** (Weir Controls 59.5 cfs @ 2.97 fps)

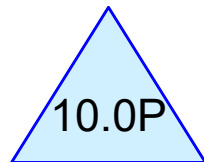
Summary for Link POA-1: Railroad Box Culvert

Inflow Area = 33.888 ac, 35.53% Impervious, Inflow Depth > 4.72" for 100-Year event
Inflow = 80.3 cfs @ 12.51 hrs, Volume= 13.337 af
Primary = 80.3 cfs @ 12.51 hrs, Volume= 13.337 af, Atten= 0%, Lag= 0.0 min

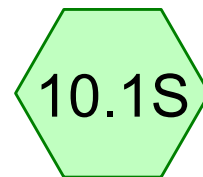
Primary outflow = Inflow, Time Span= 0.00-48.00 hrs, dt= 0.01 hrs



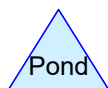
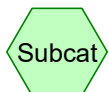
Deering Ridge
Subdivision



Proposed Gravel
Wetland



Railroad Box Culvert



Routing Diagram for 240361 Proposed Conditions

Prepared by Sebago Technics, Printed 1/20/2026

HydroCAD® 10.20-5c s/n 00643 © 2023 HydroCAD Software Solutions LLC

240361 Proposed Conditions

Prepared by Sebago Technics

Printed 1/20/2026

HydroCAD® 10.20-5c s/n 00643 © 2023 HydroCAD Software Solutions LLC

Page 2

Area Listing (all nodes)

Area (acres)	CN	Description (subcatchment-numbers)
38.580	77	General Area (10.0S, 10.1S)
38.580	77	TOTAL AREA

240361 Proposed Conditions*Type III 24-hr 2-Year Rainfall=3.10"*

Prepared by Sebago Technics

Printed 1/20/2026

HydroCAD® 10.20-5c s/n 00643 © 2023 HydroCAD Software Solutions LLC

Page 3

Time span=0.00-60.00 hrs, dt=0.01 hrs, 6001 points
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN
Reach routing by Dyn-Stor-Ind method - Pond routing by Dyn-Stor-Ind method

Subcatchment10.0S: Deering Ridge Runoff Area=1,476,171 sf 0.00% Impervious Runoff Depth=1.14"
Tc=12.6 min CN=77 Runoff=35.3 cfs 3.222 af

Subcatchment10.1S: Runoff Area=204,370 sf 0.00% Impervious Runoff Depth=1.14"
Tc=12.6 min CN=77 Runoff=4.9 cfs 0.446 af

Pond 10.0P: Proposed Gravel Wetland Peak Elev=84.72' Storage=53,804 cf Inflow=35.3 cfs 3.222 af
Primary=8.5 cfs 3.222 af Secondary=0.0 cfs 0.000 af Outflow=8.5 cfs 3.222 af

Link POA-1: Railroad Box Culvert Inflow=10.3 cfs 3.668 af
Primary=10.3 cfs 3.668 af

Total Runoff Area = 38.580 ac Runoff Volume = 3.668 af Average Runoff Depth = 1.14"
100.00% Pervious = 38.580 ac 0.00% Impervious = 0.000 ac

240361 Proposed Conditions

Prepared by Sebago Technics

HydroCAD® 10.20-5c s/n 00643 © 2023 HydroCAD Software Solutions LLC

Type III 24-hr 2-Year Rainfall=3.10"

Printed 1/20/2026

Page 4

Summary for Subcatchment 10.0S: Deering Ridge Subdivision

Runoff = 35.3 cfs @ 12.18 hrs, Volume= 3.222 af, Depth= 1.14"
 Routed to Pond 10.0P : Proposed Gravel Wetland

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-60.00 hrs, dt= 0.01 hrs
 Type III 24-hr 2-Year Rainfall=3.10"

	Area (sf)	CN	Description
*	1,476,171	77	General Area
	1,476,171		100.00% Pervious Area

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

Summary for Subcatchment 10.1S:

Runoff = 4.9 cfs @ 12.18 hrs, Volume= 0.446 af, Depth= 1.14"
 Routed to Link POA-1 : Railroad Box Culvert

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-60.00 hrs, dt= 0.01 hrs
 Type III 24-hr 2-Year Rainfall=3.10"

	Area (sf)	CN	Description
*	204,370	77	General Area
	204,370		100.00% Pervious Area

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

Summary for Pond 10.0P: Proposed Gravel Wetland

Inflow Area = 33.888 ac, 0.00% Impervious, Inflow Depth = 1.14" for 2-Year event
 Inflow = 35.3 cfs @ 12.18 hrs, Volume= 3.222 af
 Outflow = 8.5 cfs @ 12.71 hrs, Volume= 3.222 af, Atten= 76%, Lag= 31.5 min
 Primary = 8.5 cfs @ 12.71 hrs, Volume= 3.222 af
 Routed to Link POA-1 : Railroad Box Culvert
 Secondary = 0.0 cfs @ 0.00 hrs, Volume= 0.000 af
 Routed to Link POA-1 : Railroad Box Culvert

Routing by Dyn-Stor-Ind method, Time Span= 0.00-60.00 hrs, dt= 0.01 hrs
 Peak Elev= 84.72' @ 12.71 hrs Surf.Area= 21,529 sf Storage= 53,804 cf
 Flood Elev= 90.50' Surf.Area= 35,465 sf Storage= 208,406 cf

Plug-Flow detention time= 325.7 min calculated for 3.221 af (100% of inflow)
 Center-of-Mass det. time= 325.9 min (1,186.2 - 860.3)

240361 Proposed Conditions

Type III 24-hr 2-Year Rainfall=3.10"

Prepared by Sebago Technics

Printed 1/20/2026

HydroCAD® 10.20-5c s/n 00643 © 2023 HydroCAD Software Solutions LLC

Page 5

Volume	Invert	Avail.Storage	Storage Description
#1	82.00'	593 cf	Forebay (Prismatic) Listed below (Recalc)
#2	81.60'	242,463 cf	Treatment Cell (Prismatic) Listed below (Recalc)
		243,056 cf	Total Available Storage

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
82.00	365	0	0
82.50	595	240	240
83.00	815	353	593

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
81.60	13,740	0	0
82.00	14,450	5,638	5,638
83.00	16,250	15,350	20,988
84.00	19,310	17,780	38,768
85.00	21,255	20,283	59,051
86.00	23,255	22,255	81,306
87.00	25,315	24,285	105,591
88.00	27,430	26,373	131,963
89.00	29,600	28,515	160,478
90.00	31,830	30,715	191,193
90.50	34,650	16,620	207,813
91.00	34,650	17,325	225,138
91.50	34,650	17,325	242,463

Device	Routing	Invert	Outlet Devices
#1	Primary	81.27'	30.0" Round Culvert L= 38.0' CPP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 81.27' / 81.10' S= 0.0045 '/' Cc= 0.900 n= 0.013, Flow Area= 4.91 sf
#2	Device 1	81.27'	3.5" Vert. WQV Orifice C= 0.600 Limited to weir flow at low heads
#3	Device 1	83.40'	30.0" W x 8.0" H Vert. Orifice C= 0.600 Limited to weir flow at low heads
#4	Device 1	88.45'	6.0' long Sharp-Crested Rectangular Weir 2 End Contraction(s)
#5	Secondary	89.60'	20.0' long + 3.0 ' SideZ x 10.0' breadth Emergency Spillway 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

Primary OutFlow Max=8.5 cfs @ 12.71 hrs HW=84.72' TW=0.00' (Dynamic Tailwater)

- 1=Culvert (Passes 8.5 cfs of 30.7 cfs potential flow)
 2=WQV Orifice (Orifice Controls 0.6 cfs @ 8.75 fps)
 3=Orifice (Orifice Controls 7.9 cfs @ 4.76 fps)
 4=Sharp-Crested Rectangular Weir(Controls 0.0 cfs)

Secondary OutFlow Max=0.0 cfs @ 0.00 hrs HW=81.60' TW=0.00' (Dynamic Tailwater)

- 5=Emergency Spillway (Controls 0.0 cfs)

240361 Proposed Conditions*Type III 24-hr 2-Year Rainfall=3.10"*

Prepared by Sebago Technics

Printed 1/20/2026

HydroCAD® 10.20-5c s/n 00643 © 2023 HydroCAD Software Solutions LLC

Page 6

Summary for Link POA-1: Railroad Box Culvert

Inflow Area = 38.580 ac, 0.00% Impervious, Inflow Depth = 1.14" for 2-Year event
Inflow = 10.3 cfs @ 12.51 hrs, Volume= 3.668 af
Primary = 10.3 cfs @ 12.51 hrs, Volume= 3.668 af, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 0.00-60.00 hrs, dt= 0.01 hrs

240361 Proposed Conditions

Type III 24-hr 10-Year Rainfall=4.60"

Prepared by Sebago Technics

Printed 1/20/2026

HydroCAD® 10.20-5c s/n 00643 © 2023 HydroCAD Software Solutions LLC

Page 7

Time span=0.00-60.00 hrs, dt=0.01 hrs, 6001 points
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN
Reach routing by Dyn-Stor-Ind method - Pond routing by Dyn-Stor-Ind method

Subcatchment10.0S: Deering Ridge Runoff Area=1,476,171 sf 0.00% Impervious Runoff Depth=2.29"
Tc=12.6 min CN=77 Runoff=73.3 cfs 6.473 af

Subcatchment10.1S: Runoff Area=204,370 sf 0.00% Impervious Runoff Depth=2.29"
Tc=12.6 min CN=77 Runoff=10.1 cfs 0.896 af

Pond 10.0P: Proposed Gravel Wetland Peak Elev=87.37' Storage=115,735 cf Inflow=73.3 cfs 6.473 af
Primary=16.1 cfs 6.473 af Secondary=0.0 cfs 0.000 af Outflow=16.1 cfs 6.473 af

Link POA-1: Railroad Box Culvert Inflow=21.7 cfs 7.369 af
Primary=21.7 cfs 7.369 af

Total Runoff Area = 38.580 ac Runoff Volume = 7.369 af Average Runoff Depth = 2.29"
100.00% Pervious = 38.580 ac 0.00% Impervious = 0.000 ac

240361 Proposed Conditions

Prepared by Sebago Technics

HydroCAD® 10.20-5c s/n 00643 © 2023 HydroCAD Software Solutions LLC

Type III 24-hr 10-Year Rainfall=4.60"

Printed 1/20/2026

Page 8

Summary for Subcatchment 10.0S: Deering Ridge Subdivision

Runoff = 73.3 cfs @ 12.17 hrs, Volume= 6.473 af, Depth= 2.29"
 Routed to Pond 10.0P : Proposed Gravel Wetland

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-60.00 hrs, dt= 0.01 hrs
 Type III 24-hr 10-Year Rainfall=4.60"

Area (sf)	CN	Description
* 1,476,171	77	General Area
1,476,171		100.00% Pervious Area

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

Summary for Subcatchment 10.1S:

Runoff = 10.1 cfs @ 12.17 hrs, Volume= 0.896 af, Depth= 2.29"
 Routed to Link POA-1 : Railroad Box Culvert

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-60.00 hrs, dt= 0.01 hrs
 Type III 24-hr 10-Year Rainfall=4.60"

Area (sf)	CN	Description
* 204,370	77	General Area
204,370		100.00% Pervious Area

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

Summary for Pond 10.0P: Proposed Gravel Wetland

Inflow Area = 33.888 ac, 0.00% Impervious, Inflow Depth = 2.29" for 10-Year event
 Inflow = 73.3 cfs @ 12.17 hrs, Volume= 6.473 af
 Outflow = 16.1 cfs @ 12.70 hrs, Volume= 6.473 af, Atten= 78%, Lag= 31.8 min
 Primary = 16.1 cfs @ 12.70 hrs, Volume= 6.473 af
 Routed to Link POA-1 : Railroad Box Culvert
 Secondary = 0.0 cfs @ 0.00 hrs, Volume= 0.000 af
 Routed to Link POA-1 : Railroad Box Culvert

Routing by Dyn-Stor-Ind method, Time Span= 0.00-60.00 hrs, dt= 0.01 hrs
 Peak Elev= 87.37' @ 12.70 hrs Surf.Area= 26,916 sf Storage= 115,735 cf
 Flood Elev= 90.50' Surf.Area= 35,465 sf Storage= 208,406 cf

Plug-Flow detention time= 208.8 min calculated for 6.472 af (100% of inflow)
 Center-of-Mass det. time= 209.1 min (1,048.8 - 839.7)

240361 Proposed Conditions

Type III 24-hr 10-Year Rainfall=4.60"

Prepared by Sebago Technics

Printed 1/20/2026

HydroCAD® 10.20-5c s/n 00643 © 2023 HydroCAD Software Solutions LLC

Page 9

Volume	Invert	Avail.Storage	Storage Description
#1	82.00'	593 cf	Forebay (Prismatic) Listed below (Recalc)
#2	81.60'	242,463 cf	Treatment Cell (Prismatic) Listed below (Recalc)
		243,056 cf	Total Available Storage

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
82.00	365	0	0
82.50	595	240	240
83.00	815	353	593

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
81.60	13,740	0	0
82.00	14,450	5,638	5,638
83.00	16,250	15,350	20,988
84.00	19,310	17,780	38,768
85.00	21,255	20,283	59,051
86.00	23,255	22,255	81,306
87.00	25,315	24,285	105,591
88.00	27,430	26,373	131,963
89.00	29,600	28,515	160,478
90.00	31,830	30,715	191,193
90.50	34,650	16,620	207,813
91.00	34,650	17,325	225,138
91.50	34,650	17,325	242,463

Device	Routing	Invert	Outlet Devices
#1	Primary	81.27'	30.0" Round Culvert L= 38.0' CPP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 81.27' / 81.10' S= 0.0045 '/' Cc= 0.900 n= 0.013, Flow Area= 4.91 sf
#2	Device 1	81.27'	3.5" Vert. WQV Orifice C= 0.600 Limited to weir flow at low heads
#3	Device 1	83.40'	30.0" W x 8.0" H Vert. Orifice C= 0.600 Limited to weir flow at low heads
#4	Device 1	88.45'	6.0' long Sharp-Crested Rectangular Weir 2 End Contraction(s)
#5	Secondary	89.60'	20.0' long + 3.0 ' SideZ x 10.0' breadth Emergency Spillway 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

Primary OutFlow Max=16.1 cfs @ 12.70 hrs HW=87.37' TW=0.00' (Dynamic Tailwater)

- 1=Culvert (Passes 16.1 cfs of 52.1 cfs potential flow)
- 2=WQV Orifice (Orifice Controls 0.8 cfs @ 11.75 fps)
- 3=Orifice (Orifice Controls 15.3 cfs @ 9.18 fps)
- 4=Sharp-Crested Rectangular Weir(Controls 0.0 cfs)

Secondary OutFlow Max=0.0 cfs @ 0.00 hrs HW=81.60' TW=0.00' (Dynamic Tailwater)

- 5=Emergency Spillway (Controls 0.0 cfs)

240361 Proposed Conditions*Type III 24-hr 10-Year Rainfall=4.60"*

Prepared by Sebago Technics

Printed 1/20/2026

HydroCAD® 10.20-5c s/n 00643 © 2023 HydroCAD Software Solutions LLC

Page 10

Summary for Link POA-1: Railroad Box Culvert

Inflow Area = 38.580 ac, 0.00% Impervious, Inflow Depth = 2.29" for 10-Year event
Inflow = 21.7 cfs @ 12.23 hrs, Volume= 7.369 af
Primary = 21.7 cfs @ 12.23 hrs, Volume= 7.369 af, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 0.00-60.00 hrs, dt= 0.01 hrs

240361 Proposed Conditions

Type III 24-hr 25-Year Rainfall=5.80"

Prepared by Sebago Technics

Printed 1/20/2026

HydroCAD® 10.20-5c s/n 00643 © 2023 HydroCAD Software Solutions LLC

Page 11

Time span=0.00-60.00 hrs, dt=0.01 hrs, 6001 points
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN
Reach routing by Dyn-Stor-Ind method - Pond routing by Dyn-Stor-Ind method

Subcatchment10.0S: Deering Ridge Runoff Area=1,476,171 sf 0.00% Impervious Runoff Depth=3.31"
Tc=12.6 min CN=77 Runoff=106.1 cfs 9.334 af

Subcatchment10.1S: Runoff Area=204,370 sf 0.00% Impervious Runoff Depth=3.31"
Tc=12.6 min CN=77 Runoff=14.7 cfs 1.292 af

Pond 10.0P: Proposed Gravel Wetland Peak Elev=89.18' Storage=166,419 cf Inflow=106.1 cfs 9.334 af
Primary=31.5 cfs 9.334 af Secondary=0.0 cfs 0.000 af Outflow=31.5 cfs 9.334 af

Link POA-1: Railroad Box Culvert Inflow=36.3 cfs 10.626 af
Primary=36.3 cfs 10.626 af

Total Runoff Area = 38.580 ac Runoff Volume = 10.626 af Average Runoff Depth = 3.31"
100.00% Pervious = 38.580 ac 0.00% Impervious = 0.000 ac

240361 Proposed Conditions

Type III 24-hr 25-Year Rainfall=5.80"

Prepared by Sebago Technics

Printed 1/20/2026

HydroCAD® 10.20-5c s/n 00643 © 2023 HydroCAD Software Solutions LLC

Page 12

Summary for Subcatchment 10.0S: Deering Ridge Subdivision

Runoff = 106.1 cfs @ 12.17 hrs, Volume= 9.334 af, Depth= 3.31"
 Routed to Pond 10.0P : Proposed Gravel Wetland

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-60.00 hrs, dt= 0.01 hrs
 Type III 24-hr 25-Year Rainfall=5.80"

Area (sf)	CN	Description
* 1,476,171	77	General Area
1,476,171		100.00% Pervious Area

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

Summary for Subcatchment 10.1S:

Runoff = 14.7 cfs @ 12.17 hrs, Volume= 1.292 af, Depth= 3.31"
 Routed to Link POA-1 : Railroad Box Culvert

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-60.00 hrs, dt= 0.01 hrs
 Type III 24-hr 25-Year Rainfall=5.80"

Area (sf)	CN	Description
* 204,370	77	General Area
204,370		100.00% Pervious Area

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

Summary for Pond 10.0P: Proposed Gravel Wetland

Inflow Area = 33.888 ac, 0.00% Impervious, Inflow Depth = 3.31" for 25-Year event
 Inflow = 106.1 cfs @ 12.17 hrs, Volume= 9.334 af
 Outflow = 31.5 cfs @ 12.60 hrs, Volume= 9.334 af, Atten= 70%, Lag= 25.8 min
 Primary = 31.5 cfs @ 12.60 hrs, Volume= 9.334 af
 Routed to Link POA-1 : Railroad Box Culvert
 Secondary = 0.0 cfs @ 0.00 hrs, Volume= 0.000 af
 Routed to Link POA-1 : Railroad Box Culvert

Routing by Dyn-Stor-Ind method, Time Span= 0.00-60.00 hrs, dt= 0.01 hrs
 Peak Elev= 89.18' @ 12.60 hrs Surf.Area= 30,815 sf Storage= 166,419 cf
 Flood Elev= 90.50' Surf.Area= 35,465 sf Storage= 208,406 cf

Plug-Flow detention time= 177.1 min calculated for 9.332 af (100% of inflow)
 Center-of-Mass det. time= 177.3 min (1,006.5 - 829.2)

240361 Proposed Conditions

Type III 24-hr 25-Year Rainfall=5.80"

Prepared by Sebago Technics

Printed 1/20/2026

HydroCAD® 10.20-5c s/n 00643 © 2023 HydroCAD Software Solutions LLC

Page 13

Volume	Invert	Avail.Storage	Storage Description
#1	82.00'	593 cf	Forebay (Prismatic) Listed below (Recalc)
#2	81.60'	242,463 cf	Treatment Cell (Prismatic) Listed below (Recalc)
		243,056 cf	Total Available Storage

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
82.00	365	0	0
82.50	595	240	240
83.00	815	353	593

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
81.60	13,740	0	0
82.00	14,450	5,638	5,638
83.00	16,250	15,350	20,988
84.00	19,310	17,780	38,768
85.00	21,255	20,283	59,051
86.00	23,255	22,255	81,306
87.00	25,315	24,285	105,591
88.00	27,430	26,373	131,963
89.00	29,600	28,515	160,478
90.00	31,830	30,715	191,193
90.50	34,650	16,620	207,813
91.00	34,650	17,325	225,138
91.50	34,650	17,325	242,463

Device	Routing	Invert	Outlet Devices
#1	Primary	81.27'	30.0" Round Culvert L= 38.0' CPP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 81.27' / 81.10' S= 0.0045 '/' Cc= 0.900 n= 0.013, Flow Area= 4.91 sf
#2	Device 1	81.27'	3.5" Vert. WQV Orifice C= 0.600 Limited to weir flow at low heads
#3	Device 1	83.40'	30.0" W x 8.0" H Vert. Orifice C= 0.600 Limited to weir flow at low heads
#4	Device 1	88.45'	6.0' long Sharp-Crested Rectangular Weir 2 End Contraction(s)
#5	Secondary	89.60'	20.0' long + 3.0 ' SideZ x 10.0' breadth Emergency Spillway 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

Primary OutFlow Max=31.5 cfs @ 12.60 hrs HW=89.18' TW=0.00' (Dynamic Tailwater)

- 1=Culvert (Passes 31.5 cfs of 61.0 cfs potential flow)
 2=WQV Orifice (Orifice Controls 0.9 cfs @ 13.42 fps)
 3=Orifice (Orifice Controls 18.7 cfs @ 11.23 fps)
 4=Sharp-Crested Rectangular Weir (Weir Controls 11.9 cfs @ 2.79 fps)

Secondary OutFlow Max=0.0 cfs @ 0.00 hrs HW=81.60' TW=0.00' (Dynamic Tailwater)

- 5=Emergency Spillway (Controls 0.0 cfs)

240361 Proposed Conditions*Type III 24-hr 25-Year Rainfall=5.80"*

Prepared by Sebago Technics

Printed 1/20/2026

HydroCAD® 10.20-5c s/n 00643 © 2023 HydroCAD Software Solutions LLC

Page 14

Summary for Link POA-1: Railroad Box Culvert

Inflow Area = 38.580 ac, 0.00% Impervious, Inflow Depth = 3.31" for 25-Year event
Inflow = 36.3 cfs @ 12.56 hrs, Volume= 10.626 af
Primary = 36.3 cfs @ 12.56 hrs, Volume= 10.626 af, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 0.00-60.00 hrs, dt= 0.01 hrs

240361 Proposed Conditions

Type III 24-hr 50-Year Rainfall=6.90"

Prepared by Sebago Technics

Printed 1/20/2026

HydroCAD® 10.20-5c s/n 00643 © 2023 HydroCAD Software Solutions LLC

Page 15

Time span=0.00-60.00 hrs, dt=0.01 hrs, 6001 points
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN
Reach routing by Dyn-Stor-Ind method - Pond routing by Dyn-Stor-Ind method

Subcatchment10.0S: Deering Ridge Runoff Area=1,476,171 sf 0.00% Impervious Runoff Depth=4.28"
Tc=12.6 min CN=77 Runoff=137.0 cfs 12.076 af

Subcatchment10.1S: Runoff Area=204,370 sf 0.00% Impervious Runoff Depth=4.28"
Tc=12.6 min CN=77 Runoff=19.0 cfs 1.672 af

Pond 10.0P: Proposed Gravel Wetland Peak Elev=89.95' Storage=190,048 cf Inflow=137.0 cfs 12.076 af
Primary=55.0 cfs 11.881 af Secondary=10.7 cfs 0.195 af Outflow=65.8 cfs 12.076 af

Link POA-1: Railroad Box Culvert Inflow=75.0 cfs 13.747 af
Primary=75.0 cfs 13.747 af

Total Runoff Area = 38.580 ac Runoff Volume = 13.747 af Average Runoff Depth = 4.28"
100.00% Pervious = 38.580 ac 0.00% Impervious = 0.000 ac

240361 Proposed Conditions

Type III 24-hr 50-Year Rainfall=6.90"

Prepared by Sebago Technics

Printed 1/20/2026

HydroCAD® 10.20-5c s/n 00643 © 2023 HydroCAD Software Solutions LLC

Page 16

Summary for Subcatchment 10.0S: Deering Ridge Subdivision

Runoff = 137.0 cfs @ 12.17 hrs, Volume= 12.076 af, Depth= 4.28"
 Routed to Pond 10.0P : Proposed Gravel Wetland

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-60.00 hrs, dt= 0.01 hrs
 Type III 24-hr 50-Year Rainfall=6.90"

Area (sf)	CN	Description
* 1,476,171	77	General Area
1,476,171		100.00% Pervious Area

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

Summary for Subcatchment 10.1S:

Runoff = 19.0 cfs @ 12.17 hrs, Volume= 1.672 af, Depth= 4.28"
 Routed to Link POA-1 : Railroad Box Culvert

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-60.00 hrs, dt= 0.01 hrs
 Type III 24-hr 50-Year Rainfall=6.90"

Area (sf)	CN	Description
* 204,370	77	General Area
204,370		100.00% Pervious Area

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

Summary for Pond 10.0P: Proposed Gravel Wetland

Inflow Area = 33.888 ac, 0.00% Impervious, Inflow Depth = 4.28" for 50-Year event
 Inflow = 137.0 cfs @ 12.17 hrs, Volume= 12.076 af
 Outflow = 65.8 cfs @ 12.45 hrs, Volume= 12.076 af, Atten= 52%, Lag= 16.8 min
 Primary = 55.0 cfs @ 12.45 hrs, Volume= 11.881 af
 Routed to Link POA-1 : Railroad Box Culvert
 Secondary = 10.7 cfs @ 12.45 hrs, Volume= 0.195 af
 Routed to Link POA-1 : Railroad Box Culvert

Routing by Dyn-Stor-Ind method, Time Span= 0.00-60.00 hrs, dt= 0.01 hrs
 Peak Elev= 89.95' @ 12.45 hrs Surf.Area= 32,523 sf Storage= 190,048 cf
 Flood Elev= 90.50' Surf.Area= 35,465 sf Storage= 208,406 cf

Plug-Flow detention time= 150.5 min calculated for 12.074 af (100% of inflow)
 Center-of-Mass det. time= 150.8 min (972.6 - 821.8)

240361 Proposed Conditions

Type III 24-hr 50-Year Rainfall=6.90"

Prepared by Sebago Technics

Printed 1/20/2026

HydroCAD® 10.20-5c s/n 00643 © 2023 HydroCAD Software Solutions LLC

Page 17

Volume	Invert	Avail.Storage	Storage Description
#1	82.00'	593 cf	Forebay (Prismatic) Listed below (Recalc)
#2	81.60'	242,463 cf	Treatment Cell (Prismatic) Listed below (Recalc)
		243,056 cf	Total Available Storage

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
82.00	365	0	0
82.50	595	240	240
83.00	815	353	593

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
81.60	13,740	0	0
82.00	14,450	5,638	5,638
83.00	16,250	15,350	20,988
84.00	19,310	17,780	38,768
85.00	21,255	20,283	59,051
86.00	23,255	22,255	81,306
87.00	25,315	24,285	105,591
88.00	27,430	26,373	131,963
89.00	29,600	28,515	160,478
90.00	31,830	30,715	191,193
90.50	34,650	16,620	207,813
91.00	34,650	17,325	225,138
91.50	34,650	17,325	242,463

Device	Routing	Invert	Outlet Devices
#1	Primary	81.27'	30.0" Round Culvert L= 38.0' CPP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 81.27' / 81.10' S= 0.0045 '/' Cc= 0.900 n= 0.013, Flow Area= 4.91 sf
#2	Device 1	81.27'	3.5" Vert. WQV Orifice C= 0.600 Limited to weir flow at low heads
#3	Device 1	83.40'	30.0" W x 8.0" H Vert. Orifice C= 0.600 Limited to weir flow at low heads
#4	Device 1	88.45'	6.0' long Sharp-Crested Rectangular Weir 2 End Contraction(s)
#5	Secondary	89.60'	20.0' long + 3.0 ' SideZ x 10.0' breadth Emergency Spillway 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

Primary OutFlow Max=55.0 cfs @ 12.45 hrs HW=89.95' TW=0.00' (Dynamic Tailwater)

- 1=Culvert (Passes 55.0 cfs of 64.4 cfs potential flow)
- 2=WQV Orifice (Orifice Controls 0.9 cfs @ 14.06 fps)
- 3=Orifice (Orifice Controls 20.0 cfs @ 12.00 fps)
- 4=Sharp-Crested Rectangular Weir (Weir Controls 34.1 cfs @ 4.00 fps)

Secondary OutFlow Max=10.7 cfs @ 12.45 hrs HW=89.95' TW=0.00' (Dynamic Tailwater)

- 5=Emergency Spillway (Weir Controls 10.7 cfs @ 1.48 fps)

240361 Proposed Conditions*Type III 24-hr 50-Year Rainfall=6.90"*

Prepared by Sebago Technics

Printed 1/20/2026

HydroCAD® 10.20-5c s/n 00643 © 2023 HydroCAD Software Solutions LLC

Page 18

Summary for Link POA-1: Railroad Box Culvert

Inflow Area = 38.580 ac, 0.00% Impervious, Inflow Depth = 4.28" for 50-Year event
Inflow = 75.0 cfs @ 12.44 hrs, Volume= 13.747 af
Primary = 75.0 cfs @ 12.44 hrs, Volume= 13.747 af, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 0.00-60.00 hrs, dt= 0.01 hrs

240361 Proposed Conditions*Type III 24-hr 100-Year Rainfall=8.10"*

Prepared by Sebago Technics

Printed 1/20/2026

HydroCAD® 10.20-5c s/n 00643 © 2023 HydroCAD Software Solutions LLC

Page 19

Time span=0.00-60.00 hrs, dt=0.01 hrs, 6001 points
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN
Reach routing by Dyn-Stor-Ind method - Pond routing by Dyn-Stor-Ind method

Subcatchment10.0S: Deering Ridge

Runoff Area=1,476,171 sf 0.00% Impervious Runoff Depth=5.37"
Tc=12.6 min CN=77 Runoff=171.2 cfs 15.154 af

Subcatchment10.1S:

Runoff Area=204,370 sf 0.00% Impervious Runoff Depth=5.37"
Tc=12.6 min CN=77 Runoff=23.7 cfs 2.098 af

Pond 10.0P: Proposed Gravel Wetland

Peak Elev=90.41' Storage=205,163 cf Inflow=171.2 cfs 15.154 af
Primary=66.4 cfs 14.131 af Secondary=42.7 cfs 1.024 af Outflow=109.0 cfs 15.154 af

Link POA-1: Railroad Box Culvert

Inflow=124.4 cfs 17.252 af
Primary=124.4 cfs 17.252 af

Total Runoff Area = 38.580 ac Runoff Volume = 17.252 af Average Runoff Depth = 5.37"
100.00% Pervious = 38.580 ac 0.00% Impervious = 0.000 ac

240361 Proposed Conditions

Type III 24-hr 100-Year Rainfall=8.10"

Prepared by Sebago Technics

Printed 1/20/2026

HydroCAD® 10.20-5c s/n 00643 © 2023 HydroCAD Software Solutions LLC

Page 20

Summary for Subcatchment 10.0S: Deering Ridge Subdivision

Runoff = 171.2 cfs @ 12.17 hrs, Volume= 15.154 af, Depth= 5.37"
 Routed to Pond 10.0P : Proposed Gravel Wetland

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-60.00 hrs, dt= 0.01 hrs
 Type III 24-hr 100-Year Rainfall=8.10"

Area (sf)	CN	Description
* 1,476,171	77	General Area
1,476,171		100.00% Pervious Area

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

Summary for Subcatchment 10.1S:

Runoff = 23.7 cfs @ 12.17 hrs, Volume= 2.098 af, Depth= 5.37"
 Routed to Link POA-1 : Railroad Box Culvert

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-60.00 hrs, dt= 0.01 hrs
 Type III 24-hr 100-Year Rainfall=8.10"

Area (sf)	CN	Description
* 204,370	77	General Area
204,370		100.00% Pervious Area

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

Summary for Pond 10.0P: Proposed Gravel Wetland

Inflow Area = 33.888 ac, 0.00% Impervious, Inflow Depth = 5.37" for 100-Year event
 Inflow = 171.2 cfs @ 12.17 hrs, Volume= 15.154 af
 Outflow = 109.0 cfs @ 12.34 hrs, Volume= 15.154 af, Atten= 36%, Lag= 10.4 min
 Primary = 66.4 cfs @ 12.34 hrs, Volume= 14.131 af
 Routed to Link POA-1 : Railroad Box Culvert
 Secondary = 42.7 cfs @ 12.34 hrs, Volume= 1.024 af
 Routed to Link POA-1 : Railroad Box Culvert

Routing by Dyn-Stor-Ind method, Time Span= 0.00-60.00 hrs, dt= 0.01 hrs
 Peak Elev= 90.41' @ 12.34 hrs Surf.Area= 34,933 sf Storage= 205,163 cf
 Flood Elev= 90.50' Surf.Area= 35,465 sf Storage= 208,406 cf

Plug-Flow detention time= 130.2 min calculated for 15.152 af (100% of inflow)
 Center-of-Mass det. time= 130.5 min (945.9 - 815.4)

240361 Proposed Conditions

Type III 24-hr 100-Year Rainfall=8.10"

Prepared by Sebago Technics

Printed 1/20/2026

HydroCAD® 10.20-5c s/n 00643 © 2023 HydroCAD Software Solutions LLC

Page 21

Volume	Invert	Avail.Storage	Storage Description
#1	82.00'	593 cf	Forebay (Prismatic) Listed below (Recalc)
#2	81.60'	242,463 cf	Treatment Cell (Prismatic) Listed below (Recalc)
		243,056 cf	Total Available Storage

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
82.00	365	0	0
82.50	595	240	240
83.00	815	353	593

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
81.60	13,740	0	0
82.00	14,450	5,638	5,638
83.00	16,250	15,350	20,988
84.00	19,310	17,780	38,768
85.00	21,255	20,283	59,051
86.00	23,255	22,255	81,306
87.00	25,315	24,285	105,591
88.00	27,430	26,373	131,963
89.00	29,600	28,515	160,478
90.00	31,830	30,715	191,193
90.50	34,650	16,620	207,813
91.00	34,650	17,325	225,138
91.50	34,650	17,325	242,463

Device	Routing	Invert	Outlet Devices
#1	Primary	81.27'	30.0" Round Culvert L= 38.0' CPP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 81.27' / 81.10' S= 0.0045 '/' Cc= 0.900 n= 0.013, Flow Area= 4.91 sf
#2	Device 1	81.27'	3.5" Vert. WQV Orifice C= 0.600 Limited to weir flow at low heads
#3	Device 1	83.40'	30.0" W x 8.0" H Vert. Orifice C= 0.600 Limited to weir flow at low heads
#4	Device 1	88.45'	6.0' long Sharp-Crested Rectangular Weir 2 End Contraction(s)
#5	Secondary	89.60'	20.0' long + 3.0 '/' SideZ x 10.0' breadth Emergency Spillway 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

Primary OutFlow Max=66.4 cfs @ 12.34 hrs HW=90.41' TW=0.00' (Dynamic Tailwater)

- 1=Culvert (Inlet Controls 66.4 cfs @ 13.52 fps)
 2=WQV Orifice (Passes < 1.0 cfs potential flow)
 3=Orifice (Passes < 20.7 cfs potential flow)
 4=Sharp-Crested Rectangular Weir(Passes < 50.1 cfs potential flow)

Secondary OutFlow Max=42.6 cfs @ 12.34 hrs HW=90.41' TW=0.00' (Dynamic Tailwater)

- 5=Emergency Spillway (Weir Controls 42.6 cfs @ 2.36 fps)

240361 Proposed Conditions*Type III 24-hr 100-Year Rainfall=8.10"*

Prepared by Sebago Technics

Printed 1/20/2026

HydroCAD® 10.20-5c s/n 00643 © 2023 HydroCAD Software Solutions LLC

Page 22

Summary for Link POA-1: Railroad Box Culvert

Inflow Area = 38.580 ac, 0.00% Impervious, Inflow Depth = 5.37" for 100-Year event
Inflow = 124.4 cfs @ 12.33 hrs, Volume= 17.252 af
Primary = 124.4 cfs @ 12.33 hrs, Volume= 17.252 af, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 0.00-60.00 hrs, dt= 0.01 hrs

Appendix 4

Inspection, Maintenance, and Housekeeping Plan



INSPECTION, MAINTENANCE, AND HOUSEKEEPING PLAN

For:
Palmer Avenue Detention Basin Retrofit
Portland, Maine

By:
Sebago Technics, Inc.
75 John Roberts Road, Suite 4A
South Portland, Maine

Introduction

The following plan outlines the anticipated inspection and maintenance procedures for the erosion and sedimentation control measures as well as stormwater management facilities for the project. This plan also outlines several housekeeping requirements that shall be followed during and after construction. These procedures shall be followed in order to ensure the intended function of the designed measures and to prevent unreasonably adverse impacts to the surrounding environment.

The procedures outlined in this Inspection, Maintenance and Housekeeping Plan are provided as an overview of the anticipated practices to be used on this site. In some instances, additional measures may be required due to unexpected conditions. For additional detail on any of the erosion and sedimentation control measures or stormwater management devices to be utilized on this project, refer to the most recently revised edition of the "Maine Erosion and Sedimentation Control BMP" manual and/or the "Stormwater Management for Maine: Best Management Practices" manual as published by the Maine Department of Environmental Protection (MDEP).

During Construction

1. **Inspection:** During the construction process, it is the Contractor's responsibility to comply with the inspection and maintenance procedures outlined in this section. These responsibilities include inspecting disturbed and impervious areas, erosion control measures, materials storage areas that are exposed to precipitation, and locations where vehicles enter or exit the site. These areas shall be inspected at least once a week as well as before and after a storm event (0.5" of rainfall), and prior to completing permanent stabilization measures. A person with knowledge of erosion and stormwater control, including the standards and conditions in any applicable permits, shall conduct the inspections.
2. **Maintenance:** All measures shall be maintained in an effective operating condition until areas are permanently stabilized. If Best Management Practices (BMPs) need to be maintained or modified, additional BMPs are necessary, or other corrective action is needed, implementation must be completed within 7 calendar days and prior to any storm event (0.5" of rainfall).
3. **Documentation:** A log summarizing the inspections and any corrective action taken must be maintained on-site. The log must include the name(s) and qualifications of the person making the inspections, the date(s) of the inspections, and major observations about the operation and maintenance of erosion and sedimentation controls, material storage areas, and vehicle access points to the site. Major observations must include BMPs that need maintenance, BMPs that failed

to operate as designed or proved inadequate for a particular location, and locations where additional BMPs are needed. For each BMP requiring maintenance, BMP needing replacement, and location needing additional BMPs, note in the log the corrective action taken and when it was taken. The log must be made accessible to the appropriate regulatory agency upon request. The permittee shall retain a copy of the log for a period of at least three years from the completion of permanent stabilization.

4. **Specific Inspection and Maintenance Tasks:** The following is a list of erosion control and stormwater management measures and the specific inspection and maintenance tasks to be performed during construction.

A. Sediment Barriers:

- Hay bale barriers, silt fences, and filter berms shall be inspected immediately after each rainfall and at least daily during prolonged rainfall.
- If the fabric on a silt fence or filter barrier should decompose or become ineffective prior to the end of the expected usable life and the barrier is still necessary, it shall be replaced.
- Sediment deposits should be removed after each storm event (0.5" of rainfall). They must be removed before deposits reach approximately one-half the height of the barrier.
- Filter berms shall be reshaped as needed.
- Any sediment deposits remaining in place after the silt fence or filter barrier is no longer required should be dressed to conform to the existing grade, prepared, and seeded.

B. Riprap Materials:

- Once a riprap installation has been completed, it should require very little maintenance. It shall, however, be inspected periodically to determine if high flows have caused scour beneath the riprap or dislodged any of the stone.

C. Erosion Control Blankets:

- Inspect these reinforced areas semi-annually and after significant rainfall events for slumping, sliding, seepage, and scour. Pay close attention to unreinforced areas adjacent to the erosion control blankets, which may experience accelerated erosion.
- Review all applicable inspection and maintenance procedures recommended by the specific blanket manufacturer. These tasks shall be included in addition to the requirements of this plan.

D. Stabilized Construction Entrances/Exits:

- The exit shall be maintained in a condition that will prevent tracking of sediment onto public rights-of-way.
- When the control pad becomes ineffective, the stone shall be removed along with the collected soil material. The entrance should then be reconstructed.
- Areas that have received mud-tracking or sediment deposits shall be swept or washed. Washing shall be done on an area stabilized with aggregate, which drains

into an approved sediment-trapping device (not into storm drains, ditches, or waterways).

E. Temporary Seed and Mulch:

- Mulched areas should be inspected after rain events to check for rill erosion.
- If less than 90% of the soil surface is covered by mulch, additional mulch shall be applied in bare areas.
- In applications where seeding and mulch have been applied in conjunction with erosion control blankets, the blankets must be inspected after rain events for dislocation or undercutting.
- Mulch shall continue to be reapplied until 95% of the soil surface has established temporary vegetative cover.

F. Stabilized Temporary Drainage Swales:

- Sediment accumulation in the swale shall be removed once the cross section of the swale is reduced by 25%.
- The swales shall be inspected after rainfall events. Any evidence of sloughing of the side slopes or channel erosion shall be repaired and corrective action should be taken to prevent reoccurrence of the problem.
- In addition to the stabilized lining of the channel (i.e. erosion control blankets), stone check dams may be needed to further reduce channel velocity.

5. **Housekeeping:** The following general performance standards apply to the proposed project.

- A. Spill prevention: Controls must be used to prevent pollutants from being discharged from materials on-site, including storage practices to minimize exposure of the materials to stormwater, and appropriate spill prevention, containment, and response planning and implementation.
- B. Groundwater protection: During construction, liquid petroleum products and other hazardous materials with the potential to contaminate groundwater may not be stored or handled in areas of the site draining to an infiltration area. An "infiltration area" is any area of the site that by design or as a result of soils, topography and other relevant factors, accumulates runoff that infiltrates into the soil. Dikes, berms, sumps, and other forms of secondary containment that prevent discharge to groundwater may be used to isolate portions of the site for the purposes of storage and handling of these materials.
- C. Fugitive sediment and dust: Actions must be taken to ensure that activities do not result in noticeable erosion of soils or fugitive dust emissions during or after construction. Oil may not be used for dust control.
- D. Debris and other materials: Litter, construction debris, and chemicals exposed to stormwater must be prevented from becoming a pollutant source.
- E. Trench or foundation dewatering: Trench dewatering is the removal of water from trenches, foundations, cofferdams, ponds, and other areas within the construction area

that retain water after excavation. In most cases, the collected water is heavily silted and hinders correct and safe construction practices. The collected water must be removed from the ponded area, either through gravity or pumping, and must be spread through natural wooded buffers or removed to areas that are specifically designed to collect the maximum amount of sediment possible, like a cofferdam sedimentation basin. Avoid allowing the water to flow over disturbed areas of the site. Equivalent measures may be taken if approved.

Post-Construction

1. **Inspection:** After construction, it is the responsibility of the owner or assigned heirs to comply with the inspection and maintenance procedures outlined in this section. All measures must be maintained in effective operating condition. The owner shall inspect and maintain the BMPs, including but not limited to any parking areas, catch basins, drainage swales, detention basins and ponds, pipes and related structures, in accordance with all municipal and state inspection, cleaning and maintenance requirements of the approved post-construction stormwater management plan.
2. **Specific Inspection and Maintenance Tasks:** The following is a list of permanent erosion control and stormwater management measures and the inspection and maintenance tasks to be performed after construction. If the BMP requires maintenance, repair or replacement to function as intended by the approved post-construction stormwater management plan, the owner or operator of the BMP shall take corrective action(s) to address the deficiency or deficiencies as soon as possible after the deficiency is discovered and shall provide a record of the deficiency and corrective action(s) to the local municipality in the annual report.

A. Vegetated Areas:

- Inspect vegetated areas, particularly slopes and embankments, early in the growing season or after heavy rains (>0.5") to identify active or potential erosion problems.
- Replant bare areas or areas with sparse growth. Where rill erosion is evident, armor the area with an appropriate lining or divert the erosive flows to on-site areas able to withstand the concentrated flows.

B. Ditches, Swales and Other Open Channels:

- Inspect ditches, swales, level spreaders and other open stormwater channels in the spring, in the late fall, and after heavy rains to remove any obstructions to flow. Remove accumulated sediments and debris, remove woody vegetative growth that could obstruct flow, and repair any erosion of the ditch lining.
- Vegetated ditches must be mowed at least annually or otherwise maintained to control the growth of woody vegetation and maintain flow capacity.
- Any woody vegetation growing through riprap linings must also be removed. Repair any slumping side slopes as soon as practicable.
- If the ditch has a riprap lining, replace riprap in areas where any underlying filter fabric or underdrain gravel is showing through the stone or where stones have dislodged.

C. Culverts:

- Inspect culverts in the spring, in the late fall, and after heavy rains (>0.5") to remove any obstructions to flow.
- Remove accumulated sediments and debris at the inlet, at the outlet, and within the conduit.
- Inspect and repair any erosion damage at the culvert's inlet and outlet.

D. Removal of Winter Sand:

- Clear accumulations of winter sand in parking lots and along roadways at least once a year, preferably in the spring.
- Accumulations on pavement may be removed by pavement sweeping.
- Accumulations of sand along road shoulders may be removed by grading excess sand to the pavement edge and removing it manually or by a front-end loader or other acceptable method.

E. Gravel Wetland:

- During the first year, the basin shall be inspected semi-annually and following major storm events.
- Debris and sediment buildup shall be removed from the forebay and basin as needed. Any bare area or erosion rills shall be repaired with new filter media or sandy loam then seeded and mulched. Maintaining good vegetative cover will minimize clogging with fine sediments and if ponding exceeds 48 hours, the top of the filter bed must be rototilled to reestablish the soil's filtration capacity.
- The gravel wetland should be inspected after every major storm in the first year to be sure it is functioning properly. Thereafter, the filter should be inspected at least once every six months to ensure that it is draining within 48 hours following a one inch storm or greater. Following storms that fill the system and overflow is observed, the soil filter should drain in no less than 24 to 48 hours. If the system drains too fast, an orifice may need to be added on the underdrain outlet or, if already present, may need to be modified.
- Sediment Removal: Sediment and plant debris should be removed from the pretreatment structure at least annually.
- Check and clean the risers if there is evidence of standing water, discolored water or accumulated sediments in the cells.
- Remove any decaying vegetation, litter, and debris that may be found.
- Check for foreign species. Particular care must be used to avoid the unintended introduction of invasive species such as purple loosestrife (*Lythrum salicaria*) and common reed (*Phragmites australis*). It is recommended that a qualified wetland biologist be consulted when these are found in the area of the gravel wetland.
- Plant biomass shall be harvested annually.

3. Documentation:

- A. The owner or operator of a BMP or a qualified post-construction stormwater inspector hired by that person, shall, as required by the local municipality, provide a completed and signed certification on a form provided by the local municipality, certifying that the person has inspected the BMP(s) and that they are adequately maintained and functioning as intended by the approved post-construction stormwater management plan, or that they required maintenance or repair, including the record of the deficiency and corrective action(s) taken.
- B. A log summarizing the inspections and any corrective action taken must be maintained. The log must include the name(s) and qualifications of the person making the inspections, the date(s) of the inspections, and major observations about the operation and maintenance of controls. Major observations must include BMPs that need maintenance, BMPs that failed to operate as designed or proved inadequate for a particular location, and locations where additional BMPs are needed. For each BMP requiring maintenance, BMP needing replacement, and location needing additional BMPs, note in the log the corrective action taken and when it was taken. The log must be made accessible to the appropriate regulatory agency upon request. A sample "Stormwater Inspection and Maintenance Form" has been included as Attachment 1 of this Inspection, Maintenance, and Housekeeping Plan.

- 4. Duration of Maintenance:** Perform maintenance as described and required for any associated permits unless and until the system is formally accepted by a municipality or quasi-municipal district or is placed under the jurisdiction of a legally created association that will be responsible for the maintenance of the system. If a municipality or quasi-municipal district chooses to accept a stormwater management system, or a component of a stormwater system, it must provide a letter to the MDEP stating that it assumes responsibility for the system. The letter must specify the components of the system for which the municipality or district will assume responsibility, and that the municipality or district agrees to maintain those components of the system in compliance with MDEP standards. Upon such assumption of responsibility, and approval by the MDEP, the municipality, quasi-municipal district, or association becomes a co-permittee for this purpose only and must comply with all terms and conditions of the permit.

ATTACHMENT 1 – STORMWATER INSPECTION AND MAINTENANCE LOG

Palmer Avenue Detention Basin Retrofit Portland, Maine

This log is intended to accompany the Inspection, Maintenance, and Housekeeping Plan for the detention basin retrofit in Portland, Maine. The following items shall be checked, cleaned, and maintained on a regular basis as specified in the Maintenance Plan and as described in the sections below. This log shall be kept on file for a minimum of five (5) years and shall be available for review by the City of Portland and the Maine DEP. Qualified personnel familiar with the drainage systems and soils shall perform all inspections. A copy of the construction and post-construction maintenance logs are provided.

General Site

INSPECTION MAINTENANCE AND HOUSEKEEPING FORM			
General Information			
Project Name:		Inspection Date:	
Project Location:		Current Weather:	
		Date / Amount Last Precip:	
BMP Owner:		Company conducting inspection:	
Owner Mailing Address:		Company Mailing Address	
Owner Phone #:		Company Phone #:	
Owner Email:		Inspector Name:	
		Inspector Email:	
Site Element	Suggested Maintenance (recm'd frequency)	Observations	Inspection Notes/Recommended Action
Vegetated Areas	Inspect Slopes/Embankments for erosion (annually)		
	Replant bare areas or areas of sparse growth (annually)		
Ditches/Swales	Remove obstructions/debris/sediment (monthly)		
	Inspect for erosion/repair as needed (annually)		
	Remove woody vegetation (annually)		
	Mow vegetated ditches (annually)		
Catch Basins	Remove sediment/debris from sump (annually)		
	Remove accumulated debris from inlet grate		
Culverts	Remove sediment/debris from inlet/outlet aprons (annually)		
	Inspect inlet/outlet aprons for erosion, repair as needed (annually)		
	Inspect, repair as needed, riprap aprons for dislodged/sparse coverage (annually)		
Pipe Outlets	Remove sediment/debris from outlet aprons (annually)		
	Inspect outlet aprons for erosion, repair as needed (annually)		
	Inspect, repair as needed, riprap aprons for dislodged/sparse coverage (annually)		
Additional Notes/Observations:			

Gravel Wetland

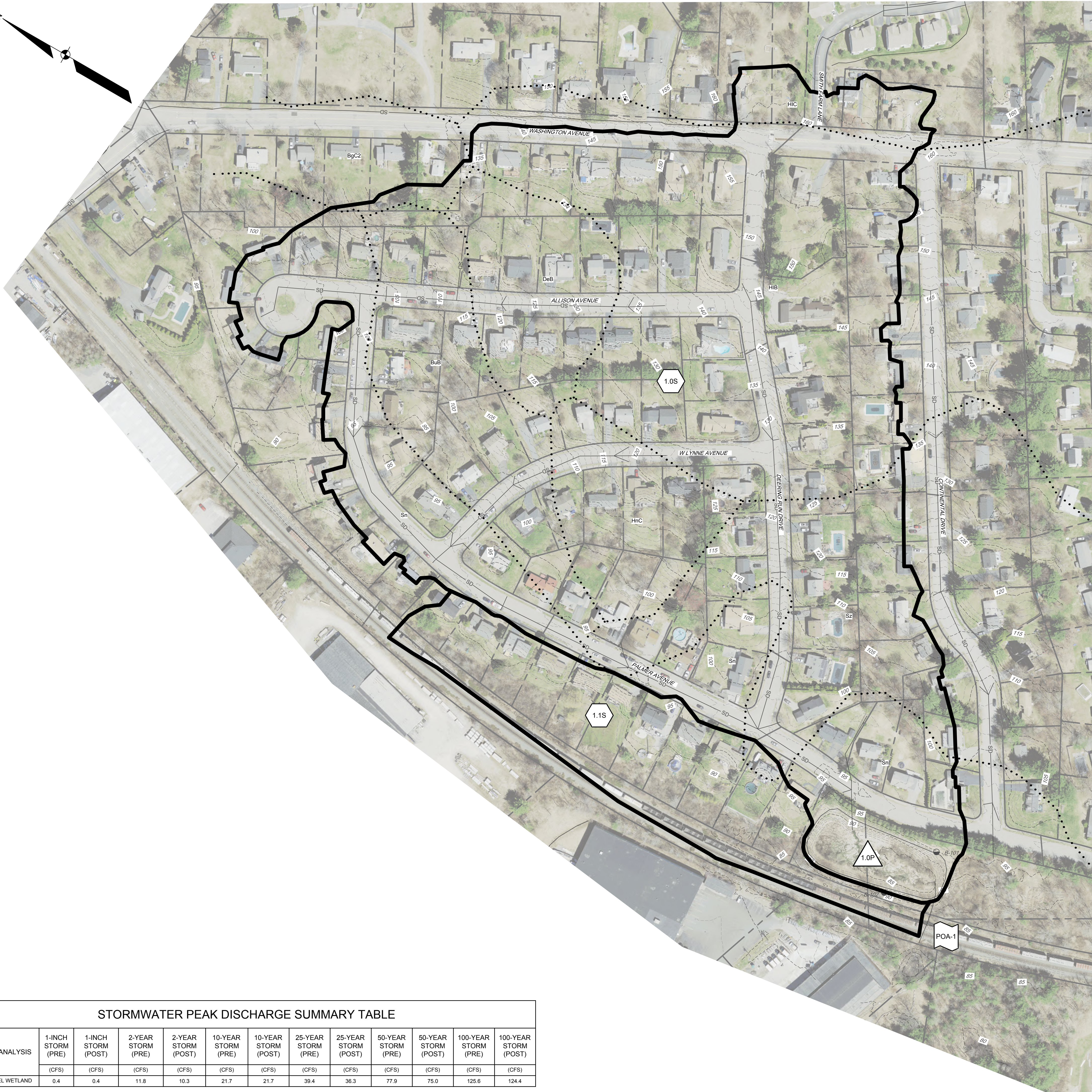
INSPECTION MAINTENANCE AND HOUSEKEEPING FORM			
General Information			
Project Name:		Inspection Date:	
Project Location:		Current Weather:	
		Date / Amount Last Precip:	
BMP Owner:		Company conducting inspection:	
Owner Mailing Address:		Company Mailing Address	
Owner Phone #:		Company Phone #:	
Owner Email:		Inspector Name:	
		Inspector Email:	
BMP Element	Suggested Maintenance (recm'd frequency)	Observations	Inspection Notes/Recommended Action
Forebay/Pretreatment	Sediment/Debris Removal (Twice Annually)		
	Inspect for bare areas or rill erosion (Twice Annually)		
Outlet Control Structure	Sediment Depth (Twice Annually)		
	Floatables/Debris (Twice Annually)		
Riser Pipes	Review for signs of erosion, sediment accumulation or discolored water (> 1" rain, Twice Annually)		
Discharge Pipe	Ground Stabilized (>1" rain, Twice Annually)		
Emergency Spillway	Review for signs of erosion (Twice Annually)		
	Review for signs of discharge (>1" rain, Twice Annually)		
Embankments	Review for signs of erosion (Twice Annually)		
Treatment Cells	Review for dense root mat establishment (>1" rain, Twice Annually)		
	Review for decaying vegetation, litter and debris (Twice Annually)		
	Confirm system drains in 24-48 hours for water quality volume (>1" rain, Twice Annually)		
Additional Notes/Observations:			

Appendix 5

Watershed Plans

F:\PROJECTS\240001240361\DWG\DESIGN\240361 SWP EXISTING POST.SB.DWG PRE: 11/12/2024

STORMWATER PEAK DISCHARGE SUMMARY TABLE												
POINT OF ANALYSIS	1-INCH STORM (PRE)	1-INCH STORM (POST)	2-YEAR STORM (PRE)	2-YEAR STORM (POST)	10-YEAR STORM (PRE)	10-YEAR STORM (POST)	25-YEAR STORM (PRE)	25-YEAR STORM (POST)	50-YEAR STORM (PRE)	50-YEAR STORM (POST)	100-YEAR STORM (PRE)	100-YEAR STORM (POST)
POA-1 GRAVEL WETLAND	(CFS)	(CFS)	(CFS)	(CFS)	(CFS)	(CFS)	(CFS)	(CFS)	(CFS)	(CFS)	(CFS)	(CFS)
	0.4	0.4	11.8	10.3	21.7	21.7	39.4	36.3	77.9	75.0	125.6	124.4



SOIL TYPES TABLE			
SYMBOL	SOIL SERIES	SLOPE	HSG
BgC2	NICHOLVILLE	8-15%	B
BuB	LA MOINE	3-8%	C/D
DeB	DEERFIELD	3-8%	A
HIB	HINCKLEY	3-8%	A
HIC	HINCKLEY	8-15%	A
HnC	HINCKLEY	8-15%	A
Sn	SCANTIC	0-3%	D
Sz	SWANTON	N/A	C/D

LEGEND	
EXISTING	DESCRIPTION
---	PROPERTY LINE/R.O.W.
---	ABUTTER LINE/R.O.W.
---	CONTOURS
---	SD STORM DRAIN
⊙	DRAINAGE MANHOLE
⊙	CATCH BASIN
⊙	B-1 BORING

EXISTING CONDITIONS LEGEND

---	WATERSHED BOUNDARY
A --- B	TIME OF CONCENTRATION
1.0S	SUBCATCHMENT LABEL
POA-1	POINT OF ANALYSIS
1P	STORMWATER TREATMENT/DETENTION POND
.....	SOILS BOUNDARY

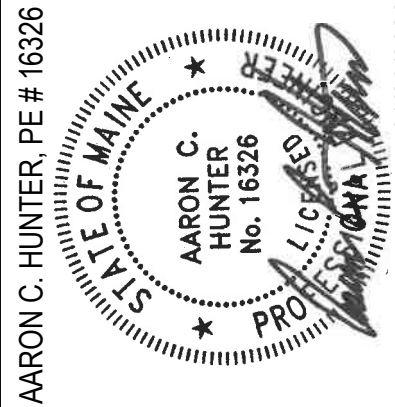
NOTES

- THE PROPOSED PROJECT WAS DESIGNED NOT TO CHANGE THE QUANTITY AND/OR CHARACTER OF FLOW IN THE RAILWAY'S DITCHES AND/OR DRAINAGE STRUCTURES
- TIME OF CONCENTRATION IS 12.6 MIN. AS BASED ON REPORT CONDUCTED FOR THE DEERING RUN SUBDIVISION BY SEBAGO TECHNICS IN 1985.



DESIGN BY:	DJS
DRAWN BY:	RGL
CHECKED BY:	ACH
SHEET NAME:	EXISTING CONDITIONS WATERSHED PLAN

DATE:	11-1-2024
PAGE 1 OF 2	
SHEET NO.:	D1
VAULT #:	REV.: F



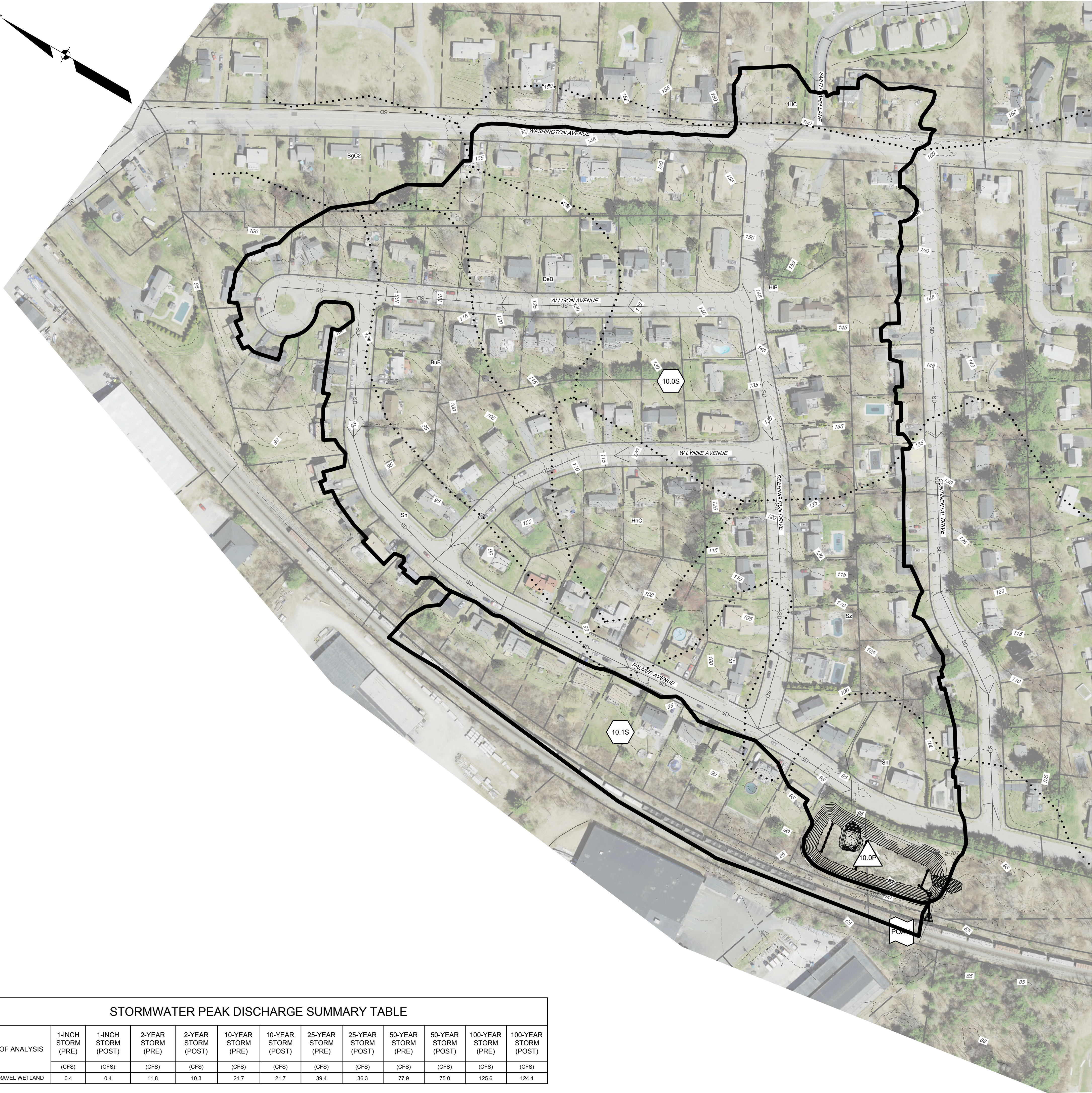
F	REVISED PER CSX COMMENTS	01/20/2026
E	REVISED PER CSX COMMENTS	07/23/2025
D	REVISED PER CSX COMMENTS	05/15/2025
C	ISSUED FOR 80% PS&E	04/17/2025
B	80% PROGRESS SET	03/18/2025
A	ISSUED FOR 30% PDR	12/11/2024
REV	SUBMISSION	DATE

PROJECT NAME:	PALMER AVE DETENTION BASIN RETROFIT
CITY OF PORTLAND, MAINE	DEPARTMENT OF PUBLIC WORKS
WATER RESOURCES DIVISION	212 CANO ROAD, SUITE B, PORTLAND, MAINE 04103
PHONE (207) 874-8846	



F:\PROJECTS\24000\24036\DWG\DESIGN\40361 SWP POST DWG POST 11/1/2024

STORMWATER PEAK DISCHARGE SUMMARY TABLE												
POINT OF ANALYSIS	1-INCH STORM (PRE)	1-INCH STORM (POST)	2-YEAR STORM (PRE)	2-YEAR STORM (POST)	10-YEAR STORM (PRE)	10-YEAR STORM (POST)	25-YEAR STORM (PRE)	25-YEAR STORM (POST)	50-YEAR STORM (PRE)	50-YEAR STORM (POST)	100-YEAR STORM (PRE)	100-YEAR STORM (POST)
	(CFS)	(CFS)	(CFS)	(CFS)	(CFS)	(CFS)	(CFS)	(CFS)	(CFS)	(CFS)	(CFS)	(CFS)
POA-1 GRAVEL WETLAND	0.4	0.4	11.8	10.3	21.7	21.7	39.4	36.3	77.9	75.0	125.6	124.4



NOTE:
TIME OF CONCENTRATION IS 12.6 MIN. AS BASED ON
REPORT CONDUCTED FOR THE DEERING RUN
SUBDIVISION BY SEBAGO TECHNICIS IN 1985.

SOIL TYPES TABLE			
SYMBOL	SOIL SERIES	SLOPE	HSG
BgC2	NICHOLVILLE	8-15%	B
BuB	LAMOINE	3-8%	C/D
DeB	DEERFIELD	3-8%	A
HIB	HINCKLEY	3-8%	A
HIC	HINCKLEY	8-15%	A
HnC	HINCKLEY	8-15%	A
Sn	SCANTIC	0-3%	D
Sz	SWANTON	N/A	C/D

LEGEND		
EXISTING	DESCRIPTION	PROPOSED
---	PROPERTY LINE/R.O.W.	
---	ABUTTER LINE/R.O.W.	
---	CONTOURS	---
---	STORM DRAIN	---
⊙	DRAINAGE MANHOLE	
⊙	CATCH BASIN	⊙
⊙	BORING	

PROPOSED CONDITIONS LEGEND

— A — B —	WATERSHED BOUNDARY
10.0S	TIME OF CONCENTRATION
POA-1	SUBCATCHMENT LABEL
10P	POINT OF ANALYSIS
.....	STORMWATER TREATMENT/DETENTION POND
.....	SOILS BOUNDARY

NOTES

1. THE PROPOSED PROJECT WAS DESIGNED NOT TO CHANGE THE QUANTITY AND/OR CHARACTER OF FLOW IN THE RAILWAY'S DITCHES AND/OR DRAINAGE STRUCTURES
2. TIME OF CONCENTRATION IS 12.6 MIN. AS BASED ON REPORT CONDUCTED FOR THE DEERING RUN SUBDIVISION BY SEBAGO TECHNICIS IN 1985.

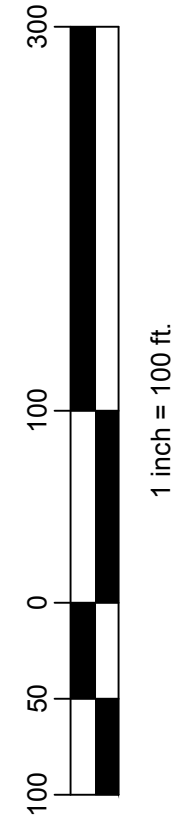
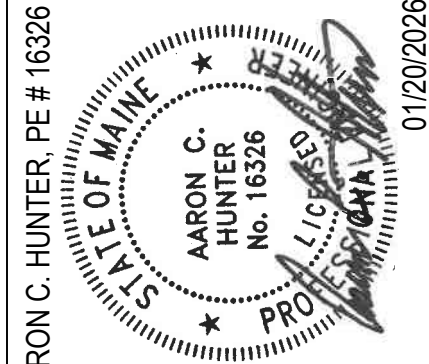
PROJECT NAME:
PALMER AVE DETENTION BASIN
RETROFIT

CITY OF PORTLAND, MAINE
DEPARTMENT OF PUBLIC WORKS
WATER RESOURCES DIVISION
212 CANCO ROAD, SUITE B, PORTLAND, MAINE 04103
PHONE (207) 874-8846



DESIGN BY:	DJS
DRAWN BY:	RGL
CHECKED BY:	ACH
SHEET NAME:	PROPOSED CONDITIONS WATERSHED PLAN
DATE:	11-1-2024
SHEET NO.:	22
VAULT #:	F

F	REVISED PER CSX COMMENTS	01/20/2026
E	REVISED PER CSX COMMENTS	07/23/2025
D	REVISED PER CSX COMMENTS	06/15/2025
C	ISSUED FOR 80% PS&E	04/17/2025
B	80% PROGRESS SET	03/18/2025
A	ISSUED FOR 30% PDR	12/11/2024
REV	SUBMISSION	DATE



Appendix 6

Geotechnical Report



REPORT

24-2454 S

April 10, 2025

Explorations and Geotechnical Engineering Services

Proposed Stormwater Basin Retrofit
Palmer Avenue
Portland, Maine

Prepared For:

Sebago Technics
Attention: Aaron Hunter, P.E.
75 John Roberts Road, Suite 4A
South Portland, ME 04106

Prepared By:

S. W. Cole Engineering, Inc.
286 Portland Road
Gray, ME 04039
T: 207-657-2866

www.swcole.com | info@swcole.com

TABLE OF CONTENTS

1.0 INTRODUCTION	1
1.1 Scope and Purpose	1
1.2 Site and Proposed Construction	1
2.0 EXPLORATION AND TESTING	2
2.1 Explorations	2
2.2 Testing	2
3.0 SUBSURFACE CONDITIONS	3
3.1 Soil and Bedrock	3
3.2 Groundwater	4
4.0 EVALUATION AND RECOMMENDATIONS	4
4.1 General Findings	4
4.2 Global Stability Evaluation	5
4.3 Site and Subgrade Preparation	5
4.4 Excavation and Dewatering	6
4.5 Fill, Backfill and Compaction	7
4.6 Weather Considerations	8
4.7 Design Review and Construction Testing	8
5.0 CLOSURE	8
 Appendix A	Limitations
Appendix B	Figures
Appendix C	Exploration Logs & Key
Appendix D	Global Slope Stability Evaluation Graphics

24-2454 S

April 10, 2025

Sebago Technics
Attention: Aaron Hunter, P.E.
75 John Roberts Road, Suite 4A
South Portland, ME 04106

Subject: Explorations and Geotechnical Engineering Services
Proposed Stormwater Basin Retrofit
Palmer Avenue
Portland, Maine

Dear Aaron:

In accordance with our Proposal, dated January 24, 2025, we have performed subsurface explorations for the subject project. This report summarizes our findings and geotechnical recommendations and its contents are subject to the limitations set forth in Appendix A.

1.0 INTRODUCTION

1.1 Scope and Purpose

The purpose of our services was to obtain subsurface information at the site in order to develop geotechnical recommendations relative to earthwork associated with the proposed construction. Our scope of services included test boring explorations, a geotechnical analysis of the subsurface findings, and preparation of this report.

1.2 Site and Proposed Construction

The site consists of an existing stormwater detention basin on the western side of Palmer Avenue in Portland, Maine, adjacent to an active railroad alignment to the west. The existing basin appears to be in a cut on the easterly side with a top rim elevation of about 96 feet (project datum), transitioning to a perimeter fill berm to the west with a top rim elevation of about 90 feet. The pond has a vegetated bottom at approximately

elevation 84 to 85 feet (project datum). We understand a piped stormwater inlet enters the northeastly corner of the basin and outlets from the southwest corner.

We understand project planning includes retrofitting the existing stormwater detention basin into a lined and underdrained gravel wetland. We understand the gravel wetland will include about 3 feet of filter materials (wetland soil, pea gravel, and crushed stone) and a finish grade of 81.6 feet at the bottom. We understand a new outlet control structure is proposed in the southwesterly corner of the basin.

Proposed and existing site features are shown on the "Exploration Location Plan" attached in Appendix B.

2.0 EXPLORATION AND TESTING

2.1 Explorations

Two test borings (B-101 and B-102) were made at the site on March 12, 2025 by Seaboard Drilling, LLC working under subcontract to S. W. Cole Engineering, Inc. (S.W.COLE). The exploration locations were selected and established in the field by S.W.COLE using measurements from existing site features. Access to the test boring locations were limited by terrain and soft ground surface around the existing stormwater basin. The approximate exploration locations are shown on the "Exploration Location Plan" attached in Appendix B. Logs of the explorations and a key to the notes and symbols used on the logs are attached in Appendix C. The elevations shown on the logs were estimated based on topographic information shown on the "Exploration Location Plan".

2.2 Testing

The test borings were drilled using a combination of hollow stem auger and cased wash-boring techniques. The soils were sampled at 5 foot intervals using a split spoon sampler and Standard Penetration Testing (SPT) methods. Pocket Penetrometer Tests (PPT) were performed where stiffer cohesive soils were encountered. Vane Shear Testing (VST) was performed where softer cohesive soils were encountered. SPT blow counts and PPT and VST results are shown on the logs. Soil samples obtained from the explorations were returned to our laboratory for further visual classification.

3.0 SUBSURFACE CONDITIONS

3.1 Soil and Bedrock

The test borings encountered a subsurface profile generally consisting of fill and relic ground surface soils, overlying native glaciomarine clays, overlying native glacial outwash sands. The principal soils encountered at the explorations are summarized below. Not all of the strata were encountered at each exploration; refer to the attached boring logs for more detailed subsurface information.

Fill and Relic Ground Surface Soils: Underlying surficial layer of topsoil, the explorations encountered fill associated with the existing stormwater basin construction extending to depths of about 10 feet below existing ground surface (bgs). The fill consisted of very loose to loose brown and gray-brown silty sand with varying portions of gravel, and stiff silty clay with trace organics and varying portions of sand.

Underlying the fill, boring B-101 encountered probable relic ground surface soils about 1-foot thick, consisting of loose sandy silt with trace rootlets and organics

Glaciomarine Soils: Underlying the fill and relic ground surface soils, the borings encountered native glaciomarine deposits. These deposits consisted of an upper “crust” of very stiff to stiff brown silty clay ranging in thickness from about 4 to 7 feet thick. Below depths of about 14 and 18 feet bgs, the upper “crust” transitioned to an underlying layer of soft to medium gray silty clay ranging in thickness from about 13 to 19 feet. In-situ vane shear testing performed in the gray silty clay indicates undrained shear strengths of about 410 to 670 psf.

Glacial Outwash: Underlying the glaciomarine soils, the borings encountered native glacial outwash deposits consisting of loose to medium dense silty sand with varying portions of gravel. The borings were terminated in these deposits at depths of 37 and 42 feet bgs.

Bedrock: Bedrock was not encountered within the depths explored in the test borings.

3.2 Groundwater

The soils encountered at the test borings were damp to moist below depths of about 5 feet bgs. Saturated soils were encountered below depths of 14 feet to 18 feet bgs. Groundwater likely becomes perched in the fill and on the relatively impervious silty clay encountered in the test borings. Long term groundwater information is not available. It should be anticipated that groundwater levels will fluctuate, particularly in response to periods of snowmelt and precipitation, changes in site use, and the water level of the existing stormwater basin.

4.0 EVALUATION AND RECOMMENDATIONS

4.1 General Findings

Based on the subsurface findings, the proposed construction appears feasible from a geotechnical standpoint. The principle geotechnical considerations include:

- Based on the subsurface findings and our understanding of proposed finish grades, we anticipate the gravel wetland subgrade will consist of silty clay soils. The silty clay soils are highly sensitive to strength loss when disturbed, particularly when wet. Equipment should not operate directly on the native soils. Temporary haul roads and potentially crane mats, will likely be required for construction. Excavation of bearing surfaces should be completed with a smooth-edged bucket to lessen subgrade disturbance.
- We recommend all existing organics, muck, fill, and loose and disturbed soils be removed from beneath proposed gravel wetland and structures, such as the outlet control structure, and backfilled with compacted Granular Borrow. An initial layer of Underdrain Sand may be needed over wet subgrades.
- Outlet piping should have anti-seepage collars and impervious backfill to prevent piping of soils and seepage from following the outlet pipe bedding and associated trenches.
- The contractor should anticipate the need to temporarily divert stormwater inflow and dewater the basin prior to starting excavation and throughout construction. We recommend the contract documents require the contractor to submit excavation staging and dewatering plans prior to construction for review by the design team.

4.2 Global Stability Evaluation

We performed global stability analysis along the westerly (railroad) and easterly (Palmer Avenue) sides of the proposed gravel wetland basin. Our global stability analysis utilized a method of slices assuming moment equilibrium and was based on: 1) our current understanding of the project; 2) subsurface information obtained at the explorations, and; 3) proposed and existing site grades shown on Sheet 1.

Our analysis indicates the following safety factors against a deep rotational failure for the temporary excavation, long-term post-construction, and transient seismic cases:

Model	Safety Factor		
	Long-term Static Case	Transient Seismic Case	Temporary Excavation Case
Westerly (Railroad) Side of Basin	1.67	1.2	1.58
Easterly (Palmer Avenue) Side of Basin	1.73	1.13	1.57

Safety factors of 1.3 are considered acceptable for slopes supporting infrastructure for long-term conditions and safety factors of 1.1 are considered acceptable for seismic loading conditions. Based on our analysis, the factors of safety against a deep rotational failure are above the acceptable thresholds for the proposed construction provided the geotechnical recommendations presented herein are followed. Slope stability output graphics are attached in Appendix D.

4.3 Site and Subgrade Preparation

We recommend that site preparation begin with the construction of an erosion control system to protect adjacent drainage ways and areas outside the construction limits. Organics, roots and topsoil should be completely removed from areas of proposed fill and construction. As much vegetation as possible should remain outside the construction areas to lessen the potential for erosion and site disturbance.

We recommend all existing organics, fill, and loose and disturbed soils be removed from beneath proposed structures, such as the proposed outlet control structure, and backfilled with compacted Granular Borrow. Final excavation to subgrade should be made with a smooth-edged bucket to reduce soil strength loss from subgrade disturbance.

Beneath pipes and utility structures with soft trench bottoms, we recommend overexcavating with a smooth edged bucket and installing at least 1 foot of Underdrain Sand below customary bedding materials followed by geotextile fabric wrapped customary bedding materials. The depth of customary bedding materials for soft trench bottoms should be at least 12 inches for pipes and 24 inches for structures.

4.4 Excavation and Dewatering

Excavation work will generally encounter existing stormwater basin muck and organics, fill, and silty clay soils. Care must be exercised during construction to limit disturbance of the bearing soils. Earthwork and grading activities should occur during drier, non-freezing weather of Spring, Summer and Fall. Construction equipment should not operate directly on the native soils. Low ground pressure tracked equipment may be needed and temporary haul roads and crane mats may be necessary. Final cuts to subgrade should be performed with a smooth-edged bucket to help reduce strength loss from soil disturbance.

Vibrations from construction should be controlled below threshold limits of 0.5 in/sec for structures, water supply wells and infrastructure within 500 feet of the project site. More restrictive vibration limits may be warranted in specific cases with sensitive equipment, historic structures or artifacts on-site or within close proximity.

The contractor should anticipate the need to divert stormwater inflow and dewater the basin prior to starting excavation and throughout construction. Controlling the water levels to at least one foot below planned excavation depths will help stabilize subgrades during construction. Excavations must be properly shored or sloped in accordance with OSHA Regulations to prevent sloughing and caving of the sidewalls during construction. Care must be taken to preclude undermining adjacent structures, utilities and roadways. The design and planning of excavations, excavation support systems, and dewatering is the responsibility of the contractor. We recommend the contract documents require the contract to submit excavation staging and dewatering plans prior to construction for review by the design team.

4.5 Fill, Backfill and Compaction

We recommend the following fill and backfill materials: recycled products must also be tested in accordance with applicable environmental regulations and approved by a qualified environmental consultant.

Granular Borrow: Backfill for overexcavations beneath proposed structures should be sand meeting the requirements of 2020 MaineDOT Standard Specification 703.19 Granular Borrow.

Structural Fill: Backfill for structures should be clean, non-frost susceptible sand and gravel meeting the gradation requirements for Structural Fill as given below:

Structural Fill	
Sieve Size	Percent Finer by Weight
4 inch	100
3 inch	90 to 100
¾ inch	25 to 90
No. 40	0 to 30
No. 200	0 to 6

Underdrain Sand: Sand used beneath bedding materials in soft trench bottoms and over wet subgrades should be clean, free-draining sand meeting the requirements of 2020 MaineDOT Standard Specification 703.22 Underdrain Backfill Material Type B.

Anti-Seepage and Impervious Backfill: Outlet piping should have anti-seepage collars and impervious backfill to prevent piping of soils and seepage from following the outlet pipe bedding and associated trenches.

Reuse of Site Soils: The non-organic on-site soils may be suitable for reuse in landscape areas, provided they are at a compactable moisture content at the time of reuse.

Placement and Compaction: Fill should be placed in horizontal lifts and compacted such that the desired density is achieved throughout the lift thickness with 3 to 5 passes of the compaction equipment. Loose lift thicknesses for grading, fill and backfill activities should not exceed 12 inches. We recommend that fill and backfill in building

and paved areas be compacted to at least 95 percent of its maximum dry density as determined by ASTM D-1557.

4.6 Weather Considerations

Construction activity should be limited during wet and freezing weather and the site soils may require drying or thawing before construction activities may continue. The contractor should anticipate the need for water to temper fills in order to facilitate compaction during dry weather. If construction takes place during cold weather, subgrades must be protected during freezing conditions. Fill must not be placed on frozen soil.

4.7 Design Review and Construction Testing

S.W.COLE should be retained to review the construction documents prior to bidding to determine that our earthwork recommendations have been properly interpreted and implemented.

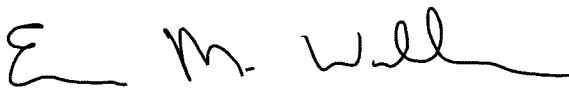
A construction materials testing and quality assurance program should be implemented during construction to observe compliance with the design concepts, plans, and specifications. S.W.COLE is available to observe earthwork and subgrade preparation activities, as well as to provide testing services for soil construction materials.

5.0 CLOSURE

It has been a pleasure to be of assistance to you with this phase of your project. We look forward to working with you during the construction phase of the project.

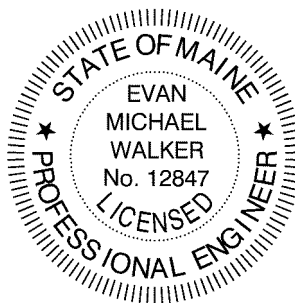
Sincerely,

S. W. Cole Engineering, Inc.



Evan M. Walker, P.E.
Senior Geotechnical Engineer

EMW:tjb



APPENDIX A

Limitations

This report has been prepared for the exclusive use of Sebago Technics for specific application to the proposed Stormwater Basin Retrofit on Palmer Avenue in Portland, Maine. S. W. Cole Engineering, Inc. (S.W.COLE) has endeavored to conduct our services in accordance with generally accepted soil and foundation engineering practices. No warranty, expressed or implied, is made.

The soil profiles described in the report are intended to convey general trends in subsurface conditions. The boundaries between strata are approximate and are based upon interpretation of exploration data and samples.

The analyses performed during this investigation and recommendations presented in this report are based in part upon the data obtained from subsurface explorations made at the site. Variations in subsurface conditions may occur between explorations and may not become evident until construction. If variations in subsurface conditions become evident after submission of this report, it will be necessary to evaluate their nature and to review the recommendations of this report.

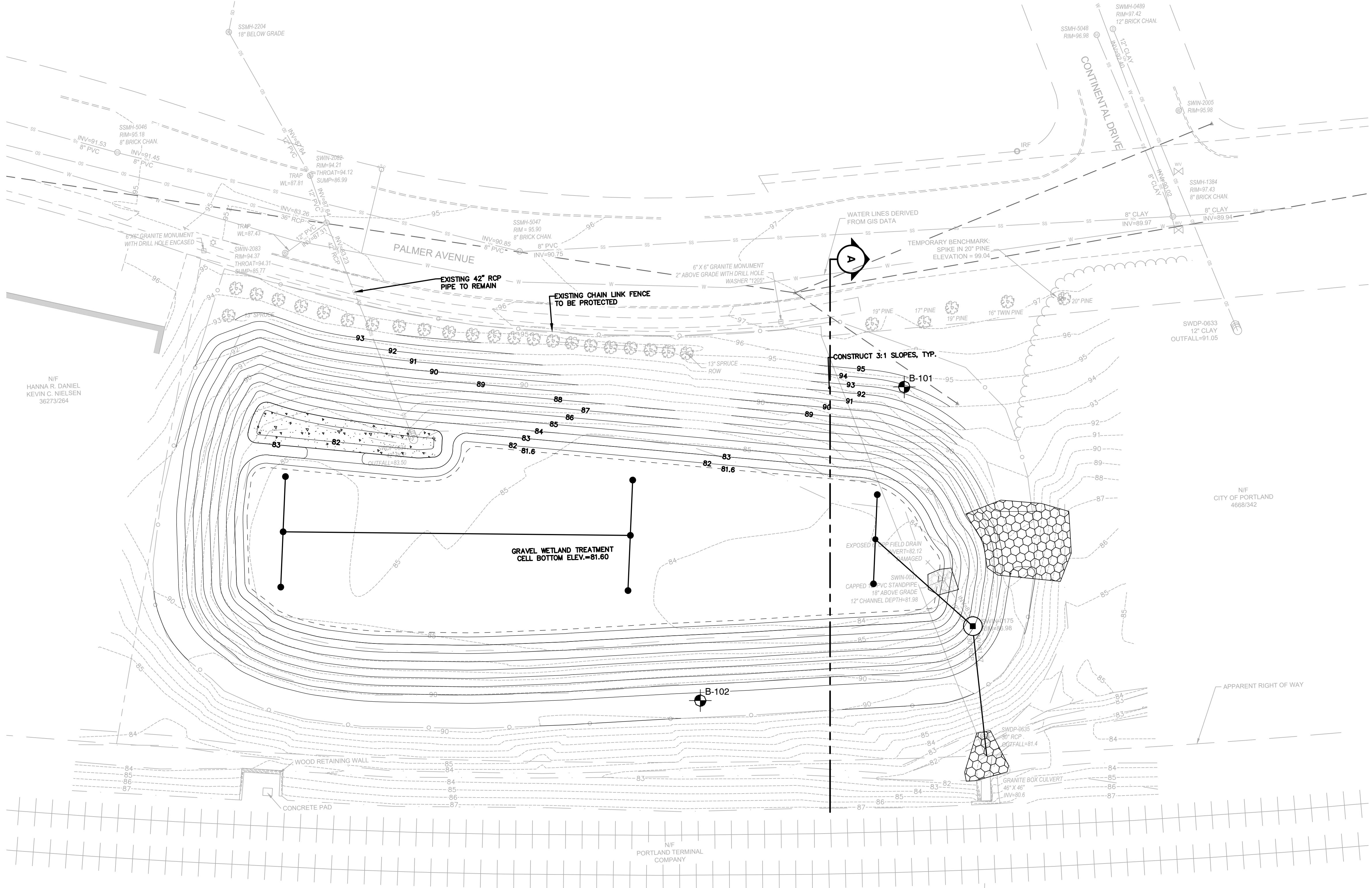
Observations have been made during exploration work to assess site groundwater levels. Fluctuations in water levels will occur due to variations in rainfall, temperature, and other factors.

S.W.COLE's scope of services has not included the investigation, detection, or prevention of any Biological Pollutants at the project site or in any existing or proposed structure at the site. The term "Biological Pollutants" includes, but is not limited to, molds, fungi, spores, bacteria, and viruses, and the byproducts of any such biological organisms.

Recommendations contained in this report are based substantially upon information provided by others regarding the proposed project. In the event that any changes are made in the design, nature, or location of the proposed project, S.W.COLE should review such changes as they relate to analyses associated with this report. Recommendations contained in this report shall not be considered valid unless the changes are reviewed by S.W.COLE.

APPENDIX B

Figures



- LEGEND:**
- APPROXIMATE BORING LOCATION
- NOTES:**
- EXPLORATION LOCATION PLAN WAS PREPARED FROM A 1"=20' SCALE PLAN OF THE SITE TITLED "SITE PLAN," PREPARED BY SEBAGO TECHINCS, RECEIVED VIA E-MAIL 03/13/2025.
 - THE BORINGS WERE LOCATED IN THE FIELD BY MEASUREMENTS FROM EXISTING SITE FEATURES.
 - THIS PLAN SHOULD BE USED IN CONJUNCTION WITH THE ASSOCIATED S. W. COLE ENGINEERING, INC. GEOTECHNICAL REPORT.
 - THE PURPOSE OF THIS PLAN IS ONLY TO DEPICT THE LOCATION OF THE EXPLORATIONS IN RELATION TO THE EXISTING CONDITIONS AND PROPOSED CONSTRUCTION AND IS NOT TO BE USED FOR CONSTRUCTION.

S.W. COLE
ENGINEERING, INC.

SEBAGO TECHINCS

EXPLORATION LOCATION PLAN

PROPOSED STORMWATER BASIN RETROFIT
PALMER AVENUE
PORTLAND, MAINE

Job No.:	24-2454	Scale:	1" = 20'
Date :	04/09/2025	Sheet:	1

R:\2024\24-2454\CAD\Drawings\24-2454-EP.dwg, 1/7/2025 3:54:34 PM, CEN, S. W. Cole Engineering, Inc.

APPENDIX C

Exploration Logs and Key



BORING LOG

BORING NO.: **B-101**
SHEET: 1 of 1
PROJECT NO. 24-2454
DATE START: 3/12/2025
DATE FINISH: 3/12/2025

CLIENT: Sebago Technics
PROJECT: Proposed Stormwater Basin Retrofit
LOCATION: Palmer Avenue, Portland, ME

Drilling Information

LOCATION: See Exploration Location Plan ELEVATION (FT): 94' +/- TOTAL DEPTH (FT): 37.0 LOGGED BY: Evan Walker
DRILLING CO.: Seaboard Drilling DRILLER: Jay Adams DRILLING METHOD: Hollow Stem Auger
RIG TYPE: Track Mounted Diedrich D-50 AUGER ID/OD: 2 1/4 in / 5 5/8 in SAMPLER: Standard Split-Spoon
HAMMER TYPE: Automatic HAMMER WEIGHT (lbs): 140 CASING ID/OD: N/A / N/A CORE BARREL: N/A
HAMMER CORRECTION FACTOR: _____ HAMMER DROP (inch): 30
WATER LEVEL DEPTHS (ft): ▽ 18 ft Soil Moist Below 5', Saturated Below 18' +/-

GENERAL NOTES:

KEY TO NOTES AND SYMBOLS: Water Level
▽ At time of Drilling
▽ At Completion of Drilling
▽ After Drilling
D = Split Spoon Sample
U = Thin Walled Tube Sample
R = Rock Core Sample
V = Field Vane Shear
Pen. = Penetration Length
Rec. = Recovery Length
bpf = Blows per Foot
mpf = Minute per Foot
WOR = Weight of Rods
WOH = Weight of Hammer
RQD = Rock Quality Designation
PID = Photoionization Detector
S_v = Field Vane Shear Strength, kips/sq.ft.
q_u = Unconfined Compressive Strength, kips/sq.ft.
Ø = Friction Angle (Estimated)
N/A = Not Applicable

Elev. (ft)	Depth (ft)	Casing Pen. (bpf)	SAMPLE INFORMATION					Graphic Log	Sample Description & Classification	H ₂ O Depth	Remarks
			Sample No.	Type	Depth (ft)	Pen./ Rec. (in)	Blow Count or RQD	Field / Lab Test Data			
90	5		1D	×	0-2	24/16	8-6-4-5		0.8 Vegetation / Topsoil (FILL) Loose, brown, silty SAND, some gravel, with silty clay layers (FILL)		
85	10		2D	×	5-7	24/18	2-1-1-1		5.0 Very loose, gray-brown, silty SAND, some gravel (FILL)		
80	15		3D	×	10-12	24/20	2-3-5-5	q _p =5 ksf	10.0 Loose, gray, sandy SILT, with trace rootlets and organics 10.8 Very stiff, gray and gray-brown silty CLAY, with occasional sand seams		
75	20		4D	×	15-17	24/24	2-2-3-4	q _p =5-7.5 ksf	18.0 Soft, gray, silty CLAY, with black streaking	▽	
70	25		5D	×	20-22	24/24	WOH/18" 1				
65	30		6D	×	25-27	24/24	WOH/24"		...with frequent sand seams below 25'		
60	35		7D	×	30-32	24/20	WOH/12" 4-2		31.0 Loose, gray, silty SAND, some gravel		
			8D	×	35-37	24/15	2-4-7-2				

Bottom of Exploration at 37.0 feet

Stratification lines represent approximate boundary between soil types, transitions may be gradual. Water level readings have been made at times and under conditions stated. Fluctuations of groundwater may occur due to other factors than those present at the time measurements were made.

BORING NO.: **B-101**



BORING LOG

BORING NO.: B-102**SHEET:** 1 of 1**PROJECT NO.** 24-2454**DATE START:** 3/12/2025**DATE FINISH:** 3/12/2025**CLIENT:** Sebago Technics**PROJECT:** Proposed Stormwater Basin Retrofit**LOCATION:** Palmer Avenue, Portland, ME

Drilling Information

LOCATION: See Exploration Location Plan **ELEVATION (FT):** 90' +/- **TOTAL DEPTH (FT):** 42.0 **LOGGED BY:** Evan Walker
DRILLING CO.: Seaboard Drilling **DRILLER:** Jay Adams **DRILLING METHOD:** Cased Boring
RIG TYPE: Track Mounted Diedrich D-50 **AUGER ID/OD:** N/A / N/A **SAMPLER:** Standard Split-Spoon
HAMMER TYPE: Automatic / Automatic **HAMMER WEIGHT (lbs):** 140 / 140 **CASING ID/OD:** 4 in / 4 1/2 in **CORE BARREL:** N/A
HAMMER CORRECTION FACTOR: **HAMMER DROP (inch):** 30 / 30
WATER LEVEL DEPTHS (ft): Soils Damp to Moist Below 5', Saturated Below 14' +/-

GENERAL NOTES:

KEY TO NOTES AND SYMBOLS: Water Level
▽ At time of Drilling
▼ At Completion of Drilling
▼ After Drilling
D = Split Spoon Sample
U = Thin Walled Tube Sample
R = Rock Core Sample
V = Field Vane Shear
Pen. = Penetration Length
Rec. = Recovery Length
bpf = Blows per Foot
mpf = Minute per Foot
WOR = Weight of Rods
WOH = Weight of Hammer
RQD = Rock Quality Designation
PID = Photoionization Detector
S_v = Field Vane Shear Strength, kips/sq.ft.
q_u = Unconfined Compressive Strength, kips/sq.ft.
Ø = Friction Angle (Estimated)
N/A = Not Applicable

Elev. (ft)	Depth (ft)	Casing Pen. (bpf)	SAMPLE INFORMATION					Graphic Log	Sample Description & Classification	H ₂ O Depth	Remarks
			Sample No.	Type	Depth (ft)	Pen./ Rec. (in)	Blow Count or RQD				
85	5		1D	×	0-2	24/15	5-3-3-5		0.5 Organics / Topsoil (FILL) Layered, brown, loose silty SAND, and stiff silty CLAY, trace gravel (FILL)		
			2D	×	5-7	24/20	5-6-5-6		3.0 Stiff, brown and gray-brown, silty CLAY, trace sand, trace organics (FILL)		
80	10		3D	×	10-12	24/22	3-3-4-5		10.0 Very stiff to stiff, gray-brown, silty CLAY, with frequent clayey silt and silty sand seams		
75	15		4D	×	15-17	24/24	WOH/24"		14.0 Soft to medium, gray, silty CLAY, with occasional sand seams		
70	20		1V	□	20-21	12			S _v =0.41/0.02ksf		
			1V'	□	21-22	12			S _v =0.62/0.07ksf		
65	25		2V	□	25-26	12			S _v =0.27/0.01ksf		
			2V'	□	26-27	12			S _v =0.54/0.07ksf		
60	30		3V	□	30-31	12			S _v =0.49/0.02ksf		
			3V'	□	31-32	12			S _v =0.67/0.08ksf		
55	35		5D	×	35-37	24/2	6-3-3-3		33.0 Loose to medium dense, gray, gravelly silty SAND		
50	40		6D	×	40-42	24/6	9-6-6-6				

Bottom of Exploration at 42.0 feet

Stratification lines represent approximate boundary between soil types, transitions may be gradual. Water level readings have been made at times and under conditions stated. Fluctuations of groundwater may occur due to other factors than those present at the time measurements were made.

BORING NO.: B-102

KEY TO NOTES & SYMBOLS

Test Boring and Test Pit Explorations

Stratification lines represent the approximate boundary between soil types and the transition may be gradual.

Key to Symbols Used:

w	-	water content, percent (dry weight basis)
q _u	-	unconfined compressive strength, kips/sq. ft. - laboratory test
S _v	-	field vane shear strength, kips/sq. ft.
L _v	-	lab vane shear strength, kips/sq. ft.
q _p	-	unconfined compressive strength, kips/sq. ft. – pocket penetrometer test
O	-	organic content, percent (dry weight basis)
W _L	-	liquid limit - Atterberg test
W _P	-	plastic limit - Atterberg test
WOH	-	advance by weight of hammer
WOM	-	advance by weight of man
WOR	-	advance by weight of rods
HYD	-	advance by force of hydraulic piston on drill
RQD	-	Rock Quality Designator - an index of the quality of a rock mass.
γ _T	-	total soil weight
γ _B	-	buoyant soil weight

Description of Proportions:

Trace:	0 to 5%
Some:	5 to 12%
"Y"	12 to 35%
And	35+%
With	Undifferentiated

Description of Stratified Soils

Parting:	0 to 1/16" thickness
Seam:	1/16" to 1/2" thickness
Layer:	1/2" to 12" thickness
Varved:	Alternating seams or layers
Occasional:	one or less per foot of thickness
Frequent:	more than one per foot of thickness

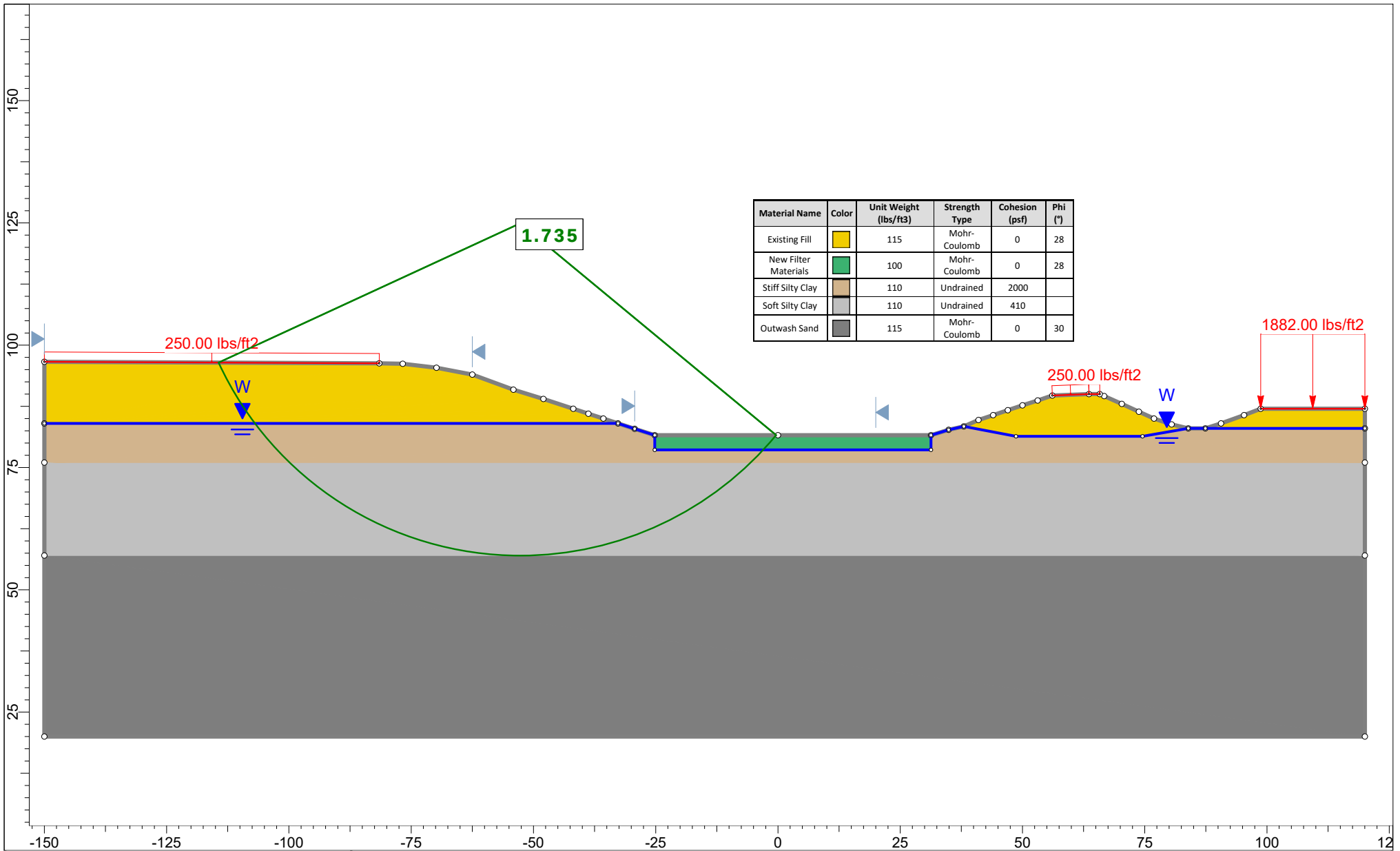
REFUSAL: Test Boring Explorations - Refusal depth indicates that depth at which, in the drill foreman's opinion, sufficient resistance to the advance of the casing, auger, probe rod or sampler was encountered to render further advance impossible or impracticable by the procedures and equipment being used.

REFUSAL: Test Pit Explorations - Refusal depth indicates that depth at which sufficient resistance to the advance of the backhoe bucket was encountered to render further advance impossible or impracticable by the procedures and equipment being used.

Although refusal may indicate the encountering of the bedrock surface, it may indicate the striking of large cobbles, boulders, very dense or cemented soil, or other buried natural or man-made objects or it may indicate the encountering of a harder zone after penetrating a considerable depth through a weathered or disintegrated zone of the bedrock.

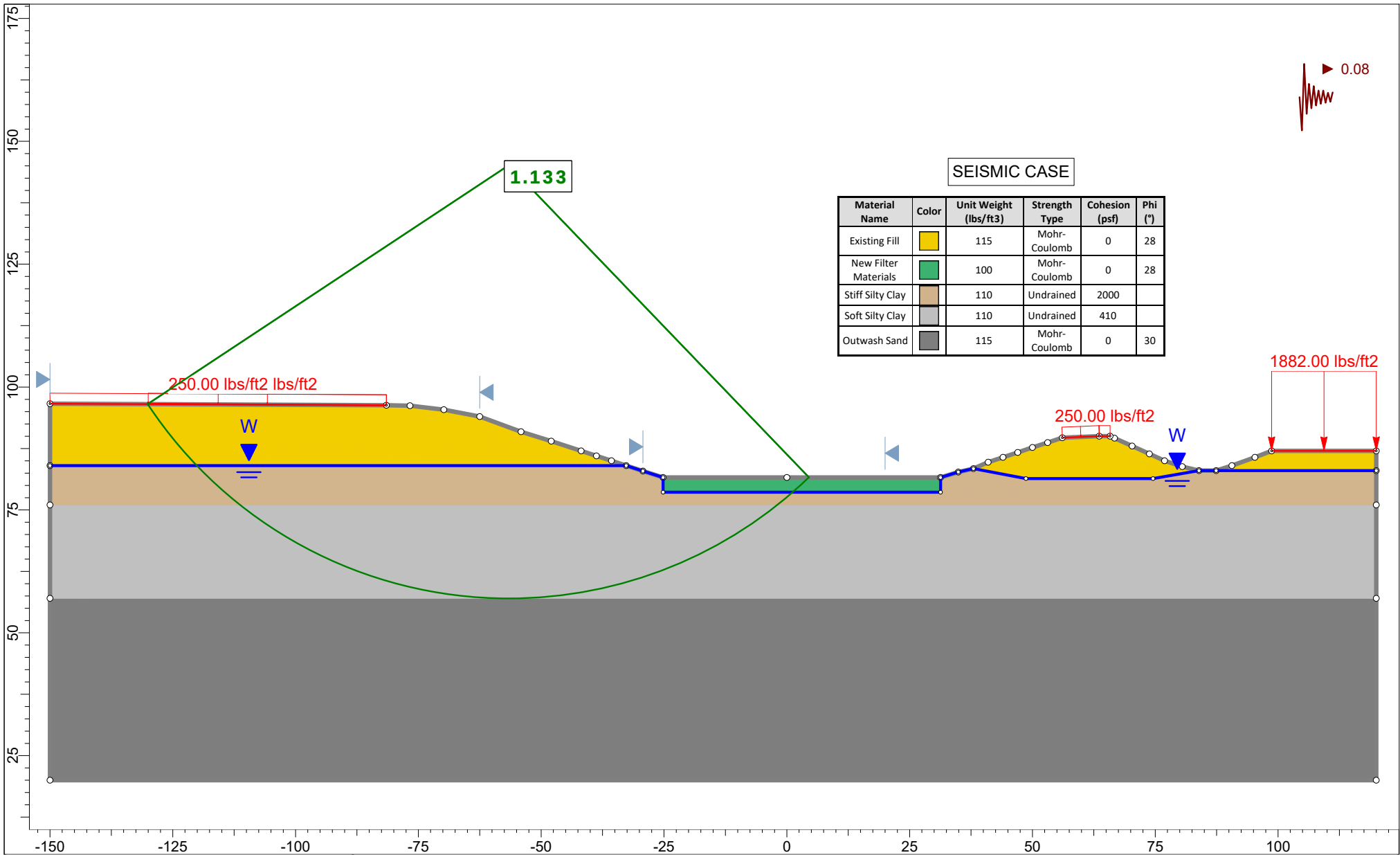
APPENDIX D

Global Slope Stability Evaluation Graphics

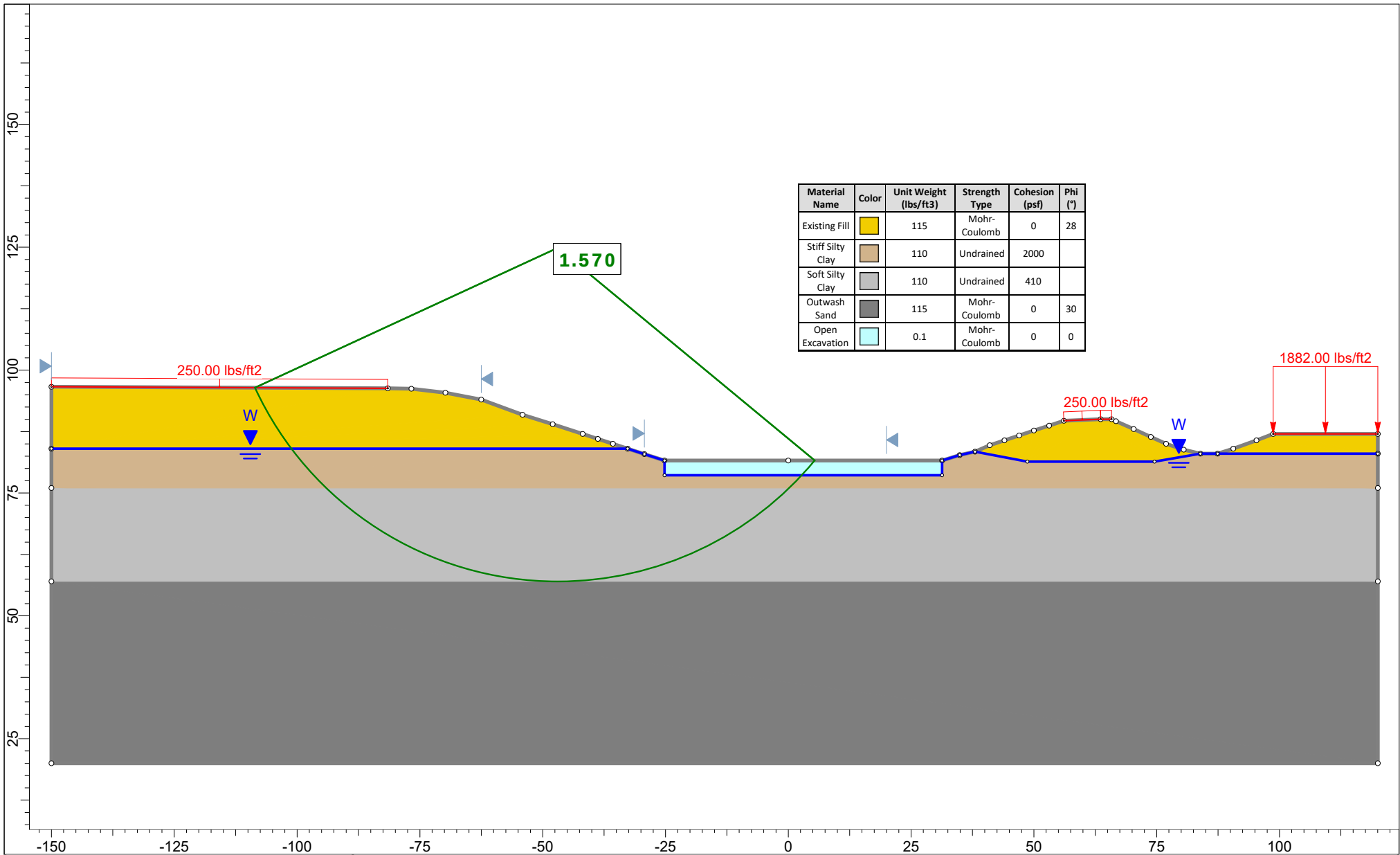


Material Name	Color	Unit Weight (lbs/ft ³)	Strength Type	Cohesion (psf)	Phi (°)
Existing Fill	■	115	Mohr- Coulomb	0	28
New Filter Materials	■	100	Mohr- Coulomb	0	28
Stiff Silty Clay	■	110	Undrained	2000	
Soft Silty Clay	■	110	Undrained	410	
Outwash Sand	■	115	Mohr- Coulomb	0	30

	Project		24-2454 Proposed Stormwater Basin Retrofit	
	Analysis Description		Global Stability	
	Drawn By		EMW	Company S.W. COLE ENGINEERING, INC.
	Date		4/8/2025, 10:58:21 AM	File Name 24-2454 Portland, ME Slide Model.slmd
	SLIDEINTERPRET 9.031			

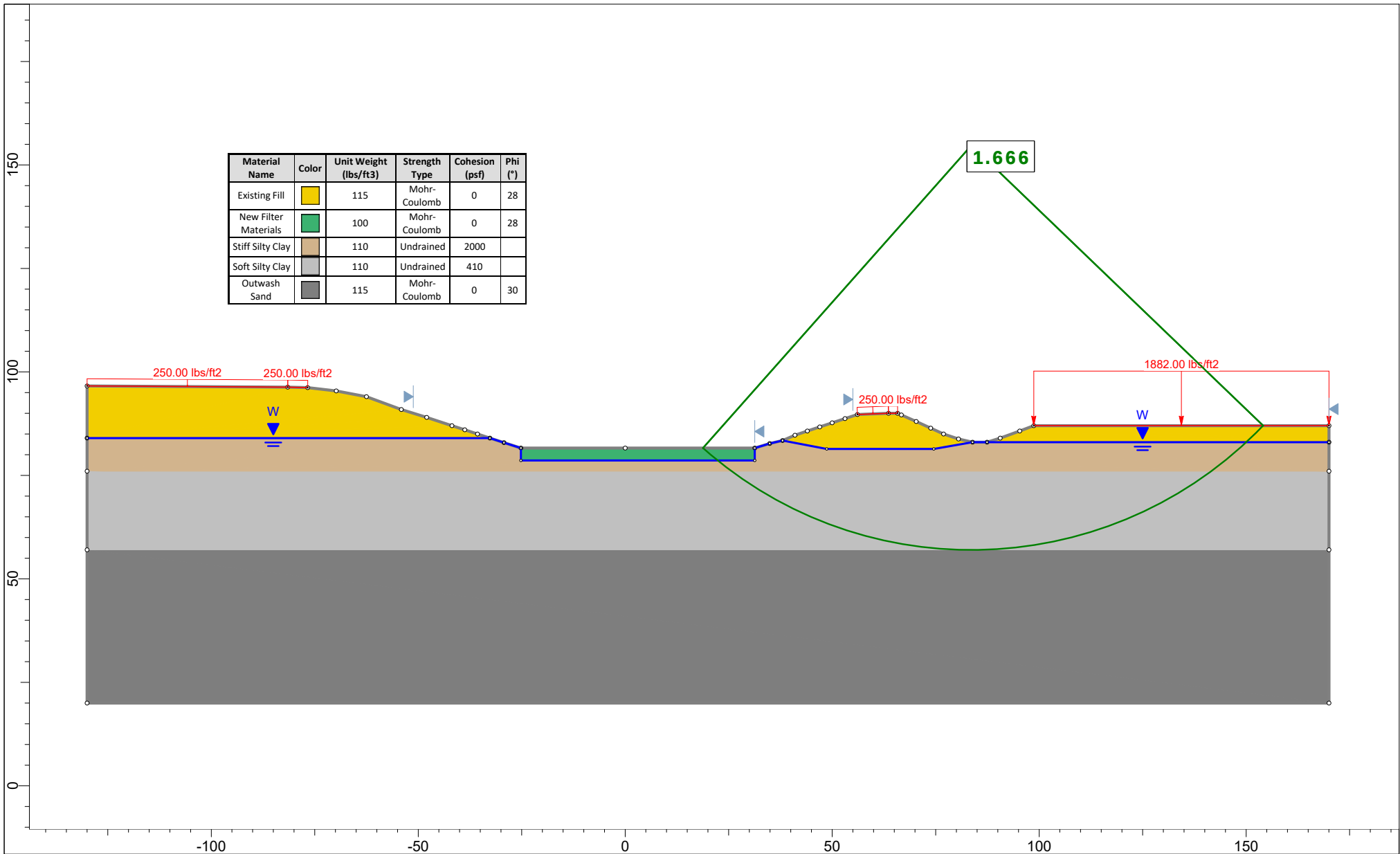


	Project		24-2454 Proposed Stormwater Basin Retrofit	
	Analysis Description		Global Stability	
	Drawn By		EMW	Company S.W. COLE ENGINEERING, INC.
	Date		4/8/2025, 10:58:21 AM	File Name 24-2454 Portland, ME Slide Model.slmd

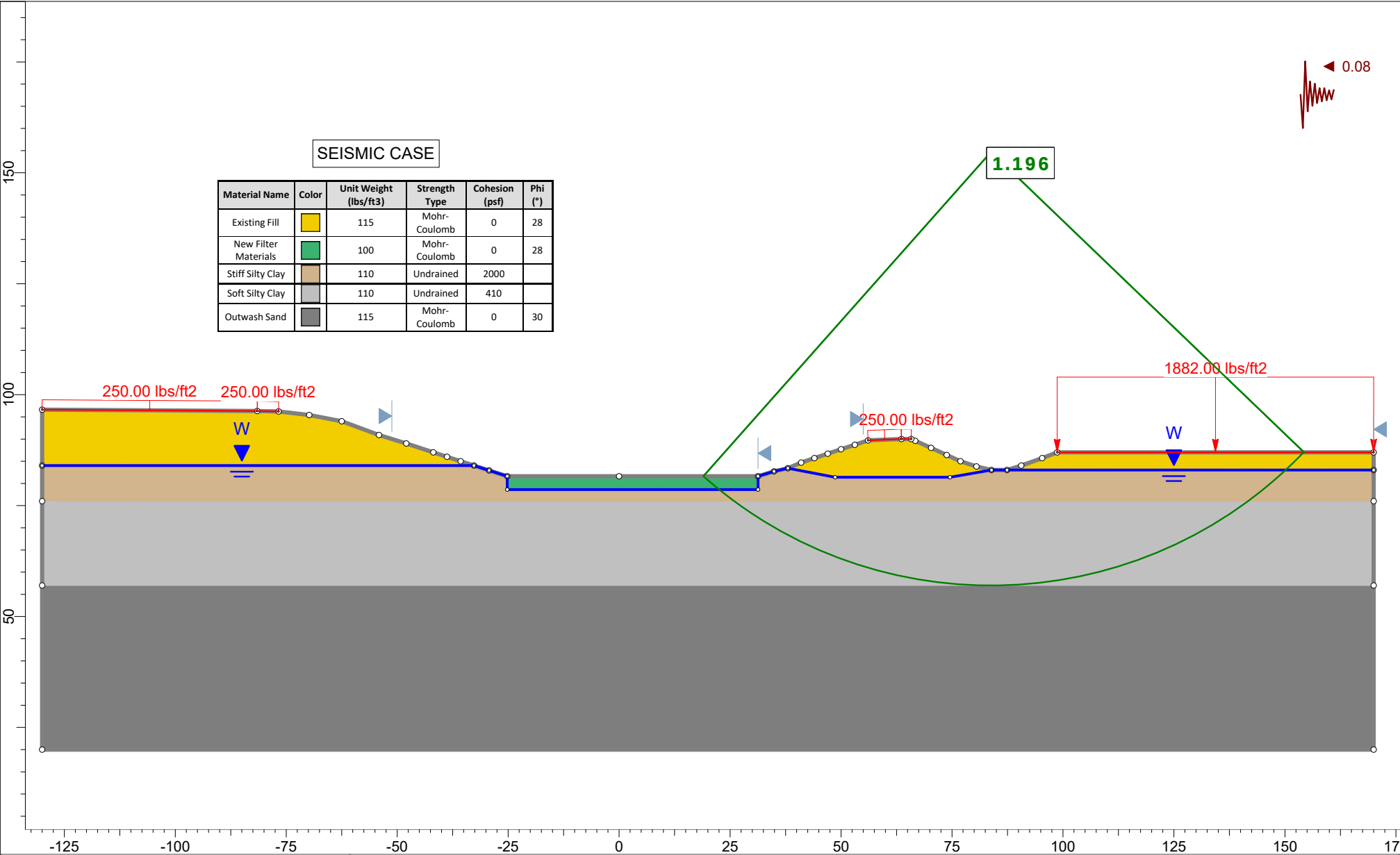


Material Name	Color	Unit Weight (lbs/ft3)	Strength Type	Cohesion (psf)	Phi (°)
Existing Fill		115	Mohr-Coulomb	0	28
Stiff Silty Clay		110	Undrained	2000	
Soft Silty Clay		110	Undrained	410	
Outwash Sand		115	Mohr-Coulomb	0	30
Open Excavation		0.1	Mohr-Coulomb	0	0

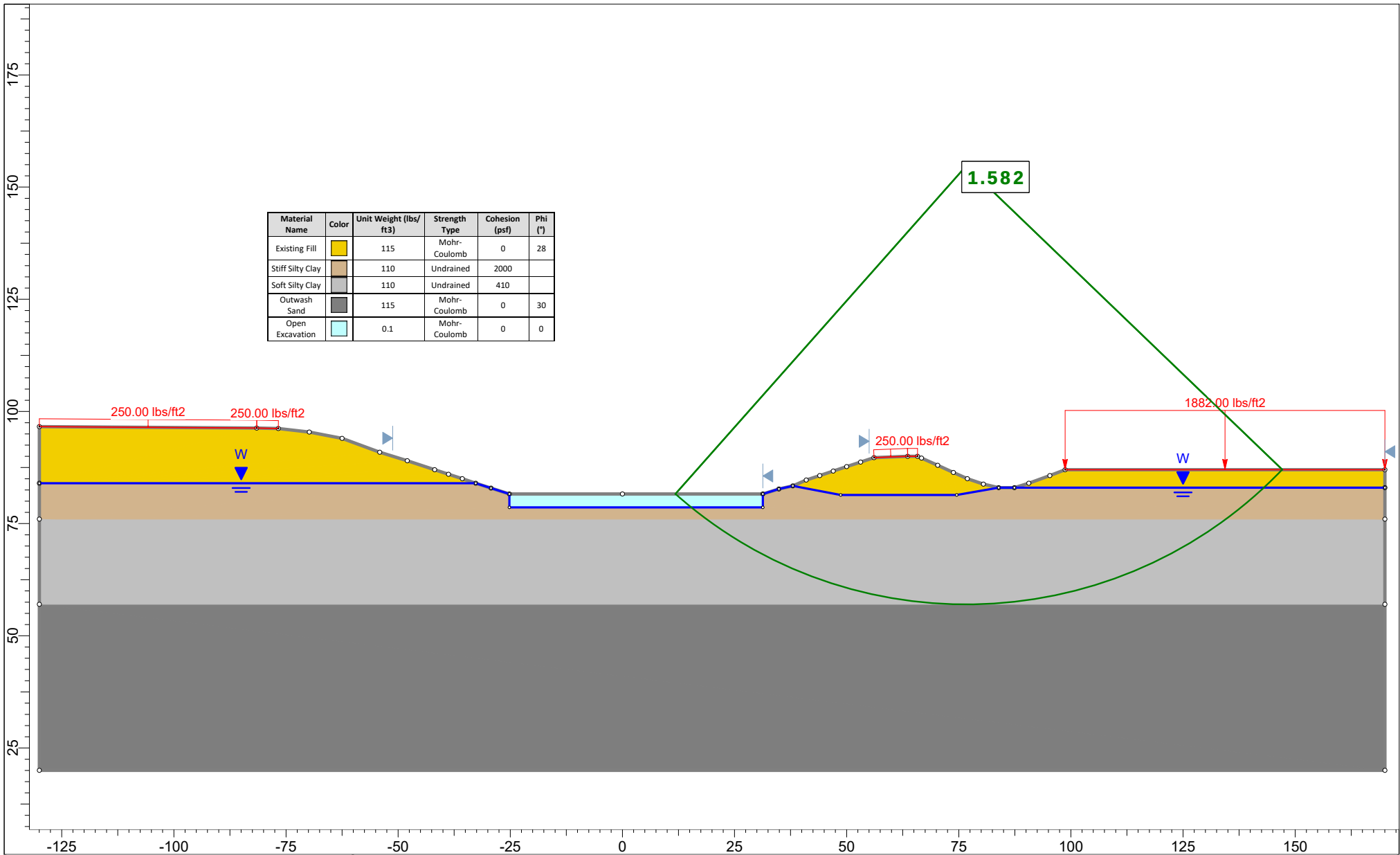
	Project	24-2454 Proposed Stormwater Basin Retrofit	
	Analysis Description	Global Stability	
	Drawn By	EMW	Company S.W. COLE ENGINEERING, INC.
	Date	4/8/2025, 10:58:21 AM	File Name 24-2454 Portland, ME Slide Model.slmd



	Project		24-2454 Proposed Stormwater Basin Retrofit	
	Analysis Description		Global Stability	
	Drawn By		EMW	Company S.W. COLE ENGINEERING, INC.
	Date		4/8/2025, 10:58:21 AM	File Name 24-2454 Portland, ME Slide Model.slmd



rocscience	Project		24-2454 Proposed Stormwater Basin Retrofit	
	Analysis Description		Global Stability	
	Drawn By		EMW	Company S.W. COLE ENGINEERING, INC.
	Date		4/8/2025, 10:58:21 AM	File Name 24-2454 Portland, ME Slide Model.slmd



	Project		24-2454 Proposed Stormwater Basin Retrofit	
	Analysis Description		Global Stability	
	Drawn By		EMW	Company S.W. COLE ENGINEERING, INC.
	Date		4/8/2025, 10:58:21 AM	File Name 24-2454 Portland, ME Slide Model.slmd

Appendix 7

Maine DEP Correspondence

Aaron Hunter

From: Aaron Hunter
Sent: Friday, January 31, 2025 5:13 PM
To: 'Justin Pellerin'; Sirois, Alison
Cc: Obropta, Cody; Reed Allen; Dylan Stuart
Subject: RE: [External] Palmer Avenue Detention Basin Retrofit Project - Portland ME

Hi All,

I am in agreement with Justin. There are no impacts to natural resources as we are proposing work within the existing detention pond footprint to retrofit it into a gravel wetland.

The proposed work will increase the non-revegetated by a minimal amount far less than 10,000 sf in order to construct a forebay and emergency spillway. It is my opinion that the proposed work would meet the site law exemption requirements based on the requirements outlined in the email below.

Please let me know if you require any additional information in order to allow us to proceed under the exemption.

Thanks,

Aaron Hunter, PE *Project Manager*

Sebago Technics, Inc. | An Employee-Owned Company
75 John Roberts Rd., Suite 4A, South Portland, ME 04106
Office: 207.200.2100 | Direct: 207.200.2099 |
ahunter@sebagotechnics.com | www.sebagotechnics.com



This notice and disclaimer regards the transmittal and use of electronic files generated and forwarded by Sebago Technics, Inc. This message contains confidential information and is intended only for the individual named. If you are not the named addressee, you should not disseminate, distribute or copy this email. Please notify the sender immediately by email if you have received this email by mistake and delete this email from your system. Email transmission cannot be guaranteed to be secure or error-free, as information could be intercepted, corrupted, lost, destroyed, arrive late or incomplete, or contain viruses. The sender, therefore, does not accept liability for any errors or omissions in the contents of this message which arise as a result of email transmission. If verification is required, please request a hard-copy version. The information contained in these electronic files is privileged and confidential and is intended only for the use of the individual or entity stated in the address above. Any dissemination, distribution or copying of these electronic files is strictly prohibited. The recipient of the electronic file acknowledges and consents to the fact that the sender, Sebago Technics, Inc. makes no claim that electronic files are current, accurate or correct. Any use or reuse of the electronic file in any manner whatsoever is at the user's sole risk and the user agrees, to the fullest extent permitted by law, to hold Sebago Technics, Inc. harmless and to indemnify it from all claims, losses, damages, expenses and costs including all reasonable attorneys fees that may arise from its use or reuse.

From: Justin Pellerin <jrp@portlandmaine.gov>
Sent: Friday, January 31, 2025 10:15 AM
To: Sirois, Alison <Alison.Sirois@maine.gov>
Cc: Obropta, Cody <Cody.Obropta@maine.gov>; Aaron Hunter <ahunter@sebagotechnics.com>; Reed Allen <rhallen@portlandmaine.gov>
Subject: Re: [External] Palmer Avenue Detention Basin Retrofit Project - Portland ME

Thanks Alison and Cody.

The project is proposing to disturb area within the existing detention pond, so I don't think there will be any additional natural resource impacts. Aaron - do you agree with that?

I'll also let Aaron weigh in on the possibility of an exemption. I believe nearly all of the project's disturbed area will be revegetated outside of a rip-rap emergency spillway. I don't think that would exceed the 10,000 SF threshold listed in that exemption.

Thanks

Justin Pellerin, P.E.
Senior Water Resources Engineer
Department of Public Works
jrp@portlandmaine.gov
207-874-8881



On Wed, Jan 29, 2025 at 1:25 PM Sirois, Alison <Alison.Sirois@maine.gov> wrote:

Hi Justin,

As Cody stated, yes, you would need to amend the Site permit by way of a minor amendment.

Are there any natural resources or wetland impacts associated the project site?

And, I haven't reviewed this closely but does this fit within the Site Law exemption thresholds?

[§488. Applicability](#)

29. Exemption for new construction at or modification of existing development. New construction at or modification of an existing licensed development that is permitted pursuant to this article is exempt from review under this article if:

A. The additional disturbed area not to be revegetated does not exceed 10,000 square feet ground area in any calendar year and does not exceed 20,000 square feet ground area in total; and [PL 2013, c. 183, §1 (NEW).]

B. The construction or modification does not involve a division of the parcel of land. [PL 2013, c. 183, §1 (NEW).]

The permittee shall annually notify the department of any new construction or modification undertaken during the previous 12 months that is governed by this subsection. The notice must identify the type, location and ground area of the new construction or modification. At the time of the annual notification, the permittee shall provide to the department development plans, certified by a professional engineer, for new construction or modification governed by this subsection.

[PL 2013, c. 183, §1 (NEW).]

From: Justin Pellerin <jrp@portlandmaine.gov>

Sent: Tuesday, January 28, 2025 2:38 PM

To: Sirois, Alison <Alison.Sirois@maine.gov>

Cc: Obropta, Cody <Cody.Obropta@maine.gov>; Aaron Hunter <ahunter@sebagotechnics.com>; Reed Allen <rhallen@portlandmaine.gov>

Subject: Palmer Avenue Detention Basin Retrofit Project - Portland ME

EXTERNAL: This email originated from outside of the State of Maine Mail System. Do not click links or open attachments unless you recognize the sender and know the content is safe.

Good Afternoon Alison and Cody.

The City of Portland DPW is working on a stormwater retrofit project which will convert an existing stormwater detention basin into a gravel wetland system aimed at increasing the water quality and flow control performance of the existing facility. This project is being completed as one of the City's required BMP's to be implemented in the Dole Brook watershed in accordance with the City's Stormwater Management Plan and MS4 permit requirements.

The existing detention basin was constructed as part of a single family subdivision development, known at that time as the Deering Run Subdivision, to provide flood control for the 33 acre residential neighborhood at the time the area was developed. It's my understanding that the detention basin was deeded and turned over to the City at the conclusion of the project for O&M purposes.

We have found documentation that this subdivision project was permitted under an existing SLODA permit in 1987 by the DEP. I've attached a copy of this permit for your review.

I have also attached a 30% level drawing of the proposed gravel wetland and the project design report completed by Sebago Technics. The only land disturbance associated with this project will be associated with the pond retrofit itself. We are not proposing any new developed or impervious areas.

Do we need to amend the existing SLOD permit? Since this is a City project we would probably need to submit any SLOD permit modification application directly to the DEP for review despite the City's delegated review status.

If it's determined we don't need to update the SLOD permit, is there any other permitting the DEP would require?

Thanks for your time and review of this inquiry. Please let me know if you have any questions.

Justin Pellerin, P.E.

Senior Water Resources Engineer

Department of Public Works

jrp@portlandmaine.gov

207-874-8881



Appendix 8

Original Stormwater Calculations



BOSTON & MAINE CORPORATION
DELAWARE & HUDSON RAILWAY M.P.
MAINE CENTRAL RAILROAD COMPANY

PORTLAND TERMINAL COMPANY

APPENDIX VI



Rigby Road West, P.O. Box 9701, Portland, Maine 04104 - (207) 773-6036

Administration Building
December 3, 1985

SUBJECT: Deering Run Subdivision

Mr. J. R. Nester
Granger Northern, Inc.
One Canal Plaza
P.O. Box 7230
Portland, Maine 04112

Dear Mr. Nester:

With reference to your letter of November 8, 1985 and letter with attachments of November 5, 1985 from W. P. Stinson, the Portland Terminal Company has no objections to the Deering Run Subdivision, subject to the following:

It is understood that the City of Portland will take in fee the detention basin and will maintain the basin, outlet pipe and the rip-rap apron extending from the outlet pipe to the Railroad's stone box culvert.

It is understood that the ditch between this detention basin and the toe of the railroad slope will be a minimum of 15' wide as stated in the design calculations.

It is understood that there will be an easement or deed restriction for a 40' wide "greenbelt" in the deed for each subdivision lot abutting the Railroad's right of way. Although there may be some changes to the draft of the deed restriction, it is understood that the City will have enforcement rights in the "greenbelt" to assure that the "greenbelt" will continue to function as intended.

Very truly yours,

R. H. Potter
Engineer of Structures

cc: Walter P. Stinson, P.E.
Sebago Technics, Inc.
9 Circus Time Road
So. Portland, Maine 04106

Marc Guimond, City Engineer
City of Portland
55 Portland Street
Portland, Maine 04101

RHP:ds

8542A

RUNOFF AND DRAINAGE EVALUATION

DEERING RUN SUBDIVISION

PORTLAND, MAINE

Watershed Description

The Deering Run Subdivision comprises a 31.5 acre tract of land lying southwesterly of Washington Avenue in Portland, Maine.

The proposed subdivision lies in the Presumpscot River Watershed.

The 31.5 acre tract is wooded. The terrain is primarily rolling with gentle slopes with an average gradient of 3.5%. The area was soil mapped as being of marine origin, primarily the Buxton, Deerfield, Scantic, Suffield/Hinckley complex series.

Evaluation Procedures

The purpose of the evaluation was to comply with Exhibit "E", Section 6 Technical Supplement to Portland's Subdivision Ordinance for reviewing land subdivisions, and identify the expected impact on peak volume of stormwater runoff that could be expected as a result of project development. The 2 and 25-year, 24-hour design storms were used in the evaluation process.

Peak runoff rates were estimated in accordance with methods developed by the United States Department of Agriculture's Soil Conservation Service. The procedures and methods are described in detail in the Agency's Technical Release 55 and the Greater Portland Council of Governments Stormwater Manual.

Summary and Conclusions

The proposed 88 unit subdivision has been carefully planned to provide maximum protection to the Presumpscot River Watershed and abutting landowners. The hydrologic analysis of this watershed produced no significant impacts to the abutting landowners. The 88 residential units represent a conversion of about 95% of the woodland to impervious use. This is reflected in the increase of RCN value from 69 to 77 for the total project. In terms of land use/soil type/runoff relationships, this could be considered to be an average RCN value increase in terms of a before and after situation.

The present and future runoff rate comparison shows an increase of 2.8 cfs per acre. Times of concentration decrease from .67 hrs to .21 hrs. These increases in hydrologic values occur on the

site because the runoff is primarily overland street gutter and conduit flows. To reduce any chance of offsite impacts to abutting landowners and an existing stormwater disposal system(s) a retention/storage basin will be established as part of the site development and in the undeveloped area below Palmer Drive.

Stormwater release will not exceed the predevelopment rates. The detention facility is designed in accordance with City of Portland standards for stormwater detention, and provides a level of control for both 2-year and 25-year storm events. A total of approximately 45,000 cubic feet of temporary stormwater storage will be provided to control the 2-year storm event, while approximately 150,000 cubic feet of temporary storage will provide a level of control for the 25-year storm event.

The key to limiting outflow rate from the structure will be the two culverts which will control outflow from the facility to predevelopment levels. The maximum water depth for the 2-year storm event will be about 3.8 feet, while the maximum storage depth for the 25-year storm event will be approximately 7.2 feet. These peak depths of stormwater storage will occur for very short periods of time. We anticipate the structure to be completely dewatered during the 2-year storm event in less than 3 1/2 hours after the cessation of rainfall. Dewatering time during the 25-year storm event was estimated to be approximately 6 1/2 hours after the cessation of rainfall.

In conclusion, we feel that this development as planned poses no threat to water quality or land resource values. The sediment and erosion control plan will provide maximum protection during the development phase.

Prepared by:

Walter P. Stinson
Professional Engineer

①

Peering Run Phase

Granger Northern

By WRS 7/85

Detention Area Computations

Hydrology Evaluation - SCS Curve No. Method

Ret: SCS TR 55

2yr & 25yr design storms

Outlet of proposed detention area is

culvert No. 3 - See attached Watershed map.

a. Watershed Area

(1) Area before development contributing to this culvert is Area III B = 18.9 Ac.

(2) Area after development contributing to this culvert is Area III A = 31.5 Ac.

b. Land use

Before Woods light tree growth.

After: 95% - 1/4 Ac House lots.

5% Woods light growth.

c. Soils 25% HSG A

75% HSG C.

(2)

d. Runoff Curve Nos.

Before

8 Acs - HSG A - Woods	RCH 45	25
23.5 Acs HSG C - Work.	RCH 77	70

$$\text{Weighted RCH} = \frac{8 \times 45 + 23.5 \times 77}{31.5} = 69$$

After

1.5 Acs. HSG A - Woods	RCH 45
6.5 Acs HSG A - $\frac{1}{4}$ Ac House lots	RCH 61
23.5 Acs. HSG C - $\frac{1}{4}$ Ac House lots	RCH 83

$$\text{Weighted RCH} = \frac{1.5 \times 45 + (6.5 \times 61) + (23.5 \times 83)}{31.5} = 77$$

e Time of Concentration

Before

All overland Flow - 1700 L.F. Ave Slope 3.5%
 $V = 0.7$ fps. (Fig 3-1, TR 55)

$$T_c = \frac{1700}{0.7} = 2428 \text{ sec} = 40 \text{ min} = \underline{0.67 \text{ hrs.}}$$

After. 800 ft overland. ave slope 6%, $V = 2$ fps.

1700 ft pipe ave Slope: 1%

ave size = 15", ave $q = 10$ cfs, $V = 5$ fps.

(3)

$$T_c = \frac{800}{2} + \frac{1700}{5} = 400 + 340 = 740 \text{ sec.}$$

$$= 12.3 \text{ min.} = \underline{\underline{.2 \text{ hrs.}}}$$

Ret: Chan 5 - TR 56

$$q \text{ for } T_c = 0.67 \text{ hrs} = 435 \text{ csm}$$

$$q \text{ for } T_c = 0.21 \text{ hrs} = 800 \text{ csm}$$

Storm Duration.	P-25	R ₂₅ Before Development	R ₂₅ After Development
2 yr	2.6"	0.47"	0.8"
25 yr	5.4"	2.25"	2.96"

$$Q_{\text{peak}} = \frac{q \times R \times A}{640}$$

Storm Duration.	Peak Runoff Before Dev.	Peak Runoff After Dev.
2 yr	60 cfs (1)	31.5 cfs
25 yr	29 cfs (20)	116 cfs

Stormwater storage vols req'd for detention:

$$\underline{2 \text{ yr}} \quad \frac{Q_o}{Q_i} = \frac{6.0}{31.5} = 0.19$$

$$\frac{2}{31.5} = 0.10$$

④

$\therefore \frac{V_s}{V_r}$ to achieve this (Table A, pg 11-558, Eng. Field/Man.)

$$= 0.49$$

$$\therefore V_s = \frac{0.49 \times 0.8'' \times 31.5 \text{ Hrs.}}{12 \text{ ft}} = 1.03 \text{ Ac Ft} \quad \left(\frac{913}{1000} \right)$$

$$44,823 \text{ ft}^3$$

25 yr.

$$\frac{Q_o}{Q_i} = \frac{29}{116} = 0.25$$

$$\therefore \frac{V_s}{V_r} = 0.445$$

$$V_s = \frac{2.96}{12} \times 31.5 \times 0.445 = 3.45 \text{ Ac Ft} = 150,615 \text{ ft}^3$$

PROJECT R.W. GRANGER SITE	COMP. BY JYM	JOB NO. 8542
	CHK. BY	DATE 8/15/85

SCALE: 1"=40'

ELEV	IN ²	AREA	INC. Volume	Cum. Volume
82	0	0	0	0
83	5.86	9376	4688	4688
84	11.73	18768	14072	18760
85	13.75	22000	20384	39144
86	15.22	24352	23176	62320
87	16.59	26544	25448	87768
88	18.01	28816	27680	115448
89	19.43	31088	29752	145400
90	20.84	33344	32216	177616
91	22.54	36064	34704	212320

