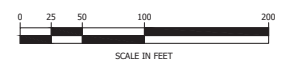


- EXISTING LOT LINE
- SUBJECT PROPERTY BOUNDARY LINE
- WATERSHED BOUNDARY
- SOIL MAP UNIT BOUNDARY
- SOIL MAPPING LIMIT
- GRAVEL ROAD
- MINOR CONTOUR (2')
- MAJOR CONTOUR (10')

LEGEND

- PERENNIAL STREAM
- INTERMITTENT STREAM
- EPHEMERAL FLOW
- FLOW DIRECTION
- EXISTING WETLAND

- BEAVER DAM
- TEST PIT LOCATION AND ID



DATE OF PRINT
MARCH 27 2023
HORIZONS ENGINEERING



PROJECT #:	19045	DATE:	MARCH 2023	NO.	REVISION DESCRIPTION
SURVEYED BY:	HEI	CHECKED BY:			
ENGINEERED BY:	MCLOWR				
DRAWN BY:	BIDDYRP				
CHECKED BY:	MCLOWR				

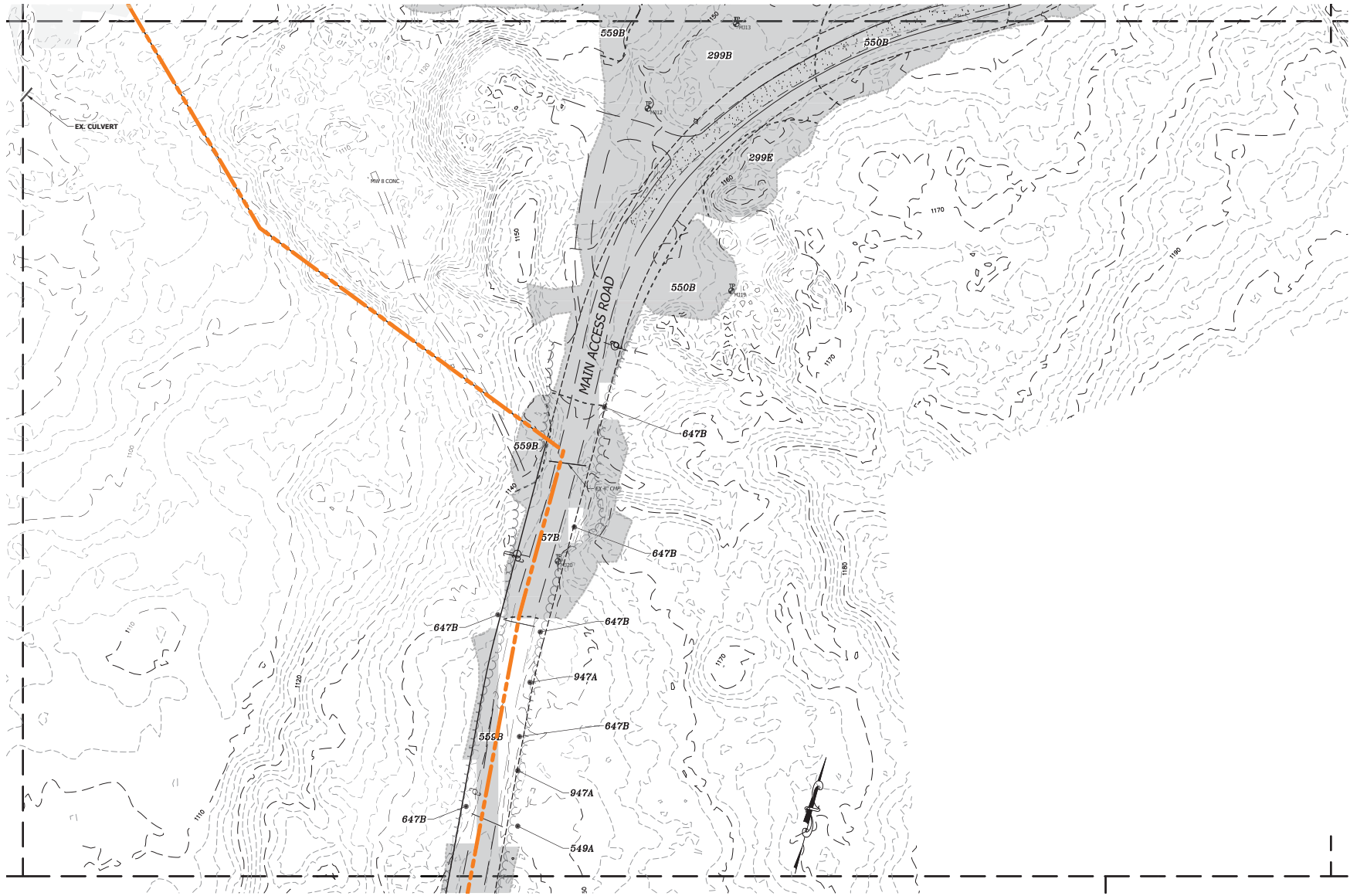


horizons Engineering
 Engineering • Land Surveying • Environmental
 PAUL & NEW HAMPSHIRE A VEKSWOY
 www.horizonsengineering.com

GRANITE STATE LANDFILL, LLC
 DALTON, NEW HAMPSHIRE
 SITE SPECIFIC SOIL PLANS
 SOIL MAPPING PLAN

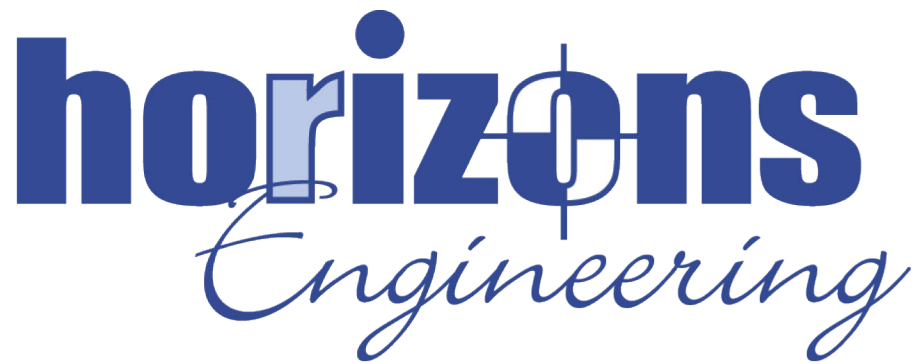
SHEET S-7

2:\proj_2019\03\0105\0305 - 03a.mxd\DWG\plan\SSS045_S01_S01.dwg, 7:10:28 AM, 3/27/2023 10:02:38 AM, Kurnar@hobas.com



Appendix M

Infiltration Feasibility Report



PROPOSED GRANITE STATE LANDFILL INFILTRATION FEASIBILITY REPORT



Granite State Landfill
Dalton, NH
October 20, 2023

Table of Contents

Cover Letter

Introduction..... 1

Results..... 2

Conclusion 3



34 School Street • Littleton, NH 03561 • Phone 603-444-4111 • Fax 603-444-1343 • www.horizonsengineering.com

October 20, 2023

New Hampshire Department of Environmental Services
Land Resources Management
29 Hazen Drive
Concord, New Hampshire 03302

Subject: Proposed Granite State Landfill – Infiltration Feasibility Report

This report was prepared in reference to the Alteration of the Terrain Permit Application for the proposed Granite State Landfill and in accordance with New Hampshire Department of Environmental Services (NHDES) Env-Wq 1504.13. All activities were conducted by or under the supervision of Horizons Engineering Staff members Ethan Jennings, Nick Barker, and Joel Banaszak.

An investigation of infiltration rates was conducted at 8 out of 13 proposed stormwater infiltration practices. This report includes the results that pertain to the stormwater infiltration basin design of April 2023, as shown on the Proposed Infiltration Practice Map. A tabular summary of results at other locations is included for reference. The results presented in this report are based on fieldwork conducted in 2021 and 2022 to investigate previous potential stormwater infiltration basin layouts. Additional infiltration testing is required to determine the design infiltration rate for some of the proposed stormwater infiltration basins.

A total of 16 test locations within the current stormwater infiltration basin layout were either excavated or drilled between October 12, 2021, and October 10, 2022. Test pits and boreholes were logged in accordance with NHDES Env-Wq 1504.13(e). Infiltration test was conducted between October 25, 2021, and October 27, 2022, through the implementation of the Borehole Infiltration test as outlined in NHDES Env-Wq 1504.14(e)(4).

Please do not hesitate to contact the undersigned at (603) 575-9272 if you have any questions or require additional information.

Sincerely,

A handwritten signature in black ink, appearing to read "Ethan Jennings", is written over a light blue horizontal line.

Ethan Jennings
Geologist
Horizons Engineering

Horizons Engineering, Inc.

MAINE • NEW HAMPSHIRE • VERMONT

INTRODUCTION

Eleven stormwater infiltration basins requiring a determination of a design infiltration rate per Env-Wq 1504.13 are proposed for the site of the Granite State Landfill in Dalton, NH.. In order to determine the design infiltration rate, test pits/bores were installed and the infiltration rate at each tested. Eight of the eleven proposed infiltration basins have been fully or partially tested pursuant to Env-Wq 1504.14.

Extensive fieldwork over late 2021 and 2022 was undertaken in order to determine the design infiltration rates for previous stormwater infiltration basin design plans for the site. Infiltration test results from that fieldwork provide the basis for this report, and the relevant testing location's nomenclature has been updated to match the current infiltration basin design plan as of April 2023. In total, 16 locations over the eight basins were installed, either by drilling or excavation, and tested with the borehole infiltration test method in order to determine their design infiltration rate. 4" PVC casing was installed to a depth of 2' below the elevation of the Bottom of Practice (BOP) for each basin. 24" of water was delivered to each testing location from a pre-measured container 24 hours before testing commenced. Testing consisted of adding 24" of water to each location and measuring water level change over a 1-hour period. Immediately after the end of the test, another 24" of water was added and the test was repeated for a total of 4 tests at each location. Observed infiltration rates were averaged at each location, and the infiltration rate for each site was determined to be the average or the final test value, whichever was lower. For each potential stormwater infiltration basin, the results of each test location within the basin were averaged to produce a basin infiltration rate multiplied by 0.5 to produce a design infiltration rate.

A plan of the current stormwater infiltration pond design and test locations and a site-specific soil series plan is included in **Appendix A**.

RESULTS

The average and design infiltration rates for these basins are summarized in the table below:

Basin:	Average Infiltration Rate (in/hr)	Design Infiltration Rate (in/hr)
2	23.94	11.92
4	>24	>12
DD6	>24	>12
7	21.42	10.71
9	>24	>12
10	>24	>12
12	8.16	4.08
13	17.40	8.702

The calculated design infiltration rates at the majority of the basins tested in this field effort are above 10 in/hr. Pond 12 and Pond 13 exhibited rates lower than 10 in/hr but higher than .50 in/hr. Observed infiltration rates at individual testing locations varied from 0 in/hr to above 24 in/hr, with higher values predominant.

Test location summaries, pit/bore logs, and field data sheets from the infiltration tests undertaken in the 8 basins tested are included in **Appendix B**. A table summarizing the infiltration rates at from infiltration tests site-wide is included in **Appendix C**. Evidence of seasonal high-water table (SHWT) was scant in the test pits, likely due to the sandy soil drainage class. Estimates of SHWT presented in the logs were based on observations of root depth in the majority of cases and do not represent the SHWT determination for the design of the basins. SHWT has been determined for the basins via groundwater monitoring conducted by Sanborn, Head & Associates Inc.

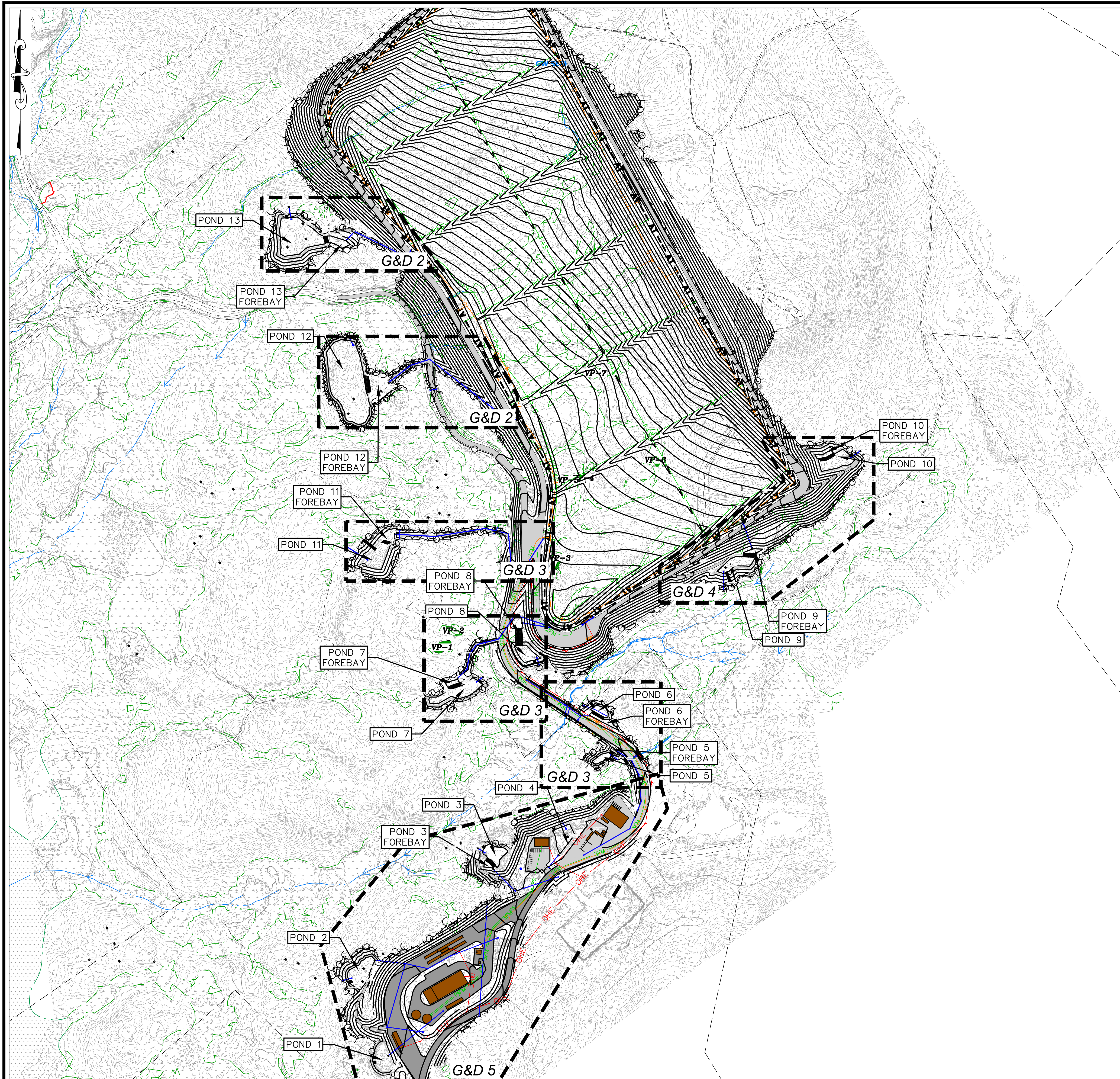
CONCLUSIONS

Design infiltration rates are high at this site. Most locations tested had measured infiltration rates higher than 24 in/hr. Confining layers were rarely observed above the bedrock surface.

Design infiltration rates for three of the proposed basins have yet to be established through field testing, and additional test locations are necessary for some of the basins that have had test locations installed. Testing progress for each proposed basin is summarized below:

Basin:	Basin Surface Area (sf)	# of Testing Locations Installed	# of Testing Locations Required
DD6	1241	1	1
2	6655	2	3
3	5925	0	3
4	7070	1	3
5	1390	0	1
7	9696	2	4
8	5775	0	3
9	4750	1	2
10	5390	1	3
11	5680	0	3
12	55100	3	23
13	23580	5	10

Appendix A
Proposed Stormwater Infiltration Basin Plan
Site-Specific Soil Series Plan



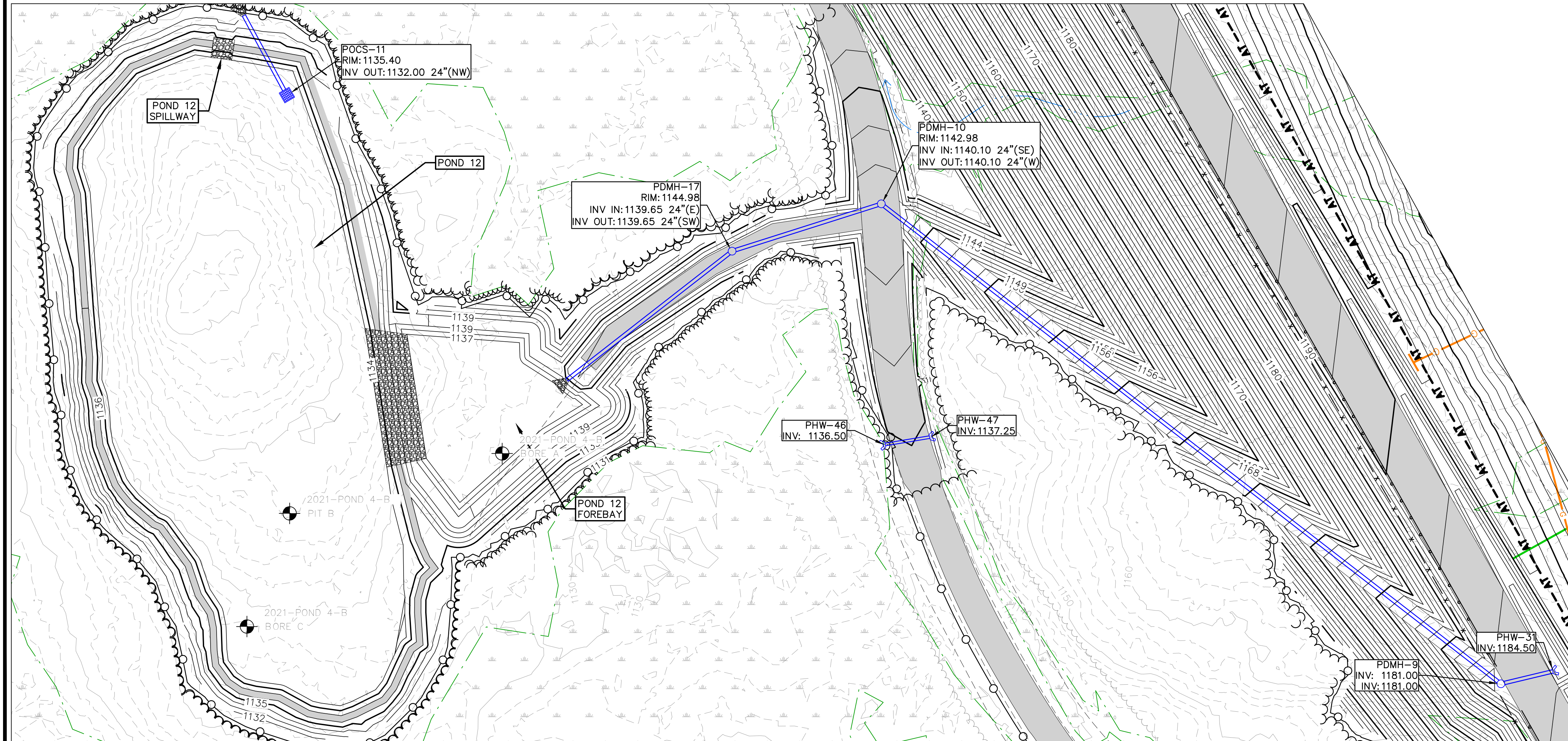
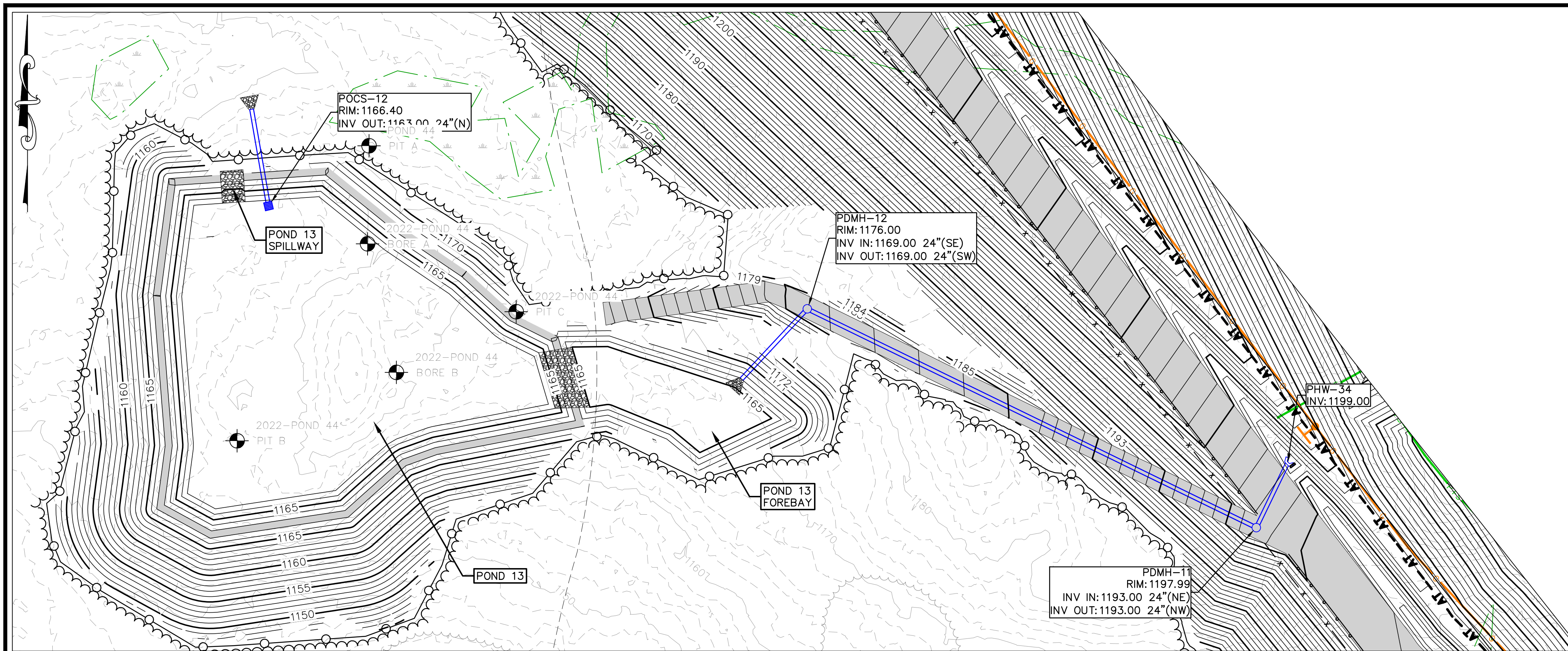
Notes:

- Proposed grades shown within the anchor trench represent top of sand base grades. Proposed grades shown outside the anchor trench represent final grades.
- Wetlands shown are wetlands remaining after permitted wetland filling.
- Refer to Sheets 9, 10, 11, and 12 for additional detail.

Legend

- Existing 2' Contour
- Existing 10' Contour
- Existing Tree Line
- Existing Edge of Gravel
- Existing Perennial Stream
- Existing Intermittent Stream
- Wetland Delineation Limit (See Note 2)
- Proposed 1' Contour
- Proposed 5' Contour
- Proposed Anchor Trench
- Proposed Erosion Control (Compost Sock, Silt Fence, ECM Berm)
- Proposed Guardrail
- Proposed Wall
- Proposed Treeline
- Proposed Litter Fence
- Proposed Gas Line
- Proposed Forcemain
- Proposed Overhead Electric
- Proposed Sewer
- Proposed Pavement Road
- Proposed Gravel Road

<p>CMA ENGINEERS <small>CIVIL/ENVIRONMENTAL/STRUCTURAL</small></p> <p>Portsmouth, NH 603/431-6196 • Manchester, NH 603/627-0708 • Portland, ME 207/641-4223</p> <p>cmaengineers.com</p>		no.	revision	date	by
		no.	revision	date	by
<p>Granite State Landfill, LLC Dalton, New Hampshire NHDES Standard Permit for Solid Waste Landfill Application Stormwater Ponds Grading and Drainage Plan Index</p>		<p>designed by: R/JG</p>	<p>drawn by: ATRU/MSTF</p>	<p>approved by: R/JG</p>	
<p>date: April 2023</p>	<p>project no: 1101</p>	<p>checked by: R/JG</p>	<p>scale: 0 250' 500' Scale: 1" = 250'</p>		
<p>drawing no. G&D-1</p>		<p>sheet: 8 of 50</p>			



no.	revision	date	by

CMA ENGINEERS
 CIVIL/ENVIRONMENTAL/STRUCTURAL
 Portsmouth, NH • Manchester, NH • Portland, ME
 603/431-6196 • 603/627-0708 • 207/541-4223
 c m a e n g i n e e r s . c o m

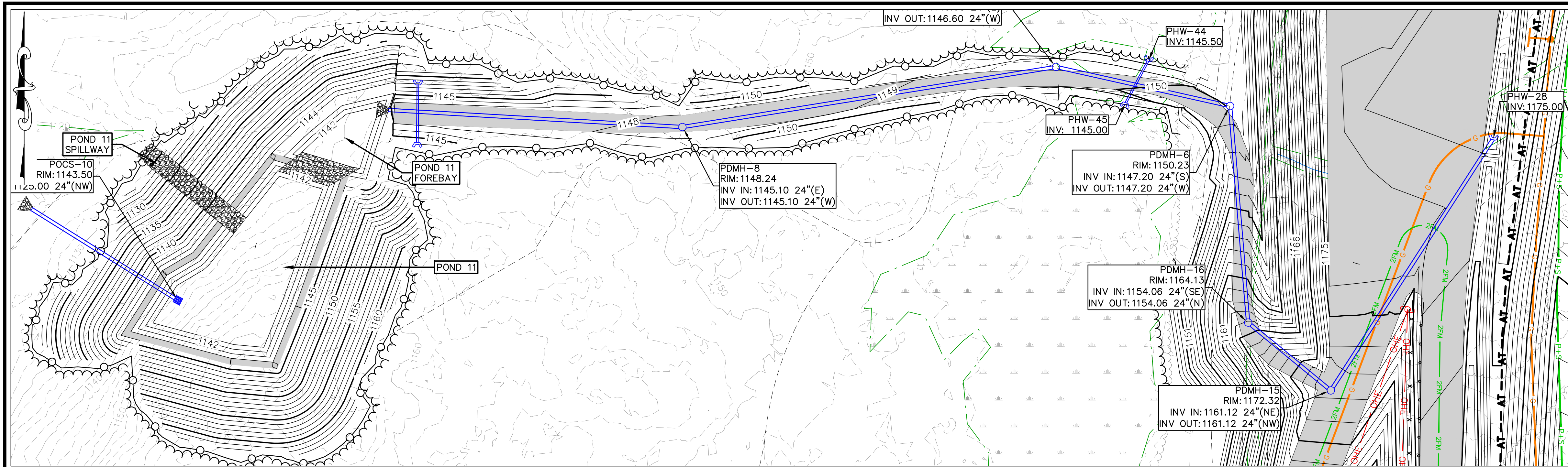
Granite State Landfill, LLC
 Dalton, New Hampshire
 NHDES Standard Permit for
 Solid Waste Landfill Application
 Stormwater Ponds
 Draining and Drainage Plan 1

date:	April 2023	designed by:	R/JG
project no.:	1101	drawn by:	ATRU/JMSTF
checked by:	R/JG	approved by:	R/JG

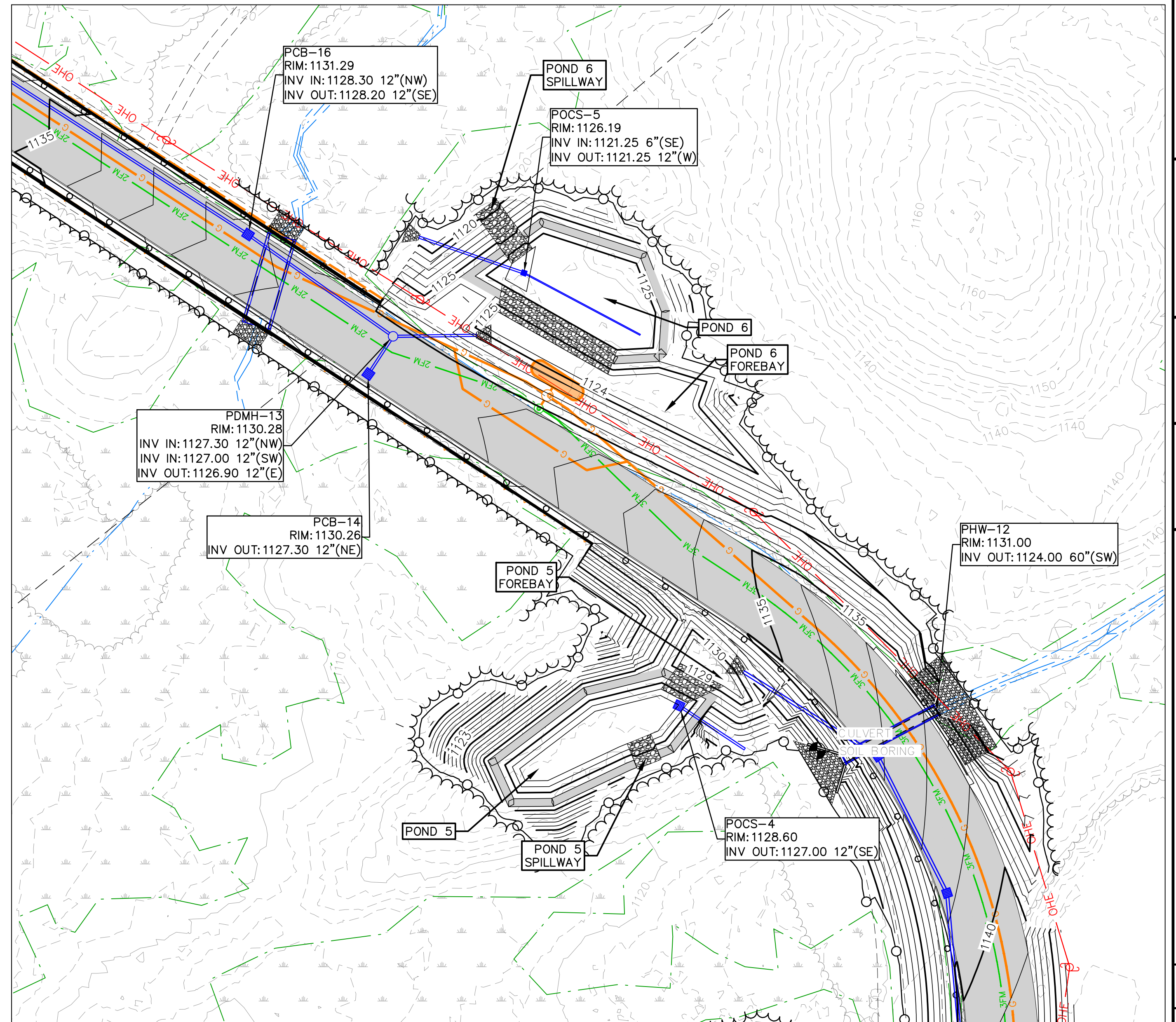
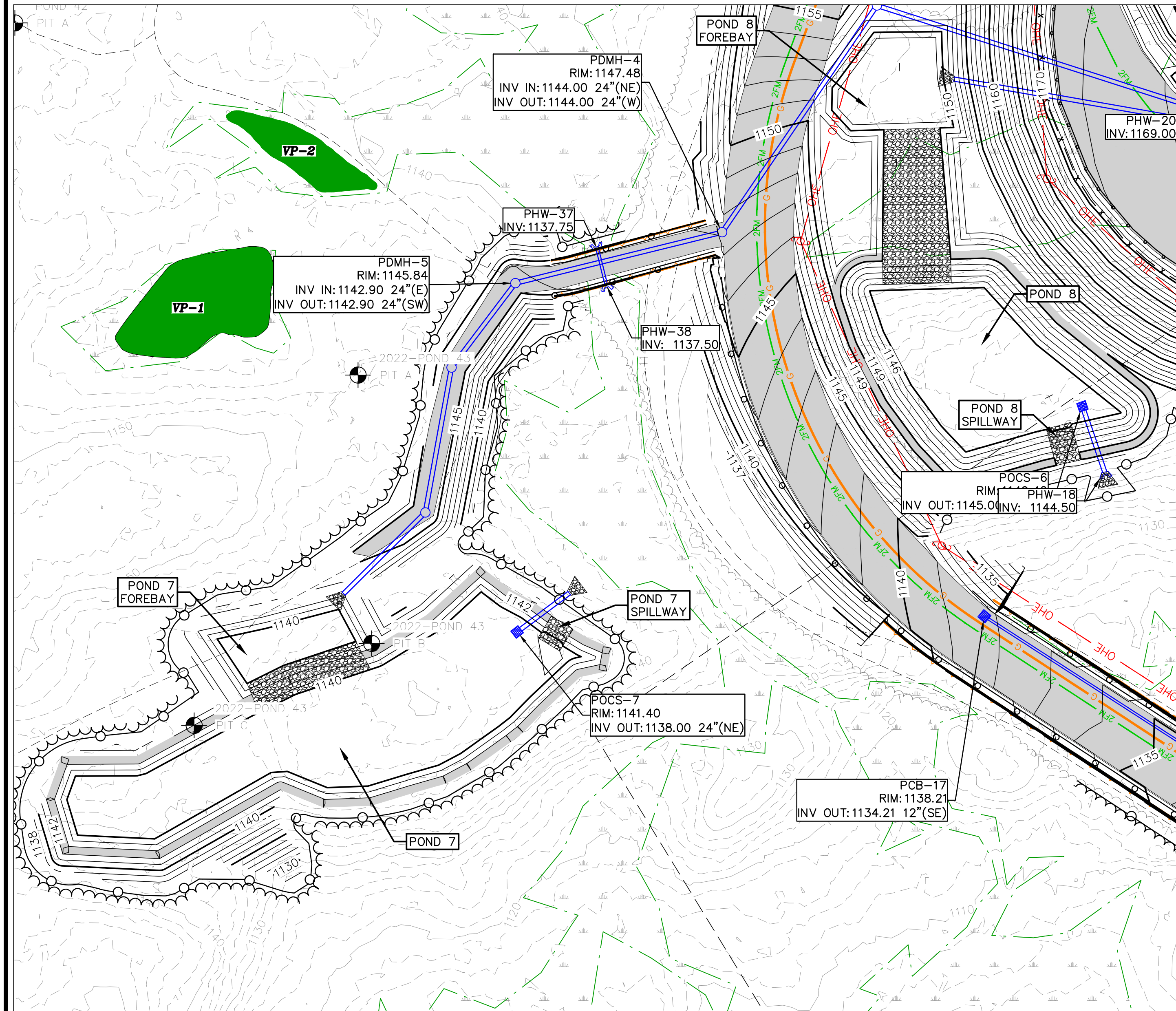
Scale: 1" = 40'
 0 40' 80'

drawing no.
G&D-2

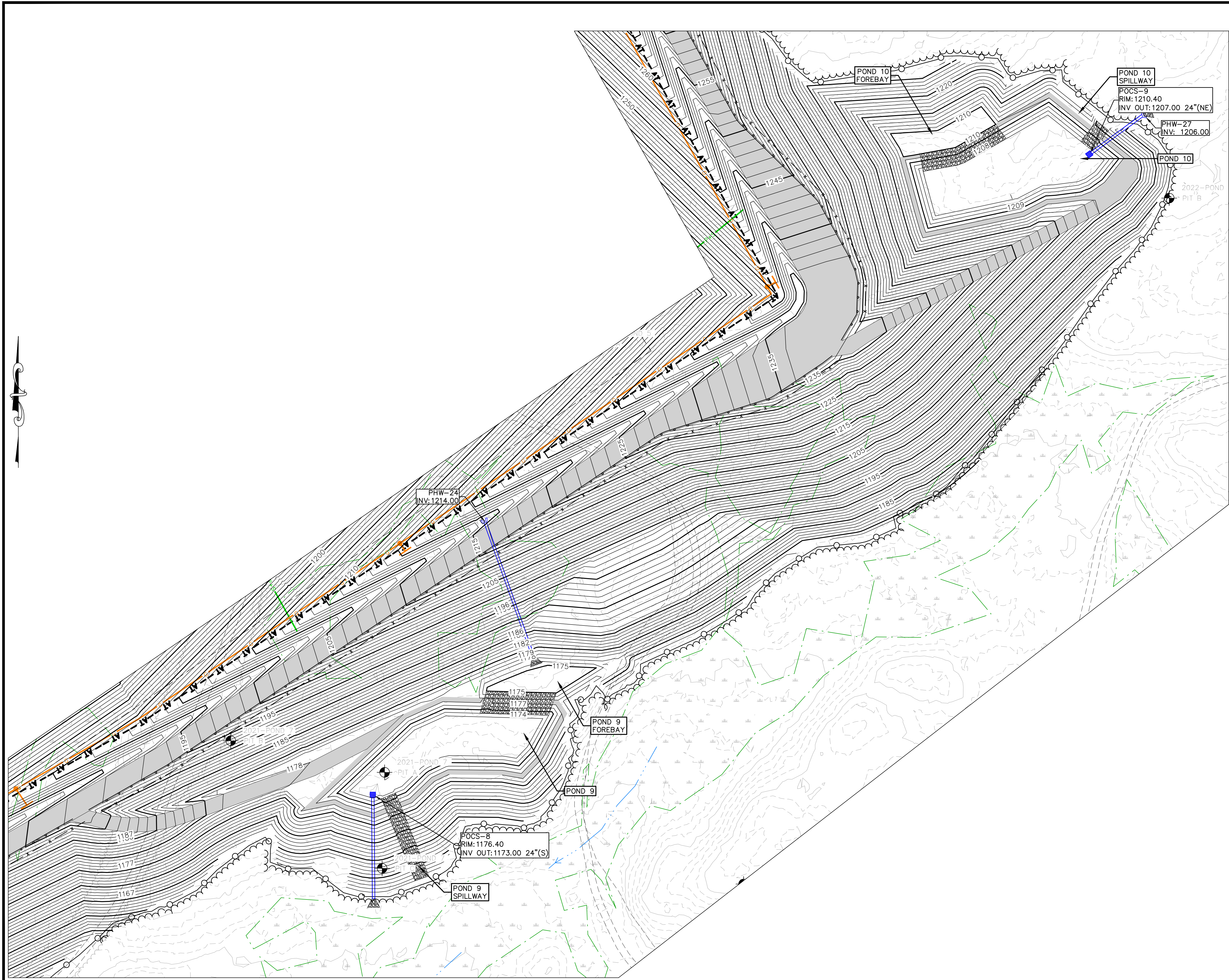
Note:
 1. Refer to Sheet 8 for notes and legend.



Note:
1. Refer to Sheet 8 for notes and legend.

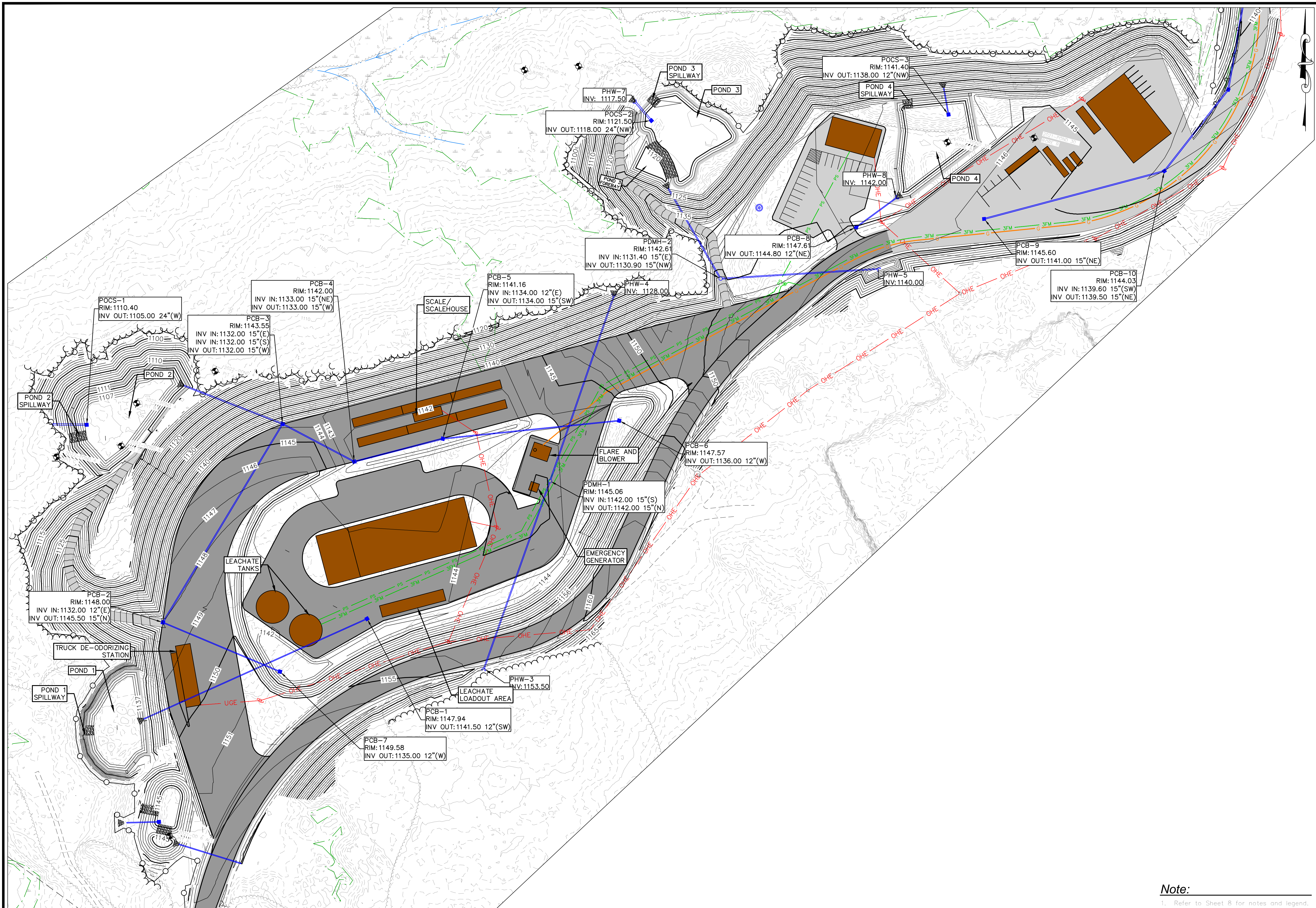


CMA ENGINEERS CIVIL/ENVIRONMENTAL/STRUCTURAL Portsmouth, NH • Manchester, NH • Portland, ME 603/431-6196 • 603/627-0708 • 207/541-4223 c m a e n g i n e e r s . c o m			
designed by: R/JG drawn by: ATR/JUM/STF checked by: R/JG approved by: R/JG	date: April 2023 project no: 1101 scale: 1" = 40' 0 40' 80'		
Granite State Landfill, LLC Dalton, New Hampshire NHDES Standard Permit for Solid Waste Landfill Application Stormwater Ponds Grading and Drainage Plan 2			
drawing no: G&D-3			
sheet: 10 of 50			
no.	revision	date	by



Note:
1. Refer to Sheet 8 for notes and legend.

Granite State Landfill, LLC Dalton, New Hampshire NHDES Standard Permit for Solid Waste Landfill Application Stormwater Ponds Grading and Drainage Plan 3		designed by: R/JG drawn by: ATRA/UM/STF checked by: R/JG approved by: R/JG	date: April 2023 project no: 1101 checked by: R/JG	scale: 0 40' 80' Scale: 1" = 40'	
CMA ENGINEERS CIVIL/ENVIRONMENTAL/STRUCTURAL Portsmouth, NH • Manchester, NH • Portland, ME 603/431-6196 • 603/627-0708 • 207/641-4223 c m a e n g i n e e r s . c o m		no.	revision	date	
drawing no. G&D-4		sheet: 11 of 50			



no.	revision	date	by

CMA ENGINEERS
 CIVIL/ENVIRONMENTAL/STRUCTURAL
 Portsmouth, NH • Manchester, NH • Portland, ME
 603/431-6196 • 603/627-0708 • 207/641-4223
 c m a e n g i n e e r s . c o m

date:	April 2023	designed by:	R/JG
project no.:	1101	drawn by:	ATRU/MSTF
checked by:	R/JG	approved by:	R/JG

scale: 1" = 60'
 0 60' 120'

Granite State Landfill, LLC
 Dalton, New Hampshire
 NHDES Standard Permit for
 Solid Waste Landfill Application
 Stormwater Ponds
 Grading and Drainage Plan 4

Note:
 1. Refer to Sheet 8 for notes and legend.

Appendix B

Test Location Summaries, Pit/Boring Logs, and Infiltration Testing Field Data Sheets

POND 2

POND 2 INFILTRATION BASIN

Practice Location				Pit Summaries	
The basin is located in the central part of the property, east of Douglas Drive. The current topography is a moderate, south facing bouldery slope.				Pit:	B
				Surface Elevation*:	1009.4
				ESHWT:	Not found
				Bedrock:	Not found
				Deepest Elevation of Pit:	1104
Test Pit Construction				Pit:	D
Two test pits were installed for this basin on 10/6/22, Pit B and Pit D. 4" PVC was installed two feet below the bottom of practice, and infiltration testing began on 11/8/22 with a 24-hr pre-soak.				Surface Elevation:	1108.6
				ESHWT:	Not found
				Bedrock:	Not found
				Deepest Elevation of Pit:	1104
				Pit:	
Surface Elevation:					
ESHWT:					
Bedrock:					
Deepest Elevation of Pit:					
Pit:					
Surface Elevation:					
ESHWT:					
Bedrock:					
Deepest Elevation of Pit:					
Infiltration Rates (in/hr)				Bedrock:	
Location	Pit B	Pit D		Deepest Elevation of Pit:	
Test #1	24	23.4			
Test #2	24	23.76		Pit:	
Test #3	24	23.52		Surface Elevation:	
Test #4	24	24		ESHWT:	
Avg	24	23.67		Bedrock:	
DIR**:	12	11.835		Deepest Elevation of Pit:	
Location				Bottom of Practice:	1106
Test #1					
Test #2					
Test #3					
Test #4					
Avg:					
DIR:					
Basin Average: 11.918				*Elevations in feet above mean sea level	
				**Design infiltration rate is half of either the average rate over four tests, or the final test rate if lower	



Horizons Engineering, Inc.
34 School Street
Littleton, NH 03561

Project: Granite State Landfill

Project No.: 19045

Client: Casella

Subcontractor: Chick's Sand and Gravel

Test Boring Log No.: Pond 2 Pit B **Operator:** Doug Ingerson III

Date: 10/6/2022 **Inspector:** Nick Barker

<u>Site Conditions:</u>		<u>Equipment</u>	<u>Test Bore Location</u>	
		Hitachi EX60G	44.34261°, -71.69514	
Depth	Sketch	Description	Drilling Effort (Easy, Moderate, Difficult)	Other
.7'		Black (5YR 2.5/1) organic rich top soil, well rooted. Very fine silty loam, moist	E	
1.2'		Gray (10YR 5/1) SILTY LOAM, some organic material, loose	E	
2.4'		Yellowish brown (10YR 5/6) SILTY SAND with cobbles and boulders. Friable, dense, and compact. Dry	M	
5.4'		Dark yellowish brown (10YR 4/6) TILL. Cobbles, boulders, sand, poorly sorted. Friable, dense and compact. Dry	D	
		Summary: Bedrock or restricting feature not encountered. SHWT unable to be determined. Seepage was not observed.		



Horizons Engineering, Inc.
 34 School Street
 Littleton, NH 03561

Project: Granite State Landfill

Project No.: 19045

Client: Casella

Subcontractor: Chick's Sand and Gravel

Test Boring Log No.: Pond 2 Pit D **Operator:** Doug Ingerson III

Date: 10/6/2022 **Inspector:** Nick Barker

Site Conditions:

Equipment

Test Bore Location

Hitachi EX60G

44.34243°, -71.69515

Depth	Sketch	Description	Drilling Effort (Easy, Moderate, Difficult)	Other
.6'		Black (5YR 2.5/1) organic rich top soil, well rooted. Very fine silty loam, moist	E	
1.0'		Gray (10YR 5/1) SILTY LOAM, some organic material, loose, moist	E	
2.5'		Dark yellowish brown (10YR 4/4) SANDY TILL, some boulders and cobbles. Friable, compact and moist	M	
4.6'		Dark yellowish brown (10YR 4/6) SANDY TILL. Cobbles, boulders, sand, poorly sorted. Friable, dense and compact. Moist	D	
		Summary: Bedrock or restricting feature not encountered. SHWT unable to be determined. Seepage was not observed.		

INFILTRATION TEST FIELD DATA FORM

Test Location: IA Pt B (2023 Pond 2 Pit B)

Initial WL: dry / 6.56

Pre-Soak Start Date/Time: 1/28 9:35

	Date/Time	Initial WL	WL After Water Added	WL After 1 Hour	Rate of Infiltration
1 st Test	1/29 9:35	dry	6.10	dry	72 μ / hr
2 nd Test	10:35	dry	6.32	dry	72 μ / hr
3 rd Test	11:35	dry	6.44	dry	72 μ / hr
4 th Test	12:35	dry	6.32	dry	72 μ / hr

Notes: