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PHASE III REPORT

Cell 9 Vertical Expansion

Application For Permit Modification

MDE Refuse Disposal Permit 2023-WMF-0240A

Millersville Municipal Landfill And Resource Recovery Facility

389 Burns Crossing Road Severn, Maryland

Prepared for

Anne Arundel County

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October 2025
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the State of Maryland,*

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Expiration Date: 4/29/2027.



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ACRONYMS AND ABBREVIATIONS

%	percent
3H:1V	3 horizontal to 1 vertical
4H:1V	4 horizontal to 1 vertical
CFR	Code of Federal Regulations
cm/s	centimeter(s) per second
C/PCC	closure and post-closure care
CQA	construction quality assurance
CRC	Central Recycling Center
cy	cubic yards
E&S	erosion and sediment
EMP	Environmental Monitoring Plan
ESD	Environmental Site Design
ft	feet
ft/min	feet per minute
gal/acre/day	gallons per acre per day
Geosyntec	Geosyntec Consultants, Inc.
GCCS	gas collection and control system
HDPE	high-density polyethylene
HELP	Hydrologic Evaluation of Landfill Performance
LandGEM	Landfill Gas Emissions Model
LCS	leachate collection system
LEL	lower explosive limit
LFG	landfill gas
LLDPE	linear low-density polyethylene
LTS	leachate transmission system
MDE	Maryland Department of the Environment
mcy	million cubic yards
MLFRRF	Millersville Municipal Landfill and Resource Recovery Facility
MSW	municipal solid waste
NGVD29	National Geodetic Vertical Datum of 1929
NPDES	National Pollutant Discharge Elimination System

PCB	polychlorinated biphenyls
PCC	post-closure care
RCRA	Resource Conservation and Recovery Act
ROI	radius of influence
SCD	Soil Conservation District
SCS	SCS Engineers
SDR	standard dimension ratio
USEPA	United States Environmental Protection Agency

1. INTRODUCTION

1.1 Organization and Terms of Reference

Maryland Regulation of Water Supply, Sewage Disposal, and Solid Waste, COMAR 26.04.07, establishes the Maryland Department of the Environment (MDE) as the permitting authority for sanitary landfills within the state and the process for submittal, review, and approval of such permits. As described in COMAR 26.04.07.08, following the submittal and approval of Phase I and Phase II reports, the third step to permit a new or expanded sanitary landfill is submitting a Phase III report including detailed plans, operating manuals, contingency plans, and monitoring plans for the proposed landfill. In accordance with this requirement, this Phase III report has been prepared for a refuse disposal permit modification for the vertical expansion of Cell 9 with no increase in footprint at the Millersville Municipal Landfill and Resource Recovery Facility (MLFRRF), located at 389 Burns Crossing Road, Severn, Maryland. The MLFRRF operates under MDE refuse disposal permit number 2023-WMF-0240A (MDE 2023). This Phase III report is prepared by Geosyntec Consultants, Inc. (Geosyntec) on behalf of the Anne Arundel County Department of Public Works (the County), the owner and operator of the MLFRRF.

The County submitted Phase I of the permit application (Phase I Report) to the MDE Solid Waste Program (MDE/SWP) in October 2023. In November 2023, the County submitted a revised Phase I Report (Geosyntec 2023) to MDE/SWP. As part of the Phase I process, MDE/SWP held a Public Informational Meeting at the Arundel High School (1001 Annapolis Road, Gambrills, Maryland 21054) on Thursday, May 23, 2024, at 5:30 p.m. On June 6, 2024, MDE/SWP notified the County that the Phase I Report satisfied the minimum requirements under the COMAR 26.04.07.06. Subsequently, the County submitted Phase II of the permit application (Phase II Report) (Geosyntec 2024) to MDE/SWP in September 2024. On August 26, 2025, MDE/SWP notified the County that the Phase II Report satisfied the minimum requirements under the COMAR 26.04.07.07.

This Phase III report is organized in a manner consistent with the format and conditions of COMAR 26.04.07.08(B). In this report, the term “Drawings” refers to the drawing package entitled, “Application for a Municipal Landfill Permit: Phase III Report, Cell 9 Vertical Expansion Project, Millersville Landfill Resource Recovery Facility” dated March 2026 and prepared by Geosyntec. The Drawings are included as Appendix A.

This Phase III report was prepared by Geosyntec of Columbia, Maryland, by Mr. Daniel Espinoza and was reviewed by Ms. Meena Viswanath, P.E. (MD) in accordance with Geosyntec’s internal review policy.

Throughout this report the term “vertical expansion” and “landfill” are in specific reference to the Cell 9 disposal area, which is the subject of this permit application. The term “MLFRRF” or “facility” is in reference to the existing Millersville Municipal Landfill and Resource Recovery

Facility, which incorporates multiple landfill disposal areas and other operational facilities. However, as the proposed vertical expansion will be an extension of the current Cell 9 and a part of the larger MLFRRF, the administrative and operations items discussed in this report will carry over from the current MLFRRF and landfill procedures and remain unchanged.

1.2 Remaining Siting Considerations

Information regarding location restriction and environmental impact criteria outlined in 40 CFR 258 for municipal solid waste landfills were addressed in the Phase II Report. No further action on siting considerations was requested by MDE as part of the Phase II approval.

2. REQUIREMENTS FOR THE PHASE III REPORT

2.1 Overview of Pertinent Regulations

MDE requires that a Phase III Report include information on several issues in sufficient detail to permit a comprehensive review of the proposed project. These issues are identified in three separate regulatory and guidance documents: (i) COMAR 26.04.07.08; (ii) 40 CFR Part 258; and (iii) Current Terms and Conditions of Permit No. 2023-WMF-0240A. In the following three subsections, the specific issues from each separate regulatory source are reproduced in italic type, followed by a description of where that requirement is met and/or addressed in the remainder of this Phase III report, drawings, and/or appendices. For ease of review, this information is also provided in the form of a checklist in **Table 1**, which identifies where in the permit application the information is provided.

2.2 Requirements of COMAR 26.04.07.08

COMAR 26.04.07.08(B) requires that a Phase III Report include information on twenty-one specific issues. Each of these issues is listed in italic text below followed by, in regular text, the location where the issue is addressed in this permit application.

(1) A map which designates the property boundaries, the actual area to be used for filling, and all existing and proposed structures.

The property boundaries, filling area, and existing and proposed structures at the MLFRRF are included in Drawings 2 and 3 (**Appendix A**).

(2) A description of any vehicle weighing facilities, any telephones or other communications equipment, any maintenance and equipment storage facilities, any employee safety and sanitary facilities, and any water supply and sewerage systems. Any proposed on-site water supply and sewerage systems shall be approved by the Approving Authority.

A description of the current operational facilities at the MLFRRF (which are not proposed to change) is included in **Section 3** as well as in the Operations Guide (**Appendix B**). The operational facilities are shown on Drawings 2 and 3 (**Appendix A**).

(3) The location and type of all existing or proposed on-site roads.

A description of the existing and proposed on-site roads at the MLFRRF is included in **Section 4**. The existing roads are shown on Drawings 2 and 3 and the proposed roads are shown on Drawings 10 and 10A (**Appendix A**).

(4) A description of the types of solid waste which will be accepted, the types of solid waste which may not be accepted, and the area and population which will be served by the facility.

The waste types and service area for Cell 9 are described in **Section 5** and in the Operations Guide (**Appendix B**).

(5) The anticipated quantities of solid waste which will be accepted and the calculations used to determine the useful life of the facility.

The anticipated waste quantities and facility life projection for Cell 9 are included in **Section 6**. Calculations of the useful life of the facility are provided as **Appendix C**.

(6) Proposed methods of collecting and reporting data on the quantities and types of solid waste received and for revising facility life expectancy projections.

The methods for revising waste types, quantities, and facility life projection for Cell 9 are included in **Section 7** and in the Operations Guide (**Appendix B**).

(7) The volume and type of available cover material, the calculated volume of earth needed for daily, intermediate, and final cover, the location of earth stockpiles, and provisions for saving topsoil for use as final cover.

Information regarding the cover material and stockpiles for Cell 9 is included in **Section 8**.

(8) Proposed means of controlling unauthorized access to the site.

Facility access control for the MLFRRF is described in **Section 9** and in the Operations Guide (**Appendix B**).

(9) Proposed operating procedures including: (a) Hours and days of operation; (b) Number and types of equipment to be used; (c) Number of employees and their duties; (d) Provisions for fire prevention and control; (e) Means of preventing public health hazards and nuisances from blowing paper, odors, rodents, vermin, noise, and dust; and (f) Proposed method of daily operation including wet weather operation.

Operating procedures for Cell 9 are described in **Section 10** and in the Operations Guide (**Appendix B**).

(10) The location and depth of solid waste cells and the sequence of filling.

The landfill cell design and fill sequencing for Cell 9 are described in **Section 11**. The landfill cells are shown on Drawings 4 through 9 (**Appendix A**). Engineering specifications for construction of the solid waste cells are provided as **Appendix D**. Liner design calculations are provided as **Appendix E**. Leachate calculations are provided as **Appendix F**. Slope stability calculations are provided as **Appendix G**.

(11) Natural or artificial screening to be used.

The screening methods to be used for Cell 9 are described in **Section 12**.

(12) Methods of controlling on-site drainage, drainage leaving the site, and drainage onto the site from adjoining areas. Erosion and sediment control provisions shall be approved by the appropriate approving agency and satisfy the requirements of Environment Article, Title 4, Subtitle 1, and COMAR 26.09.01.

Drainage and stormwater management for Cell 9 are described in **Section 13**. The MLFRRF general discharge permit, Concept Plan, and stormwater calculations are included as **Appendix H**. The current grading permit and erosion and sediment control plans are included as **Appendix I**.

(13) Proposed methods and engineering specifications for the collection, management, and disposal of leachate generated at the facility. The calculations used to determine the anticipated quantities of leachate which will be generated shall be included.

Leachate collection, management, and disposal for Cell 9 is described in **Section 14**. Leachate calculations are included as **Appendix F**. Specifications for leachate system construction are included as **Appendix D**. A construction quality assurance plan is included as **Appendix J**.

(14) A contingency plan for preventing or abating the pollution of the waters of this State. At a minimum, the contingency plan shall address the following items: (a) Emergency provisions of potable water to users whose supply may be affected by the landfill; (b) A spill containment and prevention plan for any leachate collected or stored at the site; and (c) Emergency telephone numbers and contact persons for fires, medical emergencies, spills of hazardous materials, or other emergency situation.

The contingency plan for the MLFRRF is described in **Section 15** and is included as part of the Operations Guide (**Appendix B**). Spill response will follow the Environmental Monitoring Plan (EMP) (**Appendix K**).

(15) Proposed methods for controlling landfill gas.

Landfill gas control for Cell 9 is described in **Section 16**. Landfill gas calculations are provided as **Appendix L**. Landfill gas monitoring will be performed in accordance with the EMP (**Appendix K**).

(16) Proposed methods for covering and stabilizing completed areas.

The methods of covering and stabilizing completed areas at Cell 9 are described in **Section 17**.

(17) A system for routinely monitoring the quality of the waters of this State around and beneath the site, including the location and types of monitoring stations, and the methods of construction of monitoring wells. Wells shall be installed by a State licensed well driller in accordance with COMAR 26.04.04.

Environmental quality monitoring at the MLFRRF is described in **Section 18** and in the EMP (**Appendix K**).

(18) A statement that "Burning of solid waste is not allowed, except as permitted by the Department of the Environment."

This statement is included in **Section 19**.

(19) A schedule for implementing construction and implementation of the operation plans and engineering specifications once the refuse disposal permit has been issued.

The construction implementation schedule is described in **Section 20**.

(20) A landfill closure and post-closure plan to be followed over a period of not less than 5 years after application of final cover.

The Closure and Post-Closure Care Plan (C/PCC Plan) is described in **Section 21** and included as **Appendix M**. Final cover calculations are included as **Appendix N**.

(21) The name, address, and telephone number of the person or agency responsible for the maintenance and operation of the site. Changes to this information shall be submitted to the Approving Authority once effected.

The responsible agency is listed in **Section 22**.

2.3 Requirements of 40 CFR Part 258

Federal regulation of municipal solid waste (MSW) landfills under 40 CFR 258 (also referred to as "Subtitle D" of the Resource Conservation and Recovery Act [RCRA]) requires that a permit application design report include information on specific issues. These issues are identified below in italics followed by, in regular text, the location where the issue is addressed in this permit application.

(1) § 258.20 (a) Owners or operators of all MSWLF units must implement a program at the facility for detecting and preventing the disposal of regulated hazardous wastes as defined in part 261 of this chapter and polychlorinated biphenyls (PCB) wastes as defined in part 761 of this chapter...

Regulated hazardous wastes and PCB wastes are addressed in **Section 5.2** and the Operations Guide (**Appendix B**).

(2) § 258.21 (a) Except as provided in paragraph (b) of this section, the owners or operators of all MSWLF units must cover disposed solid waste with six inches of earthen material at the end of each operating day, or at more frequent intervals if necessary, to control disease vectors, fires, odors, blowing litter, and scavenging. (b) Alternative materials of an alternative thickness (other than at least six inches of earthen material) may be approved by the Director of an approved State.

Daily cover is addressed in **Section 10.7**.

- (3) **§ 258.22(a)** *Owners and operators of all MSWLF units must prevent or control on-site populations of disease vectors using techniques appropriate for the protection of human health and the environment.*

Control of on-site populations of disease vectors is addressed in **Section 10.6** and the Operations Guide (**Appendix B**).

- (4) **§ 258.23** (a) *Owners or operators of all MSWLF must ensure that: (1) the concentration of methane gas generated by the facility does not exceed 25 percent of the lower explosive limit for methane in facility structures (excluding gas control or recovery system components); and (2) the concentration of methane gas does not exceed the lower explosive limit for methane at the facility property boundary. (b) Owners or operators of all MSWLF units must implement a routine methane monitoring program to ensure that the standards of paragraph (a) of this section are met.*

Methane gas control is addressed in **Section 16.4** and the EMP (**Appendix K**).

- (5) **§ 258.24** (a) *Owners or operators of all MSWLFs must ensure that the units not violate any applicable requirements developed under a State Implementation Plan (SIP) approved or promulgated by the Administrator pursuant to section 110 of the Clean Air Act, as amended. (b) Open burning of solid waste, except for the infrequent burning of agricultural wastes, silvicultural wastes, land clearing debris, diseased trees, or debris from emergency cleanup operations, is prohibited at all MSWLF units.*

The method to control atmospheric emission and/or subsurface migration of landfill gas is presented in **Section 16**. Open burning of solid wastes is not permitted, as stated in **Section 19** and the Operations Guide (**Appendix B**).

- (6) **§ 258.25** *Owners or operators of all MSWLF units must control public access and prevent unauthorized vehicular traffic and illegal dumping of wastes by using artificial barriers, natural barriers, or both, as appropriate to protect human health and the environment.*

Facility access control for the MLFRRF is described in **Section 9** and in the Operations Guide (**Appendix B**).

- (7) **§ 258.26** (a) *Owners or operators of all MSWLF units must design, construct, and maintain: (1) a run-on control system to prevent flow into the active portion of the landfill during peak discharge from a 25 year storm; (2) A run-off control system from the active portion of the landfill to collect and control at least the water volume of water resulting from a 24-hour, 25-year storm. (b) Run-off from the active portion of the landfill unit must be handled in accordance with § 258.27(a) of this part.*

Drainage and stormwater management for Cell 9 are described in **Section 13**. The general discharge permit, Concept Plan, and stormwater calculations are included as **Appendix H**.

- (8) **§ 258.27** (a) *MSWLF units shall not cause a discharge of pollutants into waters of the United States, including wetlands, that violates any requirements of the Clean Water Act, including, but*

not limited to, the National Pollutant Discharge Elimination System (NPDES) requirements, pursuant to section 402. (b) Cause the discharge of a nonpoint source of pollution to waters of the United States, including wetlands, that violates any requirement of an area-wide or State-wide water quality management plan that has been approved under section 208 or 319 of the Clean Water Act, as amended.

Drainage and stormwater management for Cell 9 are described in **Section 13**. The general discharge permit, Concept Plan, and stormwater calculations are included as **Appendix H**.

- (9) **§ 258.28** (a) *Bulk or containerized liquid waste may not be placed in MSWLF units unless...*
(b) *Containers holding liquids may not be placed in a MSWLF unit unless...*

The acceptable and unacceptable waste types for Cell 9 are described in **Section 5.2** and in the Operations Guide (**Appendix B**).

- (10) **§ 258.29** (a) *The owner or operator of a MSWLF unit must record and retain near the facility in an operating record or in an alternative location approved by the Director of an approved State the following information as it becomes available: (1) Any location restriction demonstration required under subpart B of this part; (2) Inspection records, training procedures, and notification procedures required in § 258.20 of this part; (3) Gas monitoring results from monitoring and any remediation plans required by § 258.23 of this part; (4) Any MSWLF unit design documentation for placement of leachate or gas condensate in a MSWLF unit as required under § 258.28(a)(2) of this part; (5) Any demonstration, certification, finding, monitoring, testing, or analytical data required by subpart E of this part; (6) Closure and post-closure care plans and any monitoring, testing, or analytical data as required by §§ 258.60 and 258.61 of this part; and (7) Any cost estimates and financial assurance documentation required by subpart G of this part. (8) Any information demonstrating compliance with small community exemption as required by § 258.1(f)(2). (b) The owner/operator must notify the State Director when the documents from paragraph (a) of this section have been placed or added to the operating record, and all information contained in the operating record must be furnished upon request to the State Director or be made available at all reasonable times for inspection by the State Director. (c) The Director of an approved State can set alternative schedules for recordkeeping and notification requirements as specified in paragraphs (a) and (b) of this section, except for the notification requirements in § 258.10(b) and § 258.55(g)(1)(iii). (d) The Director of an approved state program may receive electronic documents only if the state program includes the requirements of 40 CFR Part 3—(Electronic reporting).*

The record keeping for Cell 9 is described in the Operations Guide (**Appendix B**).

- (11) **§ 258.40** (a) *New MSWLF units and lateral expansions shall be constructed: (1) In accordance with a design approved by the Director of an approved State...; (2) With a composite liner...and a leachate collection system that is designed and constructed to maintain less than a 30-cm depth of leachate over the liner.*

The landfill cell design and fill sequencing for Cell 9 are described in **Section 11**. Leachate collection, management, and disposal for Cell 9 is described in **Section 14**. The landfill cells and

leachate collection system are shown on Drawings 4 through 9 (**Appendix A**). Engineering specifications for construction of the solid waste cells are provided as **Appendix D**. Liner design calculations are provided as **Appendix E**. Leachate calculations are provided as **Appendix F**. A construction quality assurance plan is included as **Appendix J**.

(12) § 258.50 (a) The requirements in this part apply to MSWLF units...; (c) Owners and operators of MSWLF units...must comply with the ground-water monitoring requirements of this part...

Environmental quality monitoring at the MLFRRF is described in **Section 18** and in the EMP, provided as **Appendix K**.

(13) § 258.60 (a) Owners or operators of all MSWLF units must install a final cover system that is designed to minimize infiltration and erosion... (b) The Director of an approved State may approve an alternative final cover design that includes an infiltration layer that achieves an equivalent reduction in infiltration... (c) The owner or operator must prepare a written closure plan that describes the steps necessary to close all MSWLF units at any point during its active life. (d) ...must notify the State Director that a closure plan has been prepared and placed in the operating record... (e) Prior to beginning closure of each MSWLF unit as specified in § 258.60(f), an owner or operator must notify the State Director that a notice of the intent to close the unit... (f) ...must begin closure activities of each MSWLF unit no later than 30 days after the date on which the MSWLF unit receives the known final receipt of wastes, or... (g) ...must complete closure activities of each MSWLF unit in accordance with the closure plan within 180 days following the beginning of closure... (h) ...must notify the State Director that a certification, signed by an independent registered professional engineer or approved by Director of an approved State, verifying that closure has been completed...

The C/PCC Plan is described in **Section 21** and included as **Appendix M**. Final cover calculations are included as **Appendix N**.

(14) § 258.61 (a) Following closure of each MSWLF unit, the owner or operator must conduct post-closure care. Post-closure care must be conducted for 30 years, except as provided under paragraph (b) of this section, and...

The C/PCC Plan is described in **Section 21** and included as **Appendix M**. Final cover calculations are included as **Appendix N**.

(15-17) § 258.71 (a) The owner or operator must have a detailed written estimate, in current dollars, of the cost of hiring a third party to close the largest area of all MSWLF units ever requiring a final cover as required under § 258.60 at any time during the active life in accordance with the closure plan. The owner or operator must notify the State Director that the estimate has been placed in the operating record. (1) The cost estimate must equal the cost of closing the largest area of all MSWLF unit ever requiring a final cover at any time during the active life when the extent and manner of its operation would make closure the most expensive, as indicated by its closure plan (see § 258.60(c)(2) of this part). (2) During the active life of the MSWLF unit, the owner or operator must annually adjust the closure cost estimate for inflation. (3) The owner or operator must increase the closure cost estimate and the amount of financial assurance provided

under paragraph (b) of this section if changes to the closure plan or MSWLF unit conditions increase the maximum cost of closure at any time during the remaining active life. (4) The owner or operator may reduce the closure cost estimate and the amount of financial assurance provided under paragraph (b) of this section if the cost estimate exceeds the maximum cost of closure at any time during the remaining life of the MSWLF unit. The owner or operator must notify the State Director that the justification for the reduction of the closure cost estimate and the amount of financial assurance has been placed in the operating record. (b) The owner or operator of each MSWLF unit must establish financial assurance for closure of the MSWLF unit in compliance with § 258.74. The owner or operator must provide continuous coverage for closure until released from financial assurance requirements by demonstrating compliance with § 258.60 (h) and (i).

§ 258.72 *(a) The owner or operator must have a detailed written estimate, in current dollars, of the cost of hiring a third party to conduct post-closure care for the MSWLF unit in compliance with the post-closure plan developed under § 258.61 of this part. The post-closure cost estimate used to demonstrate financial assurance in paragraph (b) of this section must account for the total costs of conducting post-closure care, including annual and periodic costs as described in the post-closure plan over the entire post-closure care period. The owner or operator must notify the State Director that the estimate has been placed in the operating record. (1) The cost estimate for post-closure care must be based on the most expensive costs of post-closure care during the post-closure care period. (2) During the active life of the MSWLF unit and during the post-closure care period, the owner or operator must annually adjust the post-closure cost estimate for inflation. (3) The owner or operator must increase the post-closure care cost estimate and the amount of financial assurance provided under paragraph (b) of this section if changes in the post-closure plan or MSWLF unit conditions increase the maximum costs of post-closure care. (4) The owner or operator may reduce the post-closure cost estimate and the amount of financial assurance provided under paragraph (b) of this section if the cost estimate exceeds the maximum costs of post-closure care remaining over the post-closure care period. The owner or operator must notify the State Director that the justification for the reduction of the post-closure cost estimate and the amount of financial assurance has been placed in the operating record. (b) The owner or operator of each MSWLF unit must establish, in a manner in accordance with § 258.74, financial assurance for the costs of post-closure care as required under § 258.61 of this part. The owner or operator must provide continuous coverage for post-closure care until released from financial assurance requirements for post-closure care by demonstrating compliance with § 258.61(e).*

§ 258.73 *(a) An owner or operator of a MSWLF unit required to undertake a corrective action program under § 258.58 of this part must have a detailed written estimate, in current dollars, of the cost of hiring a third party to perform the corrective action in accordance with the program required under § 258.58 of this part. The corrective action cost estimate must account for the total costs of corrective action activities as described in the corrective action plan for the entire corrective action period. The owner or operator must notify the State Director that the estimate has been placed in the operating record. (1) The owner or operator must annually adjust the estimate for inflation until the corrective action program is completed in accordance with § 258.58(f) of this part. (2) The owner or operator must increase the corrective action cost estimate and the amount of financial assurance provided under paragraph (b) of this section if changes*

in the corrective action program or MSWLF unit conditions increase the maximum costs of corrective action. (3) The owner or operator may reduce the amount of the corrective action cost estimate and the amount of financial assurance provided under paragraph (b) of this section if the cost estimate exceeds the maximum remaining costs of corrective action. The owner or operator must notify the State Director that the justification for the reduction of the corrective action cost estimate and the amount of financial assurance has been placed in the operating record. (b) The owner or operator of each MSWLF unit required to undertake a corrective action program under § 258.58 of this part must establish, in a manner in accordance with § 258.74, financial assurance for the most recent corrective action program. The owner or operator must provide continuous coverage for corrective action until released from financial assurance requirements for corrective action by demonstrating compliance with § 258.58 (f) and (g).

The site demonstrates compliance with these requirements using the mechanism of the Local Government Financial Test (§ 258.74(f))¹. The County meets the public notice requirement by referencing the closure and post-closure costs in the comprehensive annual financial report². Additionally, Anne Arundel County has established a Solid Waste Financial Assurance Fund in local law³ and makes annual contributions for future closure and post-closure costs. The County will maintain the record of financial assurance documentation required by Subpart G as noted in the Operations Guide (**Appendix B**).

2.4 Permit Conditions

Terms and conditions in “*Part III: General Conditions*” of the Millersville Municipal Landfill and Resource Recovery existing refuse disposal permit 2023-WMF-0240A include information on the following eighteen specific items. It is anticipated that similar terms and conditions will apply to the MLFRRF vertical expansion; therefore, these items are identified below in italics followed by, in regular text, the location where the issue is addressed in this permit application.

(A) Waste Restrictions: (1) The permittee may accept solid waste as specified in this facility’s Refuse Disposal Permit Application and its supporting documents identified in Part I of this permit, except as restricted or prohibited in this condition. (2) If the permittee accepts the following classes of waste as defined below, the acceptance of these materials is subject to the exceptions noted... (3) The following waste materials are specifically prohibited from being accepted at this site, regardless of their origin or type... (4) If sewage sludge, processed sewage sludge, or any other product containing these materials is proposed for storage, handling, or utilization at the landfill site, a separate application shall be submitted to the Biosolids Division for a sewage sludge utilization permit. That permit must be issued prior to the acceptance on site of any sewage sludge.

¹ <https://www.aacounty.org/sites/default/files/2024-03/auditor-landfill-FY23-report.pdf>

² <https://www.aacounty.org/sites/default/files/2025-01/2024-acfr.pdf>

³ https://codelibrary.amlegal.com/codes/annearundel/latest/annearundelco_md/0-0-0-162349#JD_13-4-109

The acceptable and unacceptable waste types for Cell 9 are described in **Section 5.2** and in the Operations Guide (**Appendix B**).

(B) Cell Floor Construction: (1) The permittee shall notify the Department... (14) No waste placement may commence in any cell unless and until the following requirements are fulfilled...

The landfill cell design and fill sequencing for Cell 9 are described in **Section 11**. Leachate collection, management, and disposal for Cell 9 is described in **Section 14**. The landfill cells and leachate collection system are shown on Drawings 4 through 9 (**Appendix A**). Engineering specifications for construction of the solid waste cells are provided as **Appendix D**. Liner design calculations are provided as **Appendix E**. Leachate calculations are provided as **Appendix F**. A construction quality assurance plan is included as **Appendix J**.

(C) Protection of Liner and Leachate Collection System: A minimum of 4 feet of select waste containing no long pipes, boards, or other materials that could damage the liner and leachate collection system must be placed over the protective layer before compaction, to minimize the risk of damage to the liner and leachate collection system. No refuse hauling vehicles, equipment used for landfilling operations, or any heavy equipment shall operate over the leachate collection pipes and liner on the floor and side of the cell slopes until there is at least 4 feet of select waste placed upon the protective drainage layer. The permittee must notify the Department prior to the placement of the select waste.

Operating procedures for Cell 9 are described in **Section 10** and in the Operations Guide (**Appendix B**). The construction implementation schedule is described in **Section 20**.

(D) Leachate: (1) All ponded leachate occurring in areas... (10) Should a force main be constructed to convey leachate to a sewer system...

Leachate collection, management, and disposal for Cell 9 is described in **Section 14**. Leachate calculations are included as **Appendix F**. Specifications for leachate system construction are included as **Appendix D**. A construction quality assurance plan is included as **Appendix J**.

(E) Water Level Measurement: (1) The water elevations in all existing monitoring wells and piezometers shall be measured monthly and the readings shall be included in the semiannual water quality report referenced in this permit.

Environmental quality monitoring at the MLFRRF is described in **Section 18** and in the EMP (**Appendix K**).

(F) Written Reports on Water Quality Analysis: (1) Within 90 days of the effective date of this permit, the permittee shall submit a hard copy and a searchable electronic/digital copy to the Department for review and approval a Groundwater and Surface Water Monitoring (G&SWM)

Plan. The Plan shall be prepared in accordance with COMAR 26.04.07.08B(17), 26.04.07.09F, 40 CFR §258, and guidelines established by the Department.

The groundwater and surface water monitoring program at the MLFRRF is described in **Section 18** and in the EMP (**Appendix K**).

(G) Spreading and Compaction: Solid waste shall be spread in uniform layers and compacted to its smallest practicable volume before application of cover material.

Daily operating and waste placement procedures for Cell 9 are described in **Section 10.7** and in the Operations Guide (**Appendix B**).

(H) Solid Waste Lifts: A lift of solid waste may not exceed 8 feet in height, except as specifically authorized in writing by the Department.

Daily operating and waste placement procedures for Cell 9 are described in **Section 10.7** and in the Operations Guide (**Appendix B**).

(I) Daily Cover: A uniform compacted layer of clean earth at least 6 inches in depth, or an approved cover material of a thickness specified by the Department, shall be placed over exposed solid waste by the end of each day's operation, or more frequently as may be determined by the Department. To meet approval, the cover material may not: (1) Contain free liquids, putrescibles, or toxic materials. Moisture that is present...; (4) Impede compaction of wastes by standard landfill equipment.

Daily operating and cover procedures for Cell 9 are described in **Section 10.7** and in the Operations Guide (**Appendix B**). Daily cover is described in **Section 8**.

(J) Intermediate Cover: A uniform, compacted layer of clean earth not less than 1 foot in depth shall be placed over each portion of a lift not later than 1 month following completion of that lift. The intermediate cover layer may not be removed without written authorization from the Department.

Operating and cover procedures for Cell 9 are described in **Section 10.7** and in the Operations Guide (**Appendix B**). Intermediate cover is described in **Section 8**.

(K) Final Cover: (1) A uniform compacted layer of earthen material not less than 2 feet in depth shall be placed over any part of the final lift of refuse not later than 90 days following completion of that final lift; (2) Areas which have received final cover shall be mowed at least once a year, or more often if necessary, to control growth of woody vegetation and to allow facility personnel to inspect for signs of erosion, settlement, ponding of water, and leachate seeps.

Operating and final cover procedures for Cell 9 are described in **Section 10.7** and in the C/PCC Plan (**Appendix M**). Final cover is described in **Section 8** and **Section 17**.

(L) Grading and Drainage: The disposal site shall be graded and drained to: (1) Minimize runoff onto the fill area of the sanitary landfill; (2) Prevent erosion and ponding within the fill areas; and (3) Drain water from the surface of the sanitary landfill.

Drainage and stormwater management for Cell 9 are described in **Section 13**. The general discharge permit, Concept Plan, and stormwater calculations are included as **Appendix H**. The current grading permit and erosion and sediment control plans are included as **Appendix I**. Fill area drainage is addressed in the Operations Guide (**Appendix B**).

(M) Erosion and Sediment Control Plan: The permittee shall have a signed copy of a valid Erosion and Sediment Control Plan prepared in accordance with the requirements of COMAR 26.17.01 and approved by the appropriate approving authority prior to the construction of the landfill as authorized by this permit. An approved plan as required under COMAR 26.17.01 that covers all areas of the permitted facility must be maintained at all times during the life of this permit.

The erosion and sediment control plan is described in **Section 13.3**. A copy of an approved erosion and sediment control plan for one of the subcells currently under construction is provided as **Appendix I**.

(N) Storm Water Management Plan: (1) The permittee shall have a signed copy of a valid Storm Water Management Plan prepared in accordance with the requirement of COMAR 26.17.02 and approved by the appropriate approving authority prior to the construction of the landfill as authorized by this permit. (2) Means for separating and diverting uncontaminated storm water from the landfill cells may be proposed by the permittee. If approved by the Department, the plans and specifications for the separation and diversion of uncontaminated storm water shall be incorporated into and become as part of this permit.

Drainage and stormwater management for Cell 9 are described in **Section 13**. The general discharge permit, Concept Plan, and stormwater calculations are included as **Appendix H**. The current grading permit and erosion and sediment control plans are included as **Appendix I**. Stormwater management is also addressed in the Operations Guide (**Appendix B**).

(O) Water Supply Contingency Plan: (1) If a risk to public health due to contamination of the groundwater by the landfill has developed...; (4) Should the Department determine that migration of contaminants from the property on which the landfill is located has occurred or is likely to occur, the permittee shall immediately implement the water supply contingency plan in accordance with the approved schedule.

The water supply contingency plan for Cell 9 is described in **Section 15** and in the Operations Guide (**Appendix B**).

(P) Closure and Post-Closure: When the design capacity has been exhausted, the permittee shall cap the landfill in accordance with the requirements of COMAR 26.04.07.21 and the federal

regulation under 40 CFR §258. Furthermore, at least 6 months prior to cessation of landfilling operations, a closure plan shall be submitted to the Department for review and approval.

The C/PCC Plan is described in **Section 21** and included as **Appendix M**.

(Q) Gas Monitoring: (1) The permittee shall implement a gas monitoring program approved by the Department to comply with the lower explosive limit (LEL, 5 percent by volume in air) requirements for methane...; (6) If approved by the Department, the remediation plan must be implemented immediately with any changes to the plan or schedule reasonably require by the Department.

Landfill gas control for Cell 9 is described in **Section 16**. Landfill gas monitoring will be performed in accordance with the EMP, provided as **Appendix K**.

(R) Location Restrictions and Design Demonstrations: If not previously submitted, the permittee shall demonstrate to the Department compliance with the Location Restrictions specified under federal regulation 40 CFR 258.10 through 258.16 regarding airport safety, floodplains, wetlands, fault areas, seismic impact zones, and unstable areas. If not previously submitted, the permittee shall also demonstrate to the Department compliance with the Design Criteria specified under federal regulation 40 CFR §258.40.

This has previously been submitted with the Phase I and Phase II reports.

(S) Wetlands and Wildlife Protection: (1) Landfill construction and operation may not impact any regulated wetlands area until necessary authorization is received from the applicable State and federal wetland authorities. This includes construction of access roads, landfill cells, or other land disturbance, and pertains to wetlands regulated by the State of Maryland and/or the U.S. Army Corps of Engineers. (2) Landfill construction and facility operations, which may impact upon State or federally regulated endangered species, may not begin unless all necessary permits or authorizations are obtained from the applicable State or federal wildlife regulatory agencies.

This has previously been addressed in the Phase II report.

3. OPERATIONAL FACILITIES

3.1 Introduction

In accordance with the requirements of COMAR 26.04.07.08(B)(2), operational facilities are described in this section. Many existing operational facilities at the existing MLFRRF will continue to be used during operation of the proposed Cell 9 vertical expansion. Such operational facilities are described below, including: (i) entrance and vehicle weighing facilities; (ii) administrative office; (iii) maintenance facilities; (iv) existing closed landfills; (v) residential recycling center; (vi) cardboard recovery facility and recycling shed; (vii) yard waste composting facility; (viii) landfill recycling area; (ix) landfill gas-to-electricity plant and blower/flare station; (x) leachate storage tank area and pre-treatment plant; (xi) communication equipment; (xii) employee sanitary and safety facilities; (xiii) water supply; and (xiv) exterior lighting.

3.2 Entrance and Vehicle Weighing Facilities

The MLFRRF has two-way scales fitted with an electronic scale data recording and management system, which is housed in a manned scalehouse with sanitary facilities and water supply.

3.3 Administrative Office

The MLFRRF has an on-site office building which houses the administrative functions of the facility, including operation of the landfill, and business functions, such as facility accounting, billing and record storage. The office includes a conference room and has sanitary facilities and water supply. The office building also houses other County Department of Public Works administrative functions for the residential recycling center.

3.4 Maintenance Facilities

The MLFRRF has on-site maintenance facilities, including maintenance shops, covered equipment storage buildings, and uncovered equipment and material storage areas. These maintenance facilities service MLFRRF equipment and vehicles.

3.5 Existing Closed Landfills

The MLFRRF has been accepting waste since 1975. Multiple closed cells are present at the facility. These include Cell 1-East, Cell 2, Cell 4, Cell 567, and Cell 8. Cell 1-West and Cell 4 were previously excavated and relocated into the lined Cell 8 in 1994 and 1996, respectively. These cells are currently under post-closure care.

3.6 Residential Recycling Center

The MLFRRF has a dedicated area called the Central Recycling Center (CRC) to allow residents from Anne Arundel County to drop off recyclables. Paper, plastic, metal, and glass are taken to

Waste Management Recycle America in Elkridge, Maryland. From there, the items are sorted and sold to companies that manufacture new materials. Brush, soil, rock, and rubble are taken to the landfill recycling area for processing (**Section 3.8**). Other recyclables are stored at the CRC or the landfill recycling area and then removed by a contractor for recycling, energy recovery, or disposal.

3.7 Cardboard Recovery Facility

The MLFRRF has an on-site cardboard recovery facility to bale cardboard dropped off at the residential recycling center. The baled cardboard is then sold.

3.8 Yard Waste Composting Facility

The MLFRRF has an on-site MDE Tier 1 yard waste composting facility. Non-woody vegetation (grasses and leaves) is separated, ground into small pieces, and used to create compost. The compost is used on-site or sold to vendors.

3.9 Landfill Recycling Area

The MLFRRF has an on-site landfill recycling area, currently located within the future footprint of Cell 9. The landfill recycling area includes brush, soil, rock, and rubble stockpiling, processing, and management areas. Brush is separated, ground into mulch and used to create driving surfaces throughout the MLFRRF. It is also used for temporary soil erosion control in the active landfill area. Rubble (asphalt, concrete and brick) is crushed and applied as road base material at the MLFRRF and given away for free to residents.

3.10 Landfill Gas-to-Electricity Plant and Blower/Flare Station

Since the mid-1990s, the MLFRRF has had an active landfill gas (LFG) management system which covers the entire waste mass. This system directs collected gases to either the blower/flare station for destruction (i.e., combustion) or to an on-site LFG-to-electricity plant for generation of electricity under a long-term contract with the County.

3.11 Leachate Storage Tank Area and Pre-Treatment Plant

Leachate is pumped from the closed Cell 8 disposal area and the active Cell 9 disposal area to leachate storage tanks. The leachate storage and treatment system consists of tanks, a secondary containment area, piping, a pre-treatment facility, a truck loading area, a force main pipe from the storage tanks for conveyance to the public wastewater treatment facility, and an automated sampling system housed in a shed that contains leachate effluent and transfer pumps.

The leachate storage tank area includes two 330,000-gallon storage tanks (both located inside a secondary containment area) and a leachate truck loading station. The leachate pre-treatment facility is located adjacent to the leachate storage tank area. In general, leachate is pumped directly to the influent leachate storage tank. If needed, leachate is then transferred to the pre-treatment facility in batches for treatment. Once a leachate batch has completed the pre-treatment process, it is pumped to the effluent leachate storage tank for storage until it is pumped via a force main to the municipal sewer system.

3.12 Communication Equipment

Telephones and internet communications systems are available at the scale house, maintenance building, pre-treatment facility, and administrative office. Emergency telephone numbers and contact persons for fires, medical emergencies, spills of hazardous materials, or other emergency situations are listed at these locations. In addition, a two-way radio system is used to facilitate communication among facility personnel at the landfill working face and with operations and maintenance personnel working around the facility. This two-way radio system also provides a link from personnel across the facility to the scale house and administrative office. The two-way radio system allows immediate response to any emergency and improves control over operations.

3.13 Employee Safety and Sanitary Facilities

3.13.1 Employee Safety

A first aid kit is maintained on site at the landfill administrative office, scale house, maintenance building, and in the working face equipment and landfill personnel vehicles. These first aid supplies are accessible for use by all employees on an as-needed basis. For serious injuries, the County Emergency Response (911) will be contacted.

In addition, all site personnel are trained to recognize hazardous waste materials (or other materials not permitted for disposal per the Solid Waste Permit) and to notify the proper authorities if hazardous waste is discovered in any vehicle entering the MLFRRF or in any dumped load at the working face.

3.13.2 Sanitary Facilities

Sanitary facilities are provided at the scale house, administrative office, pre-treatment facility, cardboard recovery facility, and the maintenance building. Portable sanitary facilities are temporarily available around the landfill, as landfill operations/tasks change over time. Additional portable sanitary facilities can be provided at the MLFRRF as needed.

3.14 Water Supply

The MLFRRF is serviced by public water supply including potable drinking water to various building and fire hydrants located throughout the facility.

3.15 Exterior Lighting

Exterior automatic lighting is provided at the administrative office, maintenance facilities area, the scale house, the gas-to-energy plant, and at various critical operations areas across the landfill. Security lighting is provided at various buildings, the existing leachate storage area, and at each of the landfill cell riser houses.

4. ON-SITE ROADS

4.1 Introduction

In accordance with the requirements of COMAR 26.04.07.08.B(3), the location and type of all existing or proposed on-site roads are described in this section.

Facility access and the control of traffic at the MLFRRF are provided via three separate entrances that are located along Burns Crossing Road: the main gate, the CRC entrance, and the administrative office entrance. Multiple access roads traverse the MLFRRF, providing access to all the facilities. These roads are all shown on Drawing 2 (**Appendix A**). A description of the roads is provided below.

4.2 Main Gate Entrance Road

The main gate entrance is used for all landfill customers, including residential, commercial and government vehicles, County staff vehicles, and construction and service-related vendor vehicles. Traffic is controlled by a traffic signal on Burns Crossing Road and entry to the facility occurs via a gate approximately 180 feet east of Burns Crossing Road, on Pascal Boulevard. The gate is open during operating hours and locked at all other times. The main gate entrance leads to a scale house and two-way scales. The main gate entrance road extends past the scale house to the maintenance facility and the leachate storage tank area and pre-treatment plant. No modifications to the existing entrance road will be needed for the proposed vertical expansion.

4.3 CRC Entrance Road

Access to the CRC is via an entrance located approximately 400 feet north of the main gate entrance. The CRC entrance is gated and consists of two asphalt-paved lanes (one entering and one exiting). The gate is open during operating hours and locked at all other times. The lanes are divided and pavement markers and signs direct citizens to a “Meet and Greet” booth where a County employee controls traffic and provides information, directing customers to the appropriate disposal or recycling areas within the center.

4.4 Administrative Office Entrance

Access to the administrative offices at the facility is via an entrance located approximately 350 feet south of the main gate entrance. The administrative office entrance consists of two asphalt-paved lanes (one entrance, one exit) into an asphalt-paved parking area. The entrance is not gated, but use is typically limited to administrative staff and customers tending to administrative business. A fence separates the parking area and the administrative office entrance from the MLFRRF.

4.5 Facility Access and Landfill Perimeter Roads

The facility contains two main access roads: Pascal Boulevard and Joel Saline Way. Pascal Boulevard leads from the main gate entrance to Cell 1, Cell 2, Cell 3, Cell 4, Cell 567, Cell 8, the LFG-to-electricity plant, and the yard waste composting facility. Joel Saline Way leads from Pascal Boulevard to Cell 9. Joel Saline Way is asphalt-paved from Pascal Boulevard to the active disposal areas within Cell 9. The remainder of Joel Saline Way, consisting of a perimeter access road around Cell 9, is constructed of asphalt millings.

4.6 Temporary Landfill Access Roads

Temporary access roads are typically 30-ft-wide rubble roads leading from the Cell 9 perimeter road to the active waste disposal area. Access road locations and lengths will depend on the waste filling sequence and are subject to use per landfill operation's needs.

4.7 Permanent Landfill Access Road

After closure, a permanent access road will be constructed over the final cover system along the crest of the vertical expansion, as shown on Drawings 10 and 10A (**Appendix A**). This road will connect to Joel Saline Way and will primarily be used to access the final cover during post-closure care. The road will be approximately 20 ft wide and sloped into the landfill at a minimum of 2% to provide positive drainage and will have a recycled asphaltic concrete surface and inside drainage channel. Details of the landfill access road and drainage channel are shown on Drawing 13 (**Appendix A**).

5. WASTE TYPES AND SERVICE AREA

5.1 Introduction

In accordance with COMAR 26.04.07.08.B(4), a description of the types of solid waste that will be accepted, the types of solid waste that may not be accepted, and the area and population that will be served by the vertical expansion are described in this section.

5.2 Acceptable and Unacceptable Wastes

The proposed vertical expansion will continue to accept only those waste types permitted at the MLFRRF under current refuse disposal permit 2023-WMF-0240A. A designated list and description of acceptable and unacceptable waste types is provided in the Operations Guide (**Appendix B**). Cell 9 is designed to accept non-hazardous municipal, commercial, construction/demolition, and institutional solid waste. Solid waste disposed at Cell 9, including following the expansion, will be brought from residential, commercial, and government (municipal and state) sources. Small quantities of non-hazardous industrial wastes may be brought to the facility by commercial haulers. Generally, solid waste accepted at the MLFRRF includes a variety of paper, plastics, cans, food waste, wood, glass, rubber and leather products, textiles, metals, rubble, and yard waste. Procedures for inspection and visual observation of incoming waste at the MLFRRF entrance area and the landfill working face, as well as procedures to be followed if unauthorized wastes are identified, are provided in the Operations Guide (**Appendix B**). Unacceptable wastes include any materials containing hazardous waste, PCB wastes, chlorofluorocarbons, bulk liquid wastes, radioactive materials, and asbestos or asbestos-containing materials.

5.3 Service Area

Cell 9, including the vertical expansion, is intended to serve only the residents and businesses of Anne Arundel County.

5.4 Population

According to 2024 U.S. Census estimates, the total population of Anne Arundel County was about 602,350. Based on the 2010 U.S. Census data, the population was 537,656, which represents approximately a 12.0% increase or approximately 0.81% increase per year. Assuming this growth rate continues, the Anne Arundel County population will be approximately 653,000 people in 2044. The County intends to utilize the proposed vertical expansion to provide additional waste disposal capacity to accommodate this anticipated population growth. The anticipated quantities of waste received, and facility life projection based on tonnage receipt data trends, which is directly influenced by population changes, are described in **Section 6**.

6. ANTICIPATED WASTE QUANTITIES AND FACILITY LIFE PROJECTION

In accordance with COMAR 26.04.07.08.B(5), the anticipated quantities of solid waste that will be accepted and the calculations used to determine the useful life of the proposed vertical expansion are presented in this section. Calculation details are provided in **Appendix C**.

The currently approved permitted capacity of Cell 9 (excluding the two-foot final cover system and bottom liner system) is 8,523,000 cubic yards (cy) (BAI Group 2023). The proposed vertical expansion will increase the design net capacity of Cell 9 to 12,938,000 cy (considering traditional final cover) or to 13,207,000 cy (considering alternative final cover [see **Section 21.2.1**]).

The Cell 9 disposal area lifespan was calculated using a scenario that assumes 140,000 tons of solid waste is disposed in 2024, with a 1% annual increase thereafter. The projection assumes that a large portion of the County-generated waste is under contract to be diverted by contract haulers from curbside disposal to the Annapolis Junction Transfer Station where the waste will be transported out of state for disposal, as is currently the case. This program of curbside diversion and out-of-state disposal is in accordance with the County's 10-Year Solid Waste Management Plan and assumes renewal of the waste diversion contract. The waste diversion contract with Waste Management, Inc. was renewed and effective on April 12, 2023, and has an expiration date of June 30, 2033 (if all annual contractual renewals are approved). The waste is assumed to be placed and compacted in the landfill to achieve an equivalent landfill utilization rate of 1,200 pounds per cubic yard, which is based on a long-term historical average from Cell 8.

Based on calculations of annual waste disposal rate and remaining airspace in the currently permitted Cell 9, the County will exhaust its disposal capacity in Cell 9 in about 2048. With the proposed vertical expansion, the Cell 9 disposal area lifespan will increase to about 2062 (traditional final cover) or about 2063 (alternative final cover [see **Section 21.2.1**]).

7. METHODS OF REVISING WASTE TYPES, QUANTITIES, AND FACILITY LIFE PROJECTION

In accordance with COMAR 26.04.07.08.B(6), this section describes the proposed methods for (i) collecting and reporting data on the quantities and types of solid waste received at the landfill and (ii) revising the projections of Cell 9 life expectancy.

The quantity of solid waste landfilled will be reported both in tons (weight) and in-place cubic yards (volume). The volume of solid waste received at Cell 9 (i.e., airspace) will be estimated based on aerial photogrammetric surveys of the landfill disposal areas and waste tonnage conversions. Aerial photogrammetric surveys will be utilized on annual basis to compare the pre-waste disposal contours to the post-waste disposal contours to calculate volume. The weight of the waste will be estimated based on the sum of the weights of the waste in all vehicles that enter the facility, as measured at the truck scales. As described in detail in the Operations Guide (**Appendix B**), the scale house attendant will record the type of waste received and will perform random spot inspections as they enter the MLFRRF.

The life expectancy of Cell 9 will be periodically revised by dividing the total remaining airspace by the volume of waste that is expected to be received each year. Records of the most recent consumed airspace and/or waste tonnages will be used to estimate the current yearly consumption and the growth rate of airspace consumption. Note that the projected date at which the landfill will reach its capacity is dependent on the actual in-place density of the solid waste. The cumulative in-place density of the solid waste will be estimated by dividing the cumulative weight of the waste by the cumulative consumed airspace. This data can be then used to verify the life expectancy of the Cell 9 based on the annual tonnage records.

A written report will be submitted annually to MDE concerning the status of Cell 9 for each year the landfill is in use. The report will be submitted no later than 60 days following the date specified in the permit and will include:

- the quantity (reported both in tons and in-place cubic yards) of solid waste that was landfilled and materials recycled at the facility during each of the preceding 12 months,
- an estimate of the total quantity of soil material that was used in the landfill during each of the previous 12 months,
- an estimate of the percentage of total landfill capacity that was used for placement of solid waste and the percentage that was used for soil cover materials,
- an estimate of the projected date at which the landfill will reach its maximum disposal capacity and the premises upon which this determination was made, and
- an estimate of the remaining volume in each active subcell after the waste is placed during the preceding 12 months.

8. COVER MATERIAL

8.1 Introduction

In accordance with the requirements of COMAR 26.04.07.08.B(7), the volume and type of available cover material, the calculated volume of earth needed for daily, intermediate, and final cover soils (operations soils), the location of earth stockpiles, and provisions for saving topsoil for use as final cover are presented in this section.

8.2 Volume and Type of Available Cover Material

The primary source for cover materials will be existing on-site soil borrow areas and other available sources (such as landfill customers). The existing on-site soil borrow areas are anticipated to supply nearly all the construction, operations, and final cover soils for Cell 9, as described in **Section 8.3** and summarized in **Table 2**. The volume of operations soils can be reduced through the use of approved daily cover tarps or alternative cover materials approved by MDE.

Excavation of Subcells 9.1 through 9.5 will provide a significant volume of clay and structural fill that can be used for cell construction, operations, and final closure, while stripping the Cell 9 footprint prior to cell construction will provide topsoil. The volume of soil that will be generated from excavation of Subcells 9.3 through 9.5, accounting for a 10% bulking factor on the structural fill, is presented in **Table 2**. This volume also incorporates the excavation soils from Subcells 9.1 and 9.2, which were previously temporarily stockpiled within the Subcell 9.3 footprint.

8.3 Volume of Cover Soil Requirements

The calculated net airspace of the vertical expansion is approximately 12.9 million cubic yards (mcy) (top of protective cover drainage layer to bottom of final cover geosynthetics) for the traditional final cover and 13.2 mcy for the alternative final cover (**Appendix C**). The volume of maximum soil needed for daily, intermediate, and final cover soil (operations soil) is estimated as a percentage of that net airspace. Since 2017, MLFRRF has used about 16.2% of the waste in place volume (2,203 mcy; **Appendix C**) for operations soil (totaling approximately 357,000 cy of operations soil used to date). Applying that operations soil percentage to the proposed net airspace (and subtracting the operations soil used to date), approximately 1.739 mcy of daily, intermediate, and final cover soils (up to final cover geosynthetics) will be needed as of the start of 2024 for the traditional final cover and 1.783 mcy for the alternative final cover (**Table 2**).

The total area of Cell 9 is approximately 84 acres. The volume of soil needed for the installation of a 1.5-ft thick protective soil cover and 0.5-ft thick layer of topsoil, as shown on Detail 1 of Drawing 13 (**Appendix A**), over the entire Cell 9 area is approximately 208,000 cy of protective soil cover and 69,000 cy of topsoil (**Table 2**). If the alternative final cover detail shown in Detail 2 on Drawing 13 is utilized, no additional soil will be required.

In total, therefore, the volume of soil needed (structural fill and topsoil) for the future operation and final closure of the landfill is approximately 2.016 mcy (**Table 2**). If the alternative final cover option is selected, the volume of structural fill needed for the future operations and final closure of the landfill is approximately 1.783 mcy. Considering the operations and closure soil needs presented in **Section 8.3** and **Table 2**, a small quantity of import structural fill will be needed for both the traditional final cover option (236,000 cy) as well as for the alternative final cover option (72,000 cy). In addition, approximately 57,000 cy of topsoil will need to be imported for the traditional final cover option, whereas the alternative final cover option will result in a topsoil surplus of approximately 12,000 cy. Both final cover options result in a significant volume of surplus clay (855,000 cy), which can be used elsewhere at the MLFRRF or at other County sites.

8.4 Stockpile Locations

The footprints of Subcells 9.4 and 9.5 are currently in use as a stockpile area while Subcell 9.3 is constructed. This stockpile area currently contains excavated soils from Subcell 9.1 through 9.3, segregated by soil type. As construction moves into Subcells 9.4 and 9.5, the stockpiles will be relocated across previously constructed subcells, either as large individual stockpiles or spread out over the entire footprint to minimize the height of the piles. These areas will be stabilized according to the approved soil erosion and sediment control plans.

It is also expected that small soil stockpiles may be located close to the working face for use as daily cover, in the event that a ‘hot’ load is received or a landfill fire occurs, or for rehabilitation of the driving and tipping areas. The location of these stockpiles will be determined as necessary, and they will be of temporary use.

8.5 Topsoil

Topsoil will be stripped from all areas prior to soil excavation and stored in a distinct topsoil pile. At times when there is excess material or in times of operational need in the MLFRRF, compost material (previously processed as yard waste) will be mixed or blended with on-site soils (from subcell borrow areas) to manufacture a topsoil material. The topsoil material will be used on-site for vegetative establishment. Areas that use temporary stabilization may have their topsoil stripped and reused for permanent stabilization.

Topsoil will be redistributed in a six-inch layer over the completed, capped landfill cells as one of the final steps in construction of the final landfill cover system. As noted in **Section 8.3** of this report, the use of the traditional final cover will require import of topsoil (57,000 cy), while the use of the alternative final cover will result in the site having an excess of topsoil (12,000 cy) which can be used elsewhere at the MLFRRF or at other County sites (**Table 2**).

9. FACILITY ACCESS CONTROL

In accordance with the requirements of COMAR 26.04.07.08.B(8), the means for controlling public and unauthorized access to the facility are described in this section.

The existing means of access control at the MLFRRF will continue to be utilized during continued operation of Cell 9 following the vertical expansion. The MLFRRF (except the administrative offices) is enclosed by an 8-foot-high chain-link fence with strands of barbed-wire on top of the chain-link fencing. All traffic entering the facility must enter using one of the three entrances. The administrative office entrance does not provide access to the disposal facilities.

The main gate entrance is used for all landfill customers, including residential, commercial and government vehicles, County staff vehicles, and construction and service-related vendor vehicles. Personnel stationed at the scalehouse provide access control, monitor for unacceptable waste, and direct vehicles (as necessary) during operating hours. All customers hauling waste or other materials to the MLFRRF are required to access the facility through the main gate and unauthorized vehicles are directed to turn around and leave the facility. Disposal of waste and delivery of construction materials is allowed only during operating hours. All gates are secured by lock each day when employees leave the facility. The sign at the main gate entrance displays the facility operating hours.

The CRC entrance is gated. The gate is open during operating hours and locked at all other times. The lanes are divided and pavement markers and signs direct citizens to a “Meet and Greet” booth where a County employee controls traffic and provides information, directing customers to the appropriate disposal or recycling areas within the center.

After hours, primary security is provided by the fence and locked gate. Specific facilities are also equipped with fire, smoke and/or security alarm systems. Further details of facility access control and security measures are provided in the Operations Guide (**Appendix B**).

10. OPERATING PROCEDURES

Throughout this section the term “vertical expansion” and “landfill” are in specific reference to the 84-acre Cell 9 area, which is the subject of this permit application. The term “MLFRRF” or “facility” applies to the existing Millersville Municipal Landfill and Resource Recovery Facility, which incorporates multiple landfills. However, as the proposed vertical expansion will be an extension of the current Cell 9 and a part of the larger MLFRRF, the administrative and operations items discussed in this section will carry over from the current MLFRRF landfill procedures and remain unchanged.

10.1 Introduction

The Operations Guide (**Appendix B**) for the MLFRRF generally remains same as originally permitted, with only minor modifications to incorporate the vertical expansion of Cell 9. In accordance with the requirements of COMAR 26.04.07.08.B(9), operating procedures are described in the Operations Guide as summarized in this section, including: hours and days of operation; number and types of equipment to be used; organization chart; provisions for fire prevention and control; means of preventing public health hazards and nuisance from blowing paper, odors, rodents, vermin, noise, and dust; and proposed method of daily operation including wet weather operation.

10.2 Hours and Days of Operation

Consistent with the current MLFRRF facility operations, the landfill will be open to receive municipal solid waste and recyclables between the operating hours of 8:00 a.m. and 4:00 p.m., Monday through Saturday. The MLFRRF is permitted to accept municipal solid waste from residential or commercial customers on the following days and times:

- Monday - Saturday: 7:30 a.m. - 5:00 p.m.
- Sunday: 8:00 a.m. - 4:00 p.m.

The administrative offices at the MLFRRF are typically open between the hours of 8:00 a.m. and 4:00 p.m. Monday through Friday. The landfill will be closed for receiving waste on observed County holidays.

10.3 Operating Equipment

On-site equipment is identified in Section 13 and on Table 13-1 of the Operations Guide. The operating equipment generally falls into three categories, listed below:

Heavy compaction equipment specifically designed for landfill applications is used to push, crush and densify landfilled material. Special cleats on the equipment wheels break up materials by driving across relatively thin layers of waste and can achieve in-place waste densities up to 1,200 pounds per cubic yard (70 kiloNewtons per cubic meter).

Heavy earth-moving machinery is required to remove soil overburden, excavate cover material, and to place/relocate construction materials for berms, sideslopes, roadways, and drainage features. Additionally, this machinery is used to move daily, intermediate, and final cover materials during landfill operations. Bulldozers, loaders, excavators, and dump trucks will be maintained on site at all times.

Service and light machinery are used to support landfill operations and, to a lesser extent, construction. Included are a service truck for carrying fuel, lubricants, engine fluids, easily-replaced parts, and tools; pickup trucks primarily for transporting employees and collecting litter; surface maintenance equipment (mowers, water truck, etc.); and water pumps to relocate rainwater that may pond during construction and drain groundwater at soil excavations.

All equipment will be regularly serviced and routinely cleaned according to the manufacturer's servicing policy, at a minimum. If essential equipment becomes inoperable, the Landfill Manager will procure appropriate replacement equipment from local equipment rental companies as needed.

10.4 Landfill Staff and Responsibilities

Landfill personnel requirements are identified in Section 11 of the Operations Guide. The landfill operational staff will consist of Solid Waste Disposal and Maintenance Manager, Equipment Maintenance Supervisor, Landfill Manager, Auto Mechanics, Welder, Landfill Supervisor, Scalehouse Operators, CRC Solid Waste Crew Supervisor, Equipment Operators, Maintenance Workers, Environmental Technician, and Laborers. Most personnel on site will serve multiple roles as they will also be able to operate some of the service and light machinery as needed. The Scalehouse Operators will be on site during operating hours to monitor and measure incoming waste and direct traffic. Ultimate responsibility for accepting/rejecting waste shall rest with the Landfill Manager by way of the Landfill Supervisor.

The operation of the landfill must be directed by a responsible, knowledgeable person for the proper implementation of the plans and specifications. The Landfill Manager and Landfill Supervisor must be able to: communicate with landfill personnel, administrators, and haulers; understand and implement the intent of various plans and specifications; maintain all components of the landfill in a fully operational posture; and have a working knowledge of construction, engineering and equipment, sequence of operations, grading and all other operations related to landfill development and maintenance.

10.5 Fire Control

Procedures that will be taken to protect against fires are identified in Section 10.2 of the Operations Guide. Protection against fires will include providing fire extinguishers on the landfill equipment. In addition, all operators will be on alert for any indication that a load of waste may be smoldering or about to ignite. Active face Equipment Operators will also be trained in procedures to follow if a smoking or smoldering load of waste is observed. In case of a fire such that emergency fire

service responds, the County must notify the MDE/SWP in writing within 72 hours of fire occurrence and schedule a follow-up site inspection. Smoking will be prohibited on site except in designated areas. Burning of solid waste shall not be allowed except as permitted by MDE. Emergency procedures to be followed in the event of a non-waste fire are described in Section 10 of the Operations Guide (**Appendix B**).

10.6 Public Health Hazards and Nuisances Prevention

Procedures that will be followed to protect public health and prevent nuisances, as required by COMAR 26.04.07.10(N,P), COMAR 26.02.03, and MDE standard permit conditions, are addressed in Section 5.2 of the Operations Guide. Specific measures for control of litter, dust, vectors, noise, odors, and unacceptable wastes are summarized below.

Litter Control. Preventive measures are necessary to preclude the unwanted release of solid waste to the environment. Litter is controlled through local “tarp laws” requiring that all transported debris is secured and/or covered. Incoming refuse hauling vehicles shall remain covered until they have reached the designated untarping area near the active working face to reduce the potential for the release of litter and debris. All vehicles must be equipped with properly fitted manually or hydraulically operated covering devices. The hauler must ensure these devices are used at all times when hauling solid waste. Vigilance of the hauler (and landfill personnel) also is needed to make sure the netting or “tarp” is used and maintained properly, and landfill personnel will verify that the covering is in place as the vehicle enters the disposal area. The drivers of unsecured loads will be notified of the tarping requirements and monitored for future compliance. Placement of approximately six inches of daily cover soil or an alternate daily cover tarp onto the working face at the end of the working day is one preventive measure that will be employed at Cell 9 to minimize blown litter.

Litter fencing will be installed downwind of the working face to collect windblown material or debris. The fences will be cleaned as needed (more frequently during windy days) by operations personnel, and the waste will be re-deposited in the active working face area. Additional portable litter fencing is available for use near the working face when conditions warrant. The placement of portable fencing is determined by the Landfill Supervisor or the Landfill Manager. Litter and perimeter chain-link fencing will be installed downwind of the area, and the area is also controlled by landfill personnel to assure litter is policed.

Litter will be collected on a routine basis, both off-site and on-site. Additionally, roads surrounding the facility will be inspected periodically (usually at least weekly) and all litter missed in weekly field reconnaissance will be collected during special collection efforts.

Odor Control. Most common and objectionable odors occur from normal incoming waste at the working face. This odor generally dissipates within a short distance, posing no threat of nuisance to off-site areas. Strong odors also may be caused by buried, decomposing waste, or leachate seeps, but application of daily cover generally is satisfactory to prevent development of an odor problem.

Regular inspection and maintenance of daily cover for soil shrinkage cracks or erosion of previously filled areas will control escaping odors.

Should odors become a problem at Cell 9, it will likely be due to regular receipt of odorous waste or from emissions of LFG. In this case, the source of the odor will be identified, and remedial actions addressed. In the event LFG is identified as the source of odor, an on-site evaluation will be performed, and appropriate remedial actions taken based on the results of the evaluation. If gas-related odors persist, an expansion to the gas collection and control system may be required to mitigate the nuisance.

Vector Control. To minimize problems associated with rodents, insects and birds, waste will be compacted as soon as practical (typically immediately). The Cell 9 working area (of open waste) will be generally kept small. Areas where disposal activity and compacting are not active are covered with soil. The active work area is covered at the end of each workday with soil or an MDE-approved alternative daily cover until the following workday. These actions reduce potential food sources and breeding areas. On-site personnel will also observe the area on a daily basis to identify the need for further vector abatement programs. Mosquitoes will be controlled by limiting the number of standing water bodies to naturally occurring wetlands and required storm water management ponds and sediment traps. Low spots, particularly in fill areas, will be graded to ensure positive drainage. Bird populations at the facility will be controlled by keeping the work area small and covering compacted waste at the end of each workday.

Noise Control. The noise generated at Cell 9 is potentially derived from earthmoving/compacting equipment, heavy equipment used for mulching and composting and waste-carrying vehicles. The equipment creates high noise levels when operating, but this type of noise should not become a nuisance problem off site due to natural and man-made buffering such as topography, wooded areas, capped landfill areas, and stockpiles. All equipment is maintained and include manufacturer installed noise suppression devices. All vehicles are required to maintain mufflers and exhaust systems to limit engine noise. On-site noise control for employees will be governed by the Occupational Safety and Health Administration (OSHA) Standards. Noise control measures for the facility will be implemented in accordance with COMAR 26.02.03.

Dust Control. A comprehensive dust prevention and control program is implemented at the facility. MLFRRF roads from the main gate to the scale house and to the landfill disposal areas and the parking areas are paved with asphalt. Facility access roads within the Cell 9 disposal areas are prepared with asphalt millings (primary haul roads), rubble (temporary access roads), or mulch (in or near the working face). Other access roads used for maintenance and monitoring activities are paved with gravel or asphalt millings. Dust will primarily be controlled through the application of water or other chemical suppressants approved by MDE to road surfaces and shoulders from which dust could be generated. Waste oil will not be used as a dust suppressant for unpaved surfaces. A water truck is typically used to wet down unpaved and paved roads in dry weather for dust control.

Finally, a power broom (wheel brush) or sweeper truck will be used to remove accumulated soil from paved roadways in order to minimize the spread of dust and mud drag out onto public roads.

10.7 Daily Operation

Daily operation of the MLFRRF will be performed in full accordance with the requirements of COMAR 26.04.07.10(A-I), as well as conditions stipulated in the operating permit for the facility. Daily operating procedures are discussed in detail in Section 5 of the Operations Guide. Sections 3.5.3.2 and 5.7.2 of the Operations Guide, respectively, outline the procedures for preventing acceptance and disposal of unauthorized wastes. A brief description of daily operating procedures is provided in this section.

A controlled flow of waste materials will be directed at all times to the working face of Cell 9 where placing, spreading, and compaction of waste will occur systematically. Subcells will strategically be filled in a manner to minimize leachate generation and maximize landfill stability and no waste will be placed in ponded water. Furthermore, grading at Cell 9 will be maintained to minimize runoff onto fill areas, to prevent erosion and ponding, and to drain water from the surface of the landfill. All incoming loads of solid waste will be inspected at the working face by vehicle spotters and/or equipment operators and only acceptable waste will be allowed for filling, as described in **Section 5.2**. Lifts will be placed and compacted in layers not exceeding eight feet in height within the bottom area and six feet height on side slopes exceeding 4 horizontal to 1 vertical (4H:1V) slope. The working face slope will be maintained at 3H:1V or flatter to enhance landfill stability and to facilitate proper compaction.

An alternate daily cover (tarp) has been approved for use, as described in Section 5.5.1 of the Operations Guide. The tarp will be moved into place at the end of each operating day and removed when waste is received for disposal the following day. The tarp is inspected each working day for damage, such as tears, and repairs will be made as needed. When weather conditions (e.g., high winds, snow, excessive rainfall, etc.) or excessive damage prevents use of the tarp, a six-inch-thick daily soil cover layer will be spread over the waste. The following morning, when the working face is opened, the previous day's soil cover will be removed to the extent possible and set aside for later re-application on an as needed basis. The cover material will be stockpiled at or near the working face, with runoff from the stockpile confined to the working face to prevent the runoff of waste to other locations near Cell 9. This practice will facilitate continuous waste-to-waste contact to minimize barriers in the landfill mass and promote leachate and gas movement.

10.8 Inclement Weather Operation

Operation of the MLFRRF during inclement weather is described in Section 5.6 of the Operations Guide. During heavy rains, heavy snow, or icy conditions, waste compaction will continue. However, the presence of mud can create traffic difficulties on sloped access roads or can mire vehicles on level ground. Therefore, during inclement weather operations procedures will be carefully planned and precautions taken, such as:

- Stormwater in cells will be removed as leachate (if in contact with waste materials) or handled as stormwater runoff;
- The stormwater drainage system will be maintained and kept free of debris and sediment collected therein;
- Slope angles and erosion control materials will be maintained to promote positive drainage, especially at the working face;
- Stockpiled soils will be protected using insulating material and covering with plastic and coarse-textured soil will be used as cover material during cold weather; and
- Roads and walkways will be plowed and treated during snow/ice conditions.

Typically, during inclement weather, high winds are a common occurrence which increases the amount of windblown litter on the landfill and area surrounding the landfill. The Landfill Manager and Landfill Supervisor will increase inspection and collection efforts during periods of high wind, whether other inclement weather is occurring or not.

Any area of eroded intermediate or final cover material will be maintained by promptly filling, grading, and vegetatively stabilizing, as necessary, to control further erosion.

11. LANDFILL CELL DESIGN

11.1 Introduction

The proposed MLFRRF vertical expansion has been designed to conform the minimum requirements outlined in COMAR 26.04.07.07.C(12). In this section, a discussion of the following landfill cell design criteria are provided below.

1. Post-settlement grades of the landfill cell are sufficient for leachate flow (i.e., COMAR 26.04.07.07.C(12)(a)(v)).
2. The buffer distance between the liner system and groundwater table complies with regulatory requirements (i.e., COMAR 26.04.07.07.C(12)(b)).
3. Differential settlement will not cause excessive strain in the liner system (i.e., COMAR 26.04.07.07.C(12)(a)(iii));
4. The liner system will have sufficient puncture resistance to construction and operation loading (i.e., COMAR 26.04.07.07.C(12)(a)(iii));
5. The drainage/protective layer material can be placed on the sideslope while maintaining sufficient stability (i.e., COMAR 26.04.07.07.C(12)(a)(iii));
6. The components of the liner system will be compatible with the expected leachate constituents of municipal solid waste;
7. The landfill will have sufficient factor of safety against instability under short-term and long-term conditions; and
8. The landfill will have sufficient factor of safety against instability during a design seismic event.

The first six design items above are discussed in **Section 11.2**, while the seventh item is discussed in **Section 11.3**. As discussed in the Phase II Report, Cell 9 is not located in a seismic impact zone.

11.2 Description of Solid Waste Cells and Liner Design

11.2.1 Landfill Cell Layout and Liner System

The existing Cell 9 (and the proposed vertical expansion) covers an area of approximately 84 acres. Cell 9 is divided into Subcells 9.1 through 9.5. Subcells 9.1 and 9.2 are currently operational and accepting waste. Construction of Subcell 9.1 was completed in late 2016, and construction of Subcell 9.2 was completed in March 2021; base grades and infrastructure shown in **Appendix A** for Subcells 9.1 and 9.2 are as-built grades. Subcell 9.3 is currently under construction; base grades

and infrastructure shown in **Appendix A** for Subcell 9.3 are as shown in the approved construction drawings. Subcells 9.4 and 9.5 have not yet been constructed; base grades and infrastructure shown in **Appendix A** for Subcells 9.4 and 9.5 are design grades.

Drawings 4 through 9 (**Appendix A**) illustrate the grading plan for the top of subbase component of the liner system and the leachate management system for Cell 9. The base of the landfill cells will be graded to maintain a minimum 2% post-settlement slope. Leachate on the cell floor will be collected by a protective cover drainage layer, a leachate collection geocomposite, and 8-inch-diameter perforated HDPE pipes and transferred to the leachate transmission, storage, and treatment system. The leachate collection pipe corridors within the subcells will be constructed to maintain a minimum 0.5% post-settlement slope. The subcells will have excavated below-grade sideslopes with a maximum inclination of 3H:1V; the maximum height of the side slopes is 85 ft. Details of the liner and leachate collection system are shown on Drawings 12 through 15 (**Appendix A**). Calculations demonstrating the efficacy of the liner system are presented in **Appendix E**.

The currently permitted liner system for Cell 9 consists of the following seven component layers (from top to bottom).

- 2-ft-thick protective cover drainage layer with a hydraulic conductivity no less than 5×10^{-3} centimeters per second (cm/s)
- Double-sided geocomposite drainage/cushion layer (leachate collection)
- 60-mil-thick textured high-density polyethylene (HDPE) geomembrane liner (primary liner)
- Double-sided geocomposite drainage/cushion layer (leak detection)
- 60-mil-thick textured HDPE geomembrane liner (secondary liner)
- 18-inch compacted clay liner with a maximum hydraulic conductivity of 1×10^{-5} cm/s (subbase)
- Prepared subgrade with a 3-ft minimum offset from the highest observed groundwater

Engineering specifications for the above liner components are provided in **Appendix D**. The surface of subgrade soils will be prepared in accordance with specifications prior to installation of the subbase. The thickness of the subgrade soils shall be such that a minimum 3-ft buffer exists between the base of the subbase and the top of groundwater (based on highest observed conditions from the Phase II Report) across the entire base area of the landfill, in compliance with COMAR 26.04.07.07.C(12)(b)(ii).

11.2.2 Landfill Cell Grades and Liner Settlement

Geosyntec conducted liner settlement analyses based on filling the landfill to the proposed elevation of 285 feet per the National Geodetic Vertical Datum of 1929 (ft-NGVD29). Calculated

settlements are used to determine if the minimum specified slopes of the drainage layer and the leachate collection pipes are adequate to provide positive drainage throughout the life of the facility. The analyses are presented in **Appendix E.1**.

A total of five representative cross sections were analyzed for settlement. Cross sections A-A', B-B', and C-C' run perpendicular to the base grades of Subcells 9.3, 9.4, and 9.5 respectively to evaluate the post-settlement slope of the landfill base. Cross sections D-D' and E-E' run along leachate collection pipe corridors in Subcells 9.3 and 9.5, respectively, to evaluate the post-settlement slope along the leachate collection pipe corridors. The cross-sections layout is shown in Figures 1 and 2 of **Appendix E.1**, and in section views in Figures 3 and 4 of **Appendix E.1**. These figures also show the location of the analysis points of interest used in this settlement analysis.

To reduce the potential of grade reversal throughout the life of the landfill, the post-settlement base grades must be steeper than 2%. Similarly, the leachate collection pipes must maintain a minimum slope of 0.5%. Post-settlement geomembrane strains should be less than 5%. The maximum calculated settlement of 6.50 feet occurs at Point 4 in Section C-C', located in the middle of Subcell 9.5 where the thickness of the clay layer is greater than at other points and the change in load is greater. The maximum strain on the geomembrane is 0.19% between points 1 and 2 in Section A-A'. The minimum post-settlement side slope is located between points 1 and 2 along Section C-C' at a slope of 35.7%.

11.2.3 Liner Strength and Puncture Resistance

The maximum calculated geomembrane strain due to differential settlement is 0.19% (**Appendix E.1**), which is within the long-term allowable strain range of HDPE geomembrane (4 to 5%). Therefore, the integrity of the liner system is not expected to be influenced by differential settlement.

In order for the geomembrane to work efficiently as a barrier layer, puncturing of the geomembrane should be minimized. The capability of the liner system to resist the additional overburden loading imposed by the overlying waste is evaluated in **Appendix E.2**. The analysis shows that the puncture resistance of the HDPE liner exceeds the expected overburden loading with a sufficient factor of safety. Therefore, the integrity of the liner system will be maintained during waste filling.

11.2.4 Liner Veneer Stability

Because sliding during placement of the sand drainage/protective layer may take place, veneer stability of the liner system on the 3H:1V sideslope was evaluated. The lowest recommended friction angle was back-calculated using a published sliding wedge failure analysis method for geosynthetic-soil layered systems along a critical surface of a finite slope length as presented in **Appendix E.3** and assuming a factor of safety of 1.25. The combinations of interface friction angle (δ) and interface adhesion (a) required to achieve a target factor of safety equal to 1.25 were

calculated (Figure 3 of **Appendix E.3**); these ranges of interface friction angle and interface adhesion can be met with commercially available materials.

11.2.5 Liner Chemical Compatibility

A chemical compatibility demonstration is presented in **Appendix E.4**. As outlined in the appendix, all liner system components are compatible with the expected constituents of MSW leachate.

11.3 Landfill Stability Analyses

Geosyntec conducted a slope stability analysis to calculate the factor of safety against global sliding. The stability analysis is included as **Appendix G**. Based on the results of subsurface investigation presented in the Phase II Report, five idealized cross sections representing the most critical conditions were developed, as indicated on Figures 1 and 2 in **Appendix G**. These sections were chosen because they include the highest waste slope in each of the five subcells and therefore represent the largest driving forces for slope stability failure in each subcell.

The stability of the selected cross-sections was evaluated based on limit equilibrium theory using the methods of slices. Both circular and block failure surfaces were evaluated. The minimum calculated factor of safety was 1.5, which meets the minimum factor of safety for the long-term condition of 1.5 recommended in the technical manual entitled, “Solid Waste Disposal Facility Criteria” (USEPA 1993).

12. NATURAL AND ARTIFICIAL SCREENING

In accordance with the requirements of COMAR 26.04.07.08.B(11), natural or artificial screening will be used around the proposed vertical expansion. The MLFRRF facility perimeter is predominantly forested with mature deciduous trees. Existing vegetation will adequately screen landfilling operations and associated noise from nearby residents and motorists traveling on adjacent roadways. Along Dicus Mill Road, in particular, the existing minimum 500 feet wide setback will be maintained from the road to the edge of the proposed landfill cells. Should a nuisance occur, the area of concern will be evaluated by management and appropriate remediation will be enacted (e.g., planting of vegetation) if deemed necessary. There are no proposed changes to the natural and artificial screening associated with this vertical expansion.

13. DRAINAGE AND STORMWATER MANAGEMENT

13.1 Overview

The design and methods for controlling on-site drainage and stormwater runoff associated with the vertical expansion are presented in this section. As required by COMAR 26.04.07.08.B(12), stormwater and erosion and sediment (E&S) control designs will be submitted, reviewed, and approved by the appropriate local agencies prior to construction of each subcell and closure. The approved E&S plan for each subcell and closure will be submitted to MDE/SWP prior to the start of construction. Stormwater management plans will be reviewed by the County for conformance with Anne Arundel County's Stormwater Management Code. The Anne Arundel County Soil Conservation District (SCD) will also review stormwater management plans for conformance with COMAR 26.17.01 requirements for E&S control. As noted below, an approved E&S plan for the site is included as **Attachment I** and a submitted stormwater concept plan is submitted as **Appendix H.2**. The approved stormwater concept plan will be submitted to MDE/SWP prior to issuance of the permit.

The following aspects of the stormwater design for the vertical expansion are presented in the remainder of this section:

- Overview of the state and local stormwater and E&S control permit review and approval process;
- Summary of existing and future discharge permits;
- Analysis and design for permanent stormwater management conveyance and detention features; and
- Analysis and design for permanent E&S control structures.

13.2 State Stormwater Review and Approval

In accordance with the Clean Water Act, the United States Environmental Protection Agency (USEPA) has developed the National Pollutant Discharge Elimination System (NPDES) program. In Maryland, USEPA has delegated authority to issue NPDES permits to MDE. As part of this program, MDE has issued the General Permit for Discharges of Stormwater Associated with Construction Activity (Maryland General Permit No. 20-CP) and the General Permit for Discharges from Stormwater Associated with Industrial Activities (Maryland General Permit No. 20-SW).

The MLFRRF currently has coverage for stormwater discharges associated with facility operations under the 20-SW. This permit is included as **Appendix H.1**. Additionally, the MLFRRF will apply for coverage under the 20-CP prior to construction of each subcell. The MLFRRF currently has a 20-CP permit for construction of Subcell 9.3. That permit is also included in **Appendix H.1**.

13.3 Local Stormwater Review and Approval

Stormwater management and erosion and sediment control permitting in Maryland is administered by local authorities. For stormwater management permitting, that local authority is Anne Arundel County. For erosion and sediment control permitting, that local authority is the Anne Arundel Soil Conservation District.

13.3.1 Stormwater Permitting

In accordance with the requirements of Anne Arundel County Stormwater Management Code (Article 16, Title 4, of the Anne Arundel County Code), development projects require implementation of Environmental Site Design (ESD) procedures, in accordance with the latest edition of the 2000 Maryland Stormwater Design Manual Volumes I and II. Implementation of ESD requires early contemplation, review, and approval of conceptual plans that incorporate low-impact stormwater design elements and strategies, followed by two additional rounds of detailed design preparation, review, and approval. The three stages of stormwater management design preparation, review, and approval are identified as Concept Plan, Preliminary Plan, and Final Plan.

Because the stormwater management plan for Cell 9 following the vertical expansion is for the final closed configuration, and because of the long-term horizon associated with constructing, developing, and filling the vertical expansion (closure is not expected until 2062 or 2063), the Concept Plan provides the appropriate level of detail for inclusion in this Phase III report. The Concept Plan prepared by Geosyntec is included as **Appendix H.2**. Since Cell 9 has an existing grading permit issued by the County (included in **Appendix I**), Geosyntec has submitted the Concept Plan to Anne Arundel County Department of Inspections and Permitting for modification of the existing grading permit.

Preliminary and Final Stormwater Management Plans that illustrate the specific details for grading and construction of permanent and temporary erosion and sediment control structures, as well as details for grading and construction of permanent stormwater management features will be prepared as part of the Closure Plan for Cell 9 prior to initiating construction of the final closure capping system. These plans will be consistent with the approved Concept Stormwater Management Plan and the approved vertical expansion permit design. Each set of Preliminary and Final Stormwater Management Plans will be reviewed and approved by the County before being submitted to the MDE Solid Waste Program in conjunction with the Closure Plan and Closure Construction Documents.

As shown in the Concept Plan, permanent stormwater management features will be used to convey and treat stormwater runoff from the landfill final cover. HydroCad models used to conduct a stormwater routing analysis for Cell 9 are presented in **Appendix H.3**. Runoff will be treated to manage post-development stormwater quality and quantity prior to discharge. The stormwater management features designed for this project include the following typical conveyance and structural retention features.

- Perimeter channels, downchutes, cover access road channel, tack-on benches, drainage benches, and culverts on and around Cell 9 will convey stormwater runoff based on the 25-year, 24-hour storm event. Calculations supporting the design of these features are included as **Appendix H.4**.
- Pond 9-2 (currently serving as a sedimentation basin) will be converted to a retention basin by deepening the pond and modifying the existing riser structure. In this configuration, it will work in conjunction with an adjacent forebay (within the current perimeter channel footprint) to collect and treat the 24-hour extended detention for the Water Quality Volume (WQ_v) and Channel Protection Volume (Cp_v). Pond 9-2 will also maintain the Overbank Flood Protection Volume (Q_p) by keeping the post-development 10-year, 24-hour storm peak discharge rate (Q_{p10}) from exceeding the pre-development discharge rate. The principal spillway is designed for the 100-year storm. This design maintains the required forebay volume of 0.1 inches per impervious acre of contributing drainage, minimum freeboard height of 2 feet for the 100-year storm, and does not require the Extreme Flood Volume (Q_f) criterion for flood control because it is located outside the 100-yr floodplain. Calculations to support the design of the Pond 9-2 conversion are included as **Appendix H.5**.

The layout and main features of the final stormwater management system are shown on Drawings 21 through 27 (**Appendix A**).

13.3.2 Erosion and Sediment Control Permitting

In accordance with the requirements of Anne Arundel County Stormwater Management Code (Article 16, Title 3, of the Anne Arundel County Code), grading permits require E&S control permitting. E&S control practices will be the primary methods used to manage and treat runoff from the Cell 9 area throughout construction and operations. The facility currently maintains an open grading permit for Cell 9, which is included in **Appendix I**. As each subcell is constructed, a modification to the grading permit is submitted to the Anne Arundel County Department of Inspections and Permitting. These modifications include updated E&S control drawings for each subcell, which are reviewed by the Anne Arundel County SCD.

Most recently, an E&S control plan was submitted to and approved by Anne Arundel County SCD for construction of Subcell 9.3. This plan is included in **Appendix I**. Prior to construction of Subcells 9.4 and 9.5, new E&S control plans will be prepared and submitted to Anne Arundel County SCD as part of a grading permit modification.

The primary features used at Cell 9 for permanent E&S control will be tack-on benches, downchutes, a perimeter drainage channel, and the existing sedimentation basin (Pond 9-2). Temporary E&S control during construction and operation of the vertical expansion will be managed through the use of practices from the *2011 Maryland Standards and Specifications for Soil Erosion and Sediment Control* (MDE 2011) including, but not limited to, stabilized

construction entrances, staging areas, stockpile areas, super silt fence, perimeter swales and dikes, and sediment trapping devices.

14. LEACHATE MANAGEMENT

14.1 Introduction

In accordance with the requirements of COMAR 26.04.07.07.C.12(c), the leachate collection system for Cell 9, including the vertical expansion, is designed such that the materials: (i) are chemically resistant to the waste managed in the landfill and the leachate expected to be generated; (ii) are of sufficient strength and thickness to prevent collapse under the pressures exerted by overlying wastes, waste cover materials, and by any equipment used at the landfill; (iii) designed to function without clogging; and (iv) are designed to ensure that the leachate depth over the liner does not exceed 30 centimeters (12 inches).

14.2 Leachate Quantity Estimates

The USEPA's Hydrologic Evaluation of Landfill Performance (HELP) Model, Version 4.0 (USEPA 2020) was used to estimate the leachate generation rate and head above the liner. Leachate generation quantities were calculated based on estimated rates of leachate production during four different phases of landfill cell development and operation (i.e., open cell, daily cover, temporarily closed under intermediate cover, or closed under final cover). The HELP Model performs a water-budget computation to predict leachate generation rates for a given configuration of soil, waste, geosynthetic layers, and precipitation conditions.

The HELP analysis (**Appendix F.1**) results provide maximum daily, maximum annual, and average annual leachate flow rates. The HELP model was run assuming the standard landfill final cover would be used (rather than the alternative final cover) since the soil component of the standard landfill final cover would result in more leachate infiltration. The modeled maximum daily leachate head on the liner was less than 12 inches for all four landfill development conditions. During operation, the maximum annual leachate generation rate in each subcell is estimated to be 472,503 gallons per day per acre (gal/acre/day) for the open cell condition, 387,270 gal/acre/day for the daily cover condition, 435,799 gal/acre/day for the intermediate cover condition, and 29 gal/acre/day for the final cover condition. Based on the various operating scenarios modeled in **Appendix F.1** (i.e., realistic combinations of open, daily/intermediate cover, and final closure of the various cells), the maximum annual leachate generation rate for Cell 9 is 36.6 million gal/year. This represents the worst-case scenario when Subcell 9.5 has just been constructed and Subcells 9.1 through 9.4 have not yet been closed. To reduce the total quantity of leachate generated in later stages of landfill operation, the County could elect to sequentially cap portions of completed cells with a final geosynthetic cover rather than waiting to cap the entire expansion at the end of its operating life. Once all cells are closed, the maximum annual leachate generation is expected to reduce by four orders of magnitude to about 2,400 gal/year.

14.3 Leachate Collection System

The leachate collection system (LCS) is designed to convey leachate to low points within each cell for removal to the leachate transmission system (LTS). The LCS will include the following elements.

- A drainage layer, comprising a 2-ft-thick protective cover drainage layer overlying a 250-mil double-sided geocomposite drainage layer covering the entire footprint of Cell 9.
- Multiple 8-inch-diameter perforated HDPE leachate collection laterals that drain leachate from the drainage layer to the leachate collection sump.

The layout of the LCS is shown on Drawings 4 through 9 (**Appendix A**). Details of the LCS features are shown on Drawings 12 and 14 through 20 (**Appendix A**). Design calculations have been performed to evaluate the flow capacity of the selected leachate collection pipes (**Appendix F.2**). In the remainder of this section, each component of the LCS is described. Features of the LTS are discussed in **Section 14.4**.

Protective Cover Drainage Layer: A 2-ft-thick protective cover drainage layer, consisting of sand or gravel on the floor and gravel on the slopes, will be installed to provide even drainage of leachate from across the liner area and protect the liner system from damage during construction and waste filling operations. The liner is sloped to achieve a minimum 2% post-settlement grade to the sump. The protective cover drainage layer is designed to promote leachate drainage and help limit leachate head on the liner. The results of the HELP modeling performed for the cell (**Appendix F.1**) indicate that if a protective cover drainage layer having a hydraulic conductivity of no less than 5×10^{-3} cm/s is used and the drainage lengths shown on Drawing 4 and 9 are maintained, then the maximum static leachate head on the liner will be maintained at significantly less than 1 ft under all cell operational conditions.

Geocomposite: The 250-mil geocomposite drainage layer will function as the primary means of leachate collection by promoting efficient drainage of leachate from the protective cover drainage layer to the leachate sump and maintaining a hydraulic head of less than one foot above the liner system. Complete requirements for geocomposite material properties, placement methods, and construction quality assurance (CQA) documentation, are provided in the Engineering Specifications (see **Appendix D**) and CQA Plan (see **Appendix J**).

Collection Laterals: Leachate collection laterals will be installed within the protective cover drainage layer at multiple locations in each subcell as well as at the toe of the side slopes to intercept leachate flowing in the protective cover drainage layer and geocomposite drainage layer and drain it to the leachate sump. The proposed laterals are 8-inch standard dimension ratio (SDR)-11 perforated HDPE leachate collection pipes surrounded by coarse aggregate. The laterals have been designed to maintain positive post-settlement drainage (see **Appendix E.1**). Based on a conservative assumption that the post-settlement slope on the lateral will be reduced to 0.5%, the

calculations in **Appendix F.2** show that the selected leachate collection pipes have more than enough flow capacity for the anticipated maximum leachate flow.

14.4 Leachate Transmission System and Storage Tanks

14.4.1 Description of Proposed Leachate Transmission System and Tanks

As shown on Drawings 4 through 9 and 14 through 17 (**Appendix A**), and presented in **Appendix F.3**, leachate collected from each cell will be pumped from leachate sumps via 2-inch SDR-11 HDPE pipes contained within 24-inch SDR-11 HDPE riser pipes to riser vaults located along the landfill perimeter berm. Leachate will then flow through a dual contained 8-inch x 12-inch HDPE gravity main line (i.e., 8-inch SDR-17 pipe inside a 12-inch SDR-11 containment pipe) to a wet well.

The wet well (which has already been constructed) has an internal diameter of 96 inches and a total height of 16 feet. The wet well has two pumps: a lead pump with a pump on elevation of 112.1 ft-NGVD29 and a lag pump with a pump on elevation of 113.1 ft-NGVD29. This corresponds to a net leachate storage volume of 752 gal for the lead pump and 1,128 gal for the lag pump.

The collected leachate in the wet well is then pumped using the two pumps to a valve manhole and then to the existing leachate storage tanks through a force main, which consists of a dual-contained 4-inch x 8-inch HDPE force main line (i.e., 4-inch SDR-17 pipe inside an 8-inch SDR-11 containment pipe).

The existing leachate storage tanks include two 330,000-gallon storage tanks (both located inside a secondary containment area) and a leachate truck loading station. The leachate pre-treatment facility is located adjacent to the leachate storage tank area. In general, leachate is pumped directly to the influent leachate storage tank. If needed, leachate is then transferred to the pre-treatment facility in batches for treatment. Once a leachate batch has completed the pre-treatment process, it is pumped to the effluent leachate storage tank for storage until it is pumped via a force main to the municipal sewer system and ultimately treated at the County's Patuxent Water Reclamation Facility in Crofton, MD.

14.4.2 Leachate Flow Monitoring and Control

The flow of leachate from the landfill subcells to the wet well and the leachate storage tanks is monitored daily as part of routine inspection and maintenance activities. Hour meters record run-time for each riser station pump which is recorded daily. Flow volumes are determined via calculation for each subcell, based on pump flow rate and pump run time. Pump flow rates are recorded for each subcell on a yearly basis or when a pump is replaced. Subcell leachate volume can be compared to flow meter readings from Cell 9 flow meters and from the total effluent flow meter for diagnostic purposes.

A summary report of leachate flow measurements at MLFRRF is prepared monthly. This report contains a listing of monthly quantities of leachate removed from the leachate collection and the leakage detection sumps of each subcell.

14.5 Leachate Collection Pipe and Leachate Transmission Pipe Strength

An evaluation of the structural capacity of the leachate collection lateral pipes and leachate transmission force mains is provided in **Appendix F.4**. The analysis shows that the proposed LCS and LTS pipes have sufficient structural capacity to withstand the anticipated overburden loads that will be applied by developing the landfill as proposed, inclusive of the maximum weight of the protective cover drainage layer, waste in place, intermediate and final cover soils, final cover system, and landfill operation equipment.

15. CONTINGENCY PLAN

15.1 Introduction

In accordance with the requirements of COMAR 26.04.07.08.B(14), a contingency plan for preventing and abating pollution of the waters of the State is presented in this section. At a minimum, the contingency plan is required to address the following items.

- Emergency provisions for users of potable water supply
- A spill containment and prevention plan for any leachate collected or stored at the facility
- Emergency telephone numbers and contact persons for fires and medical emergencies, and leachate spills

These items are addressed in the following three subsections and in more detail in Section 10 of the Operations Guide (**Appendix B**).

15.2 Emergency Provisions for Users of Potable Water Supply

Should MDE determine that contaminants have leaked from the liner system and migrated off site to neighboring residential water supply wells, the County will provide potable water as quickly as possible and design a plan detailing a long-term solution to repair the potable water source and mitigate the cause of contamination. In order for the MLFRRF facility to be confirmed as the source of contamination, the following must occur.

- Anne Arundel County must be provided with the results of analytical tests that indicate that the water supply source may have been impacted by the MLFRRF facility.
- Anne Arundel County must be given the opportunity to sample the groundwater from the source and analyze the sample.
- Anne Arundel County must be given access to all records that are available regarding the water supply source.

If testing by Anne Arundel County confirms that the MLFRRF facility has impacted the potable water source, then the County will provide potable water as soon as possible using a short-term method chosen by the County. Short-term replacement methods may include supplying bottled drinking water to affected areas. In addition, the County will develop a plan describing the manner in which alternative long-term water supplies will be provided to potentially affected areas around the landfill. The requirements of this plan are detailed in Section 10 of the Operations Guide (**Appendix B**).

15.3 Leachate Spill Containment and Prevention

15.3.1 Introduction

The MLFRRF is designed to contain all leachate that is generated in the landfill. However, because leachate may occasionally be transferred into leachate hauling trucks, transported through the MLFRRF, and hauled off site, it is possible that leachate spills may occur. In this section, a plan is presented that is designed to minimize the impact of leachate spills and to mitigate adverse impacts should leachate spills occur.

15.3.2 Spill and Leak Prevention

Leachate generated by MLFRRF could adversely impact the quality of groundwater supplies or surface water supplies if the leachate were released to the environment by spill or leak. In this section, the design and operation measures that will be taken to prevent spills and leaks at the MLFRRF are described.

To minimize the possibility of leaks, all subcells of Cell 9 are designed using a liner system that meets the requirements of COMAR 26.04.07.08 and is highly effective in containing leachate. All leachate transmission system piping outside of the lined area is dual contained, and the piping connects to the existing leachate storage and transfer facility, which has a secondary containment area. All these features are designed to prevent leaks or spills of leachate into the environment. The CQA Plan (**Appendix J**) will be implemented during cell liner construction to verify that the materials and methods used meet the requirements of the permit and the project specifications.

Any spills or leaks which occur during truck loading will run back into the secondary containment area. In the event of a leak from the storage tanks, the leachate will be contained within the secondary containment area. The leachate in the containment area will then be removed as appropriate. The remaining leachate in any leaking tank will be drained to a level where repairs can be completed.

15.3.3 Leachate Spill Response Plan

In the event of an on-site leachate spill, members of the spill response team listed in **Section 15.4** will be called immediately and measures taken, under the direction of the spill response team, to contain the spilled leachate. Following the response, measures will be taken to prevent the release from recurring and any features that are damaged or contaminated by the release will be repaired.

15.3.4 Leak Response Plan – Landfill Area

Leachate releases into the environment are minimized by a composite liner system. In the monthly summary report, the daily quantities of leachate removed from the leachate collection and the leakage detection sumps of active and closed subcells in Cell 8 and Cell 9 are noted in terms of gallons and gallons per acre per day (gal/acre/day), which is obtained by dividing the total daily

leachate collection and leakage detection flows by the area (in acres) of the corresponding subcell. If the total quantity of leachate removed from a leakage detection sump averaged over one month exceeds 100 gal/acre/day, the cause for the high level of flow will be investigated by County personnel and actions are taken to reduce the flow (e.g., repair of obvious tear in the liner system).

If County personnel are not successful in reducing leakage detection flows within one month, the performance of the liner system will be evaluated within 30 days by an expert in liner system performance evaluations. The purpose of this evaluation would be to investigate the reason for the high leakage detection flows, and to recommend appropriate actions, if needed. The above-described evaluations will not be conducted if the leakage detection flows exceed the prescribed limits during the initial operation of any subcell, since the flows are likely to be the result of the release of construction water.

A groundwater monitoring system will be maintained at the facility (**Section 18**) to detect any groundwater contamination resulting from landfill operations. The locations of groundwater monitoring wells are identified in the EMP (**Appendix K**). Should the analyses of samples from the groundwater monitoring wells indicate potential pollution from Cell 9, the procedures outlined in the EMP will be followed.

15.3.5 Leak Response Plan – Leachate Storage and Transfer Area

Various components of the leachate storage and transfer area are monitored and have alarm systems. The system provides continuous monitoring of liquid levels at sumps, tanks, and at several pre-treatment steps. The automated monitors are connected to local and SCADA alarm systems. Level alarms in the wet well and storage tanks are also tied directly to local and SCADA alarm systems. The purpose of these alarm systems is to alert Anne Arundel County personnel that one or more components of the leachate management system is not functioning properly, or that a hazardous condition could develop.

A list of these alarms, as well as remedies for those alarms, are included in Section 7 of the Operations Guide (**Appendix B**). During any period in which the lined subcells collect leachate, but the pre-treatment facility or storage tanks are not operational, tanker trucks can be used for direct removal of leachate from the storage tanks, wet well, or subcell sumps to an approved wastewater treatment facility, as needed. During this temporary condition, the leachate removal pumps will be manually operated. A flexible hose with quick connects on both ends will be used to convey leachate from the leachate storage tanks, wet well, or subcell risers directly to a tanker truck.

If leachate is spilled on the ground surface during loading or transporting, the contaminated earth will be removed and landfilled, and the affected area will be regraded. If leachate is spilled on a paved surface, leachate will be contained and pumped back into the tank or absorbed and returned to the landfill along with the material used to clean up the spill.

15.3.6 Material Compatibility

All components of the leachate collection and transmission system which may contact the leachate are made of materials that are compatible with the leachate.

15.3.7 Inspection and Monitoring Programs

Visual inspection of the various components of the leachate collection, transmission, and storage systems will be conducted during routine daily activities. This includes the inspection of pipes, pumps, valves and fittings, storage tanks, and monitoring equipment. Facility personnel will be trained to identify any deviations from normal operating conditions. Any identified problems will either be immediately remedied or reported to the Landfill Supervisor so that maintenance can be scheduled.

The leachate transmission system will be monitored periodically for leaks. The pump control panels and flow meters will be checked weekly during normal operations to verify proper performance. The leachate storage tanks will be visually inspected on a regular schedule for corrosion or leaks. The automated monitors are connected to local and SCADA alarm systems. Level alarms in the wet well and storage tanks are also tied directly to local and SCADA alarm systems. Detailed inspections and monitoring of the components of the leachate collection, transmission, and storage system will be conducted periodically as part of a scheduled maintenance program. The landfill will be monitored for leakage by sampling groundwater monitoring wells and surface water monitoring stations. Samples will be taken and analyzed semiannually.

15.4 Emergency Telephone Numbers

Emergency Operations Support team members are designated for the landfill. The Operations Support staff on duty will be responsible for directing all emergency response measures necessary to minimize or prevent harm to human health and the environment as a result of an incident described in **Sections 15.2 and 15.3**, or in the event of a fire, explosion, potentially hazardous emissions, and/or other emergency situation at the MLFRRF as defined in Section 10 of the Operations Guide (**Appendix B**). Contact details for the Operations Support Staff are provided in Table 10-1 of the Operations Guide (**Appendix B**).

The following telephone numbers should be called in the event of an emergency.

- Fire
Anne Arundel County Fire Department
8501 Veterans Highway
Millersville, MD 21108
911 or (410) 222-8300

- Medical Emergency
Baltimore/Washington Medical Center
301 Hospital Drive
Glen Burnie, MD 21061
911 or (410) 787-4565
- Leachate Spill Response Team
Clean Harbors Environmental Services Leachate Spill Response Team
3527 Whisky Bottom Road
Laurel, MD 20724
(301) 939-6037

16. LANDFILL GAS CONTROL

16.1 Introduction

As required under COMAR 26.04.07.08.B(15), the proposed method for controlling atmospheric emission and/or subsurface migration of LFG at Cell 9 is presented in this section. The active gas collection and control system (GCCS) described in this section is designed to effectively manage LFG from Cell 9.

16.2 Gas Collection and Control System Design

16.2.1 Overview

The main features of the Cell 9 GCCS are:

1. Vertical gas extraction wells;
2. Solid transmission header and lateral pipes;
3. A perimeter header around Cell 9; and
4. A system for managing condensate within Cell 9.

The perimeter header conveys LFG to the active LFG-to-electricity plant.

Specific operational criteria were applied during design of the GCCS, which should

- efficiently manage LFG generated throughout the operational and post-closure life of Cell 9 without disrupting landfill operations;
- prevent leachate, free liquid within the landfill (if present), and/or LFG condensate from clogging LFG transmission piping and/or impairing GCCS operations and performance; and,
- remain active over the operational and post-closure periods without being damaged by settlement of the landfill.

The GCCS is designed to function in accordance with standard industry practice in conformance with generally applicable Federal regulations and design guidance. The expected performance of the GCCS based on design computations is discussed in the remainder of this section. Calculations include the expected LFG generation rate, radius of influence (ROI) of vertical extraction wells, head loss, flow velocity, and sizing of transmission piping, and expected condensate generation and removal.

16.2.2 Landfill Gas Generation

The quantity and rate of LFG generation at a landfill is a function of the landfill size, operating conditions (in particular, moisture content), and waste properties. The LFG generation potential of the MSW within Cell 9 was previously evaluated by SCS Engineers (SCS) as part of the design of the LFG management system for Cell 9. Assumptions from the SCS analysis were considered in the selection of input parameters in this analysis.

The maximum LFG generation rate affects the design of all components of the GCCS. The maximum rate of LFG generation at the landfill was estimated using the USEPA's Landfill Gas Emissions Model (LandGEM), as coded into an Excel® spreadsheet (USEPA 2005). Standard input values for LandGEM were selected based on USEPA guidance (USEPA 2024), previous calculations performed by SCS, and historical waste acceptance records provided by the County (2017 to 2023) assuming a 1% annual increase thereafter (**Section 6**). The maximum estimated volume of LFG generated from the landfill is 2,192 standard cubic feet per minute. The maximum LFG generation rate will occur one year after cessation of waste placement in the landfill in 2063 or 2064. Computations are provided in **Appendix L.1**.

16.2.3 Vertical Extraction Wells

To provide adequate LFG extraction, the density (i.e., vertical spacing between centers) of the wellfield must be such that “dead spots” are minimized, and reasonable ROI overlap occurs. To provide full LFG collection coverage, 93 vertical wells will need to be installed, as shown on Drawing 28 (**Appendix A**). A detail depicting the proposed wells and wellheads is shown on Drawing 29 (**Appendix A**).

The methodology used to calculate the ROI for wells is provided in **Appendix L.2**, along with input parameters and assumptions. Details regarding the calculated well ROI and total slotted length of well pipe required are also provided in **Appendix L.2**. In all cases, the well bottom elevation is at least 15 feet above the top-of-liner elevations.

16.2.4 Gas Transmission Pipe Sizing

As described in **Appendix L.3**, the LFG perimeter header around Cell 9 connects to the flare via a main header pipe (flare header). To reduce entrainment of condensate, the perimeter header is sized such that the gas velocity will be less than 1,200 feet per minute (ft/min) for pipes with countercurrent flow (i.e., LFG flow direction opposite to that of condensate) and less than 2,400 ft/min for pipes with concurrent flow (i.e., LFG and condensate flow in the same direction). The velocity in the existing flare header pipe, including in portions that have countercurrent flow, exceeds 1,200 fpm, which means that LFG conveyed in these sections will have a slightly higher-than-typical condensate load. However, since the flare header pipes switches from countercurrent to concurrent flow several times, and the last long run of pipe is countercurrent flow, most of the LFG that does become entrained is expected to condense out and collect in condensate sump CS9-

3. As such, condensate management is not expected to be an issue. The design also restricts head losses to one inch of water column per 100-foot length of pipe to minimize power requirements for the blower. The calculation in **Appendix L.3** describes the approach used to size the perimeter header and the lateral pipes connecting the proposed wellheads and the perimeter header. The maximum quantity of LFG handled by each component of the transmission system was over-designed for normal operations, as all laterals were sized to handle peak gas flows from the number of wellheads that are located on one lateral. The amount of flow per well was calculated at the peak LFG flow rate divided by the total number of wells.

All laterals will be installed as 6-inch pipes with a downward slope to drain. The perimeter and flare header pipes incorporate pipe sections with diameters of 10, 12, 14, and 18 inches. The alignments of the laterals and perimeter and flare headers are shown on Drawing 28 (**Appendix A**).

16.2.5 Condensate Management

In the eastern United States, LFG is typically saturated with water vapor and has a temperature between 80°F and 120°F in the landfill. When LFG is extracted, it cools, causing water vapor to condense. This condensate must be managed to prevent the flooding of LFG transmission lines and damage to the flare station equipment. The expected maximum volume of condensate generated was calculated based on the largest LFG flow rate that the GCCS is expected to handle. The expected maximum volume of condensate was calculated to be less than 1,393 gallons/day (see **Appendix L.4**).

Condensate will be managed along the Cell 9 LFG perimeter and flare header using four condensate sumps that will convey liquid to the leachate forcemain. The perimeter header will be sloped at least 1% to the low points to promote condensate drainage and prevent clogging of the header.

16.2.6 Landfill Gas-to-Electricity Plant and Blower/Flare Station

In 2012, the County commissioned a 3.2-megawatt LFG-to-electricity plant at the MLFRRF to convert the LFG generated by Cell 8 and Cell 9 to electricity. The existing LFG-to-electricity plant will be used to provide efficient destruction of LFG generated by the vertical expansion. When the LFG-to-electricity plant is not operational, LFG will be flared in either of the on-site enclosed flare or utility flare.

16.3 Gas Collection and Control System Components

16.3.1 Layout of Primary Elements

The layout of the proposed GCCS for Cell 9 is shown on Drawing 28 (**Appendix A**). The main features of the proposed system are as follows.

1. 93 vertical gas extraction wells, consisting of perforated piping installed in aggregate back-filled boreholes, and fitted with a wellhead, with 15 ft offset between the bottom of the well and the top of liner.
2. Solid transmission header and lateral piping (i.e. 6-inch-diameter laterals and 10, 12, 14, or 18-inch-diameter perimeter and main flare header) connecting the wells to the LFG-to-electricity plant and the blower/flare station.
3. Three 4-foot-diameter condensate sump manholes and one 14-inch-diameter stacked tee condensate sump.
4. Isolation valves between the lateral pipes and the perimeter header.
5. The existing LFG-to-electricity plant, featuring a blower and bypass enclosed and utility flares.

Specific components comprising or associated with each of the primary elements listed above are described in the remainder of **Section 16.3**.

16.3.2 Vertical Extraction Wells

Each well will comprise a wellhead assembly, a well casing, a pipe sleeve, aggregate backfill, and a bentonite grout seal. These components are described below. Well and wellhead details are shown on Drawing 29 (**Appendix A**).

Wellhead Assembly: The wellhead assembly will provide monitoring, sampling, and adjustment functions. The monitoring and sampling functions will be provided by self-sealing quick connect fittings that can be used for gas sampling, static pressure measurement, dynamic pressure measurement, and temperature monitoring. The flow rate and level of vacuum applied to the well will be manually adjustable by means of a valve on the wellhead. The wellhead will be connected to the transmission piping by a flexible PVC hose to allow for differential settlement. A union (i.e., a threaded connection) included on the wellhead will allow for easy disconnection from the transmission piping, if needed.

Well Casing: The vertical well casing will consist of 8-inch-diameter or larger Schedule 80 PVC pipe that is slotted for a certain length above the base of the well as calculated in **Appendix L.2**. The top of the slotted portion of the casing will be located a minimum of 12 ft below the bottom of the final cover to minimize the potential for drawing air into the landfill. Schedule 80 PVC pipe is used to withstand the impact of gravel backfill being dropped into a deep borehole. Slotting details are shown on Drawing 29 (**Appendix A**).

Backfill Material: The annular material around the perforated portion of the well casing will consist of AASHTO No. 57 or engineer-approved alternatives such as crushed stone, alluvial gravel, or waste materials such as tire shreds or glass chips, which will provide a high-permeability

medium resistant to fouling by the surrounding waste. A large size of aggregate is required to minimize the potential for clogging of the GCCS.

Bentonite Grout Seal: The annular material above the backfill material, around the solid portion of the well casing, will be filled with a 2-ft-thick layer of bentonite grout to minimize air intrusion. The bentonite grout seal will be overlain by at least 8 ft of soil backfill and the final cover to further reduce air intrusion.

16.3.3 Transmission Piping

LFG will be conveyed from the wells to the LFG-to-electricity plant and the blower/flare station through the LFG transmission piping network.

Transmission Pipes: The LFG transmission piping will be HDPE SDR-26 pipe designed to be chemically resistant and to withstand the expected external loads. The LFG transmission piping network will consist of (i) 6-inch-diameter downslope lateral pipes connecting vertical wells to the perimeter header; (ii) control/isolation valves (with associated monitoring and sampling features) at the intersections of the laterals and perimeter header; (iii) a 10, 12, 14, or 18-inch-diameter perimeter header around the landfill, sloped at minimum 1% to low points for condensate drainage; and (iv) 14-inch or 18-inch-diameter flare header connection to the existing flare station. A 3-inch-diameter gravity drain connection from the perimeter and flare headers to each condensate sump will allow condensate to drain into the leachate management system. The layout and locations of different portions of the transmission network is shown in Attachment L.3-1 of **Appendix L.3**. All LFG transmission laterals and headers will be buried below the ground surface.

Control Valves: Control/isolation valves will be installed on the at locations shown on Drawing 28 (**Appendix A**). These will be used to isolate or throttle the vacuum applied to groups of vertical wells. Valve details are provided on Drawing 29 (**Appendix A**).

Condensate Drains: To manage condensate and prevent clogging, the GCCS design focuses on minimizing entrainment of condensate into the LFG transmission system. Beyond limiting the velocity of gas flow in transmission piping, this is achieved in part through sloping laterals downward to the perimeter header connection, as shown on Drawing 28 (**Appendix A**). In addition, the GCCS design includes once 14-inch-diameter stacked tee and three four-foot-diameter condensate sumps which will pump collected liquids directly into the leachate management system (see Attachment L.3-1 of **Appendix L.3** for locations of header low points and condensate sumps). Any condensate remaining in the transmission piping that cannot be drained from the perimeter or flare header will be removed at the flare header drain or condensate knockout tank located upstream of the LFG-to-electricity plant.

The transmission piping will terminate at the LFG-to-electricity plant where LFG is managed by Anne Arundel County.

16.4 Control and Monitoring of Subsurface Gas Migration

COMAR 26.04.07.03(9) and 40 CFR 258.23 require that the concentration of explosive gases generated by a facility or practice shall not exceed 25% of the lower explosive limit (LEL) for the gases in on-site facility structures (excluding LFG control or recovery systems components) or the LEL for the gases at the property boundary.

Control of subsurface gas migration at Cell 9 will be achieved by the low permeability liner system for all cells and operation of an active GCCS as described in the preceding sections. The performance of the GCCS will be monitored in accordance with the Operations Guide for the GCCS, which is Appendix E of the Operations Guide (**Appendix B**⁴).

Monitoring of potential subsurface gas migration will be performed in accordance with the gas monitoring provisions in the EMP (**Appendix K**), which is discussed in **Section 18.4**.

⁴ The appendices to the Operations Guide are not provided as part of this report due to the size of the attachments. They have previously been submitted to MDE as part of the Operations Guide in 2018.

17. COVERING AND STABILIZING COMPLETED AREAS

17.1 Introduction

In accordance with the requirements of COMAR 26.04.07.08.B(16), the proposed methods for covering and stabilizing completed areas are presented in this section.

Ground surfaces which are disturbed during landfill operations will be vegetated according to the vegetation plan presented in this section. The goal of establishing vegetation of disturbed surfaces is to minimize erosion and sediment migration in surface waters at or near Cell 9. Vegetation reduces runoff velocities of surface water, reduces runoff volumes by promoting increased percolation rates, binds soil with roots, and protects soil from wind, thereby minimizing the sediment loads entering the surrounding waterways.

Covering and stabilizing operations will be accomplished by vegetation when sufficiently large areas are developed. Stabilization will be performed within seven days of completion of construction for the following: final and intermediate cover surfaces, all disturbed areas with slope of 3H:1V or greater (whenever possible), and all grass-lined drainage terraces and ditches. All other disturbed surfaces will be vegetated within 14 days of disturbance (whenever possible) or completion of construction.

The procedures for vegetating temporary and permanent surfaces associated with landfill development are summarized in this section. For both temporary and permanent surfaces, procedures involved in vegetation include site preparation (grading and fertilizing), seeding, mulching, and maintenance; each of this is described in detail below.

17.2 Temporary Vegetation

17.2.1 Overview

Temporary surfaces to be vegetated during landfill development include all intermediate cover surfaces within the disposal area. The criteria for vegetation of these surfaces will follow the *2011 Maryland Standards and Specifications for Soil Erosion and Sediment Control* (MDE 2011). Temporary vegetation will be performed by facility personnel or by contracted services.

17.2.2 Site Preparation

To promote the vegetation on intermediate cover surfaces, both the consistency and chemical content of the soil must be considered. If the intermediate cover is packed, crusted, and hard prior to seeding, the top three inches of soil will be loosened by disking or tracked with a bulldozer. Fertilizer will be applied as prescribed in the *2011 Maryland Standards and Specifications for Soil Erosion and Sediment Control* (MDE 2011). In addition, the pH of the soil will be tested prior to seeding to determine if agricultural lime is needed. Fertilizer and lime (if used) will be disked into the intermediate cover before seeding. All temporary surfaces to be revegetated will be tracked

using a bulldozer before seeding, with cleat marks oriented parallel with the surface contours, to minimize seed washout.

17.2.3 Seeding

The type of seed to be used to vegetate temporary surfaces for a period no longer than six months varies depending on the seeding date and most current Anne Arundel County SCD approved sediment and erosion control plan. All areas receiving straw mulch will be properly prepared and vegetatively stabilized immediately at the start of the next seeding season. The method used for the application of the seed will be either hand broadcasting with a thin cover soil veneer or hydroseeding.

17.2.4 Mulching

Mulch for temporary surfaces involves the application of ground and shredded woody yard waste to a thickness of approximately 4 inches or uncropped straw at the rate of 2 tons per acre by mechanical blowing or hand application. The straw mulch will be sufficiently anchored to avoid movement by wind or water and provide protection to the seed bed using synthetic liquid mulch binders at manufacturers' recommended application rates.

17.2.5 Maintenance

The success of vegetation will be assessed based on the occurrence of erosion of the intermediate cover surfaces. Unacceptable amounts of erosion will be indicated by excessive sediment in drainage ditches and/or culverts, accelerated siltation in sediment basins, the presence of erosion gullies, or exposure of waste beneath intermediate cover surfaces. If vegetation is not established to the degree necessary to limit erosion to an acceptable level on the intermediate cover surfaces, the surface will be revegetated in accordance with the *2011 Maryland Standard and Specifications for Soil Erosion and Sediment Control*. Any waste that is exposed due to erosion will be immediately covered by facility personnel with a minimum cover thickness of one foot of suitable soil and revegetated.

17.3 Permanent Vegetation

17.3.1 Overview

Permanent surfaces to be vegetated during landfill development include all final cover surfaces within the disposal area as well as all other miscellaneous areas around Cell 9 where surface soils will be disturbed. The criteria for vegetation of these surfaces will follow the *2011 Maryland Standards and Specifications for Soil Erosion and Sediment Control* (MDE 2011). Permanent vegetation activities will be performed by either facility personnel or private contractor. The final cover will be vegetatively stabilized within 30 days of completing construction as required by

COMAR 26.04.07.21. If the alternative final cover, which incorporates artificial turf in place of vegetation (see **Section 21.2.1**), is selected, no permanent vegetation will be required.

17.3.2 Site Preparation

To provide a suitable environment for the growth of vegetation on final cover surfaces, both the consistency and chemical content of the soil must be considered. The top 3 inches of soil will be loosened by disking or tracked with a bulldozer or prior to seeding. Fertilizer will be applied as prescribed in the *2011 Maryland Standards and Specifications for Soil Erosion and Sediment Control* (MDE 2011). In addition, the pH of the soil will be tested prior to seeding to determine if agricultural lime is needed. Fertilizer and lime (when used) will be disked into the soil before seeding. Permanent surfaces to be vegetated will be tracked using a bulldozer before seeding, with track marks oriented parallel with the surface contours, to minimize seed washout.

17.3.3 Seeding

The type of seed to be used to vegetate permanent surfaces varies based on the Anne Arundel County SCD approved sediment and erosion control plan for the disposal areas. The method used for the application of the seed will be either, hand broadcasting and applying a thin cover soil veneer or hydroseeding.

17.3.4 Mulching

The procedure used for mulching permanent surfaces will be identical to the one described for temporary surfaces.

17.3.5 Maintenance

The success of vegetative stabilization of permanent surfaces is assessed monthly by estimating the percentage of coverage the vegetation provides. If the percentage occupied by living vegetation is less than 40%, vegetation is reestablished on the surface following the original recommendations for soil preparation, seeding, and mulching. If 40% to 70% of an area is occupied by living vegetation, the area is revegetated by overseeding and applying fertilizer using half the rates originally applied. Soil testing will be performed if vegetation coverage is less than 60%. A vegetative coverage of 95% will be considered adequate.

The success of vegetation on permanent surfaces will be based on the occurrence of erosion. Unacceptable amounts of erosion are identified by excessive sediment in surface channels and/or culverts, accelerated siltation in sediment ponds or traps, or the presence of rills and gullies. Permanent surfaces that exhibit an unacceptable occurrence of erosion are repaired by filling with topsoil, regrading eroded areas, and restabilization. Problem areas may require the use of a special erosion control blanket in lieu of straw mulch, and/or the temporary diversion of run-off.

Mowing is carried out periodically to assist in completing inspections, monitoring, and to prevent woody growth. Vegetation is mowed no closer than 5 to 6 inches from the ground surface.

18. GROUNDWATER AND SURFACE WATER QUALITY MONITORING

18.1 Overview

In accordance with the requirements of COMAR 26.04.07.08.B(17), a system for routinely monitoring the quality of the waters of the State around and beneath MLFRRF, including the location and types of monitoring stations and the method of construction and monitoring wells, is discussed in this section.

Details of how groundwater monitoring will be performed are contained in the EMP (**Appendix K**), which includes the following.

- The locations and types of monitoring locations
- Methods of construction for monitoring wells
- Sampling and analysis procedures and protocols
- Methodologies for analyzing groundwater quality data
- Procedures to be followed to report the results of groundwater monitoring
- Measures to implement if monitoring results do not comply with groundwater quality standards

The EMP also describes the approach taken to provide an adequate number and sampling frequency of groundwater monitoring locations to monitor groundwater quality downgradient of the waste limits, as well as to select sampling locations that are representative of background groundwater quality.

18.2 Groundwater Quality Monitoring Program

The groundwater water monitoring program for the MLFRRF is described in the EMP, which was approved by MDE on January 27, 2025. The groundwater monitoring program contains detailed information pertaining to the construction and development of groundwater monitoring wells, the monitoring well locations and frequencies, procedures to be followed when collecting groundwater samples, required equipment, the analytical program, quality assurance and quality control procedures, and the evaluation and reporting of groundwater data. The surface water monitoring program contains detailed information regarding solute transport in surface water, monitoring locations, sampling procedures, and the evaluation and reporting of data.

The groundwater monitoring program at the MLFRRF is consistent with the operating criteria outlined in 40 CFR Part 258 Subtitle D and COMAR 26.04.07. Both the State and Federal regulations require that groundwater be monitored throughout the active life and post-closure care period of Cell 9. 40 CFR Part 258 also requires that landfill sites will not discharge pollutants into or impact waters of the State.

The groundwater monitoring program provides for periodic collection of groundwater quality samples and water-level data from groundwater monitoring wells, located both on-site and off-site along the eastern and southern boundaries.

Future modifications or changes to the groundwater monitoring program for the MLFRRF will be included in the MDE-approved EMP, as amended.

18.3 Surface Water Monitoring

The surface water monitoring program for the MLFRRF is described in the facility's EMP, which was approved by MDE on January 27, 2025. The surface water monitoring program at the MLFRRF is consistent with the operating criteria outlined in 40 CFR Part 258 Subtitle D and COMAR 26.04.07. Future modifications or changes to the surface water monitoring program for the MLFRRF will be included in the MDE-approved EMP, as amended.

18.4 Landfill Gas Monitoring

LFG monitoring at the MLFRRF consists of a network of existing gas probes located around the perimeter of the existing waste disposal area. The LFG monitoring network at the MLFRRF consists of monitoring probes located along the northern and eastern property boundaries adjacent to landfill cells. New monitoring probes were installed in May 2016 along the southern and western property boundaries, adjacent to the Cell 9 disposal area. LFG monitoring is also performed in the LFG-to-electricity facility due to its proximity to waste disposal areas and the nature of its operations. Other buildings at the MLFRRF are in areas where LFG is not expected to migrate.

Other on-site LFG management infrastructure includes extraction wells, horizontal conveyance piping, condensate traps/sumps, a blower/flare station, an enclosed flare, and a utility flare, which receive periodic monitoring and inspection for operational functionality and performance. In 2012, the County commissioned a 3.2-megawatt LFG-to-electricity facility at the MLFRRF to convert LFG to electricity. Permit and performance requirements for the LFG-to-electricity facility are specified under the MDE-issued Permit-to-Operate.

Details regarding the LFG monitoring network, gas probes, and gas monitoring procedures are outlined in the EMP (**Appendix K**).

19. BURNING OF SOLID WASTE

As required by COMAR 26.04.07.08.B(18), burning of solid waste will not be allowed at Cell 9 except as permitted by MDE.

20. CONSTRUCTION IMPLEMENTATION SCHEDULE

This section addresses the requirements of COMAR 26.04.07.08.B(19) regarding a schedule for construction and operation of Cell 9 and the operation plans and engineering specifications after the refuse disposal permit has been issued. Since this permit application is for a vertical expansion, a portion of Cell 9 has already been constructed and is operational. Subcells 9.1 and 9.2 have already been constructed and are accepting waste, while Subcell 9.3 is under construction and is anticipated to begin accepting waste in late 2025. In general, the implementation schedule is expected to follow these steps:

- After MDE issues the revised refuse disposal permit, the County will continue to operate Subcells 9.1, 9.2, and 9.3. When airspace needs dictate, the County will develop a set of construction-grade drawings and bid documents for procurement of a contractor for construction of Subcell 9.4 and the landfill infrastructure necessary for waste filling and cell operation (e.g., access roads, portions of the leachate management system, etc.). The documents will include construction drawings (including an approved E&S control plan and Stormwater Management plan), technical specifications, and a CQA plan that are consistent with the elements approved in the permit for the facility (as presented in the Drawings in **Appendix A**, the technical specifications in **Appendix D**, and the CQA Plan in **Appendix J**). These documents will be provided to MDE for review prior to issuing the bid documents. The bid documents will also include contract terms and conditions, bid schedules, and other items specific to procurement that are not relevant to the permit and, therefore, will not be submitted to MDE for review.
- Upon approval by MDE and successful procurement of a contractor, construction of Subcell 9.4 and associated landfill infrastructure will begin. A Construction Certification Report will be submitted to MDE within 90 days following completion and approval of construction. It is anticipated that MDE will review and approve the report within 3 months.
- Placement of the 4-ft (minimum) initial select waste layer in Subcell 9.4 will begin prior to general disposal. During this time, collection vehicles from the county's curbside collection program will be routed to Subcell 9.4. This select waste layer will consist of bagged household waste and other waste that will not damage the liner system.
- The provisions of the various plans governing landfill construction and operation will be implemented as follows:
 - The E&S Control and Stormwater Management Plans will be implemented during construction of Subcell 9.4. These plans will be important to controlling stormwater and preventing environmental impacts during construction.

- The Operations Guide (**Appendix B**) will be implemented during the operating period of Cell 9.
- The approved EMP (**Appendix K**) will be implemented during the operation of Cell 9.
- The Emergency Contingency Plan presented in the Operations Guide (**Appendix B**) will be implemented only if a situation arises that requires action according to the provisions of the plan.
- A similar process to that described above will be followed for construction of Subcell 9.5 along with necessary expansions of associated landfill infrastructure until the entire Cell 9 buildout, as depicted on the Drawings (**Appendix A**), has been completed.
- The revised C/PCC Plan (**Appendix M**) will be implemented during final closure of Cell 9 and after the landfill is closed and will supersede the Operations Guide, which will be redundant once waste disposal activities cease.

This schedule will be updated if needed depending on the County's rate of filling and specific needs during the Cell 9 operation.

21. CLOSURE AND POST-CLOSURE CARE PLANS

21.1 Regulatory Requirements and Overview of Closure System

In accordance with the requirements of COMAR 26.04.07.08.B(20) and 40 CFR 258.60 and .61, a plan for closing Cell 9 and providing post-closure care (PCC) after application of the final cover system is discussed in this section. A standalone C/PCC Plan for the landfill has been developed (**Appendix M**). The C/PCC Plan includes the following.

- A description of the relevant requirements for closure and post-closure care
- Methods and procedures to be followed to close the landfill
- Descriptions of the closure system features and their design
- Cost estimates for closing the landfill
- A plan for providing PCC throughout the post-closure period
- Methods for determining whether the appropriate amount of post-closure care has been provided and for evaluating whether it is appropriate for regulatory post-closure care to end

The closure system will consist of several components, including a final cover system (**Section 21.2**), an LFG management system (**Section 16**), and a stormwater management system (**Section 13**). The leachate management system (**Section 14**), which will remain in operation during the post-closure period, is not considered to be a closure system component because it will have already been constructed and in operation before final closure. Construction of all closure system components will be performed in accordance with CQA procedures, as described in the CQA Plan (**Appendix J**).

21.2 Final Cover System

After the final receipt of waste in Cell 9 and before construction of the final cover system, the surface of the landfill will be graded such that the computed post-settlement elevation of the final grading layer is the required depth below the contours shown on Drawings 10 and 10A (**Appendix A**). In preparation for construction of the closure cap, a 24-inch-thick final grading layer will be applied to provide smooth grades for the overlying closure cap and proper drainage slopes for the final cover system. The final grading layer will also provide temporary control of LFG, minimize the amount of infiltration into the landfill, reduce odors, and minimize the amount of maintenance required. The County will attempt to minimize the amount of final grading that is needed by filling the landfill as closely as possible to the required grades. Slopes range to a maximum of 33.3%.

The closure cap will be constructed in its entirety across all portions of the landfill once filled to final grades. Final cover drainage features will be constructed at the time of final closure.

Two final cover alternatives are considered for the final closure of Cell 9.

21.2.1 Final Cover

The traditional final cover consists of a geomembrane placed over the soil grading layer, which will be overlain by (in ascending order): (i) a geocomposite drainage layer; (ii) an 18-inch-thick protective cover soil layer; and (iii) a 6-inch-thick vegetated topsoil layer. This final cover system is illustrated in Detail 1 on Drawing 13 (**Appendix A**).

The low-permeability cap component of this final cover system will be constructed in accordance with the requirements of COMAR 26.04.07.21 and 40 CFR 258.60. As described in **Section 8**, soils that will be used for the various soil layers comprising the final cover system will likely be obtained from the County's adjacent soil borrow areas and will conform with the technical specifications provided in **Appendix D**.

Geosyntec conducted a cover system settlement analysis (**Appendix N.1**) to evaluate the impact of post-closure settlement on the integrity of the cover system and whether post-settlement grades are sufficient for effective long-term stormwater management. Geosyntec also evaluated the capability of the cover system to resist puncture in response to equipment and operational loading (**Appendix N.2**). Finally, the veneer stability of the cover system was evaluated in **Appendix N.3**.

21.2.2 Alternative Final Cover

The proposed alternative final cover consists of three layers (in ascending order): (i) Agru 50-mil LLDPE Microdrain; (ii) engineered synthetic turf with geotextile backing; and (iii) 0.75-inch-thick sand infill. This final cover system is sold commercially as ClosureTurf[®], manufactured by WatershedGeo, Inc. ClosureTurf is an alternative to traditional vegetated soil or geosynthetic-soil cover systems.

ClosureTurf is expected to have better performance under the post-closure condition in nearly all engineering analyses: it will reduce leachate generation; it will reduce the risk of erosion in the post-closure condition; it will improve stormwater runoff quality; and it will reduce the cost, truck traffic, and carbon footprint associated with final closure construction. As required by COMAR 26.04.07.26, an engineering analysis of ClosureTurf has been prepared to supply the economic, technological, and environmental justification, as well an evaluation of the alternative final cover to conserve and protect the public health, the natural resources, and environment of the State, and to control air, water, and land pollution to at least the same extent as would be obtained by compliance with the regulation (**Appendix N.4**). Since ClosureTurf would be more exposed to wind uplift forces than a traditional final cover, a wind uplift calculation was also prepared (**Appendix N.5**).

22. RESPONSIBLE AGENCY

In accordance with COMAR 26.04.07.08.B(21), the name, address, and telephone number of the person or agency responsible for the maintenance and operation of the facility is presented in this section.

The agency responsible for operation and maintenance of the MLFRRF is:

Anne Arundel County Department of Public Works

2662 Riva Road

Annapolis, MD 21401

Tel: (410) 222-7500

Bureau of Waste Management Services

389 Burns Crossing Road

Severn, MD 21144

Tel: (410) 222-6108

23. REFERENCES

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Geosyntec. 2023. *Phase I Report, Cell 9 Vertical Expansion, Application for Permit Modification, MDE Refuse Disposal Permit 2022-WMF-0240, Millersville Municipal Landfill and Resource Recovery Facility*. Geosyntec Consultants, Inc. November.

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TABLES

TABLE 1
PHASE III REPORT CHECKLIST – MDE CHECKLIST

Phase III Report
Proposed Millersville Landfill and Resource Recovery Facility Vertical Expansion
Severn, Anne Arundel County, Maryland

Item	Where Addressed
1. DESIGN DOCUMENTATION	
1.1 Permit Application Check List	
1.1.1 Site Background	Ph. III Section 1.1, and Drawings 2-3
1.1.2 General Facility Information	Ph. III Section 3, and Drawings 2-3
1.1.3 Estimated Project Schedule	Ph. III Section 20
1.1.4 Report Organization	Ph. III Section 1.1
1.1.5 Phase III Application	See Application Document
1.2 Facility Background	
1.2.1 General	Ph. III Section 1
1.2.2 Regulations Check Lists	Ph. III Section 2
1.2.3 Local Regulations	Ph. III Section 2.1 & 2.4
1.2.4 State Regulations	Ph. III Section 2.2
1.2.5 Federal Regulations	Ph. III Section 2.3
1.3 Site Development	
1.3.1 Introduction	Ph. III Section 1.1, 3.1, and Drawing 3
1.3.2 Property Boundary Defined	Drawing 2
1.3.3 A Map that Designates the Property Boundary	Drawing 2
1.3.4 Fill Area Defined	Drawings 4-9
1.3.5 Existing and Proposed Structures Located	Drawings 2-4
1.3.6 Detail Adequately Defined	Drawings 12-17
1.3.7 Buffer and Screening Design Criteria	Ph. III Sections 11.1, 11.2.1 and, Drawing 4
1.3.8 Flood Plain and Wetland Areas Defined	Ph. II Report
1.3.9 Wetland Permit/Approval	Ph. II Report
1.3.10 Location Restriction Part 258 Part B	Ph. I Report
1.3.10.1 Airport Safety COMAR 26.04.07.06B(2), 2604.0706C(1), 26.04.07.0C(4)	Ph. I Report
1.3.10.2 Is Site within 5,000/10,000 feet of Applicable Runway?	Ph. I Report
1.3.10.3 Is Site within 5 miles of Applicable Runway?	Ph. I Report
1.3.10.4 Airport Notified & FAA letter Enclosed?	Ph. I Report
1.3.10.5 Date of Letter from FAA	Ph. I Report
1.3.11 Site Access	Ph. III Section 9, and Drawings 2-4

TABLE 1
PHASE II REPORT CHECKLIST – MDE CHECKLIST

Phase III Report
Proposed Millersville Landfill and Resource Recovery Facility Vertical Expansion
Severn, Anne Arundel County, Maryland
(continued)

Item	Where Addressed
1.3.12 Type of Solid Waste Acceptable and Unacceptable	Ph. III Section 5.2, and Appendix B
1.3.13 Area and Population to be Served	Ph. III Sections 5.3, and 5.4
1.3.14 Method of Collecting and Reporting on the Quantities of and Types of Solid Waste Received	Ph. III Section 7
1.3.14.1 Hours and Days of Operation	Ph. III Section 10.2, and Appendix B
1.3.14.2 Waste Quantities	Ph. III Section 6, and Appendix C
1.3.14.3 Site Life	Ph. III Section 6, and Appendix C
1.3.14.4 Revision Facility's Life	Ph. III Section 6, and Appendix C
1.3.14.5 Site Layout and Landfill Phasing	Ph. III Drawing 4 and Appendix B
2. SOIL BALANCE EVALUATION	
2.1 Volume and Type of Available Cover Material	Ph. III Section 8.2
2.2 Cover Material Requirements	Ph. III Section 8.3
2.3 Earth Stockpiles Storage Capacity	Ph. III Section 8.4
2.4 Topsoil Requirement and Availability	Ph. III Section 8.5
3. SUPPORT FACILITIES	
3.1 Introduction	Ph. III Section 3
3.2 Office and Site Communications	Ph. III Section 3, and Appendix B
3.2.1 Telephone/Other Communication Equipment	Ph. III Section 3.12, and Appendix B
3.2.2 Type of Manufacturer	Appendix B
3.2.3 Location Onsite	Ph. III Section 3.12, and Appendix B
3.2.4 Range	Ph. III Section 3.12, and Appendix B
3.2.5 Description of Operations	Appendix B
3.2.6 License Required	Appendix B
3.3 Electric Service & Other Utilities	Ph. III Section 3.10, and Appendix B
3.3.1 Type of Service Described	Ph. III Section 3.10, and Appendix B
3.3.2 Point of Entry Onsite	Appendix B and Drawing 28
3.3.3 Transformer or Other Installations	Ph. III Section 3.10, and Appendix B
3.4 Maintenance and Equipment Storage Facility	Ph. III Section 3.4, and Appendix B
3.4.1 Description or Type of Structure	Ph. III Section 3.4, and Appendix B
3.4.2 Size and Dimensions Stated (maintenance building, office, and scale-house)	Ph. III Section 3.4, and Appendix B
3.4.3 Location Onsite Specified	Ph. III Section 3.4, and Appendix B
3.4.4 Utility Service Provided	Ph. III Section 3, and Appendix B
3.4.5 Safety Facilities Described	Ph. III Section 3.13, and Appendix B
3.4.6 Safety Equipment Provided	Ph. III Section 3.13, and Appendix B

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PHASE II REPORT CHECKLIST – MDE CHECKLIST

Phase III Report
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Item	Where Addressed
3.4.7 Safety Training Defined	Appendix B
3.4.8 Continues Training for Employees Defined	Appendix B
3.5 Employee Facilities	
3.5.1 Water Supply and Sewerage Systems	Ph. III Section 3.14, and Appendix B
3.5.2 Source of Supply Identified	Ph. III Section 3.14, and Appendix B
3.5.3 Public Water/Groundwater-Permit Required?	Ph. III Section 3.14, and Appendix B
3.5.4 Location on Site Defined	Drawing 2
3.5.5 Onsite Water Treatment Plan Defined	Appendix B
3.5.6 NPDES Permit Required	Not applicable to Employee facilities.
3.5.7 Sanitary Facility Described	Ph. III Sections 3.13
3.5.8 Toilet Facilities Described	Ph. III Section 3.13
3.5.9 Shower Facilities	N/A
3.5.10 Male/Female Facilities	Ph. III Section 3.13
3.5.11 Location on Site Defined	Drawing 2
3.6 Facilities On Site	
3.6.1 Number and Types of Equipment to be Used	Ph. III Section 10.3 and Appendix B
3.6.2 Number of Employees and their Duties	Ph. III Section 10.4 and Appendix B
3.6.3 Vehicle Weighing Station/ Scale Defined	Ph. III Section 3.2 and Appendix B Section 4.3.3
3.6.4 Type of Manufacture	Appendix B
3.6.5 Capacity	Ph. III Section 6 and Appendix C
3.6.6 Description of Operation	Ph. III Sections 10.7, and Appendix B
3.7 Site Security	Ph. III Section 9 and Appendix B
3.8 Paved or All Weather Roads to Facility Defined	
3.8.1 Location of Roads Specified	Ph. III Sections 3.2 & 4 & Drawings 2, and 3, and Appendix B
3.8.2 Public Access Areas Defined	Ph. III Section 4.2, and 9, and Appendix B
3.8.3 Public Disposal Site Designated	Drawings 2, and 3
3.8.4 Recycling Collection Site Designated	Appendix B
3.8.5 Traffic Pattern Specified	Appendix B
3.8.6 Traffic Control Specified	Appendix B
3.8.7 Vehicle Queuing Described (need to address truck queuing)	Appendix B

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PHASE II REPORT CHECKLIST – MDE CHECKLIST

Phase III Report
Proposed Millersville Landfill and Resource Recovery Facility Vertical Expansion
Severn, Anne Arundel County, Maryland
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Item	Where Addressed
4. STORMWATER MANAGEMENT & EROSION AND SEDIMENT CONTROL	
4.1 Introduction	Ph. III Section 13.1
4.2 Run-on Controls	Ph. III Section 13
4.3 Run-off Controls	Ph. III Section 13
4.3.1 Drainage Caps on Top and Side Slopes	Ph. III Section 21.2
4.3.2 Down slope Gabion-Lined Channels	Ph. III Section 13.3
4.3.3 Perimeter Diversion Channels	Ph. III Section 13.3
4.3.4 Stormwater Quantity and Quality Controls	Ph. III Section 13.3
4.3.5 Approved Erosion and Sediment Control Provision by Appropriate Approving Agency and satisfy the Requirements of Environmental Article, Title 4, Subtitle 1, and COMAR 26.09.01	Appendix I
4.3.6 Sedimentation Trap & Size Specification	Appendix I
5. OPERATING PROCEDURES	
5.1 Introduction	Ph. III Section 10.1 and Appendix B
5.2 Equipment	Ph. III Section 10.3 and Appendix B
5.3 Manpower	Ph. III Section 10.4 and Appendix B
5.4 Hours and Days of Operation	Ph. III Section 10.2 and Appendix B
5.5 Methods of Daily Operation	Ph. III Section 10.7 and Appendix B
5.6 Inclement Weather Operation	Ph. III Section 10.8 and Appendix B
5.7 Maintenance and Equipment Storage	Ph. III Section 3.4
5.7.1 Description and Type of Structures	Ph. III Section 3 and Appendix B
5.7.2 Size and Dimensions Stated	Drawing 2-3, and Appendix B
5.7.3 Location on Site Specified	Ph. III Section 3, Drawings 2-3
5.7.4 Utility Service Provided	Ph. III Section 3.8, and Appendix B
5.8 Prevention of Public Health Hazards	Ph. III Section 10.6, and Appendix B
5.9 Blowing Liters	Ph. III Section 10.6, and Appendix B
5.10 Prevention of Vector Attraction and Scavenging	Ph. III Section 10.6, and Appendix B
5.11 Fire Prevention and Control	Ph. III Section 10.5, and Appendix B
5.12 Open Burning	Ph. III Section 19, and Appendix B
5.13 Record Keeping	Appendix B
5.14 Contact Person	Appendix B
6. WATER QUALITY MONITORING	
6.1 Introduction	Ph. III Section 18, and Appendix K
6.2 Sampling Procedures and Protocol	Appendix K

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PHASE II REPORT CHECKLIST – MDE CHECKLIST

Phase III Report
Proposed Millersville Landfill and Resource Recovery Facility Vertical Expansion
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Item	Where Addressed
6.3 Sample Collection	Appendix K
6.4 Sample Collection QA/QC	Appendix K
6.5 Groundwater Monitoring Network	Appendix K
6.6 Water Level Measurements	Appendix K
6.7 Groundwater Monitoring System	Appendix K
6.8 Surface Water Monitoring System	Appendix K
6.9 Groundwater Sampling and Analysis	Appendix K
6.10 Sampling Procedures	Appendix K
6.11 Laboratory Analysis Procedures	Appendix K
6.12 Evaluation of Groundwater Quality Data	Appendix K
6.13 Contingency Plan for Preventing or Mitigating the Pollution of Groundwater	Ph. III Section 15, and Appendix K
6.14 Sample Custody and Documentation	Appendix K
6.15 Decontamination	Appendix K
6.16 Quality Control	Appendix K
6.17 Data Review	Appendix K
6.18 Surface Water	Appendix K
7. GEOTECHNICAL EVALUATION	
7.1 Introduction	Ph. III Section 11.1
7.2 Subbase Settlement Analysis	Ph. III Sections 11.2.2, and Appendix E.1
7.3 Slope Stability Analysis	Ph. III Section 11.3, and Appendix G
7.4 Stability of Waste Slope and Final Slopes	Ph. III Section 11.3, and Appendix G
7.5 Stability of Excavated Slopes	Ph. III Section 11.3, and Appendix G
8. SUBBASE CONSTRUCTION QUALITY ASSURANCE (CQA) PROGRAM	
8.1 CQA Management Organization	Appendix J
8.2 State Regulatory Agency	Appendix J
8.3 Landfill Owner	Appendix J
8.4 Personnel	Appendix J
8.5 CQA Manager	Appendix J
8.6 CQA Inspectors	Appendix J, and Appendix D
8.7 Contractor	Appendix J, and Appendix D
8.8 CQC Manager	Appendix J, and Appendix D
8.9 Construction Crews	Appendix J, and Appendix D
8.9.1 Site Preparation	Appendix J, and Appendix D

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Item		Where Addressed
8.9.2	General	Appendix J, and Appendix D
8.9.3	Aerial Survey	Appendix J, and Appendix D
8.9.4	Control Benchmarks	Appendix J, and Appendix D
8.9.5	Clearing and Grubbing	Appendix J, and Appendix D
8.9.6	Sedimentation and Erosion Controls	Appendix J, and Appendix D
8.9.7	Site Grading	Appendix J, and Appendix D
8.9.7.1	General	Appendix J, and Appendix D
8.9.7.2	Initial Construction	Appendix J, and Appendix D
8.9.7.3	Phase Development	Appendix J, and Appendix D
8.9.7.4	Engineering Analyses	Ph. III Section 11
8.9.7.5	Settlement Potential	Appendix E.2
8.9.7.6	Bearing Capacity and Stability Analyses	Appendix E.4
8.9.7.7	Subgrade Preparation	Appendix J, and Appendix D
8.9.7.8	Subgrade Construction	Appendix J, and Appendix D
8.9.7.9	Foundation QA/QC	Appendix J, and Appendix D
8.9.7.10	Foundation Certification	Appendix J, and Appendix D
8.9.8	Subbase Construction	Appendix J, and Appendix D
8.9.8.1	General	Appendix J, and Appendix D
8.9.8.2	Soil Source	Appendix J, and Appendix D
8.9.8.3	Soil Selection	Appendix J, and Appendix D
8.9.8.4	Subbase Preparation	Appendix J, and Appendix D
8.9.8.5	Subbase Number of Lifts	Appendix J, and Appendix D
8.9.8.6	Soil Tests	Appendix J, and Appendix D
8.9.8.6.1	Number of Tests Per Lift and Acre	Appendix J, and Appendix D
8.9.8.6.2	Field Testing-Soil Moisture, Permeability, Compaction Optimum Soil Moisture	Appendix J, and Appendix D
8.9.8.6.3	Failed Field Testing & Methods Used to Correct the ?	Appendix J, and Appendix D
8.9.8.6.4	Lab Soil Testing for Moisture & Permeability	Appendix J, and Appendix D
8.9.8.6.5	QA/QC Subbase Construction	Appendix J, and Appendix D
8.9.8.6.6	Subbase Certification	Appendix J, and Appendix D
9.	LANDFILL DESIGN	

TABLE 1
PHASE II REPORT CHECKLIST – MDE CHECKLIST

Phase III Report
Proposed Millersville Landfill and Resource Recovery Facility Vertical Expansion
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Item	Where Addressed
9.1 Introduction	Ph. III Section 11.1
9.2 Liner System	
9.2.1 Chemical Characteristics and Compatibility	Ph. III Section 11.2.5
9.2.2 Liner System Testing	Ph. III Section 11.2
9.2.3 Physical Stress on the HDPE Membrane	Ph. III Section 11.2
9.3 General	Ph. III Section 11
9.4 Geomembrane Deployment	Appendix D
9.5 Geomembrane Protection	Ph. III Section 11.2.3, and 11.2.4
9.6 Liner System Design	Ph. III Section 11.2
9.6.1 CQC/CQA Procedures to Keep Up with Enhanced Materials and Test Methods	Appendix J, and Appendix D
9.6.2 Landfill Floor Liner System	Ph. III Section 11.2.1
9.6.3 Landfill Side Slope Liner Anchor Trench	Drawing 12
9.6.4 Leak Detection Methods	PH. III Section 15.3, and Appendix K
9.6.5 QA/QC Liner Installation	Appendix J, and Appendix D
9.6.6 Defects and Repairs	Appendix J, and Appendix D
9.7 Granular Drainage Media	
9.7.1 General	Ph. III Section 14.3, and Drawings 12
9.7.2 Aggregate Thickness and Placement	Ph. III Section 14.3, and Drawings 12
9.8 Leachate Collection System	
9.8.1 Leachate Collection Piping	Ph. III Section 14.3, and Drawings 4-9, and 14
9.8.2 Leachate Sumps and Appurtenances	Ph. III Section 14.3, and Drawings 4-9, and 14
9.8.3 Leachate Flow Rate Measurement	Ph. III Section 14.4.2
9.8.4 Maximum Head of Leachate	Ph. III Section 14.1, 14.2, and Appendix F.1
9.8.5 Leachate Sampling and Analysis	Appendix B
9.8.6 Leachate Disposal	Ph. III Section 14.4.1
9.8.7 Pipe Installation	Ph. III Section 14.3, and Drawings 4-9
9.8.8 Pipe Clogging	Appendix F.2
9.8.9 QA/QC Pipe Installation	CQA
9.9 Gas Management System	Ph. III Section 16
9.10 Cover Material	Ph. III Section 8
9.11 Borrow Area	Ph. III Section 8.2, and Drawing 3
10. STORMWATER MANAGEMENT AND SEDIMENT & EROSION CONTROL PLAN	

TABLE 1
PHASE II REPORT CHECKLIST – MDE CHECKLIST

Phase III Report
Proposed Millersville Landfill and Resource Recovery Facility Vertical Expansion
Severn, Anne Arundel County, Maryland
(continued)

Item	Where Addressed
10.1 General	Ph. III Section 13, and Appendix H.2
10.2 Run-On Control	Ph. III Section 13, and Appendix H.2
10.3 Run-off Control	Ph. III Section 13, and Appendix H.2
10.4 Sedimentation and Erosion Control	Ph. III Sections 13, 17, and Appendix B
10.5 Leachate Management	Ph. III Section 14
10.6 Landfill Gas	Ph. III Section 16
11. OPERATION AND MAINTENANCE	
11.1 General	Appendix B
11.2 Operational Plan Defined	Appendix B
11.3 Operation Procedures	Appendix B
11.4 Waste Collection/Transportation	Appendix B
11.5 Hours of Operation	Ph. III Section 10.2, and Appendix B
11.6 Site Security and Signs	Appendix B
11.7 Site Access	Ph. III Section 4, and Appendix B
11.8 General Waste Analysis	Appendix B
11.9 Areas to be Served Defined	Ph. III Section 5.2, and Appendix B
11.10 Population to be Served	Ph. III Section 5.4, and Appendix B
11.11 Sources of Waste	Ph. III Section 5.2, 5.3, and Appendix B
11.12 Quantities of Waste	Ph. III Section 6, and Appendix C
11.13 Volume of Waste to be Received	Ph. III Section 6, and Appendix C
11.14 Tonnage of Waste to be Received	Ph. III Section 6, and Appendix C
11.15 Useful Life Projection of Landfill Defined	Ph. III Section 6, and Appendix C
11.16 Calculation Included	Ph. III Section 6, and Appendix C
11.17 Waste Stream Volume Reduction Considered/Discussed	Ph. III Section 5.4, and Appendix B
11.18 Acceptable Wastes Solid Waste	Ph. III Section 5.2, and Appendix B
11.19 Acceptable Wastes Defined	Ph. III Section 5.2, and Appendix B
11.20 Non-Acceptable Wastes Defined	Ph. III Section 5.3, and Appendix B
11.20.1 Waste Acceptance Procedure	Appendix B
11.20.2 Check-In Procedures	Ph. III Section 9, and Appendix B
11.20.3 Waste Inspection and Acceptance	Appendix B
11.20.4 Waste Placement	Appendix B
11.20.5 Filling Sequence	Appendix B
11.20.6 Filling Procedure	Appendix B
11.20.7 Inclement Weather Operation	Ph. III Section 10.8, and Appendix B

TABLE 1
PHASE II REPORT CHECKLIST – MDE CHECKLIST

Phase III Report
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Item	Where Addressed
11.20.8 Check-Out Procedures	Appendix B
11.21 Data Collection	Appendix B
11.21.1 Types of Data to be Collected	Appendix B
11.21.2 Format for Collection Data	Appendix B
11.21.3 Data to be Reported	Appendix B
11.21.4 Adequacy of Data Discussed	Appendix B
11.21.5 Relevance of Data	Appendix B
11.21.6 Source, Type, Volume & Tonnage	Ph. III Section 5, 6, and Appendix B
11.21.7 Daily, Weekly, Monthly & Annual Data	Appendix B
11.21.8 Facility Life Estimate Calculation	Ph. III Section 6, and Appendix C
11.21.9 Top Soil Recovery & Storage Plan	Ph. III Section 8.5
11.21.10 Cover Material Stockpiles Defined on Site	Ph. III Section 8.4
11.21.11 Daily Cover Requirements	Ph. III Section 8
11.21.12 Volumes Required	Ph. III Section 8.3
11.21.13 Type of Material Specified	Ph. III Section 8
11.21.14 Storage Location Onsite Specified	Ph. III Section 8.4
11.21.15 Final Cover Requirements	Ph. III Section 8
11.22 Traffic Patterns	Appendix B
11.22.1 Traffic Characterization and Routing	Appendix B
11.23 Runoff Management	Ph. III Section 13, Appendix B, and Appendix H
11.24 Leachate Management System	Ph. III Section 14, and Appendix F
11.24.1 General	Ph. III Section 14.1
11.24.2 Leachate Collection System	Ph. III Section 14.3, and Appendix F.2
11.24.3 Leachate Transmission System	Ph. III Section 14.3, and Appendix F.3
11.25 Landfill Gas Management System	Ph. III Section 16, and Appendix L
11.26 Procedures to Prevent Hazards	Ph. III Section 10.6, and Appendix B
11.27 Security	Ph. III Section 9, and Appendix B
11.27.1 Entry Control	Ph. III Section 9, and Appendix B
11.27.2 General Inspection Requirements	Appendix B
11.27.3 Inspection Schedule	Appendix B
11.27.4 Inspection Procedure	Appendix B
11.28 Remedial Maintenance and Hazard Preventive Procedures	Appendix B
11.28.1 Unloading Operations	Appendix B
11.28.2 Fire Protection	Ph. III Section 10.5, and Appendix B

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Item	Where Addressed
11.28.3 Groundwater Quality Protection	Appendix B
11.28.4 Equipment and Power Failure	Appendix B
11.28.5 Safety Procedures	Ph. III Section 3.13, and Appendix B
11.28.6 Communications	Ph. III Section 3.12, and Appendix B
11.29 MAINTENANCE PROCEDURES	Appendix B
11.29.1 General Maintenance Program	Appendix B
11.29.2 Site Maintenance	Appendix B
11.29.3 General	Appendix B
11.29.4 Berms and Cover System	Ph. III Drawing 10
11.29.5 Leachate Collection/Transmission System	Ph. III Section 14.3, Appendix F.2, and F.3
11.29.6 Method of Leachate Collection System	Ph. III Section 14.3, and Appendix F.2
11.29.7 Leachate Collection Cleanout	Ph. III Section 14.3, and Appendix B
11.29.8 Gas Management System	Ph. III Section 16, and Appendix B
11.29.9 Utilities	Appendix B
11.29.10 Perimeter Roads	Ph. III Section 9, and Appendix B
11.29.11 Drainage Ditches Defined & Delineated	Drawing 10, 13, and Appendix B
11.29.12 Sedimentation and Erosion Control Plan Addressed & Approved by Local SCS District	Appendix I
11.29.13 Stormwater Collection Ponds Defined & Calculation for Capacity	Ph. III Section 13, and Appendix H.5
11.30 FACILITIES AND EQUIPMENT MAINTENANCE	Appendix B
11.30.1 General	Appendix B
11.30.2 Leachate Transmission System	Ph. III Section 14.3, and Appendix F.3
11.30.3 Operating Equipment Defined	Ph. III Section 10.3, and Appendix B
11.30.4 Leachate Storage Tanks Specified & Capacity	Ph. III Section 14.4, and Appendix B
11.31 PERSONNEL	Ph. III Section 10.4, and Appendix B
11.31.1 General	Ph. III Section 10.4, and Appendix B
11.31.2 Manpower Requirements-Staff Described	Ph. III Section 10.4, and Appendix B
11.31.3 Qualifications	Ph. III Section 10.4, and Appendix B
11.32 FACILITIES	Ph. III Section 3, and Appendix B
11.32.1 General	Ph. III Section 3, and Appendix B
11.32.2 Landfill Office/Maintenance Building	Ph. III Section 3.4, and Appendix B
11.32.3 Utilities	Appendix B

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Item	Where Addressed
11.33 Records	Appendix B
11.33.1 General	Appendix B
11.33.2 Financial Records	Appendix B
11.33.3 Operation Records	Appendix B
11.34 Types and Volume of Waste	Ph. III Section 6, and Appendix B
11.35 Personnel	Ph. III Section 10.4, and Appendix B
11.36 Maintenance	Appendix B
11.37 Inspection	Appendix B
11.38 Permits	Appendix B
11.39 Reports	Appendix B
11.40 Training Program	Appendix B
11.41 Safety Program	Ph. III Section 3.13, and Appendix B
11.41.1 General	Appendix B
11.41.2 Safety Training	Appendix B
11.41.3 Salvage and Scavenge	Appendix B
11.41.4 Fire Protection	Ph. III Section 10.5, and Appendix B
11.41.5 Hazardous Handling	Appendix B
11.41.6 Hazardous Waste Reporting	Appendix B
11.41.7 Emergency Response	Ph. III Section 15, and Appendix B
11.42 ENVIRONMENTAL MONITORING AND CONTROL	
11.42.1 General	Appendix K
11.42.2 Monitoring Program	Ph. III Section 18, and Appendix K
11.42.3 Water Quality	Ph. III Section 18, and Appendix K
11.42.4 Air Quality	Appendix K
11.43 Environmental Control Program	
11.43.1 Soil Contamination	Appendix B
11.43.2 Dust and Noise	Ph. III Section 10.6, and Appendix B
11.43.3 Run off, Sedimentation and Erosion	Ph. III Section 13, and 17
11.43.4 Leachate	Ph. III Section 14, and Appendix F
11.44 CONTINGENCY PLAN	Ph. III Section 15, and Appendix B
11.44.1 General	Ph. III Section 15
11.44.2 Emergency Coordinator	Appendix B
11.44.3 Emergency Coordination	Appendix B
11.44.4 During Operating Hours	Appendix B
11.44.5 During Non-Operating Hours	Appendix B

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Item	Where Addressed
11.44.6 Limit of Authority	Appendix B
11.44.7 Emergency Personnel	Appendix B
11.44.8 Implementation	Appendix B
11.44.9 Emergency Response Procedures	Appendix B
11.44.10 Emergency Coordinator	Appendix B
11.45 Specific Emergency Actions	Appendix B
11.45.1 General	Appendix B
11.45.2 Spill Procedure: On Site Liquids	Ph. III Section 15.3
11.45.3 Spill Procedure: On Site Solids	Appendix B
11.45.4 Spill Procedure: Underground	Appendix B
11.45.5 Fire Procedures	Ph. III Section 10.5, and Appendix B
11.45.6 Explosion Procedures	Appendix B
11.46 Discovery of Hazardous Waste/Unauthorized Waste Procedures	Appendix B
11.46.1 Erosion Discovery Procedures	Ph. III Sections 17.2.5, and 17.3.5
11.46.2 Differential Settlement Procedures	Appendix B
11.46.3 Cleanup Activities	Appendix B
11.46.4 Post Incident Actions	Appendix B
11.46.5 Emergency Equipment	Appendix B
11.46.6 Coordination Agreement	Appendix B
11.46.7 Evaluation Plan	Appendix B
11.46.8 Amendments to the Plan	Appendix B
12. CLOSURE PLAN	Ph. III Section 21, and Appendix M
12.1 General	Appendix M
12.2 Schedule and Description	Appendix M
12.2.1 Performance Standard	Appendix M
12.2.2 Closure Activities	Appendix M
12.2.2.1 Partial Closure	Appendix M
12.2.2.2 Closure During Operating Life	Appendix M
12.2.2.3 Closure After Landfill Reaches Permitted Capacity	Appendix M
12.2.2.4 Contact for Final Closure	Appendix M
12.3 Notification Procedures	Appendix M
12.4 Restricted Access Assurance	Appendix M
12.4.1 Deed Notation	Appendix M
12.4.2 Closure Cost Estimate and Financial Assurance	Appendix M

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Item	Where Addressed
12.4.3 Closure System Design	Appendix M
12.4.3.1 General	Appendix M
12.4.3.2 Cover System Design	Appendix M Section 3.3, and Drawing 10
12.4.3.3 Final Closure Plan	Appendix M
12.4.3.4 Design of Key System for the Cap	Appendix N
12.4.3.5 Slope Stability Analysis	Appendix N.1
12.4.3.6 Barrier Layer Integrity	Appendix N.2
12.4.3.7 QA/QC for Cover System Materials	Appendix J
12.4.3.8 QA/QC for Cover System Inspection	Appendix M
12.4.3.9 Final Cover Availability and Suitability	Ph. III Section 8
12.4.3.10 Construction Quality Assurance/Quality Control	Appendix M
12.4.3.11 Vegetation	Ph. III Section 17
12.4.3.11.1 Temporary Seeding	Ph. III Section 17.2
12.4.3.11.2 Permanent Seeding	Ph. III Section 17.3
12.4.3.11.3 Mulching	Ph. III Section 17.2.4, and 17.3.4
12.4.3.11.4 General	Ph. III Section 17.1
12.4.3.11.5 Certification of Closure	Appendix M
13. POST CLOSURE CARE	Ph. III Section 21, and Appendix M
13.1 General	Appendix M
13.2 Post Closure Care	Appendix M
13.3.1 Site Maintenance Plan	Appendix M
13.3.2 Post Closure Activity	Appendix M
13.3 Monitoring Plan	Appendix M
13.3.1 Surfacewater Management System	Appendix M
13.3.2 Groundwater Monitoring	Appendix M
13.3.3 Landfill Gas Management System	Appendix M
13.3.4 Leachate Collection System	Appendix M
13.3.5 Cover System	Appendix M
13.3.6 Inspection Plan	Appendix M
13.4 Post Closure Security	
13.4.1 Site Security	Appendix B
13.4.2 Entry Control	Appendix B

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Item	Where Addressed
13.4.3 Miscellaneous Items	Appendix M
13.5 Post Closure Maintenance Activities	Appendix M
13.5.1 Repair of Security Devices	Appendix M
13.5.2 Repair of Erosion or Cracking of Final Cover	Appendix M
13.5.3 Repair of Settlement Depressions	Appendix M
13.5.4 Repair of Run-On and Run Off Control Systems	Appendix M
13.5.5 Repair of Leachate Control Systems	Appendix M
13.5.6 Maintenance of Gas Venting Wells and Monitoring Probes	Appendix M
13.5.7 Maintenance of Groundwater Monitoring System	Appendix M
13.5.8 Post Closure Personnel Training	Appendix M
13.5.9 Post Closure Contact	Appendix M
13.5.10 Post Closure Site Use	Appendix M
13.5.11 Post Closure Cost Estimate and Financial Assurance	Appendix M

TABLE 2
SOIL BALANCE EVALUATION

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Soils	Clay (Cubic Yards)	Structural Fill (Cubic Yards)	Topsoil (Cubic Yards)
Calculate Available Soils			
To be Stripped from Subcells 9.1 and 9.2 Interim Cover Soils	0	0	1,000
Stockpiled from Subcell 9.3 Construction	233,000	369,000	14,000 ²
Anticipated Excavation for Subcell 9.4	253,000	578,000	0
Anticipated Excavation for Subcell 9.5	503,000	868,000	3,000
Calculate Required Soils For Cell 9 Construction			
Subgrade and Perimeter Berm Construction	0	104,000	6,000
Subcell 9.3 Liner Construction	38,000	0 ¹	0
Subcell 9.4 Liner Construction	38,000	0 ¹	0
Subcell 9.5 Liner Construction	58,000	0 ¹	0
Calculate Required Soils For Future Cell 9 Operations			
Operations Soil Needed for Traditional Closure	0	1,739,000 ³	0
Operations Soil Needed for ClosureTurf	0	1,783,000 ³	0
Calculate Required Soils For Cell 9 Closure			
Soil Needed for Traditional Closure	0	208,000	69,000
Soil Needed for ClosureTurf	0	0 ⁴	0 ⁴
Net Available Soils			
Net Available Soils (Traditional Closure)	855,000	-236,000	-57,000
Net Available Soils (ClosureTurf)	855,000	-72,000	12,000

Note:

- 1) Assume import material to be used for protective cover.
- 2) Value is taken from all the topsoil stripped during the excavation of Subcell 9.3. Value includes previously stockpiled material and topsoil stripped from select areas in Subcells 9.3 through 9.5.
- 3) Value presented considers the 357,000 cubic yards of soil that have been used as daily and intermediate cover in Subcells 9.1 and 9.2 from 2017 to the beginning of 2024.
- 4) The sand infill layer used in ClosureTurf will be import material to match the specifications provided by WatershedGeo (Appendix N.4). ClosureTurf does not require any additional cover soils.

APPENDIX A

Drawings

ANNE ARUNDEL COUNTY, MARYLAND
DEPARTMENT OF PUBLIC WORKS

APPLICATION FOR MUNICIPAL LANDFILL PERMIT: PHASE III REPORT

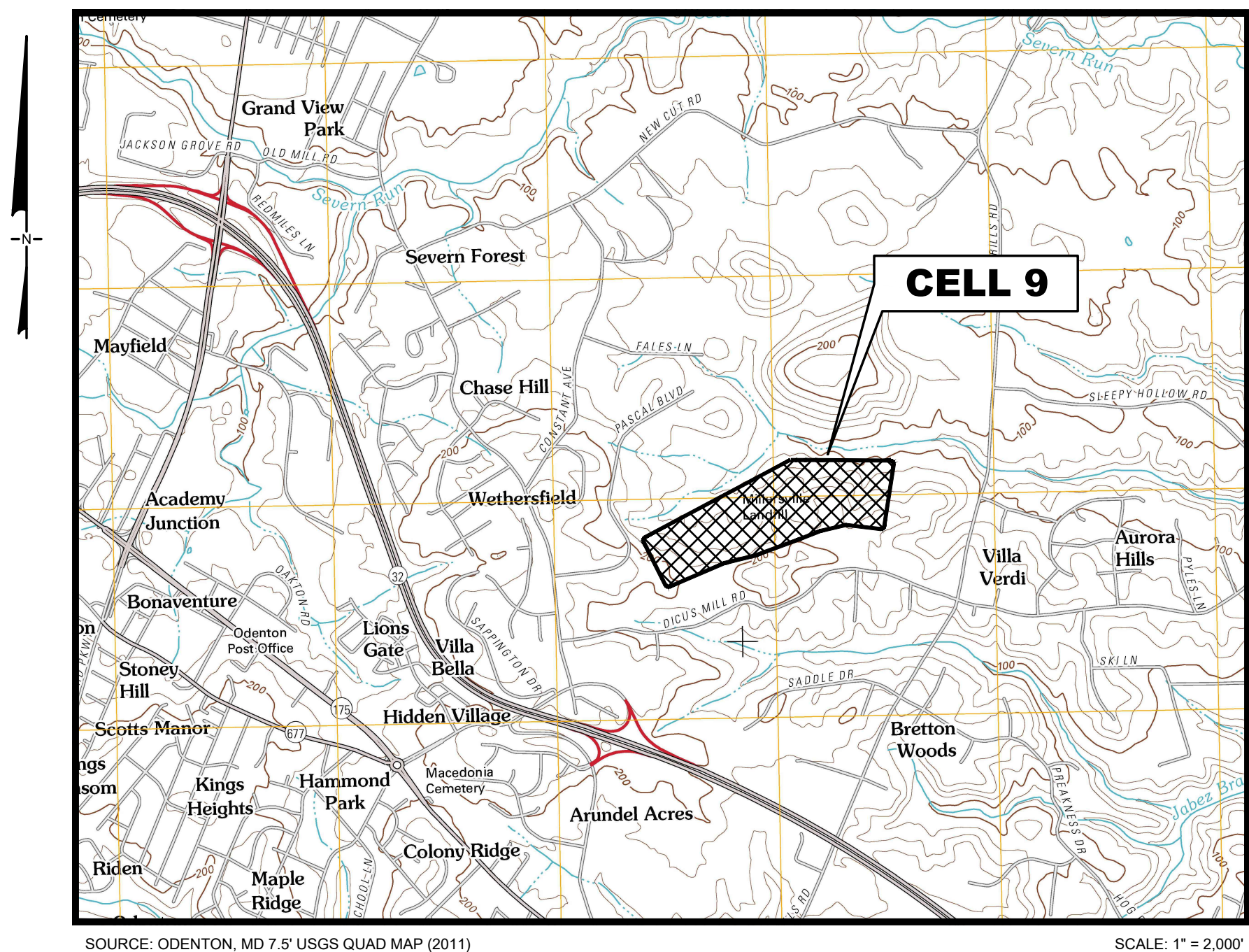
CELL 9 VERTICAL EXPANSION PROJECT

MILLERSVILLE LANDFILL AND
RESOURCE RECOVERY FACILITY

MARCH 2026

PROJECT NO. N561400

CONTRACT NO. N561401

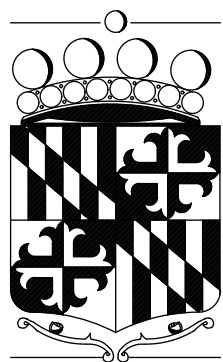


VICINITY MAP

SHEET LIST	
SHEET No.	SHEET TITLE
1	COVER SHEET
2	EXISTING CONDITIONS - MILLERSVILLE LANDFILL
3	EXISTING CONDITIONS - CELL 9
4	LINER AND LEACHATE MANAGEMENT SYSTEMS PLAN-CELL 9
5	LINER AND LEACHATE MANAGEMENT SYSTEMS-SUBCELL 9.1
6	LINER AND LEACHATE MANAGEMENT SYSTEMS-SUBCELL 9.2
7	LINER AND LEACHATE MANAGEMENT SYSTEMS-SUBCELL 9.3
8	LINER AND LEACHATE MANAGEMENT SYSTEMS-SUBCELL 9.4
9	LINER AND LEACHATE MANAGEMENT SYSTEMS-SUBCELL 9.5
10	FINAL COVER GRADING PLAN I
10A	FINAL COVER GRADING PLAN II
11	LANDFILL SECTIONS
12	LINER SYSTEM AND FINAL COVER DETAILS I
13	LINER SYSTEM AND FINAL COVER DETAILS II
14	LEACHATE SUMP AND RISER PLAN
15	LEACHATE SUMP AND RISER SECTIONS
16	LEACHATE COLLECTION VAULT AND GRAVITY MAIN DETAILS
17	EXISTING WET WELL, FORCEMAIN, AND METER MANHOLES
18	UNDERDRAIN SYSTEM-SUBCELLS 9.1, 9.2, AND 9.3
19	UNDERDRAIN SYSTEM-SUBCELL 9.4 AND 9.5
20	UNDERDRAIN DETAILS
21	STORMWATER MANAGEMENT PLAN
22	POND 9-2 PLAN - STORMWATER
23	POND 9-2 SECTION AND SPILLWAY RISER DETAILS
24	SPILLWAY RISER AND TRASH RACK DETAILS
25	STORMWATER MANAGEMENT SYSTEM DETAILS I
26	STORMWATER MANAGEMENT SYSTEM DETAILS II
27	CHANNEL AND FOREBAY PROFILE
28	LANDFILL GAS MANAGEMENT SYSTEM PLAN I
28A	LANDFILL GAS MANAGEMENT SYSTEM PLAN II
29	LANDFILL GAS MANAGEMENT SYSTEM DETAILS
30	ENVIRONMENTAL MONITORING PLAN

PREPARED FOR:

ANNE ARUNDEL COUNTY
DEPARTMENT OF PUBLIC WORKS
2662 RIVA ROAD
ANNAPOLIS, MARYLAND 21401
PHONE: (410) 222-7500

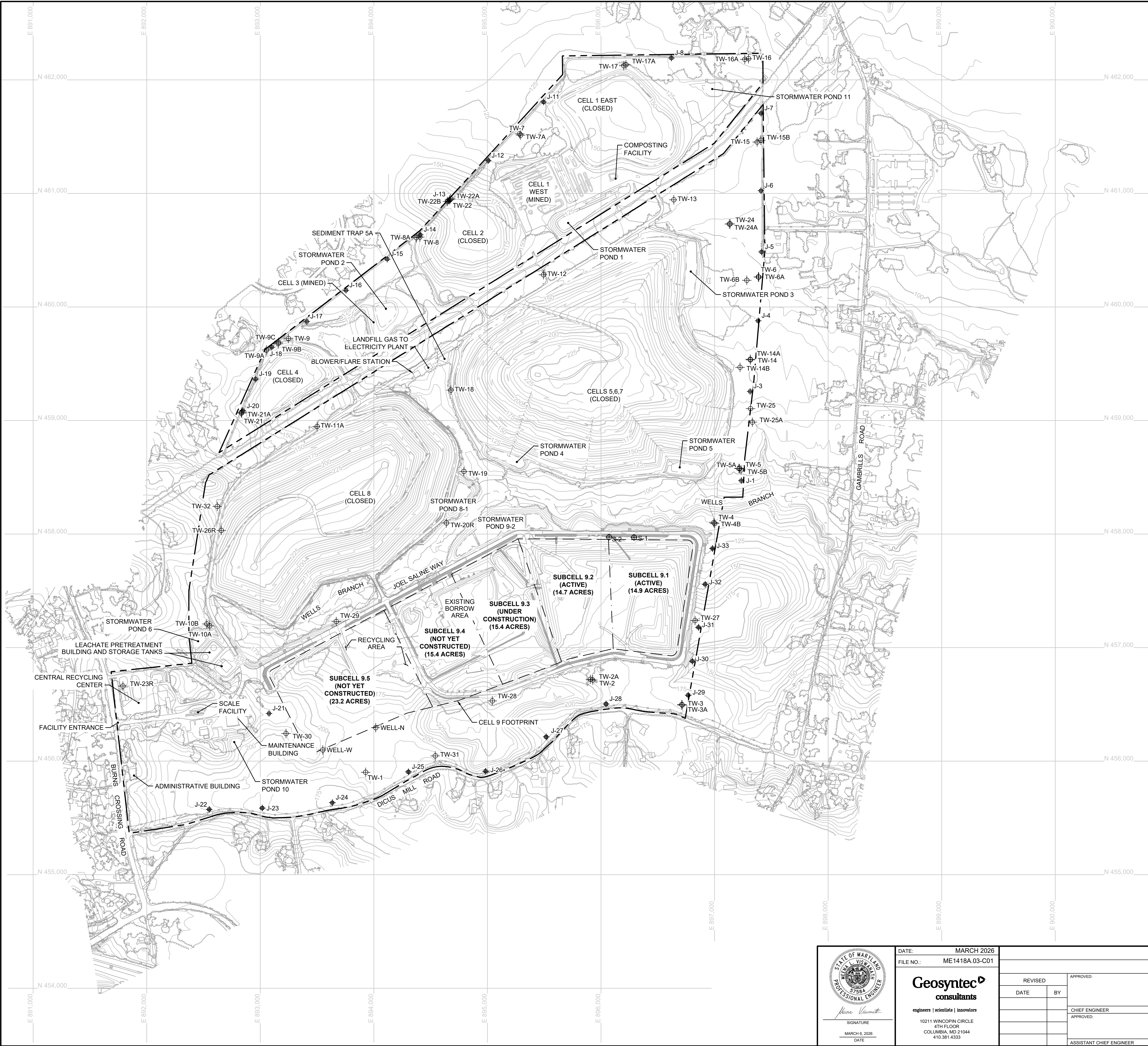


PREPARED BY:

GEOSYNTEC
CONSULTANTS
10211 WINCOPIN CIRCLE
4TH FLOOR
COLUMBIA, MD 21044
PHONE: (410) 381-4333



	DATE: MARCH 2026	ANNE ARUNDEL COUNTY				
	FILE NO.: ME1418A.03-G01	DEPARTMENT OF PUBLIC WORKS				
		REVISED	APPROVED:	DATE	APPROVED:	DATE
		DATE	BY			
		CHIEF ENGINEER	PROJECT MANAGER			
APPROVED:		APPROVED:	DATE	DATE		
	ASSISTANT CHIEF ENGINEER	CHIEF RIGHT-OF-WAY				
		SCALE:	NOTED	PROJECT: CELL 9 VERTICAL EXPANSION MILLERSVILLE LANDFILL AND RESOURCE RECOVERY FACILITY		
		DRAWN BY: BW/MJ	CHECKED BY: MV	TITLE: COVER SHEET		
		DRAWING NO.: 1 OF 30	PROJECT NO.: ME1418A			

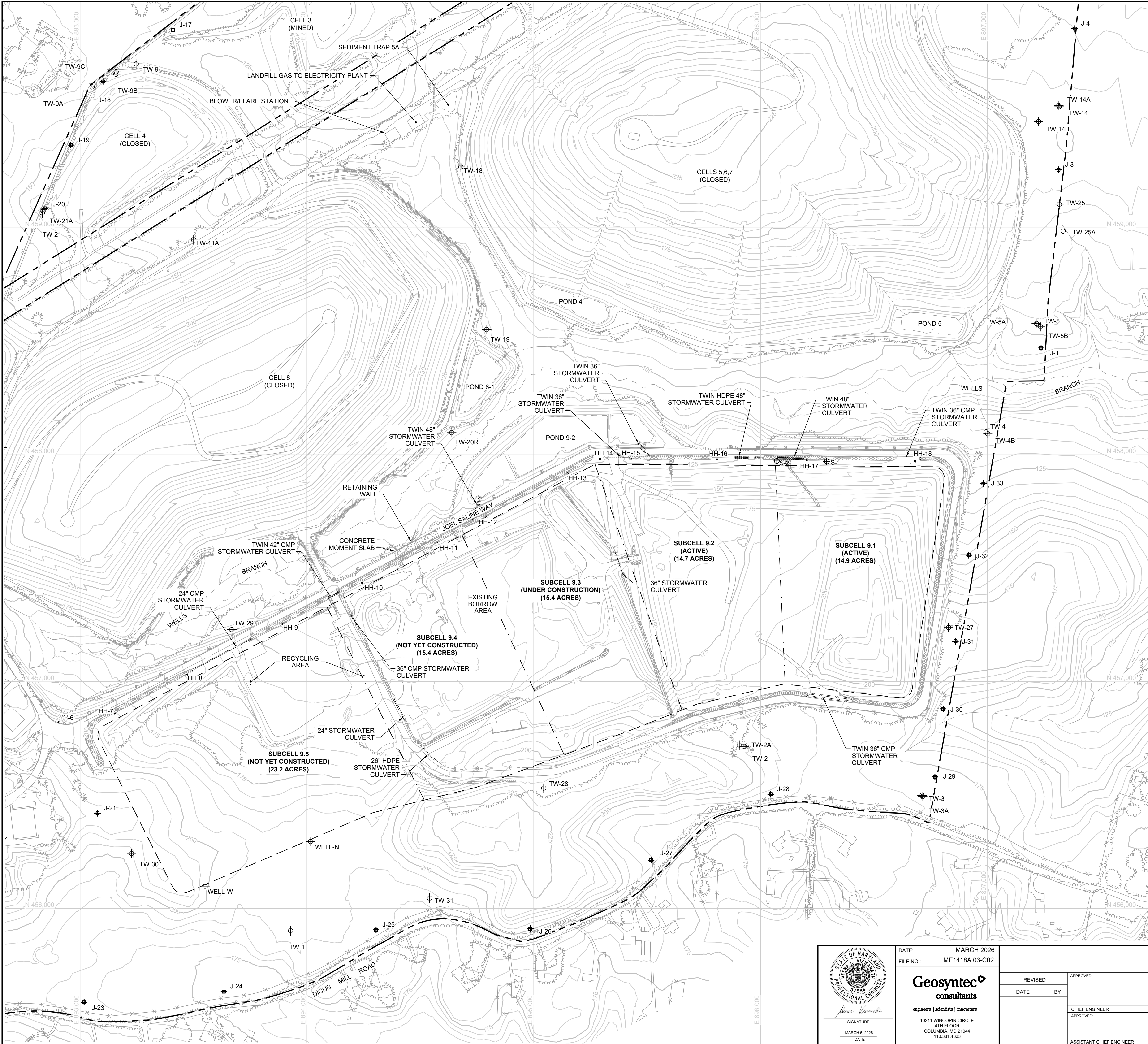


- LEGEND**
- PROPERTY BOUNDARY
 - EXISTING TOPOGRAPHY CONTOUR (FEET-MSL)
 - STRUCTURE / BUILDING
 - FENCE
 - PAVED DRIVE
 - GRAVEL DRIVE
 - TREELINE
 - STREAM / WATERLINE
 - GROUNDWATER MONITORING WELL
 - GAS PROBE
 - CELL 9 FOOTPRINT
 - SUBCELL BOUNDARY
 - LITTER FENCE
 - GUARDRAIL
 - SENTRY WELL

- GENERAL NOTES:
- GENERAL TOPOGRAPHIC MAP FROM AERIAL SURVEY CONDUCTED ON 2 JANUARY, 2024 BY BAI GROUP, LLC OF STATE COLLEGE, PENNSYLVANIA. ACTUAL FIELD CONDITIONS MAY VARY DUE TO ONGOING CONSTRUCTION AND OPERATIONS AT CELL 9, WHICH IS AN ACTIVE OPERATIONAL LANDFILL.
 - HORIZONTAL COORDINATES CORRESPOND TO THE MARYLAND NORTH AMERICAN DATUM OF 1927 (NAD27); VERTICAL DATUM IS THE 1929 NATIONAL GEODETIC VERTICAL DATUM (NGVD29).
 - THE EXISTING UTILITIES SHOWN WERE OBTAINED FROM THE BEST AVAILABLE RECORDS LISTED BELOW:
 - LEACHATE FORCEMAIN AND GRAVITY MAIN: SUBMITTAL 17-095R3 ENTITLED "CELL 9 FORCEMAIN & SUBCELLS 9.1 & 9.2 GRAVITY MAIN AS-BUILT DRAWINGS" BY ALLAN MYERS, INC. DATED 08 FEBRUARY 2017.
 - ELECTRICAL LINES: SUBMITTAL 17-094R2 ENTITLED "CELL 9 ELECTRIC DUCT BANK AS-BUILT DRAWINGS" BY ALLAN MYERS, INC. DATED 09 FEBRUARY 2017.
 - LANDFILL GAS HEADER: SUBMITTAL 17-093R3 ENTITLED "CELL 9 LANDFILL GAS HEADER AS-BUILT DRAWINGS" BY ALLAN MYERS, INC. DATED 09 FEBRUARY 2017.
 - LANDFILL GAS PROBES: SUBMITTAL 22-103 ENTITLED "LFG PROBE AS-BUILT DRAWING" BY ALLAN MYERS, INC. DATED 12 SEPTEMBER 2016.
 - MONITORING WELLS: CADD FILE ENTITLED "SITE MAP.DWG" FROM SCS ENGINEERING (NO DATE).
 - GAS PROBES: CADD FILE ENTITLED "012F004ABC-012E001ABC (Site Monitoring, LFG, Utilities Plans).dwg" FROM BALANCED ENVIRONMENTAL SOLUTIONS GROUP INC. DATED 12 JULY 2017.

 SIGNATURE MARCH 6, 2024 DATE	DATE: MARCH 2026 FILE NO.: ME1418A.03-C01	ANNE ARUNDEL COUNTY DEPARTMENT OF PUBLIC WORKS						
	 engineers scientists innovators 10211 WINCOPIN CIRCLE 4TH FLOOR COLUMBIA, MD 21044 410.381.4333	REVISED	APPROVED:	DATE	APPROVED:	DATE	SCALE: NOTED	PROJECT: CELL 9 VERTICAL EXPANSION MILLERSVILLE LANDFILL AND RESOURCE RECOVERY FACILITY
		DATE	BY					DRAWN BY: BW/MJ
				CHIEF ENGINEER	PROJECT MANAGER			CHECKED BY: MV
		APPROVED:	DATE	APPROVED:	DATE	DRAWING NO.: 2 OF 30	TITLE: EXISTING CONDITIONS - MILLERSVILLE LANDFILL	
		ASSISTANT CHIEF ENGINEER	CHIEF RIGHT-OF-WAY			PROJECT NO.: ME1418A		

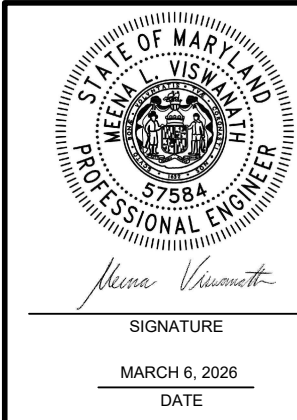
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LEGEND

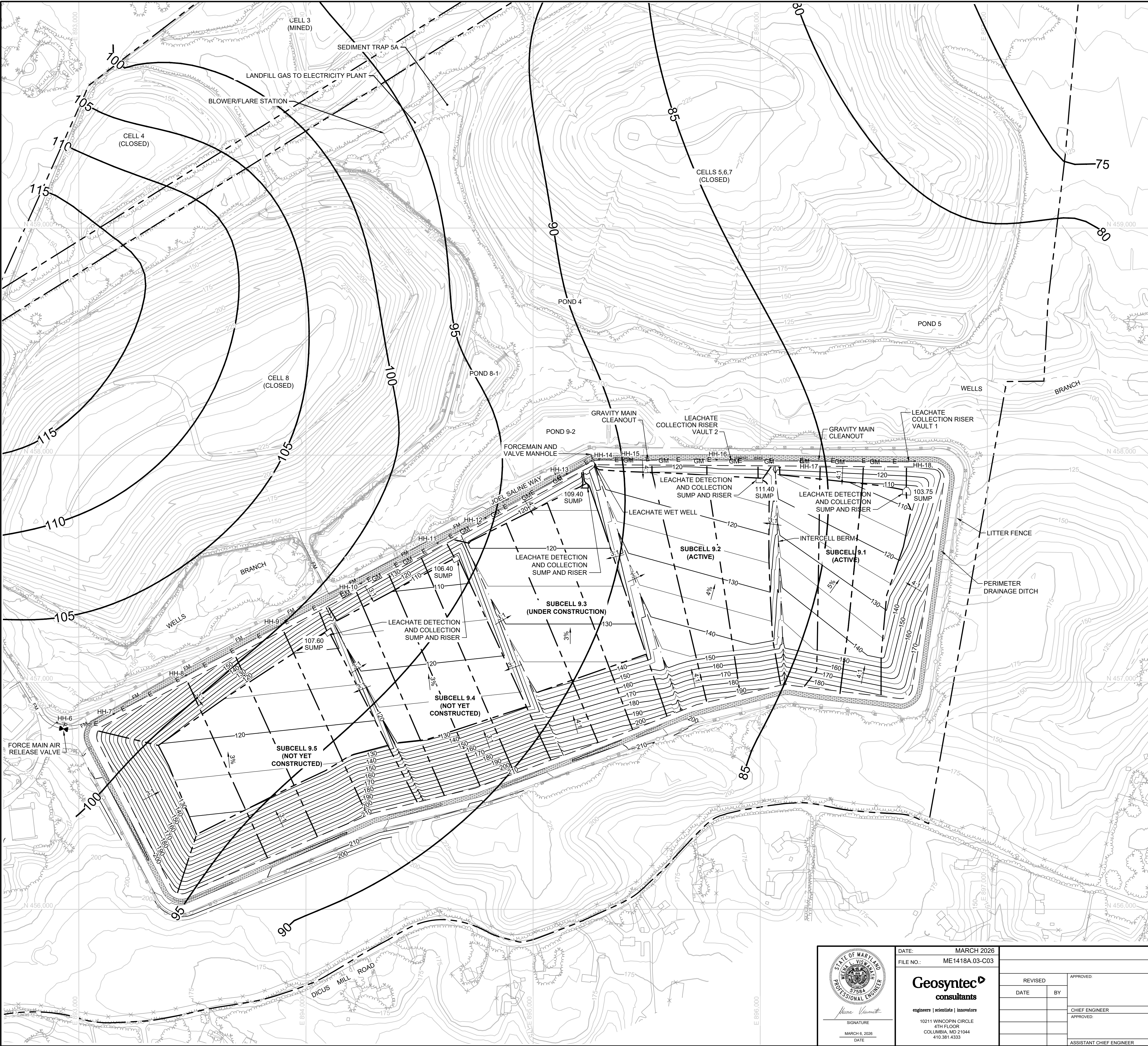
- PROPERTY BOUNDARY
- EXISTING TOPOGRAPHY CONTOUR (FEET-MSL)
- STRUCTURE / BUILDING
- FENCE
- PAVED DRIVE
- GRAVEL DRIVE
- TREELINE
- STREAM / WATERLINE
- GROUNDWATER MONITORING WELL
- GAS PROBE
- CELL 9 FOOTPRINT
- SUBCELL BOUNDARY
- LITTER FENCE
- GUARDRAIL
- ELECTRIC HANDHOLE
- STORMWATER CULVERT
- RIPRAP
- CONCRETE MOMENT SLAB
- SENTRY WELL

- NOTES:
- SEE DRAWING NO. 2 FOR GENERAL NOTES.

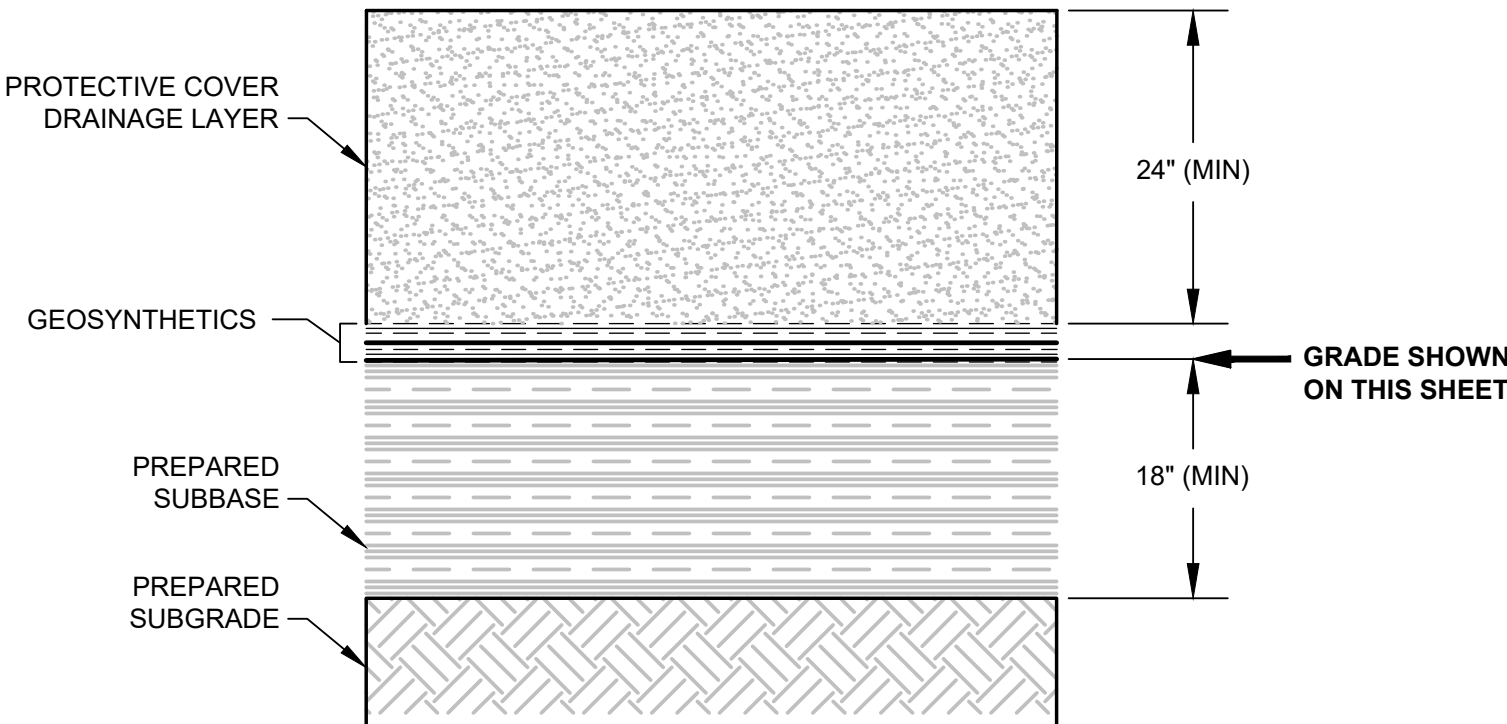


DATE: MARCH 2026
FILE NO.: ME1418A.03-C02
Geosyntec
consultants
engineers | scientists | innovators
1021 WINCOPIN CIRCLE
4TH FLOOR
COLUMBIA, MD 21044
410.381.4333

ANNE ARUNDEL COUNTY									
DEPARTMENT OF PUBLIC WORKS									
REVISED		APPROVED:		DATE		APPROVED:		DATE	
DATE	BY					SCALE:		NOTED	
						DRAWN BY:		BW/MJ	
						CHECKED BY:		MV	
		CHIEF ENGINEER		PROJECT MANAGER		DRAWING NO.: 3 OF 30		TITLE:	
		APPROVED:		DATE					
		ASSISTANT CHIEF ENGINEER		CHIEF RIGHT-OF-WAY					
						PROJECT NO.:		ME1418A	
								EXISTING CONDITIONS - CELL 9	

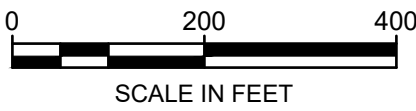


- LEGEND**
- PROPERTY BOUNDARY
 - EXISTING TOPOGRAPHY CONTOUR (FEET-MSL)
 - PROPOSED SUBBASE CONTOUR (FEET-MSL)
 - STRUCTURE / BUILDING
 - FENCE
 - PAVED DRIVE
 - GRAVEL DRIVE
 - TREELINE
 - STREAM / WATERLINE
 - STORMWATER CULVERT
 - RIPRAP
 - EXISTING CONCRETE MOMENT SLAB
 - CELL 9 FOOTPRINT
 - SUBCELL BOUNDARY
 - LITTER FENCE
 - GUARDRAIL
 - HH-15 □ ELECTRIC HANDHOLE
 - E --- ELECTRIC DUCT BANK (22" X 16")
 - FM --- LEACHATE FORCE MAIN (4" X 8" DUAL CONTAINMENT PIPE)
 - GM --- LEACHATE GRAVITY MAIN (8" X 12" DUAL CONTAINMENT PIPE)
 - LEACHATE COLLECTION PIPE
 - 80 --- GROUNDWATER CONTOUR



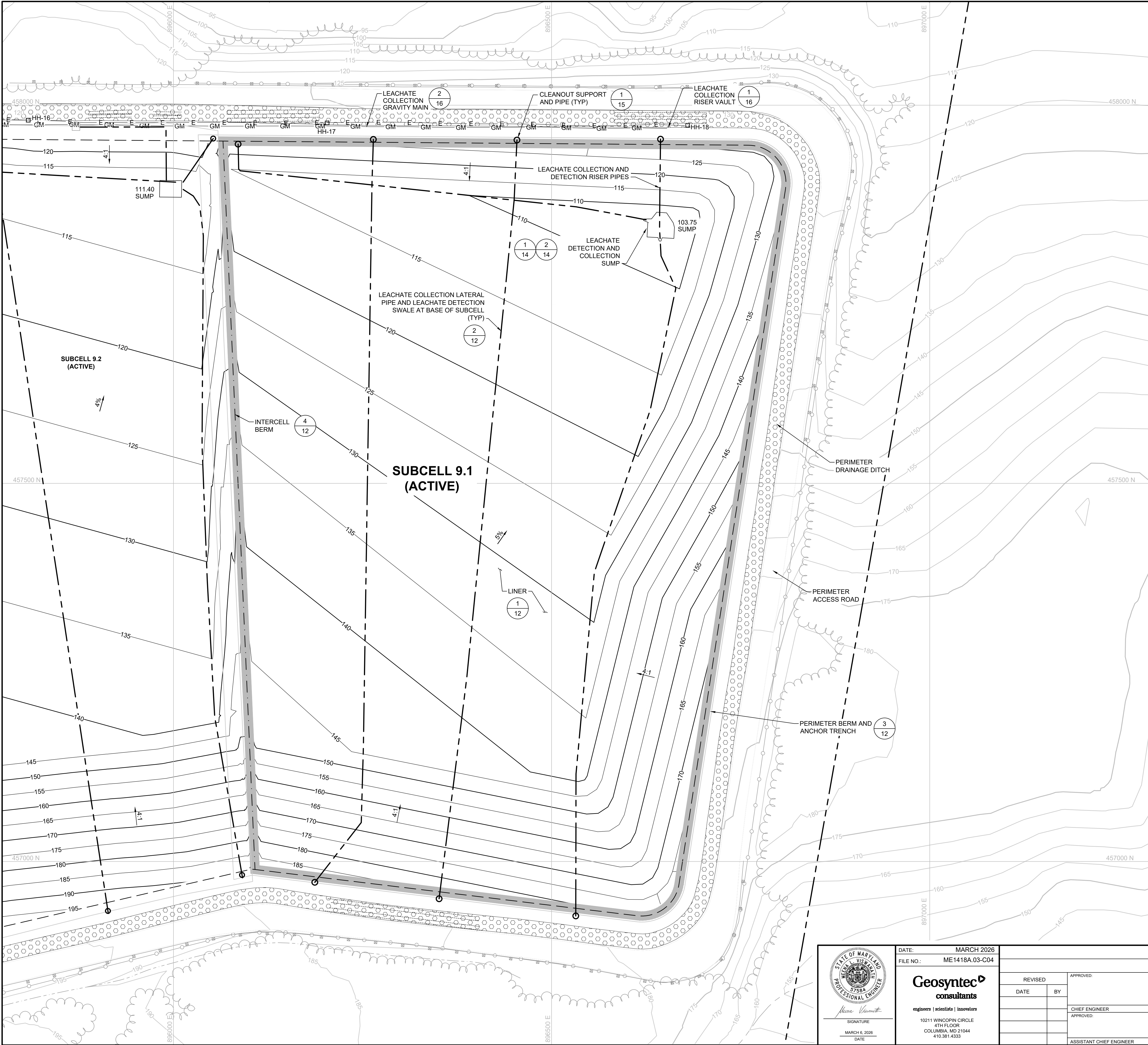
1 **DETAIL**
LINER SYSTEM, TYP.
SCALE: NTS

- NOTES:
- SEE SHEET 2 FOR GENERAL NOTES.
 - GROUNDWATER ELEVATIONS USED TO PRODUCE THE CONTOURS SHOWN ON THIS SHEET ARE THE HIGHEST RECORDED LEVEL FOR EACH INDIVIDUAL WELL OR PIEZOMETER MEASURED ON A MONTHLY BASIS FROM JANUARY 2022 THROUGH DECEMBER 2023.
 - GROUNDWATER DATA WAS RECEIVED FROM ANNE ARUNDEL COUNTY DEPARTMENT OF PUBLIC WORKS, BUREAU OF WASTE MANAGEMENT SERVICES.
 - INFRASTRUCTURE AND LINER GRADES SHOWN FOR SUBCELLS 9.1 AND 9.2 ARE AS-BUILT GRADES; INFRASTRUCTURE AND LINER GRADES SHOWN FOR SUBCELLS 9.3 THROUGH 9.5 ARE NOT YET CONSTRUCTED.

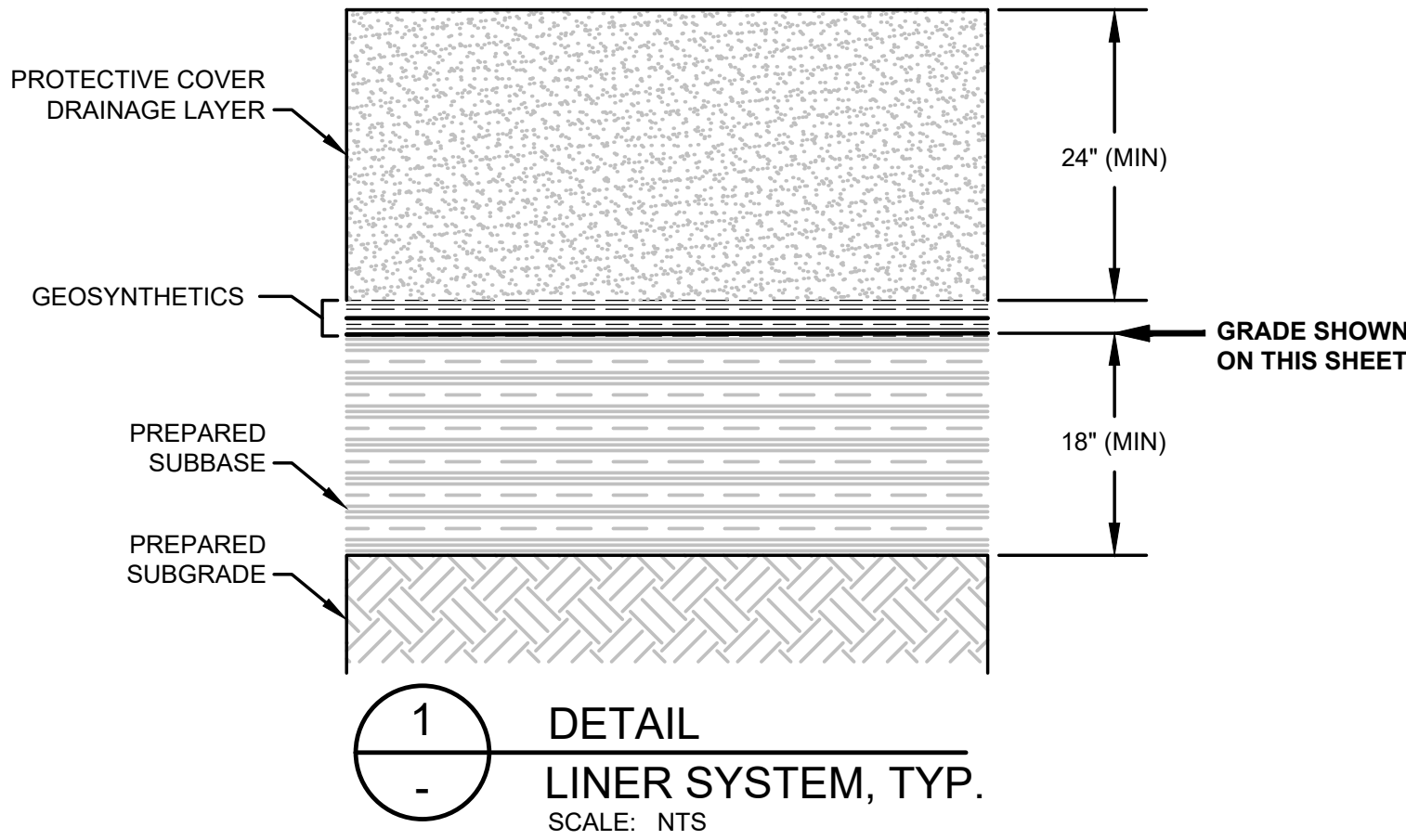


	DATE: MARCH 2026	ANNE ARUNDEL COUNTY				
	FILE NO.: ME1418A.03-C03	DEPARTMENT OF PUBLIC WORKS				
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	DATE	BY	CHIEF ENGINEER	PROJECT MANAGER	CHECKED BY:	DATE
	APPROVED:	DATE	APPROVED:	DATE	DRAWING NO.: 4 OF 30	PROJECT NO.: ME1418A
ASSISTANT CHIEF ENGINEER		CHIEF RIGHT-OF-WAY		PROJECT: CELL 9 VERTICAL EXPANSION MILLERSVILLE LANDFILL AND RESOURCE RECOVERY FACILITY		
				TITLE: LINER AND LEACHATE MANAGEMENT SYSTEMS PLAN-CELL 9		

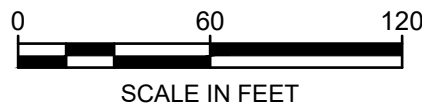
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- LEGEND**
- PROPERTY BOUNDARY
 - EXISTING TOPOGRAPHY CONTOUR (FEET-MSL)
 - PROPOSED SUBBASE CONTOUR (FEET-MSL)
 - STRUCTURE / BUILDING
 - FENCE
 - PAVED DRIVE
 - GRAVEL DRIVE
 - TREELINE
 - STREAM / WATERLINE
 - STORMWATER CULVERT
 - RIPRAP
 - CELL 9 FOOTPRINT
 - SUBCELL BOUNDARY
 - LITTER FENCE
 - GUARDRAIL
 - HH-15 □ ELECTRIC HANDHOLE
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 - FM LEACHATE FORCE MAIN (4" X 8" DUAL CONTAINMENT PIPE)
 - GM LEACHATE GRAVITY MAIN (8" X 12" DUAL CONTAINMENT PIPE)
 - LEACHATE COLLECTION PIPE
 - LIMIT OF SUBCELL LINER

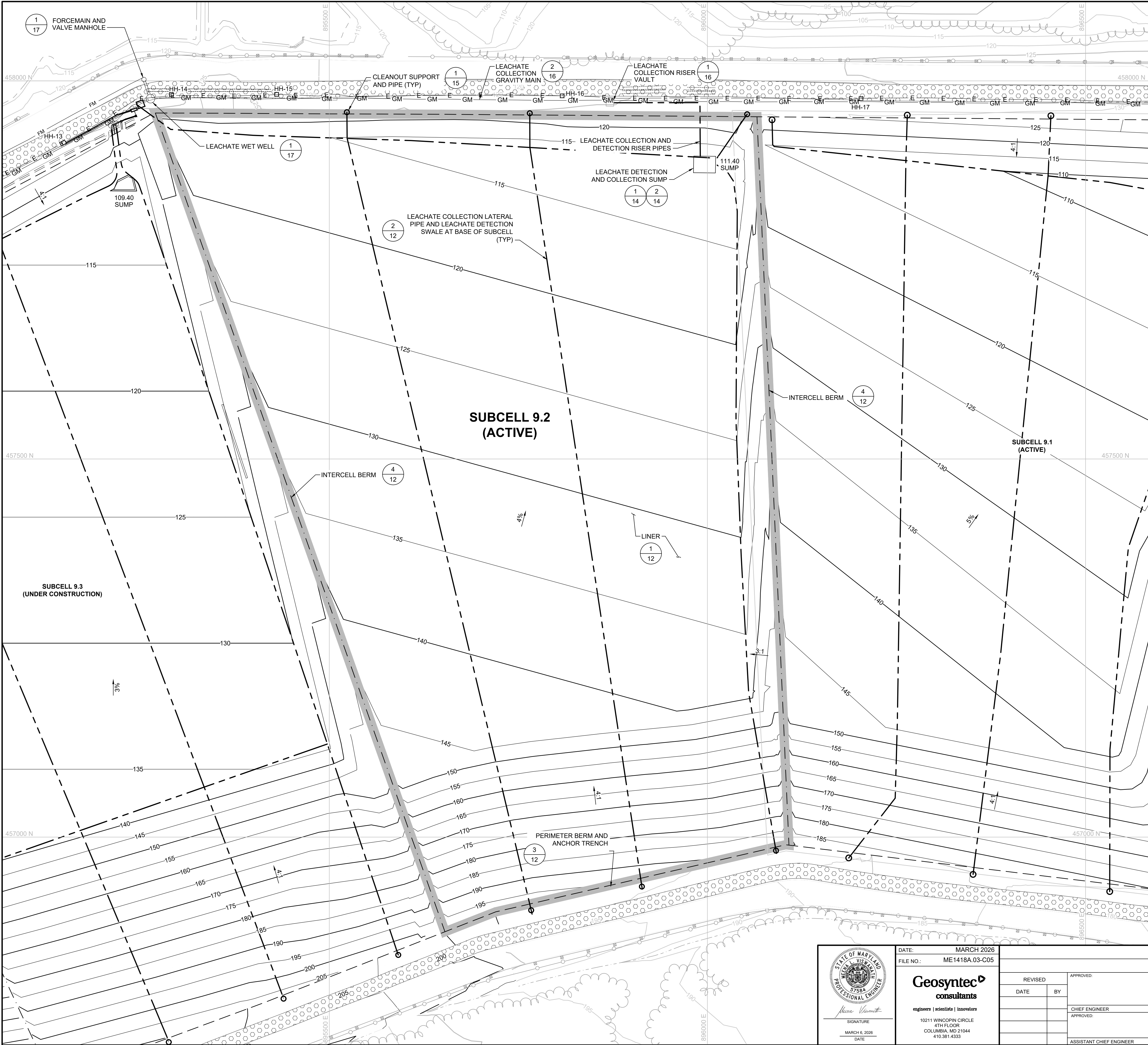


- NOTES:**
- SEE DRAWING NO. 2 FOR GENERAL NOTES.
 - INFRASTRUCTURE AND LINER GRADES SHOWN FOR SUBCELLS 9.1 AND 9.2 ARE AS-BUILT GRADES; INFRASTRUCTURE AND LINER GRADES SHOWN FOR SUBCELLS 9.3 THROUGH 9.5 ARE NOT YET CONSTRUCTED.
 - CLEANOUTS SHALL BE ADDED ALONG THE GRAVITY MAIN IF THE DISTANCE BETWEEN LEACHATE COLLECTION RISER VAULTS EXCEEDS 800 FEET.

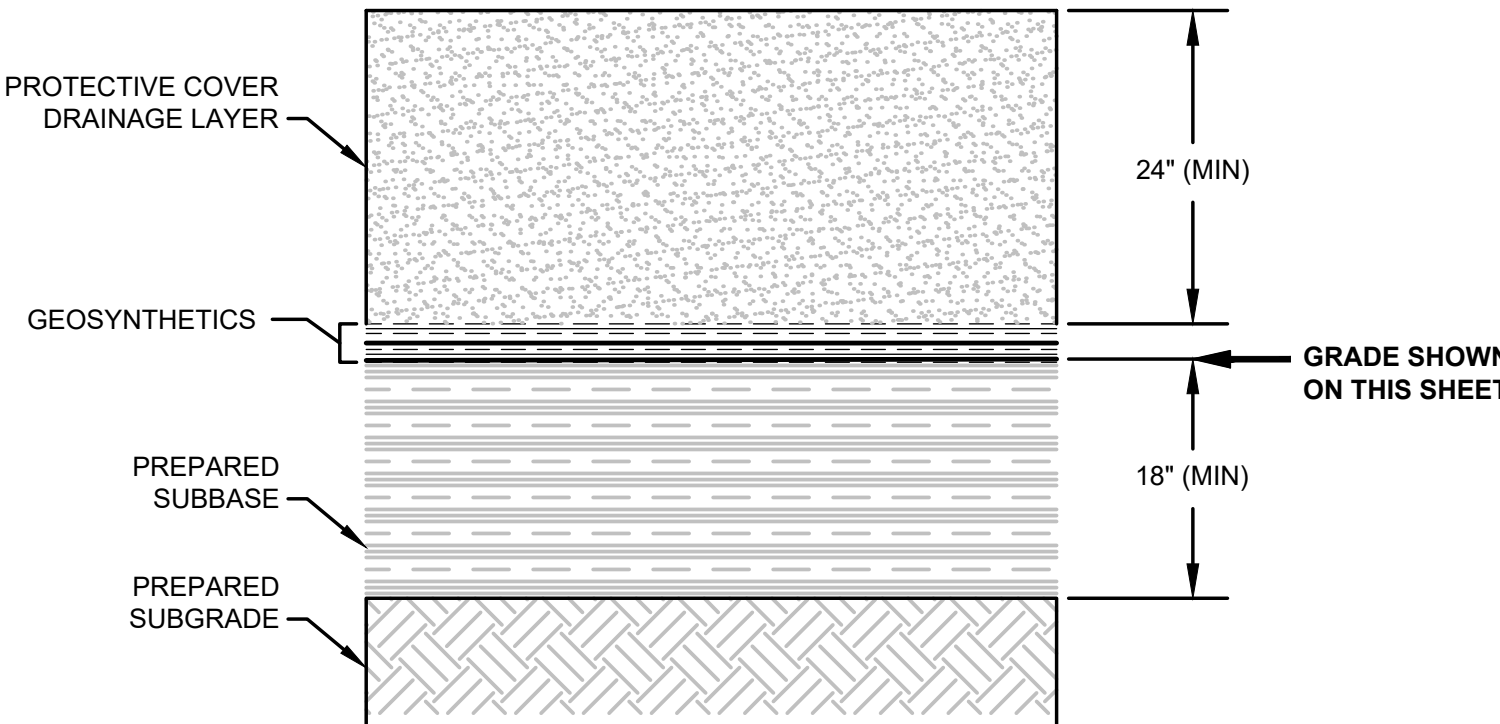


	DATE: MARCH 2026	ANNE ARUNDEL COUNTY				
	FILE NO.: ME1418A.03-C04	DEPARTMENT OF PUBLIC WORKS				
	Geosyntec consultants	REVISED	APPROVED:	DATE	APPROVED:	DATE
	engineers scientists innovators	DATE	BY			
	10211 WINCOPIN CIRCLE 4TH FLOOR COLUMBIA, MD 21044 410.381.4333		CHIEF ENGINEER	PROJECT MANAGER		
		APPROVED:	DATE	APPROVED:	DATE	
		ASSISTANT CHIEF ENGINEER	CHIEF RIGHT-OF-WAY			

SCALE: NOTED	PROJECT: CELL 9 VERTICAL EXPANSION MILLERSVILLE LANDFILL AND RESOURCE RECOVERY FACILITY
DRAWN BY: BW/MJ	
CHECKED BY: MV	
DRAWING NO.: 5 OF 30	TITLE: LINER AND LEACHATE MANAGEMENT SYSTEMS-SUBCELL 9.1
PROJECT NO.: ME1418A	

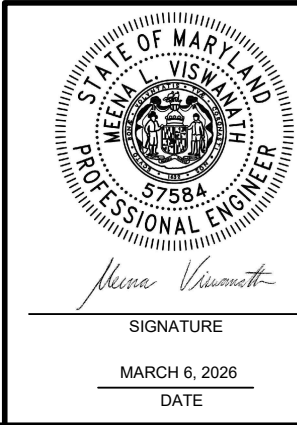


- LEGEND**
- PROPERTY BOUNDARY
 - EXISTING TOPOGRAPHY CONTOUR (FEET-MSL)
 - PROPOSED SUBBASE CONTOUR (FEET-MSL)
 - STRUCTURE / BUILDING
 - FENCE
 - PAVED DRIVE
 - GRAVEL DRIVE
 - TREELINE
 - STREAM / WATERLINE
 - STORMWATER CULVERT
 - RIPRAP
 - CELL 9 FOOTPRINT
 - SUBCELL BOUNDARY
 - LITTER FENCE
 - GUARDRAIL
 - HH-15 □ ELECTRIC HANDHOLE
 - E ELECTRIC DUCT BANK (22" X 16")
 - FM LEACHATE FORCE MAIN (4" X 8" DUAL CONTAINMENT PIPE)
 - GM LEACHATE GRAVITY MAIN (8" X 12" DUAL CONTAINMENT PIPE)
 - LEACHATE COLLECTION PIPE
 - LIMIT OF SUBCELL LINER



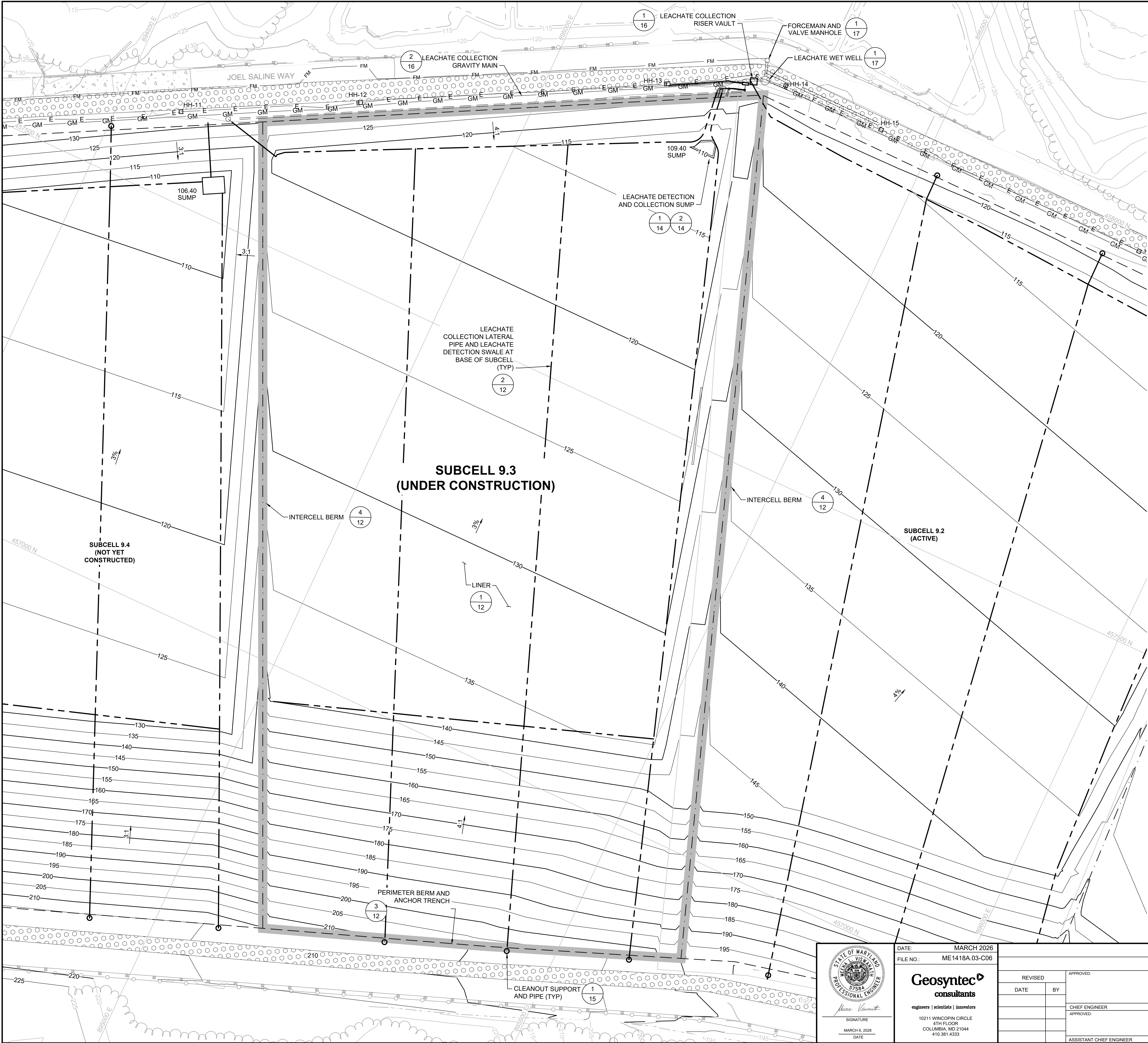
1
-
DETAIL
LINER SYSTEM, TYP.
SCALE: NTS

- NOTES:
- SEE DRAWING NO. 2 FOR GENERAL NOTES.
 - INFRASTRUCTURE AND LINER GRADES SHOWN FOR SUBCELLS 9.1 AND 9.2 ARE AS-BUILT GRADES; INFRASTRUCTURE AND LINER GRADES SHOWN FOR SUBCELLS 9.3 THROUGH 9.5 ARE NOT YET CONSTRUCTED.
 - CLEANOUTS SHALL BE ADDED ALONG THE GRAVITY MAIN IF THE DISTANCE BETWEEN LEACHATE COLLECTION RISER VAULTS EXCEEDS 800 FEET.

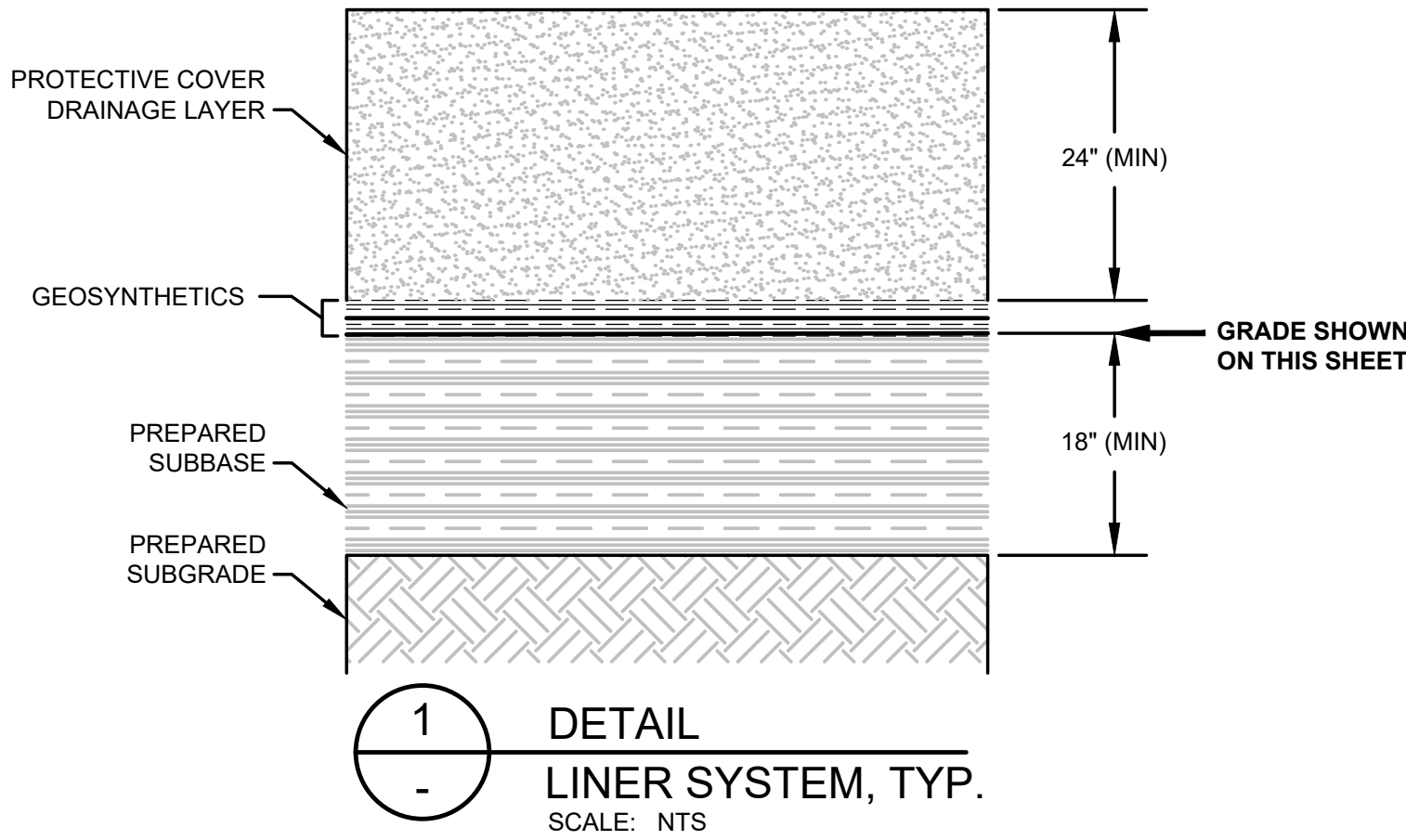


DATE: MARCH 2026
FILE NO.: ME1418A.03-C05
Geosyntec
consultants
engineers | scientists | innovators
10211 WINCOPIN CIRCLE
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COLUMBIA, MD 21044
410.381.4333

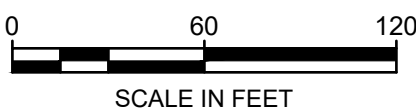
ANNE ARUNDEL COUNTY											
DEPARTMENT OF PUBLIC WORKS											
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DATE		BY				SCALE:		NOTED			
						DRAWN BY:		BW/MJ			
						CHECKED BY:		MV			
		CHIEF ENGINEER		PROJECT MANAGER				PROJECT: CELL 9 VERTICAL EXPANSION MILLERSVILLE LANDFILL AND RESOURCE RECOVERY FACILITY			
		APPROVED:		DATE		APPROVED:				DATE	
						DRAWING NO.:				6 OF 30	
						PROJECT NO.:				ME1418A	
		ASSISTANT CHIEF ENGINEER		CHIEF RIGHT-OF-WAY				TITLE: LINER AND LEACHATE MANAGEMENT SYSTEMS-SUBCELL 9.2			



- LEGEND**
- PROPERTY BOUNDARY
 - EXISTING TOPOGRAPHY CONTOUR (FEET-MSL)
 - PROPOSED SUBBASE CONTOUR (FEET-MSL)
 - STRUCTURE / BUILDING
 - FENCE
 - PAVED DRIVE
 - GRAVEL DRIVE
 - TREELINE
 - STREAM / WATERLINE
 - STORMWATER CULVERT
 - RIPRAP
 - CELL 9 FOOTPRINT
 - SUBCELL BOUNDARY
 - LITTER FENCE
 - GUARDRAIL
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 - ELECTRIC HANDHOLE
 - E
 - ELECTRIC DUCT BANK (22" X 16")
 - FM
 - LEACHATE FORCE MAIN (4" X 8" DUAL CONTAINMENT PIPE)
 - GM
 - LEACHATE GRAVITY MAIN (8" X 12" DUAL CONTAINMENT PIPE)
 - LEACHATE COLLECTION PIPE
 - LIMIT OF SUBCELL LINER
 - CONCRETE MOMENT SLAB



- NOTES:**
- SEE DRAWING NO. 2 FOR GENERAL NOTES.
 - INFRASTRUCTURE AND LINER GRADES SHOWN FOR SUBCELLS 9.1 AND 9.2 ARE AS-BUILT GRADES; INFRASTRUCTURE AND LINER GRADES SHOWN FOR SUBCELLS 9.3 THROUGH 9.5 ARE NOT YET CONSTRUCTED.
 - CLEANOUTS SHALL BE ADDED ALONG THE GRAVITY MAIN IF THE DISTANCE BETWEEN LEACHATE COLLECTION RISER VAULTS EXCEEDS 800 FEET.



STATE OF MARYLAND
DEPARTMENT OF PUBLIC WORKS
PROFESSIONAL ENGINEER
No. 57554
Name: Vincent

DATE: MARCH 2026
FILE NO.: ME1418A.03-C06

Geosyntec
consultants

engineers | scientists | innovators

10211 WINCOPIN CIRCLE
4TH FLOOR
COLUMBIA, MD 21044
410.381.4333

REVISED		APPROVED	DATE	APPROVED	DATE
DATE	BY				
		CHIEF ENGINEER		PROJECT MANAGER	
		APPROVED	DATE	APPROVED	DATE
		ASSISTANT CHIEF ENGINEER		CHIEF RIGHT-OF-WAY	

ANNE ARUNDEL COUNTY
DEPARTMENT OF PUBLIC WORKS

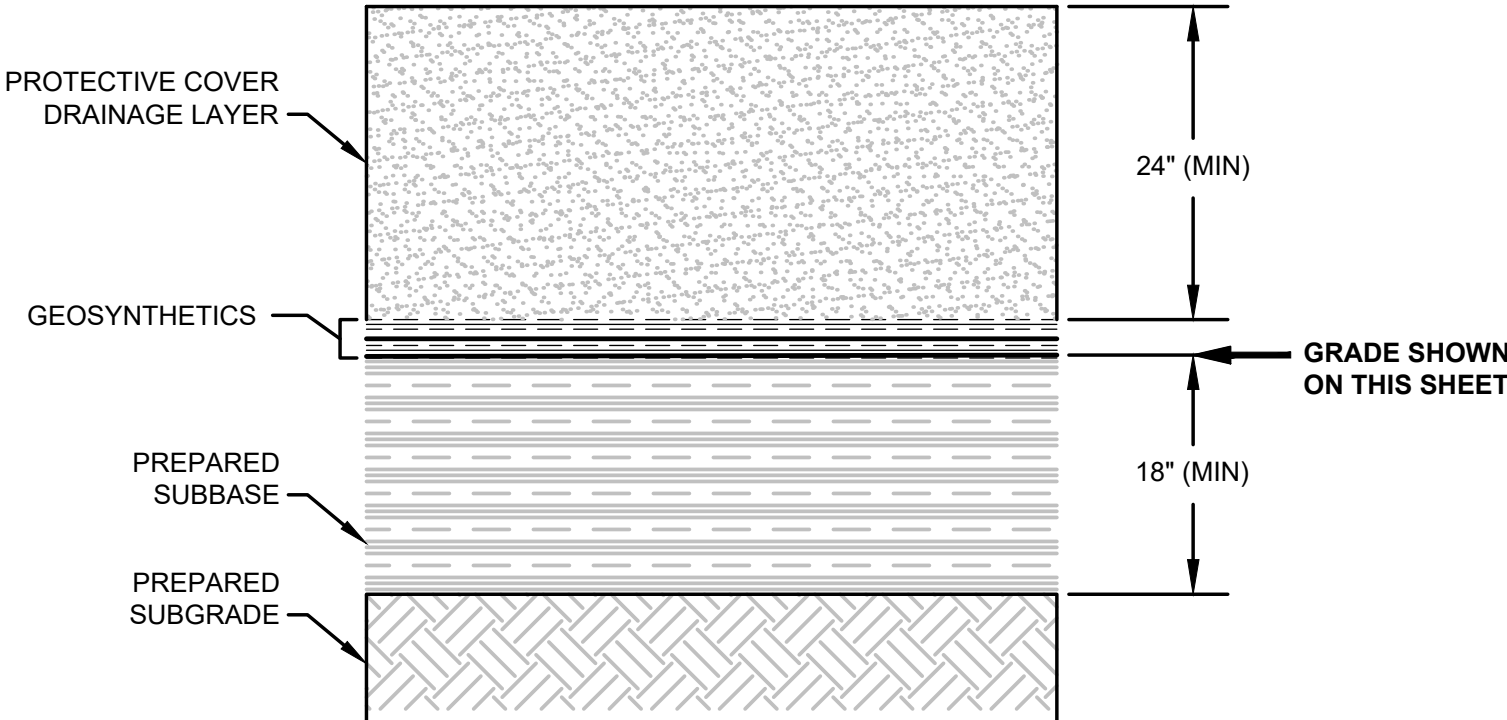
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CHECKED BY: MV
DRAWING NO.: 7 OF 30
PROJECT NO.: ME1418A

PROJECT: CELL 9 VERTICAL EXPANSION
MILLERSVILLE LANDFILL AND
RESOURCE RECOVERY FACILITY
TITLE: LINER AND LEACHATE MANAGEMENT
SYSTEMS-SUBCELL 9.3



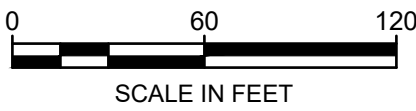
LEGEND

- PROPERTY BOUNDARY
- EXISTING TOPOGRAPHY CONTOUR (FEET-MSL)
- PROPOSED SUBBASE CONTOUR (FEET-MSL)
- STRUCTURE / BUILDING
- FENCE
- PAVED DRIVE
- GRAVEL DRIVE
- TREELINE
- STREAM / WATERLINE
- STORMWATER CULVERT
- RIPRAP
- CELL 9 FOOTPRINT
- SUBCELL BOUNDARY
- LITTER FENCE
- GUARDRAIL
- HH-15
- ELECTRIC HANDHOLE
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- ELECTRIC DUCT BANK (22" X 16")
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- LEACHATE FORCE MAIN (4" X 8" DUAL CONTAINMENT PIPE)
- GM
- LEACHATE GRAVITY MAIN (8" X 12" DUAL CONTAINMENT PIPE)
- LEACHATE COLLECTION PIPE
- LIMIT OF SUBCELL LINER
- CONCRETE MOMENT SLAB



1
-
DETAIL
LINER SYSTEM, TYP.
SCALE: NTS

- NOTES:
- SEE DRAWING NO. 2 FOR GENERAL NOTES.
 - INFRASTRUCTURE AND LINER GRADES SHOWN FOR SUBCELLS 9.1 AND 9.2 ARE AS-BUILT GRADES; INFRASTRUCTURE AND LINER GRADES SHOWN FOR SUBCELLS 9.3 THROUGH 9.5 ARE NOT YET CONSTRUCTED.
 - CLEANOUTS SHALL BE ADDED ALONG THE GRAVITY MAIN IF THE DISTANCE BETWEEN LEACHATE COLLECTION RISER VAULTS EXCEEDS 800 FEET.





SIGNATURE
MARCH 6, 2026
DATE

DATE: MARCH 2026
FILE NO.: ME1418A.03-C07

Geosyntec
consultants

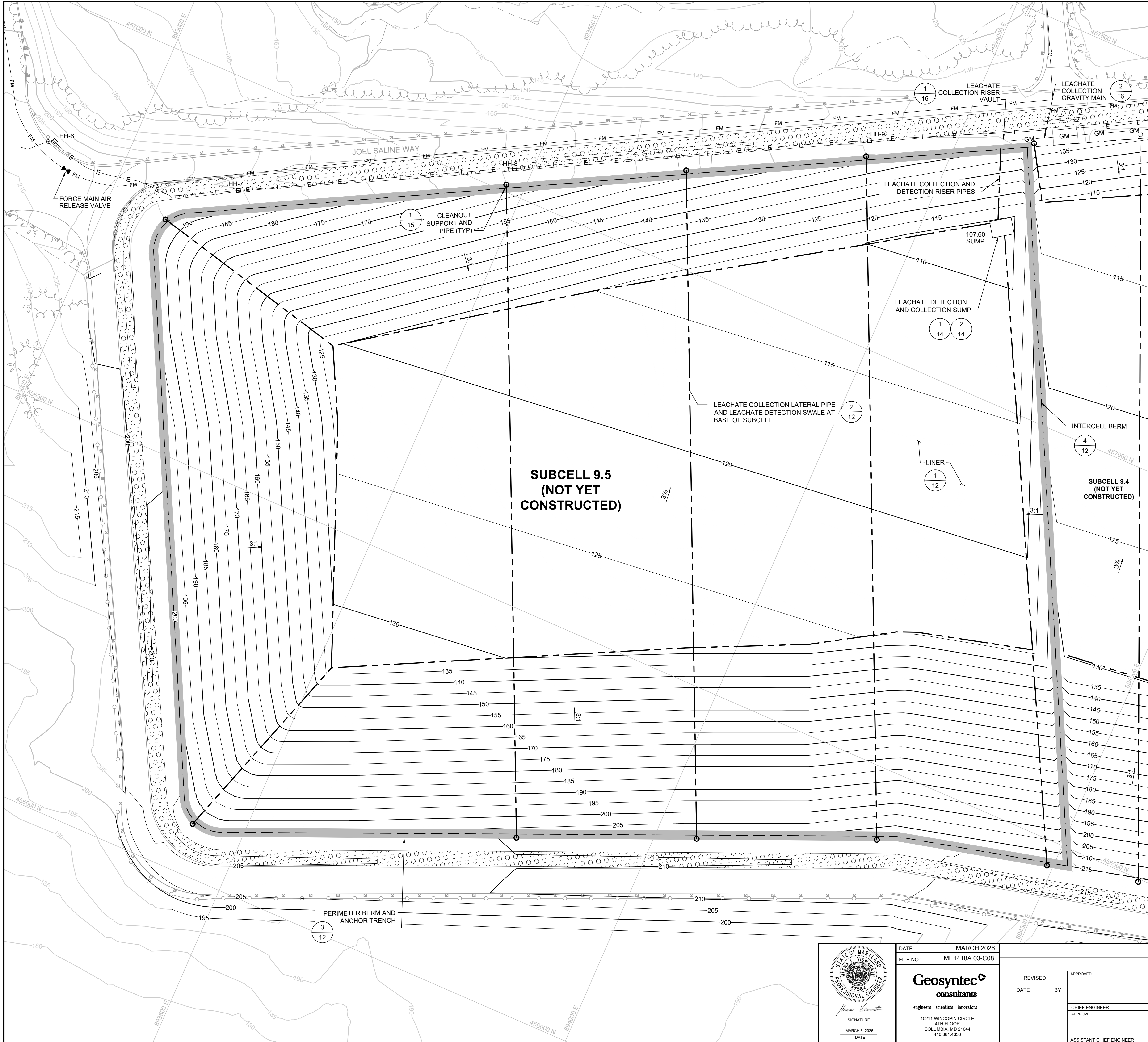
engineers | scientists | innovators

10211 WINCOPIN CIRCLE
4TH FLOOR
COLUMBIA, MD 21044
410.381.4333

ANNE ARUNDEL COUNTY DEPARTMENT OF PUBLIC WORKS			
REVISED	APPROVED:	DATE	APPROVED:
DATE	BY		
	CHIEF ENGINEER	PROJECT MANAGER	
	APPROVED:	APPROVED:	
	ASSISTANT CHIEF ENGINEER	CHIEF RIGHT-OF-WAY	

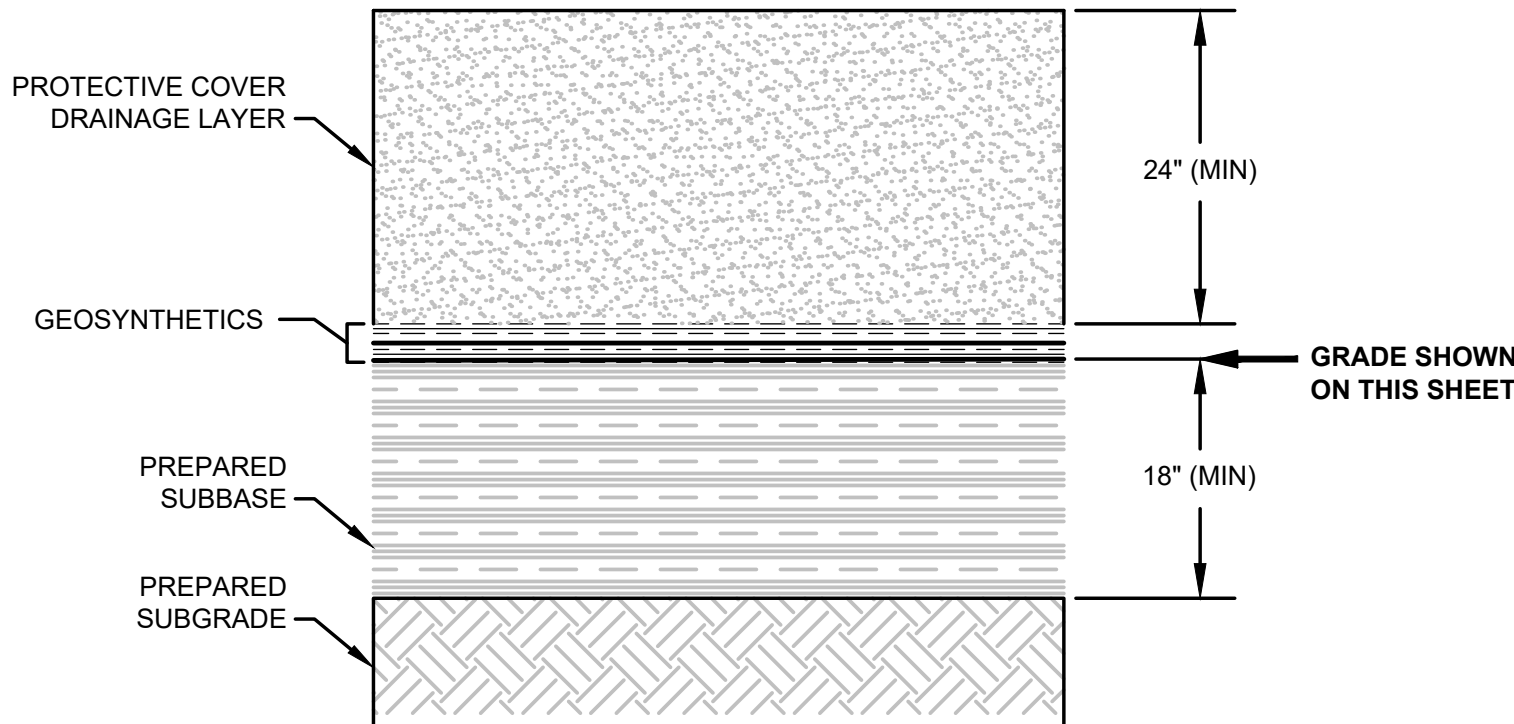
SCALE: NOTED	PROJECT: CELL 9 VERTICAL EXPANSION MILLERSVILLE LANDFILL AND RESOURCE RECOVERY FACILITY
DRAWN BY: BW/MJ	
CHECKED BY: MV	
DRAWING NO.: 8 OF 30	TITLE: LINER AND LEACHATE MANAGEMENT SYSTEMS-SUBCELL 9.4
PROJECT NO.: ME1418A	

5-Mar-26 5:37 PM
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LEGEND

- PROPERTY BOUNDARY
- EXISTING TOPOGRAPHY CONTOUR (FEET-MSL)
- PROPOSED SUBBASE CONTOUR (FEET-MSL)
- STRUCTURE / BUILDING
- FENCE
- PAVED DRIVE
- GRAVEL DRIVE
- TREELINE
- STREAM / WATERLINE
- STORMWATER CULVERT
- RIPRAP
- CELL 9 FOOTPRINT
- SUBCELL BOUNDARY
- LITTER FENCE
- GUARDRAIL
- HH-15 □ ELECTRIC HANDHOLE
- E ELECTRIC DUCT BANK (22" X 16")
- FM LEACHATE FORCE MAIN (4" X 8" DUAL CONTAINMENT PIPE)
- GM LEACHATE GRAVITY MAIN (8" X 12" DUAL CONTAINMENT PIPE)
- LEACHATE COLLECTION PIPE
- LIMIT OF SUBCELL LINER

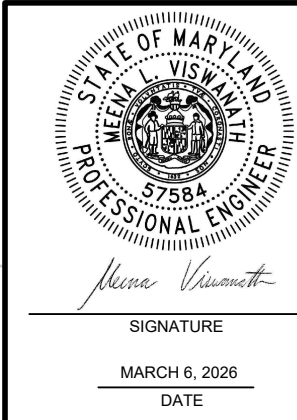


1
-
DETAIL
LINER SYSTEM, TYP.
SCALE: NTS

NOTES:

- SEE DRAWING NO. 2 FOR GENERAL NOTES.
- INFRASTRUCTURE AND LINER GRADES SHOWN FOR SUBCELLS 9.1 AND 9.2 ARE AS-BUILT GRADES; INFRASTRUCTURE AND LINER GRADES SHOWN FOR SUBCELLS 9.3 THROUGH 9.5 ARE NOT YET CONSTRUCTED.
- CLEANOUTS SHALL BE ADDED ALONG THE GRAVITY MAIN IF THE DISTANCE BETWEEN LEACHATE COLLECTION RISER VAULTS EXCEEDS 800 FEET.

0 60 120
SCALE IN FEET



DATE: MARCH 2026
FILE NO.: ME1418A.03-C08
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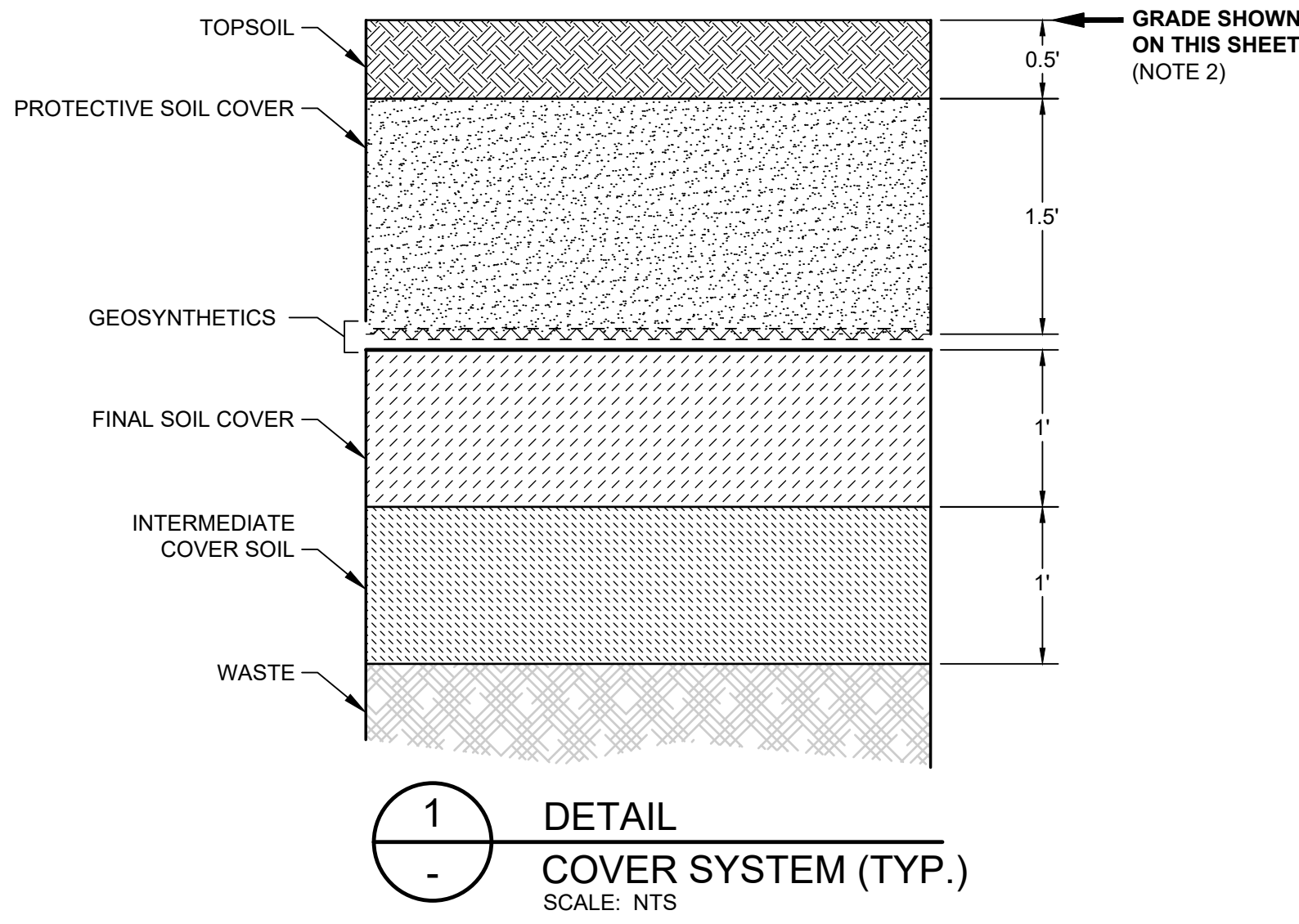
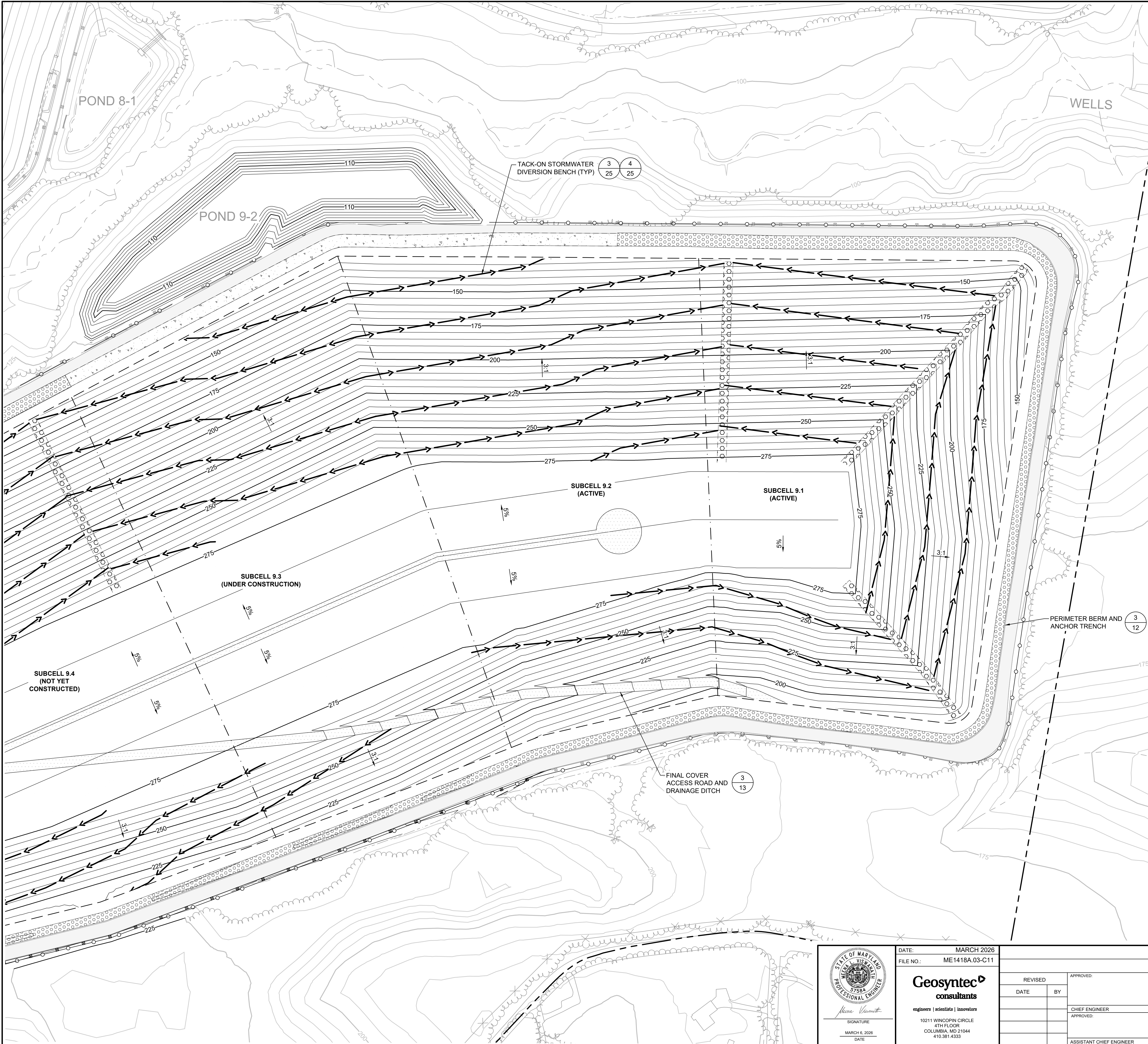
REVISED		APPROVED:	DATE	APPROVED:	DATE
DATE	BY				
		CHIEF ENGINEER		PROJECT MANAGER	
		APPROVED:	DATE	APPROVED:	DATE
		ASSISTANT CHIEF ENGINEER		CHIEF RIGHT-OF-WAY	

ANNE ARUNDEL COUNTY DEPARTMENT OF PUBLIC WORKS

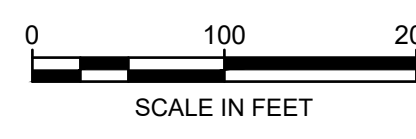
SCALE: NOTED
DRAWN BY: BW/MJ
CHECKED BY: MV
DRAWING NO.: 9 OF 30
PROJECT NO.: ME1418A

PROJECT: CELL 9 VERTICAL EXPANSION
MILLERSVILLE LANDFILL AND
RESOURCE RECOVERY FACILITY
TITLE: LINER AND LEACHATE MANAGEMENT
SYSTEMS-SUBCELL 9.5

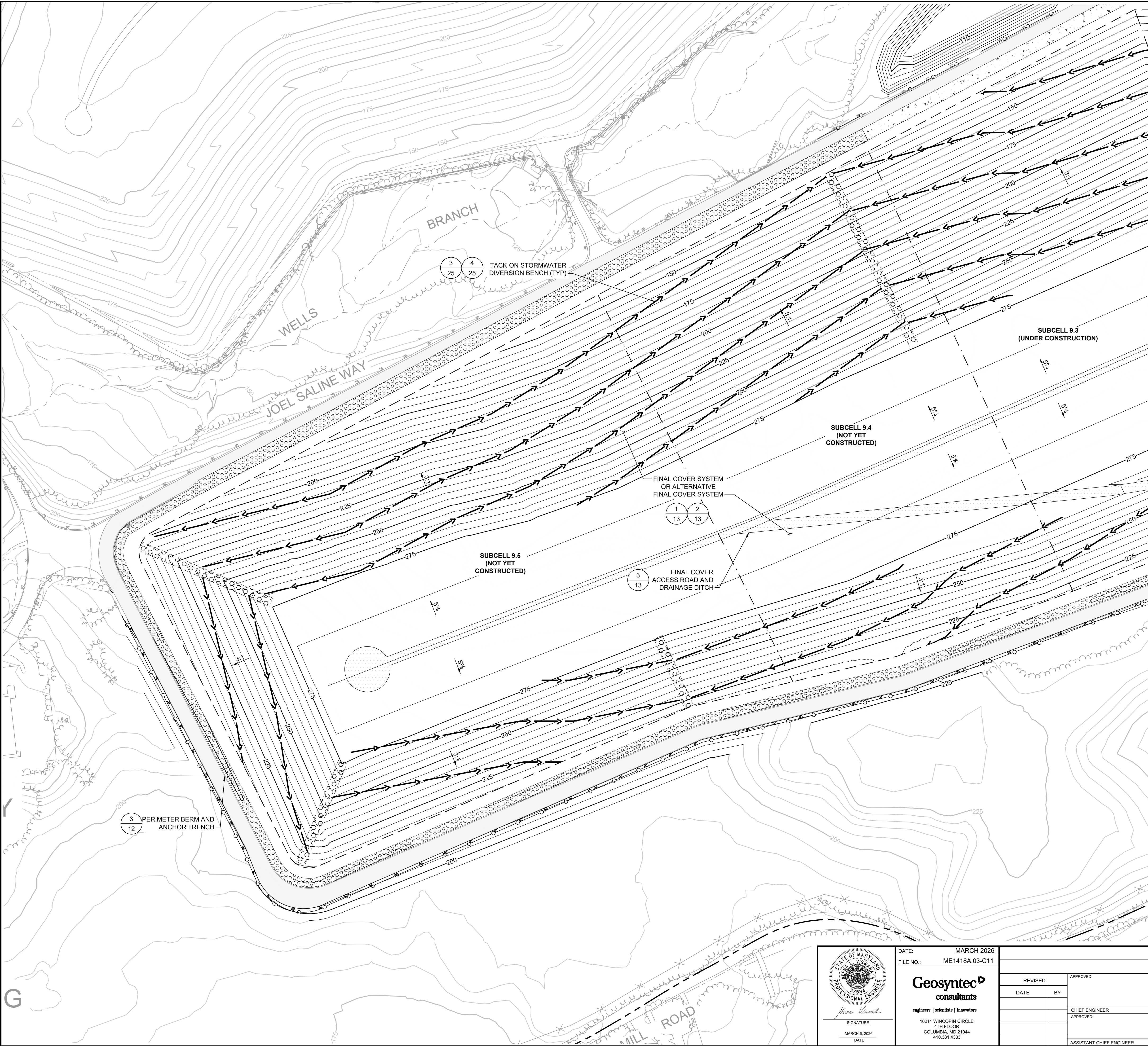
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- NOTES:
- SEE SHEET 2 FOR GENERAL NOTES.
 - THE FINAL COVER ELEVATIONS PRESENTED ON THIS SHEET APPLY WHETHER THE FINAL COVER SYSTEM OR THE ALTERNATIVE FINAL COVER SYSTEM IS SELECTED (SEE SHEET 13). THE FINAL COVER SYSTEM SHOWN IN DETAIL 1 IS FOR ILLUSTRATION PURPOSES ONLY.

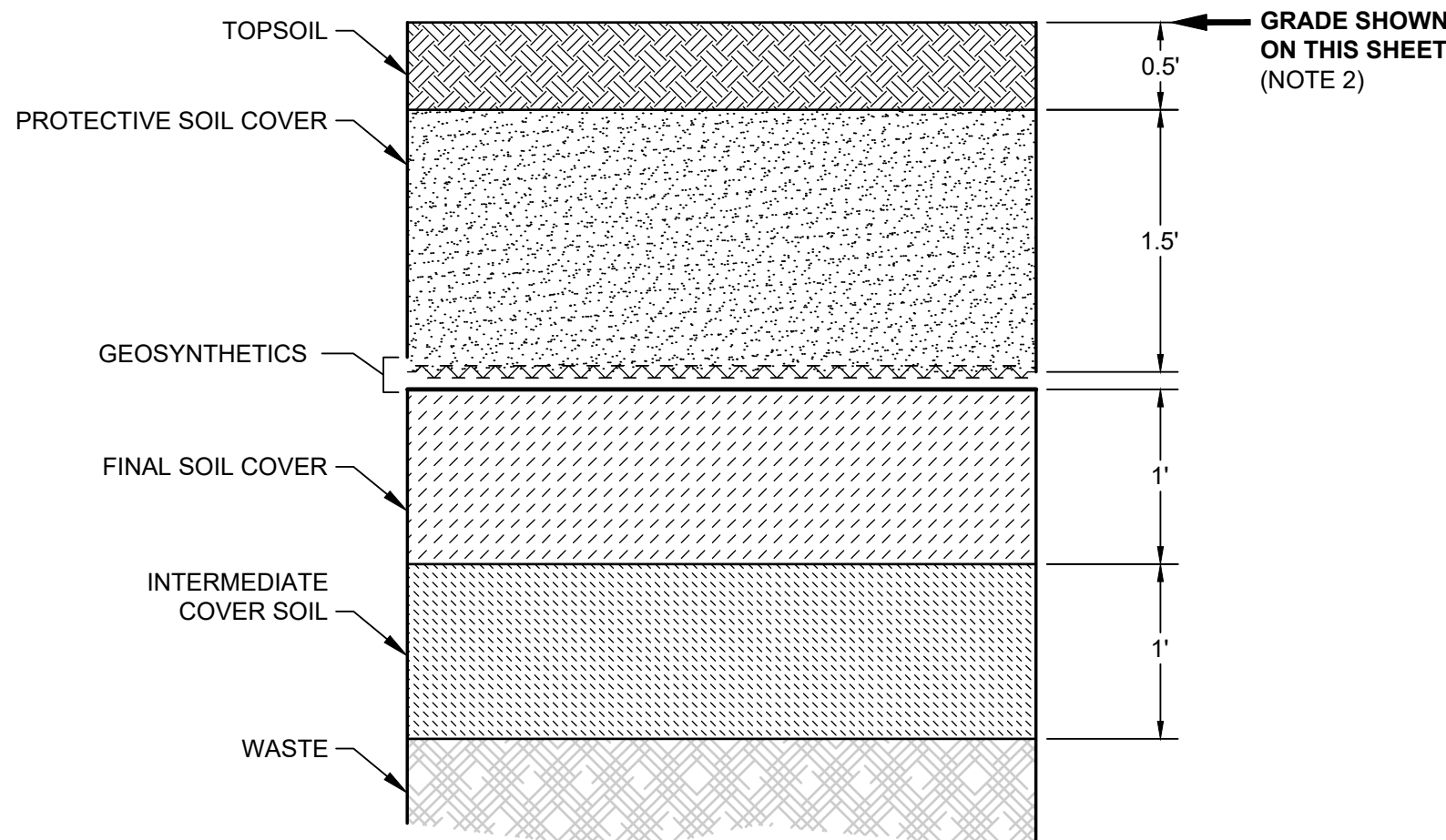


	DATE: MARCH 2026	ANNE ARUNDEL COUNTY							
	FILE NO.: ME1418A.03-C11	DEPARTMENT OF PUBLIC WORKS							
	Geosyntec consultants	engineers scientists innovators							
	10211 WINCOPIN CIRCLE 4TH FLOOR COLUMBIA, MD 21044 410.381.4333								
REVISOR	DATE	BY	APPROVED:	DATE	APPROVED:	DATE	SCALE:	NOTED	PROJECT:
			CHIEF ENGINEER		PROJECT MANAGER		DRAWN BY:	BW/MJ	CELL 9 VERTICAL EXPANSION MILLERSVILLE LANDFILL AND RESOURCE RECOVERY FACILITY
			APPROVED:		APPROVED:		CHECKED BY:	MV	
			ASSISTANT CHIEF ENGINEER		CHIEF RIGHT-OF-WAY		DRAWING NO.:	10 OF 30	
							PROJECT NO.:	ME1418A	TITLE:
							FINAL COVER GRADING PLAN I		

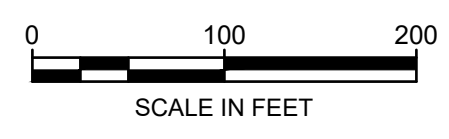


LEGEND

- PROPERTY BOUNDARY
- EXISTING TOPOGRAPHY CONTOUR (FEET-MSL)
- PROPOSED FINAL GRADE CONTOUR (FEET-MSL)
- STRUCTURE / BUILDING
- FENCE
- PAVED DRIVE
- GRAVEL DRIVE
- TREELINE
- STREAM / WATERLINE
- CELL 9 FOOTPRINT
- SUBCELL BOUNDARY
- LITTER FENCE
- GUARDRAIL
- RIPRAP
- CONCRETE FOREBAY
- DOWNCHUTE
- TACK-ON STORMWATER DIVERSION BENCH
- ACCESS ROAD
- PERIMETER ROAD



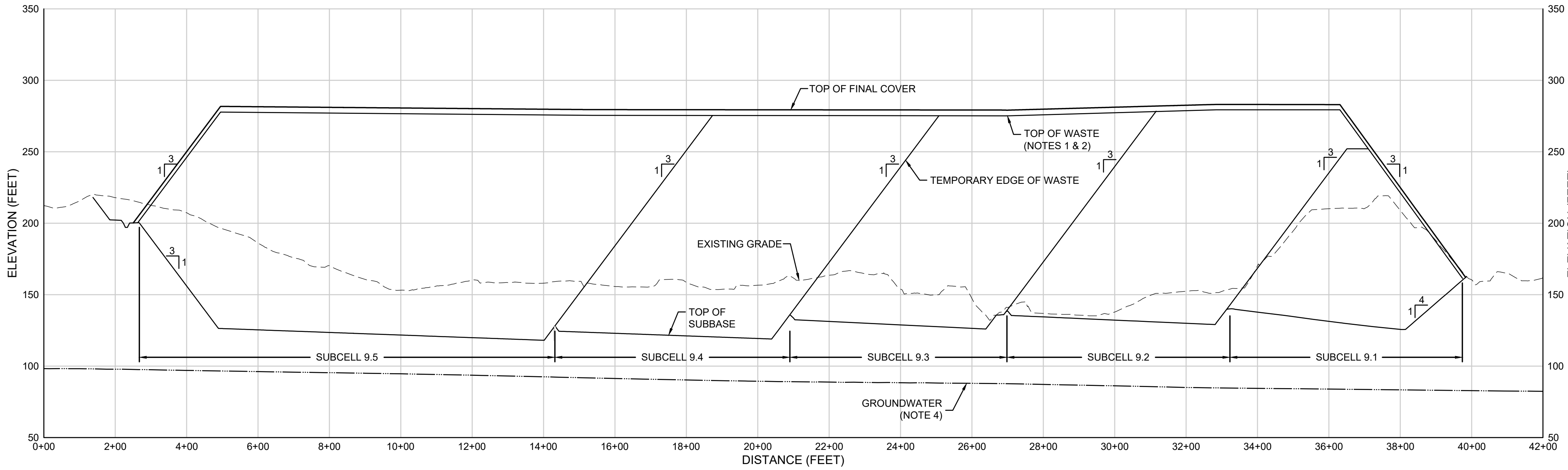
- NOTES:
- SEE SHEET 2 FOR GENERAL NOTES.
 - THE FINAL COVER ELEVATIONS PRESENTED ON THIS SHEET APPLY WHETHER THE FINAL COVER SYSTEM OR THE ALTERNATIVE FINAL COVER SYSTEM IS SELECTED (SEE SHEET 13). THE FINAL COVER SYSTEM SHOWN IN DETAIL 1 IS FOR ILLUSTRATION PURPOSES ONLY.



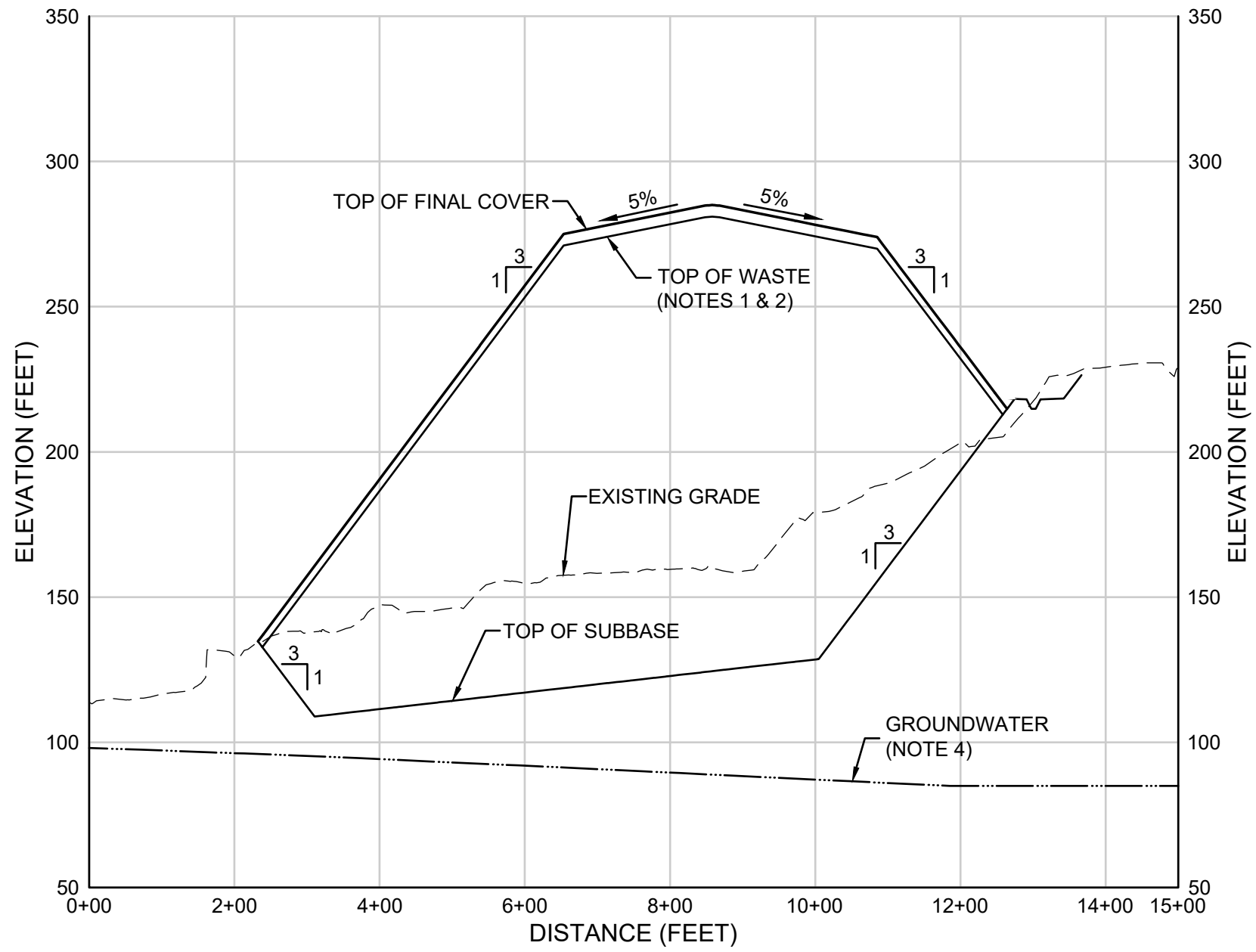
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G

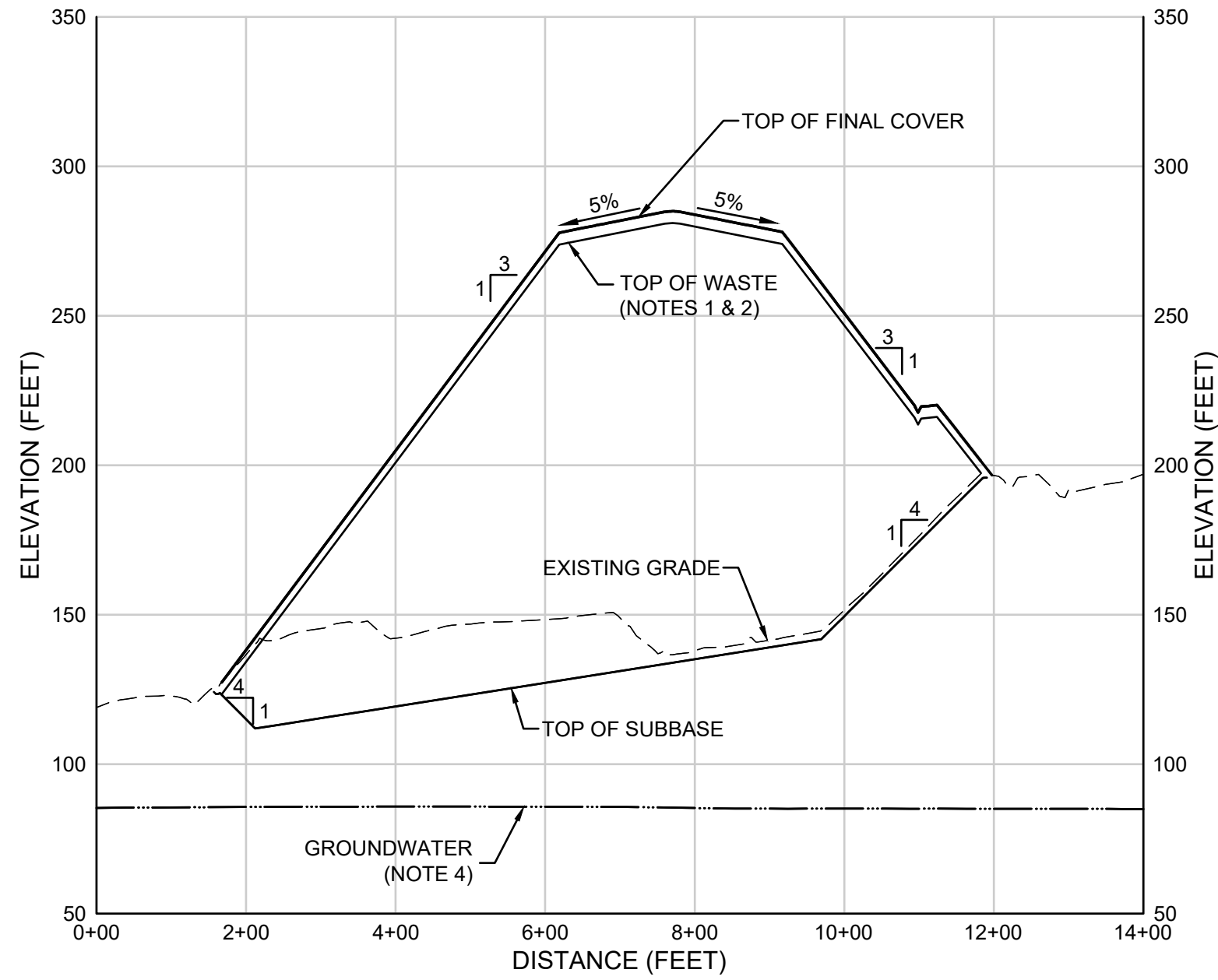
	DATE: MARCH 2026	ANNE ARUNDEL COUNTY						
	FILE NO.: ME1418A.03-C11	DEPARTMENT OF PUBLIC WORKS						
	Geosyntec consultants	REVISED	APPROVED:	DATE	APPROVED:	DATE	SCALE: NOTED	PROJECT: CELL 9 VERTICAL EXPANSION MILLERSVILLE LANDFILL AND RESOURCE RECOVERY FACILITY
	engineers scientists innovators	DATE	BY	CHIEF ENGINEER	PROJECT MANAGER	CHECKED BY: MV	DRAWING NO.: 10A OF 30	TITLE: FINAL COVER GRADING PLAN II
	10211 WINCOPIN CIRCLE 4TH FLOOR COLUMBIA, MD 21044 410.381.4333			APPROVED:	DATE	APPROVED:	DATE	PROJECT NO.: ME1418A
SIGNATURE: [Signature] DATE: MARCH 6, 2028			ASSISTANT CHIEF ENGINEER	CHIEF RIGHT-OF-WAY				



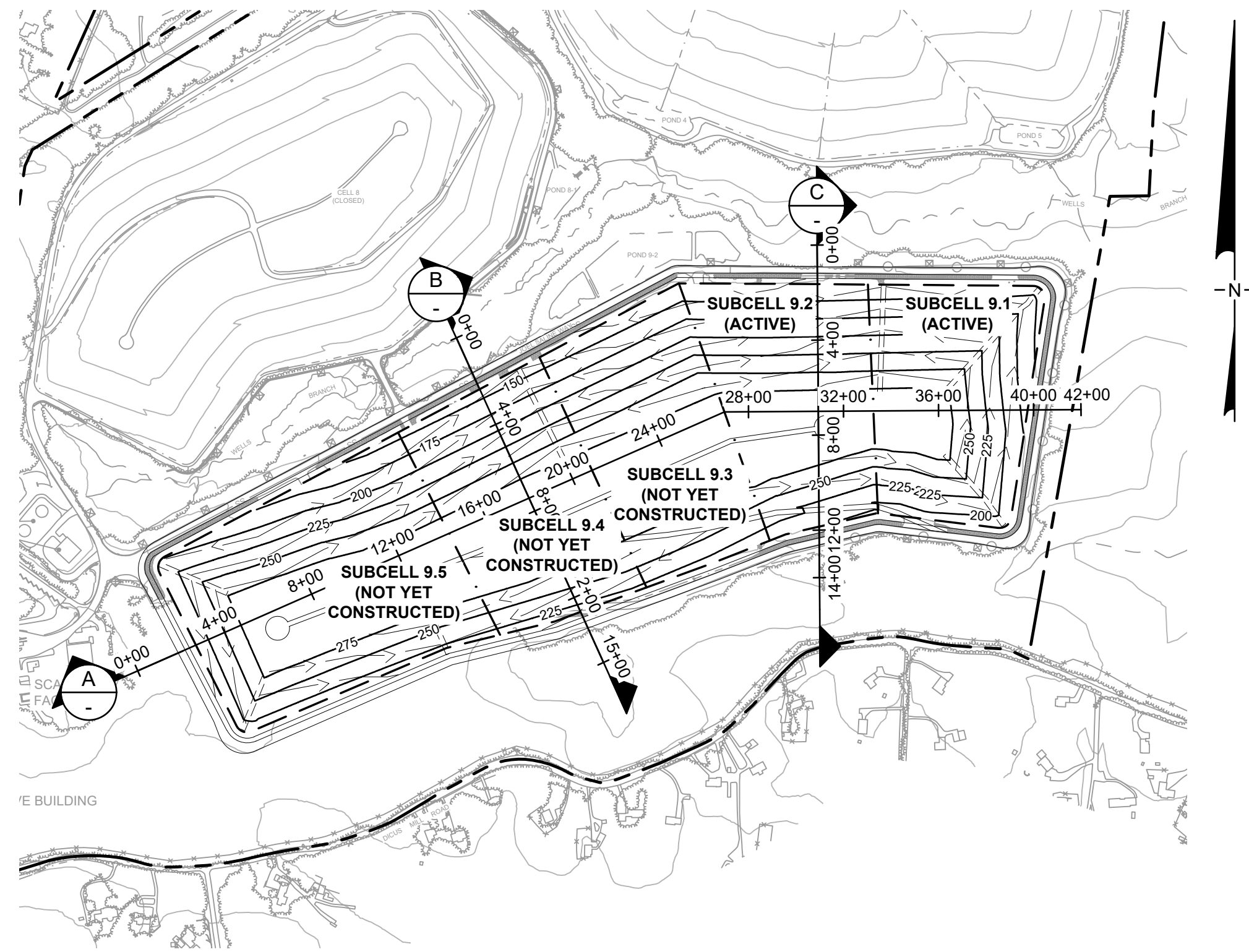
A PROFILE
HORIZONTAL SCALE: 1" = 200'
VERTICAL: 1" = 50'
VERTICAL EXAGGERATION: 4x



B PROFILE
HORIZONTAL SCALE: 1" = 200'
VERTICAL: 1" = 50'
VERTICAL EXAGGERATION: 4x

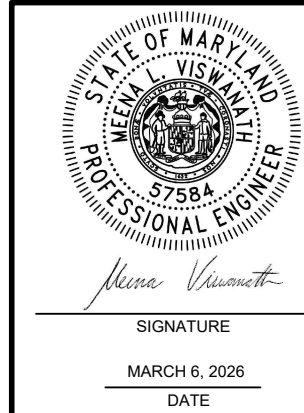
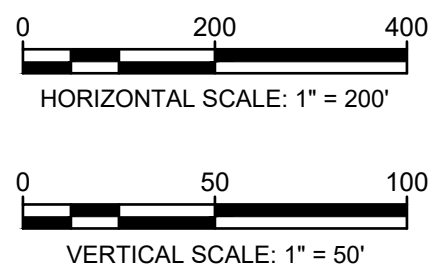


C PROFILE
HORIZONTAL SCALE: 1" = 200'
VERTICAL: 1" = 50'
VERTICAL EXAGGERATION: 4x



CROSS SECTION LOCATION PLAN
SCALE IN FEET
0 500 1000

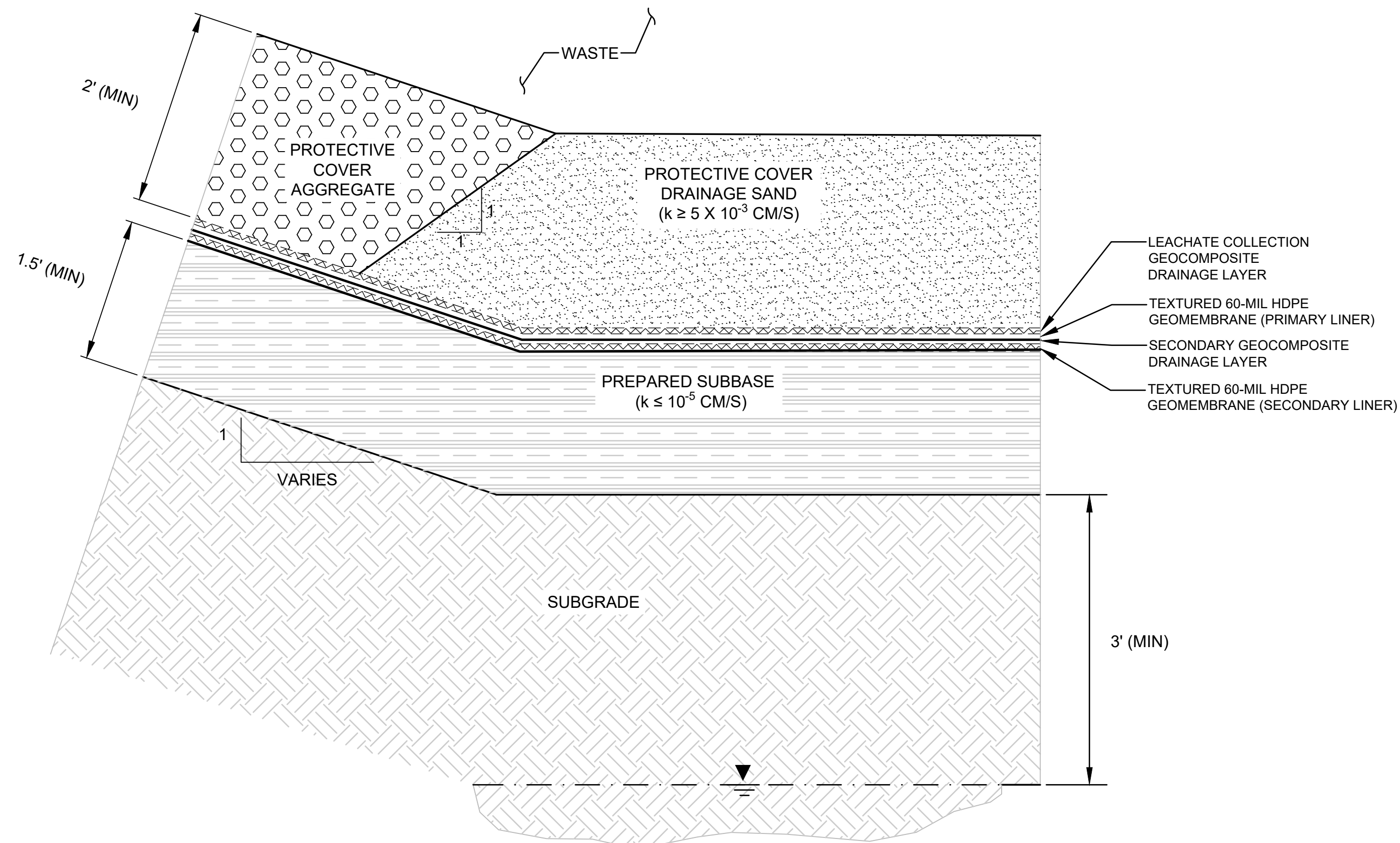
- NOTES:
- TOP OF WASTE SHOWN HERE APPLIES IF FINAL COVER SYSTEM IS SELECTED. IF ALTERNATIVE FINAL COVER (SHEET 13) IS SELECTED, TOP OF WASTE WILL BE APPROXIMATELY 1.5 FEET HIGHER.
 - TOP OF WASTE SHOWN HERE REPRESENTS THE SURFACE ON WHICH FINAL COVER GEOSYNTHETICS WILL BE INSTALLED AND INCORPORATES THE INTERMEDIATE SOIL COVER AND THE FINAL SOIL COVER.
 - THE FINAL COVER ELEVATIONS PRESENTED ON THIS SHEET APPLY WHETHER THE FINAL COVER SYSTEM OR THE ALTERNATIVE FINAL COVER SYSTEM IS SELECTED (SEE SHEET 13). THE FINAL COVER SYSTEM SHOWN HERE IS FOR ILLUSTRATION PURPOSES ONLY.
 - GROUNDWATER DATA WAS RECEIVED FROM ANNE ARUNDEL COUNTY DEPARTMENT OF PUBLIC WORKS, BUREAU OF WASTE MANAGEMENT SERVICES.



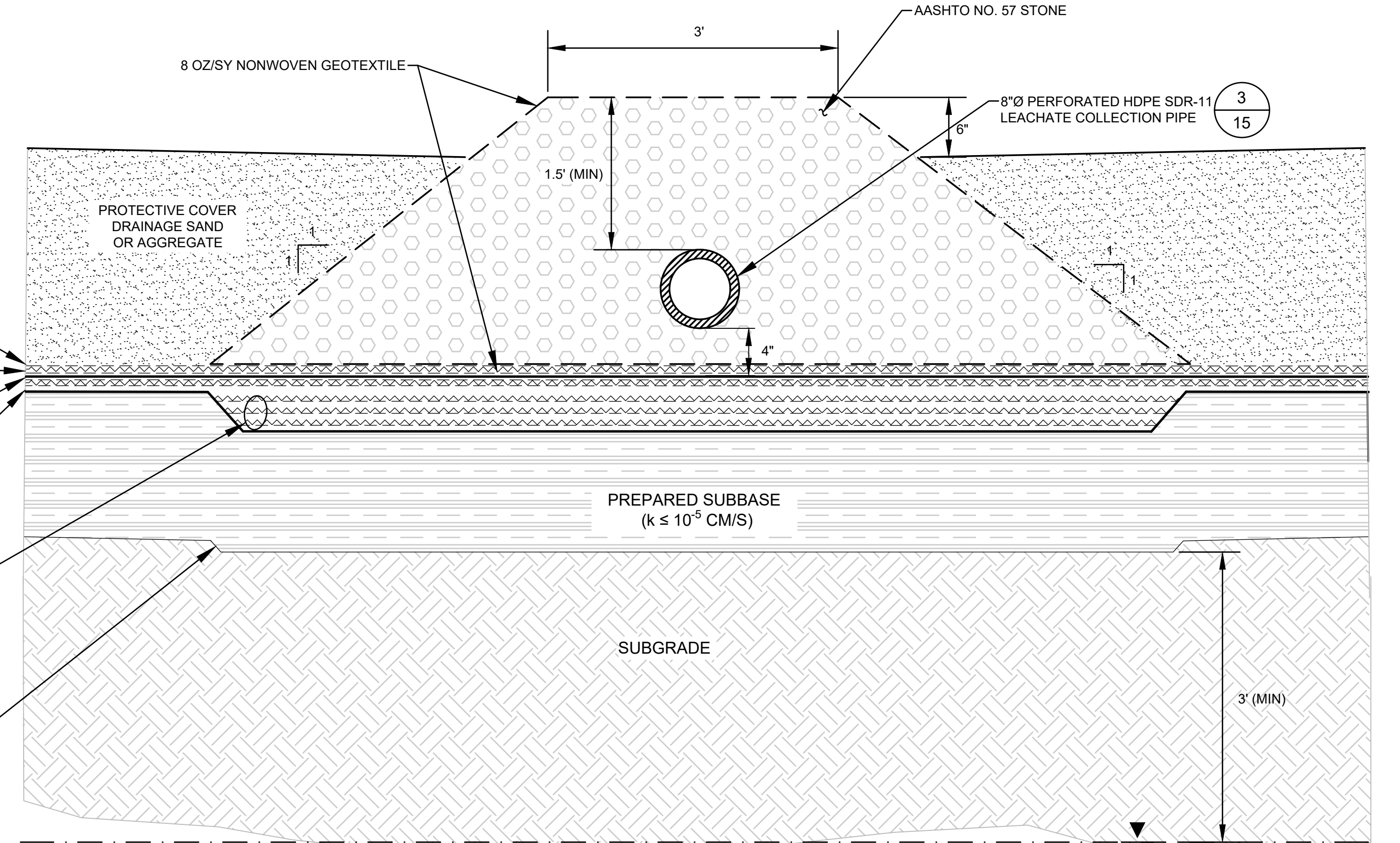
DATE: MARCH 2026
FILE NO.: ME1418A.03-C12
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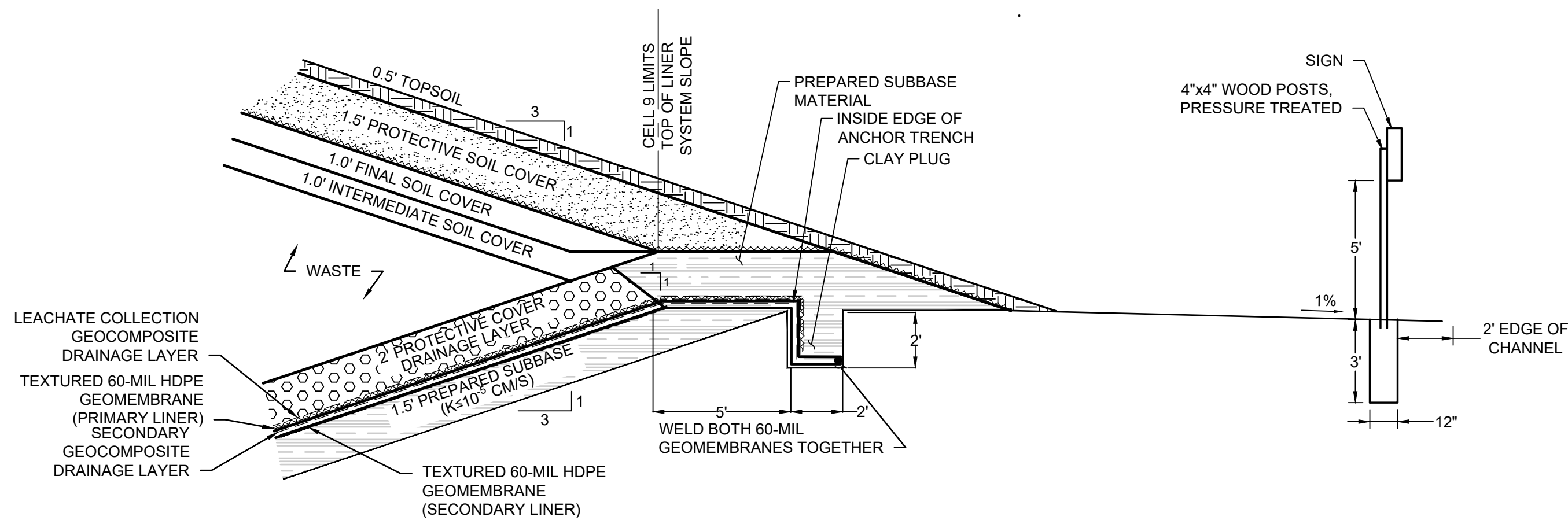
REVISED		APPROVED:	DATE	APPROVED:	DATE	SCALE:	NOTED	PROJECT: CELL 9 VERTICAL EXPANSION MILLERSVILLE LANDFILL AND RESOURCE RECOVERY FACILITY
DATE	BY					DRAWN BY:	BW/MJ	
		CHIEF ENGINEER		PROJECT MANAGER		CHECKED BY:	MV	TITLE: LANDFILL SECTIONS
		APPROVED:	DATE	APPROVED:	DATE	DRAWING NO.:	11 OF 30	
		ASSISTANT CHIEF ENGINEER		CHIEF RIGHT-OF-WAY		PROJECT NO.:	ME1418A	



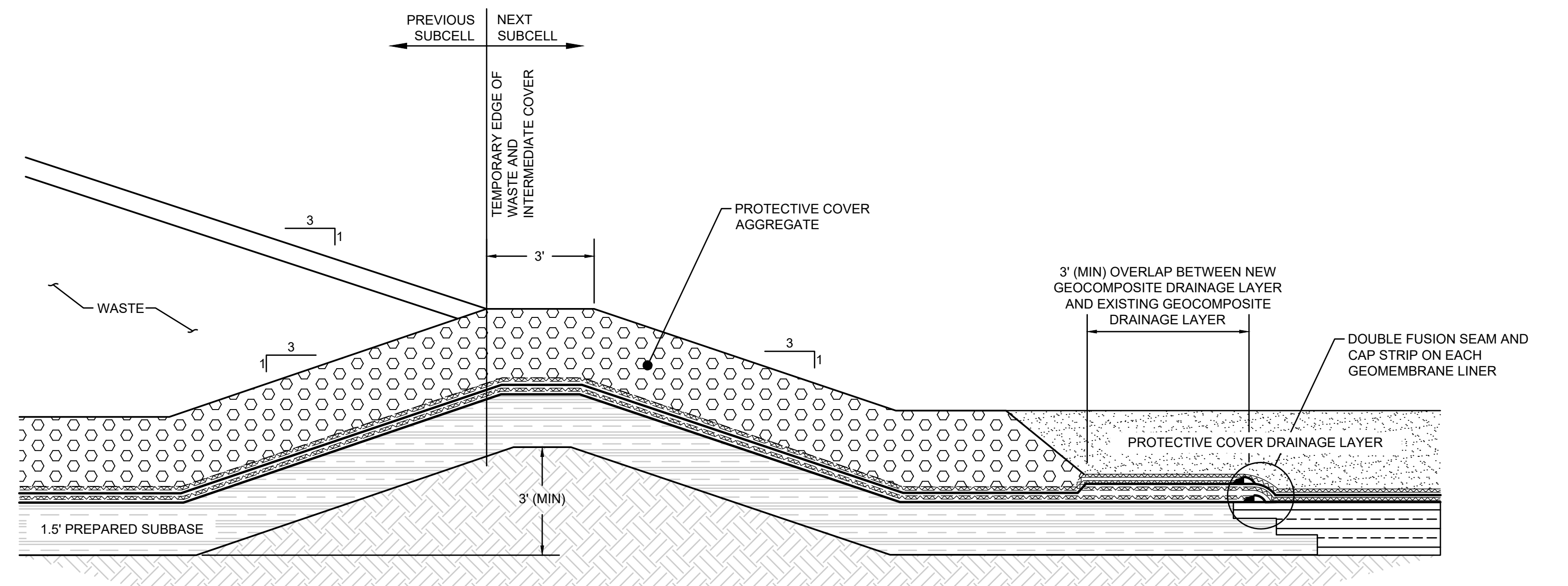
1
5 **DETAIL**
LINER SYSTEM
SCALE: NTS



2
5 **DETAIL**
LEACHATE COLLECTION LATERAL PIPE AND
LEACHATE DETECTION SWALE
SCALE: NTS



3
5 **DETAIL**
PERIMETER BERM AND ANCHOR TRENCH
SCALE: NTS



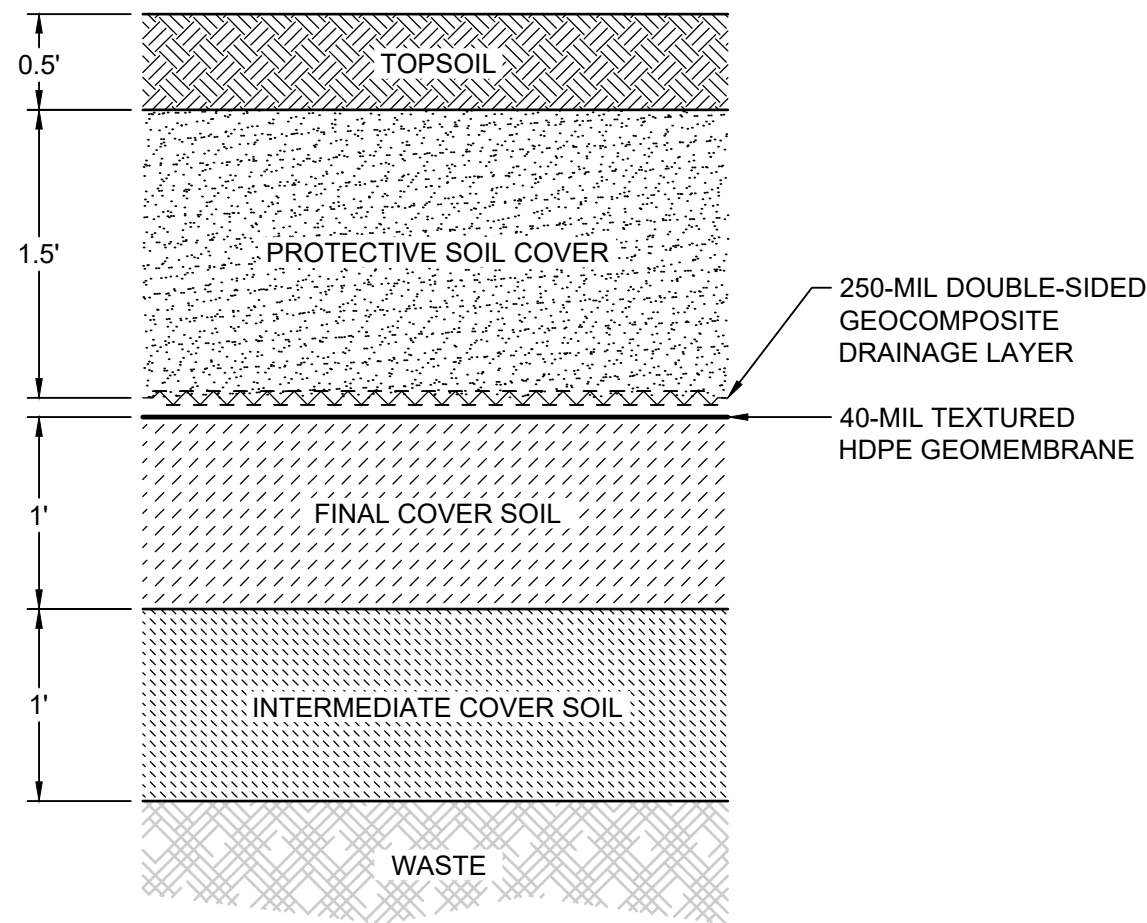
4
5 **DETAIL**
INTERCELL BERM
SCALE: NTS

NOTES:

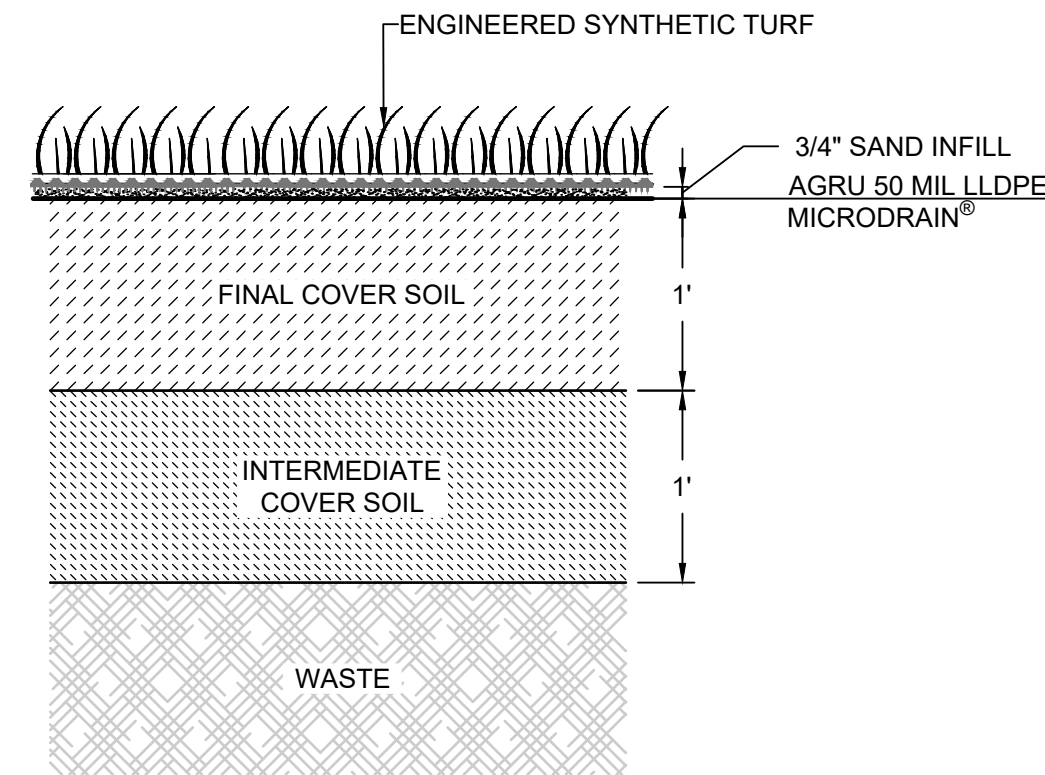
- SUBCELLS 9.1 AND 9.2, WHICH ARE ALREADY CONSTRUCTED, AND SUBCELL 9.3, WHICH IS CURRENTLY UNDER CONSTRUCTION, HAVE LINER SIDESLOPES OF 4H:1V.

	DATE: MARCH 2026	ANNE ARUNDEL COUNTY			
	FILE NO.: ME1418A.03-C13	DEPARTMENT OF PUBLIC WORKS			
	Geosyntec consultants	REVISOR: DATE BY	APPROVED: DATE	APPROVED: DATE	SCALE: NOTED
	engineers scientists innovators	CHIEF ENGINEER	PROJECT MANAGER	CHIEF RIGHT-OF-WAY	PROJECT: CELL 9 VERTICAL EXPANSION MILLERSVILLE LANDFILL AND RESOURCE RECOVERY FACILITY
10211 WINCOPIN CIRCLE 4TH FLOOR COLUMBIA, MD 21044 410.381.4333	MARCH 6, 2026	DATE	DATE	DATE	DRAWN BY: BW/MJ
					CHECKED BY: MV
					DRAWING NO.: 12 OF 30
					PROJECT NO.: ME1418A
					TITLE: LINER SYSTEM AND FINAL COVER DETAILS I

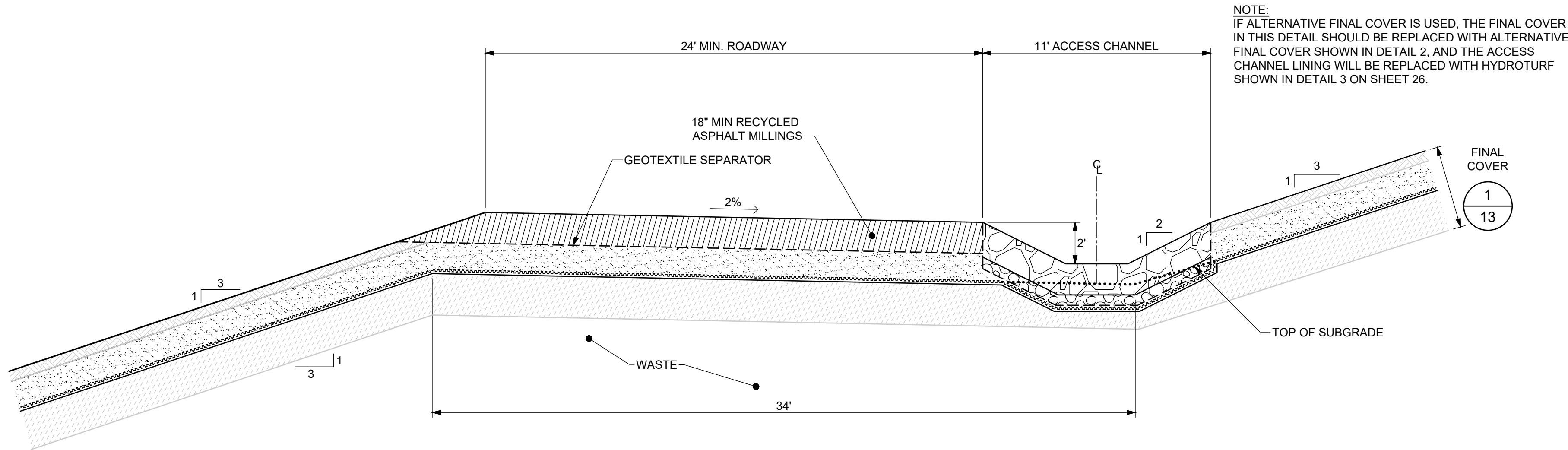
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1
10
DETAIL
FINAL COVER
SCALE: NTS



2
10
DETAIL
ALTERNATIVE FINAL COVER
(CLOSURETURF)
SCALE: NTS



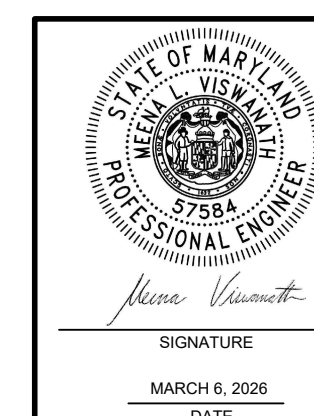
3
10
DETAIL
FINAL COVER ACCESS ROAD AND DRAINAGE DITCH
SCALE: NTS

- NOTES:
1. ALTERNATIVE FINAL COVER IS COMMERCIALY KNOWN AS CLOSURETURF®, MANUFACTURED BY WATERSHED GEO, LLC.

	DATE: MARCH 2026	ANNE ARUNDEL COUNTY				
	FILE NO.: ME1418A.03-C14	DEPARTMENT OF PUBLIC WORKS				
	Geosyntec consultants engineers scientists innovators 10211 WINCOPIN CIRCLE 4TH FLOOR COLUMBIA, MD 21044 410.381.4333	REVISED	APPROVED:	DATE	APPROVED:	DATE
		DATE	BY			
				CHIEF ENGINEER	PROJECT MANAGER	
			APPROVED:	DATE	APPROVED:	DATE
			ASSISTANT CHIEF ENGINEER	CHIEF RIGHT-OF-WAY		
					SCALE: NOTED	PROJECT: CELL 9 VERTICAL EXPANSION MILLERSVILLE LANDFILL AND RESOURCE RECOVERY FACILITY
					DRAWN BY: BW/MJ	
					CHECKED BY: MV	
					DRAWING NO.: 13 OF 30	TITLE: LINER SYSTEM AND FINAL COVER DETAILS II
					PROJECT NO.: ME1418A	



1. SUBCELLS 9.1 AND 9.2, WHICH ARE ALREADY CONSTRUCTED, AND SUBCELL 9.3, WHICH IS CURRENTLY UNDER CONSTRUCTION, HAVE LINER SIDESLOPES OF 4H:1V.



DATE: MARCH 2026
FILE NO.: ME1418A.03-C16

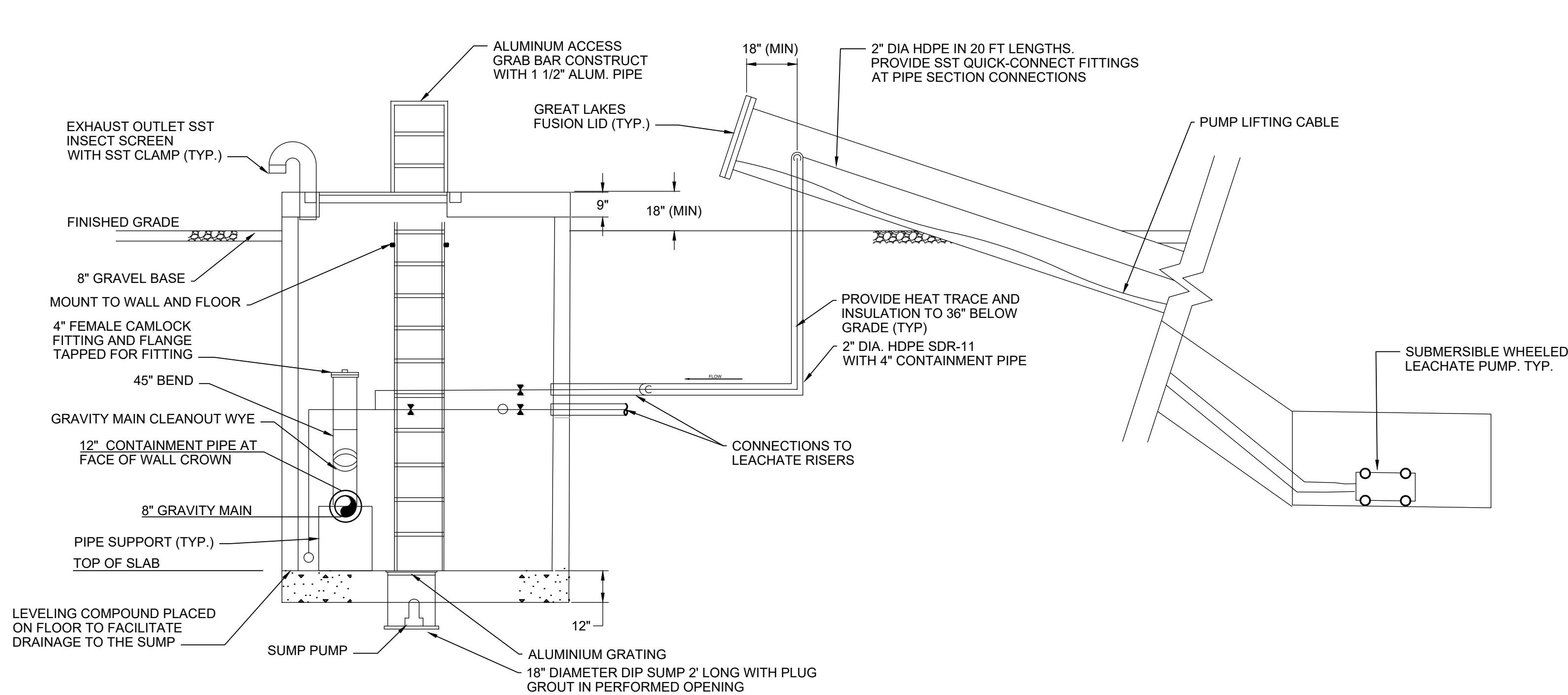
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consultants

engineers | scientists | innovators

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COLUMBIA, MD 21044
410.381.4333

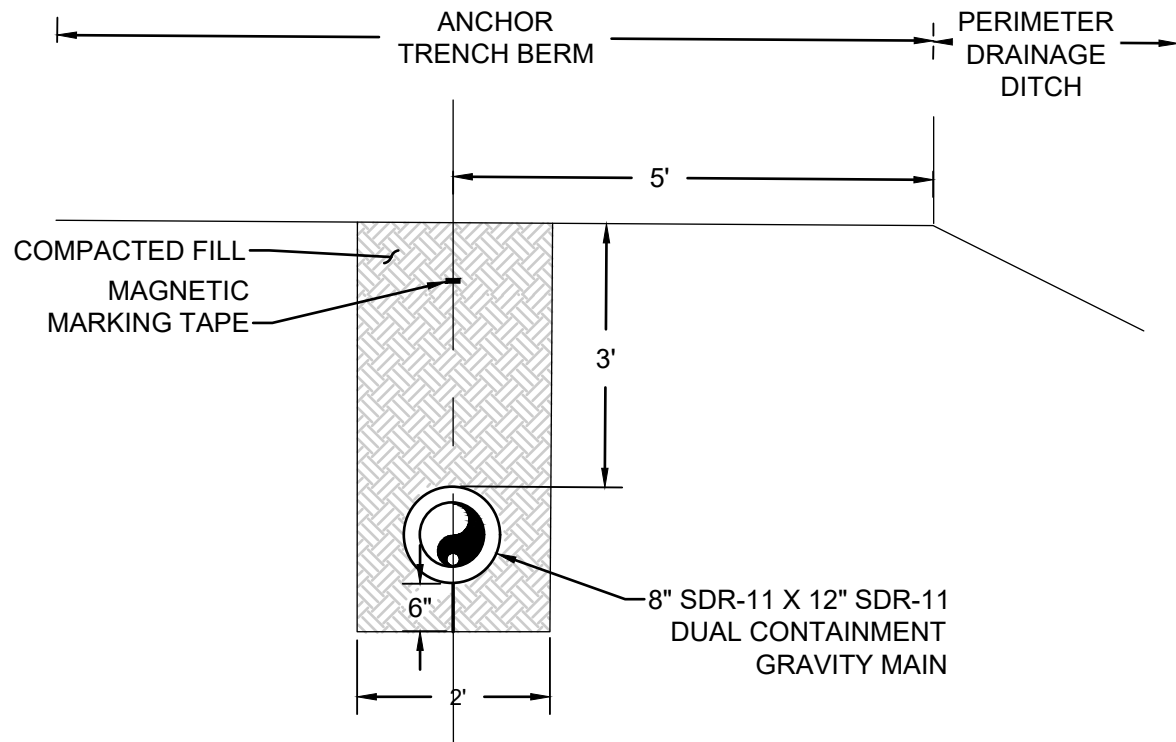
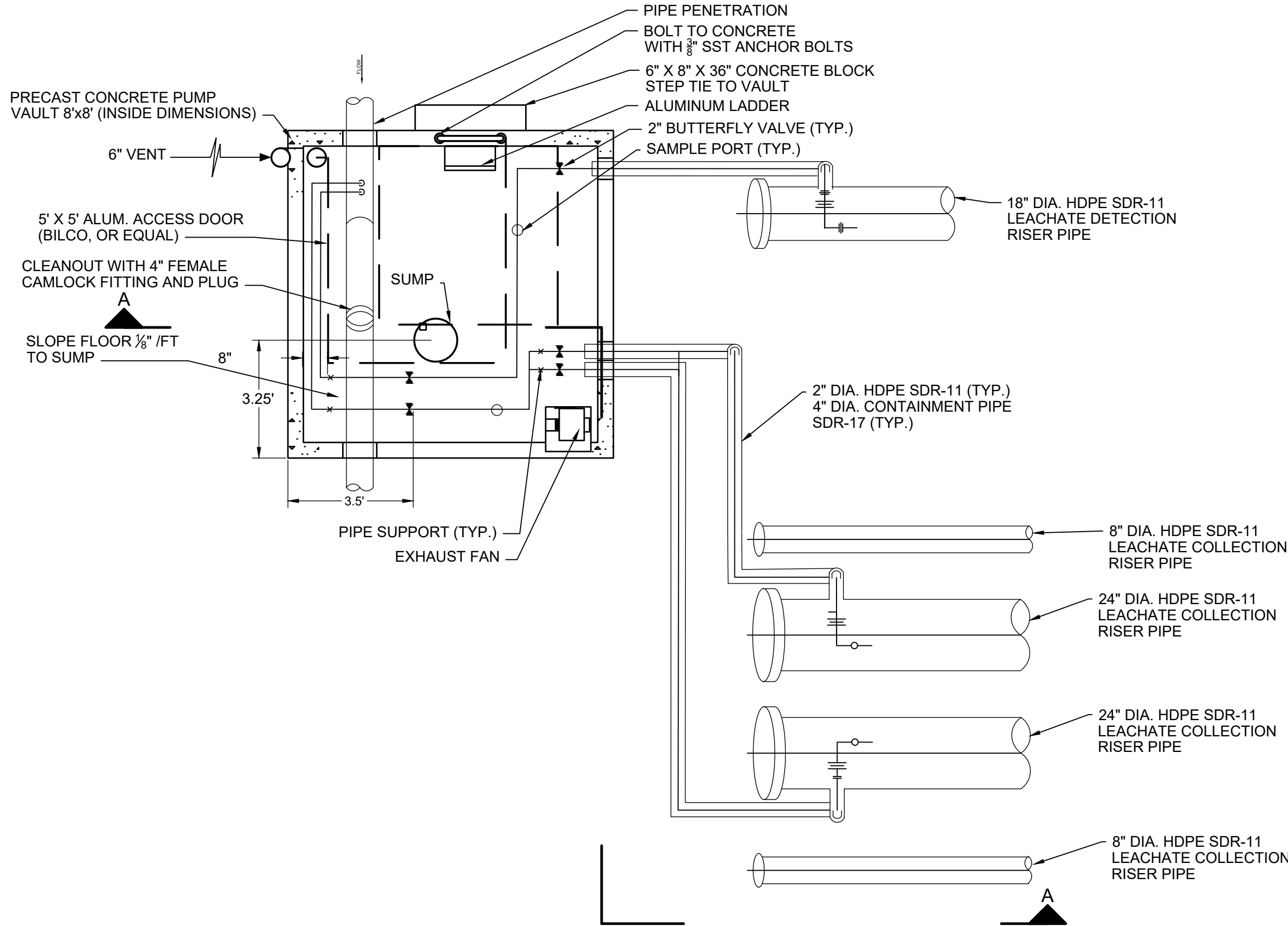
ANNE ARUNDEL COUNTY									
DEPARTMENT OF PUBLIC WORKS									
REVISED		APPROVED:		DATE		APPROVED:		DATE	
DATE		BY				SCALE:		NOTED	
						DRAWN BY:		BW/MJ	
						CHECKED BY:		MV	
		CHIEF ENGINEER		PROJECT MANAGER		DRAWING NO.:		15 OF 30	
		APPROVED:		DATE		APPROVED:		DATE	
						PROJECT NO.:		ME1418A	
								TITLE:	
								CELL 9 VERTICAL EXPANSION MILLERSVILLE LANDFILL AND RESOURCE RECOVERY FACILITY	
								LEACHATE SUMP AND RISER SECTIONS	

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SECTION A-A
NOTES 1, 2, 3

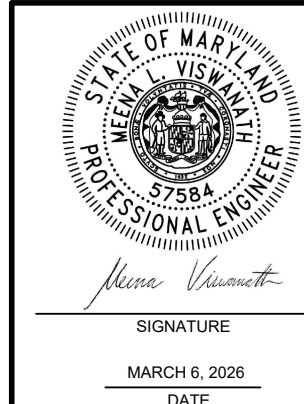
1
5
DETAIL
LEACHATE COLLECTION RISER VAULT
SCALE: NTS



2
5
DETAIL
LEACHATE COLLECTION GRAVITY MAIN
SCALE: NTS

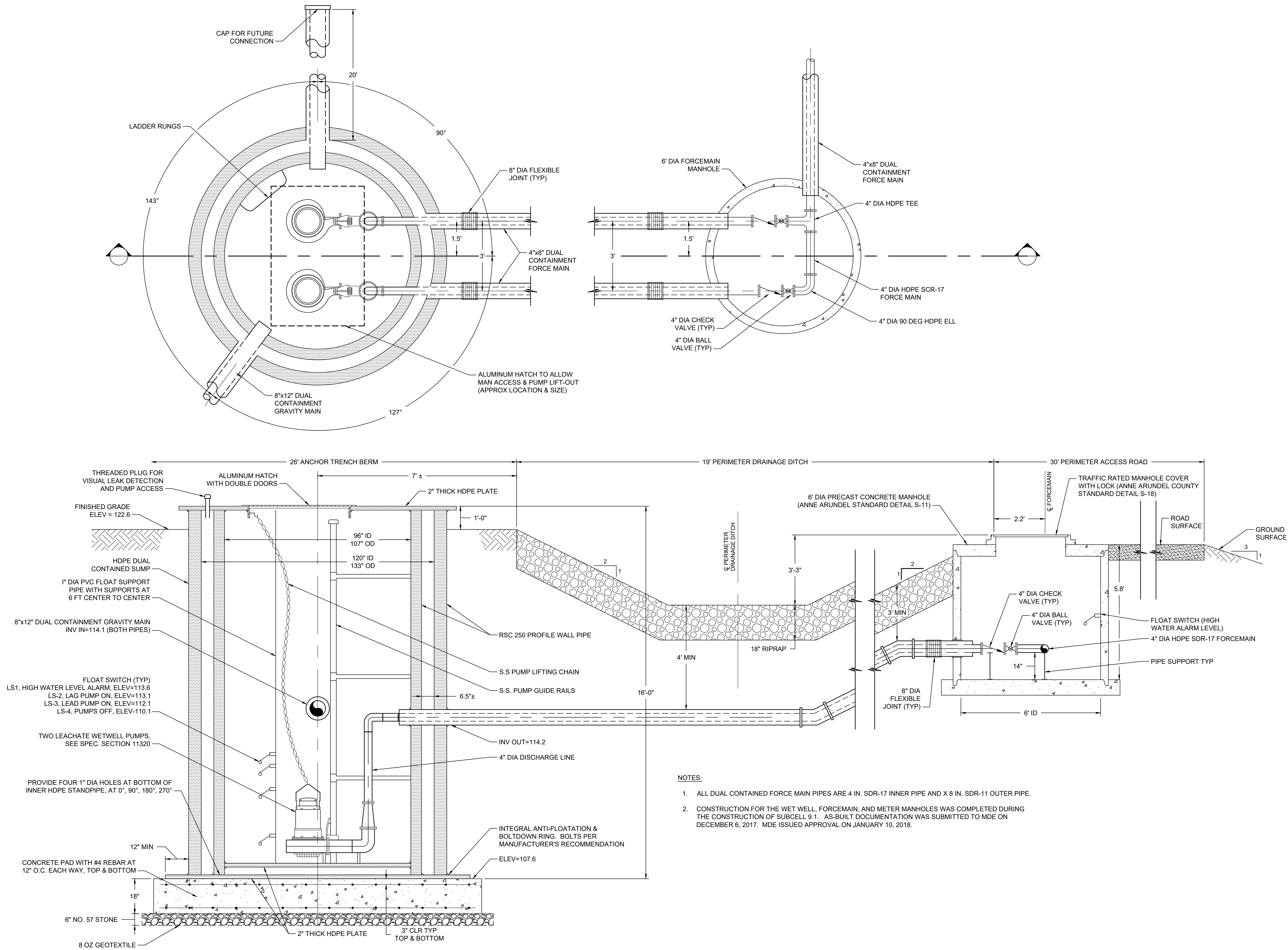
NOTES:

1. PROVIDE AND INSTALL SUMP PUMP. PIPE TO GRAVITY MAIN WITH TUBING AS DEFINED IN NOTE 3. PROVIDE QUICK CONNECT COUPLINGS AND VALVE AT TIE-IN TO GRAVITY MAIN.
2. INSTALL FLOOD DETECTION UNIT WITHIN SUMP SO THAT BOTTOM OF PROBE IS 6" ABOVE SUMP FLOOR AND PROBE LIES ALONG SUMP WALL. MOUNT WITH SST HARDWARE.
3. FLEXIBLE TUBING (2") TO CONSIST OF ELASTOMETRIC TUBING WITH REINFORCEMENT OF HIGH TENSILE STRENGTH TEXTILE AND WIRE HELIX TUBING SHALL BE RATED FOR 100 PSI SERVICE AND 10" Hg VACUUM. MATERIALS SHALL BE SUITABLE FOR LEACHATE SERVICE MINIMUM BEND RADIUS = 4.0 INCHES. GATES RUBBER CO. SUPET-VAC #307079 OR EQUAL.
4. PROVIDE AND INSTALL 8" GRAVEL BASE BETWEEN VAULT, RISER PIPE AND CONTROL PANEL AND VAULT CONTROL PANEL, AND ACCESS ROAD. SLOPE FROM RISER PIPE TO ACCESS ROAD FOR DRAINAGE.
5. EXACT DIMENSIONS AND ELEVATIONS OF LEACHATE COLLECTION RISER VAULTS WILL VARY BETWEEN SUBCELLS, DEPENDING ON GROUND AND SUBCELL ELEVATIONS.



DATE: MARCH 2026
FILE NO.: ME1418A.03-C17
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410.381.4333

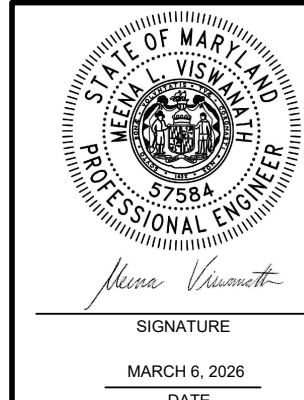
ANNE ARUNDEL COUNTY DEPARTMENT OF PUBLIC WORKS									
REVISED		APPROVED: DATE		APPROVED: DATE		SCALE: NOTED		PROJECT: CELL 9 VERTICAL EXPANSION MILLERSVILLE LANDFILL AND RESOURCE RECOVERY FACILITY	
DATE	BY					DRAWN BY: BW/MJ			
		CHIEF ENGINEER		PROJECT MANAGER		CHECKED BY: MV			
		APPROVED: DATE		APPROVED: DATE		DRAWING NO.: 16 OF 30		TITLE: LEACHATE COLLECTION VAULT AND GRAVITY MAIN DETAILS	
		ASSISTANT CHIEF ENGINEER		CHIEF RIGHT-OF-WAY		PROJECT NO.: ME1418A			



NOTES:

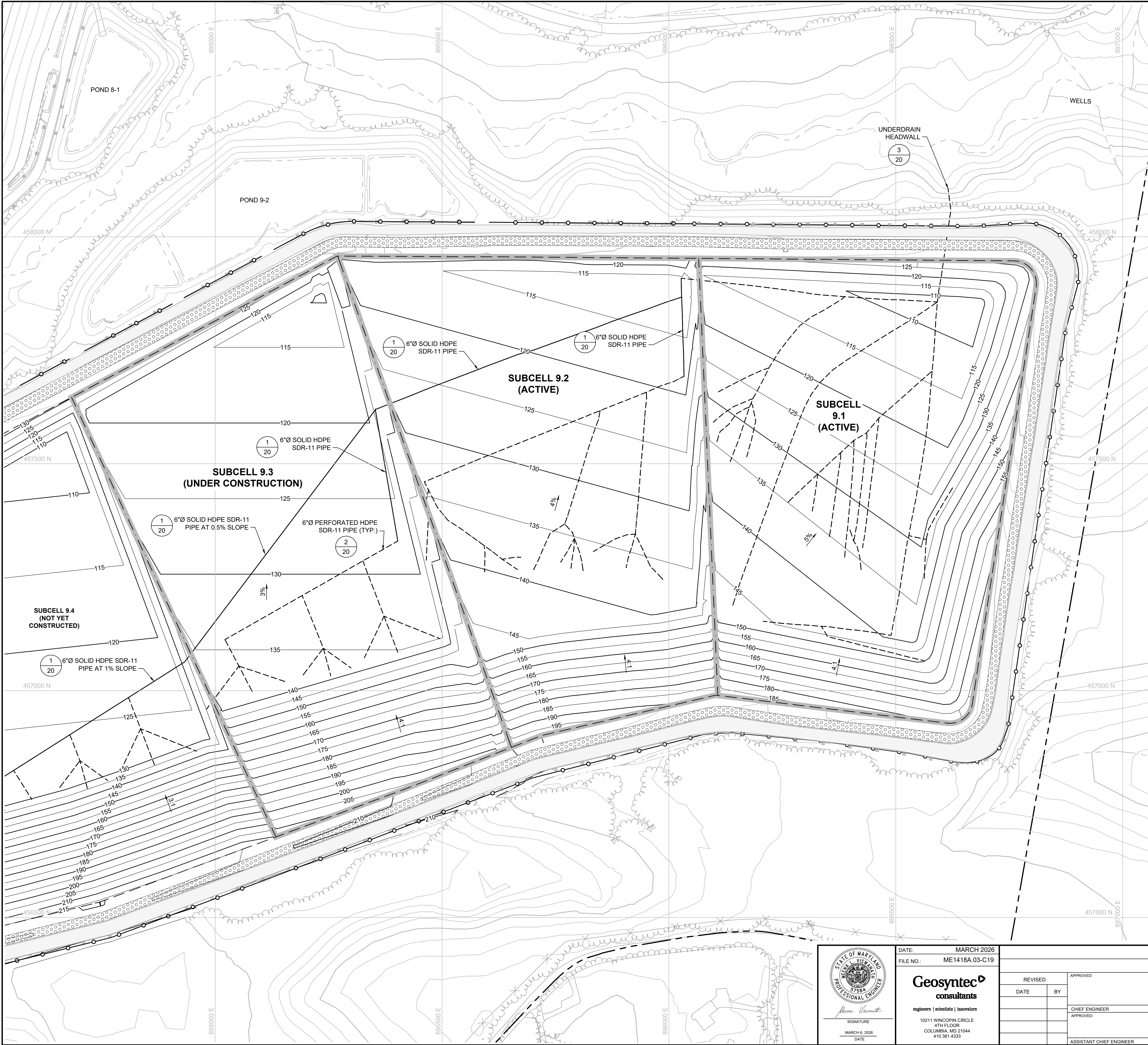
1. ALL DUAL CONTAINED FORCE MAIN PIPES ARE 4 IN. SDR-17 INNER PIPE AND X 8 IN. SDR-11 OUTER PIPE.
2. CONSTRUCTION FOR THE WET WELL, FORCEMAIN, AND METER MANHOLES WAS COMPLETED DURING THE CONSTRUCTION OF SUBCELL 9.1. AS-BUILT DOCUMENTATION WAS SUBMITTED TO MDE ON DECEMBER 6, 2017. MDE ISSUED APPROVAL ON JANUARY 10, 2018.

1
6
DETAIL
LEACHATE FORCEMAIN / WET WELL
SCALE: 1" = 1'



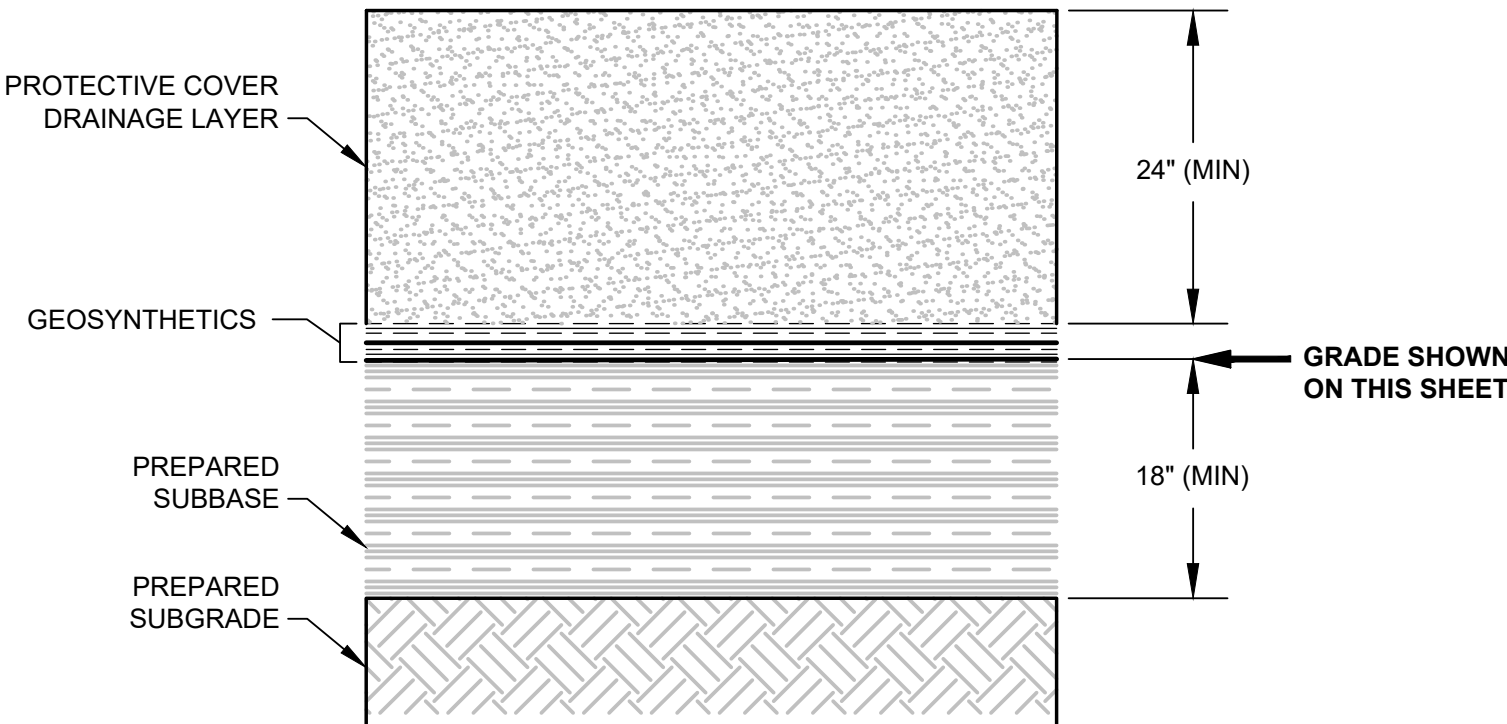
DATE: MARCH 2026
FILE NO.: ME1418A.03-C18
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4TH FLOOR
COLUMBIA, MD 21044
410.381.4333

ANNE ARUNDEL COUNTY DEPARTMENT OF PUBLIC WORKS									
REVISED		APPROVED:		DATE		APPROVED:		DATE	
DATE	BY					SCALE:		NOTED	
						DRAWN BY:		BW/MJ	
						CHECKED BY:		MV	
CHIEF ENGINEER		PROJECT MANAGER						PROJECT:	
APPROVED:		DATE		APPROVED:		DATE		CELL 9 VERTICAL EXPANSION MILLERSVILLE LANDFILL AND RESOURCE RECOVERY FACILITY	
						DRAWING NO.:		17	
						OF		30	
						PROJECT NO.:		ME1418A	
								TITLE:	
								EXISTING WET WELL, FORCEMAIN, AND METER MANHOLES	



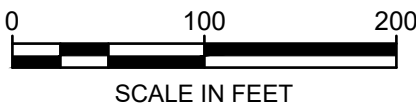
LEGEND

- PROPERTY BOUNDARY
- EXISTING TOPOGRAPHY CONTOUR (FEET-MSL)
- PROPOSED SUBBASE CONTOUR (FEET-MSL)
- STRUCTURE / BUILDING
- FENCE
- PAVED DRIVE
- GRAVEL DRIVE
- TREELINE
- STREAM / WATERLINE
- CELL 9 FOOTPRINT
- SUBCELL BOUNDARY
- LITTER FENCE
- GUARDRAIL
- STORMWATER CULVERT
- RIPRAP
- CONCRETE MOMENT SLAB
- LIMIT OF SUBCELL LINER
- UNDERDRAIN PIPE (SOLID)
- UNDERDRAIN PIPE (PERFORATED)



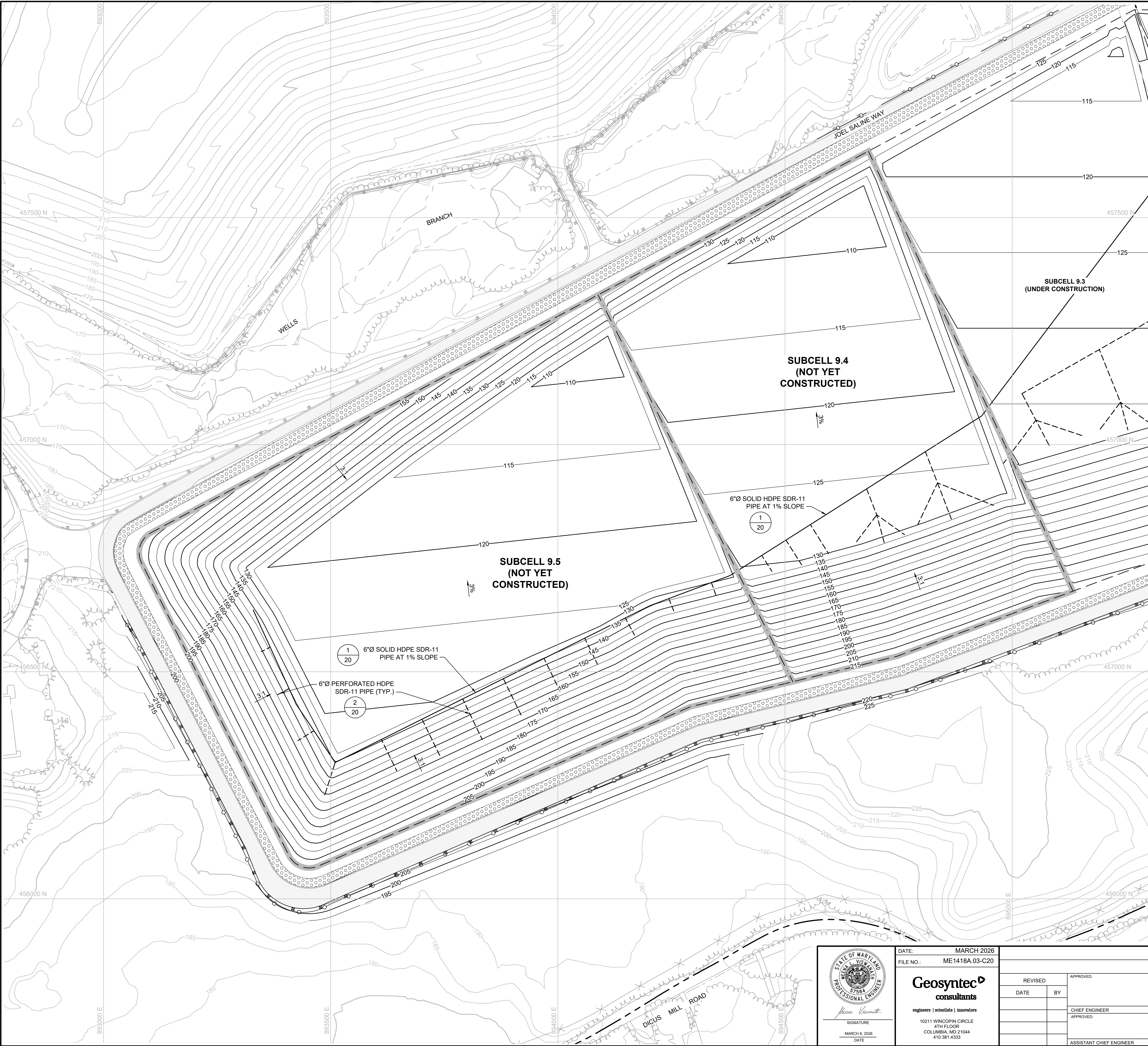
1
-
DETAIL
LINER SYSTEM, TYP.
SCALE: NTS

- NOTES:
- SEE SHEET 2 FOR GENERAL NOTES.
 - INFRASTRUCTURE AND LINER GRADES SHOWN FOR SUBCELLS 9.1 AND 9.2 ARE AS-BUILT GRADES; INFRASTRUCTURE AND LINER GRADES SHOWN FOR SUBCELLS 9.3 THROUGH 9.5 ARE NOT YET CONSTRUCTED.
 - NORTHERN LIMIT OF PERFORATED UNDERDRAIN IS INTENDED TO INTERCEPT THE LIMITS OF THE UPPERMOST SAND LAYER FOLLOWING SUBGRADE EXCAVATION. FINAL LOCATION MAY BE ADJUSTED DURING CONSTRUCTION TO INTERCEPT PERCHED WATER WHERE OBSERVED.

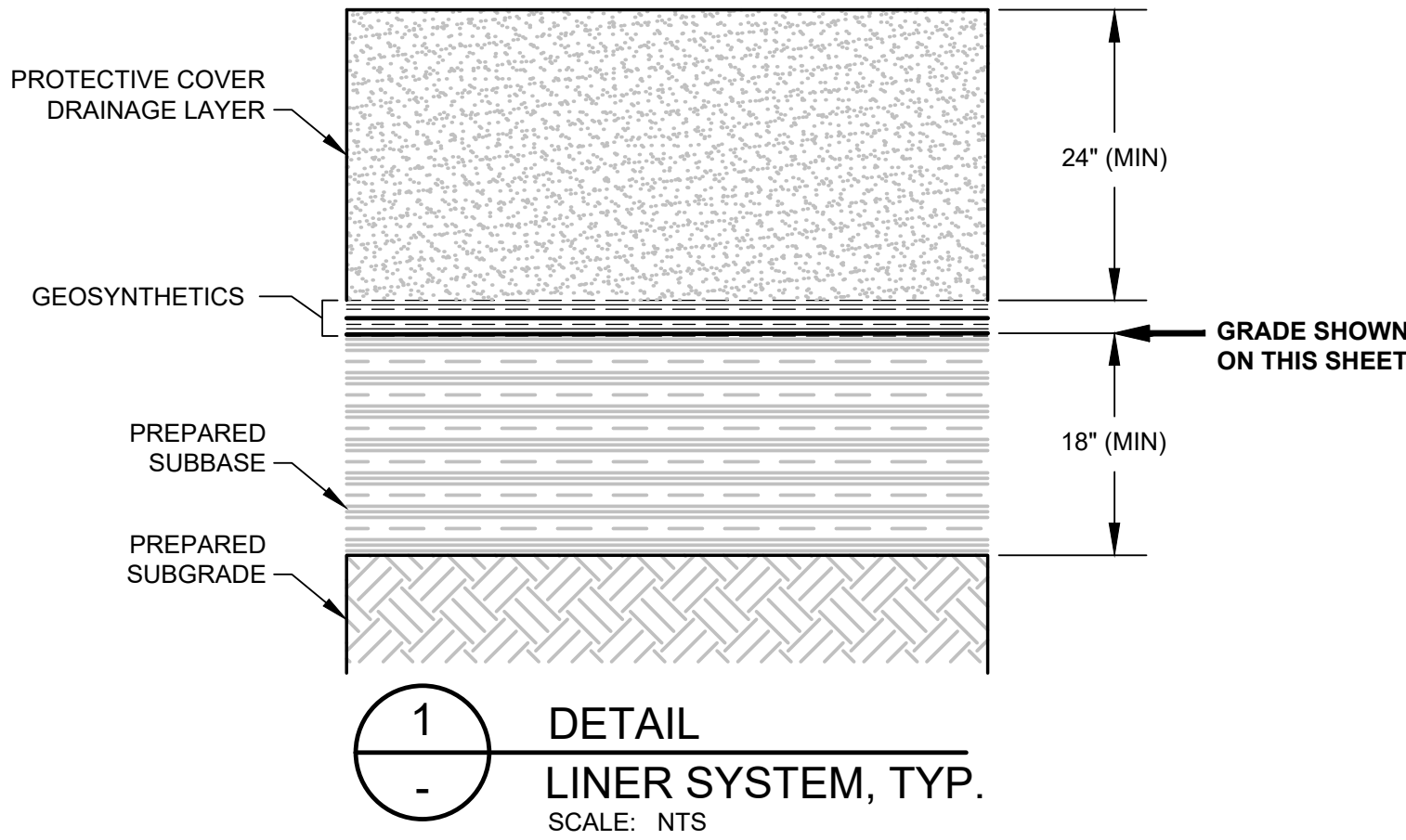


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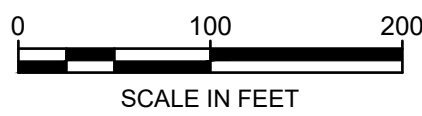
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	FILE NO.: ME1418A.03-C19	DEPARTMENT OF PUBLIC WORKS				
	Geosyntec consultants	REVISED	APPROVED:	DATE	APPROVED:	DATE
	engineers scientists innovators	DATE	BY	CHIEF ENGINEER	PROJECT MANAGER	SCALE: NOTED
	10211 WINCOPIN CIRCLE 4TH FLOOR COLUMBIA, MD 21044 410.381.4333	APPROVED:	DATE	APPROVED:	DATE	DRAWN BY: BW/MJ
SIGNATURE: <i>Neena Viswanath</i>	APPROVED:	DATE	APPROVED:	DATE	CHECKED BY: MV	
MARCH 6, 2026	APPROVED:	DATE	APPROVED:	DATE	DRAWING NO.: 18 OF 30	
DATE	APPROVED:	DATE	APPROVED:	DATE	PROJECT NO.: ME1418A	
	ASSISTANT CHIEF ENGINEER	CHIEF RIGHT-OF-WAY			TITLE: CELL 9 VERTICAL EXPANSION MILLERSVILLE LANDFILL AND RESOURCE RECOVERY FACILITY	
					UNDERDRAIN SYSTEM-SUBCELLS 9.1, 9.2, AND 9.3	



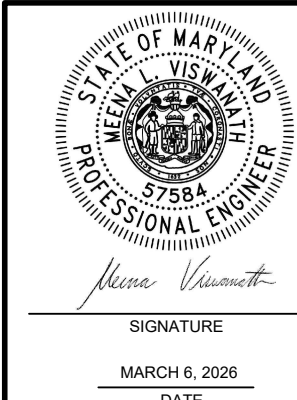
- LEGEND**
- PROPERTY BOUNDARY
 - EXISTING TOPOGRAPHY CONTOUR (FEET-MSL)
 - PROPOSED SUBBASE CONTOUR (FEET-MSL)
 - STRUCTURE / BUILDING
 - FENCE
 - PAVED DRIVE
 - GRAVEL DRIVE
 - TREELINE
 - STREAM / WATERLINE
 - CELL 9 FOOTPRINT
 - SUBCELL BOUNDARY
 - LITTER FENCE
 - GUARDRAIL
 - STORMWATER CULVERT
 - RIPRAP
 - EXISTING CONCRETE MOMENT SLAB
 - LIMIT OF SUBCELL LINER
 - UNDERDRAIN PIPE (SOLID)
 - UNDERDRAIN PIPE (PERFORATED)



- NOTES:**
- SEE SHEET 2 FOR GENERAL NOTES.
 - INFRASTRUCTURE AND LINER GRADES SHOWN FOR SUBCELLS 9.1 AND 9.2 ARE AS-BUILT GRADES; INFRASTRUCTURE AND LINER GRADES SHOWN FOR SUBCELLS 9.3 THROUGH 9.5 ARE NOT YET CONSTRUCTED.
 - NORTHERN LIMIT OF PERFORATED UNDERDRAIN IS INTENDED TO INTERCEPT THE LIMITS OF THE UPPERMOST SAND LAYER FOLLOWING SUBGRADE EXCAVATION. FINAL LOCATION MAY BE ADJUSTED DURING CONSTRUCTION TO INTERCEPT PERCHED WATER WHERE OBSERVED.

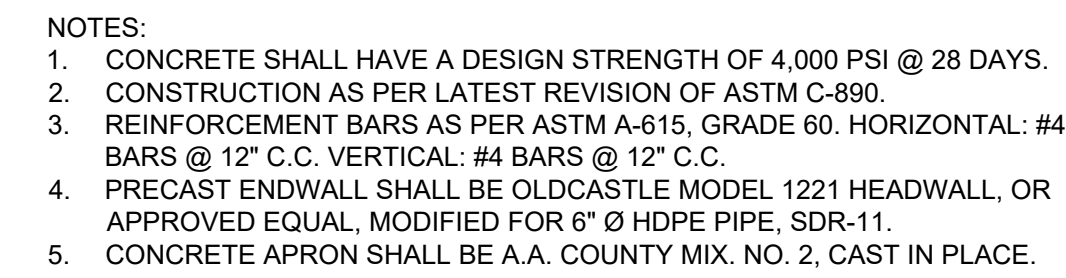


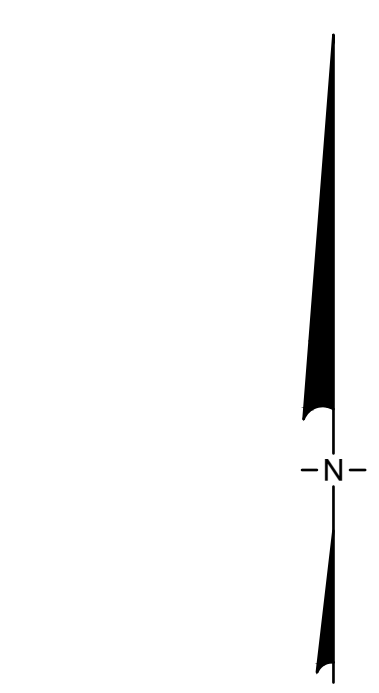
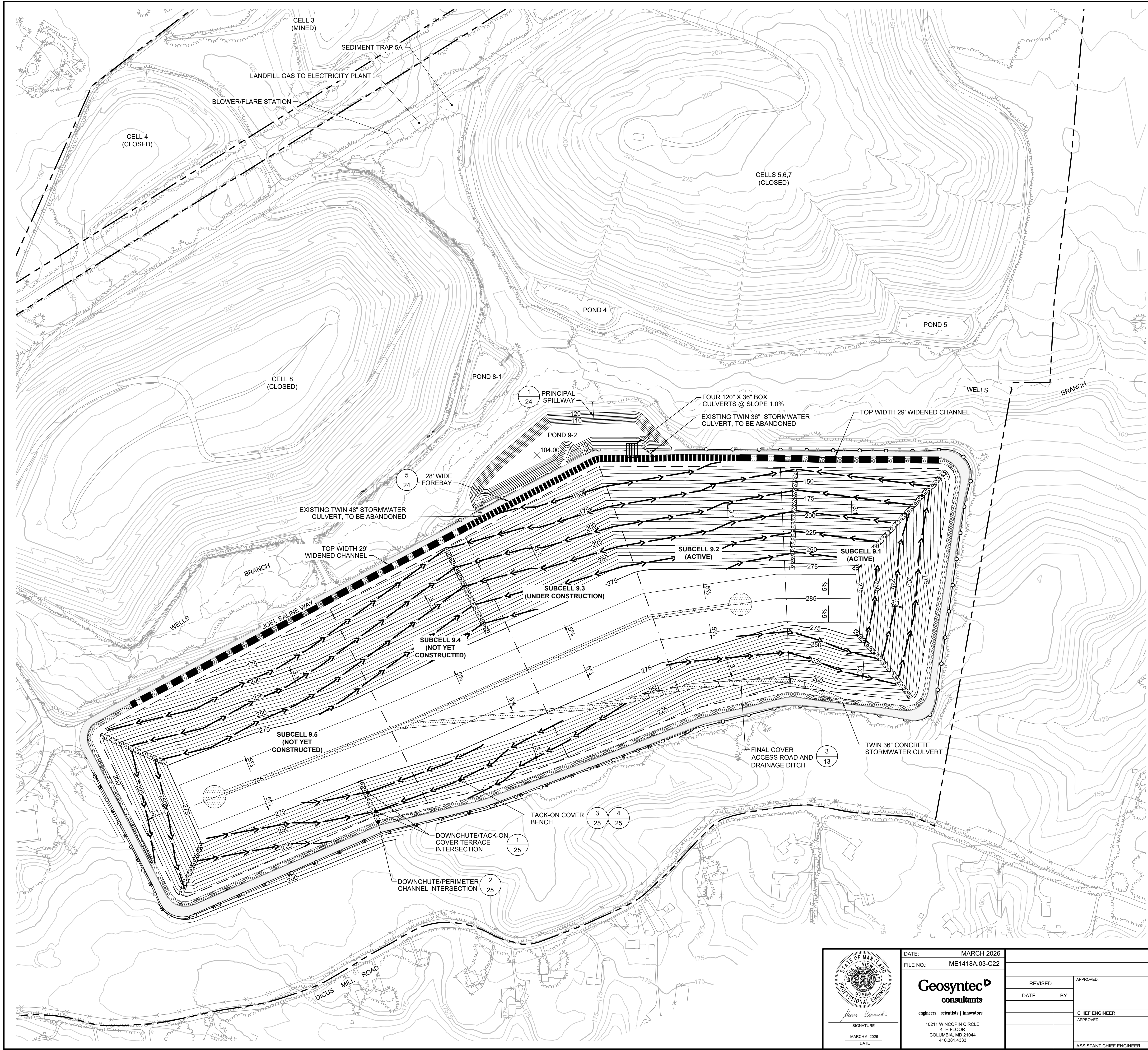
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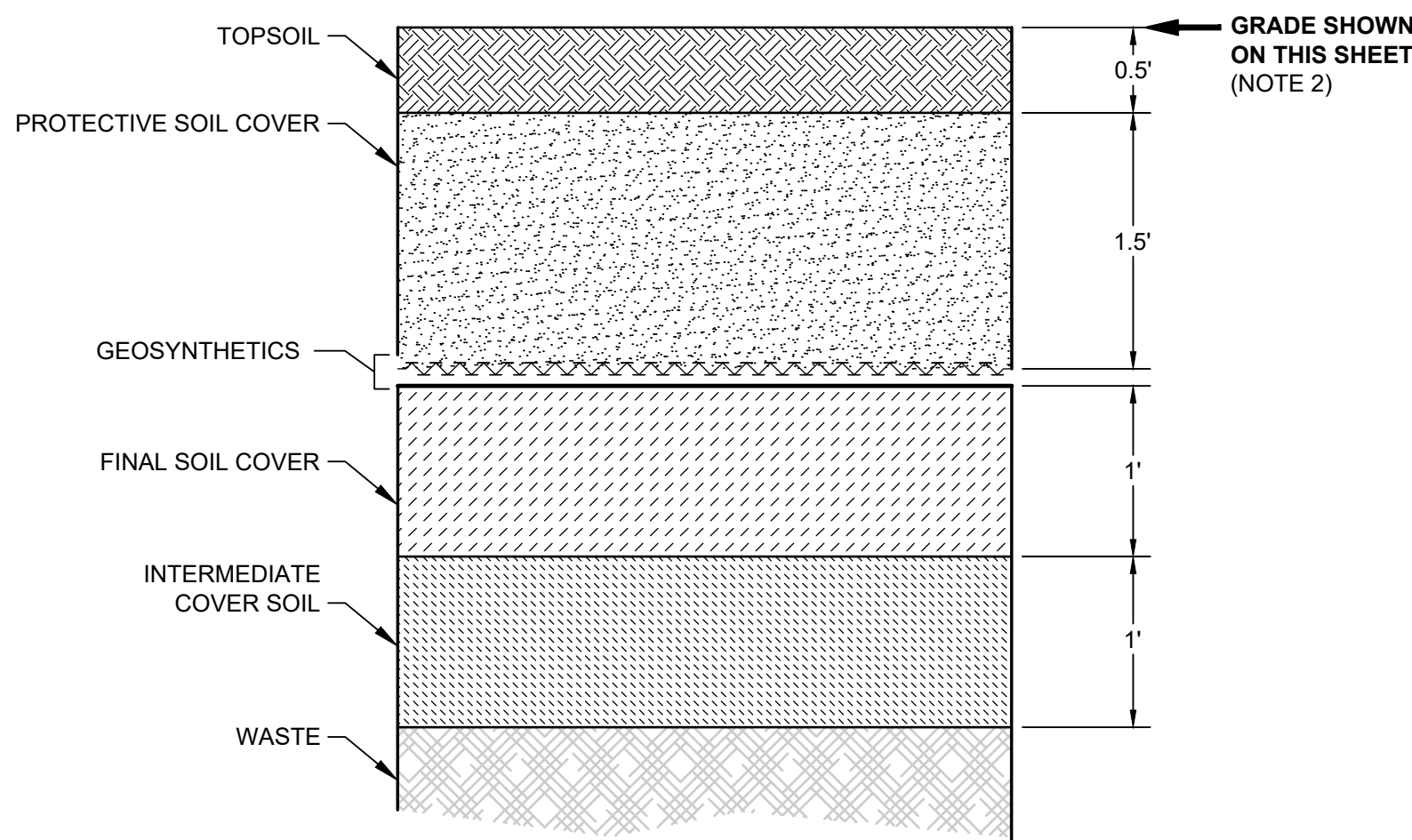
DATE: MARCH 2026
FILE NO.: ME1418A.03-C20
Geosyntec
consultants
engineers | scientists | innovators
10211 WINCOPIN CIRCLE
4TH FLOOR
COLUMBIA, MD 21044
410.381.4333

ANNE ARUNDEL COUNTY									
DEPARTMENT OF PUBLIC WORKS									
REVISED		APPROVED:		DATE		APPROVED:		DATE	
DATE	BY					SCALE:		NOTED	
	DRAWN BY:					BW/MJ			
	CHECKED BY:					MV			
	DRAWING NO.:					19 OF 30			
		CHIEF ENGINEER		PROJECT MANAGER		PROJECT NO.:		ME1418A	
		APPROVED:		DATE		APPROVED:		DATE	
		ASSISTANT CHIEF ENGINEER		CHIEF RIGHT-OF-WAY					
						TITLE:		CELL 9 VERTICAL EXPANSION MILLERSVILLE LANDFILL AND RESOURCE RECOVERY FACILITY	
								UNDERDRAIN SYSTEM-SUBCELL 9.4 AND 9.5	



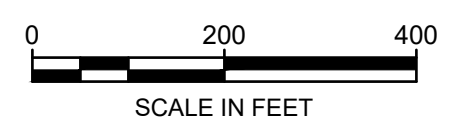


- LEGEND**
- PROPERTY BOUNDARY
 - EXISTING TOPOGRAPHY CONTOUR (FEET-MSL)
 - PROPOSED FINAL GRADE CONTOUR (FEET-MSL)
 - STRUCTURE / BUILDING
 - FENCE
 - PAVED DRIVE
 - GRAVEL DRIVE
 - TREELINE
 - STREAM / WATERLINE
 - CELL 9 FOOTPRINT
 - SUBCELL BOUNDARY
 - LITTER FENCE
 - GUARDRAIL
 - RIPRAP
 - DOWNCHUTE
 - TACK-ON BENCH
 - ACCESS ROAD
 - PERIMETER ROAD
 - TOP WIDTH 29' WIDENED CHANNEL
 - 28' FOREBAY



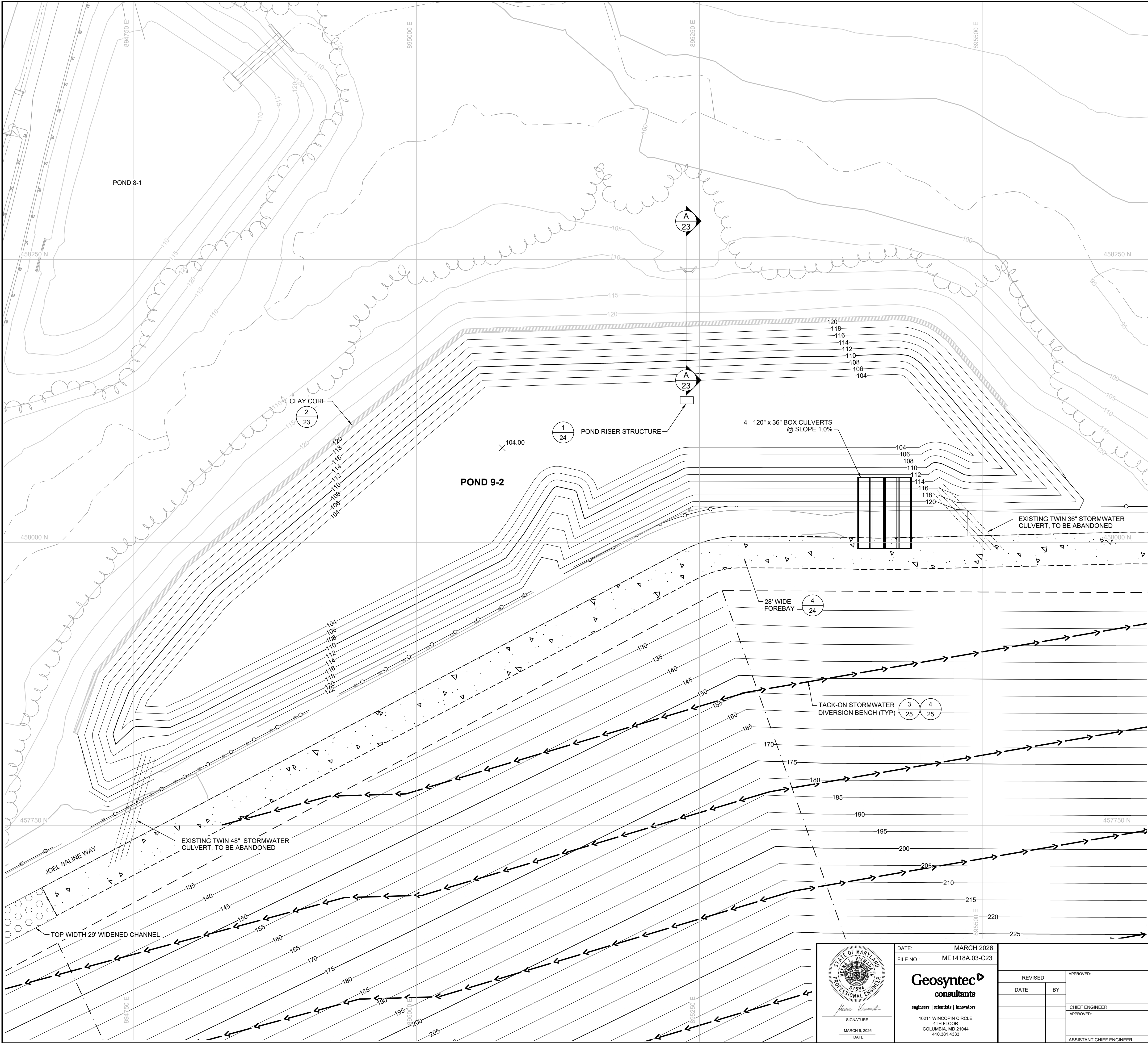
1
-
DETAIL
COVER SYSTEM (TYP.)
SCALE: NTS

- NOTES:
- SEE SHEET 2 FOR GENERAL NOTES.
 - THE FINAL COVER ELEVATIONS PRESENTED ON THIS SHEET APPLY WHETHER THE FINAL COVER SYSTEM OR THE ALTERNATIVE FINAL COVER SYSTEM IS SELECTED (SEE SHEET 13). THE FINAL COVER SYSTEM SHOWN HERE IS FOR ILLUSTRATION PURPOSES ONLY.
 - THE STORMWATER FEATURES PRESENTED ON THIS SHEET ARE DESIGNED TO ACCOMMODATE RUN-OFF FROM EITHER THE FINAL COVER SYSTEM OR THE ALTERNATIVE FINAL COVER SYSTEM.



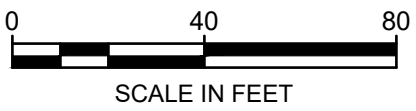
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	DATE:	MARCH 2026							
	FILE NO.:	ME1418A.03-C22							
	Geosyntec consultants engineers scientists innovators								
	10211 WINCOPIN CIRCLE 4TH FLOOR COLUMBIA, MD 21044 410.381.4333								
	SIGNATURE MARCH 6, 2024 DATE								
		ANNE ARUNDEL COUNTY DEPARTMENT OF PUBLIC WORKS							
REVISED		APPROVED:	DATE	APPROVED:	DATE	SCALE:	NOTED	PROJECT:	CELL 9 VERTICAL EXPANSION MILLERSVILLE LANDFILL AND RESOURCE RECOVERY FACILITY
DATE		BY				DRAWN BY:	BW/MJ		
		CHIEF ENGINEER		PROJECT MANAGER		CHECKED BY:	MV		
		APPROVED:	DATE	APPROVED:	DATE	DRAWING NO.:	21 OF 30	TITLE:	
		ASSISTANT CHIEF ENGINEER		CHIEF RIGHT-OF-WAY		PROJECT NO.:	ME1418A	STORMWATER MANAGEMENT PLAN	



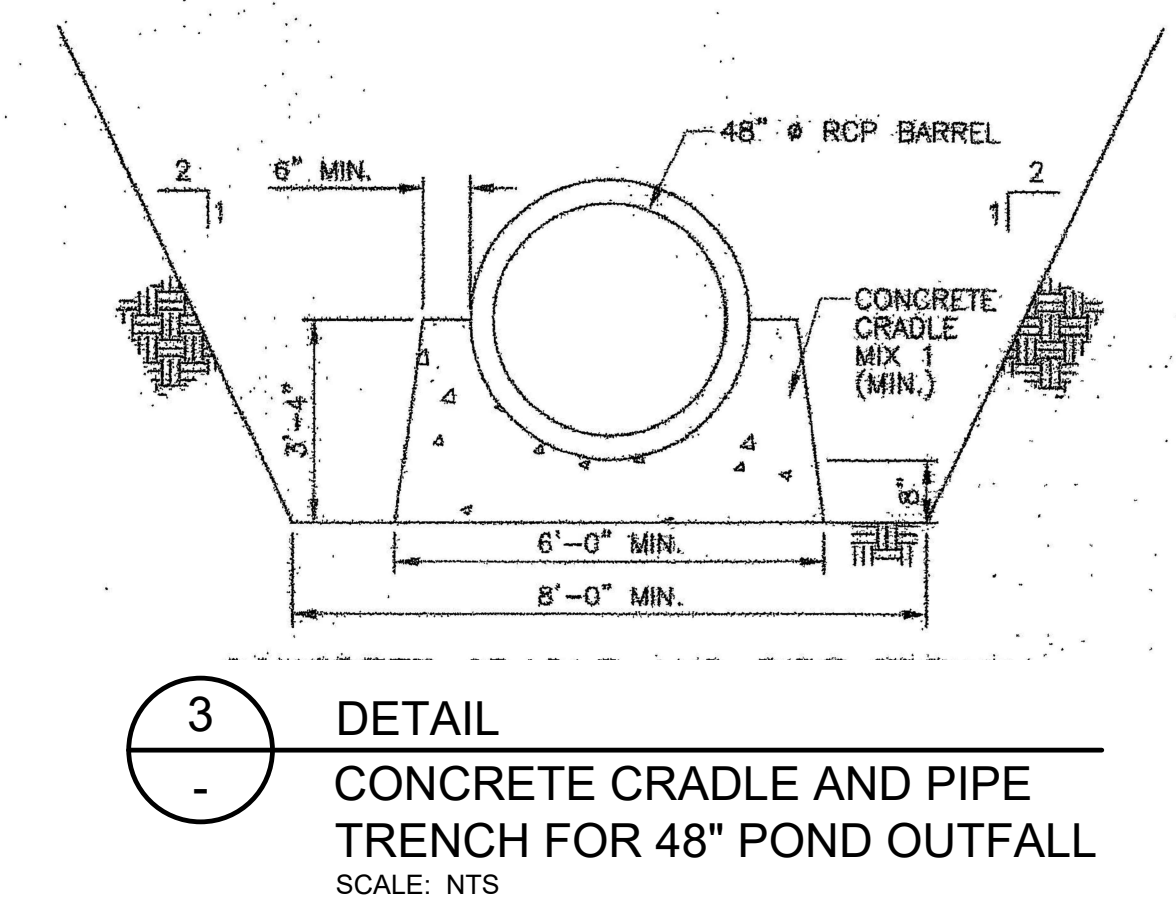
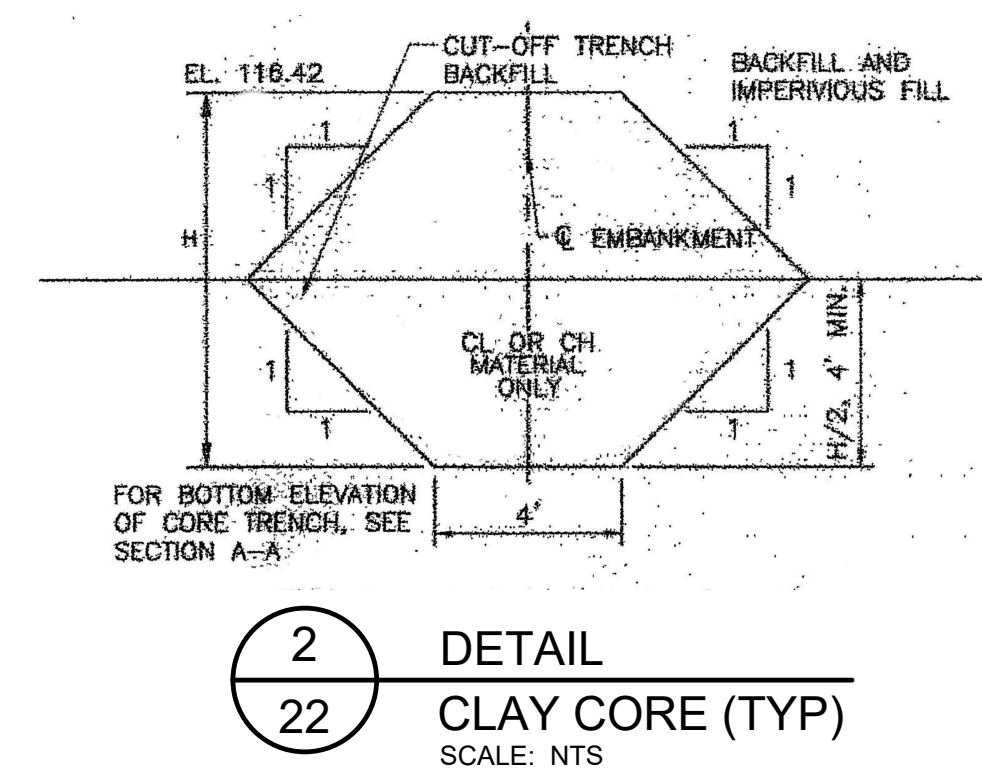
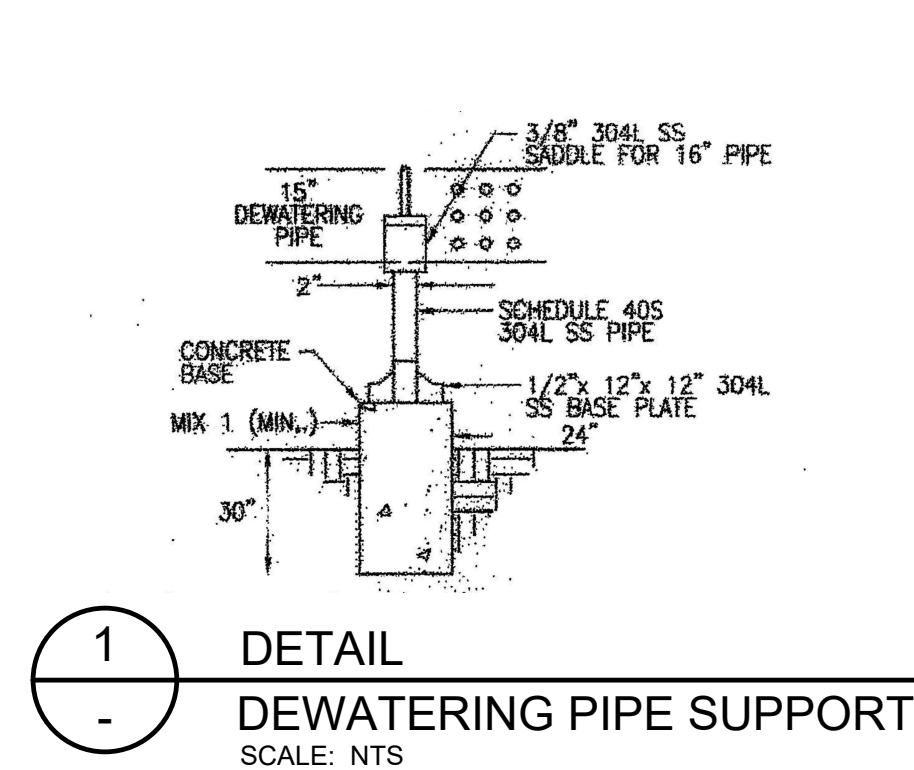
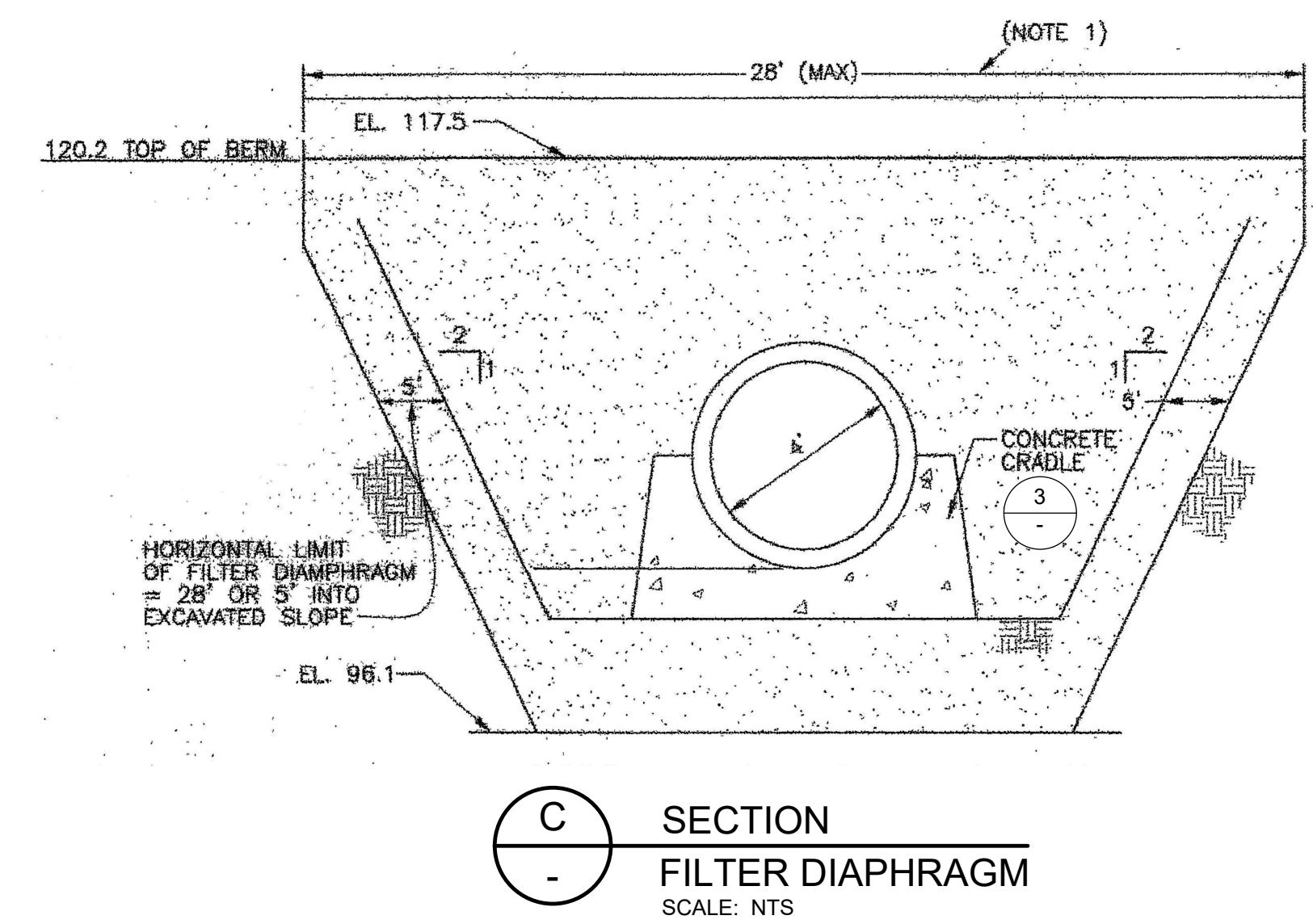
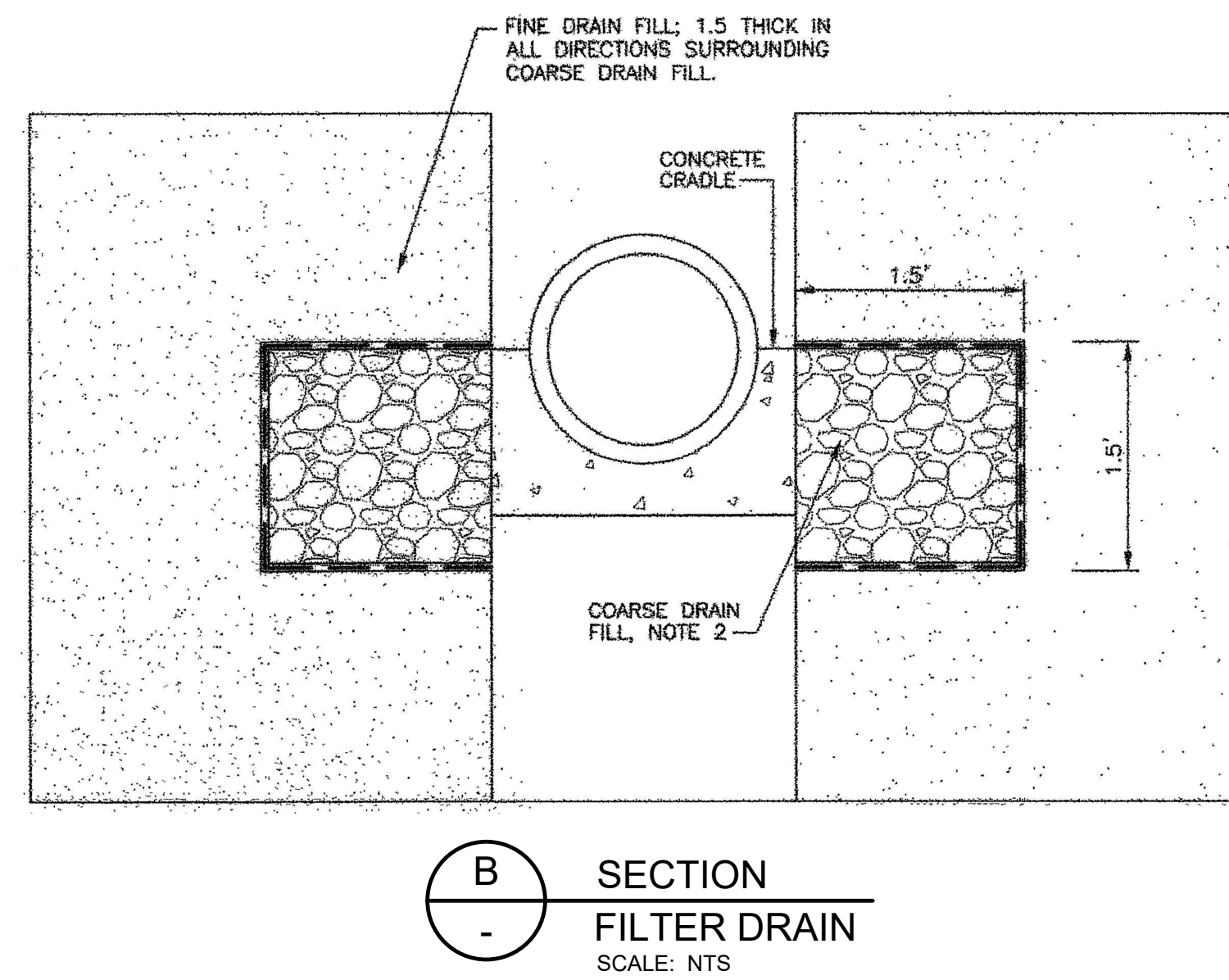
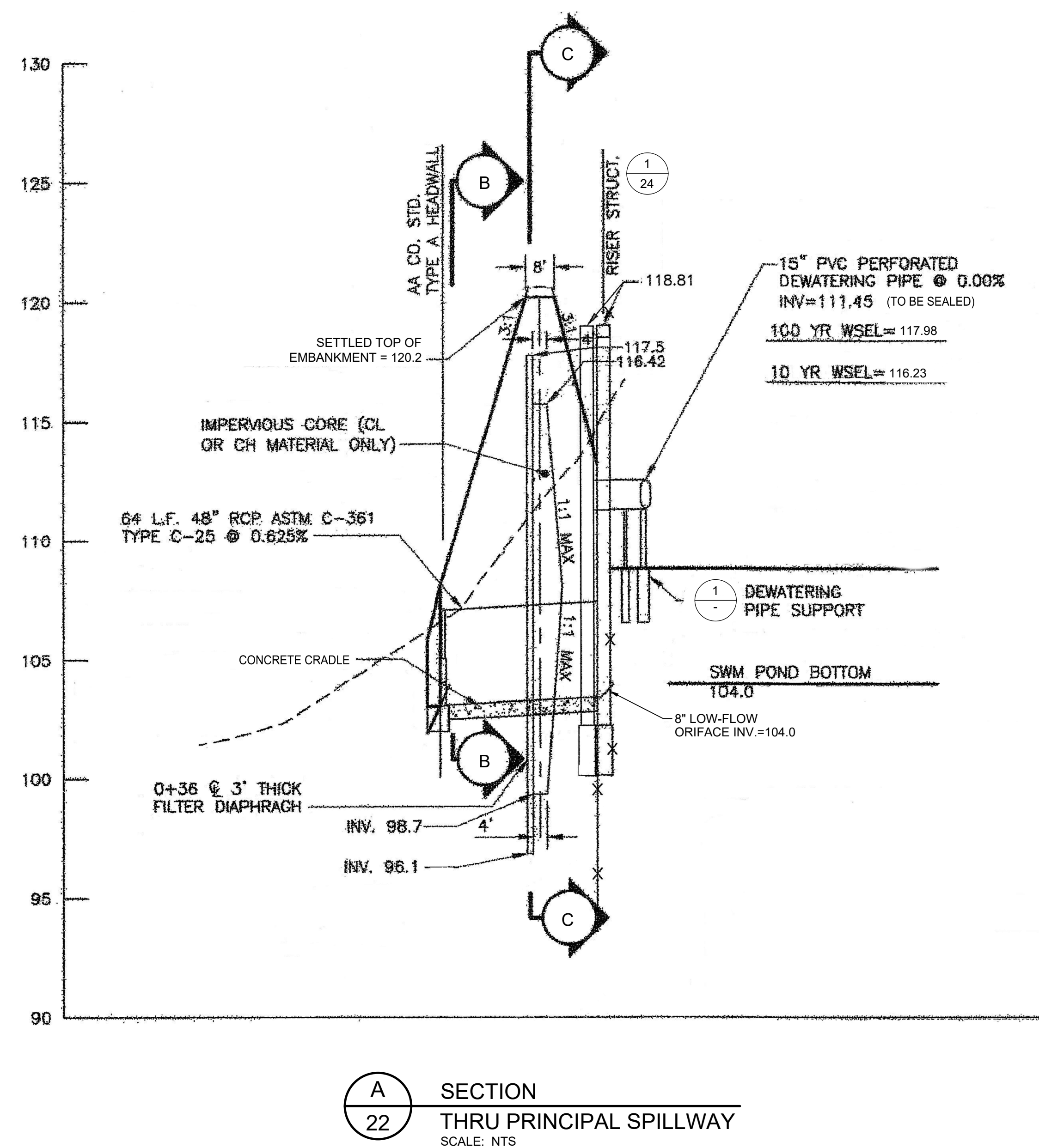
- LEGEND**
- PROPERTY BOUNDARY
 - EXISTING TOPOGRAPHY CONTOUR (FEET-MSL)
 - PROPOSED FINAL GRADE CONTOUR (FEET-MSL)
 - PAVED DRIVE
 - TREELINE
 - STREAM / WATERLINE
 - CELL 9 FOOTPRINT
 - SUBCELL BOUNDARY
 - LITTER FENCE
 - GUARDRAIL
 - STORMWATER CULVERT
 - RIPRAP
 - TACK-ON BENCH
 - ACCESS ROAD
 - TOP WIDTH 29' WIDENED CHANNEL
 - 28' FOREBAY

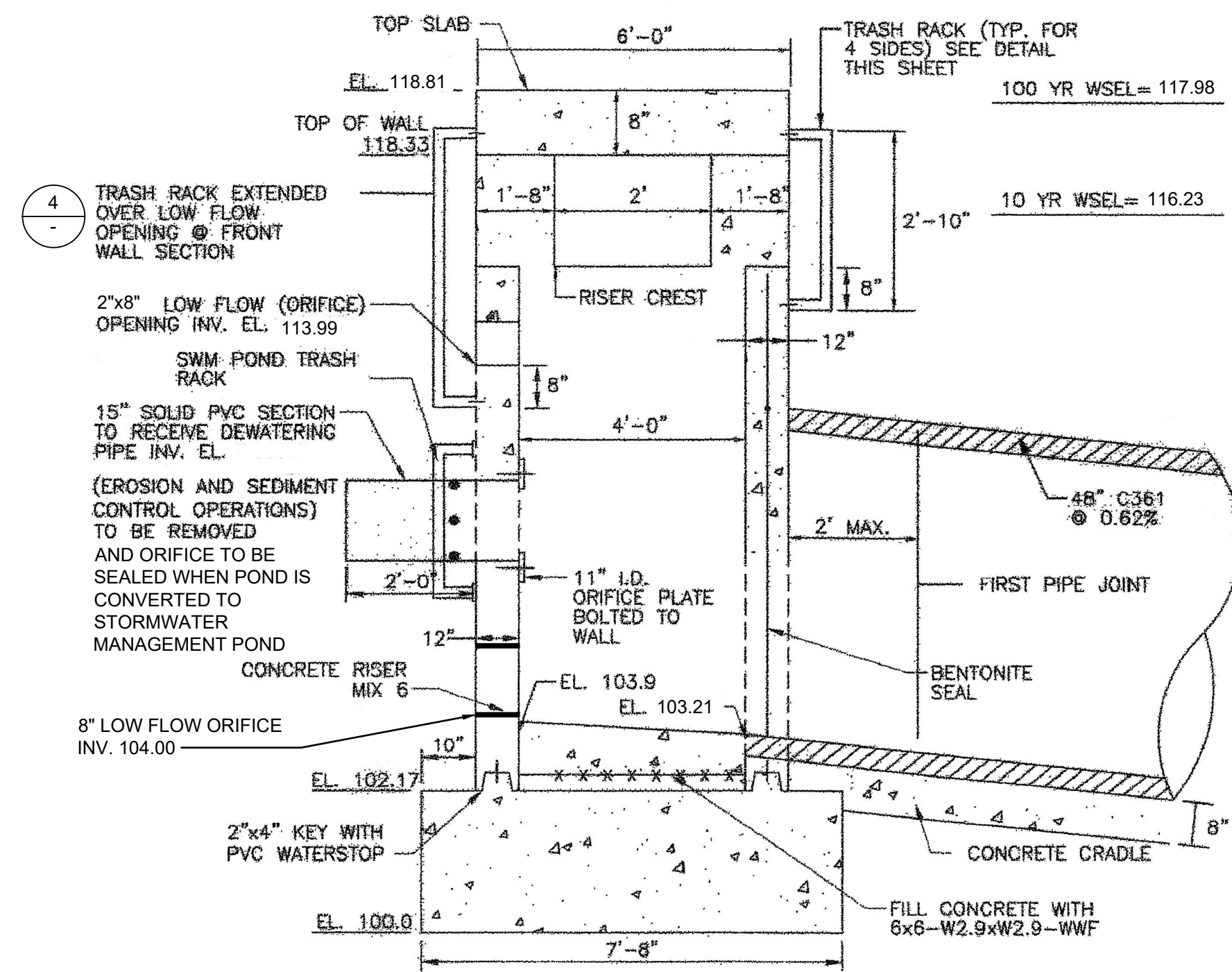
NOTES:
1. SEE SHEET 2 FOR GENERAL NOTES.



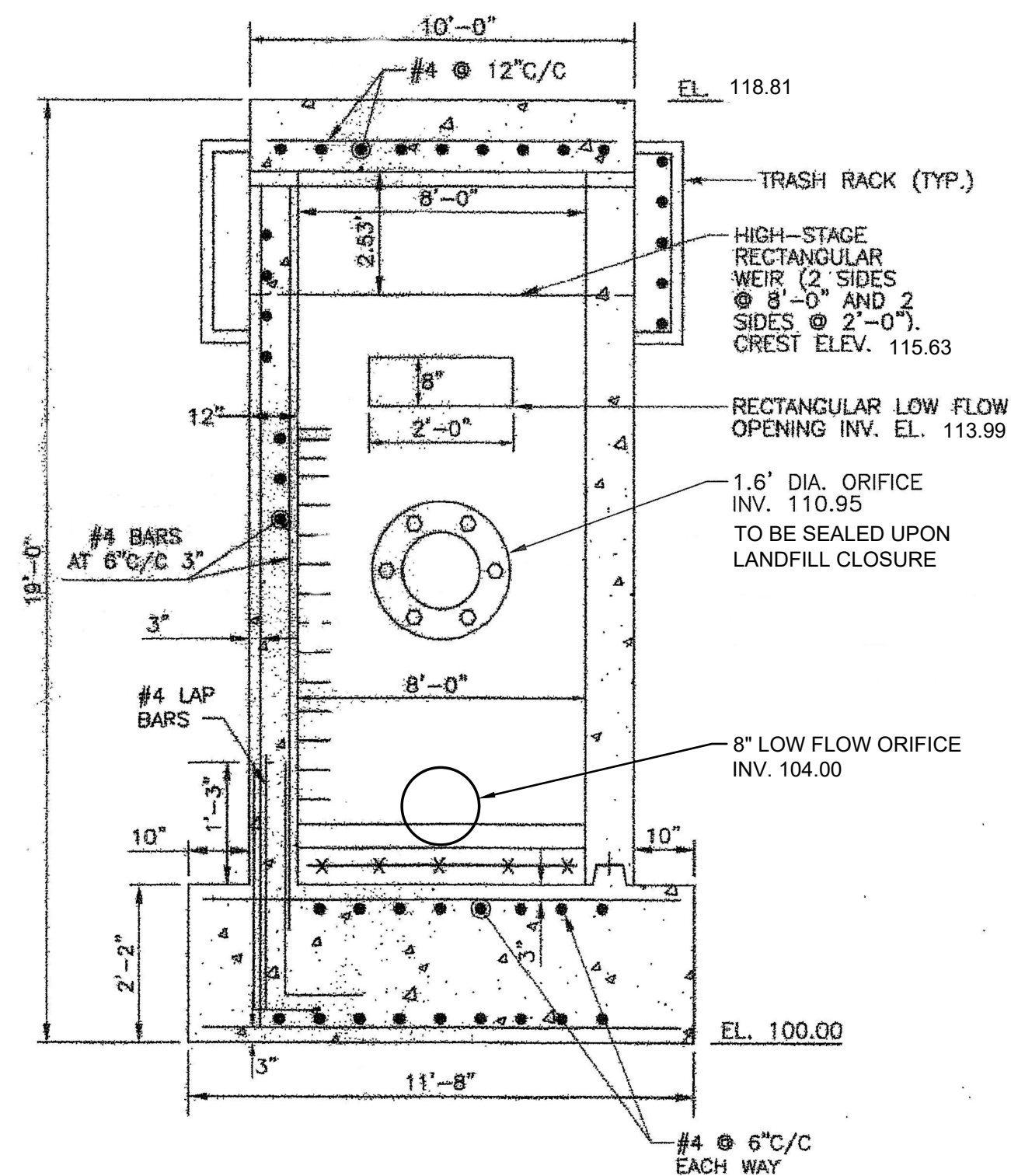
ANNE ARUNDEL COUNTY									
DEPARTMENT OF PUBLIC WORKS									
DATE: MARCH 2026		APPROVED:		DATE:		APPROVED:		DATE:	
FILE NO.: ME1418A.03-C23		REVIS		BY		CHIEF ENGINEER		PROJECT MANAGER	
		DATE				APPROVED:		DATE:	
						ASSISTANT CHIEF ENGINEER		CHIEF RIGHT-OF-WAY	
		engineers scientists innovators		10211 WINCOPIN CIRCLE 4TH FLOOR COLUMBIA, MD 21044 410.381.4333		SCALE: NOTED		PROJECT: CELL 9 VERTICAL EXPANSION MILLERSVILLE LANDFILL AND RESOURCE RECOVERY FACILITY	
SIGNATURE MARCH 6, 2026 DATE						DRAWN BY: BW/MJ		TITLE: POND 9-2 PLAN - STORMWATER	
						CHECKED BY: MV			
						DRAWING NO.: 22 OF 30			
						PROJECT NO.: ME1418A			

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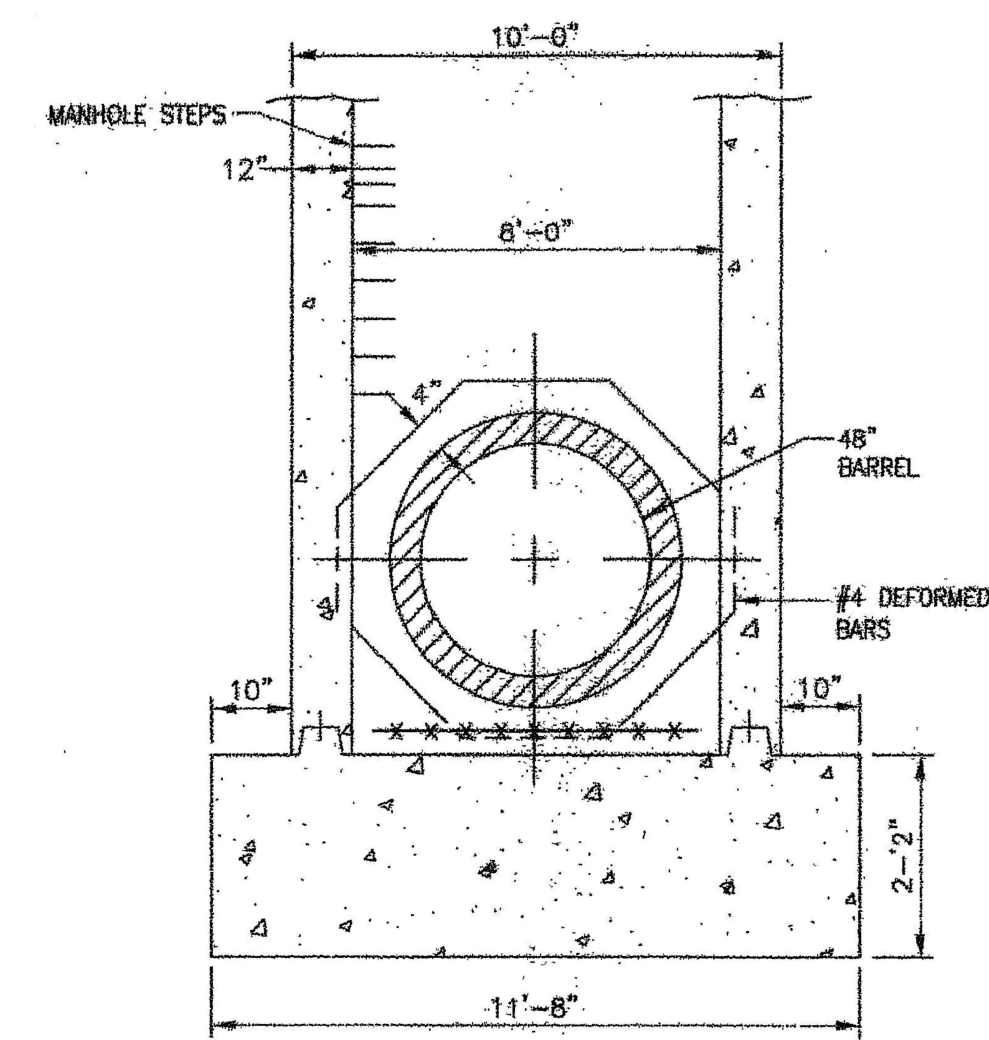




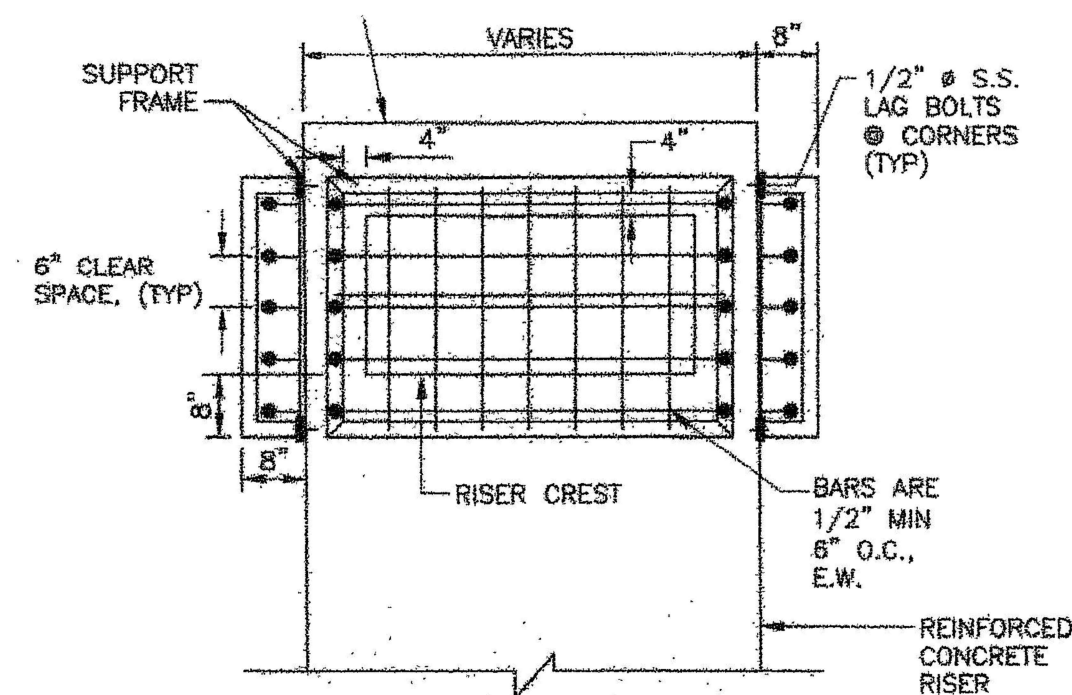
1
22 SECTION
THROUGH CENTER OF
PRINCIPAL SPILLWAY RISER
SCALE: 1" = 1'



2
- SECTION
FRONT VIEW OF
PRINCIPAL SPILLWAY RISER
SCALE: NTS



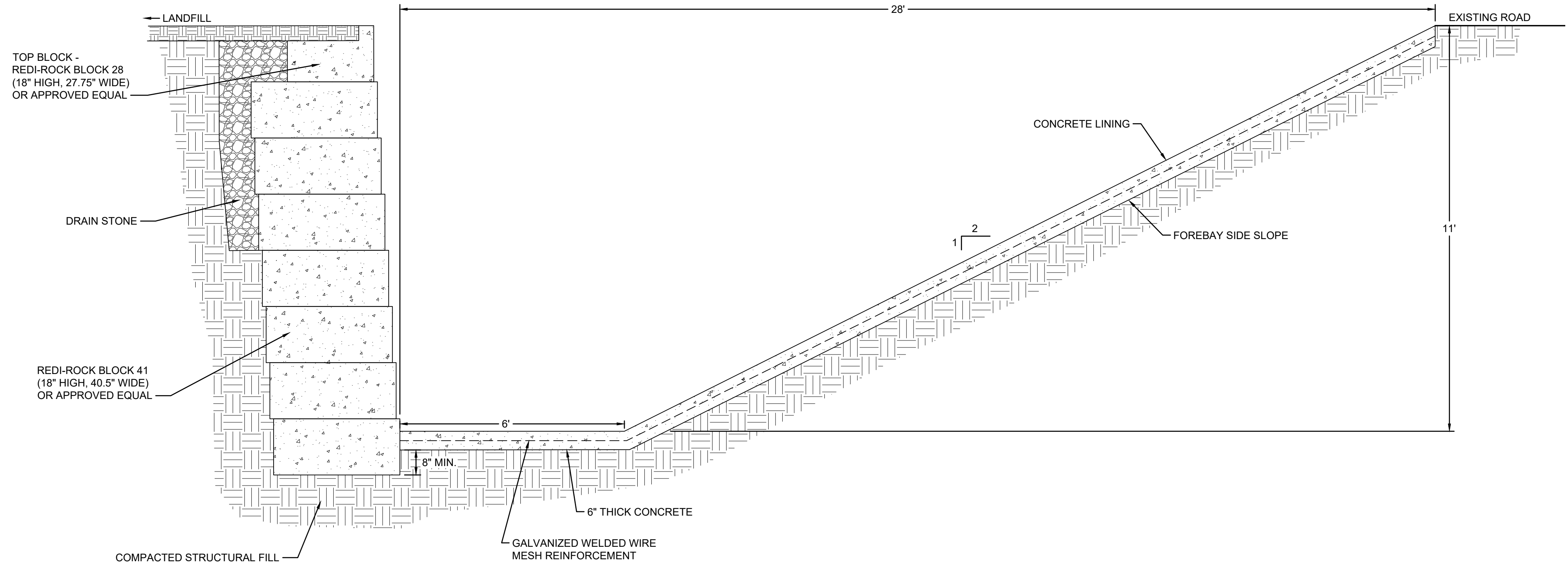
3
- SECTION
REAR VIEW OF
PRINCIPAL SPILLWAY RISER
SCALE: NTS



4
- DETAIL
TRASH RACK
SCALE: NTS

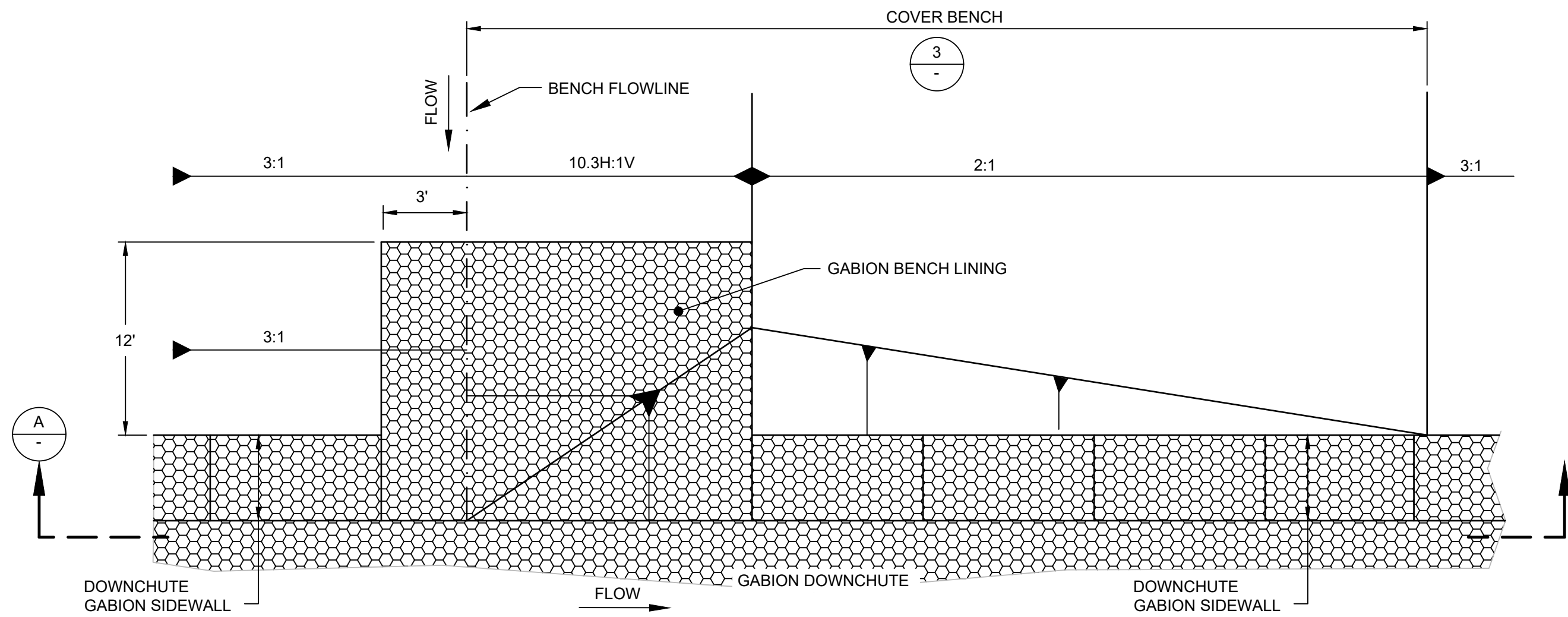
NOTES: TRASH RACKS, ETC. TO BE BOLTED ONTO STRUCTURE BY USING STAINLESS STEEL ANCHOR BOLTS W/ THREADED INSERTS. ALL OPENINGS IN WALLS TO BE PRECAST. ADDITIONAL REINFORCING FOR PIPES THROUGH RISER TO BE PRECAST.

AT CONVERSION FROM SEDIMENT BASIN TO STORMWATER MANAGEMENT POND, A TRASH RACK OVER THE DEWATERING ORIFICE MUST BE INSTALLED.
ALL TRASH RACKS SHALL BE HOT-DIPPED GALVANIZED, OR GLASS REINFORCED HDPE.

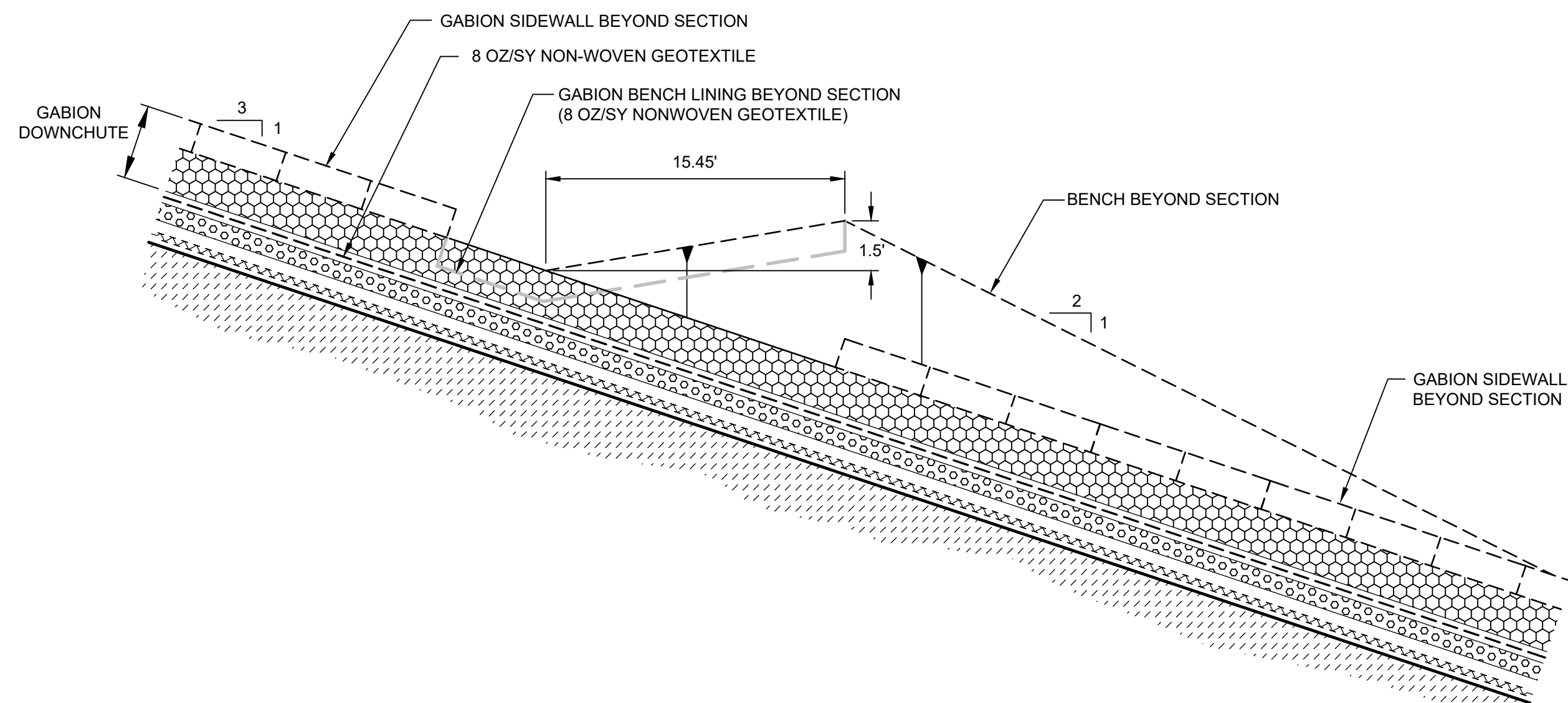


5
21 SECTION
SEDIMENT FOREBAY
SCALE: NTS

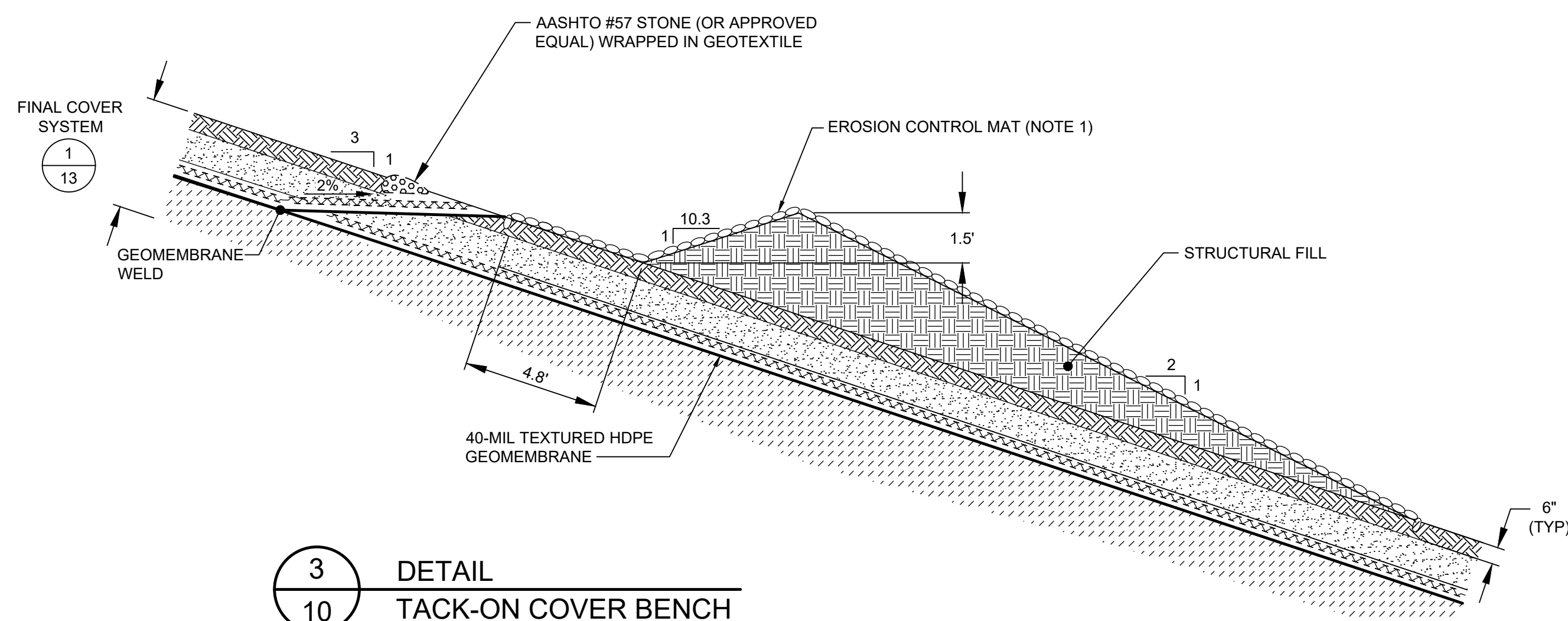
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REVISED	APPROVED:	DATE	APPROVED:	DATE	SCALE:	NOTED	PROJECT:
DATE	BY				DRAWN BY:	BW/MJ	CELL 9 VERTICAL EXPANSION
					CHECKED BY:	MV	MILLERSVILLE LANDFILL AND
	CHIEF ENGINEER		PROJECT MANAGER				RESOURCE RECOVERY FACILITY
	APPROVED:	DATE	APPROVED:	DATE	DRAWING NO.:	24 OF 30	TITLE:
	ASSISTANT CHIEF ENGINEER		CHIEF RIGHT-OF-WAY		PROJECT NO.:	ME1418A	SPILLWAY RISER AND TRASH RACK
							DETAILS



1
21 DETAIL
DOWNCHUTE / TACK-ON COVER BENCH INTERSECTION
SCALE: NTS

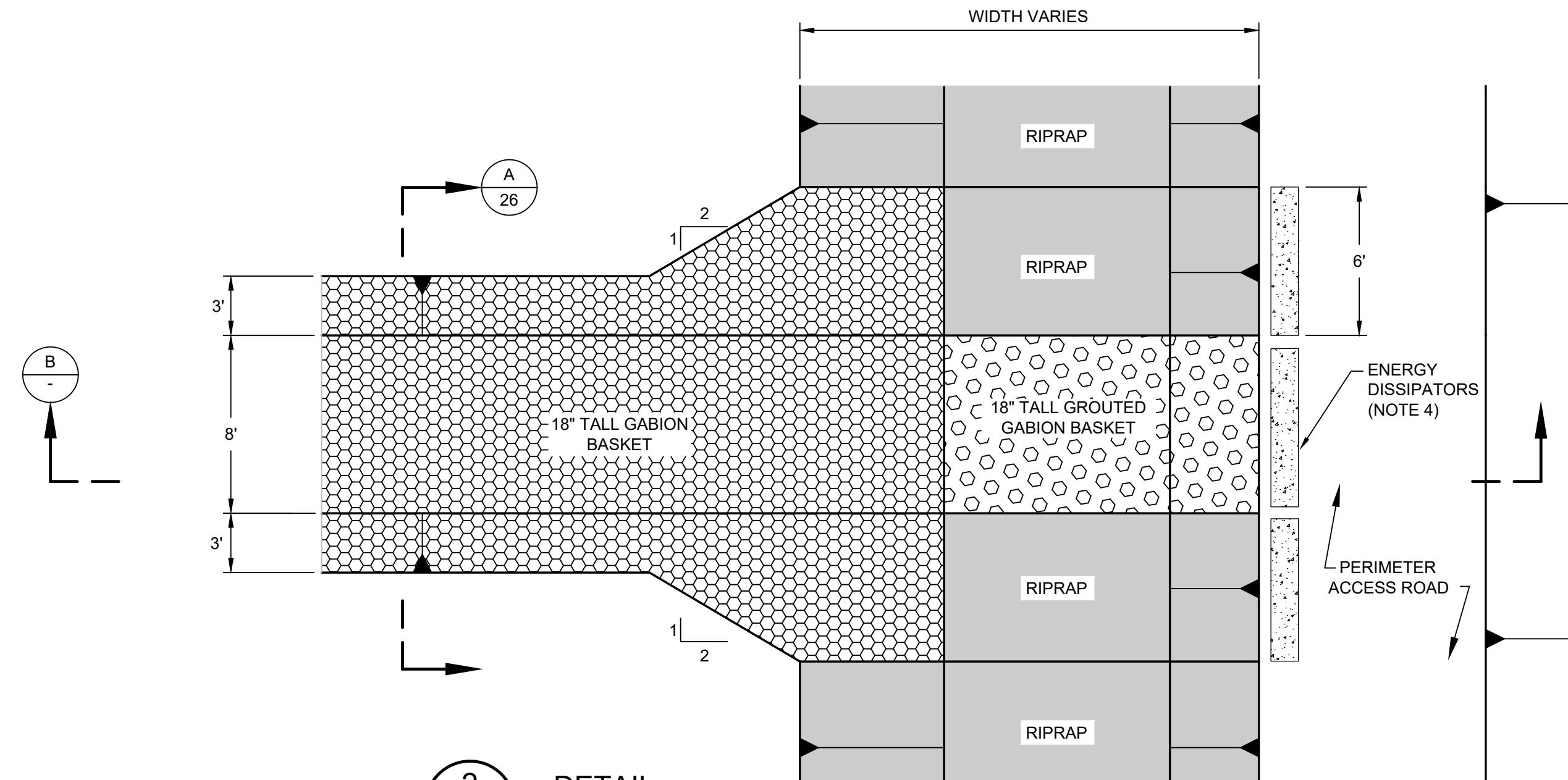


A
- SECTION
DOWNCHUTE / TACK-ON COVER BENCH INTERSECTION
SCALE: NTS

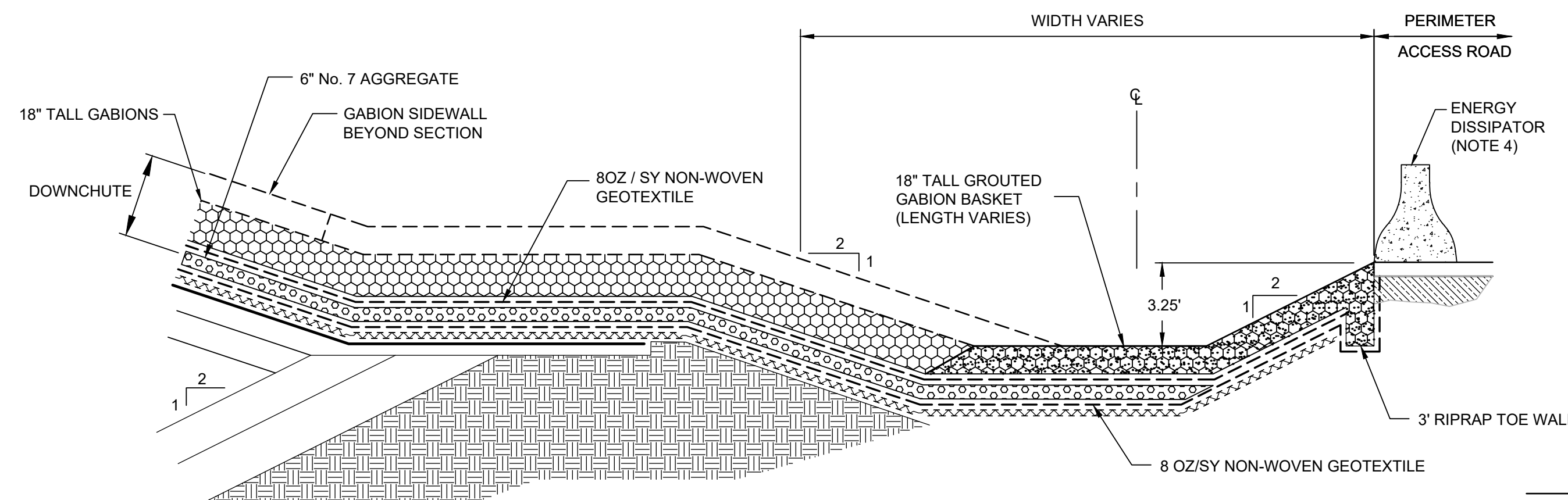


3
10 DETAIL
TACK-ON COVER BENCH
SCALE: NTS

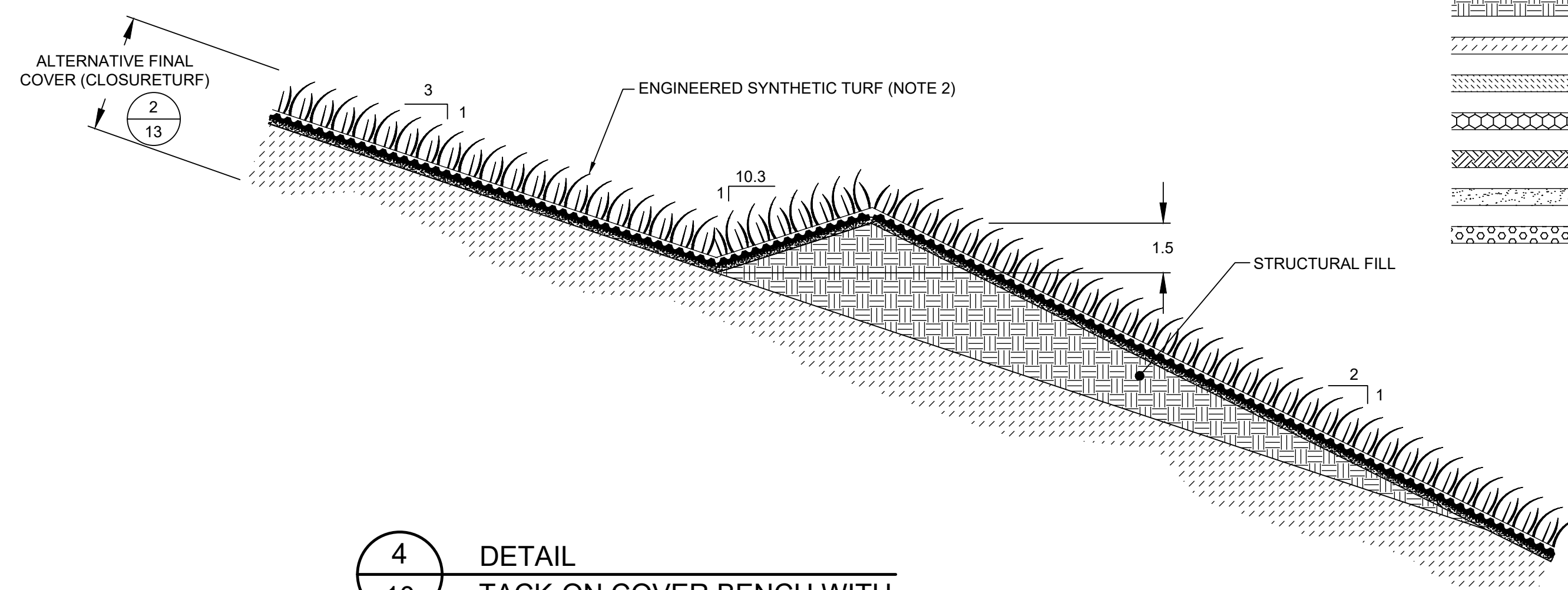
- NOTES:
- ALL BENCHES SHALL BE LINED WITH TEMPORARY EROSION CONTROL MATTING MEETING THE FOLLOWING CRITERIA:
 - LONGEVITY GREATER THAN 6 MONTHS
 - MAXIMUM FLOW VELOCITY GREATER THAN 6 FT/S
 - MAXIMUM SHEAR STRESS GREATER THAN 1.5 PSF
 - IF ALTERNATIVE FINAL COVER IS USED, DOWNCHUTES SHALL BE LINED WITH HYDROTURF (DETAIL 3 / SHEET 26). DOWNCHUTE / PERIMETER CHANNEL INTERSECTION IS DESIGNED TO ACCOMMODATE FLOW FROM EITHER GABION-LINED OR HYDROTURF-LINED DOWNCHUTES.
 - GABION THICKNESS AND FILL PER MANUFACTURER'S RECOMMENDATION.
 - ENERGY DISSIPATION STRUCTURE SHALL BE DESIGNED PRIOR TO LANDFILL CLOSURE.



2
21 DETAIL
DOWNCHUTE / PERIMETER CHANNEL INTERSECTION
SCALE: NTS



B
- SECTION
DOWNCHUTE / PERIMETER CHANNEL INTERSECTION
SCALE: NTS

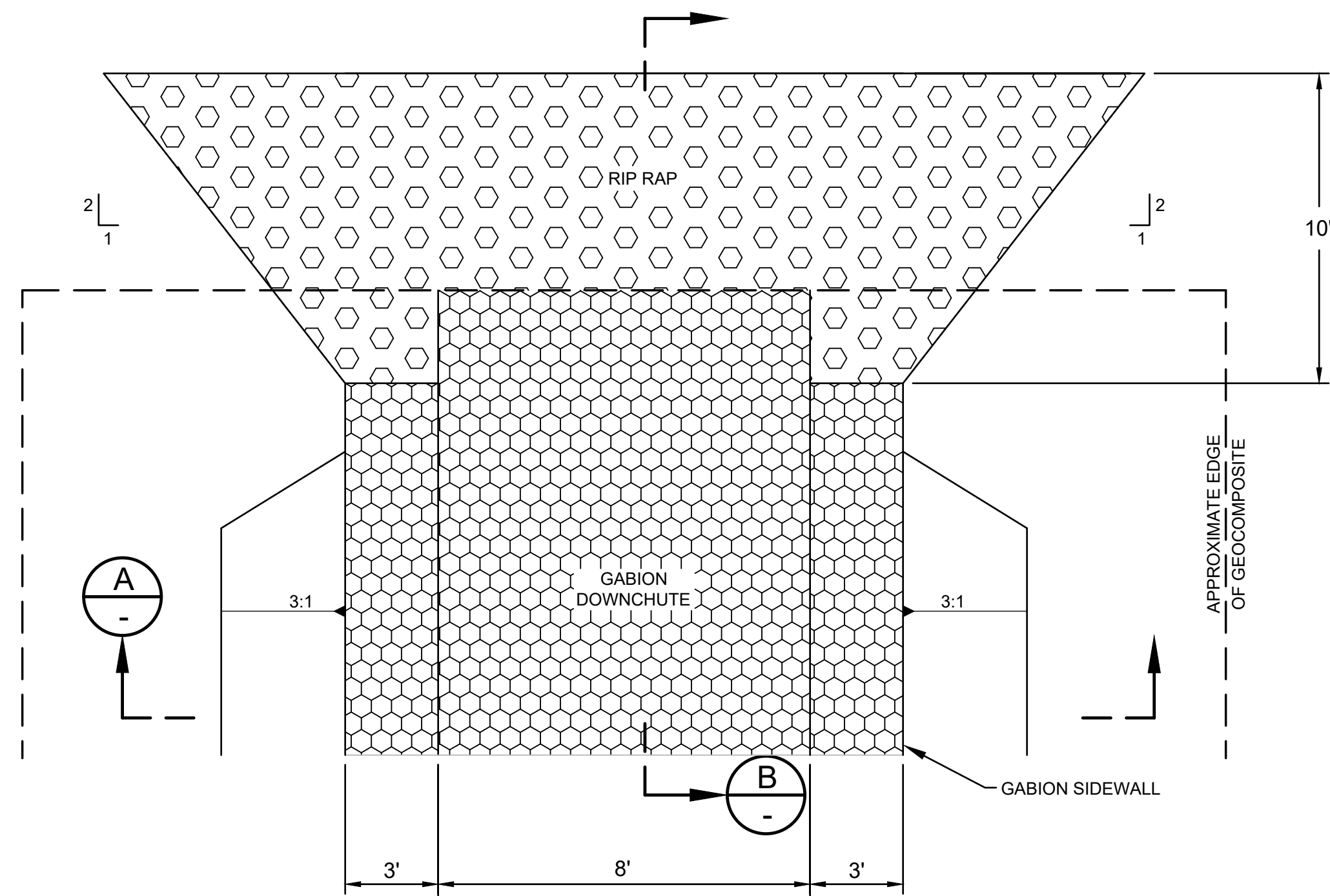


4
10 DETAIL
TACK-ON COVER BENCH WITH
ALTERNATIVE FINAL COVER
SCALE: NTS

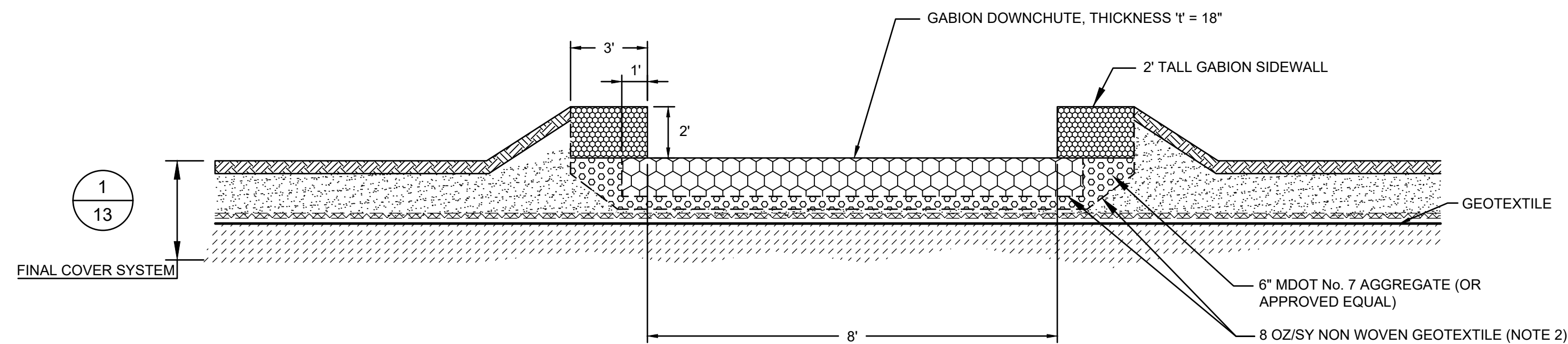
LEGEND	
---	GEOTEXTILE
~~~~~	GEOCOMPOSITE
----	GEOMEMBRANE
	WASTE
	STRUCTURAL FILL
	FINAL COVER SOIL
	INTERMEDIATE COVER SOIL
	GABION BASKET
	TOPSOIL
	PROTECTIVE SOIL COVER
	DOWNCHUTE AGGREGATE

 SIGNATURE MARCH 6, 2026 DATE	DATE: MARCH 2026 FILE NO.: ME1418A.03-C26	ANNE ARUNDEL COUNTY DEPARTMENT OF PUBLIC WORKS			
	<b>Geosyntec</b> consultants engineers   scientists   innovators 10211 WINCOPIN CIRCLE 4TH FLOOR COLUMBIA, MD 21044 410.381.4333	REVISIONS DATE BY CHIEF ENGINEER APPROVED:	APPROVED: DATE PROJECT MANAGER APPROVED: DATE ASSISTANT CHIEF ENGINEER CHIEF RIGHT-OF-WAY	SCALE: NOTED DRAWN BY: BW/MJ CHECKED BY: MV DRAWING NO.: 25 OF 30 PROJECT NO.: ME1418A	PROJECT: CELL 9 VERTICAL EXPANSION MILLERSVILLE LANDFILL AND RESOURCE RECOVERY FACILITY TITLE: STORMWATER MANAGEMENT SYSTEM DETAILS I

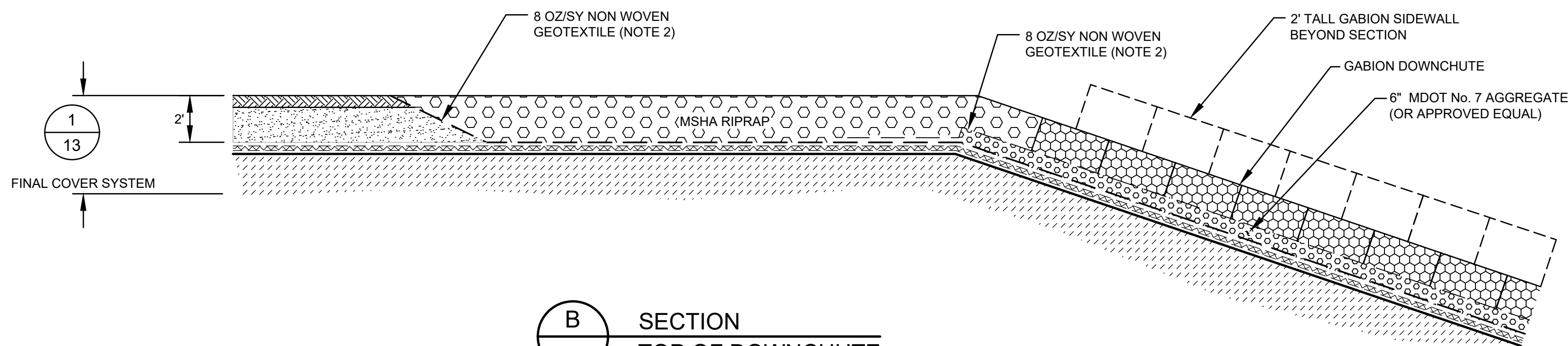




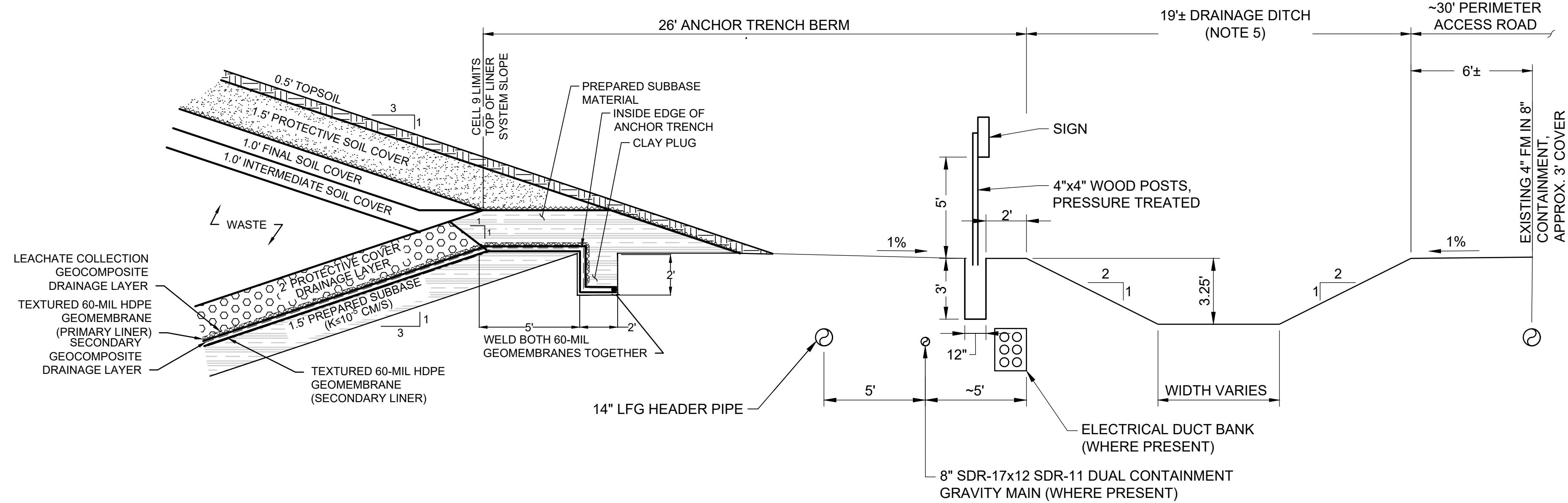
**1**  
**21** **DETAIL**  
**TOP OF DOWNCHUTE**  
SCALE: NTS



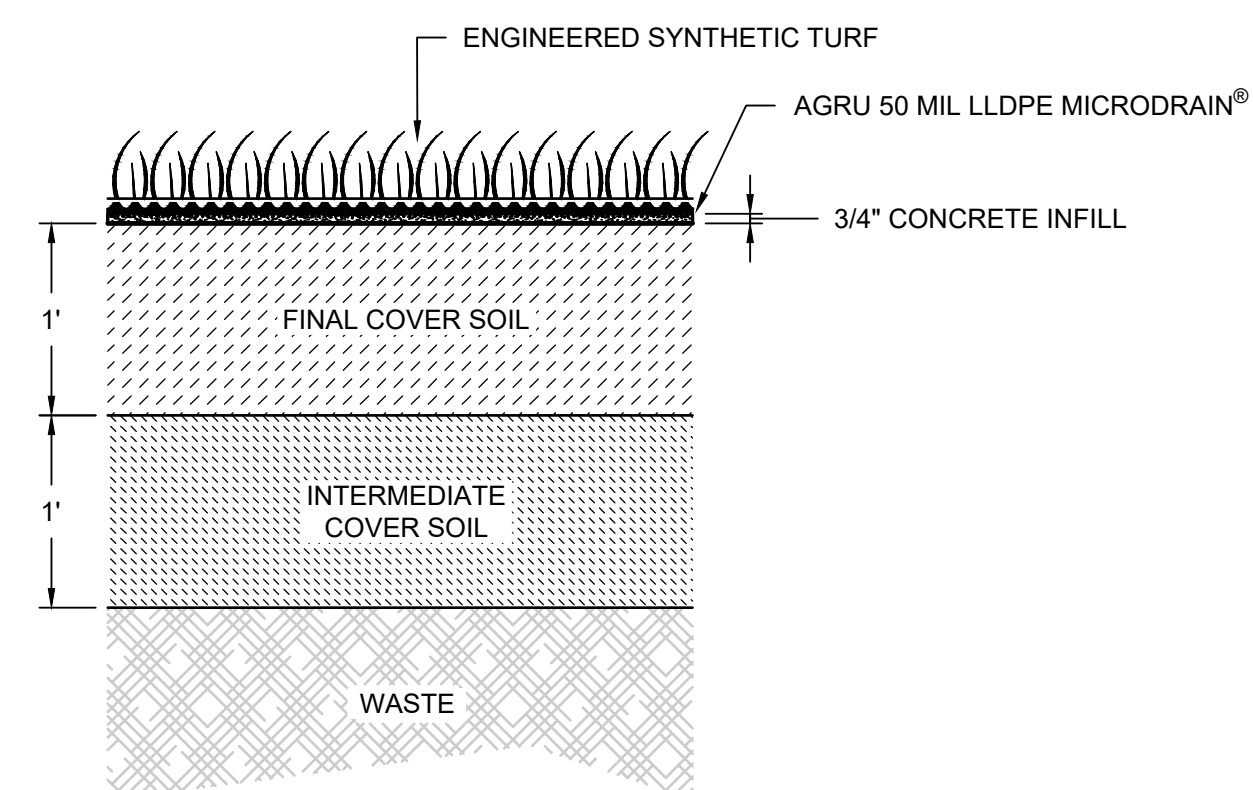
**A**  
**-** **SECTION**  
**DOWNCHUTE**  
SCALE: NTS



**B**  
**-** **SECTION**  
**TOP OF DOWNCHUTE**  
SCALE: NTS



**2**  
**26** **DETAIL**  
**PERIMETER DRAINAGE CHANNEL**  
SCALE: NTS



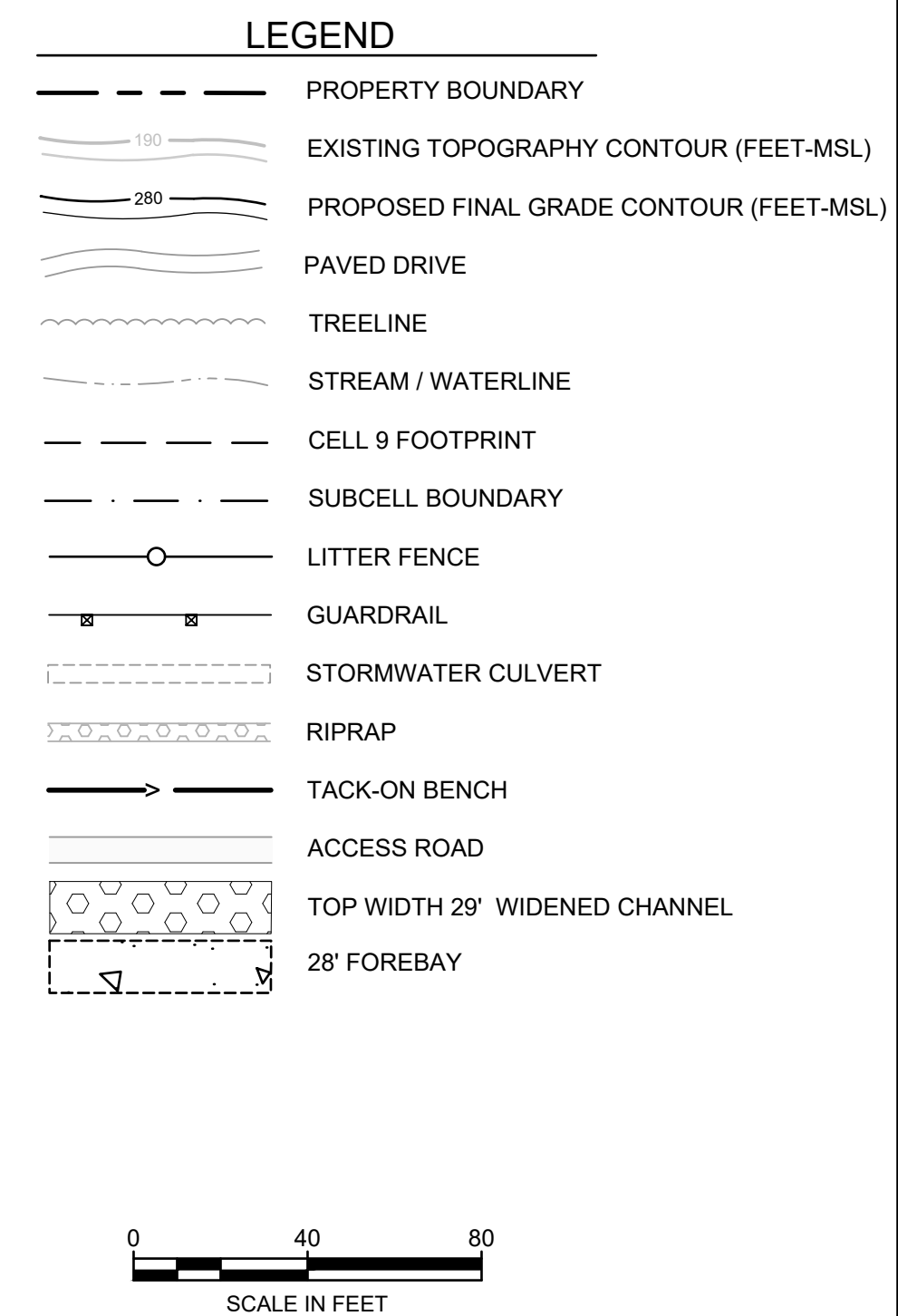
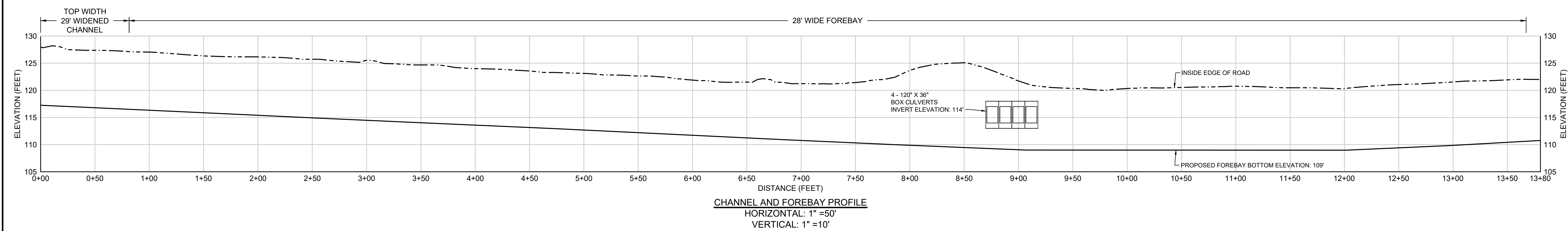
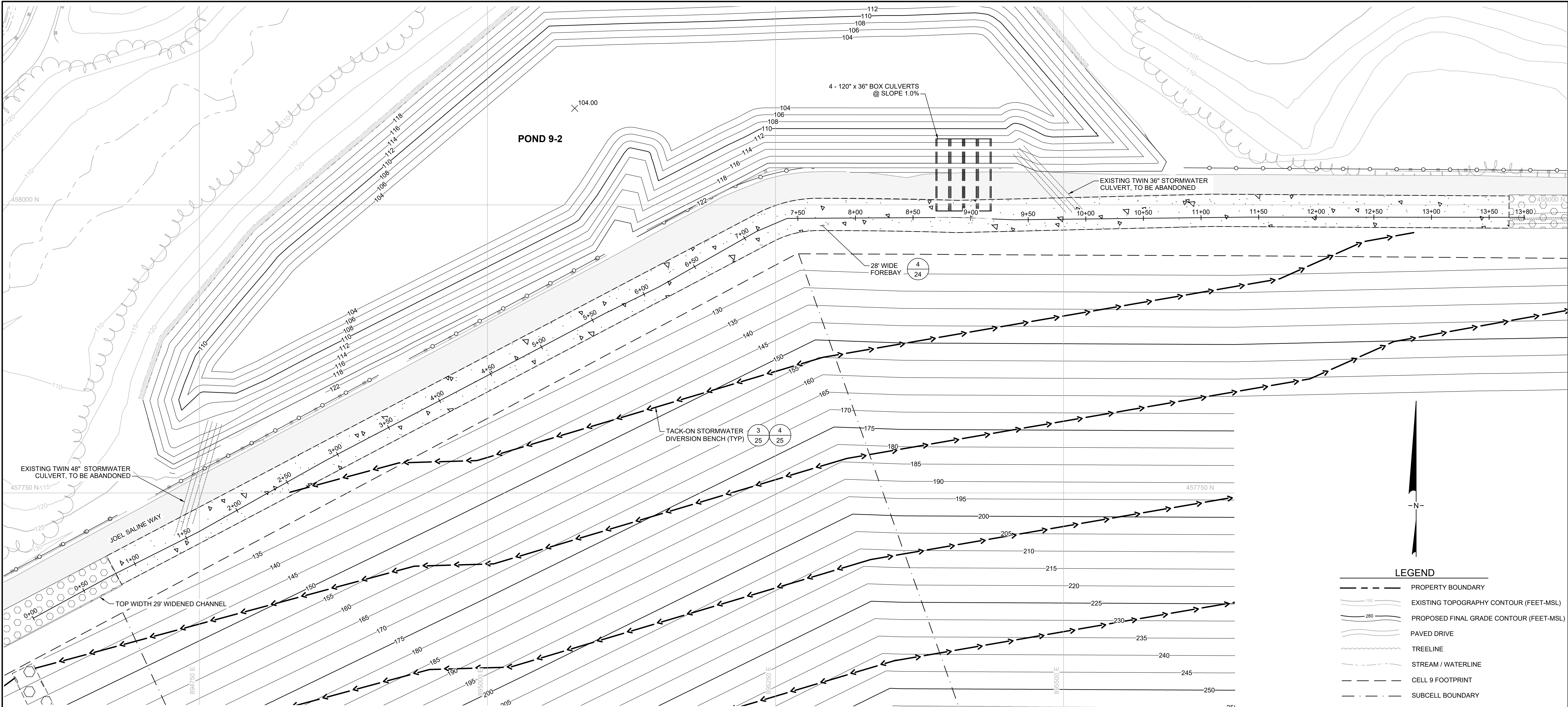
**3**  
**26** **DETAIL**  
**ALTERNATIVE FINAL COVER**  
**DOWNCHUTE LINING (HYDROTURF)**  
(NOTE 4)  
SCALE: NTS

LEGEND	
	GEOTEXTILE
	GEOCOMPOSITE
	GEOMEMBRANE
	WASTE
	STRUCTURAL FILL
	FINAL COVER SOIL
	INTERMEDIATE COVER SOIL
	GABION BASKET
	TOPSOIL
	PROTECTIVE SOIL COVER
	DOWNCHUTE AGGREGATE

- NOTES:
- GABION THICKNESS AND FILL WAS SELECTED PER MANUFACTURER'S RECOMMENDATION.
  - OVERLAP BETWEEN GEOTEXTILES SHALL BE MINIMUM 12 INCHES.
  - GEOSYTHETIC MATERIALS SHOWN AT EXAGGERATED SCALE FOR CLARITY.
  - ALTERNATIVE FINAL COVER DOWNCHUTE LINING IS COMMERCIALY KNOWN AS HYDROTURF® MANUFACTURED BY WATERSHED GEO, LLC.
  - WHERE PERIMETER CHANNEL IS WIDENED TO 29 FEET OR WHERE FOREBAY IS PRESENT, PERIMETER ACCESS ROAD WIDTH SHALL BE REDUCED ACCORDINGLY.
  - SUBCELL 9.1 AND 9.2, WHICH ARE ALREADY CONSTRUCTED, AND SUBCELL 9.3, WHICH IS CURRENTLY UNDER CONSTRUCTION, HAVE LINER SIDESLOPES OF 4H:1V.

		DATE: MARCH 2026		ANNE ARUNDEL COUNTY				
		FILE NO.: ME1418A.03-C27		DEPARTMENT OF PUBLIC WORKS				
<b>Geosyntec</b> consultants engineers   scientists   innovators 10211 WINCOPIN CIRCLE 4TH FLOOR COLUMBIA, MD 21044 410.381.4333		REVISED	APPROVED:	DATE	APPROVED:	DATE	SCALE: NOTED	PROJECT: CELL 9 VERTICAL EXPANSION MILLERSVILLE LANDFILL AND RESOURCE RECOVERY FACILITY
		DATE	BY					
		CHIEF ENGINEER	APPROVED:	DATE	PROJECT MANAGER	APPROVED:	DATE	TITLE: STORMWATER MANAGEMENT SYSTEM DETAILS II
		ASSISTANT CHIEF ENGINEER			CHIEF RIGHT-OF-WAY			
		DRAWING NO.: 26 OF 30		PROJECT NO.: ME1418A				



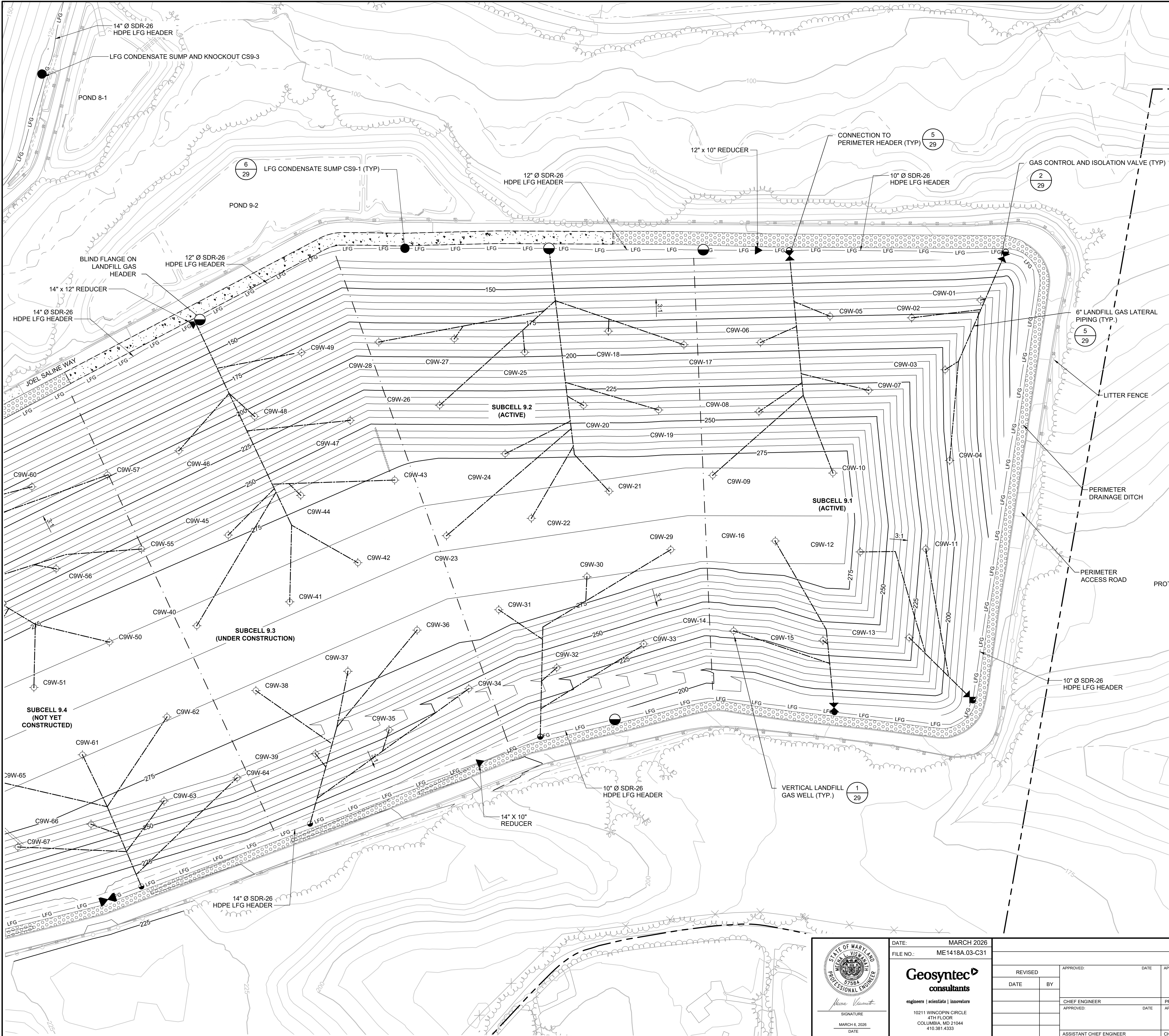


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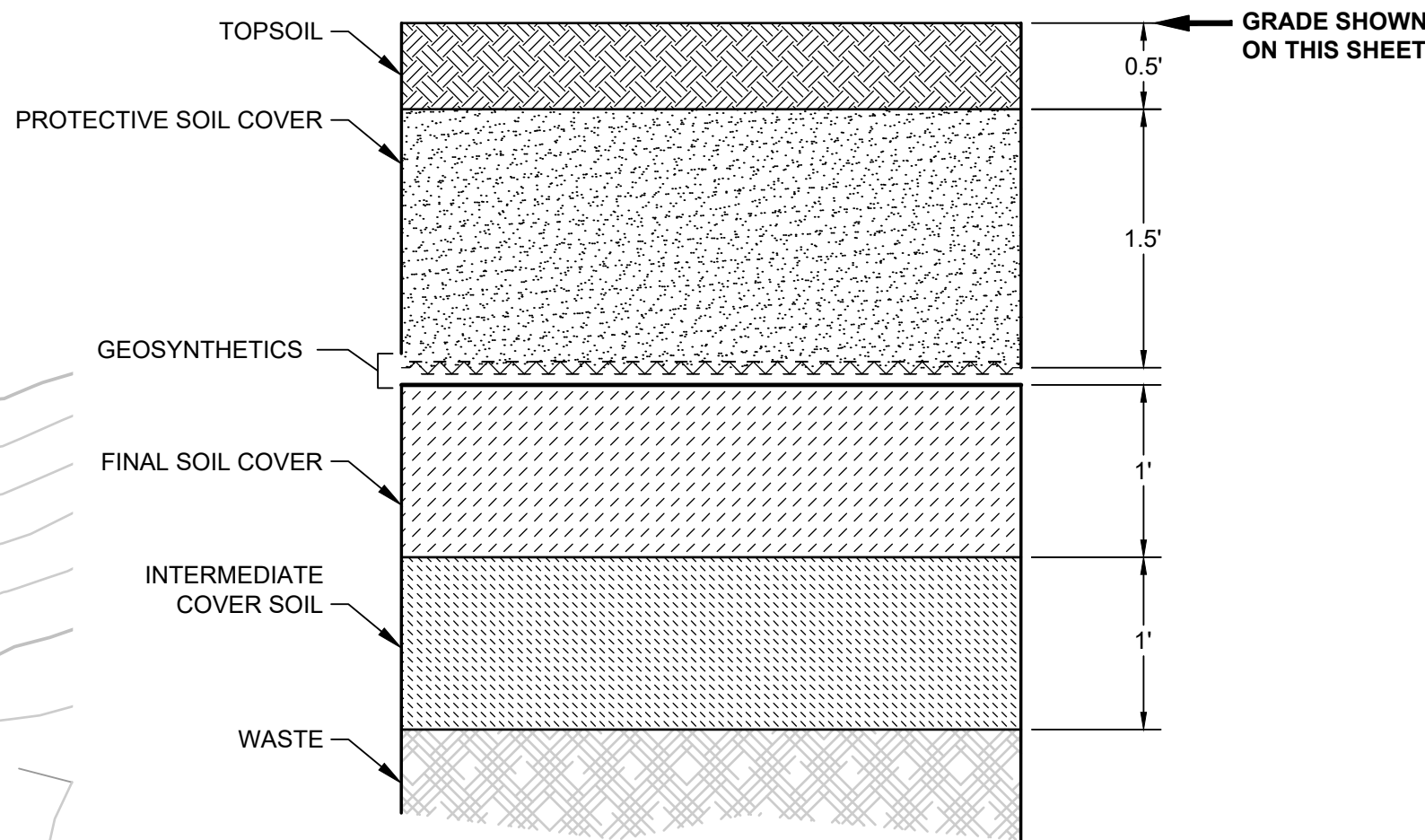
 SIGNATURE MARCH 6, 2026 DATE	DATE: MARCH 2026 FILE NO.: ME1418A.03-C35	ANNE ARUNDEL COUNTY DEPARTMENT OF PUBLIC WORKS						
	 engineers   scientists   innovators 10211 WINCOPIN CIRCLE 4TH FLOOR COLUMBIA, MD 21044 410.381.4333	REVISED	APPROVED:	DATE	APPROVED:	DATE	SCALE: NOTED	PROJECT: CELL 9 VERTICAL EXPANSION MILLERSVILLE LANDFILL AND RESOURCE RECOVERY FACILITY
		DATE	BY					DRAWN BY: BW/MJ
				CHIEF ENGINEER	PROJECT MANAGER	CHECKED BY: MV		
		APPROVED:	DATE	APPROVED:	DATE	DRAWING NO.: 27 OF 30	TITLE: CHANNEL AND FOREBAY PROFILE	
		ASSISTANT CHIEF ENGINEER	CHIEF RIGHT-OF-WAY			PROJECT NO.: ME1418A		



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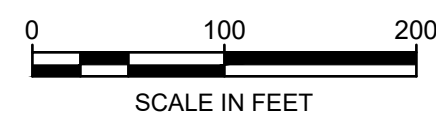


- LEGEND**
- PROPERTY BOUNDARY
  - EXISTING TOPOGRAPHY CONTOUR (FEET-MSL)
  - PROPOSED FINAL GRADE CONTOUR (FEET-MSL)
  - STRUCTURE / BUILDING
  - FENCE
  - PAVED DRIVE
  - GRAVEL DRIVE
  - TREELINE
  - STREAM / WATERLINE
  - STORMWATER CULVERT
  - RIPRAP
  - EXISTING CONCRETE MOMENT SLAB
  - CELL 9 FOOTPRINT
  - SUBCELL BOUNDARY
  - LITTER FENCE
  - GUARDRAIL
  - LFG
  - LANDFILL GAS HEADER
  - VERTICAL LANDFILL GAS LATERAL PIPE
  - ISOLATION VALVE
  - BLIND FLANGE ON LANDFILL GAS HEADER
  - REDUCER
  - VERTICAL LANDFILL GAS WELL



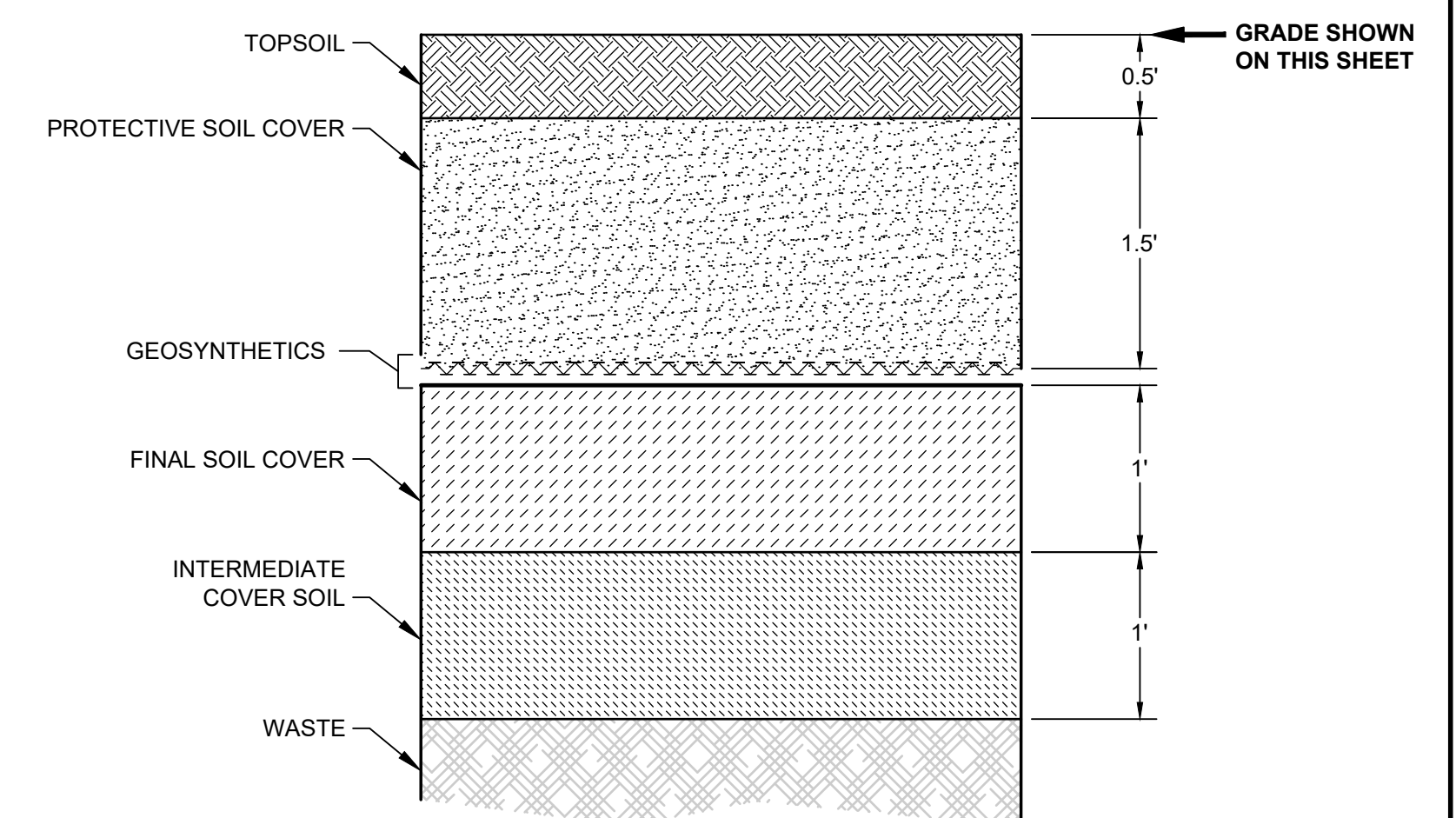
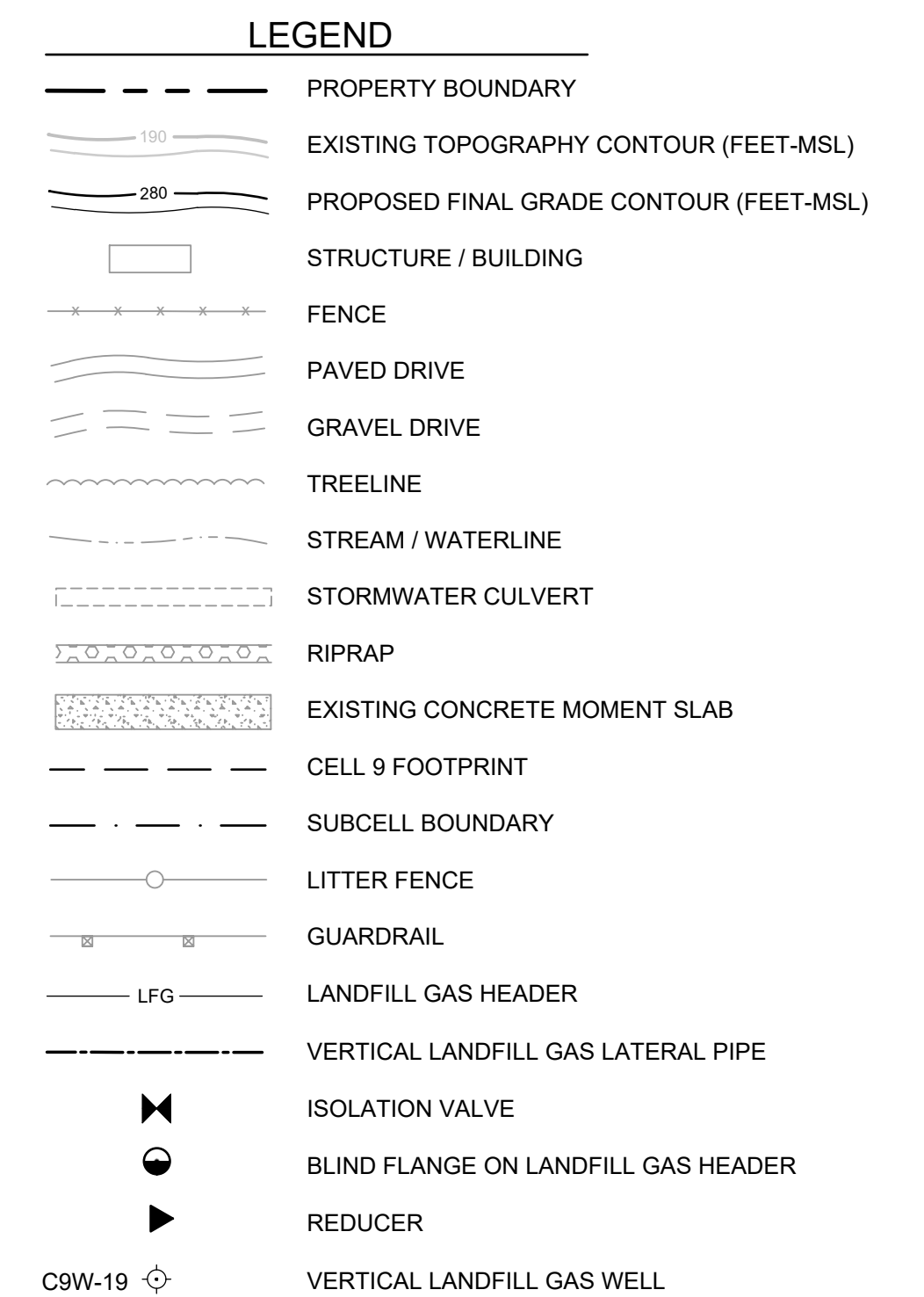
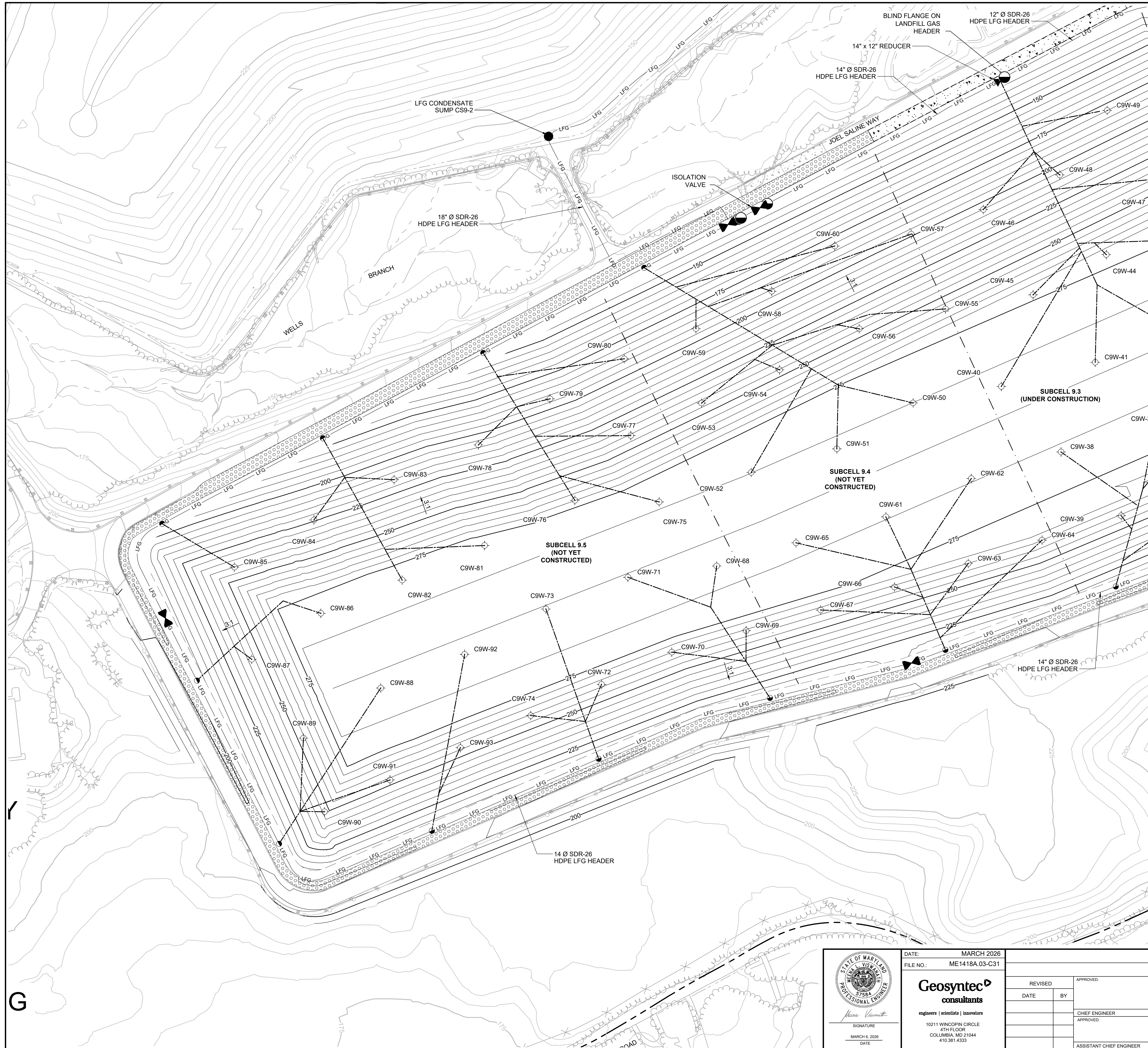
**1**  
DETAIL  
COVER SYSTEM (TYP.)  
SCALE: NTS

- NOTES:
- SEE DRAWING NO. 2 FOR GENERAL NOTES.
  - PROVIDE A MINIMUM PIPE SLOPE OF 3 PERCENT ALONG LATERAL PIPES.



	DATE: MARCH 2026	ANNE ARUNDEL COUNTY				
	FILE NO.: ME1418A.03-C31	DEPARTMENT OF PUBLIC WORKS				
	<b>Geosyntec</b> consultants engineers   scientists   innovators 10211 WINCOPIN CIRCLE 4TH FLOOR COLUMBIA, MD 21044 410.381.4333	REVISED	APPROVED:	DATE	APPROVED:	DATE
	DATE	BY	DATE	DATE	DATE	DATE
SIGNATURE MARCH 6, 2026 DATE		CHIEF ENGINEER APPROVED:	DATE	PROJECT MANAGER APPROVED:	DATE	
		ASSISTANT CHIEF ENGINEER		CHIEF RIGHT-OF-WAY		
		SCALE: NOTED		PROJECT: CELL 9 VERTICAL EXPANSION MILLERSVILLE LANDFILL AND RESOURCE RECOVERY FACILITY		
		DRAWN BY: BW/MJ		TITLE: LANDFILL GAS MANAGEMENT SYSTEM PLAN I		
		CHECKED BY: MV				
		DRAWING NO.: 28 OF 30				
		PROJECT NO.: ME1418A				





1  
-  
DETAIL  
COVER SYSTEM (TYP.)  
SCALE: NTS

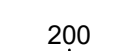
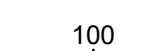
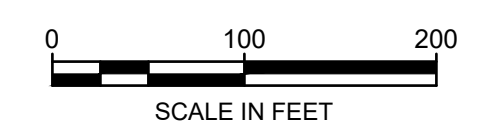
COVER SYSTEM (TYP.)  
SCALE: NTS

SCALE: NTS

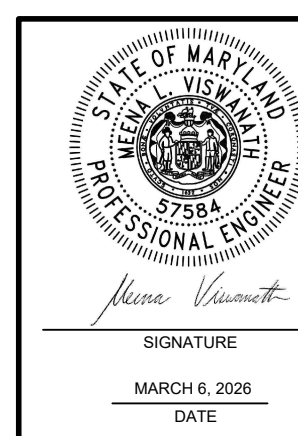
NOTES:

1. SEE DRAWING NO. 2 FOR GENERAL NOTES.
2. PROVIDE A MINIMUM PIPE SLOPE OF 3 PERCENT ALONG LATERAL PIPES.

2. PROVIDE A MINIMUM PIPE SLOPE OF 3 PERCENT ALONG LATERAL PIPES.



SCALE IN FEET



DATE: MARCH 2026  
FILE NO.: ME1418A.03-C31

**Geosyntec**   
**consultants**

engineers | scientists | innovators

10211 WINCOPIN CIRCLE  
4TH FLOOR  
COLUMBIA, MD 21044  
410.381.4333

FILE NO.: ME1418A

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DEPARTMENT OF PUBLIC WORKS

DEPARTMENT OF PUBLIC WORKS

SCALE:	NOTED
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DRAWN BY: BW/M I

DRAWN BY:	DW/MG
CHECKED BY:	MM

CHECKED BY:	MV
DATE:	03

DRAWING NO.: 28A OF 30

PROJECT: CELL 9 VERTICAL EXPANSION  
MILLERSVILLE LANDFILL AND  
RESOURCE RECOVERY FACILITY

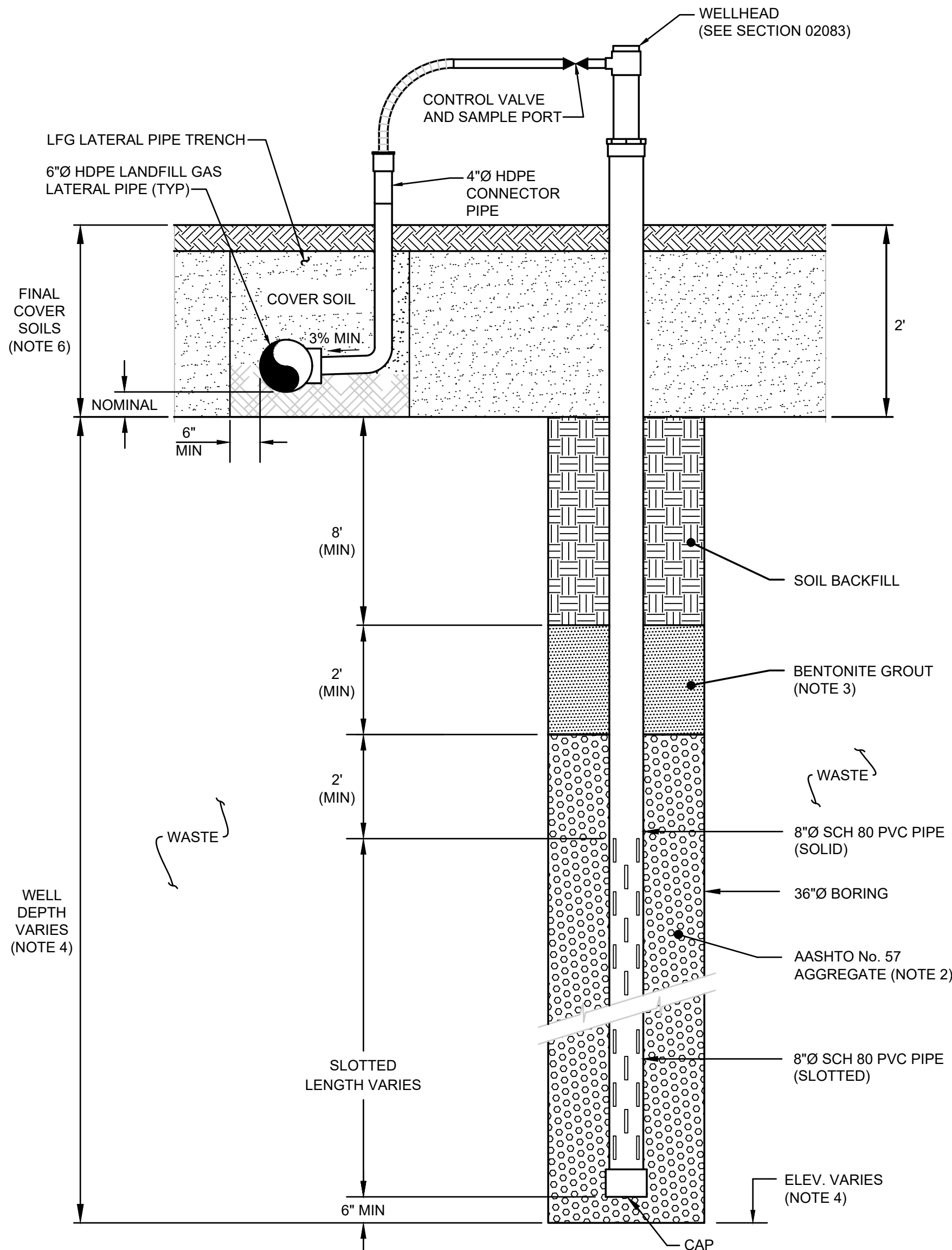
MILLERSVILLE LANDFILL AND  
RESOURCE RECOVERY FACILITY

TITLE:
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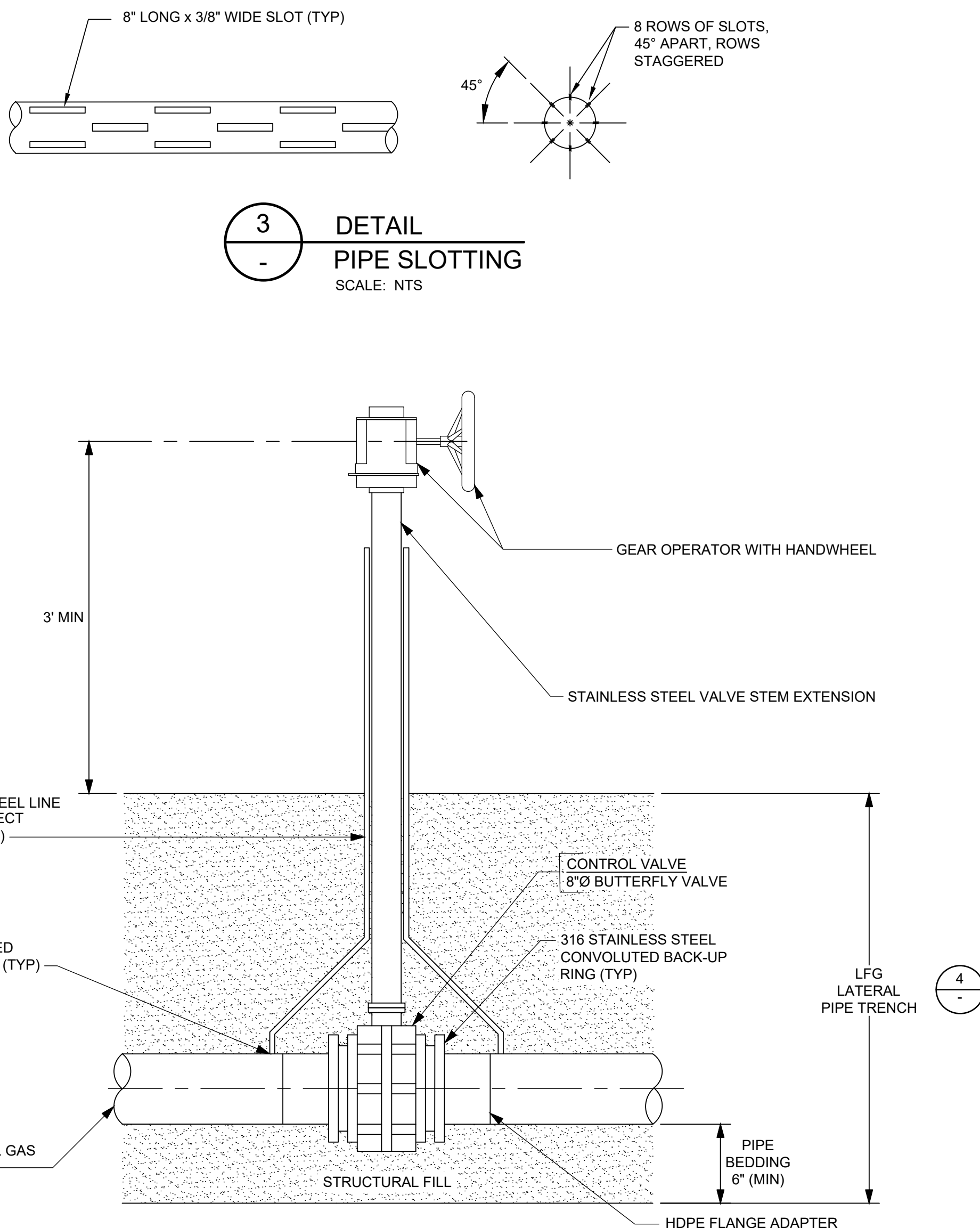
## LANDFILL GAS MANAGEMENT SYSTEM

PLAN II

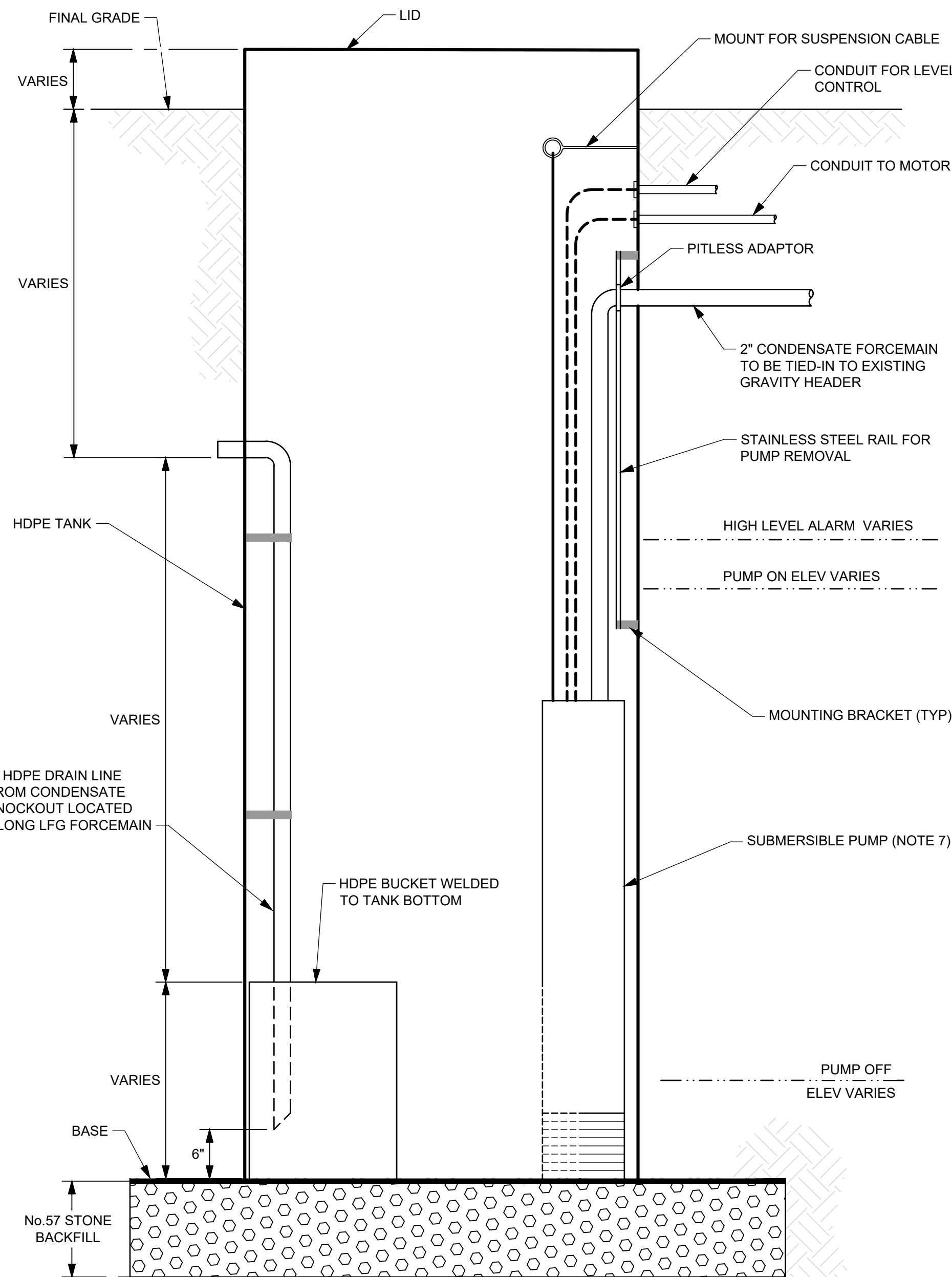




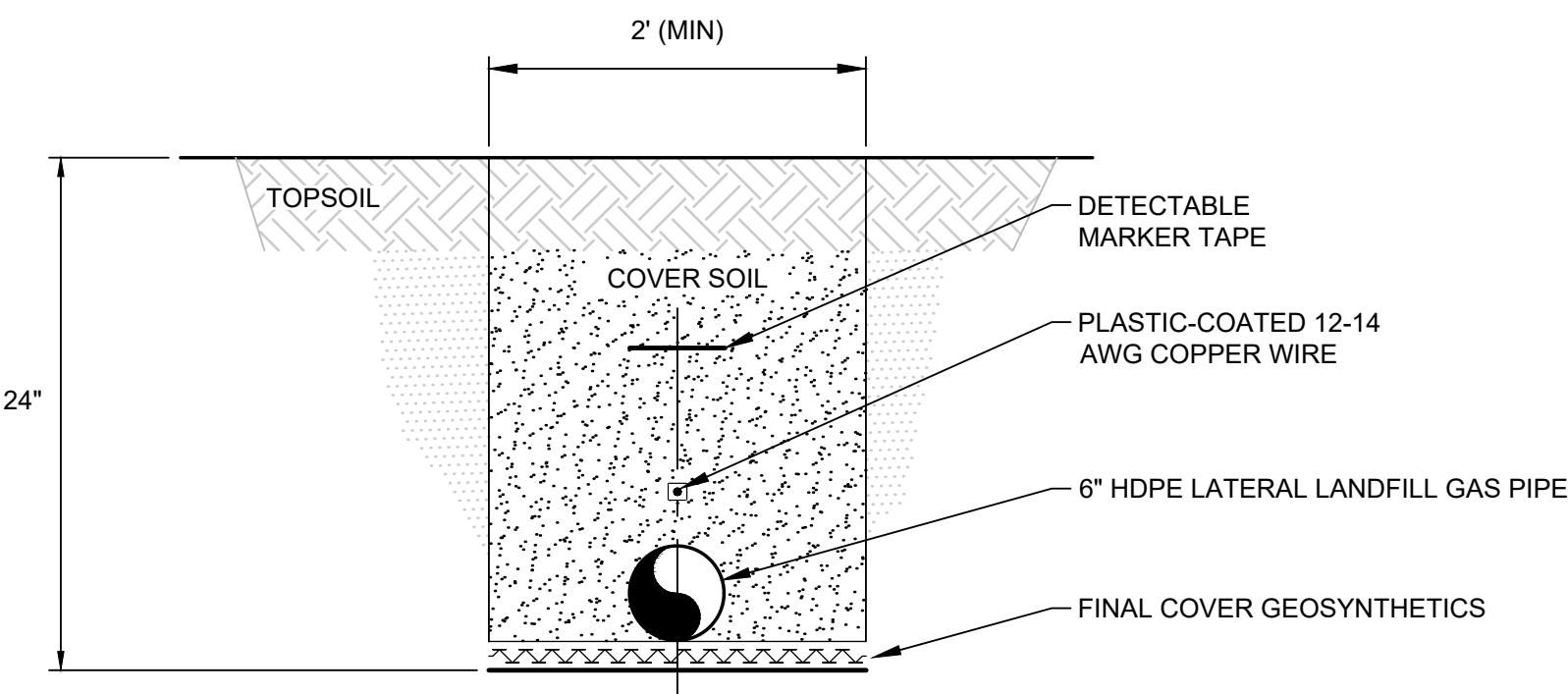
1  
28  
DETAIL  
VERTICAL LANDFILL GAS WELL AND WELLHEAD  
(NOTE 1)  
SCALE: NTS



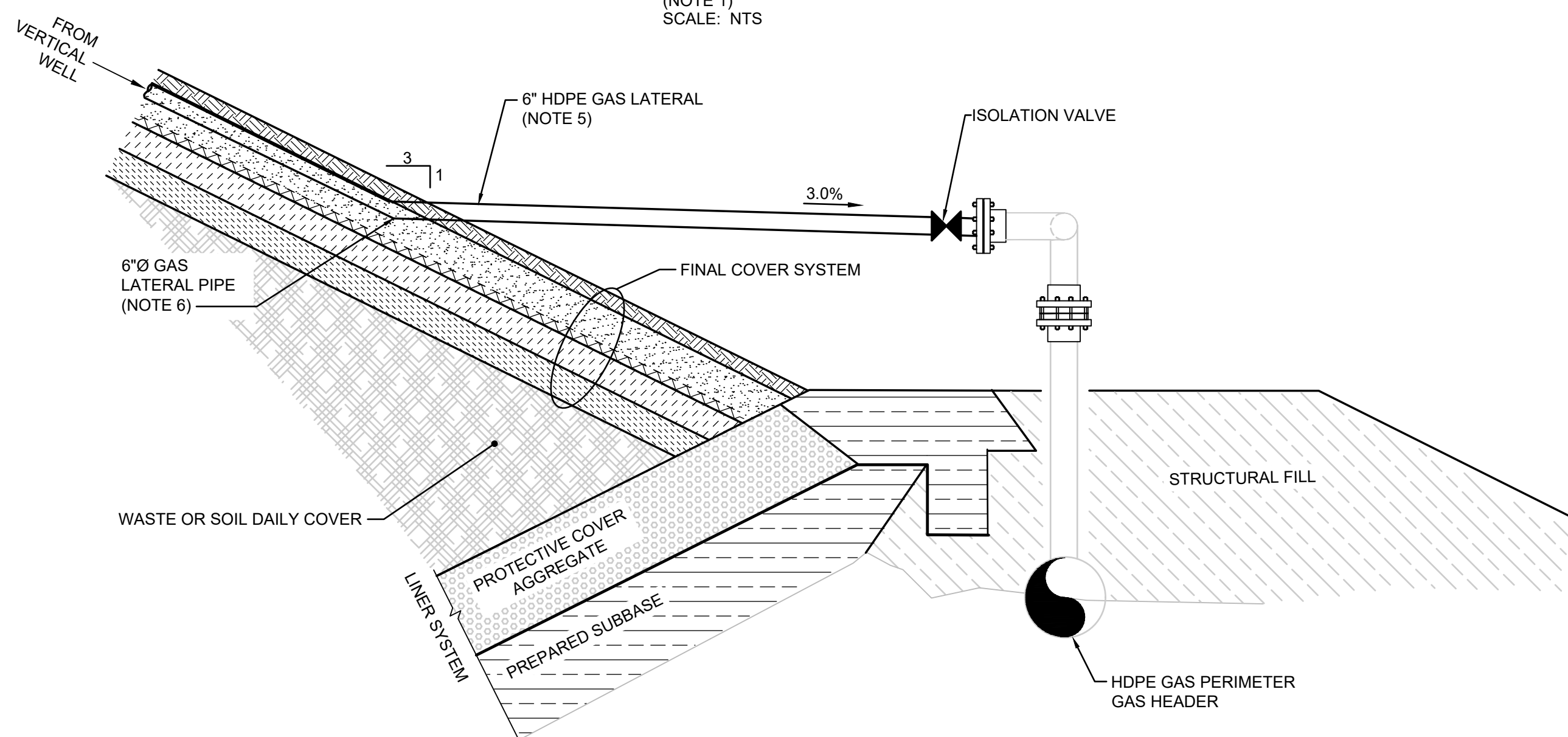
2  
28  
DETAIL  
GAS CONTROL AND ISOLATION VALVE  
(NOTE 1)  
SCALE: NTS



6  
-  
DETAIL  
CONDENSATE SUMP AND PUMP  
SCALE: NTS



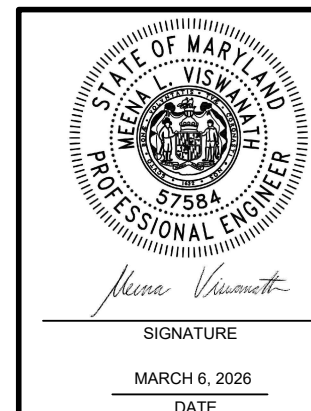
4  
28  
DETAIL  
LFG LATERAL PIPE TRENCH  
(NOTE 1, 6)  
SCALE: NTS



5  
28  
DETAIL  
PERIMETER HEADER CONNECTION  
(NOTE 1)  
SCALE: NTS

NOTES:

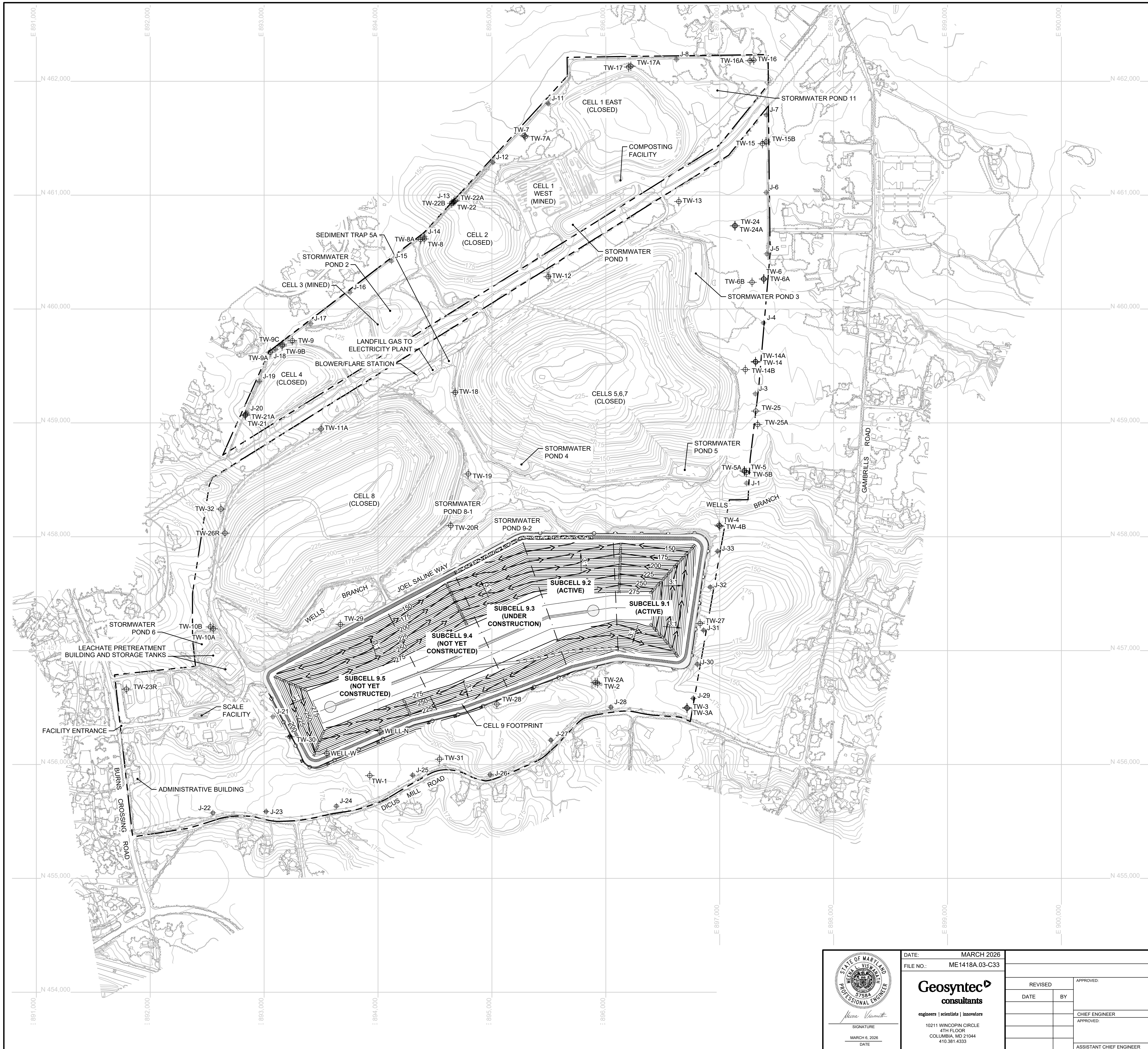
- MINIMUM 6" GRANULAR FILL MATERIAL BETWEEN ALL BURIED COMPONENTS OF LANDFILL GAS TRANSMISSION SYSTEM AND GEOSYNTHETIC COMPONENTS OF FINAL COVER SYSTEM. IF ANY LFG SYSTEM COMPONENTS ARE INSTALLED PRIOR TO FINAL CLOSURE, LFG PIPING MAY SIT DIRECTLY ON INTERMEDIATE COVER UNTIL FINAL CLOSURE.
- AASHTO No. 57 AGGREGATE OR ALTERNATIVE ENGINEER-APPROVED INERT GRANULAR MEDIA THAT SUPPORTS SUFFICIENT PORE SIZES MAY BE USED (E.G. SCRAP TIRE CHIPS OR CRUSHED GLASS).
- BENTONITE CHIPS SHALL BE HYDRATED PER MANUFACTURER'S RECOMMENDATIONS IN 6" LIFTS.
- WELL TERMINATES A MINIMUM OF 15 FT ABOVE TOP OF DRAINAGE/PROTECTION LAYER IN LINER SYSTEM.
- 6" HDPE GAS LATERAL PIPE SHALL BE SUPPORTED WITH PIPE SUPPORTS OR A SOIL WEDGE.
- IF ALTERNATIVE FINAL COVER SYSTEM IS SELECTED, LATERAL PIPING WILL LAY ON TOP OF FINAL COVER SYSTEM.
- SUMP PUMP SHALL BE EPG SERIES S TRUEPUMP, MODEL S-2, 1/2 HP, 230V-1-60Hz, 5.0 FLA OR EQUAL.



DATE: MARCH 2026  
FILE NO.: ME1418A.03-C32  
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COLUMBIA, MD 21044  
410.381.4333

ANNE ARUNDEL COUNTY DEPARTMENT OF PUBLIC WORKS									
REVISED		APPROVED:		DATE		APPROVED:		DATE	
DATE	BY								
		CHIEF ENGINEER		PROJECT MANAGER					
		APPROVED:		DATE		APPROVED:		DATE	
		ASSISTANT CHIEF ENGINEER		CHIEF RIGHT-OF-WAY					
SCALE: NOTED		PROJECT:		CELL 9 VERTICAL EXPANSION MILLERSVILLE LANDFILL AND RESOURCE RECOVERY FACILITY		TITLE: LANDFILL GAS MANAGEMENT SYSTEM DETAILS			
DRAWN BY: BW/MJ		CHECKED BY: MV		DRAWING NO.: 29 OF 30		PROJECT NO.: ME1418A			





DATE: MARCH 2026  
FILE NO.: ME1418A.03-C33

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410.381.4333

APPROVED: _____ DATE _____

CHIEF ENGINEER

APPROVED: _____ DATE _____

ASSISTANT CHIEF ENGINEER

SCALE:	NOTED
DRAWN BY:	BW/MJ
CHECKED BY:	MV
DRAWING NO.:	30 OF 30
PROJECT NO.:	ME1418A

TITLE: ENVIRONMENTAL MONITORING PLAN

DETAIL  
COVER SYSTEM (TYP.)  
SCALE: NTS