CORRESPONDENCE COVER SHEET
WASTE PERMITS DIVISION
TEXAS COMMISSION ON ENVIRONMENTAL QUALITY

Date: 6/30/2023
Facility Name: City of Victoria Landfill
Permit or Registration No.: MSW #1522-B, RN100212968

Nature of Correspondence:
☐ Initial/New
☒ Response/Revision*

*If Response/Revision, please provide previous TCEQ Tracking No.: 27435345
(Previous TCEQ Tracking No. can be found in the Subject line of the TCEQ's response letter to your original submittal.)

This cover sheet should accompany all correspondences submitted to the Waste Permits Division and should be affixed to the front of your submittal as a cover page. Please check the appropriate box for the type of correspondence being submitted. For questions regarding this form, please contact the Waste Permits Division at (512) 239-2335.

Table 1 - Municipal Solid Waste

APPLICATIONS	REPORTS and RESPONSES
☐ New Notification	☐ Closure Report
☐ New Permit (including Subchapter T)	☐ Groundwater Alternate SRC Demonstration
☐ New Registration (including Subchapter T)	☐ Groundwater Corrective Action
☒ Major Amendment	☐ Groundwater Monitoring Report
☐ Minor Amendment	☐ Groundwater Statistical Evaluation
☐ Limited Scope Major Amendment	☐ Landfill Gas Corrective Action
☐ Notice Modification	☐ Landfill Gas Monitoring
☐ Non-Notice Modification	☐ Liner Evaluation Report
☐ Transfer/Name Change Modification	☐ Soil Boring Plan
☐ Temporary Authorization	☐ Special Waste Request
☐ Voluntary Revocation	☐ Other:
☐ Subchapter T Workplan	
☐ Other:	

Table 2 - Industrial & Hazardous Waste

APPLICATIONS	REPORTS and RESPONSES
☐ New	☐ Annual/Biennial Site Activity Report
☐ Renewal	☐ CfPT Plan/Result
☐ Post-Closure Order	☐ Closure Certification/Report
☐ Major Amendment	☐ Construction Certification/Report
☐ Minor Amendment	☐ CPT Plan/Result
☐ Class 3 Modification	☐ Extension Request
☐ Class 2 Modification	☐ Groundwater Monitoring Report
☐ Class 1 ED Modification	☐ Interim Status Change
☐ Class 1 Modification	☐ Interim Status Closure Plan
☐ Endorsement	☐ Soil Core Monitoring Report
☐ Temporary Authorization	☐ Treatability Study
☐ Voluntary Revocation	☐ Trial Burn Plan/Result
☐ 335.6 Notification	☐ Unsaturated Zone Monitoring Report
☐ Other:	☐ Waste Minimization Report
	☐ Other:

BURNS & McDONNELL

July 17, 2023

Mr. Frank Zeng
Project Manager
Waste Permits Division
Texas Commission on Environmental Quality
12100 Park 35 Circle, Building F (MC-124)
Austin, TX 78753

Re: Response to Third Technical Notice of Deficiency (TCEQ Tracking No. 27435345)
City of Victoria Landfill (Type I)
Victoria, Victoria County, Texas
CN600243257/RN100212968
Proposed TCEQ Permit Number MSW-1522B
Major Amendment Permit Application

Dear Mr. Zeng:

On behalf of the City of Victoria, Burns & McDonnell is submitting the enclosed response to the third technical notice of deficiency (NOD) provided via email on January 6, 2023 from the Texas Commission on Environmental Quality (TCEQ) for the City of Victoria Landfill application. The permit application has been revised to address the NOD comments. The NOD comments and associated responses are provided in the following NOD table.

Enclosed is one (1) original version and one (1) unmarked copy of the pages that were revised to address the NOD. In addition, one redline/strikeout copy of the revised pages is also attached. An additional one (1) unmarked copy will be mailed directly to the TCEQ Region 14 Regional Office.

We appreciate your review of the enclosed materials and look forward to your comments. If you need additional clarification on anything presented in this NOD response, please do not hesitate to contact me directly to discuss your questions or concerns.

Sincerely,

Tonya Koller, PE
Project Engineer

Enclosure

cc: Darryl Lesak, City of Victoria
Jeffrey Reed, Lloyd, Gosselink Rochelle & Townsend, P.C.

NOD ID	NOD Description	Response
T1 (T3)	*(Regarding the response to T3 of the second NOD) For clarity, revise Drawings III.A.1.5 and III.A.1.6 to use an appropriate symbol/legend to show locations of the leachate pipe risers and cleanouts for each sump. Also, revise these two drawings by adding a note stating that the leachate pipe risers and cleanouts for sumps in the developed areas (including, but not limited to, Trench 5) will remain accessible for operation and maintenance throughout the closure and post-closure period.*	Drawings III.A1.5 and III.A1.6 in Attachment III-1 have been revised to clearly depict the leachate pipe risers and cleanouts for each sump through revised symbology and the addition of detail insets. Additionally, the notes on these drawings have been revised according to this comment.
T2 (T7)	*(Regarding the response to T7(a) of the second NOD) The response states that Outfall Southwest will continue to function post-expansion; and "Table 5-1 has not been updated as calculations have not been completed for existing permitted outfalls, but reference to historic drainage calculations in Appendix 2B have been included for reference." Page Attachment 2-5 is revised to state, "Outfall Southwest consists of partial final cover and partial TBC landfill, with stormwater discharging Outfall Southwest from an existing detention pond." Revised Drawing III.A2.4 appears to show that runoff from Sub-Basin 4-1 will discharge into a ditch that discharges into the existing detention basin Southwest. Since the east portion of Sub-Basin 4-1 will be part of the vertical expansion area, discuss how surface drainage from Sub-Basin 4-1 will differ from the currently approved condition (pre-development condition); and revise the application (design, text, and drawings) as necessary. Also, discuss the drainage condition for the rest of Basin 4; and revise as necessary.*	Attachment III-2 has been revised to address how previously approved discharges from Sub-Basin 4-1 will be affected by the proposed expansion design.
T3 (T8)	*(Regarding the response to Comment T8(b) of the second NOD) The maximum working face dimensions specified in the revised Drawing IIIA.1.17 are greater than the maximum working face dimensions specified in Section 7.2.4 of Part IV, SOP. Revise the drawings to be consistent.*	Detail 6 on Drawing III.A1.17 in Attachment III-1 has been revised to make the working surface dimensions consistent with the working face dimensions specified in Section 7.2.4 of Part IV, SOP.

NOD ID	NOD Description	Response
T4 (T11)	*(Regarding the response to Comment T11 of the second NOD) The response and revisions made to address Comment T11 and other relevant comments clarified the issues of whether there would be vertical expansions over the pre-Sub D areas and the developed sub-D areas; and whether overliners are proposed. Questionable contents were removed from the application per this comment. Please address the following comments:* *a. Ensure all contents related to the landfill disposal capacities (permitted under 1522A, current remaining, proposed increase by 1522B, and total under 1522B) are correct and consistent (for example, but not limited to, Sections 1and 2 of Parts I/II, Section 4 of Part III, and Attachment 9 Final Closure Plan). Note that the total disposal capacity (in million cubic yards) to be authorized under MSW 1522B is the sum of the capacity permitted under MSW 1522A and the capacity increase proposed by this amendment application (including the air space taken up by daily cover and intermediate cover). The total disposal capacity (in million cubic yards) will be specified in the MSW 1522B permit sheet, if issued.*	The total permitted disposal capacity under 1522A is 15,655,460 cubic yards. The total proposed disposal capacity under 1522B (top of protective cover layer to top of final intermediate/bottom of final cover layer) is 35,065,000 cubic yards, for a total disposal capacity for 1522B of 50,720,460 cubic yards. This volume has been updated within Sections 1 and 2 of Parts I/II, Section 4 of Part III, and Attachment III-9.
	b. Section V.A(14) of Attachment 9 states that the total landfill volume was estimated using AutoCAD by comparing the top of geomembrane to the top of final cover. Note that the disposal capacity/air space/maximum waste inventory does not include the volume of the liner system and the final cover system. Revise Section V.A(14) and other relevant portions of the application as necessary. It is noticed that the maximum inventory of waste is listed at 51,555,460 cubic yards in Section V.B of Attachment 9; revise this number accordingly.	The total permitted disposal capacity under 1522A is 15,655,460 cubic yards. The total proposed disposal capacity under 1522B (top of protective cover layer to top of final intermediate/bottom of final cover layer) is 35,065,000 cubic yards, for a total disposal capacity for 1522B of 50,720,460 cubic yards. This volume has been updated within Attachment III-9.

NOD ID	NOD Description	Response
	c. Update Site Life Projection in Section 4.4 of Part III; and ensure correctness of all numbers used in the life calculation.	The remaining capacity of 1522A reported in the FY 2022 Annual Report (August 31, 2022) was 5,521,079 cubic yards. The total remaining capacity with the expansion is approximately 40.59 million cubic yards. Remaining site life calculations have been updated in Part III, Section 4.4.
	d. Ensure a correct number is entered for Totals in Table 1 of Attachment 9.	The permitted disposal capacity for 1522B has been updated in Table 1, Attachment III-9.
T5 (T12)	*(Regarding the response to Comment T12 of the second NOD) The response states that final cover for future cells has been revised to be the prescriptive composite cover profile. Revisions to page III-24 and other portions of the application describe the final cover profile as a geomembrane layer overlain by an 18-inch clay-rich soil layer; and a six-inch erosion layer on top of the clay-rich layer. The revised final cover design specifies a permeability of no greater than* $1x10^{-5}$ *cm/s for the clay-rich layer. Please address the following comments:* *a. The original application indicated that installation of the clay-rich layer over the geomembrane would have “constructability issues.” Revise to identify the constructability issues and include measures that will be employed to eliminate the constructability issues.*	The composite final cover has been revised to be (from top to bottom): 12-in protective soil layer, drainage geocomposite, 40 mil LLDPE geomembrane liner, 18-in compacted clay-rich soil layer with a permeability no greater than $1x10^{-5}$ cm/s. This final cover profile was agreed to by the TCEQ as documented in an email dated May 16, 2023. All portions of the application have been updated to reflect this revised final cover, which include Part III and Attachments III-7, III-9, and III-10. Items T5 a, b, c, d, and e have been addressed by the revision of the final cover profile. The phrase “constructability issues” could not be located in the application and any potential “constructability issues” have been addressed through the revision of the proposed final cover system.

NOD ID	NOD Description	Response
	b. Revise to discuss if the changed final cover profile will affect the leachate generation rates and, if applicable, revise leachate generation and removal/management measures as appropriate.	The final cover system has been revised to match the originally proposed profile for which leachate generation rates were previously calculated, therefore, no revisions are necessary.
	c. Revise to address any impacts the changed final cover design will have on closure cost estimates.	The final cover system has been revised to match the originally proposed profile for which the closure cost estimates were previously calculated, therefore, no revisions are necessary.
	d. It is a well-known phenomenon that after installation and when exposed to the elements, the permeability in compacted soil layer can increase by 1 to 3 orders in response to pedogenic processes. Revise the closure plan and post-closure care plan to include measures (testing, inspection, and maintenance/repair) to maintain the permeability in the clay-rich layer at no greater than 1x10^{-5} cm/s after the final cover is constructed, including during the post-closure care period. Note this requirement is necessary and reasonable just as the requirement to maintain the specified vegetation coverage after its initial establishment on the final cover during the post-closure care period. This application specifies that a 90 percent grass coverage be established and maintained (see the measures included on page 4 of 18 in Attachment 11-4 and page 8 of 18 in Attachment 11-8). Please note that we are available for further discussion over this issue.	The final cover system has been revised to match the originally proposed profile, which will address the TCEQ's concern related to maintaining the permeability of the compacted soil layer by constructing the compacted soil layer beneath the geomembrane.

NOD ID	NOD Description	Response
	e. (It is highly recommended that the final cover design be revised per this comment) In lieu of addressing Comments a. and d. above, revise the final cover design to be the same as that currently approved and installed at the existing Subtitle D areas. Page III-24 specifies the current final cover profile as (from top to bottom): 24-in erosion layer/geocomposite/geomembrane/18-inch clay-rich soil with permeability no greater than 1x10^{-5} cm/s. Revise to address Comments b and c above, accordingly. It is accepted that the clay-rich layer built beneath the geomembrane layer can be assumed to be able to maintain its constructed characteristics (permeability).	The composite final cover has been revised to be (from top to bottom): 12-in protective soil layer, drainage geocomposite, 40 mil LLDPE geomembrane liner, 18-in compacted clay-rich soil layer with a permeability no greater than 1x10^{-5} cm/s. This final cover profile was agreed to by the TCEQ as documented in an email dated May 16, 2023.
	f. Once the above comments have been addressed, revise all relevant portions of the application accordingly (including, but not limited to, Attachments 7, 9 and 10).	All portions of the application have been updated to reflect the revised final cover, which include Part III and Attachments III-7, III-9, and III-10.

NOD ID	NOD Description	Response
NA	Additional comments from the TCEQ included via email on May 16, 2023 included, *"Please revise the existing Attachment 11 (PCC form 20722), Section IV.C.4 (inspection Activities) to specify the inspection frequencies related to vegetation coverage and erosion (note that this section refers to SOP for inspection and maintenance provisions in the SOP, i.e., Table 7-4). Under Table 7-4 the final cover inspection is weekly and within 72-hours of a rainfall event of 0.5 inches.* *Revise Attachment 11, Section IV.C.6 (Corrective Actions) to include more detailed provisions about restoring 90% grass coverage and erosion layer (may include an attachment to this PCC form). Refer to 330.165(g) for provisions related to erosion of final cover. Revise all relevant portions of the application accordingly."*	Attachment III-11 (PCC form 20722), Section IV.C.4 (inspection Activities), has been revised to clarify the reference to the SOP is limited to the recordkeeping requirements. Inspection and maintenance frequencies related to post-closure care are identified in Attachment III-11. Final cover inspection frequencies during the active life of the site are identified in Part IV, Section 7.23, Table 7-5. "Table 7-4" is considered to have been mistakenly referenced and the appropriate reference is presumed to be "Table 7-5". Attachment III-11, Section IV.C.6 (Corrective Actions) has been revised to include more detailed provisions about restoring 90% grass coverage and erosion layer, in accordance with 30 TAC 330.165(g).
T6 (T16)	*(Regarding the response to Comments T16 of the second NOD and T68 of the first NOD) Revise Section 2.2.7 of Attachment III-3 by removing "solidified, treated and discharged" from the first sentence in the first paragraph. Revise other relevant portions of the application accordingly.*	Reference to the option for leachate to be "solidified, treated and discharged" has been removed from Section 2.2.7 of Attachment III-3.

NOD ID	NOD Description	Response
T7 (T17)	*a. Submit a site map showing surveyed locations and elevations of all borings, including "previous" borings: you must add elevations to the provided map.* *b. Rename the drawing from Figure 2.1 to a name that reflects the location of the map in the Amendment Application (part, attachment, appendix …).* *c. Ensure in your response to provide a figure name to reference the revised map.*	a. Figure III.A5.5G-1 has been included in Attachment III-5, Appendix 5G to show the locations of all borings on the site. Table III.A5.5G-1T follows Figure III.A5.5G-1 and contains the surveyed locations and elevations of each boring, including “previous” borings. b. Figure 2.1 in Attachment III-5, Appendix 5K has been renamed to Figure III.A5.5K-1. c. Figure III.A5.5G-1 has included in Attachment III-5, Appendix 5G to show the locations of all borings on the site. Table III.A5.5G-1T follows Figure III.A5.5G-1 and contains the surveyed locations and elevations of each boring, including “previous” borings.
T8 (T18)	*Submit cross-sections spanning the expanded site as proposed. The sections will depict the generalized strata at the facility and be based on integrated new and pre-existing boring logs.* *This deficiency has not been addressed. You must provide a geologic cross-section based on site data as interpreted by the geoscience professional of record.* *Ensure in your response that the name(s)/number(s) of the revised figure(s) are provided.*	The cross-sections provided on Drawings III.A1.13 to III.A1-15B in Attachment III-1 have been revised to depict generalized strata based on interpretations from new and pre-existing borings. A Professional Geoscientist interpreted and developed the depictions of strata on each of the cross-section drawings as evidenced by the professional’s seal on these cross-section drawings.

NOD ID	NOD Description	Response
T9 (T19)	*Provide information on sitewide static water level, based on integrated data from new piezometers and pre-existing monitoring wells.* *This deficiency has not been addressed. The annotation of static water level shall be on the geologic cross-sections required under 330.63(e)(4)(G).*	The cross sections provided on Drawings III.A1.13 to III.A1-15B in Attachment III-1 have been revised to depict the seasonal high static water level, based on interpretations from the historical highest measured level of borings and groundwater monitoring wells (between 2007 and 2019). Ancillary to this change, the groundwater contours displayed on Drawing III.A1.12 have been revised to also reflect this seasonal high static water level.
T10 (T24)	*Provide a monitoring system dedicated to groundwater.* *This deficiency has not been addressed. Provide a dedicated groundwater monitoring system, uncluttered from other information, in accordance with 330.63(f)(1).*	Drawing III.A1.12 in Attachment III-1 has been revised to establish a focus on the groundwater monitoring network; gas monitoring probes (and references thereof) have been removed. The Drawing title has been changed accordingly. Drawing III.A1.12B has been established to depict the gas monitoring probes.

NOD ID	NOD Description	Response
T11 (T25)	*Provide signed, sealed logs of boring for all existing, operational monitoring wells.* *This deficiency has not been addressed. No boring logs were found in the referenced Appendix 5K. All monitor well boring logs must be maintained and presented upon request by the TCEQ, unless you request and are approved for a variance or an exception.*	Enclosed with this NOD response is a memorandum requesting an exception to rule §330.421(a)(1)(D) as signed, sealed logs of boring for all existing, operational monitoring wells could not be located through searches that exhausted all means of identifying and obtaining these records. Boring logs for monitoring wells P-1 through P-11 (also known as, MW-10 through MW-20) were provided with the addition of Appendix 5K in response to NOD#1. An exhaustive and thorough review of TCEQ records indicates that boring logs dated prior to 2001 are unsealed as sealing requirements were not created at the time of boring installation. Additionally, several boring logs dated after 2001 were found unsealed and after an exhaustive and thorough search, the sealed versions could not be located. An exception to this requirement is being requested for these records.

NOD ID	NOD Description	Response
T12 (T26)	*Construction specification is provided for only 6 of the listed 24 'existing' monitoring wells. Provide the following for all existing monitoring wells:* *1. Casing specifications* *2. Screening specifications* *3. Filter pack* *4. Annular seal* *5. Concrete pad to be placed on top of the casing seal* *6. Protective collar.*	A table summarizing the current existing operational monitoring wells is provided in Attachment III-5, Appendix 5G. There are currently 22 monitoring wells in the existing monitoring network. Construction specifications of the existing groundwater monitoring wells in the monitoring network are provided as part of the response to comment T14 of this NOD. Additionally, construction specifications for monitoring wells not included in the existing groundwater monitoring network were previously provided. The construction specifications have been added to Attachment III-5, Appendix 5K.
T13 (T27)	*Submit surveyed locations and elevations sealed by a Texas registered professional land surveyor (RPLS) for existing monitoring wells.* *This deficiency has not been addressed. You submitted surveyed locations for 6 of the listed 24 'existing' monitoring wells. Provide surveyed locations and elevations for all existing monitoring wells.*	A table summarizing the current existing operational monitoring wells is provided in Attachment III-5, Appendix 5G. There are currently 22 monitoring wells in the existing monitoring network. Surveyed locations and elevations sealed by a Texas RPLS have been added to Attachment III-5, Appendix 5F for the remaining monitoring wells.

NOD ID	NOD Description	Response
T14 (T28)	*Submit a well installation report (Monitor well Data sheet) for each of the existing monitoring well.* *This deficiency has not been addressed. You submitted Well Data sheets for 6 of the listed 24 'existing' monitoring wells. Provide Well Data sheets for all existing monitoring wells.*	A table indicating the current existing operational monitoring wells is provided in Attachment III-5, Appendix 5G. Monitor Well Data Sheets have been added to Attachment III-5, Appendix 5K for monitoring wells P-1 through P-5, P-7 through P-11 (also known as MW-10 through MW-20, excluding MW-15), MW-15AR, MW-21 through MW-24, MW-A2, MW-A5, MW-C1, and OW-25 through OW-28.
T15 (T29)	*Submit a dedicated, clearly annotated landfill gas monitoring network.* *This deficiency has not been addressed. Provide a dedicated landfill gas monitoring network, uncluttered from other information, and in accordance with 330.371(h)(2).*	A new Drawing III.A1.12B in Attachment III-1 has been added to display the landfill gas monitoring network. The information from the former version of Drawing III.A1.12 related to landfill gas monitoring was moved to this new drawing for clarity. Groundwater information was not included to satisfy this comment.

NOD ID	NOD Description	Response
NA	*Informal request received by the TCEQ via email on May 11, 2023:* *"In our recent internal discussion, the question of acceptable geomembrane break code came up. In TX we have been using film tear bond (Peel NSF Failure Code FTB) as the acceptable break code for destructive tests (peel) on welded geomembrane in liner and final cover (see the attached technical guidance and pages from sample liner quality control plans). Note FTB is the only break code defined in the guidance. I just noticed that the application (Attachments 4 and 10) for MSW 1522B proposed to use break codes different than FTB. It has been deemed that FTB will be easier for the permittee to demonstrate good quality and easier for the TCEQ reviewer to decide on acceptance of the test results. Can you please consider revising the application to specify FTB as the acceptable break mode/code? It is not an NOD, though. Your consideration is appreciated."*	Attachments III-4 and III-10 were revised to include film tear bond (FTB) as the acceptable break code for destructive testing of geomembrane liner in addition to the requirements identified in GRI GM19a.

Facility Name: City of Victoria Landfill
Permittee/Registrant Name: City of Victoria
MSW Authorization #:1522-B
Initial Submittal Date: 3/28/2022
Revision Date: 07/17/2023

TCEQ

Texas Commission on Environmental Quality

Part I Application Form for New Permit, Permit Amendment, or Registration for a Municipal Solid Waste Facility

1. Reason for Submittal

☐ Initial Submittal ☒ Notice of Deficiency (NOD) Response

2. Authorization Type

☒ Permit ☐ Registration

3. Application Type

☐ New Permit ☒ Permit Major Amendment ☐ Permit Major Amendment (Limited Scope)

☐ New Registration

4. Application Fees

Amount
☒ $2,050 for Permits and Permit Amendments ☐ $150 for Registrations
Payment Method
☒ Check ☐ Online through ePay portal <https://www3.tceq.texas.gov/epay/>
If paid online, enter ePay Trace Number:

5. Application URL

Is the application submitted for a Type I Arid Exempt (AE) or Type IV AE facility?

☐ Yes ☒ No

If the answer is "No", provide the URL address of a publicly accessible internet web site where the application and all revisions to that application will be posted.
http://**info.burnsmcd.com/tceq-permits-city-of-victoria-landfill**

Signature Page

I, Jesús A. Garza ____________________, ____________ City Manager,
(Site Operator (Permittee/Registrant)'s Authorized Signatory) (Title)

certify under penalty of law that this document and all attachments were prepared under my direction or supervision in accordance with a system designed to assure that qualified personnel properly gather and evaluate the information submitted. Based on my inquiry of the person or persons who manage the system, or those persons directly responsible for gathering the information, the information submitted is, to the best of my knowledge and belief, true, accurate, and complete. I am aware there are significant penalties for submitting false information, including the possibility of fine and imprisonment for knowing violations.

Signature: ____________________ Date: 07-18-23

- -

TO BE COMPLETED BY THE OPERATOR IF THE APPLICATION IS SIGNED BY AN AUTHORIZED REPRESENTATIVE FOR THE OPERATOR

I, ____________________, hereby designate ________________________
(Print or Type Operator Name) (Print or Type Representative Name)

as my representative and hereby authorize said representative to sign any application, submit additional information as may be requested by the Commission; and/or appear for me at any hearing or before the Texas Commission on Environmental Quality in conjunction with this request for a Texas Water Code or Texas Solid Waste Disposal Act permit. I further understand that I am responsible for the contents of this application, for oral statements given by my authorized representative in support of the application, and for compliance with the terms and conditions of any permit which might be issued based upon this application.

____
Printed or Typed Name of Operator or Principal Executive Officer

____
Signature

- -

SUBSCRIBED AND SWORN to before me by the said____________________

On this ______ day of ______, ______

My commission expires on the ______ day of ______, ______

____
Notary Public in and for

____________________ County, Texas
(Note: Application Must Bear Signature & Seal of Notary Public)

Part I Attachments

(See Instructions for P.E. seal requirements.)

Required Attachments	**Attachment No.**
Supplementary Technical Report	**Application Part I/II Report**
Property Legal Description	**Part I/II- Appendix I/II-D**
Property Metes and Bounds Description	**Part I/II- Appendix I/II-D**
Facility Legal Description	**Part I/II- Appendix I/II-D**
Facility Metes and Bounds Description	**Part I/II- Appendix I/II-D**
Metes and Bounds Drawings	**Part I/II- Appendix I/II-D**
On-Site Easements Drawing	**Part I/II- Appendix A, Drawing I/II.B.2**
Land Ownership Map	**Fig I/II.A.6 in Appendix I/II-A**
Land Ownership List	**Appendix I/II-A**
Electronic List or Mailing Labels	**Labels in Part I/II Application**
Texas Department of Transportation (TxDOT) County Map	**Figure I/II.A.1 in Appendix I/II-A**
General Location Map	**Fig I/II.A.1 in Appendix I/II-A**
General Topographic Map	**Fig I/II.A.2a and Fig I/II.A.2b in Appendix I/II-A**
Verification of Legal Status	**Part I/II- Section 5.0**
Property Owner Affidavit	**Part I/II- Appendix I/II-E**
Evidence of Competency	**Part I/II- Section 6.0**

Additional Attachments as Applicable- Select all those apply and add as necessary

☐ TCEQ Core Data Form(s)

☐ Signatory Authority Delegation

☒ Fee Payment Receipt **Copy of Check 113979 provided in binder**

☐ Confidential Documents

☐ Waste Storage, Processing and Disposal Ordinances

☐ Final Plat Record of Property

☐ Certificate of Fact (Certificate of Incorporation)

☐ Assumed Name Certificate

Part I/II Landfill Permit Amendment Existing Conditions Summary and Supplementary Technical Report TCEQ MSW Permit No. 1522B

City of Victoria, Texas

City of Victoria Landfill Lateral and Vertical Expansion
Project No. 107608

Revision 3, June 30, 2023

Part I/II Landfill Permit Amendment Existing Conditions Summary and Supplementary Technical Report TCEQ MSW Permit No. 1522B

prepared for

City of Victoria, Texas
City of Victoria Landfill Lateral and Vertical Expansion
Victoria County, Texas

Project No. 107608

Revision 0, March 28, 2022
Revision 1, August 15, 2022
Revision 2, November 18, 2022
Revision 3, June 30, 2023

TONYA L. KOLLER
133943
7-14-23

prepared by

Burns & McDonnell Engineering Company, Inc.
8911 N Capital of Texas Hwy, Building 3, Suite 3100
Austin, Texas 78759
Texas Firm Registration No. F-845

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LIST OF TABLES

TONYA L. KOLLER
133943

7-14-23

1.0 INTRODUCTION

The purpose of this Major Permit Amendment is to secure authorization to expand the existing City of Victoria Landfill (Landfill), Texas Commission on Environmental Quality (TCEQ) Municipal Solid Waste (MSW) Landfill Permit No. 1522A (Landfill). The proposed permit amendment will increase the height of fill in a portion of the existing permitted waste footprint, expand the waste footprint laterally into the adjacent property, and allow for the option of below-grade (i.e., below natural grade) Class 1 non-hazardous industrial waste (NHIW) within the lateral expansion area. The permit amendment will result in both a vertical and lateral expansion. The height of the existing Landfill will be increased from 144 feet above mean sea level (amsl) to 168 feet amsl. The lateral expansion will have a maximum final cover height of approximately 188 ft amsl. The Landfill was permitted under 1522A with a disposal capacity of 15,655,460 cubic yards. The proposed lateral and vertical expansions will add 35,065,000 cubic yards of additional disposal capacity, providing for long term solid waste disposal planning for the City of Victoria, Victory County, and the extended Golden Crescent Regional Planning Commission (GCRPC) area. The total permitted disposal capacity (existing permitted plus the proposed expansion) under 1522B is 50,720,460 cubic yards.

General activities to occur at the facility include but are not limited to:

- Acceptance and disposal of municipal solid waste and industrial wastes;
- Excavation and earth moving for cell construction;
- Construction and quality assurance of composite liner system and composite final cover system;
- Excavation of soils and application thereof for daily, intermediate, and/or final cover;
- Maintenance of equipment, roads, and working face;
- Environmental monitoring.

The Landfill consists of a perimeter fence, a scale house, all-weather roads, borrow areas, soil stockpiles, landfill gas collection system, gas monitoring wells, landfill gas-to-energy system, groundwater monitoring wells, leachate collection and leachate storage tanks, and solid waste disposal area, and stormwater controls. Composting activities occur on an adjacent parcel owned by the City but operated by a third-party (Texas Landfill Management LLC) and permitted through a separate registration (Registration 42034). The composting parcel is located within the expansion area footprint and will be relocated to another parcel coincident with Landfill expansion of the permit boundary.

The General Application Requirements (Part I) and Existing Conditions (Part II) sections of this permit amendment application for the Landfill have been prepared in accordance with the State of Texas requirements set forth in Title 30 Texas Administrative Code (TAC) Sections 330.57, 330.59, 330.61, and 305.45. Part II has been combined with Part I in accordance with 30 TAC 330.57(c)(2). Section 2.0 of this report presents an overview of the project and a detailed facility description, as well as the types of waste that will be accepted at the facility. The remaining portions of Parts I and II present information on specific existing conditions on and around the site, and regulatory matters related to the TCEQ MSW Landfill Permit Amendment Application process.

2.0 GENERAL INFORMATION

2.1 Facility Description

The Landfill is a Type I MSW landfill serving the City and surrounding communities in the Golden Crescent Regional Planning Commission area (Calhoun, Dewitt, Goliad, Gonzales, Jackson, Lavaca, and Victoria Counties). Existing and permitted conditions for the current Landfill footprint are shown in Drawing I/II.B.2 in Appendix I/II-B.

The Landfill currently receives approximately 163,000 tons per year of waste. To extend the life of this facility, the proposed permit amendment includes a lateral expansion to the South extent of the current footprint and a vertical expansion over portions of the existing Landfill footprint (currently permitted Trench 7 and 8). The proposed permit amendment also includes the option to accept Class 1 NHIW for below-grade disposal in the expansion area.

The Landfill was permitted under 1522A with a disposal capacity of 15,655,460 cubic yards.. The proposed expansion would increase the disposal capacity by 35,065,000 cubic yards, for a total disposal capacity of 50,720,460 million cubic yards. Detailed site capacity and Landfill life calculations are presented in Part III Site Development Plan (SDP).

2.2 Size and Location of Facility [30 TAC 330.59(b)]

This Type I Municipal Solid Waste Management Facility is located on an approximately 515-acre site owned by the City of Victoria, and located 0.75 miles east of the intersection of FM 1686 and State Highway 185 in Victoria County, Texas. The physical address is 18545 FM 1686, VICTORIA, TX 77905. A general site map is provided in Appendix I/II-A. The legal description of metes and bounds is provided in Appendix I/II-D.

Coordinates and Elevation of Site Permanent Benchmark:

Latitude: 28° 41' 36" North
Longitude: 96° 54' 23" West
Elevation: 64.97 feet above mean sea level (amsl)

2.3 Existing Conditions Summary [30 TAC 330.61(a)]

A portion of the site is currently operating as a Type I Municipal Solid Waste Landfill in accordance with TCEQ Municipal Solid Waste Rules and Regulations. The site's existing permitted waste footprint consists of approximately 134.3 acres, most of which contains waste. This permit amendment would add approximately 225.4 acres of additional waste disposal area to the south of the existing Landfill, for a total permitted waste disposal area of approximately 359.7 acres. The current development conditions of each existing cell are summarized in Table I/II-1. The liner and final cover systems for each of the cell types outlined in Table I/II-1 are provided in Table I/II-2 and Table I/II-3. The locations of Pre-Subtitle D cells and Developed Subtitle D cells, including Trench 11 and Trench 12 are provided in Attachment III-1, Appendix 1A, Drawing 2A and 3.

- Option 1: 12 inches of granular drainage sand material with minimum hydraulic conductivity of $1x10^{-2}$ cm/sec and 12 inches of protective cover soil; or
- Option 2: 200-mil double-sided geocomposite drainage layer overlain with 24 inches of protective cover soil.

Option 1 was constructed for Cells 4A-8 and 4A-7 and Trench 5. Option 2 was constructed for Trenches 6, 9 and 10. Trenches 7 and 8 are yet to be constructed.

Chimneys (areas of higher hydraulic conductivity) are required to be employed if protective cover permeability is less than $1x10^{-4}$ cm/sec.

2.3.4 Existing Final Cover System

The existing final cover design for the Pre-Subtitle D cells consists of the following from top to bottom:

- 6 inches of protective soil, and
- 18 inches of compacted clay-rich soil with permeability no greater than 1×10^{-7} cm/sec.

The existing final cover design for the Subtitle D Cells 4A-7, 4A-8, and Trench 12 consist of the following from top to bottom:

- 2 feet of an erosion layer capable of sustaining native plant growth,
- 200-mil geocomposite,
- 40-mil linear low-density polyethylene (LLDPE) geomembrane, and
- 18 inches of compacted clay-rich soil with permeability no greater than 1×10^{-5} cm/sec.

The final cover system for Trench 11 will also consist of the components listed above for the Subtitle D final cover (Historic Composite Cover).

The final cover system for each of the cell types outlined in Table I/II-1 is provided in Table I/II-3. Final cover details for Pre-Subtitle D and Subtitle D cells are provided in Part III, Attachment III-1, Drawings A3, A4, and A5.

Table I/II-3:Existing Final Cover Components for Landfill Areas

Final Cover System Component	**Pre-Subtitle D** **Existing Area – Pre-Subtitle D (CLOSED and To Be Closed)**	**Historic Composite** **Existing Area – Subtitle D (CLOSED)** **& Existing Area – Trench 11**
Erosion Control Layer	6-inch protective soil layer	24-inch erosion layer capable of sustaining native plant growth
Drainage Geocomposite	None	200-mil double-sided drainage geocomposite (side slopes) and cushion geotextile (top deck)
Geomembrane	None	40-mil LLDPE geomembrane (smooth on top deck and textured on sides)
Compacted Clay Layer	18-inch compacted clay-rich soil with permeability no greater than 1 x 10^{-7} cm/sec	18-inch compacted clay-rich soil with permeability no greater than 1 x 10^{-5} cm/sec

2.3.5 Existing Landfill Gas Management System

The existing landfill gas management system consists of gas monitoring probes surrounding the currently permitted area of the Landfill, and gas extraction wells installed on the western half of the existing Landfill area where existing permitted final grades have been met. The existing system is connected with various lateral collection lines flowing into the main header pipe. Additionally, an air line and condensate forcemain are buried with the header and in branches across the Landfill. The air line provides compressed air to the pneumatic pumps in the sumps at each low point around the Landfill, and the condensate is pumped out of the sumps and into the condensate force main, which is collected at the leachate holding tanks at the north end of the site for hauling offsite for disposal at a wastewater treatment plant (WWTP). The landfill gas is collected and beneficially utilized off-site or combusted at the flare skid at the north end of the site.

The construction and operation of the facility shall comply with subchapter U of 30 TAC Chapter 330 (relating to Standard Air Permits for Municipal Solid Waste Landfill Facilities and Transfer Stations) or other approved air authorizations.

Facility Name	Location		Facility Type	Dates of Operation[a]
BFI Glenwood Springs TS	Glenwood Springs	CO	TS	December 1999 to Present
Washington Street TS	Denver	CO	TS	December 1999 to Present
BFI Glenwood Springs TS	Glenwood Springs	CO	TS	December 1991 to Present
Greeley TS	Greeley	CO	TS	November 1995 to Present
Boulder LF	Boulder	CO	CLF	Closed
Basalt TS	Basalt	CO	TS	January 1999 to Present
Denver Regional LF North	Erie	CO	CLF	Closed
Foothills LF	Golden	CO	LF	September 1992 to Present
Grand Junction Recyclery	Grand Junction	CO	MRF	February 1982 to Present
Jeffco 1 LF		CO	CLF	Closed
Tower LF	Commerce City	CO	LF	November 1982 to Present
ADS of Connecticut - Stratford	Stratford	CT	TS	December 1999 to Present
PM Services Transfer	Hartford	CT	TS	December 1999 to Present
Capitol Recycling & Brokerage	Hartford	CT	MRF	November 1990 to Present
BFI Waste Services of Washington (Consolidated TS)	Washington	DC	TS	September 1994 to Present
545 Landfill	Winter Garden	FL	LF	*
Cedar Trail Landfill	Bartow	FL	LF	*
Nine Mile Road	St. Augustine	FL	LF	*
Metro Recycling	Tampa	FL	TS	*
Envirocycle	Ft. Lauderdale	FL	MRF	*
Rocket Blvd Material Recovery Facility	Orlando	FL	MRF	*
Southland Recycling Services	Jacksonville	FL	MRF	*
Buckeye Landfill (CLOSED TO PUBLIC)	Perry	FL	LF	December 1999 to Present
BFI Sarasota TS	Sarasota	FL	TS	December 1999 to Present
Delta Lakefill	Pompano Beach	FL	LF	December 1999 to Present
Key West Recyclery	Key West	FL	MRF	December 1999 to Present
Miami Beach TS	Miami Beach	FL	TS	December 1999 to Present
Pensacola TS	Pensacola	FL	TS	December 1999 to Present
Royal Oaks Ranch C&D LF	Titusville	FL	CLF	Closed
Tall Pines Recycling	W Palm Beach	FL	MRF	December 1999 to Present

minimize the letdown thickness. In the existing footprint, chutes will be extended, where required, to integrate with the existing stormwater management infrastructure.

Runoff will generally be segregated for management on the East and West of the Landfill. Runoff from the vertical expansion area of the existing Landfill and the East portion of the lateral expansion will be conveyed to the new Detention Basin East. Runoff from the Western portion will be conveyed to the new First Flush Detention Basin West. The existing detention pond will be used to manage stormwater from the existing closed area. The First Flush Detention Basin West will discharge from the South into the existing tributary ditch, which will be re-routed to accommodate the Landfill expansion (as discussed in more detail in Part III (SDP)).

The 100-year flood elevation is approximately 60.8 – 61.8 feet on the East side of the expansion area (east side tributary Chocolate Bayou) and 62.7 – 63.4 feet on the West side of the expansion area. The determination of 100-year flood elevations are described in Attachment III-2. FEMA’s endorsement of the CLOMR included a thorough review of the HEC-RAS hydraulic model and establishes the 100-year flood elevations for the project site, even though the CLOMR maintains the floodplain as a Zone A boundary. To prevent run-on from the 100-year flood, the edge of the Landfill perimeter berm will be constructed at a minimum elevation of 66.4 feet amsl to meet 3-foot freeboard requirements. The Part III, SDP further details the surface water and its protection thereof.

The facility has been designed to prevent discharge of pollutants into waters of the State or Waters of the United States, as defined by the Texas Water Code and the Federal Clean Water Act, respectively. The Landfill has a current Texas Pollution Discharge Elimination System (TPDES) multi-sector general permit (MSGP) for industrial activity (Permit No. TXR05EI73) which is included in Appendix I/II-I. The facility is in full compliance with TPDES under the Clean Water Act, Section 402, as amended. Any stormwater that has become contaminated by contact with the working face or with leachate will be handled in accordance with the Leachate and Contaminated Water Management Plan included in Part III of this application. The Landfill maintains a current Stormwater Pollution Prevention Plan (SWPPP) as required for coverage under the TPDES MSGP. The Landfill will update and maintain TPDES coverage (Current Permit TXR05E173) as required throughout the construction and site life and to reflect approved permit modifications.

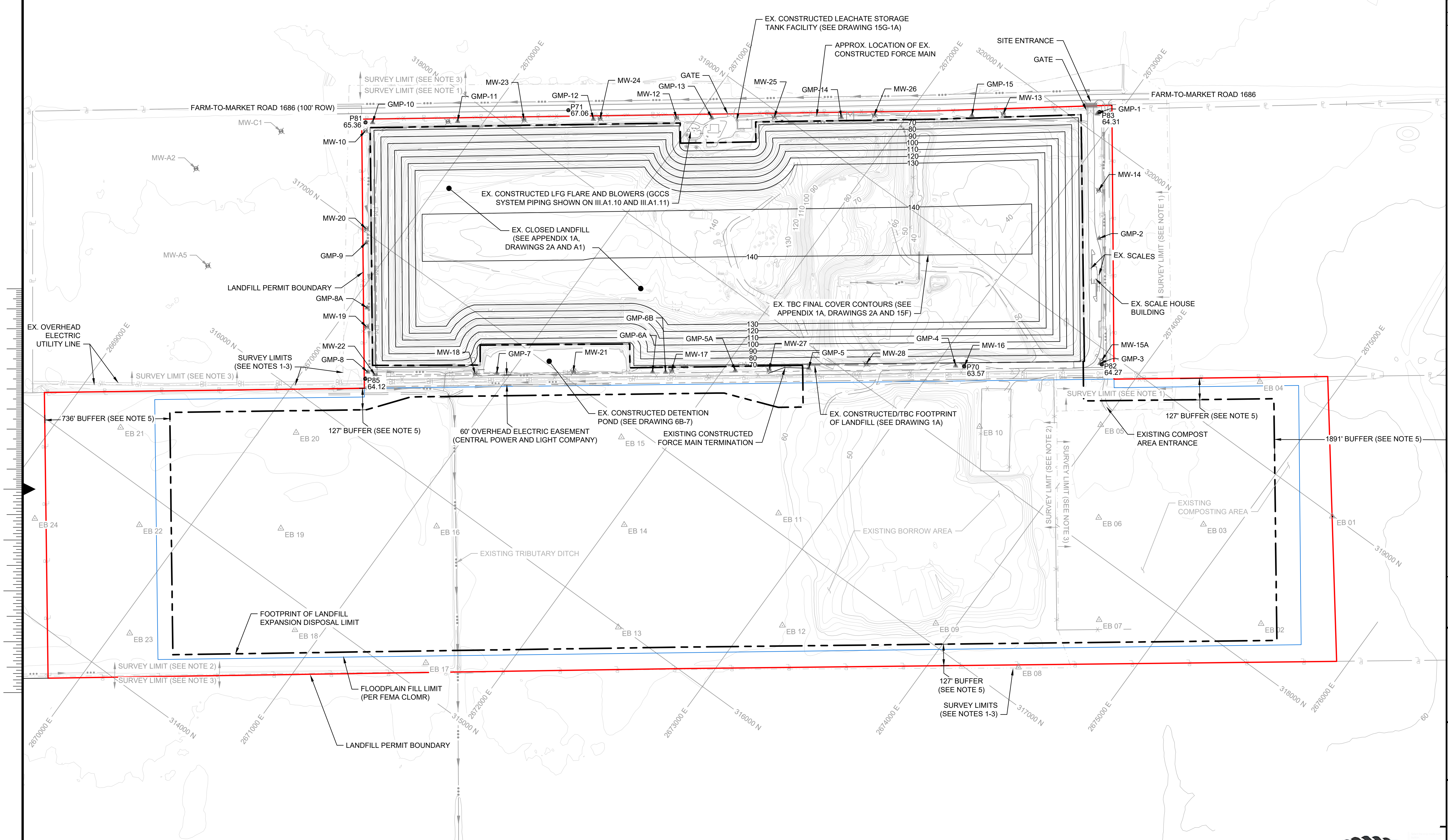
All liquids resulting from the operation of the Landfill shall be disposed of in a manner that will not cause surface water or groundwater pollution. The Landfill shall provide for the treatment of wastewaters

APPENDIX I/II-B – FACILITY LAYOUT DRAWINGS

no.	date	by	ckd	description
0	3/28/22	TJS	SAM	INITIAL SUBMITTAL
1	8/15/22	TJS	TLK	REV. PER TCEQ NOD
2	11/18/22	TJS	TLK	REV. PER TCEQ NOD
3	6/30/23	TJS	TLK	REV. PER TCEQ NOD

NOTES:

1. VICTORIA LANDFILL SITE TOPOGRAPHY (NORTHERN PROPERTY AND EXISTING LANDFILL GRADES) PROVIDED BY COOPER AERIAL SURVEYS CO. DATE OF AERIAL SURVEY: NOVEMBER 24, 2019. SURVEY LIMITS SHOWN ON DRAWING III.A1.2.
2. EXPANSION PROPERTY SITE TOPOGRAPHY PROVIDED BY CIVIL CORP. DATE OF GROUND SURVEY: OCTOBER 2, 2018. SURVEY LIMITS SHOWN ON DRAWING III.A1.2.
3. TOPOGRAPHY OUTSIDE OF THE AREA DESCRIBED IN NOTES 1 AND 2 WAS OBTAINED FROM THE TEXAS NATURAL RESOURCES INFORMATION SYSTEM, DATED APRIL 1999.
4. THE SURVEY COORDINATES ARE ON THE TEXAS SOUTH CENTRAL STATE PLANE '83, COORDINATE SYSTEM. HORIZONTAL DATUM IS NAVD 1983. VERTICAL DATUM IS NAVD 1988.
5. BUFFERS SHOWN REPRESENT DISTANCE BETWEEN LIMITS OF WASTE AND THE PROPERTY BOUNDARIES.
6. DESIGN CONTOURS REPRESENT TOP OF PREVIOUSLY PERMITTED FINAL COVER. CONTOUR INTERVAL IS 10-FEET.
7. EXISTING BACKGROUND CONTOUR INTERVAL IS 2 FEET.



SITE CONTROL POINTS			
POINT ID	NORTHING	EASTING	ELEVATION (FT AMSL)
70	318435.19	2673139.67	63.57
71	318285.02	2670362.64	67.06
81	317523.31	2669436.40	65.36
82	318921.55	2673790.18	64.27
83	320118.09	2672904.15	64.31
85	316299.10	2670324.48	64.12

TONYA L. KOLLER
133943
7-14-23

TONYA L. KOLLER P.E.
LICENSE NO. 133943

FOR PERMITTING PURPOSES ONLY

BURNS MCDONNELL
9400 WARD PARKWAY
KANSAS CITY, MO 64114
816-333-9400
Burns & McDonnell Engineering Co, Inc.
FIRM REG. NO. F-845

date	detailed
MARCH 2022	T. CAMMACK
designed	checked
T. SCHMIDT	T. KOLLER

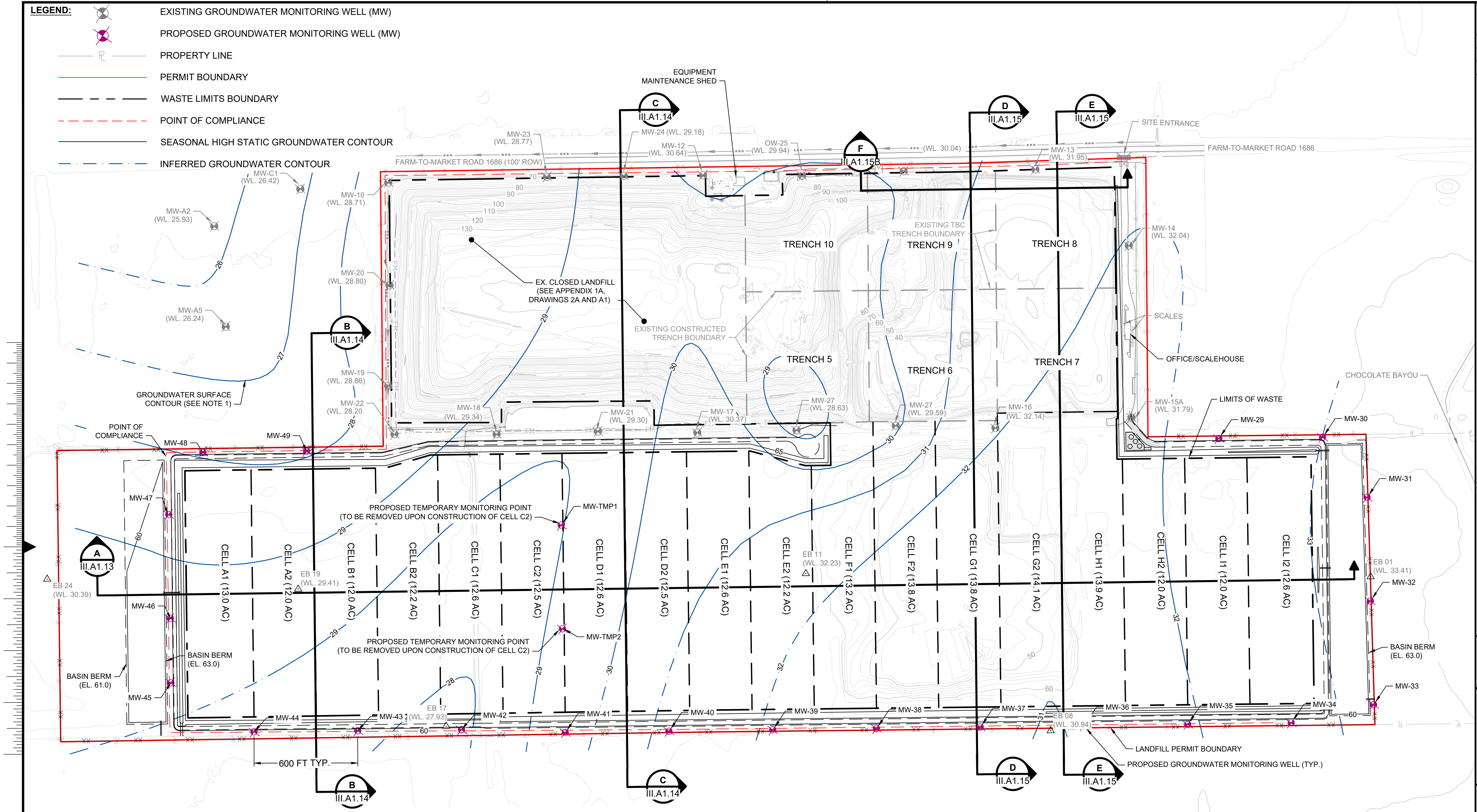
THE CITY OF VICTORIA TEXAS

Victoria County, Texas

1522B PERMIT AMENDMENT

EXISTING CONDITIONS WITH EXPANSION FOOTPRINT

project 107608
contract -
drawing I/II.B.2
rev. 3
sheet 3 of 25 sheets
file 107608III.A1.2.dwg



INSTALLATION/ABANDONMENT TABLE		
WELL/PROBE ID	INSTALL DURING CONSTRUCTION OF	ABANDON DURING CONSTRUCTION OF
MW-16	EXISTING	CELL G2
MW-28	EXISTING	CELL F2
MW-29	CELL G2	N/A
MW-30	CELL G2	N/A
MW-31	CELL G2	N/A
MW-32	CELL G2	N/A
MW-33	CELL G2	N/A
MW-34	CELL G2	N/A
MW-35	CELL G2	N/A
MW-36	CELL G2	N/A
MW-37	CELL G2	N/A
MW-38	CELL G2	N/A
MW-39	CELL G2	N/A
MW-40	CELL G2	N/A

INSTALLATION/ABANDONMENT TABLE		
WELL/PROBE ID	INSTALL DURING CONSTRUCTION OF	ABANDON DURING CONSTRUCTION OF
MW-41	CELL G2	N/A
MW-TMP1	CELL G2	CELL D1
MW-TMP2	CELL G2	CELL D1
MW-42	CELL D1	N/A
MW-43	CELL D1	N/A
MW-44	CELL D1	N/A
MW-45	CELL D1	N/A
MW-46	CELL D1	N/A
MW-47	CELL D1	N/A
MW-48	CELL D1	N/A
MW-49	CELL D1	N/A

DATES OF MEASUREMENT OF MAXIMUM STATIC GROUNDWATER ELEVATIONS:

DECEMBER 2007:
MW-10, MW-11, MW-13, MW-15, MW-17, MW-18, MW-19, MW-20

MARCH 2008:
MW-10, MW-14

SEPTEMBER 2010:
MW-16

JANUARY 2011:
MW-15A, MW-21, MW-22, MW-23, MW-24

MARCH 2012:
MW-27, MW-28

FEBRUARY 2019:
A2, C1, EB-01, EB-08, EB-17, MW-26

AUGUST 2019:
A5, EB-11, EB-19, EB-24, OW-25

Appendix B-5

AMANDA K. BREITLING
11071
7/17/23

AMANDA BREITLING P.G.
LICENSE NO. 11071

TONYA L. KOLLER
133943
7-14-23

TONYA L. KOLLER P.E.
LICENSE NO. 133943

no.	date	by	ckd	description
0	3/28/22	TJS	SAM	INITIAL SUBMITTAL
1	8/15/22	TJS	TLK	REV. PER TCEQ NOD
2	11/18/22	TJS	TLK	REV. PER TCEQ NOD
3	6/30/23	TJS	TLK	REV. PER TCEQ NOD

NOTES:

1. GROUNDWATER CONTOUR LINES REPRESENT A POTENTIOMETRIC SURFACE GENERATED BY BURNS & MCDONNELL ENGINEERING CO. USING MAXIMUM SEASONAL HIGH WATER ELEVATIONS BETWEEN DECEMBER 2007 AND AUGUST 2019.
2. PROPOSED POINT OF COMPLIANCE MONITORING WELLS FOR THE EXPANSION AREA INCLUDE MONITORING WELLS MW-17, MW-21, MW-37 THROUGH MW-41, MW-TMP-1, MW-TMP-2, AND OW-27 DURING OPERATION OF CELLS D1 THROUGH G2. UPON CONSTRUCTION OF CELLS A1 THROUGH C2, POINT OF COMPLIANCE MONITORING WELLS WILL ALSO INCLUDE MW-18, MW-22, AND MW-42 THROUGH MW-49. UPON CONSTRUCTION OF CELLS H1 THROUGH I2, MONITORING WELLS MW-15A, MW-29, MW-35, AND MW-36 WILL BE CONVERTED FROM UPGRADIENT MONITORING WELLS TO POINT OF COMPLIANCE MONITORING WELLS.
3. BACKGROUND CONTOURS REPRESENT EXISTING GROUND. SOURCES PROVIDED ON DRAWING III.A1.2. CONTOUR INTERVAL IS 2 FEET.

FOR PERMITTING PURPOSES ONLY

BURNS McDONNELL
9400 WARD PARKWAY
KANSAS CITY, MO 64114
816-333-9400
Burns & McDonnell Engineering Co, Inc.
FIRM REG. NO. F-845

date	detailed
MARCH 2022	T. CAMMACK
designed	checked
T. SCHMIDT	T. KOLLER

THE CITY OF VICTORIA TEXAS

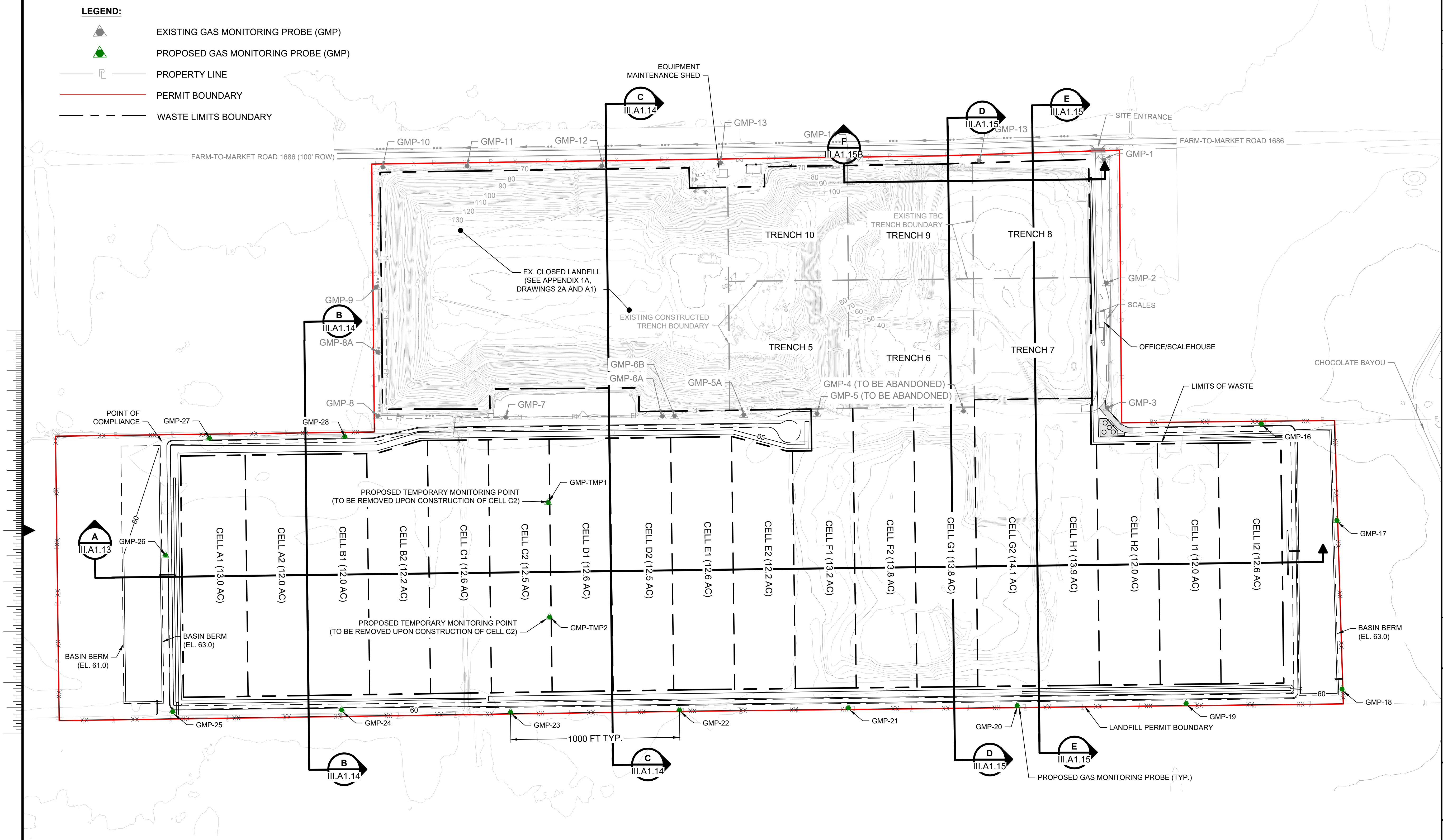
Victoria County, Texas

1522B PERMIT AMENDMENT

FINAL GROUNDWATER MONITORING PLAN

project 107608
contract -
drawing I/II.B.5 – rev. 3
sheet 13 of 25 sheets
file 107608III.A1.12.dwg

Scale For Microfilming
Millimeters
Inches



no.	date	by	ckd	description
0	3/28/22	TJS	SAM	INITIAL SUBMITTAL
1	8/15/22	TJS	TLK	REV. PER TCEQ NOD
2	11/18/22	TJS	TLK	REV. PER TCEQ NOD
3	6/30/23	TJS	TLK	REV. PER TCEQ NOD

NOTES:

1. BACKGROUND CONTOURS REPRESENT EXISTING GROUND. SOURCES PROVIDED ON DRAWING III.A1.2. CONTOUR INTERVAL IS 2 FEET.

FOR PERMITTING PURPOSES ONLY

BURNS McDONNELL
9400 WARD PARKWAY
KANSAS CITY, MO 64114
816-333-9400
Burns & McDonnell Engineering Co, Inc.
FIRM REG. NO. F-845

date MARCH 2022	detailed T. CAMMACK
designed T. SCHMIDT	checked T. KOLLER

THE CITY OF VICTORIA TEXAS

Victoria County, Texas

1522B PERMIT AMENDMENT

FINAL LANDFILL GAS MONITORING PLAN

project 107608	contract -
drawing I/II.B.5B	rev. 3
sheet 13B	of 25 sheets
file 107608III.A1.12B.dwg	

INSTALLATION/ABANDONMENT TABLE		
WELL/PROBE ID	INSTALL DURING CONSTRUCTION OF	ABANDON DURING CONSTRUCTION OF
GMP-4	EXISTING	CELL G2
GMP-5	EXISTING	CELL F1
GMP-16	CELL G2	N/A
GMP-17	CELL G2	N/A
GMP-18	CELL G2	N/A
GMP-19	CELL G2	N/A
GMP-20	CELL G2	N/A
GMP-21	CELL G2	N/A
GMP-22	CELL G2	N/A

INSTALLATION/ABANDONMENT TABLE		
WELL/PROBE ID	INSTALL DURING CONSTRUCTION OF	ABANDON DURING CONSTRUCTION OF
GMP-TMP1	CELL G2	CELL D1
GMP-TMP2	CELL G2	CELL D1
GMP-23	CELL D1	N/A
GMP-24	CELL D1	N/A
GMP-25	CELL D1	N/A
GMP-26	CELL D1	N/A
GMP-27	CELL D1	N/A
GMP-28	CELL D1	N/A

TONYA L. KOLLER
133943

7-14-23

TONYA L. KOLLER P.E.
LICENSE NO. 133943

Appendix B-5B

Part III Landfill Permit Amendment
Site Development Plan
TCEQ MSW Permit No. 1522B

City of Victoria, Texas

City of Victoria Landfill Lateral and Vertical Expansion
Project No. 107608

Revision 3, June 30, 2023

Part III Landfill Permit Amendment
Site Development Plan
TCEQ MSW Permit No. 1522B

prepared for

City of Victoria, Texas
City of Victoria Landfill Lateral and Vertical Expansion
Victoria County, Texas

Project No. 107608

Revision 0, March 28, 2022
Revision 1, August 15, 2022
Revision 2, November 18, 2022
Revision 3, June 30, 2023

TONYA L. KOLLER
133943
7-14-23

prepared by

Burns & McDonnell Engineering Company, Inc.
8911 N Capital of Texas Hwy, Building 3, Suite 3100
Austin, Texas 78759
Texas Firm Registration No. F-845

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STATE OF TEXAS
TONYA L. KOLLER
133943
LICENSED PROFESSIONAL ENGINEER
7-14-23

TONYA L. KOLLER
133943

7-14-23

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Page No.

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Page No.

STATE OF TEXAS
TONYA L. KOLLER
133943
LICENSED PROFESSIONAL ENGINEER

7-14-23

Refer to Attachment III-1, Drawing III.A1.5 and III.A1.6 for proposed top of liner grades, Drawing III.A1.16 for leachate sump details, Drawing III.A1.7 and III.A1.8 for proposed final cover elevations and slopes.

4.4 Site Life Projection [330.63(d)(4)(D)]

As of FY 2022 annual reporting to TCEQ, there are approximately 5.52 million cubic yards of disposal capacity remaining at the Landfill. The vertical and lateral expansion in this permit amendment will add an additional 35,065,000 cubic yards of disposal capacity. Based on the following assumptions, the City of Victoria Landfill is expected to have a total site life of approximately 138 years (as of August/FY 2022):

- 163,000 tons of waste received at the Landfill based on an average from fiscal years 2018-2022
- Average of 666 pounds/cubic yard in trucks at the gate and 2,000 pounds/ton
- Landfill volume is used 80% for waste placement and 20% for daily and final cover
- 2.0 cubic yards of waste in garbage trucks occupies one cubic yard of space in the landfill
- Waste growth is assumed to be zero due to implementation of waste reduction and recycling

Summary of Calculations:

- 35,065,000 cubic yards (expansion volume) + 5,521,079 cubic yards (remaining 1522A volume as of FY 2022) = ~40.59 million cubic yards remaining as of FY2022
- 40.59 million cubic yards • 80% (waste placement) = ~32.47 million cubic yards remaining for waste placement
- 163,000 tons of waste per year • 2000 pounds per ton / 666 pounds per cubic yard in truck = ~490,000 cubic yards on truck • 1 cubic yard in landfill / 2 cubic yards in truck = ~245,000 cubic yards in landfill per year
- 32.47 million cubic yards remaining for waste placement / 245,000 cubic yards waste in place per year = ~138 years site life remaining as of the end of FY 2022 (August 2022).

If additional volumes of waste are received at the landfill, site life will be reduced.

4.5 Landfill Cross Sections and Perimeter Details [330.63(d)(4)(E) and (F)]

Landfill cross sections are provided in Attachment III-1 – Drawings III.A1.13, III.A1.14, and III.A1.15. The location of each section was chosen to represent proposed conditions across the entire site. The Landfill cross sections show the top of the perimeter berm, top of fill, top of waste, maximum elevation of proposed fill, existing ground, bottom of the excavations, and side slopes of trenches and fill areas. In addition, the cross sections show gas monitoring wells, groundwater monitoring wells, and the seasonal high static water level. Cross sections accurately depict the Existing Area and Expansion Area depths of all fill areas within the site. The fill cross sections go through or very near the soil borings to show boring logs on the soil profile. Lastly, the cross sections show construction and design details of proposed compacted perimeter and toe berms and aerial-fill waste disposal areas. The disposal area will be excavated with side slopes no steeper than 3H:1V.

4.6 Liner Design [330.331]

A composite liner is included as part of the landfill design to meet the requirements of 30 TAC §330.331(a)(2) and §330.331(e). The landfill liner and leachate collection system design is provided in Table 4-1. The currently permitted leachate collection system consists of one of two options:

1. 12 inches of granular drainage sand material with minimum hydraulic conductivity of $1x10^{-2}$ cm/sec and 12 inches of protective cover soil, or
2. 200-mil double-sided geocomposite drainage layer overlain with 24 inches of protective cover soil.

The proposed composite liner system featuring a 200-mil double-sided geocomposite drainage layer overlain with 24 inches of protective cover soil is shown in Attachment III-1 - Drawing III.A1.16. Chimneys (areas of higher hydraulic conductivity) will be employed at a maximum spacing of every 200 feet if protective cover permeability is less than 1×10^{-4} cm/sec.

As detailed in Table I/II-1 in Part I/II, the liner system has been partially installed in Trenches 6 and 9. For Trenches 7 and 8 and the lateral expansion area (Cells A1-I2), these areas are currently undeveloped and a composite liner shall be constructed as provided in Table 4-1 consisting of a constructed clay liner and flexible membrane liner installed over the entire bottom and sidewalls of the landfill excavation in accordance with procedures described in Attachment III-4. The vertical expansion will not involve the installation of a piggyback liner system as there are no Pre-Subtitle D cells are overlain by the vertical expansion. As shown in Drawing III.A1.4, after waste placement is completed in Trenches 6 and 9 (which are currently partially developed), Trench 8 will be constructed with composite liner and filled to the new limits of waste (vertical expansion), followed by the construction and fill of Trench 7. Next, waste placement will commence in the lateral expansion area beginning with Cell G2 and will continue west through Cell A1. During this time, the current operating contract for the composting facility will expire and the facility will be relocated off-site prior to the final phase of Landfill development. The final phase of waste placement will begin with Cell H1 and continue east through the final lateral expansion cell (Cell I2).

Table 4-1: Liner System Components for Landfill Areas

Liner System Component (top to bottom)	Existing Area Pre-Subtitle D	Existing Area Subtitle D Option 1	Existing Area Subtitle D Option 2	Expansion Area Trenches 7 and 8 and Cells A1-I2 (if MSW Only)	Expansion Area Cells A1-I2 (Below-Grade Class 1)
Protective Cover	NA	12-inch protective cover	24-inch protective soil layer	24-inch protective soil layer	24-inch protective soil layer
Leachate Collection System		12-inch granular drainage sand (minimum of $1x10^{-2}$ cm/sec)	Drainage Geocomposite	Drainage Geocomposite	Drainage Geocomposite
Geomembrane	NA	60-mil HDPE Geomembrane	60-mil HDPE Textured Geomembrane	60-mil HDPE Textured Geomembrane	60-mil HDPE Textured Geomembrane
Compacted Soil Liner	24-inch (minimum) compacted clay liner	24-inch compacted clay liner (max of $1x10^{-7}$ cm/sec)	24-inch compacted clay liner (max of $1x10^{-7}$ cm/sec)	24-inch compacted clay liner (max of $1x10^{-7}$ cm/sec)[1]	36-inch compacted clay liner (max of $1x10^{-7}$ cm/sec)[1]
Subgrade	Prepared Subgrade	Prepared Subgrade	Prepared Subgrade	Prepared Subgrade	18-inch engineered subgrade (max of $1x10^{-8}$ cm/sec)[2]

[1] Leachate collection system sumps will also include a GCL underneath the primary liner and a secondary geomembrane for additional protection against contaminant migration.

[2] There will be a minimum of 18 inches of engineered subgrade (prepared to a maximum hydraulic conductivity of $1x10^{-8}$ centimeters per second [cm/sec]) placed prior to placement of the compacted soil liner to conform with the intent of 30 TAC §335.584(b)(2).

Historical groundwater elevations from past groundwater monitoring reports were reviewed for the period of December 2007 to September 2021 to assess the seasonal high groundwater elevation for the existing site. The maximum observed groundwater elevation during the period of review was 32.26 feet amsl in March 2011 at observation well OW-28. In the lateral expansion area, the maximum observed groundwater elevation of 33.50 feet amsl occurred in August 2020 at the EB-11 piezometer. The EB-11 piezometer is located near an existing sedimentation basin in the current borrow soil excavation area, which may influence groundwater elevations via increased infiltration and recharge due the removal of surficial, low permeability, clay material and accumulation/ponding of water in the soil borrow source area.

Burns & McDonnell developed a spreadsheet that tabulated groundwater water level data from December 2007 through September 2021. A summary table with this data is provided in Appendix 4A of Attachment III-4, and will be updated based on new monitoring data. While approximately 99 percent of the reported groundwater level data was below the elevation of 32 feet amsl, 33.5 feet amsl is being referenced as the seasonal high static water level to be conservatively protective of groundwater.

There are 5 feet of soil and liner materials that separate the seasonal high static water level (33.5 feet amsl) from the base of the planned leachate sumps in the lateral expansion area (38.5 feet amsl). Accounting for protective cover thickness, the minimum elevation of waste disposal shall be approximately 43 feet amsl for Cells A1-I2 as shown in Attachment III-1 – Drawing III.A1.16. The base geomembrane liner elevation beyond the sump extent is 41 feet amsl, or 7.5 feet above the seasonal high static water level.

The maximum observed groundwater level (33.5 feet amsl) is 0.4 feet higher than the base of the proposed leachate sump in Trench 7/8 (33.1 feet amsl). The base geomembrane liner elevation beyond the sump extent is 35.6 feet amsl, or 3.6 feet above the seasonal high static water level. To demonstrate that the sump is properly ballasted by the aggregate within the sump, the following calculation was performed:

If (Weight of Ballast) > (Buoyant Force of Groundwater), Then Sump is Properly Ballasted

Weight of Ballast = (Density of Aggregate) x (Aggregate Thickness per Square Foot)
= (150 lb/cf) x (2.5 ft) = 375 lbs/sf

Buoyant Force = (Density of Water) x (Groundwater Depth per Square Foot)
= (62.4 lb/cf) x (0.4 ft) = 24.96 lbs/sf

375 lb/sf > 24.96 lb/sf, (Ok)

Accounting for protective cover thickness, the minimum elevation of waste disposal shall be approximately 37.6 feet amsl in Trench 8 as shown in Attachment III-1 – Drawing III.A1.16.

As noted in Table 4-1, a GCL will be installed underneath the primary liner and a secondary geomembrane will also be installed within the Expansion Area (including Trench 7, Trench 8, and Cells A1-I2) for additional protection against contaminant migration in proposed leachate sumps. Based on

Darcy’s Law, the added GCL (equivalent to two feet of compacted soil liner) and Geomembrane (effective hydraulic conductivity of 2 x 10^{-13} cm/sec based on Hydrologic Evaluation of Landfill Performance Version 4.0 defaults), will be at least as protective of the liner system requirements stated in the referenced regulations. Using Darcy’s Law, the secondary geomembrane alone is equivalent to 2,500 feet of clay. A sample calculation is provided herein:

$$0.06\text{-inches (geomembrane thickness)} \quad x \quad \frac{1x10^{-7}\text{ cm/sec}}{2x10^{-13}\text{ cm/sec}} \quad x \quad \frac{1\text{ foot}}{12\text{ inches}} = 2{,}500\text{ feet}$$

Consistent with 30 TAC §330.331, the liner design ensures that concentration values will not be exceeded in the uppermost aquifer at the point of compliance. The liner design includes a composite liner and a leachate collection system that is designed and constructed to maintain less than a 30-centimeter (approximately one-foot) depth of leachate over the liner throughout the landfill life and post-closure care period, and considers the following:

- The hydrogeologic characteristics of the facility and surrounding land
- The climatic factors of the area
- The volume and physical and chemical characteristics of the leachate
- The quantity, quality, and direction of flow of groundwater
- The public health, safety, and welfare effects
- The practicable capability of the owner or operator

4.6.1 Class 1 Waste Landfill Cells Liner Design [330.331, 330.335 and 335.590]

The composite liner design is consistent with 30 TAC §330.331(e)(1) and 30 TAC §335.590(24)(A)(ii) requirements for Class 1 cells and consists of three feet of compacted soil liner with a maximum hydraulic conductivity of 1 x 10^{-7} cm/sec overlain with a 60-mil HDPE geomembrane. In addition, the liner design includes an alternative liner system in accordance with 30 TAC §330.335. The liner profile can be found on Attachment III-1 - Drawing III.A1.16. As noted in Table 4-1, Cells in the lateral expansion area (A1-I2) are designated to be used for below-grade Class 1 disposal. Cells in the lateral expansion area that share a sump (i.e., A1 and A2, B1 and B2, etc.) will be constructed to accept the same type of below-grade waste type (i.e., MSW-only or Class 1). Prior to developing a cell in the lateral expansion area for MSW-only disposal, a permit modification will be filed and approved by TCEQ to change the cells’ designation from Class 1 to MSW-only.

Base excavation grades are designed to maintain separation from the seasonal high groundwater level to eliminate the need for design and installation of a liner ballast system and minimize the potential of having to manage groundwater during cell construction activities. There are additional potentially applicable restrictions for Class 1 cells related to groundwater protection based on existing soil types (30 TAC §335.584(b)(1)) and protected regional aquifers (30 TAC §335.584(b)(2)).

There are certain portions of the expansion area where compliance with 30 TAC §335.584(b)(1) can be documented; however, there are also portions of the expansion area that would need to be designed using an alternative subgrade soil permeability and thickness to conform with 30 TAC §335.584(b)(1) requirements. Based on initial feedback from TCEQ during the planning stages of the preparation of this Permit Amendment, the alternative subgrade areas would require a minimum of 6 inches of engineered subgrade (that meets standard compacted soil liner requirements) prior to placement of the compacted soil liner to conform with the intent of §335.584(b)(1); however, additional protection is necessary based on requirements provided in 30 TAC §335.584(b)(2) and is discussed in the next series of paragraphs.

According to the Texas Water Development Board Report 380, *Aquifers of Texas*, the Site overlies formations belonging to the Gulf Coast Aquifer. A review of regional aquifer conditions was conducted as part of the preparation of the Geology Report. In general, confined conditions were not encountered during the field investigation, which is corroborated by historical hydrogeologic information discussed in Attachment III-5 – Geology Report. Please refer to Section 2.3 and Section 4.0 of the Geology Report.

Based on the 30 TAC §335.584(b)(2) siting requirements, the underlying subgrade of the standard Class 1 landfill cell base liner has been designed using an alternative soil permeability and thickness equivalent to the 30 TAC §335.584(b)(2) requirements. As shown in Table 4-1, the alternative subgrade in Class 1 cells shall have a minimum of 18 inches of engineered subgrade (prepared to a maximum hydraulic conductivity of 1×10^{-8} centimeters per second [cm/sec]) prior to placement of the compacted soil liner.

To demonstrate equivalency to the regional aquifer siting requirement of 30 TAC §335.584(b)(2), Burns & McDonnell calculated the steady-state travel time for fluid to flow through the prescribed underlying soil unit and compared this travel time to that of alternative soil barriers of different thicknesses and hydraulic conductivities. If the alternative soil barrier produces a travel time of equal-to or greater-than the prescribed travel time, the alternative soil barrier is acceptable.

The methodology for the equivalency demonstration is from the publication Comparison of Leachate Flow through Compacted Clay Liners and Geosynthetic Clay Liners in Landfill Liner Systems, a technical paper by J.P. Giroud, K Badu-Tweneboah, and K.L. Soderman (Giroud). Equation 18 from this paper provides the steady-state travel time for leachate to adjectively flow through a liner. This equation is as follows:

The footprint of the vertical expansion permitted under the Expansion Area extends above portions of Trench 5, 6, 7 and 8. In these areas of the Existing Area waste unit directly below the Expansion Area waste unit, only the final cover system of the Expansion Area waste unit will be installed, at the design elevations provided in Attachment III-1– Drawings III.A1.7 and III.A1.8.

The final cover system for Cells A1 – I2, Trench 7/8 as well as the final cover to be constructed over Subtitle D cells that have not been closed follows the composite final cover profile, which will be made up of the following layers from bottom to top:

- 18 inches of clay rich soil with a coefficient of permeability no greater than 1 x 10^{-5} cm/sec
- A 40-mil LLDPE geomembrane (textured both sides)
- A 200-mil geocomposite drainage layer
- A 12-inch soil layer capable of sustaining native plant growth

Table 4-2 details the final cover system scenario for each disposal cell type.

Table 4-2: Final Cover System Components for Landfill Areas

Cover System	Pre-Subtitle D	Historic Composite	Future Composite
Final Cover System Component	Existing Area – Pre-Subtitle D (CLOSED and To Be Closed)	Existing Area – Subtitle D (CLOSED) & Existing Area – Trench 11	Existing Area – Trenches 5 through 10 & Expansion Area – Cells A1 through I2
Erosion Control Layer	6-inch protective soil layer	24-inch erosion layer capable of sustaining native plant growth	12-inch protective soil layer capable of sustaining native plant growth
Drainage Geocomposite	None	200-mil double-sided drainage geocomposite (side slopes) and cushion geotextile (top deck)	200-mil double-sided drainage geocomposite
Geomembrane	None	40-mil LLDPE geomembrane (smooth on top deck and textured on sides)	40-mil LLDPE Textured Geomembrane
Compacted Clay Layer	18-inch compacted clay-rich soil with permeability no greater than 1 x 10^{-7} cm/sec	18-inch compacted clay-rich soil with permeability no greater than 1 x 10^{-5} cm/sec	18-inch compacted clay rich soil with permeability no greater than 1 x 10^{-5} cm/sec

ATTACHMENT III-1 – PERMIT AMENDMENT DRAWINGS

City of Victoria Landfill

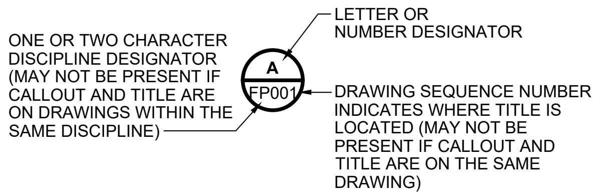
Landfill Expansion Permit Amendment

City of Victoria, TX

TCEQ Permit No. 1522B

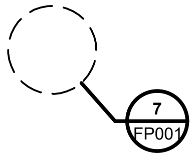
MARCH 2022

BMcD Project No. 107608



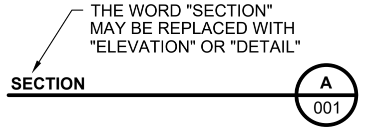
SECTION, DETAIL, AND ELEVATION SYMBOL IDENTIFIERS

SECTION CALLOUT EXAMPLE



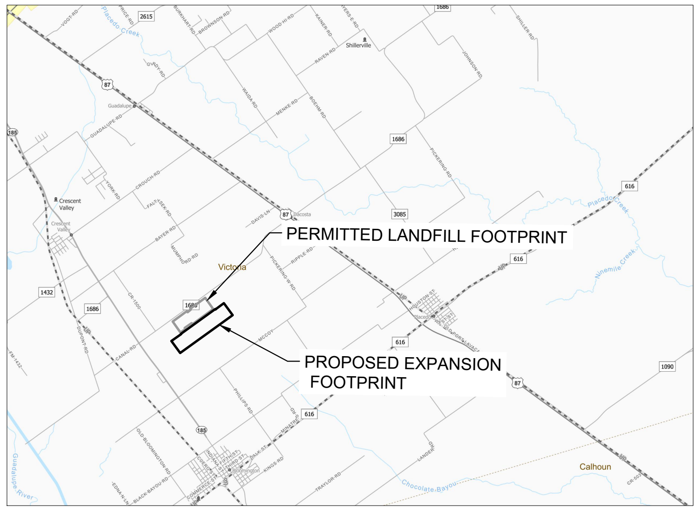
DETAIL CALLOUT EXAMPLE

ELEVATION CALLOUT EXAMPLE



SECTION, DETAIL, OR ELEVATION TITLE EXAMPLE

SECTION, DETAIL, AND ELEVATION IDENTIFICATION SYSTEM



GENERAL LOCATION MAP

0 10000' 20000'
SCALE IN FEET
N

List of Drawings

DWG. NO.	TITLE
III.A1.0	COVER - INDEX
III.A1.1	GENERAL NOTES, LEGEND, AND ABBREVIATIONS
III.A1.2	EXISTING CONDITIONS WITH EXPANSION FOOTPRINT
III.A1.3	LANDFILL CELL EXPANSION PLAN
III.A1.4	WASTE PLACEMENT PHASING PLAN
III.A1.5	BASE GRADING PLAN - WEST
III.A1.6	BASE GRADING PLAN - EAST
III.A1.7	FINAL GRADING PLAN - WEST
III.A1.8	FINAL GRADING PLAN - EAST
III.A1.9	LARGEST OPEN AREA
III.A1.10	LFG COLLECTION SYSTEM PLAN - WEST
III.A1.11	LFG COLLECTION SYSTEM PLAN - EAST
III.A1.12	FINAL GROUNDWATER MONITORING PLAN
III.A1.12B	FINAL LANDFILL GAS MONITORING PLAN
III.A1.13	CROSS SECTIONS - 1
III.A1.14	CROSS SECTIONS - 2
III.A1.15	CROSS SECTIONS - 3
III.A1.15B	CROSS SECTIONS - 4
III.A1.16	DETAIL SHEET 1
III.A1.17	DETAIL SHEET 2
III.A1.18	DETAIL SHEET 3
III.A1.19	DETAIL SHEET 4
III.A1.20	DETAIL SHEET 5
III.A1.21	DETAIL SHEET 6
III.A1.21B	DETAIL SHEET 7
III.A1.22	DETAIL SHEET 8

TONYA L. KOLLER
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7-14-23

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0	3/28/22	TJS	SAM	INITIAL SUBMITTAL
1	8/15/22	TJS	TLK	REV. PER TCEQ NOD
2	11/18/22	TJS	TLK	REV. PER TCEQ NOD
3	6/30/23	TJS	TLK	REV. PER TCEQ NOD

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816-333-9400
Burns & McDonnell Engineering Co, Inc.
FIRM REG. NO. F-845

COVER - INDEX

no.	date	by	ckd	description
0	3/28/22	TJS	SAM	INITIAL SUBMITTAL
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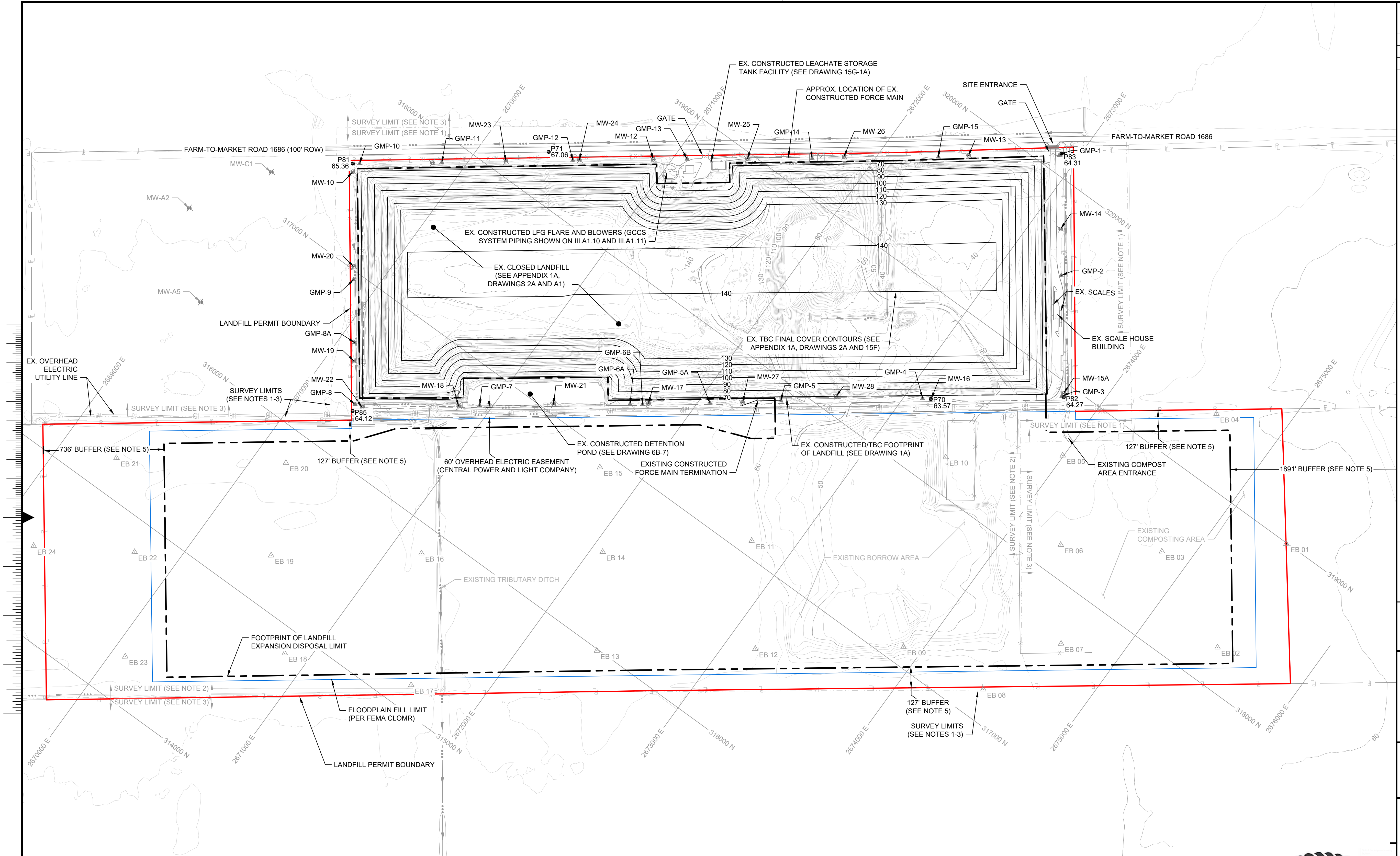
2	11/18/22	TJS	TLK	REV. PER TCEQ NOD
3	6/30/23	TJS	TLK	REV. PER TCEQ NOD



NOTES:

1. VICTORIA LANDFILL SITE TOPOGRAPHY (NORTHERN PROPERTY AND EXISTING LANDFILL GRADES) PROVIDED BY COOPER AERIAL SURVEYS CO. DATE OF AERIAL SURVEY: NOVEMBER 24, 2019. SURVEY LIMITS SHOWN ON DRAWING III.A1.2.
2. EXPANSION PROPERTY SITE TOPOGRAPHY PROVIDED BY CIVIL CORP. DATE OF GROUND SURVEY: OCTOBER 2, 2018. SURVEY LIMITS SHOWN ON DRAWING III.A1.2.
3. TOPOGRAPHY OUTSIDE OF THE AREA DESCRIBED IN NOTES 1 AND 2 WAS OBTAINED FROM THE TEXAS NATURAL RESOURCES INFORMATION SYSTEM, DATED APRIL 1999.
4. THE SURVEY COORDINATES ARE ON THE TEXAS SOUTH CENTRAL STATE PLANE '83, COORDINATE SYSTEM. HORIZONTAL DATUM IS NAVD 1983. VERTICAL DATUM IS NAVD 1988.
5. BUFFERS SHOWN REPRESENT DISTANCE BETWEEN LIMITS OF WASTE AND THE PROPERTY BOUNDARIES.
6. DESIGN CONTOURS REPRESENT TOP OF PREVIOUSLY PERMITTED FINAL COVER. CONTOUR INTERVAL IS 10-FEET.
7. EXISTING BACKGROUND CONTOUR INTERVAL IS 2 FEET.

SITE CONTROL POINTS △

POINT ID	NORTHING	EASTING	ELEVATION (FT AMSL)
70	318435.19	2673139.67	63.57
71	318285.02	2670362.64	67.06
81	317523.31	2669436.40	65.36
82	318921.55	2673790.18	64.27
83	320118.09	2672904.15	64.31
85	316299.10	2670324.48	64.12

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date	detailed
MARCH 2022	T. CAMMACK
designed	checked
T. SCHMIDT	T. KOLLER

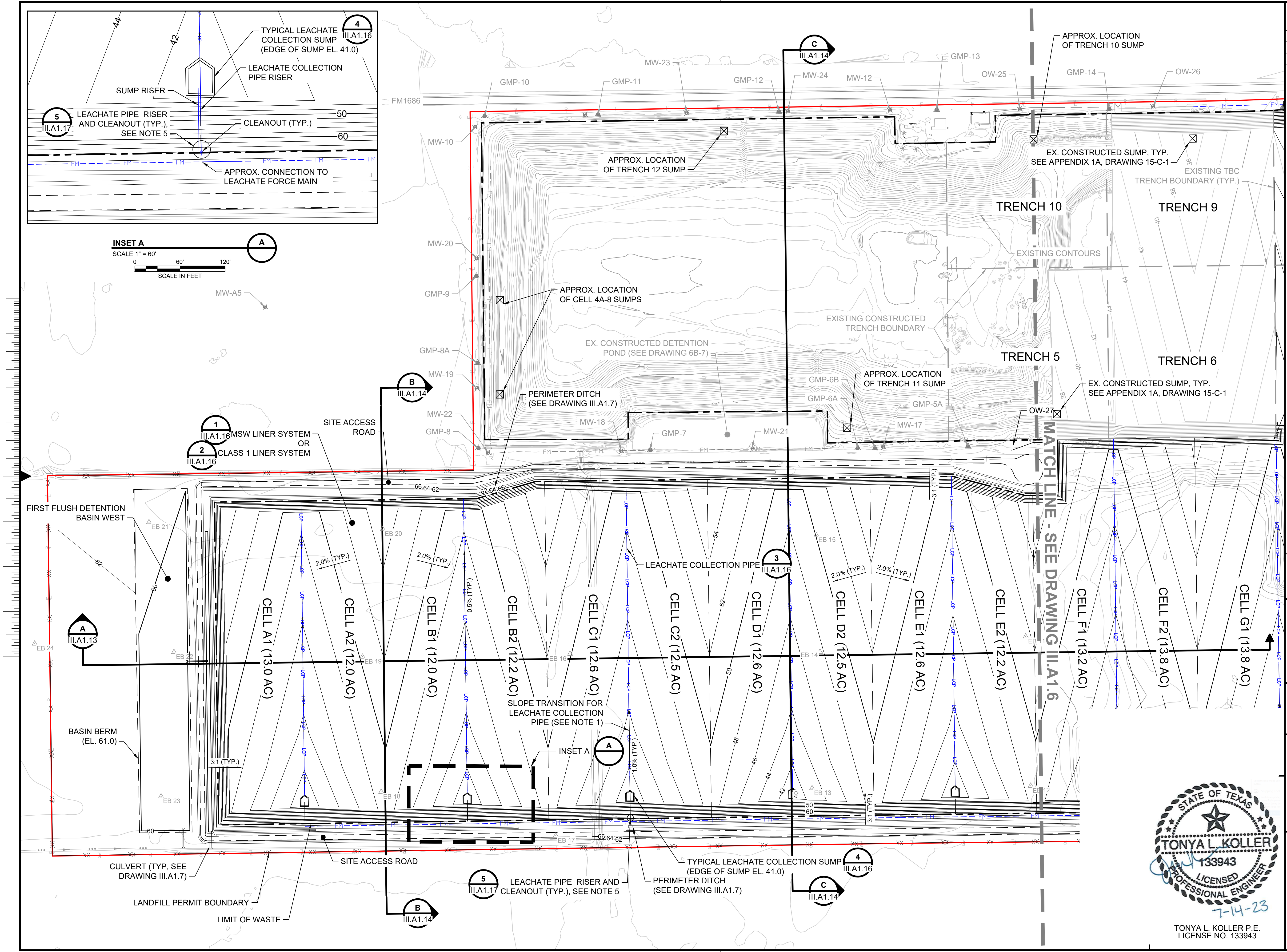
THE CITY OF VICTORIA TEXAS

Victoria County, Texas

1522B PERMIT AMENDMENT

EXISTING CONDITIONS WITH EXPANSION FOOTPRINT

project 107608
contract -
drawing III.A1.2
rev. 3
sheet 3 of 25 sheets
file 107608III.A1.2.dwg



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3	6/30/23	TJS	TLK	REV. PER TCEQ NOD

NOTES:

1. LINER GRADING THROUGH THE FLOWLINE TRANSITIONS FROM 0.5% TO 1.0% AT 250' FROM THE NORTH EDGE OF EACH SUMP. THE TRANSITION IS NECESSARY TO MAINTAIN 0.5% SLOPE THROUGHOUT THE LEACHATE COLLECTION PIPE AFTER LANDFILL SETTLEMENT.
2. DESIGN CONTOURS REPRESENT TOP OF SOIL LINER. CONTOUR INTERVAL IS 2-FEET. BACKGROUND CONTOURS REPRESENT EXISTING GROUND, EXCEPT WITHIN THE TRENCH 6-9 BOUNDARIES AND EASTERN PORTION OF TRENCH 5, WHERE CONTOURS REPRESENT THE PREVIOUSLY PERMITTED TOP OF SOIL LINER. BACKGROUND CONTOUR SOURCES PROVIDED ON DRAWING III.A1.2.
3. LEACHATE PIPE RISERS AND CLEANOUTS FOR SUMPS IN THE PREVIOUSLY DEVELOPED AREAS WILL REMAIN ACCESSIBLE FOR OPERATION AND MAINTENANCE THROUGHOUT THE CLOSURE AND POST-CLOSURE PERIOD.
4. REFER TO DRAWING III.A1.17 FOR LEACHATE COLLECTION SYSTEM DETAILS.
5. EACH SUMP WILL HAVE A DEDICATED SIDE SLOPE RISER PIPE FOR SUMP ACCESS. SIDE SLOPE RISER PIPES WILL REMAIN ACCESSIBLE DURING OPERATIONS AND THROUGHOUT THE CLOSURE AND POST-CLOSURE CARE.

PRELIMINARY - NOT FOR CONSTRUCTION

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MARCH 2022	T. CAMMACK
designed	checked
T. SCHMIDT	T. KOLLER

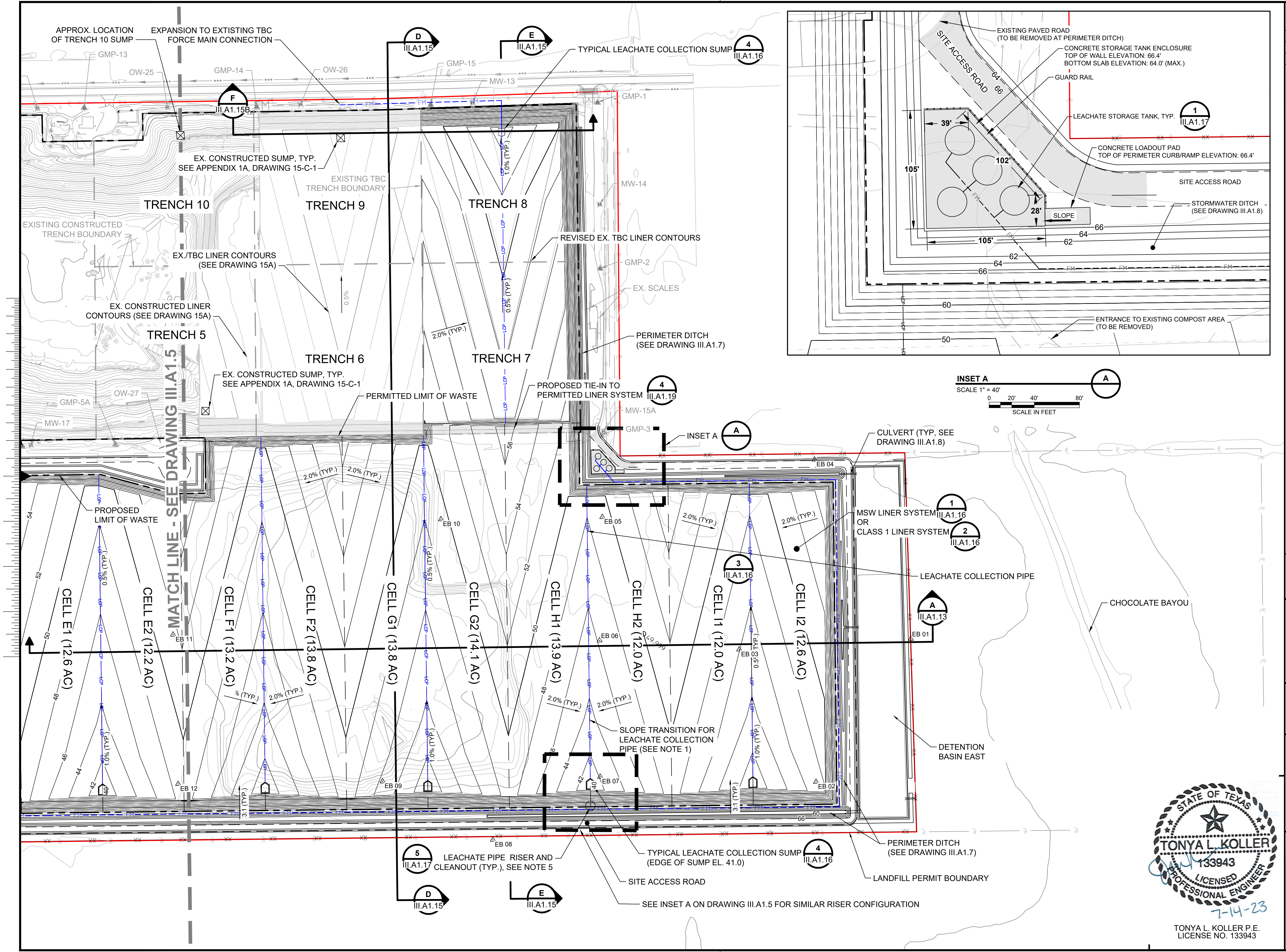
THE CITY OF VICTORIA TEXAS

Victoria County, Texas

1522B PERMIT AMENDMENT

BASE GRADING PLAN - WEST

project 107608
contract -
drawing **III.A1.5 — 3** rev.
sheet 6 of 25 sheets
file 107608III.A1.5.dwg



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3	6/30/23	TJS	TLK	REV. PER TCEQ NOD

NOTES:

1. LINER GRADING THROUGH THE FLOWLINE TRANSITIONS FROM 0.5% TO 1.0% AT 200' FROM THE NORTH EDGE OF EACH SUMP. THE TRANSITION IS NECESSARY TO MAINTAIN 0.5% SLOPE THROUGHOUT THE LEACHATE COLLECTION PIPE AFTER LANDFILL SETTLEMENT.
2. DESIGN CONTOURS REPRESENT TOP OF SOIL LINER. CONTOUR INTERVAL IS 2-FEET. BACKGROUND CONTOURS REPRESENT EXISTING GROUND, EXCEPT WITHIN THE TRENCH 6-9 BOUNDARIES AND EASTERN PORTION OF TRENCH 5, WHERE CONTOURS REPRESENT THE PREVIOUSLY PERMITTED TOP OF SOIL LINER. BACKGROUND CONTOUR SOURCES PROVIDED ON DRAWING III.A1.2.
3. LEACHATE PIPE RISERS AND CLEANOUTS FOR SUMPS IN THE PREVIOUSLY DEVELOPED AREAS WILL REMAIN ACCESSIBLE FOR OPERATION AND MAINTENANCE THROUGHOUT THE CLOSURE AND POST-CLOSURE PERIOD.
4. REFER TO DRAWING III.A1.17 FOR LEACHATE COLLECTION SYSTEM DETAILS.
5. EACH SUMP WILL HAVE A DEDICATED SIDE SLOPE RISER PIPE FOR SUMP ACCESS. SIDE SLOPE RISER PIPES WILL REMAIN ACCESSIBLE DURING OPERATIONS AND THROUGHOUT THE CLOSURE AND POST-CLOSURE CARE.

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designed
T. SCHMIDT

checked
T. KOLLER

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BASE GRADING PLAN - EAST

project
107608

contract
-

drawing
III.A1.6 —

rev.
3

sheet 7 of 25 sheets

file 107608III.A1.6.dwg

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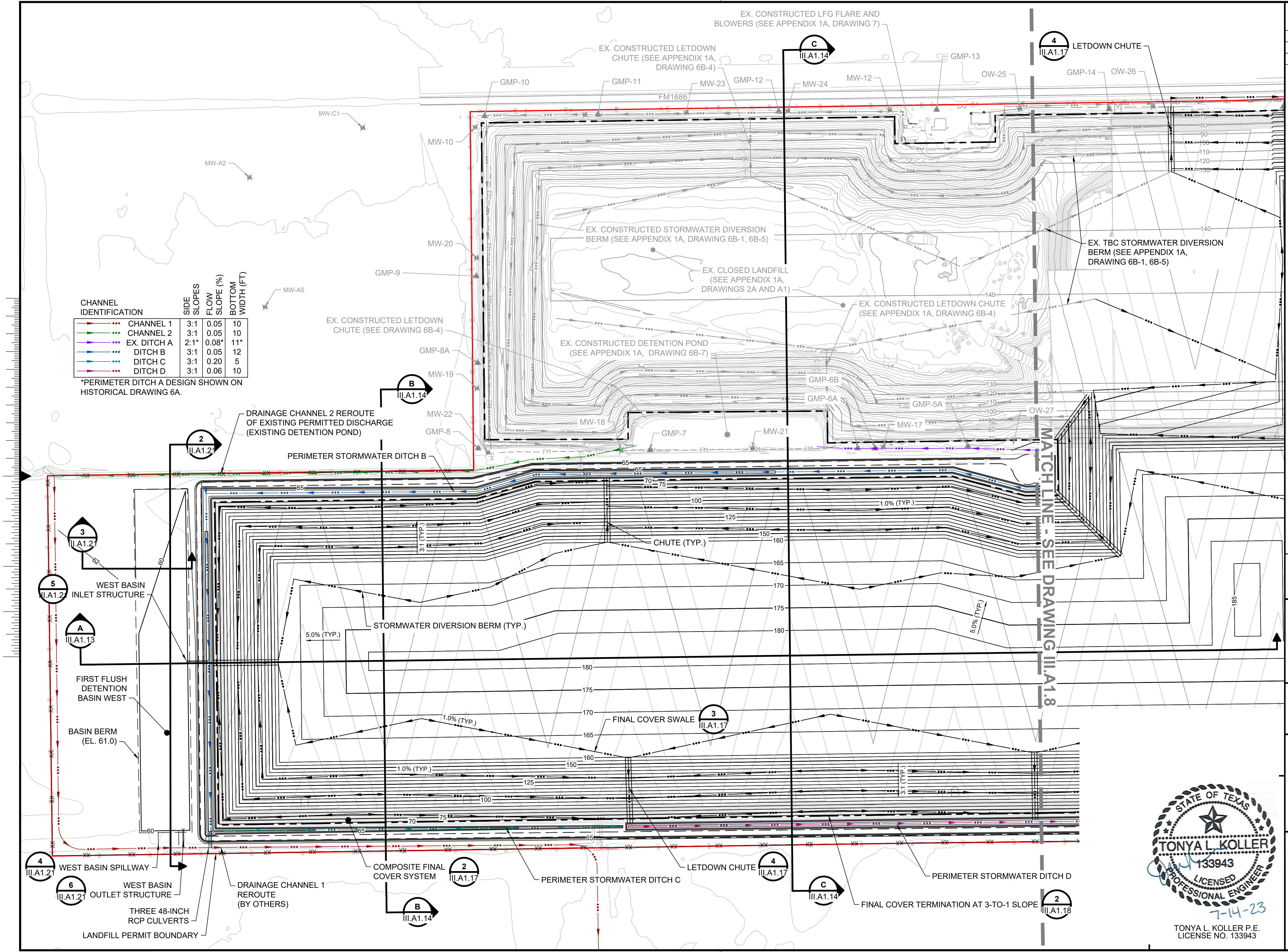

CHANNEL IDENTIFICATION	SIDE SLOPES	FLOW SLOPE (%)	BOTTOM WIDTH (FT)
CHANNEL 1	3:1	0.05	10
CHANNEL 2	3:1	0.05	10
EX. DITCH A	2:1*	0.08*	11*
DITCH B	3:1	0.05	12
DITCH C	3:1	0.20	5
DITCH D	3:1	0.06	10

*PERIMETER DITCH A DESIGN SHOWN ON HISTORICAL DRAWING 6A.

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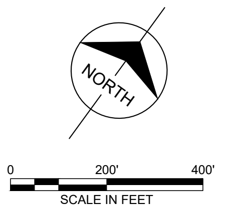
3	6/30/22	TJS	TLK	REV. PER TCEQ NOD

NOTES:

1. DESIGN CONTOURS REPRESENT TOP OF FINAL COVER. DESIGN CONTOUR INTERVAL IS 5-FEET. BACKGROUND CONTOURS REPRESENT TOP OF SOIL LINER AND EXISTING GROUND (OUTSIDE OF TRENCHES 6-9, EASTERN PORTION OF TRENCH 5 AND CELLS A1-I2). BACKGROUND CONTOUR INTERVAL IS 2-FEET. BACKGROUND CONTOUR SOURCES PROVIDED ON DRAWING III.A1.2.
2. PERIMETER DITCH CROSS SECTIONS SHOWING DIMENSIONS, FLOW DEPTHS, ETC. ARE PROVIDED ON DRAWINGS III.A1.20 AND III.A1.21.



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Burns & McDonnell Engineering Co, Inc.
FIRM REG. NO. F-845

date MARCH 2022
detailed T. CAMMACK
designed T. SCHMIDT
checked T. KOLLER

THE CITY OF VICTORIA TEXAS
Victoria County, Texas

1522B PERMIT AMENDMENT

FINAL GRADING PLAN - WEST

project 107608
contract -
drawing **III.A1.7 –** rev. **3**
sheet 8 of 25 sheets
file 107608III.A1.7.dwg

no.	date	by	ckd	description
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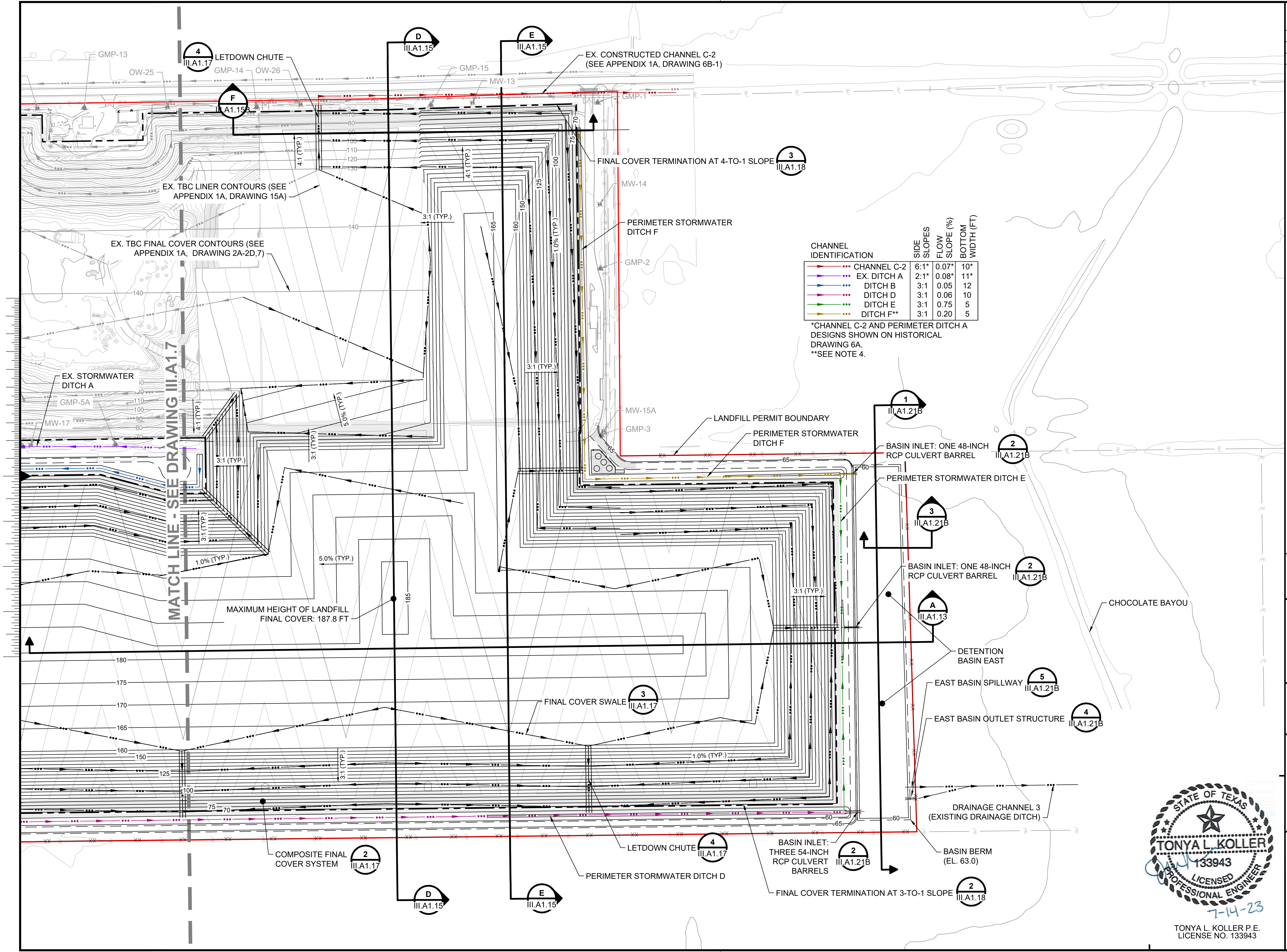
3	6/30/23	TJS	TLK	REV. PER TCEQ NOD

NOTES:

1. THE EAST BASIN DISCHARGES INTO AN EXISTING DITCH NOT SHOWN IN THE EXISTING TOPOGRAPHY.
2. DESIGN CONTOURS REPRESENT TOP OF FINAL COVER. DESIGN CONTOUR INTERVAL IS 5-FEET. BACKGROUND CONTOURS REPRESENT TOP OF SOIL LINER AND EXISTING GROUND (OUTSIDE OF TRENCHES 6-9, EASTERN PORTION OF TRENCH 5 AND CELLS A1-I2). BACKGROUND CONTOUR INTERVAL IS 2-FEET. BACKGROUND CONTOUR SOURCES PROVIDED ON DRAWING III.A1.2.
3. PERIMETER DITCH CROSS SECTIONS SHOWING DIMENSIONS, FLOW DEPTHS, ETC. ARE PROVIDED ON DRAWINGS III.A1.20 AND III.A1.21.
4. PERIMETER DITCH F IS NOT REPRESENTED IN CROSS SECTIONS. 25-YEAR STORM DEPTH IS 1.1 FT AND 100-YEAR STORM DEPTH IS 1.5 FT.



CHANNEL IDENTIFICATION	SIDE SLOPES	FLOW SLOPE (%)	BOTTOM WIDTH (FT)
CHANNEL C-2	6:1*	0.07*	10*
EX. DITCH A	2:1*	0.08*	11*
DITCH B	3:1	0.05	12
DITCH D	3:1	0.06	10
DITCH E	3:1	0.75	5
DITCH F**	3:1	0.20	5

*CHANNEL C-2 AND PERIMETER DITCH A DESIGNS SHOWN ON HISTORICAL DRAWING 6A.
**SEE NOTE 4.

TONYA L. KOLLER
133943

7-14-23

TONYA L. KOLLER P.E.
LICENSE NO. 133943

PRELIMINARY - NOT FOR CONSTRUCTION

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FIRM REG. NO. F-845

date	detailed
MARCH 2022	T. CAMMACK
designed	checked
T. SCHMIDT	T. KOLLER

THE CITY OF VICTORIA TEXAS

Victoria County, Texas

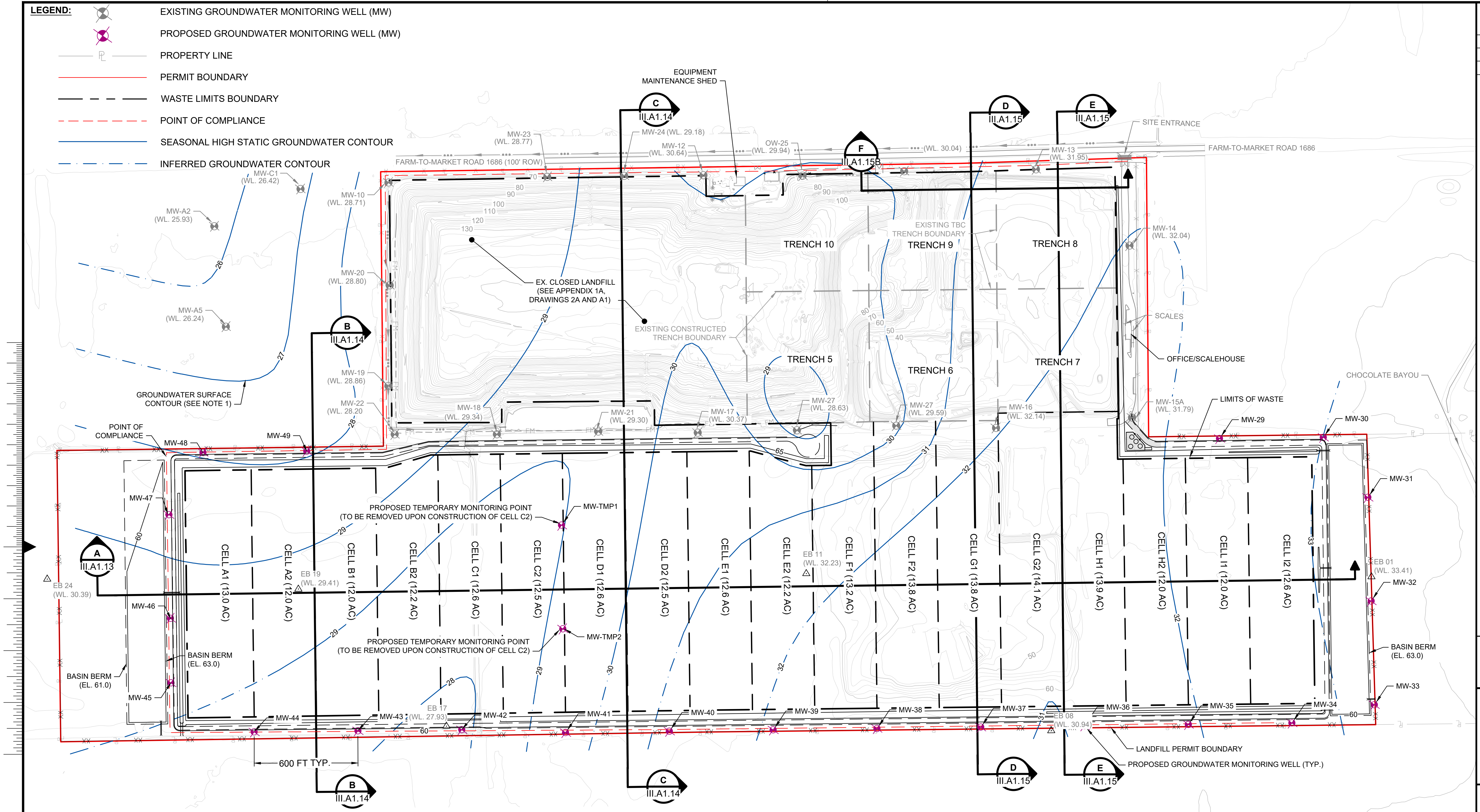
1522B PERMIT AMENDMENT

FINAL GRADING PLAN - EAST

project 107608
contract -
drawing **III.A1.8 — 3** rev.
sheet 9 of 25 sheets
file 107608III.A1.8.dwg

LEGEND:

EXISTING GROUNDWATER MONITORING WELL (MW)
PROPOSED GROUNDWATER MONITORING WELL (MW)
PROPERTY LINE
PERMIT BOUNDARY
WASTE LIMITS BOUNDARY
POINT OF COMPLIANCE
SEASONAL HIGH STATIC GROUNDWATER CONTOUR
INFERRED GROUNDWATER CONTOUR



INSTALLATION/ABANDONMENT TABLE		
WELL/PROBE ID	INSTALL DURING CONSTRUCTION OF	ABANDON DURING CONSTRUCTION OF
MW-16	EXISTING	CELL G2
MW-28	EXISTING	CELL F2
MW-29	CELL G2	N/A
MW-30	CELL G2	N/A
MW-31	CELL G2	N/A
MW-32	CELL G2	N/A
MW-33	CELL G2	N/A
MW-34	CELL G2	N/A
MW-35	CELL G2	N/A
MW-36	CELL G2	N/A
MW-37	CELL G2	N/A
MW-38	CELL G2	N/A
MW-39	CELL G2	N/A
MW-40	CELL G2	N/A

INSTALLATION/ABANDONMENT TABLE		
WELL/PROBE ID	INSTALL DURING CONSTRUCTION OF	ABANDON DURING CONSTRUCTION OF
MW-41	CELL G2	N/A
MW-TMP1	CELL G2	CELL D1
MW-TMP2	CELL G2	CELL D1
MW-42	CELL D1	N/A
MW-43	CELL D1	N/A
MW-44	CELL D1	N/A
MW-45	CELL D1	N/A
MW-46	CELL D1	N/A
MW-47	CELL D1	N/A
MW-48	CELL D1	N/A
MW-49	CELL D1	N/A

DATES OF MEASUREMENT OF MAXIMUM STATIC GROUNDWATER ELEVATIONS:

DECEMBER 2007:
MW-10, MW-11, MW-13, MW-15, MW-17, MW-18, MW-19, MW-20

MARCH 2008:
MW-10, MW-14

SEPTEMBER 2010:
MW-16

JANUARY 2011:
MW-15A, MW-21, MW-22, MW-23, MW-24

MARCH 2012:
MW-27, MW-28

FEBRUARY 2019:
A2, C1, EB-01, EB-08, EB-17, MW-26

AUGUST 2019:
A5, EB-11, EB-19, EB-24, OW-25

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AMANDA BREITLING P.G.
LICENSE NO. 11071

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no.	date	by	ckd	description
0	3/28/22	TJS	SAM	INITIAL SUBMITTAL
1	8/15/22	TJS	TLK	REV. PER TCEQ NOD
2	11/18/22	TJS	TLK	REV. PER TCEQ NOD
3	6/30/23	TJS	TLK	REV. PER TCEQ NOD

NOTES:

1. GROUNDWATER CONTOUR LINES REPRESENT A POTENTIOMETRIC SURFACE GENERATED BY BURNS & MCDONNELL ENGINEERING CO. USING MAXIMUM SEASONAL HIGH WATER ELEVATIONS BETWEEN DECEMBER 2007 AND AUGUST 2019.
2. PROPOSED POINT OF COMPLIANCE MONITORING WELLS FOR THE EXPANSION AREA INCLUDE MONITORING WELLS MW-17, MW-21, MW-37 THROUGH MW-41, MW-TMP-1, MW-TMP-2, AND OW-27 DURING OPERATION OF CELLS D1 THROUGH G2. UPON CONSTRUCTION OF CELLS A1 THROUGH C2, POINT OF COMPLIANCE MONITORING WELLS WILL ALSO INCLUDE MW-18, MW-22, AND MW-42 THROUGH MW-49. UPON CONSTRUCTION OF CELLS H1 THROUGH I2, MONITORING WELLS MW-15A, MW-29, MW-35, AND MW-36 WILL BE CONVERTED FROM UPGRADIENT MONITORING WELLS TO POINT OF COMPLIANCE MONITORING WELLS.
3. BACKGROUND CONTOURS REPRESENT EXISTING GROUND. SOURCES PROVIDED ON DRAWING III.A1.2. CONTOUR INTERVAL IS 2 FEET.

FOR PERMITTING PURPOSES ONLY

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date	detailed
MARCH 2022	T. CAMMACK
designed	checked
T. SCHMIDT	T. KOLLER

THE CITY OF VICTORIA TEXAS

Victoria County, Texas

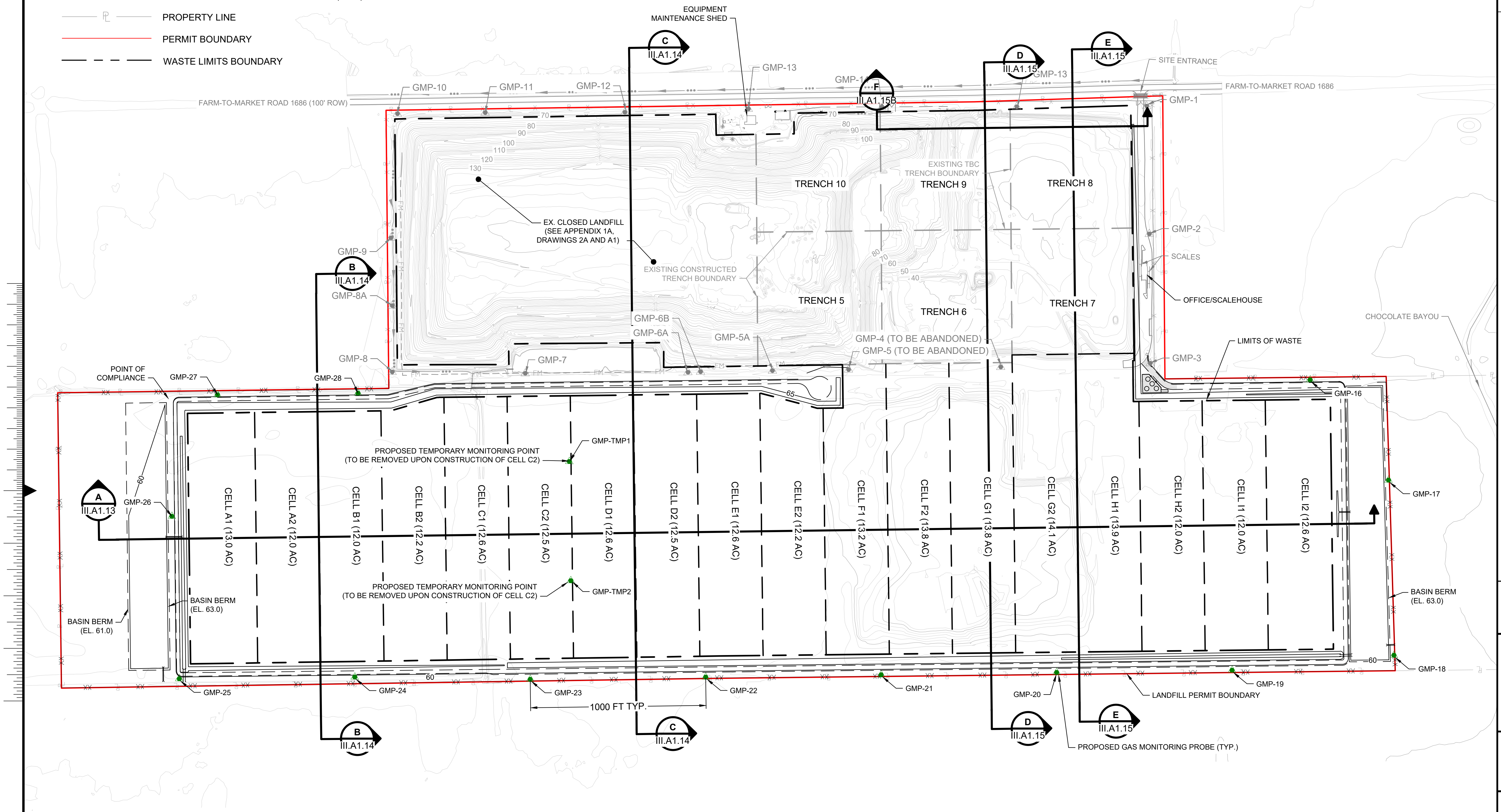
1522B PERMIT AMENDMENT

FINAL GROUNDWATER MONITORING PLAN

project 107608
contract -
drawing **III.A1.12 — 3** rev.
sheet 13 of 25 sheets
file 107608III.A1.12.dwg

LEGEND:

▲	EXISTING GAS MONITORING PROBE (GMP)
▲	PROPOSED GAS MONITORING PROBE (GMP)
— ℙ —	PROPERTY LINE
—	PERMIT BOUNDARY
— — —	WASTE LIMITS BOUNDARY



INSTALLATION/ABANDONMENT TABLE

WELL/PROBE ID	INSTALL DURING CONSTRUCTION OF	ABANDON DURING CONSTRUCTION OF
GMP-4	EXISTING	CELL G2
GMP-5	EXISTING	CELL F1
GMP-16	CELL G2	N/A
GMP-17	CELL G2	N/A
GMP-18	CELL G2	N/A
GMP-19	CELL G2	N/A
GMP-20	CELL G2	N/A
GMP-21	CELL G2	N/A
GMP-22	CELL G2	N/A

INSTALLATION/ABANDONMENT TABLE

WELL/PROBE ID	INSTALL DURING CONSTRUCTION OF	ABANDON DURING CONSTRUCTION OF
GMP-TMP1	CELL G2	CELL D1
GMP-TMP2	CELL G2	CELL D1
GMP-23	CELL D1	N/A
GMP-24	CELL D1	N/A
GMP-25	CELL D1	N/A
GMP-26	CELL D1	N/A
GMP-27	CELL D1	N/A
GMP-28	CELL D1	N/A

no.	date	by	ckd	description
0	3/28/22	TJS	SAM	INITIAL SUBMITTAL
1	8/15/22	TJS	TLK	REV. PER TCEQ NOD
2	11/18/22	TJS	TLK	REV. PER TCEQ NOD
3	6/30/23	TJS	TLK	REV. PER TCEQ NOD

NOTES:

1. BACKGROUND CONTOURS REPRESENT EXISTING GROUND. SOURCES PROVIDED ON DRAWING III.A1.2. CONTOUR INTERVAL IS 2 FEET.

FOR PERMITTING PURPOSES ONLY

BURNS McDONNELL

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date MARCH 2022	detailed T. CAMMACK
designed T. SCHMIDT	checked T. KOLLER

THE CITY OF VICTORIA TEXAS

Victoria County, Texas

1522B PERMIT AMENDMENT

FINAL LANDFILL GAS MONITORING PLAN

project 107608	contract -
drawing **III.A1.12B —**	rev. **3**
sheet 13B of 25 sheets	
file 107608III.A1.12B.dwg	

TONYA L. KOLLER
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7-14-23

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LICENSE NO. 133943

no.	date	by	ckd	description
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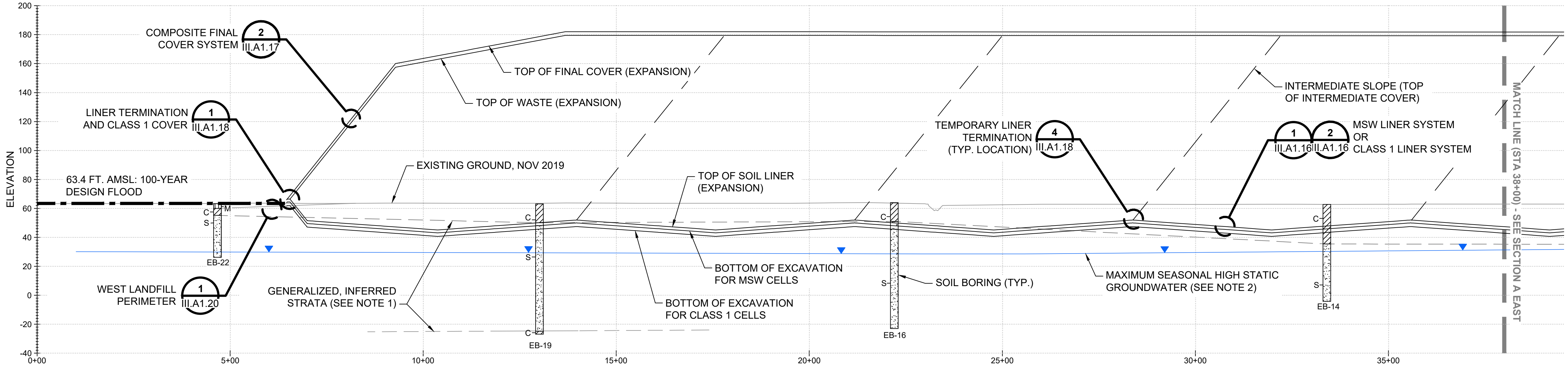
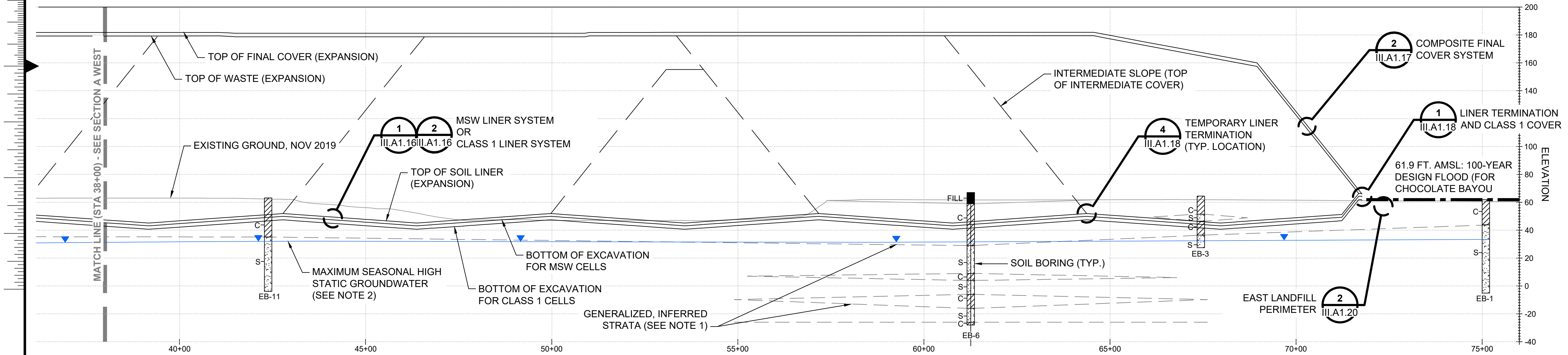
2	11/18/22	TJS	TLK	REV. PER TCEQ NOD
3	6/30/23	TJS	TLK	REV. PER TCEQ NOD



SECTION (WEST) A III.A1.5 III.A1.6, III.A1.7, III.A1.8, III.A1.12, III.A1.12B

0 150' 300' HORIZONTAL SCALE IN FEET

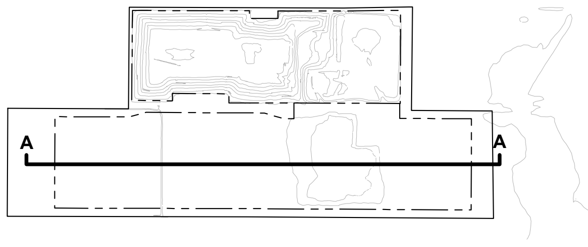
0 20' 40' 80' VERTICAL SCALE IN FEET



SECTION (EAST) A III.A1.5 III.A1.6, III.A1.7, III.A1.8, III.A1.12, III.A1.12B

0 150' 300' HORIZONTAL SCALE IN FEET

0 20' 40' 80' VERTICAL SCALE IN FEET



KEY MAP
(SCALE 1" = 1500')

NOTES:

1. CROSS SECTION TRANSECT LINES DO NOT INTERSECT ALL BORINGS DEPICTED. GENERALIZED, INFERRED STRATA PRESENTED, AS INTERPRETED FROM DEPICTED BORINGS. REFER TO III.A1.5 AND III.A1.6 FOR BORING LOCATIONS.
2. STATIC WATER ELEVATIONS BASED ON THE MAXIMUM SEASONAL HIGH GROUNDWATER SURFACE, SHOWN ON DRAWING III.A1.12.
3. LITHOLOGY IS GENERALIZED BY SAND, SILT, AND CLAY.
4. EXISTING GROUND SOURCES PROVIDED ON DRAWING III.A1.2.

LEGEND:

C	CLAY
M	SILT
S	SAND
GENERALIZED INFERRED STRATA	— — —
APPROXIMATE STATIC GROUNDWATER	▼
INITIAL WATER LEVEL	▽

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date	detailed
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designed	checked
T. SCHMIDT	T. KOLLER

THE CITY OF VICTORIA TEXAS

Victoria County, Texas

1522B PERMIT AMENDMENT

CROSS SECTIONS - 1

project	contract
107608	-

drawing **III.A1.13** rev. **3**

sheet 14 of 25 sheets

file 107608III.A1.13.dwg

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7-14-23

TONYA L. KOLLER P.E.
LICENSE NO. 133943

Millimeters
Scale For Microfilming
Inches

no.	date	by	ckd	description
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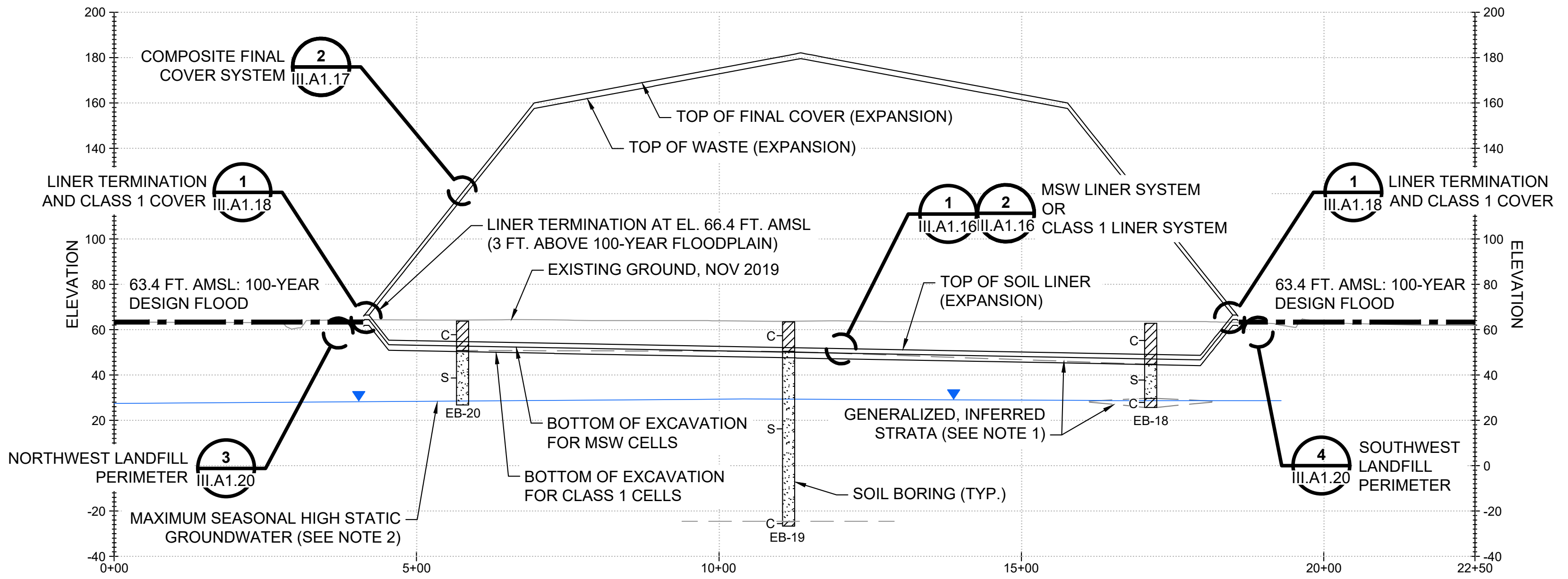
2	11/18/22	TJS	TLK	REV. PER TCEQ NOD
3	6/30/23	TJS	TLK	REV. PER TCEQ NOD

NOTES:

1. CROSS SECTION TRANSECT LINES DO NOT INTERSECT ALL BORINGS DEPICTED. GENERALIZED, INFERRED STRATA PRESENTED, AS INTERPRETED FROM DEPICTED BORINGS. REFER TO III.A1.5 AND III.A1.6 FOR BORING LOCATIONS.
2. STATIC WATER ELEVATIONS BASED ON THE MAXIMUM SEASONAL HIGH GROUNDWATER SURFACE, SHOWN ON DRAWING III.A1.12.
3. LITHOLOGY IS GENERALIZED BY SAND, SILT, AND CLAY.
4. EXISTING GROUND SOURCES PROVIDED ON DRAWING III.A1.2.

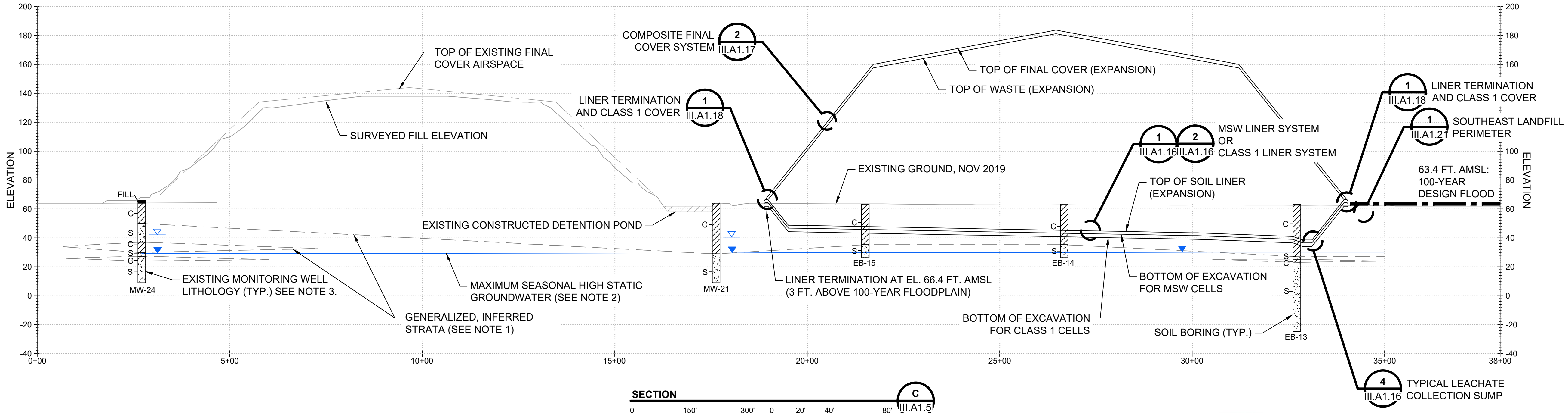


SECTION B III.A1.5

0 150' 300' HORIZONTAL SCALE IN FEET

0 20' 40' 80' VERTICAL SCALE IN FEET

III.A1.7, III.A1.12, III.A1.12B

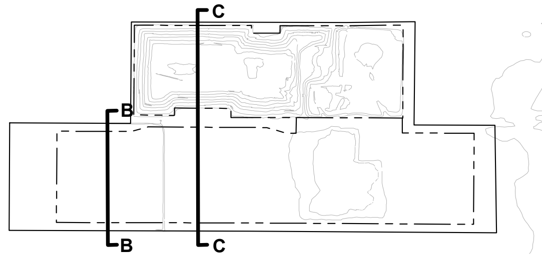


SECTION C III.A1.5

0 150' 300' HORIZONTAL SCALE IN FEET

0 20' 40' 80' VERTICAL SCALE IN FEET

III.A1.7, III.A1.12, III.A1.12B



KEY MAP
(SCALE 1" = 1500')

LEGEND:

C	CLAY
M	SILT
S	SAND
GENERALIZED INFERRED STRATA	— — —
APPROXIMATE STATIC GROUNDWATER	▼
INITIAL WATER LEVEL	▽

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date MARCH 2022	detailed T. CAMMACK
designed T. SCHMIDT	checked T. KOLLER

THE CITY OF VICTORIA TEXAS

Victoria County, Texas

1522B PERMIT AMENDMENT

CROSS SECTIONS - 2

project 107608	contract -
drawing III.A1.14	rev. 3
sheet 15 of 25 sheets	

file 107608III.A1.14.dwg

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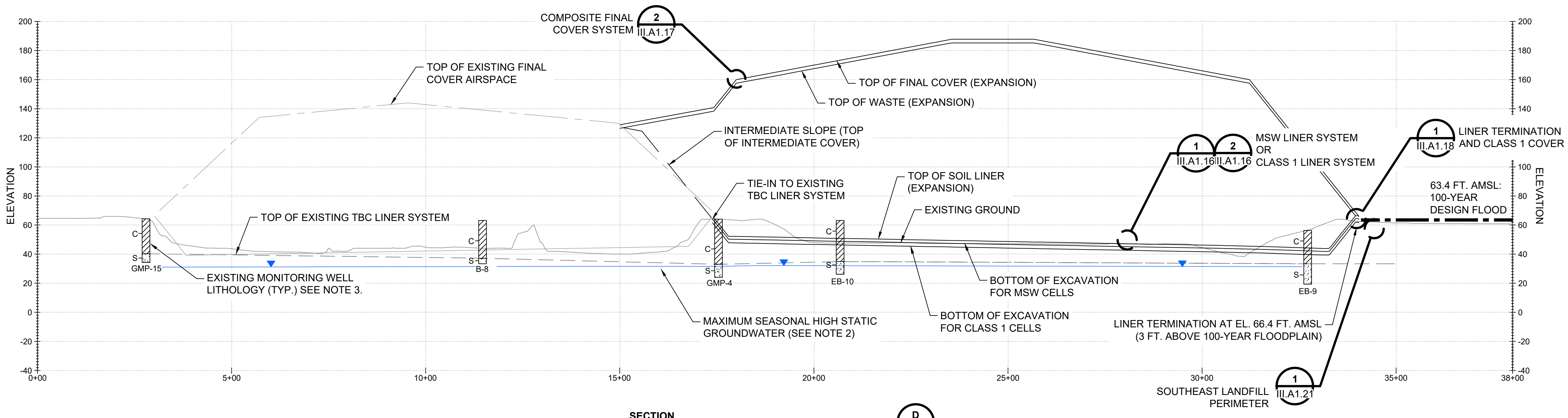
TONYA L. KOLLER P.E.
LICENSE NO. 133943

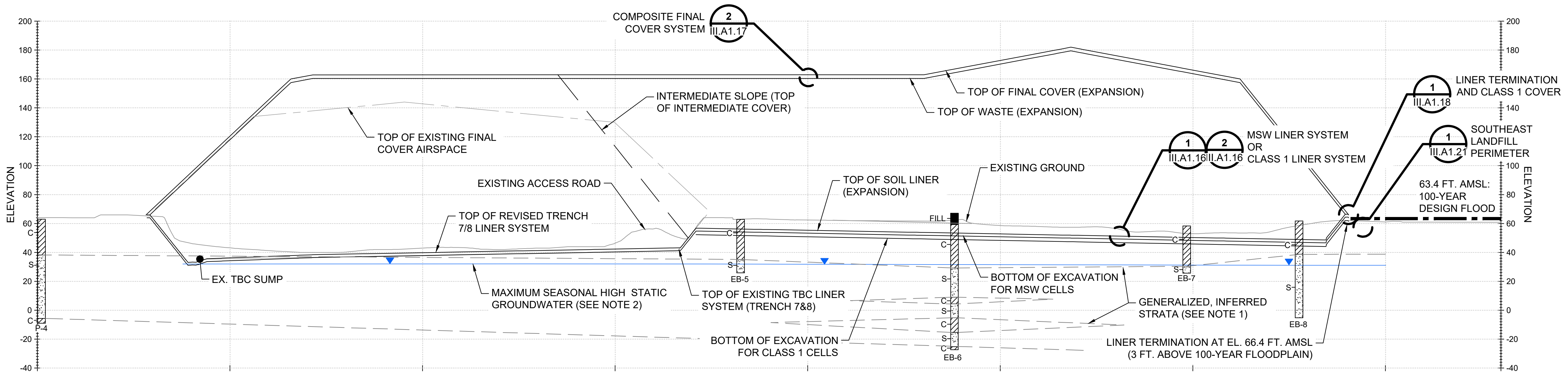
no.	date	by	ckd	description
0	3/28/22	TJS	SAM	INITIAL SUBMITTAL
1	8/15/22	TJS	TLK	REV. PER TCEQ NOD
2	11/18/22	TJS	TLK	REV. PER TCEQ NOD
3	6/30/23	TJS	TLK	REV. PER TCEQ NOD



SECTION D III.A1.6 — III.A1.8, III.A1.12, III.A1.12B

0 150' 300' HORIZONTAL SCALE IN FEET

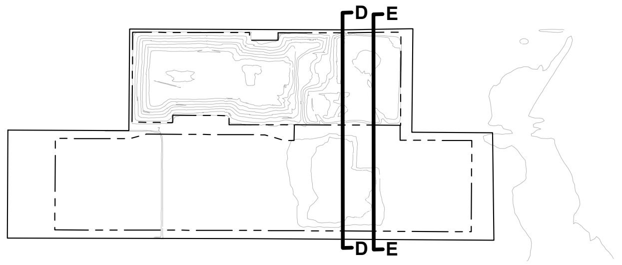
0 20' 40' 80' VERTICAL SCALE IN FEET



SECTION E III.A1.6 — III.A1.8, III.A1.12, III.A1.12B

0 150' 300' HORIZONTAL SCALE IN FEET

0 20' 40' 80' VERTICAL SCALE IN FEET



KEY MAP
(SCALE 1" = 1500')

NOTES:

1. CROSS SECTION TRANSECT LINES DO NOT INTERSECT ALL BORINGS DEPICTED. GENERALIZED, INFERRED STRATA PRESENTED, AS INTERPRETED FROM DEPICTED BORINGS. REFER TO III.A1.5 AND III.A1.6 FOR BORING LOCATIONS.
2. STATIC WATER ELEVATIONS BASED ON THE MAXIMUM SEASONAL HIGH GROUNDWATER SURFACE, SHOWN ON DRAWING III.A1.12.
3. LITHOLOGY IS GENERALIZED BY SAND, SILT, AND CLAY.
4. GMP-4 AND GMP-15 LITHOLOGY OBTAINED FROM BORING LOGS PREPARED BY MORRIS-KNUDSEN.
5. EXISTING GROUND SOURCES PROVIDED ON DRAWING III.A1.2.

LEGEND:

C	CLAY
M	SILT
S	SAND
GENERALIZED INFERRED STRATA	– – –
APPROXIMATE STATIC GROUNDWATER	▼
INITIAL WATER LEVEL	▽

PRELIMINARY - NOT FOR CONSTRUCTION

AMANDA K. BREITLING
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7/17/23

AMANDA BREITLING P.G.
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TONYA L. KOLLER
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7-14-23

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THE CITY OF VICTORIA TEXAS

Victoria County, Texas

1522B PERMIT AMENDMENT

CROSS SECTIONS - 3

project 107608	contract -
drawing **III.A1.15**	rev. **3**
sheet 16	of 25 sheets

file 107608III.A1.15.dwg

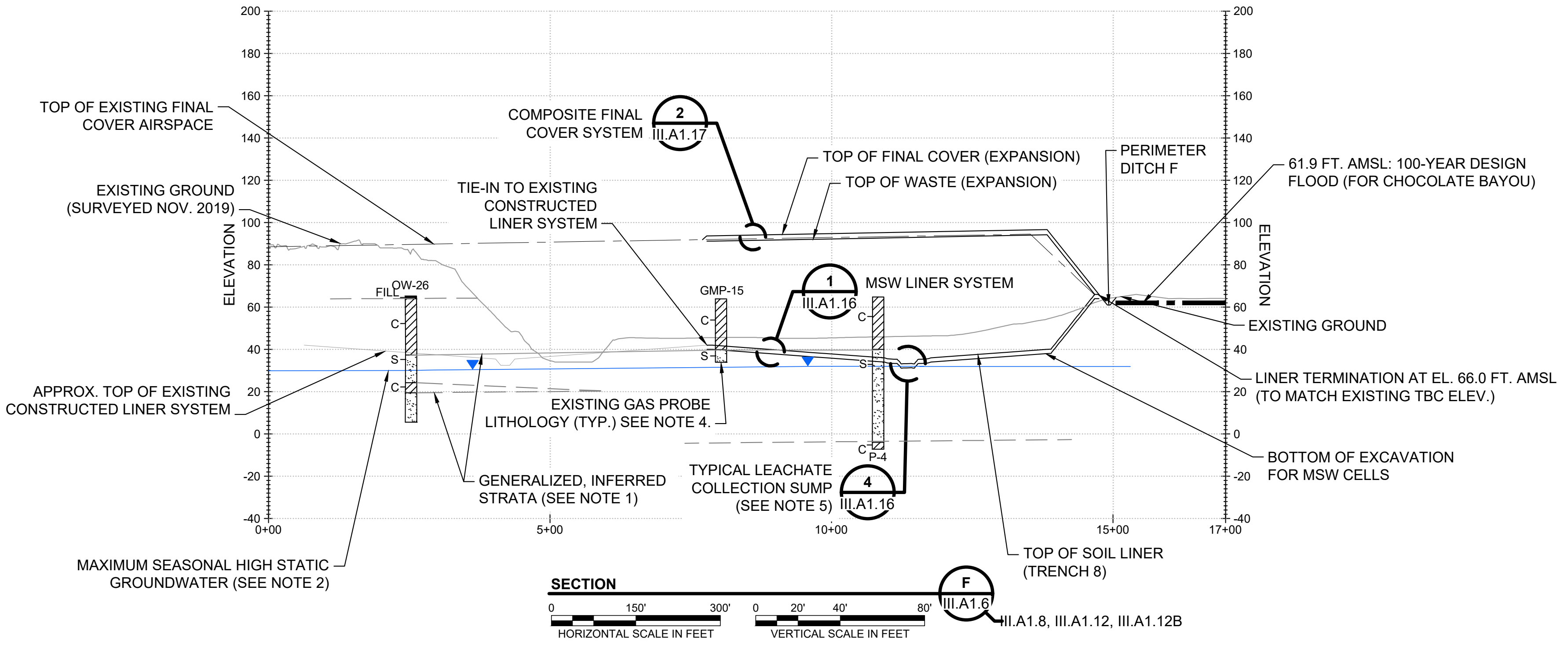
no.	date	by	ckd	description
0	3/28/22	TJS	SAM	INITIAL SUBMITTAL
1	8/15/22	TJS	TLK	REV. PER TCEQ NOD
2	11/18/22	TJS	TLK	REV. PER TCEQ NOD
3	6/30/23	TJS	TLK	REV. PER TCEQ NOD

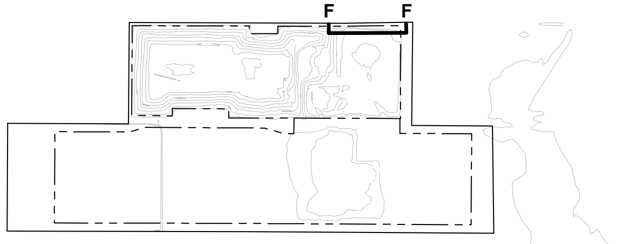
NOTES:

1. CROSS SECTION TRANSECT LINES DO NOT INTERSECT ALL BORINGS DEPICTED. GENERALIZED, INFERRED STRATA PRESENTED, AS INTERPRETED FROM DEPICTED BORINGS. REFER TO III.A1.5 AND III.A1.6 FOR BORING LOCATIONS.
2. STATIC WATER ELEVATIONS BASED ON THE MAXIMUM SEASONAL HIGH GROUNDWATER SURFACE, SHOWN ON DRAWING III.A1.12.
3. LITHOLOGY IS GENERALIZED BY SAND, SILT, AND CLAY.
4. GMP-15 LITHOLOGY OBTAINED FROM BORING LOGS PREPARED BY MORRIS-KNUDSEN.
5. THE SEASONAL HIGH GROUNDWATER ELEVATION IS HIGHER THAN THE DESIGN LINER SYSTEM WITHIN THE TRENCH 8 SUMP. SECTION 4.6 OF THE PART III LANDFILL PERMIT AMENDMENT SITE DEVELOPMENT PLAN - TCEQ MSW PERMIT NO. 1522B, PREPARED BY BMcD, DISCUSSES THE INTERFACE BETWEEN THE SUMP AND GROUNDWATER.
6. EXISTING GROUND SOURCES PROVIDED ON DRAWING III.A1.2.

LEGEND:

C	CLAY
M	SILT
S	SAND
GENERALIZED INFERRED STRATA	— — —
APPROXIMATE STATIC GROUNDWATER	▼
INITIAL WATER LEVEL	▽





KEY MAP
(SCALE 1" = 1500')

Millimeters

Scale For Microfilming

Inches

AMANDA K. BREITLING
11071

7/17/23

AMANDA BREITLING P.G.
LICENSE NO. 11071

TONYA L. KOLLER
133943

7-14-23

TONYA L. KOLLER P.E.
LICENSE NO. 133943

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McDONNELL
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FIRM REG. NO. F-845

date	detailed
MARCH 2022	T. CAMMACK
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T. SCHMIDT	T. KOLLER

THE CITY OF VICTORIA TEXAS

Victoria County, Texas

1522B PERMIT AMENDMENT

CROSS SECTIONS - 4

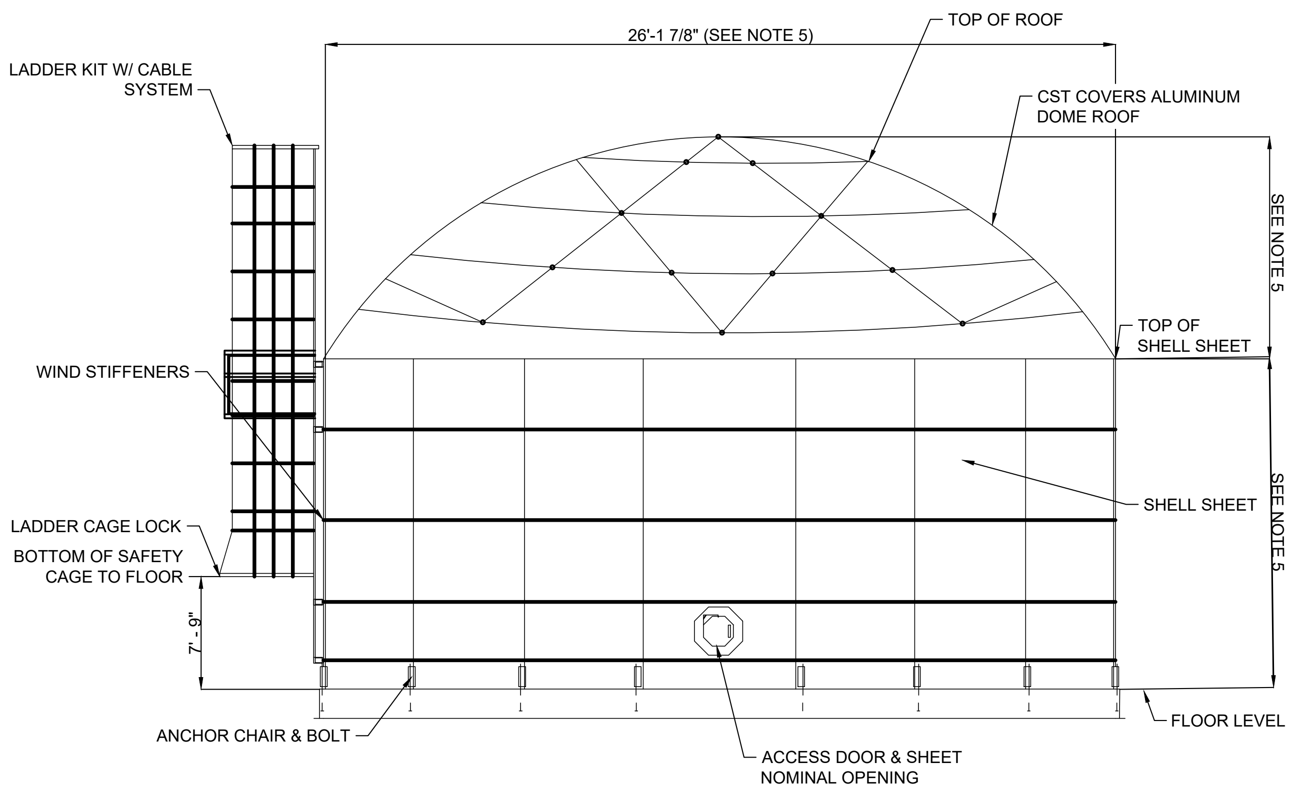
project	contract
107608	-

drawing III.A1.15B — rev. 3

sheet 17 of 23 sheets

file 107608III.A1.15B.dwg

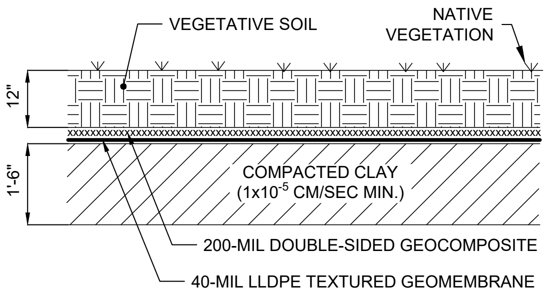
no.	date	by	ckd	description
0	3/28/22	TJS	SAM	INITIAL SUBMITTAL
1	8/15/22	TJS	TLK	REV. PER TCEQ NOD
2	11/18/22	TJS	TLK	REV. PER TCEQ NOD
3	6/30/23	TJS	TLK	REV. PER TCEQ NOD



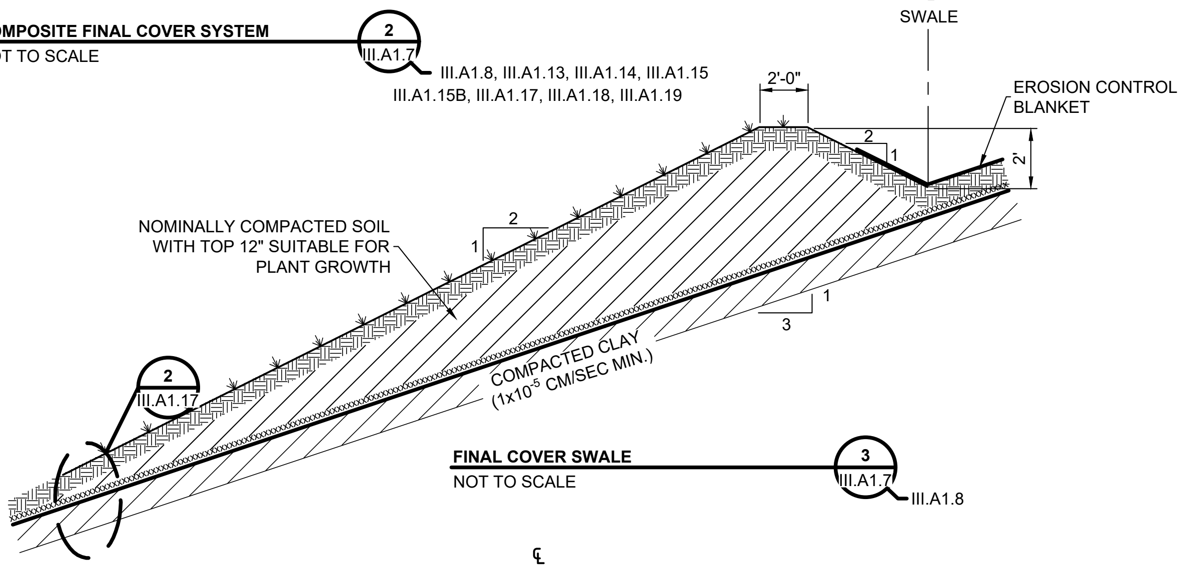
LEACHATE STORAGE TANK
NOT TO SCALE
1 III.A1.6

NOTES:

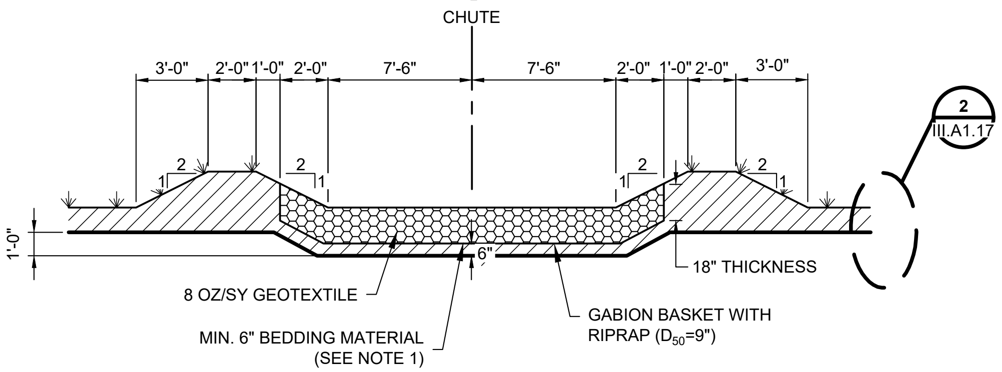
1. PANEL INTERIOR COATING IS WHITE GLASS 97 FUSED GLASS WITH EDGECOAT PROCESS.
2. PANEL EXTERIOR COATING IS FUSED GLASS.
3. FINAL DESIGN DIMENSIONS TO BE PROVIDED TO TCEQ AT DESIGN STAGES.
4. TANKS SHALL BE CAPABLE OF HOLDING 64,000 GALLONS OF LEACHATE.
5. TANK DIMENSIONS SHALL MATCH EXISTING CONSTRUCTED TANK DIMENSIONS, AS SHOWN IN DRAWING 15G-1B (OR EQUIVALENT).
6. THE SECONDARY CONTAINMENT FACILITIES ASSOCIATED WITH THE LEACHATE STORAGE TANKS THAT WILL BE INSTALLED WILL BE DESIGNED TO PREVENT RUN-ON FROM THE 100-YEAR, 24-HOUR STORM EVENT.
7. LEACHATE STORAGE TANK SECONDARY CONTAINMENT WILL BE MAINTAINED AND OPERATED TO MANAGE STORMWATER FROM THE 25-YEAR, 24-HOUR STORM EVENT.



COMPOSITE FINAL COVER SYSTEM
NOT TO SCALE
2 III.A1.7
III.A1.8, III.A1.13, III.A1.14, III.A1.15
III.A1.15B, III.A1.17, III.A1.18, III.A1.19



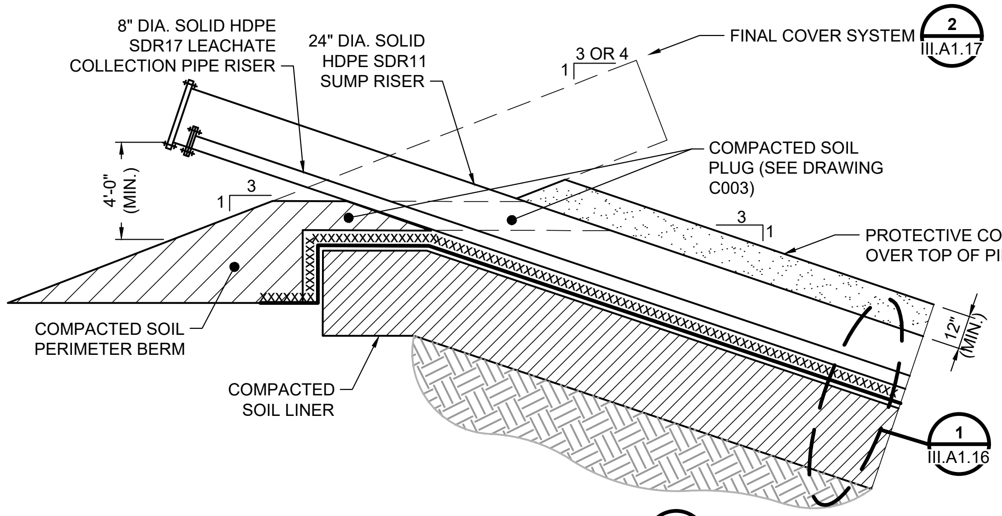
FINAL COVER SWALE
NOT TO SCALE
3 III.A1.7
III.A1.8



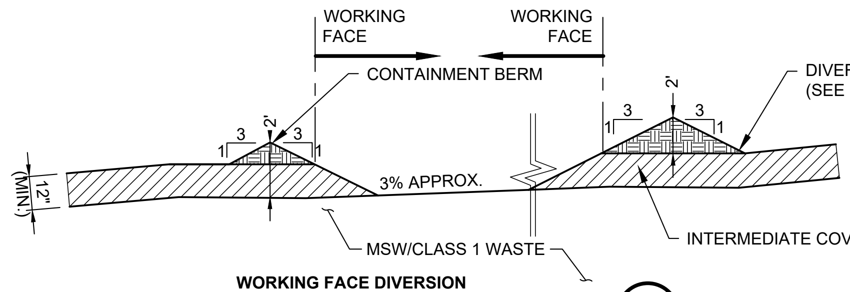
LETDOWN CHUTE
NOT TO SCALE
4 III.A1.7
III.A1.8

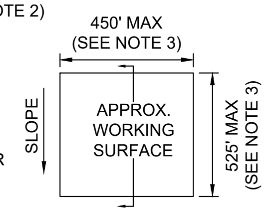
NOTES:

1. BEDDING MATERIAL WILL CONSIST OF CLAYEY SOILS OVERLAIN BY 8 OZ/SY GEOTEXTILE PRIOR TO PLACEMENT OF GABIONS.
2. CHANNEL ARMORING SHALL BE INCISED INTO FINAL COVER. TOP OF ARMORING SHALL MATCH FINAL GRADE ELEVATION AT ALL TERMINATION EDGES. EROSION CONTROL BLANKET IN TERRACE SHALL OVERLAP A MINIMUM OF 1 FOOT AT CONFLUENCE OF TERRACE AND ARMORING.
3. LINER ELEVATIONS SHALL BE LOWERED AS SHOWN TO ACCOUNT FOR 18" GABION BASKET AND BEDDING MATERIAL.
4. GABION KEYWAYS SHALL BE INSTALLED ALONG THE WIDTH OF THE CHUTE AT EVERY TERRACE INTERSECTION. DIMENSIONS SHALL BE 3' THICK X 3' DEEP. FINAL COVER GEOMEMBRANE ELEVATIONS SHALL BE LOWERED IN THESE LOCATIONS TO ACCOUNT FOR ADDITIONAL GABION DEPTH.



LEACHATE PIPE RISER AND CLEANOUT
NOT TO SCALE
5 III.A1.5
III.A1.6





DETAIL 6 KEY

WORKING FACE DIVERSION AND CONTAINMENT BERM
NOT TO SCALE
6 III.A1.17

NOTES:

1. WORKING FACE WILL RELOCATE IN CONJUNCTION WITH CURRENT WASTE FILLING PATTERNS.
2. DIVERSION BERM FLOWLINE SHALL BE 0.5% MINIMUM TO CONVEY UNCONTAMINATED WATER AROUND WORKING FACE.
3. MAXIMUM WORKING FACE DIMENSIONS ARE DEPENDENT UPON WASTE QUANTITY. SEE SITE OPERATING PLAN.

TONYA L. KOLLER
133943
7-14-23

TONYA L. KOLLER P.E.
LICENSE NO. 133943

PRELIMINARY - NOT FOR CONSTRUCTION

BURNS McDONNELL
9400 WARD PARKWAY
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816-333-9400
Burns & McDonnell Engineering Co, Inc.
FIRM REG. NO. F-845

date	detailed
MARCH 2022	T. CAMMACK
designed	checked
T. SCHMIDT	T. KOLLER

THE CITY OF VICTORIA TEXAS

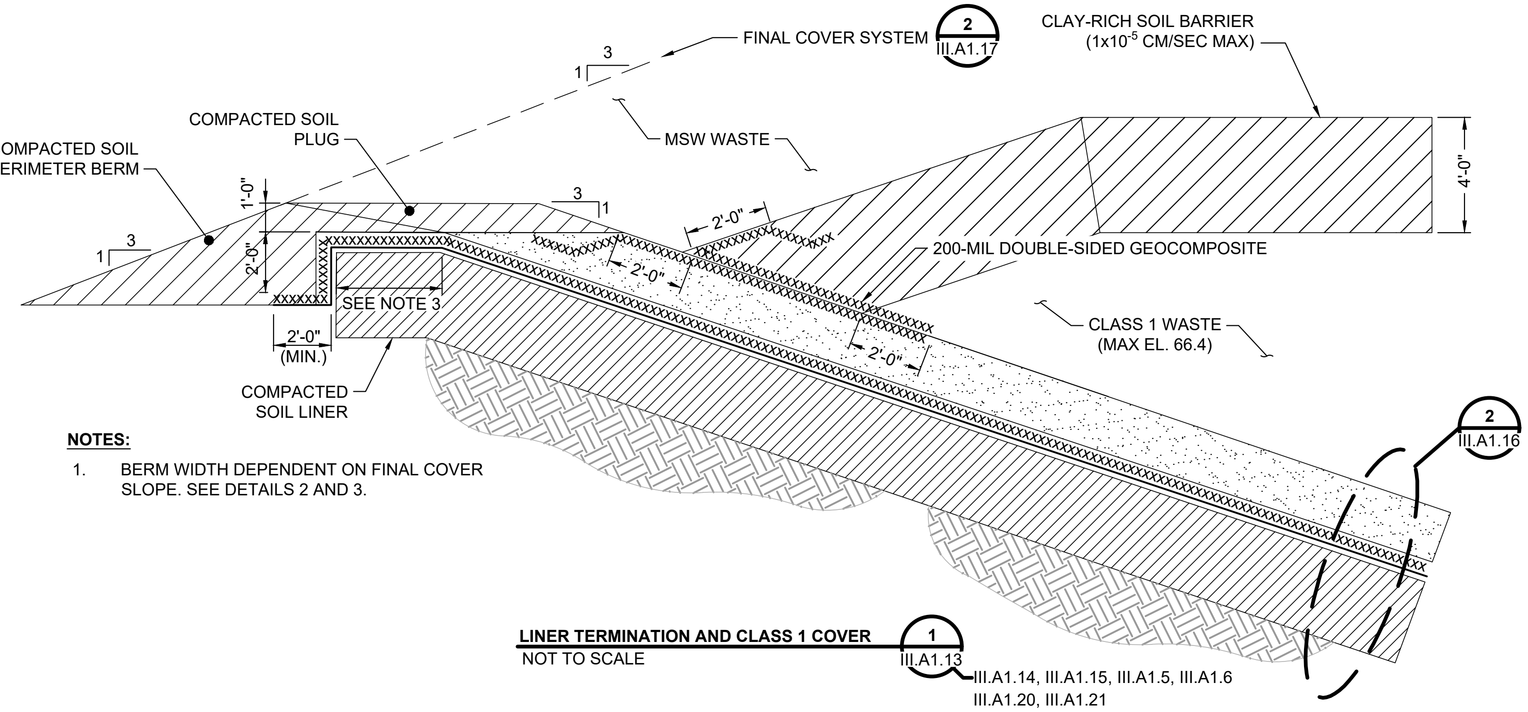
Victoria County, Texas

1522B PERMIT AMENDMENT

DETAIL SHEET 2

project 107608
contract -
drawing III.A1.17 – rev. 3
sheet 19 of 25 sheets
file 107608III.A1.17.dwg

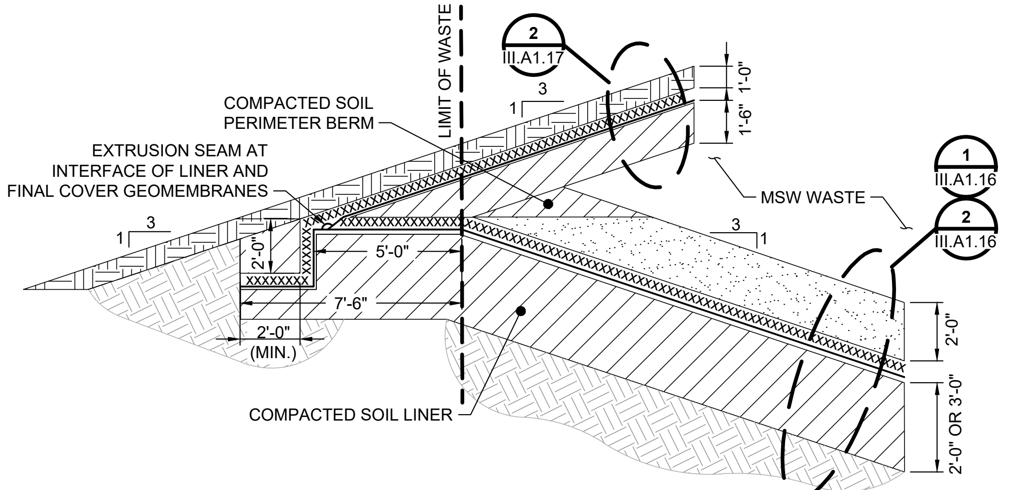
Scale For Microfilming
Millimeters
Inches



NOTES:

1. BERM WIDTH DEPENDENT ON FINAL COVER SLOPE. SEE DETAILS 2 AND 3.

LINER TERMINATION AND CLASS 1 COVER 1 III.A1.13
NOT TO SCALE
III.A1.14, III.A1.15, III.A1.5, III.A1.6
III.A1.20, III.A1.21



FINAL COVER TERMINATION AT 3-TO-1 SLOPE 2 III.A1.13
NOT TO SCALE
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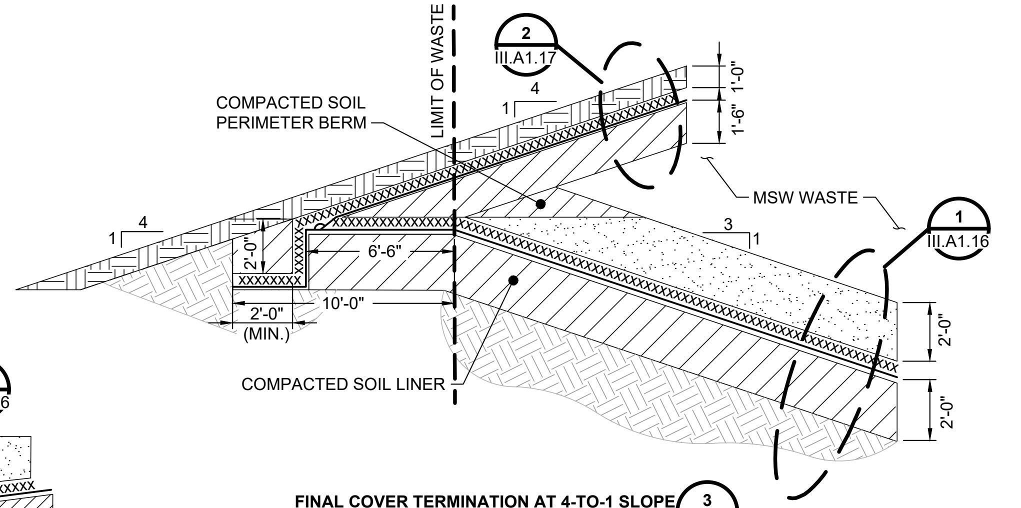
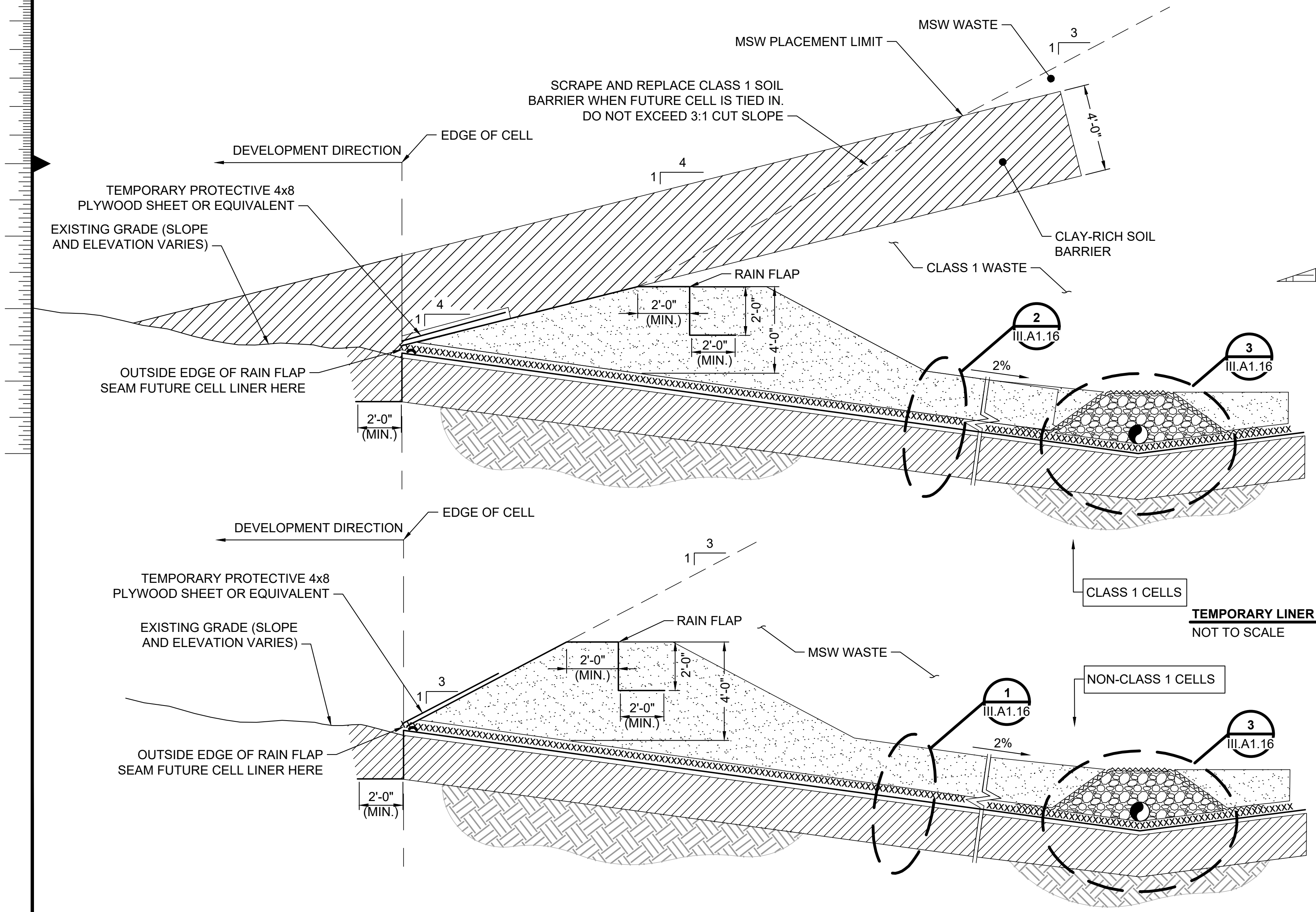


FINAL COVER TERMINATION AT 4-TO-1 SLOPE 3 III.A1.13
NOT TO SCALE
III.A1.14, III.A1.15, III.A1.5, III.A1.6



TEMPORARY LINER TERMINATION 4 III.A1.13
NOT TO SCALE
III.A1.14, III.A1.15

no.	date	by	ckd	description
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1	8/15/22	TJS	TLK	REV. PER TCEQ NOD
2	11/18/22	TJS	TLK	REV. PER TCEQ NOD
3	6/30/23	TJS	TLK	REV. PER TCEQ NOD

PRELIMINARY - NOT FOR CONSTRUCTION

BURNS McDONNELL
9400 WARD PARKWAY
KANSAS CITY, MO 64114
816-333-9400
Burns & McDonnell Engineering Co, Inc.
FIRM REG. NO. F-845

date: MARCH 2022
detailed: T. CAMMACK
designed: T. SCHMIDT
checked: T. KOLLER

THE CITY OF VICTORIA TEXAS
Victoria County, Texas

TONYA L. KOLLER
133943
7-14-23

TONYA L. KOLLER P.E.
LICENSE NO. 133943

1522B PERMIT AMENDMENT

DETAIL SHEET 3

project: 107608
contract: -
drawing: **III.A1.18 –**
rev.: 3
sheet 20 of 25 sheets
file 107608III.A1.18.dwg

no.	date	by	ckd	description
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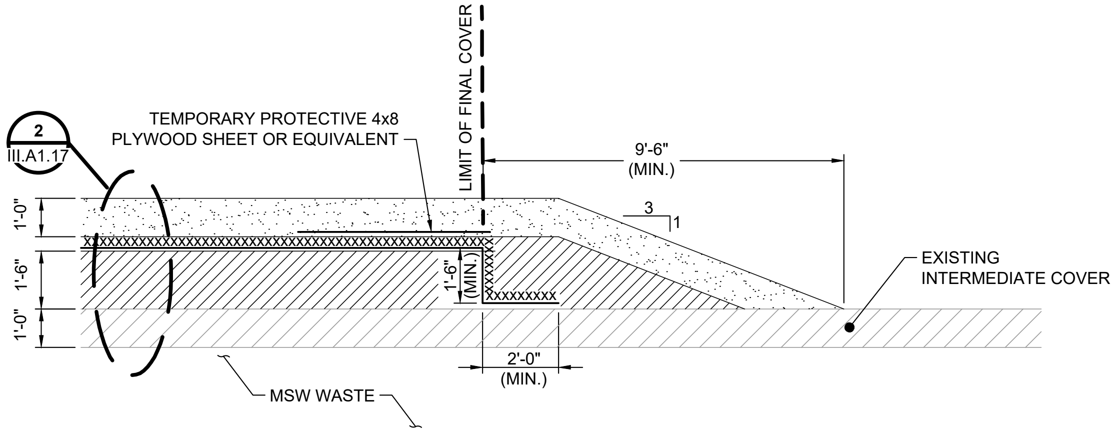
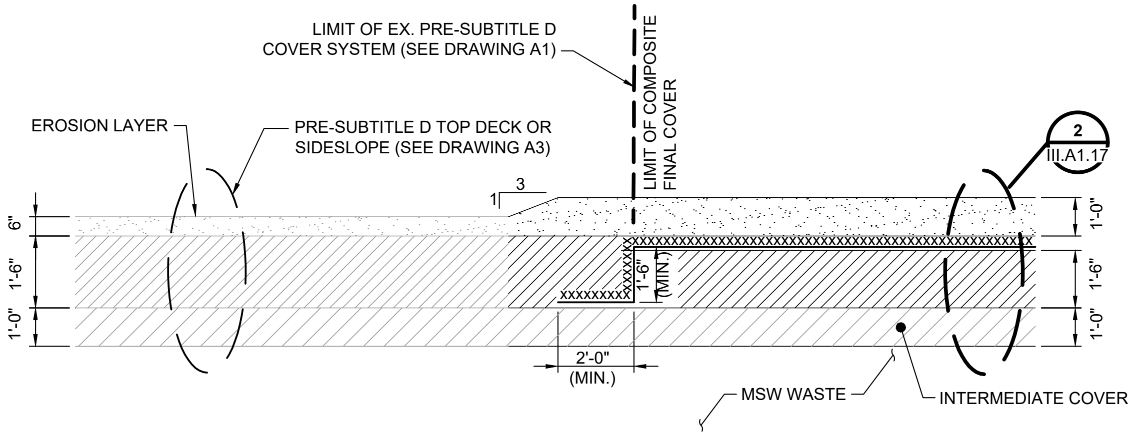
1	8/15/22	TJS	TLK	REV. PER TCEQ NOD
2	11/18/22	TJS	TLK	REV. PER TCEQ NOD
3	6/30/23	TJS	TLK	REV. PER TCEQ NOD

NOTES:

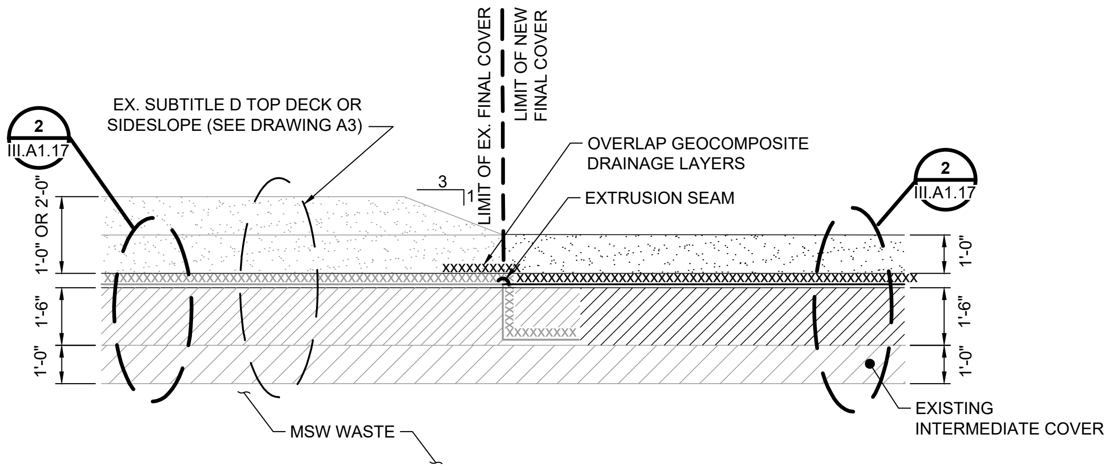
1. EXISTING LOW PERMEABILITY MATERIAL SHALL BE STAIR-STEP CUT INTO TO FORM CONTINUOUS LOW PERMEABILITY MATERIAL LAYER FOR CELL CONSTRUCTION. EACH STEP IN EXISTING LOW PERMEABILITY MATERIAL SHALL HAVE THE SURFACE SCARIFIED TO PROVIDE MAXIMUM BONDING BETWEEN OLD AND NEW SECTIONS.



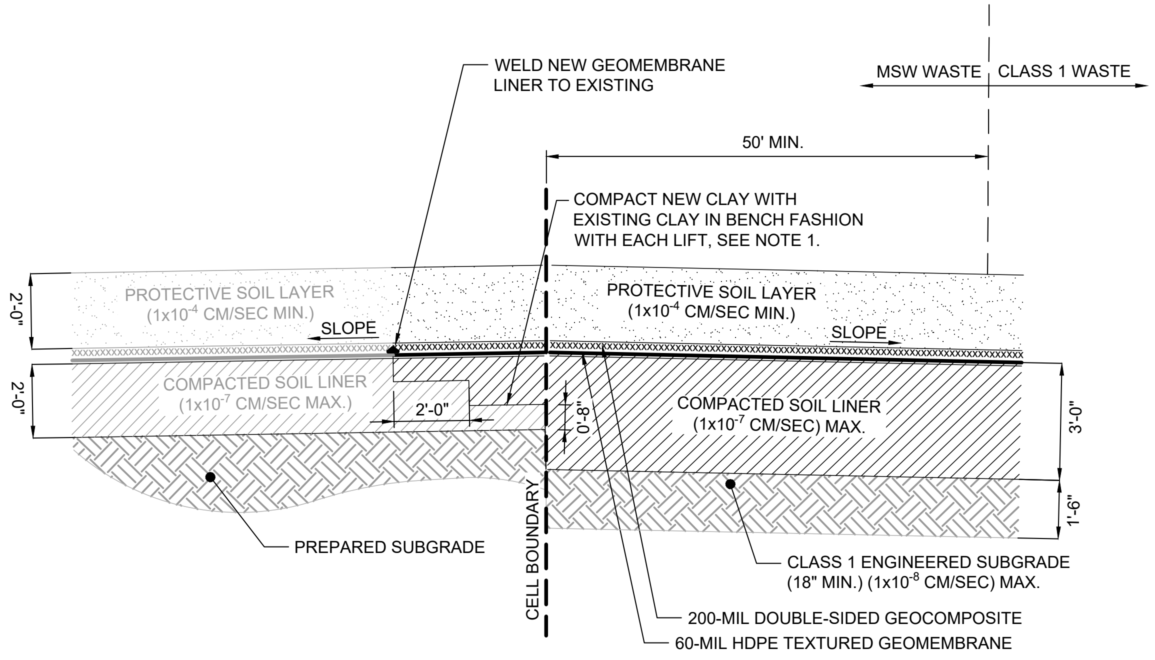
COMPOSITE FINAL COVER TERMINATION FOR FUTURE TIE-IN
NOT TO SCALE
1 III.A1.13 III.A1.14, III.A1.15



COMPOSITE FINAL COVER TIE-IN TO PRE-SUBTITLE D COVER
NOT TO SCALE
2 III.A1.19



COMPOSITE FINAL COVER TIE-IN TO VARIOUS SUBTITLE D COVERS
NOT TO SCALE
3 III.A1.19



MSW LINER TIE-IN TO CLASS 1 LINER
NOT TO SCALE
4 III.A1.6

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7-14-23

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PRELIMINARY - NOT FOR CONSTRUCTION

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date	detailed
MARCH 2022	T. CAMMACK
designed	**checked**
T. SCHMIDT	T. KOLLER

THE CITY OF VICTORIA TEXAS

Victoria County, Texas

1522B PERMIT AMENDMENT

DETAIL SHEET 4

project	contract
107608	-

drawing **III.A1.19** rev. **3**

sheet 21 of 25 sheets

file 107608III.A1.19.dwg

Millimeters
Scale For Microfilming
Inches

ATTACHMENT III-2 – SURFACE WATER DRAINAGE REPORT

Part III, Attachment 2
Surface Water Drainage Report
TCEQ MSW Permit No.1522B

City of Victoria, Texas

City of Victoria Landfill Lateral and Vertical Expansion
Project No. 107608

Revision 3, June 30, 2023

Part III, Attachment 2
Surface Water Drainage Report
TCEQ MSW Permit No.1522B

prepared for

City of Victoria, Texas
City of Victoria Landfill Lateral and Vertical Expansion
Victoria County, Texas

Project No. 107608

Revision 3, June 30, 2023

TONYA L. KOLLER
133943
7-14-23

prepared by

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8911 N Capital of Texas Hwy, Building 3, Suite 3100
Austin, Texas 78759 Austin, Texas
Texas Firm Registration No. F-845

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TONYA L. KOLLER
133943

7-14-23

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STATE OF TEXAS
TONYA L. KOLLER
133943
LICENSED PROFESSIONAL ENGINEER
7-14-23

3.0 DRAINAGE DESIGN

3.1 Pre-Development and Post-Development Conditions

The landfill expansion was designed to utilize drainage features of the existing landfill and take advantage of the natural drainage patterns that existed at the site prior to expansion. The original, natural topography of the site allows water to drain generally north to south, separated into two watersheds, east and west. All discharge of water will be in accordance with the site's U.S. Environmental Protection Agency TPDES Multi-Sector Stormwater Permit, a copy of which is included in Appendix I of the Part I/II Application.

The existing landfill consists of three permitted outfalls (under MSW 1522A); Northwest, Northeast, and Southwest. Final cover is already complete to the Northwest Outfall with no changes required and will continue to function as previously permitted. Outfall Northeast consists mainly of TBC landfill but will maintain an equivalent drainage area and runoff characteristics, and therefore continue to function as designed and permitted with no changes required to the outfall. Outfall Southwest consists of partial final cover and partial TBC landfill, with stormwater discharging to the outfall from an existing detention pond. The post-development drainage area to Outfall Southwest is less than the existing permitted drainage area (as described in more detail below) and runoff will continue to discharge the site in the same manner and to the same locations. Therefore, post expansion, the outfall will continue to function as designed and permitted with no changes required to the detention pond or outfall. Refer to Section 6.0 for a further historical review of the existing permitted drainage design and its applicability to the overall site and current TCEQ regulations

The proposed vertical expansion in the east portion of the existing permitted landfill (new Sub-Basins 4-1 and 5) requires the letdown chute from previously permitted subarea D-4 to be relocated as shown in Appendix 2A- Exhibit III.A2.4. This chute will drain all of Basin 4 to Perimeter Ditch A and to the existing Detention Pond Southwest. The vertical expansion splits runoff from permitted subareas D-7 and D-12 between existing Outfall Southwest (Basin 4) and expansion Outfall East (Basin 5), which previously all drained to Outfall Southwest, therefore reducing the overall drainage area to Outfall Southwest. Rational Method runoff characteristics from Sub-Basin 4 are comparable to permitted subareas D-4 and D-7, and with a reduced drainage area, surface drainage from Sub-Basin 4 will therefore be lower than previously permitted and cause no adverse impact to Outfall Southwest. Revised drainage calculations at the three existing outfalls were therefore not updated for this Report, but have been checked for consistency. Historic drainage reports identifying calculations for these outfalls can be found in Appendix 2B with additional historical drainage design review provided in Section 6.0.

The pre-development and post-development drainage basin layouts are provided in Drawings III.A2.1 and III.A2.2 included in Appendix 2A. FM 1686, which borders the existing permitted landfill to the north, acts to divert runoff from the north around the existing landfill in a series of drainage ditches. In the west watershed existing condition, upstream channelized run-on flow enters the expansion site's requested permit boundary from offsite in a man-made tributary drainage ditch at the northwest corner, turns to follow the north expansion boundary, then turns south bisecting the expansion site, exiting along the south boundary. In the proposed condition this ditch will be re-routed along the west expansion permit boundary but will be directed to keep run-on flow outside of the permitted limits of waste. The re-routed ditch will then turn to follow the south property line and exit the site at the same location as the existing condition. To the east, the Chocolate Bayou routes offsite channelized flow north to south through City of Victoria-owned property. However, this drainageway is already outside of the proposed landfill expansion permit boundary and therefore will remain intact. No other offsite run-on enters the east watershed in the existing or proposed condition. Discharge from the east portion of the landfill expansion will be conveyed to the Chocolate Bayou by an existing west-to-east drainage ditch at the Outfall East site discharge comparison point at the Permit Boundary. Due to the natural terrain features, existing ditch network, and existing permitted landfill, no other significant flow or run-on enters the expansion site than described above in the west and east watersheds.

Stormwater from the landfill expansion site will flow, by a series of perimeter ditches, into the existing conveyance channels that eventually flow to Chocolate Bayou and then to Lavaca Bay. The route to Chocolate Bayou is split into east and west watersheds. The east drainage path discharges the site to an existing conveyance channel located near the southeast corner of the proposed landfill boundary that parallels the south property boundary until tying in directly to Chocolate Bayou. The west portion of the site discharges to an existing conveyance channel located along the west half of the south proposed landfill boundary, continuing southeast until tying into Chocolate Bayou further to the south. These drainage paths were essential in the design of the stormwater management system as pre-development condition flows to these conveyance channels set the maximum allowable peak flow for the proposed conditions, as shown in Table 5-1.

For pre-to-post comparison purposes, two site discharge points (East and West) have been established along the Landfill Permit Boundary at the locations described above. Runoff discharges the site generally in the same locations as the pre-development conditions, although due to perimeter berms and ditches, sheet flow that left the permit boundary in the pre-development condition generally leaves the post-developed site as a point discharge at the site discharge comparison points, but to the same location as an existing point discharge ditch. However, due to the project design of perimeter ditches and detention basins, the east and west drainage patterns have not adversely affected offsite drainage, as shown in Table 5-1. It should be noted that the total Cumulative Catchment Area for both Outfalls (East and West) has increased by approximately 15 acres. This is due to Outfall East picking up a portion of Existing TBC landfill to the north that was originally to be routed to the existing landfill detention pond at the southwest corner. See Drawings III.A2.1 and III.A2.2 for a graphical representation of pre vs. post development watershed areas.

All drainage and run-off calculations for “pre-development conditions” are based on the configuration of the property prior to landfill development, i.e., cultivated farmland. All post-development drainage and runoff design is based on the final full closure configuration of the landfill. As shown in Table 5-1, existing drainage patterns will not be adversely altered.

3.2 Stormwater Management Overview

The conveyance of stormwater is accomplished through a series of swales, chutes, ditches, channels, and detention basins. The overall routing of stormwater can be seen in the Drawings in Appendix 2A. Rainfall data was obtained from the NOAA Atlas 14, Volume 11 (version 2) precipitation frequency tables for the project location in Victoria County, Texas. A 25-year recurrence interval and 24-hour storm duration were selected for both the Pre-Development and Post-Development Conditions model. A NOAA Atlas 14 first quartile temporal distribution, 20% occurrence interval was selected for 24-hour unit hydrograph rainfall distribution.

3.3 Final Cover Swales

Runoff from the final cover system will be collected by swales located along the landfill slopes. Spacing of the swales will not exceed 30 vertical feet, as discussed in Section 2.1 of this report. Swales will consist of a 24” deep, V-shaped channel with a nominally compacted soil berm extending vertically beyond the final cover system. The invert flowline of these features will be constructed at a 1% slope, except for certain existing TBC swales designed with a 0.5% invert. Swales will be lined for erosion prevention as discussed in Section 2.3 of this report. Swales will be vegetated. Stormwater collected by these features will be conveyed to letdown chutes. Design methodologies are discussed in Section 5.3 and 5.4 of this report.

The existing permitted to-be-constructed swales are also 24” deep and spaced at a maximum of approximately 30 vertical feet. The existing permitted to-be-constructed swales are designed with a 0.5% minimum flowline.

3.4 Letdown Chutes

A total of nine (9) letdown chutes will be constructed within the vertical expansion design, each serving as the drainage outlet for several final cover swales (discussed in Section 3.3). The letdown chutes shall be oriented directly downslope, with a maximum flowline slope of 3:1, and shall discharge into the perimeter ditches (discussed in Section 3.5). A trapezoidal geometry shall be used for the chutes, with a depth of 12 inches and a bottom width of 12 feet. The chutes will be lined with riprap contained within 18-inch-deep gabion baskets. The mean rock size shall be 9 inches. Design methodologies are discussed in Section 3.2 and 3.3 of this report.

Two types of letdown chutes are permitted for the existing to-be-constructed waste unit. Both have a trapezoidal geometry with a depth of 24 inches and bottom widths of 8-10 feet. One type utilizes a 6” tri-lock concrete lining material and the other type utilizes a 6” gabion with 5-inch (mean diameter) riprap. Due to the maximum landfill slope of 4:1 for this waste unit, the maximum flowline of these chutes is lower than that which is to be permitted under the vertical expansion.

3.5 Perimeter Ditches

The routing of surface runoff from the permitted waste boundary via perimeter ditches is shown in Drawing III.A2.3. The perimeter ditches are located between the proposed perimeter access road and landfill liner boundary (perimeter berms). All ditches are trapezoidal in shape with 3:1 side slopes and varying longitudinal slopes, with bottom widths from 5 feet to 12 feet. Each ditch was sized to convey the 25-year storm event with capacity to allow approximately 1 ft. of freeboard to both the perimeter access road and landfill liner. Each ditch has also been sized to not overtop in the 100-year storm event and remain below the elevation of the landfill liner. Perimeter ditches and perimeter berms have also been located and designed to not be inundated by the surrounding 100-year floodplain but have been sized to account for submerged outlet conditions due to backwater from the floodplain at landfill permit boundaries and the site discharge points where ditches discharge offsite. Drainage ditch methodologies and calculations can be found in Table 5-2 and Section 5.1.2.1. Further Perimeter Ditch details can be found in the Attachment III-1 - Permit Drawings, including 25-year storm ditch depths and perimeter ditch relationship to the external 100-year floodplain.

Table 3-1 provides a summary of the landfill’s stormwater conveyance structures that discharge into each perimeter ditch. The IDs of the perimeter ditches can be found in Appendix 2A on Drawing III.A2.3 and Section 5.1.2.

Table 3-1: Perimeter Ditch Tributaries

Perimeter Ditch ID	Tributaries
A (Existing TBC design)	Basin No. 4 Letdown Chute*
B-1	Basin No. 3 Letdown Chute* Basin No. 2 Letdown Chute*
B-2	Basin No. 1 Letdown Chute*
B-3	Perimeter Ditch B-2
C	Sheet flow only
D	Basin No. 9 Letdown Chute* Basin No. 8 Letdown Chute* Basin No. 7 Letdown Chute*
E	Basin No. 6 Letdown Chute*
F	Basin No. 5 Letdown Chute*

*See Drawing III.A2.4 in Appendix 2A for letdown chute drainage basins.

STATE OF TEXAS
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LICENSED PROFESSIONAL ENGINEER
7-14-23

3.6 Conveyance Channel Reroute

The current expansion site includes an existing conveyance channel that bisects the west half of the proposed landfill expansion, routing offsite flow from the north through the landfill boundary. This channel (labeled Drainage Channel 1 on Drawing III.A2.1 in Appendix 2A) will be re-routed along the west and south property lines to keep external runoff and flood flows outside of the permitted landfill boundary, tying back into the existing drainage channel at the southern property boundary. A second channel (labeled Drainage Channel 2) which collects a significant portion of the existing landfill discharge to the southwest corner, will also be re-routed along the north property boundary to convey flow from the existing landfill detention pond to the west property boundary, discharging to Drainage Channel 1 at the northwest corner of landfill property. The new routing of the two conveyance channels can be seen on Drawing III.A2.1 in Appendix 2A. Re-routed Drainage Channel 1 will also function as the downstream Outlet West discharge point for Perimeter Ditches B and C, and the proposed First Flush Detention Basin West.

3.7 Culverts

Concrete culverts are used throughout the site for both perimeter drainage ditches and detention basin outlet structures. Perimeter Ditch B utilized culverts as inlets (labeled Culvert B-2 on Drawing III.A2.1 in Appendix 2A) into the First Flush Detention Basin West (herein also referred to as West Basin) sized to control the first flush storm depth. Perimeter Ditches D, E, and F each use culverts to route flow from ditches Detention Basin East (herein also referred to as East Basin) on the east side of the landfill. Culvert information can be found in Table 5-3 in Section 5.1.2.2.

3.8 First Flush Detention Basin West

The west portion of the site in both pre-development and post-development conditions discharges to the tributary ditch (Channel 1) described in Section 3.6 at the site discharge comparison point near the southwest corner of the proposed landfill expansion boundary. As shown in Table 5-1, Outfall West does not require detention of the 25-year storm event as post-development conditions peak runoff to the drainage channel is less than pre-development conditions peak runoff. This can be attributed to changes in drainage boundaries due to landfill grading plan, including a reduction in overall drainage area and minimal changes in runoff Curve Numbers. However, as a local stormwater best management practice for filtering sediment and slowing the discharge of site flow from more frequent storm events to the downstream system, a first flush detention basin is proposed along the west side of the expansion permit boundary. Runoff from the first flush storm event, defined as the runoff conveyed from the first 1.5-inches of rainfall, will be routed to the First Flush Detention Basin West.

The unlined, grass-bottom dry basin was sized to capture and detain the first flush storm event, defined as the first 1.5-inches of rainfall over a 24-hour time span. The basin outlet structure has been designed and sized to account for a submerged outlet condition due to backwater from the surrounding floodplain. The First Flush Detention Basin West is located on the west side of the proposed landfill expansion boundary and discharges to the re-routed Drainage Channel 1 through an outlet structure as shown on Drawing III.A2.2 in Appendix 2A. With the basin's sole purpose of capturing the 1.5-inch first flush storm with no additional detention requirements necessary, the basin has been located within the floodplain and is designed to be inundated by the 25 and 100-year floodplain. Inundation by these events will have no adverse impact on the intended function of the West Basin. Basin design and outlet structure details can be found in Attachment III-1. Further design information and details can be found in Section 5.1.2.3. Further design details and basin routing modeling results summary reports for the pre and post development runoff conditions can be found in Appendix 2D and Appendix 2E.

3.9 Detention Basin East

Post-development runoff to the east side of the landfill expansion exceeded the pre-development conditions peak runoff, so detention is required to decrease the peak flow for the 25-year event. The Detention Basin East is located on the east side of the proposed landfill expansion boundary. The East Basin was designed as an unlined, grass-bottom dry basin to detain the 25-year storm event and serve as a central collection point for Perimeter Ditches D, E & F before discharging through a two-stage outlet structure located on the east side of the basin to the existing Drainage Channel 3 routed towards Chocolate Bayou. The outlet structure has been designed and sized to account for a submerged outlet condition due to backwater from the Chocolate Bayou floodplain.

The detention basin embankment has been set above the 100-year floodplain water surface elevation. However, with the basin’s sole purpose of providing detention for the 25-year storm event with no additional 100-year design requirements necessary, the potential exists for the 100-year flood to back up through the proposed outlet structure weir, which has been accounted for in the design. Inundation by the 100-year flood will have no adverse impact on the intended function of the East Basin or on drainage within the landfill permit boundary, as a Perimeter Berm will still hold floodwater from inundation of the permitted waste boundary and remain below the top of liner elevation. The Detention Basin East design information can be found in Section 5.1.2.4. Further basin and outlet structure details can be found in the Attachment III-1 – Permit Drawings, and basin routing modeling results summary reports for the pre and post development runoff conditions can be found in Appendix 2D and Appendix 2E.

3.10 Stormwater Drainage During Phased Construction of the Landfill

The landfill cells will be constructed in the order presented in Drawing III.A1.4 of Attachment III-1 (Waste Placement Phasing Plan). The Phases presented herein refer to the Phases presented in Drawing III.A1.4. Phased construction of the drainage system will accommodate drainage and run-off control during interim construction periods. Final cover swales and letdown chutes will be constructed with the installation of the final cover system. Intermediate swales and letdowns shall be installed as necessary. Below is a list of the numerical phases presented in Drawing III.A1.4 and descriptions of the corresponding surface water drainage conditions. Each perimeter drainage feature (perimeter ditches, culverts, and detention basins) may be installed before but not after the Phase below where each feature is initially planned for construction.

Phase 1/2: The north slopes of Trenches 8-10 drain to the channel along Farm-to-Market 1686 and leave site. The slopes of Trenches 6-9 of the Existing TBC Area (except those mentioned previously) will drain into the south-sloping perimeter ditch before reaching the existing detention pond, as originally permitted. Landfill slopes and final cover swales on the north slopes of Trenches 8/9 and the east slopes of Trenches 7/8 shall be constructed in accordance with Attachment III-1. The south slope of Trench 7 will contain a temporary letdown chute, as shown in Appendix 2B to receive the drainage from the swales along the east slope.

During the construction of these phases, the following temporary erosion and sediment controls shall be used, in addition to the stormwater diversion features discussed above:

- Dust control
- Check dams

- Blankets and matting (to stabilize slopes at final grade)
- Silt fences and fiber rolls (where runoff from slopes has the potential to leave the property)

Phase 3/4: The construction of Cell G2 will cause the perimeter ditch east of Trenches 7/8 to be unable to flow into the existing detention pond, per Existing TBC conditions in Appendix 2B. Therefore, the perimeter ditch shall be terminated at the SE corner of Trench 7 and Perimeter Ditch F shall be extended to convey flows east to the East Basin, which shall be constructed fully or partially at this phase (if constructed partially, it shall be progressively constructed and fully constructed by Phase 5/6. The new portion of Perimeter Ditch F shall be adjacent to the northeast perimeter of future Cell H1 and northern perimeter of future Cells H2, I1 and I2. The temporary letdown chute in the Trench 7 footprint shall remain, as it is located east of Cell G2 and able to discharge into Perimeter Ditch F.

The portion of Perimeter Ditch D to be constructed at this time shall be from the SW corner of Cell G1 to the discharge point of the East Basin to convey flows from the north and south slopes of the constructed expansion area. A temporary sediment basin shall be constructed at the west edge of Cell G1 to capture flow from the west slope of Cell G1 (and all areas below the elevation, or otherwise unable to flow into the Perimeter Ditch D).

The north and south culverts discharging into the East Basin shall be constructed at this time.

During the construction of these phases, the following temporary erosion and sediment controls shall be used, in addition to the stormwater diversion features discussed above:

- Dust control
- Check dams
- Blankets and matting (to stabilize slopes at final grade)
- Silt fences and fiber rolls (where runoff from slopes has the potential to leave the property)

Phase 5/6: The portion of Perimeter Ditch D to be constructed at this time shall be from the SW corner of Cell F1 to west extent of the previously constructed portion (SW corner of Cell G1). A small portion of Perimeter Ditch B shall be constructed at this time, along the North edge of Cell F1. A temporary sediment basin shall be constructed at the west edge of Cell F1 to capture flow from the west slope of Cell F1 (and all areas below the elevation, or otherwise unable to flow into the Perimeter Ditch B/D). Perimeter Ditch B, running east-west will also discharge into this sediment basin. It is assumed that Perimeter Ditch A (design information in Appendix 2B) has already been constructed at this time.

During the construction of these phases, the following temporary erosion and sediment controls shall be used, in addition to the stormwater diversion features discussed above:

- Dust control
- Check dams
- Blankets and matting (to stabilize slopes at final grade)
- Silt fences and fiber rolls (where runoff from slopes has the potential to leave the property)

Phase 7/8: The portion of Perimeter Ditch D to be constructed at this time shall be from the SW corner of Cell E1 to west extent of the previously constructed portion (SW corner of Cell F1). The portion of Perimeter Ditch B shall be constructed at this time shall be from the NW corner of Cell E1 to west extent of the previously constructed portion (NW corner of Cell F1). A temporary sediment basin shall be constructed at the west edge of Cell F1 to capture flow from the west slope of Cell E1 (and all areas below the elevation, or otherwise unable to flow into the Perimeter Ditch B/D). Perimeter Ditch B shall continue to discharge into the temporary sediment basin.

During the construction of these phases, the following temporary erosion and sediment controls shall be used, in addition to the stormwater diversion features discussed above:

- Dust control
- Check dams
- Blankets and matting (to stabilize slopes at final grade)
- Silt fences and fiber rolls (where runoff from slopes has the potential to leave the property)

Phase 9/10: At this time, the remaining portions of Perimeter Ditches B and D shall be constructed, along with the West Basin and Drainage Channels 1 and 2. A temporary sediment basin shall be constructed at the west edge of Cell D1 to capture flow from the west slope of Cell E1 (and all areas below the elevation, or otherwise unable to flow into the Perimeter Ditch B/D).

At this time, the route of discharge from the existing north detention pond will no longer be active. Flow will instead pass through the regraded Drainage Channel 2 and around the West Basin (via Drainage Channel 1).

During the construction of these phases, the following temporary erosion and sediment controls shall be used, in addition to the stormwater diversion features discussed above:

- Dust control

- Check dams
- Blankets and matting (to stabilize slopes at final grade)
- Silt fences and fiber rolls (where runoff from slopes has the potential to leave the property)

Phase 11/12: A temporary sediment basin shall be constructed at the west edge of Cell C1 to capture flow from the west slope of Cell C1 (and all areas below the elevation, or otherwise unable to flow into the Perimeter Ditch B/D). Perimeter Ditch C shall be installed in its entirety at this point.

During the construction of these phases, the following temporary erosion and sediment controls shall be used, in addition to the stormwater diversion features discussed above:

- Dust control
- Check dams
- Blankets and matting (to stabilize slopes at final grade)
- Silt fences and fiber rolls (where runoff from slopes has the potential to leave the property)

Phase 13/14: A temporary sediment basin shall be constructed at the west edge of Cell C1 to capture flow from the west slope of Cell C1 (and all areas below the elevation, or otherwise unable to flow into the Perimeter Ditch B/D).

During the construction of these phases, the following temporary erosion and sediment controls shall be used, in addition to the stormwater diversion features discussed above:

- Dust control
- Check dams
- Blankets and matting (to stabilize slopes at final grade)
- Silt fences and fiber rolls (where runoff from slopes has the potential to leave the property)

Phase 15/16: No temporary channel shall be installed at this time, due to permanent perimeter controls being in place to handle flows from Cells A1 and A2.

During the construction of these phases, the following temporary erosion and sediment controls shall be used, in addition to the stormwater diversion features discussed above:

- Dust control
- Check dams
- Blankets and matting (to stabilize slopes at final grade)

- Silt fences and fiber rolls (where runoff from slopes has the potential to leave the property)

Phase 17/18: The temporary letdown chute in Trench 7 shall be abandoned at this time, to prevent stormwater discharge into Cells H1 and H2. A temporary sediment basin shall be constructed at the east edge of Cell H2 to capture flow from the east slope of Cell H2 (and all areas below the elevation, or otherwise unable to flow out of the new cells).

During the construction of these phases, the following temporary erosion and sediment controls shall be used, in addition to the stormwater diversion features discussed above:

- Dust control
- Check dams
- Blankets and matting (to stabilize slopes at final grade)
- Silt fences and fiber rolls (where runoff from slopes has the potential to leave the property)

Phase 19/20: No temporary channel shall be installed at this time. Perimeter Ditch E (along with the third culvert discharging into the East Basin) shall be installed along the east edge of Cell I2. This shall complete the permanent perimeter ditch construction at the Facility.

During the construction of these phases, the following temporary erosion and sediment controls shall be used, in addition to the stormwater diversion features discussed above:

- Dust control
- Check dams
- Blankets and matting (to stabilize slopes at final grade)
- Silt fences and fiber rolls (where runoff from slopes has the potential to leave the property)

5.1.2 Post-Development Conditions Model

The Post-Development Conditions Model shows the integrated network of subarea catchments with proposed perimeter ditches and detention basins. Table 5-1 shows a high-level comparison between cumulative catchment area and corresponding peak runoff, reflecting changes in catchment area due to proposed landfill grading and channel capacity. With more area now contributing to Chocolate Bayou (Outfall East), the Detention Basin East is required to decrease peak discharge below the pre-development conditions peak flow as seen in Table 5-1. No detention is required on the west side of the site as a reduction in drainage area and changes in landcover SCS Curve Numbers and time of concentrations resulted in lower peak flows in post-development conditions compared to pre-development conditions for the 25-year storm event.

Table 5-1: Pre-Development vs. Post-Development Model Comparison for 25-Year Rain Event

Area**	Attribute	Pre-Development Condition Model	Post-Development Condition Model*
Outfall West	Peak Runoff [cfs]	359.81	290.04
	Total Runoff Volume (ac-ft)	104.94	89.40
	Cumulative Catchment Area [acre]	146.65	136.57
Outfall East	Peak Runoff [cfs]	360.88	354.66
	Total Runoff Volume (ac-ft)	104.63	113.99
	Cumulative Catchment Area [acre]	146.23	172.05

*Runoff results are presented with detention provided.
**See Appendix 2B for historic calculations on 1522A permitted landfill discharges. As described in Section 3.1, the expansion does not increase existing outfall flowrates.

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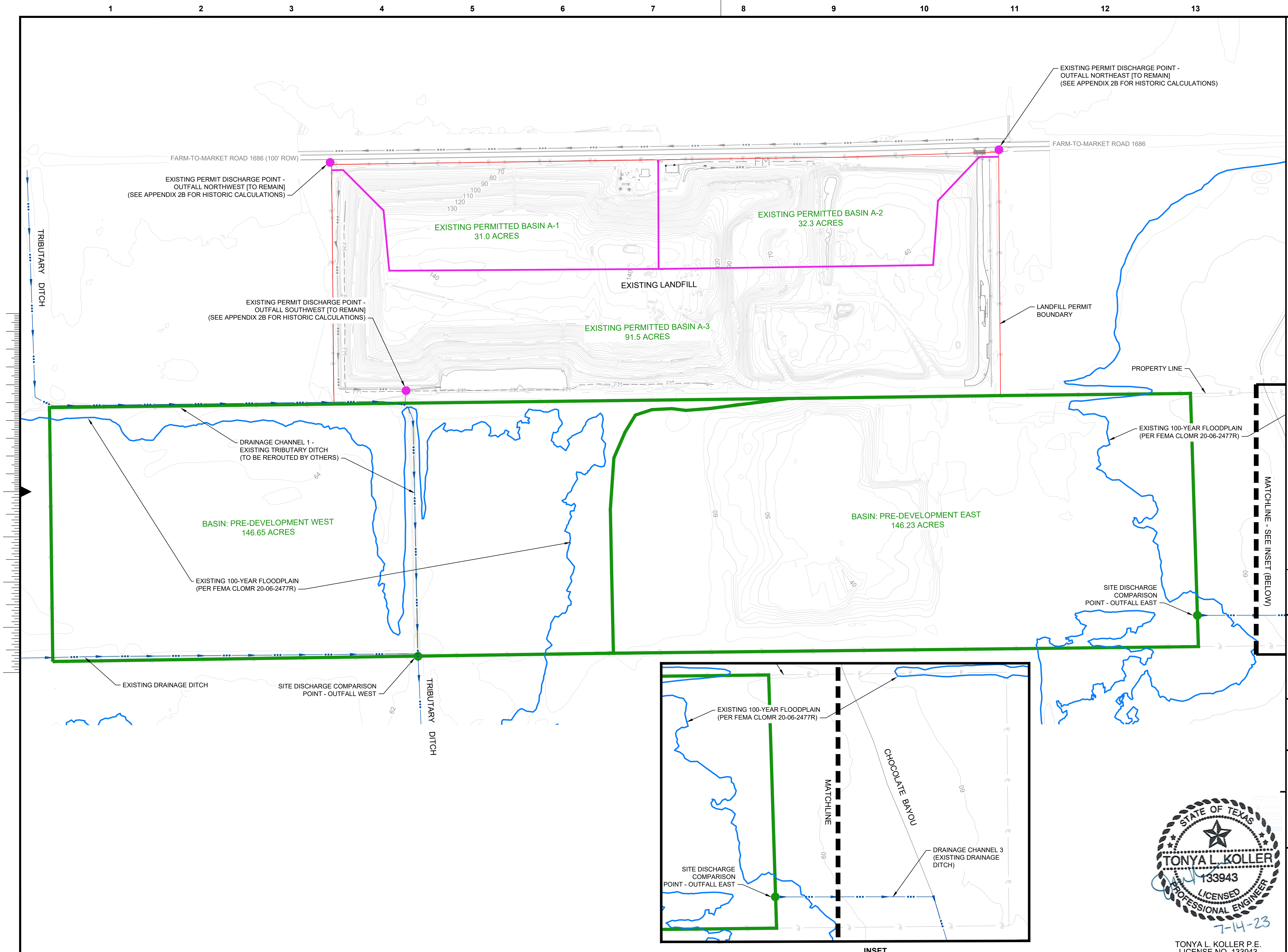
The post-development conditions catchments were relatively consistent with SCS Curve Number selection. Catchment areas that will be converted from pre-development conditions to landfill were given the classification Fully Developed Urban Areas with Open Space in fair condition (grass cover 50%-75%). This area was defined to have USGS Soil D classification, which provided an SCS Curve Number of 84 for the disturbed areas. The remaining area within the property boundary were assumed to match the pre-development conditions land use classifications.

5.1.2.1 Perimeter Ditch Design

Proposed Perimeter Ditch design attributes can be seen in Table 5-2. All ditches are trapezoidal in shape with 3:1 side slopes. Reference Drawing III.A2.3 in Appendix 2A for Ditch ID's.

APPENDIX 2A – DRAWINGS

no.	date	by	ckd	description
0	3/28/22	TJS	SAM	INITIAL SUBMITTAL
1	8/15/22	TJS	TLK	REV PER TCEQ NOD
2	11/18/22	JPP	TJS	REV PER TCEQ NOD 2
3	6/30/23	JPP	TJS	REV PER TCEQ NOD 3



INSET

Attachment 2-31B

LEGEND:

🟩	EXPANSION BASIN BOUNDARY
▬	PERMITTED BASIN BOUNDARY (PER DRAWING 6B-1 OF APPENDIX 2B)
●	EXST PERMITTED DISCHARGE POINT
●	EXPANSION SITE DISCHARGE POINT
→•••	EXISTING FLOWLINE
—℄—	PROPERTY LINE
🟥	PERMIT BOUNDARY
▬	100-YEAR FLOODPLAIN

NORTH

0 300' 600'
SCALE IN FEET

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FIRM REG. NO. F-845

date MARCH 2022	detailed T. SCHMIDT
designed T. SCHMIDT	checked J. PARKER

THE CITY OF VICTORIA TEXAS

Victoria County, Texas

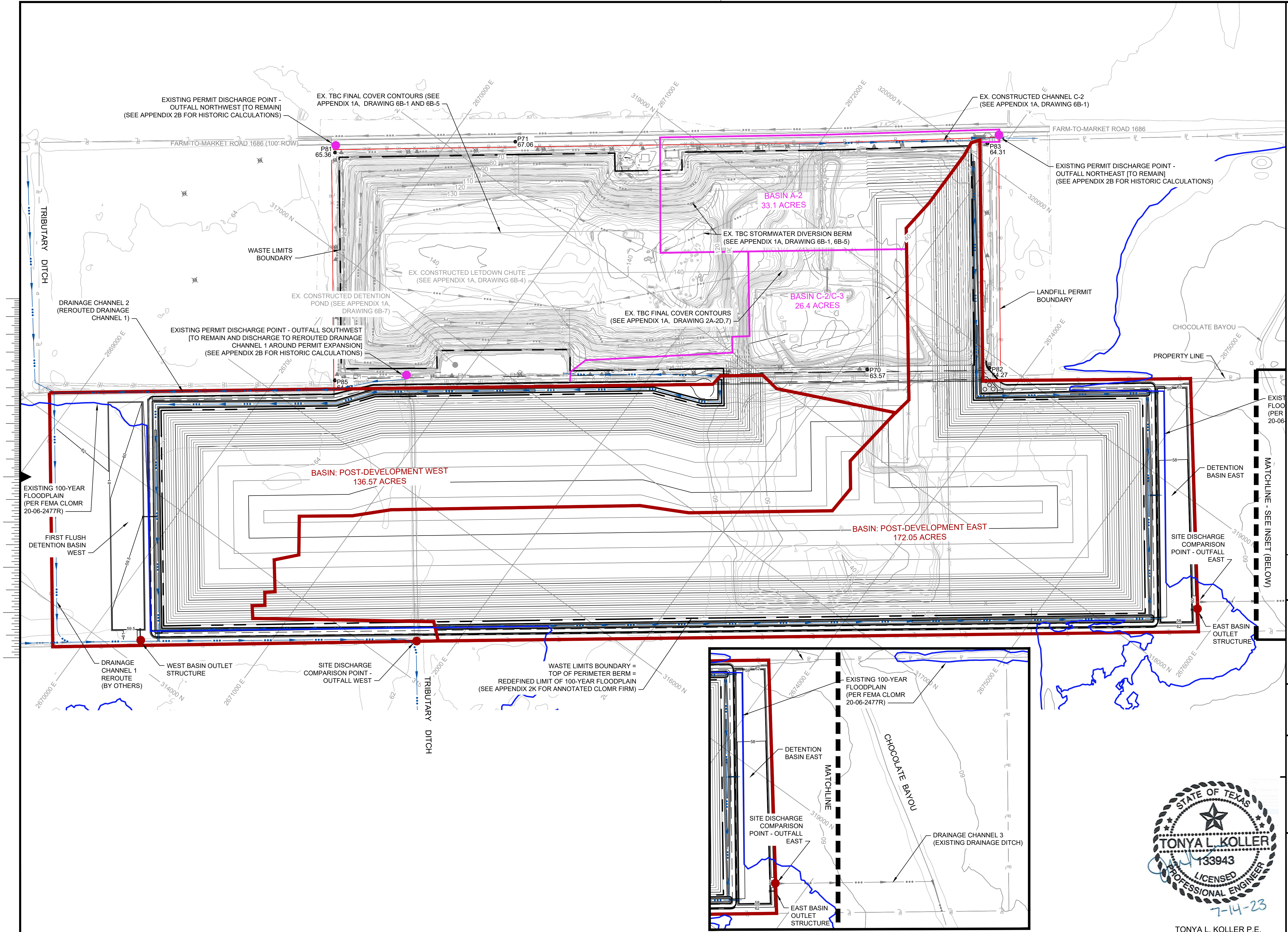
EXPANSION PERMIT DESIGN

STORMWATER DESIGN FIGURE:
LANDFILL PRE-DEVELOPMENT BASINS

project 107608	contract -
drawing III.A2.1	rev. 3

sheet 1 of 4 sheets

file



no.	date	by	ckd	description
0	3/28/22	TJS	SAM	INITIAL SUBMITTAL
1	8/15/22	TJS	TLK	REV PER TCEQ NOD
2	11/18/22	JPP	TJS	REV PER TCEQ NOD 2
3	6/30/23	JPP	TJS	REV PER TCEQ NOD 3

NOTE:

1. THE MODIFIED EXISTING BASINS SHOWN ON THE EXISTING TO-BE-CONSTRUCTED LANDFILL SUPPORT THE HISTORIC DRAINAGE DESIGN REVIEW, WHICH CAN BE FOUND IN THE 1522B PERMIT AMENDMENT, ATTACHMENT 2. THESE HISTORIC BASIN AREAS WERE MODIFIED BY THE LANDFILL EXPANSION. THE ORIGINAL BASIN A-2 CAN BE FOUND ON DRAWING 6B-1 OF APPENDIX 2B. THE ORIGINAL BASINS C-2/C-3 CAN BE FOUND ON DRAWING 6H-6 OF APPENDIX 2B.

LEGEND:

—	BASIN BOUNDARY
●	DISCHARGE POINT
—•••—	PERIMETER DITCH (SEE FIGURE 3)
—	MODIFIED EXISTING PERMITTED BASIN (SEE NOTE)
●	EXISTING BASIN DISCHARGE POINT
— ℞ —	PROPERTY LINE
—	PERMIT BOUNDARY
— — —	WASTE LIMITS BOUNDARY
—	100-YEAR FLOODPLAIN

NORTH

0 300' 600'
SCALE IN FEET

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date	detailed
MARCH 2022	T. SCHMIDT
designed	checked
T. SCHMIDT	J. PARKER

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Victoria County, Texas

EXPANSION PERMIT DESIGN

STORMWATER DESIGN FIGURE:
LANDFILL POST-DEVELOPMENT BASINS

project	contract
107608	-

drawing **III.A2.2** — rev. **3**

sheet 2 of 4 sheets

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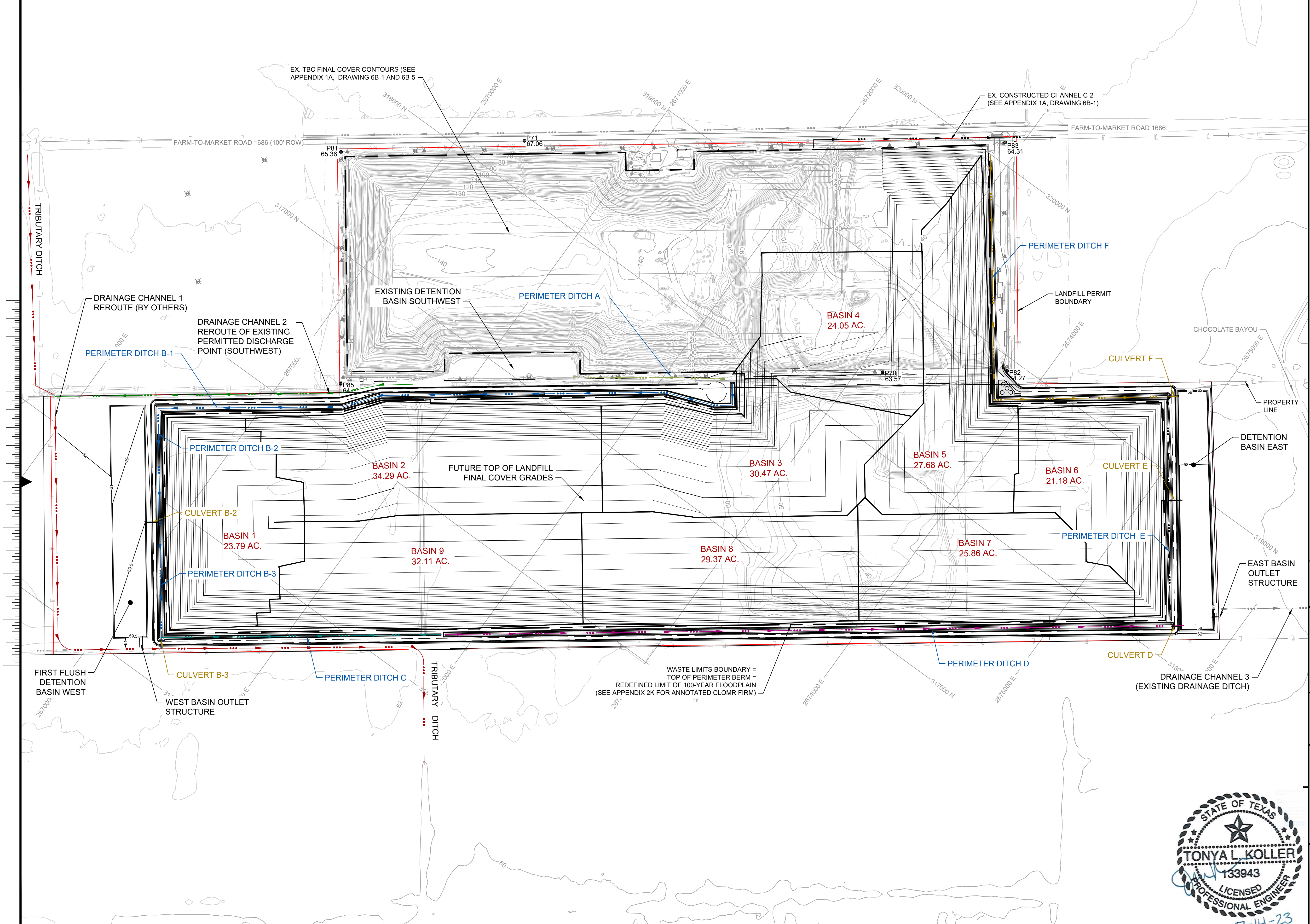

no.	date	by	ckd	description
0	3/28/22	TJS	SAM	INITIAL SUBMITTAL
1	8/15/22	TJS	TLK	REV PER TCEQ NOD
2	11/18/22	JPP	TJS	REV PER TCEQ NOD 2
3	6/30/23	JPP	TJS	REV PER TCEQ NOD 3

LEGEND:

——— ℙ ———	PROPERTY LINE
————	PERMIT BOUNDARY
——— — — ———	WASTE LIMITS BOUNDARY
——▶—— ••• ——	PERIMETER DITCH FLOWLINE

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date MARCH 2022	detailed T. SCHMIDT
designed T. SCHMIDT	checked J. PARKER

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Victoria County, Texas

EXPANSION PERMIT DESIGN

STORMWATER DESIGN FIGURE:
PERIMETER DRAINAGE FEATURES

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Attachment 2-31D

ATTACHMENT III-3 – LEACHATE AND CONTAMINATED WATER PLAN

Part III, Attachment 3
Leachate and Contaminated Water Plan
TCEQ MSW Permit No. 1522B

City of Victoria, Texas

City of Victoria
City of Victoria Landfill Lateral and Vertical Expansion
Project No. 107608

Revision 3, June 30, 2023

Part III, Attachment 3
Leachate and Contaminated Water Plan
TCEQ MSW Permit No. 1522B

prepared for

City of Victoria, Texas
City of Victoria
City of Victoria Landfill Lateral and Vertical Expansion
Victoria County, Texas

Project No. 107608

Revision 3, June 30, 2023

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freeboard above the 100-year flood elevation. The capacity of the secondary containment area shall be adequate for holding the volume of the largest tank in the event of a release, plus the rainfall volume of a 25-year, 24-hour storm event that would be contained within the enclosure. Design calculations for the leachate tanks secondary containment area are provided in Appendix 3D.

Leachate storage tank secondary containment facilities will feature a low point where water collected during storm events, or leachate accumulated from a potential release inside the tank area can be removed with a portable or dedicated pump. If the water is suspected to be leachate from a release, will be pumped back into the storage tank.

2.2.7 Leachate Disposal

Leachate removed from the sumps will be recirculated/sprayed within the waste fill or transported off-site for treatment and disposal. The volume of leachate removed from the sumps will be recorded on a continuing basis. The results of any periodic analyses of leachate will also be placed in the Operating Record.

The primary disposal for leachate is off-site through a publicly owned treatment works. A copy of the original approval letter from the Guadalupe-Blanco River Authority Loop 175 Wastewater Treatment Plant for the off-site disposal of leachate is included in Attachment A. Consistent with §330.177, there is no regulatory requirement to characterize leachate and gas condensate sent to publicly owned treatment works for disposal; and leachate sampling and analysis will be performed in accordance with the treatment plant requirements.

Consistent with §330.177, recirculation of leachate and gas condensate may occur only on areas designed and constructed with a leachate collection system and composite liner. If utilized, procedures for recirculation may include:

- Discharge to trenches containing perforated pipes or prefabricated infiltration units spaced at regular horizontal and vertical intervals throughout the waste;
- Discharge to open trenches temporarily excavated into the waste which are then backfilled with waste and covered in accordance with §330.133;
- Spray application of leachate to working face or daily cover.

Refer to Section 10 of Part IV for operational procedures for recirculation of leachate and gas condensate.

ATTACHMENT III-4 – SOIL LINER QUALITY CONTROL PLAN

Part III, Attachment 4
Soil and Liner Quality Control Plan
TCEQ MSW Permit No. 1522B

City of Victoria, Texas
Landfill Lateral and Vertical Expansion
Victoria County, Texas

City of Victoria Landfill Lateral and Vertical Expansion
Project No. 107608

Revision 2, June 30, 2023

Part III, Attachment 4
Soil and Liner Quality Control Plan
TCEQ MSW Permit No. 1522B

prepared for

City of Victoria, Texas
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Victoria County, Texas

Project No. 107608

Revision 2, June 30, 2023

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Film Tear Bond (FTB) – A failure in the geomembrane sheet material on either side of the seam and not within the seam itself.

Flexible membrane liner (geomembrane): A relatively impermeable thin sheet of high-density polyethylene used as a barrier liner or cover to prevent liquid or vapor migration into or from liquid or solid storage facilities.

Fusion Weld: A bond between two high density polyethylene (HDPE) materials which is achieved by fusing both HDPE surfaces in a homogeneous bond of the two surfaces using a power-driven apparatus capable of heating and compressing the overlapped portions of the geomembrane sheets.

GQCP: Geotechnical Professional Engineer registered in the state of Texas or a certified Engineering Geologist providing monitoring of construction, construction surveillance, testing services, and surveying services or technical oversight of testing and surveying services; responsible for the implementation of the SLQCP and for certification that construction is in accordance with the SLQCP, and specifications outlined herein. While the Registered Professional Engineer or Certified Engineering Geologist is the certifying professional, within this document GQCP collectively refers to the certifying professional, their firm, or staff and technicians working under their direct supervision.

Independent Geosynthetics Laboratory (IGL): A qualified geosynthetics testing laboratory not affiliated with either the manufacturer or the owner.

In-Situ: "As Is", or as it exists in place naturally.

Moisture Content: Ratio of quantity of water in the soil (by weight) to the weight of the soil solids (dry soil), expressed in percentage; also referred to as water content.

OMC: Moisture content corresponding to maximum dry density as determined in standard Proctor test (ASTM 0698) or modified Proctor (ASTM 01557).

Permeability: Ability of pore fluid to travel through a soil mass via interconnected voids. "High" permeability indicates relatively rapid flow of pore fluid and vice versa. Rates of permeability are generally reported in centimeters per second.

Plasticity: Ability of soil to be remolded without raveling or breaking apart. The plasticity index, numerically equal to the difference between the liquid and plastic limit, is a comparative number which describes the range of moisture contents over which a soil behavior is plastic.

Project Representative: The on-site or designated representative of the City or its operator.

Secondary Structure: The macrostructure of geologic stratum. Structural features in a soil or rock deposit which can be seen with little or no magnification, to include, but not limited to, pockets, lenses, layers, seams, or partings of varying soil types, slickensided fissures, laminated structure, and/or mineral concretions or staining.

2.0 SOIL LINER REQUIREMENTS

All liners shall have continuous on-site inspection during construction by the GQCP or a technician under their direct supervision. All field sampling and testing, both during construction and after completion of the liner construction, shall be performed by the GQCP or a technician under their supervision. The QCA monitor shall provide continues on-site observation during compacted soil liner placement, compaction, and testing in accordance with 30 TAC §330.339(a)(2).

Engineered subgrade for Class 1 material shall meet all requirements of soil liner as discussed in this document. In-situ borrow material to be used for subgrade was tested for hydraulic conductivity in accordance with ASTM Method D5084 to verify the proposed maximum hydraulic conductivity of $1x10^{-8}$ cm/sec. These results are summarized in Attachment III-5, Table 3-3. During subgrade installation, testing will be done in accordance with ASTM Method D5084 to verify the proposed maximum hydraulic conductivity of $1x10^{-8}$ cm/sec.

Compacted soil materials shall be free from debris, rubbish, frozen materials, foreign objects, and organic material. The requirements for constructed soil liner and soil liner materials are provided in Table 2-1.

Table 2-1: Requirements for Constructed Soil Liner and Soil Liner Materials

Test	Method	Required Value
Sieve Analysis[1]	ASTM D6913. ASTM D422	100% (nominal) passing 1" screen
Sieve Analysis	ASTM D1140	30% passing #200 sieve
Atterberg Limits	ASTM D4318	Plasticity index equal to or greater than 15 Liquid limit equal to or greater than 30
Permeability[2]	ASTM D5084; or Corp of Engineers EM 1110-2-1906, Appen. VII	$k \leq 1x10^{-7}$ cm/sec for soil liner $k \leq 1x10^{-8}$ cm/sec for Class 1 engineered subgrade
Soil Classification	ASTM D2487	N/A
Moisture Content	ASTM D2216	N/A
Standard Proctor	ASTM D698	Compaction curve for reference
Thickness of constructed liner	Survey methods	Minimum 2' thick with geomembrane liner

Notes:

[1] ASTM D422 is specified in §330.339(c)(4)(B) but has been discontinued. ASTM D6913 provides a Standard Test Methods for Particle-Size Distribution (Gradation) of Soils Using Sieve Analysis.

[2] Permeability tests for proving the suitability of soils to be used in constructing clay liners shall be performed in the laboratory.

Preconstruction testing procedures and frequencies are listed in Section 3.0.

3.0 PRECONSTRUCTION TESTING – SOIL LINERS

After identifying a potential soil liner material, characteristic tests will be conducted on representative samples of the material as directed below.

3.1 Characteristic Testing

Sieve analysis, Atterberg limits and soil classification will be conducted to determine if the soil meets the criteria outlined in Table 2-1. If the results of these tests indicate acceptable source material, a Proctor compaction test will be conducted to determine the maximum dry density and optimum moisture content. The type of ASTM Proctor compaction test, standard or modified, will be determined by the certifying engineer based on types of heavy equipment to be used in the field. If a modified Proctor is to be used, equipment capable of providing 56,000 ft-lb/ft^3 or greater compaction will be used.

Using the results from the standard Proctor test, a permeability test sample will be prepared at no less than 95 percent maximum dry density and optimum moisture content. If modified Proctor test is used as a reference, a permeability test sample will be prepared at no less than 90 percent of maximum dry density and optimum moisture content. For both compaction tests, the moisture content should not exceed a maximum value, which is governed by shear strength requirements and the need to minimize the possibility of rutting under construction equipment or desiccation cracking upon drying.

Permeability tests will be conducted per the specified test method using tap water or 0.05N calcium sulfate solution as the permeant fluid. Distilled or deionized water is not acceptable for use as permeant fluid. The permeant fluid shall be deaired.

If the permeability requirements identified in Table 2-1 are met, soil liner construction may begin with that soil material. If the permeability test for the sample prepared at 95 percent maximum dry density and optimum moisture content does not satisfy the required permeability requirements, permeability test(s) with increased dry density and/or increased moisture content will be required if the soil material is to be used for liner construction. Using systematic increases in compaction effort and moisture content, additional permeability test sample(s) shall be prepared and tested.

The minimum acceptable compaction criteria for soil liner construction will be based on the criteria used in the permeability test which met the permeability requirements in Table 2-1.

All permeability test data on soil materials which are used for soil liner must be submitted regardless of test method used or test result.

4.0 SOIL LINER SPECIFICATIONS

4.1 Subgrade Preparation

The prepared subgrade will be installed in areas where Class I waste is to be deposited, regardless of the types of in-situ subgrade materials observed during excavation.

Prior to placing soil liner materials, the subgrade should be proof-rolled with heavy, rubber-tired equipment to detect soft areas. The geotechnical professional (GP) or CQA monitor must observe the proof-rolling, and identified soft areas should be undercut to firm material and then backfilled with compacted general fill.

The subgrade elevations shall be verified in accordance with the requirements prior to placement of the compacted soil liner. The excavation surface will be surveyed prior to liner construction for documentation.

After excavation surveying but prior to soil liner material placement, the excavation or subgrade surface shall be scarified a minimum of 2 inches to provide bonding between the compacted soil liner and the underlying surface.

Soil liner construction shall be sequenced in such a manner as to maintain drainage and minimize the potential effects of precipitation on the construction.

Continuous and repeated visual inspection of the materials being used will be performed to ensure proper soils are being used. The GQCP shall inspect soils to ensure debris such as large rocks, sticks, etc., or soils that the GQCP suspects as not conforming to the specifications established in the pre-construction testing are not included in the liner. Any such soils found to be unsuitable for liner construction shall be rejected by the GQCP. The GQCP shall note any such rejections of soils for any reason in the daily logs of the GQCP.

The liner soil material shall contain no rocks or stones larger than one inch in diameter or that total more than 10 percent by weight. The final lift for composite liners should not contain any rocks or any other materials that can cause damage to the geomembrane.

4.1.1 Dewatering During Construction

The Trench 7/8 sump is the only area known to be below the seasonal high groundwater table. No areas within the lateral expansion are known to be below the seasonal high groundwater table. A table summarizing the recorded seasonal high groundwater elevations for the site is provided in Appendix 4A.

Monitoring data will continue to be reviewed, and the permit will be modified if warranted by new data. During construction in Trench 7/8 or in areas observed with signs of groundwater during excavation, the following procedures will be performed to properly dewater any areas where groundwater is observed:

- Grading around excavations will be controlled to prevent surface water from flowing into excavation areas.
- Draining or pumping will be performed to continually maintain all excavations free of water or mud from any source. Any water or mud will be discharged to approved drains or channels. Draining or pumping will be commenced when water first appears and will be continued as required to keep the excavation area free of standing water during the entire time the excavation is open.
- If necessary, groundwater will be pumped from the excavation using pumps of adequate capacity to ensure rapid drainage of the area. Drainage channels and subdrains with sumps will be constructed as required.
- If water is found in the excavation, unsuitable excessively wet subgrade materials will be removed and replaced with approved compacted fill material. Excavation soils will be stockpiled and allowed to further dewater prior to reuse.

4.2 Placement

Soil liner material will not be placed or compacted during sustained periods of temperatures below 30°F. Soil liner material may be placed during early morning freezing temperatures with warming trends during the day.

If necessary, the soil material will be screened, processed, disced, or worked to reduce dry clod size to approximately one inch or less prior to compaction. The maximum clod size shall be approximately one inch in diameter prior to initiating compaction. Soil clods will be reduced to the smallest size necessary to achieve the coefficient of permeability reported by the testing laboratory (or the maximum value identified in Table 2-1) and to destroy any macrostructure evidenced after the compaction of the clods under density-controlled conditions.

Approved soil liner material will be placed in uniform layers not exceeding nine inches (loose lift). If the pads of the compactor to be used will not penetrate a nine-inch loose lift, the thickness of the loose lift will be reduced to allow for full penetration by the compactor pads. No loose lift shall be thicker than the pads of the compactor so that complete bonding with the top of the previous lift is achieved. Compaction equipment will be maintained to avoid clogging of liner soil around the compactor pads. In constructing a two foot thick soil liner, a minimum of four lifts will be used.

The top of each lift shall be roughened to a shallow depth prior to the placement of the next lift of soil for compaction. Prior to compaction, representative samples shall be tested for moisture content. If moisture content is at or wet of optimum or within the range specified by preconstruction testing, compaction may begin. If the moisture content is outside the specified ranges, the soil liner material shall be wetted or dried and reworked accordingly.

If the moisture content is outside the acceptable range, the soil will be wetted or dried and reworked accordingly. The soil shall be sprinkled or sprayed with water and dozed, wind-rowed, disc-plowed or processed to uniformly increase the moisture content of the soil if the material is below the specified moisture content. The soil shall be dozed, wind-rowed, disc-plowed or processed if the moisture content is too high.

If water is to be added to soil liner material, it shall be sprinkled or sprayed uniformly and worked to provide a relatively uniform moisture content within the soil liner material to be compacted.

Contaminated water will not be used in the construction of soil liner.

4.3 Compaction

As each lift (approximate six inch compacted thickness) of liner has been completed, field density and moisture content tests will be performed at the frequency outlined.

Minimum field compaction criteria for constructed soil liner is 95 percent of the maximum dry density at determined by standard Proctor (ASTM D698) at a moisture content at or above optimum moisture content.

Compaction of soil liner material loose lifts shall be performed with an appropriately heavy, properly ballasted, penetrating foot compactor such as a pad foot, prong-foot, or sheepsfoot compactor similar to a CAT compactor series 815 or equivalent. The minimum weight of the compactor shall be 1,500 pounds per linear foot of drum length. Soil liners will not be compacted with a bulldozer or any track-mobilized equipment unless it is used to pull a pad-footed roller.

A minimum of four passes are required, with a pass being defined as two applications of the compacting roller (i.e., for a one roller compactor, a pass is a trip forward and back, for a two roller compactor, a pass is a trip forward). Additional passes may be required to achieve compaction requirements.

Dozer or scraper equipment shall not be used for primary compactive effort except as follows:

An initial lift of soil liner placed upon an underdrain system or an underlying geosynthetic layer shall be compacted to the specified density and moisture content with a standard track-width dozer or equivalent track equipment capable of providing equal or greater bearing pressure (1,100 psf).

Penetrating foot compactors shall not be used above an underdrain system or geosynthetic layer until the overlying soil thickness is equal to or greater than 1.5 times the length of the penetrating foot.

Within a construction area, each lift shall be thoroughly compacted and satisfy moisture and density controls through field testing prior to placement of subsequent lifts.

4.4 Lift Bonding

Previously compacted lifts will be thoroughly scarified a minimum of two inches prior to placement of subsequent lifts to promote bonding between lifts.

During construction, finished lifts or sections may be sprinkled with water as needed to prevent drying and desiccation.

If desiccation and crusting of a lift surface occurs before placement of the next lift, the area shall be sprinkled with water, scarified, and tested for acceptable moisture content prior to placement of a subsequent lift.

Completed lifts or sections of compacted soil liner shall be sealed by rolling with a rubber tired or smooth drum roller and sprinkled with water as needed.

The surface of the soil liner will be proof rolled when construction is shut down for more than 24 hours, and on a routine basis during the summer months at the end of each day’s liner construction to mitigate the effects of desiccation cracking.

Prior to placing subsequent lifts, the surface of the previous lift shall be scarified, and moisture conditioned to provide bonding between lifts. The length of the compactor pads shall be sufficient to penetrate the subsequent loose lift and the lift interface to provide bonding between lifts.

4.5 Liner Protection

Tie-ins to existing liner areas will be made using a stair step approach. Within the leading edge of the liner construction (minimum 10 feet for two foot-thick liner and 15 feet for three foot-thick liner), lifts of compacted soil liner will terminate in a stair step manner. When additional liner is to be constructed, this leading edge will be scarified, and the new liner tied into the existing liner. This intent of this method of construction is to prevent a vertical joint through the constructed liner.

All sampling or testing locations shall be backfilled with bentonite pellets or a hand tamped soil liner material and bentonite mixture. These locations include field density test locations, material sample locations and tube sample locations, as well as any other liner penetration.

Ponded water on constructed soil liner and protective cover shall be removed in a timely manner.

For soil liners which will not be overlain with a flexible membrane liner, protective cover will be placed a minimum one foot thick over the constructed soil liner. Compaction of protective cover is not required. Protective cover shall be placed as soon as possible after installation of the soil liner, geosynthetic clay liner (GCL), geomembrane, and any overlying geosynthetics, and will be placed during the coolest part of the day. Protective cover shall not contain material greater than 3/8-inch in size.

For soil liners which will be overlain with a flexible membrane liner, the compacted soil liner shall be smooth drum rolled in preparation for geomembrane placement.

SLER markers will be provided at the limits of constructed soil liner and will remain in-place during active disposal operations within that area. To facilitate operations, SLER markers may be removed upon approval of subsequent disposal areas. The SLER markers must be tied into the master site grid system for reference and shall not be placed through the constructed liner.

Soil liner construction will be conducted in a systematic and timely fashion. A construction period of 60 days or less will be targeted for each given area. For construction periods exceeding 60 days for a given area, explanations for the delayed construction and the methods to be used to ensure liner integrity will be provided in the SLER.

4.6 Field Testing - Soil Liner

Minimum requirements for field testing during construction of soil liner using parallel lifts are as follows:

- A field density and moisture content test will be conducted per every 8,000 square feet for each six-inch compacted lift. A minimum of three field density tests will be conducted per six-inch lift.
- Sieve analysis will be performed at a frequency of one test per every 100,000 square feet or major fraction thereof. A minimum of one test per six-inch compacted lift is required.

- Atterberg limits will be determined at a frequency of one test per every 100,000 square feet or major fraction thereof. A minimum of one test per six-inch compacted lift is required.
- Permeability tests will be performed at a frequency of one test per every 100,000 square feet or major fraction thereof. A minimum of one permeability test per each six-inch compacted lift is required.
- Thickness verification will be performed by survey methods. A minimum of one verification point per 5,000 square feet of surface area is required. If the construction area is under 5,000 square feet, a minimum of two verification points will be required.
- Sidewall liners constructed using parallel lifts will be constructed monolithically with the floor liner. Sidewall liner evaluation will be performed using the same criteria and rate of testing as the bottom liner evaluation.

Minimum requirements for field testing during construction of soil liner using horizontal lifts are as follows:

- A field density and moisture content test will be conducted for every 100 lineal feet for each 12-inch compacted thickness and shall be located within the 4 feet closest to the protected wall.
- Sieve analysis will be performed at a frequency of one test per every 2,000 lineal feet or major fraction thereof. A minimum of one test per 12-inch compacted thickness is required.
- Atterberg limits will be determined at a frequency of one test per every 2,000 lineal feet or major fraction thereof. A minimum of one test per 12-inch compacted thickness is required.
- Permeability tests will be performed at a frequency of one test per every 2,000 lineal feet. A minimum of one permeability test per 12-inch compacted thickness and a minimum of six permeability tests per entire sidewall liner is required.
- Thickness verification will be performed by survey methods. A minimum of one verification point per 5,000 square feet of surface area is required. If the construction area is under 5,000 square feet, a minimum of two verification points will be required.

Thickness of in-situ soil liners should be determined by augering to a depth equal to the required liner thickness plus one foot with the top foot is to be used as protective cover. The rate of verification should be at a minimum of one location for each 5,000 feet of surface area. Each augered hole shall be backfilled with a mixture of at least 2 percent bentonite by volume and parent soil material and, at a minimum, compacted by hand-tamping.

When sampling for permeability tests, two Shelby tubes/drive cylinders shall be retrieved. One tube/cylinder shall serve at the primary test sample. The second tube/cylinder shall serve as the backup sample in case of damage or sample disturbance in the first tube, or in case of a non-conforming permeability test.

Care will be taken to reference field density tests to the correct Proctor curve for the material being used in construction.

An increase in the frequency of field density testing does not require a corresponding increase in sieve analysis, Atterberg limits or permeability testing.

If the frequency of field density testing is increased, the frequency of the other tests remains one test per 100,000 square feet per six-inch compacted lift or major fraction thereof for parallel lifts.

If the frequency of field density/moisture tests for horizontal lifts on sidewall liners is increased, the frequency of sieve analysis, Atterberg limits and permeability tests will remain one test per every 2,000 lineal feet of sidewall per twelve-inch lift or major fraction thereof.

Throughout construction of soil liner, test results will be reviewed. If the liquid limit or plasticity index of the soil varies more than 10 points from the limits determined during preconstruction testing, a compaction test will be performed on the varying material. A laboratory permeability test will be performed on the varying material to ensure a permeability of 1×10^{-7}·cm/sec or less will be achieved using the construction compaction criteria. For the engineered subgrade, a permeability of 1×10^{-8}·cm/sec or less must be achieved using the construction compaction criteria.

Sand cone tests, rubber balloon tests, or drive cylinder samples may be used to correlate dry density and moisture content measurements with those of the nuclear gauge. The results of these tests shall be documented and reviewed to determine if re-calibration of the nuclear density gauge is necessary.

All sampling or testing locations shall be backfilled with bentonite pellets or a hand tamped soil liner material and bentonite mixture. These locations include field density test locations, material sample locations and tube sample locations, as well as any other liner penetration.

If used, field permeability testing of in-situ soils or constructed soil liner shall be in accordance with ASTM D5093 or the Boutwell STEI two-stage field permeability test. Field permeability testing shall be used only with the prior consent of the TCEQ.

All test results shall be reported. In case of non-conforming test results, the steps taken to correct the nonconformity shall be explained in the SLER following procedures outlined below.

4.7 Non-Conforming Tests - Soil Liner Field Density and Moisture Tests

Sections of compacted soil liner which do not meet the density and moisture content requirements may be reworked and retested until the section does pass the criteria or the section of compacted soil liner may be removed and replaced to passing standards.

In the event of a failed moisture-density test, it is necessary to isolate the non-conforming area. Additional tests will be performed approximately half-way between the failed test and the nearest adjacent passing test locations. If the additional tests pass, the area bounded by passing tests will be reworked and retested. If the additional tests fail, a second set of additional tests will be performed between the failing additional tests and surrounding passing tests. This process will be repeated until the non-conforming area is defined. Once the non-conforming area is defined, it will be reworked and retested until compaction and moisture criteria are met.

In lieu of additional tests to define the non-conforming area, it is acceptable to rework entire area bounded by the initial surrounding passing tests.

If reworking consistently fails and the section does not pass the criteria, the non-conforming area shall be removed and replaced.

All reworked areas shall be tested and confirmed to satisfy the compaction criteria. The reporting of retests shall clearing indicate the number and location of the non-conforming test and the subsequent conforming retest. Retests shall be taken near the location of the original non-conforming test.

4.8 Permeability Tests

In the event of a non-conforming permeability test, the test procedures and test sample shall be reviewed for inconsistency in test procedure or flaw in the permeability test sample. A review of the associated soil characteristic tests and field density/moisture content tests shall be performed to confirm that the appropriate compaction criteria were used.

A permeability sample shall be prepared from the backup drive cylinder or Shelby tube sample and an additional permeability test shall be performed on the backup sample.

If the backup sample provides an acceptable permeability result, the results of the first sample will be disregarded if it is determined that the first sample or test procedure was flawed. If the backup sample does not provide an acceptable permeability, a review of the required compaction criteria will be performed to determine if the compaction criteria require revision.

Additional permeability test samples will be retrieved between the non-conforming permeability location and the surrounding passing permeability test locations. The results from these additional permeability tests will be used to bound the area requiring rework or removal and replacement. The area to be reworked or removed and replaced will be bounded by passing permeability tests. In lieu of additional testing to define the nonconforming area, the area between the initial passing permeability tests may be reworked or removed and replaced.

If reworking consistently fails and the section does not pass the criteria, the non-conforming area will be removed and replaced. All reworked areas shall be tested and confirmed to satisfy the permeability criteria. The reporting of retests shall clearly indicate the number and location of the non-conforming test and the subsequent conforming retest. Retests shall be taken near the location of the original non-conforming test.

All soil testing and evaluation of in-situ soil or constructed soil liners shall be completed prior to installing the leachate collection system.

4.9 Survey Control

The as-built thickness of the soil liner shall be determined by survey methods.

Prior to the placement of soil liner, the excavation surface shall be surveyed once per 5,000 square feet on a pre-established grid.

Upon completion of the soil liner, and prior to the installation of subsequent elements, the top of the soil liner shall be surveyed to ensure the specified thickness of soil liner has been achieved.

Upon completion of the protective cover/leachate collection system, the top of the layer shall be surveyed to ensure the specified thickness has been placed.

4.10 Documentation

A Soil Liner Evaluation Report (SLER) will be completed and filed with the TCEQ documenting the soil liner construction. A cover letter will preface the SLER giving names and telephone numbers of contact personnel. In addition, at a minimum, the information listed below will be included with the SLER.

- A scaled plot will be made for each six-inch compacted lift. This plot will contain locations and identification number for all the tests conducted on a particular lift and sample locations. For clarity, multiple plots for the same six-inch compacted lift may be provided (i.e., one plot for field density/moisture tests and another plot for soils characteristics and permeability test sample locations). The locations of all soils tests (passing and failing) will be recorded. The site grid system will be overlain onto the plot. North arrows and bar scales will be provided. Side liners constructed using horizontal lifts may submit, in lieu of multiple plan views, an elevation view showing the location of all tests and samples.
- Summary tables will be provided for test results. At a minimum, test and/or sample number, location, and result will be reported. Where appropriate, laboratory test numbers will cross-reference corresponding field density/moisture tests. Cross-references will be provided between non-conforming tests and subsequent passing retests.
- In addition to reporting the results of permeability tests, test data calculations will be included for all permeability tests. Summary tables will be provided for all test results.
- A site layout plan will be included indicating area of liner construction covered by the submittal, filled areas, active area, site grid plan, graphic scale, north arrow, and other pertinent site information. This site layout will show the location of areas covered by previous submittals as well as the approval dates.
- Reference locations will be noted on a drawing of the area evaluated. All elevation calculations necessary for thickness determination shall be attached as part of the supporting documentation to the SLER.
- A listing of the quality control personnel and their respective days on-site will be included in the submittal.
- A construction log will be provided which indicated dates, stages of construction, and weather conditions.
- A copy of TCEQ form 00674: Municipal Solid Waste Landfill Site Soil Liner Evaluation Report will be provided.

The limits of all constructed liners, including the most recent covered by the current evaluation, will be clearly marked with the placement of red-colored markers. These markers will be readily discernible by site workers and site inspectors and be maintained at all times during the active disposal operations within the area and may be removed as needed to facilitate operations upon approval of subsequent SLER areas. The SLER markers must be tied into the master site grid system for reference and shall not be placed through the constructed liner.

4.11 Reporting Procedures

At least three copies of each SLER shall be submitted to TCEQ.

Each SLER must be signed and where applicable sealed by the individual performing the evaluation and countersigned by the site operator or their authorized representative.

When the individual trench method of filling is used, the dividing area between individual trenches will be lined prior to placement of aerial fill overlying the filled trench area.

Prior to disposal of solid waste in any trench or on any area, excavation, or unprotected surface, a SLER and FMLER shall be submitted to the executive director for review and approval. If no response, either written or verbal, is received within 14 days after the SLER/FMLER was received at the Municipal Solid Waste Division of TCEQ, the SLER shall be considered approved. Waste may be placed in the area only after notification to the Groundwater Protection Team of the Compliance and Enforcement Section of the Municipal Solid Waste Division of TCEQ by telephone of the intent to place waste on the area. In areas requiring a leachate collection system and/or protective cover, documentation of such construction must also be submitted to the TCEQ prior to waste disposal on the area.

5.0 FLEXIBLE MEMBRANE LINER SPECIFICATIONS

5.1 Material Requirements

Geomembrane liner shall be made of 60 mil smooth (for cell bottoms only) or textured (for both cell bottoms and side slopes), high density polyethylene (HDPE). No more than one percent of the material may be additives and no recycled or reclaimed material shall be used by the manufacturer. No more than two percent regrind material will be allowed. The CQA monitor shall provide continuous on-site observation during geomembrane (GM) deployment, trial welds, seaming, testing, and repairing in accordance with 30 TAC §330.339(a)(2). The GP shall make sufficient site visits during GM installation to document the installation and testing in the required FMLER.

Geomembrane liner shall be shipped rolled. Rolls shall be stored on site in stacks of five rolls or less, and will be secured to prevent shifting, abrasion, or other adverse movement. A cover or temporary shelter will be provided for geomembrane stored on-site for longer than 6 months to protect against precipitation, ultraviolet exposure, and accidental damage. The temporary storage location will be dry, will protect geomembrane materials from soft, wet, rocky, and rough ground, and will be prepared such that no stones or other rough objects that could damage the geomembrane are present on the ground.

The geomembrane liner shall be installed as soon as practical after completion and approval of the SLER. Each sequential section of liner shall be secured in an anchor trench and continuously welded to the adjacent sections.

The geomembrane used shall meet, at a minimum, the standards of GRI-GM13.

Resin documentation, including density, carbon black content, carbon black dispersion, oxidative induction time, and melt flow index shall be submitted for resins used.

5.2 Preconstruction Testing

All geomembrane rolls will be tested and evaluated in accordance with GRI-GM13 prior to acceptance. In general, testing of the rolls will be conducted by the manufacturer.

Test results shall be submitted to the GQCP, who will review and confirm the HDPE material meets specifications prior to installation of a HDPE roll.

Environmental Stress Crack (ASTM 01693) test results shall be submitted to the Project Representative within 75 days of material shipment.

  - Wearing damaging shoes
  - Engaging in any other activity likely to damage the geomembrane
- Unroll only those sections which are to be seamed together or anchored in one day. Panels shall not be placed in inclement weather such as rain or high winds. Panels shall be positioned with the overlap recommended by the manufacturer, but not less than three inches. The edge of the upslope sheet shall be positioned above the edge of the downslope sheet. The geomembrane liner sections will be placed in an anchor trench which is then backfilled with soil compacted to a 90 percent of the maximum dry density as determined by the Standard Proctor Compaction Tests (ASTM D698).
- After panels are initially in place, remove as many wrinkles as possible. Unroll several panels and allow the liner to "relax" before beginning field seaming. The purpose of this is to make the edges which are to be bonded as smooth and free of wrinkles as possible. The number of rolls deployed ahead of seaming operations will be at the discretion of the Installer.

5.3.3 Trial Seams

Testing of trial seams will be conducted by the Installer under observation by the GQCP.

The Installer shall maintain and use equipment and personnel at the site to perform testing of test seams.

A test seam will be made for each seaming apparatus to be used in field seaming. If more than one seaming technician uses the same apparatus, a separate test seam will be made for each apparatus/technician combination that will perform field welding. Test seams will be made each day prior to commencing field seaming. These seams will be made on fragment pieces of geomembrane liner to verify that seaming conditions are adequate. The texture(s) of the geomembrane pieces selected for the trial seams should represent any geomembrane interfaces to be seamed together in the field. Time, tip temperature, and seamer name will be recorded for each trial seam. For extrusion welding, test the welder and the machine for each new trial seam. For fusion welding, test the machine only for each new trial seam (since the machine is not operator dependent).

Such test seams will be made at the beginning of each seaming period, such as morning start-up and after mid-day or lunch break. Additional test seams will be made for each occurrence of significantly different environmental conditions (temperature, humidity, dust, etc.), and any time the machine is turned off for more than 30 minutes. At the GQCP's discretion, additional trial seams may be required. Each seamer will make at least one test seam each day.

The test seam sample will be at least 0.9m (3 ft) long by 0.3m (1 ft) wide with the seam centered lengthwise. Four (six when possible if using dual track fusion welding) adjoining specimens 25mm (1 in) wide each will be die cut from the test seam sample. These specimens will be tested in the field with a tensiometer for both shear (two specimens) and peel (two specimens, four when possible if testing both inner and outer welds for dual track fusion welding). Whenever possible, peel specimens will be tested on the interior track and peel specimens will be tested on the exterior track. The extensometer testing apparatus used for peel and shear tests shall have an updated calibration certificate that is traceable to National Institute of Standards and Technology prior to the start of testing.

Test seams will be tested by the Installer under observation of the GQCP. The specimens shall not fail in the weld.

A passing fusion or extrusion welded test seam will be achieved when the seam strength criteria described in GRI-GM19a are satisfied. Break type requirements are not applicable to field tested seams.

If a test seam fails, the entire operation will be repeated. If the additional test seam fails, the seaming apparatus or seamer will not be accepted and will not be used for seaming until the deficiencies are corrected and two consecutive successful full test seams are achieved. Test seam failure is defined as failure of any one of the specimens tested in shear or peel. Field welding will not begin, for the machine or welder (if applicable), until all test seams pass.

5.3.4 Field Seaming

All foreign matter (dirt, water oil, etc.) shall be removed from the edges to be bonded. No solvents shall be used to clean the geomembrane liner. All manufacturer recommendations will be followed for field seaming and repairs.

The Installer shall provide the Owner's Representative and CQA Officer with a panel layout drawing. This drawing may be modified, with the approval of the CQA Officer, to meet job site conditions. The Installer will maintain record drawings that shall be updated by the Installer on a regular basis.

A seam numbering system shall be agreed to by the CQA Officer and Installer prior to the start of seaming operations. One methodology is to identify the seam by adjacent panels. For example, the seam located between Panel 306 and 401 would be Seam No. 306/401.

Prior to seaming, trial welds shall be completed as described in Section 5.3.3. During seaming operations, the CQA Officer shall verify that the following conditions exist:

- The Installer has the number of welders and spare parts agreed to in the pre-construction meeting
- Equipment used for seaming does not damage the geomembrane
- The extruder is purged prior to beginning a seam until all the heat-degraded extruder is removed (extrusion welding only)
- Seam grinding has been completed less than 30 minutes before seam welding (extrusion welding only)
- Seam edges are beveled and grind marks are perpendicular to the seam (extrusion welding only)
- Grind marks do not extend more than 1/4 inch from edge of weld (extrusion welding only)
- The ambient temperature measured within 6 inches of the geomembrane surface is between 32 degrees and 104 degrees Fahrenheit, unless approved otherwise by the CQA Officer
- The end of old welds, more than five minutes old, are ground to expose new material before restarting a weld (extrusion welding only)
- The weld is free of dust, dirt, moisture, or other contaminants
- The seams overlap a minimum of three inches for extrusion welding and four inches for fusion welding, or in accordance with manufacturer's recommendations
- No solvents or adhesives are present in the seam area
- The procedure used to temporarily hold the panels together does not damage the panels and does not preclude CQA testing
- The panels are seamed in accordance with the plans and specifications
- Seams that join the side slopes and bottom sections are at least 5 feet from the side slope and along the floor
- The number of seams in corners and odd-shaped geometric locations is minimized

A passing machine-welded seam will be achieved for both peel and shear testing for both fusion and extrusion welded seams when the following two conditions are met (utilizing testing method ASTM D4437):

- Seam strength meeting the requirements of GRI-GM19a
- Seam failure by FTB and break code not unacceptable per GRI-GM19a

5.3.5 Field Testing - Flexible Membrane Liner

All geomembrane seams will be tested and evaluated prior to acceptance. The GQCP will observe all production seam field test procedures. Testing of the seams will be conducted by the Installer under observation by the GQCP and will be completed consistent with current ASTM standards and GRI Test

Method GM19a (GRI GM19a). At their discretion, the GQCP may have additional testing performed to verify that the HDPE seams meet the specifications. Testing will meet the manufacturer's standards and (for HDPE) the values in the GRI Test Method GM13 (GRI GM13) for all geomembrane materials properties.

Non-Destructive Testing - Production seams will be tested by the Contractor continuously using non-destructive techniques. Requirements for non-destructive testing are as follows:

Single Weld Seams - the Installer shall maintain and use equipment and personnel at the site to perform continuous vacuum box testing on all single weld production seams. The vacuum shall be held for a minimum of 10 seconds for each section of seam.

Double Weld Seams - The Installer shall maintain and use equipment and personnel to perform air pressure testing of all double weld seams. The system shall be capable of applying a pressure of at least 30 psi for not less than five minutes. The Installer shall perform all pressure and vacuum testing under the supervision of the GQCP. When the test is complete, the Installer shall release pressure from the seam end opposite of the pressure gauge to verify that the entire seam was pressurized.

5.3.6 Construction Testing

Two nondestructive testing procedures shall be utilized, depending on the type of welding procedure used. For extrusion welded seams the vacuum box method shall be employed for the full seam length. A vacuum of at least three- pounds per square inch (psi) shall be maintained for at least ten seconds. For the dual wedge (hot shoe) fusion welded seam, the air channel shall be pressurized to a maximum pressure of 30-psi. The air channel shall be pressurized for at least five minutes. If the loss of pressure exceeds two psi or pressure does not stabilize after five minutes, the defective area shall be located and repaired.

5.3.7 Destructive Testing

Destructive testing will be performed at least once within each 500 linear feet of production seam. The locations will be selected by the GQCP in such a manner as to representatively sample the geomembrane seam quality for the entire installation. Individual repairs of leaks or failed seams greater than 10 feet in length must be counted in determining the total seam length for testing. At a minimum, a destructive test will be performed for each welding machine used. Sufficient samples will be obtained by the Installer to provide one sample to the archive, one sample to the GQCP for laboratory testing, and two samples to be retained by the Installer for both field and laboratory testing. Additional destructive test samples will be taken if deemed necessary by the GQCP.

The Installer shall initially field test the seam using a calibrated tensiometer. Field testing shall include at least two peel tests (four, when possible, for testing both track on dual-track fusion welds) and two shear tests. Field tests will be evaluated for the criteria described in Section 5.3.4, with the exception of break codes.

If the field test indicates an acceptable seam, the samples for laboratory testing will be delivered to the laboratories and tested for both strength and strain requirements. Laboratory tested fusion and extrusion welded seams must meet the requirements identified in Section 5.3.4. Testing shall include the shear and peel test (ASTM D6392). At least five specimens shall be tested in peel and five specimens in shear. All of the five specimens tested by the Testing Laboratory using each method must meet the minimum test values presented in the Project Documents. The Testing Laboratory shall provide test results within 24 hours in writing or via telephone with the CQA Officer. Certified test results are to be provided within 5 days. The Contractor or Installer shall immediately notify the CQA Officer and Engineer in the event of a failed test. No areas (except as necessary to provide temporary wind protection or to temporarily prevent water from getting under the geomembrane) are to be covered prior to receiving the laboratory test results.

If unresolved discrepancies exist between the GQCP’s and installer’s test results, the archived sample may be tested by the GQCP.

5.3.8 Non-Conforming Test Results

Samples which do not pass the shear and peel tests will be re-sampled from locations at least 10 feet on each side of the original location. These two re-test samples must pass both shear and peel testing. If these two samples do not pass, then additional samples will continue to be obtained until the questionable seam area is defined.

If desired, it is acceptable to cap strip the non-conforming seam length with the cap strip extending the entire length between two passing seam tests.

Damaged and sample coupon areas of geomembrane shall be repaired by the Installer by construction of a cap strip. The cap strip will extend a minimum of six inches in all direction from the area of concern. The cap strip will be completely seamed by extrusion welding to the parent geomembrane.

No repairs shall be made to seams by application of an extrusion bead to a seam edge previously welded by fusion or extrusion methods. Spot welding and extrusion beads may be used to repair surface flaws or irregularities.

Repaired areas will be non-destructive tested for seam integrity. At the discretion of the GQCP, destructive tests may be conducted on the repaired areas.

5.3.9 Repairs

Portions of the geomembrane with flaws or that fail a non-destructive or destructive test shall be repaired in accordance with the specifications and manufacturer's recommendations. Repairs will be tested non-destructively at a minimum and will be tested destructively if required.

- Patching is used to repair large holes, tears, large panel defects, and destructive testing sample locations. Patches will extend for a distance of at least six inches in all directions of the faulty spot or area detected.
- Extrusion is used to repair small defects in the panels and seams. In general, this procedure should be used for defects less than 3/8 inch in the largest dimension.
- Capping is used to repair failed welds or to cover seams where welds cannot be nondestructively tested. Caps will extend for a distance of at least six inches in all directions of the faulty spot or area detected.
- Removal is used to replace areas with large defects where the preceding methods are not appropriate. Removal is also used to remove excess material (wrinkles) from the installed geomembrane.

5.3.10 Wrinkles

Placing soil cover or drainage materials over the geomembrane, temperature changes, or creep may cause wrinkles to develop in the geomembrane. Any wrinkles that can fold over shall be repaired either by cutting out excess material or, if possible, allowing the liner to contract due to temperature reduction. In no case shall material be placed over the geomembrane that could result in the geomembrane folding.

5.3.11 Bridging

Unless approved by the CQA Officer, bridging must be removed and repaired at no cost to Owner.

5.3.12 Folded Material

All folded HDPE geomembrane shall be removed and repaired at no cost to Owner.

5.3.13 Liner Protection

At the end of each day or installation segment all unseamed edges shall be anchored by rope, sandbags, or other approved device. Sandbags securing the geomembrane on the side slopes shall be connected by rope fastened at the top of the slope section by a temporary anchor. Staples, U-shaped rods or other penetrating anchors shall not be used to secure the geomembrane.

Only low ground pressure support equipment approved by the Project Representative may be allowed on the geomembrane. Personnel working on the geomembrane shall not smoke, wear damaging shoes, or engage in any activity which damages the geomembrane. Small equipment, such as generators, will be placed on scrap liner material (rub sheets) placed over the geomembrane liner.

Between construction of partial sections of the geomembrane liner, leading edges of the geomembrane may be exposed or buried for extended periods of time prior to their joining to adjacent subsequent geomembrane sections. It is necessary to protect leading edges in high activity areas.

5.3.14 Completion

The anchor trench will be backfilled with soil and compacted.

Care shall be taken when backfilling the trench to prevent any damage to the geomembrane. Anchor trench spoil shall be used as backfill material, wherever possible.

5.4 Survey Control

The coordinates and elevations of the boundary of the flexible membrane liner system (interior upper edge of the anchor trench) shall be documented by survey methods.

The documentation survey may be performed separately or in conjunction with the protective cover/leachate collection system survey.

5.5 Documentation

A Flexible Membrane Liner Evaluation Report (FMLER) will be completed and filed with the TCEQ documenting the flexible membrane liner construction. A cover letter will preface the FMLER giving names and telephone numbers of contact personnel. In addition, at a minimum, the information listed below will be included with the FMLER.

- A scaled plot will be made indicating the panel layout, seam locations and number, repair locations, and destructive test locations. This plot will contain locations and identification number for all the tests conducted. If necessary, multiple plots may be provided. The site grid system will be overlain onto the plot. North arrows and bar scales will be provided.
- Manufacturer quality control test results and conformance test results will be submitted.

- Documentation tables will be provided for trial test welds, non-destructive tests, and destructive test results. At a minimum, test and/or sample number, location, and result will be reported. Cross-references will be provided between non-conforming tests and subsequent passing retests.
- Whenever appropriate, summary tables will be provided for test results.
- A site layout plan will be included indicating area of flexible membrane liner construction covered by the submittal, filled areas, active area, site grid plan, graphic scale, north arrow, and other pertinent site information. This site layout will show the location of areas covered by previous submittals as well as the approval dates.
- Survey locations indicating the extent of flexible membrane liner installation will be included.
- All subgrade acceptance documentation will be submitted.
- A construction log will be provided which indicates dates, stage of construction, and weather conditions.
- A copy of TCEQ form 10070: Municipal Solid Waste Facility Geomembrane/Geosynthetic Liner Evaluation Report will be provided.

The limits of all constructed liners, including the most recent covered by the current evaluation, will be clearly marked with the placement of red-colored markers. These markers will be readily discernible by site workers and site inspectors and be maintained at all times during the active disposal operations within the area and may be removed as needed to facilitate operations upon approval of subsequent SLER areas. The SLER markers must be tied into the master site grid system for reference and shall not be placed through the constructed liner.

5.6 Reporting Procedures

At least three copies of each FMLER shall be submitted to TCEQ.

Each FMLER must be signed and where applicable sealed by the individual performing the evaluation and countersigned by the site operator or their authorized representative.

Prior to disposal of solid waste in any trench or on any area, excavation, or unprotected surface, a FMLER shall be submitted to the executive director for review and approval. If no response, either written or verbal, is received within 14 days after the SLER/FMLER was received at the Municipal Solid Waste Division of TCEQ, the FMLER shall be considered approved. Waste may be placed on the area only after notification to the Ground-Water Protection Team of the Compliance and Enforcement Section of the Municipal Solid Waste Division of TCEQ by telephone of the intent to place waste on the area. In areas requiring a leachate collection system and/or protective cover, documentation of such construction must also be supplied to the TCEQ prior to waste disposal on the area.

5.7 Geomembrane Acceptance

The Installer shall retain all ownership and responsibility for the geomembrane until acceptance by the Owner. In the event the Installer is responsible for placing a protective cover over the geomembrane, the Installer shall retain ownership and responsibility for the geomembrane until the protective cover is placed.

The CQA Officer shall accept the geomembrane when the following activities have occurred:

- The installation is finished
- All seams have been inspected and approved
- All required laboratory tests have been completed and approved
- Signed QC certificates for each roll of geomembrane have been supplied by the Installer and approved by the CQA Officer. Certificates shall include resin identification, roll number, date of production, and test results for density, melt index, and tensile strength (ASTM D638)
- All record drawings have been completed and approved
- All documentation required by the specification has been received

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ATTACHMENT III-5 – GEOLOGY REPORT

Part III, Attachment 5 – Geology Report
TCEQ MSW Permit No. 1522B

City of Victoria, Texas

City of Victoria Landfill Lateral and Vertical Expansion
Project No. 107608

Revision 3, June 30, 2023

Part III, Attachment 5 – Geology Report
TCEQ MSW Permit No. 1522B

prepared for

City of Victoria, Texas
City of Victoria Landfill Lateral and Vertical Expansion
Victoria County, Texas

Project No. 107608

STATE OF TEXAS
AMANDA K. BREITLING
GEOLOGY
11071
LICENSED
PROFESSIONAL GEOSCIENTIST

Revision 3, June 30, 2023

7/17/23

prepared by

Burns & McDonnell Engineering Company, Inc.
8911 N Capital of Texas Hwy, Building 3, Suite 3100
Austin, Texas 78759
Texas Firm Registration No. F-845 / 50338

TABLE OF CONTENTS

AMANDA K. BREITLING
GEOLOGY
11071

7/17/23

33.50 feet amsl (in August 2020). Groundwater gradient and flow rate from February 2019 through September 2021 ranged from 0.00089 to 0.0012 and 50.95 to 67.21 feet/year, respectively.

During the August 2019 and February 2020 gauging events, pumping associated with dewatering to support construction of a new landfill cell (Trench 6) affected groundwater resulting in atypical groundwater flow directions and elevations across portions of the Landfill expansion area (and the existing Landfill. Upon cessation of pumping, groundwater flow direction and elevations returned to typical conditions. The Landfill soil borrow source area may also influence groundwater elevations in nearby piezometers (EB-08 and EB-11) via increased infiltration and recharge due the removal of surficial, low permeability, clay material and accumulation/ponding of water in the Landfill soil borrow source area.

As described in the *Report on Assessment of Corrective Measures for Exceedances of Arsenic in Groundwater, Victoria Landfill, MSW Permit No. 1522A, Victoria County, Texas* (Hydrex, 2011), unconfined groundwater conditions occur at the northeastern portion of the Landfill in areas where clay is absent or minimal between the sand units and locally confined conditions occur at the southwest portion of the Landfill where clay is present between the sand units. Similar conditions were observed at EB- piezometers as noted in the previous section: the clay layer between the sand units was not observed at the three piezometers (EB-01, EB-08, and EB-11) in the north/east portion of the Landfill expansion area, or at piezometer EB-19 in the south/west portion of the Landfill expansion area; the clay between the sand units was observed at two piezometers (EB-17 and EB-24) in the southwest portion of the Landfill expansion area.

A summary of Landfill monitoring program groundwater elevations, gradients, and flow rates calculated by Hydrex Environmental, Inc. from December 2007 to March 2021 and groundwater elevation tables and figures from the 2007 to 2021 Hydrex Environmental, Inc. groundwater monitoring reports are included in Appendix 5I. The current monitoring network at the Landfill includes 18 monitoring wells and four observation wells. Groundwater elevations reported by Hydrex Environmental, Inc. from December 2007 through September 2021 varied from a low of 22.72 feet amsl (in February 2015) to a high of 32.26 feet amsl (in March 2011). A map depicting seasonal high water levels is presented in Attachment III-1, Drawing III.A1.12. Groundwater flows from the northeast to the southwest (as mentioned above, pumping associated with new Landfill cell construction affected groundwater elevations resulting in atypical groundwater flow directions and elevations across portions of the site during the August 2019 and February 2020 monitoring events). Groundwater gradient and flow rate from September 2011 through March 2021 ranged from 0.0008 to 0.0012 and 46.17 to 68.46 feet/year,

APPENDIX 5F – SURVEY REPORT

MARTIN SURVEY ASSOCIATES, INC.
8810 WILL CLAYTON PARKWAY, SUITE F • HUMBLE, TEXAS 77338
PROFESSIONAL SURVEYORS
LANDFILL SPECIALISTS
SITE DEVELOPMENT CONSULTANTS
TELEPHONE: (281) 446-8899
FAX: (281) 446-8609
EMAIL:msahouston@earthlink.net

VICTORIA LANDFILL
MONITORING WELL LOCATIONS

DESIGNATION	NORTHING	EASTING	T/PROTECTIVE COLLAR	TOP OF PVC CASING	TOP OF CONCRETE	NAT. GRND
A-2	316,715.62	2,668,787.54	68.67	68.06	65.24	64.7
LAT 28º 41' 17.743" LON 096º 54' 51.212"						
A-5	316,291.64	2,669,181.36	68.48	67.84	64.88	64.4
LAT 28º 41' 13.476" LON 096º 54' 46.876"						
C-1	317,188.36	2,669,064.75	69.34	68.67	65.82	65.2
LAT 28º 41' 22.374" LON 096º 54' 48.005"						

NOTES:

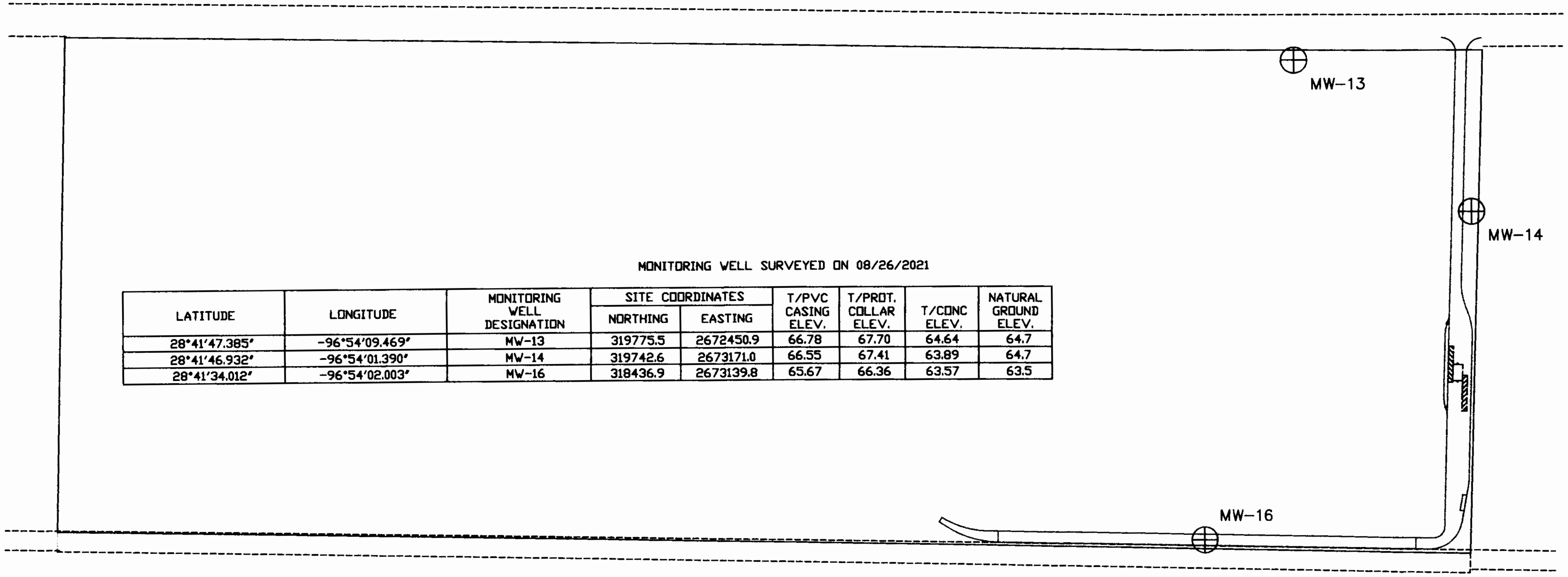
1.) COORDINATES AND ELEVATIONS BASED ON EXISTING GAS PROBE LOCATIONS TAKEN FROM PAPE-DAWSON ENGINEERS DRAWING NO. 9478-93 DATED NOVEMBER 1993.
2.) COORDINATES ARE TO CENTER OF PROTECTIVE COLLAR
3.) LAT. AND LON. ARE BASED ON NAD 83 (CORS96) (EPOCH:2002.0000)
4.) TOP OF CONCRETE ELEVATION TAKEN AT SURVEY DISK DISK SET IN PAD
5.) T/PROTECTIVE COLLAR ELEVATION TAKEN ON TOP OF LID
6.) SURVEYED ON THE GROUND 03/07/2011.

KEVIN A. OLSON
TEXAS REGISTERED PROFESSIONAL SURVEYOR NO. 4524
vlA03072011.xls

KEVIN A. OLSON
4524

NOTES:
1) ELEVATIONS BASED ON EXISTING GAS PROBE LOCATIONS TAKEN FROM PAPE-DAWSON ENGINEERS DRAWING NO. 9478-93 DATED NOVEMBER 1993.

2) COORDINATES ARE TO THE TOP OF PROTECTIVE COLLAR



MONITORING WELL SURVEYED ON 08/26/2021

LATITUDE	LONGITUDE	MONITORING WELL DESIGNATION	SITE COORDINATES		T/PVC CASING ELEV.	T/PROT. COLLAR ELEV.	T/CONC ELEV.	NATURAL GROUND ELEV.
			NORTHING	EASTING				
28°41'47.385"	-96°54'09.469"	MW-13	319775.5	2672450.9	66.78	67.70	64.64	64.7
28°41'46.932"	-96°54'01.390"	MW-14	319742.6	2673171.0	66.55	67.41	63.89	64.7
28°41'34.012"	-96°54'02.003"	MW-16	318436.9	2673139.8	65.67	66.36	63.57	63.5

KEVIN A OLSON
4524

SURVEYED ON THE GROUND: 03/14/2023

FIRM REGISTRATION NO. 10194114

MARTIN OLSON SURVEY INC.
PROFESSIONAL SURVEYORS, BOUNDARY
CONSTRUCTION & TOPOGRAPHIC SURVEYS

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HUMBLE, TEXAS 77338
PH: 281-446-8899

MARTIN FILE: VL_MW APRIL 2023.DWG

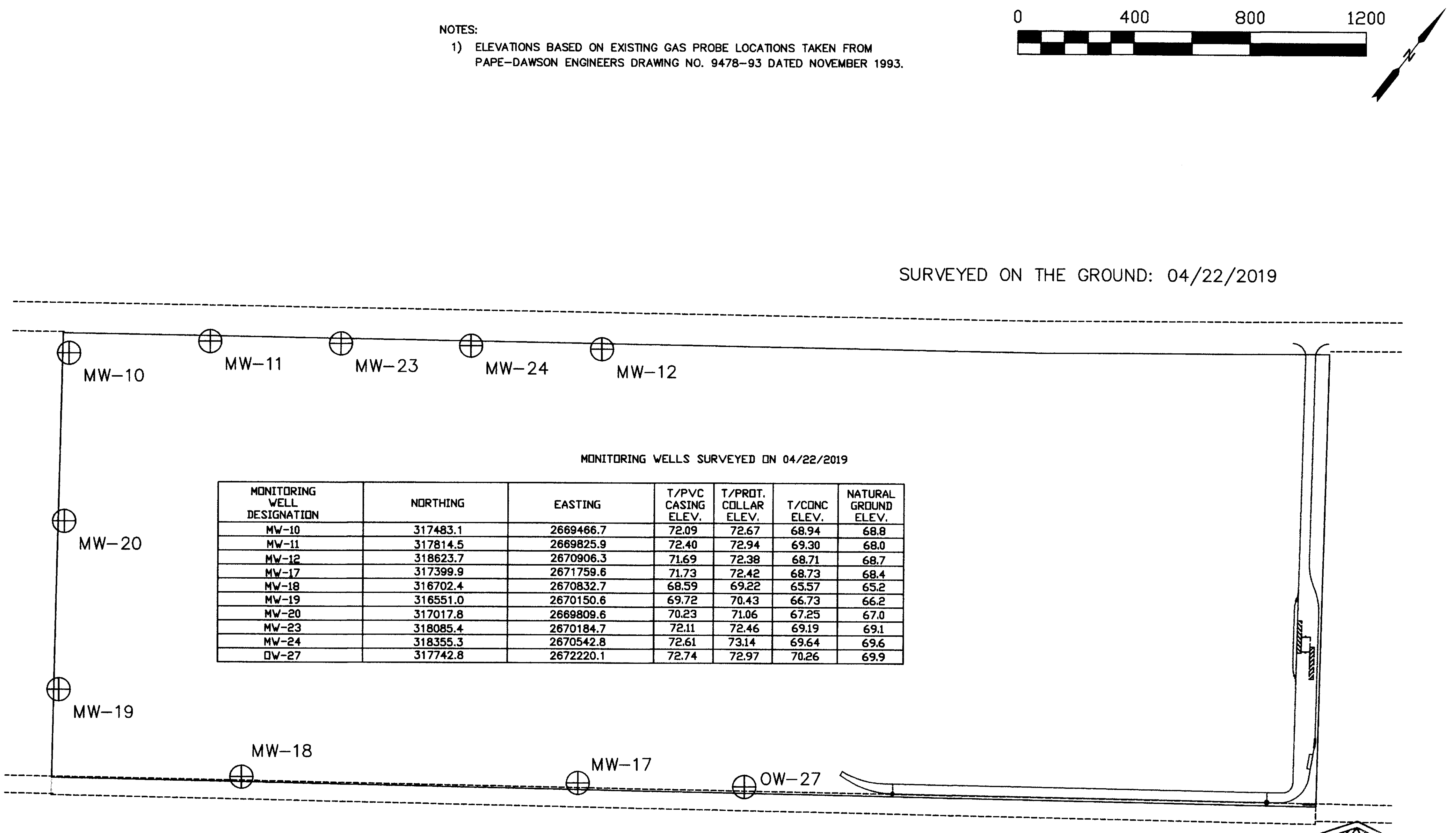
RECORD DRAWING
MONITORING WELL SURVEY

CITY OF VICTORIA LANDFILL
VICTORIA COUNTY, TEXAS

REPUBLIC SERVICES

NOTES:

1) ELEVATIONS BASED ON EXISTING GAS PROBE LOCATIONS TAKEN FROM PAPE-DAWSON ENGINEERS DRAWING NO. 9478-93 DATED NOVEMBER 1993.



SURVEYED ON THE GROUND: 04/22/2019

MONITORING WELLS SURVEYED ON 04/22/2019

MONITORING WELL DESIGNATION	NORTHING	EASTING	T/PVC CASING ELEV.	T/PROT. COLLAR ELEV.	T/CONC ELEV.	NATURAL GROUND ELEV.
MW-10	317483.1	2669466.7	72.09	72.67	68.94	68.8
MW-11	317814.5	2669825.9	72.40	72.94	69.30	68.0
MW-12	318623.7	2670906.3	71.69	72.38	68.71	68.7
MW-17	317399.9	2671759.6	71.73	72.42	68.73	68.4
MW-18	316702.4	2670832.7	68.59	69.22	65.57	65.2
MW-19	316551.0	2670150.6	69.72	70.43	66.73	66.2
MW-20	317017.8	2669809.6	70.23	71.06	67.25	67.0
MW-23	318085.4	2670184.7	72.11	72.46	69.19	69.1
MW-24	318355.3	2670542.8	72.61	73.14	69.64	69.6
OW-27	317742.8	2672220.1	72.74	72.97	70.26	69.9

STATE OF TEXAS REGISTERED PROFESSIONAL LAND SURVEYOR
KEVIN A OLSON
4524

07/06/2023

Added Northings & Eastings

FIRM REGISTRATION NO. 10194114

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MARTIN FILE: VL_MW_04222019.DWG

RECORD DRAWING
WELL SURVEY

CITY OF VICTORIA LANDFILL
VICTORIA COUNTY, TEXAS

REPUBLIC WASTE SERVICES

MARTIN SURVEY ASSOCIATES, INC.
8810 WILL CLAYTON PARKWAY, SUITE F ∘ HUMBLE, TEXAS 77338
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LANDFILL SPECIALISTS
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TELEPHONE: (281) 446-8899
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EMAIL:msahouston@earthlink.net

VICTORIA LANDFILL
MONITORING WELL/ OBSERVATION WELL LOCATIONS

DESIGNATION	NORTHING	EASTING	T/PROTECTIVE COLLAR	TOP OF PVC CASING	TOP OF CONCRETE	NAT. GRND
MW-15A	318939.52	2673776.01	68.10	67.57	64.90	64.4
LAT 28° 41' 38.880" LON 096° 53' 54.757"						
MW-21	317053.39	2671295.44	67.78	67.26	64.57	64.3
LAT 28° 41' 20.649" LON 096° 54' 22.987"						
MW-22	316349.56	2670359.03	69.37	68.88	66.00	65.7
LAT 28° 41' 13.847" LON 096° 54' 33.641"						
MW-23	318084.76	2670185.08	70.28	69.75	66.97	66.4
LAT 28° 41' 31.056" LON 096° 54' 35.246"						
MW-24	318354.44	2670543.40	70.22	69.66	66.61	66.1
LAT 28° 41' 33.662" LON 096° 54' 31.168"						
OW-25	318964.98	2671369.24	70.46	69.93	67.13	66.9
LAT 28° 41' 39.560" LON 096° 54' 21.774"						
OW-26	319321.01	2671840.17	69.30	68.57	65.83	65.6
LAT 28° 41' 43.001" LON 096° 54' 16.415"						
OW-27	317741.76	2672220.90	71.29	70.73	68.14	68.0
LAT 28° 41' 27.299" LON 096° 54' 12.458"						
OW-28	318106.83	2672663.75	69.33	68.65	65.87	65.5
LAT 28° 41' 30.835" LON 096° 54' 07.413"						

NOTES:
1.) COORDINATES AND ELEVATIONS BASED ON EXISTING GAS PROBE LOCATIONS TAKEN FROM PAPE-DAWSON ENGINEERS DRAWING NO. 9478-93 DATED NOVEMBER 1993.
2.) COORDINATES ARE TO CENTER OF PROTECTIVE COLLAR
3.) TOP OF CONCRETE ELEVATION TAKEN AT BRASS DISK SET IN PAD
4.) T/PROTECTIVE COLLAR ELEVATION TAKEN ON TOP OF LID
5.) SURVEYED ON THE GROUND 05/12/2010.

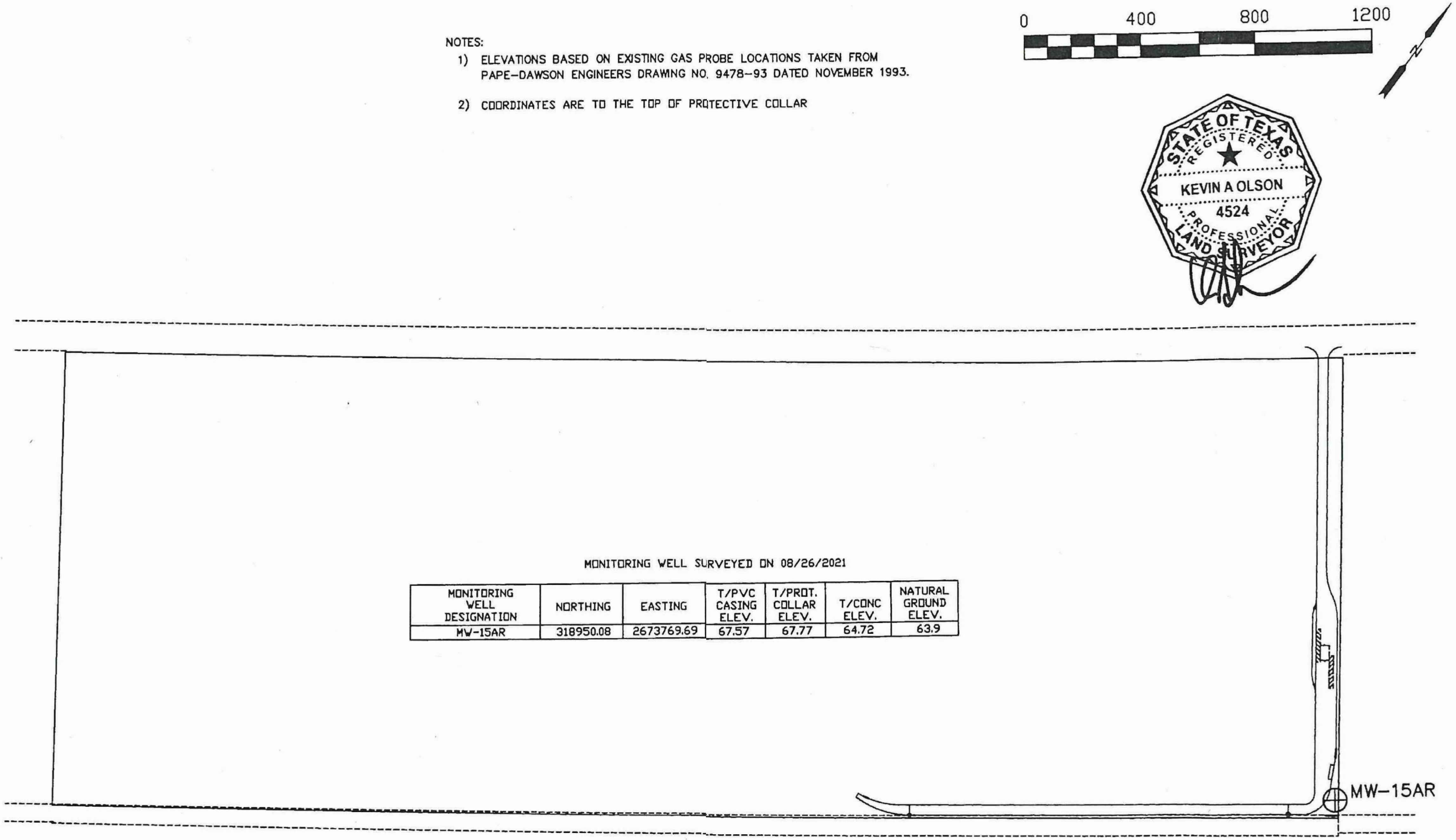
KEVIN A. OLSON
TEXAS REGISTERED PROFESSIONAL SURVEYOR NO. 4524
vlw05122010.xls

KEVIN A. OLSON
4524

NOTES:

1) ELEVATIONS BASED ON EXISTING GAS PROBE LOCATIONS TAKEN FROM PAPE-DAWSON ENGINEERS DRAWING NO. 9478-93 DATED NOVEMBER 1993.

2) COORDINATES ARE TO THE TOP OF PROTECTIVE COLLAR



KEVIN A OLSON
4524

MONITORING WELL SURVEYED ON 08/26/2021

MONITORING WELL DESIGNATION	NORTHING	EASTING	T/PVC CASING ELEV.	T/PROT. COLLAR ELEV.	T/CONC ELEV.	NATURAL GROUND ELEV.
MW-15AR	318950.08	2673769.69	67.57	67.77	64.72	63.9

FIRM REGISTRATION NO. 10194114

MARTIN OLSON SURVEY INC.
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MARTIN FILE: VL_MW 15AR_08262021.DWG

RECORD DRAWING
WELL SURVEY

CITY OF VICTORIA LANDFILL
VICTORIA COUNTY, TEXAS

REPUBLIC SERVICES

APPENDIX 5G – HISTORICAL SITE GEOLOGY INFORMATION

Path: C:\Users\jdsimmons\OneDrive - Burns & McDonnell\Documents\ArcGIS\Projects\TX_Victoria\TX_Victoria.aprx jdsimmons 6/30/2023

COPYRIGHT © 2023 BURNS & McDONNELL ENGINEERING COMPANY, INC.

Service Layer Credits: World Imagery: Maxar

Legend

- ● Expansion Boring (Completed at least 5' below elevation of deepest excavation [EDE])
- ● Expansion Boring (Completed at least 30' below EDE)
- ⊕ Expansion Piezometer (Boring completed at least 30' below EDE)
- ● Previous Boring (Approximate Location)
- ⊕ Existing Monitoring/ Observation Well (Approximate Location)
- 🟥 Proposed Landfill Expansion Area
- 🟩 Current Landfill Boundary
- - - Stream / Ditch

Note: See Table III.A5.5G-1T for locations and elevations of borings.

NORTH

1,000 500 0 1,000

Feet

BURNS McDONNELL℠

Figure III.A5.5G-1
Boring Locations
Victoria Landfill Expansion
Victoria County, Texas

Source: ESRI; FEMA; USDA NRCS; USFWS NWI; USGS NHD; Burns & McDonnell Engineering Company, Inc

Issued: 6/30/2023

Table III.A5.5G-1T
Locations and Elevations of Borings

Victoria Landfill Expansion
Victoria County, Texas

ID	Latitude	Longitude	Ground Surface Elevation	Approximate Borehole Depth (feet below ground surface)	Date Installed
C-3*	28° 41' 19.1"	-96° 54’ 45.5"	65.8	50	2/24/2011
C-5*	28° 41' 15.9"	-96° 54' 42.9"	65.6	50	2/24/2011
C-7*	28° 41' 12.6"	-96° 54' 40.3"	65.4	50	2/24/2011
D-3*	28° 41’ 20.6"	-96° 54’ 43.2"	65.7	50	2/23/2011
D-5*	28° 41' 17.3"	-96° 54' 40.6"	65.5	50	2/23/2011
D-7*	28° 41' 14.0"	-96° 54’ 38.0"	65.3	50	2/24/2011
MW-A2**	28° 41' 17.743"	-96° 54' 51.212"	64.7	60	2/25/2011
MW-A5**	28° 41' 13.476"	-96° 54' 46.876"	64.4	60	2/25/2011
MW-C1**	28° 41' 22.374"	-96° 54' 48.005"	65.2	54	2/25/2011
MW-1	(boring log not available, depicted on historical cross-section)				
MW-5	28° 41' 29.49"	-96° 54' 38.79"	64.3	65	5/13/1992
MW-6	28° 41' 36.74"	-96° 54' 26.31"	64.8	65	5/12/1992
MW-7	28° 41' 29.98"	-96° 54' 09.05"	63.0	65	5/14/1992
MW-8	28° 41' 24.28"	-96° 54' 18.13"	63.4	65	6/18/1992
MW-9	28° 41' 18.45"	-96° 54' 27.56"	63.4	65	6/16/1992
MW-10** (P-1)	28° 41' 25.22"	-96° 54' 43.45"	68.8	68.5	10/23/1995
MW-11** (P-2)	28° 41' 29.13"	-96° 54' 39.38"	68.0	73.5	10/21/1995
MW-12** (P-3)	28° 41' 36.25"	-96° 54' 27.04"	68.7	70.0	10/20/1995
MW-13** (P-4)	28° 41' 47.385"	-96° 54' 09.469"	64.7	73.0	10/16/1995
MW-14** (P-5)	28° 41' 46.932"	-96° 54' 01.390"	64.7	100.0	10/18/1995
MW-15* (P-6)	28° 41' 41.21"	-96° 53' 56.42"	63.5	70.0	10/19/1995
MW-15A*	28° 41' 38.88"	-96° 53' 54.76"	64.4	55	4/27/2010
MW-15AR**	28° 41' 38.01"	-96° 53' 53.88"	63.9	60.5	8/26/2021
MW-16** (P-7)	28° 41' 34.012"	-96° 54' 02.003"	63.5	70.0	10/20/1995
MW-17** (P-8)	28° 41' 23.98"	-96° 54' 17.71"	68.4	68.5	10/25/1995
MW-18** (P-9)	28° 41' 17.26"	-96° 54' 28.27"	65.2	68.5	10/25/1995
MW-19** (P-10)	28° 41' 15.88"	-96° 54' 35.93"	66.2	73.5	10/24/1995
MW-20** (P-11)	28° 41' 20.56"	-96° 54' 39.67"	67.0	68.5	10/23/1995
MW-21**	28° 41' 20.649"	-96° 54' 22.987"	64.3	55	4/28/2010
MW-22**	28° 41' 13.847"	-96° 54' 33.641"	65.7	70	4/29/2010
MW-23**	28° 41' 31.056"	-96° 54' 35.246"	69.1	60	4/28/2010
MW-24**	28° 41' 33.662"	-96° 54' 31.168"	69.6	57	4/28/2010
OW-25**	28° 41' 39.560"	-96° 54' 21.774"	66.9	60	4/27/2010
OW-26**	28° 41' 43.001"	-96° 54' 16.415"	65.6	60	4/26/2010
OW-27**	28° 41' 27.299"	-96° 54' 12.458"	69.9	65	4/29/2010
OW-28**	28° 41' 30.835"	-96° 54’ 07.413"	65.5	60	5/3/2010
B-1	28° 41' 37.10"	-96° 54' 22.89"	64	70	3/22/1982
B-2	28° 41' 44.07"	-96° 54' 00.77"	63.1	45	3/24/1982
B-3	28° 41' 27.62"	-96° 54' 14.94"	62.8	80	3/25/1982
B-4	28° 41' 20.32"	-96° 54' 37.42"	63.6	55	3/24/1982
B-A	28° 41' 28.84"	-96° 54' 35.29"	(boring log not available, depicted on historical cross-section)		

Table III.A5.5G-1T
Locations and Elevations of Borings

Victoria Landfill Expansion
Victoria County, Texas

ID	Latitude	Longitude	Ground Surface Elevation	Approximate Borehole Depth (feet below ground surface)	Date Installed
B-B	28° 41' 19.74"	-96° 54' 27.63"	63.3	40	3/23/1982
B-C	28° 41' 28.26"	-96° 54' 25.26"	63.4	40	3/22/1982
B-D	28° 41' 36.059"	-96° 54' 13.06"	63.4	40	3/22/1982
B-E	28° 41' 35.34"	-96° 54' 02.80"	62.4	40	3/24/1982
B-F	28° 41' 44.88"	-96° 54' 10.69"	64	40	3/24/1982
B-G	28° 41' 32.41"	-96° 54' 18.89"	63.5	40	4/29/1982
1 (TB-1)	28° 41' 25.47"	-96° 54' 42.24"	63.8	30.0	11/3/1980
2 (TB-2)	28° 41' 14.94"	-96° 54' 34.02"	63.8	30.0	11/3/1980
3 (TB-3)	28° 41' 23.93"	-96° 54' 31.64"	63.8	30.0	11/3/1980
4 (TB-4)	28° 41' 32.47"	-96° 54' 30.69"	63.8	30.0	11/3/1980
5 (TB-5)	28° 41' 22.28"	-96° 54' 22.17"	63.1	30.0	11/3/1980
6 (TB-6)	28° 41' 40.35"	-96° 54' 18.00"	64.3	30.0	11/4/1980
7 (TB-7)	28° 41' 30.16"	-96° 54' 09.73"	62.9	30.0	11/4/1980
8 (TB-8)	28° 41' 39.19"	-96° 54' 07.54"	63.4	30.0	11/4/1980
9 (TB-9)	28° 41' 48.32"	-96° 54' 05.89"	63.5	30.0	11/4/1980
10 (TB-10)	28° 41' 38.04"	-96° 53' 57.18"	62.3	30.0	11/4/1980
EB-01	28° 41' 39.1381"	-96° 53' 36.329"	62.0	67	1/29/2019
EB-02	28° 41' 31.614"	-96° 53' 36.1162"	61.9	88	1/22/2019
EB-03	28° 41' 34.4401"	-96° 53' 43.0195"	64.4	37	1/17/2019
EB-04	28° 41' 43.1566"	-96° 53' 45.3611"	62.3	87	1/23/2019
EB-05	28° 41' 35.7614"	-96° 53' 52.3708"	62.9	37	1/17/2019
EB-06	28° 41' 31.259"	-96° 53' 48.9621"	67.4	95	1/18/2019
EB-07	28° 41' 26.3754"	-96° 53' 45.0574"	62.6	37	1/17/2019
EB-08	28° 41' 21.4122"	-96° 53' 47.6303"	61.9	67	2/13/2019
EB-09	28° 41' 20.7425"	-96° 53' 53.7905"	56.2	37	1/24/2019
EB-10	28° 41' 31.6242"	-96° 53' 58.8814"	63.3	37	1/21/2019
EB-11	28° 41' 20.7499"	-96° 54' 6.5038"	63.1	67	2/12/2019
EB-12	28° 41' 15.5103"	-96° 54' 2.044"	62.6	37	1/28/2019
EB-13	28° 41' 9.9304"	-96° 54' 10.8795"	63.1	88	1/15/2019
EB-14	28° 41' 15.0295"	-96° 54' 14.4437"	63.4	37	1/16/2019
EB-15	28° 41' 19.1285"	-96° 54' 17.9203"	63.5	37	1/16/2019
EB-16	28° 41' 8.6766"	-96° 54' 24.5715"	64.0	87	1/14/2019
EB-17	28° 41' 1.783"	-96° 54' 19.9657"	62.1	87	2/15/2019
EB-18	28° 40' 58.9751"	-96° 54' 28.3264"	62.6	37	1/13/2019
EB-19	28° 41' 3.3587"	-96° 54' 32.9389"	63.3	90	2/14/2019
EB-20	28° 41' 8.4553"	-96° 54' 35.7488"	63.7	37	1/13/2019
EB-21	28° 41' 2.8287"	-96° 54' 45.4712"	63.9	88	1/12/2019
EB-22	28° 40' 58.7904"	-96° 54' 40.7504"	63.2	37	1/11/2019
EB-23	28° 40' 53.2813"	-96° 54' 37.163"	62.9	102	1/24/2019
EB-24	28° 40' 55.5914"	-96° 54' 46.6643"	63.2	67	2/14/2019

Notes:

* - Plugged and abandoned

** - Included in current Landfill monitoring network

Sealed surveys are presented in Attachment III-5, Appendix 5F. Locations not presented in Attachment III-5, Appendix 5F were derived from other sources such as boring logs and Computer-Aided Design (CAD) data. A thorough and exhaustive search for survey records was performed and for locations with no survey data found and that have been plugged and abandoned, surveys can no longer be obtained.

APPENDIX 5K - ADDITIONAL HISTORICAL INFORMATION

Path: Z:\Clients\ENS\CityVictoria\107608_LandfillPermit\Studies\Geospatial\DataFiles\ArcDocs\Figure3_BoringLocation.mxd ewemmerich 10/12/2018

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Service Layer Credits: Source: Esri, DigitalGlobe, GeoEye, Earthstar Geographics, CNES/Airbus DS, USDA, USGS, AeroGRID, IGN, and the GIS User Community

●	Proposed Boring (Completed at least 5' below elevation of deepest excavation [EDE])
●	Proposed Boring (Completed at least 30' below EDE)
⊕	Proposed Piezometer (Boring completed at least 30' below EDE)
●	Previous Boring (Approximate Location)
⊕	Existing Monitoring/Observation Well (Approximate Location)
🟥	Proposed Landfill Expansion Area
🟩	Current Landfill Boundary
- - -	Stream / Ditch

Note: See Table III.A5.5G-1T for locations and elevations of borings.

NORTH

1,000 500 0 1,000

Feet

BURNS McDONNELL

Figure III.A5.5K-1
Boring Locations
Victoria Landfill Expansion
Victoria County, Texas

Source: ESRI; FEMA; USDA NRCS; USFWS NWI; USGS NHD; Burns & McDonnell Engineering Company, Inc

Issued: 10/12/2018

Hydrex ENVIRONMENTAL, INC.

Monitor Well

Monitor Well No.:**MW-15A**

LEONELL N. SCARBOROUGH
GEOLOGY
#10048
6/10/10

PROJECT INFORMATION

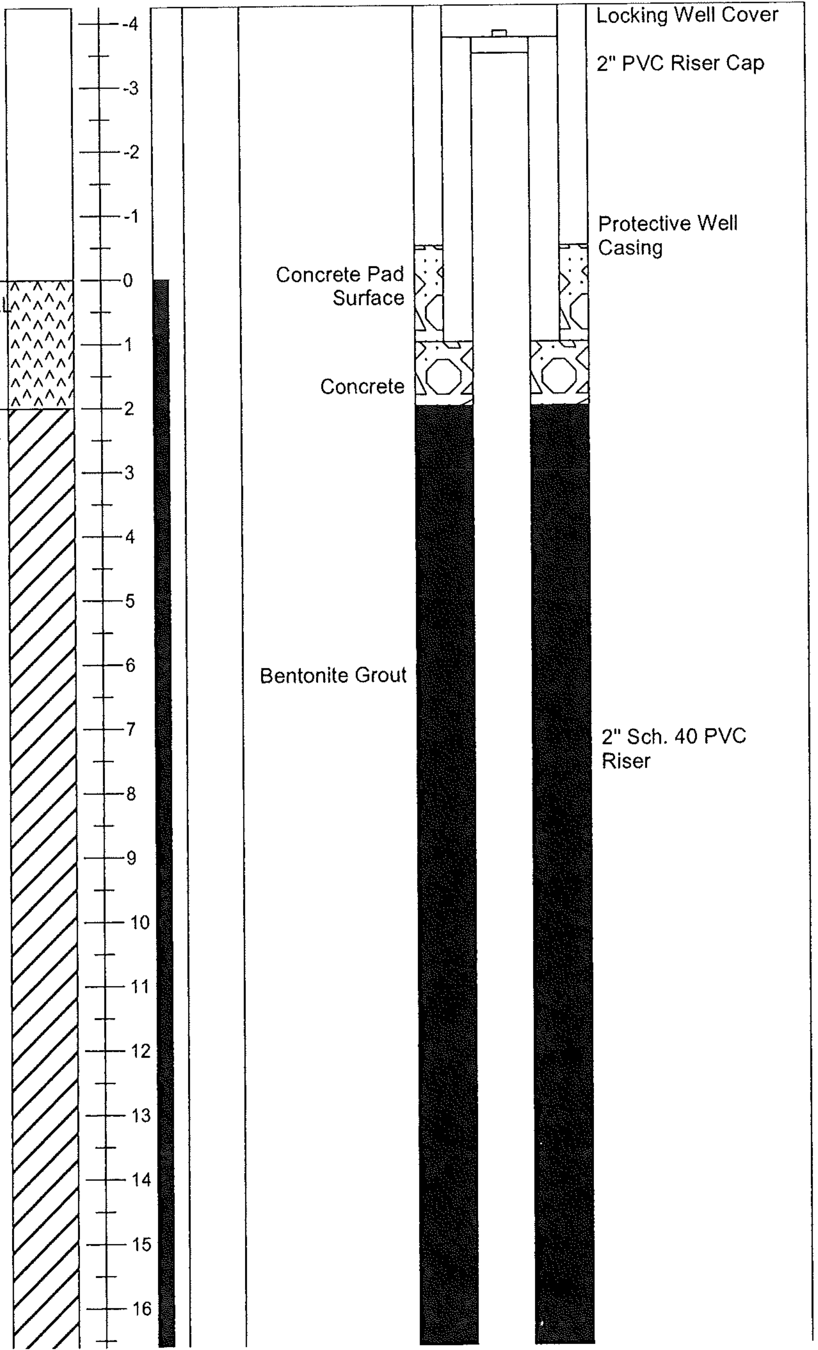
PROJECT:	**City of Victoria Landfill**
PROJECT NO.:	**L-04-622**
LOGGED BY:	**Mellisa Sanchez**
SUPERVISING PG:	**Leonell Scarborough**
INSTALLATION:	**04/27/10**
DEVELOPMENT:	**05/04/10**
SITE LOCATION:	**Victoria, Texas**
WELL OWNER:	**Republic Waste Services of Texas, Ltd.**

DRILLING INFORMATION

DRILLER:	**Best Drilling/Lawrence H. Tobola**
DRILLER'S LICENSE NO.:	**3026M**
RIG TYPE:	**Mobil Drill CME-75**
METHOD OF DRILLING:	**Hollow Stem Auger**
SAMPLING METHODS:	**Split Core Barrel**
SURFACE ELEVATION:	**64.4'**
HOLE DIAMETER:	**8.25"**
NORTHING: **318939.52**	EASTING: **2673776.01**

▽ Water level during drilling ▼ Water level in completed well ▮ Split Core ☐ No Recovery ▦ Auger

DESCRIPTION	USCS	SOIL SYMBOLS	DEPTH	SAMPLE	WATER LEVEL	WELL CONSTRUCTION
FILL: Tan and red-brown; native fill material 0.0' to 2.0'; iron concretions; dry	FILL		0			
CLAY: Black; medium stiff to stiff clay; calcareous concretions, increasing with depth; dry	CH		2			
- slight red-brown and light gray mottling; hard clay; increase in calcareous concretions						
- light gray, tan, and red-brown with increase in mottling with depth; increase in calcareous concretions						
- decrease in light gray clay and increase in red-brown clay, with depth; decrease in amount of calareous concretions with depth						



NOTES: Not to be used separately from original report. USCS descriptors based on field classification not laboratory verified. Page 1 of 3

Monitor Well

Monitor Well No.:**MW-15A**

LEONELL N. SCARBOROUGH
#10048

PROJECT INFORMATION

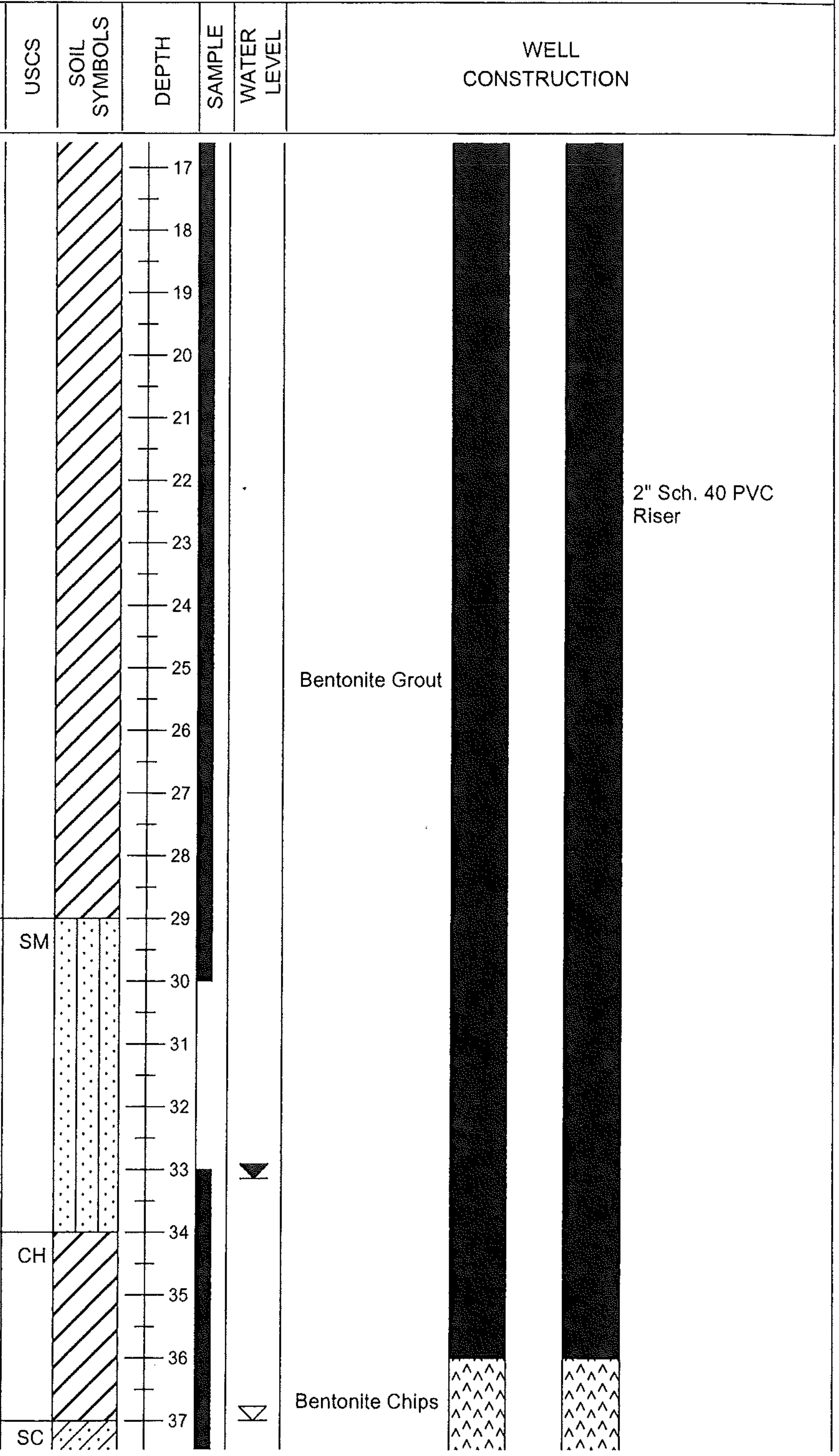
PROJECT:	**City of Victoria Landfill**
PROJECT NO.:	**L-04-622**
LOGGED BY:	**Mellisa Sanchez**
SUPERVISING PG:	**Leonell Scarborough**
INSTALLATION:	**04/27/10**
DEVELOPMENT:	**05/04/10**
SITE LOCATION:	**Victoria, Texas**
WELL OWNER:	**Republic Waste Services of Texas, Ltd.**

DRILLING INFORMATION

DRILLER:	**Best Drilling/Lawrence H. Tobola**
DRILLER'S LICENSE NO.:	**3026M**
RIG TYPE:	**Mobil Drill CME-75**
METHOD OF DRILLING:	**Hollow Stem Auger**
SAMPLING METHODS:	**Split Core Barrel**
SURFACE ELEVATION:	**64.4'**
HOLE DIAMETER:	**8.25"**
NORTHING: **318939.52**	EASTING: **2673776.01**

▽ Water level during drilling ▼ Water level in completed well ▮ Split Core ▯ No Recovery ▨ Auger

DESCRIPTION	USCS
- decrease in red-brown mottling with depth; increase in calcareous concreations with depth; iron staining and gravel - increase in sand content with depth; calcareous concretions and iron staining	
SAND: Tan and red-brown; loose; very fine-grained quartz sand; sub-rounded to sub-angular; dry - no recovery from 30.0' to 33.0'	SM
CLAY: Gray and red-brown, mottling; hard clay, no sand present; dry	CH
CLAYEY SAND: Tan; coarse-grained to medium-grained	SC



NOTES: Not to be used separately from original report. USCS descriptors based on field classification not laboratory verified. Page 2 of 3

Hydrex
ENVIRONMENTAL, INC.

Monitor Well

Monitor Well No.: **MW-15A**

LEONELL N. SCARBOROUGH
GEOLOGY
#10048
5/10/10

PROJECT INFORMATION

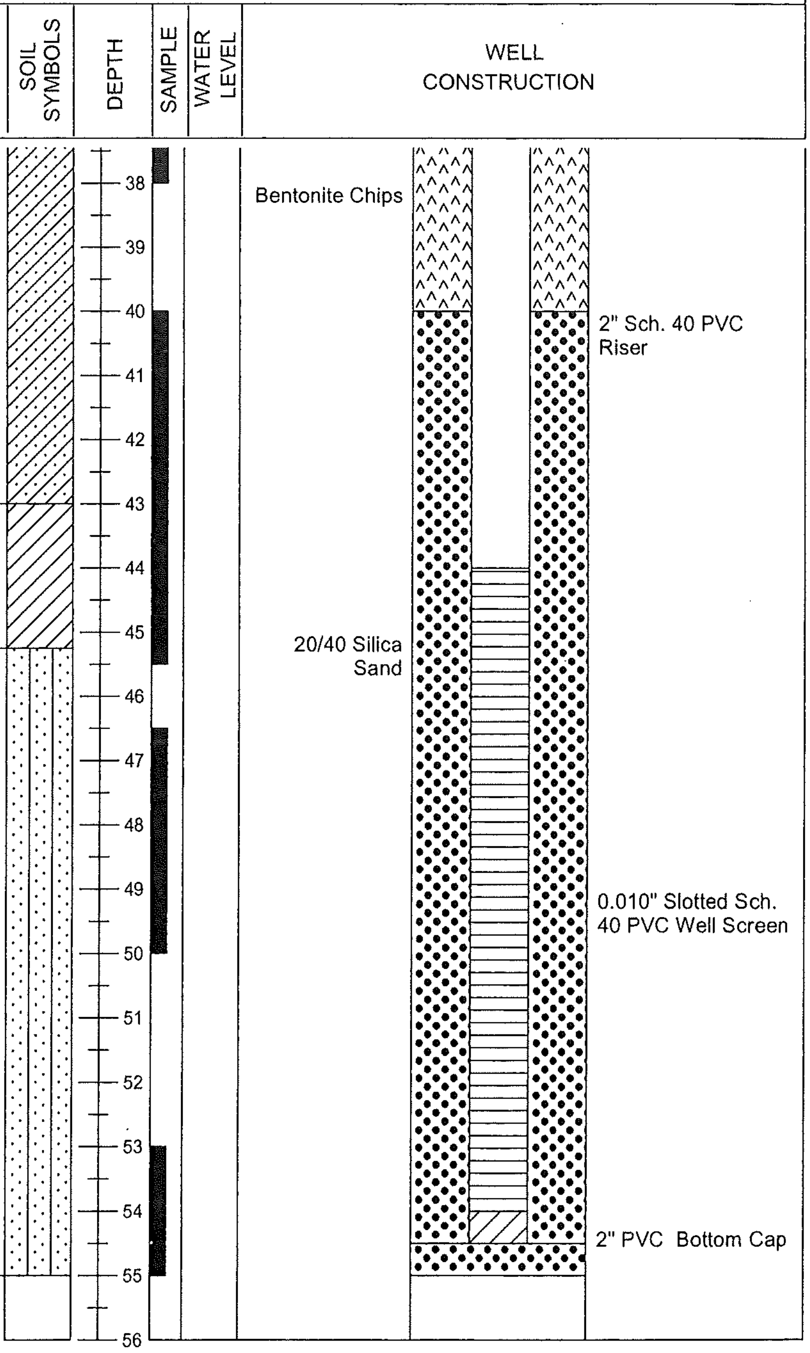
PROJECT:	**City of Victoria Landfill**
PROJECT NO.:	**L-04-622**
LOGGED BY:	**Mellisa Sanchez**
SUPERVISING PG:	**Leonell Scarborough**
INSTALLATION:	**04/27/10**
DEVELOPMENT:	**05/04/10**
SITE LOCATION:	**Victoria, Texas**
WELL OWNER:	**Republic Waste Services of Texas, Ltd.**

DRILLING INFORMATION

DRILLER:	**Best Drilling/Lawrence H. Tobola**
DRILLER'S LICENSE NO.:	**3026M**
RIG TYPE:	**Mobil Drill CME-75**
METHOD OF DRILLING:	**Hollow Stem Auger**
SAMPLING METHODS:	**Split Core Barrel**
SURFACE ELEVATION:	**64.4'**
HOLE DIAMETER:	**8.25"**
NORTHING: **318939.52**	EASTING: **2673776.01**

▽ Water level during drilling ▼ Water level in completed well ▮ Split Core ▯ No Recovery ▦ Auger

DESCRIPTION	USCS
quartz sand with minor amount of clay; wet @ 37.0' - no recovery from 38.0' to 40.0'	
SILTY CLAY: Orange and gray; silty clay; medium stiff - no recovery from 45.5' to 46.5'	CL
SAND: Tan and light brown; loose; very fine-grained quartz sand with increase in grain size with depth; sub-rounded to rounded - medium to coarse-grained sand with fine gravel and pebble-sized gravel - no recovery from 50.0' to 53.0'	SM
Bottom of Boring @ 55.0'	



NOTES: Not to be used separately from original report. USCS descriptors based on field classification not laboratory verified. Page 3 of 3

Monitor Well

Monitor Well No. **MW-15AR**

LEONELL N. SCARBOROUGH
GEOLOGY
#10048
5/30/22

PROJECT INFORMATION

PROJECT:	City of Victoria Landfill
PROJECT NO.:	L-05-617
LOGGED BY:	Uziel Rendon
SUPERVISING PG:	L. N. Scarborough
COMPLETION:	8/26/2021
SITE LOCATION:	18545 FM 1686 Victoria, TX 77903
WELL OWNER:	City of Victoria Landfill

DRILLING INFORMATION

DRILLER:	Lawrence Tobola
DRILLER'S LICENSE NO.:	3026
RIG TYPE:	CME75
METHOD OF DRILLING:	HSA
SAMPLING METHODS:	SS
TOP OF CASING ELEV.	67.57
HOLE DIAMETER:	8.25"
LATITUDE:	28.693891
LONGITUDE:	-96.8983

▼ Water level after completion ▽ Water level while drilling

TBPG Firm No. 50027

DESCRIPTION	USCS	SOIL SYMBOLS	DEPTH	WATER LEVEL	WELL CONSTRUCTION

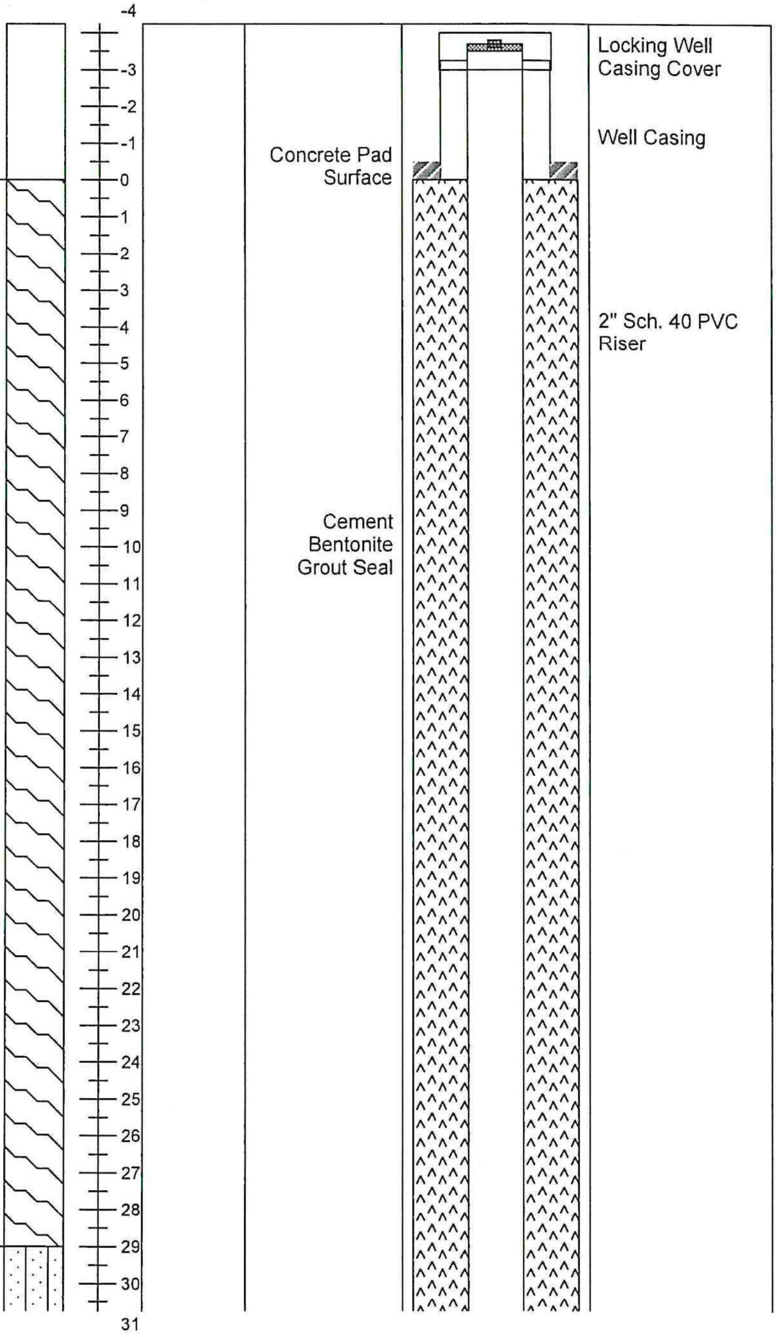
CLAY: Reddish-brown with light gray mottling, hard, some calcareous concretions, and dry — CH

@ 17' decerase in reddish-brown mottling, some gravel

@ 20' increase in calcareous nodules

@ 26' some minor amounts of sand

SILTY SAND: Light-brown, fine grained, rounded, dry — SM



NOTES: LOG SHOULD NOT BE USED SEPARATELY FROM ORIGINAL REPORT. USCS DESCRIPTIONS ARE FIELD IDENTIFICATIONS
SURVEY FROM MARTIN OLSON SURVEY INC.

Hydrex ENVIRONMENTAL

Monitor Well

Monitor Well No. **MW-15AR**

LEONELL N. SCARBOROUGH
GEOLOGY
#10048
9/2/21

PROJECT INFORMATION

PROJECT: **City of Victoria Landfill**
PROJECT NO.: **L-05-617**
LOGGED BY: **Uziel Rendon**
SUPERVISING PG: **L. N. Scarborough**
COMPLETION: **8/26/2021**
SITE LOCATION: **18545 FM 1686 Victoria, TX 77903**
WELL OWNER: **City of Victoria Landfill**

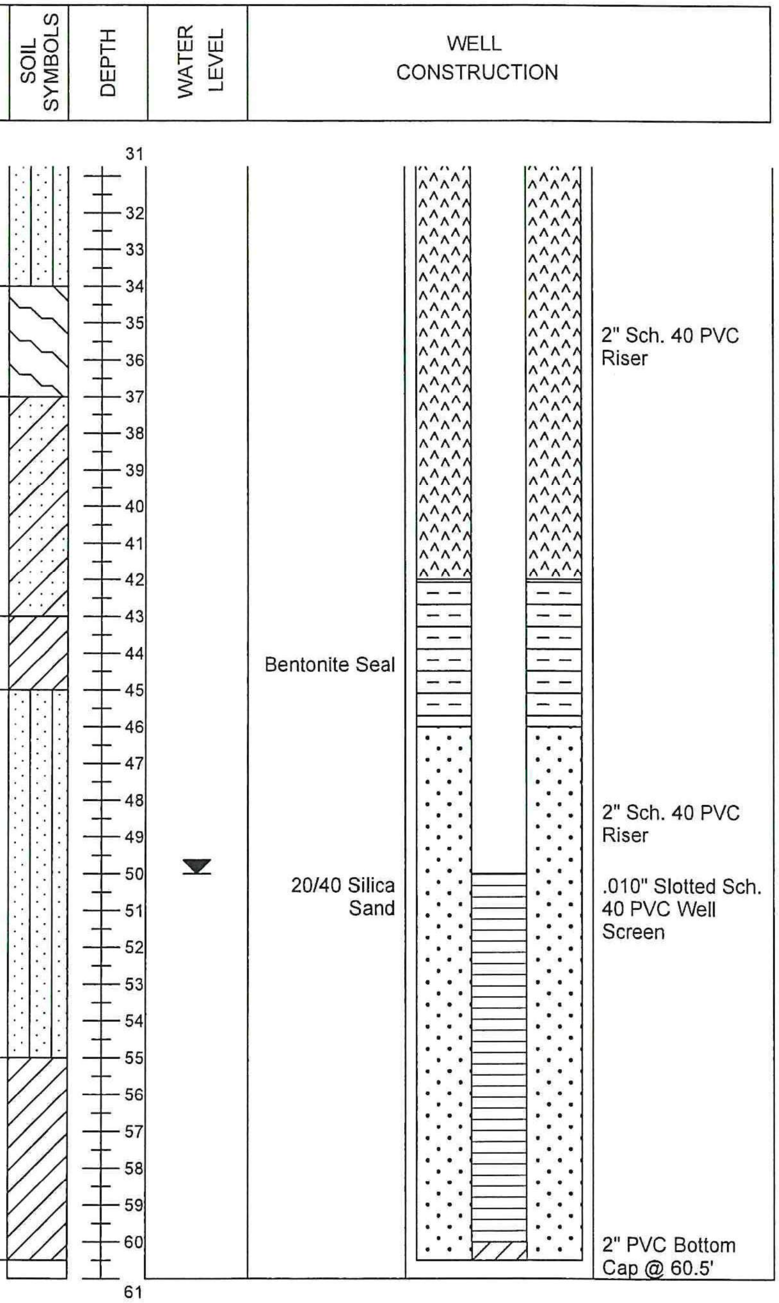
DRILLING INFORMATION

DRILLER: **Lawrence Tobola**
DRILLER'S LICENSE NO.: **3026**
RIG TYPE: **CME75**
METHOD OF DRILLING: **HSA**
SAMPLING METHODS: **SS**
TOP OF CASING ELEV. **67.57**
HOLE DIAMETER: **8.25"**
LATITUDE: **28.693891** LONGITUDE: **-96.8983**

▼ Water level after completion ▽ Water level while drilling

TBPG Firm No. 50027

DESCRIPTION	USCS
CLAY: Light-tan, hard, calcareous nodules and manganses staining, dry	CH
CLAYEY SAND: Reddish-tan, medium grained sand, rounded, dry	SC
SANDY CLAY: Reddish-tan, medium to course grained sand, rounded, fine gravel, dry	CL
SILTY SAND: Dark-tan, medium to course grained sand and pebble-sized gravel, wet	SM
CLAY: Brown, hard, dry	CL



NOTES: LOG SHOULD NOT BE USED SEPARATELY FROM ORIGINAL REPORT. USCS DESCRIPTIONS ARE FIELD IDENTIFICATIONS
SURVEY FROM MARTIN OLSON SURVEY INC.

HYDREX ENVIRONMENTAL, INC.

Monitor Well

Monitor Well No.:**MW-21**

6/10/10

LEONELL N. SCARBOROUGH
GEOLOGY
#10048

PROJECT INFORMATION

PROJECT:	**City of Victoria Landfill**
PROJECT NO.:	**L-04-622**
LOGGED BY:	**Mellisa Sanchez**
SUPERVISING PG:	**Leonell Scarborough**
INSTALLATION:	**04/28/10**
DEVELOPMENT:	**05/03/10**
SITE LOCATION:	**Victoria, Texas**
WELL OWNER:	**Republic Waste Services of Texas, Ltd.**

DRILLING INFORMATION

DRILLER:	**Best Drilling/Lawrence H. Tobola**
DRILLER'S LICENSE NO.:	**3026M**
RIG TYPE:	**Mobil Drill CME-75**
METHOD OF DRILLING:	**Hollow Stem Auger**
SAMPLING METHODS:	**Split Core Barrel**
SURFACE ELEVATION:	**64.3'**
HOLE DIAMETER:	**8.25"**
NORTHING: **317053.39**	EASTING: **2671295.44**

▽ Water level during drilling ▼ Water level in completed well ▮ Split Core ▯ No Recovery ▨ Auger

DESCRIPTION	USCS	SOIL SYMBOLS	DEPTH	SAMPLE	WATER LEVEL	WELL CONSTRUCTION

CLAY: Black and dark brown; calcareous concretions and organic matter, roots and grass; dry

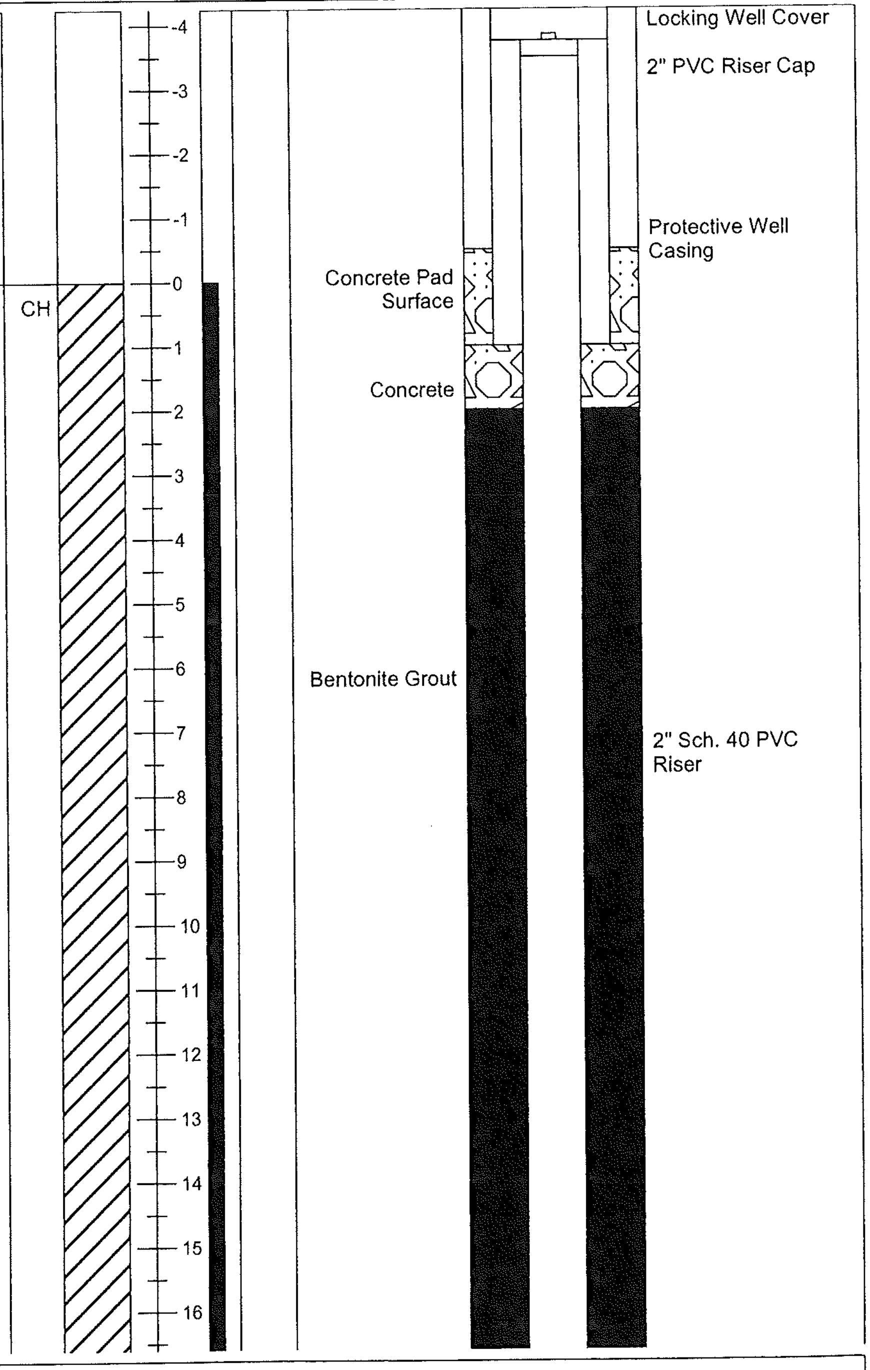
- increase in calcareous concretions and gravel

- slight red-brown and dark gray mottling; hard clay; iron oxide concretions and calcareous concretions, gravel-sized

- light gray, tan, and red brown with increase in mottling with depth; increase in calcareous material

- decrease in light gray clay and increase in red-brown clay, with depth; decrease in amount of calareous concretions with depth

- decrease in red-brown mottling with depth; increase in calcareous concretions with depth; iron staining and gravel



NOTES: Not to be used separately from original report. USCS descriptors based on field classification not laboratory verified. Page 1 of 3

Hydrex
ENVIRONMENTAL, INC.

Monitor Well

Monitor Well No.:**MW-21**

LEONELL N. SCARBOROUGH
GEOLOGY
#10048

PROJECT INFORMATION

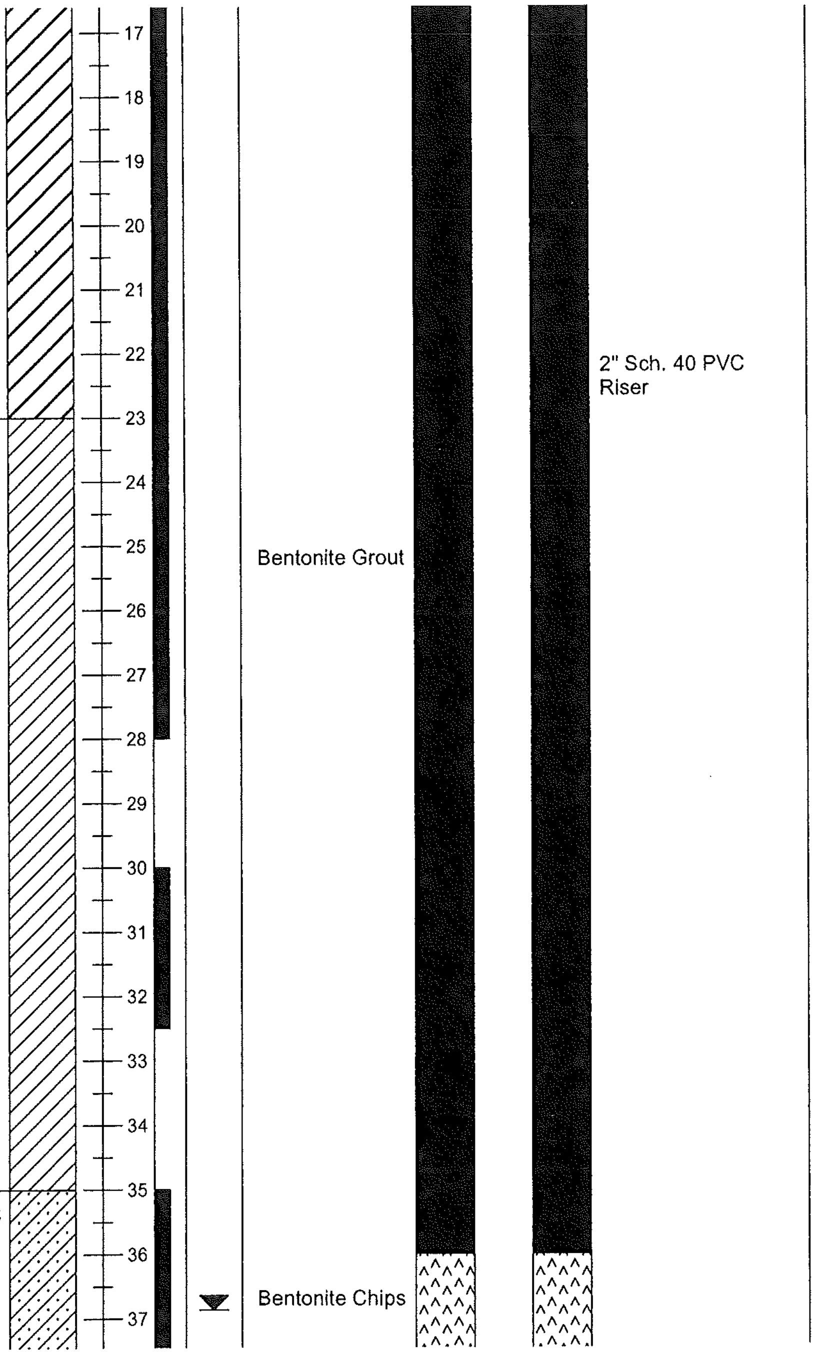
PROJECT:	**City of Victoria Landfill**
PROJECT NO.:	**L-04-622**
LOGGED BY:	**Mellisa Sanchez**
SUPERVISING PG:	**Leonell Scarborough**
INSTALLATION:	**04/28/10**
DEVELOPMENT:	**05/03/10**
SITE LOCATION:	**Victoria, Texas**
WELL OWNER:	**Republic Waste Services of Texas, Ltd.**

DRILLING INFORMATION

DRILLER:	**Best Drilling/Lawrence H. Tobola**
DRILLER'S LICENSE NO.:	**3026M**
RIG TYPE:	**Mobil Drill CME-75**
METHOD OF DRILLING:	**Hollow Stem Auger**
SAMPLING METHODS:	**Split Core Barrel**
SURFACE ELEVATION:	**64.3'**
HOLE DIAMETER:	**8.25"**
NORTHING:	**317053.39**
EASTING:	**2671295.44**

▽ Water level during drilling ▼ Water level in completed well ▮ Split Core ▯ No Recovery ▨ Auger

DESCRIPTION	USCS	SOIL SYMBOLS	DEPTH	SAMPLE	WATER LEVEL	WELL CONSTRUCTION
- increase in silt content with depth; blocky clay; calcareous concretions and iron staining						
SILTY CLAY: Light gray; medium stiff to stiff clay; increases in silt content with depth; sandy zone @ 24.0' to 24.5'; calcareous concretions; dry	CL					
- calcareous concretions increase with depth						
- no recovery from 28.0' to 30.0'						
- very silty clay; calcareous concretions; iron oxide staining						
- no recovery from 32.5' to 35.0'						
CLAYEY SAND: Tan and light gray; loose; very fine-grained quartz sand and gravel; sub-rounded to sub-angular; calcareous concretions; dry	SC					



NOTES: Not to be used separately from original report. USCS descriptors based on field classification not laboratory verified.

Page 2 of 3

Hydrex
ENVIRONMENTAL, INC.

Monitor Well

Monitor Well No.:**MW-21**

LEONELL N. SCARBOROUGH
GEOLOGY
#10048

PROJECT INFORMATION

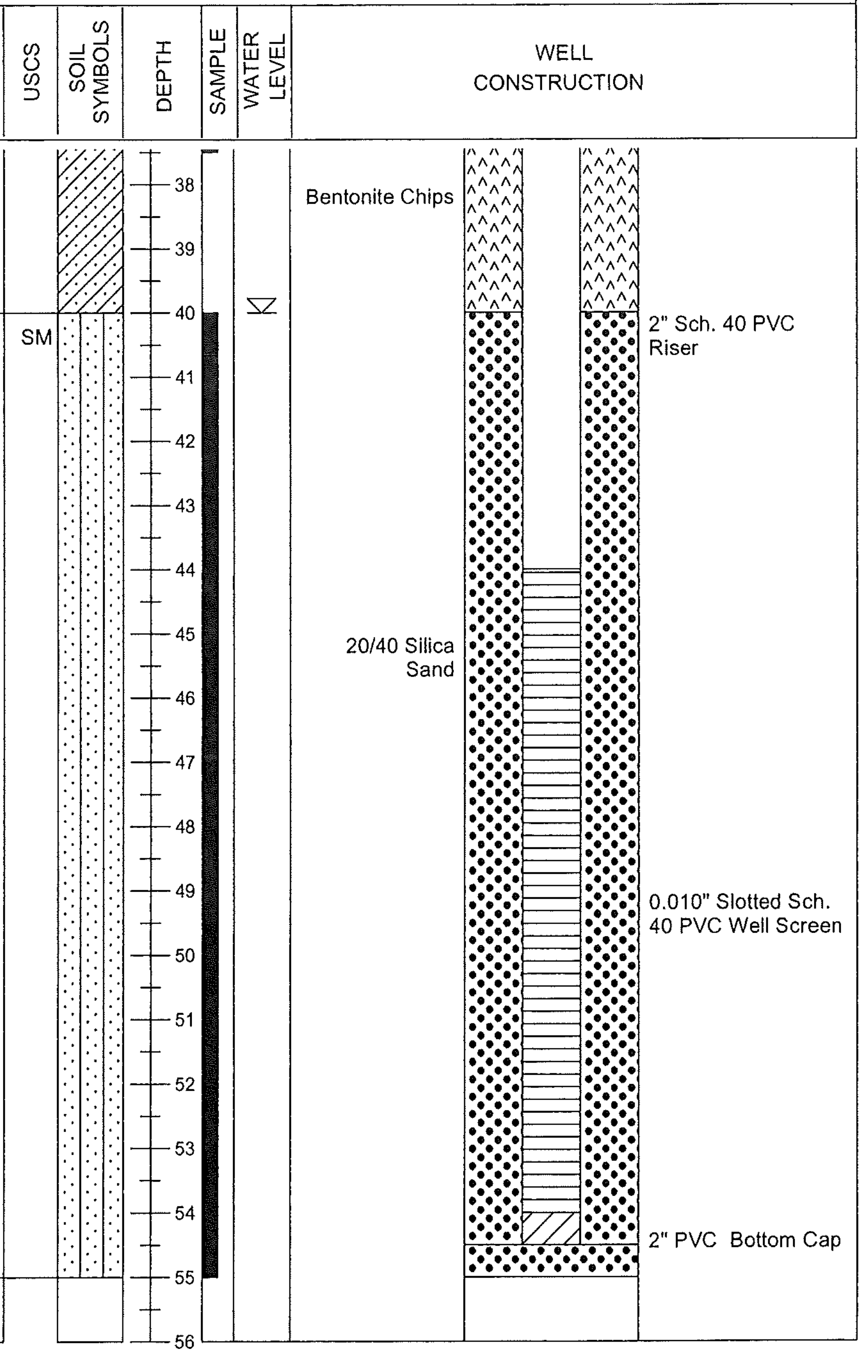
PROJECT:	**City of Victoria Landfill**
PROJECT NO.:	**L-04-622**
LOGGED BY:	**Mellisa Sanchez**
SUPERVISING PG:	**Leonell Scarborough**
INSTALLATION:	**04/28/10**
DEVELOPMENT:	**05/03/10**
SITE LOCATION:	**Victoria, Texas**
WELL OWNER:	**Republic Waste Services of Texas, Ltd.**

DRILLING INFORMATION

DRILLER:	**Best Drilling/Lawrence H. Tobola**
DRILLER'S LICENSE NO.:	**3026M**
RIG TYPE:	**Mobil Drill CME-75**
METHOD OF DRILLING:	**Hollow Stem Auger**
SAMPLING METHODS:	**Split Core Barrel**
SURFACE ELEVATION:	**64.3'**
HOLE DIAMETER:	**8.25"**
NORTHING:	**317053.39**
EASTING:	**2671295.44**

▽ Water level during drilling ▼ Water level in completed well ▮ Split Core ▯ No Recovery ▦ Auger

DESCRIPTION	USCS
- no recovery from 37.5' to 40.0'	
SAND: Tan; loose; very fine-grained quartz sand; sub-rounded and sub-angular; wet @ 40.0'	SM
- 6" clay seam @ 43.5' to 44.0'	
- fine to medium-grained sand with fine gravel and pebble-sized gravel	
- 2" laminated clay seam @ 49.0'	
- fine to coarse-grained sand and gravel	
Bottom of Boring @ 55.0'	



NOTES: Not to be used separately from original report. USCS descriptors based on field classification not laboratory verified.

Hydrex
ENVIRONMENTAL, INC.

Monitor Well

Monitor Well No.:**MW-22**

PROJECT INFORMATION

PROJECT: **City of Victoria Landfill**
PROJECT NO.: **L-04-622**
LOGGED BY: **Mellisa Sanchez**
SUPERVISING PG: **Leonell Scarborough**
INSTALLATION: **04/29/10**
DEVELOPMENT: **05/04/10**
SITE LOCATION: **Victoria, Texas**
WELL OWNER: **Republic Waste Services of Texas, Ltd.**

DRILLING INFORMATION

DRILLER: **Best Drilling/Lawrence H. Tobola**
DRILLER'S LICENSE NO.: **3026M**
RIG TYPE: **Mobil Drill CME-75**
METHOD OF DRILLING: **Hollow Stem Auger**
SAMPLING METHODS: **Split Core Barrel**
SURFACE ELEVATION: **65.7'**
HOLE DIAMETER: **8.25"**
NORTHING: **316349.56** EASTING: **2670359.03**

LEONELL N. SCARBOROUGH
GEOLOGY
#10048
6/10/10

▽ Water level during drilling ▼ Water level in completed well ▮ Split Core ▯ No Recovery ▨ Auger

DESCRIPTION	USCS	SOIL SYMBOLS	DEPTH	SAMPLE	WATER LEVEL	WELL CONSTRUCTION

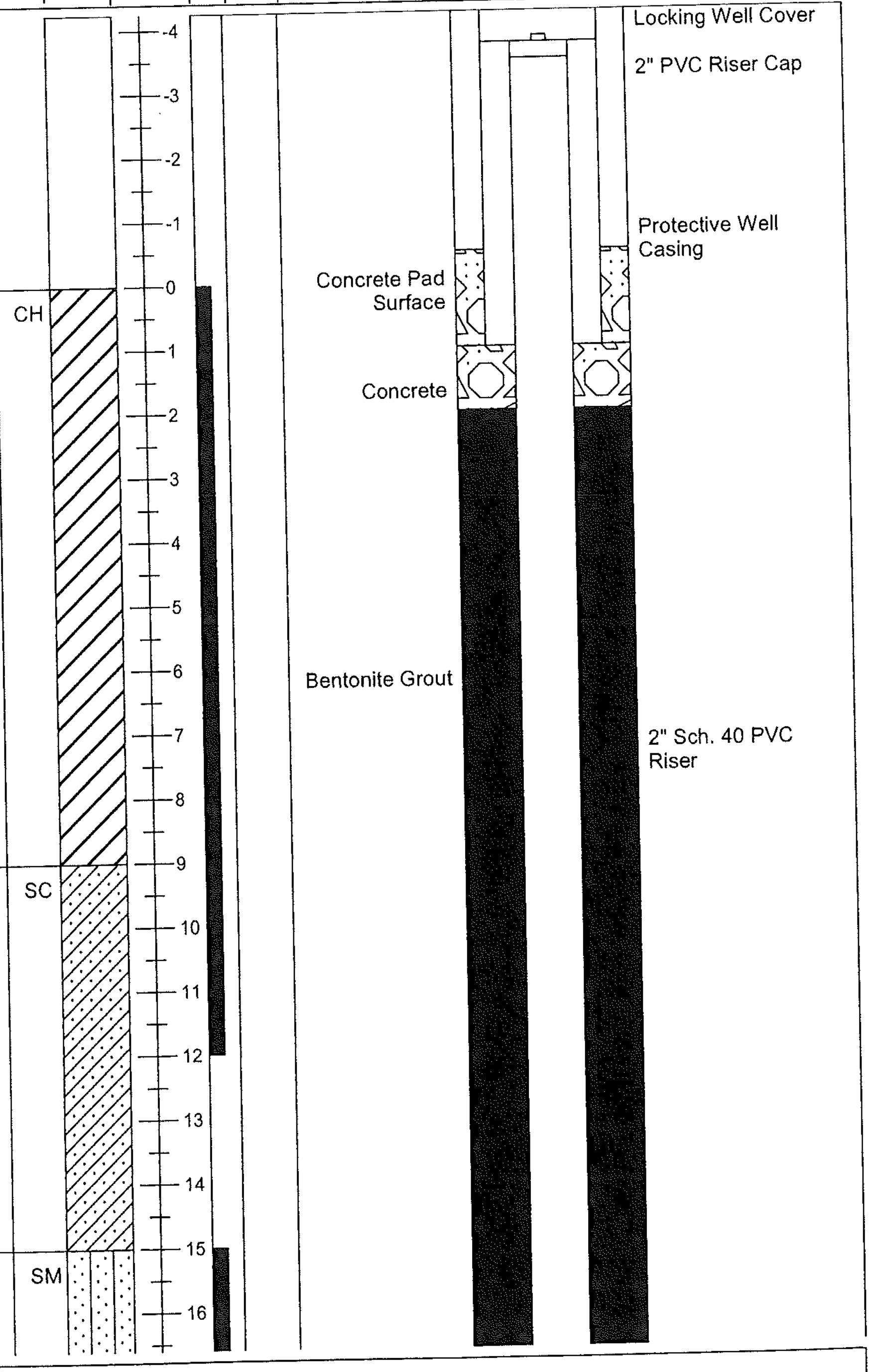
CLAY: Black; calcareous concretions and organic matter, roots and grass; soft to medium stiff; dry

- dark gray clay, hard; increase in silt content with depth

CLAYEY SAND: Tan; loose; very fine-grained quartz sand and gravel with clay; sandy clay layer at 9.0' and laminated clayey sand layers at 11.5'; sub-rounded to sub-angular sand grains; large calcareous nodules; dry

- no recovery from 12.0' to 15.0'

SAND: Tan with thin light red-brown layers; loose; very fine-grained quartz sand; sub-rounded and rounded; dry



NOTES: Not to be used separately from original report. USCS descriptors based on field classification not laboratory verified.

Hydrex
ENVIRONMENTAL, INC.

Monitor Well

Monitor Well No.:**MW-22**

LEONELL N. SCARBOROUGH
GEOLOGY
#10048
STATE OF TEXAS
PROFESSIONAL GEOSCIENTIST
LICENSED

6/7/10

PROJECT INFORMATION

PROJECT:	**City of Victoria Landfill**
PROJECT NO.:	**L-04-622**
LOGGED BY:	**Mellisa Sanchez**
SUPERVISING PG:	**Leonell Scarborough**
INSTALLATION:	**04/29/10**
DEVELOPMENT:	**05/04/10**
SITE LOCATION:	**Victoria, Texas**
WELL OWNER:	**Republic Waste Services of Texas, Ltd.**

DRILLING INFORMATION

DRILLER:	**Best Drilling/Lawrence H. Tobola**
DRILLER'S LICENSE NO.:	**3026M**
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METHOD OF DRILLING:	**Hollow Stem Auger**
SAMPLING METHODS:	**Split Core Barrel**
SURFACE ELEVATION:	**65.7'**
HOLE DIAMETER:	**8.25"**
NORTHING:	**316349.56**
EASTING:	**2670359.03**

▽ Water level during drilling ▼ Water level in completed well ▮ Split Core ☐ No Recovery ▨ Auger

DESCRIPTION	USCS	SOIL SYMBOLS	DEPTH	SAMPLE	WATER LEVEL	WELL CONSTRUCTION

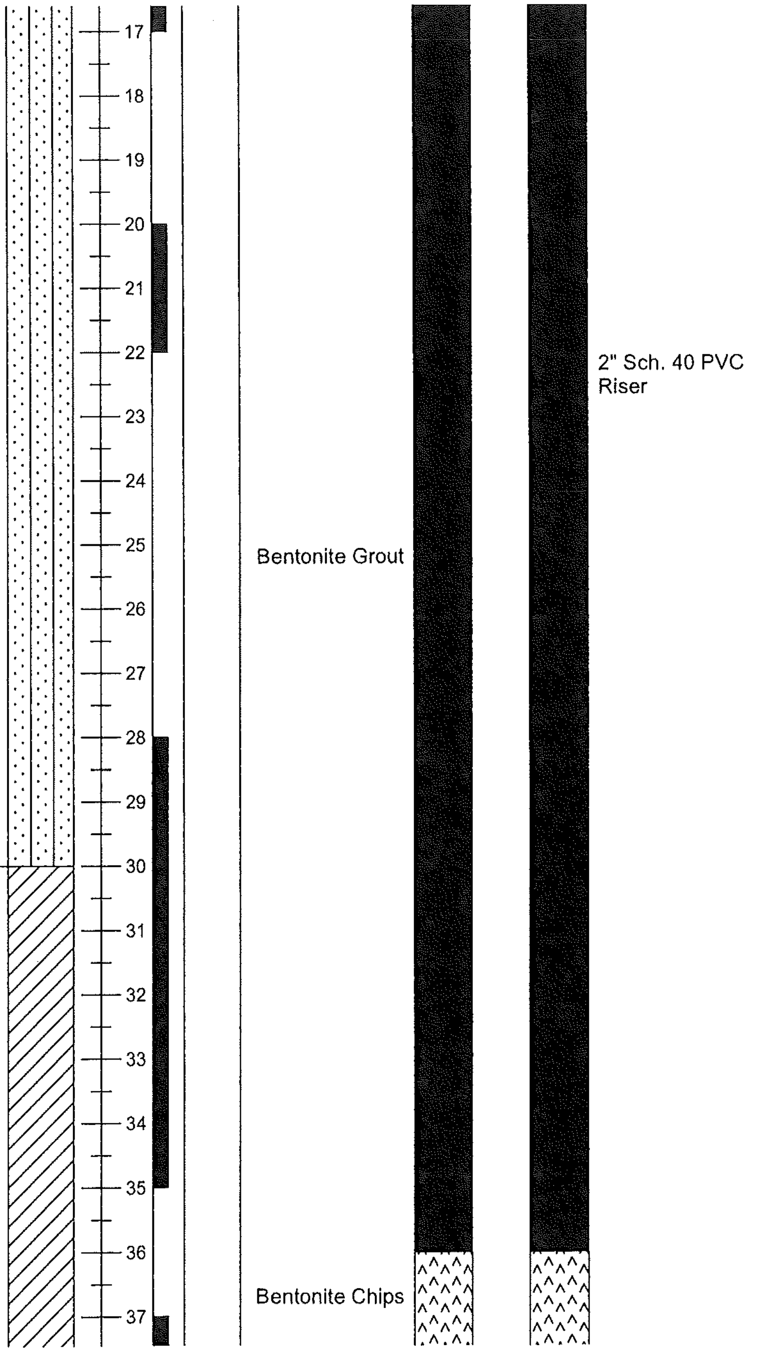
- no recovery from 17.0' to 20.0

- no recovery from 22.0' to 28.0'

- 2" clay layer @ 29.0'

SANDY CLAY: Red-brown and gray; medium stiff to stiff clay; decrease in sand content and an increase in silt with depth; calcareous concretions; dry — CL

- no recovery from 35.0' to 37.0'



NOTES: Not to be used separately from original report. USCS descriptors based on field classification not laboratory verified.

Hydrex ENVIRONMENTAL, INC.

Monitor Well

Monitor Well No.:**MW-22**

LEONELL N. SCARBOROUGH GEOLOGY #10048

PROJECT INFORMATION

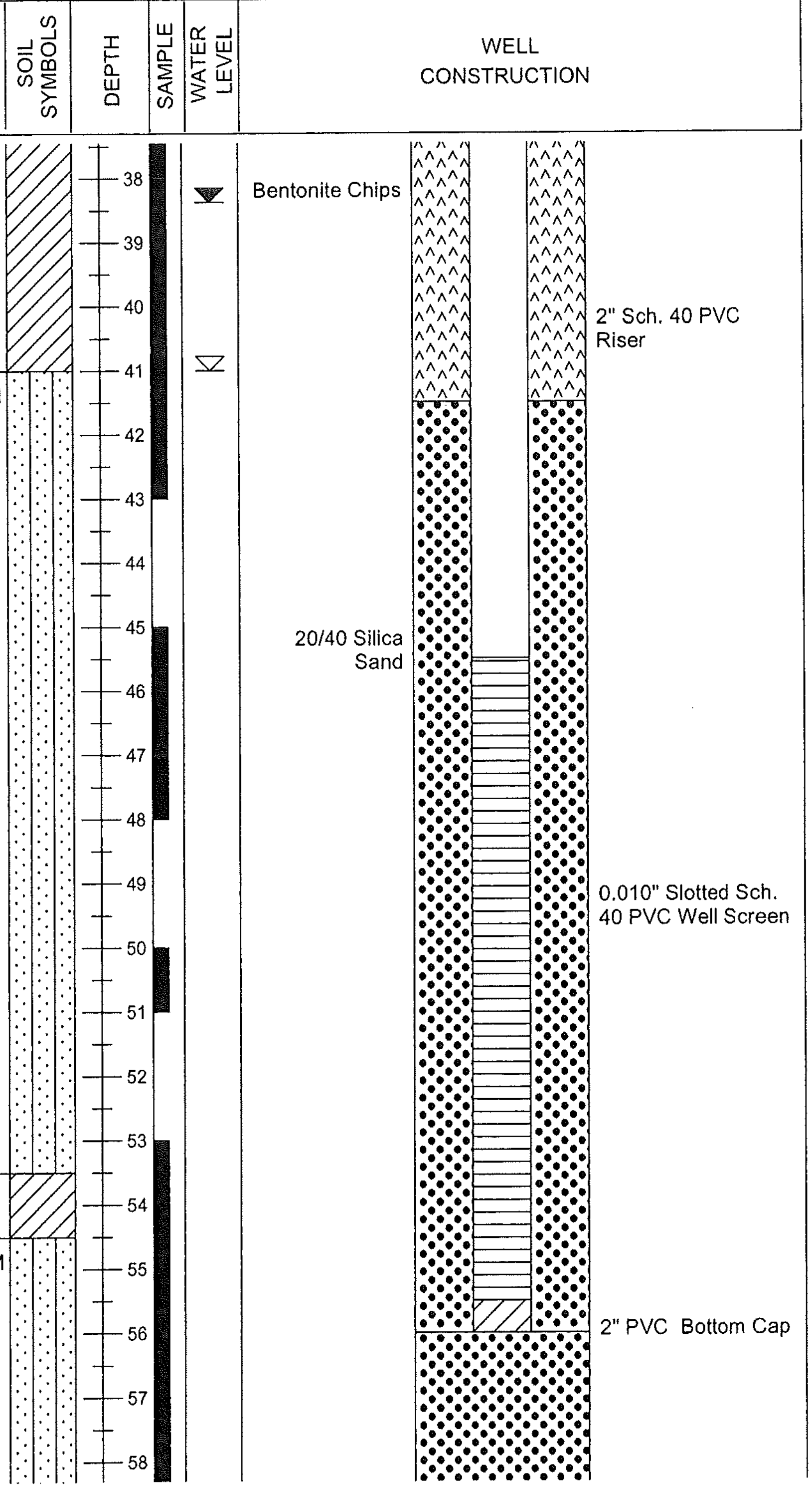
PROJECT:	**City of Victoria Landfill**
PROJECT NO.:	**L-04-622**
LOGGED BY:	**Mellisa Sanchez**
SUPERVISING PG:	**Leonell Scarborough**
INSTALLATION:	**04/29/10**
DEVELOPMENT:	**05/04/10**
SITE LOCATION:	**Victoria, Texas**
WELL OWNER:	**Republic Waste Services of Texas, Ltd.**

DRILLING INFORMATION

DRILLER:	**Best Drilling/Lawrence H. Tobola**
DRILLER'S LICENSE NO.:	**3026M**
RIG TYPE:	**Mobil Drill CME-75**
METHOD OF DRILLING:	**Hollow Stem Auger**
SAMPLING METHODS:	**Split Core Barrel**
SURFACE ELEVATION:	**65.7'**
HOLE DIAMETER:	**8.25"**
NORTHING:	**316349.56**
EASTING:	**2670359.03**

▽ Water level during drilling ▼ Water level in completed well ▮ Split Core ▯ No Recovery ▦ Auger

DESCRIPTION	USCS
- alternating clay and silt layers from 38.0' to 40.0'	
SAND: Tan with light red-brown layering; loose; fine-grained quartz sand; sub-rounded and rounded; wet @ 41.0' - no recovery from 43.0' to 45.0' - coarse-grained sand, grain size increasing with depth - 2" laminated clay seam @ 47.0' - no recovery from 48.0' to 50.0' - very coarse-grained sand and gravel, pebble size; large chert pebbles and gravel	SM
SILTY CLAY: Light gray and red-brown, mottling; medium stiff to stiff clay; calcareous concretions	CL
SAND: Tan; loose, fine-grained and coarse-grained quartz sand; sub-rounded and sub-angular; calcareous gravel	SM



NOTES: Not to be used separately from original report. USCS descriptors based on field classification not laboratory verified.

Hydrex
ENVIRONMENTAL, INC.

Monitor Well

Monitor Well No.:**MW-22**

LEONELL N. SCARBOROUGH
GEOLOGY
#10048
5/10/10

PROJECT INFORMATION

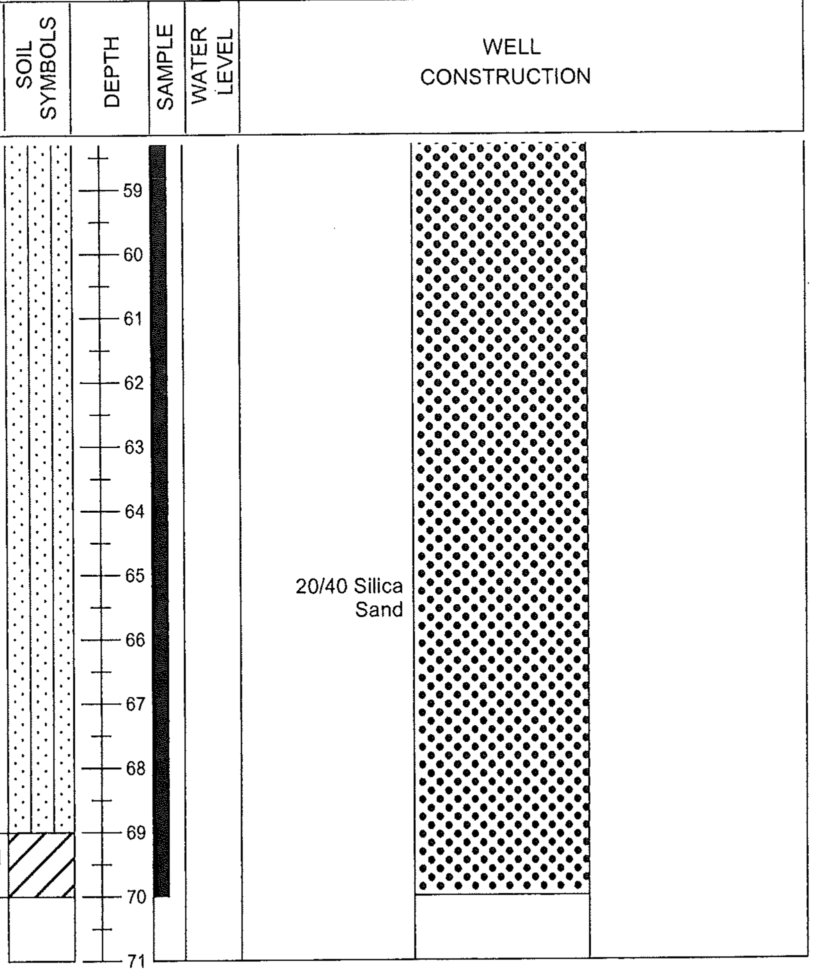
PROJECT:	City of Victoria Landfill
PROJECT NO.:	L-04-622
LOGGED BY:	Mellisa Sanchez
SUPERVISING PG:	Leonell Scarborough
INSTALLATION:	04/29/10
DEVELOPMENT:	05/04/10
SITE LOCATION:	Victoria, Texas
WELL OWNER:	Republic Waste Services of Texas, Ltd.

DRILLING INFORMATION

DRILLER:	Best Drilling/Lawrence H. Tobola
DRILLER'S LICENSE NO.:	3026M
RIG TYPE:	Mobil Drill CME-75
METHOD OF DRILLING:	Hollow Stem Auger
SAMPLING METHODS:	Split Core Barrel
SURFACE ELEVATION:	65.7'
HOLE DIAMETER:	8.25"
NORTHING:	316349.56
EASTING:	2670359.03

▽ Water level during drilling ▼ Water level in completed well ▮ Split Core ☐ No Recovery ▨ Auger

DESCRIPTION	USCS
- coarse-grained sand and calcareous gravel	
CLAY: Gray; stiff clay; calcareous concreations	CH
Bottom of Boring @ 70.0'	



NOTES: Not to be used separately from original report. USCS descriptors based on field classification not laboratory verified. Page 4 of 4

Hydrex
ENVIRONMENTAL, INC.

Monitor Well

Monitor Well No.:**MW-23**

STATE OF TEXAS
LEONELL N. SCARBOROUGH
GEOLOGY
#10048
LICENSED
PROFESSIONAL GEOSCIENTIST
6/10/10

PROJECT INFORMATION

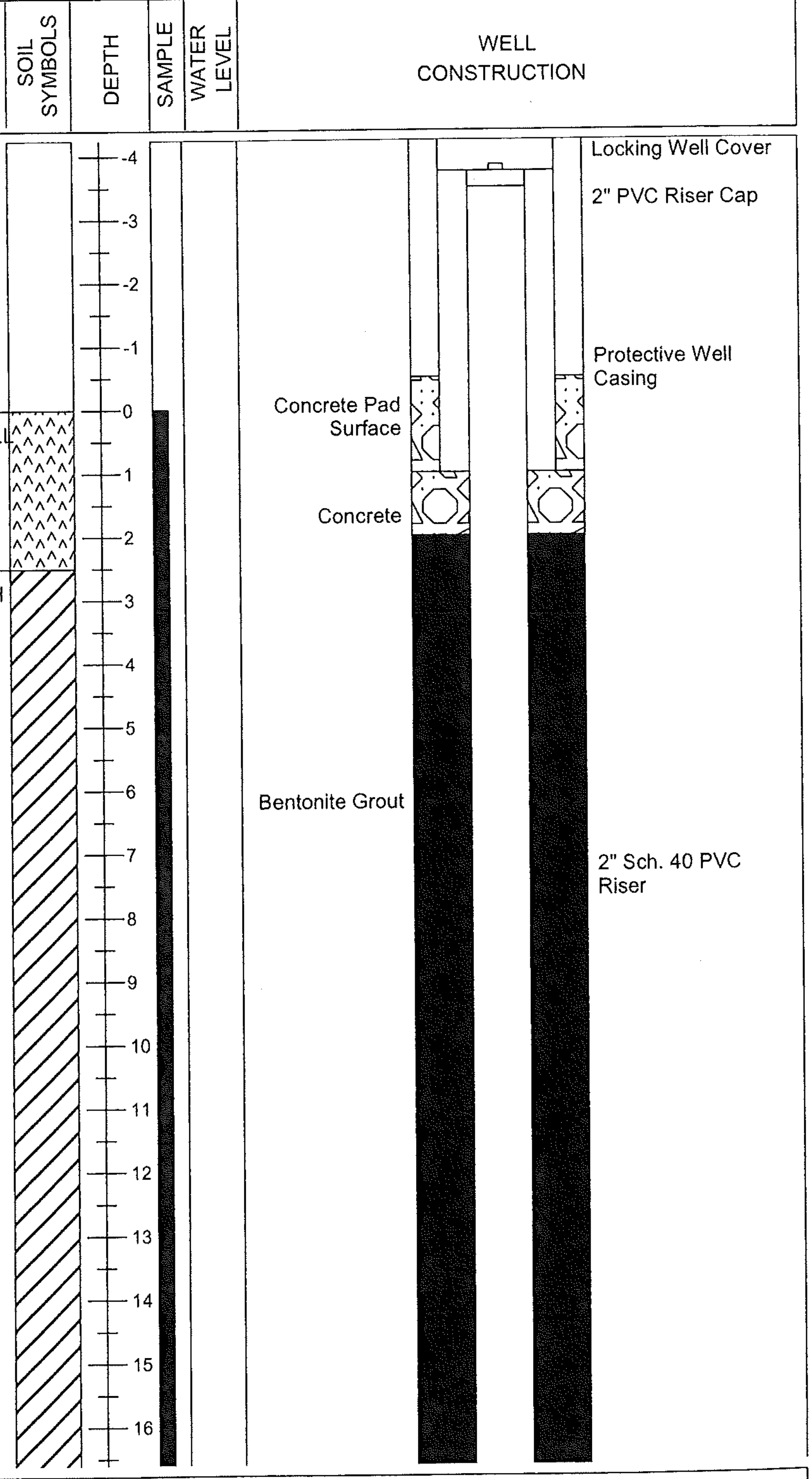
PROJECT:	**City of Victoria Landfill**
PROJECT NO.:	**L-04-622**
LOGGED BY:	**Mellisa Sanchez**
SUPERVISING PG:	**Leonell Scarborough**
INSTALLATION:	**04/28/10**
DEVELOPMENT:	**05/03/10**
SITE LOCATION:	**Victoria, Texas**
WELL OWNER:	**Republic Waste Services of Texas, Ltd.**

DRILLING INFORMATION

DRILLER:	**Best Drilling/Lawrence H. Tobola**
DRILLER'S LICENSE NO.:	**3026M**
RIG TYPE:	**Mobil Drill B-57**
METHOD OF DRILLING:	**Hollow Stem Auger**
SAMPLING METHODS:	**Split Core Barrel**
SURFACE ELEVATION:	**66.4'**
HOLE DIAMETER:	**8.25"**
NORTHING:	**318084.76**
EASTING:	**2670185.08**

▽ Water level during drilling ▼ Water level in completed well ▮ Split Core ▯ No Recovery ▨ Auger

DESCRIPTION	USCS
FILL: Black; stiff clay, native fill material 0.0' to 2.5'; dry	FILL
CLAY: Dark gray; hard; calcareous concretions and organic matter, roots and grass; stiff; dry - gray and dark gray clay with mottling and minor amounts of orange; hard clay - minor light gray, red-brown, and tan mottling; increase in calcareous concretions and gravel with depth; iron oxide concretions and gravel - increase in sand content with depth	CH



NOTES: Not to be used separately from original report. USCS descriptors based on field classification not laboratory verified.

Hydrex
ENVIRONMENTAL, INC.

Monitor Well

Monitor Well No.:**MW-23**

LEONELL N. SCARBOROUGH
GEOLOGY
#10048
6/10/10

PROJECT INFORMATION

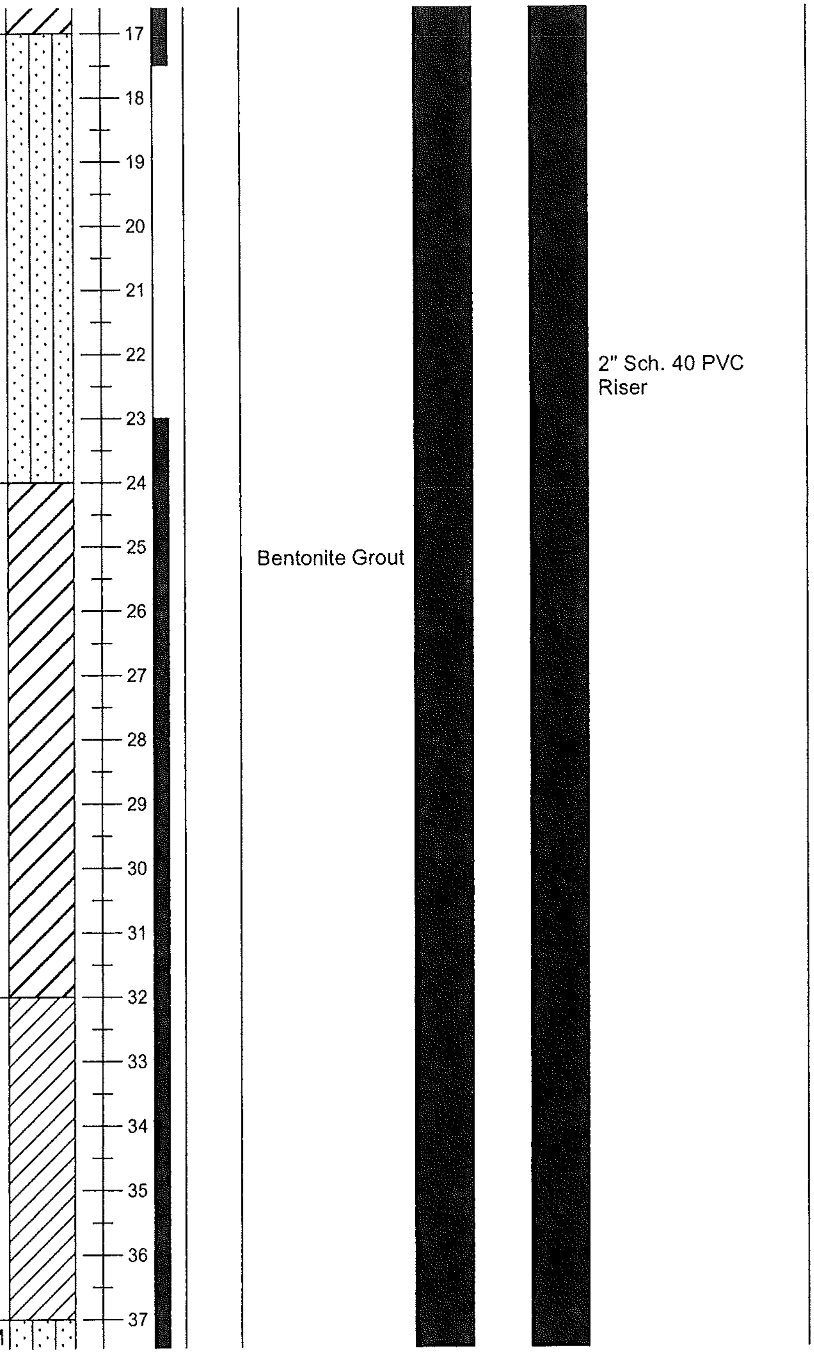
PROJECT:	**City of Victoria Landfill**
PROJECT NO.:	**L-04-622**
LOGGED BY:	**Mellisa Sanchez**
SUPERVISING PG:	**Leonell Scarborough**
INSTALLATION:	**04/28/10**
DEVELOPMENT:	**05/03/10**
SITE LOCATION:	**Victoria, Texas**
WELL OWNER:	**Republic Waste Services of Texas, Ltd.**

DRILLING INFORMATION

DRILLER:	**Best Drilling/Lawrence H. Tobola**
DRILLER'S LICENSE NO.:	**3026M**
RIG TYPE:	**Mobil Drill B-57**
METHOD OF DRILLING:	**Hollow Stem Auger**
SAMPLING METHODS:	**Split Core Barrel**
SURFACE ELEVATION:	**66.4'**
HOLE DIAMETER:	**8.25"**
NORTHING:	**318084.76**
EASTING:	**2670185.08**

▽ Water level during drilling ▼ Water level in completed well ▮ Split Core ☐ No Recovery ▨ Auger

DESCRIPTION	USCS	SOIL SYMBOLS	DEPTH	SAMPLE	WATER LEVEL	WELL CONSTRUCTION
SAND: Red-brown and orange; loose; fine-grained quartz sand; sub-rounded and sub-angular; dry - no recovery from 17.5' to 23.0'	SM					
CLAY: Orange and minor amount of light gray mottling; hard clay; minor amount of calcareous concretions; iron oxide concretions and staining; dry - increase in sand and silt content with depth	CH					
SANDY CLAY: Tan and brown; stiff clay; increase in sand and silt content with depth; calcareous concretions with a zone of large calcareous concretions and gravel @ 44.5'; iron oxide concretions; dry - minor red-brown mottling; very sandy clay; calcareous concretions	CL					
SAND: Tan with light brown layering; loose; fine-grained	SM					



NOTES: Not to be used separately from original report. USCS descriptors based on field classification not laboratory verified.

Hydrex ENVIRONMENTAL, INC.

Monitor Well

Monitor Well No.:**MW-23**

STATE OF TEXAS
LEONELL N. SCARBOROUGH
GEOLOGY
#10048
LICENSED
PROFESSIONAL GEOSCIENTIST

PROJECT INFORMATION

PROJECT:	**City of Victoria Landfill**
PROJECT NO.:	**L-04-622**
LOGGED BY:	**Mellisa Sanchez**
SUPERVISING PG:	**Leonell Scarborough**
INSTALLATION:	**04/28/10**
DEVELOPMENT:	**05/03/10**
SITE LOCATION:	**Victoria, Texas**
WELL OWNER:	**Republic Waste Services of Texas, Ltd.**

DRILLING INFORMATION

DRILLER:	**Best Drilling/Lawrence H. Tobola**
DRILLER'S LICENSE NO.:	**3026M**
RIG TYPE:	**Mobil Drill B-57**
METHOD OF DRILLING:	**Hollow Stem Auger**
SAMPLING METHODS:	**Split Core Barrel**
SURFACE ELEVATION:	**66.4'**
HOLE DIAMETER:	**8.25"**
NORTHING:	**318084.76**
EASTING:	**2670185.08**

▽ Water level during drilling ▼ Water level in completed well ▮ Split Core ☐ No Recovery ▦ Auger

DESCRIPTION

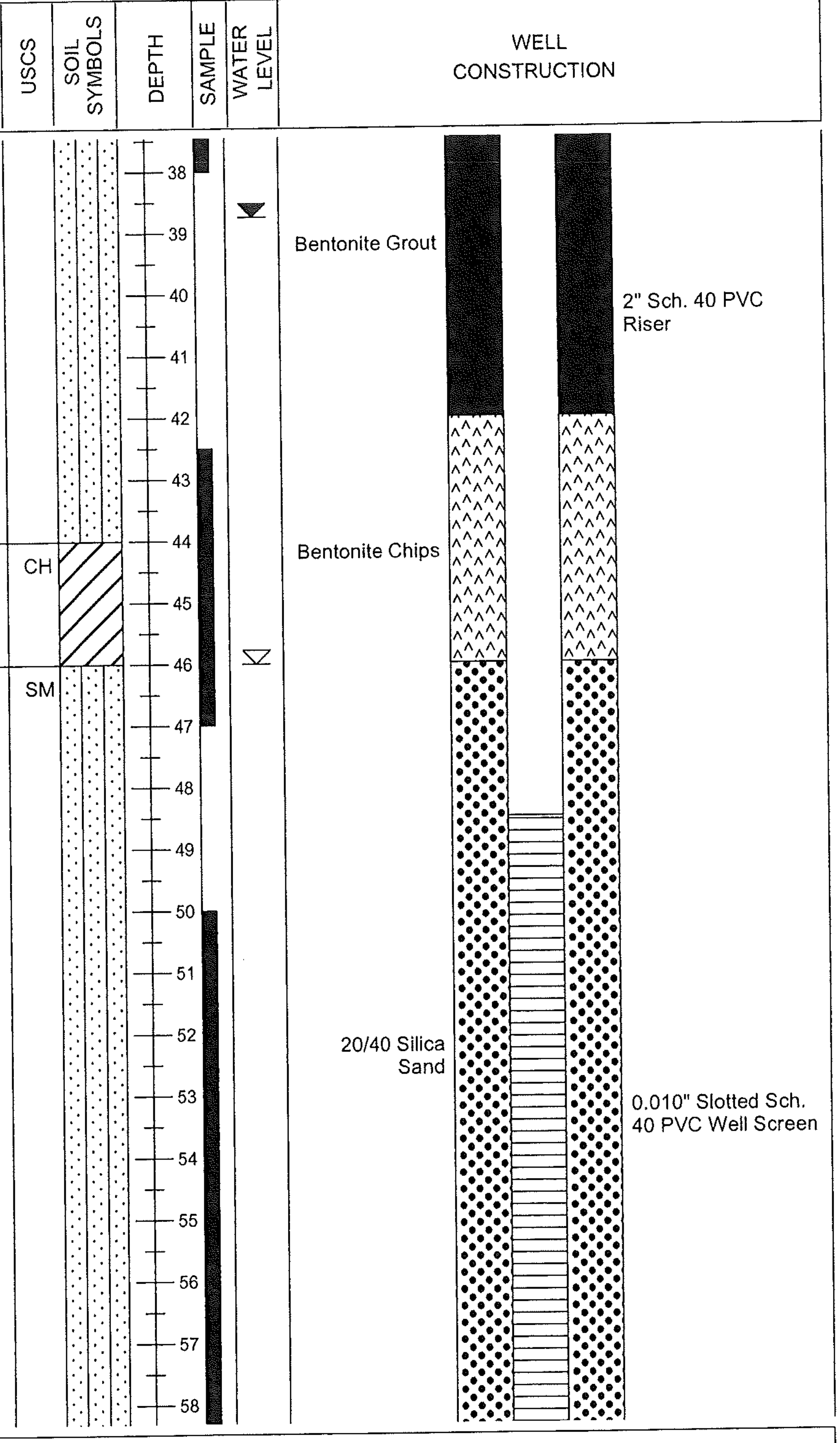
quartz sand; sub-rounded and rounded; 2" calcareous zone @ 43.5'; dry

- no recovery from 38.0' to 42.5'

CLAY: Tan and brown; stiff clay; calcareous concretions; dry

SAND: Tan; loose, fine-grained to medium-grained quartz sand; sub-rounded and sub-angular; calcareous gravel wet @ 46.0'

- no recovery from 47.0' to 50.0'



NOTES: Not to be used separately from original report. USCS descriptors based on field classification not laboratory verified.

HYDREX ENVIRONMENTAL, INC.

Monitor Well

Monitor Well No.:**MW-23**

STATE OF TEXAS
LEONELL N. SCARBOROUGH
GEOLOGY
#10048
LICENSED
PROFESSIONAL GEOSCIENTIST
6/1/10

PROJECT INFORMATION

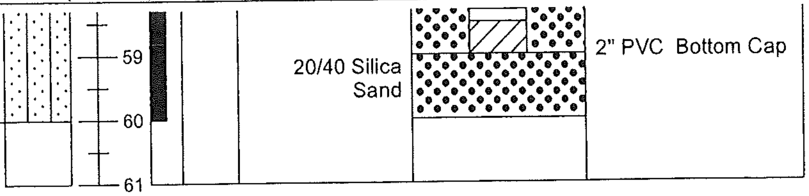
PROJECT: **City of Victoria Landfill**
PROJECT NO.: **L-04-622**
LOGGED BY: **Mellisa Sanchez**
SUPERVISING PG: **Leonell Scarborough**
INSTALLATION: **04/28/10**
DEVELOPMENT: **05/03/10**
SITE LOCATION: **Victoria, Texas**
WELL OWNER: **Republic Waste Services of Texas, Ltd.**

DRILLING INFORMATION

DRILLER: **Best Drilling/Lawrence H. Tobola**
DRILLER'S LICENSE NO.: **3026M**
RIG TYPE: **Mobil Drill B-57**
METHOD OF DRILLING: **Hollow Stem Auger**
SAMPLING METHODS: **Split Core Barrel**
SURFACE ELEVATION: **66.4'**
HOLE DIAMETER: **8.25"**
NORTHING: **318084.76** EASTING: **2670185.08**

▽ Water level during drilling ▼ Water level in completed well ▮ Split Core ▯ No Recovery ▦ Auger

DESCRIPTION	USCS	SOIL SYMBOLS	DEPTH	SAMPLE	WATER LEVEL	WELL CONSTRUCTION



Bottom of Boring @ 60.0'

NOTES: Not to be used separately from original report. USCS descriptors based on field classification not laboratory verified. Page 4 of 4

Hydrex
ENVIRONMENTAL, INC.

Monitor Well

Monitor Well No.:**MW-24**

LEONELL N. SCARBOROUGH
GEOLOGY
#10048
STATE OF TEXAS
PROFESSIONAL GEOSCIENTIST
LICENSED
6/10/10

PROJECT INFORMATION

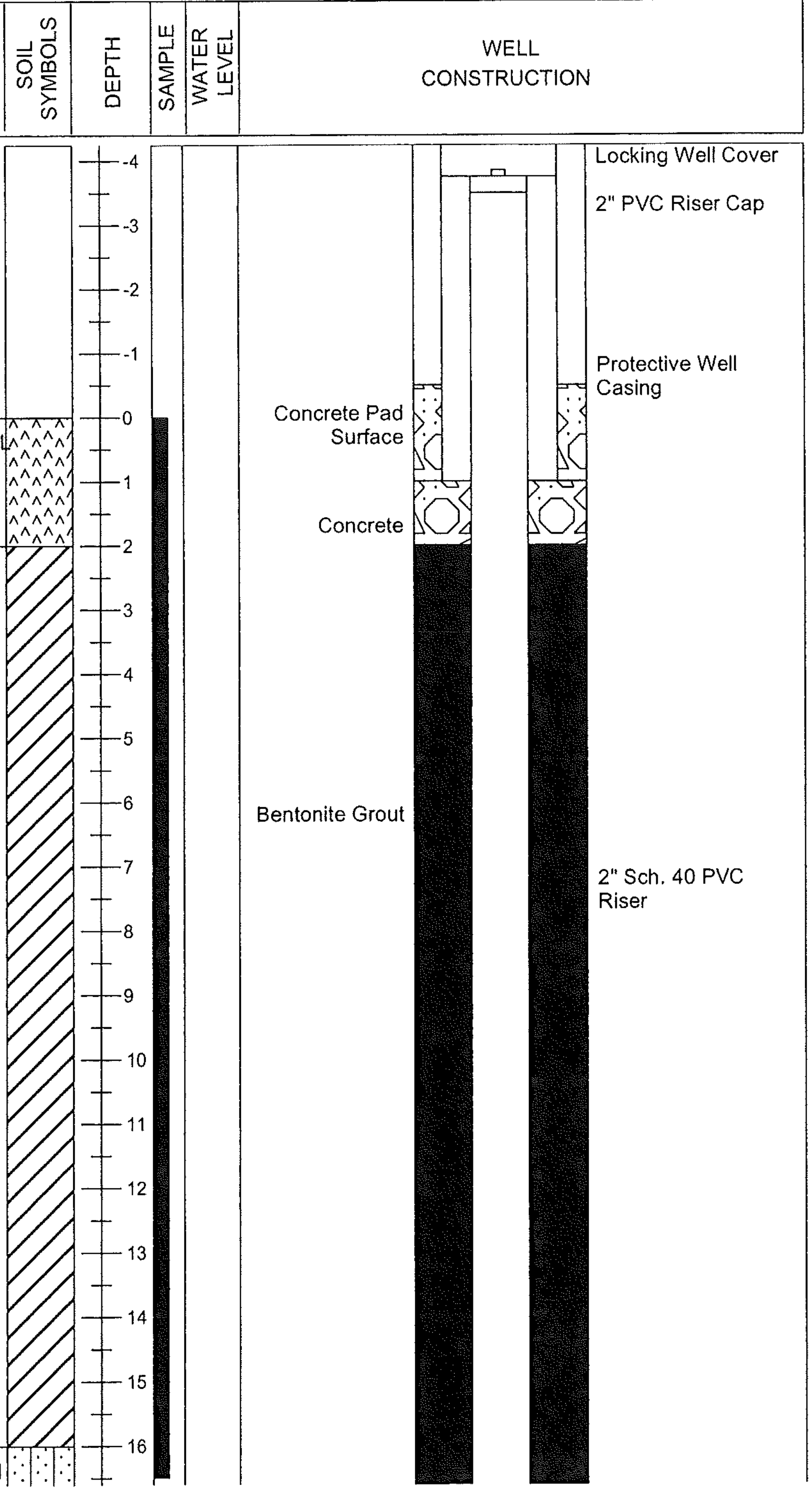
PROJECT:	**City of Victoria Landfill**
PROJECT NO.:	**L-04-622**
LOGGED BY:	**Mellisa Sanchez**
SUPERVISING PG:	**Leonell Scarborough**
INSTALLATION:	**04/28/10**
DEVELOPMENT:	**05/04/10**
SITE LOCATION:	**Victoria, Texas**
WELL OWNER:	**Republic Waste Services of Texas, Ltd.**

DRILLING INFORMATION

DRILLER:	**Best Drilling/Lawrence H. Tobola**
DRILLER'S LICENSE NO.:	**3026M**
RIG TYPE:	**Mobil Drill CME-75**
METHOD OF DRILLING:	**Hollow Stem Auger**
SAMPLING METHODS:	**Split Core Barrel**
SURFACE ELEVATION:	**66.1'**
HOLE DIAMETER:	**8.25"**
NORTHING:	**318354.44**
EASTING:	**2670543.40**

▽ Water level during drilling ▼ Water level in completed well ▮ Split Core ☐ No Recovery ▦ Auger

DESCRIPTION	USCS
FILL: Black; hard clay, native fill material 0.0' to 2.5'; dry	FILL
CLAY: Black; medium stiff; calcareous concretions and organic matter, roots and grass; dry - amount of calcareous concretions increase with depth - medium gray and black, slight mottling - tan, light gray, and red-brown, mottling; calcareous gravel and pebble-sized concretions; iron oxide staining	CH
SAND: Tan and orange; loose; very fine-grained quartz	SM



NOTES: Not to be used separately from original report. USCS descriptors based on field classification not laboratory verified.

Hydrex
ENVIRONMENTAL, INC.

Monitor Well

Monitor Well No.:**MW-24**

STATE OF TEXAS
LEONELL N. SCARBOROUGH
GEOLOGY
#10048
LICENSED
PROFESSIONAL GEOSCIENTIST
6/1/10

PROJECT INFORMATION

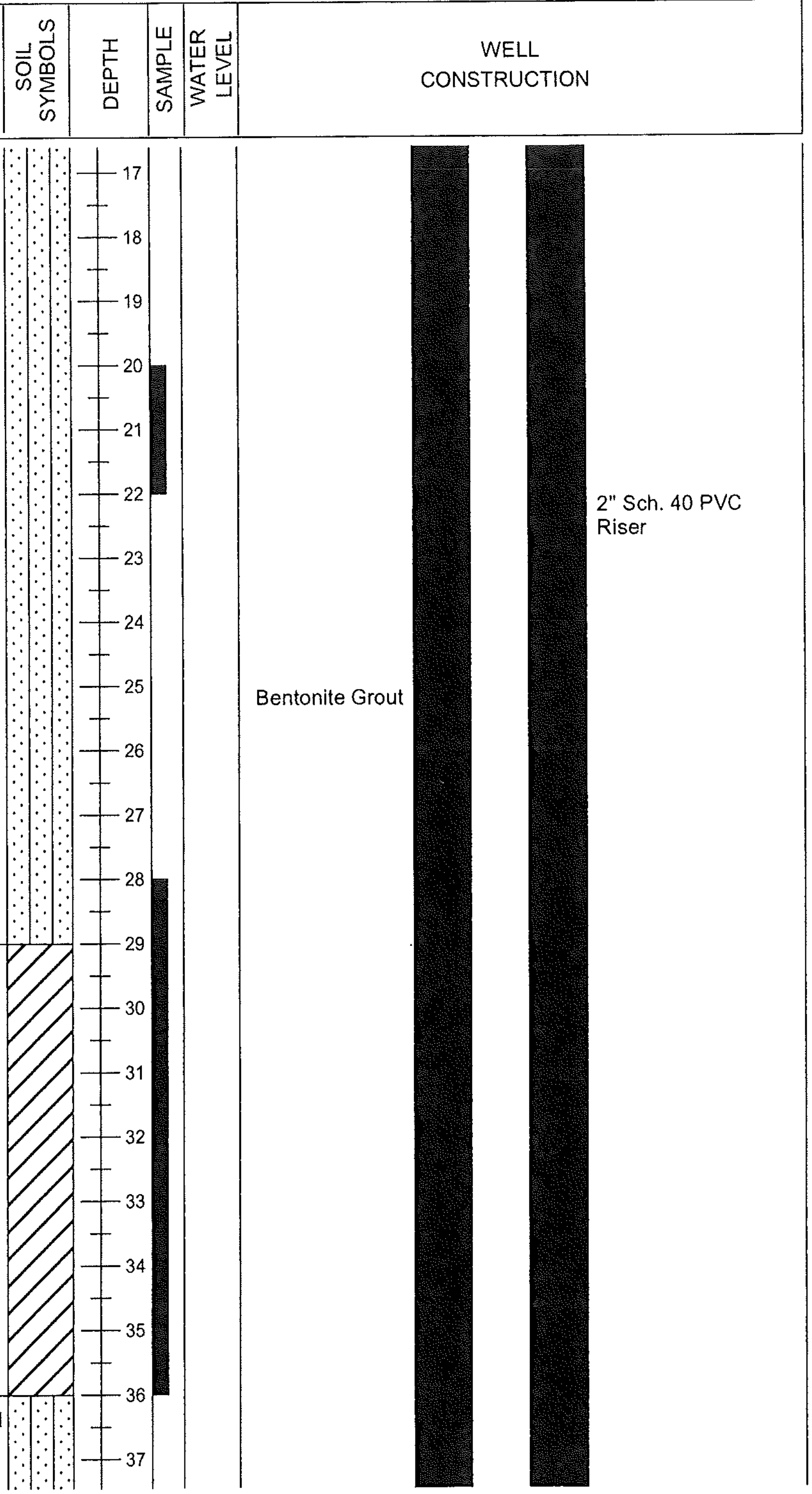
PROJECT: **City of Victoria Landfill**
PROJECT NO.: **L-04-622**
LOGGED BY: **Mellisa Sanchez**
SUPERVISING PG: **Leonell Scarborough**
INSTALLATION: **04/28/10**
DEVELOPMENT: **05/04/10**
SITE LOCATION: **Victoria, Texas**
WELL OWNER: **Republic Waste Services of Texas, Ltd.**

DRILLING INFORMATION

DRILLER: **Best Drilling/Lawrence H. Tobola**
DRILLER'S LICENSE NO.: **3026M**
RIG TYPE: **Mobil Drill CME-75**
METHOD OF DRILLING: **Hollow Stem Auger**
SAMPLING METHODS: **Split Core Barrel**
SURFACE ELEVATION: **66.1'**
HOLE DIAMETER: **8.25"**
NORTHING: **318354.44** EASTING: **2670543.40**

▽ Water level during drilling ▼ Water level in completed well ▮ Split Core ▯ No Recovery ▦ Auger

DESCRIPTION	USCS
sand; sub-rounded and sub-angular; dry - no recovery from 16.5' to 20.0' - no recovery from 22.0' to 28.0'	
CLAY: Orange and gray, mottling; hard clay; minor amount of calcareous concretions; iron oxide concretions and staining; dry - increase in calcareous concretions with depth; iron oxide staining - 2" calcareous seam @ 34.0'; increase in sand content with depth	CH
SAND: Tan; loose; fine-grained quartz sand; sub-rounded and rounded; clay seam @ 37.0' to 37.5'; large calcareous concretions @ 36.0'; dry	SM



NOTES: Not to be used separately from original report. USCS descriptors based on field classification not laboratory verified. Page 2 of 3

HYDREX ENVIRONMENTAL, INC.

Monitor Well

Monitor Well No.:**MW-24**

LEONELL N. SCARBOROUGH
GEOLOGY
#10048
6/10/10

PROJECT INFORMATION

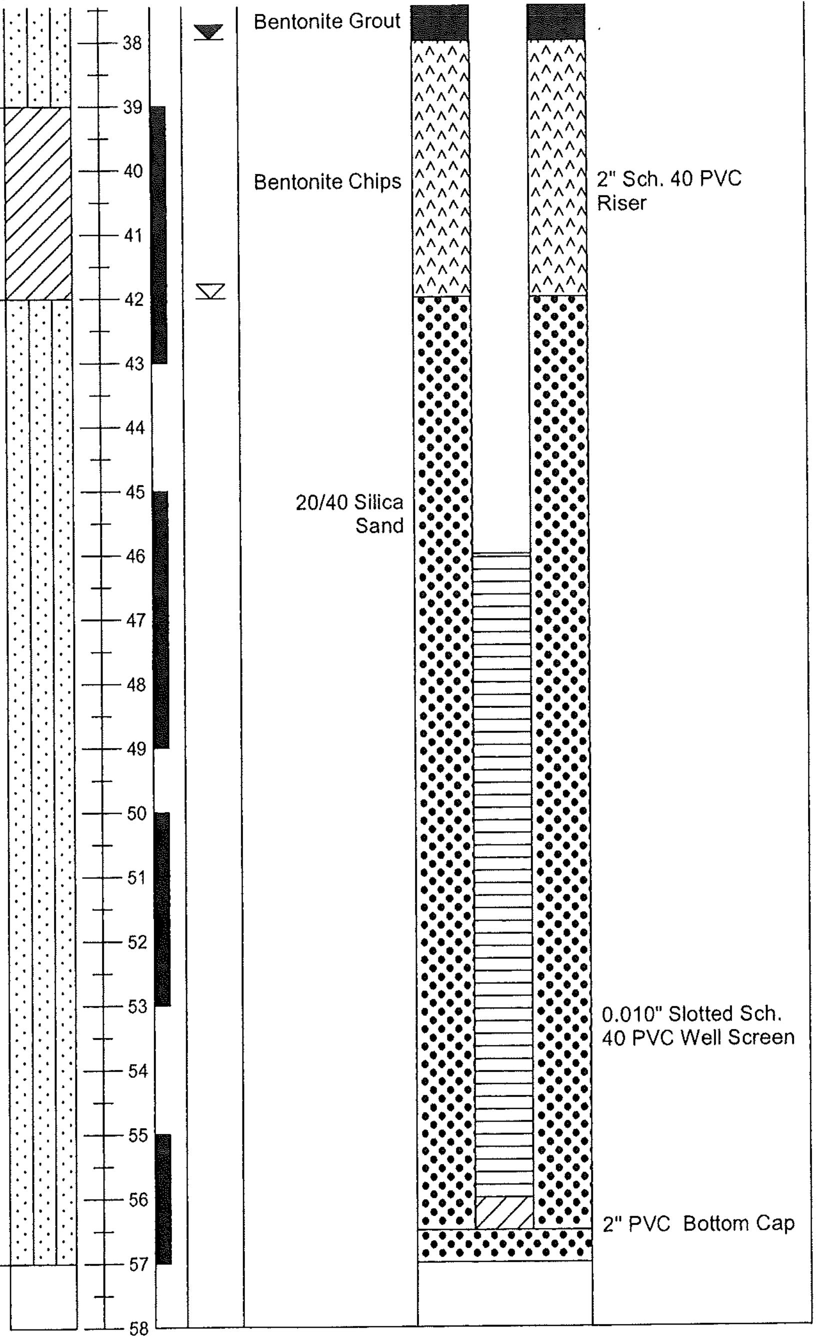
PROJECT: **City of Victoria Landfill**
PROJECT NO.: **L-04-622**
LOGGED BY: **Mellisa Sanchez**
SUPERVISING PG: **Leonell Scarborough**
INSTALLATION: **04/28/10**
DEVELOPMENT: **05/04/10**
SITE LOCATION: **Victoria, Texas**
WELL OWNER: **Republic Waste Services of Texas, Ltd.**

DRILLING INFORMATION

DRILLER: **Best Drilling/Lawrence H. Tobola**
DRILLER'S LICENSE NO.: **3026M**
RIG TYPE: **Mobil Drill CME-75**
METHOD OF DRILLING: **Hollow Stem Auger**
SAMPLING METHODS: **Split Core Barrel**
SURFACE ELEVATION: **66.1'**
HOLE DIAMETER: **8.25"**
NORTHING: **318354.44** EASTING: **2670543.40**

▽ Water level during drilling ▼ Water level in completed well ▮ Split Core ▯ No Recovery ▨ Auger

DESCRIPTION	USCS
- no recovery from 36.0' to 39.0'	
SANDY CLAY: Tan and brown; stiff sandy clay with gravel; calcareous concretions and iron oxide gravel; 2" sandy seam @41.0' o 41.2'; dry	CL
SAND: Tan; loose, very fine-grained quartz sand; sub-rounded and sub-angular; wet @ 42.0' - no revovery from 43.0' to 45.0' - no recovery from 49.0' to 50.0' - increase in grain size with depth - no recovery from 53.0' to 55.0'	SM
Bottom of Boring @ 57.0'	



NOTES: Not to be used separately from original report. USCS descriptors based on field classification not laboratory verified. Page 3 of 3

HYDREX ENVIRONMENTAL, INC.

Observation Well

Observation Well No.: **OW-25**

LEONELL N. SCARBOROUGH
GEOLOGY
#10048
STATE OF TEXAS LICENSED PROFESSIONAL GEOSCIENTIST
6/1/10

PROJECT INFORMATION

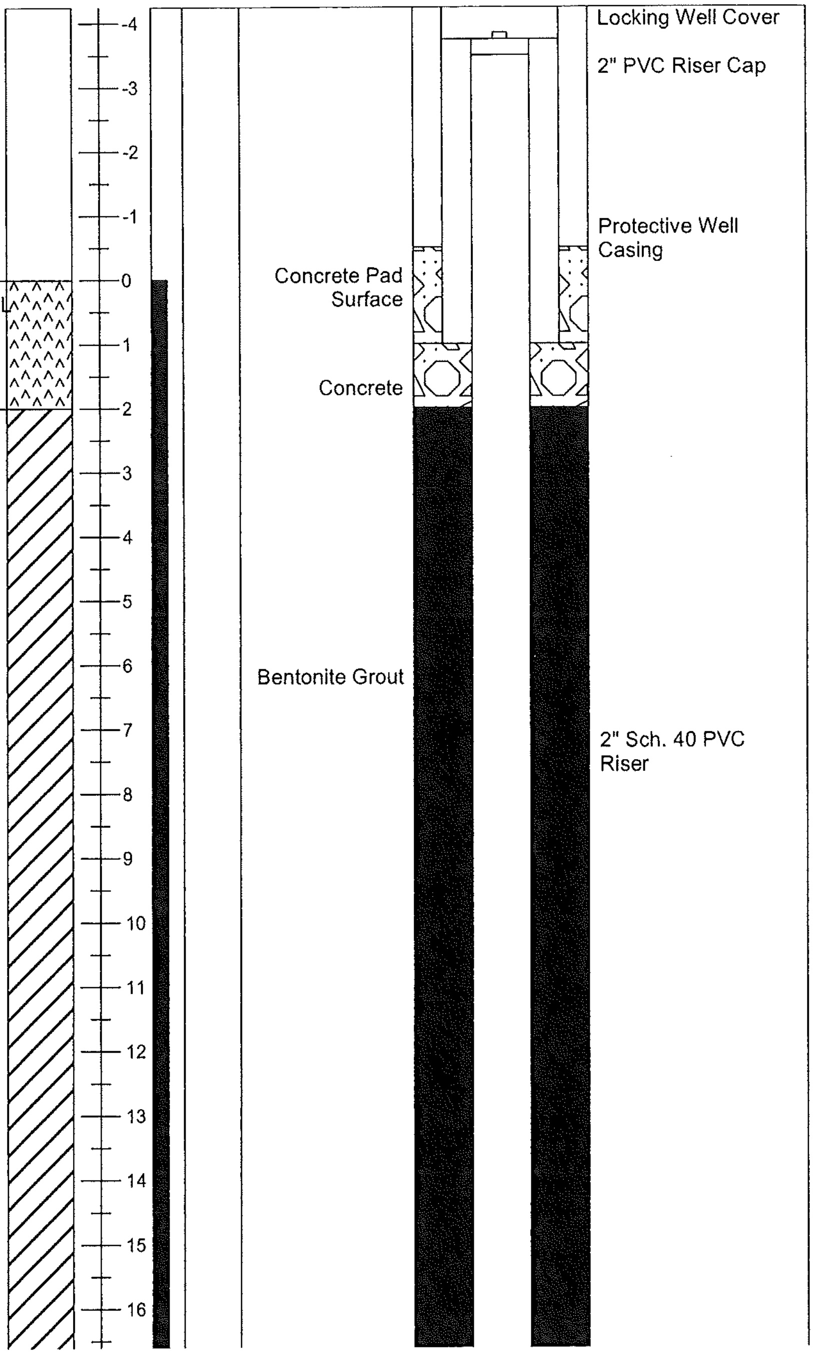
PROJECT:	**City of Victoria Landfill**
PROJECT NO.:	**L-04-622**
LOGGED BY:	**Mellisa Sanchez**
SUPERVISING PG:	**Leonell Scarborough**
INSTALLATION:	**04/27/10**
DEVELOPMENT:	**05/03/10**
SITE LOCATION:	**Victoria, Texas**
WELL OWNER:	**Republic Waste Services of Texas, Ltd.**

DRILLING INFORMATION

DRILLER:	**Best Drilling/Lawrence H. Tobola**
DRILLER'S LICENSE NO.:	**3026M**
RIG TYPE:	**Mobil Drill CME-75**
METHOD OF DRILLING:	**Hollow Stem Auger**
SAMPLING METHODS:	**Split Core Barrel**
SURFACE ELEVATION:	**66.9'**
HOLE DIAMETER:	**8.25"**
NORTHING:	**318964.98**
EASTING:	**2671369.24**

▽ Water level during drilling ▼ Water level in completed well ▮ Split Core ☐ No Recovery ▦ Auger

DESCRIPTION	USCS
FILL: Black; hard clay, native fill material 0.0' to 2.5'; calcareous nodules; dry	FILL
CLAY: Black; medium stiff; calcareous concreations and organic matter, roots and grass; dry - amount of calcareous concretions and gravel increase with depth - dark gray and black, clay; zones of calcareous gravel - tan, light gray, and red-brown, mottling; decrease in calcareous gravel and pebble-sized concretions with depth	CH



NOTES: Not to be used separately from original report. USCS descriptors based on field classification not laboratory verified.

Observation Well

Observation Well No.: **OW-25**

STATE OF TEXAS
LEONELL N. SCARBOROUGH
GEOLOGY
#10048
LICENSED
PROFESSIONAL GEOSCIENTIST
6/1/10

PROJECT INFORMATION

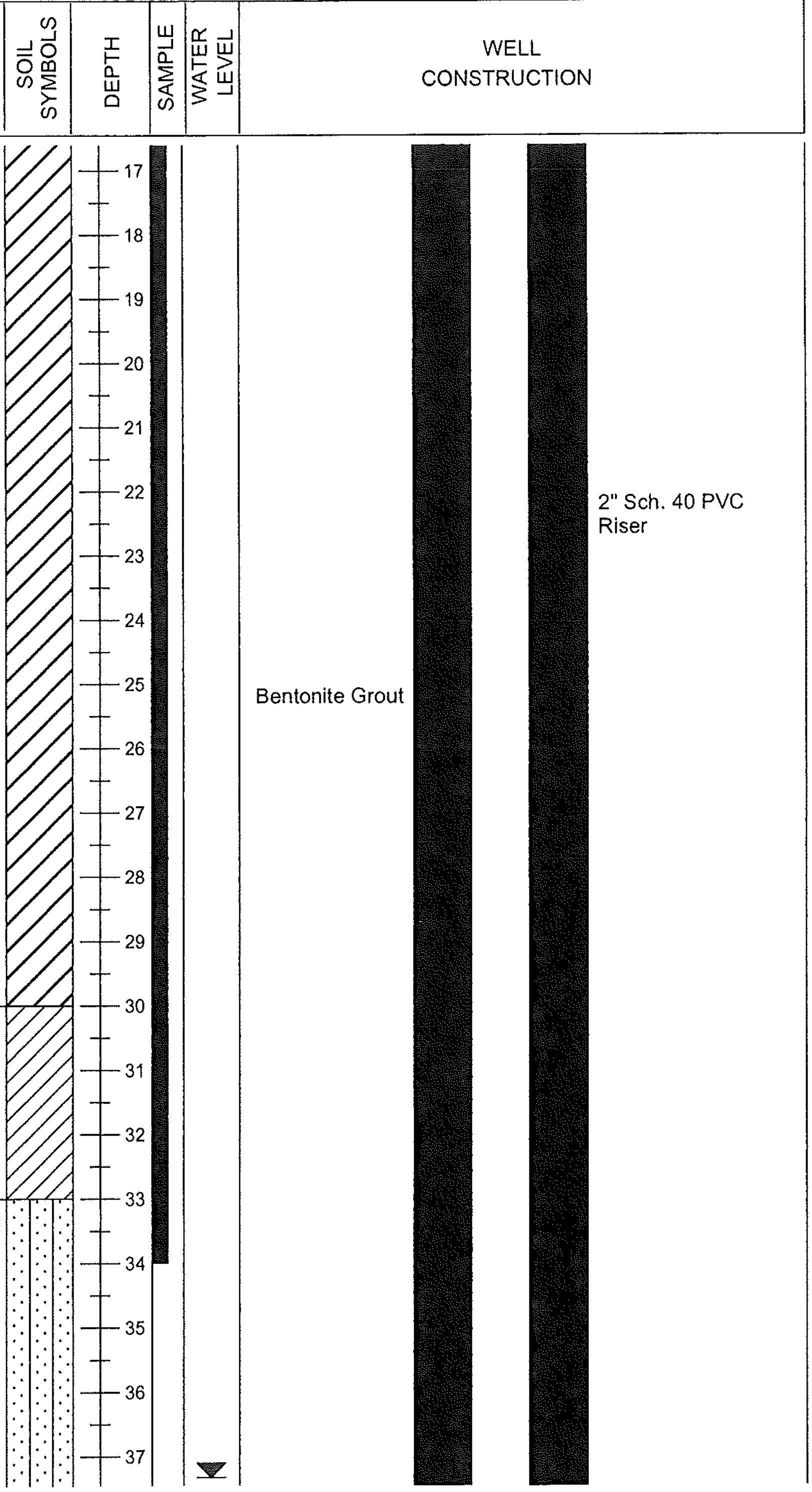
PROJECT:	**City of Victoria Landfill**
PROJECT NO.:	**L-04-622**
LOGGED BY:	**Mellisa Sanchez**
SUPERVISING PG:	**Leonell Scarborough**
INSTALLATION:	**04/27/10**
DEVELOPMENT:	**05/03/10**
SITE LOCATION:	**Victoria, Texas**
WELL OWNER:	**Republic Waste Services of Texas, Ltd.**

DRILLING INFORMATION

DRILLER:	**Best Drilling/Lawrence H. Tobola**
DRILLER'S LICENSE NO.:	**3026M**
RIG TYPE:	**Mobil Drill CME-75**
METHOD OF DRILLING:	**Hollow Stem Auger**
SAMPLING METHODS:	**Split Core Barrel**
SURFACE ELEVATION:	**66.9'**
HOLE DIAMETER:	**8.25"**
NORTHING:	**318964.98**
EASTING:	**2671369.24**

▽ Water level during drilling ▼ Water level in completed well ▮ Split Core ☐ No Recovery ▨ Auger

DESCRIPTION	USCS
- minor light gray and red-brown mottling; increase in calcareous concretions, pebble and sand sized - iron oxide staining and concretions sand and pebble sized	
SANDY CLAY: Tan and red-brown, minor mottling; stiff clay with increase in sand content with depth; calcareous concretions and iron oxide gravel; dry	CL
SAND: Tan minor amount of red-brown; loose; fine-grained quartz sand; sub-rounded and sub-angular; dry - no recovery from 34.0' to 37.5'	SM



NOTES: Not to be used separately from original report. USCS descriptors based on field classification not laboratory verified.

Hydrex
ENVIRONMENTAL, INC.

Observation Well

Observation Well No.: **OW-25**

LEONELL N. SCARBOROUGH
GEOLOGY
#10048
STATE OF TEXAS LICENSED PROFESSIONAL GEOSCIENTIST
6/10/10

PROJECT INFORMATION

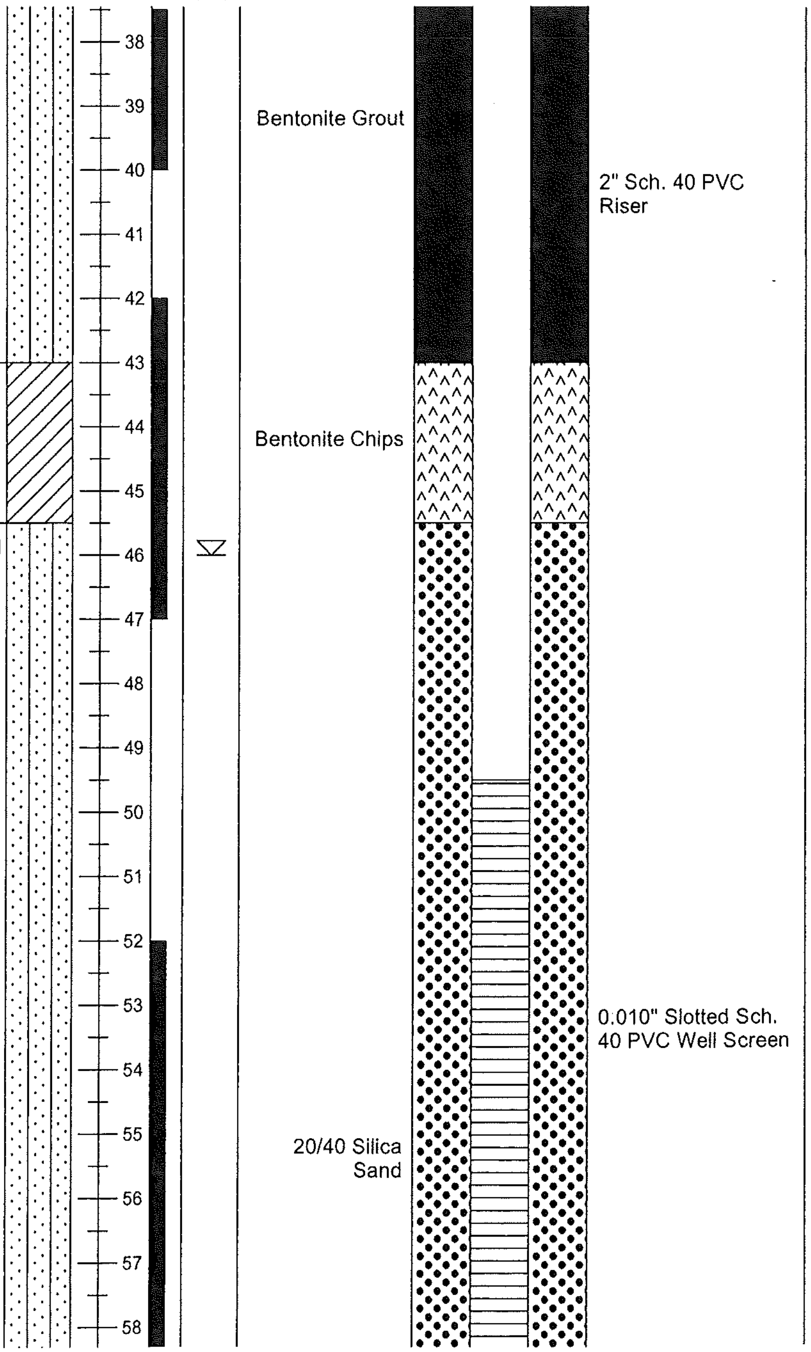
PROJECT: **City of Victoria Landfill**
PROJECT NO.: **L-04-622**
LOGGED BY: **Mellisa Sanchez**
SUPERVISING PG: **Leonell Scarborough**
INSTALLATION: **04/27/10**
DEVELOPMENT: **05/03/10**
SITE LOCATION: **Victoria, Texas**
WELL OWNER: **Republic Waste Services of Texas, Ltd.**

DRILLING INFORMATION

DRILLER: **Best Drilling/Lawrence H. Tobola**
DRILLER'S LICENSE NO.: **3026M**
RIG TYPE: **Mobil Drill CME-75**
METHOD OF DRILLING: **Hollow Stem Auger**
SAMPLING METHODS: **Split Core Barrel**
SURFACE ELEVATION: **66.9'**
HOLE DIAMETER: **8.25"**
NORTHING: **318964.98** EASTING: **2671369.24**

▽ Water level during drilling ▼ Water level in completed well ▮ Split Core ▯ No Recovery ▨ Auger

DESCRIPTION	USCS
- no recovery from 40.0' to 42.0'	
SANDY CLAY: Tan and brown; stiff sandy clay; calcareous concretions; dry	CL
SAND: Tan; loose, very fine-grained quartz sand; sub-rounded and sub-angular; wet @ 46.0' - no recovery from 47.0' to 52.0' - increase in grain size with depth - increase in grain size with depth	SM



NOTES: Not to be used separately from original report. USCS descriptors based on field classification not laboratory verified.

Hydrex ENVIRONMENTAL, INC.

Observation Well

Observation Well No.: **OW-25**

LEONELL N. SCARBOROUGH
GEOLOGY
#10048
STATE OF TEXAS
LICENSED
PROFESSIONAL GEOSCIENTIST
6/10/10

PROJECT INFORMATION

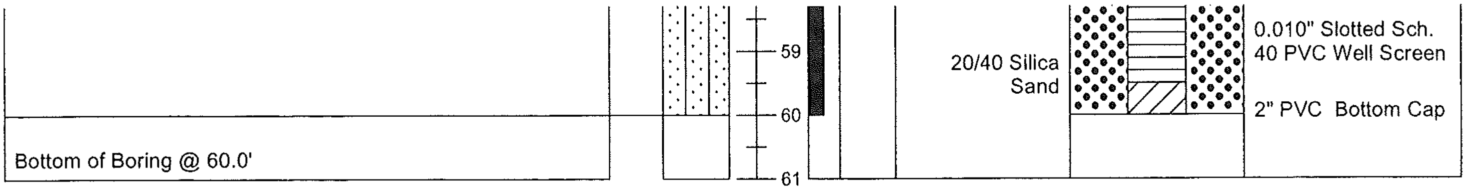
PROJECT:	**City of Victoria Landfill**
PROJECT NO.:	**L-04-622**
LOGGED BY:	**Mellisa Sanchez**
SUPERVISING PG:	**Leonell Scarborough**
INSTALLATION:	**04/27/10**
DEVELOPMENT:	**05/03/10**
SITE LOCATION:	**Victoria, Texas**
WELL OWNER:	**Republic Waste Services of Texas, Ltd.**

DRILLING INFORMATION

DRILLER:	**Best Drilling/Lawrence H. Tobola**
DRILLER'S LICENSE NO.:	**3026M**
RIG TYPE:	**Mobil Drill CME-75**
METHOD OF DRILLING:	**Hollow Stem Auger**
SAMPLING METHODS:	**Split Core Barrel**
SURFACE ELEVATION:	**66.9'**
HOLE DIAMETER:	**8.25"**
NORTHING:	**318964.98**
EASTING:	**2671369.24**

▽ Water level during drilling ▼ Water level in completed well ▮ Split Core ▯ No Recovery ▦ Auger

DESCRIPTION	USCS	SOIL SYMBOLS	DEPTH	SAMPLE	WATER LEVEL	WELL CONSTRUCTION



Bottom of Boring @ 60.0'

NOTES: Not to be used separately from original report. USCS descriptors based on field classification not laboratory verified.

Hydrex
ENVIRONMENTAL, INC.

Observation Well

Observation Well No.: **OW-26**

LEONELL N. SCARBOROUGH
GEOLOGY
#10048
6/1/10

PROJECT INFORMATION

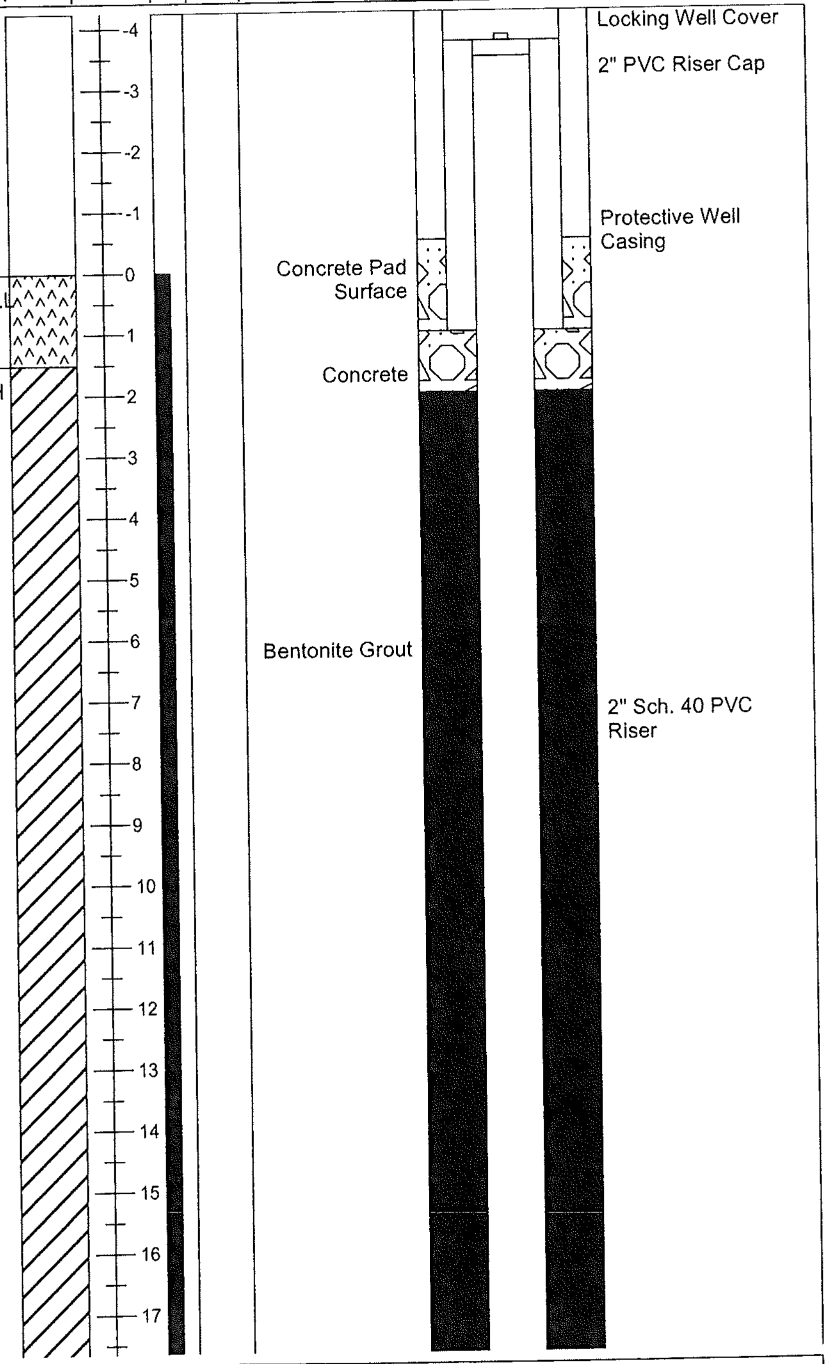
PROJECT:	City of Victoria Landfill
PROJECT NO.:	L-04-622
LOGGED BY:	Mellisa Sanchez
SUPERVISING PG:	Leonell Scarborough
INSTALLATION:	04/26/10
DEVELOPMENT:	05/03/10
SITE LOCATION:	Victoria, Texas
WELL OWNER:	Republic Waste Services of Texas, Ltd.

DRILLING INFORMATION

DRILLER:	Best Drilling/Lawrence H. Tobola
DRILLER'S LICENSE NO.:	3026M
RIG TYPE:	Mobil Drill B-57
METHOD OF DRILLING:	Hollow Stem Auger
SAMPLING METHODS:	Split Core Barrel
SURFACE ELEVATION:	65.6'
HOLE DIAMETER:	8.25"
NORTHING:	319321.01
EASTING:	2671840.17

▽ Water level during drilling ▼ Water level in completed well ▮ Split Core ☐ No Recovery ▦ Auger

DESCRIPTION	USCS
FILL: Black; hard clay, native fill material 0.0' to 1.5'; dry	FILL
CLAY: Black; hard clay; calcareous concretions and organic matter, roots and grass; dry - minor light gray and red-brown mottling; increase in calcareous concretions, pebble and sand sized - iron oxide concretions, sand and pebble-sized	CH



NOTES: Not to be used separately from original report. USCS descriptors based on field classification not laboratory verified.

Hydrex ENVIRONMENTAL, INC.

Observation Well

Observation Well No.: **OW-26**

STATE OF TEXAS
LEONELL N. SCARBOROUGH
GEOLOGY
#10048
LICENSED PROFESSIONAL GEOSCIENTIST
7/10/10

PROJECT INFORMATION

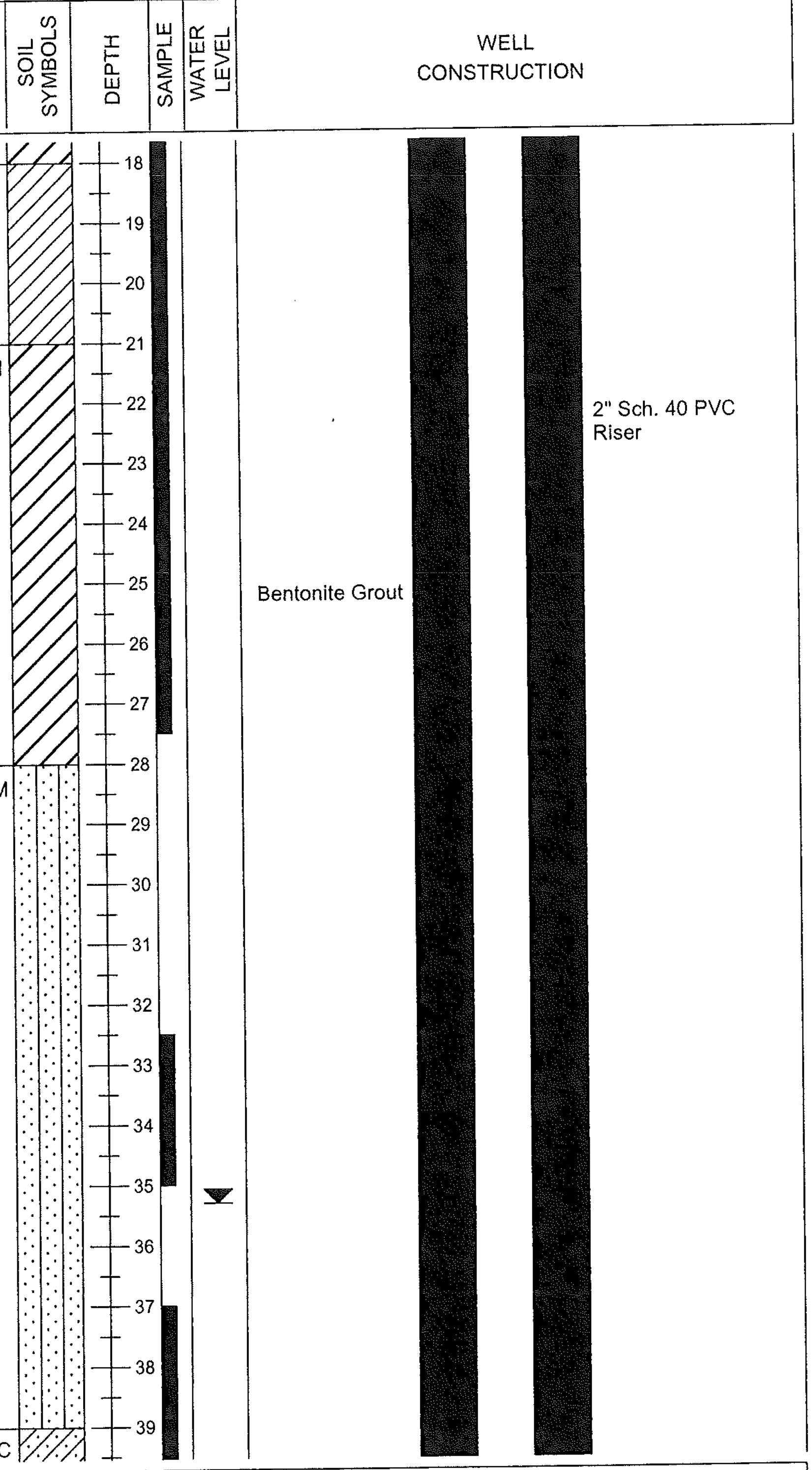
PROJECT:	City of Victoria Landfill
PROJECT NO.:	L-04-622
LOGGED BY:	Mellisa Sanchez
SUPERVISING PG:	Leonell Scarborough
INSTALLATION:	04/26/10
DEVELOPMENT:	05/03/10
SITE LOCATION:	Victoria, Texas
WELL OWNER:	Republic Waste Services of Texas, Ltd.

DRILLING INFORMATION

DRILLER:	Best Drilling/Lawrence H. Tobola
DRILLER'S LICENSE NO.:	3026M
RIG TYPE:	Mobil Drill B-57
METHOD OF DRILLING:	Hollow Stem Auger
SAMPLING METHODS:	Split Core Barrel
SURFACE ELEVATION:	65.6'
HOLE DIAMETER:	8.25"
NORTHING:	319321.01
EASTING:	2671840.17

▽ Water level during drilling ▼ Water level in completed well ▮ Split Core ☐ No Recovery ▨ Auger

DESCRIPTION	USCS
SILTY CLAY: Tan and light gray with minor red-brown mottling; hard clay with increase in silt content with depth; dry	CL
CLAY: Light gray; hard clay minor amounts of silt decreasing with depth; increase in amount of calcareous concreations, sand and pebble sized; dry - no recovery from 27.5' to 32.5'	CH
SAND: Tan; loose; very fine-grained quartz sand; rounded; dry - no recovery from 35.0' to 37.0' - increase in grain size with depth	SM
CLAYEY SAND: Tan and light gray; loose; sand with clay	SC



NOTES: Not to be used separately from original report. USCS descriptors based on field classification not laboratory verified.

Hydrex
ENVIRONMENTAL, INC.

Observation Well

Observation Well No.: **OW-26**

STATE OF TEXAS
LEONELL N. SCARBOROUGH
GEOLOGY
#10048
LICENSED
PROFESSIONAL GEOSCIENTIST
6/10/10

PROJECT INFORMATION

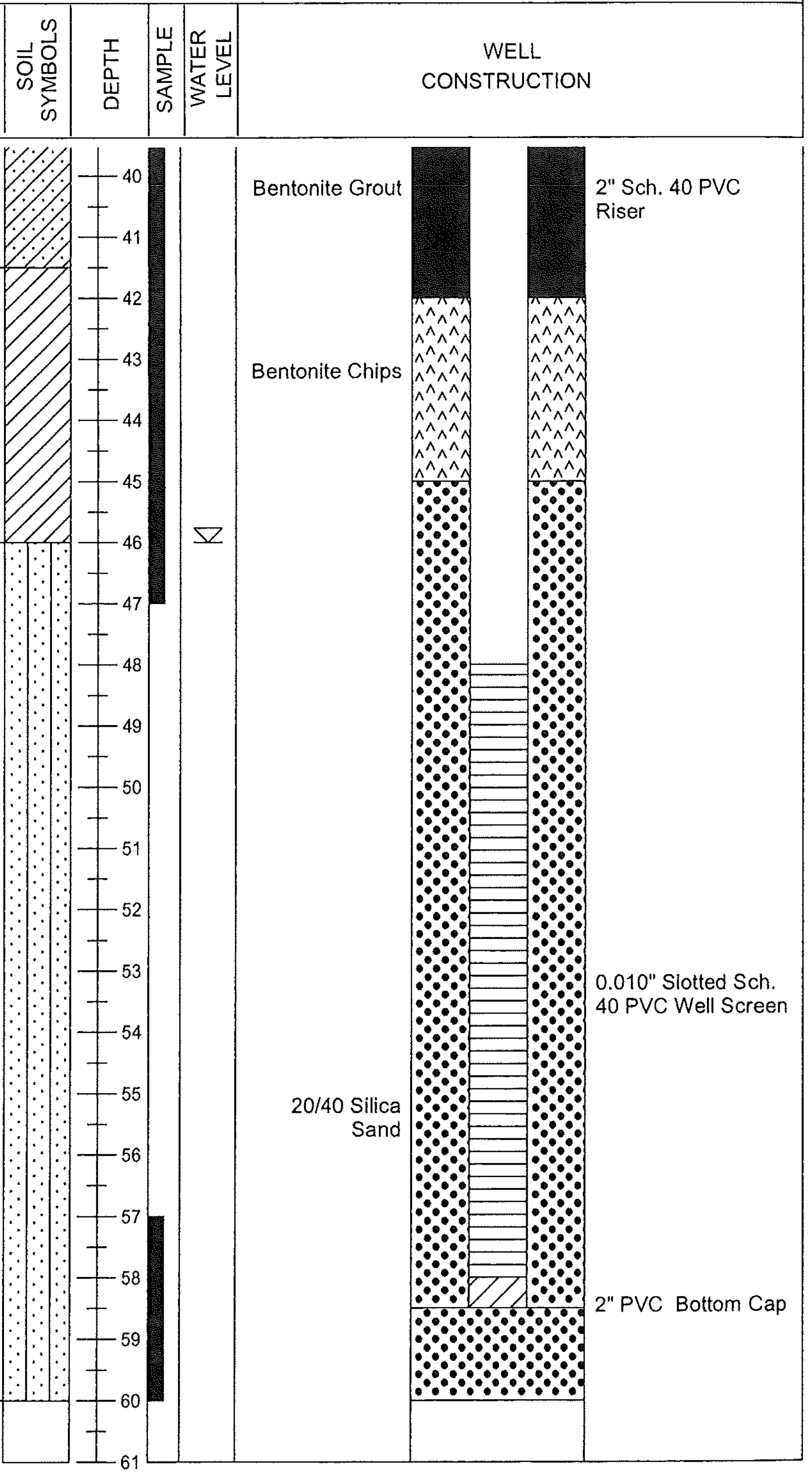
PROJECT:	**City of Victoria Landfill**
PROJECT NO.:	**L-04-622**
LOGGED BY:	**Mellisa Sanchez**
SUPERVISING PG:	**Leonell Scarborough**
INSTALLATION:	**04/26/10**
DEVELOPMENT:	**05/03/10**
SITE LOCATION:	**Victoria, Texas**
WELL OWNER:	**Republic Waste Services of Texas, Ltd.**

DRILLING INFORMATION

DRILLER:	**Best Drilling/Lawrence H. Tobola**
DRILLER'S LICENSE NO.:	**3026M**
RIG TYPE:	**Mobil Drill B-57**
METHOD OF DRILLING:	**Hollow Stem Auger**
SAMPLING METHODS:	**Split Core Barrel**
SURFACE ELEVATION:	**65.6'**
HOLE DIAMETER:	**8.25"**
NORTHING:	**319321.01**
EASTING:	**2671840.17**

▽ Water level during drilling ▼ Water level in completed well ▮ Split Core ▯ No Recovery ▨ Auger

DESCRIPTION	USCS
and gravel, with increase in clay content with depth; decrease in grain size with depth; calcareous gravel; dry	
SANDY CLAY: Tan and red-brown; stiff sandy clay; calcareous concretions; dry	CL
SAND: Tan and red-brown; loose, fine-grained to medium grained quartz sand with minor amounts of clay matrix decreasing with depth; sub-rounded and sub-angular; wet @ 46.0' - no recovery from 47.0' to 57.0'	SM
Bottom of Boring @ 60.0'	



NOTES: Not to be used separately from original report. USCS descriptors based on field classification not laboratory verified. Page 3 of 3

Hydrex
ENVIRONMENTAL, INC.

Observation Well

Observation Well No.: **OW-27**

STATE OF TEXAS
LEONELL N. SCARBOROUGH
GEOLOGY
#10048
LICENSED
PROFESSIONAL GEOSCIENTIST
6/10/10

PROJECT INFORMATION

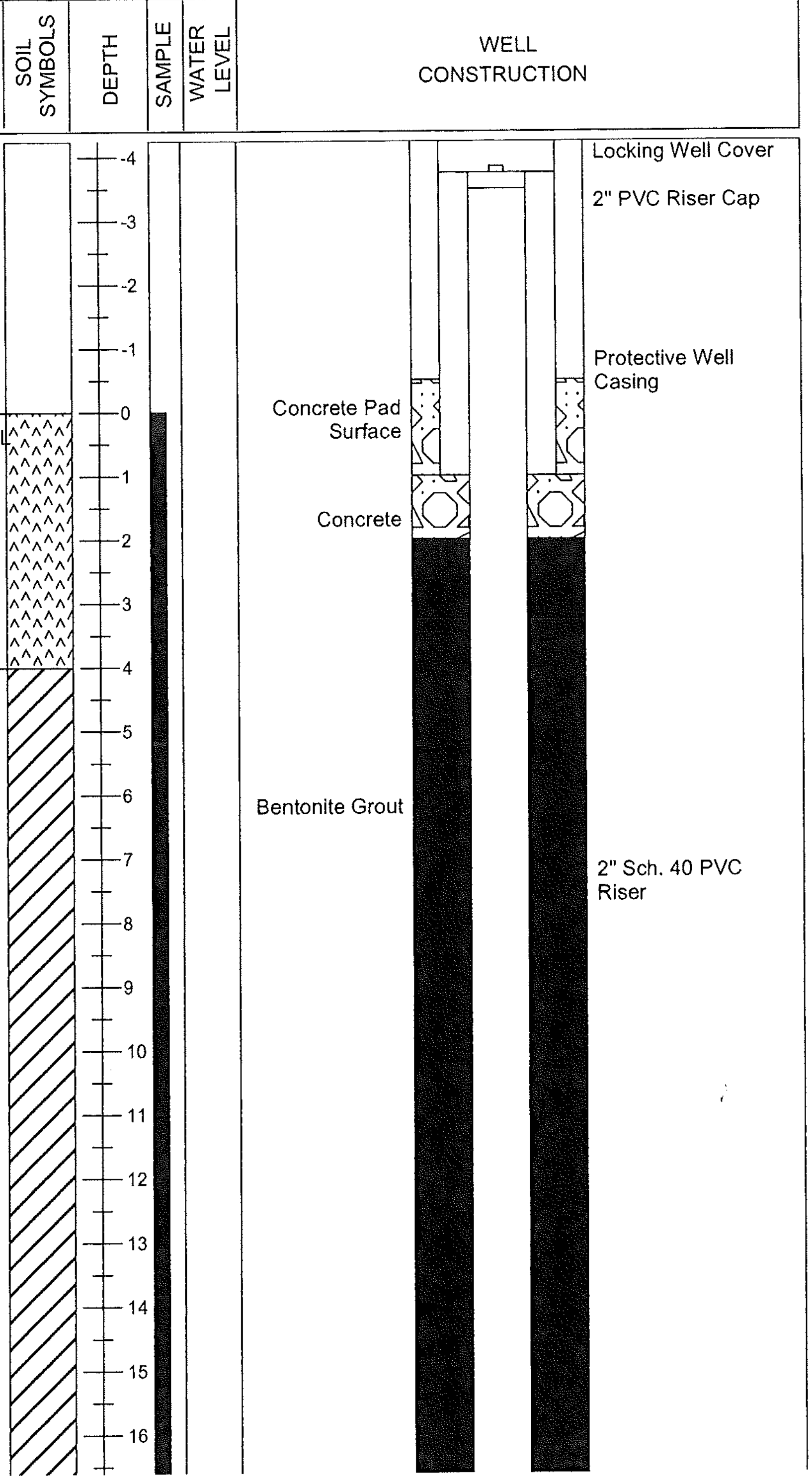
PROJECT:	City of Victoria Landfill
PROJECT NO.:	L-04-622
LOGGED BY:	Mellisa Sanchez
SUPERVISING PG:	Leonell Scarborough
INSTALLATION:	04/29/10
DEVELOPMENT:	05/03/10
SITE LOCATION:	Victoria, Texas
WELL OWNER:	Republic Waste Services of Texas, Ltd.

DRILLING INFORMATION

DRILLER:	Best Drilling/Lawrence H. Tobola
DRILLER'S LICENSE NO.:	3026M
RIG TYPE:	Mobil Drill CME-75
METHOD OF DRILLING:	Hollow Stem Auger
SAMPLING METHODS:	Split Core Barrel
SURFACE ELEVATION:	68.0'
HOLE DIAMETER:	8.25"
NORTHING:	317741.76
EASTING:	2672220.90

▽ Water level during drilling ▼ Water level in completed well ▮ Split Core ▯ No Recovery ▨ Auger

DESCRIPTION	USCS
FILL: Tan, gray, and red-brown, mottling; stiff silty clay, native fill material 0.0' to 4.0'; calcareous concretions; dry	FILL
CLAY: Black; stiff to hard clay; increase in calcareous concretions with depth; dry	CH
- dark gray; increase in calcareous concretions, pebble and sand sized	
- tan, light gray, and red-brown; decrease in calcareous concretions; iron oxide concretions, sand and pebble-sized	
- red-brown and light gray, mottling; slight increase in silt with depth; iron oxide staining	



NOTES: Not to be used separately from original report. USCS descriptors based on field classification not laboratory verified. Page 1 of 4

Hydrex
ENVIRONMENTAL, INC.

Observation Well

Observation Well No.: **OW-27**

STATE OF TEXAS
LEONELL N. SCARBOROUGH
GEOLOGY
#10048
LICENSED
PROFESSIONAL GEOSCIENTIST
6/1/10

PROJECT INFORMATION

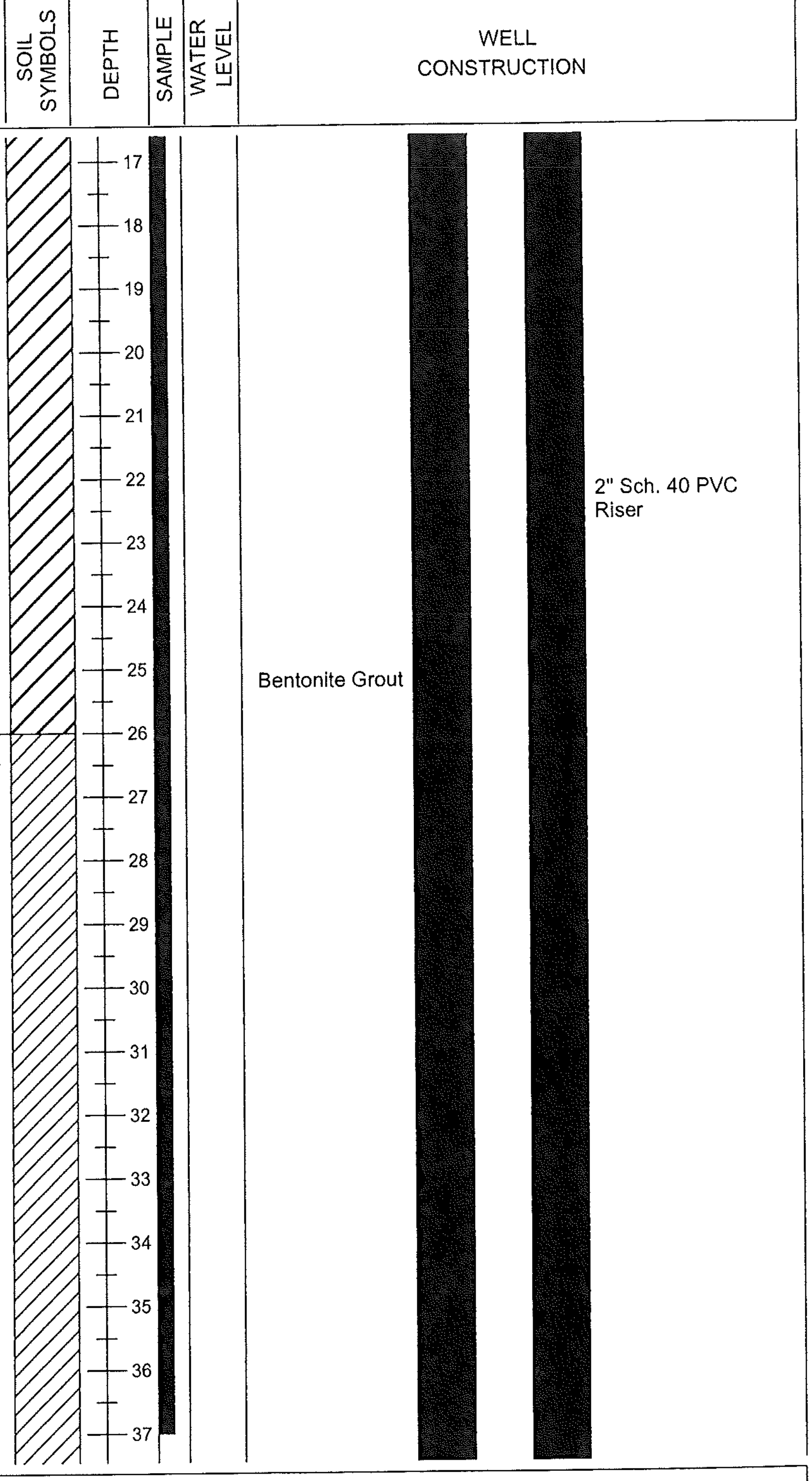
PROJECT:	City of Victoria Landfill
PROJECT NO.:	L-04-622
LOGGED BY:	Mellisa Sanchez
SUPERVISING PG:	Leonell Scarborough
INSTALLATION:	04/29/10
DEVELOPMENT:	05/03/10
SITE LOCATION:	Victoria, Texas
WELL OWNER:	Republic Waste Services of Texas, Ltd.

DRILLING INFORMATION

DRILLER:	Best Drilling/Lawrence H. Tobola
DRILLER'S LICENSE NO.:	3026M
RIG TYPE:	Mobil Drill CME-75
METHOD OF DRILLING:	Hollow Stem Auger
SAMPLING METHODS:	Split Core Barrel
SURFACE ELEVATION:	68.0'
HOLE DIAMETER:	8.25"
NORTHING:	317741.76
EASTING:	2672220.90

▽ Water level during drilling ▼ Water level in completed well ▮ Split Core ▯ No Recovery ▨ Auger

DESCRIPTION	USCS
- light gray and red-brown; increase in silty seams throughout	
SILTY CLAY: Tan with minor red-brown, decreasing with depth; hard clay with increase in silt content with depth; calcareous material; dry	CL
- red-brown, orange, and tan; iron oxide staining	
- no recovery from 37.0' to 40.0'	



NOTES: Not to be used separately from original report. USCS descriptors based on field classification not laboratory verified.

Hydrex
ENVIRONMENTAL, INC.

Observation Well

Observation Well No.: **OW-27**

LEONELL N. SCARBOROUGH
GEOLOGY
#10048
STATE OF TEXAS
PROFESSIONAL GEOSCIENTIST
LICENSED
6/1/10

PROJECT INFORMATION

PROJECT:	**City of Victoria Landfill**
PROJECT NO.:	**L-04-622**
LOGGED BY:	**Mellisa Sanchez**
SUPERVISING PG:	**Leonell Scarborough**
INSTALLATION:	**04/29/10**
DEVELOPMENT:	**05/03/10**
SITE LOCATION:	**Victoria, Texas**
WELL OWNER:	**Republic Waste Services of Texas, Ltd.**

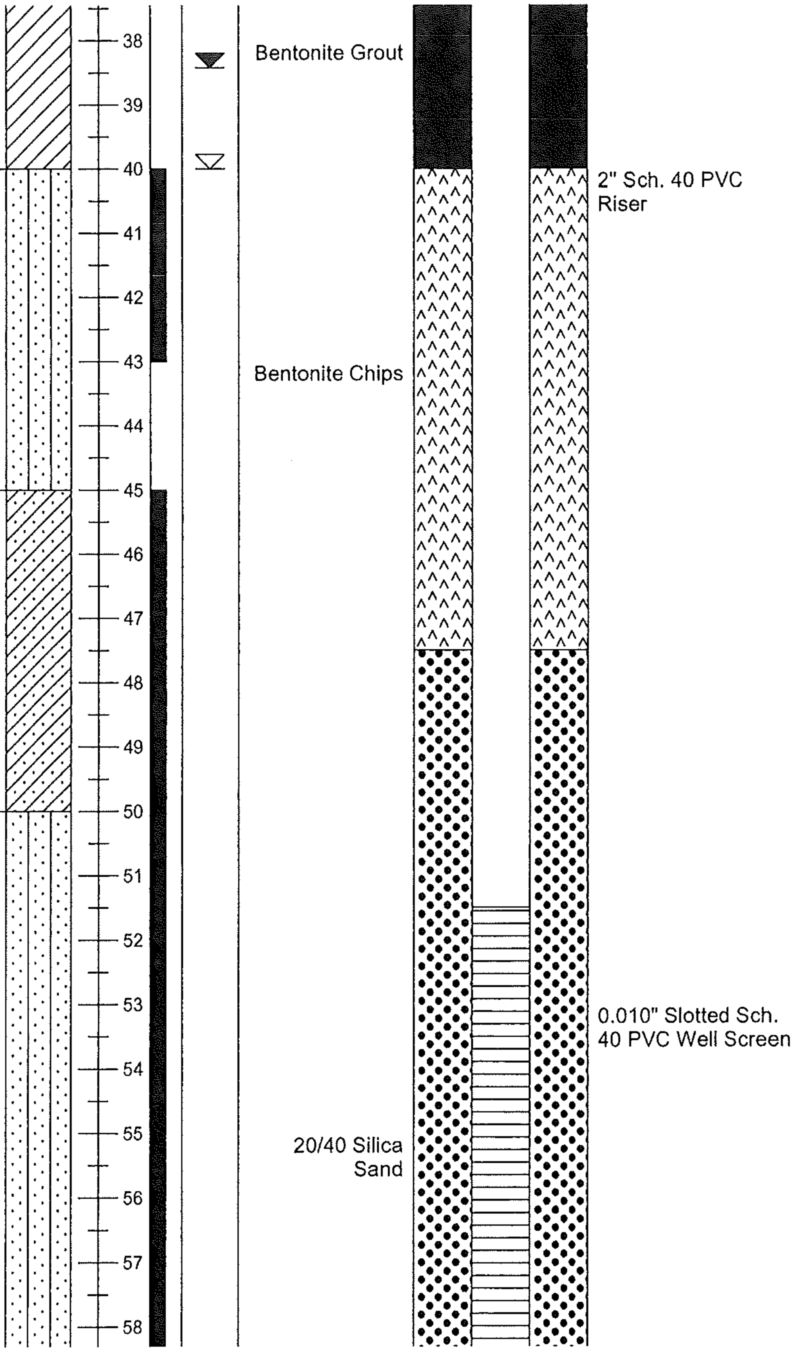
DRILLING INFORMATION

DRILLER:	**Best Drilling/Lawrence H. Tobola**
DRILLER'S LICENSE NO.:	**3026M**
RIG TYPE:	**Mobil Drill CME-75**
METHOD OF DRILLING:	**Hollow Stem Auger**
SAMPLING METHODS:	**Split Core Barrel**
SURFACE ELEVATION:	**68.0'**
HOLE DIAMETER:	**8.25"**
NORTHING:	**317741.76**
EASTING:	**2672220.90**

▽ Water level during drilling ▼ Water level in completed well ▮ Split Core ☐ No Recovery ▨ Auger

DESCRIPTION	USCS
SAND: Tan; loose; very fine-grained quartz sand; rounded; wet @ 40.0' - clay seam @ 42.5' - no recovery from 43.0' to 45.0'	SM
CLAYEY SAND: Tan and orange; sand with clay seams throughout, with loose sand layers; iron oxide staining	SC
SAND: Tan; loose, fine-grained to medium grained quartz sand; sub-rounded and sub-angular	SM

SOIL SYMBOLS | DEPTH | SAMPLE | WATER LEVEL | WELL CONSTRUCTION



NOTES: Not to be used separately from original report. USCS descriptors based on field classification not laboratory verified.

ENVIRONMENTAL, INC.

Observation Well

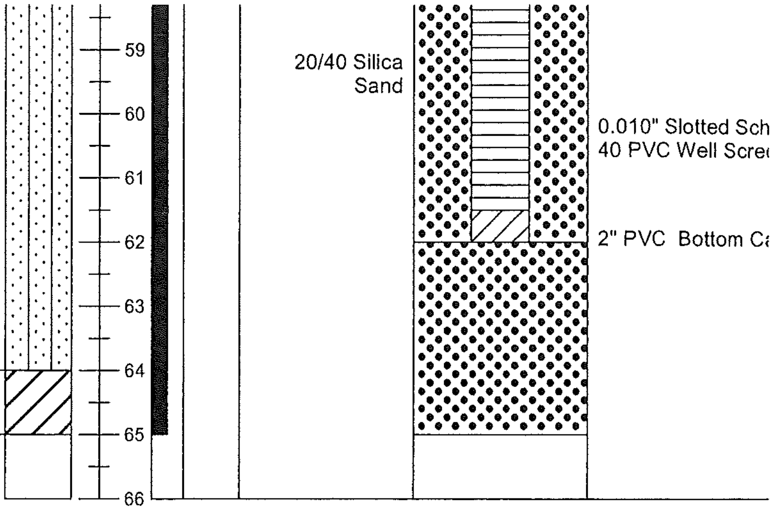
Observation Well No.: **OW-27**

STATE OF TEXAS
LEONELL N. SCARBOROUGH
GEOLOGY
#10048
LICENSED
PROFESSIONAL GEOSCIENTIST
6/10/10

PROJECT INFORMATION		DRILLING INFORMATION	
PROJECT:	**City of Victoria Landfill**	DRILLER:	**Best Drilling/Lawrence H. Tobola**
PROJECT NO.:	**L-04-622**	DRILLER'S LICENSE NO.:	**3026M**
LOGGED BY:	**Mellisa Sanchez**	RIG TYPE:	**Mobil Drill CME-75**
SUPERVISING PG:	**Leonell Scarborough**	METHOD OF DRILLING:	**Hollow Stem Auger**
INSTALLATION:	**04/29/10**	SAMPLING METHODS:	**Split Core Barrel**
DEVELOPMENT:	**05/03/10**	SURFACE ELEVATION:	**68.0'**
SITE LOCATION:	**Victoria, Texas**	HOLE DIAMETER:	**8.25"**
WELL OWNER:	**Republic Waste Services of Texas, Ltd.**	NORTHING: **317741.76**	EASTING: **2672220.90**

▽ Water level during drilling ▼ Water level in completed well ▮ Split Core ☐ No Recovery ▨ Auger

DESCRIPTION	USCS
- increase in grain size, coarse-grained and gravel, pebble sized	
CLAY: Gray; hard clay; calcareous concretions	CH
Bottom of Boring @ 65.0'	



NOTES: Not to be used separately from original report. USCS descriptors based on field classification not laboratory verified.

Hydrex
ENVIRONMENTAL, INC.

Observation Well

Observation Well No.: **OW-28**

LEONELL N. SCARBOROUGH
GEOLOGY
#10048
6/10/10

PROJECT INFORMATION

PROJECT:	**City of Victoria Landfill**
PROJECT NO.:	**L-04-622**
LOGGED BY:	**Mellisa Sanchez**
SUPERVISING PG:	**Leonell Scarborough**
INSTALLATION:	**05/03/10**
DEVELOPMENT:	**05/05/10**
SITE LOCATION:	**Victoria, Texas**
WELL OWNER:	**Republic Waste Services of Texas, Ltd.**

DRILLING INFORMATION

DRILLER:	**Best Drilling/Lawrence H. Tobola**
DRILLER'S LICENSE NO.:	**3026M**
RIG TYPE:	**Mobil Drill CME-75**
METHOD OF DRILLING:	**Hollow Stem Auger**
SAMPLING METHODS:	**Split Core Barrel**
SURFACE ELEVATION:	**65.5'**
HOLE DIAMETER:	**8.25"**
NORTHING:	**318106.83**
EASTING:	**2672663.75**

▽ Water level during drilling ▼ Water level in completed well ▮ Split Core ☐ No Recovery ▦ Auger

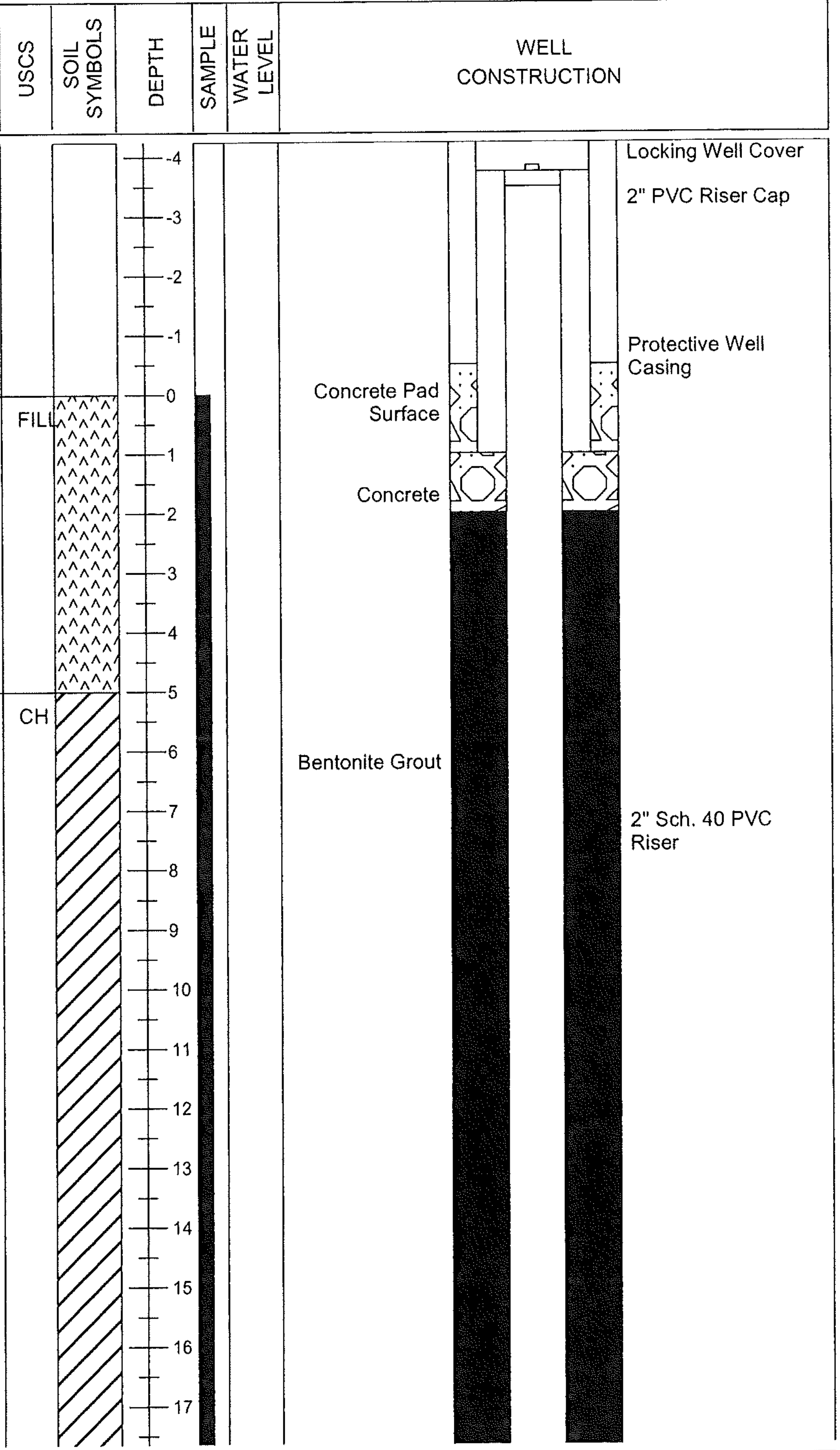
DESCRIPTION

FILL: Dark gray; stiff clay, native fill material 0.0' to 5.0'; dry

CLAY: Black; hard clay; calcareous concreations; dry

- gray, red-brown, and orange, mottling; increase in iron concretions with depth

- increase in calcareous concretions



NOTES: Not to be used separately from original report. USCS descriptors based on field classification not laboratory verified. Page 1 of 3

Hydrex ENVIRONMENTAL, INC.

Observation Well

Observation Well No.: **OW-28**

LEONELL N. SCARBOROUGH
GEOLOGY
#10048

PROJECT INFORMATION

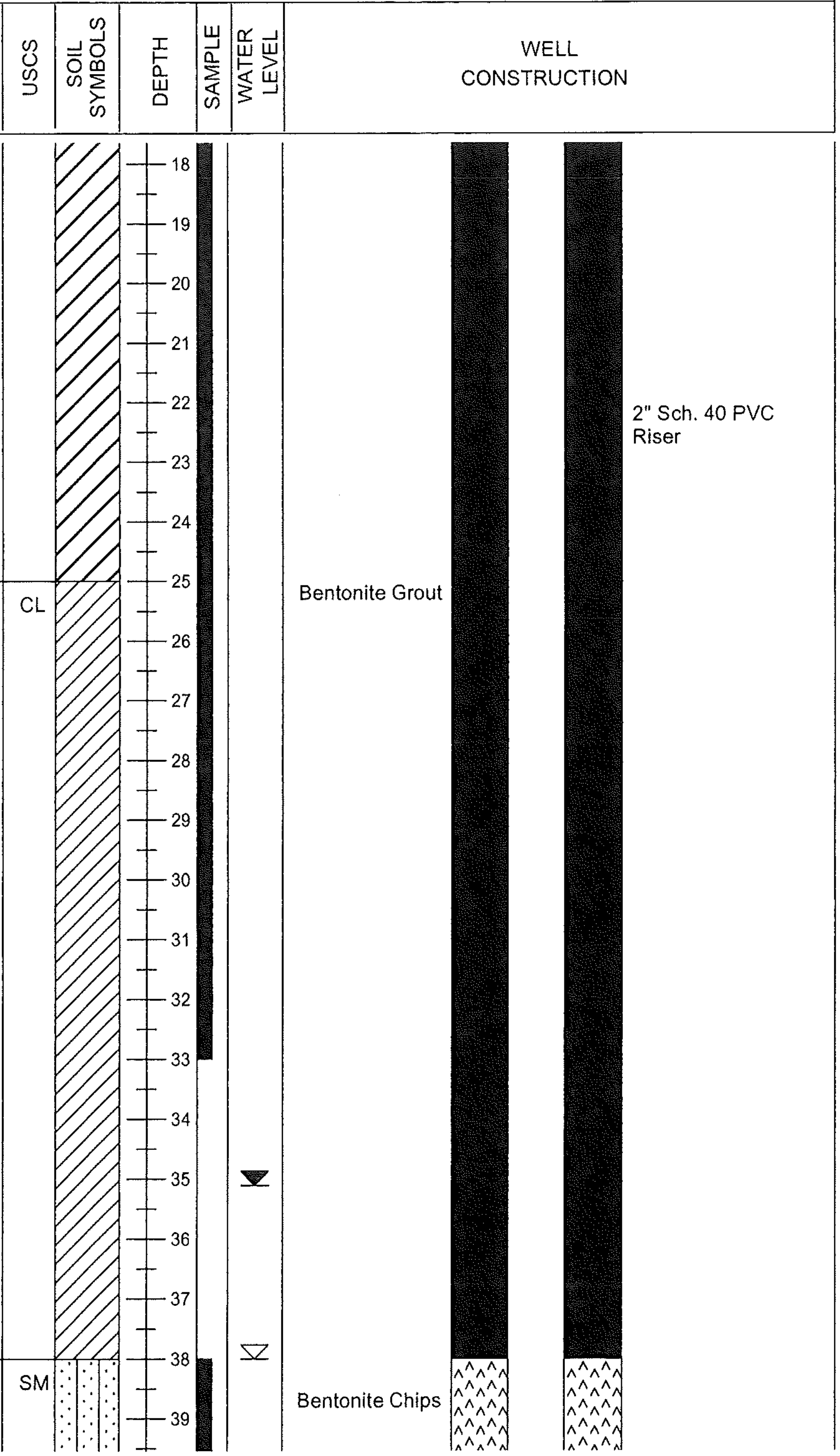
PROJECT: **City of Victoria Landfill**
PROJECT NO.: **L-04-622**
LOGGED BY: **Mellisa Sanchez**
SUPERVISING PG: **Leonell Scarborough**
INSTALLATION: **05/03/10**
DEVELOPMENT: **05/05/10**
SITE LOCATION: **Victoria, Texas**
WELL OWNER: **Republic Waste Services of Texas, Ltd.**

DRILLING INFORMATION

DRILLER: **Best Drilling/Lawrence H. Tobola**
DRILLER'S LICENSE NO.: **3026M**
RIG TYPE: **Mobil Drill CME-75**
METHOD OF DRILLING: **Hollow Stem Auger**
SAMPLING METHODS: **Split Core Barrel**
SURFACE ELEVATION: **65.5'**
HOLE DIAMETER: **8.25"**
NORTHING: **318106.83** EASTING: **2672663.75**

▽ Water level during drilling ▼ Water level in completed well ▮ Split Core ▯ No Recovery ▨ Auger

DESCRIPTION	USCS
- decrease in iron concretions with depth	
SILTY CLAY: Tan and light gray with minor red-brown mottling; hard clay with increase in silt content with depth; increase in calcareous concretions with depth; dry - no recovery from 33.0' to 38.0'	CL
SAND: Tan; loose; very fine-grained quartz sand; rounded; wet @ 38.0'	SM



NOTES: Not to be used separately from original report. USCS descriptors based on field classification not laboratory verified. Page 2 of 3

HYDREX
ENVIRONMENTAL, INC.

Observation Well

Observation Well No.: **OW-28**

LEONELL N. SCARBOROUGH
GEOLOGY
#10048

PROJECT INFORMATION

PROJECT:	**City of Victoria Landfill**
PROJECT NO.:	**L-04-622**
LOGGED BY:	**Mellisa Sanchez**
SUPERVISING PG:	**Leonell Scarborough**
INSTALLATION:	**05/03/10**
DEVELOPMENT:	**05/05/10**
SITE LOCATION:	**Victoria, Texas**
WELL OWNER:	**Republic Waste Services of Texas, Ltd.**

DRILLING INFORMATION

DRILLER:	**Best Drilling/Lawrence H. Tobola**
DRILLER'S LICENSE NO.:	**3026M**
RIG TYPE:	**Mobil Drill CME-75**
METHOD OF DRILLING:	**Hollow Stem Auger**
SAMPLING METHODS:	**Split Core Barrel**
SURFACE ELEVATION:	**65.5'**
HOLE DIAMETER:	**8.25"**
NORTHING: **318106.83**	EASTING: **2672663.75**

▽ Water level during drilling ▼ Water level in completed well ▮ Split Core ☐ No Recovery ▨ Auger

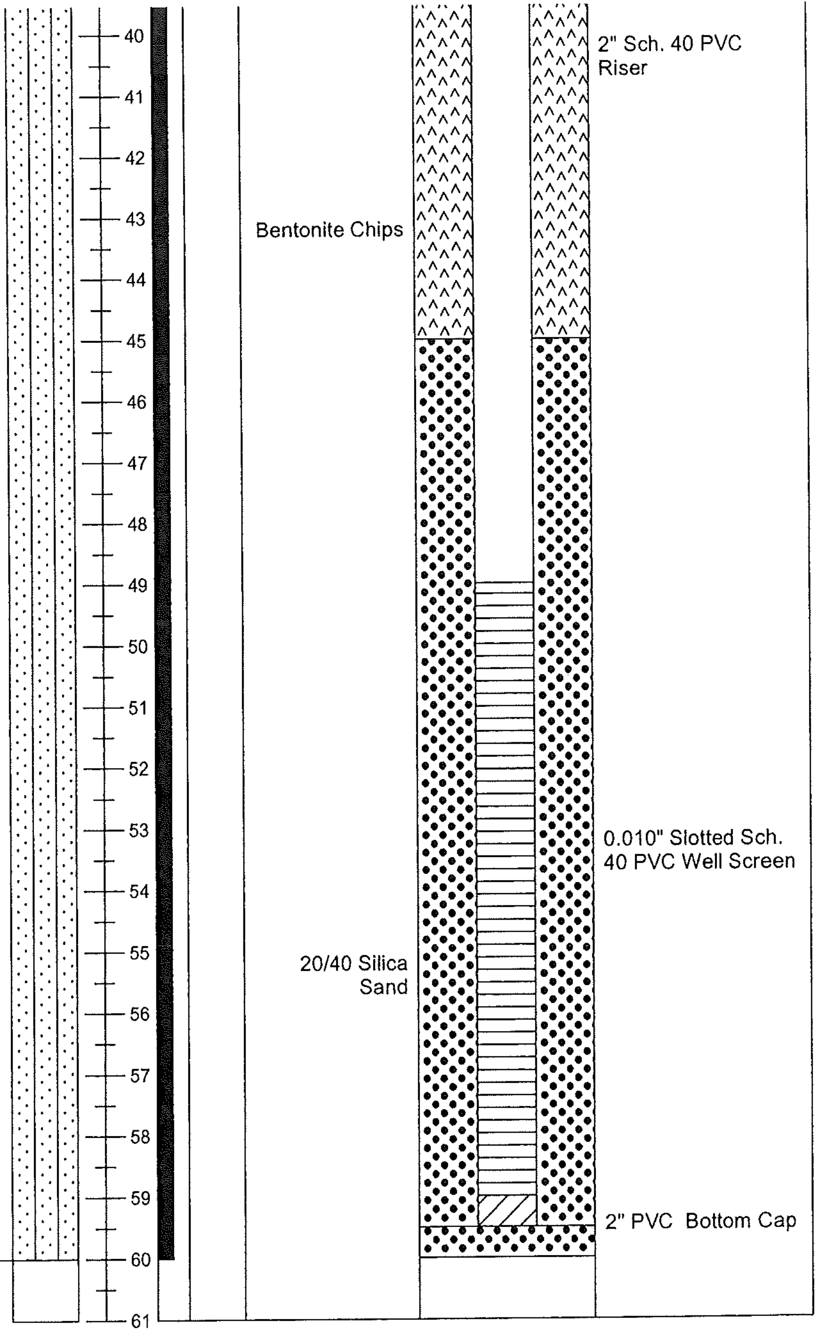
DESCRIPTION	USCS	SOIL SYMBOLS	DEPTH	SAMPLE	WATER LEVEL	WELL CONSTRUCTION

- 2" clay seam @ 39.5'

- tan sand and a 2" gray clay seam @ 49.5'

- tan sand and a 2" gray clay seam @ 54.5'

Bottom of Boring @ 60.0'



NOTES: Not to be used separately from original report. USCS descriptors based on field classification not laboratory verified. Page 3 of 3

BURNS & McDONNELL

June 30, 2023

Mr. Frank Zeng
Project Manager
Waste Permits Division
Texas Commission on Environmental Quality
12100 Park 35 Circle, Building F (MC-124)
Austin, TX 78753

Re: Request for Exception to Well Record Requirements
City of Victoria Landfill (Type I)
Victoria, Victoria County, Texas
CN600243257/RN100212968
Proposed TCEQ Permit Number MSW-1522B

Dear Mr. Zeng:

On behalf of our client, the City of Victoria, Texas, Burns & McDonnell Engineering Company, Inc. (Burns & McDonnell) is submitting this letter as a response to Item No. T11 of the Notice of Deficiency, dated January 09, 2023 (NOD), issued by the Texas Commission on Environmental Quality (TCEQ) for the pending Municipal Solid Waste (MSW) Permit No. 1522B (major amendment of MSW Permit No. 1522A).

Burns & McDonnell would like to request an exception to Title 30 of the Texas Administrative Code (30 TAC) §330.421(a)(1)(D) as it relates to the sealing, signing, and dating of boring logs by a licensed professional (e.g., geoscientist or engineer). A search has been completed to identify and obtain copies of all existing, sealed versions of boring logs within the proposed permit boundary of MSW Permit No. 1522B, including searches of the records maintained by the owner/operator, contracted entities working on the site (including Hydrex Environmental), and those of TCEQ (including Central File Room visitation, through submittal of PIR #23-80907-PIR and #23-81145-PIR, and online request 37168 MSW PA). Through these efforts, Burns & McDonnell believes that an exhaustive and thorough search of these records has been conducted and copies of the boring logs containing the seal of a licensed professional for MW-10 through MW-21 (named P-1 through P-11 at the time of drilling) and MW-A2, MW-A5, and MW-C1, could not be identified and obtained.

An exception to this requirement is being requested to allow for the submittal of unsealed boring logs for all boring logs installed prior to 2001 including MW-5 through MW-20 (excluding MW-15A and MW-15AR), B-1 through B-4, B-B through B-G, and 1 through 10. Additionally, after an exhaustive and thorough search an exception to this requirement is being requested for the following borings installed after 2001 for which sealed boring logs could not be found: MW-A2, MW-A5, MW-C1, C-3, C-5, C-7, D-3, D-5, and D-7. These exceptions are being requested based on the following reasons:

1. At the time of drilling borings prior to 2001, the applicable regulations (30 TAC §330.242(a)(1)(D)) did not require boring logs to be sealed. Additionally, the professional geoscientist seal did not exist prior to 2001 when the requirement for seals was created.
2. Boring logs for MW-A2, MW-A5, and MW-C1 were submitted to TCEQ as Appendix C to the *Report on Assessment of Corrective Measures for Exceedances of Arsenic in Groundwater* (August 2011). The report was sealed; however individual boring logs were not sealed. The professional of record (Marty Ford) no longer works at Hydrex Environmental and therefore, could not be contacted to seal these logs for the permit application of MSW Permit No. 1522B. Provided that the remaining “C” and “D” borings were installed in 2011 as well, sealed boring logs could not be located during the exhaustive and thorough search.

Burns & McDonnell and the City of Victoria have exhausted all means of locating the requested records and all efforts suggest that sealed copies of these records, prior to the establishment of the applicable regulations, do not exist. We are requesting an exception to 30 TAC §330.421(a)(1)(D), which requires that boring logs at municipal solid waste landfills be provided for monitoring wells that are sealed by the professional of record.

Sincerely,

Burns & McDonnell Engineering Company, Inc.

Jack D. Simmons, P.G.
Project Manager

cc: Tonya Koller, Burns & McDonnell
Darryl Lesak, City of Victoria

HYDREX ENVIRONMENTAL, INC.

Monitor Well

Monitor Well No.:**A-2**

PROJECT INFORMATION

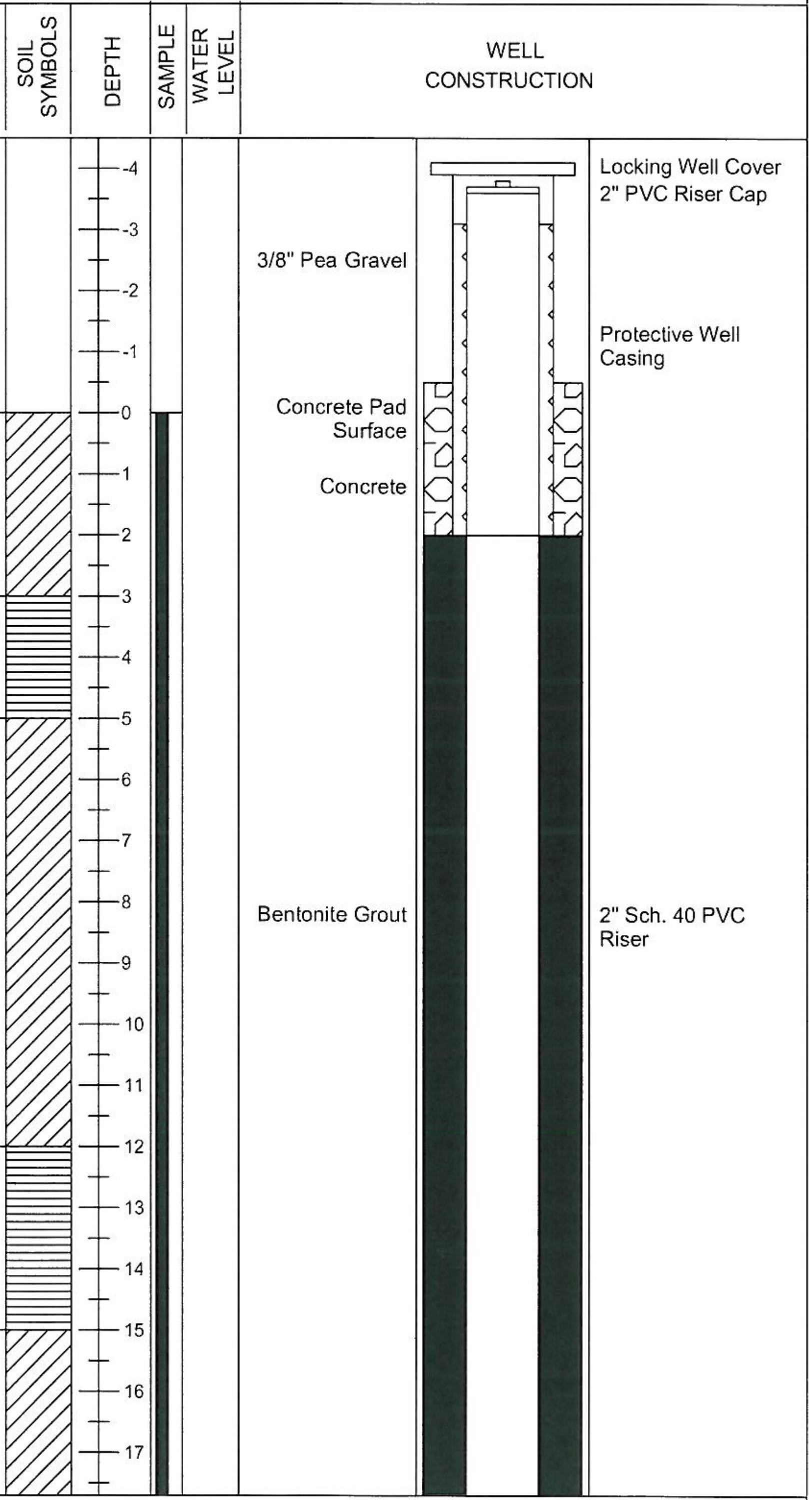
PROJECT:	**City of Victoria Landfill**
PROJECT NO.:	**L-05-617**
LOGGED BY:	**Marty Ford**
SUPERVISING PG:	**Marty Ford**
INSTALLATION:	**02/24 to 02/25/11**
DEVELOPMENT:	**02/25/11**
SITE LOCATION:	**Victoria, Texas**
WELL OWNER:	**City of Victoria Landfill**

DRILLING INFORMATION

DRILLER:	**Best Drilling / Lawrence Tobola**
DRILLER'S LICENSE NO.:	**3026**
RIG TYPE:	**Mobile Drill B-57 Buggy Rig**
METHOD OF DRILLING:	**Hollow Stem Auger**
SAMPLING METHODS:	**Split Core Barrel**
SURFACE ELEVATION:	**64.7'**
HOLE DIAMETER:	**8.25"**
Latitude:	**N 28 41' 17.7"**
Longitude:	**W 96 54' 51.2"**

▽ Water encountered while drilling ▼ Water level in completed well ◧ Split Spoon ☐ No Recovery ▨ Auger

DESCRIPTION	USCS
SILTY CLAY: dark brown-gray, decreasing silt content with depth, slightly moist	CL
CLAY: light brown-gray, slightly silty, slightly moist	CH
SANDY CLAY: light brown-gray, fine to coarse sand grains, some white calcareous material, slightly moist	CL
SILTY CLAY: yellow-brown, slightly moist	
SANDY CLAY: mottled brown and light brown-gray, predominantly very fine to fine sand grains, some medium to coarse sand grains, slightly moist	
CLAY: mottled brown and light tan-gray, slight to moderately silty, slightly moist	CH
SILTY CLAY: mottled brown and light tan-gray, sandy in zones, very fine to medium sand grains, trace light tan-gray angular calcareous fragments, slightly moist	CL



NOTES: Not to be used separately from original report. USCS descriptors based on field classification, not laboratory verified.

Hydrex
ENVIRONMENTAL, INC.

Monitor Well

Monitor Well No.:**A-2**

PROJECT INFORMATION

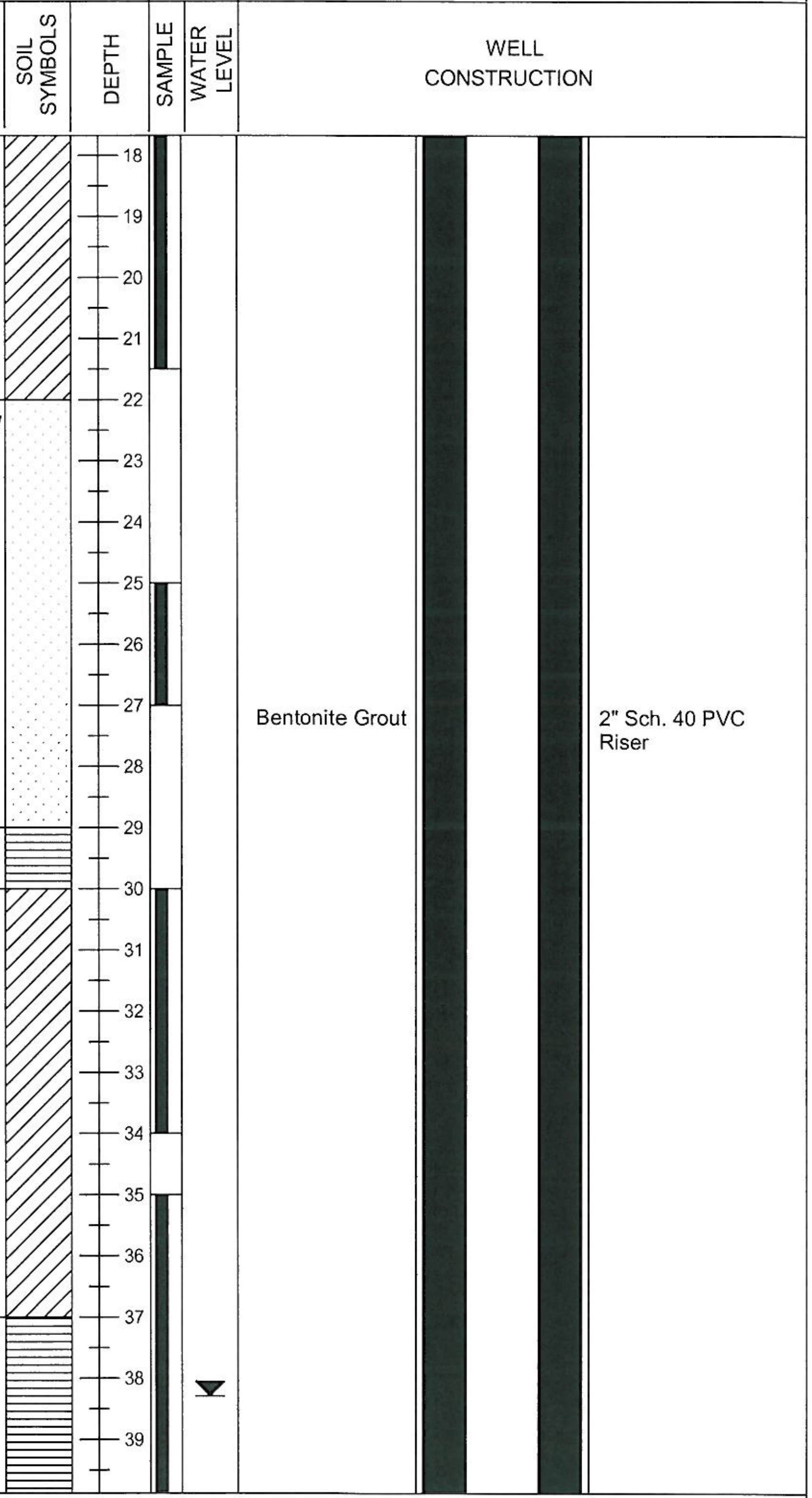
PROJECT:	**City of Victoria Landfill**
PROJECT NO.:	**L-05-617**
LOGGED BY:	**Marty Ford**
SUPERVISING PG:	**Marty Ford**
INSTALLATION:	**02/24 to 02/25/11**
DEVELOPMENT:	**02/25/11**
SITE LOCATION:	**Victoria, Texas**
WELL OWNER:	**City of Victoria Landfill**

DRILLING INFORMATION

DRILLER:	**Best Drilling / Lawrence Tobola**
DRILLER'S LICENSE NO.:	**3026**
RIG TYPE:	**Mobile Drill B-57 Buggy Rig**
METHOD OF DRILLING:	**Hollow Stem Auger**
SAMPLING METHODS:	**Split Core Barrel**
SURFACE ELEVATION:	**64.7'**
HOLE DIAMETER:	**8.25"**
Latitude:	**N 28 41' 17.7"**
Longitude:	**W 96 54' 51.2"**

▽ Water encountered while drilling ▼ Water level in completed well ◧ Split Spoon ☐ No Recovery ▨ Auger

DESCRIPTION	USCS
SILTY CLAY: mottled brown and light tan-gray, moderate to slightly sandy, very fine to fine sand grains, decreasing sand content with depth, slightly moist	
SAND: brown-gray, predominantly medium grained, well sorted, unconsolidated, fairly dry Poor Sample Recovery from 20' to 25' Poor Sample Recovery from 25' to 30'	SW
CLAY: brown, slightly moist	CH
SILTY CLAY: mottled brown and light tan-gray, occasion slightly sandy zones, very fine sand grains, slightly moist Poor Sample Recovery from 30' to 35'	CL
CLAY: light tan-gray, slightly silty, some white calcareous material, slightly moist	CH



NOTES: Not to be used separately from original report. USCS descriptors based on field classification, not laboratory verified.

Hydrex
ENVIRONMENTAL, INC.

Monitor Well

Monitor Well No.:**A-2**

PROJECT INFORMATION

PROJECT:	**City of Victoria Landfill**
PROJECT NO.:	**L-05-617**
LOGGED BY:	**Marty Ford**
SUPERVISING PG:	**Marty Ford**
INSTALLATION:	**02/24 to 02/25/11**
DEVELOPMENT:	**02/25/11**
SITE LOCATION:	**Victoria, Texas**
WELL OWNER:	**City of Victoria Landfill**

DRILLING INFORMATION

DRILLER:	**Best Drilling / Lawrence Tobola**
DRILLER'S LICENSE NO.:	**3026**
RIG TYPE:	**Mobile Drill B-57 Buggy Rig**
METHOD OF DRILLING:	**Hollow Stem Auger**
SAMPLING METHODS:	**Split Core Barrel**
SURFACE ELEVATION:	**64.7'**
HOLE DIAMETER:	**8.25"**
Latitude:	**N 28 41' 17.7"**
Longitude:	**W 96 54' 51.2"**

▽ Water encountered while drilling ▼ Water level in completed well ◧ Split Spoon ☐ No Recovery ▨ Auger

DESCRIPTION

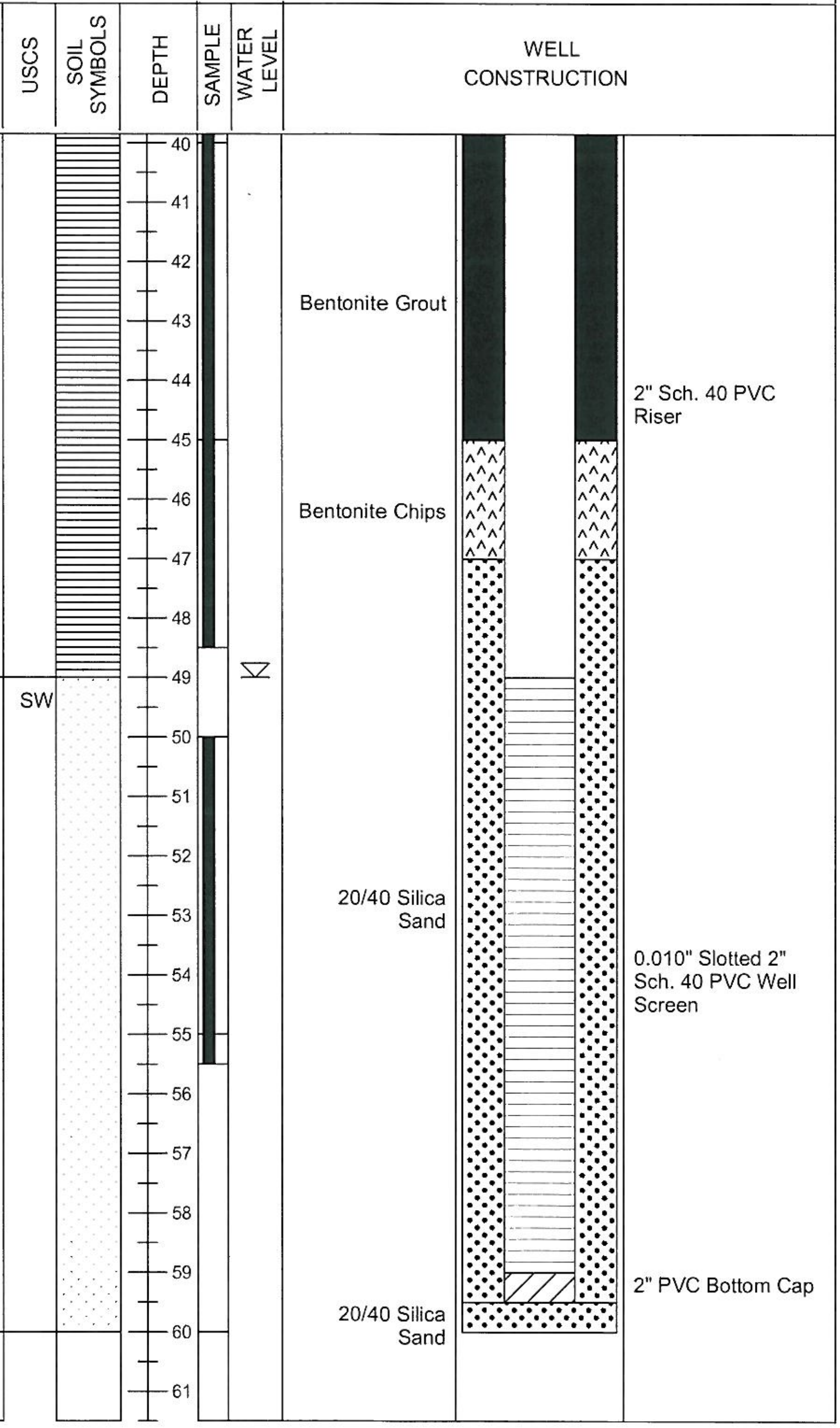
CLAY: light tan-gray, slightly silty, some white calcareous material, slightly moist

Poor Sample Recovery from 45' to 50'

SAND: light gray, predominantly fine grained, some very fine sand grains, well sorted, unconsolidated, saturated

Poor Sample Recovery from 55' to 60'

Bottom of Boring @ 60.0'



NOTES: Not to be used separately from original report. USCS descriptors based on field classification, not laboratory verified. Page 3 of 3

ENVIRONMENTAL, INC.

Monitor Well

Monitor Well No.:**A-5**

PROJECT INFORMATION

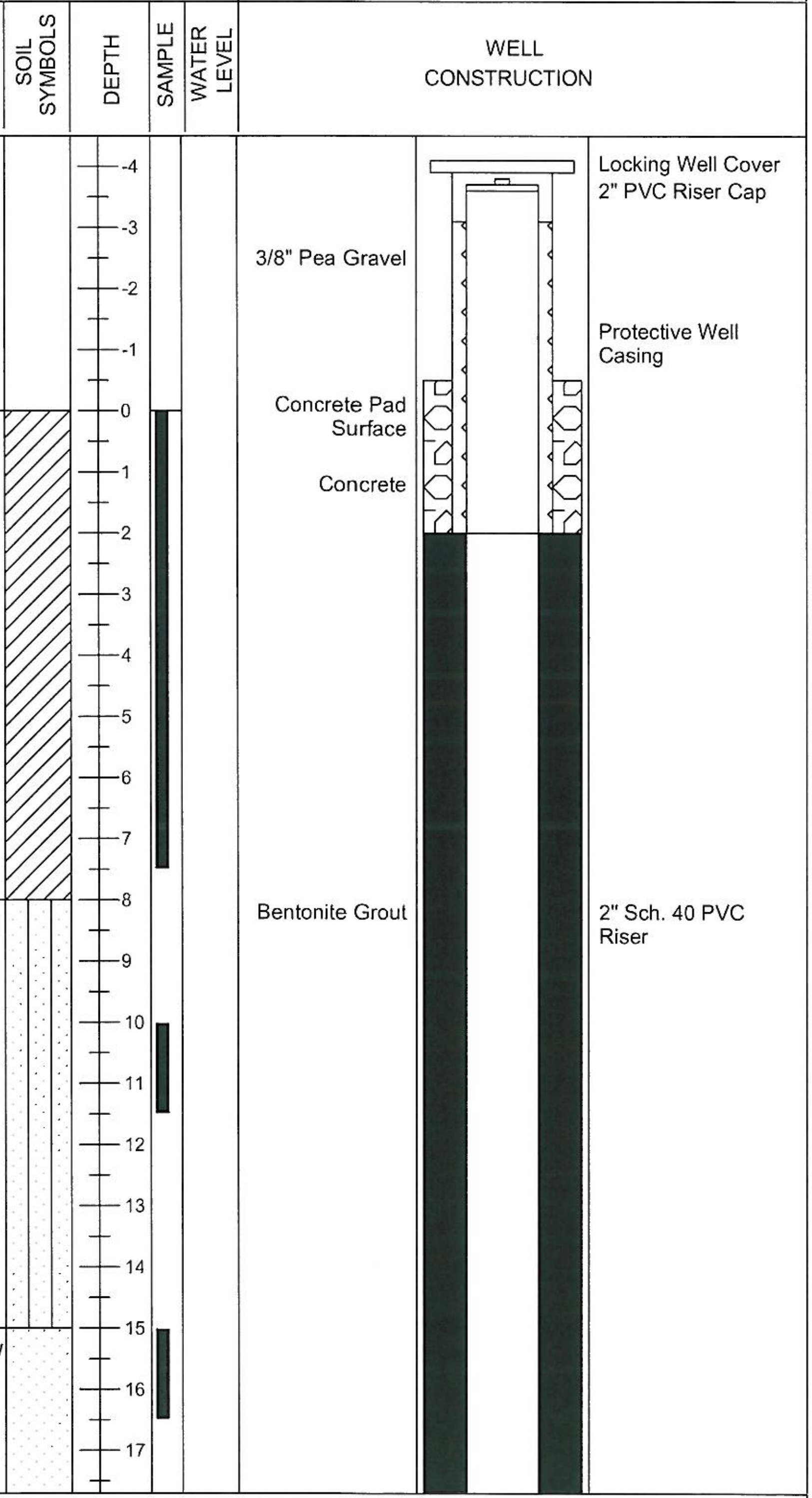
PROJECT:	**City of Victoria Landfill**
PROJECT NO.:	**L-05-617**
LOGGED BY:	**Marty Ford**
SUPERVISING PG:	**Marty Ford**
INSTALLATION:	**02/25/11**
DEVELOPMENT:	**02/26/11**
SITE LOCATION:	**Victoria, Texas**
WELL OWNER:	**City of Victoria Landfill**

DRILLING INFORMATION

DRILLER:	**Best Drilling / Lawrence Tobola**
DRILLER'S LICENSE NO.:	**3026**
RIG TYPE:	**Mobile Drill B-57 Buggy Rig**
METHOD OF DRILLING:	**Hollow Stem Auger**
SAMPLING METHODS:	**Split Core Barrel**
SURFACE ELEVATION:	**64.4'**
HOLE DIAMETER:	**8.25"**
Latitude:	**N 28 41' 13.5"**
Longitude:	**W 96 54' 46.9"**

▽ Water encountered while drilling ▼ Water level in completed well ◧ Split Spoon ☐ No Recovery ▨ Auger

DESCRIPTION	USCS
SILTY CLAY: dark brown-gray, soft to slightly firm, moderately moist	CL
SILTY CLAY: gray-brown, slightly sandy, fine to coarse sand grains, occassional white calcareous material, fairly dry	
SILTY SAND: gray-brown, very fine to fine grained, moderate to slight clay content, fairly dry Poor Sample Recovery from 5' to 10' Poor Sample Recovery from 10' to 15'	SM
SAND: light brown-gray, very fine to fine grained, moderately well sorted, unconsolidated, fairly dry Poor Sample Recovery from 15' to 20'	SW



NOTES: Not to be used separately from original report. USCS descriptors based on field classification, not laboratory verified.

Hydrex
ENVIRONMENTAL, INC.

Monitor Well

Monitor Well No.:**A-5**

PROJECT INFORMATION

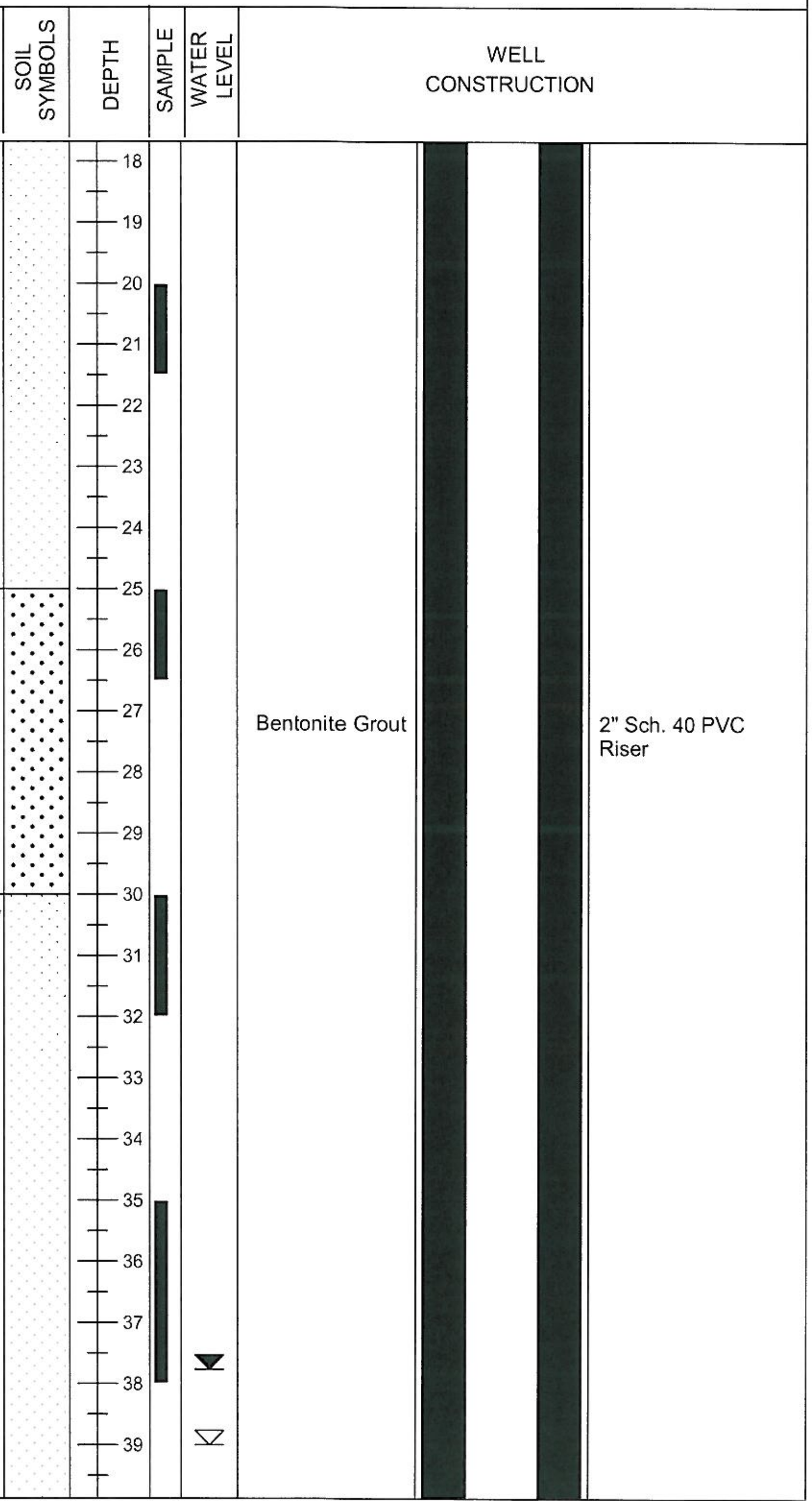
PROJECT:	**City of Victoria Landfill**
PROJECT NO.:	**L-05-617**
LOGGED BY:	**Marty Ford**
SUPERVISING PG:	**Marty Ford**
INSTALLATION:	**02/25/11**
DEVELOPMENT:	**02/26/11**
SITE LOCATION:	**Victoria, Texas**
WELL OWNER:	**City of Victoria Landfill**

DRILLING INFORMATION

DRILLER:	**Best Drilling / Lawrence Tobola**
DRILLER'S LICENSE NO.:	**3026**
RIG TYPE:	**Mobile Drill B-57 Buggy Rig**
METHOD OF DRILLING:	**Hollow Stem Auger**
SAMPLING METHODS:	**Split Core Barrel**
SURFACE ELEVATION:	**64.4'**
HOLE DIAMETER:	**8.25"**
Latitude:	**N 28 41' 13.5"**
Longitude:	**W 96 54' 46.9"**

▽ Water encountered while drilling ▼ Water level in completed well ◧ Split Spoon ☐ No Recovery ▨ Auger

DESCRIPTION	USCS
SAND: light brown-gray, predominantly fine grained, some medium grains, moderately well sorted, unconsolidated, fairly dry Poor Sample Recovery from 20' to 25'	
SAND: light brown-gray, medium to coarse grained, increasing clay content with depth, poorly sorted, friable, abundant small white calcareous fragments, slightly moist Poor Sample Recovery from 25' to 30'	SP
SAND: yellow-brown, fine to very fine grained, moderately well sorted, slight clay content, unconsolidated, fairly dry Poor Sample Recovery from 30' to 35' SAND: yellow-brown, fine to very fine grained, moderately well sorted, unconsolidated, moderately moist to saturated	SW



NOTES: Not to be used separately from original report. USCS descriptors based on field classification, not laboratory verified.

Hydrex
ENVIRONMENTAL, INC.

Monitor Well

Monitor Well No.:**A-5**

PROJECT INFORMATION

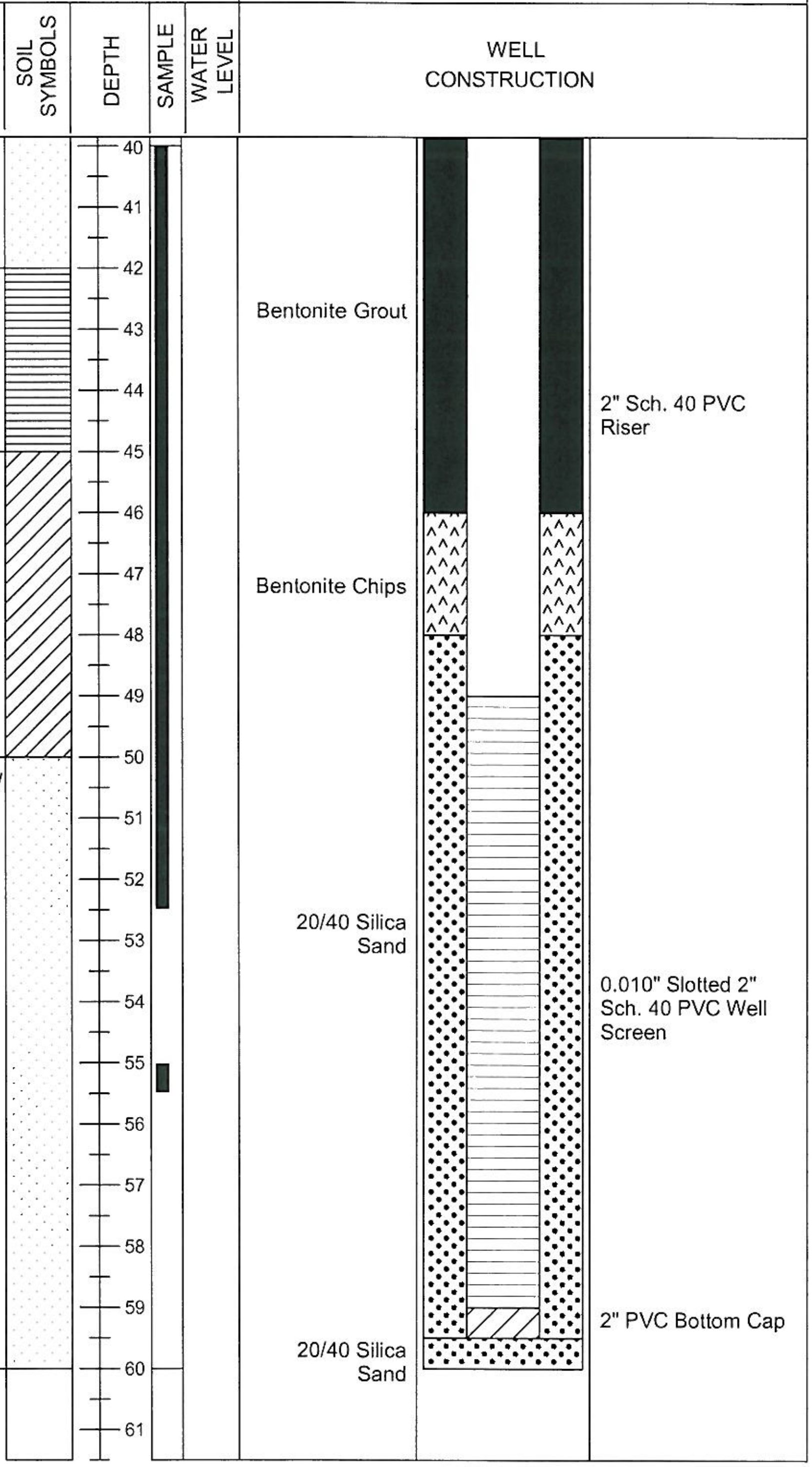
PROJECT:	**City of Victoria Landfill**
PROJECT NO.:	**L-05-617**
LOGGED BY:	**Marty Ford**
SUPERVISING PG:	**Marty Ford**
INSTALLATION:	**02/25/11**
DEVELOPMENT:	**02/26/11**
SITE LOCATION:	**Victoria, Texas**
WELL OWNER:	**City of Victoria Landfill**

DRILLING INFORMATION

DRILLER:	**Best Drilling / Lawrence Tobola**
DRILLER'S LICENSE NO.:	**3026**
RIG TYPE:	**Mobile Drill B-57 Buggy Rig**
METHOD OF DRILLING:	**Hollow Stem Auger**
SAMPLING METHODS:	**Split Core Barrel**
SURFACE ELEVATION:	**64.4'**
HOLE DIAMETER:	**8.25"**
Latitude:	**N 28 41' 13.5"**
Longitude:	**W 96 54' 46.9"**

▽ Water encountered while drilling ▼ Water level in completed well ◧ Split Spoon ☐ No Recovery ▨ Auger

DESCRIPTION	USCS
SAND: brown-gray, fine to medium grained, moderately well sorted, slight clay content, unconsolidated, saturated	
CLAY: light tan-gray, slightly silty, very stiff, occassional white calcareous material, slightly moist	CH
SANDY CLAY: light tan-gray, medium to fine sand grains, abundant white calcareous material, some calcareous cementing, slightly moist	CL
SAND: gray, predominantly fine grained, some medium sand grains, moderately well sorted, unconsolidated, saturated Poor Sample Recovery from 50' to 55' Poor Sample Recovery from 55' to 60'	SW
Bottom of Boring @ 60.0'	



NOTES: Not to be used separately from original report. USCS descriptors based on field classification, not laboratory verified.

Hydrex ENVIRONMENTAL, INC.

Monitor Well

Monitor Well No.:**C-1**

PROJECT INFORMATION

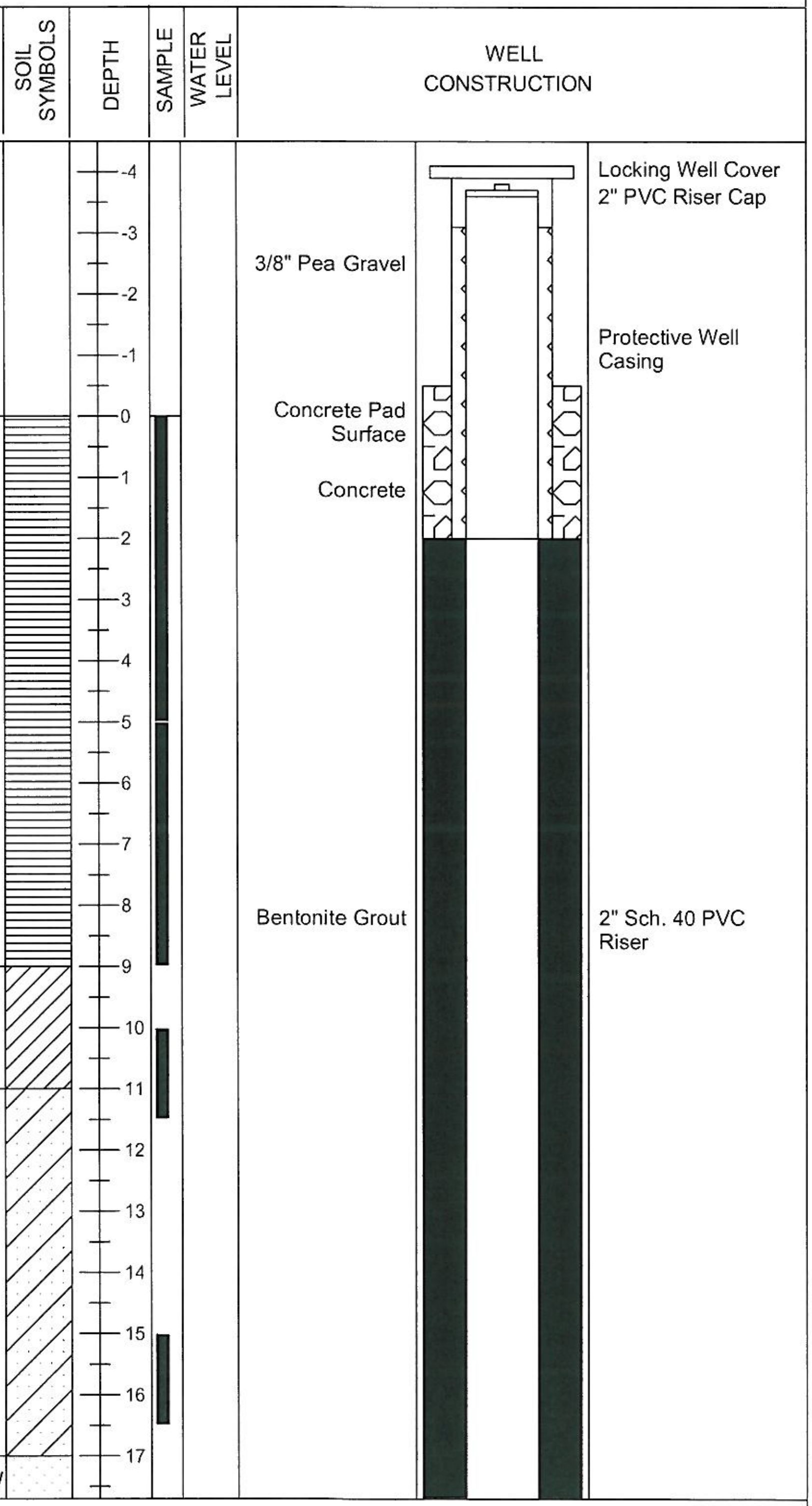
PROJECT:	**City of Victoria Landfill**
PROJECT NO.:	**L-05-617**
LOGGED BY:	**Marty Ford**
SUPERVISING PG:	**Marty Ford**
INSTALLATION:	**02/25/11**
DEVELOPMENT:	**02/25/11**
SITE LOCATION:	**Victoria, Texas**
WELL OWNER:	**City of Victoria Landfill**

DRILLING INFORMATION

DRILLER:	**Best Drilling / Lawrence Tobola**
DRILLER'S LICENSE NO.:	**3026**
RIG TYPE:	**Mobile Drill B-57 Buggy Rig**
METHOD OF DRILLING:	**Hollow Stem Auger**
SAMPLING METHODS:	**Split Core Barrel**
SURFACE ELEVATION:	**65.2'**
HOLE DIAMETER:	**8.25"**
Latitude:	**N 28 41' 22.4"**
Longitude:	**W 96 54' 48.0"**

▽ Water encountered while drilling ▼ Water level in completed well ◧ Split Spoon ☐ No Recovery ▨ Auger

DESCRIPTION	USCS
CLAY: dark brown-gray, sticky, moderately moist CLAY: yellow-brown, slightly silty, slightly moist	CH
Moderate Sample Recovery from 5' to 10' SANDY CLAY: mottled brown and light brown-gray, very fine to fine sand grains, slightly moist	CL
CLAYEY SAND: light tan, very fine to fine grained, slightly moist Poor Sample Recovery from 10' to 15' CLAYEY SAND: light brown-gray, very silty, very fine to fine sand grains, friable, fairly dry	SC
SAND: light brown, predominantly fine grained, some very	SW



NOTES: Not to be used separately from original report. USCS descriptors based on field classification, not laboratory verified.

Hydrex ENVIRONMENTAL, INC.

Monitor Well

Monitor Well No.:**C-1**

PROJECT INFORMATION

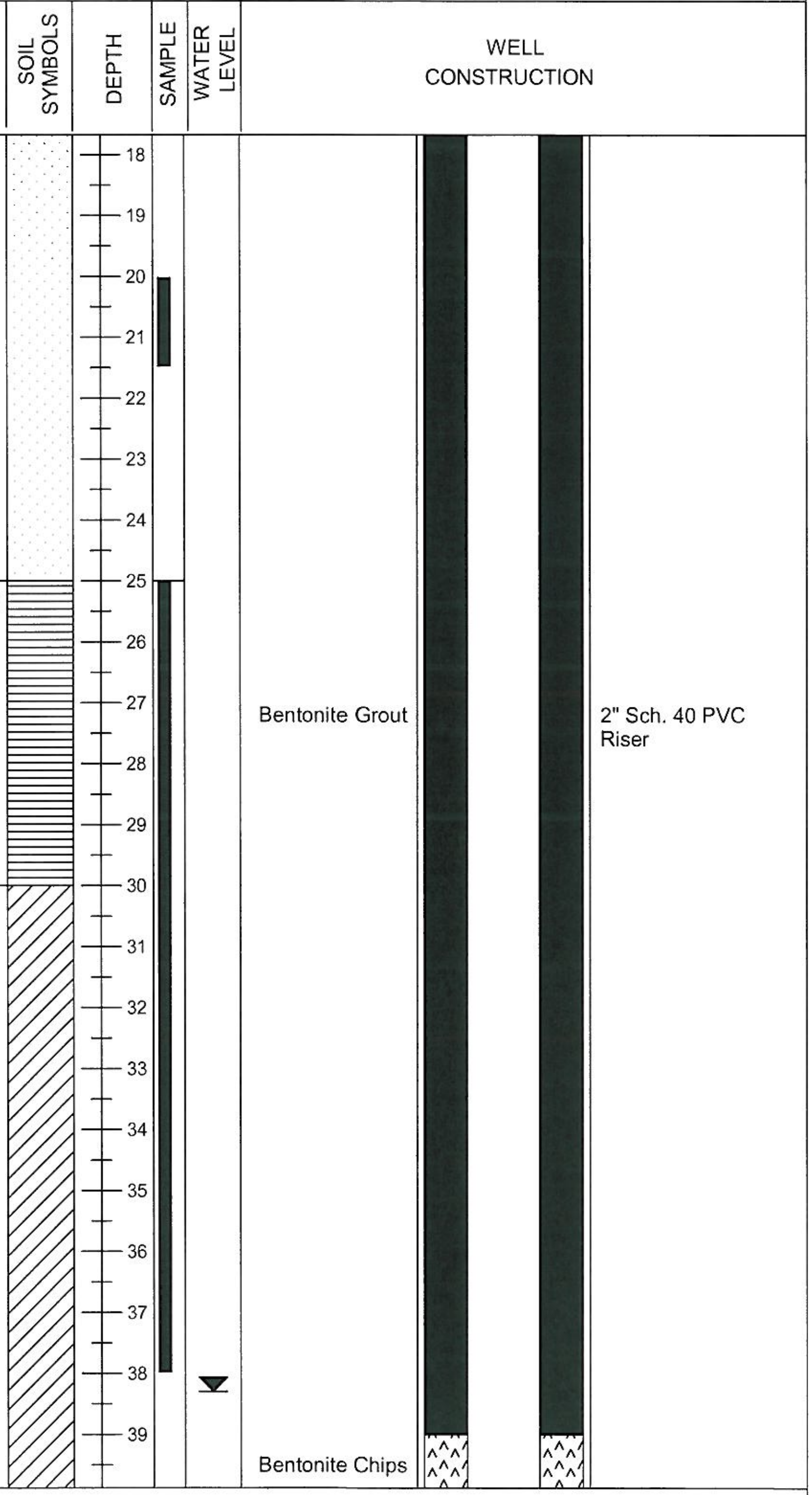
PROJECT: **City of Victoria Landfill**
PROJECT NO.: **L-05-617**
LOGGED BY: **Marty Ford**
SUPERVISING PG: **Marty Ford**
INSTALLATION: **02/25/11**
DEVELOPMENT: **02/25/11**
SITE LOCATION: **Victoria, Texas**
WELL OWNER: **City of Victoria Landfill**

DRILLING INFORMATION

DRILLER: **Best Drilling / Lawrence Tobola**
DRILLER'S LICENSE NO.: **3026**
RIG TYPE: **Mobile Drill B-57 Buggy Rig**
METHOD OF DRILLING: **Hollow Stem Auger**
SAMPLING METHODS: **Split Core Barrel**
SURFACE ELEVATION: **65.2'**
HOLE DIAMETER: **8.25"**
Latitude: **N 28 41' 22.4"** Longitude: **W 96 54' 48.0"**

▽ Water encountered while drilling ▼ Water level in completed well ◧ Split Spoon ☐ No Recovery ▧ Auger

DESCRIPTION	USCS
fine sand grains, moderately well sorted, unconsolidated, fairly dry Poor Sample Recovery from 15' to 20' Poor Sample Recovery from 20' to 25'	
CLAY: mottled light brown and light gray, silty from 25' to 26', slight to moderately silty from 26' to 27', slightly sandy, fine to very fine sand grains, slightly moist	CH
SILTY CLAY: mottled light brown and light gray, sandy in zones, very fine to fine sand grains, slightly moist	CL
SANDY CLAY: light brown-gray, fine to medium sand grains, occassional coarse sand grains, fairly dry Poor Sample Recovery from 35' to 40'	



NOTES: Not to be used separately from original report. USCS descriptors based on field classification, not laboratory verified.

HYDREX ENVIRONMENTAL, INC.

Monitor Well

Monitor Well No.:**C-1**

PROJECT INFORMATION

PROJECT:	**City of Victoria Landfill**
PROJECT NO.:	**L-05-617**
LOGGED BY:	**Marty Ford**
SUPERVISING PG:	**Marty Ford**
INSTALLATION:	**02/25/11**
DEVELOPMENT:	**02/25/11**
SITE LOCATION:	**Victoria, Texas**
WELL OWNER:	**City of Victoria Landfill**

DRILLING INFORMATION

DRILLER:	**Best Drilling / Lawrence Tobola**
DRILLER'S LICENSE NO.:	**3026**
RIG TYPE:	**Mobile Drill B-57 Buggy Rig**
METHOD OF DRILLING:	**Hollow Stem Auger**
SAMPLING METHODS:	**Split Core Barrel**
SURFACE ELEVATION:	**65.2'**
HOLE DIAMETER:	**8.25"**
Latitude:	**N 28 41' 22.4"**
Longitude:	**W 96 54' 48.0"**

▽ Water encountered while drilling ▼ Water level in completed well ◧ Split Spoon ☐ No Recovery ▨ Auger

DESCRIPTION

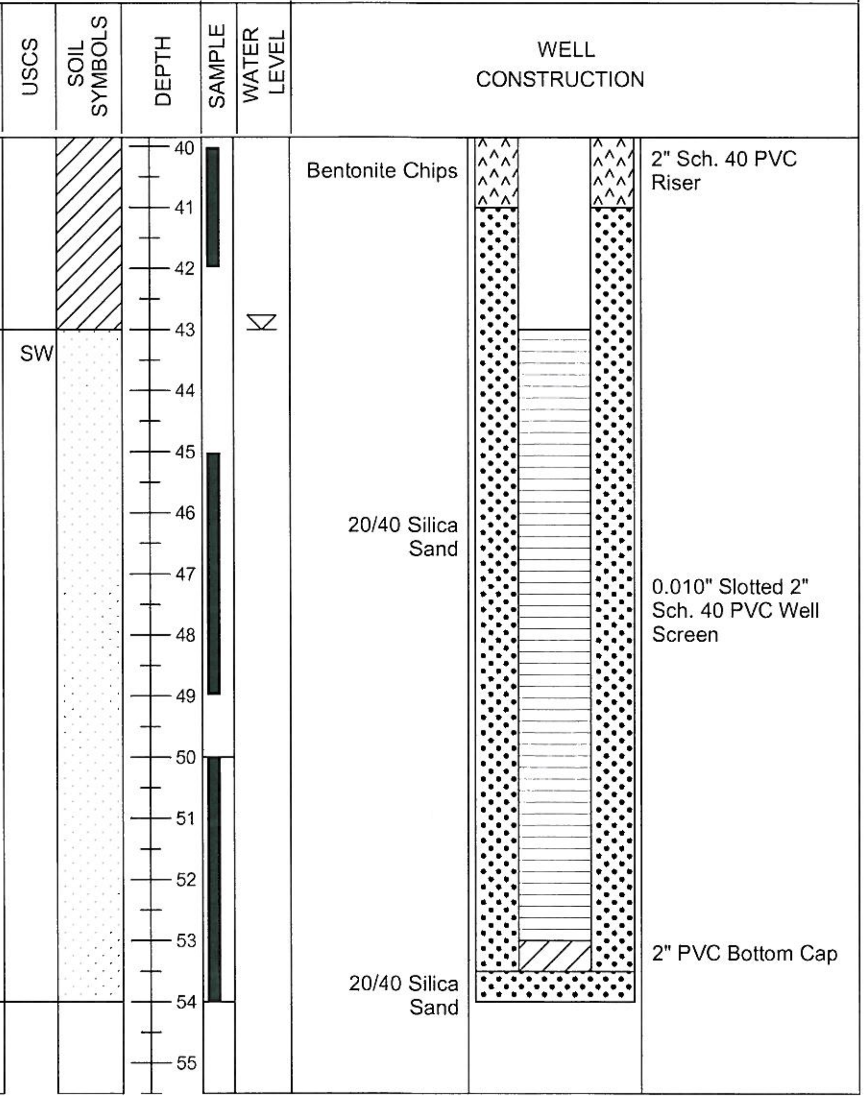
SANDY CLAY: light brown-gray, very fine to fine sand grains, very moist

Poor Sample Recovery from 40' to 45'

SAND: brown-gray, predominantly medium grained, well sorted, unconsolidated, saturated

Moderate Sample Recovery from 45' to 50'

Bottom of Boring @ 54.0'



NOTES: Not to be used separately from original report. USCS descriptors based on field classification, not laboratory verified.

Hydrex ENVIRONMENTAL, INC.

Monitor Well

Monitor Well No.:**C-3**

PROJECT INFORMATION

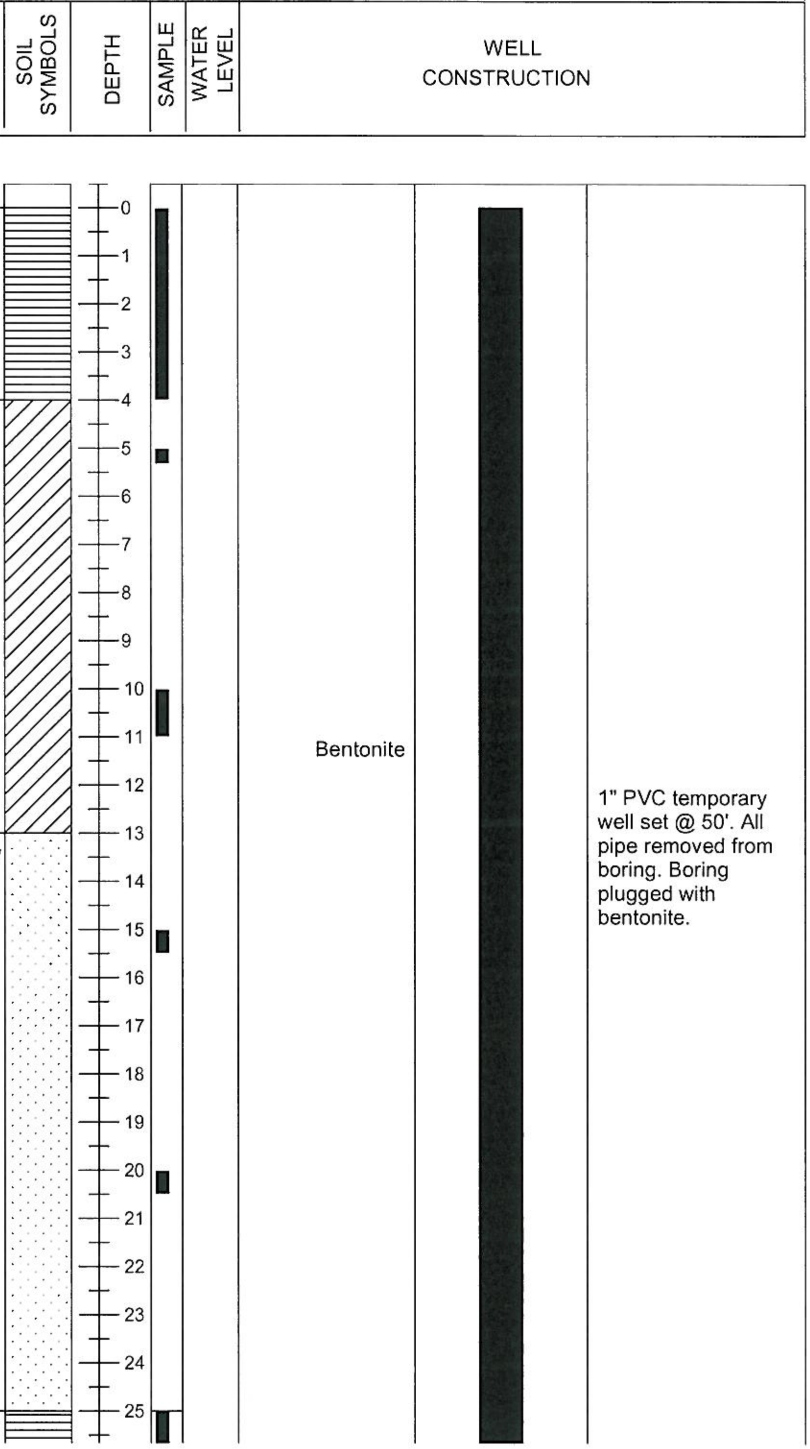
PROJECT:	**City of Victoria Landfill**
PROJECT NO.:	**L-05-617**
LOGGED BY:	**Marty Ford**
SUPERVISING PG:	**Marty Ford**
INSTALLATION:	**02/24/11**
DEVELOPMENT:	**Temporary Well**
SITE LOCATION:	**Victoria, Texas**
WELL OWNER:	**City of Victoria Landfill**

DRILLING INFORMATION

DRILLER:	**Best Drilling / Lawrence Tobola**
DRILLER'S LICENSE NO.:	**3026**
RIG TYPE:	**Mobile Drill B-57 Buggy Rig**
METHOD OF DRILLING:	**Hollow Stem Auger**
SAMPLING METHODS:	**Split Core Barrel**
SURFACE ELEVATION:	**~65.8'**
HOLE DIAMETER:	**8.25"**
Latitude:	**N 28 41' 19.1"**
Longitude:	**W 96 54' 45.5"**

▽ Water encountered while drilling ▼ Water level in completed well ◧ Split Spoon ☐ No Recovery ▨ Auger

DESCRIPTION	USCS
CLAY: dark brown-gray, slightly silty, slightly moist	CH
Moderate Sample Recovery from 0' to 5' SILTY CLAY: light tan-gray, occassional sandy zones, very fine to fine sand grains, slightly moist Very Poor Sample Recovery from 5' to 10' SILTY CLAY: tan-gray, slight to moderately sandy, very fine sand grains, some fine sand grains, trace to occassional white calcareous material, slightly moist Poor Sample Recovery from 10' to 15'	CL
SAND: tan-gray, fine to very fine grained, moderately well sorted, unconsolidated, fairly dry Poor Sample Recovery from 15' to 20' SAND: tan-gray, predominantly fine grained, some medium grains, moderately well sorted, fairly dry Poor Sample Recovery from 20' to 25'	SW
CLAY: mottled brown and tan-gray, slightly silty, slightly	CH



1" PVC temporary well set @ 50'. All pipe removed from boring. Boring plugged with bentonite.

NOTES: Not to be used separately from original report. USCS descriptors based on field classification, not laboratory verified.

Hydrex
ENVIRONMENTAL, INC.

Monitor Well

Monitor Well No.:**C-3**

PROJECT INFORMATION

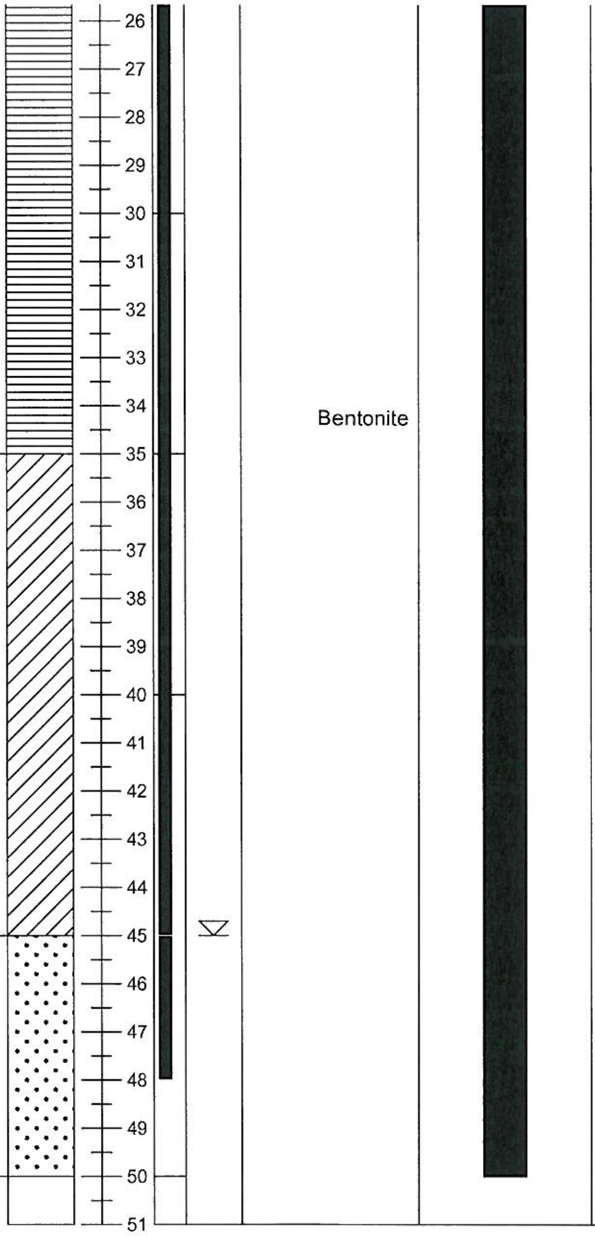
PROJECT:	**City of Victoria Landfill**
PROJECT NO.:	**L-05-617**
LOGGED BY:	**Marty Ford**
SUPERVISING PG:	**Marty Ford**
INSTALLATION:	**02/24/11**
DEVELOPMENT:	**Temporary Well**
SITE LOCATION:	**Victoria, Texas**
WELL OWNER:	**City of Victoria Landfill**

DRILLING INFORMATION

DRILLER:	**Best Drilling / Lawrence Tobola**
DRILLER'S LICENSE NO.:	**3026**
RIG TYPE:	**Mobile Drill B-57 Buggy Rig**
METHOD OF DRILLING:	**Hollow Stem Auger**
SAMPLING METHODS:	**Split Core Barrel**
SURFACE ELEVATION:	**~65.8'**
HOLE DIAMETER:	**8.25"**
Latitude: **N 28 41' 19.1"**	Longitude: **W 96 54' 45.5"**

▽ Water encountered while drilling ▼ Water level in completed well ◧ Split Spoon ☐ No Recovery ▨ Auger

DESCRIPTION	USCS
moist	
CLAY: mottled brown and light tan-gray, slightly moist	
SILTY CLAY: light tan-gray, slight to moderately sandy, fine to very fine sand grains, some white calcareous material, slightly moist	CL
SANDY CLAY: light tan-gray, predominantly fine sand grains, some medium sand grains, some white calcareous material, slightly moist	
SAND: light gray, medium to coarse grained, rounded sand grains, some rounded small gravel fragments, abundant white calcareous fragments, saturated Poor Sample Recovery from 45' to 50'	SP
Bottom of Boring @ 50'	



1" PVC temporary well set @ 50'. All pipe removed from boring. Boring plugged with bentonite.

Temporary well screened from 47.5' to 50'

NOTES: Not to be used separately from original report. USCS descriptors based on field classification, not laboratory verified.

Hydrex
ENVIRONMENTAL, INC.

Monitor Well

Monitor Well No.:**C-5**

PROJECT INFORMATION

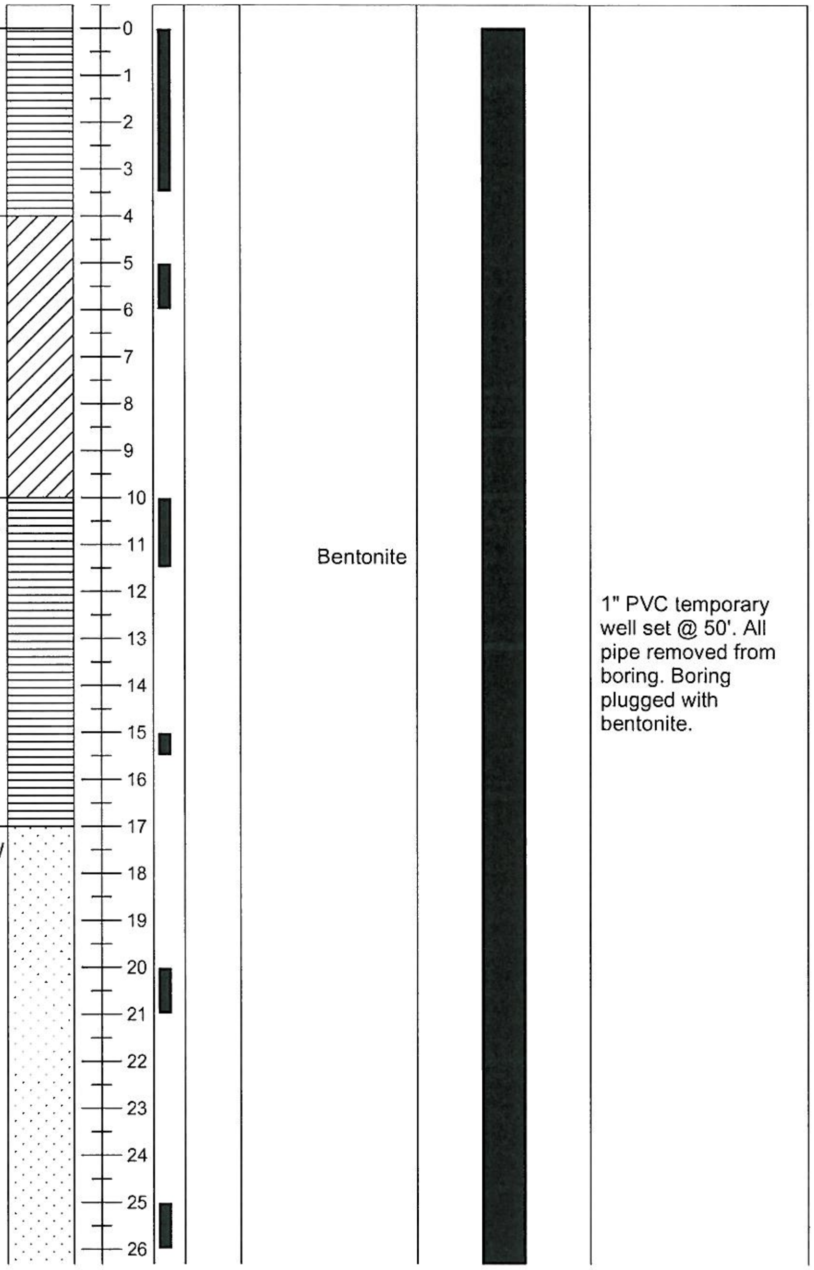
PROJECT:	**City of Victoria Landfill**
PROJECT NO.:	**L-05-617**
LOGGED BY:	**Marty Ford**
SUPERVISING PG:	**Marty Ford**
INSTALLATION:	**02/24/11**
DEVELOPMENT:	**Temporary Well**
SITE LOCATION:	**Victoria, Texas**
WELL OWNER:	**City of Victoria Landfill**

DRILLING INFORMATION

DRILLER:	**Best Drilling / Lawrence Tobola**
DRILLER'S LICENSE NO.:	**3026**
RIG TYPE:	**Mobile Drill B-57 Buggy Rig**
METHOD OF DRILLING:	**Hollow Stem Auger**
SAMPLING METHODS:	**Split Core Barrel**
SURFACE ELEVATION:	**~65.6'**
HOLE DIAMETER:	**8.25"**
Latitude: **N 28 41' 15.9"**	Longitude: **W 96 54' 42.9"**

▽ Water encountered while drilling ▼ Water level in completed well ◧ Split Spoon ☐ No Recovery ▨ Auger

DESCRIPTION	USCS
CLAY: dark brown-gray, slightly silty, slightly moist Poor Sample Recovery from 0' to 5'	CH
SILTY CLAY: tan-gray, slightly sandy, very fine to fine sand grains, some white calcareous material, slightly moist Poor Sample Recovery from 5' to 10'	CL
CLAY: tan-gray, slight to moderately silty, occassional white calcareous material, slightly moist Poor Sample Recovery from 10' to 15'	CH
SAND: brown-gray, medium to fine grained, moderately well sorted, unconsolidated, fairly dry Poor Sample Recovery from 15' to 20' Poor Sample Recovery from 20' to 25'	SW



1" PVC temporary well set @ 50'. All pipe removed from boring. Boring plugged with bentonite.

NOTES: Not to be used separately from original report. USCS descriptors based on field classification, not laboratory verified.

Hydrex ENVIRONMENTAL, INC.

Monitor Well

Monitor Well No.:**C-5**

PROJECT INFORMATION

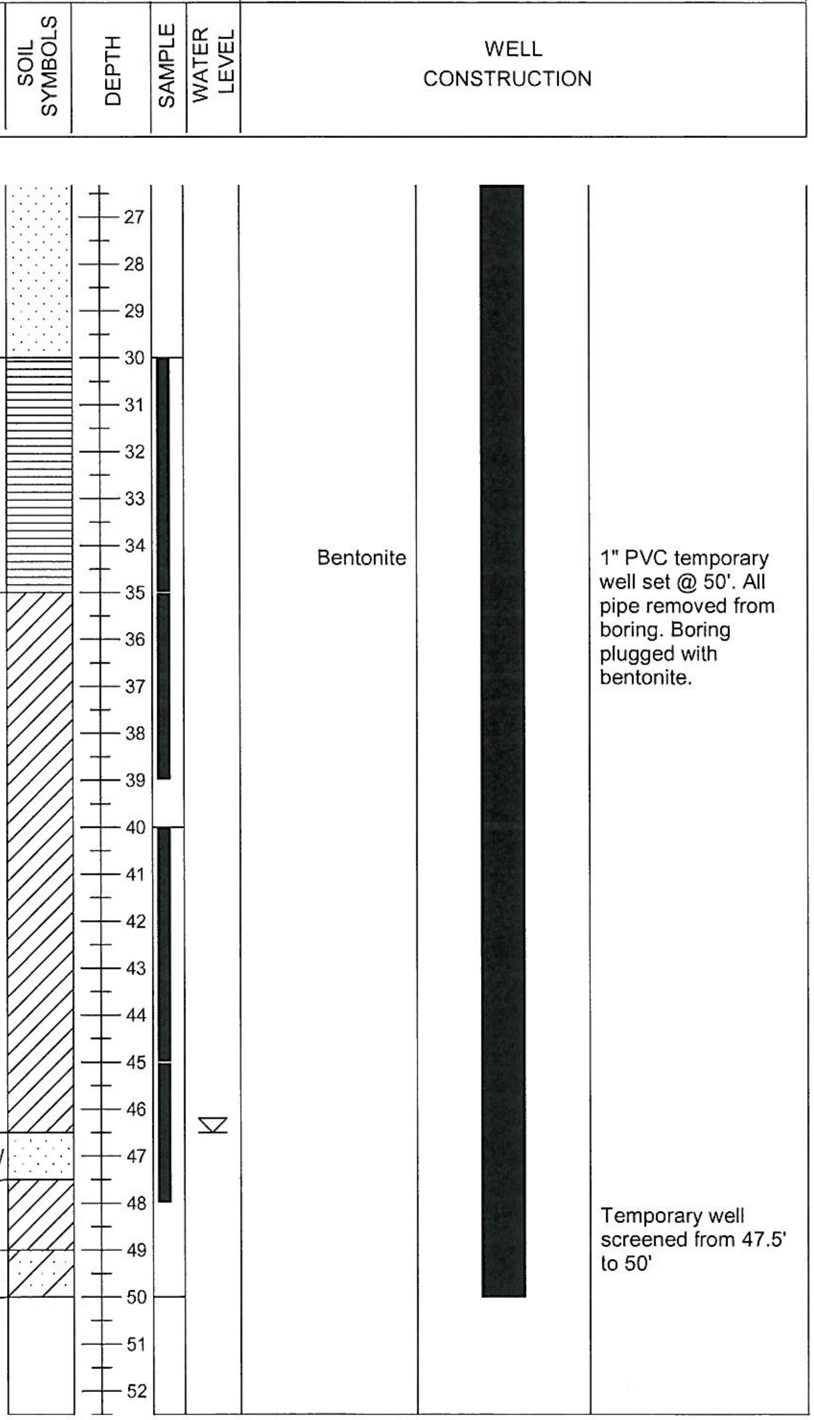
PROJECT:	**City of Victoria Landfill**
PROJECT NO.:	**L-05-617**
LOGGED BY:	**Marty Ford**
SUPERVISING PG:	**Marty Ford**
INSTALLATION:	**02/24/11**
DEVELOPMENT:	**Temporary Well**
SITE LOCATION:	**Victoria, Texas**
WELL OWNER:	**City of Victoria Landfill**

DRILLING INFORMATION

DRILLER:	**Best Drilling / Lawrence Tobola**
DRILLER'S LICENSE NO.:	**3026**
RIG TYPE:	**Mobile Drill B-57 Buggy Rig**
METHOD OF DRILLING:	**Hollow Stem Auger**
SAMPLING METHODS:	**Split Core Barrel**
SURFACE ELEVATION:	**~65.6'**
HOLE DIAMETER:	**8.25"**
Latitude: **N 28 41' 15.9"**	Longitude: **W 96 54' 42.9"**

▽ Water encountered while drilling ▼ Water level in completed well ◧ Split Spoon ☐ No Recovery ▨ Auger

DESCRIPTION	USCS
Poor Sample Recovery from 25' to 30'	
CLAY: mottled yellow-brown and tan-gray, slightly silty, slightly moist	CH
SILTY CLAY: light tan-gray, slight to moderately sandy, fine to medium sand grains, some coarse sand grains, slightly moist Poor Sample Recovery from 35' to 40' SILTY CLAY: light tan-gray, slight to moderately sandy, fine to medium sand grains, some coarse sand grains, abundant white calcareous material, slightly moist	CL
SANDY CLAY: light tan-gray, fine to medium sand grains, some coarse sand grains, slightly moist SANDY CLAY: light tan-gray, abundant hard tan-gray blocky calcareous fragments, slightly moist	
SAND: brown-gray, fine to medium grained, moderately well sorted, unconsolidated, saturated	SW
SANDY CLAY: tan-gray, fine to medium sand grains, occassional white calcareous material, slightly moist Poor Sample Recovery from 45' to 50'	CL
CLAYEY SAND: tan-gray, fine to medium grained, unconsolidated, moderately moist	SC
Bottom of Boring @ 50'	



1" PVC temporary well set @ 50'. All pipe removed from boring. Boring plugged with bentonite.

Temporary well screened from 47.5' to 50'

NOTES: Not to be used separately from original report. USCS descriptors based on field classification, not laboratory verified.

Hydrex ENVIRONMENTAL, INC.

Monitor Well

Monitor Well No.:**C-7**

PROJECT INFORMATION

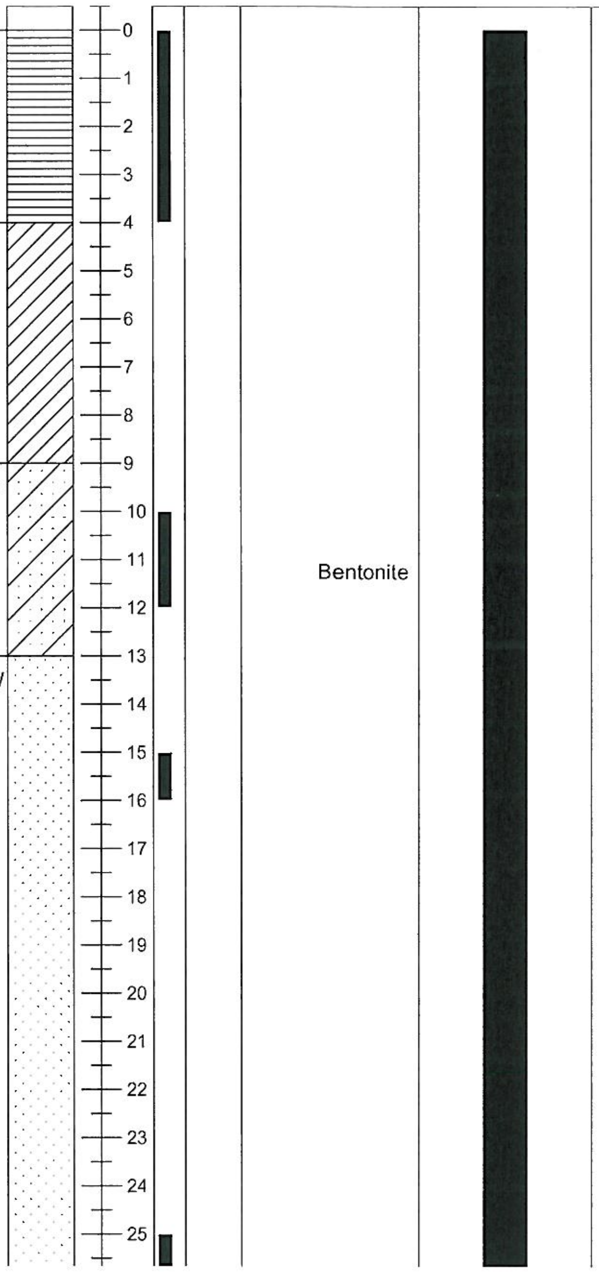
PROJECT:	**City of Victoria Landfill**
PROJECT NO.:	**L-05-617**
LOGGED BY:	**Marty Ford**
SUPERVISING PG:	**Marty Ford**
INSTALLATION:	**02/24/11**
DEVELOPMENT:	**Temporary Well**
SITE LOCATION:	**Victoria, Texas**
WELL OWNER:	**City of Victoria Landfill**

DRILLING INFORMATION

DRILLER:	**Best Drilling / Lawrence Tobola**
DRILLER'S LICENSE NO.:	**3026**
RIG TYPE:	**Mobile Drill B-57 Buggy Rig**
METHOD OF DRILLING:	**Hollow Stem Auger**
SAMPLING METHODS:	**Split Core Barrel**
SURFACE ELEVATION:	**~65.4'**
HOLE DIAMETER:	**8.25"**
Latitude:	**N 28 41' 12.6"**
Longitude:	**W 96 54' 40.3"**

▽ Water encountered while drilling ▼ Water level in completed well ◧ Split Spoon ☐ No Recovery ▨ Auger

DESCRIPTION	USCS
CLAY: dark brown-gray, slight to moderately silty, slight to moderately moist	CH
Moderate Sample Recovery from 0' to 5' SILTY CLAY: brown-gray, slight to moderately sandy, very fine to fine sand grains, slightly moist No Sample Recovery from 5' to 10'	CL
CLAYEY SAND: light tan-gray, very fine to fine grained, some white calcareous material, friable, slightly moist Poor Sample Recovery from 10' to 15'	SC
SAND: light gray, predominantly fine grained, some very fine sand grains, moderately well sorted, unconsolidated, fairly dry Poor Sample Recovery from 15' to 20' No Sample Recovery from 20' to 25' SAND: light brown-gray, predominantly medium grained,	SW



1" PVC temporary well set @ 50'. All pipe removed from boring. Boring plugged with bentonite.

NOTES: Not to be used separately from original report. USCS descriptors based on field classification, not laboratory verified.

Hydrex ENVIRONMENTAL, INC.

Monitor Well

Monitor Well No.:**C-7**

PROJECT INFORMATION

PROJECT: **City of Victoria Landfill**
PROJECT NO.: **L-05-617**
LOGGED BY: **Marty Ford**
SUPERVISING PG: **Marty Ford**
INSTALLATION: **02/24/11**
DEVELOPMENT: **Temporary Well**
SITE LOCATION: **Victoria, Texas**
WELL OWNER: **City of Victoria Landfill**

DRILLING INFORMATION

DRILLER: **Best Drilling / Lawrence Tobola**
DRILLER'S LICENSE NO.: **3026**
RIG TYPE: **Mobile Drill B-57 Buggy Rig**
METHOD OF DRILLING: **Hollow Stem Auger**
SAMPLING METHODS: **Split Core Barrel**
SURFACE ELEVATION: **~65.4'**
HOLE DIAMETER: **8.25"**
Latitude: **N 28 41' 12.6"** Longitude: **W 96 54' 40.3"**

▽ Water encountered while drilling ▼ Water level in completed well ◧ Split Spoon ☐ No Recovery ▨ Auger

DESCRIPTION

some coarse and fine sand grains, moderately well sorted, unconsolidated, fairly dry

Poor Sample Recovery from 25' to 30'

SAND: brown, predominantly fine grained, some very fine sand grains, moderately well sorted, unconsolidated, fairly dry

Poor Sample Recovery from 30' to 35'

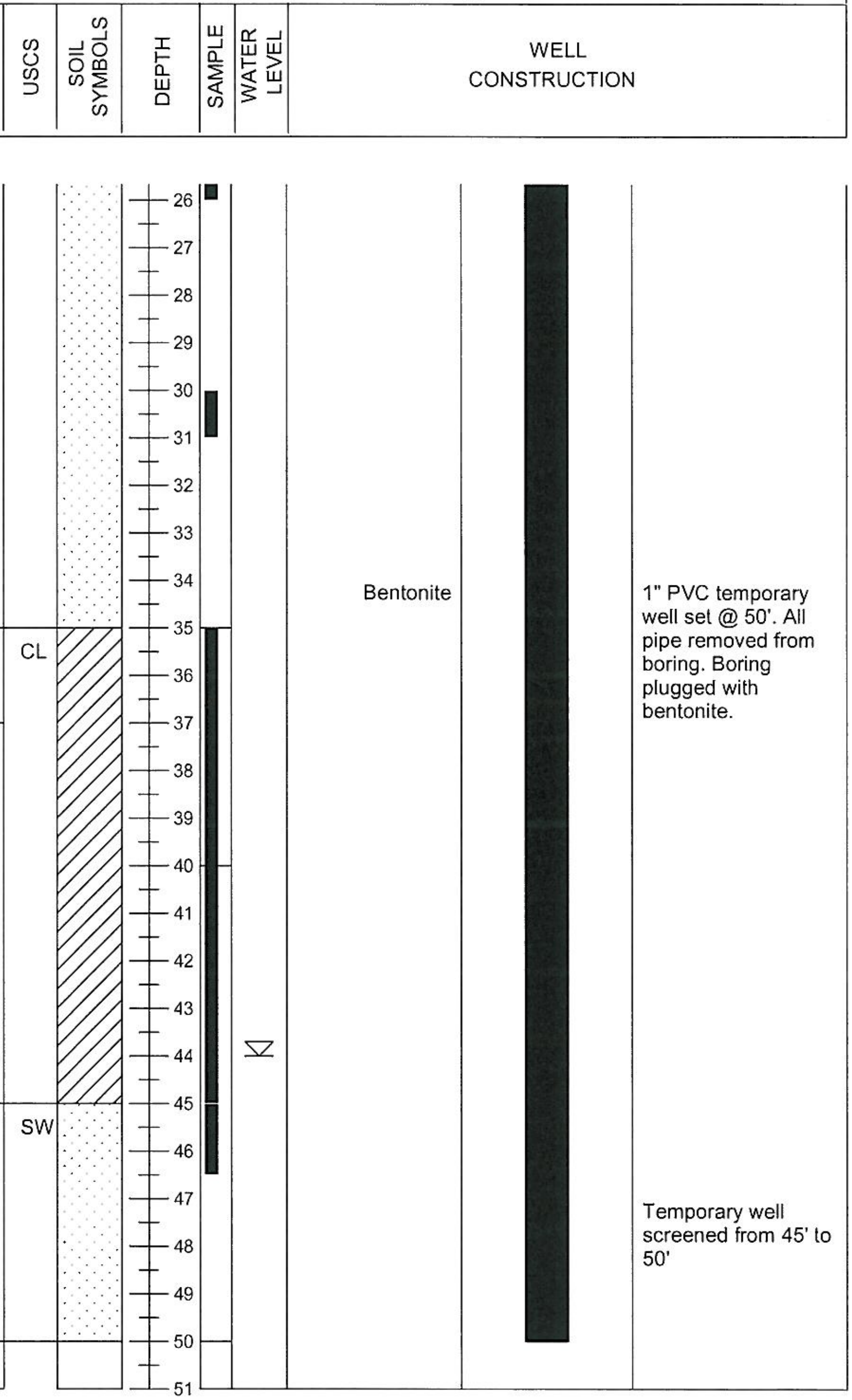
SILTY CLAY: mottled brown and light tan-gray, trace medium to coarse sand grains, slightly moist

SANDY CLAY: light tan-gray, medium to fine sand grains, trace white calcareous fragments, slightly moist, saturated in zones at bottom

SAND: gray, medium to coarse grained, moderately well sorted, unconsolidated, saturated

Poor Sample Recovery from 45' to 50'

Bottom of Boring @ 50'



1" PVC temporary well set @ 50'. All pipe removed from boring. Boring plugged with bentonite.

Temporary well screened from 45' to 50'

NOTES: Not to be used separately from original report. USCS descriptors based on field classification, not laboratory verified. Page 2 of 2

Hydrex ENVIRONMENTAL, INC.

Monitor Well

Monitor Well No.:**D-3**

PROJECT INFORMATION

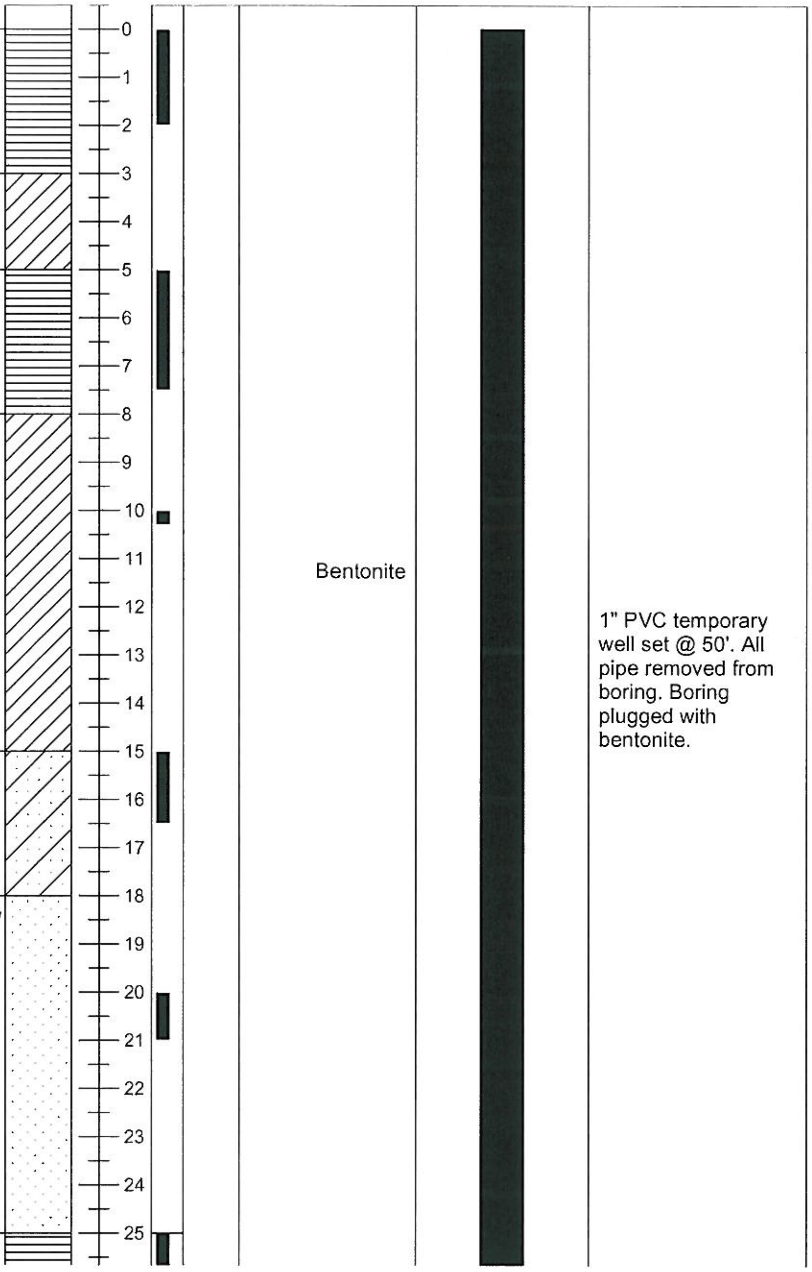
PROJECT: **City of Victoria Landfill**
PROJECT NO.: **L-05-617**
LOGGED BY: **Marty Ford**
SUPERVISING PG: **Marty Ford**
INSTALLATION: **02/23/11**
DEVELOPMENT: **Temporary Well**
SITE LOCATION: **Victoria, Texas**
WELL OWNER: **City of Victoria Landfill**

DRILLING INFORMATION

DRILLER: **Best Drilling / Lawrence Tobola**
DRILLER'S LICENSE NO.: **3026**
RIG TYPE: **Mobile Drill B-57 Buggy Rig**
METHOD OF DRILLING: **Hollow Stem Auger**
SAMPLING METHODS: **Split Core Barrel**
SURFACE ELEVATION: **~65.7'**
HOLE DIAMETER: **8.25"**
Latitude: **N 28 41' 20.6"** Longitude: **W 96 54' 43.2"**

▽ Water encountered while drilling ▼ Water level in completed well ◧ Split Spoon ☐ No Recovery ▨ Auger

DESCRIPTION	USCS
CLAY: dark brown-gray, slight to moderately moist Poor Sample Recovery from 0' to 5'	CH
SILTY CLAY: light brown-gray, slightly sandy, very fine to fine sand grains, slightly moist	CL
CLAY: light brown-gray, slightly silty, slightly moist	CH
SILTY CLAY: light tan-gray, abundant white calcareous material, slightly moist Poor Sample Recovery from 5' to 10' SILTY CLAY: light tan-gray, slightly sandy, very fine to fine sand grains, trace white calcareous material, slightly moist Very Poor Sample Recovery from 10' to 15'	CL
CLAYEY SAND: light brown-gray, very fine to fine grained, decreasing clay content and more uniform grain size with depth, slightly moist to fairly dry Poor Sample Recovery from 15' to 20'	SC
SAND: light brown-gray, predominantly fine grained, well sorted, unconsolidated, fairly dry Poor Sample Recovery from 20' to 25'	SW
CLAY: mottled tan and light brown-gray, slightly silty,	CH



1" PVC temporary well set @ 50'. All pipe removed from boring. Boring plugged with bentonite.

NOTES: Not to be used separately from original report. USCS descriptors based on field classification, not laboratory verified.

Hydrex ENVIRONMENTAL, INC.

Monitor Well

Monitor Well No.:**D-3**

PROJECT INFORMATION

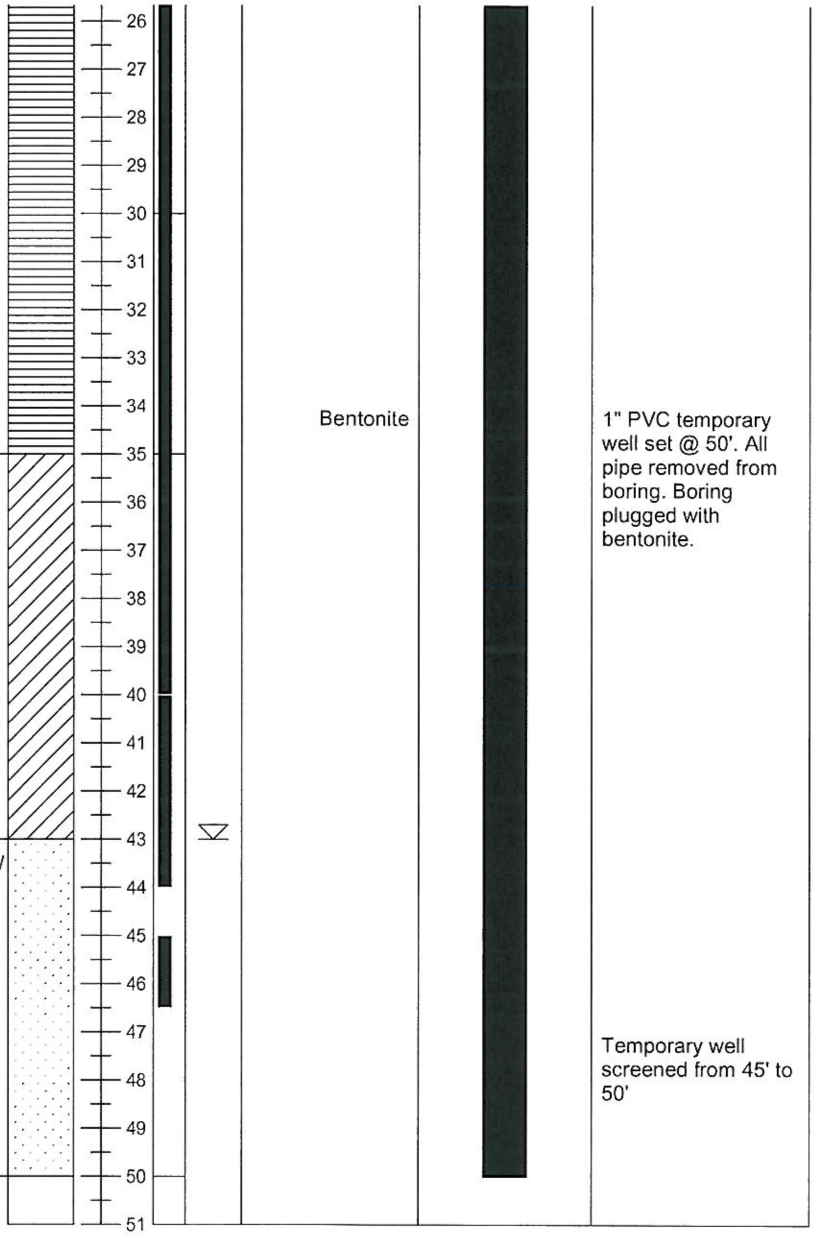
PROJECT: **City of Victoria Landfill**
PROJECT NO.: **L-05-617**
LOGGED BY: **Marty Ford**
SUPERVISING PG: **Marty Ford**
INSTALLATION: **02/23/11**
DEVELOPMENT: **Temporary Well**
SITE LOCATION: **Victoria, Texas**
WELL OWNER: **City of Victoria Landfill**

DRILLING INFORMATION

DRILLER: **Best Drilling / Lawrence Tobola**
DRILLER'S LICENSE NO.: **3026**
RIG TYPE: **Mobile Drill B-57 Buggy Rig**
METHOD OF DRILLING: **Hollow Stem Auger**
SAMPLING METHODS: **Split Core Barrel**
SURFACE ELEVATION: **~65.7'**
HOLE DIAMETER: **8.25"**
Latitude: **N 28 41' 20.6"** Longitude: **W 96 54' 43.2"**

▽ Water encountered while drilling ▼ Water level in completed well ◧ Split Spoon ☐ No Recovery ▨ Auger

DESCRIPTION	USCS
decreasing silt content with depth, slightly moist CLAY: mottled tan and light brown-gray, slightly silty, occassionally slightly sandy, very fine to medium sand grains, trace white calcareous material, slightly moist	
SILTY CLAY: light brown-gray, slight to moderately sandy, fine to medium sand grains, occassional white calcareous material, slightly moist	CL
SANDY CLAY: light brown-gray, fine to medium sand grains, increasing sand content with depth, slightly moist	
SAND: light brown-gray, fine to medium grained, moderately well sorted, unconsolidated, saturated Moderate Sample Recovery from 40' to 45' SAND: light brown-gray, predominantly medium grained, some coarse grains, moderately well sorted, unconsolicated, saturated Poor Sample Recovery from 45' to 50'	SW
Bottom of Boring @ 50'	



1" PVC temporary well set @ 50'. All pipe removed from boring. Boring plugged with bentonite.

Temporary well screened from 45' to 50'

NOTES: Not to be used separately from original report. USCS descriptors based on field classification, not laboratory verified.

HYDREX ENVIRONMENTAL, INC.

Monitor Well

Monitor Well No.:**D-5**

PROJECT INFORMATION

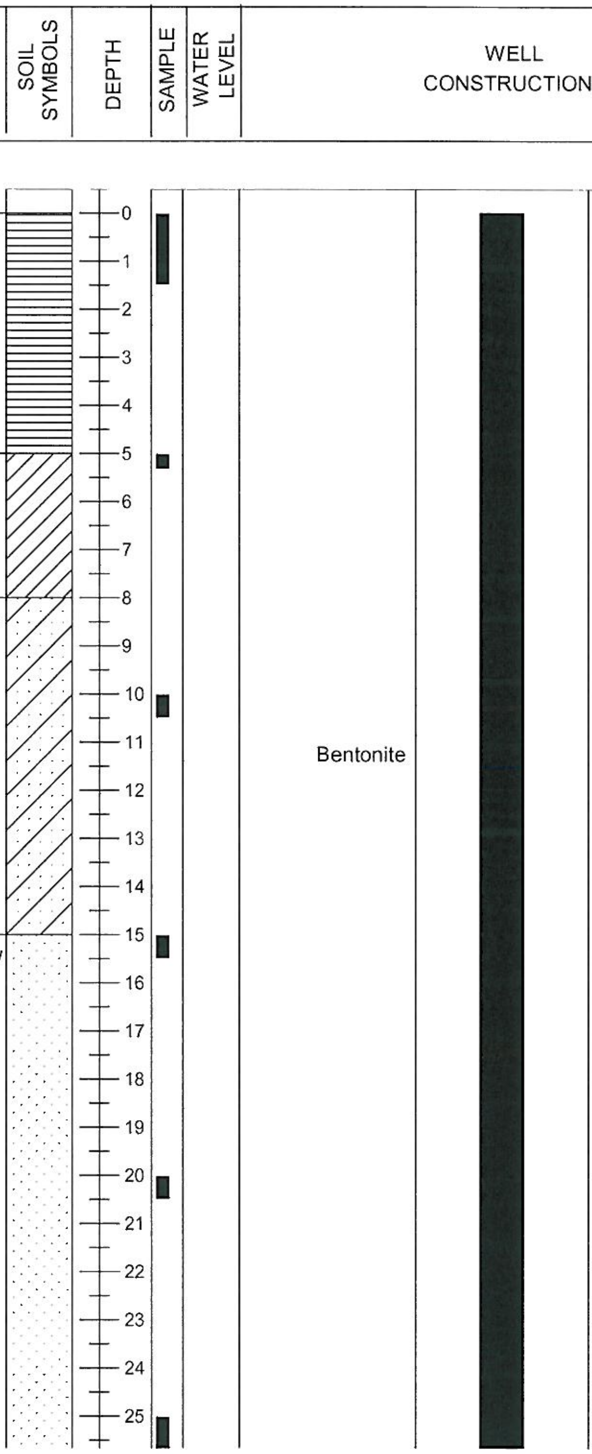
PROJECT: **City of Victoria Landfill**
PROJECT NO.: **L-05-617**
LOGGED BY: **Marty Ford**
SUPERVISING PG: **Marty Ford**
INSTALLATION: **02/23/11**
DEVELOPMENT: **Temporary Well**
SITE LOCATION: **Victoria, Texas**
WELL OWNER: **City of Victoria Landfill**

DRILLING INFORMATION

DRILLER: **Best Drilling / Lawrence Tobola**
DRILLER'S LICENSE NO.: **3026**
RIG TYPE: **Mobile Drill B-57 Buggy Rig**
METHOD OF DRILLING: **Hollow Stem Auger**
SAMPLING METHODS: **Split Core Barrel**
SURFACE ELEVATION: **~65.5'**
HOLE DIAMETER: **8.25"**
Latitude: **N 28 41' 17.3"** Longitude: **W 96 54' 40.6"**

▽ Water encountered while drilling ▼ Water level in completed well ◧ Split Spoon ☐ No Recovery ▨ Auger

DESCRIPTION	USCS
CLAY: brown-gray, slightly silty, slightly moist Poor Sample Recovery from 0' to 5'	CH
SANDY CLAY: tan, fine to medium sand grains, some white calcareous material and nodules, slightly moist Very Poor Sample Recovery from 5' to 10'	CL
CLAYEY SAND: gray-brown, very fine to medium sand grains, decreasing clay content and more uniform grain size with depth, fairly dry Poor Sample Recovery from 10' to 15'	SC
SAND: light brown-gray, predominantly fine to medium grained, moderately well sorted, unconsolidated, fairly dry Poor Sample Recovery from 15' to 20' Poor Sample Recovery from 20' to 25'	SW
SAND: light brown-gray, medium to coarse grained,	



1" PVC temporary well set @ 50'. All pipe removed from boring. Boring plugged with bentonite.

NOTES: Not to be used separately from original report. USCS descriptors based on field classification, not laboratory verified.

HYDREX ENVIRONMENTAL, INC.

Monitor Well

Monitor Well No.:**D-5**

PROJECT INFORMATION

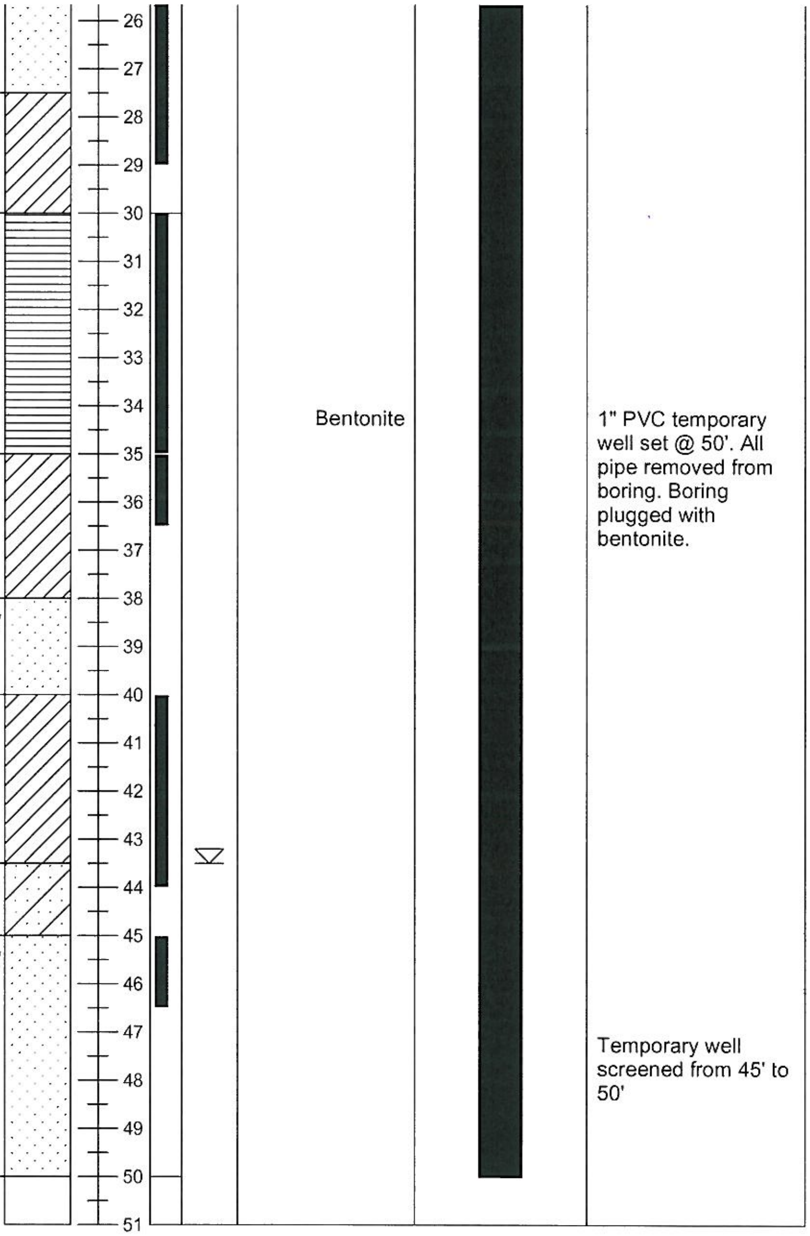
PROJECT:	**City of Victoria Landfill**
PROJECT NO.:	**L-05-617**
LOGGED BY:	**Marty Ford**
SUPERVISING PG:	**Marty Ford**
INSTALLATION:	**02/23/11**
DEVELOPMENT:	**Temporary Well**
SITE LOCATION:	**Victoria, Texas**
WELL OWNER:	**City of Victoria Landfill**

DRILLING INFORMATION

DRILLER:	**Best Drilling / Lawrence Tobola**
DRILLER'S LICENSE NO.:	**3026**
RIG TYPE:	**Mobile Drill B-57 Buggy Rig**
METHOD OF DRILLING:	**Hollow Stem Auger**
SAMPLING METHODS:	**Split Core Barrel**
SURFACE ELEVATION:	**~65.5'**
HOLE DIAMETER:	**8.25"**
Latitude:	**N 28 41' 17.3"**
Longitude:	**W 96 54' 40.6"**

▽ Water encountered while drilling ▼ Water level in completed well ◧ Split Spoon ☐ No Recovery ▨ Auger

DESCRIPTION	USCS
moderately well sorted, slight to moderate clay content, unconsolidated, fairly dry	
SILTY CLAY: gray-brown, moderately sandy, very fine to fine sand grains, slightly moist Moderate Sample Recovery from 25' to 30'	CL
CLAY: mottled brown and brown-gray, slightly silty, decreasing silt content with depth, slightly moist	CH
SANDY CLAY: mottled brown and brown-gray, fine to medium sand grains, slightly moist Poor Sample Recovery from 35' to 40'	CL
SAND: mottled brown and brown-gray, fine to medium grained, moderately well sorted, unconsolidated, slightly moist	SW
SANDY CLAY: brown-gray, fine to medium sand grains, increasing sand content with depth, slightly moist	CL
CLAYEY SAND: brown-gray, fine to medium grained, friable, saturated Moderate Sample Recovery from 40' to 45'	SC
SAND: brown-gray, fine to medium grained, moderately well sorted, unconsolidated, saturated Poor Sample Recovery from 45' to 50'	SW
Bottom of Boring @ 50'	



1" PVC temporary well set @ 50'. All pipe removed from boring. Boring plugged with bentonite.

Temporary well screened from 45' to 50'

NOTES: Not to be used separately from original report. USCS descriptors based on field classification, not laboratory verified.

Page 2 of 2

HYDREX ENVIRONMENTAL, INC.

Monitor Well

Monitor Well No.:**D-7**

PROJECT INFORMATION

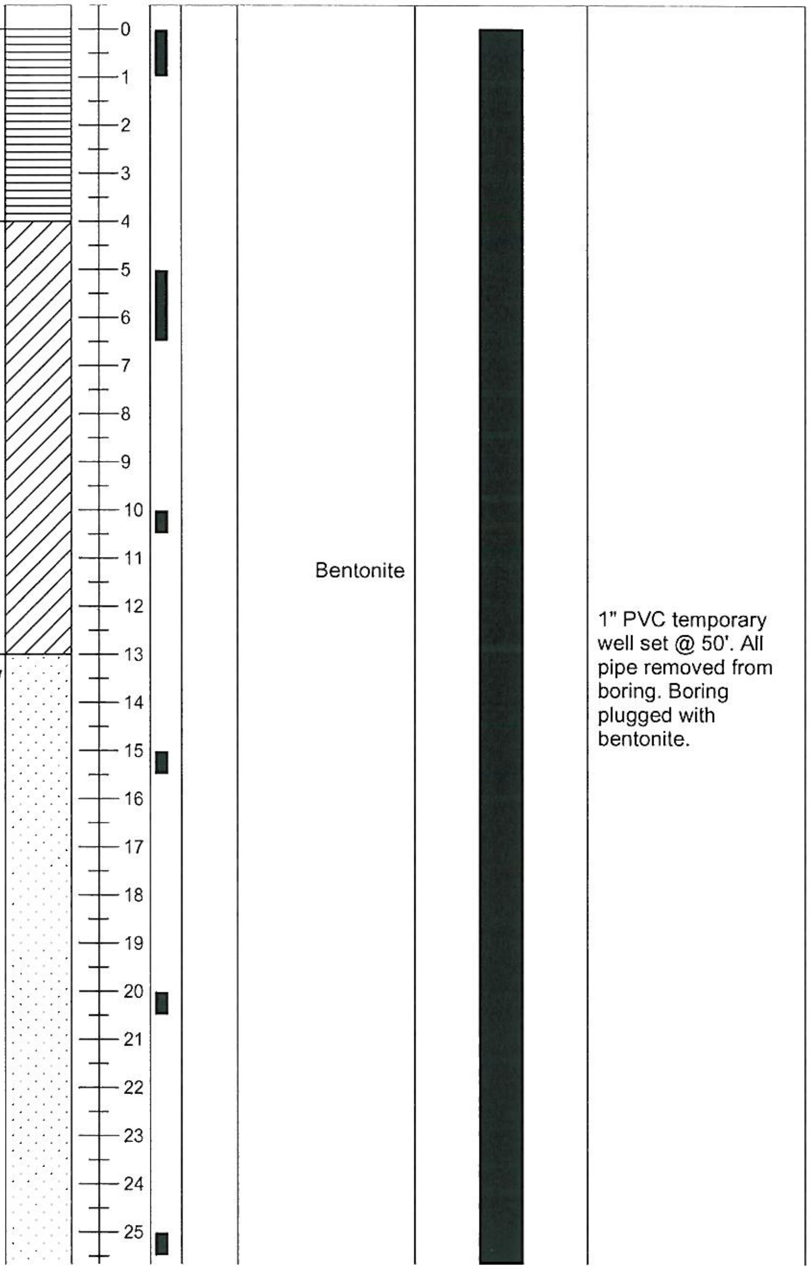
PROJECT:	**City of Victoria Landfill**
PROJECT NO.:	**L-05-617**
LOGGED BY:	**Marty Ford**
SUPERVISING PG:	**Marty Ford**
INSTALLATION:	**02/24/11**
DEVELOPMENT:	**Temporary Well**
SITE LOCATION:	**Victoria, Texas**
WELL OWNER:	**City of Victoria Landfill**

DRILLING INFORMATION

DRILLER:	**Best Drilling / Lawrence Tobola**
DRILLER'S LICENSE NO.:	**3026**
RIG TYPE:	**Mobile Drill B-57 Buggy Rig**
METHOD OF DRILLING:	**Hollow Stem Auger**
SAMPLING METHODS:	**Split Core Barrel**
SURFACE ELEVATION:	**~65.3'**
HOLE DIAMETER:	**8.25"**
Latitude: **N 28 41' 14.0"**	Longitude: **W 96 54' 38.0"**

▽ Water encountered while drilling ▼ Water level in completed well ◧ Split Spoon ☐ No Recovery ▨ Auger

DESCRIPTION	USCS
CLAY: dark brown-gray, slightly moist Poor Sample Recovery from 0' to 5'	CH
SILTY CLAY: tan, some white calcareous material, slightly moist Poor Sample Recovery from 5' to 10'	CL
SANDY CLAY: tan, very fine to fine sand grains, slightly moist to fairly dry Poor Sample Recovery from 10' to 15'	
SAND: yellow-brown, predominantly fine grained, well sorted, unconsolidated, fairly dry Poor Sample Recovery from 15' to 20' SAND: tan and yellow-brown, fine to medium grained, moderately well sorted, unconsolidated, fairly dry Poor Sample Recovery from 20' to 25' SAND: light brown-gray, medium to fine grained, moderately	SW



1" PVC temporary well set @ 50'. All pipe removed from boring. Boring plugged with bentonite.

NOTES: Not to be used separately from original report. USCS descriptors based on field classification, not laboratory verified.

Hydrex ENVIRONMENTAL, INC.

Monitor Well

Monitor Well No.:**D-7**

PROJECT INFORMATION

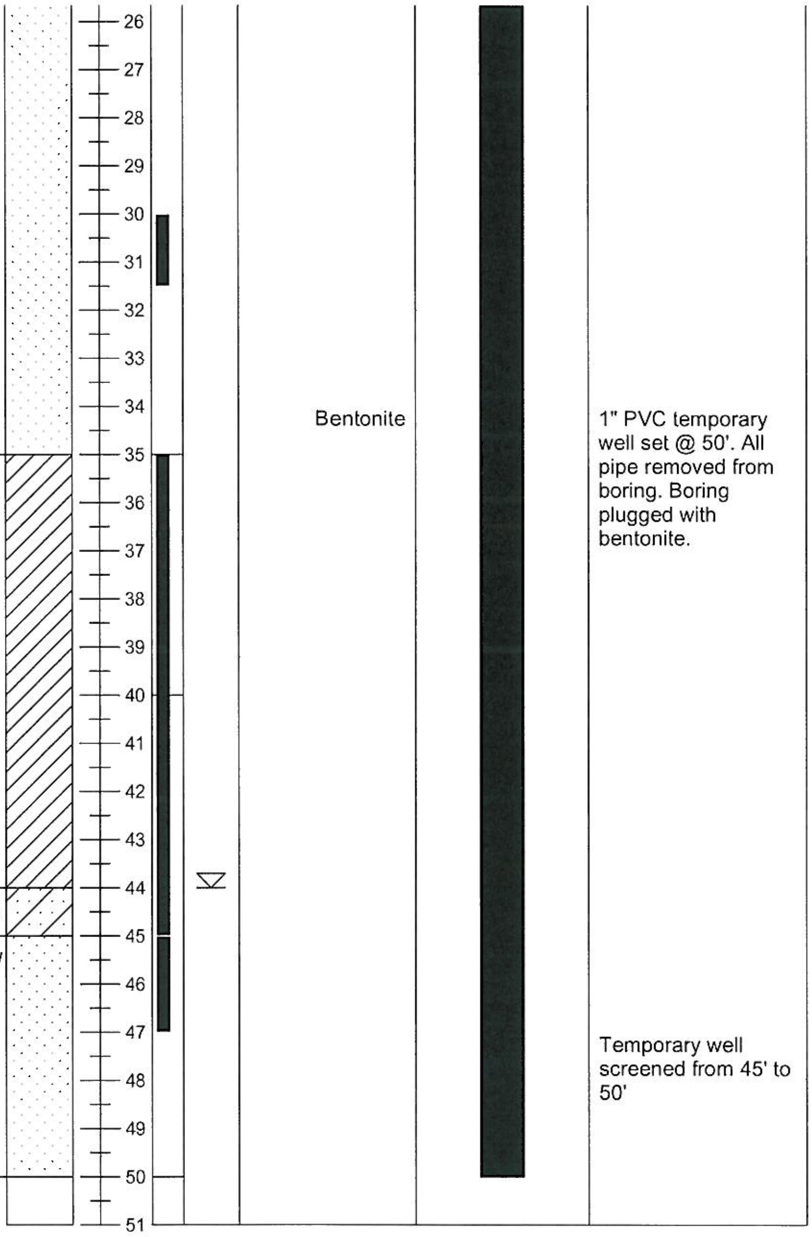
PROJECT:	**City of Victoria Landfill**
PROJECT NO.:	**L-05-617**
LOGGED BY:	**Marty Ford**
SUPERVISING PG:	**Marty Ford**
INSTALLATION:	**02/24/11**
DEVELOPMENT:	**Temporary Well**
SITE LOCATION:	**Victoria, Texas**
WELL OWNER:	**City of Victoria Landfill**

DRILLING INFORMATION

DRILLER:	**Best Drilling / Lawrence Tobola**
DRILLER'S LICENSE NO.:	**3026**
RIG TYPE:	**Mobile Drill B-57 Buggy Rig**
METHOD OF DRILLING:	**Hollow Stem Auger**
SAMPLING METHODS:	**Split Core Barrel**
SURFACE ELEVATION:	**~65.3'**
HOLE DIAMETER:	**8.25"**
Latitude:	**N 28 41' 14.0"**
Longitude:	**W 96 54' 38.0"**

▽ Water encountered while drilling ▼ Water level in completed well ◧ Split Spoon ☐ No Recovery ▨ Auger

DESCRIPTION	USCS
well sorted, unconsolidated, fairly dry	
Poor Sample Recovery from 25' to 30'	
SAND: light brown-gray, predominantly fine grained, well sorted, unconsolidated, fairly dry	
Poor Sample Recovery from 30' to 35'	
SANDY CLAY: light brown-gray, fine sand grains, some white calcareous material, slightly moist - becoming more sandy with depth	CL
CLAYEY SAND: light brown-gray, fine to medium grained, friable, saturated	SC
SAND: gray, predominantly medium grained, well sorted, unconsolidated, saturated Poor Sample Recovery from 45' to 50'	SW
Bottom of Boring @ 50'	



Bentonite

1" PVC temporary well set @ 50'. All pipe removed from boring. Boring plugged with bentonite.

Temporary well screened from 45' to 50'

NOTES: Not to be used separately from original report. USCS descriptors based on field classification, not laboratory verified.

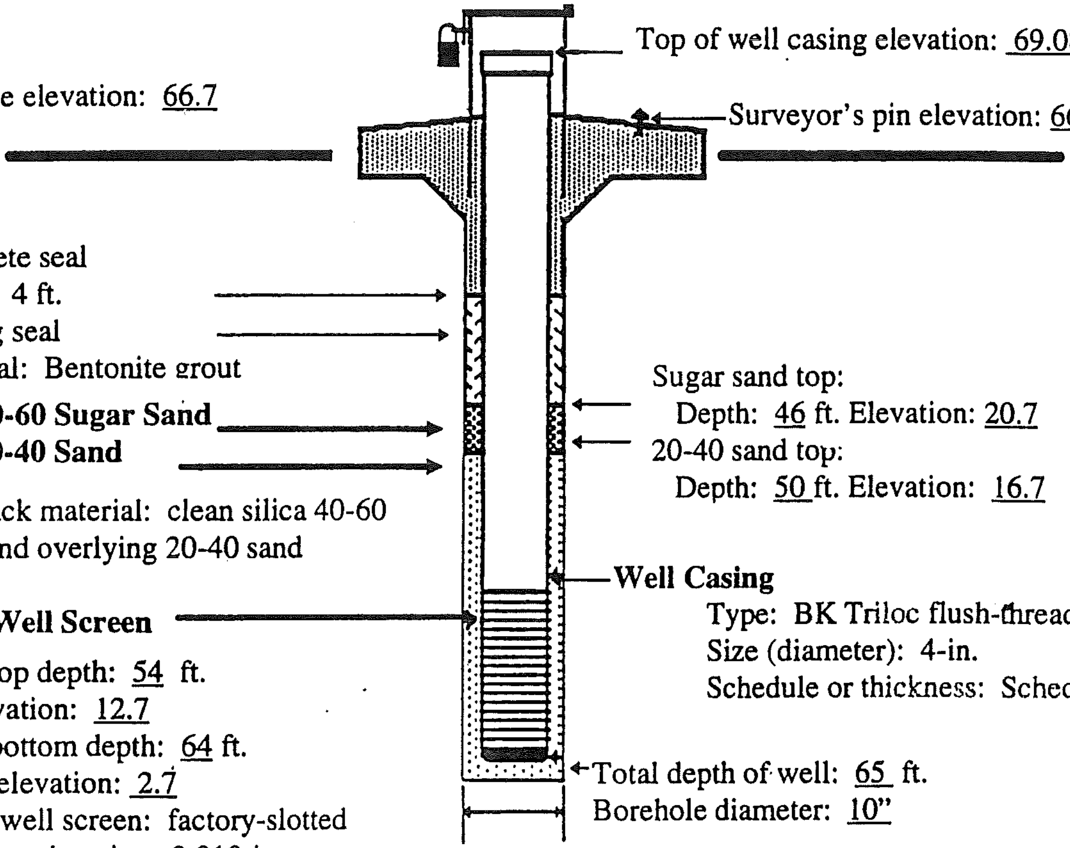
MONITORING WELL DATA SHEET

Permittee or site name: BFI Victoria Landfill
MSW Permit No.: 1522 County: Victoria County, Texas
Monitoring well I.D. No.: P-1
Date of monitoring well installation: 3/17/16
Date of monitoring well development: 3/22/96
Well location: Latitude (or Northing): 317482.9 Longitude (or Easting): 2669465.3
Monitoring well groundwater gradient: Upgradient? Downgradient? X
Monitoring well driller name: Bludworth License No.: 4885M
Geologist or engineer supervising well installation: Stefan Stamoulis, Geologist
Static water-level elevation (feet above mean sea level) after well development: 25.48
Name of geologic formation(s) in which well is completed: Beaumont

Type of locking device: Padlock

Type of well casing protection: 8-in. x 8-in. steel housing

Concrete surface pad dimensions: 6' x 6'



Top of well casing elevation: 69.08

Surface elevation: 66.7

Surveyor's pin elevation: 66.94

Concrete seal depth: 4 ft.

Casing seal material: Bentonite grout

40-60 Sugar Sand

20-40 Sand

Sugar sand top:
Depth: 46 ft. Elevation: 20.7

20-40 sand top:
Depth: 50 ft. Elevation: 16.7

Filter pack material: clean silica 40-60 sugar sand overlying 20-40 sand

Well Casing
Type: BK Triloc flush-thread PVC
Size (diameter): 4-in.
Schedule or thickness: Schedule 40

Well Screen
Screen top depth: 54 ft.
Top elevation: 12.7
Screen bottom depth: 64 ft.
Bottom elevation: 2.7
Type of well screen: factory-slotted
Screen opening size: 0.010-in.

Total depth of well: 65 ft.
Borehole diameter: 10"

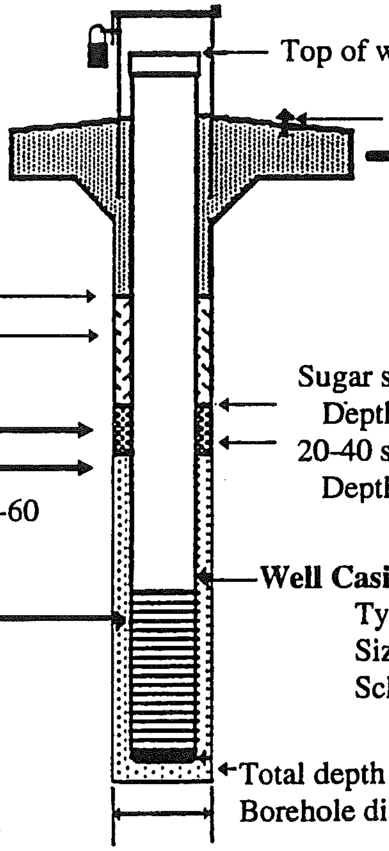
MONITORING WELL DATA SHEET

Permittee or site name: BFI Victoria Landfill
MSW Permit No.: 1522 County: Victoria County, Texas
Monitoring well I.D. No.: P-2
Date of monitoring well installation: 3/21/96
Date of monitoring well development: 3/24/96
Well location: Latitude (or Northing): 317814.5 Longitude (or Easting): 2669826.1
Monitoring well groundwater gradient: Upgradient? Downgradient? X
Monitoring well driller name: Bludworth License No.: 4885M
Geologist or engineer supervising well installation: Stefan Stamoulis, Geologist
Static water-level elevation (feet above mean sea level) after well development: 25.90
Name of geologic formation(s) in which well is completed: Beaumont

Type of locking device: Padlock

Type of well casing protection: 8-in. x 8-in. steel housing

Concrete surface pad dimensions: 6'x6'



Top of well casing elevation: 68.32

Surface elevation: 65.7

Surveyor's pin elevation: 66.30

Concrete seal depth: 4 ft.

Casing seal material: Bentonite grout

40-60 Sugar Sand

20-40 Sand

Sugar sand top:
Depth: 51 ft. Elevation: 14.7

20-40 sand top:
Depth: 55 ft. Elevation: 10.7

Filter pack material: clean silica 40-60 sugar sand overlying 20-40 sand

Well Casing
Type: BK Triloc flush-thread PVC
Size (diameter): 4-in.
Schedule or thickness: Schedule 40

Well Screen
Screen top depth: 59.5 ft.
Top elevation: 6.2
Screen bottom depth: 69.5 ft.
Bottom elevation: -3.8
Type of well screen: factory-slotted
Screen opening size: 0.010-in.

Total depth of well: 70 ft.
Borehole diameter: 10"

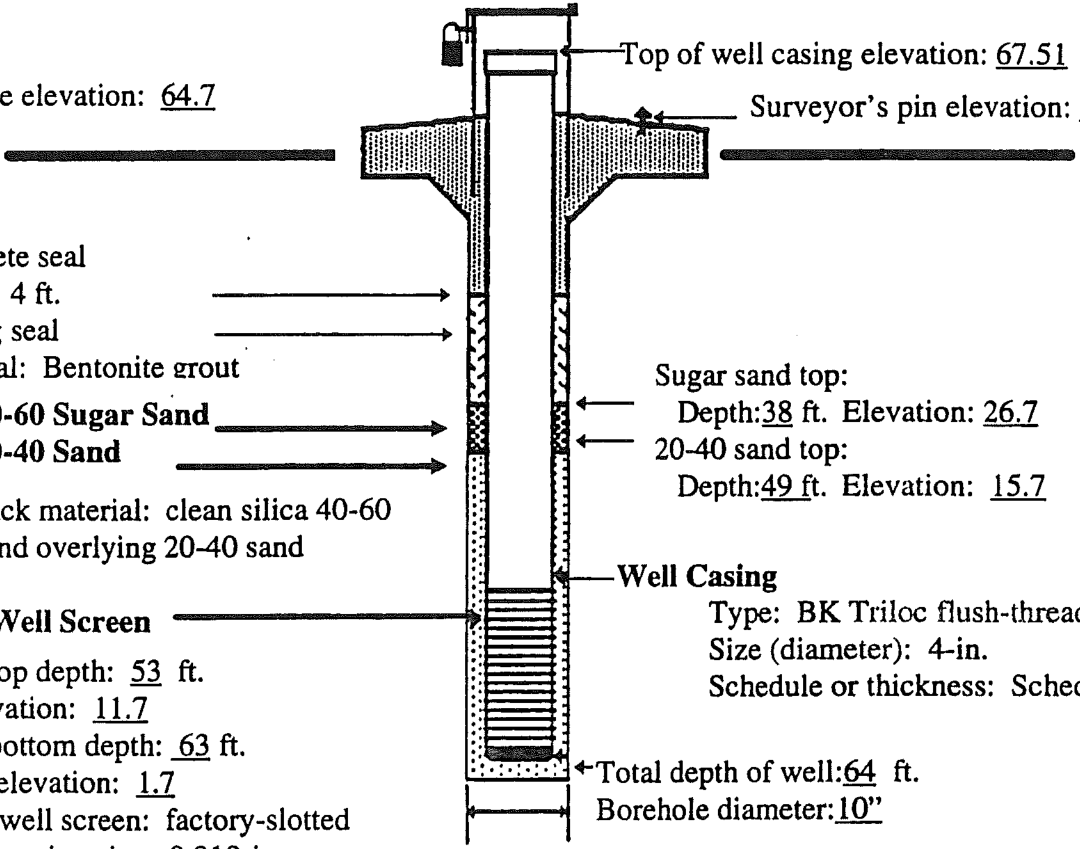
MONITORING WELL DATA SHEET

Permittee or site name: BFI Victoria Landfill
MSW Permit No.: 1522 County: Victoria County, Texas
Monitoring well I.D. No.: P-3
Date of monitoring well installation: 3/13/96
Date of monitoring well development: 3/19/96
Well location: Latitude (or Northing): 318623.2 Longitude (or Easting): 2670906.8
Monitoring well groundwater gradient: Upgradient? Downgradient? X
Monitoring well driller name: Bludworth License No.: 4885M
Geologist or engineer supervising well installation: Stefan Stamoulis, Geologist
Static water-level elevation (feet above mean sea level) after well development: 27.41
Name of geologic formation(s) in which well is completed: Beaumont.

Type of locking device: Padlock

Type of well casing protection: 8-in. x 8-in. steel housing

Concrete surface pad dimensions: 6'x6'



Surface elevation: 64.7

Top of well casing elevation: 67.51

Surveyor's pin elevation: 65.28

Concrete seal depth: 4 ft.

Casing seal material: Bentonite grout

40-60 Sugar Sand

20-40 Sand

Sugar sand top:
Depth: 38 ft. Elevation: 26.7

20-40 sand top:
Depth: 49 ft. Elevation: 15.7

Filter pack material: clean silica 40-60 sugar sand overlying 20-40 sand

Well Casing
Type: BK Triloc flush-thread PVC
Size (diameter): 4-in.
Schedule or thickness: Schedule 40

Well Screen
Screen top depth: 53 ft.
Top elevation: 11.7
Screen bottom depth: 63 ft.
Bottom elevation: 1.7
Type of well screen: factory-slotted
Screen opening size: 0.010-in.

Total depth of well: 64 ft.
Borehole diameter: 10"

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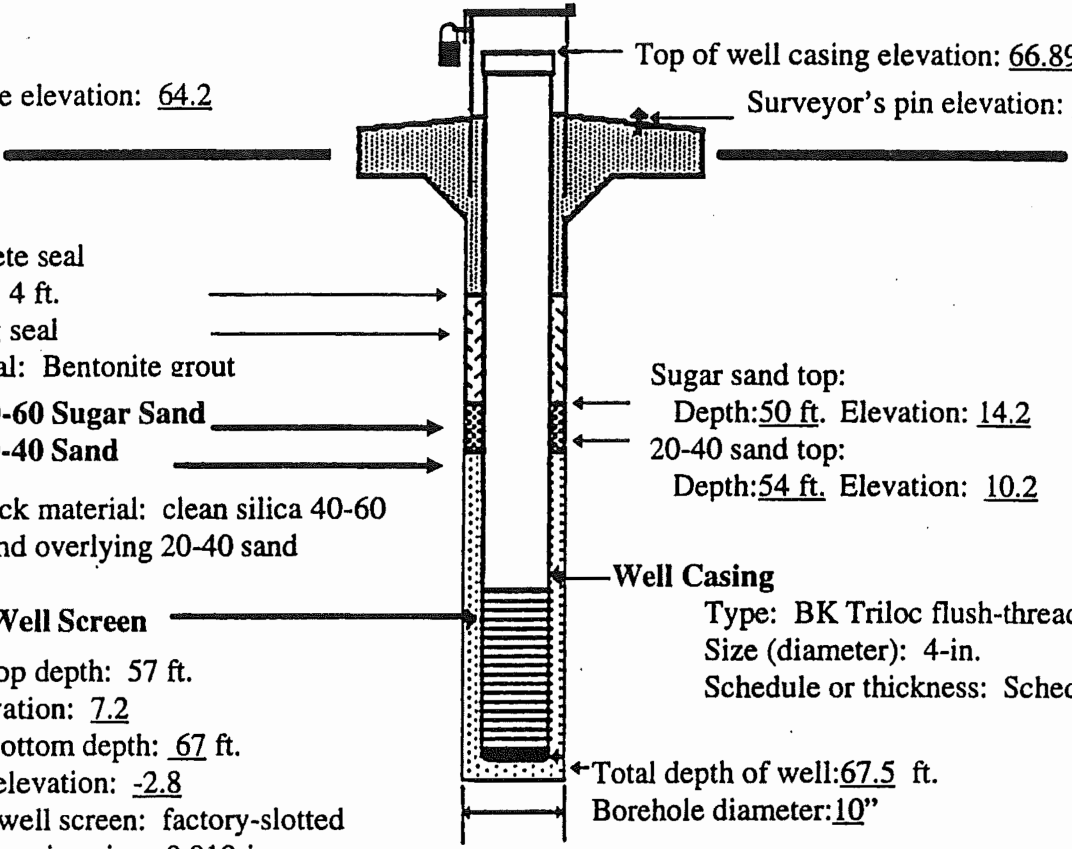
MONITORING WELL DATA SHEET

Permittee or site name: BFI Victoria Landfill
MSW Permit No.: 1522 County: Victoria County, Texas
Monitoring well I.D. No.: P-4
Date of monitoring well installation: 3/16/96
Date of monitoring well development: 3/24/96
Well location: Latitude (or Northing): 319775.8 Longitude (or Easting): 2672451.2
Monitoring well groundwater gradient: Upgradient? X Downgradient?
Monitoring well driller name: Bludworth License No.:4885M
Geologist or engineer supervising well installation: Stefan Stamoulis, Geologist
Static water-level elevation (feet above mean sea level) after well development: 28.77
Name of geologic formation(s) in which well is completed: Beaumont

Type of locking device: Padlock

Type of well casing protection: 8-in. x 8-in. steel housing

Concrete surface pad dimensions: 6'x6'



Top of well casing elevation: 66.89

Surface elevation: 64.2

Surveyor's pin elevation: 64.68

Concrete seal depth: 4 ft.

Casing seal material: Bentonite grout

40-60 Sugar Sand

20-40 Sand

Sugar sand top:
Depth:50 ft. Elevation: 14.2

20-40 sand top:
Depth:54 ft. Elevation: 10.2

Filter pack material: clean silica 40-60 sugar sand overlying 20-40 sand

Well Casing
Type: BK Triloc flush-thread PVC
Size (diameter): 4-in.
Schedule or thickness: Schedule 40

Well Screen

Screen top depth: 57 ft.
Top elevation: 7.2
Screen bottom depth: 67 ft.
Bottom elevation: -2.8
Type of well screen: factory-slotted
Screen opening size: 0.010-in.

Total depth of well:67.5 ft.
Borehole diameter:10"

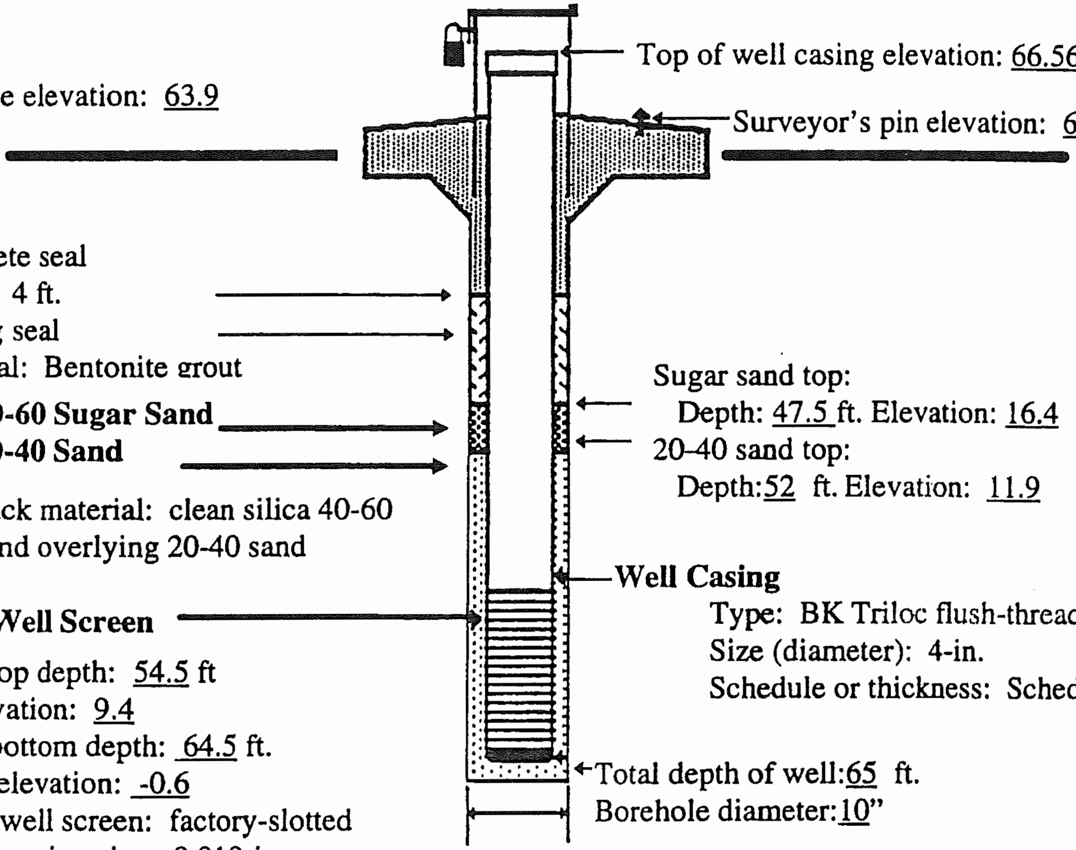
MONITORING WELL DATA SHEET

Permittee or site name: BFI Victoria Landfill
MSW Permit No.: 1522 County: Victoria County, Texas
Monitoring well I.D. No.: P-5
Date of monitoring well installation: 3/20/96
Date of monitoring well development: 3/23/96
Well location: Latitude (or Northing): 319742.9 Longitude (or Easting): 2673171.2
Monitoring well groundwater gradient: Upgradient? X Downgradient?
Monitoring well driller name: Bludworth License No.:4885M
Geologist or engineer supervising well installation: Stefan Stamoulis, Geologist
Static water-level elevation (feet above mean sea level) after well development: 29.08
Name of geologic formation(s) in which well is completed: Beaumont

Type of locking device: Padlock

Type of well casing protection: 8-in. x 8-in. steel housing

Concrete surface pad dimensions: 6'x6'



Top of well casing elevation: 66.56

Surface elevation: 63.9

Surveyor's pin elevation: 64.73

Concrete seal depth: 4 ft.

Casing seal material: Bentonite grout

40-60 Sugar Sand

20-40 Sand

Sugar sand top:
Depth: 47.5 ft. Elevation: 16.4

20-40 sand top:
Depth:52 ft. Elevation: 11.9

Filter pack material: clean silica 40-60 sugar sand overlying 20-40 sand

Well Casing
Type: BK Triloc flush-thread PVC
Size (diameter): 4-in.
Schedule or thickness: Schedule 40

Well Screen

Screen top depth: 54.5 ft
Top elevation: 9.4
Screen bottom depth: 64.5 ft.
Bottom elevation: -0.6
Type of well screen: factory-slotted
Screen opening size: 0.010-in.

Total depth of well:65 ft.
Borehole diameter:10"

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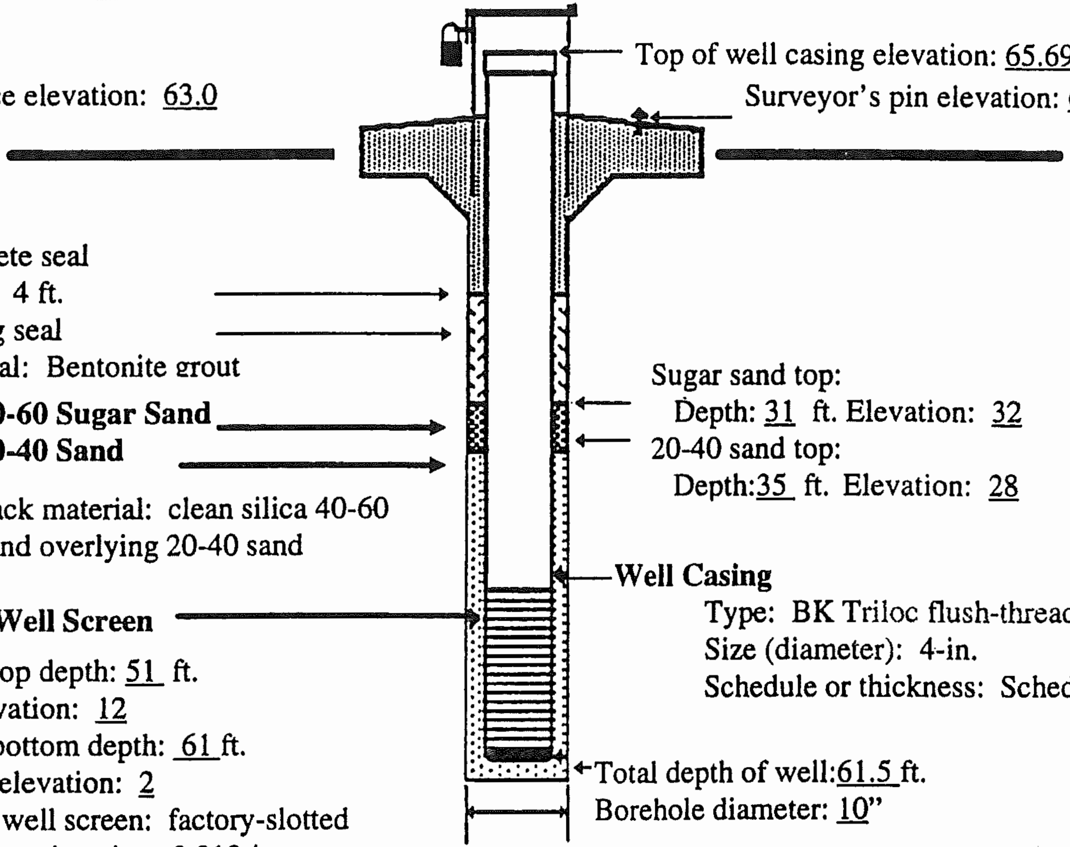
MONITORING WELL DATA SHEET

Permittee or site name: BFI Victoria Landfill
MSW Permit No.: 1522 County: Victoria County, Texas
Monitoring well I.D. No.: P-7
Date of monitoring well installation: 3/15/96
Date of monitoring well development: 3/20/96
Well location: Latitude (or Northing): 318437.4 Longitude (or Easting): 2673140.1
Monitoring well groundwater gradient: Upgradient? X Downgradient?
Monitoring well driller name: Bludworth License No.:4885M
Geologist or engineer supervising well installation: Stefan Stamoulis, Geologist
Static water-level elevation (feet above mean sea level) after well development: 28.90
Name of geologic formation(s) in which well is completed: Beaumont

Type of locking device: Padlock

Type of well casing protection: 8-in. x 8-in. steel housing

Concrete surface pad dimensions: 6'x6'



Top of well casing elevation: 65.69

Surface elevation: 63.0

Surveyor's pin elevation: 63.48

Concrete seal depth: 4 ft.

Casing seal material: Bentonite grout

40-60 Sugar Sand

20-40 Sand

Sugar sand top:
Depth: 31 ft. Elevation: 32
20-40 sand top:
Depth:35 ft. Elevation: 28

Filter pack material: clean silica 40-60 sugar sand overlying 20-40 sand

Well Casing
Type: BK Triloc flush-thread PVC
Size (diameter): 4-in.
Schedule or thickness: Schedule 40

Well Screen

Screen top depth: 51 ft.
Top elevation: 12
Screen bottom depth: 61 ft.
Bottom elevation: 2
Type of well screen: factory-slotted
Screen opening size: 0.010-in.

Total depth of well:61.5 ft.
Borehole diameter: 10"

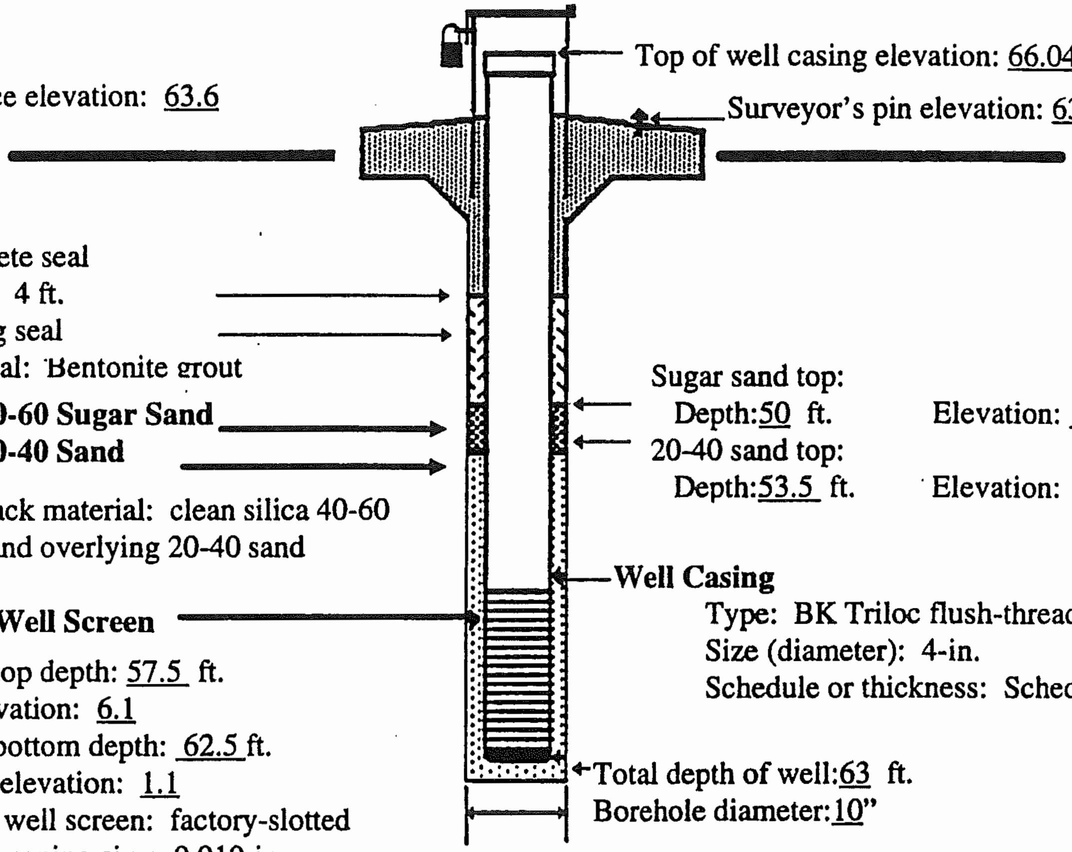
MONITORING WELL DATA SHEET

Permittee or site name: BFI Victoria Landfill
MSW Permit No.: 1522 County: Victoria County, Texas
Monitoring well I.D. No.: P-8
Date of monitoring well installation: 3/19/96
Date of monitoring well development: 3/22/96
Well location: Latitude (or Northing): 317398.7 Longitude (or Easting): 2671759.8
Monitoring well groundwater gradient: Upgradient? Downgradient? X
Monitoring well driller name: Bludworth License No.:4885M
Geologist or engineer supervising well installation: Stefan Stamoulis, Geologist
Static water-level elevation (feet above mean sea level) after well development: 27.48
Name of geologic formation(s) in which well is completed: Beaumont

Type of locking device: Padlock

Type of well casing protection: 8-in. x 8-in. steel housing

Concrete surface pad dimensions: 6'x6'



Top of well casing elevation: 66.04

Surface elevation: 63.6

Surveyor's pin elevation: 63.85

Concrete seal depth: 4 ft.

Casing seal material: Bentonite grout

40-60 Sugar Sand

20-40 Sand

Sugar sand top:
Depth:50 ft. Elevation: 13.6

20-40 sand top:
Depth:53.5 ft. Elevation: 10.10

Filter pack material: clean silica 40-60 sugar sand overlying 20-40 sand

Well Casing
Type: BK Triloc flush-thread PVC
Size (diameter): 4-in.
Schedule or thickness: Schedule 40

Well Screen

Screen top depth: 57.5 ft.
Top elevation: 6.1
Screen bottom depth: 62.5 ft.
Bottom elevation: 1.1
Type of well screen: factory-slotted
Screen opening size: 0.010-in.

Total depth of well:63 ft.
Borehole diameter:10"

AUS\I:\BFISE67.DOTblowe:1

TNRCC SE-67

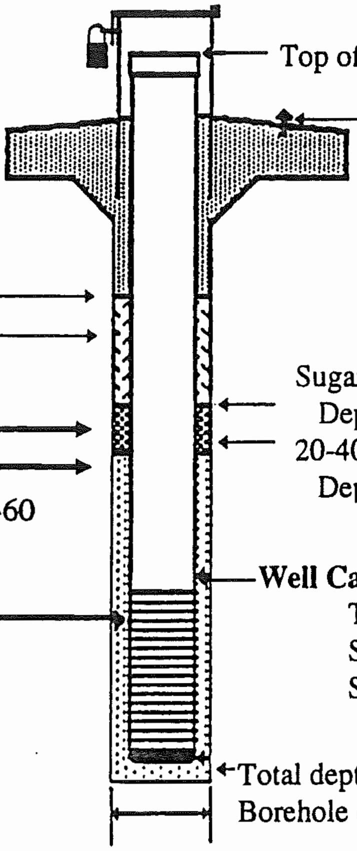
MONITORING WELL DATA SHEET

Permittee or site name: BFI Victoria Landfill
MSW Permit No.: 1522 County: Victoria County, Texas
Monitoring well I.D. No.: P-9
Date of monitoring well installation: 3/18/96
Date of monitoring well development: 03/22/96
Well location: Latitude (or Northing): 316703.7 Longitude (or Easting): 2670831.6
Monitoring well groundwater gradient: Upgradient? Downgradient? X
Monitoring well driller name: Bludworth License No.:4885M
Geologist or engineer supervising well installation: Stefan Stamoulis, Geologist
Static water-level elevation (feet above mean sea level) after well development: 26.41
Name of geologic formation(s) in which well is completed: Beaumont

Type of locking device: Padlock

Type of well casing protection: 8-in. x 8-in. steel housing

Concrete surface pad dimensions: 6'x6'



Top of well casing elevation: 66.22

Surface elevation: 63.8

Surveyor's pin elevation: 63.8

Concrete seal depth: 4 ft.
Casing seal material: Bentonite grout

40-60 Sugar Sand
20-40 Sand

Sugar sand top:
Depth:38 ft. Elevation: 25.80
20-40 sand top:
Depth:42.5 ft. Elevation: 21.3

Filter pack material: clean silica 40-60 sugar sand overlying 20-40 sand

Well Casing
Type: BK Triloc flush-thread PVC
Size (diameter): 4-in.
Schedule or thickness: Schedule 40

Well Screen

Screen top depth: 46.5 ft.
Top elevation: 17.3
Screen bottom depth: 56.5 ft.
Bottom elevation: 7.3
Type of well screen: factory-slotted
Screen opening size: 0.010-in.

Total depth of well:57 ft.
Borehole diameter:10"

TNRCC SE-67

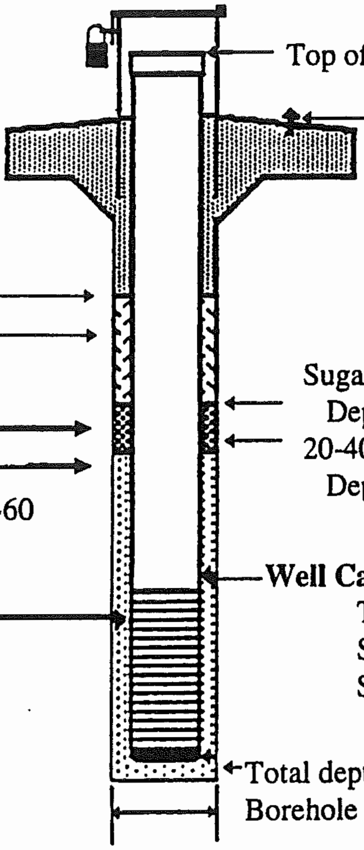
MONITORING WELL DATA SHEET

Permittee or site name: BFI Victoria Landfill
MSW Permit No.: 1522 County: Victoria County, Texas
Monitoring well I.D. No.: P-10
Date of monitoring well installation: 3/14/96
Date of monitoring well development: 3/20/96
Well location: Latitude (or Northing): 316552.0 Longitude (or Easting): 2670151.6
Monitoring well groundwater gradient: Upgradient? Downgradient? X
Monitoring well driller name: Bludworth License No.:4885M
Geologist or engineer supervising well installation: Stefan Stamoulis, Geologist
Static water-level elevation (feet above mean sea level) after well development: 25.72
Name of geologic formation(s) in which well is completed: Beaumont

Type of locking device: Padlock

Type of well casing protection: 8-in. x 8-in. steel housing

Concrete surface pad dimensions: 6'x6'



Top of well casing elevation: 66.76

Surface elevation: 64.0

Surveyor's pin elevation: 64.38

Concrete seal depth: 4 ft.

Casing seal material: Bentonite grout

40-60 Sugar Sand

20-40 Sand

Sugar sand top:
Depth:40 ft. Elevation: 24

20-40 sand top:
Depth:44 ft. Elevation: 20

Filter pack material: clean silica 40-60 sugar sand overlying 20-40 sand

Well Casing
Type: BK Triloc flush-thread PVC
Size (diameter): 4-in.
Schedule or thickness: Schedule 40

Well Screen
Screen top depth: 56 ft.
Top elevation: 8
Screen bottom depth: 66 ft.
Bottom elevation: -2.0
Type of well screen: factory-slotted
Screen opening size: 0.010-in.

Total depth of well:66.5 ft.
Borehole diameter:10"

AUS\I:\BFISE67.DOTblowe:1

TNRCC SE-67

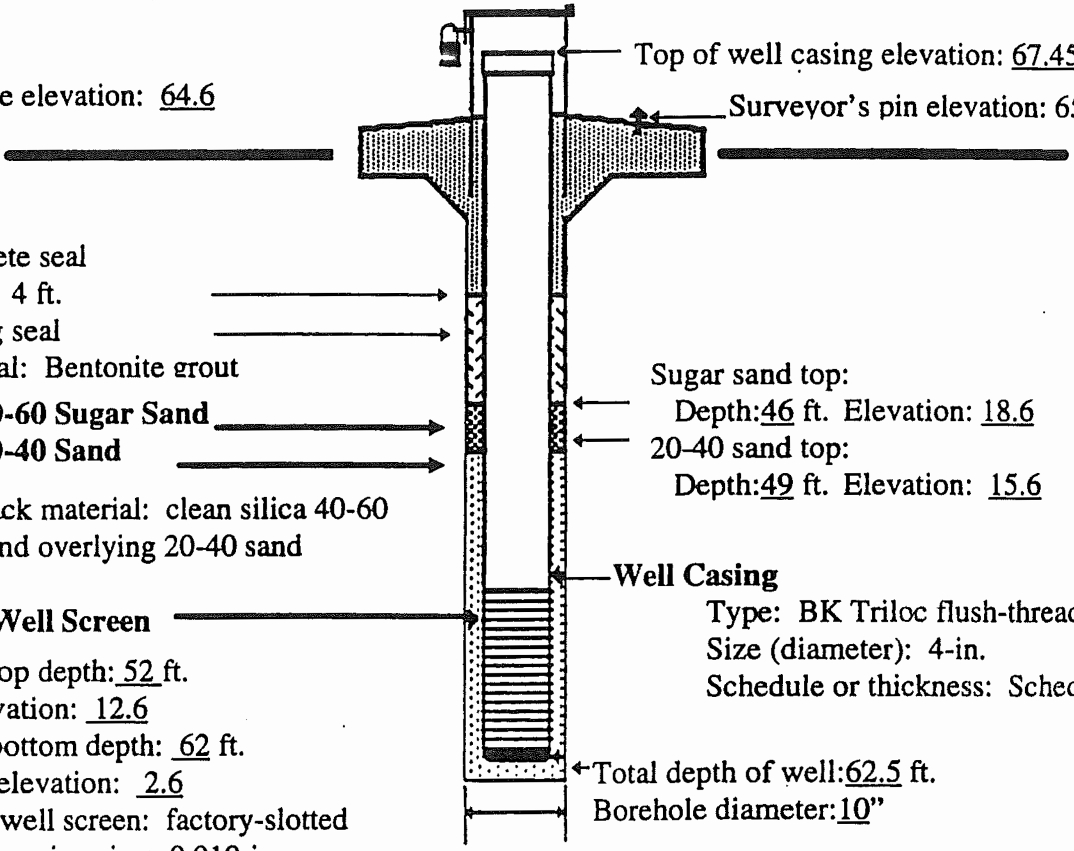
MONITORING WELL DATA SHEET

Permittee or site name: BFI Victoria Landfill
MSW Permit No.: 1522 County: Victoria County, Texas
Monitoring well I.D. No.: P-11
Date of monitoring well installation: 3/13/96
Date of monitoring well development: 3/18/96
Well location: Latitude (or Northing): 317018.6 Longitude (or Easting): 2669810.2
Monitoring well groundwater gradient: Upgradient? Downgradient? X
Monitoring well driller name: Bludworth License No.: 4885M
Geologist or engineer supervising well installation: Stefan Stamoulis, Geologist
Static water-level elevation (feet above mean sea level) after well development: 25.61
Name of geologic formation(s) in which well is completed: Beaumont

Type of locking device: Padlock

Type of well casing protection: 8-in. x 8-in. steel housing

Concrete surface pad dimensions: 6'x6'



Top of well casing elevation: 67.45

Surface elevation: 64.6

Surveyor's pin elevation: 65.21

Concrete seal depth: 4 ft.

Casing seal material: Bentonite grout

40-60 Sugar Sand

20-40 Sand

Sugar sand top:
Depth: 46 ft. Elevation: 18.6

20-40 sand top:
Depth: 49 ft. Elevation: 15.6

Filter pack material: clean silica 40-60 sugar sand overlying 20-40 sand

Well Casing
Type: BK Triloc flush-thread PVC
Size (diameter): 4-in.
Schedule or thickness: Schedule 40

Well Screen

Screen top depth: 52 ft.
Top elevation: 12.6
Screen bottom depth: 62 ft.
Bottom elevation: 2.6
Type of well screen: factory-slotted
Screen opening size: 0.010-in.

Total depth of well: 62.5 ft.
Borehole diameter: 10"

AUS\I:\BFISE67.DOTblowe:1

Monitor Well Data Sheet

Permittee or Site Name: City of Victoria Landfill
County: Victoria County, Texas
Date of Monitor Well Installation: April 28, 2010
Monitor Well Latitude: N 28° 41' 20.65" Longitude: W 96° 54' 22.99"
Monitor Well Groundwater Gradient Position:
Upgradient ______ Downgradient X

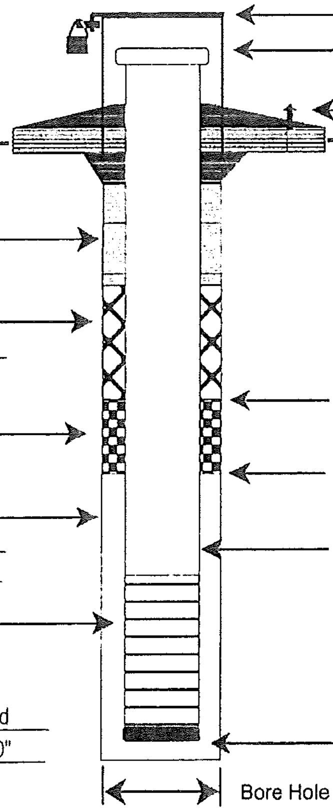
MSW Permit No.: MSW 1522A
Monitor Well I.D. No.: MW-21
Date of Monitor Well Development: May 03, 2010
Monitor Well Driller
Name: Lawrence H. Tobola
License No.: 3026M

NOTES:

- Report all depths from Surface Elevation and all Elevations relative to Mean Sea Level (MSL), to nearest hundredth of a foot.
- Diameter of boring should be at least 4 inches larger than diameter of well casing.
- Use flush screw joint casing only, 2-inch diameter or larger, with o-rings or PTFE tape in joints (4-inch diameter recommend).
- Well development should continue until water is clear, and pH and conductivity are stable.

Geologist, Hydrologist, or Engineer Supervising Well Installation: Leonell Scarborough
Static Water Level Elevation (with respect to MSL) after Well Development: 27.43'
Name of Geologic Formation(s) in which Well is completed: Beaumont Formation

Type of Locking Device: Padlock
Type of Casing Protection: Lockable Hinged Pipe
Concrete Surface Pad (with steel reinforcement) Dimensions: 6' X 6' X 6" (min.)



Top of Protective Collar Elevation: 67.78'
Top of Casing Elevation: 67.26'
Surface Elevation: 64.3'
Surveyor's Pin Elevation: 64.57'

Concrete Seal
Depth: 2.0'

Casing Seal (backfill)
Material: Bentonite Grout

Bentonite Seal

Bentonite Seal Top
Depth: 36.0' Elevation: 28.3'

Filter Pack Top
Depth: 40.0' Elevation: 24.3'

Filter Pack
Filter Pack Material: 20 / 40 Silica Sand

Well Casing
Type: PVC
Size (diameter): 2"
Schedule or Thickness: Sch. 40

Well Screen
Top Depth: 44.0'
Top Elevation: 20.3'
Type of Well Screen: Slotted
Screen Opening Size: 0.010"
Bottom Depth: 54.0'
Bottom Elevation: 10.3'

Bottom Cap Depth: 54.5'

Bore Hole Diameter: 8.25"

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Project No. L-04-622	June 2010	Drawing Not To Scale

Monitor Well Data Sheet

Permittee or Site Name: City of Victoria Landfill

County: Victoria County, Texas

Date of Monitor Well Installation: April 29, 2010

Monitor Well Latitude: N 28° 41' 13.85" Longitude: W 96° 54' 33.64"

Monitor Well Groundwater Gradient Position:

Upgradient ____ Downgradient X

MSW Permit No.: MSW 1522A

Monitor Well I.D. No.: MW-22

Date of Monitor Well Development: May 04, 2010

Monitor Well Driller

Name: Lawrence H. Tobola

License No.: 3026M

NOTES:
- Report all depths from Surface Elevation and all Elevations relative to Mean Sea Level (MSL), to nearest hundredth of a foot.
- Diameter of boring should be at least 4 inches larger than diameter of well casing.
- Use flush screw joint casing only, 2-inch diameter or larger, with o-rings or PTFE tape in joints (4-inch diameter recommend).
- Well development should continue until water is clear, and pH and conductivity are stable.

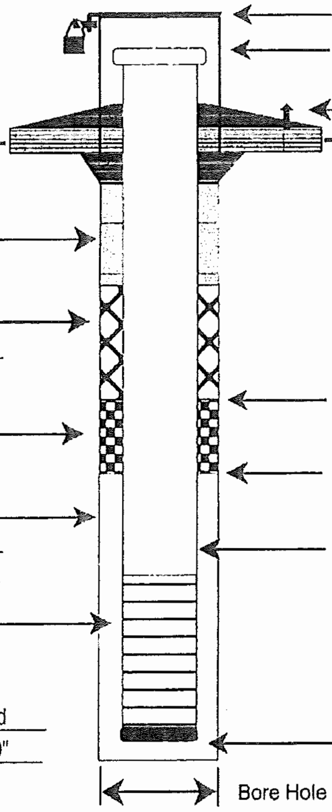
Geologist, Hydrologist, or Engineer Supervising Well Installation: Leonell Scarborough

Static Water Level Elevation (with respect to MSL) after Well Development: 27.33'

Name of Geologic Formation(s) in which Well is completed: Beaumont Formation

Type of Locking Device: Padlock Type of Casing Protection: Lockable Hinged Pipe

Concrete Surface Pad (with steel reinforcement) Dimensions: 6' X 6' X 6" (min.)



Top of Protective Collar Elevation: 69.37'

Top of Casing Elevation: 68.88'

Surface Elevation: 65.7'

Surveyor's Pin Elevation: 66.00'

Concrete Seal Depth: 2.0'

Casing Seal (backfill) Material: Bentonite Grout

Bentonite Seal

Bentonite Seal Top Depth: 36.0' Elevation: 29.7'

Filter Pack Top Depth: 40.0' Elevation: 25.7'

Filter Pack

Filter Pack Material: 20 / 40 Silica Sand

Well Casing

Type: PVC

Size (diameter): 2"

Schedule or Thickness: Sch. 40

Well Screen

Top Depth: 45.5'

Top Elevation: 20.2'

Type of Well Screen: Slotted

Screen Opening Size: 0.010"

Bottom Depth: 55.5'

Bottom Elevation: 10.2'

Bottom Cap Depth: 56.0'

Bore Hole Diameter: 8.25"

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Project No. L-04-622	June 2010	Drawing Not To Scale

Monitor Well Data Sheet

Permittee or Site Name: City of Victoria Landfill
County: Victoria County, Texas
Date of Monitor Well Installation: April 28, 2010
Monitor Well Latitude: N 28° 41' 31.06" Longitude: W 96° 54' 35.25"
Monitor Well Groundwater Gradient Position:
Upgradient ____ Downgradient X

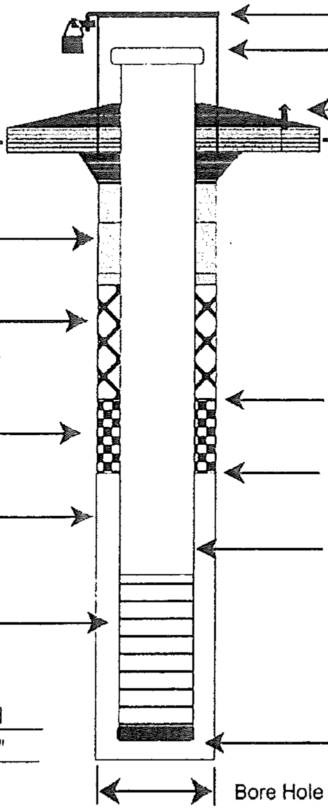
MSW Permit No.: MSW 1522A
Monitor Well I.D. No.: MW-23
Date of Monitor Well Development: May 03, 2010
Monitor Well Driller Name: Lawrence H. Tobola
License No.: 3026M

NOTES:

- Report all depths from Surface Elevation and all Elevations relative to Mean Sea Level (MSL), to nearest hundredth of a foot.
- Diameter of boring should be at least 4 inches larger than diameter of well casing.
- Use flush screw joint casing only, 2-inch diameter or larger, with o-rings or PTFE tape in joints (4-inch diameter recommend).
- Well development should continue until water is clear, and pH and conductivity are stable.

Geologist, Hydrologist, or Engineer Supervising Well Installation: Leonell Scarborough
Static Water Level Elevation (with respect to MSL) after Well Development: 27.66'
Name of Geologic Formation(s) in which Well is completed: Beaumont Formation

Type of Locking Device: Padlock
Type of Casing Protection: Lockable Hinged Pipe
Concrete Surface Pad (with steel reinforcement) Dimensions: 6' X 6' X 6" (min.)



Top of Protective Collar Elevation: 70.28'
Top of Casing Elevation: 69.75'
Surface Elevation: 66.4'
Surveyor's Pin Elevation: 66.97'

Concrete Seal
Depth: 2.0'

Casing Seal (backfill)
Material: Bentonite Grout

Bentonite Seal

Bentonite Seal Top
Depth: 42.0' Elevation: 24.4'

Filter Pack Top
Depth: 46.0' Elevation: 20.4'

Filter Pack
Filter Pack Material: 20 / 40 Silica Sand

Well Casing
Type: PVC
Size (diameter): 2"
Schedule or Thickness: Sch. 40

Well Screen
Top Depth: 48.5'
Top Elevation: 17.9'
Type of Well Screen: Slotted
Screen Opening Size: 0.010"
Bottom Depth: 58.5'
Bottom Elevation: 7.9'

Bottom Cap Depth: 59.0'
Bore Hole Diameter: 8.25"

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Project No. L-04-622	June 2010	Drawing Not To Scale

Monitor Well Data Sheet

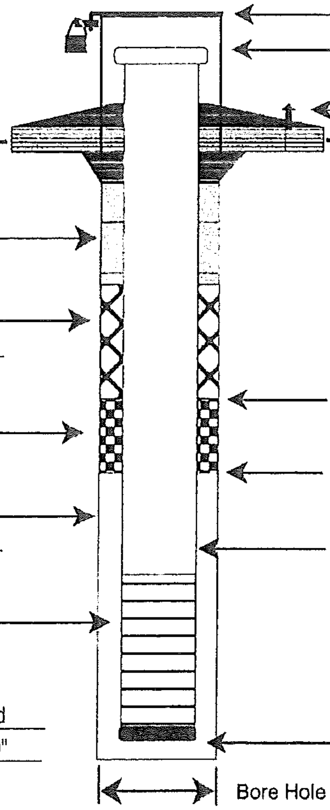
Permittee or Site Name: City of Victoria Landfill
MSW Permit No.: MSW 1522A
County: Victoria County, Texas
Monitor Well I.D. No.: MW-24
Date of Monitor Well Installation: April 28, 2010
Date of Monitor Well Development: May 04, 2010
Monitor Well Latitude: N 28° 41' 33.66" Longitude: W 96° 54' 31.17"
Monitor Well Groundwater Gradient Position:
Upgradient ____ Downgradient X
Monitor Well Driller
Name: Lawrence H. Tobola
License No.: 3026M

NOTES:

- Report all depths from Surface Elevation and all Elevations relative to Mean Sea Level (MSL), to nearest hundredth of a foot.
- Diameter of boring should be at least 4 inches larger than diameter of well casing.
- Use flush screw joint casing only, 2-inch diameter or larger, with o-rings or PTFE tape in joints (4-inch diameter recommend).
- Well development should continue until water is clear, and pH and conductivity are stable.

Geologist, Hydrologist, or Engineer Supervising Well Installation: Leonell Scarborough
Static Water Level Elevation (with respect to MSL) after Well Development: 28.14'
Name of Geologic Formation(s) in which Well is completed: Beaumont Formation

Type of Locking Device: Padlock
Type of Casing Protection: Lockable Hinged Pipe
Concrete Surface Pad (with steel reinforcement) Dimensions: 6' X 6' X 6" (min.)



Top of Protective Collar Elevation: 70.22'
Top of Casing Elevation: 69.66'
Surface Elevation: 66.1'
Surveyor's Pin Elevation: 66.61'
Concrete Seal Depth: 2.0'
Casing Seal (backfill) Material: Bentonite Grout
Bentonite Seal Top Depth: 38.0' Elevation: 28.1'
Bentonite Seal
Filter Pack Top Depth: 42.0' Elevation: 24.1'
Filter Pack
Filter Pack Material: 20 / 40 Silica Sand
Well Casing
Type: PVC
Size (diameter): 2"
Schedule or Thickness: Sch. 40
Well Screen
Top Depth: 46.0'
Top Elevation: 20.1'
Type of Well Screen: Slotted
Screen Opening Size: 0.010"
Bottom Depth: 56.0'
Bottom Elevation: 10.1'
Bottom Cap Depth: 56.5'
Bore Hole Diameter: 8.25"

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Project No. L-04-622	June 2010	Drawing Not To Scale

Monitor Well Data Sheet

Permittee or Site Name: City of Victoria Landfill

County: Victoria County, Texas

Date of Monitor Well Installation: April 27, 2010

Monitor Well Latitude: N 28° 41' 39.56" Longitude: W 96° 54' 21.77"

Monitor Well Groundwater Gradient Position:

Upgradient ______ Downgradient ______

MSW Permit No.: MSW 1522A

Monitor Well I.D. No.: OW-25

Date of Monitor Well Development: May 03, 2010

Monitor Well Driller Name: Lawrence H. Tobola

License No.: 3026M

NOTES:

- Report all depths from Surface Elevation and all Elevations relative to Mean Sea Level (MSL), to nearest hundredth of a foot.
- Diameter of boring should be at least 4 inches larger than diameter of well casing.
- Use flush screw joint casing only, 2-inch diameter or larger, with o-rings or PTFE tape in joints (4-inch diameter recommend).
- Well development should continue until water is clear, and pH and conductivity are stable.

Geologist, Hydrologist, or Engineer Supervising Well Installation: Leonell Scarborough

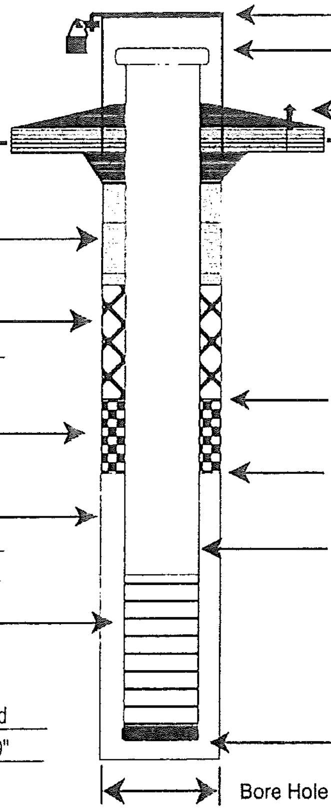
Static Water Level Elevation (with respect to MSL) after Well Development: 29.57'

Name of Geologic Formation(s) in which Well is completed: Beaumont Formation

Type of Locking Device: Padlock

Type of Casing Protection: Lockable Hinged Pipe

Concrete Surface Pad (with steel reinforcement) Dimensions: 6' X 6' X 6" (min.)



Top of Protective Collar Elevation: 70.46'

Top of Casing Elevation: 69.93'

Surface Elevation: 66.9'

Surveyor's Pin Elevation: 67.13'

Concrete Seal Depth: 2.0'

Casing Seal (backfill) Material: Bentonite Grout

Bentonite Seal

Bentonite Seal Top Depth: 43.0' Elevation: 23.9'

Filter Pack Top Depth: 46.0' Elevation: 20.9'

Filter Pack

Filter Pack Material: 20 / 40 Silica Sand

Well Casing Type: PVC

Size (diameter): 2"

Schedule or Thickness: Sch. 40

Well Screen

Top Depth: 49.5'

Top Elevation: 17.4'

Type of Well Screen: Slotted

Screen Opening Size: 0.010"

Bottom Depth: 59.5'

Bottom Elevation: 7.4'

Bottom Cap Depth: 60.0'

Bore Hole Diameter: 8.25"

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Project No. L-04-622	June 2010	Drawing Not To Scale

Monitor Well Data Sheet

Permittee or Site Name: City of Victoria Landfill
County: Victoria County, Texas
Date of Monitor Well Installation: April 26, 2010
Monitor Well Latitude: N 28° 41' 43.00" Longitude: W 96° 54' 16.42"
Monitor Well Groundwater Gradient Position:
Upgradient ____ Downgradient ____

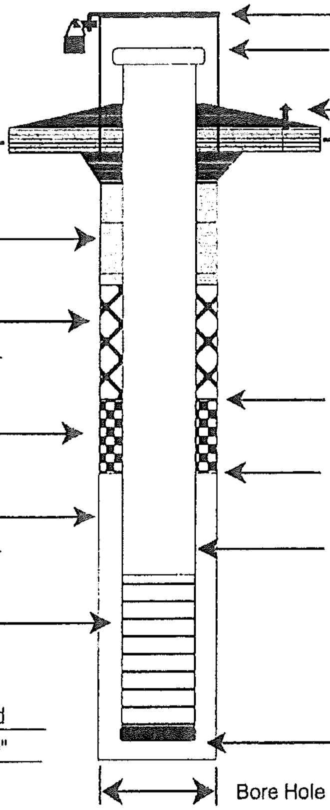
MSW Permit No.: MSW 1522A
Monitor Well I.D. No.: OW-26
Date of Monitor Well Development: May 03, 2010
Monitor Well Driller
Name: Lawrence H. Tobola
License No.: 3026M

NOTES:

- Report all depths from Surface Elevation and all Elevations relative to Mean Sea Level (MSL), to nearest hundredth of a foot.
- Diameter of boring should be at least 4 inches larger than diameter of well casing.
- Use flush screw joint casing only, 2-inch diameter or larger, with o-rings or PTFE tape in joints (4-inch diameter recommend).
- Well development should continue until water is clear, and pH and conductivity are stable.

Geologist, Hydrologist, or Engineer Supervising Well Installation: Leonell Scarborough
Static Water Level Elevation (with respect to MSL) after Well Development: 30.30'
Name of Geologic Formation(s) in which Well is completed: Beaumont Formation

Type of Locking Device: Padlock
Type of Casing Protection: Lockable Hinged Pipe
Concrete Surface Pad (with steel reinforcement) Dimensions: 6' X 6' X 6" (min.)



Top of Protective Collar Elevation: 69.30'
Top of Casing Elevation: 68.57'
Surface Elevation: 65.6'
Surveyor's Pin Elevation: 65.83'
Concrete Seal Depth: 2.0'
Casing Seal (backfill) Material: Bentonite Grout
Bentonite Seal
Bentonite Seal Top Depth: 42.0' Elevation: 23.6'
Filter Pack
Filter Pack Material: 20 / 40 Silica Sand
Filter Pack Top Depth: 45.0' Elevation: 20.6'
Well Casing
Type: PVC
Size (diameter): 2"
Schedule or Thickness: Sch. 40
Well Screen
Top Depth: 48.0'
Top Elevation: 17.6'
Type of Well Screen: Slotted
Screen Opening Size: 0.010"
Bottom Depth: 58.0'
Bottom Elevation: 7.6'
Bottom Cap Depth: 58.5'
Bore Hole Diameter: 8.25"

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Project No. L-04-622	June 2010	Drawing Not To Scale

Monitor Well Data Sheet

Permittee or Site Name: City of Victoria Landfill
County: Victoria County, Texas
Date of Monitor Well Installation: April 29, 2010
Monitor Well Latitude: N 28° 41' 27.30" Longitude: W 96° 54' 12.46"
Monitor Well Groundwater Gradient Position:
Upgradient ______ Downgradient ______

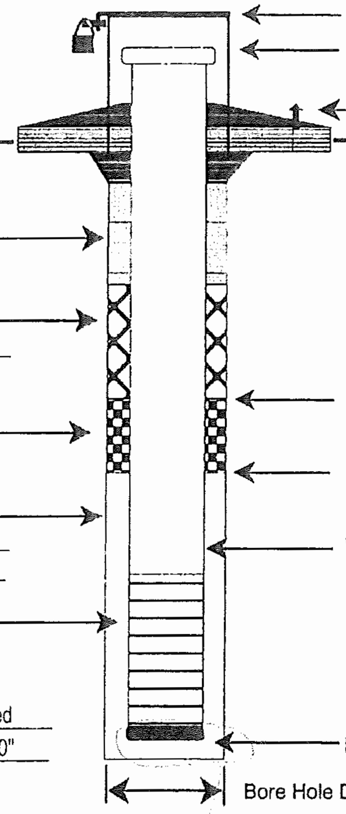
MSW Permit No.: MSW 1522A
Monitor Well I.D. No.: OW-27
Date of Monitor Well Development: May 03, 2010
Monitor Well Driller
Name: Lawrence H. Tobola
License No.: 3026M

NOTES:

- Report all depths from Surface Elevation and all Elevations relative to Mean Sea Level (MSL), to nearest hundredth of a foot.
- Diameter of boring should be at least 4 inches larger than diameter of well casing.
- Use flush screw joint casing only, 2-inch diameter or larger, with o-rings or PTFE tape in joints (4-inch diameter recommend).
- Well development should continue until water is clear, and pH and conductivity are stable.

Geologist, Hydrologist, or Engineer Supervising Well Installation: Leonell Scarborough
Static Water Level Elevation (with respect to MSL) after Well Development: 29.58'
Name of Geologic Formation(s) in which Well is completed: Beaumont Formation

Type of Locking Device: Padlock Type of Casing Protection: Lockable Hinged Pipe
Concrete Surface Pad (with steel reinforcement) Dimensions: 6' X 6' X 6" (min.)



Top of Protective Collar Elevation: 71.29'
Top of Casing Elevation: 70.73'
Surface Elevation: 68.0'
Surveyor's Pin Elevation: 68.14'
Concrete Seal Depth: 2.0'
Casing Seal (backfill) Material: Bentonite Grout
Bentonite Seal
Bentonite Seal Top Depth: 40.0' Elevation: 28.0'
Filter Pack Top Depth: 45.0' Elevation: 23.0'
Filter Pack
Filter Pack Material: 20 / 40 Silica Sand
Well Casing
Type: PVC
Size (diameter): 2"
Schedule or Thickness: Sch. 40
Well Screen
Top Depth: 51.5'
Top Elevation: 16.5'
Type of Well Screen: Slotted
Screen Opening Size: 0.010"
Bottom Depth: 61.5'
Bottom Elevation: 6.5'
Bottom Cap Depth: 62.0'
Bore Hole Diameter: 8.25"

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Project No. L-04-622	June 2010	Drawing Not To Scale

Monitor Well Data Sheet

Permittee or Site Name: City of Victoria Landfill
County: Victoria County, Texas
Date of Monitor Well Installation: May 03, 2010
Monitor Well Latitude: N 28° 41' 30.84" Longitude: W 96° 54' 07.41"
Monitor Well Groundwater Gradient Position:
Upgradient ______ Downgradient ______

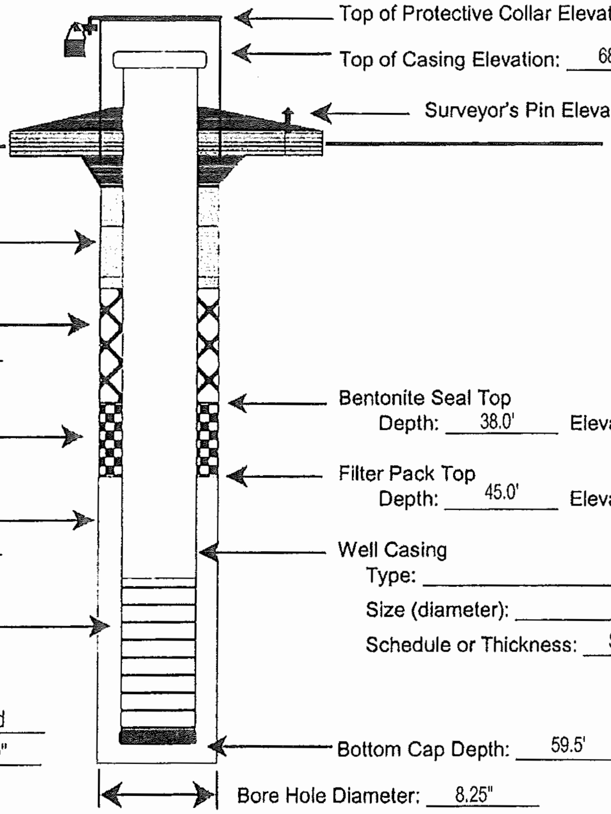
MSW Permit No.: MSW 1522A
Monitor Well I.D. No.: OW-28
Date of Monitor Well Development: May 05, 2010
Monitor Well Driller
Name: Lawrence H. Tobola
License No.: 3026M

NOTES:

- Report all depths from Surface Elevation and all Elevations relative to Mean Sea Level (MSL), to nearest hundredth of a foot.
- Diameter of boring should be at least 4 inches larger than diameter of well casing.
- Use flush screw joint casing only, 2-inch diameter or larger, with o-rings or PTFE tape in joints (4-inch diameter recommend).
- Well development should continue until water is clear, and pH and conductivity are stable.

Geologist, Hydrologist, or Engineer Supervising Well Installation: Leonell Scarborough
Static Water Level Elevation (with respect to MSL) after Well Development: 30.39'
Name of Geologic Formation(s) in which Well is completed: Beaumont Formation

Type of Locking Device: Padlock Type of Casing Protection: Lockable Hinged Pipe
Concrete Surface Pad (with steel reinforcement) Dimensions: 6' X 6' X 6" (min.)



Top of Protective Collar Elevation: 69.33'
Top of Casing Elevation: 68.65'
Surface Elevation: 65.5'
Surveyor's Pin Elevation: 65.87'
Concrete Seal Depth: 2.0'
Casing Seal (backfill) Material: Bentonite Grout
Bentonite Seal
Bentonite Seal Top Depth: 38.0' Elevation: 27.5'
Filter Pack Top Depth: 45.0' Elevation: 20.5'
Filter Pack
Filter Pack Material: 20 / 40 Silica Sand
Well Casing
Type: PVC
Size (diameter): 2"
Schedule or Thickness: Sch. 40
Well Screen
Top Depth: 49.0'
Top Elevation: 16.5'
Type of Well Screen: Slotted
Screen Opening Size: 0.010"
Bottom Depth: 59.0'
Bottom Elevation: 6.5'
Bottom Cap Depth: 59.5'
Bore Hole Diameter: 8.25"

TCEQ-10308

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HYDREX ENVIRONMENTAL, INC.
1120 NW Stallings Drive
Nacogdoches, Texas 75964
(936) 568-9451 Fax (936) 568-9527

Project No. L-04-622	June 2010	Drawing Not To Scale

Monitor Well Data Sheet

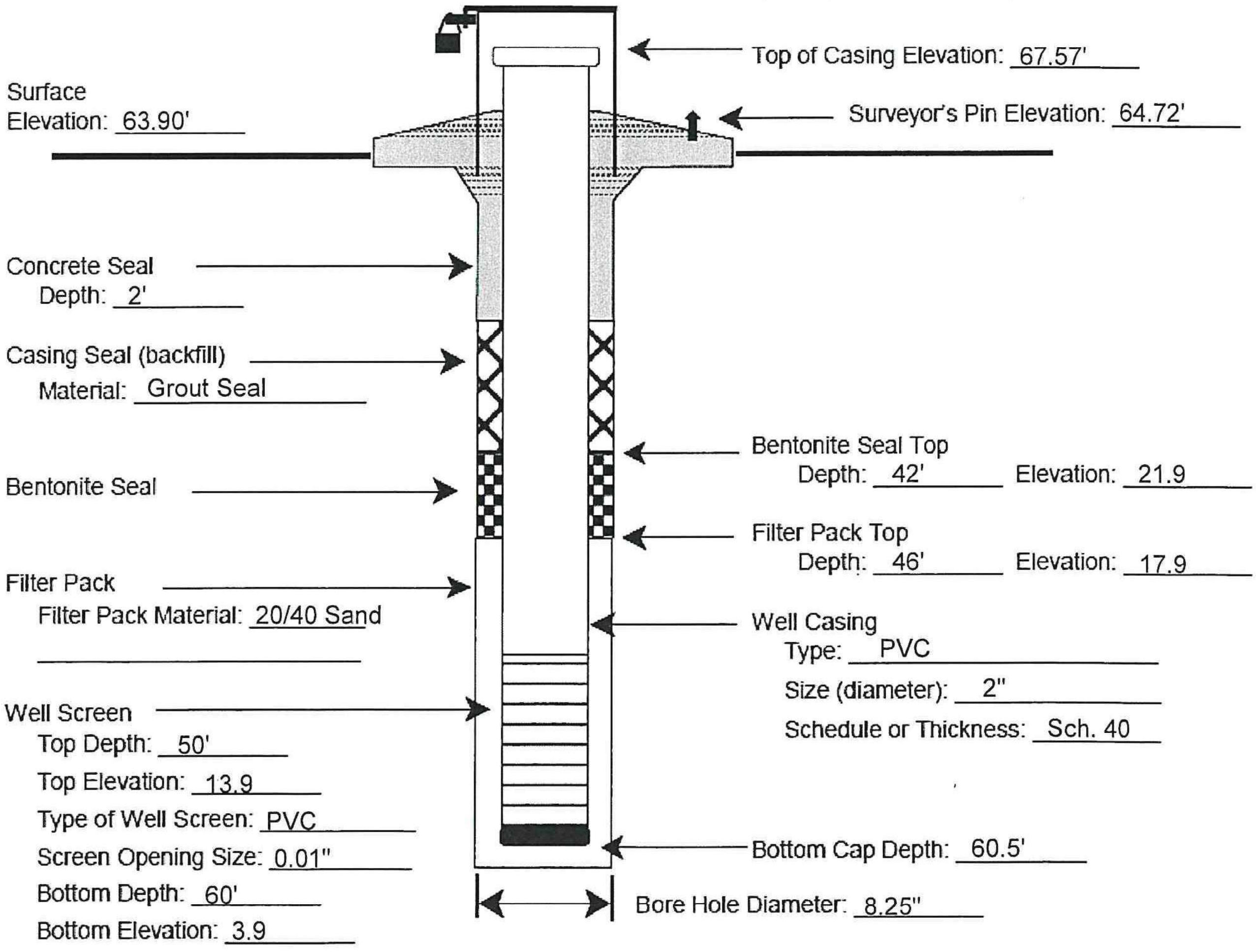
Texas Commission on Environmental Quality
Waste Permits Division

Permittee or Site Name: City of Victoria Landfill
MSW Permit No.: 1522A
County: Victoria County, Texas
Monitor Well I.D. No.: MW-15AR
Date of Monitor Well Installation: 8/23/2021
Date of Well Development: 8/26/2021
Monitor Well Latitude : 28.693891 Longitude: -95.8983
Monitor Well Driller
Name: L. Tobola
License No.: 3026
Monitor Well Hydraulic Position:
Upgradient X Downgradient ________

Geologist, Hydrologist, or Engineer Supervising Well Installation: L. Scarborough
Static Water Level Elevation (with respect to MSL) after Well Development: 36.86
Name of Geologic Formation(s) in which Well is completed: Beaumont Formation
Type of Locking Device: Pad Lock Type of Casing Protection: Aluminum
Concrete Surface Pad (with steel reinforcement) Dimensions: 4.5'x4.5'x6"

Notes:

- Report all depths from Surface Elevation and all Elevations relative to Mean Sea Level (MSL), to nearest hundredth of a foot.
- Diameter of boring should be at least 4 inches larger than diameter of well casing.
- Use flush screw joint casing only, 2-inch diameter or larger, with o-rings or PTFE tape in joints (4-inch diameter recommend).
- Well development should continue until water is clear, and pH and conductivity are stable.



Top of Casing Elevation: 67.57'
Surface Elevation: 63.90'
Surveyor's Pin Elevation: 64.72'
Concrete Seal Depth: 2'
Casing Seal (backfill) Material: Grout Seal
Bentonite Seal
Bentonite Seal Top Depth: 42' Elevation: 21.9
Filter Pack Top Depth: 46' Elevation: 17.9
Filter Pack
Filter Pack Material: 20/40 Sand
Well Casing
Type: PVC
Size (diameter): 2"
Schedule or Thickness: Sch. 40
Well Screen
Top Depth: 50'
Top Elevation: 13.9
Type of Well Screen: PVC
Screen Opening Size: 0.01"
Bottom Depth: 60'
Bottom Elevation: 3.9
Bottom Cap Depth: 60.5'
Bore Hole Diameter: 8.25"

TCEQ-10308 (Rev. 11/18/11)

Monitor Well Data Sheet

Permittee or Site Name: City of Victoria Landfill
County: Victoria County, Texas
Date of Monitor Well Installation: February 25, 2011
Monitor Well Latitude: N 28° 41' 17.74" Longitude: W 96° 54' 51.21"
Monitor Well Groundwater Gradient Position:
Upgradient ____ Downgradient X

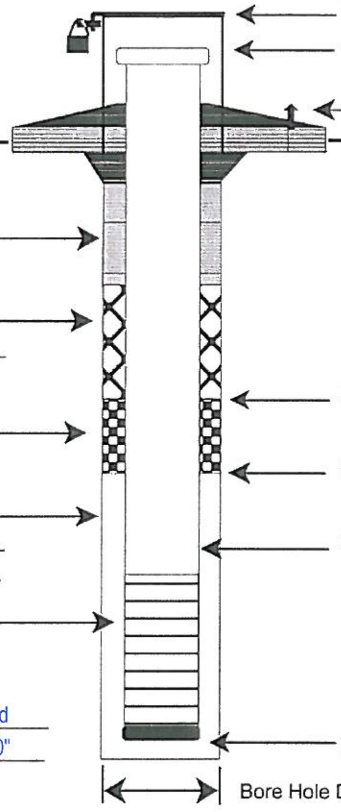
MSW Permit No.: MSW 1522A
Monitor Well I.D. No.: A-2
Date of Monitor Well Development: February 25, 2011
Monitor Well Driller
Name: Lawrence H. Tobola
License No.: 3026M

NOTES:

- Report all depths from Surface Elevation and all Elevations relative to Mean Sea Level (MSL), to nearest hundredth of a foot.
- Diameter of boring should be at least 4 inches larger than diameter of well casing.
- Use flush screw joint casing only, 2-inch diameter or larger, with o-rings or PTFE tape in joints (4-inch diameter recommend).
- Well development should continue until water is clear, and pH and conductivity are stable.

Geologist, Hydrologist, or Engineer Supervising Well Installation: Marty Ford
Static Water Level Elevation (with respect to MSL) after Well Development: 26.41'
Name of Geologic Formation(s) in which Well is completed: Beaumont Formation

Type of Locking Device: Padlock
Type of Casing Protection: Lockable Hinged Pipe
Concrete Surface Pad (with steel reinforcement) Dimensions: 6' X 6' X 6" (min.)



Top of Protective Collar Elevation: 68.67'
Top of Casing Elevation: 68.06'
Surface Elevation: 64.7'
Surveyor's Pin Elevation: 65.24'
Concrete Seal Depth: 2.0'
Casing Seal (backfill) Material: Bentonite Grout
Bentonite Seal
Bentonite Seal Top Depth: 45.0' Elevation: 19.7'
Filter Pack Top Depth: 47.0' Elevation: 17.7'
Filter Pack
Filter Pack Material: 20 / 40 Silica Sand
Well Casing
Type: PVC
Size (diameter): 2"
Schedule or Thickness: Sch. 40
Well Screen
Top Depth: 49.0'
Top Elevation: 15.7'
Type of Well Screen: Slotted
Screen Opening Size: 0.010"
Bottom Depth: 59.0'
Bottom Elevation: 5.7'
Bottom Cap Depth: 59.5'
Bore Hole Diameter: 8.25"

TCEQ-10308

Hydrex
ENVIRONMENTAL, INC.
1120 NW Stallings Drive
Nacogdoches, Texas 75964
(936) 568-9451 Fax (936) 568-9527

Project No. L-05-617	March 2011	Drawing Not To Scale

Monitor Well Data Sheet

Permittee or Site Name: City of Victoria Landfill

County: Victoria County, Texas

Date of Monitor Well Installation: February 25, 2011

Monitor Well Latitude: N 28° 41' 13.48" Longitude: W 96° 54' 46.88"

Monitor Well Groundwater Gradient Position:

Upgradient ____ Downgradient X

MSW Permit No.: MSW 1522A

Monitor Well I.D. No.: A-5

Date of Monitor Well Development: February 25, 2011

Monitor Well Driller

Name: Lawrence H. Tobola

License No.: 3026M

NOTES:

- Report all depths from Surface Elevation and all Elevations relative to Mean Sea Level (MSL), to nearest hundredth of a foot.
- Diameter of boring should be at least 4 inches larger than diameter of well casing.
- Use flush screw joint casing only, 2-inch diameter or larger, with o-rings or PTFE tape in joints (4-inch diameter recommend).
- Well development should continue until water is clear, and pH and conductivity are stable.

Geologist, Hydrologist, or Engineer Supervising Well Installation: Marty Ford

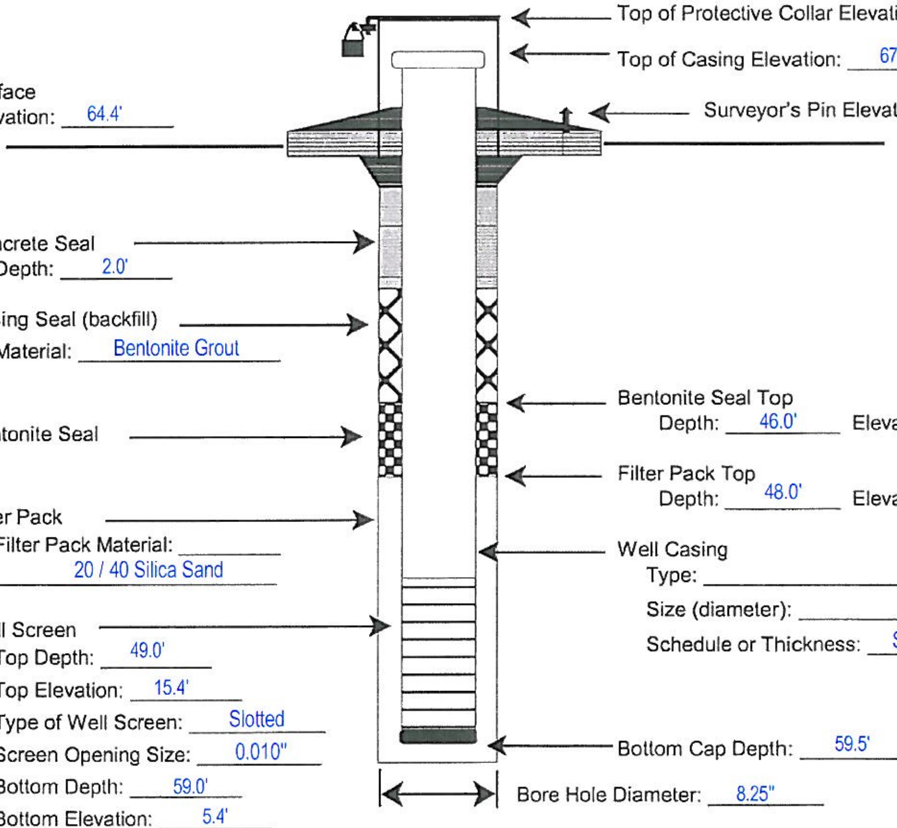
Static Water Level Elevation (with respect to MSL) after Well Development: 26.63'

Name of Geologic Formation(s) in which Well is completed: Beaumont Formation

Type of Locking Device: Padlock

Type of Casing Protection: Lockable Hinged Pipe

Concrete Surface Pad (with steel reinforcement) Dimensions: 6' X 6' X 6" (min.)



Top of Protective Collar Elevation: 68.48'

Top of Casing Elevation: 67.84'

Surface Elevation: 64.4'

Surveyor's Pin Elevation: 64.88'

Concrete Seal Depth: 2.0'

Casing Seal (backfill) Material: Bentonite Grout

Bentonite Seal

Bentonite Seal Top Depth: 46.0' Elevation: 18.4'

Filter Pack Top Depth: 48.0' Elevation: 16.4'

Filter Pack

Filter Pack Material: 20 / 40 Silica Sand

Well Casing

Type: PVC

Size (diameter): 2"

Schedule or Thickness: Sch. 40

Well Screen

Top Depth: 49.0'

Top Elevation: 15.4'

Type of Well Screen: Slotted

Screen Opening Size: 0.010"

Bottom Depth: 59.0'

Bottom Elevation: 5.4'

Bottom Cap Depth: 59.5'

Bore Hole Diameter: 8.25"

TCEQ-10308

Hydrex
ENVIRONMENTAL, INC.
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(936) 568-9451 Fax (936) 568-9527

Project No. L-05-617	March 2011	Drawing Not To Scale

Monitor Well Data Sheet

Permittee or Site Name: City of Victoria Landfill

County: Victoria County, Texas

Date of Monitor Well Installation: February 25, 2011

Monitor Well Latitude: N 28° 41' 22.37" Longitude: W 96° 54' 48.01"

Monitor Well Groundwater Gradient Position:

Upgradient ____ Downgradient X

MSW Permit No.: MSW 1522A

Monitor Well I.D. No.: C-1

Date of Monitor Well Development: February 25, 2011

Monitor Well Driller

Name: Lawrence H. Tobola

License No.: 3026M

NOTES:

- Report all depths from Surface Elevation and all Elevations relative to Mean Sea Level (MSL), to nearest hundredth of a foot.
- Diameter of boring should be at least 4 inches larger than diameter of well casing.
- Use flush screw joint casing only, 2-inch diameter or larger, with o-rings or PTFE tape in joints (4-inch diameter recommend).
- Well development should continue until water is clear, and pH and conductivity are stable.

Geologist, Hydrologist, or Engineer Supervising Well Installation: Marty Ford

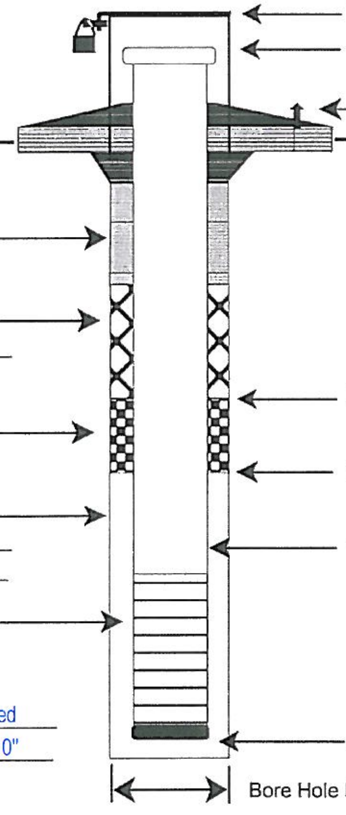
Static Water Level Elevation (with respect to MSL) after Well Development: 26.90'

Name of Geologic Formation(s) in which Well is completed: Beaumont Formation

Type of Locking Device: Padlock

Type of Casing Protection: Lockable Hinged Pipe

Concrete Surface Pad (with steel reinforcement) Dimensions: 6' X 6' X 6" (min.)



Top of Protective Collar Elevation: 69.34'

Top of Casing Elevation: 68.67'

Surface Elevation: 65.2'

Surveyor's Pin Elevation: 65.82'

Concrete Seal
Depth: 2.0'

Casing Seal (backfill)
Material: Bentonite Grout

Bentonite Seal

Bentonite Seal Top
Depth: 39.0' Elevation: 26.2'

Filter Pack Top
Depth: 41.0' Elevation: 24.2'

Filter Pack
Filter Pack Material: 20 / 40 Silica Sand

Well Casing
Type: PVC
Size (diameter): 2"
Schedule or Thickness: Sch. 40

Well Screen
Top Depth: 43.0'
Top Elevation: 22.2'
Type of Well Screen: Slotted
Screen Opening Size: 0.010"
Bottom Depth: 53.0'
Bottom Elevation: 12.2'

Bottom Cap Depth: 53.5'

Bore Hole Diameter: 8.25"

TCEQ-10308

ENVIRONMENTAL, INC.
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Project No. L-05-617	March 2011	Drawing Not To Scale

ATTACHMENT III-6 – GROUNDWATER SAMPLING AND ANALYSIS PLAN

Part III Landfill Permit Amendment Attachment 6 – Groundwater Sampling and Analysis Plan and Groundwater Monitoring Plan

TCEQ MSW Permit No. 1522B

City of Victoria, Texas

City of Victoria Landfill Lateral and Vertical Expansion
Project No. 107608

Revision 2, June 30, 2023

Part III Landfill Permit Amendment Attachment 6 – Groundwater Sampling and Analysis Plan and Groundwater Monitoring Plan TCEQ MSW Permit No. 1522B

prepared for

City of Victoria, Texas
City of Victoria Landfill Lateral and Vertical Expansion
Victoria County, Texas

Project No. 107608

Revision 2, June 30, 2023

AMANDA K. BREITLING
GEOLOGY
11071

7/17/23

prepared by

Burns & McDonnell Engineering Company, Inc.
Austin, Texas
Texas Firm Registration No. F-845 / 50338

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STATE OF TEXAS
AMANDA K. BREITLING
GEOLOGY
11071
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PROFESSIONAL GEOSCIENTIST

7/17/23

potential contaminant pathway is addressed in the engineering and design of the future landfill cells and the design of the groundwater monitoring system.

3.2 Groundwater Monitoring System

The existing groundwater monitoring system consists of 22 monitoring wells. Detection, assessment, and corrective action groundwater monitoring is performed semiannually in accordance with the facility's GWSAP and 30 TAC §330 Subchapter J. The monitoring status of the wells as of August 2022 is as follows (Hydrex, 2021):

- Detection monitoring: MW-10, MW-11, MW-12, MW-13, MW-14, MW-15AR, MW-16, MW-17, MW 22, and MW-23
- Assessment monitoring: MW-24
- Corrective action monitoring: MW-18, MW-19, MW-20, MW-21, MW-A2, MW-A5, and MW-C1
- Background monitoring: OW-25, OW-26, OW-27, and OW-28

The proposed groundwater monitoring system for the Landfill expansion area is presented in the following sections.

3.2.1 Design Criteria

In accordance with 30 TAC §330.403(a) and (e), a groundwater monitoring system must be installed that consists of a sufficient number of monitoring wells installed at appropriate locations and depths to yield representative samples from the uppermost aquifer. The design of the system shall be based on site-specific technical information that includes a thorough characterization of aquifer thickness, groundwater flow rate, groundwater flow direction, including seasonal and temporal fluctuations in flow, effect of site construction and operations on groundwater flow direction and rates, and thickness, stratigraphy, lithology and hydraulic characteristics of saturated and unsaturated geologic units and fill materials overlying the uppermost aquifer, materials of the uppermost aquifer, and materials of the lower confining unit underlying the uppermost aquifer. Subsurface characterization of the Landfill expansion area is included in the Geology Report (Part III, Attachment 5).

The facility must notify the Executive Director if changes in site construction or operation or changes in adjacent property affect or are likely to affect the direction and rate of groundwater flow and the potential for detecting groundwater contamination from the facility.

The groundwater monitoring system was designed and is operated in accordance with the above regulations and was certified by a qualified groundwater scientist.

3.2.2 Monitoring Well Locations

Groundwater monitoring will be conducted under the GWSAP. The monitoring wells and observation wells included in the existing program will not be modified, except for removal of wells MW-16 and OW-28 (as described below) related to construction for the Landfill expansion area.

The revised groundwater monitoring system related to the Landfill expansion area will consist of 21 new permanent monitoring wells (MW-29 through MW-49) and two new temporary monitoring wells (MW-TMP-1 and MW-TMP-2) installed at 600-foot spacing around the perimeter of the Landfill. Five existing monitoring wells located between the existing Landfill and the Landfill expansion area will remain in place (MW-17, MW-18, MW-21, MW-22, and OW-27). One monitoring well (MW-16) and one observation well (OW-28) located within the construction area of Landfill expansion area will be plugged and abandoned in accordance with 16 TAC §76.702 and §76.1004 upon written authorization from the TCEQ. Monitoring well locations are depicted on Figure 6B-1 included in Appendix 6A.

Installation of monitoring wells for the revised groundwater monitoring system related to the Landfill expansion area will be phased in coordination with the order of cell construction presented in Section 4.3 of the Part III Landfill Permit Amendment. Waste placement in the Landfill expansion area is planned to progress from Cell G2 through Cell A1, then Cell H2 through Cell I2. Monitoring Wells MW-29 through MW-41 and Temporary Monitoring Wells MW-TMP-1 and MW-TMP-2 (located at the boundary of Cells C2 and D1) will be installed to provide groundwater monitoring of Cells D1 through I2. Monitoring Wells MW-42 through MW-49 will be installed and Temporary Monitoring Wells MW TMP-1 and MW-TMP-2 will be abandoned in coordination with construction of Cells A1 through C2.

During the operation of Cells D1 through G2, eight new monitoring wells (MW-29, MW-30, MW-31, MW-32, MW-33, MW-34, MW-35, and MW-36) and one existing monitoring well (MW-15AR) will be considered upgradient and seven new monitoring/temporary monitoring wells (MW-37, MW-38, MW-39, MW-40, MW-41, MW-TMP-1, and MW-TMP-2) and four existing monitoring/observation wells (MW-17, MW-18, MW-21, and OW-27) will be considered downgradient/point of compliance. Upon construction of Cells A1 through C2, Temporary Monitoring Wells MW-TMP-1 and MW-TMP-2 will be removed, and eight additional new monitoring wells (MW-42, MW-43, MW-44, MW-45, MW-46, MW-47, MW-48, and MW-49) and one existing monitoring well (MW-22) will be considered downgradient/point of compliance. Upon construction of Cells H1 through I2, four monitoring wells

(MW-15AR, MW-29, MW-35, and MW-36) previously considered upgradient monitoring wells will be converted to be considered downgradient/point of compliance monitoring wells.

3.2.3 Monitoring Well Design and Construction

Monitoring well design and construction will be in accordance with 30 TAC §330.421. Wells will be drilled by a Texas-licensed driller using methods that will not introduce contaminants into the borehole or casing. A licensed professional geoscientist or engineer who is familiar with the geology of the area will supervise monitoring well installation and development and will provide a log of the boring. Future monitoring well construction details are presented on Figure 6B-2 included in Appendix 6A. Monitoring well construction will be completed in accordance with 30 TAC §330.63, §330.403, and §330.421.

If any fluid is required in the drilling of monitoring wells, treated, potable water from the City of Victoria shall be used and a chemical analysis provided to the TCEQ. No glue or solvents will be used in monitoring well construction.

Monitoring wells will be developed to remove drilling artifacts (fine particles and sediment) from the well screen and filter pack and increase hydraulic connection between the water-bearing zone and the well. Development will continue until the water used or affected during drilling activities is removed and field measurements of pH, specific conductance, and temperature are stabilized.

When monitoring wells are installed in unusual conditions that vary from 30 TAC §330.421, all aspects of the installation that vary from 30 TAC §330.421 must be approved in writing by the TCEQ.

A Texas registered professional land surveyor will survey the well location (latitude and longitude at least to the nearest tenth of a second or accurately located with respect to the landfill grid system) and top of well casing and ground surface elevation (to the nearest 0.01 foot above mean sea level). The point of the elevation datum will be permanently marked on the well casing and well pad.

Reporting of monitoring well installation and construction will be submitted to the TCEQ within 60 days of well completion, including Texas Commission on Environmental Quality forms, applicable forms required by other agencies, geologic logs, description of development procedures, sample data, site map showing monitoring well locations and relevant point of compliance.

Monitoring wells identified as being damaged and that are no longer usable will be reported to the TCEQ to determine whether to replace or repair the well. In accordance with 30 TAC §305.70, if a compromised well requires replacement a permit modification request will be submitted to the TCEQ within 45 days of the discovery.

Plugging and abandonment of monitoring wells will be performed as needed in accordance with 16 TAC §76.702 and §76.1004. No abandonment will be performed without prior written authorization from the TCEQ.

All parts of the groundwater monitoring system shall be operated and maintained so that they perform at least to design specifications through the life of the groundwater monitoring program.

The owner or operator shall promptly notify the TCEQ, and any local pollution agency with jurisdiction that has requested to be notified, in writing of changes in facility construction or operation or changes in adjacent property that affect or are likely to affect the direction and rate of groundwater flow and the potential for detecting groundwater contamination from a solid waste management unit and that may require the installation of additional monitoring wells or sampling points (additional wells or sampling points require a modification of the Site Development Plan).

3.3 Groundwater Monitoring Program

The GWSAP and GMP describe the groundwater monitoring program under 30 TAC §330.405 as well as the proposed sampling, analysis, and statistical comparison procedures. Groundwater monitoring will be conducted throughout the active life and any required post-closure care period of the waste management unit.

3.3.1 Background Samples

Background groundwater quality will be established for the monitoring parameters and constituents listed in 40 Code of Federal Regulations (CFR) Part 258, Appendix I and 30 TAC §330.419 (see Table 1 of GWSAP) for the 21 new permanent monitoring wells and two new temporary monitoring wells prior to placement of waste in the Landfill expansion area. A minimum of four statistically independent samples for VOC analysis and a minimum of eight statistically independent samples for remaining parameters will be collected from each newly installed well on a quarterly basis to allow for hydraulic and chemical stabilization of groundwater between sampling events and allow evaluation of potential seasonal variation in groundwater quality. Procedures for statistical evaluation of groundwater samples are included in the GWSAP (see 0).

3.3.2 Detection Monitoring

After establishment of background values, detection monitoring of newly installed wells will be conducted on a semiannual basis for constituents listed in 40 CFR Part 258, Appendix I and 30 TAC §330.419 (see Table 1 of the GWSAP) unless otherwise approved by the TCEQ.

Within 60 days of each sampling event, it will be determined if a statistically significant increase (SSI) over background values has occurred for any constituent. The TCEQ and any local pollution agency with jurisdiction that has requested to be notified, shall be notified in writing within 14 days of determination of a SSI, and an assessment monitoring program shall be established within 90 days of determination of a SSI. Discussion of detection monitoring sampling, reporting, and statistical analysis is included in Sections 4 and 5 of the GWSAP (see 0).

A permit amendment or modification will be submitted within 90 days if it is determined that detection monitoring no longer satisfies 30 TAC §330.407.

3.3.3 Assessment Monitoring

If hazardous constituents listed in 40 CFR Part 258, Appendix I, and 30 TAC §330.419 (see Table 1 of the GWSAP) are detected in the future, and if the detections support the implementation of assessment monitoring (SSI over background), information to establish an assessment monitoring program under 30 TAC §330.409 will be submitted to the TCEQ, including a description of special wastes previously handled at the landfill and a characterization of the contaminated groundwater, including any detected concentration(s) of assessment constituents defined in 30 TAC §330.409.

Should SSIs of hazardous constituents be detected in the future groundwater monitoring events and absent an alternate source demonstration, a notice will immediately be placed in the operating record describing the SSI and an assessment monitoring program will be established in accordance with 30 TAC §330.409, including sampling for constituents listed in Appendix II to 40 CFR Part 258 (see Appendix 6B) using the procedures described in the GWSAP. Within 90 days of a SSI during detection monitoring and at least annually thereafter, a minimum of one sample will be collected from point of compliance wells for the full set of constituents listed in Appendix II to 40 CFR Part 258 (see Appendix 6B) (following the initial sampling, subsequent assessment monitoring may sample a subset of locations and/or constituents, or may be conducted at an alternate frequency, upon the approval of the TCEQ). Background concentrations and GWPSs will be established for detected Appendix II constituents in accordance with 30 TAC §330.409(d)(2) and (3), §330.409(h), §330.409(i), and §330.409(j). Results will be submitted to the TCEQ within 60 days of sampling, and the TCEQ and appropriate local government officials will be notified within seven days of determination of statistical exceedances of GWPSs and background concentrations. If Appendix II constituent concentrations are less than or equal to background for two consecutive events, then detection monitoring may resume upon approval from the TCEQ. Assessment monitoring will continue if Appendix II constituent concentrations exceed background but are less than GWPSs. If Appendix II constituent concentrations exceed the GWPS, an alternate source demonstration may be made that the exceedance is due to a source other than the waste management unit, natural variation in groundwater quality, or an error in sampling, analysis, or evaluation. If a successful demonstration is made in accordance with 30 TAC §330.409(g)(2) and (3), assessment monitoring will continue. If Appendix II constituent concentrations exceed the GWPS and a successful demonstration is not made, additional groundwater characterization, well installation, notifications, and assessment of corrective measures will be initiated in accordance with 30 TAC §330.409(g)(1).

An annual assessment monitoring report will be submitted with 60 days of the second semiannual groundwater monitoring event in a calendar year and will include the items included in Section 4.3 of the GWSAP and 30 TAC §330.409(k) for the calendar year represented by the annual report.

A permit amendment or modification will be submitted within 90 days if it is determined that assessment monitoring no longer satisfies 30 TAC §330.409.

3.3.4 Corrective Action Program

If hazardous constituents are detected in future groundwater monitoring events above the concentration limits (GWPSs) established in 30 TAC §330.409, and absent an alternate source demonstration, then information, data, and analysis to establish a corrective action program meeting the requirements of 30 TAC §330.411 and §330.413 will be submitted to the TCEQ, including a description of special wastes previously handled at the landfill and a characterization of the contaminated groundwater, including any detected concentration(s) of assessment constituents included in 30 TAC §330.409. The corrective action program will be implemented in accordance with 30 TAC §330.415.

Detailed plans and an engineering report describing the corrective action to be taken will be addressed if hazardous constituents have been measured in the groundwater at levels exceeding the limits (GWPSs) established in 30 TAC §330.409. The following will be submitted in establishing a corrective action program to comply with 30 TAC §330.411:

- Characterization of the contaminated groundwater, including concentrations of assessment constituents included in 30 TAC §330.409
- The concentration limit (GWPS) for each constituent found in the groundwater

- Detailed plans and an engineering report describing the corrective action to be taken
- A description of how the groundwater monitoring program will demonstrate the adequacy of the corrective action
- A schedule for submittal of the information required

4.0 REFERENCES

Hydrex Environmental, Inc. (2011, August). *Report on Assessment of Corrective Measures for Exceedances of Arsenic in Groundwater, Victoria Landfill, MSW Permit No. 1522A, Victoria County, Texas*.

Hydrex Environmental, Inc. (2021, April). *1st 2021 Semi-Annual Detection, Assessment, and Corrective Action Groundwater Monitoring Report, City of Victoria Landfill, MSW Permit No. 1522A, Victoria County, Texas*.

Hydrex Environmental, Inc. (2022, October). *2022 Annual Detection, Assessment, and Corrective Action Groundwater Monitoring Report, City of Victoria Landfill, MSW Permit No. 1522A, Victoria County, Texas*.

ATTACHMENT III-7 – SLOPE STABILITY AND SETTLEMENT ANALYSIS

Geosynthetic Design Parameters

Geosynthetic materials will be utilized as part of the base liner and will be considered as part of the final cover design. They also have been utilized for the base liner system in the existing cell. Interface shear strengths of geosynthetics for the base liner and cover can control slope stability and require special evaluation. Note that the existing permitted cover system is a soil only system and does not require an interface evaluation.

For the base liner of the existing cell, the system is made up of the following materials, from top to bottom:

- 24 inches of protective cover soil (assumed cohesive),
- Leachate Collection System
    - Granular drainage material with geotextile fabric on top
- 60-mil HDPE Smooth Geomembrane
- Clay subgrade

For the base liner of the new cell, the system will be made up of the following materials, from top to bottom:

- 24 inches of protective cover soil (assumed cohesive),
- Leachate Collection System
    - Geocomposite
- 60-mil HDPE Textured Geomembrane
- Needle punched GCL encased with an underlying textured 60-mil geomembrane (in leachate sumps only)
- Clay subgrade

The cover system is made up of the following materials, from top to bottom:

- 12 inches of Cover Soil (cohesive)
- Drainage Layer
    - Geocomposite
- 40-mil LLDPE Textured Geomembrane
- 18 inches of Compacted Clay

To estimate these different interface strengths, published values in the *GRI Report #30* were reviewed. For each interface, both peak and residual strengths will be noted. Base liner interfaces and strengths for the existing and new cells will be noted separately. The interface information for the existing cell base liner are noted below:

Table 7-1. Existing Cell Base Liner Interfaces and Strengths

	Peak	Residual

Interface	Friction Angle (deg)	Cohesion (psf)	Friction Angle (deg)	Cohesion (psf)
Cover Material – Geotextile	30	100	21	0
Geotextile – Granular Drainage Material	33	0	33	0
Granular Material – Geomembrane (smooth)	21	0	17	0
Geomembrane (smooth) – Compacted Clay	11	280	11	0

The interface information for the new cell base liner are noted below:

Table 7-2. New Cell Base Liner Interfaces and Strengths

	Peak		Residual	
Interface	Friction Angle (deg)	Cohesion (psf)	Friction Angle (deg)	Cohesion (psf)
Cover Material – Geocomposite	30	100	21	0
Geocomposite – Geomembrane (textured)	25	160	17	0
Geomembrane (textured) – GCL	23	160	13	0
GCL Internal (needle punched)	16	760	6	120
Geomembrane (textured) – Compacted Clay	18	200	16	0

For the cover system, the geomembrane is assumed to be textured given the side slopes and lengths of slopes. Estimated interface information for the cover system are listed below:

Table 7-3. New and Existing Cells Cover Interfaces and Strengths

	Peak		Residual	
Interface	Friction Angle (deg)	Cohesion (psf)	Friction Angle (deg)	Cohesion (psf)
Cover Material – Geocomposite	30	100	21	0
Geocomposite – Geomembrane (textured)	26	160	17	190
Granular Material – Geomembrane (textured)	34	0	31	0
Geomembrane (textured) – Compacted Clay	21	220	13	140

For determining the controlling strength for the base liner, the interface shear strength for every interface was calculated for a range of effective stresses. This was done because different interfaces control for different effective stress ranges. Based on this evaluation, the following design strength envelope was determined for the existing cell base liner:

Table 7-4. Existing Cell Base Liner Design Strength Envelope

Peak		Residual	
Effective Stress (psf)	Interface Shear Strength (psf)	Effective Stress (psf)	Interface Shear Strength (psf)

0	0	0	0
1500	572	10000	1944
10000	2224	[redacted]	[redacted]

The following design strength envelope was determined for the new cell base liner:

Table 7-5. New Cell Base Liner Design Strength Envelope

Peak		Residual	
Effective Stress (psf)	Interface Shear Strength (psf)	Effective Stress (psf)	Interface Shear Strength (psf)
0	100	0	0
500	363	1000	225
10000	3449	10000	1171

For the cover system, all interface strength values will be evaluated using the parameters listed in Table 7-3.

Excerpt from the *GRI Report #30* and base liner strength determinations are included are included in Appendix 7-C.

Sections

Sections were drawn across the area of the new cell. Section B was drawn across the new cell only and Section D was drawn across the new cell and vertical expansion area of the existing landfill cell.

For the new cell, the base liner has a slope of 0.5% for the center portion of the cell and 1.0% on the sump side of the cell on the south side of the cell. Based on this, the south slope of the new cell is the controlling slope. Final landfill side slopes were specified as 3H:1V with a crest elevation of 160 feet. Above this point, the top slope decreases to 5% with a maximum top of landfill elevation of 180 feet.

For the vertical expansion area, the base liner has a slope of 0.5% for the center portion of the cell and 1.0% on the sump side on the north side of the existing cell. The existing permitted slope is 4H:1V. This slope will be extended up in the vertical expansion area to match the new permitted geometry. The top of landfill elevations are the same as those noted for the new cell.

Different subsurface conditions represented by the different borings were then evaluated. Subsurface conditions with the maximum Fat Clay, Sandy Fat Clay and Sandy Lean Clay soils were determined to be controlling as they represent the lowest strength materials, especially for drained shear strengths. Given the excavation that will occur to reach design base liner elevations, much of these materials will be removed beneath the landfill. It was determined that using borings B-4 and B-5 to determine the subsurface conditions along Section B would provide the controlling subsurface conditions.

For the vertical expansion area on top of the existing landfill, Section D was drawn given the relatively limited width of the vertical expansion. For subsurface conditions, B-2 was considered for the north portion of the existing cell given the proximity of this boring to the vertical expansion. For the southern portion of subsurface conditions, B-5 and B-7 were compared with B-5 being determined to have controlling conditions.

Section information is included in Appendix 7-D.

Slope Stability

Slope stability calculations were performed for Sections B and D using UTexas4. Calculations were performed for the following conditions:

- End of Construction (EOC) – Undrained strength (cohesion) for cohesive soils, full MSW height
- Long-term Steady State 1 (LTSS-1) – Effective Shear Strength envelope for all soils, full MSW height
- Long-term Steady State 2 (LTSS-2) – Noncircular Surface Through Liner, Effective Shear Strength envelope for all soils, Peak and residual liner strengths, full MSW height

For the EOC case, the cohesion values determined based on the undrained unconsolidated triaxial testing were used for modeling the Fat Clay, Sandy Fat Clay and Sandy Lean Clay. These tests were performed on materials that were only consolidated under the existing soil conditions at the time of the investigations. During placement of the MSW, the materials will be loaded in an undrained manner as layers of MSW are placed. After placement of each layer, dissipation of excess pore pressures will occur, increasing the effective stress increases in these soils, thus increasing the undrained shear strengths of these material. Based on this, using the in-situ undrained cohesion under full MSW landfill loading, essentially assuming the MSW is placed instantaneously, is a conservative design assumption.

For the LTSS–2 case, the stability factor of safety was controlled by the interface shear strength of the base liner. As noted, the existing and new cell base liners vary, with each having a separate interface strength envelope. The existing cell base liner interface strength envelope was used for Section E and the new cell base liner interface strength envelope was used for Section B.

Base liner evaluations will consider both peak shear strength and residual shear strength. Residual shear strengths can be caused by settlement induced liner movement or strain compatibility of the MSW shear strength (peak strength developed at high strains) and the liner system (peak strength developed at low strains).

The 2014 USGS Deaggregation online program was utilized for determining the design seismic event peak ground acceleration. For a Site Class B/C, which represents acceleration on bedrock, the bedrock acceleration is 0.028g. Given this low acceleration, evaluating seismic stability was not considered necessary and was not performed.

For the EOC and LTSS-1 cases, a “floating grid” search method was used for calculating the stability factor of safety. This method involves setting a gridded location of circular centers and then choosing a point along the surface to run all the circular surfaces through. UTexas4 will then cycle through all the circles based on the different circular centers. Multiple points along the surface were evaluated to determine the lowest factor of safety.

For the LTSS-2 case, noncircular surfaces are evaluated. Since this case is to evaluate surfaces along the liner interface, the surface must stay within the base liner system. This requires a noncircular surface. Multiple different points along the slope surface and base liner were evaluated to determine the controlling factor of safety.

Results of the slope stability analyses are listed below:

Table 7-6. Slope Stability Factors of Safety

Section	Case	Factor of Safety
Section B	EOC	2.60
	LTSS – 1	2.57
	LTSS – 2 – Peak Textured	2.28
	LTSS – 2 – Residual Textured	1.41
Section D	EOC	3.22
	LTSS – 1	3.22
	LTSS – 2 – Peak Smooth	2.18
	LTSS – 2 – Residual Smooth	1.87

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No direct guidance for slope stability factors of safety is included in TCEQ regulations for MSW landfill. Therefore, generally accepted minimum factors of safety for slope stability were relied upon and are listed below:

- EOC – 1.3
- LTSS-1 and LTSS-2 peak liner strength – 1.5
- LTSS-2 residual liner strength – 1.0

Factors of safety for EOC and LTSS cases are based off generally accepted values for slope stability evaluations of MSW landfills. For EOC and LTSS-1 and LTSS-2 with peak liner strength, factors of safety were used consistent with Duncan and Wright *Soil Strength and Slope Stability*. For LTSS-2 with residual liner strength, the paper by Stark and Poeppel entitled *Landfill Liner Interface Strengths from Torsional-Ring-Shear Tests* was reviewed. Direction in this paper is to consider a case with fully residual strengths for the liner with a target factor of safety of 1.0.

Inputs and outputs from the UTexas4 program, the 2014 USGS deaggregation for the site and the Stark and Poeppel paper are included in Appendix 7-E.

Settlement

Total and differential settlements were evaluated to confirm that the settlements do not affect design liner grades such that leachate flow towards the sumps is disrupted.

Settlement is controlled by the specific settlement characteristics of the soils as well as the thickness of the soil deposits. Based on site conditions in this area of Texas, the soil deposits are known to be very deep (hundreds to thousands of feet). While these deep soils are very stiff, they will still experience some strain caused by the loading from the landfill. Given the size of the landfill, the depth of stress from the MSW will be very deep also, on the order of several thousand feet.
For the upper 100 feet, site conditions and settlement parameters are considered to be well known. Consolidation testing for the Fat Clay, Sandy Fat Clay and Sandy Lean Clay were performed to determine consolidation characteristics. Modulus values were estimated for the Clayey Sand and Poorly Graded Sand based on measured blow counts and correlated values.

As noted, the soils are several thousand feet deep at this site. Characteristics of these deeper soils are not specifically known but given a general understanding of the deposits at the site and indications of the soils near the base of the current investigation, these soils are expected to be very dense/hard deposits. For modeling the settlement response of these deeper soils, a modulus of 4,000 ksf was used for all of these materials. This value was chosen based on the upper end modulus values recommended in Table D-3 of the *USACE EM 1110-1-1904 Settlement Analysis*.

For evaluating the soils beneath 100 feet, the depth of soils that are assumed to settle was reviewed based on available geologic information. Published geology maps indicated that the approximate upper 1,000 feet at the site is made up of the Lissie and Willis formations. These formations are noted as being made up of unconsolidated alluvial formations and are expected to settle under the landfill loading. Below the Willis formation is the Fleming and Oakville formations. These formations are described as calcareous sedimentary rock. Given this designation, these formations are not considered compressible.

Assuming that the Lissie and Willis formations extend 1,000 feet, the total expected settlement is 28 inches beneath the center of the landfill (cover elevation of 180 feet), 20 inches under the slope crest (cover elevation of 160 feet) and 6 inches at the perimeter of the landfill.

Results from the Settle3D analysis and geology references are included in Appendix 7-F.

Cover Stability

Cover stability was also evaluated for cover options that will include geosynthetics. Both dry and saturated conditions were evaluated for peak interface shear strengths for the four different interfaces. For saturated conditions, the maximum allowable water height is the full 2 feet thickness of the soil/granular material cover. A slope of 3H:1V was evaluated based on current grading plans. Note that the existing landfill cell is to sloped at 4H:1V.

Ditches will be constructed as part of the surface water management along the landfill cover slope. To account for this additional driving force from the small earthen embankments, multiple calculations considering different ways to apply the loading were performed.

The soil cover-geocomposite, geocomposite-geomembrane, and granular material-geomembrane interfaces are above the geomembrane that will collect water and thus are influenced by pore pressures. The geomembrane compacted clay interface is below the geomembrane and so no pore pressure will be assumed in these calculations.

Interface strengths used in modeling are based on the *GRI Report #30*. Interface shear strengths for interfaces with either cohesive soils or textured geomembrane include adhesion. Adhesion has a significant effect on the stability of the cover system as the thin soil veneer has a relatively low driving force associated with it.

For peak strengths, factors of safety were above 1.5 for all cases. The only limiting condition was the granular material-geomembrane where the maximum amount of water on the interface can be 0.9 feet. During final construction, confirmation of the assumed interface shear strengths will be required to confirm the final materials are stable. Calculations for the cover stability based on published interface shear strengths are included in Appendix 7-G.

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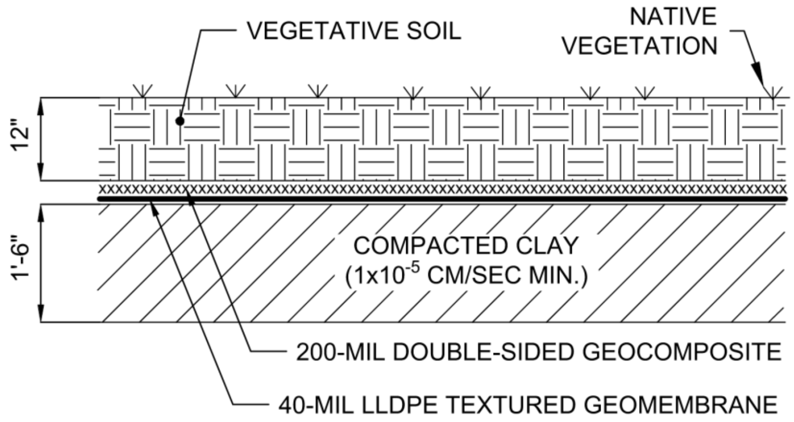
Appendix 7-G – Cover Stability

Introduction

Previous calculations involving the mass stability of the planned Victoria, Texas MSW landfill were performed as part of the permitting process. Based on discussions with TCEQ, additional calculations were requested related to the final cover system, specifically for the planned stormwater ditches that will be constructed.

Cover System

The cover system is made up of the following system:



Based on this system including geosynthetics, the stability will be controlled by the strength along the interfaces of the controlling geosynthetic. The following interfaces will be evaluated:

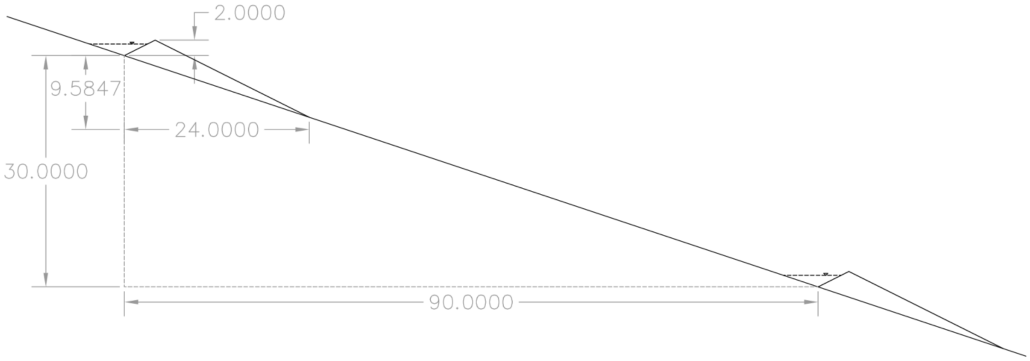
- Vegetative soil (cohesive) – Geocomposite (Interface #1)
- Geocomposite – LLDPE Textured Geomembrane (Interface #2)
- LLDPE Textured Geomembrane – Compacted soil (cohesive) (Interface #3)

For the interface shear strengths of these geosynthetics interfaces, GRI Report #30 was reviewed. Based on this reference, the following interface shear strengths were used:

- Interface #1: Phi = 30 degrees, cohesion = 100 psf [peak]; phi = 21 degrees, cohesion = 0 psf [residual]
- Interface #2: Phi = 26 degrees, cohesion = 160 psf [peak]; phi = 17 degrees, cohesion = 190 psf [residual]
- Interface #3: Phi = 21 degrees, cohesion = 220 psf [peak]; phi = 13 degrees, cohesion = 140 psf [residual]

Final cover slope is 3H:1V and has crest and toe elevations of approximately 160 feet and 70 feet, respectively.

As noted, storm ditches are needed along the length of the cover system. These ditches will be spaced every 30 vertical feet along the cover system, with a total of approximately four. The ditch is made up of a triangular fill placed along the cover system that creates a 2 feet deep ditch. The interior and exterior slopes of the fill are 2H:1V. See below for storm ditch section:



Based on the use of geocomposite within the cover system and stormwater ditches as noted, it is assumed that no build-up of pore pressures within the cover system will occur.

Drawings are included in Appendix G1. Interface shear strengths from GRI Report #30 are included in Appendix G2.

Cover Stability

Previous calculations included evaluating the stability of the cover system by utilizing infinite slope calculations for a uniform thickness of soil. Based on the addition of the storm ditches and the driving force associated with them, further evaluations of the cover system are required.

Limit Equilibrium Method

An approach is put forth by Koerner and Daniel in *Final Covers for Solid Waste Landfills and Abandoned Dumps* that calculates the cover stability based on limit equilibrium, see below:

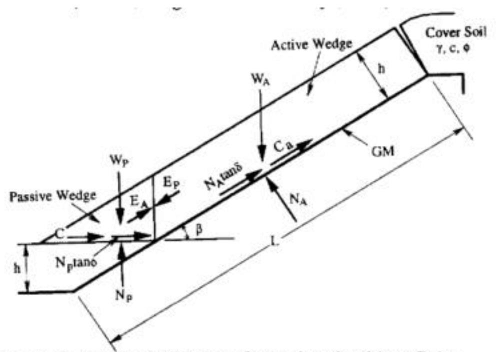
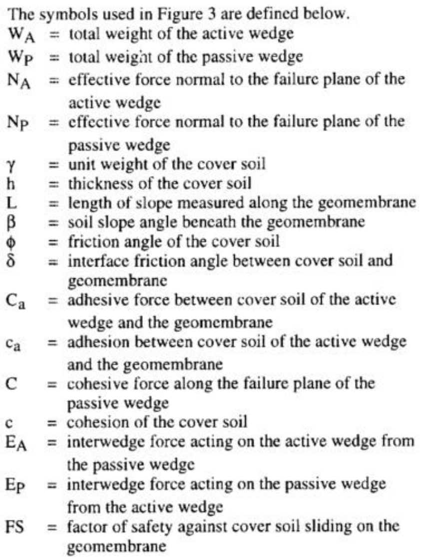


Figure 3. Limit equilibrium forces involved in a finite length slope analysis for a uniformly thick cover soil.

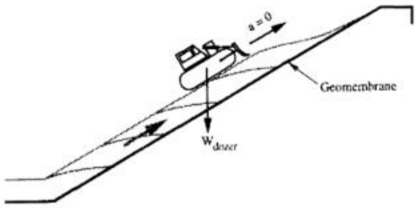


The symbols used in Figure 3 are defined below.

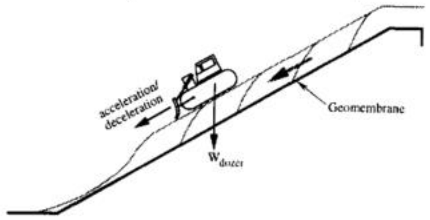
W_A = total weight of the active wedge
W_P = total weight of the passive wedge
N_A = effective force normal to the failure plane of the active wedge
N_P = effective force normal to the failure plane of the passive wedge
γ = unit weight of the cover soil
h = thickness of the cover soil
L = length of slope measured along the geomembrane
β = soil slope angle beneath the geomembrane
ϕ = friction angle of the cover soil
δ = interface friction angle between cover soil and geomembrane
C_a = adhesive force between cover soil of the active wedge and the geomembrane
c_a = adhesion between cover soil of the active wedge and the geomembrane
C = cohesive force along the failure plane of the passive wedge
c = cohesion of the cover soil
E_A = interwedge force acting on the active wedge from the passive wedge
E_P = interwedge force acting on the passive wedge from the active wedge
FS = factor of safety against cover soil sliding on the geomembrane

Based on this method, stability along the interface of the cover system can be calculated based on the specific characteristics of the cover system.

This evaluation is meant to understand the effect of the stormwater ditches on the cover system stability. Further limit equilibrium calculation methods were considered. A further use of this approach is calculating the stability while accounting for equipment loads on the cover, see below:



(a) Equipment backfilling up slope
(the recommended method)



(b) Equipment backfilling down slope
(method is not recommended)

Figure 5. Construction equipment placing cover soil on slopes containing geosynthetics.

For the uphill equipment situation, the weight of the construction equipment can be included in the calculations to understand the exact effect on the overall cover stability. The construction equipment is modeled as an additional vertical weight on the system. This same method can also be applied to stormwater ditches by modeling them as an additional vertical weight on the cover system.

The storm ditch fill volume is approximately 40.2 cubic feet per foot. Utilizing a unit weight of 120 pcf, the total weight of each storm ditch is approximately 5,000 pounds per foot, with total weight of four ditches of 20,000 pounds per foot over the full length of the slope.

Multiple slope lengths were evaluated to better understand the variation in calculated factors of safety depending on the assumptions in the calculations. The following cases were evaluated:

- Full length slope (284 feet), four stormwater ditches (20,000 pounds)
- Slope between stormwater ditches (95 feet), two stormwater ditches (10,000 pounds)
- Slope beneath stormwater ditch (25.3 feet), one stormwater ditch (5,000 pounds)

	L = 284 feet FoS	L = 95 feet FoS	L = 25.3 feet FoS
Interface #1	4.3	3.7	2.8
Interface #2	4.1	3.7	2.9
Interface #3	4.8	4.2	3.2

Based on these calculations, the cover system is considered stable with the addition of the stormwater ditches.

Spreadsheets showing limit equilibrium calculations are included in Appendix G3. Hand calculations for one of the spreadsheets are included in Appendix G4.

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Client:	Victoria, TX			Page	7	of 8
Project:	107608	Date:	06/30/2023	Made by:	Textor	
Victoria, TX Landfill Expansion				Checked by:		
Cover Stability				Prelim:		Final:

Appendix G3 – Calculation Spreadsheets

Victoria, TX Landfill
Cover Soil Stability

Gamma	120	Cover soil unit weight (pcf)
h	1	Cover soil thickness (ft)
L	284	Length of slope (ft)
Beta	18.43	Slope of cover (degrees)
ca	200	Interface cohesion (psf)
Phi (inter)	18	Interface friction angle (deg)
c	0	Cover soil cohesion (psf)
Phi (soil)	0	Cover soil friction angle (deg)
W ditches	20000	Weight of stormwater ditch (lbs)
Wa	53680.4	
Na	50927.2	
Ca	56167.4	
Wp	200.0	
C	0.0	
a	5090.1	
b	-21809.4	
c	0.0	
FS	4.3	

Slope length = 284 feet
Four (4) Stormwater Ditches (20,000 lbs)
Cover Soil-Geocomposite Interface

Victoria, TX Landfill
Cover Soil Stability

Gamma	120	Cover soil unit weight (pcf)
h	1	Cover soil thickness (ft)
L	284	Length of slope (ft)
Beta	18.43	Slope of cover (degrees)
ca	160	Interface cohesion (psf)
Phi (inter)	26	Interface friction angle (deg)
c	0	Cover soil cohesion (psf)
Phi (soil)	0	Cover soil friction angle (deg)
W ditches	20000	Weight of stormwater ditch (lbs)
Wa	53680.4	
Na	50927.2	
Ca	44933.9	
Wp	200.0	
C	0.0	
a	5090.1	
b	-20927.0	
c	0.0	
FS	4.1	

Slope length = 284 feet
Four (4) Stormwater Ditches (20,000 lbs)
Geocomposite-Geomembrane Interface

Gamma	120	Cover soil unit weight (pcf)
h	1	Cover soil thickness (ft)
L	284	Length of slope (ft)
Beta	18.43	Slope of cover (degrees)
ca	220	Interface cohesion (psf)
Phi (inter)	21	Interface friction angle (deg)
c	0	Cover soil cohesion (psf)
Phi (soil)	0	Cover soil friction angle (deg)
W ditches	20000	Weight of stormwater ditch (lbs)
Wa	53680.4	
Na	50927.2	
Ca	61784.1	
Wp	200.0	
C	0.0	
a	5090.1	
b	-24394.4	
c	0.0	
FS	4.8	

Slope length = 284 feet
Four (4) Stormwater Ditches (20,000 lbs)
Geomembrane-Cohesive Soil Interface

Victoria, TX Landfill
Cover Soil Stability

Gamma	120	Cover soil unit weight (pcf)
h	1	Cover soil thickness (ft)
L	95	Length of slope (ft)
Beta	18.43	Slope of cover (degrees)
ca	200	Interface cohesion (psf)
Phi (inter)	18	Interface friction angle (deg)
c	0	Cover soil cohesion (psf)
Phi (soil)	0	Cover soil friction angle (deg)
W ditches	10000	Weight of stormwater ditch (lbs)
Wa	21000.4	
Na	19923.3	
Ca	18367.4	
Wp	200.0	
C	0.0	
a	1991.3	
b	-7450.5	
c	0.0	
FS	3.7	

Slope length = 95 feet
Two (2) Stormwater Ditches (10,000 lbs)
Cover Soil-Geocomposite Interface

Gamma	120	Cover soil unit weight (pcf)
h	1	Cover soil thickness (ft)
L	95	Length of slope (ft)
Beta	18.43	Slope of cover (degrees)
ca	160	Interface cohesion (psf)
Phi (inter)	26	Interface friction angle (deg)
c	0	Cover soil cohesion (psf)
Phi (soil)	0	Cover soil friction angle (deg)
W ditches	10000	Weight of stormwater ditch (lbs)
Wa	21000.4	
Na	19923.3	
Ca	14693.9	
Wp	200.0	
C	0.0	
a	1991.3	
b	-7321.7	
c	0.0	
FS	3.7	

Slope length = 95 feet
Two (2) Stormwater Ditches (10,000 lbs)
Geocomposite-Geomembrane Interface

Cover Soil Stability

Gamma	120	Cover soil unit weight (pcf)
h	1	Cover soil thickness (ft)
L	95	Length of slope (ft)
Beta	18.43	Slope of cover (degrees)
ca	220	Interface cohesion (psf)
Phi (inter)	21	Interface friction angle (deg)
c	0	Cover soil cohesion (psf)
Phi (soil)	0	Cover soil friction angle (deg)
W ditches	10000	Weight of stormwater ditch (lbs)
Wa	21000.4	
Na	19923.3	
Ca	20204.1	
Wp	200.0	
C	0.0	
a	1991.3	
b	-8353.7	
c	0.0	
FS	4.2	

Slope length = 95 feet
Two (2) Stormwater Ditches (10,000 lbs)
Geomembrane-Cohesive Soil Interface

Gamma	120	Cover soil unit weight (pcf)
h	1	Cover soil thickness (ft)
L	25.3	Length of slope (ft)
Beta	18.43	Slope of cover (degrees)
ca	200	Interface cohesion (psf)
Phi (inter)	18	Interface friction angle (deg)
c	0	Cover soil cohesion (psf)
Phi (soil)	0	Cover soil friction angle (deg)
W ditches	5000	Weight of stormwater ditch (lbs)
Wa	7636.4	
Na	7244.8	
Ca	4427.4	
Wp	200.0	
C	0.0	
a	724.1	
b	-2033.9	
c	0.0	
FS	2.8	

Slope length = 25.3 feet
One (1) Stormwater Ditch (5,000 lbs)
Cover Soil-Geocomposite Interface

Gamma	120	Cover soil unit weight (pcf)
h	1	Cover soil thickness (ft)
L	25.3	Length of slope (ft)
Beta	18.43	Slope of cover (degrees)
ca	160	Interface cohesion (psf)
Phi (inter)	26	Interface friction angle (deg)
c	0	Cover soil cohesion (psf)
Phi (soil)	0	Cover soil friction angle (deg)
W ditches	5000	Weight of stormwater ditch (lbs)
Wa	7636.4	
Na	7244.8	
Ca	3541.9	
Wp	200.0	
C	0.0	
a	724.1	
b	-2122.1	
c	0.0	
FS	2.9	

Slope length = 25.3 feet
One (1) Stormwater Ditch (5,000 lbs)
Geocomposite-Geomembrane Interface

Gamma	120	Cover soil unit weight (pcf)
h	1	Cover soil thickness (ft)
L	25.3	Length of slope (ft)
Beta	18.43	Slope of cover (degrees)
ca	220	Interface cohesion (psf)
Phi (inter)	21	Interface friction angle (deg)
c	0	Cover soil cohesion (psf)
Phi (soil)	0	Cover soil friction angle (deg)
W ditches	5000	Weight of stormwater ditch (lbs)
Wa	7636.4	
Na	7244.8	
Ca	4870.1	
Wp	200.0	
C	0.0	
a	724.1	
b	-2294.8	
c	0.0	
FS	3.2	

Slope length = 25.3 feet
One (1) Stormwater Ditch (5,000 lbs)
Geomembrane-Cohesive Soil Interface

Attachment D – Example Hand Calculations

BURNS McDONNELL

030215 Form GCO-28

Client Victoria, TX Page ____ of ____

Project 107608 Date ~~5/24/21~~ 11/15/21 Made By

Victoria Landfill Checked By

Cover → Spreadsheet Hand Calc Preliminary ____ Final ____

Inputs:

Cover Soil Unit Weight = 120 pcf

Cover thickness = ~~0.5'~~ 1.0 (above geosynthetics) → Cover system revised

Slope length = 284'

Slope angle = 18.43°

Interface cohesion = 100 psf

Interface friction angle = 30 deg

Soil cohesion = 0 psf

Soil friction angle = 0 degrees

} → ignore passive soil at bottom of slope strength

Weight of ditches = 20,000 lbs

Active Wedge

$$W_A = \gamma h^2\left[\frac{L}{h} - \frac{1}{\sin\beta} - \frac{\tan\beta}{2}\right] + W_{ditches}$$

$$= (120\text{ pcf})(\overset{1.0}{\cancel{0.5}}(1))^2\left[\frac{284}{\cancel{0.5}'\ 1.0} - \frac{1}{\sin 18.43} - \frac{\tan 18.43}{2}\right] + 20{,}000$$

$$= \overset{120}{\cancel{30}}\text{ pcf}\left[\overset{284}{\cancel{568}} - 3.16 - 0.1666\right] + 20{,}000$$

$$= \overset{53{,}680}{\cancel{36{,}940}}\text{ lbs}$$

$$N_A = W_A\cos\beta = (\overset{53{,}680}{\cancel{36{,}940}}\text{ lb})(\cos 18.43) = \overset{50{,}927}{\cancel{35{,}045}}\text{ lbs}$$

$$C_a = c_a\left(L - \frac{h}{\sin\beta}\right) = 100\left(284 - \frac{\overset{1.0}{\cancel{0.5}}}{\sin 18.43}\right) = \overset{28{,}083}{\cancel{28{,}242}}\text{ lbs}$$

$$W_P = \frac{\gamma h^2}{\sin 2\beta} = \frac{120\text{ pcf}(\overset{1.0}{\cancel{0.5}}')^2}{\sin(2\cdot 18.43)} = \overset{200}{\cancel{50}}\text{ lbs}$$

$$C = \frac{ch}{\sin\beta} = \frac{(0)(\overset{1.0}{\cancel{0.5}})}{\sin 18.43} = 0$$

BURNS & McDONNELL

030215 Form GCO-28

Client Victoria, TX Page ____ of ____

Project 107608 Date 5/24/21 Made By Texler

Victoria Landfill Checked By ____

Cover → Spreadsheet Hand Calc. Preliminary ____ Final ____

$$a = [W_A - N_A \cos\beta] \cos\beta$$

$$= [\overset{53,690}{\cancel{31,990}} \text{ lbs} - (\overset{50,927}{\cancel{35,095}} \text{ lbs})(\cos 18.43)] \cos 18.43$$

$$= [\overset{5365}{\cancel{3692}} \text{ lb}] \cos 18.43 = \overset{5090}{\cancel{3,503}}$$

$$b = -[(W_A - N_A \cos\beta) \sin\beta \tan\phi + (N_A \tan\delta + C_a) \sin\beta \cos\beta + \sin\beta (C + W_p \tan\phi)]$$

$$= -[(\overset{53,680}{\cancel{31,990}} - (\overset{50,927}{\cancel{35,095}})(\cos 18.437)) \sin 18.43 \tan 0 + ((\overset{50,927}{\cancel{35,045}}) \tan 30 + \overset{28083}{\cancel{28092}}) \sin 18.43 \cos 18.43 + \sin 18.43 (0 + \underset{200}{\cancel{50}} \tan 0)]$$

$$= -[(\overset{5365}{\cancel{3692}})(0.316)(0) + (\overset{29,403}{\cancel{20,233}} + \overset{28083}{\cancel{28242}})(0.316)(0.949) + (0.316)(0)]$$

$$= -\overset{-17,242}{\cancel{14,539}}$$

$$c = (N_A \tan\delta + C_a) \sin^2\beta \tan\phi = [(35,045) \tan 30 + 28,242] \sin^2 18.43 \tan 0$$

$$= (\overset{29403}{\cancel{20233}} + \overset{28083}{28,242})(0.099)(0) = 0$$

$$FS = \frac{-b + \sqrt{b^2 - 4ac}}{2a} = \frac{\overset{-17,242}{\cancel{14,539}} + \sqrt{(-\overset{-17,242}{\cancel{14,539}})^2 - 4(\overset{5090}{\cancel{3,803}})(0)}}{2(\underset{5090}{\cancel{3,503}})}$$

$$= \frac{\overset{17,242}{\cancel{14,539}} + \overset{17,242}{\cancel{14,539}}}{\underset{10,180}{\cancel{7006}}}$$

$$= \underset{3.4 ✓}{\cancel{4.15}}$$

ATTACHMENT III-9 – FINAL CLOSURE PLAN

Texas Commission on Environmental Quality

Closure Plan for Municipal Solid Waste Type I Landfill Units and Final Facility Closure

This form is for use by applicants or site operators of Municipal Solid Waste (MSW) Type I landfills to detail the plan for closure of a landfill unit, closure of associated storage or processing units, and final closure of the facility to meet the requirements in 30 TAC Chapter 330, §330.63(h) and 30 TAC Chapter 330 Subchapter K for a MSW Type I facility.

If you need assistance in completing this form, please contact the MSW Permits Section in the Waste Permits Division at (512) 239-2335.

I. General Information

Facility Name: City of Victoria Landfill

MSW Permit No.: 1522B

Site Operator/Permittee Name: City of Victoria/CN600243257

II. Landfill and Other Waste Management Units and Operations Requiring Closure at the Facility

A. Facility Units

Table 1. Description of Landfill Units.

Name or Descriptor of Unit	Operating Status of Unit	Type of Liner System Under Unit	Above Grade Class 1 Disposal Cells in this Unit	Below Grade Class 1 Disposal Cells in this Unit	Other Class 1 Disposal Cells in this Unit (describe)	Size of Unit's Waste Footprint (acres)	Maximum Inventory of Waste Ever in Unit (indicate cubic yards or tons)	Other Necessary Information that Pertains to the Unit
Existing Area	Active	Composite Liner	☐	☐	☐	135.6	15,655,460	* See Below
*The Existing Area includes a Closed, Constructed, and To Be Constructed areas within it. The Closed Area entails 51.6 acres, of which 29.2 acres are permitted as pre-Subtitle D and 22.4 acres are permitted as Subtitle D.								

Name or Descriptor of Unit	Operating Status of Unit	Type of Liner System Under Unit	Above Grade Class 1 Disposal Cells in this Unit	Below Grade Class 1 Disposal Cells in this Unit	Other Class 1 Disposal Cells in this Unit (describe)	Size of Unit's Waste Footprint (acres)	Maximum Inventory of Waste Ever in Unit (indicate cubic yards or tons)	Other Necessary Information that Pertains to the Unit
Expansion Area	To Be Constructed	Composite Liner	☐	☒	☐	256.8	35,065,000	** See Below
** The Expansion Area includes a lateral overlap of the Existing Area by 31.3 acres as well as a vertical expansion to an elevation of 187.8 feet								
Totals						361.1	50,720,460	

Table 2. Description of Waste Storage or Processing Units or Operations Associated with this Permit.

Type of Storage or Processing Unit or Operation (individual units may be closed at any time prior to or during the final facility closure as described in this plan)	Operational Status of Unit	Size of the Area Used for the Storage or Processing Unit or Operation (Acres)	Maximum Inventory of Waste Ever in Storage or Processing Unit or Operation (indicate cubic yards or tons)	Other Information (enter other necessary information that pertains to the unit)
Leachate Storage Tanks	Existing	0.057	0 ☒cubic yards ☐tons	Accepts leachate from Existing Area (1 tank)
Leachate Storage Tanks	Future	0.057	0 ☒cubic yards ☐tons	Will accept leachate from Existing Area (1 tank)
Leachate Storage Tanks	Future	0.23	0 ☒cubic yards ☐tons	Will accept leachate from Expansion Area (4 tanks)
Totals		0.344	0 cy	

B. Waste Inventory Summary

Table 3. Maximum Inventory of Wastes Ever On Site.

Item	Quantity (indicate cubic yards or tons)
Maximum inventory of waste in landfill units (total from Table 1)	50,720,460 ☒cubic yards or ☐tons

Item	Quantity (indicate cubic yards or tons)
Maximum inventory of waste in storage or processing units or operations (total from Table 2)	0 ☒cubic yards or ☐tons
Total Maximum Inventory of Wastes ever on site over the active life of the MSW facility (sum of totals from Tables 1 and 2)	50,720,460 ☒cubic yards or ☐tons

C. Drawings Showing Details of the Waste Management Units at Closure

Table 4. Location of the Drawings showing Details of the Waste Management Units at Closure (outlines, dimensions, maximum elevations of waste and final cover of landfill units, and waste storage or processing units or operations at closure of the facility).

Drawing Location in the SDP	Drawing Figure Number	Drawing Title	Waste Management Units Details Shown
Attachment III-1, Appendix 1A	A2	Final Cover System Evaluation Report Top of Final Cover Plan	Existing Area: Waste Footprint, outlines of landfill units, top of final cover elevation, and top and side slopes
Attachment III-1, Appendix 1A	A3	Final Cover System Evaluation Report Final Cover Details	Existing Area: Top and side slopes, cross sections for final cover systems
Attachment III-1	III.A1.3	Landfill Cell Expansion Plan	Expansion Area: Proposed limits of waste, cell dimensions
Attachment III-1	III.A1.7	Final Grading Plan - West	Existing Area and Expansion Area: Top of final cover elevation and top and side slopes, stormwater diversion berms
Attachment III-1	III.A1.8	Final Grading Plan - East	Existing Area and Expansion Area: Top of final cover elevation and top and side slopes, stormwater diversion berms

III. Description of the Final Cover System Design

A. Types and Descriptions of the Final Cover Systems

Table 5. Types and Descriptions of the Final Cover Systems Permitted or Proposed for Closure of the Landfill Units.

Landfill Unit Name or Descriptor	Type of Final Cover System	Final Cover System Components Description	Other Information (Enter other information as applicable)
Existing Area	Pre-Subtitle D final cover	6”-thick topsoil erosion layer (earthen material capable of sustaining native plant growth) 18”-thick compacted clay-rich layer (k<1x10^-7 cm/s)	Existing Area – Closed & Existing Area – Constructed: Immediately following the application of the final cover, it will be seeded with Common Bermuda grass, or other similar turf grasses that have with the majority of the root depths of 6 inches or less, in order to minimize erosion
Existing Area	Historic Composite Final Cover	24”-thick topsoil erosion layer (earthen material) with top 6” capable of sustaining native plant growth 40-mil LLDPE geomembrane (smooth on top deck and textured on side slopes) 18”-thick compacted clay-rich layer (k<1x10^-5 cm/s)	Existing Area – Closed and Existing Area – Trench 11: Immediately following the application of the final cover, it will be seeded with Common Bermuda grass, or other similar turf grasses that have with the majority of the root depths of 6 inches or less, in order to minimize erosion
Existing Area	Future Composite Final Cover	12”-thick soil layer capable of sustaining native plant growth 200-mil double-sided drainage geocomposite 40-mil LLDPE geomembrane (textured both sides) 18” thick compacted clay layer (k<1x10^-5 cm/s)	Existing Area – Constructed and To Be Constructed: Includes Cells 5 – 9. Immediately following the application of the final cover, it will be seeded with Common Bermuda grass, or other similar turf grasses that have with the majority of the root depths of 6

Landfill Unit Name or Descriptor	Type of Final Cover System	Final Cover System Components Description	Other Information (Enter other information as applicable)
			inches or less, in order to minimize erosion
Expansion Area	Future Composite Final Cover	12”-thick topsoil layer (capable of sustaining native plant growth) 200-mil double-sided drainage geocomposite (side slopes) and cushion geotextile (top deck) 40-mil LLDPE textured geomembrane 18” thick compacted clay layer (k<1x10^-5 cm/s)	Lateral and Vertical: Immediately following the application of the final cover, it will be seeded with Common Bermuda grass, or other similar turf grasses that have with the majority of the root depths of 6 inches or less, in order to minimize erosion

B. Design Details

Table 6. Design Details of the Final Cover Top and Side Slopes for the Landfill Units.

Landfill Unit Name or Descriptor	Maximum Final Elevation of Waste (feet above mean sea level [ft-msl])	Maximum Elevation of Top of Final Cover (ft-msl)	Minimum Grade of the Final Cover Top Slope (%)	Maximum Grade of the Final Cover Side Slope (%)	Other Information (enter other information as applicable, e.g. above-grade Class 1 Cell Dikes)
Existing Area	142'	144'	2.5	25	Pre-Subtitle D
Existing Area	140.5'	144'	2.5	25	Subtitle D/MSW/Trench 11, Trench 9, Parts of Trench 5
Existing Area	165.7'	168.2	5.0	25 (NW slope) 33 (other slopes)	MSW Trenches 7 and 8. Parts of Trenches 5 and 6.
Expansion Area	185.4'	187.9	5.0	33	MSW and Class 1 industrial waste below the exterior berm elevation (66.4’ AMSL) and covered by a 4-foot clay rich soil barrier

C. Final Cover Drainage Features

Storm water drainage and erosion and sediment control features incorporated on the final cover of the landfill units to protect the integrity and effectiveness of the final cover system include *(please list and describe the drainage features to be installed on the final cover at or prior to closure for each landfill unit, or list the drainage features and provide cross references on the location(s) of the descriptive and details (drawing) information in other parts of the SDP)*:

Existing Area (Closed)

Structural controls for the closed and yet to be closed portions have/will consist of letdowns constructed to direct stormwater from the sideslopes and top deck to a perimeter channel and the southern detention pond. Sideslope and top deck swales have/will be constructed to intercept and divert stormwater to the letdowns. Letdown locations and constructed berms are shown on Drawings A1 and A2 located in Attachment III-1, Appendix 1A.

Existing Area (Constructed and To Be Constructed) and Expansion Area

The stormwater system will consist of berms, chimney drains, chutes, stormwater channels, and detention ponds comprising the stormwater control system, shown in Drawings III.A1.9, III.A1.10, III.A1.16, III.A1.17, and III.A1.18 are located within Attachment III-1. Within the landfill footprint, final cover swales will be used for stormwater conveyance to the letdown channels to maximize waste volume, and gabions are planned to minimize the letdown thickness. Additional detail on drainage features and their specifications are provided in Attachment 2 – Surface Water Drainage Report, Sections 2.2, 2,3 and 3.0.

Runoff will generally be segregated for management on the East and West of the landfill. Runoff from the Northeast of the existing landfill (i.e., approximately Trenches #7-#9) and the East portion of the expansion will be conveyed to a new Detention Basin East. Runoff from the Western portion will be conveyed to the new First Flush Detention Basin West. The existing detention pond will be used to manage stormwater from the existing closed area and a portion of the expansion area in Cells F1, G2 and G1, not exceeding the area that the pond had originally been designed to manage. The First Flush Detention Basin West will discharge from the South into the existing tributary ditch, which will be re-routed to accommodate the landfill expansion.

Drawing No.	Drawing Title	Description of Information Contained in Drawing
III.A1.14	Cross Sections – 2	Expansion Area: Cross section drawing
III.A1.15	Cross Sections – 3	Expansion Area: Cross section drawing
III.A1.15B	Cross Sections – 4	Expansion Area: Cross section drawing
III.A1.16	Detail Sheet 1	Expansion Area: Final cover details
III.A1.17	Detail Sheet 2	Expansion Area: Final cover details and drainage feature details
III.A1.18	Detail Sheet 3	Expansion Area: Final cover details and drainage feature details
III.A1.19	Detail Sheet 4	Expansion Area: Final cover details and drainage feature details
III.A1.20	Detail Sheet 5	Expansion Area: Final cover details and drainage feature details

C. Final Cover Quality Control Plan

A final cover quality control plan (FCQCP) is located in Attachment III-10. The FCQCP describes the final cover system design, construction, and evaluation protocol and processes, including the personnel, materials, methods, sampling and testing standards, procedures, and practices to be used in procuring, handling, installing, and evaluating all elements of the final cover system. It establishes the material requirements; personnel qualifications and roles; installation requirements; quality control and quality assurance monitoring, testing, documentation, and reporting programs to be used during construction of each component of the final cover system to assure and to verify that the final cover system is constructed as designed and in accordance with applicable rules and technical standards.

D. Documentation and Reporting of Final Cover System Construction and Testing

The professional of record will document all aspects and stages of the final cover installation, including materials used, equipment and construction methods, and the type and rate of sampling and quality control testing performed. Following completion of construction of the final cover, the site operator/permittee will submit to the TCEQ executive director, a Final Cover System Evaluation Report (FCSER) for each landfill unit.

V. Closure Activities and Completion Schedules for Each Landfill Unit and for the Final Facility Closure

A. Closure of a Landfill Unit

The following activities will be conducted to satisfy the closure criteria for a landfill unit:

(1) Closure Notification to the TCEQ Executive Director:

The site operator will inform the executive director of the TCEQ, in writing, of the intent to close the unit no later than 45 days prior to the initiation of closure activities and place this notice of intent in the operating record.

(2) Stoppage of Waste Acceptance and Commencement of Other Closure Activities for the Unit:

The site operator will stop accepting waste upon receiving the known final receipt of waste. The site operator will ensure that the permitted top elevations of the in-place waste, as depicted in/derived from the unit’s final contour map approved by the TCEQ executive director, are not exceeded at any section or part of the landfill unit. The site operator will begin closure activities for the unit no later than:

- Thirty days after the date on which the unit receives the known final receipt of wastes; or
- One year after the most recent receipt of wastes if the unit has remaining capacity and there is a reasonable likelihood that the unit will receive additional wastes.

(3) Request for Extension Beyond the 1-Year Deadline for Commencing Closure Activities for a Unit:

The site operator may submit a written request to the executive director of the TCEQ for review and approval for an extension beyond the one-year deadline for the initiation of closure. The request will include the following:

(a) All applicable documentation necessary to demonstrate that the unit has the capacity to receive additional waste; and

(b) All documentation necessary to demonstrate that the site operator has taken and will continue to take all steps necessary to prevent threats to human health and the environment from the MSW landfill unit.

(4) Construction of Final Cover:

The site operator will construct the permitted final cover over the waste mass utilizing methods, procedures, and specifications described in the FCQCP. The final constructed contours, elevations, and slopes of the installed final cover will match the permitted final cover contours, elevations, and slopes shown in closure drawings contained in this closure plan.

(5) Construction of Drainage Features:

The site operator will construct the drainage structures shown in drawings referenced or contained in this closure plan or in the facility surface water drainage report.

(6) Completion of Outstanding or Replacement of Damaged Groundwater or Landfill Gas Monitoring Components:

The site operator will complete installation of any outstanding or replacement of any damaged groundwater or landfill gas monitoring system components and landfill gas control systems as needed to maintain current and effective groundwater or landfill gas monitoring and control systems.

(7) Submittal of Final Cover System Evaluation Report (FCSER) to the TCEQ Executive Director:

Following completion of construction of the final cover for the subject landfill unit, the site operator will submit to the TCEQ executive director for review and acceptance, a FCSER for the unit.

(8) Completion of Closure Activities for the Landfill Unit:

The site operator will complete closure activities for the unit within 180 days following the start of closure activities, unless the executive director of the TCEQ grants an extension as described in Item V.A.8(a) below.

(a) Request for Extension of the Completion of Closure Activities for the Landfill Unit:

The site operator may submit a written request for an extension for the completion of closure activities to the TCEQ for review and approval. The extension request will include:

- All applicable documentation necessary to demonstrate that closure will, of necessity, take longer than 180 days; and
- All applicable documentation necessary to document that all steps have been taken and will continue to be taken to prevent threats to human health and the environment from the unclosed MSW landfill unit.

(9) Submittal of Engineer’s Certification of Closure to the TCEQ Executive Director and Request of Closure Inspection to TCEQ Regional Office:

Following completion of all closure activities for the landfill unit, the site operator will submit:

(a) Closure Inspection

A written request to the local TCEQ regional office for a closure inspection of the unit.

(b) Closure Certification

A certification, signed by an independent licensed professional engineer, to the executive director of the TCEQ for review and approval verifying that closure has been completed in accordance with this closure plan. The site operator will submit the certification via registered mail, and the submittal will contain all applicable documentation necessary for certification of closure of the unit, including:

- A final cover system evaluation report (FCSER) documenting the installation of the final cover. The FCSER may be submitted as a separate document for review and approval following the completion of the final cover installation. In that case, the certification of closure will be submitted subsequently;
- A final contour map as described under Section III.E that includes the relevant unit; and
- Copy of the letter to the TCEQ regional office requesting a closure inspection of the relevant unit.

(10) TCEQ's Acknowledgement of Termination of Operation and Closure of a Unit:

Upon receipt, the TCEQ executive director will review the closure documents for completeness and accuracy; and following receipt of the closure inspection report from the agency's regional office verifying proper closure of the MSW landfill unit according to this closure plan, the executive director will, in writing, acknowledge the termination of operation and closure of the unit and deem it properly closed. Thereafter, the site operator will comply with the post-closure care requirements described in the post-closure care plan for the unit.

(11) Deed Recordation for Disposed Regulated Asbestos Containing Materials (RACM):

Upon closure of the unit that accepted RACM, the site operator will place a specific notation that the unit accepted RACM in the deed records for the facility with a diagram identifying the RACM disposal areas. Concurrently, the site operator will submit to the TCEQ executive director, a notice of the deed recordation and a copy of the diagram identifying the asbestos disposal areas.

(12) Placement of all Closure Documentation in the Site Operating Record:

Once approved, the closure certification and all other documentation of closure will be placed in the site operating record.

(13) Closure Schedule for the Landfill Unit:

A closure schedule is found in Attachment 9B and discussed below based on the remaining available landfill volume. The schedule shows all the closure activities listed within Section V.A and the timelines for commencing and completing each activity. Also, the schedule shows that closure activities for the landfill unit will be completed within 180 days following the initiation of closure activities as required, unless an extension is granted by the TCEQ executive director.

(14) Other: (enter as applicable).

30 TAC 330.457(e)(3): The total Landfill volume was estimated using AutoCAD by comparing the top of geomembrane to the top of final cover and the waste disposal capacity was obtained by removing the protective cover and final cover volumes from the total Landfill volume number. The total remaining Landfill volume available for waste disposal in the Existing Area is approximately 5.52 million yards of airspace remaining as of August 2022. The proposed lateral and vertical expansions will add approximately 35.065 million cubic yards of additional airspace, which will provide capacity through approximately 2160 based on current waste receipts.

B. Closure of the Waste Storage or Processing Units or Operations

Closure of the waste storage or processing units or operations authorized under this permit will include removal of all waste, waste residues, and any recovered materials. The facility units and operations will either be dismantled and removed off-site or decontaminated. The site operator will dispose at the landfill or evacuate all materials (including feedstock, in process, and processed) to an authorized facility and disinfect all leachate handling units, tipping areas, processing areas, and post-processing areas. If there is evidence of a release from a unit or operation, the site operator will conduct an investigation, as approved by the TCEQ executive director, into the nature and extent of the release and an assessment of measures necessary to correct an impact to groundwater.

C. Final Closure of the Facility

In addition to the closure activities listed in Section V.A above for closing a landfill unit, the site operator will conduct the following activities for the closure of the entire facility:

(1) Publish Final Closure Notice and Place the closure Plan in a Public Place:

No later than 90 days prior to the initiation of the final facility closure, the site operator will:

(a) Publication of Notice:

The site operator will publish notice in the newspaper(s) of largest circulation in the vicinity of the facility to inform the public of the final closure of the facility. This notice will include:

- The name of the facility;
- The address, and physical location of the facility;
- The facility’s permit number; and

- The last date of intended receipt of waste.

(b) Place Copies of the Closure Plan in a Public Place:

The site operator will also make available an adequate number of copies of the approved final closure and post-closure plans for public access and review at the Victoria City Hall, 105 W Juan Linn St., Victoria, TX 77901 (state public place within the area, including address, where the plan will be available for public access and review).

(2) Submit Written Notice of "Intent to Close the Facility" to the TCEQ Executive Director:

The site operator will provide written notification to the TCEQ executive director of the intent to close the facility. This notice will be provided to the executive director no later than 90 days prior to the initiation of the final facility closure, and thereafter be placed in the site operating record.

(3) Post Signs and Install Barriers:

Upon notifying the executive director of the intent to close the facility and no later than 90 days prior to the initiation of final facility closure, the site operator will:

(a) Post Final Closure Signs:

The site operator will post a minimum of one sign at the main entrance and all other frequently used points of access for the facility notifying all persons who may utilize the facility of the date of closing for the entire facility and the prohibition against further receipt of waste materials after the stated date.

(b) Install Barriers:

Also, the site/operator will install suitable barriers at all gates or access points to adequately prevent the unauthorized dumping of solid waste at the closed facility.

(4) Filling of "Affidavit to the Public" and Performance of the Final Deed Recording:

Upon closure of all the landfill units or upon final closure of the facility, the site operator will:

(a) File Affidavit

File with the county deed records an "Affidavit to the Public" in a form provided by the TCEQ executive director that includes an updated metes and bounds description of the extent of the disposal areas at the facility and the restrictions to future use of the land in accordance with applicable provisions under 30 TAC Chapter 330, Subchapter T.

(b) Record a Notation on the Deed

Record a certified notation on the deed to the facility property, or on some other instrument that is normally examined during title search, that will in perpetuity notify any potential purchaser of the property that the land has been used as a landfill facility and use of the land is restricted according to the provisions under 30 TAC Chapter 330, Subchapter T.

(c) Place Documents in the Operating Record

Place a copy of the "Affidavit to the Public" and a copy of the modified deed in the site operating record.

(5) Submittal of a Copy of the "Affidavit to the Public" and the "Modified Deed" to the TCEQ Executive Director:

Within ten days after completion of final closure activities of the facility, the site operator will submit the following to the TCEQ executive director by registered mail:

(a) A certified copy of the "Affidavit to the Public";

(b) A certified copy of the modified deed to the facility property; and

(c) A certification, signed by an independent licensed professional engineer, verifying that final facility closure has been completed in accordance with the approved closure plan. The submittal will contain all applicable documentation necessary for certification of final facility closure, including:

- Final Cover System Evaluation Report (FCSER) documenting the installation of the final cover. The FCSER may be submitted earlier as a separate document for review and approval following the completion of the final cover installation. In that case, the certification of closure will be submitted subsequently;
- A final contour map as described under Item III.G above;
- Copy of a letter to the TCEQ regional office requesting a final closure inspection of the facility; and
- Copies of documents verifying newspaper publication of the notice of the final facility closure.

(6) Other

Additional items relating to the schedule for final facility closure, and additional closure activities specific to the final closure of this facility include:
Cells A1-I2 indicated on Attachment III-1 - Drawing III.A1.4 are suitable for disposal of both MSW and Class 1 waste. Class 1 waste shall be disposed of below the exterior berm elevation (66.4' AMSL), and covered by a 4-foot clay rich soil barrier. The material properties (internal and interface) used in the slope stability analysis will be tested on the materials to be used in the landfill development (including waste and construction materials). The professional

engineers responsible for the design and construction of the individual area will review the test results and decide whether the stability analysis results are still valid or new stability analysis using the test results is needed.

(7) TCEQ’s Acceptance of Termination of Operation and Closure of a Landfill Facility:

Following the TCEQ executive director’s receipt and completion of the review of the professional engineer’s certification of the completion of facility closure and the final closure documents, and receipt of the inspection report from the agency’s regional office verifying proper closure of the facility according to this closure plan, the executive director will, in writing, accept the termination of operation and closure of the facility and deem it properly closed. Thereafter, the site operator will comply with the post closure care requirements described in the post closure plan for the facility.

(8) Final Closure Schedule for the Facility:

The attached Appendix 9B, Final Closure Schedule, provides the closure schedule for the final facility closure. It incorporates the schedule for closure of a unit as discussed in Section V.A and also shows the commencement and completion timelines for the final closure activities listed within this Section.

VI. Summary of Attachments

A. Drawings and Maps

The following Drawings and Maps are referenced as part of this plan.

- Other Drawings/Maps: located in:
  Attachment III-1:
  - Drawing III.A1.3, Landfill Cell Expansion Plan
  - Drawing III.A1.4, Waste Placement Phasing Plan
  - Drawings III.A1.7 to III.A1.10, Final Cover and Drainage Features Installation Drawings.
  - Drawings III.A1.13 to III.A1.15B, Cross-Section Drawings of the Landfill Units at Closure.
  - Drawings III.A1.16 to III.A1.20, Final Cover Installation Details and Drainage Feature Details

B. Documents

- Attachment III-10, Final Cover Quality Control Plan (FCQCP).
- Appendix 9A , Landfill Unit Closure Schedule Chart.
- Appendix 9B, Final Closure Schedule Chart.
- Other: Attachment

C. Additional Items Attached (enter as applicable)

VII. Professional Engineer’s Statement, Seal, and Signature

Name: Tonya Koller

Title: Project Engineer

Date: Revision 3, 06/30/2023Company Name: Burns & McDonnell

Firm Registration Number: F-845

Professional Engineer’s Seal

STATE OF TEXAS

TONYA L. KOLLER

133943

LICENSED PROFESSIONAL ENGINEER

7-14-23

Signature

ATTACHMENT III-10 – FINAL CLOSURE QUALITY CONTROL PLAN

Part III, Attachment 10
Final Cover Quality Control Plan
TCEQ MSW Permit No. 1522B

City of Victoria, Texas

City of Victoria Landfill Lateral and Vertical Expansion
Project No. 107608

Revision 3, June 30, 2023

Part III, Attachment 10
Final Cover Quality Control Plan
TCEQ MSW Permit No. 1522B

prepared for

City of Victoria, Texas
City of Victoria Landfill Lateral and Vertical Expansion
Victoria County, Texas

Project No. 107608

Revision 3, June 30, 2023

TONYA L. KOLLER
133943
7-14-23

prepared by

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Representative Sample – A representative sample of FML material consists of one or more specimens (commonly referred to as coupons) from the same rectangular portion of FML material, oriented along a seam, that is removed for field or laboratory testing purposes.

Soil Borrow Source – Soils in which the LL and PI do not vary by 10 points. A soil that varies by 10 or more points from the originally established LL or PI is considered as a separate soil source for the purpose of this FCQCP and requires a separate soil test series.

Soil Test Series – Tests performed to determine a soil's physical characteristics and to document its ability to satisfy the MSWR compacted clay layer requirements. These tests include sieve analysis (gradation), Atterberg Limits, moisture/density, and coefficient of permeability.

Specimen – (With respect to FML destructive testing) – A specimen is the individual test strip (sometimes called coupon) from a sample location. A sample location usually consists of many specimens.

1.3 Final Cover Systems

Final cover at the City of Victoria Landfill includes three types of final cover systems. These final cover systems are included under the following unit classifications:

- Pre-Subtitle D: Existing Area – Closed
- Historic Composite: Existing Area – Closed
- Future Composite:
    - Existing Area – Constructed or To Be Constructed (TBC)
    - Expansion Area – Lateral or Vertical

These Areas are defined in Attachment III-9 – Final Closure Plan.

The Pre-Subtitle D final cover system includes an 18-inch-thick compacted clay-rich soil and a 6-inch thick topsoil erosion layer consisting of earthen material capable of sustaining native plant growth.

The Historic Composite final cover system includes an 18-inch-thick compacted clay layer, 40 mil LLDPE textured geomembrane (textured on both sides), and 24-inch thick erosion layer, of which the top 6 inches can sustain vegetative growth.

Most Existing Areas utilizing Pre-Subtitle D and Historic Composite final cover have been closed as of 2015. Final cover for the remaining Pre-Subtitle D open area (Existing Area – Constructed) and Subtitle

D open area (Existing Area – Trench 11) will be installed per the previously permitted and approved CQA plan located in Appendix 10C.

The Future Composite final cover system will include a 12-inch thick soil layer capable of sustaining vegetative growth, 200-millimeter (mil) double-sided drainage geocomposite, 40 mil LLDPE geomembrane (textured both sides), and an 18-inch thick compacted clay layer. The vegetative layer will be seeded with Common Bermuda grass, or other similar turf grasses that have most of the root depths of 6 inches or less.

Future Composite final cover will be placed on all areas that have yet to receive final cover, including Existing Area – Constructed or TBC and Expansion Areas. This FCQCP covers the CQA requirements for the Future Composite final cover system.

The final cover systems at the site are designed to minimize the amount of precipitation that infiltrates the deposited waste, thus minimizing the amount of leachate generated. The final cover system is designed to convey stormwater to detention ponds via final cover erosion control structures and perimeter channels.

The material properties (internal and interface) used in the slope stability analysis will be tested on the materials to be used in the landfill development (including waste and construction materials). The professional engineers responsible for the design and construction of the individual area will review the test results and decide whether the stability analysis results are still valid or new stability analysis using the test results is needed.

In the Expansion Area, final cover installation will require construction on slopes in excess of 25%. Additional safety precautions for operating on steep slopes should be used, including awareness and spotting, angle of approach and operation, weather considerations, use of safe speed and appropriate track, etc.

3.0 CONSTRUCTION QUALITY ASSURANCE FOR GEOSYNTHETICS

This section describes CQA procedures for the installation of geosynthetic components.

The scope of geosynthetic-related construction quality assurance includes the following elements:

- Geomembrane Liner: 40-mil LLDPE – textured on both sides. Minimum required material properties for the geomembrane are listed in Appendix 10B.
- Drainage Layer: 200-mil drainage geocomposite – minimum required material properties for the drainage layer are found in Appendix 10B.

The overall goal of the geosynthetics quality assurance program is to assure that proper construction techniques and procedures are used, the geosynthetic contractor implements their quality control plan in accordance with this FCQCP, the construction and testing of all elements of the final cover are performed in accordance with this FCQCP and the Attachment III-9 – Final Closure Plan, and that the project is built in accordance with the project construction drawings and technical specifications. The quality assurance program is intended to identify and define problems that may occur during construction and to observe that these problems are avoided and/or corrected before construction is complete. The FCSER, prepared after project completion, will document that the constructed facility meets design intent and specifications and that all final cover construction and QA/QC testing are performed in accordance with this FCQCP.

3.1 Geosynthetics Quality Assurance

3.1.1 General

A geomembrane and drainage geocomposite are the geosynthetic components of the Future Composite final cover system. All testing requirements and minimum required properties are listed in Appendix 10B. Construction quality control for the geosynthetic installation will be performed by the geosynthetic installation contractor. Construction quality assurance for the geosynthetic installation will be performed by the POR to assure the geosynthetic is constructed as specified in the design. Construction must be conducted in accordance with the project construction drawings, which will be developed in accordance with this FCQCP and the Attachment III-9 – Final Closure Plan at the time of each final cover construction and in accordance with specifications outlined in this FCQCP. Where there is discrepancy, the project construction drawings and specifications shall govern. To monitor compliance, a quality assurance program will include the following:

- Review of Installer's QC submittals

the CQA Officer believes that an operator or seaming apparatus is not functioning properly. If there are large changes in temperature, humidity, or wind speed, the test weld is to be repeated.

During seaming operations, the CQA Officer shall verify that the following conditions exist:

- The Installer has the number of welders and spare parts agreed to in the pre-construction meeting
- Equipment used for seaming does not damage the geomembrane
- The extruder is purged prior to beginning a seam until all the heat-degraded extruder is removed (extrusion welding only)
- Seam grinding has been completed less than 30 minutes before seam welding (extrusion welding only)
- Seam edges are beveled and grind marks are perpendicular to the seam (extrusion welding only)
- Grind marks do not extend more than 1/4 inch from edge of weld
- The ambient temperature measured within 6 inches of the geomembrane surface is between 32 degrees and 105 degrees Fahrenheit, unless approved otherwise by the CQA Officer
- The end of old welds, more than five minutes old, are ground to expose new material before restarting a weld (extrusion welding only)
- The weld is free of dust, dirt, moisture, or other contaminants
- The seams overlap a minimum of three inches for extrusion welding and four inches for fusion welding, or in accordance with manufacturer’s recommendations
- No solvents or adhesives are present in the seam area
- The procedure used to temporarily hold the panels together does not damage the panels and does not preclude CQA testing
- The panels are seamed in accordance with the plans and specifications

The CQC Manager shall prepare a Geomembrane Seaming Log for each seam on a form similar to that shown in Appendix 10A.

3.2.4 Construction Testing

Two nondestructive testing procedures shall be utilized, depending on the type of welding procedure used. For extrusion welded seams the vacuum box method shall be employed for the full seam length. A vacuum of at least three- pounds per square inch (psi) shall be maintained for at least ten seconds. For the dual wedge (hot shoe) fusion welded seam, the air channel shall be pressurized to a maximum pressure of 30-psi. The air channel shall be pressurized for at least five minutes. If the loss of pressure exceeds two psi or pressure does not stabilize after five minutes, the defective area shall be located and repaired.

3.2.4.1 Nondestructive Seam Testing

During nondestructive testing operations, the CQA Officer shall perform the following activities:

- Observe all nondestructive testing.
- Verify that the CQC Manager records the location, date, test number, technician name, and results of all nondestructive testing. These results shall be recorded on a Geomembrane Nondestructive Test Record form similar to that shown in Appendix 10A.
- Mark the location of any defects requiring repairs and record on the Geomembrane Repair Log form.
- Mark the failed areas with a waterproof marker compatible with the liner (spray paint should not be used) and inform the CQC Manager of any required repairs.
- Verify that all testing covers the entire length of all field seams and is completed in accordance with the project specifications.
- Verify that all repairs are completed and then tested in accordance with the project specifications
- Tests shall be performed concurrently with seaming operation, not at the completion of all seaming.

3.2.4.2 Destructive Seam Testing

Destructive testing shall be performed concurrently with seaming operations, not at the completion of the installation. The types of destructive testing required during the liner installation are peel and shear tests.

The CQA Officer shall determine test locations as per the ***Sampling Frequency Methodology*** presented below. Locations selected may also be prompted by liner distortion due to overheating, weld contamination, or any potential cause of poor welds. The Installer shall not be informed in advance of the destructive test sample locations.

The CQC Manager shall remove samples at locations identified by the CQA Officer. The CQA Officer shall perform the following activities:

- Observe sample cutting;
- Mark each sample with an identifying number containing the seam number; and
- Record the sample location and reason sample was taken (e.g., random sample, visual appearance, result of a previous failure, etc.) on a Geomembrane Destructive Test Record form (an example is provided in Appendix 10A).

The destructive sample shall be approximately 42 inches long by 12 inches wide, with the seam centered along the length. This recovered sample shall be divided into three parts: one 12-inch section shall be tested in the field, one 12-inch by 12-inch sample shall be given to the Owner for storage, and one 12-inch by 18-inch sample shall be sent to the Testing Laboratory for testing. Each sample shall be marked with the appropriate identification information. The Contractor or Installer shall ship samples for destructive analysis to the Testing Laboratory on the same day the sample is recovered.

Testing shall include the shear and peel test (ASTM D6392). At least five specimens shall be tested in peel and five specimens in shear. All of the five specimens tested by the Testing Laboratory using each method must meet the minimum test values presented in the Project Documents. The Testing Laboratory shall provide test results within 24 hours in writing or via telephone with the CQA Officer. Certified test results are to be provided within 5 days. The Contractor or Installer shall immediately notify the CQA Officer and Engineer in the event of a failed test. No areas (except as necessary to provide temporary wind protection or to temporarily prevent water from getting under the geomembrane) are to be covered prior to receiving the laboratory test results.

A passing machine-welded seam will be achieved for both peel and shear testing for both fusion and extrusion welded seams when the following two conditions are met (utilizing testing method ASTM D4437):

- Seam strength meeting the requirements of GRI-GM19a
- Seam failure by Film Tear Bond (FTB) and break code not unacceptable per GRI-GM19a

If the laboratory test fails in either peel or shear, the Installer may either reconstruct the entire seam or additional samples may be recovered to identify the deficient area more accurately. If additional samples are to be recovered, samples must be taken on either side of the failed sample for laboratory testing. These samples must be taken at least 10 feet from the location of the failed sample in either direction or at the end of the seam if it is less than 10 feet from the failed sample. Sample size and disposition shall be as described previously.

This process shall be repeated until samples that pass the tests ‘bracket’ the failed seam section on each side. All failed seams will be bounded by locations where samples passing laboratory tests have been taken. In cases involving more than 50 feet of reconstructed or cap stripped seam, the reconstructed or cap stripped seam must also be tested. Laboratory testing governs seam acceptance (for destructive testing). In no case shall destructive field testing of installed seams be used for final acceptance.

The testing locations shall be documented and included as part of the as-built panel placement drawing.

The CQA Officer shall select locations where seam samples will be cut for laboratory testing. These locations shall be established in the following manner:

<u>Sampling Frequency Methodology</u>

Method 1: For all landfill construction projects consisting of 50,000 linear feet of geomembrane seaming or less, a minimum of one test per 500 feet of seam length will be taken. This is a minimum frequency for the entire installation; individual samples may be taken at shorter intervals as determined by the CQA Officer. A testing frequency shall be agreed to by the CQC Manager, CQA Officer, and Owner's Representative at the pre-construction meeting. However, if the number of failed samples exceeds 3 percent of the tested samples, this frequency may be increased at the discretion of the CQA Officer. Samples taken as the result of failed tests do not count toward the total number of tests.

Method 2: For all landfill construction projects consisting of more than 50,000 linear feet of geomembrane seaming the prescriptive methodology contained within the Geosynthetics Institute publication GRI GM17, which is included as Appendix 10B, will be utilized:

- The failure rate shall be laboratory failure rate. The provisions for corrective actions required to address failures is provided above.
- If at any time, the failure rate equals or exceeds 3%, the sampling frequency shall be increased to a minimum of 1 sample per 420 linear feet of seam length for the next 39 tests. This frequency may be increased at the discretion of the CQA Officer.
- If at any time, the failure rate is between 2% and 3%, the sampling frequency shall remain constant as established by the criteria below.
- If at any time, the failure rate is less than 2%, the sampling frequency shall be able to be reduced by the factors identified below. The maximum sampling interval shall be 1 destructive test per 1,000 linear feet.
- Minimum Allowable Batch Size shall be no less than 20 samples, due to lead time associated with receipt of laboratory destruct results. This approach increases the number of required tests when compared to the GRI GM17 Method's standard "Batch Size" reduction at each stage (it will require more testing for an installer to demonstrate "Good" Quality).

A stepwise example is included below for illustrative purposes assuming 90,000 linear feet of seam (initial number of 180 samples at the one test per 500 feet of seam length).

- Initial destructive seam sampling frequency shall be set at 1 sample per 500 linear feet of seam length for first 32 destructive tests (Table 2b, Appendix 10B);
- If a minimum of 32 of the first 32 destructive tests pass, then sampling frequency shall be decreased to 1 sample per 600 linear feet for the next 28 destructive tests (total of 60 destructive tests). If more than 1 seam fails in the first 32 destructive laboratory tests, then the sampling frequency shall increase to 1 sample per 420 linear feet of seam length for the next 39 tests (frequency will return to 500 linear feet if cumulative failure rate is less than 3%);
- If a minimum of 59 of the first 60 destructive tests pass, then the sampling frequency shall be decreased to 1 sample per 720 linear feet for the next 23 destructive tests (total of 83 destructive tests). If more than 2 seams fail in the first 60 destructive laboratory tests, then the sampling frequency shall increase to 1 sample per 420 linear feet of seam length for the next 39 tests;
- If a minimum of 81 of the first 83 destructive tests pass, then the sampling frequency shall be decreased to 1 sample per 850 linear feet for the next 20 destructive tests (total of 103 destructive tests). If more than 2 seams fail in the first 83 destructive laboratory tests, then the sampling frequency shall increase to 1 sample per 420 linear feet of seam length for the next 39 tests;
- If a minimum of 101 of the first 103 destructive tests pass, then the sampling frequency shall be decreased to 1 sample per sample per 1,000 linear feet for the next 17 destructive tests (total of 120 destructive tests). If more than 3 seams fail in the first 103 destructive laboratory tests, then the sampling frequency shall increase to 1 sample per 420 linear feet of seam length for the next 39 tests.

3.2.5 Repairs

Portions of the geomembrane with flaws or that fail a nondestructive or destructive test shall be repaired in accordance with the specifications and manufacturer’s recommendations. The CQA Officer shall locate and describe all repairs on the Geomembrane Repair Log form (see Appendix 10A).

- Patching is used to repair large holes, tears, large panel defects, and destructive testing sample locations.
- Extrusion is used to repair small defects in the panels and seams. In general, this procedure should be used for defects less than 3/8 inch in the largest dimension.
- Capping is used to repair failed welds or to cover seams where welds cannot be nondestructively tested.

- Removal is used to replace areas with large defects where the preceding methods are not appropriate. Removal is also used to remove excess material (wrinkles) from the installed geomembrane.

3.2.6 Wrinkles

Placing soil cover or drainage materials over the geomembrane, temperature changes, or creep may cause wrinkles to develop in the geomembrane. Any wrinkles that can fold over shall be repaired either by cutting out excess material or, if possible, allowing the liner to contract due to temperature reduction. In no case shall material be placed over the geomembrane that could result in the geomembrane folding.

3.2.7 Bridging

Unless approved by the CQA Officer, bridging must be removed and repaired at no cost to Owner.

3.2.8 Folded Material

All folded HDPE geomembrane shall be removed and repaired at no cost to Owner.

3.2.9 Geomembrane Acceptance

The Installer shall retain all ownership and responsibility for the geomembrane until acceptance by the Owner. In the event the Installer is responsible for placing a protective cover over the geomembrane, the Installer shall retain ownership and responsibility for the geomembrane until the protective cover is placed.

The CQA Officer shall accept the geomembrane when the following activities have occurred:

- The installation is finished
- All seams have been inspected and approved
- All required laboratory tests have been completed and approved
- Signed QC certificates for each roll of geomembrane have been supplied by the Installer and approved by the CQA Officer. Certificates shall include resin identification, roll number, date of production, and test results for density, melt index, and tensile strength (ASTM D638)
- All record drawings have been completed and approved
- All documentation required by the specification has been received

3.3 Geocomposite

3.3.1 Delivery and Handling

The CQA Officer shall verify that the following activities are completed:

- Equipment used to unload the rolls shall not damage the geocomposite
- Care is used to unload the rolls
- The label containing product identification, roll number, and roll dimensions has been supplied by the Installer and been approved by the CQA Officer
- The geocomposite is covered to minimize contact with dirt and other contaminants
- Geocomposite rolls are not dragged across ground surface
- Heavy construction equipment is not operated directly on the geocomposite

At the CQA Officer's discretion, damaged rolls may be rejected and removed from the site or stored at a location, separate from accepted rolls, designated by the Owner's Representative. All rolls without proper manufacturer's documentation shall be rejected.

3.3.2 Conformance Testing

3.3.2.1 Tests

Before delivery, the Geosynthetics Manufacturer shall obtain one geocomposite sample per 50,000 square feet of geocomposite. The samples shall be forwarded to the Testing laboratory for the following tests:

- Carbon Black
- Transmissivity
- Thickness
- Tensile Properties
- Density
- Adhesion of Geotextile to Geonet

Where optional procedures are noted in the test method, the specification requirements shall prevail. The CQA Officer shall review all test results and report any nonconformance to the Owner's Representative and the Installer.

3.3.2.2 Sampling Procedure

Samples shall be taken across the entire roll width and shall not include the first three feet unless otherwise specified, samples shall be three feet long by the roll width. The CQA Officer or authorized representative shall tag the sample with the manufacturer's roll identification number and the date sampled.

3.3.3 Geocomposite Installation

Prior to geocomposite installation, the CQA Officer shall verify that the following conditions exist:

- The geocomposite installation, including all required documentation, has been completed
- The geocomposite surface is clean

During panel placement, the CQA Officer shall perform the following activities:

- Observe the geocomposite as it is deployed and record all defects and disposition of the defects (panel rejected, patch installed, etc.). All repairs are to be made in accordance with the specifications
- Verify that equipment used does not damage the geocomposite or underlying geomembrane by handling, trafficking, leakage of hydrocarbons, or other means
- Verify that people working on the geocomposite do not smoke, wear shoes that could damage the geocomposite, or engage in activities that could damage the geocomposite or underlying geomembrane
- Verify that the geocomposite is anchored to prevent movement by the wind (the Installer is responsible for any damage resulting to or from windblown geocomposite)
- Verify that the geocomposite remains free of contaminants such as soil, grease, fuel, etc.

The CQA Officer shall inform the Installer and Owner's Representative if the above conditions are not met.

During geocomposite placement, the CQA Officer shall verify that the following conditions exist:

- Adjacent edges along the length of the geocomposite roll shall be overlapped a minimum of four inches, or as recommended by the Manufacturer.
- The overlapped edges shall be joined in accordance with the plans and specifications.
- Adjoining rolls across the roll width should be shingled down in the direction of the slope and joined together in accordance with the plans and specifications.

- Repair procedures include the following activities:
  - Patching is used to repair holes, breaks, tears, and defects
  - Removal is used to replace areas with large defects where patching is not appropriate.

3.4 Equipment on Geosynthetic Materials

Construction equipment on the composite final cover system will be minimized to reduce the potential for geosynthetic material puncture. The CQA Officer will verify that small equipment such as generators are placed on scrap geomembrane material (rub sheets) above geosynthetic materials in the final cover system. The erosion layer will be placed using low ground pressure equipment. The CQA Officer will verify that the geosynthetics are not displaced while the soil layers (e.g., erosion layer) are being placed.

Unless otherwise specified by the POR, lifts of soil material placed over geosynthetics will conform to the guidelines in Table 3-1.

Table 3-1: Equipment and Soil Material Guidelines

Equipment Ground Pressure (psi)	Minimum Lift Thickness (in.)
<5.0	12 and under
5.1 - 8.0	18
8.1 - 16.0	24
>16.0	36

No equipment will be left running and unattended over the constructed geosynthetics.

3.5 Reporting

The POR on behalf of the Operator will submit to the TCEQ a FCSER for approval of the constructed final cover system. Section 5.0 describes the documentation requirements.

4.0 CONSTRUCTION QUALITY ASSURANCE FOR EROSION LAYER

The erosion layer for the Composite final cover areas will consist of a minimum of 12 inches of earthen material and a 200 mil double sided drainage geocomposite. The top six inches of the erosion layer will be capable of sustaining native and introduced vegetative growth and must be seeded immediately after completion of the final cover. Temporary or permanent erosion control materials may be used to minimize erosion and aid establishment of vegetation. The physical characteristics of the erosion layer will be evaluated through visual observation (and laboratory testing if deemed necessary by the POR) before construction and visual observation during construction. Additional testing during construction will be at the discretion of the POR.

The erosion layer may be placed using any appropriate equipment capable of completing the work and should only receive minimal compaction required for stability. Under no circumstances will the construction equipment come in direct contact with the installed geosynthetics. Equipment used to install the erosion layer must meet the requirement of Section 3.4.

The thickness of the erosion layer will be verified with surveying procedures at a minimum of one survey point per 10,000 square feet of constructed area by a licensed Texas surveyor with a minimum of one reference point. The survey results for the erosion layer will be included in the FCSER.

During construction, the CQA Officer will:

- Verify that grade control is performed prior to work.
- Verify that underlying geosynthetic installations are not damaged during placement operations or by survey grade controls. Mark damaged geosynthetics and verify that damage is repaired.
- Monitor haul-road thickness over installed geosynthetics and verify that equipment hauling, and material placement meet equipment specifications (see Section 3.4).
- The POR will coordinate with the project surveyor to perform a thickness verification survey of the erosion layer materials upon completion of placement operations. Verify corrective action measures as determined by the verification survey. Thickness surveying to determine minimum erosion layer thickness will be performed similar to the compacted clay layer thickness verification shown in Table 2-1.

ATTACHMENT III-11 – POST-CLOSURE PLAN

corrective action to address confirmed releases from the landfill have been completed as acknowledged in writing by the executive director.

C. Post-Closure Care Requirements and Activities for Municipal Solid Waste Landfill Units that Receive Waste on or after October 9, 1993 and for New Units

The site operator will commence and conduct post-closure care maintenance of the units that receive waste on or after October 9, 1993 and new units constructed under this permit as follows and in accordance with applicable rules under 30 TAC §330.463.

1. Commencement of Post-Closure Care

Post-closure care maintenance will start on the date the professional engineer's certification of the completion of closure is accepted in writing by the TCEQ executive director and the site operator will carry out the following activities and operations during the period.

2. Period of Post-Closure Care

The site operator will conduct post-closure care for the landfill units for a period of **30 years**, unless this time period is increased or reduced by the executive director as discussed in Subsection IV.C.11.

3. Maintenance of Right of Entry and Rights of Way

The site operator will retain the right of entry to the closed units and the facility and will maintain all rights-of-way of the closed units in order to conduct periodic inspection and maintenance of the closed units until the end of the post-closure care period.

4. Inspection Activities

The site operator will conduct periodic inspection of the closed units to identify and document deficiency conditions and conduct maintenance and corrective action to maintain compliance. Sections IV.C. 8.(a)-(c) provide information on the inspection items and deficiency conditions that the site operator will look for during inspection of the major components of the landfill and the site during the post-closure care period. Other inspection and maintenance provisions that apply during the post-closure care period as specified in the facility's site operating plan (see Part IV, Section 2.0

regarding recordkeeping), site development plan, or applicable rules will remain in effect.

5. Documentation of Inspection

The site operator will document and maintain records of the post-closure care inspections in the site operating record. The records will include:

- The date of inspection;
- Components and items inspected;
- Problems detected or observed; and
- The name of the personnel who conducted the inspection.

6. Corrective Actions

Based on the results of the inspection activities, the site operator will conduct needed restoration and remediation actions on the closed unit no later than the next scheduled inspection event. Also, the site operator will conduct maintenance action on regular periodic schedule in order to:

- Maintain the integrity and effectiveness of all final cover, facility vegetation, and drainage control systems.
    - Final cover vegetation shall be maintained at 90 percent grass coverage, areas not meeting this requirement will be seeded as necessary to reestablish vegetation.
- Correct any effects of settlement, subsidence, ponded water, erosion, or other events or failures detrimental to the integrity of the closed unit.
- Prevent any surface run-on and run-off from eroding or otherwise damaging the final cover system during the post-closure care period.
- Repair any erosion gullies or washed-out areas deep enough to jeopardize the final or intermediate cover within five days (unless the commission's regional office approves otherwise) in accordance with 30 TAC §330.165(g).

7. Documentation of Corrective Actions

The site operator will document and maintain, in the facility’s site operating record, records of the restoration, remediation, and maintenance activities performed, including the date of completion of the activities.

8. Inspection Activities Schedules

(a) Final Cover Inspection

Inspection Frequency: Semi-Annually

Other Inspection Occasions/Events: Following significant wet weather events

Table 5: Final Cover Inspection Items

Inspection Item	Types of Deficiency Conditions to be looked for during Inspection
Vegetation and other Ground Cover Materials	Erosion, Less than 90 percent established vegetative cover
Settlement	Concave appearance of cap, signficant cracking/damage to soil/geomembrane, ponding after precipitation
Subsidence	Concave appearance of cap, signficant cracking/damage to soil/geomembrane, ponding after precipitation
Ponded Water	Ponding water where not designed following 25-yr, 24-hr storm events
Erosion	Significant erosion, lack of vegetation
Other (enter other events or failures detrimental to the integrity and effectiveness of the final cover):	

(b) *Drainage Control System Inspection*

Inspection Frequency: Semi-Annually

Other Inspection Occasions/Events: Following/during wet weather events

Table 6: Drainage Control System Inspection Items

Inspection Item	Types of Deficiency Conditions to be looked for during Inspection
Vegetation within Drainage Control Structures	Lack of established vegetation
Component Failures	During wet weather conditions when flow is expected, the pipe outlets will be inspected to verify that flow is occurring. If there is no flow, the pipe will be checked for clogging and flushed or replaced as necessary
Wash Outs	Significant washout of vegetation or riprap directly downgradient of the outlet pipe or around entrance of inlet pipe
Sediment Build Up	Sediment buildup inside pipe or up/downgradient of pipe inlet/outlet
Other (enter other events or failures detrimental to the integrity and effectiveness of drainage structures):	

XI. Engineer's Seal and Signature

Name: Tonya Koller Title: Project Engineer

Date: 06/30/2023

Company Name: Burns & McDonnell Firm Registration Number: F-845

Professional Engineer's Seal

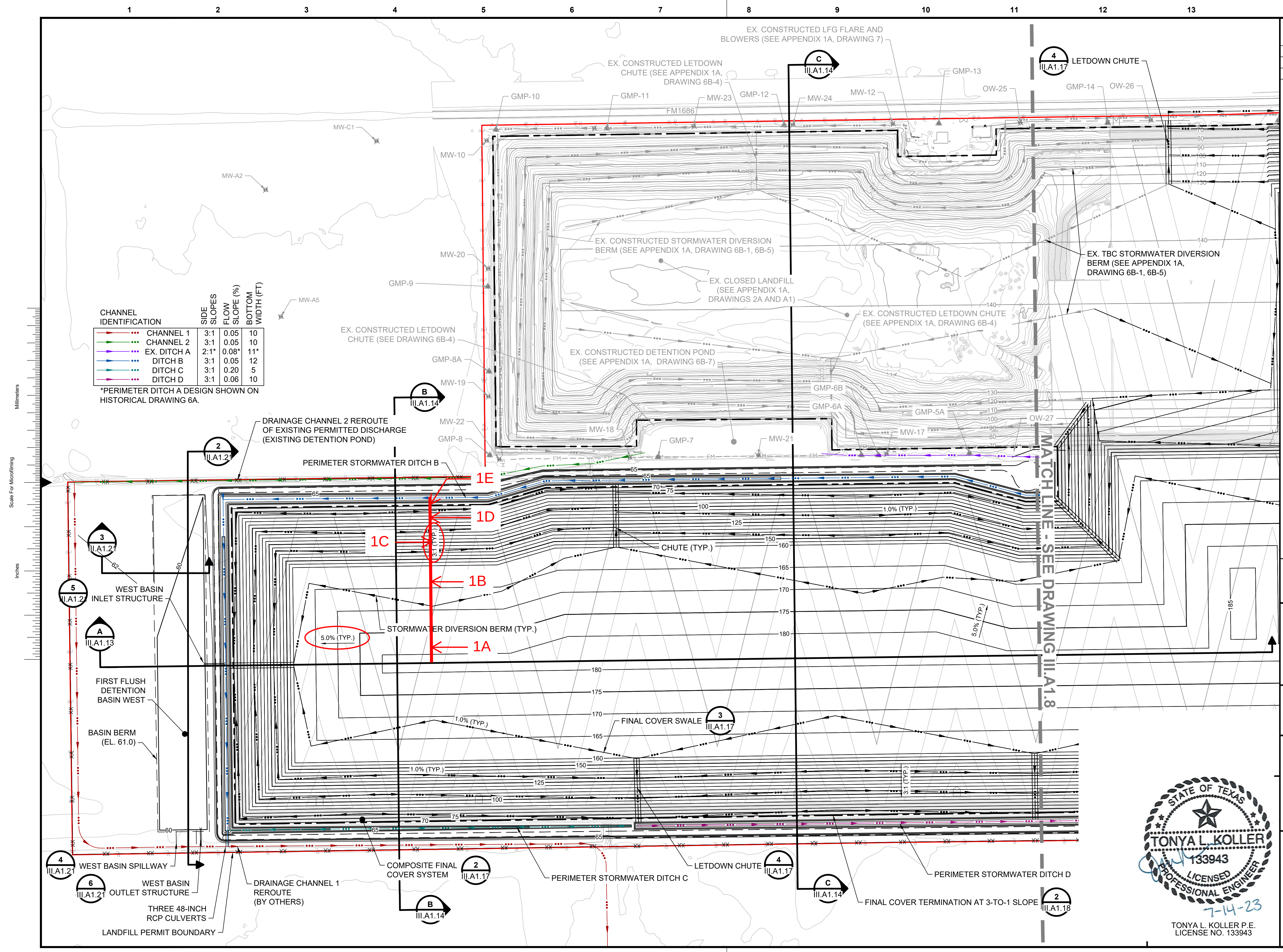
TONYA L. KOLLER
133943

7-14-23

Signature

ATTACHMENT III-14 – RUSLE2 REPORT

APPENDIX 14B – CALCULATION LOCATION DRAWINGS



CHANNEL IDENTIFICATION		SIDE SLOPES	FLOW SLOPE (%)	BOTTOM WIDTH (FT)
🟥	CHANNEL 1	3:1	0.05	10
🟩	CHANNEL 2	3:1	0.05	10
🟪	EX. DITCH A	2:1*	0.08*	11*
🟦	DITCH B	3:1	0.05	12
	DITCH C	3:1	0.20	5
	DITCH D	3:1	0.06	10

*PERIMETER DITCH A DESIGN SHOWN ON HISTORICAL DRAWING 6A.

no.	date	by	ckd	description
0	3/28/22	TJS	SAM	INITIAL SUBMITTAL
1	8/15/22	TJS	TLK	REV. PER TCEQ NOD
2	11/18/22	TJS	TLK	REV. PER TCEQ NOD
3	6/30/22	TJS	TLK	REV. PER TCEQ NOD

NOTES:

1. DESIGN CONTOURS REPRESENT TOP OF FINAL COVER. DESIGN CONTOUR INTERVAL IS 5-FEET. BACKGROUND CONTOURS REPRESENT TOP OF SOIL LINER AND EXISTING GROUND (OUTSIDE OF TRENCHES 6-9, EASTERN PORTION OF TRENCH 5 AND CELLS A1-I2). BACKGROUND CONTOUR INTERVAL IS 2-FEET. BACKGROUND CONTOUR SOURCES PROVIDED ON DRAWING III.A1.2.
2. PERIMETER DITCH CROSS SECTIONS SHOWING DIMENSIONS, FLOW DEPTHS, ETC. ARE PROVIDED ON DRAWINGS III.A1.20 AND III.A1.21.

PRELIMINARY - NOT FOR CONSTRUCTION

TONYA L. KOLLER
133943
7-14-23

TONYA L. KOLLER P.E.
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date MARCH 2022
detailed T. CAMMACK
designed T. SCHMIDT
checked T. KOLLER

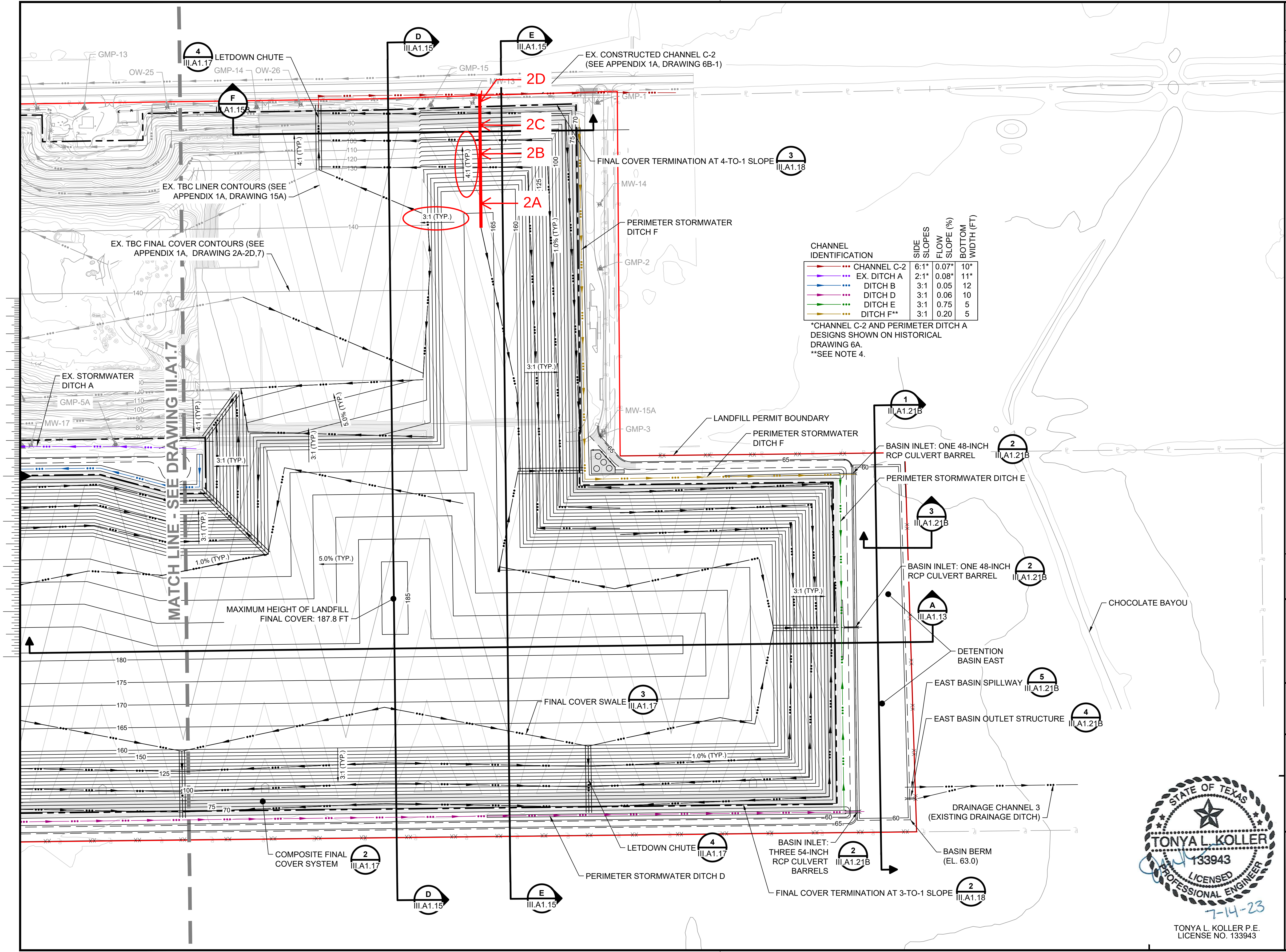
THE CITY OF VICTORIA TEXAS

Victoria County, Texas

1522B PERMIT AMENDMENT

FINAL GRADING PLAN - WEST

project 107608
contract -
drawing **III.A1.7 – 3** rev.
sheet 8 of 25 sheets
file 107608III.A1.7.dwg



CHANNEL IDENTIFICATION	SIDE SLOPES	FLOW SLOPE (%)	BOTTOM WIDTH (FT)
CHANNEL C-2	6:1*	0.07*	10*
EX. DITCH A	2:1*	0.08*	11*
DITCH B	3:1	0.05	12
DITCH D	3:1	0.06	10
DITCH E	3:1	0.75	5
DITCH F**	3:1	0.20	5

*CHANNEL C-2 AND PERIMETER DITCH A DESIGNS SHOWN ON HISTORICAL DRAWING 6A.
**SEE NOTE 4.

no.	date	by	ckd	description
0	3/28/22	TJS	SAM	INITIAL SUBMITTAL
1	8/15/22	TJS	TLK	REV. PER TCEQ NOD
2	11/18/22	TJS	TLK	REV. PER TCEQ NOD
3	6/30/23	TJS	TLK	REV. PER TCEQ NOD

NOTES:

1. THE EAST BASIN DISCHARGES INTO AN EXISTING DITCH NOT SHOWN IN THE EXISTING TOPOGRAPHY.
2. DESIGN CONTOURS REPRESENT TOP OF FINAL COVER. DESIGN CONTOUR INTERVAL IS 5-FEET. BACKGROUND CONTOURS REPRESENT TOP OF SOIL LINER AND EXISTING GROUND (OUTSIDE OF TRENCHES 6-9, EASTERN PORTION OF TRENCH 5 AND CELLS A1-I2). BACKGROUND CONTOUR INTERVAL IS 2-FEET. BACKGROUND CONTOUR SOURCES PROVIDED ON DRAWING III.A1.2.
3. PERIMETER DITCH CROSS SECTIONS SHOWING DIMENSIONS, FLOW DEPTHS, ETC. ARE PROVIDED ON DRAWINGS III.A1.20 AND III.A1.21.
4. PERIMETER DITCH F IS NOT REPRESENTED IN CROSS SECTIONS. 25-YEAR STORM DEPTH IS 1.1 FT AND 100-YEAR STORM DEPTH IS 1.5 FT.

PRELIMINARY - NOT FOR CONSTRUCTION

BURNS McDONNELL
9400 WARD PARKWAY
KANSAS CITY, MO 64114
816-333-9400
Burns & McDonnell Engineering Co, Inc.
FIRM REG. NO. F-845

date	detailed
MARCH 2022	T. CAMMACK
designed	**checked**
T. SCHMIDT	T. KOLLER

Victoria County, Texas

1522B PERMIT AMENDMENT

FINAL GRADING PLAN - EAST

project 107608
contract -
drawing III.A1.8 — rev. 3
sheet 9 of 25 sheets
file 107608III.A1.8.dwg

TONYA L. KOLLER
133943
7-14-23

TONYA L. KOLLER P.E.
LICENSE NO. 133943

Volume 5
Part IV Landfill Permit Amendment
Site Operating Plan
TCEQ MSW Permit No. 1522B

City of Victoria, Texas

City of Victoria Landfill Lateral and Vertical Expansion
Project No. 107608

Revision 3, June 30, 2023

Volume 5
Part IV Landfill Permit Amendment
Site Operating Plan
TCEQ MSW Permit No. 1522B

prepared for

City of Victoria, Texas
City of Victoria Landfill Lateral and Vertical Expansion
Victoria County, Texas

Project No. 107608

Revision 0, March 28, 2022
Revision 1, August 15, 2022
Revision 2, November 18, 2022
Revision 3, June 30, 2023

STATE OF TEXAS
TONYA L. KOLLER
133943
LICENSED PROFESSIONAL ENGINEER
7-14-23

prepared by

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Austin, Texas 78759 Austin, Texas
Texas Firm Registration No. F-845

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TCEQ Regional Office approves otherwise, based on the extent of the damage requiring more time to repair, or the repairs are delayed because of weather conditions. An eroded area is considered to be deep enough to jeopardize the final or intermediate cover if it exceeds four inches in depth as measured from the vertical plane from the erosion feature and the 90-degree intersection of this plane with the horizontal slope face or surface. The date of detection of erosion and date of completion of repairs, including reasons for any delays, must be documented in the Cover Application Log (refer to Section 7.18.6). Such periodic inspections and restorations are required during the entire operational life and for the post closure maintenance period. Refer to Section 7.23 of this SOP for a Site Inspection and Maintenance List during the operational life of the site and refer to Attachment III-11 for inspection procedures during the post-closure maintenance period.

Final cover placement over completed portions of the site will consist of the following steps:

- Survey controls will be implemented to control the filling of solid waste to the bottom level of the final cover system.
- A surveyed grid system on 100-foot centers will be established, or other suitable surveying or plans will be used to control placement of the final cover.
- When the appropriate design landfill height of the proposed final cover is reached, the top of the landfill will be regraded and reshaped as needed.
- During the first growing season following application of the final cover system, the site will be vegetated with appropriate grasses to minimize erosion.
- The surface water protection system will be constructed as indicated in Attachment III-2 – Groundwater and Surface Water Protection and Drainage Plan.
- The final cover system layers will be constructed. Testing of the various components of the final cover system will be performed in accordance with Attachment III-9 – Final Closure Plan.
- A final cover certification report complete with an as-built survey will be prepared by an independent licensed professional engineer and submitted to the TCEQ for approval.
- The TCEQ-approved final cover certification report will be maintained in the Site Operating Record and the final cover construction log (see Section 7.18.6) will be updated to reflect the area where final cover has been placed, the date final cover was constructed, and the thickness applied that date. The TCEQ Regional Office will also be notified that final cover placement has occurred at the site.

The final cover system, including the erosion control structures (drainage swales and chutes) will be maintained during and after construction. During the active life of the site, the Landfill Manager or their designee will inspect the final cover system on a weekly basis. In addition, during the active life of the landfill, inspections of the final cover will occur within 72 hours of a rainfall event of 0.5 inches or more (i.e., 0.5 inches during a 24-hour period). Post Closure care inspection procedures are outlined in Attachment III-11 – Post Closure Plan.

7.18.6 Cover Application Log

Throughout the landfill operation, a Cover Application Log will be maintained by the Landfill Manager, or their designee, and be readily available for inspection in accordance with §330.165(h). For intermediate cover and daily cover, the log will specify the date cover (no exposed waste) was accomplished, the area covered (by use of the grid system), how it was placed, when it was completed, and the last area covered. For final cover, the log will show the final cover area, specify the area covered, the date cover was applied, the thickness applied that date, and reference the final cover certification report for each area. The signature of the Landfill Manager, or other on-site supervisor, will certify each entry that the work was accomplished as stated in the log. Repairs will be documented in the log. The date of detection of erosion, or other repair issue, date of completion of repair (including reasons for any delays) will be included to document the report. In addition, both the volume of the earthen material required to be maintained within 1,000 feet of each working face and the volume of earthen material to cover the working face with at least one day application of six inches of daily cover will be recorded each day on the Cover Application Log.

7.19 Prevention of Ponded Water [30 TAC §330.167]

Site grading and maintenance will prevent the ponding of water over areas containing waste. Should ponding occur, the water will be removed as soon as practicable from areas not designated as stormwater collection areas in Attachment III-1 – Drawings III.A1.7 and III.A1.8. Records of ponding preventive and corrective activities will be kept in the Site Operating Record. The depressions will be filled and regraded as quickly as possible, but no later than seven days from the end of the rainfall event (i.e., the end of the rainfall event is equivalent to the term “occurrence” as defined by 30 TAC §330.167). If the ponded water has come into contact with waste, leachate, or contaminated soils, it will be treated as contaminated water and handled in accordance with Attachment III-3 – Leachate and Contaminated Water Plan. Contaminated water will be removed via a vacuum truck and transported to an off-site permitted treatment facility (refer to Section 3.0 of Attachment III-3 – Leachate and Contaminated Water Plan).

The site will be inspected weekly to verify that no unauthorized ponded water areas exist. Ponded water that is not contaminated in areas not over waste, such as in excavations, and detention ponds or basins (this does not include approved lined areas; ponded water on approved liners is prohibited), is not prohibited so long as ponding in other areas does not cause or contribute to nuisance conditions. Ponding in these areas will be monitored to prevent nuisance odors. In addition, excavations will be pumped out as necessary to maintain the area as accessible to earth-moving equipment. Detention ponds and basins will be maintained to perform as designed. Uncontaminated water contained in basins or excavations may be used for dust control.

7.20 Disposal of Special Wastes [30 TAC §330.171]

The facility may only accept special wastes that are specifically addressed in the SOP (wastes under 330.173(c) and (d)), or which acceptance will be authorized by the permittee following an approved Special Waste Acceptance Plan (SWAP). An application for an approved SWAP is provided in Appendix IV-B. Once approved, the SWAP will be maintained in the Site Operating Record. As specified in 30 TAC §330.171(b)(2), requests for approval to accept certain types of special wastes (not specifically identified in 30 TAC §330.171(c) or (d) or in 30 TAC §330.173) shall be submitted to the TCEQ or to the facility with an approved plan and shall include the following:

- A complete description of the chemical and physical characteristics of each waste, a statement as to whether or not each waste is a Class 1 industrial waste as defined in 30 TAC §330.3, and the quantity and rate at which each waste is produced and/or the expected frequency of disposal.
- A hazardous waste determination as required by 30 TAC §335.6(c) for all Class I industrial waste.
- If special handling instructions are required, they will be provided as part of the pre-approval process; including, the proposed procedures for handling waste and listing required protective equipment for operating personnel and onsite emergency equipment.
- Procedures and responsibilities for containment and cleanup of any accidental spills occurring during the delivery and/or disposal operation will be conducted.
- When special wastes are to be disposed of at the City of Victoria Landfill, a complete transporter and generator profile will be required prior to acceptance of the special wastes. This profile includes:
    - A written declaration by the generator that the waste stream is non-hazardous waste.
    - A written declaration by the generator that the waste is not Class I Nonhazardous Industrial Solid Waste.
    - An estimate of the anticipated quantity, rate, and frequency of disposal for each special waste.

Approval by the TCEQ will not obligate the facility to accept the waste. The above-listed information will be maintained in the Site Operating Record.

7.23 Site Inspection and Maintenance List

Table 7-5: Site Inspection and Maintenance Requirements During Active Disposal Operations

Item	Task	Frequency	Inspector	Inspection Documentation
Fence/Gates	Inspect perimeter fence and gates for damage. Make repairs if necessary.	Weekly	Landfill Manager or Designee	Document inspection in the Site Operating Record. Notification to Regional Office of a breach (if any).
Wind Blown Waste	Police working fence area, wind fences, access roads, entrance area, and perimeter fence for loose trash. Clean up as necessary	Daily as specified in Section 7.5.	Landfill Manager or Designee	Document inspection in the Site Operating Record
Waste Spilled on Route to Site	Police the entrance areas and all roads at least two miles from the site entrances for loose trash. Clean up as necessary.	Daily as specified in Section 7.8.	Landfill Manager or Designee	Document inspection in the Site Operating Record
Landfill Markers	Inspect all landfill markers for damage, color-coding, and general location. Correct or replace damaged markers within 15 days of discovery.	Monthly	Landfill Manager or Designee	Document inspection in the Site Operating Record
Site Access Road	Inspect site access road for damage from vehicle traffic, erosion, or excessive mud accumulation. Maintain as needed with crushed rock or stone. Grading equipment will be used at least once per week to control or remove mud accumulations on roads as well as minimize depressions, ruts, and potholes.	Daily or more often during wet weather or extended dry weather periods.	Landfill Manager or Designee	Document inspection and repairs in the Site Operating Record
Daily Cover	Inspect for proper placement, thickness, and compaction. Correct problems as needed. Verify that vectors are not an issue	Daily at the active face. All daily cover areas will be inspected within 72-hours of a rainfall event of 0.5 inches or more.	Landfill Manager or Designee	Document inspection in the Site Operating Record
Intermediate Cover	Inspect for proper placement, thickness, erosion, compaction and for presence of waste or other contamination. Correct problems as needed.	Weekly and within 72-hours of a rainfall event of 0.5 inches or more.	Landfill Manager or Designee	Document inspection in the Site Operating Record

Item	Task	Frequency	Inspector	Inspection Documentation
Final Cover	Inspect for proper placement, thickness, compaction, slope, settlement, and erosion. Maintenance will be ongoing throughout post-closure care period in accordance with Attachment III-11. Correct problems as needed.	Weekly and within 72-hours of a rainfall event of 0.5 inches or more.	Landfill Manager or Designee	Document inspection in the Site Operating Record
Leachate	Measure depth of leachate in sump, as required.	Weekly	Landfill Manager or Designee	Document inspection in the Site Operating Record
Site Signs	Inspect all site signs for damage, general location, and accuracy of posted information.	Weekly	Landfill Manager or Designee	Document inspection in the Site Operating Record
Ponded Water	Inspect site for unauthorized ponded water areas as described in Section 7.19. Correct problems as needed.	Weekly and within 72-hours of a rainfall event of 0.5 inches or more.	Landfill Manager or Designee	Document inspection in the Site Operating Record
Odor	Inspect the perimeter of the site to access the performance of site operations to control odor.	Daily	Landfill Manager or Designee	Document in the Site Operating Record.
Perimeter Channels	Inspect perimeter channels to verify that they are functioning as designed (e.g., excess sediment removed, outlet structures intact, erosion control measures intact)	Weekly and within 72-hours of a rainfall event of 0.5 inches or more.	Landfill Manager or Designee	Document in the Site Operating Record.
Surface Drainage Systems	Inspect ponds and basins, perimeter ditches, swales, and berms to verify they are functioning as designed (e.g., excess sediment removed, outlet structures intact, erosion control measure intact)	Weekly and within 72-hours of a rainfall event of 0.5 inches or more	Environmental Manager or Designee	Document inspection in the Site Operating Record
GCCS	Verify GCCS is operating and maintained in accordance with all applicable requirements.	Monthly	Environmental Manager or Designee	Document in the Site Operating Record

Note: Site inspection and maintenance requirements during post-closure care are identified in Attachment III-11, Post-Closure Plan.