

NOTICE TO BIDDERS

NOTICE IS HEREBY GIVEN THAT SEALED BIDS WILL BE RECEIVED BY THE TANGIPAHOA PARISH GOVERNMENT UNTIL **MONDAY, JUNE 28, 2021, AT 10:00 A.M.** IN THE TPC CHAMBERS, COURTHOUSE ANNEX, 206 E. MULBERRY STREET, AMITE, LOUISIANA ON THE FOLLOWING:

**INSTALLATION OF ALTERNATE SYNTHETIC COVER
AT LANDFILL CELL 12
TANGIPAHOA PARISH REGIONAL SOLID WASTE FACILITY**

THEN AND THERE BIDS WILL BE OPENED AND READ ALOUD. BIDS RECEIVED AFTER THE SPECIFIED TIME AND DATE WILL NOT BE OPENED OR RECOGNIZED.

A MANDATORY PRE-BID CONFERENCE FOR THIS PROJECT WILL BE HELD ON **WEDNESDAY, JUNE 16, 2021 AT 10:00 A.M.** IN THE TANGIPAHOA PARISH GOVERNMENT ANNEX OFFICE, 206 E. MULBERRY STREET, AMITE, LOUISIANA.

TANGIPAHOA PARISH GOVERNMENT BID DOCUMENTS ARE POSTED ON www.centralbidding.com

THE TANGIPAHOA PARISH GOVERNMENT RESERVES THE RIGHT TO REJECT BIDS IN ACCORDANCE WITH THE LAW.

S/DONNA DOMIANO
PURCHASING AGENT

DAILY STAR
PLEASE PUBLISH JUNE 1, 8 & 15, 2021

TANGIPAHOA PARISH GOVERNMENT
Office of Environmental Services



Request for Bids

Tangipahoa Parish Regional Solid Waste Facility

INSTALLATION OF ALTERNATE SYNTHETIC FINAL COVER AT
LANDFILL CELL 12

Questions or comments please contact:



Ricardo Abreu
05/14/2021

Dr. Ricardo de Abreu, P.E.
Fourrier & de Abreu Engineers, LLC
225-677-7950
ricardo@fdaengineers.com

Jeff McKneely
Assistant Finance Director
Tangipahoa Parish Government
985-748-3211

MAY 14, 2021

TANGIPAHOA REGIONAL SOLID WASTE FACILITY
INSTALLATION OF ALTERNATE SYNTHETIC FINAL COVER AT LANDFILL CELL 12

TABLE OF CONTENTS

- Project Requirements and Instructions to Bidders

Attachments

- Attachment A – Project Description
- Attachment B – Bid Proposal Forms
 - Louisiana Uniform Public Work Bid Form
 - Unit Price Form
 - Bid Bond
 - Affidavit
 - Attestation Clause Required by LA. R.S.38:2227
- Attachment C – Technical Specifications
 - Green Textured High-Density Polyethylene (HDPE) Geomembrane
 - Percussive Driven Earth Anchors (Geomembrane Anchors)
- Attachment D – Landfill’s Construction Quality Assurance (CQA) Plan
- Attachment E – Drawings
 - General Construction Drawings and Details

TANGIPAHOA PARISH REGIONAL SOLID WASTE FACILITY
INSTALLATION OF ALTERNATE SYNTHETIC FINAL COVER AT LANDFILL CELL 12

PROJECT REQUIREMENTS AND INSTRUCTIONS TO BIDDERS

The Tangipahoa Parish Government (herein called the "Owner") will be accepting sealed bids from contractors to install an alternate synthetic final cover and other materials as part of the final closure of the landfill Cell 12 at the Tangipahoa Parish Regional Solid Waste Facility, located in Independence, Louisiana. Drawings, specifications, and additional requirements for installation are attached.

The alternative synthetic final cover to be utilized in this project shall be a green textured 60-mil HDPE geomembrane secured on the ground through the use of percussive driven earth anchors. Contractor shall provide materials and installation for this project, including, but not limited to, the 60-mil HDPE geomembrane and earth anchors.

Mandatory Pre-Bid Conference

A mandatory pre-bid conference will be held in the Tangipahoa Parish Government Annex Building on the advertised date. All questions regarding this project shall be directed to the Tangipahoa Parish Government officers and their consulting engineers during the mandatory pre-bid conference.

Bid Preparation and Delivery

All bids must be made on the required bid proposal forms (**Attachment B**). All blank spaces for individual bid prices and total bid price must be filled in, in ink or typewritten, and the bid proposal forms must be fully completed and executed when submitted. Quantities cannot be altered in the bid proposal forms. Only one copy of the bid proposal forms is required.

When purchasing materials for this project, the Contractor will be authorized to act as an authorized purchasing agent of the Parish and qualify for the respective tax exemptions. Therefore, sales taxes should not be included in the bid prices.

Each bid must be accompanied by a bid bond payable to the Owner for 5% of the total amount of the bid.

Each bid must be delivered in a sealed envelope. Each sealed envelope containing a bid must be plainly marked on the outside as "INSTALLATION OF ALTERNATE SYNTHETIC FINAL COVER AT LANDFILL CELL 12" and the envelope should bear on the outside the bidder's name, address, and Louisiana Contractor License Number. To bid and perform work covered by these documents, the Contractor must be licensed under Classification III-Heavy Construction, or Classification IV-Municipal and Public Works Construction, or under the Specialty Classification, Resilient Chemical Liners.

Sealed bids shall be received by the Tangipahoa Parish Government at the Courthouse Annex, 206 E. Mulberry Street, Amite, Louisiana (mailing address: P.O. Box 215; Amite, Louisiana 70422), until the advertised time and date of the bid opening.

The Owner may waive any informalities or minor defects or reject any and all bids, in accordance with the Law. Any bid may be withdrawn prior to the above scheduled time for the opening of bids or authorized postponement thereof. Any bid received after the time and date specified or in a form other than that described above shall not be considered. No bidder may withdraw a bid within 45 days after the actual date of the opening thereof.

The Owner may make investigations as deemed necessary to determine the ability of the bidder to perform the work, and the bidder shall furnish to the Owner all such information and data for this purpose as the Owner may request. The Owner reserves the right to reject any bid if the evidence submitted by, or investigation of, such bidder fails to satisfy the Owner that such bidder is properly qualified to carry out the obligations of the Agreement and to complete the work contemplated therein. A conditional or qualified bid will not be accepted.

Upon award of the project and upon request by the Owner, Contractor shall submit detailed specification datasheets and information for all materials to be installed for the project. Before delivery of materials to the site, Contractor shall provide to Owner all written documentation regarding the Manufacturer's Quality Control/Quality Assurance for the properties and frequencies shown in the **Attachment C** (Technical Specifications).

Bidder Qualifications

In determining the ability of the bidder of performing the work for this project, the following items may be verified prior of awarding the Contract:

1. Bidder's experience in the installation of the same types of geosynthetics utilized in this project.
2. If manufacturer(s) of geosynthetic materials have a certification or accreditation program, or a similar program, Bidder's certification or accreditation to install the geosynthetic materials by the manufacturer(s) of the materials.
3. Bidder's performance in projects with similar or greater complexity to the project.
4. Experience of Bidder's Geosynthetics Installation Supervisor in projects similar or with greater complexity and size to this project.
5. Bidder's professional references.
6. Additional qualifications depending on the specific product. Please refer to the Technical Specifications section.

Warranty Requirement

Owner will require that at the end of the project, the Contractor submit a letter certifying that installation of the product was performed in accordance with manufacturer's or supplier's Quality Assurance/Quality Control standards. Final acceptance by the Owner will only be acknowledged after receipt of this certifying letter.

Manufacturer or supplier of the alternate synthetic final cover shall guarantee the materials against defects in materials and workmanship for a period equal or greater than 30 years commencing with the date of final acceptance. Costs of manufacturer's or supplier's warranty for the synthetic final cover shall be included in the bidder's price. Freight costs should also be included in the bid price.

Other materials not supplied by the Owner shall have a warranty against defects in materials and workmanship for a period equal or greater than one year after final acceptance.

Additional Conditions

All applicable laws, ordinances, rules, and regulations, including applicable Federal, State and Local Laws, shall apply to the bid process and contract throughout.

Bidders must fully acquaint themselves with the work by examination of the site and review of the drawings and technical specifications, including all addenda. Bidders are responsible for verifying the quantities presented in the Bid Form and notifying the Engineer and Owner of any variances or discrepancies prior to bidding. After bids have been submitted, the bidder shall not assert that there was a misunderstanding concerning the quantities of work or of the nature of the work to be done.

The drawings and technical specifications contain the provisions required for the construction of the project. Information obtained from an officer, agent, or employee of the Owner or any other person shall not affect the risks or obligations assumed by the Contractor or relieve the Contractor from fulfilling any of the conditions of the contract.

Prospective bidders can inspect the site individually by contacting Mr. Donnie Colona, Field Landfill Director for the Tangipahoa Parish Regional Solid Waste Facility, at (985) 878-4403.

Award and Notice to Proceed

Award, if made, will be to the lowest responsive and responsible bidder within the available funds for the project. All applicable laws, ordinances, and rules and regulations of all authorities having jurisdiction over construction of the project shall apply to the bid process and contract throughout.

The Notice to Proceed for materials purchase will be issued within thirty (30) days of the execution of the Agreement by the Owner. Should there be reasons why the Notice to Proceed for Materials cannot be issued within such period, the time may be extended by mutual agreement between the Owner and Contractor. If the Notice to Proceed for Materials has not been issued within the thirty (30) day period or within the period mutually agreed upon, the Contractor may terminate the Agreement without further liability on the part of either party.

A performance bond and payment bond in the value of 50% of the contract price will be required upon awarding of the contract. The performance bond shall be issued by a

corporation duly authorized as a surety company to transact business in the State of Louisiana.

Time for Completion and Liquidated Damages

Time is of the essence. Contractor shall deliver the materials within 60 days after signature of the agreement between Owner and Contractor and the Notice to Proceed for Materials is issued to the Contractor. Contractor agrees to commence work for this project within fifteen (15) calendar days after receipt of the Notice to Proceed for Installation and to fully complete the work within 90 calendar days, excluding weather delays, after the Notice to Proceed is issued.

Liquidated damages will be assessed to the contractor at a rate of \$1,000/day in case the contractor does not complete the project in accordance with the project's specifications or to the Owner's satisfaction.

Acceptance of Work and Clear Lien Certificate

Upon satisfactory completion of the work and compliance by the Contractor with all terms of this contract, the Contractor shall notify the Owner of this completion and request that a final inspection of the work be conducted. Provided the work has been completed to the satisfaction of the Owner, within ten days from the date of inspection, a letter of acceptance of the work will be issued to the Contractor by the Owner. It shall be the responsibility of the Contractor to record the aforementioned letter of acceptance at the office of the Clerk of Court, Tangipahoa Parish, Louisiana, and submit a recorded copy to the Owner.

At the end of forty-five (45) calendar days from the date of recording of the letter of acceptance, it shall also be the responsibility of the Contractor to deliver to the Owner a "no lien certificate" secured from a person in the office of the Clerk of Court, Tangipahoa Parish, authorized to issue such a certificate. This "no lien certificate" shall certify that there are no liens or claims recorded at the Tangipahoa Parish Courthouse which would affect this contract.

After the deliverance of the "no lien certificate" as described above, the Owner shall prepare or cause to be prepared a final estimate of the final amount due to the Contractor on this contract. The final estimate will be prepared on the month immediately succeeding the month in which the "no lien certificate" is issued.

All prior estimates and payments shall be subject to correction in the final estimate and payment. Until the "no lien certificate" is delivered as described above, the Owner may withhold at least the amount of any lienable claims against the Contractor, pending the result of any legal actions against the Contractor.

Work Extension

Owner may decide to extend the area to be covered with alternate synthetic final cover beyond the limits shown in the drawings (**Attachment E**). If Contractor and Owner mutually agree to this extension or modification of the work area, payment will be performed based on the unit prices stated by the Contractor on the "Unit Price Form".

Attachments

Attachment A – Project Description

Attachment B – Bid Proposal Forms

Attachment C – Technical Specifications

Attachment D – Landfill's Construction Quality Assurance (CQA) Plan

Attachment E – Drawings

Attachment A
Project Description

TANGIPAHOA PARISH REGIONAL SOLID WASTE FACILITY
INSTALLATION OF ALTERNATE SYNTHETIC FINAL COVER AT LANDFILL CELL 12

PROJECT DESCRIPTION

1. INTRODUCTION

This document presents the description of the activities to be developed for installation of geosynthetics as part of the final cover activities for Cell 12 at the Tangipahoa Parish Regional Solid Waste Facility. Cell 12 is a Subtitle D cell located, respectively, at the North side of the previous landfilling area. This cell was a “piggyback” expansion of the landfill (i.e., a lateral and vertical expansion). Drawing No. **FDAE-1** shows the location of Cell 12 that is part of the scope for this project.

At this time, the Owner is performing the regularization of the areas where the alternate final cover will be installed and repairing the existing elements of stormwater drainage (earth diversion and perimeter berms, and excavation of let-downs). Therefore, regularization of the installation area and performance of earthwork activities for stormwater drainage are not part of this Contract.

The installation project consists of supplying and installing the following materials in accordance with the attached drawings and technical specifications:

- Green Textured 60-mil HDPE Geomembrane;
- Percussive Driven Earth Anchors;
- HDPE boots for gas system component interferences;
- Boots for existing concrete headwalls;
- Gas pressure relief valves; and
- Additional materials necessary for the adequate installation, and in accordance with the drawings and technical specifications.

Details of those materials are presented on the attached drawings and specifications.

In the execution of this project, the Contractor shall have all equipment in good condition. Any leakage (e.g., oil, fuel, grease, coolant, etc) must be removed by the Contractor to the satisfaction of the Owner or Engineer.

The description of the necessary activities for the installation of geosynthetics at Cell 12 is presented in the following paragraphs.

2. ALTERNATE SYNTHETIC FINAL COVER

The final cover configuration will consist of a 60-mil HDPE geomembrane over at least 12 inches of consolidated soil material (clay). Owner is responsible for execution, regularization, and maintenance of the 12-in thick consolidated clay layer and for all earthwork. The final configuration of the cover area is presented on Drawings Nos. **FDAE-2** and **FDAE-3**.

The geomembrane shall be secured with the use of Percussive Driven Earth Anchors with typical spacing as shown on Detail 10 of Drawing No. **FDAE-7**. Typical spacing of the anchors can vary between 11 and 15 ft depending on the location (top of the landfill, upper third of the slope, middle third of slope, or bottom third of the slope) and also on the underground interferences (mainly landfill gas pipes).

Owner will be responsible for excavating and covering the anchor trenches at the locations indicated on Drawing No. **FDAE-2**. Anchor trenches are designed to be placed on top, bottom and sides of the area where the synthetic final cover will be installed. If waste is found during excavation of anchor trenches, Owner will be responsible for collection, transportation, and disposal at the landfill's active cell. Owner will also be responsible for marking the utilities (force mains, underground landfill gas pipes, and electrical conduits).

Contractor will be responsible for any damages to the existing gas well heads, sumps, risers, or utilities, during the installation of geosynthetics, infills, or/and gas system. Such damages shall be repaired at the Contractor's expense.

Penetrations boots shall be provided and installed by the Contractor for interferences located inside the area that will receive the synthetic final cover. Those interferences are mainly existing gas wells, leachate risers/headwalls, valves, and sumps. r.

3. STORMWATER DRAINAGE SYSTEM AND LET-DOWNS

Elements of stormwater drainage for Cell 12 will consist of let-downs, diversion berms and perimeter berms. Drawing No. **FDAE-3** shows the Stormwater Drainage Plan for Cell 12. Owner will be responsible for excavation and maintenance of let-downs and for construction and maintenance of diversion and perimeter berms. Contractor will be responsible for installing geosynthetics as shown on Drawings Nos. **FDAE-2, FDAE-3, FDAE-6, FDAE-7** and **FDAE-8**, and also in accordance with the Technical Specifications.

Owner will be responsible for excavating and covering the anchor trenches used for installation of the synthetic let downs.

4. CONNECTIONS FOR GAS COLLECTION AND CONTROL SYSTEM

Contractor shall supply, assemble, and install gas pressure relief valves. Location of the installation of the valves will be provided by the Owner prior to installation.

Attachment B
Bid Proposal Forms

LOUISIANA UNIFORM PUBLIC WORK BID FORM

TO: Tangipahoa Parish Government
206 E. Mulberry Street
Amite, LA 70422

BID FOR: Tangipahoa Parish Regional Solid Waste Facility
Installation of Alternate Synthetic Final Cover at
Landfill Cell 12

The undersigned bidder hereby declares and represents that she/he; a) has carefully examined and understands the Bidding Documents, b) has not received, relied on, or based his bid on any verbal instructions contrary to the Bidding Documents or any addenda, c) has personally inspected and is familiar with the project site, and hereby proposes to provide all labor, materials, tools, appliances and facilities as required to perform, in a workmanlike manner, all work and services for the construction and completion of the referenced project, all in strict accordance with the Bidding Documents prepared by: Fourrier & de Abreu Engineers, LLC and dated: May 14, 2021

Bidders must acknowledge all addenda. The Bidder acknowledges receipt of the following **ADDENDA:** (Enter the number the Designer has assigned to each of the addenda that the Bidder is acknowledging) _____.

TOTAL BASE BID: For all work required by the Bidding Documents (including any and all unit prices designated "Base Bid" * but not alternates) the sum of:

_____ Dollars (\$ _____)

ALTERNATES: For any and all work required by the Bidding Documents for Alternates including any and all unit prices designated as alternates in the unit price description.

Alternate No. 1 – (Owner to provide description of alternate and state whether add or deduct) for the lump sum of:

N/A _____ Dollars (\$ _____)

Alternate No. 2 (Owner to provide description of alternate and state whether add or deduct) for the lump sum of:

N/A _____ Dollars (\$ _____)

Alternate No. 3 (Owner to provide description of alternate and state whether add or deduct) for the lump sum of:

N/A _____ Dollars (\$ _____)

NAME OF BIDDER: _____

ADDRESS OF BIDDER: _____

LOUISIANA CONTRACTOR'S LICENSE NUMBER: _____

NAME OF AUTHORIZED SIGNATORY OF BIDDER: _____

TITLE OF AUTHORIZED SIGNATORY OF BIDDER: _____

SIGNATURE OF AUTHORIZED SIGNATORY OF BIDDER **: _____

DATE: _____

THE FOLLOWING ITEMS ARE TO BE INCLUDED WITH THE SUBMISSION OF THIS LOUISIANA UNIFORM PUBLIC WORK BID FORM:

* The Unit Price Form shall be used if the contract includes unit prices. Otherwise it is not required and need not be included with the form. The number of unit prices that may be included is not limited and additional sheets may be included if needed.

** **A CORPORATE RESOLUTION OR WRITTEN EVIDENCE** of the authority of the person signing the bid for the public work as prescribed by LA R.S. 38:2212(B)(5).

BID SECURITY in the form of a bid bond, certified check or cashier's check as prescribed by LA R.S. 38:2218(A) attached to and made a part of this bid.

LOUISIANA UNIFORM PUBLIC WORK BID FORM

UNIT PRICE FORM

TO: Tangipahoa Parish Government
 206 E. Mulberry Street
 Amite, LA 70422

BID FOR: Tangipahoa Parish Regional Solid Waste Facility
 Installation of Alternate Synthetic Final Cover at
 Landfill Cell 12

1/3

UNIT PRICES: This form shall be used for any and all work required by the Bidding Documents and described as unit prices. Amounts shall be stated in figures and only in figures.

DESCRIPTION:	<input checked="" type="checkbox"/> Base Bid or <input type="checkbox"/> Alt.#	Mobilization/Demobilization – Cell 12	UNIT PRICE	UNIT PRICE EXTENSION (Quantity times Unit Price)
REF. NO.	QUANTITY:	UNIT OF MEASURE:		
1	1	Lump Sum		
DESCRIPTION:	<input checked="" type="checkbox"/> Base Bid or <input type="checkbox"/> Alt.#	Green Textured 60-mil HDPE geomembrane (Materials)		
REF. NO.	QUANTITY:	UNIT OF MEASURE:	UNIT PRICE	UNIT PRICE EXTENSION (Quantity times Unit Price)
2	1,095,000*	sq. ft.		
DESCRIPTION:	<input checked="" type="checkbox"/> Base Bid or <input type="checkbox"/> Alt.#	Green Textured 60-mil HDPE geomembrane (Installation)		
REF. NO.	QUANTITY:	UNIT OF MEASURE:	UNIT PRICE	UNIT PRICE EXTENSION (Quantity times Unit Price)
3	1,095,000*	sq. ft.		
DESCRIPTION:	<input checked="" type="checkbox"/> Base Bid or <input type="checkbox"/> Alt.#	Percussive Driven Earth Anchors – Geomembrane Anchors (Materials)		
REF. NO.	QUANTITY:	UNIT OF MEASURE:	UNIT PRICE	UNIT PRICE EXTENSION (Quantity times Unit Price)
4	5,573	units		
DESCRIPTION:	<input checked="" type="checkbox"/> Base Bid or <input type="checkbox"/> Alt.#	Percussive Driven Earth Anchors – Geomembrane Anchors (Installation)		
REF. NO.	QUANTITY:	UNIT OF MEASURE:	UNIT PRICE	UNIT PRICE EXTENSION (Quantity times Unit Price)
5	5,573	units		
DESCRIPTION:	<input checked="" type="checkbox"/> Base Bid or <input type="checkbox"/> Alt.#	Patching of Anchors through Extrusion Welding (Materials and Installation)		
REF. NO.	QUANTITY:	UNIT OF MEASURE:	UNIT PRICE	UNIT PRICE EXTENSION (Quantity times Unit Price)
6	5,573	units		
DESCRIPTION:	<input checked="" type="checkbox"/> Base Bid or <input type="checkbox"/> Alt.#	HDPE Boot for Existing Interferences/Gas System Wells and Risers – 0.25-inch diam. (Materials and Installation)		
REF. NO.	QUANTITY:	UNIT OF MEASURE:	UNIT PRICE	UNIT PRICE EXTENSION (Quantity times Unit Price)
7	12	units		

Wording for “DESCRIPTION” is to be provided by the Owner.

All quantities are estimated. The contractor will be paid based upon actual quantities as verified by the Owner.

* Quantity for Refs. No. 2 and 3 includes material and installation in anchor trenches, diversion berms, and let-downs including areas outside of the area to be capped. Total quantity measured as 3D-area (not plan-view).

LOUISIANA UNIFORM PUBLIC WORK BID FORM

UNIT PRICE FORM

TO: Tangipahoa Parish Government
 206 E. Mulberry Street
 Amite, LA 70422

BID FOR: Tangipahoa Parish Regional Solid Waste Facility
 Installation of Alternate Synthetic Final Cover at
 Landfill Cell 12

2/3

UNIT PRICES: This form shall be used for any and all work required by the Bidding Documents and described as unit prices. Amounts shall be stated in figures and only in figures.

DESCRIPTION:	<input checked="" type="checkbox"/> Base Bid or <input type="checkbox"/> Alt.#	HDPE Boot for Existing Interferences/Gas System Wells and Risers – 2-inch diam. (Materials and Installation)	UNIT PRICE	UNIT PRICE EXTENSION (Quantity times Unit Price)
REF. NO.	QUANTITY:	UNIT OF MEASURE:		
8	29	units		
DESCRIPTION:	<input checked="" type="checkbox"/> Base Bid or <input type="checkbox"/> Alt.#	HDPE Boot for Existing Interferences/Gas System Wells and Risers – 3-inch diam. (Materials and Installation)	UNIT PRICE	UNIT PRICE EXTENSION (Quantity times Unit Price)
REF. NO.	QUANTITY:	UNIT OF MEASURE:		
9	75	units		
DESCRIPTION:	<input checked="" type="checkbox"/> Base Bid or <input type="checkbox"/> Alt.#	HDPE Boot for Existing Interferences/Gas System Wells and Risers – 6-inch diam. (Materials and Installation)	UNIT PRICE	UNIT PRICE EXTENSION (Quantity times Unit Price)
REF. NO.	QUANTITY:	UNIT OF MEASURE:		
10	55	units		
DESCRIPTION:	<input checked="" type="checkbox"/> Base Bid or <input type="checkbox"/> Alt.#	HDPE Boot for Existing Interferences/Gas System Wells and Risers – 8-inch diam. (Materials and Installation)	UNIT PRICE	UNIT PRICE EXTENSION (Quantity times Unit Price)
REF. NO.	QUANTITY:	UNIT OF MEASURE:		
11	25	units		
DESCRIPTION:	<input checked="" type="checkbox"/> Base Bid or <input type="checkbox"/> Alt.#	HDPE Boot for Existing Interferences/Gas System Wells and Risers – 10-inch diam. (Materials and Installation)	UNIT PRICE	UNIT PRICE EXTENSION (Quantity times Unit Price)
REF. NO.	QUANTITY:	UNIT OF MEASURE:		
12	20	units		
DESCRIPTION:	<input checked="" type="checkbox"/> Base Bid or <input type="checkbox"/> Alt.#	HDPE Boot for Existing Interferences/Condensate Sumps – 18-inch diam. (Materials and Installation)	UNIT PRICE	UNIT PRICE EXTENSION (Quantity times Unit Price)
REF. NO.	QUANTITY:	UNIT OF MEASURE:		
13	4	units		
DESCRIPTION:	<input checked="" type="checkbox"/> Base Bid or <input type="checkbox"/> Alt.#	HDPE Boot for Existing Interferences/Isolation Valves – 2-inch diam w/ 2"x4" plate (Materials and Installation)	UNIT PRICE	UNIT PRICE EXTENSION (Quantity times Unit Price)
REF. NO.	QUANTITY:	UNIT OF MEASURE:		
14	12	units		
DESCRIPTION:	<input checked="" type="checkbox"/> Base Bid or <input type="checkbox"/> Alt.#	Concrete Headwall Boots as per Drawing FDAE-8 (Materials and Installation)	UNIT PRICE	UNIT PRICE EXTENSION (Quantity times Unit Price)
REF. NO.	QUANTITY:	UNIT OF MEASURE:		
15	12	units		

Working for "DESCRIPTION" is to be provided by the Owner.
 All quantities are estimated. The contractor will be paid based upon actual quantities as verified by the Owner.

LOUISIANA UNIFORM PUBLIC WORK BID FORM
UNIT PRICE FORM

TO: Tangipahoa Parish Government
 206 E. Mulberry Street
 Amite, LA 70422

BID FOR: Tangipahoa Parish Regional Solid Waste Facility
 Installation of Alternate Synthetic Final Cover at
 Landfill Cell 12

3/3

UNIT PRICES: This form shall be used for any and all work required by the Bidding Documents and described as unit prices. Amounts shall be stated in figures and only in figures.

DESCRIPTION:	<input checked="" type="checkbox"/> Base Bid or <input type="checkbox"/> Alt.#	Gas Pressure Relief Valves (Materials and Installation)	UNIT PRICE EXTENSION (Quantity times Unit Price)
REF. NO.	QUANTITY:	UNIT OF MEASURE:	UNIT PRICE
16	16	units	

Wording for "DESCRIPTION" is to be provided by the Owner.
All quantities are estimated. The contractor will be paid based upon actual quantities as verified by the Owner.

BID BOND

Date: _____

KNOW ALL MEN BY THESE PRESENTS:

That _____ of _____, as Principal, and _____, as Surety, are held and firmly bound unto the Tangipahoa Parish Government (Obligee), in the full and just sum of five (5%) percent of the total amount of this proposal, including all alternates, lawful money of the United States, for payment of which sum, well and truly be made, we bind ourselves, our heirs, executors, administrators, successors and assigns, jointly and severally firmly by these presents.

Surety represents that it is listed on the current U. S. Department of the Treasury Financial Management Service list of approved bonding companies as approved for an amount equal to or greater that the amount for which it obligates itself in this instrument or that it is a Louisiana domiciled insurance company with at least an A - rating in the latest printing of the A. M. Best's Key Rating Guide. If surety qualifies by virtue of its Best's listing, the Bond amount may not exceed ten percent of policyholders' surplus as shown in the latest A. M. Best's Key Rating Guide.

Surety further represents that it is licensed to do business in the State of Louisiana and that this Bond is signed by surety's agent or attorney-in-fact. This Bid Bond is accompanied by appropriate power of attorney.

THE CONDITION OF THIS OBLIGATION IS SUCH that, whereas said Principal is herewith submitting its proposal to the Obligee on a Contract for:

Tangipahoa Parish Regional Solid Waste Facility - Installation of Alternate Synthetic Final Cover at Landfill Cell 12

NOW, THEREFORE, if the said Contract be awarded to the Principal and the Principal shall, within such time as may be specified, enter into the Contract in writing and give a good and sufficient bond to secure the performance of the terms and conditions of the Contract with surety acceptable to the Obligee, then this obligation shall be void; otherwise this obligation shall become due and payable.

PRINCIPAL (BIDDER)

SURETY

BY: _____
AUTHORIZED OFFICER-OWNER-PARTNER

BY: _____
AGENT OR ATTORNEY-IN-FACT(SEAL)

AFFIDAVIT

STATE OF LOUISIANA

PARISH/COUNTY OF TANGIPAHOA

BEFORE ME, the undersigned authority, duly commissioned and qualified within and for the state and parish or county aforesaid, personally came and appeared _____
_____ representing _____
_____.

Who, being by me first duly sworn deposed and said that he or she has read and signed this Affidavit and he/she does hereby attest, under oath, as follows:

- (1) That affiant and his or her firm is registered and participates in a status verification system to verify that all employees in the State of Louisiana are legal citizens of the United States or are legal aliens;
- (2) That affiant and his or her firm will continue, during the term of any contract with the Tangipahoa Parish Government, to utilize a status verification system to verify the legal status of all new employees in the State of Louisiana; and
- (3) That affiant and his or her firm will require all subcontractors to submit to them and/or their employer a sworn Affidavit verifying compliance with paragraphs (1) and (2) of this Affidavit.

Prospective bidder or representative to sign and type or print name below signature.

Affiant Signature Printed Name

SWORN TO AND SUBSCRIBED BEFORE ME THIS ____ day of _____, 2021.

Notary Public

**ATTESTATION CLAUSE REQUIRED BY
LA. R.S. 38:2227 (PAST CRIMINAL CONVICTIONS OF BIDDERS)**

Sworn statements shall be submitted in the form of an affidavit as indicated below, executed and sworn to by the bidder before persons authorized by laws of the State to administer oaths. The original of such sworn statement shall be submitted by the successful bidder before the Award of Contract. The award of Contract shall be within (____) calendar days of the bid opening.

State Project Number: _____ (if applicable)

Name of Project: _____

Parish: _____

- (an individual)
- (a partnership)
- (a corporation)

certify that:

Appearer, as a Bidder on the above-entitled Public Works Project, does hereby attest that:

- A. No sole proprietor or individual partner, incorporator, director, manager, officer, organizer, or member who has a minimum of a ten percent (10%) ownership in the bidding entity named below has been convicted of, or has entered a plea of guilty or nolo contendere to, any of the following state crimes or equivalent federal crimes:

- (a) Public bribery (R.S. 14:118)
- (b) Corrupt influencing (R.S. 14:120)
- (c) Extortion (R.S. 14:66)
- (d) Money laundering (R.S. 14:23)

- B. Within the past five years from the project bid date, no sole proprietor or individual partner, incorporator, director, manager, officer, organizer, or member who has a minimum of a ten percent (10%) ownership in the bidding entity named below has been convicted of, or has entered a plea of guilty or nolo contendere to any of the following state crimes or equivalent federal crimes, during the solicitation or execution of a contract or bid awarded pursuant to the provisions of Chapter 10 of Title 38 of the Louisiana Revised Statutes:

- (a) Theft (R.S. 14:67)
- (b) Identity Theft (R.S. 14:67.20)
- (c) Theft of a business record (R.S. 14:67.20)
- (d) False accounting (R.S. 14:70)
- (e) Issuing worthless checks (R.S. 14:71)
- (f) Bank fraud (R.S. 14:71.1)
- (g) Forgery (R.S. 14:72)
- (h) Contractors; misapplication of payments (R.S. 14:202)
- (i) Malfeasance in office (R.S. 14:134)

Name of Bidder

Name of Authorized Signatory of Bidder

Date

Title of Authorized Signatory of Bidder

WITNESSES:

Signature of Authorized Signatory Bidder

Parish or county _____

State of _____

Subscribed and sworn to before me this _____ day of _____, 20____.

NOTARY PUBLIC (signature)

NOTARY PUBLIC (printed name)

NOTARY PUBLIC NUMBER

EXPIRATION DATE

ATTESTATION CLAUSE

Attachment C
Technical Specifications

SECTION 02660

HDPE GEOMEMBRANE LINER

1. SCOPE

The scope of this document consists of furnishing all labor, equipment, materials etc. necessary to properly install a high-density polyethylene geomembrane as shown on plan drawings and as described herein.

2. SUBMITTALS, HANDLING, AND WARRANTY

2.1. General

Prior to installation of the geomembrane material, the following production data shall be furnished in writing to the Engineer:

A. Resin Data:

- (1) Certification stating that the resin meets the specification requirements shall be submitted prior to installation of geomembrane.
- (2) Certification stating all resin is from the same Manufacturer shall be submitted prior to installation of any geomembrane.
- (3) Copy of Quality Assurance/Quality Control certificates issued by the Manufacturer and resin supplier(s) shall be submitted after delivery of the geomembrane to the job site.

B. Geomembrane Roll:

- (1) Certification stating geomembrane meets the Specification requirements shall be submitted prior to installation of geomembrane.
- (2) Statement certifying no reclaimed polymer has been added to resin shall be submitted prior to installation of geomembrane.

- (3) Geomembrane delivery, storage, handling and installation instructions shall be submitted prior to material delivery.
 - (4) Copy of quality control certificates issued by Manufacturer shall be furnished upon delivery of the geomembrane.
 - (5) Extrudate resins and/or rod shall be certified that all extrudate is from one Manufacturer, is the same resin type, and was obtained from the same resin supplier as the resin used to manufacture the geomembrane rolls.
- C. Installation layout drawings: Installation layout drawings shall be submitted prior to installation of geomembrane. Submit drawings shall show panel layout, indicating all seams, and details. These drawings shall be approved prior to installing the geomembrane. This approval will be for concept only and actual panel placement will be determined by job site conditions. Deviations from these drawings shall be documented by the Contractor on "as-built" drawings.
- D. Contractor's Geosynthetics Field Installation Quality Assurance Plan.
- E. Certification of Acceptance of Geomembrane Subsurface by Contractor. Each area to be covered by the geomembrane system shall have a certificate of acceptance signed by the installation supervisor prior to the start of installation. Beginning installation shall mean acceptance and approval of existing surface condition.
- F. To be submitted to the Engineer upon completion of installation:
- Certificate stating the geomembrane has been installed in accordance with the Contract Documents.
 - Manufacturer's standard warranty and the Contractor's installation warranties which have been agreed to by the Owner or Engineer.
 - Quality Assurance documentation recorded during installation.

- “As-built” marked-up drawing(s) (hardcopy(ies), pdf, and AutoCad electronic file(s)) showing panel lay-out, panel numbers, location of patches, location of destructive tests performed, and locations where extrusion welds were performed.

No installation will commence or proceed without approval of submittal data by the Engineer.

2.2. HDPE Geomembrane Manufacturer Company Qualifications

- (1) The manufacturer company shall each have manufactured at least 4,000,000 square feet in HDPE geomembrane for other projects;
- (2) The manufacturer representative shall have worked on at least three projects similar in size and complexity to the project described in the Contract Documents.

2.3. Delivery, Storage, and Handling

Conform to the manufacturer’s requirements to prevent damage to geomembrane.

2.3.1. Delivery

- A. Deliver materials to the site only after the Engineer approves required submittals.
- B. Separate damaged rolls from undamaged rolls and store at locations designated by the Owner until proper disposition of material is determined by Owner.
- C. Store on level prepared surface supported above mud and standing water. Contractor or supplier shall be responsible for long term (up to 2 years) storage.
- D. Stack per Manufacturer’s recommendation, and at the direction of the Owner.

2.3.2. On Site Handling. Use appropriate handling equipment to load, move, or deploy geomembrane rolls. Appropriate handling equipment includes slings, spreader bars or an equipment bucket which has been properly protected.

2.3.3. Damaged Geomembrane:

- A. Geomembrane damage shall be documented by Contractor.
- B. Damaged geomembrane shall be repaired by Contractor, if possible, in accordance with these Specifications, or shall be replaced at no cost or time delay to the Owner.

2.4 Warranty

Manufacturer's and Contractor's warranties for material and workmanship shall be provided. The warranties shall warrant both the quality of the material and workmanship for at least 30 years after acceptance.

3. PRODUCTS

3.1. Geomembrane

3.1.1. Geomembrane shall be a green textured HDPE at all locations.

3.1.2. Resin

- A. Shall be virgin material with no more than 10% rework, first quality, compounded and manufactured specifically for producing HDPE geomembrane. If rework is used, it must be a similar HDPE as the parent material. No post-consumer resin (PCR) of any type shall be added to the formulation.
- B. Resin types shall not be intermixed.
- C. Resin shall meet the following additional requirements:

TABLE 1
HDPE RESIN REQUIREMENTS

Test	Test Designation	Minimum Frequency Requirements	Limit
Density (gm/cm ³)	ASTM D792 (B) or ASTM D1505	1/200,000 lb	>= 0.932
Melt Index	ASTM D1238 Condition E	1/180,000 lb	<= 1.0 g /10 minutes ⁽¹⁾

⁽¹⁾ per resin batch: test data shall be supplied to the Engineer prior to his acceptance. Failing tests may be adjusted at the Engineer's sole determination.

3.1.3. Geomembrane Rolls

- A. Shall not exceed a combined maximum total of one percent by weight of additives other than carbon black.
- B. Shall use raw materials or finished materials produced in the United States. Material from other sources may be used with prior approval by the Engineer.
- C. Geomembrane shall be supplied in rolls free of holes, pinholes, bubbles, blisters, excessive contamination by foreign matter, and nicks and cuts on roll edges. Each roll shall be identified with labels indicating number, thickness, length, width, and Manufacturer.
- D. Factory Inspection: All liner sheets produced at the factory shall be inspected prior to shipment for compliance with the physical appearance requirements listed in previous section and be tested by an acceptable method of inspecting for pinholes (i.e., spark tester). If pinholes are located, identified, and indicated during manufacturing, these pinholes may be corrected during installation. Manufacturer shall certify and provide documentation that spark tester has been calibrated to meet these requirements.

- 3.1.4. Contractor shall provide testing certificates from manufacturer with the testing frequency required by this specification. In addition to the specifications set on this document, HDPE geomembranes shall meet all requirements, including minimum physical properties and frequency of testing as presented on the latest version of the GRI Test Method GM-13 of the Geosynthetics Research Institute.

4. INSTALLATION

4.1. Surface Acceptance

Prior to placement and deployment of the geomembrane, an inspection of the subgrade surface shall be performed by Contractor and Owner (or Owner's representative) to verify that all areas to be lined are smooth, free of all foreign and organic material, sharp objects, or debris of any kind. These surfaces shall provide a firm, unyielding foundation with no sharp changes or abrupt breaks in grade. Excessive moisture or standing water shall not be allowed. No synthetic liner shall be placed in an area that has been softened by precipitation.

It is the responsibility of the Contractor to verify that the surface on which the synthetic liner or cover will be installed is prepared in accordance with the plans and specifications.

4.2. Deployment

1. Each panel shall be assigned a simple and logical identifying code. The coding system shall be subject to approval by the Engineer and shall be determined at the job site.
2. The geomembrane shall be visually inspected during deployment for imperfections and any faulty or suspect areas shall be marked for repair.
3. Deployment of the geomembrane panels shall conform to the following requirements:

- A. Unroll geomembrane panels using methods that will not damage, stretch or crimp the geomembrane and that will protect the underlying subgrade surface from damage (i.e., Spreader Bar-Protected Equipment Bucket).
 - B. Place ballast on geomembrane to prevent uplift due to wind, while not damaging the geomembrane. Sandbags may be used.
 - C. Personnel walking on the geomembrane shall not engage in activities or wear shoes that could damage the geomembrane.
 - D. Do not allow vehicular traffic directly on geomembrane. ATV's are acceptable if wheel contact pressure is less than six psi.
 - E. Equipment shall not damage geomembrane by handling, trafficking, leakage of hydrocarbons or any other means. The geomembrane shall be protected in areas of heavy traffic by placing compatible protective cover over the geomembrane.
4. Sufficient material shall be provided to allow for geomembrane shrinkage and contraction.
 5. Perforation of geomembranes for deployment will not be accepted, unless the portions of the geomembrane that was perforated are discarded and, therefore, not used in cell liner:

4.3. Field Seams

1. Seam location shall meet the following requirements:
 - A. Orient seams parallel to line of slope, i.e., up-and-down the slope and not across the slope.
 - B. Minimize number of field seams in corners, odd-shaped geometric locations and outside corners.
 - C. Slope seams (panels) shall extend a minimum of five feet from toe of slope into bottom area or as presented in the drawings.

- D. Use a sequential seam numbering system compatible with panel numbering system that is agreeable to Engineer and Contractor.

TABLE 2
60-MIL HDPE GEOMEMBRANE SEAM TESTING

Test	Method	Requirement	Frequency
Shear Strength* (lb/in) Lab Test	ASTM D6392	≥ 120	1/500 lf
Elongation at Break (%) Lab Test	ASTM D6392	$\geq 50\%$	1/500 lf
Peel Strength* (lb/in) Lab Test	ASTM D6392	≥ 91 ≥ 78 (extrusion)	1/500 lf
Peel Separation (%) Lab Test	ASTM D6392	$\geq 25\%$	1/500 lf
Vacuum Box or Air Pressure Test Field Test	ASTM D6392	Pass	Continuously

* Values listed for shear and peel strengths are for 4 out of 5 test specimens; the 5th specimen can be as low as 80% of the listed values

Field tests shall be performed by the installer at the Contractor's expense. Locations for collecting destructive samples of field seams shall be determined at the CQA Technician's discretion. The installer shall cut the samples from the liner and, after identified, shall be shipped to the Engineer or to the lab assigned by the Engineer for testing, at the Owner's expense.

4.4. Anchor Trench

1. The anchor trench will be excavated by the Owner to the line, grade, and width shown on the construction drawings, prior to liner system placement. The CQA Technician shall verify that the anchor trench has been constructed according to the construction drawings.

2. Slightly rounded corners shall be provided in the trench where the geomembrane adjoins the trench so as to avoid sharp bends in the geomembrane.
3. The anchor trench will be backfilled and compacted by the Owner. Trench backfill material shall be placed in eight-inch-thick loose lifts and compacted by wheel rolling with light, rubber-tired or other light compaction equipment or other compactor approved by the Engineer.
4. At no time shall construction equipment come into direct contact with the geomembrane. If damage occurs, it shall be repaired by the Contractor prior to the completion of backfilling.

5. RECORD DOCUMENTS

5.1. Manufacturer Documents

Contractor shall provide the Engineer all material information and test documents for the raw materials and with all the information and tests for the finished product(s).

5.2. Contractor Documents

Contractor shall provide the Engineer an as-built drawing showing the location of all seams and joins (hardcopy(ies), pdf, and AutoCad electronic file(s)).

Contractor is responsible for obtaining and verifying all appropriate specifications prior to submitting the various prices requested by the bid or proposal invitation.

6. UNIT PRICES

6.1. Method of Measurement

Unit of measure for the HDPE geomembrane component(s) is the installed in-place square feet. The basis of measurement will be the area as computed by the Engineer based on the Drawings (Engineered Quantities). Measurement will be limited to the dimensions and limits shown on the Drawings, and no payment will be made for additional geomembrane installed by the Contractor at any other locations, unless

approved by the Engineer in writing, previously to installation by Contractor.

The HDPE geomembrane unit price shall cover all materials, transportation, manufacturer's testing, manufacturer's quality assurance and quality control, and all on-site storage.

Allowance will be made for the HDPE geomembrane in anchor trenches (quantity already included in the Unit Price Bid Form). No allowances will be made for waste, overlap, or materials used for the convenience of the installation contractor.

6.2. Basis of Payment

Paid for at the contract unit prices per square foot, in accordance with the Unit Price Bid Form and as defined in Section 6.1 above. Payment covers all items listed in this document, other related documents, and associated drawings. Contractor is responsible for verifying the quantities presented in the Bid Forms and notifying the Engineer of any variances or discrepancies prior to bidding.

7. CONTRACT DOCUMENTS

Where request for bid or other contract documents differ from those requirements herein, the bid or other contract documents shall govern.

END OF SECTION 02660

SECTION 02834

PERCUSSIVE DRIVEN EARTH ANCHOR

1. SCOPE

The scope of this document consists of furnishing all labor, equipment, materials etc. necessary to properly install Percussive Driven Earth Anchors (PDEAs) as shown on plan drawings and as described herein.

All anchors indicated on the drawings or specified are to be PDEAs obtaining their required tension load carrying capacity from embedment into subgrade as a method of anchoring geomembrane liner.

2. SUBMITTALS

Prior to installation of the geomembrane material, the following production data shall be furnished in writing to the Engineer:

A. Shop Drawings

Product technical data including:

1. Manufacturer and type of proposed anchor along with proposed anchor corrosion protection.
2. Proposed sizes and types of anchor, wire tendons, and locking mechanism.
3. Proposed methods of installing and tensioning of anchors.
4. Connection details between the anchor and the geomembrane liner.

B. Certifications

1. Manufacturer shall submit a letter of certification that the product meets or exceeds physical properties, endurance, performance and packaging requirements.
2. PDEA manufacturer shall provide ISO 9001 compliance certificates.

C. Qualifications

1. Submit record of at least one (1) previous successful PDEA installation in similar conditions by same manufacturer.
2. If the installer has no previous experience with the PDEA manufacturer, a certificate of completion of training by the PDEA manufacturer will be required.

3. QUALITY ASSURANCE QUALIFICATIONS

Anchor installer to be trained by the anchor manufacturer in the installation and construction of the type of anchors shown on the Drawings and required by the Specification Sections.

The PDEA system should be produced in accordance with Platipus Anchors ISO 9001 standards, or equivalent.

4. DEFINITIONS

- A. Percussive Driven Earth Anchor (PDEA): Lightweight corrosion resistant earth anchor that does not disturb the soil during installation. The PDEA shall be driven from finished grade elevation using conventional portable equipment such as an electric or pneumatic demolition hammer. The PDEA shall be pulled to an exact holding capacity and fully operational immediately.
- B. Anchor Reinforced Grid Solution (ARGS)
 - 1. Anchor Reinforced: Percussive Driven Earth Anchor (PDEA) system includes the correct anchor, associated tendon, load plate and top terminations such as a wedge grip as specified by the Engineer of Record (EOR)
 - 2. Grid: Any surface protection materials that can handle the load generated by the PDEA and perform the function of stabilizing the surface
 - 3. Solution: The Solution is Designed by a Qualified Engineer (EOR) who has looked at all aspects of the design
- C. Installer or Applicator:
 - 1. Installer is the person installing or applying the product in the field at the project site.

5. PROJECT CONDITIONS

Do not begin anchor installation until the earthwork in the area where PDEAs are to be installed has been completed and geomembrane liner has been installed as shown on the Drawings and indicated in this Specification Section.

6. MANUFACTURERS

- A. Subject to compliance with the Contract Documents, the following manufacturers are acceptable:
1. Percussive Driven Earth Anchors: Anchor Assemblies to be manufactured in accordance with ISO 9001 standards
Platipus Anchors, Inc., 1902 Garner Station Blvd., Raleigh, NC 27603. Phone: (866) 752-8478, Fax (919)662-0998, www.platipus.us
- B. Request of equivalent substitutions may be made. Submittals to the Engineer must include all technical data and information to prove its equivalency.

7. ANCHOR PERFORMANCE

- A. Allowable working tension load: 1,320 lbs.
- B. Frequency: See the frequency table included in the construction drawings.

8. MATERIALS

PDEAs in compliance with Engineer's design shall be manufactured in accordance with ISO 9001 Standards as manufactured by Platipus Anchors.

Platipus S6HA ARGS GL 1 Ton Anchor (High Performance-Increased Corrosion Protection)

- Anchor: S06HA Hard Anodized Aluminum Alloy Anchor
- Lower Termination: Stainless Steel Soft Eye including Stainless-Steel Ferrule.
- Wire Tendon: 6' of Grade 316 Stainless Steel
- Top Accessory: 8" diameter UV stabilized HDPE Load Plate with Beveled Edge
- Top Termination: Stainless Steel Self-Setting Wedge Grip and Stainless-Steel Washer

9. EXECUTION

9.1. Lines and Levels

- A. Complete necessary excavation and grading and furnish all lines and levels necessary for completion of anchor installation.

9.2. Anchor Installation and Detail Requirements

A. Equipment:

1. Driving equipment shall be adequate to obtain required embedment depth of the anchor in the subgrade encountered
2. Anchors shall be driven using a percussive/demolition style hammer only, vibration or rotary type hammers are not recommended.
3. Post tensioning of anchors to be accomplished by use of a tensioning device capable of applying the required tension loads and for load tested PDEAs, including appropriate gauges to indicate the load applied.

B. Installation and load locking apparatus:

1. **DRIVE RODS:** Use only the appropriate hardened power drive rod. Electric or air compressed percussive hammer to be provided by the contractor.
2. **SETTING TOOLS:** Use only specific hand tools provided by the anchor manufacturer that will not damage the anchor tendon or the liner. These tools include hand held wire kleins for safely gripping the tendon to initially set the anchor, setting plate and/or bobbin (for properly setting the wedge grip).
3. **STRESSING JACK:** It is recommended to use the anchor manufacturer's manual or hydraulic stressing jack and load gauge. The appropriate stressing jack for liner applications should have a rubber base that will not damage the liner when used as directed. The manufacturer's load gauges shall be made specifically for the stressing jack model being used, and calibrated to read in pounds (or kN) in tension.

C. Anchor Placement:

1. Do not install any anchors which are bent, cracked, of insufficient length, of reduced cross section due to any reason, or damaged in any way which would decrease the tension load carrying capacity of the anchor.
2. Install anchors at the indicated locations, to the embedment length as directed by the Engineer and at a right (90°) angle of inclination.
3. All anchors to be continuous full length without splices.

measure the capacity on the gauge. If required load not achieved after a 4" stroke, reset the cylinder and repeat the process. When required load is achieved, release tension on SJ3 and remove.

8. Once the load requirement has been met, set wedges in wedge grip by tapping bobbin with hammer, release the tension, and remove the jack. If load is not met, record load and report to the engineer.
9. Record load and extension (the length the tendon pulled out of ground).
10. Do not cut the tendon, neatly coil the tendon around the load plate so that it lays flat.
11. Prepare surface around the anchor for membrane patch. Follow the membrane manufacturers recommendations for extrusion welding preparation and patching.
12. Begin by properly cleaning and grinding the surfaces of the beveled load plate and liner to receive extrusion weld. Once the load plate has been properly welded to the liner, prepare to install appropriate sized patch, as directed by the engineer or shown on plans, over the secured load plate.
13. Completely weld the patch over the anchor plate to provide an airtight seal as shown in the plans or as directed by the engineer.

10. UNIT PRICES

10.1. Method of Measurement

Unit of measure for the PDEA component(s) is the number of anchors driven to engineered depth or to refusal, and successfully load-locked at Engineer's required load. Measurement will be limited to the actual number of anchors successfully installed. No payment will be made for additional anchors installed by the Contractor at any locations, unless approved by the Engineer in writing, previously to installation by Contractor.

The PDEA unit price shall cover all costs for material, labor, equipment and accessories required for complete anchor installation and anchor load testing as shown on the Drawings and indicated in this Specification Section, and all on-site storage.

10.2. Basis of Payment

Paid for at the contract unit prices per number of anchors, in accordance with the Unit

Price Bid Form and as defined in Section 10.1 above. Payment covers all items listed in this document, other related documents, and associated drawings.

Adjustment to total bid price for the number of anchors in place and anchor load tests to be made in accordance with unit prices in the Unit Price Bid Form.

11. CONTRACT DOCUMENTS

Where request for bid or other contract documents differ from those requirements herein, the bid or other contract documents shall govern.

END OF SECTION 02834

Attachment D
Landfill's Construction Quality Assurance
(CQA) Plan

D. Load Testing of Production Anchors:

1. All production anchors shall have an ultimate load capacity of 2,200 lbs. and a minimum working load of 1,760 lbs.
2. Load test 10% of the anchors to the required working load of 1,760 lbs. The Engineer may increase or decrease this percentage based on his review of the field test data.
3. Keep a record of all anchors to be tested and provide a copy to the engineer.
4. Load testing to be performed by means of a hydraulic jack or appropriate tensioning device that includes an appropriate gauge that indicates a certified load in tension.

E. Installation Procedure:

1. Once the geomembrane liner has been properly deployed and free of wrinkles, begin by measuring and marking anchor positions on the geomembrane liner per engineer's specification.
2. Once marked, cut a slit in the geomembrane liner only as large as required for the anchor head to pass through the liner at the appropriate mark.
3. Install PDEA using manufacture-certified tools and as directed by manufacturer.
4. After removing the drive rod from the anchor head, use the manufacturer's appropriate setting tool to load lock the anchor into its full working position by applying a load to the wire tendon.
5. If refusal is encountered prior to achieving specified depth, for < 3' depth, care should be taken to attempt to retrieve the anchor by pulling up on the tendon and drive rod at same time. If anchor is retrieved successfully, reposition anchor 1-2' from original mark and attempt to drive and set anchor, record and report positioning and load to the engineer. If anchor cannot be retrieved, record the depth and attempt to gain specified load and report the resulting load to the engineer.
6. Insert wire through the load plate (beveled edge facing up), washer, and bottom of the wedge grip and slide/push tight against the liner.
7. Thread bobbin over the wire tendon and place the stressing jack with rubber base over load plate and attach the jack's wire klein to the tendon. Using the hand pump, extend the cylinder (stressing the anchor) and

CONSTRUCTION QUALITY ASSURANCE PLAN
FOR LINER AND COVER CONSTRUCTION AND MAINTENANCE

CONSTRUCTION QUALITY ASSURANCE PLAN
FOR LINER AND COVER CONSTRUCTION AND MAINTENANCE

TABLE OF CONTENTS

Section	Page
1. GENERAL	1
1.1. Introduction	1
1.2. QA/QC Responsibilities	1
1.2.1. Owner	2
1.2.2. Owner's Project Manager	2
1.2.3. Design Engineer	2
1.2.4. Geosynthetic Manufacturer	2
1.2.5. Contractor	2
1.2.6. Soil Quality Assurance Laboratory	2
1.2.7. Geosynthetics Quality Assurance Laboratory	3
1.2.8. Construction Quality Assurance (CQA) Consultant	3
1.2.9. CQA Project Manager	3
1.2.10. CQA Engineer.....	3
1.2.11. CQA Technician.....	3
1.2.12. Preconstruction Meeting.....	3
1.2.13. Daily or Weekly Progress Meetings	4
1.2.14. Problem or Deficiency Identification and Corrective Action Meeting.....	4
1.3. Documentation	5
1.3.1. Daily Field Reports.....	5
1.3.2. Summary Progress Report	6
1.3.3. Final Construction Documentation Report	6
1.4. Oral Communication	6
1.4.1. Communication with the Owner	6
1.4.2. Communication with the Contractor.....	6
1.5. Communications with Other Parties	7
1.5.1. Regulatory Agencies	7
1.5.2. Third Parties	7
1.6. Control of Plans and Specifications	7
1.6.1. CQA Engineer 's Set	7
1.6.2. Field Set.....	8
1.6.3. Changes by Designer	8
1.6.4. Field Changes.....	8
1.6.5. Out of Permit Changes	8
1.7. Sampling and Testing Control.....	9
1.7.1. Documentation.....	9
1.7.2. Control.....	9

Section	Page
2. SURVEYING.....	9
2.1. General.....	9
2.2. Accuracy.....	9
2.3. Frequency.....	10
2.3.1. Layout.....	10
2.3.2. Excavation Depth.....	10
2.3.3. Component Thicknesses.....	10
2.4. Documentation.....	10
3. RECOMPACTED SOIL LINER/COVER.....	11
3.1. Material Acceptance.....	11
3.1.1. New Material.....	11
3.1.2. Approved Material.....	11
3.2. Material Verification.....	12
3.2.1. Sampling and Documentation.....	12
3.2.2. Test Types and Frequencies.....	12
3.2.3. Test Pad Option.....	12
3.3. Construction Control.....	13
3.3.1. Visual Inspection.....	13
3.3.2. Lift Thickness.....	13
3.3.3. Field Moisture and Density Testing.....	13
3.3.3.1. Frequency and Documentation.....	13
3.3.3.2. Procedure.....	14
3.3.3.3. Action in Case of Failure.....	14
3.3.3.4. Calibration (Nuclear Tests).....	14
3.3.3.5. Proctor Compaction Tests.....	15
3.3.4. Permeability Tests.....	15
3.3.4.1. Frequency and Documentation.....	15
3.3.4.2. Sampling Methodology.....	15
3.3.4.3. Testing.....	16
3.3.4.4. Nonconformity.....	16
3.3.5. Overall Component Thickness.....	16
3.3.5.1. Compacted Soil Liner.....	16
3.3.5.2. Soil Components of Cover.....	17
3.3.5.3. Variances.....	17

Section	Page
4. SYNTHETIC LINER	17
4.1. Material Acceptance	17
4.1.1. New Material	17
4.1.2. Approved Material	17
4.2. Material Verification	18
4.2.1. Sampling and Documentation	18
4.2.2. Test Types and Frequencies	18
4.3. Construction Control	18
4.3.1. Visual Inspection	18
4.3.2. Seam Testing	19
4.3.2.1. Field Test Welds	19
4.3.2.2. Non-Destructive Testing	19
4.3.2.3. Destructive Testing	21
5. GEOSYNTHETIC CLAY LINER (GCL)	22
5.1. Material Acceptance	22
5.1.1. New Material	22
5.1.2. Approved Material	22
5.2. Material Verification	23
5.2.1. Sampling and Documentation	23
5.2.2. Test Types and Frequencies	23
5.3. Construction Control	23
5.3.1. Visual Inspection	23
5.3.2. Seams	24
5.3.3. Repairs	24
6. LEACHATE COLLECTION SYSTEM	25
6.1. Material Acceptance	25
6.1.1. New Material	25
6.1.2. Approved Material	25
6.2. Material Verification	25
6.2.1. Sampling and Documentation	25
6.2.2. Test Types and Frequencies	25
6.3. Construction Control	26
6.3.1. Visual Inspection	26
6.3.1.1. Sand	26
6.3.1.2. Pipe	26
6.3.1.3. Gravel	26

Section	Page
7. CLOSURE TURF™ (OR EQUIVALENT) FINAL COVER SYSTEM	27
7.1. Material Acceptance	27
7.1.1. New Material.....	27
7.1.2. Approved Material	28
7.2. Material Verification	28
7.3. Construction Control.....	28
7.3.1. Visual Inspection	28
7.3.1.1. Subgrade.....	28
7.3.1.2. Geomembrane.....	28
7.3.1.3. Synthetic Turf	29
7.3.1.4. Sand.....	29
7.3.2. Seam Testing	30
7.3.2.1. Field Test Welds.....	30
7.3.2.2. Non-Destructive Testing	30
7.3.2.3. Destructive Testing	30
8. EXPOSED GEOMEMBRANE FINAL COVER SYSTEM	31
8.1. Material Acceptance	31
8.1.1. New Material.....	31
8.1.2. Approved Material	31
8.2. Material Verification	32
8.3. Construction Control.....	32
8.3.1. Visual Inspection	32
8.3.1.1. Subgrade.....	32
8.3.1.2. Geomembrane.....	32
8.3.2. Seam Testing	33
8.3.2.1. Field Test Welds.....	33
8.3.2.2. Non-Destructive Testing	33
8.3.2.3. Destructive Testing	34

LIST OF TABLES

Title	No.
Compacted Clay Liner and Final Cover Soil Component's Specifications and Testing Frequencies.....	CQA-1
Gravel for Leachate Collection System Specifications and Testing Frequencies	CQA-2
Structured LLDPE Geomembrane Component of Closure Turf tm or Equivalent Specifications and Testing Frequencies	CQA-3
Structured LLDPE Geomembrane Component of Closure Turf tm or Equivalent Passing Criteria	CQA-4

CONSTRUCTION QUALITY ASSURANCE PLAN
FOR LINER AND COVER CONSTRUCTION AND MAINTENANCE

1. GENERAL

1.1. Introduction

The purpose of this document is to present a Quality Assurance and Quality Control Plan (QA/QC Plan) for the Tangipahoa Parish Regional Solid Waste Facility (Tangipahoa RSWF) in accordance with LAC 33:VII.711.B.5.a to assure that the liners and covers used in facility operations are designed, constructed, installed, and maintained properly. Hereafter, the term "liner" shall refer to both "liner and cover," where appropriate. The QA/QC Plan describes procedures for the installation and maintenance of the soil and geosynthetic components used in the composite liner system as specified by the facility design plans.

This QA/QC Plan addresses quality assurance and quality control in the following context. Quality Assurance (QA) refers to means and actions employed to assure conformity of the liner system production and installation with the project specific design specifications and regulatory requirements. Quality Control (QC) refers only to those actions taken to assure that materials and workmanship meet the requirements of the project plans and specifications. Quality control is provided by the manufacturers, suppliers, contractors, and installers of the various components of the liner system.

The overall goal of this QA/QC Plan is to assure all liners used in the facility operations are inspected by or under the direction of a professional engineer, registered in the state Louisiana, with the appropriate expertise. This QA/QC Plan contains the programs for both QC testing and inspection and QA analyses and certification.

1.2. QA/QC Responsibilities

The identification of the responsibilities associated with the ownership, design, supply, manufacture, installation, and quality assurance of the waste cell(s) construction, including but not limited to the clay liner and composite liner system, is essential for meeting project specifications and regulatory requirements. The definitions and responsibilities of typical parties involved in cell design construction, installation, and maintenance are outlined below:

1.2.1. Owner

Owner and operator of the solid waste facility. For this plan the term "Owner" refers to the Tangipahoa RSWF and the Tangipahoa Parish Government.

1.2.2. Owner's Project Manager

The official representative of the Owner. In this QA/QC Plan, the term "Owner's Project Manager" shall mean a duly authorized employee or representative of the Owner and shall apply or be interchangeable with the term "Construction Coordinator." Generally this person is the Landfill Manager.

1.2.3. Design Engineer

An individual or firm with appropriate Louisiana professional engineering licenses and registration responsible for the design, drawings, plans, and specifications of the soil and geosynthetic liner systems. The person shall be a professional engineer registered in the state of Louisiana, with the appropriate expertise.

1.2.4. Geosynthetic Manufacturer(s)

The firm(s) responsible for the manufacturing of the various synthetic liner system components.

1.2.5. Contractor(s)

General term referring to the firm(s) responsible for the construction of the clay liner or the firm(s) responsible for field handling, storing, deploying, seaming, temporary restraining, and all other aspects of the geosynthetic components of the liner system (or both). The Parish or Tangipahoa RSWF employees may be the Contractor for part or all of the waste cell components, at the Landfill Manager's determination.

1.2.6. Soil Quality Assurance Laboratory

The firm(s) responsible for conducting the appropriate laboratory tests on any soils samples taken from the site and from off-site borrow sources. Said laboratory shall be LDEQ accredited.

1.2.7. Geosynthetics Quality Assurance Laboratory

The firm(s) responsible for conducting the appropriate laboratory tests on samples of geosynthetics at the site or taken from the site. The Manufacturer's laboratory may be this Laboratory at the Landfill Manager's determination.

1.2.8. Construction Quality Assurance (CQA) Consultant

The firm(s) or person(s) responsible for observing, testing, and documenting activities related to construction quality control and quality assurance during the installation of the soil and geosynthetic liner systems.

1.2.9. CQA Project Manager

The CQA Project Manager refers to duly authorized employee(s) or representative(s) of the CQA Consultant or of the Owner in charge of the CQA activities.

1.2.10. CQA Engineer

The individual employed by the CQA Consultant responsible for the supervision of CQA on-site personnel, testing, observing, and documentation activities. The CQA Engineer is also responsible for the preparation of the documentation report and files.

1.2.11. CQA Technician

The individual(s) responsible for documenting, testing, and observation of cell construction activities. The CQA Technician is an employee or designated agent of the CQA Consultant or of the Owner.

Typically, the responsibilities of each party involved in the installation and maintenance of the composite liner system are established through regular meetings. These meetings are held both during pre-construction and construction phases of the liner installation and maintenance procedures. The description of each meeting is given below:

1.2.12. Preconstruction Meeting

A preconstruction meeting may be held at the site prior to the beginning of liner system installation if deemed necessary by the Owner. Typically, participants in the meeting shall be the Owner's Project Manager, the CQA Consultant, and the Design Engineer.

The purpose of the preconstruction meeting is to review the requirements of the Site Specific QA/QC Plan and develop a site-specific addendum, if required; review design requirements, construction drawings, and specifications; review the responsibilities of each party and the lines of authority and communication; review the time schedule; and, review health and safety requirements and site rules. The meeting shall be documented by a person designated by the Owner at the beginning of the meeting, and written minutes shall be transmitted to all parties.

1.2.13. Daily or Weekly Progress Meetings

A daily or weekly progress meeting may be held on-site. The meeting shall discuss current progress, planned construction activities, issues requiring resolution, and any new business or revisions to the work. The meeting may be attended by Owner's Project Manager, the CQA Engineer or Technician (or both), the Contractor's superintendent, and any other concerned parties.

1.2.14. Problem or Deficiency Identification and Corrective Action Meeting

The CQA Consultant or his representative(s) is required to inform the Contractors in a timely manner, of any difference between the interpretation of the plans and specifications by the Contractors versus the CQA Owner's interpretation. In addition, any actual suspected work deficiencies shall be brought to the Owner's Project Manager's attention.

A special meeting shall be held if a problem or deficiency is present. At a minimum, meeting participants may be the Contractors, the Owner's Project Manager, the CQA Engineer, and the CQA Technician. If the problem involves a possible design or specification modification, the Design Engineer should also be present. The purpose of this meeting is to define and resolve the problem and work deficiency as follows:

- 1) define and discuss the problem or deficiency;
- 2) review alternative solutions; and
- 3) implement an action plan to resolve the problem or deficiency.

Design or specification change (or both) shall be made only with the written approval of the Owner's Project Manager and the Design Engineer. These design changes shall take the form of an addendum to the specifications or this document (or both), and shall be in accordance with the provisions of Sections 1.6.3 and 1.6.5 of this CQA Plan.

Resolution of all problems or deficiencies shall be in accordance with LAC 33.711.B.5 to assure that liners used in facility operations are designed, constructed, installed, and maintained properly.

1.3. Documentation

An effective construction QA/QC Plan depends largely on recognition of all construction activities that should be monitored and on assigning responsibilities for the monitoring of each activity. The CQA Consultant will document that all QA/QC requirements have been satisfactorily addressed. The CQA Consultant shall provide the Owner's Project Manager with signed descriptive remarks, data sheets, and checklists to verify that required monitoring activities have been carried out. The CQA Consultant, through the CQA Technician, shall also maintain at the job site a complete file of all documents which comprise the QA program, this QA/QC Plan, checklists, test procedures, daily logs, and other pertinent documents. Documentation shall be provided through daily field reports, laboratory testing reports, weekly progress reports, record drawings, and the final QA documentation, as follows:

1.3.1. Daily Field Reports

The CQA Technician will prepare a Daily Field Report (DFR). If more than one CQA Technician is present on a discrete portion of the project, the lead Technician shall prepare a DFR from information on individual technician's daily field logs. The report shall include the description, location and quantity of work performed, the results and locations of all tests and surveys performed, the locations and types of samples secured for laboratory testing, any observed discrepancies or deviation from the specifications (each test will be clearly marked "Pass" or "Fail"), the record of all pertinent verbal communications with Contractor, Owner's Project Manager or other personnel, weather and site conditions, and official visitors (regulatory agencies, etc.).

Each DFR will be signed by the CQA Technician (or lead Technician, as appropriate) or the approval agent. Daily Field Reports shall be prepared in one original and two copies. One copy shall be delivered to the Owner's Project Manager, one retained by the CQA Technician, and the original delivered to the CQA Consultant or his authorized representative. No reports will be made available to any third party without written authorization appropriately distributed by the Owner's Project Manager.

1.3.2. Summary Progress Report

The CQA Technician (or lead Technician) shall prepare a weekly summary progress report or at the time established at the preconstruction meeting. The summary progress report may consist of (but not limited to) daily overview of construction activities, failing test results and retest results, new personnel on site, weather conditions, installed material quantities, problems and resolutions encountered, major construction activities started, and major construction activities completed.

1.3.3. Final Construction Documentation Report

Following the completion of construction activities, the CQA Engineer shall prepare a final certification report covering the installation and testing of the soil and geosynthetic liner system. This report shall include summaries of all construction activities, observations and test data sheets including sample location plans, construction problems and solutions, deviations from design and material specifications, record drawings, and certification statements sealed and signed by a Professional Engineer registered in the State of Louisiana, with the appropriate expertise.

1.4. Oral Communication

1.4.1. Communication with the Owner

These communications shall include, but not be limited to, notice of major violations of or deviations from the specifications where immediate remedial action is indicated, interim results of tests when requested by the Owner, and other major problems or anticipated delays which may have an adverse effect on cost and/or scheduling.

Such communications will be confirmed in writing as soon as practicable. Serious problems or emergency situations will also be communicated to the CQA Consultant.

1.4.2. Communication with the Contractor

Reports and communications to the Contractor's superintendent will be limited to the results of QC tests (numerical value, whether passed or failed, probable reason for failure such as excessive moisture, lift thickness, and improper material type, etc). Under no circumstances (other than extreme emergencies involving possible severe injury or property damage) will any CQA Technician give any instruction to Contractor personnel

or take any action which could be construed as supervising or directing Contractor's operations, procedures or methods.

1.5. Communications with Other Parties

Except as noted below, no communication concerning the work will be made to any persons other than the Owner, the CQA Consultant, Contractor's superintendents, or approved agent of the Owner without the express written permission of the Owner.

1.5.1. Regulatory Agencies

Representatives of the USEPA and/or LDEQ may visit the site and request information. Responses to such requests should include all factual data requested: test results, site conditions, status of project, etc. Any requests for opinions or information of a general nature should be referred to the Owner's Project Manager and/or the CQA Consultant. Subject to the above, assistance and cooperation should be given to regulatory personnel to the greatest degree possible.

1.5.2. Third Parties

No communications shall be made with third parties without the approval by and presence of the Owner.

1.6. Control of Plan and Specifications

1.6.1. CQA Engineer's Set

Prior to commencement of the project, the CQA Consultant shall obtain from the Owner's Project Manager a full set of the plans and specifications for the project. This set will be kept in his office, and he will update this set with any revisions. He will check the plans and specifications, including revisions, against the QC plans and specifications. Any discrepancies will be brought to the attention of the CQA Engineer and all CQA Technician and Owner's Project Manager. When plans and specifications are not available from any previous work, the CQA Engineer will develop plans and narrative as needed. Any change must be approved by the Design Engineer, or, if such a change would affect a permit condition, the LDEQ. See Sections 1.6.3 and 1.6.5 of this CQA Plan.

1.6.2. Field Set

The CQA Consultant will assure that an up-to-date set of the plans and specifications is maintained at the site.

1.6.3. Changes by Designer

Modifications to the plans and specifications may be made by the Design Engineer from time-to-time during operations or the closure process. However, only changes within the scope of the LDEQ permit shall be made. Such modifications shall be in writing or verbally; in the latter case, written verification must be received within one week. The contact person for such modifications is the CQA Consultant. Should any modifications be received by CQA personnel other than the CQA Consultant, the receiving person must make a written record and notify the CQA Consultant within 24 hours after becoming aware of them.

1.6.4. Field Changes

Except under emergency conditions, where life or property are in immediate danger, no CQA personnel are authorized to change the plans and/or specifications. Any field changes proposed by CQA personnel must be brought to the CQA Consultants attention, approved by the CQA Consultant, and approved again by the Design Engineer and the Owner's Project Manager before they are implemented. Such approval may be in writing or verbal. If verbal, they are to be confirmed in writing by the Owner using the procedure mentioned above. Only changes within the scope of the LDEQ permit shall be made.

1.6.5. Out of Permit Changes

Changes to be made that are out of scope of the LDEQ permit will require a formal LDEQ Permit Modification - major modification or minor modification. Said changes must be discussed with LDEQ personnel then the change applied for. The LDEQ change may take 4 to 12 weeks to obtain. The Owner and his agents will be responsible for obtaining this modification change. No such changed work shall be done prior to LDEQ approval in writing.

1.7. Sampling and Testing Control

1.7.1. Documentation

The location of every test or sampling point must be fully documented to the degree that any knowledgeable person could re-establish the location. Date and time of the action shall be included. Horizontal location shall be specified by the method in use for this work at the facility (e.g., grid coordinates, seam number and distance from specified end, etc.). Where elevation is also important (e.g., lift number), it shall be included. Each test or sample shall be assigned a unique number.

1.7.2. Control

Any sample to be sent off-site shall be under chain-of-custody control. The control sheet shall include the pertinent data in Section 1.3.1 in addition to the instructions for testing, if appropriate.

2. SURVEYING

2.1. General

Field surveys are required for layout, determination of excavation depth, liner thickness, quantity take-off, and checking slopes. This work will be performed under the general supervision of a professional engineer or a land surveyor, registered in the state of Louisiana. The CQA Technician (or lead CQA Technician, if appropriate) is responsible for coordinating surveys.

2.2. Accuracy

Layout of all facilities shall be tied into the coordinate system. Horizontal layout shall consist of a closed loop (either on itself or to a known coordinate point) with an error of closure not greater than 1:1000. Level surveys and cross-section surveys shall begin and be tied back into established bench marks. Turning points should be solid objects with readings taken to the nearest 0.01 ft. Error of closure of level surveys should not exceed 0.03 ft. Individual elevation determinations (cross-sections and thickness) shall be taken to the nearest 0.01 ft.

2.3. Frequency

2.3.1. Layout

Horizontal control lines should be laid out well in advance of construction operations and must be coordinated with the Contractor. Offset lines are desirable to minimize the need for re-surveying during construction.

2.3.2. Excavation Depth

This survey shall be made upon completion of each excavated area to determine bottom elevation. This survey shall be made on the same spacings as given in Section 2.3.3. In the case of excavations for buffer material, a more detailed grid may be necessary to allow accurate determinations of volume. Special instructions for such cases will be issued by the Design Engineer through the CQA Consultant.

2.3.3. Component Thicknesses

This survey consists of cross-sections made upon completion of each component of liner or cover construction. The section taken upon completion of the excavation will serve as the base for the clay liner, and the section taken on the clay surface will serve as the base for the next component and so on until construction has been completed. The survey grid spacing should not exceed 50 feet. On side slopes, each section will include at least the crest, toe, and one intermediate location even if fewer points would satisfy the 50-foot spacing requirement. All such surveys shall be made before-and-after each component and at the same horizontal points.

2.4. Documentation

All survey data will be recorded in standard field books. If surveying is performed with a "Total Station" computer type instrument, all field data must be printed in a final form before the survey is considered complete. If surveying is performed with a Global Positioning System (GPS), all data must be documented and printed for the file record. Notes shall include date, section surveyed, weather conditions, and names of members of survey party. Surveys shall be plotted when required, to facilitate determination of compliance with specification requirements.

3. RECOMPACTED SOIL LINER/COVER

3.1. Material Acceptance

3.1.1. New Material

A New Material is one for which approval has not been granted in writing by the CQA Consultant. The stockpile for any New Material must be thoroughly characterized. The location of any New Material source or stockpile shall be described in adequate detail. A composite sample must be prepared and tested for Atterberg Limits (ASTM D4318), Percent Passing the No. 200 Sieve (ASTM D1140) or Particle Size Analysis (ASTM D422), Moisture/Density Relationship (ASTM D698); and, a permeability test series shall be performed. The results of permeability tests on field-compacted samples may be used at the discretion of the CQA Consultant. The CQA Technician shall secure a 50-pound bag sample of any New Material at least seven days prior to its intended use. A New Material can be accepted if it can develop the required permeability within the moisture-compaction range as specified in Table CQA-1. No New Material can be used until it has been approved by the CQA Consultant. If this approval is verbal, it must be confirmed in writing within three working days.

3.1.2. Approved Material

An Approved Material is one for which approval has been previously granted in writing by the CQA Consultant. A material which is substantially the same as an Approved Material can be allowed at the discretion of the CQA Technician. For this purpose, the proposed material shall be tested for Atterberg Limits (ASTM D4318) and Percent Passing the No. 200 Sieve (ASTM D1140). If the Liquid Limit, Plasticity Index and Percent Passing the No. 200 Sieve all meet the requirements presented in Table CQA-1 (as appropriate) and are all within the range of 90% to 110% those for an Approved Material, the CQA Technician can authorize use of the material. Should the material fall outside the range given above, it is considered a New Material. CQA Technician's authorization does not constitute a change in the characteristics of an Approved Material.

3.2. Material Verification

3.2.1. Sampling and Documentation

Samples for the various tests required on compacted soil under Section 3.2.3 or 3.3, as appropriate, shall be secured at the frequencies given for each test type on Table CQA-1. These samples may be secured from the in-place fill and can be for more than one test. The locations where any material samples are obtained must be clearly identified by the CQA Technician. The Sample Control Sheet (chain-of-custody) is required for each sample. It shall indicate the sample number, source, unit, unit component and lift number, etc. Laboratory personnel will sign for the sample on the Sample Control Sheet whenever a sample is transferred to a laboratory and not tested by the CQA Technician.

3.2.2. Test Types and Frequencies

The types of tests and the frequency with which each test is to be performed on each component involving compacted soil are contained on Table CQA-1. Variances from Atterberg limits and grain size may be granted by the CQA Consultant, provided that: 1) no more than 5% of the samples fall outside the specified range, 2) such occurrences are not concentrated in any one lift or area, and 3) the samples conform to their appropriate permeability requirements. The CQA Consultant may also grant variances from the permeability requirements, provided that: 1) no more than 5% of the samples fall beyond the specified limit, 2) no accepted sample exhibits a permeability exceeding the standard by a factor of more than 1.5, and 3) the arithmetic average of all samples (including the variants) meets the permeability standard.

3.2.3. Test Pad Option

The Owner/Operator may elect to construct one or more test pads to verify that his materials and procedures will produce the required vertical permeability for barrier soils (compacted clay liner, intermediate cover layer, protective soil layers). In such a case, the test pad will be constructed using the proposed material and procedures, to the requirements, and using the CQA program in these specifications and Plan. The test pad(s) will be at least as thick as the proposed barrier unit(s) and have an area such that the equipment reaches full speed and there is adequate clearance (12 feet minimum) between a field test and the top edge of the pad.

In addition to the normal CQA testing, the pad may be tested using the Sealed, Double-Ring Infiltrometer (ASTM D5093) and/or a five-test group of the Two-Stage Borehole Test

(ASTM D6391). If the field test program meets the permeability requirement, the laboratory permeability test frequency specified for that barrier component can be reduced to one-half the values on Table CQA-1.

3.3. Construction Control

3.3.1. Visual Inspection

The CQA Technician shall maintain visual inspection of all liner material placement, processing, and compaction. He shall specifically observe for the presence of roots, sticks, stones, or other deleterious matter, and for clod size. All of these items shall conform to the Specifications or the CQA Technician shall record the discrepancy in his DFR, bring it to the Contractor's attention, and record it in the appropriate DFR when the discrepancy is corrected.

3.3.2. Lift Thickness

The CQA Technician shall verify the loose lift thickness as specified on Table CQA-1. This shall be done by making a shovel hole through the loose material, but shall not damage any underlying liner. The depth shall be measured from a straightedge across the hole, and to the nearest ½ inch. Upon completion of the measurement, the hole shall be refilled. If the measured deviation in thickness exceeds 10% of the specified value, the area shall be considered as "FAIL." Should there be a smaller deficiency, the CQA Technician may immediately retest at two locations within 10 feet of the original test. If the average of the three tests is a "PASS," the area shall be considered as "PASS," and no further action is necessary. Otherwise, the area shall be brought into conformity. All locations shall be recorded and clearly identified (e.g., grid point and lift number).

3.3.3. Field Moisture/Density Testing

3.3.3.1. *Frequency and Documentation.* Field moisture and density tests will be performed at a frequency at least equal to that given on Table CQA-1. The minimum test locations will be determined on a random basis as prescribed by the CQA Consultant. Each test must be referenced to site/cell grid coordinates and lift number. All tests shall be recorded. Failing tests shall be specifically tracked until the failed area is reworked and retested satisfactorily. Each test must meet both the required moisture and density criteria as indicated in Table CQA-1 to "Pass." Every test must be specifically marked "Pass" or "Fail."

3.3.3.2. *Procedure.* Allowable test procedures are tabulated below; all are ASTM methods:

Method	Density	Moisture
Nuclear	D2922	D3017
Sand Cone	D1556	D2216
Drive Cylinder	D2937	D2216
Balloon	D2167	D2216

All holes made into compacted liner material must be backfilled. Dry bentonite pellets or crumbles shall be tamped lightly into the hole, then wetted. The hole shall then be covered with moist liner soil and tamped.

3.3.3.3. *Action in Case of Failure*

Failure. If the test yields a compaction more than 1.0 percentage point below that required by the Specifications or if its moisture content is more than 1.0 percentage point outside the range given in the Specifications, it is a failure. Such areas shall be reworked and retested until satisfactory results are obtained. The CQA Technician shall promptly inform the Owner's Project Manager and the Contractor of all failing tests.

Marginal Test. If a test is closer to the Specifications than the limits stated above but not a clear "Pass," the CQA Technician may, at his discretion, follow the Marginal Test procedure. Three more field moisture/density tests shall be performed within a three-foot radius of the marginal test. If all of these tests and the average of these three plus the marginal test pass on both moisture and density, the combined test is considered to "Pass." Otherwise, the test is a "Fail," and Section 3.3.3.3 (Failure) above applies. The CQA Technician shall clearly record combined tests.

3.3.3.4. *Calibration (Nuclear Tests).* The laboratory calibration given in ASTM D2922 and ASTM D3017 shall be performed at least every other year. Checks using the Calibration Block shall be made at the beginning and end of each shift.

At least one moisture content per day shall be conducted according to ASTM D2216 on a sample secured from a field moisture/density test location. The sample shall be referenced to this field test. In addition, the CQA Consultant shall check the moisture and density results from each permeability and strength test against the data from the corresponding field density test. The CQA Consultant shall determine the correction factor for the Nuclear Gauge from this data. This correction factor must be used by the CQA Technician until changed by the CQA Consultant.

3.3.3.5. *Proctor Compaction Tests.* A Standard Proctor Test (ASTM D698) will be available for each Approved Material (Section 3.1.2). Additional Standard Proctor Tests will be performed as necessary to meet the frequency requirements of Table CQA-1. The sampling dates and locations for these tests will be at the discretion of the CQA Technician (Lead CQA Technician, if present) or CQA Consultant. Samples shall be identified and controlled following Section 3.2.1. Each Proctor shall have a minimum of four moisture-density points. The material from each Standard Proctor test shall also be tested for Atterberg limits (ASTM D4318), and percent passing the No. 200 sieve (ASTM D1140). The full particle size analysis (ASTM D422) may be required at the discretion of the CQA Consultant.

3.3.4. Permeability Tests

3.3.4.1. *Frequency and Documentation.* Samples for permeability tests shall be secured at a frequency not less than that given on Table CQA-1. The minimum sampling locations will be determined on a random basis as prescribed by the CQA Consultant. Each sample location will be in close proximity to a field moisture/density test; that test number will be recorded on the Sample Control Sheet. The sample will further be identified by site grid and lift number.

3.3.4.2. *Sampling Methodology.* The permeability samples shall be taken at a location no closer to the field moisture and density test hole than six inches, nor further than 12 inches. All loose surface material shall be removed prior to sampling. The samples shall be taken using the three-inch drive cylinder method (ASTM D2937), except that field weighing is not required. The permeability sample shall be the full size of the ring for at least two inches in length and have axis perpendicular to the face of the compacted clay for parallel lift construction. However, in no case shall a sampler be driven to within three inches of a geomembrane. Block samples may be taken with subsequent trimming

performed in the laboratory. The CQA Technician shall check the sample for obvious defects caused by sampling. Any defective or short sample shall be discarded and a new sample taken no closer to the previous location than six inches but still complying with the above. The hole(s) shall be backfilled with bentonite pellets or crumbles in accordance with Section 3.3.3.2.

The sample shall be trimmed so that none protrudes from the drive cylinder. It shall then be capped, placed into a plastic bag, which shall be indelibly marked with the same information as required for the Sample Control Sheet. It shall be returned to the laboratory under Sample Control as soon as possible.

- 3.3.4.3. *Testing.* The samples shall be tested according to the methodology specified on Tables CQA-1. In addition to permeability, each sample shall be tested for dry density, moisture content (ASTM D2216), Atterberg limits (ASTM D4318), and percent passing the No. 200 sieve (ASTM D1140). The full particle size analysis (ASTM D422) may be required at the CQA Consultant's discretion.
- 3.3.4.4. *Nonconformity.* Any discrepancies must be handled directly by the CQA Consultant. The laboratory technician shall keep the CQA Consultant informed of the status of all permeability testing. If a sample fails, the CQA Consultant shall immediately inform the CQA Consultant, the on-site CQA Technician, and the Owner's Project Manager by telephone, confirming with a memo as soon as practicable. The area to be reworked shall be determined by the CQA Consultant and proposed to the Owner's Project Manager. Such area shall be reworked, and then retested for moisture/density (Section 3.3.3) and for permeability following Section 3.3.4.

3.3.5. Overall Component Thickness

- 3.3.5.1. *Compacted Soil Liner.* The thickness shall be determined by before-and-after surveys in conformance with Sections 2.3.2 and 2.3.3. The thickness of sloped components shall be determined perpendicular to the slope face.
- 3.3.5.2. *Soil Components of Cover.* If necessary, the thickness of each soil component shall be determined by hand boring or excavation on a grid as described in Section 2.3.3, except that the spacing shall not exceed 100 feet. All resulting holes shall be backfilled with bentonite pellets or crumbles.

3.3.5.3. *Variances.* The CQA Consultant may grant variances from the thickness requirements provided that: 1) the point is not deficient by more than 0.1 feet, 2) no more than 5% of points are deficient, 3) these points are not concentrated in one area, and 4) the average thickness (including the deficient points) meets or exceeds the specified value.

4. SYNTHETIC LINER

4.1. Material Acceptance

4.1.1. New Material

A new material is any material delivered to the site with approved manufacturer verification data sheets and bill of lading, but which has not been previously approved by the CQA Consultant. The CQA Technician shall inventory all materials as they are received on site. Any noticeable defects of the delivered material will be documented and suspect rolls segregated. Any materials without approved manufacturer verification will also be segregated.

4.1.2. Approved Material

An Approved Material is one which has been previously approved (in writing) by the CQA Consultant. The CQA Consultant shall review all manufacturer verification tests for specified minimum material properties and frequency of such tests before written approval is given. Confirmatory tests, which may be the manufacturer's tests, are also required prior to material approval. It is the intent herein that the manufacturer's QC and manufacturing tests will be used in lieu of confirmatory materials testing by the Owner or his agent.

4.2. Material Verification

4.2.1. Sampling and Documentation

The CQA Technician will inventory, sample, and document all materials when they are delivered on site. Each roll of material will be sampled and the sample archived for the duration of the project. Additional confirmatory tests may be performed on the samples obtained.

4.2.2. Test Types and Frequencies

Test types and frequency for synthetic liners shall closely follow the most recent version of the specifications issued by the Geosynthetic Research Institute. At the discretion of the Design Engineer, test types or frequencies can be modified. Such modifications shall be presented in written to the CQA Consultant.

4.3. Construction Control

4.3.1. Visual Inspection

The CQA Technician shall maintain visual inspection during all phases of liner deployment. During deployment, oversight and documentation will follow the guidelines listed below:

- Overlap of panels will be measured every 25 feet prior to seaming;
- All scratches, punctures, tears and crimps will be documented and repaired;
- All seaming will be continuously inspected and documented as vacuum and/or air pressure tests. Seams on the slopes shall run up and down the slopes not across the slopes;
- No personnel working on the synthetic liner shall smoke, wear damaging shoes, or engage in other activities that could damage the synthetic liner;
- The method used to unroll the synthetic liner shall not cause scratches or crimps in the synthetic liner and shall not damage the supporting soil or underlying surface;
- All necessary steps will be taken to minimize the wrinkles. The number of wrinkles shall be identified as to location and submitted for approval;

- Adequate loading (e.g. sand bags, or similar items that will not damage the synthetic liner) shall be placed to prevent uplift by wind; and,
- As-built drawings will be made by the Contractor and verified by the CQA Technician during construction of the liner. Construction drawings shall include at least the locations of all welded seams, patches, caps, destructive test locations, and panel numbers.

4.3.2. Seam Testing

See Section 5 for bonded HDPE/GCL products. The references to welding within this Section refer to non-bonded products.

4.3.2.1. *Field Test Welds.* Field test welds are a performance test for the welder and his welding equipment. Such testing will be required each day welding is performed, with a minimum of the beginning and end of each shift for all welders and their machines. Section 4.3.2.2 addresses the procedures for performing field test welds. Each test will be documented on a specific test form and in the DFR.

4.3.2.2. *Non-Destructive Testing.* All non-destructive seam testing will be continuously performed and documented on all welded seams, patches and repairs. The following paragraphs address both test procedures for vacuum and air pressure testing and retest procedures.

- Visual Inspection: The CQA Technician shall verify that the seam area is clean and ready for welding. He shall also observe the welding operation for continuity, bond, specified welding sequence, sand bagging, etc. The CQA Technician shall verify that no adhesives are used, even for holding edges in place temporarily.

- Air Pressure Testing: Seal both ends of the seam to be tested. Insert needle or other approved pressure feed device into the sealed channel. Inflate the test channel. Inflate the test channel to pressure of 30 psi, close valve, and observe initial pressure after approximately two minutes.

Initial pressure settings are read after a two-minute “relaxing period” ends and the initial pressure is determined. If the pressure does not stabilize, locate the

faulty area and repair it in accordance with this section. Observe and record the air pressure five minutes after “relaxing period” ends and initial pressure setting is determined. The difference of the initial pressure and final pressure should be less than three psi.

At the conclusion of the pressure test, the end of the seam opposite the pressure gauge is cut. A decrease in gauge pressure must be observed or the air channel will be considered “blocked” and the test will have to be repeated after the blockage is corrected.

Remove needle or other approved pressure feed device and seal hole by extrusion welding.

- Vacuum Box Welding: The procedure shall conform to ASTM D4437. A biodegradable soap solution is first applied to the seam section (approximately three feet long) to be tested. The vacuum box suction tester is placed over that section of seam. Any leakage which shows as bubbles in the soap solution constitutes a failure. Each Vacuum Box Test shall overlap the previous test by at least three inches. The absolute pressure in the box shall be maintained 10 to 15 seconds at two to four psi (four to eight inches of mercury) during the test.

In the event of a non-complying Air Pressure or Vacuum Box Testing (or both), the following retest procedure shall be followed:

- Air Pressure Testing:
 - A. Check Seam and rerun test.
 - B. If non-compliance with specified maximum pressure differential re-occurs, the seam may be divided in half, and each half pressure-tested to locate the leak. This is totally dependent upon the length of the seam.
 - C. Alternate to (B), would be to remove the overlap (if any) left by the wedge welder and vacuum test the entire seam in accordance with the Vacuum Box Test procedure described above.
 - D. If the leak is located by either pressure or vacuum test, it shall be

repaired by extrusion welding and vacuum tested until the section passes.

- Vacuum Testing:
 - A. Check seam and rerun test.
 - B. Mark all areas where soap bubbles appear.
 - C. Repair areas of non-conformance by patching or capping by extrusion welding with a minimum overlap of four inches.
 - D. Retest all repaired areas in accordance with the Vacuum Box Test procedure described above.

4.3.2.3. *Destructive Testing.* Destructive samples will be obtained from the welded production seams at a minimum frequency of one sample per 500 lineal feet of seam but not less than one sample per day. The following paragraphs discuss the procedures for sampling, testing and repairing destructive samples, and areas of sampling. Acceptance criteria shall follow the most recent version of the specifications for geomembrane seams (GM19) issued by the Geosynthetic Research Institute.

- Frequency of Sampling/Testing: Actual production welded samples of the synthetic liner shall be obtained at intervals not exceeding 500 lineal feet of seam, but not less than one daily. All areas of destructive testing shall be patched, repaired, and then tested in accordance with Section 4.3.2.2.
- Sampling: Field weld samples shall be at least one foot wide and two feet long. The seam shall be roughly centered in the sample. The samples shall be secured with a sharp knife, taking care not to damage any underlying component.
- Retest Procedure: In the event of a non-complying peel or shear test, the following procedure shall be followed:
 - A. If a production sample fails the strength criteria, additional samples shall be obtained ten feet from the failure in both directions along the seam following the procedures mentioned in this subsection for sampling and

testing.

- B. Should these additional samples fail, the procedure in A should be repeated until the failing area is delineated.
- C. After the failing seam area has been delineated, the entire failed area shall be capped. After capping, the capped seam shall be tested by Vacuum Box Testing. If no leaks are encountered, the capped area is considered acceptable.

5. GEOSYNTHETIC CLAY LINER (GCL)

5.1. Material Acceptance

5.1.1. New Material

A new material is any material delivered to the site with approved manufacturer verification data sheets and bill of lading, but which has not been previously approved by the CQA Consultant. The CQA Technician shall inventory all materials as they are received on site. Any noticeable defects of the delivered material will be documented and suspect rolls segregated. Any materials without approved manufacturer verification will also be segregated.

5.1.2. Approved Material

An Approved Material is one which has been previously approved (in writing) by the CQA Consultant. The CQA Consultant shall review all manufacturer verification tests for specified minimum material properties and frequency of such tests before written approval is given. Confirmatory tests, which may be the manufacturer's tests, are also required prior to material approval. It is the intent herein that the manufacturer's QC and manufacturing tests will be used in lieu of confirmatory materials testing by the Owner of his agent.

5.2. Material Verification

5.2.1. Sampling and Documentation

The CQA Technician will inventory, sample, and document all materials when they are delivered on site. Each roll of material will be sampled and the sample archived for the duration of the project. Confirmatory tests may be performed on the samples obtained.

5.2.2. Test Types and Frequencies

Test types and frequency for GCL shall closely follow the most recent version of the specifications issued by the Geosynthetic Research Institute. At the discretion of the Design Engineer, test types or frequencies can be modified. Such modifications shall be presented in writing to the CQA Consultant.

5.3. Construction Control

Installation of GCL shall include a generous 12-inch overlap of adjacent panels. Panels shall be installed down a slope in the direction of flow, not along a slope perpendicular to flow. The GCL may have a HDPE geomembrane bonded to its top. If the HDPE geomembrane is bonded to the GCL no welding of the HDPE is required. However, if the HDPE geomembrane is not bonded to the GCL, the geomembrane shall be welded and tested in accordance with Section 4 of this document and the project specifications.

5.3.1. Visual Inspection

The CQA Technician shall maintain visual inspection during all phases of liner deployment. During deployment, oversight and documentation will follow the guidelines listed below:

- Overlap of panels will be measured every 25 feet;
- All punctures, tears, perforations and crimps will be documented and repaired;
- All seaming, when applicable, will be continuously inspected and documented;
- No personnel working on the GCL shall smoke, wear damaging shoes, or engage in other activities that could damage the synthetic liner;
- The method used to unroll the GCL shall not cause tears or crimps in the liner and shall

not damage the supporting soil or underlying surface. A rub sheet may be used to reduce friction damage during placement;

- All necessary steps will be taken to minimize the wrinkles. The number of wrinkles shall be identified as to location and submitted for approval;
- Adequate loading (e.g. sand bags, or similar items that will not damage the synthetic liner) shall be placed to reduce uplift by wind; and,
- As-built drawings will be made by the Contractor and verified by the CQA Technician during construction of the liner. Construction drawings shall include at least the locations of all seams, patches, caps, test locations, and panel numbers.

5.3.2. Seams

GCL seams are constructed by overlapping adjacent edges. Care should be taken to ensure that the overlap area does not contain loose soil. Seams at the ends of GCL panels should be shingled in the direction of the slope to prevent runoff from entering the seam. Bentonite enhanced seams, when required, are constructed by exposing the underlying edge and applying a continuous bead of granular sodium bentonite along the exposed edge and the overlying GCL.

5.3.3. Repairs

If the GCL is damaged during installation, repairs may be made by cutting a patch to cover the damaged area. The patch should be cut so as to provide a minimum overlap of 12 inches around the entire damaged area. Use a sharp utility knife to cut the GCL. Frequent blade changes may be required to keep a sharp knife blade and thereby avoid damage to the GCL. Dry bentonite or a bentonite mastic may be applied around the damaged area prior to placing the patch. An adhesive may be desired to ensure that the patch is not displaced during subsequent cover material placement.

6. LEACHATE COLLECTION SYSTEM

6.1. Material Acceptance

6.1.1. New Material

The materials for this component of the liner system consist of sand, leachate pipe, gravel, geonet, geocomposite and geotextile. The pipe, geonet, geocomposite, and geotextile will be inventoried by the CQA Technician upon arrival on site. The manufacturer's verification data sheet will be reviewed upon delivery. The sand and gravel will be sampled and tested prior to use.

6.1.2. Approved Material

An Approved Material is one for which approval has been previously granted in writing by the CQA Consultant. The CQA Technician shall review all manufacturer's verification test for the pipe, geonet, geocomposite, and geotextile. The CQA Technician shall also review the gradation test for the gravel to assure minimum specifications are met. The sand will be tested at the Soil Quality Assurance Laboratory for permeability. This will be performed prior to approval.

6.2. Material Verification

6.2.1. Sampling and Documentation

The CQA Technician will inventory, sample, and document all materials as they arrive on site. Archive samples will be maintained for each roll of geonet, geocomposite, and geotextile and each bundle of pipe for the duration of the project. Gravel and sand samples will be archived at the Soil Quality Assurance Laboratory after testing.

6.2.2. Test Types and Frequencies

Test types and frequency for geonet, geocomposite, and geotextiles shall closely follow the most recent version of the specifications issued by the Geosynthetic Research Institute. At the discretion of the Design Engineer, test types of frequencies can be modified. Such modifications shall be presented in written to the CQA Consultant.

6.3. Construction Control

6.3.1. Visual Inspection

The CQA Technician shall maintain visual inspection during all phases of the leachate collection system construction. All construction will be performed in accordance with the specifications and construction drawings. Daily documentation will be recorded on the DFRs.

6.3.1.1. *Sand.* The drainage sand layer, when used, will be checked for type and thickness; it will also be sampled and tested to meet the following standards:

- The sand shall be free of any metals, roots, tree stumps, concrete, construction debris, or any other organic matter or deleterious material.
- The drainage sand shall have a minimum permeability of 1×10^{-2} cm/sec based on falling head permeability testing in accordance with EM 1110-2-1906, Appendix VII, or other acceptable procedure. Permeability tests shall be performed on sand samples in a frequency of one test for every 5 acres.
- The drainage layer sand shall be classified as SW or SP in accordance with the Unified Soil Classification System (U.S.C.S) and shall not be gap graded. As guidance, the material shall contain less than five percent (by dry weight) passing the No. 200 sieve with 100 percent (by dry weight) passing the 3/4-inch sieve, no more than 60 percent (by dry weight) passing the No. 10 sieve, and no more than 10 percent (by dry weight) passing the No. 20 sieve. However, the minimum permeability of 1×10^{-2} cm/sec governs over the gradation discussed above.

6.3.1.2. *Pipe.* Leachate pipe installation will be checked for type, location, elevations, and orientations of the perforations.

6.3.1.3. *Gravel.* The gravel pack placement around the leachate pipe, when used, will be inspected and documented for size. There are no specific dry density or moisture content requirements for the placement. The gravel pack shall be constructed in such a manner that the finished product is dense and compact, and neither damages nor shifts the pipe. The gravel will be sampled and tested as outlined in Table CQA-2.

- 6.3.1.4. *Geotextile*. Installation of the geotextile shall be performed in accordance with plans and specifications. For the gravel pack, the material will be placed so that the wrap overlap is at least 12 inches, or as specified in the construction drawing. The wrap overlap will be observed and reported on the DFRs.

7. CLOSURE TURF™ (OR EQUIVALENT) FINAL COVER SYSTEM

The installation of the Closure Turf™ (or equivalent final cover system) is addressed in this section. This cover system consists of:

- 12-inch minimum interim earthen material over waste material;
- 50-mil LLDPE structured drainage geomembrane (Agru Super Gripnet®, or equivalent);
- Synthetic turf component consisting to two woven geotextiles tufted with artificial grass; and
- One-half inch of sand, anchoring the turf to the surface of the landfill.

Alternative manufacturers of the synthetic materials may be used as long as materials conform to specifications presented on Tables CQA-3 and CQA-4. At the discretion of the Design Engineer, test types of frequencies can be modified. Such modifications shall be presented in written to the CQA Consultant.

7.1. Material Acceptance

7.1.1. New Material

The materials for this system consist of sand, synthetic turf, and LLDPE structured drainage geomembrane. The materials will be inventoried by the CQA Technician upon arrival on site. The manufacturer's verification data sheet will be reviewed upon delivery.

7.1.2. Approved Material

An Approved Material is one for which approval has been previously granted in writing by the CQA Consultant. The CQA Technician shall review all manufacturer's verification tests for the components including the gradation test for the sand to assure that the minimum specifications are met.

7.2. **Material Verification**

The CQA Technician will inventory, sample, and document all materials as they arrive on site. Archive samples will be maintained for each roll of geosynthetic liner, and synthetic turf, or at the discretion of the CQA Engineer. The manufacturer's QC and manufacturing test data may be used in lieu of materials testing by the Owner or his agent.

7.3. **Construction Control**

7.3.1. Visual Inspection

The CQA Technician shall maintain visual inspection during construction of the final cover system. All construction will be performed in accordance with the specifications and construction drawings. Daily documentation will be recorded on the DFRs.

7.3.1.1. *Subgrade*. The subgrade surface should be free of large stones or any object that would penetrate or otherwise compromise the geosynthetic layers of the cover system.

7.3.1.2. *Geomembrane*. During deployment, oversight and documentation will follow the guidelines listed below.

- Five-inch overlap of panels will be confirmed prior to seaming;
- All scratches, punctures, tears and crimps will be documented and repaired;
- All seaming will be continuously inspected and documented as air pressure tests. Seams on the slopes shall run up and down the slopes not across the slopes;
- No personnel working on the synthetic liner shall smoke, wear damaging

shoes, or engage in other activities that could damage the synthetic liner;

- The method used to unroll the synthetic liner shall not cause scratches or crimps in the synthetic liner and shall not damage the supporting soil or underlying surface;
- All necessary steps will be taken to minimize the wrinkles. The number of wrinkles shall be identified as to location and submitted for approval;
- Adequate loading (e.g. sand bags, or similar items that will not damage the synthetic liner) shall be placed to prevent uplift by wind during the construction process; and,
- As-built drawings will be made by the Contractor and verified by the CQA Technician during construction of the liner. Construction drawings shall include at least the locations of all welded seams, patches, destructive test locations, and panel numbers.

7.3.1.3. *Synthetic Turf.* Observations shall be made to ensure that the synthetic turf consists of two woven lower geotextiles tufted with 1-1/4 inch long yarns. The manufacturer shall confirm a material weight of at least 19 oz./sq.yd.

Seaming operations shall be monitored for overlap, seam quality and completion. Sand bags or similar type anchors may be used along the edges of panels to prevent uplift during installation.

7.3.1.4. *Sand.* The sand layer will be checked for type and thickness:

- The sand shall be free of any metals, roots, tree stumps, concrete, construction debris, or any other organic matter or deleterious material.
- The sand ballast will be classified as SP/SW in accordance with the U.S.C.S. The material shall have gradation of approximately ten percent coarse and ten percent fine sands, or as approved by the Design Engineer.

7.3.2. Seam Testing

This section addresses seam testing requirements of the 50-mil LLDPE structured drainage geomembrane (Agru Super Gripnet®, or equivalent).

7.3.2.1. *Field Test Welds.* Field test welds are a performance test for the welder and his welding equipment. Such testing will be required each day welding is performed, with a minimum of the beginning and end of each shift for all welders and their machines. Section 7.3.2.3 addresses the procedures for performing field test welds. Each test will be documented on a specific test form and in the DFR.

7.3.2.2. *Non-Destructive Testing.* All non-destructive seam testing will be continuously performed and documented on all welded seams.

- **Visual Inspection:** The CQA Technician shall verify that the seam area is clean and ready for welding. He shall also observe the welding operation for continuity, bond, specified welding sequence, sand bagging, etc. The CQA Technician shall verify that no adhesives are used, even for holding edges in place temporarily.
- **Air Pressure Testing:** Inflate the test channel to pressure of 30 psi, close valve, and observe pressure drop for five minutes. The difference of the initial pressure and final pressure should be less than three psi. If the pressure does not stabilize or seam does not meet this criterion, locate the faulty area and patch it using extrusion welding.

7.3.2.3. *Destructive Testing.* Destructive samples will be obtained from the welded production seams. The following paragraphs discuss the procedures for sampling, testing, and repairing destructive samples. Testing frequency and acceptance criteria shall follow Tables CQA-3 and CQA-4.

- **Frequency of Sampling/Testing:** Actual production welded samples of the synthetic liner shall be obtained at intervals not exceeding 500 linear feet of seam, but not less than one daily. The samples shall be tested for shear and peel strength.

- Sampling: Field weld samples shall be at least one foot wide and two feet long. The seam shall be roughly centered in the sample. The samples shall be carefully secured with a sharp knife.
- Repairing: All areas of destructive testing shall be patched using extrusion welding. Prior to extrusion welding the spikes of the drainage layer shall be grinded down to allow for better contact between the sheets.

8. EXPOSED GEOMEMBRANE FINAL COVER SYSTEM

The installation of the exposed geomembrane final cover system is addressed in this section. The cover system is as follows:

- 12-inch minimum interim earthen material over waste material; and
- 60-mil HDPE geomembrane.

Test types and frequency for exposed geomembranes shall closely follow the most recent version of the specifications issued by the Geosynthetic Research Institute. At the discretion of the Design Engineer, test types or frequencies can be modified. Such modifications shall be presented in writing to the CQA Consultant.

8.1. Material Acceptance

8.1.1. New Material

The materials for this system consist of HDPE geomembrane. The geomembrane will be inventoried by the CQA Technician upon arrival on site. The manufacturer's verification data sheet will be reviewed upon delivery.

8.1.2. Approved Material

An Approved Material is one for which approval has been previously granted in writing by the CQA Consultant. The CQA Technician shall review all manufacturer's verification tests for the geomembrane.

8.2. Material Verification

The CQA Technician will inventory, sample, and document all geomembrane as it arrives on site. Archive samples will be maintained for each roll of geomembrane liner or at the discretion of the CQA Engineer. The manufacturer's QC and manufacturing test data will be used in lieu of materials testing by the Owner or his agent.

8.3. Construction Control

8.3.1. Visual Inspection

The CQA Technician shall maintain visual inspection during construction of the final cover system. All construction will be performed in accordance with the specifications and construction drawings. Daily documentation will be recorded on the DFRs.

8.3.1.1. *Subgrade*. The subgrade surface should be free of large stones or any object that would penetrate or otherwise compromise the geomembrane layer of the cover system.

8.3.1.2. *Geomembrane*. During deployment, oversight and documentation will follow the guidelines listed below.

- Five-inch overlap of panels will be confirmed prior to seaming;
- All scratches, punctures, tears and crimps will be documented and repaired;
- All seaming will be continuously inspected and documented as air pressure tests. Seams on the slopes shall run up and down the slopes not across the slopes;
- No personnel working on the synthetic liner shall smoke, wear damaging shoes, or engage in other activities that could damage the synthetic liner;
- The method used to unroll the synthetic liner shall not cause scratches or crimps in the synthetic liner and shall not damage the supporting soil or underlying surface;

- All necessary steps will be taken to minimize the wrinkles. The number of wrinkles shall be identified as to location and submitted for approval;
- Adequate loading (e.g. sand bags, or similar items that will not damage the synthetic liner) shall be placed to prevent uplift by wind during the construction process; and,
- As-built drawings will be made by the Contractor and verified by the CQA Technician during construction of the liner. Construction drawings shall include at least the locations of all welded seams, patches, destructive test locations, and panel numbers.

8.3.2. Seam Testing

This section addresses seam testing requirements of the 60-mil HDPE geomembrane.

8.3.2.1. *Field Test Welds.* Field test welds are a performance test for the welder and his welding equipment. Such testing will be required each day welding is performed, with a minimum of the beginning and end of each shift for all welders and their machines. Section 8.3.2.3 addresses the procedures for performing field test welds. Each test will be documented on a specific test form and in the DFR.

8.3.2.2. *Non-Destructive Testing.* All non-destructive seam testing will be continuously performed and documented on all welded seams.

- **Visual Inspection:** The CQA Technician shall verify that the seam area is clean and ready for welding. He shall also observe the welding operation for continuity, bond, specified welding sequence, sand bagging, etc. The CQA Technician shall verify that no adhesives are used, even for holding edges in place temporarily.
- **Air Pressure Testing:** Inflate the test channel to pressure of 30 psi, close valve, and observe pressure drop for five minutes. The difference of the initial pressure and final pressure should be less than three psi. If the pressure does not stabilize or seam does not meet this criterion, locate the faulty area and patch it using extrusion welding.

8.3.2.3. *Destructive Testing.* Destructive samples will be obtained from the welded production seams. The following paragraphs discuss the procedures for sampling, testing, and repairing destructive samples. Acceptance criteria shall follow the most recent version of the specifications for geomembrane seams (GM19) issued by the Geosynthetic Research Institute.

- Frequency of Sampling/Testing: Actual production welded samples of the synthetic liner shall be obtained at intervals not exceeding 500 linear feet of seam, but not less than one daily. The samples shall be tested for shear and peel strength.
- Sampling: Field weld samples shall be at least one foot wide and two feet long. The seam shall be roughly centered in the sample. The samples shall be carefully secured with a sharp knife.
- Repairing: All areas of destructive testing shall be patched using extrusion welding.

TABLES

**TABLE CQA-1
 COMPACTED CLAY LINER AND FINAL COVER SOIL COMPONENTS
 SPECIFICATIONS AND TESTING FREQUENCIES**

 #

Test	Method	Requirement	Frequency cu yd ⁽¹⁾	Frequency sq ft ⁽¹⁾
Standard Proctor Compaction with Atterberg Limits In-Place Dry Density	ASTM D698	N/A	6,500 ⁽²⁾	351,000 ⁽²⁾
	ASTM D4318			
	ASTM D2922 ⁽⁵⁾			
Water Content at Compaction Atterberg Limits (Loose Fills)	ASTM D3017 ⁽⁵⁾	0 to 3 > W _{opt} ⁽³⁾ (cover) 0 to 8 > w _{opt} ⁽³⁾ (bottom)	46	2,500
	ASTM D4318	LL ≥ 30, PI ≥ 15	3,000	162,000
Grain Size	ASTM D422 or ASTM D1140	≥ 50% - #200	6,500	351,000
	ASTM D5084 or EPA 9100D ASTM D 1140 ASTM D 4318			
Permeability with Grain Size and Atterberg Limits	Direct Measurement	≤ 1.0 x 10 ⁻⁷ cm/sec	806	43,560 (1 acre/lift)
Lift Thickness		≤ 8" loose; ≤ 6" compacted ⁽⁴⁾	N/A	N/A

#

(1) Per lift (conversions calculated based upon 6" lift thickness).

(2) At least one test per every 5 point liquid limit variation.

(3) As determined by standard Proctor compaction test for appropriate soil type, or, saturation >85%.

(4) Unless alternatives approved by geotechnical engineer.

(5) See alternate methods in Section 3.3.3.2.

TABLE CQA-2
GRAVEL FOR LEACHATE COLLECTION SYSTEM
SPECIFICATIONS AND TESTING FREQUENCIES

GRAVEL⁽¹⁾ (SAMPLE EVERY 500 CUBIC YARDS: TEST ASTM D422 or C136)	
U.S. Standard Sieve Opening	Percent Passing ⁽²⁾
1 ½"	100
1"	90 - 100
¾"	35 - 85
½"	25 - 60
No. 4	0 - 10
No. 8	0 - 5
No. 200	0 - 1

⁽¹⁾ Actual gradation should be able to produce permeability $\geq 1 \times 10^{-2}$ cm/sec.

⁽²⁾ As close as practicable and at the discretion of the Design Engineer.

**TABLE CQA-3
 STRUCTURED LLDPE GEOMEMBRANE COMPONENT OF
 CLOSURE TURF™ OR EQUIVALENT
 SPECIFICATIONS AND TESTING FREQUENCIES**

Responsible Party	Type of Test		Standard Test Method	Frequency of Testing
Resin Manufacturer	Resin	Density	ASTM D 1505	Per manufacturer quality control and every resin lot
		Melt Flow Index	ASTM D 1238 (90/2.16 and 190/21.6)	
	Resin/Compound Quality Evaluation		Per manufacturer's quality control specifications	Per manufacturer's quality control specifications
Geomembrane Manufacturer	Manufacturer's Quality Control		Testing per GRI Standard, GRI Test Method GM17 for 50 mil LLDPE ¹	
Conformance Testing by 3 rd Party Independent Laboratory*	Thickness ²		ASTM D 5994	Per manufacturer quality control requirements and every resin lot
	Drainage Stud Height		GRI GM12	
	Friction Spike Height		GRI GM12	
	Specific Gravity/Density		ASTM D 792, Method B	
	Carbon Black Content		ASTM D 4218	
	Carbon Black Dispersion		ASTM D 5596 ³	
	Tensile Properties		ASTM D 6693 Type IV Specimen	
3 rd Party CQA	Destructive Seam Field Testing ⁴	Shear & Peel	ASTM D 6392	Various for field, lab, and archive
Contractor	Non-Destructive Seam Field Testing	Air Pressure	GRI GM6	All dual-track fusion weld seams
		Vacuum	ASTM D 4437	All non-air pressure tested seams when possible
		Other		Concurrence of State

*Conformance Testing may or may not be performed at the discretion of the Owner or/and Engineer

¹ UV Resistance testing not required for geomembrane, which is to be immediately covered.

² Field thickness measurements for each panel must be conducted. Use ASTM D 5994 and perform 1 series of measurements among the leading edge of each panel, with individual measurements no greater than 5 feet apart. No single measurement will be less than the required nominal thickness in order for the panel to be acceptable.

³ Only near spherical agglomerates for 10 views: 9 views in category 1 or 2, and 1 view in category 3.

⁴ Break elongation calculated using 2-inch initial gauge length.

⁵ Passing criteria for seams are listed in Table CQA-4.

TABLE CQA-4
STRUCTURED LLDPE GEOMEMBRANE COMPONENT OF
CLOSURE TURF™ OR EQUIVALENT
PASSING CRITERIA

Property	Test Method	Minimum Required Property
Thickness, mils Minimum average Lowest individual reading Lowest individual of 8 of 10 readings	ASTM D 5994	47.5 42.5 45
Density, g/cc (maximum)	ASTM D 792, Method B	0.939
Drainage Stud Height (min. ave.)	GRI GM12	145
Friction Spike Height (min. ave.)	GRI GM12	175
Tensile Properties ¹ Break Strength, lb/in (min. ave.) Break Elongation, % (min. ave.)	ASTM D 6693, Type IV	105 300
Tear Resistance, lb (min. ave.)	ASTM D 1004	30
Puncture Resistance, lb (min. ave.)	ASTM D 4833	55
Break Resistance Strain, % (min)	ASTM D 5617	30
Carbon Black Content ² , %	ASTM D 1603	2.0 – 3.0
Oxidative Induction Time (OIT) (min. ave.) Standard OIT, minutes	ASTM D 3895	100
Carbon Black Dispersion ³ , Category	ASTM D 5596	1 or 2 and 3
Oven Aging at 85°C Standard OIT – % retained after 90 days or High Pressure OIT – % retained after 90 days	ASTM D 5721 ASTM D 3895 ASTM D 5885	35 60
Seam Properties Shear Strength, lb/in Peel Strength, lb/in	ASTM D 6392	100 78 (65, Extrusion Weld)

¹ Machine direction (MD) and cross machine direction (XMD) average values should be on the basis of 5 test specimens each direction. Break elongation is calculated using a gauge length of 2.0 inches.

² Other methods such as ASTM D 4218 or microwave methods are acceptable if an appropriate correlation can be established.

³ Only near spherical agglomerates for 10 views: 9 views in Category 1 or 2, and 1 view in Category 3.

⁴ The condition of the test should be 20 hr UV cycle at 75°C followed by 4 hr. condensation at 60°C.

⁵ UV resistance is based on percent retained value regardless of the original HP-OIT value.

Attachment E
Drawings

TANGIPAHOA PARISH REGIONAL SOLID WASTE FACILITY TANGIPAHOA PARISH, LOUISIANA

57510 Hano Road
Independence, Louisiana 70443
(985) 878-4403

Installation of Alternate Synthetic Final Cover at Landfill Cell 12

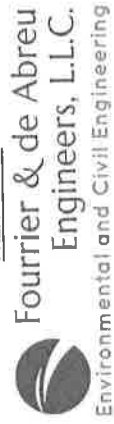
CONSTRUCTION DRAWINGS AND DETAILS

PREPARED FOR



Tangipahoa Parish Government
Amite, Louisiana

PREPARED BY

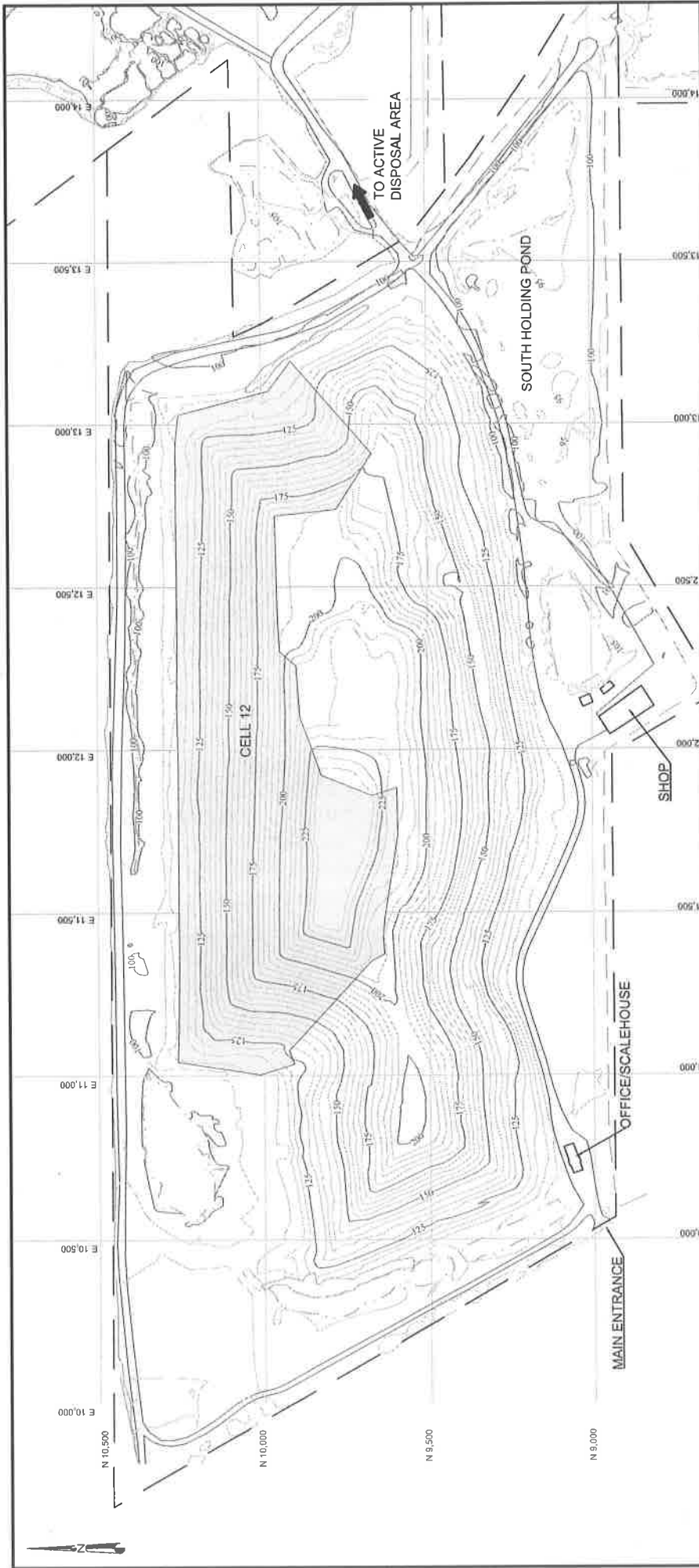


Fourrier & de Abreu Engineers, L.L.C.
10995 Coursey Blvd.
Baton Rouge, Louisiana 70816
(225) 677-7950

May 14, 2021

<u>Drawing No.</u>	<u>Drawing Title</u>	<u>Revision No.</u>	<u>Date</u>
FDAE-1	Project Location	0	05-14-2021
FDAE-2	Proposed Configurations	0	05-14-2021
FDAE-3	Stormwater Drainage System	0	05-14-2021
FDAE-4	SW Drainage - Open Area	0	05-14-2021
FDAE-5	Grading of Top Area	0	05-14-2021
FDAE-6	Typical Plan Details	0	05-14-2021
FDAE-7	Typical Plan Details 2	0	05-14-2021
FDAE-8	Headwall/Boot Typical Plan Details	0	05-14-2021





TANGIPAOHA PARISH REGIONAL SOLID WASTE FACILITY
INDEPENDENCE, LOUISIANA
 for
TANGIPAOHA PARISH GOVERNMENT
AMITE, LOUISIANA

CELL 12 - EXPOSED HDPE GEOMEMBRANE PROJECT LOCATION

Project Engineer: J. Deamer
 Project No.: TAN-058
 Date: 05/14/2021
 Drawing No.: FDAE-1

NOTES:

- This drawing is schematic only and intends to show the approximate location of the Cell 12 closure project area. This drawing should not be used for estimating distances, elevations, areas, volumes, quantities, etc.
- This drawing shows topographic contours which are based on aerial survey conducted on December 17, 2018 by Clack Land Surveying, L.L.C. Therefore, ground elevations and contours shown in this and other drawings of these plans may not reflect the actual elevations.

REFERENCE:

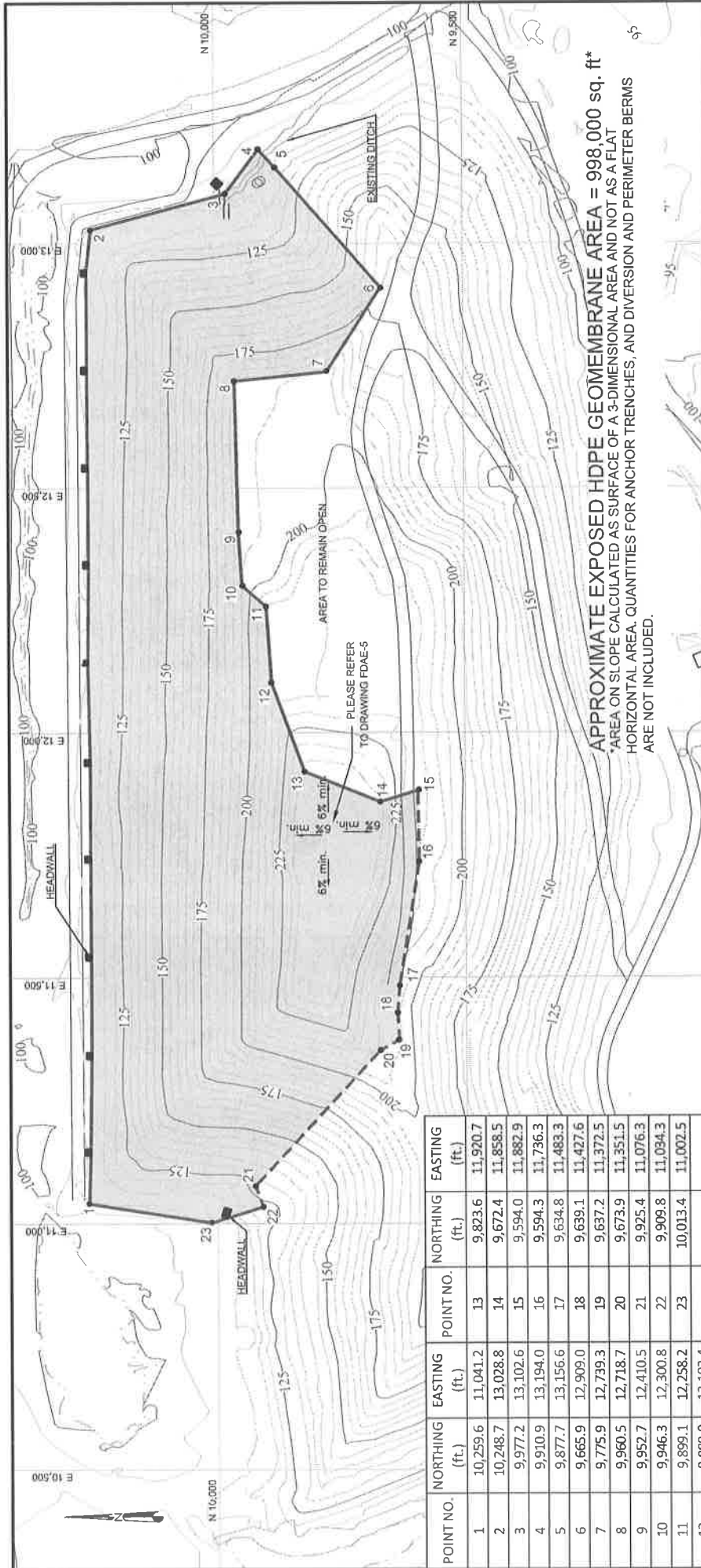
- Topographic survey performed on December 17, 2018 by Clack Land Surveying.

LEGEND:

- Topographic Contour: 125
- Edge of Water
- Edge of Travel Way
- Treeline
- Property Limits
- Project Area

SCALE: 1" = 300'

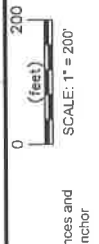
STATE OF LOUISIANA
RICARDO C. DE ABREU
 License No. 31257
 PROFESSIONAL ENGINEER
 CIVIL ENGINEERING
 05-14-2021



POINT NO.	NORTHING (ft.)	EASTING (ft.)	POINT NO.	NORTHING (ft.)	EASTING (ft.)
1	10,259.6	11,041.2	13	9,823.6	11,920.7
2	10,248.7	13,028.8	14	9,672.4	11,858.5
3	9,977.2	13,102.6	15	9,594.0	11,882.9
4	9,910.9	13,194.0	16	9,594.3	11,736.3
5	9,877.7	13,156.6	17	9,634.8	11,483.3
6	9,665.9	12,909.0	18	9,639.1	11,427.6
7	9,775.9	12,799.3	19	9,637.2	11,372.5
8	9,960.5	12,718.7	20	9,673.9	11,351.5
9	9,952.7	12,410.5	21	9,925.4	11,076.3
10	9,946.3	12,300.8	22	9,909.8	11,094.3
11	9,899.1	12,258.2	23	10,013.4	11,002.5
12	9,889.0	12,102.4			

LEGEND:

- Anchor Trench Locations
- Tie-in with existing Closure Turf
- Topographic Contour
- Access Road (to remain)
- Area to be Capped with Exposed HDPE Geomembrane (Project Area)
- Power Pole (to be removed by Owner)
- Culvert (to be removed by Owner)
- Headwall (to remain)



TANGIPAHOA PARISH REGIONAL SOLID WASTE FACILITY
INDEPENDENCE, LOUISIANA
 for
TANGIPAHOA PARISH GOVERNMENT
AMITE, LOUISIANA

FOURRIER & DE ABREU ENGINEERS, L.L.C.
 Environmental and Civil Engineering
 10985 COURSEY BLVD.
 BATON ROUGE, LA 70816
 Phone: 225-677-7950
 comaco@fdaengineers.com
 www.fdaengineers.com

CELL 12 - EXPOSED HDPE GEOMEMBRANE PROPOSED CONFIGURATION

LEGEND:

- Anchor Trench Locations
- Tie-in with existing Closure Turf
- Topographic Contour
- Access Road (to remain)
- Area to be Capped with Exposed HDPE Geomembrane (Project Area)
- Power Pole (to be removed by Owner)
- Culvert (to be removed by Owner)
- Headwall (to remain)

NOTES:

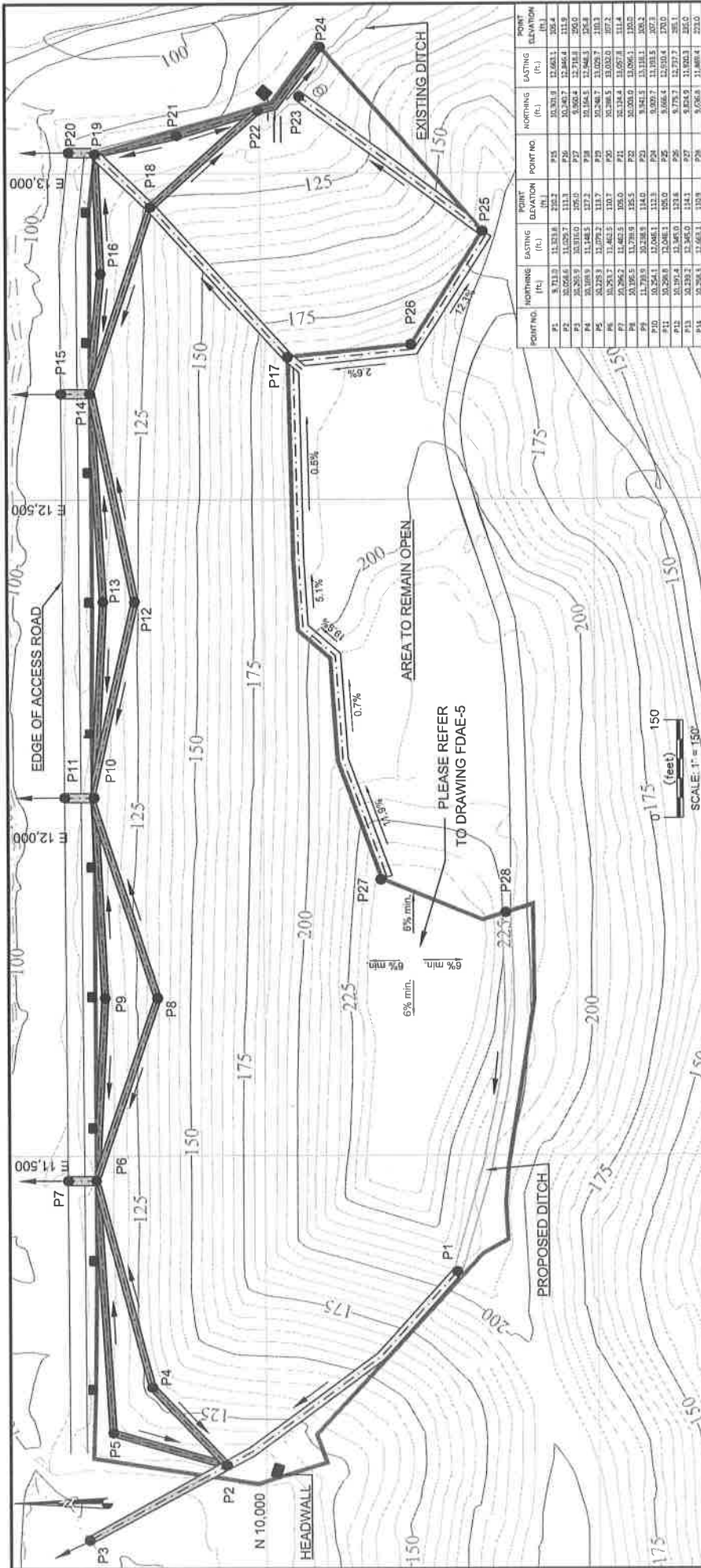
- Anchor trenches to be excavated and covered by Owner. Owner shall identify all interferences and underground utilities before construction. Please refer to drawings FDAE-6 and FDAE-7 for anchor trench details.
- Coordinates are in facility coordinates. Elevations are in foot, NAVD.

REFERENCE:

- Topographic survey performed on December 17, 2018 by Clack Land Surveying.



Project Engineer:	J. Deamer	Project No.:	TAN-058	Date:	05/14/2021	Drawing No.:	FDAE-2
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POINT NO.	NORTHING (ft.)	EASTING (ft.)	POINT ELEVATION (ft.)	POINT NO.	NORTHING (ft.)	EASTING (ft.)	POINT ELEVATION (ft.)
P1	8,173.0	11,533.8	228.2	P15	10,320.6	12,661.1	306.4
P2	10,026.6	11,029.7	111.3	P16	10,487.1	12,866.4	111.9
P3	10,285.9	10,116.0	106.0	P17	9,900.4	12,714.3	206.0
P4	10,109.9	11,148.5	117.2	P18	10,164.1	12,846.3	124.8
P5	10,229.3	11,079.2	111.7	P19	10,246.1	12,800.0	107.2
P6	10,262.2	11,462.5	106.0	P20	10,184.4	11,607.8	111.4
P7	10,262.2	11,462.5	106.0	P21	10,000.0	11,000.0	100.0
P8	11,710.0	10,338.6	114.0	P22	9,841.5	11,111.1	100.2
P9	10,264.1	12,046.1	112.3	P23	9,907.7	11,103.5	107.8
P10	10,264.1	12,046.1	112.3	P24	9,906.4	12,550.4	170.0
P11	10,194.4	11,851.0	118.6	P25	9,175.1	12,737.7	105.1
P12	10,194.4	11,851.0	118.6	P26	9,100.0	11,000.0	100.0
P13	10,194.4	11,851.0	118.6	P27	9,100.0	11,000.0	100.0
P14	10,194.4	11,851.0	118.6	P28	9,100.0	11,000.0	100.0

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 for
TANGIPAHOA PARISH GOVERNMENT
AMITE, LOUISIANA

CELL 12 - EXPOSED HDPE GEOMEMBRANE STORMWATER DRAINAGE SYSTEM

Project Engineer: J. Deamer
 Project No.: TAN-058
 Date: 05/14/2021
 Drawing No.: FDAE-3

LEGEND:

- Synthetic Final Cover Limits
- Topographic Contour
- Let-Down (Inside Exposed HDPE Geomembrane Area)
- Let-Down (Outside Exposed HDPE Geomembrane Area)
- Bottom Diversion Berm
- Perimeter Diversion Berm
- Top Diversion Berm
- Headwall (to remain)
- Power Pole (to be removed by Owner)
- Pipe (to be rerouted by Owner)

NOTES:

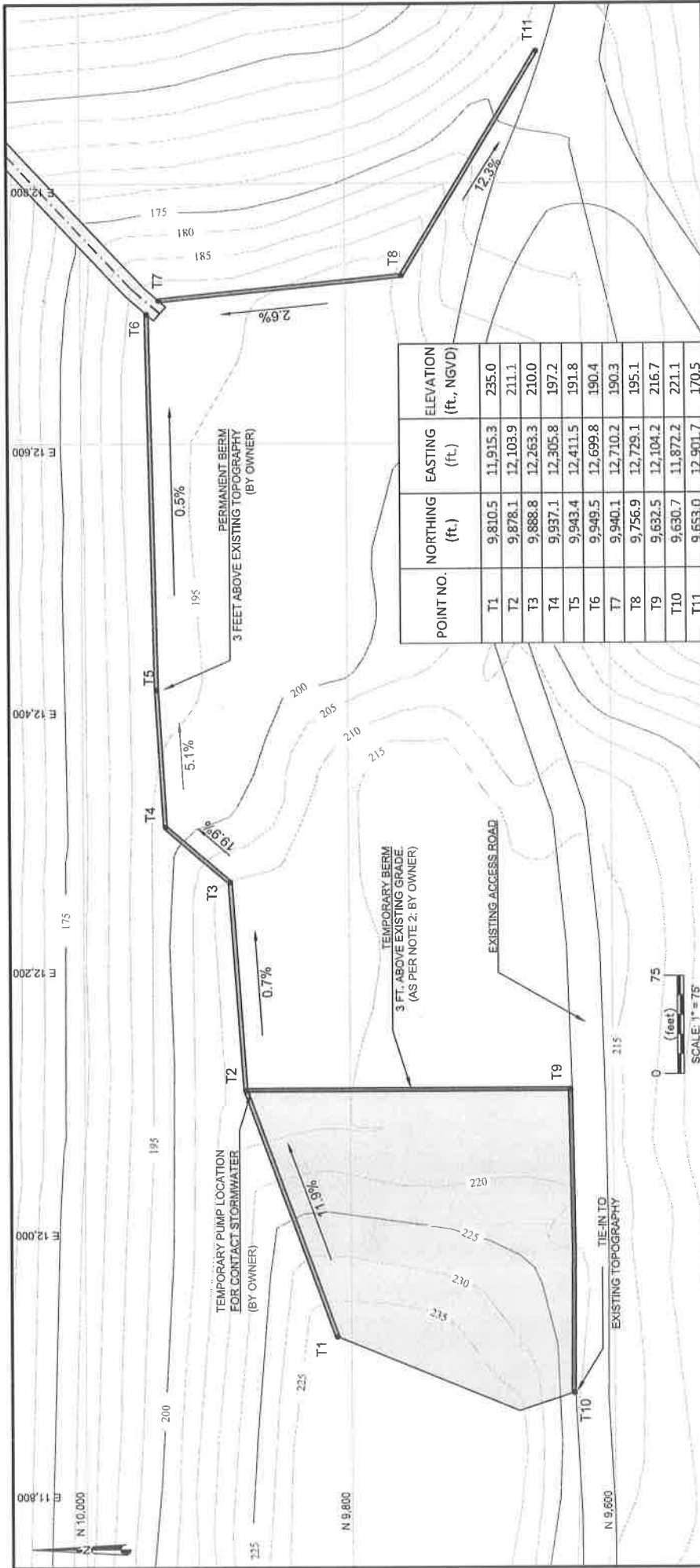
- This drawing shows the topographic survey of Cell 12, area by Clack Land Surveying dated December 17, 2018. Therefore, ground elevations and contours shown in this and other drawings of the plans may not accurately reflect the actual elevations in the area of Cell 12.
- Elevations shown for the stormwater drainage are approximate. Final as-built elevations shall allow the same drainage patterns as shown in this drawing. Minimum drainage slopes for diversion berms are 2%.
- Owner will be responsible for earthwork. Owner will identify all subsurface utilities and interferences prior to construction.
- Please refer to drawings FDAE-6 through FDAE-8 for details.

REFERENCE:

- Topographic survey performed on December 17, 2018 by Clack Land Surveying.

STATE OF LOUISIANA
RICARDO C. DE ABREU
 License No. 31257
 PROFESSIONAL ENGINEER
 CIVIL ENGINEERING
 05-14-2021

Environmental and Civil Engineering
Fournier & de Abreu Engineers, L.L.C.
 10985 COURSEY BLVD.
 BATON ROUGE, LA 70816
 Phone: 225-677-7950
 contact@fdaengineers.com
 www.fdaengineers.com



POINT NO.	NORTHING (ft.)	EASTING (ft.)	ELEVATION (ft., NGVD)
T1	9,810.5	11,915.3	235.0
T2	9,878.1	12,103.9	211.1
T3	9,888.8	12,263.3	210.0
T4	9,937.1	12,305.8	197.2
T5	9,943.4	12,411.5	191.8
T6	9,949.5	12,699.8	190.4
T7	9,940.1	12,710.2	190.3
T8	9,756.9	12,729.1	195.1
T9	9,632.5	12,104.2	216.7
T10	9,630.7	11,872.2	221.1
T11	9,653.0	12,901.7	170.5

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Fourtier & de Abreu
 Engineers, L.L.C.
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 10995 COURSEY BLVD.
 BATON ROUGE, LA 70816
 Phone: 225-677-7950
 contact@fdaengineers.com
 www.fdaengineers.com

CELL 12 - EXPOSED HDPE GEOMEMBRANE SW DRAINAGE - OPEN AREA

Project Engineer: J. Deatmer
 Project No.: TAN-058
 Date: 05/14/2021
 Drawing No.: FDAE-4

LEGEND:

- Topographic Contour
- Berm (Temporary) For Contact Stormwater Containment
- Berm (Permanent) For Non-contact Stormwater Management
- Let-Down (Inside Exposed HDPE Geomembrane Area)
- Future Initial Disposal Area (Approx. 1 acre)

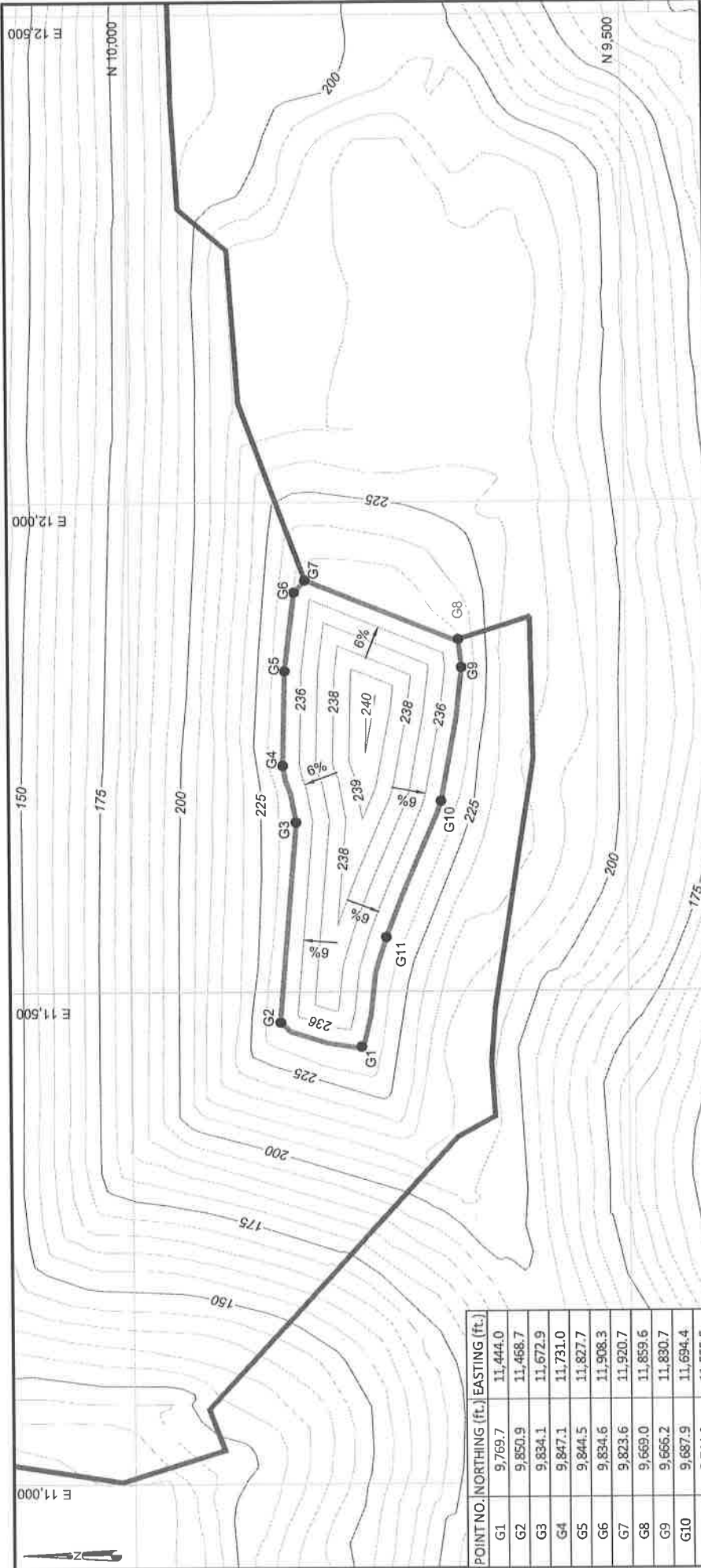
NOTES:

- Contact stormwater shall be pumped to the nearest Cell 12 headwall stormwater connection (by Owner).
- Top of berms are designed at approximately 3 feet above existing grade (by Owner).
- Temporary berms shall be installed prior to initial waste disposal at top of the cell.

REFERENCE:

- Topographic survey performed on December 17, 2018 by Clack Land Surveying.

RICARDO C. DE ABREU
 License No. 31297
 PROFESSIONAL ENGINEER
 STATE OF LOUISIANA
 05-14-2021



POINT NO.	NORTHING (ft.)	EASTING (ft.)
G1	9,769.7	11,444.0
G2	9,850.9	11,468.7
G3	9,834.1	11,672.9
G4	9,847.1	11,731.0
G5	9,844.5	11,827.7
G6	9,834.6	11,908.3
G7	9,823.6	11,920.7
G8	9,669.0	11,859.6
G9	9,666.2	11,830.7
G10	9,687.9	11,694.4
G11	9,744.0	11,555.5

NOTES:

- Grading of the top area to be performed by Owner.
- Fill shall be compacted in one foot lifts.
- Coordinates are in facility coordinates. Elevations are in foot, NVGD.

REFERENCE:

- Topographic survey performed on December 17, 2018 by Clark Land Surveying.

LEGEND:

- Topographic Contour
- Exposed HDPE Geomembrane Limits
- Area to be Graded



05-14-2021

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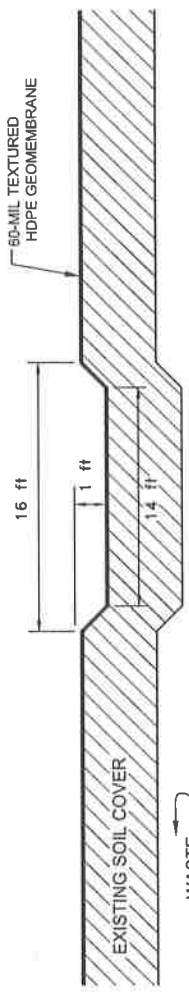
for
TANGIPAHOA PARISH GOVERNMENT
AMITE, LOUISIANA

Fourrier & de Abreu
Engineers, L.L.C.
Environmental and Civil Engineering
Phone: 225-677-7950
contact@fdaengineers.com
www.fdaengineers.com

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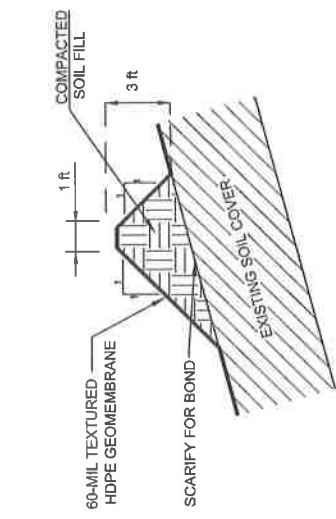
CELL 12 - EXPOSED HDPE GEOMEMBRANE GRADING OF TOP AREA

Project Engineer: J. Deamer
Project No.: TAN-038
Date: 05/14/2021
Drawing No.: FDAE-5



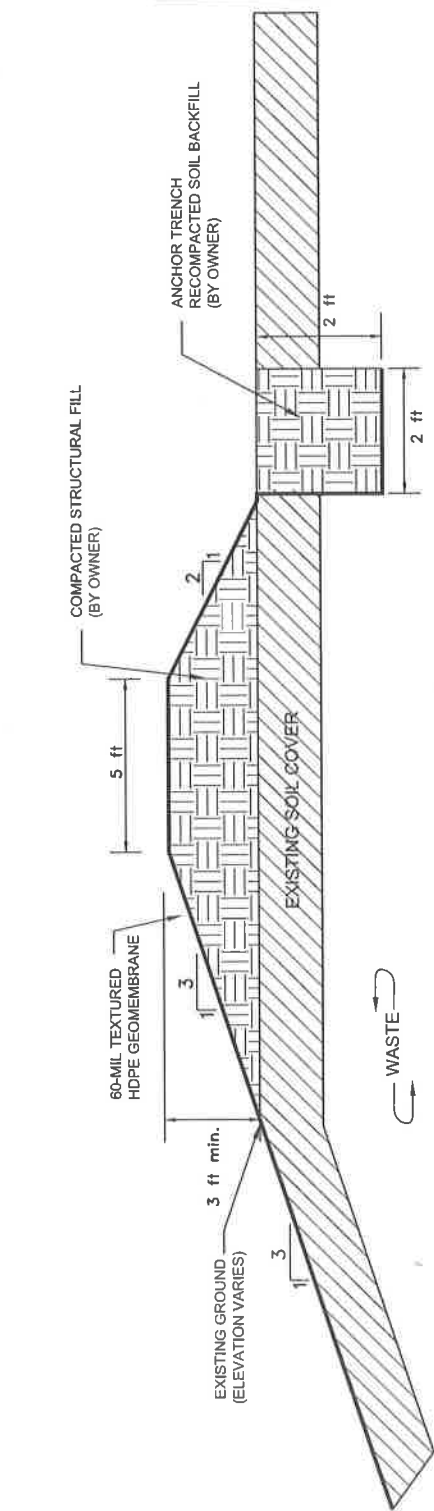
① EXPOSED HDPE GEOMEMBRANE CROSS-SECTION
NOT TO SCALE

② LET-DOWN - INSIDE SYNTHETIC COVER AREA
NOT TO SCALE




③ LET-DOWN - OUTSIDE SYNTHETIC COVER AREA
NOT TO SCALE

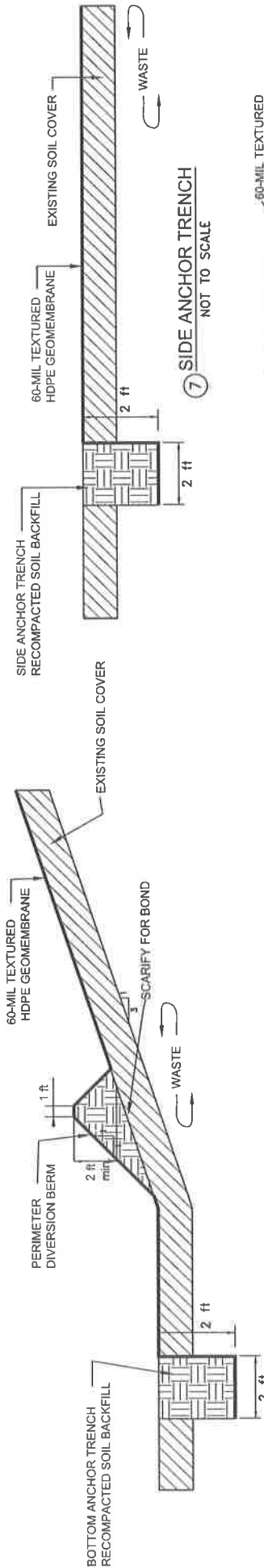
④ BOTTOM DIVERSION BERM
NOT TO SCALE



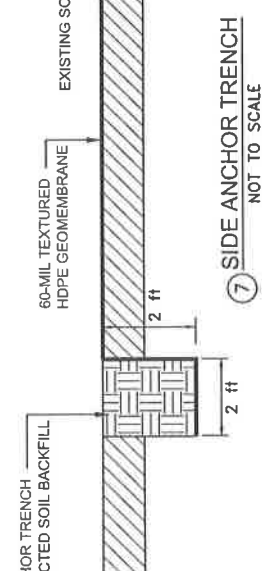
⑤ TOP DIVERSION BERM
NOT TO SCALE



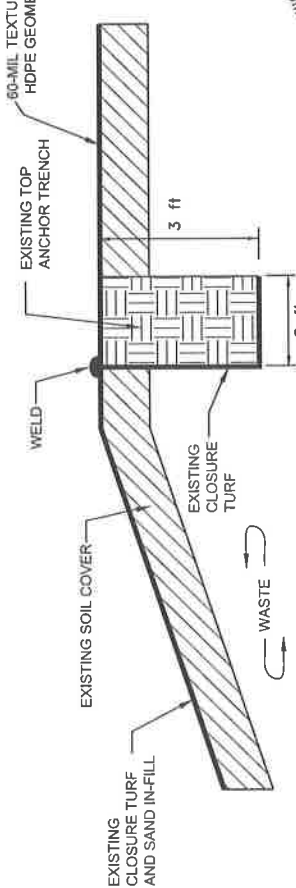
TANGIPAHOA PARISH REGIONAL SOLID WASTE FACILITY INDEPENDENCE, LOUISIANA	
for TANGIPAHOA PARISH GOVERNMENT AMITE, LOUISIANA	
 Fournier & de Abreu Engineers, L.L.C. Environmental and Civil Engineering Phone: 225-677-7650 contact@fdaengineers.com www.fdaengineers.com	
16995 COURSEY BLVD. BATON ROUGE, LA 70816	
Project Engineer: J. Deamer	Project No.: TAN-058
Date: 05/14/2021	Drawing No.: PDAE-6
CELL 12- EXPOSED HDPE GEOMEMBRANE TYPICAL PLAN DETAILS	



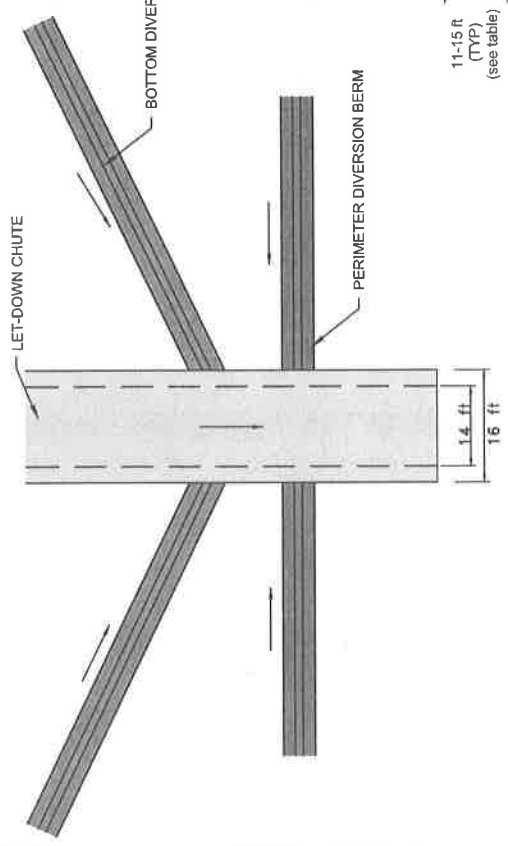
6 BOTTOM ANCHOR TRENCH AND TYPICAL PERIMETER DIVERSION BERM
NOT TO SCALE



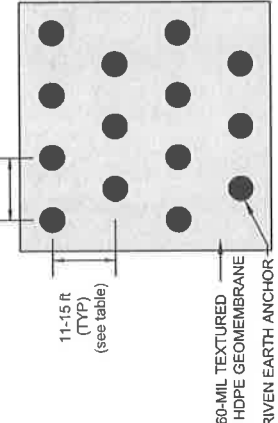
7 SIDE ANCHOR TRENCH
NOT TO SCALE



9 TIE-IN BETWEEN EXISTING CLOSURE TURF
AND PROPOSED GEOMEMBRANE AREAS
NOT TO SCALE



8 LET-DOWN - DIVERSION BERMS
PLAN VIEW DETAIL
NOT TO SCALE



10 ANCHOR SPACING TYPICAL DETAIL
NOT TO SCALE

Location	Typical Spacing (ft.)	Approx. # of Anchors
Top Slope	11	496
Upper Third	12	1645
Middle Third	13	1851
Bottom Third	15	1581
Appr. Total:		5573



TANGIPAHOA PARISH REGIONAL SOLID WASTE FACILITY INDEPENDENCE, LOUISIANA

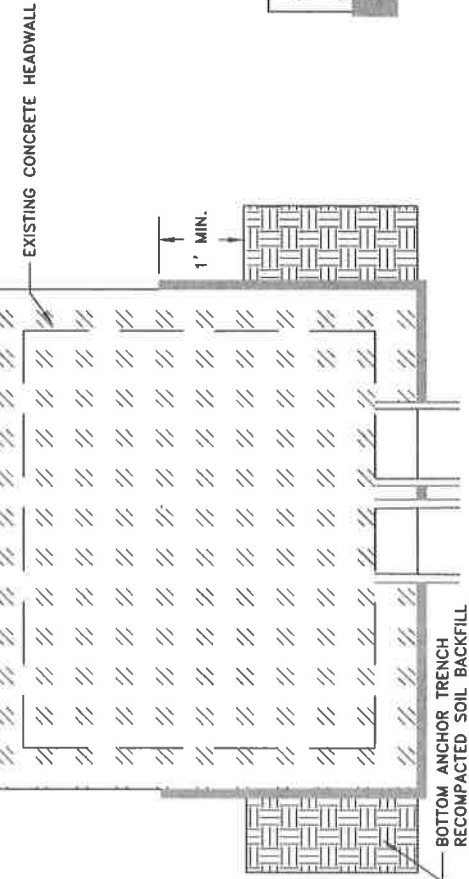
for
TANGIPAHOA PARISH GOVERNMENT AMITE, LOUISIANA

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contact@fdaengineers.com
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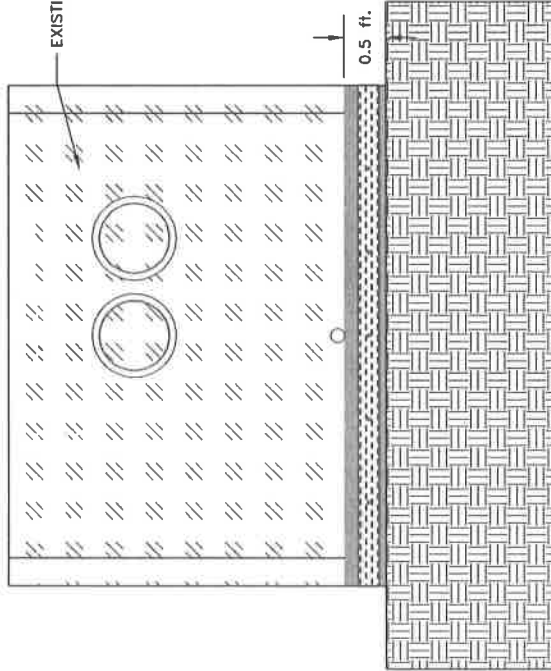
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CELL 12- EXPOSED HDPE GEOMEMBRANE TYPICAL PLAN DETAILS 2

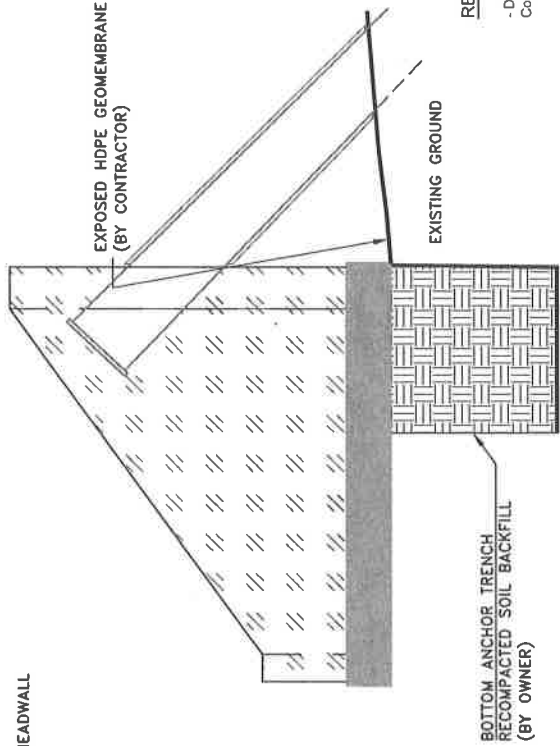
Project Engineer: J. Deamer
Project No.: TAN-058
Date: 05/14/2021
Drawing No.: FDAE-7



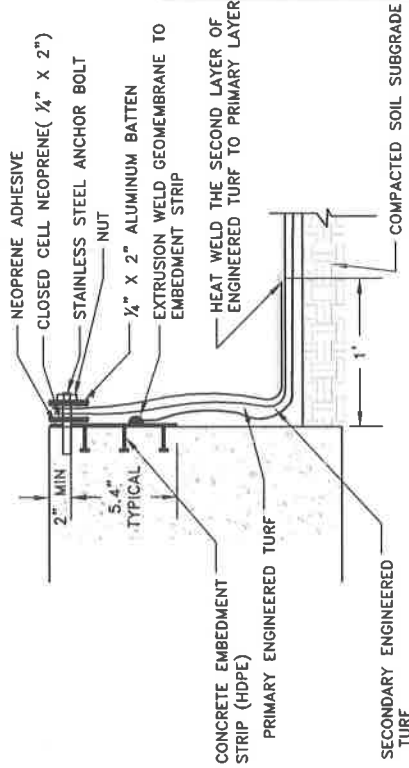
11 HEADWALL BOOT - PLAN VIEW
NOT TO SCALE



13 HEADWALL BOOT - FRONT VIEW
NOT TO SCALE



12 HEADWALL BOOT - SIDE DETAIL
NOT TO SCALE



14 HEADWALL BOOT - EXPOSED GEOMEMBRANE CONNECTION
NOT TO SCALE

- LEGEND:**
- Existing 10" SDR-17 HDPE Pipe
 - HDPE Boot for 10" SDR-17 Pipe (By Contractor)
 - HDPE Boot for Concrete Headwall (By Contractor)
 - Batten Bar (By Contractor)

REFERENCE:

- Detail #13 adapted from Watershed Geo drawing titled, "Hydro turf CS Connection with Concrete Embedment Strip", dated, February 8, 2017.



TANGIPAHOA PARISH REGIONAL SOLID WASTE FACILITY
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for
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Fourrier & de Abreu
Engineers, LLC.
Environmental and Civil Engineering
Phone: 225-677-7950
contact@faengineers.com
www.faaengineers.com

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Project Engineer: J. Deamer
Project No.: TAN-058
Date: 05/14/2021
Drawing No.: FDAB-8

CELL 12 - EXPOSED HDPE GEOMEMBRANE HEADWALL BOOT TYPICAL PLAN DETAILS