CITY OF LOGAN
LOGAN, UTAH

North Valley Landfill
Cell #2 Liner Installation

Contract Documents
and Specifications

June 10, 2019

City of Logan
Environmental Department
Logan, Utah

CIVIL ENGINEER
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PROJECT MANAGER
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TABLE OF CONTENTS

BID REQUEST

Sealed bids will be received by the City of Logan Purchasing Agent at City Hall, 290 North 100 West, until 2:00 p.m., June 26, 2019 for:

North Valley Landfill
Cell #2 Liner Installation

Bid opening will then be held in the **City Hall Conference Room.**

Specifications are available on the Logan City website and on file in the office of the Logan City Purchasing Agent, 290 North 100 West, Logan, Utah, and copies may be obtained by prospective bidders.

Contractors should be prepared to submit documentation with their PROPOSAL as outlined in the INSTRUCTIONS FOR BIDDERS as a part of a Contractor Qualification Process.

A Bid Bond, or cashier's check for 5% of bid, payable to City of Logan, must accompany each bid, along with a proposed SCHEDULE FOR CONSTRUCTION COMPLETION. Upon awarding of the bid, a PAYMENT BOND and a PERFORMANCE BOND will be required for 100% of any bid which exceeds $5,000.

Questions regarding bid, please contact: *Tyler Richards at tyler.richards@loganutah.org or (435) 716-9756.*

The right is reserved by the City of Logan to reject any or all bids.

Dated this June 10, 2019.

Lori Mathys
Purchasing Agent

INSTRUCTIONS TO BIDDERS

Bids will be received by the **CITY OF LOGAN** (herein called "Owner"), at 290 North 100 West, Logan, Utah until **2:00 PM** On **Wednesday June 26, 2019** and then publicly opened and read aloud at 3:00 p.m. that same day.

There will be a mandatory, on-site pre-bid meeting held on Tuesday June 18, 2019 at 10:00 a.m.

During the Bidding period, all questions pertaining to the project or bid must be submitted in writing by 11:00 a.m. on Monday June 24, 2019 to Tyler Richards at tyler.richards@loganutah.org. The responses to these questions will be posted daily on the City of Logan's, Purchasing Division website. The website address is: http://www.loganutah.org/government/departments/finance/purchasing/index.php

Each Bid must be submitted in a sealed envelope addressed to Purchasing Agent, City of Logan, 290 North 100 West, Logan, Utah. Each sealed envelope should bear on the outside the name of the project for which the bid is submitted. If forwarded by mail, the sealed envelope containing the Bid must be enclosed in another envelope addressed to the owner at the address above.

All Bids must be submitted on the required BID SCHEDULE. All blank spaces for unit prices and total costs must be filled in, in ink or typewritten, and the BID SCHEDULE must be fully completed showing the total of the bid and executed when submitted. Only one copy of the Bid Schedule is required.

Any Bid may be withdrawn prior to the above scheduled time for the opening of bids or authorized postponement thereof. The purchasing agent or her representative shall have possession of the bids at the designated time and location. Any Bid en route, either in the mail or at other locations in the City; will not be considered timely and will be returned unopened. No Bidder may withdraw a Bid within 90 days after the actual date of the opening thereof. Should there be reasons why the contract cannot be awarded within the specified period, the time may be extended by mutual agreement between the Owner and the Bidder.

The Bidder shall submit as a part of their Bid the included CONTRACTOR QUALIFICATION FORM outlining experience of the Bidder on similar projects over the past three (3) years. This form will be used to help determine the qualifications of the Bidder. Any Bid which does not include a CONTRACTOR QUALIFICATION FORM, shall be considered non-responsive and shall be returned to the BIDDER without being read.

Owner reserves the right to reject any and all Bids, to waive any and all informalities not involving price, time or changes in the Work and to negotiate contract terms with the successful Bidder, and the right to disregard all nonconforming, nonresponsive or conditional Bids. Also, Owner reserves the right to reject the Bid of any Bidder if Owner believes that it would not be in the best interest of the Project to make an award to that Bidder, whether because the Bid is not

responsive or the Bidder is unqualified or of doubtful financial ability or fails to meet any other pertinent standard or criteria established by the Owner.

Each BID must include a detailed SCHEDULE FOR CONSTRUCTION COMPLETION showing the anticipated beginning date, the nature and sequence of construction activity including SWPPP implementation, obtaining of building permits, and the approximate completion date. The time to complete the work shall be less than or equal to the time allowed to complete the work as shown on the PROPOSAL form, but shall not exceed the time allowed for completion as shown on the PROPOSAL form. Any BID which does not include a SCHEDULE FOR CONSTRUCTION COMPLETION shall be considered non-responsive and shall be returned to the BIDDER without being read. If the TOTAL one or more BIDS submitted is within 5% of the lowest submitted BID, the bid may be awarded to the BIDDER with the earliest start time and/or the shortest, reasonable time for completion, as agreed upon by the Owner of the project.

Liquidated Damages are a part of this Contract. The only way to extend the completion date for a project is by CHANGE ORDER. If the work is not completed by the completion dates as set by the approved SCHEDULE FOR CONSTRUCTION COMPLETION submitted, or as adjusted by CHANGE ORDER, Liquidated Damages will be imposed for every day, Sundays and City observed holidays excluded, that the work proceeds past the completion date, including time to complete the “Punch List” items.

Bidders must satisfy themselves of the accuracy of the estimated quantities in the BID SCHEDULE by examination of the site and review of the Drawings and Specifications including Addenda. 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 Owner shall provide to Bidders prior to bidding, all information which is pertinent to, and delineates and describes, the land owned and easements or rights-of way acquired or to be acquired.

The Contract Documents 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. All questions about the meaning or intent of the Contact Documents are to be directed to the Project Manager. Only questions answered by the formal written Addenda will be binding. Oral and other interpretations or clarifications will be without legal effect.

Each Bid must be accompanied by a BID BOND payable to the Owner for five percent of the total amount of the Bid. As soon as the bid prices have been compared, the Owner will return the Bid Bonds of all except the three lowest responsible Bidders. When the Contract for Construction is executed, the Bid Bonds of the two remaining unsuccessful Bidders will be returned. The Bid Bond of the successful Bidder will be retained until the Payment Bond and Performance Bond have been executed and approved, at which time it will be returned. A certified check may be used in lieu of a Bid Bond.

Attorneys-in-fact who sign Bid Bonds or Payment Bond and Performance Bond must file with each Bond a certified and effective dated copy of their power of attorney.

The party to whom the Project is awarded will be required to execute the CONTRACT FOR CONSTRUCTION and obtain the PERFORMANCE BOND AND PAYMENT BOND and PROOF OF INSURANCE within the (10) calendar days from the date when NOTICE OF AWARD is delivered to the Bidder. The NOTICE OF AWARD shall be accompanied by the necessary CONTRACT FOR CONSTRUCTION and Bond forms. In case of failure of the Bidder to execute the CONTRACT FOR CONSTRUCTION, the Owner may at his option consider the Bidder in default, in which case the BID BOND accompanying the Proposal shall become the property of the Owner.

The Owner within sixty days of receipt of acceptable PERFORMANCE BOND, PAYMENT BOND and CONTRACT FOR CONSTRUCTION signed by the party to whom the Contract was awarded shall sign the Contract and return to such party an executed duplicate of the Contract. Should the Owner not execute the Contract within such period, the Bidder may by written notice withdraw his signed Contract. Such notice of withdrawal shall be effective upon receipt of the notice by the Owner.

The NOTICE TO PROCEED shall be issued within ten (10) calendar days of the execution of the CONTRACT FOR CONSTRUCTION by the Owner. Should there be reasons why the NOTICE TO PROCEED cannot be issued within such period; the time may be extended by mutual agreement between the Owner and Contractor. If the NOTICE TO PROCEED has not been issued within the ten (10) day period or within the period mutually agreed upon, the Contractor may terminate the Contract without further liability on the part of either party.

The Owner may make such investigations as the Owner deems 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 the Owner may request. The Owner may reject any Bid if the evidence submitted, or an investigation of such Bidder fails to satisfy the Owner that the Bidder will complete the work contemplated therein or if Bidder fails to furnish requested information.

A conditional or qualified Bid will not be accepted.

Award will be made according to Logan City Municipal Code.

All applicable laws, ordinances, and rules and regulations of all authorities having jurisdiction over construction of the Project shall apply to the Contract throughout.

Each Bidder is responsible for inspecting the site and for reading and being thoroughly familiar with the Contract Documents, including SPECIAL PROVISIONS and the CITY OF LOGAN STANDARDS AND SPECIFICATIONS. The failure or omission of any Bidder to do any of the foregoing shall in no way relieve any Bidder from any obligation in respect to his Bid.

PROPOSAL

Bids will be received at the office of the Purchasing Agent of the City of Logan, at 290 North 100 West, Logan, Utah.

Dear Sir:

The undersigned, after having personally and carefully examined the Plans, Specifications, Quality Assurance/Quality Control Plan, and location which are a part hereof, proposes and agrees to furnish all materials, labor, equipment, and transportation necessary to install ready for service and to the satisfaction of the City Engineer for Logan City, in accordance with the Plans and Specifications which are a part hereof, all items included in the **North Valley Landfill Cell #2 Liner Installation** in consideration of the unit prices totaling to the lump sum of $_____ and further agree to complete the work within the time specified in the SCHEDULE FOR CONTRACT COMPLETION after being notified by the Engineer to commence the work. Contractor further agrees to pay as liquidated damages, the sum of $**1000.00** for each consecutive day thereafter as provided in the General Conditions.

It is understood that the quantities stated are approximate only and are for the purpose of comparing Bids and fixing the amount of Bonds, and the payments will only be made on the basis of the above unit prices of the actual quantities, as determined by the Owner's Engineer in the completed work. It is further understood that the quantities will be increased or decreased as necessary to maximize the benefit of the existing budgets.

It is hereby agreed that The City of Logan has the right to reject this proposal or to award the work to the undersigned at the sum stipulated, if action is taken within thirty (30) days after opening of Bids.

The Contractor hereby acknowledges receipt of the following Addenda:_____

_____

_____ _____

Date

_____

_____

_____

Contractor

BID SCHEDULE

PROJECT: North Valley Landfill Cell #2 Liner Installation

NOTE: Bidder agrees to perform all the work described in the CONTRACT DOCUMENTS for the following unit prices. Bid prices shall include sales tax and all other applicable taxes and fees.

ITEM NO.	DESCRIPTION	UNIT	QUANTITY	UNIT PRICE	ITEM PRICE
1	Place drain-net on north side of existing access road	sf	34,200		
2	Remove and replace existing access road soils onto drain net	yd^3	1,900		
3	Cell 2 Excavation and Grading	yd^3	28,300		
4	Prepare Subgrade	acres	7		
5	Excavate and Backfill Anchor Trench	ft	1,150		
6	Expose Existing Liner	ft	1,150		
7	Install Reinforced GCL	sf	306,000		
8	Install Textured 60-mil HDPE Liner	sf	306,000		
9	Place 8 Oz. Needle Punch Geotextile	yd^2	3,700		
10	Place 8" Diameter DR 11 Perforated HDPE Pipe	ft	1,850		
11	Install Drain Net	sf	306,000		
12	Place Gravel Backfill	yd^3	550		
13	Place Cover Soil	yd^3	3,200		
14	Place Slag	yd^3	3,555		

TOTAL PRICE **$** _____

COMPANY NAME _____

SIGNATURE OF PREPARER _____

MEASUREMENT AND PAYMENT

Item No __1__: The unit price to be paid for this item shall be considered compensation in full for all labor, materials and equipment necessary to place Drain Net as approved by the Project Manager. This item shall be measured and paid on a per square foot installed basis.

Item No __2__: The unit price to be paid for this item shall be considered compensation in full for all labor, materials and equipment necessary to excavate existing soils and move them northward to create a new access road into the active landfill. This item shall be measured and paid on a per cubic installed basis.

Item No __3__: The unit price to be paid for this item shall be considered compensation in full for all labor, materials and equipment necessary to remove and stockpile existing soils to provide rough grading of Cell 2 floor. This item shall be measured and paid on a per cubic installed basis.

Item No. __4__: Prepare Subgrade: The unit price to be paid for this item shall be considered compensation in full for all labor and equipment necessary to prepare and maintain subgrade soils prior to the placement of GCL materials. Soils shall be graded and compacted such that subgrade is of uniform grade and will adequately support construction equipment used to deploy the GCL. This item shall be measured and paid on a per acre basis.

Item No. __5__: Excavate and Backfill Anchor Trench: The unit price to be paid for this item shall be considered compensation in full for all labor and equipment necessary to excavate the anchor trench utilized for liner installation as approved by the Project Manager. It shall also include all costs for backfilling and compaction of anchor trench soils once liner components are installed, and restoring gravel road surfaces where anchor trench coincides with roads. This item shall be measured and paid on a linear foot basis.

Item No. __6__: Excavate Soil to Expose Liner: The unit price to be paid for this item shall be considered compensation in full for all labor and equipment necessary to excavate the soils over the existing liner to expose the HDPE. Excavation of site soils to expose the existing HDPE liner material will need to be done with methods that do not damage the existing HPDE. Soil excavation methods for HDPE liner exposure as approved by the Project Manager. It shall also include all costs for cleaning the exposed HPDE to render it adequate for extrusion welding of new liner. This item shall be measured and paid on a linear foot basis.

Item No. __7__: Install Reinforced GCL: The unit price to be paid for this item shall be considered compensation in full for all labor, materials and equipment necessary to place the reinforced GCL as approved by the Project Manager. Material placement and construction documentation is as indicated in the QA/QC Plan. This item shall be measured and paid on a per square foot basis.

Item No. __8__: Install 60-mil HDPE: The unit price to be paid for this item shall be considered compensation for all labor, materials, and equipment necessary to place 60-mil HDPE liner material as approved by the Project Manager. Material placement and construction documentation is as indicated in the QA/QC Plan. This item shall be measured and paid on a per square foot basis.

Item No. 9 : Place 8 Oz. Needle Punch Geotextile: The unit price to be paid for this item shall be considered compensation for all labor, materials and equipment, necessary to place 8 Oz. Needle Punch Geofabric. Material placement and construction documentation is as indicated in the QA/QC Plan. This item shall be measured and paid on a square yard basis.

Item No. 10 : 8" Dia. DR 11 Perforated HDPE Pipe: The unit price to be paid for this item shall be considered compensation in full for all labor, materials and equipment required for the welding and placement of 8" Dia. Perforated HDPE Pipe. Material placement and construction documentation is as indicated in the QA/QC Plan. This item shall be measured and paid for on a per linear foot cut basis.

Item No. 11: Install Drain Net: The unit price to be paid for this item shall be considered compensation in full for all labor, materials and equipment necessary to plance Drain Net as approved by the Project Manager. This item shall be measured and paid on a per square foot installed bases.

Item No. 12 : Place Gravel Backfill: The unit price to be paid for the placement of Gravel Pipe Backfill shall be considered compensation in full for all labor, materials and required equipment. This item shall be measured and paid for on a cubic yard basis. Gravel shall consist of 3/4 – inch clean, rounded gravel.

Item No. 13 : Place Cover Soils: The unit price to be paid for this item shall be considered compensation in full for all labor, materials and equipment necessary to Place Cover Soils as approved by the Project Manager. Material placement and construction documentation is as indicated in the QA/QC Plan. This item shall be measured and paid on a cubic yard basis.

Item No. 14 : Place Slag / Bank Run Gravel : The unit price to be paid for this item shall be considered compensation in full for all labor, materials and equipment necessary to Place Slag / Bank Run Gravel as approved by the Project Manager. Material placement and construction documentation is as indicated in the QA/QC Plan. This item shall be measured and paid on a cubic yard basis.

CONTRACTOR QUALIFICATION FORM

(List similar projects by the Contractor over the past three (3) years)

NAME / DATE OF PROJECT	DOLLAR AMOUNT OF PROJECT	OWNER REFERENCE (NAME AND TELE NO.)	INVOLVEMENT OR ROLE IN PROJECT	COMPLETION	
				ON TIME	WITHIN BUDGET

SCHEDULE FOR CONTRACT COMPLETION

TO BE COMPLETED BY CONTRACTOR

THIS MUST BE A GANTT CHART SHOWING SEQUENCING AND CRITICAL PATHS

BID BOND

KNOW ALL MEN BY THESE PRESENTS, that we, the undersigned,
as Principal, and _____ as Surety, are hereby held and firmly bound unto
as OWNER in the penal sum of _____ for the payment
of which, well and truly to be made, we hereby jointly and severally bind ourselves, successors,
and assigns. Signed, this _____ day of _____ , 20 _____ . The
Condition of the above obligation is such that whereas the Principal has submitted to
a certain BID, attached hereto and hereby made a part hereof to enter into a contract in writing,
for the
North Valley Landfill
Cell #2 Liner Installation

NOW, THEREFORE,

(a) If the BID shall be rejected, or

(b) If said BID shall be accepted and the Principal shall execute and deliver a contract in the Form of Contract attached hereto (properly completed in accordance with said BID) and shall furnish a BOND or bonds for his faithful performance of said contract, and for the payment of all persons performing labors and furnishing materials in connection therewith, and shall in all other respects perform the agreement created by the acceptance of said BID.

then this obligation shall be void, otherwise the same shall remain in force and effect; it being expressly understood and agreed that the liability of the Surety for any and all claims hereunder shall, in no event, exceed the penal amount of this obligation as herein stated. The Surety, for value received, hereby stipulates and agrees that the obligations of said Surety and its BOND shall be in no way impaired or affected by any extension of the time within which the OWNER may accept such BID; and said Surety does hereby wave notice of any such extension.

IN WITNESS WHEREOF, the Principal and the Surety have hereunto set their hands and seals, and such of them as are corporations have caused their corporate seals to be hereto affixed and these presents to be signed by their proper officers, the day and year first set forth above.

_____ (L.S.)

Principal

Surety

By:

IMPORTANT - Surety companies executing BONDS must appear on the Treasury Department's most current list (Circular 570 as amended) and be authorized to transact business in the state where the project is located.

NOTICE OF AWARD

TO:

PROJECT DESCRIPTION: North Valley Landfill Cell #2 Liner Installation

The Owner has considered the Bid submitted by you for the above described work and you are hereby notified that your bid has been accepted for items in the amount of $_____.

You are required by the Instructions for Bidders to execute the Contract for Construction and furnish the required Contractor's Performance Bond, Payment Bond and certificates of insurance within ten (10) calendar days from the date of this Notice to you.

If you fail to execute said Contract and to furnish said Bonds within ten (10) days from the date of this Notice, said Owner will be entitled to consider all your rights arising out of the Owner's acceptance of your Bid as abandoned and as forfeiture of your Bid Bond. The Owner will be entitled to such other rights as may be granted by law.

You are required to return an acknowledged copy of this Notice of Award to the Owner.

The instructions in Paragraph 2.5 of Section 00 72 00 of the APWA Manual of Standard Specifications are expected to be complied with as part of this project. This information is included as Attachment A.

Dated this _____, 2019.

Owner: City of Logan, Utah

By:
Title:

ACCEPTANCE OF NOTICE
Receipt of the above Notice of Award is hereby acknowledged.

This _____ day of _____, 2019.

By:

Title:

Section 00 72 00

Paragraph 2.5

2.5 **BEFORE STARTING CONSTRUCTION**

A. **In General**: Before starting each part of the Work, CONTRACTOR shall carefully study and compare the Contract Documents and check and verify pertinent figures shown thereon and all applicable field measurements. CONTRACTOR shall promptly report in writing to Project Manager any conflict, error or discrepancy that CONTRACTOR may discover and shall obtain a written interpretation or clarifications from Project Manager before proceeding with any work affected thereby.

B. **Submittals**: Within 10 Days after the Effective Date of the Construction Contract, CONTRACTOR shall submit to Project Manager, in reasonable detail and form acceptable to Project Manager, copies of the following documents.

1. **Preliminary Progress Schedule**: The preliminary progress schedule shall show starting and completion dates for each construction sequence and:

a. submittal dates and dates required for approved submittals for shop drawings, product data and samples;
b. decision dates for products specified by allowances, selection of finishes and critical material or equipment release orders;
c. product procurement and delivery dates;
d. holiday cleanup preparations, And
e. specific dates for all special Inspections required prior to any utilities "turn-on" including temporary power.

2. **Preliminary Shop Drawing Schedule**: A supplemental schedule to the preliminary progress schedule shall show all Shop Drawing submissions required for the Work.

3. **Preliminary Schedule of Values**: The preliminary schedule of values (for Lump Sum Work), which includes provisions set forth in quantities and prices of items aggregating the Contract Price, shall subdivide the Work into component parts in sufficient detail to serve as the basis for progress payments during construction. Such prices will include an appropriate amount of overhead and profit applicable to each item of work. Bond expense shall not be prorated, but shall be shown as a separate item.

4. **Mobilization Program**: The site mobilization program shall allow for field office and trailer locations, material storage locations, power requirements for trailers, if any, and sanitary facilities.

5. **Permits**: The listing of, and photocopies of permits that the CONTRACTOR is required to purchase and maintain in accordance with Article 6.7.

6. **Quality Control Program**: The written program for the control of product quality and workmanship.

7. **Safety and Protection Plan**: The safety and protection plan shall comply with Article 6.12.

C. **Field Office**: When specified, the CONTRACTOR shall establish and maintain a field office in such a location that ENGINEER may always contact CONTRACTOR for transmittal of Plans, instructions and dissemination of Project information. Unless waived by Project Manager, CONTRACTOR shall provide and maintain a telephone and facsimile machine in the field office during work performance.

CONTRACT FOR CONSTRUCTION

This Contract is by and between The City of Logan (hereinafter called the OWNER) and _____ _____ (hereinafter called CONTRACTOR). OWNER and CONTRACTOR, in consideration of the mutual covenants hereinafter set forth, agree as follows:

ARTICLE 1 – THE PROJECT

1.01 The Project for which the Work under the Contract Documents shall apply is generally described as follows:

Liner installation for Cell #2 at the North Valley Landfill. Work includes preparation of site soils, installation of reinforced GCL, 60-mil HDPE liner, needle punch geofabric, perforated HDPE pipe, drain rock, and Drain Mat to serve as a liner system for a municipal solid waste landfill. Work includes the placement of protective cover soils and placement of Slag / Bank Run Gravel.

ARTICLE 2 – WORK

2.01 CONTRACTOR shall complete all Work as specified or indicated in the Contract Documents for completion of the project.

ARTICLE 3 – ENGINEER

3.01 The ENGINEER, unless otherwise indicated in the Contract Documents, shall be IGES, Inc.

ARTICLE 4 – CONTRACT TIMES

4.01 Time of the Essence:

A. All time limits for Milestones, if any, Substantial Completion, and completion and readiness for final payment as stated in the Contract Documents are of the essence of the Contract.

4.02 Dates for Substantial Completion and Final Payment:

A. The Work will be substantially completed on or before October 15th , 2019, and completed and ready for final payment in accordance with the General Conditions.

4.03 Liquidated Damages:

A. CONTRACTOR and OWNER recognize that time is of the essence of this Agreement and the OWNER will suffer financial loss if the Work is not completed within the times specified in paragraph 4.02, plus any extensions thereof allowed in accordance with the General Conditions. The parties also recognize that it will be impracticable to determine actual damages which OWNER will sustain in the event of or by reason of the delay. Accordingly, instead of requiring any such proof, OWNER and CONTRACTOR agree that as liquidated damages for delay (but not as a penalty) CONTRACTOR shall pay OWNER $1,000 for each day that expires after the specified time in paragraph 4.02 for substantial completion until the Work is substantially complete. After substantial completion, if CONTRACTOR shall neglect, refuse, or fail to complete the remaining

Work within the contract time or any proper extension thereof granted by OWNER, CONTRACTOR shall pay OWNER $1,000 for each day that expires after the time specified in paragraph 4.02 for completion and readiness for the final payment until the Work is completed and ready for final payment. It is further agreed that the amount stipulated for liquidated damages per day of delay is a reasonable estimate of the damages that would be sustained by OWNER, and CONTRACTOR agrees to pay such liquidated damages as herein provided. In case the liquidated damages are not paid, CONTRACTOR agrees that OWNER may deduct the amount thereof from any money due or that may become due to CONTRACTOR by progress payments or otherwise under the Agreement, or if said amount is not sufficient, recover the total amount.

ARTICLE 5 – CONTRACT PRICE

5.01 OWNER shall pay CONTRACTOR FOR COMPLETION OF THE Work in accordance with the Contract Documents an amount in current funds equal to the sum of the amounts determined pursuant to paragraph 5.01.A below:

A. For all Work, the sum of:

_____ $ _____

(use words) (use figures)

ARTICLE 6 – PAYMENT PROCEDURES

6.01 Submittal and Processing of Payments:

A. CONTRACTOR shall submit Applications of Payment in accordance with the General Conditions. Applications for Payment will be processed by Project Manager as provided in the General Conditions.

6.02 Progress Payments; Retainage:

A. OWNER shall make progress payments on account of the Contract Price on the basis of CONTRACTOR's Applications for Payment once each month during performance of the Work as provided in paragraphs 6.02.A.1 and 6.02.A.2 below. All payments will be made based on the percentage of job completion, and will be verified by Project Manager prior to invoicing:

1. Prior to Substantial Completion, progress payments will be made in an amount equal to the percentage indicated below but, in each case, less the aggregate of payments previously made and less such amounts as Project Manager may determine or OWNER may withhold, in accordance with the General Conditions:

    a. The OWNER will pay the CONTRACTOR a progress payment on the basis of the approved partial payment estimate submitted by the CONTRACTOR and verified by the Project Manager, including any approved Change Orders, but will not hold retainage.

2. Upon Substantial Completion of the project, the OWNER will pay to 95 percent of the revised contract amount including any approved Change Orders.

6.03 Final Payment

A. When all items on any generated 'Punch' or Completion List have been completed, the OWNER will pay the remaining 5 percent of the revised contract amount within 30 days of notification to the OWNER in writing by the CONTRACTOR that all items have been completed. The OWNER shall verify that all items have been completed before final payment is made.

ARTICLE 7 – INTEREST

7.01 All moneys not paid when due as provided in the General Conditions shall bear interest at the same rate that OWNER's funds accrue interest in the State's treasury account.

ARTICLE 8 – CONTRACTOR'S REPRESENTATIONS

8.01 In order to induce OWNER to enter into this Agreement, CONTRACTOR makes the following representations:

A. CONTRACTOR has examined and carefully studied the Contract Documents and the other related data identified in the Bidding Documents.

B. CONTRACTOR has visited the Site and become familiar with and is satisfied as to the general, local, and Site conditions that may affect the cost, progress, and performance of the Work.

C. CONTRACTOR is familiar with and is satisfied as to all federal, state, and local Laws and Regulations that may affect cost, progress, and performance of the Work.

D. CONTRACTOR has carefully studied all: (1) reports of explorations and tests of subsurface conditions at or contiguous to the Site and all drawings of physical conditions in or relating to existing surface or subsurface structures at or contiguous to the Site (except Underground Facilities) which have been identified in the Supplementary Conditions as provided in the General Conditions and (2) reports and drawings of a Hazardous Environmental Condition, if any, at the Site which is identified in the Supplementary Conditions as provided in the General Conditions..

E. CONTRACTOR has obtained and carefully studied (or assumes responsibility for having done so) all additional or supplementary examinations, investigations, explorations, tests, studies, and data concerning conditions (surface, subsurface, and Underground Facilities) at or contiguous to the Site which may affect cost, progress, or performance of the Work or which relate to any aspect of the means, methods, techniques, sequences, and procedures of construction to be employed by CONTRACTOR, including applying the specific means methods, techniques, sequences, and procedures of construction, if any, expressly required by the Contract Documents to be employed by CONTRACTOR, and safety precautions and programs incident thereto.

F. CONTRACTOR does not consider that any further examinations, investigations, explorations, tests, studies or data are necessary for the performance of the Work at the Contract Price, within the Contract Times, and in accordance with the other terms and conditions of the Contract Documents.

G. CONTRACTOR is aware of the general nature of work to be performed by OWNER and others at the Site that relates to the Work as indicated in the Contract Documents.

H. CONTRACTOR has correlated the information known to CONTRACTOR, information and observations obtained from visits to the Site, reports and drawings identified in the Contract Documents, and all additional examinations, investigations, explorations, tests, studies, and data with the Contract Documents.

I. CONTRACTOR has given Project Manager written notice of all conflicts, errors, ambiguities, or discrepancies that CONTRACTOR has discovered in the Contract Documents, and the written resolution thereof by Project Manager is acceptable to CONTRACTOR.

J. CONTRACTOR agrees to register and participate in the Status Verification System to verify the work eligibility status of the CONTRACTOR's new employees that are employed in the state as set forth in Utah Code Section 63G-12-302. Each contractor or subcontractor who works under or for another contractor shall certify to the main contractor by affidavit that the contractor or subcontractor has verified through the Status Verification System the employment status of each new employee of the respective contractor or subcontractor.

K. The Contract Documents are generally sufficient to indicate and convey understanding of all terms and conditions of performance and furnishing of the work.

ARTICLE 9 – CONTRACT DOCUMENTS

9.01 Contents:

A. The Contract Documents consist of the following:
1. Instructions to Bidders
2. Bid Bond
3. This Agreement
4. Performance Bond
5. Payment Bond
6. General Conditions, Document 00 72 00 of the APWA Manual of Standard Specifications, 2007 Edition, as modified herein.
7. Material Specifications – Attachment A
8. QA/QC Plan – Attachment B
9. Construction Plans – Attachment C
10. Addenda (numbers _____ to _____, inclusive)
11. Insurance and Bond Requirements
12. Exhibits to this Agreement (enumerated as follows):

a. Proposal
b. Bid Schedule
c. Schedule of Values (for Lump Sum Bid)
d. Measurement and Payment
e. Schedule of Project Completion
f. Contractor Qualification Form
g. Certificate of Insurance, approved by OWNER’s Risk Management Division

13. The following which may be delivered or issued on or after the Effective Date of the Agreement and are not attached hereto:
   a. Notice of Award
   b. Notice to Proceed
   c. Written Amendments
   d. Change Orders
   e. Field Orders

B. There are no Contract Documents other than those listed above in this Article 9.

C. The Contract Documents may only be amended, modified or supplemented as provided in the General Conditions.

ARTICLE 10 – MISCELLANEOUS

10.01 Terms:

Terms used in this Agreement will have the meanings indicated in the General Conditions

10.02 Assignment of Contract:

No assignment by a party hereto of any rights under or interests in the Contract will be binding on another party hereto without the consent of the party sought to be bound; and specifically but without limitation, moneys that may become due and moneys that are due may not be assigned without such consent (except to the extent that the effect of this restriction may be limited by law), and unless specifically stated to the contrary in any written consent to an assignment, no assignment will release or discharge the assignor from any duty or responsibility under the Contract Documents.

10.03 Successors and Assigns:

OWNER and CONTRACTOR each binds itself, its partners, successors, assigns, and legal representatives to the other party thereto, its partners, successors assign and legal representatives in respect to all covenants, agreements, and obligations contained in the Contract Documents.

10.04 Termination for OWNER's Convenience:

A. Upon ten (10) days' written notice to Contractor, Owner may, without cause and without prejudice to any other right or remedy of Owner, terminate the Contract. In such case, Contractor shall be paid for (without duplication of any payment amounts or work items):

1. completed and acceptable Work executed prior to the effective date of termination, in accordance with the payment provisions of the Contract Documents; provided, however, that no completed work items shall be paid on a cost-plus basis;

2. reasonable expenses sustained prior to the effective date of termination in performing services and furnishing labor, materials, or equipment as required by the Contract Documents in connection with uncompleted Work or unacceptable Work (but

only those portions of the unacceptable Work that are acceptable and Contractor shall not be entitled to any compensation for any portions of the Work which are unacceptable), plus fair and reasonable sums for overhead and profit on such expenses; provided, however, that Contractor shall not be entitled to additional compensation for Work items paid under subparagraph 10.04 A.1. above;

3. costs incurred in settlement of terminated contracts with Subcontractors, Suppliers, and others; provided, however, that Contractor shall not be entitled to additional compensation for Work items paid under subparagraphs 10.04 A.1. and 2. above; and

4. reasonable expenses directly attributable to termination; provided, however, that Contractor shall not be entitled to additional compensation for Work items paid under subparagraphs 10.04 A. 1., 2. and 3. above.

B. Contractor shall not be paid on account of loss of anticipated profits or revenue or other economic loss arising out of or resulting from such termination. Termination under this Subparagraph 10.04 shall not entitle Contractor to compensation on a cost-plus basis except for items paid under Subparagraph 10.04 A. 2. above.

C. This Article 10.04 shall amend the General Conditions, Document 007200 referenced in Article 9.01 A. 6. by replacing the "Termination for Owner's Convenience" clause contain in 15.2 F. therein.

10.05 Severability:

Any provision or part of the Contract Documents held to be void or unenforceable under any Law or Regulation shall be deemed stricken, and all remaining provisions shall continue to be valid and binding upon OWNER and CONTRACTOR, who agree that the Contract Documents shall be reformed to replace such stricken provision of part thereof with a valid and enforceable provision that comes as close as possible to expressing the intention of the stricken provision.

10.06 Guarantee Period

The CONTRACTOR agrees to indemnify and save harmless the OWNER from any and all defects appearing or developing in the workmanship or materials performed or furnished under the Contract for a period of **one (1) year after** the date of the written notice from the Project Manager recommending final acceptance of the entire project by the OWNER.

10.07 Counterparts:

This Agreement may be executed in counterparts, each of which shall be deemed an original but all of which shall constitute on and the same instrument.

IN WITNESS WHEREOF, the Parties have duly caused this Agreement to be executed on their respective behalves.

This Agreement will be effective on _____, 20___.

OWNER: CONTRACTOR:

_____	_____
By: _____	By: _____
Attest: _____	Attest: _____
Address for giving notices:	Address for giving notices:
_____	_____
_____	_____
_____	_____

END OF DOCUMENT

CITY OF LOGAN INSURANCE AND BOND REQUIREMENTS

FOR: NVL Liner Installation – May 2019

The Contracting party shall procure and maintain for the duration of the contract insurance and bonds against claims or liability which arises out of or in connection with the performance of the work hereunder by the Contracting party, his agents, representatives, employees or subcontractors. The cost of such insurance and bonds shall be included in the Contracting party's bid or proposal.

A. MINIMUM LIMITS OF INSURANCE

Contracting party shall maintain limits not less than:

1. **GENERAL LIABILITY**: $2,000,000 combined single limit per occurrence, personal injury and property damage, $3,000,000 aggregate. Broad Form Commercial General Liability is required. (ISO 1993 or better) to include Products - Comp/OP aggregate of $2,000,000. Limits to apply to this project individually.

2. **PROFESSIONAL LIABILITY:** Not applicable to this project.

3. **AUTOMOBILE LIABILITY**: $2,000,000 per occurrence. "Any Auto" coverage is required.

4. **WORKERS' COMPENSATION and EMPLOYERS LIABILITY**: Workers' Compensation statutory limits as required by the Workers Compensation Act of the State of Utah and Employers Liability limits at a minimum of $100,000 per occurrence.

5. **PAYMENT and PERFORMANCE BONDS**: Contracting party shall provide payment and performance bonds in a form acceptable to the City and in the full amount of the contract.

6. **CONTRACTORS' POLLUTION LIABILITY**: Contractor shall maintain Pollution Liability insurance covering liability for bodily injury, property damage, and environmental damage resulting from pollution and related cleanup and restoration costs incurred, all arising out of the work or services to be performed under the contract. Limits not less than $2,000,000 per occurrence and $3,000,000 policy aggregate shall be provided."

B. ACCEPTABILITY OF INSURERS

Insurance and bonds are to be placed with insurers admitted in the State of Utah with an A. M. Best rating of not less than A-: IX, and in the limits as listed in this document, unless approved by the City's Risk Manager, or his designee, **a minimum of five (5) business days prior to bid or proposal deadline.**

C. DEDUCTIBLES AND SELF-INSURED RETENTIONS

Any deductibles or self-insured retention exceeding 5% of the policy limits must be declared to and approved by Logan City. At the option of Logan City, either (1) the insurer may be required to reduce or eliminate such deductibles or self-insured retention as respects Logan City, its

officers, officials and employees; or (2) the Contracting party may be required to procure a bond guaranteeing payment of losses and related investigations, claim distribution and defense expenses.

D. NOTICE OF INCIDENT OR ACCIDENT

Contracting party shall agree to promptly disclose to Logan City, all incidents or occurrences of accident, injury, and/or property damage covered by the insurance policy or policies.

E. OTHER INSURANCE PROVISIONS

The policies are to contain, or be endorsed to contain, the following provisions:

I. General Liability, Automobile Liability and Contractors' Pollution Liability Coverages

A. Logan City, its officers, officials, employees and volunteers are to be covered as additional insureds as respects: liability arising out of activities performed by or on behalf of the contracting party; products and completed operations of the Contracting party; premises owned, leased, hired or borrowed by the Contracting party. The coverage shall contain no special limitations on the scope of protection afforded to Logan City, its officers, officials, employees or volunteers.

B. The Contracting party's insurance coverage shall be a primary insurance as respects to Logan City, its officers, officials, employees and volunteers. Any insurance or self-insurance maintained by Logan City, its officers, officials, employees or volunteers shall be in excess of the Contracting party's insurance and shall not contribute with it.

C. Any failure to comply with reporting provisions of the policies shall not affect coverage provided to Logan City, its officers, officials, employees or volunteers.

D. The Contracting party's insurance shall apply separately to each insured against whom claim is made or suit is brought, except with respects to the limits of the insurer's liability.

F. VERIFICATION OF COVERAGE

Contracting party shall furnish Logan City with certificates of insurance and with original endorsements effecting coverage required by this clause. The certificates and endorsements are to be signed by a person authorized by that insurer to bind coverage on its behalf. The certificates and endorsements are to be on forms acceptable to Logan City before work commences. Logan City reserves the right to require complete, certified copies of all required insurance policies, with all endorsements, at any time.

G. SUBCONTRACTORS

Contracting party shall include all subcontractors as insureds under its policies or shall furnish separate certificates and endorsements for each subcontractor. All coverages for subcontractors shall be subject to all of the requirements stated herein.

PERFORMANCE AND PAYMENT BOND

KNOW ALL MEN BY THESE PRESENTS, that we _____, as Principal, and _____ , a corporation duly authorized to do a general surety business in Utah, as Surety, are jointly and severally held and bound unto Hereinafter called the Obligee, in the sum of _____ dollars ($_____). for the payment of which we jointly and severally bind ourselves, our heirs, executors, administrators, successors and assigns, firmly by these presents:

THE CONDITION OF THIS BOND IS SUCH THAT

WHEREAS, the Principal herein entered into a Contract with Obligee dated _____, 20___, which Contract includes and consists of Advertisement for Bids, Information for Bidders, Proposal, Special Provisions, General Conditions, Contract for Construction, Specifications and Plans, all of which are hereinafter referred to as Contract Documents and are attached hereto and made a part hereof and pursuant to the terms and conditions of all of which Principal has undertaken to perform all labor and to furnish all material, tools, and equipment of every kind and nature necessary or required in accordance with the terms and conditions set forth in said Contract Documents, and has undertaken to make payment promptly for all such labor (including all sums required to be paid by the laws of the State of Utah for the benefit and welfare of all workers, including workmen's compensation and unemployment security), all taxes of every kind and nature, and for all materials and services furnished or rendered pursuant to such Contract: and,

WHEREAS, said Principal has agreed to save the Obligee harmless from any claim for damages and injury to property or persons arising by reason of said work, as set out more fully in said Contract Documents, and to do and perform all things in said Contract Documents required in the time and manner and under the terms and conditions therein set forth, and in conformity with all laws, State and National, applicable thereto.

NOW, THEREFORE, if the Principal shall promptly make payment to all persons supplying labor and material to Principal or to any subcontractor in the prosecution of the work provided for, and shall well and truly perform and fulfill all the undertakings, covenants, terms, conditions, and agreements of said Contract during the original term of said Contract and any extensions thereof that may be granted by the Obligee, with or without notice to the Surety, and shall also well and truly perform and fulfill all the undertakings, covenants, terms, conditions,

and agreements of any and all duly authorized modifications of said Contract that may hereafter be made to Principal and/or to subcontractors, or their assigns, and shall, commencing with the date hereof and continuing for one (1) year after the complete performance of the Contract and the final settlement thereof, save harmless the Obligee, its officers and agents, from all claims therefore, or from any claim for damages or injury to property or persons arising by reason of said work; and shall, in the time and manner and under the terms and conditions prescribed, well and faithfully do, perform, and furnish all labor, materials, and things as by it in said Contract undertaken and as by law, State and National, prescribed, then this obligation shall be void, but otherwise it shall remain in full force and effect.

PROVIDED HOWEVER, that this Bond is subject to the following further conditions:

a) All material suppliers, and all persons who shall supply such laborers, mechanics, or subcontractors with material, supplies, or provisions for carrying on such work, shall have a direct right of action against the Principal and Surety on this Bond, second only to the right of the Obligee under this Bond, which right of action shall be asserted in proceedings instituted in the appropriate court of the State of Utah and insofar as permitted by the law of Utah, such right or action shall be asserted in a proceeding firm, or corporation instituting such action and of all persons, firms, or corporations having claims thereunder, and any other person, firm, or corporation having a claim hereunder shall have the right to be made a party to such proceeding, but not later than one (1) year after, the complete performance of said Contract and final settlement thereof and to have such claim adjudicated in such action and judgement rendered thereon.

b) In no event shall the Surety be liable for a greater sum than the penalty of this Bond, or subject to any suit, action, or proceeding thereon that is instituted later than one (1) year after the complete performance of said Contract and final settlement thereof.

c) The said Surety, for value received, hereby stipulates and agree that no change, extension of time, alteration, or addition to the terms of the contract or to the work to be performed thereunder or the Specifications accompanying the same shall in any way affect its obligations on this Bond, and it does hereby waive notice of any such change, extension of time, alteration, or addition to the terms of the Contract or to the work or to the Specifications.

IN WITNESS WHEREOF, the parties hereto have caused this Bond to be executed in _____, this _____ day of _____ , 2019.

_____ (Seal)

_____ (Seal)

_____ (Seal)
Principal

Witnesses:

_____ (Seal)

_____ (Seal)

_____ (Seal)
Surety

Countersigned:

By
Resident Agent

The Attorney-in-Fact (Resident Agent), who executes this Bond in behalf of the surety company, must attach a copy of their power-of-attorney as evidence of their authority.

NOTICE TO PROCEED

To: _____ Date:

_____

_____

Project: North Valley Landfill Cell #2 Liner Installation

You are hereby notified to commence work in accordance with the Contract for Construction dated _____, and you are to complete the work within _____ consecutive calendar days thereafter. The date of completion of all work is therefore _____, 20___.

City of Logan, Utah

By:

Title:

ACCEPTANCE OF NOTICE

Receipt of the above Notice to Proceed is hereby acknowledged by

_____

This ___ day of _____20____ .

Title:

CITY OF LOGAN

CHANGE ORDER FORM

CHANGE ORDER # : _____ DATE _____

PROJECT NAME North Valley Landfill Cell #2 Liner Installation

CONTRACTOR _____

DESCRIPTION:

Item	**Description**	**Total**

CHANGE ORDER AMOUNT $ _____

TOTAL ADJUSTED CONTRACT AMOUNT $ _____

TIME EXTENSION PER THIS CHANGE ORDER: _____

REVISED COMPLETION DATE: _____

Date _____ Project Manager _____

Date _____ Engineer _____

Date _____ Sponsoring Dept. Rep. _____

Date _____ Contractor _____

NOTIFICATION OF PROJECT COMPLETION

PROJECT NAME AND LIMITS: ______________________________

CONTRACTOR: ______________________________

DATE: ______________________________

PROJECT MANAGER: ______________________________

This is to certify that as of the above date, all work connected with the above PROJECT, including BID items, CHANGE ORDER items, and PUNCH LIST items have been completed. We further certify that payment for any testing that was required by the project has been paid, including all bacteriological testing of pipe lines.

We hereby request that the Project Manager verify completion of the PROJECT

CONTRACTOR Signature: ______________________________

(ABOVE TO BE COMPLETED BY THE CONTRACTOR)

- -

(BELOW TO BE COMPLETED BY ENGINEERING DIVISION)

DATE OF COMPLETION VERIFICATION: ______________________________

(For verification of payment for bacteriological testing, call 753-5135 ext. 119 or 111)

PROJECT MANAGER Signature: ______________________________

PROJECT SPONSOR Signature: ______________________________

ATTACHMENTS:

ATTACHMENT A: MATERIAL SPECIFICATIONS
ATTACHMENT B: QA/QC PLAN
ATTACHMENT C: CONSTRUCTION PLANS (Separate Download)

TABLE OF CONTENTS

PART I
BIDDING AND CONTRACTUAL DOCUMENTS
(See Logan City Documents)

PART II
STANDARD GENERAL CONDITIONS OF THE CONSTRUCTION CONTRACT
(See Logan City Documents)

PART III
MATERIAL SPECIFICATIONS

SECTION 3.1 - GEOSYNTHETIC CLAY LINER (GCL)

3.1.01 SECTION *INCLUDES*

a. Furnish a geosynthetic clay liner (GCL).
b. Furnish a Field Representative from the Manufacturer (if needed) to assist installation Vendor.

3.1.02 REFERENCES

a.	ASTM D 4643	Determination of Water (Moisture) Content of Soil by Microwave Oven Method
b.	ASTM D 5261	Test Method for Measuring the Mass Per Unit Area of Geotextiles
c.	ASTM D 5321	Determining the Coefficient of Soil and Geosynthetic or Geosynthetic and Geosynthetic Friction by the Direct Shear Method
d.	ASTM D 5887	GCL Index Flux
e.	ASTM D 5890	Bentonite Swell Index
f.	ASTM D 5891	Bentonite Fluid Loss
g.	ASTM D 5993	Standard Test Method for Measuring Mass Per Unit of Geosynthetic Clay Liners
h.	ASTM D 6496	GCL Peel Strength
i.	ASTM D 6768	GCL Grab Strength

3.1.03 DEFINITIONS

For the purpose of this specification, the following terms are defined below:

a. Geosynthetic Clay Liner (GCL): A manufactured hydraulic barrier consisting of clay bonded to a layer or layers of geosynthetics.

b. Geomembrane: An essentially impermeable geosynthetic composed of one or more geosynthetic sheets.
c. Geotextile: Any permeable textile used with foundation, soil, rock, earth, or any other geotechnical engineering-related material as an integral part of a human-made project, structure, or system.
d. Minimum Average Roll Value (MARV): The minimum average value of a particular physical property of a material, for 95 percent of all of the material in the lot.
e. Overlap: Where two adjacent GCL panels contact, the distance measured perpendicular from the overlying edge of one panel to the underlying edge of the other.

3.1.04 SUBMITTALS

a. Submit prior to contract award, Manufacturer's certification that proposed product meets this specification.
b. Submit prior to contract award, product sample, Manufacturer's test data, and construction and installation details.
c. The Manufacturer shall provide the Owner/Owner's Representative with the QA/QC certifications for each shipment of GCL. The certification shall be signed by a responsible party employed by the Manufacturer such as the QA/QC Manager, Production Manager, or Technical Services Manager. The QA/QC certifications shall include:
    1. GCL lot and roll numbers (with corresponding shipping information).
    2. Manufacturer's test data for raw materials used in GCL product, including, at a minimum, mass/area data and tensile test data.
    3. Manufacturer's test data for finished GCL product, including at a minimum, clay mass/area data and tensile testing data.
    4. Certificates of analysis for the bentonite clay used in GCL production and certification that the bentonite will not shift during transportation or installation, causing thin spots in the body of the GCL.

3.1.05 QUALITY *CONTROL*

A Manufacturer's representative shall be available (as required) on-site during the first two days of GCL installation to observe and direct the work.

3.1.06 DELIVERY, *STORAGE, AND HANDLING*

a. Manufacturer assumes responsibility for initial loading and shipping of the GCL and will give written instruction prior to delivery for unloading, on-site handling, and storage by others.
b. All rolls will be inspected prior to offloading and rolls with damaged GCL material shall be rejected and replaced and delivered at Manufacturer's expense.

3.1.07 WARRANTY

Provide Manufacturer's warranty for geosynthetic clay liner material in compliance with provisions of the Conditions of the Contract. Provide a minimum 20-year pro rata warranty for the material against deterioration due to exposure to the elements, either exposed or buried. The warranty for material must cover costs of material replacement and installation; assuming the area is rendered

in a clean, dry, unencumbered condition. In the event the area cannot be rendered as such, compensation for defective material will be provided to Owner on a pro rata basis for the estimated cost to Owner at that time of supplying and installing material to a clean, dry, and unencumbered condition by a third party installer.

3.1.08 PRODUCTS

a. The GCL shall consist of a layer of sodium bentonite clay encapsulated between two polypropylene geotextiles.
b. Reinforced GCL must be used for all applications.

3.1.09 MATERIAL

a. Acceptable GCL products are Bentomat DN.

3.1.10 PRODUCT *LABELING*

Prior to shipment, the GCL Manufacturer shall affix a label to each roll identifying the following characteristics:

a. Product identification information (Manufacturer name and address, brand name, and product code)
b. Lot number and roll number.
c. Roll length and width.
d. Total roll weight.

3.1.11 PACKAGING

a. The GCL shall be wound around a cardboard core 4 inches in diameter to facilitate handling. The core is not intended to support the roll for lifting but should be sufficiently strong to prevent collapse during transit.
b. To protect the GCL from foul weather, all rolls shall be labeled and bagged in packaging that is resistant to photo degradation by ultraviolet (UV) light.

SECTION 3.2 - HIGH-DENSITY POLYETHYLENE GEOMEMBRANE LINER

3.2.01 SECTION *INCLUDES*

a. Furnish a textured (both sides) 60 mil high-density polyethylene (HDPE) geomembrane liner.
b. Furnish a Field Representative from the Manufacturer (if needed) to assist Contractor.

3.2.02 REFERENCES

a. American Society for Testing and Materials (ASTM):

1. D 792 Test Methods for Specific Gravity (Relative Density) and Density of Plastics by Displacement.

2. D 1004 Test Method for Initial Tear Resistance of Plastics Film and Sheeting

3. D 1238 Test Method for Flow Rates of Thermoplastics by Extrusion Plastometer

4. D1505 Test Method for Density of Plastics by the Density-Gradient Technique

5. D 1603 Test Method for Carbon Black in Olefin Plastics

6. D 3895 Test Method for Oxidative Induction Time of Polyolefins by Thermal Analysis

7. D 4218 Test Method for Determination of Carbon Black Content in Polyethylene Compounds by the Muffle-Furnace Technique.

8. D 4833 Test Method for Index Puncture Resistance of Geotextiles, Geomembranes and Related Products.

9. D 5199 Test Method for Measuring Nominal Thickness of Geotextiles and Geomembranes

11. D 5397 Procedure to Perform a Single Point Notched Constant Tensile Load (SP-NCTL) Test: Appendix

12. D 5596 Test Method for Microscopic Evaluation of the Dispersion of Carbon Black in Polyolefin Geosynthetics

13. D 5721 Practice for Air-Oven Aging of Polyolefin Geomembranes.

14. D5885 Test method for Oxidative Induction Time of Polyolefin Geosynthetics by High Pressure Differential Scanning Calorimetry

15. D 5994 Test Method for Measuring the Core Thickness of Textured Geomembranes

16. D 6370 Standard Test Method for Rubber-Compositional Analysis by

Thermogravimetry (TGA)

17. D 6693 Test Method for Determining Tensile Properties of Nonreinforced Polyethylene and Nonreinforced Flexible Polypropelene Geomembranes

18. D 7466 Test Method for Measuring the Asperity Height of Textured Geomembranes

b. Geosynthetic Research Institute (GRI) Standards:

1. GM-10 Specification for the Stress Crack Resistance of Geomembrane Sheet

2. GM-11 Accelerated Weathering of Geomembranes using a Fluorescent UVA-Condensation Exposure Device

3.2.03 DEFINITIONS

a. Batch: A quantity of resin, usually the capacity of one railcar, used in the fabrication of a high-density polyethylene (HDPE) geomembrane sheet. The finished sheet will be identified by a roll number corresponding to the particular quantity of resin used.

b. Bridging: The condition when geomembrane becomes suspended over its subgrade due to contraction of the material or poor installation.

c. Extrudate: The molten polymer which is emitted from an extruder during seaming using either extrusion fillet or extrusion flat methods. The polymer is initially in the form of a ribbon rod, bead, or pellets.

d. Fabricator: The party responsible for the fabrication of geomembrane panels constructed from rolls received from the Manufacturer.

e. Geomembrane Manufacturer: The party responsible for the production of the geomembrane rolls from resin and for the quality of the resin.

f. Geomembrane: An essentially impermeable membrane used as a solid or liquid barrier. Synonymous term for flexible membrane liner (FML).

g. Geomembrane Subgrade: The soil or other material upon which the geomembrane lies.

h. Contractor: The party responsible for field handling, transporting, storing, deploying, seaming, temporary restraining (against wind), and installation of the geomembrane.

i. Panel: The unit area of geomembrane that will be seamed in the field. If the geomembrane is not fabricated into panels in a factory, a panel is identified as a roll or portion of a roll without any seams.

j. Drain Mat: A geotextile used for drainage. In this case it means a composite material made up of a lattice type HDPE material and two sides of geotextile fabric.

3.2.04 SUBMITTALS

a. Submit prior to contract award Manufacturer Certification that proposed product meets this specification.

b. Submit prior to contract award, product sample, Manufacturer's test data, and installation and construction details.

c. Product Data: Submit the following to Owner/Owner's Representative, 7 days prior to receiving material at site.

1. Resin Data.
   a. Statement of production date or dates.
   b. Certification stating that the resin meets the product requirements (see Section 3.2.09).
   c. Certification stating that all resin is from the same Manufacturer.
   d. Copy of quality control certificates issued by Manufacturer.
   e. Test reports from Manufacturer.

2. Geomembrane Roll.
   a. Statement of production date or dates.
   b. Laboratory test results and certification stating that the geomembrane meets the product requirements (see Section 3.2.10).
   c. Certification stating that all geomembrane rolls are furnished by one supplier, and that all rolls are manufactured from one resin type obtained from one resin supplier.
   d. Copy of quality control certificates issued by Manufacturer.
   e. Test reports from the Manufacturer.
   f. Typical results of complete notched constant tensile load test (GRI-GM-5) for specified resin and sheet thickness.
   g. Statement certifying that no reclaimed polymer is added to the resin.
   h. Statement listing percentages/total of processing aids, antioxidants, and other additives other than carbon black added to or in the resin.
   i. Geomembrane delivery, storage, and handling instructions.
   j. Geomembrane installation instructions.
   k. Sample warranties for review.

3. Extrudate Beads and/or Rod.
   a. Statement of production date or dates.
   b. Laboratory certification stating that the extrudate meets the product requirements (see Section 3.2.11).
   c. Certification stating that all extrudate is manufactured by one Manufacturer and resin is supplied from one supplier.
   d. Copy of quality control certificates issued by Manufacturer.
   e. Test reports from the Manufacturer.

f. Certification stating that the extrudate bead or rod resin is the same type, from the same Manufacturer, and compatible with the resin used to manufacture the geomembrane supplied for this project.

3.2.05 MANUFACTURER/*FABRICATOR QUALIFICATIONS*

The following are pre-qualified. Substitutions will be considered.

a. GSE Lining Technology
b. Agru America

3.2.06 QUALITY *CONTROL*

The Contractor is responsible for continuous quality control testing to ensure that the HDPE products meet specifications.

3.2.07 DELIVERY, *STORAGE, AND HANDLING*

a. General: Conform to the Manufacturer's requirements.
b. Delivery:

1. Deliver materials to the site only after Owner/Owner's Representative accepts required submittals.
2. Separate damaged rolls from undamaged rolls and store at locations designated by Owner/Owner's Representative until proper disposition of material is determined by Owner/Owner's Representative.
3. QA/QC personnel will collectively determine damage.
4. Deliver in rolls — do not fold.

3.2.08 WARRANTY

Provide Manufacturer's warranty for geomembrane material in compliance with provisions of the Conditions of the Contract. Provide a minimum 20-year pro rata warranty for the material against deterioration due to exposure to the elements, either exposed or buried. The warranty for material must cover costs of material replacement and installation; assuming the area is rendered in a clean, dry, unencumbered condition. In the event the area cannot be rendered as such, compensation for defective material will be provided to Owner on a pro rata basis for the estimated cost to Owner at that time of supplying and installing material to a clean, dry, and unencumbered condition by a third party installer.

3.2.09 GEOMEMBRANE *RESIN*

a. High-density Polyethylene (HDPE) must be new, first quality, compounded, and manufactured specifically for producing HDPE geomembrane.
b. Do not mix resin types during manufacturing.

c. Do not use recycled materials or seconds in manufacturing.

d. Meet the following requirements unless otherwise approved:

Test	Test Designation	Requirements	Testing Frequency (minimum)
Density[1.]	ASTM D-792, Method A, or ASTM D-1505	0.94 g/cc	200,000 lb.

Notes:
1. Measure on pure resin without additives.

3.2.10 HIGH-*DENSITY POLYETHYLENE (HDPE) GEOMEMBRANE LINER-TEXTURED*

Manufacturing:

a. Do not exceed a combined maximum total of 1 percent by weight of additives other than carbon black or pigment. Identify percentage of processing aids, antioxidants, and other additives other than carbon black.

b. Do not exceed 3.5 percent by weight of finished geomembrane for total combined processing aids, antioxidants, carbon, and other additives. Do not exceed 3% carbon black by weight.

c. All additives for UV protection, thermal stability, color, or processing agents must not "bloom" to the surface over time or inhibit welding.

d. Use materials produced in the United States, Canada, Mexico, or as approved by Owner.

e. Provide finished product free from blemishes, holes, pin holes, bubbles, blisters, excessive gels, un-dispersed resins, and/or carbon black, contamination by foreign matter and nicks or cuts on edges.

f. Roll manufactured sheets or panel for shipment.

g. Meet the following requirements unless otherwise approved:

Properties for 60 mil HDPE Geomembrane - Textured

Test	Test Designation	Test Value	Testing Frequency (min.)
Sheet Thickness (min. ave.) • lowest individual for 8/10 values • lowest individual for any of the 10 values	ASTM D 5994	60 mil (-5%) -10% -15%	Per roll
Asperity Height mils (min ave.) *(1)*	ASTM D 7466	10 mil	Every 2nd roll *(2)*
Tensile Properties *(3)* (min. ave.) • yield strength • break strength • yield elongation • break elongation	ASTM D 6693 Type IV	 126 lb/in 90 lb/in 12% 100%	20,000 lb
Tear Resistance	ASTM D 1004	42 lb	45,000 lb
Puncture Resistance	ASTM D 4833	90 lb	45,000 lb
Stress Crack Resistance *(4)*	ASTM D 5397 (Appendix)	300 hr.	Per GRI GM10
Carbon Black Content (range)	ASTM D 4218 *(3)*	2.0-3.0 %	20,000 lb
Carbon Black Dispersion	ASTM D 5596	*note (6).*	45,000 lb
Oxidative Induction Time (OIT) (min ave.) *(5)* (a) standard OIT -or- (b) High Pressure OIT	 ASTM D 3895 ASTM D 5855	 100 min. 400 min	200,000 lb
Oven Aging at 85°C *(7) (8)* (a) standard OIT- (min ave.) %ret after 90 days -or- (b) High Pressure OIT- (min ave.) %ret after 90 days	ASTM D 5721 ASTM D 3895 ASTM D 5855	 55% 80%	Per each Formulation
UV Resistance (9) (a) standard OIT- (min ave.) -or- (b) High Pressure OIT- (min ave.) %ret after 1600 hrs *(11)*	GRI GM 11 ASTM D 3895 ASTM D 5855	 NR *(10)* 50%	Per each formulation

(1) of 10 readings; 8 out of 10 must be ≥7 mils, and lowest individual reading must be ≥ 5 mils; also see note 6.

(2) Alternate the measurement side for double sided textured sheet

(3) Machine direction (MD) and cross machine direction (XMD) average values should be on the basis of 5 test specimens each direction.
Yield elongation is calculated using a gage length of 1.3 inches
Break elongation is calculated using a gage length of 2.0 inches

(4) P-NCTL test is not appropriate for testing geomembranes with textured or irregular rough surfaces. Test should be conducted on smooth edges of textured rolls or on smooth sheets made from the same formulation as being used for the textured sheet materials.

(5) Other methods such as D 1603 (tube furnace) or D 6370 (TGA) are acceptable if an appropriate correlation to D 4218 (muffle furnace) can be established.

(6) Carbon black dispersion (only near spherical agglomerates) for 10 different views: 9 in Categories 1 or 2 and 1 in Category 3

(7) The manufacturer has the option to select either one of the OIT methods listed to evaluate the antioxidant content in the geomembrane.

(8) It is also recommended to evaluate samples at 30 and 60 days to compare with the 90 day response.

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

(10) Not recommended since the high temperature of the Std-OIT test produces an unrealistic result for some of the antioxidants in the UV exposed samples.

(11) UV resistance is based on percent retained value regardless of the original HP-OIT value

3.2.11 EXTRUDATE *ROD OR BEAD*

Extrudate rod or bead must:

a. Meet the geomembrane Manufacturer requirements.
b. Be made from same resin as the geomembrane.
c. Have thoroughly dispersed additives throughout rod or bead.
d. Contain 2 to 3 percent carbon black.
e. Be free of contamination by moisture or foreign matter.

3.2.12 MANUFACTURER *SOURCE QUALITY CONTROL*

Refer to the "Testing Frequency" columns from property tables contained in sections *3.2.09 Geomembrane Resin* and *3.2.10 High Density Polyethylene (HDPE) Geomembrane - Textured,* for the minimum acceptable testing frequency required of geomembrane manufacturers. For additional information on sampling, retesting and rejection of substandard products, please refer to GRI GM-13.

SECTION 3.3 - DRAIN MAT

3.3.01 SECTION *INCLUDES*

a. Furnish a drain mat.
b. Furnish a Field Representative from the Manufacturer (if needed) to assist Contractor.

3.3.02 REFERENCES

a. ASTM D 1238 — Standard Test Method for Melt Flow Rates of Thermoplastics by Extrusion Plastometer
b. ASTM D 1505 — Test Method for Density of Plastics by the Density-Gradient Technique
c. ASTM D 3786 — Standard Test Method for Hydraulic Bursting Strength of Textile Fabrics-Diaphragm Bursting Strength Tester Method
d. ASTM D 4218 — Standard Test Method for Determination of Carbon Black Content in Polyethylene Compounds By the Muffle-Furnace Technique
e. ASTM D 4491 — Test Method for Water Permeability of Geotextiles by Permittivity
f. ASTM D 4632 — Test Method for Grab Breaking Load and Elongation of Geotextiles
g. ASTM D 4716 — Test Method for Determining the (In-plane) Flow Rate per Unit Width and Hydraulic Transmissivity of a Geosynthetic Using a Constant Head
h. ASTM D 4751 — Test Method for Determining Apparent Opening Size of a Geotextile
i. ASTM D 4833 — Test Method for Index Puncture Resistance of Geotextiles, Geomembranes, and Related Products
j. ASTM D 5035 — Test Method for Breaking Force and Elongation of Textile Fabrics (Strip Method)
k. ASTM D 5199 — Test Method for Measuring the Nominal Thickness of Geosynthetics
l. ASTM D 5261 — Test Method for Measuring Mass per Unit Area of Geotextiles

3.3.03 DEFINITIONS

a. Drain Mat: Made of nonwoven geotextile fabric heat bonded to one or both sides of an HDPE net. The drain mat filters, drains gases and liquids that pass through it. The geotextile provides gas venting, drainage, and filtration by retaining silt and soil particles while allowing gas and liquids to flow through.
b. Geotextile: A nonwoven fabric that is used as part of the drain mat. The geotextile filters liquids that pass through it.
c. Net: Made of HDPE and part of the drain mat that allows space for gases and liquids to flow through the drain mat.
d. Contractor: The party responsible for field handling, transporting, storing, deploying, seaming, temporary restraining (against wind), and installation of the drain mat.
e. Drain Mat Manufacturer: The party responsible for the production and quality of the drain mat rolls.

3.3.04 SUBMITTALS

a. Submit prior to contract award a Manufacturer's Certificate indicating the proposed product meets the requirements of this specification.
b. Submit prior to contract award, product samples, Manufacturer's test data, and installation and construction details (if applicable).
c. Submit with each delivery of drain mat material, a Manufacturer's QA/QC certificate stating that material quality meets the specifications outlined in this document.

3.3.05 DELIVERY, *STORAGE, AND HANDLING*

a. General: Conform to the Manufacturer's requirements.
b. Delivery.
    1. Deliver materials to the site only after Owner/Owner's Representative accepts required submittals.
    2. Separate damaged rolls from undamaged rolls and store at locations designated by Owner/Owner's Representative until proper disposition of material is determined by Owner/Owner's Representative.
    3. Owner/Owner's Representative will determine damage.
    4. Deliver in rolls — do not fold.

3.3.06 PRODUCTS

a. Drain mat with geotextile fabric heat bonded to both sides.
b. Approved Products and Manufacturers
    1. Transnet^{TM} HDPE Geocomposite (geotextile on both sides) with 270 mil Geonet, 8 oz., by Skaps Industries, or approved equal.
c. The drain mat shall have the following properties:

Property	Test Method	Units	Required Value	Qualifier
GeoNet				
Mass per Unit Area	ASTM D 5261	lb/ft^2	0.25	Minimum
Thickness	ASTM D5199	mil.	270±15	Range
Carbon Black	ASTM D 4218	%	2 to 3	Range
Tensile Strength	ASTM D 5035	lb/in	75	Minimum
Melt Flow	ASTM D 1238[3]	g/10 min.	1	Maximum
Density	ASTM D 1505	g/cm^3	0.94	Minimum
Transmissivity[1]	ASTM D 4716	m^2/sec	$2.25x10^{-3}$	MARV[2]
Composite				
Ply Adhesion (Minimum)	GRI GC7	lb/in	0.5	MARV
Ply Adhesion (Average)	GRI GC7	lb/in	1	MARV
Transmissivity[1a]	ASTM D 4716	m^2/sec	$9x10^{-4}$	MARV
Geotextile				
Fabric Weight	ASTM D 5261	oz/yd^2	8	MARV
Grab Strength	ASTM D 4632	lb	225	MARV
Grab Elongation	ASTM D 4632	%	50	MARV
Tear Strength	ASTM D 3786[4]	lb	90	MARV
Puncture Resistance	ASTM D 4833	lbs.	130	MARV
Mullen Burst	ASTM D 3786[4]	psi	450	MARV
Water Flow Rate	ASTM D 4491	gpm/ft^2	100	MARV
Permittivity	ASTM D 4491	sec^{-1}	1.26	MARV
Permeability	ASTM D 4491	cm/sec	0.3	MARV
AOS	ASTM D 4751	US Sieve	80	MARV

Notes:

1. Transmissivity measured using water at 21 ± 2°C (70 ± 4°F) with a gradient of 1.0 and confining pressure of 15000 psf between stainless steel plates after 15 minutes. Values may vary between individual labs.
   1a. Transmissivity measured using water at 21 ± 2°C (70 ± 4°F) with a gradient of 0.1 and a confining pressure of 10000 psf between stainless steel plates after 15 minutes. Values may vary between individual labs.
2. MARV is statistically defined a mean minus two standard deviations and it is the value which is exceeded by 97.5% of all the test data.
3. Condition 190/2.16
4. Modified

SECTION 3.4 - GEOTEXTILE

3.4.01 SECTION *INCLUDES*

a. Furnish geotextile.
b. Furnish a Field Representative from the Manufacturer (if needed) to assist Contractor.

3.4.02 REFERENCES

a. ASTM D 3786 — Test Method for Hydraulic Bursting Strength of Textile Fabrics-Diaphragm Bursting Strength Tester Method
b. ASTM D 4355 — Test Method for Deterioration of Geotextiles by Exposure to Light, Moisture and Heat in a Xenon Arc Type Apparatus
c. ASTM D 4491 — Test Methods for Water Permeability of Geotextiles by Permittivity
d. ASTM D 4533 — Test Method for Trapezoid Tearing Strength of Geotextiles
e. ASTM D 4632 — Standard Test Method for Grab Breaking Load and Elongation of Geotextiles
f. ASTM D 4751 — Test Method for Determining Apparent Opening Size of a Geotextile
g. ASTM D 4833 — Test Method for Index Puncture Resistance of Geotextiles, Geomembranes, and Related Products
h. ASTM D 5199 — Test Method for Measuring the Nominal Thickness of Geosynthetics
i. ASTM D 5261 — Test Method for Measuring Mass per Unit Area of Geotextiles

3.4.03 DEFINITIONS

a. Geotextile: A nonwoven fabric that is used in various applications such as filtration. This geotextile will be used to protect the HDPE from gravel backfill as it is placed down.
b. Contractor: The party responsible for field handling, transporting, storing, deploying, seaming, temporary restraining (against wind), and installation of the drain mat.
c. Geotextile Manufacturer: The party responsible for the production and quality of the drain mat rolls.

3.4.04 SUBMITTALS

a. Submit prior to contract award a Manufacturer's Certificate indicating the proposed product meets the requirements of this specification.
b. Submit prior to contract award, product samples, Manufacturer's test data, and installation and construction details (if applicable).
c. Submit with each delivery of geotextile material, a Manufacturer's QA/QC certificate stating that material quality meets the specifications outlined in this document.

3.4.05 DELIVERY, *STORAGE, AND HANDLING*

a. General: Conform to the Manufacturer's requirements.
b. Delivery.
    1. Deliver materials to the site only after Owner/Owner's Representative accepts required submittals.
    2. Separate damaged rolls from undamaged rolls and store at locations designated

by Owner/Owner's Representative until proper disposition of material is determined by Owner/Owner's Representative.

3. Owner/Owner's Representative will determine damage.
4. Deliver in rolls — do not fold.

3.4.06 PRODUCTS

a. Geotextile fabric
b. Approved Products and Manufacturers
   1. GSE NW8 or approved equal.
c. The geotextile fabric shall have the following properties:

GEOTEXTILE PROPERTIES			
Property	**Test**	**Units**	**Minimum**
Mass/Unit Area	ASTM D 5261	oz/yd^2	8.0
Mechanical			
Grab Tensile Strength	ASTM D 4632	lbs.	220
Grab Elongation	ASTM D 4632	%	50
CBR Puncture Resistance	ASTM D 6241	lbs.	575
Endurance			
UV Resistance @ 500 hrs.	ASTM D 4355	%	70
Hydraulic			
Apparent Opening Size (AOS)	ASTM D 4751	US Std. Sieve	80
Permittivity	ASTM D 4491	sec^{-1}	1.30
Water Flow Rate	ASTM D 4491	gpm/ft^2	95

PART IV
MATERIAL INSTALLATION SPECIFICATIONS

SECTION 4.1 - GENERAL REQUIREMENTS

4.1.01 GENERAL *CONDITIONS*

The provisions of Part II — General Conditions of the Contract are hereby made a part to these General Conditions, and further intended to be part of all other sections of these project specifications.

4.1.02 WORK *INCLUDED*

The work as performed under the agreement, includes all work necessary as outlined below to install leachate drainage system, Geosynthetic Clay Liner (GCL), High-density Polyethylene (HDPE) Liner, Drain Mat, Anchor Trench, Geotextile on Owner's property at the North Valley Landfill located north of Logan, Utah.

a. Prepare / Implements SWPPP
b. Prepare Appr. 7 Acres of Subgrade
c. Excavate and Backfill Appr. 1,150 ft of Anchor Trench
d. Expose Appr. 1,150 feet of liner
e. Install approximately 306,000 square feet of Reinforced GCL.
f. Install approximately 306,000 square feet of Textured 60-mil HDPE Liner.
g. Install approximately 3,700 square yards of Geotextile.
h. Install approximately 1,850 linear feet of 8" dia. DR11 Perforated HDPE Pipe.
i. Place approximately 550 cubic yards of Gravel Backfill.
j. Install approximately 306,000 square feet of Drain Mat.
k. Place approximately 3,200 cubic yards of Cover Soils.
l. Place approximately 3,555 cubic yards of Slag / Bank Run Gravel

4.1.03 SUMMARY *OF WORK*

The principle features of work include:

a. Install the leachate drain system and liner materials as detailed on the bidding drawings and located to the lines and grades established by the Owner/Owner's Representative. Drawings included with the proposal package are for bidding purposes only and final locations and final details will be confirmed with the issue of construction drawings prior to work commencing. Quantities are not expected to change more than ten percent (10%) from bidding documents to construction documents.
b. Install in accordance with these minimum specifications and the approved Manufacturers' installation standards attached to these specifications.
c. Anchor liner materials securely in place as per the details on the Drawings and the approved Manufacturers' installation standards attached to these specifications.
d. Sequence and coordinate installations and testing to ensure that all operations are achieved in an orderly and expeditious manner.

e. Extreme care shall be exercised by the Contractor to ensure that no damage occurs to the underlying prepared surface while installing the geotextile, GCL, HDPE, HDPE pipe, gravel backfill, and Drain Mat. Extra care will be taken during transporting and installing of successive layers.

f. Touch-up minor damaged surfaces caused during installation in accordance with industry standards, these specifications, and the recommendations of the Manufacturers. Replace damaged components as directed by Owner/Owner's Representative.

g. Installation will not be considered complete until the liner is completely inspected by the Owner/Owner's Representative.

4.1.04 PRIME *CONTRACTOR'S RESPONSIBILITY*

The prime contractor, herein referred to as "Contractor", shall properly coordinate all work done, expediting the work of the various trades. Contractor shall guarantee that the different elements are built and installed in proper sequence and so that the parts fit together in a neat, tight, and workmanlike manner to function properly and as intended at the completion of the work. The Contractor shall see to it that orders for installation accessories, which he is to furnish, as called for under this contract and specifications and under his direction, are ordered by the various trades involved and are delivered to the site at the proper time.

The Contractor and the various trades working under his leadership and direction shall coordinate their work with adjacent work and with other contractors, so as to facilitate the general progress of the work. Each contractor shall afford other contractors every reasonable opportunity for the installation of their work and for the storage of their material.

4.1.05 CONFORMITY *WITH PLANS*

All work shall be done by the Contractor in exact conformity with the plans and specifications and instructions of the Owner/Owner's Representative. All minor details of the work which are not mentioned in the specifications, but are obviously incidental, shall be considered a part of the work for which prices are given in the proposal, and no extra compensation shall be allowed the Contractor for the performance thereof.

4.1.06 ERRORS *AND OMISSIONS*

If the Contractor, in the course of the work, finds any errors or omissions in plans or in the layout as given by survey points and instructions, or if he finds any discrepancy between the plans and the physical conditions of the locality, he shall promptly verify the same. Any work done after such discovery, until authorized, will be done at the Contractor's risk.

4.1.07 NOTICE *TO OWNER'S REPRESENTATIVE*

The Contractor shall give forty-eight hours' notice when he will need the services of the Owner's Representative for observing any portion of the work.

4.1.08 LINES *AND GRADES*

All work shall be done to the true line and grade, as shown on the contract drawings. The Owner/Owner's Representative will furnish survey benchmarks for the Contractor's use and the Contractor must protect them and will be held responsible for any defective work caused by his negligence in this respect. If the benchmarks are destroyed, they will be replaced by the Contractor. The Contractor is responsible for all surveying with the exception of the initial benchmarks.

4.1.09 SUPERVISORY *PERSONNEL*

It is the intent of these specifications to provide a completed project which will in every way reflect the work of competent journeyman mechanics in the various trades represented. The Contractor shall insure that each portion of the work is supervised by a qualified person, well versed in the operation of the various tools required for the trade, the method in which the work is to be done, and knowledge of the general requirements of the construction work. All work is to be done in accordance with the latest methods devised for such work to insure a workmanlike appearance of the completed project.

4.1.10 TIME *OF PERFORMANCE AND PARTIAL PAYMENTS*

The work shall be commenced at the time stated in the notice to proceed, and shall be carried on continuously until completed within the time set forth in the proposal. At least ten days before each progress payment falls due (but not more often than once a month), the Contractor may submit to the Owner/Owner's Representative a partial payment estimate filled out and signed by the Contractor covering the work performed during the period covered by the partial payment estimate and supported by such data as the Owner/Owner's Representative may reasonably require. The Owner/Owner's Representative will, within ten days after receipt of each partial payment estimate, either indicate in writing his approval of payment and present the partial payment estimate to the Owner/Owner's Representative, or return the partial payment estimate to the Contractor indicating in writing his reasons for refusing to approve payment. The Owner/Owner's Representative will within ten days of presentation to him of an approved partial payment estimate, pay the Contractor a progress payment on the basis of the approved partial payment estimate. The Owner/Owner's Representative shall retain ten (10%) percent of the amount of each payment until final completion and acceptance of all work covered by the contract documents.

SECTION 4.2 - EQUIPMENT AND LABOR FURNISHED BY CONTRACTOR

The Contractor shall furnish all labor, equipment, tools, supervision, etc., and all costs involved, necessary to the final completion of the work required under this contract as specified, including all power required to power all tools and equipment used, such as gasoline, fuel, oil, electricity, etc. All equipment, tools, machinery, etc. used shall be in good repair and shall be maintained in a good workable and safe condition necessary to continuously carry on the work involved in this project in a workmanlike, expeditious, and safe manner, without serious or costly delays in the performance of all phases of the work involved. Any and all equipment and machinery used on this project shall be in accordance with all ordinances. No equipment or machinery shall be operated in or over paved streets or prepared roadway shoulders, in getting to, from, or in working on this project, that is equipped with treads or cleats that, in the opinion of the Owner/Owner's Representative, may be injurious to pavement or shoulder surfaces. Any damage done in these operations shall be immediately repaired by the Contractor at his expense.

If requested by the Owner/Owner's Representative, the Contractor shall furnish a list of all equipment and machinery that he has of his own or which he has access to and which he proposes to use on the work under this project. The Contractor shall state the present condition of equipment as to its fitness and safety on this type of work, together with a written statement as to the past experiences of those who will operate the various machines to be used, their qualifications and the previous experiences the Contractor has had in performing similar work as that required under this contract.

SECTION 4.3 - GEOSYNTHETIC CLAY LINER (GCL)

4.3.01 SECTION *INCLUDES*

a. Installation of a reinforced Geosynthetic Clay Liner (GCL) on the bottom of the cell as shown on the Drawings.
b. All Geosynthetic Clay Liner (GCL) shall be provided by the Contractor.

4.3.02 DEFINITIONS

For the purpose of this specification, the following terms are defined below:

a. Geosynthetic Clay Liner (GCL): A manufactured hydraulic barrier consisting of clay bonded to a layer or layers of geosynthetics. Refer to the QA/QC Plan attached to these specifications and included as a contract document.
b. Construction Quality Assurance (CQA): The party, independent from Manufacturer or Contractor, which is responsible for observing and documenting activities related to the quality assurance of installation of the geosynthetic components of the lining system. This CQA consultant may enlist the aid of a CQA laboratory to conduct tests on samples of geosynthetics obtained at the site.
c. Construction Quality Control (CQC): The individual who will be responsible for quality control of the Contractor's operations; observing, recording, and documenting activities related to the quality control of the installation of the geosynthetic components of the lining system.
d. Overlap: Where two adjacent GCL panels contact, the distance measured perpendicular from the overlying edge of one panel to the underlying edge of the other.
e. GCL Subgrade: The graded and compacted site soils that the GCL will be placed upon.
f. Contractor: The party responsible for field handling, transporting, storing, deploying, seaming, temporary restraining (against wind), and installation of the GCL.
g. Panel: The unit area of GCL that will be installed in the field.

4.3.03 SUBMITTALS

a. Submit prior to contract award evidence that Contractor is experienced to install GCL and include a project reference list demonstrating company experience in installing GCL.
b. Submit prior to contract award a conceptual panel layout to cover the entire work area.
c. Contractor shall supply the labels from the wrap on the outside of each roll of liner to the Owner's Representative.
d. Contractor shall submit daily field reports detailing liner placed, QC testing, personnel, and weather conditions.

4.3.04 QUALITY *CONTROL*

a. Perform liner installation with adequately trained personnel experienced in similar liner installations.
b. Contractor will be responsible for all QC functions as called out in the QA/QC Plan attached to these specifications.
c. Contractor shall inspect for overlap continuously during GCL placement at the rate of a minimum of once per roll for the first six rolls installed, then once per ten rolls thereafter. Inspections shall be documented daily.
d. Owner will engage and pay for the services of an independent Construction Quality Assurance (QA) consultant.

4.3.05 PRODUCTS

a. The GCL must be supplied by the Contractor.

4.3.06 ON-*SITE HANDLING*

a. The Manufacturer assumes responsibility for initial loading of the GCL. Unloading of the GCL is the responsibility of the Contractor. On-site handling and installation of the GCL are the responsibility of the Contractor.
b. A visual inspection of each roll should be made by the Contractor as it is unloaded to identify if any packaging has been damaged. Rolls with damaged packaging shall be reported to the Owner/Owner's Representative and then marked and set aside for further inspection. The packaging should be repaired prior to being placed in storage.
c. Rolls with damaged GCL material shall be rejected and replaced by the Contractor.
d. The Contractor will contact the Manufacturer prior to shipment to ascertain the appropriateness of the proposed unloading methods and equipment.

4.3.07 STORAGE - *CONTRACTOR RESPONSIBILITY*

a. Storage of the GCL rolls shall be the responsibility of the Contractor. A dedicated storage area shall be selected at the job site that is away from high traffic areas; is level, dry, and well-drained; and is protected from other sources of damage.
b. Rolls should be stored in a manner that prevents sliding or rolling from the stacks and may be accomplished by the use of chock blocks or by use of the dunnage shipped between rolls. Rolls should be stacked at a height no higher than recommended by the Manufacturer or at a height at which the lifting apparatus can be safely operated (typically no higher than four rolls high).
c. All stored GCL materials and the accessory bentonite must be covered with a weather and UV resistant plastic sheet or tarpaulin until their installation to ensure that water does not come into contact with the materials.
d. The integrity and legibility of the labels shall be preserved during storage.

4.3.08 GCL *PLACEMENT*

a. During start-up of the GCL installation, an agent or representative of the Manufacturer shall provide instructions regarding the appropriate installation techniques.

b. The use of equipment capable of freely suspending the GCL roll is required. A spreader bar and core pipe are also required for supporting the roll and allowing it to unroll freely. The core bar and spreader bar shall not bend or flex excessively when a full roll is lifted. GCL rolls should be delivered to the working area in their original packaging. Immediately prior to deployment, the packaging should be carefully removed so as not to damage the GCL.

c. GCL panels shall be placed with the side indicated by the Manufacturer facing down. Panels should be placed from the highest elevation to the lowest within the area to be lined, to facilitate drainage in the event of precipitation. Panels should be overlapped such that the direction of flow is from the uphill (top) sheet to the downhill (bottom) sheet to produce a shingle effect. Panels shall be placed free of tension or stress and without wrinkles or folds. It is not permissible to stretch the GCL in order to fit a designated area. To ensure that the integrity of the prepared surface is maintained, panels shall not be dragged across the sub-grade into position.

d. Panels may be placed in any weather conditions except for moderate to heavy rains, extremely high winds, or in ponded water.

e. The Contractor shall unwrap and install only as much GCL in one working day as recommended by the Manufacturer or that can be covered at the end of the working day with HDPE membrane. All GCL panels should lie flat on the underlying surface, with no wrinkles or folds, especially at the exposed edges of the panels. Equipment which could damage the GCL shall not be allowed to travel directly on it. If installation equipment causes rutting of the sub-grade, the sub-grade must be repaired and restored to acceptable condition prior to continuation of placement.

f. GCL material which becomes hydrated prior to backfilling shall be removed and replaced at the Contractor's expense. The Contractor and Owner/Owner's Representative shall inspect the GCL for hydration and/or swelling prior to placement of backfill. If the Owner/Owner's Representative notices significant hydration and/or swelling, the Contractor shall, at his own expense, arrange for the GCL to be inspected by a certified Manufacturers representative. The Manufacturer's representative shall inspect the GCL and evaluate its suitability for the intended design purpose and compliance with product warranty. The Manufacturer's representative's inspection and evaluation shall be documented and submitted to the Owner/Owner's Representative.

4.3.09 GCL *PANEL SEAMING*

a. Longitudinal seams for GCL without Supergroove®, or equivalent, shall be formed by executing a bentonite-enhanced overlap to ensure that a continuous seal is achieved between panels.

b. If GCL is equipped with features such as Supergroove®, or equivalent, a bentonite-enhanced overlap is not necessary when seaming. Bentonite-enhanced overlaps are unnecessary when using GCL with Supergroove®, or equivalent, because the mat has self-seaming capabilities in longitudinal overlaps. GCL seams constructed using Supergroove® GCL, or equivalent, shall be formed by overlapping adjacent panel edges and ends. Care should be taken to ensure that the overlap zone is not contaminated with loose soil or other debris.

c. A 6-inch minimum overlap should exist at all seam locations. A 24-inch minimum overlap shall exist at the tie-in between the bottom of the cell, and all end-of-panel applications. The lap line and match lines printed on the panels shall be used to assist

in obtaining this overlap. The edges of the GCL panels should be adjusted to smooth out any wrinkles, creases, or "fish-mouths" in order to maximize contact with the underlying panel.

d. After the overlying panel is placed, its edge shall be pulled back to expose the overlap zone. Any soil or debris present in the overlap zone or entrapped in the geotextiles shall be removed. A fillet of granular bentonite shall then be poured in a continuous manner along the overlap zone (between the edge of the panel and the 6-inch line), at a rate of at least one-quarter pound per lineal foot. The use of a watering can is recommended to improve the uniformity and consistency of the bentonite enhancement.

4.3.10 DAMAGE *REPAIR*

a. Any damage in the form of cuts or tears in the GCL shall be identified and repaired by the Contractor by cutting a patch from unused GCL and placing it over the affected area.

b. The damaged area should be cleaned of all dirt and debris. A patch of GCL shall be cut to fit over the damaged area and to extend at least one foot in all directions around it. Accessory bentonite shall then be placed around the perimeter of the affected area at the rate of one-half pound per lineal foot, and the patch shall be placed over the damage. The patch shall be weighted down using backfill or sandbags until final backfilling takes place.

4.3.11 INSTALLATION

Installation shall be in accordance with the Manufacturer's recommended procedures. Any questions with regards to installation techniques should be directed to the Manufacturer. Care must be taken to avoid damage to underlying, existing, in-place liner components.

4.3.12 *INSTALLATION WARRANTY*

Provide an installation warranty for GCL material in compliance with the conditions of the Contract. Provide a minimum of 2 year non-pro rata warranty for the installation against defects.

SECTION 4.4 - HIGH-DENSITY POLYETHYLENE GEOMEMBRANE LINER

4.4.01 SECTION *INCLUDES*

a. Installation of high-density polyethylene (HDPE) geomembrane liner for solid waste cell construction.

b. The geomembrane shall be 60 mil in thickness and both sides will have textured surfaces.

4.4.02 DEFINITIONS

a. Bridging: The condition when geomembrane becomes suspended over its subgrade due to contraction of the material or poor installation.

b. Construction Quality Assurance (CQA): The party, independent from Manufacturer or

Contractor, which is responsible for observing and documenting activities related to the quality assurance of installation of the geosynthetic components of the lining system. This CQA consultant may enlist the aid of a CQA laboratory to conduct tests on samples of geosynthetics obtained at the site.

c. Construction Quality Control (CQC): The individual who will be responsible for quality control of the Contractor's operations; observing, recording, and documenting activities related to the quality control of the installation of the geosynthetic components of the lining system.

d. Geomembrane: An essentially impermeable membrane used as a solid or liquid barrier. Synonymous term for flexible membrane liner (FML).

e. Geomembrane Subgrade: The Geosynthetic Clay Liner that the HDPE Liner will be placed upon.

f. Contractor: The party responsible for field handling, transporting, storing, deploying, seaming, temporary restraining (against wind), and installation of the geomembrane.

g. Panel: The unit area of geomembrane that will be seamed in the field. If the geomembrane is not fabricated into panels in a factory, a panel is identified as a roll or portion of a roll without any seams.

4.4.03 SUBMITTALS

a. Schedules and Drawings
   1. Submit detailed installation schedule within seven (7) days of award of contract. Include hours worked per day, week, and per shift. Indicate all weather delays built into schedule.
   2. Installation layout drawings: Within seven (7) days of award of contract, Contractor shall submit drawings showing the panel layout indicating both fabricated (if applicable) and field seams, and details not conforming to the Contract Drawings. Upon acceptance by Owner/Owner's Representative, Contractor shall use these drawings for installation of geomembrane.

b. Qualifications: Submit within seven (7) days of award:
   1. Resume of installation supervisor/field engineer to be assigned to the project.
   2. Resume of master seamer.
   3. Resumes of installation seamers performing seaming operations.

c. Field Quality Control Documents
   1. Submit quality control documentation prepared during installation.
   2. Submit daily prior to the start of installation: subgrade acceptance certificate signed by the installation supervisor for each area to be covered by the geomembrane.

d. Equipment and Personnel: Submit the following within seven (7) days of award:
   1. Equipment list stating quantity and types.
   2. List of personnel to perform field seaming operations.

e. Submit upon completion of the installation:
   1. Certificate stating the liner has been installed in accordance with the plans and specifications.
   2. The warranty obtained from the Manufacturer/fabricator and the installation warranty.
   3. As-built drawings showing location of panels, seams, repairs, patches, and destructive samples, including measurements.
   4. Copies of seam test results and statistical analysis of each welder's performance.

4.4.04 QUALIFICATIONS

a. Contractor: Must have successfully installed a minimum of 10,000,000 square feet of welded polyethylene geomembrane with documented references.
b. Master Welder Qualifications: Must have completed a minimum of 5,000,000 square feet of polyethylene geomembrane seaming work using the type of seaming apparatus proposed for use on this project.
c. Other Seamer's Qualifications: Must have seamed a minimum of 1,000,000 square feet of HDPE geomembrane.

4.4.05 QUALITY *CONTROL*

Contractor will be responsible for all CQC functions as called out in the QA/QC Plan attached to these specifications.

4.4.06 QUALITY *ASSURANCE*

Owner will engage and pay for the services of an independent Construction Quality Assurance Inspector (CQA).

4.4.07 ON-*SITE HANDLING*

a. General: Conform to the Manufacturer's requirements.
b. Handling on Site:
    1. Use appropriate handling equipment to load, move, or deploy geomembrane rolls. Appropriate handling equipment includes cloth chokers and spreader bar for loading, carrying, and roll bars for deployment. Dragging panels on ground surface will not be permitted.
    2. Do not fold geomembrane material; folded material will be rejected.
    3. Contractor is responsible for off-loading, storing, and transporting material from storage area to installation site.

4.4.08 INSTALLATION

Installation shall be in accordance with the Manufacturer's recommended procedures. Any questions with regards to installation techniques should be directed through the Contractor to the Manufacturer. Care must be taken to avoid damage to underlying, existing, in place liner components.

4.4.09 INSTALLATION *WARRANTY*

Provide an installation warranty for geomembrane material in compliance with the conditions of the Contract. Provide a minimum of 2 year non-pro rata warranty for the installation against defects.

SECTION 4.5 - DRAIN MAT

4.5.01 SECTION *INCLUDES*

a. Installation of Drain Mat - drain net material for solid waste cell construction.
b. The Drain Mat material shall be provided by the Contractor.

4.5.02 DEFINITIONS

a. Bridging: The condition when geocomposite becomes suspended over its subgrade due to contraction of the material or poor installation.
b. Construction Quality Assurance (QA): The party, independent from Manufacturer or Contractor, which is responsible for observing and documenting activities related to the quality assurance of installation of the geosynthetic components of the lining system. This CQA consultant may enlist the aid of a CQA laboratory to conduct tests on samples of geosynthetics obtained at the site.
c. Construction Quality Control (CQC): The individual who will be responsible for quality control of the Contractor's operations; observing, recording, and documenting activities related to the quality control of the installation of the geosynthetic components of the lining system.
d. Drain Mat: An essentially permeable geocomposite used as a collection zone for any liquids.
e. Drain Mat Subgrade: The HDPE Liner that the Drain Mat will be placed upon.
f. Contractor: The party responsible for field handling, transporting, storing, deploying, seaming, temporary restraining (against wind), and installation of the Drain Net.
g. Panel: The unit area of Drain Mat that will be installed in the field.

4.5.03 SUBMITTALS

a. Schedules and Drawings: Submit the following within seven (7) days of award of contract:
    1. Installation schedule, including hours worked per day, week, and per shift. Indicate all weather delays built into schedule.
    2. Installation layout drawings, showing the panel layout field seams, and details not conforming to the Contract Drawings. Upon acceptance by Owner/Owner's Representative, Contractor shall use these drawings for installation of drain net.
b. Field Quality Control Documents: Submit quality control documentation prepared during installation as per the QA/QC Plan.
c. Equipment and Personnel: Within seven (7) days of award, submit equipment list stating quantity and types.
d. Submit upon completion of the installation:
    1. Certificate stating the drain net has been installed in accordance with the plans and specifications.
    2. Installation warranty.
    3. As-built drawings showing location of panels, seams, repairs, patches, and destructive samples, including measurements.

4.5.04 QUALIFICATIONS

Contractor must have successfully installed a minimum of 10,000,000 square feet of polyethylene Drain Mat with documented references.

4.5.05 QUALITY *CONTROL*

Contractor will employ an individual whose sole responsibility will be to perform all QC functions as called out in the QA/QC Plan attached to these specifications.

4.5.06 QUALITY *ASSURANCE*

Owner will engage and pay for the services of an independent Construction Quality Assurance Inspector (QA).

4.5.07 ON-*SITE HANDLING*

a. General: Conform to the Manufacturer's requirements.
b. On-Site Handling and Placement:
    1. Use appropriate handling equipment to load, move, or deploy Drain Mat rolls. Appropriate handling equipment includes cloth chokers and spreader bar for loading, spreader, and roll bars for deployment. Dragging panels on ground surface will not be permitted.
    2. Do not fold Drain Mat material; folded material will be rejected.
    3. Contractor is responsible for off-loading, storage, and transporting material from storage area to installation site.
    4. Drain Mat material shall be kept in sufficient tension to reduce folds and wrinkles.
    5. In the presence of high wind, all Drain Mat shall be weighted with sandbags or the equivalent.
    6. Drain Mat materials shall be cut using an approved cutter. If it is cut in place, special care must be taken to protect other materials under and around the drain net.
    7. Care shall be taken not to entrap stones or excessive dust that could damage the Drain Mat and generate clogging of drains or filters.

4.5.08 INSTALLATION

Installation shall be in accordance with the Manufacturer's recommended procedures. Any questions with regards to installation techniques should be directed through the Contractor to the Manufacturer. Care must be taken to avoid damage to underlying, existing, in-place liner components.

4.5.09 *INSTALLATION WARRANTY*

Provide an installation warranty for drain net material in compliance with the conditions of the Contract. Provide a minimum of 2 year non-pro rata warranty for the installation against defects.

SECTION 4.6 - SUPPLY AND INSTALLATION OF GEOTEXTILE

4.6.01 SECTION *INCLUDES*

a. Installation of Geotextile fabric installation sheet to prevent disturbance of the subgrade soil.
b. The Geotextile material shall be provided by the Contractor.

4.6.02 DEFINITIONS

a. Bridging: The condition when Geotextile becomes suspended over the subgrade due to contraction of the material or poor installation.
b. Construction Quality Assurance (QA): The party, independent from Manufacturer or Contractor, which is responsible for observing and documenting activities related to the quality assurance of installation of the geosynthetic components of the lining system. This QA consultant may enlist the aid of a QA laboratory to conduct tests on samples of geosynthetics obtained at the site.
c. Construction Quality Control (QC): The individual who will be responsible for quality control of the Contractor's operations; observing, recording, and documenting activities related to the quality control of the installation of the geosynthetic components of the lining system.
d. Geotextile: A 8 oz. non-woven polypropylene fabric. SKAPS GE 180 or approved equal.
e. Geotextile Subgrade: The final graded and compacted soil that the Geotextile will be placed upon.
f. Contractor: The party responsible for field handling, transporting, storing, deploying, seaming, temporary restraining (against wind), and installation of the Geotextile.
g. Panel: The unit area of Geotextile that will be installed in the field.

4.6.03 *SUBMITTALS*

a. Schedules and Drawings: Submit the following within seven (7) days of award of contract:
    1. Installation schedule, including hours worked per day, week, and per shift. Indicate all weather delays built into schedule.
    2. Installation layout drawings, showing the panel layout field seams (or overlaps), and details not conforming to the Contract Drawings. Upon acceptance by Owner/Owner's Representative, Contractor shall use these drawings for installation of Geotextile.
b. Field Quality Control Documents: Submit quality control documentation prepared during installation as per the QA/QC Plan.
c. Equipment and Personnel: Within seven (7) days of award, submit equipment list stating quantity and types.
d. Submit upon completion of the installation:
    1. Certificate stating the Geotextile has been installed in accordance with the plans and specifications.
    2. Installation warranty.
    3. As-built drawings showing location of panels, seams, repairs, patches, and destructive samples, including measurements.

4.6.04 *QUALIFICATIONS*

Contractor must have successfully installed a minimum of 5,000,000 square feet of Geotextile fabric with documented references.

4.6.05 *QUALITY CONTROL*

Contractor will employ an individual whose sole responsibility will be to perform all QC functions as called out in the QA/QC Plan attached to these specifications.

4.6.06 *QUALITY ASSURANCE*

Owner will engage and pay for the services of an independent Construction Quality Assurance Inspector (QA).

4.6.07 *ON-SITE HANDLING*

a. General: Conform to the Manufacturer's requirements.
b. On-Site Handling and Placement:
    1. Use appropriate handling equipment to load, move, or deploy Geotextile rolls. Appropriate handling equipment includes cloth chokers and spreader bar for loading, spreader, and roll bars for deployment. Dragging panels on ground surface will not be permitted.
    2. Do not fold Geotextile material; folded material will be rejected.
    3. Contractor is responsible for off-loading, storage, and transporting material from storage area to installation site.
    4. Geotextile material shall be kept in sufficient tension to reduce folds and wrinkles.
    5. All Geotextile shall be weighted with sandbags or the equivalent to prevent wind drift.
    6. Geotextile panels shall be stitched or overlapped as per the Manufacturer's recommendations. Care must be taken to protect subgrade surface. Contractor will be responsible to repair damage to the subgrade. Any rocks or stones in the prepared subgrade that are dislodged or visibly apparent will be removed by the Contractor.

4.6.08 *INSTALLATION*

Installation shall be in accordance with the Manufacturer's recommended procedures. Any questions with regards to installation techniques should be directed through the Contractor to the Manufacturer. Care must be taken to avoid damage to underlying prepared subgrade.

4.6.09 *INSTALLATION WARRANTY*

Provide an installation warranty for Geotextile material in compliance with the conditions of the Contract. Provide a minimum of 2 year non-pro rata warranty for the installation against defects.

LOGAN CITY UNITED IN SERVICE

ENVIRONMENTAL DEPARTMENT

North Valley Landfill

Cell 2 Construction QA/QC Plan

May, 2019

1.0 RESPONSIBILITY AND AUTHORITY

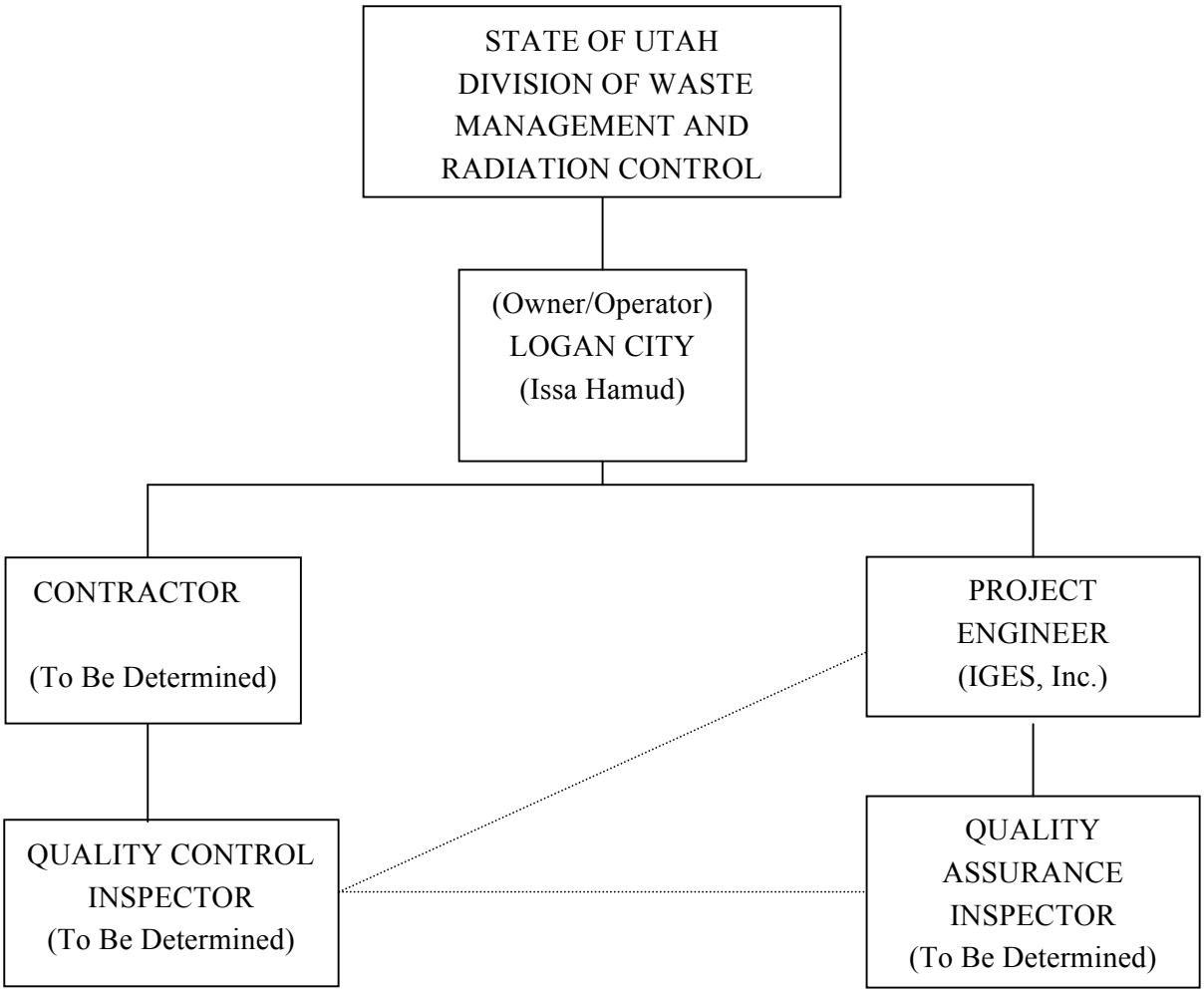
1.1 INTRODUCTION

This Construction Quality Assurance/Quality Control (QA/QC) Plan is a site-specific document that has been prepared to provide construction controls for the Cell 2 liner system at the North Valley Landfill (NVL). Construction Quality Control (QC) will be performed by the Contractor, independently from Construction Quality Assurance (QA) activities, and consists of inspections necessary to control the quality of the constructed or installed components. The Owner or an Owner provided subcontractor will perform the QA work. QA activities will consist of inspections, verifications, audits, and evaluations of materials and workmanship necessary to determine and document the quality of the constructed facility and QC activities of the Contractor. In cases of discrepancy within the construction documents the Plans shall govern followed by the QA/QC Plan and finally the Specifications.

1.2 ORGANIZATION

The principal organizations involved in permitting, designing, and construction of Cell 2 liner system at the NVL and their respective responsibilities are outlined in Figure 1. Figure 1 represents the organization structure for the QA/QC program under this Plan.

FIGURE 1: ORGANIZATIONAL STRUCTURE



Line of Authority ———————————
Line of Communication .....

1.2.1 Permitting Agency (Utah Division of Solid and Hazardous Waste)

The State of Utah Division of Waste Management and Radiation Control (DWMRC) is authorized by State statute to review liner and cover construction associated with municipal solid waste disposal facilities. It is the responsibility of the permitting agency to review the Owner/Operator's construction documents for completion and to ensure that the construction documents are in accordance with the facilities permit. The DWMRC also has the

responsibility and authority to review all QC and QA documentation during or after facility construction to confirm that the approved QA/QC Plan was followed and that the facility was constructed as specified in the construction Plans and Specifications.

1.2.2 Owner/Operator (Logan City)

The NVL is owned and will be operated by Logan City. The Owner is responsible for the design, construction, and operation of the landfill including compliance with requirements of the permitting agency. The Owner is also responsible for assuring the permitting agency, by the submission of QC and QA documentation, that the facility was constructed as specified in the Construction Plans and Specifications. The Owner has the authority to select and dismiss organizations charged with design, QA, and construction activities and to accept or reject design Plans and Specifications, QA plans, reports and recommendations of the QA inspector, and the materials and workmanship of the Contractor. The Owner will notify the DWMRC of individuals/organizations, which will be performing duties under this Plan, and if any changes to those personnel are made during the project life. The Owner's representative on the project will be Issa Hamud.

1.2.3 Project Engineer (IGES, Inc.)

The primary responsibility of the Project Engineer (Engineer) is to provide engineering design support during construction of the facility to fulfill the operational requirements of the Owner, and the performance requirements of the permitting agency. The Engineer shall provide clarification of the Plans and Specifications if necessary, to assist the implementation of the approved Plans and Specifications. The Engineer has the authority to change some component designs if unexpected site conditions are encountered or changes in construction methodology occur. The QA portion of the QA/QC Plan is designed to ensure that these unexpected changes or conditions will be detected, documented, and addressed during construction. In addition, the Engineer shall oversee implementation of the QA/QC Plan, periodically review QA documentation, and provide technical support during construction. The Engineer shall approve of all corrective measures in cases where work deviates from the Plans and Specifications. The Engineer and the QA inspector shall be in direct communication on every aspect of the construction activities, especially any issues of installation, which the QA Officer identifies as deviations from the Plans or Specifications. The Engineer shall report directly to the Owner.

1.2.4 QA Inspector (To Be Determined)

The QA Inspector will be responsible for guiding QA activities at the site and reviewing QC results. The QA Inspector shall have the authority to stop work elements if required to maintain the quality of the project. Problems with QA/QC that are not readily resolved or require a change in design shall be referred to the Engineer. The QA Inspector will communicate daily directly to the Engineer and shall coordinate any change notifications to the QA/QC Plan to the Engineer. Responsibilities of the QA Inspector will include:

- Reviewing design criteria, plans, and specifications for clarity and completeness so that the QA/QC Plan may be implemented.
- Scheduling and coordinating QA inspection activities including:
  - Confirming that the testing equipment, personnel, and procedures do not change over time or making sure that any changes do not adversely impact the inspection process.
  - Confirming that the test data are accurately recorded and maintained.
  - Verifying that the raw data are properly recorded, validated, reduced, summarized, and interpreted.
  - Maintain in an up-to-date, organized and accessible manner all inspection forms, documentation and submitted certifications, on site for regulatory and Engineer's review.
- Providing reports to the Engineer on the inspection results including:
  - Review and interpretation of all data sheets and reports.
  - Identification of work that the QA inspector believes should be accepted, rejected, or uncovered for observation, or that may require special testing, inspection, or approval.
  - Rejection of defective work and verification that corrective measures are implemented.
- Verifying that all contractors' construction quality control plans are in accordance with this QA/QC Plan.
- Reporting to the Contractor, at the Engineer's request, results of observations and tests as the work progresses and interacting with the Contractor to aid in modifying the materials and work to comply with the specified design.

1.2.5 Construction Contractor (To Be Determined)

The responsibility of the Contractor is to provide materials, equipment and labor necessary to construct the Cell 2 liner system in strict accordance with design criteria, plans, and specifications using the necessary construction procedures and techniques. The Contractor is also responsible for implementing QC testing required by this QA/QC Plan and for

submitting the necessary data to the Engineer for development of As-Built drawings. The Contractor shall prepare and submit to the Engineer a Construction Quality Control Plan (QC Plan) that provides details and schedules for meeting the QC requirements in this Plan. Contractor shall submit their QC Plan at least 1 week prior to the Preconstruction Meeting.

1.3 PROJECT MEEETINGS

1.3.1 Preconstruction Meeting

A preconstruction meeting will be held following completion of facility design, permit approval, and award of construction contracts. The Owner, Engineer, QA Inspector, and all Contractors and their QC personnel will attend the preconstruction meeting. State of Utah DWMRC personnel may attend the Preconstruction Meeting at their option. The meeting shall be documented by the QA Inspector and minutes of the meeting distributed to all personnel in attendance. The meeting agenda will include, but not be limited to, the following:

- Issuing of Construction Plans and Specifications.
- Issuing of Construction QA/QC Plan. Familiarizing each organization with the QA/QC Plan and its role relative to the design criteria, plans, and specifications.
- Reviewing the responsibilities and lines of communication and authority of each organization.
- Discussing procedures for observations and testing.
- Discussing procedures for handling construction deficiencies, repairs, and retesting.
- Reviewing methods for documenting and reporting testing and inspection activities.
- Discussing procedures for the location and protection of construction materials and for the prevention of damage of the materials from inclement weather or other adverse events.
- Conducting a site walk-around to review site conditions and material and inspection equipment storage locations.
- Identifying required submittals for the project.
- Procedures for stopping work.

1.3.2 Daily Progress Meetings

Daily Progress Meetings will be held at the work area prior to commencement of work. This meeting will be attended, at a minimum, by the Contractor, the QC Inspector, and the QA

Inspector. The QA Inspector will document the meeting by filling out a meeting form. The purpose of this meeting will be to:

- Review the previous day's activities and accomplishments.
- Review the work location and activities scheduled for the day.
- Identify the contractor's personnel and equipment assignments for the day.
- Discuss any potential construction problems.

1.3.3 Weekly Meetings

Weekly meetings will be held during the life of the project to strengthen responsibility and authority by enhancing communication between personnel responsible for designing, inspecting, and constructing the Cell 2 liner. It will be the responsibility of the QA Inspector to conduct project meetings. This meeting will be attended, at a minimum, by the QA Inspector, Contractor, the QC Inspector, Owner, and Engineer with optional attendance by the State of Utah DWMRC personnel. The QA Inspector will document the meeting by filling out a meeting form. A major goal of project meetings will be to ensure familiarity with authorized personnel, individual responsibilities, facility design, construction procedures, and any design changes for all parties involved in the project.

1.3.4 Problem or Work Deficiency Meetings

A special meeting will be held when and if a problem or deficiency is present or likely to occur. This meeting will be attended, at a minimum, by the Owner, Engineer, Contractor, the QC Inspector and QA Inspector. The QA Inspector will document the meeting by filling out a meeting form. The purpose of the meeting will be to define and resolve a problem or recurring work deficiency in the following manner:

- Define and discuss the problem or deficiency.
- Review alternative solutions.
- Implement a plan to resolve the problem or deficiency.

2.0 PERSONNEL QUALIFICATIONS

2.1 GENERAL

To assure that the individuals involved with implementation of the QC/QA Plan are properly qualified, a list of minimum qualifications has been developed. This will ensure that the individuals have the proper training and experience to adequately perform their task. Qualifications are presented below:

2.1.1 Project Engineer

- Bachelor's Degree in Civil Engineering or related field and at least 10 years of experience in related projects. The Engineer must be familiar with all aspects of geosynthetic liner/cover construction including; embankment construction, QA/QC plan implementation, and the installation of geosynthetic materials.
- Must have good interpersonal and communication skills.
- Must be registered as a professional civil engineer in the State of Utah.

2.1.2 QA Inspector

- Should have a minimum of 2 years in related synthetic liner system experience and shall be familiar with all aspects of geomembrane testing, and other QA/QC controls relating to liner construction or have a college degree in engineering.
- Must have good interpersonal and communication skills.
- Be capable of independently performing all geosynthetic liner/cover on-site related testing.

2.1.3 Contractor

- Contractor shall have a minimum of 5,000,000 square feet of documented liner construction experience.
- Contractor shall have a demonstrated understanding of QA/QC Plans about liner construction.
- Contractor shall have personnel on site that have documented experience with liner construction and testing.

3.0 QA/QC INSPECTION AND SAMPLING

3.1 PRECONSTRUCTION ACTIVITIES

The Owner, QA Inspector and Engineer will review the Plans and Specifications and the Contractor provided QC plan for clarity and consistency. Any problems identified by the QA Inspector will be brought to the attention of the Project Engineer for clarification and/or modification as necessary.

During the Preconstruction Meeting, the Project Engineer will give instructions to QA/QC personnel to acquaint them with design concepts and to provide them with a clear understanding of expected conditions, methods of construction, and the scope of Plans and Specifications.

3.2 INSPECTION ACTIVITIES

The following Appendix A details QA/QC inspection activities required for the Cell 2 liner construction at the NVL:

Appendix A - Major Work:

Subgrade Preparation
Geosynthetic Clay Liner (GCL)
60-mil textured HDPE geomembrane
Geonet (geonet and geotextile composite)
Soil Cover

4.0 CHANGE CONTROL PROCEDURES

4.1 MINOR CHANGES

This section describes the procedures for initiating and approving MINOR changes, to the Plans and Specifications, which may be necessary to maintain or enhance quality during construction in a timely manner. As the need for MINOR changes occurs, they must be reviewed and approved by the Project Engineer. Changes will be by the Change Control Procedures.

The Engineer will submit all MINOR changes to the Owner for the Owner's concurrence. Upon concurrence, the proposed change will be documented and submitted to the DWMRC for processing. The following procedures will apply:

- All proposed design engineering and construction changes will be reviewed and approved by the Project Engineer. If approved, the Project Engineer will provide documentation to the Contractor and Owner indicating that the proposed change(s) meet the quality requirements of the design criteria.

- The following changes to the design will be considered MINOR in nature: change in locations of any structures, field fitting of structures, product substitutions, work methodology, etc. Minor design changes will not require a permit modification by DWMRC All minor changes will be documented by the QA Inspector.

- All documentation submitted to the agencies regarding the change(s) will be included in the construction documentation report. As-built details of the project will be prepared that will reflect approved changes.

4.2 MAJOR CHANGES

This section describes the procedures for initiating and approving MAJOR changes, to the Plans and Specifications, which are unlikely to occur, but may be necessary during the course of construction. If the need for a MAJOR change occurs, a special meeting with the State of Utah DWMRC will be scheduled immediately. The Owner and Project Engineer will attend the meeting with the DWMRC and present the basis for change. No MAJOR changes to the Design, Specifications, or QA/QC plan will be made without express written approval from the State of Utah DWMRC and approval from the Owner. Major changes to the Plans and

Specification would include the elimination of structures, drainage features, elimination or addition of liner components or change in liner extent.

Any proposed major change (written) will be submitted by the Contractor to the Owner and Engineer to review. If the Owner and Engineer concur with the Contractor's submittal; the Owner shall submit to DWMRC the Contractors written information along with Owner / Engineer's written assessment of the need for a major change to the project.

All paperwork received from the DWMRC will be forwarded by the Owner to the Engineer for distribution to both the QA and QC personnel.

5.0 DOCUMENTATION

5.1 GENERAL

Documentation forms for the QA/QC plan will be initiated by the QC Inspector and counter-signed by the QA Inspector. The exceptions to this are the Daily Field Log and Meeting Documentation forms for the preconstruction, daily, weekly, and work deficiency meetings. The QA Inspector will maintain copies of all QA/QC documentation on-site. The distribution of QA/QC documentation is specified in Section 5.6. Photographs will be used as a general documentation tool to provide the Owner with a visual record of construction. The QA/QC plan will not require the photographic documentation of specific activities. All documentation forms are included in Appendix B – QA/QC Forms. Contractor's QA/QC forms may be substituted for the forms presented in Appendix B if all pertinent data is recorded on Contractor's forms.

5.2 MEETINGS (DOCUMENTED BY QA ON MEETING DOCUMENTATION FORM)

The QA Inspector will record the preconstruction, weekly, daily, and any necessary work deficiency meeting information on the Meeting Documentation form. Information to be recorded will include the following:

- Date and report number.
- Persons in attendance.
- Progress review.
- Scheduled work activities.
- Scheduled tests and inspections.
- Problems.

The QA Inspector will copy, distribute, and file the Meeting Documentation forms as specified in Section 5.6.

5.3 DAILY RECORD KEEPING (ALL DOCUMENTS MAINTAINED BY QA INSPECTOR)

Daily documentation of QA/QC inspections and observations will be kept on a Daily Field Log to ensure adequate documentation of the QA/QC Plan. Other daily records will include

the daily meeting documentation, material acceptance, subgrade acceptance, leachate system inspection, and soil cover inspection. All daily records will be collected, distributed and maintained by the QA Inspector. Record distribution will be as indicated in Section 5.6.

5.3.1 Daily Field Log (QA documented, QC countersigned, QA distributed)

All work activities will be documented on a Daily Field Log. The Daily Field Log will be the responsibility of the QA Inspector. The QC Inspector shall review the information presented in the Daily Field Log then countersign. The Daily Field Log will be distributed per Section 5.6. The Daily Field Log shall include the following:

- Report date and number
- Weather conditions.
- Contractor personnel and equipment on site.
- Visitors on site.
- Summary of Minor work activities.
- Summary of Major work activities.
- Seaming, testing, and repair activities.

Attached to the Daily Field Log will be the **Meeting Documentation** (daily meeting) form and **Material Acceptance** form when materials arrive on site. **Subgrade Acceptance** forms will be submitted prior to deployment of GCL.

5.3.2 Daily Meeting Documentation (Documented by QA on Meeting Documentation form).

The QA Inspector will record the items discussed at the daily meeting. Information to be recorded will include the following:

- Date, type of meeting and report number.
- Persons in attendance.
- Progress review.
- Scheduled work activities.
- Scheduled tests and inspections.
- Problems or concerns.

5.3.3 Material Acceptance (Documented by QC, countersigned by QA, on Material Acceptance form)

The QA and QC Inspectors will jointly inspect all materials delivered to the site. The QC Inspector will fill out and sign the Material Acceptance form then submit the form to the QA Inspector. The QA Inspector will verify that the data on the Material Acceptance form is correct then sign the form. The Material Acceptance form will include the following:

- Date and report number.
- Material type and manufacturer identification.
- Truck number and trucking company.
- Quantity of material (number of rolls, roll numbers, tons, yards etc.)
- Material damage.

5.3.4 Subgrade Acceptance (Documented by QC, countersigned by QA, on Subgrade Acceptance form).

The subgrade to be covered by GCL and geomembrane on any day shall be certified by the QC Inspector and approved by the QA Inspector. The Subgrade Acceptance form shall include the following:

- Date and report number
- Specific Area of Cover Placement

5.3.5 Leachate System Inspection (QC documented, QA countersigned, QA distributed)

Any portion of the leachate system to be covered on a day shall be inspected and documented on the Leachate System Inspection Form. Filling out this form will be the responsibility of the QC Inspector. The QA Inspector shall review the information presented and then countersign. The Daily Field Log will be distributed per Section 5.6. The Leachate System Inspection Form shall include the following:

- Report date and number
- Location.
- Geotextile checklist of items to be inspected as per the specifications.
- Piping checklist of items to be inspected as per the specifications.
- Drain checklist of items to be inspected as per the specifications.

5.3.6 Soil Cover Inspection (QC documented, QA countersigned, QA distributed)

Document the Soil Cover efforts on the Soil Cover Inspection Form. Filling out this form will be the responsibility of the QC Inspector. The QA Inspector shall review the information presented and then countersign. The Daily Field Log will be distributed per Section 5.6. The Soil Cover Inspection Form shall include the following:

- Report date and number
- Area of soil cover placement.
- Document if and how the depth was monitored.
- Document any damage to the geonet and the corrective action taken.

5.4 WEEKLY RECORD KEEPING (ALL DOCUMENTS MAINTAINED BY QC INSPECTOR)

Most of the major QA/QC activities are ongoing (multiple day) activities with QA/QC documentation being kept by the QC Inspector on various progress logs. Copies of the following logs will be submitted by QC Inspector to the QA Inspector weekly. QA Inspector will distribute as indicated in Section 5.6.

- GCL Panel Placement Logs.
- HDPE Panel Placement Logs.
- HDPE Trial Welding Logs.
- HDPE Panel Seaming Logs.
- HDPE Non-Destructive Testing Logs.
- HDPE Destructive Testing Logs.
- HDPE Repair Logs.
- Geonet Placement Logs.

5.4.1 GCL Panel Placement (Documented by QC on GCL Panel Placement Log)

The QC Inspector will document the placement of the GCL material on a GCL Panel Placement Log. QC Inspector will maintain As-Build drawings of the location of each of the GCL panels and the date in which each panel was placed. The GCL Panel Placement log shall include the following:

- Date
- Reinforced or Unreinforced GCL deployment
- Panel Number

- Roll Number
- Panel Length and Width
- Panel Location.

5.4.2 HDPE Panel Placement (Documented by QC on HDPE Panel Placement Log)

The QC Inspector will document the placement of the HDPE material on a HDPE Panel Placement Log. QC Inspector will maintain As-Build drawings of the location of each of the HDPE panels and the date in which each panel was placed. The HDPE Panel Placement log shall include the following:

- Date
- Panel Number
- Roll Number
- Panel Length and Width
- Panel Location.

5.4.3 HDPE Trial Welding (Documented by QC on HDPE Trial Weld Log)

The QC Inspector will document the results of the testing on the trial welds on a HDPE Trial Weld Log. The HDPE Trial Weld Log shall include the following:

- Date and time.
- Air Temperature
- Machine Number
- Seamer ID.
- Peel and Shear values
- Pass or Fail rating.

5.4.4 HDPE Panel Seaming (Documented by QC on HDPE Panel Seaming Log)

The QC Inspector will document all HDPE panel seaming activities on a HDPE Panel Seaming Log The HDPE Panel Seaming Log shall include the following:

- Date and time.
- Seam number.
- Panel numbers.
- Seam length.
- Tech initials.

- Machine number.
- Temperature setting.
- Speed or Preheat.

5.4.5 HDPE Non-Destructive Testing (Documented by QC on HDPE Non-Destructive Testing Log)

The QC Inspector will document the Non-Destructive testing of all HDPE seams on a HDPE Non-Destructive Testing Log. The HDPE Non-Destructive Testing Log shall include the following:

- Date and time.
- Seam number.
- Tester identification.
- Air testing pressure and time.
- Pass or fail rating.

5.4.6 HDPE Destructive Testing (Documented by QC on HDPE Destructive Testing Log)

The QC Inspector will document the Destructive testing of the HDPE on a HDPE Destructive Testing Log. The HDPE Destructive Testing Log shall include the following:

- Date
- Sample ID
- Seam number.
- Technician ID.
- Machine number.
- Peel values
- Pass or fail rating

5.4.7 HDPE Repair (Documented by QC on HDPE Repair Log)

The QC Inspector will document all repairs to the HDPE on a HDPE Repair Log. The HDPE Repair Log shall include the following:

- Field seam number.
- Panel number.
- Repair date.
- Welder name.

- Machine number.
- Test date and time.
- Test crew.
- Pass or fail rating of repair.

5.4.8 Geonet Placement (Documented by QC on Geonet Placement Log)

The QC Inspector will document the placement of all Geonet on the Geonet Placement Log. The QC Inspector will maintain As-Built drawings of the location of each of the Geonet panels and the date in which each panel was placed. The Geonet Placement Log shall include the following:

- Date
- Panel number.
- Roll number.
- Panel length and width.
- Panel location

5.5 PROBLEM IDENTIFICATION AND CORRECTIVE ACTION REPORT (Documented by QA Inspector, sent to Engineer for resolution)

When material or workmanship is identified which does not meet the specified design Problem Identification and Corrective Measure Report will be made. Problem Identification and Corrective Measure Reports will be cross-referenced to specific inspection data records in which the problem was identified. At a minimum, they shall include the following information:

- Detailed description of the problem.
- Location of the problem.
- Probable cause.
- How and when the problem was located (reference to inspection data records).
- Estimation of how long the problem has existed.
- Suggested corrective measure
- Documentation of correction (reference to inspection data records).
- Signature of the QA Inspector.
- All Problem Identification Corrective Action Reports will be sent immediately to the Engineer for resolution.

5.6 REPORT DISTRIBUTION

QA Inspector will distribute daily reports by 9:00 the following morning. The distribution list and preferred method of distribution for daily reports will be created at the Preconstruction Meeting. Weekly QA/QC documentation will be distributed by the QA Inspector by Monday Noon. The distribution list for weekly QA/QC documentation will be created at the Preconstruction Meeting.

5.7 CONSTRUCTION REPORT

The Engineer will complete a report documenting the construction of the Cell 2 liner. The report will document that materials and material installation met the requirements of the approved Plans and Specifications. The Construction Report will be completed within 60 days of the completion of construction. The report shall include:

- Copies of the daily and weekly reports.
- Copies of all QA/QC documentation.
- As-Built drawings.
- All reports submitted to the Owner/Engineer by the Installer.

The Installer shall also submit a certification that the Cell 2 liner has been installed in accordance with the Plans and Specifications and meets requirements of the QA/QC Plan. The final report shall be compiled by the Engineer and shall be submitted to the landfill Owner. The Owner will submit Construction Report to the State of Utah DWMRC.

5.8 STORAGE OF RECORDS

The QA Inspector will be responsible for all facility QA/QC documents during the construction of the landfill liner. After construction is complete the Owner will store the as-built drawings at the facility for easy access. A copy will also be sent to the DWMRC for entry into the facility records.

APPENDIX A

MAJOR WORK

SUBGRADE PREPARATION

Work Activity/ Specifications	Contractor Quality Control	Owner Quality Assurance
Examination: Examine that site conditions are suitable to begin subgrade preparation, i.e., materials and equipment are out the way and safety measures are in place.	Confirm work progress in **Daily Field Log**. Countersign Daily Field Log.	Observe and record work progress recorded in **Daily Field Log.**
Execution: Prepare subgrade soils to receive geosynthetic clay liner (GCL) by means of grading, rolling and/or track walking.	Certify and document on **Subgrade Acceptance Form** that subgrade is in a condition suitable* for GCL placement. *Suitable condition for GCL placement is one in which no surface irregularities (rocks, sticks, etc.) that can damage the HDPE or GCL are present. There should also be no ponded water or soft areas.	Approve and countersign **Subgrade Acceptance Form** that subgrade is in a condition suitable for GCL placement. Attach Subgrade Acceptance Form to Daily Field Log.

GEOSYNTHETIC CLAY LINER (GCL)

Work Activity/ Specifications	Contractor Quality Control	Owner Quality Assurance
Submittals: Collect manufacturer product sheets and submit to Engineer for approval. Do not schedule shipping of material until written approval is obtained from Engineer.	None	None
Material Acceptance: Collect shipping information on all material arriving to site for construction of the system.	Confirm that materials meet the requirements of the Plans and Specifications. Prepare **Material Acceptance Form.** Submit shipping information to QA Inspector for filing.	Inspect materials arriving to the site. Confirm that the materials meet the requirements of the Plans and Specifications. Countersign **Material Acceptance Form.** Attach Material Acceptance Form to Daily Field Log. Collect and file all shipping information.
Unloading and Storage: All material is to be unloaded in a manner that will not cause damage. Material will be stored to avoid damage from wind, precipitation, sun, traffic, etc…	Observe material unloading and storage areas.	Observe material unloading and storage areas.

Work Activity/ Specifications	Contractor Quality Control	Owner Quality Assurance
Installation: Install GCL in accordance with Plans, Specifications, and Manufacturers Specifications. Meet overlap requirements and bentonite enhanced seams (if required).	Observe and record work progress on **GCL Panel Layout Form and Daily Field Log**. Document that overlaps are adequate and in proper direction. Document seams are enhanced with bentonite (if required) and no debris was present. Document any damage to GCL and the corrective action performed. Maintain As-Built drawing of the GCL panel layout.	Confirm work progress recorded on **GCL Panel Layout Form and Daily Field Log**. Countersign Daily Field Log. Inspect and verify overlaps, seams, damage and corrective action. Countersign GCL Panel Layout Form.
Testing / Observation: Testing is not required. Observe work for conformance with Plans and Specifications.	Observe work was performed in accordance with Plans and Specifications. Confirm work progress recorded on **Daily Field Log.** Countersign Daily Field Log.	Observe and record work was performed in accordance with Plans and Specifications. Record on **Daily Field Log**.

60-MIL HDPE GEOMEMBRANE

Work Activity/ Specifications	Contractor Quality Control	Owner Quality Assurance
Submittals: Obtain appropriate submittals from the manufacturer. Do not order HDPE until Engineer has given written approval of submittals. Installer is to submit to Engineer an HDPE panel layout to Engineer for informational purposes. Engineer shall forward material acceptance to both QA and QC personnel.	None	None
Material Acceptance: Collect shipping information on all material arriving on site for construction of the system.	Confirm that materials meet the requirements of the Plans and Specifications. Prepare **Material Acceptance Form.** Submit shipping information to QA Inspector for filing.	Inspect materials arriving to the site. Confirm that the materials meet the requirements of the Plans and Specifications. Countersign **Material Acceptance Form.** Attach Material Acceptance Form to Daily Field Log. Collect and file all shipping information.

Work Activity/ Specifications	Contractor Quality Control	Owner Quality Assurance
Unloading and Storage: All material is to be unloaded in a manner that will not cause damage. Material will be stored to avoid damage from wind, precipitation, sun, traffic, etc…	Observe material unloading and storage areas.	Observe material unloading and storage areas.
HDPE Placement: Install system in accordance with Plans and Specifications. Installer is to use HDPE panel layout drawing to reference panel location.	Record the deployment of each panel of HDPE in a **HDPE Panel Placement Log**. Maintain As-Built drawing of the HDPE panel layout. Confirm work progress recorded in **Daily Field Log.** Countersign Daily Field Log.	Record work progress in **Daily Field Log**. Review the **HDPE Panel Placement Log** for accuracy, copy and distribute weekly.
Trial Welds: Prior to HDPE installation, perform trial welds to verify equipment and methods are in accordance with specifications. Perform trial welds at a minimum at the beginning of every seaming shift (i.e. Every morning and afternoon).	Record the result of every trial weld on a **Trial Welding Log**.	Review the **Trial Welding Log** for test frequency and test results, copy and distribute weekly.
Panel Seaming: As the HDPE installation progresses, maintain panel-seaming documentation. Installer is to use HDPE panel layout drawing to reference panel and weld location.	Record the result of every trial weld on a **Panel Seaming Log**.	Review the **Panel Seaming Log** for test frequency and test results, copy and distribute weekly.
Non-Destructive Testing: Non-Destructively test all welds on the HDPE. Perform Non-Destructive tests as indicated in the Plans and Specifications. Installer is to use HDPE panel layout drawing to reference panel and test location.	Record the result of HDPE Non-Destructive testing on HDPE **Non-Destructive Testing Log**.	Review the HDPE **Non-Destructive Testing Log** for test frequency and test results, copy and distribute weekly.

Work Activity/ Specifications	Contractor Quality Control	Owner Quality Assurance
Destructive Testing: Perform Destructive tests as indicated in the Plans and Specifications. Installer is to use HDPE panel layout drawing to reference panel and test location. Passing test criteria is 4 out of 5 coupons. Tests to be performed at a minimum of every 500 feet of seam.	Record the result of HDPE Destructive testing on **HDPE Destructive Testing Log**.	Review the **HDPE Destructive Testing Log** for test frequency and test results, copy and distribute weekly.
Damage Repair: Repair damage to the HDPE indicated by conditions of materials, or test results. Installer is to use HDPE panel layout drawing to reference repairs.	Record the performance of HDPE Repairs on **HDPE Repair Log**.	Review the **HDPE Repair Log** for accuracy and test results, copy and distribute weekly.

GEONET (GEONET AND GEOTEXTILE COMPOSITE)

Work Activity/ Specifications	Contractor Quality Control	Owner Quality Assurance
Submittals: Obtain submittals from the manufacturer for submittal to the Engineer. Do not schedule delivery of Geonet until Engineer has given written approval of submittals. Installer is to submit to Engineer a Geonet panel layout to Engineer for informational purposes. Engineer shall forward material acceptance to both QA and QC personnel.	None	None
Material Acceptance: Collect shipping information on all material arriving to site for construction of the system.	Confirm that materials meet the requirements of the Plans and Specifications. Prepare **Material Acceptance Form.** Submit shipping information to QA Inspector for filing.	Inspect materials arriving to the site. Confirm that the materials meet the requirements of the Plans and Specifications. Countersign **Material Acceptance Form.** Attach Material Acceptance Form to Daily Field Log. Collect and file all shipping information.

Work Activity/ Specifications	Contractor Quality Control	Owner Quality Assurance
Unloading and Storage: All material is to be unloaded in a manner that will not cause damage. Material will be stored to avoid damage from wind, precipitation, sun, traffic, etc…	Observe material unloading and storage areas.	Observe material unloading and storage areas.
Geonet Placement: Install Geonet in accordance with Plans and Specifications. Tie seams as specified. Installer is to use Geonet panel layout drawing to reference panel location.	Observe seam connections Record the deployment of each panel of Geonet in a **Geonet Panel Placement Log**. Confirm work progress recorded on **Daily Field Log.** Countersign Daily Field Log.	Observe and record work progress on **Daily Field Log**. Review the **Geonet Panel Placement Log** for accuracy, copy and distribute weekly.
Testing / Observation: Testing is not required. Observe work for conformance with Plans and Specifications.	Confirm work is in compliance with Plans and Specifications and recorded on **Daily Field Log**. Countersign Daily Field Log.	Observe work is in compliance with Plans and Specifications and record on **Daily Field Log**.
Damage Repair: Repair Geonet in accordance with Plans and Specifications.	Confirm damage repair on **Daily Field Log.** Countersign Daily Field Log.	Observe and record damage repair on **Daily Field Log**.

GEOTEXTILE FABRIC

Work Activity/ Specifications	Contractor Quality Control	Owner Quality Assurance
Submittals: Collect manufacturer product sheets and submit to Engineer for approval. Do not schedule shipping of material until written approval is obtained from Engineer. Engineer shall forward material acceptance to both QA and QC personnel.	None	None
Material Acceptance: Collect shipping information on all material arriving to site for construction of the system.	Confirm that materials meet the requirements of the Plans and Specifications. Prepare **Material Acceptance Form.** Submit shipping information to QA Inspector for filing.	Inspect materials arriving to the site. Confirm that the materials meet the requirements of the Plans and Specifications. Countersign **Material Acceptance Form.** Attach Material Acceptance Form to Daily Field Log. Collect and file all shipping information.

Work Activity/ Specifications	Contractor Quality Control	Owner Quality Assurance
Unloading and Storage: All material is to be unloaded in a manner that will not cause damage. Material will be stored to avoid damage from wind, precipitation, sun, traffic, etc…	Observe material unloading and storage areas.	Observe material unloading and storage areas.
Installation: Install system in accordance with Plans and Specifications. Meet overlap requirements for length and direction	Observe and record work progress on **Leachate Collection System Form.** Verify overlap and shingled placement. Countersign Daily Field Log.	Confirm work progress recorded in **Leachate Collection System Form.** Record work progress in the **Daily Field Log.**
Testing / Observation: Testing is not required. Observe work for conformance with Plans and Specifications.	Observe work is in compliance with Plans and Specifications and record on **Leachate Collection System Form.** Countersign **Daily Field Log.**	Confirm work is in compliance with Plans and Specifications and recorded on **Leachate Collection System Form.** Record work progress in the **Daily Field Log**.

SOIL COVER

Work Activity/ Specifications	Contractor Quality Control	Owner Quality Assurance
Preparation: Soil cover material shall be placed in accordance with Plans and Specifications. All underlying materials should be approved by QC/QA personnel prior to beginning soil placement. Contractor to submit to Engineer an earthmoving plan listing equipment and methods for moving the soil cover material. The earthmoving plan should specify cover protective measures and specific actions to be taken if any liner components are displaced.	Verify Geonet and all underlying liners are free from wrinkles, folds etc… Verify plan for covering will allow soil to be pushed ahead in all areas, and uphill where possible. Verify that all areas to be covered will be accessible in the order of soil placement. Equipment will not be allowed directly on geonet drainage system. Verify the Geonet, GCL and geomembrane are anchored as specified in all areas to be able to with stand the forces applied during soil cover placement.	In conjunction with QC, Verify Geonet and all underlying liners are free from wrinkles, folds etc. Verify plan for covering will allow soil to be pushed ahead in all areas, and uphill where possible. Verify that all areas to be covered will be accessible in the order of soil placement. Equipment will not be allowed on geonet drainage system. Verify the geonet, GCL and geomembrane are anchored as specified in all areas to be able to withstand the forces applied during soil cover placement.

Work Activity/ Specifications	Contractor Quality Control	Owner Quality Assurance
Placement: Install system in accordance with Plans and Specifications. Install system in accordance with earthmoving plan.	Inspect all filling operations. Implement methods to minimize impact to geonet and underlying liners. Observe and record details on **Soil Cover Placement Form.** Countersign Daily Field Log.	Inspect soil cover installation and confirm compliance with plans and specifications. Review documentation provided by QC Inspector on **Soil Cover Placement Form. Record work progress on the Daily Field Log**. Countersign Soil Cover Placement form.
Testing / Observation: Depth testing of soil cover is required. No compaction testing of soil cover is required. Observe work for conformance with Plans and Specifications. QC Inspector shall provide an acceptable means for verifying depth, such as surveying or excavating potholes, for every 100 x 100 square foot area of soil cover placed. In potholes, the depth of soil shall be measured from an 8-foot straightedge to the Geonet. Measurement is to be perpendicular to the slope.	Observe and record work progress on **Soil Cover Placement Form.** Document that a minimum of 36 inches of soil cover is placed. Record location and depth on **Soil Cover Placement Form.** Show locations and depths of potholes on As-Built Drawing. Countersign Daily Field Log.	Confirm work progress recorded in **Soil Cover Placement Form.** Record work progress on the **Daily Field Log.** Document that a minimum of 36 inches of soil cover is placed. Review test data and countersign **Soil Cover Placement Form**. Make sure locations and depths of potholes are shown on As-Built Drawing.

APPENDIX B

QA/QC FORMS

LOGAN CITY UNITED IN SERVICE
ENVIRONMENTAL DEPARTMENT

MEETING DOCUMENTATION

DATE:_____ DAILY / WEEKLY / WORK DEFICIENCY REPORT #:_____

PERSONS IN ATTENDANCE:

NAME	ORGANIZATION

WORK ITEMS DISCUSSED (progress review, scheduled work activities, scheduled tests and inspections, problems…):

_____

QA INSPECTOR SIGNATURE

REPORT DATE:_____ **REPORT #:_____**

NORTH VALLEY LANDFILL
DAILY FIELD LOG – CELL 2 CONSTRUCTION

WEATHER CONDITIONS:

SUN: CLEAR PARTLY CLOUDY CLOUDY	WIND: LIGHT MODERATE HIGH
PRECIPITATION: NONE LT. RAIN/SNOW MED. RAIN/SNOW HEAVY RAIN/SNOW	
TEMPERATURE (Deg. F): 20 30 40 50 60 70 80 90 100 H=HIGH L=LOW	

CONTRACTOR PERSONNEL, CONTRACTOR EQUIPMENT AND VISITORS ON SITE:

CONTRACTOR PERSONNEL (Number): SUPERVISORS:_____ OPERATORS:_____ LABORERS:_____ OTHERS:_____	VISITORS (Name and Affiliation): _____ _____ _____ _____
EQUIPMENT(List): EARTHMOVING/LINING/MISC.EQUIPMENT:_____ _____ _____	

MEETINGS:

DAILY MEETING HELD?	YES* / NO
WEEKLY MEETING HELD?	YES* / NO
WORK DEFICIENCY MEETING HELD?	YES* / NO

*QA Inspector to complete Meeting Documentation form and attach to Daily Field Log.

MATERIAL ARRIVAL:

DID ANY MATERIALS ARRIVE ON SITE?	YES* / NO

*QC and QA Inspectors to complete Material Acceptance form and attach to Daily Field Log.

ANCILLARY WORK ACTIVITITS (If work is being performed, describe the area of work):

GEOTEXTILE FABRIC: Comments:	IS WORK BEING PERFORMED YES / NO
SOIL PLACEMENT: Comments:	IS WORK BEING PERFORMED YES / NO

MAJOR WORK ACTIVITIES (If work is being performed, describe the area of work):

SUBGRADE PREPARATION/ACCEPTANCE: Comments:	IS WORK BEING PERFORMED YES* / NO * QC Inspector to complete Subgrade Acceptance form, QA Inspector to countersign
GEOSYNTHETIC CLAY LINER (GCL): Comments:	IS WORK BEING PERFORMED YES* / NO HAS SUBGRADE BEEN ACCEPTED YES / NO** *QC Inspector to record work in GCL Panel Placement Log. ** Stop Work, Inspect and Accept Subgrade.
60 MIL. HDPE: Comments:	IS WORK BEING PERFORMED YES* / NO HAS GCL BEEN INSTALLED & ACCEPTED YES / NO** *QC Inspector to record work in HDPE Panel Placement Log. ** Stop Work, Inspect and Accept GCL.
GEONET: Comments:	IS WORK BEING PERFORMED YES* / NO IS TESTING & REPAIR COMPLETE ON HDPE YES / NO** *QC Inspector to record work in GEONET Panel Placement Log. ** Stop Work, Test and Repair HDPE.

HDPE SEAMING/TESTING/REPAIR (If work is being performed, describe the area of work):

TRIAL WELDS: Comments:	IS WORK BEING PERFORMED YES* / NO * QC Inspector to record results in the Trial Weld Log.
PANEL SEAMING: Comments:	IS WORK BEING PERFORMED YES* / NO *QC Inspector to record data in Panel Seaming Log.
DESTRUCTIVE AND NON-DESTRUCTIVE TESTING: Comments:	IS WORK BEING PERFORMED YES* / NO *QC Inspector to record results in the Destructive and Non-Destructive Testing Log.
REPAIRS: Comments:	IS WORK BEING PERFORMED YES* / NO *QC Inspector to record repairs in the Repair Log.

QA INSPECTOR SIGNATURE:_____

QC INSPECTOR SIGNATURE:_____

LOGAN CITY UNITED IN SERVICE
ENVIRONMENTAL DEPARTMENT

MATERIAL ACCEPTANCE

DATE:_____ **TRUCK #:**_____
REPORT #:_____ **TRUCKING CO:**_____

SYNTHETIC MATERIAL

COMPLETE ROLL NUMBER		BATCH #	ROLL SIZE	DAMAGE/ REMARKS
1				
2				
3				
4				
5				
6				
7				
8				
9				
10				

_____ _____
QC INSPECTOR SIGNATURE **QA INSPECTOR SIGNATURE**

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SUBGRADE ACCEPTANCE

DATE:_____ **REPORT NUMBER:**_____

The undersigned, being a representative of the Installer, have viewed the subgrade surface described below and found it to be an acceptable surface upon which to install HDPE. This certification is based solely on observations of the surface of the subgrade. No subterranean inspections or tests have been performed by Installer and Installer makes no representations or warranties regarding conditions which may exist below the surface of the subgrade.

AREA OF SUBGRADE BEING ACCEPTED (Describe Fully):

QC INSPECTOR

SIGNATURE: _____

DATE: _____

TIME: _____

QA INSPECTOR

SIGNATURE: _____

DATE: _____

TIME: _____

LOGAN CITY UNITED IN SERVICE
ENVIRONMENTAL DEPARTMENT

LEACHATE SYSTEM INSPECTION SHEET

DATE:_____ REPORT NO.: _____

LOCATION: _____

GEOTEXTILE

REMOVE DEBRIS? (YES / NO)	MINIMIZED WRINKLES? (YES / NO)	CORRECT OVERLAPS? (direction & length) (YES / NO)	COMPLIES WITH SPECS & DRAWINGS (YES / NO)

If "NO" describe corrective action performed: _____

_____

_____

If damage, describe repair: _____

_____

PIPING

CLEAN & UNDAMAGED? (YES / NO)	CORRECT/SECURE CONNECTIONS? (YES / NO)	CONTINUOUSLY SUPPORTED? (YES / NO)	COMPLIES WITH SPECS & DRAWINGS (YES / NO)

If "NO" describe corrective action performed

_____

_____

_____

_____

DRAIN ROCK

CLEAN AND ROUNDED? (YES / NO)	LEVEL FINAL SURFACE? (YES / NO)	GEOTEXTILE OVERLAPPED? (YES / NO)	COMPLIES WITH SPECS & DRAWINGS (YES / NO)

If "NO" describe corrective action performed

_____

_____

_____

_____

_____ _____

QC INSPECTOR SIGNATURE **QA INSPECTOR SIGNATURE**

LOGAN CITY UNITED IN SERVICE
ENVIRONMENTAL DEPARTMENT

SOIL COVER INSPECTION

DATE:_____ REPORT NO.: _____

APPROXIMATE AREA COVER WAS PLACED: _____

_____

DEPTH MONITORED?: (YES / NO)

If "YES" describe method used:

_____

_____

If "NO" describe future action to be performed:

_____

_____

DAMAGE TO GEONET OBSERVED? (YES / NO):

If "YES" describe corrective action performed:

_____

_____

DEPTH CHECKED BY POT-HOLES? (YES / NO):

If "YES" Please document

LOCATION	DEPTH

If pot-hole depths do not meet requirements describe corrective action performed:

_____

_____

_____

_____ _____

QC INSPECTOR SIGNATURE **QA INSPECTOR SIGNATURE**

GCL PANEL PLACEMENT LOG

DATE	PANEL #	ROLL #	PANEL LENGTH	PANEL WIDTH	PANEL LOCATION/COMMENTS

QC INSPECTOR SIGNATURE

QA INSPECTOR SIGNATURE

HDPE PANEL PLACEMENT LOG

DATE	PANEL #	ROLL #	PANEL LENGTH	PANEL WIDTH	PANEL LOCATION/COMMENTS

QC INSPECTOR SIGNATURE

QA INSPECTOR SIGNATURE

LOGAN CITY UNITED IN SERVICE
ENVIRONMENTAL DEPARTMENT

HDPE TRIAL WELD LOG

DATE/ TIME	AMBIENT TEMP	QC INITALS	MACHINE #	SEAMER INITALS	EXTRUSION WELDS		FUSION WELDS		PEEL VALUES LBS/INCH				SHEAR	PASS/ FAIL	COMMENTS
					BARREL TEMP	PREHEAT TEMP	WEDGE TEMP	SPEED SETTING							
					SET	SET	SET								

QC INSPECTOR SIGNATURE

QA INSPECTOR SIGNATURE

HDPE PANEL SEAMING LOG

DATE/ TIME	SEAM #	PANEL NUMBERS	SEAM LENGTH	TECH INITIALS	MACHINE #	TEMP SETTING	SPEED OR PREHEAT	WELDING DIRECTION	END BONE P/F	COMMENTS

QC INSPECTOR SIGNATURE

QA INSPECTOR SIGNATURE

HDPE NON-DESTRUCTIVE TESTING LOG

DATE/ TIME	SEAM #	TESTER INTIALS	AIR TESTING					COMPLETE Y/N	V-BOX COMPLETE Y/N	LOCATION/COMMENTS
			PRESSURE				TIME			

QC INSPECTOR SIGNATURE

QA INSPECTOR SIGNATURE

HDPE DESTRUCTIVE TESTING LOG

DATE	SAMPLE ID	SEAM #	MACH. #	TECH INTIALS	PEEL VALUES LBS/INCH						PASS/ FAIL	DATE TO LAB PKG SLIP#	LAB PASS/ FAIL	LOCATION/COMMENTS

QC INSPECTOR SIGNATURE

QA INSPECTOR SIGNATURE

HDPE REPAIR LOG

FIELD SEAM #	PANEL #	REPAIR DATE	REPAIR CREW	MACHINE #	TEST DATE	TEST CREW	TEST P/F	COMMENTS/PANEL LOCATION

QC INSPECTOR SIGNATURE

QA INSPECTOR SIGNATURE

GEONET PANEL PLACEMENT LOG

DATE	PANEL #	ROLL #	PANEL LENGTH	PANEL WIDTH	COMMENTS/PANEL LOCATION

QC INSPECTOR SIGNATURE

QA INSPECTOR SIGNATURE

LOGAN CITY UNITED IN SERVICE
ENVIRONMENTAL DEPARTMENT

PROBLEM IDENTIFICATION/CORRECTIVE ACTION

DATE:_____ REPORT NUMBER:_____

PROBLEM (detailed description):

PROBLEM LOCATION/CAUSE/ WHEN NOTICED/TIME OF EXISTANCE:

SUGGESTED CORRECTIVE MEASURE:

_____

QA INSPECTOR SIGNATURE

CORRECTIVE ACTION

PROBLEM REQUIRES WORK TO STOP: YES / NO

CORRECTIVE MEASURE:

_____

ENGINEER SIGNATURE

DOCUMENTATION OF PROBLEM RESOLUTION:

_____

QA INSPECTOR SIGNATURE