SPECIFICATIONS AND CONTRACT DOCUMENTS
FOR THE CONSTRUCTION OF:

OTERO/GREENTREE REGIONAL LANDFILL CELL #5

. . . . .

CITY OF ALAMOGORDO, NEW MEXICO
PUBLIC WORKS BID NUMBER 2018-001

JANUARY 2018

TITLE SHEET

CITY OF ALAMOGORDO, NEW MEXICO

RICHARD A. BOSS, MAYOR

MAYOR PRO-TEM	AL HERNANDEZ
COMMISSIONER	SUSAN L. PAYNE
COMMISSIONER	NADIA SIKES
COMMISSIONER	JASON BALDWIN
COMMISSIONER	JENNY TURNBULL
COMMISSIONER	VACANT
CITY MANAGER	MARGARET PALUCH
CITY CLERK	RACHEL HUGHS
CITY ATTORNEY	PETRIA SCHREIBER

SPECIFICATIONS AND CONTRACT DOCUMENTS

FOR

OTERO/GREENTREE REGIONAL LANDFILL CELL #5

TABLE OF CONTENTS

GENERAL SPECIFICATIONS

SECTION 1 - ADVERTISEMENT FOR BIDS

Sealed Bids will be received by the **City of Alamogordo in City Hall Commission Chambers, 1376 East Ninth St., Alamogordo, New Mexico, 88310**, for the construction of the Project known as "**Otero/Greentree Regional Landfill Cell #5",** Public Works Bid No. **2018-001**, until **2:00 P.M. (MST)** on **March 8, 2018,** at which time the Bid Opening and reading of the Bids received will begin, in **City Hall Commission Chambers, 1376 East Ninth St. Alamogordo, NM**. The tabulation of Bids will be considered by the City Commission of the City of Alamogordo at its next regular meeting, or at a later meeting if required.

The work will consist of installation of liner, leachate collection system, and earthwork for Cell #5 at the Otero/Greentree Regional Landfill.

Construction Industries Division (CID) Classification Determination is GF04, GF08, GF09, or GF98. In accordance with the provisions of the New Mexico Construction Industries Licensing Act, all project work must be performed by properly licensed contractors and subcontractors with active licenses in good standing as of the date and time specified for Bid Opening. The City has determined that the Contractor shall possess a valid license classification as specified above or other appropriate license classification under the Construction Industries Licensing Act at the time the contract is Bid. Any work outside the scope of the Prime Contractor's classification(s) must be subcontracted. Any work subcontracted by a Prime Contractor must be performed by an entity that is validly licensed in the classification(s) of the work that is to be subcontracted as of the date and time specified for Bid Opening. Bids that not satisfy applicable licensing requirements will be considered non-responsive.

Specifications and Drawings will be available to BIDDERS on the **City website through the Vendor Registration and Bid Notification System** or by CD. Requests may be faxed to (575) 439-4117, or emailed to cquairoli@ci.alamogordo.nm.us. **The CD will be provided at no charge.** If the CD is to be mailed, the requestor shall supply the Purchasing Department with a **pre-paid mailing account** and the appropriate information required for delivery.

A non-mandatory Pre-Bid Conference will be held at **2:00 p.m. (MST) on February 14, 2018,** at the Otero/Greentree Regional Landfill, 4258 U.S. Highway 54 South.

Prospective BIDDERS are advised of a 10% Bid Evaluation Criterion for area businesses that will apply to this Project. The CONTRACTOR, and local SUBCONTRACTOR, are advised to obtain specific information as to the qualifications and conditions of the Bid Evaluation Criterion before submitting a Bid.

Each Bid shall be accompanied by a Bid Security in the amount of not less than five (5) percent of the total Bid amount.

The successful BIDDER will be required to furnish a Performance Bond and a Payment Bond in the amount of one hundred (100) percent of the Bid amount to assure performance of the Contract, and payment for all labor and materials of the Contract.

No Bids may be withdrawn after the scheduled closing time for receipt of Bids, and the City of Alamogordo reserves the right to reject any or all Bids and waive all technicalities and formalities.

No BIDDER may withdraw their Bid within thirty (30) days after the actual date of the Bid Opening thereof.

Attention of BIDDERS is particularly called to the requirements as to conditions of employment to be observed and minimum wage rates to be paid under the Contract.

Barbara Pyeatt
Chief Procurement Officer

Advertised on February 4, 2018 in:

Alamogordo Daily News
Albuquerque Journal

SECTION 2 - INSTRUCTIONS TO BIDDERS

1.0 DEFINED TERMS

Terms used in these Instructions to BIDDERS which are defined in the General Conditions of the Construction Contract have the meanings assigned to them in the General Conditions. The term "BIDDER" means one who submits a bid directly to OWNER, as distinct from a sub-bidder, who submits a bid to a Bidder. The term "Successful BIDDER" means the lowest, qualified, responsible and responsive BIDDER to whom OWNER (on the basis of OWNER's evaluation as hereinafter provided) makes an award. The term "Bidding Documents" includes the Advertisement or Invitation to Bid, Instructions to BIDDERS, the Bid Schedule, and the proposed Contract Documents (including all Addenda issued prior to receipt of Bids).

2.0 EXAMINATION OF CONTRACT DOCUMENTS AND PROJECT SITE

Before submitting a bid, each BIDDER must:

A. Examine and study the Project Plans and Contract Documents thoroughly.

B. Visit the site to become familiar with local conditions that may in any manner affect performance of the Work.

Before submitting a Bid, each BIDDER may, at BIDDER's own expense, make or obtain any additional examinations, investigations, explorations, tests and studies and obtain any additional information and data which pertain to the physical conditions (surface, subsurface and underground facilities) at or contiguous to the site or otherwise which may affect cost, progress, performance or furnishing of the Work and which BIDDER deems necessary to determine its Bid for performing and furnishing the Work in accordance with the time, price and other terms and conditions of the Contract Documents.

Any explorations or tests that each BIDDER deems necessary for submission of the bid shall be coordinated and performed with the prior approval of the City of Alamogordo. Any work of this nature will be done in strict compliance with all applicable permits, requirements and regulations.

C. Be familiar with federal, state and local laws, ordinances, rules and regulations affecting performance of the work and employment of labor.

D. Carefully correlate any observations with the requirements of the Contract Documents.

E. Notify ENGINEER of all conflicts, errors or discrepancies in the Contract Documents.

F. Note that information and data reflected in the Contract Documents with respect to Underground Facilities at or contiguous to the site is based upon information and data furnished to OWNER and ENGINEER by owners of such Underground Facilities or others, and neither the ENGINEER nor the OWNER assumes responsibility for the accuracy or completeness thereof. It shall be the CONTRACTOR's sole responsibility to locate all utilities before any work commences.

The submission of a bid will constitute an incontrovertible representation by BIDDER that BIDDER has complied with all requirements contained herein, that without exception the

Bid is premised upon performing and furnishing the Work required by the Contract Documents and such means, methods, techniques, sequences or procedures of construction as may be indicated in or required by the Contract Documents, and that the Contract Documents are sufficient in scope and detail to indicate and convey understanding of all terms and conditions for performance and furnishing of the Work.

3.0 INTERPRETATIONS AND ADDENDA

All questions about the meaning or intent of the Contract Documents shall be submitted via fax (575) 439-4117 or e-mail to bpyeatt@ci.alamogordo.nm.us. **Questions received after 3:00 p.m. on February 26, 2018 will not be answered.** Submitted questions will be answered by formal written addenda and will be binding. Oral clarification will not be binding.

Each Addenda shall be made part of the Contract Documents to the same extent as though contained in the original documents and itemized listings thereof. On the Bid Proposal, each BIDDER shall acknowledge receipt of each Addenda.

4.0 CONTRACT TIME

The number of calendar days within which, or the dates by which, the Work is to be substantially completed and ready for Final Payment (the Contract Time) as set forth in the AGREEMENT, Section 8. This time may be defined as a specified fixed date or a given number of calendar days. The Contract Time may be amended by mutual written Agreement to include authorized time extensions as the performance of the Contract requires.

5.0 LIQUIDATED DAMAGES

Provisions for liquidated damages are set forth in the AGREEMENT, Section 8.

6.0 SUBSTITUTE OR "OR-EQUAL" ITEMS

The Contract, if awarded, will be on the basis of materials and equipment described in the Drawings or specified in the Specifications without consideration of possible substitutes or "or-equal" items. Whenever it is indicated in the Drawings or in the Specifications that a substitute or an "or-equal" item of material or equipment may be furnished or used by the CONTRACTOR, if acceptable to ENGINEER, application for acceptance will not be considered by ENGINEER until after the Effective Date of the AGREEMENT. The procedure for the submission of any such application by the CONTRACTOR for consideration by the ENGINEER is set forth in the General Conditions.

7.0 SUBCONTRACTORS

BIDDERS will submit to OWNER a list of all Subcontractors and other persons and organizations proposed for those portions of the Work whose value in services is $5,000.00 or more. **SUCH LIST WILL BE COMPLETED AND SUBMITTED WITH THE BID AND SHALL INCLUDE THE NAME AND ADDRESS OF EACH SUBCONTRACTOR AND THE NATURE OF THE WORK TO BE PERFORMED**. If OWNER or ENGINEER, after due investigation, has reasonable objection to any proposed Subcontractor, other person, or organization, they may before giving the Notice of Award, request the Apparent Low BIDDER to submit an acceptable substitute Subcontractor without an increase in the Bid Price. If the Apparent Low Bidder declines to make any such substitution, he will not thereby sacrifice his Bid Security. Any Subcontractor, other person, or

organization so listed and to whom OWNER or ENGINEER does not make written objection prior to the giving of the Notice of Award will be deemed acceptable to OWNER and ENGINEER.

The CONTRACTOR shall not be required to employ any Subcontractor, other person, or organization against whom CONTRACTOR has reasonable objection.

The BIDDER is specifically advised that any person, firm, or other party to whom it is proposed to award a subcontract must be acceptable to the OWNER.

8.0 WAGE RATES

The BIDDER's attention is directed to the fact that the prevailing State Wage Rate Decision listed by the New Mexico State Office of Labor and contained in Section 12, herein, shall also be made a part of the Contract. It shall be the BIDDER'S responsibility thoroughly be informed of all state, federal and local laws and statutes pertaining to the employment and shall strictly adhere to such laws and regulations.

9.0 COLLUSION - GENUINE BID

The BIDDER, by submitting a Bid, certifies that the Bid is genuine and is not a sham or collusive, or made in the interest, or in the behalf of any person not named as BIDDER, and that the BIDDER has not directly or indirectly induced or solicited any other BIDDER to put in a sham Bid, or any other person, firm or corporation to refrain from bidding, and that the BIDDER has not in any manner sought by collusion to secure himself an advantage over any other BIDDER.

10.0 QUANTITIES

The quantities set forth in the Bid Proposal are estimated quantities. Payment will be made at the unit price bid amounts for the Work actually performed. The City reserves the right to increase or decrease quantities. The CONTRACTOR shall not be paid for any portion of the Project built beyond plan dimensions and thickness. The OWNER has the right (and BIDDER by submission of a Bid, agrees OWNER has this right) to increase or reduce the quantities shown in the Bid Schedule up to twenty-five (25) percent before the CONTRACTOR can present a claim to adjust the unit bid prices.

11.0 EQUAL EMPLOYMENT OPPORTUNITY

During the performance of this contract, the CONTRACTOR agrees as follows:

The CONTRACTOR will not discriminate against any employee or applicant for employment because of race, creed, color, or national origin. The CONTRACTOR will take affirmative action to insure that applicants are employed, and that employees are treated during employment without regard to their race, creed, color, or national origin. Such action shall include, but not be limited to the following: employment, upgrading, demotion or transfer; recruitment or recruitment advertising; layoff or termination; rates of pay or other forms of compensation; and selection for training.

The CONTRACTOR agrees to post in conspicuous places, available to employees and applicants for employment, notices setting forth the provisions of this nondiscrimination clause.

12.0 GROSS RECEIPTS SURETY BOND

Effective July 1, 1975, New Mexico House Bill 262 added Section 7-1-55, NMSA 1978 to the Tax Administration Act, Subsection A, provides for any person engaged in the construction business,

as defined in Section 7-9-3, NMSA 1978, who does not have its principal place of business in New Mexico and enters into a prime construction contract to be performed in this state, at the time such contract is entered into, to furnish the Commissioner of Revenue or an authorized delegate with a surety bond, or other acceptable security, in a sum equivalent to the gross receipts to be paid under the contract, multiplied by the sum of the applicable rate of the gross receipts tax imposed by Section 7-9-4, NMSA 1978, plus the rate of tax imposed by the local option gross receipts tax. Upon receipt of a surety bond, or other acceptable security, the Commissioner, or the delegate, shall issue a certificate stating that the requirements of this section have been met.

13.0 SAFETY STANDARDS AND ACCIDENT PREVENTION

With respect to all Work performed under this Contract, the CONTRACTOR shall:

A. Comply with the safety standards provisions of applicable laws, building and construction codes, the "Manual of Accident Prevention in Construction" published by the Associated General Contractors of America, the requirements of the Occupational Safety and Health Act of 1970 (Public Law 91-596).

B. Exercise every precaution at all times for the prevention of accidents and the protection of persons (including employees) and property.

C. Maintain in the Project Office or other well known place at the job site, all articles necessary for giving first aid to the injured, and shall make standing arrangements for the immediate removal to a hospital or a doctor's care of persons (including employees), who may be injured on the job site. In no case shall employees be permitted to work at a job site before the employer has made a standing arrangement for removal of injured persons to a hospital or a doctor's care.

14.0 WORK ON OR ADJACENT TO PRIVATE PROPERTY

The CONTRACTOR shall be required to provide access for the residents and businesses along the construction route to the satisfaction of the ENGINEER. In addition, any private improvements that exist shall be preserved against damage from the CONTRACTOR's activities. The CONTRACTOR shall be required to remove and rebuild any improvements damaged during construction at his sole expense. These improvements include but are not limited to: buildings, fences, sidewalks, structures, walls, driveways, and landscaping. The CONTRACTOR shall not be allowed to make a claim for additional Time or expense due to rebuilding improvements damaged by construction activities.

Except as specified otherwise, in the execution of work on private property, the CONTRACTOR shall make all arrangements with the private property owners to the satisfaction of both the private owner and the ENGINEER before proceeding with the Work. Items removed on private property to facilitate access to the Work shall be replaced to a condition satisfactory to both the private property owner and the ENGINEER at the cost of the CONTRACTOR.

15.0 TWELVE (12) HOUR CALL-OUT NOTICE

The CONTRACTOR shall be required to maintain a clean, safe work site as well as adequate, safe access for all residents and businesses along the construction routes, to the satisfaction of the ENGINEER. This Work shall include any measures necessary to keep the site clean and safe, and provide access, including but not limited to routine sweeping, treatment to prevent blowing soil,

complete removal of mud, grading, temporary driveways, and import of dry suitable material to form temporary driving surfaces.

Upon verbal notification by the ENGINEER, the CONTRACTOR shall perform whatever measures necessary to provide the required cleanup for adequate and safe site conditions and access to adjacent property. The CONTRACTOR shall have twelve (12) hours to respond and begin the work required to cleanup the work site or provide said access.

Failure by CONTRACTOR to respond and begin corrective work within twelve (12) hours will cause OWNER to hire an independent CONTRACTOR to perform the Work required, as determined solely on the ENGINEER's opinion, and withhold all expenses incurred from the CONTRACTOR's Payment for the Project. The CONTRACTOR, by submission of a bid, agrees to the above stated conditions and is required to sign the call out notice acknowledgment in Section 3 - Bid Schedule.

16.0 COPIES OF BIDDING DOCUMENTS

Specifications and Drawings will be available to BIDDERS on the **City website through the Vendor Registration and Bid Notification System** or by CD. Requests may be faxed to (575) 439-4117, or emailed to cquairoli@ci.alamogordo.nm.us. **The CD will be provided at no charge.** If the CD is to be mailed, the requestor shall supply the Purchasing Department with a **pre-paid mailing account** and the appropriate information required for delivery.

Complete sets of Bidding Documents must be used in preparing Bids. Neither OWNER nor the ENGINEER assumes any responsibility for errors or misinterpretations resulting from the use of incomplete sets of Bidding Documents.

OWNER and ENGINEER in making copies of Bidding Documents available on the above terms do so only for the purpose of obtaining Bids on the Work and do not confer a license or grant for any other use.

17.0 SUBMISSION OF BIDS

The following bid documents are to be submitted as your bid:

Section 3 - Bid Schedule

Section 4 – Subcontractor's Fair Practice Act Compliance

Section 5 - Bid Bond

Section 6 - Statement of Bidders Qualifications

Section 7 – Campaign Contribution Disclosure Form and Veteran Preference Form

Copy of State of New Mexico, Regulation and Licensing Department, Construction Industries Division, License.

Copy of New Mexico Department of Workforce Solutions, Certificate of Public Works Registration.

and any other information that may be required from time to time.

Prices shall be filled in for all items on the Bid Schedules. Prices shall be written in words and numerals in the spaces provided. In the case of a discrepancy, the amount shown in words shall govern. The Bid Schedule must be completed in ink or by typewriter.

Bids by corporations must be executed in the corporate name by the president or vice-president (or other corporate officer accompanied by evidence of authority to sign) and the corporate seal shall be affixed to the bid and attested by the secretary or an assistant secretary. The corporate address and state of incorporation shall be shown below the signature. Bids by partnerships must be executed in the partnership name and signed by a partner, whose title must appear under the signature, and the official address of the partnership must be shown below the signature.

All names must be typed or printed below the signature.

The Bid shall contain an acknowledgment of receipt of all Addenda (the numbers of which shall be filled in on the Bid Schedule), and acknowledgment of the Twelve (12) Hour Call-Out Notice.

Bids shall be submitted before the time and place stated herein. Bids received after the Bid Opening time will be returned unopened. Faxed bids will not be accepted.

The address and telephone number for communications regarding the Bid must be shown.

Alterations to Bid amounts by erasures or by interlineations shall be initialed by the signer of the Bid. Any Bid not duly signed will not be considered. All Proposals shall be submitted and received with the understanding that the BIDDER accepts the terms and conditions as set forth herein.

Each Bid, accompanied by the Bid Security and all other required documents shall be placed in a sealed opaque envelope marked with the words "Bid Proposal", the Project title, the Public Works Bid Number (shown on the title sheet of the Specification book), Attn: Edward Balderrama, Project Manager, and the name and address of the BIDDER.

18.0 QUALIFICATIONS OF BIDDERS

To demonstrate qualifications to perform the Work, each BIDDER must submit with their bid, the "Statement of Bidder's Qualifications" contained in Section 6 herein. The City of Alamogordo reserves the right to require additional information and to reject any and all bids from BIDDERS that OWNER determines not to be qualified to carry out the obligations of the Contract and complete the Project.

19.0 BID SECURITY

Bid Security in the amount of five (5) percent of the amount of the bid shall accompany the Bid Proposal. This Bid Security must be in the form of a certified or bank's cashier's check, payable without condition or recourse, to the OWNER or it may be a Bid Bond issued by a surety licensed to conduct business in the State of New Mexico and be named in the current list of the Insurance Division, State Corporation Commission, Santa Fe, New Mexico.

The attached Bid Security is to become the property of the OWNER in the event the AGREEMENT and Bonds are not executed within the time specified in this Bid Proposal as liquidated damages for the delay and additional expenses caused the OWNER.

The Bid Security is submitted as a guarantee that the BIDDER, if awarded the Contract, will execute such Contract in accordance with the Bid Schedule - Section 3, and in the manner and form required by the Contract Documents.

The Bid Security of the three (3) lowest Bidders will be retained until the Contract is awarded or other disposition is made. The Bid Security of all Bidders except the three (3) lowest will be returned promptly after the canvass of bids. Bid Proposals submitted without the required Bid

Security will not be considered. Attorneys-in-fact who sign the Bid Security must file a certified and effective dated copy of their power of attorney.

The Bid Security of the successful BIDDER will be retained until such BIDDER has Executed the Agreement and furnished the required Contract security, whereupon the Bid Security will be returned. If the successful BIDDER fails to Execute and deliver the Agreement and furnish the required Contract security within ten (10) days after the Notice of Award, OWNER may annul the Notice of Award and the Bid Security of that BIDDER will be forfeited. The Bid Security of other BIDDERS whom OWNER believes to have a reasonable chance of receiving the award may be retained by OWNER until the earlier of the seventh (7^{th}) day after the Effective Date of the AGREEMENT or the sixty-first (61^{st}) day after the Bid Opening, whereupon Bid Security furnished by such BIDDERS will be returned.

20.0 GROSS RECEIPTS TAXES, PERMITS AND LICENSES

Prices stated in the Bid Proposal shall not include applicable State gross receipts or applicable local option taxes. They shall be added to the subtotal Bid amount. The CONTRACTOR will be reimbursed for the actual gross receipts tax liability incurred during construction. The CONTRACTOR will be responsible for all permits and licenses required to perform the Work, including the required Public Works Construction Permit available from the City of Alamogordo Code Administration Office.

21.0 OPENING OF BIDS

BIDDERS are invited to be present at the Bid Opening. The person reading the Bids will utilize the following procedure prior to reading the amount of the Bid:

A. Read name of BIDDER and BIDDER's New Mexico contractor's license number and classification.

B. Check for list of Subcontractors to be utilized on the Project.

C. Verify that the proper Bid Security is enclosed.

D. Verify receipt of the Statement of Bidder’s Qualifications.

E. Verify Bidder’s acknowledgment of each Addendum issued, if any.

F. Verify Bidder’s acknowledgment of the Twelve (12) Hour Call-Out Notice.

G. Determine whether the Bid Proposal is signed.

H. Verify receipt of State of New Mexico, Regulation and Licensing Department, Construction Industries Division, License.

I. Verify receipt of New Mexico Department Workforce Solutions, Certificate of Public Works Registration.

J. Verify receipt of Campaign Contribution Disclosure Form.

K. Verify receipt of Resident Veterans Preference Certification.

L. Verify any other information that may be required from other funding sources. (If this is a federally funded project, federal “pink sheets” must be completed and signed.)

M. Proceed with reading the Bid amounts.

If any of the requirements of the Contract Documents have not been met, the Bid shall be subject to rejection based solely on the OWNER'S discretion.

22.0 BIDS TO REMAIN SUBJECT TO ACCEPTANCE

The OWNER will require time to study and canvass each Bid to determine which Bid is in the best interest of the OWNER. In consideration thereof, no Bid Proposal may be withdrawn after the scheduled closing time for receipt of Bids, for a period of thirty (30) days. The OWNER may return any or all Bids along with the Bid Security prior to that date.

23.0 AWARD OF CONTRACT

The OWNER reserves the right to reject any and all Bids, to waive any and all formalities. 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 OWNER to make an award to that BIDDER.

In evaluating bids, the OWNER will consider the qualifications of the BIDDERs as well as other prescribed requirements, and such alternates, Unit Prices and other data, as may be requested in the Bid Schedule or by the OWNER prior to the Notice of Award.

The OWNER may consider the qualifications and experience of the CONTRACTOR, Subcontractors, suppliers, and other persons and organizations proposed in evaluating the Bids. The OWNER may also consider the operating costs, maintenance requirements, performance data and guarantees of major items of materials and equipment proposed for incorporation in the Work when such data is required to be submitted prior to the Notice of Award.

The OWNER may conduct such investigations as deemed necessary in the evaluation of any Bid and to establish the responsibility, qualifications and financial ability of each BIDDER, proposed Subcontractors, suppliers and other persons and organizations to perform and furnish the Work. If requested by the OWNER, the BIDDER shall provide a certified statement of financial condition.

The Contract will be Awarded to the BIDDER whose evaluation by the OWNER indicates that said Award will be in the best interests of the Project.

If the Contract is to be Awarded, OWNER will give the Successful BIDDER a Notice of Award within forty-five (45) days after the day of the Bid Opening. BIDDERS are hereby notified that, if Awarded the Contract, they **MAY NOT** assign Payments due under the Award without permission of the OWNER. Further, BIDDERS are notified that consent to such assignments will be rarely granted.

24.0 PERFORMANCE BOND, LABOR AND MATERIAL PAYMENT BOND, AND CERTIFICATE OF INSURANCE BOND

Upon receipt of Notice of Award, the BIDDER will Execute the formal Contract Documents within ten (10) days and deliver the Performance Bond, Labor and Material Bond and Certificate of Insurance as required herein, naming the OWNER as co-insured. Each Surety Bond shall be in the amount of one hundred (100) percent of the total Contract Price as security for the faithful performance of the Contract and for the payment of all labor and materials. The sureties on such bonds shall be duly authorized to conduct business in the State of New Mexico and acceptable to the OWNER and shall otherwise meet the requirements set forth in the Contract Documents. Attorneys-in-fact who sign Payment and Performance Bonds must file with each bond a certified and effective dated copy of their power of attorney. Sureties must also identify a service agent in the State of New Mexico.

OWNER reserves the right to require that any Bond furnished pursuant to the Contract Documents be in a form acceptable to OWNER. OWNER may reject any Bond which is not acceptable. CONTRACTOR'S inability to provide a Bond acceptable to OWNER may serve to render the Bid non-responsive.

25.0 EXECUTION OF CONTRACT

The Contract Agreement shall be Executed in two (2) counterparts, any one of which shall be deemed to be an original, and shall be distributed as follows:

CONTRACTOR	1 copy
OWNER	1 copy

26.0 CONSTRUCTION SCHEDULE

The CONTRACTOR shall submit to the OWNER a proposed construction schedule in accordance with Article 2.8 of the General Conditions, Section 13. The CONTRACTOR is required to schedule the Work so as to maintain a minimum amount of disturbance to the local residents and businesses.

27.0 MAJOR EQUIPMENT

Upon the Execution of the Contract Documents, the CONTRACTOR shall immediately place orders for all equipment and materials to be used on the Project. It is recommended that the CONTRACTOR place tentative orders, subject to cancellation for failure to complete the Contract Documents upon Notification of Award, for all equipment and materials with critical delivery dates.

28.0 SHOP DRAWINGS

Shop Drawings, descriptive literature and calculations as required covering all materials and equipment proposed for the job shall be submitted in three (3) copies by the CONTRACTOR to the ENGINEER for approval. The purpose of the Shop Drawings is to show the ENGINEER that the CONTRACTOR understands the design concept, demonstrating CONTRACTOR's understanding by indicating which equipment and material CONTRACTOR intends to furnish and install, and by detailing the fabrication and installation CONTRACTOR intends to use.

All data submitted shall be complete, including type, size, number required, etc., as called for in the Contract, Project Plans, and Specifications. If material or equipment other than that specified is submitted for approval, the submittal data shall clearly show and point out any differences with adequate information to determine its equality.

The approval of the Shop Drawings by the ENGINEER shall not be construed as a complete check, but will indicate that the general method of construction is satisfactory. Approval of the Shop Drawings will not relieve the CONTRACTOR of the responsibility for any errors or omissions which may exist. The CONTRACTOR will be responsible for the satisfactory construction of all Work covered under this Contract. If deviations, discrepancies or conflicts between Shop Drawings and Specifications are discovered, either prior to or after Shop Drawing submittals are processed by the ENGINEER, the Design Drawings and Specifications shall control and shall be followed.

All data shall be submitted in strict accordance with the following procedures:

A. Submit to the ENGINEER within fifteen (15) days after the Notice of Award.

B. Submittals shall be made in groups of items which are related to facilitate cross checking and coordination.

C. Each submittal shall be accompanied by a letter giving the CONTRACTOR's name, the Project name and an itemized list of the submittal data.

Should this procedure not be followed, the CONTRACTOR shall make no claim for loss of time or money as a result of delay in receiving approved submittal data. Material fabricated or equipment delivered to the site before the approved submittals have been returned to the CONTRACTOR shall be subject to rejection by the ENGINEER.

OWNER shall review each submittal and provide written acceptance or rejection within ten (10) working days after receipt.

29.0 WORK GUARANTEE

The CONTRACTOR shall guarantee in writing all work constructed under this Contract against defective materials and workmanship as follows:

All items of Work shall be guaranteed for a period of one (1) year, unless stated otherwise in these Specifications.

The Performance Bond shall guarantee claims for damages due to the workmanship for the same period as stated above. The Guarantee Period begins on the date of Substantial Completion of the Work as determined by the OWNER. All corrective work satisfying the Guarantee Periods shall be accomplished at no cost to the OWNER. Emergency repairs performed by forces of or on the behalf of the OWNER will be billed to the CONTRACTOR. The Labor and Materials Payment Bond shall guarantee payment for all equipment, equipment rental, labor and materials for a period of one (1) year after Substantial Completion of the Work.

30.0 PRE-BID CONFERENCE

A non-mandatory Pre-Bid Conference will be held at **2:00 p.m. (MST) on February 14, 2018,** at the Otero/Greentree Regional Landfill, 4258 U.S. Highway 54 South.

31.0 Construction Industries Division (CID) Project Classification Determination:

GF04, GF08, GF09, or GF98

32.0 BID EVALUATION CRITERION FOR AREA BUSINESSES

Effective March 20, 2015, the Alamogordo City Commission adopted Ordinance No. 1490 establishing Bid evaluation criterion for area businesses. Any business licensed in New Mexico, with a current business registration from the City of Alamogordo, with fixed offices or distribution points within fifteen (15) miles of the city limits of Alamogordo and able to furnish evidence of payment of New Mexico Gross Receipts tax shall qualify. If the Bid from the local business multiplied by 0.90 is less than or equal to the lowest responsible BIDDER, who does not qualify as a local business, the Contract will be offered to the local business at the same price as the lowest Bid. Acceptance of the offer is optional for the local business. If the area business rejects the offer, the Contract will be Awarded to the lowest responsible BIDDER.

Such acceptance by the area business must be in writing and signed by a principal officer of the firm. In addition, the acceptance package must include an affidavit that the area business meets

the criterion set forth in the ordinance and an adjusted Bid Schedule such that the grand total is equal to the lowest BIDDER's Price.

The complete Ordinance No. 1490, Bid Evaluation for Area Businesses, can be viewed at http://ci.alamogordo.nm.us/AssetsOrdinance+No.+1490.pdf

33.0 VETERANS PREFERENCE

To receive a Veterans Preference pursuant to Section 13-1-21 and 13-1-22 NMSA 1978, a resident veterans business shall submit with its bid a copy of a valid "Resident Veterans Preference Certification" issued by the taxation and revenue department (TRD). For the purpose of awarding, the SPD Policy Memo FY13-001 contained in Section 6 shall apply to a bid submitted by a resident veteran business.

For information on obtaining a resident contractor certificate, the potential Bidder should contact the State of New Mexico Taxation and Revenue Department, P.O. Box 5373, Santa Fe, New Mexico 87502-5374, telephone (505) 827-0951.

34.0 IN-STATE PREFERENCE

To receive a resident contractor preference pursuant to Section 13-4-2 NMSA 1978, a contractor shall submit with its bid a copy of a valid resident contractor certificate issued by the taxation and revenue department. For the purpose of awarding, a bid submitted by a resident contractor shall be deemed to be five percent lower than the bid actually submitted.

All Bidder Preferences

Select Only One Option per Bid

Resident Veterans Preference

Certificate and Form in Section 6 Must accompany submitted Bid Documents

Is Veterans Preference being claimed? _____YES _____ NO

In State Contractor Preference

Certificate Must accompany submitted Bid Documents

Is In-State Contractor Preference being claimed? _____YES _____ NO

Residential Preference

Is Residential Preference being claimed? _____YES _____ NO

City Business Registration Number Must be entered.

City Business Registration No. _____

SECTION 3 - BID SCHEDULE

BIDDER agrees to perform all of the work described in the specifications and shown on the plans for the following unit or lump sum prices. Prices should be written in numerals in the spaces provided.

Public Works Bid No. 2018-001
Otero/Greentree Regional Landfill Cell #5

ITEM NO.	ITEM DESCRIPTION	UNIT	EST. QTY.	UNIT PRICE	TOTAL PRICE
1	Soil Compaction Testing Allowance (95% of Modified Proctor).	LS	1	$6,000	$6,000
2	Unclassified Excavation: Contractor to grade. Finish grade to design plan set	CY	251,958		
3	6” Subgrade compacted to 95% Modified Proctor Density (ASTM1557)	CY	9,235		
4	6-inch Perforated HDPE SDR11 Pipe, including all appurtenances, CIP	LF	730		
5	6-inch Solid HDPE SDR11 Pipe, including all appurtenances, Complete-In-Place (CIP)	LF	255		
6	12-inch Perforated HDPE SDR11 Pipe, including all appurtenances, CIP	LF	30		
7	12-inch Solid HDPE SDR11 Pipe, including all appurtenances, CIP	LF	155		
8	60 Mil HDPE Double Textured, Side-Slope Liner - including weld and integrity testing of the liner and anchor trench, CIP (Anchor and drainage trenches, waste, overlap, or materials used for convenience are considered incidental to project and no extra payment will be made).	SY	18,254		
9	60 Mil HDPE Smooth, Floor Liner - including weld and integrity testing of the liner and anchor trench, CIP (Anchor and drainage trenches, waste, overlap, or materials used for convenience are considered incidental to project and no extra payment will be made).	SY	32,826		
10	Geosynthetic Clay Liner with Woven Geotextiles on Both Sides, CIP (Anchor and drainage trenches, waste, overlap, or materials used for convenience are considered incidental to project and no extra payment will be made).	SY	51,080		
11	Non-Woven Geosynthetic Filter Fabric (6-inch minimum overlap), CIP	SY	820		
12	Coarse Aggregate; Type H (Graded Drain Rock)	CY	257		

13	Stormwater Protection Structure; including earthwork for ditch (95% Modified Proctor for Maximum Dry Density), earthwork for berm, 4x8 CDX with 1/4" or greater thickness plywood sheeting, marker stakes every 50 ft, and marker flag every 50 ft.	LF	730		
14	4 Layers of 200 Mil HDPE Geonet Cushion Covering Leachate Sump Floor, as shown on plans, CIP	SY	80		

TOTAL BASE BID AMOUNT EXCLUDING NMGRT **$**_____

A-1	Soil Cushion, 2' (24" thickness) soil layer used for protective layer on top of Geomembrane	CY	33,988		

TOTAL ADD. ALT. BID AMOUNT EXCLUDING NMGRT **$**_____

TOTAL BASE BID & ADD. ALT. AMOUNTS EXCLUDING NMGRT **$**_____

NOTE: Gross receipts tax shall be paid with each pay request as it is submitted at the current tax rate for the County of Otero, New Mexico (6.3125%)

To the City of Alamogordo, New Mexico (hereinafter called "OWNER"), the undersigned, (hereinafter called "BIDDER"), in compliance with your invitation for bids for the construction of **Otero/Greentree Regional Landfill Cell #5, Public Works Bid No. 2018-001,** having carefully examined the Contract Documents and the site of the proposed work, and being familiar with all of the conditions surrounding the construction of the proposed project including the availability of materials and labor, hereby proposes to furnish all labor, materials, and supplies, and to construct the project in accordance with the Contract Documents, within the time set forth herein, and at the unit prices stated above. These prices are to cover all expenses incurred in performing the work required under the Contract Documents of which this Bid Schedule is a part. Quantities shown in this Bid Schedule are estimated and actual payment will be made on the basis of the unit bid prices for confirmed quantities as constructed.

BIDDER acknowledges receipt of the following addenda: _____ _____ _____

CALLOUT NOTICE ACKNOWLEDGMENT:

Authorized Signature of Bidder

Business Name of Bidder

Authorized Signature of Bidder

Printed Name and Title of Authorized Signature

BIDDER'S New Mexico Contractor's License No. & Classification

Address

Telephone Fax

(SEAL) If Bid Proposal is submitted by a corporation

SECTION 4 - SUBCONTRACTOR'S FAIR PRACTICE ACT COMPLIANCE

This Project is subject to the provisions of the State of New Mexico Subcontractor's Fair Practice Act.

Listing Threshold	$5,000.00 (Five-thousand dollars) for projects under $1 million and one-half of one percent for projects over $1 million

For each category of the Project list all Subcontractors, sub-Subcontractors, other organizations, and/or persons which the BIDDER will be subcontracting, for an amount exceeding the listing threshold indicated above, the BIDDER shall define the subcontracting categories and list only one Subcontractor, sub-Subcontractor, other organization, and/or person for each category. The listing shall be in the format indicated on the following page, and shall be completed and submitted with the Bid.

No CONTRACTOR whose Bid is accepted shall sublet or subcontract any portion of the Work of the Project in an amount exceeding the threshold amount given above, where the original Bid amount did not designate a subcontract, unless 1) the CONTRACTOR received no bid for that category (note: the BIDDER must designate on the list of Subcontractors that "no bid was received"), or 2) the Work is pursuant to a change order that causes changes or deviations from the original Contract.

No CONTRACTOR whose Bid is accepted shall substitute any Subcontractor in place of the Subcontractor listed in the Bid except as provided for in the Subcontractor's Fair Practice Act.

LIST OF PROJECT SUBCONTRACTORS FOR
AMOUNTS EXCEEDING THE LISTING THRESHOLD
(THIS FORM MUST BE FILLED OUT AND SUBMITTED WITH BID)

Subcontractor's Business Name _____
Principal Place of Business _____
Telephone No. _____
NM Contractor's License No. _____
Type of Work _____

Subcontractor's Business Name _____
Principal Place of Business _____
Telephone No. _____
NM Contractor's License No. _____
Type of Work _____

Subcontractor's Business Name _____
Principal Place of Business _____
Telephone No. _____
NM Contractor's License No. _____
Type of Work _____

Subcontractor's Business Name _____
Principal Place of Business _____
Telephone No. _____
NM Contractor's License No. _____
Type of Work _____

Subcontractor's Business Name _____
Principal Place of Business _____
Telephone No. _____
NM Contractor's License No. _____
Type of Work _____

_____ _____
Signature of Authorized Representative for BIDDER Date

Duplicate, complete, and submit additional sheets as required.

SECTION 5 - BID BOND

KNOW ALL MEN BY THESE PRESENTS, that we the undersigned, _____ _____, as PRINCIPAL, and _____, as SURETY are held and firmly bound unto The City of Alamogordo, New Mexico, hereinafter called the OWNER, in the penal sum of _____ dollars, ($_____) lawful money of the United States, for the payment of which sum well and truly to be made, we bind ourselves, our heirs, executors, administrator, successors, personal representatives, and assigns, jointly and severally, firmly by these presents.

THE CONDITION OF THIS OBLIGATION IS SUCH, that whereas the PRINCIPAL has submitted the accompanying Bid, dated _____, 20____, for _____ _____.

NOW, THEREFORE, if the PRINCIPAL shall not withdraw said Bid within the period therein specified after the Opening of the same or, if no period be specified, within sixty (60) days after the said Opening, and shall within the period specified therefore, or if no period be specified, within fifteen (15) days after the prescribed forms are presented to PRINCIPAL for signature, enter into a written Contract with the OWNER in accordance with the Bid as accepted, and give bond with good and sufficient surety or sureties, as may be required, for the faithful performance and proper fulfillment of such Contract, or in the event of the withdrawal of said Bid within the period specified, or the failure to enter into such Contract and give such bond within the time specified, the PRINCIPAL shall pay the OWNER the difference between the amount specified in said Bid and the amount for which the OWNER may procure the required Work or supplies or both, if the latter be in excess of the former, then the above obligation shall be void and of no effect, otherwise to remain in full force and virtue.

IN WITNESS WHEREOF, the above bounded parties have executed this instrument under their several seals this _____ day of _____, 20___, the name and corporate seal of each corporate party being hereto affixed and these presents signed by its undersigned representative, pursuant to authority of its governing body.

In presence of:

_____

[Individual PRINCIPAL] [SEAL]

_____

[Business Address]

_____ _____

[Partnership] [SEAL]

_____ _____

[Business Address]

Attest: _____ By: _____

[Corporate PRINCIPAL]

_____

[Business Address]

By: _____Affix Corporate Seal

_____ _____

Attest: _____ _____

[Corporate SURETY]

By: _____Affix Corporate Seal

Countersigned

By: _____

Attorney-in-Fact[1], State of _____

_____

[1]Power-of-attorney for person signing for Surety Company must be attached to bond and must indicate availability for service in the State of New Mexico and a current mailing address.

SECTION 6 - STATEMENT OF BIDDER'S QUALIFICATIONS

(TO BE SUBMITTED BY THE BIDDER AND INCLUDED WITH BID)

All questions must be answered and the data given must be clear and comprehensive. This statement must be notarized. If necessary, questions may be answered on separate attached sheets. The BIDDER may submit additional information.

1. Name of Bidder:
   Current City of Alamogordo Business Registration Number:
   N.M. Contractor's License Number:

2. Permanent main office address.

3. When organized?

4. If a corporation, where and when incorporated?

5. How many years have you been engaged in the contracting business under your present firm or trade name?

6. On a separate sheet, list active and completed projects similar in nature to this project for the past 3 years. Indicate name of project, and name, address, email and phone number of project owner/client. Supply the scheduled or actual completion dates, contract amounts, progress percentage completed, (Must have at least one project completed).

7. General trade of work performed by your company.

8. Have you ever defaulted on a contract? If so, where and why?

9. List your major equipment available for this contract.

10. Background and experience of the principal members of your organization, including the officers.

11. Credit available: $_____.

12. Give bank reference:
    Name:
    Address:
    Contact person:
    Telephone number:

13. You may be required upon request, to furnish a detailed audited financial statement with name and address of firm preparing the statement and any other information that may be required by the OWNER.

14. The undersigned hereby authorizes any person, firm, or corporation to furnish any information requested by the OWNER in verification of the recitals comprising this statement of Bidder's Qualifications. This _____ day of

_____, 20_____, dated at _____.

_____
Name of Bidder

By:_____

Title:_____

State of_____)
)ss.
County of _____)

_____, the _____ of
Name Position

_____ being duly sworn,
Company Name

deposes and says that the answers to the foregoing questions and all statements therein contained are true and correct.

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

_____
Notary Public

My Commission expires _____, 20___

LIST OF PROPOSED EQUIPMENT MANUFACTURERS

The following listing of material and/or equipment manufacturers must be completed and signed by the Contractor and submitted with the Bid Proposal. Bids submitted without this completed and signed listing or with more than one manufacturer listed for each item may be considered non-responsive.

MATERIAL/EQUIPMENT	MANUFACTURER
Leachate Collection Pipe (6" Perforated HDPE, 6" Solid HDPE, 12" Perforated HDPE and 12" Perforated HDPE)	
Geosynthic Clay Liner	
60 Mil HDPE Double Textured Liner	
60 Mil HDPE Smooth Liner	
Coarse Aggregate; Type H	
Non-Woven Geosynthetic Filter Fabric	
4 Layer HDPE Geonet	

Bidder's Name: _____

By (Signature): _____

Print or Type Name and Title: _____

This is a notice to all New Mexico resident businesses, New Mexico resident veteran businesses and New Mexico contractors.

1. All resident businesses, resident veteran businesses and contractors must apply for a current certification issued by the Tax and Revenue Department.
2. Certificates issued prior to July 1, 2016 are deemed EXPIRED for purposes of claiming a preference, and therefore all businesses must reapply for certification.
3. Applications for in-state preference will NOT be processed through the State Purchasing Division. All resident businesses, resident veteran businesses and contractors must obtain a preference number & certificate with the New Mexico Department of Taxation & Revenue.
4. Your preference will only apply if a copy of a Certificate issued on or after July 1, 2016 accompanies your bid or proposal.
5. Certificates must be provided with each and every bid and proposal submission individually, even if the Certificate was previously provided to State Purchasing Division with a prior procurement. Certificates missing from procurement submissions will not benefit from the preference.
6. For additional information and application forms:
   Call Tax & Revenue Department at: **505-827-0926, 505-827-0949, 505-827-0948)** or
   Web link to: http://www.tax.newmexico.gov/Businesses/in-state-veteran-preference-certification.aspx

SECTION 7 - CAMPAIGN CONTRIBUTION DISCLOSURE FORM

Pursuant to NMSA 1978, 13-1-191.1 (2006), any prospective contractor seeking to enter into a contract with any state agency or local public body **for professional services, a design and build project delivery system, or the design and installation of measures the primary purpose of which is to conserve natural resources** must file this form with that state agency or local public body. This form must be filed even if the contract qualifies as a small purchase or a sole source contract. The prospective contractor must disclose whether they, a family member or a representative of the prospective contractor has made a campaign contribution to an applicable public official of the state or local public body during the two years prior to the date on which the contractor submits a proposal or, in the case of a sole source or small purchase contract, the two years prior to the date the contractor signs the contract, if the aggregate total of contributions given by the prospective contractor, a family member or a representative of the prospective contractor to the public official exceeds two hundred and fifty dollars ($250) over the two year period.

Furthermore, the state agency or local public body shall void an executed contract or cancel a solicitation or proposed award for a proposed contract if: 1) a prospective contractor, a family member of the prospective contractor, or a representative of the prospective contractor gives a campaign contribution or other thing of value to an applicable public official or the applicable public official's employees during the pendency of the procurement process or 2) a prospective contractor fails to submit a fully completed disclosure statement pursuant to the law.

THIS FORM MUST BE FILED BY ANY PROSPECTIVE CONTRACTOR WHETHER OR NOT THEY, THEIR FAMILY MEMBER, OR THEIR REPRESENTATIVE HAS MADE ANY CONTRIBUTIONS SUBJECT TO DISCLOSURE.

The following definitions apply:

"**Applicable public official"** means a person elected to an office or a person appointed to complete a term of an elected office, who has the authority to award or influence the award of the contract for which the prospective contractor is submitting a competitive sealed proposal or who has the authority to negotiate a sole source or small purchase contract that may be awarded without submission of a sealed competitive proposal.

"Campaign Contribution" means a gift, subscription, loan, advance or deposit of money or other thing of value, including the estimated value of an in-kind contribution, that is made to or received by an applicable public official or any person authorized to raise, collect or expend contributions on that official's behalf for the purpose of electing the official to either statewide or local office. "Campaign Contribution" includes the payment of a debt incurred in an election campaign, but does not include the value of services provided without compensation or un-reimbursed travel or other personal expenses of individuals who volunteer a portion or all of their time on behalf of a candidate or political committee, nor does it include the administrative or solicitation expenses of a political committee that are paid by an organization that sponsors the committee.

"Contract" means any agreement for the procurement of items of tangible personal property, services, professional services, or construction.

"Family member" means spouse, father, mother, child, father-in-law, mother-in-law, daughter-in-law or son-in-law.

"Pendency of the procurement process" means the time period commencing with the public notice of the request for proposals and ending with the award of the contract or the cancellation of the request for proposals.

"Person" means any corporation, partnership, individual, joint venture, association or any other private legal entity.

"Prospective contractor" means a person who is subject to the competitive sealed proposal process set forth in the Procurement Code or is not required to submit a competitive sealed proposal because that person qualifies for a sole source or a small purchase contract.

"Representative of a prospective contractor" means an officer or director of a corporation, a member or manager of a limited liability corporation, a partner of a partnership or a trustee of a trust of the prospective contractor.

DISCLOSURE OF CONTRIBUTIONS:

Contribution Made By: _____

Relation to Prospective Contractor: _____

Name of Applicable Public Official: _____

Date Contribution(s) Made: _____

Amount(s) of Contribution(s): _____

Nature of Contribution(s): _____

Purpose of Contributions(s): _____

_____ _____
Signature Date

_____
Title (position)

--OR—

NO CONTRIBUTIONS IN THE AGGREGATE TOTAL OVER TWO HUNDRED FIFTY DOLLARS ($250) WERE MADE to an applicable public official by me, a family member or representative.

_____ _____
Signature Date

_____
Title (position)

SECTION 8 - CONTRACT AGREEMENT

This AGREEMENT is dated as of the _____ day of _____ in the year 2018 by and between the City of Alamogordo, a New Mexico municipal corporation ("OWNER") and _____**,** a New Mexico corporation ("CONTRACTOR").

OWNER and CONTRACTOR, in consideration of the mutual covenants hereinafter set forth, agree as follows:

ARTICLE 1 CONTRACT DOCUMENTS

The Contract Documents which comprise the entire AGREEMENT between OWNER and CONTRACTOR concerning the work consist of the following:

- This AGREEMENT.
- Exhibits to this AGREEMENT.
- All required Bonds.
- Notice of Award.
- Conditions of the Contract (General, Supplementary, and Other Conditions).
- Project Specifications.
- Drawings with each sheet bearing the following general title:

OTERO/GREENTREE REGIONAL LANDFILL CELL #5
(PUBLIC WORKS BID NO. 2018-001)

- Notice to Proceed.
- Bid Documents and CONTRACTOR'S ***Bid Schedule***
- The Certificate of Insurance.
- All Addenda Issued Prior to, and all Modifications Issued after, Execution of this AGREEMENT.

These documents form the Contract, and all are as fully a part of the Contract, as if attached to this AGREEMENT, or repeated herein.

There are no Contract Documents other than those listed above in the Article 1. The Contract Documents may only be amended, modified or supplemented as provided in Section 13, General Conditions.

ARTICLE 2 WORK

CONTRACTOR shall complete all Work as specified or indicated in the Contract Documents. The Work is generally described as follows:

OTERO/GREENTREE REGIONAL LANDFILL CELL #5
(PUBLIC WORKS BID NO. 2018-001)

consisting of the following: See attached ***Exhibit A***.

ARTICLE 3 TIME OF COMMENCEMENT AND SUBSTANTIAL COMPLETION

The date of commencement of the Work is the date established in the NOTICE TO PROCEED AS ISSUED BY THE OWNER. Substantial Completion shall be achieved not later than **One Hundred twenty (120) calendar days** after the date of written "Notice to Proceed", except as hereafter extended by valid written Change Order, by the OWNER. Final Completion shall be achieved not later than **thirty (30) calendar days** after the date of Substantial Completion.

Should the CONTRACTOR neglect, refuse, or otherwise fail to complete the Work within the time specified in this article, the CONTRACTOR agrees, in partial consideration for the award of this Contract, to pay to the OWNER the amount of **One Thousand-Five Hundred Dollars** (**$1,500.00**) per consecutive calendar day, not as a penalty, but as liquidated damages for such breach of this Contract.

ARTICLE 4 CONTRACT PRICE

OWNER shall pay CONTRACTOR in current funds for performance of the Work, subject to additions and deductions by Change Order as provided in the Contract Documents, the Contract Price determined as follows:

See CONTRACTOR'S ***Bid Schedule***, attached hereto as ***Exhibit B*** and incorporated by reference.

ARTICLE 5 PROGRESS PAYMENTS

Based upon Applications for Payment submitted in accordance with Article 14 of the General Conditions, the OWNER shall make progress payments on account of the Contract Price to the CONTRACTOR as provided in the Contract Documents for the period ending the last day of the month as follows:

Not later than twenty-one (21) days following receipt by the OWNER, of the undisputed Application, for Payment, one hundred percent (100%) of the portion of the Contract Price properly allocable to labor, materials, and equipment incorporated in the Work, and one hundred percent (100%) of the portion of the Contract Price properly allocable to materials and equipment suitably stored at the site or some other location agreed upon in writing for the period covered by the Application for Payment, less the aggregate of previous payments made by the OWNER; and upon Substantial Completion of the entire Work, a sum sufficient to increase the total payments to one hundred percent (100%) of the Contract Price, less such amounts as the Engineer shall determine for all incomplete Work and unsettled claims as provided in the Contract Documents, which shall be paid in accordance in Article 6 of this Contract.

Valid, undisputed payments, due and unpaid, under the Contract Documents shall bear interest from the date payment is due, at the legal rate established by Laws of 2001, Chapter 68, Section 5. Section 13-4-28, NMSA 1978.

ARTICLE 6 FINAL PAYMENT

Final payment, constituting the entire undisputed, unpaid balance of the Contract Price, shall be paid by the OWNER to the CONTRACTOR within ten (10) days after notification of the OWNER, by the Architect/Engineer that all incomplete and unacceptable Work that was noted during the Substantial Completion Inspection, and listed on the attachment to the Certificate of Substantial Completion has been corrected, and provided the Contract has been fully performed, and a final Certificate for Payment has been issued by the Architect/Engineer. In addition, the CONTRACTOR shall provide to the OWNER a certified statement of Release of Liens (AIA Document G706A or approved form) and Consent of Surety.

ARTICLE 7 CONTRACTOR'S REPRESENTATIONS

CONTRACTOR makes the following representations:

CONTRACTOR has studied and become familiar with the nature and extent of the Contract Documents, Work, site, locality, and all local conditions and Laws and Regulations that in any manner may affect cost, progress, performance or furnishing of the Work.

CONTRACTOR has studied carefully all reports of explorations and tests of subsurface conditions and drawings of physical conditions as provided in Section 12, General Conditions, and accepts the determination of the extent of the technical data contained in such reports and drawings upon which CONTRACTOR is entitled to reply.

CONTRACTOR has obtained and carefully studied (or assumes responsibility for obtaining and carefully studying) all such examinations, investigations, explorations, tests, reports and studies (in addition to or to supplement those referred above) which pertain to the subsurface or physical conditions at or contiguous to the site or otherwise may affect the cost, progress, performance or furnishing of the Work as CONTRACTOR considers necessary for the performance or furnishing of the Work at the Contract Price, within the Contract Time and in accordance with the other terms and conditions of the Contract Documents, including specifically the provisions of Section 12, General Conditions; and no additional examinations, investigations, explorations, tests, reports, studies or similar information or data are or will be required by CONTRACTOR for such purposes.

CONTRACTOR has reviewed and checked all information and data shown or indicated on the Contract Documents with respect to existing Underground Facilities at or contiguous to the site and assumes responsibility for carefully locating said Underground Facilities. No additional examinations, investigations, explorations, tests, reports, studies or similar information or data with respect to said Underground Facilities are or will be required by CONTRACTOR in order to perform and furnish the Work at the Contract Price, within the Contract Time and in accordance with the other terms and conditions of the Contract Documents, including specifically the provisions of Section 12, General Conditions.

CONTRACTOR has correlated the results of all such observations, examinations, investigations, explorations, tests, reports and studies with the terms and conditions of the Contract Documents.

CONTRACTOR has given OWNER’s Representative all conflicts, errors or discrepancies that CONTRACTOR has discovered in the Contract Documents and the written resolution thereof by OWNER's Representative is acceptable to CONTRACTOR.

ARTICLE 8 GENERAL AND SPECIAL PROVISIONS

The OWNER's Representative is Larry Garner, Public Works Director for the City of Alamogordo, New Mexico, who is hereinafter called OWNER's Representative and who is to act as OWNER's Representative, assume all duties and responsibilities and have the rights and authority assigned to OWNER's Representative in the Contract Documents in connection with completion of the Work in accordance with the Contract Documents.

This AGREEMENT shall be governed exclusively by the provisions hereof, and by the laws of the State of New Mexico, as the same from time to time exist.

Terms used in this AGREEMENT, which are defined in the Conditions of the Contract, shall have the meanings designated in those Conditions.

As between the parties to this AGREEMENT: As to all acts or failures to act by either party to this AGREEMENT, any applicable statue of limitations shall commence to run and any alleged cause of action shall be deemed to have accrued in any and all events not later than the relevant Date of Substantial Completion of the Work; and as to any acts or failures to act occurring after the relevant

Date of Substantial Completion, not later than the date of the OWNER's approval of the Final Certificate of Payment.

The CONTRACTOR shall hold harmless and indemnify the OWNER against any and all injury, loss, or damage, including cost of defense - including but not limited to court costs and attorneys' fees - arising out of the negligent acts, errors, or omissions of the CONTRACTOR.

This AGREEMENT shall not become effective until it is signed by all parties which are required to sign this AGREEMENT.

The CONTRACTOR and his agents and employees are independent CONTRACTORs, and are not employees of the City of Alamogordo. The CONTRACTOR and his agents and employees shall not accrue leave, retirement, insurance, bonding, use of City vehicles, or any other benefits afforded to employees of the City of Alamogordo, as a result of this AGREEMENT.

The CONTRACTOR, upon final payment of the amounts due under this AGREEMENT, releases the OWNER, his officers and employees, and the City of Alamogordo from all liabilities and obligations arising from or under this AGREEMENT, including but not limited to all damages, losses, costs, liability, and expenses, including but not limited to attorneys' fees and costs of litigation that the CONTRACTOR may incur.

The CONTRACTOR agrees not to purport to bind the City of Alamogordo to any obligation not assumed herein by the City of Alamogordo unless the CONTRACTOR has express written authority to do so, and then only within the strict limits of that authority.

Notices
All notices herein provided to be given, or which may be given, by either party to the other shall be deemed to have been fully given when made in writing and deposited in the United States mail, postage prepaid - in the instance of notice of termination of work also by certified mail - and addressed as follows:

THE OWNER:

City of Alamogordo
Public Works Department
2600 N. Florida Avenue
Alamogordo, NM 88310

THE CONTRACTOR:

Nothing herein contained shall preclude the giving of any such written notice by personal service. The address to which notices shall be mailed to either party may be changed by written notice given by such party to the other as here in above provided.

Gender, Singular/Plural. Words of any gender used in this AGREEMENT shall be held and construed to include any other gender, and words in the singular number shall be held to include the plural, unless the context requires otherwise.

Captions and Section Headings. The captions and section headings contained in this AGREEMENT are for convenience of reference only, and in no way limit, define, or enlarge the terms, scope, and conditions of this AGREEMENT.

Certificates and Documents Incorporated. All certificates and documentation required by the provisions of this AGREEMENT shall be attached to this AGREEMENT at the time of Execution and are hereby incorporated by reference as though set forth in full in this AGREEMENT to the extent they are consistent with its conditions and terms.

Severability. If any clause or provision of this AGREEMENT is illegal, invalid, or unenforceable under present or future laws effective during the term of this AGREEMENT, then and in that event it is the intention of the parties hereto that the remainder of this AGREEMENT shall not be affected thereby.

Waiver. No provision of this AGREEMENT shall be deemed to have been waived by either party unless such waiver be in writing signed by the party making the waiver and addressed to the other party; nor shall any custom or practice which may evolve between the parties in the administration of the terms hereof be accordance with the terms hereof. Further, the waiver by any party of a breach by the other party of any term, covenant, or condition hereof shall not operate as a waiver of any subsequent breach of the same or any other term, covenant, or condition thereof.

Entire AGREEMENT. This AGREEMENT represents the entire contract between the parties and, except as otherwise provided herein, may not be amended, changed, modified, or altered without the written consent of the parties hereto. This AGREEMENT incorporates all of the conditions, agreements, and understandings between the parties concerning the subject matter of this AGREEMENT, and all such conditions, understandings, and agreements have been merged into this written AGREEMENT. No prior condition, agreement, or understanding, verbal or otherwise, of the parties or their agents shall be valid or enforceable unless embodied in this written AGREEMENT.

Interchangeable Terms. For purposes of all provisions within this AGREEMENT and all attachments hereto, the terms "AGREEMENT" and "Contract" shall have the same meaning and shall be interchangeable.

Words and Phrases. Words, phrases, and abbreviations, which have well-known technical or trade meanings used in the Contract Documents shall be used according to such recognized meanings. In the event of a conflict, the more stringent meaning shall govern.

Relationship of Contract Documents. The Contract Documents are complementary, and any requirement of one contract document shall be as binding as if required by all.

Pursuant to Section 13-1-191, NMSA 1978, reference is hereby made to the Criminal Laws of New Mexico (including Sections 30-24-1 through 30-24-3, NMSA 1978, and 30-41-1 through 30-41-3, NMSA 1978), which prohibit bribes, kickbacks, and gratuities, violations of which constitutes a felony. Further, the Procurement Code (Sections 13-1-28 through 13-1-199, NMSA 1978) imposes civil and criminal penalties for its violation.

A potential CONTRACTOR, or the CONTRACTOR, agrees to comply with state laws and rules pertaining to worker's compensation insurance coverage for its employees. If CONTRACTOR fails to comply with the Worker's Compensation Act, and applicable rules when required to do so, the contract may be canceled effective immediately.

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

IN WITNESS WHEREOF, OWNER and CONTRACTOR have Executed two copies of this AGREEMENT. One counterpart each has been delivered to CONTRACTOR and OWNER's Representative. All portions of the Contract Documents have been signed or identified by OWNER and CONTRACTOR or by OWNER's Representative on their behalf.

CONTRACTOR
.

By: _____

NM Taxpayer Identification Number:
Federal Taxpayer Identification Number:

OWNER
CITY OF ALAMOGORDO, NEW MEXICO
a New Mexico municipal corporation

By:_____ _____
Maggie Paluch, City Manager Date

ATTEST:

_____
Rachel Hughs, City Clerk

APPROVED AS TO FORM:

_____
Petria Schreiber, City Attorney

EXHIBIT A

The work will consist of installation of liner, leachate collection system, and earthwork for cell #5 at the Otero/Greentree Regional Landfill.

SECTION 9 - PERFORMANCE BOND

KNOW ALL MEN BY THESE PRESENTS:

THAT, [*Insert the name or legal title of the CONTRACTOR]* _____as Principal, herein after called the CONTRACTOR, and *[Insert the legal title of the surety and address*]

_____

_____ a corporation organized and existing under and by virtue of the laws of the State of _____ and authorized to do business in the State of New Mexico, hereinafter called the Surety, are held and firmly bound unto *[Insert the name or legal title and address of the OWNER*)

_____

_____ as Obligee, hereinafter called the OWNER, in the amount of _____Dollars ($_____), for the payment whereof CONTRACTOR and Surety bind themselves, their heirs, executors, administrators, successors, and assigns, jointly and severally, firmly by these presents.

WHEREAS, CONTRACTOR has by written agreement dated _____, _____, entered into a contract described as follows:

_____

_____

_____

which contract is by reference made a part hereof and is hereinafter referred to as the Contract.

NOW, THEREFORE, the condition of this obligation is such that, if CONTRACTOR shall faithfully perform and complete said Contract according to its terms and comply with all requirements of law, then this obligation shall be null and void; otherwise it shall remain in full force and effect.

The Surety hereby waives notice of any alteration or extension of time made by the OWNER.

Whenever the CONTRACTOR shall be, and shall be declared by the OWNER to be, in default under the said Contract, the OWNER having performed its obligations hereunder, the Surety may promptly remedy the default or shall promptly:

1. Complete the Contract in accordance with its terms and conditions, or

2. At OWNER's option, obtain a bid or bids for submission to the OWNER for completing said Contract in accordance with its terms and conditions and, upon determination by the OWNER and Surety of the lowest responsible BIDDER, arrange for a contract between such

BIDDER and the OWNER and make available as Work progresses (even though there should be a default or a succession of defaults under the Contract or contracts of completion arranged under this paragraph) sufficient funds to pay the cost of completion less the balance of the Contract Price but not exceeding, including other costs and damages for which the Surety may be liable hereunder, the amount set forth in the first paragraph hereof. The term "balance of the Contract Price", as used in this paragraph shall mean the total amount payable by the OWNER to the CONTRACTOR under the Contract and any amendments thereto less the amount previously paid by the OWNER to the CONTRACTOR.

The Surety acknowledges that said Contract may contain express guarantees and agrees that said guarantees, if any, are covered by the Surety's obligation hereunder.

Right of action with respect to any express guarantees in the Contract shall accrue from the date of completion and formal acceptance of the Work under the Contract.

No right of action shall accrue on this bond to or for the use of any person or corporation other than the OWNER named herein or its successors or assigns.

SIGNED AND SEALED _____, _____.

_____
Contractor-Principal]

In presence of:

_____

By:_____

Title:_____[Surety]

Approved as to form:

_____

By:_____
Attorney for the OWNER

Title:_____

\
Countersigned:

_____
Surety's Authorized New Mexico Agent for Service

SECTION 10 - LABOR AND MATERIAL PAYMENT BOND

KNOW ALL MEN BY THESE PRESENTS:

THAT, [*Insert the name or legal title and address of the CONTRACTOR]*

_____

_____, as PRINCIPAL, hereinafter called the CONTRACTOR, and [*Insert the legal title of the surety and address*]

_____

_____, a corporation organized and existing under and by virtue of the laws of the State of _____ and authorized to do business in the State of New Mexico, hereinafter called the Surety, as held and firmly bound unto [*Insert the name or legal title and address of the OWNER]*

_____

_____as Obligee, hereinafter called the OWNER and supplier of labor, material or supplies as joint obligees, in the amount of _____dollars ($_____), for the payment whereof CONTRACTOR and Surety bind themselves, their heirs, executors, administrators, successors, and assigns, jointly and severally firmly by these presents.

WHEREAS, CONTRACTOR has by written agreement dated _____, 20_____ entered into a contract described as follows:

_____

_____

_____

_____

which contract is by reference made a part hereof and is hereinafter referred to as the Contract.

NOW, THEREFORE, the condition of this obligation is such that, if the CONTRACTOR shall pay as they become due all just claims for labor performed and materials and supplies furnished upon or for the Work under the Contract, whether said labor be performed and materials and supplies be furnished under the original Contract or any contract there-under, then this

obligation shall be null and void; otherwise it shall remain in full force and effect, subject, however, to the following conditions.

The right to sue on this bond accrues only to the OWNER and the parties to whom the right is granted pursuant to Section 13-4-1 et. seq., NMSA 1978 (1988 repl. pamp.) and New Mexico Law; and any such right shall be exercised only in accordance with the provisions and limitations of said statutes.

SIGNED AND SEALED ON _____, _____

_____
[CONTRACTOR - PRINCIPAL]

In presence of:

_____

By _____

Title:_____

_____
Approved as to form: [Surety]

_____ By:_____
Attorney for the OWNER

Title:_____

Countersigned:

_____
Surety's Authorized New Mexico Agent for Service

This bond is issued simultaneously with performance bond in favor of OWNER and suppliers of labor, materials or supplies for the faithful performance of the Contract.

PLEASE ATTACH AN INSURANCE CERTIFICATE FROM A NEW MEXICO LICENSED INSURANCE AGENT PER THE GENERAL CONDITIONS, SECTION 13 ARTICLE 5

SECTION 12 - WAGE RATES

APPLICABLE TO PROJECTS OVER $60,000

STATE OF NEW MEXICO
NEW MEXICO DEPARTMENT OF
WORKFORCE SOLUTIONS
Labor Relations Division,
121 Tijeras Ave NE, Suite 3000
Albuquerque, NM 87102
www.dws.state.nm.us

Wage Decision Approval Summary

1) Project Title: Otero/Greentree Regional Landfill Cell #5
Requested Date: 01/22/2018
Approved Date: 01/24/2018
Approved Wage Decision Number: OT-18-0100-A

Wage Decision Expiration Date for Bids: 05/24/2018

2) Physical Location of Jobsite for Project:
Job Site Address: 4258 U.S. Highway 54 South
Job Site City: Alamogordo
Job Site County: Otero

3) Contracting Agency Name (Department or Bureau): City of Alamogordo
Contracting Agency Contact's Name: Bob Johnson
Contracting Agency Contact's Phone: (575) 439-4337 Ext.

4) Estimated Contract Award Date: 03/27/2018

5) Estimated total project cost: $1,800,000.00
a. Are any federal funds involved?: No
b. Does this project involve a building?: No
c. Is this part of a larger plan for construction on or appurtenant to the property that is subject to this project?: No
d. Are there any other Public Works Wage Decisions related to this project?: No
e. What is the ultimate purpose or functional use of the construction once it is completed?: New landfill cell.

6) Classifications of Construction:

Classification Type and Cost Total	Description
Highway/Utilities (A) **Cost:** $1,800,000.00	Installation of liner, leachate collection system, and earthwork for Cell #5 at the Otero/Greentree Regional Landfill.

TYPE "A" - STREET, HIGHWAY, UTILITY & LIGHT ENGINEERING

Effective January 1, 2018

Trade Classification	Base Rate	Fringe Rate
Bricklayer/Blocklayer/Stonemason	23.52	8.84
Carpenter/Lather	24.00	9.97
Cement Mason	17.42	6.35
Ironworker	26.50	15.30
Painter (Brush/Roller/Spray)	16.75	6.28
Plumber/Pipefitter	28.95	12.23
Electricians (outside)		
Groundman	22.36	11.56
Equipment Operator	32.08	14.09
Lineman/Wireman or Tech	37.75	15.57
Cable Splicer	41.53	16.56
Laborers		
Group I	11.96	5.55
Group II	12.26	5.55
Group III	12.66	5.55
Operators		
Group I	16.94	6.33
Group II	17.69	6.33
Group III	17.80	6.33
Group IV	17.88	6.33
Group V	18.00	6.33
Group VI	18.14	6.33
Group VII	18.52	6.33
Group VIII	18.75	6.33
Group IX	25.70	6.33
Group X	28.60	6.33
Truck Drivers		
Group I	16.00	7.17
Group II	16.00	7.17
Group III	16.00	7.17
Group IV	16.00	7.17

NOTE: All contractors are required to pay SUBSISTENCE, ZONE AND INCENTIVE PAY according to the particular trade. Details are located in a PDF attachment at WWW.DWS.STATE.NM.US. Search Labor Relations/Labor Information/Public Works/Prevailing Wage Rates.

STATE OF NEW MEXICO
NEW MEXICO DEPARTMENT OF
WORKFORCE SOLUTIONS
Labor Relations Division
121 Tijeras Ave NE, Suite 3000
Albuquerque, NM 87102
www.dws.state.nm.us

PUBLIC WORKS PROJECT REQUIREMENTS

As a participant in a Public Works project valued at more than $60,000 in the State of New Mexico, the following list addresses many of the responsibilities that are defined by statute or regulation to each project stakeholder.

Contracting Agency

- Ensure that all Contractors wishing to bid on a Public Works project when the project is $60,000 or more are actively registered with the Public Works and Apprenticeship Application (PWAA) website: http://www.dws.state.nm.us/pwaa (Contractor Registration) prior to bidding.
- Please submit Notice of Award (NOA) and Subcontractor List(s) to the PWAA website promptly after the project is awarded.
- Please update the Subcontractor List(s) on the PWAA website whenever changes occur.
- All Sub-Contractors and tiers (excluding professional services) regardless of contract amount must be listed on the Subcontractor List and must adhere to the Public Works Minimum Wage Act.
- Ninety days after project completion please go into the PWAA system and close the project. Only Contracting Agencies are allowed to close the project. Agents or Contractors are not allowed to close projects.

General Contractor

- Provide a complete Subcontractor List and Statements of Intent (SOI) to Pay Prevailing Wages for all Contractors, regardless of amount of work, to the Contracting Agency within 3 (three) days of award.
- Ensure that all Subcontractors wishing to bid on a Public Works project have an active Contractor Registration with the Public Works and Apprenticeship Application (PWAA) website: http://www.dws.state.nm.us/pwaa prior to bidding when their bid will exceed $60,000.
- Submit weekly certified payroll bi-weekly to the Contracting Agency.
- Make certain the Public Works Apprentice and Training Act contributions are paid either to an approved Apprenticeship Program or to the Public Works Apprentice and Training Fund.
- Confirm the Wage Rate poster, provided in PWAA, is displayed at the job site in an easily accessible place.
- Make sure, when a project has been completed, the Affidavits of Wages Paid (AWP) are sent to the Contracting Agency.

- All Subcontractors and tiers (excluding professional services) regardless of contract amount must be listed on the Subcontractor List and must adhere to the Public Works Minimum Wage Act.

Subcontractor

- Ensure that all Subcontractors wishing to bid on a Public Works project have an active Contractor Registration with the Public Works and Apprenticeship Application (PWAA) website: http://www.dws.state.nm.us/pwaa prior to bidding when their bid will exceed $60,000.
- Submit weekly certified payroll bi-weekly to the General Contractor(s).
- Make certain the Public Works Apprentice and Training Act contributions are paid either to an approved Apprenticeship Program or to the Public Works Apprentice and Training Fund.
- All Subcontractors and tiers (excluding professional services) regardless of contract amount must be listed on the Subcontractor List and must adhere to the Public Works Minimum Wage Act.

Additional Information

Reference material and forms may be found at New Mexico Department of Workforce Solutions Public Works web pages at: https://www.dws.state.nm.us/Labor-Relations/Labor-Information/Public-Works.

CONTACT INFORMATION

Contact the Labor Relations Division for any questions relating to Public Works projects by email at public.works@state.nm.us or call (505) 841-4400.

SECTION 13 - GENERAL CONDITIONS

TABLE OF CONTENTS

ARTICLE 1 DEFINITIONS AND TERMS

Wherever used in these General Conditions or in the other Contract Documents, the following terms have the meanings indicated which are applicable to both the singular and plural thereof:

AGREEMENT - The written agreement which constitutes a contract between OWNER and CONTRACTOR covering the Work to be performed; other Contract Documents are part of the AGREEMENT

Application for Payment - The form furnished by ENGINEER which is to be used by CONTRACTOR in requesting progress payments and a CONTRACTOR affidavit stating that progress payments theretofore received on account of the Work have been applied by CONTRACTOR to discharge in full all of CONTRACTOR's obligations reflected in prior Applications for Payment

ARCHITECT - The person or firm designated by OWNER, who may or may not be an employee, who is responsible for providing architectural services under this AGREEMENT

Bid - The offer or proposal of the BIDDER submitted on the prescribed form setting forth the prices for the Work to be performed

BIDDER - Any person, firm, or corporation submitting a responsive BID for the Work

Bonds - BID, performance and payment bonds, and other instruments of security furnished by CONTRACTOR or SUBCONTRACTOR and CONTRACTOR's or SUBCONTRACTOR's surety in accordance with the Contract Documents

Change Order - A written order to CONTRACTOR signed by OWNER authorizing an addition, deletion, or revision in the Work or an adjustment in the Contract Price or the Contract Time issued after execution of the AGREEMENT

City Commission - The governing body of the City of Alamogordo

Contract Documents - The written AGREEMENT between the CONTRACTOR and the OWNER setting forth the obligations of the parties there under, including but not limited to the performance of the Work and the Basis of Payment. The Contract Documents include: the Advertisement for Bids, Addenda (whether issued prior to the opening of Bids or the execution of the Agreement), Instructions to BIDDERs, CONTRACTOR's Bid, the Performance Bonds and Labor and Payment Bond (for both CONTRACTOR and SUBCONTRACTOR, if applicable to SUBCONTRACTOR), the Certificate of Insurance, the Statement of BIDDER's Qualifications, the Campaign Contribution Disclosure Form, the Notice of Award, the Notice to Proceed, these General Conditions, the Contract Specifications, any Special Conditions, any referenced Specifications or Standards, Drawings and Plans, and all Modifications to the above, including Change Orders and extensions of Contract Time, all of which constitute one instrument

Contract Price - The total monies payable to CONTRACTOR under the Contract Documents

Contract Time - The time specified in the AGREEMENT for completion of the Project. This time may be defined as a specified fixed date or a given number of calendar days. The Contract

Time may be amended by mutual written Agreement to include authorized time extensions as the performance of the Contract requires.

CONTRACTOR - The person, firm, or corporation with whom OWNER has executed the Agreement

Day - A calendar day of twenty-four (24) hours measured from midnight to the next midnight

DESIGNER - The person or firm designated by OWNER, who may or may not be an employee, who is responsible for providing engineering services

Drawings or Plans - The drawings which show the character and scope of the WORK to be performed and which have been prepared or approved by ENGINEER and are referred to in the Contract Documents

ENGINEER – The City of Alamogordo's City Engineer or authorized representative.

Engineer of Record – Professional Engineer, licensed in the State of New Mexico, that stamps the design (plans). Can be either the City Engineer or a consultant

Field Order - A written order issued by ENGINEER which clarifies or interprets the Contract Documents in accordance with paragraph 9.3 or orders minor changes in the Work in accordance with paragraph 10.2

General Conditions - This document

Modification - (a) A written amendment to the Contract Documents signed by both parties; (b) a Change Order; (c) a written clarification or interpretation issued by ENGINEER in accordance with paragraph 9.3; or (d) a written order for a minor change or alteration in the Work issued by ENGINEER pursuant to paragraph 10.2. A Modification may only be issued after execution of the AGREEMENT

Notice of Award - The written notice by OWNER to the apparent successful BIDDER stating that, upon compliance with the conditions precedent to be fulfilled by CONTRACTOR within the time specified

Notice to Proceed - A written notice given by OWNER to CONTRACTOR fixing the date on which the Contract Time will commence to run and on which CONTRACTOR shall start to perform the obligations set forth in the Contract Documents

OWNER - The City of Alamogordo, New Mexico, a New Mexico municipal corporation. The term "City" may be used interchangeably with the term "OWNER"

Project - The entire construction to be performed as provided in the Contract Documents

Project Manager – The OWNER's representative who is delegated the responsibility for administration of the PROJECT and who is the primary point of contact for the CONTRACTOR

Project Close Out Documents - Project Close Out Documents consist of as-built drawings of the Project; waiver of lien certificates from all Subcontractors, material suppliers, or service

companies involved in the construction of the project; affidavit of release of liens that the lien releases or waivers attached include all parties above and any others who have lien rights; consent of surety for final payment prior to release of final payment; CONTRACTOR's certificate of completion that Project is complete in conformance with the Contract Drawings and specifications; written warranty (one year period) in accordance with Article 13.1 of these General Conditions.

Public Works Inspector - An authorized representative of ENGINEER who is assigned to inspect the technical aspects of the Project or any part thereof

Reference Specifications, Test Methods, and Applicable Codes - All standard specifications and test methods of any society, association, or organization referred to herein are hereby made a part of these Contract Documents the same as if written in full. (Any reference to a paragraph or subparagraph within an article or section shall include all general provisions of the article or section to which reference is made.) References to such standards refer to the latest published issues as of the date of the Invitation to Bid, unless otherwise specified. References to local or state codes and laws shall mean the latest adopted and published codes as of the date of the Invitation to Bid, unless otherwise specified

Service Connections - Service Connections shall be construed to mean all or any portion of the pipe, conduit, cable, or duct which connects a utility main or distribution line to a building, home, residence, or property

Shop Drawings - All drawings, diagrams, illustrations, brochures, schedules, and other data which are prepared by CONTRACTOR, a SUBCONTRACTOR, manufacturer, supplier, or distributor which have been approved by ENGINEER and which illustrate the equipment, material, or some portion of the Work

Special Conditions - Conditions which modify any article or paragraph of these General Conditions

Specifications (also Technical Specifications) - Those portions of the Contract Documents consisting of written technical descriptions of materials, equipment, construction systems, standards and workmanship as applied to the Work

Subcontractor - An individual, firm or corporation having a direct contract with CONTRACTOR or with any other SUBCONTRACTOR for the performance of a part of the WORK

Substantial Completion - Date, as certified by ENGINEER, when construction of the Project or a specified part thereof is sufficiently completed, in accordance with the Contract Documents, so that the Project or a specified part thereof can be utilized for the purposes for which it was intended; or, if there be no such certification, the date when final payment is due in accordance with paragraph 14.13

Utility - Overhead or underground wires, pipes, conduits, ducts, or structures, operated and maintained in or across a public right-of-way or easement or private easement operated and maintained to supply such commodities as water, gas, power, telephone, cable television, or sewer.

A. Public Utility - Owned and operated by a municipality or another political subdivision of the State

B. Private Utility - Owned and operated by a private company or corporation

Work - Any and all obligations, duties, and responsibilities necessary to the successful completion of the Project assigned to or undertaken by CONTRACTOR under the CONTRACT DOCUMENTS, including all labor, materials, equipment, incidentals, and the furnishing and installation thereof

ARTICLE 2 PRELIMINARY MATTERS

Execution of AGREEMENT

2.1. At least two (2) counterparts of the Agreement and such other Contract Documents as are required to be executed will be executed and delivered by CONTRACTOR to OWNER within ten (10) days of the Notice of Award; and OWNER will execute and deliver one counterpart to CONTRACTOR within ten (10) days of receipt of the executed Agreement from CONTRACTOR.

Delivery of Bonds and Insurance

2.2. When CONTRACTOR delivers the executed Agreements to OWNER, CONTRACTOR shall also deliver to OWNER such Bonds and Certificates of Insurance as CONTRACTOR and SUBCONTRACTORS may be required to furnish in accordance with Article 5 of these General Conditions.

Copies of Documents

2.3. OWNER shall furnish to CONTRACTOR one (1) complete set of Contract

CONTRACTOR's Pre-Start Representations

2.4. CONTRACTOR represents that CONTRACTOR is familiar with and assumes full responsibility for becoming familiar with the nature and extent of the Contract Documents, Work and locality; and with all local conditions and federal, state, and local laws, ordinances, rules, and regulations that may in any manner affect performance of the Work. CONTRACTOR represents that CONTRACTOR has correlated CONTRACTOR's study and observations with the requirements of the Contract Documents. CONTRACTOR also represents that CONTRACTOR has studied all surveys and investigation reports of subsurface and latent physical conditions referred to in the Specifications, that CONTRACTOR has made such additional surveys and investigations as CONTRACTOR deems necessary for the performance of the Work at the Contract Price in accordance with the requirements of the Contract Documents, and that CONTRACTOR has correlated the results of all such data with the requirements of the Contract Documents.

Commencement of Contract Time; Notice to Proceed

2.5. The Contract Time will commence to run on the day indicated in a written Notice to Proceed is given, on the day indicated in the Notice to Proceed is issued by the OWNER.

A Notice to Proceed may be given at any time within 30 days after the day on which OWNER delivers the executed Agreement to CONTRACTOR.

Starting the Project

2.6. CONTRACTOR may start to perform the WORK ONLY AFTER RECEIVING A WRITTEN Notice to Proceed.

Before Starting Construction

2.7. Before undertaking each part of the Work, CONTRACTOR shall carefully study and compare the Contract Documents, and check and verify pertinent figures shown thereon, and check and verify all applicable field measurements. CONTRACTOR shall at once report in writing to ENGINEER any conflict, error or discrepancy which CONTRACTOR may discover; however, CONTRACTOR shall not be liable to OWNER for failure to discover any conflict, error, or discrepancy in the Drawings or Specifications.

2.8. The CONTRACTOR, within twenty-one (21) calendar days after being Awarded the Contract unless agreed otherwise by the OWNER, shall prepare and submit for the ENGINEER's approval, a CONTRACTOR's construction schedule for the Work. The schedule shall not exceed time limits current under the Contract Documents, shall be approved by CONTRACTOR's sureties, if any, shall be related to the entire Project to the extent required by the Contract Documents, and shall provide for expeditious and practicable execution of the Work. The construction schedule may be significantly modified only upon prior written agreement of the CONTRACTOR and its sureties, if any, and the ENGINEER. CONTRACTOR shall conform to the most recently approved schedules and shall not be entitled to an extension of the Contract Time or an increase in the Contract Price for the time required to obtain any Surety's approval.

2.9. Before starting the Work at the site, CONTRACTOR shall furnish OWNER certificates of insurance as required by Article 5 of these General Conditions. Within twenty (20) days after delivery of the executed Agreement by OWNER to CONTRACTOR, but before starting the Work at the site, a conference will be held to review the above schedules; to establish procedures for the handling of Shop Drawings and other submissions and the processing of Applications for Payment; and to establish a working understanding between the parties as to the Project. The conference will be attended by the OWNER, ENGINEER, and CONTRACTOR.

ARTICLE 3 CORRELATION, INTERPRETATION, AND INTENT OF CONTRACT DOCUMENTS

3.1. The parties intend that the Specifications and Drawings describe a complete Project to be constructed in accordance with the Contract Documents. The Contract Documents comprise the entire Agreement between OWNER and CONTRACTOR. They may be altered only by a Contract Modification.

3.2. The Contract Documents are complementary; what is called for by one is as binding as if called for by all. If CONTRACTOR finds a conflict, error, or discrepancy in the Contract Documents, CONTRACTOR shall call it to ENGINEER's attention in writing at once and before proceeding with the Work affected thereby; however, CONTRACTOR shall not be liable to OWNER for failure to discover any conflict, error, or discrepancy in the Specifications or

Drawings. In resolving such conflicts, errors, and discrepancies, the documents shall be given precedence in the following order: Agreement, Contract Modification(s), Addenda, Instructions to BIDDERs, General Conditions, Specifications, and Drawings. Figure dimensions on Drawings shall govern over scale dimensions, and Detailed Drawings shall govern over General Drawings. Any Work that may reasonably be inferred from the Contract Documents as being required to produce the intended result shall be supplied whether or not it is specifically called for. Work, materials or equipment described in words which so applied have a well-known technical or trade meaning shall be deemed to refer to such recognized standards.

Reference to Standard Specifications, manuals or codes of any technical society, organization or association, or to the laws or regulations of any governmental authority, whether such reference be specific or by implication, shall mean the most current Standard Specification, manual, code or laws or regulations in effect at the time of opening of Bids (or, on the Effective Date of the Agreement if there were no Bids), except as may be otherwise specifically stated.

ARTICLE 4 AVAILABILITY OF LANDS; PHYSICAL CONDITIONS; REFERENCE POINTS

Availability of Lands

4.1. OWNER shall furnish, as indicated in the Contract Documents and not later than the date when needed by CONTRACTOR, the lands upon which the Work is to be done, rights-of-way for access thereto, and any other lands designated for use by CONTRACTOR. Easements for permanent structures or permanent changes in existing facilities will be obtained and paid for by OWNER unless otherwise specified in the Contract Documents. If CONTRACTOR believes that any delay in OWNER furnishing these lands or easements entitles CONTRACTOR to an extension of the Contract Time, CONTRACTOR may make a claim therefor as provided in Article 12 of these General Conditions. CONTRACTOR shall provide for any additional lands and access that may be required for temporary construction facilities or storage of materials and equipment at their expense.

Physical Conditions-Surveys and Reports

4.2 The OWNER will, upon request, furnish to the CONTRACTOR copies of all relevant boundary surveys and other pertinent reports and material which are readily available in OWNER's office. OWNER has not made tests of subsurface conditions and makes no warranties or statements to CONTRACTOR as to the presence or absence of difficult excavation conditions.

Unforeseen Physical Conditions

4.3. CONTRACTOR shall promptly notify ENGINEER in writing of any subsurface or latent physical conditions at the site differing materially from those indicated in the Contract Documents.

ENGINEER will promptly investigate those conditions and determine if further surveys or subsurface tests are necessary. ENGINEER shall obtain any necessary additional surveys and tests and furnish copies to CONTRACTOR. If appropriate, a Change Order shall be issued incorporating the necessary revisions.

The CONTRACTOR is responsible for locating and protecting underground and aerial utilities and constructions.

Reference Points

4.4. ENGINEER shall provide engineering surveys for construction to establish reference points which, in OWNER's judgment, are necessary to enable CONTRACTOR to proceed with the Work. CONTRACTOR shall be responsible for surveying and laying out the Work (unless otherwise agreed) and shall protect and preserve the established reference points. CONTRACTOR shall make no changes or relocations without the prior written approval of OWNER. CONTRACTOR shall report to OWNER whenever any reference point is lost or destroyed or requires relocation because of necessary changes in grades or locations, and shall be responsible for the accurate replacement or relocation of such reference points by professionally qualified personnel.

Physical Conditions - Underground Facilities

4.5. Shown or Indicated: The information and data shown or indicated in the Contract Documents with respect to existing Underground Facilities are based on information and data furnished to OWNER by the owners of such Underground Facilities or by others. Unless it is otherwise expressly agreed:

4.5.1. OWNER shall not be responsible for the accuracy or completeness of any such information or data; and,

4.5.2. CONTRACTOR shall have full responsibility for reviewing and checking all such information and data, for locating all Underground Facilities shown or indicated in the Contract Documents, for coordination of the Work with the owners of such Underground Facilities during construction, for the safety and protection thereof, for repairing any damage thereto resulting from the Work, and for the cost; all of which will be considered as having been included in the Contract Price.

4.6. Not Shown or Indicated: If an Underground Facility is uncovered or revealed which was not shown or indicated in the Contract Documents and of which CONTRACTOR could not reasonably have been expected to be aware, CONTRACTOR shall promptly identify the owner of such Underground Facility and give written notice thereof to OWNER. OWNER will promptly review the Underground Facility to determine the extent to which the Contract Documents should be modified to reflect the new condition, and the Contract Documents will be amended or supplemented to the extent necessary. During the interim, CONTRACTOR shall be responsible for the safety and protection of such Underground Facility. If the parties are unable to agree as to the amount or length of the appropriate adjustment, CONTRACTOR may make a claim therefor as provided in this Agreement.

ARTICLE 5 BONDS AND INSURANCE

Performance, Payment, and Other Bonds

5.1. CONTRACTOR and CONTRACTOR’s SUBCONTRACTORS [if Subcontractors’ contract for work to be performed on the Project is one hundred twenty-five thousand dollars ($125,000) or more] shall furnish performance and payment Bonds as security for the faithful performance

of this Contract and for payment of all the CONTRACTOR's and CONTRACTOR's SUBCONTRACTORS' obligations under the Contract Documents. These Bonds shall be in amounts at least equal to the Contract Price and shall be in a form acceptable to OWNER and issued by sureties which are licensed to conduct business in the State of New Mexico and which are named in the current list of "Surety Companies Acceptable on Federal Bonds" as published in the Federal Register by the Audit Staff Bureau of Accounts, U. S. Treasury Department. The Performance Bond shall include coverage for the Guarantee Period. Notwithstanding the obligation of any other party, person or entity to notify CONTRACTOR's and CONTRACTOR's Subcontractors' sureties, CONTRACTOR and CONTRACTOR's Subcontractors shall give immediate written notice to its sureties of any change in the Contract Sum, Contract Time, Scope of Work or any other event for which failure to give said sureties notice would operate to discharge a surety's liability. The Surety on the performance bond shall furnish a waiver by which it consents to progress or partial payments to the CONTRACTOR in accordance with this Contract. Surety shall further agree that such payment shall not preclude or stop the OWNER from showing the true character and quantity of the materials furnished or from recovering from the CONTRACTOR or Subcontractor or CONTRACTOR'S or Subcontractors' sureties such damages as the OWNER may sustain by reason of any deficiency in quantity of the materials with respect to which a progress payment was made.

If the surety on any Bond furnished by CONTRACTOR or SUNCONTRACTOR is declared bankrupt or becomes insolvent, or if its right to do business is terminated in any state where any part of the Project is located, CONTRACTOR or SUBCONTRACTOR shall within five days thereafter substitute another Bond and surety, both of which shall be acceptable to OWNER.

Insurance Requirements

5.2. Until final acceptance by the OWNER of the Work, the CONTRACTOR shall procure and maintain at CONTRACTOR's own expense insurance of the kinds and in the amounts herein provided. This insurance shall be provided by insurance companies authorized to do business in New Mexico and shall cover all operations under the Contract, whether performed by the CONTRACTOR, CONTRACTOR's agents or employees or by Subcontractors. All insurance provided shall remain in full force and effect for the entire period of the Work, up to and including final acceptance, and the removal of all equipment and employees, agents and SUBCONTRACTORS there from.

I. Public Liability and Automobile Liability Insurance

A. General Liability: Bodily Injury Liability and Property Damage Liability insurance applicable in full to the subject project shall be provided in the following minimum amounts:

Bodily Injury Liability:
$500,000 each occurrence
$1,000,000 aggregate

Property Damage Liability:
$500,000 each occurrence
$1,000,000 aggregate

1. The policy to provide this insurance is to be written on a Comprehensive General Liability form which must include the following:

a. Coverage for liability arising out of the operation of independent Contractors.

b. Completed Operations Coverage.

c. Attachment of the Broad Form Comprehensive General Liability Endorsement.

2. In the event that any use of explosives is a required part of the Contract, the CONTRACTOR's insurance must include coverage for injury to or destruction of property arising out of blasting or explosion.

3. In the event that any form of work next to an existing building or structure is a required part of the Contract, the CONTRACTOR's insurance must include coverage for injury to or destruction of property arising out of:

The collapse of or structural injury to any building or structure due to excavation, including borrowing, filling or backfilling in connection therewith, or to tunneling, cofferdam work or caisson work or to moving, shoring, underpinning, raising or demolition of any building or structure or removal or rebuilding of any structural support thereof.

4. Coverage must be included for injury to or destruction of any property arising out of injury to or destruction of wires, conduits, pipes, mains, sewers or other similar property or any apparatus in connection therewith below the surface of the ground, if such injury or destruction is caused by or occurs during the use of mechanical equipment for the purpose of excavating, digging or drilling, or to injury to or destruction of property at any time resulting there from.

A. Automobile Liability Insurance coverage for the CONTRACTOR (whether included in the policy providing General Liability insurance or in a separate policy) must provide liability for the ownership, operation and maintenance of owned, non-owned and hired cars. The limits of liability for Automobile Liability insurance shall be provided in the following amounts:

Bodily Injury Liability:
$500,000 each person
$1,000,000 each occurrence

Property Damage Liability:
$1,000,000 each occurrence

II. Workers' Compensation Insurance

The CONTRACTOR shall also carry Workers' Compensation Insurance or otherwise fully comply with the provisions of the New Mexico Workmen's Compensation Act and Occupational Disease Disablement Law.

III. Owners' Protective Liability Insurance

The CONTRACTOR shall purchase Standard Form Owners' Protective Liability insurance naming the OWNER as the name insured, with limits of liability applicable in full to the subject project as follows:

Bodily Injury Liability:
$500,000 each occurrence

Property Damage Liability:
$100,000 each occurrence

Property Damage and Bodily Injury Combined:
$1,000,000 aggregate

IV. Certificate of Insurance

The CONTRACTOR being Awarded the Contract shall furnish evidence of CONTRACTOR's insurance coverage by a Certificate of Insurance executed on a form acceptable to the OWNER, to be made a part of the Contract and included with the Contract Documents prior to signing the Contract. Such certificate shall indicate compliance with these specifications and shall certify that the coverage shall not be changed, canceled or allowed to lapse without giving the OWNER thirty (30) days written notice. Also, a Certificate of Insurance shall be furnished to the OWNER on renewal of a policy or policies as necessary during the terms of the Contract. The OWNER shall not issue a Notice to Proceed until such time as the above requirements have been met.

V. Umbrella Coverage

The insurance limits cited in the above paragraphs are minimum limits. This specification is in no way intended to define what constitutes adequate insurance coverage for the individual CONTRACTOR. The OWNER will recognize excess coverage (Umbrella) as meeting the requirements of Subsection I of this Section should such insurance otherwise meet all the requirements of such Subsection.

VI. Optimal Insurance

The CONTRACTOR shall procure and maintain, when required by the OWNER, forms and types of Bailee insurance such as, but not limited to, Builder's Risk Insurance, which should include, but is not limited to, theft, vandalism, weather conditions and acts of God, CONTRACTOR's Equipment Insurance, Rigger's Liability Property Insurance, etc. in amounts necessary to protect the OWNER against claims, losses and expenses arising from the damage, disappearance or destruction of property of others in the care, custody or control of the CONTRACTOR, including property of others being installed, erected or worked upon by the CONTRACTOR, CONTRACTOR's agents or Subcontractors.

VII. Railroad Insurance

In the event that railroad property is affected by the subject Contract, the CONTRACTOR is advised that, in addition to the above requirements, CONTRACTOR shall be required to furnish a Railroad Protective Liability policy in the name of the railroad company involved. In addition, on those rails that are used by the National Railroad Passenger Corporation (NRPC), the CONTRACTOR will also obtain a Railroad Protective Liability policy in the name of NRPC.

The limits of liability for the Railroad Protective Liability policy (or policies) must be negotiated with the railroad company on a hazard and risk basis. In no event will the limits exceed the following:

Bodily Injury Liability, Property Damage Liability:
$2,000,000 each occurrence

Liability and Physical Damage to Property:
$6,000,000 aggregate

The limits of liability stated above apply to the coverage as set forth in the Railroad Protective Liability Endorsement Form, subject to the terms, conditions and exclusions found in the Form.

The policy must afford coverage as provided for in the standard Railroad Protective Liability Endorsement (AASHTO Form).

Additional Bonds and Insurance

5.3. Prior to delivery of the executed Agreement by OWNER to CONTRACTOR, OWNER may require CONTRACTOR to furnish such other Bonds and such additional insurance, in such form and with such sureties or insurers, as OWNER may require. If such other Bonds or such other insurance are specified by written instructions given prior to opening of Bids, the premiums shall be paid by CONTRACTOR; if subsequent thereto, they shall be paid by OWNER (except as otherwise provided in paragraphs 6.7 and 6.7.1).

ARTICLE 6 CONTRACTOR'S RESPONSIBILITIES

Registration

6.1 CONTRACTOR must be registered with the Industrial Division of the Department of Labor.

Supervision and Superintendence

6.2. CONTRACTOR shall supervise and direct the Work efficiently and with CONTRACTOR’s best skill and attention. CONTRACTOR shall be solely responsible for the means, methods, techniques, sequences, and procedures of construction; but shall not be solely responsible for the negligence of others in the design or selection of a specific mean, method, technique, sequence, or procedure of construction which is indicated in and required by the Contract Documents. CONTRACTOR shall be responsible to see that the finished Work complies accurately with the Contract Documents.

6.3. CONTRACTOR shall keep on the Work at all times during its progress a competent resident Superintendent, who shall not be replaced without written notice to ENGINEER (written notice only, NOT consent) except under extraordinary circumstances. The Superintendent will be CONTRACTOR's representative at the site and shall have authority to act on behalf of CONTRACTOR. All communications given to the Superintendent shall be as binding as if given to CONTRACTOR.

Labor, Materials, and Equipment

6.4. CONTRACTOR shall provide competent, suitably qualified personnel to survey and lay out the Work and perform construction as required by the Contract Documents. CONTRACTOR shall at all times maintain good discipline and order at the site.

6.5. CONTRACTOR shall furnish all materials, equipment, labor, transportation, construction equipment and machinery, tools, appliances, fuel, power, light, heat, telephone, water and sanitary facilities, and all other facilities and incidentals necessary for the execution, testing, initial operation, and completion of the Work.

6.6. All materials and equipment shall be new, except as otherwise provided in the Contract Documents. If required by ENGINEER, CONTRACTOR shall furnish satisfactory evidence as to the kind and quality of materials and equipment.

6.7. All materials and equipment shall be applied, installed, connected, erected, used, cleaned, and conditioned in accordance with the instructions of the applicable manufacturer, fabricator, or processors, except as otherwise provided in the Contract Documents or directed by the ENGINEER.

6.7.1. CONTRACTOR shall assign to OWNER all express and implied warranties and Contract rights for materials and equipment installed in the Project and for which OWNER has paid CONTRACTOR.

Substitute Materials or Equipment

6.8. If the Specifications, laws, ordinances, or applicable rules or regulations permit CONTRACTOR to furnish or use a substitute that is equal to any material or equipment specified, and if CONTRACTOR wishes to furnish or use a proposed substitute, CONTRACTOR shall, prior to the conference called for by paragraph 2.9, make written application to ENGINEER for approval of such a substitute, certifying in writing that the proposed substitute will perform adequately the functions called for by the general design, be similar and of equal substance to that specified, and be suited to the same use and capable of performing the same function as that specified; stating whether or not its incorporation in or use in connection with the Project is subject to the payment of any license fee or royalty; and identifying all variations of the proposed substitute from that specified and indicating available maintenance service. No substitute shall be ordered or installed without the written approval of ENGINEER, who will be the judge of equality and who may require CONTRACTOR to furnish such other data about the proposed substitute as ENGINEER considers pertinent. No substitute shall be ordered or installed without such performance guarantee and bonds as OWNER may require which shall be furnished at CONTRACTOR's expense.

Concerning Subcontractors

6.9. CONTRACTOR shall not employ any Subcontractor or other person or organization (including those who are to furnish the principal items of materials or equipment), whether initially or as a substitute, against whom OWNER or ENGINEER may have reasonable objection. A Subcontractor or other person or organization identified in writing to OWNER by CONTRACTOR prior to the Notice of Award and not objected to in writing by OWNER prior to the Notice of Award will be deemed acceptable to OWNER. Acceptance of any Subcontractor, other person, or organization by OWNER or ENGINEER shall not constitute a waiver of any right of OWNER to reject defective Work or Work not in conformance with the Contract Documents.

If OWNER, after due investigation, has reasonable objection to any Subcontractor, other person, or organization proposed by CONTRACTOR after the Notice of Award, CONTRACTOR shall submit an acceptable substitute and the Contract Price shall be increased or decreased by the difference in cost occasioned by such substitution and an appropriate Change Order shall be issued. CONTRACTOR shall not be required to employ any Subcontractor, other person, or organization against whom CONTRACTOR has reasonable objection. CONTRACTOR shall not, without the consent of OWNER, make any substitution for any Subcontractor, other person, or organization who has been accepted by OWNER unless OWNER determines that there is good cause for doing so.

6.10. CONTRACTOR shall be fully responsible for all acts and omissions of CONTRACTOR's Subcontractors and of persons and organizations directly or indirectly employed by them and of persons and organizations for whose acts any of them may be liable to the same extent that CONTRACTOR is responsible for the acts and omissions of persons directly employed by CONTRACTOR. Nothing in the Contract Documents shall create any contractual relationship between OWNER and any Subcontractor or other person or organization having a direct contract with CONTRACTOR, nor shall it create any obligation on the part of OWNER to pay or to see to the payment of any monies due any Subcontractor or other person or organization, except as may otherwise be required by law. OWNER may furnish to any Subcontractor or other person or organization, to the extent practicable, evidence of amounts paid to CONTRACTOR on account of specific Work done in accordance with the schedule of values.

6.11. The sections of the Specifications and the identifications of any Drawings shall not control CONTRACTOR in dividing the Work among Subcontractors or delineating the Work to be performed by any specific trade. All work shall be performed by persons licensed to perform such work by New Mexico Construction Industries Division.

6.12. CONTRACTOR agrees to bind specifically every Subcontractor to the applicable terms and conditions of the Contract Documents for the benefit of OWNER.

Patent Fees and Royalties

6.13. CONTRACTOR shall pay all license fees and royalties and assume all costs incident to the use in the performance of the Work of any invention, design, process, product, or device which is the subject of patent rights or copyrights held by others. If a particular invention, design, process, product, or device is specified in the Contract Documents for use in the performance of the Work and if, to the actual knowledge of OWNER, its use is subject to patent rights or copyrights calling for the payment of any license fee or royalty to others, the existence

of such rights shall be disclosed by OWNER in the Contract Documents. CONTRACTOR shall indemnify and hold harmless OWNER and anyone directly or indirectly employed by either of them from and against all claims, damages, losses, and expenses, including attorneys' fees, arising out of any infringement of patent rights or copyrights incident to the use in the performance of the Work or resulting from the incorporation in the Work of any invention, design, process, product, or device not specified in the Contract Documents and shall defend all such claims in connection with any alleged infringement of such rights.

Permits

6.14. CONTRACTOR shall obtain and pay for all construction permits and licenses and shall pay all governmental charges and inspection fees necessary for the prosecution of the Work, which are applicable at the time of CONTRACTOR's Bid. OWNER shall assist CONTRACTOR, when necessary, in obtaining such permits and licenses. CONTRACTOR shall also pay all public utility charges.

Laws and Regulations

6.15. CONTRACTOR shall give all notices and comply with all laws, ordinances, rules, and regulations applicable to the Work. If CONTRACTOR observes that the Specifications or Drawings are at variance therewith, CONTRACTOR shall give ENGINEER prompt written notice thereof; and any necessary changes shall be adjusted by an appropriate Modification. If CONTRACTOR performs any Work knowing it to be contrary to such laws, ordinances, rules, and regulations and without such notice to ENGINEER, CONTRACTOR shall bear all costs arising there-from; however, it shall not be CONTRACTOR's primary responsibility to make certain that the Specifications and Drawings are in accordance with such laws, ordinances, rules, and regulations.

Taxes

6.16. CONTRACTOR shall pay all New Mexico gross receipts, sales, consumer, use, and other similar taxes required to be paid by CONTRACTOR in accordance with the law of the place where the Work is to be performed.

Use of Premises

6.17. CONTRACTOR shall confine CONTRACTOR's equipment, the storage of materials and equipment, and the operations of CONTRACTOR's workmen to areas permitted by law, ordinances, permits, or the requirements of the Contract Documents and shall not unreasonably encumber the premises with materials or equipment.

6.18. CONTRACTOR shall not load nor permit any part of any structure to be loaded with weights that will endanger the structure, nor shall CONTRACTOR subject any part of the Work to stresses or pressures that will endanger it.

Record Drawings

6.19. CONTRACTOR shall keep one record copy of all Specifications, Drawings, Addenda, Modifications and Shop Drawings at the site in good order and currently annotated to show all

changes made during the construction process. These shall be available to ENGINEER and shall be delivered in good condition to OWNER upon completion of the Project.

Safety and Protection

6.20. CONTRACTOR shall be responsible for initiating, maintaining and supervising all safety precautions and programs in connection with the Work. CONTRACTOR shall take all necessary precautions for the safety of and shall provide the necessary protection to prevent damage, injury, or loss to:

6.20.1. All employees on the Work and other persons who may be affected thereby;

6.20.2. All the Work and materials or equipment to be incorporated therein, whether in storage on or off the site; and

6.20.3. Other property at the site or adjacent thereto, including trees, shrubs, lawns, walks, pavements, roadways, structures and utilities not designated for removal, relocation, or replacement in the course of construction.

6.20.4. All personal property that may be affected by the work.

The CONTRACTOR shall conduct construction operations in a manner which will minimize interference with the normal use of property adjacent to the construction Work and shall give owners of such property at least twenty-four (24) hours notice of the commencement of Work in the area abutting their property. CONTRACTOR shall comply with all applicable laws, ordinances, rules, regulations and orders of any public body having jurisdiction for the safety of persons or property or to protect them from damage, injury, or loss. CONTRACTOR shall erect and maintain, as required by the conditions and progress of the Work, all necessary safeguards for its safety and protection. CONTRACTOR shall notify owners of adjacent utilities at least forty-eight (48) hours in advance when prosecution of the Work may affect them. All damage, injury, or loss to any property referred to in subparagraphs 18.4.1 and 18.4.2 caused, directly or indirectly, in whole or in part, by CONTRACTOR, any Subcontractor, or anyone directly or indirectly employed by any of them or anyone for whose acts any of them may be liable, shall be remedied by CONTRACTOR, except for damage or loss attributable to the fault of Drawings or Specifications or to the acts or omissions of DESIGNER or anyone employed by OWNER or anyone for whose acts OWNER may be liable, and not attributable, directly or indirectly, in whole or in part, to the fault or negligence of CONTRACTOR. CONTRACTOR's duties and responsibilities for the safety and protection of the Work shall continue until such time as all the work is completed and ENGINEER has issued a notice to OWNER and CONTRACTOR in accordance with paragraph 14.13 that Work is acceptable.

6.21. CONTRACTOR shall designate a responsible member of CONTRACTOR’s organization at the site whose duty shall be the prevention of accidents. This person shall be CONTRACTOR's superintendent, unless otherwise designated in writing by CONTRACTOR to OWNER.

Emergencies

6.22. In emergencies affecting the safety of persons or the Work or property at the site or adjacent thereto, CONTRACTOR, without special instruction or authorization from ENGINEER

or OWNER, is obligated to act, on self discretion, to prevent threatened damage, injury, or loss. CONTRACTOR shall give ENGINEER prompt written notice of any significant changes in the Work or deviations from the Contract Documents caused thereby; and a Change Order shall thereupon be issued covering the changes and deviations involved. If CONTRACTOR believes that additional work done in an emergency which arose from causes beyond CONTRACTOR's control entitles an increase in the Contract Price or an extension of the Contract Time, CONTRACTOR may make a claim as provided in Articles 11 and 12 of these General Conditions.

Shop Drawings and Samples

6.23. After checking and verifying all field measurements, CONTRACTOR shall submit to ENGINEER for approval, in accordance with the accepted schedule of Shop Drawing submissions (see paragraph 2.9), three copies (or, at ENGINEER's option, one reproducible copy) of all Shop Drawings which shall have been checked by and stamped with the approval of CONTRACTOR and identified as ENGINEER may require. The data shown on the Shop Drawings will be complete with respect to dimensions, design criteria, materials of construction, and the like to enable ENGINEER to review the information as required.

6.24. CONTRACTOR shall also submit to ENGINEER for approval, with such promptness as to cause no delay in Work, all samples required by the Contract Documents. All samples will have been checked by and stamped with the approval of CONTRACTOR, identified clearly as to material, manufacturer, and pertinent catalog numbers and the use for which intended.

6.25. At the time of each submission, CONTRACTOR shall in writing call ENGINEER's attention to any deviations that the Shop Drawings or sample may have from the requirements of the Contract Documents.

6.26. ENGINEER will review and approve with reasonable promptness Shop Drawings and samples, but ENGINEER's review and approval shall be only for conformance with the design concept of the Project and for compliance with the information given in the Contract Documents. The approval of a separate item as such will not indicate approval of the assembly in which the item functions. CONTRACTOR shall make any corrections required by ENGINEER and shall return the required number of corrected copies of Shop Drawings and resubmit new samples until approved. CONTRACTOR shall direct specific attention in writing or on resubmitted Shop Drawings to revisions other than the corrections called for by ENGINEER on previous submissions. CONTRACTOR's stamp of approval on any Shop Drawing or sample shall constitute a representation to ENGINEER that CONTRACTOR has either determined and verified all quantities, dimensions, field construction criteria, materials, catalog numbers, and similar data or assumes full responsibility for doing so and that CONTRACTOR has reviewed or coordinated each Shop Drawing or sample with the requirements of the Work and the Contract Documents.

6.27. Where a Shop Drawing or sample submission is required by the Specifications, no related Work shall be commenced until the submission has been approved by ENGINEER. A copy of each approved Shop Drawing and each approved sample shall be kept in good order by CONTRACTOR at the site and shall be available to ENGINEER.

6.28. ENGINEER's approval of Shop Drawings or samples shall not relieve CONTRACTOR from CONTRACTOR's responsibility for any deviations from the requirements of the Contract

Documents unless CONTRACTOR has in writing called ENGINEER's attention to such deviation at the time of submission and ENGINEER has given written approval to the specific deviation, nor shall any approval by ENGINEER relieve CONTRACTOR from responsibility for errors or omissions in the Shop Drawings.

Cleanup

6.29. CONTRACTOR shall keep the premises free from accumulations of waste materials, rubbish, and other debris resulting from the Work; and at the completion of the Work, CONTRACTOR shall remove all waste materials, rubbish, and debris from and about the premises, as well as all tools, construction equipment and machinery, and surplus materials and shall leave the site clean and ready for occupancy by OWNER. CONTRACTOR shall restore to their original condition those portions of the site not designated for alteration by the Contract Documents.

Indemnification

6.30. CONTRACTOR shall indemnify and hold harmless OWNER and its agents and employees from and against all claims, damages, losses, and expenses including attorneys' fees arising out of or resulting from the performance of the Work by the CONTRACTOR, provided that any such claim, damage, loss, or expense (a) is attributable to bodily injury, sickness, disease, or death or to injury to or destruction of tangible property (other than the Work itself) including the loss of use resulting there from and (b) is caused in whole or in part by any negligent act or omission of CONTRACTOR, any Subcontractor, anyone directly or indirectly employed by any of them or anyone for whose acts any of them may be liable, regardless of whether or not it is caused in part by a party indemnified hereunder.

6.31. In any and all claims against OWNER or any of its agents or employees by any employees of CONTRACTOR, any Subcontractor, anyone directly or indirectly employed by any of them or anyone for whose acts any of them may be liable, the indemnification obligation under this Agreement shall not be limited in any way by any limitation on the amount or type of damages, compensation, or benefits payable by or for CONTRACTOR or any Subcontractor under workmen's compensation acts, disability benefit acts, or other employee benefit acts.

6.32. The obligations of CONTRACTOR under this Agreement shall not extend to the liability of OWNER, OWNER’s agents, or employees arising out of (a) the preparation or approval of maps, drawings, opinions, reports, surveys, Change Orders, designs, or Specifications or (b) the giving of or the failure to give directions or instructions by OWNER, OWNER’s agents, or employees provided such giving or failure to give is the primary cause of injury or damage.

Notice to Surety

6.33. In all cases involving changes in the Work, the CONTRACTOR shall be obligated to promptly notify its Sureties, if any, of any change in Contract Price, scope of the Work or Contract Time which might operate to discharge the Sureties if notice were not provided. No obligation to notify a Surety or actual notice to a Surety by any other person or party shall operate to relieve CONTRACTOR of its obligation to notify a Surety.

Documents, Records and Correspondence

6.34. The CONTRACTOR shall maintain the following documents and records and, upon request by the OWNER, shall promptly make the records or legible copies thereof available to OWNER: Bid estimates, site observation reports, material and equipment invoices, payment records, payroll records, approved shop drawings, job meeting minutes, daily reports, logs and diaries, and photographs pertaining to the Work. The CONTRACTOR shall furnish copies of all correspondence pertaining to the Work to the OWNER upon request.

ARTICLE 7 WORK BY OTHERS

7.1. OWNER may itself perform additional Work related to the Project or it may let other direct contracts therefore which shall contain General Conditions similar to these. CONTRACTOR shall afford the other contractors who are parties to such direct contracts (or OWNER, if performing the additional work directly) reasonable opportunity for the introduction and storage of materials and equipment and for the execution of work and shall properly connect and coordinate CONTRACTOR's Work with theirs.

7.2. If any part of CONTRACTOR's Work depends for proper execution or results upon the work of any such other contractor (or OWNER), CONTRACTOR shall inspect and promptly report to ENGINEER in writing any defects or deficiencies in such work that render it unsuitable for such proper execution and results. CONTRACTOR's failure to report shall constitute an acceptance of the work as fit and proper for the relationship of CONTRACTOR's Work except as to defects and deficiencies which may appear in the other work after the execution of CONTRACTOR's Work.

7.3. CONTRACTOR shall do all cutting, fitting and patching of the Work that may be required to make its several parts come together properly and fit it to receive or be received by such other work. CONTRACTOR shall not endanger any work of others by cutting, excavating or otherwise altering their work and will only cut or alter their work with the written consent of OWNER and of the other contractors whose work will be affected.

7.4. If the performance of additional work by other contractors or OWNER is not noted in the Contract Documents prior to the execution of the Contract, written notice thereof shall be given to CONTRACTOR prior to starting any such additional work. If CONTRACTOR believes that the performance of such additional work by OWNER or others involves additional expense or warrants an extension of the Contract Time, CONTRACTOR may make a claim therefor as provided in Articles 11 and 12 of these General Conditions.

7.5. Work by the CONTRACTOR and work by others shall be coordinated and expedited by the OWNER to prevent time delays and additional cost to the CONTRACTOR. Any extension of time and/or additional costs caused by other contractors may be claimed as provided in Articles 11 and 12 of these General Conditions.

ARTICLE 8 OWNER'S RESPONSIBILITIES

8.1. OWNER shall issue all official communications to CONTRACTOR through ENGINEER, in writing.

8.2. In case of termination of the employment of ENGINEER, OWNER shall appoint an engineer whose status under the Contract Documents shall be that of the former ENGINEER.

8.3. OWNER shall furnish the data required of OWNER under the Contract Documents promptly and shall make payments to CONTRACTOR promptly after they are due as provided in paragraphs 14.4 and 14.13.

8.4. OWNER's duties in respect of providing lands and easements and providing engineering surveys to establish reference points are set forth in paragraphs 4.1 and 4.4.

8.5. In connection with OWNER's rights to request changes in the Work in accordance with Article 10 of these General Conditions, OWNER (especially in certain instances as provided in paragraph 10.4) is obligated to execute Change Orders.

8.6. OWNER's responsibility in respect of certain inspections, tests and approvals is set forth in paragraph 13.2.

8.7. In connection with OWNER's right to stop Work or suspend Work, see paragraphs 13.11 and 15.1. Paragraph 15.2 deals with OWNER's right to terminate services of CONTRACTOR.

ARTICLE 9 ENGINEER'S STATUS DURING CONSTRUCTION

OWNER's Representative

9.1. ENGINEER will be OWNER's representative during the construction period. For the purpose of inspecting and approving the WORK.

Visits to Site

9.2. ENGINEER will make visits to the site at intervals appropriate to the various stages of construction to observe the progress and quality of the executed Work and to determine, in general, if the Work is proceeding in accordance with the Contract Documents. ENGINEER will not be required to make exhaustive or continuous on-site inspections to check the quality or quantity of the Work. ENGINEER shall exercise reasonable skill and diligence to ensure that the completed Work will conform to the Contract Documents.

Clarifications and Interpretations

9.3. ENGINEER will issue with reasonable promptness such written clarifications or interpretations of the Contract Documents (in the form of Drawings or otherwise) as ENGINEER may determine necessary, which shall be consistent with or reasonably inferable from the overall intent of the Contract Documents. If CONTRACTOR believes that a written clarification or interpretation justifies an increase in the Contract Price or Contract Time, CONTRACTOR may make a claim therefor as provided in Article 11 or Article 12 of these General Conditions.

Rejecting Defective Work

9.4. ENGINEER will have authority to disapprove or reject Work which is defective and will also have authority to require special inspection or testing of the Work as provided in paragraph 13.7, whether or not the Work is fabricated, installed or completed.

Shop Drawings, Change Orders and Payments

9.5. In connection with ENGINEER's responsibility for Shop Drawings and samples, see paragraphs 6.23 through 6.28 inclusive.

9.6. In connection with ENGINEER's responsibilities as to Change Orders, see Articles 10, 11 and 12 of these General Conditions.

9.7. In connection with ENGINEER's responsibilities in respect of Applications for Payment, etc., see Article 14 of these General Conditions.

Project Representation

9.8. The ENGINEER may designate a Project Representative to assist ENGINEER in observing the performance of the Work. The duties, responsibilities and limitations of authority of any such Project Representative and assistants will be as delegated by the ENGINEER.

Decisions on Disagreements

9.9. ENGINEER will be the initial interpreter of the requirements of the Contract Documents and judge of the acceptability of the Work there-under. Claims, disputes and other matters relating to the acceptability of the Work or the interpretation of the requirements of the Contract Documents pertaining to the execution and progress of the Work shall be referred initially to ENGINEER in writing with a request for a formal decision in accordance with this paragraph, which ENGINEER will render in writing within a reasonable time, unless ENGINEER advises CONTRACTOR that additional time is needed in which to ascertain more accurate data.

9.10. The rendering of a decision by ENGINEER pursuant to paragraph 9.9 with respect to any claim, dispute or other matter will be a condition precedent to any exercise by OWNER or CONTRACTOR of such rights or remedies as either may otherwise have under the Contract Documents or at law in respect of that claim, dispute or other matter.

Limitations on ENGINEER's Responsibilities

9.11. Neither ENGINEER's authority to act under this Article 9 or elsewhere in the Contract Documents nor any decision made by ENGINEER in good faith either to exercise or not exercise such authority shall give rise to any duty or responsibility of ENGINEER to CONTRACTOR, any Subcontractor, any manufacturer, fabricator, supplier or distributor, or any of their agents or employees or any other person performing any of the Work.

9.12. Whenever in the Contract Documents the terms "as ordered," "as directed," "as required," "as allowed" or terms of like effect or import are used, or the adjectives "reasonable," "suitable," "acceptable," "proper" or "satisfactory" or adjectives of like effect or import are used, to describe requirement, direction, review or judgment of ENGINEER as to the Work, it is intended that such requirement, direction, review or judgment will be solely to evaluate the Work for compliance with the Contract Documents (unless there is a specific statement indicating otherwise). The use of any such term or adjective never indicates that ENGINEER shall have authority to supervise or direct performance of the Work or authority to undertake responsibility contrary to the provisions of paragraphs 9.13 or 9.14.

9.13. ENGINEER will not be responsible for CONTRACTOR's means, methods, techniques, sequences or procedures of construction, or the safety precautions and programs incident thereto, and ENGINEER will not be responsible for CONTRACTOR's failure to perform the Work in accordance with the Contract Documents.

9.14. ENGINEER will not be responsible for the acts or omissions of CONTRACTOR or of any Subcontractor, or of the agents or employees of any CONTRACTOR or Subcontractor, or of any other persons at the site or otherwise performing any of the Work.

ARTICLE 10 CHANGES IN THE WORK

Change Order

10.1. Without invalidating the Agreement, OWNER may, at any time order additions, deletions or revisions in the Work; these will be authorized by written Change Orders. Upon receipt of a signed Change Order, CONTRACTOR shall proceed with the Work involved. All such Work shall be executed under the applicable conditions of the Contract Documents. If any Change Order causes an increase or decrease in the Contract Price or an extension or shortening of the Contract Time, an equitable adjustment may be made as provided in Article 11 or Article 12 of these General Conditions on the basis of a claim made by either party.

Field Order

10.2. ENGINEER may authorize minor changes in the Work not involving an adjustment in the Contract Price or the Contract Time and which are consistent with the overall intent of the Contract Documents. These may be accomplished by a Field Order and shall be binding on OWNER and CONTRACTOR, who shall perform the change promptly. If CONTRACTOR believes that a Field Order justifies an increase in the Contract Price or Contract Time, CONTRACTOR may make a claim therefore as provided in Article 11 or Article 12 of these General Conditions.

10.3. Additional Work performed without authorization of a written and executed Change Order will not entitle CONTRACTOR to an increase in the Contract Price or to an extension of the Contract Time, except in the case of an emergency as provided in paragraph 6.22 and except as provided in paragraphs 10.2, 11.9 and 13.10.

10.4. OWNER shall execute appropriate Change Orders prepared by ENGINEER covering changes in the Work which are required by OWNER or which are required because of emergencies or as provided in Article 7 of these General Conditions or as provided in paragraph 11.9, or because of any other valid claim of CONTRACTOR for a change in the Contract Time or the Contract Price which is recommended by ENGINEER and accepted by the OWNER.

10.5. If notice of any change affecting the general scope of the Work or change in the Contract Price is required by the provisions of any Bond to be given to the Surety, it will be CONTRACTOR's responsibility to so notify the Surety, and the amount of each applicable Bond shall be adjusted accordingly. CONTRACTOR shall furnish proof of such adjustment to OWNER.

10.6. CONTRACTOR shall not be entitled to receive damages or additional cost for delay reasonably caused by the OWNER, OWNER'S consultants, agents and employees. In such event, however, CONTRACTOR may be entitled to an extension of the Contract Time.

10.7. Changes in the Work which represent less than twenty-five percent (25%) of the value of the Work shall not be considered to change the scope of the Work provided that the operations and methods required to perform the change are not significantly different from those contemplated by the original Work.

ARTICLE 11 CHANGE OF CONTRACT PRICE

11.1. The Contract Price constitutes the total compensation payable to CONTRACTOR for performing the Work. All duties, responsibilities, and obligations assigned to or undertaken by CONTRACTOR shall be at CONTRACTOR's expense without change in the Contract Price.

11.2. The Contract Price may only be changed by a Change Order. Any claim for an increase in the Contract Price shall be based on written notice delivered to OWNER within fifteen (15) days of the occurrence of the event giving rise to the claim but before the CONTRACTOR has incurred additional expenses except in the case of emergencies, under paragraph 6.22. Notice of the amount of the claim with supporting data and written explanation of the basis for the claim shall be delivered within seven (7) days of such occurrence unless ENGINEER allows an additional period of time to ascertain accurate cost data. All claims for adjustments in the Contract Price shall be determined by OWNER. Any change in the Contract Price resulting from any such claim shall be incorporated in a Change Order. OWNER may grant CONTRACTOR an extension of the Contract Time for resolving a claim for adjustment but in no case shall CONTRACTOR be entitled to damages for delay.

11.3. The value of any Work covered by a Change Order or of any claim for an increase or decrease in the Contract Price shall be determined in one of the following ways:

11.3.1. Where the Work involved is covered by unit prices contained in the Contract Documents, by application of unit prices to the quantities of the items involved.

11.3.2. By mutual acceptance of a lump sum or unit prices.

11.3.3. On the basis of the Cost of the Work, plus a CONTRACTOR's Fee for supervision, overhead, bond, profit and any other general expenses, fee shall not exceed fifteen percent (15%) of the actual Cost of Work.

11.3.4. If the CONTRACTOR subcontracts all or part of the Work and the subcontract is to be paid on the basis of the Cost of Work plus a Fee, the Total Fee for the subcontracted Work and the CONTRACTOR's Fee shall not exceed fifteen percent (15%) of the actual cost of Work, as determined in accordance with paragraphs 11.4 and 11.5, unless otherwise as determined or agreed to by OWNER. The Cost of Work and Fee shall be identified individually in the Change Order back-up provided to the OWNER by the CONTRACTOR, in a format acceptable to the OWNER.

Cost of the Work

11.4. The term Cost of the Work means the sum of all costs necessarily incurred and paid by the CONTRACTOR in the proper performance of the Work. Except as otherwise may be agreed in writing by OWNER; such costs shall be in amounts no higher than those prevailing in the locality of the Project, shall include only the following items, and shall not include any of the costs itemized in paragraph 11.5:

11.4.1. Payroll costs for employees in the direct employ of CONTRACTOR in the performance of the Work under schedules of job classifications agreed upon by OWNER and CONTRACTOR. Payroll costs for employees not employed full time on the Work shall be apportioned on the basis of their time spent on the Work. Payroll costs shall include salaries and wages plus the cost of fringe benefits which shall include social security contributions, unemployment, excise and payroll taxes, workmen's compensation, health and retirement benefits, sick leave, vacation and holiday pay applicable thereto. Employees shall include superintendents and foremen at the site. The expenses of performing work after regular working hours, on Sunday or legal holidays shall be included in the above to the extent authorized by OWNER.

11.4.2. Cost of all materials and equipment furnished and incorporated in the Work, including costs of transportation and storage thereof, and manufacturers' field services required in connection therewith. All cash discounts shall accrue to CONTRACTOR unless OWNER deposits funds with CONTRACTOR with which to make payments, in which case the cash discounts shall accrue to OWNER. All trade discounts, rebates and refunds, and all returns from sale of surplus materials and equipment shall accrue to OWNER and CONTRACTOR shall make provisions so that they may be obtained.

11.4.3. Payments made by CONTRACTOR to the Subcontractors for Work performed by Subcontractors. If required by OWNER, CONTRACTOR shall obtain competitive Bids from Subcontractors acceptable to CONTRACTOR and shall deliver such Bids to OWNER who will then determine which Bids will be accepted. If a subcontract provides that the Subcontractor is to be paid on the basis of Cost of the Work Plus a Fee, the Cost of the Work shall be determined in accordance with paragraphs 11.4 and 11.5. The Total Fee for Subcontractor’s Fee and CONTRACTOR’s Fee combined shall not exceed fifteen percent (15%) of the actual Cost of Work, unless otherwise determined or agreed to by OWNER. Fee includes compensation for supervision, overhead, bond, profit and any other general expenses. All subcontracts shall be subject to the other conditions of the Contract Documents insofar as applicable.

11.4.4. Costs of special consultants (including, but not limited to, engineers, architects, testing laboratories, surveyors, lawyers, and accountants) employed for services specifically related to the Work to the extent authorized in advance by OWNER.

11.4.5. Supplemental costs including the following:

11.4.5.1. The proportion of necessary transportation, traveling, and subsistence expenses of CONTRACTOR's employees incurred in discharge of duties connected with the Work.

11.4.5.2. Cost, including transportation and maintenance, of all materials, supplies, equipment, machinery, appliances, office and temporary facilities at the site, and hand tools not owned by the workmen, which are consumed in the performance of the Work; and cost less market value of such items used but not consumed which remain the property of CONTRACTOR.

11.4.5.3. Rentals of all construction equipment and machinery and parts thereof, whether rented by CONTRACTOR or others in accordance with rental agreements approved by OWNER,and the costs of transportation, loading, unloading, installation, dismantling, and removal thereof -- all in accordance with terms of said rental agreements. The rental of any such equipment, machinery or parts shall cease when the use thereof is no longer necessary for the Work; if rental is not timely ceased, OWNER shall incur no cost beyond that absolutely required for the Work.

11.4.5.4. Sales, use, or similar taxes related to the Work and for which CONTRACTOR is liable, imposed by any governmental authority.

11.4.5.5. Deposits lost for causes other than CONTRACTOR's negligence, royalty payments, and fees for permits and licenses.

11.4.5.6. Losses, damages and expenses not compensated by insurance or otherwise, sustained by CONTRACTOR in connection with the execution of and to the Work, provided they have resulted from causes other than the negligence of CONTRACTOR, any Subcontractor, or anyone directly or indirectly employed by any of them or for whose acts any of them may be liable. Such losses shall include settlements made with the written consent and approval of OWNER. No such losses, damages and expenses shall be included in the Cost of the Work for the purpose of determining CONTRACTOR's Fee. If, however, any such loss or damage requires reconstruction and CONTRACTOR is placed in charge thereof, CONTRACTOR shall be paid for the services a fee proportionate to that stated in paragraph 11.6.2.

11.4.5.7. The cost of utilities, fuel and sanitary facilities at the site.

11.4.5.8. Minor expenses such as telegrams, long distance telephone calls, telephone service at the site, expressage and similar petty cash items in connection with the Work.

11.5. The term Cost of the Work shall not include any of the following:

11.5.1. Payroll costs and other compensation of CONTRACTOR's officers, executives, principals (of partnership and sole proprietorships), general managers, engineers, architects, estimators, timekeepers, clerks and other personnel employed by CONTRACTOR whether at the site or in CONTRACTOR’s principal or a branch office for general administration of the Work and not specifically included in the schedule referred to in paragraph 11.4.1 -- all of which are to be considered administrative costs covered by the CONTRACTOR's Fee.

11.5.2. Expenses of CONTRACTOR's principal and branch offices other than CONTRACTOR’s office at the site.

11.5.3. Any part of CONTRACTOR's capital expenses, including interest on CONTRACTOR's capital employed for the Work and charges against CONTRACTOR for delinquent payment.

11.5.4. Cost of premiums for all bonds and for all insurance policies whether or not CONTRACTOR is required by the Contract Documents to purchase and maintain the same.

11.5.5. Costs due to the negligence of CONTRACTOR, any Subcontractor, or anyone directly or indirectly employed by any of them or for whose acts any of them may be liable, including but not limited to, the correction of defective work, disposal of materials or equipment wrongly supplied and making good any damage to property.

11.5.6. Other overhead or general expense costs of any kind and the costs of any item not specifically and expressly included in paragraph 11.4.

CONTRACTOR's Fee

11.6. The CONTRACTOR's Fee that is allowed to CONTRACTOR for overhead and profit shall be determined as follows:

11.6.1. A mutually acceptable fixed fee; or if none can be agreed upon,

11.6.2. An amount determined by the OWNER to be reasonable.

11.6.2.1. No fee shall be payable on the basis of costs itemized under paragraphs 11.4.4, 11.4.5, and 11.5.

11.6.3. If a subcontract provides that the Subcontractor is to be paid on the basis of Cost of the Work plus a Fee, the Cost of the Work shall be determined in accordance with paragraphs 11.4 and 11.5. The Total Fee for Subcontractor’s Fee and Contractor’s Fee combined shall not exceed fifteen percent (15%) of the actual Cost of Work, unless otherwise determined or agreed to by OWNER. Fee includes compensation for supervision, overhead, bond, profit and any other general expenses

11.7. The amount of credit to be allowed by CONTRACTOR to OWNER for any change in contract price which results in a net decrease in cost will be the amount of the actual net decrease plus an allowance for overhead and administration. When both additions and credits are involved in any one change, the combined overhead and profit shall be figured on the basis of the net increase or decrease.

11.8. Whenever the cost of any Work is to be determined pursuant to paragraphs 11.4 and 11.5, CONTRACTOR will submit in the form prescribed by OWNER an itemized cost breakdown together with supporting data.

Cash Allowances

11.9. It is understood that CONTRACTOR has included in the Contract Price all cash allowances required by the Contract Documents and the CONTRACTOR shall cause the Work covered to be done by sums within the limit of the allowances as OWNER may approve.

Upon final payment, the Contract Price shall be adjusted as required and an appropriate Change Order issued. CONTRACTOR agrees that the original Contract Price includes such sums as CONTRACTOR deems proper for costs and profit on account of cash allowances. No demand for additional cost or profit in connection therewith will be allowed.

ARTICLE 12 CHANGE OF THE CONTRACT TIME

12.1. The Contract Time may only be changed by written approval from the OWNER. Any claim for an extension in the Contract Time shall be based on written notice delivered to OWNER within seven (7) days of the occurrence of the event giving rise to the claim for contract time extension and shall be accompanied by supporting data unless OWNER allows an additional period of time to ascertain more accurate data. All claims for adjustment in the Contract Time shall be determined by OWNER.

12.2. The Contract Time may be extended in an amount equal to time lost due to delays beyond the control of CONTRACTOR if CONTRACTOR makes a claim therefor as provided in paragraph 12.1. Such delays shall include, but not be restricted to, acts or neglect by any separate contractor employed by OWNER, fires, floods, labor disputes, epidemics, weather conditions, or acts of God. If the CONTRACTOR has worked less than four (4) hours in a day, and is forced to suspend work due to weather conditions, CONTRACTOR shall receive credit for one (1) day. The CONTRACTOR shall deliver to the OWNER, a written request within seven (7) days of each occurrence, regarding the credit day(s). The OWNER shall make the final determination as to the validity of each request.

12.3. All time limits stated in the Contract Documents are of the essence of the Agreement. The conditions of this Article 12 shall not exclude recovery for damages (including compensation for additional professional services) for delay by either party; except that CONTRACTOR shall be entitled only to an extension of the Contract Time, and not for other damages, resulting from OWNER's decision to delay the Work either prior to the time for commencement of the Work or during performance of the Work.

ARTICLE 13 WARRANTY AND GUARANTEE; TESTS AND INSPECTIONS; CORRECTION, REMOVAL, OR ACCEPTANCE OF DEFECTIVE WORK

Warranty and Guarantee

13.1. CONTRACTOR warrants and guarantees to OWNER that all materials and equipment will be new unless otherwise specified and that all Work will be of good quality, will be free from faults or defects, and will be in accordance with the requirements of the Contract Documents and of any inspections, tests, or approvals referred to in paragraph 13.2. All unsatisfactory Work, all faulty or defective Work, and all Work not conforming to the requirements of the Contract Documents or of such inspections, tests or approvals, shall be considered defective. Prompt notice of all defects shall be given to CONTRACTOR. All defective Work, equipment

and materials whether or not in place, may be rejected, corrected or accepted as provided in this Article 13.

Tests and Inspections

13.2. If the Contract Documents, laws, ordinances, rules, regulations or orders of any public authority having jurisdiction require any Work to specifically be inspected, tested or approved by some public body, CONTRACTOR shall assume full responsibility therefore, shall pay all costs in connection therewith and shall furnish OWNER the required certificates of inspection, testing or approval.

Quality Assurance Materials Testing (Geotechnical)

13.3 - 13.7 RESERVED

Access to Work

13.8. ENGINEER and ENGINEER'S representatives and other representatives of OWNER will have access to the Work at reasonable times. CONTRACTOR shall provide proper and safe facilities for such access and observation of the Work and also for any inspection or testing thereof by others.

Uncovering Work

13.9. If any Work is covered contrary to the request of ENGINEER, it must, if requested by ENGINEER, be uncovered for ENGINEER's observation and the cover replaced in compliance with the Contract Documents at CONTRACTOR's expense.

13.10. If any Work has been covered which ENGINEER has not specifically requested to observe prior to its being covered or if ENGINEER considers it necessary or advisable that covered Work be inspected or tested by others, CONTRACTOR, at ENGINEER's request, shall uncover or otherwise make available for observation, inspection or testing as ENGINEER may require that portion of the Work in question, furnishing all necessary labor, material and equipment. If it is found that such Work is defective, CONTRACTOR shall bear all the expenses of such uncovering, exposure, observation, inspection and testing and of satisfactory reconstruction, including compensation for additional professional services; and an appropriate deductive Change Order shall be issued. If, however, such Work is not found to be defective, CONTRACTOR shall be allowed an increase in the Contract Price or an extension of the Contract Time, or both, directly attributable to such uncovering, exposure, observation, inspection, testing and reconstruction if CONTRACTOR makes a claim therefor as provided in Articles 11 and 12 of these General Conditions.

OWNER May Stop the Work

13.11. If the Work is defective or CONTRACTOR fails to supply sufficient skilled workmen or suitable materials or equipment, when an imminent hazard condition is known to exist, when the CONTRACTOR either delays in correcting or permits repeated occurrences of a hazardous condition, or if CONTRACTOR fails to make prompt payments to Subcontractors or for labor, materials or equipment, OWNER may order CONTRACTOR to stop the Work or any portion thereof until the cause for such order has been eliminated; however, this right of OWNER to stop the Work shall not give rise to any duty on the part of OWNER to exercise this right for the benefit of CONTRACTOR or any other party. This authority to suspend Work does not relieve the CONTRACTOR of the legal responsibility for safety at the jobsite.

Correction or Removal of Defective Work

13.12. If required by ENGINEER prior to approval of final payment, CONTRACTOR shall promptly (as determined by ENGINEER), without cost to OWNER and as specified by ENGINEER, either correct any defective Work, whether or not fabricated, installed, or completed or, if the Work has been rejected by ENGINEER, remove it from the site and replace it with non-defective Work. If CONTRACTOR does not correct such defective Work or remove and replace such rejected Work within a reasonable time as determined by ENGINEER, all as specified in a written notice from ENGINEER, OWNER may have the deficiency corrected or the rejected Work removed and replaced. All direct or indirect costs of such correction or removal and replacement, including compensation for additional professional services, shall be paid by

CONTRACTOR and an appropriate deductive Change Order shall be issued. CONTRACTOR shall also bear the expenses of making good all Work of others destroyed or damaged by such correction, removal, or replacement of CONTRACTOR's defective Work.

One Year Correction Period

13.13. If, after the approval of final payment and prior to the expiration of one year after the date of FINAL ACCEPTANCE provided by letter by OWNER or such longer period of time as may be prescribed by law or by the terms of any applicable special guarantee required by the Contract Documents, any Work is found to be defective, CONTRACTOR shall promptly, without cost to OWNER and in accordance with OWNER's written instruction, either correct such defective Work or, if it has been rejected by OWNER, remove it from the site and replace it with non-defective Work. If CONTRACTOR does not promptly comply with the terms of such instructions, OWNER may have the defective Work corrected or the rejected Work removed and replaced and all direct and indirect cost of such removal and replacement, including compensation for additional professional services, shall be paid by CONTRACTOR.

Acceptance of Defective Work

13.14. The OWNER, may elect to accept defective work, instead of requiring correction or removal and replacement of the defective Work. In such case, if acceptance occurs prior to approval of final payment, a Change Order shall be issued incorporating the necessary revisions in the Contract Documents, including appropriate reduction in the Contract Price; or, if the acceptance occurs after approval of final payment, an appropriate amount shall be paid by CONTRACTOR to OWNER.

Neglected Work by CONTRACTOR

13.15. If CONTRACTOR shall fail to prosecute the Work in accordance with the Contract Documents, including any requirements of the progress schedule, OWNER, after seven (7) days written notice to CONTRACTOR may, without prejudice to any other remedy OWNER may have, make good any deficiencies and the cost thereof, including compensation for additional professional services, shall be charged against CONTRACTOR if ENGINEER approves such action, in which case a Change Order shall be issued incorporating the necessary revisions in the Contract Documents, including an appropriate reduction in the Contract Price. If the payments then or thereafter due CONTRACTOR are not sufficient to cover such amount, CONTRACTOR shall pay the difference to OWNER.

ARTICLE 14 PAYMENTS TO CONTRACTOR AND COMPLETION

Schedules

14.1. Prior to commencement of the Work, CONTRACTOR shall submit to OWNER a Project schedule and a final schedule of Shop Drawing submission. The schedule shall be approved in writing by CONTRACTOR's Sureties and shall be satisfactory in form and substance to OWNER.

Application for Progress Payment

14.2. No later than the first day of each month, CONTRACTOR shall submit to OWNER for review an Application for Payment filled out and signed by CONTRACTOR covering the Work

completed as of the date of the Application and accompanied by such supporting documentation as is required by the Contract Documents and also as OWNER may reasonably require. If payment is requested on the basis of materials and equipment not incorporated in the Work, but delivered and suitably stored at the site or at another location agreed to in writing, the Application for Payment shall also be accompanied by such data, satisfactory to OWNER, as will establish OWNER's title to the material and equipment and protect OWNER's interest therein, including applicable insurance. **Each subsequent Application for Payment shall include an affidavit of CONTRACTOR stating that all previous progress payments received on account of the Work have been applied to discharge in full all of CONTRACTOR's obligations reflected in prior Applications for Payment**.

CONTRACTOR'S Warranty of Title

14.3. CONTRACTOR warrants and guarantees that title to all Work, materials and equipment covered by any Application for Payment, whether incorporated in the Project or not, will pass to OWNER at the time of payment free and clear of all liens, claims, security interests and encumbrances (hereafter in these General Conditions referred to as "Liens").

Review of Applications for Progress Payment

14.4. OWNER will, within seven (7) days after receipt of each Application for Payment, except as submitted the Application for Payment or return the Application to CONTRACTOR indicating in writing the reasons for refusing to recommend payment. In the latter case, CONTRACTOR may make the necessary corrections and resubmit the Application. OWNER shall pay CONTRACTOR the amount recommended by ENGINEER, within forty-five (45) days of the Application for Payment.

14.5. ENGINEER's recommendation of any payment requested in an Application for Payment will constitute a representation by ENGINEER to OWNER, based on ENGINEER's on-site observations of the Work in progress as an experienced and qualified design professional and on ENGINEER's review of the Application for Payment and the accompanying data and schedules that the Work has progressed to the point indicated; that, to the best of ENGINEER's knowledge, information and belief, the quality of the Work is in accordance with the Contract Documents (subject to an evaluation of the Work as a functioning Project upon Substantial Completion, to the results of any subsequent tests called for in the Contract Documents and any qualifications stated in the recommendation) and that CONTRACTOR is entitled to payment of the amount recommended. However, by recommending any such payment ENGINEER will not thereby be deemed to have represented that exhaustive or continuous on-site inspections have been made to check the quality or the quantity of the Work, or that the means, methods, techniques, sequences and procedures of construction have been reviewed or that any examination has been made to ascertain how or for what purpose CONTRACTOR has used the monies paid or to be paid to CONTRACTOR on account of the Contract Price, or that title to any Work, materials or equipment has passed to OWNER free and clear of any Liens.

14.6. ENGINEER's recommendation of final payment will constitute an additional representation by ENGINEER to OWNER that the conditions precedent to CONTRACTOR's being entitled to final payment as set forth in paragraph 14.13 have been fulfilled.

14.7. ENGINEER may refuse to recommend the whole or any part of any payment if, in ENGINEER’s opinion, it would be incorrect to make such representations to OWNER.

ENGINEER may also refuse to recommend any such payment, or, because of subsequently discovered evidence or the results of subsequent inspections or tests, nullify any such payment previously recommended to such extent as may be necessary in ENGINEER's opinion to protect OWNER from loss because:

14.7.1. The Work is defective, or completed Work has been damaged requiring correction or replacement,

14.7.2. Written claims have been made against OWNER in connection with the Work,

14.7.3. The Contract Price has been reduced because of Modifications,

14.7.4. OWNER has been required to correct defective Work or complete the Work in accordance with paragraph 13.9,

14.7.5. Of CONTRACTOR's unsatisfactory prosecution of the Work in accordance with the Contract Documents, or

14.7.6. Of CONTRACTOR's failure to make payment to Subcontractors, or for labor, materials or equipment.

Substantial Completion

14.8. When CONTRACTOR considers the entire Work ready for its intended use CONTRACTOR shall, in writing to OWNER, certify that the entire Work is substantially complete and request that ENGINEER issue a certificate of Substantial Completion. Within a reasonable time thereafter, OWNER, CONTRACTOR and ENGINEER shall make an inspection of the Work to determine the status of completion. If ENGINEER does not consider the Work substantially complete, ENGINEER will notify CONTRACTOR in writing giving his reasons therefor. If ENGINEER considers the Work substantially complete, ENGINEER will prepare a tentative certificate of Substantial Completion which shall fix the date of Substantial Completion and acceptance. There shall be attached to the certificate a tentative list of items to be completed or corrected before final payment.

14.9. OWNER shall have the right to exclude CONTRACTOR from the Work after the date of Substantial Completion, but OWNER shall allow CONTRACTOR reasonable access to complete or correct items on the tentative list.

Partial Utilization

14.10. Use by OWNER of any completed portion of the Work may be accomplished prior to Substantial Completion of all Work subject to the following:

14.10.1. OWNER at any time may request CONTRACTOR in writing to permit OWNER to use any part of the Work which OWNER believes to be substantially complete and which may be so used without significant interference with construction of the other parts of the Work. If CONTRACTOR agrees, CONTRACTOR will certify to OWNER that said part of the Work is substantially complete and request ENGINEER to issue a certificate of Substantial Completion for that part of the Work. Prior to the OWNER using that portion of work, OWNER, CONTRACTOR and ENGINEER shall make an inspection of that part of the Work to determine its status of completion. If

ENGINEER does not consider that part of the Work to be substantially complete, ENGINEER will notify OWNER and CONTRACTOR in writing giving the reasons therefor. If ENGINEER considers that part of the Work to be substantially complete, ENGINEER will execute and deliver to OWNER and CONTRACTOR a certificate to that effect, fixing the date of Substantial Completion as to that part of the Work, attaching thereto a tentative list of items to be completed or corrected before final acceptance and payment. Prior to issuing a certificate of Substantial Completion as to part of the Work, ENGINEER will deliver to OWNER and CONTRACTOR a written recommendation as to the division of responsibilities pending final payment between OWNER and CONTRACTOR with respect to security, operation, safety, maintenance, utilities and insurance for that part of the Work, which shall become binding upon OWNER and CONTRACTOR at the time of issuing the definitive certificate of Substantial Completion as to that part of the Work unless OWNER and CONTRACTOR shall have otherwise agreed in writing and so informed ENGINEER. OWNER shall have the right to exclude CONTRACTOR from any part of the Work which ENGINEER has so certified to be substantially complete, but OWNER shall allow CONTRACTOR reasonable access to complete or correct items on the tentative list.

14.10.2. In lieu of the issuance of a certificate of Substantial Completion as to part of the Work, OWNER may take over operation of a facility constituting part of the Work whether or not it is substantially complete if such facility is functionally and separately usable; provided that prior to any such takeover, OWNER and CONTRACTOR have agreed as to the division of responsibilities between OWNER and CONTRACTOR for security, operation, safety, maintenance, correction period, heat, utilities and insurance with respect to such facility.

Final Inspection

14.11. Upon written notice from CONTRACTOR that the Work is complete, ENGINEER will make a final inspection with OWNER and CONTRACTOR and will notify CONTRACTOR in writing of all particulars in which this inspection reveals that the Work is incomplete or defective. CONTRACTOR shall immediately take such measures as are necessary to remedy such deficiencies.

Final Application for Payment

14.12. After CONTRACTOR has completed all deficiency corrections to the satisfaction of ENGINEER and delivered all maintenance and operating instructions, schedules, warranty assignments, guarantees, Bonds, certificates of inspection, marked-up record documents and other documents, all as required by the Contract Documents, and after ENGINEER has indicated that the Work is acceptable (subject to the provisions of paragraph 14.15), CONTRACTOR may make application for final payment following the procedure for progress payments. The final Application for Payment shall be accompanied by all documentation called for in the Contract Documents (to include all Project Close Out Documents as defined in Article 12 of these General Conditions), and such other data and schedules as ENGINEER may reasonably require. CONTRACTOR shall also furnish an affidavit of CONTRACTOR to the effect that the labor, services, material and equipment charges have been satisfied in full; and that all payrolls, material and equipment bills, and other indebtedness connected with the Work have been paid or otherwise satisfied; and consent of the Surety, if any, to final payment.

Final Payment and Acceptance

14.13. If, on the basis of ENGINEER's observation of the Work during construction and final inspection and ENGINEER's review of the final Application for Payment and accompanying documentation--all as required by the Contract Documents--ENGINEER is satisfied that the Work has been completed and CONTRACTOR has fulfilled all of CONTRACTOR's obligations under the Contract Documents (to include all Project Close Out Documents as defined in Article 12 of these General Conditions), ENGINEER will, within seven (7) days after receipt of the final Application for Payment, indicate in writing ENGINEER's recommendation of payment and present the Application to OWNER for payment. Thereupon ENGINEER will give written notice to OWNER and CONTRACTOR that the Work is acceptable subject to the provisions of paragraph 14.15. Otherwise, ENGINEER will return the Application to CONTRACTOR, indicating in writing the reasons for refusing to recommend final payment, in which case CONTRACTOR shall make the necessary corrections and resubmit the Application. If the Application and accompanying documentation are satisfactory and complete in form and substance, OWNER shall, within twenty-one (21) days after receipt thereof, pay CONTRACTOR the amount recommended by ENGINEER.

CONTRACTOR's Continuing Obligation

14.14. CONTRACTOR's obligation to perform and complete the Work in accordance with the Contract Documents shall be absolute. Neither recommendation of any progress or final payment by ENGINEER, nor the existence of an unresolved claim, nor the issuance of a certificate of Substantial Completion, nor any payment by OWNER to CONTRACTOR under the Contract Documents, nor any use or occupancy of the Work or any part thereof by OWNER, nor any act of acceptance by OWNER nor any failure to do so, nor the issuance of a notice of acceptability by ENGINEER pursuant to paragraph 14.13, nor any correction of defective Work by OWNER shall constitute an acceptance of Work not in accordance with the Contract Documents or a release of CONTRACTOR's obligation to perform the Work in accordance with the Contract Documents.

Waiver of Claims

14.15. The making and acceptance of final payment shall constitute:

14.15.1. A waiver of all claims by OWNER against CONTRACTOR, except claims arising from defective Work appearing after final inspection pursuant to paragraph 14.11 or from any failure to comply with the Contract Documents or the terms of any special guarantees specified therein; however, it shall not constitute a waiver by OWNER of any rights in respect of CONTRACTOR's continuing obligations under the Contract Documents; and

14.15.2. A waiver of all claims by CONTRACTOR against OWNER other than those previously made in writing and still unsettled.

ARTICLE 15 SUSPENSION OF WORK AND TERMINATION

OWNER May Suspend Work

15.1. OWNER may, at any time and without cause, suspend the Work or any portion thereof for a period of not more than ninety (90) days by notice in writing to CONTRACTOR and fix the

date on which Work shall be resumed. CONTRACTOR shall resume the Work on the date so fixed unless CONTRACTOR and OWNER agree otherwise. CONTRACTOR will be allowed an extension of the Contract Time directly attributable to any suspension if CONTRACTOR makes a claim therefor as provided in Article 12 of these General Conditions, but shall not be entitled to an increase in the Contract Price or to any sums in damages.

OWNER May Terminate

15.2. If CONTRACTOR is adjudged bankrupt or insolvent; makes a general assignment for the benefit of creditors; or if a trustee or receiver is appointed for CONTRACTOR or for any of CONTRACTOR's property; or if CONTRACTOR files a petition to take advantage of any debtor's act or to reorganize under the bankruptcy or similar laws; repeatedly fails to supply sufficient skilled workmen or suitable materials or equipment; repeatedly fails to make prompt payments to Subcontractors for labor, materials, or equipment; disregards laws, ordinances, rules, regulations, or orders of any public body having jurisdiction; disregards the authority of ENGINEER; or violates any provision of the Contract Documents, then OWNER may, without prejudice to any other right or remedy and after giving CONTRACTOR and CONTRACTOR's Surety seven days' written notice, terminate the services of CONTRACTOR and take possession of the Project and of all materials, equipment, tools, construction equipment and machinery thereon owned by CONTRACTOR and make demand upon CONTRACTOR's Surety to finish the Work. If Surety fails to make satisfactory arrangements within twenty-one days for completion of the Work, OWNER may finish the Work by whatever means it may deem expedient. In such case CONTRACTOR shall not be entitled to receive any further payment until the Work is finished. If the unpaid balance of the Contract Price exceeds the direct and indirect costs of completing the Project, including compensation for additional professional services, such excess shall be paid to CONTRACTOR. If such costs exceed such unpaid balance, CONTRACTOR shall pay the difference to OWNER. Such costs incurred by OWNER shall be determined by OWNER and incorporated in a Change Order.

15.3. Where CONTRACTOR's services have been so terminated by OWNER, said termination shall not affect any rights of OWNER against CONTRACTOR then existing or which may thereafter accrue. Any retention or payment of monies by OWNER due CONTRACTOR will not release CONTRACTOR from liability.

15.4. If the OWNER, which is a public entity, makes a good faith determination that such action is in the best interests of the entity, OWNER may terminate the Work or the Project upon seven days' written notice to CONTRACTOR for any reason which is within the legitimate purview of OWNER.

If OWNER terminates the Work under this provision, CONTRACTOR shall be entitled to payment for all portions of the Work completed and materials on hand at the date of termination and for expenses reasonably resulting from termination.

> 15.4.1. If, after notice of termination of the CONTRACTOR's right to proceed under the provisions of this clause, it is determined for any reason that the CONTRACTOR was not in default under the provisions of this clause, or that the delay was excusable under the provisions of this clause, the rights and obligations of the parties shall, if the Contract contains a clause providing for termination for convenience of the OWNER, be the same as if the notice of termination had been issued pursuant to such clause. If, in the foregoing circumstances, this Contract does contain a clause providing for termination

for convenience of the OWNER, the Contract shall be equitably adjusted to compensate for such termination and the Contract modified accordingly.

CONTRACTOR May Stop Work or Terminate

15.5. If, through no act or fault of CONTRACTOR, the Work is suspended for a period of more than ninety (90) days by OWNER or under an order of court or other public authority, or if ENGINEER fails to act on any Application for Payment within thirty days after it is submitted, or if OWNER fails to pay CONTRACTOR any sum approved by ENGINEER within thirty (30) days of its approval and presentation, then CONTRACTOR may, upon seven (7) days written notice to OWNER, terminate the Agreement and recover from OWNER payment for all Work executed and any expense sustained. In addition and in lieu of terminating the Agreement, if ENGINEER has failed to act on an Application for Payment or OWNER has failed to make any payment as aforesaid, CONTRACTOR may, upon seven (7) days notice to OWNER, stop the Work until payment is made.

ARTICLE 16 FORMAL DISPUTE

16.1. Prior to seeking judicial relief in a court of law, and in addition and prior to arbitration, the interested parties shall endeavor to settle disputes by mediation under the requirements of Sections 13-4C-1 through 13-4C-11 NMSA 1978. Mediation shall commence within the time limits stipulated in the Act. Such time limits shall then be extended for arbitration by ten days (Chapter 63, Laws of 1992.)

16.2. All persons or entities whose interests or responsibilities in the dispute are substantial may be joined, and claims and disputes may be consolidated, in accordance with the law.

16.3. CONTRACTOR will carry on the Work and maintain the progress schedule during any dispute resolution proceedings, unless otherwise agreed by CONTRACTOR and OWNER in writing.

ARTICLE 17 MISCELLANEOUS

Giving Notice

17.1. Whenever any provision of the Contract Documents requires the giving of written notice, it shall be deemed to have been validly given on the date delivered in person to the individual or to a member of the firm or to an officer of the corporation for whom it is intended or three days after sent by certified mail, postage prepaid and return receipt requested, to the last business address known to the person who gives the notice.

Computation of Time

17.2. When any period of time is referred to in the Contract Documents by days, it shall be computed to include the first and the last day of such period.

General

17.3. All monies not paid when due hereunder shall bear interest at the maximum rate allowed by law at the place of the Project.

17.4. All Specifications, Drawings and copies thereof furnished by OWNER shall remain the property of OWNER. They shall not be used on another Project and, with the exception of those sets which have been signed in connection with the execution of the Agreement, shall be returned on request upon completion of the Project.

17.5. The duties and obligations imposed by these General Conditions and the rights and remedies available hereunder and, in particular but without limitation, the warranties, guarantees, and obligations imposed upon CONTRACTOR by paragraphs 6.29, 13.1, 13.10, and 14.3 and the rights and remedies available to OWNER there-under shall be in addition to and shall not be construed in any way as a limitation of any rights and remedies available to them which are otherwise imposed or available by law, by special guarantee or by other provisions of the Contract Documents.

17.6. Should OWNER or CONTRACTOR suffer injury or damage to person or property because of any error, omission or act of the other or of any of the other's employees or agents or others for whose acts the non-injured party is legally liable, claim shall be made in writing to the other party within a reasonable time of the first observance of such injury or damage.

17.7. The Contract Documents shall be governed by the laws of the State of New Mexico.

Minimum Wages

17.8. The CONTRACTOR and any Subcontractor performing Work under this Contract shall comply fully with the "Public Works Minimum Wage Act", Section 13-4-11 through 13-4-17 NMSA 1978 (1988 Repl.), and all amendments thereto, which provides in part that “the CONTRACTOR shall pay all mechanics and laborers employed on the site of the project unconditionally and not less often than once a week, and without subsequent unlawful deduction or rebate on any account, the full amounts accrued at time of payment, computed at wage rates not less than those stated in the advertised specifications.”

The minimum hourly rate of wage which may be paid to workmen in each trade or occupation required for the Work under the Contract employed in the performance of the Contract either by the CONTRACTOR or Subcontractor or by other persons doing or contracting to do the whole or part of the Work contemplated by the Contract shall be as set forth in the schedule of Minimum Wage Rates appearing in the State Wage Rates, and the workmen employed in the performance of the Contract shall be paid not less than the applicable specified minimum hourly rate of wage as such is set forth in said schedule.

The scale of wages to be paid shall be posted by the CONTRACTOR in a prominent and easily accessible place at the site of the work; and it is further provided that there may be withheld from the CONTRACTOR so much of accrued payments as may be considered necessary by the OWNER to pay to laborers and mechanics employed by the CONTRACTOR or Subcontractor on the Work, the difference between the rates of wages required by the Contract to be paid laborers and mechanics on the Work and the rates of wages received by such laborers and mechanics and not refunded to the CONTRACTOR, Subcontractors, or their agents.

The attention of the CONTRACTOR and any Subcontractor performing work under this Contract is directed to Section 13-4-12 NMSA 1978 (1988 Repl.) which reads in part, as follows:

"A. As used in Section 13-4-11 NMSA 1978, ‘wages’, ‘scale of wages’, ‘wage rates’, ‘minimum wages’, and ‘prevailing wages’ include:

(1) The basic hourly rate of pay, and

(2) The amount of:

(a) The rate of contribution irrevocably made by a CONTRACTOR or Subcontractor to a trustee or a third person pursuant to a fund, plan, or program; and

(b) The rate of costs to a CONTRACTOR or Subcontractor which reasonably may be anticipated in providing benefits to laborers and mechanics pursuant to an enforceable commitment to carry out a financially responsible plan or program which was communicated in writing to the laborers and mechanics affected for: 1) medical or hospital care, 2) pensions on retirement or death, 3) compensation for injuries or illness resulting from occupational activity, or 4) insurance to provide for any of the foregoing, and for 5) employment benefits, 6) life insurance, 7) disability and sickness insurance, 8) accident insurance, 9) vacation and holiday pay, 10) costs of apprenticeship or other similar programs, or for 11) other bona fide fringe benefits, but only where the CONTRACTOR or Subcontractor is not required by other federal, state, or local law to provide any of the foregoing or similar benefits.”

However, the obligation of a CONTRACTOR or Subcontractor to make payment in accordance with the prevailing wage determinations of the State Labor Commissioner [Director of the Labor and Industrial Division of the Department of Labor], insofar as Section 13-4-11 NMSA 1978, or other sections or legislative acts incorporating Section 13-4-11 NMSA 1978 are concerned may be discharged by:

(1) The making of payments in cash;

(2) The making of contributions of a type referred to in (2a) above; or

(3) The assumption of an enforceable commitment to bear the costs of a plan or program of a type referred to in (2b) above or any combination thereof, where the aggregate of any payments or contributions and costs therefor is not less than the rate of pay described in Section 13-4-11 NMSA 1978, plus the amount referred to in this section."

In the event it is found by the State Labor Commissioner that any laborer or mechanic employed by the CONTRACTOR or Subcontractor on the site of the Project covered by the Contract has been or is being paid as a result of a willful violation of a rate of wages less than the rate of wages required by the Contract, the OWNER may, by written notice to the CONTRACTOR and CONTRACTOR’s Subcontractor, if the violation involves the Subcontractor, terminate their right to proceed with the work or such part of the Work as to which there has been a willful failure to pay the required wages; and the OWNER may prosecute the Work to completion by Contract or otherwise, and the CONTRACTOR and CONTRACTOR’s sureties shall be liable to the State of New Mexico for any excess costs occasioned thereby. Any party receiving notice of

termination of a contract or subcontract under the provisions of this section may appeal the finding of the State Labor Commissioner as provided in the Public Works Minimum Wage Act.

There is no representation on the part of the OWNER that labor can be obtained at the hourly rates shown in the General Conditions. It is the responsibility of BIDDERs to inform themselves as to local labor conditions and prospective changes or adjustments of wage rates. No increase in the Contract Price shall be allowed or authorized on account of the payment of wage rates in excess of those listed. The CONTRACTOR and any Subcontractor performing work under this Contract shall submit one certified copy of weekly payrolls to the State Labor and Industrial Commission not later than five working days after close of any payroll period that occurs during the month of June. One certified copy of all payrolls shall be submitted to the ENGINEER not later than five (5) working days after the close of any payroll. The scale of wages must be posted by the CONTRACTOR at the project site. The weekly payrolls shall conform to the following:

(1) Form and Content: Any particular form may be used for CONTRACTOR or Subcontractor payrolls, provided all payrolls contain the following information:

(a) The employee's full name, address, and social security number.

(i) The employee's full name and social security number need only appear on the first payroll on which employee's name appears.

(ii) The employee's address need be shown only on the first submitted payroll on which employee's name appears, unless a change of address necessitates an additional submittal to reflect the new address.

(b) The employee's classification (or classifications).

(c) The employee's hourly wage rate (or rates); and, where applicable, employee's overtime hourly wage rate (or rates).

(d) The daily and weekly hours worked in each classification, including actual overtime hours worked (not adjusted).

(e) The itemized deductions made.

(f) The net wages paid.

(2) Numbering Payrolls: All payrolls shall be numbered starting with number one (1) for the first payroll at the beginning of the job and continuing in numerical order until the job is completed.

(3) Certification of Payrolls: The CONTRACTOR and each Subcontractor shall submit a weekly statement of compliance in the following form:

Date _____

I, _____, _____ do hereby state:

1. That I pay or supervise the payment of the persons employed by _____ on the _____ that during the payroll period commencing on the _____ day of _____, 20___, and ending the _____ day of _____, 20___, all persons employed on said project have been paid the full weekly wages earned, that no rebates have been or will be made either directly or indirectly to or on behalf of said _____ from the full weekly wages earned by any person and that no deductions have been made either directly or indirectly from the full wages earned by any person other than deductions permitted by law.

2. That any payrolls under this Contract required to be submitted for the above period are correct and complete; that the wage rates for laborers or mechanics contained therein are not less than the applicable wage rates incorporated into the Contract; that the classifications set forth therein for each laborer or mechanic conform with the work employee performed.

3. That any apprentices employed in the above period are duly registered in a bona fide apprenticeship program registered with a state apprenticeship agency recognized by the Bureau of Apprenticeship and Training, United States Department of Labor.

17.8.1. Minimum Wages (Federal) - In the event that any work under this Contract involved Federal Funds, then the prevailing area Wage Rate Decision listed by the U.S. Department of Labor shall be made a part of this Contract. Whenever a conflict exists between the State and Federal Minimum Hourly Wage Rates, the higher of the conflicting wages rates shall govern.

Archaeological Salvage and Reports

17.9. Where objects of historical, archaeological, and paleontological value, including ruins, sites, buildings, artifacts, fossils and other objects of antiquity are encountered within the areas on which the CONTRACTOR's operations are performed, the CONTRACTOR shall postpone operations in the area, shall preserve such objects from disturbance or damage, and shall immediately notify the ENGINEER of their existence and location.

Upon receipt of such notification, the ENGINEER will arrange for the disposition of the objects or for the recording of data relative thereto and will notify the CONTRACTOR when it is proper to proceed with the Work in the affected area. In this regard, the ENGINEER may consult the Museum of New Mexico or other appropriate agency as to the nature and disposition of such objects. If the CONTRACTOR is directed by the ENGINEER to perform any Work in salvaging said objects, the CONTRACTOR shall do so in accordance with the "Changes in the Work" provision of Article 10.

Measurement

17.10. Measurement of Quantities for Unit Price Work: Unless otherwise specified, linear or area quantities of Work, such as grading, landscaping, paving, curb, gutter, sidewalk, drive apron, and other Work of a similar nature, shall be determined from measurements or dimensions of such Work and computed in horizontal planes. However, linear quantities of underground cable, fencing, piling, and timber shall be considered as being the true length

measured along the longitudinal axis thereof. For pipe Work see related technical specifications; but if the method of measurement for pipe Work is not stated therein, it shall be measured along the longitudinal axis of the pipe in place from center of fitting to center of fitting. A station, when used as a definition or term of measurement, will be one hundred (100) linear feet.

Method of Measurement

17.11. Materials and items of Work which are to be paid for on the basis of measurement shall be measured in accordance with the methods stipulated in the particular articles herein covering materials or types of Work.
When material is to be paid for on a volume basis and it would be impracticable to determine a volume by the specified method of measurement or when requested by the CONTRACTOR and approved by the ENGINEER, the material will be weighed in accordance with the requirements specified for weight measurement and such weights will be converted to volume measurement for payment purposes. Factors for conversion from weight measurement to volume measurement will be determined by the ENGINEER. Unless otherwise provided, when mineral aggregate or roadway material is being paid for by weight, deductions from pay quantities will be made for the weight of water in excess of three percent (3%) if the material is to be treated with bitumen and six percent (6%) if the material is to be water bound.

Units of Measurement

17.12. Measurements shall be in accordance with U.S. Standard Measures. A pound shall be avoirdupois. A ton shall be two thousand (2,000) pounds. The unit of liquid measure shall be the U.S. gallon.

Certified Weights

17.13. All materials to be paid for at a Contract unit price per ton shall be weighed on platform scales furnished by the CONTRACTOR or the supplier of the material at the CONTRACTOR's expense, or such materials may be weighed on certified public scales at the CONTRACTOR's expense. All scales shall be of adequate size to permit the entire vehicle to rest on the scale platform while being weighed. Scales furnished by the CONTRACTOR shall be installed on beams, piers, or foundations of sufficient strength and bearing to prevent the weighing mechanism supporting the scale platform from settling. The weighing facilities shall include a weatherproof scale house with a minimum floor area of thirty-two (32) square feet and equipped with adequate heat and light.

ARTICLE 18 UTILITIES

Policy on the proximity of water and sewer lines

18.1. Whenever possible, it is desirable to lay parallel water and sewer lines at least ten (10) feet apart horizontally, and the water line should be a higher elevation than the sewer. If this is not possible, separate trenches will be required in all cases (this shall be effective even though one line has been installed prior to the other), and the water line shall be at least two (2) feet above the sewer. When water and sewer lines cross each other, the water line shall be at least three (3) feet above the sewer; otherwise the sewer shall be of cast iron pipe, or equivalent, for ten (10) feet on each side of the water line.

18.2. Existing House Sewer Lateral or Water Service Connections, and Replacement of Mains.

18.2.1. Where house service line connections to existing sewer mains and water mains are encountered, the CONTRACTOR shall insure that the service line will not be disturbed or damaged. Should any service line connection be broken during the construction of the new line, it shall be replaced by the CONTRACTOR with new pipe, appropriate for the application, as determined by the ENGINEER. No extra compensation will be allowed the CONTRACTOR for this item.

18.2.2. Where the horizontal alignment of the new sanitary sewer line coincides with the alignment of an existing sanitary sewer line and the grade of the new line is approximately at the same grade as the existing line or lower, then the existing line shall be removed or dealt with as ordered by the ENGINEER. The cost of this work when applicable shall be paid for under the appropriate item in the Bid Proposal. The ENGINEER shall determine if it is necessary to pump sewage around the replacement work, or if it is possible to temporarily plug the sewer line during the replacement operation. In the case of by-pass pumping, it will be paid for as indicated in the Bid Proposal.

18.3. Operation of the Existing Water System

18.3.1 All shutoffs shall be done by the OWNER. The CONTRACTOR shall notify the OWNER forty-eight (48) hours prior to the date of required shutoff. The OWNER shall make a "trial shutoff" of the system within the project limits prior to issuance of Notice to Proceed, in order to preclude delay of emergency and required shutoffs. If valves cannot be located or are not in operating condition, the OWNER shall notify the CONTRACTOR as soon as possible. The OWNER's personnel will locate the valves, make the necessary repairs, or determine an alternate method of making the shutoff.

18.3.2. The CONTRACTOR shall notify each household, office or other affected water user that a shutoff will be made, giving full details by personal contact if possible or by leaving a door knob hanger notification. CONTRACTOR shall also notify the media, i.e. radio stations and newspaper, the City Water Shop, (575) 439-4244, and the ENGINEER giving full details of the date, time and location of the shutoff. Notifications shall be given at least twenty-four (24) hours in advance of a shutoff.

18.3.3. The CONTRACTOR shall notify the Fire Department when fire hydrants are taken out of service and returned to service.

18.3.4. The OWNER shall be responsible for the actual operation of the valves.

18.3.5. EMERGENCY BREAKS: The Water Division, (575) 439-4244, shall be notified immediately so that it may perform the shutoff.

18.4. Protection and Restoration of Property

18.4.1. The CONTRACTOR shall never unnecessarily interfere with or interrupt the services of any public utility having property within or adjacent to the streets, alleys and easements involved in the Work and shall take all necessary precaution and effort to locate and protect all underground conduit, cables, pipes, water mains, sewers, structures, gas lines, trees, monuments, power lines, telephone and telegraph lines, traffic control devices and other structures, both below and above ground. CONTRACTOR shall give all Public Utility Companies a reasonable notice in writing, but in no event less than forty-eight (48) hours, for any work that CONTRACTOR contemplates which would interfere in any way whatsoever with the service of any existing public utility and City-owned facilities. If such public utility does not cooperate for the protection of its services, the CONTRACTOR shall notify the ENGINEER. Utility lines shall be located by the CONTRACTOR far enough in advance of construction work in order that the owner of such lines may raise, lower, realign or remove lines and structures, if necessary, and in order that the ENGINEER may make any line and grade changes necessary should the existing utility lines conflict with the Work under construction providing such adjustments do not materially affect the Work. The CONTRACTOR shall immediately report any damages to property or plant of public utility companies and City property to the company or owner involved, and to the ENGINEER.

18.4.2. The CONTRACTOR shall restore at CONTRACTOR’s own expense any public, City-owned, or private property damage for which CONTRACTOR is directly or indirectly responsible to a condition equal to that existing before damage. The CONTRACTOR shall promptly notify CONTRACTOR’s insurance carrier of the alleged damage, and if CONTRACTOR refuses to do so upon notice or if CONTRACTOR otherwise fails to make a restoration for which CONTRACTOR is responsible, the OWNER may cause such restoration and deduct cost from monies due, or which may become due, the CONTRACTOR.

18.4.3. The CONTRACTOR shall not remove, realign, or adjust any official City traffic control device. CONTRACTOR shall give the ENGINEER forty-eight (48) hours notice of any official City traffic control devices that need to be moved. The OWNER shall move all traffic control devices as soon as practical thereafter.

18.5. Abandoned Utilities

18.5.1. Unless otherwise specified, the CONTRACTOR shall remove all interfering portions of utilities which are shown on the drawings as "abandoned" or "to be abandoned in place" and which interfere with the construction of the project. All abandoned water mains shown on the drawings as "abandoned" or "abandoned in place" or found during construction shall be removed or capped at a minimum, unless otherwise specified. All costs involved in said removals shall be included in the prices Bid for the various items of Work. All such abandoned utilities removed by the CONTRACTOR shall be stored on the site where directed and shall remain the property of the OWNER utility company or contracting agency as determined by the ENGINEER.

18.5.2. Where utilities are shown on the drawings as "abandoned" or "to be abandoned in place," it shall be the CONTRACTOR's responsibility to contact the utility company involved within forty-eight (48) hours prior to excavating around such utilities to ascertain that the abandonment of the utility has been completed.

18.6. Location of Existing Utilities

18.6.1. The public utilities shall be responsible to locate their utilities and provide information stating the horizontal and vertical alignments of same. If field verification excavations are required, the public utility will provide same in a timely manner.

18.6.2. Utilities which upon exploration are found to interfere with the permanent project Work, or which are within the trenching prism as defined by OSHA, will be relocated, altered or reconstructed by others or the ENGINEER may order changes in location, line or grade of structures being built in order to avoid the utilities. The cost of such changes will be paid for under applicable Bid Items.

18.7. Unknown Utilities Disclosed by the CONTRACTOR or by Others During the Contract Work.

18.7.1. In the event that a utility is disclosed subsequent to the award of the Contract, such utility not being indicated on the drawings, or in the event that an existing utility is found to be in a materially different location than shown on the drawings and thus requires additional work on the part of the CONTRACTOR for its maintenance, relocation or support, the necessary alteration, relocation, proper support and protection shall be done and paid for as follows:

When said utility is found to occupy the space within the trenching prism as defined by OSHA, or the permanent works to be constructed, it shall be relocated or the CONTRACTOR shall be paid extra for its support.

18.8. Responsibility of the CONTRACTOR

18.8.1. The CONTRACTOR shall be responsible for all costs for the repair of any and all damage to the Contract Work or to any utility (which is previously known and disclosed to CONTRACTOR by the utility) as may be caused by CONTRACTOR’s operations. Utilities which are relocated by others in order to avoid interference with structures and which cross the project Work shall be maintained in their relocated positions by the CONTRACTOR. All costs for such work shall be absorbed or included in the prices bid for the various items of Work.

18.9. Delays Caused by Failure to Relocate Utilities

18.9.1. Where parties other than the CONTRACTOR are responsible for the relocation of utilities and a delay in the CONTRACTOR's Work is caused by the failure on the part of said parties to remove or relocate such utilities in time to prevent such delay, or by any action or lack of action on the part of the Contracting Agency, the CONTRACTOR shall be entitled to an extension of the Contract Time as determined by the ENGINEER.

18.9.2. In order to minimize delays to the CONTRACTOR caused by the failure of other parties to relocate utilities which interfere with structures, the CONTRACTOR may upon request to the ENGINEER, be permitted to temporarily omit the portion of the Work affected by the utility. The portion thus omitted shall be constructed by the CONTRACTOR immediately following the relocation of the utility involved. The

CONTRACTOR shall be paid mobilization and demobilization to construct the omitted portion.

ARTICLE 19 TRAFFIC CONTROL

19.1. CONTRACTOR shall perform all signing, barricading and channelization required for the project in accordance with the Manual on Uniform Traffic Control Devices, latest edition. All signs, barricades and channelizing devices used at night shall be reflectorized with retroreflective sheeting (both orange and white). All advance warning signs used at night shall be equipped with flashing warning lights; all channelizing devices used at night shall be equipped with steady burning warning lights. Traffic Control shall comply with Article 01-002.2 - TRAFFIC CONTROL AND MANAGEMENT.

19.2. Traffic control to be used on the project shall be pre-approved by the OWNER.

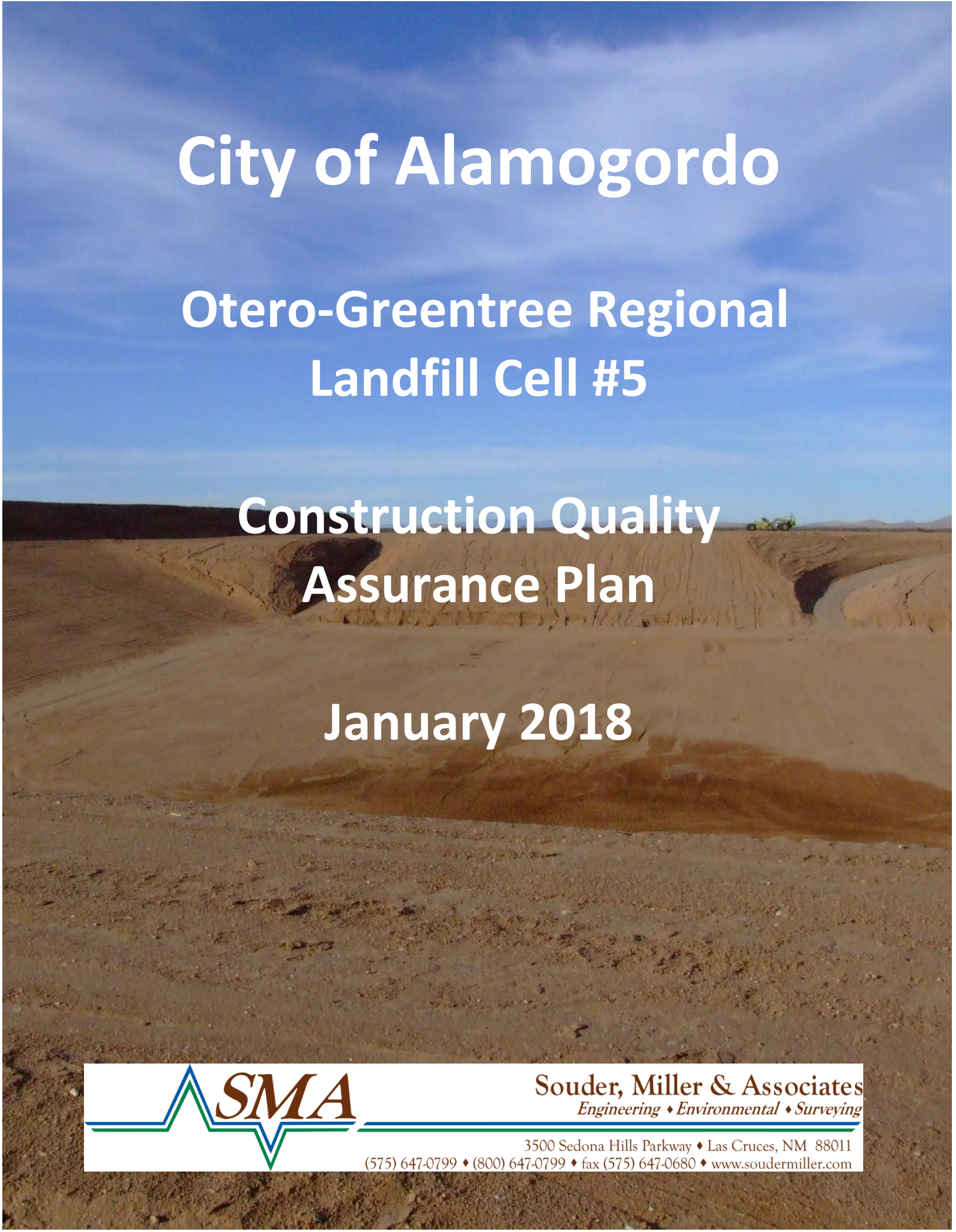
ARTICLE 20 DIGITAL VIDEO RECORDING

20.1 Prior to initiating construction operations, CONTRACTOR, shall perform digital video recording of the entire project, its full length and width. The CONTRACTOR, shall also include or add as necessary, any areas to be disturbed for material storage, employee parking or equipment storage.

The video documentation shall be completed in digital format; it shall be a minimum resolution of 1920 x 1080 pixels, at 60 fps (frame per second) and in color. The video documentation shall be performed between 10:00 a.m. and 2:00 p.m. during periods of full sun exposure. The actual date of recording shall be date-stamped within each frame of the video. Approval of the video must be obtained from the ENGINEER prior to the commencement of any clearing and grubbing operations.

A DVD copy of the video recording shall be submitted to the ENGINEER, in the format compatible with standard DVD players.

All cost associated with the video recording specified in this article shall be considered incidental to other related items of work and no separate payment will be made unless specifically indicated elsewhere in the Special Provisions.



City of Alamogordo

Otero-Greentree Regional Landfill Cell #5

Construction Quality Assurance Plan

January 2018

SMA
Souder, Miller & Associates
Engineering ♦ Environmental ♦ Surveying
3500 Sedona Hills Parkway ♦ Las Cruces, NM 88011
(575) 647-0799 ♦ (800) 647-0799 ♦ fax (575) 647-0680 ♦ www.soudermiller.com

SECTION 1.0 INTRODUCTION

This Construction Quality Assurance Plan (CQAP), in accordance with New Mexico Environment Department (NMED) Testing and Quality Control for Liner installation, is provided to supplement the project specifications. New Mexico Administrative Code (NMAC) 20.9.4.14 requires that a site-specific CQAP be submitted and approved by the NMED prior to commencement of any construction activities. Adherence to the procedures and policies of this CQAP will ensure that the completed work will have been constructed to meet or exceed all design criteria plans and specifications. Additionally, as per 20.9.3.21.A NMAC, at least 14 days prior to the start of solid waste facility construction, the owner or operator shall provide NMED with a major milestone schedule for construction activities.

1.1 Document Purpose

This CQAP is for construction activities at the Otero-Greentree Regional Landfill as contracted by the City of Alamogordo (Owner). The Plan objective is to ensure that construction requirements are properly implemented and that the design and performance standards are achieved. The components of the construction that will require some form of inspection or testing as described by the CQAP are as follows:

- Basegrading
- HDPE liner and GCL Construction
- Geotextile
- Granular Fill Materials
- Leachate Pipe Materials
- Leachate Collection System
- Soil Infiltration Layer

This plan includes four elements. These are:

a. Responsibility and Authority

b. Personnel Qualifications

c. Inspection Activities

d. Documentation

This CQAP provides guidance and requirements to determine that:

a. Critical materials specified in the contract documents are supplied and installed in accordance with the source, design, and performance criteria in order to meet the overall intent of the construction.

b. CQAP reports, samples, and test results are substantiated and maintained as proof to the quality of construction in accordance with the approved design criteria for each site.

c. Each party involved has a clear understanding of what is required for each component of the construction therefore decreasing the possibility for confusion over the minimum acceptable requirements during construction.

1.2 Document Users

Use of this document will be required of the following companies and agencies participating in the construction.

- New Mexico Environment Department Solid Waste Bureau
- Owner
- Consulting Engineer
- Construction Quality Assurance Personnel
- General Contractor & Subcontractors
- Approved Testing Laboratories

Any other subcontractor, subconsultant, or laboratory that eventually becomes a participant in the project will also be required to implement the provisions of this document.

1.3 Concepts of Construction Quality Control/Assurance

The management of construction quality is the responsibility of the Engineer. This function involves the use of appropriate scientific and engineering principles and practices to confirm that the specific landfill components have been constructed to meet or exceed the intent of the design criteria, plans, and specifications. To accomplish this, construction quality control activities will be performed by the Supervising Contractor and provided to the CQAP Certifying Engineer for approval and incorporation into a final construction completion report. Construction quality control is a planned system of inspections that is used to directly monitor and control the quality of the construction process. The construction quality assurance will be performed by the Construction Quality Assurance Personnel. Therefore, the quality assurance will be performed independently of the parties engaged in direct construction activities. Quality assurance will include the inspections, verifications, audits, and evaluations of materials and workmanship detailed in this plan, necessary to determine and document the quality of construction for the facility.

1.4 Scope of Quality Control and Quality Assurance

The scope of this CQAP includes full-time quality assurance of the construction activities.

This CQAP does provide guidance for design, testing, and material requirements according to the Solid Waste Rules 20.9.2 – 20.9.10 NMAC, and particularly 20.9.3.21 (B) NMAC, 20.9.4.13 NMAC, 20.9.4.14 NMAC, and 20.9.4.15 NMAC.

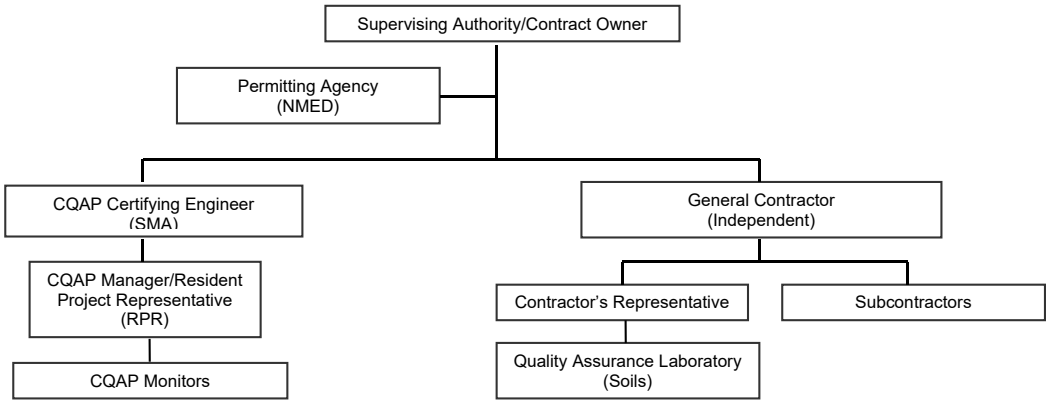
1.5 References

The CQAP includes references to test procedures of the American Society for Testing and Materials (ASTM). Recognizing the changing nature of the above standards, this CQAP is subject to periodic revision until its full implementation.

SECTION 2.0 CQAP MANAGEMENT

The parties discussed in this section are associated with the design, transportation, execution, and quality assurance of the construction activities at the Otero-Greentree Regional Landfill. The definitions, qualifications, and responsibilities of these parties are outlined in the following subsections. **Figure 2-1** provides an organizational layout of the parties.

Figure 2-1
Organizational Chart
Construction Activities
Otero-Greentree Regional Landfill
Otero County, New Mexico



All CQAP personnel will be employed by an organization that operates independently of the Supervising Authority/Contract Owner and General Contractor. However, the Owner may be involved in CQAP activities under the direct supervision of the CQAP Certifying

Engineer and/or CQAP Manager. The CQAP Manager/Resident Project Representative (RPR) and the CQAP Monitors can be held by same individual given project size and complexity.

2.1 Supervising Authority/Contract Owner

The City of Alamogordo (Owner) is the Supervising Authority/Contract Owner for the design, construction and final closure of the landfill facility. This responsibility includes complying with the requirements of the permitting agency, New Mexico Environment Department (NMED), and reviewing the submitted CQAP documentation to ensure that the landfill improvements were constructed as specified in the design. Owner has the authority to select and dismiss organizations charged with design, CQAP, and construction activities. Owner also has the authority to accept or reject design plans and specifications, CQAP, reports and recommendations of the CQAP Manager/Resident Project Representative (RPR), and the materials and workmanship of the General Contractor (when not acting as the General Contractor).

2.2 General Contractor

2.2.1 Responsibilities

The General Contractor is the principal contractor retained by Owner to perform the construction activities, unless Owner self-performs the construction. In this event, Owner will take on the responsibilities of the General Contractor during CQAP activities. The General Contractor is responsible for scheduling and coordination of the required work with subcontractors (as necessary) to complete the project. The General Contractor shall provide a representative at all times during any construction activity onsite. The General Contractor is responsible for furnishing as-built drawings and a copy of complete documentation for the construction. The General Contractor is also responsible for updating all design drawings onsite daily for all deviations from the contract drawings. All deviations must be initialed and approved by the responsible CQAP Manager/RPR onsite.

2.2.2 Qualifications

The General Contractor shall be qualified to perform all aspects of work required to successfully construct the project. The General Contractor shall be licensed in the State of New Mexico and shall demonstrate prior related experience. If Owner self-performs the construction, it shall be exempt from these qualifications.

2.3 Contractor's Representative

2.3.1 Responsibilities

The Contractor's Representative is responsible for coordinating and supervising his crew and subcontractors' work onsite. In the event that Owner self-performs the construction efforts, Owner will take on the responsibilities of the Contractor’s Representative. The Contractor's Representative is responsible for making sure that the construction activities are conducted in accordance with the plans and specifications. The Contractor’s Representative is responsible for properly labeling, packaging and

shipping all of the laboratory test samples. The Contractor's Representative is responsible for pointing out to the CQAP Manager/RPR any discrepancies between the plans and specifications and the field conditions. The Contractor's Representative is responsible for attending all meetings held related to the project. The Contractor's Representative is responsible for keeping a log of all construction activities onsite. The Contractor's Representative is responsible for proposing alternative methods, where necessary, to the CQAP Manager/RPR for approval and signature as required per the specifications.

2.3.2 Qualifications

The Contractor's Representative shall be a qualified individual who is able to perform all the tasks associated with the construction activities. The Contractor's Representative shall demonstrate prior and similar experience to the CQAP Manager/RPR. The Contractor's Representative shall have the authority to direct and instruct his crew and his subcontractors (as necessary).

2.4 CQAP Certifying Engineer

2.4.1 Responsibilities

The CQAP Certifying Engineer is responsible for all CQAP activities being performed during construction. The CQAP Certifying Engineer may have also performed the engineering design and preparing the associated drawings and specifications for the construction activities, however, this role may be performed by others. The CQAP Certifying Engineer is responsible for approving all design and specification changes and making design clarifications necessitated during the construction activities. The CQAP Certifying Engineer is responsible for reviewing and approving shop drawings submitted by the General Contractor, as required by the contract documents. The CQAP Certification Engineer is also responsible for submitting the final record drawings and certification report to the Supervising Authority/Contract Owner and the NMED. The CQAP Certifying Engineer will be employed by an organization that operates independently of the Supervising Authority/Contract Owner and General Contractor. CQAP Certifying Engineer is responsible for checking of field and laboratory methods and results for accuracy, maintaining test data for future reporting, acceptance and approval of materials and workmanship, education of inspection personnel in CQA requirements and procedures, and assuring that the project is constructed according to the NMED approved plans and specifications.

2.4.2 Qualifications

The CQAP Certifying Engineer shall be licensed by the New Mexico State Board of Licensure for Professional Engineers and Surveyors. The CQAP Certifying Engineer shall be familiar with all applicable regulatory requirements.

2.5 CQAP Manager/Resident Project Representative (RPR)

2.5.1 Responsibilities

The CQAP Manager/RPR is responsible for observing and documenting activities related to the construction on behalf of the Supervising Authority/Contract Owner. In the scope of this document, the term CQAP Manager/RPR applies to a qualified individual(s) assigned by the CQAP Certifying Engineer to oversee construction activities.

The specific duties of the CQAP Manager/RPR personnel are as follows:

a. Perform Field Quality Control observation and documentation. Quality assurance documentation shall be used to review Construction Quality Control (CQC).

b. Develop a site-specific addendum for the quality assurance plan (if necessary) with the assistance of the CQAP Certifying Engineer.

c. Review all Manufacturer and Installer certifications and documentation and make appropriate recommendations, as required by the contract documents.

d. Review installer personnel qualifications for conformance with those qualifications pre-approved for work onsite.

e. Review design criteria, plans and specifications for clarity and completeness, so that the CQAP can be implemented.

f. Prepare a summary of the quantities of materials installed and tested.

g. Prepare summaries of the cover-system quality assurance activities.

h. Oversee the marking, packaging, and shipping of all laboratory test samples.

i. Review the result of laboratory testing and makes appropriate recommendations to CQAP Certifying Engineer.

j. Report any unapproved deviations from the CQAP to the CQAP Certifying Engineer.

k. Prepare the final certification report.

l. Monitor the following operations for all cover system material:

    1) Material delivery
    2) Unloading and onsite transport and storage
    3) Sampling for conformance testing
    4) Deployment operations and documentation
    5) Visual inspection by walkover
    6) Repair operations

m. Document any onsite activities that could result in damage to the cover system. Any problems noted shall be reported as soon as possible to the CQAP Certifying Engineer.

n. Identification of work to the CQAP Certifying Engineer that the CQAP Manager/RPR believes should be accepted, rejected or uncovered for observation, or that may require special testing, inspection, or approval.

o. Rejection of defective work and verification that corrective measures are implemented.

p. Reviewing design criteria, plans, and specifications for clarity and completeness so that the CQAP can be implemented.

q. Educating CQAP inspection personnel on CQAP requirements and procedures, as necessary.

r. Scheduling and coordinating CQAP inspection activities.

s. Provide copies of any logs, summary reports, or other documentation requested by the CQAP Certifying Engineer.

2.5.2 Qualifications

The CQAP Manager/RPR should possess formal training, be qualified by experience (specified in project specifications) and have an in-depth familiarity with the project and knowledge regarding all aspects of landfill construction.

2.6 Construction Quality Assurance Monitors

2.6.1 Responsibilities

The term “CQAP Monitor” applies to any qualified individuals working under the CQAP Manager/RPR to implement the CQAP, as deemed appropriate based upon the burden of inspection, sampling, and documentation necessary during construction activities. The overall responsibility of CQAP Monitors is to perform the activities specified in this plan (e.g., inspection, sampling, documentation). CQAP Monitors will observe all critical components of the stormwater control system, basegrading, GCL and HDPE liner construction, geotextile, granular fill materials, leachate pipe materials, and soil infiltration layer.

The specific responsibilities and authority of each of these individuals, as amended by the CQAP Manager/RPR, are defined as follows:

a. Reviews all design drawings and specifications.

b. Reviews other site-specific documentation, including proposed layouts and manufacturer and installer literature.

c. Reviews all changes to design drawings and specifications as issued by the CQAP Certifying Engineer.

d. Acts as an onsite representative of the Supervising Authority/Contract Owner.

e. Attends all quality assurance related meetings.

f. Participates in the preparation of the record drawings.

g. Reviews all reports, logs, and photographs.

h. Notes any onsite activities that could result in damage to the cover system.

i. Reports to the CQAP Manager/RPR, and logs in any reports and relevant observations.

j. Prepares his own summary reports.

k. Oversees the monitoring and documentation (including photographic) of all installation operations. Photographs shall be taken routinely and in critical areas of the installation sequence. Operations related to GCL and geomembrane activities to be monitored include:

    a. Subgrade preparation

    b. Weather conditions

    c. Conformance testing

    d. Material delivery

    e. Unloading and on-site transport and storage

    f. Sampling for conformance testing

    g. Deployment operations

    h. Joining and/or seaming operations (geomembrane, geo fabric, and GCL)

    i. Condition of panels placed

    j. Repair operations

    k. Trial seams

    l. Seam preparation

    m. Seaming

n. Nondestructive seam testing

o. Sampling for destructive seam testing

p. Appropriate logging of seaming and patching testing

q. Field tensiometer testing

r. Laboratory sample marking

s. Leachate Collection System construction

l. Prepares daily summaries of quantities of material installed each day

m. Prepares a weekly summary of the liner and/or cover system quality assurance activities

2.6.2 Qualifications

CQAP Monitors shall be familiar with all aspects of landfill construction and have sufficient practical, technical, and administrative experience to execute and record inspection activities.

2.7 Field Liner Installation Manager

2.7.1 Responsibilities

The Field Liner Installation Manager is the individual provided and assigned by the Installer (Contractor) to be his field representative, and to provide supervision and guidance to the installation crew. The Field Liner Installation Manager is responsible for providing guidance and supervision to the installation crew to ensure that the geosynthetic products are installed in accordance with the manufacturer guidelines and the project plans and specifications. The Field Liner Installation Manager is responsible for conducting all the required field testing and coordinating and reporting all conflicts to the Contractor's Representative and the CQA Monitor. The Field Liner Installation Manager is responsible for keeping a daily log of all activities related to geosynthetic products installed and attending all related project meetings.

2.7.2 Qualifications

The Field Liner Installation Manager must be qualified based on previously demonstrated experience, management ability, and authority. The Field Liner Installation Manager shall have previously managed the installation of at least a total of 2,000,000 square feet of geosynthetic products using the same type of seaming apparatus to be used at the site.

2.8 Geosynthetic Clay Liner (GCL) Installer

2.8.1 Responsibilities

The Liner Installer is the firm responsible for installation of the GCL products. In the context of this plan, the Liner Installer is the approved installer trained and certified to install the Manufacturer's GCL. The Liner Installer shall be responsible for field handling, storing, deploying, seaming, temporary restraining and all other aspects of the geosynthetics installation. The Liner Installer shall be responsible for submittal of the documentation listed in Section 2.8.3 of this document.

2.8.2 Qualifications

The Liner Installer shall be certified to install the manufacturer's GCL. The Liner Installer shall be pre-qualified and approved by the Owner's Representative. The Liner Installer shall be able to provide qualified personnel to meet the demands of the project. The Liner Installer may be required to provide a Field Liner Installation Manager.

2.8.3 Submittal

2.8.3.1 Pre-Qualification

To be considered for pre-qualification, the Liner Installer shall submit the following information:

a. Corporate background and information

b. Description of installation capabilities:

   i. Information on equipment (numbers and types), personnel (number of site managers, number of crews).

   ii. Average daily production anticipated.

c. A list of completed facilities (projects), totaling a minimum of 1,000,000 square feet for which the Liner Installer has installed geomembrane. For each installation, the following information shall be provided:

   i. Name and purpose of facility, location, and date of installation.

   ii. Name of owner, design engineer, manufacturer, and contact at the facility who can discuss the project.

   iii. Type and thickness of product and surface area of the installed product.

   iv. Type of seaming, patching and tacking equipment used.

   v. A copy of the manufacturer's certification or approval letter.

vi. Resume of the qualifications of the Field Liner Installation Manager and Master Seamer.

d. The Liner Installer's quality control manual.

e. A copy of letters of recommendation supplied by the GCL liner manufacturers.

f. Five letters of reference from clients/owners who have worked with the proposed superintendent attesting to Liner Installer's quality of work, date performed, adherence to project schedule, and responsiveness to quality control deficiencies.

2.8.3.2 Pre-Installation

Prior to commencement of the installation, the Liner Installer must submit to the CQA Monitor:

a. Resume of the Field Liner Installation Manager to be assigned to this project, including dates and duration of employment.

b. Resume of the Master Seamer to be assigned to this project, including dates and duration of employment.

c. A panel layout drawing showing the installation layout identifying field seams as well as any variance or additional details which deviate from the engineering drawings. The layout shall be adequate for use as a construction plan and shall include dimensions, details, etc.

d. Installation schedule.

e. A list of personnel performing field seaming operations along with pertinent experience information.

f. All GCL quality control certificates as required by this CQAP (unless submitted directly to the CQA Monitor by the Manufacturer).

g. Documentation that bentonite to be used for seaming of the GCL is the same type as the liner and is recommended by the Manufacturer.

2.8.3.3 Installation

During the installation, the Liner Installer shall be responsible for the submission of

a. Quality control documentation recorded during installation.

b. Subgrade surface acceptance certificates for each area to be covered by the lining system, signed by the Liner Installer.

2.8.3.4 Completion

Upon completion of the installation, the Liner Installer shall submit:

a. The warranty obtained from the Manufacturer

b. The installation warranty.

2.9 Polyethylene Geomembrane Liner Installer

2.9.1 Responsibilities

The Liner Installer is the firm responsible for installation of the geosynthetic products. In the context of this plan, the Liner Installer is the Manufacturer or an approved installer trained and certified to install the Manufacturer's geomembrane. The Liner Installer shall be responsible for field handling, storing, deploying, seaming, temporary restraining and all other aspects of the geosynthetics installation. The Liner Installer shall be responsible for submittal of the documentation listed in Section 2.9.3 of this document.

2.9.2 Qualifications

The Liner Installer shall be certified to install the manufacturer's geomembrane material. The Liner Installer shall be pre-qualified and approved by the Owner's Representative. The Liner Installer shall be able to provide qualified personnel to meet the demands of the project. The Liner Installer may be required to provide a Field Liner Installation Manager.

2.9.3 Submittal

2.9.3.1 Pre-Qualification

To be considered for pre-qualification, the Liner Installer shall submit the following information:

a. Corporate background and information

b. Description of installation capabilities:

   i. Information on equipment (numbers and types), personnel (number of site managers, number of crews).

   ii. Average daily production anticipated.

   iii. A minimum of three samples of field geomembrane seams and a list of minimum values for geomembrane seam properties.

c. A list of at least three completed facilities (projects), totaling a minimum of 500,000 square feet for which the Liner Installer has installed geomembrane. For each installation, the following information shall be provided:

   i. Name and purpose of facility, location, and date of installation.

ii. Name of owner, design engineer, manufacturer, and contact at the facility who can discuss the project.

iii. Type and thickness of product and surface area of the installed product.

iv. Type of seaming, patching and tacking equipment used.

v. A copy of the manufacturer's certification or approval letter.

vi. Resume of the qualifications of the Field Liner Installation Manager and Master Seamer.

d. The Liner Installer's quality control manual.

e. A copy of letters of recommendation supplied by the geomembrane liner manufacturers.

f. Five letters of reference from clients/owners who have worked with the proposed superintendent attesting to Liner Installer's quality of work, date performed, adherence to project schedule, and responsiveness to quality control deficiencies.

2.9.3.2 Pre-Installation

Prior to commencement of the installation, the Liner Installer must submit to the CQA Monitor:

a. Resume of the Field Liner Installation Manager to be assigned to this project, including dates and duration of employment.

b. Resume of the Master Seamer to be assigned to this project, including dates and duration of employment.

c. A panel layout drawing showing the installation layout identifying field seams as well as any variance or additional details which deviate from the engineering drawings. The layout shall be adequate for use as a construction plan and shall include dimensions, details, etc.

d. Installation schedule.

e. A list of personnel performing field seaming operations along with pertinent experience information.

f. All geosynthetic quality control certificates as required by this CQAP (unless submitted directly to the CQA Monitor by the Manufacturer).

g. Certificates that extrudate to be used is comprised of the same resin as the geomembrane to be used.

The documentation shall be reviewed by the CQA Monitor as outlined in Section 2.6 of this CQAP, before installation of the geosynthetic can begin.

2.9.3.3 Installation

During the installation, the Liner Installer shall be responsible for the submission of

a. Quality control documentation recorded during installation.

b. Subgrade surface acceptance certificates for each area to be covered by the lining system, signed by the Liner Installer.

2.9.3.4 Completion

Upon completion of the installation, the Liner Installer shall submit:

a. The warranty obtained from the Manufacturer

b. The installation warranty.

2.10 Manufacturer

2.10.1 Responsibilities

The Manufacturer is the firm or corporation responsible for production of the geosynthetic material to be used in the project. The Manufacturer is responsible for the condition of the geosynthetic until the material is accepted by the Owner or CQA Monitor upon delivery. The Manufacturer shall produce a consistent product meeting the project specifications, and shall provide quality control documentation for the project specified herein.

2.10.2 Qualifications

Prior to shipment of any material, each Manufacturer shall be pre-qualified by the CQA Manager/RPR. Each Manufacturer shall provide sufficient production capacity and qualified personnel to meet the demands of the project as identified in the project specifications. Each Manufacturer shall have an internal quality control program for its product that meets the specified requirements. The Manufacturer is the firm or corporation responsible for production of the geosynthetic.

2.10.2.1 Pre-Qualification

Each Manufacturer shall meet the following requirements and submit the following information to be considered for pre-qualification:

a. Corporate background and information

b. Manufacturing capabilities:

    a. Information on plant size, equipment, personnel, number of shifts per day, and capacity per shift.

b. A list of material properties and samples of liner with attached certified test results.

c. GCL Manufacturer must have produced at least 10 million square feet (1 million square meters) of GCL, with at least 8 million square feet (800,000 square meters) installed.

d. A list of at least 10 completed facilities (projects) totaling a minimum of 5,000,000 square feet for which the Manufacturer has manufactured geosynthetic product. For each facility, the following information shall be provided:

i. Name and purpose of facility, location, and date of installation.

ii. Name of owner, project manager, design engineer, and installer.

iii. Type and thickness of product, and surface area of installed product.

iv. Available information on the performance of the lining system and the facility.

c. The Manufacturer's quality control manual, including a description of the quality control laboratory facilities.

d. The Manufacturer's Field Installation Quality Control Manual. At a minimum, the manual shall contain procedures and recommendations for the following:

a. Geomembrane deployment

b. Field panel placement

c. Geomembrane seaming

d. Seam testing (destructive, non-destructive for field and laboratory)

e. Repair of defects

e. The origin (supplier's name and production plant) and identification (brand name and number) of resin used to manufacture the product.

f. A fingerprint of the Manufacturer's geosynthetic product (for polyethylene-based geosynthetics) in accordance with fingerprinting protocol listed in Appendix A, Tables A-2 and A-3 of this CQAP.

g. Manufacturer's NSF certification.

2.10.2.2 Pre-Installation

Prior to the installation of any geosynthetic material, each Manufacturer must submit to the CQA Manager/RPR all quality control documentation required by the appropriate section of this CQAP. This documentation shall be reviewed and approved by the CQA Manager/RPR before installation can begin.

2.11 Master Seamer

2.11.1 Responsibilities

The Master Seamer is the individual assigned by the Installer to conduct seaming operations of the geosynthetic products. The Master Seamer is responsible for seaming the geosynthetic products in accordance with the manufacturer guidelines and the project plans and specifications. The Master Seamer is responsible for maintaining a top quality seaming product free from defects and irregularities. The Master Seamer is responsible for reporting seaming problems and defects to the Field Installation Manager.

2.11.2 Qualifications

The Master Seamer shall be a qualified individual who has previous experience in seaming the geosynthetic products. The Master Seamer shall demonstrate that he has seamed a minimum of 500,000 square feet of the geosynthetic product.

2.12 Quality Assurance Laboratory (QAL)

2.12.1 Responsibilities

The Quality Assurance Laboratory is a firm, independent from the Supervising Authority/Contract Owner and General Contractor, responsible for conducting geotechnical testing on samples required for the project.

The Quality Assurance Laboratory shall be responsible for conducting the appropriate laboratory tests in accordance with this CQAP or as directed by the CQAP Manager/RPR. The test procedures shall be in accordance with the test methods specified. The Quality Assurance Laboratory shall be responsible for providing tests results as outlined in this CQAP.

2.12.2 Qualifications

The Quality Assurance Laboratory/Laboratories shall be an approved certified laboratory having experience in testing soils, and familiarity with American Society for Testing and Materials (ASTM) and other applicable test standards.

2.13 Permitting Agency

The Permitting Agency, NMED, has the responsibility to review the CQAP for compliance with the Department's regulations and to make a decision to approve or

deny the Plan. The NMED will have the responsibility and authority to review and accept or reject any design revisions or requests for variance that are submitted by the facility applicant after the CQAP is approved. The Permitting Agency also has the responsibility and authority to enforce compliance with the permit requirements during the construction process and may review all CQAP documentation during or after facility construction to confirm that the approved CQAP was followed and that the facility was constructed as specified in the design. Finally, the NMED will review the certification report and make a decision as to whether the basegrading, GCL, HDPE, geotextile, granular fill materials, leachate pipe materials, soil infiltration layer, and stormwater control structures was constructed in accordance with the CQAP.

2.14 Communications Between Parties

To guarantee a high degree of quality during construction and assure a final product that meets all of the project plans and specifications, open channels of communication are essential. This section discusses appropriate lines of communication and describes all necessary meetings.

2.14.1 Lines of Communication

All lines of communication shall go through the CQAP Certifying Engineer who, in turn, will direct the necessary course of action.

2.14.2 Pre-Construction Meeting

A pre-construction meeting shall be held before any construction activity begins. The meeting shall be attended by the Supervising Authority/Contract Owner, General Contractor (if contracted), CQAP Certifying Engineer, CQAP personnel and any appropriate subconsultants, subcontractors, suppliers and utilities. The following is a list of CQAP related items suggested for discussion at the pre-construction meeting.

a. Familiarizing each organization with the CQAP and its role relative to the construction.

b. Providing each organization with all relevant CQAP/CQC documents.

c. Defining the lines of authority and reviewing the responsibilities of each organization.

d. Discussing the established procedures or protocol for handling construction deficiencies, repairs, and retesting.

e. Reviewing methods for documenting and reporting field data.

f. Reviewing methods for distributing and storing documents.

g. Reviewing work area security and safety protocols.

h. Discussing procedures for the location and protection of construction materials and for the prevention of damage to the materials from inclement weather or other adverse events.

i. Conducting a site walk-around to review construction material, inspect borrow source site, and inspection equipment storage locations.

j. The meeting shall be documented and minutes will be transmitted to all parties by the CQAP Certifying Engineer.

2.14.3 Progress Meetings

Progress meetings between the CQAP Certifying Engineer, CQAP Manager/RPR, Contractor's Representative, and any other concerned parties (e.g. other subconsultants, subcontractors, and suppliers) shall be held periodically during construction. These meetings shall discuss current progress, planned activities, and schedule for the upcoming weeks, issues requiring resolution and any new business or revisions to the work. The CQAP Manager/RPR shall log any problems, decisions, or questions arising at this meeting in his progress report. If any matter remains unresolved at the end of this meeting, the CQAP Manager/RPR and/or CQAP Certifying Engineer shall be responsible for the resolution of the matter and the communication of the decision to the appropriate parties.

SECTION 3.0 INSPECTION ACTIVITIES

3.1 Scope of Inspection Activities

Throughout implementation of the construction activities there will be numerous inspections and testing requirements for specific work tasks. The inspection and testing requirements will ensure compliance with the design as presented in the construction drawings and specifications, as well as ensure completion of the work tasks to the highest level of quality. Inspections and testing will provide a means of monitoring the quality and progress of work performed.

The components of the construction that will require some form of inspection or testing as described by the CQAP are as follows:

- Basegrading
- HDPE liner and GCL Construction
- Geotextile
- Granular Fill Materials
- Leachate Pipe Materials
- Soil Infiltration Layer (Soil Cushion)

The inspections and testing is described in further detail in the Sections below.

3.2 Scope of Inspection Activities

Throughout the period of construction, the quality of work completed and material used for each of the work tasks will be maintained at its highest possible level through regular inspections of the work. The CQA Manager and/ or Resident Project Representative (RPR) and representatives of the Owner (as required) will complete inspections throughout the construction period.

Overall, inspections to be conducted by the CQA Manager/RPR include the following:

a. Daily inspections of the work progress

b. Inspections of material at the time of delivery to the site to check for characteristics rendering the material unsuitable for use

c. Comparison of the material delivered to design specifications to ensure that the material delivered meets applicable project specifications.

3.2.1 Pre-construction Inspection

A pre-construction inspection will be performed prior to beginning work on any major task. The pre-construction inspection will include the following:

a. Review of contract requirements to ensure that all materials and/or equipment have been determined to meet applicable standards and specifications.

b. Confirmation that provisions have been made to provide required quality control testing.

c. Examination of the work area to ascertain that all applicable preliminary work tasks have been completed.

d. Coordination of work activities with corresponding CQAP required testing and inspections.

3.2.2 General Inspections

General inspections will be performed periodically as the amount of work completed warrants and at critical junctures. A general inspection will include the following:

a. Examination of quality of workmanship

b. Testing of materials for compliance with contract requirements.

c. Identification of any omissions

d. Record of general progress of construction activities

3.2.3 Final Inspections

Final inspections will be performed upon completion of each work task to ensure compliance with the Project Plans and Specifications and to ensure that deficiencies identified in the general inspections have been corrected.

The CQA Manager/RPR will perform these inspections and the results of the inspections will be provided in the final construction report. The CQA Certifying Engineer will notify Supervising Authority/Contract Owner and NMED representatives at least three days in advance of any major final inspections. The results of all inspections will be recorded in the CQA Manager/RPR's site logbook.

3.3 Testing

In addition to the CQA inspections, quality control testing of materials will be carried out as required in the CQAP and the Project Plans and Specifications. Testing of select materials provides additional assurances that the component has been properly installed and coordinated with the other components of construction.

The testing requirements, applicable test methods, testing frequency, and acceptance criteria for relevant work task materials and components are detailed in the project specifications, and are summarized in Sections 5 and 6 of this exhibit.

SECTION 4.0 GEOSYNTHETICS MANUFACTURING AND DELIVERY

4.1 Manufacturing

4.1.1 Raw Material

The raw material shall be first quality resin containing no more than 2% clean recycled polymer by weight, and meeting the following specifications:

Specific Gravity (ASTM D792 Method A or ASTM D1505): >0.94 g/cc, Melt Index (ASTM D1238 Condition 190/2.16): $\leq$1.0 gm/10 min.

Quality control testing shall be carried out by the Manufacturer to demonstrate that the product meets this specification.

Prior to liner delivery and installation, the Manufacturer shall provide the CQA Manager/RPR with the following information:

a. The origin (resin suppliers name, resin production plant), identification (brand name, number) and production date of the resin;

b. A copy of the quality control certificates issued by the resin supplier noting results of density and melt index;

c. Reports on the tests conducted by the Manufacturer to verify the quality of the resin used to manufacture the geomembrane rolls assigned to the considered facility [these tests should include Specific Gravity (ASTM D792 Method A or ASTM D1505) and Melt Index (ASTM D1238 Condition 190/2.16)];

d. Reports on the tests conducted by the Manufacturer to certify the quality of the liner sheet.

4.1.2 Geosynthetics Manufacturing

Prior to liner delivery and installation, the Manufacturer shall provide the CQA Manager/RPR with the following:

a. The properties sheet including, at a minimum, all specified properties, measured using test methods indicated in the specification, or equivalent;

b. The CQA Manager/RPR shall verify that:

i. The property values certified by the geosynthetic Manufacturer meet all of the specifications; and

ii. The measurements of properties by the Manufacturer are properly documented, and that the test methods used are acceptable.

4.1.3 Rolls

After receipt of material, the Manufacturer shall provide the CQA Manager/RPR with one quality control certificate for every roll of geosynthetics provided. The quality control certificate shall be signed by the Manufacturer's responsible party. The quality control certificate shall include at a minimum:

a. Roll numbers and identification

b. Results of quality control tests. As a minimum, ASTM test methods shall be used to test for thickness, tensile strength, and tear resistance.

4.2 Delivery, Storage and Handling

4.2.1 Delivery and Handling

a. The geosynthetic products shall be packaged and shipped by appropriate means to prevent damage of the material. Off-loading and storage of the geosynthetic is the responsibility of the Contractor. The Contractor shall be responsible for replacing any damaged or unacceptable material. Geosynthetic products shall be carefully off loaded prior to unwrapping any product. For off-loading, appropriate equipment equipped with a cloth sling shall be used.

b. No off-loading shall be performed unless CQA Manager/RPR and/or CQA Monitor is present. Damage during off-loading shall be documented by the CQA Manager/RPR and/or CQA Monitor. All damaged products must be separated from the undamaged products until the proper disposition of that material has been determined by the CQA Manager/RPR and/or CQA Monitor.

c. Geosynthetic products shall be stored so as to be protected from light, puncture, dirt, grease, water, moisture, mud, mechanical abrasions and excessive heat that may damage the geosynthetic material. The rolls shall be stored on a prepared level surface (not wooden pallets) without sharp edges and shall not be stacked more than two rolls high (rolls shall be limited to a maximum of 5 feet diameter).

4.2.2 Storage

The delivered material shall be stored in a location (or several locations) such that on-site transportation and handling are minimized. Storage space shall be protected from theft, vandalism, passage of vehicles, and be adjacent to the area to be lined.

SECTION 5.0 LINER AND LEACHATE COLLECTION SYSTEM CONSTRUCTION QUALITY ASSURANCE

Construction of the liner and leachate collections systems must be in accordance with the approved design plans and Project Specifications. This CQAP establishes the construction quality assurance monitoring and testing program designed to ensure construction compliance. The liner and leachate collection system quality assurance testing program consists of the testing requirements of the high-density polyethylene (HDPE) liner, geosynthetic clay liner (GCL), drainage material, and leachate pipe materials. Quality assurance testing and observation are required during construction of liner system components as described below.

5.1 Geosynthetic Clay Liner

5.1.1 Conformance Testing

Conformance testing shall be performed by the Quality Assurance Laboratory to assure compliance with the specifications. A 2.0 ft length by roll width sample is cut for quality assurance testing at the specified frequencies listed in the Certified Properties Table. The following tests shall be performed on the samples per Appendix A:

a. Bentonite Mass per Unit Area

b. Grab Strength

c. Grab Elongation

d. Peel Strength

e. Permeability

f. Internal Shear Strength (1 test total)

5.1.2 Execution

5.1.2.1 Basegrade Preparation

a. Preparation of the basegrade shall consist of the top six inches of the in-situ material being compacted to 95 percent of the Modified proctor density (ASTM 1557). Compaction shall be documented on the Field Compaction Testing Log (Appendix B). Acceptance of the subgrade by the Contractor shall be documented using the Subgrade Surface Acceptance Form (Appendix B).

b. The surface of the subgrade shall be smooth, uniform, free from sudden changes in grade (such as vehicular ruts), rocks, stones, debris and deleterious materials. During actual placing and seaming of the geomembrane, the subgrade shall be kept free of all standing water. If the subgrade below the geomembrane becomes wet and unstable, it shall be dried and recompacted.

c. All fill shall consist of well graded material that is free of organic, trash, clayballs, and other deleterious material that could damage the geomembrane. The upper six (6) inches of the finished subgrade shall not contain stones or debris larger than one half (1/2) inch. The subgrade shall have no sudden sharp or abrupt changes in grade.

d. The subgrade shall be protected from desiccation, flooding and freezing. Protection, if required, may consist of a thin plastic protective cover (or other material, as approved by the Engineer) that is installed over the completed subgrade until placement of the geomembrane liner begins. Subgrades found to have desiccation cracks greater than one half (1/2) inch in width or depth, or which exhibit swelling, heaving, or other similar conditions, shall be replaced or reworked.

e. The CQA Manager/RPR shall inspect and approve the basegrade before installation of the geosynthetic clay liner can proceed. It shall be the Contractor's responsibility to properly prepare and maintain the basegrade in a smooth, uniform and compacted condition during installation of the liner.

f. If the basegrade is damaged during liner installation, the Contractor shall restore, recompact and test the area and retest the basegrade prior to installing the liner.

g. The Contractor shall protect the geosynthetic clay liner delivered to the site from inclement weather conditions using plastic sheeting on other method approved by the Engineer. The stockpile shall be barricaded from any traffic that may occur near the stockpile.

5.1.2.2 Geosynthetic Clay Liner Placement

a. GCL rolls should be delivered to the working area of the site in their original packaging. Immediately prior to deployment, the packaging should be carefully removed. Unless otherwise specified, the GCL shall be installed such that the product name printed on one side of the GCL faces up.

b. Rolls shall be handled utilizing a solid steel bar inserted through the core bar and slings or chains attached to the ends of the bar. The core bar shall be suspended from a spreader bar so that the edges of the liner are not damaged by the suspending straps or chains.

c. Traffic across the GCL shall be minimized; Construction equipment shall not be used on top of the GCL. If the installation equipment causes rutting of the basegrade, the basegrade must be restored to its originally accepted condition prior to placement.

d. Care must be taken to minimize the extent to which the GCL is dragged across the basegrade in order to avoid damage to the bottom surface of the GCL. A slip sheet or rub sheet shall be used to reduce friction damage during significant movement of the GCL.

e. The GCL shall be placed so that field seams shall be oriented parallel to the line of maximum slope (i.e. oriented along, not across the slope); the number of field seams in corners and irregular shaped areas shall be minimized; there shall be no horizontal seam within five feet of the toe of the slope.

f. Seam areas or runs shall be flat and clear of any large rocks, debris, or ruts. Contacting surfaces shall be clean and clear of dirt or native soil with all edges pulled tight to maximize contact and to smooth out any wrinkles or creases. Longitudinal seams shall be overlapped a minimum of 6 inches. End of roll overlap shall be a minimum of 24 inches. Where liner is cut to fit in small areas or around structures overlap shall be a minimum of 1 foot and abundant bentonite shall be applied. All overlap amounts shall be verified by the Engineer. Overlap seams shall be placed so that the edge of the upper panel aligns with the appropriate match line on the lower panel.

g. The GCL shall be secured at the top of the slope in an anchor trench with the HDPE liner, as shown on the Drawings. Vertical seams within the anchor trench shall be sealed with an approved adhesive. Seams along the bottom shall be sealed per No. 6 above.

h. Seams shall be augmented with granular bentonite to insure seam integrity if recommended by the GCL manufacturer. Granular bentonite shall be dispersed evenly from the panel edge to the lap line at the manufacturer's recommended rate continuously along all seams or overlap areas. Accessory bentonite shall be of the same type as the material within the composite liner itself. Adhesives may be used on seams to keep panels in contact during backfill operation, if necessary.

i. GCL shall be manufactured by the needle punched-reinforced method. GCL shall not be allowed to hydrate to an extent greater than that recommended by the manufacturer. The Engineer, using the manufacturer's criteria, will decide if any wetted materials shall remain or be removed from the premises.

j. Large rips or tears shall be repaired by completely exposing the affected area, removing all foreign objects or soil, and by then placing a patch over the damage, with a minimum overlap of 24 inches on all edges. Accessory bentonite shall be placed between the patch and the repaired material at the manufacturer's recommended rate, spread in a 6-inch width.

k. Cutting the GCL should be performed using a sharp utility knife. Frequent blade changes are recommended to avoid damage to the geotextile components of the GCL during the cutting process.

l. Although direct vehicular contact with the GCL is to be avoided, lightweight, low wheel-pressure vehicles such as 4-wheel ATVs may be used to facilitate the installation of any geosynthetic material placed over the GCL. Vehicle type must be approved by Engineer prior to use.

m. Only as much GCL should be deployed in a given day as can be covered during that day by the HDPE liner. In the event wind conditions prohibit deploying HDPE, the GCL may be covered the following morning.

5.1.2.3 Field Quality Control

a. Documentation and observation files for field quality control shall be maintained by the CQA Manager/RPR. At the end of each work week the files shall be updated and checked to assure that all

copies of pertinent project information are included in each file. The CQA Manager/RPR shall submit daily copies of the documentation to the CQA Certifying Engineer. Forms to be completed include Daily Field Log, Daily CQA Report, Subgrade Surface Acceptance, Material Receiving Log, Daily Panel Placement Log, Daily Seaming Log and Field Compaction Testing Log. Forms are included as Appendix B.

b. Prior to placement of the HDPE liner over the GCL, the geotextile installation and related work shall be inspected by the CQA Manager/RPR and/ or CQA Monitor. All work in the system therein being inspected shall be complete, clean and ready for use. All work shall meet the requirements as to line, grade, cleanliness and workmanship, as determined by the CQA Certifying Engineer.

c. All discrepancies shall be noted and repaired at no additional expense. Final acceptance of the system shall be contingent upon the approval of the CQA Certifying Engineer.

5.2 High Density Polyethylene (HDPE) Geomembrane Liner

5.2.1 Conformance Testing

a. A minimum of 60-mil HDPE shall be used in all cell construction. Conformance testing shall be performed by an independent Quality Assurance Laboratory provided by the Owner. The CQA Manager/RPR and/ or CQA Monitor shall obtain samples from the delivered material, mark the machine direction and identification number. Samples shall be taken at the rate of one per two acres of installed liner or a minimum of one per lot. A lot is defined as a group of consecutively numbered rolls from the same manufacturing line. This sampling frequency may be increased as deemed necessary by the CQA Manager/RPR and/ or CQA Monitor. The samples shall be taken across the entire roll width and shall not include the first 3 feet. The following conformance tests shall be conducted at the laboratory:

i. Thickness (ASTM D751)

ii. Density (ASTM D792)

iii. Tensile properties (ASTM D638)

iv. Tear resistance (ASTM D1004)

v. Carbon black control (ASTM D1603)

vi. Carbon black dispersion (ASTM D3015)

b. These conformance tests shall be performed in accordance with Appendix A.

c. All conformance test results shall be reviewed by the CQA Manager/RPR and accepted or rejected, prior to the placement of the geomembrane. All test results shall meet, or exceed, the property values listed in Appendix A**.** In case of failing test results, the manufacturer may request that another sample be retested by the Quality Assurance Laboratory with Manufacturer's technical representative present during the testing procedures. The retesting shall be paid for by the manufacturer. The Manufacturer may also have the sample retested at two different laboratories approved by the Owner. If both laboratories report passing results, the material shall be accepted. If both laboratories do not report passing results, all geomembrane material from the lot representing the failing sample will be considered out of specification and rejected

5.2.2 Execution

5.2.2.1 Basegrade Preparation

a. Basegrade preparation shall be accomplished as specified in Section 5.1.2.1 of this exhibit, and the GCL shall be installed per Section 5.1 of this exhibit.

b. The geosynthetic liner material shall be installed over the GCL only after the condition of GCL has been thoroughly inspected, all seams and overlaps are per specified requirements, and approval is given by the CQA Manager/RPR for the work to proceed.

5.2.2.2 Anchor Trench

a. CQA Manager/RPR shall record information on anchor trench construction in his/her daily report. The anchor trench shall be constructed in accordance with plans and specifications.

b. Slightly rounded comers shall be provided in the trench to avoid sharp bends in the geomembrane.

c. The anchor trench shall be adequately drained to prevent water ponding and softening of adjacent soils. The anchor trench shall be backfilled with local fill material and compacted to 95 percent modified Proctor density, ASTM D1557.

d. If the anchor trench is located in a clay susceptible to desiccation, the amount of trench open at any time shall be limited to one day of geomembrane installation capacity

5.2.2.3 Geomembrane Placement

No geomembrane placement shall proceed without the presence of the CQA Manager/RPR or his/her designated CQA Monitor.

a. Weather Conditions

i. Geomembrane placement shall not proceed at an ambient temperature below 40 degrees F or above 104 degrees F unless otherwise authorized, in writing, by the CQA Manager/RPR. Geomembrane placement shall not be performed during precipitation, excessive moisture, in an area of ponded water, or excessive winds so as not to adversely affect the geomembrane installation.

ii. Method of Placement

1. Each panel of the geomembrane shall be rolled out and installed in accordance with the approved shop drawings prepared by the Contractor. The layout shall be designed to keep field joining of the geomembrane to a minimum and consistent with proper methods of HDPE geomembrane installation.

2. Geomembrane rolls shall be placed using proper spreader and rolling bars with cloth slings. If a sheet must be replaced a distance greater than its width, a slip sheet shall be used.

3. The CQA Manager/RPR and/ or CQA Monitor shall inspect each panel, after placement and prior to seaming, for damage and/ or defects. Defective or damaged panels shall be replaced or repaired, as approved by the CQA Manager/RPR and/ or CQA Monitor.

4. The installer shall not drag the geomembrane sheets on rough soil basegrades.

5. All geomembrane shall be anchored as shown on the drawings and consistent with Manufacturer's recommendations.

6. Personnel working on the geomembrane shall not smoke, wear damaging shoes or involve themselves in any activity that may damage the geomembrane.

7. All edges of the geomembrane shall be properly weighted to avoid uplift due to wind. Sand bags, if used, shall be tied shut.

8. Vehicular traffic across the geomembrane shall not be allowed.

9. All damage shall be recorded and located on the as-built drawings.

10. When tying into existing geomembrane, all excavation of previously installed liner shall be performed by hand to prevent damage.

11. The geomembrane shall be kept free of debris, unnecessary tools and materials. In general, the geomembrane area shall remain neat in appearance

iii. Liner Boots

1. HDPE boots or shrouds shall be furnished and installed where indicated on the drawings. The boots shall be of the same material as the geomembrane.

2. The geomembrane end of the boots shall terminate in a skirt section suitable for welding to the geomembrane. The overlap between the boot and the geomembrane shall be approximately 18 inches. The boot shall be welded to the geomembrane as previously specified herein.

3. Boots and shrouds shall fit snugly around the pipe. Prefabricated material shall be designed to fit site specific condition, for the intended slope and size of pipe.

4. Neoprene sponge rubber gasket shall be used between the boot or shroud and the pipe with a stainless steel clamp. An HDPE sacrificial sheet shall be used between the boot or shroud and the clamp for protection.

5. For pipes larger than 4 inches in diameter, a second clamp shall be used. The fastener of the second clamp shall be located on the opposite

side of the pipe from the first clamp, to compensate for uneven pressure and elongation

5.2.2.4 Seaming Weather Conditions

a. Normal weather conditions

   i. Ambient temperature higher than 40 degrees F and lower than 104 degrees F.

   ii. No precipitation or other excessive moisture, such as fog or dew.

   iii. No excessive winds.

   iv. These weather conditions shall be fulfilled during seaming process

b. Cold weather conditions are temperature below 40 degrees F, and the following conditions shall be met to ensure quality seaming process:

   i. Preheating the surface of the geomembrane to achieve normal temperature range.

   ii. Preheating may be waived by the CQA Manager/RPR and/or CQA Monitor if the installer demonstrates that satisfactory welds of equivalent quality may be obtained without preheating at the expected temperature of installation.

   iii. Preheating devices shall be approved by the Manufacturer.

   iv. Care shall be taken to assure that surface temperatures are not lowered below the minimum required surface temperature for welding due to winds.

   v. Additional destructive tests samples shall be taken at the discretion of the CQA Manager/RPR and/or CQA Monitor.

   vi. Test seams shall be performed under the same ambient temperature conditions as the actual seams.

   vii. No excessive winds that can cause dirt or any other debris from entering and defecting the seaming procedure.

viii. These weather conditions shall be fulfilled during seaming process.

c. Warm Weather Conditions

i. If the ambient temperature is above 104 degrees F, no seaming of geomembrane shall be permitted unless the installer can demonstrate, to the satisfaction of the CQA

ii. Manager/RPR and/or CQA Monitor that geomembrane seam quality is not adversely impacted.

iii. Test seams shall be performed under the same ambient temperature conditions as the actual seams.

iv. Additional destructive tests shall be taken at the discretion of the CQA Manager/RPR and/or CQA Monitor

v. No excessive winds that can cause dirt or any other debris from entering and defecting the seaming procedure.

vi. These weather conditions shall be fulfilled during seaming process.

5.2.2.5 Field Seams

a. Individual panels of geomembrane shall be laid out and overlapped by a minimum of 4 inches prior to welding. The area to be welded shall be cleaned and prepared in accordance with the quality control welding procedures.

b. Single or double track hot wedge fusion welder shall be used for straight welds.

c. Extrusion welder shall be used for cross seam tees, patches and repairs and penetration boots.

d. The welding equipment used shall be capable of continuously monitoring and controlling the temperatures in the zone of contact where the machine is actually fusing the geomembrane material so as to ensure that changes in environmental conditions will not affect the integrity of the weld.

e. No "fish mouths" shall be allowed within the seam area. Where "fish mouths" occur, the material shall be cut, overlapped and a patch

extrusion weld shall be applied. All welds upon completion of the work shall be tightly bonded. Any geomembrane area showing injury due to excessive scuffing, puncture, or distress from any cause shall be replaced or repaired with an additional piece of geomembrane. The number of patches per 100-foot length shall not exceed five. If more than five patches per 100-foot length are necessary, then the entire 100-foot length of seam shall be removed. Further welding shall cease at this time and the Engineer Field Representative shall be notified.

f. All seams shall have a seam number that corresponds with the panel layout numbers. The numbering system shall be used in the development of the as-built drawings. Seam numbers shall be derived from the combination of the two panel numbers that are to be welded together.

g. All fusion welded "T" seams (i.e., the result of the geomembrane panels placed perpendicular to each other) shall be double welded where possible. The extrusion process shall be used for the second weld.

h. All extrudate shall be free of dirt, dry and protected from damage.

i. If an extrusion welder is stopped for longer than one minute, it shall be purged to remove heat-degraded extrudate. All purged extrudate shall be placed on a sacrificial sheet and disposed of.

j. All seams constructed on sloped surfaces shall be perpendicular (vertical) to the top and toe of slope.

k. All vertical panels placed on sloped surfaces shall extend 5 feet inward from the toe of slope or edge of trench.

l. All end seams shall be staggered a minimum of 5 feet in length between contiguous panels.

m. To prevent moisture buildup during fusion welding, the CQA Manager/RPR and/ or CQA Monitor shall determine when it is necessary to place a movable protective layer of plastic (rub sheet) directly below each overlap of geomembrane during the seaming operation.

n. If required or determined by the CQA Manager/RPR and/or CQA Monitor, a firm substrate shall be provided by using a flat board or similar hard surface directly under the seam overlap to achieve proper support during seaming operation.

o. All seams shall extend across the anchor trench.

p. All factory seams, field seams and repair welds shall meet seam strength requirements specified in Appendix A.

5.2.2.6 Field Quality Control

a. Documentation and observation of files for field quality control shall be maintained by the CQA Manager/RPR. At the end of each work week the files shall be updated and checked to assure that all copies of pertinent project information are included in each file. The CQA Manager/RPR shall submit daily copies of the documentation to the CQA Certifying Engineer. Forms to be completed for CQA activities during geomembrane placement, testing and repairs include Daily Field Log, Daily CQA Report, Subgrade Surface Acceptance, Material Receiving Log, Daily Panel Placement Log, Trial Weld Log, Daily Seaming Log, Seam Inspection Log (Fusion Weld Air Pressure Testing and Extrusion Weld Vacuum Testing), and Destructive Sample Log. Forms are included in Appendix B.

b. Startup Testing

    i. A test weld 3 feet long from each welding machine shall be run upon the beginning of each shift and every four hours thereafter, under the same conditions as exist for the geomembrane welding. The test weld shall be marked with date, ambient temperature and welding machine number. A tensiometer shall be required to be on-site before and during geomembrane installation for the purpose of testing samples. Six specimens of weld l-in wide shall be cut from the test weld and tested on site. Specimens shall be tested on-site for shear and peel strength in accordance with Appendix A. No welder may start work until the sample weld has been approved by the CQA Manager/RPR and/or CQA Monitor.

    ii. Test seams shall be performed under the same conditions as the actual seams and shall be at least 3 feet long, 1 foot wide after seaming. Test seam for welding shall be cut out of the geomembrane rolls.

c. Nondestructive Seam Testing

    i. The installer shall perform nondestructive tests on all field seams over their full length. The purpose of this test is to assure continuity and integrity of the seams. Vacuum and air pressure tests shall be used for nondestructive testing. The vacuum test shall be used for extrusion

welds and single track hot wedge welds. The air pressure test shall be used for double track hot wedge welds.

ii. Vacuum Testing

1. Equipment for testing single wedge fusion seams and extrusion seams shall be comprised of the following:

    a. A vacuum box assembly consisting of a rigid housing, a transparent viewing window, a soft rubber gasket attached to the bottom, port hole or valve assembly and a vacuum gage.

    b. A vacuum tank and pump assembly equipped with a pressure controller and pipe connections.

    c. A rubber pressure/vacuum hose with fittings and connections.

    d. A plastic bucket and wide paint brush.

    e. A soapy solution.

2. The following procedures shall be followed by the installer:

    a. Excess sheet overlap shall be trimmed away.

    b. Clean the window, gasket surfaces and check for leaks.

    c. Energize the vacuum pump and reduce the tank pressure to approximately 5 psi.

    d. Wet a strip of geomembrane approximately 12 inches by 48 inches (length of box) with the soapy solution.

    e. Place the box over the wetted area and compress.

    f. Close the bleed valve and open the vacuum valve.

g. Ensure that a leak-tight seal is created.

h. For a minimum period of 30 seconds, examine the geomembrane through the viewing window for the presence of soap bubbles.

i. If no bubbles appear after 30 seconds, close the vacuum valve and open the bleed valve, move the box over the next adjoining area with a minimum of 3-inch overlap and repeat the process.

j. All areas where soap bubbles appear shall be marked and repaired in accordance with Paragraph 5.2.2.7 of this exhibit and then retested.

3. If the seam cannot be tested prior to final installation, the seaming operations shall be observed by the CQA Manager/RPR and/or CQA Monitor for uniformity and completeness.

iii. Air Pressure Testing (for double track fusion seams only)

1. The following procedures are applicable to those processes to produce a double seam with an enclosed space.

2. Equipment for testing double fusion seams shall be comprised of the following:

a. An air pump equipped with pressure gage capable of generating and sustaining a pressure between 25 and 30 psi and mounted on a cushion to protect the geomembrane.

b. A manometer equipped with a sharp hollow needle, or other approved pressure feed device.

3. The following procedures shall be followed by the Installer.

a. Seal both ends of the seam to be tested.

b. Insert needle or other approved pressure feed device into the tunnel created by the double wedge fusion weld.

c. Energize the air pump to a pressure between 25 and 30 psi, close valve and sustain pressure for at least five minutes.

d. If loss of pressure exceeds 4 psi, or pressure does not stabilize, locate faulty area, repair in accordance with Paragraph 5.2.2.7 of this exhibit and retest.

e. Remove needle or other approved pressure feed device and seal with an extrusion weld.

d. Destructive Seam Testing

i. The purpose of the destructive testing is to evaluate seam strength properties. A minimum of one test sample shall be obtained per 500 feet of performed seam length. The location of samples shall be determined by the CQA Manager/RPR and/or CQA Monitor. Selection of such locations may be prompted by suspicion of overheating, contamination, or other potential cause that may adversely impact the welds. Sampling shall be performed by the installer. Testing of field samples shall be performed in the presence of the CQA Manager/RPR and/or CQA Monitor as described herein.

ii. Sampling Procedures

a. Samples shall be cut by the installer at locations chosen by the CQA Manager/RPR and/or CQA Monitor as the seaming progresses.

b. The seams shall not be covered by another material before they have been tested and accepted by CQA Manager/RPR and/or CQA Monitor.

c. Upon obtaining each sample, assign a number to the sample and mark it accordingly.

d. Record -sample location on layout drawing.

e. Record purpose of the sample, statistical routine or suspicious weld area.

f. Holes in the geomembrane resulting from destructive seam testing shall be immediately repaired in accordance with Paragraph 5.2.2.7 of this exhibit.

iii. Size and Disposition of Samples

a. The sample for testing shall be 12 inches wide by 36 inches long with the seam centered lengthwise. The sample shall be cut into three parts, labeled, and distributed as follows:

i. One portion to the installer for field testing (see below for procedure), 12 inches by 12 inches.

ii. One portion for Quality Assurance Laboratory testing, 12 inches by 12 inches.

iii. One portion to the CQA Manager/RPR for archive storage, 12 inches by 12 inches.

iv. Field Testing

a. The following shall be performed by the Installer in the presence of the CQA Manager/RPR and/or CQA Monitor:

i. The Installer shall cut ten 1-inch wide replicate specimens from the field testing samples to be tested for shear and peel strength, in accordance with the criteria set in Appendix A.

ii. The Installer shall test five specimens for shear seam strength and five for peel strength. Four out of the five replicate test specimens

shall pass for the seam to be acceptable

iii. Any specimen that fails through the weld or by fusion at the weld sheet interface is a non-FTB (Film Tearing Bond) break and shall be considered a failure even if it achieves the acceptable strengths

v. Quality Assurance Laboratory Test

a. The Installer shall package and ship destructive test samples to the independent Quality Assurance Laboratory approved by the Owner.

b. Laboratory test shall include shear and peel strength tests. The minimum acceptable values obtained in these tests shall be in accordance with Appendix A.

c. At least five specimens shall be tested each for shear and peel strength. A passing test shall meet the minimum required values in a least four of the five specimens tested for each method.

d. The Quality Assurance Laboratory shall provide verbal test results to the CQA Manager/RPR and/ or CQA Monitor no more than 24 hours after they receive the samples. The CQA Manager/RPR and/ or CQA Monitor shall review the laboratory results as soon as they become available

vi. Procedures for Destructive Test Failure

a. The following procedures shall apply whenever a sample fails a destructive test, whether that test is conducted in the field or by the Quality Assurance Laboratory. The Installer has two options:

i. The Installer can repair the entire length of the seam between any two

passing test locations in accordance with Paragraph 5.2.2.7 of this exhibit.

ii. The Installer can retrace the welding path to an intermediate location on each side of the original failed test, on both sides, and take a sample for an additional field test. If this test passes, then the seam shall be repaired between that location and the original failed location. If the test fails, then the process is repeated to establish the zone in which the seam should be repaired.

b. All acceptable repaired seams shall be bound by two locations from which samples passing laboratory destructive tests have been taken. In cases where repaired seam exceeds 150 feet, a sample taken from the zone in which the seam has been repaired must pass destructive testing. Repairs shall be made in accordance with Paragraph 5.2.2.7 of this exhibit.

c. The Quality Assurance Laboratory shall document all actions taken in conjunction with destructive test failures.

5.2.2.7 Repair Procedures

a. Any portion of the geomembrane exhibiting signs of any kind of defect, or failing a destructive or a nondestructive test, shall be repaired. Several procedures exist for the repair of these areas. The final decision as to the appropriate repair procedure shall be made by the CQA Manager/RPR and/or CQA Monitor.

b. The repair procedures available include:

i. Patching, used to repair large holes, tears, undispersed raw materials and contamination by foreign matter.

ii. Spot welding or seaming, used to repair small tears, pinholes, or other minor, localized defects.

iii. Capping, used to repair large lengths of failed seams.

iv. Removing bad seam and replacing with a strip of new material welded in place.

c. For any repair method, the following provisions shall be satisfied:

i. Surfaces of the geomembrane which are to be repaired using extrusion methods shall be abraded no more than one hour prior to the repair.

ii. All surfaces shall be clean and dry at the time of the repair.

iii. All seaming equipment used in repairing procedures shall be qualified.

iv. All patches and caps shall extend at least 4 inches beyond the edge of the defect.

v. All patches shall have rounded corners.

d. Repair Verification

i. Each repair shall be numbered and logged by the Installer. Each repair shall be nondestructively tested using the methods described in Paragraph 5.2.2.6 Part 2 of this exhibit, as appropriate. Repairs which pass the nondestructive test shall be taken as an indication of an adequate repair. Repairs more than 150 feet long may be of sufficient length to require destructive test sampling, at the discretion of the CQA Manager/RPR and/or CQA Monitor. A failed test of the repaired section indicates that the repair shall be redone and retested until passing test results are achieved. The CQA Manager/RPR and/ or CQA Monitor shall observe all nondestructive testing of repairs. The Installer shall record the number of each repair, date and test outcome.

5.2.2.8 Wrinkles

Large wrinkles that remain in the sheet as a result of temperature expansion or uneven surface preparation may need removal as determined by the CQA Manager/RPR and/ or CQA Monitor in consideration of applied loads on the wrinkle. Should the wrinkle need removing, the lower down-slope edge of the wrinkle shall be cut, overlapped and repaired as described in 5.2.2.7 of this exhibit. Both ends of the wrinkle repair shall be patched. Caution must be taken in removing any wrinkles. Wrinkles are needed to allow for future contraction of the geomembrane, especially in cold weather.

5.2.2.9 Construction Equipment

Construction equipment or vehicles with steel tracks shall not be permitted on the geomembrane. Vehicles with rubber tires may be allowed in accordance with the Manufacturer recommendation. Other equipment such as portable generators and power centers shall be permitted if the support apparatus is protected from damaging the liner, and if care is taken to prevent leaking lubricants from damaging the geomembrane.

5.2.2.10 Disposal of Waste Material

Upon completion of installation, the Contractor shall remove and dispose of all trash, waste material and equipment used in connection with the performed work and shall leave the premises in a condition that is neat and acceptable to the CQA Manager/RPR.

5.2.2.11 Temporary Markers to Identify Waste Disposal Limits

Upon completion of installation, the Contractor shall install temporary markers outside the edge of liner for the purpose of identifying the limits of waste disposal.

5.3 Coarse Aggregate

5.3.1 Testing

At the discretion of the CQA Manager/RPR, conformance testing of the delivered fill materials may be required. If deemed necessary, conformance testing shall be conducted in accordance with the following:

5.3.1.1 Conformance Testing

a. Coarse Aggregate Type H

   i. At least one sample per day for each size of coarse aggregate (no less than once per 1,000 cubic yards) shall be provided for conformance testing. Sieve analysis (ASTM D422) shall be performed by the Quality Assurance Laboratory on samples from each source of the coarse aggregate to assure compliance with the specifications.

5.3.2 Execution

5.3.2.1 Coarse Aggregate Type H

a. Trenches for the leachate collection pipes shall be excavated within the liner protection where shown on the drawings. The Contractor shall exercise special care not to disturb or damage the geomembrane and underlying GCL. If a backhoe is used to construct the trench, a rubber modification section shall be installed on the bucket to protect the geomembrane. Any and all areas of geomembrane damage shall be immediately repaired by a qualified installer as directed by the CQA Manager/RPR.

b. A 2-inch minimum layer of liner protection material shall be placed in the trench followed by a geotextile fabric. The leachate piping shall be installed, and shall be backfilled with coarse aggregate to the depth and width shown on the Drawings. Care should be taken during backfilling of the pipe to assure the pipe will not be crushed or otherwise damaged. The geotextile fabric shall then be overlapped at least 12- to 18-in over the coarse aggregate.

c. Following construction of the leachate piping, the granular fill material shall be brought to final grade and compacted as specified.

5.3.2.2 Field Quality Control

a. Coarse Aggregate

i. Samples shall be taken every 50 cubic yards of in-place coarse aggregate. The samples shall be taken by the CQA Manager/RPR and the following tests shall be performed on the samples by the Quality Assurance Laboratory:

1. Sieve Analysis (ASTM D422)

5.4 Geotextile Fabrics

5.4.1 Testing

At the discretion of the CQA Manager/RPR, conformance testing of the delivered geotextile fabric materials may be required. If deemed necessary, conformance testing shall be conducted in accordance with the following:

5.4.1.1 Conformance Testing

a. Conformance testing shall be performed by an independent Quality Assurance Laboratory approved by the Owner. CQA Manager shall obtain samples from the delivered material, mark the machine direction and identification number. The Quality Assurance Technician, in the presence of the CQA Manager, will obtain samples from the delivered material, mark the machine direction and identification number. Samples shall be taken at the rate of one sample per lot, but not to exceed one conformance test per 100,000 square feet of material. A lot is defined as a group of consecutively numbered rolls from the same manufacturing line. This sampling frequency may be increased as deemed necessary by the CQA Manager. The samples shall be taken across the entire roll width and shall not include the first 3 feet. This sampling frequency may be increased as deemed necessary by the CQA Manager. The samples shall be taken across the entire roll width

and shall not include the first 3 feet. The following conformance tests shall be conducted at the laboratory.

i. Mass per unit area (ASTM D5261)

ii. Grab tensile strength (ASTM D4632)

iii. Grab tensile elongation (ASTM D4632)

iv. Trapezoidal tear strength (ASTM D4533)

v. Puncture (pin) strength (ASTM D4833)

vi. UV resistance (ASTM D7238)

b. All conformance tests shall be performed in accordance with Appendix A.

c. All conformance test results shall be reviewed by the CQA Manager and accepted or rejected, prior to the deployment of the geotextile. All test results shall meet, or exceed, the property values listed in Appendix A.

d. The Manufacturer reserves the right to obtain additional samples from rolls immediately before and after the failing roll or as directed by the Engineer's Field Representative and have them tested. If these rolls pass, then only the failing roll will be rejected. If they fail, then the entire lot will be rejected.

5.4.2 Execution

5.4.2.1 Installation

a. Panel Placement

i. The geotextile shall be installed as shown on the drawings and in accordance with the Manufacturer's recommendations and approved shop drawings. Each panel, in accordance with the approved panel layout, shall have an identification number corresponding to adjacent roll numbers.

ii. No mechanical equipment shall be driven directly on top of the geotextile.

iii. The subgrade shall be maintained in a smooth, uniform and compacted condition during installation of the geotextile.

iv. Soil cover shall be placed with mechanical equipment; however, no mechanical equipment shall be allowed directly on top of the geotextile material. Equipment shall be driven on pre-deposited material.

v. Soil cover shall be brought to the work area with earth-carrying equipment, deposited on the previously spread soil cover, and then pushed onto the uncovered portion of the fabric with graders or bulldozers. This operation shall be repeated until the total area is covered.

vi. Soil cover for the side slopes of the geotextile shall be placed at the bottom and pushed up so as to reduce any tension on the geotextile.

vii. Damage to the geotextile occurring during the placement of soil cover shall be repaired immediately.

viii. All fabric installation shall be completely covered at the end of each work day unless otherwise approved by the CQA Manager.

b. Field Seaming

i. The seams shall be overlapped a minimum of 8 inches.

ii. The geotextile panels shall be sewn together. The thread used to sew the panels shall be as approved by the Manufacturer, and shall be of a contrasting color. Sewn seams shall be continuous, and spot sewing shall be avoided.

5.4.2.2 Field Quality Control

a. Documentation files for panel placement shall be maintained by the CQA Manager/RPR. At the end of each work week the files shall be updated and checked to assure that all copies of pertinent project information are included in each file. The CQA Manager/RPR shall submit daily copies of the documentation to the CQA Certifying Engineer. Forms to be completed include Daily Field Log, Daily CQA Report, Material Receiving Log, Daily Panel Placement Log, and Daily Seaming Log. Forms are located in Appendix B.

b. Prior to placement of the soil cover, the geotextile installation and related work shall be inspected by the Engineer's Field

Representative. All work in the system therein being inspected shall be complete, clean and ready for use. All work shall meet the requirements as to line, grade, cleanliness and workmanship, as determined by CQA Manager.

c. All discrepancies shall be noted and repaired. Final acceptance of the system shall be contingent upon the approval of the Engineer's Field Representative.

d. Upon completion of installation, the Contractor shall remove and dispose of all trash, waste material and equipment used in connection with the performed work and shall leave the premises in a neat condition acceptable to the CQA Manager.

5.5 Leachate Collection System

5.5.1 Testing

At the discretion of the CQA Manager/RPR, conformance testing of the delivered leachate collection piping may be required. If deemed necessary, conformance testing shall be conducted in accordance with the following:

5.5.1.1 Conformance Testing – Leachate Collection Pipe

a. Polyethylene pipe: ASTM F714.

b. Each production lot of pipe shall be tested for melt index, density, percent carbon, dimensions and ring tensile strength.

c. Permanent co-extruded colored stripes in outside surface of pipe shall be present. Color to match content of pipe.

d. Molded fillings in accordance with ASTM D3261.

e. Polyethylene flange adapters made with sufficient through-bore to be clamped in a butt fusion-joining machine without use of a stub-end holder.

5.5.1.2 Conformance Testing – Bedding and Cover Material

a. Testing to be conducted in accordance with Section 5.3 – granular fill material.

5.5.1.3 Conformance Testing – Geotextile Material

b. Testing to be conducted in accordance with Section 5.4 – geotextile material.

5.5.2 Execution

5.5.2.1 Installation

a. Install pipe, fittings and accessories in accordance with drawings.

b. Pipe joining shall be by heat fusion joining. Joints between plain end pipes and fittings shall be made by butt fusion. Joints between the main and saddle branch fittings shall be made using saddle fusion. Joints shall be as recommended by the pipe and fitting manufacturer.

c. Backfilling and compaction to be conducted in accordance with specifications.

d. Do no displace or damage pipe when compacting.

e. Solid pipe shall be pressure tested with air to 6 psi for four hours to ensure no leakage. Any leakage shall be corrected by approved means and piping retested until test results are satisfactory.

f. All piping shall be cleaned to remove all dirt, stones, and other material which may enter during construction.

g. Following pipe installation, gravel shall be emplaced around leachate collection piping, encased in geotextile fabric.

5.5.2.2 Field Quality Control

a. Documentation and observation files for leachate piping shall be maintained by the CQA Manager/RPR. At the end of each work week the files shall be updated and checked to assure that all copies of pertinent project information are included in each file. The CQA Manager/RPR shall submit daily copies of the documentation to the CQA Certifying Engineer. Forms to be completed include Daily Field Log, Daily CQA Report, and Material Receiving Log, Forms are located in Appendix B.

b. Prior to placement of the gravel and geotextile material, the pipe installation and related work shall be inspected by the Engineer's Field Representative. All work in the system therein being inspected shall be complete, clean and ready for use. All work shall meet the requirements as to line, grade, cleanliness and workmanship, as determined by CQA Manager.

c. All discrepancies shall be noted and repaired. Final acceptance of the system shall be contingent upon the approval of the Engineer's Field Representative.

d. Upon completion of installation, the Contractor shall remove and dispose of all trash, waste material and equipment used in connection with the performed work and shall leave the premises in a neat condition acceptable to the CQA Manager.

5.6 Soil Protective Cushion Layer

5.6.1 Testing

At the discretion of the CQA Manager/RPR, testing of the soil protective cushion material shall be required. If deemed necessary, conformance testing shall be conducted in accordance with the following:

5.6.1.1 Conformance Testing

a. Two daily samples, separated by at least three truck loads shall be provided for conformance testing by the Quality Assurance Laboratory from each source of liner soil cushion material to assure compliance with the specifications (a minimum of one sample per day shall be tested from each source, and sample frequency shall not be less than requirements below). The following tests shall be performed on the samples prior to placement:

b. Sieve Analysis (ASTM D422) – as above and no less than once every 1,000 cubic yards

c. Specific Gravity (ASTM D854) – as above

d. Laboratory Density - Permeability Relationship – as above and no less than once every 5,000 cubic yards

e. Attterberg limits – no less than once every 5,000 cubic yards

f. Laboratory permeability – no less than once every 5,000 cubic yards – $k \geq 5.2 \times 10^{-4}$ cm/sec.

5.6.2 Execution

a. After installation completion and acceptance of the liner system and related work activities, place the soil protective cushion layer material to thickness and areas as shown on the drawings.

b. During the placement of the material, no construction equipment shall be allowed directly on the geomembrane and any damage shall be repaired immediately in accordance with the specifications.

c. Care shall be taken to protect the geomembrane liner. Sand ramps shall be provided at down slopes and in other heavily traveled areas.

All heavily traveled areas shall have a minimum of three feet of material above the liner. Only large radius turns by the loader and other equipment shall be permitted, as sharp turns may damage the liner.

d. Liner protection materials shall not be placed over a fold in the geomembrane.

e. The liner protection layer shall be compacted by rolling with a smooth drum roller. The final grade shall be laid to elevations as shown on the drawings.

f. Liner protection material shall be placed on the side slopes starting at the toe of the slope and working toward the top of the berm.

g. Liner protection material shall be brought to the work area with earth-carrying equipment, deposited on the previously spread liner protective material, and then pushed onto the uncovered portion of the fabric with graders or bulldozers. This operation shall be repeated until the total area is covered

h. No material shall be placed, spread, or compacted while the ground or material is frozen or thawing or during unfavorable weather conditions.

SECTION 6.0 DOCUMENTATION AND CERTIFICATION

6.1 Documentation

The documentation of landfill cell construction is an important factor to ensure the performance of the installed system. The documentation shall be performed as described below and all related activities shall be recorded on the appropriate forms.

6.2 Reporting

All reports shall be prepared by the CQAP Manager/RPR. Standard reporting procedures should include preparation of a summary report containing any recorded deficiencies and corrective measures. At a minimum, the reports should include:

a. Project name, location, and date

b. Weather conditions including:

i. Temperature (daily high and low)

ii. Wind conditions

iii. Precipitation events

iv. Amount of precipitation

c. Description of construction activities underway and those completed.

d. Equipment and personnel onsite.

e. Types of materials and equipment delivered.

f. Summary of material quantities installed and tested.

g. Any work deficiencies and corrective actions taken.

h. Record of visitors.

i. Any relevant conversations.

j. Any field modifications.

k. Laboratory and/or field test data attached.

6.3 Record Drawings

After the installation and completion of all construction activities, record drawings shall be prepared by the Contractor, CQAP Surveyor and CQAP Certifying Engineer and submitted to the Supervising Authority/ Contract Owner and NMED. The record drawings shall include a final as described in Section 3.2 and approved by a professional engineer to verify that all contours and elevations are in general accordance with the Project Plans and Specifications.

Record drawings of the leachate collection system shall include detailed drawings of each riser and collection pipe, indicating the slope angle of the riser pipe and leachate collection pipe, length of pipes from the extraction point access to the bottom of the sump, diameter of pipes, and depth of liquid in the pipe equal to one foot of head on the liner system.

Record drawings shall include survey ties from the cell boundary corners to an on-site bench mark in accordance with 20.9.6.9.A.6 NMAC.

6.4 Certification

A certification report shall be prepared by the CQAP Manager/RPR and the CQAP Certifying Engineer certifying the construction of the cover and drainage systems. The report, at a minimum, shall include:

a. Certification letter stating that construction activities were conducted in accordance with the Project Plans and Specifications.

b. Description and location of the site.

- Acreage of cell(s)
- Cubic yards of subgrade
- Cubic yards of protective soil cushion layer

c. Description of the construction activities.

d. Description of the location, frequency and results of all the testing conducted during construction.

e. Description of steps and methods followed to report and retest the failed areas and results of the retesting.

f. A copy of the record drawings.

g. A copy of all the forms completed during construction activities, including but not limited to:

- Number of tests required according to 20.9.4.14 NMAC
- Number of tests completed

h. Photographs documenting significant construction elements.

i. Problems during construction and resolutions.

j. Summary of general construction progress.

Upon receipt and review by the CQAP Certifying Engineer, the report shall be sealed by the CQAP Certifying Engineer and submitted to the Contract Owner and NMED.

Appendix A: Material Properties

Table A-1
GCL Material Properties

MATERIAL PROPERTY	TEST METHOD	TEST FREQUENCY $ft^2(m^2)$	REQUIRED VALUES
Bentonite Swell Index[1]	ASTM D 5890	1 per 50 tonnes	24 ml/2g min.
Bentonite Fluid Loss[1]	ASTM D 5891	1 per 50 tonnes	18 ml max.
Bentonite Mass/Area[2]	ASTM D 5993	40,000 ft^2 (4,000 m^2)	0.75 lb/ft^2 (3.6 kg/m^2) min
GCL Tensile Strength[3]	ASTM D 6768	200,000 ft^2 (20,000 m^2)	30 lbs/in (53 N/cm) MARV
GCL Peel Strength[3]	ASTM D 6496	40,000 ft^2 (4,000 m^2)	3.5 lbs/in (6.1 N/cm) min
GCL Index Flux[4]	ASTM D 5887	Weekly	1×10^{-8} m^3/m^2/sec max
GCL Hydraulic Conductivity[4]	ASTM D 5887	Weekly	5×10^{-9} cm/sec max
GCL Hydrated Internal Shear Strength[5]	ASTM D 5321 ASTM D 6243	Periodic	500 psf (24 kPa) typ @ 200 psf

Bentomat ST is a reinforced GCL consisting of a layer of granular sodium bentonite between woven and nonwoven geotextiles, which are needlepunched together.

Notes

[1] Bentonite property tests performed at a bentonite processing facility before shipment to CETCO's GCL production facilities.

[2] Bentonite mass/area reported at 0 percent moisture content.

[3] All tensile strength testing is performed in the machine direction using ASTM D 6768. All peel strength testing is performed using ASTM D 6496. Upon request, tensile and peel results can be reported per modified ASTM D 4632 using 4 inch grips.

[4] Index flux and permeability testing with deaired distilled/deionized water at 80 psi (551kPa) cell pressure, 77 psi (531 kPa) headwater pressure and 75 psi (517 kPa) tailwater pressure. Reported value is equivalent to 925 gal/acre/day. This flux value is equivalent to a permeability of 5×10^{-9} cm/sec for typical GCL thickness. Actual flux values vary with field condition pressures. The last 20 weekly values prior the end of the production date of the supplied GCL may be provided.

[5] Peak values measured at 200 psf (10 kPa) normal stress for a specimen hydrated for 48 hours. Site-specific materials, GCL products, and test conditions must be used to verify internal and interface strength of the proposed design.

Table A-2
Minimum Values for Smooth Black-Surfaced HDPE Geomembranes
(Refer to Minimum and Nominal Values corresponding to HDE 060A000)

TESTED PROPERTY	TEST METHOD	FREQUENCY		MINIMUM VALUE			
Product Code				HDE 040A000	HDE 060A000	HDE 080A000	HDE 100A000
Thickness,(minimum average) mil (mm)	ASTM D 5199	Every roll		40 (1.00)	60 (1.50)	80 (2.00)	100 (2.50)
Lowest individual reading (-10%)				36 (0.91)	54 (1.40)	72 (1.80)	90 (2.30)
Density, g/cm^3	ASTM D 1505	200,000 lb		0.94	0.94	0.94	0.94
Tensile Properties (each direction)	ASTM D 6693,Type IV						
Strength at Break, lb/in (N/mm)	Dumbell, 2 ipm			152 (27)	228 (40)	304 (53)	380 (67)
Strength at Yield, lb/in (N/mm)		20,000 lb		84 (15)	126 (22)	168 (29)	210 (37)
Elongation at Break, %	G.L. 2.0 in (51 mm)			700	700	700	700
Elongation at Yield, %	G.L. 1.3 in (33 mm)			12	12	12	12
Tear Resistance, lb (N)	ASTM D 1004	45,000 lb		28 (125)	42 (187)	56 (249)	70 (311)
Puncture Resistance, lb (N)	ASTM D 4833	45,000 lb		72 (320)	108 (480)	144 (640)	180 (800)
Carbon Black Content, %	ASTM D 1603*/4218	20,000 lb		2.0	2.0	2.0	2.0
Carbon Black Dispersion	ASTM D 5596	45,000 lb		+ Note 1	+ Note 1	+ Note 1	+ Note 1
Notched Constant Tensile Load, hr	ASTM D 5397, Appendix	200,000 lb		300	300	300	300
REFERENCE PROPERTY	**TEST METHOD**	**FREQUENCY**		**NOMINAL VALUE**			
Oxidative Induction Time, min	ASTM D 3895, 200° C; 0_2, 1 atm	200,000 lb		>100	>100	>100	>100
Roll Length[(1)] (approximate), ft (m)				870 (265)	560 (171)	430 (131)	340 (104)
Roll Width[(1)], ft (m)				22.5 (6.9)	22.5 (6.9)	22.5 (6.9)	22.5 (6.9)
Roll Area, ft² (m²)				19,575 (1,819)	12,600 (1,171)	9,675 (899)	7,650 (711)

NOTES:

- +Note1: Dispersion only applies to near spherical agglomerates. 9 of 10 views shall be Category 1 or 2. No more than 1 view from Category 3.
- GSE HD is available in rolls weighing about 3,900 lb (1,769 kg)
- All GSE geomembranes have dimensional stability of ±2% when tested with ASTM D 1204 and LTB of <-77° C when tested with ASTM D 746.
- [(1)]Roll lengths and widths have a tolerance of ± 1%.

Table A-3
Minimum Values for Black-Surfaced Coextruded Textured HDPE Geomembranes
(Refer to Minimum and Nominal Values corresponding to HDT 060G000)

TESTED PROPERTY	TEST METHOD	FREQUENCY	MINIMUM VALUE			
Product Code			HDT 040G000	HDT 060G000	HDT 080G000	HDT 100G000
Thickness, (minimum average) mil (mm) Lowest individual for 8 out of 10 values Lowest individual for any of the 10 values	ASTM D 5994	every roll	38 (0.96) 36 (0.91) 34 (0.86)	57 (1.45) 54 (1.40) 51 (1.30)	76 (1.93) 72 (1.80) 68 (1.73)	95 (2.41) 90 (2.30) 85 (2.16)
Density, g/cm^3	ASTM D 1505	200,000 lb	0.94	0.94	0.94	0.94
Tensile Properties (each direction)[1]	ASTM D 6693, Type IV					
Strength at Break, lb/in-width (N/mm)	Dumbell, 2 ipm		60 (11)	90 (16)	120 (21)	150 (27)
Strength at Yield, lb/in-width (N/mm)		20,000 lb	84 (15)	126 (22)	168 (29)	210 (37)
Elongation at Break, %	G.L. = 2.0 in (51 mm)		100	100	100	100
Elongation at Yield, %	G.L. = 1.3 in (33 mm)		12	12	12	12
Tear Resistance, lb (N)	ASTM D 1004	45,000 lb	28 (125)	42 (187)	56 (249)	70 (311)
Puncture Resistance, lb (N)	ASTM D 4833	45,000 lb	60 (267)	90 (400)	120 (534)	150 (667)
Carbon Black Content, %	ASTM D 1603*/4218	20,000 lb	2.0	2.0	2.0	2.0
Carbon Black Dispersion	ASTM D 5596	45,000 lb	+ Note 1	+ Note 1	+ Note 1	+ Note 1
Aperity ight	GRI GM 12	second roll	+Note 2	+Note 2	+ Note 2	+Note 2
Notched Constant Tensile Load[2], hr	ASTM D 5397, Appendix	200,000 lb	300	300	300	300
REFERENCE PROPERTY	**TEST METHOD**	**FREQUENCY**	**NOMINAL VALUE**			
Oxidative Induction Time, min	ASTM D 3895, 200° C; 0_2 , 1 atm	200,000 lb	>100	>100	>100	>100
Roll Length[3] (approximate), ft (m)	Standard Textured		700 (213)	520 (158)	400 (122)	330 (101)
Roll Width[3], ft (m)			22.5 (6.9)	22.5 (6.9)	22.5 (6.9)	22.5 (6.9)
Roll Area, ft^2 (m^2)			15,750 (1,463)	11,700 (1,087)	9,000 (836)	7,425 (690)

NOTES:

- + Note 1: Dispersion only applies to near spherical agglomerates. 9 of 10 views shall be Category 1 or 2. No more than 1 view from Category 3.
- +Note 2 : 10 mil average . 8 of 10 readings ≥7 mils. Lowest individual ≥5 mils.
- GSE HD Standard Textured is available in rolls weighing about 4,000 lb (1,800 kg).
- [1] The combination of stress concentrations due to coextrusion texture geometry and the small specimen size results in large variation of test results. Therefore, these tensile properties are minimum average values.
- [2] NCTL for HD Textured is conducted on representative smooth membrane samples.
- All GSE geomembranes have dimensional stabilty of ±2% when tested with ASTM D 1204 and LTB of <-77° C when tested with ASTM D 746.
- [3] Roll lengths and widths have a tolerance of ± 1%.
- *Modified.

TABLE A-4
FACTORY AND FIELD SEAMS PROPERTIES
HIGH DENSITY POLYETHYLENE (HDPE) GEOMEMBRANE
TEXTURED AND SMOOTH SHEET

				SPECIFIED THICKNESS (mil)					
PROPERTY	**UNIT**	**VALUE**	**TEST METHOD***	**30**	**40**	**60**	**80**	**100**	**120**
Bonded Shear Strength	lb/in	min	ASTM D638 Type V	60	80	120	160	200	240
Seam Peel Adhesion									
- Fusion	lb/in	min	ASTM D638 Type V	49	65	95	130	162	196
- Extrusion	lb/in	min	ASTM D638 Type V	39	52	78	104	130	157

* Testing methods and procedures shall be in accordance with GRI, GM13 Document

Table A-5								
Required Properties, Test Methods and Values for Geotextile Fabrics								
Property	**Test Method ASTM**	**Unit**	**Mass/Unit area (oz/yd2)**					
Mass per unit area	D5261	oz/yd2	10	12	16	24	32	60
Grab tensile strength	D4632	lb	230	300	370	450	500	630
Grab tensile elongation	D4632	%	50	50	50	50	50	50
Trapezoidal tear strength	D4533	lb	95	115	145	200	215	290
Puncture (pin) strength	D4833	lb	120	140	170	250	300	390
UV resistence	D7238	%	70	70	70	70	70	70
Notes:								
All values are MARV except UV resistence; it is a minimum value								

Souder, Miller & Associates
Engineering ♦ Environmental ♦ Surveying

Table A-6

Final Cover Construction Quality Control Testing

Material/Type of Test	Standard	Frequency	Acceptance Criteria
TEST PAD			
Thickness	--	3 tests/lift	minimum established by Project P&S
Density and Field Compaction (in-place)	ASTM D2922	3 tests/lift	95% Standard Proctor
Grain Size	ASTM D422	1 test/lift	soil type confirmation per Specification
Atterberg Limits	ASTM D4318	1 test/lift	soil type confirmation per Specification
Standard Proctor	ASTM D698	1 test/lift	confirm density/field compaction and perform hydraulic conductivity
Hydraulic Conductivity (undisturbed sample)	ASTM D5084	1 test/lift	equal to or less than 1 x 10-5 cm/sec
Soil Classification	D2487/D2488	1 test/lift	soil type confirmation per Specification
CONSTRUCTION TESTING			
Subgrade (Base Grading)			
Top of Subgrade Elevation	Survey	Min. 50-ft grid spacing	+/- 0.1 ft
Standard Proctor Density	ASTM D698	1 sample/source and 1 test/10,000 CY	confirm density and compaction
Thickness (in-place)	--	1 test/acre (survey on grid)	minimum established by Project P&S
Density and Field Compaction (in-place)	ASTM D2922	4 tests/acre/lift	95% Standard Proctor
Soil Infiltration Layer			
Grain Size	ASTM D422	1 test/5,000 CY	soil type confirmation per Specification
Atterberg LImits	ASTM D4318	1 test/10,000 CY	soil type confirmation per Specification
Standard Proctor Density	ASTM D698	1 test/source and 1 test/10,000 CY	confirm density/field compaction and perform hydraulic conductivity
Hydraulic Condictivity (remolded sample)	ASTM D5084	1 test/10,000 CY (borrow) and 1 test/2 acres (in-place)	equal to or less than 1 x 10-5 cm/sec
Thickness (in-place)	--	1 test/acre (survey on grid)	minimum established by Project P&S
Density and Field Compaction (in-place)	ASTM D2922	4 tests/acre/lift	95% Standard Proctor
Erosion Control Layer			
Thickness (in-place)	--	1 test/acre (survey on grid)	minimum established by Project P&S

Appendix B: CQA Forms

DAILY CQA REPORT

Project No._____

Project Name _____

Date _____ Weather_____Temp: AM____PM___

Contractor:_____

Log: _____

_____

_____

_____

_____

Deficiencies and Corrective Actions:_____

_____

_____

_____

_____

Outstanding Items: _____

_____

_____

_____

Attachments: _____

_____

_____

CQA Manager/Monitor/RPR _____

SUBGRADE SURFACE ACCEPTANCE

Date:_____ Project No._____

Project Name: _____

Earth Contractor: _____

Address:_____

City:_____ State: _____ Zip: _____

Superintendent of Project: _____ Phone: _____

Geosynthetic Installer: _____

Address:_____

City:_____ State: _____ Zip: _____

Superintendent of Project:_____ Phone: _____

CERTIFICATE OF ACCEPTANCE
OF SUBGRADE SOIL/SUBGRADE BY INSTALLER

I the undersigned, duly authorize representative of_____

do hereby accept the subgrade/subgrade soil surface as being acceptable for placement of a geosynthetic liner.

_____

Name Signature Title Date

Certificate Accepted by Inspector-Company:_____

_____

Name Signature Title Date

EFR: _____

Contractor's Representative: _____

Installing Supervisor: _____

Use back for comments

Project No._____

Project Name _____

Date _____

DAILY FIELD LOG

Personnel On-site: _____

_____

_____

Log: _____

_____

_____

_____

_____

_____

_____

_____

_____

_____

_____

_____

_____

_____

_____

_____

_____

CQA Manager/Monitor/RPR _____

FIELD SOIL COMPACTION TESTING LOG

PROJECT NAME: _____

DATE: _____ PROJECT NO.: _____ MATERIAL: _____

LOCATION	TEST DATE	DENSITY (%)	PASS/FAIL	RETEST DENSITY (%)	PASS/FAIL	COMMENTS

DESTRUCTIVE SAMPLE LOG

PROJECT NAME: _____

DATE: _____ PROJECT NO.: _____ MATERIAL: _____

SAMPLE ID. NO.	LOCATION	MACHINE NO.	SEAMER ID.	TYPE OF WELD	MACHINE TEMP. AND SETTING	FIELD PEEL VALUES LBS/INCH	FIELD SHEAR VALUES LBS/INCH	SENT TO LAB Y/N

FIELD SOIL COMPACTION TESTING LOG

PROJECT NAME: _____

DATE: _____ PROJECT NO.: _____ MATERIAL: _____

LOCATION	TEST DATE	DENSITY (%)	PASS/FAIL	RETEST DENSITY (%)	PASS/FAIL	COMMENTS

SEAM INSPECTION LOG - EXTRUSION WELD
VACUUM TESTING

PROJECT NAME: _____

DATE: _____ **PROJECT NO.:** _____ **MATERIAL:** _____

REPAIR ID NUMBER	LOCATION	REASON FOR DAMAGE	TEST DATE	PASS/FAIL	RETEST DATE	PASS/FAIL	COMMENTS

SEAM INSPECTION LOG - FUSION WELD
AIR PRESSURE TESTING

PROJECT NAME: _____

DATE: _____ **PROJECT NO.:** _____ **MATERIAL:** _____

SEAMER ID NO.	LOCATION	START TIME	END TIME	START PRESSURE	END PRESSURE	+/-	LENGTH TESTED	COMMENTS

DAILY SEAMING LOG

PROJECT NAME: _____

DATE: _____ PROJECT NO.: _____ MATERIAL: _____

SEAMER ID	SEAM LENGTH	AM/PM	COMMENTS

TOTAL LINEAR FEET WELDED: _____

TODAY _____ FUSION WELD _____ EXTRUSION WELD

TRIAL WELD LOG

PROJECT NAME: _____

DATE: _____ PROJECT NO.: _____ MATERIAL: _____

SEAMER ID	MACHINE NUMBER	AMBIENT TEMPERATURE	AM/PM	EXTRUSION WELD MACHINE TEMP/PREHEAT TEMP	FUSION WELD WEDGE TEMP/SPEED SET	PEEL VALUES LBS/IN	SHEAR VALUES LBS/IN

DAILY PANEL PLACEMENT LOG

PROJECT NAME: _____

DATE: _____ PROJECT NO.: _____ MATERIAL: _____

PANEL NUMBER	FACTORY ROLL NUMBER	LENGTH	WIDTH	COMMENTS

TOTAL SQ. FT. DEPLOYED TODAY _____

MATERIAL RECEIVING LOG

PROJECT NAME: _____

DATE: _____ PROJECT NO.: _____ MATERIAL: _____

BATCH/LOT NUMBER	FACTORY ROLL NUMBER	LENGTH	WIDTH	COMMENTS

NOTE: BILLS OF LADING/SHIPPING STATEMENTS ATTACHED

EXHIBIT A

Submittals Checklist

				SUBMITTALS CHECKLIST **Project Name: Permit Modification for Otero-Greentree Regional Landfill** **Project Number: 4323139**
Item	**Date Received**	**Approved**	**Not Approrved**	**Comments**
Testing and Misc.				
Compaction				
Video of Exisiting Site Conditions				
Safety Plan				
Landfill Liner / Earthwork				
Engineered Fill Material				
Gravel				
Geotextile Fabric				
Geosynthic Clay Liner				
Polyethylene Geomembrane				

Important Note: The items listed on this form require submittal data. However, this list should not be considered all inclusive. If Technical Specifications or the Drawings include other submittal requirements, those must be met as well. Also, the Engineer may require additional submittals beyond those identified above and/or in the Specifications and Drawings.

TECHNICAL SPECIFICATIONS

SECTION 01 00 00

BASIC REQUIREMENTS

PART 1 GENERAL

1.1 SECTION INCLUDES

A. Summary:
- 1.2: Contract description.
- 1.3: Special considerations.
- 1.4: Work by Owner.
- 1.5: Contractor's use of premises.
- 1.6: Specification conventions.
- 1.7: Minimum wage rate determination.

B. Price and Payment Procedures:
- 1.8: Testing and inspection allowances.
- 1.9: Schedule of values.
- 1.10: Applications for payment.
- 1.11: Change procedures.
- 1.12: Unit prices.
- 1.13: Alternates.

C. Administrative Requirements:
- 1.14: Coordination.
- 1.15: Suspension of Work.
- 1.16: Field engineering.
- 1.17: Pre-Construction Conference.
- 1.18: Progress meetings.
- 1.19: Cutting and patching.

D. Submittals:
- 1.20: Submittal procedures.
- 1.21: Construction progress schedules.
- 1.22: Proposed products list.
- 1.23: Product data.
- 1.24: Shop drawings.
- 1.25: Test reports.
- 1.26: Manufacturer's instructions and certificates.

E. Quality Requirements:
- 1.27: Quality control.
- 1.28: Tolerances.
- 1.29: References.
- 1.30: Manufacturer's field services and reports.
- 1.31: Examination.

F. Temporary Facilities and Controls:
- 1.32: Temporary services.
- 1.33: Access roads.
- 1.34: Progress cleaning and waste removal.
- 1.35: Project identification.
- 1.36: Barriers and fencing.
- 1.37: Protection of installed work.
- 1.38: Security.
- 1.39: Water control.
- 1.40: Pollution and environmental control.
- 1.41: Removal of utilities, facilities, and controls.

G. Product Requirements:
- 1.42: Products.
- 1.43: Delivery, handling, storage, and protection.
- 1.44: Substitutions.

H. Execution Requirements:
- 1.45: Closeout procedures.
- 1.46: Final cleaning.
- 1.47: Starting of systems.
- 1.48: Demonstration and instructions.
- 1.49: Testing, adjusting and balancing.
- 1.50: Protecting installed construction.
- 1.51: Project record documents.
- 1.52: Operation and maintenance data.
- 1.53: Spare parts and maintenance materials.
- 1.54: Warranties.

1.2 CONTRACT DESCRIPTION

A. Work of the Project includes construction of Cell 5 including earthwork, new liner, and increasing length of leachate collection system piping.

B. Perform Work of Contract under a stipulated price basis with Owner in accordance with Conditions of Contract.

1.3 SPECIAL CONSIDERATIONS

A. Contractor is responsible for the excavation and backfilling of required anchor trenches.

B. Contractor is required to place the soil cover over liner materials (Additive Alternative).

C. Contractor is responsible for the placement of pipe and gravel for leachate system.

D. Contractor is responsible to provide and place geotextile for leachate system.

E. Contractor is responsible for cell dewatering and cleanup if rainfall occurs during the construction period.

F. The liner testing is included in the liner bid item.

G. The liner pay quantities will include liner material in anchor trench.

H. Fine grading/compaction testing will be completed as part of another contract prior to liner installation. The contractor is responsible for the compaction testing in the anchor trench.

1.4 WORK BY OWNER

A. Items noted as NIC (Not in Contract) or site grading, will be furnished and installed by Owner under separate contract.

1.5 CONTRACTOR'S USE OF PREMISES

A. No work shall be done before 7:00 A.M. or after 7:00 P.M., local time on a working day, on Sundays, or on legal holidays, except as necessary for the proper care and protection of work already performed, or during emergencies.

B. The Contractor shall make every effort to minimize noise caused by his operations. Equipment shall be equipped with silencers or mufflers designed to operate with the least possible noise.

C. The Contractor shall restrict his operations as nearly as possible to the immediate site. Unnecessary cutting of vegetation adjacent to the site is prohibited. Every effort shall be made to minimize erosion during and after construction and the site shall be returned to its original condition, except where improvements are indicated or required.

D. The Contractor shall take affirmative action to prevent the misuse of the natural environment, wasting of natural resources, or destruction of natural values.

E. The Contractor shall conform to all requirements set forth in the latest edition of the New Mexico Standard Specifications for Public Works Construction with latest revision, and Occupational Safety and Health Administration Regulations for trenching, shoring and excavation, and all other activities where such regulations apply. The Contractor and all subcontractors shall conduct all activities in conformance with federal and state laws and regulations relating to occupational health and safety. Authorized inspectors from NMED's Occupational Health and Safety Bureau shall have unobstructed access to project sites and shall not be impeded in any way from performance of their duties.

1.6 SPECIFICATION CONVENTIONS

A. These specifications are written in imperative mood and streamlined form. This imperative language is directed to the Contractor, unless specifically noted otherwise. The words "shall be" are included by inference where a colon (:) is used within sentences or phrases.

B. The Contractor shall furnish all materials, labor, plant and equipment necessary to complete the contract work as called for by the Technical Specifications and as indicated

on the Drawings. Material and work, either expressed or implied, necessary for the satisfactory completion of the contract work shall be considered an integral part thereof.

C. All standards incorporated herein by reference shall be the latest edition, unless otherwise specified. The abbreviations and applicable standards are described below:

AASHTO	American Association of State Highway and Transportation Officials
ACI	American Concrete Institute
AIA	American Institute of Architects
ANSI	American National Standards Institute, Inc.
ASTM	American Society for Testing and Materials
AWS	American Welding Society
AWWA	American Water Works Association
CID	Construction Industries Division of the NM Regulation and Licensing Department
EJCDC	Engineers Joint Contract Documents Committee
EPA	Environmental Protection Agency
IBC	International Building Code
ISO	International Organization for Standardization
MSJC	Masonry Standards Joint Committee
NACE	National Association of Corrosion Engineers
NMDOT	New Mexico Department of Transportation
NMED	New Mexico Department of Environment
NMSSPWC	New Mexico Standard Specifications for Public Works Construction
NSF	National Sanitation Foundation
OSHA	Occupational Safety and Health Administration
SAE	Society of Automotive Engineers
SSPC	Steel Structure Painting Council
UL	Underwriters Laboratories, Inc.

1.7 MINIMUM WAGE RATE DETERMINATION

A. Article 13-4-11, NMSA, 1978, requires that prevailing local wages be determined by labor category, and that this prevailing wage be the minimum acceptable pay rate. The Public Works Minimum Wage Act covers all public works construction, alteration, demolition, or repair projects when the project cost is $60,000 or more, and when the state or any political subdivision is a party. The wage rate determination provided by the New Mexico Department of Workforce Solutions for the present project can be found in an appendix to the Contract Documents.

B. The Contractor warrants and agrees that he and all subcontractors shall comply with all applicable provisions of the New Mexico Public Works Minimum Wage Act and other statutes pertaining to public works in New Mexico; and the Federal Wage Rate Determination.

C. Applicable federal and state regulations require that the higher of the federal or the state wage rate for each classification must be paid.

1.8 TESTING AND INSPECTION ALLOWANCES

A. Testing Allowance: The bid schedule includes a predetermined sum to cover the cost of testing and inspection services as required in the Contract Documents.

B. Costs Included in Allowance: Cost of engaging testing or inspection firm, execution of tests or inspection, and reporting of results.

C. Costs Not Included in Allowance:
   1. Incidental labor and facilities required to assist testing or inspection firm.
   2. Cost of disinfection of waterlines, if applicable.
   3. Costs of hydrostatic pressure testing or testing of material welds as called for in the Contract Documents.
   4. Costs of failed tests.

D. Costs will be drawn from testing allowance and paid based on invoice(s) submitted to Contractor by testing or inspection firm(s). Contractor shall submit appropriate NTTC form to testing firm to assure tax is not included on invoices.

E. The Contractor is advised that the Testing Allowance established on the Bid Form for the present Contract, may be used to cover the cost of testing of work performed by another contractor under separate contract, at the discretion of the Owner. In such cases, the provision under Article 1.8.C.4 above does not apply.

1.9 SCHEDULE OF VALUES

A. Submit schedule of values on the Construction Progress sheet within the Application for Payment forms provided in the Construction Contract Documents Progress Estimate sheet within the Application for Payment forms (EJCDC Form C-620 (2013 Edition), or on other form acceptable to the Engineer. Contractor's standard form or electronic media printout will be considered.

B. Base structure of Schedule of Values on Bid Schedule with identical item numbering, quantities, and values.

C. Submit Schedule of Values in duplicate at least 15 days prior to first Progress Meeting.

1.10 APPLICATIONS FOR PAYMENT

A. Application for Payment is synonymous with Partial Payment Estimate.

B. Submit four [4] copies of each application on the Partial Payment Estimate form provided in the Contract Documents, together with updated Schedule of Values identifying fully the list of items in the Application for Payment.

C. The Partial Payment Estimate forms consist of four sections: Cover Sheet, Construction Progress spreadsheet, Materials-On-Hand form, and Monthly Construction Progress Certificate. The purpose of the Monthly Construction Progress Certificate is to provide a complete account of all change orders/claims for the corresponding contract period, and all outstanding change orders/claims from previous contract periods, and waives any rights to further adjustments in contract times or price for any change orders/claims that originated in the current contract period.

D. Payment Period: Monthly

1.11 CHANGE PROCEDURES

A. All Change Orders shall be prepared on the form provided in these Contract Documents.

B. Unit Price Change Order: For pre-determined unit prices and quantities, Change Order will be executed on fixed unit price basis. For unit costs or quantities of units of work not pre-determined, refer to Article 12 - Change of Contract Price; Change of Contract Times, of the Standard General Conditions (EJCDC C-700 Standard General Conditions of the Construction Contract).

1.12 UNIT PRICES

A. Engineer will take measurements and compute quantities accordingly. The Contractor will assist in taking of measurements and determination of work completed prior to preparation of corresponding Application for Payment.

1.13 ALTERNATES

A. Alternates quoted on Bid Forms will be reviewed and accepted or rejected at Owner's option.

B. Coordinate related Work and modify surrounding Work as required.

1.14 COORDINATION

A. Coordinate scheduling, submittals, and Work of various sections of specifications to ensure efficient and orderly sequence of installation of interdependent construction elements.

B. Verify utility requirement characteristics of operating equipment are compatible with building utilities.

C. Submit a Traffic Control Plan which shall be approved by the Engineer before continuing with the project.
   1. All existing signs, markers, delineators, etc. within the construction limits shall be removed, stored, and reset.
   2. Subject to the approved Traffic Control Plan, at least one lane shall be open to traffic at all times. Provide proper signage to maintain the traffic lane in such a manner as to assure proper safety to the traveling public on all affected roads. Provide access to all private and public property at all times except when grading, excavation and backfill operations are being conducted immediately in front of the property, in which case access will not be denied for more than 4 hours without approval from the Engineer.
   3. Traffic lanes provided during construction shall be maintained in such a condition under all weather conditions, so as to permit the reasonable passage of passenger vehicles, and shall be kept graded and smooth and watered several times daily, as needed, to control dust.

D. Obtain all applicable permits from the NMDOT before boring under any roadways or working along or across NMDOT rights-of-way, unless the permits have already been obtained by the Engineer. The Contractor is also responsible for obtaining all applicable local, county and state building and development permits not previously obtained by Engineer or Owner. This includes permits from the Construction Industries Division of the Regulation and Licensing Department of the State of New Mexico, and any other regulatory agency having jurisdiction.

E. Contractor is responsible for timely scheduling of any pertinent inspections with local, county and state agencies with jurisdiction, and as required by the permits.

F. Coordinate space requirements and installation of mechanical and electrical work indicated diagrammatically on Drawings. Follow routing shown for pipes, ducts, and conduit, as closely as practicable.

G. All notices, demands, requests, instructions, approvals, proposals and claims must be in writing.
   1. Any notice to or demand upon the Contractor shall be sufficiently given if delivered at the office of the Contractor stated on the signature page of the Agreement.
   2. All papers required to be delivered to the Owner shall, unless otherwise specified in writing to the Contractor, be delivered to the Owner at the address stated on the signature page of the Agreement.
   3. Any such notice shall be deemed to have been given as of the time of actual delivery, in the case of mailing, when the same should have been received in due course of post, or in the case of telegrams, certified mail, or telephone facsimiles, at the time of actual receipt as the case may be.

1.15 SUSPENSION OF WORK

A. The Owner may order suspension of work due to seasonal or other conditions unsuitable for construction work.

B. Maintenance during suspension: Prior to suspension for any cause, the Contractor shall take necessary precautions to protect the work during the period of suspension from any factors which would contribute to its deterioration.

C. Time elapsed during suspension of the work shall not count as contract time. The Contractor shall make no claim for damages due to delay, additional mobilization charges, nor any additional costs that may be incurred solely due to suspension of work.

D. Requests for additional time to be added after the “contract completion date” due to delays or extra work shall be made to the Owner in writing by the Contractor within ten (10) days after the time of the occurrence of the delay or receipt of a Change Order for extra work. Such requests shall set forth the justification for the additional time.

E. Upon approval, the additional contract time shall then be in full force and effect, the same as though it were the original date for completion, and will be shown as the completion date plus an amount of additional working days. Any time required to complete the work

beyond the contract time or additional contract time will result in the assessment of liquidated damages, as specified in the Contract Documents. Failure to make such requests within the above limits will be considered as a waiver on the part of the Contractor as to the need for additional contract time.

1.16 FIELD ENGINEERING

A. Establish elevations, lines, and levels and certify and confirm elevations and locations of the Work, conforming with the Contract Documents, with the Engineer prior to performing any excavation.

B. Verify field measurements are as indicated on shop drawings or as instructed by manufacturer.

C. From the information provided by the Owner, the Contractor shall develop and make all detail surveys needed for construction such as slope stakes, batter boards, easement alignments, stakes for pipe locations and other working points, lines, elevations and cut sheets.

1.17 PRE-CONSTRUCTION CONFERENCE

A. Engineer will schedule Pre-Construction Conference after Notice of Award for affected parties.

B. The Contractor, or his duly authorized representative, and subcontractor representatives will attend the meeting.

1.18 PROGRESS MEETINGS

A. Schedule in coordination with the Engineer at maximum monthly intervals, and attend all Progress Meetings throughout progress of the Work.

B. The purpose of the meetings will be to review the following:
1. Work progress since previous meetings.
2. Field observations, problems, conflicts.
3. Problems which impede construction schedule.
4. Corrective measures and procedures to regain projected schedule.
5. Revisions to construction schedule.
6. Plan progress and schedule during succeeding work period.
7. Coordination of schedules.
8. Off-site fabrication and delivery schedules.
9. Maintenance of quality standards.
10. Proposed changes, construction schedule and completion date.
11. Coordination of separate contracts.
12. Record or “as-built” drawings of completed work.
13. Other business as required.
14. Regulatory requirements including OSHA, New Mexico Board of Labor, and others as applicable.

15. Funding requirements including RUS, NMED, NMFA, DFA, USEPA and others as applicable.

C. During each meeting, the Contractor is required to present any issues which may impact his Work, with a plan to resolve these issues expeditiously.

D. Together with each payment application, Contractor must present the current as-built drawings reflecting all work performed to date.

1.19 CUTTING AND PATCHING

A. Employ skilled and experienced installer to perform cutting and patching new Work; restore Work with new Products.

B. Execute cutting, fitting, and patching, including excavation and fill, to complete Work, and to:
1. Uncover Work to install or correct ill-timed Work.
2. Remove and replace defective and non-conforming Work.
3. Remove samples of installed Work for testing.
4. Provide openings in elements of Work for penetration of mechanical and electrical Work.

C. Cut masonry and concrete materials using masonry saw or core drill. Restore Work with new Products in accordance with requirements of Contract Documents.

D. Fit Work tight to adjacent elements. Maintain integrity of wall, ceiling, or floor construction; completely seal voids.

E. Refinish surfaces to match adjacent finishes.

1.20 SUBMITTAL PROCEDURES

A. Identify Project, Contractor, subcontractor and supplier; pertinent drawing and detail number, and specification section number, appropriate to submittal.

B. Apply Contractor's stamp, signed or initialed, certifying that review, verification of Products required, field dimensions and elevations, adjacent construction Work, and coordination of information is in accordance with requirements of the Work and Contract Documents.

C. Identify variations from Contract Documents and Product or system limitations which may be detrimental to successful performance of completed Work.

D. Revise and resubmit submittals as required by the Engineer; identify changes made since previous submittal.

E. Submit number of copies Contractor requires, plus two copies Engineer will retain, at a minimum, unless otherwise indicated at the Pre-Construction Conference.

F. Transmit each submittal with Engineer accepted form.

G. Distribute copies of reviewed submittals as appropriate. Instruct parties to promptly report inability to comply with requirements.

H. Prior to commencing construction activities, Contractor must submit a safety plan for approval by Engineer.

1.21 CONSTRUCTION PROGRESS SCHEDULES

A. Submit initial progress schedule in duplicate within fifteen [15] days after date of Owner-Contractor Agreement for Engineer review.

B. Submit revised schedules with each Application for Payment, identifying changes since previous version. Indicate estimated percentage of completion for each item of Work at each submission.

C. Distribute copies of reviewed schedules to Project site file, subcontractors, suppliers, and other concerned parties.

D. Show complete sequence of construction by activity, identifying Work of separate stages and other logically grouped activities. Indicate early and late start, early and late finish, float dates, and duration.

E. Indicate delivery dates for Owner furnished products and products identified under Allowances.

1.22 PROPOSED PRODUCTS LIST

A. Unless required as an attachment to Bid, within 15 days after date of Owner-Contractor Agreement, submit list of major products proposed for use, with name of manufacturer, trade name, and model number of each product.

B. For products specified only by reference standards, give manufacturer, trade name, model or catalog designation, and reference standards.

1.23 PRODUCT DATA

A. Product Data: Submit to Engineer for review for limited purpose of checking for conformance with information given and design concept expressed in Contract Documents.

B. Submit copies and distribute in accordance with Submittal Procedures article.

C. Mark each copy to identify applicable products, models, options, and other data. Supplement manufacturers' standard data to provide information specific to this Project.

D. Indicate product utility and electrical characteristics, utility connection requirements, and location of utility outlets for service for functional equipment and appliances.

1.24 SHOP DRAWINGS

A. Shop Drawings:
   1. Submitted to Engineer for review for limited purpose of checking for conformance with information given and design concept expressed in Contract Documents.
   2. Include detail design calculations, shop drawings, fabrication, and installation drawings, erection drawings, list, graphs, catalog sheets, data sheets, and similar items.
   3. Design calculations shall bear the signature and seal of an engineer registered in the appropriate branch and in the state wherein the project is to be built, unless otherwise directed.
   4. After review, provide copies and distribute in accordance with Submittal Procedures article and for record documents purposes as specified.
   5. Except as may otherwise be indicated herein, the Engineer will return copies of each submittal to the Contractor with comments noted thereon, within 30 calendar days following their receipt by the Engineer.

B. Indicate special utility and electrical characteristics, utility connection requirements, and location of utility outlets for service for functional equipment and appliances.

C. Submit number of opaque reproductions Contractor requires, plus two copies Engineer will retain.

1.25 TEST REPORTS

A. Submit for Engineer's knowledge as contract administrator or for Owner.

B. Submit test reports for information for limited purpose of assessing conformance with information given and design concept expressed in Contract Documents.

1.26 MANUFACTURER’S INSTRUCTIONS AND CERTIFICATES

A. When specified in individual specification sections, submit manufacturer printed instructions for delivery, storage, assembly, installation, start-up, adjusting, and finishing, to Engineer for delivery to Owner in quantities specified for Product Data.

B. Indicate special procedures, perimeter conditions requiring special attention, and special environmental criteria required for application or installation.

C. When specified in individual specifications sections, submit certifications by manufacturer to Engineer, in quantities specified for Product Data.

D. Indicate material or Product conforms to or exceeds specified requirements. Submit supporting reference data, affidavits, and certifications as appropriate.

E. Certificates may be recent or previous test results on material or Product, but must be acceptable to Engineer.

1.27 QUALITY CONTROL

A. Monitor quality control over suppliers, manufacturers, products, services, site conditions, and workmanship, to produce Work of specified quality.

B. Comply with manufacturer's instructions.

C. Comply with specified standards as minimum quality for the Work except when more stringent tolerances, codes, or specified requirements indicate higher standards or more precise workmanship.

1.28 TOLERANCES

A. Monitor fabrication and installation tolerance control of installed products over suppliers, manufacturers, products, site conditions, and workmanship, to produce acceptable Work. Do not permit tolerances to accumulate.

B. Comply fully with manufacturer's tolerances.

1.29 REFERENCES

A. Conform to reference standards by date of issue current as of date of Contract Documents.

B. When specified reference standard conflict with Contract Documents, request clarification from Engineer before proceeding.

1.30 MANUFACTURER'S FIELD SERVICES AND REPORTS

A. When specified in individual specification sections, require material or product suppliers or manufacturers to furnish qualified staff personnel to observe site conditions and to initiate instructions when necessary.

B. Report observations and site decisions or instructions that are supplemental or contrary to manufacturer's written instructions.

1.31 EXAMINATION

A. Verify existing site conditions and substrate surfaces are acceptable for subsequent Work. Beginning new Work means acceptance of existing conditions.

B. Verify utility services are available, of correct characteristics, and in correct location.

C. Contractor is solely responsible for utility location, protection and verification. Contractor must notify New Mexico One Call System Inc., at 811, and all local utility providers, three (3) days before starting utility line construction.

D. It shall be the responsibility of the Contractor to become acquainted with the location of all underground structures which may be encountered or which may affect the Work hereunder.

1.32 TEMPORARY SERVICES

A. Provide, maintain and pay for suitable quality water service as required.

B. Maintain uninterrupted water and electric service to all properties adjoining the Work, except where specifically approved by the authority having jurisdiction. Services damaged by the Contractor shall be immediately and permanently repaired or replaced at the expense of the Contractor. Give a minimum of 48-hour advance notice to occupants of adjacent properties before interrupting any service. Any interruption of service shall be kept to the minimum length of time possible.

C. Until final inspection and approval of the Work and issuance of the Certificate of Substantial Completion, the Contractor is responsible for all Work directly or indirectly affected by the Contractor's activities. Such responsibility continues for all Work detailed on the punch list that may accompany the Certificate of Substantial Completion, until satisfactorily completed by the Contractor and approved by the Owner and Engineer.

D. Furnish, install and maintain any temporary water storage structures, electrical connections, meters, wiring, outlets, switches, lamps, etc., as necessary for the work. The Contractor shall provide such temporary heat as may be necessary for the prevention of injury to the work or material through dampness or cold. All temporary connections, installations, facilities and supplies furnished or installed as specified in this paragraph, shall be removed prior to the completion of the Contract, and the premises left perfectly clean and satisfactory to the Owner.

E. Maintain ambient temperature above freezing in enclosed/occupied areas where construction is in progress, unless indicated otherwise in specifications.

F. Provide temporary electricity and power outlets for construction operations, connections, branch wiring, distribution boxes, and flexible power cords as required. Do not disrupt Owner's need for continuous service.

G. Provide and maintain required sanitary facilities and enclosures in clean and sanitary condition.

1.33 ACCESS ROADS

A. Construct and maintain temporary roads accessing public thoroughfares to serve construction area.

B. Existing on-site roads, designated by the Owner, may be used for construction traffic.

1.34 PROGRESS CLEANING AND WASTE REMOVAL

A. Collect and maintain areas free of waste materials, debris, and rubbish. Maintain site in clean and orderly condition.

B. Remove waste and surplus materials, rubbish, and construction facilities from site. Restore all job sites and adjoining areas, including roads and driveways, to a condition equal to or better than the original status. Special attention will be made to not disturb unimproved roads by placing any excavated material to the sides of these roads when water lines are located along the right-of-way.

C. Brush and trees shall be felled parallel to the right-of-way to minimize damage to trees and structures on adjacent property. All brush, tree tops, stumps and other debris shall be removed from the right-of-way and disposed of by the Contractor, subject to and in conformity with the special provisions applying to the tract of land involved (if any). The Contractor shall not destroy nor remove any trees, shrubbery, nor any other improvements, without permission of the Owner.

D. The Contractor shall not dispose of debris, refuse or sanitary wastes in an open dump or in a natural watercourse, whether on public or private property, or in such places that undesirable wastes can eventually be exposed or carried to a natural watercourse.

1.35 PROJECT IDENTIFICATION

A. No project sign is required.

B. The Contractor shall not erect, or permit the erection of advertising signs. Only minimal identification and direction signs shall be permitted on the site. Unnecessary or obnoxious posters, pictures, signs, symbols, drawings or writing on work, material or equipment, resulting from vandalism or other causes, shall be covered or removed by the Contractor.

1.36 BARRIERS AND FENCING

A. Provide barriers or fencing to prevent unauthorized entry to construction areas and to protect existing facilities and adjacent properties from damage.

1.37 PROTECTION OF INSTALLED WORK

A. Protect installed Work and provide special protection where specified in individual specification sections.

1.38 SECURITY

A. Provide security and facilities to protect Work and existing facilities, and Owner's operations from unauthorized entry, vandalism, or theft.

1.39 WATER CONTROL

A. Provide erosion control.

B. Maintain excavations free of water. Provide, operate, and maintain pumping equipment.

C. In the event that one acre of earth or more is disturbed, the Contractor shall submit to the Owner's Representative a Storm Water Pollution Prevention Plan (SWPPP) that will address all construction phases and the proposed pollution prevention and sediment control measures. This shall be done in accordance with the National Pollution Discharge Elimination System (NPDES) general permit requirements for all construction activities, and shall include all required reporting. If the Bid Form does not include an item for preparation and implementation of the SWPPP, the cost thereof will be considered incidental to related work.

D. The Contractor shall conduct his operations to minimize damage to natural watercourses, and shall not permit petroleum products, volatile fluid wastes, or any other wastes which are prohibited by local ordinances, or excessive amounts of silt, clay, or mud to enter any drainage system. The bed of natural watercourses or man-made irrigation ditches shall be restored to normal gradient and cross-section after being disturbed.

1.40 POLLUTION AND ENVIRONMENTAL CONTROL

A. Provide methods, means, and facilities to prevent contamination of soil, water, and atmosphere from discharge of noxious, toxic substances, and pollutants produced by construction operations.

B. Provide dust control, erosion and sediment control, noise control, pest control and rodent control to allow for proper execution of the Work. Short term effects of dust produced by equipment will be mitigated by sprinkling traffic areas with water. Motor equipment shall be kept in repair and equipped with anti-pollution devices, if possible, to cut down on exhaust emissions. Burning as a method of cleaning or disposal will not be permitted without approval of the proper authorities.

C. Comply with all applicable standards, orders, or regulations issued pursuant to the Clean Air Act of 1970 (42 U.S.C. 1251 et seq.) as amended. Violations shall be reported to the New Mexico Environment Department.

D. The Contractor shall be responsible for the reporting and the cleanup of spills associated with project construction and shall report and respond to spills of hazardous materials such as gasoline, diesel, motor oil, solvents, chemicals, toxic and corrosive substances, and other materials which may be a threat to the public health or the environment. The Contractor shall be responsible for reporting past spills encountered during construction and of current spills not associated with construction. Reports shall be made to the New Mexico Environment Department Emergency Response Team at (505) 827-4308 or (505) 470-3657 and to the Owner's Representative. The Contractor shall clean up any unreported spills associated with project construction identified after construction.

1.41 REMOVAL OF UTILITIES, FACILITIES, AND CONTROLS

A. Remove temporary utilities, equipment, facilities, and materials, prior to Substantial Completion review.

B. Clean and repair damage caused by installation or use of temporary work.

C. Restore existing facilities used during construction to original condition. Restore permanent facilities used during construction to specified condition.

1.42 PRODUCTS

A. Products: Means new material, machinery, components, equipment, fixtures, and systems forming the Work, but does not include machinery and equipment used for preparation, fabrication, conveying and erection of the Work. Products may also include existing materials or components specifically identified for reuse.

B. Do not use materials and equipment removed from existing premises, except as specifically identified or allowed by the Contract Documents.

C. Provide interchangeable components of same manufacturer for components being replaced.

1.43 DELIVERY, HANDLING, STORAGE, AND PROTECTION

A. Deliver, handle, store, and protect Products in accordance with manufacturer's instructions.

1.44 SUBSTITUTIONS

A. Substitutions will only be considered when Product becomes unavailable through no fault of Contractor, or where an “approved equal” is specifically allowed elsewhere in the Technical Specifications or noted on the Drawings.

B. Specific manufacturers may be required for certain items in order to maintain consistency with the Owner’s existing inventory. In such cases, substitutions will not be allowed as indicated in each specification section where applicable. Only exceptions that will be accepted shall be when Product becomes unavailable through no fault of Contractor.

C. Document each request with complete data substantiating compliance of proposed Substitution with Contract Documents.

D. Submit three [3] copies of request for Substitution to the Engineer for consideration. Limit each request to one proposed Substitution.

1.45 CLOSEOUT PROCEDURES

A. Submit written certification Contract Documents have been reviewed, Work has been inspected, and Work is complete in accordance with Contract Documents and ready for Engineer's inspection.

B. Submit final Application for Payment identifying total adjusted Contract Price, previous payments, and amount remaining due.

C. Among required closeout submittals include: Release of Liens, Consent of Surety, and Certification of Labor Standards.

1.46 FINAL CLEANING

A. Execute final cleaning prior to final inspection.

B. Upon completion of the work under this contract, thoroughly clean and make any needed repairs caused by damage during construction to any existing utilities or other structures on the site.

C. Notify the Engineer in writing once final cleaning is complete. The final estimate will not be prepared until the Contractor has complied with all requirements set forth and the Engineer has made his final inspection of the entire work and is satisfied that it is properly constructed and the site properly cleaned.

1.47 STARTING OF SYSTEMS

A. Provide seven [7] days notification prior to start-up of each item.

B. Ensure each piece of equipment or system is ready for operation.

C. Execute start-up under supervision of responsible persons in accordance with manufacturer’s instructions.

D. Submit written report stating equipment or system has been properly installed and is functioning correctly.

1.48 DEMONSTRATION AND INSTRUCTIONS

A. Demonstrate operation and maintenance of Products to Owner's personnel two weeks prior to date of Substantial Completion.

B. For equipment or systems requiring seasonal operation, perform demonstration for other season within six [6] months.

C. Demonstrate start-up, operation, control, adjustment, trouble-shooting, servicing, maintenance, and shutdown of each item of equipment at agreed-upon times, at designated location.

1.49 TESTING, ADJUSTING, AND BALANCING

A. Adjust operating products and equipment to ensure smooth and unhindered operation.

B. Owner retains the right to appoint, employ, and pay for services of independent firm to perform testing, adjusting, and balancing. Reports will be submitted by independent firm to Engineer indicating observations and results of tests and indicating compliance or non-compliance with specified requirements and with requirements of Contract Documents.

C. Contractor will cooperate with independent firm; furnish assistance as requested.

D. Re-testing required because of non-conformance to specified requirements will be charged to Contractor.

1.50 PROTECTING INSTALLED CONSTRUCTION

A. Provide temporary and removable protection for installed products. Control activity in immediate work area to prevent damage.

B. Protect finished floors, stairs, and other surfaces from traffic, dirt, wear, damage, or movement of heavy objects, by protecting with durable sheet materials.

C. Prohibit traffic or storage upon waterproofed or roofed surfaces. When traffic or activity is necessary, obtain recommendations for protection from waterproofing or roofing material manufacturer.

D. Prohibit traffic from landscaped areas.

1.51 PROJECT RECORD DOCUMENTS

A. Maintain on site one set of Contract Documents to be utilized for record documents.

B. Record actual revisions to the Work. Record information concurrent with construction progress.

C. Specifications: Legibly mark and record at each Product section description of actual Products installed.

D. Record Documents and Shop Drawings (As-Built Drawings): Legibly mark each item to record actual construction. Deliver two (2) sets of As-Built Drawings with redlines to the Owner upon completion of the Project. The As-Built Drawings will be submitted to the Engineer prior to processing of final payment to the Contractor.

E. The Contractor shall also submit electronic survey information of the actual placement of lines and appurtenances. Submittals to be a combination of electronic survey point files with copies of survey field book information and/or electronic CAD drawing files including relevant survey point file and field book information. All survey information and electronic CAD drawings to be tied to established survey control as provided on plan set survey control sheet.

F. Submit documents to Engineer together with claim for final Application for Payment.

1.52 OPERATION AND MAINTENANCE DATA

A. Submit 3 sets prior to final inspection, bound in 8-1/2 x 11 inch text pages, three D side ring binders with durable plastic covers.

B. Prepare binder cover with printed title "OPERATION AND MAINTENANCE INSTRUCTIONS" and title of project.

C. Internally subdivide binder contents with permanent page dividers, logically organized.

D. Contents:
1. Part 1: Directory
   a. List names, addresses, and telephone numbers of Engineer, Contractor, subcontractors, and major equipment suppliers.
2. Part 2: Operation and maintenance instructions, arranged by system:
   a. Equipment summary, operational procedures, preventive maintenance procedures and schedules, parts list, shop drawings, safety issues.
3. Part 3: Project documents and certificates.
   a. All equipment warranties, affidavits, and certifications required by the Technical Specifications shall be placed in this part.

1.53 SPARE PARTS AND MAINTENANCE MATERIALS

A. Provide products, spare parts, maintenance and extra materials in quantities specified in individual specification sections.

B. Deliver to project site and place in location as directed by Engineer; obtain receipt prior to final payment.

1.54 WARRANTIES

A. Execute and assemble transferable warranty documents from subcontractors, suppliers, and manufacturers for all products with extended warranties beyond one (1) year.

B. Submit prior to final Application for Payment.

PART 2 PRODUCTS

Not Used.

PART 3 EXECUTION

Not Used.

END OF SECTION

SECTION 31 05 19.13

GEOTEXTILE FABRIC

PART 1 GENERAL

1.1 SUMMARY

A. Contractor shall furnish all geotextile, labor, incidental materials, tools, supervision, transportation, and installation equipment necessary for the installation of geotextile, as specified herein, and as shown on the Drawings.

B. Related Sections:
1. Section 31 05 19.15 - Geosynthetic Clay Liner.
2. Section 31 05 19.16 - Polyethylene Geomembrane Liner.
3. Section 31 23 23 - Backfill.
4. Section 33 47 30 - Leachate Collection System Piping.

1.2 REFERENCES

A. American Society for Testing and Materials (ASTM)
1. ASTM D5261 - Standard Test Method for Measuring Mass per Unit Area of Geotextiles.
2. ASTM D4632 - Standard Test Method for Grab Breaking Load and Elongation of Geotextiles.
3. ASTM D4533 - Standard Test Method for Index Trapezoidal Tearing Strength of Geotextiles.
4. ASTM D4833 - Standard Test Method for Index Puncture Resistance of Geotextiles, Geomembranes and Related Products.
5. ASTM D4491 - Standard Test Method for Water Permeability of Geotextiles by Permittivity.
6. ASTM D4751 - Standard Test Method for Determining Apparent Opening Size of a Geotextile.
7. ASTM D4354 - Standard Practice for Sampling of Geosynthetics for Testing.
8. ASTM D4759 - Standard Practice for Determining the Specifications Conformance of Geosynthetics.

1.3 SUBMITTALS

A. Prior to material delivery to project site, the Contractor shall provide the Engineer with a written certification or manufacturers quality control data which displays that the geotextile meets or exceeds minimum average roll values (MARV) specified herein.

B. The Contractor shall submit, if required by the Engineer, manufacturer’s quality control manual for the geotextile to be delivered to the site.

1.4 MATERIAL WARRANTY

A. The geotextile manufacturer shall warrant the material against manufacturing defects and material degradation for a period of 1 year from the date of installation. The manufacturer shall replace any material which fails from the above causes within the warranty period. The manufacturer shall furnish a written warranty covering these requirements.

1.5 GUARANTEE

A. The Contractor shall guarantee the geotextile against defects in installation and workmanship for the period of 1 year commencing with the date of Final Acceptance. The guarantee shall include the services of qualified service technicians and all materials and labor required for the repairs at no expense to the Owner.

PART 2 PRODUCTS

2.1 GEOTEXTILE

A. The non-woven needle punched geotextile specified herein shall be made from polypropylene staple fiber.

B. The geotextile shall be manufactured from prime quality virgin polymer.

C. The geotextile shall be able to withstand direct exposure to ultraviolet radiation from Sun for up to 30 days without any noticeable effect on index or performance properties.

D. Geotextile shall meet or exceed all material properties listed in Table 1.1.

Table 1.1: Minimum Average Roll Values (MARV) Required for Nonwoven Needle punched Geotextiles:
(Refer to column with the heading 'NW12', Product Code GEO 1208002 for relevant required values)

TESTED PROPERTY	TEST METHOD	FREQUENCY	NW4	NW5	NW8	NW10	NW12	NW16
Product Code			GEO 0408002	GEO 0608002	GEO 0808002	GEO 1008002	GEO 1208002	GEO 1608002
AASHTO M288 Class			3	2	1	>1	>>1	>>>1
Mass per Unit Area, oz/yd^2 (g/m^2)	ASTM D 5261	90,000 ft^2	4 (135)	6 (200)	8 (270)	10 (335)	12 (405)	16 (540)
Grab Tensile Strength, lb (N)	ASTM D 4632	90,000 ft^2	120 (530)	170 (755)	220 (975)	260 (1,155)	320 (1,420)	390 (1,735)
Grab Elongation, %	ASTM D 4632	90,000 ft^2	50	50	50	50	50	50
Puncture Strength, lb (N)	ASTM D 4833	90,000 ft^2	60 (265)	90 (395)	120 (525)	165 (725)	190 (835)	240 (1,055)
Trapezoidal Tear Strength, lb (N)	ASTM D 4533	90,000 ft^2	50 (220)	70 (310)	95 (420)	100 (445)	125 (555)	150 (665)
Apparent Opening Size, Sieve No. (mm)	ASTM D 4751	540,000 ft^2	70 (0.212)	70 (0.212)	80 (0.180)	100 (0.150)	100 (0.150)	100 (0.150)
Permittivity, sec^{-1}	ASTM D 4491	540,000 ft^2	1.50	1.50	1.50	1.20	0.80	0.70

Permeability, cm/sec	ASTM D 4491	540,000 ft^2	0.22	0.30	0.30	0.30	0.29	0.27
Water Flow Rate, gpm/ft^2 (l/min/m^2)	ASTM D 4491	540,000 ft^2	120 (4,885)	110 (4,480)	110 (4,480)	85 (3,460)	60 (2,440)	50 (2,035)
UV Resistance (% retained after 500 hours)	ASTM D 4355	per formulation	70	70	70	70	70	70
Roll Length[(1)], ft (m)			600 (182)	600 (182)	600 (182)	300 (91)	300 (91)	300 (91)
Roll Width[(1)],ft (m)			15 (4.6)	15 (4.6)	15 (4.6)	15 (4.6)	15 (4.6)	15 (4.6)
Roll Area, ft^2 (m^2)			9,000 (836)	9,000 (836)	9,000 (836)	4,500 (418)	4,500 (418)	4,500 (418)

NOTES:

- The property values listed are in weaker principal direction. All values listed are Minimum Average Roll Values (MARV) except apparent opening size in mm and UV resistance. Apparent opening size (mm) is a Maximum Average Roll Value. UV is a typical value.
- [(1)]Roll lengths and widths have a tolerance of ±1%.

2.2 MANUFACTURER

A. All rolls of the geotextile shall be identified with permanent marking on the roll or packaging, with the manufacturers name, product identification, roll number and roll dimensions.

2.3 TRANSPORT

A. Transportation of the geotextile shall be the responsibility of the Contractor.

B. During shipment, the geotextile shall be protected from ultraviolet light exposure, precipitation, mud, dirt, dust, puncture, or other damaging or deleterious conditions.

C. Upon delivery at the job site, the Contractor shall ensure that the geotextile rolls are handled and stored in accordance with the manufacturer's instructions as to prevent damage.

D. Geotextile rolls are to be unloaded under the supervision of the liner installer using straps or other devices that will prevent damage to the liner material.

E. Geotextile rolls should be stored in their original wrappers on smooth, well-drained subgrade, and shall be stacked not more than four rows high.

F. If any material damage is noted during unloading or storage, the damaged areas are to be marked with a permanent marker, and a notation made as to the roll number, location of damage, and type of damage.

PART 3 EXECUTION

3.1 EXAMINATION

A. Section 01 00 00 - Quality Requirements: Examination of existing conditions before starting work.

3.2 QUALITY ASSURANCE

A. The Engineer shall examine the geotextile rolls upon delivery to the site and report any deviations from project specifications to the Contractor.

B. The Engineer may decide to arrange conformance testing of the rolls delivered to the job site. For this purpose, the Engineer shall take a sample three feet (along roll length) by roll width according to ASTM Practice D4354 The sample shall be properly marked, wrapped and sent to an independent laboratory for conformance testing.

C. The pass or fail of the conformance test results shall be determined according to ASTM Practice D4759.

3.3 INSTALLATION

A. The subgrade shall be inspected and approved by the Engineer prior to installation of the geotextile. The subgrade shall be maintained in a smooth, uniform and compacted condition during the installation of the fabric.

B. The geotextile shall be handled in such a manner as to ensure that it is not damaged in any way. Should the Contractor damage the geotextile to the extent that it is no longer usable as determined by these specifications or by the Engineer, the Contractor shall replace the geotextile at his own cost.

C. The geotextile shall be installed to the lines and grades as shown on the contract drawings and as described herein.

D. The geotextile shall be rolled down the slope in such a manner as to continuously keep the geotextile in tension by self weight. The geotextile shall be securely anchored in an anchor trench where applicable, or by other approved or specified methods.

E. Materials will not be deployed when moisture, high winds, or other adverse weather conditions are expected. Geotextiles shall be weighted by sandbags or approved equivalent to temporarily secure material in the event of light winds. Such anchors shall be installed during placement and shall remain in place until replaced with cover material.

F. The Contractor shall take necessary precautions to prevent damage to adjacent or underlying materials during placement of the geotextile. Should damage to such material occur due to the fault of the Contractor, the latter shall repair the damaged materials at his own cost and to the satisfaction of the Engineer.

G. During placement of the geotextile, care shall be taken not to entrap soil, stones or excessive moisture that could hamper subsequent seaming of the geotextile as judged by the Engineer.

H. The geotextile shall not be exposed to precipitation prior to being installed.

I. The geotextile shall be seamed using a stitching methods as recommended by the manufacturer and approved by the Engineer. Sewn seams shall be made using polymeric thread with chemical resistance equal to or exceeding that of the geotextile. All sewn seams shall be continuous. Seams shall be oriented down slopes perpendicular to grading contours unless otherwise specified. The sewing machine shall sew a two-thread double locked stitch. The thread used for sewing shall be a color that contrasts with the geotextile material.

J. The Contractor shall not use heavy equipment to traffic above the geotextile without approved protection.

K. The geotextile shall be covered as soon as possible after installation and approval. Installed geotextile shall not be left exposed for more than 15 days. Material overlying the geotextile shall be carefully placed to avoid wrinkling or damage to the geotextile.

L. Geotextile panels are be oriented at right angles to the toe of the berm (downslope) where possible. Transition seams between vertical slope panels and horizontal panels will be located at least 5 feet from the toe of the slope. Geotextile panels are to be deployed in a manner that minimizes field seams.

M. Geotextile deployment shall start at the top of the slope and proceed downward. Adjacent rolls are to be overlapped a minimum of 6”.

N. Damaged areas are to be patched with an additional layer of geotextile material. The patch is to overlap the damaged area by a minimum of 12 inches on each side, and is to be heat bonded to the main layer of geotextile. If the damaged area is in excess of 50% of the roll width, the damaged section is to be removed and replaced with undamaged geotextile material.

END OF SECTION

SECTION 31 05 19.15

GEOSYNTHETIC CLAY LINER

PART 1 GENERAL

1.1 SUMMARY

A. This specification covers the technical requirements for the furnishing and installation of the geosynthetic clay liner described herein. All materials used shall meet the requirements of this specification, and all work shall be performed in accordance with the procedures provided herein and the contract drawings.

B. Related Sections:
1. Section 31 05 19.13 - Geotextile Fabric.
2. Section 31 05 19.16 - Polyethylene Geomembrane Liner.
3. Section 33 47 30 - Leachate Collection System Piping.
4. Section 31 23 23 - Backfill.

1.2 DEFINITIONS

A. For the purposes of this specification guideline, the following terms are defined below
1. Geosynthetic Clay Liner (GCL) - A manufactured hydraulic barrier consisting of clay bonded to a layer or layers of geosynthetics.
2. Geomembrane - An essentially impermeable geosynthetic composed of one or more geosynthetic sheets.
3. Geotextile - Any permeable geosynthetic comprised solely of textiles.
4. Minimum Average Roll Value - For geosynthetics, the value calculated as the typical value minus two (2) standard deviations from documented quality control test results for a defined population from one specific test method associated with one specific property.
5. Overlap - Where two adjacent GCL panels contact, the distance measuring perpendicular from the overlying edge of one panel to the underlying edge of the other.
6. Typical Value - The mean value calculated from documented manufacturing quality control test results for a defined population obtained from one test method associated with one specific property.

1.3 UNIT PRICES

A. Measurement will be made of the total surface area in square feet covered by the GCL as shown on the contract drawings. Final quantities will be based on as-built conditions. GCL in anchor and drainage trenches will be considered incidental to the project and no allowance or payment will be made for waste, overlap, or materials used for the convenience of the Contractor. GCL installed and accepted will be paid for at the respective contract unit price in the bidding schedule.

1.4 SUBMITTALS

A. With the bid, the Contractor shall furnish the following information:
   1. Conceptual description of the proposed plan for placement of the GCL panels over the area of installation.
   2. GCL manufacturer's MQC Plan for documenting compliance to Articles 2.1 and 2.2 of these specifications.
   3. GCL manufacturer's historical data for reinforced GCL of a) 10,000-hour creep shear testing per Article 2.2 D and b) seam flow data at 2 psi confining pressure per Article 2.2 E.
   4. A copy of GCL manufacturer's ISO quality Certificate of Registration.

B. At the Engineer's or Owner's request the Contractor shall furnish:
   1. A representative sample of the GCLs.
   2. A project reference list for the GCL(s) consisting of the principal details of at least ten projects totaling at least 10 million square feet (100,000 square meters) in size.

C. Upon shipment, the Contractor shall furnish the GCL manufacturer's Quality Assurance/Quality Control (QA/QC) certifications to verify that the materials supplied for the project are in accordance with the requirements of this specification.

D. As installation proceeds, the Contractor shall submit certificates of subgrade acceptance, signed by the Contractor and CQA Inspector (see Sections 1.6 and 3.3) for each area that is covered by the GCL.

1.5 QUALIFICATIONS

A. GCL Manufacturer must have produced at least 10 million square feet of GCL, with at least 8 million square feet installed.

B. The GCL Installer must either have installed at least 1 million square feet of GCL, or must provide to the Engineer satisfactory evidence, through similar experience in the installation of other types of geosynthetics, that the GCL will be installed in a competent, professional manner.

1.6 CONSTRUCTION QUALITY ASSURANCE (CQA)

A. The Owner and Engineer shall provide an inspector for CQA of the GCL installation. The inspector shall be an individual or company who is independent from the manufacturer and installer, who shall be responsible for monitoring and documenting activities, related to the CQA of the GCL, throughout installation. The inspector shall have provided CQA services for the installation of the proposed or similar GCL for at least 5 completed projects totaling not less than 1 million square feet.

B. Testing of the GCL, as necessary to support the CQA effort, shall be performed by a third party laboratory retained by the Contractor and independent from the GCL manufacturer and installer. The laboratory shall have provided GCL CQA testing of the proposed or similar GCL for at least 5 completed projects totaling not less than 1 million square feet).

C. CQA shall be provided in accordance with the GCL CQA Manual provided by the Engineer.

D. Post Production Quality Assurance: The finished GCL is sampled across the roll width within each lot. This sample is immediately sent to the quality assurance laboratory for finished product testing.

1. Sampling: A 2.0 ft length by roll width sample is cut for quality assurance testing at the specified frequencies listed in the Certified Properties Table, below.
   a. The laboratory sample is labeled with the roll number, and production date. Test specimens are taken from positions across the width of the roll.
   b. The five specimen positions are defined as a constantly repeating set of locations determined by the roll number. A 1.0 ft by 1.0 ft section is labeled and retained for 5 years for future reference or testing. The sample must be completely sealed with a dark plastic or container to protect the sample from UV rays.
2. Evaluation of Results: Samples are tested using the frequencies and procedures listed in the Certified Properties Table, below. All data are recorded and compared to established order specifications. If materials do not meet the required minimum average values and/or the customer specifications, the manufacturing personnel are immediately notified to make the appropriate adjustments. Only products meeting minimum average values and customer's specifications will be approved for shipment to the corresponding project.
3. Reporting: All rolls supplied for a specific project or order will be provided a manufacturing quality assurance document. This document identifies the standards on which the approval is based along with the actual test results demonstrated by the material. Each report is reviewed by quality assurance personnel stamped, and initiated by an independent laboratory technician.

PART 2 PRODUCTS

2.1 GENERAL

A. The GCLs shall consist of a layer of natural sodium bentonite clay encapsulated between two geotextiles and shall comply with all of the criteria listed in this Section.

B. Prior to using an alternate GCL, the Contractor must furnish independent test results demonstrating that the proposed alternate material meets all requirements of this specification. The Contractor also must obtain prior approval of the alternative GCL by the Project Engineer.

2.2 MATERIALS

A. Acceptable reinforced GCL products are Bentomat® ST, as manufactured by CETCO Lining Technologies, or an engineer-approved equal.

B. Areas requiring reinforced GCL will be furnished with Bentomat® ST, or equal. The delineation of these areas shall be agreed by the Installer and the Engineer prior to installation.

C. The reinforced GCL shall have the properties shown in the Certified Properties Table.

D. The reinforced GCL shall have 10,000 hour test data for large-scale constant-load (creep) shear testing under hydrated conditions. The displacement shall be 0.11 in. (2.7 mm) or less at a constant shear load of 250 psf (12 kPa) and a normal load of 500 psf (24 kPa).

E. The reinforced GCL shall have seam test data from an independent laboratory showing that the seam flow with a grooved cut in the nonwoven geotextile is less than 1×10^{-8} $m^3/m^2/s$ at 2 psi hydraulic pressure.

F. The minimum acceptable dimensions of full-size GCL panels shall be 150 feet (45.7 m) in length. Short rolls (those manufactured to a length greater than 70 feet (21 m) but less than a full-length roll) may be supplied at a rate no greater than 3 per truckload or 3 rolls every 36,000 square feet (3,500 square meters) of GCL, whichever is less.

G. A 6-inch (150 mm) overlap guideline shall be imprinted on both edges of the upper geotextile component of the GCL as a means for providing quality assurance of the overlap dimension. Lines shall be printed in easily visible, non-toxic ink.

2.3 PRODUCT QUALITY DOCUMENTATION

A. The GCL manufacturer shall provide the Contractor or other designated party with manufacturing QA/QC certifications for each shipment of GCL. The certifications shall be signed by a responsible party employed by the GCL manufacturer and shall include:
   1. Certificates of analysis for the bentonite clay used in GCL production demonstrating compliance with the parameters swell index and fluid loss shown in the Certified Properties Table.
   2. Manufacturer's test data for finished GCL product(s) of bentonite mass/area, GCL tensile strength and GCL peel strength (reinforced only) demonstrating compliance with the index parameters shown in the Certified Properties Table.
   3. GCL lot and roll numbers supplied for the project (with corresponding shipping information).

2.4 PRODUCT LABELING

A. Prior to shipment, the GCL manufacturer shall label each roll, identifying:
   1. Product identification information (Manufacturer's name and address, brand product code).
   2. Lot number and roll number.
   3. Roll length, width and weight.

2.5 PACKAGING

A. The GCL shall be wound around a rigid core whose diameter is sufficient to facilitate handling. The core is not necessarily intended to support the roll for lifting but should be sufficiently strong to prevent collapse during transit.

B. All rolls shall be labeled and bagged in packaging that is resistant to photo-degradation by ultraviolet (UV) light.

CERTIFIED PROPERTIES TABLE

MATERIAL PROPERTY	TEST METHOD	TEST FREQUENCY $ft^2(m^2)$	REQUIRED VALUES
Bentonite Swell Index[1]	ASTM D 5890	1 per 50 tonnes	24 ml/2g min.
Bentonite Fluid Loss[1]	ASTM D 5891	1 per 50 tonnes	18 ml max.
Bentonite Mass/Area[2]	ASTM D 5993	40,000 ft^2 (4,000 m^2)	0.75 lb/ft^2 (3.6 kg/m^2) min
GCL Grab Strength[3]	ASTM D 6768	200,000 ft^2 (20,000 m^2)	30 lbs/in (53 N/cm) MARV
GCL Peel Strength[3]	ASTM D 6496	40,000 ft^2 (4,000 m^2)	3.5 lbs/in (6.1 N/cm) min
GCL Index Flux[4]	ASTM D 5887	Weekly	1 x 10^{-8} m^3/m^2/sec max
GCL Hydraulic Conductivity[4]	ASTM D 5887	Weekly	5 x 10^{-9} cm/sec max
GCL Hydrated Internal Shear Strength[5]	ASTM D 5321 ASTM D 6243	Periodic	500 psf (24 kPa) typ @ 200 psf

NOTES:

1. Bentonite property tests performed at a bentonite processing facility before shipment to GCL production facilities.

2. Bentonite mass/area reported at 0 percent moisture content.

3. All tensile strength testing is performed in the machine direction using ASTM D6768. All peel strength testing is performed using ASTM D6496. Upon request, tensile and peel results can be reported per modified ASTM D4632 using 4 inch grips.

4. Index flux and permeability testing with deaired distilled/deionized water at 80 psi (551kPa) cell pressure, 77 psi (531 kPa) headwater pressure and 75 psi (517 kPa) tailwater pressure. Reported value is equivalent to 925 gal/acre/day. This flux value is equivalent to a permeability of 5x10-9 cm/sec for typical GCL thickness. Actual flux values vary with field condition pressures. The last 20 weekly values prior the end of the production date of the supplied GCL may be provided.

5. Peak values measured at 200 psf (10 kPa) normal stress for a specimen hydrated for 48 hours. Site-specific materials, GCL products, and test conditions must be used to verify internal and interface strength of the proposed design.

2.6 ACCESSORY BENTONITE

A. The granular bentonite sealing clay used for overlap seaming, penetration sealing and repairs shall be made from the same natural sodium bentonite as used in the GCL and shall be as recommended by the GCL manufacturer. Seaming of GCLs shall be conducted in accordance with the manufacturer's guidelines for each particular GCL.

PART 3 EXECUTION

3.1 SHIPPING AND HANDLING

A. The manufacturer assumes responsibility for initial loading the GCL. Shipping will be the responsibility of the party paying the freight. Unloading, on-site handling and storage of the GCL are the responsibility of the Contractor, Installer or other designated party.

B. A visual inspection of each roll should be made during unloading to identify if any packaging has been damaged. Rolls with damaged packaging should be marked and set aside for further inspection. The packaging should be repaired prior to being placed in storage.

C. The party responsible for unloading the GCL should contact the Manufacturer prior to shipment to ascertain the appropriateness of the proposed unloading methods and equipment.

3.2 STORAGE

A. Storage of the GCL rolls shall be the responsibility of the installer. A dedicated storage area shall be selected at the job site that is away from high traffic areas and is level, dry and well drained.

B. Rolls should be stored on smooth subgrade or wooden supports in a manner that prevents sliding or rolling from the stacks and may be accomplished by the use of chock blocks. Rolls should be stacked at a height no higher than that at which the lifting apparatus can be safely handled (no higher than four).

C. All stored GCL materials and the accessory bentonite must be covered with a plastic sheet or tarpaulin until their installation.

D. The integrity and legibility of the labels shall be preserved during storage.

E. GCL rolls are to be unloaded under supervision of the liner installer using straps or other devices that will prevent damage to the liner material.

F. If any material damage is noted during unloading, the damaged areas are to be marked with a permanent marker, and a notation made as to the roll number, location of damage, and type of damage.

3.3 EARTHWORK

A. Any earthen surface upon which the GCL is installed shall be prepared and compacted in accordance with the project specifications and drawings. The surface shall be smooth, firm, and unyielding, and free of:
   1. Vegetation.
   2. Construction Debris.
   3. Sticks.
   4. Sharp rocks.

5. Void spaces.
6. Ice.
7. Abrupt elevation changes.
8. Standing water.
9. Cracks larger than one-quarter inch (6 mm) in width.
10. Any other foreign matter that could contact the GCL.

B. Immediately prior to GCL deployment, the subgrade shall be final-graded to fill in all voids or cracks and then smooth-rolled to provide the best practicable surface for the GCL. At completion of this activity, no wheel ruts, footprints or other irregularities shall exist in the subgrade. Furthermore, all protrusions extending more than one-half inch (12 mm) from the surface shall either be removed, crushed or pushed into the surface with a smooth-drum compactor.

C. On a continuing basis, the project CQA inspector shall certify acceptance of the subgrade before GCL placement.

D. It shall be the installer's responsibility thereafter to indicate to the Engineer any change in the condition of the subgrade that could cause the subgrade to be out of compliance with any of the requirements listed in this Section.

E. At the top of sloped areas of the job site, an anchor trench for the GCL shall be excavated or an equivalent runout shall be utilized in accordance with the project plans and specifications and as approved by the CQA Inspector. When utilizing an anchor trench design, the trench shall be excavated and approved by the CQA Inspector prior to GCL placement. No loose soil shall be allowed at the bottom of the trench and no sharp corners or protrusions shall exist anywhere within the trench.

3.4 GCL PLACEMENT

A. Unreinforced GCL shall be placed on the flatter areas of the site; reinforced GCL shall be placed on the more steeply sloped areas. The Installer and Project engineer shall review and agree upon which GCL shall be placed on these areas prior to installation.

B. GCL rolls should be delivered to the working area of the site in their original packaging. Immediately prior to deployment, the packaging should be carefully removed without damaging the GCL. The orientation of the GCL (i.e., which side faces up) should be in accordance with the Engineer's recommendations.

C. Equipment, which could damage the GCL, shall not be allowed to travel directly on it. If the installation equipment causes rutting of the subgrade, the subgrade must be restored to its originally accepted condition before placement continues.

D. Care must be taken to minimize the extent to which the GCL is dragged across the subgrade in order to avoid damage to the bottom surface of the GCL. A temporary geosynthetic subgrade covering commonly known as a slip sheet or rub sheet may be used to reduce friction damage during placement.

E. Materials will not be deployed when moisture, high winds, or other adverse weather conditions are expected. Temporary sand bags are to be used to prevent material uplift and movement from light winds during liner installation

F. Material on slopes greater than 10:1 is to be placed parallel to the direction of the slope. Other than roll end (butt) seams, no horizontal seams are allowed on slopes. Transition seams between material on the slopes and material on the bottom of the cell are to be located a minimum of two feet from the bottom of the slope

G. All GCL panels should lie flat on the underlying surface, with no wrinkles or fold, especially at the exposed edges of the panels. Excessive wrinkles are to be removed from the material after deployment.

H. Only as much GCL shall be deployed as can be covered at the end of the working day with soil, a geomembrane, or a temporary waterproof tarpaulin. The GCL shall not be left uncovered overnight. If the GCL is hydrated when no confining stress is present, it may be necessary to remove and replace the hydrated material. The project Engineer, CQA inspector, and GCL supplier should be consulted for specific guidance if premature hydration occurs.

3.5 ANCHORAGE

A. As directed by the project drawings and specifications, the end of the GCL roll shall be placed in an anchor trench at the top of the slope or an equivalent runout design shall be utilized. When utilizing an anchor trench design, the front edge of the trench should be rounded so as to eliminate any sharp corners. Loose soil should be removed from the floor of the trench. The GCL should cover the entire trench floor but does not extend up the rear trench wall.

3.6 SEAMING

A. The GCL seams are constructed by overlapping their adjacent edges. Care should be taken to ensure that the overlap zone is not contaminated with loose soil or other debris.

B. The minimum dimension of the longitudinal overlap should be 6 inches (150 mm). If the GCL is manufactured with a grooved cut in the nonwoven geotextile that allows bentonite to freely extrude into the longitudinal overlap then no supplemental bentonite is required for this overlap. If the GCL does not have a grooved cut in the nonwoven geotextile longitudinal overlap, then bentonite-enhanced seams are required as described below.

C. End-of-roll overlapped seams should be constructed with a minimum overlap of 24 inches (600 mm). Seams at the ends of the panels should be constructed such that they are shingled in the direction of the grade to prevent the potential for runoff flow to enter the overlap zone. End-of-roll overlapped seams for all reinforced GCL seams require bentonite-enhanced seams as described below.

D. Bentonite-enhanced seams are constructed between the overlapping adjacent panels as follows. The underlying edge of the longitudinal overlap is exposed and then a

continuous bead of granular sodium bentonite is applied along a zone defined by the edge of the underlying panel and the 6-inch (150-mm) line. The granular bentonite shall be applied at a minimum application rate of one quarter pound per lineal foot (0.4 kg/m). A similar bead of granular sodium bentonite is applied at the end-of-roll overlap.

3.7 DETAIL WORK

A. The GCL shall be sealed around penetrations and embedded structures embedded in accordance with the design drawings and the GCL Manufacturer.

B. Cutting the GCL should be performed using a sharp utility knife. Frequent blade changes are recommended to avoid damage to the geotextile components of the GCL during the cutting process.

3.8 DAMAGE REPAIR

A. If the GCL is damaged (torn, punctured, perforated, etc.) during installation, it may be possible to repair it by cutting a patch to fit over the damaged area. The patch shall be obtained from a new GCL roll and shall be cut to size such that a minimum overlap of 12 inches (300 mm) is achieved around all of the damaged area. Granular bentonite or bentonite mastic should be applied around the damaged area prior to placement of the patch. It may be desirable to use an adhesive to affix the patch in place so that it is not displaced during cover placement.

3.9 COVER PLACEMENT

A. Cover soils shall be free of angular stones or other foreign matter that could damage the GCL. Cover soils should be approved the project Engineer with respect to particle size, uniformity and chemical compatibility. Cover soils with high concentrations of calcium (e.g., limestone, dolomite) are not acceptable.

B. Soil cover shall be placed over the GCL using construction equipment that minimizes stresses on the GCL. A minimum thickness of 1foot (300 mm) of cover should be maintained between the equipment tires/tracks and the GCL at all times during the covering process. This thickness recommendation does not apply to frequently trafficked areas or roadways, for which a minimum thickness of 2 feet (600 mm) is required.

C. Soil cover should be placed in a manner that prevents the soil from entering the GCL overlap zones. Cover soil shall be pushed up slopes, not down slopes, to minimize tensile forces on the GCL.

D. Although direct vehicular contact with the GCL is to be avoided, lightweight, low ground pressure vehicles (such as 4-wheel all-terrain vehicles) may be used to facilitate the installation of any geosynthetic material placed over the GCL. The GCL supplier or CQA engineer should be contacted with specific recommendations on the appropriate procedures in this situation.

E. When a textured geomembrane is installed over the GCL, a temporary geosynthetic covering known as a slip sheet or rub sheet should be used to minimize friction during

placement and to allow the textured geomembrane to be more easily moved into its final position.

F. Claymax must be covered with a geomembrane and/or 12" of cover material within 8 hours of deployment to prevent the potential for shrinkage by desiccation.

G. Cyclical wetting and drying of GCL covered only with geomembrane can cause overlap separation. Soil cover should be placed promptly whenever possible. Geomembranes should be covered with a white geotextile and/or operations layer without delay to minimize the intensity of wet-dry cycling. If there is the potential for unconfined cyclic wetting and drying over an extended period of time, the longitudinal seam overlaps should be increased based on the project engineer's recommendations.

H. To avoid seam separation, the GCL should not be put in excessive tension by the weight or expansion of textured geomembrane on steep slopes. The project Engineer should be consulted about the potential for GCL tension to develop.

END OF SECTION

SECTION 31 05 19.16

POLYETHYLENE GEOMEMBRANE LINER

PART 1 GENERAL

1.1 SUMMARY

A. Specifications and guidelines for manufacturing and installing geomembrane liners.

B. Related Sections:
1. Section 31 05 19.13 - Geotextile Fabric.
2. Section 31 05 19.15 - Geosynthetic Clay Liner.
3. Section 33 47 30 - Leachate Collection System Piping.

1.2 UNIT PRICE - MEASUREMENT AND PAYMENT

A. Polyethylene Geomembrane Liner:
1. Basis of Measurement: Square Feet.
2. Basis of Payment: Includes furnishing all polyethylene geomembrane liner material and installation equipment, installation of liner material, and testing of material and welds as called for in this specification. Square footage calculation is based on finished area. No additional payment will be made for required overlap of material or trench anchor as per these specifications, or manufacturer's instructions.

1.3 REFERENCE

A. American Society for Testing and Materials (ASTM)
1. ASTM D1004 - Test Method for Initial Tear Resistance of Plastic Film and Sheeting.
2. ASTM D1238 - Standard Test Method for Flow Rates of Thermoplastics by Extrusion Plastometer.
3. ASTM D1505 - Test Method for Density of Plastics by the Density-Gradient Technique.
4. ASTM D1603 - Test Method for Carbon Black in Olefin Plastics.
5. ASTM D3895 - Standard Test Method for Oxidative-Induction Time of Polyolefins by Differential Scanning Calorimetry.
6. ASTM D4833 - Standard Test Method for Index Puncture Resistance of Geotextiles, Geomembranes, and Related Products.
7. ASTM D5199 - Standard Test Method for Measuring Nominal Thickness of Geotextiles and Geomembranes.
8. ASTM D5397 - Standard Test Method for Evaluation of Stress Crack Resistance of Polyolefin Geomembranes Using Notched Constant Tensile Load Test.
9. ASTM D5596 - Standard Test Method for Microscopic Evaluation of the Dispersion of Carbon Black in Polyolefin Geosynthetics.
10. ASTM D5994 - Standard Test Method for Measuring Core Thickness of Textured Geomembranes.

11. ASTM D6392 - Standard Test Method for Determining the Integrity of Nonreinforced Geomembrane Seams Produced Using Thermo-Fusion Methods.
12. ASTM D6693 - Standard Test Method for Determining Tensile Properties of Nonreinforced Polyethylene and Nonreinforced Flexible Polypropylene Geomembranes.

B. Geosynthetic Research Institute (GRI)
1. GRI GM 13 Test Properties - Testing Frequency and Recommended Warranty for High Density Polyethylene (HDPE) Smooth and Textured Geomembranes.
2. GRI GM 17 Test Properties - Testing Frequency and Recommended Warranty for Liner Low Density Polyethylene (LLDPE) Smooth and Textured Geomembranes.

1.4 DEFINITIONS

A. Lot - A quantity of resin (usually the capacity of one rail car) used in the manufacture of geomembranes. Finished roll will be identified by a roll number traceable to the resin lot used.

B. Construction Quality Assurance Consultant (Consultant) - Party, independent from Manufacturer and Contractor that is responsible for observing and documenting activities related to quality assurance during the lining system construction.

C. Engineer - The individual or firm responsible for the design and preparation of the project's Contract Drawings and Specifications.

D. Geomembrane Manufacturer (Manufacturer) - The party responsible for manufacturing the geomembrane rolls.

E. Geosynthetic Quality Assurance Laboratory (Testing Laboratory) - Party, independent from the Owner, Manufacturer and Installer, responsible for conducting laboratory tests on samples of geosynthetics obtained at the site or during manufacturing, usually under the direction of the Owner.

F. Installer - Party responsible for field handling, transporting, storing, deploying, seaming and testing of the geomembrane seams. For the sake of the present Contract Documents, reference to Installer throughout this specification shall be understood to be one and the same as Contractor, whether the Contractor subcontracts the installation or not.

G. Panel - Unit area of a geomembrane that will be seamed in the field that is larger than 100 ft2.

H. Patch - Unit area of a geomembrane that will be seamed in the field that is less than 100 ft2.

I. Subgrade Surface - Soil layer surface that immediately underlies the geosynthetic material(s).

1.5 SUBMITTALS POST-AWARD

A. Furnish the following product data, in writing, to Engineer prior to installation of the geomembrane material:

1. Resin Data shall include the following:
   a. Certification stating that the resin meets the specification requirements (see Section 1.09).
2. Geomembrane Roll:
   a. Statement certifying no recycled polymer and no more than 10% rework of the same type of material is added to the resin (product run may be recycled).

B. The Contractor shall furnish the following information to the Engineer prior to installation:
1. Installation layout drawings:
   a. Must show proposed panel layout including field seams and details.
   b. Must be approved prior to installing the geomembrane
      1) Approved drawings will be for concept only and actual panel placement will be determined by site conditions.
2. Installer's Geosynthetic Field Installation Quality Assurance Plan.

C. The Contractor will submit the following to the Engineer upon completion of installation:
1. Certificate stating the geomembrane has been installed in accordance with the Contract Documents.
2. Material and installation warranties.
3. As-built drawings showing actual geomembrane placement and seams including typical anchor trench detail.

1.6 QUALITY ASSURANCE

A. The Owner may engage and pay for the services of a Geosynthetic Quality Assurance Consultant and Laboratory to monitor geomembrane installation.

1.7 QUALIFICATIONS

A. Manufacturer:
1. Manufacturer shall have 10 completed projects totaling a minimum of 5,000,000 square feet of polyethylene geomembrane.

B. Installer:
1. Installer shall have worked in a similar capacity on at least three (3) projects similar in complexity to the project described in the Contract Documents.
2. The Installation Supervisor shall have worked in a similar capacity on projects similar in size and complexity to the project described in the Contract Documents within the past three (3) years.
3. The Installer shall provide a minimum of one Master Seamer for work on the project.
   a. Must have completed a minimum of 500,000 square feet of geomembrane seaming work using the type of seaming apparatus proposed for the use on this Project.

1.8 MATERIAL LABELING, DELIVERY, STORAGE AND HANDLING

A. Labeling - Each roll of geomembrane delivered to the site shall be labeled by the Manufacturer. The label will identify:

1. Manufacturer's name.
2. Product identification.
3. Thickness.
4. Length.
5. Width.
6. Roll number.

B. Packaging - The geomembrane shall be rolled onto a substantial core or core segments and held firm by dedicated straps/slings, or other suitable means.

C. Delivery - Rolls of liner will be prepared to ship by appropriate means to prevent damage to the material and to facilitate off-loading.

D. Storage - The on-site storage location for geomembrane material, provided by the Contractor to protect the geomembrane from punctures, abrasions and excessive dirt and moisture for should have the following characteristics:
1. Level (no wooden pallets).
2. Smooth and dry.
3. Protected from theft and vandalism.
4. Adjacent to the area being lined.

E. HDPE rolls are to be unloaded under the supervision of the liner installer using straps or other devices that will prevent damage to the liner material.

F. Rolls should be stored on subgrade that is clean, dry, and well compacted. HDPE materials shall be stacked not more than three rolls high.

G. If any material damage is noted during unloading, the damaged areas are to be marked with a permanent marker, and a notation made as to the roll number, location of damage, and type of damage. Recording of minor damage to the outer wraps of liner material is not required.

H. Handling - Materials are to be handled so as to prevent damage.

1.9 WARRANTY

A. Material shall be warranted for a period of 1 year from the date of geomembrane installation.

B. Installation shall be warranted against defects in workmanship for a period of 1 year from the date of geomembrane completion.

PART 2 PRODUCTS

2.1 GEOMEMBRANE

A. Manufacturer:
1. Geomembrane shall be manufactured by the following:
   a. GSE Lining Technology, Inc.; or
   b. Approved equal.

B. Material shall be smooth or textured polyethylene geomembrane as shown on the Drawings. Smooth liner shall be installed at the bottom of the pond and textured liner on the walls of the pond with textured side facing up.

C. Resin:
1. Resin shall be new, first quality, compounded and manufactured specifically for producing geomembrane.
2. Natural resin (without carbon black) shall meet the following minimum requirements:

Property	Test Method	HDPE	LLDPE
Density [g/cm^3]	ASTM D 1505	0.932	0.915
Melt Flow Index [g/10 min.]	ASTM D 1238 (190/2.16)	≤ 1.0	≤ 1.0
OIT [minutes]	ASTM D 3895 (1 atm/200°C)	≥ 100	≥ 100

D. Geomembrane Rolls:
1. Do not exceed a combined maximum total of 1 percent by weight of additives other than carbon black.
2. Geomembrane shall be free of holes, pinholes as verified by on-line electrical detection, bubbles, blisters, excessive contamination by foreign matter, and nicks and cuts on roll edges.
3. Geomembrane material is to be supplied in roll form. Each roll is to be identified with labels indicating roll number, thickness, length, width and manufacturer.
4. All liner sheets produced at the factory shall be inspected prior to shipment for compliance with the physical property requirements listed in section 1.09, B, and be tested by an acceptable method of inspecting for pinholes. If pinholes are located, identified and indicated during manufacturing, these pinholes may be corrected during installation.

E. Smooth surfaced geomembrane shall meet the requirements shown in the following table for the following material:
1. Table 1.1 for black HDPE, Product Code HDE 060A000, or approved equal, with thickness (minimum average) mil (mm) of 60 (1.50), and lowest individual reading (-10%) of 54 (1.40), and all other related characteristics as identified in the table under the corresponding column.

F. Textured geomembrane shall meet the requirements shown in the following table for the following material:
1. Table 1.2 for black coextruded textured HDPE, Product Code HDT 060G000, or approved equal, with thickness (minimum average) mil (mm) of 57 (1.45), and lowest individual reading (-10%) of 51 (1.30), and all other related characteristics as identified in the table under the corresponding column.

G. Extrudate Rod or Bead:
1. Extrudate material shall be made from same type resin as the geomembrane.
2. Additives shall be thoroughly dispersed.
3. Materials shall be free of contamination by moisture or foreign matter.

2.2 EQUIPMENT

A. Welding equipment and accessories shall meet the following requirements:
   1. Gauges showing temperatures in apparatus (extrusion welder) or wedge (wedge welder) shall be present.
   2. An adequate number of welding apparatuses shall be available to avoid delaying work.
   3. Power source must be capable of providing constant voltage under combined line load.

PART 3 EXECUTION

3.1 GENERAL

A. Section 01 00 00 - Quality Requirements: Examination of existing conditions before starting work.

B. Installer:
   1. Installation shall be performed by one of the following installation companies:
      a. GSE Lining Technology, Inc.
      b. Approved equal.

3.2 DEPLOYMENT

A. Assign each panel a simple and logical identifying code. The coding system shall be subject to approval and shall be determined at the job site.

B. If a Liner Installation Plan has been submitted, the geomembrane shall be installed in accordance with said Plan. The panel layout may be adjusted in the field if required by site conditions. Panels are to be identified with a Panel Number that allows ready identification of the location of the panel. The Panel Number is to be written on the liner material with a permanent marker.

C. Prior to placement of any liner materials, the subgrade is to be inspected and approved by the Engineer. Any areas found to be unacceptable are to be corrected prior to placement of liner material. Documentation of this inspection is to be provided if required by the project specifications.

D. Visually inspect the geomembrane during deployment for imperfections and mark faulty or suspect areas.

E. Materials will not be deployed when moisture, high winds, or other adverse weather conditions are expected.

F. Deployment of geomembrane panels shall be performed in a manner that will comply with the following guidelines:
   1. HDPE materials are to be deployed using methods that will not crimp, bend, or otherwise damage the material, nor damage the underlying surface. Unless otherwise approved, HDPE materials are to be deployed using a "spreader bar" manufactured especially for this purpose.

2. Place ballast (commonly sandbags) on geomembrane which will not damage geomembrane to prevent wind uplift.
3. Personnel walking on geomembrane shall not engage in activities or wear shoes that could damage it. Smoking will not be permitted on the geomembrane.
4. No motorized equipment will be allowed to operate directly over the geomembrane material. Portable equipment (portable generators, compressors, etc.) will be mounted on rubber tires (less than 6 psi) or placed on a sacrificial sheet of material.
5. Protect geomembrane in areas of heavy traffic by placing protective cover over the geomembrane.

G. The liner panels shall be oriented at right angles to the toe of the berm (downslope) where possible. Except for roll end (butt) seams, horizontal seams are not allowed on slopes steeper than 8:1. Transition seams between vertical slope panels and horizontal panels will be located at least 5 feet from the toe of the slope. Liner panels are to be deployed in a manner that minimizes field seams.

H. HDPE liner materials are to be deployed in a manner that minimizes wrinkling, but allows for sufficient material slack to properly conform to the subgrade and allow for thermal expansion and contraction of the material. Ambient weather conditions and liner temperature are to be taken into account when making this determination.

I. When HDPE materials are deployed at temperatures greater than 80° F and in direct sunlight, the material will be allowed to stabilize overnight before the anchor trenches are backfilled. Stabilizing is accomplished using the following techniques:
1. Leave sufficient excess liner material on the outboard side of the anchor trench to allow for anticipated liner shrinkage.
2. Temporarily weight the liner in the anchor trench using sandbags.
3. Place sufficient sandbags at the toe of the slope to allow the liner to pull the excess material from the anchor trench as it shrinks. The number and placement of sandbags will vary according to the pond design and expected weather conditions.
4. Inspect the liner material while the material is still cool the following morning. If sufficient liner shrinkage has occurred, the anchor trench is to be backfilled.

3.3 FIELD SEAMING

A. Seams shall meet the following requirements:
1. To the maximum extent possible, orient seams parallel to line of slope, i.e., down and not across slope.
2. Minimize number of field seams in corners, odd-shaped geometric locations and outside corners.
3. Slope seams (panels) shall extend a minimum of five-feet beyond the grade break into the flat area.
4. Use a sequential seam numbering system compatible with panel numbering system that is agreeable to the Engineer and Installer.
5. Align seam overlaps consistent with the requirements of the welding equipment being used. Unless otherwise specified below, a minimum 6-inch overlap is required.

B. During Welding Operations:
   1. Provide at least one Master Seamer who shall provide direct supervision over other welders as necessary.

C. Extrusion Welding:
   1. Extrusion welding is to be used for detail work, repairs, and in other areas where wedge welding cannot be used.
   2. The extrusion welder shall be purged prior to beginning a seam until all potentially heat-degraded extrudate has been removed from the barrel.
   3. Areas to be extrusion welded are to be clean and dry. Surface oxidation is to be removed by grinding. Grinding is to be done not more than one hour prior to the time the extrusion weld is made, using the procedures listed below:
      a. The grinding shall not extend more than ¼ inch beyond the limit of the extrudate after seam completion.
      b. Grinding shall be performed preferentially in a perpendicular path across the seam.
      c. The depth of grinding shall be less than 10 percent of the sheet thickness.
      d. All shavings produced from grinding shall be removed from the seaming area prior to welding.
   4. Where patches are required, the patches are to be round or oval in shape, and are to overlap the damaged area by a minimum or 4" on all sides. Patches are to be heat sealed to the main liner prior to extrusion welding to prevent the edge of the patch from lifting when the extrudate is applied.
   5. Extrusion welds are to be tested by use of a vacuum box.

D. Hot Wedge Welding:
   1. After allowing the liner temperature to stabilize, overlap adjacent panels a minimum of 4". Remove any excessive wrinkles prior to seaming.
   2. Field seams are to be made using the dual-hot-wedge welding method whenever possible.
   3. The area to be seamed is to be clean and dry. If required, a protective layer is to be placed under the seam to prevent dust or moisture from entering the seam area, and/or the liner material in the seam area is to be wiped with a clean rag.
   4. Welding apparatus shall be a self-propelled device equipped with an electronic controller which displays applicable temperatures.
   5. At the start of each seam, the machine operator is to mark the date, time, machine number, machine temperature, machine speed, and operator initials on the lining material with a permanent marker. This information is to be recorded in the project log.
   6. The machine operator is responsible for ensuring that the area to be seamed is clean and dry. If any questionable seam areas are noted, the operator is to mark these areas for later inspection and testing.
   7. The machine operator is to read the machine temperature at intervals of approximately 100'. This procedure will ensure that seams are made at the proper temperature. If an excessively high or low temperature reading is noted, the operator is to stop seaming and mark the affected area for testing. The cause of the problem is to be located and corrected, and a new trial seam made and tested before seaming resumes.

E. Trial Welds:
1. Prior to seaming any materials, perform trial welds on geomembrane samples to verify welding equipment is operating properly.
2. Make trial welds under the same surface and environmental conditions as the production welds, i.e., in contact with subgrade and similar ambient temperature.
3. Trial seams are to be conducted immediately prior to the start of any welding period, if the welding equipment has been shut down for a period of more than (10) minutes, at mid shift, and if a substantial change in weather conditions occurs. A trial seam is to be done for each piece of welding equipment to be used during a welding period.
4. Cut four, one-inch wide by six-inch long test strips from the trial weld.
5. Quantitatively test specimens for peel adhesion, and then for shear strength.
6. At least (3) peel and (3) shear tests are to be conducted on each trial seam. Trial weld specimens shall pass when the results shown in Tables 2.1 and 2.2 are achieved in both peel and shear test.
   a. The break, when peel testing, occurs in the liner material itself, not through peel separation (FTB).
   b. The break is ductile.
7. Upon completion of a successful test, the date, time, seamer name, wedge welding machine number, machine temperature setting, machine speed setting, and test results are to be recorded in the Trial Seam Log. No seaming is to be done until a successful test seam has been completed and recorded.
8. If a trial seam fails the test, the entire process will be repeated. If the same welding machine and seamer fail the testing a second time, the welding machine and the seamer will not be used for seaming until the deficiencies are corrected and two consecutive successful trial seams are complete.
9. No welding equipment or welder shall be allowed to perform production welds until equipment and welders have successfully completed and recorded trial weld.

F. Seaming shall not proceed when ambient air temperature or adverse weather conditions jeopardize the integrity of the liner installation. Installer shall demonstrate that acceptable seaming can be performed by completing acceptable trial welds.

G. Defects and Repairs
1. Examine all seams and non-seam areas of the geomembrane for defects, holes, blisters, undispersed raw materials, and any sign of contamination by foreign matter.
2. Repair and non-destructively test each suspect location in both seam and non-seam areas. Do not cover geomembrane at locations that have been repaired until test results with passing values are available.

3.4 FIELD QUALITY ASSURANCE

A. Manufacturer and Installer shall participate in and conform to all terms and requirements of the Owner's quality assurance program. Contractor shall be responsible for assuring this participation.

B. Quality assurance requirements are as specified in this Section and in the Field Installation Quality Assurance Manual if it is included in the contract.

C. Field Testing:
1. Non-destructive testing may be carried out as the seaming progresses or at completion of all field seaming.
   a. Vacuum Testing.
      1) Shall be performed in accordance with ASTM D5641, Standard Practice for Geomembrane Seam Evaluation by Vacuum Chamber.
   b. Air Pressure Testing.
      1) Shall be performed in accordance with ASTM D5820, Standard Practice for Pressurized Air Channel Evaluation of Dual Seamed Geomembranes.
   c. Other approved methods.
2. Destructive Testing (performed by Installer).
   a. Location and Frequency of Testing.
      1) Collect destructive test samples at a frequency of one per every 500 liner feet of seam length.
      2) Test locations will be determined after seaming.
      3) Exercise Method of Attributes as described by GRI GM-14 (Geosynthetic Research Institute, www.geosynthetic-institute.org) to minimize test samples taken.
   b. Sampling Procedures are performed as follows:
      1) Installer shall cut samples at locations designated by the Engineer as the seaming progresses in order to obtain field laboratory test results before the geomembrane is covered.
      2) Samples shall be taken across the entire roll width and shall not include the first 3 feet.
      3) Installer will number each sample, and the location will be noted on the installation as-built.
      4) Samples shall be twelve (12) inches wide by minimal length with the seam centered lengthwise.
      5) Cut a 2-inch wide strip from each end of the sample for field-testing.
      6) Cut the remaining sample into two parts for distribution as follows:
         a) One portion for Installer, 12-inches by 12 inches.
         b) One portion for the Third Party laboratory, 12-inches by 18-inches.
         c) Additional samples may be archived if required.
      7) Destructive testing shall be performed in accordance with ASTM D6392, Standard Test Method for Determining the Integrity of Non-Reinforced Geomembrane Seams Produced Using Thermo-Fusion Methods.
      8) Installer shall repair all holes in the geomembrane resulting from destructive sampling.
      9) Repair and test the continuity of the repair in accordance with these Specifications.
3. Failed Seam Procedures.
   a. If the seam fails, Installer shall follow one of two options:
      1) Reconstruct the seam between any two passed test locations.

2) Trace the weld to intermediate location at least 10 feet minimum or where the seam ends in both directions from the location of the failed test.

b. The next seam welded using the same welding device is required to obtain an additional sample, i.e., if one side of the seam is less than 10 feet long.

c. If sample passes, then the seam shall be reconstructed or capped between the test sample locations.

d. If any sample fails, the process shall be repeated to establish the zone in which the seam shall be reconstructed.

3.5 REPAIR PROCEDURES

A. Remove damaged geomembrane and replace with acceptable geomembrane materials if damage cannot be satisfactorily repaired.

B. Repair any portion of unsatisfactory geomembrane or seam area failing a destructive or non-destructive test.

C. Installer shall be responsible for repair of defective areas.

D. Agreement upon the appropriate repair method shall be decided between Engineer and Installer by using one of the following repair methods:
1. Patching - Used to repair large holes, tears, undispersed raw materials and contamination by foreign matter.
2. Abrading and Re-welding - Used to repair short section of a seam.
3. Spot Welding - Used to repair pinholes or other minor, localized flaws or where geomembrane thickness has been reduced.
4. Capping - Used to repair long lengths of failed seams.
5. Flap Welding - Used to extrusion weld the flap (excess outer portion) of a fusion weld in lieu of a full cap.
6. Remove the unacceptable seam and replace with new material.

E. The following procedures shall be observed when a repair method is used:
1. All geomembrane surfaces shall be clean and dry at the time of repair.
2. Surfaces of the polyethylene which are to be repaired by extrusion welds shall be lightly abraded to assure cleanliness.
3. Extend patches or caps at least 6 inches for extrusion welds and 4 inches for wedge welds beyond the edge of the defect, and around all corners of patch material.

F. Repair Verification:
1. Number and log each patch repair (performed by Installer).
2. Non-destructively test each repair using methods specified in this Specification.

3.6 MEASUREMENT AND PAYMENT

A. Payment for geomembrane installation will be as per contract unit price per square foot, as measured parallel to liner surface, including designed anchor trench material and is based upon net lined area.

B. Net lined area is defined to be the true area of all surfaces to be lined plus designed burial in all anchor trenches, rubsheets, and sacrificial layers. Net lined area does not include overlap of liner material as specified, nor does it include any waste material.

C. Prices shall include full compensation for furnishing all labor, material, tools, equipment, and incidentals.

D. Prices also include doing all the work involved in performing geomembrane installation completely as shown on the drawing, as specified herein, and as directed by the Engineer.

Table 1.1: Minimum Values for Smooth Black-Surfaced HDPE Geomembranes
(Refer to Minimum and Nominal Values corresponding to HDE 060A000)

TESTED PROPERTY	TEST METHOD	FREQUENCY		MINIMUM VALUE			
Product Code				HDE 040A000	HDE 060A000	HDE 080A000	HDE 100A000
Thickness,(minimum average) mil (mm)	ASTM D 5199	Every roll		40 (1.00)	60 (1.50)	80 (2.00)	100 (2.50)
Lowest individual reading (-10%)				36 (0.91)	54 (1.40)	72 (1.80)	90 (2.30)
Density, g/cm^3	ASTM D 1505	200,000 lb		0.94	0.94	0.94	0.94
Tensile Properties (each direction)	ASTM D 6693,Type IV						
Strength at Break, lb/in (N/mm)	Dumbell, 2 ipm			152 (27)	228 (40)	304 (53)	380 (67)
Strength at Yield, lb/in (N/mm)		20,000 lb		84 (15)	126 (22)	168 (29)	210 (37)
Elongation at Break, %	G.L. 2.0 in (51 mm)			700	700	700	700
Elongation at Yield, %	G.L. 1.3 in (33 mm)			12	12	12	12
Tear Resistance, lb (N)	ASTM D 1004	45,000 lb		28 (125)	42 (187)	56 (249)	70 (311)
Puncture Resistance, lb (N)	ASTM D 4833	45,000 lb		72 (320)	108 (480)	144 (640)	180 (800)
Carbon Black Content, %	ASTM D 1603*/4218	20,000 lb		2.0	2.0	2.0	2.0
Carbon Black Dispersion	ASTM D 5596	45,000 lb		+ Note 1	+ Note 1	+ Note 1	+ Note 1
Notched Constant Tensile Load, hr	ASTM D 5397, Appendix	200,000 lb		300	300	300	300
REFERENCE PROPERTY	**TEST METHOD**	**FREQUENCY**		**NOMINAL VALUE**			
Oxidative Induction Time, min	ASTM D 3895, 200° C; 0_2, 1 atm	200,000 lb		>100	>100	>100	>100
Roll Length[(1)] (approximate), ft (m)				870 (265)	560 (171)	430 (131)	340 (104)
Roll Width[(1)], ft (m)				22.5 (6.9)	22.5 (6.9)	22.5 (6.9)	22.5 (6.9)
Roll Area, ft² (m²)				19,575 (1,819)	12,600 (1,171)	9,675 (899)	7,650 (711)

NOTES:

- +Note1: Dispersion only applies to near spherical agglomerates. 9 of 10 views shall be Category 1 or 2. No more than 1 view from Category 3.
- GSE HD is available in rolls weighing about 3,900 lb (1,769 kg)
- All GSE geomembranes have dimensional stability of ±2% when tested with ASTM D 1204 and LTB of <-77° C when tested with ASTM D 746.
- [(1)]Roll lengths and widths have a tolerance of ± 1%.
- *Modified.

Table 1.2: Minimum Values for Black-Surfaced Coextruded Textured HDPE Geomembranes
(Refer to Minimum and Nominal Values corresponding to HDT 060G000)

TESTED PROPERTY	TEST METHOD	FREQUENCY		MINIMUM VALUE			
Product Code				HDT 040G000	HDT 060G000	HDT 080G000	HDT 100G000
Thickness, (minimum average) mil (mm)	ASTM D 5994	every roll		38 (0.96)	57 (1.45)	76 (1.93)	95 (2.41)
Lowest individual for 8 out of 10 values				36 (0.91)	54 (1.40)	72 (1.80)	90 (2.30)
Lowest individual for any of the 10 values				34 (0.86)	51 (1.30)	68 (1.73)	85 (2.16)
Density, g/cm^3	ASTM D 1505	200,000 lb		0.94	0.94	0.94	0.94
Tensile Properties (each direction)(1)	ASTM D 6693, Type IV						
Strength at Break, lb/in-width (N/mm)	Dumbell, 2 ipm			60 (11)	90 (16)	120 (21)	150 (27)
Strength at Yield, lb/in-width (N/mm)		20,000 lb		84 (15)	126 (22)	168 (29)	210 (37)
Elongation at Break, %	G.L. = 2.0 in (51 mm)			100	100	100	100
Elongation at Yield, %	G.L. = 1.3 in (33 mm)			12	12	12	12
Tear Resistance, lb (N)	ASTM D 1004	45,000 lb		28 (125)	42 (187)	56 (249)	70 (311)
Puncture Resistance, lb (N)	ASTM D 4833	45,000 lb		60 (267)	90 (400)	120 (534)	150 (667)
Carbon Black Content, %	ASTM D 1603*/4218	20,000 lb		2.0	2.0	2.0	2.0
Carbon Black Dispersion	ASTM D 5596	45,000 lb		+ Note 1	+ Note 1	+ Note 1	+ Note 1
Aperity Height	GRI GM 12	second roll		+Note 2	+Note 2	+ Note 2	+Note 2
Notched Constant Tensile Load(2), hr	ASTM D 5397, Appendix	200,000 lb		300	300	300	300
REFERENCE PROPERTY	**TEST METHOD**	**FREQUENCY**		**NOMINAL VALUE**			
Oxidative Induction Time, min	ASTM D 3895, 200˚C; 0_2 , 1 atm	200,000 lb		>100	>100	>100	>100
Roll Length(3) (approximate), ft (m)	Standard Textured			700 (213)	520 (158)	400 (122)	330 (101)
Roll Width(3), ft (m)				22.5 (6.9)	22.5 (6.9)	22.5 (6.9)	22.5 (6.9)
Roll Area, ft^2 (m^2)				15,750 (1,463)	11,700 (1,087)	9,000 (836)	7,425 (690)

NOTES:

- + Note 1: Dispersion only applies to near spherical agglomerates. 9 of 10 views shall be Category 1 or 2. No more than 1 view from Category 3.
- +Note 2 : 10 mil average . 8 of 10 readings ≥7 mils. Lowest individual ≥5 mils.
- GSE HD Standard Textured is available in rolls weighing about 4,000 lb (1,800 kg).
- (1) The combination of stress concentrations due to coextrusion texture geometry and the small specimen size results in large variation of test results. Therefore, these tensile properties are minimum average values.
- (2) NCTL for HD Textured is conducted on representative smooth membrane samples.
- All GSE geomembranes have dimensional stabilty of ±2% when tested with ASTM D 1204 and LTB of <-77° C when tested with ASTM D 746.
- (3) Roll lengths and widths have a tolerance of ± 1%.
- *Modified.

Table 2.1: Minimum Weld Values for HDPE Geomembranes

Property	Test Method	60
Peel Strength (fusion), ppi	ASTM D6392	98
Peel Strength (extrusion), ppi	ASTM D6392	78
Shear Strength (fusion & ext.), ppi	ASTM D6392	121

Table 2.2: Minimum Weld Values for LLDPE Geomembranes

Property	Test Method	60
Peel Strength (extrusion), ppi	ASTM D 6392	72
Peel Strength (fusion), ppi	ASTM D 6392	75
Shear Strength (fusion & ext.), ppi	ASTM D 6392	90

END OF SECTION

SECTION 31 22 13

ROUGH GRADING

PART 1 GENERAL

1.1 SUMMARY

A. Section Includes:
1. Excavating subsoil.
2. Cutting, grading, filling, rough contouring, and compacting site for site structures and building pads.

B. Related Sections:
1. Section 31 23 17 - Trenching.
2. Section 31 23 23 - Backfill.

1.2 UNIT PRICE - MEASUREMENT AND PAYMENT

A. The following payment concepts only apply when a corresponding item is included in the Bid Schedule. If no specific item is provided, then this work shall be considered incidental to those items which require grading.

B. Subsoil Fill:
1. Basis of Payment: Includes excavating existing subsoil, supplying subsoil materials, stockpiling, scarifying substrate surface, placing where required, and compacting.

1.3 REFERENCES

A. American Association of State Highway and Transportation Officials (AASHTO):
1. AASHTO T180 - Standard Specification for Moisture-Density Relations of Soils Using a 10-lb Rammer and an 18-in. Drop.

B. American Society for Testing and Materials International (ASTM):
1. ASTM C136 - Standard Test Method for Sieve Analysis of Fine and Coarse Aggregates.
2. ASTM D422 - Particle -Size Analysis of Soils.
3. ASTM D653 - Terminology Relating to Soil, Rock, and Contained Fluids.
4. ASTM D698 - Standard Test Method for Laboratory Compaction Characteristics of Soil Using Standard Effort 12,400 ft-lbf/ft3.
5. ASTM D1140 - Amount of Material in Soils Finer than the No. 200 Sieve.
6. ASTM D1556 - Standard Test Method for Density of Soil in Place by the Sand-Cone Method.
7. ASTM D1557 - Standard Test Method for Laboratory Compaction Characteristics of Soil Using Modified Effort 56,000 ft-lbf/ft3.
8. ASTM D1633 - Test Method for Compressive Strength of Molded Soil - Cement Cylinders.

9. ASTM D2167 - Standard Test Method for Density and Unit Weight of Soil in Place by the Rubber Balloon Method.
10. ASTM D2216 - Laboratory Determination of Water (Moisture) Content of Soil and Rock by Mass.
11. ASTM D2419 - Standard Test Method for Sand Equivalent Value of Soils and Fine Aggregate.
12. ASTM D2434 - Standard Test Method for Permeability of Granular Soils Constant Head.
13. ASTM D2487 - Classifications of Soils for Engineering Purposes (Unified Soil Classification System).
14. ASTM D2488 - Description and Identification of Soils (Visual-Manual Procedure).
15. ASTM D2774 - Standard Practice for Underground Installation of Thermoplastic Pressure Piping.
16. ASTM D2901 - Test Method for Cement Content of Freshly Mixed Soil Cement.
17. ASTM D2922 - Standard Test Method for Density of Soil and Soil-Aggregate in Place by Nuclear Methods Shallow Depth.
18. ASTM D3017 - Standard Test Method for Water Content of Soil and Rock in Place by Nuclear Methods Shallow Depth.
19. ASTM D4253 - Standard Test Methods for Maximum Index Density and Unit Weight of Soils Using a Vibratory Table.
20. ASTM D4254 - Minimum Index Density and Unit Weight of Sols and Calculation of Relative Density.
21. ASTM D4318 - Liquid Limit, Plastic Limit, and Plasticity Index of Soils.
22. ASTM D4564 - Density of Soil in Place by the Sleeve Method.
23. ASTM D4643 - Determination of Water (Moisture) Content of Soil by the Microwave Oven Heating.
24. ASTM D4718 - Correction of Unit Weight and Water Content for Soils Containing Oversize Particles.
25. ASTM D4832 - Compressive Strength of Controlled Low Strength Material.
26. ASTM D4914 - Density of Soil and Rock in Place by the Sand Replacement Method in a Test Pit.
27. ASTM D4959 - Determination of Water (Moisture) Content of Soil by Direct Heating.
28. ASTM D5030 - Density of Soil and Rock in Place by the Water Replacement Method in a Test Pit.
29. ASTM D5080 - Rapid Determination of Percent Compaction.
30. ASTM D6938 - Standard Test Method for In-Place Density and Water Content of Soil and Soil-Aggregate by Nuclear Methods (Shallow Depth).

1.4 SUBMITTALS

A. Section 01 00 00 - Submittal Procedures.

B. Samples: Submit, in airtight containers, 10 lb sample of each type of fill to testing laboratory.

C. Materials Source: Submit name of imported materials suppliers.

D. Manufacturer's Certificate: Certify Products meet or exceed specified requirements.

1.5 CLOSEOUT SUBMITTALS

A. Project Record Documents: Accurately record actual locations of utilities remaining by horizontal dimensions, elevations or inverts, and slope gradients.

1.6 QUALITY ASSURANCE

A. Perform Work in accordance with ASTM C136, ASTM D2419, and ASTM D2434.

B. Perform Work in accordance with applicable New Mexico State Standards.

PART 2 PRODUCTS

2.1 MATERIALS

Not Used.

PART 3 EXECUTION

3.1 EXAMINATION

A. Section 01 00 00 - Quality Requirements: Examination of existing conditions before starting work.

B. Verify survey benchmark and intended elevations for the Work are as indicated on Drawings.

3.2 PREPARATION

A. Call New Mexico “One Call” at 811 and local utility companies at least three (3) days before performing Work.
   1. Request underground utilities to be located and marked within and surrounding construction areas.

B. Identify required lines, levels, contours, and datum.

C. Notify utility company to remove and relocate utilities.

D. Protect remaining utilities from damage.

E. Protect plant life, lawns, and other features remaining as portion of final landscaping.

F. Protect benchmarks, survey control point, existing structures, fences, sidewalks, paving, and curbs from excavating equipment and vehicular traffic.

3.3 SUBSOIL EXCAVATION

A. Excavate subsoil from areas to be further excavated, relandscaped, or regraded.

B. Do not excavate wet subsoil or excavate and process wet material to obtain optimum moisture content.

C. When excavating through roots, perform Work by hand and cut roots with sharp axe.

D. Remove excess subsoil not intended for reuse, from site.

E. Benching Slopes: Horizontally bench existing slopes greater than 1: 4 to key placed fill material to slope to provide firm bearing.

F. Stability: Replace damaged or displaced subsoil as specified for fill.

G. Notify Owner of any utility damage at once so emergency measures can be taken. The Contractor will pay for any required repairs.

H. Intercept and divert surface drainage and precipitation away from excavation through use of dikes, curb walls, ditches, pipes, or other means.

I. Remove and exclude water, including storm water, groundwater, irrigation water, and/or other waters, from all excavations. Dewatering wells, well-points, sump pumps, or other means shall be used to remove water and continuously maintain groundwater at a level below the bottom of excavations. Water shall be removed and excluded until backfilling is complete and all field soils testing have been completed.

J. Comply with New Mexico state standards and requirements for dewatering to any watercourse, prevention of stream degradation, and erosion and sediment control.

K. Excavation under areas to be lined shall extend to sub-base. After the required excavation has been completed, the area shall be scarified a minimum of 6 inches below the subgrade surface and compacted to 95% Modified Proctor. The finished sub-grade shall be even, self-draining, and in conformance with the slope as indicated on the construction plans. Areas that could accumulate standing water shall be regraded to provide a self-draining subgrade.

L. Material beyond prescribed lines which is loosened by the Contractor's operations shall be removed, replaced and/or compacted, as directed by the Engineer, at no additional cost to the Owner.

3.4 FILLING

A. See Section 31 23 23 - Backfill.

3.5 DISPOSAL OF EXCAVATED MATERIALS

A. Excess excavated material or excavated material not suitable for backfill may be disposed of on-site, provided that:
   1. The finished grade substantially conforms with the Drawings, or any deviation therefrom is approved by the Engineer.
   2. All on-site disposal of material is approved by the Engineer.

B. Do not dispose of waste material by dumping from tops of slopes.

C. Do not dispose of excess material within 15 feet of any wash, drainage or waterway.

3.6 TOLERANCES

A. Section 01 00 00 - Quality Requirements: Tolerances.

B. Top Surface of Subgrade: Plus or minus 1/10 foot from required elevation.

3.7 FIELD QUALITY CONTROL

A. Section 01 00 00 - Execution Requirements: Testing, adjusting, and balancing.

B. Perform laboratory material tests in accordance with ASTM D1557, ASTM D698, AASHTO T180.

C. Perform in place compaction tests in accordance with the following:
   1. Density Tests: ASTM D2922.
   2. Moisture Tests: ASTM D3017.

D. When tests indicate Work does not meet specified requirements, remove Work, replace and retest.

E. Compaction testing shall be done to the extent such that the Owner and Engineer can be reasonably assured that the backfill has been placed in accordance with the requirements of the Contract Documents or in accordance with the NMDOT Standard Specifications for Road and Bridge Construction, whichever is the more stringent. When a testing allowance is established on the Bid Form, the Owner and Engineer will determine the testing frequency to be used throughout the project. If no allowance is included, the frequency of testing shall be at least once every 400 linear feet of trenching, or at least once every 400 square feet below structural slabs.

3.8 SCHEDULES

A. Subsoil Fill:
   1. Fill Type as per the City of Deming: To subgrade elevation.
   2. Compact uniformly to minimum 95 percent of maximum density.

END OF SECTION

SECTION 31 23 17

TRENCHING

PART 1 GENERAL

1.1 SUMMARY

A. Section Includes:
1. Excavating trenches for utilities.
2. Compacted fill from top of utility bedding to finished grade.
3. Backfilling and compaction.

B. Related Sections:
1. Section 31 23 23 - Backfill.
2. Section 33 47 30 – Leachate Collection System Piping.

1.2 REFERENCES

A. New Mexico Standard Specifications for Public Works Construction (NMSSPWC):
1. NMSSPWC Sections 701, 801 & 802 “Trenching, Excavation and Backfill”.

B. American Association of State Highway and Transportation Officials (AASHTO):
1. AASHTO T180 - Standard Specification for Moisture-Density Relations of Soils Using a 10-lb Rammer and an 18-in. Drop.

C. American Society for Testing and Materials International (ASTM):
1. ASTM C136 - Standard Test Method for Sieve Analysis of Fine and Coarse Aggregates.
2. ASTM D422 - Particle -Size Analysis of Soils.
3. ASTM D653 - Terminology Relating to Soil, Rock, and Contained Fluids.
4. ASTM D698 - Standard Test Method for Laboratory Compaction Characteristics of Soil Using Standard Effort (12,400 ft-lbf/ft3).
5. ASTM D1140 - Amount of Material in Soils Finer than the No. 200 Sieve.
6. ASTM D1556 - Standard Test Method for Density of Soil in Place by the Sand-Cone Method.
7. ASTM D1557 - Standard Test Method for Laboratory Compaction Characteristics of Soil Using Modified Effort (6,000 ft-lbf/ft3).
8. ASTM D1633 - Test Method for Compressive Strength of Molded Soil - Cement Cylinders.
9. ASTM D2167 - Standard Test Method for Density and Unit Weight of Soil in Place by the Rubber Balloon Method.
10. ASTM D2216 - Laboratory Determination of Water (Moisture) Content of Soil and Rock by Mass.
11. ASTM D2487 - Classifications of Soils for Engineering Purposes (Unified Soil Classification System).
12. ASTM D2488 - Description and Identification of Soils (Visual-Manual Procedure).

13. ASTM D2774 - Standard Practice for Underground Installation of Thermoplastic Pressure Piping.
14. ASTM D2901 - Test Method for Cement Content of Freshly Mixed Soil Cement.
15. ASTM D2922 - Standard Test Method for Density of Soil and Soil-Aggregate in Place by Nuclear Methods (Shallow Depth).
16. ASTM D3017 - Standard Test Method for Water Content of Soil and Rock in Place by Nuclear Methods (Shallow Depth).
17. ASTM D4253 - Standard Test Methods for Maximum Index Density and Unit Weight of Soils Using a Vibratory Table.
18. ASTM D4254 - Minimum Index Density and Unit Weight of Sols and Calculation of Relative Density.
19. ASTM D4318 - Liquid Limit, Plastic Limit, and Plasticity Index of Soils.
20. ASTM D4564 - Density of Soil in Place by the Sleeve Method.
21. ASTM D4643 - Determination of Water (Moisture) Content of Soil by the Microwave Oven Heating.
22. ASTM D4718 - Correction of Unit Weight and Water Content for Soils Containing Oversize Particles.
23. ASTM D4832 - Compressive Strength of Controlled Low Strength Material.
24. ASTM D4914 - Density of Soil and Rock in Place by the Sand Replacement Method in a Test Pit.
25. ASTM D4959 - Determination of Water (Moisture) Content of Soil by Direct Heating.
26. ASTM D5030 - Density of Soil and Rock in Place by the Water Replacement Method in a Test Pit.
27. ASTM D5080 - Rapid Determination of Percent Compaction.
28. ASTM D6938 - Standard Test Method for In-Place Density and Water Content of Soil and Soil-Aggregate by Nuclear Methods (Shallow Depth).

1.3 SUBMITTALS

A. Section 01 00 00 - Submittal Procedures: Requirements for submittals.

B. Materials Source: Submit name of imported fill materials suppliers.

C. Manufacturer's Certificate: Certify Products meet or exceed specified requirements.

1.4 QUALITY ASSURANCE

A. Perform Work in accordance with applicable New Mexico State standards.

B. Perform Work in accordance with applicable OSHA trench safety standards.

1.5 FIELD MEASUREMENTS

A. Verify field measurements prior to fabrication.

1.6 COORDINATION

A. Section 01 00 00 - Administrative Requirements: Coordination and project conditions.

B. Verify Work associated with lower elevation utilities is complete before placing higher elevation utilities.

PART 2 PRODUCTS

2.1 FILL MATERIALS

A. Pipe Bedding and Embedment: As specified in Section 31 23 23.

B. Pipe Backfill: As specified in Section 31 23 23.

C. Structural Fill: As specified in Section 31 23 23.

D. Granular Fill: As specified in Section 31 23 23.

PART 3 EXECUTION

3.1 LINES AND GRADES

A. Lay pipes to lines and grades indicated on Drawings.
   1. Engineer reserves right to make changes in lines, grades, and depths of utilities when changes are required for Project conditions.

3.2 PREPARATION

A. Call New Mexico “One Call” at 811 and local utilities not less than three working days before performing Work.
   1. Request underground utilities to be located and marked within and surrounding construction areas.

B. Identify required lines, levels, contours, and datum locations.

C. Protect plant life, lawns and other features remaining as portion of final landscaping.

D. Protect benchmarks, existing structures, fences, sidewalks, paving, and curbs from excavating equipment and vehicular traffic.

E. Maintain and protect above and below grade utilities indicated to remain.

F. Establish temporary traffic control and detours when trenching is performed in public right-of-way. Relocate controls and reroute traffic as required during progress of Work.

3.3 LINES, GRADES AND DIMENSIONS

A. Excavate trench to lines and grades indicated on Drawings.
   1. Engineer reserves right to make changes in lines, grades, and depths of utilities when changes are required based on field conditions.
   2. Deviations from horizontal and vertical pipe line and grade by Contractor as indicated on Drawings.
   3. When bottom of trench is rocky, over-excavate and fill as specified in Section 31 23 23.

B. Excavate trench to minimum width as indicated on Drawings.

1. Cut trenches to width indicated on Drawings, providing at least 6 inches of clear space between the trench face and the outside diameter of the pipe. The maximum permissible width of the trench shall be the outside diameter of the pipe (or distance between pipes plus pipe diameters in the event that two pipes are buried in the same trench) plus 24 inches, unless otherwise indicated on the Drawings, permission in writing to use a greater width is obtained from the Engineer.
2. Increase trench width as required to meet required clearances between pipe and trench wall, to avoid voids in the haunch areas of the pipe and to meet embedment compaction requirements. Increased trench width, if needed to meet these requirements, shall be provided at no additional cost to the Owner.

3.4 TRENCHING

A. Excavate subsoil required for utilities.

B. Remove lumped subsoil, boulders, and rock up to the size that would require special equipment beyond conventional machinery used for trenching, in which case the Engineer should be notified immediately.

C. Allowable Open Trench: Trenches may be opened in advance of pipe placement and backfill operations under the following conditions:

1. In developed areas and along traveled roadways, no more than 100 feet of trench shall be opened in advance of pipe laying operations. This distance may be reduced due to traffic control considerations. Backfilling shall begin as soon as pipe is laid and inspected and shall keep pace with the pipe laying. In undeveloped areas outside of roadway rights-of-way and away from any vehicular or pedestrian traffic, open trench shall not be advanced more than 500 feet ahead of installed pipe. Whenever local, county, state or federal regulations impose stricter limitations, such regulations will take precedence.
2. All trenches shall be fully backfilled at the end of each day or, in lieu thereof, shall be covered by traffic weight steel plates adequately braced and capable of supporting vehicular traffic in those locations where it is impractical to backfill at the end of each day. The above requirements for backfilling or use of steel plates may be waived in undeveloped areas, such as where the trench is located further than 100 feet from any traveled roadway or occupied structure. In such cases, however, barricades and warning lights, or escape ramps and earthen trench plugs for wildlife, shall be provided and maintained to meet applicable safety requirements. In no case shall more than 100 feet of trench be left open at end of working day.
3. Do not block vehicular traffic or impede access to homes or businesses.
4. Protect open trench to protect the public, livestock, wildlife and the environment.

    a. Comply with all stipulations set forth by the State Land Office, Luna County, and other land-controlling agencies.
    b. The Owner or land-controlling agencies, at their sole discretion, may require temporary fencing to protect livestock, wildlife and local residents and land users from open trenches. Such fences shall be

required in all trenches left open in active livestock grazing areas. Contractor shall provide such fencing, if required, at no additional cost to the Owner.

5. Contractor is solely responsible for safety of all open trenches and bears sole liability for any incidents or accidents arising from open trenches.
6. The Owner may restrict the amount of open trench as needed due to safety, land use or environmental considerations.

D. Intercept and divert surface drainage and precipitation away from excavation through use of dikes, curb walls, ditches, pipes, or other means.

E. Dewater and maintain substantially dry subgrade during pipe installation.
1. Remove groundwater by pumping to keep excavations dry.
2. Comply with New Mexico state standards and requirements for dewatering to any watercourse, prevention of stream degradation, and erosion and sediment control.
3. If a separate bid item is not included on the Bid Form for dewatering, the cost thereof will be considered incidental to the cost of trenching and utility installation.

F. Excavate trenches to depth indicated on Drawings. Provide uniform and continuous bearing and support for bedding material and pipe.

G. Do not interfere with 45 degree bearing splay of foundations. Any excavation in this area shall be backfilled and compacted using the same materials and methods as structural fill for new buildings. Refer to Section 31 23 23.

H. Slope or shore trench as needed to meet safety requirements. When sidewalls cannot be sloped, provide sheeting and shoring to protect excavation as specified in this section.

I. When subsurface materials at bottom of trench are loose or soft, excavate to greater depth as directed by Engineer until suitable material is encountered. Backfill and compact to reach specified or directed line and grade. Refer to specifications for overexcavation backfill, as set forth in Section 31 23 23.

J. Cut out soft areas of subgrade not capable of compaction in place. Backfill and compact to specified or directed line and grade. Refer to specifications for overexcavation backfill, as set forth in Section 31 23 23.

K. Trim excavation. Hand trim for bell and spigot pipe joints. Remove loose matter.

L. Correct over excavated areas with compacted backfill as specified for authorized excavation or replace with fill concrete as directed by Engineer.

M. Remove excess subsoil not intended for reuse, from site.

N. Protect open trench at all times to prevent danger to the public and to wildlife. Any safety requirements imposed by agencies or entities with jurisdiction must be met.

3.5 SHEETING AND SHORING

A. Sheet, shore, and brace excavations to prevent danger to persons, structures and adjacent properties and to prevent caving, erosion, and loss of surrounding subsoil.

B. Support trenches more than 5 feet deep excavated through unstable, loose, or soft material. Provide sheeting, shoring, bracing, or other protection to maintain stability of excavation.

C. Design sheeting and shoring to be removed at completion of excavation work. If the Engineer orders the sheeting to be left in place for the protection of the work, a payment will be allowed only for the actual cost of the timber left in place.

D. Repair damage caused by failure of the sheeting, shoring, or bracing and for settlement of filled excavations or adjacent soil.

E. Repair damage to new and existing Work from settlement, water or earth pressure or other causes resulting from inadequate sheeting, shoring, or bracing.

3.6 BACKFILLING OF TRENCHES

A. See Section 31 23 23 - Backfill, Articles 3.3 and 3.4 for general backfill requirements, as well as trench backfill and bedding requirements around pipelines.

3.7 DISPOSAL OF EXCAVATED MATERIALS

A. Excess excavated material or excavated material not suitable for backfill may be disposed of on-site, provided that:
   1. The finished grade substantially conforms with the Drawings, or any deviation therefrom is approved by the Engineer
   2. All on-site disposal of material is approved by the Engineer.

B. Do not dispose of waste material by dumping from tops of slopes.

C. Do not dispose of excess material within 15 feet of any wash, drainage or waterway.

3.8 TOLERANCES

A. Section 01 00 00 - Quality Requirements: Tolerances.

B. Top Surface of Backfilling Under Paved Areas: Plus or minus 1 inch from required elevations.

3.9 FIELD QUALITY CONTROL

A. Section 01 00 00 - Execution Requirements: Testing, adjusting, and balancing.

B. Determine compaction characteristics of materials in accordance with ASTM D698.

C. Classify soils in accordance with ASTM D2487.

D. Perform laboratory material tests in accordance with ASTM D1557.

E. Refer to compaction testing requirements in Section 31 22 13 - Rough Grading and/or Section 31 23 23 - Backfill, Field Quality Control, as applicable.

3.10 PROTECTION OF FINISHED WORK

A. Section 01 00 00 - Execution Requirements: Protecting installed construction.

B. Reshape and re-compact fills subjected to vehicular traffic during construction.

END OF SECTION

SECTION 31 23 23

BACKFILL

PART 1 GENERAL

1.1 SUMMARY

A. Section Includes:
1. Backfilling building perimeter to subgrade elevations.
2. Backfilling site structures to subgrade elevations.
3. Fill under slabs-on-grade.
4. Fill under paving.
5. Fill for over-excavation.
6. Pipe bedding material.

B. Related Sections:
1. Section 31 05 19.13 – Geotextile Fabric.
2. Section 31 05 19.15 – Geosynthetic Clay Liner.
3. Section 31 05 19.16 – Polyethylene Geomembrane Liner.
4. Section 31 23 17 - Trenching.
5. Section 33 47 30 – Leachate Collection System Piping.

1.2 REFERENCES

A. New Mexico Standard Specifications for Public Works Construction (NMSSPWC):
1. NMSSPWC Sections 701, 801 & 802 “Trenching, Excavation and Backfill”.

B. American Association of State Highway and Transportation Officials (AASHTO):
1. AASHTO T99 - Standard Method of Test for Moisture-Density Relations of Soils Using a 2.5-kg (5.5-lb) Rammer and a 3050mm (12-in.) Drop.
2. AASHTO T180 - Standard Specification for Moisture-Density Relations of Soils Using a 4.54-kg (10-lb) Rammer and a 457-mm (18-in.) Drop.

C. American Society for Testing and Materials International (ASTM):
1. ASTM C136 - Standard Test Method for Sieve Analysis of Fine and Coarse Aggregates.
2. ASTM D422 - Particle -Size Analysis of Soils.
3. ASTM D653 - Terminology Relating to Soil, Rock, and Contained Fluids.
4. ASTM D698 - Standard Test Method for Laboratory Compaction Characteristics of Soil Using Standard Effort (12,400 ft-lbf/ft3 (600 kN-m/m3)).
5. ASTM D1140 - Amount of Material in Soils Finer than the No. 200 Sieve.
6. ASTM D1556 - Standard Test Method for Density of Soil in Place by the Sand-Cone Method.
7. ASTM D1557 - Standard Test Method for Laboratory Compaction Characteristics of Soil Using Modified Effort (56,000 ft-lbf/ft3, 2,700 kN-m/m3).
8. ASTM D1633 - Test Method for Compressive Strength of Molded Soil - Cement Cylinders.

9. ASTM D2167 - Standard Test Method for Density and Unit Weight of Soil in Place by the Rubber Balloon Method.
10. ASTM D2216 - Laboratory Determination of Water (Moisture) Content of Soil and Rock by Mass.
11. ASTM D2487 - Classifications of Soils for Engineering Purposes (Unified Soil Classification System).
12. ASTM D2488 - Description and Identification of Soils (Visual-Manual Procedure).
13. ASTM D2774 - Standard Practice for Underground Installation of Thermoplastic Pressure Piping.
14. ASTM D2901 - Test Method for Cement Content of Freshly Mixed Soil Cement.
15. ASTM D2922 - Standard Test Method for Density of Soil and Soil-Aggregate in Place by Nuclear Methods (Shallow Depth).
16. ASTM D3017 - Standard Test Method for Water Content of Soil and Rock in Place by Nuclear Methods (Shallow Depth).
17. ASTM D4253 - Standard Test Methods for Maximum Index Density and Unit Weight of Soils Using a Vibratory Table.
18. ASTM D4254 - Minimum Index Density and Unit Weight of Sols and Calculation of Relative Density.
19. ASTM D4318 - Liquid Limit, Plastic Limit, and Plasticity Index of Soils.
20. ASTM D4564 - Density of Soil in Place by the Sleeve Method.
21. ASTM D4643 - Determination of Water (Moisture) Content of Soil by the Microwave Oven Heating.
22. ASTM D4718 - Correction of Unit Weight and Water Content for Soils Containing Oversize Particles.
23. ASTM D4832 - Compressive Strength of Controlled Low Strength Material.
24. ASTM D4914 - Density of Soil and Rock in Place by the Sand Replacement Method in a Test Pit.
25. ASTM D4959 - Determination of Water (Moisture) Content of Soil by Direct Heating.
26. ASTM D5030 - Density of Soil and Rock in Place by the Water Replacement Method in a Test Pit.
27. ASTM D5080 - Rapid Determination of Percent Compaction.
28. ASTM D6938 - Standard Test Method for In-Place Density and Water Content of Soil and Soil-Aggregate by Nuclear Methods (Shallow Depth).

1.3 DEFINITIONS

A. Percentage Compaction: Ratio, expressed as percentage, of actual density of material compared with maximum dry density based on Modified Proctor (ASTM D1557).

B. Optimum Moisture Content: Based on Modified Proctor (ASTM D1557).

C. Unified Soil Classification System: Based on ASTM D2487.

1.4 SUBMITTALS

A. Section 01 00 00 - Submittal Procedures.

B. Submit samples and certified test documentation of all materials to be used.

C. Materials Source: Submit name of imported fill materials suppliers.

D. Manufacturer's Certificate: Certify Products meet or exceed specified requirements.

E. Submit field soil test on material in place as backfill and pipe bedding material.

F. Submit construction drawings with compaction test locations marked and labeled with station, date, test number, depth of test below ground surface, and test result.

PART 2 PRODUCTS

2.1 FILL MATERIALS

A. Suitable materials may be processed on-site, or may be imported. If imported materials are required to meet the quantity requirements of the project, it will be provided at no additional expense to the Owner, unless a unit price item is included for imported materials on the Bid Form. The following types of materials are defined as suitable where scheduled:

1. Type A (three-quarter inch minus aggregate backfill): Crushed rock or gravel, and sand with the gradation requirements below.

Sieve Size	Percentage Passing
3/4-inch	100
No. 4	30 – 50
No.200	0 – 12

2. Type B (Class I crushed stone): Manufactured angular, crushed stone, crushed rock, or crushed slag with the following gradation requirements. The material shall have a minimum sand equivalent value of 75.

Sieve Size	Percentage Passing
3/4-inch	100
No. 4	30 – 50
No. 200	0 - 5

3. Type C (sand backfill): Sand with 100 percent passing a 3/8-inch sieve, at least 90 percent passing a No. 4 sieve, and a sand equivalent value not less than 30.
   a. This material to be used only when approved by Engineer.

4. Type D: (pipe bedding material): Crushed rock or gravel with 100 percent passing a 1/2-inch sieve and not more than 3 to 5 percent passing a No. 10 sieve and 1 to 2 percent passing a No. 200 sieve.

5. Type E (pea gravel backfill): Crushed rock or gravel with 100 percent passing a 1/2-inch sieve and not more than 10 percent passing a No. 4 sieve.

6. Type F (coarse drain rock): Crushed rock or gravel meeting the following gradation requirements:

Sieve Size	Percentage Passing
2-inch	100
1-1/2-inch	90- 100
1-inch	20 – 55
3/4-inch	0 – 15
No. 200	0 – 3

7. Type G (aggregate base, base course) as follows:

Sieve Size	Percentage Passing
1-inch	100
3/4 inch	80-100
No.4	30-60
No.10	20-45
No. 200	3-10

8. Type H (graded drain rock): Drain rock shall be crushed rock or gravel, durable and free from slaking or decomposition under the action of alternate wetting or drying. The material shall be uniformly graded and shall meet the following gradation requirements:

Sieve Size	Percentage Passing
1-inch	100
3/4-inch	90 - 100
3/8-inch	40 - 100
No. 4	25 – 40
No. 8	18 – 33
No. 30	5 – 15
No. 50	0 – 7
No. 200	0 – 3

9. Type I Not Used

10. Type J (cement-treated backfill): Material which consists of Type H material, or any mixture of Types B, C, G, and H materials which has been cement-treated so that the cement content of the material is not less than 5 percent by weight when tested in accordance with ASTM D2901 - Test Method for Cement Content of Freshly Mixed Soil Cement. The ultimate compressive strength at 28 days shall be not less than 400 psi when tested in accordance with ASTM D1633 - Test Method for Compressive Strength of Molded Soil - Cement Cylinders.

11. Type K (topsoil): Stockpiled topsoil material which has been obtained at the site by removing soil to a depth not exceeding 2 feet. Removal of the topsoil shall be done after the area has been stripped of vegetation and debris.

12. Type L (controlled low strength material): Controlled low strength material, also referred to as ‘soil cement slurry’ or ‘flowable fill’ shall meet the following requirements:

a. Slurry shall have a 7-day compressive strength of not less than 50 psi and not more than 150 psi. The compressive strength shall be determined in accordance with ASTM D4832.
b. Typical cement content: 3 to 10 percent by dry weight of soil to obtain specified compressive strength.
c. The water-cement ratio of the mix shall not exceed 3.5:1. The water content shall not exceed that required to provide a mix that will flow and can be pumped.
d. The consistency of the slurry shall be such that the slurry flows easily into all openings between the pipe and the lower portion of the trench.

13. Type M (aggregate sub-base, structural fill). Well-graded crushed rock or natural gravel meeting the following gradation requirements:

Sieve Size	Percentage Passing
4-inch	100
3-inch	95 100
No. 200	3 - 15

B. Where these Specifications conflict with the requirements of any local agency having jurisdiction or with the requirements of a pipe material manufacturer, the Engineer shall be immediately notified. In case of conflict between types of pipe embedment backfills, the Contractor is to use the agency-specified backfill material if that material provides a greater degree of structural support to the pipe, as determined by the Engineer. In case of conflict between types of trench or final backfill types, the Contractor shall use the agency-specified backfill material if that material provides the greater in-place density after compaction.

C. Fill and backfill types, including use of native soil, shall be used in accordance with the following provisions. Native soil used for fill and backfill must meet the requirements of the type of material specified below and as shown for the corresponding type of material shown in 2.1.A above.
1. Embankment fills shall be constructed of Type M material, as defined herein, or other material approved by the Project Engineer. Drainage structures embankments shall be backfilled with materials used in original construction.
2. Pipe zone backfill shall consist of the following materials for each pipe material listed below. All pipe bedding material shall receive prior approval by the Engineer before use.
   a. Concrete pipe, shall be provided Type A or B pipe bedding and embedment backfill material, or native material that meets the criteria described below, and is acceptable to the Engineer.
   b. Plastic pipe shall be provided Type D bedding and embedment zone material, or native material that meets the criteria described below, and is acceptable to the Engineer.
      1) In trenches where dewatering is required, the pipe bedding material and embankment backfill shall be Type A or B as directed by the Engineer.
   c. Excavated native material will be allowed, provided that it is free draining and contains no organic materials, no rocks larger than 1/2-inch,

clods or frozen lumps. A proctor of this material shall be submitted to the Engineer for review and approval before use. If native backfill material is approved, on-site screening may be required by Engineer to remove any rock material larger than 1/2-inch at no additional expense to the Owner. The location of such sites must be coordinated with the Owner.

3. Trench zone backfill for pipelines shall be any of Types A through H backfill materials or any mixture thereof.
4. Final backfill material for pipelines under paved areas shall be Type G backfill material.
5. Final backfill under areas not paved shall be the same material as that used for trench backfill, unless otherwise indicated.
6. Trench backfill and final backfill for pipelines under structures shall be the same material as used in the pipe zone, except where concrete encasement is required by the Contract Documents.
7. Aggregate base materials under pavements, curb and gutter, and sidewalk shall be Type G material constructed to the thickness indicated.
8. Aggregate sub-base shall be Type M material.
9. Backfill around structures shall be Types A through Type H materials, or any mixture thereof.
10. Under structures where groundwater must be removed to allow placement of concrete, Type F material shall be used. Before the Type F material is placed, filter fabric shall be placed over the exposed foundation. Filter fabric shall be Mirafi 140 N, Mirafi 700X, or equal.
11. Under all other structures, Type G or H material shall be used.
12. Backfill used to replace pipeline trench over-excavation shall be a layer of Type F material with a 6-inch top filter layer of Type E material or filter fabric to prevent migration of fines for wet trench conditions or the same material as used for the pipe zone backfill if the trench conditions are not wet.

PART 3 EXECUTION

3.1 EXAMINATION

A. Section 01 00 00 - Administrative Requirements: Coordination and project conditions.

B. Verify subdrainage, dampproofing, or waterproofing installation has been inspected.

C. Verify underground tanks are anchored to their own foundations to avoid flotation after backfilling.

D. Verify structural ability of unsupported walls to support loads imposed by fill.

3.2 PREPARATION

A. Compact subgrade to density requirements for subsequent backfill materials.

B. Cut out soft areas of subgrade not capable of compaction in place. Backfill with structural fill and compact to density equal to or greater than requirements for subsequent fill material.

C. Scarify subgrade surface to depth of 8 inches.

D. Proof roll to identify soft spots; fill and compact to density equal to or greater than requirements for subsequent fill material.

3.3 BACKFILLING FOR STRUCTURES, SITE WORK AND APPURTENANCES

A. Backfill areas to contours and elevations with unfrozen materials as indicated on the Drawings or as directed by the Engineer.

B. Systematically backfill to allow maximum time for natural settlement. Do not backfill over porous, wet, frozen or spongy subgrade surfaces.

C. Each layer shall be thoroughly mixed as necessary to promote uniformity of material in each layer.

D. Place material in continuous layers as follows:
1. Subsoil Fill: Maximum 8 inches compacted depth.
2. Structural Fill: Maximum 6 inches compacted depth.
3. Granular Fill: Maximum 6 inches compacted depth.

E. Employ placement method that does not disturb or damage other work.

F. Maintain optimum moisture content of backfill materials to attain required compaction density.

G. Slope grade away from building minimum 6 inches in 10 ft, unless noted otherwise.

H. Make gradual grade changes. Blend slope into level areas.

I. Shape and drain embankments and excavations, maintain ditches and drains to provide drainage at all times. Protect graded areas against action of elements prior to acceptance of work, and reestablish grade where settlement or erosion occurs.

J. Bench hillside slopes or fills to key the embankment. Remove and re-compact a minimum of 12 inches normal to the slope of the hillside or fill as the embankment or fill is brought up in layers.

K. Under surfaced or paved roads, driveways or parking areas, apply base course at uppermost layer of backfill to same thickness as existing driving surface, or 6 inches, whichever is greater. If paved, apply pavement patch to thickness equal to or greater than existing pavement.

L. Remove surplus backfill materials from site.

M. Leave fill material stockpile areas free of excess fill materials.

N. Repair or replace remaining items damaged by excavation or filling.

3.4 BACKFILLING OF TRENCHES

A. Place a minimum of 4 inches of bedding material in pipe trenches to lines and grades indicated on Drawings or as directed by Engineer and compact before pipe is laid. Grade bedding material parallel to bottom of pipe.

B. Do not place material when either the material or the surface upon which it is to be placed is frozen.

C. Pipe zone backfill materials shall be manually spread around the pipe so that, when compacted, the pipe zone backfill will provide uniform bearing and side support.
   1. Exercise care not to damage pipe or appurtenances when placing embedment material.
   2. Maintain optimum moisture content of fill materials to attain required compaction density.
   3. Ensure material is placed to equal height on both sides of pipe to avoid unequal loading and possible lateral displacement of the pipe. Elevation difference of embedment between each side of pipe shall not exceed 6 inches.
   4. Place material in uniform layers.
   5. Work material into pipe haunches to prevent voids and achieve specified compaction under the haunches.
   6. No backfilling by machine methods permitted until a minimum of one foot of material has been placed by hand over the top of the pipe.
   7. Place material to a compacted depth of 12 inches over the top of the pipe, 15 inches of compacted depth over the top of the pipe in paved or traffic areas, and compacted by hand held compacting tools before other backfilling is done.

D. If pipe laying operations are interrupted for more than 24 hours, cover pipe laid in the trench with backfill.

E. When the bottom of the trench is unstable, an additional 4 inches shall be over-excavated and filled with bedding material before pipe is laid.

F. Where rock is present and where there is concern that settling rocks in the surrounding material may rupture the pipeline, the amount of bedding material below and above the pipe shall be increased. In these cases there will be 8 inches of bedding material below the pipe and 15 inches above, as directed by the Engineer.

G. When using free-draining crushed rock or gravel for embedment on stretches longer than 300 feet, install trench plugs composed of silty, non-plastic material at 300 foot intervals to impede flow of trench water through the embedment.

H. Under surfaced or paved roads, driveways or parking areas, apply base course at uppermost layer of backfill to same thickness as existing driving surface, or 6 inches,

whichever is greater. If paved, apply pavement patch to thickness equal to or greater than existing pavement.

3.5 COMPACTION

A. Do not place and compact soil under the following conditions:
1. Ambient air temperature below freezing.
2. Rain that creates puddles in clayey or silty materials.
3. Ice or snow pockets visible in material being placed.

B. Surface Preparation:
1. Prepare surface so that first compacted lift will be placed on firm, stable base. Compact surface to specified percent compaction, if necessary.
2. For water-retaining compacted fill, scarify and moisten surface to provide satisfactory bonding surface before placing first layer of material to be compacted.
3. Do not place material to be compacted on frozen surface.

C. Compact material in trenches in layers having approximately the same top elevation on both sides of the pipeline to avoid unequal loading and displacement of the pipe.

D. Placement:
1. Place soil to be compacted in horizontal layers.
2. Blend materials as needed to ensure compacted fill is homogenous and free from lenses, pockets, streaks, voids, laminations and other imperfections.

E. Compaction Procedures:
1. Silty or Clayey Material:
   a. Compact with mechanical impact tampers, tamping rollers, vibrating pad foot rollers, rubber tire rollers or other suitable compaction equipment.
   b. Uniformly distribute equipment passes.
   c. Compact in horizontal layers to compacted thickness of 6 inches or less.
2. Cohesionless Free-Draining Material: Compact in horizontal layers to maximum compacted thickness of:
   a. Tampers and rollers: 6 inches
   b. Crawler-type tractors, vibrating drum rollers, surface vibrators or similar equipment: 12 inches
   c. Saturation and internal vibration: Penetrating depth of vibrator.
3. When compacting pipe embedment material, exercise care not to damage the pipe or appurtenances with compaction equipment. Do not apply compaction equipment directly above the pipe.
4. Demonstration: Lift thicknesses may vary depending on equipment and methods. Field adjustments to the specified lift thicknesses may be allowed or required. Contractor shall demonstrate that proposed equipment and methods will meet required compaction for the proposed lift thickness.
5. Flooding and jetting is not allowed unless specifically approved by the Engineer.

F. Moisture Content:

1. Optimum moisture content for each soil type, whether native soil or imported material, shall be determined by the Modified Proctor method, ASTM D1557.
2. Moisture content during compaction shall be no more than 2 percentage points wet or dry of optimum moisture content.
3. Moisten or aerate material, as necessary, to provide specified moisture content. Add water to soil in increments that will permit moisture content to be uniform and homogenous through each layer after mixing.
4. Add no more than 2 percent water to fill by sprinkling just prior to compaction when fill is clayey and contains dry clods of clay.
   a. If clayey soil is more than 2 percent below optimum moisture, pre-conditioning and curing may be required to obtain uniform and homogenous distribution of moisture in clods.
   b. Use of disks, harrows or rakes may be required to blend moisture prior to placement and compaction.
5. For cohesionless soils, add water as necessary during compaction, as these soils are free-draining.

G. Minimum Percent Compaction:
1. Over-excavation: Backfill of over-excavation to specified or directed lines shall be compacted to same percent compaction as embedment material or undisturbed foundation material, whichever is greater. If the in-place compaction of the undisturbed foundation material is greater than 95%, the over-excavation backfill may be compacted to 95%.
2. Pipe Bedding Material: Place and compact pipe bedding material as indicated on Drawings for given soil classification, pipe wall thickness, and depth of cover. If native material meets grading requirements and is used, compact to 95%.
3. Initial and Final Backfill: For trenches outside of roads, driveways, parking areas or wash crossings, compact to 90%, or to a density equal to that of the adjacent undisturbed soil, as directed by the Engineer. For trenches within the driving surfaces of roads, driveways or parking areas (both paved and unpaved) or within wash crossings, compact to 95%.
4. Embankments: Compact to same requirements as Final Backfill.
5. Under buildings, tanks, slabs and other structures: Compact to 95].
6. Note that all Percent Compaction values in these Technical Specifications and Drawings are based on Modified Proctor, ASTM D1557, unless otherwise noted.

3.6 TOLERANCES

A. Section 01 00 00 - Quality Requirements: Tolerances.

B. Top Surface of Backfilling within Building Areas: Plus or minus 1 inch from required elevations.

C. Top Surface of Backfilling under Paved Areas: Plus or minus 1 inch from required elevations.

D. Top Surface of General Backfilling: Plus or minus 1 inch from required elevations.

E. Percent Compaction: Shall meet minimum required compaction as set forth in these specifications

F. Moisture Content: As set forth in these specifications.

3.7 FIELD QUALITY CONTROL

A. Section 01 00 00 - Execution Requirements: Testing, Adjusting, and Balancing.

B. Perform laboratory material tests in accordance with ASTM D1557.

C. Perform in place compaction tests in accordance with the following:
1. Density Tests: ASTM D1556, ASTM D2167, or ASTM D2922.
2. Moisture Tests: ASTM D3017.

D. When tests indicate Work does not meet specified requirements, remove material, replace, compact, and retest.

E. Provide test trenches and excavations including excavation, trench support, and groundwater removal for the soils testing operations, at the locations and depths required. The cost of all work associated with accessing, preparing, or time delays for testing to be included in the unit price of the applicable pay item being tested.

F. Compaction testing shall be done to the extent such that the Owner and Engineer can be reasonably assured that the backfill has been placed in accordance with the requirements of the Contract Documents, or as required by the utility for which the trenching is being provided, whichever is the more stringent. When a testing allowance is established on the Bid Form, the Owner and Engineer will determine the testing frequency to be used throughout the project. If no allowance is included, the frequency of testing shall be at least once every 500 linear feet of trenching, or at least once every 400 square feet below structural slabs.

G. Correction of Substandard Work: All fill and backfill represented by tests that fail to meet compaction, moisture content, soil classification or other specifications shall be uncovered as needed, replaced as needed, re-compacted and re-tested until all specifications are met, at no additional expense to the Owner.
1. Elevations, lines and grades of replaced material, as well as of pipe and other structures resting against such material, shall be re-surveyed at the direction of the Engineer. Contractor shall correct elevations, lines and grades as needed, at no additional expense to the Owner.

3.8 PROTECTION OF FINISHED WORK

A. Section 01 00 00 - Execution Requirements: Protecting Installed Construction.

B. Reshape and re-compact fills subjected to vehicular traffic.

3.9 SCHEDULE

A. Coarse Aggregate
   1. Fill Type H
   2. Installed per details and at locations identified in drawings.

B. Soil Cushion
   1. Soil Protective layer
   2. Layer K 5.2X104 cm/sec

C. Temporary Berm
   1. 95% Modified Proctor Density
   2. Marker Flag for Edge of Trash
   3. Marker Stake for Edge of Liner

END OF SECTION

SECTION 33 47 30

HDPE LEACHATE COLLECTION SYSTEM PIPING

PART 1 GENERAL

1.1 SUMMARY

A. Furnish all labor, materials, equipment and incidentals required and install HDPE leachate collection system piping, including fittings and appurtenances as shown on the Drawings and as specified herein.

B. Related Sections:
1. Section 31 05 19.13 Geotextile Fabric.
2. Section 31 05 19.15 Geosynthetic Clay Liner.
3. Section 31 05 19.16 - Polyethylene Geomembrane Liner.
4. Section 31 23 23 - Backfill.

1.2 UNIT PRICE - MEASUREMENT AND PAYMENT

A. HDPE Pipe:
1. Basis of Measurement: By the linear foot.
2. Basis of Payment: Includes excavating; removing soft subsoil, bedding fill, compacting; pipe, fittings and accessories assembled.

1.3 REFERENCES

A. American Association of State Highway and Transportation Officials:
1. AASHTO M294 - Specification for Corrugated Polyethylene Pipe, 305- to 915-mm (12- to 36-In.) Diameter.
2. AASHTO T99 - Standard Specification for the Moisture-Density Relations of Soils Using a 2.5 kg (5.5 lb) Rammer and a 305 mm (12 in.) Drop.
3. AASHTO T180 - Standard Specification for Moisture-Density Relations of Soils Using a 4.54-kg (10-lb) Rammer and a 457-mm (18-in.) Drop.

B. ASTM International:
1. ASTM D698 - Standard Test Method for Laboratory Compaction Characteristics of Soil Using Standard Effort (12,400 ft-lbf/ft3 (600 kN-m/m3)).
2. ASTM C1433 - Standard Specification for Precast Reinforced Concrete Box Section for Culverts, Storm Drains, and Sewers.
3. ASTM D1557 - Standard Test Method for Laboratory Compaction Characteristics of Soil Using Modified Effort (6,000 ft-lbf/ft3 (2,700 kN-m/m3)).
4. ASTM F2164 - Standard Practice for Field Leak Testing of Polyethylene (PE) Pressure Piping Systems Using Hydrostatic Pressure.
5. ASTM D2412 - Pipe Stiffness Requirements.
6. ASTM D2922 - Standard Test Method for Density of Soil and Soil-Aggregate in Place by Nuclear Methods (Shallow Depth).

7. ASTM D3017 - Standard Test Method for Water Content of Soil and Rock in Place by Nuclear Methods (Shallow Depth).
8. ASTM D3350 - HDPE Cell Classifications.

1.4 SUBMITTALS

A. Section 01 00 00 - Submittal Procedures: Requirements for submittals.

B. Shop Drawings: Submit shop drawings for HDPE pipe. Indicate piece numbers and locations and restrained joint locations.

C. Product Data: Submit data indicating pipe material used, pipe accessories, restrained joint details and materials.

D. Manufacturer's Installation Instructions: Indicate special procedures required to install Products specified.

E. Manufacturer's Certificate: Certify products meet or exceed specified requirements.

1.5 CLOSEOUT SUBMITTALS

A. Section 01 00 00 - Execution Requirements: Requirements for submittals.

B. Project Record Documents:
1. Accurately record actual locations of pipe runs, connections, and invert elevations.

1.6 DELIVERY, STORAGE, AND HANDLING

A. Section 01 00 00 - Product Requirements: Requirements for transporting, handling, storing, and protecting products.

B. When lifting with slings, only wide fabric choker slings capable of safely carrying the load shall be sued to lift, move, or lower pipe and fittings. Wire rope and chain are prohibited. Slings shall be of sufficient capacity for the load, and shall be inspected before use. Worn or damaged equipment shall not be used.

C. Do not place materials on private property without written permission of property owner.

D. During loading, transporting and unloading, exercise care to prevent damage to materials.

E. Avoid shock or damage to pipe.

PART 2 PRODUCTS

2.1 LEACHATE COLLECTION PIPE

A. Polyethylene Pipe: ASTM D3035 for sizes up to 3" diameter, and ASTM F714 for sizes 4" diameter and above.
   1. Each production lot of pipe shall be tested for melt index, density, percent carbon, dimensions and ring tensile strength.
   2. Permanent co-extruded colored stripes in outside surface of pipe. Color to match content of pipe.
   3. Molded fittings in accordance with ASTM D3261.
   4. Polyethylene flange adapters made with sufficient through-bore to be clamped in a butt fusion-joining machine without use of a stub-end holder.

2.2 CORRUGATED PIPE

A. Polyethylene Culvert Pipe: Type C, AASHTO M294, corrugated exterior with smooth interior, manufactured from high density polyethylene (HDPE) virgin compounds.

B. HDPE compounds used in the manufacture of plastic pipe culverts shall conform to the cell classifications as provided in ASTM Designation D3350.

C. Pipe Thickness, Stiffness and Unit Mass:
   1. Wall thickness of Type C corrugated polyethylene pipe shall be measured at the inside valley of the corrugation.
   2. The pipe stiffness shall be determined in accordance with ASTM Designation: D2412 at 5 percent deflection. Average pipe stiffness shall be determined for each manufactured run from three test specimens. The length of each test specimen shall equal the nominal pipe diameter, except that the specimen length shall not exceed 900 mm for pipe larger than 900 mm in nominal diameter.
   3. The pipe unit mass shall be computed as the average mass per meter of length determined from three test specimens, taken from each manufactured run. Each test specimen for pipes 600 mm in diameter and less shall be a minimum length of two diameters. The length of each test specimen for pipes larger than 600 mm in diameter shall be one diameter or a maximum of 900 mm, whichever is less. The mass of pipe specimens shall be determined with any suitable weighing device accurate to 0.05-kg.
   4. Furnish materials in accordance with NMDOT and City of Deming Public Works standards.
   5. Joints: AASHTO M294, corrugated to match pipe.

2.3 BEDDING AND COVER MATERIALS

A. Bedding: Fill Type H as specified in Section 31 23 23, or as indicated on the Drawings.

B. Soil Backfill from above Pipe to Finish Grade: Subsoil with no rocks over 6 inches in diameter, frozen earth or foreign matter.

PART 3 EXECUTION

3.1 INSTALLATION - PIPE

A. Install pipe, fittings, and accessories in accordance with Drawings.

B. Refer to Section 31 23 17 for backfilling and compacting requirements. Do not displace or damage pipe when compacting.

C. Connect to existing sewer system.

D. Install metal backed plastic ribbon tape continuous over top of pipe, buried 18 inches above pipeline; coordinate with Section 31 23 17 and 31 23 23.

E. Install Work in accordance with State of New Mexico Public Works standards.

3.2 JOINING

A. Electrofusion Joining: Joints between plain end pipes and fitting shall be made by butt fusion. Joints between the main and saddle branch fittings shall be made using saddle fusion. Either procedure used must be recommended by the pipe and fitting manufacturer.

B. Polyethylene pipe and fittings may be joined together or to other materials by means of:
1. Flanged connections (flange adapters and back-up rings);
2. Mechanical coupling designed for joining polyethylene pipe or for joining polyethylene pipe to another material;
3. MJ adapters; or
4. Electrofusion.

3.3 CLEANING

A. At the conclusion of the work, thoroughly clean all of the new pipe lines to remove all dirt, stones, pieces of wood or other material which may have entered during the construction period. Debris cleaned from the lines shall be removed from the job site. If, after this cleaning, any obstructions remain, they shall be removed.

B. All perforated HDPE leachate collection piping shall be flushed with a minimum of 5,000 gallons of water.

3.4 TESTING PIPE

A. All HDPE pipe shall be tested for its entire length. Pipe may be tested in sections, as approved by the Engineer. All tests results shall be certified in writing by the Contractor.

3.5 PROTECTION OF FINISHED WORK

A. Section 01 00 00 - Execution Requirements: Requirements for protecting finished Work.

B. Protect pipe and aggregate cover from damage or displacement until backfilling operation is in progress.

END OF SECTION