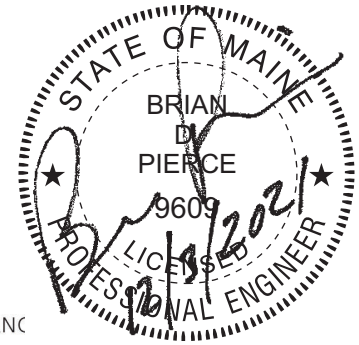
CONSTRUCTION SPECIFICATIONS
DOLBY LANDFILL COVER UPGRADE
PHASES 2 AND 3
EAST MILLINOCKET, MAINE

Prepared for

MAINE BUREAU OF GENERAL SERVICES
AUGUSTA, MAINE

June 2017
(Revised December 2021)



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DIVISION 00 – PROCUREMENT AND CONTRACTING REQUIREMENTS

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DIVISION 00 – PROCUREMENT AND CONTRACTING REQUIREMENTS

00 11 13
Notice to Contractors

Dolby Landfill Cover Upgrade - Phase 2 and 3 BGS 3345

The State of Maine is seeking proposals to construct an upgrade of the cover system for the state-owned Dolby III Landfill in East Millinocket, Maine. The purpose of the upgrade is an effort to improve the hydraulic performance of the existing cover system to limit infiltration into an underlying waste deposit. The waste deposit consists primarily of pulp and paper mill residuals from operation of the former Great Northern Paper Company mills in Millinocket and East Millinocket. Phase 1 of the cover upgrade was constructed in 2016 and included 25 acres of landfill surface. As of 2022 approximately 42.8 acres of the Dolby III Landfill remain to receive cover upgrade. In 2022/2023 approximately 32.7 acres (of the remaining 42.8 acres) will receive cover upgrade. The 32.7 acres will be known as Phase 2 (14.2 acres) and Phase 3 (18.5 acres). Drawing C-101 (of the plan set) shows the general layout of Phase 2 and Phase 3 relative to Phase 1. The cover upgrade contractor is expected to complete construction of at least one of the cover phases in 2022, however BGS will accept alternate cover upgrades schedules for the 2022/2023 construction.

The portion of Dolby III not receiving cover upgrade in 2022/2023 will be known as Phase 4. The Phase 4 area will be available for use as a controlled laydown area during construction of Phase 2 and Phase 3. Phase 4 of the Dolby III cover upgrade will be completed in 2024 (or after) when funding is available..

The cost of the work is approximately $ 5,100,000. The work to be performed under this contract shall be completed on or before the Final Completion date of *15 September 2023*.

1. Submit bids on a completed Contractor Bid Form, plus bid security when required, all scanned and included as an attachment to an email with the subject line marked "**Bid for *Dolby Landfill Cover Upgrade - Phases 2 and 3***" and addressed to the Bid Administrator at: BGS.Architect@Maine.gov, so as to be received no later than **2:00:00 p.m.** on ***January 13, 2022*** .

   Bid submissions will be opened and read aloud at the time and date noted above at the Bureau of General Services office, accessible as a video conference call. Those who wish to participate in the call must submit a request for access to BGS.Architect@Maine.gov.

   Any bid received after the noted time will not be considered a valid bid and will remain unopened. Any bid submitted by any other means will not be considered a valid bid. The Bid Administrator may require the Bidder to surrender a valid paper copy of the bid form or the bid security document in certain circumstances.

   Questions on the bid opening process shall be addressed to the Bid Administrator: Joseph H. Ostwald, Director, Division of Planning, Design & Construction, Bureau of General Services, 77 State House Station, Augusta, Maine 04333-0077, BGS.Architect@Maine.gov.

2. The bid shall be submitted on the Contractor Bid Form (section 00 41 13) provided in the Bid Documents. The Owner reserves the right to accept or reject any or all bids as may best serve the interest of the Owner.

3. Bid security *is required* on this project.
   If noted above as required, the Bidder shall include a satisfactory Bid Bond (section 00 43 13) or a certified or cashier's check for 5% of the bid amount with the completed bid form submitted to the Owner. The Bid Bond form is available on the BGS website.

00 11 13
Notice to Contractors

4. Performance and Payment Bonds *are required* on this project.
   If noted above as required, the selected Contractor shall furnish a 100% contract Performance Bond (section 00 61 13.13) and a 100% contract Payment Bond (section 00 61 13.16) in the contract amount to cover the execution of the Work. Bond forms are available on the BGS website.

5. Filed Sub-bids *are not required* on this project.

6. There *are no* Pre-qualified General Contractors on this project.
   If Pre-qualified General Contractors are identified for this project, the name of each company, with their city and state, are listed below.

7. An on-site pre-bid conference *will* be conducted for this project.
   If a pre-bid conference is scheduled, it is *optional* for General Contractors and optional for Subcontractors and suppliers. Contractors who arrive late or leave early for a mandatory meeting may be prohibited from participating in this meeting and bidding. *The Pre-bid conference will be held on December 16, 2021 at 10:30 a.m. at the East Millinocket Town Hall on 53 Main Street East Millinocket, Maine*.

8. Bid Documents - full sets only - will be available on or about *December 7, 2021* and may be obtained *electronically "at no cost"* from:
   Sevee & Maher Engineers, Inc.
   4 Blanchard Road
   Cumberland, ME 04021
   ATTN: Matt Muzzy, 207-829-5016
   Dolbyphase2@smemaine.com

9. Bid Documents may be examined at:
   AGC Maine
   188 Whitten Road
   Augusta, ME 04330
   Phone 207-622-4741 Fax 207-622-1625

   Construction Summary
   734 Chestnut Street
   Manchester, NH 03104
   Phone 603-627-8856 Fax 603-627-4524

00 21 13
Instructions to Bidders

1. Bidder Requirements

1.1 A bidder is a Contractor who is qualified, or has been specifically pre-qualified by the Bureau of General Services, to bid on the proposed project described in the Bid Documents.

1.2 Contractors and Subcontractors bidding on projects that utilize Filed Sub-bids shall follow the requirements outlined in these Bid Documents for such projects. See Section 00 22 13 for additional information.

1.3 Contractors and Subcontractors are not eligible to bid on the project when their access to project design documents prior to the bid period distribution of documents creates an unfair bidding advantage. Prohibited access includes consultation with the Owner or with design professionals engaged by the Owner regarding cost estimating, constructability review, or project scheduling. This prohibition to bid applies to open, competitive bidding or pre-qualified contractor bidding or Filed Sub-bidding. The Bureau may require additional information to determine if the activities of a Contractor constitute an unfair bidding advantage.

1.4 Each bidder is responsible for becoming thoroughly familiar with the Bid Documents prior to submitting a bid. The failure of a bidder to review evident site conditions, to attend available pre-bid conferences, or to receive, examine, or act on addenda to the Bid Documents shall not relieve that bidder from any obligation with respect to their bid or the execution of the work as a Contractor.

1.5 Prior to the award of the contract, General Contractor bidders or Filed Sub-bidders may be required to provide documented evidence to the Owner or the Bureau showing compliance with the provisions of this section, their business experience, financial capability, or performance on previous projects.

1.6 The selected General Contractor bidder will be required to provide proof of insurance before a contract can be executed.

1.7 Contracts developed from this bid shall not be assigned, sublet or transferred without the written consent of the Owner.

1.8 By submitting a bid the Contractor attests that it has not been declared ineligible to bid on State of Maine projects. The Director of the Bureau of General Services may disallow award of this contract to any Contractor if there is evidence that the Contractor or any of its Subcontractors, through their own fault, have been terminated, suspended for cause, debarred from bidding, agreed to refrain from bidding as part of a settlement, have defaulted on a contract, or had a contract completed by another party.

1.9 The Contractor attests that it is not presently indicted for or otherwise criminally or civilly charged by a Federal, State or local government entity with commission of any of the following offenses and has not within a three-year period preceding this bid been convicted of or had a civil judgment rendered against them for commission of fraud or a criminal offense in connection with obtaining, attempting to obtain, or performing a public (Federal, State or local) transaction, or contract under a public transaction, violation of Federal or State anti-trust statutes or commission of embezzlement, theft, forgery, bribery, falsification or destruction of records, making false statements, or receiving stolen property.

1.10 The Contractor shall not make any award or permit any award (subgrant or contract) at any tier to any party which is debarred or suspended or is otherwise excluded from or ineligible for participation in Federal assistance programs or State of Maine projects.

2. Authority of Owner

2.1 The Owner reserves the right to accept or reject any or all bids as may best serve the interest of the Owner.

2.2 Subject to the Owner's stated right to accept or reject any or all bids, the Contractor shall be selected on the basis of the lowest sum of an acceptable Base Bid plus any Alternate Bids the Owner elects to include. An acceptable bid is one from a responsive and responsible bidder.

3. Submitting Bids and Bid Requirements

3.1 Each bid shall be submitted on the forms provided in the Bid Documents.

3.2 Each bid shall be valid for a period of thirty calendar days following the Project bid closing date and time.

3.3 A bid that contains any escalation clause is considered invalid.

3.4 Bidders shall include a Bid Bond or other approved bid security with the bid form submitted to the Owner when the bid form indicates such bid security is required. The bond value shall be 5% of the bid amount. The form of bond is shown in section 00 43 13.

3.5 Bidders shall include the cost of Performance and Payment Bonds in the bid amount if the bid amount will result in a construction contract value over $125,000, inclusive of alternate bids that may be awarded in the contract. Pursuant to 14 M.R.S.A., Section 871, Public Works Contractors' Surety Bond Law of 1971, subsection 3, the selected Contractor is required to provide these bonds before a contract can be executed. The form of bonds are shown in section 00 61 13.13 and 00 61 13.16.

3.6 Bidders may modify bids in writing, by the same means as the original bid submission, prior to the bid closing time. Such written amendments shall not disclose the amount of the initial bid. If so disclosed, the entire bid is considered invalid.

3.7 Bidders shall acknowledge on the bid form all Addenda issued in a timely manner. The Consultant shall not issue Addenda affecting the content of the bid less than 72 hours prior to the bid closing time. Addenda shall be issued to all companies who are registered holders of Bid Documents.

3.8 A bid may be withdrawn without penalty if a written request by the bidder is presented to the Owner prior to the bid closing time. Such written withdrawal requests are subject to verification as required by the Bureau. After the bid closing time, such written withdrawal requests may be allowed in consideration of the bid bond or, without utilizing a bid bond, if the Contractor

provides documented evidence to the satisfaction of the Bureau that factual errors had been made on the bid form.

3.9 In the event State of Maine Offices unexpectedly close on the published date of a public bid opening in the location of that bid opening, prior to the time of the scheduled deadline, the new deadline for the public bid opening will be the following business day at the originally scheduled hour of the day, at the original location. Official closings are posted on the State of Maine government website.

3.10 The Owner may require, in a Notice of Intent to Award letter to the apparent low bidder, a Schedule of Values, Project Schedule, and List of Subcontractors and Suppliers as both a demonstration of capability of the Bidder and as a condition of award.

3.11 Projects which require a State of Maine wage determination will include that schedule as part of the Bid Documents. See section 00 73 46, if such rates are required.

3.12 Projects which require compliance with the Davis-Bacon Act are subject to the regulations contained the Code for Federal Regulations and the federal wage determination which is made a part of the Bid Documents. See section 00 73 46, if such rates are required.

3.13 The Owner is exempt from the payment of Maine State sales and use taxes as provided in 36 M.R.S. §1760 (1). The Contractor and Subcontractors shall not include taxes on exempt items in the construction contract.

00 41 13
Contractor Bid Form

Dolby Landfill Cover Upgrade – Phases 2 and 3 BGS project number 3345

Bid Form submitted by: *email only to email address below*

Bid Administrator:
William Longfellow BGS.Architect@Maine.gov
Bureau of General Services
111 Sewall Street, Cross State Office Building, 4th floor
77 State House Station
Augusta, Maine 04333-0077

Bidder:

Signature: _____

Printed name and title: _____

Company name: _____

Mailing address: _____

City, state, zip code: _____

Phone number: _____

Email address: _____

State of incorporation, if a corporation: _____

List of all partners, if a partnership: _____

The Bidder agrees, if the Owner offers to award the contract, to provide any and all bonds and certificates of insurance, as well as Schedule of Values, Project Schedule, and List of Subcontractors and Suppliers if required by the Owner, and to sign the designated Construction Contract within twelve calendar days after the date of notification of such acceptance, except if the twelfth day falls on a State of Maine government holiday or other closure day, or a Saturday, or a Sunday, in which case the aforementioned documents must be received before 12:00 noon on the first available business day following the holiday, other closure day, Saturday, or Sunday.

As a guarantee thereof, the Bidder submits, together with this bid, a bid bond or other acceptable instrument as and if required by the Bid Documents.

00 41 13
Contractor Bid Form

1. The Bidder, having carefully examined the form of contract, general conditions, specifications and drawings dated *December 2021*, prepared by *Sevee & Maher Engineers, Inc.* for *Dolby Landfill Cover Upgrade – Phases 2 and 3*, as well as the premises and conditions relating to the work, proposes to furnish all labor, equipment and materials necessary for and reasonably incidental to the construction and completion of this project for the **Base Bid** amount of:

   $ _____ .00

2. Allowances *are not included* on this project.

3. Alternate Bids *are not included* on this project.

4. The Bidder acknowledges receipt of the following addenda to the specifications and drawings:

Addendum No. ____	Dated: _____	Addendum No. ____	Dated: _____
Addendum No. ____	Dated: _____	Addendum No. ____	Dated: _____
Addendum No. ____	Dated: _____	Addendum No. ____	Dated: _____
Addendum No. ____	Dated: _____	Addendum No. ____	Dated: _____

5. Bid security *is required* on this project.
   If noted above as required, the Bidder shall include with this bid form a satisfactory Bid Bond (section 00 43 13) or a certified or cashier's check for 5% of the bid amount with this completed bid form submitted to the Owner.

6. Filed Sub-bids *are not required* on this project.
   If noted above as required, the Bidder shall include with this bid form a list of each Filed Sub-bidder selected by the Bidder on the form provided (section 00 41 13F).

00 43 13
Contractor Bid Bond

Bond No.: **insert bond number**

We, the undersigned, ***insert company name of Contractor***, ***select type of entity*** of ***insert name of municipality*** in the State of ***insert name of state*** as principal, and ***insert name of surety*** as Surety, are hereby held and firmly bound unto ***select title of obligee*** in the penal sum of ***five percent of the bid amount***, for the payment of which, well and truly to be made, we hereby jointly and severally bind ourselves, our heirs, executors, administrators, successors and assigns, signed this ***insert date, i.e.: 8th*** day of ***select month***, ***select year***, which is the same date as that of the first specified bid due date, or subsequent bid due date revised by addendum.

The condition of the above obligation is such that whereas the principal has submitted to the Owner, or State of Maine, to a certain bid, attached hereto and hereby made a part hereof, to enter into a contract in writing, for the construction of ***insert name of project as designated in the contract documents***

Now therefore:

If said bid shall be rejected, or, in the alternate,

If said bid shall be accepted and the principal shall execute and deliver a contract in the form of contract attached hereto, properly completed in accordance with said bid, and shall furnish a bond for the faithful performance of said contract, and for the payment of all persons performing labor or furnishing material in connection therewith, and shall in all other respects perform the agreement created by the acceptance of said bid, then this obligation shall be void.

Otherwise, the same shall remain in force and effect- it being expressly understood and agreed that the liability of the Surety for any and all claims hereunder shall, in no event, exceed the penal amount of this obligation as herein stated.

The Surety, for value received hereby stipulates and agrees that the obligation of said Surety and its bonds shall be in no way impaired or affected by any extension of the time within which the Obligee may accept such bid and said Surety does hereby waive notice of any such extension.

[Fillable bond forms may be downloaded from the Bureau of General Services website.]

00 43 13
Contractor Bid Bond

In witness whereof, the principal and the Surety have hereunto set their hands and seals, and such of them as are corporations have caused their corporate seals to be hereto affixed and these presents to be signed by their proper officers, the day and year first set above.

Signed and sealed this ***insert date, i.e.: 8th*** day of ***select month***, ***select year***, which is the same date as that of the first specified bid due date, or subsequent bid due date revised by addendum.

Contractor

(Signature)

insert name and title

insert company name

insert address
insert city state zip code

Surety

(Signature)

insert name and title

insert company name

insert address
insert city state zip code

If Contractor is a partnership, all partners shall execute the bond. A power of attorney document indicating that it still is in full force and effect shall be provided by the person executing this bond.

[Fillable bond forms may be downloaded from the Bureau of General Services website.]

AdvantageME CT# _____

State of Maine
CONSTRUCTION CONTRACT

Large Construction Project

This form is used when the Contract value is $50,000 or greater.
The Project Manual, Specifications and Drawings are considered part of this Contract.

Agreement entered into by and between the ***insert contracting entity name*** hereinafter called the ***Owner*** and ***insert Contractor company name*** hereinafter called the ***Contractor***.

BGS Project No.: ***insert number assigned by BGS*** Other Project No.: _____

For the following Project: ***title of project shown on documents*** at ***facility or campus name***, ***municipality***, Maine.

The Specifications and the Drawings have been prepared by ***firm name***, acting as Professional-of-Record and named in the documents as the Consultant Architect or Engineer.

The *Owner* and *Contractor* agree as follows:

ARTICLE 1 COMPENSATION AND PAYMENTS

1.1 The Owner shall pay the Contractor to furnish all labor, equipment, materials and incidentals necessary for the construction of the Work described in the Specifications and shown on the Drawings the Contract Amount as shown below.

Base Bid	*$0.00*
Alternate Bid number and name or "no Alternates"	*$0.00*
Alternate Bid number and name or "no Alternates"	*$0.00*
Alternate Bid number and name or "no Alternates"	*$0.00*
Alternate Bid number and name or "no Alternates"	*$0.00*
Alternate Bid number and name or "no Alternates"	*$0.00*
Total Contract Amount	***$0.00***

1.2 The Contractor's requisition shall contain sufficient detail and supporting information for the Owner to evaluate and support the payment requested.

1.2.1 Payments are due and payable twenty-five working days from the date of receipt of a Contractor requisition which is approved by the Owner.

1.2.2 Provisions for late payments are governed by 5 M.R.S. Chapter 144, *Payment of Invoices Received from Business Concerns*, and interest shall be calculated at 1% per month.

ARTICLE 2 COMMENCEMENT AND COMPLETION DATES

2.1 The Work of this Contract shall commence no sooner than the date this document is executed by the approval authority, or a subsequent date designated in the contract documents.

2.2 The Substantial Completion Date shall be ***15 December 2023***.

2.3 The Work of this Contract shall be completed on or before the Contract Final Completion Date of ***31 December 2023***.

2.4 The Contract Expiration Date shall be ***29 February 2024***. (This date is the Owner's deadline for internal management of contract accounts. The Contract Expiration Date does not directly relate to any contract obligation of the Contractor.)

ARTICLE 3 INELIGIBLE BIDDER

3.1 By signing this contract the Contractor attests that it has not been declared ineligible to bid on State of Maine projects. The Bureau of General Services may disallow award of this contract to any Contractor if there is evidence that the Contractor or any of its Subcontractors, through their own fault, have been terminated, suspended for cause, debarred from bidding, agreed to refrain from bidding as part of a settlement, have defaulted on a contract, or had a contract completed by another party.

3.2 By signing this contract the Contractor attests that it is not presently indicted for or otherwise criminally or civilly charged by a Federal, State or local government entity with commission of any of the following offenses and has not within a three-year period preceding this bid been convicted of or had a civil judgment rendered against them for commission of fraud or a criminal offense in connection with obtaining, attempting to obtain, or performing a public (Federal, State or local) transaction, or contract under a public transaction, violation of Federal or State anti-trust statutes or commission of embezzlement, theft, forgery, bribery, falsification or destruction of records, making false statements, or receiving stolen property.

3.3 The Contractor shall not make any award or permit any award (subgrant or contract) at any tier to any party which is debarred or suspended or is otherwise excluded from or ineligible for participation in Federal assistance programs or State of Maine projects.

ARTICLE 4 CONTRACTOR'S RESPONSIBILITIES

4.1 On this project, the Contractor ***shall*** furnish the Owner the appropriate contract bonds in the amount of 100% of the Contract Sum. Contract bonds are mandated if the Contract Sum exceeds $125,000, or if bonds are specifically required by the Contract Documents.

4.2 The Contractor shall comply with all laws, codes and regulations applicable to the Work.

4.3 The Contractor shall acquire all permits and third-party approvals applicable to the Work not specifically identified as provided by the Owner. Costs for Contractor-provided permits and third-party approvals shall be included in the Contract Sum identified in Section 1.1 above.

4.4 The Contractor shall remain an independent agent for the duration of this Contract, shall not become an employee of the State of Maine, and shall assure that no State employee will be compensated by, or otherwise benefit from, this Contract.

4.5 The Contractor shall be responsible for any design cost, construction cost, or other cost incurred on the Project to the extent caused by the negligent acts, errors or omissions of the Contractor or their Subcontractors in the performance of Work under this Contract.

ARTICLE 5 OWNER'S RESPONSIBILITIES

5.1 The Owner shall provide full information about the objectives, schedule, constraints and existing conditions of the project. The Owner has established a budget with reasonable contingencies that meets the project requirements.

5.2 By signing this contract, the Owner attests that all State of Maine procurement requirements for this contract have been met, including the solicitation of competitive bids.

ARTICLE 6 INSTRUMENTS OF SERVICE

6.1 The Contractor's use of the drawings, specifications and other documents known as the Consultant's Instruments of Service is limited to the execution of the Contractor's scope of work of this project unless the Contractor receives the written consent of the Owner and Consultant for use elsewhere.

ARTICLE 7 MISCELLANEOUS PROVISIONS

7.1 This Contract shall be governed by the laws of the State of Maine.

7.2 The Owner and Contractor, respectively, bind themselves, their partners, successors, assigns and legal representatives to this Contract. Neither party to this Contract shall assign the Contract as a whole without written consent of the other party, which consent the Owner may withhold without cause.

7.3 Notwithstanding any other provision of this Agreement, if the Owner does not receive sufficient funds to fund this Agreement or funds are de-appropriated, or if the Owner does not receive legal authority from the Maine State Legislature or Maine Courts to expend funds intended for this Agreement, then the Owner is not obligated to make payment under this Agreement; provided, however, the Owner shall be obligated to pay for services satisfactorily performed prior to any such non-appropriation in accordance with the termination provisions of this Agreement. The Owner shall timely notify the Contractor of any non-appropriation and the effective date of the non-appropriation.

ARTICLE 8 CONTRACT DOCUMENTS

8.1 The General Conditions of the contract, instructions to bidders, bid form, Special Provisions, the written specifications and the drawings, and any Addenda, together with this agreement, form the contract. Each element is as fully a part of the Contract as if hereto attached or herein repeated.

8.2 Specifications: ***indicate date of issuance of project manual***

8.3 Drawings: ***note each sheet number and title***

8.4 Addenda: ***note each addenda number and date, or "none"***

BGS Project No.: _____

The Contract is effective as of the date executed by the approval authority.

OWNER	**CONTRACTOR**
Signature *Date* *name and title* *name of contracting entity* *address* *telephone* *email address*	*Signature* *Date* *name and title* *name of contractor company* *address* *telephone* *email address* *Vendor Number*

Indicate the names of the review and approval individuals appropriate to the approval authority.

select proper approval authority	
Reviewed by:	**Approved by:**
Signature *Date* *insert name*	*Signature* *Date* *Joseph H. Ostwald*
Project Manager/ Contract Administrator	*Director, Planning, Design & Construction*

00 61 13.13
Contractor Performance Bond

Bond No.: **insert bond number**

We, the undersigned, ***insert company name of Contractor***, ***select type of entity*** of ***insert name of municipality*** in the State of ***insert name of state*** as principal, and ***insert name of surety*** as Surety, are hereby held and firmly bound unto ***select title of obligee*** in the penal sum of the Contract Price $ ***insert the Contract Price in numbers*** for the payment of which, well and truly to be made, we hereby jointly and severally bind ourselves, our heirs, executors, administrators, successors and assigns.

The condition of the above obligation is such that if the principal shall promptly and faithfully perform the contract entered into this ***insert date, i.e.: 8th*** day of ***select month***, ***select year***, which is the same date as that of the notice of intent to award letter, or in the absence of such a letter, not later than the date the Owner signs the construction contract, for the construction of ***insert name of project as designated in the contract documents***, then this obligation shall be null and void.

Otherwise, the same shall remain in force and effect- it being expressly understood and agreed that the liability of the Surety for any and all claims hereunder shall, in no event, exceed the penal amount of this obligation as herein stated.

The Surety, for value received hereby stipulates and agrees that the obligation of said Surety and its bonds shall be in no way impaired or affected by any extension of the time which the Obligee may accept during the performance of the contract and said Surety does hereby waive notice of any such extension.

[Fillable bond forms may be downloaded from the Bureau of General Services website.]

00 61 13.13
Contractor Performance Bond

In witness whereof, the principal and the Surety have hereunto set their hands and seals, and such of them as are corporations have caused their corporate seals to be hereto affixed and these presents to be signed by their proper officers, the day and year first set above.

Signed and sealed this ***insert date, i.e.: 8th*** day of ***select month***, ***select year***, which is the same date as that of the notice of intent to award letter, or in the absence of such a letter, not later than the date the Owner signs the construction contract.

Contractor

(Signature)

insert name and title

insert company name

insert address
insert city state zip code

Surety

(Signature)

insert name and title

insert company name

insert address
insert city state zip code

If Contractor is a partnership, all partners shall execute the bond. A power of attorney document indicating that it still is in full force and effect shall be provided by the person executing this bond.

[Fillable bond forms may be downloaded from the Bureau of General Services website.]

00 61 13.16
Contractor Payment Bond

Bond No.: **insert bond number**

We, the undersigned, ***insert company name of Contractor***, ***select type of entity*** of ***insert name of municipality*** in the State of ***insert name of state*** as principal, and ***insert name of surety*** as Surety, are hereby held and firmly bound unto ***select title of obligee*** in the penal sum of the Contract Price $ ***insert the Contract Price in numbers*** for the use and benefit of claimants, defined as an entity having a contract with the principal or with a subcontractor of the principal for labor, materials, or both labor and materials, used or reasonably required for use in the performance of the contract, for the payment of which, well and truly to be made, we hereby jointly and severally bind ourselves, our heirs, executors, administrators, successors and assigns.

The condition of the above obligation is such that if the principal shall promptly satisfy all claims and demands incurred for all labor and materials, used or required by the principal in connection with the work described in the contract entered into this ***insert date, i.e.: 8th*** day of ***select month***, ***select year***, which is the same date as that of the notice of intent to award letter, or in the absence of such a letter, not later than the date the Owner signs the construction contract, for the construction of ***insert name of project as designated in the contract documents***, and shall fully reimburse the obligee for all outlay and expense with said obligee may incur in making good any default of said principal, then this obligation shall be null and void.

Otherwise, the same shall remain in force and effect- it being expressly understood and agreed that the liability of the Surety for any and all claims hereunder shall, in no event, exceed the penal amount of this obligation as herein stated.

The Surety, for value received hereby stipulates and agrees that the obligation of said Surety and its bonds shall be in no way impaired or affected by any extension of the time which the Obligee may accept during the performance of the contract and said Surety does hereby waive notice of any such extension.

[Fillable bond forms may be downloaded from the Bureau of General Services website.]

00 61 13.16
Contractor Payment Bond

In witness whereof, the principal and the Surety have hereunto set their hands and seals, and such of them as are corporations have caused their corporate seals to be hereto affixed and these presents to be signed by their proper officers, the day and year first set above.

Signed and sealed this ***insert date, i.e.: 8th*** day of ***select month***, ***select year***, which is the same date as that of the notice of intent to award letter, or in the absence of such a letter, not later than the date the Owner signs the construction contract.

Contractor

_____

(Signature)

insert name and title

insert company name

insert address
insert city state zip code

Surety

_____

(Signature)

insert name and title

insert company name

insert address
insert city state zip code

If Contractor is a partnership, all partners shall execute the bond. A power of attorney document indicating that it still is in full force and effect shall be provided by the person executing this bond.

[Fillable bond forms may be downloaded from the Bureau of General Services website.]

revised 05 April 2021

AdvantageME CT# 00000000000000000000

State of Maine
CONSTRUCTION CONTRACT
Application for Payment

Dolby Landfill Cover Upgrade - Phase 2 and 3
East Millinocket, Maine

Contractor Company name
address
city state zip code

Application Number: 1
Period Start Date:
Period End Date:
BGS Project No.: 3345
Other Project No.:

1	Original Contract Amount		
2	Net of Change Orders to Date	(from table below)	$0
3	Contract Sum to Date	(line 1 plus or minus line 2)	$0
4	Total Completed and Stored to Date	(column G on Continuation Sheet)	
5a	5% Retainage of Completed Work	(columns D + E x 5%)	
5b	5% Retainage of Stored Materials	(column F x 5%)	
5c	Total Retainage	(column I)	$0
6	Total Earned Less Retainage	(line 4 minus line 5c)	$0
7	Less Previous Approved Applications for Payment	(line 6 from previous Application)	
8	Current Payment Due	(line 6 minus line 7)	**$0**
9	Balance to Finish, Including Retainage	(line 3 minus line 6) $0	

Change Order Summary	Additions	Deductions	
Total Changes Approved in Previous Months			
Total Changes Approved this Month			
Subtotals	$0	$0	
Net of Change Orders to Date			$0

The undersigned Contractor certifies that to the best of the Contractor's knowledge, information, and belief the Work covered by this Application for Payment has been completed in accordance with the Contract Documents, that all amounts have been paid by the Contractor for Work for which the previous Certificates for Payment were issued and payments received from the Owner, and that current payment shown herein is now due.

Contractor
Type company name here
Type person's name, title here

signature date

In accordance with the Contract Documents, based on on-site observations and the data comprising this Application, the Consultant certifies to the Owner that to the best of the Consultant's knowledge, information, and belief the Work has progressed as indicated, the quality of the Work is in accordance with the Contract Documents, and the Contractor is entitled to payment of the Amount Certified. **Amount Certified:**

Consultant (Architect or Engineer)
Sevee & Maher Engineers, Inc.
Matthew Muzzy, PE

signature date

Owner
Type contracting entity name here
Type person's name, title here

signature date

Owner's Rep / other - clear text if not used
Type entity name here
Type person's name, title here

signature date

Bureau of General Services

Type person's name, title here

signature date

revised 05 April 2021

AdvantageME CT# 0000

State of Maine
CONSTRUCTION CONTRACT
Change Order

Dolby Landfill Cover Upgrade Phase 2 and 3
East Millinocket, Maine

Change Order Number: **1**

Issue Date of this Document:

Contractor Company name
address
city state zip code

BGS Project No.: 3345
Other Project No.:

Cost Change *Show Deduct as a negative number, e.g.: "-$850".*

	Add	Deduct	Total
Net Amount of this Change Order	$0	$0	
Net Amount of Previous Change Orders	$0	$0	
Net of Change Orders to Date	$0	$0	$0
Original Contract Amount			$0
		Revised Contract Amount	**$0**

Time Change *Show Deduct as a negative number, e.g.: "-8".*

	Add	Deduct	Total
Net Calendar Days Adjusted by this Change Order	0	0	
Net Calendar Days Adjusted by Previous Change Orders	0	0	
Net of Change Orders to Date	0	0	0
Original Contract Final Completion Date			15-Sep-2023
		Revised Contract Final Completion Date*	**15-Sep-2023**

Consultant (Architect or Engineer)
Sevee & Maher Engineers, Inc.
Matthew Muzzy, P.E.

signature date

Contractor
Type company name here
Type person's name, title here

signature date

Owner
Type contracting entity name here
Type person's name, title here

signature date

Type Entity, such as "Owner's Rep", or "not used"
Type entity name here
Type person's name, title here

signature date

Bureau of General Services
Division of Planning, Design & Construction
Type person's name, title here

signature date

Attach the "List of Change Order Items" sheet, plus all supporting documentation for each Change Order Item.

Substantial Completion Date: the deadline for first beneficial use by Owner, as certified by Consultant.
** **Contract Final Completion Date** : the Contractor's final completion deadline for contract work.*
Contract Expiration Date: the Owner's deadline for internal management of contract accounts;
Contract Expiration Date does not directly relate to any contract obligation of the Contractor.

15-Sep-2023

List of Change Order Items

Project name
Contractor Company name

C. O. Number: 1

CO Item No.	CP No.	Item Name	Reason Code	Calendar Days*	Cost
1	1	Type brief name of Change Order Item here		0	$0
				0	$0
				0	$0
				0	$0
				0	$0
				0	$0
				0	$0
				0	$0
				0	$0
				0	$0
				0	$0
				0	$0
				0	$0
				0	$0
				0	$0
				0	$0
			Totals	**0**	**$0**

Reason Codes

EO Error or omission of Consultant
UC Unforeseen job site condition
OC Owner-generated change
RC Regulatory authority-generated change
CC Contractor-generated change

** Calendar Days shows Contract Final Completion Date impact only.*

Attach this sheet to the BGS "Change Order" cover sheet (with cost and time summaries, and signatures). Attach a "Details" sheet, and other supporting documentation, for each Change Order Item listed above.

revised 05 April 2021

State of Maine Change Order

Details of Change Order Item

Project name
location / school / campus

Contractor Company name
address
city state zip code

Change Order Item Number **1**
CP (Change Proposal) Number 1
Issue Date of this Document: 31-Oct-2021

BGS Project No.: n
Other Project No.: x

Change Order Item	Type name of Change Order Item here			
Description of Work	Type brief description here of work scope here.			
Reason or Necessity of Work	Type brief justification for change here.			
Cost Breakdown	Work by Subcontractor only	Work by Sub *and* Contractor	Work by Contractor only	
Subcontractor base cost	$0	$0		
Subcontractor markup	$0	$0		
Contractor base cost		$0	$0	
Contractor markup	$0	$0	$0	
Subtotal	$0	$0	$0	
Compensation	lump sum		**Total Cost**	**$0**
Initiated by	Consultant		**Calendar Days***	0
Reason Code	CC		**Supporting Documentation**	is attached

EO — *Error or omission of Consultant*
UC — *Unforeseen job site condition*
OC — *Owner-generated change*
RC — *Regulatory authority-generated change*
CC — *Contractor-generated change*

** Calendar Days shows Contract Final Completion Date impact only.*

Consultant (Architect or Engineer)
Type firm name here
Type person's name, title here
signature date

Contractor
Type company name here
Type person's name, title here
signature date

Owner
Type contracting entity name here
Type person's name, title here
signature date

Owner's Rep
Type entity name here
Type person's name, title here
signature date

Bureau of General Services
Division of Planning, Design & Construction
Type person's name, title here
signature date

00 71 00
Definitions

1. Definitions

1.1 *Addendum*: A document issued by the Consultant that amends the Bid Documents. Addenda shall not be issued less than seventy-two hours prior to the specified bid opening time.

1.2 *Allowance*: A specified dollar amount for a particular scope of work or service included in the Work that is identified in the Bid Documents and included in each Bidder's Bid. The Contractor shall document expenditures for an Allowance during the Project. Any unused balance shall be credited to the Owner. The Contractor is responsible for notifying the Owner of anticipated expenses greater than the specified amount and the Owner is responsible for those additional expenses.

1.3 *Alternate Bid*: The Contractor's written offer of a specified dollar amount, submitted on the Bid Form, for the performance of a particular scope of work described in the Bid Documents. The Owner determines the low bidder based on the sum of the base Bid and any combination of Alternate Bids that the Owner selects.

1.4 *Architect*: A Consultant acting as, or supporting, the Professional-of-Record who is responsible for the design of the Project. Equivalent to "Consultant" in State of Maine contract forms.

1.5 *Architectural Supplemental Instruction (ASI)*: A written instruction from the Architect for the purpose of clarification of the Contract Documents. An ASI does not alter the Contract Price or Contract Time. ASIs may be responses to RFIs and shall be issued by the Architect in a timely manner to avoid any negative impact on the Schedule of Work.

1.6 *Bid*: The Contractor's written offer of a specified dollar amount or amounts, submitted on a form included in the Bid Documents, for the performance of the Work. A Bid may include bonds or other requirements. A base Bid is separate and distinct from Alternate Bids, being the only cost component necessary for the award of the contract, and representing the minimum amount of Work that is essential for the functioning of the Project.

1.7 *Bid Bond*: The security designated in the Bid Documents, furnished by Bidders as a guaranty of good faith to enter into a contract with the Owner, should a contract be awarded to that Bidder.

1.8 *Bidder*: Any business entity, individual or corporation that submits a bid for the performance of the work described in the Bid Documents, acting directly or through a duly authorized representative. See also *Responsive and Responsible Bidder*.

1.9 *Bid Documents*: The drawings, procurement and contracting requirements, general requirements, and the written specifications -including all addenda, that a bidder is required to reference in the submission of a bid.

1.10 *Bureau*: The State of Maine Bureau of Real Estate Management (formerly known as Bureau of General Services, or BGS) in the Department of Administrative and Financial Services.

1.11 *Calendar days*: Consecutive days, as occurring on a calendar, taking into account each day of the week, month, year, and any religious, national or local holidays. Calendar days are used for changes in Contract Time.

1.12 *Certificate of Substantial Completion*: A document developed by the Consultant that describes the final status of the Work and establishes the date that the Owner may use the facility for its intended purpose. The Certificate of Substantial Completion may also include a provisional list of items - a "punch list" - remaining to be completed by the Contractor. The Certificate of Substantial Completion identifies the date from which the project warranty period commences.

1.13 *Certificate of Occupancy*: A document developed by a local jurisdiction such as the Code Enforcement Officer that grants permission to the Owner to occupy a building.

1.14 *Change Order (CO)*: A document that modifies the contract and establishes the basis of a specific adjustment to the Contract Price or the Contract Time, or both. Change Orders may address correction of omissions, errors, and document discrepancies, or additional requirements. Change Orders should include all labor, materials and incidentals required to complete the work described. A Change Order is not valid until signed by the Contractor, Owner and Consultant and approved by the Bureau.

1.15 *Change Order Proposal (COP) (see also Proposal)*: Contract change proposed by the Contractor regarding the contract amount, requirements, or time. The Contractor implements the work of a COP after it is accepted by all parties. Accepted COPs are incorporated into the contract by Change Order.

1.16 *Clerk of the Works*: The authorized representative of the Consultant on the job site. Clerk of the Works is sometimes called the Architect's representative.

1.17 *Construction Change Directive (CCD)*: A written order prepared by the Consultant and signed by the Owner and Consultant, directing a change in the Work prior to final agreement with the Contractor on adjustment, if any, in the Contract Price or Contract Time, or both.

1.18 *Contract*: A written agreement between the Owner and the successful bidder which obligates the Contractor to perform the work specified in the Contract Documents and obligates the Owner to compensate the Contractor at the mutually accepted sum, rates or prices.

1.19 *Contract Bonds (also known as Payment and Performance Bonds)*: The approved forms of security, furnished by the Contractor and their surety, which guarantee the faithful performance of all the terms of the contract and the payment of all bills for labor, materials and equipment by the Contractor.

1.20 *Contract Documents*: The drawings and written specifications (including all addenda), Standard General Conditions, and the contract (including all Change Orders subsequently incorporated in the documents).

1.21 *Contract Expiration Date*: Date determined by the Owner as a deadline for internal management of contract accounts. This allows time after the Contract Final Completion Date for processing the final Requisition for Payment. The Contract Expiration Date does not directly relate to any contract obligation of the Contractor.

1.22 *Contract Final Completion Date*: Point of time when the Work is fully completed in compliance with the Contract Documents, as certified by the Consultant. Final payment to the Contractor is due upon Final Completion of the Project.

1.23 *Contract Price*: The dollar amount of the construction contract, also called *Contract Sum*.

1.24 *Contract Time*: The designated duration of time to execute the Work of the contract, with a specific date for completion.

1.25 *Contractor*: Also called the "General Contractor" or "GC" the individual or entity undertaking the execution of the general contract work under the terms of the contract with the Owner, acting directly or through a duly authorized representative. The Contractor is responsible for the means, methods and materials utilized in the execution and completion of the Work.

1.26 *Consultant*: The Architect or Engineer acting as Professional-of-Record for the Project. The Consultant is responsible for the design of the Project.

1.27 *Drawings*: The graphic and pictorial portion of the Contract Documents showing the design, location and dimensions of the Work, generally including plans, elevations, sections, details, schedules, and diagrams.

1.28 *Engineer*: A Consultant acting as, or supporting, the Professional-of-Record who is responsible for the design of the Project. Equivalent to “Consultant” in State of Maine contract forms.

1.29 *Filed Sub-bid*: The designated major Subcontractor's (or, in some cases, Contractor’s) written offer of a specified dollar amount or amounts, submitted on a form included in the Bid Documents, for the performance of a particular portion of the Work. A Filed Sub-bid may include bonds or other requirements.

1.30 *General Requirements*: The on-site overhead expense items the Contractor provides for the Project, typically including, but not limited to, building permits, construction supervision, Contract Bonds, insurance, field office, temporary utilities, rubbish removal, and site fencing. Overhead expenses of the Contractor's general operation are not included. Sometimes referred to as the Contractor's General Conditions.

1.31 *Owner*: The State agency which is represented by duly authorized individuals. The Owner is responsible for defining the scope of the Project and compensation to the Consultant and Contractor.

1.32 *Owner’s Representative*: The individual or entity contracted by the Owner to be an advisor and information conduit regarding the Project.

1.33 *Overhead*: General and administrative expenses of the Contractor’s principal and branch offices, including payroll costs and other compensation of Contractor employees, deductibles paid on any insurance policy, charges against the Contractor for delinquent payments, and costs related to the correction of defective work, and the Contractor’s capital expenses, including interest on capital used for the work.

1.34 *Performance and Payment Bonds (also known as Contract Bonds)*: The approved forms of security, furnished by the Contractor and their surety, which guarantee the faithful performance of all the terms of the contract and the payment of all bills for labor, materials and equipment by the Contractor.

1.35 *Post-Bid Addendum*: Document issued by the Consultant that defines a potential Change Order prior to signing of the construction contract. The Post-Bid Addendum allows the Owner to negotiate

contract changes with the Bidder submitting the lowest valid bid, only if the negotiated changes to the Bid Documents result in no change or no increase in the bid price.

A Post-Bid Addendum may also be issued after a competitive construction Bid opening to those Bidders who submitted a Bid initially, for the purpose of rebidding the Project work without re-advertising.

1.36 *Project*: The construction project proposed by the Owner to be constructed according to the Contract Documents. The Project, a public improvement, may be tied logistically to other public improvements and other activities conducted by the Owner or other contractors.

1.37 *Proposal (see also Change Order Proposal)*: The Contractor's written offer submitted to the Owner for consideration containing a specified dollar amount or rate, for a specific scope of work, and including a schedule impact, if any. A proposal shall include all costs for overhead and profit. The Contractor implements the work of a Proposal after it is accepted by all parties. Accepted Proposals are incorporated into the contract by Change Order.

1.38 *Proposal Request (PR)*: An Owner's written request to the Contractor for a Change Order Proposal.

1.39 *Punch List*: A document that identifies the items of work remaining to be done by the Contractor at the Close Out of a Project. The Punch List is created as a result of a final inspection of the work only after the Contractor attests that all of the Work is in its complete and permanent status.

1.40 *Request For Information (RFI)*: A Contractor's written request to the Consultant for clarification, definition or description of the Work. RFIs shall be presented by the Contractor in a timely manner to avoid any negative impact on the Schedule of Work.

1.41 *Request For Proposal (RFP)*: An Owner's written request to the Contractor for a Change Order Proposal.

1.42 *Requisition for Payment*: The document in which the Contractor certifies that the Work described is, to the best of the Contractor's knowledge, information and belief, complete and that all previous payments have been paid by the Contractor to Subcontractors and suppliers, and that the current requested payment is now due. See *Schedule of Values.*

1.43 *Responsive and Responsible Bidder*: A bidder who complies, on a given project, with the following *responsive* standards, as required by the bid documents:
provided specific qualifications to bid the project, if required;
attended mandatory pre-bid conferences, if required;
provided a bid prior to the close of the bid period;
submitted a complete bid form;
submitted other materials and information, such as bid security, as required;
and, meets the following minimums regarding these *responsible* standards:
sustains a satisfactory record of project performance;
maintains a permanent place of business in a known physical location;
possesses the financial means for short- and long-term operations;
possesses the appropriate technical experience;
employs adequate personnel and subcontractor resources;
maintains the equipment needed to perform the work;

complies with the proposed implementation schedule;
complies with the insurance and bonding requirements;
can provide post-construction warranty coverage;
and other criteria which can be considered relevant to the contract.

1.44 *Retainage*: The amount, calculated at five percent (5%) of the contract value or a scheduled value, that the Owner shall withhold from the Contractor until the work or portion of work is declared substantially complete or otherwise accepted by the Owner. The Owner may, if requested, reduce the amount withheld if the Owner deems it desirable and prudent to do so. (See Title 5 M.R.S.A., Section 1746.)

1.45 *Sample*: A physical example provided by the Contractor which illustrates materials, equipment or workmanship and establishes standards by which the Work will be judged.

1.46 *Schedule of the Work*: The document prepared by the Contractor and approved by the Owner that specifies the dates on which the Contractor plans to begin and complete various parts of the Work, including dates on which information and approvals are required from the Owner.

1.47 *Schedule of Values*: The document prepared by the Contractor and approved by the Owner before the commencement of the Work that specifies the dollar values of discrete portions of the Work equal in sum to the contract amount. The Schedule of Values is used to document progress payments of the Work in regular (usually monthly) requisitions for payment. See *Requisition for Payment*.

1.48 *Shop Drawings*: The drawings, diagrams, schedules and other data specially prepared for the Work by the Contractor or a Subcontractor, manufacturer, supplier or distributor to illustrate some portion of the Work.

1.49 *Specifications*: The portion of the Contract Documents consisting of the written requirements of the Work for materials, equipment, systems, standards, workmanship, and performance of related services.

1.50 *Subcontractor*: An individual or entity undertaking the execution of any part of the Work by virtue of a written agreement with the Contractor or any other Subcontractor. Also, an individual or entity retained by the Contractor or any other Subcontractor as an independent contractor to provide the labor, materials, equipment or services necessary to complete a specific portion of the Work.

1.51 *Substantial Completion Date*: Point of time when the Work or a designated portion of the Work is sufficiently complete in compliance with the Contract Documents so that the Owner can occupy or utilize the Work for its intended purpose without unscheduled disruption. Substantial Completion is documented by the date of the Certificate of Substantial Completion signed by the Owner and the Contractor.

1.52 *Superintendent*: The representative of the Contractor on the job site, authorized by the Contractor to receive and fulfill instructions from the Consultant.

1.53 *Surety*: The individual or entity that is legally bound with the Contractor and Subcontractor to insure the faithful performance of the contract and for the payment of the bills for labor, materials and equipment by the Contractor and Subcontractors.

1.54 *Work*: The construction and services, whether completed or partially completed, including all labor, materials, equipment and services provided or to be provided by the Contractor and Subcontractors to fulfill the requirements of the Project as described in the Contract Documents.

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General Conditions

Table of Contents of this General Conditions Section

1. Preconstruction Conference

1.1 The Contractor shall, upon acceptance of a contract and prior to commencing work, schedule a preconstruction conference with the Owner and Consultant. The purpose of this conference is as follows.

1.1.1 Introduce all parties who have a significant role in the Project, including:
Owner (State agency or other contracting entity)
Owner's Representative
Consultant (Architect or Engineer)
Subconsultants
Clerk-of-the-works
Contractor (GC)
Superintendent
Subcontractors
Other State agencies
Construction testing company
Commissioning agent
Special Inspections agent
Bureau of General Services (BGS);

1.1.2 Review the responsibilities of each party;

1.1.3 Review any previously-identified special provisions of the Project;

1.1.4 Review the Schedule of the Work calendar submitted by the Contractor to be approved by the Owner and Consultant;

1.1.5 Review the Schedule of Values form submitted by the Contractor to be approved by the Owner and Consultant;

1.1.6 Establish routines for Shop Drawing approval, contract changes, requisitions, et cetera;

1.1.7 discuss jobsite issues;

1.1.8 Discuss Project close-out procedures;

1.1.9 Provide an opportunity for clarification of Contract Documents before work begins; and

1.1.10 Schedule regular meetings at appropriate intervals for the review of the progress of the Work.

2. Intent and Correlation of Contract Documents

2.1 The intent of the Contract Documents is to describe the complete Project. The Contract Documents consist of various components; each component complements the others. What is shown as a requirement by any one component shall be inferred as a requirement on all corresponding components.

2.2 The Contractor shall furnish all labor, equipment and materials, tools, transportation, insurance, services, supplies, operations and methods necessary for, and reasonably incidental to, the construction and completion of the Project. Any work that deviates from the Contract Documents which appears to be required by the exigencies of construction or by inconsistencies in the Contract Documents, will be determined by the Consultant and authorized in writing by the Consultant, Owner and the Bureau prior to execution. The Contractor shall be responsible for requesting clarifying information where the intent of the Contract Documents is uncertain.

2.3 The Contractor shall not utilize any apparent error or omission in the Contract Documents to the disadvantage of the Owner. The Contractor shall promptly notify the Consultant in writing of such errors or omissions. The Consultant shall make any corrections or clarifications necessary in such a situation to document the true intent of the Contract Documents.

3. Additional Drawings and Specifications

3.1 Upon the written request of the Contractor, the Owner shall provide, at no expense to the Contractor, up to five sets of printed Drawings and Specifications for the execution of the Work.

3.2 The Consultant shall promptly furnish to the Contractor revised Drawings and Specifications, for the area of the documents where those revisions apply, when corrections or clarifications are made by the Consultant. All such information shall be consistent with, and reasonably inferred from, the Contract Documents. The Contractor shall do no work without the proper Drawings and Specifications.

4. Ownership of Contract Documents

4.1 The designs represented on the Contract Documents are the property of the Consultant. The Drawings and Specifications shall not be used on other work without consent of the Consultant.

5. Permits, Laws, and Regulations

5.1 The Owner is responsible for obtaining any zoning approvals or other similar local project approvals necessary to complete the Work, unless otherwise specified in the Contract Documents.

5.2 The Owner is responsible for obtaining Maine Department of Environmental Protection, Maine Department of Transportation, or other similar state government project approvals necessary to complete the Work, unless otherwise indicated in the Contract Documents.

5.3 The Owner is responsible for obtaining any federal agency project approvals necessary to complete the Work, unless otherwise indicated in the Contract Documents.

5.4 The Owner is responsible for obtaining all easements for permanent structures or permanent changes in existing facilities.

5.5 The Contractor is responsible for obtaining and paying for all permits and licenses necessary for the implementation of the Work. The Contractor shall notify the Owner of any delays, variance or restrictions that may result from the issuing of permits and licenses.

5.6 The Contractor shall comply with all ordinances, laws, rules and regulations and make all required notices bearing on the implementation of the Work. In the event the Contractor observes disagreement between the Drawings and Specifications and any ordinances, laws, rules and regulations, the Contractor shall promptly notify the Consultant in writing. Any necessary changes shall be made as provided in the contract for changes in the work. The Contractor shall not perform any work knowing it to be contrary to such ordinances, laws, rules and regulations.

5.7 The Contractor shall comply with local, state and federal regulations regarding construction safety and all other aspects of the Work.

5.8 The Contractor shall comply with the Maine Code of Fair Practices and Affirmative Action, 5 M.R.S. §784 (2).

6. Taxes

6.1 The Owner is exempt from the payment of Maine State sales and use taxes as provided in 36 M.R.S. §1760 (1). The Contractor and Subcontractors shall not include taxes on exempt items in the construction contract.

6.2 Section 1760 further provides in subsection 61 that sales to a construction contractor or its subcontractor of tangible personal property that is to be physically incorporated in, and become a permanent part of, real property for sale to or owned by the Owner, are exempt from Maine State sales and use taxes. Tangible personal property is defined in 36 M.R.S. §1752 (17).

6.3 The Contractor may contact Maine Revenue Services, 24 State House Station, Augusta, Maine 04333 for guidance on tax exempt regulations authorized by 36 M.R.S. §1760 and detailed in Rule 302 (18-125 CMR 302).

7. Labor and Wages

7.1 The Contractor shall conform to the labor laws of the State of Maine, and all other laws, ordinances, and legal requirements affecting the work in Maine.

7.2 The Consultant shall include a wage determination document prepared by the Maine Department of Labor in the Contract Documents for state-funded contracts in excess of $50,000. The document shows the minimum wages required to be paid to each category of labor employed on the project.

7.3 On projects requiring a Maine wage determination, the Contractor shall submit monthly payroll records to the Owner ("the contracting agency") showing the name and occupation of all workers and all independent contractors employed on the project. The monthly submission must also include the Contractor's company name, the title of the project, hours worked, hourly rate or other method of remuneration, and the actual wages or other compensation paid to each person.

7.4 The Contractor shall not reveal, in the payroll records submitted to the Owner, personal information regarding workers and independent contractors, other than the information described above. Such information shall not include Social Security number, employee identification number, or employee address or phone number, for example.

7.5 The Contractor shall conform to Maine statute (39-A M.R.S. §105-A (6)) by providing to the Workers' Compensation Board a list of all subcontractors and independent contractors on the job site and a record of the entity to whom that subcontractor or independent contractor is directly contracted and by whom that subcontractor or independent contractor is insured for workers' compensation purposes.

7.6 The Contractor shall enforce strict discipline and good order among their employees at all times, and shall not employ any person unfit or unskilled to do the work assigned to them.

7.7 The Contractor shall promptly pay all employees when their compensation is due, shall promptly pay all others who have billed and are due for materials, supplies and services used in the Work, and shall promptly pay all others who have billed and are due for insurance, workers compensation coverage, federal and state unemployment compensation, and Social Security

charges pertaining to this Project. Before final payments are made, the Contractor shall furnish to the Owner affidavits that all such payments described above have been made.

7.8 The Contractor may contact the Maine Department of Labor, 54 State House Station, Augusta, Maine 04333 for guidance on labor issues.

7.9 The Contractor may contact the Maine Workers' Compensation Board, 27 State House Station, Augusta, Maine 04333 for guidance on workers' compensation issues.

8. Indemnification

8.1 The Contractor shall indemnify and hold harmless the Owner and its officers and employees from and against any and all damages, liabilities, and costs, including reasonable attorney's fees, and defense costs, for any and all injuries to persons or property, including claims for violation of intellectual property rights, to the extent caused by the negligent acts or omissions of the Contractor, its employees, agents, officers or subcontractors in the performance of work under this Agreement. The Contractor shall not be liable for claims to the extent caused by the negligent acts or omissions of the Owner or for actions taken in reasonable reliance on written instructions of the Owner.

8.2 The Contractor shall notify the Owner promptly of all claims arising out of the performance of work under this Agreement by the Contractor, its employees or agents, officers or subcontractors.

8.3 This indemnity provision shall survive the termination of the Agreement, completion of the project or the expiration of the term of the Agreement.

9. Insurance Requirements

9.1 The Contractor shall provide, with each original of the signed Contract, an insurance certificate or certificates acceptable to the Owner and BGS. The Contractor shall submit insurance certificates to the Owner and BGS at the commencement of this Contract and at policy renewal or revision dates. The certificates shall identify the project name and BGS project number, and shall name the Owner as certificate holder and as additional insured for general liability and automobile liability coverages. The submitted forms shall contain a provision that coverage afforded under the insurance policies will not be canceled or materially changed unless at least ten days prior written notice by registered letter has been given to the Owner and BGS.

9.2 The Owner does not warrant or represent that the insurance required herein constitutes an insurance portfolio which adequately addresses all risks faced by the Contractor or its Subcontractors. The Contractor is responsible for the existence, extent and adequacy of insurance prior to commencement of work. The Contractor shall not allow any Subcontractor to commence work until all similar insurance required of the Subcontractor has been confirmed by the Contractor.

9.3 The Contractor shall procure and maintain primary insurance for the duration of the Project and, if written on a Claims-Made basis, shall also procure and maintain Extended Reporting Period (ERP) insurance for the period of time that any claims could be brought. The Contractor shall ensure that all Subcontractors they engage or employ will procure and maintain similar insurance

in form and amount acceptable to the Owner and BGS. At a minimum, the insurance shall be of the types and limits set forth herein protecting the Contractor from claims which may result from the Contractor's execution of the Work, whether such execution be by the Contractor or by those employed by the Contractor or by those for whose acts they may be liable. All required insurance coverages shall be placed with carriers authorized to conduct business in the State of Maine by the Maine Bureau of Insurance.

9.3.1 The Contractor shall have Workers' Compensation insurance for all employees on the Project site in accordance with the requirements of the Workers' Compensation law of the State of Maine. Minimum acceptable limits for Employer's Liability are:

Bodily Injury by Accident.....$500,000
Bodily Injury by Disease.....$500,000 Each Employee
Bodily Injury by Disease.....$500,000 Policy Limit

9.3.2 The Contractor shall have Commercial General Liability insurance providing coverage for bodily injury and property damage liability for all hazards of the Project including premise and operations, products and completed operations, contractual, and personal injury liabilities. The policy shall include collapse and underground coverage as well as explosion coverage if explosion hazards exist. Aggregate limits shall apply on a location or project basis. Minimum acceptable limits are:

General aggregate limit.....$2,000,000
Products and completed operations aggregate $1,000,000
Each occurrence limit.....$1,000,000
Personal injury aggregate.....$1,000,000

9.3.3 The Contractor shall have Automobile Liability insurance against claims for bodily injury, death or property damage resulting from the maintenance, ownership or use of all owned, non-owned and hired automobiles, trucks and trailers. Minimum acceptable limit is:

Any one accident or loss $500,000

9.3.4 For the portion of a project which is new construction, the Contractor shall procure and maintain Builder's Risk insurance naming the Owner, Contractor, and any Subcontractor as insureds as their interest may appear. Covered causes of loss form shall be all Risks of Direct Physical Loss, endorsed to include flood, earthquake, transit and sprinkler leakage where sprinkler coverage is applicable. Unless specifically authorized in writing by the Owner, the limit of insurance shall not be less than the initial contract amount, for the portion of the project which is new construction, and coverage shall apply during the entire contract period and until the work is accepted by the Owner.

9.3.5 The Contractor shall have Owner's Protective Liability insurance for contract values $50,000 and above, naming the Owner as the Named Insured. Minimum acceptable limits are:

General aggregate limit.....$2,000,000
Each occurrence limit.....$1,000,000

10. Contract Bonds

10.1 When noted as required in the Bid Documents, the Contractor shall provide to the Owner a Performance Bond and a Payment Bond, or "contract bonds", upon execution of the contract. Each bond value shall be for the full amount of the contract and issued by a surety company authorized to do business in the State of Maine as approved by the Owner. The bonds shall be

executed on the forms furnished in the Bid Documents. The bonds shall allow for any subsequent additions or deductions of the contract.

10.2 The contract bonds shall continue in effect for one year after final acceptance of the contract to protect the Owner's interest in connection with the one year guarantee of workmanship and materials and to assure settlement of claims for the payment of all bills for labor, materials and equipment by the Contractor.

11. Patents and Royalties

11.1 The Contractor shall, for all time, secure for the Owner the free and undisputed right to the use of any patented articles or methods used in the Work. The expense of defending any suits for infringement or alleged infringement of such patents shall be borne by the Contractor. Awards made regarding patent suits shall be paid by the Contractor. The Contractor shall hold the Owner harmless regarding patent suits that may arise due to installations made by the Contractor, and to any awards made as a result of such suits.

11.2 Any royalty payments related to the work done by the Contractor for the Project shall be borne by the Contractor. The Contractor shall hold the Owner harmless regarding any royalty payments that may arise due to installations made by the Contractor.

12. Surveys, Layout of Work

12.1 The Owner shall furnish all property surveys unless otherwise specified.

12.2 The Contractor is responsible for correctly staking out the Work on the site. The Contractor shall employ a competent surveyor to position all construction on the site. The surveyor shall run the axis lines, establish correct datum points and check each line and point on the site to insure their accuracy. All such lines and points shall be carefully preserved throughout the construction.

12.3 The Contractor shall lay out all work from dimensions given on the Drawings. The Contractor shall take measurements and verify dimensions of any existing work that affects the Work or to which the Work is to be fitted. The Contractor is solely responsible for the accuracy of all measurements. The Contractor shall verify all grades, lines, levels, elevations and dimensions shown on the Drawings and report any errors or inconsistencies to the Consultant prior to commencing work.

13. Record of Documents

13.1 The Contractor shall maintain one complete set of Contract Documents on the jobsite, in good order and current status, for access by the Owner and Consultant.

13.2 The Contractor shall maintain, continuously updated, complete records of Requests for Information, Architectural Supplemental Instructions (or equivalent), Information Bulletins, supplemental sketches, Change Order Proposals, Change Orders, Shop Drawings, testing reports, et cetera, for access by the Owner and Consultant.

14. Allowances

14.1 The Contract Price shall include all allowances described in the Contract Documents. The Contractor shall include all overhead and profit necessary to implement each allowance in their Contract Price.

14.2 The Contractor shall not be required to employ parties for allowance work against whom the Contractor has a reasonable objection. In such a case, the Contractor shall notify the Owner in writing of their position and shall propose an alternative party to complete the work of the allowance.

15. Shop Drawings

15.1 The Contractor shall administer Shop Drawings prepared by the Contractor, Subcontractors, suppliers or others to conform to the approved Schedule of the Work. The Contractor shall verify all field measurements, check and authorize all Shop Drawings and schedules required by the Work. The Contractor is the responsible party and contact for the Contractor's work as well as that of Subcontractors, suppliers or others who provide Shop Drawings.

15.2 The Consultant shall review and acknowledge Shop Drawings, with reasonable promptness, for general conformity with the design concept of the project and compliance with the information provided in the Contract Documents.

15.3 The Contractor shall provide monthly updated logs containing: requests for information, information bulletins, supplemental instructions, supplemental sketches, change order proposals, change orders, submittals, testing and deficiencies.

15.4 The Contractor shall make any corrections required by the Consultant, and shall submit a quantity of corrected copies as may be needed. The acceptance of Shop Drawings or schedules by the Consultant shall not relieve the Contractor from responsibility for deviations from Drawings and Specifications, unless the Contractor has called such deviations to the attention of the Consultant at the time of submission and secured the Consultant’s written approval. The acceptance of Shop Drawings or schedules by the Consultant does not relieve the Contractor from responsibility for errors in Shop Drawings or schedules.

16. Samples

16.1 The Contractor shall furnish for approval, with reasonable promptness, all samples as directed by the Consultant. The Consultant shall review and approve such samples, with reasonable promptness, for general conformity with the design concept of the project and compliance with the information provided in the Contract Documents. The subsequent work shall be in accord with the approved samples.

17. Substitutions

17.1 The Contractor shall furnish items and materials described in the Contract Documents. If the item or material specified describes a proprietary product, or uses the name of a manufacturer, the term “or approved equal” shall be implied, if it is not included in the text. The specific item or material specified establishes a minimum standard for the general design, level of quality, type, function, durability, efficiency, reliability, compatibility, warranty coverage, installation factors

and required maintenance. The Drawing or written Specification shall not be construed to exclude other manufacturers products of comparable design, quality, and efficiency.

17.2 The Contractor may submit detailed information about a proposed substitution to the Consultant for consideration. Particular models of items and particular materials which the Contractor asserts to be equal to the items and materials identified in the Contract Documents shall be allowed only with written approval by the Consultant. The request for substitution shall include a cost comparison and a reason or reasons for the substitution.

17.3 The Consultant may request additional information about the proposed substitution. The approval or rejection of a proposed substitution may be based on timeliness of the request, source of the information, the considerations of minimum standards described above, or other considerations. The Consultant should briefly state the rationale for the decision. The decision shall be considered final.

17.4 The duration of a substitution review process can not be the basis for a claim for delay in the Schedule of the Work.

18. Assignment of Contract

18.1 The Contractor shall not assign or sublet the contract as a whole without the written consent of the Owner. The Contractor shall not assign any money due to the Contractor without the written consent of the Owner.

19. Separate Contracts

19.1 The Owner reserves the right to create other contracts in connection with this Project using similar General Conditions. The Contractor shall allow the Owner's other contractors reasonable opportunity for the delivery and storage of materials and the execution of their work. The Contractor shall coordinate and properly connect the Work of all contractors.

19.2 The Contractor shall promptly report to the Consultant and Owner any apparent deficiencies in work of the Owner's other contractors that impacts the proper execution or results of the Contractor. The Contractor’s failure to observe or report any deficiencies constitutes an acceptance of the Owner's other contractors work as suitable for the interface of the Contractor’s work, except for latent deficiencies in the Owner's other contractors work.

19.3 Similarly, the Contractor shall promptly report to the Consultant and Owner any apparent deficiencies in their own work that would impact the proper execution or results of the Owner's other contractors.

19.4 The Contractor shall report to the Consultant and Owner any conflicts or claims for damages with the Owner's other contractors and settle such conflicts or claims for damages by mutual agreement or arbitration, if necessary, at no expense to the Owner.

19.5 In the event the Owner's other contractors sue the Owner regarding any damage alleged to have been caused by the Contractor, the Owner shall notify the Contractor, who shall defend such proceedings at the Contractor's expense. The Contractor shall pay or satisfy any judgment that may arise against the Owner, and pay all other costs incurred.

20. Subcontracts

20.1 The Contractor shall not subcontract any part of this contract without the written permission of the Owner.

20.2 The Contractor shall submit a complete list of named Subcontractors and material suppliers to the Consultant and Owner for approval by the Owner prior to commencing work. The Subcontractors named shall be reputable companies of recognized standing with a record of satisfactory work.

20.3 The Contractor shall not employ any Subcontractor or use any material until they have been approved, or where there is reason to believe the resulting work will not comply with the Contract Documents.

20.4 The Contractor, not the Owner, is as fully responsible for the acts and omissions of Subcontractors and of persons employed by them, as the Contractor is for the acts and omissions of persons directly or indirectly employed by the Contractor.

20.5 Neither the Contract Documents nor any Contractor-Subcontractor contract shall indicate, infer or create any direct contractual relationship between any Subcontractor and the Owner.

21. Contractor-Subcontractor Relationship

21.1 The Contractor shall be bound to the Subcontractor by all the obligations in the Contract Documents that bind the Contractor to the Owner.

21.2 The Contractor shall pay the Subcontractor, in proportion to the dollar value of the work completed and requisitioned by the Subcontractor, the approved dollar amount allowed to the Contractor no more than seven days after receipt of payment from the Owner.

21.3 The Contractor shall pay the Subcontractor accordingly if the Contract Documents or the subcontract provide for earlier or larger payments than described in the provision above.

21.4 The Contractor shall pay the Subcontractor for completed and requisitioned subcontract work, less retainage, no more than seven days after receipt of payment from the Owner for the Contractor's approved Requisition for Payment, even if the Consultant fails to certify a portion of the Requisition for Payment for a cause not the fault of the Subcontractor.

21.5 The Contractor shall not make a claim for liquidated damages or penalty for delay in any amount in excess of amounts that are specified by the subcontract.

21.6 The Contractor shall not make a claim for services rendered or materials furnished by the Subcontractor unless written notice is given by the Contractor to the Subcontractor within ten calendar days of the day in which the claim originated.

21.7 The Contractor shall give the Subcontractor an opportunity to present and to submit evidence in any progress conference or disputes involving subcontract work.

21.8 The Contractor shall pay the Subcontractor a just share of any fire insurance payment received by the Contractor.

21.9 The Subcontractor shall be bound to the Contractor by the terms of the Contract Documents and assumes toward the Contractor all the obligations and responsibilities that the Contractor, by those documents, assumes toward the Owner.

21.10 The Subcontractor shall submit applications for payment to the Contractor in such reasonable time as to enable the Contractor to apply for payment as specified.

21.11 The Subcontractor shall make any claims for extra cost, extensions of time or damages, to the Contractor in the manner provided in these General Conditions for like claims by the Contractor to the Owner, except that the time for the Subcontractor to make claims for extra cost is seven calendar days after the receipt of Consultant's instructions.

22. Supervision of the Work

22.1 During all stages of the Work the Contractor shall have a competent superintendent, with any necessary assistant superintendents, overseeing the project. The superintendent shall not be reassigned without the consent of the Owner unless a superintendent ceases to be employed by the Contractor due to unsatisfactory performance.

22.2 The superintendent represents the Contractor on the jobsite. Directives given by the Consultant or Owner to the superintendent shall be as binding as if given directly to the Contractor's main office. All important directives shall be confirmed in writing to the Contractor. The Consultant and Owner are not responsible for the acts or omissions of the superintendent or assistant superintendents.

22.3 The Contractor shall provide supervision of the Work equal to the industry's highest standard of care. The superintendent shall carefully study and compare all Contract Documents and promptly report any error, inconsistency or omission discovered to the Consultant. The Contractor may not necessarily be held liable for damages resulting directly from any error, inconsistency or omission in the Contract Documents or other instructions by the Consultant that was not revealed by the superintendent in a timely way.

23. Observation of the Work

23.1 The Contractor shall allow the Owner, the Consultant and the Bureau continuous access to the site for the purpose of observation of the progress of the work. All necessary safeguards and accommodations for such observations shall be provided by the Contractor.

23.2 The Contractor shall coordinate all required testing, approval or demonstration of the Work. The Contractor shall give sufficient notice to the appropriate parties of readiness for testing, inspection or examination.

23.3 The Contractor shall schedule inspections and obtain all required certificates of inspection for inspections by a party other than the Consultant.

23.4 The Consultant shall make all scheduled observations promptly, prior to the work being concealed or buried by the Contractor. If approval of the Work is required of the Consultant, the Contractor shall notify the Consultant of the construction schedule in this regard. Work concealed or buried prior to the Consultant's approval may need to be uncovered at the Contractor's expense.

23.5 The Consultant may order reexamination of questioned work, and, if so ordered, the work must be uncovered by the Contractor. If the work is found to conform to the Contract Documents, the Owner shall pay the expense of the reexamination and remedial work. If the work is found to not conform to the Contract Documents, the Contractor shall pay the expense, unless the defect in the work was caused by the Owner's Contractor, whose responsibility the reexamination expense becomes.

23.6 The Bureau shall periodically observe the Work during the course of construction and make recommendations to the Contractor or Consultant as necessary. Such recommendations shall be considered and implemented through the usual means for changes to the Work.

24. Consultant's Status

24.1 The Consultant represents the Owner during the construction period, and observes the work in progress on behalf of the Owner. The Consultant has authority to act on behalf of the Owner only to the extent expressly provided by the Contract Documents or otherwise demonstrated to the Contractor. The Consultant has authority to stop the work whenever such an action is necessary, in the Consultant's reasonable opinion, to ensure the proper execution of the contract.

24.2 The Consultant is the interpreter of the conditions of the contract and the judge of its performance. The Consultant shall favor neither the Owner nor the Contractor, but shall use the Consultant's powers under the contract to enforce faithful performance by both parties.

24.3 In the event of the termination of the Consultant's employment on the project prior to completion of the work, the Owner shall appoint a capable and reputable replacement. The status of the new Consultant relative to this contract shall be that of the former Consultant.

25. Management of the Premises

25.1 The Contractor shall place equipment and materials, and conduct activities on the premises in a manner that does not unreasonably hinder site circulation, environmental stability, or any long term effect. Likewise, the Consultant's directions shall not cause the use of premises to be impeded for the Contractor or Owner.

25.2 The Contractor shall not use the premises for any purpose other than that which is directly related to the scope of work. The Owner shall not use the premises for any purpose incompatible with the proposed work simultaneous to the work of the Contractor.

25.3 The Contractor shall enforce the Consultant's instructions regarding information posted on the premises such as signage and advertisements, as well as activities conducted on the premises such as fires, and smoking.

25.4 The Owner may occupy any part of the Project that is completed with the written consent of the Contractor, and without prejudice to any of the rights of the Owner or Contractor. Such use or occupancy shall not, in and of itself, be construed as a final acceptance of any work or materials.

26. Safety and Security of the Premises

26.1 The Contractor shall designate, and make known to the Consultant and the Owner, a safety officer whose duty is the prevention of accidents on the site.

26.2 The Contractor shall continuously maintain security on the premises and protect from unreasonable occasion of injury all people authorized to be on the job site. The Contractor shall also effectively protect the property and adjacent properties from damage or loss.

26.3 The Contractor shall take all necessary precautions to ensure the safety of workers and others on and adjacent to the site, abiding by applicable local, state and federal safety regulations. The Contractor shall erect and continuously maintain safeguards for the protection of workers and others, and shall post signs and other warnings regarding hazards associated with the construction process, such as protruding fasteners, moving equipment, trenches and holes, scaffolding, window, door or stair openings, and falling materials.

26.4 The Contractor shall restore the premises to conditions that existed prior to the start of the project at areas not intended to be altered according to the Contract Documents.

26.5 The Contractor shall protect existing utilities and exercise care working in the vicinity of utilities shown in the Drawings and Specifications or otherwise located by the Contractor.

26.6 The Contractor shall protect from damage existing trees and other significant plantings and landscape features of the site which will remain a permanent part of the site. If necessary or indicated in the Contract Documents, tree trunks shall be boxed and barriers erected to prevent damage to tree branches or roots.

26.7 The Contractor shall repair or replace damage to the Work caused by the Contractor's or Subcontractor's forces, including that which is reasonably protected, at the expense of the responsible party.

26.8 The Contractor shall not load, or allow to be loaded, any part of the Project with a force which imperils personal or structural safety. The Consultant may consult with the Contractor on such means and methods of construction, however, the ultimate responsibility lies with the Contractor.

26.9 The Contractor shall not jeopardize any work in place with subsequent construction activities such as blasting, drilling, excavating, cutting, patching or altering work. The Consultant must approve altering any structural components of the project. The Contractor shall supervise all construction activities carried out by others on site to ensure that the work is neatly done and in a manner that will not endanger the structure or the component parts.

26.10 The Contractor may act with their sole discretion in emergency situations that potentially effect health, life or serious damage to the premises or adjacent properties, to prevent such potential loss or injury. The Contractor may negotiate with the Owner for compensation for expenses due to such emergency work.

26.11 The Contractor and Subcontractors shall have no responsibility for the identification, discovery, presence, handling, removal or disposal of, or exposure of persons to, hazardous materials in any form at the project site. The Contractor shall avoid disruption of any hazardous materials or toxic substances at the project site and promptly notify the Owner in writing on the occasion of such a discovery.

26.12 The Contractor shall keep the premises free of any unsafe accumulation of waste materials caused by the work. The Contractor shall regularly keep the spaces "broom clean". See the Close-out of the Work provisions of this section regarding cleaning at the completion of the project.

27. Changes in the Work

27.1 The Contractor shall not proceed with extra work without an approved Change Order or Construction Change Directive. A Change Order which has been properly signed by all parties shall become a part of the contract.

27.2 A Change Order is the usual document for directing changes in the Work. In certain circumstances, however, the Owner may utilize a Construction Change Directive to direct the Contractor to perform changes in the Work that are generally consistent with the scope of the project. The Owner shall use a Construction Change Directive only when the normal process for approving changes to the Work has failed to the detriment of the Project, or when agreement on the terms of a Change Order cannot be met, or when an urgent situation requires, in the Owner's judgment, prompt action by the Contractor.

27.3 The Consultant shall prepare the Construction Change Directive representing a complete scope of work, with proposed Contract Price and Contract Time revisions, if any, clearly stated.

27.4 The Contractor shall promptly carry out a Construction Change Directive which has been signed by the Owner and the Consultant. Work thus completed by the Contractor constitutes the basis for a Change Order. Changes in the Contract Price and Contract Time shall be as defined in the Construction Change Directive unless subsequently negotiated with some other terms.

27.5 The method of determining the dollar value of extra work shall be by:
- .1 an estimate of the Contractor accepted by Owner as a lump sum, or
- .2 unit prices named in the contract or subsequently agreed upon, or
- .3 cost plus a designated percentage, or
- .4 cost plus a fixed fee.

27.6 The Contractor shall determine the dollar value of the extra work for both the lump sum and cost plus designated percentage methods so as not to exceed the following rates. The rates include all overhead and profit expenses.
- .1 Contractor - for any work performed by the Contractor's own forces, up to 20% of the cost;
- .2 Subcontractor - for work performed by Subcontractor's own forces, up to 20% of the cost;
- .3 Contractor - for work performed by Contractor's Subcontractor, up to 10% of the amount due the Subcontractor.

27.7 The Contractor shall keep and provide records as needed or directed for the cost plus designated percentage method. The Consultant shall review and certify the appropriate amount which

includes the Contractor's overhead and profit. The Owner shall make payments based on the Consultant's certificate.

27.8 Cost reflected in Change Orders shall be limited to the following: cost of materials, cost of delivery, cost of labor (including Social Security, pension, Workers' Compensation insurance, and unemployment insurance), and cost of rental of power tools and equipment. Labor cost may include a pro-ratio share of a foreman's time only in the case of an extension of contract time granted due to the Change Order.

27.9 Overhead reflected in Change Orders shall be limited to the following: bond premium, supervision, wages of clerks, time keepers, and watchmen, small tools, incidental expenses, general office expenses, and all other overhead expenses directly related to the Change Order.

27.10 The Contractor shall provide credit to the Owner for labor, materials, equipment and other costs but not overhead and profit expenses for those Change Order items that result in a net value of credit to the contract.

27.11 The Owner may change the scope of work of the Project without invalidating the contract. The Owner shall notify the Contractor of a change of the scope of work for the Owner's Contractors, which may affect the work of this Contractor, without invalidating the contract. Change Orders for extension of the time caused by such changes shall be developed at the time of directing the change in scope of work.

27.12 The Consultant may order minor changes in the Work, not involving extra cost, which is consistent with the intent of the design or project.

27.13 The Contractor shall immediately give written notification to the Consultant of latent conditions discovered at the site which materially differ from those represented in the Drawings or Specifications, and which may eventually result in a change in the scope of work. The Contractor shall suspend work until receiving direction from the Consultant. The Consultant shall promptly investigate the conditions and respond to the Contractor's notice with direction that avoids any unnecessary delay of the Work. The Consultant shall determine if the discovered conditions warrant a Change Order.

27.14 The Contractor shall, within ten calendar days of receipt of the information, give written notification to the Consultant if the Contractor claims that instructions by the Consultant will constitute extra cost not accounted for by Change Order or otherwise under the contract. The Consultant shall promptly respond to the Contractor's notice with direction that avoids any unnecessary delay of the Work. The Consultant shall determine if the Contractor's claim warrants a Change Order.

28. Correction of the Work

28.1 The Contractor shall promptly remove from the premises all work the Consultant declares is non-conforming to the contract. The Contractor shall replace the work properly at no expense to the Owner. The Contractor is also responsible for the expenses of others whose work was damaged or destroyed by such remedial work.

28.2 The Owner may elect to remove non-conforming work if it is not removed by the Contractor within a reasonable time, that time defined in a written notice from the Consultant. The Owner may elect to store removed non-conforming work not removed by the Contractor at the Contractor's expense. The Owner may, with ten days written notice, dispose of materials which the Contractor does not remove. The Owner may sell the materials and apply the net proceeds, after deducting all expenses, to the costs that should have been borne by the Contractor.

28.3 The Contractor shall remedy any defects due to faulty materials or workmanship and pay for any related damage to other work which appears within a period of one year from the date of substantial completion, and in accord with the terms of any guarantees provided in the contract. The Owner shall promptly give notice of observed defects to the Contractor and Consultant. The Consultant shall determine the status of all claimed defects. The Contractor shall perform all remedial work without unjustifiable delay in either the initial response or the corrective action.

28.4 The Consultant may authorize, after a reasonable notification to the Contractor, an equitable deduction from the contract amount in lieu of the Contractor correcting non-conforming or defective work.

29. Owner's Right to do Work

29.1 The Owner may, using other contractors, correct deficiencies attributable to the Contractor, or complete unfinished work. Such action shall take place only after giving the Contractor three days written notice, and provided the Consultant approves of the proposed course of action as an appropriate remedy. The Owner may then deduct the cost of the remedial work from the amount due the Contractor.

29.2 The Owner may act with their sole discretion when the Contractor is unable to take action in emergency situations that potentially effect health, life or serious damage to the premises or adjacent properties, to prevent such potential loss or injury. The Owner shall inform the Contractor of the emergency work performed, particularly where it may affect the work of the Contractor.

30. Termination of Contract and Stop Work Action

30.1 The Owner may, owing to a certificate of the Consultant indicating that sufficient cause exists to justify such action, without prejudice to any other right or remedy and after giving the Contractor and the Contractor’s surety seven days written notice, terminate the employment of the Contractor. At that time the Owner may take possession of the premises and of all materials,

tools and appliances on the premises and finish the work by whatever method the Owner may deem expedient. Cause for such action by the Owner includes:

.1 the contractor is adjudged bankrupt, or makes a general assignment for the benefit of its creditors, or

.2 a receiver is appointed due to the Contractor's insolvency, or

.3 the Contractor persistently or repeatedly refuses or fails to provide enough properly skilled workers or proper materials, or

.4 the Contractor fails to make prompt payment to Subcontractors or suppliers of materials or labor, or

.5 the Contractor persistently disregards laws, ordinances or the instructions of the Consultant, or is otherwise found guilty of a substantial violation of a provision of the Contract Documents.

30.2 The Contractor is not entitled, as a consequence of the termination of the employment of the Contractor as described above, to receive any further payment until the Work is finished. If the unpaid balance of the contract amount exceeds the expense of finishing the Work, including compensation for additional architectural, managerial and administrative services, such balance shall be paid to the Contractor. If the expense of finishing the Work exceeds the unpaid balance, the Contractor shall pay the difference to the Owner. The Consultant shall certify the expense incurred by the Contractor's default. This obligation for payment shall continue to exist after termination of the contract.

30.3 The Contractor may, if the Work is stopped by order of any court or other public authority for a period of thirty consecutive days, and through no act or fault of the Contractor or of anyone employed by the Contractor, with seven days written notice to the Owner and the Consultant, terminate this contract. The Contractor may then recover from the Owner payment for all work executed, any proven loss and reasonable profit and damage.

30.4 The Contractor may, if the Consultant fails to issue a certificate for payment within seven days after the Contractor's formal request for payment, through no fault of the Contractor, or if the Owner fails to pay to the Contractor within 30 days after submission of any sum certified by the Consultant, with seven days written notice to the Owner and the Consultant, stop the Work or terminate this Contract.

31. Delays and Extension of Time

31.1 The completion date of the contract shall be extended if the work is delayed by changes ordered in the work which have approved time extensions, or by an act or neglect of the Owner, the Consultant, or the Owner's Contractor, or by strikes, lockouts, fire, flooding, unusual delay in transportation, unavoidable casualties, or by other causes beyond the Contractor's control. The Consultant shall determine the status of all claimed causes.

31.2 The contract shall not be extended for delay occurring more than seven calendar days before the Contractor's claim made in writing to the Consultant. In case of a continuing cause of delay, only one claim is necessary.

31.3 The contract shall not be extended due to failure of the Consultant to furnish drawings if no schedule or agreement is made between the Contractor and the Consultant indicating the dates

which drawings shall be furnished and fourteen calendar days has passed after said date for such drawings.

31.4 This article does not exclude the recovery of damages for delay by either party under other provisions in the Contract Document.

32. Payments to the Contractor

32.1 As noted under *Preconstruction Conference* in this section, the Contractor shall submit a Schedule of Values form, before the first application for payment, for approval by the Owner and Consultant. The Consultant may direct the Contractor to provide evidence that supports the correctness of the form. The approved Schedule of Values shall be used as a basis for payments.

32.2 The Contractor shall submit an application for each payment ("Requisition for Payment") on a form approved by the Owner and Consultant. The Consultant may require receipts or other documents showing the Contractor's payments for materials and labor, including payments to Subcontractors.

32.3 The Contractor shall submit Requisitions for Payment as the work progresses not more frequently than once each month, unless the Owner approves a more frequent interval due to unusual circumstances. The Requisition for Payment is based on the proportionate quantities of the various classes of work completed or incorporated in the Work, in agreement with the actual progress of the Work and the dollar value indicated in the Schedule of Values.

32.4 The Consultant shall verify and certify each Requisition for Payment which appears to be complete and correct prior to payment being made by the Owner. The Consultant may certify an appropriate amount for materials not incorporated in the Work which have been delivered and suitably stored at the site. The Contractor shall submit bills of sale, insurance certificates, or other such documents that will adequately protect the Owner's interests prior to payments being certified.

32.5 In the event any materials delivered but not yet incorporated in the Work have been included in a certified Requisition for Payment with payment made, and said materials thereafter are damaged, deteriorated or destroyed, or for any reason whatsoever become unsuitable or unavailable for use in the Work, the full amount previously allowed shall be deducted from subsequent payments unless the Contractor satisfactorily replaces said material.

32.6 The Contractor may request certification of an appropriate dollar amount for materials not incorporated in the Work which have been delivered and suitably stored away from the site. The Contractor shall submit bills of sale, insurance certificates, right-of-entry documents or other such documents that will adequately protect the Owner's interests. The Consultant shall determine if the Contractor's documentation for the materials is complete and specifically designated for the Project. The Owner may allow certification of such payments.

32.7 Subcontractors may request, and shall receive from the Consultant, copies of approved Requisitions for Payment showing the amounts certified in the Schedule of Values.

32.8 Certified Requisitions for Payment, payments made to the Contractor, or partial or entire occupancy of the project by the Owner shall not constitute an acceptance of any work that does

not conform to the Contract Documents. The making and acceptance of the final payment constitutes a waiver of all claims by the Owner, other than those arising from unsettled liens, from faulty work or materials appearing within one year from final payment or from requirements of the Drawings and Specifications, and of all claims by the Contractor, except those previously made and still unsettled.

33. Payments Withheld

33.1 The Owner shall retain five percent of each payment due the Contractor as part security for the fulfillment of the contract by the Contractor. The Owner may make payment of a portion of this "retainage" to the Contractor temporarily or permanently during the progress of the Work. The Owner may thereafter withhold further payments until the full amount of the five percent is reestablished. The Contractor may deposit with the Maine State Treasurer certain securities in place of retainage amounts due according to Maine Statute (5 M.R.S. §1746).

33.2 The Consultant may withhold or nullify the whole or a portion of any Requisitions for Payment submitted by the Contractor in the amount that may be necessary, in his reasonable opinion, to protect the Owner from loss due to any of the following:

.1 defective work not remedied;
.2 claims filed or reasonable evidence indicating probable filing of claims;
.3 failure to make payments properly to Subcontractors or suppliers;
.4 a reasonable doubt that the contract can be completed for the balance then unpaid;
.5 liability for damage to another contractor.

The Owner shall make payment to the Contractor, in the amount withheld, when the above circumstances are removed.

34. Liens

34.1 The Contractor shall deliver to the Owner a complete release of all liens arising out of this contract before the final payment or any part of the retainage payment is released. The Contractor shall provide with the release of liens an affidavit asserting each release includes all labor and materials for which a lien could be filed. Alternately, the Contractor, in the event any Subcontractor or supplier refuses to furnish a release of lien in full, may furnish a bond satisfactory to the Owner, to indemnify the Owner against any lien.

34.2 In the event any lien remains unsatisfied after all payments to the Contractor are made by the Owner, the Contractor shall refund to the Owner all money that the latter may be compelled to pay in discharging such lien, including all cost and reasonable attorney's fees.

35. Workmanship

35.1 The Contractor shall provide materials, equipment, and installed work equal to or better than the quality specified in the Contract Documents and approved in submittal and sample. The installation methods shall be of the highest standards, and the best obtainable from the respective trades. The Consultant's decision on the quality of work shall be final.

35.2 The Contractor shall know local labor conditions for skilled and unskilled labor in order to apply the labor appropriately to the Work. All labor shall be performed by individuals well skilled in their respective trades.

35.3 The Contractor shall perform all cutting, fitting, patching and placing of work in such a manner to allow subsequent work to fit properly, whether that be by the Contractor, the Owner's Contractors or others. The Owner and Consultant may advise the Contractor regarding such subsequent work. Notwithstanding the notification or knowledge of such subsequent work, the Contractor may be directed to comply with this standard of compatible construction by the Consultant at the Contractor's expense.

35.4 The Contractor shall request clarification or revision of any design work by the Consultant, prior to commencing that work, in a circumstance where the Contractor believes the work cannot feasibly be completed at the highest quality, or as indicated in the Contract Documents. The Consultant shall respond to such requests in a timely way, providing clarifying information, a feasible revision, or instruction allowing a reduced quality of work. The Contractor shall follow the direction of the Consultant regarding the required request for information.

35.5 The Contractor shall guarantee the Work against any defects in workmanship and materials for a period of one year commencing with the date of the Certificate of Substantial Completion, unless specified otherwise for specific elements of the project. The Work may also be subdivided in mutually agreed upon components, each defined by a separate Certificate of Substantial Completion.

36. Close-out of the Work

36.1 The Contractor shall remove from the premises all waste materials caused by the work. The Contractor shall make the spaces “broom clean” unless a more thorough cleaning is specified. The Contractor shall clean all windows and glass immediately prior to the final inspection, unless otherwise directed.

36.2 The Owner may conduct the cleaning of the premises where the Contractor, duly notified by the Consultant, fails to adequately complete the task. The expense of this cleaning may be deducted from the sum due to the Contractor.

36.3 The Contractor shall participate in all final inspections and acknowledge the documentation of unsatisfactory work, customarily called the "punch list", to be corrected by the Contractor. The Consultant shall document the successful completion of the Work in a dated Certificate of Substantial Completion, to be signed by Owner, Consultant, and Contractor.

36.4 The Contractor shall not call for final inspection of any portion of the Work that is not completely and permanently installed. The Contractor may be found liable for the expenses of individuals called to final inspection meetings prematurely.

36.5 The Contractor and all major Subcontractors shall participate in the end-of-warranty-period conference, typically scheduled close to one year after the Substantial Completion date.

37. Date of Completion and Liquidated Damages

37.1 The Contractor may make a written request to the Owner for an extension or reduction of time, if necessary. The request shall include the reasons the Contractor believes justifies the proposed completion date. The Owner may grant the revision of the contract completion date if the Work was delayed due to conditions beyond the control and the responsibility of the Contractor. The Contractor shall not conduct unauthorized accelerated work or file delay claims to recover alleged damages for unauthorized early completion.

37.2 The Contractor shall vigorously pursue the completion of the Work and notify the Owner of any factors that have, may, or will affect the approved Schedule of the Work. The Contractor may be found responsible for expenses of the Owner or Consultant if the Contractor fails to make notification of project delays.

37.3 The Project is planned to be done in an orderly fashion which allows for an iterative submittal review process, construction administration including minor changes in the Work and some bad weather. The Contractor shall not file delay claims to recover alleged damages on work the Consultant determines has followed the expected rate of progress.

37.4 The Consultant shall prepare the Certificate of Substantial Completion which, when signed by the Owner and the Contractor, documents the date of Substantial Completion of the Work or a designated portion of the Work. The Owner shall not consider the issuance of a Certificate of Occupancy by an outside authority a prerequisite for Substantial Completion if the Certificate of Occupancy cannot be obtained due to factors beyond the Contractor's control.

37.5 Liquidated Damages may be deducted from the sum due to the Contractor for each calendar day that the Work remains uncompleted after the completion date specified in the Contract or an approved amended completion date. The dollar amount per day shall be calculated using the Schedule of Liquidated Damages table shown below.

If the original contract amount is:	The per day Liquidated Damages shall be:
Less than $100,000	$250
$100,000 to less than $2,000,000	$750
$2,000,000 to less than $10,000,000	$1,500
$10,000,000 and greater	$1,500 plus $250 for each $2,000,000 over $10,000,000

38. Dispute Resolution

38.1 Mediation

38.1.1 A dispute between the parties which arises under this Contract which cannot be resolved through informal negotiation, shall be submitted to a neutral mediator jointly selected by the parties.

38.1.2 Either party may file suit before or during mediation if the party, in good faith, deems it to be necessary to avoid losing the right to sue due to a statute of limitations. If suit is filed before good faith mediation efforts are completed, the party filing suit shall agree to stay all proceedings in the lawsuit pending completion of the mediation process, provided such stay is without prejudice.

38.1.3 In any mediation between the Owner and the Consultant, the Owner has the right to consolidate related claims between Owner and Contractor.

38.2 Arbitration

38.2.1 If the dispute is not resolved through mediation, the dispute shall be settled by arbitration. The arbitration shall be conducted before a panel of three arbitrators. Each party shall select one arbitrator; the third arbitrator shall be appointed by the arbitrators selected by the parties. The arbitration shall be conducted in accordance with the Maine Uniform Arbitration Act (MUAA), except as otherwise provided in this section.

38.2.2 The decision of the arbitrators shall be final and binding upon all parties. The decision may be entered in court as provided in the MUAA.

38.2.3 The costs of the arbitration, including the arbitrators' fees shall be borne equally by the parties to the arbitration, unless the arbitrator orders otherwise.

38.2.4 In any arbitration between the Owner and the Consultant, the Owner has the right to consolidate related claims between Owner and Contractor.

00 73 46
Wage Determination Schedule

PART 1- GENERAL

1.1 Related Documents
A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and other Division 01 Specifications Sections, apply to this Section.

1.2 Summary
A. This Section includes the wage determination requirements for Contractors as issued by the State of Maine Department of Labor Bureau of Labor Standards or the United States Department of Labor.

1.3 Requirements
A. Conform to the wage determination schedule for this project which is shown on the following page.

PART 2 - PRODUCTS (not used)

PART 3 - EXECUTION (not used)

00 73 46
Wage Determination Schedule

End of Section 00 73 46

SPECIFICATIONS

SME
SEVEE & MAHER
ENGINEERS

DIVISION I - GENERAL REQUIREMENTS

SECTION 01010

SUMMARY OF WORK

1.01 WORK COVERED BY CONTRACT DOCUMENTS: These Contract Documents define the requirements of the Dolby Landfill Cover Upgrade – Phases 2 and 3 Project located in East Millinocket, Maine:

Work shall include furnishing all materials, labor, supervision, and performing all operations required to complete the work shown on the Drawings and as described in the specifications contained herein, and as evidently necessary to complete the work. The work shall include construction of landfill cover upgrade for Phase 2 (Northeast corner of Dolby III Landfill) and for Phase 3 (Southwest corner of Dolby III Landfill). This work is planned to be accomplished in two consecutive construction seasons but may be performed all within the first construction season if the contractor chooses to staff the project with multiple crews. A schedule must be provided with the bid outlining which option is chosen.

Work associated with Phase 2 cover upgrade shall include, but not be limited to:

- Construction of necessary erosion control mechanisms shown on the Contract Drawings and as required by MEDEP Best Management Practices and Maine Construction General Permit;
- Modify outlet of existing Sediment Pond #3 and provide additional erosion control measures (i.e., outlet protection), as necessary;
- Removal of existing piezometers and modification to existing catch basins and manholes within the limit of work;
- Perform test pitting as needed and as indicated on the Contract Drawings;
- Perform survey of existing catch basins as indicated on the Contract Drawings;
- Stripping and stockpiling existing cover materials for future use;
- Containment and collection of any impacted surface water resulting from regrading of waste materials;
- Regrading and repositioning of existing waste and cover materials to achieve proper base grades, including providing necessary labor and equipment for odor control;
- Pressure-jet clean leachate transport lines and catch basins within project area on south and east ends of Dolby III, including piping between CB #32, 33, 34, 35, 18, 19, 20, 21, and 22;
- Placement of final cover materials (soils, geosynthetics, and piping) as shown on the Contract Drawings;
- Seeding, fertilizing, and mulching the exterior of the final cover, stockpiles, pipe trenches, and all areas disturbed during construction in accordance with specifications contained herein and MEDEP Best Management Practices; and
- Provide as-built survey of Phases 2 construction.

Work associated with Phase 3 of the project shall include, but not be limited to:

- Construction of necessary erosion control mechanisms shown on the Contract Drawings and as required by MEDEP Best Management Practices and Maine Construction General Permit;
- Maintain and replace (as necessary) outlet protection at existing sediment ponds;
- Modify outlet of existing Sediment Ponds #1 and #2 and provide additional erosion control measures (i.e., outlet protection), as necessary;

- Removal of existing piezometers and modification to existing manholes within the limit of work;
- Stripping and stockpiling existing cover materials for future use;
- Containment and collection of any impacted surface water resulting from regrading of waste materials;
- Regrading and repositioning of existing waste and cover materials to achieve proper base grades, including providing necessary labor and equipment for odor control;
- Modifications to existing access road between leachate pond and Dolby III Landfill;
- Pressure-jet clean leachate transport lines and catch basins within project area on south and east ends of Dolby III, including piping between CB #2, 3, 4, 5, 6, 6A, 7, 8, 9, 10, 13, 17, 25, 24, and 23;
- Placement of final cover materials (soils, geosynthetics, and piping) as shown on the Contract Drawings;
- Seeding, fertilizing, and mulching the exterior of the final cover, perimeter berm, stockpiles, pipe trenches, and all areas disturbed during construction in accordance with specifications contained herein and MEDEP Best Management Practices; and
- Provide as-built survey of Phase 3 construction.

1.02 SCHEDULE OF WORK: The Contractor shall be required to submit a written document detailing the work sequence and schedule planned for the construction of the Project. As part of the Schedule of Work, the Contractor shall provide a leachate management plan and emergency stormwater management measures that will be implemented, as necessary, during the duration of the project. The schedule shall be submitted with the bid form at the bid due date. The schedule of work shall be in accordance with the Contract Documents. The schedule of work will be reviewed and approved by the Engineer and Owner as a condition of award. The schedule of work shall be in accordance with the Contract Documents and shall be as follows:

Phase 2:

- Mobilize on or after May 1, 2022
- Start construction on or after May 8, 2022;
- Substantial completion on or before September 1, 2022; and
- Final completion September 15, 2022.

Phase 3:

- Mobilize on or after May 1, 2023;
- Start construction on or after May 8, 2023;
- Substantial completion on or before September 1, 2023; and
- Final completion September 15, 2023.

The Contractor shall provide labor and equipment rate sheets for additional work. Add/Deduct work associated with the contract will be subject negotiation of fair and reasonable rates for contract costs.

A. The sequence of work for Phase 2 will be as follows:
    - Mobilization;
    - Install erosion control measures as shown on Contract Drawings;

- Install Sediment Pond #3 outlet protection and repair/replace Sediment Pond #3 outlet protection (as necessary);
- Prepare laydown areas and stockpile areas;
- Pressure-jet clean leachate transport lines designated to be cleaned;
- Perform test pitting as indicated on the Contract Drawings and report results to the Engineer;
- Survey catch basins as indicated on the Contract Drawings and report to Engineer;
- Grub and remove existing cover from the limits of work and stockpile cover materials for reuse (note removal of existing cover shall be done in 5-acre increments to limit exposure of the site to the elements or proper steps taken to contain leachate in the area if more than 5 acres is exposed);
- Establish proposed base grades as shown on the Contract Drawings;
- Remove existing piezometers and modify existing manholes and catch basins as shown on the Contract Drawings;
- Place gas collection sand and pipe as shown on the Contract Drawings;
- Install 40-mil HDPE liner;
- Install drainage geocomposite and cover drainage pipe;
- Place cover soil;
- Place topsoil;
- Seed, fertilize, lime, and mulch disturbed areas as soon as possible to minimize erosion and sedimentation;
- Perform as-built survey of site; and
- Demobilize.

B. The sequence of work for Phase 3 will be as follows:

- Mobilization;
- Install erosion control measures as shown on Contract Drawings;
- Repair/replace Sediment Ponds #1 and #2 outlet protection;
- Prepare laydown areas and stockpile areas;
- Grub and remove existing cover from the limits of work and stockpile cover materials for reuse (note removal of existing cover shall be done in 5-acre increments to limit exposure of the site to the elements or proper steps taken to contain leachate in the area if more than 5 acres is exposed);
- Establish proposed base grades as shown on the Contract Drawings;
- Remove existing piezometers and modify existing manholes as shown on the Contract Drawings;
- Place gas collection sand and pipe as shown on the Contract Drawings;
- Install 40-mil HDPE liner;
- Install drainage geocomposite and cover drainage pipe;
- Place cover soil;
- Place topsoil;

- Seed, fertilize, lime, and mulch disturbed areas as soon as possible to minimize erosion and sedimentation;
- Perform as-built survey of site; and
- Demobilize.

1.03 CONTRACTOR USE OF PREMISES:

A. It will be the responsibility of the Contractor to coordinate with the Owner with regard to use of premises, including haul routes and vehicular access. All details must be established prior to the preconstruction conference and shall be presented to the Engineer at or before the preconstruction conference.

B. The Contractor shall coordinate with the Owner's Representative prior to excavation or grading of in-place of landfill waste to assure proper odor control measures are in-place.

C. The Contractor and its subcontractors shall abide by all safety requirements associated with working at an active solid waste landfill facility (i.e., risk of worker exposure to landfill gases, leachate, solid waste) including the following:

- Comply with all Occupational Safety and Health Administration (OSHA) Regulations.
- Comply with all State of Maine Department of Labor safety requirements, including safety training, use of hardhat, safety glasses, and fluorescent safety vest at all times.
- Follow confined space entry rules established by OSHA for the site, including, but not limited to, manholes, catch basins, pump stations, test pits, trenches, etc.
- All equipment used on-site shall be equipped with back-up warning lights and alarms.

1.04 PROTECTION OF PROJECT WHILE UNDER CONSTRUCTION:

A. The Contractor will be responsible for providing complete protection of the Contract limits of the Project during construction from any acts of nature or man, such as, but not limited to, floods, earth slides, and slope failures. Damage to the Project caused by such acts will not be sufficient cause to increase Contract costs to the Owner.

B. The Contractor shall take every precaution to assure that no siltation of stormwater drainage courses occur when working in those areas.

1.05 COMPLIANCE WITH ENVIRONMENTAL PERMITS:

A. The Contractor shall comply fully with conditions of the site's MEDEP Solid Waste Order and abide by the Contractor requirements of the Maine Construction General Permit provisions related to stormwater management and sedimentation control.

END OF SECTION

SECTION 01012

HEALTH AND SAFETY

PART 1 - GENERAL

1.01 RELATED WORK SPECIFIED ELSEWHERE: All Division 2 work specified in this Contract apply to the work specified under this Contract.

1.02 DESCRIPTION: This work shall consist of the preparation and submittal of a Health and Safety Plan, prior to the commencement of construction.

PART 2 - EXECUTION

2.01 HEALTH AND SAFETY PLAN (HASP) REQUIREMENTS:

A. The HASP shall conform to guidance contained in "Occupational Safety and Health Guidance Manual for Hazardous Waste Site Activities" NIOSH/OSHA/USCG/EPA, October 1985 and 29 CFR 1910 (FR March 6, 1989).

B. The HASP will include, but not be limited to, the following:

1. Identification of potential hazards;
2. Identification of a site Health and Safety Officer;
3. Identification of the support zone, decontamination zone, and exclusion zone at the site;
4. Air monitoring activities;
5. Medical surveillance records;
6. Personnel protective equipment requirements; and,
7. Emergency and contingency planning.

PART 3 - WORK PROCEDURES:

A. All work involving excavation below grade or otherwise involving a risk of worker exposure to landfill gases, leachate, or solid waste shall be performed in accordance with applicable Occupational Safety and Health Administration (OSHA) regulations, U.S.EPA Health and Safety Regulations, and the Contractor's site Health and Safety Plan.

END OF SECTION

SECTION 01025

MEASUREMENT AND PAYMENT

1.01 RELATED DOCUMENTS: Drawings, General Conditions of the Contract including General and Supplementary Conditions and General Requirements (if any), apply to the work specified in this Section.

1.02 WORK COVERED BY CONTRACT DOCUMENTS

A. The Contractor shall furnish all labor, materials, tools, equipment, and supervision necessary for complete installation of the Work covered by the Contract Documents. This Work shall include all site work, drainage structures, and pipe installations, alterations and adjustments, site restoration, and general construction as necessary to complete the work.

B. Miscellaneous work items necessary to satisfactorily complete the project; and, for which no separate payment item is included in the Contract item, shall not be measured and paid for separately, but shall be considered as incidental to the Contract bid item.

C. The Contractor shall acquaint himself with all work associated with each payment item and shall have no claim for his unfamiliarity with the requirement of various items.

1.03 BASIS OF MEASUREMENT AND PAYMENT

Item – Dolby Landfill Cover Upgrade – Phases 2 and 3

Payment for the construction of the Dolby Landfill Cover Upgrade – Phases 2 and 3 Project as shown on the Contract Drawings, and miscellaneous work items described below shall include all equipment, labor, tools, and materials necessary for successful completion of the work. The work includes, but is not limited to, the installation of erosion control measures as required, placement of final cover system, seeding, fertilizing, mulching, installation of HDPE pipes, modifications to existing access road, managing stormwater to prevent off-site sedimentation issues and managing impacted surface water/ leachate during construction. Payment shall be made on the basis of the percentage complete of the Contract lump sum price.

1.04 METHOD OF MEASUREMENT AND BASIS OF PAYMENT

The following section describes the method of measurement and payment for work which may be necessary in addition to the work associated with the construction of the base bid item described herein and shown on the Contract Drawings. If additional work in required, it shall be subject to negotiation of fair and reasonable rates for contract costs. The additional work items shall only be undertaken upon written approval of the Owner or the Owner's Representative, and do not include any work items associated with or undertaken as a result of the construction of the base bid item.

A. Grubbing: Measurement of additional clearing and grubbing will be the actual additional acreage grubbed as measured by horizontal dimensions determined by a field survey. Payment for the accepted quantities of additional grubbing will be at the unit price per acre.

B. Test Pit Excavation: Measurement of additional test pit excavation will be based on a unit price per test pit, including excavation to a 10 – foot depth and backfill.

C. Common Excavation: Measurement of additional quantities of common excavation will be by the number of cubic yards measured in its original position by cross-sectioning the area prior to and after excavation of the material. Volumes will be computed by the average end area method or by other methods generally recognized as conforming to good engineering practice. Payment for the accepted quantities of additional common excavation will be at the unit price per cubic yard, including removal from the site and disposal, if necessary.

D. Common Borrow Material: Measurement of additional common borrow material to be used in the construction of the filled area will be the number of cubic yards, in-place, based upon the length, width, and depth of the filled area. Payment for the accepted quantities of common borrow material will be at the unit price per cubic yard.

E. Excavation of Unsuitable Material: Measurement of additional excavation of unsuitable material will be by the number of cubic yards measured in its original position by cross-sectioning the area prior to and after excavation of the unsuitable material. Volumes will be computed by the average end area method or by other methods generally recognized as conforming to good engineering practice. Payment for the accepted quantities of additional excavation of unsuitable material will be at the unit price per cubic yard, including removal from the site and disposal, if necessary.

F. Cover Soil (Till): Measurement of additional cover soil to be used will be by the number of cubic yards, in-place, based upon the length, width, and designed depth of the cover material. Payment for the accepted quantities of additional cover material will be at the unit price per cubic yard.

G. Granular Material (Aggregate Base and Subbase, Gravel, Drainage Sand, Drainage Stone, and Filter Stone): Measurement of additional granular material to be used will be by the number of cubic yards, in-place, based upon the length, width, and depth of the granular material. Payment for the accepted quantities of additional granular material will be at the unit price per cubic yard.

H. Seeding: Measurement of the quantity of additional seeding will be based on field survey upon establishment of a satisfactory vegetative cover. Additional seeding does not include seeding of areas disturbed as a result of the construction of the base bid item. Seeding includes soil preparation, fertilizer, lime, seed, and mulch. Payment for accepted quantities of additional seeding will be based upon the price per unit (1,000 sq. ft.).

I. Topsoil: If additional topsoil from off-site sources is required, the quantity shall be based on field measurement in-place area at the designed thickness. Payment for the accepted quantities of additional topsoil will be at the unit price per cubic yard.

J. Siltation Fence: Measurement for additional siltation fence shall be by the linear foot of fence installed. The accepted quantity of siltation fence will be paid for at the Contract unit price per linear foot, which shall be full compensation for furnishing, placing, maintaining and removal of the siltation fence.

K. Geomembrane, Drainage Geocomposite, Geotextiles: Measurement for additional geosynthetic products shall be by the square foot covered. The accepted quantity will be paid for at the Contract unit price per square foot, which shall be full compensation for furnishing, placing, anchoring, and maintaining. The accepted quantity will not include overlap or waste.

L. Pipe: Measurement for additional piping shall be by the linear foot installed. The acceptable quantity of pipe will be paid for at the Contract unit price per linear foot, which shall be full compensation for furnishing and installing additional piping, including fittings, geotextiles, and bedding materials.

M. Riprap: Measurement for additional quantities of riprap shall be the number of cubic yards, in-place, based upon the surface area and depth of the riprap. Payment for the accepted quantities of additional riprap will be at the unit price per cubic yard. Aggregate subbase gravel and geotextile material shall be installed under riprap as shown on the Contract Drawings. The purchase and installation of aggregate subbase gravel and geotextile shall be incidental to the riprap pay item and no additional payment will be made.

N. Erosion Control Blankets: Measurement for additional blankets shall be by the square yard covered. The accepted quantity of blankets will be paid for at the Contract unit price per square

yard, which shall be full compensation for furnishing, placing, anchoring, and maintaining. The accepted quantity will not include overlap or waste.

O. Culverts: Measurement for additional culverts shall be by the linear foot installed. The acceptable quantity of pipe will be paid for at the Contract unit price per linear foot, which shall be full compensation for furnishing and installing each culvert.

P. Manholes: Measurement for additional manholes shall be by the vertical foot installed. The acceptable quantity of manholes will be paid for at the Contract unit price per vertical foot, which shall be full compensation for furnishing and installing each manhole.

1.05 BASIS OF MEASUREMENT AND PAYMENTS:

A. Changes in the Contract work which result in reduced work will be measured based on the information shown on the Contract Drawings and described in Article 1.04, above. Measurements and volumes will be computed based on methods generally recognized as conforming to good engineering practice and acceptable to both the Contractor and the Engineer.

B. Costs of any conformance or construction testing that fails to meet the Specifications contained herein, shall be borne by the Contractor. The price shall include the cost of the failing test and any cost to resample the failing material including any shipping and handling. The Engineer, on a monthly basis, will forward a bill with a cost breakdown to the Contractor whom shall apply these in the monthly requisition for payment as a deduct from the Contract work. If the laboratory performing the tests is brought into question by the Contractor or any of his sub-Contractors and it is decided to send any further testing to a new laboratory, the Contractor(s) shall bear the cost of all new testing that will be required to demonstrate conformance of a questionable material. These “new” costs shall not be applied to the monthly requisition for payment as a deduct.

C. The Owner shall not pay for any conformance testing beyond the initial testing required to approve a material for use on this project. The Owner shall also not pay for any conformance tests required on construction materials which are required because the Contractor chooses to supply construction materials from more lots or sources than required to meet the square footage testing frequency contained in the Specifications. This does not relieve the requirement that representative samples of material used on the job be tested from each lot or source. The cost for this additional testing is the responsibility of the Contractor, and will be handled as described in paragraph B.

END OF SECTION

SECTION 01041

PROJECT COORDINATION

1.01 GENERAL:

The Contractor shall be responsible for the following:

A. Coordination of all work under this Contract.

B. Compliance with requirements of all public agencies having jurisdiction over construction.

C. Making arrangements, as necessary, for temporary electricity, heat, water, sanitary facilities, first aid facilities, fire protection and storage of materials and supplies and for the timely delivery to the job site.

D. Assisting the Owner's Representative as required in the review of construction, the testing of materials, and construction layout surveys.

E. Maintaining up to date progress records and as-built drawings.

F. Maintaining the project site in a neat condition.

G. Coordinating with all utilities, and notifying the appropriate owners when work is scheduled in areas that may affect existing utilities.

H. No extra payment shall be made to the Contractor for any delays caused by lack of progress, defective workmanship, or rescheduling of work by other Contractors, subcontractors, or equipment and material suppliers.

I. Coordinating the work of subcontractors, equipment, and material suppliers.

J. Verifying all field dimensions, notifying the Owner's Representative of any discrepancies. No additional payment will be allowed because of differences between field dimensions and those shown on the Drawings.

END OF SECTION

SECTION 01060

APPLICABLE CODES

1.01 GENERAL:

A. Comply with current edition of all local, state, and national codes applicable to the proposed construction including but not limited to the following:

1. OSHA - National Occupational Safety and Health Act
2. BOCA - Building Officials and Code Administrators - "Basic Building Code"
3. Associated General Contractors of America - "Manual of Accident Prevention in Construction"
4. ASTM - American Society for Testing Materials
5. AASHTO - American Association of State Highway and Transportation Officials
6. NFPA - National Fire Prevention Association
7. Maine Department of Environmental Protection, "Maine Erosion and Sediment Control: Best Management Practices"
8. Maine Solid Waste Management Regulations, Chapter 401.
9. Maine Construction General Permit, General Conditions.

END OF SECTION

SECTION 01300

SUBMITTAL PROCEDURES

PART 1 – GENERAL

1.01 SECTION INCLUDES:

A. Definitions.

B. Submittal procedures.

C. Construction progress schedules.

D. Proposed product list.

E. Product data.

F. Use of electronic CAD files of Project Drawings.

G. Shop Drawings.

H. Samples.

I. Other submittals.

J. Test reports.

K. Certificates.

L. Manufacturer's instructions.

M. Contractor review.

N. Architect/Engineer review.

1.02 DEFINITIONS:

A. Action Submittals: Written and graphic information and physical samples that require Engineer's responsive action.

B. Informational Submittals: Written and graphic information and physical Samples that do not require Engineer's responsive action. Submittals may be rejected for not complying with requirements.

1.03 SUBMITTAL PROCEDURES:

A. Transmit each submittal electronically to the Engineer (Matt Muzzy, DolbyPhase2@smemaine.com) on an Engineer-accepted form.

B. Sequentially number transmittal forms. Mark revised submittals with original number and sequential alphabetic suffix.

C. Identify: Project, Contractor, Subcontractor and supplier, pertinent Drawing and detail number(s), and Specification Section number appropriate to submittal.

D. Apply Contractor's stamp, signed or initialed, certifying that review, approval, verification of products required, field dimensions, adjacent construction Work, and coordination of information is according to requirements of the Work and Contract Documents.

E. Schedule submittals to expedite Project, and deliver to Engineer. Coordinate submission of related items. The Contractor may be obligated to provide submittals as dictated in the Contract between the Owner and Contractor.

F. For each submittal for review, allow seven (7) days excluding delivery time to and from Contractor.

G. Identify variations in Contract Documents and product or system limitations that may be detrimental to successful performance of completed Work.

H. Allow space on submittals for Contractor and Engineer review stamps.

I. When revised for resubmission, identify changes made since previous submission.

J. Distribute copies of reviewed submittals as appropriate. Instruct parties to promptly report inability to comply with requirements.

K. Submittals not requested will not be recognized nor processed.

L. Incomplete Submittals: Engineer will not review incomplete submittals. Complete submittals for each item are required. Delays resulting from incomplete submittals are not the responsibility of Engineer.

1.04 CONSTRUCTION PROGRESS SCHEDULES:

A. Contractor shall prepare and submit detailed progress schedules, schedule of values and shop drawing and sample submittal schedules to the Engineer for approval in accordance with the General Conditions. The schedule shall be in bar graph from showing material delivery schedules and starting and completion dates for all phases of construction.

B. If, in the opinion of the Engineer, the Contractor falls behind the progress schedule, the contractor shall take such steps as may be necessary to improve his progress, which may require him to increase the number of shifts, and/or overtime operations, days of work, and/or the amount of construction planned, and to submit for approval such supplementary schedule or schedules as necessary to demonstrate the manner in which the agreed rate to progress will be regained, all without additional cost to the Owner.

1.05 PROPOSED PRODUCT LIST:

A. 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, indicate manufacturer, trade name, model or catalog designation, and reference standards.

1.06 PRODUCT DATA:

A. Product Data: Action Submittal: Submit to Engineer for review for assessing conformance with information given and design concept expressed in Contract Documents.

B. Submit electronic submittals via email as PDF electronic files to Matt Muzzy by email at DolbyPhase2@smemaine.com.

C. Mark each copy to identify applicable products, models, options, and other data. Supplement manufacturers' standard data to provide information specific to this Project.

1.07 ELECTRONIC CAD FILES OF PROJECT DRAWINGS:

A. Electronic CAD Files of Project Drawings: May only be used to expedite production of Shop Drawings for the Project. Use for other Projects or purposes is not allowed.

B. Electronic CAD Files of Project Drawings: Distributed only under the following conditions:

1. Use of files is solely at receiver's risk. Engineer does not warrant accuracy of files. Receiving files in electronic form does not relieve receiver of responsibilities for measurements, dimensions, and quantities set forth in Contract Documents. In the event of ambiguity, discrepancy, or conflict between information on electronic media and that in Contract Documents, notify Engineer of discrepancy and use information in hard copy Drawings and Specifications.
2. CAD files do not necessarily represent the latest Contract Documents, existing conditions, and as-built conditions. Receiver is responsible for determining and complying with these conditions and for incorporating addenda and modifications.
3. User is responsible for removing information not normally provided on Shop Drawings and removing references to Contract Documents. Shop Drawings submitted with information associated with other trades or with references to Contract Documents will not be reviewed and will be immediately returned.
4. Receiver shall not hold Engineer responsible for data or file clean-up required to make files usable, nor for error or malfunction in translation, interpretation, or use of this electronic information.
5. Receiver shall understand that even though Engineer has computer virus scanning software to detect presence of computer viruses, there is no guarantee that computer viruses are not present in files or in electronic media.
6. Receiver shall not hold Engineer responsible for such viruses or their consequences, and shall hold Engineer harmless against costs, losses, or damage caused by presence of computer virus in files or media.

1.08 SHOP DRAWINGS:

A. Shop Drawings: Action Submittal: Submit to Engineer for assessing conformance with information given and design concept expressed in Contract Documents.

B. Indicate special utility and electrical characteristics, utility connection requirements, and location of utility outlets for service for functional equipment and appliances.

C. When required by individual Specification Sections, provide Shop Drawings signed and sealed by a professional Engineer responsible for designing components shown on Shop Drawings.

1. Include signed and sealed calculations to support design.
2. Submit Shop Drawings and calculations in form suitable for submission to and approval by authorities having jurisdiction.
3. Make revisions and provide additional information when required by authorities having jurisdiction.

D. Submit electronic submittals via email as PDF electronic files to Matt Muzzy by email at DolbyPhase2@smemaine.com.

1.09 SAMPLES:

A. Samples: Action Submittal: Submit to Engineer for assessing conformance with information given and design concept expressed in Contract Documents.

B. Include identification on each Sample, with full Project information.

C. Submit number of Samples specified in individual Specification Sections; Engineer will retain one sample.

D. Reviewed Samples that may be used in the Work are indicated in individual Specification Sections.

E. Samples will not be used for testing purposes unless specifically stated in individual Specification Sections.

1.10 OTHER SUBMITTALS:

A. Informational Submittal: Submit data for Engineer's knowledge as Owner's Representative or for Owner.

B. Submit information for assessing conformance with information given and design concept expressed in Contract Documents.

1.11 TEST REPORTS:

A. Informational Submittal: Submit reports for Engineer's knowledge as Owner's Representative or for Owner.

B. Submit test reports for information for assessing conformance with information given and design concept expressed in Contract Documents.

1.12 CERTIFICATES:

A. Informational Submittal: Submit certification by manufacturer, installation/application Subcontractor, or Contractor to Engineer, in quantities specified for Product Data.

B. Indicate material or product conforms to or exceeds specified requirements. Submit supporting reference data, affidavits, and certifications as appropriate.

1.13 MANUFACTURER'S INSTRUCTIONS:

A. Informational Submittal: Submit manufacturer's installation instructions for Engineer's knowledge as Contract administrator or for Owner.

B. Submit printed instructions for delivery, storage, assembly, installation, adjusting, and finishing, to Engineer in quantities specified for Product Data.

C. Indicate special procedures, perimeter conditions requiring special attention, and special environmental criteria required for application or installation.

1.14 CONTRACTOR REVIEW:

A. Review for compliance with Contract Documents and approve submittals before transmitting to Engineer.

B. Contractor: Responsible for:

1. Determination and verification of materials including manufacturer's catalog numbers.
2. Determination and verification of field measurements and field construction criteria.
3. Checking and coordinating information in submittal with requirements of Work and of Contract Documents.
4. Determination of accuracy and completeness of dimensions and quantities.
5. Confirmation and coordination of dimensions and field conditions at Site.
6. Construction means, techniques, sequences, and procedures.
7. Safety precautions.
8. Coordination and performance of Work of all trades.

A. Stamp, sign or initial, and date each submittal to certify compliance with requirements of Contract Documents.

B. Do not fabricate products or begin Work for which submittals are required until approved submittals have been received from Engineer.

1.15 ENGINEER REVIEW:

A. Do not make "mass submittals" to Engineer. "Mass submittals" are defined as six (6) or more submittals or items in one (1) day or 15 or more submittals or items in one week. If "mass submittals" are received, Engineer's review time stated above will be extended as necessary to perform proper review. Engineer will review "mass submittals" based on priority determined by Engineer after consultation with Owner.

B. Informational submittals and other similar data are for Engineer's information, do not require Engineer's responsive action, and will not be reviewed or returned with comment.

C. Submittals made by Contractor that are not required by Contract Documents may be returned without action.

D. Submittal approval does not authorize changes to Contract requirements unless accompanied by Change Order.

E. Owner may withhold monies due to Contractor to cover additional costs beyond the second submittal review.

PRODUCTS - Not Used

EXECUTION - Not Used

END OF SECTION

SECTION 01561

CLEANING

PART 1 - GENERAL

1.01 DESCRIPTION:

A. Related Requirements Specified Elsewhere:

1. Summary of Work: Section 01010
2. Project Coordination: Section 01041
3. Cleaning for Specific Products or Work: Specification Section for that work

B. Maintain premises and public properties free from accumulations of waste, debris, sediment, and rubbish, caused by operations.

C. At completion of work, remove waste materials, rubbish, tools, equipment, machinery, and surplus materials, and clean all sight-exposed surfaces; leave project area clean.

Grubbings can be disposed of on-site within the limits of the landfill. The Contractor must make arrangements to properly dispose of other wastes not acceptable for disposal on-site.

1.02 SAFETY REQUIREMENTS:

A. Conduct cleaning and disposal operations to comply with local, state and federal ordinances and laws, particularly anti-pollution laws.

1. Do not burn rubbish and waste materials on project site.
2. Do not dispose of wastes into streams or waterways.

PART 2 - PRODUCTS

Not Applicable

PART 3 - EXECUTION

3.01 DURING CONSTRUCTION:

A. At reasonable intervals during progress of work, clean site, and dispose of waste materials, debris, and rubbish.

B. Provide on-site containers for collection of waste materials, debris, and rubbish.

C. Remove waste materials, debris and rubbish from site and legally dispose of at approved public or private dumping areas off Owner's property.

3.02 FINAL CLEANING:

A. Perform cleaning operations described herein until project is completed.

END OF SECTION

SECTION 01562

DUST CONTROL

PART 1 - GENERAL

1.01 RELATED DOCUMENTS: Drawings, general provisions of Contract, and Supplementary General Conditions apply to the work specified under this Section.

1.02 RELATED WORK SPECIFIED ELSEWHERE:

A. Site Preparation: Section 02100

B. Earthwork: Section 02200

1.03 DESCRIPTION: This work shall consist of furnishing all labor, materials, and equipment for applying water for dust control in conformity with the Contract Drawings and as specified herein, or as required by the Owner's Representative.

PART 2 - PRODUCTS

2.01 GENERAL: The water shall not be salt or brackish and shall be free from oil, acid, and injurious alkali. Water shall be obtained from a source near the Landfill.

PART 3 - EXECUTION

3.01 SPRINKLING: Water shall be applied by approved methods as requested by the Owner or the Owner’s Representative. Acceptable equipment may include a tank with gauge equipped pressure pump and a nozzle-equipped spray bar. Water shall be dispersed through the nozzle under a minimum pressure of 20 pounds per square inch, gauge pressure.

3.02 CALCIUM CHLORIDE: DO NOT USE.

3.03 SWEEPING: Roads shall be kept free of soil and ash. Clay, ash, and other materials tracked, spilled and/or deposited on the roadways shall be scraped or swept clean on a daily basis or as required by the Owner’s Representative.

END OF SECTION

SECTION 01570

TRAFFIC CONTROL DEVICES

PART 1 - GENERAL

1.01 RELATED DOCUMENTS: Drawings, general provisions of Contract, and Supplementary General Conditions apply to the work specified under this Section.

1.02 DESCRIPTION: This work shall consist of furnishing all labor, materials, and equipment for traffic control devices including: signs, barricades and channelization, lighting, flagmen, and other items necessary to effectively control vehicular and pedestrian traffic through the construction.

PART 2 - PRODUCTS

2.01 Materials used shall meet the requirements of the most current version of the Maine Department of Transportation Standard Specifications for Highways and Bridges.

PART 3 - EXECUTION

3.01 Installation of traffic control devices shall be in accordance with the most current version of the Maine Department of Transportation Standard Specifications for Highways and Bridges.

END OF SECTION

SECTION 01600

MATERIAL AND EQUIPMENT

PART 1 - GENERAL

1.01 SECTION INCLUDES:

A. Products.

B. Transportation and handling.

C. Storage and protection.

D. Product options.

E. Substitutions.

1.02 RELATED SECTIONS AND DOCUMENTS:

A. Instructions to Bidders: Substitute or "Or-Equal" Items.

B. Quality Requirements.

1.03 PRODUCTS:

A. Products: Means new material, machinery, components, equipment, fixtures, and systems forming the work. Does not include machinery and equipment used for preparation, fabrication, conveying and erection of the work. Products may also include existing materials or components required for reuse.

B. Do not use materials and equipment removed from existing premises, except as specifically permitted by the Contract Documents.

C. Provide interchangeable components of the same manufacturer, for similar components.

1.04 TRANSPORTATION AND HANDLING:

A. Transport and handle products in accordance with manufacturer's instructions.

B. Promptly inspect shipments to assure that products comply with requirements, quantities are correct, and products are undamaged.

C. Provide equipment and personnel to handle products by methods to prevent soiling, disfigurement, or damage.

1.05 STORAGE AND PROTECTION:

A. Store and protect products in accordance with manufacturer's instructions, with seals and labels intact and legible. Store sensitive products in weathertight, climate controlled enclosures.

B. For exterior storage of fabricated products, place on sloped supports, above ground.

C. Provide off-site storage and protection when site does not permit on-site storage or protection.

D. Cover products subject to deterioration with impervious sheet covering. Provide ventilation to avoid condensation.

E. Store loose granular materials on solid flat surfaces in a well-drained area. Prevent mixing with foreign matter.

F. Provide equipment and personnel to store products by methods to prevent soiling, disfigurement, or damage.

G. Arrange storage of products to permit access for inspection. Periodically inspect to assure products are undamaged and are maintained under specified conditions.

H. Store materials (i.e., pipe, geotextiles, earthen materials, etc.) at laydown area depicted on the Contract documents or as stipulated by the Owner's Representative.

1.06 PRODUCT OPTIONS:

A. Products Specified by Reference Standards or by Description Only. Any product meeting those standards or description.

B. Products Specified by Naming One or More Manufacturers with a Provision for Substitutions. Submit a request for substitution for any manufacturer not named.

1.07 SUBSTITUTIONS:

A. Requests for Substitutions after the bidding period are subject to requirements specified in this section.

B. Substitutions may be considered when a product becomes unavailable through no fault of the Contractor.

C. Document each request with complete data substantiating compliance of proposed Substitution with Contract Documents.

D. A request constitutes a representation that the Contractor:

1. Has investigated proposed product and determined that it meets or exceeds the quality level of the specified product.
2. Will provide the same warranty for the Substitution as for the specified product.
3. Will coordinate installation and make changes to other work which may be required for the work to be complete with no additional cost to Owner.
4. Waives claims for additional costs or time extensions which may subsequently become apparent.

E. Substitutions will not be considered when they are indicated or implied on shop drawing or product data submittals, without separate written request, or when acceptance will require revision to the Contract Documents.

F. Substitution Submittal Procedure:

1. Submit three copies of Request for Substitution for consideration. Limit each request to one proposed substitution.
2. Submit shop drawings, product data, and certified test results attesting to the proposed product equivalence.
3. The Engineer will notify Contractor, in writing, of decision to accept or reject request.

END OF SECTION

DIVISION II – SITE WORK

SECTION 02000

SITEWORK - GENERAL

PART 1 - GENERAL

1.01 RELATED DOCUMENTS: Drawings, general provisions of Contract, and supplementary general conditions apply to the work specified under this section.

1.02 DESCRIPTION OF THE WORK: The Contractor shall provide all materials, equipment, and labor, and perform all operations necessary to complete the scope of work, including: erosion control, grading, pipe installation, culvert, seeding, and liming and fertilizing and mulching. The work shall be in accordance with the Specifications herein and shall include, but not necessarily be limited to, the following:

A. Site preparation for final cover system (including laydown areas, material stockpile areas, and topsoil manufacturing area);

B. Earthwork necessary to modify existing access roads;

C. Site dewatering and erosion control during construction;

D. Loaming, seeding, mulching, and landscaping;

E. Erosion control measures as needed to minimize flow of silt and other material from disturbed areas into existing waterways; and,

F. Layout and as-built survey of construction.

1.03 CONSTRUCTION SEQUENCE:

A. To mitigate the impact of site erosion the Contractor shall sequence construction as described in Section 02220, Erosion Control and Section 01010, Summary of Work.

B. The Contractor shall schedule and coordinate his work with all affected utilities, and other contractors as directed by the Owner's Representative.

C. The Contractor shall schedule and coordinate all confined space entry work with the Owner’s Representative.

END OF SECTION

SECTION 02016

EXISTING UTILITIES AND UNDERGROUND STRUCTURES

PART 1 - GENERAL

1.01 RELATED DOCUMENTS: Drawings, general provisions of Contract, and Supplementary General Conditions apply to the work specified under this Section.

1.02 RELATED WORK SPECIFIED ELSEWHERE:

A. Earthwork: Section 02200

B. Notifications to Owners of Utilities: General Conditions

1.03 DESCRIPTION:

A. The existing utilities shown on the Drawings are shown diagrammatically and it is not to be inferred that the locations shown are precise. The Contractor shall locate and verify the location and invert elevations at all connection points and utilities, as shown on the Contract Drawings. The Contractor shall notify the Engineer of any discrepancies. The Contractor shall be responsible for notifying and obtaining the services of Dig Safe and On-Target to locate existing utilities as necessary.

B. Coordinate with all applicable utility owners prior to excavation in areas where it is reasonable to expect the presence of existing utilities, whether shown on the Drawings or not.

C. The Contractor will be responsible for any and all damage to any existing utilities, caused by his efforts.

D. The Contractor will contact the affected utility as soon as any damage is uncovered.

E. The utility shall make the determination as to who makes the necessary repairs.

F. In areas where existing underground structures are shown or suspected carefully uncover such structures to such extent as to enable the Owner's Representative to determine what adjustments if any need to be made to accommodate the presence or removal of such structure.

END OF SECTION

SECTION 02100

SITE PREPARATION

PART 1 - GENERAL

1.01 RELATED DOCUMENTS: Drawings, general provisions of Contract, and supplementary general conditions apply to the work specified under this section.

1.02 RELATED WORK SPECIFIED ELSEWHERE:

A. Section 02200 – Earthwork

B. Section 02016 - Existing Utilities and Underground Structures

C. Section 02220 - Erosion Control

1.03 DESCRIPTION OF WORK:

A. Work specified in this section shall consist of furnishing all labor, materials, and equipment to prepare the site for subsequent improvements in conformity with the Contract Drawings, and as specified herein.

B. Site Preparation for each phase shall include, but is not limited to, the following:

1. Placement of erosion control measures.
2. Tree clearing and grubbing.
3. Topsoil stripping and grubbing.
4. Removal and disposal of unsuitable subgrade materials.
5. Pipeline and manhole cleaning at designated locations shown on the plans.
6. Verification of locations and elevations of all facilities to be connected to.
7. Protection of existing utilities, structures, and engineered systems (i.e., liner system, cover system, leachate collection and transport systems).
8. Providing labor and equipment necessary to control odors resulting from waste regrading.

C. Verification of existing utilities locations and elevations:

1. The Contractor shall locate and verify the location and invert elevations at all connection points and utilities, as shown on the Contract Drawings. The Contractor shall notify the Engineer of any discrepancies. The Contractor shall be responsible for notifying and obtaining the services of Dig Safe and On-Target to locate existing utilities, as necessary as described in Section 02016.
2. Prior to Phase 3 construction, the Contractor shall perform test pitting at the southwest corner of Dolby III to locate toe drain piping between CB #6 and CB #6A. The location and elevation of the toe drain shall be reported to the Engineer.

1.04 JOB CONDITIONS:

A. Protection of Existing Facilities:

1. Provide protections necessary to prevent damage to existing facilities indicated to remain.
2. Protect facilities on adjoining properties and on the Owner's property.
3. Restore damaged facilities to their original condition, as acceptable to parties having jurisdiction.

B. Adjoining Property: Confine all operations to the property of the Owner. Protect abutting properties from construction activities at all times.

C. Salvageable Facilities: Carefully remove items indicated to be salvaged, and store on the Owner's premises where indicated, unless otherwise directed.

PART 2 - PRODUCTS

Not Applicable.

PART 3 - EXECUTION

3.01 GENERAL:

A. The Owner's Representative will establish clearing lines and construction lines and designate the trees, shrubs, plants, and other items to remain.

B. Alignment stakes, grade stakes, witness stakes, boundary markers, benchmarks, and tie points shall be preserved until such time as their usefulness has ceased and permission for their destruction is given by the Owner's Representative.

C. Remove vegetation, facilities, or obstructions interfering with installation of new construction. Remove such items elsewhere on the site or premises as specifically indicated. Removal includes stumps and roots.

D. Carefully and cleanly cut roots and branches of trees indicated to be left standing, where such roots and branches obstruct new construction.

3.02 CLEARING:

A. In areas designated by the Owner's Representative, all trees, down timber, stubs, brush, bushes, shrubs, plants, and debris not designated to remain shall be removed and disposed of.

B. All trees and shrubs shall be cut to 6 inches from the ground.

C. Unsound or unsightly branches of trees and shrubs designated to remain, and not specified to be removed under another item shall be removed as directed. All such removing and the disposal shall be a part of and, incidental to this item.

3.03 DISPOSAL OF WASTE MATERIALS:

A. Except as otherwise provided, all wood, stumps, and woody debris generated by the on-site clearing and grubbing operations shall be disposed of by the Contractor by chipping (as described below) or by burial within the limits of the landfill, as directed by the Owner's Representative. Unsuitable subgrade materials that have been in contact with landfill leachate will be disposed of within the active landfill. Other unsuitable subgrade materials will be disposed of onsite as directed by the Owner’s representative in accordance with the MEDEP BMPs. All other trash and non-wood products generated by the Contractor as part of the closure effort will be disposed of off-site at a licensed location by the Contractor.

B. Wood Chipping: Wood chipping shall be done with approved wood chipping machines capable of reducing woody material to chips not over 1/4 inch in thickness nor over 8 inches long. Chips shall be distributed in a thin layer over the ground surface. Ground cover plants shall not be smothered and drainageways shall not be blocked. If the wood chipper or any auxiliary

machines damage existing plants or ground surface, the Owner's Representative may prohibit their further use.

3.04 PIPELINE AND MANHOLE CLEANING

A. Designated leachate collection pipelines, catch basins, and manholes shall be cleaned with high velocity jet equipment. A vacuum truck is to be used for collection of liquids and solids. The equipment shall carry its own water tank and contractor is responsible for locating a water source. No water source is available on site. Engineer shall be notified of any obstructions that may prevent the cleaning equipment from traversing the entire line. Various sections may require multiple passes with the cleaning equipment. Work shall be completed from the uphill manhole down. After manhole cleaning is complete, photographs are to be taken and submitted to the engineer within 24 hrs.

END OF SECTION

SECTION 02200

EARTHWORK

PART 1 - GENERAL

1.01 RELATED DOCUMENTS:

A. The general provisions of the Contract, including General and Supplementary Conditions and General Requirements (if any) apply to the work specified in this section.

B. The requirements set forth by the Project's Quality Assurance/Quality Control Plan (if a QA/QC Plan is required for the Project's Scope of Work by the MEDEP) shall apply to work specified in this Section. QA/QC plan is provided as Appendix B to the Construction Specifications document.

C. All work performed under this specification shall be performed in accordance with the Maine Department of Environmental Protection – Maine Erosion and Sedimentation Control Best Management Practices (October 2016 or as currently revised).

1.02 DESCRIPTION: This work shall consist of survey layout, excavation, filling, and embankment construction, installation of toe drains, manholes and catch basins, placement of cover materials, and grading including hauling, compaction, and disposal of all material encountered and necessary for construction of the project.

1.03 RELATED WORK SPECIFIED ELSEWHERE:

A. Existing Utilities and Underground Structures: Section 02016

B. Site Preparation: Section 02100

C. Erosion Control: Section 02220

D. Seeding: Section 02800

E. Quality Assurance/Quality Control Plan

1.04 QUALITY CONTROL

A. Codes and Standards: Perform excavation work in compliance with applicable requirements of governing authorities having jurisdiction and with the requirements outlined in the Project's Quality Assurance/Quality Control Plan (as applicable).

B. Testing and Inspection Service:

1. Borrow Source Characterization Testing (By Contractor).
The following borrow source characterization testing shall be performed on the materials used for the project's earthworks construction. The testing program will assure that borrow materials from on-site or off-site sources meet the requirements of this specification. Borrow source testing shall be performed prior to delivering off-site material to the site and prior to using on-site material for landfill construction. Borrow source testing is not required for existing cover soil or drainage sand that is reused for the same purpose (i.e., cover soil used as cover soil, etc.). Changes in the borrow source and/or material properties shall be avoided. The Contractor shall employ a soils testing laboratory acceptable to the Engineer to perform soil testing of borrow source materials. Borrow source characterization will be performed in accordance with the Maine

Department of Environmental Protection (MEDEP) Solid Waste Management Regulations Chapter 401 Appendix A, or as directed by the Engineer.

Borrow source characterization testing on soil materials shall be done at the following frequencies:

a. The following testing of the cover soil material shall be performed with each source or change of material or:
   (1) moisture content (ASTM D 2216) 5,000 yd^3
   (2) grain size analysis (ASTM D 421) 5,000 yd^3
   (3) moisture density (ASTM D 698) 5,000 yd^3
   (4) remolded hydraulic conductivity (ASTM D 5084) 5,000 yd^3

   Note: Borrow source testing of existing cover soil is not required, provided that it is used for the same purpose (i.e., existing cover soil used as Phase 2 or 3 cover soil).

b. The following testing of the drainage sand shall be performed with each source or change of material or:
   (1) grain size analysis (ASTM D 421) 5,000 yd^3
   (2) remolded hydraulic conductivity (ASTM D 5084) 5,000 yd^3

   Note: Borrow source testing of existing drainage sand is not required, provided that it is used for the same purpose (i.e., existing drainage sand used as Phase 2 or 3 drainage sand).

c. The following testing of the drainage stone shall be performed with each source or change of material or:
   (1) grain size analysis (ASTM D 421) 2,500 yd^3
   (2) calcium carbonate content (ASTM D 4373) or approved equivalent[1]) 2,500 yd^3

d. Aggregate Subbase Material: A minimum of 1 gradation (ASTM D 421) per source.

e. Vegetative Medium (Topsoil): Perform topsoil testing at Maine Soil Testing Service – University of Maine at Orono, as described in Section 02800. Topsoil test results shall be provided to the Owner's Representative by the end of July 2022.

C. The Contractor shall supply representative materials for testing as required by the Engineer. The Contractor shall schedule his operation and submissions, so the Engineer has sufficient time to perform testing. Failing tests of materials quality, gradation, or field density will be charged to the Contractor and deducted from payments, in accordance with Part 1.05 of Section 01025.

D. Test Reports: Submit one (1) electronic copy of the borrow source test reports directly to the Engineer from the Contractor's testing subcontractor, with copy to the Contractor. If borrow source testing indicates a significant change in material index properties during construction, the in-place material testing specifications described herein should be modified.

1.05 QUALITY ASSURANCE: (By the Owner)

A. On-Site Testing and Inspection Service: The Owner will perform quality assurance and compaction testing of materials used in the work. The Contractor shall supply representative materials for testing as required by the Owner's Representative. The Contractor shall schedule his operation and submissions, so the Owner's Representative has sufficient time to perform testing. Failing tests of materials quality, gradation, or field density will be charged to the Contractor and deducted from payments.

B. Borrow Source Construction Testing shall be performed by the Owner's Representative as material is being excavated and transported to the project site during construction. This testing is performed in order to ensure the consistency of the borrow source material being excavated, and is intended to enhance and confirm testing performed earlier during the borrow source characterization.

1. The following testing of cover soil material from off-site sources shall be performed with each source or change of material or:

    a. moisture density (ASTM D 698) 1/5,000 yd^3
    b. grain size analysis (ASTM D 421 1/5,000 yd^3
    c. moisture content (ASTM D 2216) 1/5,000 yd^3
    d. Remolded hydraulic conductivity (ASTM D 5084) 1/5,000 yd^3
2. The following testing of the drainage sand or gas layer material from off-site sources shall be performed with each source or change of material or:
    a. grain size analysis (ASTM D 422) 1/5,000 yd^3
    b. remolded hydraulic conductivity (ASTM D 5084) 1/5,000 yd^3
3. Drainage Stone: A minimum of 1 gradation (ASTM D 421) and 1 calcium carbonate content (ASTM 4373) or approved equivalent[1] per source and/or every 2,500 yd^3.
4. Vegetative Medium (Topsoil): Perform topsoil testing at Maine Soil Testing Service – University of Maine at Orono, as described in Section 02800.
5. Aggregate Base or Subbase Material: A minimum of one gradation (ASTM D 421) per source.

C. In-Place Field Quality Assurance: Allow Owner's Representative or Owner's testing service to examine and test subgrades and fill layers. Before further construction work is performed, test results meeting the requirements of paragraph 2.01 and 3.09 herein, shall be obtained.

1. The following in-place testing of the cover soil material shall be required with each change of material or:
    a. Field moisture content, in-place density (ASTM D 6938) 5/acre/lift. Undisturbed hydraulic conductivity (ASTM D 6938) 3/acre/lift.
    b. Thickness and lift interface 5/acre/lift
2. The following in-place testing of the granular drainage sand material shall be required:
    a. Remolded hydraulic conductivity (ASTM D 5084) 3/acre/lift.
    b. Thickness 5/acre/lift
3. The Owner's Representative shall identify test locations. The Contractor shall assist the Owner's Representative in obtaining the required samples.
4. If, in the opinion of the Engineer, based on reports of testing service and inspection, subgrades or fills which have been placed below specified density or thickness, the Contractor shall undertake necessary corrective actions, including removal and replacement of materials or placement of additional material, and testing at no additional expense to the Owner. This stipulation does not apply to granular drainage material or cover material previously placed at the site by others.

1.06 JOB CONDITIONS:

A. Site Information: Data on indicated subsurface conditions are not intended as representations or warranties of accuracy or continuity between soil borings. It is expressly understood that Owner and/or Engineer will not be responsible for interpretations or conclusions drawn therefrom by Contractor. Data are made available for the convenience of Contractor.

Additional test borings and other exploratory operations may be made by Contractor at no cost to Owner.

B. Existing Utilities: The Contractor shall provide the services of OnTarget or DigSafe to locate existing underground utilities in the areas of work, as necessary, or as required by law. If

[1] Equivalent methods used to determine calcium carbonate content include Whole Rock Geochemistry ME XRF06 and ME ICP06.

utilities are to remain in place, provide adequate means of protection during earthwork operations.

Should uncharted, or incorrectly charted, piping or other utilities be encountered during excavation, consult the utility owner immediately for directions. Cooperate with Owner and utilities companies in keeping respective services and facilities in operation. Repair damaged utilities to satisfaction of utility owner.

Do not interrupt existing utilities serving facilities occupied and used by Owner or others, except when permitted in writing by Owner's Representative and then only after acceptable temporary utility services have been provided.

Demolish and completely remove from site existing underground utilities indicated to be removed. Coordinate with utility companies for shut-off of services if lines are active.

C. Use of Explosives: Use of explosives at the Dolby Landfill is not permitted.

D. Protection of Persons and Property: Barricade open excavations occurring as part of this work and post with warning lights. Operate warning lights as recommended by authorities having jurisdiction.

Protect structures, utilities, sidewalks, pavements, and other facilities from damage caused by settlement, lateral movement, undermining, washout and other hazards created by earthwork operations. The Contractor shall comply with all applicable rules, procedures, and regulations regarding safety as defined by all local, state, and federal agencies, including but not limited to, State of Maine Labor Department Rules, and the Occupational Safety and Health Act (OSHA) Regulations.

PART 2 - PRODUCTS

2.01 SOIL MATERIALS:

A. Miscellaneous Materials:

1. a. Cover Soil Material (off-site source): Cover soil material shall be a till soil containing a minimum 20 percent fines passing the No. 200 sieve, with a maximum particle of 3 inch. The maximum hydraulic conductivity shall be less than or equal to $5x10^{-5}$ cm/sec with an average hydraulic conductivity less than or equal to $1x10^{-5}$ cm/sec.

   b. Cover Soil Material (existing cover soil): Cover soil material that is stripped from the Dolby III Landfill shall be a till material with a maximum particle size of 6 inches. The Contractor shall manage cover soils such that cover soils do not move from area to area. Existing cover soil stripped from Dolby Landfill Phases 2 and 3 shall be placed and compacted in the same area (i.e., existing cover soil stripped from the Northeast area shall be placed and compacted in the Northeast area; existing cover soil stripped from the Southwest area shall be placed and compacted in the Southwest area; and existing cover soil stripped from the Southeast area shall be placed and compacted in the Southeast area).

2. a. Drainage Sand: Sand shall be free of organic matter, clay clumps, and other deleterious material. The material shall have a hydraulic conductivity greater than or equal to $2x10^{-3}$ cm/sec and meet the gradation requirements shown below:

Sieve Designation	Percent Passing
1-1/2 inch	100
1 inch	95-100
1/2 inch	75-100
No. 4	50-100
No. 20	20-95

No. 40	10-85
No. 60	0-35
No. 100	0-10
No. 200	0-5

c. Drainage Sand (existing cover drainage sand): Drainage sand material that is stripped from the existing landfill shall be a sand free of organic matter, clay clumps, and other deleterious material.

3. Drainage Stone: Shall be screened and washed stone free of organic matter, silt, or clay lumps, and deleterious material. The stone shall contain no more that 15 percent calcium carbonate as determined by ASTM D 4373 or equivalent method approved by Engineer (i.e., whole rock geochemistry methods). The material shall meet the following gradation requirements:

Sieve Designation	Percent Passing
1-1/2 inch	100
1 inch	70-100
3/4 inch	20-90
1/2 inch	0-50
3/8 inch	0-30
No. 4	0-10
No. 20	0-5

4. ¾-inch Drainage Stone: Stone shall be obtained from rock of uniform quality and shall consist of clean, angular fragments of quarried rock free from soft disintegrated pieces or other questionable matter. Shall be clean and free from organic matter, silt, or clay clumps, and deleterious materials. The material shall meet the following gradation requirements:

Sieve Designation	Percent Passing
1 inch	100
3/4 inch	90-100
3/8 inch	0-75
No. 4	0-25
No. 10	0-5

5. Aggregate Base Material: Shall be crushed gravel consisting of hard durable particles, which are free from vegetative matter, lumps or balls of clay, and other deleterious substances. Gravel base shall not contain particles of rock which will not pass the 3-inch square mesh sieve. The gradation of the base materials shall meet the grading requirements of the following table:

Sieve Designation	Percent Passing
1/2 inch	45-70
1/4 inch	30-55
No. 40	0-20
No. 200	

(M.D.O.T. 703.06 Type A)

6. Aggregate Subbase Material: Aggregate subbase shall be gravel consisting of hard, durable particles which are free from vegetative matter, lumps, or balls of clay, and other deleterious substances. Gravel subbase shall not contain particles of rock which will not pass the 6-inch square mesh sieve. The gradation of the portion which will pass a 3-inch sieve shall meet the grading requirements of the following table:

Sieve Designation	Percent Passing
1/4 inch	25-70
No. 40	0-30
No. 200	0-7

(M.D.O.T. 703.06 Type D)

7. Rock Borrow: Shall consist of hard durable rock broken to various sizes that will form a compact embankment with a minimum of voids. The maximum size for any rock shall be 3 feet in its greatest dimension.
8. Vegetative Growth Medium (Topsoil): Shall be soil material stripped from the top 6 inches of the existing cover system. The material shall be in accordance with Section 02800 Seeding.
9. Satisfactory Excavated Material (On-site): Shall conform to the requirements of vegetative cover or common borrow as a minimum as determined by the Owner's Representative.

2.02 ON-SITE MATERIAL

A. Material on the site is the property of the Owner and, if suitable, shall be incorporated in the Contract work. The Owner's Representative shall classify the material under Article 2.01 headings. Any sample testing needed for this classification will be performed by an approved laboratory at the Owner's expense.

B. Material not incorporated in the work because it is unsuitable will be hauled away and disposed of, as directed by the Owner’s Representative, at the Contractor's expense.

1. Material designated to be wasted by the Owner's Representative will be disposed of by the Contractor.
2. Material designated to be saved by the Owner's Representative will be stockpiled at a location shown on the Drawings or designated by the Owner's Representative.
3. Unsuitable material shall consist of grubbings or other materials which contain rock of size exceeding specifications, organic materials, or other materials of a deleterious nature as deemed by the Owner's Representative.

PART 3 - EXECUTION

3.01 INSPECTION: Examine the areas and conditions under which excavating, filling, and grading are to be performed and notify the Owner's Representative, in writing of conditions detrimental to the proper and timely completion of the work. Do not proceed with the work until unsatisfactory conditions have been corrected in an acceptable manner.

3.02 EXCAVATION: Excavation consists of removal and disposal of material encountered when establishing required grade elevations. All excavation shall be unclassified and shall include any and all material encountered. No extra compensation shall be allowed for excavation work covered by the bid proposal.

A. Excavation for Structures: Conform to elevations and dimensions shown within a vertical tolerance of 1/2 inch and extending a sufficient horizontal distance from footings and foundations to permit placing and removal of concrete formwork, installation of services, other construction, and for inspection.

Excavation for footings and foundations shall extend to the depth necessary to remove all fill material above the native soils. When the footing and foundation grades extend into native soils, the native soil shall be excavated to the foundation grades specified on the Drawings.

In excavating for footings and foundations, take care not to disturb bottom of excavation. Excavate by hand to final grade just before concrete reinforcement is placed. Trim bottoms to required lines and grades to leave solid base to receive concrete.

Rock shattered due to drilling or ripping operations shall be removed. Excess rock excavation shall be filled with Class A or Class B concrete.

B. Excavation for Pavements: Conform to subgrade elevations and dimensions shown, within a vertical tolerance of 1 inch.

C. Excavation for Trenches: Conform to elevations and dimensions within a vertical tolerance of 1 inch. Excavate to the uniform width shown or required for the particular item to be installed. Provide adequate working space for compactive equipment.

Excavate trenches to the depth indicated or required. Carry the depth of trenches for piping to establish the indicated flow lines and invert elevations and provide suitable bedding. Pipe bedding as specified in paragraph 2.01A(2).

Where rock is encountered, carry the excavation six (6) inches below the required elevation and backfill with a 6-inch layer of crushed stone or gravel prior to installing pipe.

Grade bottoms of trenches as indicated, notching under pipe joints to provide solid bearing for the entire body of the pipe.

Do not backfill trenches until authorized by the Owner's Representative. Use care in backfilling to avoid damage or displacement of pipe systems.

D. Site Excavation: Conform to elevations and dimensions shown within a vertical tolerance of 0.1 of a foot. During the excavation to base grade, excavating equipment and trucks are to be kept off the subgrade to minimize disturbance of the subgrade. Excavate to a depth to provide for any subsequent loam, sod, or other specified surface material.

E. Excavation of Unsuitable Material: Shall consist of the excavation and removal of all fill materials including loose, uncompacted soils material, buried rubber tires and waste, saturated soil materials (muck), buried vegetation, and other organic or inorganic debris shown on the Drawings, encountered during the prosecution of the work, or as directed by the Engineer. The excavation shall extend to the limits and depth necessary to remove all fill and unsuitable material as directed by the Owner's Representative.

3.03 STABILITY OF EXCAVATIONS: Slope sides of excavations to comply with local, state and federal codes and ordinances having jurisdiction. Shore and brace where sloping is not possible because of space restrictions or stability of material excavated.

Maintain sides and slopes of excavations in a safe condition until completion of backfilling.

3.04 SHORING AND BRACING: Provide materials for shoring and bracing, such as sheet piling, uprights, stringers, and cross-braces, in good serviceable condition.

Establish requirements for trench shoring and bracing to comply with local codes and authorities having jurisdiction.

Maintain shoring and bracing in excavations regardless of time period excavations will be open. Carry down shoring and bracing as excavation progresses.

Provide permanent steel sheet piling or pressure treated timber sheet piling wherever subsequent removal of sheet piling might permit lateral movement of soil under adjacent structures. Cut off tops as required and leave permanently in place.

3.05 MATERIAL STORAGE: Stockpile satisfactory excavated materials where directed, until required for backfill or fill. Place, grade and shape stockpiles for proper drainage. Seed and mulch stockpile areas as necessary to prevent erosion in accordance with MEDEP's BMPs.

Locate and retain soil materials away from edge of excavations.

Dispose of excess soil material and waste materials as herein specified.

3.06 COLD WEATHER PROTECTION: Protect excavation bottoms against freezing when atmospheric temperature is less than 35°F.

3.07 WINTER CONSTRUCTION OF EMBANKMENTS AND CLAY BARRIERS: Frozen material shall not be placed in the embankment or clay barriers. The construction of embankments may continue during cold weather only when all frozen material in the top of the embankment or the existing ground is moved to the waste storage area, or removed from the site, before placing additional material.

Compaction shall be in accordance with the specified method of embankment and clay barriers construction. When the prevailing temperatures are below 30°F, all material used in embankment construction and clay barriers shall have a moisture content at the time of compaction equal to or less than the optimum moisture content.

The embankment shall not be constructed upon frozen material except that such construction of embankments outside the building area may be allowed providing the total depth of the added fill, including gravel bases, plus the depth of the frozen material beneath does not exceed 5 feet. Frozen material may be left in the embankment only if it has been compacted as specified prior to freezing. The Contractor shall not resume construction of any embankments built in this manner until all frozen material has thawed. If test holes are required to make this determination, they shall be dug and backfilled with satisfactory compaction at the Contractor's expense. Before additional material is added, uncompacted material on the surface of such embankments shall be either recompacted in accordance with the specified method of embankment construction or removed. Clay barrier layers shall not be constructed upon frozen material. The Contractor shall be responsible for protecting any clay barrier material placed from freezing. If previously placed clay material freezes, it shall be removed, thawed, and then replaced.

3.08 CLOSING ABANDONED UNDERGROUND UTILITIES: Close open ends of abandoned underground utilities, indicated to remain, permanently with closures sufficiently strong to withstand pressures which may result after closing.

Close open ends of metallic conduit and pipe with threaded galvanized metal caps or plastic plugs, or other suitable method for the type of material and size of pipe. Do not use wood plugs.

Close open ends of concrete and masonry utilities with not less than 8-inch thick brick masonry bulkheads, constructed to completely fill the opening.

Wet brick before laying. Lay brick in mortar so as to form a full bed with ends and side joints in one operation. Joints shall be more than 3/8 inch wide. Protect fresh masonry from freezing or from rapid drying, as necessary, and maintain protection until mortar has set.

3.09 COMPACTION:

A. General: Control soil compaction during construction providing minimum percentage of density specified for each area classification.

B. Percentage of Maximum Density Requirements: Compact soil to not less than the following percentages of maximum dry density (determined in accordance with ASTM D 698).

1. Cover Material: 90 percent maximum dry density or greater as needed to obtain required hydraulic conductivity requirement.
2. Containment Berm: 90 percent maximum dry density.
3. Pipe Trenches: Compact bedding material and each layer of backfill to 12 inches over the pipe to at least 90 percent maximum dry density for bedding materials other than 3/4-inch stone.

C. Moisture Control: Moisture content of the embankments shall be at, but not greater than, 4 percent higher than optimum as determined by ASTM D 698 (standard proctor). Where subgrade or a layer of soil material must be moisture conditioned before compaction, uniformly apply water to surface of subgrade, or layer of soil material, in proper quantities to prevent free water appearing on surface during or subsequent to compaction operations.

Remove and replace, or scarify and air dry, soil material that is too wet to permit compaction to specified density. Soil material which has been reworked or reconditioned shall be retested at approximately the same locations and frequency.

Soil material that has been removed because it is too wet to permit compaction may be stockpiled or spread and allowed to dry. Assist drying by discing, harrowing or pulverizing until moisture content is reduced to a satisfactory level.

D. Placement and Compaction: Placement of fill materials will be in layers not more than 16 inches in loose depth for material compacted by heavy compaction equipment, and not more than 6 inches in loose depth for material compacted by hand-operated tampers.

Before compaction, moisten or aerate each layer as necessary to provide the optimum moisture content. Compact each layer to required percentage of maximum dry density for each area classification. Do not place backfill or fill material on surfaces that are muddy, frozen, or contain frost or ice.

Place backfill and fill materials evenly adjacent to structures, to required elevations. Take care to prevent wedging action of backfill against structures by carrying the material uniformly around structure to approximately same elevation in each lift.

To eliminate desiccation cracks the surface will be moistened (as necessary) and reworked with 2 passes of a smooth drum roller. Desiccation is defined as moisture content below optimum, or cracks deeper than 1 inch. The cover soil will be placed and compacted and progressively covered with the overlying cover system (i.e., vegetative topsoil, seeded and mulched), to minimize the exposure of the cover material. The closure construction activities shall be phased in such a way that leachate generated in areas of stripped topsoil is collected and conveyed to the facility's leachate transport system without leaving the landfill waste limits.

The cover soil shall be compacted at the end of each work day to provide for moisture/density testing and prevent ponding of surface water overnight.

E. The Contractor shall be responsible for maintaining surface area to be covered by geomembrane as specified in Section 02771 3.03A and B.

F. Placement of soil over the geomembrane shall be in accordance with Section 02771 3.08.F.

3.10 BACKFILL AND FILL:

A. General: Place acceptable soil material in layers to required subgrade elevations, for each area classification listed below.

1. In excavations, use satisfactory excavated or common borrow material.
2. Under grassed areas, use satisfactory excavated or vegetative cover material.

B. Backfill excavations as promptly as work permits, but not until completion of the following:

1. Acceptance by Owner's Representative of construction below finish grade including, where applicable, dampproofing, waterproofing, and perimeter insulation.
2. Inspection, testing, approval, and recording locations of underground utilities.
3. Removal of concrete formwork.
4. Removal of shoring and bracing, and backfilling of voids with satisfactory materials. Temporary sheet piling driven below bottom of structures shall be removed in manner to prevent settlement of the structure or utilities, or cut off and left in place if required.
5. Removal of trash and debris.
6. Permanent or temporary horizontal bracing is in place on horizontally supported walls.
7. As-built survey of construction (as necessary).

C. Ground Surface Preparation: Remove vegetation, debris, unsatisfactory soil materials, obstructions, and deleterious materials from ground surface prior to placement of fills. Plow, strip, scarify or break-up sloped surfaces steeper than 1 vertical to 4 horizontal so that fill material will bond with existing surface.

When existing ground surface has a density less than that specified under "Compaction" for the particular area classification, break up the ground surface, pulverize, moisture-condition to the optimum moisture content, and compact to required depth and percentage of maximum density.

Equipment such as low ground pressure dozers will be used during the placement of soil materials. Extra precaution will be taken with the equipment used for placement to avoid sudden turns, stops or starts that could disturb the subbase materials. Similar equipment and precautions will be utilized during the placement of sand and topsoil above the geomembrane. The equipment used in placement of materials placed on the geomembrane shall be approved by the Engineer.

Placement of soil materials above the liner system shall be done in an upslope direction and in a manner that is least likely to cause wrinkles or damage to the underlying geosynthetics.

Equipment used to construct the landfill shall be approved by the Engineer prior to or during the pre-construction meeting.

3.11 GRADING:

A. General: Uniformly grade areas within limits of grading under this section, including adjacent transition areas. Smooth finished surface to required elevation within a tolerance of 0.1 foot. Compact with uniform levels or slopes between points where elevations are shown, or between such points and existing grades.

B. Compaction: After grading, compact subgrade surfaces to the depth and percentage of maximum density for each area classification.

3.12 TOPSOILING:

A. General: This work consists of placing vegetative cover of the specified thickness on prepared subgrade in all areas disturbed by construction and not otherwise surfaced or covered by structures and shall be in accordance with Section 02800 Seeding.

3.13 MAINTENANCE

A. Protection of Graded Areas: Protect newly graded areas from traffic and erosion. Keep free of trash and debris. If necessary, repair and re-establish grades in settled, eroded, and rutted areas to specified tolerances at no additional cost to the Owner.

B. Reconditioning Compacted Areas: Where completed compacted areas are disturbed by subsequent construction operations or adverse weather, scarify surface, re-shape, and compact to required density prior to further construction at no additional cost to the Owner.

3.14 DISPOSAL OF EXCESS AND WASTE MATERIALS:

A. Removal from Owner's Property: Remove waste materials, including unacceptable excavated material, trash and debris, and dispose of it off the Owner's property.

END OF SECTION

SECTION 02220

EROSION CONTROL

PART 1 - GENERAL

1.01 RELATED DOCUMENTS: Drawings, general provisions of Contract, supplementary and general conditions apply to the work specified under this section.

1.02 RELATED WORK SPECIFIED ELSEWHERE:

A. Site Preparation: Section 02100

B. Earthwork: Section 02200

C. Seeding: Section 02800

1.03 DESCRIPTION OF WORK:

A. The Contractor shall provide all materials, equipment, and labor necessary for the dewatering of excavations and the removal and/or diversion of surface water from the construction area, and installation of siltation and erosion control structures as shown on the Drawings and according to these Specifications, and in accordance with the MEDEP "Best Management Practices" – October 2016, or as currently revised, for erosion and sedimentation control.

B. The Contractor shall build all drains and do all ditching, pumping, bailing, and all other work necessary to keep the excavation clear of groundwater, or storm water during the progress of the work and until the finished work is safe from damage. The Contractor shall make provisions on the site to detain and filter water from the excavation operation so that sediments from the dewatering operation are contained. In no case will direct discharge from the dewatering operations to off-site drainage facilities be allowed.

C. The Contractor shall perform all inspections and documentation required by the General Conditions of the MEDEP Maine General Construction Permit.

D. The Contractor shall provide temporary seeding, mulching, or other protective coverings to exposed earth surfaces or stockpiles which will be exposed to rain or wind elements for a period of greater than two weeks.

E. The Contractor shall provide siltation fences, riprap, and/or stone check dams in the newly constructed drainage ditches for temporary sediment control as shown on the Contract Drawings.

F. At the completion of landfill construction activities, the Contractor shall provide permanent seeding, mulching, or other protective landscape coverings to exposed earth surfaces effected by construction activities, and a shown on the Contact Drawings, and as specified in Section 02800.

G. The Contractor shall be responsible for inspection, maintenance, and/or repair of all temporary erosion and sedimentation control measures during construction, including temporary erosion and sedimentation control measures installed by others and used during this project. Inspections will be undertaken by qualified personnel to ensure that controls are correctly functioning, and that additional erosion control measures are in installed if needed. Such inspections will occur bi-weekly and after each significant rain fall event (1 inch or more within a 24 hour period) during construction until permanent erosion control measures have been properly installed and the site is stabilized. Trapped sediment shall be removed when the

height of the sediment reaches greater then one-half the depth of the erosion control measure.

1.04 SEDIMENT CONTROL GUIDELINES:

A. Maine Erosion and Sedimentation Control BMPs, October 2016.

B. State of Maine Department of Environmental Protection Natural Resources Protection Act Permit by Rule Standards Chapter 305 (effective February 1989, revised April 1992).

C. MEDEP Maine Construction General Permit requirements.

1.05 SUBMITTALS:

A. The Contractor shall furnish to the Engineer, in writing, his plan for dewatering excavations and diverting surface water before beginning the construction work for which the dewatering or diversion is required. Acceptance of this plan will not relieve the Contractor of responsibility for completing the work as specified.

B. Manufacturer's product data sheets, material certifications, and standard manufacturing quality control test data for products listed in Part 2 of this specification.

1.06 PRODUCT DELIVERY, STORAGE, AND HANDLING:

A. Packaged Materials: Deliver packaged materials in containers showing weight, analysis and name of manufacturer. Handle material in accordance with manufacturer's recommendations. Protect materials from deterioration during delivery, and while stored at the site.

PART 2 - PRODUCTS

2.01 SILTATION FENCE:

A. Siltation fence shall be preassembled fence consisting of synthetic filter fabric reinforced with a supporting mesh and mounted on wood or metal stakes.

2.02 EROSION CONTROL BLANKET:

A. Shall be placed on newly topsoiled and seeded areas as indicated on the Contract Drawings. The matting shall be North American Green C125 installed with Staple Pattern D, as shown on the Contract Drawings, or an approved equal.

2.03 STONE CHECK DAMS:

A. Stone for check dams shall consist of a mixture of angular stones having a particle size between 2 inch and 3 inch. The check dams shall be installed at locations as indicated on the Drawings and shall be constructed as detailed on the Drawings.

B. Exposed Stone: The exposed stones for the check dams shall be angular and as nearly rectangular in cross-section as practicable. Rounded stone will not be permitted without the Engineer's approval. The stone shall consist of durable stones that will not disintegrate by exposure to the action of water or weather.

PART 3 - EXECUTION

3.01 GENERAL

A. The Contractor shall provide for the diversion of clean surface water from the construction area for the duration of the construction project.

B. The Contractor shall provide for the dewatering of excavations and the diversion of surface water from the construction areas and install siltation and erosion control measures as necessary in accordance with MEDEP BMPs.

C. The Contractor shall build all drains, dikes, sediment basins, install all siltation fencing, mulches, grasses, seeding, ditches, channels, riprap, grading, and all other work necessary to control water pollution, surface runoff, and soil erosion.

D. The Contractor shall provide temporary seeding, mulching, or other protective coverings to exposed earth surfaces or stockpiles which will be exposed to rain or wind elements through the fall and winter seasons.

E. The Contractor shall maintain all facilities necessary to control water pollution, surface runoff, and soil erosion until permission is given by the Engineer to discontinue the use of the facilities.

3.02 EROSION CONTROL PROVISIONS:

A. The discharge from pumping operations during dewatering operations shall be contained by a dike so constructed as to prevent siltation and the area of the outlet pipe shall be protected against erosion by flowing water by the construction of a rock or timber apron.

B. Prior to removal of sediment control dikes all retained silt or other materials shall be removed and placed within landfill limits in areas not susceptible to erosion, at no additional cost to the Owner.

3.03 REMOVAL OF TEMPORARY WORKS:

A. After the temporary works have served their purposes, the Contractor shall remove them or level and grade them to the extent required to present a sightly appearance and to prevent any obstruction of the flow of water or any other interference with the operation of or access to the permanent works.

3.04 PLACEMENT OF EROSION CONTROL BLANKET: Erosion control blanket shall be placed at locations indicated on Contract Drawings. The anchoring of the blanket shall be in accordance with manufacturer's recommendations or as directed by the Engineer or Owner's Representative.

3.05 MAINTENANCE AND ACCEPTANCE:

A. The Contractor shall be responsible for inspection and maintenance of all temporary erosion and sedimentation control measures during construction. Inspections will be undertaken and documented by a qualified person to ensure that controls are correctly functioning, and that additional erosion control measures are in installed if needed. Such inspections will occur bi-weekly and after each significant rain fall event (1 inch or more within a 24 hour period) during construction until permanent erosion control measures have been properly installed and the site is stabilized. Trapped sediment shall be removed when the height of the sediment reaches greater than one-half the depth of the erosion control measure.

END OF SECTION

SECTION 02261

RIPRAP

PART 1 - GENERAL

1.01 RELATED DOCUMENTS:

A. Drawings and general provisions of Contract, including General and Supplementary Conditions, apply to work of this Section.

1.02 RELATED WORK SPECIFIED ELSEWHERE:

A. Sitework - General: Section 02000

B. Earthwork: Section 02200

C. Erosion Control: Section 02220

D. Geotextiles: Section 02772

1.03 DESCRIPTION

A. Work specified in this Section shall consist of furnishing all labor, materials, and equipment to place a protective covering of riprap on the slopes of embankments, dikes, streambanks, channels, culvert inlets and outlets, and storm sewer outlets in conformity with the Contract Drawings and as specified herein.

PART 2 - MATERIALS

2.01 TYPE OF STONE: Stones used for riprap shall consist of sound durable rock which will not become disintegrated by exposure to the action of water or weather. Either field stone or rough unhewn quarry stone may be used.

A. Riprap used in the construction shall have a minimum d_{50} size as specified on the contract drawings.

2.02 EXPOSED STONE: The exposed stones for riprap shall be angular and as nearly rectangular in cross-section as practicable. Rounded boulders or cobbles will not be permitted without Engineer's approval.

2.03 BEDDING MATERIAL: Material for bedding shall be aggregate base material conforming to Specification 02200, Earthwork; Section 2.01.A.6.

2.04 GEOTEXTILE: A non-woven geotextile conforming to Specification 02722, Geotextiles and Drainage Geocomposite, paragraph 2.01A, shall be placed along the areas receiving riprap as shown on the Contract Drawings or as directed by the Owner's Representative.

PART 3 - EXECUTION

3.01 PLACEMENT OF RIPRAP: Riprap shall be placed full depth in one operation without special handwork, shall be approximately true to the required slope line and grade and be uniform in appearance. Larger stones shall be placed at the base of the slope. The stones shall be placed on close contact with the longer axis perpendicular to the plane of the slope and so as to stagger joints. The openings between the stones shall be filled with spall, or gravel and rocks securely pressed into place.

END OF SECTION

SECTION 02450

PIPE INSTALLATION

PART 1 - GENERAL

1.01 RELATED DOCUMENTS: Drawings, general provisions of contract, and supplementary general conditions apply to the work specified under this section.

A. The requirements set forth by the Quality Assurance/Quality Control Plan shall apply to the work specified in this Section.

1.02 RELATED WORK SPECIFIED ELSEWHERE:

A. Earthwork: Section 02200

B. Erosion Control: Section 02220

C. Polyethylene Piping: Section 02455

D. Manholes, Catch Basins, and Drainage Structures: Section 02570

E. PVC Pipe and Fittings: Section 02456

1.03 REFERENCE:

The publications listed below are part of this Technical Specification to the extent referenced. The publications are referred to in the text by the basic designation only.

A. The American Society for Testing and Materials (ASTM):

1. ASTM D 2321, "Standard Practice for Underground Installation of Thermoplastic Pipe for Sewers and Other Gravity-Flow Applications"
2. ASTM D 2774, "Standard Practice for Underground Installation of Thermoplastic Pressure Piping"

1.04 DESCRIPTION OF WORK:

A. Work of this Section shall consist of furnishing all labor, materials, and equipment to install and test pipes and culverts. Only the appropriate portions of this section pertaining to the specific contract work identified in Section 01010 "Summary of Work" or as directed by the Engineer, will apply.

1.05 SUBMITTALS:

A. The Contractor shall furnish the name of the pipe and fittings manufacturer to the Engineer prior to commencing the work. Pipe of the same manufacturer shall be used throughout the project.

B. The Contractor shall submit to the Engineer a Construction Schedule for pipe installation.

PART 2 – PRODUCTS

Not Applicable.

PART 3 - EXECUTION

3.01 INSTALLATION:

A. All materials shall be stored and handled in accordance with the manufacturer's recommendations.

B. Excavate, backfill and compact soils in accordance with Section 02200.

C. Sewer Grade Defined: The sewer grade shown on the drawings, and referred to in the specifications is as follows: When a gravel or concrete foundation is used, it is the underside of the gravel or concrete indicated on the plans. When neither a gravel nor concrete foundation is used, it is the underside of the barrel of the pipe covered by this Contract.

D. Pipe Jointing: All joints shall be made in a dry trench and in accordance with the manufacturer's recommendations and the best practices for class of pipe installed. The ends of the pipe shall be wiped clean with a dry cloth before making the joint.

E. Pipe Installation:

1. The pipe shall be accurately installed to the line and grades to the satisfaction of the Engineer. The line and grade may be adjusted by the Engineer from that shown on the drawings to meet field conditions and no extra compensation shall be claimed therefore. Whenever the nature of the material excavated is such as to render it unsuitable for bedding or backfill material, the Contractor shall furnish suitable material as otherwise provided in these specifications.
2. Dewatering: Remove any standing water in trench before pipe or bedding installation.
3. Perforated pipe shall be installed as shown in the Contract Drawings. Perforations shall be installed in the correct orientation as shown on Contract Drawings.
4. For trench conditions, the pipe shall be bedded in stone pipe bedding placed on a flat trench bottom. The bedding material shall be worked (chinked) under the haunches manually to assure proper support. The bedding material shall completely fill the trench and extend for a minimum of 6 inches above and below the top and bottom of the pipe, respectively, or as indicated in the Contract Drawings. Suitable backfill material shall be placed above the pipe bedding material in 9-inch lifts and compacted to 90 percent maximum density. The Contractor shall place warning tape along the length of the trench installation one foot below finish grade.
5. Maximum lengths of fused pipe to be handled as one section shall be places according to manufacturer's recommendations as to pipe size, pipe DR and topography so as not to cause excessive gouging or surface abrasion; but not to exceed 400 feet.
6. Temporarily cap pipe sections longer than a single length (40 feet) on both ends during placement and on leading end of fusion operations, thereby preventing unnecessary intrusion of soil.
7. Complete tie-ins within the trench where possible to prevent overstressing of the pipe and connection.
8. Notify Engineer prior to pipe installation in trench to allow time for Engineer's inspection.
9. Contractor shall maintain proper trench width during pipe installation as shown on the Contract Drawings. In areas where the Contractor's trenching operation exceeds the typical section, the Contractor may be required to use a higher strength class pipe in lieu of the designated class pipe at no additional cost to the Owner.
10. Allow sufficient time to adjust to trench temperature prior to testing, segment tie-ins or backfilling pipe.
11. Coordinate pipe installation adjacent to access roads with Owner to limit impediment of the landfill operations or operations of other Contractors.

F. Pipe Cutting:

1. Where required, sections of pipe may be cut to provide shorter sections of pipe necessary for the construction. The cutting of the pipe shall be done in accordance with the pipe manufacturer's recommendations and subject to the approval of the Engineer. Note: For dual-contained pipe, field cutting and fitting is not recommended due to the extreme importance of the conductor being centralized in the containment pipe. For tie-ins with this pipe the Contractor shall notify the pipe manufacturer of special length pipes required at the onset of the job to avoid delays.
2. When permitted and allowed by the pipe manufacturer, the pipe material shall be cut by using a saw or milling process, approved by the pipe manufacturer and not by using any impact device, such as a hammer and chisel, to break the pipe. The pipe shall be cut, not broken. The cut end of the pipe shall be square to the axis of the pipe and any rough edges ground smooth.

G. Valve Installation: All valves shall be installed in accordance with the specifications for the pipe to which they are to be connected. Valve joints shall be made up in accordance with the Contract Drawings. The valves shall bear no stresses due to loads from the adjacent pipe. All valves shall be inspected before installation and they shall be cleaned and well lubricated before being installed in the line.

H. Inspection: Pipe installation shall be subject to inspection by the Engineer for quality, adherence to line and grade, jointing, and proper backfill. Any joint not satisfactory to the Engineer shall be removed and remade to his satisfaction at the Contractor's expense. No pipe shall be backfilled until it has been approved by the Engineer**. Prior to backfilling, the contractor shall obtain as-built top of pipe coordinates and elevations at grade changes, fittings, and at least every 50 feet along the length of pipe.**

3.02 PIPE INSULATION: (NITC)

A. Exposed Condition: Install 2-inch thick Foamglass insulation by Pittsburg Corning with flexible PITTWRAP insulation jacketing where noted on plans or as directed by the Owner’s Representative.

B. Buried Trench Condition: Install 2-inch thick x 4-ft wide Styrofoam SM insulation as manufactured by Dow Chemical Co., or approved equal, between pipe and culvert or over pipe when noted on plans or as directed by the Owner’s Representative. Install over the pipe when there is less than 5 ft of cover between the top of pipe and original ground grade. Install 6 in. above the pipe unless otherwise shown on Drawings, and provide 6-in. sand blanket above and below insulation.

3.03 SPECIAL REQUIREMENTS:

A. Flexible Pipe: In the case of the installation of polyvinyl chloride pipe and HDPE, strict adherence should be made to the general pipe installation requirements (3.01-D), so that the total deflection in these pipes does not exceed 5.0% of the pipe diameter being installed.

B. Assembling Push-On Joints: Push-on joints shall be made up by first inserting the gasket into the groove of the bell and applying a thin film of special nontoxic gasket lubricant uniformly over the inner surface of the gasket which will be in contact with the spigot end of the pipe. The chamfered end of the plain pipe shall be inserted into the gasket and then pushed past it until it seats against the bottom of the socket.

C. Assembling Mechanical Joint Retainer Glands: Surfaces against which the gasket will come in contact shall be thoroughly brushed with a wire brush prior to assembly of the joint. The gasket shall be cleaned. The gasket, bell, and spigot shall be lubricated by being washed with soapy water. The gland and gasket, in that order, shall be slipped over the spigot, and the spigot shall

be inserted into the bell until it is correctly seated. The gasket shall then be seated evenly in the bell at all points, centering the spigot, and the gland shall be pressed firmly against the gasket. After all bolts have been inserted and the nuts have been made up fingertight, diametrically opposite nuts shall be progressively and uniformly tightened all around the joint to the proper tension by means of a torque wrench.

The correct range of torque as indicated by a torque wrench and the length of wrench (if not a torque wrench) used by an average man to produce such range of torque, shall not exceed the values specified in the tabulation titled TORQUE RANGE VALUES.

TORQUE RANGE VALUES

Range of torque	60 to 90 ft-lb
Length of wrench	10 in.

If effective sealing of the joint is not attained at the maximum torque indicated above, the joint shall be disassembled and thoroughly cleaned, then reassembled. Bolts shall not be overstressed to tighten a leaking joint. Set screws for retainer glands shall be torqued as recommended by the manufacturer.

END OF SECTION

SECTION 02455

POLYETHYLENE PIPING

PART 1 - GENERAL

1.01 RELATED DOCUMENTS: The general provisions of the contract, including General and Supplementary conditions and General Requirements (if any) apply to the work specified in this section.

1.02 DESCRIPTION: This work shall consist of furnishing materials in conformity with the contract drawings and as specified herein.

1.03 RELATED WORK SPECIFIED ELSEWHERE:

A. Earthwork: Section 02200

B. Pipe Installation: Section 02450

C. Geotextiles and Drainage Geocomposite: Section 02772

1.04 SUBMITTALS: The Contractor shall furnish the name of the manufacturer of pipe and appurtenances to the Owner's Representative prior to commencing work. Pipe of the same manufacturer shall be used throughout the project.

The Owner's Representative may request the manufacturer to submit a certification certifying the project meets requirements in this specification.

PART 2 - PRODUCTS

2.01 GENERAL:

A. Passive Gas Vent Pipe: Provide ADS perforated N-12 ST IB, or approved equal. Provide pipe, fittings, joint kits, and all accessories of the same material and weight class as pipe.

B. 4-inch and 6-inch Drain Pipe:

Provide ADS perforated and solid N-12 ST IB pipe with smooth interior wall or approved equal. Provide pipe, fittings, joint kits, and all accessories of the same material and weight class as pipe. The perforations shall be 0.875- x 0.125-inch slots with three slots per valley spaced 120° apart. The pipe shall be wrapped with a 2.5-3.5 oz/yd^3 polyester knitted filter sock having the following properties: Mullen Burst> 100 psi, Flow Rate 300 gallons/min/ft^2, AOS U.S. sieve No. 30 or engineer-approved equal.

C. Culvert pipe: Provide ADS N-12 ST IB pipe with smooth interior wall or approved equal. Provide pipe, fittings, joint kits, and all accessories of the same material and weight class as pipe.

D. Standards:

1. AASHTO M252 Type S for Drainage Pipe.
2. AASHTO M294 Type S for Culvert Pipe.

E. Pipe:

1. The HDPE pipe must conform to ASTM D 3035 and D 3350.
2. Outside diameter of pipe shall conform to International Standard Organization (ISO) recommendations for outside diameters.

3. The pipe shall contain no recycled compound except that generated in the manufacturer's own plant from resin of the same specification from the same raw material.
4. Perforated pipe shall be provided as indicated on the Contract Drawings. The perforations shall be 0.875- x 0.125-inch slots with three slots per valley spaced 120° apart.
5. The perforated pipe shall be wrapped with a 3.5 oz/yd^3 polyester knitted filter sock having the following properties: Mullen Burst> 100 psi, Flow Rate 300 gallons/min/ft^2, AOS U.S. sieve No. 30 or engineer approved equal.

F. Joints:

1. Pipes: Join to one another with bell and spigot or manufacturers joint kit for specified pipe.

G. Accessories

1. Provide and securely install Agri Drain Rat Guard (or approved equal) rodent screens on exposed ends of drain pipes, installed in a manner in which they can be removed for pipe access.

PART 3 - EXECUTION

3.01 GENERAL

A. Passive Gas Vent Pipe: Work involves possible extension of a passive gas vent piping system, in the locations shown on the Contract Drawings along the crown of the landfill. Work will be performed in conjunction with the final grading of the landfill and with the installation of the gas collection sand layer.

B. Drain Pipe: Work involves the installation of a piping system to facilitate the removal of water from within the final cover system. Pipe installation will be performed in conjunction with the drainage sand installation, and all piping will be installed in the locations identified on the Contract Drawings. To limit the potential movement of the drainage pipe during construction, bags containing drainage layer sand will be placed over the pipe every 10 to 15 feet.

C. Culvert Pipe: Shall be installed in the locations and to the elevations identified in the Contract Drawings as part of the stormwater management devices to be constructed as a component of the final cover system.

END OF SECTION

SECTION 02456

PVC PIPE AND FITTINGS

PART 1 - GENERAL

1.01 RELATED DOCUMENTS: Drawings, general provisions of contract, and supplementary general conditions apply to the work specified under this section.

1.02 RELATED WORK SPECIFIED ELSEWHERE:

A. Earthwork: Section 02200

B. Pipe Installation: Section 02450

C. Manholes, Catch Basins, and Drainage Structures: Section 02570

1.03 REFERENCES:

1. ASTM D 3034, "Standard Specification for Type PSM Poly(Vinyl Chloride) (PVC) Sewer Pipe and Fittings"
2. ASTM D 1784, "Standard Specification for Rigid Poly(Vinyl Chloride) (PVC) Compounds and Chlorinated Poly(Vinyl Chloride) (CPVC) Compounds"
3. ASTM D 1785, "Standard Specification for Poly(Vinyl Chloride) (PVC) Plastic Pipe, Schedules 40, 80, and 120"
4. ASTM D 2464, "Standard Specification for Threaded Poly(Vinyl Chloride) (PVC) Plastic Pipe Fittings, Schedule 80"
5. ASTM D 2467, "Standard Specification for Poly(Vinyl Chloride) (PVC) Plastic Pipe Fittings, Schedule 80"
6. ASTM D 2564, "Standard Specification for Solvent Cements for Poly(Vinyl Chloride) (PVC) Plastic Piping Systems"
7. ASTM D 2855, "Standard Practice for Making Solvent-Cemented Joints with Poly(Vinyl Chloride) (PVC) Pipe and Fittings"
8. ASTM D 3212, "Standard Specification for Joints for Drain and Sewer Plastic Pipes Using Flexible Elastomeric Seals"
9. ASTM D 3915, "Standard Specification for Rigid Poly(Vinyl Chloride) (PVC) and Chlorinated Poly(Vinyl Chloride) (CPVC) Compounds for Plastic Pipe and Fittings Used in Pressure Applications"
10. ASTM F 477, "Standard Specification for Elastomeric Seals (Gaskets) for Joining Plastic Pipe"

1.04 DESCRIPTION OF WORK:

A. Work of this Section shall consist of furnishing all labor, materials, and equipment to install and test PVC pipes as shown on the Contract Drawings. Only the appropriate portions of this section pertaining to the specific contract work identified in Section 01010 "Summary of Work" or as directed by the Engineer, will apply.

1.05 SUBMITTALS:

A. The Contractor shall furnish the name of the pipe and fittings manufacturer, to the Owner's Representative prior to commencing the work. Pipe of the same manufacturer shall be used throughout the project.

B. The Contractor shall submit to the Engineer a Construction Schedule for pipe installation.

C. The Contractor shall submit manufacturer's technical product data including chemical resistance data and installation instructions for piping joints and fittings.

1.06 PACKAGING DELIVERY AND HANDLING:

The pipe and fitting manufacturer shall package products for shipment in a manner suitable for safe transport by commercial carrier. When delivered, a receiving inspection shall be performed, and any shipping damage reported to the pipe and fittings manufacturer. Pipe and fittings shall be handled, installed and tested in accordance with manufacturer's recommendations, and the requirements of this specification.

PART 2 – PRODUCTS

2.01 PVC PIPE AND FITTINGS

A. Pipe and fittings shall be manufactured from a PVC compound which meets the requirements of Cell Classification 12454-B PVC as outlined in ASTM D 1784. Pipe and fittings materials shall be specially formulated with sufficient ultraviolet (UV) screeners to provide for longer term outdoor exposure with no deleterious effects.

B. Clean rework or recycle material generated by the manufacturer's own production may be used so long as the pipe or fittings produced meet all the requirements of this specification

C. Dimensions: Pipe Size and DR Rating shall be as shown on the Drawings.

PART 3 - EXECUTION

3.01 PIPE HANDLING

PVC pipe and pipe fittings shall be handled according to manufacturers recommendations. Under no circumstance shall Pipe and pipe fittings be dropped or dumped.

3.02 PIPE JOINTING

A. All pipe shall be inspected for cuts, scratches, or other damage prior to installation. Pipe with imperfections shall not be incorporated into the work.

B. All joints shall be made in a dry trench in accordance with the manufacturer's recommendations and the best practices for material and class of pipe installed. The ends of the pipe shall be wiped clean with a dry cloth before making each joint.

C. Bell ends of pipe shall be installed uphill.

D. Solvent cemented joints:

1. Use a good grade of PVC cement which meets ASTM standard D-2564
2. Cut pipe to desired length with pipe cutters, hack saw or cross cut saw.
3. Ream pipe both internally and externally to remove burrs and ragged edges.
4. Before making solvent weld joint be sure all joining surfaces are free of dirt, dust, water, and oil.
5. The use of a primer before the application of PVC cement is recommended.
6. Apply primer to both joining surfaces.
7. Immediately apply a smooth coat of cement to the joining surfaces.
8. Immediately insert the spigot end into the bell end to the full depth of the socket.
9. Turn pipe 1/8 to 1/4 turn in the socket to insure an even spread of cement.
10. Hold firmly in position for 15 seconds.

11. Allow joint to set according to cement manufacturer’s instructions

E. Pipe Cutting:

1. Where required, sections of pipe may be cut to provide shorter sections of pipe necessary for the construction. The cutting of the PVC pipe shall be done in accordance with the pipe manufacturer's recommendations and subject to the approval of the Engineer.
2. In general, the PVC pipe material shall be cut by using a saw or milling process, approved by the pipe manufacturer and not by using any impact device, such as a hammer and chisel, to break the pipe. The pipe shall be cut, not broken. The cut end of the pipe shall be square to the axis of the pipe and any rough edges ground smooth.

3.03 PIPE INSTALLATION AND TESTING

Install and test pipe in accordance with Section 02450 of these specifications.

3.04 PIPE SYSTEM IDENTIFICATION: All system components shall be identified in accordance with mill standards. Pipe system components shall be labeled at all accessible structures. Pipe labeling shall include labels that identify the type of fluid in the pipe and the normal flow direction of fluid in the pipe network.

END OF SECTION

SECTION 02570

MANHOLES, CATCH BASINS, AND DRAINAGE STRUCTURES

PART 1 - GENERAL

1.01 RELATED DOCUMENTS:

A. Drawings, general provisions of contract, and supplementary general conditions apply to the work specified under this section.

B. The requirements set forth by the Quality Assurance/Quality Control Plan shall apply to the work specified in this Section.

1.02 RELATED WORK SPECIFIED ELSEWHERE:

A. Earthwork: Section 02200

B. Erosion Control: Section 02220

C. Pipe Installation: Section 02450

1.03 DESCRIPTION OF WORK: Work specified in this section shall consist of furnishing all labor, materials, and equipment to construct manholes or catch basins, in conformity with the contract drawings and as specified herein.

1.04 SUBMITTALS:

A. The Contractor shall submit to the Engineer shop drawings of all precast units. Manufacturer's information shall be submitted for joint sealants and waterproofing. Manufacturer shall provide anti-floatation design shop drawings and calculations, including any extended base slabs as necessary, for proposed manholes. Manufacturer shall assume groundwater levels equal top of ground elevations and provide for a 1.2 factor of safety against floatation.

PART 2 – MATERIALS

2.01 PRECAST MANHOLE AND CATCH BASIN SECTIONS: Precast sections shall be manufactured in accordance with the latest ASTM Specification Designation C-478. Precast manholes shall be reinforced for H-20 loading (4,000 psi concrete).

2.02 MORTAR: Cement mortar shall be prepared in the following manner:

A. The cement shall be Type II. The mix shall be one (1) part cement to three (3) parts clean, well graded, hard, durable sand. Hydrated lime may be added to the mixture in an amount not to exceed 15% by weight of the cement. The amount of water shall be only the amount necessary to make a workable mix.

2.03 BRICK: Brick for manholes shall meet the latest AASHTO Specification Designation M-91.

2.04 PRECAST DRYWELL: Precast drywell shall be an American Concrete No. 1126 or equal. No cover is required.

2.05 WATERPROOFING: Waterproofing for manholes shall be either of the following:

A. Asphalt conforming to ASTM Designation D-41.

B. Cement base coating suitable for brush coat application.

2.06 HDPE LINER: All inner surfaces of the leachate transport manholes shall be provided with a cast-in-place, 3-mil HDPE Sure-Grip® Liner System as manufactured by Agru or equal. The HDPE shall be yellow in color.

2.07 FRAMES AND COVERS:

A. All castings shall be made of clean, even grain, gray cast iron. The castings shall be smooth, true to pattern and free from projections, sand holes, warp, and other defects which would interfere with the use of, or impair the serviceability of the castings.

B. The horizontal surface of the cover seat and under surface of the cover which rests upon the cover seat shall be machined on all frames and cover intended for vehicular traffic. After machining, it shall be impossible to rock any cover after it has been seated on its associated frame.

C. The iron used for castings shall conform to ASTM Designation A-48 for Class 30 gray iron.

D. Unless otherwise shown on the Drawings, all castings shall be coated with coal tar pitch varnish, to which sufficient oil has been added to make a smooth coating, tough and tenacious when cold, not tacky and not brittle.

E. Manufacturer's name and catalog figure number must be cast on each frame and cover. The work SEWER or STORM must be stamped on the manhole covers as appropriate.

F. Catch basin grates shall be as shown on contract drawings or approved equal.

2.08 BUTYL SEALANT

A. Butyl sealant used to seal precast concrete structures including manholes and catch basins shall meet AASHTO M-198, ASTM C 990, and Federal Specification SS-2-210 (210A)

B. Each manhole and catch basin shall utilize two (2) strips of sealant between sections.

C. Butyl Sealant shall be Kent Seal #22, ConSeal CS-202 or approved equal.

PART 3 - EXECUTION

3.01 FABRICATION:

A. The tongue and groove of manhole and catch basin sections shall be formed of concrete so as to receive a pre-molded butyl joint sealer. Sections shall be set so as to be vertical and in true alignment.

B. Each section of the precast manhole and catch basin shall have two (2) holes for the purpose of handling and installing. These holes shall be tapered and shall be plugged with mortar after installation.

C. Holes for pipes shall be cast in the base section so that there is a clear distance of 4-1/2" minimum between the inside bottom of the base section and the pipe invert.

D. The joint for the pipe at the base section shall consist of (a) a cast iron compression flange, together with cast iron inserts (embedded in the wall of the base section) and an "O"-Ring

gasket to provide a watertight seal and to allow a flexible joint capable of deflecting a maximum 9" from centerline of pipe; (b) rubber gasket anchoring rings cast into the concrete base and hard rubber wedge driven in to compress the gasket around the pipe: or (c) flexible rubber sleeve cast into the base section; or other joint as approved by the Resident Project Representative.

E. The inner HDPE liner of the leachate transport manholes shall be welded at each manhole section-joint in accordance with manufacturer's instructions. Each weld shall be provided with a spark test wire in accordance with Section 02771, 4.04(D) for membrane penetrations.

3.02 INSTALLATION:

A. General:

1. The excavation shall be properly dewatered while placing bedding material and setting the base or placing concrete. Waterstops shall be used at the horizontal joint of cast-in-place manholes. Bases shall be placed on a minimum 6" layer of compacted stone bedding.
2. Inlet and outlet stubs shall be connected and sealed as shown on the Drawings.
3. Barrel sections and cones of the appropriate combination of heights shall then be placed, using manufacturer's recommended procedure for sealing the horizontal joints, and as shown on the Drawings or the remaining barrel of the manhole shall be cast above the base.
4. A leakage test shall then be made as described in "Leakage Tests".
5. Following satisfactory completion of the leakage test, the frame and cover shall be placed on the top or some other means of preventing accidental entry by unauthorized persons, children, animals, etc., until the Contractor is ready to make final adjustment to grade.

B. Waterproofing: The waterproofing of the exterior surfaces of manholes shall be one of the following methods:

1. Bituminous Coating: After the concrete or cement plaster has set, two coats of an approved bituminous waterproofing material shall be applied to all outside surfaces of manholes. Waterproofing material shall be applied by brush or spray at approximate rate of 70 sq. ft./gal., in accordance with the manufacturer's instructions. Time shall be allowed between coats to permit sufficient drying so that the application of the second coat has no effect on the first.
2. Cement Base Coating: Cement base coatings delivered in sealed containers shall be mixed in accordance with the manufacturer's recommendations and applied with a stiff brush in 2 coats. Each coat shall be applied at the rate of 2 lb. per sq. yd.

C. Frames and Covers: Frames shall be set on mortared brick courses true to grade and concentric with the opening. All voids beneath the bottom flange and in the brick courses shall be completely filled to make a watertight fit. A ring of mortar at least 1 inch thick shall be placed around the outside of the bottom flange, extending to the edge of the manhole all around its circumference. The bricks and mortar shall not extend beyond the top of precast concrete cone section.

3.03 ALTER EXISTING MANHOLE OR CATCH BASIN: When altering existing catch basins and manholes, the structure shall be dismantled sufficiently to allow reconstruction in accordance with the applicable requirements as shown on the Drawings for complete catch basins and manholes.

3.04 VACUUM LEAKAGE TESTS: (NITC)

A. General:

1. To be observed by the Engineer on each sewer manhole.
2. A vacuum test made as described below. Manhole to pipe connection must be a flexible connector to perform this testing.

B. Preparation for Test:

1. After the manhole has been assembled in place, fill lifting holes and point with an approved non-shrinking mortar.
2. Perform test prior to placing the shelf and invert and before filling and pointing the horizontal joints, and before backfilling.
3. If the groundwater table has been allowed to rise above the bottom of the manhole, it must be lowered for the duration of the test.
4. Plug pipes and other openings into the manhole and the plugs braced to prevent blow out.

C. Test Procedure:

1. Test immediately after manhole assembly.
2. Use manhole vacuum test equipment equal to NPC Systems, Inc., Milford, New Hampshire.
3. Set tester in place.
4. Inflate compression band to seal base to structure.
5. Draw a vacuum of 10-in. Hg.
6. Close the valve.
7. Acceptable test:
    a. Less than 1 in. Hg drop in one minute for a manhole less than 10 ft. in depth.
    b. Less than 1 in. Hg drop in two minutes for a manhole 10 ft. to 20 ft. in depth.
8. If leakage occurs fill those points with non-shrink grout, allow to set and retest.
9. Rejected Manholes: Disassemble, reconstruct, or replace as directed by the Engineer.

D. Backfilling: The test may be conducted either before or after backfilling around the manhole. However, if the Contractor elects to backfill prior to testing, for any reason, it shall be at his own risk and it shall be incumbent upon the Contractor to determine the reason for any failure of the test. No adjustment in the leakage allowance will be made for unknown causes such as leaking plugs, absorption, etc., i.e., it will be assumed that all loss of water during the test is a result of leaks through the joints or through the concrete. Furthermore, the Contractor shall take any steps necessary to assure the Resident Project Representative that the water table is below the bottom of the manhole throughout the test.

END OF SECTION

SECTION 02771

GEOMEMBRANE LINER
40-MIL TEXTURED HIGH DENSITY POLYETHYLENE (HDPE)

PART 1 - GENERAL

1.01 RELATED DOCUMENTS:

A. The general provisions of the Contract, including General and Supplementary Conditions and General Requirements (if any) apply to the work specified in this Section.

B. Requirements set forth by the Quality Assurance/Quality Control Plan prepared for the Dolby Landfill Cover Upgrade – Phase 2 and Phase 3 Project, shall apply to the work specified in this section. QA/QC is provided as Appendix B in the Construction Specifications document.

C. GRI Standard GM13.

1.02 RELATED WORK SPECIFIED ELSEWHERE:

A. Project Coordination: Section 01041

B. Earthwork: Section 02200

C. Pipe Installation: Section 02450

D. Geotextiles and Geocomposite: Section 02772

E. Interfacial Friction Angle Conformance Testing: Section 02780

1.03 DESCRIPTION OF WORK: Furnish and install 40-mil Textured HDPE geomembrane with smooth edges, the extent of which is shown on the Drawings. Sufficient liner material shall be furnished to cover all areas shown on the drawings including overlaps at field seams, anchor trenches and waste.

1.04 SUBMITTALS:

A. Submit the number of copies required by the contractor for quality control documentation described in 1.05A, 1.05B, and 2.01E.

B. Prior to ordering HDPE material, the Contractor shall submit, for the Project Manager's approval, a description or drawing of the method of sheet layout, detailing the orientation of sheets and the direction of the overlap between sheets.

1.05 QUALITY CONTROL DOCUMENTATION: (Furnished by Liner Manufacturer and Liner Installer)

A. Manufacturer's Experience: The manufacturer supplying the membrane shall be GRI GM 13 certified and shall satisfactorily demonstrate previous experience by letter of certification. Certification shall indicate that the manufacturer has produced, and has in service in similar applications for a period of not less than one (1) year, at least fifteen (15) million sq ft of HDPE material meeting these Specifications.

B. Installer's Experience: The Installer proposing to install the lining shall satisfactorily demonstrate previous experience by letter of certification. Certification shall indicate the Installer's successful past installation of at least 10,000,000 sq ft of HDPE membrane lining.

Installation shall be performed under the direction of a single installation supervisor who shall remain on site and be in responsible charge throughout the liner installation, including

subgrade acceptance, liner layout, seaming, testing and repairs, and all other activities contracted for with the Installer. The installation supervisor shall have supervised the installation of at least 10,000,000 sf of polyethylene geomembrane. Actual seaming shall be performed under the direction of a master seamer who may be the same person as the installation supervisor, and who has a minimum of 1,000,000 sf polyethylene geomembrane seaming experience using the same type of seaming apparatus as that specified in this project. No seaming may be done by any individual with less than 500,000 sf of polyethylene geomembrane seaming experience. The installation supervisor or master seamer must be on site whenever seaming is being performed.

C. QUALITY CONTROL DURING MANUFACTURE: Random sampling shall be performed by the Manufacturer throughout the production run at the frequencies indicated below for each of the listed properties for the geomembrane to be delivered to the site. Sampling and frequency of testing shall be in accordance with GM 13 unless more frequent testing is required below.

Property	Test Method	Frequency
Thickness	ASTM D 5994	1 per roll
Asperity height	ASTM D 7466	1 per roll
Carbon black content	ASTM D 4218	1 per 20,000 lbs
Carbon black dispersion	ASTM D 5596	1 per 45,000 lbs
Force per unit width at yield	ASTM D 6693-Type IV	1 per 20,000 lbs
Force per unit width at break	ASTM D 6693-Type IV	1 per 20,000 lbs
Elongation at yield	ASTM D 6693-Type IV	1 per 20,000 lbs
Elongation at break	ASTM D 6693-Type IV	1 per 20,000 lbs
Tear resistance	ASTM D 1004	1 per 45,000 lbs
Puncture resistance	ASTM D 4833	1 per 45,000 lbs
Density	ASTM D 1505/D 792	1 per 200,000 lbs
Environmental stress crack	ASTM D 5397	Per GRI GM10
UV resistance	ASTM D 7238/D 3895/D 5885	1 per formulation
Oxidation induction time	ASTM D 34895/D 5885	1 per formulation
Oven aging at 85°C	ASTM D 5721/D 3895/D 5885	1 per formulation

Values must meet the requirements specified in Table 1 of Part 2.

The Resin Manufacturer shall provide certification to the Geomembrane Sheet Manufacturer that the resin meets or exceeds the specifications for Density, Environmental Stress Crack and Melt Index.

Sheet thickness shall be monitored continuously during manufacture and shall be nominal thickness $\pm$10% across the sheet.

Rolls not satisfying the specifications shall be rejected. The Manufacturer shall provide certification of testing as described in Part 2.

1.06 CONFORMANCE TESTING

The geomembrane will be sampled by the Geosynthetic CQA or his agent(s), at the manufacturer or upon delivery to the site. The Geosynthetic CQA shall assure that conformance test samples are obtained for the geomembrane at a rate of 1 test per 100,000 square feet of geomembrane with a minimum of once per lot, for testing, to assure conformance to the specification. A lot consists of a group of material which is manufactured from a specific batch of raw materials (e.g., HDPE resin, or bentonite clay). The manufacturer shall identify the consecutively numbered rolls of material that are inclusive within a lot. It is not required that all rolls included in a lot be supplied to the project, as long as the specified certification test results are supplied by the manufacture to bracket

the rolls delivered to the project. The interface and internal friction angle tests shall be performed at the frequency defined in Section 02780.
The contractor or sub-contractor shall coordinate information on manufacture and delivery of the geomembrane with the Geosynthetic CQA to assure that sampling and testing occur in a timely manner as to avoid construction delays.

Any further testing required to assure conformance shall be the responsibility of the contractor in accordance with 1.05 (C) of Section 01025. The testing laboratory and the results shall be acceptable to the Engineer.

Geomembrane Conformance testing shall include the following:

Thickness	ASTM D 5994
Asperity	ASTM D 7466
Carbon black content	ASTM D 4218
Carbon black dispersion	ASTM D 5596
Force per unit width at yield	ASTM D 6693
Force per unit width at break	ASTM D 6693
Elongation at yield	ASTM D 6693
Elongation at break	ASTM D 6993
Tear resistance	ASTM D 1004
Puncture resistance	ASTM D 4833
Interface friction angle between drainage geocomposite and geomembrane	ASTM D 5321
Interface friction angle between sand and the geomembrane	ASTM D 5321

These conformance tests shall be performed in accordance with the test method specified. The Contractor shall supply the materials required to perform the conformance testing.

1.07 SPECIAL PRODUCT WARRANTY: (Furnished by Liner Manufacturer)

A. Manufacturer's Guarantee: The manufacturer of the membrane liner shall enter into agreement with the Owner guaranteeing the membrane as follows:

The manufacturer warrants the HDPE liner which is manufactured, sold as first quality, and installed with technical assistance and/or by an approved installation contractor to be (1) furnished free of manufacturing defects in workmanship or material for a period of one year from the time of delivery with the basis for judgment of defects being the applicable product specifications in effect at the time the order was placed unless modified by mutual written agreement; (2) shall not develop cracks/holes which go completely through the membrane due to the effects of normal service for a period of twenty (20) years from the date of delivery. "Normal service" does not include physical damage caused by acts of God, casualty, or catastrophe such as (but not limited to) earthquakes, fire, explosion, floods, lightning, piercing hail, tornadoes, corrosive air pollution, mechanical abuse by machinery, equipment, people or animals, or excessive flexures, pressures or stress from any source other than faulty installation, and (3) immune to chemical attack and degradation by chemicals, specified in the manufacturer's literature, as compatible with, and as not having an adverse effect on the membrane; and (4) immune to chemicals tested by the manufacturer for the Owner.

Should defects or weathering degradation within the scope of the above warranty occur, the manufacturer shall refund to the purchaser-user the pro-rata part for the unexpired term of the warranty of the purchaser-user's original cost of such product, or will supply repair or replacement materials at the then-current price. In the event the manufacturer supplies repair or replacement materials, against the then- current price, the manufacturer will credit the lesser of (1) the pro-rata part of the original sales price of the material so repaired or replaced for the unelapsed period of the warranty, or (2) the pro-rata part of the then-current price of the material so repaired or replaced to the unelapsed period of the warranty. The warranty

shall continue in effect on the repaired or replaced material for the unelapsed term of the original warranty. To enable the manufacturer's technical staff to properly determine the cause of any alleged defect and to take appropriate steps to effect timely corrective measures if such defect is within the warranty, any claim for alleged breach of warranty will be made and presented in writing to manufacturer and the installing Contractor within thirty (30) days after the alleged defect was first noticed.

PART 2 - PRODUCTS

2.01 TEXTURED HIGH DENSITY POLYETHYLENE (HDPE) MEMBRANE:

A. General: The materials supplied under these Specifications shall be first quality products designed and manufactured specifically for the purposes of this work, and which have been satisfactorily demonstrated by prior use to be suitable and durable for such purposes.

B. Description of HDPE Material: The membrane shall be a high density polyethylene (HDPE) of 40-mil thickness containing no additives, fillers or extenders. The lining material shall be manufactured a minimum of 20 feet seamless widths, and have the physical characteristics listed in Table 1:

TABLE 1

Property	Test Designation	40-mil Requirement
Sheet thickness, textured	ASTM D 5994	±10% for individual for 8 out of 10 values ±15% for individual for any of the 10 values
Asperity height	ASTM D 7466	16 mil (min. average)
Specific gravity	ASTM D 1505/D 792	0.94 g/cc
Melt index	ASTM D 1238-95 Condition E	0.1 to 0.3g per 10 minutes
Tensile strength yield	ASTM D 6693-Type IV[2]	min. 84 lb per inch
Tensile strength at break	ASTM D 6693- Type IV[2]	min. 60 lb per in. width
Elongation at yield	ASTM D 6693- Type IV[2]	min. 12 percent
Elongation at break	ASTM D 6693- Type IV[2]	min. 100 percent
Tear resistance	ASTM D 1004	min. 28 lb
Puncture resistance	ASTM D 4833	min. 60 lb
Oxidative induction time (standard) (high pressure)	ASTM D 3895 ASTM D 5885	100 minutes 400 minutes
Oven aging at 85°C (standard OIT) (high pressure OIT)	 ASTM D 3895 ASTM D 5885	55% retained at 90 days 80% retained at 90 days
Environmental stress crack	ASTM D 5397	500 hrs
Carbon black content	ASTM D 4218	2 to 3 percent
Carbon black dispersion	ASTM D 5596	See note 6
UV Resistance	ASTM D 7238	Not recommended

Property	Test Designation	40-mil Requirement
(Standard OIT) (High Pressure OIT)	ASTM D 3895 ASTM D 5885	50% retained after 1,600 hrs
Interfacial Friction Angle Between drainage geocomposite and geomembrane	ASTM D 5321-92	See Section 02780
Between geomembrane and underdrain sand	ASTM D 5321-92	See Section 02780
Property	Test Designation	40-mil Requirement
HDPE Seam Properties Bonded Seam Strength	ASTM D 6392-99[3,4]	0.9XPM[5] lbs/in
Peel adhesion fusion	ASTM D 6392-99[3,4]	0.60xPM[5] lbs/in
Peel adhesion extrusion	ASTM D 6392-99[3,4]	0.50xPM[5] lbs/in

Notes:

1 Measure thickness at 1-foot intervals across the width of the roll (perpendicular to the machine direction) and report average, standard deviation, and lowest individual readings.

2 Type IV Die. ASTM D 6693-01 test specimen shall be used. The grip separation shall be 2.5 inches. This test does not require the use of extensometers. The rate of grip separation will be 2 inches per minute. A gauge length of 1.3 inches for yield values, and 2.0 inches for break values shall be used to calculate elongation from grip movement.

3 For shear tests, the sheet shall yield before failure of the seam. For peel adhesion, seam separation shall not extend more than 25% into the seam. For either test, testing shall be discontinued when the sample has visually yielded.

4 All coupons tested in shear and peel shall be in a free condition (not 90^{o} or 180^{o}). Acceptable Locus of break codes for the specimen rupture mode shall be as specified in Part 3.08 D of this specification.

5 The results of 4 of the 5 individual coupon shear strength valves shall exceed 90 percent of the parent material strength, the fifth coupon must be within 70 percent of the parent material strength. For peel strength values, 4 of 5 coupons tested must be within 60 percent of parent material strength for fusion welds or 70% of the specified value, whichever is greater, and 50 percent of parent material strength for extrusion welds, and the fifth coupon must be within 50 percent of parent material strength.
Parent material strength shall be determined by sampling actual sheets adjacent to the destructive test location in the same direction the seam is tested (using the lower value of the two sheets) or by using conformance testing results or manufacturer's roll certification information, but not less than 126 ppi.

6 Carbon black dispersion (only spherical agglomerates) for 10 different views. ***9 in categories 1 and 2 and 1 in category 3***

In addition, the geomembrane shall be produced as to be free of holes, blisters, undispersed raw materials, or any sign of contamination by foreign matter, and shall not have striations, pinholes or bubbles on the surface.

C. Factory Bonded Seam: Calendered HDPE sheeting may not be fabricated into large sections at the factory.

D. Extrusion Joining Resin: Resin for extrusion joining sheets shall be HDPE produced from the same material as the sheet resin. Physical properties shall be the same as those of the resin used in the manufacture of the HDPE liner. The resin shall be supplied in black and/or natural color. Natural resin shall be colored black through addition of 2.0 to 3.0 percent master batch colorant before use.

E. Documentation: Prior to delivery of the geomembrane to the job site, the manufacturer shall be required to provide the Owner with a written certification that the product delivered meets the standards of GRI Standard GM13. The manufacturer shall provide quality control

certificates for each batch of resin and each shift's production of geomembrane, and shall follow the quality control testing program and test frequencies as described GRI Standard GM13 and in Part 4 of this Specification. These quality control certificates shall be signed by responsible parties employed by the Manufacturer, and shall be supplied to the Owner. No geomembrane will be permitted to be delivered until the Owner has in his possession such certification.

After delivery of the geomembrane to the job site, the Owner shall test samples of the delivered geomembrane. The frequency of the samples shall be once per 50,000 sf of geomembrane with a minimum of once per lot (as per QAQC) and tested in accordance with Part 4.

F. Roll Identification: Each roll shall have permanently affixed both inside and outside the roll the following information: name of manufacturer; date of manufacture; resin batch code; thickness of the material; roll number; roll length; and roll width. Unlabeled rolls will not be used and shall be returned to the manufacturer at the manufacturer's expense.

2.02 MISCELLANEOUS MATERIALS: (Furnished by Installer)

A. Pipe Boots, Vents, and Patches: All such devices shall be of the same material as the lining or a compatible approved equal.

B. Mechanical Fastenings: Mechanical fastenings shall be of the material, size, and type as detailed on the plans or approved shop drawings.

PART 3 - EXECUTION

3.01 GENERAL: Prior to installing HDPE material, the Installer shall submit, for the Owner's approval, a description or drawing of the method of sheet layout, detailing the orientation of sheets and the direction of the overlap between sheets. During installation of the geomembrane, the Installer shall label each sheet with the roll number, panel number, and date it was installed.

3.02 SHIPPING AND HANDLING: Each roll shall be individually packaged in heavy cardboard or wooden crate fully enclosed and protected to prevent damage to it during shipment, prominently identified in the same fashion as the sheet within and showing the date of shipment. Until installed, the rolls shall be stored indoors in their original unopened crates; if outdoors, they shall be stored on pallet and shall be protected from the direct rays of the sun under a light-colored heat-reflective opaque cover in a manner that provides a free-flowing air space between the crate and cover.

3.03 SURFACE PREPARATION:

A. Conditions: Surfaces to be lined shall be smooth and free of all angular rocks, stones greater than 1 inch, sticks, roots, sharp objects or debris of any kind. The surface shall provide a firm, unyielding foundation. No standing water or excessive moisture shall be allowed.

B. Acceptance: The CQARE and the Installer shall certify in writing to the Owner that the surface to be lined is acceptable. Submittal of written acceptance may proceed incrementally according to installation schedule. No geomembrane shall be placed on subgrade deemed unsuitable by the Installer/or Owner's Representative or the CQARE.

3.04 ANCHOR TRENCH: Excavation, backfill and compaction of the anchor trench will be the responsibility of the General Contractor. The anchor trench shall be excavated along the lines shown on the design drawings. The length of open trench should not exceed the amount of liner to

be placed in a two (2) day period unless approval has been provided by Owner or Owner's testing agency.

The anchor trench shall be partially backfilled during geomembrane panel placement, however the anchor trench shall not be compacted until the geomembrane has experienced sufficient expansion/contraction cycles. Compaction of the anchor trench backfill shall be performed using manually operated compaction equipment. Backfill shall be placed in lifts not greater than 12 inches in loose thickness and shall be compacted to at least 90% of the maximum dry density according to ASTM D 698. This backfill shall be the same as the dike material or clay or impervious barrow free of any debris, sticks etc. Owner's testing agency shall approve backfill material prior to anchor trench placement, and must be notified prior to compaction.

3.05 FIELD SEAMS: The Geosynthetic Quality Assurance Resident Engineer (QARE) can, at his sole discretion, not allow any individual seamer or seaming equipment to be used for the project, based on observations made in the field. The Geosynthetic QARE will notify the Installer of the individual or seaming equipment which may not be used on the project and the reason or steps necessary to demonstrate the person or equipment acceptance on the job. The Installer shall have no recourse for this decision against the Owner, Engineer, or other parties.

A. Layout: Overlap panels in shingle style from high to low elevation. Minimize and/or avoid horizontal seams whenever possible.

B. Preparation: All areas which are to become seam interfaces shall be cleaned of dust and dirt. When extrusion joining is required, the slick surfaces of the HDPE sheet which are to become seam interfaces shall be prepared by sanding or grinding (perpendicular to the seam) to a depth of less than .005 in. before joining the sheets. Field joints shall not take place unless the sheet is dry. Cleaning methods may include, but not be limited to, high pressure washing, scrub brushes, vacuums, etc. Existing geomembrane shall be cleaned thoroughly to their installed condition. A minimum of one destructive seam test shall be taken at the Phase 1 to Phase 2 geomembrane tie-in.

C. Seaming Methods: Installer shall submit to the Owner prior to construction a list of the seaming equipment and testing equipment, including manufacturer and model number to be used on-site. Field seams shall be made by overlapping adjacent sheets a minimum of 3 in. and a maximum of 6 in. and using one of the following seaming techniques:

Hot Air/Hot Wedge: Hot air/hot wedge technique shall be made by either a nozzle which directs hot air between the sheets or a hot metal surface in contact between the sheets. Each seaming unit must include a thermometer giving the temperature of the machine at the nozzle or metal surface. The seaming unit shall maintain a recordable temperature determined by on-site conditions and shall not vary more than 50 deg.F above or below the recommended seaming temperature. The overlapped sheets are then pressed together by mechanical means. Seaming equipment that makes a split hot wedge seam will be the preferred method of seaming; single hot wedge seaming will be allowed only with the approval of the Owner.

Extrusion Bonding: Extrusion and fusion bonding will be limited to areas where hot wedge cannot be used, such as pipe boots, and to any necessary repairs. The use of extrusion and fusion bonding as the primary seaming method will be allowed only with the approval of the Owner. The joining procedure shall consist of softening the liner material by heated air. The temperature of the air impinging on the sheet for this purpose shall range from 420 deg.F to 680 deg.F. The exact temperature used shall be determined by the installation supervisor. Directly following the application of heat, a one and one-half inch minimum width strip of the same high density polyethylene resin from which the sheet is made shall be extruded between the overlapped sheets. The temperature of the resin as it emerges from the extrusion die shall range from 428 deg.F to 536 deg.F. The overlapped sheets shall be firmly pressed together by mechanical means to form the extrusion joint.

Fusion Bonding: Extrusion and fusion bonding will be limited to areas where hot wedge cannot be used, such as pipe boots, and to any necessary repairs. The major seaming of the liner will be done with hot wedge. Fusion bonding shall be by means of a homogeneous overlap extrusion fusion process which provides continuous dynamic integration of the extrudate bead with the lining material. The composition of the extrudate shall be identical to the lining material. The seaming unit shall be capable of continuously monitoring and controlling the temperature of the extrudate and the zone of contact where the machine is actually fusing the lining material. Temperature of the extrudate shall range from 428 deg.F to 536 deg.F.

D. Seaming Wrinkles: Fishmouths or wrinkles at the seam overlaps shall be cut along the ridge of the wrinkle, back into the panel so as to affect a flat overlap. The cut fishmouths or wrinkles shall be seamed as well as possible, and shall then be patched with an oval or round patch extending a minimum of 6 in. beyond the cut in all directions.

E. Repairs: Any required repair of scratches >10% of the sheet thickness and small holes in the liner surface shall be made with the extrusion hand welder. Liner material shall be cleaned of all dirt, dust and other foreign material, all smooth HDPE surfaces roughened, air heated to the prescribed temperature, and a strip of HDPE resin extruded over the hole to produce an extruded welded repair.

F. Quality of Workmanship: All joints, on completion of the work, shall be tightly bonded. Any lining surface showing injury due to crimping, scuffing, penetration by foreign objects or distress from rough subgrade shall, as directed by the Owner's Representative, be replaced or covered and sealed with an additional layer of HDPE of the proper size. The Installer shall inspect the final installation and any defects shall be repaired and tested until satisfactory.

G. No seaming shall be allowed if the Geosynthetic CQA is not on-site.

3.06 PIPE BOOTS, VENTS, MECHANICAL FASTENINGS AND PATCHES: The geomembrane shall be installed around any pipes, concrete structures or other penetrations through the geomembrane in accordance with the detailed Specifications shown on the Drawings. Prior to the start of construction, the Installer may provide, for the approval of the Owner, alternate installation methods or details to successfully perform geomembrane termination.

All clamps, bolts, nuts, gaskets or other materials used to secure the geomembrane shall be compatible with and have a lifespan at least equal to that of the geomembrane. Mechanical fasteners shall be installed using a bandie tool.

Care shall be taken to protect the underside of the geomembrane from damage due to settling at any underbedding to concrete transition.

Extreme care shall be taken while welding around any penetration or similar structure since destructive testing is not likely to be possible in such areas. All seaming in these areas shall be performed by the Installer's Master Seamer and the operations shall be observed on a full time basis by the Owner's Representative. Non-destructive pressure test is applied to the boot as described in Section 3.08 of this specification.

3.07 SEAMING WEATHER CONDITIONS:

A. Normal Weather Conditions: The normal required weather conditions for seaming are as follows:

1. Ambient temperature between 32°F (0°C) and 104°F (40°C).
2. Dry conditions, i.e., no precipitation or other excessive moisture, such as fog or dew.
3. No excessive winds.

The Geosynthetic CQA shall verify that these weather conditions are fulfilled and notify the Project Manager in writing if they are not. Ambient temperature shall be measured by the

Geosynthetic CQA in the area in which the panels are to be placed. The Project Manager will then decide if the installation is to be stopped or special procedures used.

B. Cold Weather Conditions: To assure a quality installation, if seaming is conducted when the ambient temperature is below 32°F (0°C), the following conditions must be met:

1. Geomembrane surface temperatures shall be determined by the Geosynthetic CQA at intervals of at least once per 100 foot of seam length to determine if preheating is required. For extrusion welding, preheating is required if the surface temperature of the geomembrane is below 32°F (0°C).
2. Preheating may be waived by the Project Manager based on a recommendation from the Geosynthetic QARE, if the Installer demonstrates to the Geosynthetic QARE's satisfaction that welds of equivalent quality may be obtained without preheating at the expected temperature of installation.
3. If preheating is required, the Geosynthetic QARE shall inspect all areas of geomembrane that have been preheated by a hot air device prior to seaming, to assure that they have not been overheated.
4. Care shall be taken to confirm that the surface temperatures are not lowered below the minimum surface temperatures specified for welding due to winds or other adverse conditions. It may be necessary to provide wind protection for the seam area.
5. All preheating devices shall be approved prior to use by the Project Manager.
6. Additional destructive tests (as described in Section 4.7 of the Quality Assurance/Quality Control Plan (QAP) shall be taken at an interval between 500 feet and 250 feet of seam length, at the direction of the Geosynthetic QARE.
7. Sheet grinding may be performed before preheating, if applicable.
8. Trial seaming, as described in Section 4.5.4 of the QAP, shall be conducted under the same ambient temperature and preheating conditions as the actual seams. Under cold weather conditions, new trial seams shall be conducted if the ambient temperature drops by more than 5°F from the initial trial seam test conditions.

C. Warm Weather Conditions: At ambient temperatures above 104°F, no seaming of the geomembrane shall be permitted unless the Installer can demonstrate to the satisfaction of the Project Manager that geomembrane seam quality is not compromised.

Trial seaming, as described in Section 4.5.4 of the QA, shall be conducted under the same ambient temperature conditions as the actual seams.

At the option of the Geosynthetic QARE, additional destructive tests (as described in Section 4.7 of the QAP) may be required for any suspect areas.

3.08 QUALITY CONTROL DURING INSTALLATION:

A. All work shall be performed in accordance with the project's Quality Assurance/Quality Control Plan.

B. Site Test Equipment: The Installer shall maintain on site, in good working order, the following items:

Field Tensiometer: The tensiometer shall be motor driven and have jaws capable of traveling at a measured rate of 2 in./min. The tensiometer shall be equipped with a gauge which measures the force in unit pounds exerted between the jaws.

Vacuum Box: The vacuum box shall consist of a rigid housing with a transparent viewing window on top and a soft, closed- cell neoprene gasket attached to the bottom of the housing. The housing shall be equipped with a bleed valve. A separate vacuum source shall be connected to the vacuum box such that a negative pressure can be created and maintained between 4 and 8 inches of mercury to the box. A sudsy solution consisting of soap and distilled water shall be dispensed on the seam immediately ahead of the vacuum box.

Air Pressure Test Equipment: This method shall apply only when the split hot wedge seaming method is used. Equipment shall consist of an air pump capable of generating and maintaining a positive pressure of between 20 and 30 psi. A manometer capable of reading up to 30 psi attached to a needle or nipple shall be used to pressurize the air channel in the seam.

Alternative testing methods shall be submitted to the Owner or his Representative for approval prior to commencement of testing.

C. Non-Destructive Testing:

Thickness: Upon deployment of individual panels, the Owner's Representative shall randomly check the thickness at a minimum of twice (once per side) per 100 linear feet, in conformance with the specification in Section 2.01.

Test Seams: Test seams shall be made at a minimum every 4 hours to verify that adequate conditions exist for field seaming to proceed. Each seamer shall produce a test seam at the beginning of each shift. In addition, if a seaming operation has been suspended for more than 1 hour or if a breakdown of the seaming equipment occurs, a test seam shall be produced prior to resumption of seaming operations.

Test seams shall be made in the field on pieces of the approved geomembrane. Each test seam shall be at least 5 ft long by 1 ft wide and with sufficient overlap for peel testing in the field tensiometer.

Five samples 1 in. wide shall be taken across the seam using an approved template. The samples shall be tested in the field tensiometer, four in peel and one in shear and shall meet the requirements of Section 3.08.D.

If the seam fails to pass, the seaming apparatus shall not be used for field seaming until any deficiencies have been corrected. This shall be verified by the production and successful testing of two consecutive test seams.

Vacuum Testing: All extrusion welded and solid fusion welded seams shall be evaluated using vacuum box testing. Any seam overlap will be trimmed prior to testing.

A sudsy solution shall be applied to the test section and the vacuum box placed over the section. The bleed valve is then closed and the vacuum valve opened. Once a tight seal has been established (2.5 to 3.0 psi), the test section shall be visually examined for a period of not less than 15 seconds to determine whether bubbling of the soapy solution is occurring. The vacuum box is then moved and the process is repeated on the next adjacent section. A minimum 3 in. overlap shall be provided between all test sections.

All locations where bubbling of the sudsy solution was observed shall be clearly marked for repairs with a high visibility marker and recorded by number on field test reports. Any failed portion of seam shall be repaired by cap strip in accordance with Section 3.08.E.

Air Pressure Testing: All hot air/hot wedge seams shall be evaluated using air pressure testing. The seam shall be sealed off at one end and air passed through insuring an open passage. Once the seam is proven continuous the second end of the seam shall be sealed. If a seam end will be an integral part of the geomembrane the sealing shall be done in such a way that it does not harm the geomembrane. The seam should be pressurized to 25-30 psi. The feed valve shall be closed and the pressure sustained for a period of not less than 5 minutes. If a pressure loss of greater than 4 psi is observed or if the required pressure cannot be reached then the seam shall be rejected.

All faulty areas along the seam shall be identified and repaired by cap strip in accordance with Section 3.08.E. Vacuum testing shall be allowed on split wedge welds only when the faulty area cannot be isolated using air pressure testing. Any overlapping material must be removed prior to vacuum testing. All holes created during air pressure testing shall be sealed on completion of the test and vacuum tested.

All seams shall be non-destructively tested by the Installer over their full length to verify the integrity of the seam. Non-destructive testing shall be performed concurrently with field seaming. Prefabricated field seams which will be inaccessible after installation, such as those under structures or fastened to penetrations, shall be tested prior to final installation. All non-destructive testing shall be observed and documented by the Geosynthetic CQA.

Approved non-destructive testing procedure is as above. Alternate procedures shall be submitted for approval to the Owner or his Representative and the Geosynthetic CQA prior to the commencement of non-destructive testing.

Membrane Penetrations: All pipe boot penetrations shall be tested by pressurizing the site manufactured boots with air. The installer will first build the boot on an existing pipe, and then remove it. The boot will then be heat tacked at the top trunk of the boot so the boot can be pressurized. A sacrificial piece of HDPE is then heat tacked to the bottom skirt of the boot. A hole is cut in the sacrificial flap, and using a Shop – Vac motor, the boot is pressurized. Soap and water is applied to the welds on the boot and the installer looks for bubbles. All testing of pipe boots shall be witnessed by the Geosynthetic CQA. Alternative testing methods shall be submitted to the Owner or the Owner's Representative, the CQARE and the MEDEP for approval prior to commencement of testing.

D. Destructive Testing: Destructive testing of field seams shall be performed at selected locations in order to verify the criteria given in section "Test Seams". All sampling and testing shall be done concurrently with field seaming so that verification of field seam properties is made as the work progresses and corrective action implemented.

Test samples shall be taken at an average frequency of one test location per 1,000 ft of seam. Sample locations shall be determined by the Geosynthetic CQARE. The Installer shall not be informed in advance of the locations where the seam samples will be taken.

The Geosynthetic CQA may increase the amount of destructive testing based on the results of previous testing. Additional samples may also be required when the CQARE has reason to suspect the presence of excess crystallinity, contamination, faulty seaming equipment or any other reason affecting seam quality.

The test sample shall measure approximately 12 in. wide by 42 in. long with seam centered lengthwise along the sample. Two one-in. wide sample strips shall be cut using an approved template from both ends of the sample. These strips shall be tested by the Installer in the field tensiometer in both peel and shear in accordance with section "Test Seams". The remainder of the sample shall be cut into two 12-in. lengths, and one 18-in. length. The 18-inch sample shall be taken by the Geosynthetic QARE for independent laboratory testing; of the remaining two, one shall be given to the Installer for his own records or testing, and one shall be kept by the Owner for permanent record.

Samples shall be cut by the Installer under the direction of the Geosynthetic QARE. Each sample shall be indelibly numbered and identified. The sample number and location shall be recorded by the Installer on the panel layout drawing and on the sheet where the sample was taken.

The results of laboratory testing shall be made available to the Installer by the Geosynthetic QARE not more than 48 hours after the samples have been received by the testing facility. The results of laboratory testing shall determine the acceptability of a seam. Laboratory testing shall be performed in accordance with the methods given in ASTM D 413 and ASTM D 6392-99 and meet the following criteria:

Test	Designation	Requirement
Bonded seam strength (shear)	ASTM D 6392/D 6693	4 of 5 coupons must be greater than 90% of parent material strength with none less than 70% of parent material strength* and have an acceptable mode of rupture
Peel adhesion (both tracks)	ASTM D 6392/D 6693	4 of 5 coupons on each side of the weld must be greater than 60% of parent material strength* or 70% of the specified value, whichever is greater, with none less than 50% of parent material strength* and have an acceptable mode of rupture

Note:

* Parent material strength shall be determined by sampling actual sheets adjacent to the destructive test location in the same direction the seam is tested (using the lower value of the two sheets) or by using conformance testing results or manufacturer's roll certification information, but not less than 84 ppi.

Tests for peel adhesion and Shear shall be in a free condition (not 90^{o} or 180^{o}). Acceptable Locus of break codes for the specimen rupture mode shall be the following:

For Dual Wedge Seams: BRK, SE1, SIP and AD-BRK $\leq$ 25% adhesion failure;

For Extrusion Welds: SE1, SE2, SE3, BRK1, BRK2, HT, SIP, AD-WLD if strength is achieved, AD-BRK $\leq$ 25% adhesion failure.

Any seam that fails laboratory testing shall be repaired in accordance with section 3.08(D). The costs of repairing and retesting areas which failed destructive tests shall be the responsibility of the Installer.

The area from which the destructive test sample was taken shall be repaired without delay in accordance with the procedures given in 3.08(D).

E. Inspection and Acceptance: As the work progresses, the Geosynthetic QARE shall document all locations requiring repair work and shall verify and document that all repairs have been successfully made by the Installer.

A field seam shall only be considered acceptable when bounded by two destructive test locations which have passed laboratory testing and applicable non-destructive testing. The following procedures shall apply in the event that a seam fails laboratory testing:

The Installer may reconstruct the seam with cap strips between the previous passing test location and the next passing test location (up to a maximum 75 feet) and retest, or;

The Installer may elect to trace the extent of an unacceptable seam to some intermediate location. This shall involve taking 1-in. template-cut cross-sections from the seam at a minimum distance of 10 ft in both directions from the failed test location. These samples shall be tested in the field tensiometer in both shear and peel in accordance with section "Test Seams". If one or both of these samples fail the field test, tracing along the seam shall continue at minimum 10-ft increments until a passing result is recorded in both directions from the failed test location. At these locations large samples shall be cut for laboratory testing as in section "Destructive Testing". If laboratory testing verifies the acceptability of the seam at these locations, the Installer shall reconstruct the seam (with cap strips) between the two passing test locations. If laboratory testing shows the seam to be unacceptable, the Installer

shall further trace the unacceptable seam until acceptable test results are recorded in both directions.

Reconstructed seams shall be capped by cutting out the unacceptable seam, at least 6 inches each side of the seam and a minimum 6" beyond the defect, and patching with an acceptable material.

Reconstructed seams less than 150 ft in length shall be non- destructively tested in accordance with "Non-Destructive Testing (3.08(C)". Reconstructed seams greater than 150 ft in length shall be destructively tested in accordance with "Destructive Testing (3.08(D)."

The entire geomembrane surface shall be examined by the Geosynthetic QARE to confirm that it is free of any defects, holes, blisters, undispersed raw materials, or contamination by foreign matter. The geomembrane surface shall be cleaned by the Installer, if required so that it is free of dust, mud, debris or any other material which may inhibit a thorough examination of the surface. Any suspect areas shall be clearly marked by the Geosynthetic QARE and non-destructively tested in accordance with section "Test Seams."

F. Overburden: The Geosynthetic QARE shall identify any large wrinkles which may have been built into the geomembrane. Any such wrinkle not built in to accommodate thermal contraction of the geomembrane prior to placement of the overburden shall be cut, repaired and tested by the Installer.

The Geosynthetic QARE shall identify any slope toe, declivity, or other surface transitions which might result in bridging of the geomembrane during placement of the overburden. Any such area shall be cut, repaired and tested by the Installer.

Equipment used for placing and compacting the overburden shall not be driven directly on the geomembrane. Such equipment shall be closely monitored during placement to ensure that no damage occurs.

A minimum thickness of 1 ft of cover shall be maintained between the geomembrane and light earth moving equipment. Such equipment shall have a maximum ground pressure of 5 psi. Equipment shall have no cleats and no turning of any equipment shall be allowed on the initial 1 ft of cover. A minimum thickness of 3 feet of cover shall be maintained between the geomembrane and all tired earthmoving equipment.

In all cases, the placement of overburden shall be done with caution and in a manner which is least likely to cause wrinkles in, or damage to, the geomembrane.

For grades greater than 2 percent, all soil placement shall be done in an upslope direction.

3.09 COMPLETION OF WORK:

A. Requirements: The installation of the geomembrane shall be considered totally complete when: all required deployment, seaming, repairs, testing, and site clean-up have been completed by the Installer; the Installer has submitted all the required quality control certificates to the Owner; and the Geosynthetic QARE is satisfied that the geomembrane has been installed in accordance with the above specifications.

END OF SECTION

SECTION 02772

GEOTEXTILES AND DRAINAGE GEOCOMPOSITE

PART 1 - GENERAL

1.01 RELATED DOCUMENTS:

A. The general provisions of the Contract, including General and Supplementary Conditions and General Requirements (if any) apply to the work specified in this Section.

B. Requirements set forth by the Quality Assurance/Quality Control Plan shall apply to the work specified in this Section. QA/QC is provided as Appendix B in the Construction Specifications document.

1.02 RELATED WORK SPECIFIED ELSEWHERE:

A. Earthwork: Section 02200

B. Erosion Control: Section 02220

C. Textured Geomembrane: Section 02771

D. Interfacial Friction Angle Conformance Testing: Section 02780

1.03 DESCRIPTION:

A. Furnish and install woven, non-woven geotextiles, or geonet, whichever is called for at the locations and in the manner shown on the drawings or as directed by the Engineer.

1.04 SUBMITTALS:

A. If brand name materials other than those suggested in this Section are proposed for use, furnish certified copy of laboratory test results and material sample as evidence that the material is similar and equal in strength, durability, and permeability.

B. Provide the required documentation as identified in Section 1.05 Quality Control.

1.05 QUALITY CONTROL:

A. Manufacturer's Experience: If requested by the Project Engineer, the manufacturer supplying the geotextiles and geocomposite shall satisfactorily demonstrate previous experience by letter of certification. Certification shall indicate that the manufacturer has produced, and has in service in similar applications for a period of not less than one (1) year, at least ten (10) million sq ft of geotextiles and drainage net meeting these Specifications.

B. Installer's Experience: If requested by the Engineer, the Installer proposing to install the geotextile and geocomposite shall satisfactorily demonstrate previous experience by letter of certification. Certification shall indicate the Installer's successful past installation of at least five (5) million sq ft of geotextiles and drainage net.

C. Prior to the installation of any geotextile and drainage geocomposite, the Manufacturer or Installer shall provide the Project Manager with the following information, if requested:

1. The origin (resin supplier's name and resin production plant) and identification (brand name and number) of the resin used to manufacture the geotextile.
2. Copies of the quality control certificates issued by the resin supplier.

3. Reports on tests conducted by the Manufacturer to verify that the quality of the resin used to manufacture the geotextile meets the Manufacturer's resin specifications.
4. Reports on quality control tests conducted by the Manufacturer to verify that the geotextile manufactured for the project meets the project specifications.
5. A statement indicating that the reclaimed polymer added to the resin during manufacturing was done with appropriate cleanliness.
6. A list of the materials which comprise the geotextile, expressed in the following categories as percent by weight: base polymer, carbon black, other additives.
7. A specification for the geotextile which includes all properties contained in the project specifications measured using the appropriate test methods.
8. Written certification that minimum average roll values given in the specification are guaranteed by the Manufacturer.
9. For non-woven geotextiles, written certification that the Manufacturer has continuously inspected the geotextile for the presence of needles and found the geotextile to be needle free.
10. Quality control certificates, signed by a responsible party employed by the Manufacturer. The quality control certificates shall include roll identification numbers, sampling procedures, and results of quality control tests. At a minimum, results shall be given for:

    Geotextile
    a. Mass per unit area
    b. Grab tensile/elongation
    c. Trapezoidal tear strength
    d. Puncture
    e. Apparent opening size
    f. Permittivity
    g. UV resistance

    Drainage Net
    a. Density
    b. Carbon black content
    c. Thickness
    d. Tensile strength

    Drainage Geocomposite
    a. Transmissivity
    b. Ply adhesion

    Quality control tests shall be performed in accordance with the test methods specified in Section 2.01B and 2.01C for at least every 100,000 ft^2 (10,000 m^2) of geonet and geotextile produced.

The Manufacturer shall identify all rolls of geotextiles and drainage geocomposite with the following:
1. Manufacturer's name
2. Product identification
3. Roll number
4. Roll dimensions

D. If requested by the Project Engineer, the geotextile will be sampled by the Geosynthetic CQA or his agent(s), at the manufacturer or upon delivery to the site. Conformance samples shall be collected in accordance with the project's Quality Assurance Quality Control Plan. The Geosynthetic CQA shall assure that conformance test samples are obtained for the geotextile at a rate of 1 test per 100,000 square feet of each geotextile and geocomposite with a minimum of once per lot, for testing, to assure conformance to the specification. A lot consists of a group of material which is manufactured from a specific batch of raw materials (e.g., HDPE resin, or bentonite clay). The manufacturer shall identify the consecutively numbered rolls of material that are inclusive within a lot. It is not required that all rolls included in a lot be supplied to the project, as long as the specified certification test results are supplied by the

manufacture to bracket the rolls delivered to the project. Conformance tests shall be performed in accordance with the test methods specified in Section 2.01.

The Contractor or sub-contractor shall coordinate information on manufacture and delivery of the geotextile with the Geosynthetic CQA to assure that sampling and testing occur in a timely manner as to avoid construction delays.

Any further testing required to assure conformance shall be the responsibility of the Contractor in accordance with 1.05(B) and (C) of Section 01025. The testing laboratory and the results shall be acceptable to the Engineer.

The following conformance tests shall be performed on the geotextile and geocomposite:

1. Geotextile
   Mass per unit area
   Grab tensile/elongation
   Trapezoidal tear strength
   Puncture
   Permittivity
   Apparent opening size

2. Drainage Geocomposite
   Transmissivity
   Ply adhesion
   Tensile strength (geonet)
   Interfacial friction angle
   a. Between drainage geocomposite and textured HDPE geomembrane
   b. Between cover soil and drainage geocomposite

Conformance tests shall be performed in accordance with the test methods specified in Section 2.01B and 2.01C. Interfacial friction angle testing shall be done according to Section 02780 and at a frequency as indicated in Section 02780.2.01(E).

PART 2 - PRODUCTS

2.01 MATERIALS:

A. Non-Woven Geotextiles:

1. Produced by heat bonding or needle punching.
2. The network of fibers shall be bonded so the fibers will retain their relative position with respect to each other.
3. Fibers may be made from polypropylene or polyester.
4. Geotextile shall be resistant to rot, mildew, insects, salt water, rodents, and any other biological and chemical substances commonly encountered in the ground.

a. 6 oz/sy: The geotextile heat bonded to both sides of the HDPE drainage net shall meet the minimum requirements listed below.

Property	Unit	Test Method	Value
Weight	oz/yd^2	ASTM D 5261-92	6
Grab Strength	lbs	ASTM D 4632	160
Trapezoid Tear Strength	lbs	ASTM D 4533	60
CBR Puncture Strength	lbs	ASTM D 6241	450
Apparent Opening Size	Std Sieve	ASTM D 4751	70
Permittivity	sec^{-1}	ASTM D 4491	1.4
UV Resistance	%/min. 500 hr	ASTM D 4355	70

b. 8 oz/sy: The geotextile used as a separation fabric shall meet the minimum requirements listed below.

Property	Unit	Test Method	Value
Weight	oz/yd^2	ASTM D 5261-92	8
Grab Strength	lbs	ASTM D 4632	205
Trapezoid Tear Strength	lbs	ASTM D 4533	80
CBR Puncture Strength	lbs	ASTM D 6241	500
Apparent Opening Size	Std Sieve	ASTM D 4751	80
Permittivity	sec^{-1}	ASTM D 4491	1.2
UV Resistance	%/min. 500 hr	ASTM D 4355	70

B. Drainage Geocomposite:

1. Fabric wrapped high density polyethylene (HDPE) geonet drainage media.
2. Geonet: Two overlapping strands of HDPE.
3. Geotextile fabric heat-bonded to both sides of geonet Fabric shall be bonded to the geonet so that it lies flat on the geonet, free of wrinkles and folds.
4. The geotextile shall be bonded to the geonet over 100 percent of the surface. Any material not meeting this requirement will be rejected for use on this project.
5. Geotextile extends a minimum of 2 inches beyond the edge of the geonet. The fabric edge shall be true and even to the edge of the geonet.
6. Drainage geocomposite for Type I application (see Design Drawings) shall be Skaps TN-330-2-6 or equal. Drainage geocomposite for Type II application (see Design Drawings) shall be Skaps TN-270-2-6 or equal.
7. Drainage geocomposite conforming to the following properties:

Property	Unit	Test Method	Value
Specific Gravity (geonet)	gm/cm^3	ASTM D 1505-96	0.94
Melt Flow Index (geonet)	gm/10 min.	ASTM D 1238-95 (Condition 190/2.16)	1.0
Thickness (geonet) Type I Type II	 mil mil	 ASTM D 5199 ASTM D 5199	 304/330 min / max 270/330 min / max
Percent Carbon Black (geonet)	%	ASTM D 4218	2-3
Transmissivity	m^2/sec	ASTM D 4716	See Note A.
Ply Adhesion	lbs/in	ASTM D 7005-03	1.0 min
Tensile Strength at Yield MD (geonet) Type I Type II	lbs/in	ASTM D 5035	 75 55

Note A

At a normal pressure of 500 psf, the Type I drainage geocomposite shall have minimum required transmissivities of 1.1×10^{-3}, 6.5×10^{-4}, and 4.2×10^{-4} m^2/sec at gradients of 0.10, 0.20, and 0.33, respectively. At a normal pressure of 500 psf, the Type II drainage geocomposite shall have a minimum required transmissivity of 6.0×10^{-4}, 3.2×10^{-4}, and 2.3×10^{-4} m^2/sec at a gradients of 0.05, 0.10, and 0.20, respectively. The locations where the two types of drainage composite will be used are shown on the project drawing.

The minimum calculated required transmissivity $q_{(qreqd)}$ has been determined as follows:

$$q_{reqd} = q_{design}\,[FS_d x RF_{IN} x RF_{CR} x RF_{CC} x RF_{BC}]$$

Where; q_{design}

Minimum calculated design transmissivity for geocomposite shall be as given below:

q_{design} (Type I) =

Maximum Slope (33%) = 4.7×10^{-4} m^2/sec
Intermediate Slope (20%) = 6.5×10^{-4} m^2/sec
Upper Slope (10%) = 1.1×10^{-3} m^2/sec

q_{design} (Type II) =

Minimum Slope (5%) = 6.0×10^{-4} m^2/sec
Intermediate Slope (20%) = 2.3×10^{-4} m^2/sec
Upper Slope (10%) = 3.2×10^{-4} m^2/sec

FS_d Factor of Safety for drainage = 2.0
RFIN Intrusion Reduction Factor = 1.2[1]
RFCR Creep Reduction Factor = 1.1[1]
RFCC Chemical Clogging Reduction Factor = 1.1[1]
RFBC Biological Clogging Reduction Factor = 3.0[1]

Notes

1. These Reduction Factor (RF) values were assumed in this analysis, based on published data for a wide range of geocomposite drainage materials. Project specific RF values can be applied during the material approval process if supporting documentation is provided by the manufacturer and approved by the project engineer.

Each type of drainage geocomposite shall meet the following requirement:

$$q_{100} \geq q_{reqd}$$

Where,
2100P
Flow rate of the geocomposite tested in accordance with ASTM D 4716 for all manufacturers quality control and quality assurance conformance testing, with the following conditions:

- performed between two steel plates;
- test duration = 15 mins;
- performed at a normal pressures of 500 psf;
- tested at hydraulic gradient of 0.10, 0.20, and 0.33 (Type I) and 0.05, 0.10, and 0.20 (Type II); and
- oriented in the machine direction.

Notes

1. These Reduction Factor (RF) values were assumed in this analysis, based on published data for a wide range of GCD materials. Project specific RF values shall be applied during the material approval process and shall be based on supporting documentation provided by the manufacturer and approved by the project engineer.

C. Interfacial Friction Angle:

1. Between drainage geocomposite and textured HDPE geomembrane.
2. Between cover soil and drainage geocomposite.
3. Interfacial friction angle properties shall be in accordance with the test methods specified in Section 02780.

PART 3 - EXECUTION

3.01 PREPARATION OF BASE FOR GEOTEXTILE: Subgrade surfaces shall be properly graded and compacted as called for. All sharp or protruding objects shall be removed from the subgrade surface prior to fabric placement. Geotextile fabric shall not be placed until the foundation preparation is completed and the subgrade surfaces have been inspected and approved by the Engineer.

3.02 INSTALLATION:

A. Geotextile installation shall be in accordance with manufacturer's recommendations and shall include the following considerations:

1. Place in the manner and at the locations shown on the drawings.
2. At the time of installation, geotextile shall be rejected if it has defects, rips, holes, flaws, deterioration, or damage incurred during manufacture, transportation, placement, or storage.
3. Roll Direction: Place long dimensions perpendicular to the sideslopes (i.e., up and down). Lay smooth and free of tension, stress, folds, wrinkles, or creases.
4. Join adjacent panels of geotextile with a sewn J-stitch along the entire length of the panels, or provide a minimum 6-inch overlap of geotextile in pipe trench.

B. Drainage Geocomposite Placement:

1. Place in the manner and at the locations shown on Drawings.

2. At the time of installation, drainage net shall be rejected if it has defects, rips, flaws, deterioration, or damage incurred during manufacture, transportation, or storage.
3. Join adjacent sheets of geonet with plastic ties spaced at minimum of 5 feet on-center. Adjoining sheet ends should be tied at 6 inches on-center or heat-welded along entire width.
4. Place long dimensions perpendicular to the sideslopes (i.e., up and down). Lay smooth and free of tension, stress, folds, wrinkles, or creases.
5. Provide a minimum width of 2 in. of overlap for each joint of the geotextile.
6. Tack seal or sew the overlapping geotextiles. Geotextile shall be sewn if in direct contact with soil components.
7. Place so that the upstream strip of geotextile will overlap the downstream strip.
8. Geonet geocomposite used on the sideslopes shall be extended into the anchor trench as shown on the drawing.
9. No horizontal seams shall be placed closer than 20 feet from the top of slope or on any 3 H to 1V sideslopes.

C. Geocomposite Protection: The quality assurance procedures indicated in this Section are intended only to assure that the installation of adjacent materials does not damage the geocomposite. Soil materials placed on the geosynthetic material shall be placed in accordance with specifications in this Section and in Section 02200 para. 3.10.

Soils:

1. Placement of soils on the geocomposite shall not proceed at an ambient temperature below 32^{O}F (0^{O}C) nor above 104^{O}F (40^{O}C) unless otherwise specified.
2. Placement of soil on the geocomposite should be done during the coolest part of the day to minimize the development of wrinkles in the geocomposite.
3. Equipment used for placing soil shall not be driven directly on the geocomposite.
4. A minimum thickness of 1 foot of soil is specified between a light dozer (ground pressure of 5.44 psi or lighter) and the geocomposite along any travel ways. Grading of soil to final depth shall be done to limit the number of passes to achieve required depth.
5. In any areas traversed by any vehicles other than low ground pressure vehicles shall have a minimum thickness of 3 feet. The location of these areas shall be limited by the provisions in Section 02200 para. 3.10. This requirement may be waived if provisions are made to protect the geomembrane through an engineered design. Drivers shall proceed with caution when on the overlying soil and prevent spinning of tires or sharp turns.

D. Protection of Geotextile and Drainage Net:

1. Upon delivery to the site, geotextiles shall be set up off the ground and be wrapped with a plastic tarp or stored inside a trailer or building to prevent dust clogging.
2. Exercise necessary care while transporting, storing, and installing the geotextile to prevent damaging it.
3. Protect from prolonged direct exposure to sunlight.
4. Repair all damaged areas of the geotextile by placing another piece of geotextile of sufficient size to extend a minimum of 1.0 foot beyond the limits of the damage in all directions over the damaged area.
5. Do not leave exposed more than 30 days without being covered by backfill.
6. Overlap successive pieces of geotextile a minimum of 1.0 foot.
7. When required, sew overlaps and repairs to damaged geotextile using a portable machine to provide seam strengths of at least 90 percent of the filter fabric strength concentration.

END OF SECTION

SECTION 02780

INTERFACE FRICTION CONFORMANCE TESTING

PART 1 - GENERAL

1.01 RELATED DOCUMENTS:

A. The general provisions of the Contract, including General and Supplementary Conditions and General Requirements (if any), apply to the work specified in this Section.

1.02 RELATED WORK SPECIFIED ELSEWHERE:

A. Project Coordination: Section 01041

B. Earthwork: Section 02200

C. Geomembrane Liner (HDPE): Section 02771

D. Geotextiles and Drainage Geocomposite: Section 02772

1.03 DESCRIPTION OF WORK: The work in this Section includes all labor, materials, tools, and equipment necessary to perform conformance interface friction testing for the following interfaces:

1. 40-mil HDPE textured geomembrane (outside of roll) and drainage geocomposites Type I and Type II.
2. Underdrain Sand and 40-mil HDPE textured geomembrane (inside of roll).
3. Cover Soil and Drainage Geocomposite.

1.04 QUALITY CONTROL: (furnished by Geosynthetic Laboratory)

A. Geosynthetics Quality Conformance Laboratory (QCL) Experience. The testing laboratory performing the interface friction conformance testing shall be accredited by the Geosynthetics Accreditation Institute for interface friction testing and shall have satisfactorily demonstrated previous experience by letter of certification. Certification shall indicate the testing laboratory's experience with the materials to be tested and any limitations the materials may evoke on the testing program.

B. Test Method. The Geosynthetics QCL shall perform the required interface friction testing in accordance with ASTM D 5321.

C. Test Reports. The Geosynthetics QCL shall provide test results to the project manager within 5 days of receipt of test samples. Test results shall be in the form of figures that present shear force versus displacement and shear stress versus normal stress. Both the peak strength and the large displacement strength shall be plotted. The laboratory shall report any influences or conditions that may have affected the test results. The laboratory shall indicate the correlation coefficient of the best fit lines drawn through the strength data, and the resulting peak strength and large displacement strength values for adhesion and friction angle.

PART 2 – MATERIALS AND TESTING CONDITIONS

2.01 MATERIAL SAMPLING:

A. Materials to be tested shall be obtained from materials that will be placed into service at the Dolby Landfill in East Millinocket, Maine.

B. Sample size shall be determined by the Geosynthetic QCL requirements.

C. Label outside and inside of roll on each sample.

D. Soil components used in the laboratory testing shall be obtained from the borrow source or from soil stockpiles to be utilized in the construction of the soil components of the Dolby Landfill Cover Upgrade Project.

E. Sample and testing frequency for geosynthetics components shall be as indicated below.

Interface	Testing Frequency
HDPE textured geomembrane/drainage geocomposite	2 tests per Phase
HDPE textured geomembrane/Sand (Gas Collection)	1 test per Phase
Cover Soil/Drainage Geocomposite	1 test Per Phase

Test frequency represents minimum number of tests. Additional tests may be required at the discretion of the CQA project manager.

2.02 TESTING CONDITIONS:

The following testing conditions shall be utilized for interface friction testing:

A. Use 12-inch by 12-inch-square direct shear apparatus as defined by Test Method ASTM 5321.

B. Test specimens shall be fully secured to the direct shear apparatus to prevent premature slippage.

C. Use site-specific soils and materials.

D. Test all geosynthetics in the direction parallel to the length of the roll (machine direction).

E. Orient surface texturing of HDPE textured geomembrane so that machine direction is oriented parallel to the direction of movement of the testing apparatus.

F. Soil components shall be remolded into the testing apparatus according to the project earthwork specification Section 02200.

G. Tests shall be run wet.

H. The seating pressure, seating time, normal pressure(s), consolidation time and strain rate for each interface to be tested shall be as indicated below:

Interface	Seating Stress (psi)	Soak Time (hrs)	Normal Stress(es) (psf)	Consolidation Time After Application of Normal Pressure (hrs)	Shear Force Displacement Rate (in/min.)
HDPE textured geomembrane/drainage geocomposite	-	-	100, 200, 400	4	0.2
HDPE textured geomembrane/Underdrain Sand	-	-	100, 200, 400	4	0.2
Cover Soil drainage geocomposite	0.5	2	100, 200, 400	4	0.2

All tests shall be run out to 20 percent strain in the shear displacement direction. The large-displacement strengths shall be defined as the strength occurring at horizontal strain.

PART 3 – MINIMUM REQUIREMENTS

3.01 The geosynthetic materials tested shall demonstrate their adequacy for use in the construction of the landfill by meeting or exceeding the following minimum requirements:

Each of the tested interfaces shall have test results for peak and large-displacement strengths that plot above the "required strength envelopes" as defined in the following table.

The following table provides the required minimum interface shear strength for the associated normal stresses.

Tested Normal Stress (psf)	**Required Peak Shear Strength (psf)**	**Required Large-Displacement Strength (psf)**
100	55	46
200	110	93
400	219	185

3.02 REVIEW OF TEST RESULTS:

The Geosynthetic QARE project manager shall review all test reports to determine if the test results meet the minimum requirements stated above.

3.03 RETESTING:

The contractor, installer, and the manufacturer may elect to retest failed tests. Testing may be done at the same laboratory or an independent laboratory. The testing laboratory shall be approved by CQA project manager, and the testing conditions shall be in accordance with ASTM 5321 and this section. Testing shall be done at contractor's installer's, or manufacturer's expense. Test results shall be reviewed by the CQA project manager.

END OF SECTION

SECTION 02800

SEEDING

PART 1 - GENERAL

1.01 RELATED DOCUMENTS: The general provisions of the Contract, including General and Supplementary Conditions and General Requirements (if any), apply to the work specified in this Section.

1.02 RELATED WORK SPECIFIED ELSEWHERE:

A. Sitework - General: Section 02000

B. Earthwork: Section 02200

C. Erosion Control: Section 02220

1.03 DESCRIPTION OF WORK: Work specified in this section shall consist of furnishing all labor, materials, and equipment to perform seeding work in conformity with the Contract Drawings and as specified herein. Excavation, filling, and grading required to establish elevations shown on the Drawings are not specified in this Section. Refer to Section 02200, Earthwork.

1.04 QUALITY ASSURANCE: Subcontract the seeding work to a single firm specializing in landscape work.

A. Source Quality Control:

1. General: Ship landscape materials with certificates of inspection as required by governmental authorities. Comply with governing regulations applicable to landscape materials.
2. Analysis and Standards: Package standard products with manufacturer's certified analysis. For other materials, provide analysis by recognized laboratory made in accordance with methods established by the Association of Official Agricultural Chemists, wherever applicable or as further specified.
3. Topsoil: Before delivery of topsoil, furnish written statement giving location of properties from which topsoil is to be obtained, names and addresses of owners, depth to be stripped, and crops grown during past 2 years, if requested by the Owner's Representative.
4. Grass Seed: All seed shall be certified as to mixture, germination, and purity, as being in conformity with the following requirements:
   a. Each variety of seed shall have a percentage of germination of not less than 80, a percentage of purity of not less than 85, and shall have not more than one percent of weed content.
   b. All seed shall be from the same or previous year's crop unless recent tests by an approved testing agency demonstrates that older seed meets the above requirements.
5. Inspection: The Owner's Representative reserves the right to inspect any plant materials either at the place of growth or at the site before planting, for compliance with requirements for name, variety, size, and quality.

1.05 SUBMITTALS

A. Certification: For information only, submit 2 copies of certificates of inspection as required by governmental authorities, and manufacturer's or vendors analysis for soil amendments and

fertilizer materials. Submit other data substantiating that materials comply with specified requirements.

Submit seed vendor's certified statement for each grass seed mixture required, stating botanical and common name, percentage by weight, and percentages of purity, germination, and weed seed for each grass seed species.

1.06 PRODUCT DELIVERY, STORAGE, AND HANDLING:

A. Packaged Materials: Deliver packaged materials in containers showing weight, analysis, and name of manufacturer. Protect materials from deterioration during delivery, and while stored at the site. Provide empty container of seed mix to the Owner's Representative upon completion of the project.

1.07 JOB CONDITIONS: Contractor must examine the subgrade, verify the elevations, observe the conditions under which work is to be performed and notify the Owner's Representative of unsatisfactory conditions. Do not proceed with the work until unsatisfactory conditions have been corrected in an acceptable manner.

Proceed with and complete the seeding work as rapidly as portions of the site become available, working within the required seasonal limitations.

A. Seeding Seasons: Unless variance is requested in writing and approved by the Owner's Representative, seeding shall be done within the following dates:

Permanent Seeding:	April 1 – September 15
Temporary Seeding:	September 16 - March 31

PART 2 - PRODUCTS

2.01 TOPSOIL (STRIPPINGS): Loam or approved topsoil removed within the confines of the project area shall be segregated into piles, cleaned sufficiently, and reused in accordance with Section 02200, Earthwork. If quantity of stockpiled topsoil is insufficient, or quality is not in accordance with the requirements for new topsoil, the Contractor shall provide additional new topsoil from approved sources off the site as required to complete landscape work. Manufactured topsoil will be allowed with approval of the MEDEP and the Owner.

Provide new topsoil as required which is fertile, friable, natural loam, surface soil, reasonably free of subsoil, clay lumps, brush, weeds and other litter, and free or roots, stumps, stones larger than 2 inches in any dimension (via screening or hand picking), and other extraneous or toxic matter harmful to plant growth. Obtain topsoil from local sources or from areas having similar soil characteristics to that found at project site. Obtain topsoil only from naturally, well-drained sites where topsoil occurs in a depth of not less than 4 inches; do not obtain from bogs or marshes. Mulch peat or other excessively acidic soil shall not be used. Sand, silt, and clay contents comprising existing or new topsoil shall fall within the following ranges for a sandy loam:

Sand	55%-70%
Silt	2%-40%
Clay	10%-20%

Submit representative soil samples of topsoil from off-site sources to University of Maine, Maine Soil Testing Service, Orono, Maine, as described in Section 02200 to ascertain what amendments may be necessary to obtain proper tilth, nutrient characteristics, and pH balance in accordance with the following. Provide amendments as necessary at rates indicated on the soil test in accordance with the following criteria:

Organic Matter: Greater than 5% organic matter (by weight)
pH range: 5.8 to 6.2
Phosphorus/Potassium: Optimum range
Soluble Salt: Less than 500 ppm

A. Soil Amendments:

1. Lime: Natural limestone containing not less than 90 percent of total carbonates, ground so that not less than 100 percent passes a No. 10-mesh sieve, not less than 90 percent passes a No. 20-mesh sieve, and not less than 50 percent passes a No. 100-mesh sieve.
2. Fertilizer: Fertilizer shall contain available elements in conformity with the standards of the Association of Official Agricultural Chemists. The fertilizer shall indicate the weight, contents, and guarantee analysis shown thereon or on a securely attached tag, as applicable. The selection of fertilizer shall be based on the recommended ratio of nitrogen, phosphate, and potash for the soil as determined by the chemical analysis of soil samples.
3. Manufactured Soil: If the Contractor intends to use manufactured soils, the Contractor shall include in his bid the cost to monitor the site during the growing season over time (minimum 3-year period), perform soil testing described above (including available nitrogen), and supplement soils based upon soil tests recommendations. A copy of all soil tests shall be submitted to the Owner. There shall be no extra cost for soil testing, applying recommended soil amendments or reworking the soil and reseeding the area to repair erosion or establish the required minimum 90 percent grass catch. The appropriate amount of retainage shall be determined between the Owner and the General Contractor to comply with this requirement prior to completion of the project.

2.02 GRASS MATERIAL:

Grass Seed: Provide fresh, clean, new-crop seed complying with the tolerance for purity and germination established by the Official Seed Analysts of North America. Provide seed of the grass species, proportions, and minimum percentages of purity, germination, and maximum percentage of weed seed, as specified.

The seed mixtures shall consist of seeds proportioned by weight as follows:

Permanent Seeding (180 lbs/acre)		**Temporary Seeding (120 lbs/acre)**	
Red Fescue	50%	Winter Rye	100%
Red Top	2%		
White Clover	5%		
Annual Ryegrass	25%		
Birdsfoot Trefoil	3%		
Kentucky Bluegrass	15%		

2.03 MISCELLANEOUS LANDSCAPE MATERIALS:

A. Mulch for Seeded Areas: Hay and straw mulch may be used at any time while cellulose fiber mulch may only be used between April 1 and September 1 and with the engineers approval.

1. Hay or straw mulch shall consist of long fibered hay or straw, reasonably free from noxious weeds and other undesirable material. No material shall be used which is too wet, decayed, or compacted as to inhibit even and uniform spreading. No chopped hay, grass clippings, or other short fibered material shall be used unless directed. If necessary, mulch netting will be used to anchor the mulch as directed by the Owner's Representative. Radix mulch netting manufactured by Tenax (1-800-356-8495), A.H. Harris (207-775-5764) or an engineer approved equal shall be used to anchor the mulch.

2. Cellulose fiber mulch shall consist of natural wood, recycled paper of humus cellulose fiber containing no materials which will inhibit seed germination or plant growth. Sufficient non-toxic water soluble green dye shall be added to provide a definite color contrast to the ground surface to aid in even distribution. Cellulose fiber mulch shall be supplied in moisture resistant, sealed bags marked with the manufacturer's name, the air-dry weight, and composition of the contents. Note, cellulose fiber mulch may only be applied between April 1 and September 1.

B. Mulch Binder: Material for mulch binder may be those acceptable to the Owner's Representative and may be diluted with water to assure even distribution. Other types of approved mulch binders may be used when authorized by the Owner's Representative.

PART 3 - EXECUTION

3.01 SEEDING:

A. Do not use wet seed or seed which is moldy or otherwise damaged in transit or storage.

B. Rates of Application: Rates of application for limestone, fertilizer, and grass seed shall be as follows:

Limestone:	Based on soil lab test results
Fertilizer:	Based on soil lab test results
Seed:	180 lbs/acre permanent seeding
	120 lbs/acre temporary seeding

Areas receiving temporary seeding shall be reseeded with permanent seeding during the next permanent seeding season as soon as weather conditions permit.

C. The hydraulic spray method shall be used for seeding all areas unless alternative methods are approved by the Owner's Representative.

D. Application Procedure:

1. Hydraulic Spray Method: The hydraulic spray method of sowing seed shall be done with an approved machine operated by a competent crew. Seed and fertilizing materials shall be mixed with water in the tank of the machine and kept thoroughly agitated so the materials are uniformly mixed and suspended in the water at all times during operation. The spraying equipment must be designed and operated to distribute seed and fertilizing materials evenly and uniformly on the designated areas at the required rates. If the Owner's Representative finds the application uneven or otherwise unsatisfactory, he may require the hydraulic spray method to be abandoned and the balance of the work done as specified under another method.

E. Mulching:

1. Cellulose fiber mulch shall be applied as a waterborne slurry. The cellulose fiber and water shall be thoroughly mixed and sprayed on the area to be covered so as to form a uniform mat of mulch at the rate of not less than 60 pounds at mulch material per 1,000 square feet unit of area. The cellulose fiber mulch shall completely cover the exposed ground surface.
2. Cellulose fiber mulch may be mixed with the proper quantities of seed, fertilizer, and agricultural limestone as required, or may be applied separately the next day after seeding.
3. Hay or straw mulch shall be spread evenly and uniformly over any designated areas or as directed by the Owner's Representative in the field so to avoid damage to seeded areas.

Unless otherwise directed, mulch shall be applied at the rate of 2 tons per acre and shall completely cover the ground surface. Too heavy application of mulch shall be avoided. Lumps and thick mulch material shall be thinned.

4. Unless otherwise authorized, the mulch shall be anchored in place by uniformly applying an acceptable mulch binder at a rate of 10 to 13 gallons per 1,000 square feet. Application of a concentrated stream of mulch binder will not be allowed. Other methods of anchoring mulch such as mulch netting shall be used as directed by the Owner's Representative.
5. Areas which cannot be seeded within the normal growing season (i.e., April 1 to September 15) shall be temporary seeded and mulched to provide protection to the soil surface. The area shall be mulched with hay and tacked with fiber mulch or another engineer approved tackifier. The areas will be reseeded with permanent seed as soon as seeding dates and weather conditions permit. Mulch netting will be installed per the manufacturer's recommendations.

3.02 MAINTENANCE AND ACCEPTANCE:

A. Seeded Areas:

1. Maintain seeded areas by watering, fertilizing, weeding, mowing, trimming, and other operations such as rolling, regrading and replanting as required to establish a smooth, acceptable grass growth, free or eroded or bare areas.
2. The Contractor shall maintain each seeded area until acceptance of the individual area. Maintenance shall consist of providing protection by erecting necessary signs and barriers and by repairing damaged areas as directed. Damaged areas and areas which do not produce a satisfactory stand of grass shall be repaired to re-establish the condition and grade of the area prior to the original seeding and then refertilized, reseeded and remulched as specified to produce satisfactory results. Necessary maintenance or repairs will not be paid for separately, but shall be considered incidental to the Contract.
3. Seeded areas will be accepted only upon attainment of a reasonable thick uniform stand of not less than 90 percent coverage of permanent grasses, free from sizable thin or bare spots.

3.03 CLEANUP AND PROTECTION: During landscape work, store materials and equipment where directed. Keep pavements clean and work area in an orderly condition.

Protect landscape work and materials from damage due to landscape operation, operations by other contractors, and trades and trespassers. Maintain protection during installation and maintenance periods. Treat, repair, or replace damaged landscape work as directed.

3.04 RESTORATION: All pavements, sodded and planted areas, structures, and substructures not specifically provided for in the Contract disturbed by the Contractor during the execution of the work shall be restored by the Contractor, in a manner satisfactory to the Owner's Representative, to their original conditions at no additional cost to the Owner.

END OF SECTION

APPENDIX A

MEDEP BOARD ORDER

STATE OF MAINE
DEPARTMENT OF ENVIRONMENTAL PROTECTION
17 STATE HOUSE STATION AUGUSTA, MAINE 04333-0017

BOARD ORDER

IN THE MATTER OF

STATE OF MAINE, ACTING THROUGH THE	)	SOLID WASTE
DEPARTMENT OF ADMINISTRATIVE AND FINANCIAL	)	LICENSE
SERVICES, BUREAU OF GENERAL SERVICES	)	
EAST MILLINOCKET, PENOBSCOT COUNTY, MAINE	)	
DOLBY LANDFILL FACILITY	)	
#S-000796-WO-AO-N	)	FINAL CLOSURE
(APPROVAL WITH CONDITIONS)	)	

Pursuant to the provisions of the *Maine Hazardous Waste, Septage and Solid Waste Management Act,* 38 M.R.S. §§1301 to 1319-Y; the *Rules Concerning the Processing of Applications and Other Administrative Matters*, 06-096 CMR 2 (last amended October 19, 2015); and the *Solid Waste Management Rules: General Provisions,* 06-096 CMR 400 (last revised April 6, 2015); *Landfill Siting, Design and Operation*, 06-096 CMR 401 (last revised April 12, 2015); and *Water Quality Monitoring, Leachate Monitoring, and Waste Characterization,* 06-096 CMR 405 (last revised April 12, 2015), the Department of Environmental Protection ("Department") has considered the application of the STATE OF MAINE, acting through the Department of Administrative and Financial Services, Bureau of General Services, with its supportive data, agency review comments, staff summary, and other related materials on file and FINDS THE FOLLOWING FACTS:

1. APPLICATION SUMMARY

A. Application: The Department of Administrative and Financial Services, Bureau of General Services ("DAFS/BGS") has applied for a license to close an existing paper mill landfill facility in East Millinocket.

B. History:

(1) On June 13, 1984, the Great Northern Paper Company ("GNP") received Department approval to construct and operate the Dolby III landfill (Department license #L-000796-07-A-N).

(2) The Dolby III landfill occupies approximately 72 acres and has been operated in stages consisting of 17 waste cells. Operations are currently in Cell 16.

(3) The originally-approved waste streams were wastewater sludges, woodroom/woodyard waste, wood ash, and general rubbish from GNP's Millinocket and East Millinocket paper mills and municipal solid waste from the local communities. The disposal of municipal solid waste was discontinued in 1993 in response to new federal solid waste regulations. The site also includes the Dolby I and Dolby II landfills, which have been filled to licensed capacity and are closed. Dolby I, II and III are hereinafter collectively referred to as the Dolby Landfill Facility.

(4) On April 28, 2003, the Department approved the transfer from GNP of all solid waste licenses, and other Department licenses, associated with the Dolby Landfill Facility to Katahdin Paper Company LLC ("KPC").

(5) On August 30, 2011, the Maine State Planning Office ("SPO") acquired the Dolby Landfill Facility and related properties from KPC. On September 28, 2011, the Department approved the transfer of all solid waste licenses (Department license #S-000796-WR-AJ-T), and other Departmental licenses, associated with the Dolby Landfill Facility to the SPO from KPC.

(6) Since the issuance of the aforementioned transfer license, the SPO has been dissolved and responsibilities for the oversight and operation of the Dolby Landfill Facility have been turned over to the DAFS/BGS.

C. Summary of Proposal: The DAFS/BGS is proposing to close the remaining open portions of Dolby III and upgrade the cover system of previously closed areas of Dolby II and Dolby III in several phases over the next few years. The entire project is hereinafter referred to as the Dolby Landfill Cover Upgrade Project. An Application for Landfill Closure entitled Dolby Landfill Cover Upgrade - Phase I (hereinafter "Application" or "Dolby Landfill Cover Upgrade Project - Phase I") was prepared by Sevee & Maher Engineers, Inc. and is dated April 2016. The Department accepted the Application as complete for processing on April 27, 2016.

2. TITLE, RIGHT, OR INTEREST

The Dolby Landfill Facility site is approximately 436 acres in size. The DAFS/BGS has submitted an executed copy of the Acquisition Agreement, dated August 30, 2011, that conveyed the property that the Dolby Landfill Facility is located on from KPC to the SPO. The SPO was dissolved in 2011 and ownership of the Dolby Landfill Facility was

transferred to the DAFS/BGS by PL 2011, c. 655; thereby, establishing the DAFS/BGS as the owner/operator of the facility.

The Department finds that the DAFS/BGS has submitted sufficient evidence of title, right, or interest with respect to the property proposed for use.

3. NOTICE OF INTENT

The DAFS/BGS has provided documentation of the publication of a "Notice of Intent to File" and has documented notification of abutters as required by 06-096 CMR 2. The Notice of Intent to File was published in the March 19-20, 2016 edition of the Bangor Daily News.

The Department finds that the DAFS/BGS has complied with all of the public notice requirements of 06-096 CMR 2.

4. FINANCIAL ABILITY AND ASSURANCE

The DAFS/BGS has allocated approximately $12 million for the proposed closure/cover system upgrade at the Dolby Landfill Facility. The funds for the Dolby Landfill Cover Upgrade Project were included in the 2016-2017 State of Maine biennial budget (PL 2015, c. 267 Part M). The Dolby Landfill is a state-owned facility and is not subject to the financial assurance requirements of 06-096 CMR 400(11) of Maine's *Solid Waste Management Rules* ("Department Rules").

The Department finds that the DAFS/BGS has provided adequate evidence of financial ability and assurance for the proposed Dolby Landfill Cover Upgrade Project.

5. TECHNICAL ABILITY

The DAFS/BGS has retained Sevee & Maher Engineers, Inc. ("SME") of Cumberland, Maine to assist with the design, construction management and oversight of the Dolby Landfill Cover Upgrade Project. SME was formed in 1985 to provide civil and environmental services to private and public sectors. Services provided by SME include siting, design, permitting, and operation of solid waste landfills. Personnel from SME have been involved with various aspects of the design and operation of the Dolby Landfill Facility since the mid 1980's. SME provided information regarding the technical ability of its personnel who will be utilized to design, manage, and oversee the construction of the Dolby Landfill Cover Upgrade Project. The DAFS/BGS and SME will also work with earthworks and geosynthetics contractors experienced in landfill cover construction to complete the project. Post-closure care and maintenance of the

facility will continue to be provided by the DAFS/BGS using personnel familiar with the site.

The Department finds that the DAFS/BGS has demonstrated technical ability for the proposed Dolby Landfill Cover Upgrade Project.

6. LIABILITY INSURANCE

The DAFS/BGS is a public entity and is exempt from the liability insurance requirements of 06-096 CMR 400(10).

The Department finds that the DAFS/BGS is exempt from the liability insurance requirements of 06-096 CMR 400(10) of the Department Rules.

7. SURFACE WATER QUALITY AND FLOODING

Stormwater from the Dolby Landfill site is managed in accordance with the facility's Stormwater Pollution Plan and is in compliance with the Maine Multi-Sector General Permit Sector L. In general, surface water from the site flows towards the Partridge Brook Flowage, which then flows into Dolby Pond. Partridge Brook Flowage is not listed as an impaired water body. Stormwater management for the facility includes 3 separate sediment/detention ponds that are positioned near the downslope perimeter of the Dolby III landfill. Runoff from the closed landfill areas and access roads enter grass and stone lined ditches that flow into the sediment/detention ponds. Discharges from each sediment/detention pond flow into level spreaders and then become sheet flow into the adjacent wooded areas.

Since the Dolby III landfill ceased operations prior to reaching its permitted final waste grade, the proposed final grading plan will have sideslopes that are flatter in some areas than previously expected. The proposed cover upgrades will also utilize existing cover material to re-establish a vegetative cover surface that will mimic the current cover conditions in terms of stormwater runoff from the site. SME proposes no changes to the site's current Stormwater Management Plan with respect to the proposed cover system upgrade. However, during each phase of the cover system upgrade, a stormwater analysis will be performed to verify the capacity requirements of the site's existing structures and to design the necessary temporary and permanent erosion control measures required for the proposed cover upgrades. Based upon the stormwater analysis for the Phase I cover upgrade area, the emergency spillway of Sedimentation Pond #3 will be modified. Modifications include the installation of a riprap-lined emergency spillway and outlet pipe riprap protection.

The Department finds that the proposed Dolby Landfill Cover Upgrade Project will not have an unreasonable adverse effect on surface water quality and will not unreasonably cause or increase flooding on-site or on adjacent properties nor create an unreasonable flood hazard to any structure.

8. EROSION AND SEDIMENTATION CONTROL

The proposed Dolby Landfill Cover Upgrade Project will occur within the limits of the existing landfill footprint and will minimize the disturbance of any native soils. The design and implementation of all erosion control measures associated with the proposed project will be conducted in accordance with the Maine Erosion and Sediment Control Practices Field Guide for Contractors, March 2015, or its equivalent. Suitable erosion control measures will be in-place prior to disturbance of the existing soil cover associated with the proposed project. A comprehensive Erosion and Sedimentation Control Plan has been prepared by SME and was submitted as part of the Application.

The Department finds that the DAFS/BGS has adequately addressed erosion and sediment control for the proposed Dolby Landfill Cover Upgrade Project and has demonstrated that the proposed project will not cause unreasonable sedimentation or erosion of soil.

9. FACILITY BACKGROUND AND PROJECT DESCRIPTION

The Dolby II and Dolby III landfills are non-secure landfills that collect leachate and groundwater-containing leachate. The Dolby II and Dolby III landfills have a combined size of approximately 135 acres and were permitted by the Department in 1978 and 1984, respectively. Originally, the waste streams included municipal solid wastes from the Towns of Millinocket, East Millinocket and Medway, and wastewater treatment sludge and various pulp and papermaking residuals from the GNP mills. Over the years, the Department has approved disposal of a number of different wastes streams, including, but not limited to, the following: wood waste; boiler ash; wood ash; coal ash; demolition debris ash; asbestos-containing materials; oil-contaminated soils; lime grit; waste sulfur; ink sludge; and solid waste from Baxter State Park and GNP Woodland Operations.

Cover materials have been previously placed on all of Dolby II and a majority of Dolby III. In an effort to significantly reduce the volume of leachate generated at the Dolby Landfill Facility, the DAFS/BGS plans to close the remainder of Dolby III and upgrade the cover system of previously closed areas of Dolby III and portions of previously closed areas of Dolby II. The proposed cover system upgrades will significantly limit precipitation infiltration into the waste; thereby, reducing leachate generated at the site. The objective of reducing the leachate generated at the site is to minimize future costs

associated with the transportation and treatment of leachate from the facility that will be paid for by the taxpayers of Maine.

10. SITE ASSESSMENT REPORT

Consistent with Department Rules, the DAFS/BGS is exempt from conducting an additional site investigation for closure as long as the site was previously characterized and water quality monitoring is conducted in accordance with the requirements of 06-096 CMR 405. Previous site investigations including a study conducted by E.C. Jordan in 1981 have documented the hydrogeologic conditions at the Dolby Landfill Facility. In December 2015, SME conducted an investigation to better define the bedrock surface and groundwater divide in the vicinity of Dolby II. This investigation was performed to establish the proposed cover upgrade work limits on Dolby II that would provide the greatest long-term benefit in terms of reducing leachate generation and subsequent collection, conveyance and treatment costs. Results of the December 2015 investigation were submitted, along with interpretive bedrock and phreatic surface maps for this portion of the landfill site, as part of the Application.

A facility water quality monitoring program consisting of groundwater, surface water and leachate sampling and testing has been conducted triannually with the data submitted in the annual reports.

The Department finds that the DAFS/BGS has completed a site investigation for closure and site assessment report that adequately supports the design of the proposed final cover system and that the DAFS/BGS conducts water quality monitoring in accordance with Department Rules.

11. ENGINEERING DESIGN AND REPORT

A. Closure Design: The DAFS/BGS has submitted a proposed cover system design, prepared by SME and dated March 29, 2016. The proposed Dolby Landfill Cover Upgrade Project is to occur in phases of approximately 25 acres in size over a 4 to 5 year period. The first phase, Phase I, will include a majority of the remaining open areas of Dolby III (i.e., Cells 15 and 16) and other areas in the southwest portion of Dolby III. Other phases will follow sequentially as detailed on Figure 1-2, Conceptual Closure Sequence, submitted in the Application. The Application details the approximate amount of acreage to be covered in each construction season and is as follows: for Dolby III, Summer 2016 – 25 acres, Summer 2017 – 24 acres and Summer 2018 – 23 acres; and for Dolby II, Summer 2019 – 25 acres.

Approximately 38 acres of the existing Dolby II cover system will not be upgraded. The cover system upgrade design will incorporate existing topsoil, cover soil, and sand drainage material previously placed at the site to the extent possible. A soil re-use plan has been submitted to describe how existing soils will be re-used within Phase I of the proposed Dolby Landfill Cover Upgrade Project. The proposed cover system upgrade includes, from the bottom up, the following components: a minimum 6-inch gas collection system (i.e., sand and gas vent piping); a 40-mil high density polyethylene ("HDPE") textured geomembrane; a drainage geocomposite and cover system drainage pipes; a 14-inch cover soil layer; a 4-inch vegetative soil layer; and miscellaneous permanent erosion control measures (i.e., erosion control mats, rip rap, etc.).

B. Stability and Settlement Assessment and Monitoring: Slope stability of the proposed cover system was evaluated relative to the materials and material interfaces which will comprise the proposed cover system. Slope stability factors of safety ("FOS") were calculated using soil and geosynthetic material properties considered representative of the materials available to the project and which are consistent with geotechnical literature and accepted engineering practices. Soil and geosynthetic material properties utilized within the slope stability analyses will be verified during construction.

The slope stability calculations indicate that a stable cover system configuration will be maintained during the closure and post-closure periods. The FOSs for the proposed final cover system were calculated to be consistently greater than 1.3 and 1.5 for static construction/operational and post-closure conditions, respectively, and consistently greater than 1.1 and 1.5 for seismic construction/operational and post-closure conditions, respectively. All of the calculated slope stability FOSs meet or exceed the required minimum FOSs specified in 06-096 CMR 401(2)(F)(1) of the Department Rules.

Settlement of the proposed cover systems during the post-closure period was evaluated by SME. The calculations show that: 1) the as-placed cover grades are expected to change minimally during the post-closure period and the cover system drainage is not expected to be affected and 2) the HDPE geomembrane will maintain its integrity and performance at the maximum predicted settlements. The minimal amount of settlement calculated for Phase I is largely predicated on the minor regrading and filling that will be performed to construct the proposed cover system and that much of the waste in Phase I has been in place for several years. It is expected that only a small amount of settlement will occur during the post-closure period due to long-term waste degradation and waste compression.

C. Water Balance: Leachate volumes collected and treated from the Dolby Landfill Facility have averaged approximately 74.2 million gallons per year ("MGY") over the past 5 years. SME estimates that the leachate generation rate from the Dolby Landfill Facility will be reduced to less than 7 MGY with the placement of a geomembrane cover over the portions of Dolby II and Dolby III that contribute to the facility's leachate collection system. The resistance to infiltration and runoff characteristics of the proposed cover system has been evaluated using the Hydrogeologic Evaluation of Landfill Performance ("HELP") model. The HELP model evaluation shows that the proposed cover system will meet the intent of the Department Rules by minimizing the infiltration of precipitation into the landfill after closure.

D. Leachate Management Plan: The Dolby Landfill Cover Upgrade Project will not involve changes in the site's current leachate collection system, leachate storage pond, or leachate transport system. The proposed cover system construction will be performed in discrete sections that will allow stormwater runoff to be managed properly. Areas of waste which are uncovered during the construction process will be contained using temporary berms constructed from existing cover soil to isolate the open areas and manage impacted runoff from these areas to the greatest practical extent. Impacted runoff will be diverted and/or pumped to various perimeter manholes adjacent to the work area for collection and subsequent treatment.

E. Gas Management Plan: SME recognizes the potential for degradation of the landfill waste and has estimated the gas generation for the portion of the landfill that will be closed by Phase I of the Dolby Landfill Cover Upgrade Project. SME used historical as-built drawings and available annual reports to estimate the waste thickness and the types of waste placed in this area of the landfill. The Landfill Gas Emissions Model ("LandGEM") was used to predict the quantity of gas that could be generated and the emission rate of non-methane organic compounds ("NMOC") from Phase I. Gas collection pipe spacing and passive vent locations necessary to relieve gas pressures generated by the waste and maintain cover stability were determined using standard design methods. The gas calculations indicate that the NMOC emission rate from Phase I will be below the 50 megagrams per year threshold described in 06-096 CMR 401(5)(I)(6)(c) of the Department Rules. As such, SME states that no additional gas control measures for the Dolby Landfill Cover Upgrade Project - Phase I other than passive gas collection and venting are necessary.

Gas monitoring will be performed during construction when modifications to the landfill interior manholes are made to accommodate placement of the geomembrane.

The Department finds that the proposed final cover system will maintain its integrity and performance under the maximum predicted settlement, minimize infiltration of precipitation into the landfill after closure, and adequately manage landfill gas; provided that, an engineering report is submitted to the Department for review and approval at least 3 months prior to the commencement of construction activities within each subsequent phase of the Dolby Landfill Cover Upgrade Project.

12. QUALITY ASSURANCE PLAN

A Construction Quality Assurance (CQA) Plan, prepared by SME and dated April 2016, addressing the construction quality assurance for placement of final cover materials for the Dolby Landfill Cover Upgrade Project - Phase I has been developed and submitted with the Application. The CQA plan outlines the characterization of the cover system's physical properties to determine its ability to achieve the project's performance criteria; defines procedures for cover placement; defines tests and frequency of testing to assure the construction of the cover meets or exceeds design criteria; and provides a method for documenting the cover placement. Geosynthetics and soil components will be inspected, tested, and certified by qualified CQA personnel independent of the Owner and Contractor.

The Department finds that the DAFS/BGS will implement adequate construction quality assurance measures to assure that design specifications and performance requirements for all facility components are met during construction of the Dolby Landfill Cover Upgrade Project; provided that, a CQA Plan is submitted to the Department for review and approval at least 3 months prior to the commencement of construction activities within each subsequent phase of the Dolby Landfill Cover Upgrade Project.

13. CONSTRUCTION CONTRACT BID DOCUMENTS

The DAFS/BGS has submitted *Contract Documents and Construction Specifications, Dolby Landfill Cover System Upgrade – Phase I (Documents)*, prepared by SME and dated April 2016. The Documents include drawings, technical specifications, and contract administrative documents for the Dolby Landfill Cover Upgrade Project - Phase I. The Documents describe the proposed project and the means and methods for the installation of the final cover systems.

The Department finds that the construction contract bid documents were adequately prepared and meet the requirements of 06-096 CMR 401(5)(L); provided that, construction contract bid documents, including drawings, technical specifications, and contract administrative documents are submitted to the Department for review and approval at least 3 months prior to the commencement of construction activities within each subsequent phase of the Dolby Landfill Cover Upgrade Project.

14. POST-CLOSURE MONITORING AND MAINTENANCE

An Environmental Monitoring Plan (EMP), dated April 2011, was previously submitted and approved by the Department. The EMP meets the requirements of 06-096 CMR 405 and will be the basis for the post-closure water quality monitoring program for the Dolby Landfill Facility. Provisions for groundwater, surface water, leachate and gas monitoring are outlined in the EMP. Specific procedures for the inspection and maintenance of facility components are outlined in the facility Operating Manual, dated April 2012. Slope stability and settlement monitoring of the proposed cover systems will be routinely conducted during the post-closure period. This monitoring will consist of visual inspections of the completed cover system and periodic topographical surveys for comparison to the cover surface elevations at the time of construction completion. Post-closure slope stability and settlement monitoring will be conducted annually unless conditions are encountered that warrant more frequent monitoring. The post-closure monitoring and maintenance plan will need to be revised to reflect changes associated with the Dolby Landfill Cover Upgrade Project.

Groundwater monitoring data shows that groundwater quality at monitoring well ("MW") 301, MW-302B and MW-302C has deteriorated over time. Data shows that these wells generally began to experience increasing trends for several parameters in the year 2000. The exact cause of increasing trends is unknown; however, completion of the Dolby Landfill Cover Upgrade Project is expected to help mitigate these impacts. The EMP includes a requirement for the ongoing statistical analysis of the monitoring data, using statistical tests approved by the Department, to evaluate trends in groundwater quality. The results of the ongoing evaluation will be provided in the annual report.

SME has submitted a June 23, 2016 letter proposing to evaluate the effectiveness of the Dolby Landfill Cover Upgrade Project relative to improving groundwater quality 5 years after the substantial completion of construction activities of the Dolby Landfill Cover Upgrade Project. Completion of the Dolby Landfill Upgrade Project is scheduled to occur during 2019.

The Department finds that the DAFS/BGS has adequately addressed post-closure monitoring and maintenance for the Dolby Landfill Facility; provided that: (1) the post-

closure monitoring and maintenance plan is revised to reflect changes associated with the Dolby Landfill Cover Upgrade Project and is submitted for Department review and approval at least 30 days prior to substantial completion of construction activities within the Dolby Landfill Cover Upgrade Project - Phase I and (2) five years after the substantial completion of the Dolby Landfill Cover Upgrade Project or no later than year end of 2024, whichever is earlier, the DAFS/BGS submits to the Department, for review and approval, an evaluation of water quality data from MW-301, MW-302B and MW-302C. If there has been no improvement in the water quality at MW-301, MW-302B and MW-302C, the DAFS/BGS must submit a Corrective Action Plan within 90 days of the submittal of the evaluation of water quality data from MW-301, MW-302B and MW-302C, prepared in accordance with the applicable rules in effect at that time, to the Department for review and approval. Once the Corrective Action Plan has been approved by the Department, the plan must be implemented within one year of approval.

15. FINAL USE/PERMANENT RECORD

The DAFS/BGS proposes to maintain the property that the landfill is on as open space. Permanent buildings will not be placed within 100 feet of the landfill. Currently, there are no specific plans for final use of the Dolby Landfill Facility.

Following the completion of the Dolby Landfill Cover Upgrade Project, the DAFS/BGS will prepare and record in the Penobscot County Registry of Deeds information and necessary deed restrictions to provide notice to prospective purchasers and a public record of the location of the Dolby II and Dolby III landfills. The DAFS/BGS will also provide a copy of the record information and necessary deed restrictions to the Department as required by 06-096 CMR 401(5)(B)(4). The final cover or other components of the containment systems or the functioning of the monitoring systems may not be disturbed without the written approval of the Department.

The Department finds that the DAFS/BGS has provided for the permanent record related to the Dolby Landfill Facility.

BASED on the above Findings of Facts, and subject to the CONDITIONS listed below, the Department makes the following CONCLUSIONS:

1. The DAFS/BGS has submitted evidence of sufficient title, right, or interest with respect to the property proposed for use.

2. The DAFS/BGS has complied with all of the public notice requirements of 06-096 CMR 2 and 400.

3. The DAFS/BGS has provided adequate evidence of financial and technical ability to design, construct, operate, maintain, close and accomplish post-closure care of the solid waste facility in a manner consistent with all applicable requirements.

4. The DAFS/BGS is exempt from the liability insurance requirements of 06-096 CMR 400(10).

5. The Dolby Landfill Cover Upgrade Project will not unreasonably cause or increase flooding and will have no unreasonable effect on surface water. The DAFS/BGS has adequately addressed stormwater management for the proposed project.

6. The Dolby Landfill Cover Upgrade Project will not cause unreasonable sedimentation or erosion of soil. The DAFS/BGS has adequately addressed erosion and sedimentation control for the proposed project.

7. The DAFS/BGS has completed a site assessment report that adequately supports the design of the proposed final cover system and conducts water quality monitoring in accordance with the Department Rules.

8. The proposed final cover system will maintain its integrity and performance under the maximum predicted settlement, minimize infiltration of precipitation into the landfill after closure, and adequately manage landfill gas.

9. The DAFS/BGS has proposed a final cover system design meeting the requirements of the Department Rules; provided that, an engineering report, a CQA Plan and the construction contract bid documents, including drawings, technical specifications, and the contract administrative documents are submitted to the Department for review and approval at least 3 months prior to the commencement of construction activities within each subsequent phase of the Dolby Landfill Cover Upgrade Project.

10. The DAFS/BGS has provided for post-closure monitoring and maintenance in accordance with Department Rules; provided that: (1) the post-closure monitoring and maintenance plan is revised to reflect changes associated with the Dolby Landfill Cover Upgrade Project and is submitted for Department review and approval at least 30 days prior to substantial completion of construction activities within the Dolby Landfill Upgrade Project - Phase I and (2) five years after the substantial completion of the Dolby Landfill Cover Upgrade Project or no later than year end of 2024, whichever is earlier, an evaluation of water quality data from MW-301, MW-302B and MW-302C is submitted for Department review and approval. If there has been no improvement in the water quality at MW-301, MW-302B and MW-302C, the DAFS/BGS must submit a Corrective Action Plan within 90 days of the submittal of the evaluation of water quality from MW-

301, MW-302B and MW-302C, prepared in accordance with the applicable rules in effect at that time, to the Department for review and approval. Once the Corrective Action Plan has been approved by the Department, the plan must be implemented within one year of approval.

11. The DAFS/BGS has provided for the permanent record related to the site.

12. The Dolby Landfill Cover Upgrade Project will not pollute any waters of the State, contaminate the ambient air, constitute a hazard to health and welfare, or create a nuisance.

THEREFORE, the Department APPROVES the above noted application of the STATE OF MAINE, DEPARTMENT OF ADMINISTRATIVE and FINANCIAL SERVICES, BUREAU OF GENERAL SERVICES, SUBJECT TO THE ATTACHED CONDITIONS, and all applicable standards and regulations:

1. The Standard Conditions of Approval, a copy attached as Appendix A.

2. The invalidity or unenforceability of any provision, or part thereof, of this license shall not affect the remainder of the provision or any other provisions. This license shall be construed and enforced in all respects as if such invalid or unenforceable provision or part thereof had been omitted.

3. At least 3 months prior to the commencement of construction of each subsequent phase, the DAFS/BGS shall submit an engineering report, a CQA Plan and the construction contract bid documents including drawings, technical specifications, and the contract administrative documents to the Department for review and approval.

4. At least 30 days prior to substantial completion of construction activities within the Dolby Landfill Cover Upgrade Project - Phase I, the DAFS/BGS shall submit to the Department, for review and approval, a revised post-closure monitoring and maintenance plan to reflect changes associated with the Dolby Landfill Cover Upgrade Project.

5. Five years after the substantial completion of the Dolby Landfill Cover Upgrade Project or no later than year end of 2024, whichever is earlier, the DAFS/BGS shall submit to the Department, for review and approval, an evaluation of water quality data from MW-301, MW-302B and MW-302C. If there has been no improvement in water quality at MW-301, MW-302B and MW-302C, the DAFS/BGS shall submit a Corrective Action Plan within 90 days of the submittal of the evaluation of water quality data from MW-301, MW-302B and MW-302C, prepared in accordance with the applicable rules in effect at that time, to the Department for review and approval.

STATE OF MAINE, ACTING THROUGH THE DEPARTMENT OF ADMINISTRATIVE AND FINANCIAL SERVICES, BUREAU OF GENERAL SERVICES EAST MILLINOCKET, PENOBSCOT COUNTY, MAINE DOLBY LANDFILL FACILITY #S-000796-WO-AO-N (APPROVAL WITH CONDITIONS)	14	SOLID WASTE LICENSE FINAL CLOSURE

Once the Corrective Action Plan has been approved by the Department, the plan shall be implemented within one year of approval.

DONE AND DATED AT AUGUSTA, MAINE, THIS 30th DAY OF June, 2016.

DEPARTMENT OF ENVIRONMENTAL PROTECTION

BY: _____ for
Paul Mercer, Commissioner

Filed
JUL 06 2016
State of Maine
Board of Environmental Protection

PLEASE NOTE ATTACHED SHEET FOR GUIDANCE ON APPEAL PROCEDURES.

Date of initial receipt of application: April 7, 2016
Date of application acceptance: April 27, 2016

Date filed with the Board of Environmental Protection:

xlp80430/lsp

Appendix A

STANDARD CONDITIONS TO ALL SOLID WASTE LANDFILL LICENSES

STRICT CONFORMANCE WITH THE STANDARD AND SPECIAL CONDITIONS OF THIS APPROVAL IS NECESSARY FOR THE PROJECT TO MEET THE STATUTORY CRITERIA FOR APPROVAL. VIOLATIONS OF THE CONDITIONS UNDER WHICH A LICENSE IS ISSUED SHALL CONSTITUTE A VIOLATION OF THAT LICENSE AGAINST WHICH ENFORCEMENT ACTION MAY BE TAKEN, INCLUDING REVOCATION.

1. **Approval of Variations from Plans.** The granting of this approval is dependent upon and limited to the proposals and plans contained in the application and supporting documents submitted and affirmed by the license. Any consequential variation from these plans, proposals, and supporting documents is subject to review and approval prior to implementation.

2. **Compliance with All Applicable Laws.** The licensee shall secure and comply with all applicable federal, state, and local licenses, permits, authorizations, conditions, agreements, and orders prior to or during construction and operation, as appropriate.

3. **Compliance with All Terms and Conditions of Approval.** The licensee shall submit all reports and information requested by the Department demonstrating that the licensee has complied or will comply with all terms and conditions of this approval. All preconstruction terms and conditions must be met before construction begins.

4. **Transfer of License.** The licensee may not transfer the solid waste facility license or any portion thereof without approval of the Department.

5. **Initiation of Construction or Development Within Two Years.** If the construction or operation of the solid waste facility is not begun within two years of issuance of within 2 years after any administrative and judicial appeals have been resolved, the license lapses and the licensee must reapply to the Department for a new license unless otherwise approved by the Department.

6. **Approval Included in Contract Bids.** A copy of the approval must be included in or attached to all contract bid specifications for the solid waste facility.

7. **Approval Shown to Contractors.** Contractors must be shown the license by the licensee before commencing work on the solid waste facility.

8. **Background of key individuals.** A licensee may not knowingly hire as an officer, director or key solid waste facility employee, or knowingly acquire an equity interest or debt interest in, any person convicted of a felony or found to have violated a State or federal environmental law or rule without first obtaining the approval of the Department.

STANDARD CONDITIONS
TO ALL SOLID WASTE LANDFILL LICENSES

9. **Fees.** The licensee must comply with annual license and annual reporting fee requirements of the Department's rules.

10. **Recycling and Source Reduction Determination for Solid Waste Disposal Facilities.** This condition does not apply to the expansion of a commercial solid waste disposal facility that accepts only special waste for landfilling.

    The solid waste disposal facility shall only accept solid waste that is subject to recycling and source reduction programs, voluntary or otherwise, at least as effective as those imposed by 38 M.R.S. Chapter 13.

11. **Deed Requirements for Solid Waste Disposal Facilities.** Whenever any lot of land on which an active, inactive, or closed solid waste disposal facility is located is being transferred by deed, the following must be expressly stated in the deed:

    A. The type of facility located on the lot and the dates of its establishment and closure.

    B. A description of the location and the composition, extent, and depth of the waste deposited.

    C. The disposal location coordinates of asbestos wastes must be identified.

APPENDIX B

QUALITY ASSURANCE/QUALITY CONTROL PLAN

SME
Sevee & Maher Engineers, Inc.

SME
SEVEE & MAHER
ENGINEERS

4 Blanchard Road, P.O. Box 85A
Cumberland, ME 04021
Tel: 207.829.5016 • Fax: 207.829.5692
info@sme-engineers.com
sme-engineers.com

MEMO TO: Document Reviewer

FROM: Matthew W. Muzzy, P.E.
Senior Geo-Environmental Engineer

DATE: November 15, 2021

SUBJECT: **SUPPLEMENT TO APPLICATION FOR ORDER OF COMPLIANCE WITH SOLID WASTE LICENSE CONDITIONS 3 AND 4**
DOLBY LANDFILL COVER UPGRADE PHASES 2 AND 3
EAST MILLINOCKET, MAINE.

The purpose of this memorandum is to discuss the Quality Assurance / Quality Control Plan (QA/QC Plan) prepared in 2017 for the then Phases 2 and 3 of the Dolby III cover upgrade.

The Dolby III Landfill has an overall area of approximately 68 acres. In 2016, Phase 1 (approximately 25 acres) of the Dolby III cover upgrade was constructed. The remaining 43 acres of Dolby III were to receive the cover upgrade in the following State of Maine budget cycle. Phase 2 would have an area of approximately 22 acres and Phase 3 would have an area of approximately 21 acres.

In June 2017, an Application for Order of Compliance With Solid Waste License Conditions 3 and 4 was submitted to MEPEP, which included the 22-acre Phase 2 area and 21-acre Phase 3 area. The application was subsequently put on hold due to funding. Funding was approved in 2021 for approximately 33 acres of cover upgrade and as such the extent and the position of Phases 2 and 3 were changed to reflect the funding availability. Phase 2 now consists of approximately 15 acres (located in the northeast portion of Dolby III) and Phase 3 now consists of approximately 18 acres (located in the southwestern corner of Dolby III). Approximately 10 acres of cover upgrade will not be completed until additional funding becomes available. The 10-acre area waiting for cover upgrade funding is located in the southeastern portion of Dolby III and expected to be referred to as Phase 4 when funding is approved.

The QA/QC Plan prepared in 2017 remains applicable to the planned 2021 Phase 2 and Phase 3 cover upgrade. The same materials and methods of material placement will be used for the 2021 Phase 2 and Phase 3 cover upgrade as that used for the Phase 1 cover upgrade.

QUALITY ASSURANCE/
QUALITY CONTROL PLAN
DOLBY LANDFILL COVER UPGRADE
PHASES 2 AND 3
EAST MILLINOCKET, MAINE

Prepared for

MAINE BUREAU OF GENERAL SERVICES
AUGUSTA, MAINE

June 2017
(Revised December 2021)

SME
Sevee & Maher Engineers, Inc.

ENVIRONMENTAL • CIVIL • GEOTECHNICAL • WATER • COMPLIANCE

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1.0 GENERAL

1.1 Scope

This Quality Assurance/Quality Control Plan (QAP) addresses construction quality assurance and quality control for placement of final cover materials for the Dolby Landfill Cover Upgrade – Phase 2 and 3 Project in East Millinocket, Maine.

This plan outlines the characterization of the cover system's physical properties to determine its ability to achieve the project's performance criteria; defines procedures for cover placement; defines tests and frequency of testing to assure the construction of the cover meets or exceeds design criteria; and provides a method for documenting the cover placement.

1.2 Parties

The parties discussed in this section are associated with the ownership, design, installation, and quality assurance of the cover system. The definitions, qualifications, and responsibilities of these parties are outlined in the following subsections.

1.2.1 Maine Department of Environmental Protection (MEDEP)

Is the State agency responsible for permit issues for Dolby Landfill Facility. The MEDEP is responsible for reviewing permit applications and associated documentation, issuing permits, reviewing changes to original permit application, and enforcement of granted permits and MEDEP Solid Waste Management Regulations.

1.2.2 Owner

Shall mean the State of Maine Bureau of General Services (BGS). The Owner's responsibilities during construction activities shall include the management of the engineering and construction contracts according to the approved permit application, approved plans and technical specifications, and this QAP.

1.2.3 Project Manager

The project manager is the official representative of the Owner. In this manual, the term Project Manager shall apply equally to Construction Coordinator and Owner's Representative. The Project Manager is responsible for coordinating construction and quality assurance activities for the project. The Project Manager shall serve as communications coordinator for the project, and is responsible for initiating the pre-bid, pre-construction, and construction meetings. As construction coordinator, the Project Manager shall serve as a liaison between all parties involved in the project to assure that communications are maintained. The Project Manager shall also be responsible for proper resolution of all quality assurance issues that arise during construction. The Project Manager for the Dolby Landfill Cover Upgrade – Phase 2 and 3 Project will be an employee of Sevee & Maher Engineers, Inc. (SME).

The selection of the Project Manager is the direct responsibility of the Owner. Qualifications for this position include familiarity with the following:

1. Applicable QAPs;
2. All applicable regulatory requirements;
3. Policies and procedures for project management; and
4. Placement techniques of low hydraulic conductivity material.

1.2.4 Designer (Engineer)

The designer (Engineer) is the individual and/or firm responsible for the preparation of the closure design including, project specific engineering drawings, technical specifications and the QAP. The Engineer is responsible for approving all design and specification changes, manufacturer's material certifications and contractor submittals, and for making any design clarifications during the contract bidding process and construction of the cover system. The Engineer may attend the pre-bid, pre-construction, and construction meetings upon the request of the Project Manager. The Engineer may also act as the Owner's Representative and Construction Quality Assurance Agent (CQA Agent) during construction of the project. As the Owner's Representative and CQA Agent, the Engineer is responsible for the documentation of the closure work and submittals of weekly construction reports that summarize the construction activity at the site. The Design Firm for the closure of the Landfill is Sevee & Maher Engineers, Inc. (SME) of Cumberland, Maine.

1.2.5 Construction Quality Assurance Agent

The CQA Agent is responsible for review of the borrow source and in-place material testing results and for the observation of the Contractor's work to assure that the constructed cover system meets the design specifications. Qualifications for this position include familiarity with the following:

1. Applicable QAPs;
2. All applicable regulatory requirements;
3. Placement techniques of low hydraulic conductivity material; and
4. Experience with clay inspection of landfill projects.

The CQA Agent is also responsible for the following:

- Approval/disapproval of borrow source material test results for the cover system;
- The in-place testing and approval of the materials placed by the Contractor; and
- Ensure that the placement techniques utilized conform to industry standard and this QAP, and as described in Technical Specifications.

The CQA Agent will provide continuous monitoring during placement of the proposed cover system. It is anticipated that only one CQA Agent will be necessary during construction of the cover. However, should the Contractor begin placing the cover over separate areas of the landfill simultaneously, additional CQA Agents will be added for oversight. A representative of SME will act as the CQA Agent for the Landfill cover project. The CQA Agent will work under the direct supervision of a State of Maine

licensed Professional Engineer and will be certified in the use of nuclear testing equipment in accordance with 49 CFR 172, Subpart H.

1.2.6 General Contractor

The general contractor (Contractor) is responsible for construction of the cover system including supplying labor, material, equipment, and supervision for placement of the cover system. The primary responsibility of the general contractor is to ensure the cover system is constructed in accordance with the design and specifications developed by the Engineer and approved by the permitting agency. The Superintendent is the Contractor's designee who is responsible for the Contractor's field crew. The Superintendent shall represent the Contractor at all site meetings and shall be responsible for acting as the Contractor's spokesman for the project. The Contractor shall be responsible for all aspects of cover system placement, including but not limited to, placement of all erosion control measures, subgrade preparation, placement of granular drainage material, placement of 40-mil HDPE liner and drainage geocomposite, placement of cover soil and vegetative layer, seeding, fertilizing, and mulching. The Contractor is also responsible for informing the Owner, the Engineer, and the CQA Agent of the scheduling and occurrence of all construction activities and of any discrepancies, errors, or omissions in the Contract Documents.

The Contractor shall be pre-qualified and approved by the BGS. The Superintendent must be qualified based on previously demonstrated construction experience and management ability. Services of the Contractor will be procured through a competitive bid process. Bid packages for the solicitation of construction services will require the Contractor to identify and demonstrate familiarity and experience with the various aspects of landfill construction.

1.2.7 Subcontractors

Subcontractors are responsible for that portion of the work that they are designated to perform by the General Contractor. Subcontractors' work as agents of the General Contractor and as such the General Contractor is responsible for the work and actions of the Subcontractor.

1.2.8 Materials Testing Lab

The materials testing lab is a qualified geotechnical laboratory contracted by the General Contractor, Owner or Owner's Representative to test the borrow source and in-place cover system materials. The material testing laboratory will determine the quality of the borrow source and in-place material in accordance with the ASTM test methods described in the project specifications. The materials testing laboratory will be independent from the General Contractor and the Owner.

1.2.9 Manufacturer

The Manufacturer is the firm responsible for production of any of the various geosynthetic liner system components outlined in this QAP. Each Manufacturer is responsible for the production of its geosynthetic product. In addition, each Manufacturer is responsible for the condition of the geosynthetic until the material is accepted by the Project Manager upon delivery. Each Manufacturer shall produce a consistent product meeting the project specifications. Each Manufacturer shall provide quality control documentation for its product as specified in this QAP.

Each Manufacturer shall be pre-qualified by the BGS or the Owner's Representative. Each Manufacturer shall provide sufficient production capacity and qualified personnel to meet the demands of the project. Each Manufacturer shall have an internal quality control program for its product that meets the requirements presented in this QAP.

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

1. Corporate background and information;
2. Manufacturing capabilities:
    a. Information on plant size, equipment, personnel, number of shifts per day, and capacity per shift.
    b. Daily production quantity available for Dolby Landfill facilities.
    c. A list of material properties including certified test results, to which are attached geosynthetic samples.
    d. A list of at least 15 completed landfill or surface impoundment facilities totaling a minimum of 15,000,000 square feet, for which the Manufacturer has manufactured LLDPE. For each facility, the following information shall be provided:
        (1) Name and purpose of facility, its location, and date of installation.
        (2) Name of owner, project manager, designer, fabricator (if any) and installer.
        (3) Type of geosynthetic, surface area of geosynthetic manufactured.
        (4) Available information on the performance of the lining system and the facility;
3. The Manufacturer's quality control manual, including a description of the quality control laboratory facilities; and
4. The origin (supplier's name and production plant) and identification (brand name and number) of resin used to manufacture the product.

Prior to the installation of any geosynthetic material, a Manufacturer must submit to the Project Manager all quality control documentation required by the appropriate section of this QAP. This documentation shall be reviewed by the Geosynthetic Construction Quality Assurance Agent before installation can begin.

1.2.10 Installer

The Installer is the firm responsible for installation of the geosynthetics. The Installer may be affiliated with the Manufacturer.

The Superintendent is responsible for the Installer's field crew. The Superintendent shall represent the Installer at all site meetings and shall be responsible for acting as the Installer's spokesman on the project.

The Master Seamer shall be the most experienced seamer of the Installer's field crew. The Master Seamer shall provide direct supervision over less experienced seamers.

The Installer shall be responsible for field handling, storing, deploying, seaming, temporary restraining and all other aspects of the geosynthetics installation. The Installer may also be responsible for transportation of these materials to the site and for anchor systems, if required by the project specifications. The Installer shall be responsible for submittal of the documentation from the manufacturer.

The Installer shall be pre-qualified and approved by the BGS or the Owner's Representative. The Installer shall be able to provide qualified personnel to meet the demands of the project. At a minimum, the Installer shall provide a Superintendent and a Master Seamer as described below.

The Superintendent must be qualified based on previously demonstrated experience, management ability, and authority. The Superintendent, unless otherwise approved by the Project Manager, shall have previously managed, at a minimum, two installation projects which entailed the installation of at least a total of 10,000,000 square feet of polyethylene geomembrane.

For geomembrane installation, all personnel performing seaming operations shall be qualified by experience or by successfully passing seaming tests. The Master Seamer shall have experience seaming a minimum of 1,000,000 square feet of polyethylene geomembrane using the same type of seaming apparatus to be used at the site.

To be considered for pre-qualification, the Installer may be asked to submit the following information:

1. Corporate background and information;
2. Description of installation capabilities:
    a. Information on equipment (numbers and types), and personnel (number of superintendents, number of crews),
    b. Average daily production anticipated,
    c. Samples of field geomembrane seams and a list of minimum values for geomembrane seam properties;
3. A list of at least ten completed facilities, totaling a minimum of 2,000,000 square feet for which the Installer has installed HDPE geomembrane lining. For each installation, the following information shall be provided:
    a. Name and purpose of facility, its location, and date of installation,
    b. Name of owner, project manager, designer, manufacturer, fabricator (if any), and name of contact at the facility who can discuss the project,
    c. Name and qualifications of the Superintendent(s) of the Installer's crew(s),
    d. Type of geosynthetic, and surface area installed,
    e. Type of seaming and type of seaming apparatus used,
    f. Duration of installation,
    g. Available information on the performance of the lining system and the facility;
4. The Installer's quality control manual; and
5. A copy of a letter of recommendation supplied by the geomembrane manufacturer.

Prior to commencement of the installation, the Installer will submit to the Project Manager:

1. Resume of the Superintendent to be assigned to this project, including dates and duration of employment;
2. Resume of the Master Seamer to be assigned to this project, including dates and duration of employment;

3. 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.;
4. Installation schedule;
5. A list of personnel performing field seaming operations along with pertinent experience information;
6. All geosynthetic quality control certificates as required by this QAP (unless submitted directly to the Project Manager by the Manufacturer); and
7. Certification that extrudate to be used is comprised of the same resin as the geomembrane to be used.

This documentation shall be reviewed by the Geosynthetic Construction Quality Assurance Agent before installation of the geosynthetic can begin.

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

1. Quality control documentation recorded during installation; and
2. Subgrade surface acceptance certificates for each area to be covered by the lining system, signed by the Installer.

Upon completion of the installation, the Installer shall submit:

1. The warranty obtained from the Manufacturer; and
2. The installation warranty.

1.2.11 Geosynthetic Construction Quality Assurance Agent

The Geosynthetic Construction Quality Assurance Agent (CQA) is a firm independent from the Manufacturer(s) and Installer that shall be responsible for observing and documenting activities related to the quality assurance of the production and installation of the geosynthetic system on behalf of the Owner. A representative of SME will act as the Geosynthetic CQA Agent for the Landfill cover project.

In this QAP, the term Geosynthetic Quality Assurance Engineer (QAE) shall be used to designate the Engineer (working for the Geosynthetic CQA) in charge of the quality assurance work. In some cases, the duties of the QAE described below may be shared by two individuals: A Geosynthetic Quality Assurance Managing Engineer located at the headquarters of the Geosynthetic CQA, and a Geosynthetic Quality Assurance Resident Engineer located at the site. The personnel of the Geosynthetic CQA also include Geosynthetic Quality Assurance Monitors who are located at the site for construction observation and documentation. The CQA agent will provide sufficient personnel on-site to enable complete (100%) observation of all deployment, seaming, and testing activities. The required CQA staff level will be a function of the installer's schedule.

The Geosynthetic CQA is responsible for observing and documenting activities related to the quality assurance of the production and installation of the geosynthetic system. The Geosynthetic CQA is responsible for implementation of the project QAP prepared by the Project Manager and management of the Geosynthetic Quality Assurance Laboratory. The Geosynthetic CQA is also responsible for issuing a final certification report, sealed by a registered Professional Engineer.

The specific duties of the Geosynthetic CQA personnel are as follows:

1. The Geosynthetic QAE:
    a. Reviews all design drawings and specifications,
    b. Reviews other site-specific documentation, including proposed layouts, and manufacturer's and installer's literature,
    c. Develops a site-specific addendum for quality assurance of geosynthetics (if necessary) with the assistance of the Project Manager,
    d. Administers the geosynthetic portions of the QAP (e.g., assigns and manages all geosynthetic quality assurance personnel, reviews all field reports, and provides engineering review of all quality assurance related issues)
    e. Reviews all changes to design drawings and specifications as issued by the Designer,
    f. Acts as the on-site (resident) representative of the Geosynthetic CQA,
    g. Familiarizes all Geosynthetic Quality Assurance Monitors with the site and the project QAP,
    h. Attends all quality assurance related meetings (e.g., resolution, pre-construction, daily, and weekly),
    i. Reviews all Manufacturer and Installer certifications and documentation and makes appropriate recommendations,
    j. Reviews the Installer's personnel qualifications for conformance with those qualifications pre-approved for work on site,
    k. Manages the preparation of the as-built drawing(s),
    l. Reviews the calibration certification of the on-site tensiometer, if applicable,
    m. Reviews all Geosynthetic Quality Assurance Monitor's daily reports, logs and photographs,
    n. Notes any on-site activities that could result in damage to the geosynthetics,
    o. Reports to the Project Manager, and logs in the daily report, any relevant observations reported by the Geosynthetic Quality Assurance Monitors,
    p. Prepares his own daily report,
    q. Prepares a daily summary of the quantities of geosynthetics installed that day,
    r. Prepares the weekly summary of geosynthetic quality assurance activities,
    s. Oversees the marking, packaging, and shipping of all laboratory test samples,
    t. Reviews the results of laboratory testing and makes appropriate recommendations,
    u. Designates a Geosynthetic Quality Assurance Monitor to represent the QAE whenever he is absent from the site while operations are ongoing,
    v. Reports any unapproved deviations from the QAP to the Project Manager,
    w. Prepares the final certification report,
    x. Monitors the subgrade condition and overburden soil placement, and

y. Monitors the weather conditions and verifies that the cold or warm weather seaming protocols (Section 4.5.6) are being followed.

1.2.12 The Geosynthetic Quality Assurance Monitor

1. Monitors, logs, photographs and/or documents all geosynthetic installation operations. Photographs shall be taken routinely and in critical areas of the installation sequence. These duties shall be assigned by the Geosynthetic QAE.
2. Monitors the following operations for all geosynthetics.
   a. Material delivery.
   b. Unloading and on-site transport and storage.
   c. Sampling for conformance testing.
   d. Deployment operations.
   e. Joining and/or seaming operations.
   f. Condition of panels as placed.
   g. Visual inspection by walkover.
   h. Repair operations.
   i. Construction stability.
3. Monitors and documents the geomembrane seaming operations, including:
   a. Trial seams.
   b. Seam preparation.
   c. Seaming.
   d. Nondestructive seam testing.
   e. Sampling for destructive seam testing.
   f. Field tensiometer testing.
   g. Laboratory sample marking.
   h. Repair operations.
4. Documents any on-site activities that could result in damage to the geosynthetics. Any problems noted shall be reported as soon as possible to the Geosynthetic QAE.

1.2.13 Geosynthetic Quality Assurance Laboratory

The Geosynthetic Quality Assurance Laboratory (QAL) is a firm, independent from the Manufacturer(s) and Installer responsible for conducting tests on samples of geosynthetics taken from the site.

The Geosynthetic QAL shall be responsible for conducting the appropriate laboratory tests as directed by the Geosynthetic QAE. The test procedures shall be done in accordance with the test methods outlined in this QAP and/or the project specifications.

The Geosynthetic QAL shall have experience in testing geosynthetics and be certified by the Geosynthetics Accreditation Institute Laboratory Accreditation Program (GAI-LAP) for all tests to be

performed. The Geosynthetic QAL shall be familiar with American Society for Testing and Materials (ASTM), Federal Test Method Standard (FTMS), National Sanitation Foundation (NSF), and other applicable test standards. The Geosynthetic QAL shall be capable of providing verbal results of destructive seam tests within 24 hours of receipt of test samples and shall maintain that standard throughout the installation. The Geosynthetic QAL shall be approved by the BGS or Owner's Representative.

On-site laboratory facilities may be used by the Geosynthetic QAL provided they are appropriately equipped and approved by the Geosynthetic CQA and the Project Manager.

The Geosynthetic QAL shall submit all destructive seam test results to the Geosynthetic QAE in written form within 48 hours of receipt of test samples unless otherwise specified by the Project Manager. Geomembrane destructive test results shall typically be provided verbally to the Geosynthetic QAE within 24 hours of receipt of test samples. Written test results shall be in an easily readable format and include references to the standard test methods used.

1.3 Communication

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

1.3.1 Pre-Construction Meeting

A pre-construction meeting shall be held at the site prior to the beginning of the project. Typically, the meeting shall be attended by the Project Manager, Designer, CQA Agent, Contractor, Supervisor, Installer, Geosynthetic CQA, a representative of the MEDEP, and the Owner.

Specific topics considered for this meeting include review of the project QAP for any problems or additions. In addition, the responsibilities of each party should be reviewed and understood clearly. The meeting shall be documented by a person designated at the beginning of the meeting, and minutes shall be transmitted to all parties.

The MEDEP shall be notified of the preconstruction meeting schedule by written notice at least seven days prior to the meeting date.

1.3.2 Progress Meetings

A weekly progress meeting shall be held between the Owner's Representative, Superintendent, CQA Agent, and any other concerned parties. This meeting shall discuss current progress, planned activities for the next week, issues requiring resolution, and any new business or revisions to the work. The CQA Agent shall log any problems, decisions, or questions arising at this meeting in his weekly report. If any matter remains unresolved at the end of this meeting, the Project Manager shall be responsible for the resolution of the matter and the communication of the decision to the appropriate parties.

1.3.3 Construction Problem Resolution

The resolution of construction related problems shall be the responsibility of the Project Manager. Problems or changes shall be distributed to the Project Manager. Weekly construction meetings shall be the forum used to discuss and formulate resolutions to construction problems that arise. Problems shall be resolved as follows:

- Identify the problem(s) or change(s), and the parties affected by the problem;
- Identify who is responsible for gathering additional information and/or formulating any changes;
- All pertinent information and changes shall be submitted in written form to the CQA for review by the CQA, the Project Manager, the Owner, and the MEDEP;
- Solutions to problems and any resulting changes shall be documented by the Project Manager and shall be distributed to all affected parties; and
- The Project Manager shall be responsible for implementing changes and/or decisions resulting from this problem resolution process.

2.0 SOIL QUALITY CONTROL

The following quality control procedures will be incorporated into the project specifications to assure that soil cover materials used at the site meets the project specifications, and provides the data to define quality control acceptance criteria. The program will include borrow source testing from both on-site (i.e., existing cover materials) and off-site materials to demonstrate compliance with material specifications, and construction testing to demonstrate that materials have been properly installed.

2.1 Borrow Source Characterization

The Contractor, as part of his proposal, will be required to identify the sand, topsoil, till, and gravel borrow sources. Once the construction contract has been awarded, the selected Contractor will be required to perform an initial borrow source testing program. The Contractor shall obtain borrow materials from a licensed borrow pit or from an excavation that is exempt from permitting under 38 M.R.S.A. Section 481-490 (Site Location of Development Law) and 38 M.R.S.A. Subsection 409-A et.seq. The Contractor shall employ a testing laboratory acceptable to the Owner's Representative to perform the soil testing of a potential borrow source to pre-qualify it. The intent of this program will be to determine the variability of the source properties, and its compliance with the project specifications. The Owner's Representative will accompany the Contractor during the collection of the soil samples to develop an understanding of the variability of the borrow source. The Contractor will also be required to submit soil logs and a plan of the borrow source showing the locations where the samples were collected.

The laboratory shall perform the analysis as shown on Tables 2-1 through 2-5.

TABLE 2-1

BORROW SOURCE CHARACTERIZATION
COVER SOIL (OFF-SITE SOURCE)

Test	Method	Test Frequency[1]	Required Properties
Grain Size Analysis	ASTM D 422	1/5000 yd^3	100% passing 3-inch sieve. Minimum 20% soil particles passing #200 sieve
Moisture Density	ASTM D 698	1/5000 yd^3	(2)
Moisture Content	ASTM D 2216	1/5000 yd^3	(3)
Remolded Hydraulic Conductivity	ASTM D 5084	1/5000 yd^3	maximum $5x10^{-5}$ cm/sec

Notes:
1. Test frequency per source.
2. Moisture density tests used to define maximum dry density and associated optimum moisture content.
3. Moisture content tests used to define borrow source in situ moisture contents.
4. Borrow source characterization of existing cover soils is not required.

TABLE 2-2

BORROW SOURCE CHARACTERIZATION
DRAINAGE SAND OR GAS LAYER MATERIAL (OFF-SITE SOURCE)

Test	Method	Test Frequency[1]	Required Properties
Grain Size Analysis	ASTM D 422	1/5000 yd^3	(2)
Remolded Hydraulic Conductivity	ASTM D 2434	1/5000 yd^3	minimum $2x10^{-3}$ cm/sec

Notes:
1 Test frequency per source.
2 Grain size distribution listed in specifications packet.
3 Borrow source characterization of existing drainage sand and gas layer material is not required.

TABLE 2-3

BORROW SOURCE CHARACTERIZATION
DRAINAGE STONE

Test	Method	Test Frequency[1]	Required Properties
Grain Size Analysis	ASTM D 422	1/2,500 yd^3	(2)
Calcium Carbonate Content	ASTM D 4373(3)	1/2,500 yd^3	<15%

Notes:
1 Test frequency per source.
2 Grain size distribution listed in specifications.
3 Equivalent methods used to determine calcium carbonate content include Whole rock Geochemistry MEXRF06.

TABLE 2-4

BORROW SOURCE CHARACTERIZATION
VEGETATIVE MEDIUM (TOPSOIL) (OFF-SITE SOURCE)

Test	Test Frequency[1]	Required Properties
Organic Matter	Note 2	5 to 8%
pH	Note 2	5.8 to 6.2
Phosphorous/Potassium	Note 2	Low to medium range
Soluble Salt	Note 2	Less than 500 ppm

Notes:
1 Test frequency per source.
2 Test shall be performed at Maine Soil Testing Service – University of Maine at Orono.
3 Borrow source characterization for existing cover vegetative soil is not required.

TABLE 2-5

BORROW SOURCE CHARACTERIZATION
AGGREGATE BASE AND SUBBASE MATERIAL

Test	Test Frequency[1]	Required Properties
Grain Size Analysis (ASTM D 422)f	Per source	100% Passing 3-inch sieve meeting MDOT 703.06 Type D

Note:
[1] Test frequency per source.

3.0 SOIL QUALITY ASSURANCE

The following quality control procedures and testing will be utilized by the Owner's Representative to guide and document construction of the soil cover.

3.1 Borrow Source Construction Testing

Borrow source construction testing shall be performed as the borrow source material is being excavated and transported to the project site during construction. Borrow source construction testing shall also be performed on existing on-site cover materials reused by the Contractor. The testing is performed by the owner to ensure the consistency of the borrow source material being used for the project, and is intended to enhance and confirm testing performed earlier during the borrow source characterization.

TABLE 3-1

BORROW SOURCE CONSTRUCTION TESTING
COVER SOIL MATERIAL (OFF-SITE SOURCE)

Test	Method	Test Frequency[1]	Required Properties
Moisture Density	ASTM D 698	1/5000 yd^3	See Table 2-1
Grain Size	ASTM D 422	1/5000 yd^3	See Table 2-1
Moisture Content	ASTM D 2216	1/5000 yd^3	See Table 2-1
Remolded Hydraulic Conductivity	ASTM D 5084	1/5000 yd^3	See Table 2-1

Notes
1 Test frequency per source.
2 Borrow source construction testing of existing cover soil is not required.

TABLE 3-2

BORROW SOURCE CONSTRUCTION TESTING
COMMON BORROW MATERIAL (OFF-SITE SOURCE)

Test	Method	Test Frequency[1]	Required Properties
Moisture Density	ASTM D 698	1/5000 yd^3	See Table 2-2
Grain Size	ASTM D 422	1/5000 yd^3	See Table 2-2
Moisture Content	ASTM D 2216	1/5000 yd^3	See Table 2-2

Note
1 Test frequency per source.

TABLE 3-3

BORROW SOURCE CONSTRUCTION TESTING
DRAINAGE SAND OR GAS LAYER MATERIAL (OFF-SITE SOURCE)

Test	Method	Test Frequency[1]	Required Properties
Grain Size	ASTM D 422	1/5000 yd^3	See Table 2-3
Remolded Hydraulic Conductivity	ASTM D 2434	1/5000 yd^3	See Table 2-3

Notes:
1 Test frequency per source.
2 Borrow source construction testing of existing drainage sand and gas layer material is not required.

TABLE 3-4

BORROW SOURCE CONSTRUCTION TESTING
DRAINAGE STONE

Test	Method	Test Frequency[1]	Required Properties
Grain Size	ASTM D 422	1/2,500 yd^3	See Table 2-4
Calcium Carbonate Content	ASTM D 4373[2]	1/2,500 yd^3	See Table 2-4

Notes:
1 Test frequency per source.
2 Equivalent methods used to determine calcium carbonate content include Whole Rock Geochemistry MEXRF06.

TABLE 3-5

BORROW SOURCE CONSTRUCTION TESTING
VEGETATIVE MEDIUM (TOPSOIL) (OFF-SITE SOURCE)

Test	Test Frequency[1]	Required Properties
Organic Matter	Note 2	See Table 2-5
pH	Note 2	See Table 2-5
Phosphorous/Potassium	Note 2	See Table 2-5
Soluble Salt	Note 2	See Table 2-5

Notes:
1 Test frequency per source.
2 Test shall be performed at Maine Soil Testing Service – University of Maine at Orono.
3. Borrow source construction testing of existing cover vegetative soil is not required.

TABLE 3-6

BORROW SOURCE CONSTRUCTION TESTING
AGGREGATE BASE AND SUBBASE MATERIAL

Test	Test Frequency	Required Properties
Grain Size Analysis (ASTM D 422)	Per source	See Table 2-6

3.2 Subgrade Preparation

The areas receiving cover soil will be prepared by the Contractor prior to placing the drainage sand and cover materials. Preparation of the subgrade will include grading and tracking the of waste to create a uniform surface.

3.3 Cover Soil Placement

The following QA/QC procedures will be used during placement of the soil cover materials (i.e., gas vent sand, cover soil, and vegetative layer).

3.3.1 Moisture Control

Moisture content of the cover shall range from 0 to 4 percent higher than optimum, as determined by ASTM D 698 (standard proctor), or as determined necessary to meet the project specifications. Where subgrade or a layer of soil material must be moisture conditioned before compaction, water will be uniformly applied to surface of subgrade, or layer of soil material, in proper quantities to prevent free water appearing on surface during or subsequent to compaction operations.

Soil material that is too wet to permit compaction to the specified density will be removed and replaced, or scarified and air dried.

Soil material that has been removed because it is too wet to permit compaction may be stockpiled or spread and allowed to dry. The soils may be disced, harrowed, or pulverized until moisture content is reduced to a satisfactory level.

3.3.2 Placement and Compaction

Placement of fill materials will be in layers not more than 16 inches loose depth for material compacted by heavy compaction equipment, and not more than 6 inches loose depth for material compacted by hand-operated tampers. Lift thickness will be measured by the Contractor and the CQA Agent during placement at the frequency of 5 tests per acre per lift. Other methods of determining lift thickness include laser survey or free-standing flexible grade stakes can also be used. Hand-driven wooden grade stakes shall not be allowed for placement of soil materials above the HDPE liner. The CQA Agent may also determine lift thickness by digging small test pits through the loose soil lift into the underlying layer.

Before compaction, moisten or aerate each layer as necessary to provide the optimum moisture content. Compact each layer to required percentage of maximum dry density for each area classification. Do not place backfill or fill material on surfaces that are muddy, frozen, or contain frost or ice.

Place backfill and fill materials evenly adjacent to structures, to required elevations. Take care to prevent wedging action of backfill against structures by carrying the material uniformly around a structure to approximately same elevation in each lift. To connect cover soil barrier layer lifts to a completed barrier layer section (as a result of repairs or sequential cover section at construction), offset the lifts by one-half the compaction equipment width to create a horizontal bench without continuous vertical joints through all lifts of the barrier layer.

To eliminate desiccation cracks the surface will be moistened (as necessary) and reworked with two passes of a smooth drum roller. Desiccation is defined as moisture content below optimum, or cracks deeper than 1 inch. The cover soil will be placed and compacted and progressively covered with the overlying cover soil or vegetative topsoil, seeded and mulched, to minimize the exposure of the cover material. The closure construction activities on the sideslopes shall be phased in such a way as to limit the work area to approximately 5 acres in size at any one time, with no area open for more than any two week period.

3.4 In-Place Testing

As the cover material is used in the landfill closure, in-place testing will be performed by the owner's representative to monitor material placement and conformance with the criteria specified in the construction specifications. In-place material testing will be performed by a qualified materials testing laboratory and will be observed by the CQA Agent. Testing will be performed on each lift prior to placement of the subsequent lift. The Contractor will be required to remove or rework material not conforming with material properties specified.

The owner's testing service shall perform the tests specified in Table 3-7 through 3-9 to document the in-place properties of the cover soil.

TABLE 3-7

IN-PLACE TESTING PROGRAM
COVER SOIL

Test	Method	Test Frequency	Required Properties
Field Moisture Content	ASTM D 6938	5/acre/lift	0 to 4% above optimum
Field Density	ASTM D 6938	5/acre/lift	90% of maximum
Undisturbed Hydraulic Conductivity	ASTM D 6938	3/acre/lift	• maximum $5x10^{-5}$ cm/sec (off-site soil) • average $2x10^{-5}$ cm/sec SW (off-site soil) • $1x10^{-5}$ cm/sec NE (off-site soil)
Cover Thickness	Hand Auger	5/acre/lift	

TABLE 3-8

IN-PLACE TESTING PROGRAM
COMMON BORROW MATERIAL
(Containment Berm/Temporary Cover)

Test	Method	Test Frequency	Required Properties
Moisture Content and In-Place Density	ASTM D 6938	1/200 lf/lift (berm)	90% maximum density 0 to 4% above optimum

TABLE 3-9

IN-PLACE TESTING PROGRAM
DRAINAGE SAND OR GAS LAYER SAND

Test	Method	Test Frequency	Required Properties
Remolded Hydraulic Conductivity	ASTM D 2434	3/acre/lift	minimum $2x10^{-3}$ cm/sec
Sand Thickness	Hand Auger	5/acre/lift	

4.0 GEOMEMBRANES

4.1 Quality Control Documentation

Prior to the installation of any geomembrane material, the Manufacturer or Installer shall provide the Project Manager with the following information, if requested:

1. The origin (resin supplier's name and resin production plant), identification (brand name and number), and production date of the resin;
2. Copies of the quality control certificates issued by the resin supplier;
3. Reports on tests conducted by the Manufacturer to verify that the quality of the resin used to manufacture the geomembrane meets the specifications;
4. Reports on quality control tests conducted by the Manufacturer to verify that the geomembrane manufactured for the project meets the project specifications;
5. A statement indicating that the amount of reclaimed polymer added to the resin during manufacturing was done with appropriate cleanliness and does not exceed 2 percent by weight;
6. A list of the materials which comprise the geomembrane, expressed in the following categories as percent by weight: polyethylene, carbon black, other additives;
7. A specification for the geomembrane which includes all properties contained in the specifications measured using the appropriate test methods;
8. Written certification that minimum values given in the specification are guaranteed by the Manufacturer; and
9. Quality control certificates, signed by a responsible party employed by the Manufacturer. Each quality control certificate shall include roll identification numbers, sampling procedures, and results of quality control tests. At a minimum, results shall be given for:
    a. Density
    b. Carbon black content
    c. Carbon black dispersion
    d. Thickness
    e. Tensile properties
    f. Tear resistance.

These quality control tests shall be performed in accordance with the test methods specified in the specifications and sampled at a frequency outlined in GRI Test Method GM 13.

The Manufacturer shall identify all rolls of geomembranes with the following:

1. Manufacturer's name;
2. Product identification;
3. Thickness;
4. Roll number; and

5. Roll dimensions.

4.1.1 Product Review

The Project Manager shall verify that:

1. Property values certified by the Manufacturer meet all of its guaranteed specifications;
2. Measurements of properties by the Manufacturer are properly documented and that the test methods used are acceptable;
3. Quality control certificates have been provided at the specified frequency for all rolls, and that each certificate identifies the rolls related to it;
4. Roll packages are appropriately labeled; and
5. Certified minimum properties meet the specifications.

4.2 Conformance Testing

Upon delivery of the rolls of geomembrane, the Geosynthetic CQA shall assure that conformance test samples are obtained for the geomembrane. These samples shall then be forwarded to the Geosynthetic QAL for testing to assure conformance to the specifications.

If the Project Manager desires, the Geosynthetic CQA can perform the conformance test sampling at the manufacturing plant. This may be advantageous in expediting the installation process for very large projects.

At a minimum, the following conformance tests shall be conducted:

1. Density;
2. Carbon black content;
3. Carbon black dispersion;
4. Thickness; and
5. Tensile properties.

These conformance tests shall be performance in accordance with the test methods specified in the specifications.

4.2.1 Sampling Procedures

The rolls to be sampled shall be selected by the Geosynthetic CQA. Samples shall be taken across the entire width of the roll and shall not include the first 3 feet (1 m). Unless otherwise specified, samples shall be 3 feet (1 m) long by the roll width. The Geosynthetic CQA shall mark the machine direction on the samples with an arrow.

A lot shall be defined as a group of consecutively numbered rolls from the same manufacturing line. Alternatively, a lot may be designated by the Geosynthetic CQA based on a review of all roll information including quality control documentation and manufacturing records.

Unless otherwise specified, samples shall be taken at a rate of one per lot, not to exceed one conformance test per 100,000 square feet of geomembrane.

4.2.2 Test Results

All conformance test results shall be reviewed and accepted or rejected by the Geosynthetic CQA prior to the deployment of the geomembrane.

The Geosynthetic CQA shall examine all results from laboratory conformance testing and shall report any nonconformance to the Project Manager. The Geosynthetic CQA shall be responsible for checking that all test results meet or exceed the property values listed in the project specifications.

If the Manufacturer has reason to believe that failing tests may be the result of the Geosynthetic QAL incorrectly conducting the tests, the Manufacturer may request that the sample in question be retested by the Geosynthetic QAL with a technical representative of the Manufacturer present during the testing. This retesting shall be done at the expense of the Manufacturer. Alternatively, the Manufacturer may have the sample retested at two different approved independent laboratories at the expense of the Manufacturer. If both laboratories produce passing results, the material shall be accepted. If both laboratories do not produce passing results, then the original Geosynthetic QAL test results shall be accepted. The use of these procedures for dealing with failed test results is subject to the approval of the Project Manager.

If a test result is in nonconformance, all material from the lot represented by the failing test should be considered out of specification and rejected. Alternatively, at the option of the Project Manager, additional conformance test samples may be taken to "bracket" the portion of the lot not meeting specification (note that this procedure is valid only when all rolls in the lot are consecutively produced and numbered from one manufacturing line). To isolate the out of specification material, additional samples must be taken from rolls that have roll numbers immediately adjacent to the roll that was sampled and failed. If both additional tests pass, the roll that represents the initial failed test and the roll manufactured immediately after that roll (next larger roll number) shall be rejected. If one or both of the additional tests fail, then the entire lot shall be rejected, or the procedure repeated with two additional tests that bracket a greater number of rolls within the lot.

4.3 Subgrade Preparation

4.3.1 Surface Preparation

The earthwork contractor shall be responsible for preparing the supporting soil for geomembrane placement. The Project Manager shall coordinate the work of the earthwork contractor and the Installer so that the requirements of the specification are met.

Before the geomembrane installation begins, the Geosynthetic CQA shall verify that:

1. A qualified land surveyor has verified all lines and grades;
2. The supporting soil meets the density specified in the project specifications;
3. The surface to be lined has been rolled, compacted, or handworked so as to be free of irregularities, protrusions, loose soil, and abrupt changes in grade;
4. The surface of the supporting soil does not contain stones which may be damaging to the geomembrane;
5. There is no area excessively softened by high water content; and

6. There is no area where the surface of the soil contains excessive desiccation cracks with dimensions exceeding those allowed by the project specifications.

The Installer, in conjunction with the Geosynthetic Construction Quality Assurance Agent, shall certify in writing that the surface on which the geomembrane will be installed is acceptable. A certificate of acceptance shall be given by the Installer to the Geosynthetic CQA prior to commencement of geomembrane deployment in the area under consideration. The Project Manager shall be given a copy of this certificate by the Geosynthetic CQA.

After the supporting soil has been accepted by the Installer, it is the Installer's responsibility to indicate to the Project Manager any change in the supporting soil condition that may require repair work. The Project Manager may consult with the Geosynthetic CQA regarding the need for repairs. If the Geosynthetic CQA concurs with Installer, the Project Manager shall assure that the supporting soil is repaired.

At any time before or during the geomembrane installation, the Geosynthetic CQA shall indicate to the Project Manager any locations which may not be adequately prepared for the geomembrane.

4.3.2 Anchor Trench

The Geosynthetic CQA shall verify that the anchor trench has been constructed according to the design drawings and specifications.

If the anchor trench is excavated in a clay material susceptible to desiccation, the amount of trench open at any time should be minimized. The Geosynthetic CQA shall inform the Project Manager of any signs of significant desiccation associated with the anchor trench construction.

Slightly rounded corners shall be provided in the trench so as to avoid sharp bends in the geomembrane. Excessive amounts of loose soil shall not be allowed to underlie the geomembrane in the anchor trench.

The anchor trench shall be adequately drained to prevent ponding or softening of the adjacent soils while the trench is open. The anchor trench shall be backfilled and compacted as outlined in the project specifications.

Care shall be taken when backfilling the trenches to prevent any damage to the geosynthetics. The Geosynthetic CQA shall observe the backfilling operation and advise the Project Manager of any problems. Any problems shall be documented by the Geosynthetic CQA in his daily report.

4.4 Geomembrane Deployment

4.4.1 Panel Nomenclature

A field panel is defined as a unit of geomembrane which is to be seamed in the field (i.e., a field panel is a roll or a portion of roll cut in the field).

It shall be the responsibility of the Installer to assure that each field panel is given an identification code (number or letter-number) consistent with the layout plan. This identification code shall be agreed upon by the Project Manager, Installer and Geosynthetic CQA. This field panel identification code shall be as simple and logical as possible. In general, it is not appropriate to identify panels using roll numbers since roll numbers established in the manufacturing plant are usually cumbersome and are not related to location in the field. The Geosynthetic CQA shall establish a table or chart showing correspondence

between roll numbers and field panel identification codes. The field panel identification code shall be used for all quality assurance records.

The Geosynthetic CQA shall verify that field panels are installed at the locations indicated on the Installer's layout plan, as approved by the Project Manager.

4.4.2 Panel Deployment Procedure

The Geosynthetic CQA shall review the panel deployment progress of the Installer (keeping in mind issues relating to wind, rain, clay liner desiccation, and other site-specific conditions) and advise the Project Manager on its compliance with the approved panel layout drawing and its suitability to the actual field conditions. Once approved, only the Project Manager can authorize changes to the panel deployment procedure. The Geosynthetic CQA shall verify that the condition of the supporting soil does not change detrimentally during installation.

The Geosynthetic CQA shall record the identification code, location, and date of installation of each field panel.

4.4.3 Deployment Weather Conditions

Geomembrane deployment shall not proceed at an ambient temperature below 32^{o}F (0^{o}C) or above 104^{o}F (40^{o}C) unless otherwise authorized, in writing, by the Project Manager. Geomembrane placement shall not be performed during any precipitation, in the presence of excessive moisture (e.g., fog, dew), in an area of ponded water, or in the presence of excessive winds. Geomembrane deployment shall not be undertaken if weather conditions will preclude material seaming following deployment.

The Geosynthetic CQA shall verify that the above conditions are fulfilled. Ambient temperature shall be measured by the Geosynthetic CQA in the area in which the panels are to be deployed. The Geosynthetic CQA shall inform the Project Manager of any weather related problems which may not allow geomembrane placement to proceed.

4.4.4 Method of Deployment

Before the geomembrane is handled on site, the Geosynthetic CQA shall verify that handling equipment to be used on the site is adequate and does not pose risk of damage to the geomembrane. During handling, the Geosynthetic CQA shall observe and verify that the Installer's personnel handle the geomembrane with care.

The Geosynthetic CQA shall verify the following:

1. Any equipment used does not damage the geomembrane by handling, trafficking, excessive heat, leakage of hydrocarbons, or other means;
2. The prepared surface underlying the geomembrane has not deteriorated since previous acceptance, and is still acceptable immediately prior to geomembrane placement;
3. Any geosynthetic elements immediately underlying the geomembrane are clean and free of debris;
4. All personnel do not smoke or wear damaging shoes while working on the geomembrane, or engage in other activities which could damage the geomembrane;

5. The method used to unroll the panels does not cause excessive scratches or crimps in the geomembrane and does not damage the supporting soil;
6. The method used to place the panels minimized wrinkles (especially differential wrinkles between adjacent panels);
7. The method used to place the panels prevents bridging of the geomembrane;
8. Adequate temporary loading and/or anchoring (e.g., sand bags, tires), not likely to damage the geomembrane, has been placed to prevent uplift by wind. In case of high winds, continuous loading (e.g., by sand bags), is recommended along edges of panels to minimize risk of wind flow under the panels; and
9. Direct contact with the geomembrane is minimized, and the geomembrane is protected by geotextiles, extra geomembrane, or other suitable materials, in areas where excessive traffic may be expected.

The Geosynthetic CQA shall inform the Project Manager if the above conditions are not fulfilled.

4.4.5 Damage and Defects

Upon delivery to the site, the Geosynthetic CQA shall conduct a surface observation of all rolls for defects and for damage. This inspection shall be conducted without unrolling rolls unless defects or damages are found or suspected. The Geosynthetic CQA shall advise the Project Manager, in writing, of any rolls or portions of rolls which should be rejected and removed from the site because they have severe flaws, and/or minor repairable flaws.

The Geosynthetic CQA shall inspect each panel, after placement and prior to seaming, for damage and/or defects. The Geosynthetic CQA shall advise the Project Manager which panels, or portions of panels, should be rejected, repaired, or accepted. Damaged panels, or portions of damaged panels, which have been rejected shall be marked and their removal from the work area recorded by the Geosynthetic CQA. Repairs shall be made using procedures described in Section 4.8.

4.4.6 Writing on the Liner

To avoid confusion, the Installer and the Geosynthetic CQA shall each use different colored markers that are readily visible for writing on the geomembrane. The markers used must be semi-permanent and compatible with the geomembrane.

4.5 Field Seaming

4.5.1 Seam Layout

Before installation begins, the Installer must provide the Project Manager and the Geosynthetic CQA with a panel layout drawing (i.e., a drawing of the facility to be lined showing all expected seams). The Geosynthetic CQA shall review the panel layout drawing and verify that it is consistent with accepted state-of-practice. No panels may be seamed without the written approval of the panel layout drawing by the Project Manager. In addition, panels not specifically shown on the panel layout drawing may not be used without the Project Manager's prior approval.

In general, seams should be oriented parallel to the line of maximum slope (i.e., oriented along, not across, the slope). In corners and odd-shaped geometric locations, the number of seams should be minimized. No horizontal seam should be less than 5 feet (1.5 m) from the toe of the slope, or areas of potential stress concentrations, unless otherwise authorized by the Project Manager.

A seam numbering system compatible with the panel numbering system shall be used by the Geosynthetic CQA.

4.5.2 Accepted Seaming Methods

Approved processes for field seaming are extrusion welding and fusion welding. Proposed alternate processes shall be documented and submitted by the Installer to the Project Manager for approval. Only apparatus which have been specifically approved by make and model shall be used. The Project Manager shall submit all documentation regarding seaming methods to be used to the Geosynthetic CQA for review.

4.5.2.1 Extrusion Process

The Geosynthetic CQA shall log ambient, seaming apparatus, and geomembrane surface temperatures at appropriate intervals and report any noncompliances to the Project Manager.

The Geosynthetic CQA shall verify that:

1. The Installer maintains on-site the number of spare operable seaming apparatus decided upon at the pre-construction meeting;
2. Equipment used for seaming is not likely to damage the geomembrane;
3. Prior to beginning a seam, the extruder is purged until all heat-degraded extrudate has been removed from the barrel;
4. Clean and dry welding rods or extrudate pellets are used;
5. The electric generator is placed on a smooth base such that no damage occurs to the geomembrane;
6. Grinding shall be completed no more than 1 hour prior to seaming;
7. A smooth insulating plate or fabric is placed beneath the hot welding apparatus after usage;
8. The geomembrane is protected from damage in heavily trafficked areas;
9. Exposed grinding marks adjacent to an extrusion weld shall be minimized. In no instance shall exposed grinding marks extend more than 1/4 inch from the seamed area;
10. In general, the geomembrane panels are aligned to have a nominal overlap of 3 inch for extrusion welding. In any event, the final overlap shall be sufficient to allow peel tests to be performed on the seam;
11. No solvent or adhesive is used unless the product is approved in writing by the Project Manager prior to use (samples shall be submitted to the Project Manager for testing and evaluation); and
12. The procedure used to temporarily bond adjacent panels together does not damage the geomembrane; in particular, the temperature of hot air at the nozzle of any temporary welding apparatus is controlled such that the geomembrane is not damaged or degraded.

4.5.2.2 Fusion Process

The Geosynthetic CQA shall log ambient, seaming apparatus, and geomembrane surface temperatures at appropriate intervals and report any noncompliances to the Project Manager.

The Geosynthetic CQA shall also verify that:

1. The Installer maintains on-site the number of spare operable seaming apparatus decided upon at the pre-construction meeting;
2. Equipment used for seaming is not likely to damage the geomembrane;
3. For cross seams, the edge of the cross seam is ground to an incline prior to welding;
4. The electric generator is placed on a smooth base such that no damage occurs to the geomembrane;
5. A smooth insulating plate or fabric is placed beneath the hot welding apparatus after usage;
6. The geomembrane is protected from damage in heavily trafficked areas;
7. A movable protective layer is used as required by the Installer directly below each overlap of geomembrane that is to be seamed to prevent buildup of moisture between the sheets and prevent debris from collecting around the pressure rollers;
8. In general, the geomembrane panels are aligned to have a nominal overlap of 5 inches for fusion welding. In any event, the final overlap shall be sufficient to allow peel tests to be performed on the seam; and
9. No solvent or adhesive is used unless the product is approved in writing by the Project Manager prior to use (samples shall be submitted to the Project Manager for testing and evaluation).

4.5.3 Seam Preparation

The Geosynthetic CQA shall verify that prior to seaming, the seam area is clean and free of moisture, dust, dirt, debris or foreign material of any kind. If seam overlap grinding is required, the Geosynthetic CQA must assure that the process is completed according to the Manufacturer's instructions within one hour of the seaming operation, and in a way that does not damage the geomembrane. The Geosynthetic CQA shall also verify that seams are aligned with the fewest possible number of wrinkles and "fishmouths."

4.5.4 Trial Seams

Trial seams shall be made on fragment pieces of geomembrane liner to verify that conditions are adequate for production seaming. Such trial seams shall be made at the beginning of each seaming period, and at least once each five hours, for each production seaming apparatus used that day. Each seamer shall make at least one trial seam each day. Trial seams shall be made under the same conditions as actual seams. Additional trial seams will be required after any change of operator, equipment shutdown, significant idle time, or significant weather change. Additional trial seams due to idle time or weather will be at the discretion of the Geosynthetic CQA.

The trial seam sample shall be at least 5 feet (1.0 m) long by 1 foot (0.3 m) wide (after seaming) with the seam centered lengthwise. Seam overlap shall be as indicated in Section 4.5.2.

Five specimens shall be cut from the sample with a 1-inch-wide die. The specimens shall be cut by the Installer at locations selected randomly along the trial seam sample by the Geosynthetic CQA. The specimens shall be tested in peel (3) and shear (2), using a field tensiometer. The tensiometer shall be capable of maintaining a constant jaw separation rate of 20 inches per minute. If a specimen fails, the entire operation shall be repeated. If the additional specimen fails, the seaming apparatus and seamer

shall not be accepted and shall not be used for seaming until the deficiencies are corrected and two consecutive successful trial welds are achieved. The Geosynthetic CQA shall observe all trial seam procedures.

4.5.5 General Seaming Procedures

During general seaming, the Geosynthetic CQA shall be cognizant of the following:

1. For fusion welding, it may be necessary to place a movable protective layer of plastic directly below each overlap of geomembrane that is to be seamed. This is to prevent any moisture buildup between the sheets to be welded and prevent debris from collecting around the pressure rollers;
2. If required, a firm substrate shall be provided by using a flat board, a conveyor belt, or similar hard surface directly under the seam overlap to achieve proper support;
3. Fishmouths or wrinkles at the seam overlaps shall be cut along the ridge of the wrinkle in order to achieve a flat overlap. The cut fishmouths or wrinkles shall be seamed and any portion where the overlap is inadequate shall then be patched with an oval or round patch of the same geomembrane extending a minimum of 6 inches beyond the cut in all directions;
4. If seaming operations are carried out at night, adequate illumination shall be provided;
5. Seaming shall extend to the outside edge of panels placed in the anchor trench;
6. All cross seam tees should be patched with an oval or round patch of the same geomembrane extending a minimum of 6 inches beyond the cut in all directions; and
7. No field seaming shall take place without the Master Seamer being present.

The Geosynthetic CQA shall verify that the above seaming procedures (or any other procedures agreed upon and indicated in the project manual) are followed, and shall inform the Project Manager of any nonconformance.

4.5.6 Seaming Weather Conditions

4.5.6.1 Normal Weather Conditions

The normal required weather conditions for seaming are as follows:

1. Ambient temperature between 32^{O}F (0^{O}C) and 104^{O}F (40^{O}C);
2. Dry conditions (i.e., no precipitation or other excessive moisture, such as fog or dew); and
3. No excessive winds.

The Geosynthetic CQA shall verify that these weather conditions are fulfilled and notify the Project Manager in writing if they are not. Ambient temperature shall be measured by the Geosynthetic CQA in the area in which the panels are to be placed. The Project Manager will then decide if the installation is to be stopped or special procedures used.

4.5.6.2 Cold Weather Conditions

To assure a quality installation, if seaming is conducted when the ambient temperature is below 32^{O}F (0^{O}C), the following conditions must be met:

1. Geomembrane surface temperatures shall be determined by the Geosynthetic CQA at intervals of at least once per 100 foot of seam length to determine if preheating is required. For extrusion welding, preheating is required if the surface temperature of the geomembrane is below 32^{O}F (0^{O}C);
2. Preheating may be waived by the Project Manager based on a recommendation from the Geosynthetic CQA, if the Installer demonstrates to the Geosynthetic CQA's satisfaction that welds of equivalent quality may be obtained without preheating at the expected temperature of installation;
3. If preheating is required, the Geosynthetic CQA shall inspect all areas of geomembrane that have been preheated by a hot air device prior to seaming, to assure that they have not been overheated;
4. Care shall be taken to confirm that the surface temperatures are not lowered below the minimum surface temperatures specified for welding due to winds or other adverse conditions. It may be necessary to provide wind protection for the seam area;
5. All preheating devices shall be approved prior to use by the Project Manager;
6. Additional destructive tests (as described in Section 4.7) shall be taken at an interval between 500 feet and 250 feet of seam length, at the discretion of the Geosynthetic CQA;
7. Sheet grinding may be performed before preheating, if applicable; and
8. Trial seaming shall be conducted under the same ambient temperature and preheating conditions as the actual seams. Under cold weather conditions, new trial seams shall be conducted if the ambient temperature drops by more than 5^{O}F from the initial trial seam test conditions.

4.5.6.3 Warm Weather Conditions

At ambient temperatures above 104^{O}F, no seaming of the geomembrane shall be permitted unless the Installer can demonstrate to the satisfaction of the Project Manager that geomembrane seam quality is not compromised.

Trial seaming, as described in shall be conducted under the same ambient temperature conditions as the actual seams.

At the option of the Geosynthetic CQA, additional destructive tests (as described in Section 4.7) may be required for any suspect areas.

4.6 Nondestructive Seam Testing

The Installer shall nondestructively test all field seams over their full length using a vacuum test unit, air pressure test (for double fusion seams only), or other approved method. Vacuum testing and air pressure testing are described in Sections 4.6.1 and 4.6.2, respectively. The purpose of nondestructive tests is to check the continuity of seams. It does not provide quantitative information on seam strength. Nondestructive testing shall be carried out as the seaming work progresses, not at the completion of all field seaming. At a minimum of once every 4 hours of seaming and when operation has been suspended for greater than one hour or if breakdown of seaming equipment occurs, weld samples will be tested in peel and shear in accordance with the destructive test requirements of the contract documents.

For all seams, the Geosynthetic CQA shall:

1. Observe nondestructive testing procedures;
2. Record location, data, test unit number, name of tester, and outcome of all testing; and
3. Inform the Installer and Project Manager of any required repairs.

4.6.1 Vacuum Testing

The following procedures are applicable to vacuum testing.

1. The equipment shall consist of the following:
   a. A vacuum box assembly consisting of a rigid housing, a transparent viewing window, a soft neoprene gasket attached to the bottom, a porthole or valve assembly, and a vacuum gauge;
   b. A pump assembly equipped with a pressure controller and pipe connections;
   c. A rubber pressure/vacuum hose with fittings and connections;
   d. A soapy solution of distilled water; and
   e. A bucket and wide paint brush, or other means of applying the soapy solution.
2. The following procedures shall be followed:
   a. Energize the vacuum pump and reduce the tank pressure to approximately 5 psi gauge;
   b. Wet a strip of geomembrane approximately 12 inches by 48 inches (0.3 m x 1.2 m) with the soapy distilled water solution;
   c. Place the box over the wetted area;
   d. Close the bleed valve and open the vacuum valve;
   e. Assure that a leak-tight seal is created;
   f. For a period of not less than 10 seconds, apply vacuum and examine the geomembrane through the viewing window for the presence of soap bubbles;
   g. If no bubble appears after 10 seconds, close the vacuum valve and open the bleed valve, move the box over the next adjoining area with a minimum 3 inches overlap, and repeat the process; and
   h. All areas where soap bubbles appear shall be marked and repaired in accordance with Section 4.8.

4.6.2 Air Pressure Testing

The following procedures are applicable to double fusion welding which produces a double seam with an enclosed space.

1. The equipment shall consist of the following:
   a. An air pump (manual or motor driven), equipped with pressure gauge capable of generating and sustaining a pressure between 25 and 30 psi (160 and 200 kPa) and mounted on a cushion to protect the geomembrane;
   b. A rubber hose with fittings and connections; and

c. A sharp hollow needle, or other approved pressure feed device.

2. The following procedures shall be followed:

   a. Seal both ends of the seam to be tested;

   b. Insert needle or other approved pressure feed device into the air channel created by the fusion weld;

   c. Insert a protective cushion between the air pump and the geomembrane;

   d. Energize the air pump to a pressure between 25 and 30 psi (160 and 200 kPa), close valve, allow 2 minutes for pressure to stabilize, and sustain pressure for at least 5 minutes;

   e. If loss of pressure exceeds 4 psi (30 kPa) or does not stabilize, locate faulty area and repair in accordance with Section 4.8;

   f. Cut opposite end of tested seam area once testing is completed to verify continuity of the air channel. If air does not escape, locate blockage and retest unpressurized area. Seal the cut end of the air channel; and

   g. Remove needle or other approved pressure feed device and seal.

4.6.3 Test Failure Procedures

The Installer shall complete any required repairs in accordance with Section 4.8. For repairs, the Geosynthetic CQA shall:

1. Observe the repair and testing of the repair;
2. Mark on the geomembrane that the repair has been made; and
3. Document the repair procedures and test results.

4.7 Destructive Seam Testing

Destructive seam tests shall be performed at selected locations. The purpose of these tests is to evaluate seam strength. Seam strength testing shall be done as the seaming work progresses, not at the completion of all field seaming.

4.7.1 Location and Frequency

The Geosynthetic CQA shall select locations where seam samples will be cut out for laboratory testing. Those locations shall be established as follows:

1. A minimum frequency of one test location per 1,000 feet of seam length performed by each welder. This minimum frequency is to be determined as an average taken throughout the entire facility;
2. Test locations shall be determined during seaming at the Geosynthetic CQA's discretion. Selection of such locations may be prompted by suspicion of overheating, contamination, offset welds, or any other potential cause of imperfect welding; and
3. Additional samples may be cut at the end of each seam for field testing. Sample locations shall be chosen by the Geosynthetics CQA.

The Installer shall not be informed in advance of the locations where the seam samples will be taken.

4.7.2 Sampling Procedures

Samples shall be cut by the Installer at locations chosen by the Geosynthetic CQA as the seaming progresses so that laboratory test results are available before the geomembrane is covered by another material. The Geosynthetic CQA shall:

1. Observe sample cutting;
2. Assign a number to each sample, and mark it accordingly;
3. Record sample location on layout drawing; and
4. Record reason for taking the sample at this location (e.g., statistical routine, suspicious feature of the geomembrane).

All holes in the geomembrane resulting from destructive seam sampling shall be immediately repaired in accordance with repair procedures described in Section 4.8. The continuity of the new seams in the repaired area shall be tested according to the project specifications.

4.7.3 Sample Dimensions

At a given sampling location, two types of samples shall be taken by the Installer. First, two samples for field testing should be taken. Each of these samples shall be cut with a 1-inch-wide die, with the seam centered parallel to the width. The distance between these two samples shall be 42 inches (1.1 m). If both samples pass the field test described in Section 4.7.4, a sample for laboratory testing shall be taken.

The sample for laboratory testing shall be located between the samples for field testing. The sample for laboratory testing shall be 12 inches (0.3 m) wide by 42 inches (1.1 m) long with the seam centered lengthwise. The sample shall be cut into three parts and distributed as follows:

1. One portion to the Installer for optional laboratory testing, 12 inches x 12 inches (0.3 m x 0.3 m);
2. One portion for Geosynthetic QAL testing, 12 inches x 18 inches (0.3 m x 0.5 m); and
3. One portion to the Project Manager for archive storage, 12 inches x 12 inches (0.3 m x 0.3 m).

Final determination of the sample sizes shall be made at the pre-construction meeting.

4.7.4 Field Testing

The two 1-inch-wide strips mentioned in Section 4.7.3 shall be tested in the field using a tensiometer for peel and shear and shall not fail according to the criteria in the project specifications. The tensiometer shall be capable of maintaining a constant jaw separation rate of 20 inches per minute. If the test passes in accordance with this section, the sample qualifies for testing in the laboratory. If it fails, the seam should be repaired in accordance with Section 4.8. Final judgment regarding seam acceptability, based on the failure criteria, rests with the Geosynthetic CQA. Both tracks are to be tested in peel.

The Geosynthetic CQA shall witness all field tests and mark all samples and portions with their number. The Geosynthetic CQA shall also log the date and time, ambient temperature, number of seaming unit, name of seamer, welding apparatus temperatures and pressures, and pass or fail description, and attach a copy to each sample portion.

4.7.5 Laboratory Testing

Destructive test samples shall be packaged and shipped, if necessary, under the responsibility of the Geosynthetic QAL in a manner which will not damage the test sample. The Project Manager will be responsible for storing the archive samples. Test samples shall be tested by the Geosynthetic QAL.

Testing shall include properties as defined in the specifications. The minimum acceptable values to be obtained in these tests are indicated in the specifications. At least 5 specimens shall be tested in each shear and peel. Specimens shall be selected alternately by test from the samples (i.e., peel, shear, peel, shear...). Parent material strength will be determined by sampling the actual sheets adjacent to the destructive test location, in the same direction the seam is tested.

The Geosynthetic QAL shall provide verbal test results no more than 24 hours after they receive the samples. The Geosynthetic CQA shall review laboratory test results as soon as they become available, and make appropriate recommendations to the Project Manager.

4.7.6 Destructive Test Failure Procedures

The following procedures shall apply whenever a sample fails a destructive test, whether that test is conducted by the Geosynthetic QAL, or by field tensiometer. The Installer has two options:

1. The Installer can repair the seam between any two passing test locations; and
2. The Installer can trace the welding path to an intermediate location (at 10 feet (3 m) minimum from the point of the failed test in each direction) and take a sample with a 1 inch wide die for an additional field test at each location. If these additional samples pass the test, then full laboratory samples are taken. If these laboratory samples pass the tests, then the seam is repaired between these locations. If either sample fails, then the process is repeated to establish the zone in which the seam should be repaired.

All acceptable repaired seams shall be bound by two locations from which samples passing laboratory destructive tests have been taken. Passing laboratory destructive tests of trial seam samples taken as indicated in Section 4.7 may be used as a boundary for the failing seam. In cases exceeding 150 feet (50 m) of repaired seam, a sample taken from the zone in which the seam has been repaired must pass destructive testing. Repairs shall be made in accordance with Section 4.8.

The Geosynthetic CQA shall document all actions taken in conjunction with destructive test failures.

4.8 Defects and Repairs

4.8.1 Identification

All seams and non-seam areas of the geomembrane shall be examined by the Geosynthetic CQA for identification of defects, holes, blisters, undispersed raw materials, and any sign of contamination by foreign matter. Because light reflected by the geomembrane helps to detect defects, the surface of the geomembrane shall be clean at the time of examination. The geomembrane surface shall be cleaned by the Installer if the amount of dust or mud inhibits examination.

4.8.2 Evaluation

Each suspect location both in seam and non-seam areas shall be nondestructively tested using the methods described in Section 4.6 as appropriate. Each location which fails the nondestructive testing

shall be marked by the Geosynthetic CQA and repaired by the Installer. Work shall not proceed with any materials which will cover locations which have been repaired until appropriate nondestructive and laboratory test results with passing values are available.

4.8.3 Repair Procedures

Any portion of the geomembrane exhibiting a flaw, or failing a destructive or 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 agreed upon between the Project Manager, Installer, and Geosynthetic CQA.

1. The repair procedures available include:
    a. Patching, used to repair large holes, tears, undispersed raw materials, and contamination by foreign matter;
    b. Spot welding or seaming, used to repair small tears, pinholes, or other minor, localized flaws;
    c. Capping, used to repair large lengths of failed seams;
    d. Extrusion welding the flap, used to repair areas of inadequate fusion seams, which have an exposed edge. Repairs of this type shall be approved by the Geosynthetic CQA and shall not exceed 50 feet (15 m) in length; and
    e. Removing bad seam and replacing with a strip of new material welded into place.
2. For any repair method, the following provisions shall be satisfied:
    a. Surfaces of the geomembrane which are to be repaired using extrusion methods shall be abraded no more than one hour prior to the repair;
    b. All surfaces shall be clean and dry at the time of the repair;
    c. All seaming equipment used in repairing procedures shall meet the requirements of the QAP; and
    d. Patches or caps shall extend at least 6 inches beyond the edge of the defect, and all corners of patches shall be rounded with a radius of approximately 3 inches.

4.8.4 Repair Verification

Each repair shall be numbered and logged. Each repair shall be nondestructively tested using the methods described in Section 4.6 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 extent to require destructive test sampling, at the discretion of the Geosynthetic CQA. Failed tests indicate that the repair shall be redone and retested until a passing test results. The Geosynthetic CQA shall observe all nondestructive testing of repairs and shall record the number of each repair, date, and test outcome.

4.8.5 Large Wrinkles

When seaming of the geomembrane is completed, and prior to placing overlying materials, the Geosynthetic CQA shall indicate to the Project Manager which wrinkles should be cut and reseamed by the Installer. The number of wrinkles to be repaired should be kept to an absolute minimum. Therefore, wrinkles should be located during the coldest part of the installation process, while keeping in mind the forecasted weather to which the uncovered geomembrane may be exposed. Wrinkles are considered to

be large when the geomembrane can be folded over onto itself. This is generally the case for a wrinkle that extends 12 inches from the subgrade. Seams produced while repairing wrinkles shall be tested as outlined above.

When placing overlying material on the geomembrane, every effort must be made to minimize wrinkle development. If possible, cover should be placed during the coolest weather available. In addition, small wrinkles should be isolated and covered as quickly as possible to prevent their growth. The placement of cover materials shall be observed by the Geosynthetic CQA to assure that wrinkle formation is minimized.

4.9 Geomembrane Protection

The quality assurance procedures indicated in this Section are intended only to assure that the installation of adjacent materials does not damage the geomembrane.

4.9.1 Soils

A copy of the specifications prepared by the Designer for placement of soils shall be given to the Geosynthetic CQA by the Project Manager. The Geosynthetic CQA shall verify that these specifications are consistent with the state-of-practice such as:

1. Placement of soils on the geomembrane shall not proceed at an ambient temperature below 32^{O}F (0^{O}C) nor above 104^{O}F (40^{O}C) unless otherwise specified;
2. Placement of soil on the geomembrane should be done during the coolest part of the day to minimize the development of wrinkles in the geomembrane;
3. A geotextile or other cushion approved by the Designer is generally required between aggregate and the geomembrane;
4. Equipment used for placing soil shall not be driven directly on the geomembrane;
5. A minimum thickness of 1 foot (0.3 m) of soil is specified between a light dozer (ground pressure of 5 psi (35 kPa) or lighter) and the geomembrane; and
6. In any areas traversed by any vehicles other than low ground pressure vehicles approved by the Project Manager, the soil layer shall have a minimum thickness of 3 feet (0.9 m). This requirement may be waived if provisions are made to protect the geomembrane through an engineered design. Drivers shall proceed with caution when on the overlying soil and prevent spinning of tires or sharp turns.

The Geosynthetic CQA shall measure soil thickness and verify that the required thicknesses are present. The Geosynthetic CQA must also verify that final thicknesses are consistent with the design and verify that placement of the soil is done in such a manner that geomembrane damage is unlikely. The Geosynthetic CQA shall inform the Project Manager if the above conditions are not fulfilled.

4.9.2 Sumps and Appurtenances

A copy of the plans and specifications prepared by the Designer for appurtenances shall be given by the Project Manager to the Geosynthetic CQA. The Geosynthetic CQA shall review these plans and verify that:

1. Installation of the geomembrane in appurtenant areas, and connection of geomembrane to appurtenances have been made according to specifications;

2. Extreme care is taken while welding around appurtenances since neither non-destructive nor destructive testing may be feasible in these areas; and
3. The geomembrane has not been visibly damaged while making connections to appurtenances.

The Geosynthetic CQA shall inform the Project Manager in writing if the above conditions are not fulfilled.

4.10 Lining System Acceptance

Upon written recommendation by the Geosynthetic CQA, the Project Manager shall consider accepting the geosynthetic lining system. The conditions of acceptance are described below. The Installer and Manufacturer(s) will retain all ownership and responsibility for the geosynthetics in the lining system until acceptance by the Owner. At the Owner's discretion, the geosynthetic lining system may be accepted in sections or at points of substantial completion.

The geosynthetic lining system shall be accepted by the Owner when:

1. The installation of the lining system, or section thereof, is finished.
2. Verification of the adequacy of all seams and repairs, including associated testing, is completed.
3. All documentation of installation is completed.
4. The Geosynthetic CQA is able to recommend acceptance.

The Geosynthetic CQA shall certify that installation has proceeded in accordance with the geosynthetic portions of the project QAP except as noted to the Project Manager.

5.0 GEOTEXTILES

5.1 Quality Control Documentation

Prior to the installation of any geotextile, the Manufacturer or Installer shall provide the Project Manager with the following information, if requested:

1. The origin (resin supplier's name and resin production plant) and identification (brand name and number) of the resin used to manufacture the geotextile;
2. Copies of the quality control certificates issued by the resin supplier;
3. Reports on tests conducted by the Manufacturer to verify that the quality of the resin used to manufacture the geotextile meets the Manufacturer's resin specifications;
4. Reports on quality control tests conducted by the Manufacturer to verify that the geotextile manufactured for the project meets the project specifications;
5. A statement indicating that the reclaimed polymer added to the resin during manufacturing was done with appropriate cleanliness;
6. A list of the materials which comprise the geotextile, expressed in the following categories as percent by weight: base polymer, carbon black, other additives;
7. A specification for the geotextile which includes all properties contained in the project specifications measured using the appropriate test methods;
8. Written certification that minimum average roll values given in the specification are guaranteed by the Manufacturer;
9. For non-woven geotextiles, written certification that the Manufacturer has continuously inspected the geotextile for the presence of needles and found the geotextile to be needle free;
10. Quality control certificates, signed by a responsible party employed by the Manufacturer. The quality control certificates shall include roll identification numbers, sampling procedures and results of quality control tests. At a minimum, results shall be given for those properties stated in Section 02772 Part 2.01(A and B) of the project specifications; and
11. Quality control tests shall be performed in accordance with the test methods specified in the project specifications for at least every 100,000 square feet of geotextile produced.

The Manufacturer shall identify all rolls of geotextiles with the following:

1. Manufacturer's name
2. Product identification
3. Roll number
4. Roll dimensions

5.1.1 Product Review

The Project Manager shall verify that:

1. Property values certified by the Manufacturer meet all of its guaranteed specifications.

2. Measurements of properties by the Manufacturer are properly documented and that the test methods used are acceptable.
3. Quality control certificates have been provided at the specified frequency for all rolls, and that each certificate identifies the rolls related to it.
4. Roll packages are appropriately labeled.
5. Certified minimum average roll properties meet the project specifications.

5.2 Conformance Testing

If requested by the Project Engineer, upon delivery of the rolls of geotextiles, the Geosynthetic QAE shall assure that conformance test samples are obtained for the geotextile. These samples shall then be forwarded to the Geosynthetic QAL for testing to assure conformance to the project specifications.

If the Project Manager desires, the Geosynthetic QAE or his agent, can perform the conformance test sampling at the manufacturing plant. This may be advantageous in expediting the installation process for very large projects.

The conformance tests shall be performed in accordance with the test methods indicated in Section 02772 Part 2.01 of the project specifications. Other conformance tests may be required by the Project Manager.

5.2.1 Sampling Procedures

The rolls to be sampled shall be selected by the Geosynthetic QAE. Samples shall be taken across the entire width of the roll and shall not include the first complete revolution of fabric on the roll. Samples shall not be taken from any portion of a roll which has been subjected to excess pressure or stretching. Unless otherwise specified, samples shall be 3 feet long by the roll width. The Geosynthetic QAE shall mark the machine direction on the samples with an arrow. All lots of material and the particular test sample that represents each lot should be defined before the samples are taken.

A lot shall be defined as a group of consecutively numbered rolls from the same manufacturing line. Alternatively, a lot may be designated by the Geosynthetic QAE based on a review of all roll information including quality control documentation and manufacturing records.

Unless otherwise specified, samples shall be taken at a rate of one per lot, not to exceed one conformance test per 100,000 square feet of geotextile.

5.2.2 Test Results

All conformance test results shall be reviewed and accepted or rejected by the Geosynthetic QAE prior to the deployment of the geotextile.

The Geosynthetic QAE shall be responsible for checking that all test results meet or exceed the property values listed in the project specifications.

If the Manufacturer has reason to believe that failing tests may be the result of the Geosynthetic QAL incorrectly conducting the tests, the Manufacturer may request that the sample in question be retested by the Geosynthetic QAL with a technical representative of the Manufacturer present during the testing. This retesting shall be done at the expense of the Manufacturer. Alternatively, the Manufacturer may have the sample retested at two different approved independent laboratories at the expense of the

Manufacturer. If both laboratories produce passing results, the material shall be accepted. If both laboratories do not produce passing results, then the original Geosynthetic QAL test results shall be accepted. The use of these procedures for dealing with failed test results is subject to the approval of the Project Manager.

If a test result is in nonconformance, all material from the lot represented by the failing test should be considered out of specification and rejected. Alternatively, at the option of the Project Manager/RPR, additional conformance test samples may be taken to "bracket" the portion of the lot not meeting specification (note that this procedure is valid only when all rolls in the lot are consecutively produced and numbered from one manufacturing line). To isolate the out of specification material, additional samples must be taken from rolls that have roll numbers immediately adjacent to the roll that was sampled and failed. If both additional tests pass, the roll that represents the initial failed test and the roll manufactured immediately after that roll (next larger roll number) shall be rejected. If one or both of the additional tests fail, then the entire lot shall be rejected, or the procedure repeated with two additional tests that bracket a greater number of rolls within the lot.

5.3 Geotextile Deployment

During shipment and storage, the geotextile shall be protected from ultraviolet light exposure, precipitation or other inundation, mud, dirt, dust, puncture, cutting, or any other damaging or deleterious conditions. Geotextile rolls shall be shipped and stored in relatively opaque and watertight wrappings. Wrappings shall be removed shortly before deployment.

The Geosynthetic QAE shall observe rolls upon delivery at the site and any deviation from the above requirements shall be reported to the Project Manager/RPR.

The Installer shall handle all geotextiles in such a manner as to assure they are not damaged in any way, and the following shall be complied with:

1. On slopes, the geotextiles shall be securely anchored and then rolled down the slope in such a manner as to continually keep the geotextile sheet in tension;
2. In the presence of wind, all geotextiles shall be weighted with sandbags or the equivalent. Such sandbags shall be installed during deployment and shall remain until replaced with cover material;
3. Geotextiles shall be cut using a geotextile cutter (hook blade) only. If in place, special care shall be taken to protect other materials from damage which could be caused by the cutting of the geotextiles;
4. The Installer shall take any necessary precautions to prevent damage to underlying layers during placement of the geotextile;
5. During placement of geotextiles, care shall be taken not to entrap, in or beneath the geotextile, stones, excessive dust, or moisture that could damage the geomembrane, cause clogging of drains or filters, or hamper subsequent seaming; and
6. A visual examination of the geotextile shall be carried out over the entire surface, after installation, to assure that no potentially harmful foreign objects, such as needles, are present.

The Geosynthetic QAL shall note any noncompliance and report it to the Project Manager.

5.4 Seaming Procedures

On slopes steeper than 10 horizontal:1 vertical, all geotextiles shall be continuously sewn (i.e., spot sewing is not allowed). Geotextiles shall be overlapped a minimum of 3 inches prior to seaming. In general, no horizontal seams shall be allowed on sideslopes (i.e., seams shall be along, not across, the slope), except as part of a patch.

On bottoms and slopes shallower than 10 (horizontal):1 (vertical), geotextiles shall be seamed as indicated above (preferred), or continuously thermally bonded with the written approval of the Project Manager.

The Installer shall pay particular attention at seams to assure that no earth cover material could be inadvertently inserted beneath the geotextile.

Any sewing shall be done using polymeric thread with chemical and ultraviolet light resistance properties equal to or exceeding those of the geotextile. Sewing shall be done using machinery and stitch types specified in the project specifications or as approved in writing by the Project Manager/RPR.

5.5 Defects and Repairs

Any holes or tears in the geotextile shall be repaired as follows:

On slopes, a patch made from the same geotextile shall be sewn into place in accordance with the project specifications. Should any tear exceed 10 percent of the width of the roll, that roll shall be removed from the slope and replaced.

Care shall be taken to remove any soil or other material which may have penetrated the torn geotextile.

The Geosynthetic QAE shall observe any repair and report any noncompliance with the above requirements in writing to the Project Manager.

5.6 Geotextile Protection

All soil materials located on top of a geotextile shall be deployed in such a manner as to assure:

1. The geotextile and underlying lining materials are not damaged;
2. Minimal slippage of the geotextile on underlying layers occurs; and
3. No excess tensile stresses occur in the geotextile.

Unless otherwise specified by the Geosynthetic QAE, all lifts of soil material shall be in conformance with the guidelines given in Section 4.9.1.

6.0 GEONET/DRAINAGE GEOCOMPOSITES/DRAINAGE GEOCOMPOSITES

6.1 Quality Control Documentation

Prior to the installation of any geonet/drainage geocomposite, the Manufacturer or Installer shall provide the Project Manager with the following information:

1. The origin (resin supplier's name and resin production plant), identification (brand name and number), and production date of the resin;
2. Copies of the quality control certificates issued by the resin supplier;
3. Reports on tests conducted by the Manufacturer to verify that the quality of the resin used to manufacture the geonet/drainage geocomposite meets the specifications;
4. Reports on quality control tests conducted by the Manufacturer to verify that the geonet/drainage geocomposite manufactured for the project meets the project specifications;
5. A statement indicating that the amount of reclaimed polymer added to the resin during manufacturing was done with appropriate cleanliness and does not exceed 2 percent by weight;
6. A list of the materials which comprise the geonet/drainage geocomposite, expressed in the following categories as percent by weight: polyethylene, carbon black, other additives;
7. A specification for the geonet/drainage geocomposite which includes all properties contained in the specifications measured using the appropriate test methods;
8. Written certification that minimum values given in the specification are guaranteed by the Manufacturer; and
9. Quality control certificates, signed by a responsible party employed by the Manufacturer. The quality control certificates shall include roll identification numbers, sampling procedures and results of quality control tests. At a minimum, results shall be given for those properties stated in Section 02772 Part 1.05 of the project specifications.

   Quality control tests shall be performed in accordance with the test methods specified in the specifications, for every 100,000 ft^2 of geonet/drainage geocomposite produced.

The Manufacturer shall identify all rolls of geonet/drainage geocomposite with the following:

1. Manufacturer's name
2. Product identification
3. Roll number
4. Roll dimensions

The Geosynthetic QARE shall review these documents and shall report any discrepancies with the above requirements to the Project Manager. The Geosynthetic QARE shall verify that:

1. Property values certified by the Manufacturer meet all of its guaranteed specifications;
2. Measurements of properties by the Manufacturer are properly documented and that the test methods used are acceptable;

3. Quality control certificates have been provided at the specified frequency for all rolls, and that each certificate identifies the rolls related to it;
4. Roll packages are appropriately labeled; and
5. Certified minimum properties meet the specifications.

6.2 Conformance Testing

Upon delivery of the rolls of geonet/drainage geocomposite, the Geosynthetic QARE shall assure that conformance test samples are obtained for the geonet/drainage geocomposite. These samples shall then be forwarded to the Geosynthetic QAL for testing to assure conformance to the specifications.

The conformance tests shall be performed in accordance with the test methods indicated in Section 02772 Part 2.01 of the project specifications. Other conformance tests may be required by the Project Manager.

6.2.1 Sampling Procedures

The rolls to be sampled shall be selected by the Geosynthetic QARE. Samples shall be taken across the entire width of the roll, and shall not be taken from any portion of a roll which has been subjected to excess pressure or stretching. Unless otherwise specified, samples shall be 3 ft (1 m) long by the roll width. The Geosynthetic QARE shall mark the machine direction on the samples with an arrow. All lots of material and the particular test sample that represents each lot should be defined before the samples are taken.

A lot consists of a group of materials which is manufactured from a specific batch of raw materials (e.g., HDPE resin, or bentonite clay). The manufacturer shall identify the consecutively numbered rolls of material, that are inclusive within a lot.

Unless otherwise specified, samples shall be taken at a rate of one per lot, not less than one conformance test per 100,000 ft^2 (10,000 m^2) of geonet/drainage geocomposite.

6.2.2 Test Results

All conformance test results shall be reviewed and accepted or rejected by the Geosynthetic QARE prior to the deployment of the geotextile.

The Geosynthetic QARE shall be responsible for checking that all test results meet or exceed the property values listed in the project specifications.

If the Manufacturer has reason to believe that failing tests may be the result of the Geosynthetic QAL incorrectly conducting the tests, the Manufacturer may request that the sample in question be retested by the Geosynthetic QAL with a technical representative of the Manufacturer present during the testing. This retesting shall be done at the expense of the Manufacturer. Alternatively, the Manufacturer may have the sample retested at two different GAI-LAP accredited, engineer approved independent laboratories at the expense of the Manufacturer. If both laboratories produce passing results, the material shall be accepted. If both laboratories do not produce passing results, then the original Geosynthetic QAL test results shall be accepted. The use of these procedures for dealing with failed test results is subject to the approval of the Project Manager.

If a test result is in nonconformance, all material from the lot represented by the failing test should be considered out of specification and rejected. Alternatively, at the option of the Project Manager, additional conformance test samples may be taken to "bracket" the portion of the lot not meeting specification (note that this procedure is valid only when all rolls in the lot are consecutively produced and numbered from one manufacturing line). To isolate the out of specification material, additional samples must be taken from rolls that have roll numbers immediately adjacent to the roll that was sampled and failed. If both additional tests pass, the roll that represents the initial failed test and the roll manufactured immediately after that roll (next larger roll number) shall be rejected. If one or both of the additional tests fail, then the entire lot shall be rejected or the procedure repeated with two additional tests that bracket a greater number of rolls within the lot.

6.3 Drainage Geocomposite Deployment

During shipment and storage, the geocomposite shall be protected from inundation, mud, dirt, dust, puncture, cutting, or any other damaging or deleterious conditions.

The Geosynthetic QARE shall observe rolls upon delivery at the site and any deviation from the above requirements shall be reported to the Project Manager.

The Installer shall handle all geocomposite in such a manner as to assure they are not damaged in any way, and the following shall be complied with:

1. On slopes, the geocomposite shall be securely anchored and then rolled down the slope in such a manner as to continually keep the geocomposite sheet in tension;
2. In the presence of wind, all geocomposite shall be weighted with sandbags or the equivalent. Such sandbags shall be installed during deployment and shall remain until replaced with cover material;
3. Geocomposite shall be cut using a hook blade only. If in place, special care shall be taken to protect other materials from damage which could be caused by the cutting of the geocomposite;
4. The Installer shall take any necessary precautions to prevent damage to underlying layers during placement of the geocomposite;
5. During placement of geocomposite, care shall be taken not to entrap, in or beneath the geocomposite, stones, excessive dust, soil, or moisture that could damage the geomembrane, cause clogging of drains or filters, or hamper subsequent seaming; and
6. A visual examination of the geocomposite shall be carried out over the entire surface, after installation, to assure that no potentially harmful foreign objects are present.

The Geosynthetic QAL shall note any noncompliance and report it to the Project Manager.

6.4 Seaming Procedures

Geonet/drainage geocomposites shall be overlapped a minimum of 4 inches (75 mm) prior to tying. In general, no horizontal seams shall be allowed on sideslopes (i.e., seams shall be along, not across, the slope), except as part of a patch.

6.5 Seams and Overlaps

Adjacent geonet/drainage geocomposite shall be joined according to construction drawings and specifications. At a minimum, the following requirements shall be met:

1. Adjacent rolls shall be overlapped by at least 4 inches (100 mm);
2. Overlaps shall be secured by tying;
3. Tying can be achieved by plastic fasteners or polymer braid. Tying devices shall be white or yellow for easy inspection. Metallic devices are not allowed;
4. Tying shall be every 5 feet (1.5 m) along the slope, every 6 inches (0.15 m) in the anchor trench, and every 6 inches (0.15 m) along end-to-end seams on the base of the landfill;
5. In general, no horizontal seams shall be allowed on sideslopes;
6. In the corners of the sideslopes of rectangular landfills, where overlaps between perpendicular geonet/drainage geocomposite strips are required, an extra layer of geonet/drainage geocomposites shall be unrolled along the slope, on top of the previously installed geonet/drainage geocomposite, from top to bottom of the slope;
7. When more than one layer of geonet/drainage geocomposite is installed, joints shall be staggered; and
8. The geotextiles shall be heat sealed or sewn at geonet/drainage geocomposite overlaps.

The Geosynthetic QARE shall note any noncompliance and report it to the Project Manager.

When several layers of geonet/drainage geocomposite are stacked, care shall be taken to prevent strands of one layer from penetrating the channels of the next layer, thereby significantly reducing the transmissivity. This cannot happen if stacked geonet/drainage geocomposite are placed in the same direction. A stacked geonet/drainage geocomposite shall never be laid in perpendicular directions to the underlying geonet/drainage geocomposite (unless otherwise specified by the Designer).

6.6 Defects and Repairs

Any holes or tears in the geocomposite shall be repaired by placing a patch extending 1 foot (0.3 m) beyond the edges of the hole or tear. The patch shall be secured to the original geonet/drainage geocomposite by tying every 6 inches (0.15 m). Tying devices shall be as indicated in Section 6.5. If the hole or tear width across the roll is more than 50 percent of the width of the roll, the damaged area shall be repaired as follows:

1. On the base of the landfill, the damaged area shall be cut out and the two portions of the geocomposite shall be joined as indicated in Section 6.5; and
2. On sideslopes, the damaged geocomposite shall be removed and replaced.

6.7 Geonet/drainage geocomposite Protection

Soil should never be placed in direct contact with geonet/drainage geocomposite component of the geocomposite. Soil materials near the geocomposite shall be placed in such a manner as to assure:

1. The geocomposite and underlying lining materials are not damaged;

2. Minimal slippage of the geocomposite on underlying layers occurs; and
3. No excess tensile stresses occur in the geonet/drainage geocomposite.

Unless otherwise specified by the Designer, all lifts of soil material shall be in conformance with the guidelines given in Section 3.0.

The geocomposite shall not be exposed for more than two days without being covered by backfill. A greater exposure time may be approved by the Project Manager based upon written manufacturer's recommendations.

Any noncompliance shall be noted by the Geosynthetic QARE and reported to the Project Manager.

7.0 HDPE PIPE, FITTINGS AND APPURTENANCES

7.1 Quality Control Documentation

Prior to the installation of any pipe, fittings, and appurtenances at the landfill facilities, the contractor shall provide the Engineer with material submittals on the materials to be used in construction of the landfill facilities. Submittals shall be prepared according to the project specifications. The following information shall be supplied if requested by the Engineer:

1. The origin (resin supplier's name and resin production plant), identification (brand name and number), and production date of the resin;
2. Copies of the quality control certificates issued by the resin supplier;
3. Reports on tests conducted by the Manufacturer to verify that the quality of the resin used to manufacture the HDPE pipe and fittings meets the specifications;
4. Reports on quality control tests conducted by the Manufacturer to verify that the HDPE pipe and fittings manufactured for the project meets the project specifications;
5. A statement indicating that the amount of reclaimed polymer added to the resin during manufacturing was done with appropriate cleanliness and does not exceed 2 percent by weight;
6. A list of the materials which comprise the HDPE pipe and fittings, expressed in the following categories as percent by weight: polyethylene, carbon black, other additives;
7. A specification for the pipe and fittings which includes all properties contained in the specifications measured using the appropriate test methods;
8. Written certification that minimum values given in the specification are guaranteed by the Manufacturer; and
9. Quality control certificates, signed by a responsible party employed by the Manufacturer. The quality control certificates shall include pipe identification numbers, sampling procedures and results of quality control tests. At a minimum, results shall be given for:
    a. Density
    b. Melt flow index
    c. Carbon black content

    Quality control tests shall be performed in accordance with the test methods specified in the specifications, for every 1,000 ft of pipe produced.

The Manufacturer shall identify all pipe according to ASTM D 1248 and ASTM F 714.

The Pipe CQA shall review these documents and shall report any discrepancies with the above requirements to the Project Manager. The CQA shall verify that:

1. Property values certified by the Manufacturer meet all of its guaranteed specifications;
2. Measurements of properties by the Manufacturer are properly documented and that the test methods used are acceptable;
3. Quality control certificates have been provided at the specified frequency for pipe produced, and that each certificate identifies the pipe related to it;

4. Pipe is appropriately labeled; and
5. Certified minimum properties meet the specifications.

7.2 Conformance Testing

Upon delivery of the HDPE pipe, the CQA shall inspect the pipe and based on the pipe condition and review of the manufacturer's certification documentation, may elect to sample the pipe for conformance testing. Conformance test samples shall be identified in a manner appropriate for the ASTM standard for HDPE pipe. These samples shall then be forwarded to the QAL for testing to assure conformance to the specifications.

The following conformance tests shall be performance on the pipe:

1. Physical dimensions by ASTM D 2122
2. Density by ASTM D 1505
3. Plate bearing test by ASTM D 2412
4. Impact resistance by ASTM D 2444

These conformance tests shall be performed in accordance with the test methods specified. Other conformance tests may be required by the Project Manager.

7.2.1 Sampling Procedures

A lot shall be defined as a group of consecutively numbered pipes from the same manufacturing line. Alternatively, a lot may be designated by the CQA based on a review of all pipe information including quality control documentation and manufacturing records.

Unless otherwise specified, samples shall be taken at a rate of one per lot, not less than one conformance test per 1,000 ft of HDPE pipe.

7.2.2 Test Results

All conformance test results must be reviewed and accepted or rejected by the CQA prior to the deployment of the pipe.

The CQA shall examine all results from laboratory conformance testing and shall report any nonconformance to the Project Manager. The CQA shall be responsible for checking that all test results meet or exceed the minimum property values listed in project specifications.

If the Manufacturer has reason to believe that failing tests may be the result of the QAL incorrectly conducting the tests, the Manufacturer may request that the sample in question be retested by the QAL with a technical representative of the Manufacturer present during the testing. This retesting shall be done at the expense of the Manufacturer. Alternatively, the Manufacturer may have the sample retested at two different Owner-approved independent laboratories at the expense of the manufacturer. If both laboratories produce passing results, the material shall be accepted. If both laboratories do not produce passing results, then the original QAL's test results shall be accepted. The use of these procedures for dealing with failed test results is subject to the approval of the Project Manager.

If a test result is in nonconformance, all material from the lot represented by the failing test shall be considered out of specification and rejected. Alternatively, at the option of the Project Manager, additional conformance test samples may be taken to "bracket" the portion of the lot not meeting specification (note that this procedure is valid only when all pipes in the lot are consecutively produced and numbered from one manufacturing line). To isolate the out of specification material, additional samples must be taken from pipes that have pipe numbers immediately adjacent to the pipe that was sampled and failed. If both additional tests pass, the pipe that represents the initial failed test and the pipe manufactured immediately after that pipe (next larger pipe number) shall be rejected. If one or both of the additional tests fail, then the entire lot shall be rejected or the procedure repeated with two additional tests that bracket a greater number of pipes within the lot.

7.3 Pipe and Fitting Placement

The Installer shall handle all pipe in such a manner as to ensure it is not damaged in any way, and the following shall be complied with:

1. HDPE pipe, fittings, and appurtenances shall be placed as shown in the Contract Drawings, specifications, and/or as directed by the CQA;
2. Piping placed within a trench shall be placed according to the contract drawings. Pipe bedding and backfill shall be done according to the specifications;
3. Pipe fittings shall be installed as shown on the contract drawings and as recommended by the pipe manufacturer and CQA; and
4. Solid wall HDPE transport pipe and associated fittings shall be pressure leak tested according to general industry standards. The CQA is responsible for observing and documenting these tests. The installer is responsible for locating and repairing all leaks in such a manner that is acceptable to the CQA.

7.4 Pipe Seams and Fusion Techniques

Butt fusion welding shall be used to seam pipe lengths together and install pipe fittings. Welding shall be done by qualified personnel and according to manufacturer's instructions. The installer shall provide the CQA with documentation of the pipe welder's experience. The CQA shall observe and document welding operations as necessary to assure welding techniques are highest quality.

7.5 Repairs

Any damaged pipe shall be discarded. No repairs shall be allowed.

7.6 Manholes, Valves and Other Appurtenances

Manholes, valves and other appurtenances associated with the piping systems shall be constructed according to the contract drawings and specifications. All connections to piping and/or associated equipment shall be according to the contract drawings and the manufacturer's recommendations. All manholes, valves and other pipe connections shall be leak tested according to general industry standards. The installer is responsible for repair of faulty material and repairs required to provide a leakproof installation. The CQA is responsible for observing and documenting installation and testing necessary to assure installation techniques are highest quality.

7.7 Soil Materials Placement

All soil materials located on top of a pipe shall be placed in such a manner as to ensure:

1. The pipe and underlying materials are not damaged or dislocated; and
2. The pipe structural integrity is not compromised.

Unless otherwise specified by the Designer, all lifts of soil material shall be in conformance with the guidelines given in Section 3.0.

Any noncompliance shall be noted by the CQA and reported to the Project Manager.

8.0 CONSTRUCTION DOCUMENTATION

During construction, the Owner's Representative will document that the cover placement procedures are being followed, and the cover materials are as specified. A full-time project representative will be assigned to the construction of the cover.

8.1 Weekly Inspection Reports

Inspection reports will be prepared daily and summarized weekly by the Owner's Representative during the closure of the Landfill. The reports will include, but is not limited to:

- Contractor submittals and actions taken;
- Soil material test results;
- A summary of work progress;
- Summary of significant problems encountered and their resolutions;
- Change order status;
- Photographs;
- Record drawings;
- Upcoming work items for the next two weeks; and
- Punchlist items as applicable.

The weekly summaries will be forwarded to the MEDEP within one week of the completion of each construction week.

8.2 Final Construction Certification and Report

A final construction report will be submitted by the Owner to the MEDEP within 45 days following the completion of closure construction at the Landfill. The report will include, but is not limited to:

- Written certification signed and stamped by Engineer supervising project inspection (Statement of Compliance);
- Submittals;
- Field changes and construction modifications;
- QA/QC testing reports;
- Daily reports; and
- Photographs.

The report will also contain a request that the MEDEP conduct an inspection of the facility for a finding of compliance with the Solid Waste Management Regulations.

APPENDIX C

TEST PIT DATA

PHASE 2/3 TEST PIT SUMMARY
DOLBY III LANDFILL
EAST MILLINOCKET, MAINE

	Soil Depth - inches		
Test Pit ID	**Top Soil**	**Barrier Layer (till)**	**Sand**
TP-16-1	0-4	4-24	24-44
TP-16-2	0-3	3-32	32-45
TP-16-3	0-8	8-29	29-49
TP-16-4	0-6	6-34	34-50
TP-16-5	0-8	8-23	23-37
TP-16-6	0-7	7-29	29-39
TP-16-7	0-6	6-30	30-38
TP-16-8	0-4	4-22	22-31
TP-16-9	0-8	8-39	39-51
TP-16-10	0-6	6-36	36-46
TP-16-11	0-6	6-26	26-41
TP-16-12	0-3	3-28	28-40
TP-16-13	0-5	5-36	36-60
TP-16-14	0-3	3-23	23-40
TP-16-15	0-4	4-27	27-39
TP-16-16	0-5	5-28	28-45
TP-16-17	0-4	4-26	26-50
TP-16-18	0-6	6-24	24-43
TP-16-19	0-6	6-30	30-41
TP-16-20	0-5	5-36	36-55

PHASE 2/3 TEST PIT SUMMARY
DOLBY III LANDFILL
EAST MILLINOCKET, MAINE

	Soil Depth - inches		
Test Pit ID	**Top Soil**	**Barrier Layer (till)**	**Sand**
TP-16-21	0-4	4-23	23-41
TP-16-22	0-5	5-28	28-40
TP-16-23	0-4	4-25	25-34
TP-16-24	0-6	6-25	25-38
TP-16-25	0-5	5-18	18-28
TP-16-26	0-4	4-23	23-33
TP-16-27	0-6	6-22	22-33
TP-16-28	0-6	6-24	24-40
TP-16-29	0-5	5-23	23-32
TP-16-30	0-5	5-19	19-40
TP-16-31	0-6	6-22	22-39
TP-16-32	0-6	6-26	26-40
TP-16-33	0-4	4-21	21-23
TP-16-34	0-6	6-22	22-47
TP-16-35	0-6	6-24	24-36
TP-16-36	0-6	6-20	20-34
TP-16-37	0-5	5-14	14-27
TP-16-38	0-4	4-21	21-38
TP-16-39	0-4	4-19	19-39