North Country Environmental Services, Inc.
Permit Number: DES-SW-SP-03-002 (Stage IV)

Type I-B Modification to Solid Waste Management Facility Permit

Application to NH Department of Environmental Services:

- Type I-B Modification to Solid Waste Management Facility Permit

February 2009

Submitted by:

North Country Environmental Services, Inc.
Bethlehem, New Hampshire

Prepared by:

CMA Engineers, Inc
Civil and Environmental Engineers
35 Bow Street
Portsmouth, New Hampshire 03801

North Country Environmental Services, Inc.
Stage IV, Phase II

Bethlehem, New Hampshire

February 2009

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Submitted by:

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Section I

APPLICATION FORMS

NEW HAMPSHIRE DEPARTMENT OF Environmental Services

For Office Use Only:	
WMD Log #:	
Date Rec'd.:	
No. of Copies:	
Fee: $	/Check #

APPLICATION FORM FOR

TYPE 1 MODIFICATION TO SOLID WASTE MANAGEMENT FACILITY PERMIT

pursuant to

RSA 149-M and New Hampshire Administrative Solid Waste Rule Env-Sw 315

SECTION I. FACILITY IDENTIFICATION

(1)	Facility name: North Country Environmental Services, Inc.
(2)	Functional classification: ☐ collection/storage/transfer ☐ processing/treatment ☒ landfill
(3)	Mailing address: : 581 Trudeau Road, Bethlehem, NH 03574
(4)	Permit number: DES-SW-SP-03-002 (Stage IV)
(5)	Location, by street address and municipality: 581 Trudeau Road, Bethlehem, NH 03574

SECTION II. PERMITTEE IDENTIFICATION

(1)	Permittee/applicant name: North Country Environmental Services, Inc.			
(2)	Mailing address: 3 Pitkin Court, Montpelier, VT 05602			
(3)	Telephone number: 802-223-7221			
(4)	If different than above, identify the individual associated with and designated by the permittee/applicant to be the contact individual for matters concerning this application:			
	(a)	Name: John Gay	(b)	Title: Manager, Central Region EPCC
	(c)	Mailing address: 3 Pitkin Court, Montpelier, VT 05602		
	(d)	Telephone number: 802-223-7221		

SECTION III. DESCRIPTION OF PROPOSED MODIFICATION

Describe the proposed modification by answering each of the following questions. Use additional paper as necessary.

(1)	Provide a **BRIEF** description of the proposed modification. [Check box if response is provided on separate paper ☒]
	See Attachment A
(2)	Identify whether the proposed modification is a "type I-A" or "type I-B" modification. (If uncertain, use the worksheet provided with the instructions for this form): ☐ Type I-A ☒ Type I-B
(3)	Identify, either below or on separate paper, each written permit condition that will require amendment to effect the proposed modification and provide draft language for the same. [Check box if response is provided on separate paper ☒]
	See Attachment B

(4) Identify, below, each "last approved plan of record" identified in the permit which will be affected by the proposed modification and will therefore require amendment/revision:

Check here if affected	*TYPE OF PLAN*	*DES APPROVAL DATE*	WMD LOG # (Find this number on your copy of the approval)
☒	Facility design plans/specifications	Permit for Stage IV March 13, 2003 Type II Modification for Stage IV Phase I August 5, 2005	200200068, 00200191, 200200192, 200300057 200500163, 200500173
☒	Facility operating plan	Permit for Stage IV March 13, 2003 Type II Modification for Stage IV Phase I August 5, 2005	200200068, 00200191, 200200192, 200300057 200500163, 200500173
☒	Facility closure plan	Permit for Stage IV March 13, 2003 Type II Modification for Stage IV Phase I August 5, 2005	200200068, 00200191, 200200192, 200300057 200500163, 200500173
☒	Facility financial assurance plan	Permit for Stage IV March 13, 2003 Type II Modification for Stage IV Phase I August 5, 2005	
☐	Other plan (specify):		

(5) Submit, on separate paper, the proposed amendments/revisions for each document identified pursuant to (4) above, based on the below listed instructions. (Note: The revisions may be presented in the form of replacement pages ready for substitution into the last approved plan of record, each page being clearly marked to show the date of revision. In the event there is no last approved plan of record for any of the following, you must prepare and submit a full plan, including the proposed modification(s), in accordance with the applicable cited Rules.)

☒	Facility design plans must be prepared in accordance with Env-Sw 1103.05.
☒	Facility operating plans must be prepared in accordance with Env-Sw 1105.11.
☒	Facility closure plans must be prepared in accordance with Env-Sw 1106.04.
☒	Financial assurance plans must be prepared as specified in Env-Sw 1400 and must include all related draft financial assurance documents required to effect the proposed modification.

(6) In order for DES to approve the proposed modification, the agency must be able to conclude from the information provided in this application that the proposed modification meets all applicable requirements of the Rules. Therefore, for any aspect of the proposed modification where it may not be self-evident that the proposed change meets all applicable requirements of the Rules, you should explicitly provide such information. Provide your response below and/or use separate paper as necessary. (Check box if response is attached on separate paper ☐)

SECTION IV. SCHEDULE

Provide a proposed schedule for implementing the modification. Use separate paper if necessary. (Check box if response is attached on separate paper ☒)

See Attachment C

SECTION V. STATEMENT OF NEED

Provide a statement of need describing why the proposed change is necessary or desirable. Use separate paper if necessary. (Check box if response is attached on separate paper ☒)

See Attachment D

SECTION VI. IMPACT EVALUATION

On separate paper, identify all impacts, both positive and adverse, which the proposed modification will have, including each of the below listed considerations.

(1) The effect the modification will have on facility function, capacity, life expectancy, service type and service area.

(2) The effect the modification will have on the environment, public health and safety.

(3) The effect the modification will have on the state's ability to achieve the goals and objectives specified in RSA 149-M:2, namely achieving a 40% minimum weight reduction in the solid waste stream on a per capita basis by the year 2000 and avoiding the disposal of recyclable materials in a lined landfill with a leachate collection system.

(4) The effect the modification will have on establishing and maintaining integrated waste management systems consistent with the hierarchy of waste management methods in RSA 149-M:3 [the methods, in descending order of preference as specified in RSA 149-M:3, are: source reduction; recycling and reusing; composting; waste-to-energy technologies (including incineration), incineration without resource recovery; and landfilling].

(5) Consistency with the state solid waste management plan and the applicable district plan, pursuant to RSA 149-M:12,I(b). If necessary, contact the P&DRS at (603) 271-2925 for plan information.

SECTION VII. PUBLIC BENEFIT DEMONSTRATION

Provide a "demonstration of public benefit" based on the below listed instructions. Check which one of the listed instructions applies to your particular application.

☐	**For a type I-A modification of a standard permit**, provide a "demonstration of public benefit" in accordance with RSA 149-M:11 and in conformance with the provisions of Env-Sw 1005.05. Prepare and submit the demonstration on separate paper.
☐	**For a type I-A modification of an emergency permit or a research and development permit, or a permit-by-notification**, there is a presumption of public benefit, provided that the proposed modification meets all requirements of the Rules. Therefore, you may skip this section and go to Section VIII.
☒	**For a type I-B modification**, there is a presumption of public benefit, provided that the proposed modification meets all requirements of the Rules. Therefore, you may skip this section and go to Section VIII.

SECTION VIII. OTHER PERMITS

Complete the following table to identify and provide the status of all other permits or approvals necessary to effect the proposed modification.

Type of Permit/Approval Required	Date the Application was/will be Submitted	Status/Comments
NHDES Significant Alteration of Terrain Permit (Site Specific Permit)	March 2009	
Groundwater Permit	November 2007	Issued
Temporary Air Permit	November 2000	Issued
NPDES Stormwater Permit	July 2004	Issued

SECTION IX. LEGAL NOTICES

Submit proof of having provided certain legal notifications and filings; as follows:

(1) You must send by certified mail, or deliver in hand, a complete copy of this application to the host municipality, host solid waste management district and other affected entities, with a "notice of filing," as specified by Env-Sw 303.

(2) For a type I-A modification, you must send by certified mail, or deliver in hand, a "notice of filing" to each owner of property abutting the facility site, as specified by Env-Sw 303. If the applicant/permittee or the owner of the facility site owns any abutting parcel of land, the "notice of filing" must be sent to the owner(s) of the next parcel(s) not owned by the permittee/applicant or facility site owner.

(3) You must also provide a "notice of filing" to the New Hampshire Department of Justice/Office of the Attorney General (NH DoJ/AGO) if, pursuant to Section X(2) of this form, you are required to submit business and personal disclosure information.

(4) You must attach to this application "proof" that notification has been provided as required by (1) through (3) above. Therefore, attach a copy of the notice(s) of filing and the signature(s) of all required recipients, acknowledging receipt.

SECTION X. CERTIFICATION OF COMPLIANCE/COMPLIANCE REPORT

All applications for permit modification must be submitted with either certification of compliance or a compliance report, as follows:

(1) If you are ABLE to certify that each of the statements numbered (1) - (8) below are true, do so by your signature.

(2) If you are UNABLE to certify that each of the statements numbered (1) - (8) below are true, you must:

☒ Prepare and submit a separate Compliance Report as specified by Env-Sw 303.15; and

☐ If the proposed modification involves a change in organizational structure, or a change in individuals/entities holding 10% or more of the permittee's debt or equity, or a change in officers, directors, partners or key employees, none of which constitutes a change in operational control of the facility or a change in ownership per Env-Sw 315.02(f), also submit completed "business and personal disclosure forms" for each non-compliant individual and entity involved in the change. Obtain the required forms from the P&DRS at (603) 271-2925. Submit the completed forms, with the notice of filing referenced by Section IX(3) of this form and a copy of the Compliance Report, direct to the New Hampshire Department of Justice/Office of Attorney General, Environmental Protection Bureau, 33 Capitol Street, Concord, NH 03301-6397. [Note: Copies of the completed disclosure forms should NOT be attached to this application when it is submitted to DES or to the host municipality, host solid waste management district and other effected entities, pursuant to Section IX(1) above. Only the NH DoJ/AGO should receive copies of the disclosure forms].

COMPLIANCE STATEMENT

The applicant shall certify that each of the statements listed in (1)-(8) below are true for each of the following individuals and entities:

- ☐ **The applicant.**
- ☐ **The facility owner.**
- ☐ **The facility operator.**
- ☐ **All individuals and entities holding 10% or more of the applicant's debt or equity.;**
- ☐ **All of the applicant's officers, directors, and partners.**
- ☐ **All individuals and entities having managerial, supervisory or substantial decision making authority and responsibility for the management of the facility operations or the activity(s) for which approval is being sought.**

(1)	No individual or entity listed above has been convicted of or plead guilty or no contest to a felony in any state or federal court during the 5 years before the date of the application.
(2)	No individual or entity listed above has been convicted of or plead guilty or no contest to a misdemeanor for a violation of environmental statutes or rules in any state or federal court during the 5 years before the date of the application.
(3)	No individual or entity listed above has owned or operated any hazardous or solid waste facility which has been the subject of an administrative or judicial enforcement action for a violation of environmental statutes or rules during the 5 years before the date of the application.
(4)	No individual or entity listed above has been the subject of any administrative or judicial enforcement action for a violation of environmental statutes and rules during the 5 years before the date of the application;

(5)	All hazardous and solid waste facilities owned or operated in New Hampshire by any individual or entity listed above are in compliance with either.	
	(a)	All applicable environmental statutes, rules, and DES permit requirements; or
	(b)	A DES approved schedule for achieving compliance therewith.
(6)	All individuals and entities listed above are in compliance with all civil and criminal penalty provisions of any outstanding consent agreement, settlement, or court order to which DES is a party.	
(7)	All individuals and entities listed above have paid, or are in compliance with the payment schedule for any administrative fine assessed by DES.	
(8)	All individuals and entities listed above are in compliance with all terms and conditions under every administrative order, court order or settlement agreement relating to programs implemented by DES.	

Signature of the permittee/applicant certifying the above statements are true:

Permittee/Applicant Name **(Print Clearly or Type)** _____

Permittee/Applicant Signature _____

Date _____

SECTION XI. PERMITTEE/APPLICANT SIGNATURE REQUIREMENTS

The permittee/applicant must sign the following statement prior to submitting this application. All copies of the application filed with DES must bear the permittee's/applicant's ORIGINAL signature. If the permittee/applicant is not an individual, an individual duly authorized by the permittee/applicant shall sign the application.

To the best of my knowledge and belief, the information and material submitted herewith is correct and complete. I understand that any approval granted by DES based on false and/or incomplete information shall be subject to revocation or suspension, and that administrative, civil or criminal penalties may also apply. I certify that this application is submitted on a complete and accurate form, as provided by DES, without alteration of the text.

Permittee/Applicant Name **(Print Clearly or Type)** _____

Permittee/Applicant Signature _____

Date _____

SECTION XII. PROPERTY OWNER SIGNATURE

If the permittee and property owner are not the same, the property owner must also sign this form as follows. All copies of the application filed with DES must bear the property owner's ORIGINAL signature. If the property owner is not an individual, an individual duly authorized by the property owner shall sign the application.

(1)	I hereby affirm that the permittee/applicant has the legal right to occupy and use the property on which the subject facility is or will be located for the purposes specified in this application.
(2)	I hereby affirm that I shall grant access to the property for closure and post-closure monitoring of the subject facility and site as required by RSA 149-M and the New Hampshire Solid Waste Rules (Env-Sw 100 - 300 and Env-Sw 400 - 2000), as amended.

Property Owner Name **(Print Clearly or Type)** _____

Property Owner Signature _____

Date _____

Section VI. Impact Evaluation

Per the Type I Permit Modification form, the following responses are given to the (5) enumerated questions. As an overview, this Type I-B permit modification will utilize most of the remaining capacity permitted for Stage IV, in the standard permit issued by the Department in 2003. The capacity will be within the 51 acres of land for which the courts have held that NCES has all local approvals for landfilling and the Town has designated landfilling as a permitted use. The capacity is also within portions of the original Stage IV permitted footprint.

(1) The effect the modification will have on facility function, capacity, life expectancy, service type, and service area.

The proposed modification request proposes no change to the facility function, capacity, service type, and service area. The modification will result in a modest increase in the life expectancy of the facility beyond the 10.5 years originally contemplated for Stage IV.

(2) The effect the modification will have on the environment, public health, and public safety.

The proposed modification would have no change in effect on the environment, public health, and public safety. The same siting, design, operating, and closure criteria are met with the proposed modifications, as were permitted for Stage IV. The same types of environmental controls (including groundwater protection and landfill gas management, for example) to protect public health and safety as in the existing permitted Stage IV are proposed.

(3) The effect the modification will have on the state's ability to achieve the goals and objectives specified in RSA 149-M:2, namely achieving a 40% minimum weight reduction in the solid waste stream on a per capita basis by the year 2000 and avoiding the disposal of recyclable materials in a lined landfill with a leachate collection system.

The proposed modification would have no change in effect on the state's ability to achieve the goals and objectives specified in RSA 149-M:2.

(4) The effect the modification will have on establishing and maintaining integrated waste management systems consistent with the hierarchy of waste management methods in RSA 149:M (the methods, in descending order of preference as specified in RSA 149-M:3, are: source reduction; recycling and reusing; composting; waste-to-energy (including incineration), incineration without energy recovery; and landfilling.

The proposed modification would have no change in effect on establishing and maintaining integrated waste management systems consistent with the hierarchy of waste management methods in RSA 149: M.

(5) Consistency with the state solid waste management plan and the applicable district plan, pursuant to RSA 149-M12 I(b).

The proposed modification is consistent with the state solid waste management plan pursuant to RSA 149-M12 I(b). NCES understands that there is no applicable district plan in effect.

Section X. CERTIFICATION OF COMPLIANCE/COMPLIANCE REPORT

ATTACHMENT X(2)

APPLICATIONS OF NORTH COUNTRY ENVIRONMENTAL SERVICES, INC.
FOR TYPE I-B AND TYPE II MODIFICATIONS TO
STANDARD PERMIT NO. DES-SW-SP-03-002 (STAGE IV)

COMPLIANCE REPORT

North Country Environmental Services, Inc. ("NCES") submits the following compliance report in accordance with Env-Sw 303.15(a).

Env-Sw 303.15(b) requires that a compliance report address the following subjects:

(1) **A complete explanation of the circumstances which cause any statement in Env-Sw 303.14(b)(1) through (b)(8) to be untrue;**

On or about November 20, 2007, NCES entered into a consent decree with the State of New Hampshire settling a judicial enforcement action the State proposed to bring against NCES. The consent decree settles allegations by the State that NCES's waste inspection procedures were insufficient with respect to the detection and exclusion of prohibited wastes.

(2) **For each circumstance which causes a statement in Env-Sw 303.14(b)(1) through (b)(8) to be untrue, an explanation as to why the department should not find it to be grounds for denying the requested approval pursuant to the provisions of RSA 149-M:9, IX or X; and**

The consent decree contains the terms that DES has prescribed for the remediation of the alleged insufficiencies in NCES's inspection procedures. DES did not conclude that the alleged violations warranted revocation of NCES's permit, and NCES expects to comply fully with the terms of the consent decree.

None of the grounds for denial of an application under RSA 149-M:9, IX and X is implicated here.

(3) **For each circumstance which causes a statement in Env-Sw 303.14(b)(5) through (b)(8) to be untrue, a plan and schedule by which the applicant proposes to achieve full compliance.**

The consent decree sets out the means and schedule by which NCES must comply with its terms.

Attachment A - Brief Description of Proposed Modification

On March 13, 2003, North County Environmental Services, Inc. (NCES) received Solid Waste Permit No. DES-SW-SP-03-002 from the New Hampshire Department of Environmental Services (NHDES) for Stage IV, an expansion of the NCES landfill in Bethlehem, New Hampshire with a permitted capacity of 2,050,000 cubic yards. On April 24, 2003 the Grafton County Superior Court issued an order in litigation between NCES and the Town over several aspects of the NCES development. In that order, the Superior Court upheld a Town ordinance banning the expansion of privately operated landfills. The Town had sought to impose this ordinance to prohibit the development of Stage IV of the landfill.

NCES appealed the Superior Court's order to the New Hampshire Supreme Court and on March 1, 2004, the Supreme Court issued an opinion on the appeal. With regard to development of landfill capacity on that portion of NCES' land outside of the 51 acres -- where the courts in prior decisions had ruled that landfill development could take place -- the Supreme Court found that the issue of whether the ordinance is lawful had not been fully addressed in the trial court. The matter was remanded back to the trial court for resolution. Meanwhile, the Town passed another ordinance making landfilling a permitted use within the 51 acres but prohibiting it elsewhere. Because NCES's right to expand the landfill outside the 51 acres remains unsettled, NCES has decided to seek approval to continue development of Stage IV capacity within the 51 acres.

In 2004, NCES obtained a Type II Permit Modification to the Stage IV permit for grading modifications allowing the development of 153,000 cubic yards of Stage IV capacity above the side slopes of Stages II and III through the use of berms.

In 2005, NCES obtained a Type II Permit Modification to the Stage IV permit to construct Phase I of Stage IV, providing 470,000 cubic yards of the Stage IV capacity within the 51 acres.

NCES is now seeking construction approval for Phase II of Stage IV, which involves developing capacity within the 51 acres.

Description of Modification

This modification, called Stage IV Phase II, involves development of 1,280,000 cubic yards of Stage IV capacity within the permitted 51 acre footprint. Construction plans and technical specifications are enclosed. Supporting design calculations are also provided as well as a revised Facility Operating Plan, Revised Closure Plan, Stage IV Phase II Final Grading Plan and associated details, Gas Extraction System Plan and related details, and Closure Cost Estimate.

Capacity

A volume calculation comparing proposed final grades blended to previously approved grades demonstrates that the proposed modification provides 1,280,000 cubic yards of capacity. The total capacity of the requested modification, together with the capacity previously approved in the 2004 and 2005 modifications to the Stage IV permit is within the 2,050,000 cubic yards approved for all of Stage IV. All capacity is proposed within the maximum elevation originally permitted for Stage IV. All of the capacity of Phase II is gained through vertical development within the existing landfill's footprint and a small horizontal development of the Stage I footprint within the 51 acres.

Construction

Phase II construction involves narrow expansion of the liner system to the north, west and southern limits of Stage I. The modifications consist of extending the interior side slopes of the existing perimeter berm to raise the berm height. These berm modifications expand the Stage I lining system by 63 feet to the south, 78 feet to the west and 48 feet to the north. The modified limits of waste establish a 100-foot setback to property western and southern site property lines in accordance with Env-Sw 804.04(a). The northern modified berm and the entire Phase II development are located entirely within the 51-acre parcel.

Details of the liner connections are generally consistent with those provided in the Stage IV permit plans. It is proposed to modify and completely reconstruct the Stage I, Phase I, II, and III sumps such that they drain to a new sump and Pump Station I, simplifying leachate management in this area. Temporary leachate controls will be employed as necessary to contain and collect leachate at all times during construction.

NCES will excavate waste to expose the liner connections in Stage I, in a manner similar to that employed in the construction of Stage IV, Phase I, with temporary landfill gas (LFG) and odor controls including a temporary geomembrane cover in the excavations, and perimeter gas collection.

Leachate Management

The project will involve construction to simplify and improve the leachate management system, including pump stations and piping. From new Pump Station I in the Stage I area, a new force main will be constructed along the northern perimeter berm. The force main will extend from the Stage I area along an alignment located inside of the Stage IV Phase I anchor trench to the leachate handling and storage area located northeast of Stage IV Phase I and Stage II. The force mains will be constructed using dual-walled HDPE pipe, which includes a carrier pipe within a larger diameter containment pipe. The modified Stage I leachate system will allow for the decommissioning of the current Stage I pump stations and piping system, leachate flow metering building and wet well pump station.

Excavation of the Stage I sumps will require interim leachate management during construction. The design depicts details of the proposed leachate management system, which are consistent with the details presented in the March 2002 (Revised February 2003) permitted Stage IV Design drawings, and Phase I Type II modification. The leachate from Stage I and the new Stage IV Phase II areas will be directed to a reconstructed Stage I, Phase IV sump and Pump Station I.

Contingency Leachate Storage

Based on the calculations presented, the contingency leachate storage provided exceeds the NH Solid Waste Rules (Rules) Env-Sw 805.06(g). Leachate production from Stages I, II, III, and Stage IV Phase I and II were combined in performing the calculations.

The volume of leachate generated from the 25 year 24 hour storm can be stored in the Stage IV Phase II sump without developing more that 12 inches of head on the liner system. A 85 gpm pumping rate would remove the leachate generated from the contingency event from Stage IV Phase II during initial filling within approximately 1-5 days. Therefore, leachate pumps were selected to provide a pumping rate at 85 gpm for Pump Station I.

Leak Detection System Travel Time

Based on Env-Sw 805.07(b)(1), the leak detection system is to convey liquids to an observation point for detection (sump) based on a maximum time of concentration of 24 hours under saturated hydraulic conditions. All new liners are being constructed consistent with the permitted Stage IV design, and include highly transmissive geonet (geocomposite) above the secondary liner. New liners extend up the expanded perimeter berms and beyond those currently constructed to the limits of waste. Calculations included in Section VII, Appendix A indicate the leak detection system of the applicable new liners in these areas meets the travel time requirement.

The sumps are being reconstructed within Stage I, with the installation of new lining systems and collection piping. Again, because of the geocomposite included with all new liners, and the proximity to the collection piping, the calculations indicate the leak detection requirement is met.

In Phases I, II, and III of Stage I, the flatter portions of the secondary collection system did not include geonet, as it was not required by NHDES rules at the time, and was not widely applied on landfill projects. Stage I, Phase IV was constructed with geonet in the secondary collection system and meets the current standards. Critical areas including side slopes, berms, sumps, and pipe trenches do have geonet. Under the proposed construction, waste will be excavated to expose the liner system upslope of the sumps, so that the sumps and associated piping can be re-built. The reconstructed liner systems will be constructed to current standards as permitted for Stage IV. Accordingly, a significant improvement to the liner systems will be effected, including at the most sensitive locations: the low points associated with the sumps.

In order to comply with Env-Sw 805.07, an overlay liner will be constructed over the existing waste materials in Stage I, Phases I, II and III. The overlay liner will be constructed from bottom to top with: woven geotextile fabric; 12 inches of drainage sand; 60 mil secondary geomembrane; drainage geocomposite; 60 mil primary geomembrane; drainage geocomposite, and 12 inches of drainage sand. The liner section is consistent with the section approved for Stage IV, Phase I except the woven geotextile is added to enhance liner integrity. The overlay liner will direct primary and secondary leachate to proposed collection systems at the new sump of Stage IV, Phase II and to a proposed leachate conveyance pipe at the southern limit of Stage I that will be connected to the existing leachate collection system of Stage I, Phase IV.

Landfill Gas Management

During the excavation of the sumps in Stage I, temporary measures are proposed to reduce the potential release of landfill gas and possible odors. The side slopes of the excavations will be lined with 12-mil scrim reinforced high-density polyethylene (HDPE) geomembrane. Below the geomembrane, perforated gas collection pipes beneath panels of geocomposite will be extended down the slopes and connect to the gas extraction system. Each of the perforated collection pipes will be regulated with a wellhead to measure and control the gas flow. The temporary geomembrane will be removed as fill placement in the excavations proceeds. However, the drainage geocomposite and perforated landfill gas collection pipes will be left in place. This is the same system as was successfully applied during the construction of Phase I. Other odor control measures will include use of deodorizing mister, application of granular reactive media, and other measures as needed.

The construction of the overlay liner will require modification of several of the existing vertical and horizontal landfill gas collection wells. Prior to installation of the overlay liner materials, the existing vertical wells will be lowered 15 feet and connected to a new lateral pipe via flexible piping. The laterals will extend outside the limit of the over lay liner and connect to existing or proposed header pipes with a wellhead for control of gas extraction rates. Horizontal gas collectors will also be constructed beneath the overlay liner to remove accumulated landfill gas beneath the overlay liner.

The landfill will be filled to the grades indicated on the Final Grading Plan. Several wells, and associated wellheads and laterals outside the overliner will be affected by fill placement. These locations will be maintained as part of the active system for as long as practical during operations. At the completion of filling, gas extraction wells, and header and lateral piping will be installed in the general locations indicated on the Gas Extraction System Plan.

Storm Water Management

NCES received Site-Specific Permits #WPS-5513 and #WPS-6228 for the proposed development of Stages III and IV respectively. The stormwater management plan is being slightly modified with the requested modification. NCES is applying concurrently for a modification to the applicable Site Specific permits for the site. The modified conditions are consistent with the requirements of the existing permits.

Construction will eliminate Detention Pond No. 2. The calculations, based on the 25-year 24-hour storm event, are provided in attachments, and the associated Site Specific Permit modification. The calculations indicate that the peak storm water discharge from the site will be less than the predevelopment condition.

In addition, the facility has a USEPA, NPDES multi-sector General Permit for Stormwater Management, and an associated Storm Water Pollution Prevention Plan (SWPPP) including application of Best Management Practices (BMP's) for stormwater management.

Groundwater Monitoring

While the installation of road boxes and extensions of some existing wells is proposed, no additions, deletions, or replacement wells are proposed. A plan showing specific actions to monitoring wells is provided on Sheet C-3 of the drawings.

Financial Assurance

Cost estimates for closure and post closure monitoring and maintenance for the proposed modification are included in the Revised Closure Plan. The most recent financial assurance mechanism was established in September 2006. NCES will update the policies providing financial assurance when the revised closure cost estimates have been approved by NHDES, and prior to construction, as part of a subsequent Notice of Intent to Construct after a Type II Permit Modification is issued.

Attachment B - Permit Conditions Requested to be Modified

The following conditions of the Stage IV Landfill Permit No. (DES-SW-SP-03-002) are requested to be modified with this Type I-B modification:

3. Basis of Approval/Supporting Documentation

(a) Standard Landfill Permit Application documents prepared by Sanborn Head & Associates, Inc. (SHA), WMD Log 200200068, received April 03, 2002, and follow-up materials.

➔ ***Revisions to these documents submitted herewith, including :***

Modified Design Drawings
Modified Technical Specifications
Modified Operating Plan
Modified Closure Plan

Attachment C - Schedule

With NHDES approval of this Type I-B Modification, in the Summer of 2009, NCES intends to submit a Type II Permit Application, to prepare for construction, submit the Intent to Construct, and commence with certain elements of construction in the Fall of 2009. Completion of construction of Stage IV Phase II would occur in 2010, with capacity being available by mid-2010. Certain construction elements may be accomplished after 2010, depending on the need for capacity.

In subsequent Notice of Intent to Construct filings with the Division, construction sequences may be determined to construct portions of Stage IV Phase II to meet the capacity requirements of NCES sequentially.

Attachment D - Statement of Need

The proposed change is both necessary and desirable. In the Stage IV permit issued in 2003 by NHDES, a Determination of Public Benefit was made in which the Department determined that the Stage IV facility can provide a substantial public benefit per RSA 149-M:11, X. This determination included the provision of 2.05 million cubic yards of capacity over at least 10.5 years of service to NH municipalities.

Because of the status of local land use litigation in the courts, it is not yet resolved whether all of the originally permitted Stage IV footprint can be utilized. The proposed modification will enable NCES not only to provide capacity approved by the NHDES permit but to do so within the 51 acres in which landfilling is now a permitted use under the Town's zoning ordinance.

The modification is necessary and desirable so that NCES can continue to provide uninterrupted disposal capacity to the more than 10,000 households and businesses throughout the 28 New Hampshire communities that rely upon NCES for disposal of some or all of their solid waste.

Section II

DESIGN DRAWINGS

(Bound Separately)

Section III

TECHNICAL SPECIFICATIONS

02220	Selective Demolition
02221	Clearing and Grubbing
02222	Excavation
02223	Filling
02232	Stone Fill
02234	Select Sand
02270	Erosion Control
02273	Drainage Composite
02274	Woven Geotextile Fabric
02275	Non-Woven Geotextile Filter Fabric
02276	High Density Polyethylene (HDPE) Liner
02279	Geosynthetic Clay Liner
02541	Gravel Roadway
02542	Bituminous Pavement
02555	Temporary HDPE Tarp
02614	Culverts and Stormdrains
02617	Polyvinyl Chloride (PVC) Pipe and Fittings
02619	High Density Polyethylene Pipe and Fittings
02751	Precast Valve Vaults and Chambers
02834	Reinforced Earth Berm
02850	Testing Concrete Vaults and Chambers
02930	Loaming and Seeding
02960	Decommissioning / Extension of Monitoring Wells
03300	Cast-in-Place Concrete
09800	Underground Storage Tank
09900	Coatings
11310	Leachate Pump Station Pipe & Accessories
11312	Leachate Pump and Controls
13001	Site Safety and Contingency Work Plan Outline
15083	Piping Insulation
16402	Electrical Work
16610	Lightening Protection System

Appendix A – Boring Logs

SECTION 02220
SELECTIVE DEMOLITION

PART 1- GENERAL

1.10 SCOPE OF WORK

A. CONTRACTOR shall provide all labor, materials, equipment and incidentals necessary to perform the selective demolition required to complete the Work shown on the Plans and specified herein. Work may include, but not be limited to, excavation, backfill, landfill cap and liner removal, removal of portions of the active landfill gas extraction system, building demolition, salvage of valves, instrumentation, flow meters, and electrical and control equipment.

1.20 SUBMITTALS

A. CONTRACTOR shall submit to ENGINEER a Work Plan for performing the Work described in this Section and indicated on the Plans.

PART 2- PRODUCTS

(Reserved)

PART 3- EXECUTION

3.01 STAGE I – FLOW METERING BUILDING

A. CONTRACTOR shall demolish the existing Stage I Flow Metering Building including the concrete foundations, slab, wooden structure and roof. Waste materials shall be disposed on-site in the area(s) designated by OWNER.

B. CONTRACTOR shall remove and salvage the following items where practical:
   1. Force Mains
      a. Air release valve;
      b. Pressure gauges;
      c. 2-inch PVC Ball Valves;
      d. ½ inch PVC Ball Valves; and
      d. Paddle wheel flow meters;
   2. Building Systems
      a. Electric Unit Heaters;

b. Incandescent ceiling lamp assemblies;
c. Ventilation fan and exhaust shutter assembly;
d. Air inlet louver/shutter assembly;
e. Electric distribution panels and disconnects;
f. Communication Control panel;
g. Explosion-proof thermostat;
h. Floor flood float switch;
i. Exterior lighting fixtures.
j. Personnel Door

C. Salvaged items shall be cleaned and stored on-site in the location designated by OWNER. All salvaged items shall remain the property of OWNER.

D. Salvaged unit heaters, light fixtures, paddle wheels, exhaust fan and louvers, shall be reused in the proposed Pump Station I. Usable items not listed, and items not able to be reused shall be delivered to OWNER.

3.02 STAGE I – PUMP STATIONS AND WETWELL

A. CONTRACTOR shall remove and salvage the following items where practical:
1. Pumping Systems from the HDPE Phase I Primary and Secondary Pump Stations and Wetwell
   a. Leachate pumps, discharge piping, pump disconnects; and
   b. Submersible pressure transducers
   c. Floats and brackets
   d. Leak detection sensor

B. Existing HDPE Manhole Phase I Pump Stations and Wet Well are installed with concrete ballasts at the base. Each structure shall be removed and provided to the OWNER for their use or disposal on the site.

C. Existing Phase II, III and IV Primary Pump Stations and Secondary Side Slope Riser Pipes and Access manholes will require removal during excavation of waste materials and construction of new Phase I Sump and Pump Station II. Existing Pumps and pressure transducers shall be salvaged and provided to OWNER. Structures shall be demolished and relocated to area on-site for dispoosal designated by OWNER.

D. Existing force main piping between the existing Stage I pump station and the Flow

Metering Building and the force main and gravity lines connection the Pump Stations, Wet Well and Flow Metering Building shall be demolished to the limits shown on the Drawings.

3.03 STAGE I GEOSYNTHETIC LANDFILL CAP

A. CONTRACTOR shall expose and remove existing geosynthetics from the landfill cap section in the area indicated on the Plans. The remaining edge of the geosynthetics shall be anchored and terminated in accordance with the details provided on the Plans.

B. CONTRACTOR shall dispose the geosynthetics where directed by the OWNER.

3.04 STAGE I GEOSYNTHETIC LANDFILL LINER

A. CONTRACTOR shall expose and remove existing geosynthetics from the landfill liner section in the area indicated on the Plans. The remaining edge of the geosynthetics shall be anchored and terminated in accordance with the details provided on the Plans.

B. CONTRACTOR shall dispose the geosynthetics where directed by the OWNER.

3.05 ACTIVE LANDFILL GAS EXTRACTION SYSTEM

A. CONTRACTOR shall expose and remove portions of the active landfill gas (LFG) extraction system where shown on the plans. This may include removal of LFG header and lateral pipes, LFG condensate traps, and LFG condensate drain pipes.

B. CONTRACTOR shall coordinate all work on the LFG extraction system with the OWNER. CONTRACTOR shall provide OWNER with notice of disturbance or interruption of service of the system at least 24 hours prior to the work. The LFG extraction system shall be shut down for no more than 8 hours, and shall operate for no less than 24 hours between service interruptions.

C. CONTRACTOR shall dispose of LFG system materials on-site where directed by the OWNER.

END OF SECTION

SECTION 02221
CLEARING AND GRUBBING

PART 1 GENERAL

1.01 REQUIREMENTS INCLUDED

A. Clearing and grubbing, including the disposal of cleared and grubbed materials, within the limits shown on the Plans or as ordered by the Engineer.

1.02 RELATED REQUIREMENTS

A. Section 02222 - Excavation.

PART 2 PRODUCTS

A. Materials - Existing trees, stumps, and brush.

PART 3 EXECUTION

3.01 CLEARING

A. Clearing shall consist of the satisfactory felling and removal of all trees and vegetation (except grass), together with the down timber, snags, brush, and rubbish occurring within the area to be cleared. Trees, other vegetation, stumps, roots, and brush in areas to be cleared shall be cut off flush with or below the original ground surfaces. Contractor shall remove all cleared material from site including all brush, stumps, and lumber.

B. Individual trees and groups of trees designated to be left standing by the Engineer within the cleared areas, shall be trimmed of dead branches 1½ inches or more in diameter, and shall be trimmed of live branches to such heights and in such manner as are indicated on the Plans or directed by the Engineer.

C. Limbs and branches required to be trimmed shall be neatly cut close to the bole of the tree or to main branches, and all cuts more than 1½ inches in diameter thus made shall be painted with an approved tree-wound paint.

D. Individual trees, groups of trees, and other vegetation to be left standing shall be thoroughly protected from damage incident to construction operations, by the erection of fencing or by such other means as the circumstances require, as approved by the Engineer.

E. Clearing operations shall be conducted so as to prevent damage by falling trees to trees left standing, to existing structures and installations, and to work under construction, so as to provide for the safety of employees and others.

3.02 GRUBBING

A. Grubbing shall consist of the removal and disposal of stumps, roots larger than 1½ inches in diameter, matted roots, and other organic or metallic debris from the designated grubbing areas to a depth required to remove all such material.

3.03 DISPOSAL OF MATERIAL

A. The Contractor's attention is particularly directed to the fact that no burning of cleared and grubbed material will be allowed under this Contract. All cleared and grubbed materials shall be removed from the site including all stumps, brush, and trees. If the Contractor chooses to chip materials on-site, the Contractor shall submit a plan for the proposed staging area for approval by the Owner. All chipped materials shall be removed from the site.

END OF SECTION

SECTION 02222
EXCAVATION

PART 1 GENERAL

1.01 REQUIREMENTS INCLUDED

A. Excavation and processing of excavated materials.

B. Stockpiling of fill materials.

C. Excavation for liner subgrade, utilities and roadways.

D. Excavation and disposal of unsuitable and excess materials.

E. Excavation of MSW and transport of excavated materials to the active landfill on site.

1.02 RELATED REQUIREMENTS

A. Section 01400 - Quality Assurance/Quality Control

B. Section 01500 - Construction Facilities and Temporary Controls

C. Section 02223 - Filling

D. Section 02270 - Erosion Control

E. Section 13001 – Site Safety and Contingency Work Plan

1.03 PROTECTION

A. Protect the bench-marks established for project construction.

B. Protect excavations by shoring, bracing, sheet piling, underpinning or other methods required to prevent cave-in or loose soil from falling into the excavation.

C. Notify the Engineer of unexpected subsurface conditions and discontinue affected work in area until notified to resume work.

D. Grade the perimeter to prevent surface water run-off into the excavation.

E. Barricade or otherwise protect, consistent with the project safety program, open excavations occurring as part of this work and post with warning lights.

F. Protect adjacent structures and facilities from damage caused by settlement, movement, undermining and other hazards created by earthwork operations.

G. Dust Control: Use all necessary means to control dust caused by the Contractor's operation. Prevent dust from being a nuisance to the public. The use of calcium chloride is not acceptable. Moisture addition must be limited so as not to adversely affect soil handling. The use of other agents for dust control is subject to the approval of the Engineer.

H. Dewatering: Remove water from excavations to a point lower than the proposed subgrade of the work.

I. Odor Control: The Contractor shall install the temporary geomembrane cover and extend the existing landfill gas collection system to assist with the control of odors when final waste excavation grades are completed. At the end of each day of waste excavation, Contractor shall install a minimum of 4-inches of common borrow cover over exposed waste materials.

1.04 JOB CONDITIONS

A. SITE CONDITIONS: Data referring to subsurface conditions in Appendix A are not intended as representations or warrants of continuity of such conditions between soil borings. The information is made available for the convenience of the Contractor and the Owner will not be responsible for interpretations or conclusions drawn by the Contractor.

1.05 DISTURBANCE OF EXCAVATED AND FILLED AREAS DURING CONSTRUCTION

A. The Contractor shall take the necessary steps to avoid subgrade disturbance during excavations, including dewatering and restricting the use of equipment in areas above optimum moisture level.

B. All areas disturbed during excavation that will not meet compaction requirements shall be removed and replaced with fill meeting structural requirements at no extra cost to Owner.

PART 2 PRODUCTS

2.01 MATERIALS

1. Loam/Topsoil - Topsoil materials shall be excavated and may be processed, as necessary, to meet the requirements of loam in Section 02930 for re-use.

2. Common Borrow - Soil to be excavated and utilized as common borrow fill shall have all rocks and material greater than eight (8) inches in diameter removed and no more than 30% fines passing the #200 sieve. Common Borrow in contact with geosynthetic materials shall have a maximum particle size of one (1) inch. Suitable fill shall be free from combustible, organic, and frozen materials, loam, roots, topsoil, wood, trash, snow, ice and other objectionable material, or as identified by the Engineer, or laboratory analysis. Granular materials excavated from the existing landfill cover system may be segregated from waste, till, and/or sludge and topsoil material and re-used if it meets the requirements above.

3. Unclassified Waste - Waste materials including soil cover and cover to be excavated from areas as indicated on the Drawings. May include refuse, wood chips, metal, masonry, concrete, boulders, or debris and other unclassified waste.

4. Till- Existing till materials to be excavated shall be processed as necessary to meet the requirements of Common Borrow or Screened Till in Section 02223, for use as fill beneath the liner system and other areas indicated on the Drawings.

5. Unsuitable Fill - Excavated material not meeting the requirements for reuse as topsoil, common borrow or screened till that which may not be used as fill due to excess moisture, trash, organics, or other unsatisfactory materials.

6. Boulders- Excavated rock boulders greater than 24 inches in diameter shall be relocated to an area of the site designated by the Owner. Contractor may crush and or process the boulders for use on-site as NHDOT Stone Fill or Rip Rap or as 1 ½" crushed stone fill per Section 02232 or crushed stone per Section 02541.

PART 3 EXECUTION

3.01 PREPARATION

A. Set and verify required lines and grades prior to starting the excavation. This work should be performed and verified by a registered land surveyor or professional engineer licensed to practice in the State of New Hampshire.

B. It will be the responsibility of the Contractor to establish a construction baseline on-site. The Contractor shall perform all necessary construction layout from this baseline, maintain the baseline as necessary, and perform whatever survey is required to control his work.

3.02 EXCAVATION

A. Excavation consists of the removal and stockpiling or disposal of materials encountered when establishing required grade elevations as shown on the Plans and in accordance with these Specifications. If rock boulders greater than twelve

(12) inches diameter are encountered within six (6) inches of the depth of excavation, they shall be removed and the resulting hole shall be backfilled with Common Borrow, or Screened Till.

B. Excavation for utilities: The trench for the pipes shall be excavated to the required line and grade and of sufficient width to permit thorough compacting and tamping of the fill material under the haunches and around the pipe. In general, utility trenches shall be excavated to 6 inches below the bottom of the utility line to accommodate bedding material as specified hereinafter. Soft or unsuitable material encountered below the normal bedding line of the pipe shall be removed as directed, replaced with regular fill, and thoroughly compacted.

C. Excavation for structures: Conform to elevations and dimensions shown within a tolerance of plus or minus 0.10 feet, and extending a sufficient distance from structures to permit installation of service, other construction required, and for inspection.

D. Excavation of Unclassified Waste Material: Excavation of existing cover material and waste material shall be completed to the limits indicated on the Drawings. All work will be completed in accordance with the Site Safety and Contingency Work Plan developed by the Contractor, in accordance with Section 13001. Excavated capping system materials may be utilized for fill in areas as required to achieve proposed subgrade. Excavated waste materials and shall be placed in the active landfill at a location designated by the Owner.

Excavation of waste materials shall be performed in a manner which controls odors, dust, vectors, and migration of waste. At a minimum, the "active area" of the excavation shall be covered with a minimum four (4) inches of suitable fill at the end of each day.

3.03 COMPACTION OF EXCAVATED SUBGRADE

A. Upon completion of the excavation to proposed subgrade, the conditions shall be inspected by the Engineer for acceptance. The entire area shall be fine graded to remove undulations or isolated high or low spots. The subgrade shall be proof rolled, and any soft yielding areas shall be excavated and backfilled with common borrow, or screened till.

B. Upon completion of excavation in areas beneath the proposed liner system, the natural subgrade shall be compacted to at least 95% of the maximum dry density as determined by ASTM D698, Method C.

C. Compaction equipment in open areas shall consist of vibratory rollers, or other equivalent compaction equipment reviewed by the Engineer.

D. Compaction equipment in confined areas (in trenches and adjacent to walls, piers, footings and standpipes) shall consist of hand-guided vibratory equipment or mechanical tampers reviewed by the Engineer.

E. Upon completion of the excavation in areas outside the landfill where fill will be placed, the subgrade shall be proof-rolled by two coverages of the rear wheels of a fully loaded ten-wheel dump truck, or by other suitable equipment as reviewed by the Engineer.

3.04 STOCKPILING

1. Suitable fill excavated including borrow, till materials, and topsoil shall be stockpiled until required for filling. Place, grade and shape stockpiles for proper drainage. Erosion control devices shall be used as necessary to minimize sediment transport away from the area.

2. Fill unsuitable for use as regular fill and excess materials shall be handled in accordance with Part 3.05.

3.05 DISPOSAL OF UNSUITABLE and EXCESS MATERIALS

The Contractor shall dispose of all unsuitable and excess materials on-site in a location or locations designated by the Owner or as shown on the Plans. Contractor shall take no material from the site.

Unsuitable and excess materials are defined as follows:

A. Unsuitable Material - Material containing significant clay, silt, or organic material, or material greater than eight inches (8") in diameter, or other materials identified on the contract drawings.

B. Excess Materials - Materials not meeting the definition in "A" above but which do not meet any of the specifications for materials required for this project, and/or materials in excess of the total quantity of materials required for this construction project.

C. No material shall be removed from the site. Unsuitable and excess materials shall be stored at separate locations on site as directed by the Owner.

3.06 STABILITY OF EXCAVATIONS

A. Slope sides of excavations to comply with OSHA regulations and local codes and ordinances having jurisdiction. Shore and brace where sloping is not possible due to space restrictions or instability of material excavated. Maintain the sides and the slopes of excavations in a safe condition until completion of backfilling.

B. Shoring and bracing: Provide adequate shoring and bracing, such as sheet piling, uprights, stringers and cross-braces, in good serviceable condition. Trench shoring and bracing shall comply with local codes and authorities having jurisdiction. Maintain shoring and bracing in excavation regardless of time period excavations will be open. Carry down shoring and bracing as excavation progresses. All temporary shoring and bracing plans shall be designed and stamped by a New Hampshire licensed professional engineer.

3.07 DEWATERING

A. Control of surface water is a critical requirement of the work. All necessary actions shall be taken to minimize the effect of precipitation and runoff on the work. Upgradient runoff shall be diverted from active or completed work areas, and all work shall be graded and crowned to promote runoff.

B. The Contractor shall prevent surface water and subsurface or groundwater from flowing into excavations or onto any work and from flooding the project site and surrounding area.

C. Water shall not accumulate in excavations. Contractor shall remove water to prevent softening of subgrades and soil changes detrimental to stability of the subgrade. The Contractor shall dewater excavated areas as required to perform the work, and in such a manner as to preserve the undisturbed state of subgrade material.

D. The Contractor shall provide and maintain pumps, sumps, suction and discharge lines, and other dewatering system components necessary to convey water away from excavations.

E. The Contractor shall prevent migration of sediment in accordance with erosion control requirements of this Contract.

3.08 COLD WEATHER PROTECTION

A. Protect excavation bottoms against freezing when the atmospheric temperature is less than 35° F. The Contractor shall take whatever actions are necessary during the period of construction, to prevent freezing of any areas which are to receive fill as part of this work. No fill shall be placed on areas which are frozen. The Contractor shall also comply with the requirements of Section 203, Paragraph 3.7.8 of the NH DOT Standard Specifications.

3.09 REMOVAL OF UNSATISFACTORY SOIL MATERIALS

A. Unsatisfactory soil materials shall be as defined in Paragraph 3.05 (unsuitable materials).

B. Excavate unsatisfactory soil materials encountered that extend below required elevations, to the additional depth directed by the Engineer. Do not over-excavate without prior authorization of the Engineer.

C. Such additional excavation, provided it is not due to fault or neglect of Contractor, will be measured as directed by Engineer and paid for in accordance with the measurement and payment section.

D. Material that is above or below optimum moisture for compaction of the particular material in place as determined by the Engineer, and is disturbed by the Contractor during construction operations so that proper compaction cannot be reached shall be construed as unsuitable bearing material or unsatisfactory soil material. This material shall be removed and replaced with compacted gravel fill at no additional charge to the Owner.

END OF SECTION

SECTION 02223
FILLING

PART 1 GENERAL

1.01 REQUIREMENTS INCLUDED

A. Furnishing, placing, and compaction of suitable fill (borrow) and bedding sand.
B. Production, placing and compaction of screened till from on-site till materials.
C. Coordination with the Engineer for completion of all required tests.

1.02 RELATED REQUIREMENTS

A. Section 01300 - Submittals
B. Section 01400 - Quality Assurance/Quality Control
C. Section 02222 – Excavation
D. Section 02232 - Stone Fill
E. Section 02234 - Select Sand
F. Section 02270 - Erosion Control
G. Section 02541 - Gravel Roadway
H. Section 02930 - Loaming and Seeding

1.03 REFERENCES

A. ASTM C136/C117 - Standard Test Method for Sieve Analysis of Fine and Coarse Aggregate and Standard Test Method for Materials Finer than 75-μm (No. 200) Sieve in Mineral Aggregates by Washing

B. ASTM D1557 Method "C" - Moisture-Density Relations of Soils and Soil-Aggregate Mixture using 10 lb. (4.54 kg) Hammer and 18-inch (457 mm) Drop.

C. ASTM D1556 - Standard Test Method for Density of Soil in Place by the Sand-Cone Method.

D. ASTM D6938 - 08a Standard Test Method for In-Place Density and Water Content of Soil and Soil-Aggregate by Nuclear Methods (Shallow Depth)

E. ASTM D5084 - Standard Test Method for Measurement of Hydraulic Conductivity of Saturated Porous Materials Using a Flexible Wall Permeameter.

F. ASTMD5321 – Standard Test Method for Direct Shear Testing of Geosynthetic Material and Soil Interfaces.

1.04 TESTS

A. Soil testing and compaction tests shall be performed by the Engineer in coordination with the Contractor.

B. Test and analysis of fill materials shall be performed by the Engineer in coordination with the Contractor.

C. Tests and analyses of fill materials will be performed in accordance with ASTM C136/C117, ASTM D1557, ASTM D6938-08a, ASTM D5084 and ASTM D5321 and conditions set forth in Section 02223, 2.02 "Quality Control and Quality Assurance."

PART 2 PRODUCTS

2.01 FILL

A. General

For all fill materials to be used, samples, sieve analysis, and laboratory data indicating maximum dry densities and optimum moisture for field control tests shall be reviewed by the Engineer prior to use as fill on site. Where materials for fill may be available on-site for common borrow, screened till and loam, the Contractor shall be required to excavate test pits as required from processed or existing stockpiles to allow sampling and evaluation of the materials by the Engineer. The Contractor shall excavate, screen, and stockpile materials for sampling purposes prior to placement within proposed fills.

B. Common Borrow Fill

Suitable borrow, either from on-site or off-site sources, to be utilized as regular fill shall consist of sands with all rocks or material greater than 8" removed and no more than 30% passing the No. 200 sieve. Suitable fill shall be free from combustible, organic and frozen materials, loam, roots, topsoil, wood, trash, snow, ice, and other objectionable materials, or as identified by the Engineer. The on-site till materials (some of which are anticipated >30% passing No 200 sieve and stones larger than 8" removed) may be used for common borrow fill, provided the Contractor properly manages soil water content and the materials can be properly compacted and maintained.

C. Screened Till

Screened Till for use as the 12 inches of secondary liner subgrade fill and pipe bedding shall consist of inorganic mineral soil free of organic material, loam, trash, snow, ice, frozen soil, or other unsuitable materials and shall conform to the following gradation:

U. S. Standard Sieve Size	% Finer By Weight
1 inch	100
No. 4	80-100

No. 40	60-100
#200	20 – 70

Screened till shall have a hydraulic conductivity of less than $1x10^{-4}$ cm/sec when as demonstrated by ASTM D5084, when placed and compacted as specified as a subgrade fill beneath the secondary liner.

The on-site 'till' soils to be excavated as part of the earthwork operation may be considered for use as Screened Till provided that the Contractor screen the materials to remove all stones 1" or larger (anticipated to be significant effort) and the material meets all other requirements of this section. Otherwise, Screened Till for the select secondary subgrade fill and pipe bedding shall be provided from off-site sources at no additional cost to the Owner.

1. Interface Shear Strength: Testing completed by the Engineer shall demonstrate that the interface shear strength is equal to or greater than a strength envelope of 26^0 between the 60-mil textured HDPE liner and the proposed screened till.

2. The interface shear strength shall be determined by an interface shear test performed in accordance with ASTM D5321. The normal stresses applied shall be 1, 3, 10, 25, and 50 psi. The strain rate shall not exceed 0.04 inches per minute. The 60-mil textured HDPE geomembrane shall be tested in the machine direction. The tests shall be continued until residual shear strengths are achieved, or to a maximum 2-inch displacement. The Screened Till shall be compacted to 95% of maximum dry density per ASTM D1557, and a moisture content of 2% wet of optimum.

   The laboratory test reports shall include plots of shear strength versus normal stress for peak and large displacement values, and stress versus strain plots for tests run at each normal load application. A minimum of two (2) tests shall be completed.

3. Test results not meeting the minimum requirements shall be reviewed by the Engineer for possible conformance with the overall design objectives.

D. For other fill materials see Section 02234 Select Sand, Section 02541 - Gravel Roadway, and Section 02930 - Loaming and Seeding.

2.02 QUALITY CONTROL AND QUALITY ASSURANCE

A. During earthwork operations, the Engineer will be present on the site to monitor and document the Contractor's activities relative to contract compliance.

B. The Engineer shall complete laboratory analyses of a minimum of two (2) representative samples of common borrow and screened till. The Engineer shall conduct laboratory grain size analysis, moisture density testing, and permeability in

accordance with ASTM C136/C117, ASTM D1557, and ASTM D5084, respectively, to demonstrate conformance with Parts 2.01 and 3.02 of this Section.

C. The Contractor shall provide a sample for Engineer's laboratory analysis of at least one (1) representative sample of common borrow fill and screened till for each 5,000 cubic yards of material to be placed. The Engineer shall conduct laboratory grain size analysis and moisture density testing in accordance with ASTM C136/C117 and D1557, respectively, to demonstrate conformance with Parts 2.01 and 3.02 of this Section.

D. The results of laboratory testing shall be reviewed by the Engineer prior to placement of fill materials. Costs for re-sampling and subsequent laboratory testing of all non-complying materials shall be borne by the Contractor.

E. Field tests will be performed by the Engineer on in-place fill and backfill materials to confirm that specified densities are being achieved with the minimum required coverages and compaction equipment utilized by the Contractor. The Engineer will select locations and frequency for in-place density testing. At a minimum, the frequency of field tests shall be as follows:

1. Common Borrow Fill: 1 test per lift per 10,000 ft^2
2. Screened Till: 1 test per lift per 10,000 ft^2

F. Acceptable materials placed and compacted to below the specified density shall alternatively be:

1. Recompacted as required to achieve the specified density.
2. Removed and replaced with properly placed and acceptably compacted material.

G. Materials placed and compacted which do not conform to project specifications for the area placed shall be removed and replaced with suitable material by the Contractor.

H. The Contractor will bear all costs incurred in the recompaction, removal, and replacement of fill not meeting density requirements.

PART 3 EXECUTION

3.01 PREPARATION

A. Fill to be used must be reviewed by the Engineer.

B. The subgrade which is to receive the fill shall be fine-graded and compacted in accordance with Section 02222 "Excavation" and reviewed by the Engineer.

C. All excavated surfaces shall be within 0.10'(+) and 0.20'(-) ft. of required line and grade.

D. Surfaces to be filled against which are steeper than 4:1 shall be scarified or stepped and compacted to provide a bond with the new material.

E. Fill materials will not be placed or compacted on frozen ground or during unfavorable weather conditions. Backfill operations will not be resumed until the moisture content and fill density is satisfactory to the Engineer.

F. All fill material shall be placed "in-the-dry" on a prepared ground surface acceptable to the Engineer. The Contractor shall drain away ponded areas as required to perform the placement of fill in-the-dry.

3.02 FILLING AND COMPACTION

A. Approved suitable material shall be installed in lifts no greater than as specified.

B. Lifts shall be compacted to at least the specified percentage of maximum dry density, within 3% of optimum moisture content. Field testing of these lifts will be performed in accordance with ASTM D6938-08a, and Paragraph 2.02 of this Section.

C. Do not proceed with the next layer of fill until the preceding layer has been tested and approved by the Engineer.

D. Areas at which tests indicate insufficient compaction shall be recompacted and retested until the areas conform to the requirements of this specification.

E. For the materials specified herein, the following placement and compaction requirements are included:

	Maximum Lift Before Compaction	Minimum % of Maximum Density per ASTM D1557
Common Borrow Fill	12"	95
Screened Till	12"	95

3.03 BACKFILLING OF UTILITES AND PIPING

A. After pipes and joints have been inspected and approved by the Engineer, screened till bedding or crushed stone (See Section 02232) shall be carefully placed and compacted and tamped in 6-inch layers under, around, and to the spring line of the pipe to firmly support the pipe, and prevent lateral movement.

B. Care shall be taken to provide recesses in the bedding or trench bottom, as required, to relieve each bell of any load.

C. Backfill from the top of the bedding to 12-inches above the pipe shall be completed in 12-inch layers with screened till sand, evenly on both sides of the pipe.

D. The remainder of the backfill may be material removed from the trench excavation and shall be placed in approximately 12-inch layers and compacted to 95% of the maximum dry density, as demonstrated by in-place density testing completed by the Engineer.

3.03 FINAL GRADING

A. Perform all finish grading required to attain the elevations shown on the Plans, to within 0.1 feet, to eliminate all ponded water, or as otherwise indicated.

B. Areas to be seeded shall be raked to remove all stones and other unsatisfactory material, and shall be suitably compacted.

3.04 TREATMENT AFTER COMPLETION OF GRADING

A. After grading is complete and the Engineer has finished his reviews, the Contractor shall permit no further excavating, filling, grading, or vehicular access except to maintain erosion or sediment control. Use all means necessary to prevent erosion of freshly graded areas during construction and until such time as permanent drainage and erosion control measures have been installed.

END OF SECTION

SECTION 02232
STONE FILL

PART 1 GENERAL

1.01 REQUIREMENTS INCLUDED

A. Production of Stone fill, rip-rap, and crushed stone from existing on site boulders/rock and rock materials encountered during completion of the work, or procured from off-site source.

B. Placement of stone and rip-rap stone fill for stabilization of drainage swales as shown on the Drawings or as ordered by Engineer.

1.02 RELATED REQUIREMENTS

A. Section 02275 - Non-Woven Geotextile Fabric
B. Section 02270 - Erosion Control
C. Section 02273- Drainage Geocomposite

PART 2 PRODUCTS

2.01 MATERIALS

A. Stone and Rip-rap Fill for Placement in Leachate Sumps, Stabilization of Drainage Swales, and Culvert Outlet Protection:

1. Stone and rip-rap shall conform to NHDOT Specifications for Stone Fill Class B, Class C and Class D Section 585 "Stone Fill" and Rip-rap Type A, Section 583 "Rip-rap", as indicated on the Drawings.

2. Stone and rip-rap fill shall be hard, durable, angular in shape; resistant to weathering and to water action; free from overburden, spoil, and organic material.

3. The acceptability of the processed stone will be determined by visual inspection or by suitable tests. If testing is required, suitable samples of stone shall be taken in the presence of the Engineer at least fourteen (14) days in advance of the time when the placing of stone fill is expected to begin.

4. Control of gradation will be by visual inspection. If necessary, the Contractor shall provide two (2) samples of rock, at least five tons (5T) each, meeting the gradation specified above. These samples shall be used as a reference for judging the gradation of the stone fill supplied.

5. Any difference of opinion between the Engineer and the Contractor shall be resolved by dumping and checking the gradation of two (2) random truckloads of stone. Mechanical equipment, a sorting site, and labor

needed to assist in checking gradation shall be provided by the Contractor at no additional cost of the Owner.

B. 1½" Crushed Stone

1. Crushed stone shall be hard, durable, angular in shape; resistant to weathering and to water action; free from overburden, spoil, and organic material.
2. Crushed stone shall be washed, uniformly blended and meet the following gradation:

Sieve Size	Percent Passing by Weight
1 ½ -inch	100
1 inch	75-100
¾ inch	45-75
No. 4	10-45
No. 200	0-5

3. The Engineer shall collect a sample of the processed crushed stone for laboratory testing. Materials not meeting the requirements of this section shall not be used in the Work.

PART 3 EXECUTION

3.01 PLACEMENT OF STONE FILL AND FOR RIP RAP STABILIZATION

A. Stone fill in the landfill shall be placed directly over the drainage geocomposite and pipes as shown on the Drawings. Stone fill in drainage swales shall be placed directly over a 10 oz. non-woven geotextile fabric within the prepared swales and on slopes, starting at the downstream end. Rip rap shall be placed over a 16 oz non-woven geotextile fabric within prepared swales, and slopes, starting at the downstream end.

B. Stone fill and rip rap for culvert outlet protection shall be placed directly over a 10 oz. and 16 oz. non-woven geotextile fabric, respectively, to the limits shown on the Plans.

C. All stone fill and rip rap shall be placed in a manner which will produce a reasonably well-graded mass of stone with the minimum practicable percentage of voids. The entire mass of stone shall be placed, so as to be in conformance with the lines, grades, and thicknesses shown on the plans.

D. Stone fill and rip rap shall be placed to its full course thickness at one operation and in such a manner as to avoid displacing the underlying material. Placing of stone fill in layers, or by dumping into chutes, or by similar methods likely to cause segregation, will not be permitted.

E. The larger stones shall be well distributed and the entire mass of stone shall conform to the gradation specified in paragraph 2.01. All material going into stone fill protection shall be so placed and distributed that there will be no large accumulations of either the larger or smaller sizes of stone.

F. It is the intent of these specifications to require compact stone fill protection in which all sizes of material are distributed within their proper proportions. Hand placing or rearranging of individual stones by mechanical equipment may be required to the extent necessary to secure the results specified.

END OF SECTION

SECTION 02234
SELECT SAND

PART 1 GENERAL

1.01 REQUIREMENTS INCLUDED

A. Procurement of select sand and placement of the twelve (12) and eighteen (18) inch layers of select sand as part of the landfill liner system, and at greater thicknesses as shown on the Drawings.

1.02 RELATED REQUIREMENTS

A. Section 01300 - Submittals
B. Section 01400 - Quality Assurance / Quality Control
C. Section 02223 - Filling
D. Section 02273 - Drainage Geocomposite
E. Section 02279 - Geosynthetic Clay Liner

1.03 REFERENCE STANDARDS

A. ASTM C136/C117 - Standard Test Method for Sieve Analysis of Fine and Coarse Aggregate and Standard Test Method for Materials Finer than 75-μm (No. 200) Sieve in Mineral Aggregates by Washing

B. ASTM D1557: Test Method for Laboratory Compaction Characteristics of Soil Using Modified Effort

C. ASTM D5084: Test Method for Measurement of Hydraulic Conductivity of Saturated Porous Materials Using a Flexible Wall Permeameter

D. ASTM D5321: Test Method for Direct Shear Testing of Geosynthetic Material and Soil Interfaces

E. ASTM D4373: Test Method for Determining Calcium Carbonate Content of Soils

1.04 SUBMITTALS

A. The Contractor shall provide a sample for laboratory testing by the Engineer to determine that the select sand meets the specified grain size distribution and hydraulic conductivity for at least every 3,000 cy delivered to the site.

B. The Contractor shall submit all proposed low ground pressure (LGP) equipment for Engineer's review.

C. The Engineer shall complete direct shear box tests of the select sand and the proposed drainage geocomposite to demonstrate compliance of interface friction, in accordance with Part 2.01 of this Section.

D. The Contractor shall provide one sample for laboratory testing by the Engineer for calcium carbonate content from each source of select sand.

PART 2 PRODUCTS

2.01 SELECT SAND

A. Select sand shall be well graded sand without excessive fines, free from loam clay, and organic matter and meeting the following grain size distribution:

U.S. Standard Sieve Size	% Finer By Weight
1 in.	100
#4	60-100
#10	40-95
#40	10-50
#100	0-20
#200	0-10

B. Select sand shall not contain more than 15 percent calcium carbonate as determined by ASTM D 4373. At least one test shall be performed on a representative sample from each source.

C. Select sand shall have a hydraulic conductivity greater than or equal to 1×10^{-3} cm/sec as determined by ASTM D 2434.

D. Interface Shear Strength

1. The Engineer shall complete interface shear strength testing to determine if the strength is equal to or greater than a strength envelope of 26° between the following surfaces as determined by ASTM D 5321:
    a. The proposed select sand and the proposed non-woven geotextile of the drainage geocomposite.
    b. The proposed select sand and the proposed Geosynthetic Clay Liner (GCL).
2. The interface shear strength shall be determined by an interface shear test performed in accordance with ASTM D5321. The normal stresses applied shall be 1, 3, 10, 25, and 50 psi. The strain rate shall not exceed 0.04 inches per minute. The 60-mil textured HDPE geomembrane shall be tested in the machine direction. The tests shall be continued until residual shear strengths are achieved, or to a maximum 2-inch displacement. The low

permeability soil shall be compacted to 93 percent of maximum dry density per ASTM D1557, at a moisture content of 2% wet of optimum.

The laboratory test reports shall include plots of shear strength versus normal stress for peak and large displacement values, and stress versus strain plots for tests run at each normal load application. A minimum of two (2) tests shall be completed for each interface.

3. Test results not meeting the minimum requirements shall be reviewed by the Engineer for possible conformance with the overall design objectives. Test requirements for the select sand and drainage geocomposite interface are defined in Section 02273, 2.04.D.

PART 3 EXECUTION

3.01 PREPARATION

A. Verify that the stockpiled select sand is reviewed by the Engineer.

B. Verify the lines and grades to which the select sand is to be placed and compacted.

C. Verify that the area on which select sand is to be placed is free from debris, snow, ice, or water and that the ground surface is not frozen.

3.02 PLACEMENT OF MATERIALS

A. Placement of the select sand shall be by "low ground pressure" (LGP) rated equipment having a bearing pressure of no greater than 4.7 pounds per square inch measured at 12 inches above the geomembrane. No equipment will be allowed at any time directly on the liner or geotextile fabric.

B. Select sand shall be placed by LGP equipment in lifts no less than the proposed minimum thickness for that area. In no case shall this be less than 12 inches.

C. Non LGP equipment which is necessary to operate over the landfill shall be operated on additional depths of sand or other materials to provide an equivalent bearing pressure of 4.7 pounds per square inch at 12 inches above the geomembrane.

D. Select sand shall be placed on side slopes steeper than 3.5:1 starting from the bottom of the slope and proceeding in an upward direction. The Contractor shall exercise caution when operating on side slopes and shall limit turning and braking.

E. Coordinate placement and compaction of the select sand with the installation of other components of work shown on the Plans, taking all measures to prevent damage to these materials while placing the select sand.

F. The select sand layer will be spread to a consistent depth and uniform surface, being compacted only by passage of the low ground pressure machinery. No vibratory equipment is to be used in compacting the select sand.

G. The select sand layers may not require testing for compaction densities if the Engineer believes that the sand is being placed in layers and compacted as required. If requested by Engineer, Contractor shall coordinate for testing by the Engineer to demonstrate a minimum 90% of maximum dry density is achieved.

END OF SECTION