

## **APPENDIX A**

### **Perimeter Berm Geotechnical Investigation Protocol**

## APPENDIX A

### PERIMETER BERM GEOTECHNICAL INVESTIGATION PROTOCOL

#### INTRODUCTION

This Perimeter Berm Geotechnical Investigation Protocol (“Geotechnical Investigation Protocol”) is attached as Appendix A to and incorporated by reference into the executed settlement (“Settlement Agreement”) between the Commonwealth of Massachusetts and New Ventures Associates LLC (“New Ventures”) executed on April 30, 2009 and filed in conjunction with the final judgment entered in *Commonwealth of Massachusetts v. New Ventures Associates, LLC*, Suffolk Superior Court, Civil Action No. 06-0790 C (“Final Judgment”). This Geotechnical Investigation Protocol specifies the procedures and protocols for the landfill perimeter berm geotechnical investigation required by paragraph 11(a) of the Settlement Agreement and paragraph 12(a) of the Final Judgment:

#### I. Field Work

New Ventures and its consultant, Geocomp Corporation of Boxborough Massachusetts (“Geocomp”) or other qualified consultant approved by MassDEP, shall complete the field work portion of the landfill perimeter berm geotechnical investigation in accordance with the field testing protocols and requirements in the “Sampling Protocol,” “Boring Completion,” “Test Pits” and “Additional Borings/Test Pits” sections of the “Crow Lane Landfill Perimeter Berm Boring Protocol,” attached as “Exhibit 1” to this Appendix A.

#### II. Laboratory Analysis

Following completion of the field work portion of the landfill perimeter berm geotechnical investigation, New Ventures shall have a Massachusetts certified laboratory perform any analysis of samples that may be required by the terms and criteria in Exhibit 1 in accordance with the “Testing Protocol” section of the attached Exhibit 1.

#### III. Design Verification and Geotechnical Report

Following completion of the geotechnical investigation field work and any laboratory analysis required by the terms and criteria in Exhibit 1, New Ventures shall submit for MassDEP approval a report prepared by Geocomp, or other qualified consultant approved by the MassDEP (the “Geotechnical Report”). The Geotechnical Report shall include an evaluation of the field work results and any required laboratory analysis, along with a determination of whether or not any modification to the MSE berm design plan in the Final CAD attached as Exhibit 2 to the Settlement Agreement is necessary based on the standards and criteria set forth in the “Design Verification” section of Exhibit 1.

#### **IV. MSE Berm Design Modification**

In the event that the Geotechnical Report, as approved by MassDEP, determines, in accordance with the Design Verification section of Exhibit 1, that a MSE berm design modification is necessary, New Ventures shall submit for MassDEP approval a MSE berm design modification plan, including a reasonable construction schedule, in accordance with the requirements of paragraph 11(a)(v) and (vi) of the Settlement Agreement.

**EXHIBIT 1**

**Crow Lane Landfill Perimeter Berm Boring Protocol**

# EXHIBIT 1



C O R P O R A T I O N

*Technologies to manage risk for infrastructure*

Boston  
Atlanta  
New York

[www.geocomp.com](http://www.geocomp.com)

## ***Crow Lane Landfill Perimeter Berm Boring Protocol***

### PURPOSE AND SCOPE

The purpose of the borings is to ascertain and verify the conditions and materials within and below the perimeter berm along the southwest and northwest portions of the berm. A boring location plan is attached.

### SAMPLING PROTOCOL

The soils will be sampled at 6 boring locations as shown on the attached plan prepared by Sitec. Samples will be collected from each boring at 5 foot intervals through the berm to at a depth of 2 feet above the expected base of the berm at. From this depth to refusal (defined in the following sections), the soils will be sampled continuously.

Sampling will be performed using the Split-barrel sampler used in conjunction with the Standard Penetration Test (SPT), as specified in ASTM D1586. The sampler will provide a disturbed sample representing the 2 foot length that the sampler is driven. The blows to insert the sample will be counted.

If no soil recovery is obtained the boring will be cleaned out and the sample will be retried immediately below the last attempt.

The boring will be started at the top of the berm by driving the sampler from 0 to 2 feet deep. The next sampling depths through the berm will typically be as follows

- Sample 1      0-2 feet
- Sample 2      3 -5 feet
- Sample 3      8 – 10 feet
- Sample...      starting 2 feet above base of berm continuous 2 foot samples

Soils will be classified in the field using the Unified Soil Classification System (USCS) in accordance with ASTM D 2487.

If fine grained (defined by ASTM as soils containing more than 50% of the particles finer than the No. 200 Sieve) or organic soils are encountered then continuous sampling will be started using a Thin-Walled Shelby Tube sampler. In the field the decision to Shelby tube sample will be made based on visual inspection of the sample. The Shelby tube sampler will be pushed mechanically (not driven) for 2 feet to obtain undisturbed samples for laboratory testing. Continuous Shelby Tube sampling will continue until refusal or until coarse grained soils are encountered.

## TESTING PROTOCOL

Laboratory Sieve Analysis (ASTM D422) will be run on samples from each distinctive layer. Each boring shall have a minimum of two sieve analyses, one from the berm materials and one from the foundation materials. Strength of coarse grained soils will be determined using standard methods using the SPT-N Values measured during the sampling. Strength of fine grained/organic soils (if encountered) will be determined from consolidated undrained laboratory triaxial compression tests (ASTM D4767) on Shelby tube samples.

## BORING COMPLETION

The boring is complete when refusal is encountered below the base of the berm. Refusal shall be defined as >100 blows/foot on the SPT sampler. If refusal is encountered above the base of the berm then the hole shall be relocated 5 feet and drilled to the refusal depth before sampling, or advanced through the obstruction using drill bits.

## TEST PITS

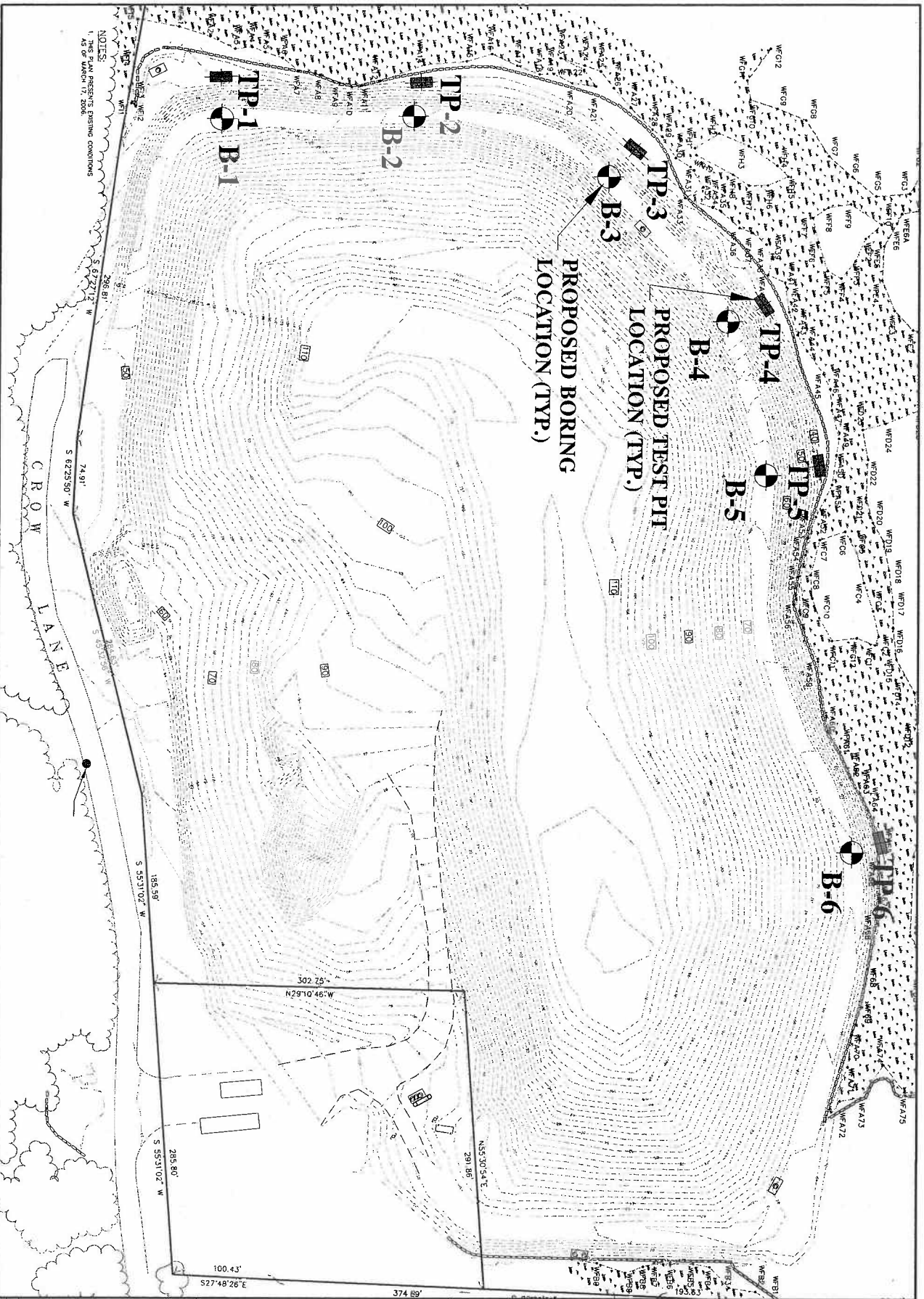
Test pits will be excavated opposite each boring at the base of the berm as shown in the attached location plan. Test pits will penetrate through the top soils and loamy soils through any underlying fine/organic soils. If fine/organic soils are encountered Shelby tube samples will be collected by pushing the tubes with the excavator bucket.

## ADDITIONAL BORINGS/TEST PITS

If fine grained/organic soils are encountered in a boring and/or test pit, an additional boring and test pit will be located 20 feet on either side. If the additional boring and/or test pit encounters fine grained soils, then the process is repeated 20 feet further away until the extent of the fine grained/organic strata is defined. Provided, should the fine grained/organic soil be found only in the test pits, and the test pits clearly demonstrate the fine grained/organic soil does not extend under the berm, additional borings may be omitted.

## DESIGN VERIFICATION

The design assumes dense coarse-grained soils within the berm. The conditions and SPT blows observed in the samples in the top portions of the berm should be representative of the design assumptions, and should be consistent throughout the depth of the berm. Below the berm the design assumption is a soil strength represented by a friction angle of 35 degrees. This corresponds to a coarse-grained soil with SPT blow counts greater than 12. Should fine grained soils/organic be encountered the strength will be measured by performing laboratory strength tests. If the strengths are less than those assumed in the design calculations, the calculations will be updated using the revised strengths. Design modifications will only be required if the computed factor of safety is less than 1.30. Should a design modification be required it is most likely to include the removal of the weak soils in the area of the expansion and the base of the berm.



NOTES:  
1. THIS PLAN PRESENTS EXISTING CONDITIONS  
AS OF MARCH 17, 2008.

CROW LANE

**SITEC**  
ENVIRONMENTAL  
Civil and Environmental Engineering  
Lead Use Planning and Surveying  
Hazardous and Solid Waste Consultants

789 Pine Street, 10th C  
Newburyport, MA 01950  
PHONE (781) 219-0100  
FAX (781) 824-4765

CROW LANE LANDFILL  
NEWBURYPORT, MASSACHUSETTS

NEW VENTURES ASSOCIATES, L.L.C.

PROPOSED BORING LOCATION PLAN  
PERIMETER BERM

Scale: 1" = 40'  
Date: 1/17/08  
Drawn: MQ  
Checked:  
Approved:  
Sheet number:  
B-1

No.	Date	Revision Description	Drawn By	Apprv. #
1	1/23/08	ADDED TEST PIT LOCATIONS		