COMMONWEALTH OF MASSACHUSETTS
THE TRIAL COURT
SUFFOLK SUPERIOR COURT

Suffolk, ss

COMMONWEALTH OF MASSACHUSETTS, Plaintiff	§ § §	
V.	§	CA # SUCV2006-00790
NEW VENTURES ASSOCIATES, LLC, Defendant	§ § §	

EXHIBIT "E"

COMMONWEALTH OF MASSACHUSETTS
EXECUTIVE OFFICE OF ENERGY & ENVIRONMENTAL AFFAIRS
DEPARTMENT OF ENVIRONMENTAL PROTECTION
NORTHEAST REGIONAL OFFICE
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DEVAL L. PATRICK
Governor

TIMOTHY P. MURRAY
Lieutenant Governor

IAN A. BOWLES
Secretary

LAURIE BURT
Commissioner

CERTIFIED MAIL

October 6, 2009

William Thibeault
New Ventures Associates, LLC
85-87 Boston Street
Everett, MA 02149

Re: NEWBURYPORT - Solid Wastes/COR
Crow Lane
Crow Lane Landfill
Revised Closure Plan
Notice of Deficiency
File No. W046210
FMF No. 39545

Dear Mr. Thibeault:

The Massachusetts Department of Environmental Protection, Northeast Regional Office, Bureau of Waste Prevention, Solid Waste Management Section ("MassDEP") has received proposed revisions to the closure plans for the Crow Lane Landfill and the supporting geotechnical analysis for the design. These revisions; submitted on your behalf by SITEC Environmental, Marshfield (SITEC), Massachusetts, dated August 26, 2009; modify the March 17, 2006 plans as last revised April 24, 2008. The geotechnical evaluation titled: "*Report on Additional Geotechnical Analysis Crow Lane Landfill Newburyport, Massachusetts*" dated August 20, 2009, was prepared by GEOCOMP Corporation (GEOCOMP) of Boxborough, Massachusetts.

The proposed revisions include deletion of the MSE berm along the easterly two thirds of the southerly (Crow Lane) side of the landfill, addition of a stone buttressed slope at the westerly end of the northerly side of the landfill, as well as alterations to the landfill access and storm water drainage. The geotechnical analysis was prepared in response to the MassDEP's July 24, 2009 letter approving the geotechnical analysis of the previous design for the MSE berm that concluded in part modification of the MSE Berm design was required.

MassDEP; as discussed with New Venture's engineers, SITEC and GEOCOMP on September 14, 2009; has observed the following issues that must be addressed relative to the proposed design and geotechnical analysis.

1. The plan provides for a "slope extension" to be constructed with boulders at the northwest corner of the site (the "boulder buttressed" section of the berm).
   a. The engineering report does not include a detailed discussion of this area with demonstration of how it meets the requirements for berm stability as established by the GeoComp stability assessment.
   b. The design is not consistent with other sections of the berm design. In particular, the berm design typically includes a one (1) foot wide setback of the toe of the MSE wall from the top of slope of the rip rap slope protection. This setback is not provided within the boulder buttressed section of the berm.

2. The geotechnical analysis needs to address issues of short and long term stability. See "Organic Material Zone within the Berm" in the attached "Shaw review of GeoComp's 'Report on Additional Geotechnical Analysis" ("Shaw review memorandum #2") for additional discussion.

3. The supporting geotechnical analysis does not sufficiently justify the assumptions relative to the strength of the clay underlying the berm or the settlement of the organic layer within the berm. See "Geotechnical Analysis of Modified Design" in the attached Shaw review memorandum #2 for additional discussion.

4. The supporting geotechnical analysis does not adequately consider effects of water level in the berm, seismic stability of berm, current topography, or the impact of settlement on berm stability and liner tensions. See "Geotechnical Analysis of Modified Design" in the attached Shaw review memorandum #2 for additional discussion.

5. The supporting geotechnical analysis does not provide adequate QA/QC procedures to insure that boulders used meet specifications. See "Geotechnical Analysis of Modified Design" in the attached Shaw review memorandum #2 for additional discussion.

6. The topography for the area of the boulder buttress section of the berm is based on a survey conducted in 2005. The plans need to address consideration of whether adjustment of the berm is required to adjust for settlement.

7. The topographic plan on Sheet 11 indicates four (4) detail sections through the berm, including a Cross-Section D-D'. The plans do not include a cross-section labeled as "D-D'". The cross-section depicted on Sheet 11, titled only "Cross Section", is not labeled to indicate its location on the berm.

Pursuant to Section 12.a.(vi) of the Final Judgment entered at Superior Court on April 30, 2009 (Docket # 06-0790 C), New Ventures shall, within fifteen (15) days of receipt of this notice, submit to MassDEP a modified berm design and supporting geotechnical analysis that addresses the above deficiencies.

If you have any questions please contact David Adams at 978-694-3295.

Sincerely,

DCA
David C. Adams
Environmental Engineer
Solid Waste Management

Sincerely,

JAC
John A. Carrigan
Section Chief
Solid Waste Management

JAC/DCA/dca

enclosures:
- #1 - Shaw Environmental, Inc., 9/09/09, "Preliminary Shaw Review Comments relative to the SITEC Engineering Drawings Perimeter Berm and the MSE Wall"
- #2 - Shaw Environmental, Inc., September 23, 2009, "Shaw review of GeoComp's Report on Additional Geotechnical Analysis'"

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NERO Web Page – Crow Lane

Preliminary Shaw Review Comments relative to the SITEC Engineering Drawings Perimeter Berm and the MSE Wall

09/09/09

Drawing 2 – Note 3 indicates that the existing topography for the northerly portion of the landfill is dated from 2005. A significant amount of construction has occurred since then and the changed topography was to be reflected in the stability cross sections. There is no indication if and when this was performed.

Drawing 3 – Directing significant amounts of stormwater via the Let-down Channel directly at the top of the MSE Wall is a potential problem area (northwest corner). It appears the Let-down Channel could be eliminated. The issues are:

1. The perimeter channel invert as Elv 75, but the adjacent road as 74.5, therefore the swale at the bottom of the Letdown Channel cannot hold water. In addition, the road is sloped towards Basin 2 only at 0.7%. Any settlement would cause ponding in the swale.
2. It is unclear how the diversion swale berm and the letdown channel cross the perimeter swale at the base on the letdown channel.
3. It appears the top access road doesn't go anywhere and is not needed; therefore the culvert at the top of the Let-down channel is not really needed either.
4. Three is a Condensate Infiltrator located in the invert of the Let-down Channel
5. On Drawing 6 Let-down Channel details, will the rock energy dissipation berm be strong enough to withstand the velocity of the water within the channel so that it does not move and allow the flow overtop the perimeter berm drainage channel and subsequently wash out the road and MSE wall?
6. On Drawing 6, since the top of the berm equals the channel depth, will the rock berm eventually become blocked by vegetation debris and force water around it and over the adjacent final cover, and then cause washouts in the final cover?
7. On Drawing 6, a geocomposite channel liner protecting the geomembrane cap from the emulsion mix is shown on the channel final cover cross section. It probably should be shown on the profile section also. The emulsion mix has potential low permeability characteristics, on the order of $1x10^{-6}$ cm/sec. This would inhibit water trapped in the geocomposite drain from percolating out and there does not appear to be any other subsurface drainage relief location at the base of the Let-down Channel. There is the potential for 20 feet of upwards hydraulic pressure at the bottom of the outlet swale in the geocomposite, which would need at least 10 feet of earth loading to control the pressure. However there is only 3 feet of cover soil so uplift failure and soil erosion seems certain. That soil would fill the perimeter swale and cause outlet water to flow over the MSE wall.

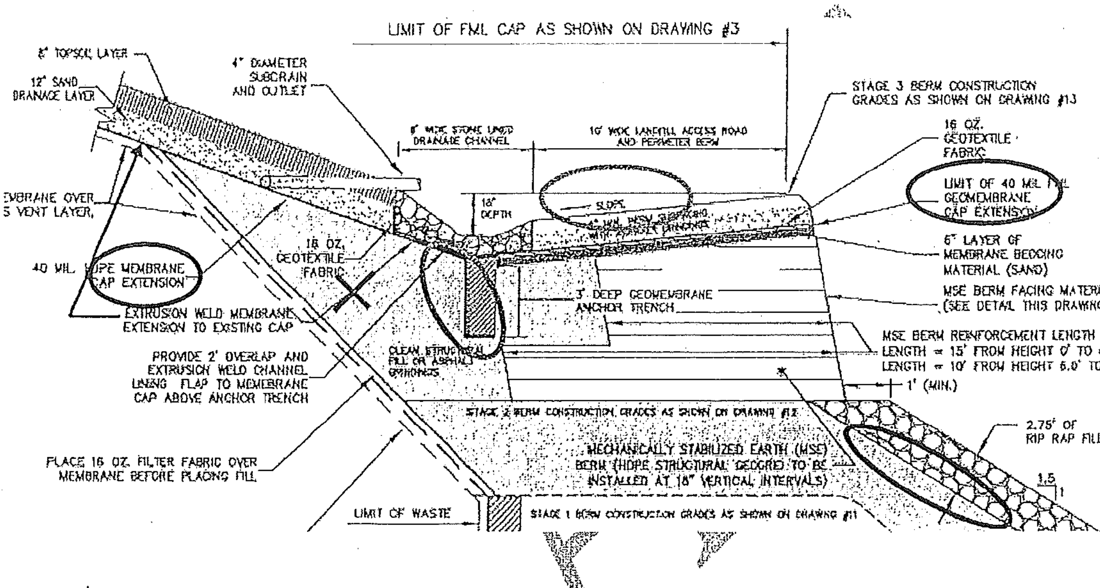
(Similar issues with the base of the northern Let-down Channel may exist)

Drawing 5 – Westerly Perimeter Berm detail:

1. The callouts identifying extrusion welds between membrane appear are confusing. Should the call out "Extrusion weld membrane extension to existing cap be at the top of the existing cap steep slope? It appears that the

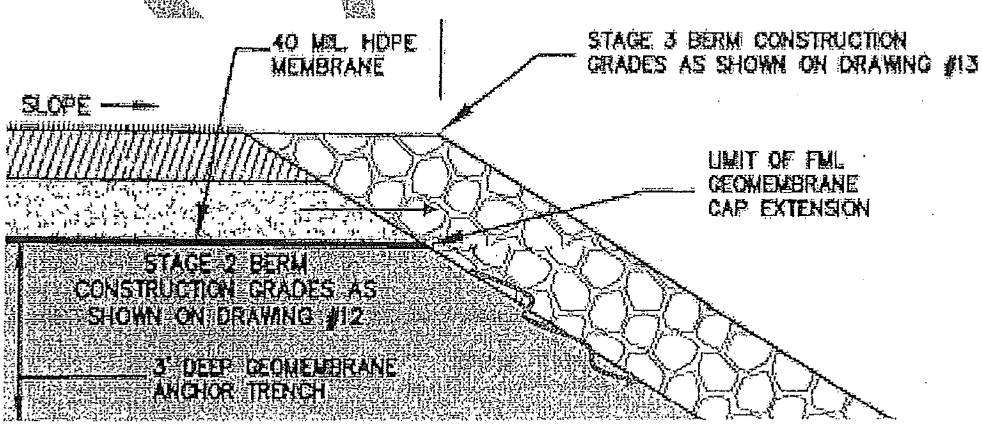
Geomembrane cap extension is continuous under the swale, so the purpose of the anchor trench is not clear, and how the weld to it would occur. If an additional swale liner is desired, then it could be just layered on top of the cap extension. (Unless the lines are miss-labeled and then these should be corrected).

2. What is the slope of the road to the channel, or the height of the channel adjacent to the road?
3. What will prevent the existing berm material under the riprap from eroding? Ether a geotextile or graded stone is needed between the riprap and the existing berm.



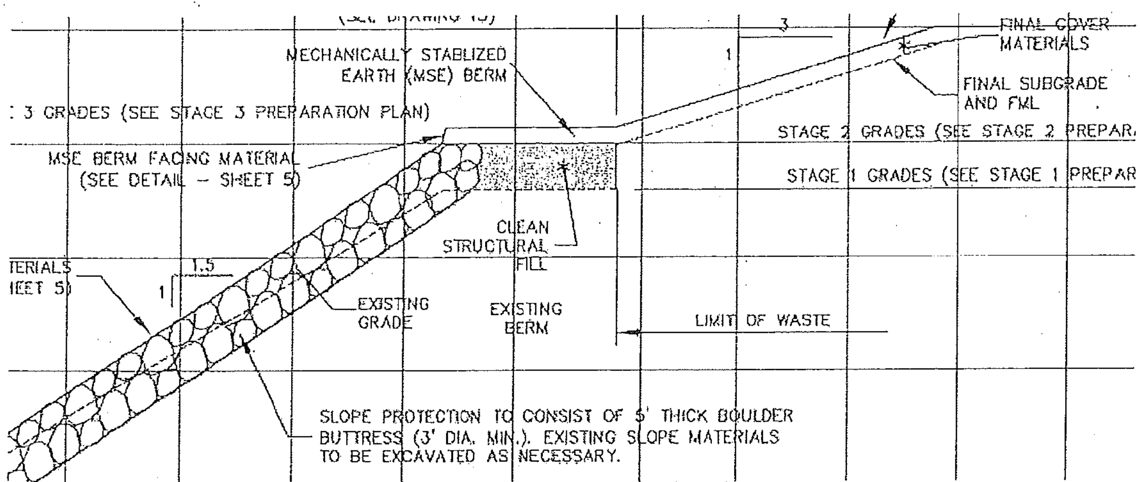
Drawing 6 – Detail Southern Perimeter Berm Detail Structural Fill.

1. What will prevent the drainage layer sand above the 40 mil HDPE membrane from washing out at the FML limit into the riprap?
2. What will prevent the existing berm material under the riprap from eroding? Ether a geotextile or graded stone is needed between the riprap and the existing berm.



Drawing 11

1. What will prevent the existing berm material under the boulders from eroding? Ether a geotextile or graded stone is needed between the riprap and the existing berm.



Reviewed by Ben Siebecker

Shaw review of GeoComp's "REPORT ON ADDITIONAL GEOTECHNICAL ANALYSIS"

September 23, 2009

Shaw reviewed the GeoComp REPORT ON ADDITIONAL GEOTECHNICAL ANALYSIS, Crow Lane Landfill, Newburyport, Massachusetts dated August 20, 2009. The report was prepared in response to the MassDEP letter dated July 24, 2009. In general, the report includes much of the supplemental information requested in the July 24 letter.

Our review indicates that the design data submissions were prepared over a period of two years. In its current form, the report does not represent a comprehensive final engineering document that could be easily used for construction purposes. For consistency, we recommend that the individual data reports and designs from previous years be compiled as a singular updated package that can be approved for construction.

There are still some significant design issues and discrepancies that need to be resolved. Below are our review comments with respect to the latest submission.

Organic Material Zone within the Berm

GeoComp identified the organic material in the berm as potentially unstable if building the Mechanically Stabilized Earth (MSE) wall on top of the berm in its current condition. Two remedial alternatives were presented; 1) to remove the organic material, or 2) to leave it in place and stabilize the berm by adding rock to the berm sideslope. If the second alternative is used, then they recommended instrumentation be used to monitoring the behavior of the berm during MSE wall construction following stabilization.

A selection of one of these alternatives must still be made and the issues cited below must be resolved.

- Alternative 1 could lead to landfill instability during material excavation and excavation in this area of the landfill could cause significant release of odors.
- Alternative 2 requires a contingency plan should monitoring indicate a potential berm failure during construction. Long term instability was not addressed, in that wood chip decomposition could lead to further weakening of the berm material and failure even after stabilization. Monitoring for potential berm failure must continue for the post closure period and a long term failure contingency plan needs be developed. Additional post closure funding may be needed to remediate the berm if failure occurs or is imminent.

Geotechnical Analysis of Modified Design

a. Provides complete justification and references for the assumptions and conclusions regarding silt and clay stratum strengths.

We observed that the undrained shear strengths presented in Table 2 of the June 16, 2009 report and Table 1 of the Report on Additional Geotechnical Analysis dated August 20, 2009 are different. The highest undrained strength reported in Table 1 is 1,728 psf. That value is slightly more conservative than the previous value of 1,850 psf reported in Section 2.2a and presented in Table 2. The lowest value presented in Table 1 is 432 psf as opposed to the 875 psf reported in the text. The higher values are still being used in the slope stability runs. The slope stability analyses should be re-run with the lower shear strength parameters.

The strength value for the Clay Zone 1 (Clay and Silt) used in the analysis is based on one consolidated undrained (CU) triaxial test data point, which may not be representative of the stratum according to other test data. We recognize that the UTEXAS4 computer model runs show that the critical failure surface does not pass through this clay stratum when using the higher shear strength value, however; the failure plane location may change if the shear strength value of the clay is lower.

A Stress History and Normalized Soil Engineering Parameters (SHANSEP) approach was used as justification for the shear strength parameters presented in the report. GeoComp used a chart developed by Ladd and Foott (1974) to present a relationship between cu/SigmaV' and Over Consolidation Ratio (OCR). The chart is based on direct simple shear (DSS) tests, which typically yield lower results than CU tests. OCR values were then approximated to back calculate shear strength values from a general SHANSEP equation for Boston Blue Clay. Therefore, using CU test strengths to estimate OCR values with the chart may be misleading. A more reasonable approach would be to estimate the OCR values from one dimensional consolidation tests and approximate the shear strength using the Ladd and Foot (1974) chart.

It should be noted that the curve used to estimate the OCR values represents the Atchafalaya Clay in Louisiana not the Boston Blue Clay. Additionally, the equation for Boston Blue Clay may yield overestimated shear strength values based on a recent study entitled "An Instrumented Multiple deployment Model Pile (MDMP) by the Federal Highway Administration (FHWA)" (http://www.tfhrc.gov/structur/pubs/99194/05.htm); there are new equations for Newbury, MA clays.

The effective stress parameters based on maximum obliquity shear strengths seem reasonable except for the cohesion value, which should have been further reduced for additional conservatism.

b. *Documents GeoComp's position that there will be a strength gain of the clay with loading and time.*

According to the SHANSEP method, the calculated strength gain can be as good as the OCR value. Therefore OCR value used should be justified.

c. *Addresses the potential of settlement associated with the small area of wood chips, the MSE wall to the northwest, and the clay stratum.*

GeoComp should provide documentation for the C_R value of 0.3 for organics and 0.11 for the clay. (Consolidation tests results or published literature.)

GeoComp should provide the detailed calculations for the Settlement Calculation summarized in Table 2. It is not clear why the clay settlement in Section AA is less than the settlement at Section CC. In Section AA, clay is depicted as twice as thick and the new wall construction is higher than at Section CC. If there are additional loadings that are not mentioned, then this should be clarified or otherwise addressed.

d. Provides QA/QC procedures or other documentation that the boulders will meet the design specifications for the boulder wall.

An internal friction angle of 45 degrees for riprap and buttress wall material was used in the February 2007 GeoComp calculation. In the May 2007 GeoComp calculation, this value increased to 50 degrees. A justification for using the higher value should be provided. Otherwise, the slope stability runs should be repeated with the previous value (45°) to determine if it changes the factor of safety (FS).

As noted in the figures below from the Connecticut DOT Drainage Manual, the maximum angle of repose for stone sizes similar to the sizes proposed for the buttresses is less than 43 degrees.

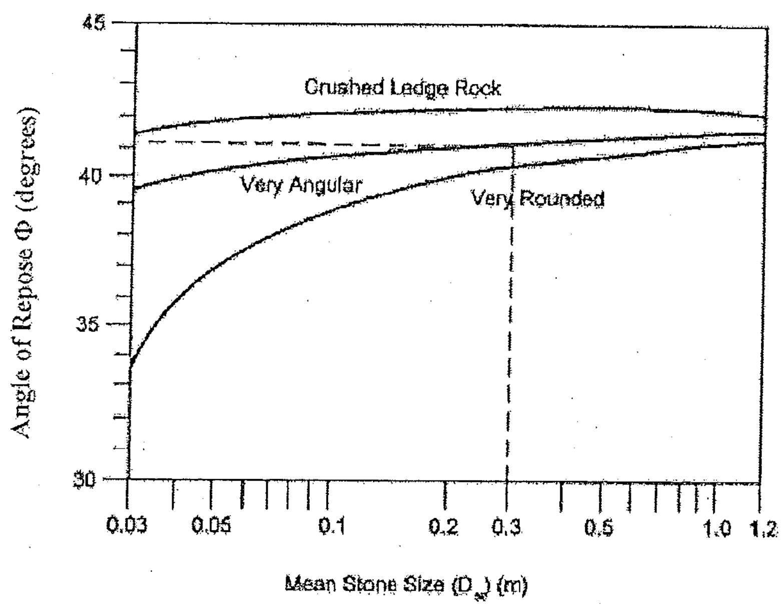
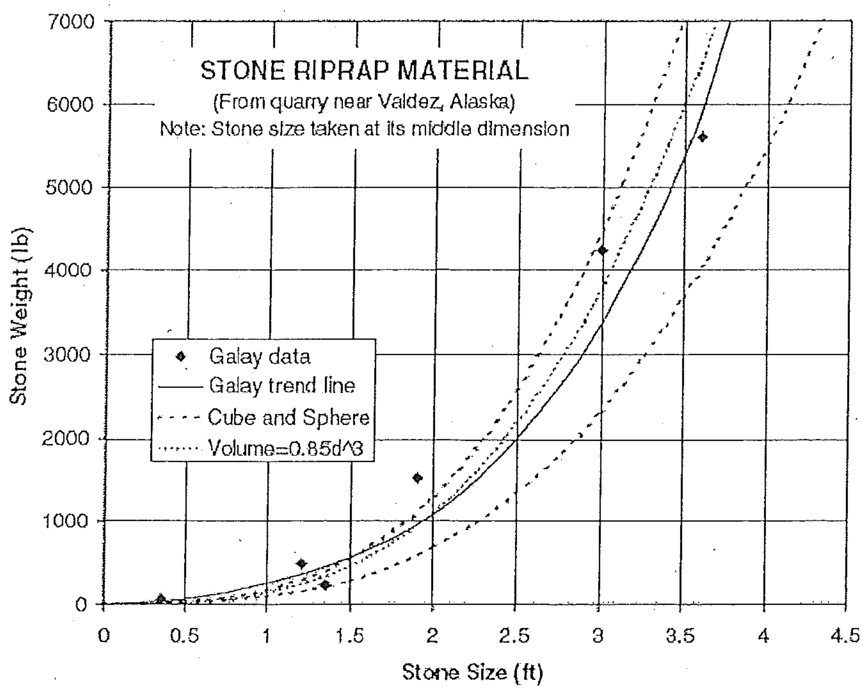


Figure 7-27 Angle Of Repose Of Riprap In Terms Of Mean Size And Shape Of Stone (metric units)

A diagram for the boulder wall and buttress rock placement description is needed, for both the near vertical and sloped buttresses. The diagram should show what a 3 point bearing is and how the normal longitudinal direction works.

In addition, unless the rock placement is such that there is less than 20% voids, the required buttress's overall density used in the stability analysis cannot be achieved. As demonstrated in Figure 3.24 from the National Cooperative Highway Research Program (NCHRP) Report 568, the size and shape of the rock significantly affect the bulk density of the embankment. For instance, due to voids, a fill with 3.15 ft cubic rocks neatly stacked will have a bulk density of 160 lbs/cf but a fill with 3.15 ft round rocks will have a bulk density of approximately 80 lbs/cf. So achieving the necessary 130 lbs/cf bulk density used in the stability calculations is not assured based upon the design presented so far.

In the construction specification for rip rap, allowable range of sizes and/or weights of the individual particles, allowable range of particle shape, minimum allowable density (or Gs), and the minimum allowable durability requirements should be addressed.



Source: modified from Galay et al. (1987)

Figure 3.24. Stone weight versus stone size for riprap.

e. *Includes additional stability sections that reflect the critical worse case conditions for the various berm construction components. All sections shall reflect the current topography and true steepness of the slope above the existing berm. If the berm height has increased since the date of the last topographic survey, the entire slope shall be resurveyed for the new slope stability/geotechnical analysis.*

The report does not mention any changes to the cross section to reflect changes to the topography that have occurred since the prior cross sections were drawn. GeoComp should address if these changes were made.

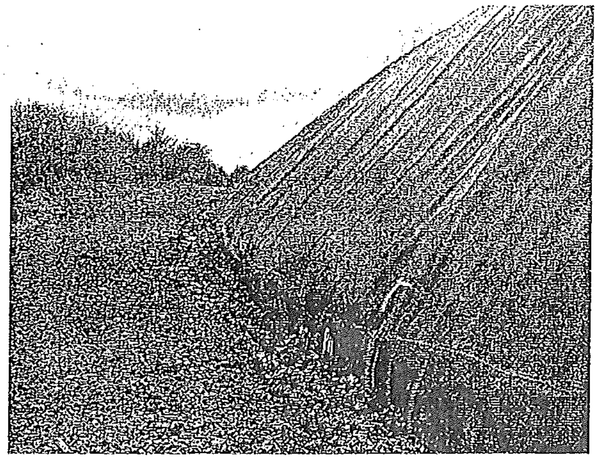
f. *Includes a sensitivity study of effects of supporting soil strength on berm stability (what is margin of error).*

A FS of 1.26 is presented for a 10% reduced shear strength of the clay. This reduction is likely insufficient for the following reasons: 1) sample disturbance in laboratory testing on soils is not totally avoidable and in some cases the disturbance might result in un-conservative shear strength values, 2) the Boston Blue Clay is typically recognized as a normally consolidated clay. Accordingly, the reduced CU shear strength should be at least 30% of the laboratory estimated value for the sensitivity analysis.

One part of a sensitivity analysis that needs to be performed should consider the effect of water in the landfill and the berm. During the test boring work, wet conditions were often observed in the berm. While the water table may be correct at the toe of slope, saturated conditions may occur above that level. B-4 identified saturated conditions at 17 feet below grade. The ground surface at B-4 is approximately elevation 58, so the groundwater elevation at that location is approximately elevation 41. In the recent analyses, the piezometric line is defined approximately at El. 37. GeoComp should address if the water table were 4 feet higher in the existing berm, what would be the resulting factor of safety be for the proposed conditions.

g. *Considers the impact of settlement on berm stability and liner tensions.*

The equation used in computing settlement combines primary and secondary settlement. Unless a time rate consolidation analysis is performed, it would be difficult to estimate how soon this settlement will occur. Although the settlement of clay/silt layer is not expected to be sudden, gradual differential settlement between the portions of the landfill that have previously consolidated may create excessive strain and possibly tear the membrane where the geo-membrane is "tucked" under the MSE wall. Much of that stress will occur near the base of the wall where the steep membrane slope occurs, as shown in photograph below.



The last sentence of the first paragraph of Section 2.2g states that the impact of the settlements on the berm stability and liner tension is expected to be minimal. The basis for this conclusion should be provided. The increased stress due to total settlement (consolidation + secondary settlement) on the geomembrane and its ability to resist tearing must be examined to demonstrate that the membrane has sufficient margin to accommodate settlement. GeoComp should address if the interaction of drainage hydraulics and landfill gas pressures with the geomembrane will be an issue.

h. Evaluates the seismic stability of berm along the critical sections and considers the silt and clay.

The information presented is a summary of the calculations performed. To fully evaluate the calculations and justification for the parameters used the full set of calculations should be appended along with cut sheets for the references. On page 11, An S_{A1} of 0.076 is presented for Site Class B in Table 4. GeoComp should confirm if this nomenclature is correct (Shaw questions if it should it be labeled as S_1). A Soil Type E (Shaw questions if the more proper term "Site Class" be used here.) is assigned for the site, but the same S_{A1} for soil type B (0.076) is given in Table 4 for Site Class E. It seems that, if 0.076 is really for Site Class B, there might be some amplification due to soft soils overlying bedrock. No reference is provided for the S_{A1} value. The code that was followed to obtain this value, e.g. IBC 2006, should clearly be stated in the calculation. The F_v factor to get S_{A1} from S_1 should be provided ($S_{A1} = Fv \times S_1$). On page 12, Site category D is stated instead of E. This appears to be a typo and should be corrected. Reference and explanation for cumulative displacements in the range of 1 to 2 inches should be given. The seismic slope stability runs (figures) were not included in the report. Without having the detailed calculations and references appended, it is difficult to follow the methodology. The last sentence references section 2.8.3., but this section was not found. GeoComp should clarify what this section is.

i. Addresses the stability considerations during construction; question of loading schedule on clay (effect of water pressure buildup and dissipation in clay).

Provided that the total and effective stress analyses demonstrate adequate factors of safety and the settlement is not an issue, this item does not require additional calculation. Any heavy equipment or intermediate construction stage that could possibly adversely affect the global stability should be addressed. If necessary, additional calculations should be provided.

j. *Include both a total and effective stress analysis that considers the silt and clay stratum.*

As previously stated in Item a, the effective stress parameters seem reasonable. The computer software runs should be added for the factors of safety presented in Table 7.

<u>General</u>

Based on UTEXAS4 slope stability runs presented in the report, FS for section AA should be 1.31 instead of 1.35 and FS for section CC Rock Boulder & MSE Berm should be 1.37 instead of 1.39 in Table 3. GeoComp should confirm these values and revise the report.

Figure 2 – note 2 indicates the figure was based upon Shaw's drawing of 05/27/09. The purpose of Shaw's drawing was not for design, and it clearly stated "Elevations to be confirmed by survey." The original drawing was labeled "Draft". Shaw does not take responsibility for the figure in the context of this report.

Figure 4 – The organics zone is not shown in the figure. The unit weight and the shear strength information are not shown in the table presented in this figure. GeoComp should add the organic layer of material.

Figure 12 – With zero cohesion and zero friction angle assigned for the organics, achieving a factor of safety of 1.337 seems a little high. GeoComp should confirm the information is accurate.