APPENDIX H

ENGINEERING PERMIT DRAWINGS
(INCLUDED AS A SEPARATE 24-INCH BY 36-INCH ROLLED DRAWING SET)
APPENDIX I

MECHANICALLY STABILIZED EARTHEN BERM DESIGN AND DRAWINGS
Slide uses 2D limit equilibrium methods to determine the minimum FS. The auto-refine, non-circular search method with optimization was used utilizing Morgenstern-Price Method to calculate all FS. The General Limit Equilibrium (GLE) / Morgenstern-Price (MP) method of analysis was selected as the method since it satisfies all conditions of equilibrium, is applicable to any shape of slip surface, side force inclinations can be the same or can vary from slice to slice, side force inclinations are calculated in the process of solution so that all conditions of equilibrium are satisfied, and is considered an accurate method.

ReSlope was utilized to evaluate sliding and pullout failures considering both static and seismic scenarios for the critical cross section at approximately Station 19+47. ReSlope is an interactive, design-oriented, program for the design of geosynthetic-reinforced slopes, which also uses 2D limit equilibrium methods to determine the minimum FS. For a given problem including geosynthetic strength, reduction factors, and design safety factors, ReSlope produces the optimal layout (embedment length and spacing) of reinforcement layers.

GEOLOGY

According Reference 1, the proposed north perimeter berm for the Dunn C&D Landfill overlays glaciolacustrine silts and sands. Subsurface information determined that significant glaciofluvial deposits are present between existing ground surface and from depths ranging from 130 to 170 feet. The glaciofluvial deposits are underlain by glacial till and the glacial till is underlain by shale. Based on the web soil survey some alluvial soil is present near the northeast corner.

GEOMETRY

The proposed north perimeter berm will be mostly constructed in areas of fill in order to construct the proposed bottom liner of the northern cells. The berm will have a slope of 0.5H:1V (horizontal:vertical). The proposed northern pond in the northwest corner, located downslope of the proposed berm, will be constructed with 2H:1V slopes. The proposed waste slopes will be constructed no steeper than 3H:1V. There is a proposed perimeter access road at the top of the proposed berm.

MATERIAL PARAMETERS

The following table summarizes the parameters used in this analysis. All parameters excluding the new fill were based on the slope stability analysis performed by CEC for the proposed modification of the facility (Reference 3). The new fill (which includes reinforced fill) parameters are based on the remolded direct shear test results of on-site materials (Reference 4).

<table>
<thead>
<tr>
<th>Material</th>
<th>Unit Weight (pcf)</th>
<th>Angle of Friction (degrees)</th>
<th>Cohesion (psf)</th>
<th>Reference</th>
</tr>
</thead>
<tbody>
<tr>
<td>Subgrade</td>
<td>120</td>
<td>30</td>
<td>0</td>
<td>4</td>
</tr>
<tr>
<td>Bottom Liner/</td>
<td>118.5</td>
<td>17.4</td>
<td>67</td>
<td>3</td>
</tr>
</tbody>
</table>
SURCHARGE LOADING

Exact equipment and traffic loading was not provided by at the time of the calculation. Therefore CEC has assumed a surcharge of 250 psf for equipment and traffic surcharge based on our experience. This surcharge was applied to the top of the proposed berm for all scenarios.

GROUNDWATER

Based on Reference 1, the depth to static groundwater is in excess of 50 feet below existing ground surface and is not considered in this analysis.

FACTOR OF SAFETY

Per 6 CCR-NY-363-4.3(c) and (d), the minimum acceptable FS for static slope stability is 1.5 and for seismic slope stability is 1.0. The minimum target FS for sliding of 1.5 for static and 1.0 for seismic were based on Reference 8.

SEISMIC ANALYSIS

Per 6 CRR-NY-363-4.3(d) any facility located in a seismic impact zone, must include a seismic stability analysis. A seismic impact zone, as defined in the RCRA Subtitle D regulations, is an area that has a 10% or greater probability that the peak ground acceleration (PGA) in lithified earth material (bedrock) expressed as a percentage of the earth’s gravitational pull will exceed 0.10g (10 percent of gravity) in 250 years.

Values of PGA having a certain probability of exceedance (P_e) were determined from the United Stated Geologic Survey (USGS) Unified Hazard Tool. The USGS Unified Hazard Tool presents the PGA value for a seismic risk level of 2% probability that the PGA will be exceeded in 50 years (e.g. P_e = 2% in 50 years); however, a seismic risk level of P_e = 2% is equivalent to P_e = 10% in 250 years. Using the unified hazard tool with the Conterminous U.S. 2014 Edition, the PGA at Dunn C&DLandfill site corresponding to P_e = 2% in 50 years is 0.105g. The USGS hazard maps report PGA at the ground surface assuming 30 meters of soil with an average shear wave velocity of 760 m/s, which is conservative based on our review of the test borings previously drilled at the site. Therefore, 0.105g was considered the free field PGA for the site. To account for acceleration amplification during a seismic event from the free field PGA (at the base of the MSE berm) to the top of the MSE berm, the Refuse-Fill 100 ft Height curve presented on the following figure was used from Reference 6. This resulted in an amplified PGA/design PGA of 0.15g.
According to 6 CRR-NY-363-4.3(d)(1)(i) a pseudo-dynamic analysis shall demonstrate all long-term containment structures are designed to retain a minimum factor of safety of 1.0 using a seismic coefficient (expressed as a fraction of the acceleration of gravity) equal to one-half the free field peak ground acceleration at the site for the design earthquake. Therefore, the seismic coefficient used in the analysis was 0.075g (1/2 the design PGA).

**GEOSYNTHETIC MATERIAL STRENGTH PROPERTIES**

Geosynthetic material strength properties used in the analysis are listed in the table below. The long-term design strengths were input into slide and the reinforcements were modeled as an active support. The strengths used were based on the ultimate strength and reduction factors listed in Reference 7. The long term design strengths calculated in Attachment C were input into ReSlope with reduction factors of 1.0 to model a generic type of geogrid. It is assumed that the backfill material will be on-site material which generally consists of silty sand. Calculations are shown in spreadsheets in Attachment B. The interface friction between the geogrid and the reinforced fill/foundation soil was determined in accordance with Reference 8.

<table>
<thead>
<tr>
<th>Geogrid Material</th>
<th>Interface Friction (°)</th>
<th>Ultimate Tensile Strength (lb/ft)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Type 1</td>
<td></td>
<td>1900</td>
</tr>
<tr>
<td>Type 2</td>
<td>21</td>
<td>3900</td>
</tr>
<tr>
<td>Type 3</td>
<td></td>
<td>8400</td>
</tr>
</tbody>
</table>
RESULTS AND CONCLUSIONS

The following tables summarize the calculated minimum global stability FS for each cross section and each scenario using Slide.

### GLOBAL STATIC STABILITY RESULTS

<table>
<thead>
<tr>
<th>Approximate Cross Section Station</th>
<th>Minimum Calculated FS</th>
<th>Minimum Target FS</th>
</tr>
</thead>
<tbody>
<tr>
<td>00+27</td>
<td>1.59</td>
<td></td>
</tr>
<tr>
<td>00+60</td>
<td>1.53</td>
<td></td>
</tr>
<tr>
<td>01+50</td>
<td>1.50</td>
<td></td>
</tr>
<tr>
<td>03+30</td>
<td>1.81</td>
<td>1.50</td>
</tr>
<tr>
<td>10+27</td>
<td>1.52</td>
<td></td>
</tr>
<tr>
<td>15+01</td>
<td>1.71</td>
<td></td>
</tr>
<tr>
<td>19+47</td>
<td>1.56</td>
<td></td>
</tr>
</tbody>
</table>

### GLOBAL SEISMIC STABILITY RESULTS

<table>
<thead>
<tr>
<th>Cross Section</th>
<th>Minimum Calculated FS</th>
<th>Minimum Target FS</th>
</tr>
</thead>
<tbody>
<tr>
<td>00+27</td>
<td>1.36</td>
<td>1.00</td>
</tr>
<tr>
<td>00+60</td>
<td>1.31</td>
<td></td>
</tr>
<tr>
<td>01+50</td>
<td>1.31</td>
<td></td>
</tr>
<tr>
<td>03+30</td>
<td>1.54</td>
<td></td>
</tr>
<tr>
<td>10+27</td>
<td>1.30</td>
<td></td>
</tr>
<tr>
<td>15+01</td>
<td>1.47</td>
<td></td>
</tr>
<tr>
<td>19+47</td>
<td>1.32</td>
<td></td>
</tr>
</tbody>
</table>

Direct sliding analysis was performed in ReSlope to check the minimum required length of the bottom geogrid at the critical cross section at Station 19+47. The minimum length required by ReSlope was 45 feet which is less than the length of 100 feet used in Slide.

Based on these results, CEC concludes that the proposed MSE berm will meet the requirements in 6 CCR-NY-363-4.3(c) and (d) if constructed in accordance with this design and the construction drawings.
OBJECTIVE

The objective of this analysis was to design the proposed mechanical stabilized earth (MSE) berm to meet the requirements in 6 CCR-NY-363-4.3(c) and (d).

REFERENCES

4. Direct Shear Results, (500, 7,500, and 15,000 psf) for Sample SG-1 (Subgrade), Lab Log: 18-115, tested by RSA Geolab, LLC, Dated 5-16-18.
6. “Seismic Response of Municipal Solid Waste Landfills”, S. Singh,

METHODOLOGY

Slope stability software Slide 9.0 and ReSlope Version 4.0 were used to calculate the minimum factor of safety (FS) in general accordance with Federal Highway Administration (FHWA) design methodology for reinforced soil slopes (RSSs) at the cross sections listed in the following table. According to Reference 8, inclinations of less than 70 degrees are considered slopes and inclinations of 70 degrees or greater are considered walls. These cross sections were chosen for analysis based on proposed berm height, proposed slope at toe of MSE berm, subsurface conditions, proposed waste height, and/or to optimize the design.

<table>
<thead>
<tr>
<th>Approximate MSE Berm Station</th>
<th>Approximate Proposed MSE Berm Height (ft)</th>
</tr>
</thead>
<tbody>
<tr>
<td>0+27</td>
<td>18</td>
</tr>
<tr>
<td>0+60</td>
<td>20</td>
</tr>
<tr>
<td>1+50</td>
<td>24</td>
</tr>
<tr>
<td>3+30</td>
<td>30</td>
</tr>
<tr>
<td>10+27</td>
<td>54</td>
</tr>
<tr>
<td>15+01</td>
<td>28</td>
</tr>
<tr>
<td>19+47</td>
<td>48</td>
</tr>
</tbody>
</table>

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ATTACHMENT A

DRAWINGS
DETAIL 1
GEOGRID PENETRATION

DETAIL 2
WELDED WIRE FORM FACING

DETAIL 3
WELDED WIRE FORM SIDE EMBEDMENT

DETAIL 4
GEOGRID AT TOP OF SLOPE

DETAIL 5
TYPICAL MSE BERM CROSS SECTION
ATTACHMENT B

SLOPE STABILITY OUTPUT
Civil & Environmental Engineering, Dunn Mine and C&D Facility
Landscape Architecture and Land Surveying, PLLC

PHASE 10C
REVISION RECORD
NO DATE DESCRIPTION
CROSS SECTIONS MSE BERM MODIFICATION

DATE: JANUARY 2022
31 Bellows Road
Raynham, MA 02767

CROSS SECTION C-C'
SCALE: ft = 100'; in = 100'

CROSS SECTION D-D'
SCALE: ft = 100'; in = 100'

EXISTING PHASE 6
PHASE 10C
PHASE 9
PHASE 8A
CROSS SECTION C-C'

EXISTING PHASE 7A
PHASE 8A
PHASE 8B
CROSS SECTION D-D'

PHASE 6
PHASE 9
PHASE 8A
PHASE 8B
PHASE 7A
PHASE 7B
PHASE 8A
PHASE 8B
PHASE 7A
PHASE 7B