3745-511-50 **Seismic stability analysis and reporting**.

(A) The seismic analyses required by this rule shall be used to determine the minimum shear strengths of engineered components and materials necessary to provide the factors of safety required by this rule.

(B) The seismic stability analysis shall demonstrate that the facility is designed to have a factor of safety of at least 1.00 against failure using a two dimensional limit equilibrium method and using a return period of two thousand five hundred years. The seismic stability analysis shall include an assessment of failure modes and conditions that at a minimum shall include the following:

(1) If the design includes a liner system, long-term deep-seated translational and rotational failure mechanisms of the interim slopes using effective stress shear strengths.

(2) Long-term deep-seated translational and rotational failure mechanisms of the final slopes using effective stress shear strengths.

(3) Shallow translational and shallow rotational failure mechanisms of final slopes for unsaturated conditions.

(4) Liquefaction failure mechanisms.

[Comment: The return period of two thousand five hundred years is cited to allow use of different seismic hazards maps. Therefore, the map published by the U.S. geological survey depicting the peak horizontal acceleration with two per cent probability of exceedance in fifty years is acceptable.]

(C) For all slopes greater than 5.0 per cent that may be loaded with one thousand four hundred forty pounds per square foot or more of vertical compressive stress, the residual shear strength shall be used during the assessment of failure mechanisms for all interfaces between geosynthetics and for all interfaces between a geosynthetic and another material.

(D) The geotechnical and stability analyses of the liner system or the cap system shall not rely on any of the tensile qualities of any of the geosynthetic engineered components included in the design other than those engineered components used primarily for tensile reinforcement.

(E) The geotechnical and stability report identified in rule 3745-511-10 of the Administrative Code shall contain a section titled "Seismic Stability Analysis" which shall contain the following information:

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(1) The scope, extent, and findings of the site investigation and earthen materials testing program bearing on seismic stability.

(2) A description of the rationale used for the selection of the analysis input parameters.

(3) A description of the method used to calculate the seismic stability.

(4) For each of the failure modes and conditions, a description of the rationale used for the selection of the critical cross sections for the interim slopes and final slopes.

(5) A drawing of each critical cross section that fully depicts the analysis input model including the following:

(a) The material boundaries.

(b) The highest temporal phreatic surface and the highest temporal piezometric surface.

(c) The material types.

(d) The in situ unit weights and the saturated unit weights of the materials.

(e) The material shear strengths.

(6) A plan view showing the location of each critical cross section including the northings and eastings for the endpoints of each critical cross section.

(7) A summary of the results using a two dimensional limit equilibrium method for each of the critical cross sections.

(8) All inputs, outputs, and calculations used for the seismic stability analysis. If a computer was used for any calculations, the computer inputs and outputs shall also be included.