Introduction

This report provides documentation for a Microsoft Excel workbook named "Seismic Stability of Retaining Walls 1.0," which was developed for the Center for Geotechnical Practice and Research (CGPR) in the Department of Civil and Environmental Engineering at Virginia Tech. This is the first version of the workbook and was developed by Rachel Finch, Samuel Lasley, Russell Green, and Jongwon Lee.

The following sections of the report describe the features of the workbook, suggest how it can be used efficiently, and describe the methods of analysis and assumptions it employs. The symbols and equations used in Seismic Stability of Retaining Walls 1.0 are listed in the appendices.

Features

The Seismic Design of Retaining Walls 1.0 workbook includes 9 worksheets:

1. *General Retaining Wall Properties Input Sheet 1.0* is for user input of foundation and backfill soil properties, general wall geometry, and ground motion parameters (see Figure 1).
2. *Semi-Gravity Retaining Wall Input and Calculations 1.0* is for user input of the properties of semi-gravity retaining walls (also known as concrete cantilever or cantilever gravity retaining walls) (see Figure 2).
3. *Gravity Retaining Wall Input and Calculations 1.0*. Mass gravity retaining wall properties are entered in this sheet (see Figure 3).
4. *MSE Retaining Wall Input and Calculations 1.0*. Mechanically stabilized earth wall properties are entered in this sheet (see Figure 4).
5. *Seismic Stability of Retaining Walls Computation Sheet 1.0* computes and displays the factor of safety against sliding, eccentricities in loading, the factor of safety against overturning, permanent displacement, and structural design loads (see Figure 5). The structural design loads are for use with semi-gravity retaining walls.
6. *Seismic Loading/Displacement of Gravity Retaining Wall Computation Sheet 1.0* provides graphical displays for the calculation of seismic active earth pressure and yield acceleration. It calculates the structural loads for the stem and seismic passive resistance for the key of semi-gravity retaining walls. It also calculates the permanent displacement of the retaining wall.
7. *Pseudo-Static Wedge Analysis Computation Sheet 1.0* performs a search for the critical slip surface in the backfill and calculates the seismic active earth pressure.
8. *Yield Acceleration Computation Sheet 1.0* searches for the yield acceleration of the retaining wall.
9. *Retaining Wall Displacement Computation Sheet 1.0* calculates the displacement regression coefficients.