Project Summary

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Seismic Design of Cantilever Retaining Walls

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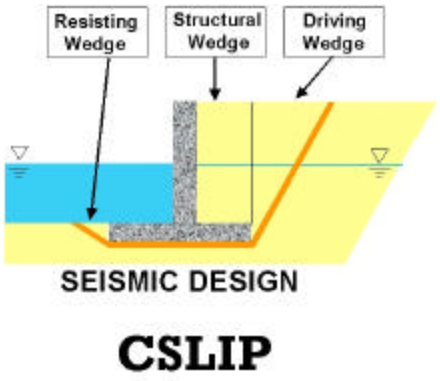
Purpose: To implement the Corps engineering procedure for the seismic design of cantilever retaining walls in a windows-based computer program, named CSLIP, to be used by District engineers.

Problem: There is no computer code available for use by District engineers in the seismic design of cantilever retaining walls that follow the Corps engineering procedures for these structures.

Accomplishments: Several engineering formulations, CSLIP and CSLIP-destined computer program implementations, are underway. During FY00, a preliminary version of the Fortran code that does the actual engineering calculations was fully incorporated into the CSLIP Windows environment program written in Visual Basic. The CSLIP Windows environment program features drop-down menus and an interactive geometry building module for description of the retaining wall system. The resulting wall system is displayed to scale along with the geometry labels and their corresponding values. A literature review of applicable permanent relative wall displacement relationships also was conducted during FY00, resulting in six procedures applicable to retaining walls. These six methods for computing the permanent relative displacement of a wall, designated as simplified procedures in the drop-down menus, were written in Fortran and fully incorporated into the CSLIP Windows environment.



During FY01, this work unit focuses its attention on development of a numerical procedure for integrating an earthquake time history to compute the permanent relative displacement of a retaining wall. A numerical integration procedure for computing the three time histories of (1) wall velocity relative to that of the ground, (2) the incremental wall displacement, and (3) permanent total displacement has been formulated. This numerical procedure has also been developed into a working Fortran subroutine. Validation of this subroutine has just been completed. This work unit has completed the process of implementing this subroutine within CSLIP. The ground acceleration, relative incremental wall displacement, and cumulative wall displacement time histories for the complete Newmark procedure are displayed by CSLIP.

Benefits: This research will provide the Corps with engineering software used to perform a seismic design of cantilever retaining walls. It has the potential to provide savings by providing analytical tools that will efficiently perform what are currently tedious and time-consuming engineering calculations by district engineers.

Final Product: Computer code for use by District engineers in the seismic design of cantilever retaining walls will be generated.