FY 07/08 Research Initial Scope of Work

I. Project Title: **S079**

Seismic Design Guidelines of Retaining Walls with/without Sound Wall

II. Background:

Freeway retaining walls with and without sound walls are ubiquitous in California, and possess great potential for loss of life, property and facility closure under seismic excitations. Particularly the walls which support bridge abutments, buildings, critical utilities or other installation for which there is low tolerance for failure. However, current analysis, procedures and design guidelines for these are over simplistic and may not guarantee satisfactory performance. Designers need new analytical tools and design guidelines to incorporate all the phenomena contributing to behavior, to ensure safety of the systems. This is particularly critical given the move toward LRFD based specifications.

III. Project Problem Statement:

The current standards contain design guidelines that are based on simplistic analysis not explicitly accounting for a variety of factors including non-standard wall configurations, soil-structure interactions etc. Bridge designers need reliable and validated analytical tools and design specifications that follow the LRFD format to improve design of these systems, particularly under seismic loading.

IV. Objective:

The objective of this research is to understand seismic behavior of retaining walls through analysis and limited experimentation to improve available design specification and design tools. The specifications should be calibrated with selected analytical tools and be validated through experimentation. Design aids and examples following the LRFD format should also be provided for clarity.

V. Description of Work and Expected Deliverables:

The proposed work should include, but not limited to, a literature search of published and unpublished activities, identifying existing limitations and obstacles in the design, developing sophisticated analysis models that are validated through experimentation, and developing improved design guidelines that follow the LRFD format. Factors such as non-standard wall configuration (eg, non-gravity and anchored walls), soil-structure interaction, passive earth pressure, cohesive soil type, and presence of water table, etc, should be considered in developing the method. Interim and final reports, validated analysis tools and software, and documented design guidelines with detailed examples are expected as the deliverables of the project.

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VI. Estimate of Duration:

24 months

VII. Related Research:
Similar research has been carried out in the past with respect to retaining walls, e.g., centrifuge modeling and field observations of dynamic behavior of reinforced soil and concrete cantilever retaining walls by:
Kutter, B.L.; Casey, J.A.; Romstad, K.M. (1990). *Fourth U.S. National Conference on Earthquake Engineering*, Proceedings, pp. 663-672.

VIII. Deployment Potential:

As a result of this research, new practical analysis, design and construction specifications for freeway retaining walls with/without sound walls will be established.

IX. Date: July 18, 2007