

# DRISI

CALTRANS DIVISION OF RESEARCH,  
INNOVATION AND SYSTEM INFORMATION

# Research Notes

Geotechnical/  
Structures

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Project Title:  
Model Test for Structures Crossing  
Highways Under Seismic Loading

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## Model Test for Structures Crossing Highways Under Seismic Loading

Development of seismic design criteria for buried structures crossing highway

### WHAT IS THE NEED?

This is Phase 2 of the research work on buried structures crossing highways (BSCH) under seismic loading. Phase 1 (executed under Contract #65A1041) conducted analytical studies and developed numerical models on the structural failure mechanism of BSCH under seismic loading and soil-structure interaction (SSI). Under Phase 1, a preliminary work plan for the experimental study of BSCH for Phase 2 was developed. For this phase of the project, large-scale tests on BSCH specimens will be carried out. The goals of this Phase 2 project are to establish an experimental-based correlation between structure responses and SSI and to develop design criteria for BSCH under seismic loading.

### WHAT ARE WE DOING?

Model tests and corresponding analysis for buried concrete and steel structures will be conducted in the research to investigate the soil-structure interaction (SSI) under seismic loading. Typical earthquake records will be used to get the maximum responses. The results of the model tests will be compared with related research, such as NCHRP 611 and other numerical modeling frameworks and provide design guidelines in the seismic design of BSCH. The research finding will be implemented in developing and improving Structural Technical Policy and Bridge Design Manual for buried structures in the state highway system.

### WHAT IS OUR GOAL?

The goal of the research is to develop design criteria for BSCH under seismic loading. It will mitigate the risk of damage for buried structures under earthquake and hence increases the safety and serviceability of the structures.



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## WHAT IS THE BENEFIT?

The research work will improve the safety of the underground buried structures in the highway system under future earthquakes. Meanwhile, buried structure could be potentially a low maintenance alternative structural type as compared with bridges. The application of the research results to Caltrans practice will meet objectives in the Structures Strategic Direction for Bridges for establishing seismic design criteria for BSCH.

## WHAT IS THE PROGRESS TO DATE?

The project is contracted with University of Reno, Nevada (UNR) and University of California, Los Angeles (UCLA) and is set to start on June 01, 2024.

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