Using Seismic Cone Penetration Testing to Develop Near Surface Vs Profiles

In order to provide the most accurate seismic site classifications and near surface shear wave velocity (Vs) profiles for site specific ground motion response analysis, a Vs profile profile needs to be developed at future bridge sites. While there are numerous methods available to determine Vs profiles from surface wave methods to Downhole, and Crosshole, Seismic Cone Penetration Testing (SCPT) provides one of the more economical options when cone soundings are being conducted for the project. With ARDOT’s recent purchase of a CPT system, this opens the door for the use of SCPT for development of the Vs profiles needed for SSGMRA and seismic site classification. Using SCPT will allow ARDOT materials to developed Vs profiles for future bridge sites, which can be used in SSGMRA which TRC1603 showed could lead to a 7% cost savings for bridges built in high seismic areas.

The main objective of this research is to implement the use of SCPT for site characterization at ARDOT. The project will develop standard field operating procedures for SCPT given ARDOT new equipment along with data analysis procedures which will provide the most accurate results. SCPT will be conducted at a number of project sites and the results compared to Vs profiles generated using surface wave methods and potentially downhole. These datasets will be used as training datasets for ARDOT.

Development ARDOT equipment specific standard operating procedures for SCPT with manual for operation. Data analysis workflow for analyzing SCPT data to develop a site specific Vs profile. Training datasets with results to aid in training future ARDOT personnel on analysis of seismic CPT data. On site training in field methods and in office training for data analysis. Final report detailing project findings.

Estimated Project Duration: 24 Months
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