

Dynamic Passive Pressure on Abutments and Pile Caps

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Work Tasks

Task 1-Literature Review and Collection of Existing Test Data

Task 2-Notification to Residents of Testing

Task 3-Pile Cap Testing and Analysis for South Temple Site

Task 4-Pile Cap Testing and Analysis to Evaluate Connection Details

Task 5-Pile Cap Testing and Analysis for SLC Airport Site

Task 6-Pile Cap/MSE Wall Testing and Analysis for SLC Airport Site

Task 7-Preparation of Final Report

As noted previously, draft final reports have been completed for Tasks 3 and 4. During this quarter, work has continued on processing the cyclic/dynamic test results associated with work task 5 and 6. Analysis of the dynamic test data to this point in the project has typically relied on a single degree-of-freedom model where the backfill and pile cap are treated as one composite structure. Although this simple approach was initially instructive for analyzing the test data, we are now moving towards a two degree-of-freedom model where the pile cap and the back fill soil are treated separately. This will allow us to investigate the stiffness and damping of the pile cap and backfill soils separately. We believe that this approach will provide a better understanding of the complex behavior observed during this testing.

In the previous quarterly report we sent plots showing damping ratio obtained for the various tests using the half-power band width approach. For the high damping levels involved, this method can overestimate the measured damping. Subsequently, damping ratios were computed by evaluating the ratio of dissipated energy to strain energy using the load-displacement loops for each cycle. Typical results using this approach are provided in an interim report describing analysis of the static and dynamic response of the pile cap with and without an MSE backfill (Task 6). This report is attached. As indicated, this analysis has only used the single degree-of-freedom approach to this point, but the observations relative to dynamic passive earth pressure are similar to what

Japanese researchers are seeing from large-scale shaking table testing with a 20 ft high laminar shear box.

We have also worked on preparing sections of the final reports for work tasks 5 and 6 involving the static testing and these sections are nearing completion. As part of this report preparation, we are comparing alternative approaches for evaluating stiffness and ultimate passive force with the measured response. We are also comparing results from the pile caps at South Temple and at the SLC airport which had different heights (3.67 ft vs. 5.5 ft) and width to height ratios (4.6 vs. 2.0). This will allow us to evaluate the effects of these factors on the measured response and allow us to evaluate design procedures which can account for the observed behavior.

Budget Considerations

We estimate that approximate \$190,000 will have been spent at the end of the quarter on work associated with Tasks 1-7. The total budget associated with all the project tasks is \$265,395. Therefore, approximately 72% of the budget has been spent for these tasks. We estimate that approximately 80% of the work on the project has now been completed. Therefore, the project appears to be on track from a budget standpoint.

Plans for the Next Quarter

We anticipate that the sections of the final reports associated with the static testing will be completed for work tasks 3, 5 and 6 during the next quarter. In addition, we anticipate that most of the analysis associated with Tasks 5 and 6 will be completed during the next quarter.