

## **Dynamic Passive Pressure on Abutments and Pile Caps**

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### **Quarterly Report May 2007 - July 2007**

The test pile cap with dimensions of 4.57m x 3.35m x 1.68m (length x width x height) was constructed and a sheet pile wall was installed to increase the reaction capacity of the two existing 1.22 m diameter drilled shafts. Test equipment from BYU and the NEES@ucla equipment site were mobilized and installed at the field test site. Static cyclic and dynamic load tests were completed for the four following backfill configurations: (1) no backfill against pile cap, (2) 0.9m of granular roadbase against cap with remaining backfill consisting of loose sand, (3) 1.8m of granular roadbase against cap with remaining backfill consisting of loose sand, and (4) an MSE wall section in place of a full-width sand backfill. These tests are complemented by other tests completed as part of a NSF/NEES project which included tests with the following backfill configuration: (1) full-width dense sand backfill, (2) full-width loose sand backfill, (3) full-width dense road-base backfill, (4) full-width loose road-base backfill, (5) full-width dense gravel backfill and (6) full-width loose gravel backfill. Photos of the test pile cap and loading system are provided in Figures 1 through 3.

Data collected during the tests included actuator force, shaker force and frequency, pile cap acceleration and displacement, soil pressure measurements, deflection versus depth profiles in the piles and in the backfill soil, and settlement/heave measurements in the backfill. The deflection versus depth profiles in the piles were obtained using both conventional inclinometer tube soundings as well as a series of six shape accelerometer arrays. The shape arrays consisted of tri-axial accelerometers at 0.3 m intervals along a 7 m length and provide a continuous readout in contrast to inclinometers. The measured deflections profiles from the shape array and the inclinometers compared favorably.

### **Plans for the Next Quarter**

Now that the field testing program is essentially completed, the next quarter will be spent to reduce the test data and produce the necessary plots of tests results.

### **Budget Considerations**

We estimate that approximate \$148,200 will have been spent at the end of the quarter on work associated with Tasks 1-6. The total budget associated with all the project tasks is \$265,395. Therefore, approximately 55% of the budget has been spent for these tasks.

We estimate that approximately 60% of the work on the project has now been completed. Therefore, the project appears to be on track from a budget standpoint.



Fig. 1. Looking northwest at test site with reaction foundation (foreground), two 600 kip hydraulic actuators, and eccentric-mass shaker (blue device in background) mounted to test pile cap



Fig. 2. 0.9m wide granular backfill zone adjacent to test cap during removal of loose sand backfill



Fig 3. Looking south at MSE wall section with test pile cap and eccentric-mass shaker in background