

ABSTRACT

Pile Installation below a Settlement-Sensitive Bridge

by

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This paper presents a case history of the Berth M project on Pier 91 at the Port of Seattle. This project consisted of reconstructing 210 linear feet of wharf structure prior to new tenant activity beginning in 2009. Berth M was the last timber wharf to be reconstructed and replaced with new concrete wharf due to its proximity to a settlement-sensitive bridge, which is the primary arterial to a large neighborhood. Although this bridge was scheduled for replacement due to deterioration and seismic damage, the Port's schedule could not wait for that replacement to occur.

The project team developed a creative foundation design that included the following five pile types optimizing each for its specific location and use:

- Driven prestressed precast concrete piles for apron support away from the bridge;
- Driven steel pipe piles for bulkhead support away from the bridge;
- Driven sheet piles for bulkhead support away from the bridge;
- Drilled augercast piles for apron and bulkhead support near the bridge; and
- Drilled micropiles for bulkhead support under the bridge.

The paper presents advantages and disadvantages of each pile type in describing their use on this project. The designers recommended a program consisting of survey and vibration monitoring due to the project's close proximity to the bridge. This included more stringent monitoring for any pile driving or demolition (e.g., timber pile extraction) located within 50 feet of bridge foundation supports. Monitoring data are presented that show the influence of pile driving in terms of settlement and peak particle velocity at various locations within or near the site. This project was successfully completed 2008.

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