

## CASE STUDY

### Micropiles

**DATE:** 2003

**JOB NAME:** Shaw Island Ferry Terminal Slip Reconstruction

**OWNER:** Washington State Department of Ferries

**LOCATION:** San Juan Islands, Washington

**GENERAL CONTRACTOR:** American Civil Constructors/Hurlen Construction



As part of a statewide transportation plan for 2003, the Washington State Department of Ferries planned the reconstruction of the Shaw Island Ferry Terminal slip in the San Juan Islands near Anacortes, Washington. In order to continue safe and reliable operations to the tight-knit community residing on Shaw Island the project provided for the replacement of the deteriorated transfer span, towers and wing walls.

American Civil Constructors / Hurlen Construction was awarded the contract for the project and awarded the micropile, ground anchor, and wingwall dowel work to Northwest Cascade's Geotechnical Division. Northwest Cascade's scope of work included the design, installation, and testing of 27 each micropiles, 21 each rock anchors, and 22 each wingwall dowels.

Micropiles on the project were used to strengthen the existing bridge deck to allow for higher traffic loads on the timber structure. Installed both vertically and at a 30° batter the micropiles were designed for a design load of 90 kips in tension and compression. The elements were made up of 8" X-Strong steel pipe with a continuous Dywidag threadbar through the rock-socket. Micropiles were selected for this project due to the lack of overburden on the ocean floor and the environmental concerns in this pristine area.

The tiedowns and dowels served to provide uplift and shear load requirements to the driven pipe piles, which made up the foundation for the wingwalls and transfer span. The 13-strand tiedowns were up to 93' in length with a bonded zone of 30' to hold the tension design load of 420 kips.

The 70' long wingwall dowels consisted of 3 each epoxy coated #18 Dywidag threadbars bundled together, they provided shear strength to the battered pipe piles that backed the wingwall dowels.

The majority of the work on this project took place on temporary platforms built up over the water with support equipment located on barges. The drilling was accomplished with a modified Klemm 806 hydraulic drill rig and used high-pressure air to flush the drill spoils. The drilling operation was set up with a closed drilling system, which provided 100% containment of the drill spoils to meet the environmental restrictions of the project area.

Even though the terminal remained in operation for the majority of the job, the project was completed on time and under budget. All the players involved considered it a major success.