



Photo courtesy Tri-Met

TILIKUM CROSSING, BRIDGE OF THE PEOPLE

PORTLAND, OREGON, USA

Portland, also known as the City of Bridges, is the new home of America's first car-free bridge. Built to accommodate trains, buses, bicyclists and pedestrians, this \$135M project is also the first bridge built across the Willamette River in four decades.

Each of the two main in-river towers consisted of six drilled shafts extending approximately 130 ft. below the river bottom. This project incorporated load tests on two production shafts, located at each of the two main towers. Shaft construction involved the use of a temporary work trestle. Malcolm Drilling Company used an oscillator rig to install a 3,000-mm segmental casing to tip. Each test shaft utilized four 3,900-kip O-Cells installed at a single level near the shaft tip.

The torsional forces required that the bridge be innovative and extremely stiff. The very large working loads support was to be from

side shear and end bearing provided by shafts placed into the Troutdale formation. Troutdale is a hard till (often partially indurated) of cobbles, gravel and some volcanic sands deposited eons ago by ancient rivers.

Testing was very successful with the desired results obtained at or very near the maximum O-Cell load capacity. This resulted in the redesign of the remaining shafts to shorter lengths. Design optimization has many obvious benefits, including reduced time and construction cost, and can also lessen associated environmental effects.

PROJECT INFORMATION

- Owner: Tri-County Metropolitan Transportation District of Oregon (TriMet)
- Prime: Kiewit Infrastructure West Co.
- Drilling Contractor: Malcolm Drilling Company, Inc.
- Engineers: T.Y. Lin International
- Completion Date: September, 2015
- Project Cost: \$135 million
- Maximum Load: 28,400 / 30,200 kips

SERVICES PROVIDED

- Load test program design
- Single Level O-Cell load test and report

One production test shaft was installed as part of each of the two main towers. The first test shaft was installed just before Christmas in 2011 and tested after the new year. The four O-Cells applied a combined load of over 30,000 kips to the shaft both above and below the cells. The shaft moved up 1/3 inch and down 3/4 inch.

The second test shaft was installed and tested in May of 2012. The four O-Cells applied a combined load of over 28,000 kips to the shaft both above and below the cells. The shaft displacement was roughly equal, with 1/2 inch in each direction.

Both test shafts proved unit shear values in excess of 20 ksf and unit end bearing values over 150 ksf in the Troutdale.



Early morning concreting



Cage installation



Sectional casing removed