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FOUNDATIONS

Load test supports savings

Load testing proved caisson length excessive.

Engineers suffering from tight budgets and extremely restrictive working conditions on a northeast New Jersey rail project recently turned to a new foundation load test to help cut costs. Although the test lopped off close to $9 million from the project's foundation cost, its newness has made it slow to catch on nationwide.

The original foundation plan for the proposed 40-story office tower in the Northeast Corridor Rail Transfer Station in Secaucus included poured-concrete caissons, each bored about 30 ft deep into solid rock (ENR 12/12/94 p. 23). That depth "is normal in this area," says Issa S. Oweis, a principal with Converse Consultants, Parsippany, N.J.

The caissons also had to be situated between active rail tracks. So, the nearly $18-million foundation cost "proved too much for our budget," says Richard Ragold, a Converse geotechnical engineer.

Test cell/frame for load test.

The challenge. To cut costs, the engineer decided to challenge the assumed soil design side-shear capacity, which is about 100 psi, including a safety factor. Two Osterberg load-cell tests were performed in November 1994 by Loadtest Inc., Gainesville, Fla. (ENR 5/10/93 p. 23).

The contractor first bored through a nearly 50-ft-thick overburden of spoil, peat, varved clay and glacial till. Workers followed that by drilling two 5-ft-deep by 36-in.-dia test sockets in the underlying rock.

Each boring was jacketed and its bottom was lined with a 3-to-8-in.-thick mortar bed. Workers then lowered a steel frame fitted with an Osterberg cell, hydraulic line, strain gauge and telltale into each boring and concreted it in place.

Pressurizing the cell with pumped-in hydraulic fluid was the eye-opener. The pressure exerted upward and downward movement, indicating a shear of 200 psi. This figure permitted designers to "cut the socket length in half," says Oweis.

Testing. "The amount of [Osterberg cell] testing has been increasing over the past few years," says Jeffrey W. Goodwin, a geotechnical engineer with Loadtest's Baltimore office. "We've gone from 10 [tests] per year to between 60 and 80 [per year] in the last three years" he adds.

Goodwin attributes the increase to a combination of greater client sophistication, a growth in value engineering, and a pack mentality. "You see [testing done in] a cluster; one in an area, then two, three and five in the surrounding areas. Ninety-five percent of the time they see cost savings," he says. "The other five percent, they find problems." ▣

By Matthew Phair