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FIELD TESTS AND NEW DESIGN PROCEDURE FOR LATERALLY LOADED DRILLED SHAFTS IN CLAY

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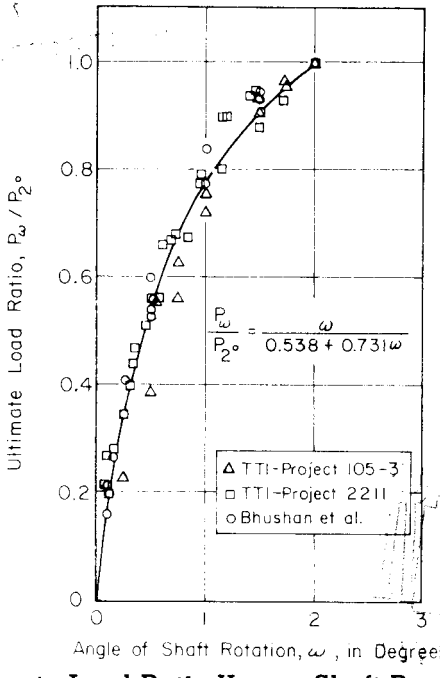

Ultimate Load Ratio Versus Shaft Rotation

Cooperative Research Program of the
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Field Tests and New Design Procedure for Laterally Loaded Drilled Shafts in Clay

by

Mark M. Bierschwale, Harry M. Coyle and Richard E. Bartoskewitz

The report summarized presents the results obtained during the fourth year of a four-year study on drilled shafts that are used to support precast panel retaining walls. A summary of data from the two previous tests conducted for this study is included. The objective of the study was to develop criteria for the design of foundations for this purpose.

A drilled shaft sustaining a lateral load may behave as either a flexible or rigid foundation member. During the first year it was determined that many drilled shafts that are used in this manner can be designed or analyzed as rigid structural members. The first part of this report discusses the characteristics and behavior for both flexible and rigid shafts in addition to briefly summarizing research which has been undertaken in recent years relating to the design of rigid shafts.

During the final year of this study, a lateral load test was conducted on a 2.5-ft-diameter by 15-ft-deep instrumented drilled shaft founded in a clay soil. During this test, long-term lateral loads were applied to the test shaft. The purpose of this phase of the study was to determine if the application of long-term loads would result in excessive time-dependent deformations. For each increment of the applied lateral load the shaft rotation, soil resistance, and lateral deflection were measured.

Using the results of the three field load tests conducted during this study and five load tests reported in the literature, the ultimate capacity for rigid shafts was defined as the load which corresponds to a shaft rotation of 2 degrees. Based upon this definition, an empirical correlation was derived relating lateral load to rotation. This correlation enables the engineer to predict a load-rotation curve for a particular size shaft up to a rotation of 2 degrees. Also, using the results of the eight load tests, various analytical methods were employed to compute the capacity of the shafts. Comparisons were made between measured field lateral capacities at 2 degrees of rotation with those predicted by the analytical methods. Based upon these comparisons and a correlation developed relating soil shear strength to the ultimate resis-

tance coefficient, N_p, at the groundline, a recommended design procedure for rigid laterally loaded drilled shafts was formulated.

Use of the recommended design procedure results in excellent agreement between measured and predicted ultimate lateral capacities, and predicted and measured rotations between 0 and 2 degrees. In addition, the procedure allows the engineer to design a shaft such that the amount of rotation may be limited to a specified amount.

The published version of this report may be obtained by addressing your request as follows:

Mr. Phillip L. Wilson, State Planning Engineer,
Transportation
Transportation Planning Division
State Department of Highways and
Public Transportation — File D-10R
P. O. Box 5051
Austin, Texas 78763
Phone (512) 475-7503 or STS 822-7403