



Research: Laterally Loaded Drilled Shafts Behind an MSE Wall Wyndotte County, Kansas

DBA Services: DBA assisted in designing the drilled shaft test program, observed the testing, and performed analyses of the lateral load response of the drilled shafts.

Project Highlights: Drilled shafts used to support sound walls and other structures are often constructed near the facing of mechanically stabilized earth walls (MSE walls) due to right-of-way constraints or other limitations. Suppliers and designers have expressed concern that lateral loads from the shafts may be transferred to the wall facing, causing excessive deformation. Procedures currently available to design MSE walls to resist internal lateral loads are very conservative. Techniques such as isolating the shafts from the backfill or using extremely large shafts to minimize deflection have been adopted. These designs are very expensive and in some cases lead to other problems. The ultimate goal of the study was to develop rational design procedures for situations where drilled shafts are constructed near or adjacent to MSE walls.

Seven test shafts and six reaction shafts were constructed at a test site near Kansas City, Kansas at the I-435 interchange with Leavenworth Road. The reaction shafts were socketed into the underlying limestone and shale bedrock while the test shafts were tipped above the bedrock. All of the test shafts were located within the reinforced backfill zone of the wall, varying the distance between the shafts and the wall face. Single shafts and shaft groups were loaded laterally. The wall face, reinforcing geogrid materials, and backfill were instrumented to measure loads, strains, and movements. The shafts were built with inclinometer casings to allow measurement of shaft deflections using an inclinometer during the tests. Many of the materials and construction work for the wall and shafts were provided as in-kind donations by various companies, including Tensar who supplied the geogrid. KDOT Maintenance personnel performed much of the construction work and provided support for the load tests.

Analysis of the drilled shafts consisted of:

- 1) developing a reasonable baseline soil model for the unreinforced fill.
- 2) performing LPILE analyses for each test, reducing the p -multiplier to achieve a reasonable match to the observed deflection response of each shaft.
- 3) calculating the mobilized shear with depth using the "best fit" p -multiplier values.

Sponsor:
Kansas Department of Transportation

Key Participants:
University of Kansas
DBA
Applied Foundation Testing, Inc.
Tensar International

