Memo of Work Task Completion

Date: 20 November 2020

To: David Stevens, Research & Innovation Division, Utah DOT

From: Prof. Kyle Rollins, Civil & Environ. Engineering Dept., BYU

Re: Completion of Work Task 8 Development of P-multipliers

With this memo I am confirming that we have completed Work Task 8 regarding the development of P-multipliers based on the results from the fixed-head and 24 inch diameter test piles in connection with FHWA Pooled Fund Study TPF-5(381) Evaluation of Lateral Pile Resistance Near MSE Walls at a Dedicated Wall Site-Phase 2. Detailed information regarding the development of the p-multipliers is provided in two draft final reports for these tests that have previously been submitted to Utah DOT. Therefore, this memo will only provide a summary of the procedure used and the results obtained.

Based on the measured pile head lateral load-deflection curve for the test pile furthest from the MSE wall (typically about 5 pile diameters away), the computer program LPILE was used to back-calculate soil parameters necessary to produce reasonable agreement between the measured and computed curves. Typically, the lateral stiffness coefficient, k, was adjusted to improve agreement with the measured curve at smaller displacements, while the friction angle, ϕ, was adjusted to improve agreement at larger deflections. After these soil parameters were obtained, they were held constant for subsequent analyses of test piles located closer to the Mechanically Stabilized Earth (MSE) wall. P-multipliers, P_{MSE}, were then back-calculated, again using LPILE, to obtain the best possible agreement with the measured pile head lateral load-deflection curve for the other test piles at closer distances from the MSE wall. Generally,

the agreement between the measured and computed curves was very good. Figure 1 shows a plot of the back-calculated p-multipliers from the fixed-head test piles and from the 24 inch diameter test pile in this study in comparison with the p-multipliers obtained previously in phase 1 with 12 inch diameter free-head tests. The new p-multipliers generally plot within the observed scatter about the best-fit line developed in phase 1; however, they are either on the line or below it. This suggests that for the larger loads imposed by the fixed-head and 24 inch diameter piles, a somewhat lower p-multiplier might be appropriate for design.

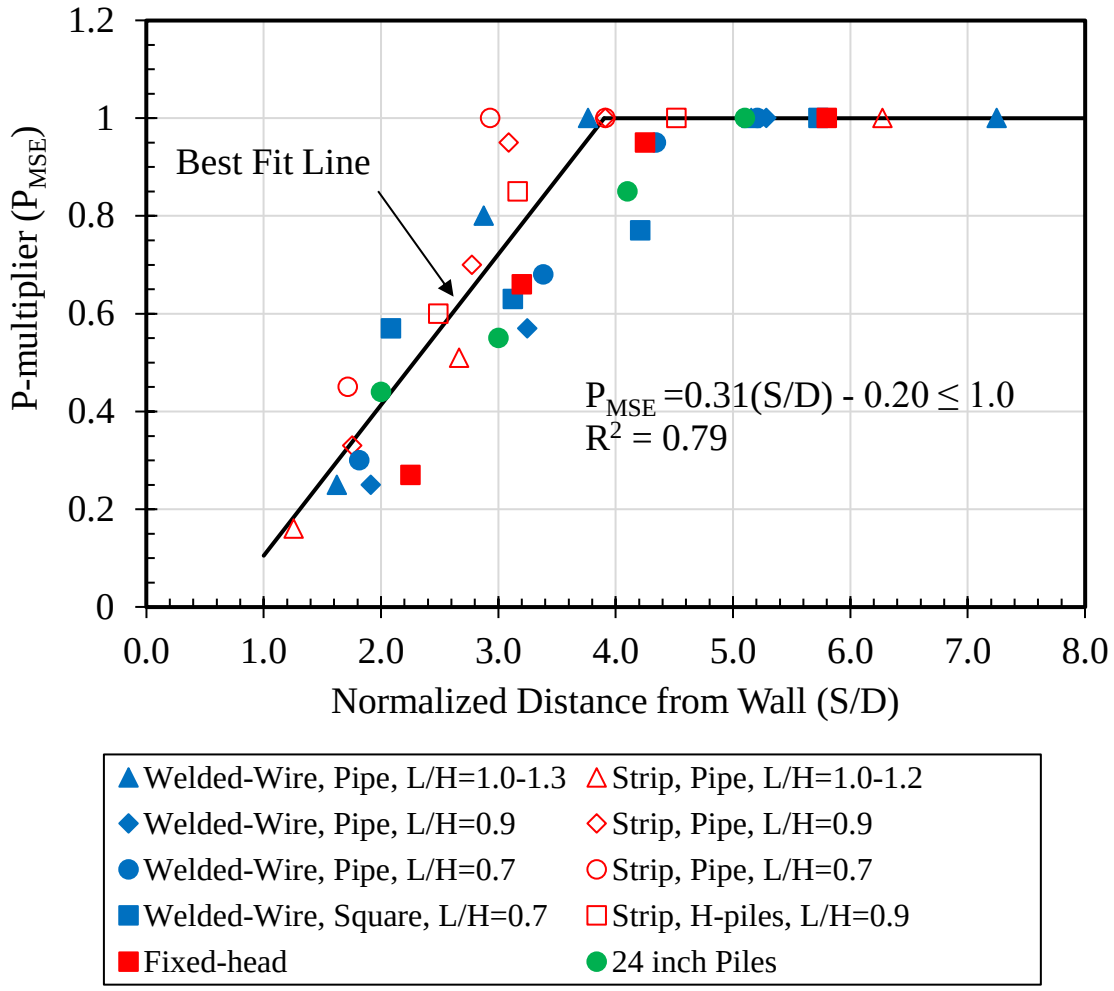

Figure 1. Back-calculated p-multipliers for fixed-head and 24 inch diameter pipe piles in this study compared with p-multipliers for 12 inch diameter free-head piles obtained in Phase 1 testing.