



Drilled Shaft Foundation and Anchored, Drilled Shaft Soldier-Pile Wall Design for an Automated People Mover Guideway

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Abstract

As part of Stage 1A for the PHX Sky Train project at Phoenix Sky Harbor International Airport in Phoenix, Arizona, a three-quarter-mile-long above-grade and below-grade people-mover guideway is being constructed between existing airport Terminals 3 and 4. The design of the large-diameter drilled shafts supporting the elevated guideway is complicated by space constraints, due to the elevated guideway alignment being situated between an existing adjacent retaining wall and an existing high-pressure jet fuel line, both of which are to remain in service during construction. Finite element analyses were performed during design to estimate the deflection of the existing retaining wall during staged construction of the guideway drilled shafts. Monitoring of the wall during construction confirmed the geotechnical design analyses, indicating that the new drilled shafts did not cause any detrimental deflection of the existing retaining wall. For the depressed section of guideway passing below two adjacent aircraft taxiway bridges, top-down construction methods were designed to construct an additional end-span and new abutment for these bridges. A combined drilled-shaft soldier pile, tieback anchor, and taxiway anchor slab system was designed to resist the high loading conditions. The drilled shafts are to be used for both foundation support of the taxiway undercrossing bridge abutments, and as the earth-retention system for excavation support. Numerical analyses were performed to predict the short- and long-term behavior of the new abutment wall. Based on survey monitoring of the new abutment wall performed during construction, the recorded lateral movement of the wall is significantly below that calculated by numerical analyses.

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DOI:

<http://dx.doi.org/10.1061/9780784413272.413>

Published online: March 25, 2014

ASCE Subject Headings: . Arizona, North America, Phoenix, United States

Conference Information

Geo-Congress 2014

February 23-26, 2014 | Atlanta, Georgia

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