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Design and Construction of CFA piles in High-Speed Rail project

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Abstract

High-speed rail is an infrastructure project in metro cities that requires a suitable foundation system as it involves complex execution processes and works in limited space. Due to the high cyclic and moving load shallow foundation is not a feasible option. Pile foundations are often considered in this type of project. Continuous flight auger (CFA) piles gained popularity over bored cast in-situ piles due to their cost-efficiency, less carbon footprint, quick construction, low noise levels, and no vibration (so best suited in constrained built-up areas with weak soil condition and high GWT). This paper is a case study of the design and construction of Drayton Lane over bridge, HS2 project, UK. At this location, the existing soil strata is Glacial Till followed by Mercia Mudstone. The single pile design was performed in ALP software using characteristic stiffness values for piles at the Pier location and soil structure interaction was performed in PLAXIS-2D software for piles at the Abutment location. The pile group settlement is estimated based on the equivalent footing analogy. Existing natural soil parameters and spacing between the piles affect the overall efficiency and construction feasibility of the CFA piles.

This paper also elaborates on the detailed design and construction challenges of CFA piles in high-speed rail project.

Keywords: High-Speed Rail, CFA piles, Stiffness, ALP and PLAXIS-2D.

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