

# Single Row Piles in Integral Bridge Foundations: Challenges and Solutions

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## Abstract

This paper presents the challenges and their solutions adopted for the design of two-span continuous integral overbridges supported by single row pile foundations without any interfacing pile cap elements, as part of A14 Cambridge to Huntingdon development. The paper highlights the geotechnical modelling limitations, construction requirements, contractor's preferences, and other constraints placed on pile configuration due to load demands and form of superstructure. With respect to structural aspects of design, the paper discusses the design challenges and solutions associated with reinforcement detailing within the abutment and pier walls in absence of interfacing pile cap elements. It also touches upon use of strut and tie approach, to propose a safe and buildable detail around the pile reinforcements, and the reinforcements of the substructure element.

**Keywords:** integral bridges, strain ratcheting, continuous flight auger, strut & tie, buildability.

## 1 Introduction

The 'A14 Cambridge to Huntingdon' is the first project of its kind being delivered under Collaborative Delivery Framework (CDF) for the client, Highways England, UK. The client has appointed Atkins and CH2M, as the collaborative design delivery partners for the scheme.

The client has engaged the contractors early, to work together with the design consultants: review, advice for safe buildability and advice on construction related issues. All these were addressed at detailed design stage, so that the construction stage is streamlined.

As is evident from the CDF set up, the key stakeholders in the scheme works together collaboratively, with a single objective of delivering the project successfully; to quality, cost and time.

The project scope under bridges and structures was delivered in the form of "good for construction" drawings during the detailed design duration. The work was closely monitored by the client, and the final deliverables incorporated the

recommendations, observations, best practices, buildable and safe solutions identified from both client and the contractor's involvements.

The design consultants checked each other's deliverables and shared best practices, thereby furthering the quality of deliverables, from collective experience.

The bridges and structures scope was broadly categorised under the following:

1. Standard Overbridges over A14
2. Bridges carrying the A14 over other roads
3. Pedestrian and equestrian Bridges
4. Gantries

This paper particularly covers the eight Standard Over Bridges grouped together and their foundations proposed therein.