

Going the extra pile! Featherbed Lane Road/ Rail Bridge, Apsley

OSBORNE

How do you arrive at the best foundation solution against a complex set of constraints?

At Featherbed Lane, railway risk was controlled by engaging the right team at the earliest stage of design development.

All ground risks were interrogated and all methods verified to give 100% confidence in delivery.

PROJECT

Apsley Bridge

CUSTOMER

Bovis Homes

LOCATION

Hemel Hempstead

CONTRACT

Design and Build NEC 3 - Lump sum

VALUE

£7.3M



Issue

Installing foundations for a new road-over-rail bridge within metres of residential properties was challenging.

Every decision during design and construction had to consider the continued safe operation of the West Coast Mainline running beneath the structure. Added to this was the requirement to keep the road into the nearby Manor Housing Estate open throughout construction.

Importantly, the design and installation method had to meet the specific requirements of Network Rail's Outside Parties Asset Protection Guidelines together with the requirements of the local highway adopting authority, the customer - Bovis Homes and local residents and stakeholders.

Piling Solution

From the outset we formed a highly engaged and experienced team which played an integral part in producing an efficient and effective design and methodology.

Armed with our specialist knowledge of bridge foundation design and installation

options, we developed a proposal that delivered against the exacting rail and highways standards and also provided the best fit whole life design.

A critical issue faced by the team was the ground conditions and the close proximity of the railway to the bridge foundations. The ideal solution in terms of programme and cost would be to install the foundations during daytime working with trains running.

Using the ground investigation data, continuous flight augured piles (CFA) were selected. CFA piling uses a continuous augur to bore into the ground and then place pumped concrete as the augur is extracted. The technique overcame the piling risk from voids in the chalk and the made ground.

However the 750mm diameter piles had to be augured to a depth of 25m, which introduced rig stability and cage handling challenges with the close proximity of rail and road.

To overcome the risk and enable programme critical daytime working, a segmental flight augured (SFA) technique was proposed. The SFA rig was only 7m high as short sections of augur were jointed during piling to achieve the required 25m depth. In turn, short sections of reinforcement were spliced together as the reinforcement was plunged into the concrete.

Onsite trials verified the methodology and the load capacity of the piles leading to optimisation of the installation programme.



Figure 1 – Rail Embankment Piling

Outcome

With the risk effectively mitigated and controlled our customer's trust in the professional team was well founded.

The bridge foundations were completed to programme during normal day time operation of the West Coast Mainline and the final structure installed during a very short 5 hour overnight rail possession.