

# Werrington Grade Separation, Peterborough

Network Rail's Werrington Grade Separation project when complete, and coupled with upgrades elsewhere along the route, will see increased capacity in journeys between London and Edinburgh on the East Coast Main Line (ECML).

The Project, which forms part of Network Rail's East Coast Upgrade, also includes upgrades at London King's Cross, Stevenage and a number of other smaller projects that collectively will allow two additional long-distance high-speed paths per hour from London to Doncaster, as well as increasing the line's freight capacity.

The Site was split generally into North (Phase I) and South (Phase II); Morgan Sindall Infrastructure PLC awarded both phases of the works to Bauer Technologies upon successful completion of the Phase I works.

*Bauer's scope of works included:*

## Phase I

- TBM Launch Pit, 183No 900mm Rotary Bored Piles x 12.5-16m deep
- Stamford Under Bridge – 120No 900mm Rotary Bored Piles x 6.5 - 15.75m deep
- Cock Lane Footbridge – 4No 900mm Rotary Bored Piles x 13m

## Phase II

- South Wall – 693No 900mm Rotary Bored Piles x 11 to 13m
- Jigsaw – 135No 900mm Rotary Bored Piles x 14 to 16m
- Jacking Slab – 30No 1200mm Rotary Bored Piles x 6.9m
- A15 dive under – 142No 600mm SFA Mini Piles
- Lincoln Rd Footbridge – 44No 900mm Rotary Bored Piles x 10 to 13.5m

All piles were installed complete with full length reinforcement.

Works commenced onsite in March 2019 after 8 weeks of planning and preparation. As a large and complex project all piling works were modelled and planned using Bauer Visual Site Installer (VSI) BIM software, although there were still several challenges to be overcome.



For example, the 183No piles required for the TBM Launch Pit (Phase I) was an increase on an original scope of 120No piles; the TBM Launch Pit was increased in length to aid later construction of a syphon for the Werrington Brook that passed through the site. Piling was also expected to be wet, however Bauer quickly discovered that the piles were dry and that the BG45 drilling rig had more than enough torque to drill the strong Cornbrash Limestone, which was encountered at 11m to 13m depth.

Bauer also installed complex GFRP cages in the face of the launch pit, to allow for easier exiting of the TBM's that were used to build the pilot tunnels for the main box jack operation.

Phase II of the project commenced in June 2019, with work on the Stamford Under Bridge (UB), although this element of the project was awarded as a bolt on to the Phase I works, before the full Phase II contract was let. The Under bridge consisted of 120No Piles to allow the top down construction. This bridge ultimately takes the new Stamford

Line around the dive-under structure.

The Cock Lane Footbridge (CLFB) was completed as part of the Stamford UB package, and whilst needing only 4No piles, it required the most intensive planning due to the tight working area and the 400kV overhead lines that ran through the site. Works on this element of the project were also planned and executed utilising a very detailed model produced using Bauer VSI software package. The South Wall was split into two sections to allow for the Stamford Line to be slewed over the Stamford UB during Christmas 2019.

The initial West Wall consisting of 281No Piles followed on from the Stamford UB and CLFB in July 2019. The line of the wall along the Stamford line dictated that the rig and the crane were required to work under strict conditions, which was up to 3m from the running line and between live overhead line masts and bases. In order to increase productivity, a second rig was mobilised early and used for lifting operations due to restrictions imposed on the cranes.

Works were completed on time and all machines were demobilised from site late September.

During November, the A15 Dive under structure section required piling works to allow the use of the existing road bridge to be used to carry the new Spalding dive under line. Works were restricted to a head room of 6m, which required the use of mini piling equipment. For this part of the project Bauer mobilised a low headroom Klemm KR709 Drilling Rig to install Sectional Flight Auger piles in the area.

After Re-mobilisation, Jacking Slab Piles were completed in December 2019, and this too posed issues with the working area being very restricted in the 9m deep cut at the throat of the TBM launch pit; piles were also drilled directly into Mudstone and Cornbrash Limestone.

Following on from the Jacking Slab Piling, 'the Jigsaw', the reception pit for the TBM was late starting in Feb 2020; therefore, it was accelerated and was completed in under 4 weeks, with Bauer working 12-hour days and night shifts. Using similar information to Phase I, Bauer detailed the complex GFRP reinforcement at the face to allow easier entry of the TBM's into the reception pit.

Stamford line was slewed as planned over the Christmas Break; and therefore, the South Ramp East Wall and Jigsaw structures were installed in an 'island' between the new Stamford lines and East Coast Main Line. During these works, concrete was pumped under the Stamford Lines to the



working rigs and cages were either taken in with line blocks or during night-time possessions. The Stamford UB allowed for small plant and pedestrian access to the worksite.

The Remaining 412No Piles of the East Wall and sections of the West Wall followed on from the Jigsaw and were installed under full COVID-19 restrictions, as work was undertaken during the lockdown in March/April/May 2020. Bauer worked with our concrete supplier, CEMEX and steel supplier ArcelorMittal to maintain production and finish on schedule.

Lincoln Road Footbridge was the last package of works and was awarded at the end of the project also requiring working under lockdown conditions. Specifically, the works

involved installing piles for a top down construction of a new footbridge over the new Spalding dive under lines. Works here too were restricted and required temporary works checks and innovations to allow for the piling rig to be positioned to install the piles from above the operational Spalding line.

Bauer's work on the project commenced March 2019 and was completed August 2020, with the company deploying a BG45 PL, BG30 PL, BG30 VL and Klemm 709-1 to undertake the works. Additionally, 1000/900mm Casing with 900mm Tooling, 1300/1200mm Casing with 1200mm Tooling, and 600mm Sectional Flight Augers were used as well as PM55 and PM80 Concrete Pumps and a 9m<sup>3</sup> and 12m<sup>3</sup> Concrete Agitator.

**Principal Contractor:**

Morgan Sindall Infrastructure Plc

**Piling Contractor:**

BAUER Technologies Limited

**Contract Period:**

March 2019 to August 2020

**Equipment Used:**

- BG45 PL, BG30 PL, BG30 VL, Klemm 700-1

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