Barhale

Beckton Pipeline

Client:	Costain Limited, Atkins Limited, Black & Veatch Limited, (CABV JV)
Location:	Beckton
Value:	£3.6m
Duration:	2 Years

In Brief...

As part of the wider Thames Tideway scheme, Barhale were engaged to design and build a new 60m long, 2.8m diameter, steel pipeline within the Beckton Waste Water Treatment Works (WWTW). The new pipeline will connect the existing Lee Tunnel to a new Storm Tunnel, and substantially increase storage capacity during flooding, thus reducing the amount of sewage being released into the Thames River yearly.

Barhale designed, fabricated and installed most of the elements, including all the steel work. We provided technical and engineering support to integrate our works into the client BIM system. We also delivered several specialist design, fabrication and lifting solutions to overcome numerous restrictions. Now complete, the works are part of the permanent Thames Tideway solution.

2800mm dia. Pipe and BCS fabricated staircase half way up the shaft

Installation of horizontal pipework

Technical Features...

Barhale's scope of work entailed the installation of approximately 30m of horizontal supported pipeline overland, connecting from a flange provided at the existing Lee Tunnel Flow Collection Chamber. This led through a 90 degree bend to a vertical pipe within the 27m deep Delivery Shaft. The vertical pipe connects to the new 800m Storm Tunnel (constructed by others).

The pipe segments each come in a variety of lengths, with the longest section being just over 11.6m. They also hold a significant weight, with the heaviest section weighing 26T. To lift the "vertical" sections of pipe into place, two cranes (200T and 90T) worked in unison to ensure the load was stable throughout and positioned correctly. The team utilised specialist in-house pipe fitters with the required knowledge and experience of working on pipework of this size.

Within the shaft, the team connected the new pipework into the tunnel via grouting. The final pressure testing was undertaken in two sections, to ensure no fluctuation in pressure between the top of the main and the bottom (potential difference of 3-4 bar pressure).

Once Barhale connected the 2.8m ID steel pipe to the 3meter dia segmented tunnel, a water proof plug was cast into place. This was made up of water proof concrete mix with a water W/C content of 0.35% and steel reinforcement. Reinjectable grout tubes where placed for future use and maintenance.

The works entailed complex temporary works. These included scaffolding to provide staged access for the installation of the pipeline segments. Barhale designed and erected a dedicated scaffold tower in the 30 meter shaft. This was necessary to ensure that the duration required for torqueing each bolt on the flanged joint could be respected (875Nm with 3 passes every 24hrs). The scaffolding as also used to carry out checks on the flanges during the system drop tests.

90 degree pipework alignment check prior to horizontal pipe installation

Section of steel staircase fabricated and delivered by BCS

Technical Features Cont...

Barhale undertook rigorous quality assurance through extensive ITP and factory checks. We engaged with the supplier and continuously monitored quality assurance throughout the fabrication process, including through multiple visits and audits at fabrication sites. As a result, the steel supplied from China (due the size of plates) could be tracked from milling through to the precise use of each plate for the construction of the corresponding pipe. On the 2.8m ID pipe line there were over 3km of submersed arc welding, each carried out to a unique WBS (Welding Procedure Specification).

The client specification for the pipe coating required a 120 year life expectancy. This was a challenging specification: it exceeds British Standards requirements, and no supplier could vouchsafe for such a long durability, as coating systems have only been introduced to the industry 50 years ago. However, Barhale was able to meet it through the introduction of a strict maintenance regime.

In-House Steelworks...

In addition to delivering the pipeline and all associated works, Barhale were also in charge of delivering all steel supports outside of the shaft. Except for the pipe itself, all steel work was fabricated and installed by BCS, Barhale's in-house steel fabricator. This included welding specialist lifting points to the pipework to enable safe lifting, as well as fabricating a bespoke steel access staircase within the shaft. The staircase was manufactured and installed within 8 weeks of drawing approval. The finished structure measured 4m x 3m x 27m and weighed approximately 20T.

Barhale achieved this milestone by successfully integrating client and contractor 3D modelling software to align the key parameters, and by utilising the technology available within the supply chain to significantly reduce manufacturing time in their workshop. Additionally, design innovation substantially reduced the time on site as compared with traditional manufacturing methodologies. This also reduced the installation time from a projected 6-8 weeks to only 5 days.