Refurbishment of Tail sluice gates to extend operating lifetime

The Saddlebow Tail sluice’s is the final stage in the Flood Relief Channel, which runs 10 miles (17km) from Denver to Saddlebow and can hold up to 9.5 million cubic metres of water at a time (more than 2 billion gallons). It was designed to protect 960 homes from the ravages of flooding from rivers, such as the severe 1947 floods, and tidal surges, such as the devastating 1953 floods. Our essential works will ensure the continued operation of Saddlebow Tail, which has been in place near King’s Lynn for 50 years.

This project involved the renovation of the seven sluice gates and the replacement of chains used to operate them.

**Year 1:** Construction of temporary access and encapsulation to facilitate the refurbishment of three sluice gates, including grit blasting, painting and resealing.

**Year 2:** Construction of temporary access and encapsulation to facilitate the refurbishment of four sluice gates, including grit blasting, painting and resealing. Removal and replacement of two sets of lifting chains used to operate the gates.

**Year 3:** Construction of temporary access and encapsulation to facilitate the refurbishment seven cantilever sluice gates, including grit blasting, painting and resealing. Removal and replacement of five sets of lifting chains used to operate the gates.

The sequence of the operation was critical to mitigate the risk of flooding. We were only allowed two gates out of operation at any one time. This was the first time the chains had been replaced since the sluice was opened in the late 1950s. The new chains do not require lubricating and will save the Environment Agency £16,000 a year and are expected to last for 50 years.
Safe
Our focus on site was to make sure everyone went home safely, whilst minimising disruption to the local community. The type of work was well understood by the project team which consisted of The Environment Agency, Opus International and ourselves. The project team clearly identified the key risks and necessary mitigation strategies at an early stage of the project. Early procurement of plant and materials prevented long lead-in items.

Innovative
Our temporary works were crucial to the success of the project as we were only allowed to use cantilevered scaffolding which was shrink wrapped to facilitate a totally encapsulated working area. The existing water had to remain in situ as the stability of the structure could not be guaranteed during any de-watering process. The shrink wrapped working area kept weather elements out and kept dust and blast material in to reduce the risk of contamination of the M&E equipment and local environment. During the construction period additional works were instructed and carried out as critical path items as detailed within our construction programme. We were able to carry out 10 weeks of critical path items within our original allocation of time.

Honest
The project team was honest, committed and open to the challenge. There was a clear strategy from the outset. Good and effective team working led to early resolution of project issues. Throughout construction we investigated ways to add value and reduce costs. We were able to make savings through the following mitigation:

- Reduced fuel through utilising existing power units
- Remove the necessity to over pump flows by redesigning our temporary works
- We employed the services of a painting consultant to ensure ongoing specification compliance. This removed the need for lengthy end of contract inspections.

Collaborative
Throughout project appraisal, detailed design and construction options were continuously reviewed by Designer, Planning Supervisor, The Environment Agency and The Contractor. This review process allowed the combined expertise of the whole team to identify and mitigate risk through all stages of the project and arrive at a quick and clear decision on the most effective methods to refurbish both the sluice and lifting gates. We secured the services of a third party painting consultant to provide the client with design best practices and suitability of products. The consultant inspected each phase of our works before signing off to the satisfaction of the client. Through proactive planning and working as a fully integrated team we were able to deliver this project on programme to a very high standard and without incident, demonstrating fully the benefits of a coordinated team approach.