



**PROJECT**

Queensferry Crossing

**CLIENT**

Transport Scotland

**MAIN CONTRACTOR**

Forth Crossing Bridge Contractors





**The Queensferry Crossing is a cable- stayed bridge which is to the west of the existing Forth Road Bridge. The project was part of a package of transport improvements costing up to £1.6 billion and opened to the public in 2017.**

## Requirement

Forth Crossing Bridge Constructors (FCBC) an international consortium consisting of Hochtief Solutions, American Bridge, Dragados & Morrison Construction appointed Cleveland Bridge to fabricate, deliver and install the North and South approach viaduct steelwork as part of the £790m Forth Replacement Crossing.

## Project scope

Approach Viaduct South; Fabrication and site assembly of two lines of trapezoidal box girders 'twin box' running parallel to each other. Approximately 550m long. Approximately 5000 tonnes of steel.  
Approach Viaduct North; Fabrication and site assembly of two lines of trapezoidal box girders running parallel to each other. Approximately 80m long. Approximately 500 tonnes of steel.

## Solution

Cleveland Bridge fabricated two lines of trapezoidal box girders, then assembled the pieces running parallel to each other on site, using approximately 5000 tonnes of British-made steel for the Approach Viaduct South.

The Approach Viaduct North included the fabrication and site assembly of two lines of trapezoidal box girders running parallel to each other.

Within the Approach Viaduct North, Cleveland Bridge also assembled circa 5500 tonnes of 'single' box segments that were delivered from China in flat pack form.

The steel twin box girders of the viaduct were fabricated then preassembled at our manufacturing facility in Darlington. This helped reduce the amount of onsite welding and helped mitigate risk enabling a right first-time approach out onsite.

The completed girders were then transported by road in halves due to the width of the boxes. Each box half was up to 33m in length and 5m high. Working with our preferred transport provider this unusual load needed careful consideration due to road constraints and legislations.

Cleveland Bridge were also responsible for the Temporary works including trestles, stillages and jacks.





## Challenges

Early 2016 saw the completion of the launch of the Approach Viaduct North. In one of the most technically challenging operations of its type ever performed, the launch involved shifting the massive steel and reinforced concrete structure, with a total launch weight of 6,300 tonnes, some 230m out towards the North Tower. This operation was particularly significant due to the fact that trailing edge of the moving structure had to be extended over two ramp walls and pivot the structure over the top of one of the two support piers beneath, rather like a gigantic seesaw. This raised the front edge by 2m, resulting in the viaduct structure being at the correct geometry to match the emerging deck coming from the North Tower.

Another challenge faced was due to the expansion and contraction of the approach viaduct south, over 550m length, given the tight tolerances of 10mm width, 25mm between piers on the project. This was monitored in an ongoing phase by phase process by the Cleveland Bridge construction manager who made minor adjustments to the steel based on the design temperature, actual steel temperature and measured length of steel on site. By trimming the steel where required the tolerances were achieved.



## Outcomes

Transport Scotland's Queensferry Crossing is one of the most striking engineering icons of the twenty-first century. The crossing is both the UK's tallest bridge and the world's longest three-tower, cable-stayed bridge.

The praised aesthetic of the crossing, the speed of its construction and its high functional specifications are all dependent on steel, and the skill of the fabricators and engineers who worked on it.

Queensferry Crossing approach viaduct south received a special commendation at the 2018 Structural Steel Design Awards.



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