

# Case study

## Tyne Tunnel Construction (Second Vehicle Crossing)



### Key facts

**Key vendors:** TT2

**Site:** TT2

**Sector:** Infrastructure

**Client:** TT2

**Contractor:** Volker Stevin

- Easy accessibility to customer services and technical support
- Good supply chain
- Solution provider

Bardon Concrete developed a unique product whilst consulting with the customer to ensure the product was of the highest quality and met the requirements of the construction project

### Brief

The New Tyne Crossing is the project to design and build a second vehicle tunnel under the River Tyne, refurbish the existing vehicle tunnel and to operate and to maintain all the tunnels under the river until 2037. It is one of the biggest transport infrastructure projects currently active in Great Britain. The new tunnel is 1.5km in length, and the new entrance and exit approaches take the total length of new carriageway to 2.4km

The new crossing has been built using the cut and cover method, where a new channel was dredged on the river bed, and sections of precast concrete tunnel lowered into place.

The tunnel segments were manufactured on the banks of the river.

The four precast concrete sections measured over 90m in length each.

Bardon Concrete was involved at the initial consultation stage to assist contractors Volker Stevin in highlighting difficulties in the project before pouring commenced. This included overcoming issues such as thermal cracking, plastic settlement, chloride ion ingress, sustainability, and other design issues. Also of importance was how our plant was able to deliver the required amounts of concrete over a time period of the pours.

The contractors worked with us from then on to develop the concrete mix.

### Solution

The Bardon Concrete Gateshead plant a mile away from the Volker Stevin site, on the other side of the river, and had the capacity to supply the pours. Bardon's advice was to use a highly workable concrete mix, which remained workable for a longer period than normal. It was also designed to be free flowing through rebar and around formwork, with a high percentage of GGBS as a cement replacement.

A number of trials were conducted, not only to meet the above criteria, but also to investigate shrinkage, heat signature and strength. Firstly trials were carried out in the laboratory, and then scaled up for testing on site. The inclusion of GGBS in the mix improved cohesion, reduced shrinkage, and reduced heat, avoiding thermal cracking.

Once the mix was tested, the first pour commenced over a period of nearly 11 hours, using 8 trucks sourced from 2 plants. In total there were 16 x 580m<sup>3</sup> roof and wall pours with the concrete pump fed constantly during pours lasting up to 18 hours in total.

As part of the project, self compacting concrete was also used on the bulkhead walls, using the bottom up placement method, again after scaled up trials to prove the technology.



Tel:01530 510066

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The tunnel segments were lowered into place over the Winter of 2010, and the two sides of the tunnel were joined in May 2010, with the tunnel opening now scheduled for Autumn 2010.

“ Volker Stevin has been impressed by the professional way in which Bardon has approached this contract, and the way in which they have delivered the required materials.

The commitment and involvement of Bardon technical staff, area management, and plant staff has been excellent, and has contributed to the success of the project, They have always put their best efforts into both the design phase and during the actual pours. Their assistance in mix design alongside our technical staff proved invaluable cooperation which resulted in a high quality, workable concrete mix.”

Gerrit Smit – Project Manager

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Gerrit Smit – Project Manager , Volker Stevin



### Our businesses supplying

- Bardon Concrete



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