

Forth Replacement Crossing

# project update

July 2016



*The View from Space!*  
Turn to centre pages photo spread to see the Forth Bridges as you have never seen them before!

A view to savour: looking north across the Firth of Forth, this view of the three famous bridges will surely become one of the best known scenes in the country.

## Project Directors' Update

A round up of the latest progress being made in the construction of the magnificent Queensferry Crossing.

**Page 2**

## Working in the Community

Latest news from the Queensferry Crossing's community liaison programme.

**Page 3**

## Technical Focus

We take a look at how the weather out in the Firth of Forth can affect operations to lift the enormous deck sections into position.

**Page 4**



## Proud of this civil engineering benchmark

Welcome to the latest edition of the Queensferry Crossing's "Project Update" newsletter. Once again, we return to a fold-out "photo centre spread" format which we believe is an ideal way to keep readers up to date with the progress being made on the construction of this fantastic bridge.



David Climie & Michael Martin.

Good progress continues to be made across the works. At the time of writing, we have successfully lifted 80 out of a total of 110 deck sections. We have completed the concrete deck casting of 103 deck sections in FCBC's fabrication yard in Rosyth Docks. On the north side of the Forth, passers-by will have noticed that the approach viaduct and the main crossing coming from the North Tower have now been joined. This milestone represents the first of four such "closures" to happen on the Project. The creation of the stay cables inside their signature white external casings continues to go well and excitement is mounting as the final look and shape of the new bridge becomes clear for all to see.

Finishing works are continuing on the three towers, the tallest bridge towers in the UK. The temporary, tower-top jumpform structures, which acted as moulds for the 54 concrete pours on each tower, have been removed from the South and North Towers and will be removed from the Centre Tower during the summer.

On the approach viaducts, all piers are now complete. Meanwhile, the casting of the concrete decks on which the final road surface will be laid is progressing well on both north and south viaducts. The temporary steel structures around the bases of piers S1 and N1 have now been removed to river bed level. For the first time, this gives us a good idea of how the completed bridge will look when all marine towers and piers will appear to rise elegantly straight out of the water.

Turning to the network connections, surfacing work on the new stretch of M90 motorway to the west and south of South Queensferry is progressing well. A number of large ITS (Intelligent Transport System) sign gantries have arrived ahead of their installation on newly built foundations. In June, northbound traffic heading to the Forth Road Bridge was successfully switched on to a section of the new carriageway. On the north side, the newly aligned Castlandhill Road was opened in June. On the nearby Ferrytoll embankment, infill and levelling work is well underway

on the land vacated by the northern approach viaduct once it had been launched out into position over its two supporting piers. This area will ultimately carry motorway traffic between the new Queensferry Crossing and the – nearing completion – Ferrytoll Viaduct a few hundred metres to the north.

In June, it was announced that the Queensferry Crossing would open to traffic by May 2017 not, as previously targetted, by the end of 2016. It is important to understand that the Project is still on target to have traffic flowing on both carriageways before its contractual completion date of June 2017 and that it remains significantly under budget. The time differential needed to complete the structure has been the result of working days lost due to poorer than expected weather, especially wind. ("Technical Focus" on the back page looks at the weather-related challenges we face every day.) Current deck lifting operations and stay-cable installations are highly wind sensitive and are being carried out at extreme heights out in the middle of the exposed Firth of Forth. We are, at all times, at the mercy of the weather.

We are proud of the progress being made and the job we are doing on this once-in-a-lifetime construction project. We remain determined to continue the work to the standards required by a worldwide benchmark of civil engineering excellence in which future generations will share our pride – just as we today still take great pride in the achievements of those who built the Forth Bridge and the Forth Road Bridge.

**David Climie**  
Transport Scotland Project Director

**Michael Martin**  
FCBC Project Director

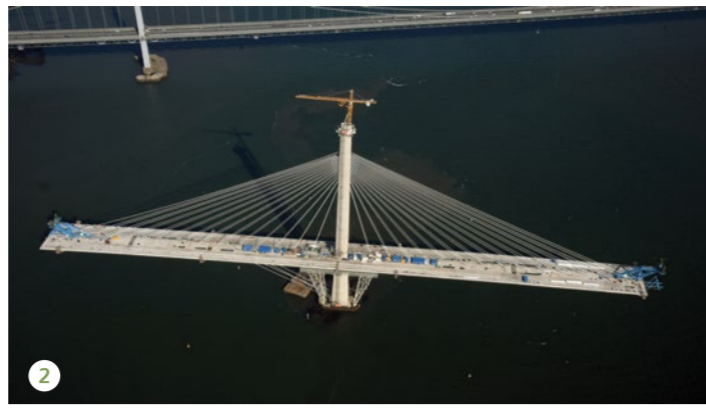


How the Queensferry Crossing will look when completed.





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**TOWERS:** 1 The unique and impressive view from the crew boat as it heads back to land. 2 At 650 metres in length, the Centre Tower will soon become the longest freestanding cantilevered structure ever built. 3 Looking south from North Queensferry, the three towers at dusk. 4 The Centre Tower poses beautifully against the sunset. 5 A stunning shot of sister bridges, the Forth Road Bridge and the Queensferry Crossing, at night. This is set to become one of the most frequently taken photos in the country!



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**DECK:** 1 A lucky omen – a rainbow comes to rest on the Queensferry Crossing. 2 Inside the Centre Tower, tensioning the steel strands which make up each stay cable. 3 The first of the four main “closures”: the final deck section between the North Tower and the Approach Viaduct North is lifted into place. 4 Out of sequence? No, the deck section on top of southside Pier S1 had to be positioned before its ‘predecessor’ in a technically challenging operation. 5 Aerial view of operation shown in No 4. Note the removal of the temporary steel structure at the foot of the pier.



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### PHOTO FROM INTERNATIONAL SPACE STATION

The view from Space! We are hugely grateful to NASA's Chris Hadfield, former Commander of the International Space Station, who took up FCBC's request and tasked British astronaut, Tim Peake, with taking this amazing photograph showing the three Forth Bridges. The photo was taken on 2nd April 2016. Now back on land, both men have a standing invitation to come and visit the Queensferry Crossing. It's the least we could do! Thanks guys! Photo courtesy of NASA



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**VIADUCTS:** 1 Welding operations on-going on the Approach Viaduct North. 2 On the Approach Viaduct North, the concrete deck surface is being cast section by section. In order to add strength to the whole structure, post-tensioning cables, such as the one being carried here, are installed through ducts inside the concrete. 3 The Approach Viaduct South reaches out across the water towards the South Tower cantilever. 4 We do get sunshine sometimes! Here, scaffolding poles are removed from the on-going Approach Viaduct South deck casting operations. 5 V is for Victory: looking through the Approach Viaduct South's concrete support piers.



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**ROADS:** 1 This aerial view of the road works at Ferrytoll, just north of the Queensferry Crossing, shows the complexity of creating the new junction, roundabouts and embankments while at all times keeping traffic flowing on the M90 and local access roads. 2 Looking north from the Approach Viaduct North (in the foreground) to the new Ferrytoll Viaduct where the application of red waterproofing material is nearing completion. 3 Progress is being made on laying the new stretch of approach motorway south of the new bridge. The completed new Queensferry Junction and roundabout are clear to see on the right. 4 Looking east towards Scotstoun to where the new approach motorway (in the foreground) will join the existing A90 heading towards Edinburgh and the M9 Spur.



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## Schools Programme Success

The Schools Programme at the Contact & Education Centre has concluded for the summer with over 15,000 school pupils having now visited to learn about the construction of the Queensferry Crossing and undertake a number of Science, Technology, Engineering and Mathematics (STEM) challenges.

The programme has proved a huge success with school pupils visiting from all over Scotland to see the latest construction progress, meet project engineers and gain an appreciation of the skill and endeavour of people working on the project.

Senior pupils from Williamwood High School in East Renfrewshire recently undertook a site visit led by project engineers who shared information and answered questions about their experiences working on the Project. The visit highlighted how learning in the classroom and pupils' subject choices can relate to potential future careers in construction and engineering.

Principal Teacher of Design & Technology, Karen Gallagher, commented: "Not only was the visit enjoyable but also very relevant and rewarding. It certainly helped to provide a wider practical context to learning within the classroom by placing course work in the context of a possible future career choice."

Depute Head Teacher, Laura Ferguson, added "This was an excellent opportunity for pupils as it

encouraged them to identify the skills and knowledge they learn in the classroom and place it in the context of a possible future career. Pupils were also encouraged to identify the skills required for learning, life and work. The visit was both educational and enjoyable for everyone involved."



**The finer points of the new bridge's construction are pointed out to pupils from Williamwood High School by Project Engineers Aidan Merrilees and Sarah Breen.**



**Budding civil engineers get to grips with bridge building.**

## Bridges to Schools

In April, "Bridges to Schools" week was held, in association with the Institution of Civil Engineers (ICE). A total of over 300 pupils enjoyed building their own cable-stayed bridge, giving them an insight into the technical challenges of civil engineering and the importance of health and safety and teamwork – while having fun along the way. Dressed in hard hats and hi-viz vests, they constructed a 12 metre long model of a cable-stayed bridge, supervised by volunteer civil engineers. The pupils (and some intrepid teachers!) then walked across the bridge to test the strength of what they had constructed.



## National Women in Engineering Day

Engineers from Amey paid us a visit in June as part of National Women in Engineering Day. Project engineers Emily Alfred and Sarah Breen gave the visitors a comprehensive presentation followed by a question and answer session and site tour.



**Forth Road Bridge Veterans with members of FCBC's Community Liaison Team.**

## Forth Road Bridge builders visit Queensferry Crossing

How does the construction of the Queensferry Crossing compare with building the Forth Road Bridge back in the 1950s and '60s? That's what over 30 of the Forth Road Bridge veterans came to find out in May in a follow up to their first site visit in 2013. Once again, it was an honour and privilege to welcome our predecessors to the Queensferry Crossing.

A presentation at the Contact & Education Centre provided an in-depth look at the construction of the new bridge and its connecting roads. A coach tour of the construction site on both shores of the Forth was followed by lunch, giving the veterans a chance to share stories and experiences not only with each other, but with project engineers. Whilst many things have changed in 50 years, a sense of pride in their work and the scale of their achievements provided common ground for those involved in these two major, neighbouring construction projects.



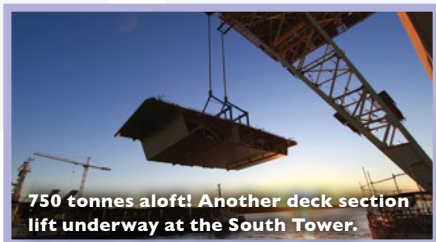
## Weathering the Weather

Last September, we explained the technical processes involved in installing the individual deck sections which form the new bridge's road deck. Here, **Florian Dieterle**, FCBC's Cable Stayed Bridge Temporary Works Co-ordinator, looks at the challenges posed by the Scottish weather when lifting such huge structures.

Since September last year, FCBC has successfully lifted 80 deck sections from sea level to road deck level on the Queensferry Crossing. Each lift operation is a major civil engineering feat in its own right. Remember, the structures we are lifting weigh on average around 750 tonnes (or roughly 54 London buses – with passengers!), they measure 40m by 16m by 5m (so they're **big!**) and we have to lift them up an incredible 60 metres (200ft) into the air! To top it all, we are carrying out these operations in the middle of a wide, exposed, maritime estuary. This is tough civil engineering!

It's a huge challenge and, every day, we face a number of significant, mostly weather related variables which govern how well each lift will go and how long it will take.

Let's start with wind. We cannot begin lifting such huge structures in wind conditions over 21 knots (or 11m per second). Wind can cause the road deck, on which the blue "erection traveller" crane is situated, to move, albeit fractionally, just as



it is designed to do. This could have knock-on effects on the movement of the deck section once it becomes airborne making precise control difficult. That's why we liaise very closely with the Met Office to identify suitable windows of opportunity where we can be confident of being able to start and complete a lift operation in safe, low wind conditions.

Wind also affects when we can lift the main stay cable pipes into position. If we cannot finish and fully tension the cables supporting the previously installed deck section, then we cannot move the erection traveller forwards and, consequently, cannot start the next deck lift. Our operations out there are sequential.

One stage has to be fully completed before the next can begin. If wind delays the completion of one operation, then subsequent operations will also be delayed.

Days can sometimes be lost waiting for the right wind conditions. Even in May this year, when the country experienced three or four consecutive weeks of warm, sunny weather, we lost some working days due to continuing variable and blustery wind conditions out on the Forth.

Then there's fog. As local residents will testify, the Forth estuary is prone to mist and fog, known locally on the east coast of Scotland as "haar". Good visibility is vital so that the barge carrying the deck section can



sail out from the dock to the tower site and to allow us to start the lift operation itself. For safety's sake, we have to be able to see every part of the operation. Powerful floodlighting means that, if necessary, we can perform a lift in reduced light conditions just as well as during the day. This is particularly important in the winter months with their shorter days.

Sea conditions are also important to a successful and timely deck lift. We can lift in both falling and rising tides, but waves of over 0.3m (1ft) in height can result in movements in the barge which could affect the way the deck section begins its journey upwards. So we have to pause and wait for the waves to subside.

So wind, fog and waves are the main "enemy". Other conditions, such as rain, snow, ice, or even a sudden heatwave, pose less of a challenge though may bring some staff safety considerations. We don't necessarily object to bad weather - if it happens at a time which leaves us free to get on with our day jobs unhindered!



## Contacting the FRC team

There are a number of ways you can contact us to ask questions, provide comments, make a complaint or find out more about the Forth Replacement Crossing project:

Call the dedicated 24 hour Project Hotline **0800 078 6910**

Email the team **enquiries@forthreplacementcrossing.info**

Look for us online:

[www.forthreplacementcrossing.info](http://www.forthreplacementcrossing.info)

[www.queensferrycrossing.co.uk](http://www.queensferrycrossing.co.uk)

@FRC\_Queensferry

Or go to the Queensferry Crossing YouTube channel

Or drop into the **Contact & Education Centre**

Adjacent Forth Road Bridge Administration Office,  
South Queensferry, Edinburgh EH30 9SF

**Opening times**

Mon-Thu: 0900-1700, Fri: 0900-1600, Sat: 1000-1600



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