

Welcome to the March 2010 issue of the Forth Replacement Crossing newsletter. In this issue you will find information on the FRC Advanced Ship Simulation Study (Page 1), the Forth Crossing Bill (Page 2), the competitive tendering process (Page 2), latest ground investigations (Page 3), archaeological investigations (Page 3), project summary (Page 3) and wind shield testing (Page 4).

Sailing under the Forth Replacement Crossing

Two ship pilots have been able to experience sailing in the Forth Estuary with the Forth Replacement Crossing in place.

Steve Michel and Neil Walker from Forth Ports were taking part in week long trials using one of the world's most advanced navigation simulation models.

Commissioned by Transport Scotland and organised by its joint venture partner JacobsArup, the FRC Main Crossing Ship Simulation Study is necessary to understand the potential effects that the new bridge would have on ship navigation during construction and once built. This included looking at scenarios such as engine or rudder failure, in order to plan mitigation measures.

The existing computer model of the Forth Estuary at the Maritime Simulation Centre, South Tyneside College had been specially updated to include the Forth Replacement Crossing under construction and completed.

Billy Minto, Transport Scotland's structures team manager for the FRC, said: "This is a very sophisticated simulation system which gives the impression of controlling a ship in the Forth Estuary. The pilots actually sit in a mock-up of a real ship control room and their field of vision is filled by a realistic computer-generated model of the estuary, existing rail and road bridges, and the new Forth Crossing."

Similar to an aircraft flight simulator, the system allows a number of ship types to be tested in real time situations. This includes carriers, tankers, containers and ferries, with tug assistance where required. Day and night

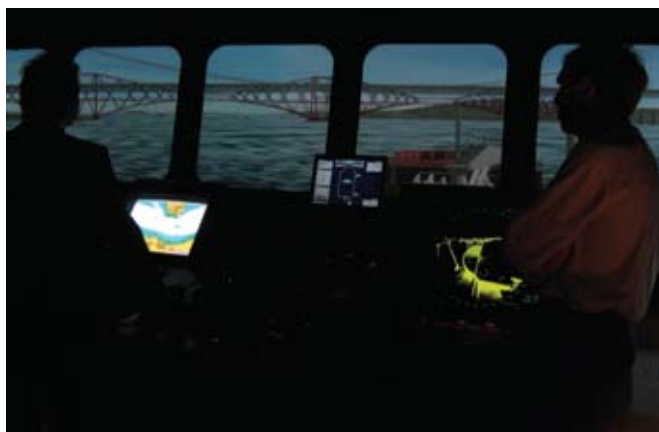
conditions can be simulated with factors such as fog, wind, tides, currents and waves altered to test different scenarios.

Commenting on the results, Billy Minto said: "The report concluded that there should be no significant constraints on ship navigation caused by the new bridge under operational conditions.

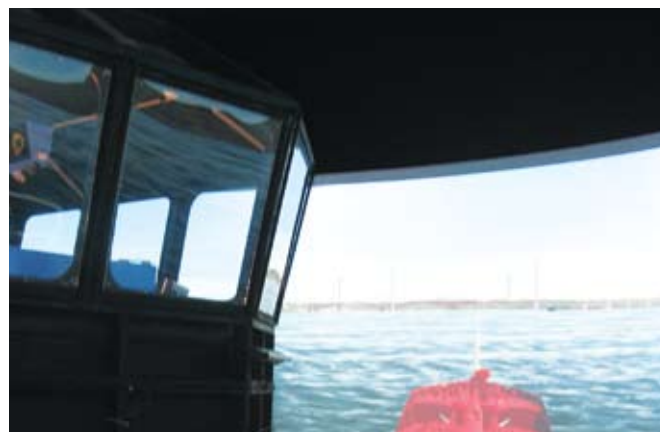
"In addition, the simulations provided very useful information which will influence our future planning on aspects such as the navigation lighting system and the use of tugs to maintain the 200 metre exclusion zones during construction."

Captain Steve Michel from the Association of Forth Pilots added: "It was extremely interesting to be able to take part in this exercise and to see the depiction of the new Forth Replacement Crossing. We were able to get a very clear idea of how it will look alongside the landscape and the existing bridges. Once the crossing has been built there will be no real impact on navigation in the current channels. This is helped by the fact that one tower will be on Beamer Rock and the other two will be in areas of the Forth that we do not sail into.

"We were able to practice what will happen during the construction phase of the project, when barges will be moored in the river as the decking sections are being lifted up into position on the bridge. This will potentially impact on navigation. As a result, we did several exercises including sailing west of Beamer Rock into the Rosyth channel to test its viability and also to identify the tidal and weather conditions and criteria which would make this feasible. Based on our findings we were able to make a number of recommendations."



Two ship pilots take part in the FRC Main Crossing Ship Simulation Study.



Forth Crossing Bill

To support the scrutiny of the Forth Crossing Bill by the Scottish Parliament, Transport Scotland has been reviewing and responding to the objections received.

By the closing date on 26 January, 89 objections had been submitted and Transport Scotland is responding to each objection in writing and, where appropriate, through meetings. Transport Scotland is committed to resolving these objections where possible and the responses will help inform the work of the Parliament's Forth Crossing Bill Committee.

Details of the objections lodged can be found on the Scottish parliament website at www.scottish.parliament.uk/s3/committees/forthXbill/inquiries/fcb-objections.htm

Senior staff from the project team have also been giving evidence to the Committee as part of its consideration of the Forth Crossing Bill at Stage 1. The Official Reports can be viewed at www.scottish.parliament.uk/s3/committees/forthXbill/meetings.htm

Competitive dialogue

The tendering process for the principal contract to build the landmark Forth Replacement Crossing has entered the competitive dialogue stage.

This allows the two international consortia which have been invited to tender for the project to discuss their proposals with Transport Scotland in support of their final tender submissions towards the end of this year.

The two consortia include eight of the world's most respected construction and specialist engineering companies.

Vinci, Balfour Beatty, BAM Nuttall and Morgan Est have formed the Forthspan consortium, while the Forth Crossing Bridge Constructors group comprises Dragados, Hochtief, American Bridge International and Morrisons.

A total of 39 companies expressed an interest in becoming involved following publication of the contract notice in June 2009. A final eight, who submitted pre-qualification questionnaires indicating their financial and technical capabilities consolidated into the two consortia.

To enable the Forth Replacement Crossing to be constructed for 2016 and avoid potential restrictions on the existing bridge, the procurement process is taking place at the same time as the Forth Replacement Crossing Bill progresses through the Scottish Parliament seeking authority for construction of the scheme.

At the introduction of the Bill, Transport Minister Stewart Stevenson said: "The Forth Crossing Bill has just been introduced to Parliament and the issuing of the formal invitation to tender demonstrates that delivery of the Forth Replacement Crossing remains on schedule."

"Delivery of the Forth Replacement Crossing remains on schedule"

Transport Minister, Stewart Stevenson

The Official Report of the Finance Committee, which is scrutinising the financial aspects of the Bill, can be viewed at www.scottish.parliament.uk/s3/committees/finance/index.htm

The Official Report of the Transport, Infrastructure and Climate Change Committee, which is scrutinising the public transport aspects of the Bill, can be viewed at www.scottish.parliament.uk/s3/committees/ticc/index.htm

The Forth Crossing Bill, the first hybrid Bill of its type ever taken forward in Scotland, was introduced on 16 November 2009 and seeks authority to implement and build the new Forth Replacement Crossing. Parliamentary scrutiny is expected to be completed by November 2010.

The three parliamentary stages will run in parallel with the procurement process. Further details on the Bill Process are available at www.scottish.parliament.uk/s3/committees/forthXbill/index.htm

"The construction industry has already signalled its enthusiasm for this project and we look forward to receiving high quality bids from some of the biggest and most experienced construction companies in the world.

"We are determined this project should provide a value-for-money solution and we are confident it compares favourably with other similar structures across the world. It will be funded directly by the Scottish Government from existing capital budgets, ensuring best value for the taxpayer."

The companies comprising each of the consortia have an excellent track record in delivering high profile bridge projects across the globe. Forthspan's experience includes delivering for the 2004 Athens Olympics the £655m Rion Antirion Bridge, a 2.8km cable-stayed bridge linking the Peloponnese peninsula to mainland Greece, and the £330m Second Severn Crossing completed in 1996 which carries the M4 over the River Severn between England and Wales.

Forth Crossing Constructors' experience includes completing construction in 1999 of the £768m Oresund Bridge which forms part of the Oresund link connection between Denmark and Sweden, and are currently undertaking the replacement of the seismically vulnerable eastern span of the San Francisco Oakland Bay Bridge, at a contract value of around £1bn.

The construction contract is expected to be awarded in Spring 2011, with work commencing later that year.

The contract, which is anticipated to be priced between £900m and £1.2bn in today's prices, includes detailed design, construction of the main crossing and approaching roads.

A separate procurement exercise will be undertaken later for two separate, smaller contracts associated with the scheme but which will be delivered early in the project programme. These will see Junction 1A on the M9 upgraded and ITS provided on the M9 Spur south to Newbridge, as well as ITS provided in Fife from Admiralty Junction to Halbeath.

Latest ground investigations

A third series of ground and marine investigations for the Forth Replacement Crossing are taking place.

These began south of the Forth on 22 February and in all other areas from 1 March.

The two consortia seeking to construct the scheme – Forthspan and Forth Crossing Bridge Constructors – are allowed to request these supplementary investigations from Transport Scotland as part of the competitive tendering process. The more detailed data produced will support the development of their design and construction methodologies which are key to their tender submissions, due towards the end of this year. (See competitive dialogue article in this issue)

Transport Scotland's consultant engineers, JacobsArup, are organising the works, which will last about eight weeks.

The extent and nature of the works will be similar to those carried out in the 2008 and 2009 investigations with the same contractors involved. Ground investigations south of the Forth will be conducted by BAM Ritchies while Vinci Norwest Holst will carry out works associated with the northern connecting roads. Glover Site Investigations Ltd will undertake the marine works.

In addition, some investigative work will be undertaken between the Admiralty and Halbeath junctions on the M90 to help Transport Scotland specify and tender the scheme's Intelligent Transport System, designed to support traffic management.

Paul Mellon, Transport Scotland's geotechnical manager for the Forth Replacement Crossing, said: "These latest marine and ground investigations support the current competitive dialogue phase of the tendering process which allows the two consortia to discuss their proposals with Transport Scotland."

"The timescale for the works is very tight to ensure that the information requested by the consortia is available in time to be taken account of in their tenders.

"Along with our consultants JacobsArup, Transport Scotland will continue to liaise with statutory organisations and residents living near to the works, ensuring they remain aware of developments. Where access is required, we also remain in close contact with landowners and are grateful for their continued cooperation.

"As with previous investigation works, our aim is to carry out these works as unobtrusively as possible."

Archaeological investigation works

The Contract Notice for the land-based archaeological investigation works was issued on 17 March. This will comprise surveys of several areas of archaeological potential which may be affected by the Forth Replacement Crossing project. The contract will comprise geophysical survey, trial trenches and hand excavation. For sites

identified which are not currently in the ownership of the Scottish Ministers, Transport Scotland intends to discuss access with existing landowners and will engage with them in the near future. The works are anticipated to begin in the late summer for a duration of approximately one year, subject to the final tender and land access.

Project summary

The Forth Replacement Crossing project involves the construction of a motorway-standard two-lane carriageway with wide hard shoulders, spanning approximately 2.7km in length, comprising a cable-stayed bridge with three "mono-towers", two central spans of approximately 650 metres each and approach viaducts, as well as trunk road connections north and south of the bridge.

The bridge and connecting roads will also include ITS (Intelligent Transport Systems) technology to manage and smooth traffic

flow via variable speed limits. Along with improved junctions and wind shielding, the Forth Replacement Crossing will significantly improve the reliability of the cross-Forth travel for vehicles.

The scheme will utilise the existing Forth Road Bridge to carry public transport, motor cycles less than 50cc, pedestrians and cyclists. This has resulted in an estimated saving of around £1.7bn on the original estimated cost of the scheme and provides a sustainable increase in capacity to meet future demand.



Artist's impression: view of Forth Replacement Crossing from Port Edgar.

Insurance advisors appointed

Transport Scotland has completed its line-up of delivery partners for the Forth Replacement Crossing with the appointment of Heath Lambert as insurance advisors.

This will allow examination of the benefits of a bespoke project insurance policy alongside the procurement competition that is now underway.

Aerodynamics put to the test by world experts

Experts whose aerodynamic research has influenced the design of the London Eye, Ferrari Formula 1 cars, and the sails of the America's Cup Team are carrying out tests on the wind shield for the proposed Forth Replacement Crossing.

Engineers at Italian university Politecnico di Milano in Milan are using complex wind tunnel testing techniques to study the way air moves around a scale model of the proposed wind shield.

The 14m wide by 4m high wind tunnel simulates the conditions in the Firth of Forth, including the site exposure and alignment of the bridge in relation to prevailing winds. The results will help determine the best design for the new bridge's wind shield. Further tests will then determine the aerodynamic behaviour of the deck, towers and ultimately the whole cable-stayed bridge structure.

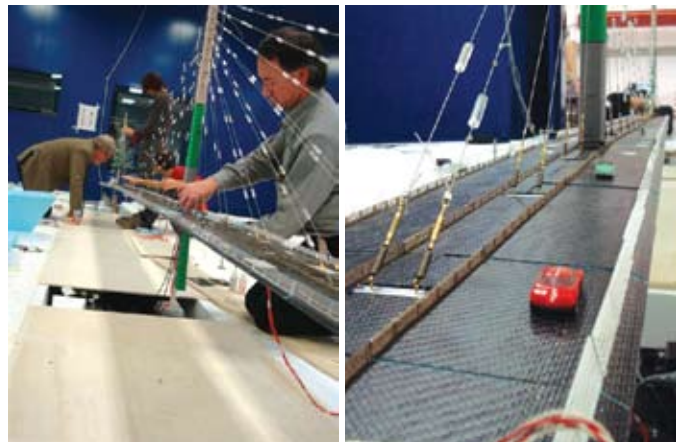
Billy Minto, Transport Scotland's structures team manager for the FRC, explains: "The effects of wind on large structures such as the Forth Replacement Crossing require very careful consideration. Computer structural analysis models cannot fully quantify the effects of wind on large bridges. Tests using scale physical models are therefore required to provide additional information and are an essential tool in the design process.

"A key requirement of the Forth Replacement Crossing is that traffic is able to cross the bridge during periods of high wind. The wind shield is therefore essential to provide the level of reliability we are looking for on such an important link in Scotland's transport network."

A number of different designs are being assessed and compared with the wind shielding on the Second Severn Crossing. The Second Severn Crossing has never been closed due to high winds in its 12-year history and these tests are designed to ensure the Forth Replacement Crossing wind shield performs equally well.



An artist's impression of what the wind shield may look like.



The Wind Tunnel Research Team at Politecnico di Milano prepare a scale model of the Forth Replacement Crossing for tests.

Contacting the Forth Replacement Crossing

For more information about the Forth Replacement Crossing please contact the Transport Scotland team on:

Phone: 0141 272 7578

Email: frcenquiries@transportscotland.gsi.gov.uk

Web: www.ForthReplacementCrossing.info

You can also sign up to our regular e-newsletter on the website to receive updates on the project by email.

