

Forth Replacement Crossing

project update

May 2012



History in the making: old meets new as the first of the new bridge's crucial steel foundation caissons arrive on the Forth.

Project Directors' update

An overview of progress to date on the Forth Replacement Crossing.

Page 2

M9 Junction 1a and Fife ITS

Latest news from the works being carried out to improve direct road access to the new bridge for traffic both north and south of the Forth.

Page 3

Technical focus

Foundation caissons are critical to the whole project. Find out more about their construction, function and installation.

Page 5



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Milestones reached on schedule

Welcome to this edition of Project Update, the quarterly newsletter containing the latest news about the Forth Replacement Crossing. As ever, our aim is to keep readers up-to-speed with all the activity on this vital infrastructure project, the biggest in Scotland for a generation, and to let you know what you can expect to see in the period ahead.

As we go to print, one of the most important milestones in the whole project has just been successfully reached – the arrival on-site of the cylindrical caissons which will help form the main foundations for two of the bridge’s three towers. Elsewhere in this newsletter, you can read about the construction, function and positioning of these super-sized steel structures.



Carlo Germani and David Climie.

2012 is ‘Foundations Year’. The caissons are one of the most critical elements of the foundations, enabling them to be formed and providing a stable base on which the bridge can be built. Without them, there would simply be no foundations, no towers, no stay-cablings and no road deck. In other words, no bridge.

Over the next few weeks, the caissons will be subject to final inspection and preparation before being towed out and installed in their final position on the seabed (see ‘Technical Focus’ on page6).

Beyond the bridge works, good progress continues to be made on the upgrade to Junction 1a of the M9 and the installation of Intelligent Transport System gantries on the M90 in Fife. Sisk Roadbridge and Graham Construction respectively are to be congratulated on the progress being made. These two contracts are essential to ensure that the trunk road network north and south of the Forth is properly connected to the new bridge when

complete. We are all too aware of the disruption such works can cause motorists and the public alike, so a comprehensive range of advance notification measures has been implemented to warn those affected and minimise any inconvenience.

Once again, we thank members of the public for their understanding and patience while traffic restrictions are in place.

Increasing interest is being generated by the Forth Replacement Crossing from industry bodies, local groups, universities, colleges and schools. As the construction activity gathers momentum, our Community Liaison team has plenty to do, hosting visits on-site and giving presentations on our progress. We have recently hosted a number of visits from civil engineering students keen to learn all about the technicalities involved in building a world class bridge in one of the world’s most famous locations for bridges.

David Climie
Transport Scotland
Project Director

Carlo Germani
FCBC
Project Director

Community Council members visit CEC construction site



In March, representatives from Queensferry District Community Council visited the site of the new FRC Contact and Education Centre, being built for Transport Scotland by Dawn Construction.

The Centre, sited adjacent to the Forth Road Bridge head office in South Queensferry, will host an exhibition of information materials about the construction of the new bridge and act as a hub for members of the public to engage with the project.

The Centre is on schedule to be completed and opened to the public this autumn.



The FRC Contact and Education Centre takes shape.

Primary pupils show their green fingers



Rosyth’s Park Road Primary School pupils can’t wait to get to work with their new gardening equipment donated by FCBC.

Fife ITS project forges ahead

Good progress is being made on the Fife Intelligent Transport System (ITS) contract between the Halbeath and Admiralty junctions of the M90.

GRAHAM Construction and their subcontractor, Breedon, have been reconstructing the southbound carriageway of the M90 using a new durable, low noise carriageway surfacing (known as TS2010) recently developed by Transport Scotland. Following trials throughout the country, this is the first major use of this material in Scotland. The same material will be used on the rest of the project including the new bridge and the upgraded Junction 1a on the M9.

The work was originally programmed to be carried out over four weekends. Instead, with careful planning and traffic management, only two weekend closures were necessary, significantly reducing disruption. Thanks are due to all M90 users who heeded the advance warnings of possible disruption and took steps to alter their travel plans, thus minimising any delays on the road.

Under this work programme, the existing M90 southbound hard-shoulder is being upgraded to provide a new bus lane, the first time a motorway hard-shoulder has been used for this purpose in Scotland. Traffic management with average speed cameras is in place to ensure the safety of the workforce and the travelling public.



Resurfacing work on the M90.



Park Lea landscaping and screen fencing in place.

Good progress is also being made on the installation of the ITS along this stretch of the M90 together with the A92 from Crossgates and the A823(M). This contract will play a crucial role in regulating traffic flow on approach to the new bridge, providing improved safety levels through lane control and variable mandatory speed limits as well as displaying a range of driver information via variable message signs.

Gantry support bases are now being constructed at various locations in preparation for the 18 new gantries being erected over the coming months.

Early on in the contract, a number of

sensitive areas were identified including Park Lea, Craig Street, Belleknowes, Middlebank, Duloch and Halbeath. GRAHAM Construction have co-ordinated specific work activities in these sensitive areas to minimise the risk of disruption. These efforts have been acknowledged by local residents.

Fencing and landscaping are complete at a number of locations and the new trees planted are already showing signs of growth with new spring foliage now evident.

The Fife ITS project is scheduled for completion later this summer.



The new Junction 1a taking shape.



Working through the night to install gantries over the M9 Spur.

M9 Junction 1a and gantries update

The upgrade works on the M9 Junction 1a are progressing on schedule. A major milestone was successfully reached in early March when four Intelligent Transport System gantries were installed with just one overnight closure of the M9 Spur.

The operation to install each state-of-the-art gantry required a team of seven experienced steel erectors, a 250 tonne mobile crane and smaller miscellaneous machinery – and took between two and three hours each.

Careful planning and a monumental effort saw three 37 tonne gantries – each the equivalent weight of eight elephants – lifted 10 metres above the motorway and bolted on to their pre-prepared steel column bases in less than ten hours, ensuring that Sisk Roadbridge met their target of requiring only a single night closure of the motorway.

These three gantries are “superspans” between 31 and 33m in length which cross the entire width of both carriageways. The fourth is a smaller 10 tonne cantilever gantry. All are designed to withstand severe weather extremes such as freezing temperatures and storm force winds and will provide advanced warning of road works or incidents on the network, advising drivers to use alternative routes.

These gantries will eventually form part of a 22km Intelligent Transport System which is a vital element of the overall Forth Replacement Crossing project. They carry hi-tech Variable Messaging Signs which will provide a range of vital, up-to-the-minute information to drivers travelling to and from the new bridge, warning them of current road conditions, any incidents ahead or variable mandatory speed limits.



Students from Stirling University's School of Management enjoy their visit to the site offices.

Community liaison team hosts student visitors

FCBC staff on the Principal Contract to build the new bridge have recently welcomed a number of colleges and universities on-site.

Students from Dunfermline's Carnegie College, Stirling University and Strathclyde University are among those who have come to learn more about the project and witness the various departments – including design, surveying, engineering, planning, health & safety – in action. Visits culminate in a climb up to the viewing platform on the roof of the Project Office where guests can see the panoramic views of the existing Forth Road Bridge, the line of the Replacement Crossing and on-going construction activity out on the Forth and on the connecting roads north and south.

In the period ahead, FCBC will continue with its programme of liaison with local schools designed to create interest in the FRC project. This will include a week long bridge building activity programme devised by the Institution of Civil Engineers (ICE) and hosted by North

Queensferry Primary School. This will involve a total of eight primary schools on both sides of the Forth. There is also a full programme of presentations to make to such organisations as Rotary Clubs, community groups and construction and civil engineering industry bodies. The new bridge is beginning to attract a lot of interest nationwide.



Briefing Strathclyde University civil engineering students.

Makeover for school garden



Kirkliston Primary School Garden.

Sisk Roadbridge (SRB) staff recently helped staff and pupils at Kirkliston Primary school to overhaul the school garden, creating areas where pupils can start new planting projects. Pupils are now looking forward to spending time outdoors learning about horticulture. The hope is that the new look garden may inspire budding gardeners of the future. The SRB team also re-painted school benches and carried out general tidying and repair works in and around the school.

Work suspended for wedding party

Works on Junction 1a of the M9 were temporarily suspended in March – for the best of reasons: to allow two local Buie Rigg residents to enjoy a garden party in the days before their wedding. The couple asked if it was possible for SRB to halt construction works near their property for three days during which family and friends were visiting from America and Australia to attend the big day. SRB readily agreed to alter their scheduled work plan to accommodate this special request and wished the happy couple all the best for the future.

Keeping the community informed

As the works ramp up from now on, the need to keep the community informed of our activities becomes even more important. Facilities such as the Forth Replacement Crossing website and the Contact and Education Centre will prove invaluable sources of information, backing up the more focussed flyers which we distribute around our closest neighbours, along with day-to-day contacts with individuals.

For the best up-to-date information, please keep an eye on the project website or drop into the temporary Contact and Education Centre which is open six days a week (directions and contact details on the back page).

www.forthreplacementcrossing.info

Laying the foundations of success

Ralf Wiegand, FCBC Technical Manager - Caissons, explains the function of the steel caissons in the foundations of the new bridge.

Down the ages, one of the most important elements in the long term success of any bridge structure has always been the foundations. In a cable-stayed bridge, which the Forth Replacement Crossing will be (see February 2012 issue of the FRC Project Update), foundations are key to the stability of the towers which support the anchors for the cables from which the deck is suspended. Critical to the success of the foundations are the steel caissons.

The photograph on the front page of this Project Update shows the first two caissons arriving on-site in earlier this month. 2012 is the 'Foundations Year' so the arrival of the caissons is a major landmark in the life of the whole project. The sheer scale of the caissons being used on the new bridge is remarkable. The largest is 30 metres high by 30 metres in diameter - approximately the size of an eight storey building. It weighs a massive 1,200 tonnes making it one of the largest steel caissons ever sunk down to the seabed anywhere in the world. The barge transporting them is the length of a Premier League football pitch. And there is room inside the two caissons pictured on the front page for three quarters of a million footballs!

But what function does a caisson actually perform? Derived from the French for "casing", essentially a caisson acts as a "mould" enabling the concrete foundations to be formed. Once the caisson is in place on the seabed and has been lowered

down to rock level, it is made watertight and the sediment lying on top of the rock is removed from inside the caisson. 16,000m³ of underwater concrete is poured in to a depth of 14 metres below sea level. This concrete "plug" forms the base of the foundations. The next stage sees the addition of temporary caisson sections on top taking the caisson structure above sea level. Sea water is then pumped out, leaving a dry hole in which the rest of the reinforced concrete foundations can be constructed.

Once the foundations are complete, the main caisson structure stays in place for the entire lifespan of the bridge, acting as a shield protecting the concrete from the ravages of the sea. The temporary caisson is removed.

On first arrival in the Forth, the caissons take up temporary residence in Rosyth docks where final preparations are made (for example, installation of pumping systems and lighting circuits) before they are ready for placing in their ultimate resting place on the seabed.

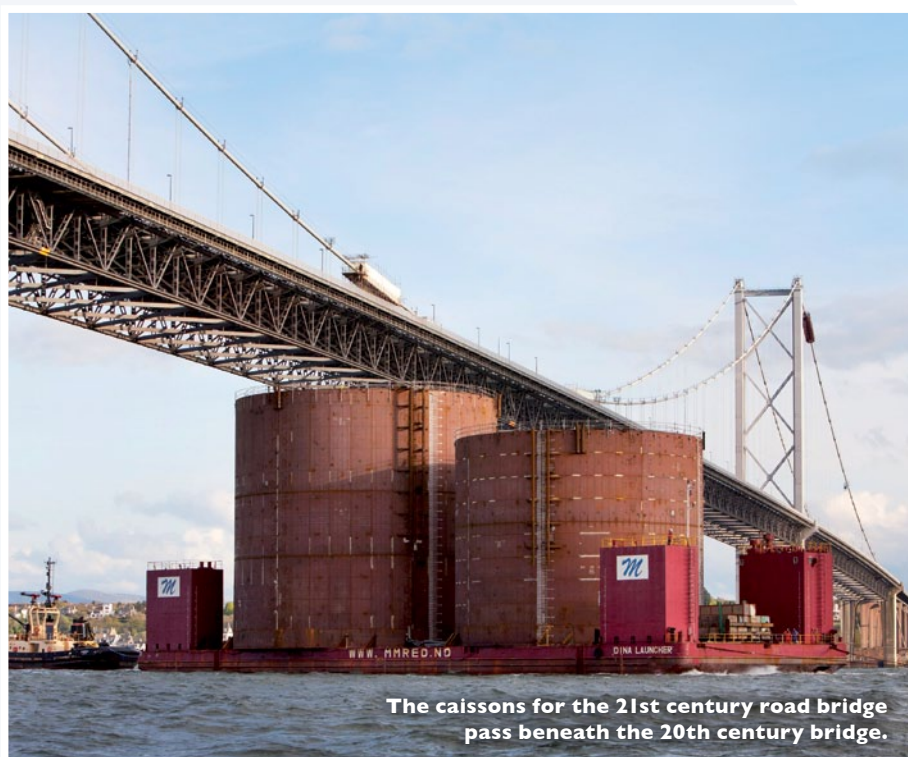
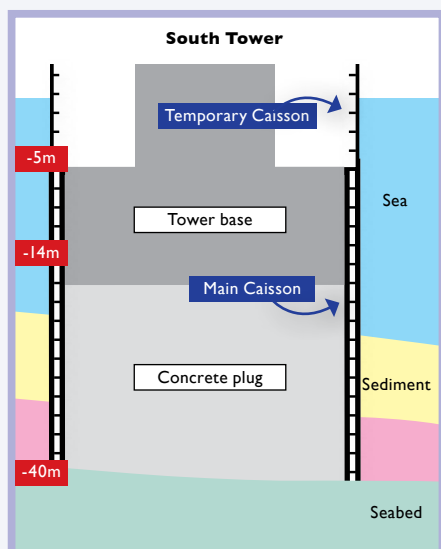
The positioning process is helped by the fact that, despite the sheer volume of steel involved, the caissons float. This seemingly



Trial fitting of temporary caisson on top of main caisson.

impossible feat is achieved because the caissons are constructed with a double skin, the cavity in between the two layers being filled with air. So, in a few weeks' time, people in the area can expect to see the caissons floated out into the Forth pulled by tugs. Once in position, concrete is poured slowly into the cavity, forcing the air out and allowing each caisson to sink.

One other point of interest is the fact that the latest GPS technology will be employed to ensure pinpoint accuracy in the placing of the caissons. It is something we will only get one shot at – so it absolutely critical to get it right first time.



The caissons for the 21st century road bridge pass beneath the 20th century bridge.



Keeping everyone safe on the Forth

Ken Clark, FCBC's Marine Liaison Officer, is responsible for keeping all marine construction traffic out on the Forth moving on-time and safely.

Q What does your job involve?

A My job is to co-ordinate all Forth Replacement Crossing traffic movements out on the water, making sure our marine traffic is able to carry out its activity unhindered, on schedule and safely. That means liaising constantly with the Forth & Tay Navigation Service (part of Forth Ports Authority) who are the "air traffic controllers" of the river to ensure we fit in with all other vessel movements and that all other river users are informed of FCBC marine construction activities.

Q What is your department's main responsibility?

A Safety. First, last and always. The safety of all river users is paramount and is the collective responsibility of all vessels using the waters of the Forth and the bodies responsible for co-ordinating movements on the water. At all times, we have a safety boat on-call accompanying marine-based FRC-related activity and able to respond swiftly to any safety issues which arise.

Q What sort of other "river users" are we talking about?

A The River Forth and Forth estuary are amongst the busiest waterways in the country. Every day, a wide variety of vessels can be seen out on the water. On the commercial side, these range from large petro-chemical ships sailing to and from Grangemouth to freight ferries and container ships making their way to and from Rosyth and continental ports such as Rotterdam and Zeebrugge. Then there are pleasure craft based mainly at the Port Edgar Marina and, in the summer months, an increasing number of international cruise ships stopping off to visit Edinburgh and Fife.

Q Are there any particular challenges on this project?

A On this project, it is the exposure to weather conditions which is the main challenge. We are operating in a hostile location with zero shelter from general weather conditions – most obviously wind and rough water, but also rain and fog. That clearly adds to the challenge to carry out marine operations safely and on-time. This is something we have to plan for when drawing up schedules for future works. On top of that, the River Forth has exceptionally high tidal streams which mean that the water can be moving as fast as 3 knots in the centre. Given these conditions, the installation of the steel foundation caissons, now arriving on-site, will be a particular challenge, involving many vessels such as tugs and barges as well as one of the largest floating cranes in the world. I'm looking forward to that!

Q What gives you most satisfaction?

A The key is maintaining a close working relationship with all the bodies governing traffic on the Forth – organisations such as Forth Ports Authority and the Port Edgar Yacht Club. FCBC is grateful to them for the help they are giving us. Also satisfying is seeing all operations carried out safely. Everything we do out on the water adheres to the highest international marine standards and is fully compliant with current legislation concerning marine safety and the protection of the marine environment. These requirements are stipulated in our contract with the Scottish Government. Our objective is that, in years to come, this project will be cited as a prime example of how to build a world-class bridge with minimum disturbance to marine life, marine traffic and the environment in general.



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**

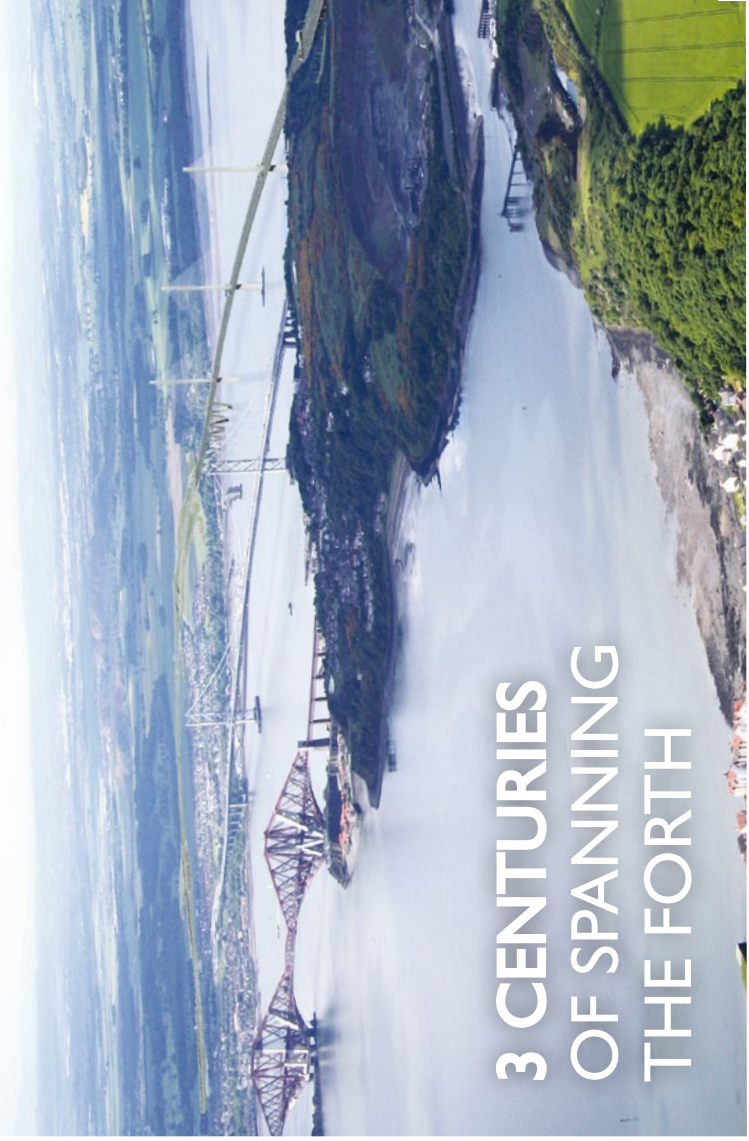
Email the team **enquiries@forthreplacementcrossing.info**

Log on to the project website at **www.forthreplacementcrossing.info**

Or drop into the **Contact & Education Centre** c/o Forth Bridge Administration Office, South Queensferry, West Lothian, EH30 9SF

Opening times
Mon–Fri: 0900–1730, Sat: 1000–1600





3 CENTURIES OF SPANNING THE FORTH



Forth Replacement Crossing contracts explained



Fife ITS

What: Installation of Intelligent Transport System gantries on M90 between the Admiralty and Halbeath Junctions in Fife and provision for southbound bus hardshoulder running

Who: JOHN Graham (Dromore) Ltd

When: Construction will begin in autumn 2011 and is scheduled for completion in summer 2012.



Forth Crossing Bridge Constructors

FRC Principal Contract

What: Construction of new cable-stayed crossing across the Forth and connecting roads

Who: Forth Crossing Bridge Constructors consortium, comprising Hochtief, Dragados, American Bridge International and Morrison

When: Construction will begin in autumn 2011 and is scheduled for completion in 2016.



M9 Junction 1a

What: Upgrade and improvements to M9 Junction 1a at Kirkliston including new west facing slip roads to the M9

Who: Sisk Roadbridge Civil Engineering Ltd

When: Construction will begin in autumn 2011 and is scheduled for completion in 2013.



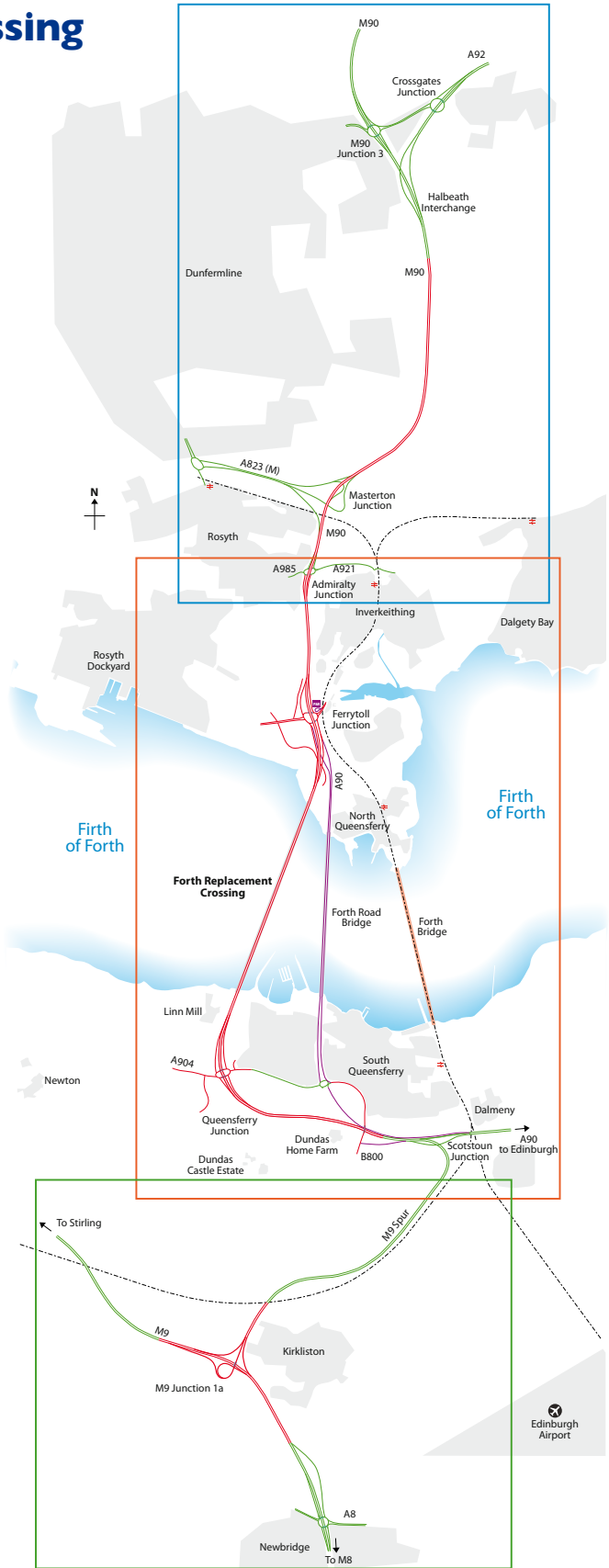
Agency of The Scottish Government

Employers Delivery Team

What: The Employers Delivery Team (EDT) will be operational on site across all three contracts to monitor progress, quality and adherence to the Forth Crossing Act.

Who: Transport Scotland and its consultants, Jacobs Arup

When: The EDT is already co-located on site and will remain in place until the successful completion of the project.



Legend

- New/Improved Roads
- Railway
- Airport
- Railway Station
- Existing Carriageway
- Waterbodies
- Settlements
- Park and Ride
- Proposed Public Transport Links