



JOHN POWER

Vote for your favourite Irish engineering project

We are pleased to announce the shortlist for the 2011 Engineers Ireland Excellence Awards in association with ESB. With the success of the inaugural awards last year we are delighted to once again showcase Irish engineering at its best. This week we continue by

featuring the third and fourth of the eight nominees in the Engineering Project of the Year shortlist. The projects featured over the next three weeks are:

■ **Sunday, September 18**
The Peace Bridge, Derry – GRAHAM Construction

The Mizen Head Footbridge – RPS/Carillion Irishenco

■ **Sunday, September 25**
Aerogen Solo II Project – Aerogen
Great Northern Haven – Dundalk Town Council/MCO Projects/Netwell/CA-SALA Centre

■ **Sunday, October 2**
M50 PPP Scheme – Atkins Roads Service DBFO – Lagan Ferrovial

The other two shortlisted projects are:
New Engineering Building – NUI Galway
Trinity College Biomedical

Sciences Institute – ARUP/Walls Construction

The winning project will be judged on the largest number of online votes received by midnight on November 3 and the winner will be announced at a special awards ceremony in The Four Seasons Hotel,

Dublin on Friday, November 4.

Visit www.engineersireland.ie/excellenceawards to register your vote.

May the best project win!

John Power is a Chartered Engineer and Director General of Engineers Ireland

Engineering Project of the Year kindly sponsored by the



The Peace Bridge, Derry – GRAHAM Construction

Bridging a divided city

Derry's Peace Bridge is more than just a landmark; it represents hope and change

Derry's Peace Bridge opened in June, completing a landmark project in the city's regeneration programme. The third bridge across the River Foyle, the Peace Bridge

has been funded by the European Union's PEACE III programme.

The programme's theme of creating shared public space aims to support large-scale infrastructure developments that

will tackle problems of separated communities by creating genuine new shared space or transforming contested space.

The €16.9 million bridge is 312 metres long and four metres wide, with landing

points at the rear of the Guildhall and the Ebrington embankment. It brings the Waterside into the city centre for the first time, and provides pedestrian and cycle access from the city side to the regenerated Ebrington site and St Columba's Park.

GRAHAM was awarded the contract for the design and construction of the bridge commissioned by urban regeneration company Ilex, and brought together a highly skilled team comprising Wilkinson Eyre, London (architects), AECOM (structural engineers) and Rowecord, Wales (steelwork fabrication). McAdam Design administered the contract and construction began in January 2010. The bridge was completed on schedule and within budget.

Linking the previously divided communities on either side of the River Foyle, the bridge's design is based on Maurice Harron's statue Hands Across the Divide. The Peace Bridge mimics the interlocking of two arms in a gesture of support and friendship. There are two structural systems, each allied to an opposing bank of the river, which overlap at mid-span in a "structural handshake" across the Foyle.

From a symbolic point of view, it was vital that the struc-



The Peace Bridge, Derry: it is based on Maurice Harron's statue Hands Across the Divide

A landmark for regeneration

"A key challenge was to design a structure that fulfilled the client's aspiration for a bridge that reflected peace and reconciliation of the two communities," said Philip Brown, chief engineer at GRAHAM Construction.

"As the bridge has a very complex structural and geometric arrangement, this created particular challenges in relation to fabrication of the steel bridge deck," said Brown.

"It was fabricated in 30 metre long sections which were welded together once lifted into position on site. To be sure that this was going to be achieved, a trial installation was car-

ried out on the completed sections before transporting them to site," he said. "The geometry of the bridge suspension cables and hangers was critical, both for the structural arrangement and appearance of the bridge. The cables and hangers had to be installed and tensioned in a carefully planned sequence to ensure they ended up in the correct position."

Brown said that the construction site posed physical constraints on the design team.

"The bridge was constructed in a very exposed location within the fast-flowing River Foyle. This was made all the more challenging as the construction period spanned two of the severest winters experienced in recent years," he said.

"For a complex project such as this it was very

important that all parties worked in close collaboration, so during the design period we held regular joint technical meetings with our designers and key subcontractors to review the design and provide input relating to buildability," said Brown.

"This continued throughout the construction period to ensure any technical issues were resolved before they became a problem. Our delivery team consisted of staff and operatives who between them had extensive experience in both the design and construction of iconic bridges," he said.

"GRAHAM and Ilex are proud of the part they have played in bringing the city together and providing it with a landmark for its regeneration and the anticipated social and economic benefits this brings," said Brown.

tural form of the bridge did not favour one side of the river over the other, and hence a symmetrical solution was necessary. In celebrating the connection and reunion of the two banks, the design had to serve both but belong to neither, while retaining a navigation channel 60 metres wide at high tide allowing leisure craft to pass safely.

The bridge comprises an S-shaped steelbox girder supported by suspension cables from two 37-metre high inclined steel pylons. In turn, they are supported on pre-cast concrete piers on tubular steel piles in the middle of the River

Foyle. The design exploits the reverse curvature of the deck and the inclined towers and suspension cables to provide balancing radial forces by which it achieves its stability.

The steel elements of the bridge were transported by road and ferry from Wales, and then from Lisahally docks by barge to the site, where they were lifted into place using a large floating plant and then welded in-situ.

The project was a first in the North, in that social clauses in the contract ensured the employment of eight local unemployed people, most of whom



The Peace Bridge is one of a number of projects integral to the regeneration plan for the city. It represents an opportunity to move towards a joint economic development and regeneration strategy for all sectors in the North West. The bridge's impact on the community is demonstrated by the fact that it was crossed more than 100,000 times in the week after the official opening.

The Peace Bridge stands out as a landmark that is more than just a functional piece of infrastructure, but represents hope and change in a previously divided city.

The Mizen Head Footbridge – RPS/Carillion Irishenco

Bridge opens up area of superb natural beauty

Engineers had to overcome severe weather, logistical challenges and environmental constraints when building new bridge

The €1.8 million Mizen Head footbridge, which opened in March is one of the most significant structures in the development of reinforced concrete as a construction material, both in Ireland and internationally.

Located at the most south-westerly point in Ireland, Mizen Head is a special area of conservation characterised by dramatic cliffs with steep, narrow footpaths and spectacular

views over the Atlantic Ocean. The new bridge is some

700mm wider than the original bridge, but otherwise identical. The concept has gained significant support from heritage professionals and other interested parties as it preserved the form of the original structure.

"RPS was originally commissioned by the Commissioners of Irish Lights to inspect and assess the bridge in 2002," said Kieran Ruane, technical director at RPS.

Detailed design of the new

bridge took place in 2007 and it was constructed between October 2009 and December 2010.

The project provided significant challenges to the design and construction teams. "Access to the site was extremely difficult, via a steeply inclined footway, less than one metre wide so access for conventional construction equipment was not possible," said Ruane. "The bridge was located in an environmentally-sensitive marine location and was subject to severe weather due to the exposed, coastal nature of the site."

The bridge had a clear span of 50 metres and the underside of the deck was located 45 metres above a sea gorge. Further constraints included the need to maintain vital services to the lighthouse facilities and to devise a solution that could be implemented as soon as possible to minimise the impact on the local tourist centre.

"The key challenge was to design a scheme that would allow safe demolition of the existing bridge and safe construction of a new bridge, with minimal disruption to the local environment," said Ruane.

"A phased demolition and construction process was de-



Mizen Head footbridge: almost identical to the original bridge

veloped which meant that the old bridge, the new bridge and several complex temporary structures co-existed on the extraordinary site for the duration of the works. This required complex planning of the works to ensure the scheme could be delivered safely, on schedule and within budget," he said.

Particular effort was placed by the design and construction teams on minimising the impact of the scheme on the sensitive local environment.

RPS specified that the bridge be demolished without

any debris falling into the sea gorge. The contractor, Carillion Irishenco, achieved this difficult task by careful planning and design of its temporary works and method statements.

"Such was the success of the project team in delivering the scheme on schedule and to budget that Fáilte Ireland granted additional funds near the end of the programme to allow the construction of footpaths and viewing platforms," said Ruane.

A footpath has been opened from the tourist centre to a new

viewing platform near the base of the steep cliffs at Mizen Head. This viewing platform opens up views to a previously hidden geological sea arch. A high-level platform located on the cliffs above the bridge opens up new views of Mizen Head, Sheep's Head and the Fastnet Lighthouse.

According to Ruane, the project's success is testament to the close collaboration between Cork County Council, RPS and the Carillion Irishenco as well as the direct funding support from Fáilte Ireland, the Commissioners of Irish

Lights and Cork County Council. "The Commissioners of Irish Lights (CIL) commissioned the original bridge, maintained it carefully for over 100 years and raised the necessary funding package to deliver the new bridge."

"Cork County Council took over responsibility for the project when construction began and successfully steered it through to completion," said Ruane.

The extraordinary achievement of replacing the bridge at Mizen Head has raised the status of Irish engineering.

Engineering as a driver for recovery

"Cork County Council is delighted with the new Mizen Head footbridge and visitor centre," said Noel O'Keefe, county engineer at Cork County Council.

"Visitor numbers are expected to top 60,000 this year, a dramatic increase on the 15,000 annual visitors previously. There are four new viewing platforms, two on the island and two on the shore, which give fantastic views towards Sheep's Head

peninsula and Roaring Water Bay to the east," he said.

"The new footbridge is not just an engineering project. It's engineering as a driver for economic recovery," said O'Keefe. "The bridge is creating jobs in a remote part of west Cork and is benefiting not just the Mizen, but all the neighbouring areas. This model could be recreated around the Irish coast," he said.

According to Kieran Ruane, technical director at RPS, the importance of the project to the local and regional economy cannot be overstated. "The tourism industry forms a significant

part of the local economy. The replacement of the Mizen bridge and the construction of new tourist facilities at Mizen Head significantly enhance the area's potential as a tourist attraction," said Ruane.

"Since the bridge reopened in March 2011, the management of the tourist centre has reported a very large increase in visitor numbers. It is likely that numbers will increase further to around 100,000 annually, particularly among international visitors, as more international guide books and travel magazines report on the recent development."