

## Bridge in Cala Galdana on Menorca





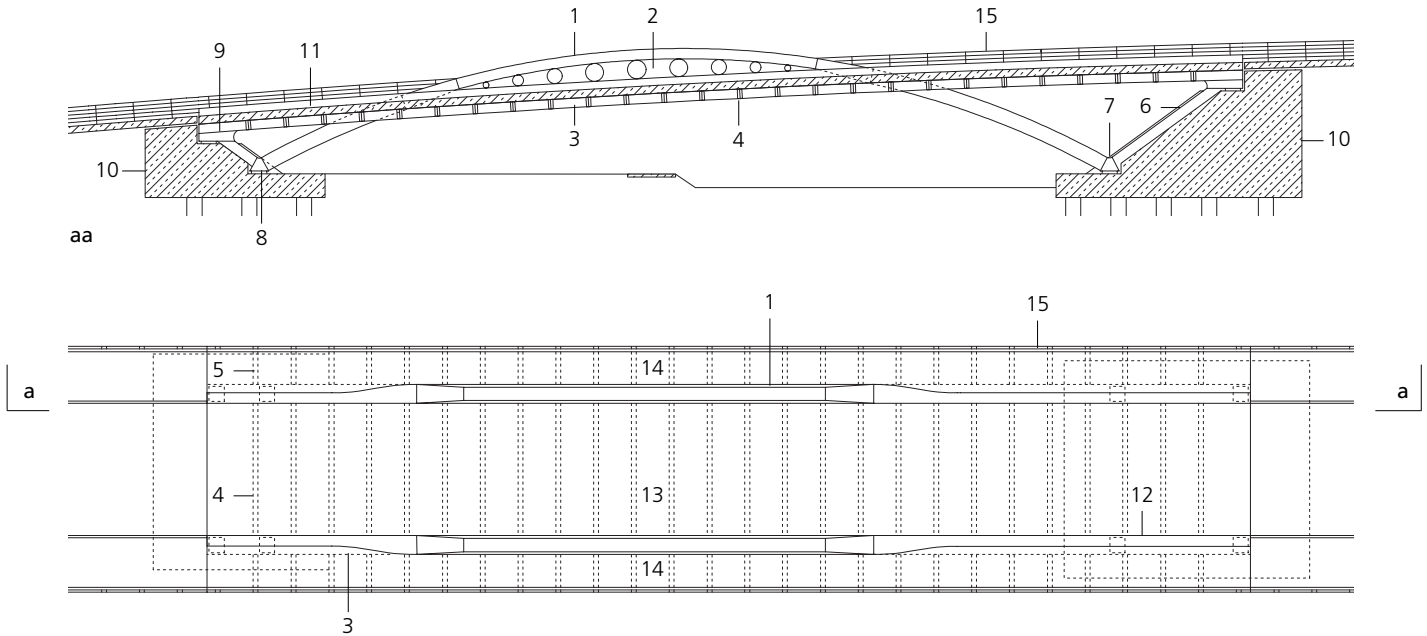
*The inclined struts between the outer ends of the arches and the longitudinal beams take up the horizontal forces in the arches, thereby relieving pressure on the foundations.*

On the rocky coast of Menorca, an island designated by UNESCO as a biosphere reserve, lies the popular tourist centre and bay of Cala Galdana. For the last 30 years a reinforced-concrete bridge spanned the mouth of the 'Torrent d'Algendar' at this point. But the structure had suffered considerable damage due to the marine environment and it was time to replace it.

The new bridge had to span the full width

of the old river bed, a distance of over 40 metres, and blend well into the surrounding landscape. Other key criteria in its design were a long service life and minimum maintenance costs, both of which prompted the choice of a bridge in duplex stainless steel. The main structure is made up of two parallel arches, triangular in cross section, spanning 45 metres and rising 6 metres at the apex. These are intersected by two longitudinal beams. Transverse beams with a spacing of two metres have been welded to the sides of the longitudinal beams and are connected to the reinforced-concrete deck in a composite action. These transverse beams have a constant hollow cross section between the longitudinal beams and on the outside they are tapered towards the edge of the bridge. The 7-metre wide, two-lane carriageway runs between the two arches. The pedestrian walkways on either side of the bridge are separated from the carriageway by the arches and a low concrete wall.

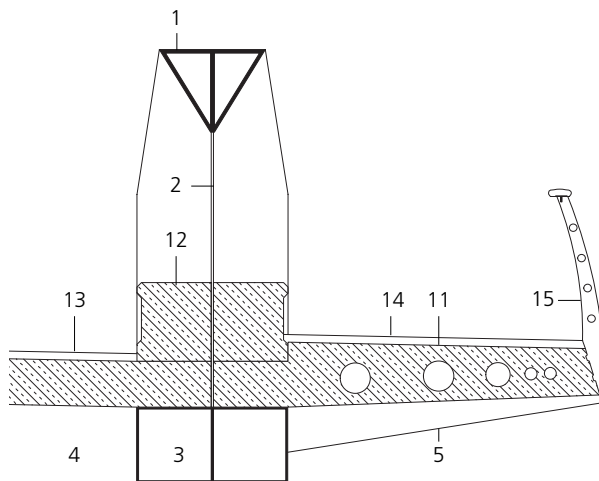




Longitudinal section · Plan scale 1:400

Sectional detail scale 1:50

- 1 arch, welded hollow section with central web, 700-1000/700/20-25 mm
  - 2 15 mm web
  - 3 longitudinal beam, welded hollow section with central web, 1000/500/15-25 mm
  - 4 transverse beam, welded hollow section 250/500-570/10-12 mm, connected to reinforced-concrete deck via Ø 20 mm studs
  - 5 cantilevered beam, welded hollow section, 250/300-50/8-10 mm
  - 6 strut, welded hollow section, 1000/500/20-25 mm, with welded transverse and longitudinal reinforcement
  - 7 connection between arch and strut, welded hollow section of 25-40 mm plates, with welded transverse and longitudinal reinforcement
  - 8 pot bearing, stainless steel
  - 9 elastomeric bearing layer, anchored
  - 10 reinforced-concrete foundations
  - 11 470 mm (centre line of bridge) reinforced-concrete deck
  - 12 concrete wall
  - 13 road surface  
60 mm asphalt on bitumen membrane
  - 14 walkway surface, simulated limestone pavers
  - 15 railings: 2x 1290/10 mm flat-steel posts, Ø 50 mm tubular steel horizontals, 150 mm wide wooden handrail
- All steel components are of stainless steel, grade 1.4462.





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*Curving slightly inwards, the railing posts are attached to the cantilevered transverse beams and connected to each other horizontally using stainless-steel tube. On top of the railing is a wooden handrail.*



*A pickling paste was applied to the stainless steel frame after welding, to remove discoloration and scale. The unified matt surface structure was achieved by subsequent beadblasting.*

All the steel components are of duplex stainless steel, grade 1.4462. The austenitic-ferritic alloy has high corrosion resistance in coastal locations and excellent mechanical properties, such as high tensile strength.

Although stainless steel was a more expensive option for the bridge than conventional materials, the overall costs in terms of longer service life and considerably lower maintenance input are comparable.



Euro Inox  
Diamant Building, Bd. A. Reyers 80,  
1030 Brussels, Belgium  
Tel. +32 2 706 82 67  
Fax +32 2 706 82 69  
E-mail info@euro-inox.org  
Internet www.euro-inox.org

Client: Consell Insular de Menorca,  
Departamento de Movilidad, Cala Galdana, Menorca  
Engineers: PEDELTA, Barcelona  
Text and layout: Martina Helzel, circa drei, Munich  
Translation: Ingrid Taylor, Munich  
Photos: PEDELTA, Barcelona