Award

Copr Bay Bridge, Swansea

PROJECT TEAM

Architect: **ACME**
Structural Engineer: **Ney & Partners**
Steelwork Contractor: **S H Structures Ltd**
Client: **City & County of Swansea**

© Hufton and Crow

Swansea is a coastal city in Wales with an illustrious industrial past, and a century as the world capital of copper production. The historic centre is only minutes from the glorious beaches of Swansea Bay, but the construction of vast docks in Victorian times, inner city main roads, industrial sheds, supermarkets and surface car park structures have contributed to a city centre that feels far removed from the sea.

To connect Swansea back to the beach, a new pedestrian and cycle bridge now spans across Oystermouth Road, seamlessly connecting the city centre with Copr Bay Phase One, which includes Swansea Arena and a coastal park, and the city's maritime quarter and seafront. The 49m-long single span bridge is an eye-catching structure that is 12m-wide × 7.5m-high that spans six lanes of traffic and provides a safe, continuous connection between the different parts of Copr Bay. Importantly, the bridge reconnects Swansea's city centre to its world-renowned coastline.

Copr Bay Phase One forms part of a wider £1Bn+ urban regeneration programme in the city. The £135M development has reactivated a previously underutilized plot of land by delivering a state-of-the-art, 3,500 capacity new arena, comprising a live performance area and conference centre, as well as new public realm including the city's first new coastal park since Victorian times, high-quality, new social housing and retail space for local businesses.

Copr Bay Bridge provides a new gateway for Swansea and is a celebration of the city's past, present and future. It was designed as an innovative stressed skin bridge, with an impossibly thin steel deck, made from a continuous 15mm-thick steel plate, held aloft by perforated arched steel plates. The iconic arch stabilises the super-slender bridge deck and creates a new urban space floating over the road.

The bridge structure offers a degree of protection from the elements. The steel has been rolled into a double curved surface and butt-welded into a single tube. Openings have been cut into the sides where the structural stresses were lower, offering glimpses across the road, the arena and the new coastal park and to allow the bridge to glow at night from within.

Steelwork was chosen primarily because of its structural properties and ability to span long distances. It provided flexibility to work with an interesting structural solution, which is essentially a deformed bow truss formed of plate steel, allowing the creation of the sculptural form, super thin bridge deck, and the opportunity to create a clear identity through the development of perforations in the truss walls and application of a gold paint finish.

Swansea-born artist Marc Rees designed the pattern on the bridge's sides featuring 2,756 laser-cut origami shapes. The perforations are abstracted and exploded silhouettes of swans, inspired by the emblematic Swansea bird. The bridge colour and lighting are designed to move in synchronization with the illuminating façade of the Arena, to create a Copr Bay district that pulsates with life at day and at night. In acknowledgment of Copr Bay's history as the centre of coal and copper production, the bridge has the colour of freshly smelted copper.

The 140t bridge was delivered to site in sections, consisting of four deck pieces, six roof sections and 11 side panels. The roof sections measured 10.5m × 4.1m × 600mm and the side panels were 2.8m × 6.9m × 15mm. The largest steel elements to be transported to site and also the heaviest, where the deck sections, measuring 24.5m × 6m × 2m and weighing 24.6t each.

As the deck is only 15mm-thick and needed to be split longitudinally for transportation, the open end was extremely lively, both when being transported and during lifting. The solution to this problem was to adopt a bespoke transport lifting beam that strengthened the deck and allowed a multiple eight-point pick-up procedure. Once on site, the bridge deck was assembled on temporary works positioned in an area adjacent to the bridge's final location. The curved plates, which form the sides, arch and roof were then welded into place, before the complete structure was given its final topcoat of gold paint.

The completed structure was then lifted onto Self-Propelled Modular Transporters (SPMTs) and manoeuvred onto its two concrete abutments during a Saturday night road closure. After the bridge structure was in its final position, the steel deck had an anti-slip resin and aggregate finish applied.

© Hufton and Crow

Oystermouth Road, one of the busiest vehicular routes in Wales, has separated Swansea city centre from Swansea Bay for half a century. Copr Bay Bridge provides a safe, enjoyable crossing and finally re-links the city centre with the beach. It creates a seamless link for both pedestrians and cyclists travelling from the city centre to the new Copr Bay district and waterfront, and provides Swansea citizens easier access to nature and new play space for all ages.

Judges' comment

The Copr Bay Bridge provides a dramatic new gateway to Swansea, with its striking form and colour acknowledging the Bay's history as a centre of coal and copper production. Of particular note are the innovative stressed skin design and the quality of the manufacturing which have resulted in an exemplary project.