

INNOVATIVE PRECAST RETAINING WALLS BUILT UNDERWATER FOR WATERFRONT DEVELOPMENT



REINFORCED EARTH

Believed to be the first of its type, Tierra Armada (Reinforced Earth) in Spain recently designed and supplied 1.5km of precast counterfort retaining panels in the Bilbao estuary. The contractor Acciona Construcción and Altuna y Uría JV worked for the client Bilbao Port Authority to gain 50,000 m² land for future development for residential and mixed uses for around €20M. A tidal estuary location, there were substantial challenges that were overcome through using such as system, but was successfully executed in under 22 months, finishing in early 2022.

Key challenges

Working in a tidal zone always presents issues. The fundamental one is often the programme constraints when works can be conducted either side of high tides. Instead of considering a standard coffer dam approach with steel piles and the disadvantages that come with these types of solutions and the client wanted an aesthetic surface to match existing estuary walls and an installation that offered extended whole life cycle costs.

The scheme therefore designed an approach using selective areas of stone column foundations, which were installed below the area to be built upon. In total around 60km of columns were installed. Granular fills were then deposited onto these and an area of levelled fills were later deposited where the thin walled precast counterfort panels would be placed. The craneage of the precast units had to also ensure lifts of these panels could be made up to 115m from the side in some instances.

Innovation

Called TechWall, the low carbon precast panels are capable of being cast to heights of over 16m, widths of up to 2.5m and have only very thin sections of 140mm. The panel is designed prestressed until it has been backfilled. The panel is further strengthened by a counterfort system on the back face of the panel, allowing a variety of selective backfills to be utilised. TechWall has significant benefits not only for use in hydraulic situations, but also where a cut situation is small, where the base can be suited accordingly to accommodate the situation.

Benefits

The significant speed of build even underwater. **In Bilbao up to 10 units a day 250m² were installed?**
Cost benefits over conventional coffer dam solutions and whole life cycle costs were significant
Surface aesthetics on the front face of the panels were possible and indeed could easily support biomimicry for coastal habitats in the intertidal zones.

Low carbon, thin walled panels of 140mm with heights of up to 16m per unit. Selective backfill options.

Almost any surface aesthetic can be applied

Suitable for a variety of uses as retaining walls, the reinforcement in the precast can be replaced with GRP or basalt to eliminate any corrosion

