

CASE STUDY

Shed 8, Bristol Port, Royal Portbury Dock



Photo credit: The Bristol Port Company

COMMERCIAL

CLIENT

The Bristol Port Company

TECHNIQUES

Driven Precast Concrete Piles

ACHIEVEMENTS

Precast piles greatly reduced the generation of spoil and any requirement to remove offsite.

The speed of installation was a great advantage.

Project Brief

Roger Bullivant Limited (RBL) worked with The Bristol Port Company and Shear Design Consulting Civil and Structural Engineers to develop a piling solution for a new development within Royal Portbury Dock.

Originally constructed in the 1970s, the site included the presence of existing piles and a new footprint that required a carefully engineered approach. RBL proposed 250mm x 250mm Driven Precast Concrete Piles, designed to carry up to 500kN in compression and 45kN in horizontal loading. The solution was tailored to meet the project's structural demands while delivering measurable programme and environmental benefits.



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Key Issues & Requirements

- Programme Efficiency and Spoil Minimisation: A key requirement was to reduce programme duration and minimise spoil removal from site. The use of Driven Precast Concrete Piles allowed for rapid installation with no excavation, aligning with both time and sustainability goals.
- Challenging Ground Conditions: The site presented a complex soil profile:
 - 2.0m of made ground
 - Very soft sandy gravelly clay to 16.0m
 - Silty sands with shell fragments to 26.0m
 - Mercia Mudstone from 28.0m to 30.0m
- This variability required a pile solution capable of penetrating through unsupportive soft strata to more competent strata while maintaining integrity and performance under both vertical and lateral loads.
- High Load Requirements and Negative Skin Friction: Due to the soft strata, the piles were designed to transfer construction loads into the Mercia Mudstone, with an allowance for negative skin friction while catering for lateral loads.

Solutions

- Efficient Design and Delivery: RBL designed and installed 250mm x 250mm Driven Precast Concrete Piles to an average depth of 29.0m. The works were completed in just 10 days, demonstrating the speed and reliability of this solution.
- Factory-Produced, High-Strength Piles: All pile sections were manufactured in-house using C50 characteristic strength concrete, in compliance with BS and ISO standards. Segmental lengths of 3m, 4m, and 6m were used to minimise waste and optimise logistics.
- Performance Validation: To verify pile capacity and ensure long-term performance, RBL conducted multiple restrike tests to confirm soil recovery and pile 'set'. Dynamic testing with CAPWAP analysis was also undertaken to provide detailed load-settlement data.
- Sustainable and Cost-Effective Delivery: Over 200 No. piles and 5,700 linear metres were installed without generating spoil, significantly reducing environmental impact and disposal costs. The use of in-house manufactured piles ensured quality control, reduced transport emissions, and supported a circular approach to materials. RBL has replaced cement content with 50% Ground Granulated Blast Furnace Slag (GGBS). Since August 2022, we have been using this Secondary Cementitious Material (SCM) in all our precast products. Calculated to have an embodied carbon value between 196 – 228 kg CO₂e per m³ of precast product manufactured.



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