

Stokes Bay East Seawall Replacement

Coastal Protection Scheme



Issue

The Stokes Bay seawall and promenade were constructed during the 1970s and had experienced several failures in recent years. In February 2022 it was unable to withstand the force of Storm Eunice which resulted in substantial damage. This led to a 135m long section of the seawall requiring replacement.

It was anticipated early in the project that the existing seawall might be in worse condition than was documented. Hence, our approach to simplifying projects would be crucial to identify the most efficient and effective replacement solution. In addition, our extensive experience in challenging marine environments, and adaptable and empowered teams, ensured that any changes to a project did not result in variations to the budget or timing. We were able to maximize productivity, through using our extensive self-delivery and ownership model that includes piling, plant, quarry materials and specialist equipment.

The £752,000 project for Coastal Partners included a sheet piling seawall, a reinforced concrete capping beam and safety handrailing. A new promenade public space was constructed behind the seawall with additional improvements to the car parking.

Solution

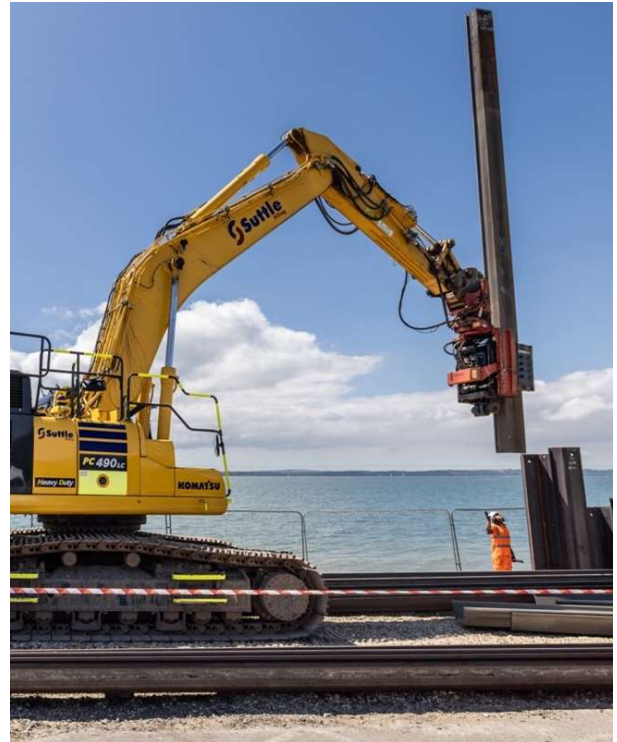
The initial task from the programme of works was to remove the existing concrete seawall that had been damaged. From previous experience, it was anticipated that it could be in a worse condition than documented and could also have moved further seaward than indicated on the project drawings. This was proven to be the case, which impacted the design position of the sheet piled walls, and subsequently the remainder of the project, including the promenade size and car park layout.

With the proposed design unworkable, the team collaborated with the client to simplify the project, by demolishing the existing seawall and burying it in situ in the beach profile at a suitable depth. This approach prevented the need to remove 220 tonnes of waste concrete from site, therefore reducing the number of lorry movements.

This resulted in significant financial savings and a reduction in carbon emissions from less transport on the local road network. The team also opted to use eco hybrid welfare units to reduce carbon emissions.

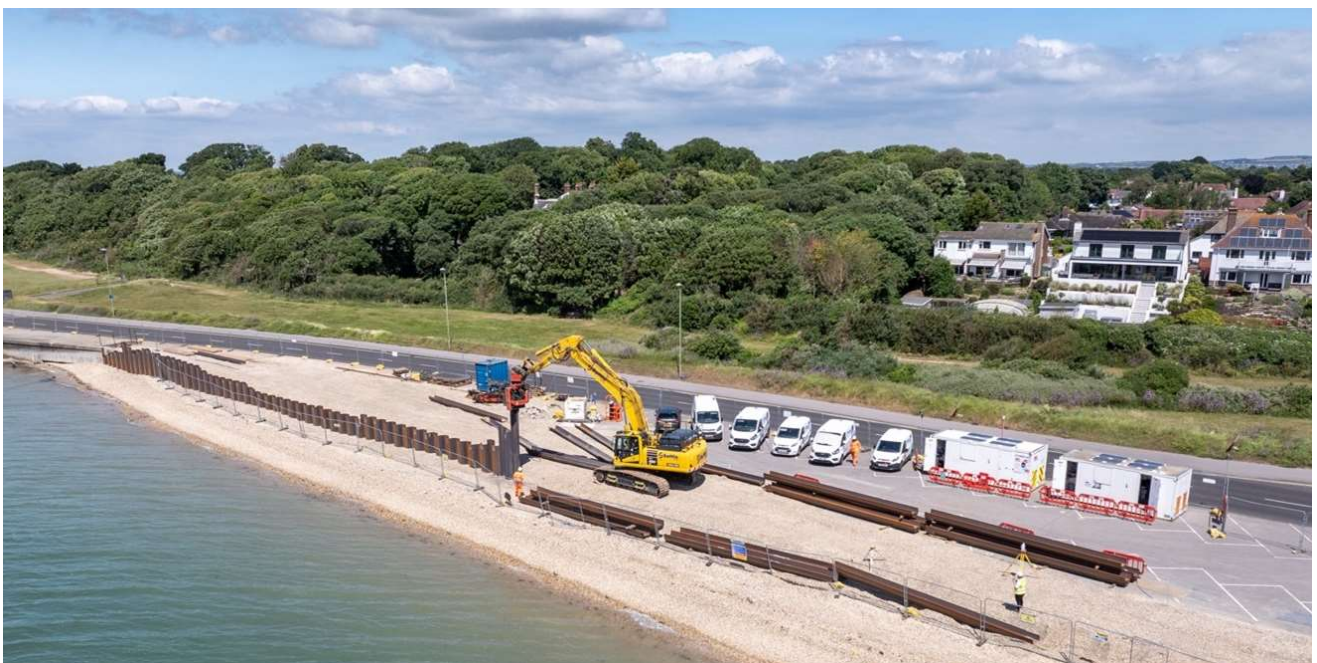
Sheet Pile Seawall

The team installed 135m of 10m sheet piles, utilising a 50t Komatsu PC490 excavator and Movax attachments, including SG75 side grip



and DH25 impact hammer. The team chose this equipment over a traditional piling rig for its versatility. This decision allowed all excavation work to be undertaken as well as the initial demolition of the damaged seawall, eliminating the need for additional machinery on site.

The Movax system also enabled the use of the same excavator for two different piling techniques: side-grip pile driving and impact hammering for back driving the piles.



Reinforced Capping Beam

A new reinforced concrete capping beam was constructed on top of the piles to create the new seawall. This was achieved using Dawson soffit formwork, which is easily installed onto the sheet piles, providing a programme benefit compared to conventional formwork. The system was designed to ensure no grout was lost into the sensitive marine environment. Stainless tying wire was utilised for all steel fixing, and concrete with XS3 exposure class (a mix with a low carbon cement alternative) was used to ensure the required design life in the coastal environment.



It wasn't all straightforward. During the excavation of the beach profile, a large area of intact WWII D-Day landing blocks was found adjacent to the pile line. Due to their archaeological importance, these blocks had to remain in position, which meant the soffit formwork could not be installed in that section.

The team quickly adapted, developing a revised construction methodology using timber mats placed on the foreshore to support side shutters and a layer of regulating sand and Cordek to form the base of the capping beam. This setup could be easily removed after the pour to ensure no materials

were left on the foreshore. These works were completed with minimal impact to the programme, and the concrete package was finished 20% ahead of schedule.

Installing the Promenade

In addition to replacing the seawall, the team reconstructed the promenade behind it and installed a new handrail. During construction, it was discovered that the proposed levels in the design were unworkable with the site conditions. The team collaborated with the client to propose new levels for sections of the promenade to ensure smooth tie-ins to the existing wall while maintaining the required falls for surface runoff. They also installed two slabs with drop kerbs to enable pedestrian access to the promenade, adjusting all slab levels to accommodate the works.

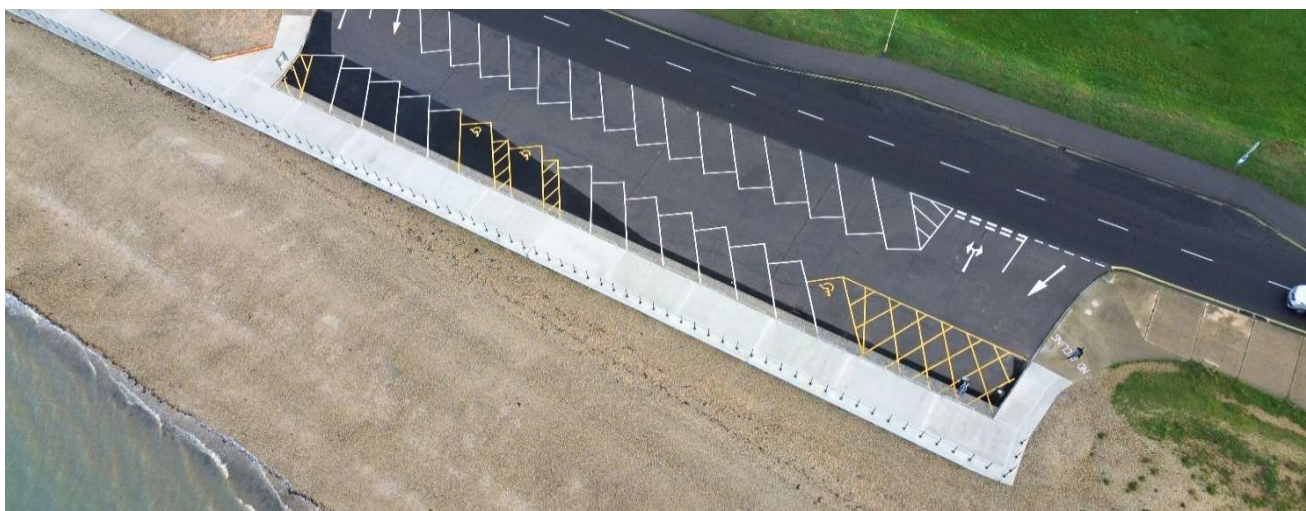
The team took on the design and installation of the handrail, presenting three potential options to the client. Working with supply chain partner Kite Projects, they finalised and installed the handrail within the required timeframe.

Car Park Improvements

The design also included the necessary reinstatement of the car park to restore it to a workable condition. Collaborating with the supply chain partner, Wessex Macadams, the team proposed a specification and works scope for the reinstatement.

Due to strong collaborative relationships on the project, these works were integrated into the programme without affecting the completion date. As a result of the piling works finishing two weeks ahead of schedule, and the team consistently exceeding all programme durations, additional works on the Alverbank car park, which included drainage, resurfacing, and line marking, were all finalised within the original completion date.

The drainage system installed in the car park consisted of 60m of Grasscrete blocks with a free-draining sub-base to facilitate water percolation into the beach shingle. Throughout the project, the team remained mindful of their proximity to a protected vegetated shingle habitat used by Terns and other wintering birds for nesting.



Consequently, they ensured that their construction methodology had no impact on this area, which influenced their haulage routes and machinery movements. While on site, in addition to completing the scheduled works, the team also created 350m² of vegetated shingle habitat in an area that had previously been covered in concrete. Since project completion the area has been transplanted with seeds found further down the beach and will become an important habitat for overwintering birds.

The project involved working closely with the Marine Management Organisation (MMO) to ensure that project environmental conditions were met. Environmental records were maintained on site and best practice measures implemented for spill prevention. MMO Audits of the site raised no areas of non-compliance with project specific conditions.

Outcome

The Suttle Projects approach to simplifying projects is founded on four key elements; reliability, productivity, creativity and sustainability.

Reliability

Despite the numerous project challenges and unforeseen obstructions, the piling was completed two weeks ahead of schedule and the project completed including additional works within the original completion date.

Productivity

Our decision to adopt an excavator-based methodology over traditional piling, maximised productivity and mitigated the potential impact of several project specific setbacks.

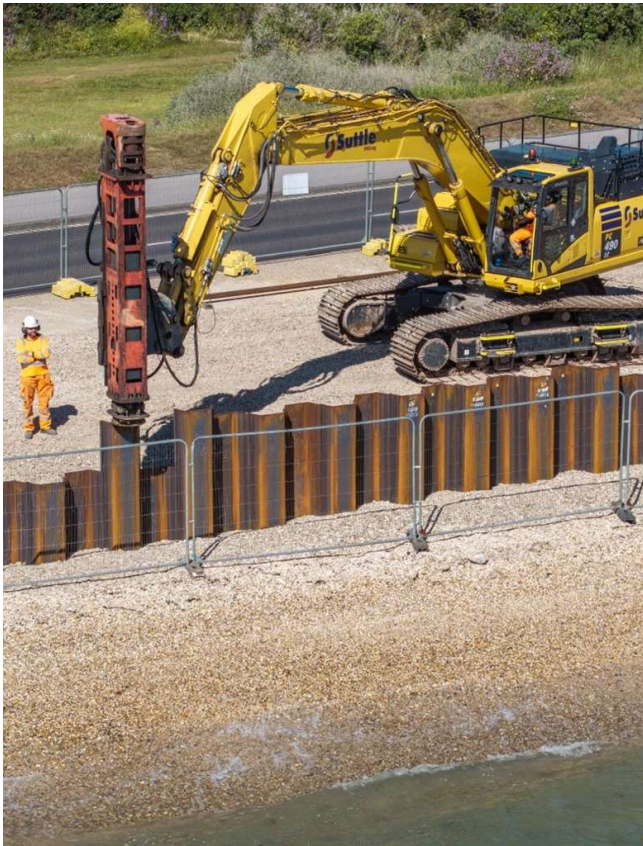
The methodology allowed all excavation work, and the initial demolition of the seawall without the need for additional machinery being brought to site. The Movax system also increased productivity and the use of two different piling techniques: side-grip pile driving and impact hammering for back driving the piles.

Creativity

When the location and condition of the existing seawall was found to be not as indicated, this could have significantly impacted the duration and cost of the project. Applying our simplifying projects approach with creativity resulted in significant financial savings for the client and a reduction in the project's associated carbon emissions.

When it was discovered during construction that the proposed promenade levels in the design were unworkable with the site conditions, the team collaborated with the client to propose new levels for sections of the promenade, again avoiding programme delays.

On the design and installation of the handrail, the team presented three potential options to the client. Once selected, this was procured and installed within the required timeframe.



Sustainability

Our methodologies prevented 220 tonnes of waste concrete being removed from site, avoiding the associated lorry movements and disruption to the local community and highway network.

While on site, 350m² of vegetated shingle habitat was created in an area that had previously been covered in concrete. In doing so providing an important habitat for overwintering birds.

Modern, low emission plant from the Suttle Projects owned fleet was used, incorporating biodegradable hydraulic oil. Soft start procedures were also implemented on the use of percussive piling, to reduce disruption to marine ecology and any nesting birds.

Eco hybrid welfare units were adopted to reduce carbon emissions and a Dawson soffit formwork system was adopted to ensure no grout contamination was possible into the sensitive marine environment.

Katie Gill MCIWEM - Coastal Engineer and Project Manager Coastal Partners commented;

"The Suttle Projects team's dedication was instrumental in delivering this project on programme. Their support with design adjustments along the way added significant value and contributed to the project being completed to a high standard."

Simplifying Projects Better more reliable outcomes

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