



CASE STUDY

QUAY WALL STABILITY ASSESSMENT

CLIENT: CONFIDENTIAL
LOCATION: UK

Highlights:

- Geotechnical Engineering
- Civil & Structural Engineering
- Onshore Marine Engineering

THE CHALLENGE

Arthian was appointed to provide multi-disciplinary civil, structural and geotechnical engineering support to help facilitate the delivery of a 187 tonne cold box measuring 57 metres in length for a new air separation plant in Clackmannanshire. The new asset was to be delivered by barge along the Firth of Forth, pre-loaded on a self-propelled modular transporter (SPMT), accessing the existing quayside area via a ramp before being driven to the final installation location some 150m inland.



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THE CHALLENGE, CONTINUED

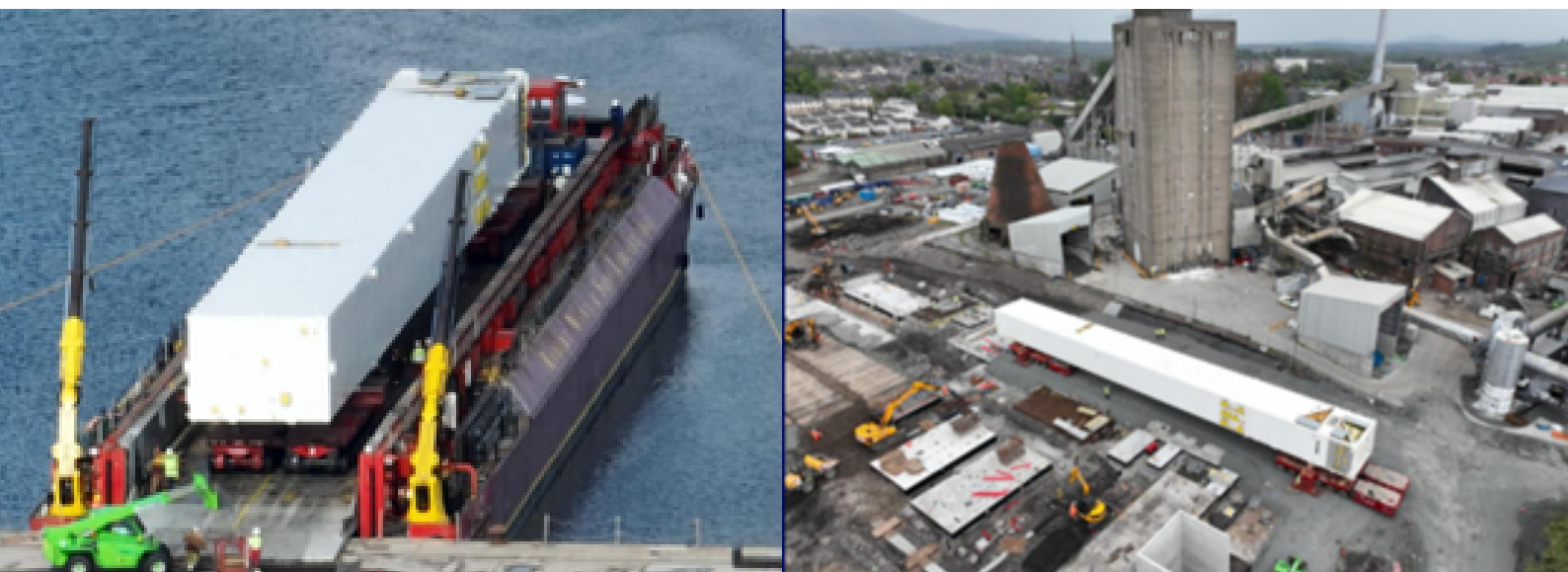
A combined structural and geotechnical assessment of the existing quayside wall, including a detailed geotechnical desktop study, indicated it was not capable of supporting the expected SPMT loads. The project was further complicated by a strict swept path as space was restricted by operational buildings and a 90-degree return section on the existing quayside wall, creating a pinch point.

THE SOLUTION

Arthian worked closely with the contractor and developed an innovative engineering solution comprising a Larssen sheet pile wall section with a series of internal tieback anchors connecting it to waler beams welded to the inside of the existing quay wall. This solution provided the lateral support that the existing quay wall required while working within the site specific constraints. An advanced design verification analysis was undertaken using finite element analysis (FEA) software.

The 150m long combined haul road and working platform section leading from the barge offload point to the final location was designed incorporating high-strength low strain geogrid reinforcement layers which helped to provide edge stability while also allowing the footprint of the haul road to be limited given the proximity of the adjacent Forth Estuary.

All design work was successfully completed within a condensed project programme which had very little flexibility as the barge arrival date was fixed.



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