

QUEENSLAND SUGAR TERMINAL



TOWNSVILLE

DYNAMIC COMPACTION/REPLACEMENT AND PRESTRESSING



Client: Queensland Sugar Limited **Consultant:** GHD Pty Ltd **Contractor (Construction):** Walter Construction Group
Head Contractor Ground Improvement/Specialist Contractor Construction: Menard Bachy Pty Ltd

THE PROJECT

For the design and construction of a bulk sugar terminal in Townsville, carried out for Queensland Sugar Limited (QSL), this required Menard Bachy's knowhow in soil consolidation and expertise in prestressing processes and understanding of the local market. This delivered the client a technically and economically viable solution to a challenging project.

QSL is the exclusive international marketer of the raw sugar production of approximately 6,500 cane growers and mill owners. The storage provided by seven terminals across the state ensures a continuous supply throughout the year, although the crushing season only extends from June to December. As part of QSL's continuous upgrading of facilities to ensure its competitiveness, the need for a new 480,000t bulk storage facility on the north-eastern coast of Queensland was identified. To maximize the benefits of the proposed storage facility, it was necessary for it to be operational in September 2003 for the latter half of the sugar crushing season when existing facilities reach capacity.

The site in the port of Townsville had been previously occupied by a coal fired power station, and included substantial areas of the tidal foreshore, reclaimed by waste from the power station and dredging operations.

Consulting Engineers GHD, were appointed by QSL to carry out the geotechnical investigation.

MENARD BACHY'S ROLE

High construction costs disqualified initial proposals of piled foundations and suspended floors. Excavate and replace options were ruled out being expensive, having practical limitations as well as potential significant environmental impact. GHD therefore opted to trial a surcharge treatment by placing a 10.8m high surcharge to define the effectiveness and time necessary for soil consolidation under surcharge conditions. The results were positive, both technically and economically, but raised serious concerns with regard to the surcharge period and the possibility of meeting the critical construction deadlines.

Alternative proposal

GHD consulted various parties on possible foundation options, providing Austress Menard. the opportunity to submit an alternative for consideration in the early stages of the project. Geoff Holding, Regional Manager for Menard Bachy targeted this as a key project for Ménard Bachy which had just successfully completed two smaller soil improvement projects in Australia.

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The joint venture offered a design and construct solution to QSL in March 2002, proposing an entirely new approach for the ground improvement based on Austress Menard's 'active' soil compaction and reinforcement processes. The recommendation was based on the dynamic replacement and compaction techniques to effectively over-consolidate the soil horizons ensuring that both the bearing capacities and settlement criteria were uniformly achieved on the full footprint of the structure. The proposal further eliminated the time risk, which was of great interest to the client. Enthalpy, Project Managers for QSL, quickly realised the technical and commercial benefits, combined with the significantly reduced construction period. With GHD's support, the soil improvement contract was awarded to Austress Freyssinet working in joint venture with Ménard Soltraitement.

Phasing works to save time

Due to time constraints, the project was awarded in phases to allow work to continue while contractual negotiations were finalised. The first phase was awarded in June 2002, and entailed further site investigation work targeted at identifying variations in geological conditions on site. The work was done by Trial Pits, Cone Penetrometer Testing and Boreholes combined with Pressuremeter testing which provided the absolute soil parameters, essential for the design of the soil improvement works.

Optimised prestressing

Austress Menard working together with the Walter Construction Group, provided the post-tensioned design and installation package for the concrete components of the Sugar Terminal Building.



Savings in time, costs and risks

The benefits of the active consolidation techniques, combined with the advantages of the prestressing system, made it possible to guarantee critical programme deadlines. It also provided cost savings by reducing earthworks and material quantities. The guaranteed maximum settlements offered the client peace of mind with regards to the future performance of the structure. Environmental risks associated with more conventional systems were effectively eliminated.

The ideal solution

'The innovation in design and execution offered jointly by Austress Menard, enabled us to overcome technical and programming challenges, both in the geotechnical and structural aspects of our project, explains Ross Broadbent, Enthalpy head of project. We thus benefited from numerous advantages, which were further enhanced by the pro-active management and co-operation displayed during the execution of the works. This literally formed the foundation of the success of our project.'