

PROJECT SHEET

PORT EXPANSION PROJECT, MELBOURNE, AUSTRALIA
PHASE 1: DEEPENING THE PORT ENTRANCE

INTRODUCTION

The Port of Melbourne is Australia's largest container and general cargo port, with 37% of Australia's container trade, € 20 Billion worth of exports and 3,500 commercial ship calls each year. By 2035 the Port aims to expand from 2 million to 8 million containers and to be able to accommodate vessels of 7000 TEU, instead of the present 6500 TEU. This expansion plan depends upon deepening the Entrance to Port Phillip Bay from 14 to 17.3 meters to accommodate more traffic and larger vessels with a draught of 14 meters (presently only 11.5 meters).

PROJECT SPECIFICATIONS

The comprehensive project objectives as specified by the Port of Melbourne were to provide Channel Modifications to sections of the Great Ship Channel at the entrance to the Bay, the South Channel, the approach channels to the Port and the Yarra River Channel as well as to protect the existing service pipelines across the Yarra River and Port Melbourne Channel taking into account the deeper channels. In May 2004 the Port of

FEATURES

Client	Port of Melbourne Corporation
Location	Melbourne, Australia
Period	2008 / 2009
Contractor	Boskalis Australia PTY



- A** Location map
- B** The unique ripper draghead
- C** TSHP Queen of the Netherlands in Port Phillip Bay with in the background Melbourne's skyline



Melbourne Corporation (PoMC) and Boskalis Australia Pty Ltd signed an Alliance Contract which provided a balanced risk spread so that all actions and decisions could be based on a 'Best for Project' principle. Phase 1 of the Melbourne project is the deepening of the entrance at Port Phillip Bay, where more than 400,000 m³ of rock had to be removed to achieve acceptable depths.

CHALLENGING ENVIRONMENTAL, SEA AND SOIL CONDITIONS

Until 1986 the port entrance was deepened using explosives, but currently environmental regulations prohibit this. The Entrance is located close to the Port Phillip Heads Marine National Park, including an 80 meter deep canyon adjacent to the two dredge areas at the Entrance. These and other areas in Port Phillip Bay are rich in many species of fish and other aquatic life and contain reefs and wetlands. The risk of rock falling on deep reef habitats is



unacceptable. The entrance to the Port Phillip Bay is one of the most turbulent and potentially dangerous stretches of water in the Bass Strait with an unusually hard seabed. The port entrance consists of sandy limestone or calcarenite varying in strength from UCS = 1 – 30 MPa. Some parts have a fine-layered structure, while other, harder, parts are massive. Under normal circumstances with these soil conditions, a large cutter dredger would be used, but with the extreme turbulence of the sea, a cutter was not the answer. Waves at the entrance can be up to 3 meters in height, with complex currents up to 8 knots. In addition, the entrance had to remain open for commercial shipping vessels.

SOLUTIONS: INTRODUCING THE UNIQUE RIPPER DRAGHEAD

The Boskalis Research & Development Department, the Central Technical Department and the Dredging Department, working as an interdisciplinary think-tank, concluded that a trailer suction hopper dredger capable of dredging rock could be the most cost-effective solution. This required the development of an innovative draghead. Next a ripperhead prototype was developed and three prototypes were built in Australia. A full-scale trial was launched for two weeks with the TSHD Queen of the Netherlands

dredging with the ripperheads at the entrance to the bay. Ultimately a ripperhead was developed that satisfied both cost-efficiency and environmental norms. On April 5 2008 the Queen of the Netherlands commenced dredging hard rock at the entrance.

ADDITIONAL MEASURES

In addition, other precautionary measures were implemented to minimize rock spillage:

- After every 24,000 m³ of material dredged, a clean-up activity was conducted with an adjusted draghead for a minimum of 18 hours and with at least 90% coverage of the dredged area. Also before inclement weather (i.e., prior to waves above 3 m) arrived, clean up was required.
- When dredging towards the canyon, the draghead had to be lifted so that no rock would be removed within 5 meters of the canyon edge.
- When dredging the canyon edge itself, only dredging towards the plateau was allowed.
- Along the Northwestern side of the Nepean Bank (closest to the Port Phillip Heads Marine National Park), a ridge was left in place until the remaining area had been dredged to design level. This ridge was removed separately, after additional clean up.

The Queen of the Netherlands completed her work on 17 September 2008, having in total dredged 461,000 m³ rock. As of 19 December 2008, dredging at the entrance is officially approved and concluded. Video cameras showed that the seabed at the entrance is clean and clear of rock. The deepening of the Channel continues, and dredging is ongoing in other sections of the Bay. The entire project must be completed by 31 December 2009.



D Foot on rock dredged with the ripper draghead
E On board the TSHD Queen of the Netherlands
F Deepening the entrance