

CSIRO - Princes Wharf 3 Remediation



Client: CSIRO
Value: \$5.34M
Completed: March 2017

PRINCES WHARF 3 IS LOCATED IN BATTERY POINT, HOBART, TASMANIA AND WAS UNDERSTOOD TO BE ORIGINALLY CONSTRUCTED IN THE 1930'S AND HOUSED THE CSIRO RESEARCH LABORATORY ON TOP OF IT.

THE WHARF CONSTRUCTION COMPRISES OF OVER 200 CONCRETE REINFORCED PILES WITH LOWER AND UPPER TRANSVERSE BEAMS SUPPORTING A CONCRETE DECK. CHLORIDE INDUCED CORROSION OF THE REINFORCEMENT HAS CAUSED REINFORCEMENT STEEL SECTION LOSS WITHIN THE CONCRETE, LEADING TO CRACKING AND EVENTUALLY SPALLING.

THE PROJECT

Whilst minor remediation works have been previously carried out, the wharf owner desired the wharf to be returned back to its original load carrying capacity. Returning the wharf back to its original capacity requires significant remediation works to each of the wharf elements. The scope of the work includes the removal of defective concrete and previous repairs to allow for remediation works.

Remediation works took place beneath the wharf, with the CSIRO building above the construction work area. The CSIRO building contains laboratories with equipment and specimens that are highly sensitive to noise and vibration. The CSIRO offices tend to be working at all hours due to the nature of their work with incoming and outgoing vessels, testing requirements and environmental constraints. This required considerable liaison between VEC and a nominated CSIRO contact, so that CSIRO staff are aware of when construction work will take place that could disturb their work, and they can plan accordingly.

THE WORK INVOLVES:

- ✓ Surveying and identifying areas for remediation and repair;
- ✓ Installation of propriety semi-submergible safe working access platforms;
- ✓ Removing those areas as per the survey results;
- ✓ Connectivity testing and steel augmentation;
- ✓ Concrete/remediation works as required;
- ✓ Impressed Current Cathodic Protection System installation (ICCP);
- ✓ Application of a silane protective coating; and
- ✓ Providing test results, monitoring and documentation for the work undertaken.

Defective concrete was broken out using hydro-demolition. VEC have our own trailer-mounted 40,000 PSI High Pressure Water Jetting System with a robotic frame to facilitate the safe and effective removal of concrete as part of our structural remediation capability. Our system is the first of its size to be based in Tasmania. VEC have key personnel that have received extensive training and experience in using the unit.

Steel augmentation was required to be undertaken all elements due to sectional losses in the original reinforcement bar within the defective concrete areas. The wharf elements were reinstated by form and pour method, shotcrete or hand patching.

An impressed current cathodic protection (ICCP) system was installed in specific areas of the piles, upper and lower transverse beams, the system consisted of discrete anodes installed into the lower beams and piles and ribbon anode installed into the upper transverse beams. Sacrificial galvanic anodes were installed into the concrete repair and protective silane coating applied to all elements outside the ICCP protection zone.



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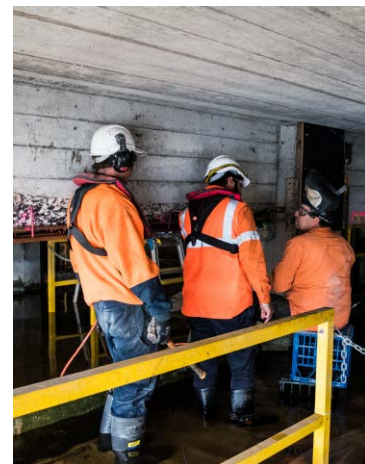
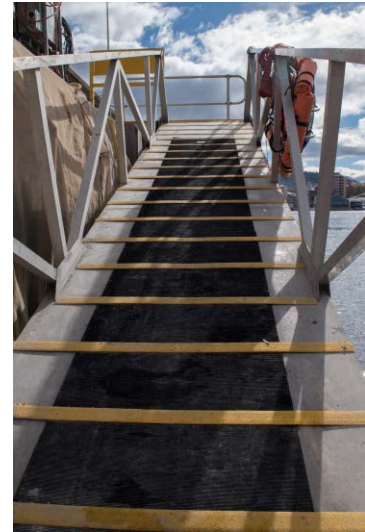
CHALLENGES

Carrying out remediation works under a wharf inherently poses many challenges including working in a tidal zone, limited visibility and access. A safe access system and effective lighting to undertake repair works to the wharf was critical to project's productivity and this required VEC to be innovative in its approach to under wharf access, this challenge was overcome by utilising a lightweight fibre-reinforced plastic access platform to provide safe stable access for undertaking all works together with low voltage LED lighting installed to provide a suitably lit environment, the platform system is fully adjustable which makes it ideally suited to tidal zones. VEC's project management team's continual commitment to stakeholder engagement meant that works proceeded directly under the research laboratory building with minimal disruption to the CSIRO's scientists and above wharf logistics.

The project is located in Salamanca; a high profile tourist, residential and CBD waterfront environment. Significant stakeholder, environmental and OH&S controls had to be developed in conjunction with the client and local community to ensure no adverse impact to the running of the Salamanca precinct occurred. Controls include a specialist silt curtain to encapsulate 100% of the effected work area, noise baffling of all pumps, integration of non-vibrating / non-noisy methodologies across the work front, restricted working hours, specialist welding equipment to allow safe welding in and over water, an off-site storage and maintenance point to reduce the visible site footprint, and an open and collaborative stakeholder engagement and communications process.

INNOVATION & EXCELLENCE

The project devised its own lightweight platform system to allow safe access under the wharf for workers. The fact that it is lightweight meant that it can be readily relocated as required. The platform also serves to capture concrete debris from the high pressure water jetting activity. This is being recycled off-site as part of VEC's sustainability initiative.



Project Facts

- ✓ Over 150m² of concrete has been hydro blasted from under the wharf and front fenders;
- ✓ Approximately 1200m of steel reo has been augmented/replaced in the beams, fenders and piles;
- ✓ Over 2500 titanium discrete anodes installed in lower beams and piles; and
- ✓ Over 800m of titanium ribbon anode installed in the upper beams.