

GLOBAL SKILLS ANCHOR

OUTSTANDING SUCCESS

The Port Botany Terminal 3 project involves undertaking the major civil works and associated services over 46 hectares of reclaimed area, providing quay line, three new shipping berths, automatic container stacking facilities, dedicated road and rail access, all within a secure estuarine environment.

PORT BOTANY TERMINAL 3 / LAING O'ROURKE



The figures involved in Laing O'Rourke's scope for the Sydney International Container Terminals (SICTL) at Port Botany Terminal 3, Phase One Civil Works Contract paint a clear picture of the project's complexities and challenges. For starters, the scope comprised 28 separate contractual dates for works spread over 29ha of reclaimed area, including a 650m quay line concrete slab, the installation of the quay crane rails for two new shipping berths, the civil and electrical works for the automatic container stacking facilities, dedicated on terminal road and rail access and a secure estuarine environment.

Major civil works and associated services include 11km of drainage and 400+ precast concrete pits; 40 Stormwater Quality Improvement Devices; 27km of trench for HV, LV and communications services; 9km of water, fire and sewer mains; 1km of rail siding construction; and 80,000m³ of concrete paving. By completion Laing O'Rourke will also have carried out ground improvement works over the entire 46 hectares, and constructed 1,500 CFA piles, 2,670m of concrete rail beam, 3 substations including full fit out, 120 tonnes of structural steel structures, 1300m of Quay crane rails and 2,300m of ASC crane rails.

"As with any project of this size and complexity, there have been a number of key challenges," said Laing O'Rourke Project Leader, Richard Hoften. "The ongoing development and refinement of the design has posed a significant challenge requiring the team to put in place a number of measures to ensure key milestones and deadlines are still feasible.

"Some other key challenges faced have been the multiple interfaces and exacting programme requirements, and the logistical challenge of maintaining safe progress in a changing environment. Given the nature of the works, the extensive interaction between people and plant has meant that the focus on well delineated work areas with close co-ordination has been of paramount importance.

"(Because) the project is being delivered in 28 sections and stages – each one requiring different personnel and specialist services - the efficient management of logistics has been key to the success of the project. The logistical constraints become even greater when areas of the project are incrementally handed over to the client so they can continue with their fit out works – this can cause further interfaces that require detailed planning and co-ordination.

"Also, working in a marine environment can expose certain construction operations to all that Mother Nature can throw at us.

Earthworks and in ground services operations have been adapted to work in and around tidal movements, again causing further logistical problems for the team to deal with."

Using their internal digital engineering capability had a significant impact on the delivery of the project. By creating a digital model of the initial design, clashes in relation to the numerous underground services were identified in the early stages enabling them to work with the client to modify the design accordingly.

Several lean construction techniques were used to assist in the planning, co-ordination and delivery of works, with communication across the project ensuring all those involved were aware of upcoming key milestones.

To ensure a consistent, reliable and high quality concrete supply for the completion of the high volume of paving across the project, given complex sequencing and a short timeframe, an on-site concrete batching plant was constructed.

Laing O'Rourke's Design for Manufacture and Assembly (DfMA) approach was used to build a significant proportion of the internal components for the three electrical substations off-site environment, with these transported to site in sections for 'plug and play' assembly.

As the project is located directly on the Penrhyn Estuary, home to a variety of threatened and endangered migratory shorebirds and an Ecologically Endangered Community (EEC) of Marine Saltmarsh, Laing O'Rourke's environmental management plan both managed risk and implemented some outstanding initiatives.

These included including the use of Biodegradable Panolin hydraulic oil for all machinery working in or adjacent Penrhyn Estuary or Botany Bay and the installation of custom sheaths to cover exposed hydraulic lines.

The project also worked successfully with a team of wetland ecologists to relocate around 1,600m² of the EEC Saltmarsh, allowing permanent stormwater works to be completed.

Protecting people on site was also a key priority, with Laing O'Rourke's Mission Zero safety programme creating a tangible safety culture onsite.

"The project was awarded Mission Zero flagship status in March 2013, an acknowledgement of the hard work that the entire team had put into making safety personal across the site," said Richard.

"There is a policy of "Don't Walk By" across the entire project, where everyone is empowered to stop the works if they have any concerns relating to Health and Safety."

Works commenced in July 2012, with the first major milestone completed in May 2013 when the team delivered several Sectional Completion Areas that had been accelerated to allow for the docking and unloading of a ship carrying large ASC Cranes needed for the next phase of the project.

In August 2013 the Quay Areas were handed over for the delivery of the gigantic Singapore-manufactured Quay Cranes, and in October 2013, the majority of the terminal was successfully handed over to SICTL for operational readiness training to commence.

The first official cargo delivery arrived in November – a very important major milestone for the Port Botany Team – and final completion and handover of all areas is on track for May 2014.

"The team at Port Botany has used many aspects of Laing O'Rourke's engineering enterprise to construct Port Botany," said Richard.

"The team has relied on global experience from all parts of the world with many nationalities represented in the team. Being able to draw on different aspects of Laing O'Rourke's unique business offering – Digital Engineering, DfMA, global experience and talent pool - the team has delivered a successful project for our client.

"Also, being able to draw on experience of other marine port projects within the business, both here in Australia and overseas, the team has been able to capitalise on lessons learnt to maximise efficiencies across the project.

"Laing O'Rourke's significant in-house rail infrastructure and services capability is also being utilised on site. Self-delivery is a key aspect of our unique business offering and with a large portion of the critical path activities across the project being self-performed, it allows for maximum control over programme and quality of the works.

"Delivery has required exceptional dedication of the site team and contractors. Our ability to respond to change and maintain delivery performance has been critical to the success of the project."

For more information contact Laing O'Rourke, 100 Arthur St, North Sydney NSW 2060, phone, 02 9903 0300, fax 02 9903 0333, website www.laingorourke.com

Lis-Con is currently undertaking a project in The Port Botany Terminal 3 Project which involves constructing a new container terminal for Sydney International Container Terminals Limited (SICTL). The terminal is owned by Hutchison Port Holdings, the world's largest freight operator. The project site is on 46 hectares of reclaimed land.

Lis-con is the sole sub contractor employed by Laing O'Rourke Australia to construct the 80,000m³ of concrete paving on the project. Lis-con has also been involved in the construction of other sections of the works including the 3 high-voltage substations, the capping beams that support the heavy duty stacking crane system & other misc structures. They have had a workforce of over 90 personnel on project at peak periods.

The concrete pavement on the project consists of 150mm of lean mix with various PCP top slab depths: from 350mm with 2 layers of mesh reinforcement to 260mm with a single mesh layer.

Lis-Con developed a steel edge shutter system for the PCP slab to deliver forming efficiencies. All concrete pavement works were carried out to B82 & B83 RMS specifications.

Lis-Con supplied a skilled workforce, including leading hands, steel fixers, formwork carpenters and concrete finishers as well as associated supervision to Laing o Rourke for the construction of other various sections of works on the project. Some of the specific works carried out included installing reinforcement, erecting modern wall forming shutters, sky decks and scaffolding supplied by Peri.

As a result of Lis-Con's extensive experience working on prestigious and high pressure projects nationwide working on The Port Botany Terminal 3 Project fit perfectly with the company's knowledge and experience.

About Lis-Con

Lis-Con began in 1998 with a small crew consisting of around 10 staff specializing in reinforced concrete works on small civil contract projects in the greater Sydney area. They have grown year on year since then and they currently employ over 400 direct staff.

Lis-Con have grown all aspects of the company over the years and currently employ project managers, senior project engineers, plant



managers, accounts mangers & site engineers and currently have offices in Victoria, South Australia, Queensland and have recently set up in Darwin with the head office still situated in Sydney in NSW.

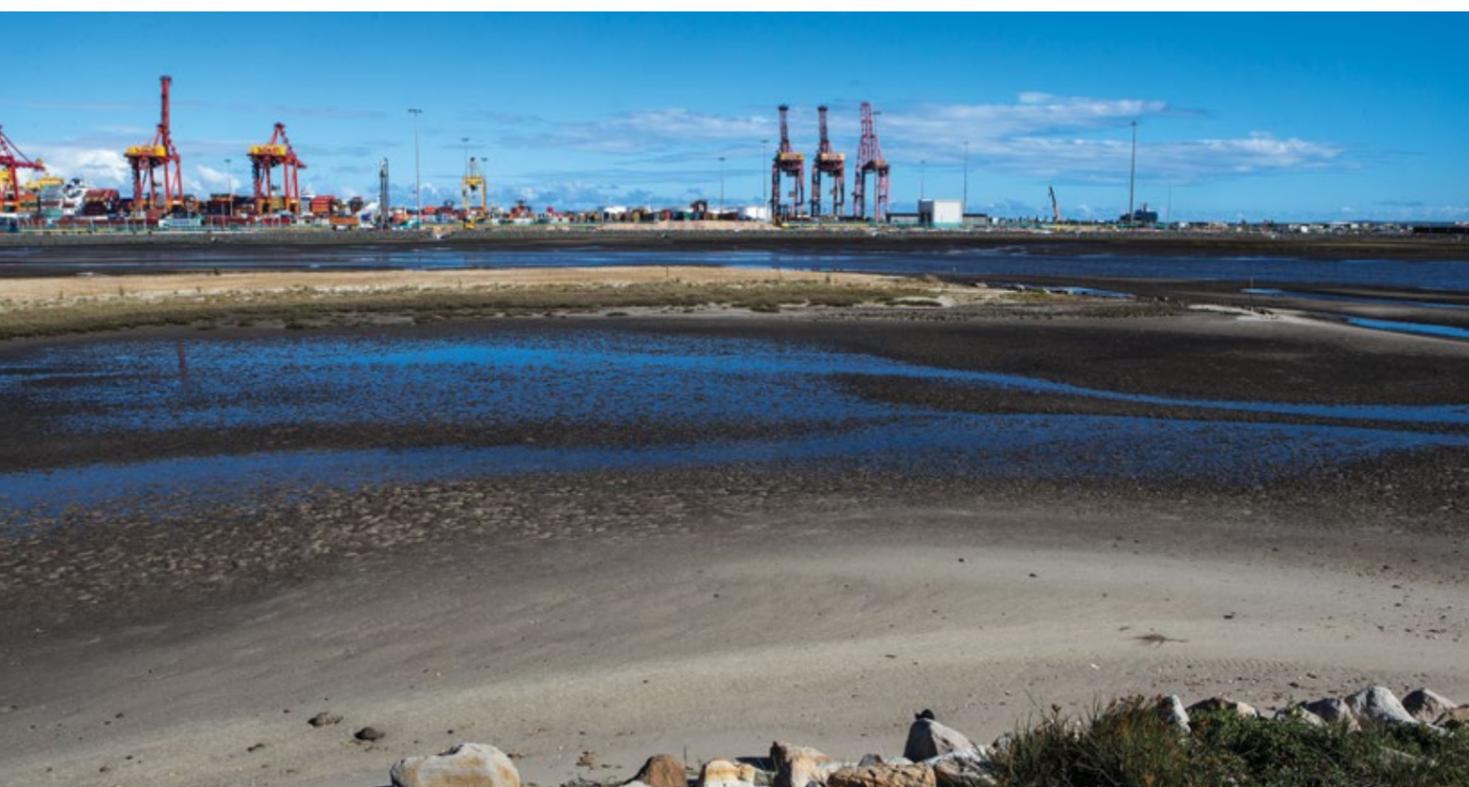
Lis-Con has used the experience of working alongside some of the industry leaders in safety to ensure that their safety procedures and structures are in line with the leading construction companies and even exceed them where possible. This is carried out by their safety team which includes Safety advisors, Rehabilitation/Return to work officers, site safety reps and the co-operation and assistance of their site foremen and site teams.

Lis-Con's ability to supply highly skilled personnel for both contract work and labor hire has paved the way for them to build sound business relationships with some of Australia's leading construction companies such as Laing O'Rourke.

Over the past 15 years, Lis-Con has been involved in some of the most high profile civil construction projects in Australia. With the Sydney Port Botany expansion being one of the largest port projects ever to be undertaken in Australia in the last 30 years Lis-Con can add another significant achievement to their portfolio.

For more information contact Lis-Con, 8-10 Pilcher St, South Strathfield, NSW 2136, PO Box 77, Croydon Park, NSW 2133, phone 1300 LISCON, fax 02 9758-7611, website www.lis-con.com.au





As an Australian manufacturer, Active Steel is able to work closely with clients like Laing O'Rourke (LOR) to meet highly specific project requirements, delivering cost effective solutions for reinforcing steel products. For the Port Botany T3 project, Active steel provided a variety of reinforcement and accessories, including a mesh product developed specifically for the pavements.

"Active Steel developed innovative and engineered Pavement mesh made to size to suit pours for the expansive pavement areas throughout the project. This not only assisted in the install but also eliminated wastage and OHS issues of cutting mesh on site," said Active Steel Spokesman Terry Stokes "Laing O'Rourke is a long term customer for Active Steel - in addition to the engineered mesh the service level provided by our personnel throughout the project greatly assisted LOR with its tight program." Active Steel fabricated and supplied 1600 tonne of Reinforcement for structures; 260,000m² of the custom-engineered Pavement Mesh; and all the accessories to fix the reinforcing including Dowel bars and mesh supports.

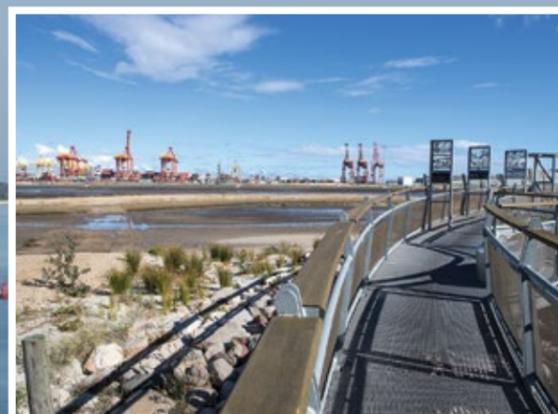
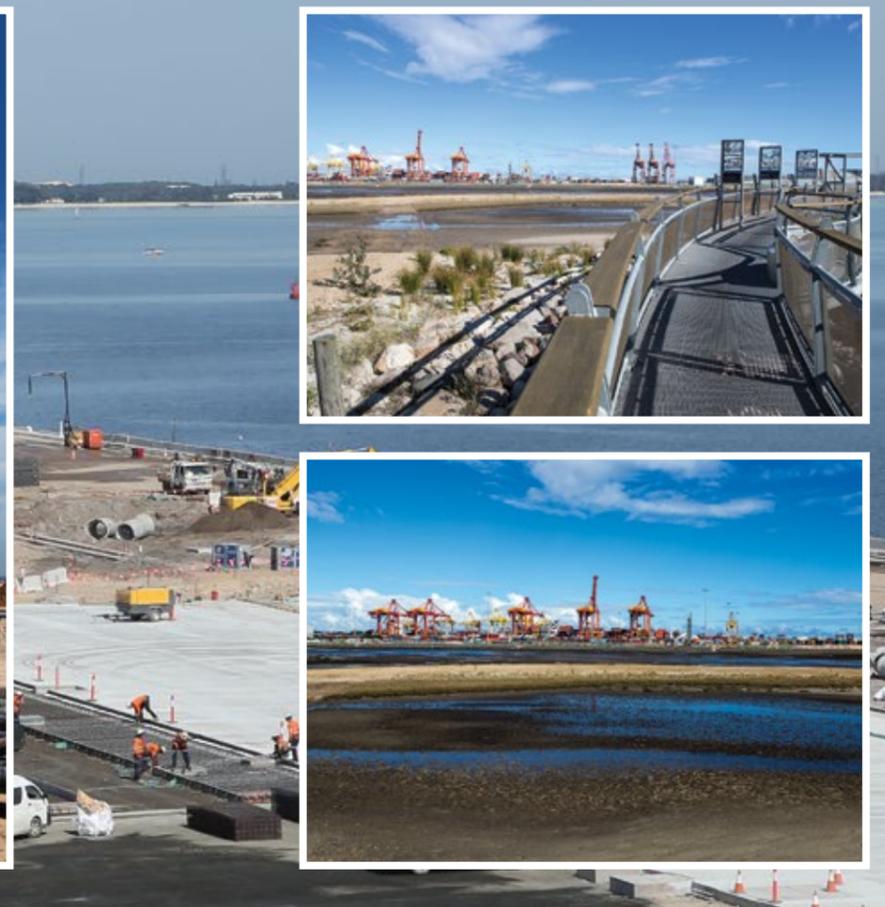
Active Steel is an independent, family owned and operated reinforcement supply company, which has been in operation since 1995. The experienced team of staff includes sales, scheduling, production, transport and administration personnel, who are all dedicated to facilitating their clients' projects. The quality of their products and the focus on service has resulted in Active Steel building long-term relationships with the leading construction companies working across New South Wales and Queensland. Other projects they are working on with LOR include MUR-Moorebank

Units Relocation, the Northern Water Treatment Plant – Wandoan and the Chinchilla-Water Treatment Plant. They also supplied LOR's reinforcing needs on the Chatswood Transport Interchange, Lawrence Hargrave Drive, Woleabee Creek & Ruby Jo Accommodation, Kenya STP Stage 2, Hornsby Platform & Stabling Project and the Ulan Coal Mine Project.

Active Steel has manufacturing facilities at Penrith and St Marys in New South Wales, and Crestmead in Queensland. All of the products are third party certified for compliance with the relevant Australian Standards and for quality, and the company is a member of ACRS (Australian Certification Authority for Reinforcing Steels) and SRIA (Steel Reinforcement Institute of Australia). Services Active Steel can provide across civil, infrastructure and general construction sectors include full reinforcement detailing; bending, cutting and delivery of reinforcement bar; manufacture of rectangular and square reinforcement mesh in standard sheet; manufacture of engineer-designed reinforcement mesh; off-site prefabricated cages; also the full range of accessories for tying and placement of reinforcement steel including Tie Wire and Bar Chairs. Having close to 20 years experience in working with major project builders also means Active Steel can assist most projects with cost saving ideas which will deliver best practice outcomes, benefitting both the project and the client.

For more information contact Active Steel Pty Ltd,
79 forrester road, St.Marys NSW 2760
Phone 02 9673 3422 Fax 02 9623 3417
Website www.activesteel.com.au

Below Pressure Right provided pumping & dewatering solutions, waste water & stormwater bypassing, ground water treatment and pneumatic pipe plugging for the Port Botany Terminal 3 project.



For a waterlogged site like Port Botany Terminal 3, the skills of Pressure Right were essential for effective management of groundwater. Pressure Right are specialists in pumping and dewatering solutions, waste water and stormwater bypassing, ground water treatment and pneumatic pipe plugging, all services they provided for the project.

Pressure Right provided both traditional well point dewatering and horizontal dewatering to enable earthworks to facilitate the installation of the drainage network on site including pipes and Stormwater Quality Improvement Device (SQID) pits. The SQID dewatering systems comprised of a perimeter of multiple well points and were installed using the company's new European-manufactured purpose built well point drilling rig. These dewatering systems were then connected to highly efficient piston dewatering pumps which were also supplied and installed by Pressure Right.

Because the site was reclaimed land and had an inherently high groundwater level, the dewatering systems needed to be highly efficient. To protect the marine environment and estuarine species, water treatment and erosion control required careful consideration, with all sediment rigorously controlled and all stormwater and removed groundwater treated, tested and then discharged offsite.

"It has been quite a challenge, especially as all the rain Sydney received during the construction period had created issues with the level of the water table as the rain and surface water was directly recharging back into the

ground water table causing the levels to increase on site," said Pressure Right General Manager, Tim Alexander.

"Laing O'Rourke also needed a way to ensure that the dewatering systems were continually working around the clock, so Pressure Right introduced a new modern and online monitoring system for the pumps on site which gave Pressure Right 24/7 system monitoring capability with an alert/alarm function. This meant that in the event of a system stopping after hours for whatever reason, staff would be notified and could immediately rectify the problem before it caused a delay to the construction program."

Pressure Right was founded five years ago out of Geelong, and has since expanded operations to include a Sydney depot servicing the Sydney region, Hunter Valley and Illawarra regions, and a Brisbane Depot servicing Southern Queensland's local water authorities and civil contractors. Current Pressure Right projects include the MT Crosby Weir repair works on the Brisbane River, Queensland Urban Utilities Bulimba Sub Main Upgrade bypassing works, a major new marina installation in the Illawarra and a range of dewatering assignments for Victorian civil contractors including waste water pump station upgrades, along with dewatering works to facilitate a new rail line overpass and upgrades in Melbourne.

For more information contact Pressure Right Pty Ltd, www.pressureright.com.au, Simon Panther - 0403 590 604, Tim Alexander - 0403 618 294

International cargo vessels are not the only world travellers who visit Port Botany's new Terminal 3, so do migratory shore birds, and it has been an important aspect of the Sydney Ports environmental strategy to enhance and rehabilitate their habitat as part of the Container Terminal Expansion project.

Over the past seven years, Dragonfly Environmental have undertaken the complex and lengthy task of surveying the Saltmarsh of the Penrhyn Estuary, planning and undertaking rehabilitation and replanting of degraded Saltmarsh and coastal bush areas, and creating over 2ha of new saltmarsh and a migratory bird roosting island.

In total the Dragonfly team have planted 280,000 Saltmarsh plants, all propagated from seed and stem cuttings gathered in the area. This is the largest Saltmarsh planting project in the world, and comprises the creation of 2ha of new Saltmarsh; as well as protection and monitoring of three existing areas adjacent to Terminal works, and the translocation of over 3000m² of Saltmarsh from a works area to a new location.

In addition, Dragonfly project managed the stabilisation of an island for migratory birds to roost on. With Shore Contracting they successfully transported 1100m³ of crushed sandstone over sensitive mudflats. Dragonfly undertook substantial rehabilitation of bushland including the removal of over 4 ha of Bitou Bush, and the planting over 500,000 native coastal dune plants including Coastal Tea-tree, Banksia and an understory of Spinifex Grass and Native Spinach (Warrigal Greens).

Below Dragonfly Environmental created the largest planted Saltmarsh globally over 250,000 plants. Dragonfly also surveyed the Saltmarsh of the Penrhyn Estuary, planned and undertook rehabilitation and replanting of degraded Saltmarsh and coastal bush areas stabilised a migratory bird roosting island.

Ongoing monitoring has revealed native fauna including blue tongue lizards and blue wrens are now flourishing in the area.

"Timing was a key challenge. There were various stages which had to be completed while the migratory birds were away, including the Saltmarsh planting and island stabilisation works," said Dragonfly Environmental Director, Andre Olson. "Developing the substrate and getting the growing medium right for the new Saltmarsh required us to factor in inundation, and get the right mix of organic material and sand. We did trials of different substrate types and organic mixes to see how they performed – there was a lot of small scale research involved with this project, and many stages of weekly monitoring. We are very much working collaboratively with the ecosystem to see how it achieves its balance."

"Dragonfly Environmental are very happy to be involved with the continuing care of the Penrhyn Estuary's environment, and are undertaking ongoing bush regeneration of the foreshores and Saltmarsh areas. Port Botany is now a habitat haven, and the people who are managing it (Sydney Ports) appreciate it as an ecological area."

Dragonfly's capabilities as ecological restoration specialists are extensive, and include environmental surveys, research, reporting, agency liaison, design, planning, plant propagation, rehabilitation, erosion management, dune and bank stabilisation, weed control and plantings. Their staff includes qualified ecologists, environmental scientists, site supervisors, qualified bush regenerators and planters, who undertake projects across both the public and private sector.

The Penrhyn project was recognised with an Engineers Australia Award for Excellence in 2011. Other successful projects have included the role of Saltmarsh Ecologist for the Victorian Desalination Plant; GIS Mapping of mudflats. Dragonfly undertook substantial rehabilitation of bushland including the removal of over 4 ha of Bitou Bush, and the planting over 500,000 native coastal dune plants including Coastal Tea-tree, Banksia and an understory of Spinifex Grass and Native Spinach (Warrigal Greens).

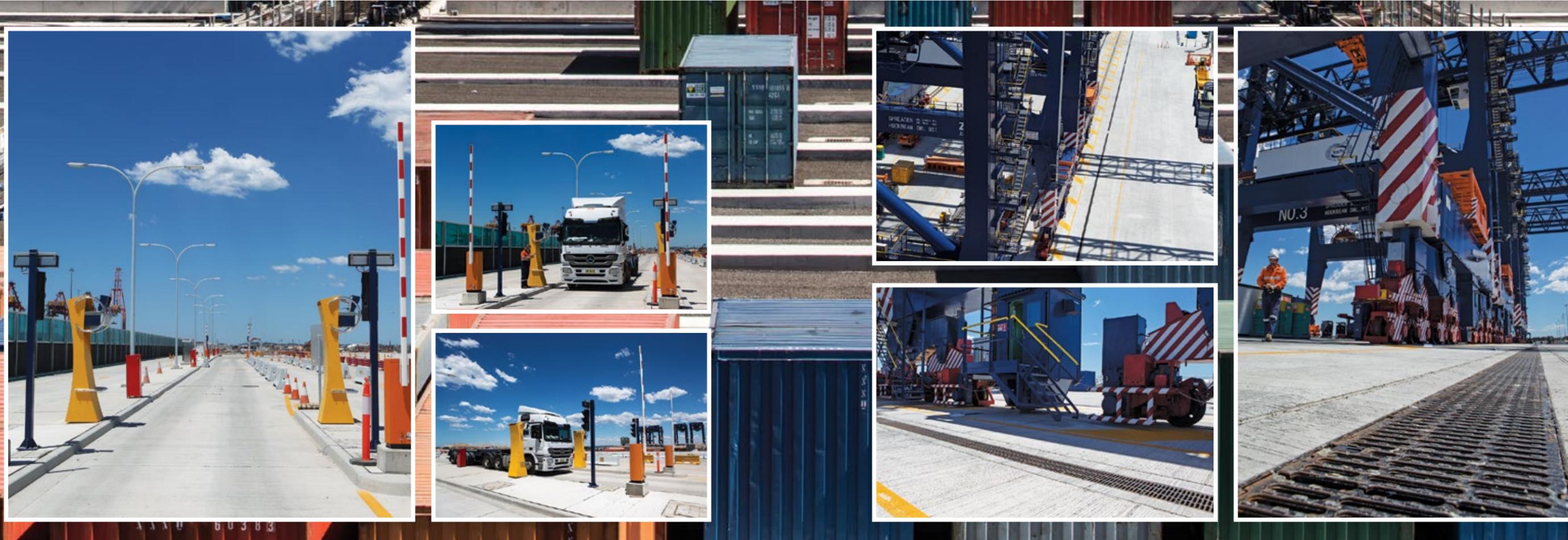


all Tidal Assets for Sydney Water; Doonside Reserve and Breakfast Creek for Mirvac Homes and Blacktown City Council; Cronulla Industrial Estate for Australand; Coolibah Reserve for Rockdale City Council; and Bush Regeneration, Dune Rehabilitation, Wetland and Waterways maintenance and rehabilitation projects for Pittwater, Warringah, Hornsby and other Councils.

For more information contact Dragonfly Environmental Pty Ltd, Studio 1/33 Avalon Parade, Avalon NSW 2107, phone 02 9918 4486, email cameron@dfc.net.au

Below Accuweigh's precise solutions ensure that each truck goes out legally loaded

Below ACO supplied Laing O'Rourke with 4,000 lineal metres of ACO Drain S300K PowerDrain sloped drainage system for T3's large pavement area.



When trucks leave the upgraded Port Botany Terminal 3, the driver can be certain the load is properly distributed and of legal weight, because Accuweigh's in-motion axle weighbridges ensure it. Two of the high-tech units were installed at the exit of the facility, and have been integrated with a CAMCO system which controls security and exit gate operation.

The advantage of this Accuweigh system compared to conventional weighbridges (which Accuweigh also install) is the truck does not need to stop, which increases throughput of vehicles. The load over each axle is weighed, and then a signal lets the driver know if they are compliant with RMS rules – green for correct weight and distribution, amber for a minor breach which requires fixing but is within legal weight, and red for an excessive breach that requires the driver stop, unload and redistribute or even reduce the load. "It's all about ensuring these trucks go out legally loaded," said Accuweigh Senior Sales Engineer, Marty Ewer.

Accuweigh's complete control over the production and installation process enabled them to complete the scope quickly, working effectively with Sydney Ports, Laing O'Rourke and the other project subcontractors to ensure the system integrated digitally and in terms of the construction staging.

All the software for the in-motion weighbridges is written by Scale Components P/L a sister company to Accuweigh, and the manufacture

of the steel weighbridge decks and supports is completed by another Accuweigh sister company Queensland Weighing Machines (QWM). The indicators and IT9000E terminal for the system are supplied by Scale Components P/L and sourced from leading European manufacturers.

Having expertise in engineering, IT and trade-qualified staff including steel fabrication, instrument fitters and electronics trades gives Accuweigh the ability to design, develop and deliver a range of niche products including the in-motion weighbridges, wheel-wash systems (both fixed and portable), full under-body truck systems, industrial weighing systems and portable weighbridges.

Accuweigh commenced operations in Adelaide in 1992 and has grown through continual innovation into a firm with branches in Western Australia, Queensland, Victoria, Sydney and Newcastle. The EPA, Queensland's DTMR, RMS in New South Wales, DTIE in South Australia, local councils, rail freight depots, mines and industrial facilities are among the clients Accuweigh has worked with.

Accuweigh can also help customers out with Short-term and long term hire contracts of Wheel Wash Systems and weighbridges that are available to suit a wide range of client needs.

For more information contact Accuweigh Pty Ltd, Marty Ewer – Senior Sales Engineer, phone 1800 802 299 website www.accuweigh.com.au

By creating innovative products which suit demanding applications, ACO have become a supplier of choice for industrial, commercial, public space and infrastructure projects, like the Port Botany Terminal 3 (T3) upgrade.

ACO supplied Laing O'Rourke (LOR) with 4,000 lineal metres of ACO Drain S300K PowerDrain sloped drainage system for T3's large pavement area. The trench drain system has a 300mm clear opening and a 0.6% fall to collect all the liquid toxins and wastewater, and direct it to treatment pits.

Having complete control of the supply chain, from in-house engineering and technical expertise through to the Sydney manufacturing plant which made the PowerDrain supplied for T3, enabled ACO to confidently predict and meet the supply schedule which they developed in consultation with LOR.

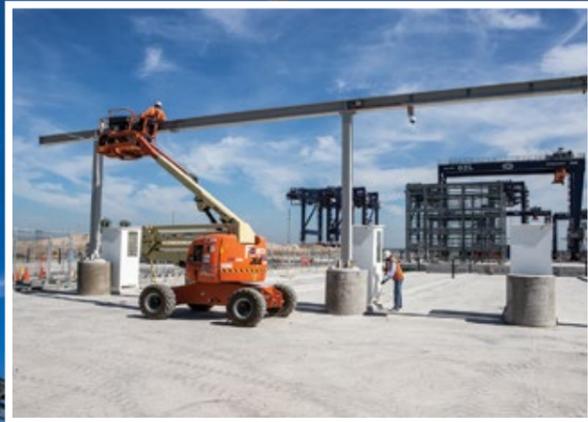
ACO's large range of Polycrete® products includes trench drains, pits, channels, ducts, lids, risers and containment sumps. Current ACO projects include Crown Mall Wollongong, the Moorebank Bank Unit Relocation, Darling Quarter and the surface drainage system upgrade for the SCG. ACO have also recently been involved with Sydney Airport and Pitt Street mall, where they supplied a unique patterned ductile iron grate. All of ACO's grates are designed to be

non-slip, sitting flush with the surrounding surface and ensuring rapid and complete drainage. ACO's Australasian operation has its head office and manufacturing base in Sydney, with branch locations in Brisbane, Melbourne, Adelaide and Perth, and representatives in other key locations including Darwin, Townsville, Hobart, New Zealand and South East Asia.

"We have supplied Polycrete® to almost every commercial and industrial project around, and we do a substantial amount of work with Sydney City Council," said ACO Australasia Spokesman, Brad Ryan. "Our technical department can work closely with architects to factor in design, and work with a project's hydraulic and civil engineers to make sure those designs are buildable. On T3, we worked closely with Aurecon, the specifier, to provide the best possible solution for pavement drainage. "As an Australian manufacturer we continue to develop innovative surface drainage products, and we will be launching a new ACO Drain product in 2014."

For more information contact ACO Polycrete Pty Ltd, 134-140 Old Bathurst Road Emu Plains NSW 2750, phone 02 4747 4000, fax 02 4747 4040, email sales@acoaus.com.au, website www.acoaus.com.au

Below NWEC fabricated and installed 160T of structural steel for the substations, Reefer Gantries and Walkways.



Decades of solid experience in meeting the needs of projects with stringent standards makes NWEC a preferred structural steel subcontractor for projects like Port Botany T3, where their scope included fabricated and installing 160T of structural steel for the substations, Reefer Gantries and Walkways. All items were surface treated with either three coat epoxy or galvanised due to the corrosive coastal location, giving the painted structures a design life of 100 years.

NWEC's proposed design changes eliminated high risk work by modularising a number of large structural components and installing them in one piece rather than stick building in position. The company has been providing high quality resources and services to heavy industry since 1976, and in 1982 opened a 1.6 hectare fabrication facility with 4000m² workshop, separate on-site blasting and painting facilities, and a trades staff of 100 including welders, boilermakers, pipefitters and painters, along with 20 office and engineering staff.

Other recent projects in and around Port Botany include the Amcor B9 Paper Machine (Piping and mechanical installation, complete tank farm site fabrication and installation) and the Vopak Bulk Liquid Terminals pipework. Across Australia, New Zealand and the Asia/Pacific NWEC provides construction management; a full range of fabrication services including structure, pipework, tanks and pressure vessels; plus on-site installation, commissioning, shutdown and operation and maintenance services.

For more information contact NWEC Pty Ltd, phone 02 8724 7000, 29 Yennora Av, Yennora NSW 2161, website www.nwec.com.au

