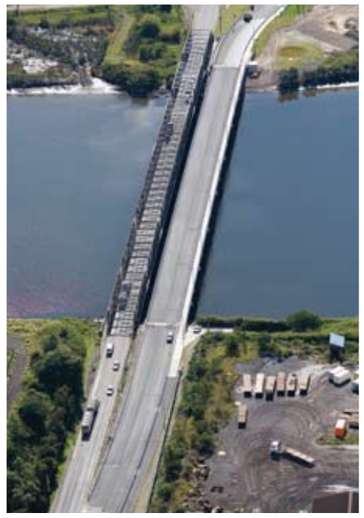
TOURLE STREET BRIDGE

DARACON
MAYFIELD NSW



OUTSTANDING SYNERGISTIC CAPABILITIES

Strong integration gives Daracon Group the ability to achieve enviable efficiency on their construction projects, such as completing the Tourle Street Bridge three months ahead of schedule.

During the construction of the new two lane bridge across the south arm of the Hunter River, Daracon had to ensure no disruption to the average of 24,000 vehicle movements a day crossing the river on the existing road. To achieve this required a six month traffic staging phase. "We had to build separate side tracks onto temporary pavement, build the new pavement then move the traffic back on to the new pavement," explained Project Manager Justin Foot. "This allowed us to build the new approaches under traffic, which was one of our major traffic control features. Usually people do the bridge first and the approach work follows later, but we had those works completed before the bridge was built which was a special staging process for this big project. This is part of how we were able to complete the project ahead of schedule. Generally, our approach is we do things efficiently, and we do things once."

Daracon own 150 pieces of plant, making them one of the largest heavy equipment owners in New South Wales. This broad all-encompassing fleet of heavy civil construction equipment minimises their need to involve multiple subcontractors, allowing for vastly increased efficiency of communications, and an ability to progress works at their own schedule.

"When it comes to heavy haulage, we have 12 floats, so we can transport equipment between sites," said Bob Murphy, Daracon's Systems Co-ordinator. "Beyond plant and transport, our quarries division has half a dozen quarries in the Lower Hunter. We produce bound pavement material and can supply a product that meets the RTA specifications for bound pavement. We have the option of using selected materials from Daracon quarries, loaded by Daracon loaders onto Daracon trucks, spread with Daracon equipment, right through to the phase where it is on the client's job. It's highly efficient, you're not dealing with six or seven subcontractors which all adds to the complication. We're all working for the one team and that's what makes us efficient."

For the Tourle Street Bridge project, Daracon had fifteen staff on site, along with their excavators, graders, backhoes, and internal truck and dog fleet. They also trialled a Caterpillar wheeled excavator, and utilised a launching truss gantry system to install the Super T girders on the bridge. This was more efficient than subcontracting a crane.

Two major environmental issues on site required clever resolution. "Preliminary works on the southern approach were complicated by the presence of a benzene plume containing coal tars and other contaminants. These byproducts from the old BHP site were sitting under the new road, and located over a clay layer atop a perched aquifer. We had to drive embankment piles and abutment piles 17m into it, the fear was we would drive the piles through and that would create a flow access for the contaminants to enter the groundwater. We had to develop a mechanism to drive the piles in without pushing the benzene through," explained Justin Foot.

"We drove the casings through into the clay, dug out the contaminated material, then disposed of it properly. The clay then sealed around the casing. Then we filled the steel casing with a bentonite grout mix, then drove the embankment piles through 17 metres into bedrock. Eighty piles required this process on the southern approach, and subsequent water testing shows we were successful. Another environmental challenge was that a preliminary environmental assessment of the northern abutment indicated acid sulphate beneath the Hunter River, so we needed a special approach with the river pilings."

Daracon processed excavated material within the river pile casings, resulting in nil contaminants released into the river.

As a diversified family owned company, Daracon are buffered from volatile markets. Their divisions include construction, mining, rail, plant & transport, landscaping, quarries and property development. Their 700-plus workforce includes civil, structural and environmental engineers, designers, business managers, mechanics, fitters, concreters and other trades. They have their own workshops for fleet maintenance and repair.

Daracon were one of the first companies to achieve Environmental Management certification to AS/NZ ISO 14001, and also hold OH&S certification toAS/NZS 4801 and Quality Assurance certification to AS/NZS ISO 9001.

The RTA is one of their major clients, they also work for local government, major commercial and industrial projects.

All in all, Daracon Group embodies remarkable achievement since their founding by Civil Engineer David Mingay and his wife Susan, who began operations in 1983 with just three employees, a grader and David's 25 years of civil engineering experience.

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HOW TOURLE ST BRIDGE GOT GREAT LEGS

Tremendous skill and superior equipment gave Piling Contractors Pty Ltd the ability to complete piling works for the bridge over Hunter River (South Arm) at Tourle Street Mayfield West ahead of schedule.

Piling Contractors were engaged by Daracon Group Pty Ltd to supply and install 64 no 750 ID mm X 16mm wall thickness Grade 350 steel tubular piles in lengths varying from 19.2 to 35m arranged into seven marine based piers and the two abutments.

"The piling works have a 100 year design life. They incorporate a concrete column which is intended to provide durability after corrosion of the steel tubes. All works were undertaken to RTA specifications, including B204 welding requirements," said a Company Spokesperson.

"Special challenges overcome in completing this project included the logistical challenges of working in and on a river, with river flow at peak tide giving a maximum flow rate of 3.5 knots. This was resisted by the use of steel tube spuds on the crane barge, and a four point mooring system with two anchor points on each bank was used to move the crane barge."

Each of the seven marine piers is comprised of eight piles formed in four groups of two piles. This layout enabled a key innovation – the fabrication of a steel working platform on temporary piles making it possible to install each pier's eight permanent piles concurrently. As each pier was completed, the temporary piles and platform were moved by supply barge to the next work site.

All piles were installed from a dumb barge carrying the driving equipment, utilising the working platform and a supply barge. The piles were generally installed in two lengths and welded in situ working from the platform.

Each pile tube, prefabricated at Mawson Engineering, included an internal welded bead placed prior to delivery to site, at 500mm centres over the top 13 metre concrete plug section to assist their bond to the concrete.

Geotechnical conditions consisted of shallow water up to 3 metres maximum over soft alluvial materials grading into sand with layers of clay overlying bedrock at 20 – 30 metres depth. There was an environmental issue with acid sulphate soils and possible release of sediments and sulphates into the river. To avoid contamination issues arising when drilling, the spoil from the pier piles was excavated using a Toyo cutter suction pump, then delivered to a desander on the supply barge alongside the working platform.

All piles at one pier were poured simultaneously after cleaning and visual inspection by an RTA superintendent. Concrete was placed by pump where feasible and for pier piles placed by kibbles on the supply barge. Approximately 5m^3 was required per pile. Concrete and reinforcement cages were supplied to the platform crane barge via a supply barge and then placed into each pile.

For the Land based abutments, eight steel tube piles (2 x 4) were initially placed into pre drilled holes drilled using Piling Contractor's mobile truck mounted drill rig, then vibrated to a suitable welding level where the next length was added and then vibrated to close to contract RL from where they were then hammered to set. These piles were then drilled out and concreted using truck mounted drill rigs.

This project also made use of Piling Contractor's road transportable modular dumb barge, which was assembled in Newcastle, and towed to the site. Their Kobelco BM800 90t crane was walked onto the barge on site. Their workboat was used to pull the supply barge to and from the shore. The pile driving process involved the use of an ICE 14-12 Vibrating hammer for the majority of the depth and piles were then set to capacity using a Juntan HHK9t hammer. Each pier had one pile dynamically tested, also carried out in house with their own equipment.

The work was carried out between November 2007 and July 2008 using a crew of five including foreman, crane operator, dogman and qualified workboat operator and piling hand who brought piling works to completion well before Daracon's scheduled date for the bridge beams.

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CATHODIC PROTECTION FOR TOURLE ST BRIDGE

Corrosion Control Engineering (NSW) Pty Ltd were engaged by Daracon Contractors in December 2008 to re-design, supply, install and commission an Impressed Current Cathodic Protection (ICCP) System to the new Tourle St Bridge, which runs over the Hunter River in Mayfield, Newcastle.

Cathodic protection is an electrochemical technique that mitigates corrosion via the application of a DC current. Protective DC current flows from the anode to the cathode (rebar). The current flow results in the formation of a passive film on the surface of the rebar which provides continuous long term protection against corrosion.

The specified ICCP system design required significant modification as the bridge headstock and pile construction techniques did not accommodate for surface mounted anodes. As a result, internally mounted discrete anodes were used instead of ribbon anodes.

Additionally, the discrete anode design eliminated the possibility of anode to rebar short circuit which must be avoided if the ICCP system is to operate satisfactorily.

The re-design process involved extensive consultation between Corrosion Control Engineering (NSW) Pty Ltd, Daracon and the RTA. An active trial at the first pier installation was also carried out to verify the design calculations.

The embedded ICCP system anodes were designed to have an operating life in excess of 50 years. This will ensure the initiation of corrosion is arrested for a minimum of 50 years. The ICCP installation was completed on time and to budget and was commissioned in May 2009.

Corrosion Control Engineering (NSW) Pty Ltd is an Australian owned company with offices in Sydney, Melbourne, Brisbane and Townsville.

Corrosion Control Engineering (NSW) Pty Ltd specialise in the design, supply and installation of cathodic protection systems to various structures including concrete steel rebar, bridges, wharves, pipelines and storage tanks.

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LEGEND CRANES
SAFE RELIABLE SERVICE

Legend Cranes have been providing **Safe Reliable Service** to Newcastle and The Hunter Valley since 1989. This locally owned and operated family business was engaged by **Daracon Australia** to assist with the construction of the new Tourle Street Bridge.

Now in its 20th year of operation, **Legend Cranes** has slowly been adding to its modern fleet of mobile cranes. Our total fleet now exceeds 16 cranes ranging from a 3 tonne Crawler Crane to our larger 130 tonne All Terrain Crane. With a wide range of experience on commercial, industrial and engineering projects, **Legend Cranes** aims to supply a quality service with latest technologies in mobile cranes. The Tourle Street Bridge project was an exciting one for us and we totally enjoyed working with **Daracon** on this project. The whole team from **Daracon** – RTA and other contractors, worked as a team, which resulted in the bridge being completed ahead of schedule; a great achievement for all personnel involved on the project.

Top 2 x 20 tonne Franna cranes loading barge with water piping for installation under Tourle Street Bridge

Above and Left Legend Cranes' All Terrain Grove GMK 5130 and Demag AC 80-2 unloading the first of 48 x 65 tonne to 75 tonne bridge girder beams

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