A WOMAN'S TOUCH

An innovative medical facility like the Macquarie University Hospital offers every kind of design and construction challenge. For Head Contractors Baulderstone, the challenges inspired the kind of innovations which won Baulderstone led by Project Manager Sophie Poole the 2009 National Association of Women in Construction (NAWIC) Team Award for Workplace Innovation.

"The project has built upon Baulderstone's knowledge and experience in the design and construction of medical facilities. Throughout the project we developed our processes and procedures to enhance existing systems and introduce new ones where appropriate. The stringent processes implemented played a key role in the delivery of a high tech, first class facility that aligned with client expectations," said Sophie.

Works commenced in November 2007 with the demolition of existing buildings and site preparation, followed by a 30,000m3 excavation for basement car parking facilities across the entire site.

With two roads running through the site, and construction restrictions allowing only one to be closed at a time, removing the existing Innovation Drive and constructing the basement and suspended deck for the new road was a critical area. A second, more complex critical area was the construction of the hospital basement level 2, the central portion of the hospital site, which houses all the radiotherapy equipment and the radiopharmacy.

"These areas were complex to design and construct due to the radiation and laser equipment requirements resulting in walls and slabs of up to 2.0m thick. Baulderstone planned and implemented a construction sequence that simultaneously had works being undertaken at basement 2 level of the hospital whilst all around the perimeter, the structure was being completed at Basement 1 and Ground level," explained Sophie. "On completion of Basement 2 works, the structure was closed in above, and while the main hospital structure continued to get Levels 1 & 2 poured and stripped.

"Incorporating the client's specialist equipment, such as Australia's first Gamma Knife, was one of the key challenges on the project. We took on the role of facilitating the design, coordination and installation of client supplied and installed equipment from very early on in the project. Baulderstone drove the process to understand and coordinate the complex services which we were to supply to each piece of specialist equipment. This was done through many minuted meetings with the suppliers and Baulderstone D&C services subcontractors; Baulderstone's tenacity to understand, document and deliver such precise and complex requirements, resulted in first class services throughout the project.

"The radiopharmacy area houses the cyclotron where radioactive isotopes will be produced for use in the detection of cancer in patients. Baulderstone managed the design of the cyclotron bunker such that the structural solution, including reinforcement detailing, concrete mix, concrete pour configuration and pour sequence, ensured the concrete would not become radioactive during operation of the cyclotron. It also ensured radiation would not penetrate through the bunker.

"The walls and roof of the bunker were 2.0m thick with a penetration in the roof closed in by 4 precast panels up to 16 tonne each. This penetration was designed to allow the equipment to be installed in the cyclotron and removed as required.

"The radiotherapy area includes four bunkers, three identical bunkers each of which house a linear accelerator and a fourth housing the Gamma Knife. Baulderstone coordinated meetings between the client's supplier of the high tech specialist equipment for these bunkers, our D&C service subcontractors and our architect and structural engineer to ensure the design of these complex areas met all radiation requirements for their certification and operation.

"We also ensured the structure was designed around installation (without vehicle access) of the equipment, with the heaviest item being 20 tonne. This included openings in the slab, preinstalled lifting beams and fit out designs to accommodate back propping of suspended decks during installation and removal of equipment."

Baulderstone also applied ingenuity to the services design for the specialist clinic building to deliver greater energy efficiency. Solutions included central chillers and heating water boilers serving all air handling units (AHU's) and any small fan coil units (FCU's); as well as plant rooms on each floor, or in the roof plant room that contain AHU's capable of a full outside air cycle, or return air when the outside air is out of design parameters. The AHU's are cooled via the central chillers with early morning warm up via the heating water system. The main supply air runs across the floors with variable air volume (VAV's) located in each tenancy zone to provide local control. Perimeter zones if required are reheated via the heating water system. Finally, a central building management system allows for optimal operational control of all areas and can monitor tenancy conditions.

During the project the client specified major design changes to the operating levels, and recently added a third level of wards. Baulderstone resolved all the design, coordination and costing issues through a systematic approach, minimising impact on the short term program and negating any impact on the overall program. Main works were completed a month ahead of schedule, with fitout works also commencing early. With recent additions by the client currently being completed, works are due to finish in June 2010.

MACQUARIE UNIVERSITY HOSPITAL

MAIN CONSTRUCTION COMPANY : Baulderstone
CLIENT : Macquarie University
PROJECT END VALUE : $150 Million
COMPLETION : June 2010
ARCHITECTS : Health Projects International
CIVIL / STRUCTURAL ENGINEER : Robert Bird Group
SURVEYOR : Rygate & Co Pty Ltd

BAULDERSTONE PTY LTD
Level 5, 39 Delhi Road,
North Ryde 2113 NSW
t. 02 9935 7100
f. 02 9935 7090
www.baulderstone.com.au

BAULDERSTONE

THE LEADING EDGE

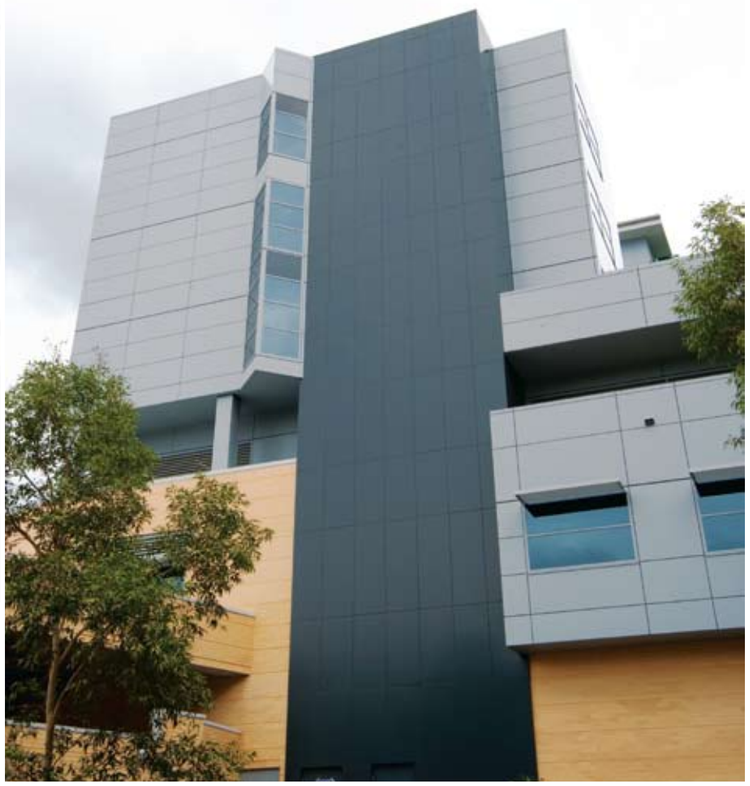
An extraordinary team of women brought the Macquarie University Hospital project into being. Even before a site was chosen, Health Projects International (HPI) worked with the client to actualise a medical facility on the model of institutions such as the world-famous Mayo Clinic, offering training and research opportunities for leading edge medicine, including the latest advances in nuclear medicine.

HPI oversaw the entire process from vision to commissioning, utilising innovative technologies which will give lifetime service assisting facility management. The full range of consultancy services provided included master planning, briefing, interior design, detailed architectural design and documentation.

"HPI's tried and tested methodology brought all the key stakeholders together and led them through the process from feasibility and briefing to design and construction," said HPI Project Architect Anne Lamb.

"We began work on this project in 2005, by assisting the client in finding a site for a new hospital as the current one had reached capacity and was in need of new, modern technology in a teaching and research friendly environment. Many alternative sites were considered but none had strong, immediate relationships to higher education/research facilities, so when the opportunity for a location next to Macquarie University had arisen, the obvious advantages were apparent. In late 2006, HPI submitted an application to the Minister for Planning for planning approval, which was granted in 13th May 2007.

"We then undertook an exhaustive briefing process. Our staff are immersed in the culture and methodology of hospital design, drawing on the company's vast research and training capacity. Health Care is too important to be treated as a sub-set of general-practice Architecture. It requires the full time dedication that only a specialist firm can bring. HPI employs not only specialist Architects with decades of experience in Hospital design but several fully qualified nurses and



hospital managers, advising on the latest models of patient care and operational factors.

"The first challenge was creating a world-class health facility linked to a leading research university, in this case the Australian School of Advanced Medicine recently established by Macquarie University.

"The Australian School of Advanced Medicine will provide specialty post-graduate training in surgical specialisation. The creation of the Australian School of Advanced Medicine was only possible with the establishment of Macquarie University Hospital on the University's campus. The Australian School of Advanced Medicine will link with the Macquarie University Hospital, utilising the hospital as a key teaching facility whilst the University provides the research and pedagogical support as well as access to an extensive range of science and health facilities.

"The second challenge was providing the right environment to facilitate the teaching process.

The Hospital will have cutting edge diagnostic and treatment technology that will place Macquarie University Hospital at the forefront of health care, including the first Cyclotron and Radiopharmacy in a private hospital, first Gamma Knife in Australia, comprehensive cancer care (including oncology and Radiotherapy), 12 fully Integrated Digital operating suites, one with fully inter-operative CT, Electronic medical records, Wireless network, RFID and VOIP communications. Teaching spaces on both the hospital site and in the Australian School of Advanced Medicine have direct access to live High Definition video images."

Design and ongoing management of a project of this magnitude and complexity was facilitated by HPI's unique international web service known as the Health Facility Briefing System (HFBS). This powerful suite of web applications is used in the detailed, standards-based briefing process of all types of hospitals. It also provides building and equipment budgeting, benchmarking, document management and Asset Audit tools.

"HFBS uses the AHFG (Australian Health Facility Guidelines) with local customisations as its foundations. It allows the users to quickly assemble the elements required in the guidelines as well as the client's project-specific requirements into a fully coordinated set of documents for briefing, verification, tendering and construction. After construction, the information can be kept on the system for the hospital maintenance through its life," explained the Project Director, Aladin Niazmand.

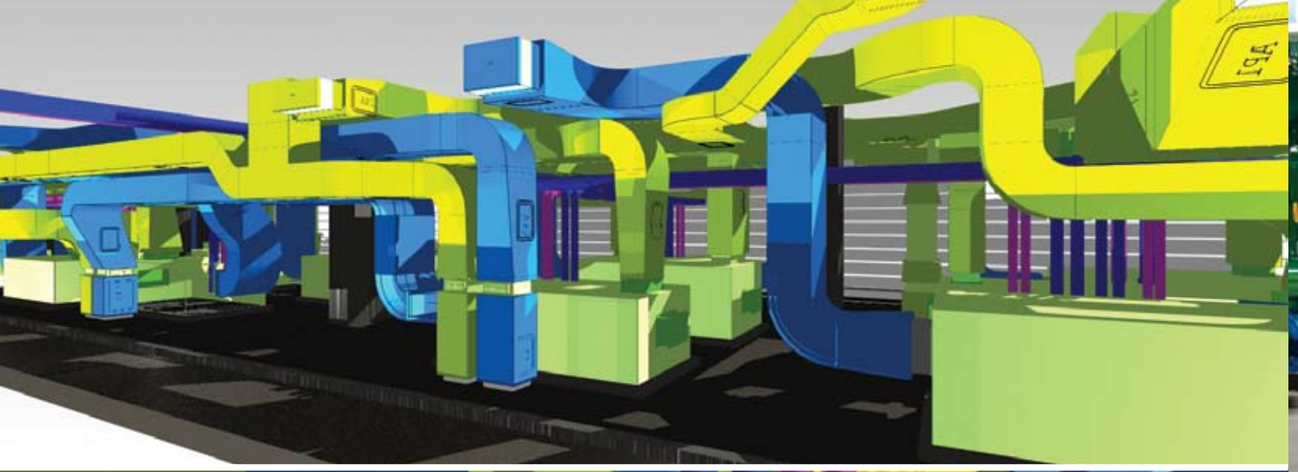
"HPI used the system to provide complete, detailed briefs and schedules for hospitals based on the AHFG, including Room Data Sheets, Schedule of Finishes and FF&E lists with budget costing etc. The system is entirely web based, using no local software or hard disk space. The client owns all information and has access to it from any computer with a standard browser with the appropriate security clearance. The HFBS database is highly secure, being maintained at the largest web hosting company in Australia ."

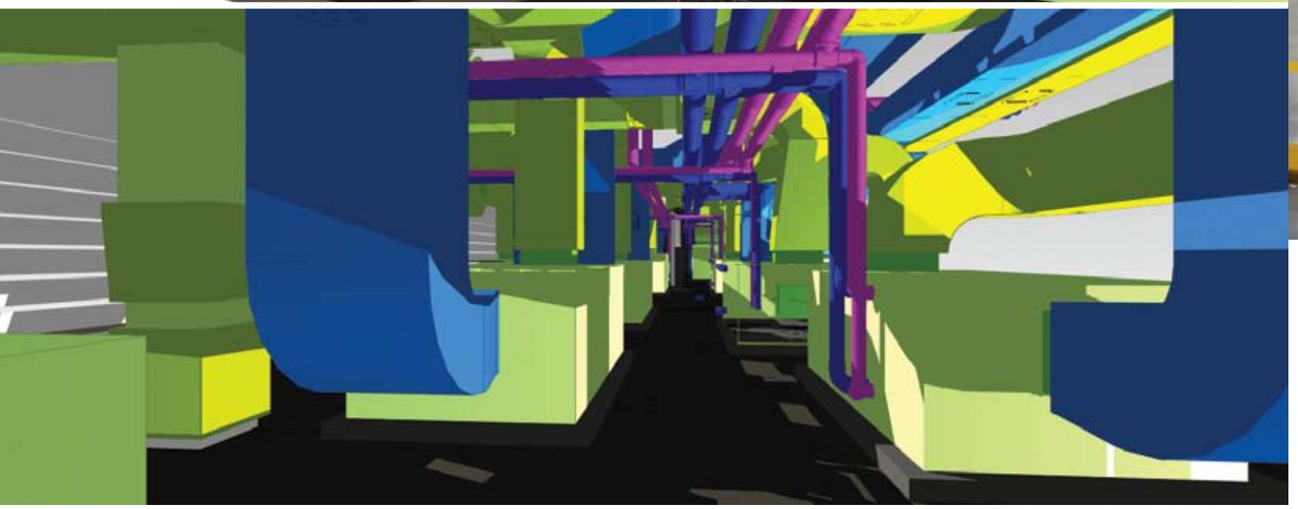
One of the most noteworthy aspects to this extraordinary construction venture is the number of women who undertook the key tasks of planning, design, project management and documentation. HPI's team included Project Architect Anne Lamb, Interior Designers Jackie Warren and Emily Roemer, Architect Meiy Tham, Draughtsperson Natalie Meyer and the two nurse planners Dianne Barton and Marilyn Mandigma. "We have done well," said Anne.

HPI is an Australian based specialist firm of Health Facility Planners and Architects, established in 1994 and is one of very few companies world-wide which specialise exclusively in Health Design. They offer an integrated approach based on international best practice and state-of-the-art methodology for the design and rapid procurement of health projects. HPI, with 53 specialised staff in its Sydney office, is one of the most prolific designers of Private Hospitals in Australia. Other recent private hospitals by HPI include North Shore Private Hospital stages 1, 2 & 3 for Ramsay Health Care and Norwest Private Hospital for Healthscope. HPI was the recent winner of the bid for the new Gold Coast University Private Hospital and North Lantau Hospital in Hong Kong.

HPI has over 50 specialist staff including health Architects, Interior Designers, Nurse Planners, Service Planners and software developers responsible for over 150 completed projects in Australia. For all projects, HPI sends its most experienced staff in various clinical specialities to assist with the project briefing, design and delivery for the duration of the project. HPI's head office is in Sydney, with associated offices in every State in Australia. HPI is also a 50% owner of the international firm of TAHPI, with affiliated offices in Hong Kong, Singapore, New Zealand, China, Malaysia and the UAE.

HEALTH PROJECTS INTERNATIONAL
Architects and Health Facility Planners
Head Office, Sydney
Suite 1 Ground Floor
68 Alfred Street Milsons Point
NSW 2061 Australia
t. 612 9460 4199
f. 612 9460 4299
e. healthpi@ozemail.com.au
www.healthpi.com.au





GREENER SERVICES

Allstaff Airconditioning has been providing a broad range of mechanical services across a number of sectors including commercial office buildings, hospitals, government institutions, retail complexes, industrial and laboratory installations in Melbourne, Sydney, Albury/Wodonga and recently in Canberra, since 1975.

Their decades of experience and ability to deliver Green solutions is why they were the right contractor for Baulderstone Pty Ltd when it came to the design, development and installation of the base mechanical services for Macquarie University Private Hospital. Their brief included not only the main buildings, but also the linking bridges and single level carpark.

As the project involved a wide diversity of mechanical systems, to solve the many challenges Allstaff utilized its in-house engineering and drafting capabilities with AutoCAD's MEP 3D drafting package. This technology is object based, therefore allowing clash detection with the building structure and the other trades. It also allows for easier incorporation of design changes, and resolution of the challenges they pose.

"During the design development stage, the client requested to increase the number of operating theatres from ten to fifteen, and the additional mechanical services were to be accommodated within the original level 2 plantroom. To comply with the physical restraints and maintain maintenance access, Allstaff produced coordinated 3D models. These models can be viewed, rotated and sectioned in any location, and by highlighting any changes at the workshop drawing stage, they minimise site remakes. Using the 3D models contributed to the successful outcome," said Allstaff's Engineering Manager Simon Spiteri.

"The choice of the PowerPax air-cooled chillers provided savings on energy consumption and, along with low power fans, head pressure and noise reduction control, provides an environmentally responsible alternative to the conventional chiller/cooling towers combination.

"The success of this facility can be attributed to the builder and all the trades involved. Allstaff Airconditioning is proud to have played its part in the construction of this newest private teaching hospital."

Allstaff Airconditioning Pty Ltd
Unit 1 43-51 College Street
Gladesville NSW 2111
t. 02 9879 3377
e. syd@allstaffnsw.com. au
www.allstaffnsw.com.au

TRIPLE 'M' – HVAC AND FIRE SYSTEMS SPECIALISTS

Because the Macquarie University Private Hospital Clinic contains coexisting facilities with different HVAC needs, Triple 'M' Group's full range of design, fabrication and installation abilities were brought into play for not one but three different energy-efficient HVAC systems.

The operating theatres of the School of Advanced Medicine are air-conditioned by a constant volume system utilising 100 per cent fresh air, with run around coils which transfer energy from the exhaust system to the air-conditioning system, reclaiming in excess of 50% of the energy being exhausted. The PC2 labs are served by chilled water fan coil units, with fresh air ducted through an arrangement of dampers to allow individual hubs to operate independently.

The upper levels of specialist clinics and consulting facilities have a variable volume system through chilled water air handling units with a full outside air economy cycle. The rooftop mounted central energy plant comprises a pair of energy efficient water cooled Turbocor chillers, and two gas fired hot water heaters.

"Triple 'M' has a wealth of experience in the Healthcare and Pharmaceutical sectors, with design and construct installations at Blacktown Hospital, Prince of Wales Hospital, Randwick Private Hospital, and the Douglas Building at Royal North Shore Hospital. In addition, Triple 'M' has the D&C contract for both HVAC and Fire Protection systems for Orange Hospital, due for completion in early 2011. Within the Pharmaceutical and Close Control sector, we have undertaken work at GlaxoSmithKline, the CSIRO Research facility and the Garvan Institute, to name a few," said Triple 'M' NSW General Manager Brian Mayo.

"What makes us unique in the HVAC industry is our in-house design and engineering, ductwork manufacturing, and installation facilities. With construction, service and maintenance, design and construct and supply and install capabilities in NSW, QLD and WA, we have the experience, resources and customer focus to exceed customer expectations."

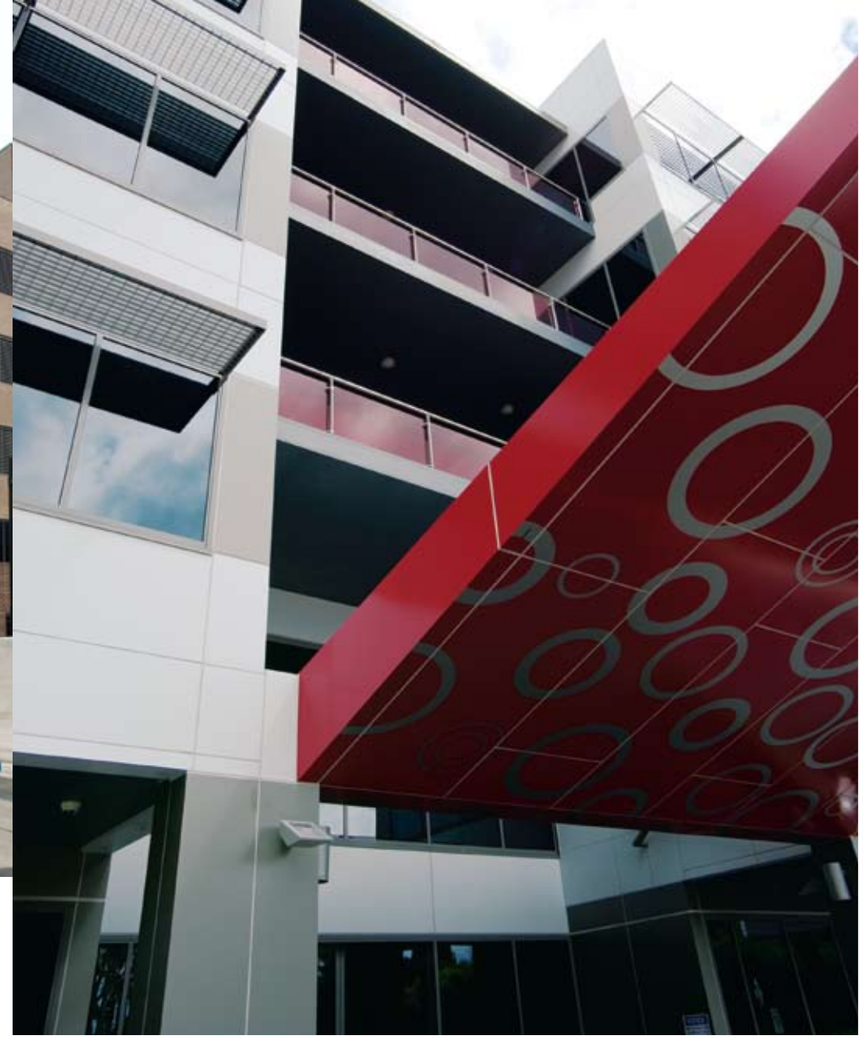
Triple 'M's commitment to excellence includes certification to AS / NZS 4801: 2001 and BS OHSAS 18001: 2007 for their Occupational Health and Safety Management System.

Triple 'M' has a specialist Sustainable Upgrades Division and recent refurbishment projects include 101 Miller Street, the Jessie Street Building in Parramatta, the Queens Square Law Courts in Sydney, and 259 George Street. The total HVAC value of Green Star rated projects undertaken to date exceeds $200 million.

Other major projects include the $50 million D&C HVAC contract for the 47 floor City Square Project in Perth (BHP's new Corporate Head Office), the $18 million Charlestown Shopping Centre Project, and the $35 million 111 Eagle Street project in Brisbane.

Triple 'M' Fire is currently facilitating the 3D integrated design, manufacture, installation and commissioning of the fire protection systems at Liverpool Hospital, including sprinkler suppression, detection , evacuation and pre-action systems. Triple 'M' Fire is a market leader in 3D co-ordinated design on some of the largest projects in Australia, including #1 Bligh Street, currently under construction in the heart of the Sydney CBD.

TRIPLE 'M' GROUP CORPORATE OFFICE
Quad 4, Level 1, 8 Parkview Drive
Sydney Olympic Park, NSW, 2127
p. 612 9763 6200
f. 612 9763 6201
e. TMG@triple-m.com.au
www.triple-m.com.au



ADVANCED SKELETON

All the things which make OneSteel Reinforcing leaders in the field of steel construction solutions made them the best contractor to supply the reinforcing steel for the Macquarie University Private Hospital Project . They have the manufacturing and engineering capacity to respond to changing project demands, meet tight timeframes, and custom-build to complex specifications.

An estimated 1,200 tonnes of reinforcing steel was supplied for the Hospital, and 525 tonnes for the adjoining clinic. OneSteel Reinforcement had two schedulers, a project supply manager and two despatch and operations staff assigned to the project's needs, tracking the two separate orders for the two separate buildings, which while being filled concurrently by the 30 odd process staff and production manager, had to be scheduled and delivered separately.

Generally, a fortnight's notice is asked for scheduling and supplying steel for projects, but the project's tight timeframes meant Baulderstone sometimes could only give notice a matter of days for an order. Fortunately, OneSteel Reinforcement's production planning process was able to schedule the manufacturing to have the order on site, on time, every time. "The other challenges were created by the reinforcing detail for some parts of the building structure. The design was very complex, with ramps and oddly-shaped slab areas, which made working out the geometry of the reinforcing steel difficult," said OneSteel Reinforcing Market Development Engineer, John Katsiris.

OneSteel Reinforcing have been providing Australian construction, manufacturing, civil infrastructure and resource sector projects with the steel strength they need since 1928, when the company began life as Aquila Steel. Following mergers with other leading reinforcement companies including Boral and BHP, OneSteel Reinforcing has grown into Australia's premier supplier of steel reinforcing solutions. Their manufacturing facilities are ACRS certified, and engineering expertise is applied to deliver the most cost-effective solution for any challenge.

Products available from their nationwide network include a wide range of innovations in the categories of rebar, prefab, reinforcing steel rollout carpets, steel decking, permanent formwork, continuously threaded rebar systems and accessories for commercial constructions. All their products contain post-consumer recycled content greater than 50 percent, which means their reinforcing contributes to Green Star points as well as structural integrity. OneSteel Reinforcement also back their products with a comprehensive suite of training and information tools, which can be accessed via the company website.

ONESTEEL REINFORCING PTY LIMITED
33 Shaddock Ave
Villawood, NSW, 2163
t. 02 9794 1000
f. 02 9727 9532
www.reinforcing.com

UNIQUE ELEMENTS

It's the final touches to a building which make it stand out from the crowd, and Icon Custom Projects have done just that at the Macquarie University Private Hospital.

The custom-designed balustrade systems and other stainless steel, aluminium, glass, timber and steel architectural features on the project have added a unique element.

Icon Custom designs, fabricates and installs the components of any major projects which give it that WOW factor, from façade elements, custom stairs and architectural features.

The Clinic Building facade balustrades utilised a new product, 3M 1172 Red glazing film to create a unique red glass balustrade on levels 2,3,4,5 & 6.

"One of the more challenging aspects of the project was that there were more than six different product designs, each needing to be independently certified by our consulting engineers to meet all applicable codes & standards," said director Paul Sewell.

Icon's experience in this area has been utilised by some of the countries leading construction companies. Mirvac's 'The Royal' in Newcastle boasts approximately 2km of glass balustrade, and is one of the many projects that Icon Custom has collaborated on with Mirvac since beginning operations in 1994.

Bovis Lend Leases' flagship project, '420 George Street', a 36 level retail and commercial development, also features Icon's talents in the form of glazed façade work incorporating Black Seraphic custom laminated elements, installed around the retail voids, terraces and mall entrances.

"In terms of turning a design idea into reality, we can do anything. We have qualified staff across numerous trades, and have built up an extensive supply chain throughout the Sydney region to manufacture and supply our components," said Paul Sewell.

ICON CUSTOM PROJECTS PTY LTD
Unit 10, 9 Meadow Way
Banksmeadow NSW 2019
t. 02 9316 7777
f. 02 9316 7766
www.iconcustomprojects.com.au

MONEY, MEN AND MATERIALS

Having SJA Construction Services onboard can smooth the waters when multi-million dollar project variations occur. SJA were primarily engaged on the Macquarie University Private Hospital project as Project Planners, assisting with time and construction methodology assessments for the initial feasibility studies, advising throughout development of Contract Programme, providing ongoing monthly status reports and planning of amended programmes to cater to project variations, and providing commercial advice to resolve major contract issues.

"SJA programming has built a strong working relationship with BPL. Their bid team asked for our expert input at feasibility stage in the form of a preliminary program assessment. With BPL's ongoing success in the various stages of project delivery, SJA became more entrenched as a member of the delivery team and viewed the timely delivery of the Project as an SJA responsibility," said SJA Planning & Programming Manager, Rob Foster.

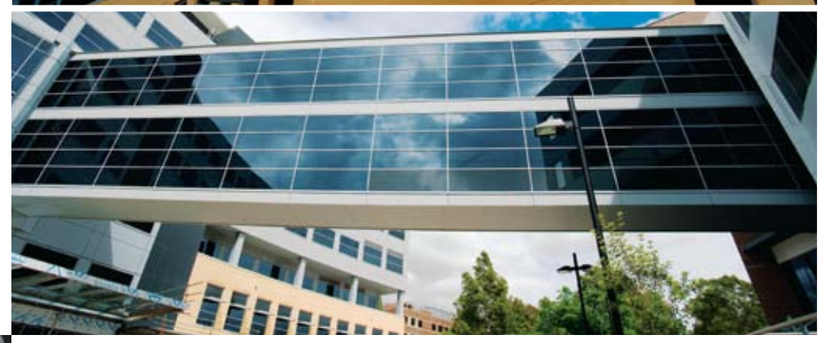
"An outstanding feature of the Project was the positive focus on 'time' by the BPL management team. They embraced time management ensuring delivery milestones were met and the work plan was right in the first place. The main challenge was integrating numerous multi-million dollar variations into the program to meet the Clients operational aspirations whilst at the same time protecting BPL's Contractual position."

For over a decade, SJA have been assisting organisations in the building, construction and engineering industries, creating greater value for projects through four complementary areas of service delivery: project management, quantity surveying, planning, and construction consulting. Their management and services systems have Quality Assurance Certification from SAI Global, and their 20 consultants operate from offices in Sydney, Brisbane and various satellite locations, ,

SJA CONSTRUCTION SERVICES PTY LTD
Level 1, 109 Pitt Street
Sydney NSW 2000
t. 02 9236 5000
f. 02 9232 2677
e. rob_foster@sja.com.au
www.sja.com.au

SJA
Construction Services

Macquarie university Hospital, NSW



A FAÇADE YOU CAN TRUST

Just as a medico should have a trustworthy face, the Macquarie University Private Hospital needed a façade solution the builder could trust. Overall Façade Systems (OFS) are specialists in fabricating and supplying whole façade packages, especially for difficult multiple product, multiple finish designs like this one.

Their contribution to the project included the windows, shopfronts, front entrance doors, canopies, bridge façade, external wall structure, steel supports, aluminium cladding panels and Fibre Cement (FC) Sheeting. Some innovative materials were part of the package, such as Rondo 150mm structural steel stud, sarking in the form of Bradford Breathable membrane, Alucobond Alumium Composite Panel, 100-150 imported aluminium frame window sections and SS22 Glazing.

OFS completed the structural design from the Architects' concept drawings, working to the Design Team's detailed specifications. The procurement of materials was undertaken both by direct manufacture and fabrication by OFS and procurement and delivery through trusted subcontracting suppliers

"We were brought on at Post DA, as façade specialists and as a one stop shop for all the project's façade requirements," said OFS Project Manager Simon Malam.

"Preliminary cost advice, various design solutions and value engineering takes place prior to the Contract placement. We attend design meetings as soon as practicably possible to advise and ensure construction meets budgetary constraints.

"The challenge was taking the concept design and producing full, detailed fabrication drawings to be certified by the façade engineer (Aurecon) we employed, and completing all the finished details between the façade elements without changing the design intent.

Other great façades created by OFS include Trinity North Ryde, Liverpool Hospital, Edward Barton Building in Canberra, and the glazed atrium at CBA Homebush.

OFS currently specialize in a stick system with punch/shopfront windows, and are flexible with all types of cladding materials. Their façades are all independently engineer certified for structural soundness, work currently carried out for OFS by Aurecon.

"The secret is in the interface between all the specified cladding components," said Simon. "We are looking into increasing the range of services we offer, by looking into other window and cladding solutions in Australia and overseas."

ONSITE GROUP PTY LTD
Level 1 90 New South Head Road
Edgecliffe NSW 2027
t. 02 9327 6633
f. 02 9327 6522
e. on-site@OnsiteGroup.com.au