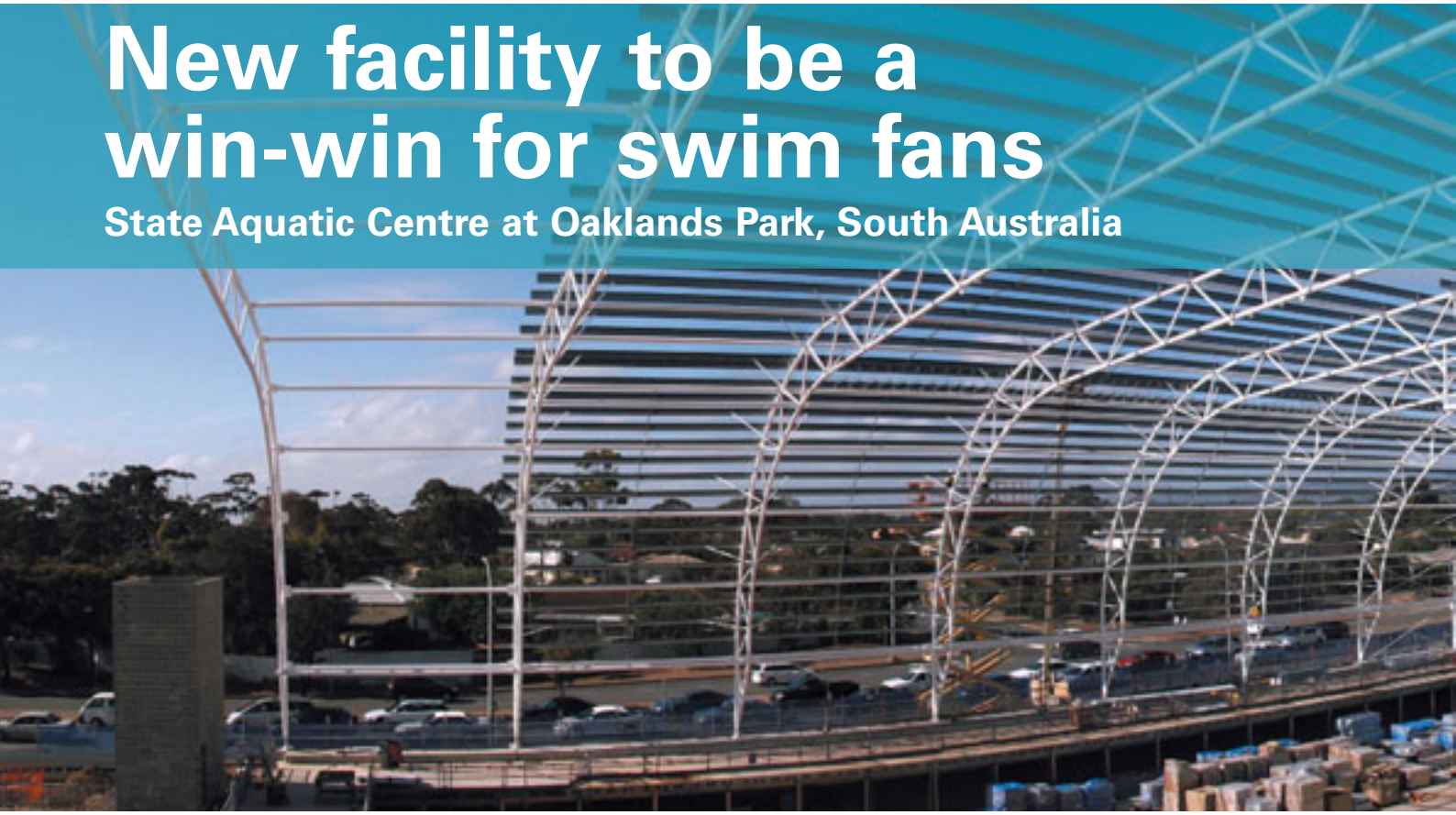
New facility to be a win-win for swim fans

State Aquatic Centre at Oaklands Park, South Australia



Aquatic athletes, swimming enthusiasts and spectators alike are soon to be treated to an international standard FINA aquatic and leisure facility in South Australia when the new State Aquatic Centre opens in 2011.

Part of a master-planned Aquatic and Health Precinct, the new Aquatic Centre is being delivered by Candetti Constructions in conjunction with the SA State Government, the Australian Government and the City of Marion.

The project is being delivered with optimal consideration of water activities and clear sightlines in keeping with its status as an international standard sporting facility.

Candetti's focus on implementing leading technologies and innovation from around the world and introducing this into the local setting has been the key to the project's success.

The Centre will be capable of hosting major state, national and selected international aquatic events and will be compliant with the requirements of FINA, the international governing body of swimming, diving, water polo, synchronised and open water swimming.

The brief called for up to 4500 spectators to be accommodated in the facility and an elevated catwalk to service events including lighting and media coverage requirements.

Candetti's in-house Design Manager worked closely with lead structural engineers, GHD and the architectural team of Woodhead and Peddle Thorp Architects (PTA). The project team also involved leading structural trade contractors within the design process to deliver the required technical and program requirements of the major project.

According to PTA, the 10-lane competition and dive/water polo pools have been orientated to the North with glazing along adjacent Diagonal Road to afford dramatic views into the pool hall and views out from the main activity spaces. The pool halls are divided into the main event pool with 3460 permanent grandstand seats and 476 permanent poolside seats together with the diving / water polo pool with 580 permanent seats.

The architecture of the building articulates the large mass of the building into smaller parts, the concept being to break the pool hall into a series of wave forms which curve up from a lower scale on Diagonal Road to the greater height in the centre of the site.

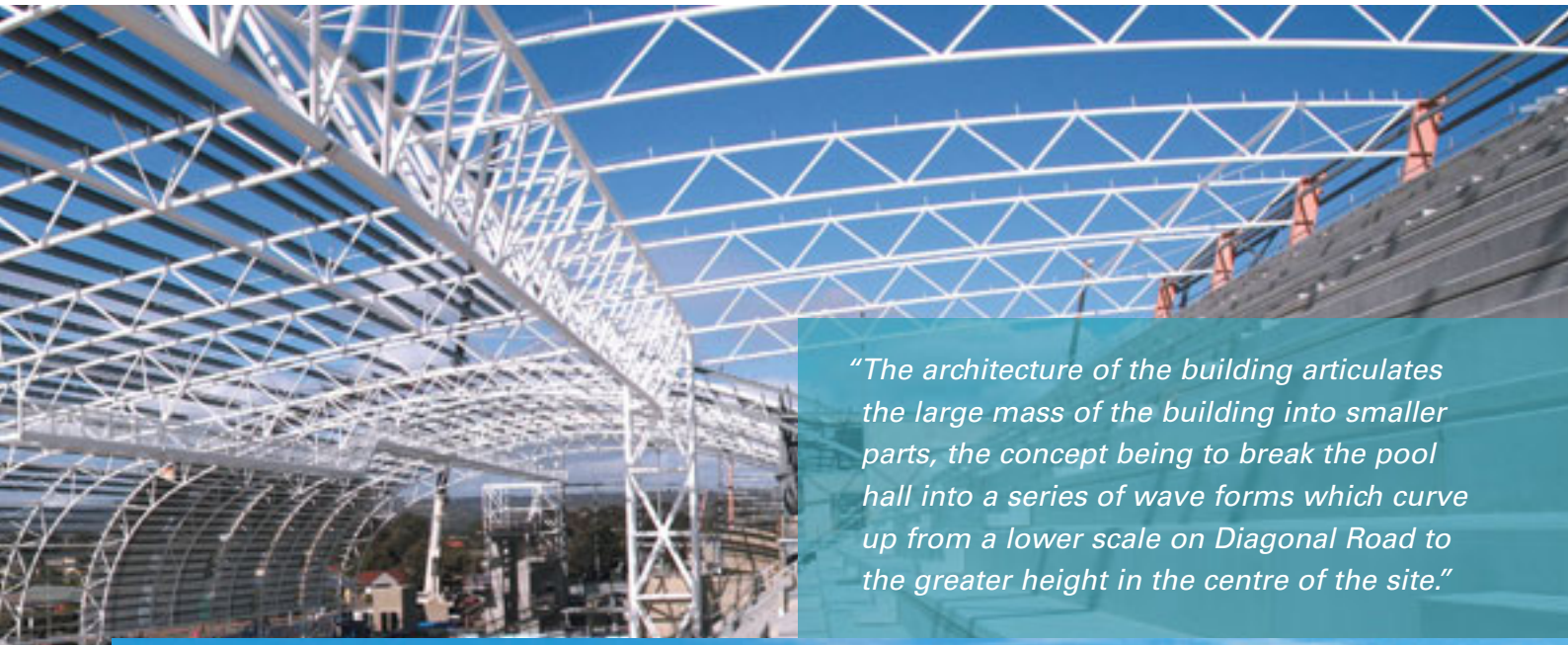
This helps to create a series of elegant forms and also gives the building a distinct aquatic theme with further articulation achieved by placing skylights to create a pattern across the curved roof form.

GHD Senior Structural Engineer **Graeme Burmeister** said that there were many challenging structural design requirements in the project. He cited a requirement for clear sightlines from the grandstand which necessitated the incorporation of a 63m clear spanning truss across the Olympic competition pool.

"This required the design of a clear spanning transfer truss to support the primary curved trusses over the main pool," he said.

The project team established early on that a key to the success of the project was rapid and efficient site construction. As such the design focus was to maximise the use of prefabricated elements that could be constructed offsite and easily installed onsite. This enabled critical structural elements to be locked in for efficient construction whilst incorporating design flexibility as the detailed design process progressed.

The challenging design was worked through using a variety of modelling packages including 2D and 3D non-linear analysis software. Using these design tools multiple options were examined before arriving at an optimal solution.



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He said that multiple primary truss design profiles were developed during the concept design phase, including 2D trusses, 3D space frames and castellated hot rolled rafters.

The final design was selected by Candetti Constructions, Woodhead, PTA and the steel contractor Samaras Structural Engineers on a value basis taking into consideration aesthetics, durability, cost and constructibility.

From detailed analysis and evaluation with the project team and the preferred trade contractor, it was decided that circular hollow sections (CHS) for the main trusses were most efficient and also aesthetically pleasing. They also provided the passive benefit of shedding water to reduce corrosion risk.

The final structural form consists of the main pool hall enclosure which is stabilised by the main grandstand and back of house area, comprising a multistorey braced steel frame with composite concrete floor diaphragms.

The change in roof profile halfway along the building also proved to be structurally challenging and required close coordination between architect and engineer.

Mr Burmeister said that delivering the project with a Design and Construct approach provided a range of benefits.

"The early involvement of contractor and fabricator enabled construction sequences and preferred materials to be explored and agreed to early in the design process," he said.

"Interaction with the fabricator and their structural steel 3D modelling detailers was invaluable in optimising steel sections to match local availability and structural efficiency."

GHD's structural engineers visited Samaras' newly upgraded steel fabrication workshop at the commencement of the design development stage to inspect and understand their automated pipe rolling and pipe scalloping capabilities and held discussions with Samaras' 3D structural steel shop detailers to understand the interaction between their 3D model and workshop machinery.

Mr Burmeister said the inspection satisfied GHD's engineers that Samaras had the capability and process in place to create the curved pipe trusses to the tolerances and dimensions required for the project. GHD was also impressed with Samaras' in-house blast cleaning and painting facility which allows handling and transportation to be kept to a minimum before delivery to site.

He said that the tight team approach also provided insight into limitations on element sizes, transportation logistics, erection preferences, welding and connection options.

(L to R) Onsite during construction were **Professor Roger Plank** (Vice President, Institution of Structural Engineers UK), **Matthew Gooding** (SAC Project Manager, Candetti Constructions), **Graeme Burmeister** (Senior Structural Engineer, GHD), and **Stuart Bater** (Structural Engineering Manager, KBR).

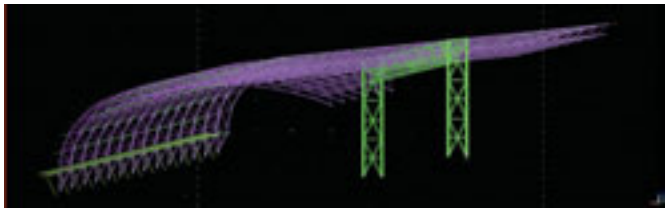
This also boded well for organising site logistics as the project is part of an integrated, new mixed-use precinct development on the Marion Domain site at Oaklands Park which also includes the largest *GP Plus* Health Care Centre in SA, including the State's first Community and Mental Health Centre, a multistorey and underground carparks and a central pedestrian plaza.

PTA's Design Statement called for the design to be "master planned with the adjacent *GP Plus* building and existing Marion Cultural Centre to create a major public precinct adjacent to the Marion Shopping zone".

These developments include ecologically sustainable design initiatives to reduce water and energy consumption across the site, including stormwater harvesting for reuse in toilet amenities and a building orientation to reduce the requirement for air conditioning.

Provision for integration of an energy cogeneration plant has also been incorporated into the base building infrastructure and the selection of specialist pool and filtration technologies saves approximately 10 million litres upon construction and an ongoing saving of approximately one million litres of water per year in addition to the recycled water capture.

The State Aquatic Centre will be operational in early 2011 and has already been successful in attracting a number of major events including the 2011 Australian Age Swimming Championships, the 2011 Short Course Championships, the 2012 World Life Saving Championships and the 2012 World Junior Diving Championships.



Aquatic Centre will comprise:

- 52 metre Olympic-sized enclosed swimming pool
- 55 metre Olympic-sized enclosed water polo/dive pool
- 10 metre high concrete dive tower
- Dry diver training area
- Back of house commercial area
- Catwalk supported from the roof trusses along the length of the building
- Leisure water area including three smaller swimming pools
- Two external water slides, one with a space bowl

Project Team

Client: South Australian Government

Project Lead and Design & Construct Contractor: Candetti Constructions

Architects: Woodhead and Peddle Thorp Architects (Melbourne)

Structural and Civil Engineer: GHD

Steel Fabricator: Samaras Structural Engineers

Steel Detailer: Samaras Structural Engineers

ASI Steel Distributors: OneSteel Steel & Tube and Southern Steel (Brice)

Coatings Supplier: PPG Industries

* 3D image courtesy of Samaras Structural Engineers 3D Modelling Services