InfraBuild

Varsity College Senior School QLD

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This case study was written at the time when InfraBuild (formerly Liberty OneSteel) was part of OneSteel. In that context, in some instances within this case study reference may be made to OneSteel.

Varsity College 3A

STEEL HELPS A MODERN AND DYNAMIC TEACHING FACILITY ACHIEVE A BACK-TO-SCHOOL DEADLINE.

CLIENT
Education Queensland

ARCHITECT
Burling Brown & Partners

STRUCTURAL ENGINEER
Bornhorst + Ward

MANAGING CONTRACTOR
Barclay Mowlem Construction Ltd

STEEL FABRICATOR
Central Engineering

STEEL DETAILERS
School Buildings:
TAS Drafting

Sports Hall and Performing Arts Centre:
DKL Drafting

The Varsity College School Complex on Queensland's Gold Coast takes a whole new approach to the design of education buildings, supported by the freedom of steel.

The Varsity College Senior School is Stage 3A in the development of a group of education facilities within the Varsity Lakes Precinct, and is the second of three stages for the Senior School.

The Middle School or Stage 2C completed for the start of the 2002 school year had set the design parameters for the whole complex. The same design and construction teams worked on both projects.

The design was dictated by the location of the school within a mixed residential and commercial development on the Queensland Gold Coast, adjacent to Bond University. The project was commissioned by Education Queensland and other stakeholders included Gold Coast City Council and the Varsity Lakes Precinct developer, Delfin Pty Ltd.

Brian Kidd of Burling Brown & Partners, architects for the project said that: "the buildings called for a solid institutional front reflecting a modern and dynamic teaching facility while blending into what is essentially a business park. The external steel structure and bracing are key elements of the architectural expression."

"The school buildings needed to interface architecturally with the business and residential development and provide community access, as some resource facilities, such as library and sports hall, are to be shared with the Varsity Lakes community."

Burling Brown & Partners cooperated closely with the Managing Contractor, Barclay Mowlem Construction Limited, the engineers Bornhorst + Ward and the steel fabricators, Central Engineering, to develop a system of construction that would allow the project to be completed within the budget and by the critical due date - the opening of the 2003 school year.

Four buildings have been completed in this latest Stage 3A: a two storey administration building; a three storey specialist building; the single-level Sports Hall and the 260 seat Performing Arts Complex.

The three story building has a concrete first floor slab with a steel framed building atop. It accommodates non traditional subjects such as manual arts, CAD graphics, computer training facilities, multi media and an art studio on the top level.

Brian Kidd said: "these facilities have enormous student appeal and are contributing to the school's increasing popularity."

Popular also are the features of the school buildings that incorporate environmental principals to provide natural cooling and lighting.

Brian Kidd again: "these elements, the structural steel design and rainbow of colours – yellows, bright oranges, greens and blues – have been a recurrent theme running through the construction of each stage of the College."

The school buildings in Stage 3A are virtually a repeat of Stage 2C where the construction is of steel frames throughout with suspended slab decking.

The Sports Hall for the Senior School is a total steel structure. Brett Taylor from Bornhorst + Ward said that the steel solution was adopted because it would deliver both economy and speed of construction on a flood-prone site where the marshy ground was unsuited to fill.

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The project was planned from the beginning to maximise the construction benefits from structural steel. Tony Pennisi, Project Manager, of Barclay Mowlem said that: "we implemented strategies to ensure the project ran to schedule and took advantage of the benefits steel could deliver." Including:

- The grid system for the buildings set up to take into account the standard OneSteel steel section lengths in order to minimise steel off-cuts and waste.
- Shear studs were reduced in some cases and totally eliminated in others after consultation with the steel fabricator.
- Simple, economical web side plate beam-to-column connections were used as much as possible.
- The steel members were designed to ensure consistency in sizes whilst keeping in mind structural economy.
- The steel framed and slab solution delivered a relatively light structure enabling conventional pad footings to be used on the filled site (heavier concrete structure would have required more costly piled foundations).
- The structural steel frame and roof sheeting was to be erected within a few days of arriving on site, enabling the floor slabs to be poured under cover and not be subjected to weather delays.
- The unpropped solution allowed fit-out of the ground floor to proceed soon after the concrete on the upper floor was poured.
- The architectural sunshades and awnings were designed to be added to the structure later, so as not to delay the construction program.

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We designed the structure to withstand the force of the flood waters" he said.

Noel Carr of Central Engineering added that; "the main steel columns were extended to ground level and 410UB54 300Plus® floor beams spanned between the columns with 100x100x5.0 TUBELINE® SHS secondary columns under the floor beams.

The steel floor beams were overlaid with purlin floor joists over which was superimposed the timber floor of the gymnasium." Noel said.

Clear span 250x250x6 TUBELINE® SHS trusses support the roof over the width of the hall. Noel said "In the roof we replaced the original tube sections of the trusses with square hollow sections as they were easier to fabricate and safer to erect."

"The Performing Arts Complex on the other hand was more of a challenge" said Brett Taylor. "The roof has complex geometry and the challenge lay in translating the architectural intent in steel while at the same time ensuring ease of construction. We had to get the geometry right and correctly locate the steel members.

The roof was designed to be erected first, so we positioned support columns which allowed the roof to be erected prior to the block walls below." Brett Taylor said.

And in conclusion he added "the use of steel on this project allowed us to meet the tight construction time frame and achieve a good finish, delivering a project expressing the aspirations of the architect."