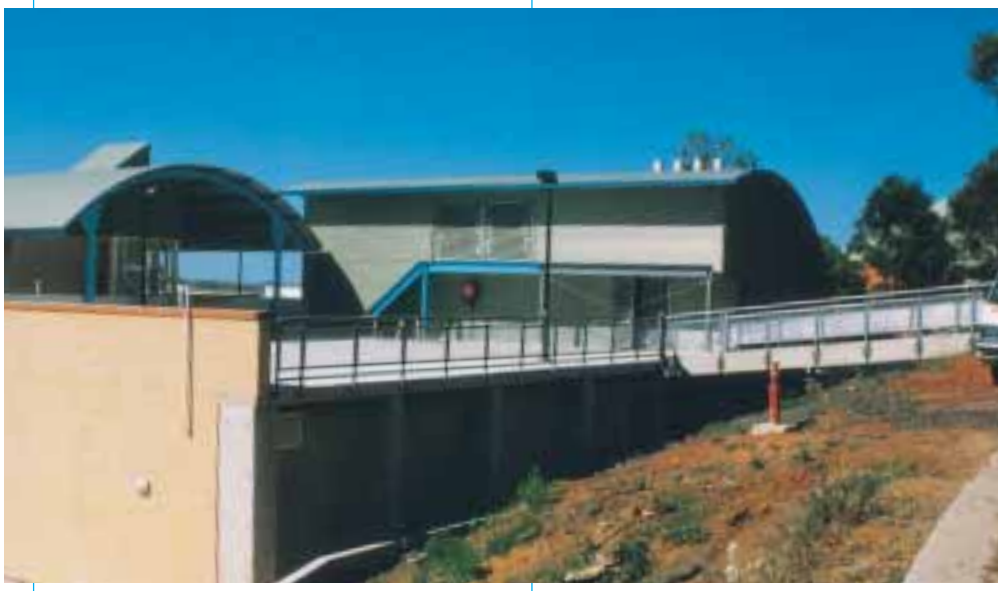
InfraBuild

Southern Cross Uni Research Building Lismore

July 1998

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

Southern Cross University, Lismore, NSW is located in the lush, picturesque Northern Rivers area on the Far North Coast. The campus, with its steep slope and limited space created some interesting challenges for Richard Crandon & Associates, a local engineering firm contracted to design and supervise construction of the University's new Forestry Research Building.



Forestry Research at Lismore

The project consisted of two separate buildings: a three storey administration block and a two storey research laboratory complex with a walkway-link between. The new building had to continue with the existing theme of the university as specified in the design brief. The roof was cleverly designed to provide car parking space for a number of cars as well as greenhouse structures.

With the site located between two existing buildings on a relatively steep slope, access was difficult and with the wet season fast approaching, important decisions were made to overcome these logistical and seasonal problems.

The use of BHP structural steel frames provided a simple solution as most of the work could be carried out off-site, allowing parallel activities to speed up the overall construction time. The steel was erected directly off delivery trucks due to the absence of site storage facilities.

The University's Capital Projects Manager, Mr Mike Cooper explained, "Steel was specified for this project due to site restrictions, allocated budget, time constraints and structural requirements. The laboratories which are to be used for various research pursuits house expensive specialised equipment. Steel framing permitted the flexibility for various penetrations and installation of specialised equipment".

Greg Clark Constructions were the successful tenderers with a winning bid inside the original estimated budget of $2.45 million. Subsequent to the tender award, a corporate firm were attracted to the project and injected substantial further capital to expand the facility, making it suitable for joint university and private use. Consequently, there were substantial scope changes to the contract and the steel frame solution offered the flexibility of being easily modified to accommodate the significant changes.

Design Detail

The structural steel frame, with composite Condeck structural decking slabs, was chosen to meet the problems associated with the site and helped to speed up the initial frame construction time. It also enabled the frame to be used to retain the lateral earth pressure from the 8 metre deep cut and backfill at the toe of the excavation. The structures are traditional fully braced frames in both directions with additional lateral stability due to the concrete core. Typical members are:

Columns	200 UC52 300PLUS
Beams	250 UB 26 - 530 UB 82 300PLUS
Bracing	CHS tubes
Connections	Bolted Web Side Plate

Deflection and vibration control was critical because of the sensitive apparatus and measuring devices to be housed within the laboratories. Deflection was typically limited to Span / 1000.

Composite slab and beam construction was used throughout with propped 1mm Condeck HP steel decking supported on unpropped steel beams with shear studs. All primary and secondary beams were designed to the new composite beam code AS2327.1 and supplied to the fabricator pre-processed, ie. cut-to-length and drilled by Union Steel in Brisbane. In addition, the shear studs were pre-welded to the beams in Brisbane prior to delivery to the fabricator, Jasen Fabrications in Lismore. The structural decking was core drilled on site to match the stud spacing.

Galvanised steel angles (150 x 90 x 10) were bolted to the edge beams to provide support for the brick facade, chosen to match the University's existing buildings. The internal

The steel frame serves as retaining wall on the deeply excavated site.

bracing, located within the wall structure presented no restrictions to the floor layout.

Construction

The builder, Greg Clark summed up the benefits of using steel on this project: "Due to site and space limitations on this particular project, the structural steel frame was very efficient. When we wanted to erect the steel, it was delivered to site and erected the same day. Two floors were erected in one day using up very little site time. The use of steel permanent formwork bearing on beams also made slabs easier to form", Mr Clark said.

Conclusion

Forward planning, team work and excellent communication between the engineers Richard Crandon & Associates, Greg Clark Constructions and Jasen Fabrications proved invaluable.

When major scope additions to the original contract were presented during construction, the challenge could be met thanks to the special steel framing techniques, which confirmed the choice of using structural steel framing.

The project was completed at the end of January 1998 in time for commencement of the first semester.

Project Cost:	$2.45 million (original budget)
Client and Project Management:	Southern Cross University, Lismore, NSW
Engineering and Design:	Richard Crandon & Associates
Builder:	Greg Clark Constructions
Fabrication and detailing:	Jasen Fabrications
Steel Distributor:	Union Steel

The fully braced steel frame, nearing completion.