Simple steel way weaves building with landscape

Waterloo Youth, Family and Community Centre, Sydney

A former amenities block at Waterloo Oval near Sydney's inner-city suburb of Redfern has recently been transformed into a built form that appears almost at one with its parkland setting to house a modern workspace and counselling facility.

The facility had been the makeshift home of Weave (formerly South Sydney Youth Services) for over 15 years assisting disadvantaged young people from the area, predominantly of Aboriginal or Torres Strait Islander descent.

Project architect **Huw Turner** of collins and turner said that elements of the existing structure were refocussed around a new central courtyard and crowned by a green roof structure combining architecture and horticulture to create a new sculptural form.

He said that its landscaped roof garden is veiled by a steel canopy structure designed to support a variety of native climbing and fruiting plants as an interlocking, but self-supported element allowing for the future demounting and relocation of the structure.

"The building is also partially submerged in its setting from subtle adjustments in the adjacent landscape levels and as plants grow across the canopy will gradually merge with its park setting," Mr Turner said.

"The building's angular form evokes both the folded planes of Origami and the triangulated surfaces of invisible stealth planes and boats and was planned to maintain where possible the existing wall and slab structures."

The interior is arranged in a pin-wheel plan around the central courtyard and includes a largely open and flexible plan with workspaces for 14 staff. It houses a reception area, two counselling rooms, a chill-out room, manager's office, kitchenette and a small facility for a visiting general practitioner. Integrated joinery elements and staff amenities subdivide the space and functions.

Internal temperature is passively controlled using natural cross ventilation, exposed thermal mass and a building envelope shaded by the canopy structure and climbing plants. Rainwater is drawn from roof and paved areas and collected in an underground tank adjacent to the structure to irrigate the plants.

He said that building materials were pared back and simply detailed, the building designed to be robust, low maintenance and long lasting.

Lead project engineer, Arup's **Andrew Johnson** said the intent was to have simple open connections in the skeleton with minimum surfaces to limit corrosive dust and moisture collection, detailed using only vertical fin plates.

"The connections were kept very rudimentary, even industrial in purpose, focussing on low cost and simplicity as opposed to architectural elegance alone as once the creepers grow the steel frame will be secondary and disappear from view," he said.

"On that basis we used simple end tees to CHS elements wherever possible and cruciform sections where eccentricity or cleat buckling was problematic for single tees due to the connection geometry. We even reviewed using squashed ends for the smaller elements.

"The geometry of the steel framing was developed with the architects by passing the same 3D model between us while we reviewed structural load paths and undertook preliminary analysis to guide the efficiency of the geometry.

"We then took the final agreed geometry of the main frame, analysed it in structural analysis software and imported this, including sizes into Tekla to hand to the steel fabricator. We then

designed the triangular cladding panels and added those in their final set-out position into the Tekla model.

"Arup has experience working in single model environments with structural steel frames locally and globally for well over a decade and this has allowed us to refine our process of delivering information in the most effective formats."

Mr Johnson said the client asked for the steel canopy to be independent from the main building structure so that it can be disassembled and re-erected elsewhere in the future. Consequently the steel frame is free-standing from baseplate level.

"The steelwork not only needed to support the estimated weight of the 'creepers', but also to withstand the structure being climbed upon for maintenance, imposing greater than just maintenance loads," he said.

He said the most cost effective corrosion protection system for mild steel in this rustic situation was hot dip galvanizing which is utilised throughout the exterior form in structural sections, grillages and meshes.

"The metallic bond created by the galvanising process offers a robust and abrasion resistant finish that will minimise damage from the creepers. The alternative of using stainless steel was unaffordable as capital cost."

Engineering Manager at the project's main steel fabricator Performance Engineering, **Glenn Andrews** said meeting steel fabrication requirements for such a distinctive built structure kept his shop on its game.

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"The 'space frame' shape supplied by the architects meant that we had significant challenges in developing the mitre joints which were complex," he said. "And the fact that the frame was tubular added another degree of difficulty."

He said they could not have completed the project merely from PDF drawings and needed to use all of his company's capabilities in handling complex data.

"We made use of the Tekla model and we were able to transfer this into our Unigraphics CAD system to aid manufacture," Mr Andrews said.

Project Team

Client: City of Sydney City

Project Management: City Projects, City of Sydney

Architect and Lead Consultant: collins and turner

Structural Engineer: Arup

Builder: Projectcorp Australia

Steelwork Contractors: Performance Engineering Group, LDG Engineering, Woody's Metalwork, E-space Engineering

Coatings Contractor: Hunter Galvanizing

ASI Steel Distributor: Southern Steel

ASI Steel Manufacturer: BlueScope Steel