

UNIVERSITY OF ADELAIDE PLANT ACCELERATOR STEEL CLAD STRUCTURES BUILDING DESIGN AWARD 2010 (SA)

H2O Architects + Philips/Pilkington Architects



Architectural merit

The University of Adelaide Plant Accelerator at the Waite Campus is Australia's largest research greenhouse. The facility covers 4 485 square metres over two levels, with an upper greenhouse level for plant growth facilities and access to automated plant imaging stations, over a lower support area including plant growth chambers, potting rooms, germination areas, research laboratories and administrative offices that operate the facility.

The Plant Accelerator addresses a fundamental infrastructure bottleneck in crop research and plant breeding in Australia. It is a national research facility, able to process 160 000 plants a year, by providing automated facilities for high volume plant growth and analysis, to support existing research facilities on the Waite Campus.

The facility has specialised greenhouses called Smarthouses with adjacent Imaging Rooms covering part of the upper level and enclosed in a proprietary greenhouse system utilising an external cladding from 16mm plexiglass, that allows ultraviolet light transmission, as a simulation of field growth conditions. Specialist conveyor, imaging and scanilizer equipment are installed in these rooms, to allow the movement each day of plants from the Smart Rooms to be photographed with visible and non visible light spectrums, providing a digital database of the above ground

with the capacity for world wide broadcast to allied research facilities.

Around these Smarthouses are located a variety of smaller research greenhouses, providing a range of sizes and climatic conditions.

The Plant Accelerator has been designed to satisfy the requirements of the University's Campus Masterplan and the intense functional demands of the usage, including a strict north to south alignment of the greenhouses to minimise the impact of shading.



Innovation in the use of steel

The two-storey building is essentially a first floor Bondek slab supported on efficient steelwork columns and beams, creating the platform for a proprietary aluminum and plexiglass greenhouse system.

Crisp white 'Longline' Colorbond cladding encloses the tall ground floor up to first floor sill level and complements the hot-dip galvanized SHS steelwork featured in the foyer and gutters and downpipes. Natural anodized aluminum greenhouse sections and foyer glazing are complemented by the white cladding and the feature structural and plywood timber used for the foyer roof framing, balustrade panels, balcony linings and staircase.

Practicality in fabrication + erection

Throughout the project, materials have been selected to perform against functional, aesthetic, environmental and budget criteria. The use of steel allowed for the desired level of transparency, as well as column free expanses where required.

The use of repeated steel elements also assisted with efficient construction.



- Use of water efficient fixtures
- Landscape designed for no watering
- High electrical loads required for the operation of the project, reconciled by Tri-generation facilities, currently be installed with additional Federal Government funding
- Generating power on site using a gas fired "Combined Heat and Power" (CHP or Co-Generation).
- Building Management System (BMS) to control all lighting and mechanical plant to minimise energy wastage.
- Employing bucket traps to capture pollutants from greenhouse drains

Summary

Designed according to strict functional requirements, the Plant Accelerator utilises lightweight steel construction to provide a streamlined structural frame befitting both form and function. Thorough consideration of sustainability measures has also contributed positively to the overall efficiency and innovation of the building.



Sustainability

The facility has the potential for large water and power requirements, which are tempered by sustainable initiatives including large roof water catchments and mechanical plant water recycling. The controlled environment of the Greenhouse manipulates temperature, venting, humidity, air velocity, shading, light type and light quantity.

The project incorporates significant environmental design outcomes including:

- On site collection of all rain water captured from the large greenhouse roof area
- Recycled waste irrigation water drained from greenhouses after plant watering
- Recycled large water quantities utilised in the mechanical conditioning of the greenhouses
- Waste, mechanical and greenhouse waters reused by onsite filtration, treatment, neutralising and settling storage facilities, removing harmful bacteria
- Providing 200,000 litres of onsite water storage tanks
- Minimising rainwater loss in storage and recycling process
- Minimising onsite water usage in facility where plants receive 4 000 Lt of rainwater per day

Project team

Architect:	H2O + Phillips Pilkington Architects
Structural Engineer:	Wallbridge & Gilbert
Head Building Contractor:	Built Environs
ASI Distributor/Manufacturer:	BlueScope Lysaght (cladding)
ASI Distributor/Manufacturer:	BlueScope Distribution
Steel Fabricator:	RC&ML Johnson
Steel Detailer:	Kloek Drafting
Coatings Suppliers:	Korvest Galvanising, Able Blasting
Metal Building Contractors:	Metal Cladding and S+LJ Roofing