Applied Research and Development Facility, Flagstaff, USA

Project data

Type of project: Architecture (education)
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Author
Name: William Taylor
Profession: Architect
Organization: Hopkins Architects (USA)
City, Country: Burns Wald Hopkins, London, United Kingdom
Further authors: Michael Taylor

Project description by author

The aim for ARD is to create a unique internationally recognised center for sustainable research. The building, which is seeking LEED platinum certification, is seen as the showcase for NAU research. The overall concept of the building is to create an environment that fosters interdisciplinary research between a unique collection of ecological departments and labs. This knowledge is in turn transferred to industry, local community groups and disseminated internationally. To design ARD NAU approached Hopkins Architects and Arup who have an international track record in creating World-class sustainable buildings, most notably the 2005 Sustainable Building of the Year- Jubilee Campus, Nottingham University, UK.

The site chosen for ARD is an existing carpark and flood detention basin. Our aim is to heal this Brownfield site and create a vibrant and ecologically rich gateway to the NAU campus. The existing linear detention basin is recontoured into an organic form lined with indigenous grass terraces and link existing woodland areas. Growing from the north rim of the basin, the new ARD faces south and the sun, allowing views over the basin and reinventing a sense of place. The building is divided into 3 distinct elements: a) 3-storey faceted stucco clad departmental block with exposed high quality architectural grade concrete structure. b) a ponderosa pine glulam passive solar heated gallery wrapped over the south elevation to house the main circulation and social heart of the building. c) Service cores are articulated as brick towers at either end of main building. d) the high volume fly ash concrete; high content recycled metals; local ponderosa pine; long life brick, stucco, and wood cladding

Architectural Design: Optimal day lighting; natural ventilation; exposed concrete as thermal mass for cooling; night time purging; external shading; BMS controlled glare control

Efficient Mechanical Systems: raised floor plenum displacement ventilation system; ultra low pressure drop central air plant systems with thermal recovery & compo- nent bypasses; BMS optimised low energy lighting, BMS controls of ventilation; integrated solar water panels; 20% of electricity generated by PV tracker

Water saving strategies: waterless urinals, ultra low flow wc's, reclaimed water use, no landscape irrigation.

Comment of the Holcim Awards 2005 jury for North America

The entry presents not only an ambitious effort to harness the resources of natural energy, but also to collaborate on an interdisciplinary level with specialists from other fields to effectively implement such an ambition. The impact of expertise could prove highly beneficial to local industry. The project successfully demonstrates a sound and integral implementation of state of the art building technologies, such as passive solar buffer collectors, solar shading, natural ventilation, as well as thermal mass for cooling and nighttime purging. Further potential for savings are introduced through the implementation of state of the art building technologies, such as passive solar buffer collectors, solar shading, natural ventilation, as well as thermal mass for cooling and nighttime purging. 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Quantum change and transferability

Our aim is to integrate simple sustainable strategies in innovative ways that creates a refined high quality architecture. We seek to use each building element for more than one function-e.g. concrete slab used as an architectural finish and for cooling. Innovative active systems are then used for fine-tuning. Energy modelling has found that CO2 emissions can be cut by 50% and together with a further 20% renewables represents a quantum leap for US lab buildings. These strategies have been adapted from our UK buildings, which highlight their inherent transferability. The passive and BMS systems will be used by NAU for extensive research programs. ARD is already high profile in Arizona, and will be promoted nationally through US- GBC, and as part of Hopkins and Arup world-renowned reputations.

Ecological quality and energy conservation

The LCA of each system has been considered, and results in the use of local long life and low embodied energy materials. Structure has been minimised and together with a env. passive emphasis and active fine-tuning has reduced energy use by 50%. Renewables include 50% solar DMW, 20% PV tracker, 100% green electricity tags. Campus density has increased by re-using car park and storm water basins.

Economic performance and compatibility

Financing for ARD includes State Bond, contributions from NAU tenants, and community. Structure, fit-out, servicing is designed for academic effectiveness of built form. Modular technology and modularity can be re-used for future. The operational building costs protect from future economic risk. Modularity, standard products right sizing, and design innovation have created a LEED Platinum Lab Building for Singapore, which has been sold to the US mark.

Contextual response and aesthetic impact

ARD seeks to transform a poor site by maximising use of permeable surfaces and indigenous landscaping to encourage local bio-diversity, and express ecological life- cycles. The building is integrated into its setting, providing shelter and enhancing place, while the gallery and terrace overlooking the basin allows internal functions to expand externally as the seasons change. Programing has been optimised by use of open plan flexible tenant areas, and circulation zones doubling up as informal visi- ting work, cafe and meeting spaces. Simplifying building form and a close attention to detail ensures architectural quality, while transparency creates an ambiance of social conductivity bathed in sunlight, and a close awareness of the surrounding ecological woodlands and the changing seasons.