

HAND-IN-HAND CONSTRUCTION EFFORTS DELIVER SUPERB EXEMPLAR

There can be no stronger proof of Hickory's skills in working collaboratively with clients and designers to achieve outstanding buildings than 41X (41 Exhibition Street, Melbourne), the new Victorian headquarters of the Australian Institute of Architects (the Institute). The \$31 million project combines design and construction innovation with leadership in sustainability, with a Five Star Green Star rating, and the landmark achievement of being the first commercial office building in Melbourne to target carbon neutrality over its entire 30-year operating lifespan.

The 21-level building has been designed by award-winning architecture firm Lyons, with an integrated interior fitout of the Institute's five floors designed by HASSELL. Under their modified ECI Design and Construct contract, Hickory worked closely with Lyons and the engineering and sustainability consultants to achieve the targeted environmental outcomes through choices around building systems, sustainable materials, waste management and transport strategies.

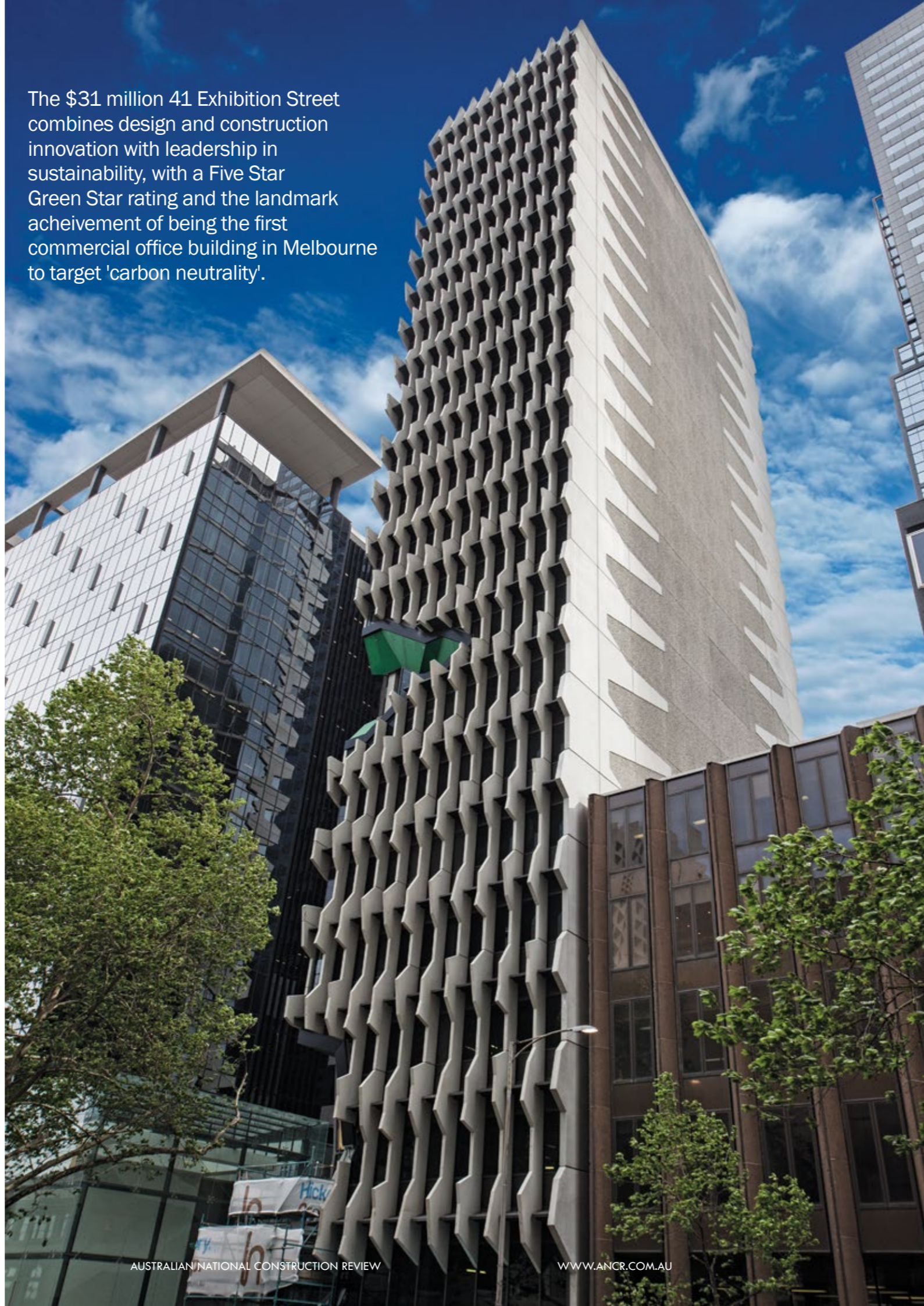
Innovations included the use of Bubbledeck precast floor panels and precast columns to reduce the need for formwork, reduce the actual concrete used in the building, and to maximise construction speed. The Bubbledeck also allowed for increased ceiling heights and fewer internal columns, giving the Institute and purchasers of other floors increased space value.

A unique energy-efficient facade has been constructed, which combines high performance glazing (argon filled double glazed units with thermal breaks) and external pre-cast panels with a complex geometry, including non-linear precast fins which act as sunshading. Hickory and the design team applied creative construction engineering thinking to develop a method of installing the glazing such that the vertical mullions aligned with the vertical precast sunshades on the east and west facades, effectively 'concealing' them when viewed from the outside. The original design had the glazing framing stick built between the vertical precast sunshades - the new solution was both more efficient and created a higher aesthetic outcome.

The facade also incorporates unique "bite" shapes of faceted green anodised aluminium supported by structural steel with a marine grade ply substrate, some of which shelter and delineate terrace areas.

Building systems have been selected for maximum energy efficiency, including a low temperature VAV system tuned for optimal operational performance through extensive energy and daylight modelling. A detailed Total Carbon Assessment was undertaken for the entire

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MAIN CONSTRUCTION COMPANY : Hickory Group
CONSTRUCTION VALUE : \$31 million
COMPLETION DATE : November 2013
CLIENT : Australian Institute of Architects
ARCHITECT : Lyons
INTERIOR ARCHITECT: HASSELL
STRUCTURAL ENGINEER : Winward Structures
BUILDING SERVICES ENGINEER : Aecom

construction life cycle of the building, which formed the basis of the project plan for achieving carbon neutrality.

During construction, Hickory used custom-designed components in the protection screen to navigate the perimeter of the intricate facade. Because the site was on such a constrained footprint, and in an extremely high-traffic (both vehicle and pedestrian) area, options were limited for scaffolding, craneage and access systems beyond the building envelope, with one elevation literally adjoining another building.

"The main challenges have been generally spatial and logistical. Due to the spatial constraints of the small footprint (combined with location on a busy city intersection) most processes are thus confined to being sequential in nature and cannot be run concurrently. This puts a greater emphasis on the challenge of planning and procurement," explained Hickory Contracts Administrator, Jonathan Lee, whose background in architecture enabled him to facilitate the team's use of REVIT.

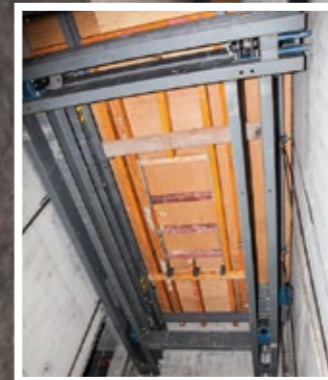
"The architectural and structural documentation was coordinated into a combined REVIT model that Hickory also had access to. Because of the sheer complexity and intricacy of many of the geometries of the building, this REVIT model proved very useful for coordination with subcontractors in verifying dimensions and visualizing how the building was to be constructed, especially regarding structure and the structural steel. Hickory management ran many workshops in the Hickory Site Office with subcontractors using the REVIT model to explain and to help them understand the complex design.

"This level of integrated coordination with the design consultants through REVIT played a critical role in the successful delivery of the project."

Hickory had an integrated team working on the project from January 2012 when demolition of the pre-existing building commenced, through to November 2013, when the building was formally handed over to the Institute. Hickory's staffing levels for the project were flexible depending on program, and comprised up to seven project management staff, up to five Hickory labourers and up to 38 Hickory Structures staff. There were also approximately 25 subcontractors, giving a combined peak daily workforce of about 100 people.

Melbourne's late spring CBD skyline is busy with construction cranes, and the Hickory name is appearing on many of them, with other current projects including a 69-level residential tower at 568 Collins Street; a twin tower apartment project for Malaysian developers SP Setia; and the Istana, a 25-level apartment building near Queen Victoria Market. Hickory has also just been awarded a D&C Contract to build the high profile 30-storey Central South Yarra residential apartments project for developers Little Projects.

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ACHIEVING MORE WITH LESS

Reducing materials, saving time and minimising risk are all important aspects of sustainable construction. For Hickory's 41 Exhibition Street project, a major contributor to the Five Star Green Star goal was BubbleDeck's unique pre-cast slab panel system, which incorporates HDPE balls in a matrix of steel mesh. BubbleDeck worked closely with the project's structural engineers, Winward Structures, and architects Lyons Architecture, to design the 280mm thick prefabricated flat plate slabs for the project. Because BubbleDeck eliminates non-structural concrete and creates a lighter, stronger slab, which can span two ways up to 50% further than a conventional slab, the architects could design without the need for supporting beams and add an additional level within the permitted building envelope.

For Hickory, the advantages included a 25% reduction in concrete, and elimination of work on unguarded leading edges, as the precast panels incorporate edge protection and provide an immediate work platform.

"Building a 22-storey office building on a site just 13 metres wide and 28 metres long, on a busy corner in the Melbourne CBD presented challenges for the builder," said BubbleDeck spokesman, Gavin Cooke. "Using prefabricated BubbleDeck panels reduced truck movements by 25% and greatly improved site logistics, reducing the quantity of materials including rebar and formwork needing to be handled and rehandled in the tight site envelope.

"Each individual panel for 41 Exhibition Street was different due to the voids and the articulation in the facade, with panel sizes ranging from 10x2.5m to 10x2.7m. Rather than have workers doing all the edge forms, cut-outs and penetrations on site, all of those were done as part of the prefabrication process."

BubbleDeck's ESD qualities include the use of fully-recyclable HDPE for the balls; the use of OneSteel mesh produced on a bespoke mesh welding line to eliminate wasted steel; and full recyclability of all components at the end of the building life-cycle.

"The Bubbledeck system is about being able to build more with less – less cost, reduced raw materials and fewer processes - and therefore achieving a better outcome for the built form," said Gavin.

"Our approach to sustainability is not only environmental, it is also the social angle of getting workers home safely at the end of the day by minimising risks, and also minimising disruption to local communities during construction."

Invented in 1991 by Danish engineer Jørgen Breuning, BubbleDeck's first Australian projects were in Western Australia, where for the last five years they have contributed to medical centres, commercial projects, mixed-use developments, and residential projects. WA builder Hanssen uses BubbleDeck in every project, including numerous high density residential developments.

Other Victorian projects include ALT @ Travancore by Bensons Property Group, and Fifty Albert for Hamton. As of October 2013 BubbleDeck has completed over 430,000 square metres of slabs in locations ranging from South Melbourne to Karratha, and presently has five projects totalling 60,000 square metres under construction.

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INNOVATION DELIVERS SAFER CONSTRUCTION SYSTEMS

To assist Hickory with achieving completion of the challenging 41X project efficiently and safely, Sureform Systems provided solutions which minimised heights risk, simplified scaffolding requirements and expedited the movement of men and materials.

Sureform designed customised perimeter protection screens in consultation with Hickory, which Hickory then manufactured as an asset which will be reused from project to project. Sureform also designed a customised crane-handled stair and platform system for the project.

"Due to the small and complex nature of the project the stair platforms enabled Hickory personnel to access the working areas without hanging a stair access on the perimeter of the building, which would have impacted the precast installation and façade of the project," explained Sureform Systems operations manager, Gavin Shaw.

"The crane handled stair and platform was designed, certified by our independent engineer and manufactured within 6 weeks. The screens were designed to enable all works to be completed behind the protection of the perimeter protection screens. The challenge in terms of design was the complex nature and features of the precast and façade and their relationship with the screens.

"Sureform can develop, design, manufacture and deliver all manner of formwork equipment. We specialise in complicated one off designs to suit critical stages and features for projects."

Founded in 2011, Sureform has a team of four design and technical staff and four trades personnel, and a supportive network of trusted subcontractors and industry professionals including some of the industry's

ABOVE: Sureform's Self-climbing formwork system at 35 Albert Road for E-Form P/L

most experienced formworkers, through E-Form P/L, an Equiset –Grollo Group company. All of Sureform's designs and products are certified by Constructioneering, an independent engineering firm owned by John Stella.

As part of their service to clients, Sureform provides onsite supervisors to assist in the erection and operation of their equipment. For clients like Hickory who intend to use the equipment across future projects, this training adds substantial value.

Other projects which have benefitted from Sureform's expertise include Equiset's Melbourne Water for which they designed a crane-handled formwork core system; 70 Queens Road for Drive Projects, which used Sureform's crane handled formwork core system, crane-handled screens and tableforms; and 27 Little Collins Street for E-Form which used Sureform's self-climbing formwork system, crane handled screens, cantilever formwork decks complete with edge protection and lifting device, and 4 meter cantilever beams at level 24.

The company's design expertise has also been used on Hickory's Fifty Albert, 82 Flinders Street for E-form, Lionville for Equiset, and Swinburne University for Drive Projects where Sureform provided conventional formwork design and inspections, tapered column forms, 'V' truss formwork, crane handled screens design and layout and tableform design and layout. In addition to the company's numerous Australian projects, Sureform also has a commercial relationship with a Singapore firm which uses the Sureform Self-Climbing Formwork System.

For more information contact Sureform Systems, Graham Shaw Design & Marketing Manager, email graham@sureformsystems.com or Gavin Shaw Operations Manager, email gavin@sureformsystems.com