2017-2018

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BUILDING EFFICIENCY

Critical Data Centres for OneSKY

Barrack Place: putting people first

Ready, jet, go

Taking tall timber to new heights

Supporting a beacon of hope

A.G.Coombs

MANAGING DIRECTOR'S MESSAGE

In the day to day reality of business challenges, we don't often reflect on what we have achieved. Preparing this latest edition of Building Efficiency provides the opportunity to do so.

The last twelve months has seen us complete many outstanding projects with our valued partners including some of Australia's newest landmark buildings such as International Towers Sydney at Barangaroo South, the International Convention Centre at Darling Harbour, the new Monash Children's Hospital in Melbourne and the New Bendigo Hospital.

The range of facilities we support with specialist maintenance services throughout Australia has now grown to be incredibly diverse and includes acute healthcare, specialist science facilities, quarantine facilities, high criticality data centres and telecommunications sites, pharmaceutical and specialist manufacturing, higher education campuses, major airports, museums, libraries as well as large complex commercial, retail and entertainment facilities.

We have welcomed the National Museum of Australia and new hyper-scale data centres amongst other new clients to the list of high profile and critical facilities where we provide complete technical management.

Our whole of life approach to building services continues to set us apart. Our expert Advisory team has further enhanced its strong reputation for providing highly valued advice to support effective building project delivery, and improvements in facility asset performance, safety and sustainability.

The built environment continues to digitise at a rapid pace. We remain at the forefront in the application of Building Information Modelling (BIM), including our long-standing and leading contribution to the industry led BIM-MEP^{AUS} initiative. These capabilities are supporting the shift to modular construction and a more productive and safer industry.

The last year has also seen a transformation in the level and usefulness of information available to asset owners and managers, and our team, as we have progressively moved clients' existing facilities to digital asset management systems. This is already delivering significant improvements in facility and system performance, increasing plant life cycles, and reducing environmental impacts and costs.

A.G. Coombs' AS/NZS ISO14001 certified Environmental Management System continues to support the sustainability of our business operations and underpins the provision of effective environmental services to our clients to improve the sustainability of their businesses.

The safety and wellbeing of our people, their ongoing personal development and a strong group-wide teamwork culture are central to our collective success. Our commitment to being incident and injury free wherever we work is fundamental. And our best practice safety management system retains longstanding certification to SafetyMap Advanced Level as well as national certification to Australian Standard AS/NZS 4801:2001.

We are immensely proud of our commitment to corporate social responsibility. In the last 12 months, we have embedded our Reconciliation Action Plan into our business, and turned intention into action. We continue to support our various charity partners.

Most of all we are proud of our people. Building Efficiency provides a clear testament to our talented personnel; they continue to be our greatest strength and together with our core values and strong organisational culture are the A.G. Coombs Group's clear point of difference.

The future is bright as we grow our people and our capabilities. Looking forward, the A.G. Coombs Group is well placed with a strong pipeline of work and highly valued relationships to continue to deliver outcomes of the highest standards for our clients.

Russell Telford
Managing Director
A.G. Coombs Group

CHAIRMAN'S MESSAGE

It gives me great pleasure to commend this year's edition of Building Efficiency to you. This publication is a means to share with you the remarkable work of our Group of Companies.

The A.G Coombs Group embodies leadership in everything it does and this work bears witness to our strong relationships, long term strategic vision and commitment to delivering success for our clients, and in turn, for our Group and its people.

The concept of leadership goes deep for us. It is reflected in our processes and standards, our corporate behaviour and in our people. We strive to be at the forefront of the building services industry, always growing our people and developing new technologies and systems to improve quality, efficiency and safety.

We are committed to acting honestly and with integrity and see great value in starting conversations, and leading dialogue in areas such as diversity and reconciliation. We look to assist others whenever we are able.

These behaviours are not new, they are underpinned by our long-standing core values, shown by teamwork and respect, and a commitment at every level to do our best.

The A.G. Coombs Group Board strongly supports this commitment to leadership with a clear-sighted strategic vision for the Group, a firm focus on long-term success and prosperity, and sound governance.

We are very proud of what we have achieved in the last 12 months and our plans for the future. We hope to continue to share our successes with you.

Clive Weeks AO
Chairman
A.G. Coombs Group

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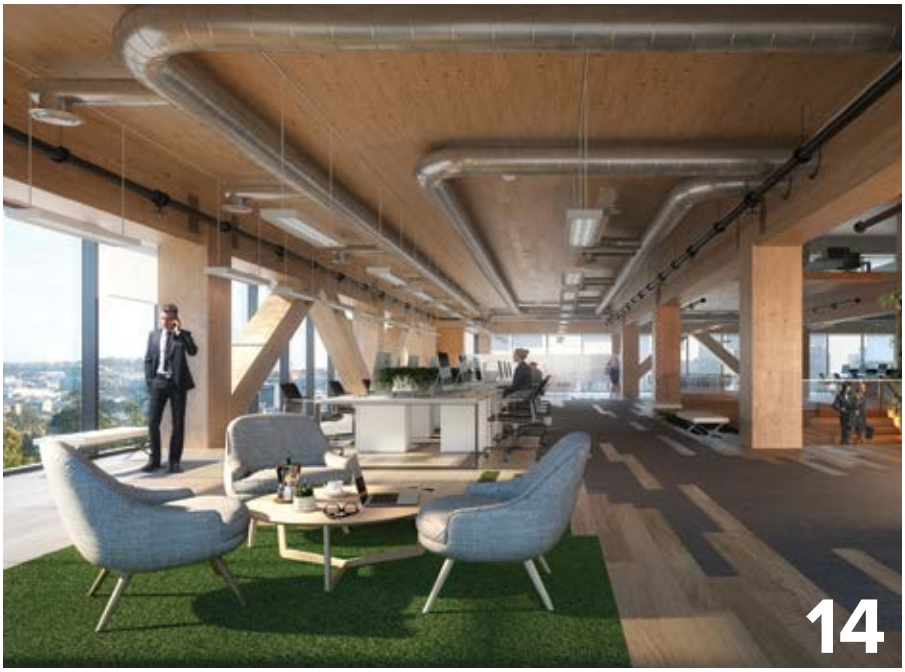


The A.G. Coombs Group acknowledges the Traditional Owners of Country throughout Australia and recognises their continuing connection to land, waters and community. We pay our respects to them and their cultures, and to elders both past and present.

Critical Data Centres for OneSKY

By 2021, Australian skies will be managed by the most advanced and integrated air traffic control system in the world.

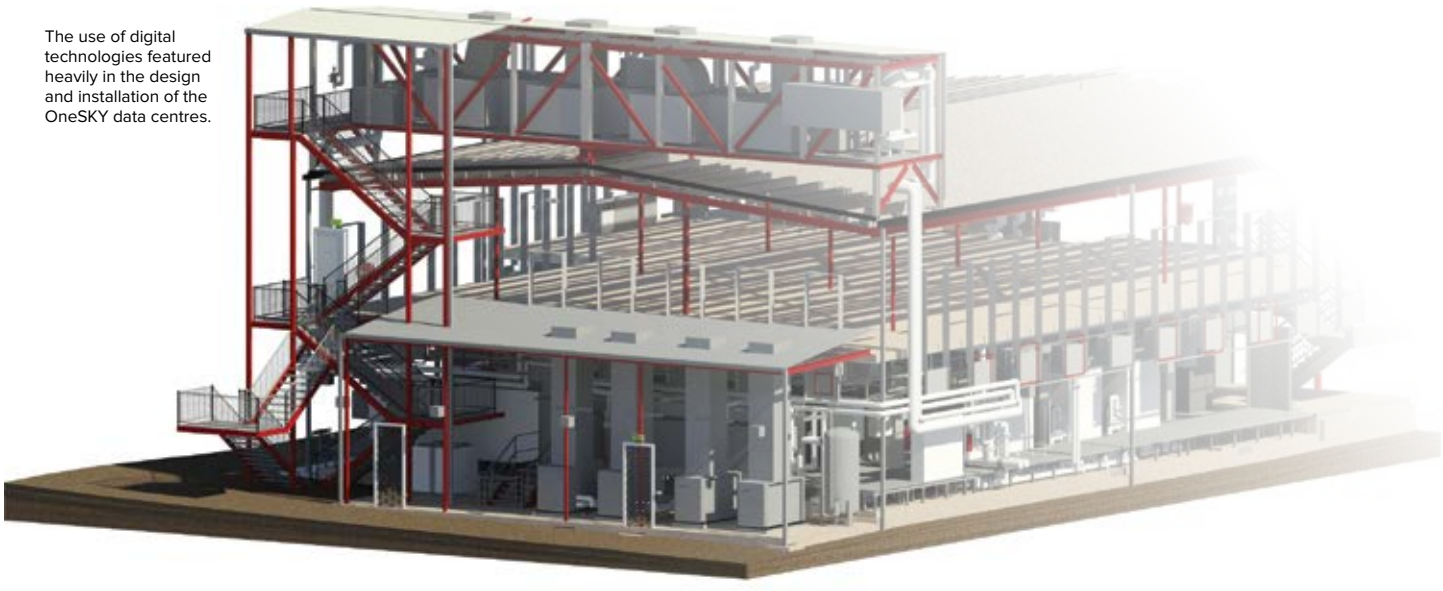
Unifying Australian skies for Defence and Civil aviation, the OneSKY program will manage approximately 11 per cent of the world's airspace – from the north of Australia to Antarctica – 24 hours a day, 7 days a week. It will enable a new level of operational efficiency and safety in Australia's air traffic management that will reduce delays for the travelling public.

OneSKY is a collaboration between the Department of Defence and Airservices Australia – a government-owned organisation that provides air traffic management and air navigation support to the aviation industry. It will replace the current civilian system known as The Australian Advanced Air Traffic System (TAAATS).

Built in the 1990s, TAAATS has had more than 200 incremental system changes since it was first commissioned in 2000.

The OneSKY program's critical functionality will be met by two recently completed data centre facilities described by the Australian Defence Force and Airservices Australia as "the two most mission critical data centres in the country."

Through close collaboration, A.G. Coombs and builder Icon Co developed a data centre solution that meets the OneSKY mission critical requirements and delivers a resilient computing environment that is safe, secure and reliable.



The use of digital technologies featured heavily in the design and installation of the OneSKY data centres.

The full Design and Construct (D&C) contract has seen the delivery of the two new data centres within Airservices Australia's facilities at Melbourne Airport and Brisbane Airport. These will ultimately replace existing facilities and underpin Australia's air traffic management system.

Each site required a similar building typology with identical technical specifications.

As lead services specialist on the project, A.G. Coombs delivered the mechanical, electrical, fire and security services design and installation for the project.

The use of digital technologies featured heavily in the design and installation. Spatial coordination of the building structures, as well as all services and systems, was achieved using 3D Building Information Modelling (BIM). Computerised Fluid Dynamics (CFD) was also applied to optimise system design capability.

Trimble positioning technology was also used to set-out services supports and ceilings, ensuring accuracy and saving time on the project.

Each facility's equipment rooms are designed to house 94 specialty IT equipment racks. The Tier 3 TIA-942 design meets Airservices Australia's stringent reliability requirement of 99.9997% availability and security requirements.

Concurrent maintainability is also achieved – meaning the facility can be maintained and upgraded in the future without outages.

Designed by Genton Architecture, the buildings' exterior facades and internal spaces have been carefully integrated with the existing Air Traffic Services Centre building to enable efficient access for operational and technical personnel. They promote a high level of security and best practice layout of spaces for OneSKY ICT equipment and supporting power, cooling and fire systems.

Installation and integration works at both locations were completed in April 2016.

> "Data Centre facilities for Air Traffic Control are at the pinnacle of Mission Critical computing. The A.G. Coombs design and construct of Mechanical, Electrical and Fire services have been carefully orchestrated to ensure the resilience and reliability this critical environment demands."
>
> Mark Toner, Data Centre and Telecommunication Facilities Manager, A.G. Coombs

According to A.G. Coombs Project Manager Gerard Mignone, the new equipment rooms at Melbourne and Brisbane airports underpin the OneSKY program.

"A.G. Coombs, in partnership with Icon Co, has successfully delivered these critical equipment rooms to meet Airservices' stringent physical, building services and digital security requirements."

The OneSKY systems are expected to transition into operations between 2018 and 2021. be

Banking on technology-based maintenance

It is one thing to use different technologies, yet quite another to integrate them successfully and produce meaningful outcomes. In fulfilling specialist maintenance for one of Australia's big four banks, A.G. Coombs is applying a range of cutting-edge systems to ensure the most appropriate and expedient response no matter the location.

Working with facilities management firm Cushman & Wakefield, A.G. Coombs has been delivering mechanical services, electrical and fire services maintenance to the National Australia Bank's (NAB) commercial, retail and critical data centre properties across its southern region since 2010.

This encompasses over 350 locations throughout Victoria, Tasmania, South Australia, Western Australia and the Northern Territory.

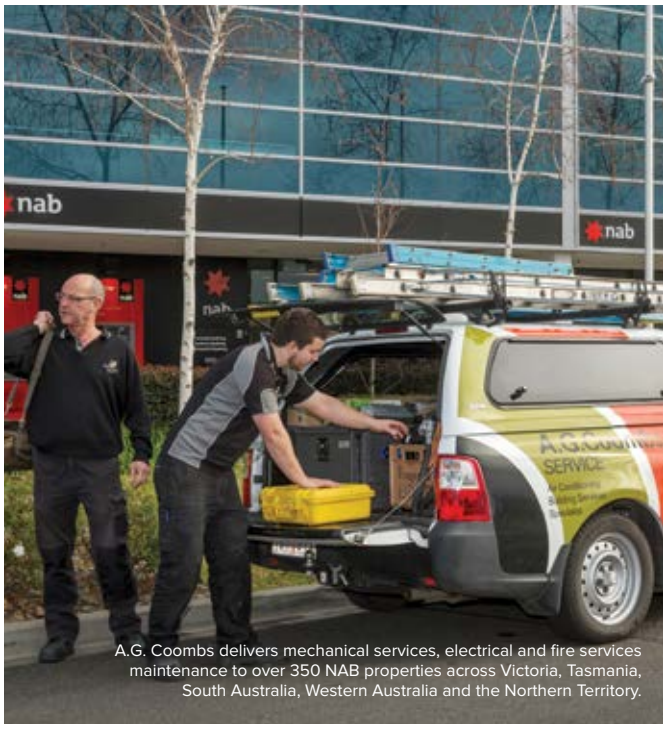
To comply with the contract's strict response and completion times while overcoming the geographical challenges that the region presents, A.G. Coombs has developed a number of smart, integrated technology solutions.

Among these are Maintenance Management systems that provide automated triage and prioritisation of work orders, the A.G. Coombs' Dispatch system, and integrated mobile device Applications that streamline onsite job management and ensure safety compliance. These systems integrate and complement systems operated by Cushman & Wakefield and NAB.

Committed to providing "the right technician, on the job, at the right time with the right information", A.G. Coombs has developed an algorithm-based Dispatch System. It references over 150 A.G. Coombs technicians based on their skill set, experience with the site, client induction status, their location relative to the site and their availability, to determine the most appropriate technician for the task.

"Along with their technical acumen and ability to overcome the challenges presented, A.G. Coombs' has developed and integrated technology solutions that contribute significant value to our client, and ensure the rigorous expectations of our contract continue to be met."

Shannon O'Connor, National Facilities Manager, NAB with Cushman & Wakefield



A.G. Coombs delivers mechanical services, electrical and fire services maintenance to over 350 NAB properties across Victoria, Tasmania, South Australia, Western Australia and the Northern Territory.

Upon arrival on site, technicians are required to log into the NAB Visitor App and comply with NAB's induction, safety and compliance requirements.

The A.G. Coombs Check Call App is used by the technician at scheduled times throughout the day to help assure their safety on site, which is particularly relevant for remote locations or where the technician is working alone.

Should a subcontractor be engaged to perform maintenance, the A.G. Coombs SNES (Sub-contractor Email Notification System) web-based system allows a direct interface with other A.G. Coombs systems to provide real-time job status updates and resolution notes without delay.

Immediate estimates on proactive work are supplied directly to Cushman & Wakefield by the technician via an A.G. Coombs Quote App, and linked to the Dispatch System for efficient job creation. Full and immediate access to job and asset information comes via the A.G. Coombs Customer Portal for compliance and reporting purposes.

This technology-based approach to managing maintenance contributes to critical infrastructure reliability, KPI and regulatory authority compliance, the effective life cycle management of assets and the delivery of comfort conditions for the wellbeing of NAB staff and customers.

"In maintaining critical infrastructure like those of the National Australia Bank, technology has an important role to play," says Shannon O'Connor, National Facilities Manager, NAB with Cushman & Wakefield. be

Barrack Place: putting people first

In achieving Australia's first ever WELL Core & Shell Precertification at the Gold level by the International WELL Building Institute™ (IWBI™), the design of a new state-of-the-art commercial office building in Sydney's CBD has put the wellbeing of building occupants first and foremost.

Managed by the International WELL Building Institute™ (IWBI™), the WELL Building Standard™ considers seven aspects of a building's design and their impact on the health and wellbeing of its occupants.

And by putting people first, Investa's new Barrack Place commercial office building in Sydney has been awarded Australia's first ever WELL Core and Shell Precertification at the Gold level, with the project on track to achieving Gold WELL Core and Shell certification once completed.

Currently under construction at 151 Clarence Street, Barrack Place will offer 22,000 square metres of state-of-the-art A-grade commercial office space, over 18-levels, to become the most advanced building in its class in Sydney.

Appointed by the project's Main Works Contractor, Built, in a D&C role, A.G. Coombs is currently delivering the building's mechanical and HVAC services utilising a number of innovative installation techniques.

Among them is the use of BIM and 3D modelling to support the design and construction process. The level of BIM on this project is high with very detailed modelling and COBie* requirements to support not only the design and construction process but also ongoing facility management and maintenance. Also significant is the "BIM to field" approach which requires very exacting levels of installation accuracy to match the detailed 3D model. A.G. Coombs is delivering these outcomes using proven BIM to laser set out methods including the use of precast positioned ferules for services hangers and supports.

All mechanical services and HVAC systems have been designed to complement the requirements of the Gold WELL certification, with the project's 5 star Green Star and 5 star NABERS Energy rating targets.

The podium levels of Barrack Place, to be tenanted by ARUP, will be served by an energy efficient underfloor air distribution (UFAD) system while the 11 levels above will be conditioned by a low temperature, variable air volume (VAV) system.

> "A.G. Coombs have brought a high level of innovation to Barrack Place with their advanced use of BIM, which mirrors the project's aim of being the most advanced building of its class in Sydney."
>
> Ben Milner, Project Manager, Built

Each system will feature a number of specialist air filtration devices, including MERV 13/ F7 filters to remove airborne contaminants and particulate matter, a provision for carbon filtration and the use of ultraviolet (UV) lights in air handling units (AHUs) to reduce odours and provide microbial control in the cooling coil. This high level of filtration will help deliver an outstanding indoor environment quality (IEQ) to tenants and occupants of Barrack Place.

The A.G. Coombs' design has also overcome some of the USA-centric standards applied within the WELL certification, as well as the incompatibilities that exist between the three rating systems being targeted. For example, the requirement of high level air filtration has resulted in an increase in size of AHUs and a corresponding fan energy penalty, with energy savings being found elsewhere.

A.G. Coombs is also employing specialist methods during construction to ensure all ductwork and air distribution requirements remain clean and free of contaminants prior to the system being commissioned, as required by the WELL certification. Barrack Place is set for completion in late 2018. be

*Construction Operations Building Information Exchange (COBie) is an international standard relating to managed asset information including space and equipment.

New model supports higher learning

An abandoned TAFE campus in Melbourne's outer east has been transformed into a vibrant and successful education setting with the help of an industry-first Managed Service Agreement between Box Hill Institute and A.G. Coombs.

Following its closure due to funding cuts in 2013, the former Swinburne TAFE campus at Lilydale lay dormant for three years until agreement was reached in late-2015 for Box Hill Institute to re-open the facility.

Needing to reinstate deteriorating building services in readiness for more than 1,000 students enrolled in vocational and higher education courses, Box Hill Institute turned to A.G. Coombs Advisory to conduct a detailed asset management plan of the existing chilled water systems serving the Lakeside campus.

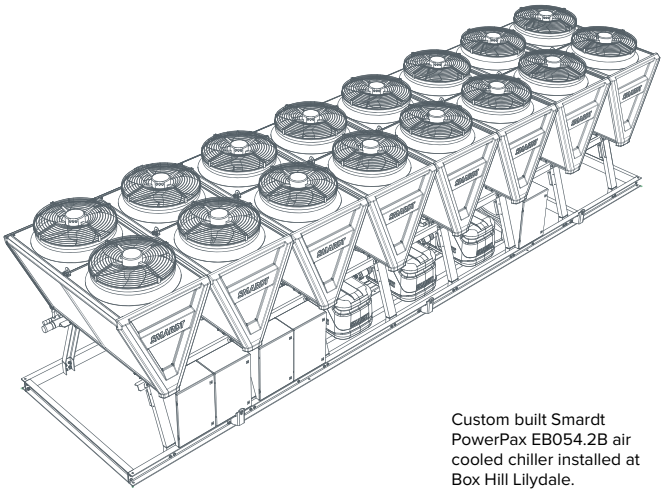
The plan provided a clear definition of the chilled water requirements for the major buildings on the campus.

It included a comprehensive condition assessment of the existing R22 chilled water systems and an outline of the options available to meet the long-term chilled water system operational requirements, in keeping with the sustainability aspirations of the Institute.

The assessment concluded that the condition of the existing chillers, coupled with the Institute's proposed master plan for the site, meant significant upgrades and/or replacements were required to serve the new and future needs of the Institute.

The proposed works included replacing an existing chiller serving the campus' Building LA with a new, high efficiency air-cooled chiller, and creating a lead-lag arrangement with two existing chillers via chiller relocation.

This new configuration would address the lack of chiller system redundancy for the building, and introduced a duty and standby pump arrangement to ensure full cooling availability in the event of a pump going offline. It also addressed an estimated shortfall in cooling capacity for the northern section of the building.



Custom built Smardt PowerPax EB054.2B air cooled chiller installed at Box Hill Lilydale.

> "The Managed Service Agreement put forward by A.G. Coombs has allowed us to focus capital expenditure elsewhere, and meet the vocational and higher education demands of students across Melbourne's east and the Yarra Valley."
>
> Winne Blackwell, Executive Director – Campus Modernisation, Box Hill Institute

The existing systems serving Building LB/LC were also targeted for replacement, with the existing rooftop air handling plant to be replaced by a chilled water unit alongside the upgrade of pump and pipework systems.

As well as providing redundancy and better serving the cooling requirements of the building, the recommendations by A.G. Coombs Advisory would also mitigate the operational risk and increasing maintenance costs associated with the old R22 plant serving both buildings.

A proposed mechanical services scope of works, associated budget and programme was subsequently put forward.

Following Box Hill Institute's acceptance of the recommendations in late September 2016, A.G. Coombs proposed a total turnkey solution that included the adoption of a Managed Service Agreement (MSA).

The MSA recognised the capital constraints of the Box Hill Institute, and provided a viable and sustainable, cost-saving procurement and financing solution for the proposed building plant and equipment upgrades.

The agreement included the design, procurement, installation, maintenance and ongoing operation of the new plant and equipment for a fixed term of 10 years. All responsibility for equipment risk and maintenance is carried by A.G. Coombs.

A key benefit of the MSA was that the works would require no upfront capital from the Institute.

Instead, the agreement was fully funded by A.G. Coombs, through financing partner Northquest, with the Institute required to make service payments over the fixed term maintenance service period.

At the end of the term, the assets would be returned to the Institute reconditioned.

In late 2016, Box Hill Institute accepted the MSA and appointed A.G. Coombs Projects as head contractor to complete the chilled water system refurbishment works as recommended.

The project was delivered on time (within a tight 12-week period from construction to commissioning) and on budget, in readiness for student intake and the opening of the new Yarra Ranges Community Library in early 2017.

It is estimated the works will deliver energy savings to the Institute of up to $45,000 per annum.

"Re-opening the Lilydale Lakeside campus presented a number of challenges and opportunities for Box Hill Institute, and we have appreciated having an innovative and committed partner in A.G. Coombs by our side," said Winne Blackwell, Executive Director – Campus Modernisation at the Box Hill Institute.

Needing to reinstate deteriorating building services in readiness for more than 1,000 students enrolled in vocational and higher education courses, Box Hill Institute turned to A.G. Coombs Advisory.

Complex Logistics for Cabrini's Plantroom Move

"We are pleased with the plantroom works delivered by A.G. Coombs. We trusted in the team's whole-of-life expertise and specialist knowledge in the healthcare sector to deliver the best outcomes for the project, the hospital, and the hospital's patients who rely on its systems."

Gerry Quinn, Project Director Advisory and Asset Management, Aurecon

Malvern's Cabrini Hospital is a 508-bed acute care hospital offering a wide range of services including coronary care, day procedures, day oncology, emergency care, hospital-in-the-home, intensive care, maternity, paediatric care, medical imaging and pathology.

A.G. Coombs Projects was appointed as Head Contractor by Project Manager Aurecon to build a new plantroom for Cabrini, to house new and relocated engineering services plant and equipment.

The project presented a complex exercise in logistics on a tight and constrained site. New equipment including large chillers, boilers and a diesel-powered generator were installed and commissioned before existing services were transferred across, including the hospital's HVAC and mechanical systems, electrical systems, and fire sprinkler systems, as well as specialist systems including steam, medical gas and pneumatic tube.

The Building Management and Controls System (BMCS) was also relocated and commissioned as part of the works, along with a control system to optimise the chiller plant operation, to ensure optimal operational performance and energy efficiency across the facility.

Under A.G. Coombs' management, building construction was undertaken by Built. Major structural elements were installed in the basement including innovative carbon fibre strengthening technology for the concrete slab to support the heavy chillers.

In order to manoeuvre the chillers and equipment into the below ground plant room, a large 6m x 4m access hole was cut through the driveway into the car park level below, where the new plant room was to be located. A traffic-load bearing, removable access cover was engineered to cover the hole for future access and maintenance of the plant.

Another significant component of the project involved upgrades and additions to major electrical systems and infrastructure. A.G. Coombs' management and coordination of sub-contractors along with planning of works sequencing was critical to ensure that during the relocation no disruption was caused to the live plantroom and ultimately, to the hospital's ongoing service delivery and patient care.

Johan Muller, the A.G. Coombs Project Manager commented, "The project presented a complex exercise in logistics. Managing site activities required a very systematic relocation plan, ongoing management of a busy pedestrian thoroughfares, and all safety measures".

Gerry Quinn, Project Director Advisory and Asset Management, Aurecon said, "We are pleased with the plantroom works delivered by A.G. Coombs. We trusted in the team's whole-of-life expertise and specialist knowledge in the healthcare sector to deliver the best outcomes for the project, the hospital, and the hospital's patients who rely on its systems." be

New equipment including large chillers, boilers and a diesel-powered generator were installed and commissioned before existing services were transferred across to the new plantroom.

Tuned for success

When seeking to improve the energy efficiency of older commercial office buildings, the best first investment owners can make is in a structured building tuning program that seeks to improve the performance of existing systems.

Located toward the north-east corner of Melbourne's CBD, 242 Exhibition Street has been a prominent fixture on Melbourne's growing skyline since it was constructed in 1992.

Owned and managed by Investa, the A-grade commercial office building features 65,913m² of space across 43 levels. In 2015, Investa engaged A.G. Coombs Advisory to conduct a Building Energy Optimisation Program (BEOP) that sought to improve the energy performance and carbon footprint of the building.

Following an audit and detailed review of the building's operations and HVAC systems, A.G. Coombs Advisory proposed a program of initiatives that considered the building's thermal and operational dynamics.

A constructive and collaborative team approach was taken, with all stakeholders including the building owner, facility manager and proprietary Building Management and Control System (BMCS) provider engaged at each stage of the works to ensure that system integrity was maintained.

Being the largest consumer of energy within a commercial building, the building's HVAC systems were naturally a focus area for the program. A.G. Coombs Advisory relied on its team's detailed knowledge of how systems consume and waste energy to apply a suite of proven methodologies.

This led to a structured approach that directly targeted the tuning of energy consuming systems by utilising the existing BMCS as a diagnosis, tuning and reporting tool.

Following enhancement to the BMCS, A.G. Coombs Advisory have also applied leading edge, operational analytics technology to further assist in monitoring and diagnosing the building's energy consuming systems.

The deployment of the sophisticated SkySpark® analytics software has further assisted with the analysis of building, energy and equipment data to identify opportunities for improved performance and operational savings.

Tuning initiatives 'airside' at 242 Exhibition Street have included the alignment of control logic – from the floor sensor, to air distribution, to central plant together with other activities to eliminate energy waste.

To date, these have delivered a reduction in air handling unit (AHU) fan energy, and reduced the reliance on variable air volume (VAV) electric duct heaters during occupancy mode – identified as a major consumer of electricity during cold/mild seasons.

> "A.G. Coombs Advisory's Building Energy Optimisation Program has proven very successful. The energy savings to date are significant and demonstrate the ability of older buildings to operate at good standards of energy efficiency."
>
> Jessica Nicol, Senior Facilities Manager, Investa

'Waterside', a variable flow control energy initiative has resulted in pump energy being reduced on both the high-rise and low-rise secondary chilled water loops. This has also had a positive impact on the primary chilled water system, resulting in a significant reduction in cooling load on the chillers.

A.G. Coombs Advisory's overall approach also represents a significant advance in control strategy philosophy – moving from simple temperature control to inbuilt, seasonally-adjusted energy conservation logic by working with existing controls systems and building infrastructure.

And the proof is in the results.

To date, a total electricity and gas energy reduction of 14% has been achieved without any major plant upgrades being undertaken. This represented a greenhouse gas emission reduction of 1,555 tonnes CO2-e and a NABERS Energy rating improvement equivalent to 0.28 stars.

242 Exhibition Street is currently performing to a 4.0 star NABERS Energy rating and targeting 4.5 star for the next assessment.

Importantly, the savings achieved will offset any escalations in energy as a result of the major tenant's adoption of an activity-based workplace model, which will see occupancy density increase from 1:12 to 1:10 person/m².

"Improving the energy performance of 242 Exhibition Street will ensure the building remains one of Melbourne's most sought after addresses," said Jessica Nicol, Senior Facilities Manager for Investa.

Ready, jet, go

From 2019, the Royal Australian Air Force Base at East Sale will become the home of basic pilot training for the Australian Defence Forces as part of the $329.8 million construction project currently underway.

Known as the AIR5428 Phase 1 Pilot Training System Facilities project, it will deliver the Department of Defence a turnkey pilot training solution that integrates physical and synthetic training environments.

The project supports the introduction of the new fleet of cutting edge PC-21 aircraft, by providing state of the art simulation facilities, and an electronic learning environment. This will enhance Defence's capability to take a trainee from initial flight screening through to their entry into advanced fighter training courses. Future generations of Joint Strike Fighter, Wedgetail and Growler pilots will begin their training on these aircraft.

The PC-21 is the world's most advanced pilot training aircraft. As part of the AIR5428 project, the PC-21 will replace Air Force's current PC-9/A and CT-4B aircraft and will be based at RAAF Base East Sale in Victoria and RAAF Base Pearce in Western Australia.

Delivered by Managing Contractor, Laing O'Rourke Australia, the RAAF Base East Sale project includes the construction of facilities to accommodate six flight simulators, twenty-eight aircraft shelters, five maintenance bays and enclosed storage for a further 17 aircraft under almost 6000m² of hangar area, as well as a state of the art learning environment and working accommodation to support the training program.

Walker Fire Protection was engaged by Laing O'Rourke Australia in late 2016 to design, install and commission specialist fire protection systems for the new facilities.

Working to a tight timeframe, Walker Fire Protection has successfully delivered the flight simulator fire protection systems. These systems

Two of Air Force's new Pilatus PC-21 aircraft, A54-003 and A54-004 fly overhead RAAF Base East Sale.

feature overhead sprinklers (some of which are pre-action sprinklers), addressable point type smoke detection and VESDA™ aspirated smoke detection, connected to a local fire indicator panel which is integrated with the base's fibre optic network.

The new hangars at RAAF Base East Sale will feature one of the largest in-floor foam fire suppression systems to be installed in Australia.

The system incorporates over 240 pop-up nozzles pre-installed in the hangar's concrete slab, which are supplied by a foam proportioning system that mixes an accurate quantity of aqueous film-forming foam (AFFF) concentrate with water.

The foam concentrate is supplied from two 4,000 litre horizontal bladder tanks (one main tank and a second in reserve).

The foam fire suppression system is supported by overhead fire sprinklers; VESDA™ aspirated smoke detection and state-of-the-art flame detection devices. These all interface with a number of other control systems, including the building occupant warning system with PA (public address) capability, mechanical fire mode controls and the building management and control system (BMCS).

The new hangers at RAAF Base East Sale will feature one of the largest in-floor foam suppression systems to be installed in Australia.

"The AIR5428 Phase 1 Pilot Training System Facilities project at the RAAF Base East Sale is an incredibly important infrastructure project for the Department of Defence."

Andrew Kloss, Technical Services Manager, Laing O'Rourke

When an alarm is activated by these systems, the in-floor nozzles are engaged and pop-up above floor level to disburse the foam in a 360 degree pattern across the hangar floor – cooling the fire and coating any oil or fuel present to prevent the risk of combustion.

Walker Fire Protection developed a detailed Cause and Effect Matrix during the design of the system to ensure it met the Department of Defence's unique specifications.

The design also includes a drainage system. Following an event, the foam is pooled and drained from the hangar and held in a storage area ready for offsite removal.

"We are pleased to have the expertise of Walker Fire Protection on the project to design and install systems that will protect this valuable infrastructure for years to come," said Andrew Kloss, Technical Services Manager with Laing O'Rourke. be

Taking tall timber to new heights

At a height of almost 45 metres, 25 King will be the world's tallest engineered timber office building when completed in late 2018 as part of the RNA Showgrounds redevelopment in Brisbane's Bowen Hills.

The use of CLT (cross-laminated timber) and Glulum (glue-laminated timber) in high-rise construction represents a growing trend around the world, and one that is making significant headway in Australia.

Following the construction of Sydney's International House at Barangaroo, Lendlease is now building its fifth engineered timber building in Australia as part of the redevelopment of the Brisbane Showgrounds precinct.

Designed by architect Bates Smart and owned by Impact Investment Group, 25 King is set to be the tallest engineered timber office building in the world once completed in late 2018.

As well as providing the structural strength of traditional concrete and steel, the use of these engineered timbers will dramatically reduce the building's environmental impact. CLT has a far lower carbon footprint than other building materials, is produced with zero waste from timbers sourced from certified sustainably-managed forests, and can accelerate the speed of construction.

The timber construction will be combined with a fully glazed façade to maximise daylight penetration across the building's nine office levels, while sun shading on the western and eastern façades will reduce solar heat gain.

But 25 King's sustainability commitments are more than just skin deep.

The project is designed to meet the Property Council of Australia A-Grade compliance, and is targeting a 6 star Green Star rating using the new Design and As-Built v1.1 tool. A 5 star NABERS Energy rating is also being targeted.

Critical to achieving these ratings will be the energy performance of the building's mechanical services and HVAC design.

Following a period of value management of the Aurecon design – themselves a key tenant of the new building – A.G. Coombs was appointed by Lendlease as mechanical contractor on the project.

The building's 14,000m² NLA of A-Grade office space will be conditioned by an energy efficient, low-temperature variable air volume (VAV) system, supplied by central air handling units (AHUs) on the roof.

The chilled water plant will comprise of two water-cooled, variable speed drive (VSD) screw chillers with variable primary chilled water pumping.

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Outside air preconditioning will be achieved using energy recovered from spill and toilet exhaust air via energy reclaim wheels.

A single level basement, to accommodate 56 cars, will also be mechanically ventilated. This level will feature electric vehicle charging points and racks for 152 bicycles – as well as end-of-trip facilities.

The use of BIM (Building Information Modelling) will be integral to the services fitout at 25 King, and the A.G. Coombs team is taking the lead for all building services with BIM coordination.

BIM will the used to ensure the accurate position of penetrations in the building's prefabricated CLT structural elements, and to provide high level coordination of building services – all of which will be exposed and require a high level of detail in their installation.

A.G. Coombs will employ a number of specialist methods during construction to achieve these outcomes, including prefabrication of plant rooms, risers and horizontal modules where possible. be

"25 King represents a world first in engineered timber construction, and we are pleased to be working with Lendlease helping to deliver what will be a wonderful achievement for the Brisbane Showgrounds precinct"

Danny McGregor, Queensland Manager, A.G. Coombs

01
The building's A-Grade office space will be conditioned by an energy efficient, low-temperature variable air volume (VAV) system.

02
The timber construction is combined with a fully glazed façade to maximise daylight penetration across the building's nine levels.

Supporting a beacon of hope

Through his work as a cancer specialist, and in his own three-year battle with an aggressive brain tumour, Professor Chris O'Brien AO inspired a nation and turned personal adversity into opportunity.

During the opening of the Chris O'Brien Lifehouse in late 2013, former Prime Minister Tony Abbott stated that: "Worthwhile things do happen provided we persist, provided we don't give up".

Four years after Prof. Chris O'Brien's passing, his vision of a not-for-profit, cancer centre offering care from diagnosis, treatment and to wellness was fulfilled. And today, the $260 million healthcare facility treats more than 40,000 public and private patients every year.

Located within the University of Sydney precinct, the nine-storey Chris O'Brien Lifehouse accommodates cancer surgery, chemotherapy, radiation therapy, complimentary therapy, research and emotional support in the one facility.

This integrated model of care allows specialist cancer services to be delivered by a multidisciplinary team and eliminates the need for patients to navigate a complex series of appointments at multiple locations.

The building is the antithesis of a traditional hospital environment. Its vertical configuration benefits from a central, full height atrium that introduces natural light into the space, while the best views are afforded to inpatients who are accommodated in the top two levels of the building.

After reaching the end of the defects liability period (DLP), the facilities management team at the Chris O'Brien Lifehouse sought specialist assistance to improve the future performance and maintenance of the building's mechanical services.

Recognising A.G. Coombs' track record in healthcare, as well as the depth of technical ability and expertise available, the Lifehouse team contacted A.G Coombs knowing that they would have access to the broad range of A.G. Coombs' Group capabilities including Projects, Service and Advisory. Chris O'Brien Lifehouse entered into a tailored HVAC maintenance contract in July 2017.

> "Knowing the technical capability of A.G. Coombs across multiple disciplines, we are pleased to have them join our team as we seek to ensure patients, their families and their carers are as comfortable as possible during their time with us."
>
> Phill Wenham, Facilities Engineer, Chris O'Brien Lifehouse

The nine-storey building accommodates cancer surgery, chemotherapy, radiation therapy, complimentary therapy, research and emotional support in the one facility.

To date, work has centred on the ongoing maintenance and service support for the new building, as well as improving the HVAC performance of the adjacent radiation oncology building.

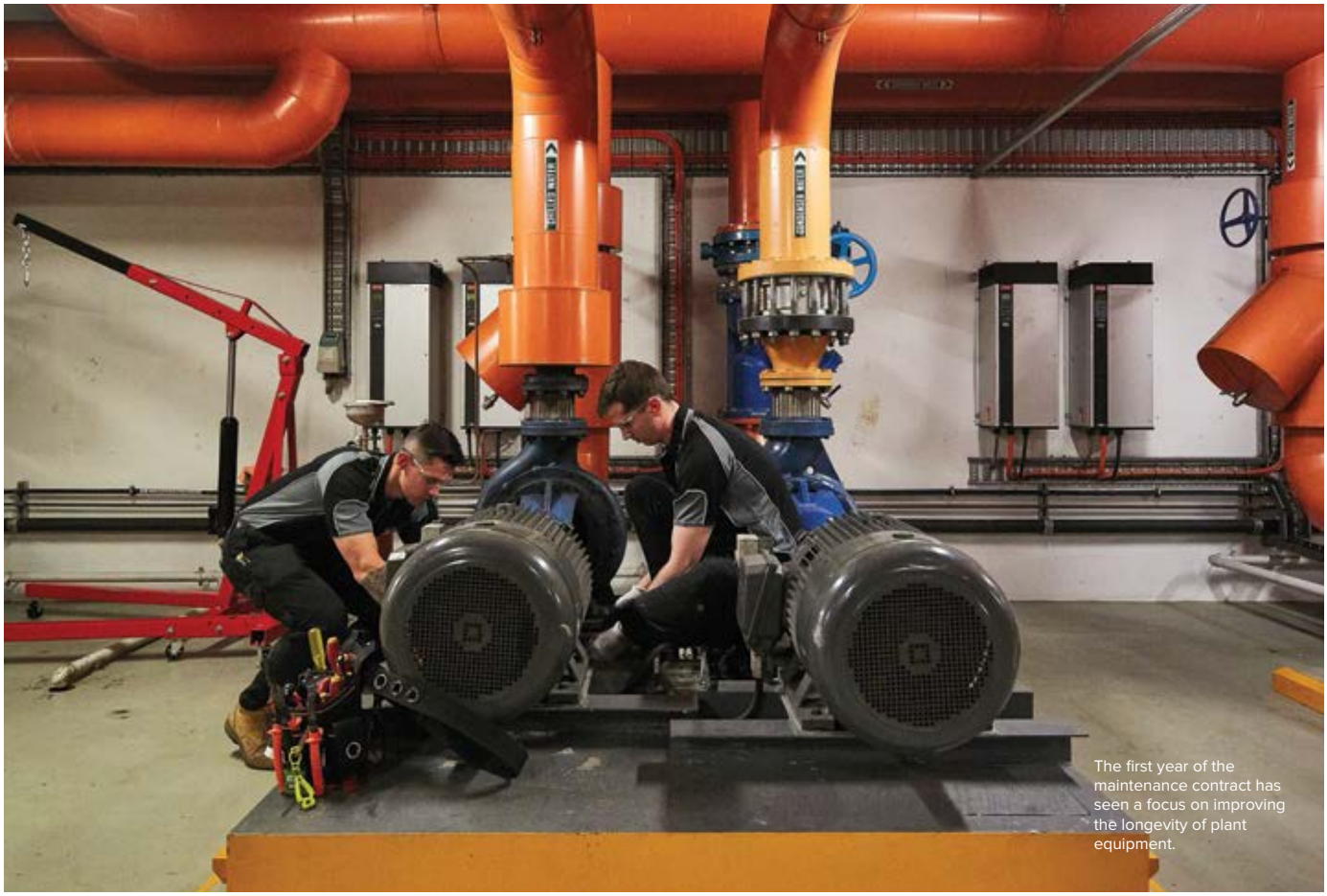
Leased to the Chris O'Brien Lifehouse from the Royal Prince Alfred Hospital (RPA), the aging building's HVAC systems are being refurbished and upgraded to meet modern standards commensurate with the new building.

Given the 24/7 nature of the building's operation and delivery of patient care, access across the site is a challenge.

A.G. Coombs is sensitive to the fact that maintenance and related works can impact on the wellbeing of patients undergoing care and treatment. Building on long experience providing maintenance and project works at other critical healthcare facilities – including the recently constructed New Bendigo Hospital and the Royal Children's and Monash Children's Hospitals – A.G. Coombs has worked closely with the Chris O'Brien Lifehouse to develop a detailed maintenance plan and workplace health and safety (WH&S) plan, that includes the appropriate induction and training of staff, to minimise impacts on patient services.

And in improving the performance of the HVAC systems serving the facility, A.G. Coombs is dedicated to contributing to an environment that is centred on the health, wellbeing and comfort of patients seeking treatment and care.

"Chris O'Brien Lifehouse places the patient at the heart of everything we do," said Phill Wenham, Facilities Engineer with the Chris O'Brien Lifehouse. be



The first year of the maintenance contract has seen a focus on improving the longevity of plant equipment.

Inside the Brisbane Square

A fresh maintenance contract has brought new thinking and A.G. Coombs' Group-wide expertise to an iconic office building in the heart of Brisbane's legal and government precinct.

Located at 266 George Street at the river end of the Queen Street Mall, Brisbane Square was one of the city's largest commercial office buildings when completed in 2006.

Featuring a net lettable area of over 50,000m² across 38 levels, the building is occupied by just two major tenants – Brisbane City Council and Suncorp – as well as ground floor retail tenancies and the Brisbane Square Library.

Having originally achieved a 5 star Green Star – Office Design v1 rating, the building's HVAC design features a variable air volume (VAV) system served by a central HVAC plant and two plant rooms with air handling units (AHUs) on each floor.

Reflecting the company's rapid growth in the Brisbane market, A.G. Coombs was recently appointed to a semi-comprehensive maintenance service contract at Brisbane Square.

The appointment of a dedicated A.G. Coombs onsite technician has brought fresh thinking to the ongoing maintenance and performance of the 11 year old building's mechanical services and HVAC systems, and led to close collaboration with the building's facility manager, Honeywell.

> "Brisbane Square is a large building, and in just a short period A.G. Coombs has provided a fresh approach and identified shortcomings in previous maintenance."
>
> Wayne Andrews, Facility Manager, Brisbane Square

In keeping with the client's desire to reduce risk through equipment life-cycle planning, the first year of the contract has seen a focus on improving the longevity of plant equipment. A number of opportunities have been identified to improve the energy efficiency and performance of the base building.

These include the eradication of air leaks from AHUs, which can impact significantly on the load and energy consumption of the chiller plant. The chilled water temperature set point has been adjusted and performance monitored with the opportunity identified to reset the chilled water supply temperature to a variable control arrangement, again with the aim of lowering the load and energy consumption of the chiller plant. be

Thinking forward

As a society, our ability to adapt to change is being tested and the building services industry is no different.

Disruptive technologies are rapidly changing the operating environment for business and impacting on building infrastructure construction, ownership and operation.

The rate of this change – as well as the potential for unexpected effects – can be unsettling for many.

Combined with issues around urbanisation, sustainability, infrastructure, asset ownership and shifts in the Australian population profile, it is becoming clear that only those businesses able to embrace the opportunities presented by change will succeed and thrive.

Having built a long-standing reputation as a technical innovator and industry pioneer, A.G. Coombs keeps a close eye on the emerging trends impacting the building services industry.

Digitisation and the move to modular construction have been identified as two of the key game-changers in our industry.

THE DIGITAL BUILT ENVIRONMENT

Digitisation has already had a profound and disruptive effect on many aspects of the building life cycle – from design and delivery, to building ownership, management, operation and maintenance.

Building Information Modelling (BIM), virtual construction, offsite prefabrication and modular construction are all enabled by the conversion of the physical built form to digital formats; while smart systems are now allowing buildings to sense our presence and preferences and deliver improved comfort and amenity.

Rapidly advancing capabilities and reducing costs of information technologies are beginning to see the digitisation of the existing built environment – particularly in relation to essential and maintenance intensive building services.

Digital tools are increasingly capable of readily capturing the important details of technical building assets to create detailed, spatially located and multifunctional databases.

Rules based analysis is being used to assess data to ensure maintenance activities are focused on the asset's actual needs as determined by its purpose and criticality within the building, as well as its duty, age, condition and design.

Combine this with compiled historical information about the asset – such as past performance, reliability, cost to maintain, energy usage and forecast costs to repair or replace – and well-founded decisions can be made regarding timely equipment replacement.

The traditional rote, task-based approach to maintenance is inevitably shifting to one that is much more information driven, targeted and outcomes focused.

New capabilities in operational analytics – where software is used to continuously extract and analyse large volumes of real-time data from Building Management and Controls Systems (BMCS), and other sources, can now be used to identify current and future operational issues for targeted rectification or improvement.

These new analytical approaches to asset management and maintenance enabled by digitisation can deliver a much more proactive approach to operational support and maintenance and result in improved systems reliability and energy efficiency, and reduced costs.

Ultimately, the insights gained will also yield significant improvements in system and component design and selection as we compile and learn from detailed life cycle knowledge. And, the application of machine learning capabilities to these systems will further underpin the optimal performance of these systems.

The move to full modular construction – where the great majority of the building's manufacture is performed offsite – will significantly change how building services including energy, HVAC, mechanical, electrical and lighting, fire protection and automation systems are incorporated into the built form.

MODULARISATION

Buildings are among the last elements of human creation to be built bespoke, and largely in-situ.

But enabled by digitisation and driven by the ongoing need to reduce costs, lessen delivery time and address safety in the construction environment, modularisation and offsite prefabrication promises to revolutionise how we design and construct our buildings.

Combined with advanced manufacturing techniques and robotic construction and installation methods, it paints an exciting and revolutionary vision of building construction in the not-too-distant future.

A.G. Coombs has pioneered prefabrication in the building services industry. To date, these solutions, including award winning vertical and horizontal services risers and plantrooms, have been applied to the conventional building design and construction process.

The use of modular techniques that challenge the old ways has been increasing. It is now well established for the offsite construction of prefabricated building components such as bathrooms and increasingly whole hotel rooms and residential apartments.

The move to full modular construction – where the great majority of the building's manufacture is performed offsite – will significantly change how building services including energy, HVAC, mechanical, electrical and lighting, fire protection and automation systems are incorporated into the built form.

Digitisation has already had a profound and disruptive effect on many aspects of the building life cycle – from design and delivery, to building ownership, management, operation and maintenance

This may challenge the industry's specialist role in some aspects of its work, or conversely offer significant opportunities to take up an integrated "all of technical services" responsibility.

A number of "modular technology paths" are being progressed by various industry participants – including A.G. Coombs – applying a variety of approaches to the use of alternative construction materials and modularisation methods.

Whichever approaches are adopted, the wider application of modularisation and prefabrication will require substantial adjustment to current industry thinking about the design and installation of building services. be

Protecting our heritage at the National Museum of Australia

Maintaining the facilities that exhibit and house treasures of national importance requires the highest standards of service, environmental management and quality of work.

As a member of the A.G. Coombs Group of Companies, Integrated Technical Management (ITM) specialises in delivering customer-focused facility management and maintenance services for buildings that are technically complex, as well as critical to the operation of an organisation's core function.

One such organisation is the National Museum of Australia in Canberra.

Recently contracted to deliver facility management and maintenance across the Museum's four sites, ITM is leveraging the in-house technical resources, experience and specialist capabilities of A.G. Coombs to take a 'whole-of-life' approach to asset management for the Museum's facilities, plant and equipment.

This appointment follows ITM's successful award of other important facilities management contracts in Canberra including Old Parliament House, the High Court of Australia and the National Portrait Gallery.

ITM's planning, management and delivery model includes the planned and reactive maintenance of the Museum's buildings plant and equipment, building services and site infrastructure under one fully integrated model.

ITM takes full responsibility for the scheduling and close coordination of multiple engineering disciplines including mechanical, electrical, lighting, hydraulics, fire protection services, lifts, catering equipment and water features.

The Museum displays its collection through the main public building in Lawson Crescent on the Acton Peninsula. Designed by architects Ashton Raggatt McDougall and Robert Peck von Hartel Threthowan, the Museum sits on 11 hectares of land on the edge of Lake Burley Griffin. Opened in 2001, it features a post-modern design that reflects the diversity found in the nation's identity.

The Museum houses many unique artefacts and displays of national importance across 6,600m² of exhibition space, including the National Historical Collection – a rich and diverse collection of Australian historical material held in trust for the nation.

The main public building is supported by the Museum's three repository facilities in Mitchell ACT. Dedicated to the registration, conservation and storage of the Museum's collection, these three facilities require a uniquely different approach to how maintenance is controlled and delivered from the Acton building.

The nature of the Museum's collection requires strict environmental control parameters to be met for all exhibition and storage areas – typically a temperature of 22°C ± 1.5°C and relative humidity of 50%RH ± 5%RH.

To achieve this, as well as maintain the full performance capability and availability of all critical systems at all times, ITM manages the facilities' building management systems on the Museum's behalf.

Standby and back-up plant is also maintained to provide redundancy when required, including during peak demand periods.

To ensure the operating life of all plant is extended, a thorough asset audit and condition assessment has been conducted across the four facilities.

An energy management service facilitates and supports the Museum's energy efficiency program, and ensures all plant and equipment operate as efficiently as possible.

A dedicated ITM onsite manager, together with onsite technical personnel, are based on the Acton site. This team is supported by the A.G. Coombs Group's 24/7 National Customer Service Centre.

Since commencing the contract, ITM's management and onsite technical team have been working collaboratively with the Museum's facility management personnel to establish systems and controls to support the broad range of plant and equipment vital to the operation of the Museum. be

"The ITM onsite management and delivery team have worked collaboratively with the National Museum of Australia's facility management personnel to bring a high level of technical expertise to support the broad range of systems, controls and operational equipment vital to the operation of the museum."

Dale Dummett, Infrastructure Manager, National Museum of Australia

Designed by architect Howard Raggatt and opened in 2011 the museum building design is based on a theme of knotted ropes – symbolically bringing together the stories of Australians.

News

This artwork symbolises working together and reconciliation. It was commissioned by A.G. Coombs and created by artist Kahli Luttrell, a Yorta Yorta (Victoria) woman based in Melbourne.

Reconciliation Action Plan (RAP) Launch

We are proud to present the A.G. Coombs Group of Companies' first Reconciliation Action Plan.

Although we have had an Indigenous Participation Policy in place for some time, we are relatively new to the formal Reconciliation Action Plan (RAP) process and therefore our journey is in its infancy. Our RAP outlines clear, achievable and measurable actions to realise our vision for reconciliation.

We recognise that the cultural issues associated with Indigenous participation are often complex, and commit to working collaboratively with all of our employees, including our Aboriginal and Torres Strait Islander employees, our suppliers, clients and all other stakeholders to address these issues.

Our RAP is the result of consultation, assistance and leadership from various stakeholders, including our employees, our community partners and our clients. Their co-operation, wise counsel and generosity of spirit is acknowledged and deeply appreciated.

Our RAP is a reflection of our Company's Core Values and is supported at all levels of our organisation. Our vision is that through our actions, we can contribute to our nation's shared goal of a reconciled, just and equitable Australia.

A.G. Coombs Group TAKE2

TAKE2 is the Victorian Government's collective climate change initiative. It supports Victorian individuals, business, government, educational and community organisations to take meaningful action to reduce climate change. A.G. Coombs is committed to reducing the environmental impact of our operations and to providing industry-leading technical and advisory services to assist our customers and business partners to do the same. We are very pleased to be part of TAKE2.

A.G. Coombs implemented a comprehensive Environmental Program in 2004 and has programs minimising the environmental impacts of A.G. Coombs Group operations and the environmental impacts of our customers' businesses through the proactive provision of our environmental capabilities and services.

The A.G. Coombs Group operates a fully documented environmental management system that is independently certified to Australian Standard AS/NZS ISO14001 Environmental Management Systems framework.

Allan Coombs Award recipient refrigeration apprentice Jon Lassig

Training Achievements Awarded

A.G. Coombs apprentices and trainees continue to receive recognition for their effort and dedication to training.

The prestigious Allan Coombs Training Award for 2016 was presented to 3rd year refrigeration apprentice, Jon Lassig from A.G. Coombs (NSW). Named after the Company's founder, Mr Allan George Coombs AM, the Allan Coombs Training Award commenced in 2000 and is conferred annually.

Mitchell Stevens, A.G. Coombs Mechanical Plumbing apprentice was awarded this year's AMCA Victorian Training Achievement Award, and Chris Adams, A.G. Coombs refrigeration apprentice, was awarded the 2017 Alan Broadhead Award as Apprentice of the Year at Box Hill Institute.

A.G. Coombs' training program combines professional mentoring and active engagement with partner educational facilities to continually track training progress and to ensure that the educational curriculum is appropriate to workplace and apprentice needs. The award-winning program has over 50 apprentices and trainees in the fields of mechanical plumbing, drafting and modelling, electro technology, refrigeration and sprinkler fitting.

Walker Fire Protection – a FPAS Recognised Business

Walker Fire Protection is proud to be a Recognised Business under the Fire Protection Accreditation Scheme (FPAS). FPAS is the nationally harmonised accreditation system designed to recognise the skills and competencies of fire protection technicians in the fire protection industry across all State and Territory jurisdictions in Australia.

Businesses recognised by the Scheme only engage appropriately accredited individuals (fire protection professionals) to provide services.

FPAS is managed by the Fire Protection Association Australia, the national peak body for fire safety.

FPAS
Fire Protection
Accreditation Scheme
Recognised Business

A.G. Coombs Group has a new Queensland Office

A.G. Coombs has moved into its new Queensland home at Level 1, HQ North Tower, 540 Wickham Street, Fortitude Valley, Queensland.

Our new accommodation reflects A.G. Coombs' position as a leading Building Services Specialist, and continued growth in the region.

A.G. Coombs is well established in South Eastern Queensland, providing fully integrated specialist building services; from engineering advice, design, installation, commissioning and maintenance to ongoing operation and management services, to deliver tailored whole-of-life building services.

A.G.Coombs

A.G. Coombs Group

The A.G. Coombs Group is a privately owned Australian group of companies that provides an integrated range of technical services for all systems in buildings, from design through to installation, commissioning, maintenance and ongoing operation and management. Operating for over 70 years, A.G. Coombs has a national capability with major operations on Australia's eastern seaboard.

Melbourne 03 9248 2700 | Sydney 02 8020 6000 | Canberra 02 6217 5600
Brisbane 07 3648 0500 | agcoombs.com.au

A.G. Coombs Projects

A.G. Coombs Projects leverage a National Centre of Excellence approach, where teamwork and project management skills set the company apart. This approach also provides high end engineering, project management and site personnel to deliver successful projects throughout Australia.

03 9248 2700 | agcoombs.com.au/projects/

A.G. Coombs Service

A.G. Coombs Service is a specialist provider of air conditioning, mechanical services, building controls and bundled services maintenance. Delivering 24/7 building support, the company is a preferred supplier to the Facilities Management Industry and provides professionally managed, highly qualified technical staff to achieve improved reliability, lower costs and regulatory compliance in commercial, retail and industrial buildings.

03 9676 4600 | agcoombs.com.au/service/

A.G. Coombs Advisory

A.G. Coombs Advisory provides quality advice and consulting services across numerous disciplines including mechanical, electrical, hydraulics and fire protection services and building technologies. A.G. Coombs Advisory is Australia's leading provider of Green Star Independent Commissioning Agent (ICA) services for projects requiring Green Star 'As Built' Certification.

03 9248 2700 | agcoombs.com.au/advisory/

Walker FIRE PROTECTION

Walker Fire Protection

Walker Fire Protection provides a range of fire protection and detection services, from high end project engineering advice and consultancy through to concept and detailed design, installation of all types of fire detection and suppression systems, and ongoing inspection, testing, maintenance and regulatory compliance support.

03 9279 7100 | agcoombs.com.au/walkerfire/

Integrated TECHNICAL MANAGEMENT

Integrated Technical Management

Integrated Technical Management is a high quality provider of Technical Facilities Management specialising in technically complex and critical facilities such as data and internet centres, major commercial complexes and sophisticated industrial plants.

03 9248 2700 | agcoombs.com.au/itm/

A.G. Coombs Group
Melbourne, Sydney, Brisbane, Canberra.

Head Office:
26 Cochranes Road (PO Box 1136)
Moorabbin, VIC 3189
General Enquiry: 03 9248 2700

www.agcoombs.com.au

National Museum of Australia, Canberra.

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