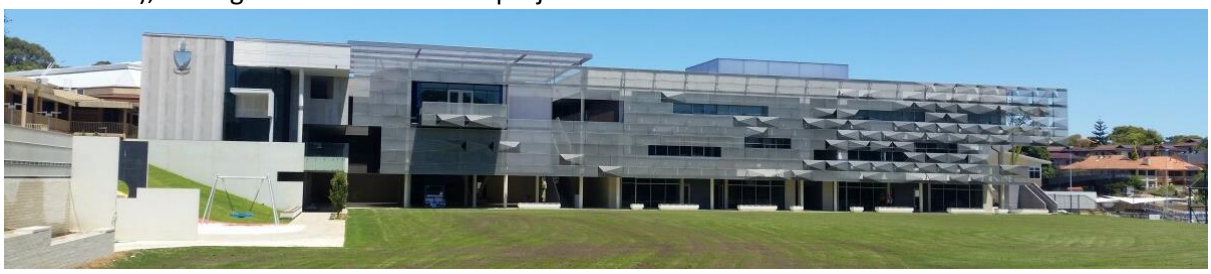
Biography Information

Peter Airey is a lifelong Structural Engineer who became a Fellow of Engineers Australia over 40 years ago following completion of the structural design for the Perth Entertainment Centre, which at the time was the largest auditorium in the world of its type.

This was preceded by other formative works of note, such as the structural design of Perry Lakes Stadium – a Commonwealth Games facility where he used a trompe l'oeil in the design to give the impression of a flat roof for the entire length of the grandstand. This innovation was based upon his observation and knowledge of Greek Architecture; and Peter often leans into his interest in Heritage and History for inspiration.

His early career commenced with Sloan Construction, before becoming the designer and computer for the City of Perth Building Surveyor, then transferring to the City Engineer's Department (where he designed the Commonwealth Games stadium at Perry Lakes).

He was then appointed Supervising Engineer for DH Fraser and was responsible for the supervision of construction of all projects undertaken, including Trinity College, Perth Concert Hall, Council House (left), and the Fremantle Port Authority Head Office. Leading industry firm Hobbs Winning Leighton and Partners recruited him to be Chief Engineer, during which time he designed the structure of the Sheraton Perth Hotel (now Pan American), Princess Margaret Hospital, the Perth Entertainment Centre, Christ Church Grammar School (a relationship he continues as incumbent Structural consultant for all new developments, such as the recently completed Preparatory School, seen *below*), among hundreds of smaller projects.



In 1971, with participation by the Directors of that Hobbs Winning Leighton, Peter commenced the consulting firm, PG Airey and Associates. He later bought out the Hobbs Winning Leighton Directors, and the firm evolved into Airey Ryan and Partners, then Airey Ryan and Hill, and finally Airey Taylor Consulting Pty Ltd.

During the starting years of the business, he designed the Qantas Accommodation buildings and Territorian Hotel in Darwin, correctly anticipating the vulnerability to cyclonic wind loads. Crucially, both buildings survived Cyclone Tracy in 1974, saving the lives of all occupants.

By invitation of Civil and Civic Pty Ltd, Peter then took the initiative to relocate to Darwin with his young wife and family to work on extensive reconstruction design following the devastation caused by the inadequate design of many structures confronted with Cyclone Tracy.

Immediately following Tracy, Cyclone Leo struck the town of Port Hedland. Peter conducted a study tour of the cyclone site alongside representatives of the Commonwealth Government and Engineers from James Cook University. A comparative review of the damage to Darwin and Port Hedland was performed. Despite the anemometer (wind speed indicator) jamming at 230 kilometres an hour at the Port Hedland airport facility, the buildings designed by Western Australian engineers were not damaged, including those designed by Peter.

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Whilst in Darwin, he initiated what eventually became the industry standard of cement stabilised rammed earth wall buildings. The prototype building he and Stephen Dobson (who went on to form the company RAMTEC) created with post-tensioned rods ensured the rammed earth walls remained in compression at all times (an example residence, seen *left*). This procedure was a world first. It was also used in a modified form for the cyclone resistant Carnarvon Hospital designed in the following year. This building standard has been since used in a multitude of projects to the benefit of the Australian community.

After assisting the Darwin reconstruction efforts and retrofitting design for a large number of buildings to increase their cyclonic resistance, Peter returned to Perth in 1976, where his personal design work and that of his firm contributed to the city's transformation from a regional administrative town to a true metropolis.

In terms of sheer volume, scale, efficiencies and innovation, Peter's impact on the built environment of Western Australia is reflected in his firm's completion of approximately 17,000 built projects and achievement of over 30 Excellence Awards, including the 2011 Engineers Australia of Best Engineering in Australia Award for the State Theatre Complex of WA (*right + below*).

His Engineering works have had a substantial positive and direct impact on the welfare of the community. These contributions include specialised community projects such as the TVW7 Telethon Institute of Child Health (recipient of the Award for Best Construction of the Year 2000 from Master Builders Awards (*below*)), Princess Margaret Hospital for Children, and commissions for the State Department of Health for alterations to 7 Regional Hospitals in a single year. Other community works extend to the completed structures of sporting facilities, schools, aged care facilities and domiciles, and cultural centres in Regional settings, and other buildings.

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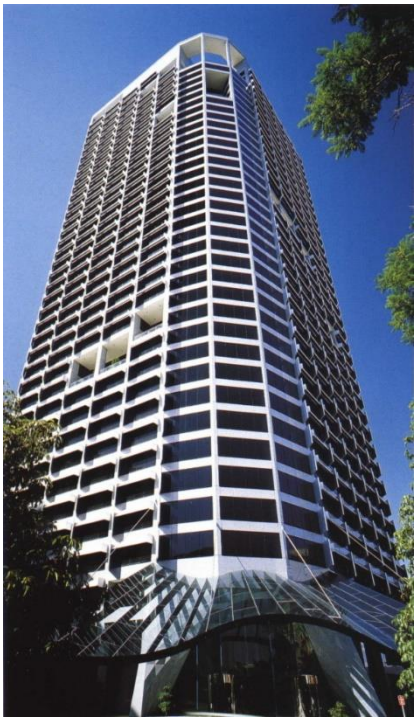
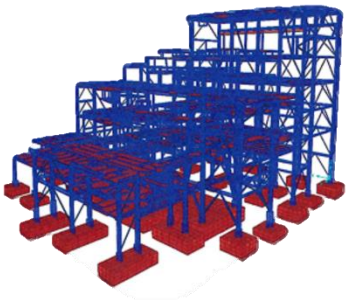
The economy and working life of the state have been aided by his creation of countless commercial and office structures, including the iconic 42 storey modernist QV.1 Tower in the CBD, winner of the Richard Roach Jewell Award for Enduring Architecture in the 2019 WA Architecture Awards (*right*). Peter's pile assisted raft design over problematic soils consisting of inter-bedded sands and clays won national acclaim for Airey Taylor Consulting for its innovative and cost-effective solution to foundational challenges. The building has become a textbook case for Engineering students.



Major industrial projects completed by Peter include the cyclone proof alternator and compressor enclosures of the North-West shelf gas project alongside major mining machinery structures, storage facilities and administrative sites serving the state's mining community.



In 2018, he presented the results of a Forensic Engineering study for Rio Tinto to the Australasian Structural Engineering Conference in Adelaide examining the structural stresses and physical characteristics of a malfunctioning structural steel crusher plant (*model left*), setting standards for vibrational analysis of major industrial emplacements.

Forensic Engineering has become a core part of Peter's practice; and he is a sought-after Expert Witness for major clients around Australia including an analysis of the Opal Tower failure in Sydney during 2019-2020. He is valued for his acuity, ability to communicate engineering concepts without jargon and unimpeachable integrity.

Peter is an established Heritage Engineer and Airey Taylor Consulting are listed consultants in this capacity with the State Government. He is conversant with historic construction methods, which he is capable of combining with present-day methodologies to update and restore valuable projects to the community.

An example was Guildford Hotel redevelopment (*right + below*). The building dated back to the 1880's but was so damaged by fire and flooding that the site had remained unoccupied, derelict and ruined by the elements for many years. In concert with Ultimo Construction, Peter achieved the architectural designs of Fratelle, not only restoring the function of the Hotel, but merging attractive contemporary design with key historical aspects of the building. Wherever possible the original structure was used, although attrition through concrete

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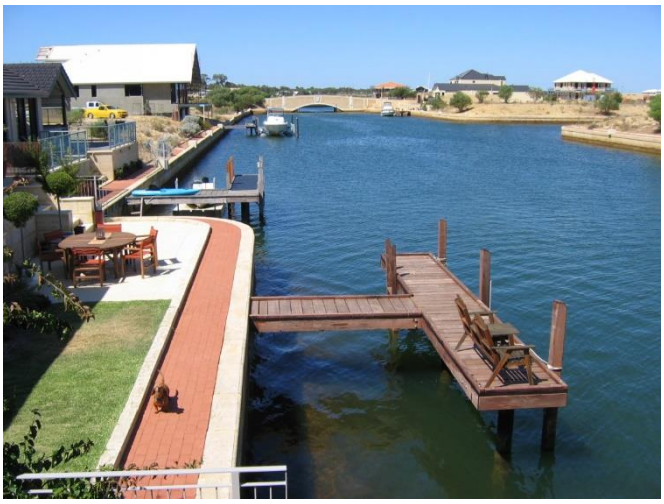
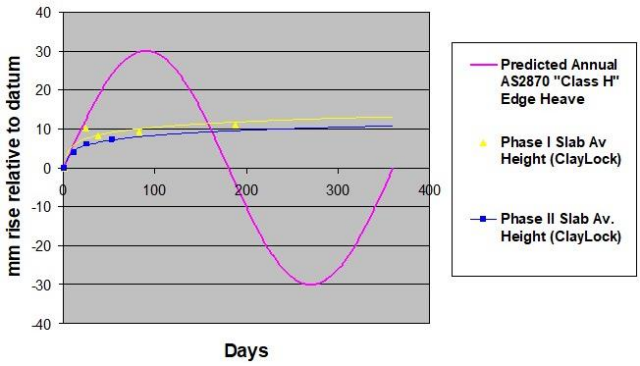
cancer was remediated. The integrity of the original external walls was not compromised. Temporary stability measures were removed and replaced with permanent stabilisation – including lateral supports. A new feature dome was fabricated and erected in place. In order to champion these heritage features, historic documents were used to recreate the original belvedere as per a 1914 illustration and impart maximum authenticity. The restoration proudly displays original exposed brick, repurposed timber and brass finishes to recapture a timeless colonial feel. Peter's understanding of historic alongside modern construction techniques made the restoration of the beloved building and functioning social place possible and was the winner of the Best Heritage Design, Best Non-Residential Interior Design, and Best Alteration/Addition Commercial Design in the National Association of Building Designers in 2017.



Peter has also been responsible for civil developments such as the large-scale entertainment theme park Adventure World, sections of Kwinana Freeway, West Coast Highway (*above*)), Stage One Reid Highway and other major roads around Western Australia. The award-winning redevelopment of Port Mandurah into subdivisions with interconnecting canals and waterways (*left*) remains a highlight of these civil developments – not only being a boon to the transport needs of local residents, but becoming a tourist attraction in their own right.

As damage to buildings from foundation failure is the number one source of litigation for civil engineering in Australia, and repairs to structures caused by high plasticity soils often cost around 30% of the structure cost, or sometimes their whole replacement. Using current practice for clay sites, Australians spend around $315 million per annum on reinforcement and foundation stiffening, but cracking still occurs. As a response to this challenge, Peter developed the Retroclay® system of remediation of buildings damaged from inadequate design on clay footings for which he received a 1998 National Award for Excellence from Engineers Australia. A recent commission for this system was a complex of 35 individual buildings (*right*) at the $350M Eastern Goldfields Prison in 2020; remediating significant clay movement damage occurring within only 2 years of construction.

From Retroclay® Peter developed the patented Claylock® proactive system for economical and technically superior protection of structures on high plasticity clay sites. The major prototype was the Moora Hospital in Western Australia in 2006. The soil profile was classified as a Class H (very high plasticity clay soil) site under AS2870, and the original hospital was demolished because of the severe damage by clay movement.



The system demonstrably (*right*) proofed the building against this movement, and as a result, Airey Taylor Consulting were commissioned to design the second stage of the same hospital. Dozens of further structures have followed.

Some of Peter's recent structural innovations involve refinement of the top-down construction technique, enabling the superstructures of projects to be built at the same time excavations for substructures occur beneath them. These include the patented Piles to Pillars technique that creates aesthetically pleasing and plumb final pillars as part of the piles casting process without the need for further cladding and maximises the space usage of the underground area. Benefits not only flow from construction efficiencies that dramatically reduce capital expenditure and quicken project delivery, but this results in the actual construction of more viable and buildable projects in the community.

Gateway Shopping Centre Stage 3 in Cockburn (completed in 2016, left) clearly demonstrates the power of his substructure innovations. Initially costed at $106 million for the complete build using conventional construction techniques, this project cost would have prevented its construction by the owners. Using Peter's dramatically different design the accepted tender was $79.7 million. Occupancy was achieved four months prior to first estimate with opening in time for the Christmas trading period, with associated benefits for owners and all tenants.

Further innovations have reduced risk to adjoining properties and improve neighbourhood and environmental integration. A perfect example of this was Church House on Pier Street in Perth (*right*) – a project deemed "unbuildable" by the subcontractors tasked with the delivery of the previous design due to the impact on the fragile Heritage buildings surrounding the site (St George's Cathedral and the Deanery – the oldest brick building in Perth).

Peter was contracted to provide a redesign that enabled safe construction of a 2 and a half level basement in up to 3 and a half metres beneath the water table and with highly restrictive site access without damage to these priceless buildings (despite the retaining walls being built within 100mm of the oldest brick building in Perth, left).

The end result was a safely constructed building nestled in the surrounds of the Cathedral district, that was the winner of the 2017 Master Builder Association of WA's Excellence Award for Best Office Building, and the 2017 National Award for Best Commercial/Industrial Building between $20 million and $50 million.

Peter has also innovated structural use of glass fibre reinforced plastic bars (GFRP) as reinforcement in concrete to extend longevity. Concrete structures as conventionally designed suffer from concrete cancer due to the rusting of the steel reinforcement. Glass fibre reinforced polymer simply does not rust, completely removing this risk. The material has great relevance for corrosive settings and Australian coastal cities.

Peter and his firm continually engage in Research and Development activities with local Universities, industry bodies and government to enhance the professional practice and knowledge base of the industry. He puts this cutting-edge research into practice and to enhance Engineering in Australia.

For glass-fibre reinforced polymers, he commenced world-first research with the University of Western Australia in 2011 focused on the use of these composite bars in concrete compression members (right); research confirmed by the University of Sherbrooke in Canada in 2016 and 2017.

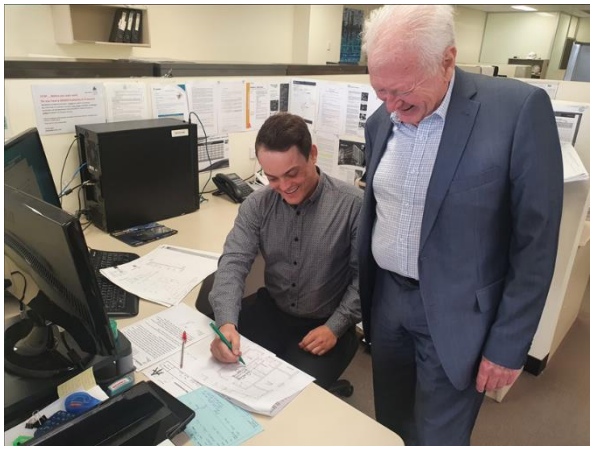
As jetty structures are in corrosive settings and the major design condition is bending and axial stress, the Majestic Point Board walk (*above*) in Applecross in 2014 was perfect practical proof of concept for this material, using GFRP bars to reinforce the foundations and columns of the structure. It is anticipated that the boardwalk substructure will have a design life in excess of 75 years.

Peter's firm remains at the forefront of the use of this material nationally. His most recent presentation for Engineers Australia was titled "A decade of design and practice using GFRP : current and future trends", part of the "GFRP Bars for Reinforced Concrete Structures : State of Practice in Australia" online presentation which streamed nationally from EA Queensland on 19 August 2021. 437 registered attendants were recorded for the session, indicating the currency of the topic with the Engineering profession.

On this and a plethora of other topics, Peter has been an active participant in the advancement of the education of his peers – presenting dozens of papers to professional bodies, universities, conferences, and associations; with his next paper to the biennial national Concrete Institute of Australia conference as the opening address of their infrastructure stream on 5 September 2021.

In further service of the professional community, Peter has featured on National Code Committees for design of residential housing foundations and for the retrofitting of existing buildings to resist earthquakes. He has conducted a national tour in 2013 giving lectures to the Engineering profession on the topic of forensic engineering. He served as Ministerial referee for the WA Minister for Local Government as ultimate arbiter on relevant matters. For four years he served as judge of the Excellence Awards for the Master Builders Association in Western Australia. He also served as Chair and Committee Member for the Concrete Institute of Australia (Western Australia).

At the invitation of Engineers Australia's WA Chapter he is a current Working Group member for the national committee rewrite of AS4678 (Earth-retaining structures), serving on WG4 for Deep Foundations where he is putting his knowledge gained from Advanced Substructures into effect to create safer substructure design parameters for the national construction industry. He is also serving on the Engineer Australia (WA)'s Cyclone Seroja taskforce and has had significant input to their policy response for the Western Australian government.



In addition to this contribution to the body of knowledge of his professional peers, Peter takes an active interest in the training and skilling of new and graduating engineers – actively running work experience placements for promising candidates from Perth's Universities. He has mentored at least 50 during his professional life (such as Aarin Ryan, with whom he is seen on *left*), guiding many to Senior Engineering placements in the industry, and he is viewed as an institution to his local Engineering community.

Internationally Peter has received commissions in places as diverse as Dodoma (for the proposed capital city of Tanzania); accommodation for the Commonwealth Government in Bangkok (multistorey apartments); demountable accommodation for the Indian Army, and Structural and Value Engineering projects in the United Arab Emirates (such as the Ameer Bu Khamseen (Bukkhamseen) Tower in Sharjah, seen *right*) and Pakistan (using both top-down construction techniques and value engineering on major high-rise structures).

As an Engineer with a deserved global reputation for Excellence, Peter's work has directly provided benefit for every community that he has served.