ENGINEERS AUSTRALIA

EHA MAGAZINE

Engineering Heritage Australia Magazine Volume 3 No.7 January 2021

Engineering Heritage Australia Magazine

ISSN 2206-0200 (Online)

January 2021
Volume 3 Number 7

EDITOR:
Margret Doring, FIEAust. CPEng. M.ICOMOS

Contact EHA by email at:
EHA@engineersaustralia.org.au
or visit the website at:
https://www.engineersaustralia.org.au/Communities-And-Groups/Special-Interest-Groups/Engineering-Heritage-Australia

Unsubscribe: If you do not wish to receive any further material from Engineering Heritage Australia, contact EHA at :
EHA@engineersaustralia.org.au

Subscribe: Readers who want to be added to the subscriber list can contact EHA via our email at :
EHA@engineersaustralia.org.au

Readers wishing to submit material for publication in the Engineering Heritage Australia Magazine, can contact the Editor via email at :
EHA@engineersaustralia.org.au

Cover Images:

Front: The Grand Concourse at Sydney Central Station in circa 1927. On the arched wall at right can be seen the four World War 1 Honour Boards, placed in remembrance of NSW Railway men who died due to service in the War. Photo by Sam Hood. Source: ARHSnsw.

Back: The story of a Malcolm Moore Ltd Gantry Crane installed at Midland Railway Workshops in WA in 1947. Photos & information from Rail Heritage WA website.

This is a free magazine covering stories and news items about industrial and engineering heritage in Australia and elsewhere. It is published online as a down-loadable PDF document for readers to view on screen or print their own copies. EA members and non-members on the EHA mailing lists will receive emails notifying them of new issues, with a link to the relevant Engineers Australia website page.

CONTENTS

Engineers Australia President's Prize 2020

At the Annual Engineers Australia Pinnacle Awards, Owen Peake, Bruce Cole, Keith Baker & Neil Hogg were presented with the President's Award for their involvement producing the two EA Centenary Books, *Wonders Never Cease* and *Anything is Possible*. The former describes 100 Australian engineering achievements, while the latter covers 100 Australian Engineering leaders.

The President's Prize is an award determined at the discretion of the National President for individuals or groups who have provided conspicuous service to the profession or the community in making a significant contribution to the realisation of Engineers Australia and its strategic goals.

The President's acknowledgement of engineering heritage was greatly appreciated by those involved and it is hoped that the books will encourage current and future engineers to be proud of what our forebears have achieved and be inspired and confident to be leaders in addressing the challenges of the future.

Editorial

A year ago, in the January 2020 issue of the magazine, my editorial was all about bushfires and the increasing dangerous effects of global warming. Who knew what was yet to come? Who could have guessed the devastation that would be caused by the Covid virus? Global warming faded into the background for most of the year, but it appears to be returning to the general consciousness again in the heat of summer, and I hope is being taken more seriously by our leaders, who should have had time to assess the "unprecedented" damage caused by fire and flood.

As for Covid, one hopes that it, too, fades into the background this year and the various vaccines are both successful and plentiful. I know it has been a truly horrible time for some, and I hope our readers have been spared the loss of loved ones and livelihoods that has happened to too many. I have to admit that I have been mostly an onlooker this year. Shut away on our mountain we are well isolated all the time, with nearest neighbours 1 km away, and a 75 km trip to our "local" shops an occasional burden. Lockdown doesn't mean much when one is locked down, in practical terms, most of the time anyway! As for "working from home", I have been doing that for years now.

In some ways, for me, Covid has brought about a closer connection with many of our writers, and other colleagues, than I have had for years. Living in isolation in the bush, and advancing age, has meant being unable to attend city based meetings and events – 18 months since I was in Melbourne, 5 years since visiting Sydney. And then, suddenly, ZOOM!! With our satellite internet connection (mobile phones are mostly "No Signal") I can attend meetings and go to lectures and seminars. I have caught up with old friends and made new ones. I have even joined a meeting in Perth WA. Now I am hoping that this situation never returns to "normal", and I get shut off again.

And now *revenons a nos moutons*, and engineering and industrial heritage. We do have a good variety of subjects in this issue. Starting with a reminder about the 2021 Australasian Engineering Heritage Conference to be held in Dunedin New Zealand later this year, and following with an account of the relocation of the Australian Railway Historical Society NSW (ARHSnsw) offices, bookshop, archives and research facilities to new rooms. Next is an obituary of Dr Emory Leland Kemp (1931-2020), a distinguished American engineer and industrial archaeologist who visited Australia twice, as keynote speaker at two conferences, in 1996 and 2005.

Bill Phippen writes about the search for, discovery, restoration and reinstatement of the Sydney Central Station Memorial to NSW Railwaymen who died due to their service in World War 1, followed by a brief update from Miles Pierce about the listing on the Victorian Heritage Register of obsolete, but conserved in situ, electrical plant and equipment at the Malvern Tram Depot in Melbourne. Then some history from World War 2. Perry Beor writes about *Perth's Secret WW2 RAAF Bunker*, still in operation in the 21st Century – of course with a different purpose now. Next, Bill Phippen (again) tells us about a rare book that he discovered in the ARHSnsw archives, and David Radcliffe gives an account of the lives and work of Malcolm Moore and Albert Longoni, two innovative engineers who built a major industrial manufactory in the 20th Century.

Going back to Sydney Central and the WW1 Honour Board (or Boards) – I have been asked which aspects of the Honour Board story are 'engineering heritage' with the implication that such a story does not belong here. My answer was all aspects are. It's the story of how a great engineering/industrial enterprise responded to WW1 and how highly they valued their employees and their employees' contributions to the War, and the great loss the deaths of those employees were to the future of the organisation – were they porters or train drivers or tram conductors, or tin smiths, or boiler makers. I was most impressed with the way the railways cared for and supported all their workers, however humble. I wonder, did such a thing happen in many such large, and often thought of as soulless, organisations – government or commercial-industrial?

Retrieving and restoring the Honour Board and all those nearly lost records (the biographies) is another aspect of engineering/industrial heritage – heritage conservation to be more precise. I would have to value that. If I didn't I would have to say I had wasted much of the last 40+ years of my professional life! This probably seems like some soap box lecture, but Carl and I have always considered that engineering/industrial heritage is not just about the buildings and hardware, it is also about the people, their skills and their working lives.

From the Editor.

2021 Australasian Engineering Heritage Conference.

Te Ao Rangahau | Engineering New Zealand

"Ka mua, Ka muri – walking backwards into the future"

Engineering New Zealand has sent us the following update for the Australasian Engineering Heritage Conference, which had to be postponed from November 2020 for a year because of the Covid 19 pandemic. We hope that easy international travel will be restored by November 2021, and lots of our readers will be able to attend.

New Conference Dates

The new conference dates are now confirmed, and we look forward to welcoming you to Dunedin in November 2021. Pre-Conference tour: Thursday 11 - Sunday 14 November 2021
Conference: Sunday 14 - Wednesday 17 November 2021

The Conference

The package of events for the 2021 Australasian Engineering Heritage Conference remains unchanged from the 2020 programme. Our theme, 'The Future of the Past', focuses on heritage engineering and technology that has endured, been re-developed, undergone restoration or re-purposing to claim a place in the future.

Our principal sponsor is Naylor Love, New Zealand's largest privately-owned construction company with a 110-year history. They are currently involved in the restoration of several iconic New Zealand landmarks including the Wellington Town Hall and the Christchurch Cathedral.

The Conference opens on the evening of 14 November at Toitû Otago Settlers Museum, where delegates and partners will be welcomed by mana whenua (the Mâori).

Toitû is in the middle of the historic Railway Station Precinct, the home to Josephine, a railway locomotive imported in 1872, as well as JA 1274, the last main line steam locomotive to roll out of Dunedin's Hillside workshops in 1956. Close by is the original Dunedin Prison and the refurbished and strengthened Dunedin Court building which we hope to have open for inspection.

Conference proceedings on 15 and 16 November will be based at the Dunedin Centre, part of the Dunedin Town Hall complex, located in the central city. It is within 10 to 15 minutes' walk from the University, museums, the thriving warehouse precinct and a range of hotel and motel accommodation.

The conference will include a very interesting range of papers, headlined by four keynote addresses. The confirmed keynote speakers are:

Takerei Norton, a Ngâi Tahu historian talking about New Zealand's pre-European transport infrastructure.
Keith Patterson, Project Director for the restoration of Christchurch Cathedral which was severely damaged and closed by the 2011 earthquakes.
Matthew Churchward, Curator for Museums Victoria and closely associated with the restoration of the Great Melbourne Telescope.
Glen Hazelton, Director of Organisational Development at Heritage New Zealand Pouhere Taonga. Glen has a particular passion for industrial heritage.

The conference dinner will be held after the first day of proceedings, featuring Ian Taylor CNZM as the after dinner speaker. He has had a varied career as a rock musician, a children's television presenter and an entrepreneur and is the CEO of Animation Research Ltd which works at the cutting edge of sports television coverage.

A half-day guided engineering heritage tour of Dunedin is planned for the morning of 25 November, which includes the Gasworks Museum, harbour reclamation, the cable car, and the warehouse precinct.

A relaxed partner's programme will also be available.

New Zealand Engineering Heritage Award

This newly established award will be presented at the conference dinner in recognition of a heritage project of historical or cultural significance that has delivered value to a community, iwi, organisation, the environment, education, or New Zealand society, in one or more of the following areas:

- Physical restoration and adaptive use. Innovative restoration or reuse of an engineering site or structure/s that are sympathetic to the original materials, while allowing for new uses, bringing new purpose and energy.
- Interpretation and storytelling. Communicated engineering heritage stories in a creative, relevant and inclusive ways with a range of audiences.
- Public Programmes or Education. Community activities or education programmes that engage with engineering heritage in meaningful ways that enhance the well being of the community.

The Pre-conference Tour

The pre-conference tour will start in Queenstown on 11th November with a twilight cruise on the *TSS Earnslaw*, the 109-year-old, Dunedin-built Lady of the Lake (See photograph below, taken from a Conference Poster). The route for the next two days starts in Queenstown, travelling to Milford Sound then looping round the south coast to Invercargill and through central Southland to Dunedin. Tour highlights will include engineering heritage sites ranging from a 'state of the art' alpine highway avalanche protection programme for a heritage tourist highway, to a restored and working flax mill. In Invercargill there will be an opportunity to visit Bill Richardson Transport World, a comprehensive road transport collection. On the way to Dunedin, highlights will include a visit to the Croydon Aviation Heritage Centre with its collection of de Havilland vintage aircraft. The tour will then travel via the Tuapeka punt over the Clutha river and arrive in Dunedin on the afternoon of Sunday 14th November.

It is expected that flight options direct to Queenstown from within New Zealand and the Australian East Coast will be available.

Call for Papers

The detailed call for papers has been published on the Engineering New Zealand website with other conference information. The moderating panel is taking an inclusive and flexible approach. We are keen to receive abstracts of up to 300 words. Papers will need to fit a 30-minute slot, including questions. As an alternative, poster displays will be welcomed on topics of particular interest.

As is normal practice, people delivering papers will need to register for the conference.

The call for papers is open until 5 April 2021. Please submit abstracts to ehconference2020@engineeringnz.org

Registration

Early bird registration will open in March 2021.
For more information go to:

https://www.engineeringnz.org/programmes/heritage/australasian-engineering-heritage-conference-2020/

Image Right:
TSS "Earmslaw", from a Conference poster.

A New Home for the ARHSnsw

A news story from the Museums & Galleries NSW Newsletter of July 2020

Introduction – from the Editor

The following story was written by someone from Museums & Galleries NSW for their July 2020 Newsletter. ARHSnsw is a member of M&GNSW, as are most museums and galleries around New South Wales.

The street frontage of the ARHSnsw' new home in Henderson Road, Alexandria, an inner suburb of Sydney. The building is clearly hard to miss! Source: M&GNSW.

In recent years, many readers of EHA Magazine will have noticed a string of interesting stories about NSW railway history and people, and one memorable one about a railway built in Lebanon (then part of Syria) by railway engineers in the Australian Army. These stories, and their brilliant images, all came from Bill Phippen's research into the amazing collections and archives of the Australian Railway Historical Society in Sydney (ARHSnsw) and their Railway Resource Centre. Bill Phippen is an engineer who appears to be permanently embedded somewhere inside the ARHS Archives, except during those occasions when he visits the NSW State Archives to research and scan the collection of thousands more NSW Railway photographs held by those Archives.

The front entrance from Henderson Rd, with the bookshop shelves at right and the café area in the background. Source: M&GNSW.

The story which follows is told as it was published in the M&GNSW July 2020 Newsletter.

From M&GNSW – A New Home for the ARHSnsw

"Fronted by a two storey larger-than-life wall mural, the new home of the Australian Railway Historical Society (ARHSnsw) in Alexandria, Sydney can't be missed. Situated within a 10 minute walk from Redfern Train Station and just across the road from the under-construction Waterloo Metro Station (slated to open in 2024), the Society hopes that its newly refurbished premises in this inner-city location will make its collection and book shop easily accessible to train enthusiasts, researchers and public visitors alike.

"The ARHSnsw' archives and activities were previously held in two locations in Redfern and Alexandria. There, the collections were mostly in storage, with little opportunity for public interaction.

The bookshop (R) and café space (L) viewed from near the front door. Upstairs rooms are not reached by the ladder. This is an artefact, non-negotiable, its worn steps blocked by an assortment of other artefacts. Source: Axiom & ARHSnsw.

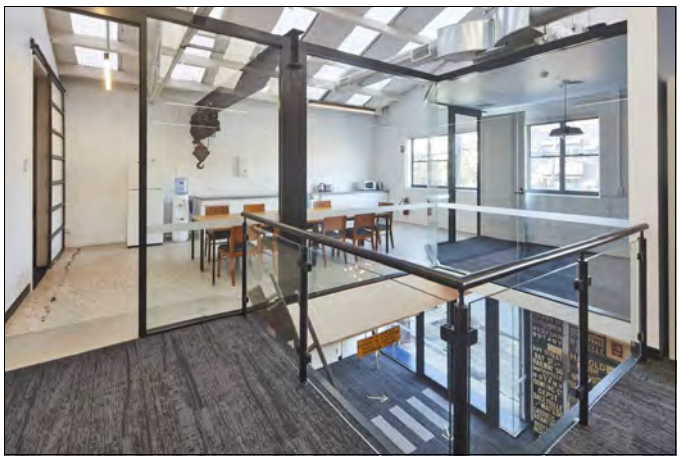
The front door and bookshop are behind the camera. At left are railway archives and research space. Straight ahead is a new lift to the 1st floor. No need for a ladder now! Source: Axiom & ARHSnsw.

"The ARHS identified that they needed to "create a space that actually invites the public in" explained General Manager, Paul Scells. Thus began an 18-month search for a new location.

New Home for the ARHSnsw

"The new space is sprawling, compared to the facilities that staff and volunteers previously worked in, and consolidates the Society's collection, archives, book shop and office space (its book shop in Central Station will also remain open). Upon entry, visitors are greeted by spacious bookshelves for browsing and purchasing; a floor to ceiling display of books and objects; and a cafe space (which, as at July 2020, is yet to be tendered). Also on the ground floor is a spacious area for research and digitisation. The ARHSnsw, , which was established in 1933, has approximately 40 active volunteers who carry out extensive digitisation work. Connecting this ground area to the top floor is a flight of stairs and a newly-installed elevator.

This long bookshelf of archival volumes is along the wall between the front door (R) and the lift (L). Source: M&GNSW.



This view of the 1st floor shows a kitchen & meeting room in the background. The top of the artefact ladder appears at the edge of the hole in the floor. Looking down through the hole, the front door to the street can be seen. Source: Axiom & ARHSnsw

"The building, which was previously home to a camera-hire and studio space business, was extensively renovated. Many aspects of the building's original structure have been kept and add character alongside the contemporary fit-out. The upstairs area now includes a temperature-controlled collection and archive room; stock area (for publications); packing area (for online orders); kitchen area; meeting room; and open-plan office area. The ARHS is now open to the public Tuesday-Thursday, at 5 Henderson Road Alexandria."

The History and Activities of ARHSnsw

The M&GNSW website has pages in which various member organisations have space to describe their purposes and missions. ARHSnsw has a nice little potted history of the organisation and a brief account of its activities.

"On 19th May 1933, six enthusiasts met in Sydney and formed the Great Railway Circle of Australia. In May 1936 the name was changed to Australian Railway & Locomotive Historical Society and further changed to Australian Railway Historical Society in 1951. Membership grew steadily and in 1945 a Division was formed in Victoria. Other Divisions followed in South Australia, Tasmania, Queensland, Western Australia and the ACT.

"Due to the increasing size and range of activities of the Society, separate companies were formed in each state to take over the assets and liabilities of the Divisions of the unincorporated Society. The Australian Railway Historical Society, New South Wales Division, is a Company Limited by Guarantee. ARHSnsw remains the oldest and largest member-based organisation of its type in the country. The Society has amassed a large library of books, magazines, drawings, photographs and other documents related to the history of railways in NSW and Australia.

"While railways are still an important part of our cities and towns, the tremendous contribution they made to the social and economic development of the nation is often unheralded. Our objectives are to preserve and promote this important history through the maintenance of our archival collection; to produce magazines and books (including our monthly magazines Australian Railway History and Railway Digest); and to encourage association between those interested and with the community through special events, rail tours and excursions. The Society also operates one of the most comprehensive railway bookshops in the world."

Acknowledgements – from the Editor.

I thank Jason Gee of Museums & Galleries NSW, and James Dalton, of ARHSnsw, for their help in facilitating the republishing of this story and the associated history and information.

Image Right: Who knows when there could be a disastrous fire, with all this paper stored? ARHSnsw takes its responsibility to protect its priceless archives very seriously. This photo shows part of the Gas Flooding Fire Protection System installed during the renovations. Source: M&GNSW.

Dr Emory Leland Kemp, 1931 - 2020.
Eminent Engineer, Historian, and Industrial Archaeologist

From the Editor, with acknowledgements to
David A. Simmons of SIA & Dr Roland Paxton of Newcomen Society.

Introduction

In October last year, in an email, my friend and colleague Ken McInnes wrote that he had noticed an obituary for Emory Kemp. It was in the latest (June 2020) Newcomen Society *Links* Magazine. He said he was: *Not sure if you met him. You might wish to add a small note in the EHA magazine.* Ken went on to tell me: *In 1996, when* [Kemp] *was Director, Institute for the History of Technology and Industrial Archaeology, West Virginia University, USA, he was the* [I.E.Aust.] *Eminent Overseas Speaker, and Keynote Speaker at the "First International and Eighth Australian Engineering Heritage Conference" in Newcastle.*[1] *In Victoria,* [Engineering Heritage Victoria] *hosted him and his wife Janet in Melbourne and he gave a talk on "Case Studies in the Preservation of Historic Engineering Works" on Tuesday 17th September 1996. . . . Emory Kemp returned* [to Australia] *again in 2005, presenting at the Second International and Thirteenth National Engineering Heritage Conference, in Sydney.*[2]

I did meet Emory Kemp, but not at the Conference in Newcastle where I too presented a paper (*Coal, Railways, and the Heritage of Newcastle* etc.). I didn't get to Newcastle until the very last day of the proceedings, and Kemp had already left. I met him 10 years earlier, in Washington DC. My partner and I were on a study tour of the US, and visiting various professionals in engineering heritage and industrial archaeology. One of our must meets was Robert Vogel, the curator of Mechanical and Civil Engineering at the Smithsonian and, we discovered, a founder of the US Society for Industrial Archeology (SIA). We spent a day with Vogel at the Smithsonian, and one of the people we had discussions with there was Emory Kemp, also a founding member of the Society. I thought Dr Emory Kemp was worth more than a small note, so here is an abbreviated compilation of obituaries written by two of his old friends - David Simmons of SIA and Roland Paxton of the Newcomen Society.

Dr Emory Leland Kemp, 1931 - 2020.

Dr Emory Kemp, circa 1980s.
Source: West Virginia & Regional History Centre.

The eminent industrial archaeologist and engineering historian Dr Emory Leland Kemp, born in Chicago on 1 October 1931, died from heart failure at Morgantown West Virginia, on 20 January 2020. He is survived by his wife Janet and three children.

From early in life Emory had a long-standing interest in science and mathematics and the creative aspects of building as represented in architecture and civil engineering. He entered the University of Illinois at the age of 16, graduating BSc in 1952 with 'highest honors'. When there, during the Korean War, after first contemplating national service in the Navy, he served in the U.S. Army Corps of Engineers as an Assistant Engineer from 1952-4. He was then awarded a Fulbright Scholarship [1954-6] for study at the Imperial College, London, obtaining his Diploma of the Imperial College in 1955.

Three years later, he obtained a master's degree in engineering from the University of London. In London he joined several consulting firms, in particular Ove Arup and Partners, where he pursued one of his first passions: the design of thin-shell concrete roof structures. His complex manual calculations helped make Danish architect Jørn Utzon's revolutionary Sydney Opera House roof design a physical reality. His time in the UK also fostered his strong interest in the history of engineering and technology, and he discovered the earliest developments of the then new discipline of Industrial Archaeology. But both interests took a back seat for some years, while he established a distinguished academic career as an engineer.

---

1 The paper Emory Kemp presented at that Conference was *The Royal Marine a Soldier and Sailor Too: Engineers, Historians and the History of Technology.* An abstract of the paper can be found at: https://search.informit.com.au/documentSummary;dn=613452719946884;res=IELENG

2 See Kemp, Emory L., *Current Issues and Future Directions for Engineering Heritage in the USA* at: https://search.informit.com.au/documentSummary;dn=068520103120556;res=IELENG

An offer of a full scholarship in the University of Illinois at Champaign's theoretical and applied mechanics doctoral program brought Kemp back to the U.S. Emory's dissertation study of torsion in reinforced concrete beams was a previously little-explored area of inquiry. Leaving Illinois in 1962, he landed in WV University's College of Engineering at Morgantown WV, and headed the Civil Engineering Department from 1964 to 1974.

Once settled at Morgantown, Kemp was encouraged by James Harlow, a former dean at the University of Oklahoma and recently named president of West Virginia University (WVU), to look into Oklahoma's history of science program. It was a natural fit, for Emory had been a lifelong student of history. In fact, his high school teachers – many of whom were also university faculty – had encouraged him to take up history as a profession, especially after he won a prize from the Daughters of the American Revolution. Instead, he followed his father's footsteps into the engineering field but never lost his fascination with and dedicated study of the past. In Morgantown, he initiated classes in the technology of the Industrial Revolution and the history of technology in conjunction with WVU's Department of History.

Kemp also became a dissertation director and doctoral committee member in the history of technology for the department. Even though he never convinced the College of Engineering to make courses in the history of science a degree requirement, he did establish a program in the History of Science and Technology at WVU that also operated jointly with the Smithsonian for nearly two decades. He also became a frequent lecturer for history, urban sociology, and photography classes at WVU. Kemp's heavy involvement with academic history, along with civil engineering, was unquestionably the most distinctive element of his career. He was equally at home teaching college-level courses in history as he was elaborating mathematics to collegiate engineering students. His wholehearted embrace and deep understanding of both disciplines was a hallmark of everything he did.

It was this highly effective combination that made Kemp the perfect candidate to organize and supervise a wide array of Historic American Engineering Record (HAER) projects in West Virginia. In the early 1970s alone, he advised on more than a dozen recording projects that included coke ovens, a machine shop and foundry, covered bridge, concrete bowstring bridge, steel truss bridge, suspension bridge, endless-wire oil pumping station,[3] market building, lumber company, glass factory, grain mills, and railroad station. He also took special pride in two 16-mm documentaries that filmed the production of lead stemware at a glassworks, and coke production in beehive ovens – the first ever done in conjunction with a HAER project. In the process, Kemp became a skilled practitioner of large-format photography. Supervising the use of surveying equipment and preparation of measured drawings came as a natural offshoot of his broad knowledge of engineering practices.

Emory Kemp was a pioneer of industrial archaeology in the US. Almost by accident he became a founding member of the US Society for Industrial Archeology (SIA), when a group of people in the field met at the Smithsonian in 1971. While visiting Robert Vogel there, Emory was invited to that first meeting. He later recalled lively discussions over the nature of industrial archeology vis-à-vis other branches of archeology, as well as of the spelling of the word itself.[4] He became active in SIA. Joining the board of directors in 1974, he was elected vice president in 1986 and was president from 1988 to 1990. Because of his university resources and while on the board, he accepted the first editorship of SIA's Industrial Archeology journal. When SIA's General Tools Award for Distinguished Service to Industrial Archeology was created in 1993, Emory Kemp was the first recipient.

Kemp's work with SIA was indispensable preparation for the 1989 establishment of the Institute for the History of Technology & Industrial Archeology (IHTIA) as part of WVU's Eberly College of Arts and Sciences. The Institute was authorized to document, preserve, and interpret historically significant industrial, engineering, and technological sites, primarily in West Virginia but also throughout the Mid-Atlantic region. By the time Emory retired in 2003, more than 150 sites, documented to HAER standards, had been added to lists of recorded sites in West Virginia, Pennsylvania, and Maryland. They ranged from workers' housing to nail works, coal mine complexes to oil field power systems, pulp mills to steel works, and dozens of bridges.

Over the years, Kemp wrote and published many academic papers and books in his field, and took part in or managed many preservation and restoration projects – notably, in West Virginia, the Wheeling Suspension Bridge, Wheeling Custom House, and Philippi Covered Bridge. Much information about these and other projects of Kemp's can be found on the internet. He was such a dominant figure in his fields of engineering, history and industrial archaeolgy, it would be hard to find anyone to surpass him. We hope knowledge of his work will live on.

3 See: https://tile.loc.gov/storage-services/master/pnp/habshaer/wv/wv0100/wv0108/data/wv0108data.pdf

4 English english 'archaeology' versus American english 'archeology' !!

NSW Railway & Tramway Honour Boards

WWI Honour Boards restored to the Grand Concourse at Sydney's Central Station

A detective story by Bill Phippen

Had there been a conversation about war memorials and honour boards in Sydney at the time of the Anzac centenary in 2015, the Cenotaph in Martin Place and the Anzac Memorial in Hyde Park would be known to everyone. If the conversation had moved specifically to railway memorials then many Sydney people would know of the honour boards assembled on the Eastern Concourse at Central Station. These were once in railway workshops and depots, but as many such places became redundant the memorials which once graced their walls were collected for preservation and display centrally. If the question of a master memorial to all railway and tramway men who had served and died was raised, the answer would have been a confident 'no'. Hardly anyone would recall the existence of such an object.[1]

In terms of military recruits to the First AIF, the contribution of the NSW Government Railways & Tramways (NSWGR&T), the single department which operated both transport modes, was great. At the end of 1914 the number of employees of the NSWGR&T was about 45,000, so allowing that there were many men too old or unfit to serve, and some women, the total number of recruits, reported as 8,477 in the 1919 Annual Report, was a very significant proportion indeed. It is my contention that the NSWGR&T were the suppliers of the largest coherent group of men to serve in the AIF. There could have been more shearers, or stockmen or miners, but these had no pre-existing relationship with each other. Notably, the NSWGR&T men did not have to resign from their civilian jobs. They were 'Granted Leave to join the Expeditionary Forces' and were still paid by the railways. Specifically, in as much as their military pay was less than their railway pay plus increments and age increases, the NSWGR&T made up the difference. By 1919 the wage supplements accumulated to £918,137.

This continuing link with a state government bureaucracy in Sydney also meant that, as it was the habit of the NSWGR&T to list all new appointments to, and all removals from the service, for whatever reason – deceased, resignation, retirement, dismissal etc – when a soldier died in Turkey or France he had to be 'removed' from the list of employees. Thus, among all the other reasons, 'killed in action' appears often in the lists of staff changes published quarterly.

Images: Two "local" NSWGR Honour Boards from World War 1, with the names of all the men who joined up from that place of employment. Those who died due to war service are marked with an asterisk.

Image Right: This board was found in situ in the Admin Building at Broadmeadow Loco Depot, Hamilton, close to the City centre of Newcastle, NSW. Photo: M.J. Doring, March, 1994.

Image Left: This board was photographed on the wall of an Administration Building at the Cardiff Railway Workshops in Glendale, a suburb of Lake Macquarie, NSW. Photo: M.J. Doring, 1992.

In fact, all of these lists, and the even longer tabulations of all employees collected every third year from 1890 to 1938, and published in the NSW Government Gazette, have been digitised and fully corrected by the volunteers of the Australian Railway Historical Society, NSW Division (ARHSnsw). The digitised documents have all been collected into a fully searchable spreadsheet of 716,000 lines. This is not online, but can be consulted in the ARHSnsw Reading Room.

1 By 1927, the Master Memorial did exist, and this story is about how it was recently re-discovered and restored. It consisted of 4 large and 4 small panels of names encased in 4 polished wood cabinets, with a large panel above and a small panel below in each cabinet. In this text, the master memorial of 4 separate cabinets, is sometimes referred to as one (single) Honour Board. At other places it may be referred to as 4 separate Honour Boards, sometimes with an identifying letter, making up a whole. *The Editor.*

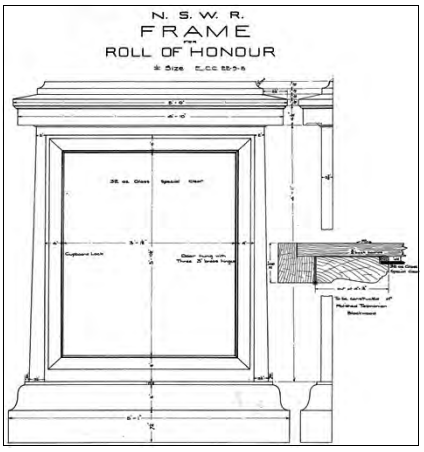
As manager of this effort, I had added the list from the 1921 Annual Report of the Railway and Tramway dead of the Great War – 1210 names. I then sought to add the names from the several honour boards on the Eastern Concourse and others, still in situ around the State, which I knew to exist. And in 2015 I was given access to the Railways Heritage Store at Chullora, and there was shown the 'Narrabeen Honour Boards'. No one knew whether they had ever been on display and if so where, or upon what basis the names on them were selected.

The NSW Railways Chullora Heritage Store (the Igloo), where the WW1 Honour Boards removed from the Grand Concourse at Central Station were found. Source: ARHSnsw.

The boards were lying on the floor, sheathed in bubble wrap, and there were eight of them – four large and four small. As they were unwrapped and photographed, the number of columns of names was seen to be four on each board, with 62 and 15 names in the columns on the large and small boards. That meant a total capacity of 1232 – very close to the reported number of Railway and Tramway dead of 1210. As this was 2015, the Anzac Centenary had led me to try to identify the NSWGR&T men who had died at Gallipoli. I knew the number to be 180 and I was familiar with their names.[2] By chance, the last board unwrapped was the first chronologically and it listed the Gallipoli dead, for that is where the first railwaymen had died. Recognising the names, questions as to the qualifications for inclusion in this memorial were instantly replaced with conviction.

This detail from the 1927 Sam Hood cover image shows the 4 large cabinets and 4 small ones underneath them, all fixed to the north wall of the Concourse. The pedimented doorway to left of the boards, leads to the Central Tram Station overlooking Eddy Avenue. Source: ARHSnsw.

But where had such a memorial ever been mounted? When had it been built? A search of the *NSW Railways & Tramways Budget* at ARHSnsw,[3] for the words 'Honour' and 'Honor' (both spellings were used interchangeably in 1915), soon found a reference to a board being unveiled on the 'Assembly Platform' at Sydney Station, now known as the Grand Concourse, in March 1916. Another report states that at that time the board contained 'about 150 names' and soon a photo was found at NSW State Archives & Records (SARA) showing an incomplete board with 162 names - clearly what was made in 1916. Just where on the concourse the first panel was first erected is unknown. With only 248 spaces the board soon became inadequate. 53 more NSWGR&T men died at Fromelles in July 1916 alone.



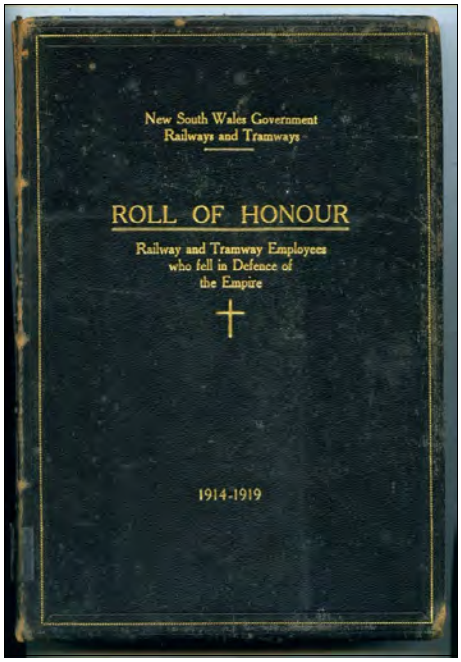
Elevation & Section of the original cabinet placed on the wall in the Concourse. Source: ARHSnsw Archives.

Plans were found in the ARHSnsw Archives of additions to the lone board as hinged shutters, but these were never built. A second identical cabinet was made later in 1916 or 1917 and in 1918 the third and fourth cabinets were added. For the siting of these, plans were found at SARA and this drawing at last showed where on Sydney Station the boards had been. Fitted to the stone and brick columns between windows, this cannot have been where the boards were first mounted as plans for the hinged additions show a blank wall beside the cabinet rather than a window.

2 That information came from my research for an article about Railway & Tramway men who fought at Gallipoli. It was first published in the December 2015 *Australian Railway History*. In December 2020 I presented a webinar on *Restoring the Great Sydney Honour Board*. Find it at: https://www.records.nsw.gov.au/archives/webinars/webinar-restoring-the-great-sydney-station-honour-board

3 The *NSW Railways & Tramways Budget*s can be digitally searched at the ARHSnsw Reading Room, or they are for sale as a DVD.

The extra panels provided in 1918 were still not large enough to hold all the names, so smaller cabinets were added, one below each of the larger ones. These hold the names so neatly that it must be guessed that they were not made until well after the war, when the final casualty list was known.



The cover of the 1924 Roll of Honour in book form, now kept in the archives of the NSW State Records office Source: SARA.

There are many lists of the NSWGR&T dead from the Great War. The *Budget* had published lists in fits and starts from as early as July 1915. The Annual Reports between 1916 and 1921 include Honour Rolls of ever-increasing length. The timber and glass cabinets were only ever seen as an interim memorial until a carefully designed grand stone shrine could be built in the western gardens of Sydney Station after the war. Twice subscriptions for this memorial were collected but the work never proceeded. To use the obviously insufficient funds, a compromise was the publication of a single high-quality book to hold the names. This was completed in 1924, as reported in *The Staff*, (the re-badged *Budget*), and the book was deposited in the Railway Institute Library, and now survives as part of the railway archives at SARA. The several lists are not identical, but the Railway Institute Book and the Honour Board correspond well, and the deduction is therefore that the board was also completed about 1924. There are certainly names of men who had not died until 1921 included on it.

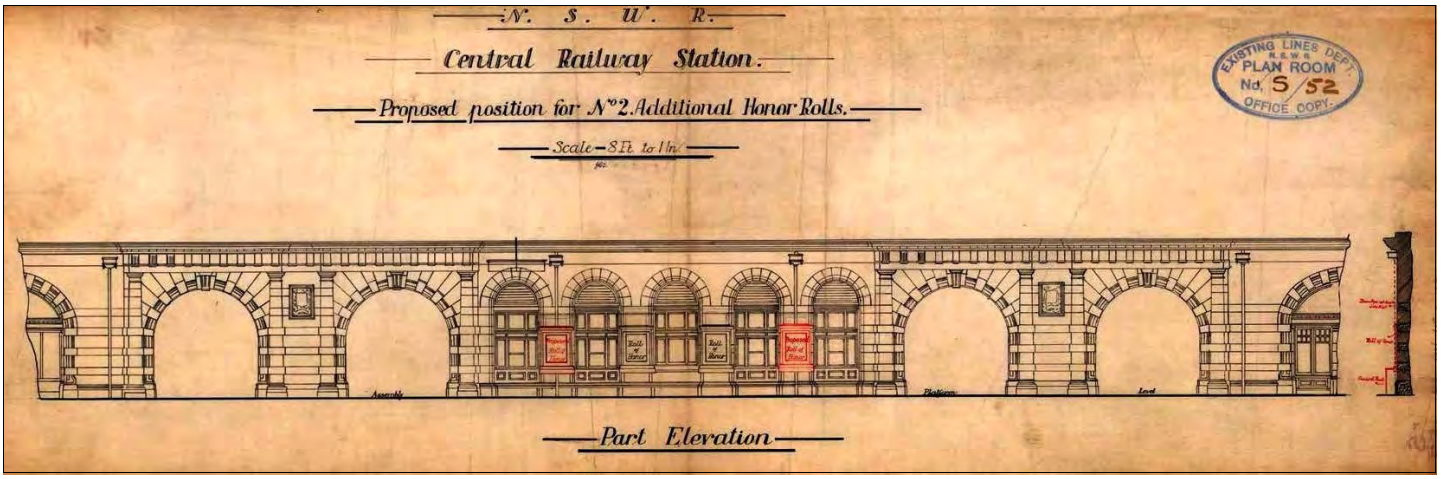
Only one picture (actually a set of four similar pictures) has ever been found of the complete board. By Sam Hood, the glass plate negatives are now held in the Mitchell Library which dates them at about 1927. No further reference to, or image of, the board is known until the mid-1950s, by which date the two centre pairs had disappeared. By 1960 all had gone, replaced by an Avis rent-a-car desk. The board had physically vanished from the station as well as from public memory. Apparently in about 2007 its component parts were delivered to the Railways Heritage Store at its then location in the old Suburban Carriage Paint Shop at Eveleigh Workshops, and from there moved with the collection to Chullora where it was first seen by this author.

Only two of the Honour Boards survive in situ in 1958. Source: NSW State Archives.

At this time the object (or objects) was known as the 'Narrabeen Honour Board'. There has never been a railway at Narrabeen. Until 1940 that northern suburb of Sydney was the terminus of a tramway, and it had a waiting shed, which still exists for bus travellers. The shelter could not hold the boards even if a reason for putting them there could be imagined. There is a large War Veterans Village at Narrabeen, but long-term employees have no recollection of an honour board there. A possibility which has never been confirmed is that 'Narrabeen' is railway slang for a shed or depot near Central. The eastern carriage shed was certainly known as 'Bondi' and a shunting neck at nearby Macdonaldtown carriage sheds was 'Bronte'. These are all well-known Sydney beaches. While many old railwaymen recognise the names Bondi and Bronte, no one recognises Narrabeen.

Detail of a Board photographed before the cabinet was opened. Source: Art & Archival (the restorers).

The boards as they had survived were badly damaged. All of the cabinets were intact, but two of the name panels held within them were deteriorated by damp, mould and insects. One of the smaller panels was completely missing. Using the photographs of the boards that I took, the names on them were compiled as well as possible. But the accuracy was limited by the damaged panels, the missing panel, and some names obscured by flaking paint and gold leaf from the inside of the glass of the doors.



This is the 1918 drawing mentioned on the previous page, showing the proposed location of two additional Honour Rolls (in red), on the north wall of the concourse. Two earlier Honour Rolls are between the red coloured ones. The image has been darkened to emphasis the outlines of the Honour Rolls. The smaller panels, in cabinets below the ones shown, were added later. One wonders if the particular damage to some of the panels was caused by overflow from the downpipes shown here. Behind this wall, and the windows, was the Central Tram Station. Source: NSW State Archives.

By April 2018 (approaching the Centennial of Armistice Day) the decision had been made by Transport Heritage NSW to restore the boards, and to place them on public display. It was not certain that they would go back to their original location, nor when they might be placed, as Central is undergoing extensive re-arrangement as part of the Metro works, not due for completion until 2024. Since two of the panels were badly damaged and one was missing, it was decided to make replicas of them all, with the originals conserved and stored. The gold leaf and paint on the glass doors would have to be redone, and with the intention to place the objects in a very public place, an alternative material to glass was deemed appropriate.

A panel shown after its removal from its cabinet (See detail photo on the previous page). Photo: Art & Archival.

The first task allotted to ARHSnsw was the recovery of the illegible and missing names. Some of these came easily once the doors were opened and the detritus cleared. One damaged panel was deciphered when SARA found a picture of the pristine panel before it had been placed in its case. No picture could be found of the second damaged panel, so careful examination by the physical restorers (*Art and Archival* in Canberra), with clues as to name length, and possible letters, were emailed back and forth, eventually producing an agreed solution.

Having 'all' the names known from other rolls such as the Institute Book, might have meant that the 60 names for the missing panel would be the 60 names not already accounted for. Unfortunately, there were 64 names left over. This probably means that four names were erroneously omitted from the board in 1918. This would not be unexpected as other errors have been noted and many other war memorials contain anomalies. Which four of the 64 could have been omitted? Looking through and tabulating all the names in all the documents where they had appeared since 1915, four of them were first seen very early. They ought to have appeared on the earlier, larger panels of the honour board, but they didn't. Exactly 60 names had not appeared until the 1919 or 1920 Annual Reports, and it made sense that they would be the names on the small panel which was not created until perhaps 1922 or 1923. But could I be sure? The four were certainly NSWGR&T men and they had certainly died on active service. Their names deserved to be on the board and until the missing panel is found, if it ever is, no one can say that they weren't included. The last panel was not quite full, so the four extra names were placed at the end, separately, to alert future custodians as to the decision made in 2018. If more information ever appears there might be justification for changing the names on the missing panel.

The project moved swiftly, and the decision was made that the boards would go back to their original location. That required knowledge of the order in which they were hung. The obvious order, since the names are entered approximately in order of death, is for the earliest to be on the left, then progressing right, as we might read any other document.

Careful examination of the 1950s photos revealed the order, not by reading names, as they are far too small, but by the pattern of the long and short names in the columns. Thus, the chronologically first board is now on the right, then the leftmost and the two in the centre, which do not appear in the 1950s photo, follow by date.

One of the set of 4 Honour Boards, complete and restored and in situ on the north wall of the Concourse, photographed in time for Armistice Day 2018. Source: ARHSnsw.

With the physical restoration under way, Transport Heritage NSW decided that they wanted more than timber, glass and black-printed names on a white panel. They would like biographies of all those men. ARHSnsw volunteers were given the task. In April 2018 the prospect of 1219 biographies being ready before the projected unveiling at the Centenary of the Armistice on 11 November seemed impossible, so it was agreed that 200 would be completed by that time and the balance a year later. The enthusiasm of the team was such however, that all were completed three weeks before the Centenary and there was even time to have them printed as a very large, 715 page, book.

The sources of information for the military aspects of the men's lives were the Australian War Memorial and the National Archives of Australia websites. Because the men were still railway or tramway employees their employment records still exist at SARA. The staff at SARA, who had already helped with the research for the history of the board, supported the writing effort by streamlining the normal process of ordering each employment record card as a single item. A team of volunteers from the Railway Resource Centre within ARHSnsw did the research and the writing was undertaken by Bill Phippen, Dugald Black, Richard Mathews and Lily Somer. In the context of an article in a magazine about engineering heritage it is noteworthy that Bill and Dugald are retired civil engineers.[4]

Detailed study of the names revealed that the board contains anomalies. Two names are duplicated, and three names are those of men who had in fact survived the war. The name J.S. Armstrong appears on the board and although he did die on active service he was not a railway employee, though J.H. Armstrong was. Though the latter man was documented as killed, this was revoked as a case of mistaken identity and confusion between the two similar names. Albert James Prior and Hector Roy Olsen were both railwaymen who served but did not die. The research has identified three other men who appear to be NSWGR&T men who did die, but whose names have never appeared on any list. Their names have not been added to the board to maintain its historical integrity, but their biographies are included on the website.

The board as it now exists in the Grand Concourse is not quite a sub-set of the Roll of Honour at the Australian War Memorial (AWM) in Canberra. Some NSWGR&T men were recent arrivals in NSW and they chose to return to the United Kingdom to enlist with regiments with which they had some association. While they do not qualify for the Canberra memorial they do qualify for the Sydney one. A small number of men who died of disease, in Sydney, after very brief military careers are included in the Sydney Board although the AWM installation does not include them.

Image Right: The 4 (or 8) cabinets & panels comprising the complete Sydney Central Honour Board, commemorating all NSW Railway Men who died in service, or due to service, in World War 1.
Source: ARHSnsw.

4 The biographies are available at: https://nswrailwaysremember.com.au/honour-boards.php

Biographies of two NSW Railwaymen who died on service in World War I

The research and preparation and writing of all those biographies of World War 1 servicemen is a tremendous achievement. I wonder if anything like it has ever been done before. I thought the least I could do is to give you a taste of the results. I chose two of the more interesting ones I have seen. I admit my choice was influenced by their places of employment – one at Randwick Tramway Workshops and the other at Eveleigh Loco Workshops, both places we have studied in the past.

The Editor.

Alexander Finnie, (Service Number 20)

Finnie was born in 1893 in Botany, and joined the Tramways as a tinsmith's apprentice at the Randwick workshops in 1908. On completion of his apprenticeship in June 1914 he was dismissed, as was the custom at the time, but re-employed the following week as a tradesman. In August 1914 he was granted leave to enlist in the AIF in Sydney and allotted to the Engineers. Embarked from Sydney in October 1914, he was in Egypt in March 1915, wounded in action at Gallipoli in August 1915 and evacuated to Egypt and hospitalised with 'gas poisoning'. Returning to duty in November, he re-joined his unit in France in July 1916, and was promoted to Corporal. In April 1917 he transferred to the Australian Flying Corps, qualified as a pilot in England, was made a temporary 2nd Lieutenant (pilot) in November, then a Lieutenant in February 1918 and after training was posted to No 4 Squadron, AFC. In April he was sent to France, and on 22 May was reported 'missing in action'. The Official History of Australia in the War, Vol. VIII, later recorded that on that day he and another pilot, *two accomplished airmen, dived at one balloon together, collided in the air, and both crashed and were killed.* He was buried by the Germans in Trou Bayard German Cemetery, 600 metres N of Estaires. In 1921 that Cemetery was concentrated into Pont du Hem Military Cemetery, Lagorgue, and he was reburied in the latter Cemetery.

Richard Mathews.

Alexander Coe (Service Number 2967)

Coe became an apprentice at Eveleigh on 28 July 1902, in the Locomotive Workshops. By 7 December 1907, his apprenticeship expired, but he was later given the position of labourer on 6 July 1908. Two more changes in position came before joining the AIF, to Painter in September 1908, and to Painter 1st Class in November 1913. He joined the AIF on 3 April 1915, and signed up under the name 'Alec', rather than Alexander, at the age of 28, allotted to the 5th Field Ambulance. His mother was given as his next of kin, though this would later cause controversy following his death. He embarked at Sydney on Transport A40 *SS Ceramic* on 25 June 1915 and proceeded to join the Mediterranean Expeditionary Force at Gallipoli on 16 August 1915. After the evacuation of the peninsula in December he returned to Egypt and from there proceeded to join the British Expeditionary Force for France at Alexandria on 17 August 1916. Coe was awarded the Military Medal in France on 24 March 1917 for bravery in the field.

Lt. Col. J. S Phipps wrote: '*On the 27th February 1917 at about 12-30 p.m. word was received at Le Sars Advanced Dressing Station, that two men were lying wounded in an exposed position on the Bapaume Road. Sgt Ivor Ling, L/Cpl. Arthur Bailey, Pte. Clive Catt and Pte. Alexander Coe at once proceeded to locate these men. This was accomplished after a most dangerous and difficult search of about 800 yards from Le Sars A.D.S., two men of the 22nd Australian Infantry Battalion, attached to the V 2 A.T.M. Battery being found. No. 361 Bomber Dodd, H. was lying on the side of the road with shell wound in left thigh, and No. 316 Pte. Bartley, R. was lying in a cellar, into which he had apparently fallen with a fractured skull and unconsciousness. First Aid was rendered, and through heavy shell fire, (both shrapnel and high explosive) the patients were conveyed to the Regimental Aid Post, the distance of carrying being 800 yards. Both on the forward and the return journeys several narrow escapes were experienced by the party. Major Chapman, the Officer i/c of the forward A.D.S's, further reports that this squad behaved in an exceptionally cool and courageous manner during the recent operations. I therefore wish to recommend these men for immediate reward, for untiring and conspicuous devotion to duty, and setting a fine example to those around them.'*

Coe died from wounds to the abdomen received in action on 25 September 1917 in Belgium. Following his death, there were problems with establishing his next of kin – he had listed his mother, but it was protocol that his wife be his next of kin. However, he and his wife had split up prior to his enlistment, which was perhaps why she was omitted from his enlistment records. The personal items that were left were a disc, medal ribbons, 3 coins, scissors, a metal watch, a knife, 2 purses, a metal match box cover, an electric torch, a photo wallet and photos, and a metal charm. These went to his mother, despite the controversy over his estranged widow. His mother also received the 1914/15 Star, the British War Medal, and the Victory Medal in trust for his young daughter, Phyllis Lillian. Alexander Coe was buried in Reningheist New Military Cemetery, Flanders, Belgium.

Lily Somer.

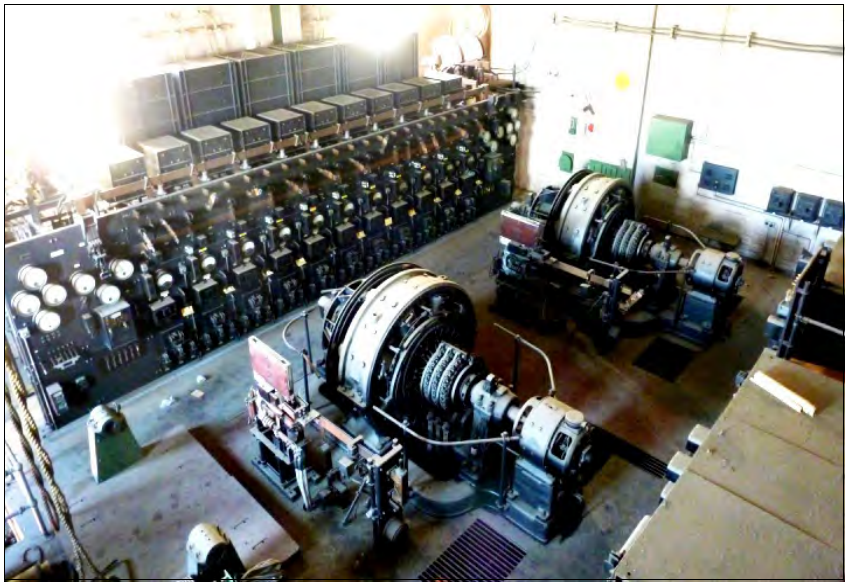
Tram Substation Machinery in Melbourne

Plant & equipment at Malvern & Brunswick Rd substations now heritage protected.

An update from Miles Pierce

During August 2020 the Victorian Heritage Council accepted the Recommendations of the Heritage Victoria Executive Director that the retired substation electrical plant and equipment be added to the existing Victorian Heritage Register (VHR) listings for the Malvern Tram Depot (VHR H0910) and the Brunswick Road former cable tram engine house and (later) tram substation (VHR H2332). This means that these now very rare and amazingly surviving rotary converters, with their associated electrical plant, will henceforth be protected from summary removal or scrapping. They will remain in the already protected buildings in which they were operated. It is further hoped that the Malvern Depot substation may become available for guided public display, if not for demonstration.

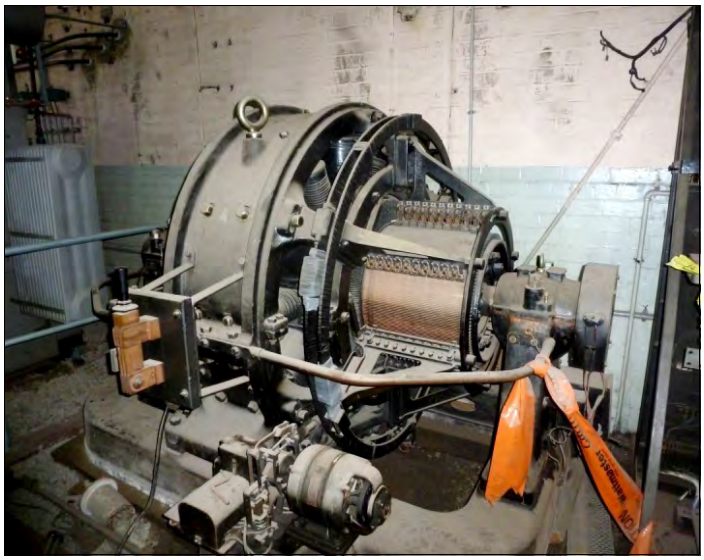
The 1929 substation built by the Melbourne & Metropolitan Tramways Board (MMTB) at the rear of the Malvern Tram Depot contains two 1000 kW English Electric Company rotary converter machines that changed the 3-phase AC mains electricity supply to 600Volt DC for supply to the tramway overhead wires.



The interior of the former Malvern tramway substation, showing the two 1000kW rotary converters and the open panel DC Switchboard. Photo - Miles Pierce.

The Malvern substation plant and equipment, including 6.6kV AC switchgear cells, stepdown transformers, the rotary converter machines and large 600V DC open panel switchboard will remain essentially as they were when this substation was finally retired in the mid 1990s. As such, Malvern is the only intact remaining substation from the rotary converter era in Victoria and, it is believed, nationally. An application was lodged by Engineering Heritage Victoria in 2014 to have the plant and equipment added to the VHR in its own right. When the new Victorian Heritage Act came into force in 2017, the application was changed to nominate that the substation plant and equipment be added to the existing Registration for the Malvern Tram Depot.[1]

The rear part of the former cable tram engine house in Brunswick Road, Brunswick (behind the Sarah Sands Hotel and near Sydney Road) was made into a tram substation by the MMTB in 1925 and contained two 500kW rotary converter machines with associated incoming 6.6kV AC switchgear cells, stepdown transformers and an open panel 600V DC switchboard. The substation remains in-service but with the rotary converters replaced by silicon rectifier equipment and the 600V DC open panel switchboard by modern fully enclosed switchgear. However, some of the original 6.6kV AC switchgear, and one of the 500kW rotary converter machines with its associated stepdown transformer and two panels of the original 600V DC switchboard, were retained on site, albeit that the rotary converter, its transformer and its AC side starting gear are no longer in their original locations, and no longer interconnected. It is this equipment and related items that have been added to the Brunswick Road site's VHR listing.[2]



Disconnected rotary converter in the former cable tram engine house in Brunswick Rd, Brunswick. Photo: Mile Pierce.

1 See article on the Malvern substation and its rotary converter plant in EHA Magazine, Vol 2, No 1, Jan 2016 p22.

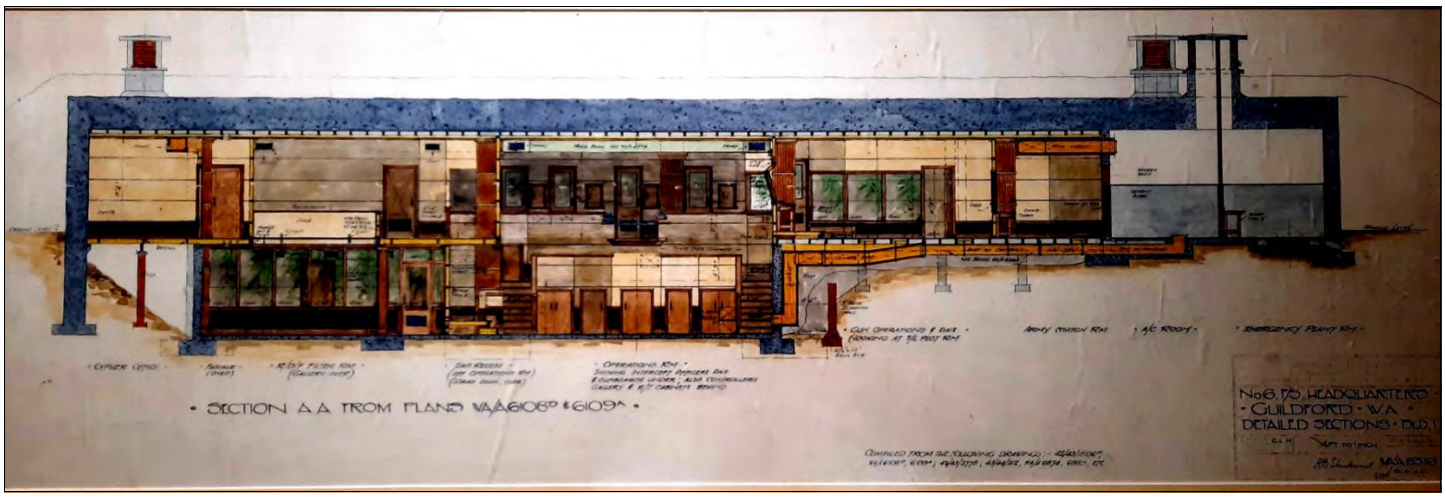
2 See reference to the Brunswick Road, Brunswick substation in EHA Magazine Vol 3, No 5, May 2020, p10.

Perth's Secret WWII RAAF Bunker

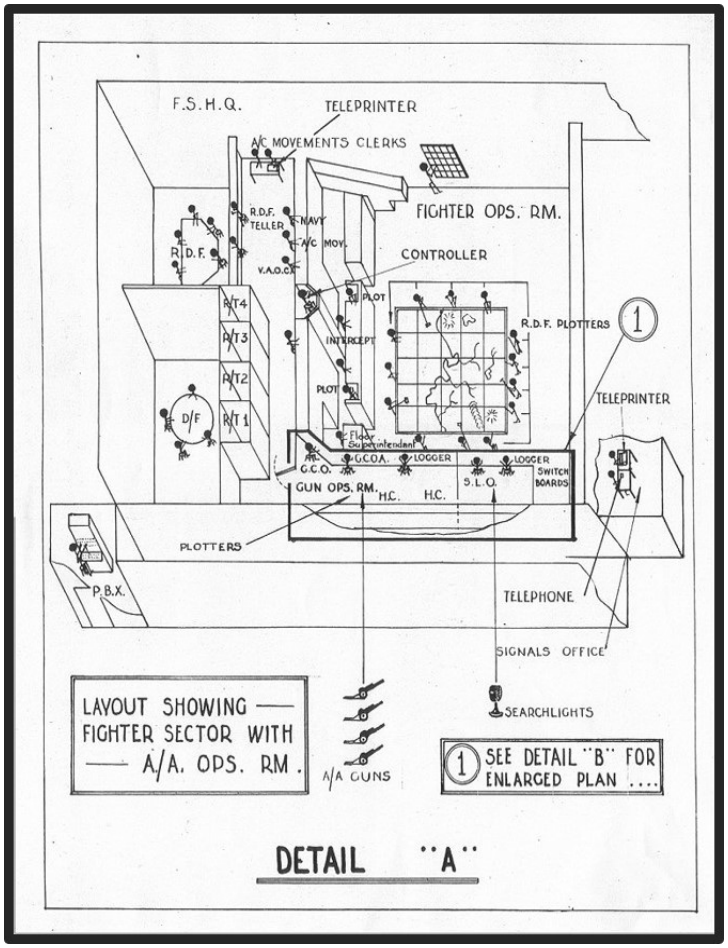
From Perry Beor.

Still in operation in the 21st Century

Deep in suburban Perth, at Belmont, or Guildford, only 6km from the heart of the CBD and 600m from Great Eastern Hwy lies a major WWII installation which has continued to fulfil a critical role in the protection of Western Australia through a number of major role changes for over 70 years, but would still remain very recognisable to any World War 2 veterans if any were still around who had once worked there.



This sectional elevation drawing is mounted under glass, so was difficult to photograph. Nevertheless, most of the notes are legible when the photo is blown up. Near the centre of the drawing is the Operations Room, over two levels, showing the Intercept Officer's Dais & cupboards underneath; also the Controller's Gallery & cabinets behind. Source: Western Australian Department of Fire and Emergency Services.



Isometric drawing showing the layout of the Operations Room with the Controller on his dais near the centre of the left hand wall of the Ops Room.
Source of Drawing: WA Dept of F&ES..

The History of the Bunker[1]

Despite Australia having been at War since 1939, the fighting all seemed far away, but the early part of 1942 brought the war focus right back to our shores. Singapore had fallen to the Japanese, Darwin had been bombed, followed by Wyndham and Broome in northern WA. Was Perth to be next? The 3rd Australian Corps had been 'stood up' in WA with three full divisions and close on 100,000 personnel, Fremantle had become the major submarine base in the southern hemisphere and Fortress Fremantle was fully operational with well over a dozen large calibre guns covering all seaward approaches.

The co-ordination of the Kittyhawk and Spitfire squadrons based around Perth and the numerous antiaircraft batteries which constituted its Air Defences was not neglected either, with the formation of No.6 Fighter Sector Head Quarters in April 1942 in the Masonic Hall in the inner-city suburb of Mt Lawley. Concurrently, planning commenced for a more permanent facility. By mid-1943, land has been acquired close to Perth Airport and construction commenced on a semi-underground Head Quarters bunker.

1 All information in this article comes courtesy of the Western Australian Department of Fire and Emergency Services

Perth's Secret WWII RAAF Bunker

The bunker was completed in late 1944 at a cost of £36,000 (against an original estimate of £20,000) and was declared fully operational on 14 March 1945. This new facility, working in conjunction with Fremantle Fortress HQ, co-ordinated all fighter, radar and anti-aircraft operations over Perth and its approaches. With War's end six months later, the need for this level of co-ordination ceased. By mid-1946 the bunker was put on a care and maintenance basis.

A 1965 view of the only visible external wall of the bunker. A storage shed on the right dates from 1965. Source: WA Dept of F&ES.

In February 1965 the bunker was declared surplus to requirements and was transferred to the Civil Defence and Emergency Service of Western Australia, being officially opened as the Civil Defence State Operations Centre on 24 Nov 1965.

The bunker Operations Room in its original Airforce layout. Source: WA Dept of F&ES

An extensive interior refurbishment was carried out in 1967–68 to better suit this new role, and the facility continued to operate in this manner for the next 40 years, until newer purpose-built facilities were constructed elsewhere. The bunker remained, however, a fully functioning backup facility until 2013 when it was again re-purposed as a Simulation Centre for the Department of Fire and Emergency Services, though continuing as a live backup for emergency triple-zero (000) calls.

Details of the Building

The Bunker is 100 feet (30m) long and 55 feet (16m) wide, semi-underground (with the roof at ground level) with reinforced concrete walls 4 feet (1.2m) thick, and a 6 feet (1.8m) thick roof. As originally built, it also had a further 3 feet of soil over the roof.

It follows the RAF/RAAF standard two story Operations Centre plan of a central operations room on the lower floor with overlooking galleries on all sides of the operations room on the upper floor surrounded by ancillary communications rooms, offices and the like, with the remainder of the lower floor for plant, equipment, accommodation and storage (the 'cellar'). The Bunker was entirely self-contained with its own generator (still operational), kitchen, independent water supply and it was fully gas tight with integral airconditioning.

The bunker Operations Room in its 2013 configuration, seen from the same angle as in the early photo above. Notice that the Controller's Dais and half level mezzanine have been removed and the formerly open galleries glassed in. Source: WA Dept of F&ES.

It was one of fourteen operational Fighter Sector Headquarters established in Australia and Papua New Guinea during WWII. Of the four purpose-built Fighter Sector HQs in Australia (Perth, Bankstown, Townsville and Darwin) it is the only one which has remained in continuous use, though a similar bunker has been recently refurbished in Townsville for use by the local State Emergency Service.

The Perth bunker is also the only one with a resident ghost, being supposedly haunted by the spirit of a WAAAF aircraftswoman who took her own life in the cellar following the breakdown of a relationship.

Rebuilds

A plaque near the entrance to the bunker unveiled by the Premier of WA on 24th Nov. 1965 to commemorate the takeover of the bunker by the WA State Operations Centre.
Source: WA Dept of F&ES.

1944 – The bunker was originally equipped as a Fighter Sector HQ controlling operations from the various Royal Australian Air Force and United States Army Air Force airfields, radar and anti-aircraft installations in the Perth Area.

1967 – Change to Civil Defence State Operations Centre. This involved removal of Squadron Operational Readiness boards and replacement by map boards, installation of a false floor in the operations room, installation of additional telephone and telex lines into the facility, upgrading of the radio facilities and aerials, enclosure of the viewing galleries, upgrading of the kitchen and connection to mains water and sewerage.

1990s – Installation of computer cabling and upgrading of communication feeds and equipment.

2013 – Change to Simulation Centre for the Department of Fire and Emergency Services. This involved installation of multi-use projection screens in the operations room, installation of a virtual reality suite for individual training, provision of dedicated Higher Command and Lower Command networks for simulation exercises (in order to replicate real time conditions when the facility will be communicating upwards to state and national levels and downwards to people on the ground), upgrade of computer fit-out and installation of the live backup emergency triple-zero (000) call facility.

2020 – Upgrading the generator switchgear and associated plant to meet current safety and regulatory requirements.

A view of another wall of the Simulation Centre Operations Room, showing the use of smart boards to provide 'real time' TV feeds in the Operations Room during an exercise. Source: WA Dept of F&ES.

Current Capability

The Simulation Centre has the capability to provide tailored exercises up to and including multiple major incidents at a State level to test incident management teams, and inter-service incident management at the most senior levels for both training and discussion purposes. It also provides, via a virtual reality suite, fire and rescue training at an individual or team level. This facility is not limited to only the Department of Fire and Emergency Services but is available to other agencies, either collectively or on a stand-alone basis to test and refine their procedures.

Conclusion

The Bunker has maintained its usefulness in its many guises for over 70 years by virtue of being in the right place at the right time. While the basic structure has remained intact, the ancillary services required to run the facility in its evolving roles have changed considerably over time – with copper telephone lines being replaced by computer cabling and that in turn being replaced by fibre optics. Or wooden Squadron Readiness boards being supplanted by map boards, and those replaced by the smart screens of today. In each iteration, the capability of the facility has increased manyfold, as has the complexity of the fit-out and the increasing issues with the remaining legacy services, such as power, lighting and air conditioning.

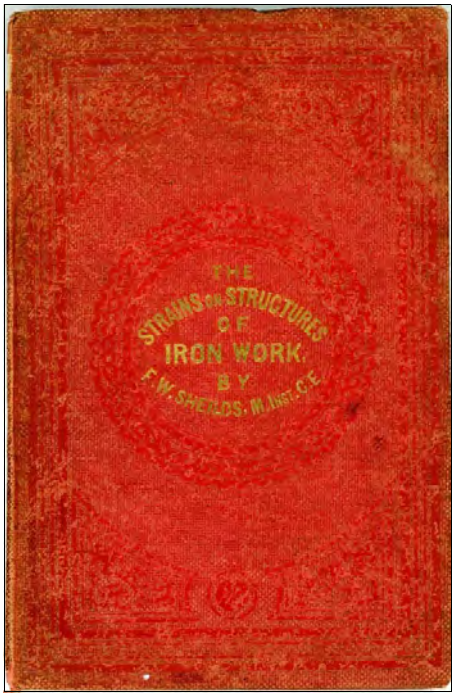
Despite this the facility has continued to operate because the underlying engineering was sound. It was built as an operational command facility and despite its many changes in role, it has always maintained this function. The heritage aspects of the facility are preserved precisely because they still do what they were intended to do, back in those far off days when war looked very likely to come to Perth.

A Book by Francis Sheilds

An Amazing Addition to ARHSnsw Archives.

By Bill Phippen

It is easy to overuse the adjective 'amazing', but a small book which recently arrived as part of a bequest to the Australian Railway Historical Society (ARHSnsw) Archives, as the Railway Resource Centre has been renamed, probably warrants the use of the term.

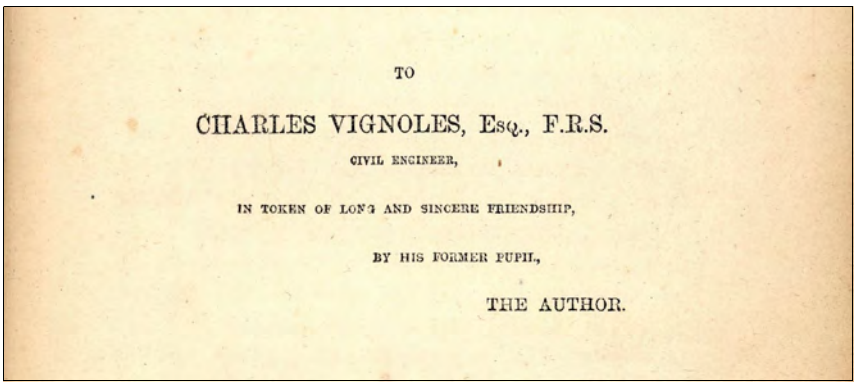


Cover of Sheilds 1861 book. Photo: Bill Phippen.

A small red cloth-covered book of only 56 pages titled *The Strains on Structures of Iron Work*, by F.W. Sheilds, published in 1861, may seem to be just another old textbook of structural mechanics, quaint in its terminology and simple in its analysis by later standards, until the reader realises the connection between Sheilds and Australia, particularly New South Wales. Francis Webb Sheilds was, in April 1848, the first engineer employed by the private Sydney Railway Company (the genesis of what later became the NSW State Railways). While Sheilds' tenure did not extend to see the first railway operating, the present Main Suburban Line, from Sydney to Parramatta, remains on his selected alignment, and so a very large proportion of Sydney commuters traverse his route every day.

Sheilds had been born in Ireland in 1820, though it is probably better to consider him to have been an Anglo-Irishman rather than an Irishman, for while the debate and debacle of railway gauge in Australia – Irish Gauge (5'3", 1600mm) versus British Standard Gauge (4'8½", 1435mm) – can be traced back to Sheilds, it would be simplistic to ascribe his recommendation to use the wider gauge as mere parochialism brought about by his place of birth.

Sheilds had worked in England as an engineer under Charles Vignoles, whose name is probably most quickly associated in the minds of engineers with the development of flat-bottomed rail which is now standard, but in 1840 was an innovation. Sheilds' relationship with Vignoles was evidently significant, as his book is dedicated to Vignoles – his teacher, mentor and employer.



TO

CHARLES VIGNOLES, Esq., F.R.S.

CIVIL ENGINEER,

IN TOKEN OF LONG AND SINCERE FRIENDSHIP,

BY HIS FORMER PUPIL,

THE AUTHOR.

Part of the page showing Sheilds' dedication to Charles Vignoles. Source: ARHSnsw.

Exactly why Sheilds came to NSW in 1843 is uncertain. He had worked with Vignoles on several British railways and was probably assured of further work. There was no prospect of furthering his career as a railway engineer in Sydney at that time as there were no railways. The reason for the migration may be related to family as he probably travelled with two sisters. His uncle was the Solicitor-General of NSW, and he was related to Darcy and William Charles Wentworth, leading citizens of the colony.

Sheilds found work with the newly formed Sydney City Council, eventually as City Surveyor, and it was from this role that he was recruited by the Sydney Railway Company. When Australian railways were first mooted, Earl Grey, Secretary of State for the Colonies, foresaw the possibility of the railways of the several Australian colonies one day meeting at their borders and recommended that a uniform gauge be adopted, and that it should be British standard gauge, and this was agreed. At the time of Sheilds' appointment in April 1848 there were no railways anywhere in Australia except for a small inclined plane, carrying coal wagons from the first Australian Agricultural Company mine, downhill to the Newcastle waterfront. Sheilds reviewed the proposed Sydney railway and recommended that a wider gauge – Irish 5'3", 1600mm – would be better than the British standard gauge. The issue was uniformity not the actual width between the rails so Earl Grey and the other colonies, at least Victoria and South Australia and Tasmania, agreed to the change. The subsequent decision by New South Wales to re-visit the issue and change back to standard gauge came after Sheilds had left the colony so the debacle cannot be laid at his feet. But it was Sheilds' first change which created the opportunity for the reversal and the subsequent many decades of mixed gauge and transhipment of goods at border stations.

A Book by Francis Sheilds

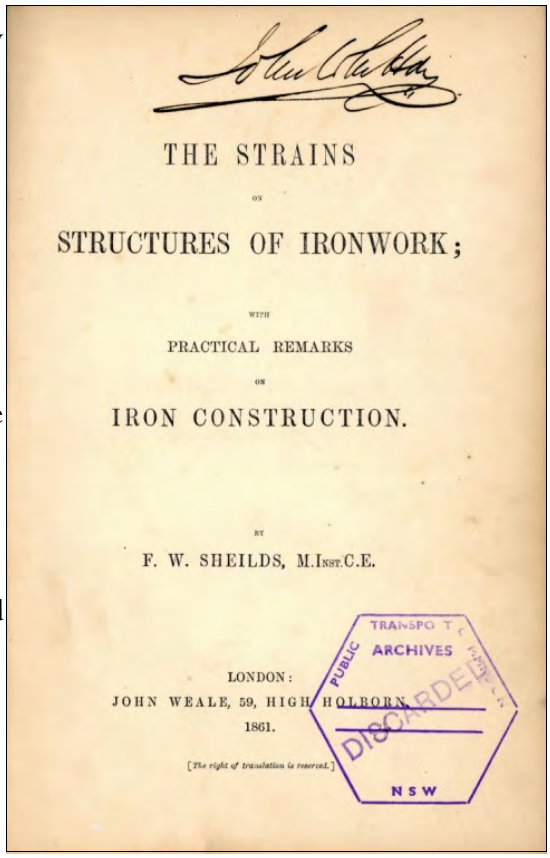
By the end of 1850 the Sydney Railway Company was particularly short of cash and so its board made significant reductions in the salaries paid to its employees, all of whom consequently resigned. Sheilds left Sydney in early February 1851. He was at first succeeded in his position at the Sydney Railway Company by Henry Mais and then by James Wallace, and it was the latter who made the fateful gauge change for NSW railways. Victoria and South Australia had had enough of New South Wales' nonsense. Both states already had materials and rolling stock manufactured to suit the broader gauge, and in transit to Australia, and they refused to change again.

Francis Webb Sheilds as depicted in the "Railway & Tramway Magazine" in 1920. Source: ARHSnsw.

Back in England, Sheilds was employed by Vignoles again and worked on several notable projects, perhaps the most relevant to his book being the Crystal Palace. His solutions to the problems he faced designing iron beams and framed girders, which a modern engineer might be tempted to call trusses, are the core of his text.

Francis Sheilds married Adelaide Baker in 1860 and they had five children, one of whom, at least, migrated to Australia as an Anglican priest and was until 1929 Archbishop of Armidale. In 1877 Sheilds formally changed his surname to Wentworth-Sheilds in honour of his grandmother, Sarah Sheilds, who had brought him up after his mother had died during his childhood. Sarah Sheilds, née Wentworth, was the step-sister of Darcy Wentworth, father and grandfather of the well-known figures in Sydney history.

Yet there is an even more compelling reason to ascribe the word amazing to this small book, for the signature of its first owner is inscribed on its title page – this was the personal copy of John Whitton, the Father of the New South Wales Railways. James Wallace had announced his intention to resign as engineer before the railway opened in late 1855. Whitton was recruited in England and arrived in Sydney in 1856. Unlike his predecessors Whitton would remain in the role for a long time, more than thirty years, and by the time age and health forced his hand in 1890 the New South Wales railways had been built.



The Title page of Sheilds' book. Note the signature of John Whitton at the top, the PTCNSW Archives reference, and the 'Discarded' stamp. Source: ARHSnsw.

So how does an archive in 2020 acquire such a significant volume? Herein lies another tale. The book is marked on the title page with the stamp of the Public Transport Commission of NSW Archives. For any reader not familiar with the cycle of names of the NSW railway operator, PTCNSW was the title in the 1970s. The book was in the official railway archives. Later the State Rail Authority, into which the PTCNSW had morphed, decided to transfer what had previously been an in-house archive to the State Archives and Records Authority. SARA is a dedicated part of the state government establishment which specialises in archiving all records generated by state agencies.

At some stage, certainly before the transfer to SARA, a decision was made that Sheilds' book was not required as part of the archive and so the word 'DISCARDED' is stamped over the PTCNSW hexagon. It must be at about this point that Don Hagarty enters the story. Don was an engineer with the NSW Railways, and ultimately the last person to hold the title 'Chief Civil Engineer'. He was intensely interested in the history of the railway, especially its formative years, and his great work *Sydney Railway 1848 - 1857* (464pp) was published by ARHSnsw in 2005. Evidently Don had become aware of the disposal of *The Strains on Structures of Iron Work*, and he took the volume into his own extensive library.

A Book by Francis Sheilds

Sadly, Don Hagarty left us in March 2020, aged 90. This author was honoured to deliver a eulogy at the funeral of his friend, on behalf of the Society. Don's collection was bequeathed to ARHSnsw which had been a focus of his life for so long and of which he had long been made a life member.

Anyone interested in more detail of the life and work of Francis Webb Sheilds ought to track down a copy of Don's book. It is no longer in print, but second-hand copies are sometimes available. The unusual surname Wentworth-Sheilds still occurs in telephone directories. Perhaps they identify descendants of F W Sheilds.

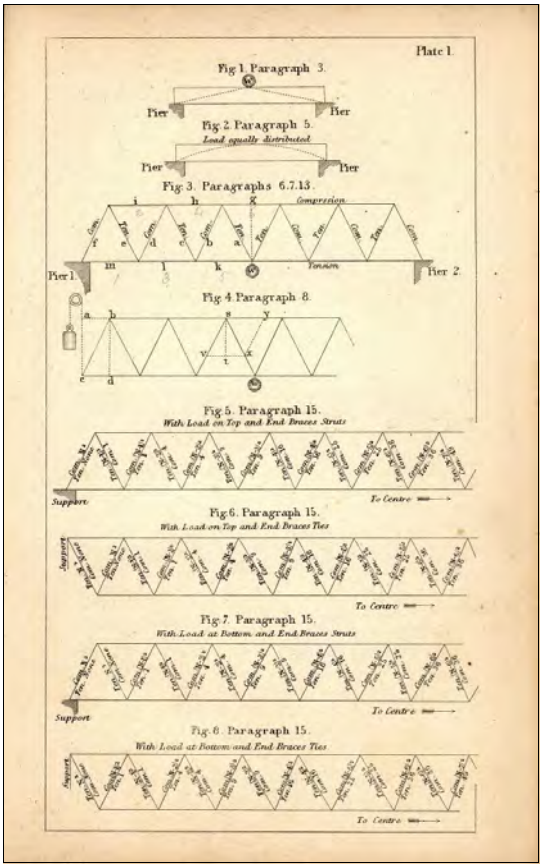


Plate 1 of Shields' book – the 1st page of illustrations, showing the simplest loading condition as Figure 1. Source: ARHSnsw.

The book treats all girders, and what would later be called trusses, as a continuum. Starting with the most elementary concept of a simple beam with a central point load, Sheilds analyses ever more complicated spans ending with roof structures which must be considered trusses, though he never uses that word. His analysis is basically one of statics which implies, without formal statement, that at all joints in a girder fabricated as flanges and web members, the axial forces in the several members are in balance.

Sheilds makes no mention of redundancy, for while he recommends opposed diagonals in panels where the member intended to carry tensile force needs to be in both directions as a load rolls across the girder, he makes no mention of the potential for their interaction. For highly redundant structures such as lattice girders, he treats these as multi-layered (Warren) girders, each statically determinate, juxtaposed and carrying equal shares of the load. In practice of course the flange members are not simply adjacent but are the same single iron members. His treatment of plate web girders is necessarily brief for he cannot analyse the web, though he does find them to be 'excellent'.

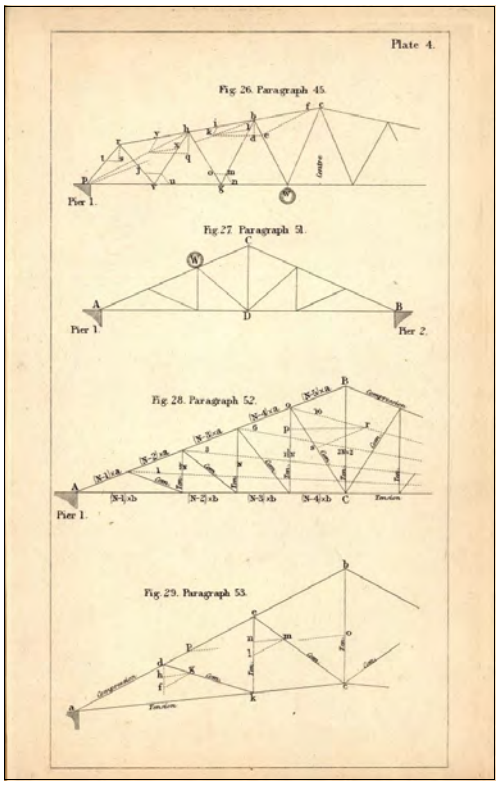
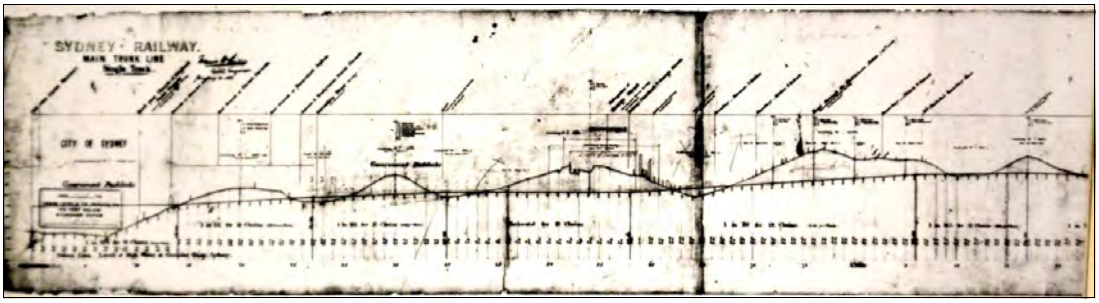


Plate 4 of Sheilds' book – the final page of illustrations, covering irregular roof frames. Source: ARHSnsw.

In accordance with the age, the 'Strains' of the title are what current engineering parlance would call forces. The use of that word to refer specifically to dimensional changes had not yet arisen. The printing technology of the age required the many diagrams to be separate from the text and this is a hindrance to reading, although using two computer screens helps greatly. One insight which this author gained was in Sheilds' use of the term 'Bow and String', rather than 'bowstring' for tied arches. The old terminology seems much more appropriate.

But for £100 worth of annual salary, this erudite man might have remained in Sydney and be accorded a bust on Sydney Central station in the place of Whitton. They were born in the same year. Sheilds lived until 1906.



Part plan of the 1st "SYDNEY RAILWAY – Main Trunk Line – Single Track", signed "Francis W Sheilds. Source: ARHSnsw.

Malcolm Moore & Albert Longoni

A Tale of Two Innovative Engineers

By David F Radcliffe[1]

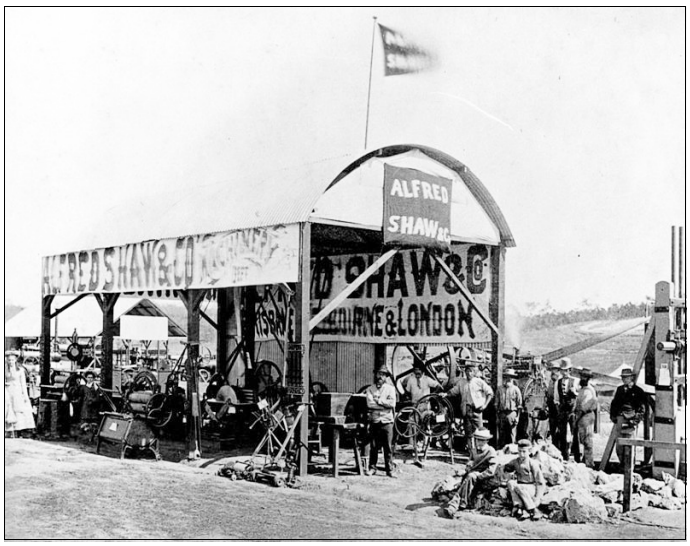
Introduction

For over sixty years, Malcolm Moore Ltd, a Melbourne company with its base in Port Melbourne, manufactured and distributed a wide variety of engineering plant and equipment used nationwide in ports, energy production, construction, local government, agriculture, timber processing, and mining. They produced cranes, conveyor systems, earth-moving and road making vehicles, transport equipment including small locomotives, agricultural implements and power hydraulics. While it was Malcolm Moore who founded the company, it was his working relationship with a Swiss engineer, Albert Longoni, that cemented the company's reputation especially in coal handling systems. Moore and Longoni came from different worlds yet their complementary backgrounds, professional experiences and overlapping skill-sets combined to shape the fortunes of the company.

Malcolm Moore Ltd promotion in the souvenir program for the Centenary of Port Melbourne in 1939. A larger version of this image can be found on the last page of this magazine.
Source: Port Melb. Historical Preservation Society.

Early Influences – Moore

Malcolm Stewart Moore[2] was born in Brisbane in February 1888, the first of three children. His father, John James Moore, was an ironmonger who worked for the Brisbane branch of Alfred Shaw and Co., a trading company started by John Moore's Melbourne based father-in-law. The company imported hardware, crockery and agricultural implements and supplies. In 1897, when Malcolm was nine years old, his father became insolvent as a result of the collapse of Alfred Shaw and Co, a victim of the major depression of the 1890s.



Display of machinery imported by Alfred Shaw & Co., Intercolonial Exhibition, Brisbane, 1876. Source: State Library Qld.

Around 1902, the Moore family moved to Melbourne, settling in Elsternwick, and fourteen year old Malcolm completed his schooling at Caulfield Grammar School. His father established a trading company as an agent for UK manufacturers of nuts and bolts and for Australian timber products used in carriage construction.

Early Influences – Longoni

Alberto Joseph Longoni was born in March 1889 in Herisau, capital of the Canton of Appenzell Ausserrhoden in the German speaking region of Switzerland. Originally from Italy, his extended family had run businesses in the construction industry for at least 100 years. Both his grandfather and his uncle were construction contractors, mainly building roads between various towns and villages in Switzerland. Longoni's father owned a quarry supplying sandstone to numerous road and rail projects including a viaduct on the Bodensee Toggenburg railway. Later he owned and operated several restaurants and was a wine merchant. Longoni was the third of eight children and whereas many of his siblings made careers in the hotel industry, Longoni followed a more technical path. He matriculated from the Canton School in nearby St Gallen in 1907, pursuing an academic rather than vocational curriculum.

1 David Radcliffe is a Melbourne engineer with a long term interest in the Malcolm Moore company and its connections.

2 Malcolm Stewart Moore http://adb.anu.edu.au/biography/moore-malcolm-stewart-11154

Engineering Education in Transition

Malcolm Moore attended the University of Melbourne, graduating in mining engineering in 1911 and in civil engineering in 1912. His time at the university coincided with a series of major reforms in the engineering curriculum led by Henry Payne, the new Professor of Engineering who joined the faculty in 1910. Two major deficiencies he identified were in the provision of engineering laboratories and the teaching of engineering design. Payne's far reaching changes took place in the wake of two influential Royal Commissions; one into Technical Education in Victoria (1901) and the other into the operation of the University of Melbourne (1904). It is not clear how many of Payne's reforms would have directly impacted the instruction received by Moore. Nevertheless, given the small number of engineering students and staff and intimate nature of the engineering education experience in those days, doubtless he would have been very aware of the issues and arguments in this very public debate.

Albert Longoni studied mechanical engineering at the Eidgenössische Technische Hochschule in Zurich, or ETH Zurich. Between 1908 and 1911 it was transformed from a canton-based 'Polytechnikum' to become a Federally funded Technical University with a new curriculum along the lines of similar institutions in Germany. Yet even when it was still the 'Poly' it had an excellent reputation, as noted by the 1901 Victorian Royal Commission on Technical Education. A defining characteristic of the Technical Universities in Germany in late 19th and early 20th century was a major focus on engineering design, and this was also the case at ETH in Switzerland.[3]

Swiss Cavalry trainees in 1909 with Albert Longoni, second from the left, seated with sword in hand. In late 1929 he still had to report to a Swiss Consulate in Australia, as part of ongoing militia obligations. Source: Longoni Family.

Longoni attended ETH for one year (1908-09), followed by two years in industry, while also undertaking basic military training. He returned to ETH in 1912 for three more years, graduating in March 1914. The curriculum had a deep foundation in mathematics and theory complemented by an extensive program of laboratory work. One of Longoni's tutors in physics was Albert Einstein. Longoni's industrial internships included stints in engineering design offices in both Switzerland and France plus experience with equipment installation, involving steelwork, materials handling, hydro-electric and steam driven power plants. He did his basic military training in the Swiss Cavalry in 1909, during which time he was involved in a duel that left him with a scar over the left cheek. While attending ETH, Longoni heard stories about Australia from a fellow student which apparently inspired him to emigrate in 1914, although other factors may have also been at play in the decision.

From Railways to Munitions

After graduating, Moore worked as assistant engineer on the construction of the Bairnsdale to Orbost railway. In a 1916 paper on the project read to the Victorian Institute of Engineers, the engineer-in-chief of Victorian Railways, Maurice Kernot, singled Moore out for special mention for his innovation in developing elegant construction techniques.[4] One example involved the use of a very effective grab bucket that Moore had designed to reduce the cost of excavating the wells for the concrete bridge piers, and another concerned a simple method he devised to quickly and simply erect 100ft long girders.

When he applied for Associate Membership of the Institution of Civil Engineers (UK) in December 1913, two of the members who endorsed his application were Maurice Kernot and John Monash. Such connections may explain his move to Great Britain a few years later to contribute to the war effort.

3 Wolfgang Konig, *Education And Social Standing: German Engineers, 1870-1930, Quaderns d'Història de l'Enginyeria*, Vol XV, 2016-2017, p. 116.

4 *Catching a Train from Orbost*, EHA Magazine Vol 1 No 5, Dec 2014, p18. https://www.engineersaustralia.org.au/Communities-And-Groups/Special-Interest-Groups/Engineering-Heritage-Australia/Previous-Magazines

Moore arrived in Scotland in October 1915 and took up the role of assistant general manager of the National Projectile Factories in Glasgow, a position he held until 1916. In this capacity, he experienced what it took to establish a new manufacturing facility on a green field site in short order, and to train a new, largely female workforce. One of the machine operators at National Projectile Factory at Cardonald, Lizzie Robinson, was the first woman to receive an OBE, awarded for her exemplary work record at the plant. The facility paid particular attention to employee welfare, organised morale building theatre performances and choirs and had an in-house newspaper.[5]

"Forging the Nose-Shells" by Arthur Farrell Frederick. Cardonald Munitions Factory (1917). Malcolm Moore learned about manufacturing here.
Source: Glasgow Museums.

In 1917, Moore moved to London to become Director of the National Ordnance Factories Section, Ministry of Munitions. In November 1917, his younger brother, John Heywood Moore, was killed in action in France.[6] As happened with so many others, this loss had a profound impact on the family. Moore headed back to Australia in June 1918 travelling via the US and Canada. During 1919 Moore lived with his parents who had moved to Shepparton, where his father had become an orchardist.

Alien Engineers

Like Moore, early in his career Longoni moved halfway around the world to work in unfamiliar surroundings. Aged 25, he sailed from London to Sydney arriving on the SS *Benalla* in April, 1914. The timing was unfortunate with the start of the First World War just months away. As an alien, he was required to register and then report each time he changed address. He was fined on one occasion for not doing so. A young Danish engineer, Henning Metz, also emigrated to Australia on the *Benalla* in 1914 and his career and Longoni's were intertwined for the next decade.

Australia had been importing much of its cement from Germany so in 1912 the Australian Government decided the country needed to manufacture its own cement. From August 1914 to June 1915, Longoni worked for the NSW Cement, Lime and Coal company based at Kandos in the mid-west of NSW. He designed structural steelwork and foundations for the new plant and the powerhouse and worked on the water supply and reservoir. The project was complicated by the outbreak of war, as the contract for the supply of the equipment had been let to Krupp of Bremen, Germany and delivery of the first kiln was delayed when it got as far as South Africa.

Albert Longoni at his desk at the Queensland Cement and Lime Company in Darra in 1916. Source: Longoni family.

In August 1915, Longoni moved to Brisbane as engineer-in-charge for the recently formed Queensland Cement and Lime Company. He was responsible for the design and construction of their plant at Darra, near Brisbane as well as for the quarry and crushing plant at Gore, about 170 km inland from Darra, the source of the limestone. The Darra plant was capable of producing 30,000 tons of cement per annum, three-quarters of the pre-war consumption in Queensland. Metz, who had changed his name to Metes, worked with Longoni on the Darra cement project. It was here that they each met their future wives, two adventurous young Danes who had emigrated to Brisbane in 1915 seeking a new life.

In August 1917, Longoni and Metes moved to Sydney. Subsequently Metes got work in Newcastle and Longoni moved to Geelong, although it is not clear if he found work during this period. In January 1918, Longoni married Ellen Marie Andersen. In those days, when a woman married she was deemed to have adopted the citizenship of her husband, so officially she was now Swiss rather than Danish.

5 Elizabeth (Lizzie) Robinson, http://www.scotlandswar.co.uk/robinson_e.html

6 National Archives of Australia (NAA): B2455, Moore J H

Between February and August 1918, Longoni investigated limestone and clay deposits at Capel near Bunbury and Kanowna near Kalgoorlie in Western Australia for an Adelaide development syndicate. In September, he was engaged by Broken Hill Associated Smelters in Port Pirie in South Australia to undertake design work connected to the reconstruction of the smelting plant there.

Longoni and his young family moved to Melbourne in June 1919, where he would be based for the remainder of his career. Given the uncertainties he faced with work during the war years, in July 1920 Longoni applied to become a naturalised Australian. Metes had applied a few months earlier.

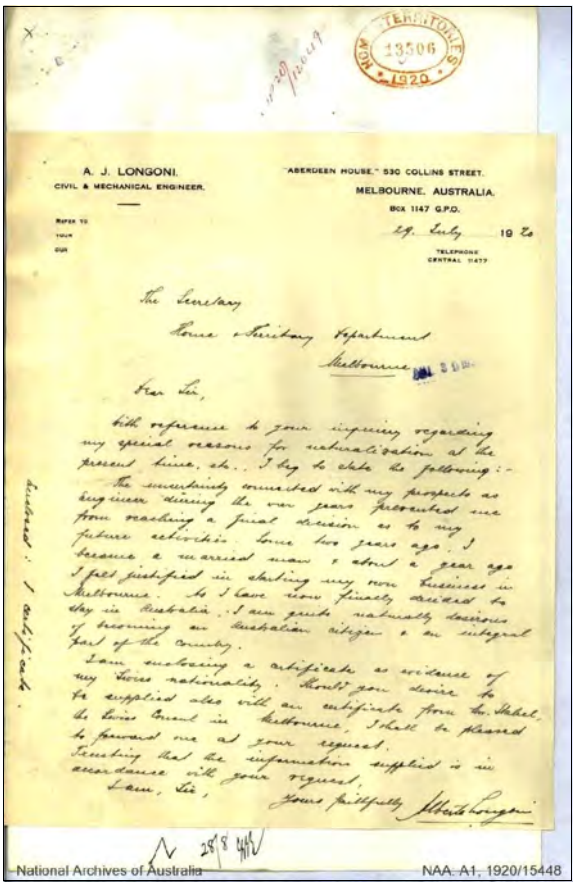
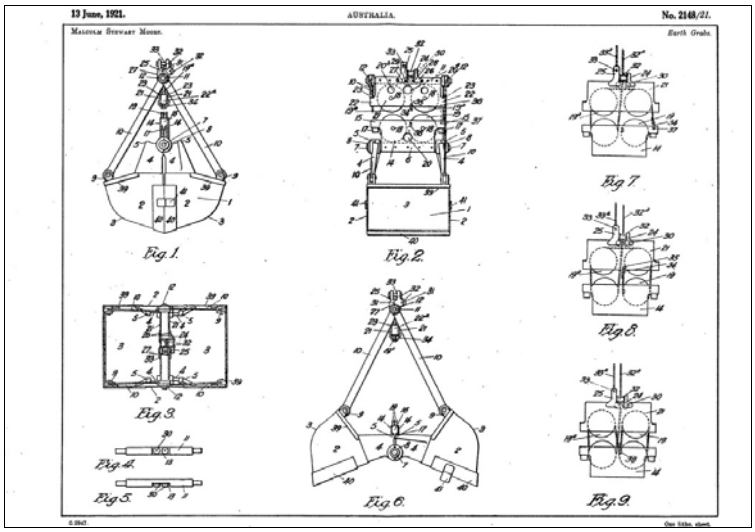

A. J. LONGONI.
CIVIL & MECHANICAL ENGINEER.
"ABERDEEN HOUSE," 530 COLLINS STREET.
MELBOURNE, AUSTRALIA.
BOX 1147 G.P.O.
29. July 19 20
The Secretary
Home Secretary Department
Melbourne
Dear Sir,
With reference to your inquiring regarding my special reasons for naturalisation at the present time, etc., I beg to state the following:-
The uncertainty connected with my prospects as engineer during the war years prevented me from reaching a final decision as to my future activities some two years ago. I became a married man about a year ago I felt justified in starting my own business in Melbourne. As I have now finally decided to stay in Australia, I am quite naturally desirous of becoming an Australian citizen & an integral part of the country.
I am enclosing a certificate as evidence of my home nationality. Should you desire to be supplied also with an extract from the Naturalisation Register in Melbourne, I shall be pleased to forward me at your request.
Trusting that the information supplied is in accordance with your request,
I am, Sir,
Yours faithfully
Albert Longoni
National Archives of Australia NAA: A1, 1920/15448

Image Right: A letter written by Albert Longoni, seeking to become a naturalised Australian citizen. Source: National Archives of Australia.

Enterprise and Innovation

In 1920, Malcolm Moore started an engineering consultancy in Lombard House, 17 Queen Street, Melbourne, the same offices his father had used for his trading business. Like his father, Moore acted as a manufacturer's agent, selling Multi-Mix cement mixers in all sizes. This became a second source of income as his consulting work became established. The first of his many patent applications, submitted in June 1921, was for "improvements to earth and like grabs". This coincided with a public demonstration of a new crane designed by Moore and manufactured by Austral Otis Engineering of South Melbourne, featuring a "Malcolm" grab bucket.[7]


13 June, 1921. AUSTRALIA. No. 2148/21.
Malcolm Stewart Moore. Earth Grabs.
Fig 1. Fig 2. Fig 7. Fig 8. Fig 3. Fig 4. Fig 5. Fig 6. Fig 9.

Malcolm Moore's first patent. Improvements to the grab bucket, 1921. An echo of his innovation while working on the Bairnsdale to Orbost railway. Source: Australian Patent Office.

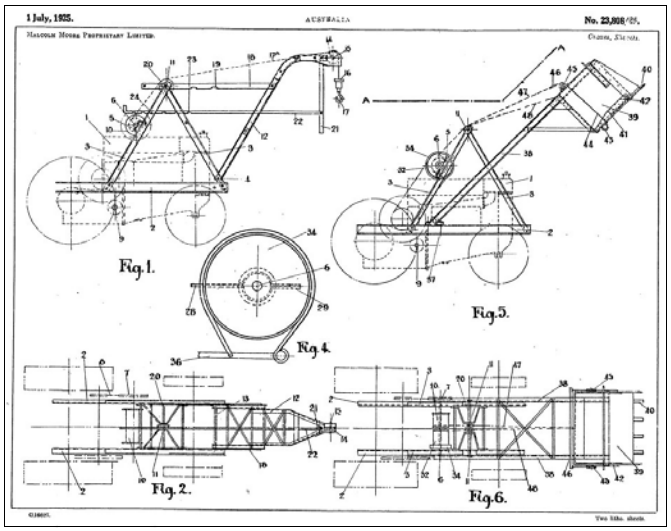
In October 1921, Malcolm Moore Pty Ltd, offering civil and mechanical engineering services, was registered with a capital of £10,000 and offices at 31 Queen Street, Melbourne. The three directors of this private company were Malcolm Moore, Theodore Lloyd and Donald Baxter. In the first few years, the new company won numerous tenders including those to deliver equipment to Victorian Railways and the Electricity Commission for handling concrete, dump trucks for the River Murray Commission, coal crushing plant suitable for brown coal to the Electricity Commission, and electric hoists for the Sydney Harbour Trust. On occasions, Moore continued to provide consulting advice to others, beyond his growing manufacturing business.

Circa 1925, Moore and other directors also established the Tractor Appliance Company Ltd., better known as TACL. Located at 501 Flinders Street, Melbourne they sold farming implements and were the distributor for Fordson tractors in Victoria. Malcolm Moore Pty Ltd made many product innovations based on core tractor chassis and engines. Between 1923 and 1927, Moore was granted seventeen Australian patents, thirteen of which involved improvements to tractors – including their conversion into mobile cranes, elevators, excavators, saw benches, road rollers, front end loaders, and even small locomotives.

Moore would continue to patent his ideas throughout his career. His last patent was granted in 1965, aged 77, for an exercise machine designed to help patients rehabilitate following illness or accidents.

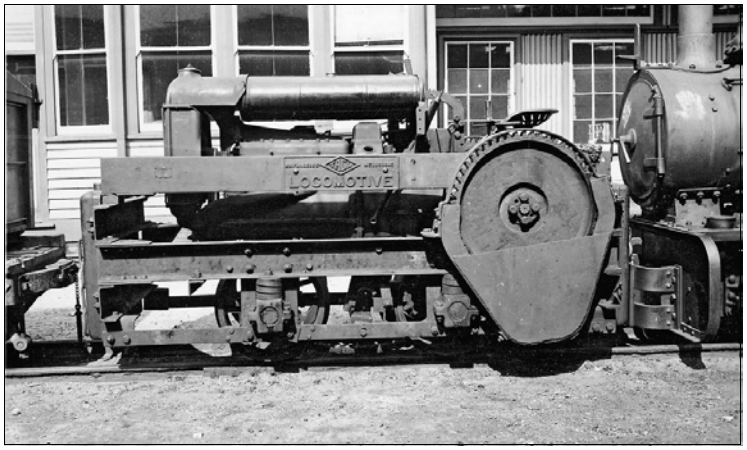
7 *Daily Commercial News and Shipping List (Sydney)*, 25 May 1921, p 9.

With orders growing, in March 1927 the company went public becoming Malcolm Moore Ltd. The new firm incorporated TACL, and the £50,000 in capital they raised helped fund the construction of a galvanized iron shed in Williamstown Road, Port Melbourne, the first building in what would become a major manufacturing complex.



A page showing a front end loader from Moore's patent "Improvements in cranes, shovels, back fillers & elevators, having as a prime mover a tractor of the internal combustion type. Inventor: Malcolm Stewart Moore, Aust. Patent 23808/ 1925". Source: Australian Patent Office.

Image Above: The first tractor powered front-end loader made in Australia. Designed and built by Malcolm Moore circa 1925. Source: Malcolm Moore Golden Jubilee

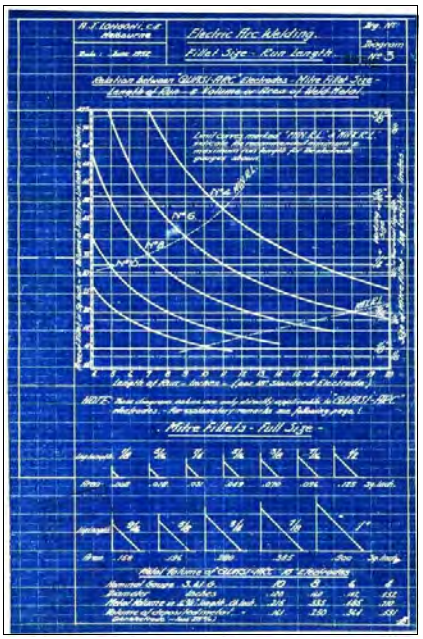


Tractor-based locomotive built by TACL for the Mt Lyell mine in Tasmania. Note the distinctive diamond shaped name plate. Photo: JNL Southern, Feb. 1937.

Welded Structures Pioneer

In mid-1919, Longoni established a consulting business at 530 Collins Street Melbourne, describing himself as a civil and mechanical engineer, although more usually he was referred to as being a civil engineer. A year later he partnered with AGM Michell as the engineering consultants on the proposed National Portland Cement facility on Maria Island, Tasmania. Michell had an international reputation based on his 1905 patented design for thrust bearings that revolutionised propeller shaft design in large ships.[8] First among the directors for the Maria Island proposal was recently knighted Sir John Monash. Longoni was the engineer-in-chief during the construction of the Maria Island facility until 1922, when he returned to consulting, this time in partnership with Metes. In 1925, Longoni applied for patents for reinforced concrete pipes and for truck bodies.

More significantly, Longoni's career trajectory changed during this period as he began to pioneer the design of arc welded steel structures for mechanical applications. This work was done in close association with Quasi-Arc, the British electric-welding equipment supplier, its local distributor Robert Bryce & Co, and Harry Grove, who headed the construction department at the Melbourne Metropolitan Gas Company. In 1923 the gas company completed the world's largest all-welded gas-holder at North Fitzroy in Melbourne, a 2 million cubic feet capacity structure made from 5000 steel plates and 15 miles of welds.[9]



Arc Welding Design Data created by Albert Longoni and copyrighted by him as a literary work. Source: NAA

8 Anthony George Maldon Michell http://adb.anu.edu.au/biography/michell-anthony-george-maldon-7567 or see *Anthony George Maldon Michell, F.R.S. – Inventor of the famous tilting pad thrust bearing* in EHA Magazine, Vol.3 No.6 Sept 2020, p18.

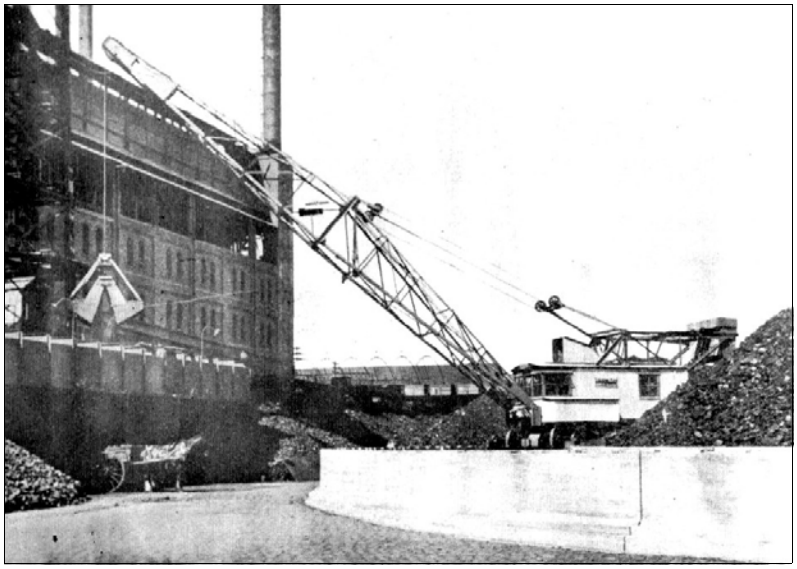
9 Paul Savage, *With Enthusiasm Burning: The Story of Welding and Associated Industries in Australia*, 1974. See http://www.cigweld.com.au/wp-content/uploads/2012/11/cigweld-with-enthusiasm-burning.pdf

While Grove devised the first system of specifying the details of welded joints, it was Longoni who developed a comprehensive set of design guidelines for welded structures applicable to a wide variety of applications. The knowledge contained in these guidelines grew out of the experience Longoni gained on many projects during the mid-1920s and early-1930s, designing all-welded structures. This practical design experience was complemented by test data from Quasi-Arc, on tests conducted at the Metropolitan Gas Company, and in the UK and Germany.[10]

Joining Forces

Moore and Longoni began to collaborate in the mid-1920s, during the time when each was building their own business. Longoni was involved in the design of trucks and a truck tipping station for Geelong Cement Company, grab transporters for the Footscray Gas Works and Newport Power Station, both in Melbourne, and a floating grab crane for the Melbourne Harbour Trust.

In 1927, the Metropolitan Gas Company completed an all welded coke handling plant at their West Melbourne facility, including a 164 ft long travelling conveyor bridge with a 110 ft clear span between the tracks. Built by the Gas Company, sources differ as whether this facility was designed by Longoni.



All welded Travelling Jib Crane with Grab-bucket. Designed by Albert Longoni & built by Malcolm Moore Ltd in 1930. Source: Robert Bryce & Co.

In 1929, Moore and Longoni applied jointly for a patent for improvements in reclaiming bulk material from bins although the patent does not seem to have been granted. The following year Longoni designed and Malcom Moore built a 75 ton, all-welded jib crane with a 4 cubic yard capacity and an 80 foot radius, for a coal storage yard at West Melbourne Gas Works. However Longoni retained a distinct business identity forming a new consulting engineering practice, Longoni, Seggel & Co. P/L in 1930. A third director of Longoni Seggel was AGM Michell.

Coal Unloaders and Conveyers, Metropolitian Gas Works, West Melbourne, 1933. Designed by Albert Longoni, built by Malcolm Moore Ltd. Source: Malcolm Moore Ltd.

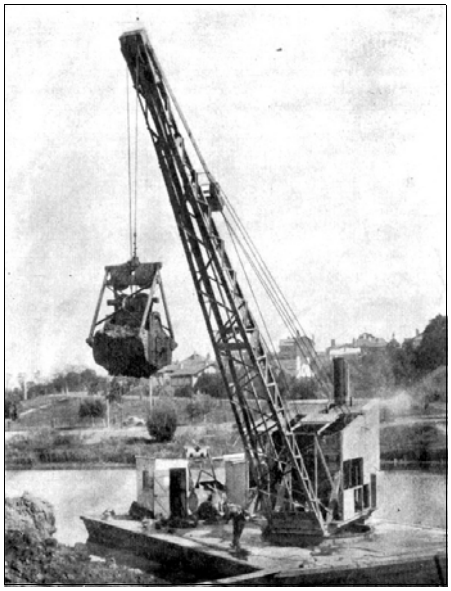
In May 1932, the Metropolitan Gas Company accepted a tender by Malcolm Moore to deliver a pair of grab bucket cranes to unload up to 200 tons per hour of coal from ships moored at North Wharf adjacent to the West Melbourne works. The system then transported the coal over a roadway via a conveyor and distributed it around the storage area by means of a gantry conveyor that rotated about a verical axis. Malcolm Moore Ltd retained the services of Albert Longoni for this project via an incentive-based contract. Tenders had been sought from leading British firms and Malcolm Moore was the only Australian company to submit a proposal. At the time the two unloading cranes were thought to be the largest in the world to be all arc welded.

The sense of occasion when the coal loading system was started up before the assembled dignitaries in November 1933 was captured by a reporter. *With true engineering nonchalance, Mr A. J. Longoni, supervising engineer for Malcolm Moore Ltd., who installed the plant, blew a little whistle at North Wharf yesterday and set in motion the new mechanical coal-handling machinery of the Metropolitan Gas Co. As 40 tons of coal were lifted by the grab and belt-conveyed to the West Melbourne Gasworks, to the delight of 160 engineers and gas experts, Mr Longoni told me this was not the first time he had watched such a performance, for my* [Longoni's] *job is to get things moving in just this way.*[11]

10 Albert Longoni, *Welds under Dynamic Loading, The Modern Engineer*, July, 1934.

11 *Herald (Melbourne)* 17 November 1933, p 6.

On the back of the success of this project, Malcolm Moore Ltd built comparable coal handling systems for Australian Gas Light at their Mortlake, Sydney works and also for the North Shore Gas Company at Waverton in Sydney. In 1936, Longoni joined the board of Malcolm Moore Ltd and became their chief designer. This core capability in large conveyor and stacker systems would later be deployed in electricity generation, steel making and metals production around Australia. Arguably it was orders for cranes and conveyor systems that carried the company through the depression years.



All arc-welded Floating Grab Crane, designed by Albert Longoni, manufactured by Malcolm Moore, 1928. Source: Malcolm Moore.

The cover of Longoni's 1934 book. Source: Longoni family.

Sharing Their Expertise

As this success ensued, both Longoni and Moore engaged in activities to share the knowledge each had gained through their careers. In 1934, Longoni published a book on the use of arc welding in structural design, targeted at engineers who were familiar with rivetted and bolted design in structural steel design but were transitioning to arc-welded joints. This was not his first foray into sharing his expertise. Back in 1917, he and Metes gave a paper at the Queensland Institute of Engineers in Brisbane on the manufacture of cement (before IEAust was founded in 1919). His new role at Malcolm Moore meant that Longoni was no longer just a contract designer, but played a critical role in sharing his design expertise more broadly within the company and enhancing its in-house design capability.

During the Second World War, Moore contributed his technical and manufacturing know how as a member of the Australian Army Mechanisation Board. His experiences in munitions production in Glasgow during the First War influenced Moore's views on the responsibilities of employers and employees to achieve an effective workplace. It is not surprising then that he was one of a group of Melbourne industrialists, led by John Story of GM Holden, that fostered the introduction in 1938 of a course on foremanship and management at the Melbourne Technical College (now RMIT University). This initiative evolved into the Institute of Industrial Management (1941) and later the Australian Institute of Management (1949). Moore became its President between 1956 and 1958. He made significant financial donations to the Institute and a third of his estate went to support management education.[12]

Malcolm Moore photographed in 1960. Source: Monash University Archives.

Changing of the Guard

In 1946, Malcolm Moore Ltd underwent a major restructure. A holding company, Malcolm Moore Industries, was floated and the existing tractor and general sales side of the business was separated from the manufacturing operations. By 1952, the group had five operating divisions each focused on a distinct product category; Moore Crane and Engineering Company Ltd; Springvale Conveyor and Engineering Company Ltd; Associated Earth Move Pty Ltd; Power Farming Equipment Pty Ltd; and Moore Hydraulics Ltd. This was a vastly different organisation to the one that existed when Moore and Longoni first met. Longoni was convinced that the growing, diversified company would have been better served by being reorganised on the basis of manufacturing operations rather than by product types. He also advocated strongly for the need to bring the design function of the group into a single, organic whole and to maintain this until separation proved to be absolutely necessary and practicable.

Malcolm Moore relinquished his position as Chair of the group although he retained a seat on the Board in 1952. Two years earlier he had stepped away from his day to day role as Managing Director. This enabled him to devote more time to pursue his passion for management education and his long association with the Royal Flying Doctor Service. Albert Longoni died in 1954 aged 65. An era had ended.

12 http://adb.anu.edu.au/biography/moore-malcolm-stewart-11154

Malcolm Moore & Albert Longoni

Moore and Longoni brought an innovative approach to the design of plant and equipment, achieved through a mixture of functional improvements made to existing technology, adaptations that increased the productivity of equipment and the early adoption of new fabrication techniques. As a prominent industrialist whose company carried on his name, long after his passing in 1969, Malcolm Moore is still remembered today by many. However, the name Albert Longoni had almost been lost to history.

Acknowledgements

The author wishes to thank the grandchildren of Albert Longoni who made available many of his documents and photographs. The array of information assembled by Greg Keane on Malcolm Moore, the man and the company, was helpful in the initial phase of this research.

Coal loading facility at the Port of Gladstone, 1954. Built by Malcolm Moore and the last job that Albert Longoni worked on.
Source: State Library Queensland.

Connections

Saving the Barwon River Ovoid Sewer Aqueduct

A Media Release from the recently formed Friends of the Aqueduct, 7th June 2020.

The Friends of Barwon River Ovoid Sewer Aqueduct has been formed in response to Barwon Water's plans to demolish four spans of this unique heritage structure. The Friends believe the aqueduct is of extremely high cultural and heritage significance and is one of the finest early-reinforced concrete constructions still extant in Australia. The 756 metre-long structure dramatically spans the Barwon River floodplain from Breakwater to Marshall, and is outstanding for its aesthetic and engineering qualities. The aqueduct's footbridge formed an important social link in allowing local people to cross the river by foot, bicycle or on horseback – to go to work, school, play sport, or visit friends.

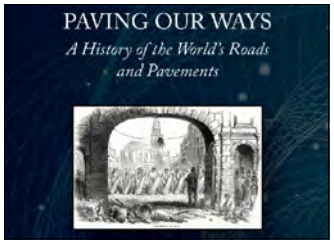
Built in 1913-16, the 14-span reinforced concrete aqueduct was designed by Stone and Siddeley, who were inspired by the celebrated Firth of Forth bridge in Scotland. Coincidentally, Stone and Siddeley also designed Geelong's unique Bow Truss Woolstore using the same techniques. Sadly, that building was controversially demolished in the 1980s. In response to Barwon Water's proposal, the Friends believe there are engineering solutions to provide safe public access under and around the aqueduct, without any demolition. The Friends encourage interested members of the public to join them to *Save the iconic aqueduct*, by visiting our website (see below). The aims of the Friends of Barwon River Ovoid Sewer Aqueduct are to:

1. Advocate for conservation of the Barwon River Ovoid Sewer Aqueduct in its entirety.
2. Provide information to the public about the aqueduct's significance to encourage broad support for the structure's entire retention and preservation.
3. Suggest alternative options for its management and provision for safety, to negate the need for demolition.
4. Explore options and advocate for the future use of the aqueduct and its surrounds.

WEBSITE: https://friendsofbarwonriverovoidseweraqueduct.org EMAIL: barwonaqueduct@gmail.com

Image Right:
The Barwon River Aqueduct.
Source: David Beauchamp.

Connections



Paving Our Ways: A History of the World's Roads & Pavements

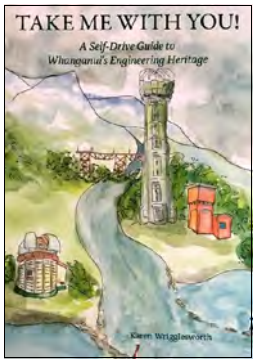
By Maxwell Lay, John Metcalf & Kieran Sharp – three top Road Engineers in Australia.

Paving Our Ways covers the international history of road paving in an interesting, readable and technically accurate way, providing an overview of associated technologies in an historical context. It examines the earliest pavements in Egypt and Mesopotamia and then North Africa, Crete, Greece and Italy, before reviewing pavements used by the Romans in their magnificent road system. The work of Telford and McAdam is examined. Asphalt and concrete slowly improved as paving materials in the second part of the 19th century. Major advances occurred in the 20th century with the availability of powerful machinery, pneumatic tyres and bitumen. The book is comprehensively illustrated, referenced and indexed. It is available via:

https://www.routledge.com/Paving-Our-Ways-A-History-of-the-Worlds-Roads-and-Pavements/Lay-Metcalf-Sharp/p/book/9780367520786

Engineers' Country Weekend at Nagambie, Victoria, in October. Save the Dates - 15, 16 & 17 October 2021.

This casual family weekend for Regional Engineers, Associates and friends will be held in Nagambie and will continue the successful format of previous weekends held throughout Country Victoria for past decades. The weekend will showcase Nagambie and the surrounding area including dinner on Saturday night (16th), plus a Heritage recognition ceremony at the Goulburn Weir (see photo at right) on Sunday morning (17th). An opt-out pre-weekend 'meet-and-greet' is available on Friday night (15th). For more information and a full program contact: David Eltringham at djelt@bigpond.com 0418 147 482 or Martin Duke at fam_duke@yahoo.com 0458 788 747



Take Me with You!

A Self-Drive Guide to Whanganui's Engineering Heritage.

Those of you who are contemplating a visit to New Zealand for the 2021 Australasian Engineering Heritage Conference in November, might find this book a useful addition to your luggage. Whanganui and the surrounding region from Patea to Raurimu to Te Apiti has an enviable engineering and industrial heritage. This engaging book lets you learn about technical marvels hidden in plain sight in the landscape. It includes maps and 40 profiles of places to visit. The book is an Award Winner – for Outstanding Contribution to Heritage, Whanganui Regional Heritage Awards, October 2020. The author, ***Karen Wrigglesworth***, is a mechanical engineer. To buy the book, email to karenwworth@gmail.com or go to: https://karenwrigglesworthwriter.com/take-me-with-you/

Discovery of historic shipwreck SS Wollongbar II

Wollongbar II was a 2,239-ton passenger steamship built by the Lithgows, Port Glasgow in 1922 for the North Coast Steam Navigation Company, as a replacement for the original *Wollongbar* which was wrecked in 1921. She was torpedoed by Japanese Navy submarine I-180 off Crescent Head, New South Wales while in a convoy on 29 April 1943. When she sank, thirty four crew members died and five of her crew waited until they were rescued and taken to Port Macquarie. In 2020 the wreck was discovered by the local community, and its identity confirmed by Heritage NSW. In an ABC broadcast, Tim Smith OAM, a marine archaeologist & Director of Heritage NSW, tells the story of how *SS Wollongbar II* was sunk and then found, after all these years.

https://www.abc.net.au/radio/northcoast/programs/breakfast/wollongbar-ii-wreck/12196542

Building the Charles Bridge in Prague

My son Bruno sent me a link to a clever Animated Video, which shows the Building of Prague's Charles Bridge in the 14th Century – 45 Years (!!) of construction in 3 Minutes. He thought I would like it, and I do – I love it! See: https://www.openculture.com/2020/10/an-animated-video-shows-the-building-of-pragues-charles-bridge-in-the-14th-century.html

The story of a Malcolm Moore Ltd Gantry Crane installed at Midland Railway Workshops in WA in 1947.

Image Above: Malcolm Moore Ltd Gantry Crane on the Coal Dam at Midland Railway Workshops in WA. Coal wagons are at left and the crane's grab bucket is partly obscured behind a post,
Source: History & all images found at: http://railheritagewa.org.au/

The Midland's Gantry Crane was manufactured by Malcolm Moore in Port Melbourne, Victoria, in conjunction with Hoskins Western Australia in 1946. The Gantry Crane has been a prominent feature in Midland since it was first installed at the Coal Dam of the former WAGR Workshops in October 1947. The crane travelled along the length of the coal dam, removing coal from the rail wagons stationed alongside the dam and then dumping the coal into the dam. When coal was required from the dam, the crane was used to reload the rail wagons.

The dam was originally built for water storage, but when it became necessary to store coal on site, its purpose was changed. The coal in the dam came from Collie in Western Australia and was required to be stored underwater to avoid it disintegrating into dust. The dam capacity was 35,000 tonnes. Coal was used to power steam locomotives within the Western Australian Government Railways fleet until steam was phased out by 1971 and replaced with diesel locomotives.

Image at Left: In 1978 the Gantry is hauled out of the Railway Workshop yards and past the impressive Chief Mechanical Engineer's Office.

The Gantry Crane was dismantled and transported by truck to its changed location at the Flashbutt Welding Yard on Elgee Road, Midland, in 1978. The crane has been used to load rail and equipment onto wagons since then. In 2020 it was to be dismantled and used for scrap, ending over 70 years of association with Midland.

Image at Right: The Gantry Crane in its second home at the Flash Butt Welding yards. A nice example (for a time) of conserving and re-using a heritage item.