

# GOLD

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**PROCEEDINGS OF THE  
SOCIETY OF ARCHITECTURAL HISTORIANS  
AUSTRALIA AND NEW ZEALAND  
VOL. 33**

Edited by AnnMarie Brennan and Philip Goad

Published in Melbourne, Australia, by SAHANZ, 2016

ISBN: 978-0-7340-5265-0

The bibliographic citation for this paper is:

**Dennis Wardleworth** "The RIBA Gold Medal of 1923 and London Architecture Medal of 1934: John Burnet and Thomas Tait, Early British Modernism, and the Pylons of Sydney Harbour Bridge." In *Proceedings of the Society of Architectural Historians, Australia and New Zealand: 33, Gold*, edited by AnnMarie Brennan and Philip Goad, 700-709. Melbourne: SAHANZ, 2016.

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## **THE RIBA GOLD MEDAL OF 1923 AND LONDON ARCHITECTURE MEDAL OF 1934: JOHN BURNET AND THOMAS TAIT, EARLY BRITISH MODERNISM, AND THE PYLONS OF SYDNEY HARBOUR BRIDGE**

*In 1923 Sir John James Burnet (1857-1938) received the Gold Medal of the Royal Society of British Architects (R.I.B.A.), an honour given annually to a single architect. In his acceptance speech, he paid particular tribute to his assistants who had become his partners. At this time his practice was called Sir John Burnet and Partners, and his architectural partner was Thomas Tait (1882-1954). Burnet subsequently began to withdraw from an active role in the practice, due to suffering from a severe form of eczema. This left Tait as senior architect and free to explore a more Modernist style, most strikingly in the workers' housing at Silver End (1928). In 1934, Tait received the RIBA London Architecture Medal for the Royal Masonic Hospital.*

*This paper focuses on the period between these two medals. It does so within the context of two other projects undertaken by Burnet and Tait. One was their commission to design war memorials in Egypt, Palestine, and on the Gallipoli peninsula, designs informed by Tait's travelling to Egypt to study pharaonic temple architecture. The other is Tait's work on the pylons for Sydney Harbour Bridge.*

*In 1923, the year of Burnet's gold medal, the final call for bids was issued to design and build Sydney Harbour Bridge. The successful bid was submitted by Dorman, Long and Company and featured Egyptian-style pylons designed by Tait. Thus, this paper also includes an account of why the bridge looks the way it does. Although they were designed in 1923, the pylons were not built until 1931-2, just before Tait received his medal.*

In 1923 the Scottish architect Sir John James Burnet (1857-1938) was awarded the Royal Institute of British Architects (R.I.B.A.) Gold Medal, an award given no more than once a year for outstanding contributions to architecture. At around this time Burnet's practice, Sir John Burnet & Partners, undertook the design of four concrete granite-clad pylons for a proposed arch bridge to span the harbour in Sydney. This design became part of the winning bid submitted by Dorman, Long & Co. of Middlesbrough, U.K., which became the basis for the bridge as it is seen today. This paper reviews how the bridge came to look as it does and how it almost did not happen. It also considers a number of innovative designs undertaken by Sir John Burnet & Partners just before and while the bridge was being built, in order to argue that these designs, including that of the pylons, made a significant contribution to the beginnings of modernism in Britain.

John James Burnet was born in Glasgow, son of the Glasgow architect John Burnet (1814-1901).<sup>1</sup> John James joined his father's office in 1871, and studied at the Ecole des Beaux-Arts in Paris under Jean-Louis Pascal (1837-1920). In 1882 John James became a partner in the practice from which John Burnet senior retired in 1890. In 1903 the practice was selected to design a major extension to the British Museum in London, the King Edward VII Galleries. On the strength of this an office was opened in London. Burnet was a highly esteemed and successful architect with a very modern view of the purpose of architecture. He had travelled widely and had important links with architects in Europe and the U.S.A. For these reasons, along with the buildings he had designed, Burnet was awarded the R.I.B.A. Gold medal.

On receiving his Gold Medal Burnet expressed his "deep sense of indebtedness to all those who have been my assistants ... three being now my partners".<sup>2</sup> The three were Norman Dick (1883-1948), who ran the Glasgow office; David Raeside (1882-1930), chief administrator in the London office, and, of most importance, Thomas Smith Tait (1882-1954). Tait had been born in Paisley, the son of a stonemason. In 1896 he joined the office of architect John Donald (1852?-1917) while studying at Paisley Technical College. In 1903 he won a scholarship to study with the Beaux-Arts architect Eugene Bourdon (1870-1916) at the Glasgow School of Art, just after the first phase of the Rennie Mackintosh (1868-1928) building had been completed. In the same year he joined Burnet as personal assistant, moving with him to the London office in 1905 and continuing his studies at the Royal Academy Schools.

In the period prior to World War I, the London office gained a number of contracts for new buildings and London became the main focus for the practice. The General Accident Assurance Building in the Aldwych (from 1909), a very Edwardian design, was a notable project, as was Kodak House (from 1909), in nearby Kingsway, which marked the beginning of a modern turn for the practice. Pevsner later described it as "an early example in London of that straightforward treatment of a commercial building to which the future belonged."<sup>3</sup>

In 1914, Burnet and Tait parted company. Tait had been secretly moonlighting with the practice Trehearne & Norman. Tait moved to the U.S.A. to work for Donn Barber (1871-1925) but, in 1915, returned to the U.K. to undertake war work at the Woolwich Arsenal. When the War ended Tait returned as a full partner in the practice renamed Sir John Burnet & Partners. Burnet had been knighted in 1914.

Within a year of its formation the practice was engaged in three major projects in central London: an extension to Selfridge's in Oxford Street (1919-1925); Vigo House in Regent Street for the Glasgow-based men's outfitters John Forsyth (1920-1925); and Adelaide House (1919-1925), an office block on the north end of London Bridge. In the London Municipal Archives (L.M.A.) there is an early sketch of Adelaide House dated 1920 signed "John James Burnet" which has tall colonnades, of twelve columns on the London Bridge façade and six fronting the river.<sup>4</sup> There were then a series of four alternative designs into 1921 with perspective drawings signed by Thomas Tait.<sup>5</sup> In the final design all columns were replaced by a simplified façade that reflects the structure of the steel frame in the manner of Louis Sullivan (1856-1924) and the Chicago School. [Fig.1]



FIGURE 1 Adelaide House, London. Sir John Burnet & Partners, 1920-25. (Photo by the author)

When the building was completed in 1925, it attracted favourable attention among architects. Howard Robertson (1888-1963), winner of the Gold Medal in 1949, predicted that it might be greatly disliked “like a piece of modern music” but that “it will delight all those who see in it the promise of something better in commercial architecture.”<sup>6</sup> A.E. Richardson (1880-1964), the proponent of classicism, called it “a remarkable building ... an outstanding example of monumental art” which “cannot but have an exhilarating effect on contemporary work.”<sup>7</sup> H. Charlton Bradshaw (1893-1943) wrote that “It is a business building and it is proud of it.”<sup>8</sup>

The practice was therefore seen as in the forefront of modern design, in a period when British architects were only just becoming aware of developments elsewhere in Europe and U.S.A. Among them was Howard Robertson, an architect travelling widely in Europe, and publishing weekly articles illustrated with photographs by his colleague Frank Yerbury (1885-1970).<sup>9</sup> Robertson also published on Louis Sullivan<sup>10</sup> and his article on the Dutch architect W.M. Dudok (1884-1974) was one of the first published in English.<sup>11</sup> Robertson and Yerbury were also Principal and Secretary of the Architectural Association, a growing teaching organisation, which was influential in bringing a broader awareness of modern design to the attention of British architects. Apart from Burnet and Tait, perhaps the only notable British architect in this early period adopting a modern style stripped of much decoration was Charles Holden (1875-1960), in his headquarters for the British Medical Association (1907), and his work for the London Transport Board, particularly its headquarters at 55 Broadway (1927-9).<sup>12</sup> Towards the end of this period the influence of Dudok and Le Corbusier (1887-1965), whose book was published in English in 1927,<sup>13</sup> became increasingly important.

At the same time Sir John Burnet & Partners was engaged in the construction of war graves and memorials to the missing. As World War I was coming to a close many of the battlefields where millions had died were covered with makeshift graves marked by small wooden crosses. The unprecedented sense of bereavement felt by the people of all nations involved in the War called for special measures of commemoration. In May 1917 an organisation charged with dealing with the remains of the dead on the battlefields was established as the Imperial (now the Commonwealth) War Graves Commission (I.W.G.C. now C.W.G.C.).<sup>14</sup> It quickly established the important principle of equality among the dead, between officers and men, and between everyone in the many nations and religions under the British Crown. Repatriation of bodies was forbidden even for the wealthiest and most influential families. A simple headstone was designed which could be used for all religions. The battlefields themselves or land nearby became the sites of cemeteries. Memorials to the missing were designed and inscribed with the names of those whose bodies could not be found. These were predominantly in the plain classical monumental style, pioneered by Edwin Lutyens (1869-1944) in the Cenotaph in Whitehall (1919). The best architectural talent was selected to design the layout of the cemeteries and the memorials. Sir John Burnet & Partners was assigned battlefields of the Middle East including Gallipoli.<sup>15</sup>

The name Gallipoli has considerable resonance in Australian memory of the War because of the involvement of new recruits of the Australian and New Zealand Army Corps (A.N.Z.A.C.) then stationed in Egypt.<sup>16</sup> The battle aim was to clear the guns guarding the Dardanelles. The Allied Navies thought this would be possible with a purely naval attack. This failed, with the loss of three battleships. A subsequent hastily planned landing of British, French, Indian and A.N.Z.A.C. troops on the Gallipoli peninsula also failed, with considerable casualties. It was widely perceived in Australia that the failure was due to incompetence in the British High Command.



Fig. 2. Lone Pine Memorial, Gallipoli. Sir John Burnet & Partners, 1922-24. By Jorge Lásca from Australia (Lone Pine Cemetery) [CC BY 2.0 (<http://creativecommons.org/licenses/by/2.0>)], via Wikimedia Commons.

In 1919 Burnet and Raeside went to Gallipoli to survey and plan the layout of the graves.<sup>17</sup> Tait went to Egypt to plan and design a memorial to Indian troops at the southern entrance to the Suez Canal at Port Tewfik.<sup>18</sup> It is very likely that he also took the opportunity to study Egyptian temple architecture. The memorials in Gallipoli were probably designed by Tait with oversight by Burnet.<sup>19</sup> That at Cape Helles, the main Allied landing point, is a sober obelisk. That at Lone Pine, site of one of the bloodiest battles involving ANZAC troops, takes the form of an Egyptian temple gate or pylon. [Fig.2]

In this same period in 1922-3 Sir John Burnet & Partners was invited to participate in preparation of a design for a bridge over Sydney Harbour.<sup>20</sup> The key figures in the development of a design were John Jacob Crew Bradfield (1867-1943), Chief Engineer for the project on behalf of the New South Wales (N.S.W.) Government; Ralph Freeman (1880-1950), consulting engineer of Sir Douglas Fox & Co; Charles Frederick Dixon (1859-1923), chairman of the Cleveland Bridge & Engineering Co. of Darlington, U.K.; and Thomas Tait. The idea of bridging the harbour had been first suggested in 1825 by Francis Howard Greenway (1777-1837).<sup>21</sup> But it was not until 1908 that a Royal Commission was appointed to consider the engineering options. It recommended a cantilever bridge. Bradfield was appointed in 1912 as engineer-in-chief for the City Transit with a remit to build the bridge. In 1914 he went on a global fact-finding tour to look at the latest in bridge designs. War intervened. In January 1921 the N.S.W. Parliament at last authorised the calling of tenders for a cantilever bridge, a call issued in September.<sup>22</sup>

On receiving the call Dixon contacted Freeman and asked him to work up a cantilever design on behalf of Cleveland.<sup>23</sup> Freeman agreed but only on condition that he would be allowed also to develop an alternative arch design which he regarded as more suitable for the site. The idea of a steel arch design was relatively new. The bowstring truss had been patented by the American engineer Squire Whipple (1804-1888) in 1841.<sup>24</sup> One early example of the form was the High-Level Bridge in Newcastle, U.K. (1849), a joint road-and-railway bridge spanning the Tyne, designed by the railway engineer Robert Stephenson (1803-1859).<sup>25</sup> Stephenson's series of short spans set on piers reflected limitations on span size imposed by steel technology of the time. The real breakthrough was the Hell Gate Bridge, a

**Dennis Wardleworth** The RIBA Gold Medal of 1923 and London Architecture Medal of 1934: John Burnet and Thomas Tait, Early British Modernism, and the Pylons of Sydney Harbour Bridge

single span railway bridge in New York using modern steel, designed by Gustav Lindenthal (1850-1935) and completed in 1916. [Fig.3] The length of the span was similar to that required for Sydney. Lindenthal's design was of an arched span with towers at both of its ends. Because the arch is self-supporting, the towers were unnecessary. Freeman did not want towers for the Sydney Bridge<sup>26</sup> but Dixon did. So, because Freeman refused to design them, John Burnet was contacted and the task was given to Tait.<sup>27</sup> Freeman's company, Sir Douglas Fox & Co., already had connections with Sir John Burnet & Partners having worked as structural engineers on Adelaide House.<sup>28</sup>



FIGURE 3 Hell Gate Bridge, New York. Gustav Lindenthal, 1912-16. By rob zand (Flickr: Hell Gate Bridge / cricket) [CC BY-SA 2.0 (<http://creativecommons.org/licenses/by-sa/2.0>)], via Wikimedia Commons.

The Hell Gate Bridge towers are in a Victorian Classical style but resemble entrances to a Norman castle. Tait's design was for two separate towers at each end of the span for Sydney Harbour. Their style reflects his study of Egyptian temple entrances and echoes his design for the Lone Pine Memorial in Gallipoli. For their construction, he chose to use a very new material, pre-stressed concrete, clad with granite.<sup>29</sup> Because they have no engineering function they are very large, decorative abstract sculptures whose height of 87 metres rises almost to that of the steel arches. They are truly adventurous, modern pieces of design. James Weirick has pointed out that because of the design connection with Gallipoli they are also a secret memorial to the soldiers of A.N.Z.A.C. "They stand as sentinels on the massive batters of the abutment towers – at once timeless monuments in the tradition of city walls and city gates, products of their time, as memorial markers of the British Empire, and pointers to the future, as proto-skyscrapers, rising above the wharves and warehouses of the port city."<sup>30</sup>

In parallel Bradfield was also thinking of an arch bridge.<sup>31</sup> On his 1914 travels he had seen the Hell Gate Bridge under construction, and had spent some time during the War considering this form of design and persuading himself of its practicality. On 16 March 1922, after issuing the call for tenders, he embarked on another world tour visiting companies who had shown an interest in bidding for the work. He visited New York and saw the completed Hell Gate Bridge. He visited the office of Lindenthal, who was preparing a design for a suspension bridge for Sydney for the McClintic-Marshall company. In the U.K. he visited Dixon in Darlington without meeting Freeman. Dixon pressed Bradfield to include the possibility of an arched bridge.<sup>32</sup> Bradfield may have seen perspective drawings similar to those prepared by Cyril A. Farey (1888-1954) [Fig.4] for Sir John Burnet & Partners. At the end of this tour Bradfield was very enthusiastic for an arch bridge. Before returning on the S.S. Diogenes he sent a cable to Sydney asking for the deadline for tenders to be extended.<sup>33</sup> He spent much of the time on his homeward voyage making calculations of an arch design to convince himself again of its practicality.<sup>34</sup> He arrived back on 29 September 1922 and persuaded the N.S.W. Government to allow the revised call for tenders to include the arch option.



FIGURE 4 Tender A3. Proposed Arch Bridge across Sydney Harbour. Cyril A. Farey, 1923. (State Records NSW, NS 17137. Courtesy of SRNSW.)

The revised call was issued on 17 January 1923. Within the specification Bradfield wrote: "Tenderers must distinctly understand that although cost will very largely be the determining factor ... the aesthetic appearance of all details of the Bridge and Approaches will receive due consideration."<sup>35</sup> Later in the year there was a setback which endangered this vision. On 25 September 1923, Dixon unexpectedly died.<sup>36</sup> Almost immediately the board of Cleveland Bridge decided to withdraw from tendering. Bradfield saw the possibility of the arch bridge he now wanted disappearing. He cabled Cleveland Bridge asking them to reconsider, pointing out that he had included the arch bridge in the tender specifically at Dixon's request.<sup>37</sup> Freeman also moved very quickly. He contacted Lawrence Ennis (1871-1938), general manager of Dorman Long's Middlesborough Steel works; Sir Hugh Bell (1844-1931) the Chairman of Dorman Long; and the influential board member Sir Arthur Dorman (1848-1931), to persuade them to take up the design that he and his team by then had completed. On 9 October Bell and Dorman in turn persuaded the Dorman Long board. Ennis was present at the board meeting and showed "the Architect's plans of the bridge" probably including the Farey watercolours.<sup>38</sup> The board agreed. A Dorman Long team, including Ennis, would travel to Sydney to negotiate directly with Bradfield. This was a crucial decision. Without it Freeman's arch and Tait's pylons may never have been built.

Dorman Long was not at that time a bridge builder but a steel maker. The alacrity with which they took up the Sydney Bridge tender might have been determined by an opportunity to sell more steel in times of business difficulty. Before the end of the year Ennis, now in Sydney, was assigned power of attorney to act on behalf of the company.<sup>39</sup> Freeman and his team including Tait were retained to work on the bid. At the board meeting on 11 March 1924 the Chairman announced that the company's tender for £4,217,721 had been accepted and would be signed by Ennis within days.<sup>40</sup> Ennis was made responsible for overseeing the construction of the bridge. In October Bradfield was in Middlesborough inspecting the steel works and expressing his confidence in the company's ability to carry out the contract.<sup>41</sup>

The lowest cost bid of all those submitted had been Dorman Long's for an arch bridge without pylons at £3.45 million.<sup>42</sup> They had submitted seven designs altogether, variants on arch and cantilever, with and without pylons. Bradfield's selection of an arch with granite-faced pylons was £4.22 million. Thus the cost of Tait's decorative pylons was about three-quarters of a million pounds, or roughly £40 million in today's money. In a paper submitted to an Institute of Civil Engineers (I.C.E.) conference in London in 1934 Bradfield justified this choice. "The Bridge would be the most distinctive feature in the skyline of the Mother City of Australia ... a steel arch springing from skewbacks small and out of all proportion with the massiveness of the steelwork would have been a utilitarian and unhandsome structure."<sup>43</sup>

In the 1934 I.C.E. conference Freeman repeated his assertion that he preferred the design without the pylons.<sup>44</sup> He also stirred up the still simmering controversy about who designed the bridge, Bradfield or Freeman.<sup>45</sup> On reading the

**Dennis Wardleworth** The RIBA Gold Medal of 1923 and London Architecture Medal of 1934: John Burnet and Thomas Tait, Early British Modernism, and the Pylons of Sydney Harbour Bridge

minutes of the conference Ennis wrote to Freeman that “Bradfield will come back at you; this I presume you expect.”<sup>46</sup> He also wrote “I do not quite agree with the remark that the Sydney Harbour Bridge would have looked better without any pylons.” Ennis, in Sydney when Bradfield was making up his mind about the Bridge, strongly supported the pylons and may have helped stiffen Bradfield’s resolve to include them in spite of the extra cost.

Because they had no structural purpose the pylons were the last part of the bridge to be built, so it was almost ten years before Tait’s design began to be seen in full. Meanwhile, his growing reputation as a modern architect was based on other work. In 1926 F.W. Crittall (1860-1935), managing director of the steel-framed window manufacturer Crittall’s, decided to build a new factory and housing for its workers in Silver End, a village just outside Braintree in Essex.<sup>47</sup> He commissioned a number of different architects to design different parts of the village. Among these were Sir John Burnet & Partners, who used Crittall windows in designs for Vigo House, Adelaide House and elsewhere.



FIGURE 5 Wolverton, Silver End. Sir John Burnet & Partners, 1928. (Photo by the author.)

By now Burnet was approaching seventy and suffering from bad eczema, which made it impossible for him to draw. He almost completely retired from the business, leaving Tait to be the leading designer. Tait worked on the Crittall contract with a young architect Frederick MacManus (1903-1985)<sup>48</sup> Together they produced some of the most remarkable housing in Britain in the 1920s, with exteriors that were cubic, flat-roofed and white, with a minimum of ornament. Interiors were simple and functional. The architects had wanted to use concrete for construction but bowed to Crittall’s desire to use his in-house workforce, whose expertise was only in brick. The bricks were rendered white. They started with three larger houses for the factory managers, Le Chateau, Craig Angus, and Wolverton, followed by Silver Street, terraced housing for the factory workers, (all started in 1927). [Fig.5] Tait designed the first, and then supervised MacManus who designed the rest. Tait might have been influenced by the Sevensteyn Country House (1920-21) by Dudok.<sup>49</sup> MacManus was influenced by the only modernist house so far built in the U.K.: New Ways, built in Northampton in 1926, was designed by the German architect Peter Behrens (1868-1940). With Silver End, Tait and Sir John Burnet & Partners became established as modernist architects, with the housing featured in many contemporary books published throughout Europe.<sup>50</sup> Within the practice, Tait took over from Burnet the role of mentoring younger architects, and concentrated himself on the wealthiest clients and largest projects.





FIGURE 6 Royal Masonic Hospital, Ravenscourt Park, London: the Entrance to the Administration Block. Burnet, Tait & Lorne, 1928-1934. (From RIBA Image Library 15666. Photo by Alfred Edward Henson. Reproduced by permission of the RIBA.)

Tait's final modernist project before the Sydney Harbour Bridge was completed was the Royal Masonic Hospital in Ravenscourt Park, London (started 1929).<sup>51</sup> [Fig.6] Following the new ethic of light and sunshine as the way to health, it was a revolutionary hospital design, with large (Crittall) windows and cantilevered concrete sun balconies. Great care went into consulting the professional medical staff in designing the layout of facilities within the building.<sup>52</sup> The initial design was quite conservative.<sup>53</sup> But the final design externally was Dutch modernism, after Dudok [Fig.7]. In her 1982 review of the building, Susan Gold wrote: "From Dudok comes the massing, the very use of brick, the broad unpunctuated expanse of surface between windows and roof, the interpenetrating volumes, the play of light and shade on cantilevered projections, the slab and ball entrance canopies."<sup>54</sup> The building was much admired and was awarded the R.I.B.A. London Medal for 1934.



FIGURE 7 Hilversum Town Hall. Willem Marinus Dudok, 1924-31. (Photo by the author.)

**Dennis Wardleworth** The RIBA Gold Medal of 1923 and London Architecture Medal of 1934: John Burnet and Thomas Tait, Early British Modernism, and the Pylons of Sydney Harbour Bridge

When Tait went to receive the medal he was accompanied by his new partner, Francis Lorne (1889-1963).<sup>55</sup> Raeside had died. Burnet had retired. A Scottish architect, Lorne had worked briefly for John Burnet before World War I, then spent over a decade working in the U.S. Tait invited him to join a practice now called Burnet, Tait & Lorne, which continued as one of the most successful based in London in the 1930s.

Sir John Burnet and Partners were at the forefront of early British modernism in the 1920s, following the awarding of the R.I.B.A. Gold Medal to Burnet. Their designs for Adelaide House, Silver End, and the Royal Masonic Hospital showed awareness of developments in Europe and the U.S. This period, a particularly creative one for the practice, was when the pylons for the Sydney Harbour Bridge were designed. Because of their similarity to the Gallipoli memorials, Tait's pylons can be read as a tribute to the A.N.Z.A.C. soldiers who died there.

## Endnotes

- 1 Biographical material from the Dictionary of Scottish Architects, <http://www.scottisharchitects.org.uk/>. See also David Walker, "Monumental Modernist," *R.I.B.A. Journal*, 98 (August 1991): 20-5.
- 2 "The Royal Gold Medal," *R.I.B.A. Journal*, 30 (June 1923): 154. In his introduction, the President of the R.I.B.A. cited both Burnet's London and his earlier Scottish work.
- 3 Nikolaus Pevsner and Bridget Cherry, *The Buildings of England: Volume One, The Cities of London and Westminster* (London: Penguin, 1996), 366.
- 4 London Municipal Archive (L.M.A.), GLC/AR/BR/046401/01. Drawing dated 21 August 1920.
- 5 J. Emberton, "Adelaide House," *The Architect* 113 (9 January 1925): 24-30. Tait's final drawing is in the L.M.A., GLC/AR/BR/046401/02. Drawing dated 15 February 1921 and stamped "Approved 4 July 1921."
- 6 Howard Robertson, "Two Great London Buildings of 1924," *The Architects' Journal* 61 (January 1925): 4-12.
- 7 A.E. Richardson, "Adelaide House," *The Builder* 127 (1925): 712.
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- 9 Some of these were published as a collection, such as Howard Robertson and F.R. Yerbury, *Travels in Modern Architecture 1925-1930* (London: Architectural Association, 1989).
- 10 Howard Robertson, "The Work of Louis H. Sullivan," *Architects' Journal* (18 June 1924): 1004.
- 11 Howard Robertson and F.R. Yerbury, "A Theme with Variations: the Hilversum schools of W.M. Dudok," *Architect and Building News* (6 February 1931): 216-19.
- 12 Eitan Karol, *Charles Holden Architect* (Donington: Shaun Tyas, 2007).
- 13 Le Corbusier, *Towards a New Architecture*, trans. Frederick Etchells (London: Rodker, 1927).
- 14 The C.W.G.C. website contains a copy of the Kenyon Report (1918) which sets out the principles by which they acted. [http://www.cwgc.org/media/394562/the\\_kenyon\\_report.doc/](http://www.cwgc.org/media/394562/the_kenyon_report.doc/).
- 15 C.W.G.C. Archive, Section 7E, file 408, contains an account of Burnet and Raeside's meeting with the I.W.G.C. in 1921. Burnet's contract is in Section 9, file 615, dated 16 October 1923.
- 16 Tim Travers, *Gallipoli 1915* (Stroud: Tempus, 2009).
- 17 C.W.G.C. Archive, Section 7E, file 408 contains an account of Burnet and Raeside's visit to the Middle East in 1919.
- 18 The only written evidence that Tait went to Egypt is in his application to become a Fellow of the R.I.B.A. in 1925, a copy of which is in his biography file in the R.I.B.A. Library in London, which lists Egypt among the countries he had visited.
- 19 In his Fellowship application Tait lists the Cape Helles Memorial as a building on which he worked.
- 20 J.J.C. Bradfield, *Sydney Harbour Bridge: Report on Tenders* (Sydney, 1924): 17, is the first mention of Sir John Burnet & Partners involvement in the design work. This document is in the Mitchell Library, Sydney. ML Q624.35/1A1.
- 21 Bradfield, *The Sydney Harbour Bridge* (1921) (State Records NSW, NRS 15438): 1.
- 22 (State Records NSW, NRS 15464) is a copy of a paper by Bradfield, *The Sydney Harbour Bridge and Approaches*, a paper given at a Conference in London of the Institute of Civil Engineers (I.C.E.) in 1933. This was also published in *The Minutes of the Proceedings of the Institute of Civil Engineers* 238 (10 April 1934): 310.

- 23 Ralph Freeman, in *I.C.E. Proceedings*: 433.
- 24 Dan Cruickshank, *Dan Cruickshank's Bridges: heroic designs that changed the world* (London: Collins, 2010), 37.
- 25 Cruickshank, *Bridges*, 179.
- 26 *I.C.E. Proceedings*: 429.
- 27 Tait's Fellowship application included the Sydney Harbour Bridge among his list of buildings. See also *I.C.E. Proceedings*: 429, where Freeman spoke of "a debt which Sydney owed to Sir John Burnet and his partner Mr Thomas Tait."
- 28 Nikolaus Pevsner and Simon Bradley, *The Buildings of England: London, Volume One, The Cities of London and Westminster* (London: Penguin, 1999), 539.
- 29 "Sydney Harbour Bridge," Supplement to *The Architects' Journal* 71 (8 January 1930): 80.
- 30 A review of Caroline Mackaness, *Bridging Sydney* (Sydney: Historic Houses Trust, 2006) by James Weirick, *Architecture Australia* 96, no. 2 (2007): 29-31.
- 31 Bradfield, (State Records N.S.W., NRS 15464): 14.
- 32 Freeman, *I.C.E. Proceedings*: 143.
- 33 Bradfield, *Report of Chief Engineer's visit abroad 16 March to 29 September 1922 to interview Tenderers* (State Records NSW, NRS 15461): 74.
- 34 Bradfield, *Estimate for Arch Bridge prepared on S. S. Diogenes 15 September 1922* (State Records N.S.W., NRS 15461).
- 35 Bradfield, *Contract for the Construction of a cantilever Bridge or an Arch Bridge across Sydney Harbour from Dawes Point to Milson's Point, Sydney, New South Wales, Australia* (State Records N.S.W., NRS 15459): 16.
- 36 Dixon died on 25 September 1923. See [http://www.gracesguide.co.uk/Charles\\_Frederick\\_Dixon/](http://www.gracesguide.co.uk/Charles_Frederick_Dixon/).
- 37 Freeman, *I.C.E. Proceedings*: 434.
- 38 *Minutes of Directors' Meeting 9 October 1923* (Dorman Long Minute Book No. 5. Tees-side Archive, Middlesborough): 247.
- 39 *Minutes 21 December 1923*: 262.
- 40 *Minutes 11 March 1924*: 274.
- 41 *Minutes 15 October 1924* (Minute Book 6): 11.
- 42 Bradfield, *Report on Tenders*: 28.
- 43 Bradfield, *Bridge and Approaches*: 14-15.
- 44 Freeman, *I.C.E. Proceedings*: 429.
- 45 Started by Freeman, "Harbour Bridge: Designer's Story," *Sydney Morning Herald*, 11 March 1929.
- 46 Letter Lawrence Ennis to Ralph Freeman dated 22 January 1934 (Dorman Long Correspondence File, Tees-side Archive).
- 47 Robin Carpenter, *Mr Pink: The Architectural Legacy of W.F. Crittall* (Chelmsford: Essex County Council, 2007).
- 48 Frederick MacManus, 'Some Recollections of My Early Architectural Years', 1985, unpublished typescript, private collection.
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