

**EMINENT
QUEENSLAND
ENGINEERS**

Volume II

**Editor
Geoffrey Cossins**

Eminent Queensland Engineers Volume II

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Geoffrey Cossins**

**Cover picture: Doctor J.J.C. Bradfield
Photograph by courtesy of
Ipswich North State School.**

**The picture was donated by Bradfield to
the school with the caption:-**

**"J.J.C. Bradfield, C.M.G., D.Sc.Eng., D.E., M.E.,
M.Inst.C.E. M.Inst.E.A.**

**Was taught his Alphabet and received the whole of his
Primary Education at the North Ipswich State School 1872 – 1880."**

**The Institution of
Engineers, Australia
Queensland Division
1999**

EMINENT QUEENSLAND ENGINEERS II

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TABLE OF CONTENTS

	PAGE
INTRODUCTION	3
CONTRIBUTORS	6

BIOGRAPHIES

1. R Ballard	10
2. Sir Charles Barton	12
3. G O Boulton	14
4. A Boyd	16
5. J J C Bradfield	18
6. H G Brameld	20
7. F H Brazier	22
8. F J Byerley	24
9. C M Calder	26
10. G F Cardno	28
11. W J Doak	30
12. J W Dowrie	32
13. D Fison	34
14. A C Fitz-Gibbon	36
15. E B Freeman	38
16. A E H Frew	40
17. D J Garland	42
18. F B Haigh	44
19. W Hansen	46
20. J Hesketh	48
21. J W Hetherington	50
22. W Highfield	52
23. P W Hill	54
24. Sir James Holt	56
25. J F Keays	58

26.	R D King-Scott	60
27.	Professor J H Lavery	62
28.	J S Louttit	64
29.	H A Lowe	66
30.	A McCulloch	68
31.	Professor G R McKay	70
32.	A C Macmillan	72
33.	R J McWilliam	74
34.	J E G Martin	76
35.	J C Mathison	78
36.	I W Morley	80
37.	J E Morwood	82
38.	J Mulholland	84
39.	W A Peak	86
40.	K G Pennyquick	88
41.	G Phillips	90
42.	R H Rudge	92
43.	R E Sexton	94
44.	Professor M Shaw	96
45.	W G Sheil	98
46.	E M Shepherd	100
47.	C R Tranberg	102
48.	G R Wilmoth	104
49.	C H Wilson	106
50.	J Wilson	108
51.	R M Wilson	110
ABBREVIATIONS		112

INTRODUCTION

The public is justifiably excited by engineering works. Witness the crowds who walked over the Gateway Bridge or through the new tunnels from Central to Brunswick Street prior to their commissioning, or across the Story Bridge on the 50th Anniversary of its commissioning. Watch tourists wandering over colossal remains at Mount Morgan Mine. Think of the pressures on the public to buy and use the newest products of electronics and communications engineering.

A journalist might ask, "Who thought of building this project?". The citizen might want to know "How is something like this done?". A school child is sure to want to know "How do I get to do these great things?". When people ask these questions they often get no reply because we engineers rarely boast about our work, neither do we trumpet the reputations of our best practitioners.

This book attempts to show eminent engineers in context, and through their life stories we get a glimpse of what engineers do, how they operate, how they became engineers, their successes and, in some cases, their failures.

The Context

The European settlement of Queensland started with a convict settlement in Redcliffe in 1824. This was moved to the central location of present Brisbane a year later. Army officers provided engineering services until a civilian engineer, Andrew Petrie, was appointed. The situation changed in 1842 with free settlement and the withdrawal of the convicts. The Petrie family and a few others then provided engineering services, mainly to the small private sector, because the New South Wales Governor provided little money for capital works. Steam driven sawmilling was the major secondary industry development requiring engineering services until the separation of Queensland from New South Wales in 1859.

The new Queensland Government adopted a vigorous policy of infrastructure development to match the decade start of the southern Colonies of Australia. Railways, stretching westwards from ports to the pastoral areas, absorbed seventy percent of the public loan funds until the end of the century. A telegraph system rapidly linked the major towns, major rivers were bridged and major towns reticulated with water. Many of these activities utilised well developed engineering technologies, largely imported from abroad, and already utilised elsewhere in the continent. Apart from the traditional materials, timber, bricks, mortar and building stone, virtually all engineering materials and equipment had to be imported.

Engineering numbers grew rapidly. All the early Queensland engineers were British migrants. Most had been articled, that is, apprenticed, to established engineers and had gained experience before arriving in Queensland, but a few others worked up from the ranks or learnt on the job. Most were accepted as members of the Institution of Civil Engineers (established in London in 1817).

Five of the engineers included in this volume practised during the period of colonial Queensland. They were succeeded by thirteen in this volume who had developed skills to cope with the changing technology required for electricity supplies, advanced methods of mineral processing, steel bridges, urban tramways, reinforced concrete etc. They were able to take advantage of the local capacity to fabricate structural sections, to make sugar milling machinery and to build locomotives, ships and steel bridges. Many of the engineers were migrants, but the number who were Australian born became significant. Most of this group of engineers had formal training, largely gained in

Australia, and two had Australian university degrees. They mostly practised from 1880 to 1940. They were at the forefront of the major engineering developments in the State, particularly when the Queensland Government moved its transport policy from railways to highways in 1922, with the requirement that spending be supervised by local authorities. Several engineers celebrated in this book took the opportunity of establishing themselves as consultants providing overall ongoing engineering services to local authorities. The early engineers of this group had to contend with the severe Australia wide depression of the 1890s, which, in Queensland, was followed by a major drought. A decade later World War I (1914-18) restricted imports of materials and equipment.

The third group of thirty-three engineers were almost all Australian born between 1890 and 1910. Almost all had university degrees, some from Queensland University, and all entered the profession in the 1920s. They were hardly established before the Great Depression of the 1930s severely curtailed engineering expenditures. World War II followed immediately, again imposing supply difficulties, while the majority of the Queensland profession was diverted to provide facilities for the Armed Forces as Queensland became the major base for both US and Australian Services.

The combination of the depression and the war resulted in a large backlog of engineering works to be overcome in the face of material and labour shortages while consumer demands for services rose rapidly. Central power stations in cities replaced scattered small plants while large dams were built for both urban water supplies and irrigation. Sewerage and water supply schemes, previously restricted to large cities, were constructed in virtually all towns. This period extended up to the 1960s when the backlogs of work were overcome.

The next phase saw the provision of regional power stations built at coal fields and connected to the load areas by high voltage transmission lines. Television services, automatic trunk telephone dialling, freeways, beef roads and major airports were built. Steam locomotives were replaced with diesel electric and later electric units. Computers started to have a significant impact. The engineers of this third group practised generally into the 1980s overseeing these changes.

The Book

The first edition of Eminent Queensland Engineers (EQEI), with thirty-four biographies, was compiled by a sub-committee of the then Engineering Heritage Committee of the Queensland Division of the Institution of Engineers, Australia (IEAust).

In 1997 the Heritage Panel of the Queensland Division appointed a sub-committee to continue the work by the compilation of Eminent Queensland Engineers Volume II (EQEII). This second sub committee adopted similar guidelines for the choice of entries, in this case limiting the choice to engineers deceased before 1995 to conform with the rules of the Australian Dictionary of Biography, and requiring that the more recent engineers should have had sufficient qualifications for admission to the IEAust.

There were doubtless several qualifying eminent Queensland engineers of whom the sub-committee was not aware. Incomplete biographical material collected by the first sub-committee provided one source of data. Appeals were made for suggestions (and material) for other biographies. The resultant suggested names were both interesting and puzzling. EQEI had, in its time, been criticised for having a preponderance of civil engineers in its entries (17 civil, 7 electrical, 9 mining and 1 mechanical). On the other hand EQEII has ended up with an even greater proportion of civil engineers (41 civil, 6 electrical, 2 mechanical and 2 mining) in spite of numerous appeals for

more recommendations of other than civil engineers. The overall response was to inundate the sub-committee with more civil engineering candidates.

Why is this so? Is it because civil engineers largely leave visible monuments of their work compared with the others? It may appear to the public in this way but we were canvassing the engineering profession itself. Is it because electrical and mechanical engineers now work in teams, so that no one individual becomes prominent? This is just as true of civil engineers.

The introduction to the first volume queried the definition of an eminent engineer. The second sub-committee echoes the question. Undoubtedly, some of our selections are truly eminent in terms of the overall profession in Australia, whilst others carried out distinguished work in their own locality.

Of the 41 civil engineers included in this volume, eleven became consulting engineers after a variety of beginnings – largely in public services. Nine of the candidates were structural engineers, six specialised in either road works, water supplies or in the broad range of local government engineering. Three ended up as academics after starting in public services.

Three of the six electrical engineers worked for one private company, one for an equivalent local authority, one became an academic and one was a telegraph engineer. Of the two mechanical engineers, one became an academic, and the other operated a successful business. One candidate with a mechanical engineering degree became a successful local authority engineer in principally the civil engineering area.

Only two outright mining engineers are represented, although one of the civil-trained engineers became the General Manager of Mount Morgan Mine Ltd.

It could be claimed that the composition of the editorial sub-committee influenced the proportions of the different branches of the profession included in the volume. Through various circumstances the majority of the data gathering was carried out, without bias, by two civils, an electrical and a mechanical engineer, but the bias towards civil engineering in the entries far exceeds this rate.

The Challenge

The sub-committee invites suggestions (and supporting material) for a third volume of Eminent Queensland Engineers. This will not be published for some years but we should start gathering material now.

Our grateful thanks are due to the many people who generously gave their time and advice on this project and, in particular, the staff of the Queensland Division Office of the Institution.

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Brisbane.

August 1999.

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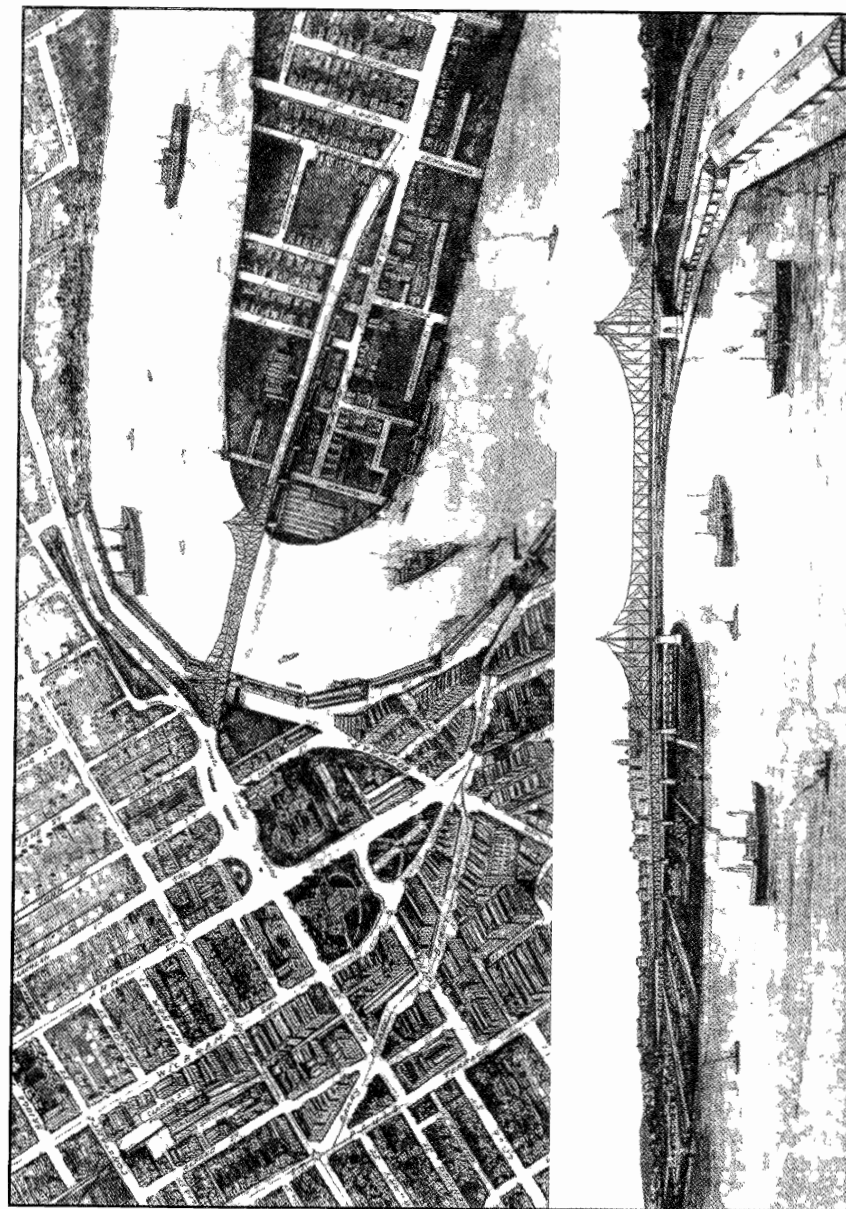
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DGY

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Dr J J C Bradfield's 1933 proposal for the Story Bridge. The detailed design started in 1934.
By Courtesy of Ipswich North State School.

1

R BALLARD

MICE MASE



Photograph by
courtesy of
Qld Railways
Historical Centre

BALLARD, ROBERT (1839-1912), railway engineer, was born in Ledbury, England and attended the King Edward Grammar School there. He trained as a civil engineer under his uncle. After joining Peto, Brassey and Betts, railway contractors, he was sent to New South Wales to construct railways in 1859. In the course of his journey, he travelled overland from the Mediterranean to the Red Sea, visiting the Egyptian pyramids *en route*. Subsequently, he served as a sectional engineer on the construction of the first railway line in Queensland, between Ipswich and Toowoomba in 1864-1867. Ballard's employers, the English firm Peto, Brassey and Betts, were relieved of the contract before the completion of the line, and he then served as District Engineer with the New South Wales Government Railways on the Great Southern Railway extension, superintending the construction of a tunnel under the Gibraltar Range and a 40 mile length of line from Picton towards Goulburn. Ballard then returned to Queensland and re-joined Peto, Brassey and Betts.

The construction of the main range section of the Southern and Western Railway was a difficult engineering feat. Ballard later wrote that he was chosen for that work because of its extremely heavy character comprising many tunnels, at which work he was considered expert. The 16 mile (26km) section, rising 1400ft (430m), included nine tunnels totalling 45½ chains (915m) and 47 bridges totalling one mile (1.6km) in length. Subsequent maintenance of this section was the least expensive of the whole line and this was attributed in part, in the 1869 report to the Commissioner of Railways on the maintenance of the way and works, to the greater care exercised in its construction. In 1868, Ballard was a partner in a contract to construct the Muhl deviation, a ¼ mile (1.2km) length, completed in five months at the low cost of £5000. He then left railway

construction for the newly discovered goldfields at Gympie, where he was elected official Mining Surveyor and opened up the Highland Mary mine among others.

Ballard had gained a high reputation as a railway engineer on the Southern and Western Railway, and in 1872 was appointed as Superintending Engineer on the Great Northern Railway, based in Rockhampton. By 1878, he was Chief Engineer for the Central and Northern Railways, the Rockhampton line being renamed the Central line, the Northern line being the proposed Townsville to Charters Towers line. Prior to his assuming that office, he had forcefully taken on vested interests by getting the Government to agree to the construction of lighter rolling stock better matched to the cheaper permanent way that he had also successfully promoted. He achieved good quality construction by careful planning and attention to detail, as well as keeping abreast of railways progress overseas, particularly in America. He failed to get immediate acceptance of his innovative design for fish plates, but his design was subsequently adopted.

Ballard was a proponent in the 1880s of a 3'-6" (1.1m) gauge trans-continental line linking the Gulf of Carpentaria with New South Wales, with 2'-0" (0.6m) gauge feeder lines linked to unopened areas. He was always an advocate of the narrow gauge line. He argued that gauge does not rule the capacity for traffic, rather that gradients and curves are more important determinants. He believed that, where cheap roads were practical, use of narrow gauge could reduce the cost by about half without reduction of efficiency; and that the narrow gauge lines could follow existing roads and use existing bridges.

Disappointed at rejection of his advice to use 2'-0" lines to open up minor areas, and to construct a line from Herberton to Cairns, Ballard resigned in 1886. Subsequently, he prepared a report for the South Australian government on future railway construction. This was adopted and recommended by a royal commission on railway construction. For the next four years, Ballard spent his time largely on private studies. From 1891 to 1895, he worked for the Mount Morgan Mining Company as surveyor and consulting engineer in the company railways, and managed the Mount Morgan West Extended Company. In 1895, leaving his wife and family of seven children in Rockhampton, he went to Menzies, a gold mining town in Western Australia, where he acted as attorney and consulting engineer for a number of English companies.

A member of the Johnsonian Club of Brisbane, Ballard, encouraged by fellow member Brunton Stephens, published his first book in 1882, *The Solution of the Pyramid Problem or Pyramid Discoveries with a New Theory as to their Ancient Use*. Another interest was lepidoptery, and his diary on the habits of butterflies, as well as his drawings of them, are held in the Mitchell Library in Sydney. Ballard left Australia in 1901. In 1906, he published *Man's Blood Guilt*, a reflective book of thoughts conceived during many years in the Australian bush. Ballard died at Fulham, UK, in 1912, aged 73. He never liked Australia, feeling isolated from the mainstream of life, but he left his memorial in well built railways and the village of Ballard, the site of one of his construction camps on the Southern and Western Railway.

Bell, Jacqueline, *Robert Ballard*, Queensland Heritage, Vol. 10, May 1969.

Bell, Jacqueline, *Ballard, Robert*, Australian Dictionary of Biography Vol. 5.

Wakelin, P., (ed) *A Century of Service; The Story of Queensland Government Railways*, Brisbane 1915

Mr R. Ballard, The Menzies Miner, March 4, 1899.

2

SIR CHARLES BARTON

KB OBE ED FTS BE Qld HonFIEAust



Photograph by
courtesy of
Qld Dept of
Main Roads

BARTON, CHARLES NEWTON (1907-1986), civil engineer, planner and administrator, was born at Bowen and educated at Maryborough Boys Grammar School. He won both the silver medal for the best pass in the Junior Public exam and the gold medal for the best Senior pass. He graduated from the University of Queensland in 1929 as a Bachelor of Engineering. After a short period with Townsville City Council he joined the Bridge Branch of the Main Roads Commission during the changeover period from timber to steel and concrete construction, and including the introduction of welded steel. He was involved in the checking of the designs for the Indooroopilly suspension bridge and the preliminary designs for the Story Bridge at Kangaroo Point. In 1935, becoming impatient with the slow rate of promotion in the Main Roads Department, he resigned, and with James Pollock set up a consulting practice in Mackay. He saw service as an infantry major in the Second World War. After being captured in North Africa in 1941 he tutored fellow officers in engineering subjects. After the war he rejoined the Citizen Military Forces and retired from the active list in 1958 with the rank of Colonel.

Barton was appointed Commissioner of Main Roads in January 1960. He set about modernising the Department by reorganising and decentralising it and by introducing more modern methods of materials testing, road design and construction and forward planning. By law at that time the State had to be divided into three divisions: each division having several districts. Barton requested that District Engineers and their staff live in the cities and towns which were the District headquarters and that the Northern and Central Divisional Engineers live in Townsville and Rockhampton respectively. He developed the policy for a Department focussed on highway building. Assistant Commissioners, Divisional Engineers and District

Engineers were required to operate within the policy and only refer to Head Office in exceptional circumstances. They were required to explain the policy and also to discuss forward programs for works in their area with each Local Authority. Barton determined the criteria which highways, main roads, developmental roads and secondary roads had to meet. He obtained Government approval for the construction of roads parallel to and adjacent to railway lines - a restriction which previously had left many major towns unconnected by a declared road. In 1963 he obtained Government approval for a Road Plan for Queensland which, for the first time, produced a logical road system on which the Department could spend funds.

Over a number of years in the 1960s, the Federal Government provided funds to build roads nominated by them, after discussion with the State, as beef roads and to build roads within the area nominated by the Commonwealth as the Brigalow Scheme. Barton directed that the design and supervision of the construction of these works were to be carried out by consulting engineers rather than by increasing MRD staff. He recognised that Brisbane needed a plan to reduce the road congestion in the future. He obtained Government approval to appoint a traffic engineering firm from the USA - Wilbur Smith - to carry out a study and to report on the results. The report of this study recommended a network of freeways, some of which have been built.

In 1969 he was appointed Co-ordinator-General of Public Works, responsible to the Premier of Queensland. One of his first activities was to break up the engineering branch of the Department. Some engineers were transferred to the Main Roads Department, some to the Department of Irrigation and Water Supply, and some to the Department of Harbours and Marine. Three engineers were retained to supervise the construction of the North Pine River dam. Wivenhoe dam was designed and construction started while Barton was Co-ordinator-General.

In 1972 a new Act modified the operations of the Co-ordinator-General's Department. New powers relating to regional planning and environmental impact were added and a Technical Branch was established. It employed professional staff drawn from a number of professions including economists, engineers, planners, etc. to co-ordinate the provision of infrastructure for major projects such as coal mines, taking into account environmental impact statements. The Department tried to get Local Authorities involved in regional planning by setting up Regional Co-ordination Councils, but the attempt was unsuccessful and, shortly after Barton retired, the Regional Co-ordination Councils were disbanded.

On his retirement as Co-ordinator-General in 1976 Barton was appointed Chairman of the Port of Brisbane Authority. He died in 1986 being survived by his wife. They had no children.

Retirement of Mr C.N. Barton as Commissioner, Queensland Roads, June 1969.

DGY

3

G O BOULTON

ME Qld FIEAust



Photograph by
courtesy of
Baulderstone
Hornibrook Pty Ltd

BOULTON, GEORGE OSWALD (1898-1976), construction engineer and manager, was born at Mitchell, Queensland, educated at Charleville, and at the Toowoomba Grammar School where in 1916 he was head scholar. After two years of active war service with the First AIF he resumed his studies. In 1923 he graduated from the University of Queensland with a first class honours BE degree and was awarded a Queensland Government gold medal for outstanding merit. In 1928 he was awarded an ME degree from the same university.

Boulton worked for consulting engineer AEH Frew (qv) from 1923 to 1925 largely on local authority works for Tinaroo Shire and then as Frew's resident representative to the firm of MR Hornibrook which was constructing the Rockhampton water supply scheme. In 1926 he was employed by the Cross River Commission in Brisbane as a technical assistant in charge of the technical staff. The Cross River Commission, headed by Professor RWH Hawken (qv Vol 1), examined the problems of further crossings of the Brisbane River within the City of Brisbane. As its first priority, the study recommended a bridge at Kangaroo Point near where the Story Bridge was completed fifteen years later and on which Boulton distinguished himself. He then joined the contracting firm MR Hornibrook, working on bridge and jetty works in North Queensland for two years before being promoted to Chief Engineer of the company in 1928 in charge of the technical planning and construction of the Grey Street (now William Jolly) Bridge across the Brisbane River in Brisbane. On this job he became an expert on compressed air working for bridge foundations, presenting a paper on the subject to the Brisbane (now Queensland) Division of the IEAust. He was next in charge of the design and construction of the Coomera River bridge, the first major bridge to eliminate one of the many ferry crossings on the Pacific Highway. In 1934 he

was employed by Professor RWH Hawken on checking the designs and estimates, and in assisting to prepare a report to the Queensland Cement and Lime Company on their proposal for handling raw materials at their Darra works. Then followed the Sandgate-Redcliffe viaduct (commonly known as the Hornibrook Highway - the longest bridge in Australia). This was a private venture by the firm of MR Hornibrook to design and build a 2.7km long toll bridge across the mouth of the Pine River. Boulton supervised the preparation of the complete plans and specifications for the bridge and then supervised its construction for the firm.

In 1935 the construction of the Story Bridge was carried out by a consortium of MR Hornibrook and Evans Deakin and here Boulton entered the administrative field as a director of Hornibrook. He went to North America to purchase the special plant required for the bridge and to recruit Canadian staff for the main steel span erection. The foundations of the bridge required the use of compressed air under conditions exceeding those of safe world experience and the measures introduced by Boulton enabled the work to be carried out without fatality. He was awarded the Warren Memorial Prize in 1943 for his paper *The Use of Air Locks*, and he sat on the committee of the Standards Association which framed the SAA compressed air code in which his practice was incorporated. During the Second World War Boulton designed a standard nailed timber type of warehouse to overcome the shortage of steel for such constructions. Boulton was Chairman of the Brisbane (later Queensland) Division of the Institution of Engineers in 1939.

Boulton continued with the firm of MR Hornibrook for the remainder of his working life. He was the General Manager of the firm from 1960. When Wood Hall took over the Hornibrook interests he retired as General Manager and was appointed Engineering Consultant to the firm from 1964 to 1972. He was involved in many other major bridge construction projects carried out by the firm including the Iron Cove bridge in Sydney in 1950 and the construction planning for the new Victoria bridge in Brisbane. Later he had an input to the construction of the "sails" of the Sydney Opera House.

Boulton died in 1976, regarded as a brilliantly successful engineer. At the time of his death he had been recommended by his confreres for significant further honours. He was survived by his wife and two daughters.

George Boulton, Wood Hall News, Wood Hall Ltd, c1971.
Membership applications, IEAust, Nov 1925, July 1926.

GC

4

A BOYD

BE Syd DSc London MIEE AMICE MIEAust



Photograph by
courtesy of
Mrs L Webber

BOYD, ARTHUR (1879-1967), electrical engineer and academic, was born in Walsall, Staffordshire, and came to Queensland in 1886. After attending the Brisbane Central State School (Normal School) he won one of the few grammar school scholarships offered by the State Government. From Brisbane Grammar School, he won an Exhibition Scholarship and a scholarship to St Andrew's College at the University of Sydney. In 1901 he was awarded the degree of Bachelor of Science, with first-class honours in Physics, and in 1902 the degree of Bachelor of Civil Engineering with first-class honours, both with a University Medal. In 1903, he gained a degree in Mechanical and Electrical Engineering, with first-class honours in Electrical Engineering, and the PN Russell Gold Medal for mechanical engineering research. From April 1901 to May 1903 he lectured at University of Sydney in engineering statics and dynamics, supervised steam engine trials, and acted as Instructor in Engineering Drawing and as Demonstrator in applied mechanics and electrical engineering testing.

In 1903, Boyd won an 1851 Exhibition Travelling Scholarship and a Manchester Science Research Scholarship, and from 1903 to 1905 undertook research in electrical machines at Kings College, University of London, where he was awarded the degree of Doctor of Science. He then worked for two years with Siemens Brothers' Dynamo Works in Stafford as a designer of electrical machines. In the evenings he lectured in engineering subjects at Stafford Municipal Technical College.

In 1907, Boyd became an assistant electrical engineer with the East Indian Railways, where from 1913 to 1920 he was Deputy Electrical Engineer, and concurrently Electrical Inspector

to the Governments of the Central Provinces and of Punjab. For ten years, he also served as a Magistrate to the Government of Bihar and Orissa. During the First World War he served for a time as an officer in the Indian Army, though he was declared unfit for active service because of defective vision in one eye. While in India he became interested in electric fans as replacements for punkahs, and later built and tested a ceiling fan at the University of Queensland.

Boyd joined the Faculty of Engineering at Queensland University in 1920 as Lecturer in Electrical and Mechanical Engineering and developed the mechanical and electrical laboratories, despite shortages of money and equipment. He had a particular interest in X-rays, and, in 1943, a mobile X-ray plant which could be towed to industrial sites was added to the mechanical engineering laboratory. He was also chosen to serve on the Electro-Medical Equipment Advisory Board, set up in 1935 to advise on the safe and rational introduction of X-rays and other new electro-medical techniques into the State's public hospitals. In 1944 the Board was absorbed into the Radium Institute, and Boyd was seconded to the latter. Boyd published many original papers, and conducted numerous investigations as a consultant to the State Government and other organisations.

During the Second World War, Boyd was appointed Associate Professor of Engineering (Mechanical and Electrical). Following the death in October 1947 of Professor RWH Hawken (qv Vol 1), Boyd was appointed Acting Professor of Engineering and Dean. Soon afterwards, the University replaced the single Chair of Engineering with separate Chairs in Civil, Mechanical and Electrical Engineering, a reorganisation which Boyd had long advocated. Lack of finance compelled the University to spread the appointments to the new Chairs over three years. Although due to retire at the end of 1949 (aged 70 years), Boyd postponed his retirement until the last of these appointments was completed in April 1950.

During his Deanship, Boyd was instrumental in inaugurating a course in Naval Architecture, and in securing the support of the mining industry for the creation of a Chair in Mining Engineering. He also served with the National Association of Testing Authorities, the Standards Association of Australia, and the Institution of Engineers, Australia of which he was an inaugural member of the Brisbane Division. He died in 1967, survived by his daughter.

University of Queensland Gazette, September 1950.

Information supplied by Mrs L. Webber (nee Boyd).

Information supplied by Professor S.A. Prentice.

Brisbane Grammar School Golden Book.

Fryer Library, Mss F2615.

U.Q.A. S2 *Agenda for Senate Meetings* Vol.37, 1946.

U.Q.A. S135, Staff Files, Boyd, Dr A. S135.

J J C BRADFIELD

CMG DSc(Eng) ME Syd MICE MIEAust



Photograph by
courtesy of
Dr KNE Bradfield

BRADFIELD, JOHN JOB CREW (1867-1943) engineer, town planner, and public servant was born in Sandgate, Queensland, of English parents who migrated to Queensland in 1859. He was educated at Ipswich North primary school and Ipswich Grammar School. An outstanding pupil, he obtained one of the three Sydney University scholarships awarded each year by the Queensland Government and studied engineering under Professor Warren. Bradfield was awarded a BE with honours, the University Gold Medal and the Sulman Prize for Architecture. After a year in the Queensland Railways he was retrenched in the Depression of 1889 and returned to Sydney as a temporary draftsman in the Engineering Drawing Office of the Roads, Bridges and Sewerage Branch of the Public Works Department in 1891. It was four years before Bradfield achieved permanency and eighteen years before he received his first promotion. Bradfield gained his Master of Engineering degree in 1896 from Sydney University and was again awarded the University Gold Medal. He worked on the analysis of the entries for a Sydney Harbour crossing competition in 1900 and was secretary of the Advisory Board for the second competition in 1902. In 1904 Bradfield was placed in charge of water supplies and water conservation designs. In 1906 a further Public Service reorganisation placed him in charge of railway and tramway design and, for the first time, he carried the designation of Engineer. In 1910 he was promoted to Assistant Engineer First Class. From 1908 he became heavily involved in preliminary designs and estimates for the Royal Commission on "Communications between Sydney and North Sydney".

Despite making his home in Sydney, Bradfield was always looking northward to Queensland. He applied, unsuccessfully, for the newly created Chair of Engineering at Queensland University in 1910. In 1911 he took charge of the Engineering Design Office, Plan Room and

Ironwork Inspection. With a change of government the harbour crossing problem was revitalised and Bradfield was assigned by the Minister for Works as Engineer in Charge of Sydney Harbour Bridge and City Transit, tasks which occupied him for the remaining twenty years of his departmental working life. In 1915 his report *Proposed Electric Railways for the City of Sydney* was incorporated into the City and Suburban Railways Act. With another change of government in 1920 Bradfield actively canvassed for a start on the bridge proposal. Tenders were called at the end of 1921 and he went overseas to interview prospective tenderers. Bradfield then submitted a full account of his work on the Sydney Harbour Bridge and the City Railway Scheme as his thesis for the degree of Doctor of Science (Engineering) which was awarded in 1925 by Sydney University with first class honours and the University Gold Medal.

The contract for an arch bridge was awarded to Dorman Long and Co. in March 1924 with the provision that, in the event of a dispute, Bradfield's decision would be final. Apart from the bridge, Bradfield was responsible for metropolitan railway construction from Redfern to Waverton. The Sydney Harbour Bridge was finished and opened in 1932 and Bradfield retired from the New South Wales Public Works Department in 1933, setting up as a consulting engineer with his son KNE Bradfield. In the same year he was appointed Consulting Engineer under contract to the Brisbane River Bridge Board for the Story Bridge over the Brisbane River. The bridge was finished in 1940 but, in the meantime, Bradfield was appointed to the University of Queensland Building Committee. He also made unsuccessful attempts to have bridge designs adopted for the Derwent River at Hobart and Auckland Harbour in New Zealand. His last grand proposal was for diverting the east coast rivers of North Queensland into the western rivers for irrigation.

Although Bradfield's engineering contact with Queensland spanned only ten years he had a lasting effect on engineering excellence in the State. Many of the engineers employed on the Story Bridge project had worked under his direction on the Sydney Harbour Bridge project as per biographies in Volume I of Eminent Queensland Engineers. These included GA Cowling and JE Kindler. Sir James Holt, HG Brameld, CM Calder and EM Shepherd are included in the present volume. He was the President of the Queensland Branch of the Royal Geographical Society of Australia from 1936 to 1939.

Bradfield died at Sydney in 1943 at the age of 76 survived by his wife Edith, one daughter and five sons.

Raxworthy, Richard, *The Unreasonable Man*, Hale and Ironmonger, 1985.
Additional Material from Dr K.N.E. Bradfield of Fairlight, N.S.W.

H G BRAMELD

BE (Hons) Syd FIEAust MRSQ



Photograph by
courtesy of
GH Brameld

BRAMELD, HUMPHREY GALBRAITH (1909-1987), structural engineer, was born at Hull in England, migrating to Melbourne with his family in 1914 and was educated at Box Hill Primary School. The family then moved to Sydney where he attended the North Sydney Boys High School and graduated from Sydney University in 1932 with an honours BE degree. During the Great Depression of the 1930s engineering employment was difficult to obtain. Consequently he spent two years as a private tutor in mathematics, but in 1934 he moved to Brisbane as an Engineering Draftsman with the Brisbane River Bridge Board which designed the Story Bridge under the direction of JJC Bradfield (qv) as consultant and JA Holt (qv) as Chief Engineer. He was employed in detailing the connections of the steel structure, designing the joints and preparing influence lines and calculating secondary stresses. This experience allowed him to specialise in later years in bridge analysis. On the completion of the design of the Story Bridge in 1938 he moved to the Irrigation and Water Supply Commission where he was engaged as an assistant to the Sewerage Engineer, RD King-Scott (qv), principally checking schemes for country sewerage. In 1940, Brameld moved briefly to the Stanley River Works Board as an Assistant Engineer on the design of the superstructure of Somerset Dam under the direction of WHR Nimmo (qv Vol 1) as chief engineer.

Following Somerset Dam he worked on the design of the ill fated bridge from West End to St Lucia in Brisbane. The entry of Japan into World War II saw Brameld, like many of his contemporaries, engaged on the design of defence works, principally concrete defence installations and dock structures.

In 1947 the Bridge Board of the Bureau of Industry became part of the Co-ordinator-General's (COG's) Department. Brameld was appointed as the leader of the bridge group. By 1950 they had prepared designs and erection procedures for two major bridges, the Fitzroy Bridge at Rockhampton and the Burdekin Bridge at Home Hill. The Fitzroy Bridge is notable for incorporating a 366m seven span continuous riveted plate girder. The Burdekin Bridge is a combined road and rail bridge incorporating 10 steel through trusses each of 76m span. This bridge saw the first Australian use of high tensile friction grip bolts to replace rivets in the field joints.

In 1950 Brameld was designated by the COG's Department as Senior Engineer (Design) and in 1965 as Chief Structural Design Engineer. Over 20 years he and his design team were responsible for the design and contract supervision of a series of major bridges, first in steel, then in prestressed concrete. The steel bridges include the 208m long continuous two span truss Indooroopilly Rail Bridge and Ipswich's David Trumpy Bridge, a continuous welded steel plate girder 265m long overall. The first major prestressed concrete bridge was the 823m long viaduct joining Bribie Island to the mainland. This was followed by design of a suite of structures in the Brisbane CBD, the Victoria Bridge, the Captain Cook Bridge and the associated Riverside Expressway structures.

As part of CN Barton's (qv) reorganisation of the COG's Department, Brameld and his team were transferred in 1970 to the Main Roads Department, Brameld as Deputy Chief Engineer (Special Projects) and his team as the Special Projects Section. Here Brameld and his section completed design and supervision of the Victoria and Captain Cook bridges and the Riverside Expressway with a remarkable total of 3.5km of bridge structures. Before Brameld's retirement in 1975, he and his team had completed designs for the Houghton Highway viaduct to replace the Hornibrook Highway (Brisbane - Redcliffe) and the never constructed New Farm Bridge.

In his career Brameld had the good fortune and technical flair to contribute to and subsequently to lead the design for structures which define Brisbane. The Story and Captain Cook bridges provide dramatic foregrounds to classic views of Brisbane City. The Victoria Bridge, by contrast, is a beautiful sculptured engineering form unpretentiously linking the Cultural Centre to the City.

During his career Brameld published eight papers on his and his team's work. He died, a widower in 1987, leaving three sons, two of whom are engineers.

Fellowship Application, IEAust, 1975.

Brameld, G. Personal communication, 1999.

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F H BRAZIER

BE Qld HonMEng James Cook FIEAust



Photograph by
courtesy of
The Brazier Family

BRAZIER, FELIX HOWARD (Phil) (1897 - 1988), local government engineer, was born in Brisbane but received his primary education in Warwick and then attended Toowoomba Grammar School where he became senior prefect and Dux of the School. He won a scholarship to the University of Queensland from which he graduated with a BE degree in 1919. For the next two years, he was employed by AEH Frew (qv) in North Queensland and then joined Tinaroo Shire as an assistant engaged on the construction of the Atherton - Yungaburra road, one of the first Main Roads Board works in North Queensland. In 1923 he joined Wynnum Town as City Engineer, but lost his seniority in 1925 on the incorporation of Wynnum into Greater Brisbane, as did J S Louttit (qv), City Engineer, South Brisbane.

In May 1925 Brazier was appointed City Engineer of Townsville. He was the first university graduate to hold the position - and remained in the position until his retirement in 1962. During his 37 years as City Engineer, the population of Townsville doubled from 26 000 to 52 000, reaching a brief peak of 100 000 in 1944 during World War II, when he was directing the Townsville Council work force to provide roads, water and other services for armed forces in the area.

Virtually all the major civil engineering works for Townsville were carried out under Brazier's direction. When he was appointed City Engineer very few of the city roads were paved and there were very few bridges. As there was no staff in the City Engineer's Department, Brazier had to carry out all functions himself. His first task was the building of a modern road system for Townsville to accommodate the transition from horse drawn vehicles to motor vehicles. He laid

out many of the roads and streets which became the backbone of Townsville's development; and his plan for the city development was followed until the appointment of a planning officer, a year after Brazier's retirement. His activities extended to Magnetic Island, which is part of the Townsville City area.

At the time of Brazier's appointment as City Engineer, the water supply system was in crisis with water available for only four hours per day. He arranged the augmentation of the supply with a weir on the Ross River in 1928. This weir was damaged by floods and a second weir was completed in 1943 at a critical time during World War II. The rapid growth of the city coupled with material and labour shortages in the post war period caused the water supply to remain inadequate. The situation was greatly relieved by the Mt Spec water supply scheme, which involved a long pipeline commissioned in 1954. The construction of the Paluma Dam at Mt Spec, the location of which was determined by Brazier from aerial photographs, provided Townsville with a more reliable water supply at a lower cost.

All the drainage and sewerage works of the city were carried out under Brazier's direction. He drew up the first sewerage plans in 1928 but shortages of funds delayed the calling of construction tenders until 1936. Swampy areas were filled and drained and the first sewers were completed in South Townsville in 1940. He was also responsible for the preliminary development of Garbutt airfield which was completed in 1939, and, with expanded facilities, it played a major role in World War II.

Brazier was active in community affairs, being President of the Rotary Club in 1935/36 a Trustee of the Board of Townsville Grammar School and a tutor to the Migrant Resources Centre where his language skills were invaluable. He also assisted in numeracy and literacy skills at the Central State Primary School. In recognition of his outstanding service to the community as City Engineer, the Townsville University College (later James Cook University) bestowed on him the Honorary Degree of Master of Engineering in March 1965, the first honorary degree to be awarded by that institution.

Brazier's wife, Dorothy, and one son predeceased him and, on his death in 1988, he was survived by two sons.

Material supplied by Messrs K. and T. Brazier of Townsville, via Citiwater, Townsville.

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8

F J BYERLEY

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Photograph by
courtesy of
the Archer Collection
Central Qld University

BYERLEY, FREDERICK JOHN, (1827-1897), civil engineer and licensed surveyor, was born in Paris, France, the son of Sir John Byerley, astronomer, engineer and mathematician. On the death of his father he migrated with his mother to Melbourne in 1841 and trained as an engineer and surveyor, being appointed to the Victorian Survey Office as an Assistant Surveyor in 1852. He was dismissed from the Victorian service in 1858 and moved to Rockhampton in 1860 where he practised as a private surveyor. In 1864, he was appointed Engineer of Roads for the Northern District, and was to play a significant role in the development of Rockhampton and district. The Northern Division, for which Byerley was responsible, extended from Gladstone and Taroom north to Townsville and west to the Thompson River.

1865 saw opening and construction of many roads within the Rockhampton district. These enabled massive reductions in travelling times for the bullock teams of the day, and were supplemented in the same year by provision of punts at Gainsford and Knebsworth on the Dawson River, a causeway across Lion Creek, a bridge over Gavial Creek and maintenance of Wiseman's Bridge. Byerley spent 142 days of 1865 on field inspections without neglecting administration of the Rockhampton office of the Department. He achieved this, in part, by employing assistants of high calibre for survey and clerical work.

Only the failure of the Government's London bank prevented a repeat in 1866 of Byerley's brilliant 1865 performance. However, in 1868 he was responsible for the successful location and construction of the urgently needed road from Caboolture to the Gympie goldfield. Between 1869 and 1873, he administered the Great Northern Railway (Rockhampton to Westwood) in addition

to his normal duties. He was to hand over his railway responsibilities in 1873 to Robert Ballard (qv). A man with a strong interest in conservation of the environment, Byerley publicly criticised the Rockhampton Town Council in 1867 for "wanton destruction" of trees on the recreation reserve and described the authorities as "modern vandals" for their clearing of timber and scrub on the government reserve on Atheistane Range. In 1867, Byerley edited and published the narrative of the epic expedition from Rockhampton to Cape York undertaken in 1864 by Alexander Jardine, a member of his survey staff.

In 1874, Byerley was appointed Inspector General of Roads, and in this office became closely associated in 1875 with Rockhampton's first road bridge across the Fitzroy River. This graceful iron suspension bridge, complete with turrets and minarets, was opened on January 1 1881. The bridge replaced punts and ferries that had operated since 1859. Byerley's design was based on suggestions and sketches presented by one of his staff, Owen Jones. Byerley later took over supervision of the construction of the bridge.

Also in 1874, Byerley and his protégé Alexander Jardine (appointed that year as Engineer for Roads in what was by then the Central District) were named as co-designers of the first bridge across the Dawson River at Gainsford.

After the responsibility for local roads passed to Divisional Boards (predecessors of Shire Councils) in 1880, Byerley established a consulting practice in Rockhampton, as Civil Engineer and Land and Mining Surveyor. He was later appointed Consulting Engineer and Town Surveyor for the Rockhampton Municipal Council. He failed to gain Council approval for a dam across the Fitzroy River to enable an adequate supply of water, but recorded his opinions in a booklet *Water Supply and the Principles of Construction of Waterworks*. He lectured at the Rockhampton School of Arts on Water Conservation and Irrigation Schemes.

Married late in life to a somewhat eccentric wife, Byerley lived in a "grace and favour" cottage provided by their friends the Archers at Gracemere. He is buried in the Archer family graveyard. They had no children.

McDonald, Lorna, *Rockhampton - A History of City and District*, University of Queensland Press, St Lucia, 1981.

Boyle, Ray, *Some Historical Sidelights on Early Rockhampton Engineering Services*, Central Regional Engineering Conference, Rockhampton, September 1992.

Harris, Bob, *Frederick John Byerley, In the Steps of Our Forefathers*, Institution of Surveyors, Queensland Division, 1988.

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C M CALDER

ME Qld MInstCE FIEAust LGEQ



Photograph by
courtesy of
Mrs S Bennet

CALDER, CLIFFORD MASON (Gerry) (1900-1975), civil engineer, attended Ipswich Grammar School before graduating in civil engineering, with honours, from the University of Queensland in 1921. He subsequently studied law and was admitted as a barrister of the Supreme Court of Queensland in 1929, but never practised in that profession. In 1931, he obtained the degree of Master of Engineering from the University of Queensland. On gaining his first degree Calder was employed briefly in 1922 by consulting engineer AEH Frew (qv) before proceeding to work on surveys in North Queensland as Engineering Assistant to WJ Reinhold (qv Vol 1), then of the Northern Division of the Main Roads Board. Calder was ultimately to be appointed to and resign from Queensland Main Roads three times during the course of his active and varied career. In 1923, he resigned from the Main Roads Board to gain survey field experience to qualify as a licensed surveyor. He was employed as a Design Draughtsman by Queensland Railways Department in 1925 and he was admitted as an authorised surveyor, and also became a certificated Local Government Engineer. In 1925 he took up his appointment to the Main Roads Commission as an Engineering Assistant supervising works on the Brisbane-Toowoomba and Main South Coast Roads. In 1926 he was appointed Assistant to the Bridge Engineer of the Commission. In 1927, he was seconded to Hinchinbrook Shire Council as relieving engineer. After he qualified as Barrister-at-Law in 1929, he was called upon by Commissioner JR Kemp (qv Vol 1) for legal advice on contracts and resumptions. On obtaining his Master of Engineering degree in 1931, he was promoted to Assistant Engineer. For an extended period in 1932, he relieved as Assistant Secretary of the Commission, and until 1934 was attached to the Secretary's branch. In 1934, his services were made available to the Bureau of Industry for setting out and checking the centreline of the Kangaroo Point (now Story) Bridge. 1935 saw him relieving, first in charge of a district, then as

the Designing Engineer in Charge of Drafting Branch. Later in the year, Calder was promoted to District Engineer No 1 District and for a time he acted as Design Engineer in Charge of the Road Design Branch. In 1941 he was appointed Honorary Ranger under "The Native Plants Protection Act 1930", an act administered by the Department of Agriculture and Stock (now Primary Industries).

The entry of Japan into World War II saw further responsibility being borne by Calder. In July 1942 he was seconded to the Department of the Co-ordinator-General of Public Works as Construction Engineer for the graving dock being built at Cairncross Rocks, Bulimba and was a member of the board, chaired by WHR Nimmo (qv Vol 1), for its design, direction and co-ordination. This major project, carried out under challenging conditions due to shortages of materials, plant and labour, accepted its first ship in June 1944, more than a year before the Captain Cook dock at Garden Island, Sydney. Its success was due, in large measure, to the drive of Calder, assisted by his Construction Manager E L Richard, and very active support of JR Kemp. In 1944, Calder visited Darwin to assess the possibility of dock construction there. In the same year, his field liaison role was extended to cover all naval projects in the Brisbane River. In that year Calder resigned from his Main Roads position to take up an appointment as First Assistant Engineer, Department of Harbours and Marine. He continued in charge of Cairncross Dock construction until its finality.

Between 1944 and 1953, Calder worked first at Peak Downs for the Queensland-British Food Corporation (of which JR Kemp was Deputy Chairman from 1947 to 1953) and then as Queensland Manager of Thiess Brothers. In 1953, he was re-admitted to the State Public Service, re-joining Main Roads to serve as Divisional Engineer for Central Queensland, with headquarters based in Brisbane. Calder resigned for the last time from Main Roads in 1956 to start practice as a consulting engineer to Chinchilla, Murilla, Taroom and Bendemere Shires, with his headquarters at Chinchilla. In later years, he was consulted also by Bungil and Warroo Shires and Roma Town. For a period of nearly 20 years, Calder played a key role in development works in the Western Darling Downs area and in shires to the west of the Downs. He designed and supervised construction of a wide range of municipal works in Chinchilla, Miles, Roma, Taroom, and Wandoan. In addition to swimming pool, water supply and sewerage schemes for the towns, projects included aerodromes, roads, bridges and a sporting complex. At the time of his death in 1975, he was the most senior practising Certificated Local Government Engineer in the State.

He was survived by his wife Caroline and three daughters.

Main Roads File 205/8/114.

Story Bridge Opening Souvenir Booklet.

Souvenir Handbook for Official Opening, Cairncross Dock.

Letters and material from Mr Graham Brandon of G.J. Brandon & Associates Pty Ltd, Chinchilla.

10

G F CARDNO

BE Qld FIEAust



Photograph by
courtesy of
Miss AB Murphy

CARDNO, GERALD FITZGERALD (1904-1985), consulting engineer, was born in Brisbane and educated at the Christian Brothers College, Gregory Terrace, Brisbane and the University of Queensland from which he graduated in 1927 with a Bachelor of Engineering Degree. He was immediately engaged by WJ Reinhold, consulting engineer (qv Vol 1) as a Designing Draftsman on street improvement schemes for Southport Town Council, and, a year later, as Resident Engineer on a stormwater drainage scheme in Southport. In 1928 he was resident engineer on road and bridge construction in Gatton and Laidley Shires, and then moved to Gladstone on the construction of roads and a reinforced concrete water reservoir and water reticulation works. From 1933 to 1936 he was the firm's resident engineer in Dalby where a 50 metre swimming pool and an elevated reinforced concrete reservoir were built. Based in Reinhold's head office in Brisbane between 1936 and 1942 he was Resident Engineer on the design and construction of road and bridge projects in South Eastern Queensland.

From 1942 to the end of 1944 Cardno was Principal Civil Engineer for the Engineer, Base Section 3, US Army engaged in the supervision of surveys, design and construction of a large wartime programme of engineering works for the development of a large military base.

In 1945, with Harold Davies, he formed the partnership Cardno and Davies, Consulting Engineers, located in Brisbane, dealing with general municipal services which now included real estate developments. Davies generally handled the design office of the firm and Cardno supervision of construction, though both partners were active in both areas. Developers T.M. Burke submitted a proposal to the Queensland Government to develop the Peregian Estate, a 10 km stretch of

Crown land from Coolumb to Noosa on the Sunshine Coast. The Crown wanted the development to proceed but a new act was needed before the development could be approved. Cardno and the developers successfully negotiated the details of the necessary act with Government members. This act opened up the way for the large developments on Crown land, one of which was Kawana. Subsequently developers were submitting proposals on the Gold Coast for canal estates such as the Isle of Capri and Florida Gardens. Again a new act was required as there was no provision for the transfer of private lands for the canals back to the Crown. Cardno again was successful in his negotiations with Government Officers and the Canals Act became law. Major canal developments have followed up and down the Queensland coast.

Cardno was successful in obtaining work for his consultancy in Papua New Guinea. The firm was the first Consulting Engineering firm to open an office in Port Moresby, and first to employ the locally trained indigenous people as draughtsmen and engineers. Cardno was particularly successful in organising the offshore business of the firm, first bringing together the firm of Valentine Laurie and Davies and then the formation of the consortium of Consultants International which drew on the expertise of architects, engineers and surveyors to engage competitively in a range of overseas projects.

He retired from the firm in 1969 and died in 1985 survived by his wife Florence. They had no children.

Membership applications, IEAust, April 1926, February 1933 and January 1960.
Letters from Mr N.H. Davies of Annerley and Miss Alma Murphy of Coorparoo.

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W J DOAK

BE Syd MinstCE MIEAust



Photograph by
courtesy of
Mrs P Diddams

DOAK, WALTER JAMES (1874-1962), civil engineer, was born at Sydney in 1874 and was educated at Newington College and Sydney High School. He graduated with a BE degree from Sydney University in 1895, being awarded the University Medal. Up to the standard age for retirement (65) he was employed by the Queensland Government Railways. For the first two years he worked as a computer, checking design stresses in railway bridges. This was followed by seven years on construction as an Assistant Engineer. In this period he worked on the erection of a number of railway bridges including the bridge across the Fitzroy River at Rockhampton for which he was the assistant to the Resident Engineer and about which he wrote a paper published in the proceedings of the Institution of Civil Engineers in 1905.

In 1904 Doak moved to the Chief Engineer's office to work on calculation and design of railway structures with the emphasis always on bridges. In 1909 he wrote a paper on reinforced concrete beams - then in the early stages of development for railway bridges - and in 1913 gave a lecture on the strengthening of railway bridges. This lecture was subsequently published.

In 1919 Doak was promoted to Bridge Engineer, a position he retained until his retirement from the Department in 1939. This was the most productive period of his life as he consolidated his experiments and research in a remarkable series of papers, some in collaboration with Prof RWH Hawken (qv Vol 1) of Queensland University. In 1920 he developed a theory of momentum grading for railways which was published as a paper by the Institution and this theory was then generalised by Hawken. In 1925 he developed with Hawken the method of cost analysis known as Economy of Purchase for the analysis of proposals submitted to the Brisbane Cross

River Commission. Also, at the request of the same Commission, he designed a steel cantilever bridge of 900ft span for the Brisbane River at Kangaroo Point, revising the costs for this design in 1939. Similarly he costed a bridge parallel to Victoria Bridge.

Doak's engineering abilities were widely recognised. He was seconded to Brisbane City Council in 1923 to report on the Victoria Bridge that had been completed in 1897 and he designed a system to lift the truss ends to repair the bearings. In 1931 he was a member of the committee formed to study flooding in Breakfast Creek, Brisbane. For the Railways Department he was responsible in 1924 for the design and launching procedure of the 200ft span bridge at Darodgee, the last link in the railway from Brisbane to Cairns. This was the last expansion work of the Railways Department until the late 1940s. In 1935 he presented a paper to the IEAust on timber railway bridges. This was the heyday of timber railway bridges almost all of which have been rebuilt in other materials.

Recent research by Prof Emeritus C O'Connor in 1998 showed that Doak privately carried out the technical design of the suspension span of the Walter Taylor road bridge across the Brisbane River at Indooroopilly. This had always been regarded as somewhat of an engineering mystery as the design plans were never signed.

After retiring from the Railways in 1939 Doak worked with J Wilson (qv) on a number of projects including the water supply for Redcliffe. From 1943 to 1950 he worked for the Stanley River Works Board on many aspects of Somerset Dam, including the limpet coffer dam for installing tracks for the emergency coaster gate on the upstream face of the dam. Retrenched by the Queensland Government as being over retiring age, he was eagerly employed by Brisbane City Council for two years until he retired at the age of 78.

Doak was a foundation member of the Queensland Institute of Engineers. As a member of this Institute he served on the Provisional Council for the establishment of the Institution of Engineers, Australia, and served on the Brisbane Division Committee from 1920 to 1937 and on the Council of the Institution in 1938 and 1939. He died in 1962, survived by his two daughters.

O'Connor, C. *Story Bridge, A Conservation Study for Brisbane City Council*, 1992.

Who's Who in Australia 1956, p. 233

O'Connor, C. *The Walter Taylor Bridge*, Engineering Update, The Institution of Engineers, Australia, Queensland Division, Vol. 6, No. 1, Jan. - March 1998.

12

J W DOWRIE

BE Qld. AMIEAust



Photograph by
courtesy of
JM Dowrie

DOWRIE, JAMES WILSON (1898-1957), Engineer and Company Director, was born in Brisbane on August 6, 1898. Starting his education at the South Brisbane Primary School, he continued on to an industrial course at the Central Technical College and then to the University of Queensland where he graduated with a Mechanical and Electrical Engineering Degree in 1923. One of his contemporaries, who also went on to become a prominent Mechanical Engineer, was AE Axon (qv vol. 1).

Dowrie excelled in sport, particularly rowing. While at school he was in the eight which won the Head of the River in 1916. Then, at University, his eight won the inter-University race in 1922 and 1923. For his contributions, he was awarded four rowing blues. He also played rugby for the university and later in life enjoyed lawn bowls at the South Brisbane Club.

After doing a graduate apprenticeship in Birmingham, UK, he returned in 1925 to join the family company G and J Dowrie. This business was started as the Atlas Foundry in 1890 by his uncle George Dowrie. Then in 1897, Dowrie's father, also James Dowrie, joined the firm which adopted the G and J Dowrie name. The company fabricated steel structures and steam boilers at a substantial one hectare property in Merivale St, South Brisbane. Truss and girder railway bridges were one of its specialties. One of these bridges was the Pioneer River railway bridge at Mackay, recently made redundant with the re-routing of the main railway line. The company made a range of horizontal multi-tubular colonial (HMC) boilers up to 4.9m diameter and serviced boilers of all types. In later years, the company moved more into manufacturing cranes, particularly overhead travelling cranes for workshops and warehouses. Dowrie was very loyal to his company and received

loyalty from his staff. One man served the company for 55 years, rising from apprentice to foreman. After Dowrie's death, his son, also Jim, took over the helm - the three generations led the company for almost a century until it was eventually sold in the 1990s.

During World War II, Dowrie served on the Munitions Board under Essington Lewis, General Manager of BHP. The Board's job was to harness the country's manufacturing potential to assist the war effort; grenades were made in Toowoomba and cordite presses in sugar mill workshops. Also he was a major in the Army Reserve.

The Dowries had a long association with the South Brisbane Gas Company, which eventually became Allgas Ltd; the three generations of the Dowries served on the Board. James Wilson Dowrie was Chairman for many years up to the time of his death and helped develop the company into one of the leaders of the energy market in Queensland. He also served as a Director of ESCA Ltd, a leading supplier of engineering materials in the 1950s.

Always a supporter of professional developments, Dowrie joined the Institution of Engineers at an early age and went on to become Chairman, Brisbane Division in 1940. Further Service to the profession resulted from his membership of the Engineering Faculty Board, University of Queensland.

Dowrie married Professor Hawken's sister-in-law. With such eminent connections, it is no wonder that Dowrie went on to make a significant contribution to Engineering in this State. He died in 1957 survived by his wife Ivy, a son, also a mechanical engineer, and a daughter.

Material supplied by J. M. Dowrie of Sunnybank Hills.

NRS

13

D FISON

MIEAust



Photograph by
courtesy of
Mrs J Fison

FISON, DAVID (1870-1956) harbour engineer and authorised surveyor, was born in New Plymouth, New Zealand, when his father, Cecil Shuttleworth Fison, a sea captain, was on an unsuccessful gold seeking venture. The family moved to Brisbane and Captain Fison took a position as Nautical Surveyor in the Department of Ports and Harbours in 1882. Fison was appointed to the position of cadet in the Department of Ports and Harbours in 1885 as an assistant to AE Cullen (qv Vol 1). In 1892 he was promoted to Assistant Nautical Surveyor and carried out many channel and port surveys in the 1890s when the economic depression of the period restricted the building of capital works.

In 1899 he was an Assistant Engineer in the Nautical Department and, upon the reorganisation of the Department in 1902 under the title of the Harbours and Rivers Department, he received the combined titles of Assistant Engineer and Nautical Surveyor. In this position he surveyed many proposed harbour works and then supervised their construction, partly by contract and partly by day labour. This work was greatly expedited by his Master's Certificate which allowed him to command survey vessels as well as conduct surveys. One of his outstanding works was the survey for the Port of Karumba. In 1909 he was particularly commended for directing the salvage of the steam barge *Dolphin* which had sunk following a collision in the Brisbane River a year before. When the large load of dredging debris had been removed the 1908 flood in the Brisbane River again filled the vessel with sand and mud but Fison organised the raising of the *Dolphin* for repair and return to service.

In 1910 Fison conducted borings at Urangan Point to aid the design of the wharf built there for the Port of Rockhampton and, in 1917, supervised the construction of a wharf at Clump Point south of Mourilyan. The Clump Point wharf was wrecked a year later by the storm surge which accompanied the 1918 cyclone. In 1931 Fison's son DC Fison was appointed to the Department as an Assistant Marine Biologist. In the same year EB Cullen (qv Vol 1) retired as Chief Engineer and was succeeded by Fison who, initially, was appointed only as head of the Works Division of the Department.

Fison was appointed as a member of the Special Committee of the Bureau of Industry to report on the Brisbane Water Supply and Flood Prevention in 1933. A year later that Committee recommended the construction of Somerset Dam for the dual purposes of water supply and flood mitigation. Fison took a major role, along with WHR Nimmo (qv Vol 1) in the hydrological calculations of floods in the Brisbane River and also calculated the reduction of flood levels to be gained by improvements to the Brisbane River in the city reaches. He continued these investigations after the Committee wound up its work, presenting a paper in two parts, *The Manner and Flow of a River in Flood*, to the Brisbane Division of the Institution and preparing an extensive appendix of Brisbane River rainfall and flood heights in the 1936 Annual Report of the Department of Harbours and Marine.

The major work of Fison's career was the Mackay Outer Harbour Project. This was an entirely artificial harbour built in the open sea with breakwaters to provide a port for the central Queensland sugar industry. Fison was in charge of the project from the surveys to the design of the harbour works and the supervision of the construction. The construction of the Mackay Outer Harbour was one of the few major construction works carried out during the Great Depression of the 1930s. The construction, starting in 1936, was carried out in stages and was completed under the direction of Fison's son, Cecil.

In 1934 Fison carried the title of Engineer and Nautical Surveyor but in the 1936 Report of the Department he is described only as Engineer. Fison retired from full employment with the Department in 1940, the same year in which his son EC Fison joined the Department, but he was retained in a consulting capacity when the staff of the Department was depleted by war service. During this time he designed and supervised the construction of the floating gate for Cairncross Dock and advised on other matters relating to the dock.

Fison was a member of the Queensland Institute of Engineers and a foundation member of the Brisbane Division of the Institution of Engineers, Australia. He finally retired in 1945 and died in 1956 survived by his wife Winifred, two daughters and two sons.

Davenport, Winifred, *Harbours & Marine - Port & Harbour Development in Queensland 1824 to 1985*, Department of Harbours & Marine Queensland, 1986.
Letters from Mrs Jenny Fison, Pullenvale.

14

A C FITZ-GIBBON

MICE



Photograph by
courtesy of
Qld Railways
Historical Centre

FITZ-GIBBON, ABRAHAM COATES (1823-1887), alternatively known as Abram Fitz-gibbon, railway engineer, was born in Kilworth, County Cork, Ireland and educated at the Royal Naval School, London. In 1837 he was apprenticed for a term of six years to Charles Lanyon MICE, principally on railway engineering in Ireland, but his experience extended to roads, bridges and harbour works. From 1847 he was employed on further railway projects in Ireland and in 1852 was commissioned to report on rail projects in the United States before moving to Canada.

The Queensland Railways originated from the operations of Robert Tooth, a grazier with large holdings on the Darling Downs, who proposed to build a tramway from the coast to the Downs. Tooth brought Fitz-gibbon to Queensland from Nelson, New Zealand in June 1863, and he examined the country and prepared a report. Tooth dropped the proposal. Hearing of this, the Government applied for and secured Fitz-gibbon's services. The arrangement between Fitz-gibbon and the Government was by a contract agreement, and although he was simultaneously Constructing Engineer (18.9.63), Engineer in Chief (30.9.63) and Commissioner of Railways (23.12.63), he was actually at no time a salaried employee of the Government, his liberal contract emoluments covering all remuneration. His contract embraced making the survey and plans and the superintendence of contract construction for railways from Ipswich to Toowoomba, and from there to Dalby and Warwick at the following rates:

Survey and Plans - Ipswich to Main Range £80 per mile and a lump sum of £3,000 for the incline up the Range; for the extensions from Toowoomba - £70 per mile. Superintendence - Ipswich to Toowoomba - £320 per mile and for the two extensions £280 per mile.

The Railway Bill of the Queensland Parliament was assented to September 1863 and within seven months the whole of the surveys, setting out, plans and sections for 130 miles of railway were completed despite the extended wet season. This included 22 miles of some of the most difficult country in Australia. A statement given by Fitz-gibbon when offering to cancel this contract shows his staff to be 8 officers on the Dalby and Warwick Lines. They were paid a total sum of £225 per month. At times he had a total staff of 29, mostly Engineers and Inspectors.

The minister found it "inconvenient" to be advised by a Commissioner living at Ipswich who was not a paid public servant and was also an engineer so AO Herbert was appointed Commissioner in October 1864. Following an inquiry by a Parliamentary Select Committee into the circumstances of Fitz-gibbon's appointment and various matters affecting the railway construction, he left the Colony in the following October.

It was Fitz-gibbon's recommendation that Queensland adopt the 3'-6" gauge as an economy measure. Railway building was the occasion for much controversy, some of it very acrimonious. Fitz-gibbon's position, at the storm centre between contending political factions, was at times an unenviable one, but he made friends as well as enemies, and on his departure he was entertained by the former and presented with a silver tankard.

When Fitz-gibbon left the Queensland service, the railway was open between Ipswich and Toowoomba and the sections Toowoomba to Dalby and Toowoomba to Allora were being constructed. He was succeeded in the position of Engineer-in-Chief by Henry T. Plews. He returned to England in 1868, not taking any further active part in his profession although his opinions, particularly on colonial railways, were frequently sought. His main interests on retirement were history and archaeology.

Obituary, *Abraham Coates Fitz-Gibbon*, Proc.Inst.C.E. Vol. 1 xlii p63.

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15

E B FREEMAN



Photograph by
courtesy of
Mrs J Perry

FREEMAN, ERIC BERNARD (1898-1966), electrical engineer, was born on 22nd March 1898 at Mount Morgan, where his father, a school teacher, had opened a new state primary school. He attended primary schools in three different towns in the years up to 1910, when he won first place and the Lilley Medal in the State Scholarship examination. As a boarder at Brisbane Grammar School, he proved an outstanding scholar and sportsman, particularly in football, cricket and rowing. Completing the Senior Public Examination in 1915, he volunteered for service in the Australian Imperial Force, which was then being withdrawn from Gallipoli. He served in the trenches in France but was soon selected for an officer training course at New College Oxford. He returned to France as a Second Lieutenant. In 1920 he commenced the mechanical and electrical engineering degree course at University of Queensland, where he was a member of St John's College.

After graduation, he joined the staff of the City Electric Light Company (CEL) in Brisbane, at first on design work for Bulimba power station, and later as Resident Engineer on the same project. In 1926 he moved to the Company's Overhead Mains Department which had increased in importance as CEL extended its supply area from the central business district of Brisbane into South Brisbane, the Ipswich area, and several of the former shires which had been incorporated into Greater Brisbane by the 1925 amalgamation. At that time, the delivery of electricity from power station to customer was undergoing rapid technical development all over the world as high voltage bulk transmission systems were superimposed on existing distribution systems. Efficient expansion of its area of supply became a constant preoccupation of the Company, as it struggled to stave off ideologically-driven takeovers by local government or state government

bodies. Consequently, construction and operation of transmission and distribution systems became a predominant aspect of Freeman's professional career.

CEL expanded its supply area into the country around Brisbane. In 1933, Freeman published a paper *The electrical development of south-east Queensland* in the Journal of the Institution, describing recently-completed transmission lines from Brisbane to Redcliffe, Brisbane to Beenleigh, and Ipswich to Gatton. The outbreak of war in 1939 brought urgent demands for electricity supply to the armed services at many locations, and other wartime developments such as munitions factories. These demands had to be met despite Commonwealth Government control of essential materials, financial controls, losses of important plant items during shipment, and manpower controls.

Some aspects of normal life continued during the War, however, and in 1944 Freeman was elected to the University of Queensland Senate. He also became a member of the Standing Committee of the Council of the University (now convocation), and an honorary lecturer in Engineering. Freeman served on several other University committees. Soon after his return from an overseas study tour in 1945, a notice of motion was presented in his name, calling upon the Senate to undertake a wide-ranging review of the teaching of engineering in the university. In 1946, he became Chairman of the Brisbane Division of the Institution of Engineers Australia, and thus a member of the Faculty of Engineering. He was a member of the committee which recommended the replacement of the single chair of Engineering by separate chairs in Civil, Mechanical, and Electrical Engineering.

The City Electric Light Company directed Freeman to visit Canada and the USA "to investigate technical and other matters in connection with the distribution of electricity". To be sent overseas was most unusual in 1945. However, after his return in 1946 CEL began installing two-way radios at distribution depots and in vehicles. This revolutionised power system operations, increased safety and saved much time. Distribution depots also began recording details of thunderstorms, a small move which grew into a Queensland research programme directed at the main cause of blackouts — lightning.

Freeman was also active in the Electricity Supply Association of Australia, particularly as convener of the Committees on Consumers' Services and on Rural Electrification. Failing health forced him to take early retirement in 1960. He died in 1966, aged 68, survived by his wife Winifred, a son and two daughters.

Material supplied by Mrs L. Perry of Canberra and Mrs W. Freeman of Brisbane.
Personal recollections.

DRM

16

A E H FREW

BE Syd BE Qld MIEAust



For source of
illustration
see references

FREW, ALISON EAVIS HARDING (Harding) (1883-1952), civil engineer, son of RDA Frew, consulting engineer, was born at Roma in Queensland. He was educated privately until 1899 then attended Brisbane Grammar School. He completed two years of an Arts course at Sydney University then transferred to the Engineering Faculty from which he graduated Bachelor of Engineering in 1908. Frew moved to Brisbane in 1908 and worked as a field assistant to the Surveyor in the Queensland Railways so as to qualify as a Certified Mining Surveyor, and in the same year obtained his BE (Qld, *ad eundem gradum*). Following the latter degree he worked for his father from 1911 to 1915 as Chief Engineering Assistant in the Brisbane consulting practice, and from 1915 to 1919 he worked in the Townsville office of the firm. In 1923 he entered into partnership with CV Rees (architect) and TW Bridger (electrical and mechanical engineer), operating in both Townsville and Brisbane. He became a member of the Town Planning Association in 1924.

Frew developed a very entrepreneurial approach to consulting engineering and vigorously competed for business, backed by a broad based team. His business success attracted the attention of the media which, possibly, were looking for a Queensland example to match the outstanding personality of JJC Bradfield (qv). The work of the partnership expanded rapidly with bridges, wharves, water supply schemes and consultancies for local authorities in Queensland and New South Wales. Many electric light and power schemes for Queensland towns were engineered by the partnership. AE Axon (qv Vol 1) worked for the partnership from 1925 to 1929. In this partnership Frew became the consulting engineer to the Metropolitan Water Supply and Sewerage Board in Brisbane and conceived a scheme to augment the water supply to the city from a dam on the Coomera River into which all the streams rising in the Macpherson Range to

the west would be diverted via tunnels. During the hearings of the 1928 Royal Commission into the Metropolitan Board, the Commissioner queried a possible conflict of family interest. Although the final report did not raise the matter, the incident may have affected his future prospects. The partnership was dissolved soon afterwards.

From 1926 to 1932 Frew was commissioned by Brisbane City Council as Bridge Engineer for the design of the Grey Street (now William Jolly) bridge over the Brisbane River, a composite steel and concrete arch structure. Although criticised for placing the arch concrete over the steel members by guniting, the bridge has stood up remarkably well. The bridge was constructed by the firm of MR Hornbrook under the supervision of GO Boulton (qv). Frew continued as a consulting engineer by himself after 1932. In that year he was associated with Ralph Freeman, senior partner of Sir Douglas Fox & Partners, consulting engineers of London, in a project by Dorman Long & Co to build a toll bridge across the Brisbane River from Kangaroo Point to Bowen Terrace; but that project was not adopted by the Queensland Government. From 1932 to 1935 he was the Engineer for Bridge Construction, Hornbrook Highway, associated with GO Boulton (qv), and then is reputed to have provided consulting services for CA Stronach, the contractor for the Mackay Outer Harbour. When Stronach's contract was cancelled in 1936 by the Mackay Harbour Board, he owed Frew a considerable amount of money, which was probably never recovered. This setback may have contributed to Frew's bankruptcy which was registered in 1941. Frew worked with the Ministry of Munitions in Melbourne in 1942 and subsequently, for over a year, for Hornbrook, Mackenzie and Clark on the Pyrmont Powerhouse in Sydney. He then returned to a consulting practice in Brisbane.

Much of Frew's work was on bridges. In 1925 the Cross River Commission headed by Professor Hawken (qv Vol 1) requested him to prepare designs and costs for a bascule bridge for the Main Street, Kangaroo Point, canal proposal, and for a transporter bridge to Bulimba. By 1926 Frew had carried out designs for 80 bridges of varying sizes in addition to the above. He was an honorary lecturer in engineering at the University of Queensland from 1925 to 1929. Frew was a foundation member of the Brisbane Division of the Institution of Engineers, Australia. He died in 1952 in Brisbane, survived by his wife Beatrice, a son and daughter.

Who's Who in Australia 1941 p279, *The Men of the Week* p279, *Smiths Weekly* Nov 1926
O'Connor, C. *William Jolly Bridge - A Conservation Study for Brisbane City Council*, September 1994.
Illustration from Harding Frew in *Men of Queensland*, Read Press, Brisbane, 1932.

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17

D J GARLAND

MBE BE Syd FIEAust FInstCE



Photograph by
courtesy of
KD Garland

GARLAND, DAVID JAMES (1896-1970), bridge engineer, was born at Perth, WA, but after several moves, the family settled in Townsville where he received some of his secondary education at the Townsville Grammar School. The family then moved to New Zealand where he finished his secondary education at the Wellington Technical College, matriculating for entry to the University of New Zealand. A move to Brisbane saw him enrolled in the University of Queensland in 1915. At this stage of his life his major interest was in radio and he became one of the first radio amateurs in Brisbane to experiment in broadcasting. He would have preferred to study electrical engineering but later circumstances moved him into civil engineering. At this juncture he joined the AIF and served with the Australian Wireless Squadron in Mesopotamia in World War I.

On demobilisation, Garland attended the University of Queensland but he then moved with his parents to Sydney and entered Sydney University from which he graduated with the degree of Bachelor of Engineering (Civil) with Honours in 1922. He was first employed as the Acting Engineer for Hawthorn City in 1922 but moved to Brisbane and was employed by the newly established Queensland Main Roads Board (later Commission) as a draftsman and bridge draftsman. He remained in the Bridge Branch of the Commission for the next thirty-one years, active in the development of a range of standard timber and steel bridges for main roads works. He pioneered the development of composite steel girder and concrete deck designs for road bridges in Queensland, of which examples are the Maclean bridge over the Logan River and the first Coomera River bridge of the Pacific Highway.

As the Main Roads organisation expanded, his work as Bridge Engineer included the general supervision of day labour and contract construction of main roads bridges as well as the survey and foundation testing for the larger bridge projects; the supervision of the materials testing branch; and reports on local authority loan projects for roads, road plant, bridges and drainage referred to the Commission by the Queensland Government for advice. Included in these were the proposals for two toll bridge projects, viz the Hornibrook Highway between Sandgate and Redcliffe across the mouth of the Pine River and the Indooroopilly suspension bridge across the Brisbane River. He also made a preliminary design and estimate for a suspension bridge across Brisbane River between Kangaroo Point and New Farm as a submission to the Cross River Commission.

Garland served in the Citizen Military Forces between the World Wars and during the World War II with the Royal Australian Engineers from 1940 to 1944. Initially he worked on the Strategic Road Plan for Australia, then made preparations for the receipt of the US forces at the end of 1941. In 1943 he was the Assistant Director of Works (Land Forces) in charge of civil engineering design. He retired with the rank of Lieutenant Colonel as Staff Officer, Royal Engineers at Australian Headquarters, Melbourne.

In 1949 Garland was promoted to Deputy Chief Engineer and in 1953 became Chief Engineer of the Main Roads Department (Commission prior to 1950). He became a member of the Principal Technical Committee of the National Association of Australian State Road Authorities. He was Chairman of the Brisbane Division of the Institution of Engineers, Australia in 1951 and further served as a Councillor of the Institution for many years prior to his retirement. He served as a member of the Board of Examiners for Local Government Engineers and Overseers and conducted many professional interviews for local candidates seeking admission to the Institution of Civil Engineers, London. During his entire career he strove to raise the professional standing of the engineer within the community and encouraged others to participate in the affairs of the Institution. He rendered distinguished service to the State of Queensland and the profession. In the New Year's Honours List in 1962 he was awarded the MBE for outstanding service to the State as Chief Engineer of the Main Roads Department.

Garland retired in 1961 and died in 1970 survived by his wife Beatrice and one son, an engineer.

Membership application, IEAust, August 1936.

Material supplied by Mr K.D. Garland of Tarragindi.

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18

F B HAIGH

MBE DipCE HonME Qld FIEAust FAIM



Photograph by
courtesy of
Mrs Lail Haigh

HAIGH, FREDERICK BRUCE (1912-1974), irrigation engineer and administrator, was born in Melbourne and educated at Coburg High School. He was first employed as a Survey Assistant and Draftsman by the State Rivers and Water Supply Commission of Victoria from 1928 to 1931 and then undertook a course with the International Correspondence School from which he was awarded a Diploma in Civil Engineering in 1935. He was again employed by the Commission from 1933 as a Survey Assistant on the Western District Towns Water Supply Scheme and in 1934 as a Designing Draftsman in the Mildura District Sub Surface Drainage Scheme. In 1935 he was appointed Assistant Engineer in the First Mildura Irrigation Trust, assisting in water distribution, channel construction and sub surface drainage, and in 1937 he was appointed Engineer for the Trust, being the only civil engineer on the staff of the Trust. In 1937 he obtained a Certificate of Irrigation Engineers for Water Supply.

In 1941 Haigh joined the Royal Australian Engineers, rising to the rank of Major commanding a field company constructing roads, airstrips, bridges, wharves, water supplies and buildings. His particular gift was in working up rundown engineering units to full efficiency for which he was Mentioned in Despatches. He retained his interest in the RAE in the post war Citizen Military Forces for which he was awarded the MBE. He was appointed Colonel Commandant RAE Northern Command in 1970 and, in 1972, became Representative Colonel Commandant RAE for Australia, a position he held until his death.

After his discharge from active duty in 1946 he returned to the Mildura Trust but in 1948 was appointed Senior Irrigation Engineer in the Queensland Irrigation and Water Supply

Commission under TA Lang as Commissioner. At this stage the Commission was being revived to tackle a major programme of irrigation development in the State. He immediately embarked upon the design of the Clare Irrigation Area on the Lower Burdekin River. Within a year he was promoted to Deputy Chief Engineer responsible for the direction of the Construction, Irrigation and Design Branches of the Commission.

In 1949, when WHR Nimmo (qv Vol 1) succeeded TA Lang as Commissioner, Haigh was appointed Assistant Commissioner (Engineering). During his brief period as Commissioner, Lang had organised the new Department, staffed it with a large infusion of new blood and persuaded an enthusiastic Queensland Cabinet to invest in large scale irrigation schemes based on major storage dams. Under the technical guidance of Nimmo, Haigh organised a detailed programme for the development of irrigation in Queensland as opposed to the piecemeal results previously achieved.

Haigh succeeded as Commissioner on the retirement of Nimmo in 1955 and reorganised the upper levels of the organisation. He ran a tight and efficient regime, introducing innovations to bring the latest technology to bear on the problems. The Commission was one of the first government instrumentalities to adopt computerisation. Under Haigh the irrigated area increased several fold, fourteen large dams were either completed or started for irrigation where none had previously existed and the number of weirs increased from 16 to 65.

He was a member of the Standing Committee of the Water Resources Council, a member of the Board of Trustees of the Water Research Foundation of Australia, a Fellow of the Australian Institute of Management and a member of the Faculty of Engineering in the University of Queensland, this service being recognised by the award of an Honorary Masters Degree in 1971. He served on the Brisbane Divisional Committee of the Institution of Engineers, Australia from 1952, and was Division Chairman in 1960. During his term as Division Chairman, the Annual General Meeting and Conference of the Institution was held in Cairns in 1960, the first time it was held outside a capital city. He was a member of the Council of the Institution from 1962, being President of the Institution in 1970, the first Queenslander in twenty two years.

Haigh died in Brisbane in 1974. On his death the dam on the Kolan River was named the Fred Haigh dam at the request of the local people. Features at four other dams were named in his memory as was Haigh Place in the suburb of Monash, ACT. The Fred Haigh Medal was for a number of years awarded annually to the top hydraulics student at QUT. He was survived by his wife, Lail, two sons and two daughters.

Membership applications, IEAust, March 1936, August 1938, March 1941 and June 1954.
Powell, J.M. *Plains Of Promise Rivers Of Destiny*, Boolarong Publications, 1991.

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19

W HANSEN

ISO MSc(Eng) Col BE BSc Qld FIRAust FAIM FASCE



Photograph by
courtesy of
Qld Dept of
Main Roads

HANSEN, WILLIAM (Bill) (1919-1982), civil engineer and administrator, was born at Gympie in 1919, educated at Gympie State High School and graduated with first class honours from Queensland University in 1942. After working with the Department of Civil Aviation he joined the staff of the Stanley River Works Board in 1944 (later absorbed into the Co-ordinator-General's Department). In 1948 a Walter and Eliza Hall Travelling Fellowship in Engineering took him to USA where he worked with the International Engineering Co. Inc. at Denver Colorado, and was awarded a Master of Science Degree in Engineering at Colorado University. He then travelled to England and worked for Dorman Long & Co. On his return to the Co-ordinator-General's Department in 1950, he was engaged on the design of the Burdekin River Bridge. In 1954 Hansen became Resident Engineer in charge of the superstructure of the combined rail and road bridge which was among the earliest bridges assembled with high tensile steel bolts instead of rivets. It was on this job that his outstanding administrative abilities were recognised.

In 1958 Hansen became Director of Northern Development in the Queensland Department of Development and Mines. In this position he had a major role in the development of the programme for the construction of "beef roads" which led to the trucking of beef cattle by road in place of the former droving technique. He was also responsible for coordinating the restoration work necessary following the 1958 and 1959 cyclones in the Ayr - Bowen - Prosperine region. In 1959 he was appointed Administrator of Cook Shire for a period of three years when the Government decided that the elected local authority council was inadequate for the task. At the end of this period he joined the Queensland Main Roads Department as Assistant Commissioner for North Queensland. In 1969, on the retirement of the Commissioner Sir Charles Barton (qv),

Hansen was appointed Deputy Commissioner and on the retirement of HA Lowe (qv) in March 1973, Hansen was appointed Commissioner for Main Roads, retiring in March 1980.

Hansen was a Fellow of the Institution of Engineers, Australia, the Australian Institute of Management, and of the American Society of Civil Engineers. He was the author of several papers published by the Institution of Engineers, Australia, including *An Experimental Study of the Hydraulic Downpull on a Coaster Gate*, with co-author JD Cronin, a problem for which he had carried out hydraulic laboratory studies on models when he had joined the Stanley River Works Board. He and his co-author JE Kindler (qv Vol 1) were awarded the Warren Memorial Prize of the Institution in 1959 for their paper *High Strength Bolt Field Connections at Burdekin Bridge*. In 1966 he represented Queensland at the Fifth World Meeting of the International Road Federation in London and attended the Permanent International Association of Road Congresses in 1975 and 1979.

As Commissioner of Main Roads he was the Queensland Member of NAASRA from 1973 to 1980, being Chairman for 1974-75. He was also a Director of the Australian Road Research Board. Hansen was associated with the Australian Transport Advisory Commission in various capacities from 1969 and a Member of the Road Group of Advisers and the Co-ordinating and General Transport Group of Advisers in 1975-76. He was also Chairman of the Interdepartmental Technical Planning Committee which advised the Policy Committee of the Minister for Main Roads on technical aspects of the planning and development of Brisbane's freeway and principal arterial road system. For a period he was a member of the Division Committee of the Queensland Division of the Institution of Engineers. He was awarded the Imperial Service Order in the 1980 Queen's Birthday Honours List.

Hansen died in 1982 survived by his wife Rose and a daughter.

Appointment of Mr W. Hansen As Commissioner, Queensland Roads, June 1973.

Retired Commissioner of Main Roads, Queensland Roads, June 1980.

Based on Personal recollections.

20

J HESKETH

AMICE MIEE AAIEE



Photograph by
courtesy of
Asia Pacific
Information
Technology

HESKETH, JOHN (1868-1917), electrical engineer, died at the early age of 49 years, only 21 of which had been spent in Australia. Within that short span he exercised considerable influence upon the development of communications systems and electric power systems, first in Queensland, and after federation, in Australia. Hesketh was born in England, and gained experience with the British Post Office before coming to Queensland as the Government Electrical Engineer in 1896. His principal duty was to organise the colony's telegraph and telephone services, but he quickly became drawn into arguments over the Electric Light and Power Bill, which was before the Queensland Parliament at the time. In September 1896, he was called before a Select Committee to give evidence. Hesketh praised the Bill as being even better than the British act on which it had been modelled, because it was simpler, gave local councils a stronger position, yet gave better security to investors in private companies which became electricity authorities where local councils were unwilling to raise the capital necessary to enter what was then a risky industry.

About 1898, in pursuit of his communications responsibilities, Hesketh set up an Electrical Engineers Branch within the Department of Posts and Telegraphs. The same year the Colonial Government requested him to report on the electricity supply system of Thargomindah, and in November 1898 he reported to Parliament that the combined power of the steam plant and the hydroelectric plant driven by artesian bore pressure amounted to 10 horsepower, which could be increased to 15 horsepower with a more efficient waterwheel. Hesketh favoured the idea of generating electricity by means of "bore power", but little more seems to have come of it. The same year, Hesketh also became Electrical Inspector for the Fire Underwriters' Association, but resigned the following year. He was a founding member of the Queensland Electrical Association, and was elected as its first President at the inaugural meeting on 18 May 1898.

The Electric Light and Power Act of 1896 required electric mains to be placed underground, and Hesketh had the task of supervising the conversion of overhead mains erected before the passage of the Act. In the case of Thargomindah, he assented to the retention of overhead mains as the only practicable system for such a small and isolated situation. However, he was not so accommodating towards the Brisbane Electric Supply Company (BESCo), which unsuccessfully sought an extension of time to remove overhead mains from its Edison Lane generating station, which was being replaced by a new power station in Ann Street.

Hesketh was called upon to advise the Brisbane Municipal Council on electric street lighting, but a poll of ratepayers rejected the idea. In April 1901 the Council refused an application by BESCo to supply electricity for lighting the Public Library in William Street, but took no action to supply it itself. The next year Hesketh advised the State Government that the Council should be excluded from the central city area served by BESCo as long as the company continued to fulfil its obligations to the public and to the government authorities. Hesketh was not afraid to exercise his statutory responsibilities in relation to other government departments when necessary, as the Railways Department found in 1900, when it began work without waiting for the issue of the necessary Power Order. Certain completed works were disallowed as being too accessible to vandals and therefore unsafe.

In 1906, Hesketh left Queensland to become Chief Electrical Inspector of the new Commonwealth Posts and Telegraphs Department, Melbourne. He applied himself vigorously to the orderly development of the telephone system, and to the introduction of the Wheatstone high speed system of telegraph working between capital cities. Safety, and the prevention of inductive interference between power systems and communications systems became a matter of great interest to him, and in 1909 he chaired a special conference of electrical engineers which was charged with the responsibility for drawing up rules to govern the development of both types of systems. Hesketh recommended the early extension in Australia of the automatic telephone system, the development of which he had been closely following in publications. He recommended the adoption of the Creed system for telegraph working between the eastern and western states, and one of his last official acts was to recommend the adoption of the latest multiple^x printing system for inter-capital traffic. He became ill, and, after a long period of illness, died on 18 July 1917. An obituary described him as "a striking personality, possessing initiative, industry, ability and courage."

Gribble P.J., *History of the Queensland Telegraph Service*, Telecom 1980

John Hesketh 1868-1917, in *Connecting Queensland*, Vol. 2 Issue 12, Asia Pacific Information Technology, 1995.

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21

J W HETHERINGTON

MAUSIME



Photograph by
courtesy of
Brisbane
City Council

HETHERINGTON, JOHN WILLIAM (1860-1928), mining engineer, industrial negotiator and politician, was born in Durham, England in 1860 and migrated to Brisbane with his family in 1887. He worked as a coal miner in Ipswich for five years before setting up as a coal merchant in Brisbane and developing improved mine safety equipment. In 1898 Hetherington merged his interests with the Tivoli Coal and Coke Company Limited of Ipswich and became its general manager. By 1905 he had gained complete control of the company and in 1907 entered into a full partnership with the Rylances who owned it.

In 1906 Hetherington was elected an alderman of the Brisbane City Council and in 1907 became the President of the West Moreton Colliery Proprietors' Association. In this position he demonstrated his skill as an industrial negotiator by successfully resolving a dispute between the colliery owners and West Moreton District Coal Miners' Union. His masterly handling of the negotiations resulted in his appointment to Queensland's first Coal Mining Industry Wages Board. His ability was further recognised when the Government appointed him as Mayor of Brisbane in 1910 to resolve the deadlock over the building of a new town hall. Six years later he was again Mayor of Brisbane, this time elected by his fellow aldermen, and he held the position for two years.

One of Hetherington's major achievements was the development of the Blair Athol coal field. Coal was first mined from its thick seams from 1890 but the operations were uneconomic until the railway was extended to the area from Clermont in 1910. Hetherington was invited to become the managing director of the Wallsend Mine in 1909 and he determinedly set about adopting modern mining technology including electric coal cutters, borer drills and lighting.

Hetherington's negotiating abilities were again in demand in 1912 when the coal miners joined the Brisbane tramwaymen's strike escalating it into a general strike. The Brisbane Employers' Federation refused to negotiate, but he was able to arrange a compromise solution which left no rancour in the coal mining industry. He then turned his activity towards cement production. In 1913 Hetherington became the first chairman of the Queensland Cement and Lime Company but it took all his abilities to overcome a four year period of labour and material shortages during the first World War and bring the Darra plant into successful production.

Hetherington's last major coal mining enterprise ended in failure. The high cost of transport and competition after the first World War made operations on the Blair Athol coalfield uneconomical. The Government agreed to reduce rail charges if the companies would undertake open cut mining. Professor Sir Edgeworth David, geologist and luminary of Australian coal mining, visited Blair Athol and warned that there would have to be a large increase in output to justify the capital cost of open cutting. Hetherington bravely committed his company to the experiment, choosing a site where the overburden was of minimum depth. The work commenced in 1922, the earth moving contract being awarded to Manuel Hornibrook who brought in a dragline and a steam shovel to the job. Disaster struck when the earth moving contract was almost complete. The steam shovel repeatedly broke down and rain delayed the project. Suddenly, without warning, Hetherington abandoned the project, the reasons for his decision still being obscure. It was another 60 years before open cut mining was successfully established in the Blair Athol field.

Fading health led to his disposal of his Rylance interests and his standing down as a Brisbane alderman. Hetherington died in 1928 recognised as "the father of the coal industry in Queensland", and was survived by his wife Amelia, three sons and a daughter.

Whitmore, R.L. *John Hetherington, Father of Queensland's Coal Industry*, J.Roy. Hist.Soc. Qld., Vol 13, pp. 445-461, 1989.

GC

22

W HIGHFIELD

CE



Photograph by
courtesy of
The Highfield
Family

HIGHFIELD, WILLIAM (1838-1923), civil engineer, was born of British parents in Leghorn, Italy, in 1838 and grew up in Birkenhead. After working with his father (also an engineer) he was appointed as the first manager of Wallasey gasworks in 1860 before emigrating to Queensland 3 years later in the company of his younger brother, Charles. Here he found a job as an assistant to J Brady (qv Vol 1) who was building Brisbane's first reticulated water supply. In July 1866 he married Louise, the daughter of Brady's clerk/accountant Edwin Hollinworth, but lost his job 5 months later when Brady's department was disbanded. He returned temporarily to the public service in 1870, and in 1873 obtained a permanent position as a draftsman in the drawing office of the Chief Engineer to the Southern and Western Railway.

At that time only Brisbane and Rockhampton had waterworks and Queensland had no government hydraulic engineer. When Ipswich was offered a government loan in 1873 for building a waterworks, James Thornloe Smith, one of the senior railway engineers, prepared a report on it which was published in Queensland Times newspaper. One person who probably read it was Highfield who wrote to Smith offering his services as Resident Engineer on the project. He also arranged an interview with the Secretary for Public Works and Mines and made it clear that he was anxious to prepare the plans for the water supply of an important town. The following year Toowoomba was granted a loan for a waterworks and in 1875 Highfield was appointed to a new position of Engineer-in-Charge, Waterworks.

In the twenty years following separation from New South Wales (1860-1880), the Queensland Government allocated £266,750 in loan funds to the construction of waterworks and

Highfield was responsible for spending more than a half of it over a period of only five years. His staff expanded to six and he was responsible for the design and most of the construction of waterworks at Toowoomba, Ipswich, Warwick and Maryborough, all of which involved the use of steam driven pumps, a daring innovation at a time when the Brisbane Board of Waterworks made every effort to avoid using pumping machinery. Unfortunately, all the schemes cost considerably more than Highfield had estimated and the various town councils proved very reluctant to take them over on completion. The Government therefore changed its policy so that councils would in future be responsible for the costing, design, construction and loan repayment of their waterworks, and in 1879 Highfield was told that his services were no longer required. Shortly before his notice expired the government accused him of embezzlement and the case created quite a sensation at the time. He was tried in the Criminal Court in Brisbane in March 1880 and found guilty. He was sentenced to twelve months imprisonment with hard labour and his appeal was lost in the Supreme Court. The charge resulted from Highfield's habit of routing government payments for his staff through his own personal bank account. The case, and a thorough analysis of Highfield's waterworks can be found in Whitmore (1997).

After his release the government gave instructions that Highfield was not to be re-employed by the government or by any of its contractors, but the ban was honoured in the breach. He became deeply involved in railway construction in Queensland and when he finally set up in Brisbane as a consulting civil engineer in 1892 he was a relatively wealthy man. He died on 9 March 1923 in his 85th year and is buried beside his wife Louise in the Anglican cemetery at Oxley.

Whitmore, R.L., *Queensland's Early Waterworks*, (Dept. of Natural Resources, Brisbane, 1997).
Information from Bill & Ross Highfield of Scarborough, Val Robinson of Moggill, and Martyn Highfield of Sussex, England.

RLW

23

P W HILL

MIEAust



Photograph by
courtesy of
Mrs J Cooper

HILL, PHILIP WALLACE (1889-1965), local government engineer, was born at Kempsey, New South Wales. He gained qualifications in civil engineering and after some early engineering experience in New South Wales, moved to Queensland in 1913, to take up an appointment as Engineer to the Esk Shire Council. He commenced with the Council at the relatively young age of 23, and probably had little idea that he would serve Esk Shire until his retirement in 1962 at the age of 72. This period of 49 years continuous service as Shire Engineer is one of the longest in local government engineering in Australia. It included both World Wars, the Great Depression of the early 1930s and the era of rapid infrastructure development of the 1950s. Esk Shire covers a large portion of the Brisbane Valley region in southern Queensland, being predominantly rural with agriculture, timber, beef and dairying as the main activities. Bullock teams and steam traction engines were the main means of transporting produce in 1913.

His earliest engineering activities were focussed on the need to provide a suitable road network to service the Shire's agricultural needs. This was an enormous task given the distances involved, the innumerable stream crossings, the lack of road-making equipment and the usual local government problem of limited funds. At the time of his appointment in 1913, there were few formed roads in the Shire and the existing tracks were rough when dry and quagmires during rain. It is reported that in 1912 Esk Shire had more bridges than any other Shire in Queensland but that these were in urgent need of repair. Hill's earliest modes of transport around the Shire are not well documented but the Council provided a motorcycle in 1919 and then a car in 1923 for his inspections. One of his first priorities was to address the lack of suitable road-making equipment. Based on his knowledge of road-making plant being used in NSW, Hill immediately

recommended the purchase of a range of equipment for the large sum in those days of £2,759. He estimated this would save £1,500 per year. Esk Shire was reportedly the first shire in Queensland to obtain such advanced road-making equipment and the new plant was proudly demonstrated in Esk to an audience including Acting Premier Hon WH Barnes MLA. Hill carried out all his own survey and drafting work, job costing and even payment of the road gangs around the shire. Other duties included inspection of sanitation in the early days before the appointment of a health inspector, as well as inspections for wheel tax and noxious weeds.

Over the half century of his term as Engineer to the Esk Shire Council, the Shire's road system was transformed to modern standards. Hill introduced the first bitumen roads as well as steel and concrete pipes and culverts. He designed and constructed numerous large wooden bridges. He worked in close liaison with the Commissioner of Main Roads and senior MRC Engineers supervising the construction of the Brisbane Valley Highway through Esk Shire. This included the difficult road construction conditions applying in the Blackbutt Range area. He also worked closely with Glenister Shell (qv), Resident Engineer for Somerset Dam when the Shire built the access roads from the railway at Esk to the project. He was also responsible for the provision of the early water supply schemes for Esk and other towns in the Shire.

Hill weathered many storms which affected Esk Shire, not just major floods, but the social effects of the Great Depression and two World Wars, fluctuations in rural industries, and the usual local government politics and parochial rivalries between the elected Councillors. To have achieved so much over such a long period of service as Engineer to one Local Authority is a tribute to both his engineering ability and his personal qualities. He was highly respected in the district and particularly by the men who worked for him. His humour is typified by his words at a farewell on his resignation in 1962:

"If I had known the job was only temporary when I started in 1913, I wouldn't have taken it on".

Hill died in 1965 at Esk and is buried in Esk cemetery. His engineering ability was a strong role model for his family (which includes two local government engineers) as well as several other civil, chemical and mining engineers. He was a foundation member of the Brisbane Division when the Institution of Engineers, Australia was established in 1919.

He was survived by his wife, Gertrude, an engineer son and a daughter.

Kerr, R.S. *Confidence and Tradition: A History of Esk Shire*, Council of the Shire of Esk, 1988.
Personal communication with family members.

PRW

SIR JAMES HOLT

KB BE Syd HonDEng Qld HonFIEAust



Photograph by
courtesy of
The Courier Mail

HOLT, JAMES ARTHUR, (1899-1982), engineer and administrator, was born at Lithgow, on 30 April 1899, and was educated at Sydney High School. At the University of Sydney he graduated BE in Civil Engineering with First Class Honours and received the Graduation Prize for Thesis in 1921. The first twelve months of his engineering career were spent with a Sydney firm of general building contractors, to be followed by ten years, 1922 to 1932, with the New South Wales Public Works Department's staff on the design and supervision of construction of the Sydney Harbour Bridge. During the first five years of this period he was engaged as Engineering Draftsman on the design of alternative types of bridge for tender purposes and on the check of the accepted design. This included nine months' work in London, concerned with the approval of Dorman Long and Company's detailed working drawings. The second five years were spent as Supervising Engineer on the inspection of fabrication and erection of the steelwork of the main arch and the approach spans of the Harbour Bridge. During 1932 and 1933 he was Officer-in-Charge of the Narooma office of the NSW Department of Main Roads.

In 1934 Holt entered the service of the Queensland Government. From 1934 to 1940 he was Supervising Engineer of the Brisbane River Bridge Board, Bureau of Industry, Queensland, responsible for the design and supervision of the contract for the construction of the Story Bridge, Brisbane, completed at a cost of £1,600,000. During 1940 and 1941 in the same capacity he was in charge of preliminary designs of the St. Lucia Bridge, Brisbane, and the Fitzroy Bridge, Rockhampton, as well as other structural projects. 1942 and 1943 saw Holt in charge of all Bureau of Industry war time activities, which included hangars for US Air Force, ordnance stores and workshops for the Australian Electrical and Mechanical Engineers, stores for the RAAF and a

large pre-fabrication depot in Brisbane. In 1943 and 1944 he was Engineer-in-Charge of all Allied Works Council projects in the Cairns area, expenditure on which totalled £1,750,000.

From 1944 to 1949 he was Chief Engineer, Bridge Branch, Co-ordinator-General's Department, Queensland, in charge of design and supervision of construction of the Fitzroy Bridge, Rockhampton, and the design and construction of the superstructure of the Burdekin River Bridge. The Bridge Branch also assisted other Departments in structural designs, investigations and reports, and had charge of construction of the new University of Queensland. In 1949 he became Chief Engineer of the Department also taking over the Hydraulics Branch (then completing Somerset Dam and designing and building the Tully Falls hydro-electric Scheme). On 1 January 1954, he was appointed Acting Co-ordinator-General of Public Works and on 1 June 1954, he succeeded Sir John Kemp (qv Vol 1), the first Co-ordinator-General of Public Works. On 31 May 1961, he was re-appointed for a further five years. The activities of the Department principally comprised the preparation of the annual co-ordinated plan of works of all State Departments and Local Authorities in Queensland, engineering design and construction, and participation in many committees. As Co-ordinator-General he chaired the main interdepartmental engineering committee and controlled a very active department which designed and then built by contract many bridges including Bribie Island, Indooroopilly Railway, New Victoria, Riverside Expressway, the Barron Falls and Tully Falls Hydro-electric schemes, Eungella Dam, and the new Brisbane Markets. The Department also supervised dredging in Moreton Bay and initiated beach protection in Queensland. Holt retired in 1963 and became a director of several engineering companies.

Holt was a member of the Brisbane Division Committee of the IEAust from 1939 to 1948, was Chairman in 1943, resigning on his transfer to Cairns. Holt was Chairman again in 1947 and was a member of the Council from 1948 to 1954. He was awarded the Warren Memorial Prize and the RW Chapman Medal for a paper entitled *Story Bridge, Brisbane*, presented in 1939, and then for a paper entitled *Fitzroy River Bridge, Queensland*, presented in 1953. In November 1961, Holt was awarded the Peter Nicoll Russell Memorial Medal. He was Queensland Government representative and Chairman of the State Committee of the Standards Association of Australia. From 1948 to 1955 Holt was a member of the Faculty of Engineering, University of Queensland, and a member of the Senate of that University from 1955. He was created a Knight Bachelor in the Queen's Birthday Honours List of June 1960. In 1965 the University of Queensland conferred on him an Honorary Doctorate of Engineering.

Sir James Holt died in 1982, survived by his wife Audrey, three sons and a daughter.

Lack, C. *Three Decades of Queensland Political History*, Qld Govt Printer, Brisbane, 1962.
O'Connor, C. *Story Bridge - A Conservation Study for Brisbane City Council*, November 1992.

25

J F KEAYS

MBE BCE Melb HonFIEAust
HonFLArBA



Photograph by
courtesy of
JG Keays

KEAYS, JOHN FREDERICK (1908-1985), consulting engineer, was born at Tallangatta, Victoria on 2 August 1908, the son of the Presbyterian minister to the area. On his parents' transfer to Deniliquin he became a boarder at Geelong College and then progressed to the University of Melbourne where he was an outstanding athlete. He graduated with honours in civil engineering in 1932. His first job was Assistant Engineer for the Shire of Corange and Windowran in NSW but he was soon appointed by A Gordon Gutteridge to go to Devonport, Tasmania for the design of the sewerage scheme of which he became project manager. Gutteridge then employed him on investigations and designs for sewerage schemes in NSW towns.

Gutteridge, in partnership with Haskins and Davey (GHD), was appointed in 1937 for the design and supervision of construction of the sewerage scheme for Maryborough (Qld) and sent Keays to take charge of the project. Appointment as Consulting Engineers to Burrum Shire followed in 1938 and much of Keays' work involved roads and bridges (mainly timber). Subsequently Keays took over the GHD office in Brisbane and was moved to Melbourne at the end of 1940 as engineer-in-charge of that office. He was released by GHD early in 1942 to join the RAAF as a Works Officer with the rank of Pilot Officer, eventually reaching the rank of Squadron Leader. Much of his war work was in North Queensland where the present sites of a number of country airstrips are those he selected. After a period in the Northern Territory he became Commanding Officer of No 6 Airstrip Construction Squadron responsible for airstrip construction and maintenance in forward areas. He later became Chief Officer of No 1 Airstrip Construction Squadron serving on Tarakan, Borneo.

At the end of the war Keays was asked to take over the small remaining office of GHD in Brisbane, in their cramped quarters. Here a staff of ten worked for a decade handling sewerage schemes in cities and towns throughout Queensland, the extensive Burrum River Water Supply Scheme as well as miscellaneous civil and structural works. During this period Keays was one of the pioneers of town planning in Queensland and plans were prepared, largely by him personally, for towns as diverse as Southport, Surfers Paradise, Redcliffe, Biloela and, with others, Ipswich. Later he supervised the preparation of town plans for many other centres.

In 1948 GHD was consulted for the sewerage of Cairns, at that time the largest unsewered city in Queensland. This provided a challenge with high water table, pervious sands and soft clays. Keays promoted the use of flat grade gravity sewers, with rubber ring joints that allowed flexibility in the poor foundation material. He also introduced multiple pumping stations, a practice later followed in other flat Queensland towns. Also in 1948 GHD commenced the necessary detailed surveys for an expansion of the Brisbane sewerage and he designed extensive areas of the city's sewerage system. GHD established a permanent office in Cairns in 1954 to handle work in North Queensland. Soon after Davey's retirement in 1964 Keays took control of the GHD Darwin office. Meantime the Brisbane office grew with work on railway projects at Mackay and Moura and other coal haulage lines, while sewerage and water supply work continued to expand.

On his retirement from the firm in 1974 at the age of 65 Keays was Manager for Queensland and the Northern Territory and Deputy Managing Director for the firm nationally. After his retirement he developed a pre-eminent reputation as an engineering arbitrator. He was a foundation Fellow of the Institute of Arbitrators, Australia, and later Honorary Fellow. He was active in Institution of Engineers affairs, being Chairman of the Queensland Division in 1973. He was one of the founding members of the Association of Consulting Engineers and National President 1972-1974. He was also a member of many technical and advisory committees, including a thirteen year membership of the Board of Examiners for Engineers and Overseers to Local Authorities. Keays made a significant contribution to the profession of engineering and this was recognised by Queensland Division of The Institution of Engineers Australia firstly by appointing him as an Honorary Fellow of the Institution and then by naming its Board Room in his honour.

Keays died in October 1985 survived by his wife Helen, two sons, both engineers, and two daughters.

Obituary, John Keays G.H.D. News, No. 53, Dec. 1985.
Royal Australian Air Force, Discharged Personnel Records.

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NHT

R D KING-SCOTT

MinstCE MIEAust MAWWA



Photograph by
courtesy of
RF King-Scott

KING-SCOTT, ROBERT DONALD (1909-1975), public service engineer, was born in Melbourne on 31 March 1909, the son of Dr and Mrs JD King-Scott. He was educated at Scotch College, Melbourne and Melbourne University where he studied architecture. He also studied civil engineering part time at the Gordon Institute of Technology, Geelong, Victoria. In 1928 he became a pupil of ETM Garlick MinstCE, consulting engineer of Geelong where he gained extensive experience in water supply, sewerage and local authority engineering. After passing the Institution of Civil Engineers examination, King-Scott was elected an Associate Member in March 1934. He continued as an assistant engineer to Garlick, engaged on water supply and sewerage engineering developments in Victoria until 1935, when he was appointed to the position of Assistant Engineer in the Department of Irrigation and Water Supply, Queensland.

In 1941 the Town Water Supply and Sewerage section of the Water Supply and Irrigation Department was transferred to the Local Government Branch of the Department of Public Works under AF Sharpe as Engineer-in-Charge, and King-Scott was appointed Assistant Engineer Division I. In 1943 he joined the Army as Staff Officer, Royal Australian Engineers (Water) when he was technical adviser to the Chief Engineer, Queensland Lines of Communication Area on all matters pertaining to water supply, drainage and sanitation in the area. His main concern here was the provision and operation of these services for the numerous army corps established in Queensland during World War II. In August 1944 he was seconded for special duty to the Office of the Chief Engineer, General Headquarters, South West Pacific Area in the Operations Division and served in New Guinea, the Philippines and Borneo. For this service he was decorated with the American Bronze Star Medal for distinguished service.

On his return from war service in 1945 King-Scott was promoted to Sewerage Engineer. The highlight of his career was the extensive work he accomplished in Queensland in developing sewerage in country districts. When he came to Queensland in 1935, only part of Brisbane and two of the major towns had sewerage works and King-Scott was largely responsible for the development of adequate standards of practice and procedures in all phases of sewerage and related works. The Department not only set standards but approved local authority sewerage plans, frequently prepared by consulting engineers, and also offered an investigation and design service to local authorities for sewerage works. When he retired, virtually every community in Queensland with a population in excess of a few hundred was sewered.

In 1954 he was appointed Engineer-in-Charge (subsequently reclassified as Chief Engineer) in the Department of Local Government and held this position until he retired in March 1974. He was Chairman of the Plumbers and Drainers Examination and Licensing Board and served on the Joint Committee, Water Supply and Sewerage By-Laws and the Board of Examiners for Engineers and Overseers to Local Authorities. He was a member of numerous government committees established to examine water supply and sewerage planning in various parts of the State. In this connection King-Scott was the Local Government Department representative on the Water Supply Planning Committee for the future water supply of Brisbane and adjacent local authorities. This Committee recommended the construction of North Pine and Wivenhoe Dams.

King-Scott won the respect and complete confidence of his many clients - all the Queensland Local Authorities except Brisbane City - and he worked closely with Brisbane City engineers to establish the high standards of materials, construction procedures and effluent qualities that have stood the test of time and satisfied the environmental demands that were affordable in the post World War II period of growth and development.

He was a foundation member and later chairman of the Queensland Division of the Australian Water and Wastewater Association. His name is remembered in the annual prize of that Association.

King-Scott died on January 6, 1975 survived by his wife Patricia and two sons.

Based on personal recollections.

VES

27

PROFESSOR J H LAVERY

CBE ME Qld BSc Oxon MInstCE FIEAust



Photograph by
courtesy of
Dr H Lavery

LAVERY, JOHN HARDIE (1905-1970), civil engineer, educator and administrator, son of Hugh Lavery and Jessie Calder Hardie, was born at Brisbane on 23 May 1905. He was educated at Brisbane Grammar School and the University of Queensland where he graduated in Civil Engineering in 1928 with first class honours, and with a Master of Engineering in 1940. Awarded a Rhodes Scholarship in 1928, he studied at Oxford University, receiving a science degree in 1931 and then undertook research work on Testing of Materials under Professor R V Southwell FRS in the Oxford University Engineering Laboratory. Lavery returned to Queensland in 1933, joining the Department of Irrigation, Water Supply and Sewerage as an assistant engineer. He worked on water supply schemes for a number of cities and towns including Toowoomba, Bundaberg, Mackay, Longreach and Coolangatta.

In 1941, Lavery moved to the Works Department of the Brisbane City Council where he was designing structures for the sewerage scheme. However, from 1942 to 1944 he served in the Royal Australian Engineers in both New Guinea and Australia, being Mentioned in Despatches for distinguished service in New Guinea. At the end of the war in 1945, Lavery returned to the Brisbane City Council as Engineer for Design in the Works Department.

Lavery had developed a considerable reputation as a structural analyst and designer and in late 1945 was appointed part-time Special Lecturer in Structural Design at the University of Queensland. Following the death of Professor Hawken, Lavery became first Professor of Civil Engineering on 25 October 1948. He proceeded to develop the new Civil Engineering Department with a strong engineering science base, adopting new methods for teaching engineering and

recognising the necessity for close co-operation between the engineering school, industry and the profession. Following a visit to Britain and Europe in 1953 he began planning for the new engineering school at St Lucia. When Federal funds became available for construction of University capital works in the late 1950s, the new Civil Engineering laboratories at St Lucia were one of the University of Queensland's first two projects. Lavery modernised the undergraduate curriculum. He also encouraged the development of postgraduate research and the first Civil Engineering PhD and MEngSc degrees were awarded in 1961. In 1953 he was one of the University's two official representatives at the Seventh Quinquennial Conference of Commonwealth Universities at Cambridge, UK. He served several terms as engineering faculty Dean, was chairman of the Professorial Board (1963-5) and a member of the Senate (1963-70). For many years he was a member of the Building and Grounds Committee and had a large input into the development of the St Lucia campus. He resigned as head of the Civil Engineering Department on 30 September 1969, having been appointed Acting Deputy Vice-Chancellor on 13 February 1969.

Lavery was active in both professional engineering and academic matters outside the University of Queensland. He was a Fellow of the Institution of Engineers, Australia, a member of its Queensland Division Committee from 1946-1961, serving as chairman in 1952, and on the Federal Council from 1955 to 1961. He was also a Member of the Institution of Civil Engineers. Other professional roles included chairman of both the Board of Registration of Engineers and the Board of Examiners for Engineers and Overseers to Local Authorities. His academic activities included Deputy Chairman and Member of the Council of the Papua and New Guinea Institute of Technology at Lae and external examiner for the University of Malaysia in the early 1960s. He was involved with the development of Townsville University College (now James Cook University) and the selection of the site for Brisbane's second university (now Griffith University).

He was awarded the University of Queensland's Sir Thomas McLlwraith Engineering Scholarship in 1927 and a Rhodes Scholarship in 1928. His Institution of Civil Engineers paper *New Methods of Testing by Impact* (co-authored with RV Southwell) was awarded a Telford Premium in 1934 and his 1946 Institution of Engineers, Australia paper *Continuity in Elevated Cylindrical Tank Structures* was awarded both the Warren Memorial Prize for the best paper on a civil engineering subject and the R W Chapman Medal for the paper of most outstanding character and originality dealing with the science and/or the practice of structural engineering. His service to both the University of Queensland and Queensland in general was recognised by the award of CBE in the January 1967 New Years Honours List, and in November 1969 the University Senate appointed him Professor Emeritus in anticipation of his intended retirement in the following year.

Lavery died at Caloundra on 19 January 1970, five months before his intended retirement, survived by his wife Audrey and two sons.

Obituary, *Professor John Lavery*, Proc. Inst. C.E., Vol. 47, 1970.

MRG

28

J S LOUITTIT

MQIE MIEAust AMICE



Photograph by
courtesy of
Mrs P Louttit

LOUITTIT, JAMES STRUTHERS (1862-1926), local government engineer, son of Samuel Laing Louttit and Jane Struthers, was born on South Ronaldsay in the Orkney Islands, Scotland on 29 May 1862. He was educated at Public Schools in Orkney and, between 1879 and 1884, served as an articled pupil under William Boulton MICE, City Engineer, Aberdeen, Scotland where he obtained experience in various aspects of Municipal Engineering.

Louttit emigrated to Australia in 1884 and initially worked in Sydney as an assistant to WR Bell MICE on a proposed Lane Cove Railway and then with GC Clark CE of Clark Brothers, Civil Engineers and Architects. In 1885 he went to North Queensland where he was a field assistant with EA Leonard, Government Surveyor, for about nine months before spending a short period in the office of Clark & Pye, Architects in Brisbane. In about 1886 he was appointed draftsman by the Woolloongabba Divisional Board, which later became part of the South Brisbane Municipal Council. Louttit worked under Chief Engineer, TC Deverall, on various projects including Vulture Street, Gladstone Road, Annerley Road, and the streets in East Brisbane. Clearing of heavily timbered areas and substantial earthworks were required and much of the road work was done using gangs of prisoners from Boggo Road Gaol.

Following the disbandment of the South Brisbane City Council's Engineering Department in the aftermath of the 1893 floods and the depression of the 1890s, Louttit spent eight months in Sydney working as Assistant to GH Statham, Engineer and Manager to the Kensington Freehold Estates. After a brief and apparently unsuccessful period as a consulting civil engineer in Brisbane, Louttit took up fruit growing and farming near Mt Gravatt. In 1896 he

returned to the South Brisbane City Council as City Engineer. His responsibilities included design and supervision of all works including city drainage, street formation and wharfage. After the absorption of South Brisbane City into Greater Brisbane in 1925 he was appointed Engineer for No. 5 District which covered a greater area than the former South Brisbane City.

Louttit was very much involved in the activities of professional engineering organisations, particularly during his later years when he had continuing employment. First elected as an Associate Member of the Institution of Civil Engineers in 1891, he resigned in 1896, but was re-elected in 1910. The Queensland Institute of Engineers (QIE) was formed in 1900 and Louttit was not a foundation member but joined within the first year. Certainly he was participating in QIE meetings from May 1903, being elected vice president in 1911 and president in 1912. In his presidential address, probably delivered in late 1913, he reviewed the state of the engineering profession, pointing out that the days of "rule of thumb" were practically gone, that educated and trained engineers were now needed and that such engineers needed better remuneration for their work. At the first meeting of the Queensland Section of the Institute of Local Government Engineers of Australasia (ILGEA) in November 1913, Louttit was elected chairman, a position which he continued to hold until that organisation was absorbed into the Institution of Engineers, Australia in 1919. When ILGEA formed a Federal Executive in 1915, Louttit was elected a Vice President, becoming President in 1917. A principal matter of concern to Louttit and his Queensland local government engineering colleagues at this time was the need for legislation to compel Local Authorities with annual incomes of over £5000 to employ qualified engineers as was the situation in New South Wales and Victoria. Louttit was himself a Certified Engineer under the New South Wales Local Government Act, 1906. As a member of ILGEA, Louttit was a foundation Associate Member of the Institution of Engineers, Australia and was transferred to full Member in 1920. He was a member of the Brisbane Division Committee from 1920 to 1923.

In recognition of his services he was honoured with one of the 96 memorial trees sponsored by the Institution in Canberra in October 1926. His tree, a Pin Oak, *Quercus palustris*, in Manuka Circle was still there in 1995.

Louttit died at Brisbane on 22 June 1926, survived by his wife Agnes and his three sons.

Inst.C.E. Candidates Circular, *James Struthers Louttit*, Dec. 1910.
Memoir, *James Struthers Louttit*, Trans.I.E.Aust., Vol.7, 1926.

MRG

29

H A LOWE

BE Qld FIE Aust FAIM FCIT



Photograph by
courtesy of
Qld Dept of
Main Roads

LOWE, HENRY ALFRED (Harry), (1908-1975) was born in Brisbane, educated at Ipswich Grammar School and graduated as a Bachelor of Engineering from the University of Queensland in 1931 having been President of the Students Union. He joined the staff of the Main Roads Commission on graduation as a temporary assistant draftsman in the Testing Branch and in 1932 was promoted to Temporary Junior Assistant Location Surveyor. By 1935 he had become an Acting Engineering Assistant and Relieving Officer in the Engineering Branch and, by 1939, Acting Assistant Engineer later confirmed as Assistant Engineer. In this capacity he administered Engineering District No.1 during the period that CM Calder (qv) supervised the construction of Cairncross Dock, being made Acting District Engineer for the District.

All Lowe's employment up to this date had been in South Eastern Queensland, but in 1943 his services were made available to the Allied Works Council for projects north of Cooktown. He returned to the Main Roads Commission in 1945 and was appointed District Engineer Grade 1. On this classification he became Second in Charge to the Foundation and Substructure Engineer for the Burdekin River Bridge at the end of 1945 and was transferred to the site as Resident Engineer a year later. In 1950 he was promoted to District Engineer of No.1 District, Brisbane, and in 1952 became Divisional Engineer, Southern Division. In 1954 Lowe was appointed a Public Service Inspector to undertake, in conjunction with the Senior State Public Services Inspector, an inspection of the Technical Branches of the Main Roads Department. In 1956 his duties were extended to Divisional Engineer South Eastern Division covering Districts 1, 2, and 12 and he acted as Designing Engineer for a brief period in 1957.

Following the reorganisation of the Main Roads Department carried out by Sir Charles Barton (qv) on his appointment as Commissioner, Lowe was appointed Deputy Commissioner in 1960 and this was broadened in 1961 to include the Chief Engineer's position. Late in 1964 a separate Chief Engineer (JH Andrews) was appointed and Lowe continued as Deputy Commissioner until Barton became Co-ordinator-General in 1960 whereupon Lowe became Commissioner. As Commissioner, Lowe was the Department's representative on the National Association of Australian State Road Authorities and was its Chairman in 1969. He had previously served on the Principal Technical Committee of the Association. He was elected Board Member of the Australian Road Research Board in 1969 and served on the Board of Directors until his retirement. He was a Queensland representative on the Australian Motor Vehicle Standards Committee for three years prior to his appointment as Commissioner.

Lowe made an official visit to America, the UK and the Continent in 1962 and undertook another overseas trip in 1971, visiting road authorities in the UK, Canada and USA. He was actively associated with the development of the arterial road system of Brisbane. He was Chairman of the Technical Planning Committee associated with the planning and implementing of the Brisbane Transportation Study and subsequently became a member of the Study Policy Committee. He was also Chairman of a committee set up to consider the operation of road trains.

Lowe retired as Main Roads Commissioner in 1973. Soon after his retirement he attended the opening of the HA Lowe Traffic Centre at Woolloongabba which forms an integrated traffic monitoring surveillance and control system. He died in 1975 survived by his wife Nerida and two daughters.

*Mr H.A.Lowe, Commissioner of Main Roads, Queensland Roads, June 1969.
Retirement of Mr H.Lowe As Commissioner, Queensland Roads, June 1973.*

GC

30

A McCULLOCH

ME Qld FIEAust



Photograph by
courtesy of
Mrs J Patterson

McCULLOCH, ALFRED, (AIF) (1899-1969), electrical engineer, was born in Ipswich on 9 March 1899, the fifth of six children. Though their parents had received little formal education, all of the children attained matriculation level at the Ipswich Grammar Schools, and four of them won Open Scholarships to the University of Queensland. In 1916, he was dux of his school, and won third place in the Open Scholarship list, headed by AE Axon (qv Vol 1). At the end of their first year in the engineering degree course, both McCulloch and Axon enlisted in the AIF. McCulloch was sent to England and, just before the Armistice, achieved his ambition of joining the Australian Flying Corps. He returned to study in Brisbane in June 1919, won the Sir Thomas McIlwraith Engineering Scholarship in 1921, and graduated with first class honours in mechanical and electrical engineering in 1922, and with a Blue in football and a Half-Blue in cricket.

In 1922, McCulloch joined the City Electric Light Co Ltd (CEL), as a junior engineer at the William Street Power Station, and later became its Superintendent. In 1926, aged 27, he became Engineer Manager of the Rockhampton City Council Electricity undertaking. A year later, his integrity and strength of purpose were tested when he insisted that all electricity users, including the Mayor and others, must be dealt with strictly in accordance with the by-laws over non-payment of accounts. The Mayor sacked him, but the other aldermen reinstated him and censured the Mayor. In the same year, he was awarded the degree of Master of Engineering. In 1932 when he resigned to become Chief Engineer of the Townsville Electric and Water Authority, the Rockhampton aldermen and the Chamber of Commerce members farewelled him with high praise for his personal and professional qualities, and his success in placing the electricity department on a sound financial basis - high praise indeed in an era when university-trained

engineers were still rare, and viewed with some suspicion. Townsville's electricity system challenged him with problems as the town water supply passed through the power station cooling system, raising the temperature of the water. The power station's magnificent exterior concealed a dirt floor and second-hand plant.

Six years later, in 1938, he rejoined CEL in Brisbane as chief engineer, under the somewhat archaic title of "Chief Assistant to the General Manager". In the following year, World War II commenced, and McCulloch undertook additional duties as chairman of the Queensland Munitions Board, and as a member of the Electrical Workers' Board of Queensland and the State Apprenticeship Executive. In 1946, the Queensland Government implemented the recommendations of the Commission of Enquiry into the Electricity Supply Industry by extending the franchise area of CEL to absorb several smaller organisations. The demand for electricity increased rapidly, and the war-strained power system began to suffer equipment failures. McCulloch played a leading role in bringing the CEL through its problems. His professional skills were widely recognised, and several States, notably Tasmania and Western Australia, sought his services as a consultant. He served on committees of CSIRO and the Electricity Supply Association of Australia, notably in the areas of tariffs and nuclear generation.

In 1952 the Southern Electric Authority of Queensland was created, absorbing CEL and other organisations, and soon afterwards McCulloch was appointed its Chief Engineer. In 1956 he was sent on an extended overseas visit, and in 1962, he was an Australian delegate to a UN Conference on the peaceful uses of atomic energy. In 1963, the Queensland Government further rationalised the electricity industry by making Brisbane City Council (BCC) responsible for electricity distribution throughout the Greater Brisbane area, while SEAQ became responsible for all electricity generation in south-east Queensland, plus bulk supply to BCC and reticulation throughout a large rural area. McCulloch was one of the principal negotiators of the interchange of staff and assets, a difficult task after the long history of competition between CEL and BCC for franchise areas.

McCulloch retired in 1967 with many well-justified tributes paid to his intense interest in electrical engineering matters, his high level of professional skill, his wide range of interests in community and charitable bodies, his strong sense of duty, and his essentially gentlemanly approach to those who worked under his leadership. He died in 1969 survived by his two daughters.

Material supplied by Mrs J. Patterson of Goondiwindi.
Personal recollections.

DRM

PROFESSOR G R McKAY

BEng PhD Liv MInstCE FIEAust



Photograph by
courtesy of
H McKay

McKAY, GORDON REINECKE (Mac) (1913-1989), civil engineer, hydraulic researcher and educator, son of Samuel James McKay and Mary Reinecke, was born at Liverpool, UK, on 22 August 1913. He was educated at Liverpool Collegiate School and Liverpool University where he graduated in Civil Engineering in 1934 with first class honours. He subsequently received a Doctor of Philosophy degree in 1936. During the period of his PhD candidature he undertook hydraulic model research under Professor T H Rehbock at the Technische Hochschule, Karlsruhe in Germany and subsequently for the River Trent Catchment Board at Liverpool University. On leaving Liverpool University in July 1936, McKay worked with the River Trent Catchment Board in Nottingham, UK, in charge of the Board's hydraulic research laboratory.

In early 1940 McKay moved to the Somerset Rivers Catchment Board at Bridgewater, UK, where he was initially Senior Assistant Engineer designing drainage works and pumping stations and then Resident Engineer in charge of the Hantspill River Scheme. Two years later in February 1942 he joined the Works Technical Branch, Ministry of Finance, Government of Northern Ireland, where he was employed on emergency drainage works and studied the behaviour of civil servants. In 1945 McKay moved to London as the English agent of an Irish contractor undertaking bomb damage repairs. He then spent four years with the County Borough of Merthyr Tydfil, South Wales, as resident engineer in charge of sewerage and drainage works. Both in Belfast and Merthyr Tydfil, McKay was a part-time lecturer in technical colleges. At the beginning of 1950 he commenced full time academic work, having accepted an appointment as senior lecturer in the Department of Civil Engineering at the NSW University of Technology (now University of NSW) in Sydney. The following year he moved to the University of Queensland where he worked with

Professor JH Lavery (qv) in developing the Civil Engineering Department. He lectured in a wide range of subjects, from fluid mechanics through hydrology to engineering construction, and was responsible for the design of the new hydraulics laboratory completed in 1961. He was promoted to Chief Lecturer (reader) in 1956 and appointed second professor of Civil Engineering on 7 April 1967. He succeeded Professor Lavery as head of department on 1 October 1969 and continued in that position until 30 June 1978. He retired from the University on 31 December 1978. McKay's most significant contribution to both the University of Queensland and the civil engineering profession in Queensland was his development of the science and art of hydraulic models. His previous experience in Germany and England enabled him both to establish the necessary laboratory facilities and to introduce Queensland civil engineers to this essential technique for hydraulic investigation and design.

His hydraulic model studies often led to new and original solutions to difficult problems. The inadequacy of conventional bank protection for the Sandy Creek weir at Clermont and the investigation of the Humpybong Creek outlet at Redcliffe in the early 1960s led to the development of the Minimum Energy concept for weir and culvert design. Flood alleviation studies for many creeks in the Brisbane area showed the need to conserve flood plain storage and also the complexity of the relation between flood levels in estuarine waterways and upland runoff. Models of estuarine ports stimulated thinking about the roles of river and tidal flows in moving sediments.

McKay was a Member of the Institution of Civil Engineers and a Fellow of the Institution of Engineers, Australia but resigned in 1975. He was awarded the 1960 Warren Memorial Prize along with co-authors EC Flison and CR Tranberg (qv) for their paper *Mourilyan Harbour Development*. He also received a posthumous award of a Telford Premium from the Institution of Civil Engineers for the paper *Bridges and culverts reduced in size and cost by use of critical flow transitions*, co-authored with NH Cottman. Following his retirement, the University of Queensland bestowed on him the title of Professor Emeritus and on the 6 November 1980, extensions to the University's Hydraulics Laboratory were opened and named the GR McKay Hydraulics Laboratory. On 8 October 1997 the small stream which flows near his former residence in Brookfield (now Kenmore Hills) was named McKay Brook in his honour.

McKay died in Brisbane on 8 March 1989, survived by his wife Judith, two sons, also civil engineers, and three daughters.

U.G.A. Staff file, Gordon Reinecke McKay, S135, Box 112.
IEAust Membership application 14 Aug. 1950.

MRG

32

A C MACMILLAN

CE



Photograph by
courtesy of
Museum of Lands
Mapping & Surveying
Qld Dept of Natural
Resources

MACMILLAN, ARCHIBALD CAMPBELL (1840-1905), surveyor and bridge engineer, was born at Oban, Scotland. He was the second son of John Macmillan, retired Surveyor of Taxes and Anne Barbara Macmillan (nee Campbell), daughter of Colonel Campbell of the 42nd Gordon Highlanders. He was educated at Inverness Academy and took up engineering as a profession.

Macmillan came to Rockhampton in 1862. A short time after his arrival he met FJ Byerley (qv), Engineer of Roads, Northern Division, and was appointed as Chief Draftsman and Clerk. In 1865, on Byerley's recommendation, Macmillan was promoted to Superintendent of Works, Kennedy District, with headquarters in Bowen. In 1866 Alexander Jardine was placed with Macmillan to learn the profession. The job involved the location and construction of roads and bridges in North Queensland and it meant a considerable amount of time was spent in the saddle. Byerley was impressed with Macmillan and in 1867 Macmillan was appointed Surveyor, Northern Division.

In 1871, with pressure coming from the miners, selectors and townspeople for better, safer and shorter roads in the north, the government formed a new northern division of the Roads Department centred on Bowen. Macmillan was appointed to head the new Division in 1872. The next few years were busy ones for him with new roads to be located and bridges built. While locating a road from Bowen to Ravenswood in 1870, Macmillan was able to find a new crossing of the Burdekin River near the present town of Millaroo. He proposed a low level undercurrent bridge, (now called a submersible) for the site; only a short section being required to be built to span the dry season channel. Flood debris was carried above the bridge deck thus causing minimal

damage. In view of the high cost of the one tender received, Macmillan was given permission to supervise the building of the bridge by day labour in 1872. The bridge withstood the flood of 1874, but the approaches were washed away. In 1878 Byerley's design for a ^{new} low level undercurrent bridge was built across the Burdekin river at Macrossan by contractors Watson and Johnston under Macmillan's supervision.

Macmillan's ability was recognised by the Government in 1873 when he was placed in charge of an official expedition to locate a road from the Endeavour River to the newly discovered Palmer River gold fields. Macmillan's party was increased by over one hundred diggers also going to the Palmer. Fourteen days later the group safely reached the diggings.

In 1876 Macmillan was suspended from his department for over-expenditure of the roads and bridges construction vote. A Board of Inquiry found that the problem lay with Macmillan's chief clerk and his bookkeeping methods, and on 25th April 1876 Macmillan was reinstated. In 1880 the responsibilities and functions as carried out by the Engineer of Roads Branch of the Public Works Department were transferred to the newly constituted Divisional Boards of Queensland, and on 8 April 1880 Macmillan's services were dispensed with.

Macmillan then turned his attention to sugar cane production. In 1887 he had been elected a Director of the Bowen Sugar Company and in 1881 he formed the Burdekin Delta Sugar Company. He built the finest mill in north Queensland on his established Airdmillan plantation, but the mill only crushed for three years from 1883 to 1886. Over-capitalisation, low sugar prices and the pending cessation of kanaka labour were blamed for the failure of the Burdekin Delta Sugar Company.

After the collapse of the company, Macmillan continued to reside at Airdmillan where he had established a fine herd of short horn cattle and thoroughbred horses, winning twenty-eight medals at the Bowen and Townsville Pastoral and Agricultural Society Shows. He was elected to the first Ayr Division Board in 1888 and was Chairman from 1894 to 1896. His other civic duties included Commissioner of the Peace (1882), Member of the Ayr Municipal Board (1889), Trustee for the Racecourse in the Parish of Jarvisfield (1890), Licensing Justice (1895), and Commissioner for the Purposes of the Diseased Animals Act (1898).

Macmillan died in 1905 at Townsville, survived by his wife Laura, four sons and a daughter.

W.M. Kitson, A.C. Macmillan - *The Man Who Blazed The Track*, Journal, Royal Historical Society of Queensland, in press.

W.M.K.

33

R J McWILLIAM

MBE BE Qld FIEAust



Photo by courtesy
of the Courier
Mail

McWILLIAM, RUSSELL JOHN (RJ) (1894-1991), consulting structural engineer, was born at Summer Hill, Sydney on 18 March 1894, son of Thomas Moore William McWilliam. He was educated at the Southport School (where he excelled in athletics) and began his studies in Civil Engineering at the University of Queensland. His progress was interrupted by the Great War, in which he served in the 1st Field Company, Engineers, First Division, AIF in France and Belgium.

After graduating from the University in 1920, he was engaged by the Expanded Steel Company in Sydney who were suppliers of steel reinforcement for concrete and who provided engineering design and reinforcement placement drawings as part of their service. In 1921 he took a similar position with Paul & Gray in Brisbane until, in 1922, he was engaged for the structural design of the Brisbane City Hall in the office of the Architects, T R Hall & Prentice. The dome over the Auditorium is the only part which is not entirely his work; his structurally efficient design of the dome was thought to be too lightweight by the architects and a heavier alternative proposed by consulting engineers from Sydney was preferred.

By 1924 there was increasing demand for structural engineering services and he started his own practice as R J McWilliam, Architectural and Structural Engineer. The practice thrived until the onset of the Great Depression when, as McWilliam said "In February 1930, I had more work than I could handle but by April 1930, I had nothing to do". With limited work available, he accepted an offer from Walter Taylor to design and detail the towers and cable anchorages for the Indooroopilly road suspension bridge for a fee of £25 and "he was pleased to have the job". The same year he was registered as an architect.

Other work completed before World War II included the structural design of Craigstone Flats (Wickham Terrace), MacArthur Chambers (then the AMP, Queen Street), AMP Building (Townsville), Bank of New South Wales (George and Queen Sts), the Courier Mail Building in Queen Street, (Penneys Building) between Queen, Edward and Adelaide Streets and a number of regional hospital buildings.

During the Second World War, McWilliam worked with Evans Deakin & Co Pty Ltd and with the United States Army Service of Supply in the design of defence projects.

He recommenced practice after the war with four new thermal power stations, the Australian Paper Manufacturers mill at Petrie and a pipe factory at Meeandah for James Hardie, as well as providing structural services to architects for commercial buildings, schools and hospitals throughout Queensland. In 1959, McWilliam with four of his staff formed R J McWilliam & Partners. In 1975, the firm became a company. The founder retired the same year, aged 81, and became consultant to the company.

He was a member of the Code Committee for Concrete Structures in the period between the Wars and chairman of the Queensland Branch of the NSW Welding Association. He was Federal President of the Australian Welding Institute in 1967, and received the Florence Taylor Award of the Australian Welding Institute in 1986 for his contribution to its advancement and welfare.

In the field of education, he was part time lecturer in structural engineering to architectural students at the Central Technical College, establishing an appreciation of structure and the value of engineers in the building design process. He was awarded an MBE in June 1986 for services to structural engineering.

McWilliam is remembered for the major role he played in the development of consulting engineering in Queensland and in establishing one of the State's earliest consulting practices. He died on 2 July 1991 at the RSL War Veterans Home at Kenmore. His wife predeceased him and he left four children and many grandchildren and great grandchildren.

Based on Personal recollections.

GHC

J E G MARTIN

CBE DSO ED BE Qld



Photograph by
courtesy of
Powerlink

MARTIN, JAMES ERIC GIFFORD (Eric) (1904-1993), electrical engineer, born in Brisbane on 17 April 1904, was educated at Toowoomba Grammar School and the University of Queensland, graduating in Mechanical and Electrical Engineering in 1925. From 1926 to 1932, he served as an assistant power station engineer in City Electric Light Co Ltd. In 1926, the company's principal power station was in William Street, Brisbane, but it was building Bulimba A, a larger plant, at Doboy Creek on the downstream reaches of the Brisbane River. Martin's first job was to supervise the operation of the electrical side of the William Street power station. When the time came to relocate the largest (20MW) generating set to Bulimba A, the steam turbine had to be partly rebuilt to suit the higher steam pressure in the new station, and it was then transported by road.

The early years of operation of Bulimba A were plagued by failures of plant to fulfil guaranteed performance, and frequent breakdowns. Martin was promoted to power station superintendent while still very young for such a position. Power was transmitted to the city by overhead 33kV lines, and with submarine cable at the river crossings. The submarine cables had failures, some of which led to a temporary reopening of William Street Power Station.

In 1932, Martin became Engineer and Manager of the Electricity Supply Department of Rockhampton City Council. Rockhampton had only a small steam turbine power station, and Martin was the only professionally qualified engineer on the staff, so for the first time he found himself managing all the electricity distribution and administration activities, as well as the power station. During his seven years as Engineer and Manager, the supply system was extended out into farming areas, and additions were made to the power station.

During the years leading up to World War II, Martin devoted much of his leisure time to service in the 9th (Militia) Battalion. When war came in 1939 he was given the task of raising the 2/9th (AIF) Battalion. As commanding officer of the 2/9th, and later as commanding officer of a Brigade, he served in England, the Middle East, and the Pacific, and was awarded the OBE, the DSO, the CBE and the ED.

After the war, the Queensland Government began implementing the recommendations of the Commission of Enquiry into the Electricity Supply Industry, and in 1946 the Capricornia Regional Electricity Board was formed, with headquarters in Rockhampton. Martin was appointed as its first Manager. His initial task was to set up an organisation with sufficient resources to take over, and eventually absorb, a number of small electricity supply organisations, including those at Rockhampton, Yeppoon, Gladstone, Monto and Mt. Morgan. In 1949, he resigned to become Senior Engineer with the City Electric Light Co Ltd. He visited England in 1950 to secure supplies of structural steel, which was in very short supply in the post-war years, and which was urgently needed to enable construction of Bulimba B Power Station to continue. The Southern Electricity Authority of Queensland was formed in 1952, and absorbed City Electric Light Co Ltd and other electricity organisations, and in 1957 Martin was appointed Deputy Chief Engineer. In 1968, he became Chief Engineer and Deputy General Manager Engineering, and from January 1970 until his retirement in June 1972, he served as Chairman and Chief Executive Officer. During his time as Chief Engineer, the Authority designed and built Swanbank Power Station on the Ipswich coalfields, in conjunction with a 275 000 volt network to supply expanding electricity loads in SE Queensland. This was the first large Queensland power station to be built remote from load centres, and marked a major growth phase of SEAQ.

Martin served as a member of the Technical Education Advisory Council, as Chairman of the Committees for the Darling Downs and Capricornia Institutes of Technology (now USQ and CQU), and as President of the Queensland Branch of the Boy Scouts' Association. He remained active in the Army Reserve, and served for many years as Honorary Commandant of the University of Queensland Regiment. From 1950, he served as treasurer, and later as chairman, of the Council of Emmanuel College (where he had resided as an undergraduate), and a new wing of the College was named the JEG Martin Wing in his honour. He died in 1993, aged 89, survived by three sons and two daughters.

Material from Dr. D Martin of Brisbane.
Personal Recollections.

DRM

35

J C MATHISON

DipEng Geel MIEAust



Photograph by
courtesy of
Qld Dept of
Main Roads

MATHISON, JOHN CYRIL (Jack) (1903-1961), road engineer, was born in Victoria and attended the Geelong High School from 1914 to 1917. He then entered the Gordon Institute of Technology at Geelong, studying civil and hydraulic engineering as well as surveying, and was granted a diploma in 1921. He then entered a pupillage arrangement with CWC Farran, civil and hydraulic engineer and licensed surveyor from 1922 to 1924. In 1924 he worked as a draftsman on surveys for the Sugarloaf Rubicon Hydro-electric Scheme and then transferred to the Sewerage Branch of the Melbourne and Metropolitan Board of Works as a draftsman on sewerage reticulation design plans. In 1926 he moved to Brisbane and was employed as an engineering draftsman with the Queensland Main Roads Commission (MRC), working on the design and plans for road and bridge works. In 1927 he was promoted to Engineering Assistant on the design of permanent works at Rockhampton in the Central Division of the State.

In 1939 Mathison was appointed District Engineer of Central District (MRC), a position involving administrative responsibility for development programs for road and bridge construction. In 1940 he was transferred to Townsville as District Engineer of the Northern District. The advent of war in the Pacific considerably expanded his responsibilities due to a large program of defence construction works under the general direction of JR Kemp (qv Vol 1), including aerodromes, aircraft depots, anti-aircraft emplacements and ammunition dumps as well as the necessary connecting roads and bridges.

After World War II, Mathison was appointed Northern Divisional engineer with his headquarters in Brisbane. From the time of his initial training as an engineer, Mathison always

had an interest in hydraulic engineering and in the conservation of water. During his time in North Queensland he was chairman of the Herbert River Trust between 1942 and 1945 and chairman of the Burdekin River Trust between 1946 and 1954. In these positions he was involved in the construction of erosion protection works on the Herbert River and he prepared the first two reports on the Burdekin River Irrigation, Hydro-electric and Flood Mitigation Project. The estimated value of these works was £90 million.

In October 1953 Mathison was appointed as assistant to the Chief Engineer of the Main Roads Department, Queensland. In addition to his significant contribution to road engineering and civil defence, Mathison is especially remembered for his contribution to the profession. He took a particularly keen and active interest in the affairs of the Institution (of Engineers Australia). He was elected chairman of the Brisbane (later Queensland) Division in 1954 and served continuously on Division Committee from 1948 until his death. In 1959 he was elected to chair a committee which investigated and planned the erection of Engineering House in Upper Edward Street, Brisbane. Regrettably he did not live to see the project completed.

Mathison was an unusually large man with a particularly deep voice, although in his early days he was a boy soprano. He was greatly respected by all who worked with him and he is remembered for his sense of humour and the kindness and consideration which he always exercised. As one of his staff has recorded, "He always talked to you, never down to you".

Mathison died suddenly on 26 August 1961, survived by his wife. They had no children. In his memory, one of the meeting rooms in Engineering House has been named as the Mathison Room.

Membership applications, IEAust, August 1932, July 1957.

EBB

I W MORLEY

ISO BME BMete HonMAusIMM MIEAust FIMM



Photograph by
courtesy of
Mrs C Storer

MORLEY, IAN WEBSTER (1904-1989), mining engineer and administrator, was born in Kew, Victoria in March 1904 and educated at Trinity College (1910-1914) and Wesley College (1914-1921). In 1926 he graduated from the University of Melbourne with the degrees of Bachelor of Metallurgical Engineering and Bachelor of Mining Engineering.

After graduation he worked at Broken Hill as an underground surveyor and lectured part time in mining subjects at the local technical college. He then worked for the Imperial Geophysical Experimental Survey in Tasmania, Victoria and South Australia, broken by a brief spell at the Mt Lyell Mining Co in Tasmania. He returned to Broken Hill as chief surveyor at the Central Mine, where he gained his Mine Manager's Certificate. From 1930 to 1934 he worked in New Guinea as Chief Sampler for New Guinea Gold Fields Ltd at Wau. Later he was Inspector of Mines and Machinery in New Guinea and Assistant Warden on the Morobe Goldfields where he helped to form the Morobe branch of the Australasian Institute of Mining and Metallurgy.

In 1934 Morley moved to Mt Coolon, Queensland as acting Superintendent and then to Georgetown as Manager. In 1936 he spent seven months as General Manager of Mt Kasi Gold Mines in Fiji. Subsequently he worked at a gold mine in Wiluna, Western Australia where he also lectured in mining at the local college of the Western Australia School of Mines before moving to Kalgoorlie as District Inspector of Mines in 1938-39. He returned to Queensland in 1939 as Assistant State Mining Engineer and Assistant Chief Inspector of Mines, becoming State Mining Engineer and Chief Inspector in 1941 and continuing in these roles until his retirement in 1969. These 30 years spanned some of the most exciting and diverse projects in Queensland's mining history

including the development of copper mining and smelting at Mount Isa during World War II, uranium at Mary Kathleen, mineral sands on the South Coast and bauxite at Weipa. Under his guidance the Department of Mines saw the beginnings of the massive expansion of the Central Queensland coal fields and the 1960s mining expansion at Mount Isa. He worked closely with the petroleum industry, particularly in exploration, including the discovery of oil at Moonie. He also promoted the mining industry through his numerous international contacts.

During his years with the Department, a new Mines Regulation Act was drafted and he was the first Australian member of the International Labour Panel of Consultants on Safety. As Chairman of the first conference of Inspectors of Mines in 1948, he commenced the formulation of a uniform Australian code of safe mining practice. He remained a member of this body until 1969 and was chairman of the Board of Examiners for Mine Managers, Mine Surveyors and Winding Drivers Licences. Also during this period "The Petroleum Regulations (Land)" 1966 were proclaimed and became the model for some other states.

Morley was a leading figure in the Australasian Institute of Mining and Metallurgy. He was elected member in 1924, and served as councillor for two periods, and twice served as branch chairman of the Southern Queensland Branch. He published many papers in the Proceedings of the Institution of Engineers, Australia. He was active in mining education, helping to establish the Department of Mining and Metallurgical Engineering in the University of Queensland in 1951. He remained a board member of the Faculty of Engineering for thirty years.

After retirement he continued as a consultant to the mining and petroleum industry and played a major role in the introduction of shaft drilling in Australia, the first such shaft being drilled in 1982. He was actively involved with the Julius Kruttschnitt Mineral Research Centre at the University of Queensland where his role is commemorated by the Ian Morley Prize established in 1990. In 1981 he published *Black Sands: A History of the Mineral Sand Mining Industry in Eastern Australia*.

Morley was a member of the sub-committee which prepared the original volume of *Eminent Queensland Engineers* (published in 1984). In his final years he continued to foster interest in the heritage of the industry to which he had contributed so much, being active in the establishment of the Australian Mineral Heritage Trust and the commissioning of the Trust's volume on Julius Kruttschnitt. He was appointed as a Companion of the Imperial Service Order in 1969.

He married Eva Marshall in 1937 they had one daughter and a son, and after her death in 1948 he married Janet Innes in 1950. Morley died on 11 September 1989.

Lauder, Ros, *Ian Webster Morley*, Proceedings, Australasian Institute of Mining and Metallurgy, 1989.
Address by Ian Webster Morley I.S.O., Proceedings, The Australasian Institute of Mining and Metallurgy, No. 284 December 1982
Material supplied by Storer of Narrore NSW, A. Saunders of Forest Lake and S.S. Derrington of Pullenvale.

37

J E MORWOOD

ME Qld FIE Aust FIEE



Photograph by
courtesy of
CH Morwood

MORWOOD, JAMES ERIC, (1901-1974), electrical engineer and administrator, was born in Brisbane. His parents, English emigrants, were dairy farmers on the Darling Downs at Yalangur. He attended, often on horseback, Kingsthorpe and other primary schools in the Darling Downs rural area. His secondary education was as a boarder at Toowoomba Grammar School. Dux of the school in 1918, he won an open scholarship to the University of Queensland, graduating in 1923 with first class honours in mechanical and electrical engineering, and was awarded a University Gold Medal for outstanding merit. A later degree of Master of Engineering was awarded in 1931. He joined the Brisbane Tramway Trust in 1923 when the electric tramway system was expanding rapidly. In 1925 the newly created Greater Brisbane City Council absorbed the Tramway Trust and embarked on the development of a new Power Station at New Farm. During the period 1925-27, as the University of Queensland's Walter and Eliza Hall Travelling Fellow, he travelled extensively in England, Europe and the USA to study developments in power generation and distribution as well as electric traction systems. On return he delivered a series of special lectures at the University of Queensland.

In 1927 he was appointed as Assistant Engineer, Tramways Department of the Brisbane City Council. In 1928 married Myrtle Lilley, a high school teacher of English and French. Morwood spent a large part of his early career in commissioning and operation of the New Farm power station. In 1938 he was appointed Efficiency Engineer at New Farm Powerhouse which by then was part of the BCC Department of Transport. He became Power Engineer in 1948 and Chief Engineer in 1949.

Morwood's career is intimately linked with the two main eras of electricity generation for the Brisbane City Council, New Farm power station from 1928 and Tennyson power station from 1955. The post war growth in demand created a need for great expansion of generating capacity. The generating activities of the Department of Transport were transferred to the BCC Department of Electricity, whereupon Morwood was appointed Deputy Chief Engineer and Manager Generation in 1951 and Chief Engineer and Manager in 1955. This was a period of great expansion in Brisbane and he is remembered particularly for his major role in planning, designing and construction of the new major station at Tennyson. Commissioned in 1955 with the first of four 30 MW sets, it expanded finally to six sets totalling 240 MW including 2 x 60 MW sets which were the largest in Queensland at the time. The final milestone in Morwood's career was to negotiate the rationalisation of generation in south east Queensland. In 1963 the Southern Electric Authority of Queensland purchased Tennyson and New Farm Stations; and the BCC purchased the inner city distribution system from the SEAQ to become a distribution utility purchasing all its energy from high voltage bulk supply substations provided by SEAQ.

Morwood worked untiringly for the standards and standing of the engineering profession. He served on the Brisbane Division Committee of The Institution of Engineers, Australia, for 16 years from 1940 to 1956 and was Division Chairman in 1945. He contributed a number of papers to the Division's technical sessions, lectured at the University of Queensland and at the Central Technical College (now QUT), and was a Board member of the Faculty of Engineering of the University of Queensland. From 1965 to 1969 he was Overseas Representative for Queensland on the Council of the Institution of Electrical Engineers (London).

On reaching the age limit in 1966 he retired from the Brisbane City Council to live at his seaside home at Caloundra from where he continued an active life of community service. Despite having been the University 880 yards sprint champion in 1921 he did not go further with athletics, but enjoyed social tennis and then bowls from about 1955. He was a member of the Johnsonian Club, of the Rotary Club of Brisbane and later Caloundra, and the Clayfield and later Caloundra Bowls Clubs.

Morwood died at Caloundra in 1974, survived by his wife Myrtle, three sons (one an engineer) and a daughter.

Personal Recollections.
Morwood Papers, Queensland Electricity
Industry Historic Trust.

CHM

38

J MULHOLLAND

ME Qld ME Harvard MIEAust



Photograph by
courtesy of
The Courier Mail

MULHOLLAND, JACK (1903-1985), consulting engineer, was born at Gympie, the son of a pioneering farming family. He was educated at Gympie High School, winning a Queensland Government Open Scholarship. He graduated from the University of Queensland in 1926 as a Bachelor of Engineering with first class honours and subsequently gained a Master of Engineering degree from that University in 1933. He was first employed by the Irrigation and Water Supply Commission. Early activities took him to Innisfail where he supervised the construction of an elevated concrete water tower for the local urban water supply.

In 1928 he was awarded a Walter and Eliza Hall Travelling Scholarship which enabled him to attend Harvard University Graduate School of Arts and Sciences. During his time at Harvard, where he completed a degree of Master of Science in 1929, he was awarded the Clemens Herschel Prize of the Civil Engineering School in practical hydraulics. He also formed a close association with Karl Terzaghi, the acknowledged father of soil mechanics, and with Gordon Fair who was held in the same regard in the field of what was then known as Sanitary Engineering. After completing studies at Harvard he spent some time working on large construction projects in Canada and the USA.

On his return to the Irrigation Commission in 1930, Mulholland grew impatient with the promotion by seniority within the Commission of people he considered far less able than himself. He resigned, set up an office in Brisbane in 1936 and undertook the planning and construction supervision for the provision of sewerage in the far-western town of Cunnamulla. This was completed in 1938, the first country community in Queensland to be sewered. An adequate

water supply was essential if the town was to be sewered, and in many cases this was provided by the local authority with the engineering carried out by Mulholland as a separate undertaking. A water supply scheme for Charleville then followed. During World War II, an American base hospital was established at Charleville and was able to take advantage of the nearly completed system. Mulholland served with the Royal Australian Engineers from 1940 to 1945, mainly in Northern Australia with short periods in Papua New Guinea. He attained the rank of Major. In the post-war period the call for water and sewerage by communities throughout Queensland provided a steady pool of work for Mulholland's office which also grew with the times. The engineering expertise of his office was spread over Queensland. The water supply for Stanthorpe, with provision of the Storm King Dam, was followed by sewerage works. Maroochy Shire was served by Wappa and Cooloolabin Dams and provided widely separated areas of the sunshine Coast including Nambour, Maroochydore and Mooloolaba with water. Sewering of all these places was also carried out.

Major works at Ipswich to augment the city water supply were carried out, including the first pre-stressed concrete reservoirs in Queensland. Large suburban areas of Ipswich were sewered. Several townships in the Balonne Shire, including St George, Dirranbandi and Bollon gained water supply and were sewered. A dam was built at Dirranbandi but the proposed dam at St George was redesigned and constructed by the Irrigation and Water Supply Commission at no cost to Balonne Shire. In most of the areas where water and sewerage were provided, further works were provided for roads, drainage, municipal swimming pools, municipal offices, grandstands and racing tracks to mention a few. Of added interest was the construction, by day labour forces, of the widely known North Gregory Hotel at Winton, associated with Waltzing Matilda.

Mulholland discussed a binding arrangement with his senior staff to form an ongoing commitment to the continuation of his business, but he was always reluctant to delegate authority and no working agreement was ever finalised. A hard working engineer, with outstanding skills, Mulholland was able to find time to serve as Chairman of the Buildings & Grounds Committee of the Queensland University Senate from 1957 to 1962, and was a member of the Senate from 1951 to 1966 and also a special lecturer in soil mechanics and water supply.

Mulholland died of a heart attack in 1985, while carrying out a field survey. He left two sons and two daughters by his first, and a son and daughter by his second marriage.

Advice from W.Brown of Warren Brown & Associates, Clayfield.

JHC

39

W A PEAK

DipCE CTC FIEAust



Photograph by
courtesy of
JG Peak

PEAK, WALTER ARTHUR (1907-1991), water engineer, was born at Inverell, NSW, and educated at Coorparoo (Brisbane) State Primary School and Brisbane Grammar School. He started work as a cadet in the Irrigation and Water Supply Commission in 1924, taking up the Civil Diploma course of the Central Technical College in 1925 and completing it in 1929. During his cadetship he worked on plans for water supply dams including the proposed Nathan Gorge Dam on the Dawson River but a change of government and the Great Depression closed down all major works. After working on the construction of a timber weir on the Dawson River, Peak moved into investigation, design and construction for urban water supplies including those for Blackall, Quilpie, Gatton, Coolangatta-Nerang and Toowoomba. He concentrated on urban water supplies all over Queensland including headworks dams such as Cooby Creek Dam for Toowoomba.

During World War II, Peak was largely engaged in providing water supplies for army and air force establishments, starting with Kingaroy. The urgency of the work increased after Japan entered the war in December 1941, and ironically, one of his duties at this time was to decide the most efficient way of destroying water supply systems in the event of a Japanese invasion. About this time the Local Government Department was reorganised and took over the responsibility for town water supply, sewerage and drainage functions from the Irrigation and Water Supply Commission. As the war progressed the emphasis on water supplies for the armed services moved north. With little labour, equipment and material available, improvisation became the normal practice. In some cases the problems were solved by careful maintenance of existing water supply systems which had run down through lack of attention during the Depression.

After World War II Peak continued to tackle the problems of water supply for both Townsville and Cairns in which the patched up wartime schemes were becoming overloaded. Also in the post war era, practically every town in Queensland was proposing new works and reports were prepared by the local authority engineer, consulting engineers or the Department of Local Government. Peak was involved in reviewing such reports and recommending loan funds for the schemes.

Peak resigned from the Department of Local Government in 1954 to become the Project Engineer for the Little Nerang Dam for the water supply of Gold Coast City and the adjacent Albert Shire. The dam, designed by the Local Government Department, was constructed by the Gold Coast City Council, using day labour to cope with the possible shortage of loan funds. Peak's salary was then the second highest paid to an engineer in Queensland. The construction of the project introduced a range of new technologies in dam construction in Queensland and provision was made for later amplification of the scheme. This was judged well: only two years later it was evident that the rapid growth of population would soon overtax the yield of the dam so Stage 2, including the provision of spillway gates, was included in the first phase of construction.

At the completion of the Little Nerang Project in 1963, Peak was appointed as Executive Engineer in the Irrigation and Water Supply Commission. Later he became Senior Engineer Surface Water Resources with control of all the hydrographic and hydrological activities of the Commission and, concurrently, Queensland representative on the Commonwealth Surface Water Resources Commission. In 1966 he was appointed Chief Investigation Engineer with control of the Surface Water, Underground Water and Project Planning Branches. In this position he worked on the preparation of reports for irrigation areas, water supplies for mining ventures and for electricity generation stations.

Peak resigned from the Commission in 1972 and joined McIntyre & Associates, working on the Julius Dam on the Leichhardt River and water supplies for other mining ventures. After three years, he found the travelling tiring and retired in 1975.

Peak died in 1992 a widower, and was survived by a son and a daughter.

Peak, W.A., *Memoirs of Walter Arthur Peak*, Water Resources Division of DPI Water Resources, 1972.
Powell, J.M., *Plains of Promise - Rivers of Destiny*, Boolarong Publications, 1991.

40

K G PENNYCUICK

BE Syd MIEAust



Photograph by
courtesy of
GJ Pennycuick

PENNYCUICK, KENNETH GERALD (1891-1957), local government engineer and administrator, was born in Rockhampton on 17 May, 1891. He received his early education at Central Boys' State School and The Rockhampton Grammar School. When his father died in 1900, Pennycuick was not able to continue his secondary education and he began work in the Town Clerk's office of the Rockhampton City Council in 1906 as a messenger. A year later he was transferred to the City Engineer's Department where he assisted in clerical and drafting duties. After six years at this work he was appointed City Valuer. In 1917, in the absence of an engineer, he was put in full charge of the water supply reticulation of the city. In 1918 he began private studies for adult matriculation in engineering and in 1920 he entered Sydney University, graduating in 1923 as Bachelor of Engineering. He returned to Rockhampton and was appointed City Engineer in February 1924. He also gained town planning qualifications and became the Town Planner.

Pennycuick's early period as City Engineer was dominated by the languid days of the Great Depression of the 1930s with its modest projects employing labour and ingenuity. In 1935 his scheme for the sewerage system for the entire town was adopted and construction by Council began in 1936 using local labour and equipment. Six years later, the city found itself in the South Pacific Theatre of World War II. Pennycuick was seconded to the additional duties of Co-ordinator of Allied Works Council activities for Central Queensland, taking charge of all resources that could be mustered locally or supplemented on a national basis to rapidly construct buildings, roads, and water supply facilities for two divisions of the US Army based near Rockhampton. At the same time, he was engaged in upgrading the Rockhampton airport from a boggy paddock to a set of three gravel runways so that heavy air support could be moved north. His civic duties continued

through this critical period. He was Executive Officer for Air Raid Precautions for the city. This involved construction of public air raid shelters, emergency infrastructure, training of council crews and citizens in service emergency repairs and bomb disposal. The intense activities of the city's war effort made it obvious that the old Fitzroy River suspension bridge needed to be replaced urgently and work was commenced before the end of the war. The Co-ordinator-General's Department designed a continuous plate-girder bridge of seven spans and Pennycuick was appointed Construction Engineer. The bridge was completed in 1952 using local labour. This was his last major completed task.

The advancement of the city of his birth was foremost in Pennycuick's thinking. In addition to the sewerage scheme, the Fitzroy Bridge construction and the National Emergency work during the war, he was continually engaged in augmentation of the water supply works at source, treatment plant and reticulation sites. He promoted the concept of the "Splitter's Creek Weir" as a future water supply. It became the reality known as "The Barrage". He upgraded building standards of the city business district. The town hall was constructed under contract commencing in 1939. Pennycuick's early time as City Valuer and further accumulated experience as City Engineer led to his being regarded as a doyen among those involved in the application of the Queensland Local Government Act. He was ever the practising engineer in an era when the mechanisation and technology of today had only begun to appear. In the field, because of the large number of personnel involved, he worked closely with the chain of command and kept all informed of the nature of the work at hand, thereby drawing a sympathetic and responsible sense of mutual co-operation from the work force. One example was the lateral relocation of a water main in the early 1930s to make way for a "modern" cement penetration concrete pavement. The realignment of the original water main was performed without disruption of supply owing to the accommodating nature of the jointing of the cast iron pipes and the astute management of the pressure reaction points.

After 33 years as City Engineer, Pennycuick relinquished this position on 30 June 1957. He was granted a year extension of service as Project Engineer. In this position he was engaged in traditional activities and preparation of specifications for the Victoria Park Swimming Baths. However, he died three months later, on September 23, 1957, leaving a wife and two sons (both graduate engineers).

Obituary, Mr. K.G. Pennycuick, The Morning Bulletin, Rockhampton, 24 Sept. 1957.

McDonald, Lorna, Rockhampton, A History of City and District, University of Queensland Press 1981, pp. 121-123, 132-135.

GJP
SKP

41

G PHILLIPS

HonMQIE HonMIEAust FRGS



Photograph by
courtesy of
Mrs E Moody

PHILLIPS, GEORGE (1843-1921), civil engineer and authorised surveyor, explorer, Member of Parliament and councillor, was born at Burslem, Staffordshire, the son of a manufacturer. He came to Australia in 1852 and attended Dr William Wood's Private School, Parramatta. He served two years at the law in Sydney with Edmund Barton and two in Melbourne with Jennings and Coote, Solicitors.

In 1862, Phillips came to Queensland to enter the service of the Roads Department, reporting to Robert Austin, Engineer for Roads. In 1865, he joined the Lands Department as a staff surveyor and accompanied William Landsborough on a private expedition from Bowen Downs westward which discovered and named the Western and Diamantina Rivers. In the Lands Department Phillips served three years in the Gulf District, during which he explored the Boyne, Norman, Gilbert and van Diemen Rivers, and Morning and Accident Inlets. He also laid out the towns of Burketown and Normanton.

From 1869 to 1873, Phillips was Staff Surveyor in the Kennedy District, which included Mackay and Cardwell, then the northernmost town in the Colony. From 1873 to 1877, he was Staff Surveyor, Moreton District, during which time he laid out the walks and driveways in the Toowong Cemetery, which contained at that time only two graves, one of Governor Blackall and the other of the daughter of Walter Hill, Curator of the Botanical Gardens. Phillips was eventually buried there, in June 1921. In 1878, Phillips joined the Railways Department as Inspecting Surveyor, in charge of all railway surveys in the Southern divisions.

In 1886, Phillips retired from the Public Service, establishing himself in a practice as Surveyor and Civil Engineer. From 1888 to 1891, he supervised the construction of the Normanton - Croydon Railway, on which metal sleepers patented by him were used, to good effect. In this regard he was famous for his open dispute with the Chief Engineer of the Queensland Railways, HC Stanley. This followed an experimental mile of the sleepers near Harrisville on the Fassifern Branch line. Phillips also designed and/or supervised construction of private railway and tram lines from Cairns to Mulgrave River, Geraldton to Johnston River, Ingham to Stone River, and on the Beaudesert to Christmas and Palen Creeks lines. Other private schemes in which he played a part included the Norman Park to Belmont, and Palmwoods to Buderim lines.

Phillips was also concerned with port and harbour development. In a paper *The Port of Brisbane* read before the Queensland Institute of Engineers in June 1908, he advocated a canal through Kangaroo Point to overcome the difficulty for ships rounding the sharp curve in the Brisbane river under the present Story Bridge. This proposal was later considered by the Cross River Commission of 1924.

Phillips was, during various stages of his life, President of the Queensland Institute of Surveyors, a member of the Government Meat and Dairy Board and of the Brisbane Board of Waterworks. He was an open advocate of the dissolution of the latter Board on the grounds of its inefficiency and the need for an authority to have powers to also sewer Brisbane. He was a leading member and Fellow of the Royal Geographical Society, and presented a series of lectures to the Royal Society of Queensland. He was the author of several contributions to the British-Israel controversy. He was a staunch advocate of the development of Stradbroke Island as a source of water supply for Brisbane.

In a series of articles published in the evening editions of the Brisbane Daily Telegraph in 1919, entitled *Sydney to Darwin - Why not Brisbane to the Gulf*, Phillips described his various expeditions in the north and west of Queensland, and actively promoted, *inter alia*, the development of the Gulf country that he had explored and surveyed in his youth.

Phillips represented Carpentaria in the Queensland Legislative Assembly from 1893 to 1895, and later served for two terms on the Sandgate Town Council. He was a resident of Sandgate for most of his life in Queensland. He was an active member of the Queensland Institute of Engineers, being President in 1909 and being elected an Honorary Member, and was an inaugural Honorary Member of the Brisbane Division of the Institution of Engineers.

He died in 1921 survived by his wife Elizabeth, eight sons, all either engineers, architects or surveyors and seven daughters.

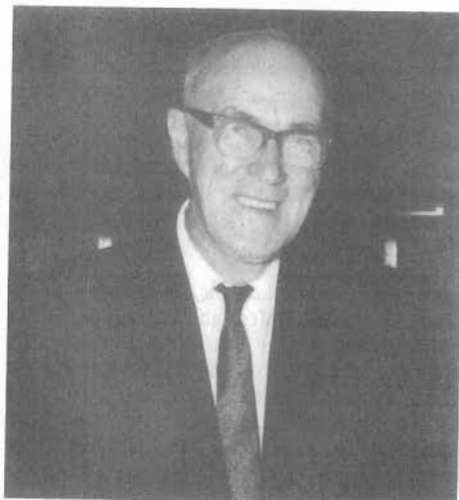
Supplement to "Queensland Country Life", October 1906; "The Telegraph", 4 June 1921.

CAHO

42

R H RUDGE

BE (Mech) Tas MIEAust



Photograph by
courtesy of
KJ Rudge

RUDGE, REGINALD HARRY (Reg), (1904-1972), local authority engineer, was born in Latrobe, Tasmania, on 21 August 1904, the youngest of a family of 11 children. He attended the Devonport High School before matriculating to the University of Tasmania where he graduated with a bachelor degree in mechanical engineering in 1928. He then travelled to Brisbane where he joined the Consulting Engineering firm of AEH Frew working on supervision of construction of the William Jolly Bridge over the Brisbane River (1928-1932). Following the completion of this bridge he joined the Queensland Main Roads Commission, undertaking survey work in South-West Queensland. He was then seconded to the Department of Local Government to supervise the construction of the Sarina Water Supply.

His acceptance of the position of Town Engineer at Roma in 1934 was the start of a long and distinguished career in Local Government in Queensland. One of the projects completed during his employment at Roma was the construction of the Town Baths. In March 1936 he was appointed to the newly created position of Shire Engineer with the Mulgrave Shire Council in Far North Queensland. At the time of his appointment the Shire had only limited road infrastructure and travel was difficult. The town of Cairns and the surrounding areas within Mulgrave Shire were expanding and the need for additional water became obvious. Rudge was the first to conceive the idea of a water supply from Behana Creek south of Gordonvale to service this need. From his early reports and subsequent investigations by officers of the Department of Local Government, the Cairns-Mulgrave Water Supply Board was established as a joint board between the Cairns City Council and the Mulgrave Shire Council. Until his retirement in 1969, he served as joint engineer on the Board with his counterpart from Cairns City Council. During construction of the

scheme from 1950 to 1955, Rudge undertook most of the field supervision of the work from construction of the access road up the Behana Creek gorge, construction of the inlet structure and pipe work from the intake to the reservoir at Henleys Hill on the outskirts of Cairns. On completion of this scheme, the towns of Aloomba, Gordonvale, Edmonton, and White Rock as well as Cairns, had a reliable reticulation scheme delivering up to five million gallons of water per day.

With the increasing demands of road transport from Cairns to Innisfail and places further south, improved roads became a priority for construction. The need for all weather access on this route required the realignment of the existing road (now called the Bruce Highway) and the building of high level bridges over the major river systems in the Shire. One of these was the bridge over the Mulgrave River near Gordonvale, constructed by Council day labour work force under Rudge's supervision. At the time of construction, this bridge was the largest built by a council day labour force on any highway in Queensland. The bridge was also constructed significantly under estimate. Under his guidance a large network of sealed roads was constructed in the predominantly sugar growing areas. The extension of water infrastructure to the developing areas was progressed as well as the construction of swimming pools, libraries and other community amenities.

Following his retirement on 21 August 1969, after thirty-three years of service, Rudge wrote a complete history of the roads and water supplies in the Mulgrave Shire. He was very active in community affairs being a member and past-president of the Cairns Rotary Club. Many community facilities were constructed under his guidance and supervision.

Rudge was active in Local Government Engineering and Institution of Engineers affairs at a regional level. His enthusiasm and drive played an important part in the holding of the 1960 National Conference of the Institution of Engineers Australia in Cairns, the first such conference held outside a capital city.

Shortly after his retirement, Rudge died in the United States in 1972. He was survived by his wife Helen, a son, also an engineer, and a daughter.

O'Connor, C. *William Jolly Bridge - A Conservation Study for Brisbane City Council*, September 1994.
Rudge, R. *History of Road and Works 1933 to 1969 - Mulgrave Shire Council*, Cairns City Council.
Additional material from R.F. Walker of Westcourt and K.J. Rudge of Mareeba.

KJR

43

R E SEXTON

MIE Aust



Photograph by
courtesy of
Qld Railways
Historical Centre

SEXTON, RICHARD ERNEST, (1861-1930), railway engineer, was appointed as draftsman in the Chief Engineer's Branch of the Northern Division of Queensland Railways in 1879 and was later transferred as draftsman and assistant to the resident engineer on the construction of the Central Line in 1881. He remained as assistant engineer on construction until his transfer in 1888 to Bowen as Assistant Engineer where he remained until the general retrenchment in 1891 caused by the depression of the 1890s. Between 1891 and 1897 he was engaged in sugar farming in the Bowen district but was re-employed in 1897 as a government engineer supervising a contract on the Charleville to Cunamulla railway extension. After this he carried out deviation works on the North Coast Line near Gympie.

In 1901 the Railway Department started a thirty year programme of extensive day labour construction and Sexton was heavily involved as Resident Engineer on construction for the Tweed Heads, Degilbo to Wetherston, Warwick to Goondiwindi and Richmond to Cloncurry lines. In 1908 he was brought into the Chief Engineer's Office as Relieving District Engineer and then appointed Inspecting Engineer in 1909 and Deputy Chief Engineer in 1911. On the transfer of Chief Engineer Bell to the Commonwealth Railways in 1914 a reorganisation of the department placed Sexton as Engineer in Charge of the Construction Branch for the whole of Queensland but a year later the arrangement was reversed with Sexton becoming Chief Engineer for the Southern Division with the added responsibility of maintenance. In 1916 all construction was again placed under Sexton and this arrangement continued until 1919 when all maintenance was placed with Divisional General Managers, leaving him as chief engineer for the remainder of his working life.

One of Sexton's main achievements was the interlinking of what had started as a series of independent railway systems each based on a major port and extending inland. The main expansion of the Queensland Railway system was completed in 1924 with the completion of the railway bridge over the Johnstone River at Innisfail to complete what was later to be known as the Sunshine route from Brisbane to Cairns. In this period the transport policy of the Queensland Government switched the emphasis from rail to road with the establishment of the Main Roads Commission in 1922. The Government's intention was to develop roads as feeders to the railway system. Railway construction did not halt completely and the standard gauge railway, to link Brisbane to the New South Wales railway system via Kyogle, was commenced in 1925. This allowed a continuous journey to be made between Brisbane and Sydney without all the cost and difficulty of trans-shipment to the other railway gauge at Wallangarra on the state border. In this respect Queensland was decades ahead of similar rail links between state capital cities. As Chief Engineer, Sexton was in charge of the construction for this Queensland section of this line from Brisbane to the state border by day labour. This work was completed in 1930 shortly before Sexton died after a long illness.

In 1925 the Institution of Engineers Australia awarded Sexton the Peter Nicol Russell Memorial Medal. This was only the third time the medal had been awarded and it recognised a lifetime of effort in the advancement of engineering.

Richard Ernest Sexton, Chief Engineer, Queensland Rail Historical Centre.

GC

PROFESSOR M SHAW

OBE MEng *Sheff* MMechE *Melb* FIMechE FIEAust FAIM

Photograph by
courtesy of
JA Shaw

SHAW, MANSERGH (1910-1993), mechanical engineer and academic, was born at Liverpool (UK) on 8 January, 1910. He was educated at Firth Park Grammar School, Sheffield, Sheffield Technical School and Sheffield University. He considered himself to be a properly trained engineer, having started as an apprentice fitter and turner at Davy Bros Ltd, Sheffield in 1925, being promoted to the drawing office and studying part-time. He gained a Whitworth Scholarship to Sheffield University and went on to complete his Masters degree. After a time on the Sheffield University staff, he was appointed Senior Lecturer at Melbourne University in 1938 and was soon assisting the war effort by developing new methods of production, in particular the design and construction of machines for ruling the gratitudes of optical measuring instruments.

In 1949, Shaw was appointed as the Foundation Professor of Mechanical Engineering, University of Queensland. At that time, there were four final year students of Mechanical Engineering, five staff and minimal laboratory facilities. By the time of his retirement in 1975, the Department was housed in a fine building at St Lucia, largely designed by him; there were fifteen academic staff supported by up to thirty technical and general staff and modern laboratories for machine tools, metrology, heat transfer, thermodynamics, control, etc. After his retirement, it was appropriate for the building to be given his name. His first love was metrology and precision production. His metrology laboratory was registered with the National Association of Testing Authorities for which Association he acted as an assessor. His expertise led to his appointment to the Advisory Committee on the future of the National Standards Laboratory at the time of their move to new buildings at Bradfield Park.

The Queensland sugar industry owes much to Professor Shaw's supervision of research into milling. The first instrumented mill in the world was constructed in his Department to determine forces and juice flows and eventually led to a theory of mill operation. Fundamental properties of the prepared cane, such as friction coefficient and permeability, were also researched. A computer program was developed to calculate the efficiency and the extraction of the mill for different settings and enable optimum operation of the milling train. This work was reported to the Australian Society of Sugar Cane Technologists and greatly influenced developments. He was particularly pleased to be elected Chairman of the Engineering Section of the 1974 International Society of Sugar Cane Technologists Conference in Durban as this enabled him to give a summary paper on the milling work. Another major research effort concerned the stability and safety of agricultural tractors. Field trials were conducted on an instrumented remote controlled tractor, which was supported by a mobile air conditioned vehicle housing the recording and control instruments. The work produced criteria relating to the handling of the tractor under various loads and operating on different terrains; the results enabled the design of improved tractors. Supporting this work, he directed a survey into tractor accidents to determine the essential links in the chain of events leading to the accident, especially pinpointing where design faults in the tractor were contributing factors.

Professor Shaw's experience was called on during the development of the Queensland Institute of Technology as well as the regional Universities: James Cook, Capricornia and Darling Downs. He was chairman of the Australian Branch of the Institution of Mechanical Engineers for many years. In Melbourne, he was a member of the inaugural committee of the Australian Branch, Institution of Production Engineers. He became Chairman, Queensland Division IEAust in 1956 and a member of Council. For his services to the Australian Institute of Management, he was made an Honorary Life Fellow. Other technical bodies that he served included the Air Pollution Council, Queensland, the CSIRO State Committee, Standards Association of Australia, the Industrial Design Council of Australia and the Australian and New Zealand Association for the Advancement of Science.

Shaw died in 1993 survived by his wife Charlotte, a son, also a mechanical engineer, and a daughter.

Shaw, M., Application for position of professor of Mechanical Engineering, University of Queensland.

Shaw, M., Staff files, U.Q.A., S135.

Personal documents.

45

W G SHEIL

CMG BSc BCE BME Melb MIEAust MAICE FAus IMM MAIMM



Photograph by
courtesy of
The Mount Morgan
Collection
Central Queensland
University

SHEIL, WILLIAM GLENISTER (Glen) (1901-1981), mining engineer, was born in Melbourne and educated at Melbourne High School and the Melbourne University. Sheil had a distinguished academic career at Melbourne University where his first degree was in Mining Engineering with Honours, for entry to which he had been awarded a bursary. While completing a BSc in Geology and gaining First Class Honours and the Exhibition in Civil Engineering, he obtained a Blue in Football. He was captain of the premiership team at the University.

After graduating in 1923, he was appointed assistant engineer with the Victorian State Rivers and Water Supply Commission working on Glenmaggie weir. In 1927 he joined civil engineers S Haunstrup Co. Pty Ltd, and was appointed manager of their Sydney office in 1932. During his time with Haunstrup, Sheil was responsible for the design and construction of cement factories in Victoria, New South Wales and Tasmania, large water service reservoirs at Castle Hill, Lakemba and Killara, and flour mills and wheat silos in New South Wales and Victoria.

In 1935, Sheil was appointed Resident Engineer for the construction of the Somerset Dam for the Brisbane water supply. It was here that he commenced a lifelong passion for the provision of modern amenities for the remote or disadvantaged townships associated with the operations he managed. In 1941, Sheil was appointed Chief Civil Engineer for the Hydro-electric Commission of Tasmania, responsible for the design and construction of major hydro-electric works including the Butler's Gorge Dam. In November 1944, he took up the position of Assistant General Manager of the once fabulously rich Mount Morgan mine in Central Queensland. Reopened by Mount Morgan Limited in 1929, the Company had fallen on hard times by 1944, with worn out

plant and equipment, principally because of the labour and materials shortages of World War II. With over six million tons of proven reserves of gold/copper ore the Mine had the potential to be developed into a profitable organisation and Sheil set about replacing the worn out equipment with more modern machinery and utilising war surplus equipment. Under Sheil's influence, the Mine began to provide low cost rental accommodation and barracks for its workers. Although established in 1882, the Town had no reticulated water supply and, as Consulting Engineer to the Mount Morgan Shire Council, Sheil designed and supervised the construction of a water supply from Fletcher Creek.

Appointed General Manager in July 1950, and, with the workforce at the Mine in excess of 1500, Sheil continued his program of modernising the operation, resulting in an increase in the scale of operations and the lowering of unit costs. The whole infrastructures of the Mine and the Town were upgraded. Buildings were repaired and painted and bitumen roads were established around the surface works while the painting of residents' houses was subsidised and bank loans for new houses were guaranteed. Sheil expanded the already successful Cadet and apprenticeship training activities of the Company and promising young men were encouraged to take up tertiary studies. Together with J Kruttschnitt (qv Vol 1) JM Newman (qv Vol 1) and IW Morley (qv) he was one of the initiators of the University of Queensland mining engineering school.

In 1958, Sheil was appointed resident Director of the Company and in 1964 moved to Sydney to become a non-executive director. When Peko-Wallsend Limited acquired the Mine in 1968, Sheil retired from the Board, but pursued his interest in mining through membership of the Boards of Stellar Minerals, Mount Arthur Molybdenum, and Crusader Oil. He had been one of the founders of, and consulting engineer to, Central Queensland Salt Limited.

Sheil was a Fellow of the Australasian Institute of Mining and Metallurgy, of which he was a long time Councillor; and was President in 1961. He was a Member of the Institution of Engineers, Australia, the American Institute of Mining, Metallurgical and Petroleum Engineers, and the American Institute of Civil Engineers. For six years in the 1960s he was a member of the Queensland State Committee of the Commonwealth Scientific and Industrial Research Organisation.

Awarded the CMG in 1976 for services to the mining industry in Queensland, Sheil died in Brisbane on 17 September 1981, survived by his wife, Maisie, three sons and two daughters.

Obituary, Proceedings of the Australasian Institute of Mining and Metallurgy, No. 260, December 1981, pp. 1-2.
John Kerr, *Mount Morgan, Gold Copper and Oil*, Brisbane, 1982, pp. 207-230
Mount Morgan Limited Board Minutes, 1944-1963.
Based on personal recollections.

RFB

46

E M SHEPHERD

ME Qld FIEAust FinstCE



Photograph by
courtesy of Dept
of Public Lands

SHEPHERD, EDWARD MILRAY (Mick) (1906-1982), hydraulic engineer, was born at Townsville, his father being the owner of "Milray" cattle property on the Burdekin River. He was educated at Townsville Grammar School and the University of Queensland from which he graduated in 1928 as a Bachelor of Engineering with first class honours. While still a student he presented a paper on Influence Lines to the Brisbane Division of the Institution. From 1928 to 1930 he was employed by the Queensland Irrigation and Water Supply Commission as a Junior Assistant Engineer working largely on country water supplies but also on the initial investigations for the proposed Nathan Gorge Dam on the Dawson River. In 1930 he was employed by WJ Reinhold (qv Vol 1) on road bridge and culvert design and on water supplies for rural properties in North Queensland. In 1932 he was awarded a Walter and Eliza Hall travelling scholarship and spent two years in England and France studying water supply and structural developments. In 1934 he returned briefly to the Irrigation and Water Supply Commission and then was employed as an Assistant Engineer by the Brisbane River Bridge Board under the direction of JA Holt (qv) on the design of the reinforced concrete section of the southern approaches of the Story Bridge in Brisbane.

In 1934 he obtained an ME Degree from the University of Queensland. At the end of the Story Bridge design phase he was appointed as Designing Engineer for the Stanley River Works Board in charge of the drawing office for the design of Somerset Dam when CB Mott (qv Vol 1) returned to Brisbane City Council from secondment to the Board. In this position he was directly responsible to the Chief Engineer WHR Nimmo (qv Vol 1). When the Pacific phase of the Second World War broke out he was responsible for the design of Calrucross Dock in Brisbane

which was built as an urgent war measure. This was followed by the hydrology and other investigation of the Burdekin Falls Dam, the Burdekin River Irrigation and Hydro-electric project and then the design of the Tully Falls Hydro-electric project and associated Koombooloomba Dam. During this fruitful period Shepherd was also involved in the Barron Falls Extension Hydro-electric Project, Eungella Dam on the Broken River which supplies water to Collinsville power station and the open cut coal mines at Goonyella and Peak Downs. Between 1959 and 1961 he was responsible for the investigations of a proposed hydro-electric scheme on the Herbert River.

In 1949, on the appointment of WHR Nimmo as Irrigation Commissioner, the Brisbane River Bridge Board and the Stanley River Works Board were amalgamated with the Co-ordinator-General's Department and Shepherd was appointed Deputy Chief Engineer, Hydraulics. On the appointment of JA Holt (qv) as Co-ordinator-General in 1956, Shepherd was appointed Deputy Chief Engineer of the Department under JE Kindler (qv Vol 1) as Chief Engineer, remaining in this position until his retirement in 1973. One of his last major works was the investigation of the Wivenhoe Dam Project for the water supply to the Brisbane conurbation and the mitigation of floods in the Brisbane River. He had previously worked on flood mitigation in the Brisbane River and on the operation of Somerset Dam, having succeeded WHR Nimmo in this regard in the later 1940s, and was also largely responsible for the installation of the small hydro-electric plant at Somerset Dam.

Shepherd represented the Co-ordinator-General's Department on the Water Supply Committee which was established in 1958 to advise on the amplification of water supplies to Brisbane City and the adjacent local authorities; among the recommendations being the construction of North Pine Dam. He was active in Institution affairs, serving on the Brisbane (later Queensland) Division Committee for many years and was also a member of the Sub-Committee which organised the Annual General Meeting of the Institution in Cairns in 1960, the first time it was held outside a capital city. He was also active in the Royal Society of Queensland, being President in 1947. He had a wide ranging interest in all aspects of science and technology and demonstrated a breadth of knowledge in fields such as meteorology, rock and soil mechanics, hydrology, paints and protective coatings and concrete technology, to name a few. In 1970, Shepherd was engaged in a consulting capacity by Brisbane City Council to monitor and report on the safety of its dams.

Most of the projects on which Shepherd was involved were crucial to the development of Queensland. He ensured that the best engineering practice was incorporated into projects and he was prepared to be innovative. He looked upon the application of his professional skills and experience for the betterment of the community as an engineer's moral responsibility. Shepherd was a quietly spoken man, able to give intense concentration to a technical problem yet also found time to help and inspire junior engineers. He died a widower in 1982, survived by his two daughters.

Membership applications, IEAust, April 1926, April 1930, July 1939 and February 1951.
Additional information from D.G. Young of Holland Park and J. Mulheron of Margate.

47

C R TRANBERG

ME MSc(Eng) Qld FIEAust



Photograph by
courtesy of
C Tranberg

TRANBERG, CHARLES REBBECK (1906-1973), consulting engineer, was born in Brisbane and educated at Brisbane Grammar School and the University of Queensland, from which he graduated in 1930 with the degree of Bachelor of Engineering with first class honours and a Queensland Government gold medal. After graduation he worked with the Main Roads Commission for two years as an assistant draftsman in the Drawing Office under the direction of WHR Nimmo (qv Vol 1) and then as a temporary junior assistant location surveyor attached to the South West Division of the Commission. In 1934 he was awarded the degree of Master of Engineering from Queensland University and was appointed Shire Engineer of Johnstone Shire Council and Engineer to the Johnstone Water Authority. Here he carried out the full range of local authority works including the supervision of road construction financed by the Main Roads Commission within the Johnstone Shire as well as the maintenance of main roads. He was also responsible for the operation, maintenance and amplification of the water supply system, including the treatment plant.

In 1942 Tranberg joined the Corps of Australian Electrical and Mechanical Engineers in the Australian Military Forces in Northern Command with the rank of Captain, but was later promoted to the rank of Major as Assistant and Deputy to Colonel AE Axon (qv Vol 1) in charge of Headquarters, Queensland Lines of Communication Area. He saw active service in New Guinea as OC Brigade Workshop Australian Electrical and Mechanical Engineers, and ended his war service as Deputy Assistant Director of the Second Australian Sub Area. Following his discharge he was appointed, in 1945, to the new post of Construction Engineer, Department of Works, Brisbane City Council and held this post for five years during which his ingenuity was taxed with the

formidable backlog of city works in the aftermath of the war in a climate of shortages of material and labour.

In 1950 he resigned from the BCC to become the Brisbane Manager of the consulting engineering firm of McDonald Wagner and Priddle, becoming a partner in the firm in 1955. He continued in charge of the firm's Queensland operations until his early death in 1973. During this period his organisation made a major contribution to development works in Queensland, in particular to the bulk sugar installations, coal and grain handling installations at Gladstone, Redbank and Dalby, port works at Bundaberg and Townsville, civil and structural engineering components of the power houses at Swanbank, Tennyson and Bulimba "B", factory and office buildings as well as shopping centres at Toowong, Ashgrove, Southport and Townsville, and buildings for the University of Queensland.

Tranberg was active in Institution affairs and served on the Division Committee from 1957 to 1963, being the Treasurer in 1959 and 1960 and Chairman in 1963. He was Chairman of the Consulting Engineers Panel from 1958 to 1961. He gave fully of his talents and time to assist professional and community activities. He was Chairman of the Building Construction Industry Safety Council from 1968 and played a major part in framing the Construction Safety Act of 1971. He assisted materially in a complete redraft of the Brisbane City Council Building Ordinances. He served as an elected member of the Board of Professional Engineers from 1956 and shortly before Tranberg's death the Minister approved his draft amendments to the Act. He retained a close interest in the University of Queensland, being an honorary lecturer in Civil Engineering from 1949 to 1972 and a member of the Engineering Faculty Board from 1969 to 1973. His help was available and freely given to schools and other community organisations and many have benefited from his sound advice and assistance. His paper *Mourilyan Harbour Development*, co-authored with GR McKay and EC Fison was awarded the 1960 Warren Memorial Prize by the Institution.

Tranberg, in his quiet way, made a major contribution to the profession of Engineering. A man with the highest academic attainment and possessed of sound judgement, he was admired and respected by all people who had dealings with him. His strength of character and courage kept him at work over the last few years despite a series of severe illnesses. He died in 1973 survived by his wife Hazel, a daughter and two sons, both engineers.

Membership application, IEAust, August 1944.

Material supplied by C. Tranberg of Brisbane.

GC

48

G R WILMOTH

BCE Melb FIEAust RPEQ



Photograph by
courtesy of
D Wilmoth

WILMOTH, GEOFFREY REGINALD (1913-1973), local authority engineer, was born in Horsham, Victoria and educated at the Horsham High School and University of Melbourne from which he graduated in 1934 with the degree of Bachelor of Civil Engineering. He was first employed as a temporary Assistant Draftsman by the Queensland Main Roads Commission in 1934 but resigned a year later to work as the assistant to CR Tranberg (qv), Shire Engineer of Johnstone Shire Council. After experience in road and bridge survey, design and construction, he obtained the position of Engineer in Charge of loan subsidy and Main Roads works in the Town of Roma in 1936. He resigned after a year to work as Assistant Engineer to HE MacDonnell, consulting engineer of Gayndah, whose practice provided virtually full engineering services for nine rural shires in the Burnett area.

Wilmoth served in the Australian Army. Upon demobilisation in 1945 he was appointed City Engineer of Bundaberg and in 1948 he was appointed City Engineer in Mackay.

Wilmoth joined Toowoomba City Council in March 1953, the organisation with which he spent the remainder of his working life until his death in 1973. Shortly after joining the City Council, he was appointed City Engineer and Town Planner. He continued research into potential sites for Toowoomba's second water supply storage area. The results of stream flows and other surveys indicated Perseverance Creek was the most suitable site. Council officers proceeded with detailed surveys and design of the dam, pump tower and rising main to the Mt Kynoch reservoir. The construction of a water treatment plant at Mt Kynoch progressed after completion of the Perseverance Dam system in 1962.

The main water distribution system was augmented with steel mains and a new service reservoir at Mt Lofty, and a new mushroom shaped elevated reservoir at Picnic Point. These projects combined to form a very efficient water supply system and were constructed over many years, by which time preliminary investigations had begun into the Cressbrook Dam system, Toowoomba's third water supply storage area.

Wilmoth encouraged major sewerage works to ensure all of Toowoomba was sewered in as short a period as finances permitted. He formulated a 10 year program of accelerated sewerage reticulation. After the 10 year program was completed, further surveying, particularly for the expansion of sewerage reticulation, was carried out using aerial photography. The sewerage reticulation program also required augmentation of existing sewers while the extended catchment areas necessitated major expansion of the Wetalla Sewage Treatment Plant.

Wilmoth also oversaw the elimination of the remaining red gravel roads, and the kerbing and channelling of all new and existing bitumen roads in Toowoomba. Under his leadership stormwater and the city's creeks also received more consideration, including the undergrounding of five year storm flows in East Creek, Lake Annand and a retention lake.

Wilmoth's philosophy was simple - first things first. Water and sewerage was the number one priority, roads number two, stormwater and creeks number three and beautification projects as funds permitted. He devised programs for construction in sequence of needs. His well-conceived and well-presented reports resulted in Council approving most of his preferred programs. He was appointed to the National Capital Planning Committee in the late 1960s.

On leave from the Council in April 1973, Wilmoth was touring New Zealand with his wife when illness forced his return to Toowoomba where he died several days later, survived by his wife, Norma, a son and four daughters.

Membership applications, IEAust, April 1932, March 1936, July 1938, February 1940 and c. 1952.
Advice from D.Wilmoth of Elwood, Victoria.

DC

49

CH WILSON

MIEAust



Photograph by
courtesy of
A Wilson

WILSON, CLEMENT HENRY (1904-1991), civil engineer, authorised surveyor, was born at Mackay and educated at the Mackay State School and Ipswich Grammar School. Following the Junior Public Examination he was employed as a cadet surveyor, becoming an authorised surveyor in 1928. In 1930 he was employed by the Main Roads Commission as a surveyor in the Roma District and from 1932 to 1937 was engaged in the relocation surveys for the Bruce Highway.

Wilson was successful in passing the Institution of Engineers examinations in 1937 and was then employed as an engineer by the Main Roads Commission (MRC). In 1938 he was appointed as the first Officer in Charge of the Central Western District of the MRC, located in Barcaldine, the office being on the verandah of Wilson's home. Early works included the relocation of many roads, such as the Longreach to Jundah Road, to higher ground away from flood-prone locations along river banks. The early years of World War II also saw construction of the first stage of the Blackall-Charleville Road by day labour, as a defence project. In 1942, Wilson investigated sites for the US Air Corps for alternatives to airfields at Winton and Longreach, and for heavy bomber airfields at Barcaldine and Alpha. Wilson fostered the Barcaldine strip site. The Barcaldine airstrip was cleared by US forces in 1942, under supervision by Wilson, with formation and gravelling and appurtenant works of the airfield later completed by the MRC. Subsequently, in 1945, the Barcaldine Shire Council successfully applied for a licence for what was then described as a new aerodrome.

In 1943, most of the large day labour force that Wilson supervised on the Blackall-Charleville Road was transferred to Horn Island off Cape York for airfield construction. At this

stage, the Barcaldine Main Roads Office was closed for 14 months, and a nucleus from the work force went with Wilson when he was seconded to the Allied Works Council as Resident Engineer for construction of the Iron Range airfield, with capacity for operation of Boeing Superfortress bombers. Wilson returned to re-open the Barcaldine Main Roads office in April 1944.

In 1945, he started the consulting firm of CH Wilson Consulting Engineers, of which Harold N Davies (a founding partner of Cardno and Davies) was an early associate. George Bourne, an early employee and later a partner of the firm (re-named CH Wilson and Partners in 1960), changed the name of the consultancy to George Bourne and Associates in 1971, two years after Wilson's retirement.

Wilson contributed extensively to the development of Western Queensland and to improvement of the quality of life for the people of the West. One of his earliest ventures was when he and his employee George Bourne surveyed the Torrens Creek Road, involving travel from Barcaldine for upward of two weeks on horseback. Almost all towns in the region have benefited from Wilson's input to their development. These include Alpha, Aramac, Barcaldine, Blackall, Isisford, Jericho and Tambo. One of Wilson's earliest proposals was to the Barcaldine Shire Council in 1946 for a tree planting programme, construction of aerodrome improvements, paving of streets and renewal of mosquito eradication. Other works undertaken were water supply and sewerage, and, at Aramac, a fountain and a shell shaped bandstand. Wilson pioneered the installation in Western Queensland of large farm-type storage reservoirs for water supply to country towns in very flat country.

Wilson was an enthusiastic music lover, and he and his wife Florence were, in the early 1970's, among the founding members of the Bach Society of Queensland. They were frequently to be seen in Queensland Symphony Orchestra concert audiences. Wilson died in 1991, survived by his wife Florence, two sons, both engineers, and three daughters.

Roger Marks - *Queensland Airfields WW2 - 50 years on*; "Outback Courier", 03 Nov 1995.
Letters from K.T. Kerr of Barcaldine, H.N. Davies of Annerley.
"The Longreach Leader", 23 September 1988.

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CAHO

50

J WILSON

BE RUJ MinstCE MIEAust



Photograph by
courtesy of Mrs
Muriel Wilson

WILSON, JOHN (1882-1967), consulting engineer, was born at Knock, County Down, Northern Ireland on 5 July 1882. He was educated at Campbell College, at Kelvin Home School, Belfast, and at Belfast Technical College. From 1897 he was a clerk in the Engineers Office, Northern Countries Committee, Belfast. From 1903 to 1907 he studied at the Royal University of Ireland (subsequently Queens University, Belfast) while working at the Engineer's Office of the Midland Railway Co in Dublin, gaining his Bachelor of Engineering Degree in 1907. After a further 18 months with the Engineer's Department of the Midland Railway in Belfast, he migrated to Australia to join the Engineering Branch of Queensland Railways Department, initially as a survey draftsman, then for a year as Assistant Engineer in Rockhampton planning and designing lines, and then a year in Dalby supervising day labour construction. For the next ten years Wilson was the Resident Engineer in charge of day labour construction of railway branch lines in various parts of the State.

In January 1922 Wilson was selected from 45 applicants to the position of Assistant Engineer with the newly formed Queensland Main Roads Board, and, some months later he was appointed Engineer to the Board. After a year with the Board he resigned and set up as a consulting engineer. Under the Main Roads policy of the time, the construction of main roads was largely placed in the hands of local authorities, few of which were then employing full time engineers.

It was against this background that Wilson went into private practice. Over the next 44 years he was a successful and highly respected consulting engineer engaged principally in local authority works. He practised under his own name until January 1943, and then as the senior member of John Wilson and Partners. He was retained by numerous local authorities including

the Brisbane, Bundaberg, Rockhampton, Warwick, Redcliffe, Landsborough, Maroochy, Noosa, Pine, Redlands, Caboolture, Mount Morgan, Balonne, Burrum, Callinal, Fitzroy, Kedron, Livingstone and Rosewood Councils. His work ranged across the spectrum of roadworks and bridges, water supply and sewerage, and town planning. By 1942 he had designed and supervised the construction of at least 1000 miles of roads and their associated bridges. In partnership with the Melbourne firm Scott and Furphy he designed and supervised the Bundaberg and Warwick sewerage schemes. His firm designed and supervised the Lake Kurwongbah Water Supply Scheme for Pine Rivers and Redcliffe and the subsequent raising of the dam and expansion of the scheme, the Leslie Harrison Dam in the Redlands Shire, as well as water supply and sewerage schemes for various other local authorities. As early as 1937-38 he prepared preliminary estimates for a water supply from Obi Obi Creek for towns between Caloundra and Maroochy, a vision which was to be realised by the construction of the Baroon Pocket Dam in the 1980s, more than 20 years after his death. As they grew and prospered most of the local authorities appointed full-time engineers, but they retained John Wilson and Partners as consultants for major investigation and design work. In 1998 the practice celebrated its 75th anniversary.

Elected an Associate Member of the Institution of Civil Engineers (London) in April 1920, he transferred to the class of Member in 1928. He became an Associate Member of the Institution of Engineers, Australia, in April 1926 and a Member in July 1926. He was Chairman of the Brisbane Division from April 1931 to April 1932. He was elected President of the Institution of Engineers, Australia in 1939, after serving as a Councillor from 1936 and as Vice-President in 1937 and 1938. He was a Member of the Board of Professional Engineers of Queensland from 1932 until 1956.

Wilson was both an extremely able and efficient engineer and a wise counsellor to the local authorities he served. Scholarly and well read, he had a profound understanding of people. His integrity was his passport. He remained in active practice until shortly before his death.

He married Muriel Florence Geater in 1942. When he died on 15 February 1967, he was survived by his wife and two daughters.

Advice from S.L. Hardy of John Wilson & Partners.

Wilson, John. Personal papers.

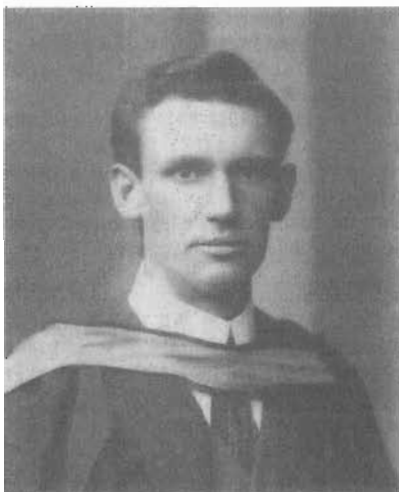
John Wilson & Partners File (Qld. State Archives A/27821).

MAW
MFW

51

R M WILSON

ME Qld FRAIA AMIEAust



Photograph by
courtesy of
BM Wilson

WILSON, RONALD MARTIN (1886-1967), architect and architectural engineer, was born at Brisbane on 14 July 1886. He attended the Normal School and Brisbane Grammar School. In 1902 he passed the Sydney Junior Public Examination with a silver medal in physiology. He was a pupil in the office of his father, Alex B Wilson, ARIBA, architect in 1902, obtained a Certificate in Art and Design in 1905 and studied drawing and modelling at the Brisbane Technical College.

In 1908 Wilson became Chief Architectural Assistant in his father's firm. He exhibited an early interest in the new structural media of steel and reinforced concrete, and when the University of Queensland offered its first courses in 1911, he enrolled in the Faculty of Engineering. He was an official of the Engineering Students Club, a member of the University Football Team, ran second in the University Mile Championship and was elected a Life Member of the Sports Union. He graduated in 1915 with first class honours in civil engineering and was awarded a Walter and Eliza Hall Travelling Fellowship, spending the two year tenure in the United States studying Architectural Engineering, with special emphasis upon structural steel and reinforced concrete construction. His report was published in serial form in the magazine "Building" during the 1920s.

Upon the completion of his Fellowship in 1917, Wilson stayed in the UK and joined the staff of Professor Steel in the British Ministry of Munitions, later transferring to The Ministry of Food as Constructional Engineer for factory and cold storage planning and construction. In 1919, he studied at the Architectural Association, London and completed a Town Planning course at the University of London. Following his return to Queensland, he lectured in engineering at the

University of Queensland and in 1921 received the first Master of Engineering degree awarded by that University.

From 1920 to 1928 he was in partnership with his father in the firm Alex B & R Martin Wilson Architects & Architectural Engineers. He was elected Associate Member of the Queensland Institute of Architects and a Foundation Associate Member of the Brisbane Division of the Institution of Engineers (Aust). He was a strong advocate of the relatively new discipline of Town Planning and lectured on this subject to civic and professional bodies in Brisbane. He was the Chairman of the Town Planning Association of Queensland in about 1930. He was a member of the University Design Selection Committee appointed in 1921 to consider various sites for a permanent University. In 1926 he was appointed, with Professor RWH Hawken and WM Neison, to the Brisbane Cross River Commission. As a member of that commission, he prepared a minority report recommending alternatives to the finally built Story Bridge.

In 1928, his father retired and he carried on the practice as R Martin Wilson, Architect & Architectural Engineer until 1956. He was a Foundation Fellow of the RAIA. His major works included the Ithaca Presbyterian Church, Birt & Co Wharves at Newstead, butter factories, industrial buildings and cliffside flats at South Brisbane.

During the Second World War he was employed as a civil engineer by the Civil Construction Corps designing sewage treatment plants for military establishments whilst he also kept his architectural firm open.

In 1955, he was joined by his son Blair Wilson and the firm became R Martin Wilson & Son Architects. Major works of the partnership between 1955 and 1967 included The Greek Orthodox Church at South Brisbane, COD Building at the Brisbane Markets, Stanthorpe Civic Centre, Extensions to the School of Veterinary Science at the University of Queensland, Albany Creek Crematorium (1965) and the first stage of the Civil Engineering Building at QUT.

Towards the end of his life, his quest for knowledge never waned. He relished special lecture courses at Queensland University on such topics as traffic engineering and the matrix theory for the design of indeterminate structures as though he still had a lifetime ahead to make use of them. He became a member of the Anthropological Society, developing an absorbing interest in aboriginal stone implements.

Wilson died at his home at St Lucia on 19 July 1967 and was survived by his wife Olga, one son and one daughter.

O'Connor, C. *Story Bridge - A Conservation Study for Brisbane City Council*, November 1992.

BMW

ABBREVIATIONS

Awards

AO	Officer of the Order of Australia
AM	Member of the Order of Australia
OBE	Officer of the Most Excellent Order of the British Empire
MBE	Member of the Most Excellent Order of the British Empire
KBE	Knight Commander of the Most Excellent Order of the British Empire
ISO	Imperial Service Order
KB	Knight Bachelor
CBE	Commander of the Most Excellent Order of the British Empire
DSO	Distinguished Service Order
ED	Efficiency Decoration
CMG	Companion of the Most Distinguished Order of St Michael and St George

Tertiary Qualifications

BE	Bachelor of Engineering
BCE	Bachelor of Civil Engineering
BE(Civil)	Bachelor of Civil Engineering
BME	Bachelor of Mining Engineering
BE(Min)	Bachelor of Mining Engineering
BMetE	Bachelor of Metallurgical Engineering
BEE	Bachelor of Electrical Engineering
BE (Mech)	Bachelor of Mechanical Engineering
CE	Civil Engineer – a title, frequently assumed in the nineteenth century by unqualified engineers.
DEng	Doctor of Engineering
DSc	Doctor of Science
DSc (Eng)	Doctor of Science in Engineering
DipCE	Diploma of Civil Engineering
LGEQ	Local Government Engineer, Queensland
ME	Master of Engineering
MEngSc	Master of Engineering Science
MSc	Master of Science
MScEng	Master of Science in Engineering
PhD	Doctor of Philosophy (includes engineering)
RPEQ	Registered Professional Engineer, Queensland

Learned Societies

AICE	American Institute of Civil Engineers
AIEE	American Institute of Electrical Engineers
AIM	Australian Institute of Management
AIMM	American Institute of Mining, Metallurgical and Petroleum Engineers
AusIME	Australasian Institute of Mining Engineers
AustIMM	Australian Institute of Mining and Metallurgy
ASE	American Society of Engineers
ASCE	American Society of Civil Engineers
AWWA	Australian Water and Wastewater Association
IARbA	Institute of Arbitrators, Australia
ICE	Institution of Civil Engineers
InstCE	Institution of Civil Engineers (modern form)
IEAust	Institution of Engineers, Australia
IEE	Institution of Electrical Engineers
IMEchE	Institution of Mechanical Engineers
IMM	Institute of Mining and Metallurgy
InstP	Institute of Physics
QHI	Queensland Historian Institute
QIE	Queensland Institute of Engineers (amalgamated into IEAust in 1920)
RAIA	Royal Australian Institute of Architects
RGS	Royal Geographical Society
RSQ	Royal Society of Queensland
NAASRA	National Association of Australian State Road Authorities
NATA	National Association of Testing Authorities

Membership Grades

AM	Associate Member
F	Fellow
Hon	Honorary (fellow, member etc)
M	Member

Note. In 1968 both the ICE and IEAust altered the designation of membership:

Member became Fellow.
Associate Member became Member.

The post nominals of engineers who died before the above date have been retained in the original form.

The Brisbane Division IEAust was renamed Queensland Division in 1967.

Text and Reference Abbreviations

qv Vol I	Refers to the 1984 IEAust publication "Eminent Queensland Engineers", Ed, R. Whitmore.
U.Q.A.	University of Queensland Archives



This booklet was prepared under the auspices of the Engineering Heritage Panel of the Queensland Division of the Institution of Engineers, Australia as a contribution towards a better understanding of the role which engineering is playing in the development of the State of Queensland.