VERTICAL TRANSPORT IN SYDNEY c. 1880 - 1915

RAY M. BARKER

BARKER, Ray McCredie
M.A.

VERTICAL TRANSPORT IN SYDNEY c.1880 - 1915
- THE ERA OF DOMINANCE OF HYDRAULIC LIFTS IN THE CENTRAL BUSINESS DISTRICT (CBD)

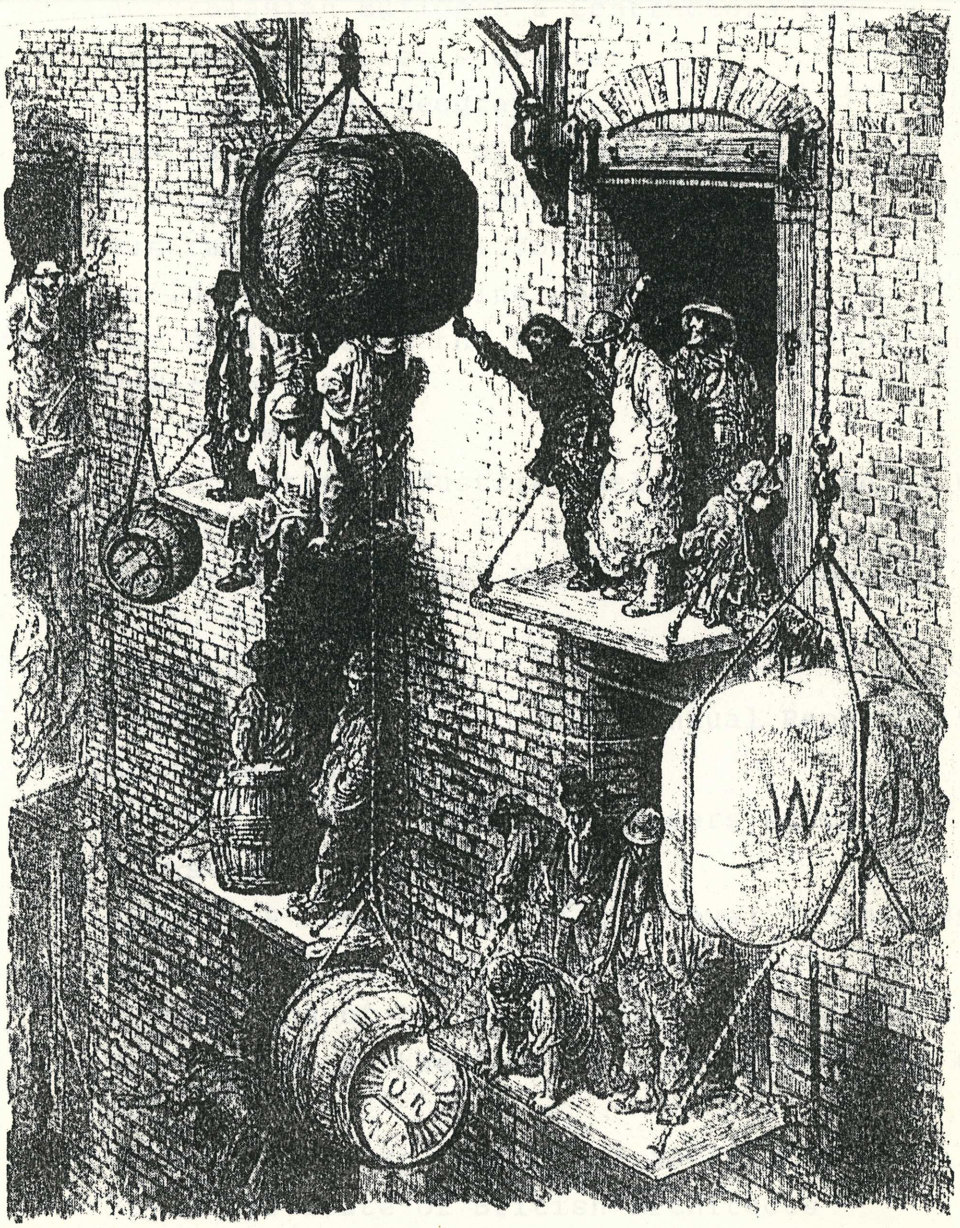


Figure 1

(Bettmann Archive)

Table of Contents

RAY M. BARKER

This work was submitted in partial fulfillment
of the requirements for an M.A. (Pass) in History

UNIVERSITY OF SYDNEY, 1989.

ABBREVIATIONS

Abbreviations used for Journals, Reports
Proceedings & Archives

ABL	Archives of Business & Labour - ANU
ABCN	Australasian Builders & Contractors News
A&G	NSW Agriculturist & Grazier
AG	The Australian Geographer
ASA	Australian Society of Archivists
AT&CJ	Australian Town & Country Journal
ATJ	Australian Technical Journal
BEJ	Building & Engineering Journal
BMS&SHPCo	Board Minutes of the Sydney & Suburban Hydraulic Power Co Ltd
BU	The Bulletin
DIR	Department of Industrial Relations - Annual Reports
DN	Daily News
DPW	Department of Public Works - Annual Reports
DT	Daily Telegraph
EW	Elevator World
FSA	Factories & Shops Act NSW - Annual Reports 1911-20
GG	Government Gazette
IEA	Journal of Institute of Engineers Australia
ISA	Illustrated Sydney News
J&PRS	Journal & Proceedings of the Royal Society NSW
ML	Mitchell Library Archives
PEA	Proceedings of the Engineering Association of NSW
PMCCS	Proceedings of the Municipal Council of the City of Sydney
RAHS	Royal Australian Historical Society - Journal
RIBA	Royal Institute of British Architects
Sands	Sands Country Directory & Gazette of NSW
SANSW	State Archives of NSW
SG	Sydney Gazette
SMH	Sydney Morning Herald
U	Upfront - The inhouse journal of E P L Kone
WA	Westpac Archives

VERTICAL TRANSPORT IN SYDNEY c.1880-1915 - THE ERA OF DOMINANCE OF HYDRAULIC LIFTS IN THE CENTRAL BUSINESS DISTRICT (CBD)

INTRODUCTION

Sydney, in the early 1880s, together with other Australian colonial cities, had emerged from a depressed period and was becoming a prosperous commercial link between rural production and markets, both local and export. This period of prosperity placed Sydney the equal of any city in the world outside Australia on an income per person basis. The rural population looked for services and manufactured goods from the cities as well as to the cities for the sale and distribution of their excess production. All roads and train lines led to Sydney. Relevant economic data from such scholars as T A Coghlan[1] and E C Fry[2] highlight the dramatic upward thrust of economic endeavour in NSW in the period under review - in spite of volatility in some areas and such debilitating factors as depressions and wars. Growth in population, wool clip, gold production, wheat, hides, ship arrivals in the Port, value of

---

1. Coghlan, T.A., 40 Years of Progress in NSW, succinctly in six pages sets out

Population	1869	481,443	Railways	1860	70 miles
	1899	1,356,650		1899	2706 miles

Shipping	1870	689,800 tons
Arrivals	1899	3,468,591 tons

Trade	Import	1899	£25,594,315	Agriculture	1870	426,976 acres
	Export	1899	£28,445,466		1900	2,813,961 acres

Mining up to 1899 - £125,757,000
Total Production £35,279,100. (The sum represents £26.10.3 per person, a figure which is not equalled by any country outside Australia).

2. Fry, E.C., The Growth of Sydney, p.26-47. Articles in J McCarty (Ed.), Australian Capital Cities.

two way trade all illustrate the changing size and shape of NSW in world trade, with Sydney as its centre. This generally improving prosperity engendered changes to the rural/ city relationship. Economies of size started to emerge as a powerful motivating factor. Manufacturing began to expand in Sydney to supply the local market. The proportion of population not only between city and country but between manufacturers and services on the one hand and direct rural occupations on the other started to change, bringing in its train stronger group cohesiveness in some occupational/skills groups, eg. the trade unions. Such changes in the economic shape of and social relationships in Sydney brought to the fore the corollary of need for changes in administrative governmental management, work practices, conditions of work and of trade. To some extent the volatility shown in some economic aspects of the period 1880-1920 was due to situations and circumstances arising which were new to the colony (and after 1901 the Commonwealth) and for which existing practices, laws, procedures and attitudes were found wanting. Values were changing. The growing power associated with the organisation of labour relative to skills required and conditions of service is an example. Australia and Australians were fast becoming independently different. Effective administrative machinery was not in place and awkward industrial situations arose and persisted which, with hindsight, may well have been handled more efficiently, eg. the local government issue of whether or not the Municipal City Council should have been strengthened as opposed to allowing the growth of statutory authorities. This central need was to be noted in many ways such as administrative coping with the expanding economy in all Government Departments, enacting laws appropriate for the changes occurring as a result of population growth and of the effects of growth in production (such as in the building industry the use of space and structure), developing civic administrative practices in the city (and rapidly expanding suburbs) which were equitable but which provided stability in the future, to provide educational systems adequate to the task of developing human resources skills appropriate at all levels and to coordinate regulations for the common good over such matters as tariff barriers between the states. One of the streams of government management which was in dire need of a cohesive structural framework during this period was the building construction industry - the biggest employer of labour. Not only concerning tightening the regulations about the structure of buildings but the use of space. Suburbs were spreading aided by improved transport, trains, trams, ferries and later omnibuses. Public costs to provide these facilities determined that closer attention needed to be given to the issue of space. Increased prosperity meant a greater market for imported goods of all sorts. In order to cope with the quickening economic tempo, this impressive growth of transport was further demonstrated by the increase in shipping into the Port of Sydney, not only to get the wool and other rural products out, but, with this cargo available, prosperity ensured that goods imported would find a market. Such increases in volume in two way trade, plus increased local manufacturing, forced greater attention onto all means of improving, ie. quickening, the handling of goods and people. At the same time, the organisation and power of labour was growing. This factor alone provided an extra impetus, by commercial interests, to use any advance in technology which would maximise reliability of production and goods handling and, at the same time, which would minimise labour costs. Due recognition is made that the detailed focus of the following report is set within the much larger arena briefly introduced above. Within this broad, complex and vibrant economic/social framework of Sydney in the 40 years following c.1880, the endeavours of vertical transport to use city space more effectively justify a separate analysis. Whilst this single aspect of transport forms part of the tangled skin of transport generally in its collective contribution to several aspects of the city and its life, vertical transport is different to transport-on-the-flat. People and goods had to be moved in ever increasing numbers and volume once they had arrived in the centre. The need exists to follow threads through such tangled skeins in order to validate general views and/or to deepen our understanding of how Sydney developed in the way that it did.

This study endeavours to bring onto centre stage one facet of transport in Sydney - vertical transport - and one era of that one facet, namely the era of hydraulic lifts. In 1920 as many people were transported by lifts as by electric trams. Although there was plenty of room for the growing population to spread in the suburbs the commercial and financial heart held together in the CBD. The banks, insurance companies, government buildings, large trading houses and retail stores all wanted to be located near the centre of power. Transport reflected this. All routes led back to the city centre. Firstly trains, ferries, then steam trams, followed by electric tra~~in~~ms and later omnibuses with shipping through the Port doubling in a decade. Steam power drove them all in the fist instance but one by one the technology improved. From c.1880 a new means of transport emerged - lifts. These various means of transport were the arteries which shaped the metropolis which Sydney became in the period under review but the creative heart - the centre of finance, trade, government, production - remained as the cohesive force in the Central Business District. Vertical transport added another dimension to the role that transport in general played in the urbanisation of Sydney. Lifts enabled buildings to be heightened and so allowed greater concentration in usage of that land space which was judged to be commercially worthwhile. This had accompanying effects such as increases in land values and population density*. This work endeavours to bring onto centre stage one era in the development of lift usage in the inner city of Sydney - that of the period of dominance of hydraulic lifts, ie. circa 1880-1915. Buildings in central Sydney after 1880 started to heighten appreciably and to increase in cubic capacity. This had a lasting effect both on land values and on Victorian architecture. Central to these changes was the role of hydraulic lifts and of the people who built, installed and maintained them. This essay endeavours to trace the rise and, in turn, the decline in usage of hydraulic lifts in Sydney. Without lifts Sydney, as we know it today (1989), would be markedly different.

The era of the dominance of these lifts in Sydney (and in Melbourne) was relatively short - say from the mid 1880s to about 1915 when the number of hydraulic lifts under the supervision of the Department of Labour & Industry was outnumbered by electric lifts. The impact of lifts on various facets of late Colonial/Victorian Sydney was lasting and out of proportion to their brief era of dominance. Height, and the style of buildings in general, legislation concerning industrial safety, technical education development and increased values of land and buildings all were attributable to a significant degree to hydraulic lifts. Developments in this specific field of industrial endeavour in Melbourne and Sydney were in parallel, with Melbourne being a couple of years ahead of Sydney in some facets of the industry and behind Sydney in others. In all aspects there were overlapping issues,

---

* Footnote

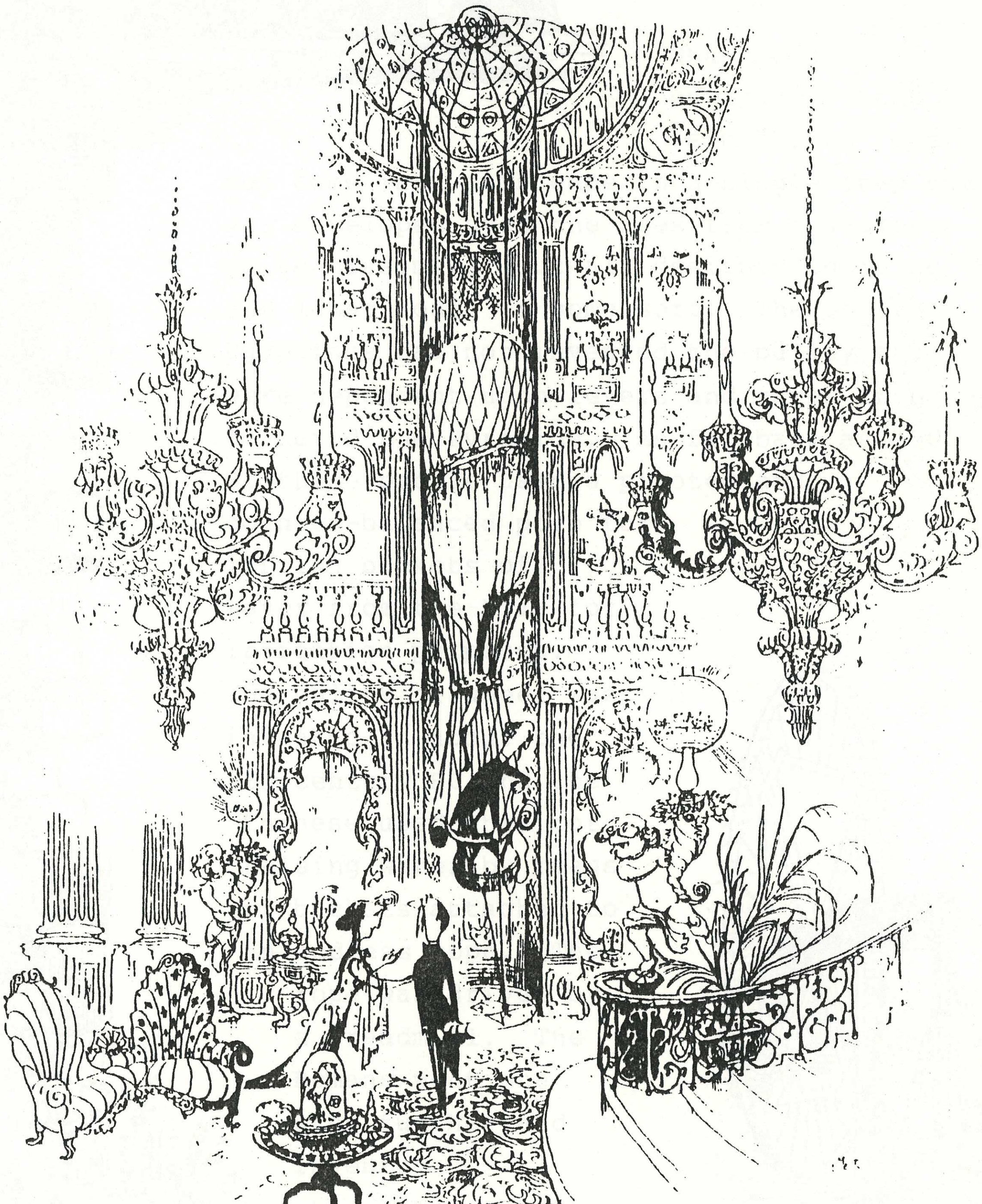
In Australian legislation and regulations the only word used is "Lifts" and this will be used throughout the following essay. The term "elevator" was introduced in America and continues to be used there. The equipment referred to is used for both lowering and raising.

personalities and competition so that in order to appreciate the progress in Sydney it is necessary to note to some extent the activities in this field in Melbourne - especially is this so when reticulation of high pressure power to the city lift installations is being discussed. The network of the reticulation system in Sydney (and in Melbourne) was yet another important factor which influenced the shaping of the CBD. High buildings could be used reliably and a greater cubic capacity in buildings was available. The larger capital outlays required influenced where developers would be prepared to build - a major factor was to build where power to drive the necessary lifts was available. Certainly, the genesis of the CBD had been laid earlier between 1788-1856 as N Edwards outlined in 1978[1] and by K W Robinson[2] in 1952, but, with the increase in volume and scope of industrial and commercial activity towards the end of the century (and in spite of the depression in the 1890s), an extra variable was thus added to the matrix which further consolidated the structure of the CBD. Competition for space, increase in frontage size, and rise in land values all had important input from vertical transport. Marked differences between managements, between relevant company policies and between Government instrumentalities had a direct influence on the scope and pace of development of lifts in this period of review. These need to be noted in order to provide a rounded picture. Hydraulic lifts had, and still have, an appeal to some people in the same way that, say, steam trains have. The tug of the valve operator's rope, the slow upward or downward movement of the cage, and with a trained operator, the steady easing to stop at the right level without a step, the clang of the doors and, in

---

1. Edwards, N., The Genesis of Sydney's CBD 1788-1856 p.42 in Max Kelly's (Ed) 19c Sydney
2. AG, June 1952 p.6-12

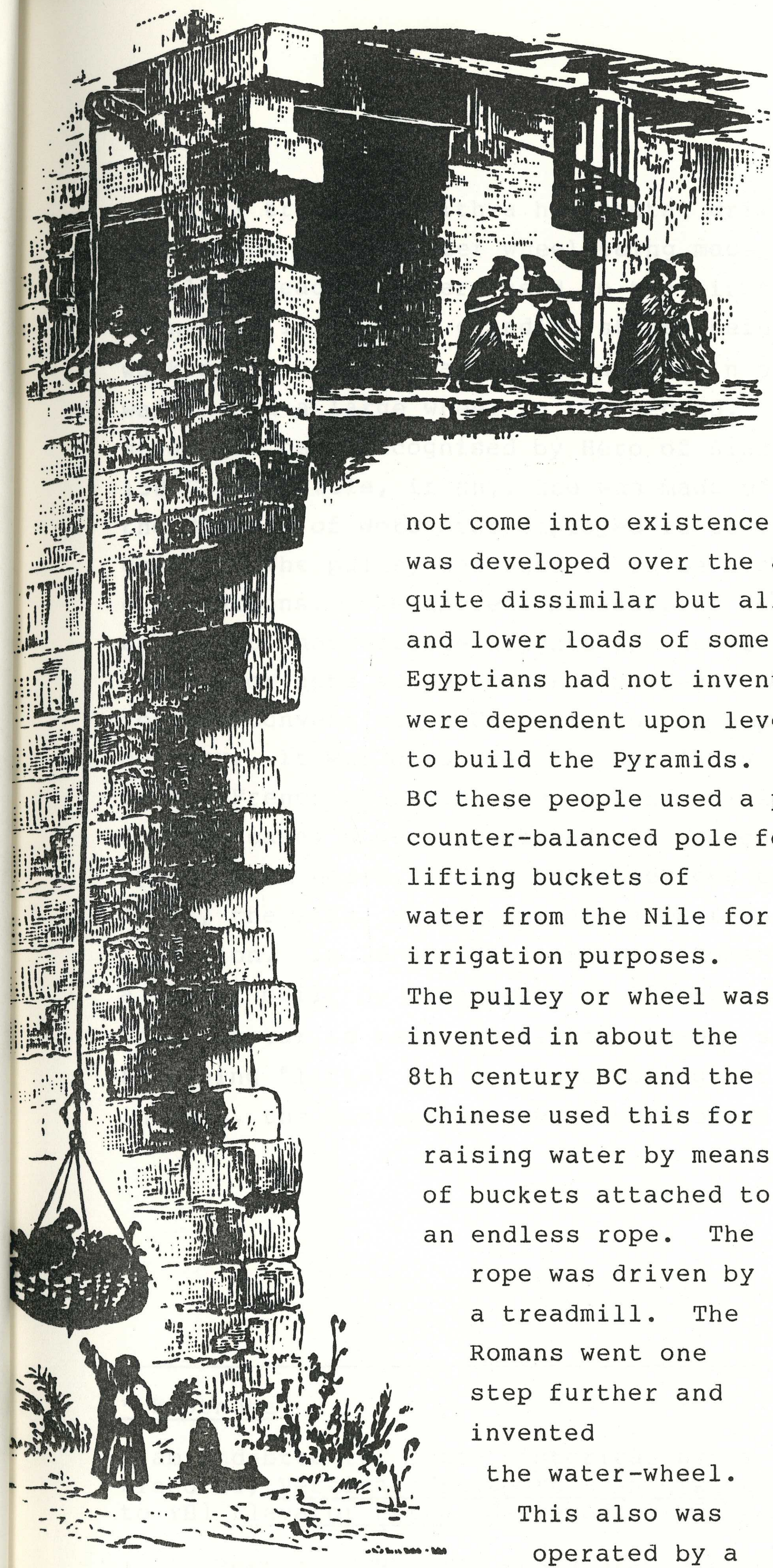
the old goods lifts, the battered wooden floors bearing silent testimony to years of hard physical treatment. The following sketch focusses on these hydraulic lifts, "the quiet achievers".



"We hesitated a long time before installing a lift, but fortunately it's Period . . ."

—(By Rowland Emett, reproduced from *Punch*, ca. 1950, by kind permission.)

<u>Figure 2</u>



St. Paul's friends lowered him to safety from the walls of Damascus

PRE-HYDRAULIC VERTICAL TRANSPORT

What we now envisage by the term "Lifts" did not come into existence in a single step but was developed over the ages from equipment quite dissimilar but all designed to raise and lower loads of some sort. The ancient Egyptians had not invented the pulley and were dependent upon levers and ramps in order to build the Pyramids. As far back as 1500 BC these people used a pivoted and counter-balanced pole for lifting buckets of water from the Nile for irrigation purposes. The pulley or wheel was invented in about the 8th century BC and the Chinese used this for raising water by means of buckets attached to an endless rope. The rope was driven by a treadmill. The Romans went one step further and invented the water-wheel. This also was operated by a treadmill but the Persians replaced the

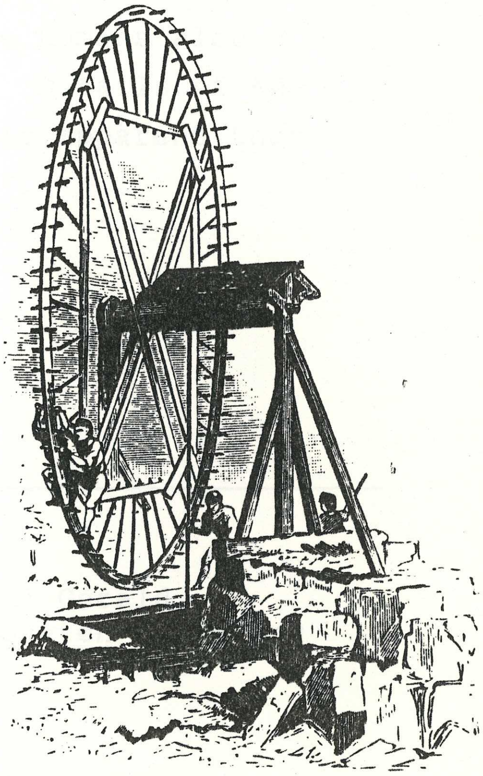


Figure 3

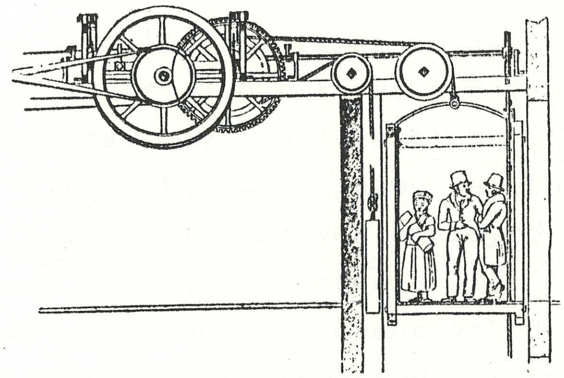
Figure 4

vertical treadmill with a horizontal drive operated by oxen, connection to the water wheel being made by wooden cogs. Similar treadmills were used in the first two flour mills in Sydney in 1794[1], the grinding stones being driven by 9 men walking in a circle around a capstan in one and by 6 men walking in a large wheel in the second. The expansive value of steam had been recognised by Hero of Alexandria as early as 150BC but little, if any, use was made of it until 1650AD when the Marquis of Worcester employed it to raise water in his castle. The pulley was used to raise items other than water - even persons. The ancient monasteries were frequently erected on almost inaccessible heights and access to these was by baskets or nets suspended from pulleys. This means was adopted for the Convent of St Catherine on Mt Sinai in the 6th century. It was also used for the Abbey of St Michael, erected on the French coast in 1203 AD, and which is still standing. In this case, however, a treadmill and donkey were used to operate the hoist. While these devices can not be regarded as lifts, the lift, as such, would appear to be far from a modern invention. In 26 BC, Vitruvius - a Roman architect - described a "lift" built by Archimedes in 236 BC and the Romans also would appear to have used lifts of some sort. Details of the foregoing "lifts" are not forthcoming but it is apparent that, in each, the motive power was human or animal*.

<u>* Footnote</u>

I am indebted for these historical notes to (A) Gerald Lincolne, <u>Vertical Transport - An Historical Sketch</u> p.1-8 and to (B) <u>Elevator World</u>, September 1963, p.14-37

1. Bertie, C.H., <u>The Story of Sydney</u> p.62



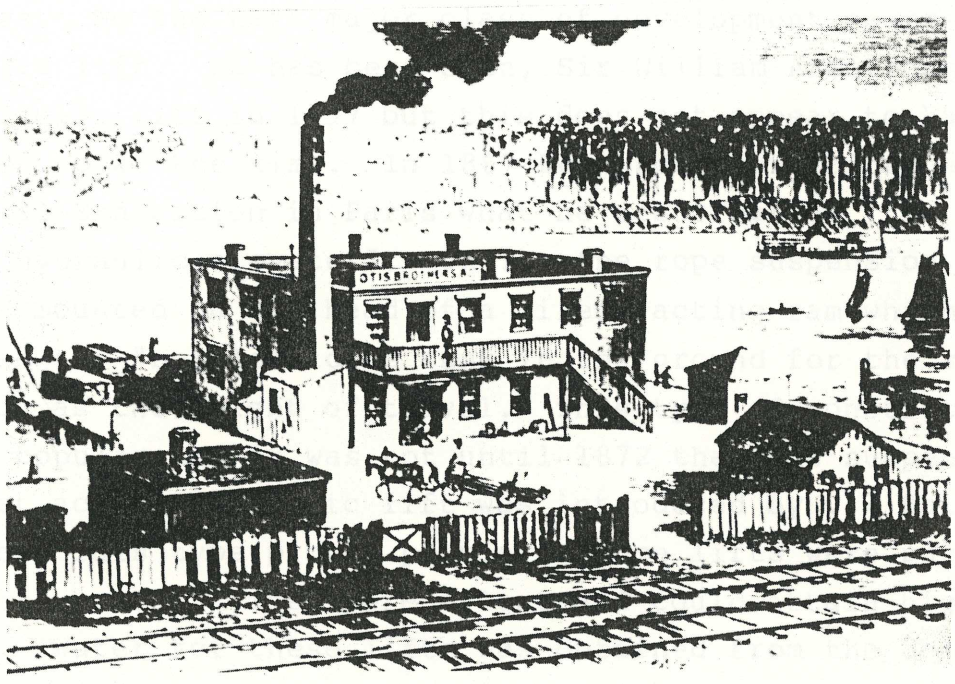
The Teagle

"Teagle" elevator in an English cotton mill, ca. 1830. The system was powered by the mill's line shafting. Control was by a stationary endless rope passing through the car and connected to the hoisting machinery, a scheme widely used for low-speed elevators —until well into the 20th century. (From *The Penny Magazine* [London], 25 July 1835:284.)

Figure 5

Steam - the motive power which changed the relationship of man to his environment in many ways revolutionised vertical transport. The first recorded use of "power" would appear to have occurred in c.1830. James Watt had now invented his steam engine and, in the year mentioned, a power driven lift, known as a "Teagle" was installed in a factory in an English cotton spinning mill. This was followed in 1845 by an hydraulic lift constructed by Sir William Thompson. Joseph Bramah had developed the "U" leather packing cup as early as 1796 and used it in the manufacture of an hydraulic press and Sir William Thompson used the idea for a lift. In the following year Sir William Armstrong made an hydraulic crane and installed it in Newcastle-on-Tyne. This was operated from the domestic water supply but, as the pressure from such a source was not always reliable, he then used a steam driven pump and pressure tank. While this was not a lift his use of a weighted accumulator was later adopted in hydraulic lifts.

While Britain thus led the way, America was not far behind. Henry Waterman constructed a lift in New York City in 1850. This, like those in England, was steam driven but he also invented the standing rope control which became standard for many years. About the same time, George H Fox & Co. of Boston made some lifts and is credited as being the first to use a worm and gear arrangement. Otis Tufts also entered the field and installed his "vertical screw railway" in several buildings in New York. We next hear of Elisha Otis whose name was to become famous in the elevator field while he was employed as an Engineer in a bedstead factory. He constructed a lift for hoisting bedsteads in 1852. Like all such equipment at that time, his car was suspended by ropes and he invented a safety gear to prevent the car from falling if the ropes broke (1854) and he also used a chain to compensate for the weight of the ropes. Like most others, his lift was steam operated. It was this 'safety' factor which proved crucial. Lifts became 'acceptable' and began to be applied widely. The usual practice in such cases, where the lift was used in a factory, was to drive the lift by means of belts and pulleys and in 1860, when Otis had formed a new Company (Otis Bros. & Co. following his Union Elevator Works) this firm developed a lift wherein a separate steam engine was used. A belt was still used to reduce speed but the whole was mounted on a single



Rendering of the first Otis plant, built in Yonkers, New York about 1854.

Figure 6

base-plate. The lift operated at a speed of 100 fpm. While steam was thus the most popular motive power, a central power plant drove all the machinery required in a factory or mill through a long 'line shaft'. Belts and pulleys could shift power as required. This arrangement failed in the non-industrial unpowered setting of an hotel, commercial structure or residential building when increased building height pressed for a means of mechanical ascension for the users. Lifts in these situations required independence and the ability to be used spasmodically. In the mid 19th century, steam was the only means to accomplish this in the middle of a city. The steam lift as a practical machine was in place by 1865 in the USA. There were still two serious limitations however. The first was its hoisting capacity owing to the limitation on the size of the winding drum required, and the second was the inherent complications of a steam plant: boiler, chimney, fuel, ash storage, handling and water supply. Also there was expenditure of energy even when the system was not at work, the need for a full-time attendant, usually licensed, and the presence of potential explosive boiler on the premises. So the next major class of development emerged - the hydraulic lift. As has been seen, Sir William Armstrong made an hydraulic lift in 1797 but this does not appear to have been followed up at the time. In 1867 Leon Edoux exhibited at the Universal Exhibition in Paris what he described as "the first secure hydraulic elevator". Unlike the rope suspension, the car was mounted on the head of a direct-acting ram which required the "bottle" to be sunk in the ground for the same distance as the height of travel. This type of construction became popular and it was not until 1872 that the suspended or indirect action hydraulic lift was introduced by C W Baldwin of Chicago. This type proved popular. Some lifts were pushed and some were pulled. They were silent and could attain high speeds. Water for these lifts was obtained from the domestic supply system where this was suitable but, in many cases, as

Sir William Armstrong had found, the pressure in such systems was frequently too low and it was still necessary to use an engine driven pump. Examples of the two main types of hydraulic lifts are shown overleaf - direct action and indirect or suspension lifts.

The era of steam lasted approximately 25 years and that of hydraulic also approximately 25 years before being overtaken by electricity. Overseas developments in vertical transportation were quickly adopted in the colony of NSW. Steam had been applied industrially since 1815 when John Dickson opened his flour mill in the Haymarket area[1]. Other applications of steam were made in the years between 1815 and the late 1860s when it was applied to vertical transportation. Mr Barker erected two new flour mills alongside his original one built in 1830 in the Haymarket[2]. The Vicars Tweed Factory which became quite big also needed steam[3]. But it was in other forms of transport that steam found ready application. At this stage Sydney was spreading steadily, helped materially by the developing tram and train and ferry networks in Sydney. Each day these networks brought workers, shoppers and visitors into the hub of the central city before steam was applied to vertical transport. When steam was applied to lifts - especially to passenger lifts in this respect - this daily inflow and outflow of population readily accepted the new form of transport[4]. Competition in the building construction industry and commerce was very keen and this ensured quick

---

1. SG, June 3, 1815
2. Selfe, N., Annual Address to the Engineering Section, J & PRS NSW XXXIV 1900 p.i-xiviii
3. Ibid
4. See page 19 for example of public reaction to lifts from the press of the day

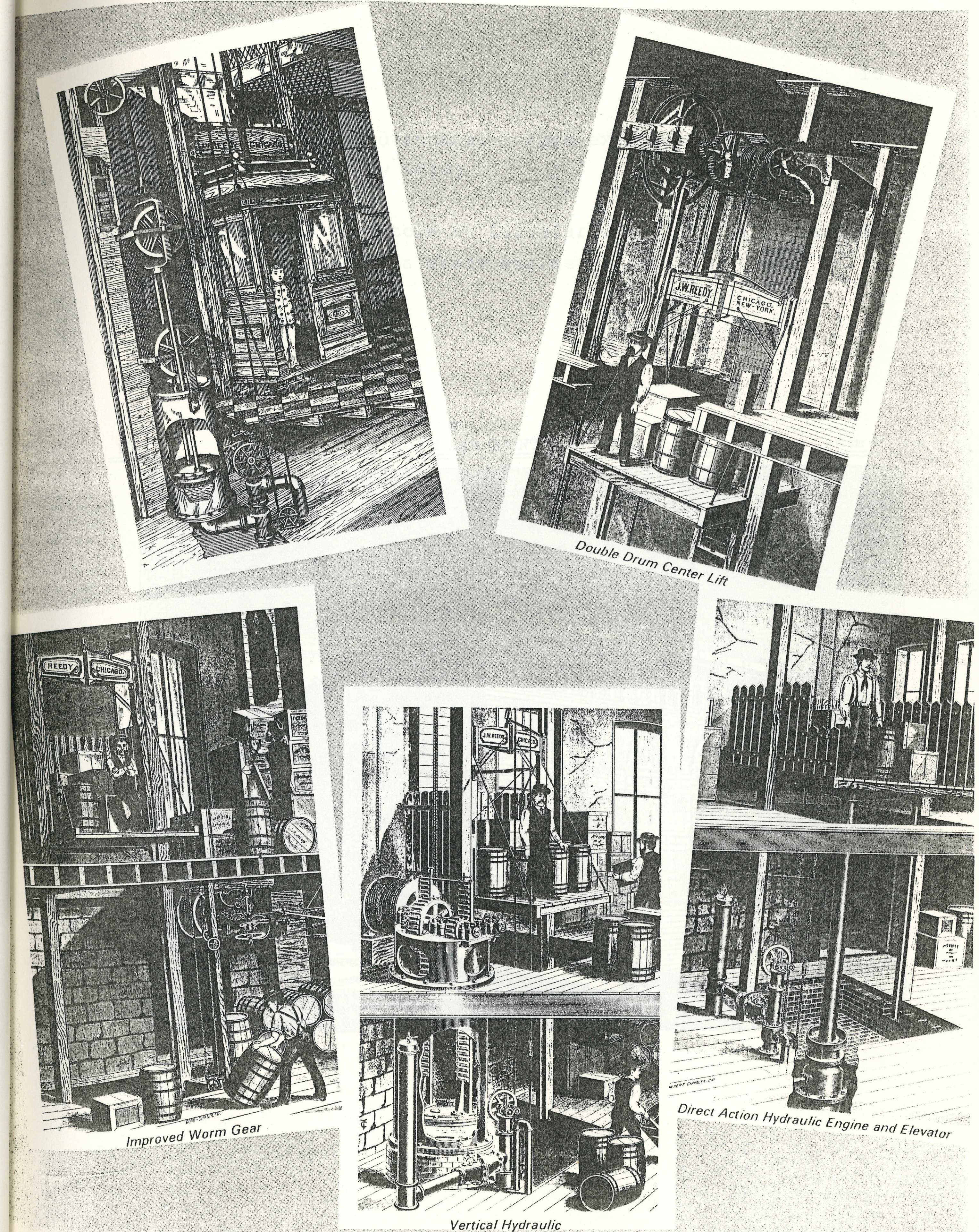
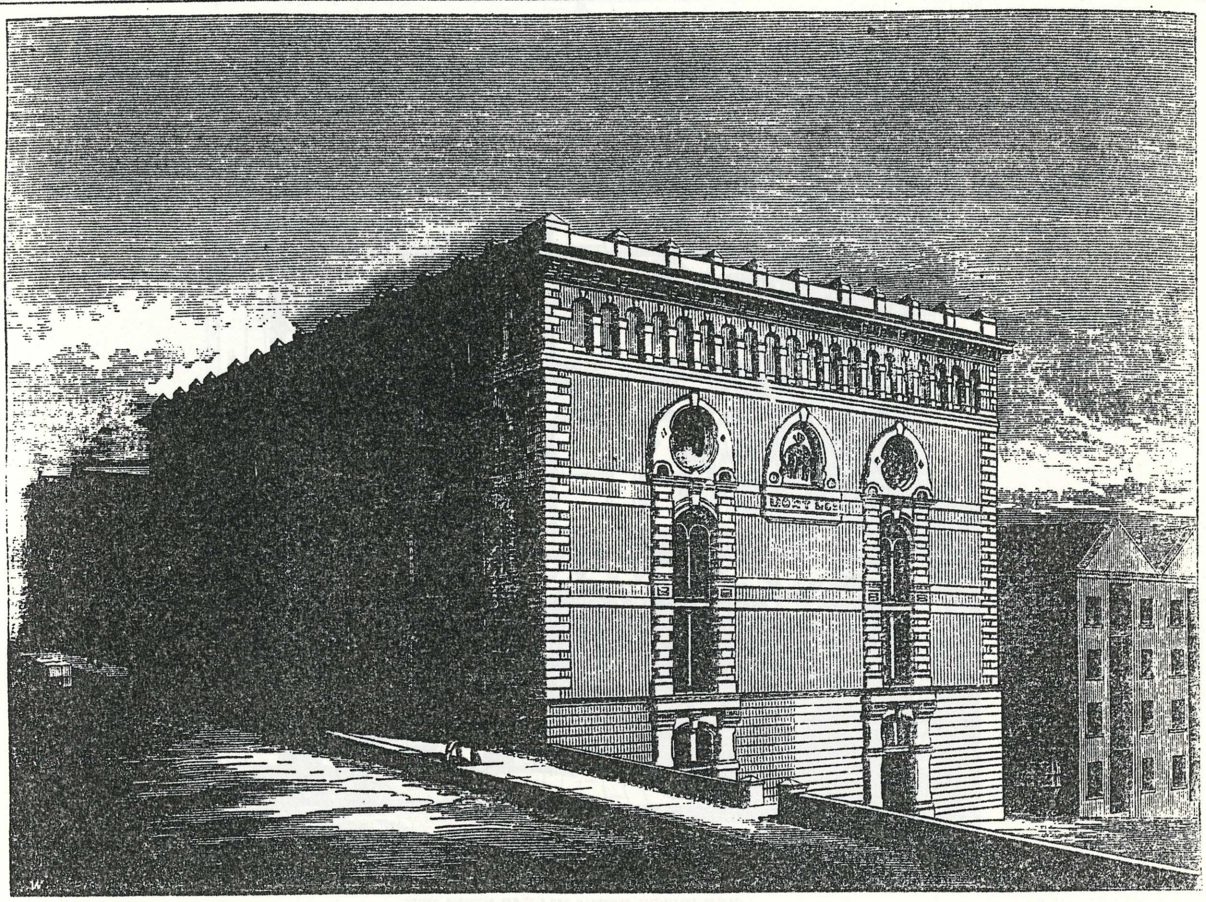


Figure 7 - Elevator World, December 1976, p.13

adoption of any cost advantage:- Some examples of early installations in Sydney were:

1. Mort & Co's woolstore at Circular Quay in 1870 installed a hoist driven by a steam engine of 4HP.

16 TOWN AND COUNTRY JOURNAL. [August 27, 1870.

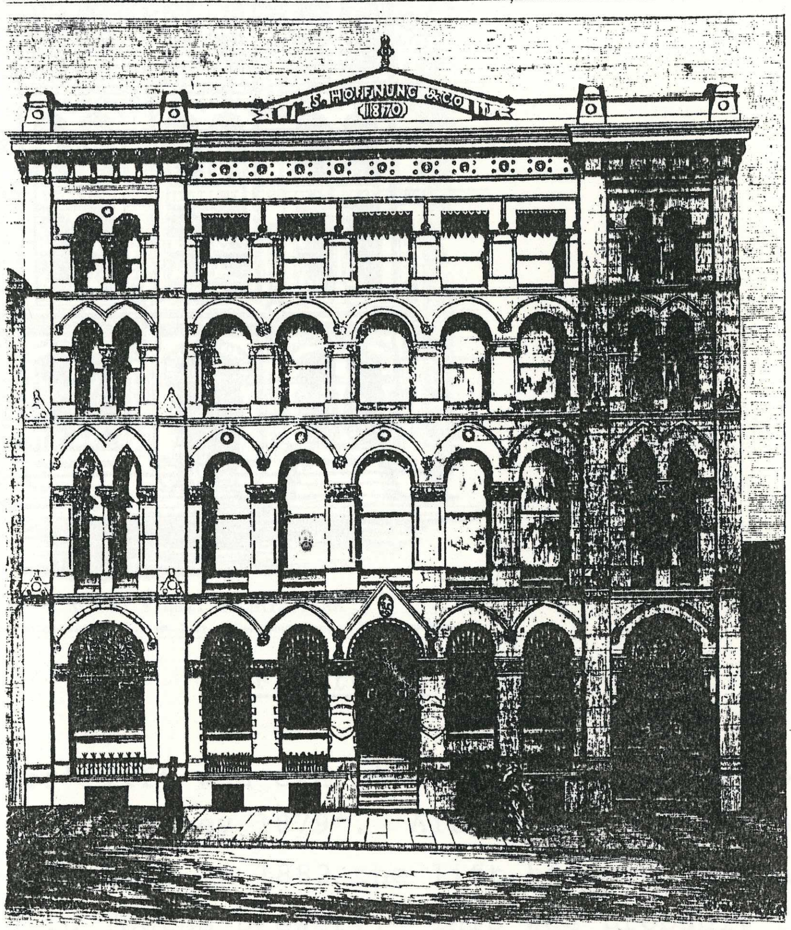


MORT'S AND CO.'S NEW WOOL STORES, CIRCULAR QUAY.

Figure 8

2. S Hoffnung & Co in 1872 contained "a hoist on the American principle made at Mr Bubb's foundry in George Street."

TOWN AND COUNTRY JOURNAL. [JAN. 13, 1872

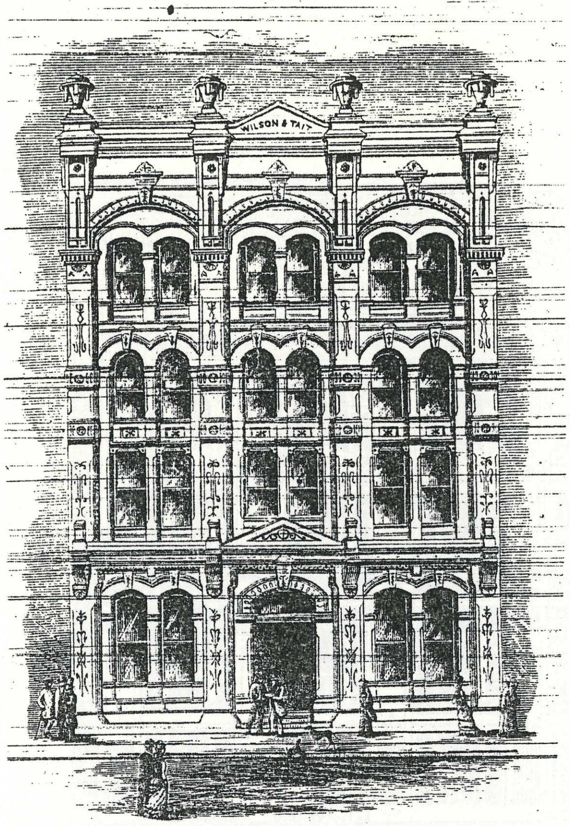


MESSRS. HOFFNUNG AND CO.'S NEW WAREHOUSE, PITT-STREET, SYDNEY.

Figure 9

3. Wilson & Tait in York Street in 1878 had an internal hoist for the prompt transport of goods."
(T&C Journal p.16 August 27, 1870)

NEW SOUTH WALES AGRICULTURIST AND GRAZIER. September 7 21 1878



SYDNEY STREET ARCHITECTURE.
New Premises of Messrs. Wilson, Tait, & Co., York Street, Wynyard Square.

Figure 10

4. A "Whittier" lift was exhibited in the International Exhibition in Sydney 1879[1]. Although the building was destroyed by fire in 1882 the lift had been taken out and installed in Tooths Brewery. This was probably the first passenger lift in Sydney (although S Hoffnung & Co makes this claim for their Waygood lift (1882))[2].

---

1. Balint, E., Whips, Hoists & Lifts, p.127 and Illustrated Sydney News 9/8/1829 p.8
2. The House of Hoffnung, 1882-1952 - author unknown, p.9

5. Dalton Brothers' warehouse in 1880[1]. "Steam is generated by gas" for the steam hoist. This equipment operated 6 hoists and by means of a shaft supplied power for more hoists in the building next door.

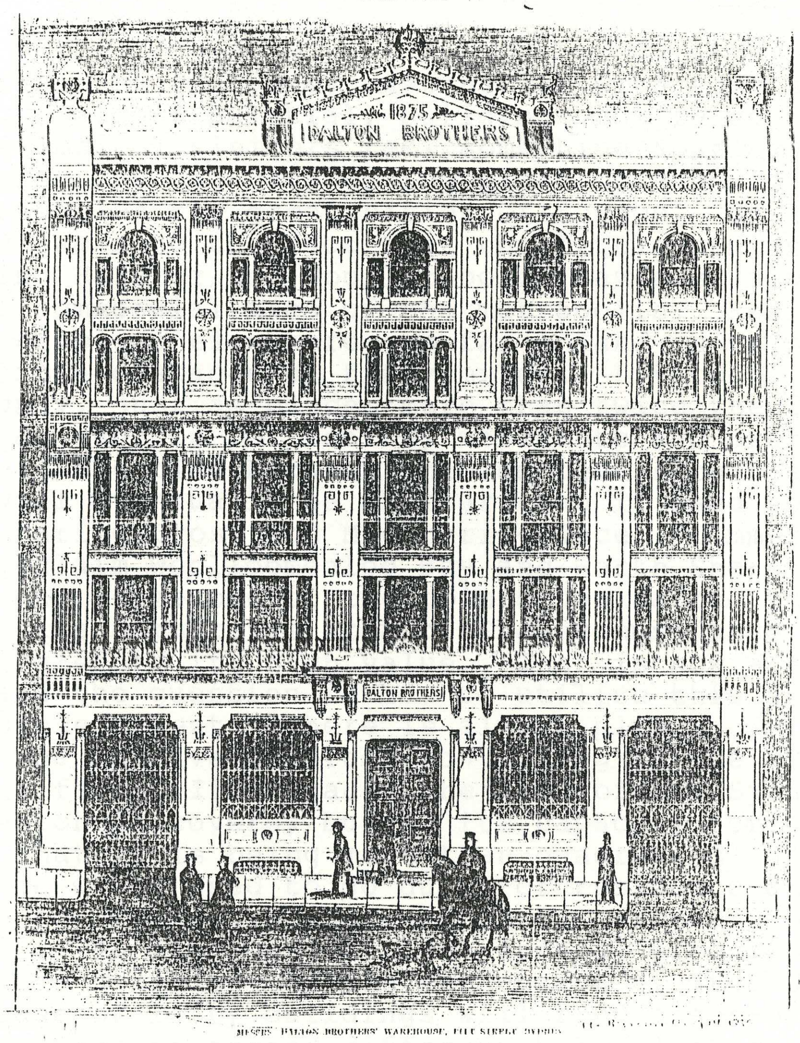


Figure 11

1. BV, August 14, 1880, p.5

Developments however quickly moved to using hydraulic power. Norm Selfe claims "the first hydraulic lifts working in this colony were erected in the Government 'Works' and 'Lands' Offices about ten years ago" (ie. in 1878)[1] and operated on pressure varying from 30 lbs to 800 lbs per square inch. There were over 100 hydraulic lifts in Sydney by 1888[2] and "have sometimes been worked by steam but by far the greater number of cases have been driven by means of gas engines."

"A constant resident in Sydney must notice with some surprise the many large, almost palatial, buildings now in course of erection. Periodical visitors feel something approaching to wonder on seeing the old city giving place to a new one of a kind which resembles the great cities of Europe. Business men are now fully awake to the fact that the little peninsula lying between Darling Harbour and Woolloomooloo Bay must always be the principal commercial area of the metropolis. Residential wants can be supplied elsewhere, as far inland as we please, or at least within a distance of fifty miles. Liverpool will be a suburb of Sydney, just as places more than twice the distance are residential suburbs for wealthy merchants and professional men of London. The time between the remotest suburb and the Post Office will eventually be shorter than it used to be between our Charing Cross and Macquarie-place. Commercial interests may claim Woolloomooloo Bay and North Shore; public requirements may seize one of two points now sacred to other services, but the commercial area of Sydney must have its limits, and therefore its high value. That is now a settled conviction, and the question is how to utilise this area to the greatest possible extent. There is always plenty of room upwards, and the massive edifices now rising in the city duly recognise that fact. If we gauge the size of new Sydney, not by the area which it covers, but by its capacity for commerce, we shall see that it is being more than quadrupled. The one-story place which used to do duty for residence and trade now makes way for factories and warehouses of modern design and great capacity. In this way, without lateral extension, the city will become great beyond the conception of its founders. The disadvantage of lofty buildings will find a set-off in the greater convenience of making different but collateral interests as close together as possible, which is a matter of great moment where time is another form of money.

---

1. BCN, January 17, 1891, p.24
2. Ibid, p.25

The contrast between the old and the new stands out now conspicuously in many places. The immediate consequence of this will be to point out how valuable city frontages are rapidly becoming, and that sound judgment is needed to make the most of them; for what is done now may have to remain a hundred years. In a few instances it is apparent that the best thing has not been done. Economy and success alike suggest the most judicious distinction between the use of good frontages for daily trade purposes and the use of property without frontages. This obvious distinction is sometimes overlooked as completely as if it were not founded in any reason. It looks like a violation of the same principle to place a factory on ground having excellent street frontages; but the mistake is partly condoned by the springing up of really good retail houses in streets not before thought of for that purpose. This is one of the healthiest signs of city growth. Not the least gratifying fact relating to is will be the sweeping away of many wretchedly inferior dwellings - small, damp, ill-famed places - whose residents will be compelled to seek daylight and fresh air beyond city boundaries. To replace some of them with modern model dwellings for the working classes compelled to reside near the port is the next step. It may be said that at the expiration of nearly 1000 years London is waking up to this necessity: we ought to do it at the end of our first century. The want exists now; it would be wrong to wait before attempting to supply it, as London has done, until the want has become an evil." (The Sydney Morning Herald, Saturday, August 11, 1883)

Additional examples of buildings in Sydney which had Austral Otis lifts installed by 1888 include Farmer & Co, Harrison Jones & Develin, New Zealand Loan & Mercantile Co, Government Printing Office, Lands Office, Colonial Life Assurance Society, David Jones & Co, Her Majesty's Theatre, Hotel Grosvenor, Crown & Anchor Hotel, Beale & Co. G Vickery's No 2 building built in 1872 shown in Fowles' sketch (page 21) contained four outside lifts and four inside patent box lifts and hydraulic presses[1]. A summary of the confusing information available on vertical transport between 1867 and 1888 in Sydney is that hoists and lifts were being installed in ever increasing numbers in central Sydney. These varied markedly in design, using gas and coal as the motive source but were all independently equipped with bulky, noisy machinery in each

1. BEJ, October 13, 1888, p.311

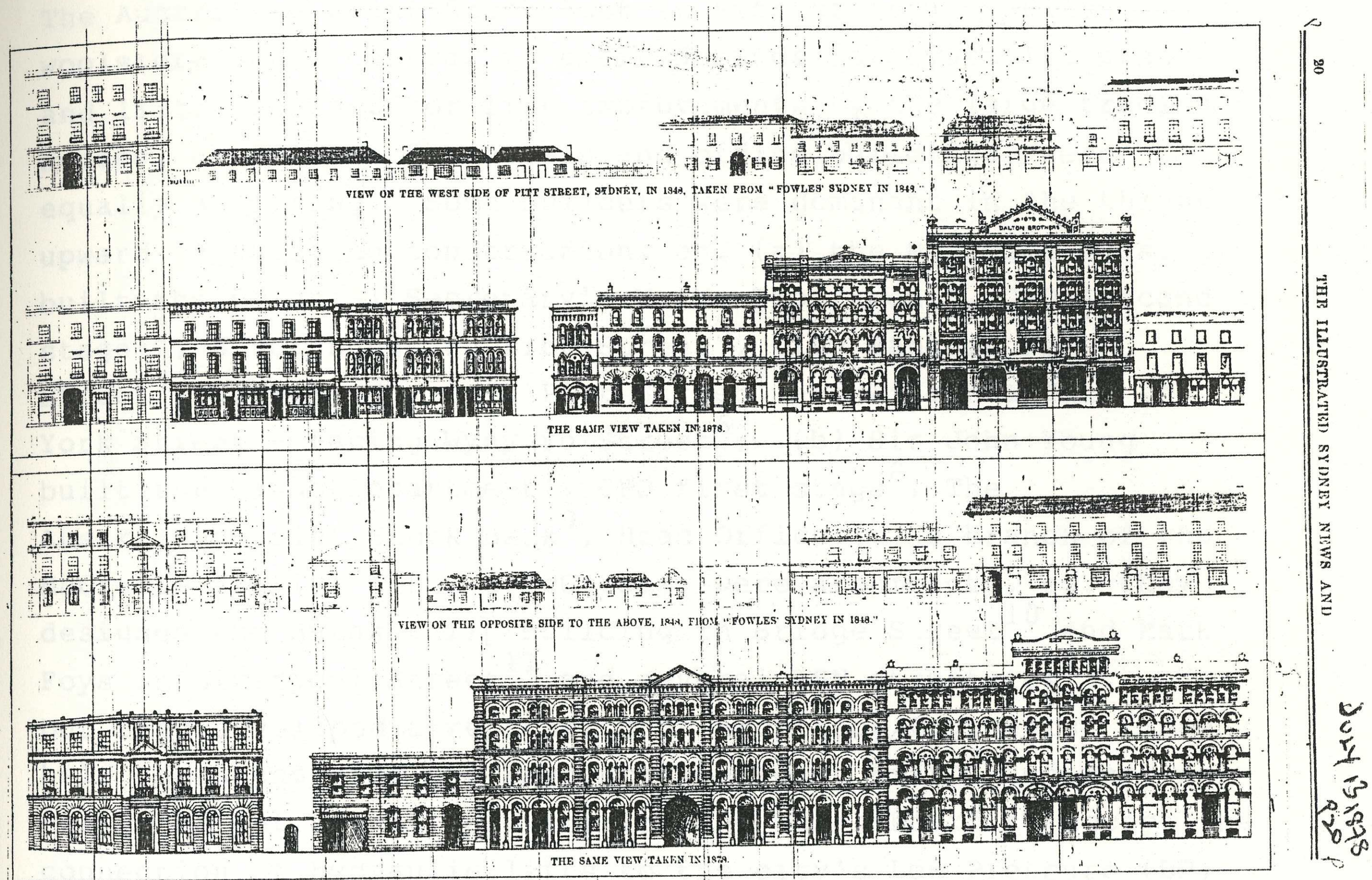


Figure 12

Views of the East & West sides of Pitt Street in 1848
and in 1878. ISN, July 13, 1878, p.20

building (including their own water tank) and which had to be attended full time. Competition between lift suppliers was keen in this rapidly growing market. Buildings were increasing in size and height as a result of the services provided by lifts and their design, maintenance and operation were not controlled in any systematic manner. Developmental needs changed rapidly and were apparent both for passenger and for goods lifts.* (Appendix 1 sets out A Case Study of Change and

---

* Footnote

City Surveyors report 1898 (p3) Proceedings of the Municipal Council of the City of Sydney

Development in Lifts 1887/88 for the Head Office Building of The Australian Joint Stock Bank in Pitt Street). Whilst woolstores were central in their demands for hydraulic presses and lifts, demands for lift improvements by the large trading houses, as well as for hotels and office buildings, were equally as strong. Some builders were dominant in the thrust upward in building construction, eg. (a) the McCredie Bros. built the Colonial Secretary's Works Department[1], GPO (second stage)[2], S Hoffnungs in Pitt Street[3], City Bank in Pitt Street[4], Vickery No. 2 in Pitt Street[5] and Wilson & Tait in York Street - facing Wynyard Street[6]; (b) Sir John Young built the Lands Department[7], GPO first stage[8], The Australian Joint Stock Bank[9], Head Office (c) a branch of the McCredie family, A L & G McCredie, were architects, eg. they designed the Burns Philp Building in Bridge Street[10] and Mark Foys in Liverpool Street[11] and several ASN structures[12], but they developed a reputation as Architect/Engineers. They held the Agency for the Lawrence Hydraulic Lift[13] and were in the forefront of the push forcing the Water Board to accept the connection of hydraulic lifts to the city's Low Pressure (LP) water supply[14]. LP mains water was variable and so

---

1. Barnet, James Paters, MSS 726 - Notes & Reports 1885-1892 Contract 8/11/1873
2. The History of the Sydney GPO, 1988, p.34/35
3. AT&CJ, 13/1/1872, p.48/49
4. AT&CJ, 14/2/1871, p.49
5. AT&CJ, 3/7/1875, p.20/21
6. ISN September 7, 1878, p.21
7. Balint, E., Whips, Hoists & Lifts, p.120
8. The History of the Sydney GPO, 1988, p.25
9. Australian Joint Bank Board Minutes - See App. I, p.10
10. Discussion with the Archivist of Burns Philp & Co, March 1989
11. SMH, 8/8/1988
12. Tenders columnms of BCN from 1891
13. ABCN, 23/2/1889, p.177, & 23/3/1889, p.283
14. ABCN, 9/3/1889, p.227

unreliable for hydraulic lifts. Each installation required a tank on the building roof to supplement the mains water pressure. Architects and entrepreneurs were keen to go higher to obtain better returns from their buildings and to increase the productivity of workmen in woolstores and trading houses. The situation was similar in Melbourne. Peter Johns had been supplying goods lifts to factories and buildings in the '80s. When the city commercial centre in 1888 started to be rebuilt lifts gained an increased degree of attention and appreciation, especially through the efforts of Austral Otis, R Waygood, P Johns and the entrepreneur F W Prell. Into this milieu of the independent steam and early hydraulic era in both Melbourne and Sydney came two companies which provided reticulation networks to supply High Pressure power to the cities - a reliable supply of water under pressure - the real source of energy. Building in Sydney had been expanding in the 1880s but by 1891 the colony was sliding into a severe depression just as the Sydney & Suburban Hydraulic Power Company Ltd was floated. Even so growth and changes in buildings in the City of Sydney was considerable. Table I, collated from the annual reports of the City Architect attached to the Municipal Council of Sydney 1890-1900, illustrates the building activity. This table does not include government buildings, realignment of buildings, changes, water, lighting, guttering, road works. Table II illustrates how building fees dropped in 1890 after the growth in 1884/1889. The annual report lists after the numerical summary of the different types of buildings a list of the actual buildings agreed during the year*. In other words, whilst building activity slowed it did not stop. Hotels and shops and stores were not markedly affected. Into this volatile economic climate a public company was floated, as mentioned above, to supply HP water, the Sydney & Suburban

---

* Footnote

See Appendix 2 for lists of the major buildings constructed in Sydney during the years 1892, 1893, 1894

TABLE I

BUILDING ACTIVITY IN SYDNEY
BETWEEN 1890 - 1900
AS REPORTED IN THE ANNUAL REPORTS
OF THE CITY COUNCIL

Buildings	1890	1891	1892	1893	1894	1895	1896	1897	1898	1899	1890	1900
Total erected. Attend or otherwise dealt with	824	1025	844	614	621	606	644	-	680	680	810	
Dwelling Houses erected	116	112	120	60	107	126	110					
Shops	73	67	32	33	93	38	22					
Stores	28	67	16	13	7	15	17					
Public Buildings	3	6	2	2	5	2	3					
Offices	6	6			21	8	1					
Hotels	9	4	7	6	4	3	2					
Factories	4	4	1	2	1	1	3					
Churches				1			1					
Coffee Palace	1	1										
Banks	2	-	2		1							
Stables	25	23	22	12	21	6	12					
WCs	64	52	46	52	19	24	26					
Awnings	44	34	38	30	38	44	26					
Open sheds	45	28	40		18	39	14					
Alterations & additions to existing buildings	266	272	330	296	243	215	292					
Buildings pulled down	138	349	188	107	82	85	115					

TABLE 2

AMOUNT OF BUILDING FEES

The following table shows the Amount of Building Fees paid into the Treasury each year since the Act came into operation:—

1881	£2,038	17	6
1882	2,961	9	9
1883	2,960	0	6
1884	1,963	4	0
1885	1,983	16	6
1886	2,514	6	6
1887	1,808	15	6
1888	1,810	15	6
1889	2,006	2	6
1890	1,214	13	0
1891	1,389	19	0
1892	1,278	5	6
1893	908	6	6
1894	870	13	0 x

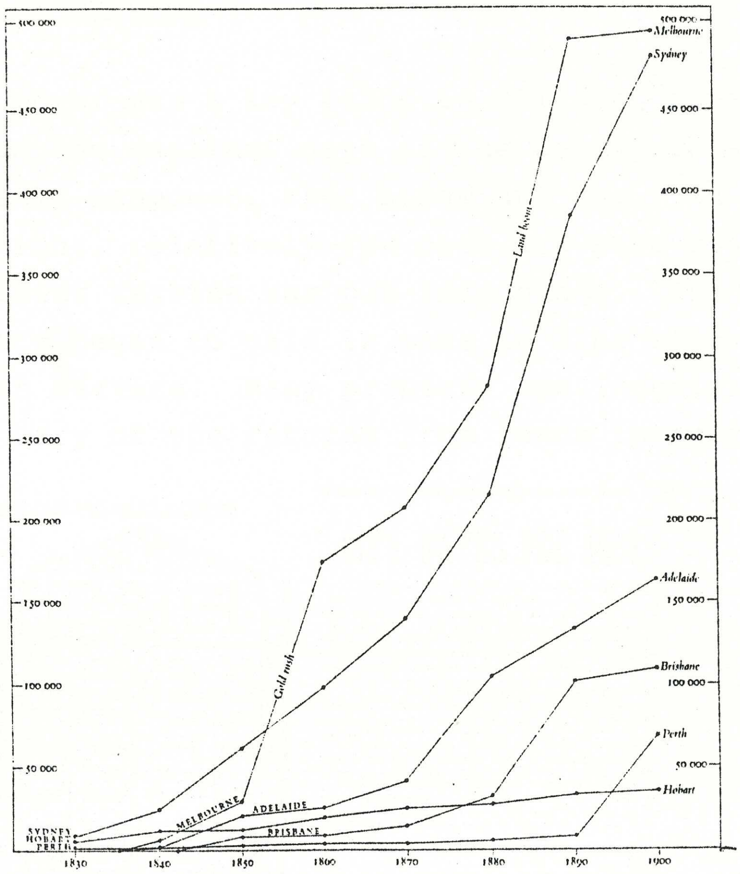
x lowest returns since the Building Act came into force in 1879.

1875 "Fees up 10% & up 6 3/4% over 1893."

1896 "Returns show a steady improvement in the building trades."

Hydraulic Power Company Ltd. Not only goods lifts were the centre of focus in the application of such facility as High Pressure water. Passenger lifts rapidly became essential in any new building in the city. The population of Sydney and of Australia generally rose dramatically in the 1890s as shown in Graph 1. Vertical transport joined the demand for improved service facilities along with other services in new buildings in the CBD such as water and water/sewerage needs. Lifts were no longer a luxury by 1888. They were necessary. Goods lifts for cost effectiveness and productivity, passenger lifts for comfort, prestige and service.

Graph 1 - Population Explosion



How population of Australian capital cities expanded during the Victorian Age 1

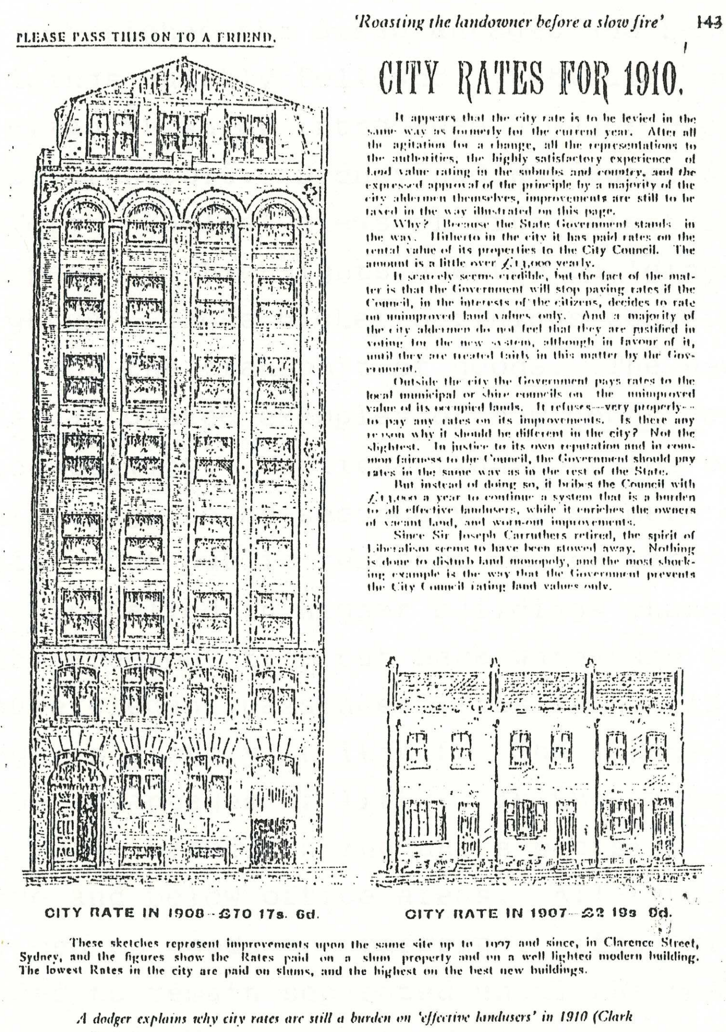
In Melbourne in 1886, followed by Sydney in 1889, separate public companies were floated to offer High Pressure water to hydraulic lifts in the two cities. These two companies were amongst the first in the world - only the City of Hull in 1875 followed by London in 1882 and Liverpool in 1886 were earlier systems. Both colonial companies were controlled initially by the same Melbourne financial interests. This Melbourne influence was not well accepted in Sydney in some quarters and possibly contributed to some of the early problems experienced by the Sydney company in their endeavours to launch the service.

One other important event occurred about this period. William Baxter installed the first electric lift in Baltimore, USA, in 1887![2]

1. Cannon, M., Life in the Cities, Vol. 3, p.14
2. Elevator World, September 1963, p.20

RETICULATION SYSTEMS TO SUPPLY HIGH PRESSURE WATER IN SYDNEY AND IN MELBOURNE

Availability of power was a key issue in building construction in the CBD. From the earliest days of the colony this had been prominent - firstly manpower, then steam and gas. In 1889 a reliable, convenient, relatively low cost and safe high pressure water power service was put into place. Installation of hydraulic lifts began to gain in pace in line with the provision of this service. Many property and industrial developers were wary of the returns from funds invested by



'Roasting the landowner before a slow fire' 143

PLEASE PASS THIS ON TO A FRIEND.

CITY RATES FOR 1910.

It appears that the city rate is to be levied in the same way as formerly for the current year. After all the agitation for a change, all the representations to the authorities, the highly satisfactory experience of land value rating in the suburbs and country, and the expressed approval of the principle by a majority of the city aldermen themselves, improvements are still to be taxed in the way illustrated on this page.

Why? Because the State Government stands in the way. Hitherto in the city it has paid rates on the rental value of its properties to the City Council. The amount is a little over £13,000 yearly.

It scarcely seems credible, but the fact of the matter is that the Government will stop paying rates if the Council, in the interests of the citizens, decides to rate on unimproved land values only. And a majority of the city aldermen do not feel that they are justified in voting for the new system, although in favour of it, until they are treated fairly in this matter by the Government.

Outside the city the Government pays rates to the local municipal or shire councils on the unimproved value of its occupied lands. It refuses—very properly—to pay any rates on its improvements. Is there any reason why it should be different in the city? Not the slightest. In justice to its own reputation and in common fairness to the Council, the Government should pay rates in the same way as in the rest of the State.

But instead of doing so, it bribes the Council with £13,000 a year to continue a system that is a burden to all effective landusers, while it enriches the owners of vacant land, and worn-out improvements.

Since Sir Joseph Carruthers retired, the spirit of Liberalism seems to have been stowed away. Nothing is done to disturb land monopoly, and the most shocking example is the way that the Government prevents the City Council rating land values only.

CITY RATE IN 1908—£70 17s. 6d.

CITY RATE IN 1907—£2 19s 0d.

These sketches represent improvements upon the same site up to 1907 and since, in Clarence Street, Sydney, and the figures show the Rates paid on a slum property and on a well lighted modern building. The lowest Rates in the city are paid on slums, and the highest on the best new buildings.

A dodger explains why city rates are still a burden on 'effective landusers' in 1910 (Clark collection).

Figure 13

---

1. Roe, Jill (Ed.), 20C Sydney, p.143

installing lifts in narrow fronted small cubic capacity buildings, especially as rates were based on the value of assets (as late as 1910) not the unimproved value (see Illustration). In Appendix 3, Knibbs tabulates the increasing value of land in the City of Sydney 1859-1916 - both improved values and after 1908 the unimproved values.

This hesitancy did not apply so much to warehouses and woolstores where more economic urgency existed. So the early development of lifts is to be found in woolstores and warehouses rather than in offices and hotels. But the advantages far outweighed the disadvantages and hotels and commercial buildings quickly followed. Reticulation of centrally organized HP water introduced a major progressive move in vertical transport. Sydney had now entered the true hydraulic lift era. Fowles' views of Pitt Street 1848 and again in 1878 (page 21) highlights how the buildings had started to heighten. These higher buildings contained lifts - but principally for the transport of goods. The newspaper writings of the day quoted examples of how <u>goods</u> could be moved to increase productivity. Vertical transport for people appeared at this stage to be secondary. Customers and staff could still walk - but public response to the early passenger lifts that were installed in higher buildings changed that perception. The breakout from out back warehouse goods lifts to front of house elegant passenger lifts in hotels and taller office buildings is a story in itself. The change quickened awareness of the advantages of lifts. In the 1880s and 1890s warehouses and small manufacturing units occupied space alongside, above and below office areas. All types of users had to be serviced so goods and passenger lifts were both needed but tended to remain separated until the positioning of banks of lifts were included in the design of buildings. Lettable space had become too valuable. The success of the first F W Prell buildings at 15 Queen Street, Melbourne, following W F Hall's (a Director of Otis Bros) exhortations

(1884), demonstrated how top floors could alter leasing rates (from being the lowest priced space to the top priced space)[1]. Other developers followed and the CBD in both Melbourne and Sydney started quite dramatically to change in appearance. E Wilson Dobbs, Assistant Government Architect of Victoria at this time, described these structures collectively as "box-like, gigantic, hideous, grotesque, gruesome and ugly"[2], but he was very much a minority voice. The press of the time consistently and positively praised the marvellous innovations and described each new structure in detail. Each new 'big' building became a little town in itself and, to a certain extent, determined traffic flow. Decisions about where to locate buildings of all sorts, trading houses, hotels, residential services, offices, had to consider the factor of the availability of HP water. The same factor had occurred in earlier years when availability of gas assisted in determining the location of the industrial area around Darling Harbour[3]. The HP network was a significant factor in the CBD. In the judgment of the Boards of Directors of the Public Companies favoured to provide the reticulation service, where could the best returns be obtained at minimum cost Such was the commercial opportunity in Sydney as seen by John Coates & his nephew G Swinburne. They had successfully commissioned such a system in Melbourne in 1888 following the pioneering examples of Hull (1875), London (1882) and Liverpool (1886)[4]. John Coates was one of the first Directors of P Johns & Co in Melbourne. Special legislation was passed in December 1888 by the NSW Legislative Assembly granting the franchise to a Public Company for the establishment and control of the distribution network throughout Sydney*. Other factors at the time which

---

<u>* Footnote</u>

See Appendix 4 for copy of the Act

1. Blainey, G., <u>Johns & Waygood Limited 1856-1956</u>, p.19
2. Davies, M., <u>A History of Vertical Transportation in Australia</u>, p.4, Assignment Stage 7 Architecture Degree 1968
3. Gerathy, G., Role of the City Council of Sydney, M.A. Thesis, Uni. of Sydney, p.76
4. Dickinson, T., PEA, May 10, 1894, p.38ff

would have weighed heavily in the decision to provide such a service were the population growth, the increase in shipping and therefore goods handling needs, and the doubling of the wool clip in the 1890s[1]. All these factors meant that trade and commerce would need servicing ready to meet the pent up demand (which would be sure to follow any downturn). This legislative approach (which was taken almost directly from the Melbourne Act of 1886) granting the Sydney & Suburban Hydraulic Power Company Ltd (S & SHP Co) the exclusive franchise was not without its detractors and objectors. Three major challenges arose. Firstly, Municipal City Council fought tooth and nail to prevent profit from a public facility going to a private company[2]. The Councillors saw no difference between high pressure water and the provision of such utilities as electricity and water.

There was little cooperation from the Municipal Council in March 1888 when the Act was due to come before the Legislative Assembly. An approach for support from the Council was made by J Coates initially to the Finance Committee asking for support from the Council but it was rejected[3]. Instead the Council asked for the Legislative Assembly to place such a utility as HP water mains to supply motive power under the Council. A direct approach to the Council was allowed and, as a result, a modified and altered Draft Bill was suggested to the Legislative Assembly. The Council asked for (a) power of purchase of the proposed Company periodically after the first 20 years, (b) sharing all dividends paid over 10% pa, (c) Company to pay for all throughfare breakages[5]. The Council saw no reason why a private company and not themselves, the City, should own, for example, the right to lay mains for a public utility[4]. The Sydney Hydraulic Power Company Act,

---

1. Gerathy, G., Role of the Sydney City Council in the development of the Metropolitan Area 1842 to 1912, Graph, p.98
2. PMCCS Annual Report 1888 p.2ff and ABCN14/3/1888 p.233
3. Ibid
4. ABCN 17/3/1888 p.171, 14/4/1888 p.233
5. ABCN 5/5//1888, p.282

1888, was assented to on December 13, 1888, and a public company was floated in 1889 (25 May 1889) strongly financed initially by Melbourne investors. The Company Share Register does not permit a clear picture of the actual proportions due to nominee holdings between Melbourne and Sydney interests but there is little doubt from the Board Minutes of the start-up period who was the driving force - John Coates and his nephew G Swinburne MLA[1]. The first Board of Directors consisted of W T Poole, W Gardiner, C R Stokes, J Angus, J W Cliff, Hon. Bruce Smith (Minister for Works), W H Ring,[2]. Secondly, the Water Board objected to town water (which was still in short supply) being used and would not allow connections to be made to lift installations[3]. A L & G McCredie, Architects/ Engineers, as agents for Lawrence Patent Hydraulic Lift Co, finally overcame the official objection by applying for connections to the town mains for 9 Lawrence lifts and by winning the court case which followed the Board's rejection[4]. This broke the official obstacle but the general objection still persisted and led to the public company providing its own water from Waterloo in 1891[5]. Sketch below provides a flow chart of the system.

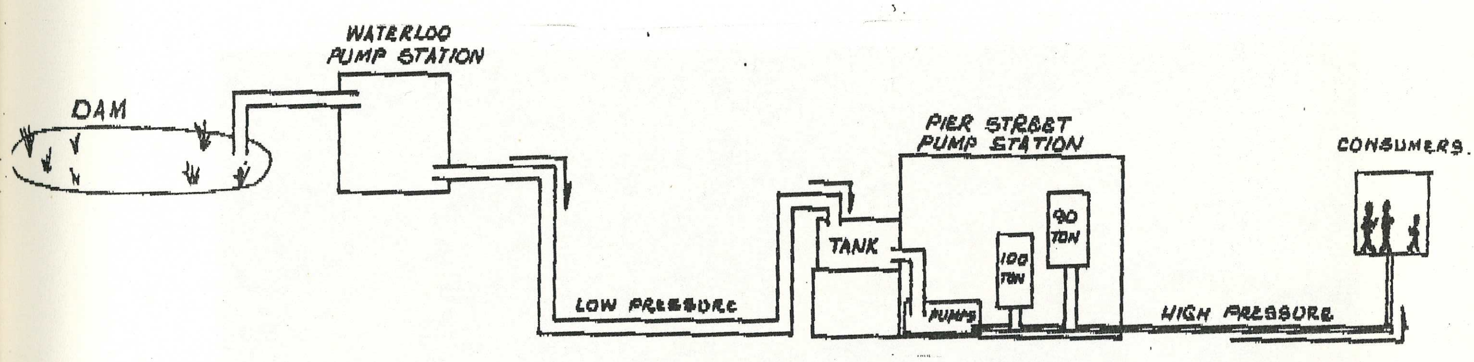
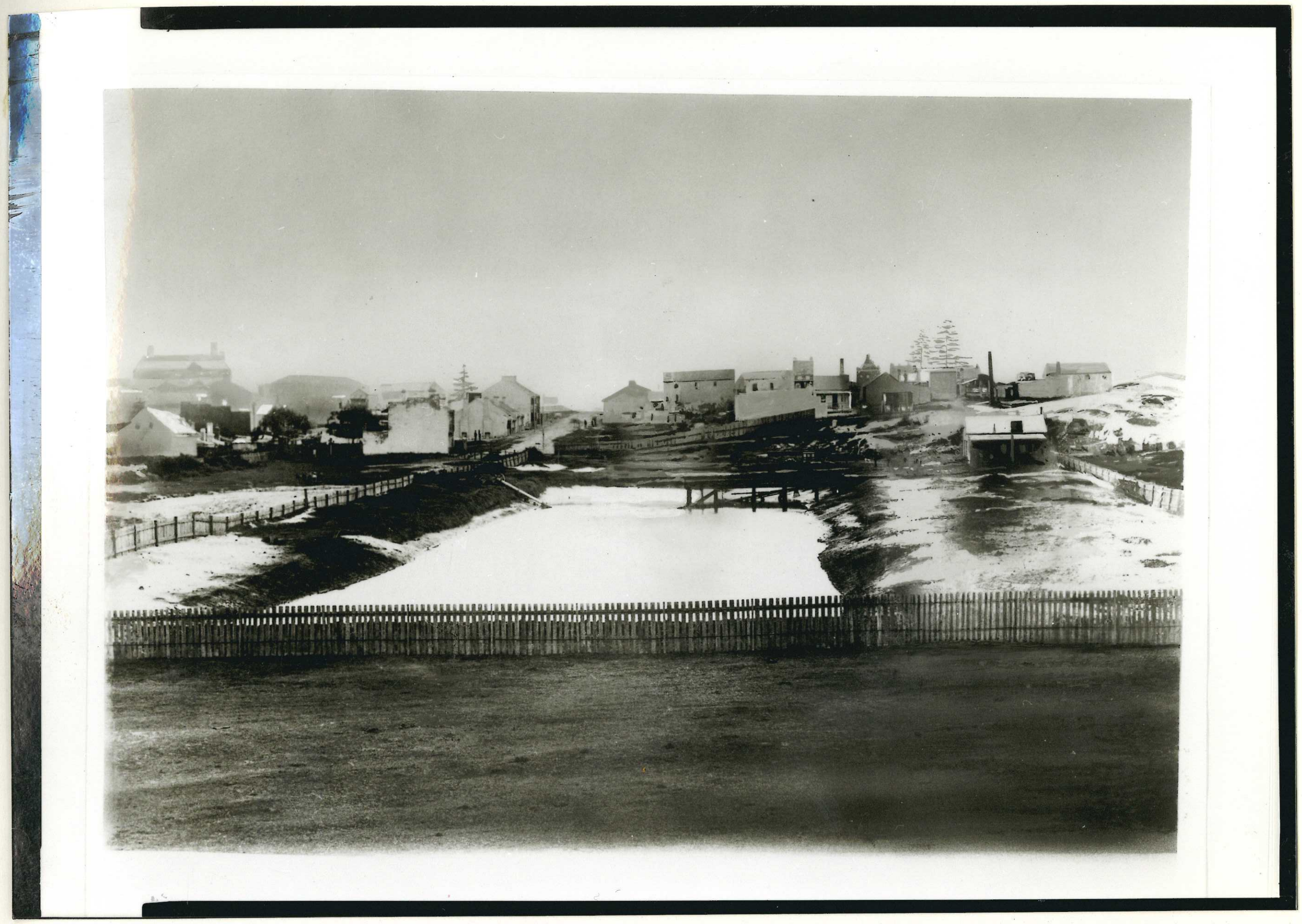


Figure 14[6]

1. Board Minutes - Book 1, p.33, 35, 37, 38 & Sugden, S.H., & Eggleston, F.W., George Swinburne p.407
2. Board Minutes Book 1, p.10 & Appendix 4 (copy of the Act)
3. ABCN 23/3/1889, p.283
4. ABCN 11/5/1889, p.416 and 18/5/1889, p.461
5. BEJ 6/2/1892, p.52
6. U, The end of an era, Link No. 85, July/Aug 1975. Article by Roy Barry of EPL Kone



Reservoir of water at Waterloo c.1891 used by Pier St. Pump Station.

Pumphouse at Pier Street, Darling Harbour, c.1920

Thirdly, challenges to the use of high pressure water for such a public facility came from both Gas and Compressed Air interests. High pressure water service was by no means the only option. Systems in Birmingham[1], Paris[2] and San Francisco[3] were running on compressed air and a gas network, The Australian Gas Company was already operating in Sydney. Cost, convenience, ease of use and effectiveness in general were the chief points advocated by the advocates of compressed air. In July 1889 N Selfe installed a hydro-pneumatic system in the Anthony Hordern Building, Haymarket, for passenger lifts. As mentioned earlier, gas was the means by which many of the early 1880s independent hydraulic lifts were powered. It already had a distribution system in place in the CBD and its advocates claimed that it could compete economically. In

---

1. ABCN, 5/11/1887, p.412
2. BEJ, October 5, 1889, p.288 & PEA 12/9/1889, p.187
3. PEA, September 12, 1889, p.181ff N. Selfe's article "<u>The Operation of Power Companies & Lower Transmission by Compressed Air</u>"
4. BEJ, 29/7/1893, p.45

the arguments about whether to use water, gas or compressed air at the time of the Parliamentary Act in 1888, electricity was not seriously considered due to it being "too dangerous"*. Claims and counterclaims were made, other installations and uses throughout the world quoted and misquoted, but finally on 13 December 1888, the legislation was passed and the S&SHP Co Ltd was floated in 1889 with W T Poole, W Gardiner, W H Ring, J Angus and J Cliff named in the Act as the persons who undertook to establish, use and maintain said system (Appendix 4).

The Pump House in Pier Street, Darling Harbour, was officially opened on 26 August 1891[2], although power supply was commenced in January 1891. Once the public company was successfully floated, new lift installations and connections to lifts already in place (page 35) moved ahead rapidly. At the third Annual General Meeting in Sydney it was reported that the company had "expanded 100% in the last quarter and 300% in the last 3 quarters"[3].

---

* Footnote:

At the time in 1889/90 there was surprisingly little comment about the role of electric lifts. N Selfe rejected their advancement very strongly, maintaining that electricity would never be safe enough[1]. He at that stage was supporting compressed air being used as the motive power, followed in preference by water, then by electricity, but rejected electricity. (The Municipal Council apparently did not foresee the future too accurately concerning the use of electricity. They did not supply electricity to light the City of Sydney until 1904, long after Melbourne, although Woolloomooloo went ahead and supplied electric street lighting well before the CBD was supplied.)

1. BEJ, 25/10/1889, p.288
2. S&SHP Co papers with EPL Kone - invitations issued 13/8/1891 Board Minutes Book 1, p.1
3. BEJ, 6/2/1892, p.52

T Dickinson, Chief Engineer of the S&SHP Co, provided the following details on May 10, 1894 in a paper given to the Institute of Engineers Sydney, Notes on Hydraulic Power Supply in Sydney, reported in PEA:

> "The Melbourne Company commenced to supply power in July 1889, with about 12 machines connected; now they are supplying Power to 413 machines, consuming 1,500,000 gallons per week, with a total length of 18 miles of mains in use.
>
> The Sydney Hydraulic Power Company commenced to supply power in January, 1891, to eight machines, and now are supplying power to over 200 machines. The steady growth in the Company's operations, and its appreciation by the public, is evidenced by the following particulars:-
>
> Water delivered to mains Dec. 1891, 240,000 galls per week.
> Water delivered to mains Dec. 1892, 570,000 galls per week.
> Water delivered to mains Dec. 1893, 721,0000 galls per week.
>
> The output at date is 740,000 gallons per week, showing a continued steady increase."

A map, provided by T Dickinson in 1894 (Figure 15) shows the reticulation network in the CBD in 1894. 12.5 miles of pipes had been laid, including 5 miles water line from Waterloo to the Power House, Pier Street, Pyrmont.

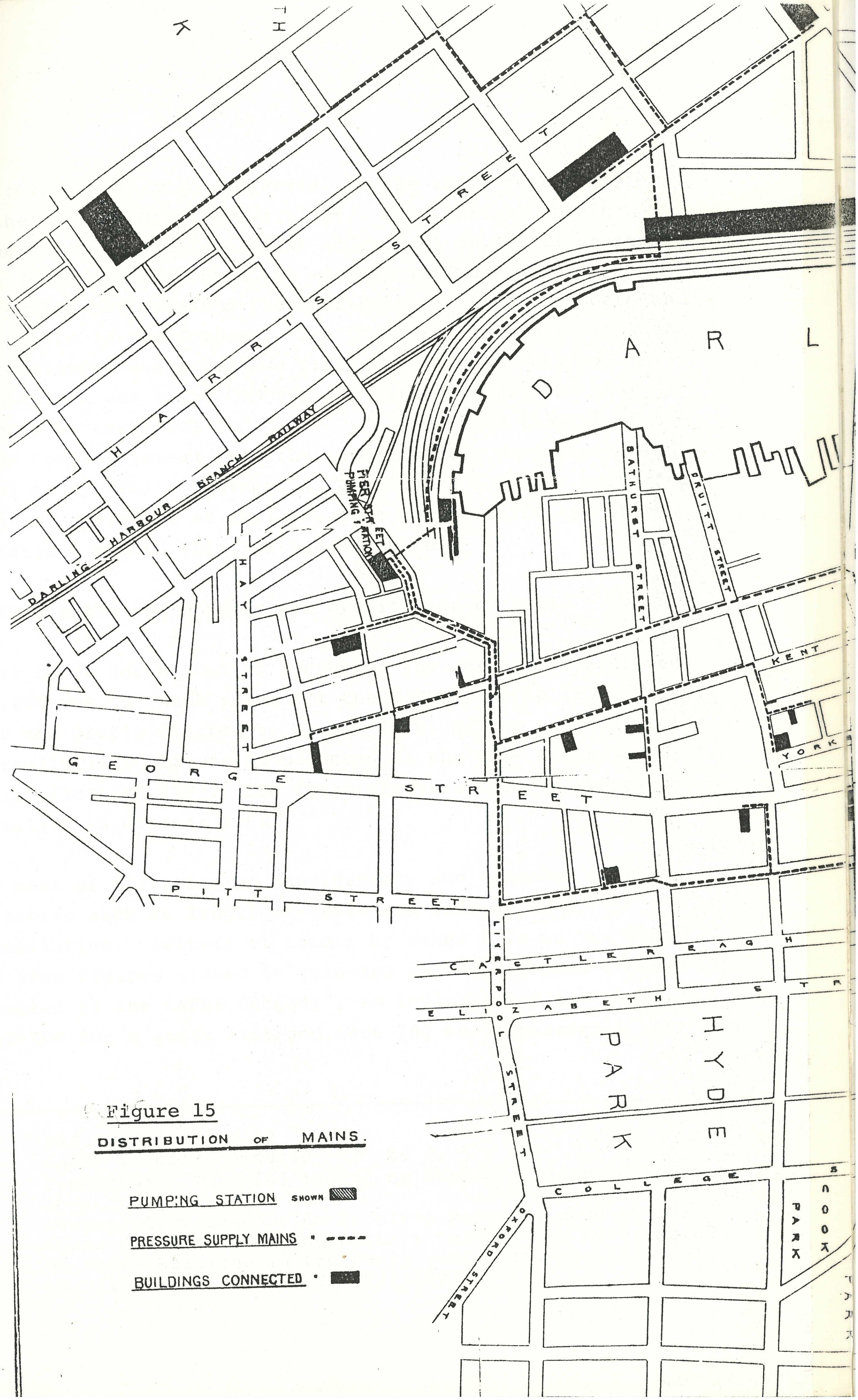
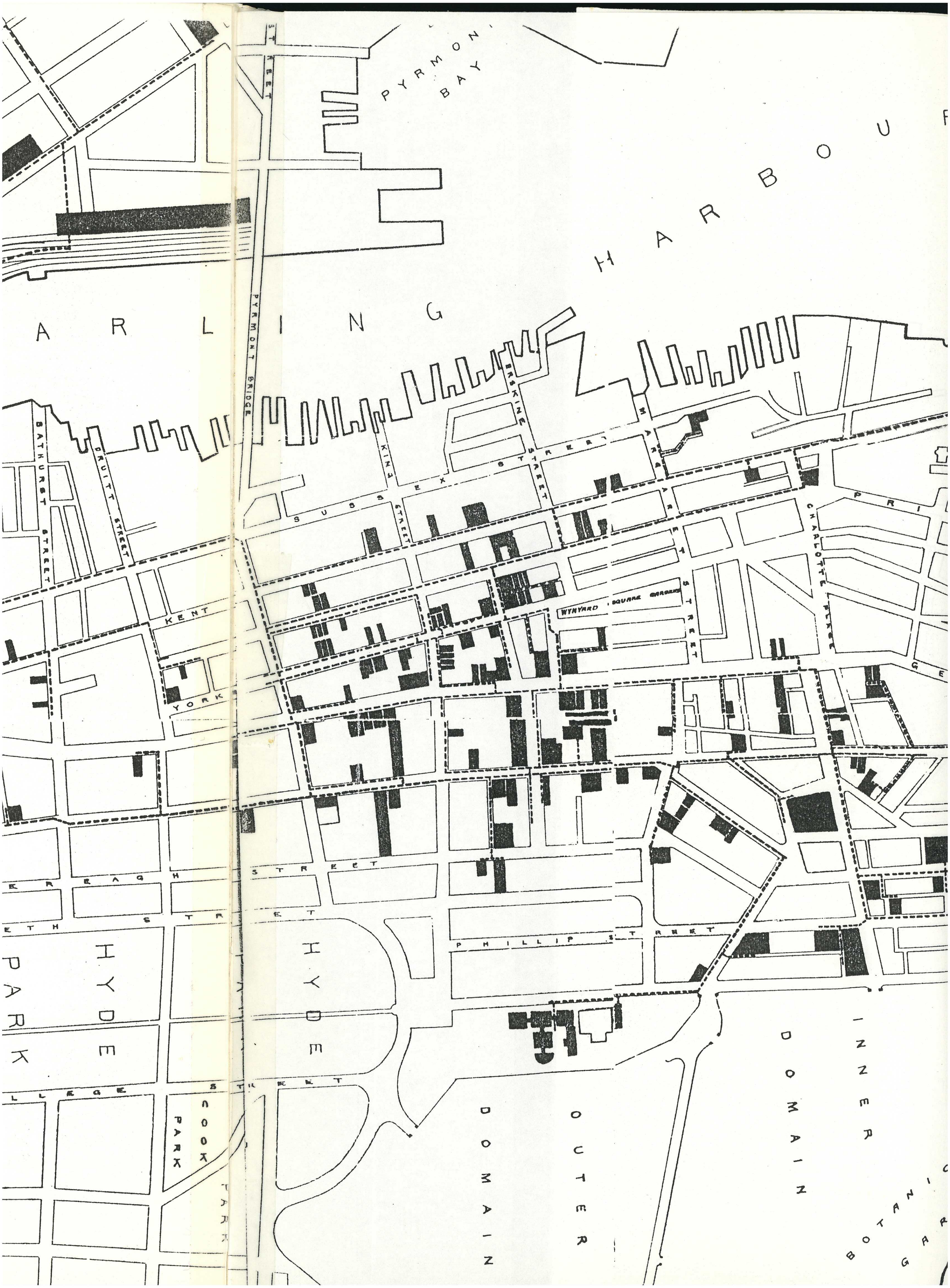
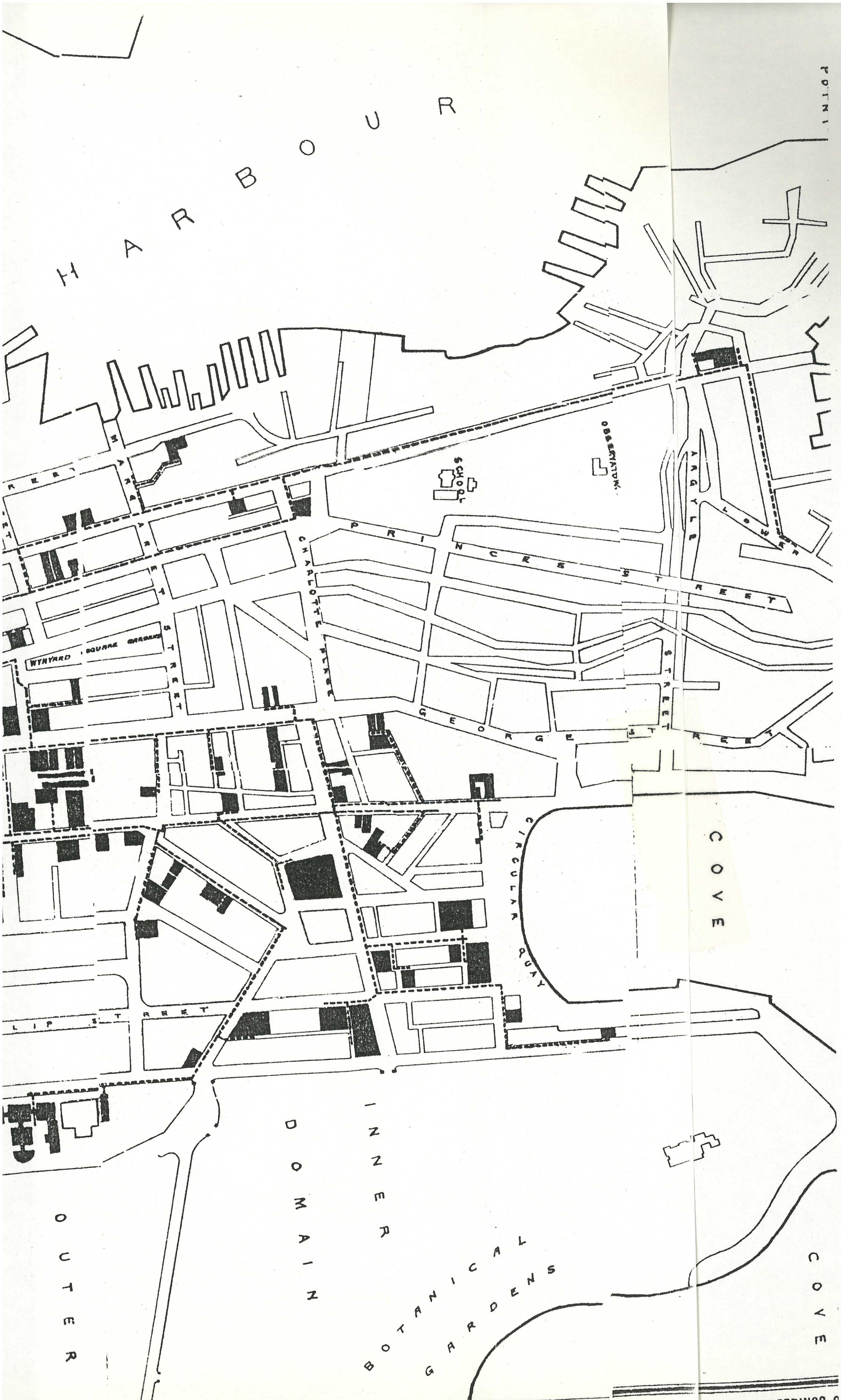


Figure 15

DISTRIBUTION OF MAINS.


PYRMONT BAY
HARBOUR
PYRMONT BRIDGE
BATHURST STREET
DRUITT STREET
KING STREET
ERSKINE STREET
SUSSEX STREET
KENT
YORK
WYNYARD SQUARE GARDENS
MARGARET STREET
CHARLOTTE PLACE
PHILLIP STREET
HYDE PARK
HYDE
COOK PARK
OUTER DOMAIN
DOMAIN
INNER DOMAIN



HARBOUR
PRINCES STREET
GEORGE STREET
CHARLOTTE PLACE
ARGYLE STREET
LOWER
SCHOOL
OBSERVATORY
WYNYARD SQUARE GARDENS
MAR
ARET STREET
LIP STREET
CIRCULAR QUAY
COVE
INNER DOMAIN
BOTANICAL GARDENS
OUTER
COVE

TABLE 3

NET PROFITS OF THE RETICULATION COMPANIES

Sydney Bulletin 25/3/22 & Evening News 5/2/23

	Net Profit Sydney £	Net Profit Melbourne £
1910	£12,300	£10,193
1911	12,009	8,739
1912	13,145	14,405
1913	12,048	11,724
1914	11,641	12,363
1915	10,175	10,427
1916	10,037	5,869
1917	9,945	6,752
1918	11,129	8,738
1919	10,698	14,454
1920	10,504	
1921	11,854	
1922	13,406	
1923	11,915	
1924	9,492	
1925	9,623	
1924	9,492	
1925	9,623	
1926	9,864	unknown
1927	11,749	
1928	10,365	
1929	7,181	
1930	6,776	
1931	7,351	
1932	7,592	
1933	8,269	
1934	9,920	
1935	8,220	
1936	8,655	

The year 1900 provided the highest profit at £16,000.

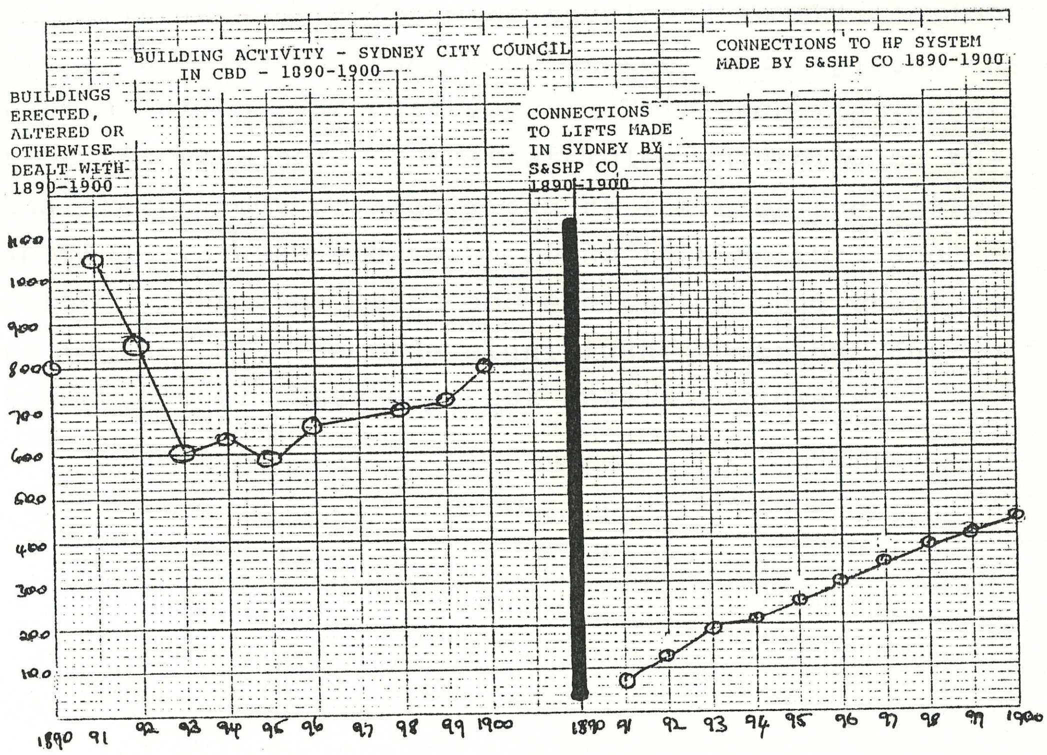
about £115-175 for a hoist. In both cases the companies were operating on between 25-30% markup on lifts sold. At the other end of the range, the provision of the extravagant and elegant the Australian Building in Elizabeth Street, Melbourne, one twelfth of the entire cost of the building was allocated to the Waygood plunger lift[1].

Graphs 5, 6 & 7 illustrate that, whilst overall building activity and property sales turnover was down during the years 1890-1900, the figures for Public Buildings, Offices, Factories, Hotels, as well as for alterations, left ample scope for new and upgraded hydraulic lift installations to consolidate their position and to contribute to city buildings as the expansion of the S&SHP Co revealed. Graphs 5, 6, & 7 show that, whilst building activity and property sales were down in the years 1892/93/94/95, S&SHP Co figures continued a steep upward movement of activity of integrating its service with the physical structure of the CBD. The Melbourne Hydraulic Power Company floated in 1888. Their success was similarly dramatic. By the end of 1889, 70 lifts had been connected to the hydraulic mains, 37 of these were Johns' lifts[2]. But, whilst Johns led with goods lifts. the Austral Otis Elevator & Engineering Company (established 1887), (an agent for the Otis Bros. USA), dominated the passenger lift market[3]. However, by 1890 the Otis lifts were neglected in

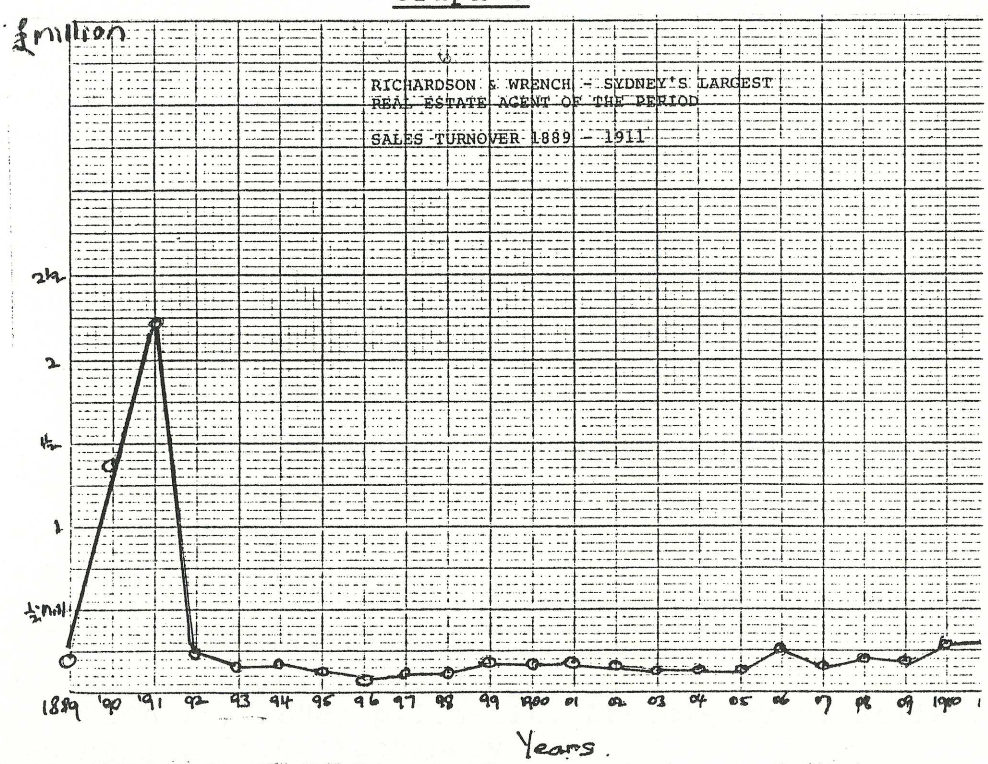
---

1. Blainey, G., Johns & Waygood Ltd 1856-1956, p.33
2. Blainey, G., op.cit. p.23
3. Ibid, p.23

Graph 2[1] Graph 4[2]



Graph 3[3]



---

1. PMCCS, collated from Annual Reports 1890-1900
2. S&SHP Co Board Meeting Minutes 1890-1900, Books 1-4
3. Rabone, R.G., <u>The History of Richardson & Wrench</u>, Appendix - pages not numbered

turn by the R Waygood & Co, a British lift company[1]. Many types and variations of lifts were developed in this period. An article by N Selfe analyses most of them and explains the actual working of the various types[2]. This technical detail will not be repeated here. Other articles enlarging on the operational technology of high pressure lifts of the period in Sydney and in Melbourne are to be found in E Balint[3] and G B Lincolne[4]. These articles and sketches reveal that the engineers in the Colonies made significant contributions to relevant technology. They were not merely followers.

---

1. Blainey, G., op.cit., p.23
2. BEJ, March 25, 1893, p.113-116. Article by N. Selfe <u>Hoisting & Lifting Machinery</u>
3. Balint, E., <u>Whips, Hoists & Lifts</u>
4. Lincolne, G.B., <u>Vertical Transport</u>

This outline traces the role of hydraulic lifts in the city of Sydney. Figs 16 and 17 illustrate the two principal types of hydraulic lifts. Fig. 16 is a suspension type lift and Fig. 17 is the direct type lift.

Building & Engineering Journal
AL. OCTOBER 6, 1888. p304

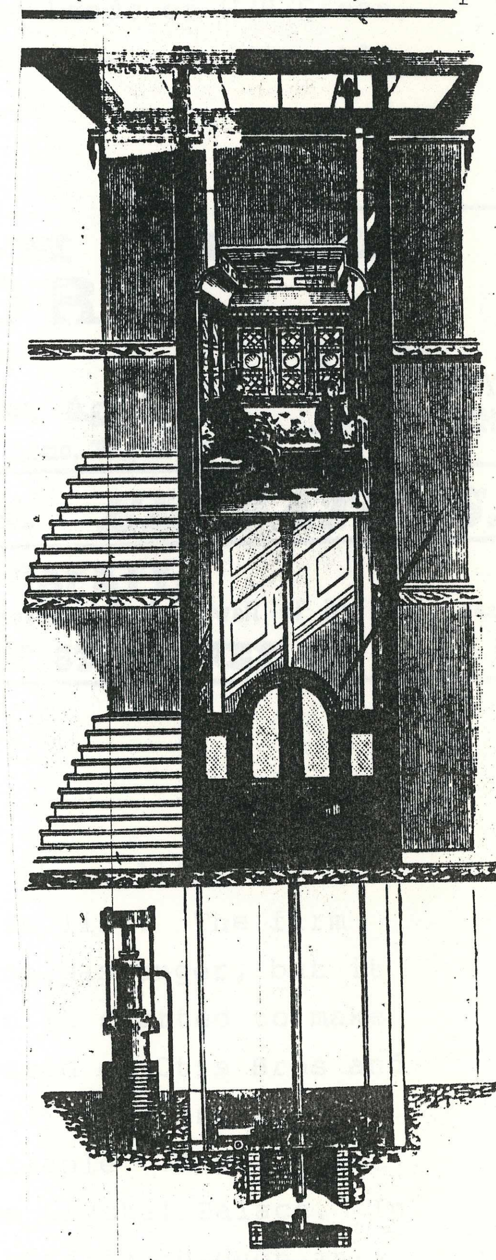


Figure 17

The story so far of the hydraulic lift era in Sydney has concentrated principally on the S&SHP Company because they supplied the power and so were central to the industry. The other lift supply companies of the period need to be incorporated into the development. There were mergers, failures, takeovers, agencies in the lift industry and for this purpose Melbourne and Sydney, and for that matter the whole of Australia, needs to be considered as one market. Ownership passed from one to another of the dominant names which sometimes had their headquarters in Melbourne and sometimes in Sydney. The following brief sketches outline the tangled skein of ownership between the leading companies in the years under review.

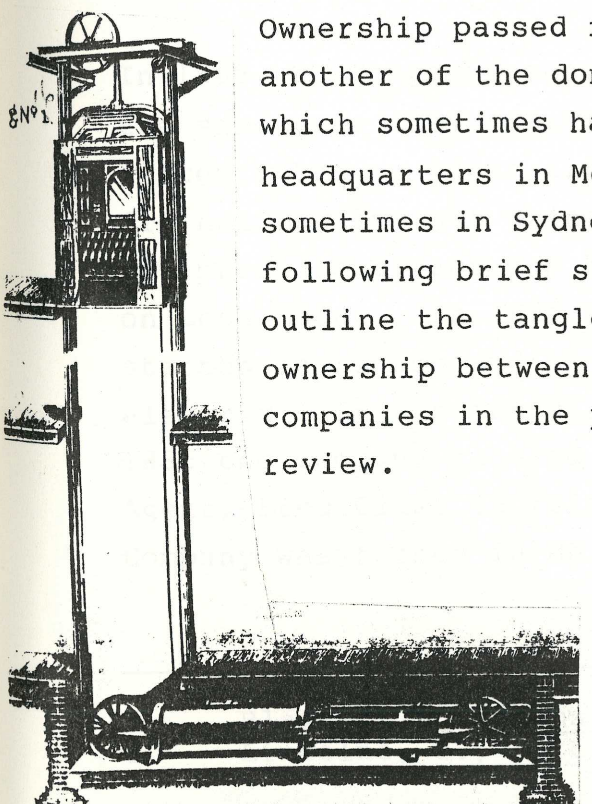


Figure 16

Richard Waygood & Company

Richard Waygood started an engineering business in England in 1833[1]. Amongst his products were water wheels. Waygood retired in 1874 and left the Company in the hands of W R Green, H C Walker and S M Day. Green & Walker were the ones directly associated with the Australian activities.

BCN June 13, 1888 p xv

WAYGOOD'S HIGH SPEED
ELEVATORS

SAFETY SPEED SIMPLICITY.

THE NOTED ENGLISH MAKERS.

FREDERICK GLASS, Engineer, Agent.

LIFTS IN STOCK. 32 Flinders Lane, W., Melbourne.

EASE ECONOMY EFFICIENCY.

ELEVATORS. ELEVATORS. ELEVATORS.

PATTERSON'S PATENT SAFETY.

The most suitable in the market for Hotel or Warehouse purposes. Spoken well of by every user.

Works—BRUMBY ST., 460 ELIZABETH ST., SYDNEY.

In 1868 the Company received an order for three lifts and in the same year they constructed an hydraulic lift. The firm concentrated on goods lifts, rather than on passenger, but it did not really 'get going' until 1879 when it started to make low pressure direct ram hydraulic lifts based on Otis Bros and on Leon Edoux. In 1880 the General Hydraulic Company was started in London and so HP water was available. Their first electric lift was installed in 1890 in the Crystal Palace. In 1886 the Company entered the market in Australia through an Agent, Fred Glass (a relative of Waygoods). After two years a Company was formed in Melbourne in conjunction with Mr D Beath

---

1. Blainey, G., Johns & Waygood 1856-1956, p.33ff
2. Lincolne, G., Vertical Transport, p.54ff

of Beath Schiess & Co - The Australian/Waygood Elevator Co Ltd. Within a year they were installing or had installed over 100 lifts throughout Australia. They dominated the lift market at this time in Melbourne.

P Johns & Company

In 1856 Peter Johns came to Melbourne from the U.K. and set up in General Engineering using imported iron and fabricating it at his works. In 1877 he installed his first lift - a low pressure one - in Allans Music Warehouse in Collins Street[1]. Johns' first big contract in hydraulics was for the Goldsborough's Wool Store in Bourke Street. Johns flourished in this period and in 1888 became Johns Hydraulic & General Engineering Company. A collapse in land values occurred shortly afterwards and the Company had a stringent time but, due to the widespread need of general engineering and jobbing work - and good management, the Company survived. A large fire which destroyed the buildings on the corner of Flinders Street and Elizabeth Street helped as the buildings had to be rebuilt.

Waygoods found the economic downturn too hard to handle. They had overcapitalised on plant and equipment. In 1892 Johns bought the assets of the Australian Waygood Elevator Company with exclusive rights to manufacture and sell Waygood patented lifts in Victoria, South Australia and Tasmania. Until 1906 it also agreed not to do business in hydraulic lifts in the northern States, ie. for 14 years. The new company traded under the name of Johns & Waygood Ltd. By 1892 there were about 300 lifts connected to the reticulation company in Melbourne and about 70% of these were either Johns or Richard

---

1. Blainey, G., Johns & Waygood, p.19 and p.35ff

Waygood lifts. (Peter Johns became a Director of the Melbourne Hydraulic Power when it was first floated). In 1903 Johns & Waygood secured the Victorian agency for the electric lifts made by Architects Smith & Stevens of England but it was not until 1907 that the first was installed at Greens Building in Swanston Street. In 1906 when the agreement with R Waygood & Company had expired Johns & Waygood came to an arrangement with the Express Elevator Company of England to instal their lifts, and later made a similar arrangement with Westinghouse Company. The war of 1914-18 forced Johns & Waygood to manufacture locally more equipment, motors, gears and controls which they had previously imported. About 1917 in the Paterson Laing & Bruce warehouse in Flinders Lane they installed their first locally made electric lift. As noted above this firm dominated the hydraulic lift market in the pioneering years. Peter Johns was one of the "blacksmith" engineers who built up a successful business by hard work and preparedness to seize opportunities. In Sydney they stayed out of the market owing to the arrangement made with R Waygood & Company but came in much later and were successful especially in supplying goods lifts. In 1949 Johns & Waygood bought 51% of the shares of Lift Inspection & Insurance, a subsidiary of Standard & Waygood Ltd in Sydney, and in 1954 acquired the remainder of the shares and, more recently still, have bought Standard Waygood Ltd. Johns Perry in turn have become absorbed into the Boral Johns Perry Company.

Standard Waygood Ltd

Mr Fred Glass, a relative of the Waygoods, came to Australia in 1886. Acting as their Agent he formed in 1888 the Australia Waygood Elevator Company in Melbourne[1]. Mr J B Nicholson, a

---

1. Lincolne, G., <u>Vertical Transport</u>, p.57ff

Director, was sent out from Waygoods U.K. in 1891 to investigate what was happening. He returned and advised selling. Mr H C Walker came out and sold the rights to Peter Johns & Co as mentioned above. The remaining Waygood headquarters was transferred to Sydney. Mr Nicholson returned to Australia and, deciding to remain, bought the Sydney business of Waygoods and formed the Standard Elevator Company Ltd with an agency for Otis lifts. In 1909 the two companies combined and the firm of Standard-Waygood Ltd came into being. The subsidiary - Lift Inspection & Insurance Ltd - was formed to service lifts in 1911 and in 1913 they added to their business the Hydraulic Engineering & Hercules Ltd, which was a subsidiary of the Sydney & Suburban Hydraulic Power Company, extending the Standard-Waygood name to Standard-Waygood Hercules Ltd. When war broke out in 1914, and engineering supplies proved difficult to get, the Company moved into manufacturing electric lifts. In 1920 the Company name was changed to the English Electric Company of Australia Ltd, but Standard-Waygood continued as another company to maintain continuity with the lift industry. This continued until it was absorbed by Johns & Waygood in 1954.

<u>Austral Otis Engineering Company Ltd</u> was another company supplying hydraulic lifts in the early years. This company

ii. THE BUILDER & CONTRACTORS' NEWS. [June 23, 1888.

THE OTIS ELEVATOR,

FOR PASSENGERS & GOODS.

Absolute Safety. OVER 5,000 IN USE. High Speed.

The Austral Otis Elevator and Engineering Company, Limited,

90 KING STREET, SYDNEY.

MINING, MILLING, HYDRAULIC AND GENERAL ENGINEERS.

formed an agreement with Otis Bros in 1887. In the 1890s they buckled after having some early success in Melbourne and Johns & Waygood took over their maintenance contracts[1]. In the late 1880s they employed over 400 men in Melbourne.

Otis Elevator Company

Elisha Otis preceded Waygood by some 13 years in developing a lift with safety gears in 1853, and in 1857 he installed his first passenger lift - belt driven from a line shaft. In 1867 he established his main Yonkers Works. By 1872 no less than 2,000 Otis lifts were in operation, ie. steam operated passenger lifts. Otis had an economical hydraulic lift developed by 1878. Their first electric lift was developed in 1889 by N P Otis and two were installed in that year. In 1898 Otis & eight other companies also active in the industry combined to form one large company - the Otis Elevator Company[2]. They started to instal direct ram hydraulic lifts up to 30 stories high. In 1902 they formed a joint company with R Waygood Ltd in Britain to form Waygood & Otis Ltd to penetrate the European market. The Otis Elevator Company contributed many technical improvements which significantly advanced the lift service. It was not until 1920 that Otis came to Australia in its own right. Earlier its activities had all been through Agency arrangements. It bought Brands Elevators Ltd through Waygood-Otis (Aust) Pty Ltd. Their first lift was installed in 1923 in Ronaldson House, Sydney[3]. In 1923 the company installed 72 electric lifts of all types[4]. In 1950 the name changed to Otis Elevator Company. They are currently amongst the big three companies operating in Australia - Boral Johns Perry & E P L Kone being the other two.

---

1. Blainey, G., Johns & Waygood 1856-1956, p.23 and p.36
2. Elevator World, September 1963, Historical Summary Issue
3. Lincolne, G., Vertical Transport, p.60ff
4. Ibid, p.61

Elevators Pty Ltd (EPL)

In 1933 the Express Lift Company and Smith, Major & Stevens combined with the name Express Lift Company. Both of these companies independently had installed lifts in Australia. The Express Lift Company appointed Agents in all States. In NSW the S&S Hydraulic Power Company was appointed agent[1]. In the 1950s and 1960s it bought (through a subsidiary EPL) lift companies in Victoria, Queensland and South Australia but was itself bought by Lend Lease Development[2]. They appointed Mr P C Amberg, the Works Manager of the Express Lift Company in England, to the chief executive position and he took the company on the road it currently occupies[3].

Lifts such as the "Lawrence" (Agent A L & G McCredie, Engineers/Architects) did a brisk trade in the early years with

THE BUILDER & CONTRACTORS' NEWS. [JANUARY 5, 1889

"THE LAWRENCE"

Patent Hydraulic Machine Company.

LIMITED.

Offices: 108 PITT STREET, SYDNEY.

THE "LAWRENCE" HYDRAULIC LIFT

Possesses the following advantages :—

Erected at a much less cost than any other Elevator. Economy in space. Simplicity in construction. Work direct from the main. No steam, gas engines, or accumulators. No shaft sinking. High speed and noiseless. Small quantity of water consumed. Work with single and double power, vertical or horizontal. No attendance required. Cannot get out of order. The highest encomiums from eminent Hydraulic Engineers.

Estimates given for all descriptions of Elevators, Hoists, Whips, and other kinds of Hydraulic Machinery.

ELEVATORS. ELEVATORS. ELEVATORS.

PATTERSON'S PATENT SAFETY.

The most suitable in the market for Hotel or Warehouse purposes. Spoken well of by every user.

Works—BRUMBY ST., 460 ELIZABETH ST., SYDNEY.

1. S&SHP Co Board Minutes
2. Discussions with officers of EPL Kone
3. Lincolne, G., Vertical Transport, p.62

their patented water savings device. "The Victory", patented by N Selfe, was a pneumatic/ hydraulic lift and economised on water by using compressed air to adjust the flow of water according to the


JAN 5, 1889 P XII.

NORMAN SELFE,

M.I.C.E. M.I.M.E., &c.

ENGINEER AND CONSULTING ARCHITECT,

348 George Street, Sydney.

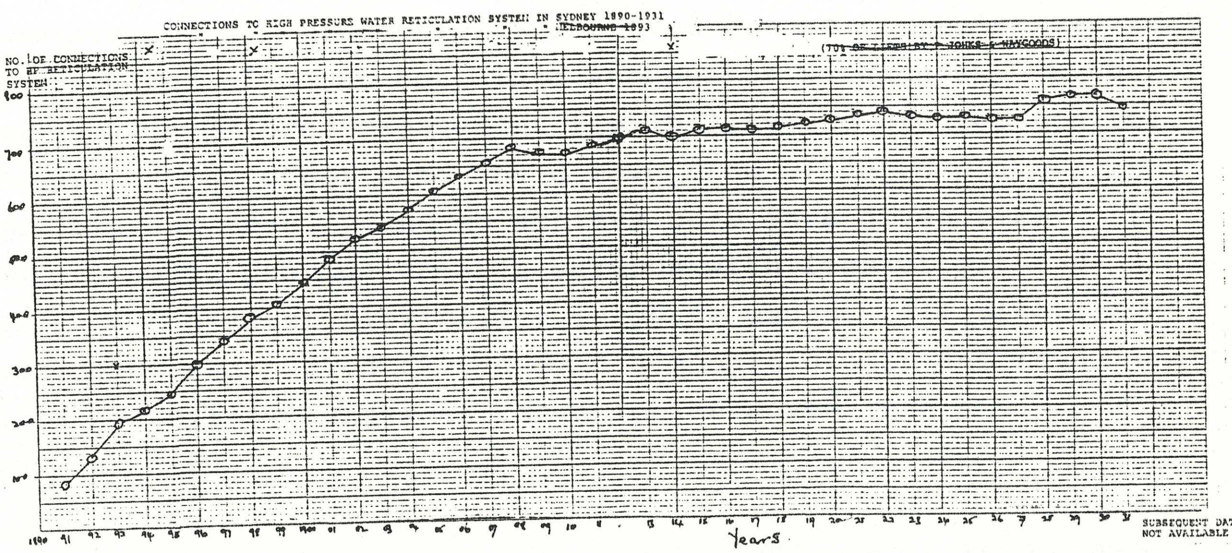
MR. SELFE having had a large experience in the Engineering of Building construction for 30 years past, and having introduced all the leading systems of lifts or elevators now in use in Sydney, may be consulted as above in all cases where Machinery is required. Reference to hundreds of successful works can be made.

THE BUILDER & CONTRACTORS NEWS

lift load; several of these lifts were installed in Anthony Horderns Building, Haymarket[1].

Installations of lifts and the network of the reticulation continued to increase and expand in the early '20s. Figures collated from the Board Meetings of the S&SHP Company Ltd up to 1891-1931 provide the precise data (see Graph 5)*.

Graph 5



---

* Footnote

Appendix 5 lists the figures from Graph 5

1. ABCN, April 6, 1889, p.322

Account has to be taken of connections other than for lifts by the Company, eg. whips, cranes, garage hoists, but hydraulic lifts for low cost installation and short travel work continued to have strong support with over 700 connections in 1931. Table 4 provides figures of hydraulic lifts under supervision by the Department of Labour & Industry between 1904-19 which are composite of hydraulic & electric lifts with hydraulics dominant up to 1915 before electric lifts started to dominate.

TABLE 4

Dept.of Labour Annual Report 1920 p50 NSW

		Lifts under Supervision.
30th June,	1904	550
,,	1905	613
,,	1906	765
,,	1907	910
,,	1908	953
,,	1909	1,041
,,	1910	1,109
,,	1911	1,331
,,	1912	1,510
,,	1913	1,715
,,	1914	1,982
,,	1915	2,100
31st Dec.,	1916	2,212
,,	1917	2,311
,,	1918	2,376
,,	1919	2,429

This increase in the pace and direction of movement both of lifts and of people in the CBD of Sydney had important ramifications. Productivity improved due to the relative speed of transfer of goods both into and out of warehouses. Bigger warehouses allowed management flexibility and greater control. People on the other hand could move from place to place more quickly and readily and so achieve more in a given time. Hotels could provide greater service with less effort and allowed a greater flexibility in space usage. All of this occurred in a period of Sydney's economic growth and in a surging self-awareness as the colonies moved into a Commonwealth.

The photos below show Sydney's CBD in 1880 and in 1920. The marked change in skyline is to be noted but more important is the bustling commercial activity going on in the solid civic image buildings in the heart of the city. Sydney had become an independent metropolis contributing proudly as part of the

1880

1920
(opens into 3)

1880 ↑

1920 ↓
(opens into 3)

British Empire. Hydraulic lifts in this period made a material contribution to Sydney's quickening pace of trade and industry. Another facet of these changes is to be noted in the residential population movement of the period. Between 1911 and 1921 the proportion of people living in the city changed from 35% in 1911 to 23% in 1921[1] (although in actual numbers the population relationship is not so clear). In the same 10 years many residential houses had made way for more industrial and commercial type buildings. Appendix 3 shows the upward values of land and buildings between 1889 and 1916[2].

What is known is the distribution network of the HP mains in 1924 and in 1973. The 1924 map published by H C Robinson is given in Appendix 8. The final 1973 map is also given in Appendix 8. Both clearly demonstrate a considerable network running from Grace Bros to Woolloomooloo and to Dawes Point along Sussex Street. The Company letterhead claims 40 miles of pipes were laid (see page 57) It is difficult to accept the proposition that such an increase in the network would not be directly related to new hydraulic installations. Increases in the mains would only be undertaken if the cost could be offset by the business attracted (upfront). Electricity had replaced steam at the Pumping Station in Pier Street in 1919[3]. When the high pressure water ceased to be supplied to the city it was over three phased periods from June 1974 to June 1975. 50 installations were still connected in 1974[4]. The installations were changed to oil installations but remained hydraulic if the lift was not replaced altogether. The Melbourne Hydraulic Power Company expanded along similar lines to Sydney. By 1894 the Company was supplying power to 413 machines, consuming 1,500,000 gallons of water per

---

1. Sperritt, P., Sydney Since the Twenties, p.252
2. Serle, G., The Rush to be Rich, p.252, Blainey G. Johns & Waygood, p.39, and Gerathy, G., Role of City Council of Sydney, p.93, provide additional clear evidence of the changing values of city property.
3. U, The End of an Era, July/August, Issue 1975
4. Discussion with Les Campbell, Chief Enginner (retired), EPL Kone

week[1]. In 1924 when the Melbourne City Council leased the Company for 3 years there were 709 machines connected. In Melbourne the system ceased in 1967. (See Appendix 6 for outline of the Melbourne system).

Work Performed by Lifts

Specific data is scarce for the period under review. Three examples are to be noted, the first in 1899, the second in 1920, the third in 1918.

1. In 1899 the four lifts (directly under D Vernon's control as Government Architect) in Government offices made 710,216 passenger journeys in one year[2].

2. Each of two lifts travelled the following distance. (The buildings were 8 floors high - maximum capacity 10 persons - 5 day week - 9 hour day - 50 weeks per year).

   The following figures show the work performed by each lift in the year 1920:-

Passengers carried up	361,500
Passengers carried down	313,400
Total	674,900
No. of complete return trips	80,400
Distance travelled	2,700 miles

   In 1920 there were 620 passenger lifts and 136 passenger-goods lifts in commission in Sydney, a total of 756. Many of these handled comparatively little traffic, but allowing that the average work of each such life was about half that shown above, the total number of passengers handled by the lifts in the City of Sydney approximated 250 millions per annum, a figure equal to

---

1. Draft sketch of the Melbourne System written by an unknown offier of EPL Kone. (See Appendix 6)
2. Annual Reports of the NSW Department of Public Works 1905, p.367

that of the passengers carried by the whole of the City and suburban electric tramway system. On the same basis the total number of trips would be over thirty millions, and the distance travelled approximately a million miles. These figures indicate to some degree the importance of lift transportation for the conveyance of passengers[1].

Lifts also play an equally important part in the transportation of goods. In the course of the distribution of merchandise in a big city, the majority of the articles are probably transported by means of these appliances once, or even several times, before they reach their final destination. On the 31st December 1919 there were 2,429 lifts and whips under the supervision of the NSW Department of Labour & Industry, and of this number 2,369 were situated in the metropolitan area. It is estimated that the actual cost at the time (1919) for installing the lifts in Sydney would exceed £2,000,000. This figure indicates to a degree the value placed on these appliances by the commercial and industrial community.

3. S&SHP Company Usage of Hydraulic Lift (Board Minutes 16/5/1918, p.236) Challis House, Martin Place. (Capacity of lift unknown, days per week unknown, number of floors unknown).

No of trips per day	260
Passengers carried	1,216
Daily mileage	11.5 miles
Assume 5 day week, 50 weeks per year	2,875 miles per year
" " "	304,000 passengers per year

---

1. NSW Department of Labour & Industry - Annual Report of Office of Departmental Engineer & Chief Inspector of Scaffolding & Lifts - 1920, p.49

Such buildings were obviously points of focus for people calling on people so that many of the social attributes of the small town or suburb would be applicable to a city building or group of 'large' buildings. Stories about meetings and happenings in lifts are many. They obviously were a focal point. Figures concerning the population of buildings in the period under review are limited. The formulas currently used to determine lift traffic required were not conceived. The figure that lift manufacturers now use to calculate required lift capacity is ... "maximum permissible waiting time" for a lift during the major arrival period, say 7am - 9am. The second key figure is the "lettable-cubic-space". Calculations are based on personal space of 1:12 sq m. An estimate made for the population of a seven storey building in 1910-20 (when the living space figure would have been lower than 1:12 would be between 50-60 persons for a floor - say 350 - 420 population - plus visitors. The graph below shows the water usage variation according to the hours of a working day in 1894. The hours of work do not appear to be onerous?

Graph 6

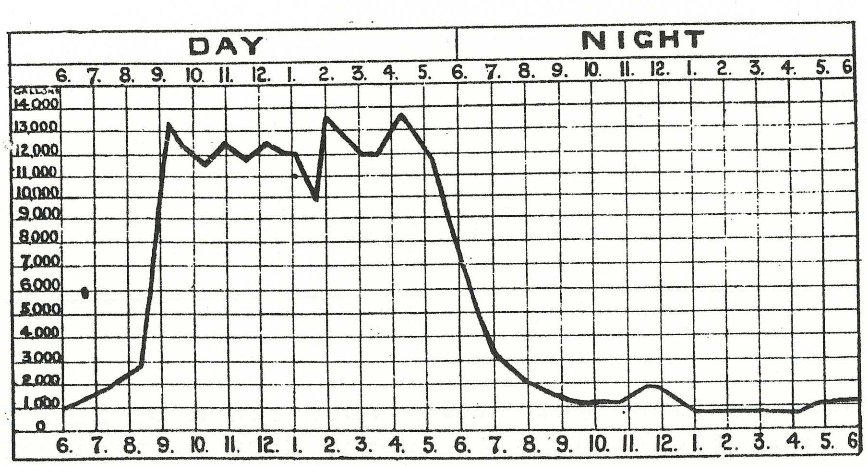
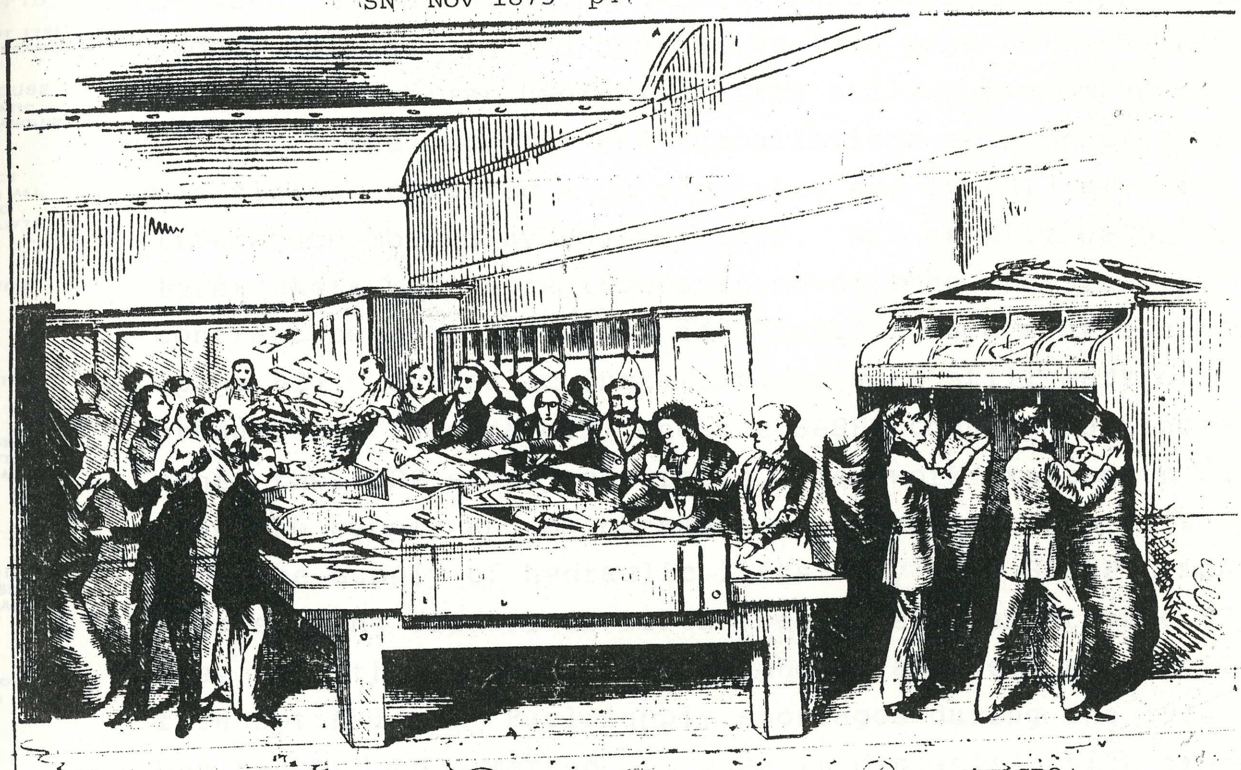


DIAGRAM SHOWING QUANTITY OF WATER PUMPED PER HOUR

DURING AN ORDINARY WORKING DAY - 1894.

SN Nov 1875 p4 *


The Newspaper Despatch Room in GPO

<u>* Footnote</u>

The ratio of 1:12 sq m has been increasing over the decades as 'working conditions', 'work space', and 'work stations' received greater regulatory attention. For example, the illustration above from 1875 shows a much more concentrated working space than would now be accepted. Such factors make building populations in the 1880s and early 1900s estimates only.

Hydraulic Power, Electric and Hydraulic Lifts Limited

LIFT CONTRACTORS & GENERAL ENGINEERING

14 MARTIN PLACE

B.W. 6142

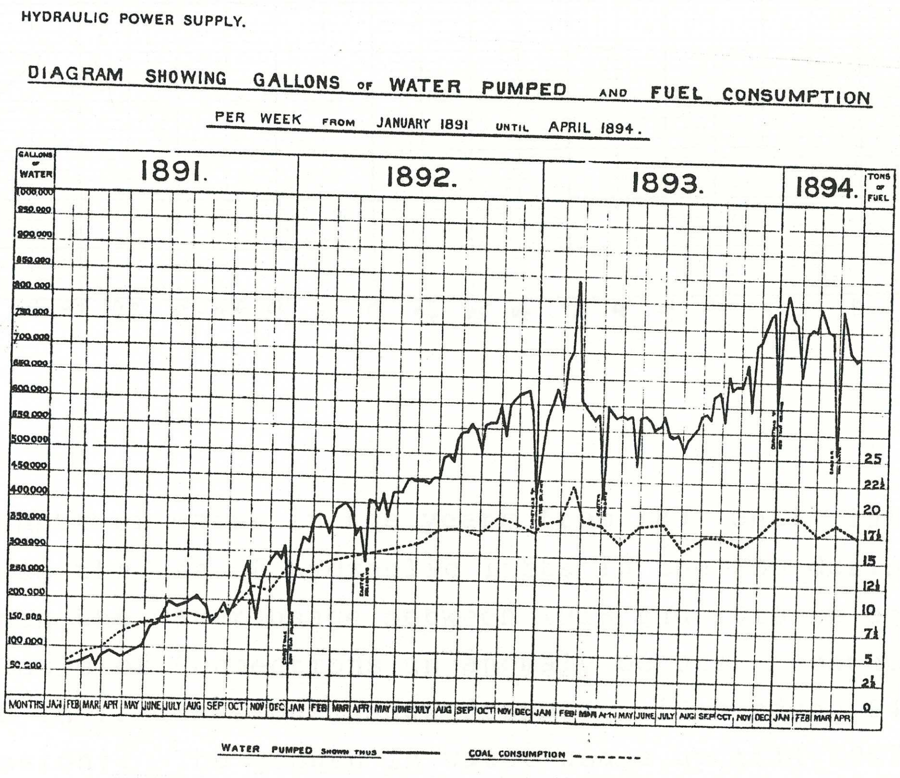
Hydraulic lifts dominated the vertical transport market between 1890 and 1915. In 1903 there were 8 electrics in Sydney compared to 522 hydraulics (see page 62). Between 1900 - 1915 whilst hydraulic lifts still outnumbered electrics the curve of new installations of hydraulic lifts was slowing compared with electrics and by 1913 electric lifts outnumbered hydraulic lifts. But as will be outlined later there were more issues involved than the straight contrast between Hydraulic and Electric as a source of power (page 62). Hydraulic installations were still part of their product mix (see margin) and the S&SHP Company continued to renew their HP supply contracts. New work started to come from the supply and maintenance of electric lifts as well as from the supply of hydraulic lifts. By 1920 S&SHP Company were selling electrical lifts (see advertisement page 63). They held the agency for Westinghouse and were also selling fire sprinklers. Fuel supply shortages during the 1914-18 War had led to a marked increase in dissatisfaction from hydraulic lift users over poor maintenance, variable pressure from the mains, and the prohibition of exports of tubing from Scottish Tube Company which made S&SHP Company turn to the US Steel Company for tubing[1].

While the graph for connections shows a gradual flattening (page 49), the graph for water usage dropped sharply from 1913 (page 59/60). Conversion to electric power of lifts and redevelopment of building sites contributed to the decline in the 1920s. The S&SHP Company converted to electric power at Pier Street on 28/8/19. Company figures of connections to the mains (page 49) do not tell the full picture. No precise breakdown between lifts, hoists, cranes,

1. S&SHP Co Board Minutes of the period

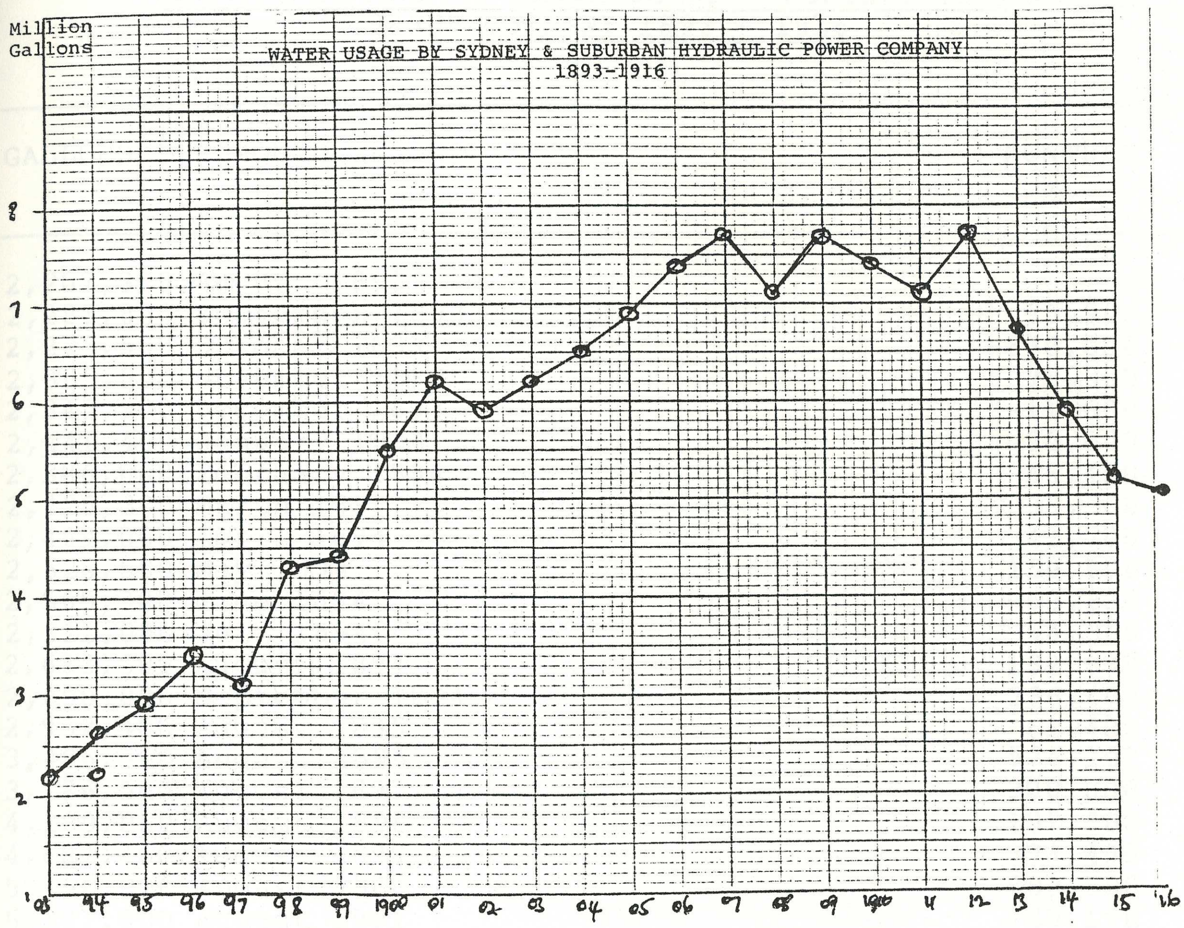
motors, sprinklers is available. Certainly the bulk of the connections were to supply hydraulic lifts. The Board of Directors of the S&SHP Company watched the throughput of water very closely (Graphs 7 & 8). It remained their principal source of revenue. The company did not become a supply force in the electric lift field nor did its other products and services offset the decline in use of HP water and so hydraulic lifts in Sydney.

Graph 7 - The Early Years 1891 - 1894



PROCEEDINGS OF THE ENGINEERING ASSOCIATION OF N.S.W.. SESSION 1893-94.

Graph 8 - Rise & Decline - The Mature Years



The throughput of water in the years from 1891 until 1916 demonstrates the use of hydraulic lifts in the CBD during those years. When the water usage between 1913 and 1916 is compared with the Table of Connections an anomaly occurs - connections maintained their level but usage dropped. (See pages 64 and 66 for discussion). The growth in water usage up till 1907 is indicative not only of the increase in the number of hydraulic lifts in use but also of increased usage, ie. more passengers and goods movement but with the increased height of many buildings, more water was needed on each trip.

TABLE 5

LATER READINGS OF WATER USAGE - MONTHLY BY THE S&SHP COMPANY 1893 - 1916

GALLONS PER MONTH			MONTHLY ±
2,207,900	August 1893		-
2,283,800	September 1893		75,900
2,277,500	October 1893		-630,000
2,355,500	November 1893		78,000
2,343,900	December 1893		-11,600
2,441,400	January 1894		95,000
2,386,000	February 1894		-55,400
2,425,300	March 1894		39,300
2,469,000	April 1894		43,700
2,628,500	May 1894		159,500
2,565,300	June 1894		-63,200
2,521,000	July 1894		-44,300
2,653,600	August 1894		132,600
2,890,000	September 1894		236,400
2,952,400	August 1895		62,400
3,486,500	August 1896		534,100
3,186,500	August 1897		-300,000
4,289,000	August 1898		1,102,500
4,687,400	August 1899		398,400
5,496,900	August 1900		809,500
6,197,000	August 1901		700,100
5,903,400	August 1902		-293,600
6,222,500	August 1903		319,100
6,512,200	August 1904		289,700
6,888,100	August 1905		375,900
7,466,700	August 1906		(578,600
7,734,400	August 1907		(267,700
7,155,900	August 1908		(-578,500
7,691,300	August 1909	NOTE	(535,400
7,477,600	August 1910		(-213,700
7,177,000	August 1911	DECLINE	(-300,600
7,700,500	August 1912		(532,500
6,716,700	August 1913		(-992,800
5,955,500	August 1914		(-761,200
5,216,700	August 1915		(-738,800
5,118,200	June 1916		(-98,500

The graph below provides an interesting parallel between Sydney and Boston, USA. The diminished attraction for hydraulic lifts occurred about the same period in Sydney as in Boston. It is to be noted that Boston lifts were supplied straight from the city mains.

Graph 9 - Hydraulic Elevators in Boston

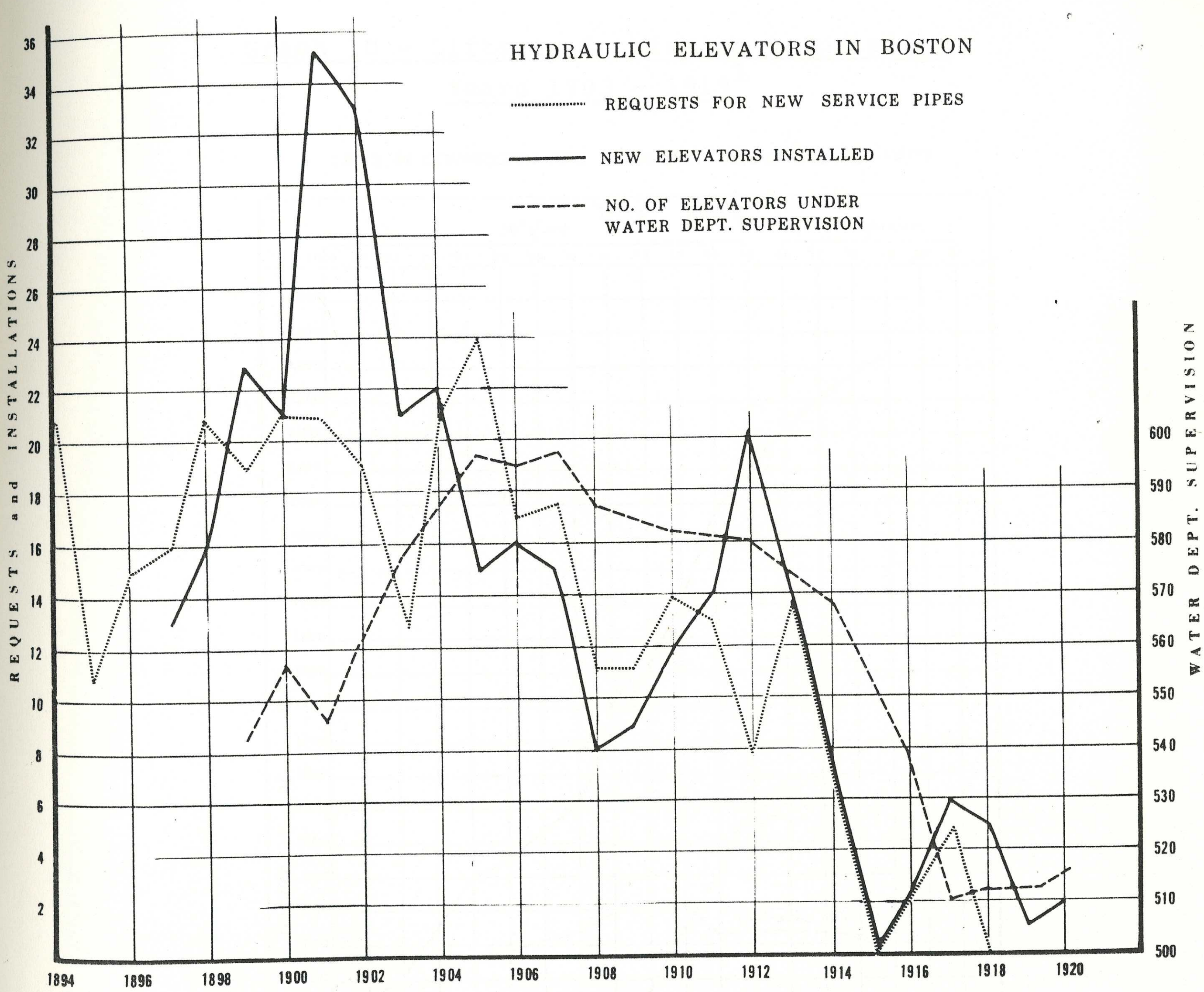
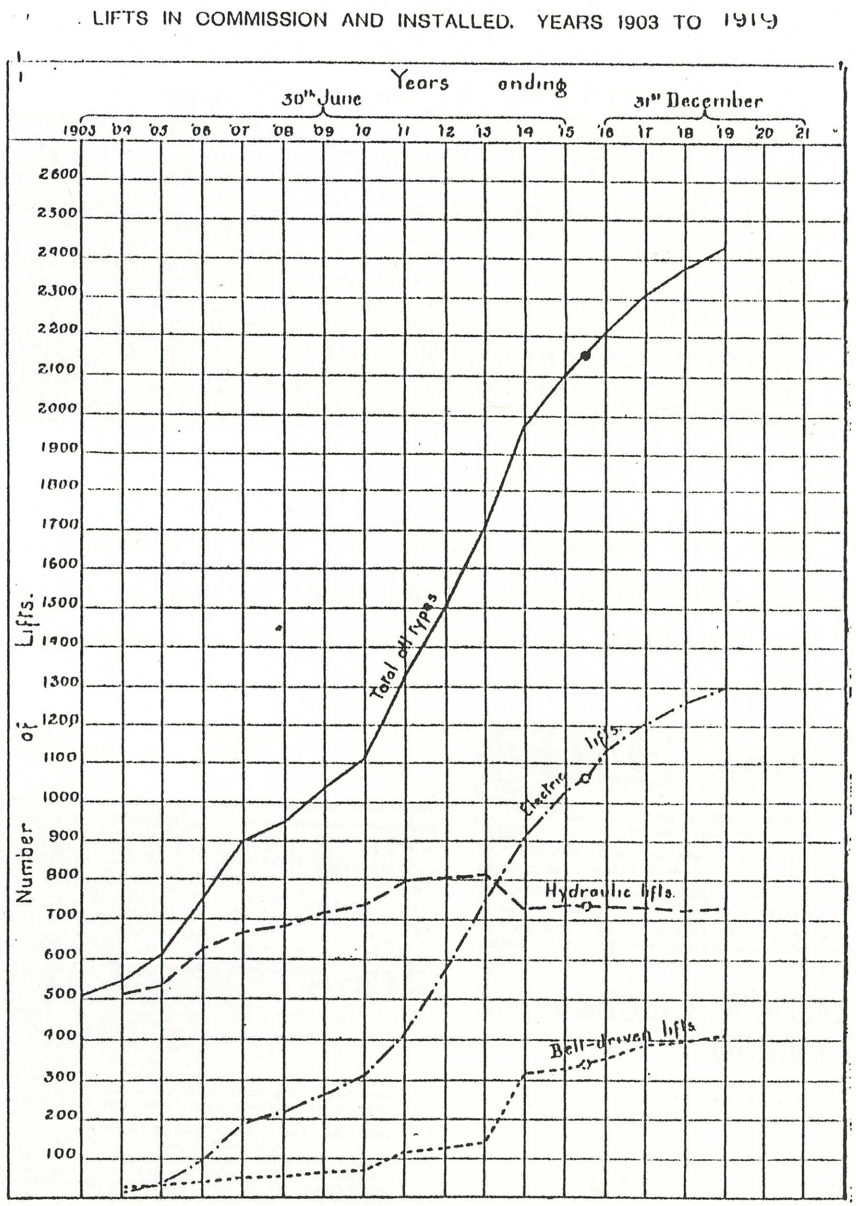


FIGURE 21.—The presence of the hydraulic elevator in Boston, 1894–1920. The three curves together provide a general qualitative sense of the gradual decline of the type, but only the figures for new installations reflect with any precision the state of affairs at a given time. The discrepancies among new installations, requests for service pipes (tappings into the mains), and water-department supervision (mains-water consumption and billing) arise from the fact that water under pressure for most large installations was supplied by house pumping equipment, not the city. The spurt of new installations around 1912 almost certainly resulted from a brief surge of interest in the large-scale direct-plunger hydraulic, the water elevator's last gasp before total dominance of the field by electricity. (From annual reports of the Water Commissioner and Inspector of Buildings.)

Electric lifts were also contributing markedly to improvements in vertical transport and were rapidly overtaking the dominance of hydraulics. The dramatic 'crossover' point was achieved in 1913-14 and from this time hydraulic lifts 'flattened' and electric lifts widened the gap until by 1919 electric installations stood at 1,300 whilst hydraulic lifts settled at slightly over 700. This major change had occurred in less than 20 years!

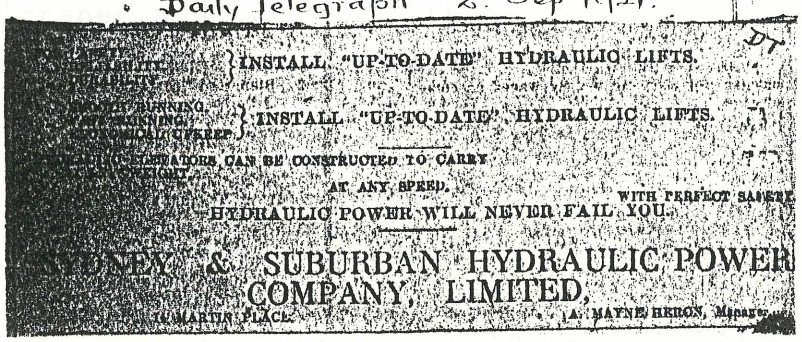
Graph 10 - Lifts in Commission & Installed
Years 1903 - 1919[1]



1. NSW Department of Labour & Industry, Annual Report of Departmental Engineer & Chief Inspector of Scaffolding &

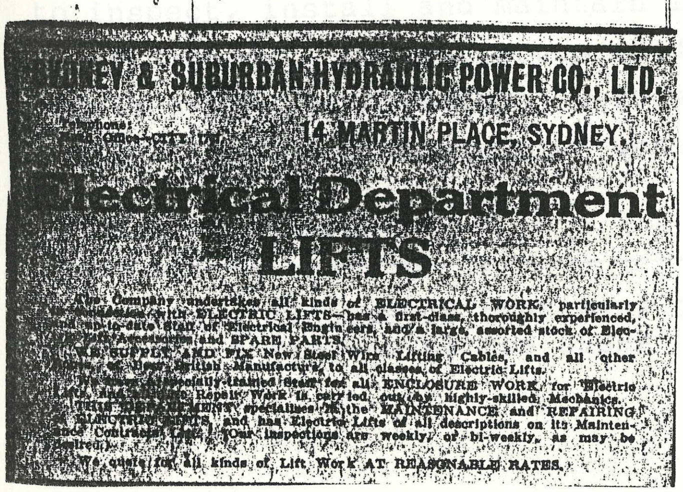
The early upsurge in actual sales and the contagious euphoria about the future of hydraulic lifts needed to be tempered from Day One by the fact that the first electric lift was installed in Baltimore, USA, in 1887. In Sydney in 1901, David Jones Ltd installed an electric. In Melbourne there were 300 by 1892 so that at the same time that hydraulic lifts moved into their flowering period the seeds of their own supplanting were being sown. Whilst the use of HP water increased in the 1890s and 1900s indicating an increasing hydraulic usage the rate of installation of electric lifts was also strong. The hydraulic lifts were winning a smaller slice of a bigger market (as was seen in Graph 10).

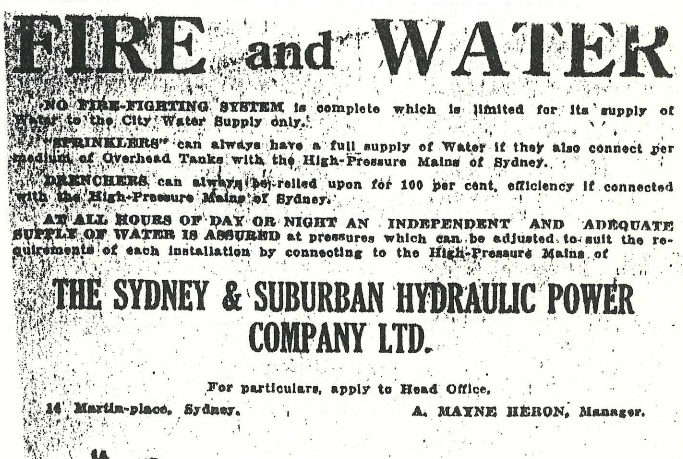
"Daily Telegraph" 2. Sep 1921.



It is a fact, however, that the S&SHP Company Ltd was itself selling electric lifts by 1920 (see advertisement this page), and probably before, as Mr T Dickinson in 1903 and in 1912

Engineering News 1-6-20.





"Sun" 16/9/21.

had been sent around the world to study lifts in general.

The accompanying promotional material on page 65 demonstrates the 'hard-hitting' competition which existed between the hydraulic and electric lift companies. There is little doubt that the lower running costs of electricity outweighed their higher initial purchase price. Also many of the installed hydraulic lifts were casualties of age and were due for replacement. Hydraulic lifts in 1920 were much the same as the original models compared against the technology of the electrics. S&SHP's product mix made it a different company from what it was in the period 1890-1900. To compare the profit figures year by year is not entirely valid for assessing the role of hydraulic lifts. The profit figures include fire sprinklers, cranes and electric lifts. Unfortunately the breakdown of sales by products is not available. But the figures for hydraulic lifts under supervision by the Inspectors of the Department of Labour & Industry and the figures of connections given in the Board Minutes of the S&SHP Company are quite close to each other and reflect the same trends. The query that needs resolution is - what were the reasons for the 'blimp' in the hydraulic lift Graph 10 in 1913 (page 62) - why the sudden dip compared with the strong, upward thrust of electric lifts? The hydraulic lift numbers never regained their dominance. The Minutes of the Board of the SS&HP Co supplies at least in part the answer. An internal dissension at Board level occurred[1]. One group wished to dispense with the services of maintenance subcontractors Standard-Waygood and to inspect, install and maintain lifts themselves, ie. the S&SHP Company. Another group of directors (who were Standard-Waygood Directors) were not prepared to agree to this action. Customer complaints[2] were frequent and strong from

1. Board Minutes of the S&SHP Co 29/8/1913 & 8/12/1913
2. Board Minutes of the S&SHP Co 7/11/1913 & 27/10/1913

PROMOTIONAL MATERIAL DISTRIBUTED BY STANDARD ELECTRIC ELEVATOR CO LTD c.1901-1908

(reduced from foolscap size)

WE CLAIM TO HAVE ESTABLISHED

A RECORD

THE FIRST ELECTRIC PASSENGER LIFT installed **IN SYDNEY,** and, if we mistake not, the first successful Electric Passenger Lift in **Australasia** which has been **in operation daily** since **October, 1901,** a period of **Six Years,** carried **103,757** passengers **DURING** the past recent **THREE MONTHS** at a total **COST OF £9 10s. 11d.** for Electric energy. On some individual days **2,885** passengers, not including the Firm's attendants and employees, were carried.

This Lift has been in continued use and operation since the date of its installation, has had its travel extended from 40 to 100 feet on the enlargement of premises, and **the Gear** itself **has not cost 20s. for repairs during the six years it has been in operation.**

YET, in the face of this and similar results obtained **by the use of Standard Apparatus,** if one believed our local hydraulic opponents, Electric Lifts are of no value and use—only hydraulic should be used, enforced by Act of Parliament !! This is admittedly true if inferior apparatus is used, made under mistaken ideas as regards lift service, controlled by inefficient means, built on wrong systems, and finally installed by those unacquainted with the necessary specialised knowledge, and whose interests are directly opposed to making the Electric Elevator a success. **Electric Elevator Practice is a Speciality** deserving careful and constant attention, and we have found that there is sufficient in it to warrant a permanent staff of trained men who have specialised. We attribute the uninterrupted **Success of Standard Elevators** to the fact that we are Specialists, confining our attention to Electric Lifts, and having a determination to make every one of our Installations a success.

CONSIDER FOR A MOMENT THE FOLLOWING FACTS:—

Within the space of time of **Four Years** nearly **200 Electric Elevators have been installed in Sydney alone.** Their **Economy** has demanded from the old antiquated hydraulic similar economical results, on the pain of making a conversion to the Electric or losing business. **The public users of Lifts have thus benefited largely, and to such an extent that there has been an all round Decrease in Operating Costs of Elevators, in some cases as much as a 75 per cent. saving.** Elevator propositions previously put on one side on the score of running cost now become possible **by the use of STANDARD ELECTRIC ELEVATOR APPARATUS.**

Sydney Harbour Trust,
Circular Quay,
Sydney, 13th April, 1907.

Dear Sir,

With reference to your letter enquiring as to the Trust's experience with regard to the Electric Lift installed by your Company in this building three and a half years ago, I am directed to inform you that throughout that period the apparatus has given the greatest satisfaction to my Commissioners. In compliance with your request, I append hereto particulars as to the cost of running the lift and the work done by it during the year ended the 31st January last :--

Cost of current	£29 2 0
Units consumed (at cost of 2d)	3,492
Feet travelled	6,906,826 = 1308.11 miles
Number of passengers carried	140,401
Number of trips made by lift	90,069
Number of feet travelled per passenger	49.19
Number of passengers carried at a cost of 1d	20.10
Cost per mile for current	5.34d.
Averaging each passenger at 10 stone, 1.25 tons were lifted for	1d.
Maintenance.	
Carbons, springs and oil	£2 4 6
Overhauling gear	0 11 2
	£2 15 8

Yours faithfully,
(Sgd.) H. Norrie, Secretary.

The Managing Engineer,
Standard Electric Elevator Co. Ltd.,
Equitable Building.

Wentworth Hotel,
April 11th, 1907.

The Manager,
The Standard Electric Elevator Co.

Dear Sir,

I wish to express the satisfaction I have of the lift which you fitted in this hotel for me about two years ago. I have had little or no trouble with it, and as there is no attendant required, makes it doubly valuable to us in these days when we have trouble with servants.

The most it has cost me for power is about 25/- per month. In every way I am perfectly satisfied with it, and the working of the same.

I remain, Yours sincerely,
(Sgd.) Hannah Maclurcan.

Schweppes Ltd.,
Sydney, 9th April, 1907.

J. R. Bainton, Esq.,
Standard Electric Elevator Co. Ltd.,
Equitable Building, Sydney.

Dear Sir,

Referring to yours of 27th ult., we have pleasure in stating that the lift installed by you two years ago has given us every satisfaction. The lift is loaded to its full capacity, running continuously nearly all day from 8 a.m. to 5 p.m. weekdays, and 1 p.m. Saturdays. The average cost of running for December (our heaviest month in the year), was 2s. 2d. per week, or 4d. per diem. The cost of running the lift per annum is therefore so infinitesimally small as to be hardly worth taking into calculation.

So far we have had no charges for repairs or renewals of any parts of the machine or haulage gear over and above the standard maintenance fee per annum.

Yours faithfully,
For Schweppes Limited,
(Sgd.) E. Paul, Superintendent.

Challis House, Martin Place,

SYDNEY.

EXTRACTS FROM LETTERS BY

PROFESSOR W. H. WARREN, of the P. N. Russell School of Engineering, University of Sydney,

ADDRESSED TO THE MANAGER OF

The Standard Electric Elevator Company, Limited.

MAY 19th, 1908.

"I shall be glad if you would give me the cost of taking out the Electric Lift in Challis House, and replacing it with one of your best Lifts."

MAY 22nd, 1908.

"Thanks for your prompt reply to my letter."

MAY 26th, 1908.

"I am anxious to improve the Lifts at Challis House. The Senate has requested me to act in this matter, and I must have an Electric Lift as good as "THE STANDARD," or a hydraulic as good and as cheap to run. The Electric Lift must be as good as the one, say, in the Equitable, or it must be replaced by such a lift."

JUNE 6th, 1908.

"Please send me the cost of two Electric Lifts."

(*Copy*). THE UNIVERSITY OF SYDNEY,
JUNE 19th, 1908.

THE MANAGER, STANDARD ELECTRIC ELEVATOR CO., LTD.

SIR,

"With reference to the correspondence which has taken place in regard to the substitution of an Electric Elevator in place of the present one in Challis House, I am now directed to inform you that the University accepts your tender at a cost of . . . . . . as quoted in your letter to Professor Warren of the 6th inst.

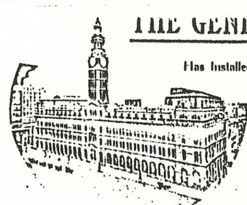
"The Elevator, it is understood, will be similar in every respect to the one in the Equitable, and the speed 275 feet per minute."

(*Signed*) ACTING REGISTRAR.

**THERE ARE SEVERAL TYPES OF ELECTRIC LIFTS,
THERE IS ONLY ONE "STANDARD."**

For full particulars Apply to—

THE STANDARD ELECTRIC ELEVATOR CO., LTD.,
GEORGE STREET, SYDNEY.



THE GENERAL POST OFFICE, SYDNEY,

Has Installed **FOUR ELECTRIC ELEVATORS** of our manufacture.

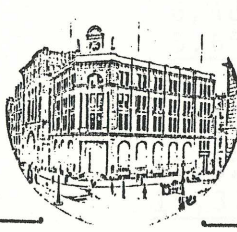
The previous **HYDRAULIC COST** before conversion for only **TWO** was **£500** per annum.

The Cost **ELECTRICALLY** now for the **FOUR** is **£100** per annum.

THE EQUITABLE BUILDING.

HYDRAULIC LIFTS have now been PULLED OUT, and, contrary to our opponents' prophecies, since their conversion the ELECTRIC LIFTS have proved their superior qualities.

HYDRAULIC PREVIOUSLY COST £670 per annum.
LOAD—10 Persons.
SPEED—275 - - empty
" 10 - 10 persons



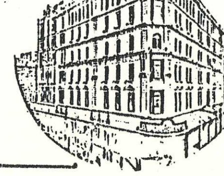
ELECTRICALLY NOW COST £160 per annum.
LOAD—23 Persons.
Speed—300 - - empty
" 275 - 23 persons

THE BANK OF AUSTRALASIA has **FOUR** of our **ELECTRIC ELEVATORS** installed.

Messrs. DAVID JONES & CO.

The first business house in Australia to recognise the **ELECTRIC ELEVATOR** by installing the first Passenger Elevator in 1901, and **WHICH IS STILL OPERATING, NOT HAVING COST FIVE POUNDS FOR REPAIRS DURING THAT PERIOD**—**HAVE NOW FIVE** Electric Elevators in use.

These Elevators are the busiest in town, some carrying over 2,000 persons per diem. Total cost of Electric Current for the five, about £160 to £180 per annum—equal to about the cost of one previous Hydraulic.



For further inquiries apply to **THE STANDARD ELECTRIC ELEV[illegible] CO LTD.,**
[illegible]itable Building, SYDNEY.

clients (eg. power to Grace Bros, Broadway, was off for a week!). The Board did little to alleviate the complaints and so the rate of severance of contracts quickened and these companies either turned to electricity or converted their lifts to independent equipment. Water usage in this period 1913-15 provides an even more definite picture of the changeover period as mentioned earlier (see Table 6). The numbers of connections remained but, with aging lifts, the usage dropped. In the years 1913-1915 the water throughput decreased dramatically as follows:-

TABLE 6

PERIODICAL COMPARISONS OF WATER USAGE DURING THE PERIOD 1912-1916

Half Year to	June 30, 1912	46,275,400
	June 30, 1913	39,366,500
		-6,908,900
Half Year to	June 30, 1914	38,229,500
	June 30, 1913	39,366,500
		-1,137,000
Half Year to	December 31, 1914	39,402,000
	December 31, 1913	41,874,000
		-2,472,500
Quarter to	September 30, 1914	6,488,300
	September 30, 1915	5,659,400
		- 728,900
Quarter to	September 30, 1915	17,025,500
	September 30, 1914	19,370,700
		-2,345,200

Quarter	September 30, 1915	17,025,500
	June 30, 1915	18,659,500
		-1,634,000
Half Year to	December 31, 1915	33,772,990
	December 31, 1914	39,402,000
		-5,629,010
Half Year to	December 31, 1915	33,772,990
	June 30, 1915	36,974,400
		-3,201,410
Quarter to	March 31, 1915	19,051,000
	March 31, 1916	17,078,000
		-1,973,000
Quarter to	December 31, 1915	16,745,800
	March 31, 1916	17,078,000
		+ 332,200
Half Year	June 30, 1916	32,737,700
	June 30, 1915	36,974,400
		-4,236,700

The S&SHP Company Board of Directors apparently could not come to grips with the task of building up alternative markets, as witnessed by the decline of both profits and dividends. The charges for HP water had provided the steady income for the Company. New lifts, parts and maintenance added to the steady cash flow and profit provided by the HP reticulation system. Water throughput in 1913-15 dropped away sharply. This, together with the fact that supplies of coal had been commandeered by the Navy[1] and that the Scottish Tubing Company were prohibited from exporting the orders received from S&SHP[2] Company meant that changes had to be made. The

1. Board Minutes of S&SHP Co 16/11/1916 p.73
2. Ibid 17/5/1917

Company took on Fire Sprinklers and an agency for Westinghouse and for Express Lifts (an electric lift) but they could not make the company work. Inflexibility at Board level appeared to be a factor, together with lack of aggressive marketing[1]. S&SHP Board Minutes do not reveal efforts commensurate with the imperative of finding necessary improvements to the lifts connected so that the Company would contribute as good a service as the opposition - electric devices. They remained a technically oriented company to the neglect of sales and service, and they suffered accordingly. The buildings the system was connected to had to have lifts which provided service at an equivalent or better level to other, and newer, buildings. Lifts were a necessity and hydraulic lift manufacturers could not come up with a complete lift which matched the opposition, particularly in the passenger lift area. Improvements such as levelling devices, cab call devices, safety features, doors control, indicators, speed of travel and variable speeds were all superior in electric lifts. Lifts contributed towards projecting an image of the companies occupying the buildings they serviced. Developmental needs of lifts (page 83) arose quickly and had to be solved. If hydraulic lifts could not answer a specific requirement electric lifts could. Correspondence of the Bank of NSW is to be found in Appendix 1. These letters and memos outline the needs and changes the Board of the Bank of NSW recognised and met during the period of making decisions about the lifts to be used in the George St Branch of the Bank of NSW They illustrate the rapid development of technology and also reveal the firm place occupied by vertical transport in city buildings by the turn of the century. The rapidly changing requirements after 1900 imposed pressures on lift manufacturers which the electric lifts manufacturers succeeded in proving themselves to be superior in fulfilling.

---

1. Board Minutes of S&SHP Co, 16/12/1915, p.233, for example.

ISSUES ARISING FROM THE IMPACT OF HYDRAULIC LIFTS

- SAFETY

Hydraulic lifts impinged on many differing groups of people in the city. Lifts were the centre of focus for improvements to safety factors involved in their construction, installation, operation and maintenance. But a much wider group, such as workers involved in goods delivery and warehouses, passengers using lifts in hotels and commercial buildings all contributed to a ripple effect in widening the field of keen interest concerning safety in lifts. The frequency of fires in buildings added impetus to the issue. Accidents involving lifts were reported fully (and unfortunately) all too often from 1875 onwards.

"It is very doubtful, indeed, if in half the instances where they have been attached the so-called safety-catches and other appliances would at the critical moment work successfully. A story is told by a leading manufacturer of this city of a patent lift-catch invented by one of his employees. This appliance was attached to a new lift in the factory, and the manufacturer invited his friends to a luncheon, and loaded the car with a ton weight. Then glasses were charged to drink to the success of the new appliance, the car was let go, and, as the manufacturer subsequently remarked, "That lot cost me a hundred pounds, and pretty well a new foundation."

"Most of the lifts and elevators were found to be worked by boys under 16 years of age, and the employers in each case having been informed of the clause in the Act bearing on this matter, the boys were subsequently replaced by lads of maturer years. At an inquest held in the early part of the year on a lad under the statutory age, who was killed in a lift, several witnesses stated that the lad, who was both healthy and strong for his age (14 years) was not physically capable of working the lift, as to start and stop it required a man's strength.[1]"

---

1. Factories & Shops Act NSW - Annual Report 1897, p.9.

81/100

'99

April 20th.

[illegible] Swinburne Esq.[1]

Melbourne.

Dear Sir,

In reply to your request of 14th.Inst. we beg to report on Lift accident at Sir Frederick Sargood's new Building, Flinders Street, as follows :-

This Lift is constructed to carry 8 cwt.having a 3½"ram, and the weight of the cage is balanced up, close weights being hung on the end of the ram for that purpose. The cage is suspended with two (2) Roebling charcoal iron wire ropes having a combined breaking strain of 10000lbs.

When the accident occured, we have reason to believe (although it is difficult to get at the truth) that the cage contained 14 fair sized men, and that 4 more got on the roof, this would mean a load of say 24 cwt.and the strain on the ropes would be very great. When the cage was at rest (this has an important bearing on the fact of the ropes breaking) the pressure owing to the heavy load would be increased in the cylinder up to about 2100lbs.per sq.inch with the cage at rest.

Our theory is, that the man who worked the lift and who untied the handrope (it having been tied at the bottom to prevent its use) opened the valve to its full extent, and owing to the heavy load, the cage fell at the rate of say 1000 feet per minute. He then got frightened and closed the valve suddenly. The

1. A.B.L. Correspondence File of Johns & Waygood, 1899.

momentum of the cage suddenly arrested would put an enormous strain on the ropes, and cause them to break. The grippers caught in the backing timbers, and although the cage reached the bottom the speed was diminished, and a very serious and perhaps fatal accident avoided.

We may here say that we are informed the man who was injured, jumped out of the cage on to an uneven floor, and 2 or 3 men jumped on top of him, result a broken leg. The others escaped with a slight shaking.

The damage is- two broken ropes, three broken cylinder bolts, two broken balance weight bolts, the rope guard on the cross head broken, and the cage damaged and safety gear spindles bent and the backing timbers are damaged by the grippers. We estimate the cost of the necessary repairs to be from £25 to £30.

Our man saw the cage at the bottom and went into the right-of-way to turn off the water, and while doing so, someone not in our employ untied the handrope, and took the cage to the top and left it there till knock-off time, when it was crowded with men, eager to get away.

Yours faithfully,

JOHNS AND WAYGOOD LIMITED

Robert W Pearce

Secretary.

"Two fatal accidents have happened in my district owing to the unprotected state of the lifts. In one case a lad under 14 years was working a goods lift. In the evidence at the inquest nothing was given to show the cause of the lad's death; and after the inquest I visited the factory, and found that the cage of the lift was only boxed up to 4 feet high, and at the back of the lift the girders of the floor joists ran across the well; and on looking at one of these girders I saw portions of the lad's hair and skin, and found that his head had been jammed between the top of the cage and the girder. In this case I had the valves attended to, as they were out of order. The second lift accident was owing to the hauling-gear of the lift giving way. This was friction lift in a flour mill. This lift was provided with safety-catches, but the guides were of oregon, and the wire rope broke while the lift was up. The safety-catches failed and the man in the lift was killed at the bottom. I am sorry to say that I have come cross several friction lifts, and in every case have had to order some alteration. Any hydraulic lift which I inspected recently was loaded with a ton weight, and the safety-catches in this case successfully held it against the guides. The well-hole is closed at night by trap-doors worked by hydraulic power. Perfect as this lift was, I had to order an addition which is a very common one, namely, that of two doors protecting the well. In nearly every case the doors already provided are just high enough to allow a person to look over and run the chance of having his head caught between the door and the cage. One accident of this kind was brought under my notice. A man was looking over the door down the well, when the lift came down and caught his head. Fortunately it stopped in time to prevent the man's death, but not till he had his jaw fractured. The occupier of a shop in the city was asked to fence the lift-well, as the cage had no door. When I called again it had not been done, and he told me that in the building opposite (which was let as offices) there was a lift of similar construction. The occupier of the shop fenced his lift in accordance with the law; but the case he referred me to is similar to many in the city, where lifts are used in offices and warehouses, over which the Act gives us no control[1]."

The Institute of Engineers[2], Trade Unions, Public Works officials and the Sydney City Council[3] all pressed for the establishment of standards for the construction and operation

---

1. Factories & Shops Act, Annual Report 1897, p.10
2. ABCN September 13, 1890, p.182, BEJ 14/12/1889 p.483, ABCN 15/2/1890 p.765, ABCN 14/6/1890, p.1112/3, ABCN 30/8/1890 p.177f
3. PMCCS Town Clerk's Annual Report 1890, p.8, City Buildings Surveyors Department Annual Report 1889, p.9

of lifts. Anyone could build a lift or introduce a change. Year after year, in the early 1890s, the annual report of the Public Works recommended that official control over lifts should be developed. The Municipal Council of the City of Sydney in 1890 reported that "Instructions have been issued to the City Solicitor to prepare a Bill to regulate the construction of hoists and elevators"[1]. Gradually regulatory change was introduced with resultant benefits. In 1895 the Government appointed an Inspector of Scaffolding but without statutory support his position was weak, but a basis had been estabished to "enlist the sympathy of Parliament"[2] When the reasons for the frequent accidents were analysed, it was apparent that the fault lay as much with the materials used as with the people directly involved. Improvements had to be made in construction and manufacture as well as in the training of operators, installation and maintenance people. With the upsurge in installations of lifts and the competition which existed various developmental needs rapidly emerged. Horrific accidents occurred because no doors were on the earlier goods lifts, overloading of lifts, careless driving all were noted. The Engineers Institute of Victoria in particular became the forum for expressing in a formal way the concern of many in the construction industry about safety regulations for lifts (as well as for other aspects of building construction). Lifts started to be installed at an earlier stage in the construction as this quickened construction (and so produced returns earlier). When it is recalled that Sir John Young had manual hoists when building the Lands Department and the McCredie Bros. had similar hoisting arrangements for the GPO (yet both buildings had hydraulic lifts installed in the completed buildings) one gains an idea of the pace of change in this

---

1. PMCCS, Town Clerk's Annual Report 1890, p.8
2. Factories & Shops Act NSW Annual Report 1918, Historical Review p.77

aspect of building construction. Equally so was the demands placed on the ability of all the skilled people involved to adjust safety to such rapid changes. At the February 1890 meeting of the Victorian Branch of the Institute of Engineers Mr Burke placed a motion before the meeting proposing that a survey be carried out. This was adopted. A group was formed under the Chairmanship of Professor Kernot (Dean of the Faculty of Engineering - University of Melbourne) to investigate and report on the then current situation of safety in the design, construction and operation and maintenance of lifts in the Colony[1]. The findings and recommendations were reported to the 14th June meeting and further discussed in an article in B&C News August 30, 1890, p.177. The recommendations were accepted. One recommendation was for the Institute to submit the report to Parliament. Such activity as this finally led to the Lifts & Scaffolding Act of 1902 in Sydney[2]. This Act was similar to the Victorian Act which had been passed a couple of years earlier. The 1902 Act was further developed in the 1908 Lifts & Scaffolding Amending Act and again in the Scaffolding and Lifts Act No. 38, 1912* - an Act which is still in existence and under consideration currently for change and incorporation into the Occupational Health Act (1989). Mr D Vernon - Government Architect in charge of the Architects' Branch of the Public Works Department - was given the assistance of an Inspector of Lifts & Scaffolding, Percy Fildes, in 1902[3]. The Act was regulated through the Architects Branch until the Department of Industrial Relations was introduced and the Inspectorate responsibility was

---

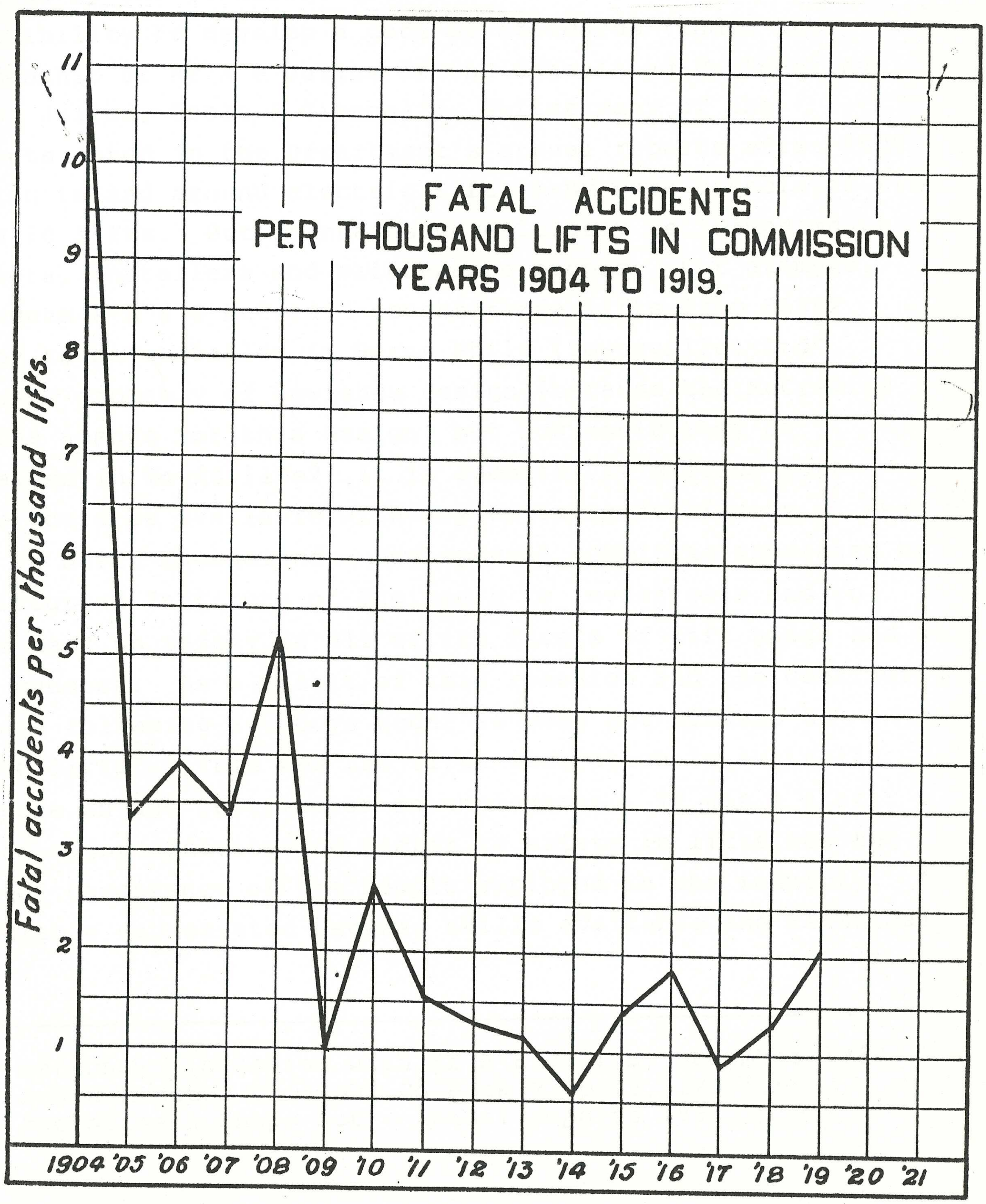
<u>* Footnote</u>

See Appendix 7 for copy of compulsory notice required to be displayed in all lifts.

1. ABCN February 15, 1890 p.765
2. Factories & Shops Act - Annual Reports of Departmental Engineer & Inspector of Scaffolding & Lifts 1918. Historical Review p.78ff
3. DPW 1899 Annual Report p.55

transferred to that Department. Accident figures prior to 1900 are difficult to find in collated form and are limited to isolated, but frequent, reported details and cannot be taken to represent the whole. Following the introduction of the Act of 1902 there was an impressive drop in fatal accidents in lifts[1].

Graph 11



1. Department of Labour & Industry - Annual Reports of Departmental Engineer 1920 p.55

What can be accepted with confidence is that control of lift construction, installation, operation and maintenance was not sufficiently strict. Evidence from employers, unions and Government was agreed on this. Indicative of the conservative development of standards for lift construction is the fact that it was as late as 1928 that the first Lifts Committee was appointed by the Standards Association charged with the responsibility to develop a code of standards (under the Chairmanship of Mr A F Julius of the Consulting Engineering firm of Julius, Poole & Gibson)[1]. Whilst many of the accidents noted in the Department's annual reports after 1900 occurred in and around electric lifts many were associated with hydraulic lifts. But standards were largely self imposed by designers, installers and maintenance people. For example, Architects A L & G McCredie bought three lifts from S&SHP Company to be installed in Burns Philp (Townsville) Ltd[2]. They were probably of Lawrence design (because the McCredies were the agents for this design) but how would they be maintained in Townsville? It is doubtful if skilled lift people would be available with any reliable regularity at that stage in North Queensland. The special committee appointed by the Victorian Institute of Engineers to investigate and to report back on safety in all of its facets of lift usage had an early success. As a result of this research and the continuing pressure following it, boys under 16 were not allowed to operate lifts[3]. This was the first occupation in Australia to impose an age restriction on employment. It was a start. But one major contributing factor to safety in lifts was the level of competence of the people employed in the industry. An appreciable gap existed between skills available and technical

---

1. Personal discussion with Mr A F Julius, December 1988
2. Board Minutes of S&SHP Co Book 2, p.13, 2/5/1895
3. Factories & Shops Act - Annual Reports 1897, p.9

education. Hydraulic lifts and safety is inextricably mixed with the level of technical skill available to all facets of hydraulic lifts.

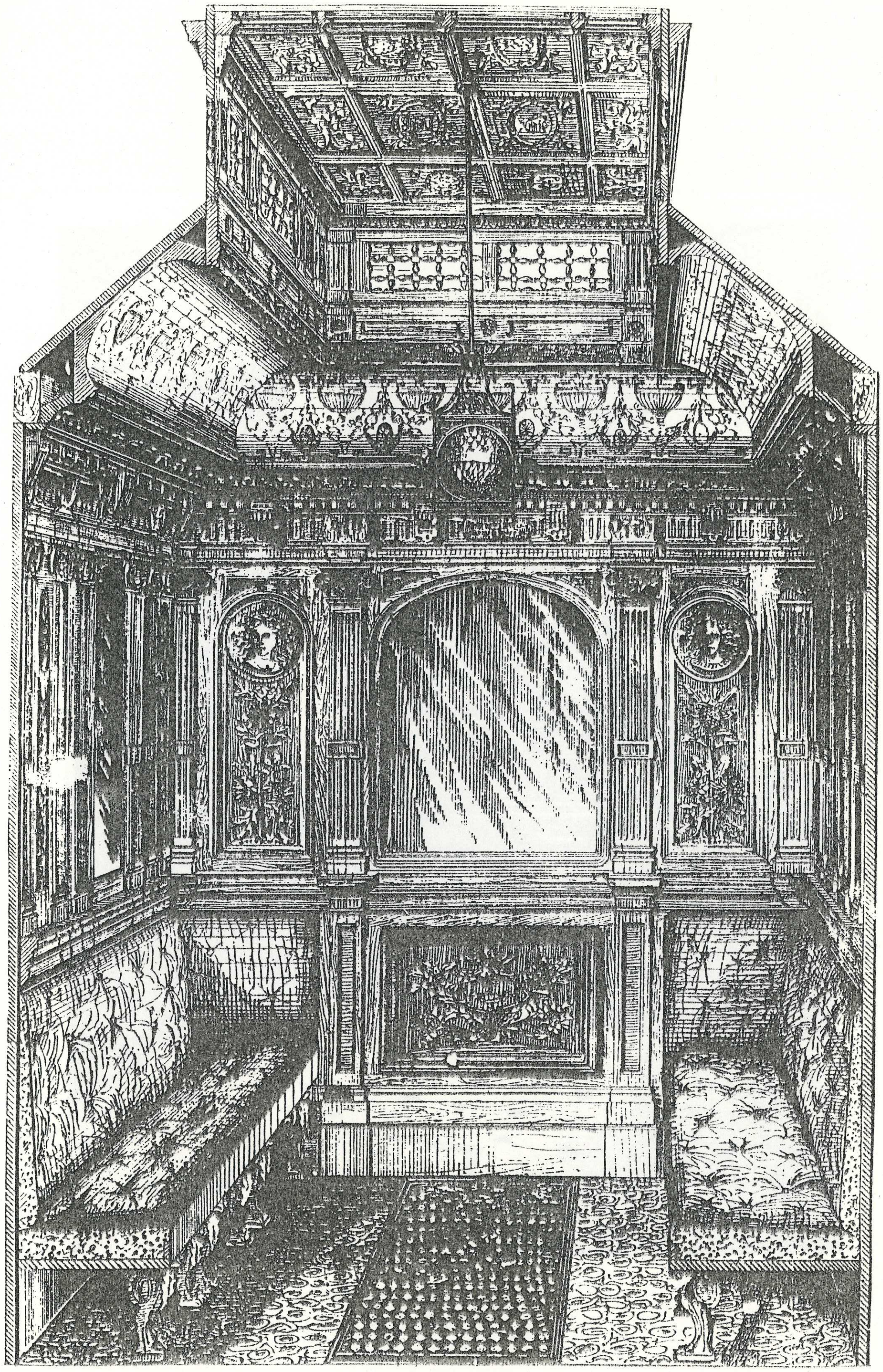
ISSUES - WHO SHOULD CONTROL LIFTS: ARCHITECTS OR ENGINEERS?

Who should be the final controller of lifts in the 1880s and 1890s came in for some sharp exchanges between Engineers, especially Consulting Engineers, and Architects. The pluses and minuses of both groups were highlighted in relevant journals such as the Builders' & Contractors' News and the Building & Engineering Journal. The Engineers Association of NSW and of Victoria was a forum for some rather crisp discussions[1]. The Architects maintained that as the final arbiter of a building they were in control, especially when such factors as cage design, levelling devices, noise factors, positioning of lifts occupied close attention. Some architects held the Agency for a make of lift and N Selfe claimed to be both an Engineer and an Architect. On the next two pages are examples of the 'finish' given to lifts in this period to set off the building but which was considered by Engineers to be 'secondary' to basic engineering. Engineers maintained that the mechanical aspects of lifts were so essentially the province of Engineers that they were the only people who could determine the overall safety and effectiveness of lifts. They emphasised in discussions the 'art' aspects of Architecture and stressed the limitations in matters engineering of Architects. T Coghlan teased out of the 1901 Census the following details (Tables 6 & 7) showing age breakdown of various professionals in Architecture and totals of Mechanical Engineers by categories.

---

1. BEJ, July 22, 1893, p.36f. This article mentions several other public statements on this issue.

THE AUSTRALASIAN BUILDER & CONTRACTORS' NEWS, SEPT. 21, 1889.



Passenger Car of Principal Elevator,

Figure 18

Anthony Hordern's Building

Figure 19
CSR Head Office, 1 O'Connell Street, c.1902.
Note the ornate ironwork of the lift.

TABLE 7[1]

Civil & Mech Engineers
Architecture & Surveying

	Males by Age				
	25-40	45-65	5& u.15	15-20	20-25
Civil Eng.	314	164		24	37
Directing or Consulting Engineering	16	11		2	-
Surveyor	485	206	3	55	112
Architect	228	98	3	36	32
Draftsman	289	108	2	28	40
Others	4	2			1

TABLE 8

	Various Categories of Engineers		No
Sub Order 15	Manufacturing Engineer		4
Group 10	Engineering Works Prop		4
(page 711)	Mech Engineer		2011
	" "	Accountant	11
	" "	Engine Drive	19
	" "	Carter	3
	" "	Clerk	78
	" "	Fireman	9
	" "	Labourer	368
	" "	Manager	11
	" "	Messenger	1
	" "	Shop Boy	23
	" "	Storeman	7
	" "	Traveller	2
	Engine Fitter		750
	Engine Packer		18
	Engine Smith		42
	Student Mech Eng		8

Note the age of some people purporting to be Architects. Norman Selfe on the other hand was in charge of the Drawing Office at P N Russell's, Engineers, before he was out of his indentured apprenticeship time. The first Chair of Engineering

---

1. Coghlan, T.A., Results of NSW Census 1901, p.654ff cf. p.711 (the page numbers vary according to the edition).

at the University of Sydney was not established until 1889. Before University graduates of Engineering started to appear and the Architect's course at the Technical College had imposed stringent standards of professional competency on a broader base, the in-fighting between the two professions in the area of lifts was understandable. People who considered themselves capable practitioners could 'set up shop' and there was no-one to say nay to them*. The lack of clear lines of demarcation between the professional groups remained apparent into the first decade of the 20th century. The acrimony continued but gradually faded from public scrutiny in the media c.1910. Depending on the strength of the personality involved so did rest the final control. The issue again underlined the necessity, in the era under review, (i) for greatly improved construction standards and policies, (ii) for improvement in professional education and in defining more clearly the parameters of each profession, and (iii) to clarify clearly the lines of responsibility in the specifications.

<u>* Footnote</u>

This skills level issue will be discussed further in the next section.

ISSUES - SKILLS AVAILABLE

The developing technology of vertical transport differing as it did in goods and passenger lifts demanded a competent workforce of widening and deepening skills. Currently this was of limited availability and nor did the future bode more hopeful for an insufficient number of apprentices were entering the relevant workplaces.

The aspects of technology listed below would require just such a workforce - technically literate and always to be steadily replenished.

- Speed of travel of lifts; (a) to reduce costs, (b) to improve production for the users, and (c) to answer the demand for service to the upper floors of buildings.
- Longer travel produced its own specific problems, such as variable speed of travel.
- Location of lifts in buildings. The integration into 'banks' of lifts as opposed to "goods lifts out the back in the dock area and passenger lifts in the foyer for front of house service". Architectural and engineering questions of how to increase lettable cubic capacity yet provide safe, effective service at competitive prices required creative input of a high order.
- Indicators of lift position, by sound and visual devices.
- Safety control systems on all facets of lift design, installation and maintenance.
- Control systems for floor stopping and for floor bypassing, together with variable speed of travel.
- Call systems including automatic control.

- Elimination of lift attendants through automatic controls
- Levelling controls for each floor.
- Maintenance requirements and quality control instruments for measuring & testing equipment.
- Door opening and closing devices.
- Integration of developments from overseas and local competitors, hopefully with local improvements to the patented improvements.
- Improvements in the basic materials from which lifts were constructed[1].

These developments, or even the need, did not occur in any sequential way - nor only in mechanical engineering. Instrument designers and hydraulic engineers, welding technologists, wire rope engineers, metal specialists, and later, electrical engineers, to name a few, were developing specialized skills which had direct application to aspects of hydraulic lift usage in Sydney from 1880 onwards. Pressure to upgrade was placed on other services. Complex problems not previously encountered occurred in the provision of trouble free maintenance toilets, supply of plumbing in general, water, lighting, load bearing floors and virtually all aspects of building construction (including traffic flow problems both during construction and afterwards). All of the relevant facilities (and associated artisan skills) had to be upgraded to meet these challenges. It is technical skills education, both its development and availability, which needs to be noted. Not only did it have a role in the development of the hydraulic lift era but also contributed in a negative way to its relatively rapid decline as electricity (and later electronic applications) provided greater scope for relevant development. There was a continuous shortage of technical

---

1. Dunstan, K., Introduction of Building Equipment, Ph.D., Thesis UNSW. The items above were collated from this thesis.

skills. Even in the economic down years of the 1890s builders were continuously noting the shortage of good craftsmen. When the relevant aspects of Technical Education and Training position in the Colony is examined in the decades 1870 - 1900 the following picture emerges:

In 1867 NSW abolished the dual boards of National and Denominational Boards. The subsequent withdrawal of funds and government aid from denominational schools had the effects of delaying educational legislation both social and industrial and it embittered a segment of the population. The colony had been gradually getting worse economically for the seven years prior to 1867, chiefly owing to the great number of immigrants and the falling off in goldfields production and also through the great amount of importation of every article "we left our own houses to come here to manufacture". (20/1/1867 Letter in "London Star" from Sydney Unions). Employers complained that "it is hard to get good men, but at the same time the rules of the Trades Unions in Sydney as to wages affect the amount of employment that can be given.[1]" "A prejudice in the minds of many persons against attempting to have castings, engine fittings and like articles made in the colonies in 1873.[2]" "The call for mechanics was far below the supply" 1867[3] "Mechanics were the most highly paid labourers in the colony" 1870[4]. "The demand for mechanics became so keen that employment was much better than it had been for many years and the able bodied population of the colony was too small for its requirements."[5]

---

1. Coghlan, T.A., Labour & Industry 1788-1901 Vol.II, p.1029
2. Ibid Vol.III, p.1426
3. Ibid Vol.II, p.1024
4. Ibid Vol.II, p.1029
5. Ibid Vol.III, p.1439

"Skilled mechanics suffered more from lack of employment than any other class. Very little building construction was being carried out"[1]. Manufacturing was beginning to have an increased importance by 1876, but in 1880 "in consequence thousands of youths were wandering about the streets in a state of vagrancy instead of learning some useful trade" (Report of a Select Committee appointed by H Parkes in 1880)[2]. In 1873 "the iron trades were in such a prosperous condition that the ironmasters of the colony signed an agreement that 8 hours should be considered a day's work"[3]. In 1896 a Factories & Workshops Act (similar to the Victorian Act of 1885) was passed which aimed at improving working conditions, such as air space, sanitation, but particularly concerning safety[4]. Union and employer groups argued about the extent of unemployment. The Unions claimed a far higher proportion of unemployed than did the employer groups who claimed only about 30% of the really competent men were unemployed[5]. Regulations controlling the employment and training of apprentices were poor. No formal apprenticeship in hydraulic lifts are noted. Johns & Waygood did not have any apprentices at this time nor did the S&SHP Company in the 1890s. In 1880 half of all the so-called apprentices in the Colony were not indentured. Lads were laid off according to the volume of work or profitability of a specific company just the same as any other hired person. When the 1901 Census of NSW is examined there was no category of occupation listed as apprentices. In 1901 less than 30% of so-called apprentices were indentured[6]. There had been a lessening of preparedness to formally indenture apprentices. Apprenticeship lacked definition. The Apprentices Improvement Act of 1894 was a progressive endeavour to clarify some of these

---

1. Coghlan, T.A. op.cit. Vol.IV, p.2018
2. Ibid op.cit. Vol.II, p.1201
3. Ibid op.cit. Vol.III, p.1425
4. Ibid op.cit. Vol.IV, p.2092
5. Ibid op.cit. Vol.III, pl438
6. Factories & Shops Act, Historical Review of Apprentices 1898 contained in Annual Report 1898, p.17

weaknesses. The control and standards of training were weak both for indentured apprentices and non-indentured, that is so-called apprentices. There was no formal direct linkage to any formal courses available. In fact the attitude was strongly held and expressed by employers in particular that hands-on practical experience was the only way to become a craftsman and that theoretical off-the-job learning was not necessary.* Sydney was not alone over this issue. England, in spite of its long tradition of apprenticeship, was grappling with the challenge in much the same way around the same period - as was Melbourne and Sydney. The Annual Reports of the Department of Labour & Industry between 1898-1905 on Apprentices provide some insight into some of the key issues in this period in relation to the development of skilled artisans in the colony. In 1898 the report noted that the Apprentices Act of 1894 was not well known and that the conditions were not adhered to very well.

In 1899 this observation is repeated but points out that the Act only applies to indentured apprentices.

> "... the number of whom does not advance in anything like relative proportion to the increase in the trades and manufactures of the Colony. On the other hand, the number of apprentices so called who are not legally indentured and whose chance of getting anything like a comprehensive knowledge of their trade is very remote, daily increases. At the same time it must not be overlooked that special opportunities for learning the <u>technique</u> of trades is now afforded by such institutions as the Technical College. These aids should, however, be regarded as elementary to, and not in substitution for, a proper system of apprenticeship."[1]

<u>* Footnote</u>

Such a linkage did not in fact occur until 1948.

1. Department of Labour & Industry - Annual Reports 1899 p.6

> "The attitude of the master craftsman towards apprentices has of recent years become somewhat exclusive. There has been a decided movement among the Unions in other colonies in the direction of limiting the number of apprentices to represent a fixed proportion to the number of master craftsmen employed. This movement has been strengthened by the consequential effects of certain legislation dealing with labour matters.[1]"

The report then continues to quote examples of unprincipled masters who used their young apprentices to operate at minimum cost (sometimes they were paid nothing). In addition when work was slack the apprentices were laid off.

In 1901 the reports continued along similar vein[2].

> "The system under regular indentures is very much on the decline, and is carried on strictly in only a few of the organised trades.
>
> "The term 'apprentice' is now very loosely used, being generally applied to learners in every trade, whether under indenture or not.
>
> "Apprenticeship under indenture indeed finds very little favour at the present time with either master or apprentice. Employers complain that parents have so little control over their children that they do not, and cannot, enforce compliance with the terms of the agreement, and that bound apprentices care very little to advance themselves in the trade, and are satisfied to do routine work with as little expenditure of trouble as possible. Employers appear to prefer to teach and advance only those learners who show ability and industry. It is also sometimes averred by employers that indentures are not really binding on the apprentice, and are of no value when put to the test.

---

1. Department of Labour & Industry Annual Reports 1899, p.6
2. Ibid 1901, p.3

> "Some employees, on the other hand, allege that, even when as apprentices they have served their full time under indentures, they have only been taught one branch of their trade, and are without experience when put to other work, though in the trade."

In the 1905 report a much more positive note is to be observed[1].

> "Apprenticeship by indenture may at the present time be regarded with more favour in some quarters, owing to the improved conditions of our industries generally. The Master Builders' Association have for some time past been in favour of the system, but have advocated the necessity for making a provision that the apprentices shall attend the Technical College two nights each week to receive additional instruction in the particular trade to which they are apprenticed. This would ... be a very reasonable condition, but the principal difficulty the master builder has had to contend with is, that as work with him may be intermittent, his apprentices would be left on his hands unless he were able to transfer them to another builder until he had again work for them.
>
> "... however, that in an award of the Arbitration Court between the Amalgamated Society of Carpenters and Joiners and the Master Builders' Union it is provided that all boys shall be apprenticed for five years either by deed or written agreement to learn the trade. The apprentice may be transferred to another employer if the master should be unable to provide him with continuous instruction. During at least two years of the apprenticeship the apprentice shall attend at least two nights in each week the classes in carpentry and joinery at the Technical College, the fees to be paid by the master, and his admission to the ranks of the journeymen will depend upon his having obtained a certificate from the Technical College of having so attended."
>
> "In the London Chamber of Commerce Journal for December, (1904) it is recorded that firms in London have, in the interests of their apprentices, arranged courses of lessons, under the most able instructors, to be held in the evenings, the expenses in connection with the classes to be defrayed by the firms. The apprentices show their

---

1. Department of Labour & Industry - Annual Report 1905, p.2

> appreciation of their employers' solicitude for their educational welfare by punctuality, regularity, and earnestness in their work.
>
> "A Birmingham firm has arranged for a number of its young employees to attend the Technical School Committee's Metal Works Centres, paying the entrance fees, and promising to supply ample inducements and facilities provided the employees attend the classes regularly, and do their best to improve by the advantages offered them."

This is a query area. In 1896 alone there were at least 400 hydraulic lifts in Sydney which needed continual maintenance. In addition, there were associated building and installation people, for cranes, hoists and other hydraulic applications. Some unemployment figures in 1896 are difficult to accept possibly due to the lack of clarity of definition of the various categories of occupation, let alone the training and level of competence attained. The contention is that the level of designated skill varied enormously and almost became 'self-elective'. Relevant Technical Education was meagre, indentured apprentices were few, and a large pool of unskilled people worked as assistants. They all would be tempted to call themselves skilled in a census and in times of weak employment. It is tempting to speculate that many 'engineers' who were unemployed had not upgraded the skills they offered. Technology had passed them by. But it was the availability of relevant ongoing skills which was paramount. Sydney in the period under review lacked adequate technical educational facilities, either for theory or for practical work regarding the demands put upon it by developments in lifts. Skill was not coming off the production line in any numbers until say 1900 and even then journeyman experience had to be gained. When the courses available in the period are examined relevant courses were not available. Artisans from other disciplines (self-elected?) who switched to lifts due to demand had to learn new applications of their basic skills. In addition, mechanical hydraulic vertical transport quickened the change of technology involved in material handling techniques which flowed from the quickening in goods movement. Such needs for technological innovations in handling equipment in turn widened the gap between the skills available and apparent requirements.

TABLE 9

RESULTS OF A CENSUS OF NEW SOUTH WALES BY T A COGHLAN, GOVERNMENT STATISTICIAN, 1904[1]

Industrial Occupations - Total employed (men and women) in NSW from the Census of 1901

146,688 in 1901	-	10.85%
136,817 in 1891	-	12.20%
107,619 in 1881	-	14.43%
55,442 in 1871	-	11.12%

These numbers need to be set against the total population figures given on page 26.

TABLE 10

INDUSTRIAL OCCUPATIONS IN NSW (Sub-Order Group 7 and 10)[2]

	NSW Number in Occupation
Scientific Instrument Making	18
Elec. Apparatus Making	2
	20
Engine Maker, Fitter, Mech.Eng.	3788
Millwright	33
Boilermaker	1381
Agriculture Machine & Implement Maker	53
Sewing m/c maker/repairer	22
Cutler tool maker, saw setter	83
Gas, water, meter maker	25
TOTAL	5435

1. Coghlan, T.A. NSW Census of 1901 p.630
2. Ibid p.674

TABLE 11

THE DISTINCT OCCUPATIONS OF ALL PERSONS ARRANGED IN ORDERS, SUB ORDERS & GROUPS 11TH CENSUS 1901[1]

		Male	Female
Order 15	Manufacturer Engineer	4	
Suborder 10	Engineering Works Prop.	4	1
Group 1	Mech Engineer	2011	
	Mech Eng Accountant	11	
	" " Engine Drive	19	
	" " Carter	3	
	" " Clerk	78	2
	" " Fireman	9	
	" " Labourer	368	
	" " Manager	11	
	" " Messenger	1	
	" " Shop Boy	23	
	" " Storeman	7	
	" " Traveller	2	
	Engine Fitter	750	
	Engine Packer	18	
	Engine Smith	42	

Note: No apprentices listed and no definitions of the various occupations are stated.

TABLE 12

THE DISTINCT OCCUPATIONS OF ALL PERSONS ARRANGED IN ORDERS, SUB-ORDERS OR GROUPS[2]

		Male	Female
15 10 1	Iron Driller	43	
	" Fitter (so described)	98	
	" Machinist	104	
	" Planner	7	
	" Turner	160	
	Student, Mechanical Engineer	8	
	Millwright	31	
	" Clerk	2	
	Boilermaker	1132	
	" Clerk	1	
	" Labour	248	
	Agricultural Implement Machine Maker	44	
	" " Carter	1	
	Clerk	3	
	" Labourer	3	
	Manager	1	
	Traveller	1	

1. Coghlan, T.A., Results of the 11th Census, 1891, p.711
2. Ibid p.711

	Male	Female
Sewing Machine Fitter, Mechanic	22	
Butcher's Requisites Maker	3	
Cutler Cutlery Grinder	32	
" " Agent	1	
" " Manager	1	
" " Traveller	1	
Saw Maker	15	
Saw Sharpener, Setter	23	
Tool Maker	7	
Gas Meter Maker	16	
" " Labourer	2	
" " Manager	1	
Water Meter Maker	5	
" " Labourer	1	
Scales Maker	18	
" " Traveller	1	
Weighbridge Fitter	1	
Bakers Tools Manufacturer	2	
Bellows Maker	7	
Cash Register Fitter	5	
Chains Manufacturers Clerk	1	
Dairy Implements Maker	1	
Gas Fitters Material Mfr	1	
Patent Pulley Cover Maker	1	
Printers Machine Manuf	1	
Shearing Machine Fitter	5	
Spiral Tube Cleaner Maker	1	
Typewriter Mechanic	4	
Wool Press Manuf	1	
TOTALS	5432	3
GRAND TOTAL	5435	

When the total of 5435 has subtracted from it the number of workers under the age of 20 (1079) and the remainder (4356) has an unknown proportion subtracted from it for working outside of the city and then the remainder split between the various industrial areas listed in Table 12, a case can be made for the claim that the number of relevant up-to-date skilled people were limited in the lift manufacturing, installation and maintenance business in Sydney.

pressure from the Unions for apprentice training to be recognized did not gain much ground in the 1890s and many employers did not see the value of the apprentice system, preferring to train boys on the job without being subject to any regulatory working conditions, control or any systematic programme of training. In addition, the Unions wished to retain control over the number of apprentices to avoid any weakening of the wage levels. These factors did not make for the development of a bigger and better pool of skills. The employers complained about not having adequate skills available and the Engineers Institute pushed for improvements both for training and in working conditions, but progress was slow. Specifically in the lift industry this, as we have seen, did not lessen, for example, the accident rate. Over time it did contribute toward the realisation of the necessity to provide for the upgrading of technical training in the many relevant skills involved in hydraulic lifts and in areas of knowledge associated with the changes which followed the altering skyline of Sydney. Professionals such as Norman Selfe went overseas for two years, and on several occasions for shorter periods, to update his personal knowledge. For a professional engineering consultant this was a big commitment. He could not be doing chargeable detail work for clients whilst he was away from Sydney. He 'sold' his knowledge by frequent newspaper publications, lectures and by advertising (page 49). One can only assume that Selfe made this 'self growth' effort more than did most of his competitors judging from his contributions. He was a 'blacksmith' engineer. He trained as an apprentice with P N Russells in Sydney and was in charge of their Drawing Office while still in his teens. T Dickinson, General Manager and Chief Engineer of S&SHP Company, was another outstanding person but the engineers who followed him, judging by their relatively short stays with the company, were seldom of his stature. Peter Johns in Melbourne was another 'blacksmith' engineer who started as a rigger on the Exhibition in London. They were all three outstanding in their day but, as development needs became more complex, even they started to strain, eg. Norm Selfe was removed by the Board of the Bank of NSW and replaced by Professor J Warren as Consulting Engineer due to the increasing requirements of their new lifts and in their anticipating further needs[1]. Johns & Waygood without W P Chancellor adding his professional input undoubtedly would not have been such a sound company[2]. Heavy reliance on overseas recruitment or immigrants for the additional technology skills required (both for straight growth and technology challenges) would have been a fairly haphazard recruitment policy. The alternative would be to recruit 'watered down' skills and try to develop them on the job. This would limit the development to the level of the trainer, for example: (i) Peter Johns recruited W P Chancellor from Canada; (ii) S Hoffnungs had R Waygoods & Co send out their own engineer to instal the lifts in their building in Pitt Street; (iii) S&SHP Company had to search beyond NSW to recruit engineers; (iv) The Bank of NSW sacked their Engineer after two months for inefficiency. A factor not to be overlooked in trying to come to grips with manpower distribution a century ago is the degree of movement between the colonies and within each colony - country to town and vice versa. For example, Melbourne lost to Sydney a significant number of unemployed skilled people in 1890-1893 but we do not know in any detail what skills migrated. What we do have to recognize is the pulsating feature of labour relations in NSW in the period under review - immigration, internal movement, flexibility of skills, growth of union organization, increasing tempo of legislative recognition of the role of labour and their 'rights' - a heady mixture when combined with high unemployment at times and often concentrated in the building trades - the largest of the industrial groupings. One could speculate along several lines but one approach that should be given due consideration is that the colony at this period lacked the depth of skill - not just the few able direction

---

1. WA, see Appendix 1
2. Blainey, G., <u>Johns & Waygood 1856-1956</u>, p.43

'pointers' but the depth at the senior artisan/foreman level. Given this deeper base, particularly in the manufacturing field, the history of vertical transport in Sydney could well have been acknowledged more prominently, eg. export of locally developed technology (eg. by Johns & Waygood) is not to be found even though the application of imported technology was as advanced as anywhere in the world. Manufacturers such as Johns & Waygood and S&SHP Company were searching for applicable inventions on a continuous basis, eg. an automatic control device was pursued like the Holy Grail, but limited expenditure is to be found in attempting to invent a device themselves. England and the U.S.A. were the meccas to be searched. Norman Selfe, although dissatisfied, accepted cast wheels much smaller than he ordered (from England) even though the smaller wheels would add to the ongoing costs of the lifts in which they were installed[1]. To put this situation in some balance it is to be noted that in the economic downturn of the early 1890s in Sydney and Melbourne the lift companies which suffered the greatest were the specialized companies R Waygoods & Austral Otis. They both had sizeable plants (Austral Otis employed 400 people) assembling lifts, manufacturing cages and installing them and maintaining them. They invested a lot of capital just before the major economic downturn of 1891[2]. On the other hand Peter Johns had built up a a solid engineering company supplying a range of products such as iron girders for bridges and buildings. Lifts were only one product. Johns survived and emerged in the late 1890s with a stronger base, as was noted earlier, from which to exploit the resurging development of the colonies. S&SHP Company in Sydney also survived, a vital factor being its strong cash flow from the HP water contracts. Speculation can be indulged in that the manufacturing component involved in lifts both in NSW and Victoria was not large enough to stand alone and survive a

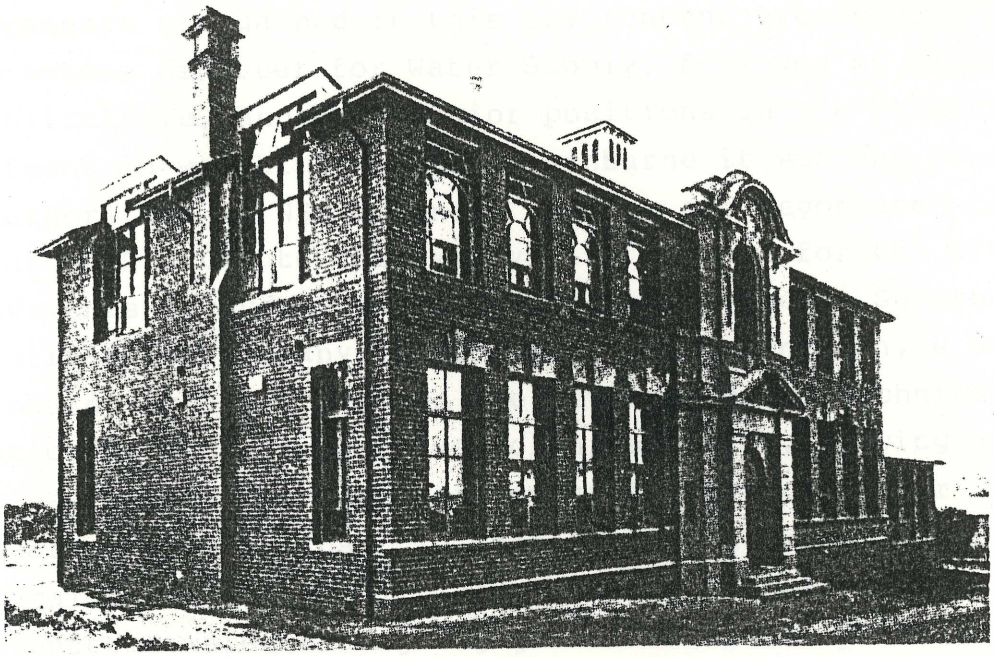
---

1. BEJ, March 25, 1893, p.113. S&SHP Co Board Minutes Book I p.260 provide another example
2. Blainey, G., op.cit. p.33ff

severe downturn. Either a cash flow coming from an established service had to be available to a company or the company had to be sufficiently flexible and to be 'lean' enough to turn to a wider variety of tasks in order to survive, eg. Austral Otis turned to mining equipment. The locally manufactured and exported goods versus imported goods issue was apparent during this period. Many goods to meet the relevant expanding economy activities were not manufactured locally (or if so in, say, NSW were subject to tariff obstacles when exported to other Australian colonies). The problems were present of being a relatively small market and of having the 'tyranny of distance', but a case for further examination can be proposed that another factor was operating - that of internal power lying with the commercial importers whose interests were best served by not actively supporting local manufacturing industry. It was 'easier to make a pound' by importing than by setting up manufacturing with such potential worries as relatively risky upfront capital costs, dealing with increasing Union power and the relative lack of supply of appropriate skills. This whole area of urban history lacks adequate exploration. Within these dynamic circumstances the level of skills training and skills available relative to demand becomes central to the contention that, given a deeper and wider engineering skills base in the Colony, the history of the impact of hydraulic lifts on Sydney would have been different. The Technical College courses plus improvements in the apprenticeship regulations and requirements - particularly the integration of technical courses with on-the-job training - started to upgrade the pool of skills available but this only occurred over a long period, but it was stressed as necessary over many years from 1880 on by, for example, N Selfe.

The same pattern of Technical Education emerged in Melbourne as for Sydney. However, in Melbourne a more politically powerful voice advocated the advancement of Technical Education. When similar mistrust of the growth of Working Mens Colleges by the

Government was experienced in Melbourne[1] as it was in Sydney[2] George Swinburne, MLA, conceived and established Swinburne Technical College, largely using his own funds, in 1908.



SWINBURNE TECHNICAL COLLEGE
Original building: opened Feb. 1909

Figure 20

In his era George Swinburne was an outstanding figure[3]. Both his outlook and subsequent actions concerning Technical Education command respect. The plumbing museum in Swinburne Technical College is unique and the Engineering Department houses outstanding working models of large buildings. Swinburne's speech on Education Law - Amendment Bill in 1910 is considered one of his finest, containing as it did his blunt and direct demand for more effort - "We have fallen far short of what we should have done". His furtherance of Technical

1. Sugden, S.H. & Eggleston, F.W., George Swinburne, p.450ff
2. A History of Technical & Further Education in NSW 1883-1983 'Spanners, Easels & Microchips, p.23'
3. Sugden & Eggleston, George Swinburne - a biography. Chapter on 'Politics'

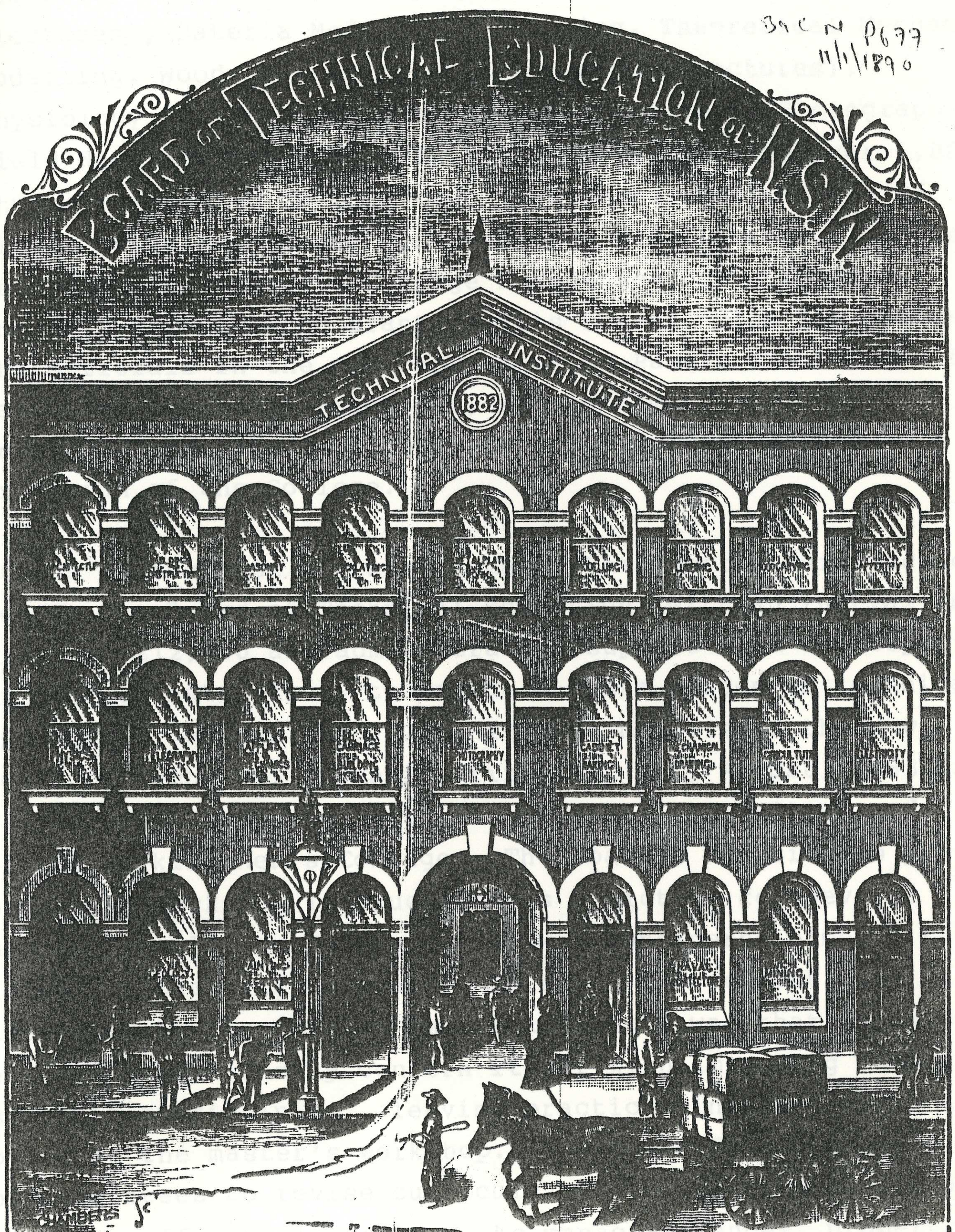
Education must be considered one of his major contributions in a life of outstanding actions. The early part of his life in Australia was spent as Engineer and Manager of the Melbourne Hydraulic Power Company up to 1897 and later as Managing Director. His experience of the working skills and training requirements was gained in this environment even though he went on to become Minister for Water Supply, followed by Minister for Agriculture, and held senior positions in the Defence Department in war time. George Swinburne it was who persuaded the authorities in NSW to enact the Law and negotiated the payment of £15,000 to the Sydney City Council for the breakage of pavements in Sydney which enabled the Sydney & Suburban Hydraulic Power Company to proceed. In combination, N Selfe & G Swinburne actively pursued the development of Technical Education in their respective Colonies/States, drawing upon their needs perceived in their everyday work of senior engineers in hydraulics. To what extent the mistrust of Technical Education facilities against which they both fought contributed towards an ongoing governmental and private outlook concerning the role of manufacturing in Australia is outside the scope of this work, but the genesis of relativity ranking between local industry versus export of raw materials justifies closer examination. However, during the era of dominance of hydraulic lifts, the technical skills available remained a challenge for the Companies involved. When it is recalled that the first Chair of Engineering at the University of Sydney was not appointed until 1889 (although there was a School of Engineering with 3 students enrolled in it in 1886) and that the following examples of development needs - wire technology, metal technology, lubricant technology, new turning machines, control instruments (flow, temperature, pressure), casting technology, metal working, lift technology, joint control gasket development, quality control (especially wear), heat exchange technology - were not available in any appreciable depth, it is remarkable what was achieved. On the other hand, it is important to note the lag between technical education and training requirements, particularly the regulations concerning indentures and technical programmes and working conditions. Whilst several other factors were active in the issue of improving Technical Education (1890-1910) the pool of skills required for the hydraulic lift industry in Australia was substantial. Combining in advocacy for safety improvement in construction and operation requirements for lifts, employers, professional institutions such as the Engineers Institute and relevant Unions were all marching to the same drummer. They also were all pressing for more Technical Education facilities. By the 1870s both the major industrial employers and trade unions were in favour of the establishment of a system of technical and further education. In 1878 the Sydney Mechanics School of Arts set up a separate 'Working Men's College', which was soon commonly referred to as 'Sydney Technical College'. (FIG 21) According to a submission to the NSW Parliament, 'the principal reason' for its establishment was 'that under present arrangements, it has been found that owing to neglected elementary education and long hours of labour, artisans and apprentices are placed at a great disadvantage in keeping up with and competing against those, whose labour being of a less exhausting nature, are in a better position to study'[1]. 'Sydney Technical College' was an immediate success, and, as the following list of courses offered in 1880 demonstrates, it endeavoured to meet to a limited extent the demand for further education and for technical education[2].

The courses on offer in 1880 included: English Grammar and Reading, Writing, Arithmetic and Bookkeeping, Elocution, German, Mathematics, Applied Mathematics and Steam Engines, Latin, Greek, French, Italian, Mechanical Drawing, Freehand Drawing (Advanced and Elementary), Drawing (Ladies' Afternoon), Drawing (Ladies' Morning), Experimental Physics, Design, Architectural Drawing, Architecture, Building Construction

---

1. op.cit. p.12
2. op.cit. p.12

Bk C N P677
11/1/1890



BOARD OF TECHNICAL EDUCATION OF NSW

Figure 21

(lectures), Phonography, Practical Geometry and Perspective, Geodesy and Surveying., Navigation, Practical Chemistry, Chemistry (lectures), Telegraphy, Natural Philosophy (lectures), Materia Medica and Planning, Theoretical Mechanics, Modelling, Woodcarving, Political Economy (lectures), Physiology, Anatomy, Simple Surgery (lectures), Photography and Field Naturalists' Club. By 1881 the College had over 1,000 students enrolled in more than 50 courses, but courses of direct relevance to the lift industry were limited. As the fees did not cover the College's expenses, it demanded increasing government grants. This factor, plus the desire of the officials in the new Department of Public Instruction to take over technical education, led to demands for the government to take full responsibility for the maintenance and expansion of the College.

It was in response to those demands that George Reid decided to set up the Board of Technical Education, with an initial annual grant of £12,000 and administrative support from the Department of Public Instruction, to manage a state system of technical and further education[1]. The nineteen members of the new Board of Technical Education first met on 1 August, 1883, and within weeks had taken over the premises, activities and staff of the Working Men's College. The Board's decision to provide practical workshop instruction was a victory for several members, including Norman Selfe, who considered himself the father of technical education in NSW. The conventional view of the time, in the British Empire at least, was that technical education should only concern itself with imparting 'underlying scientific principles', leaving practical instruction to take place in the master's workshop. The Board formed a whole range of committees to revise curricula and introduce new courses, to handle staff and timetabling, to manage finances, property and equipment. Almost all classes were held in the evenings -

---

1. <u>Spanners, Easels & Microchips</u>, op.cit. p.21

attendance by apprentices and trainees during working hours was sixty years away - and the emphasis was mainly on helping and improving those attending, both morally and educationally. The gentlemen of the Board often spoke of their evening classes as an uplifting antidote to the dissolute natures of young men. The Board's courses became increasingly 'practical'. By 1886 they included boilermaking, fitting and turning, carpentry and joinery, plumbing, carriage-building and cabinet making. The general acclaim of the foundation of the Working Men's College in 1878 was such that the government became wary of giving further support. Were they promoting a political hotbed which would act against them? James Trickett, who succeeded George Reid in 1884, expressed it "We must not let this grow into too big a thing too suddenly"[1] and warned the Board that the initial £12,000 granted by Reid may not be conveniently repeated. People like William Windeyer drew out of the guiding Board but Norm Selfe held to his advocacy of a Technical University "for the good of the working man"[2]. He and his diminishing group were rejected and technical education was placed under the general management of the Dept of Public Education in 1889*.

TABLE 13

Enrollments - Sydney Technical College*

1889	1841
1894	2956
1895	3458
1899	4837
1900	5581

Average attendance - 823

---

* Footnote

The University of Technology did not arise again for 50 years when the University of NSW was established

1. Easels, Spanners & Microchips (author unknown) p.23
2. Ibid p.23

It is difficult to quantify the influence of lifts in the progress of technical education in Sydney but such high profile personalities in lift (and associated) technologies as Norman Selfe and George Swinburne were certainly drawing on their everyday experience in this area when advocating that further support and greater recognition should be given to Technical Education in NSW. In the 1890s the increases in population, the mobility of people between colonies, the degree of relevant skills amongst the migrants, Trade Union activities (especially during the depression years of the '90s) all increased the complexity of the picture. The facts remain, however, that (i) technical skills were needed at ever deepening levels; (ii) technical training and education was not keeping pace with demand; (iii) apprentice training was varied and mixed in quality; (iv) the Colony continued to import heavily the materials needed which affected the competitive position between lift companies. These all added to the collage of the hydraulic lifts era. To what extent these factors influenced the decline of hydraulic lifts in the competitive arena when radical technical change occurred (electric power) is not clear but that they were operative to some degree is difficult to refute. Speculating that, given a stronger skill base in the community, hydraulic lifts would have been more plentiful, safer, more highly developed, cheaper and more deeply entrenched in the manufacturing, import and commercial life of Sydney, it would follow that they would have been harder to 'push to one side' when electric lifts were introduced to the market. The end would have been the same but perhaps slower in coming.

EFFECTS

A Summary of the Effects on the Sydney CBD (and paralleled in Melbourne) which can be substantially attributed to vertical transport during the era of hydraulic lifts

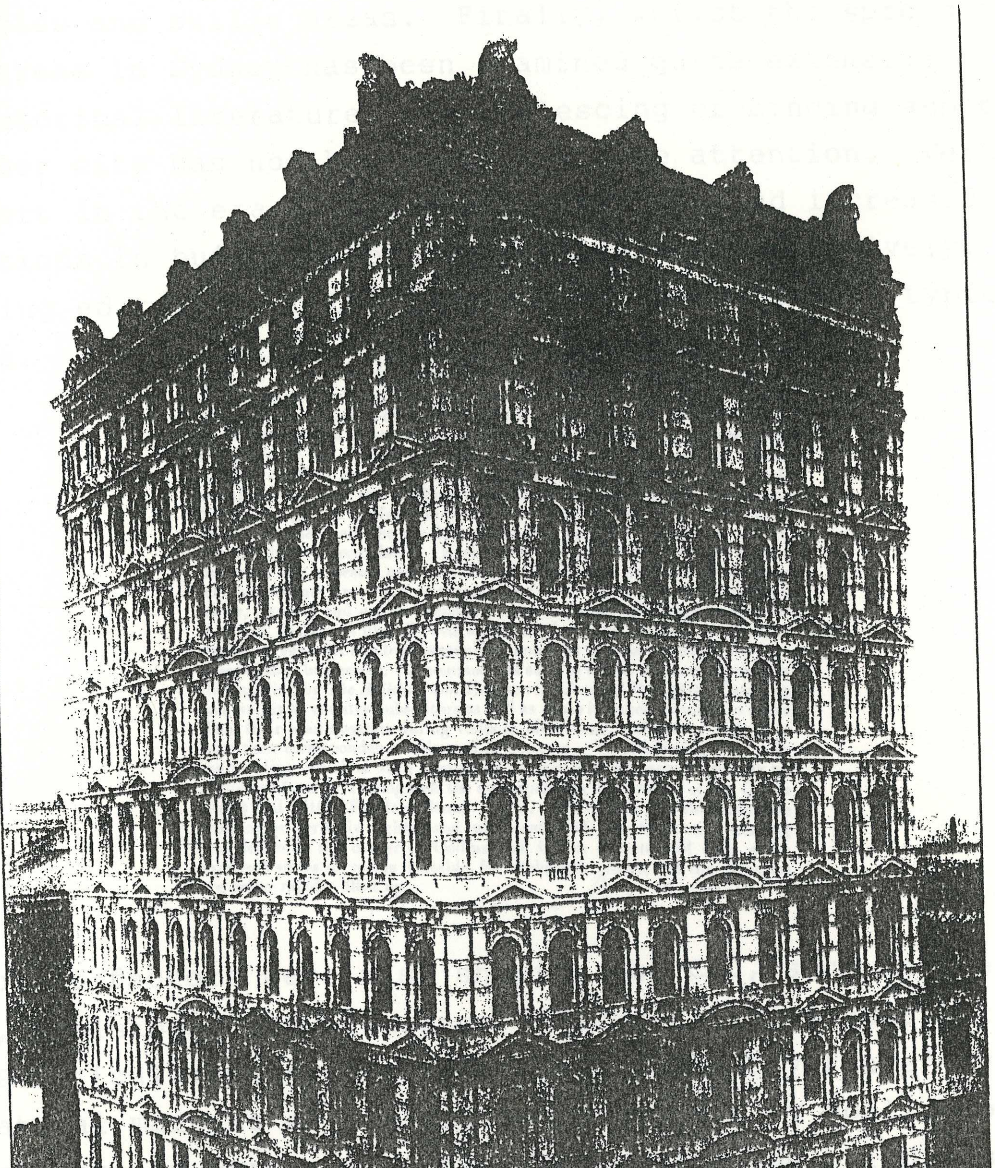
By 1880 Sydney was a burgeoning city - the foundations of a major centre were firmly laid and the framework of the future metropolis more clearly apparent. Many of the outstanding features of this urbanisation process formed steps of continua rather than being 'one-off' occurrences. Hydraulic lifts was a step of one such continuum, that of the development of vertical transport. During the period under review the world's longest travel of a direct ram lift was installed in the Australian Investment Corporation in Melbourne (145') followed closely by two other world standard direct rams (Australia Hotel in Sydney 104' and Mutual Life in Sydney 98'.) As one editor of the day said 'Sydney is no longer regarded as a camp by the outside world'[1]. More specifically and locally, however, the era ushered into Sydney a change in architectural styles. The Victorian narrow-fronted and relatively small cubic capacity buildings were not replaced as sites were redeveloped. The buildings went higher and the sites were frequently consolidated into much bigger blocks and the architecture changed to accommodate these differences. Such buildings, together with internal changes like minimizing staircase space (see page 80), thinning internal walls and re-arranging lifts into banks of lifts were all designed to maximize lettable cubic space. This in turn led to re-alignment of rent values - high floors became more valuable - no longer was the garret the low rent area of a building. These new structures yielded higher returns which were vital due to the much higher capital investments. Of equal importance when considering the role of

---

1. BEJ, October 6, 1888, p.304

hydraulic lifts, however, is that they forced more concentration on the pace of development of other services. The changes in the big buildings demanded better services all round - sewerage, drainage, lighting - these facilities were drawn along with mechanical vertical transport. In the warehouses and woolstores, new material handling techniques had to be developed to keep pace with the quickened movement of goods. Land values were in turn affected. Upward spiralling of land values was not new. Values had been increasing in what was to become the CBD area of the colony from the days of the first grants, but the changes in structures which lifts facilitated gave an extra 'fillip' to values. The claim has been made that lifts hastened the land boom and bust of the late 1880s. The changes in building construction led to challenges not encountered before, eg. (a) complaints were frequent early in the era from occupants of large buildings and their developers about the poor services to such structures from water, sewerage, lighting and especially in the flexibility of usage issues (such as the separate locations of lifts which led to a lot of frustration); (b) improvements in regulations for such issues as safety through the Scaffolding & Lifts Acts and, to a significant but possibly lesser extent, the furthering of technical education and the outcome of the Royal Commission into Apprentice System of 1912; (c) inventions were applied to other industries, eg. Mining and material handling technology in general. Lifts were in the public eye. Along with buildings such as The Colonial Secretary's Building, Lands Department, GPO, Education Department, hotels such as The Australia, the transport systems and the grand houses of The Glebe and Paddington all demonstrate the civic pride of an "upwardly mobile" capital within the British Empire. Lifts were highly visible in this age and the people using them demanded more from them, especially safety. One facet of safety was the level of competency of the artisans involved in all areas of the industry. This in turn acted as a motivating factor towards

THE BUILDING AND ENGINEERING JOURNAL, JULY 6, 1888.



F. M. WHITE & SONS, Architects

Prell's Buildings, 34 Queen Street, Melbourne.

NEW OFFICES OF THE BUILDING & ENGINEERING JOURNAL.

Figure 22

focusing on industrial needs and training in associated industries and skills areas. Finally, whilst the spread of urban areas in Sydney has been examined quite extensively in the historical literature, the coalescing or binding aspects in the inner city has not had quite the same attention. Vertical Transport in the era of hydraulic lifts allowed increased populations in buildings by using space more effectively. The following editorial in the language of the period is typical of the era.

NEW OFFICES OF THE BUILDING AND ENGINEERING JOURNAL.

In our issue of 13th October last we published from the architects drawings, the Queen Street elevation of this nine storey building which is now complete and fully occupied as offices. The architects were Messrs. F. M. White and Son and the contract for the work has been most satisfactorily completed by Mr. David Mitchell. The four passenger and one goods elevator supplied by the Austral Otis Elevator Company are now in full working order, and the building, a small city in itself, is full of tenants. Strange to say, as a refutation of the assertions of wise acres, "that they would never let," all the top floor offices were occupied by tenants before the building was completed. Every room in the building is fitted with a fire proof safe, asbestos gas stove, electric indicator to the corridor, showing whether tenents are "in" or "out," gas and electric light supplied by meter, lavatory and use of telephone, while the proprietor, alive to his own interests, deals most liberally with applicants for suites of offices on lease, in supplying such fittings to a reasonable amount as they may need for the purposes of their businesses. A commodious suite of offices has been secured in this building by *The Building and Engineering Journal Publishing Company* and we invite country subscribers as well as those in other colonies, to make them their head quarters during visits to Melbourne, and if they wish it, to have their correspondence addressed to our care. To familiarise them with the building which is such a prominent object from all parts of the city we reproduce from a Photograph the accompanying illustration of the Queen Street and Little Flinders Street fronts. Every office in this immense building is perfectly lighted and well ventilated: the blocks now nearing completion at the corner of Collins and Queen Streets still offer a few excellent suites of rooms suitable for architects offices, but the vacancies are being rapidly filled up.

B.E.J. 6/7/1889

Many other factors were also shaping the CBD, such as the Banks, Woolstores and Insurance Offices grouping together, but the HP reticulation system acted as a "boundary fence" (within the natural margins of the peninsula bounded by Woolloomooloo Bay and Darling Harbour) within which the large buildings could readily be erected and to which support services were attracted. The next era of vertical transport, that of electric lifts and escalators, found many of the accommodation changes made, some regulatory improvements made and others well on the way. Many development problems, if not solved, were fairly clearly defined.

Ex Prells Building, page 110

THE **HYDRAULIC** LIFTS IN THIS BUILDING HAVE RECENTLY BEEN

REPLACED BY

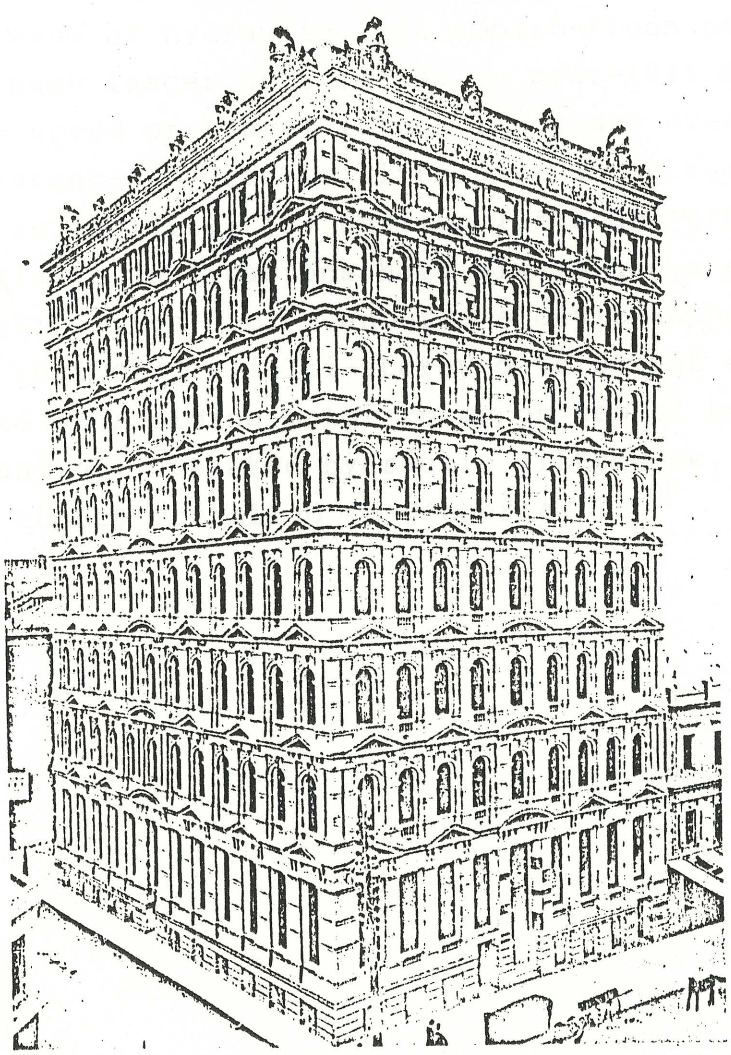
OUR UP-TO-DATE, MODERN, ECONOMICAL **ELECTRIC** ELEVATORS

Thus giving a CHEAPER and MORE SATISFACTORY SERVICE.

Previous Hydraulic Cost

£400

Per Annum.



NORWICH UNION CHAMBERS, QUEEN STREET, MELBOURNE.

Present Electric Cost

£93

Per Annum.

THESE RESULTS CAN ONLY BE OBTAINED BY USING OUR LATEST and NEW METHOD OF ECONOMICAL CURRENT SAVING CONTROL, REPRESENTING THE LATEST ADVANCEMENT & DEVELOPMENT IN THIS DIRECTION.

THE STANDARD ELECTRIC ELEVATOR COMPANY, LTD.

Figure 23

EPILOGUE/FOOTNOTES

1. When in 1957 buildings were permitted to reach higher than 150' in Sydney these earlier technical and social developments buttressed the path of demands and needs which were answered by electric lifts.

2. A second wave of hydraulic lift applications has emerged within a much larger lift market in post-1945 Sydney: (a) Where speed of travel is not important over short travel distances hydraulic lifts have advantages of low cost and reliability; (b) Bullion lifts and other heavy duty, reliable applications have always had a proportion of hydraulic lifts; (c) Canberra's civic authorities early in that city's multi-storey development expressed the desire of avoiding motor rooms on top of buildings and so many oil operated hydraulic lifts were, and continue to be, installed in Canberra.

BIBLIOGRAPHY

Books

Balint, E.,	Warehouses & Woolstores of Victorian Sydney, Oxford University Press, 1982.
Balint, Emery	Studies of Historical Commercial Buildings Construction in NSW 1850/1918.
Bertie, C.H.	The early history of the Sydney Municipal Council Sydney 1911.
Bertie, C.H.	The Story of Sydney, Chapter in 'The Coming of Steam', The Shakespeare Head Press, Australia, 1933.
Blacklock, L.	Short Tours of Old Sydney.
Blainey, G.	One hundred years - Johns & Waygood.
Burnell, J.G.	One hundred years of engineering in Victoria, Chapter 16 'Industrial Development'
Cannon, M.	The Land Boomers, Melbourne University Press, London, 1967.
Cannon, M.	Life in the Cities, Vol. 3 Australia in the Victorian Age, Thomas Nelson (Aust) Ltd, Sydney, 1976.
Coghlan, T.A.	Statistics showing the Relative Position & Importance of each of the Australasian Colonies 1890, Govt. Printer 1891
Coghlan, T.A.	40 Years of Progress in NSW, Govt. Statistician 1901.
Coghlan, T.A.	Results of a census of NSW 1901, Govt Printer 1902
Coghlan, T.A.	Labour & Industry 1788-1901, Govt Statistian 1904.
Crackwell, E.W.	Passenger & Warehouse Lifts Dec. 1882, Proceedings Eng. Inst. Dec. 1882
Fletcher, Brian	Urban Society in Australia - Writings & Approaches, Teaching History, Vol.17, Pt.2, July 1983, p15-29.
Fry, E.C.	The Growth of Sydney, p.26/47, Article in J. McCarty (Ed), Australian Capital Cities, Sydney Uni. Press 1978.

Hirsch, Max — Land Values Taxation in Practice, Renwick Pride Nuttall Pty Ltd, Melbourne, 1910.

Herman, M. — The early Australian Architects and their Work, Angus & Robertson, 2nd ed 1970.

Hoffnung, S. & Co. — The House of Hoffnung, Printed Privately

Kelly, Max (ed) — Nineteenth Century Sydney, Essays in Urban History, article by Edwards N., The genesis of the Sydney Central Business District 1988-1856, Sydney Univesity Press 1978.

Knibbs, G.H. — Local Government in Australia, Govt Statistician

Lincolne, G.B. — Vertical Transport - an Historical Sketch, private printing

\- — History of the Sydney GPO, Australia Post, Hale & Iremonger Pty Ltd 1988

Rabone, R.G. — The History of Richardson & Wrench ?

Spanners, Easels & Microchips, A History of Technical & Further Education in New South Wales 1883-1983, Council of Technical & Further Education.

Roe, Jill (Ed.) — 20 C Sydney, Hale & Iremonger, 1980..

Saunders D — Historic Buildings of Victoria, Jacaranda Press Pty Ltd, 1966. Article by G.F. James 'Melbourne: the growth of a metropolis'.

Serle, G. — The Rush to be Rich, Melbourne University Press 1971

Sperritt, P. — Sydney Since the Twenties, Hale & Iremonger, Sydney 1978.

Sugden, S.G. & Eggleston, F.W., George Swinburne: A Biography, Angus & Robertson Ltd, 1931.

Vogel, R.M. — Vertical Transport in Old Back Bay, Smithsonian Studies in History & Technology, No.50, 1988.

White, Olga et al — Our Heritage, Australian Society of Archivists 1983.

Author Unknown — 444 Sydney Buildings, Royal Institute of Architects

Brochure	Aarons Exchange Hotel Tourist Handbook to Sydney 1890, held in Mitchell Library
Brochure	NSW in 1880, Gibbs Shallard & Co

Theses

Dunstan, K.	Introduction of Building Equipment, Ph.D. Thesis, UNSW.
Davies, M.	A History of Vertical Transport in Australia, Architectural Assignment - UNSW, Oct. 1968.
Gerathy, G.	Role of City Council of Sydney, MA Thesis, Uni of Sydney, 1972.
Humphrey, L.	Warehouses of Victorian Sydney, B.Arch. Thesis, UNSW.
Nordon, S.J.	Norman Selfe & Early Technical Education, Ph.D. Thesis, UNSW, 1983.
Reynolds, P.L.	The Evolution of the Government Architect's Branch of the NSW Department of Public Works, Ph.D. Thesis, UNSW, 1972.
Roberts, A.	City Improvement in Sydney Public Policy, Ph.D. Thesis, Uni of Sydney, 1978.

ACKNOWLEDGEMENTS

It is with sincere thanks that I acknowledge the help given so readily to me in the compiling of this work. Les Campbell & Les Gleeson, both now retired from EPL Kone, were constant in their assistance as also was Michael Hodson, still with EPL Kone, John Inglis of OTIS Elevators and Geoffrey Weiland of BORAL JOHNS PERRY LIFTS ~~Perry Jones~~.

My gratitude also is given to to Lyn Milton of Westpac archives and the staff of the libraries of Public Works, Labour & Industry, Education and Mitchell. My wife Joyce was long-suffering in proof-reading this work as was Shane Marshall who patiently tackled the drafts on the word processor.

Finally, I acknowledge the help and guidance of Professor Brian Fletcher.

APPENDICES

1. (A) Relevant Board Minute notes from the Australian Joint Bank. Pages 1-15

   (B) Internal correspondence dealing with lifts in the Head Office Building of the Bank of NSW. Pages 1-24

2. Major Buildings listed in the Municipal City Council Annual Reports 1892, 1893, 1894. Pages 1-6

3. (A) List of Changes to Regulations controlling the City Council.

   (B) City of Sydney - Value of Property 1875-1916. Pages 1-3

4. Copy of the Act granting the Sydney & Suburban Hydraulic Power Company Limited the right to supply High Pressure water to the City. Pages 1-11

5. Connections to HP Mains in the CBD 1892-1931. Page 1

6. Preliminary Draft of a Sketch of the Melbourne Hydraulic Power Supply. Pages 1-3

7. Copy of Regulations of the Scaffolding & Lifts Act 1912 which had to be displayed in all Lifts. Page 1

8. Map showing the reticulation system of High Pressure Mains in the City of Sydney drawn in (a) 1924, (b) 1973. In pocket

APPENDIX 1

(A) Relevant Board Minute notes from the Australian Joint Bank.

(B) Internal correspondence dealing with lifts in the Head Office Building of the Bank of NSW.

25 September 1885

C.H.E. Blackmann. Architect. Letter 22nd Sept.

Clock. For new Head Office. Ask Allerding to give a price. Mr. Griffits will enquire.

29 September 1885

Robertson Fisher & Ralfe. Solicitors. Letter 23rd Sept.

Head Office. New Premises.

Report on Warne & Reid's request to raise back wall of Bank two feet.

Allowed on sufferance, solcitors to settle or draw memo.

2 October 1885

C.H.E. Blackmann. Letter 2nd Oct.

New Head Office Premises - Fittings.

Tender of John Young £3150.

Addept this tender - time is an object to complete.

13 October 1885

C.H.E. Blackmann. Architect. Letter 12th Octr.

New Head Office. Bank Fittings.

Send for execution by Board contract with John Young for £3000.

Contract signed.

20 October 1885

C.H.E. Blackmann. Architect. Letter 17th Octr.

Sketch plan of proposed New Extension Head Office. Temporary Lift - Hudson Bros. Tender £360 to be reduced by £100 if Screw Gear is returned. Permanent Lift - Tenders Hudson Bros. £1092 and £200 for Car - James Lawrence £1175, without cage.

Deferred for further tenders.

27 October 1885

C.H.E. Blackmann. Architect. Letter 26th Oct.

Head Office. Tenders for Passenger Lift.

Mr. Rundle and General Manager to decide.

Letter 27th Oct.

Report on German Tiles.

Noted.

Recommends "Malmesbury" Tiles, estimated cost £228.

Not approved.

~~2~~ 30 October 1885

New Bank Premises.

Consideration of Tenders for Flooring.

Consult Mr. Young for further consideration as to temporary flooring.

Minute Book No. 37

8 December 1885
C.H.E. Blackmann. Architect Letters 4th Dec.

Head Office New Premises. Suggests name of Bank in Brass on bases of front granite columns.

Deferred.

Decoration of Ceiling and Walls of Banking Room. £150 has been set apart in Specifications.

The Board ought to know what decoration the Architect proposes and the Cost, £150 ought to be sufficient.

Gas Engine for Lifts. Suggests early purchase.

Mr. Walford will make enquiries.

Head Office Extension. Sketch of portion to let.

The Board think the excavations should be all carried out alike throughout.

11 December 1885
C.H.E. Blackmann. Architect. Letter 10th Decr.

New Head Office Premises. Tenders for laying blue-stone flagging
Wilson Corben & Co. £1919. J. W. Wilkes £206.

Accept Wilson & Corben's tender.

18 Devember 1885
C.H.E. Blackmann. Architect. Letters 15th Decr.

Head Office New Premises.

For execution by Board - Contract Wilson Corben & Co. and Bank for laying foot-path in front of Head Office £199.

Signed.

Also Contract Milne Bros. & Bank for Temporary Lift £225.

Signed.

18 December 1885
C.H.E. Blackmann. Letter 16th Decr.

Head Office New Premises. Decoration of Interior - Send 3 drawings showing design - Cost £180.

Get this done at an expense not exceeding £30.

29 December 1885
C.H.E. Blackmann. Architect. Letter 23rd Decr.

Head Office New Premises. Gas Engine.

Tenders	6 h.p.	8 h.p.	12 h.p.
Milne Bros.	£303	£353	£430
James Wallace	350		500
		[illegible]	[illegible]

2 February 1886

C.H.E. Blackmann. Architect. Letter 21st Jany.

Head Office New Premises. Appointment of Engineer.

Pay this engineer off and select an efficient man.

5 February 1886

C.H.E. Blackmann. Architect. Letter 14th Feby.

Head Offices New Premises. Floorcloth.

Board desired to select again.

Pattern No. 4 for Banking Room. For the Offices, Officers may select.

9 February 1886

C.H.E. Blackmann. Architect. Letter 4th Feby.

Iron ladder in top floor for access to manhole in skylight.

Erect the necessary ladder.

Muntz metal lining for doors.

Line the side bottom of the doors.

Letter 6th Feby.

Hydraulic Lift. Force pump at cost of £45to drive water to tank in roof.

Erect this pump and make all complete.

16 February 1886

C.H.E. Blackmann. Architect. Letter 16th Feby.

Head Office New Premises. Sketch of Clock.

Not approved.

23 February 1886

C.H.E. Blackmann. Architect. Letters 20th Feby.

Head Office New Premises. Tender for iron shelving in basement £758.

Declined. This tender too high.

Tender for alterations to Lightning Conductor £18.

Make this alteration.

Tender for Wire netting over ceiling light & skylight £188.

Directors to inspect and report.

26 February 1886

C.H.E. Blackmann. Architect. Letter 24th Feby.

Head Office New Premises. Tender for iron ladder to give access to Roof.

£13.18.0

Accept this tender.

2 March 1886

6 April 1886

Recess for Customers' Deed Boxes in New Premises. Shall there be wall or iron grille.

Brick of the hardest kind that can be got built in cement with fire-proof Iron door in frames securely fixed. The room to be fitted up with iron shelves. The wall to be cemented outside.

9 April 1886

C.H.E. Blackmann. Architect. Letter 8th April.

Head Office New Premises.

Banking Room. Linoleum found unsuitable, recommends floor cloth, afraid cement floor will not stand traffic.

General Manager to arrange.

13 April 1886

Head Office New Premises. Windows of Banking Room - Insurance against breakage.

The Architect be instructed to prepare plans and specifications for Iron or Steel shutters.

Robertson Fisher & Ralfe. Solicitors Letter 12th April.

Iron Frieze. Mr. Darley strongly recommends Bank shall at once file a Bill in Equity.

Deferred.

16 April 1886

C.H.E. Blackmann. Architect. Letters 13th & 14th April.

Head Office New Premises. Venetian Shutters. Wood about £120. Iron £240.

The Board prefer steel, must be carefully and well made and sure to fit.

20 April 1886

C.H.E. Blackmann. Architect. Letter 14th April.

Head Office New Premises. Entrance to Lift. Estimate £65.

The General Manager to have done what he thinks necessary with as little cost as possible.

27 April 1886

C.H.E. Blackmann. Architect. Letter 16th April.

Head Office New Premises. Grating and Prism Lights. Suggests additional horizontal grating of $1\frac{1}{2}$ inch Iron Bars immediately under Prism Lights. Carry out this work.

11 May 1886

Letter 10th May. Reply of Post Office Secretary respecting Iron Pillars and Lattice Work.

Deferred.

25 May 1886

C.H.E. Blackmann. Architect. Letter 30th April.

Head Office New Premises. Extension of Building.

Deferred.

~~28 May 1886~~

11 June 1886

C.H.E. Blackmann. Architect. Letter 8th June.

Head Office New Premises. For execution by Board. Contract for Grilles under Prism lights £220 John Young & Bank.

Accepted & Signed.

Letters 10th June.

Head Office New Premises. Report as to sink and drain pipes in leaded property King Street.

Write the Landlord to put the drain in order.

Head Office Old Premises. Offers £7 for carpets in late ~~1st~~ Board room and General Manager's Room. Accept the offer.

15 June 1886

C.H.E. Blackmann. Architect. Letter 12th June.

Head Office. New Extension. Sketch Plan.

Deferred.

25 June 1886

C.H.E. Blackmann. Architect. Letter 21st June.

Re the present Gas Engine. Recommends driving the elevator with a powerful Belt instead.

Stand over for the present.

2 July 1886

C.H.E. Blackmann. Architect. Letter 29th June.

Working the Lift by a Belt.

Make no change for the present.

13 July 1886

C.H.E. Blackmann. Architect. Letter 12th July.

Extension of New Head Office. Submits another Sketch Plan. Returned for alteration.

23 November 1886

C.H.E. Blackmann. Architect. Letter 22nd November.

Head Office New Extension. Asks reconsideration of his account. The Board consent to give Mr. Blackmann £200 in full settlement of this demand for the rejected Plans.

26 November 1886

Elevator for New Premises. Specification from Otis Bros. & Co. Standard Hydraulic Passenger Elevator by Hudson Bros. Limited £1157 on terms stated.

Accept the Specification but Mr. Friend's additional suggestion to be part of the agreement and the Architect to be sure the shaft can be got ready in the time 3 Months or at most 4 months.

30 November 1886

Blackmann & Sulman. Architects. Letter 27th November.

New Head Office. Have issued Certificate for account of extras £5,127. 0. 5. The Architect's final account and letter explaining should have been presented to the Board for examination and approval before his Certificate. Payment to Mr. Young made, but Mr. Blackmann the Architect to further explain items in the Contractor's final detail account of £5127 0. 5.

Letter 29th November.

Head Office New Extension. Suggest extra Door.

Think it not necessary.

7 December 1886

Blackmann & Sulman. Architects. Letter 3 Decr.

Head Office New Extension. Observations on J. Try's tender to erect Shaft etc. for Elevator £350 with drawings & specification of the work.

Accept Try's tender.

14 ~~February~~ January 1887

Blackmann & Sulman. Architects. Letter 13 Jany.

Head Office Extension. Report on windows. If any steps are to be taken to prevent the owner of Pastoral Chambers obtaining a right of light from. Block up all windows.

11 February 1887

Fisher Ralfe & Salwey Solicitors. Letter 8th February.

Head Office Extension. Copy of notice to owner and Lessee of Pastoral Chambers.

25 February 1887
Blackmann & Sulman. Architects. Letter 22nd Feby.
Head Office Extension. Report on Lift Shaft.
Read.

4 March 1887
Blackmann & Sulman. Architects. Letter 1st March.
Head Office Extension. First Monthly Report on progress of Building.
Read.

8 March 1887
Head Office. Hydraulic Lift for Tellers. Norman Selfe's Report 4th March 1887. Smaller repairs estimated £25. To thoroughly remodel about £75. Carry out Mr. Selfe's suggestion and make a perfect and permanent job.
Head Office Extension. New Passenger Elevator. Norman Selfe's letter 4th March. Suggest replacing Water Tank on Roof of Building with a strong Cast Iron Cistern at extra cost of about £100 for reasons stated. Architect's letter 8th March. Mr. Selfe's suggestion respecting Cast Iron Tank approved but a division should be made for Lift use and Lavatories.

18 March 1887
Blackmann & Sulman. Architects. Letter 15 March.
Head Office Extension. Report on the Contract for shaft for Elevator.
Read.

22 March 1887
Blackmann & Sulman. Architects. Letter 16 March.
Extension. Steel Doors. The Stairs. Suggest iron framed staircase with marble treads and risers, bronze newels and ornamental balustrade.
Entrance to basement. The Drainage.
Deferred for further consideration.

29 March 1887
Blackmann & Sulman. Architects. Letter 26 March.
Head Office Extension. New Passenger Elevator. Cast Iron Cistern.
Ask directions as to calling for tenders or leaving Hudson Bros. to carry out work. Placing of Trap Door.
Accept Hudson Bros. tender £125.

15 April 1887
Blackmann & Sulman. Architects. Letter 15 April.
Head Office Extension Premises. Plan of proposed enlargement of the

to leave out stairs.

22 April 1887

Blackmann & Sulman. Architects. Letter 19th March.
Head Office Extension. Carvings. £178. Extra. Sheriff to execute the work.

Employ Sheriff. Extra £178 allowed.

3 June 1887

Blackmann & Sulman. Sydney. Letter 5th & 25th April. 1 June.......
Head Office Extension. Monthly Report No. 4.

Read.

17 June 1887

Blackmann & Sulman. Architects. Sydney.
Letter 14th June. Head Office Extension. Submit extras for approval. Alterations to Stone Stairs etc. £51. Extra height in Basement etc. £91. Prismatic Lights, Girders etc. £85. Girders to Ground Floor etc. £58. Steel Door etc. £79.

Approved.

Letter 16th June. Head Office Extension. Wall of Pastoral Chambers Mr. Try's estimate for 14 in. Wall £106 or £149. Blocking Windows etc. £15.10. 0.

Carry out this as stated.

5 July 1887

Blackmann & Sulman. Architects. Letter 4th July.
Head Office Extension. Monthly Report No. 5.
Disposal of Temporary Lift. Authorised extras since report 1st June £513 making £37,253. Remove the temporary room at once. After the engine is removed sell all other parts to best advantage.

8 July 1887

Blackmann & Sulman. Architects. Letter 5th July.
Head Office Extension. Recommend Oregon joists in place of hardwood for reasons stated.

Use orgeon.

12 July 1887

~~12 July~~ Blackmann & Sulman. Architects. Letter 8th July.
Head Office Premises. 1. Recommend laying on water from high pressure main in King Street, Hudson Bros. estimate is £42. Head Office Extension Lift. Mr. Selfe offers to perform necessary work in shifting

engine for £47.10. 0.   2. Mr. Try will allow £25 off his a/c towards same. Also will remove lift to Sussex St. if allowed the lift casing.

1. Carry the high water pressure out.   2. Carry this out.

Head Office Extension. Architects ask directions as to Heads on the 5 columns on ffont elevation as per plan. Architect to suggest some other suitable ornamental carving as well as the Heads.

15 July 1887

Blackmann & Sulman.   Letter 14th July.

Head Office Extension. Submit drawings of Console suggested instead of Heads to first floor windowsin front. Plans approved for front and archway from banking room to staircase. Archway deferred.

22 July 1887

Blackmann & Sulman. Letters 20th & 21st July.

Head Office Extension. Recommends that "Reveals" of windows facing courtyard be same as present building. Extra cost £10.

Carry this out. Could you not chamfer the wall but the window frames should be placed out as far as possible to obtain all light possible.

5 August 1887

Blackmann & Sulman.   Architects.   Letters 2nd August.

Head Office Extension. Montly Report No. 6 Noted. Arch in banking room wall. Carry out the new Arch proposed.

Statues for Head Office Premises. Facial expression on marble statues ordered from London.

Noted.

23 August 1887

Blackmann & Sulman. Architects.   Letter 19 August.

Head Office Extension. Proposed additional Otis lift. Total cost £500.

Deferred.

Letter 20 August.

Head Office Premises. Account for shutters in the Banking Room £430.16.0. Pay this account.

30 August 1887

Blackmann & Sulman. Architects. Letter 26 August.

Head Office Premises. John Young's a/c £645.12.0 for marble tiles.

Pay this account.

2 September 1887

Blackmann & Sulman. Architects. Letter 1st September.

Head Office Extension. Proposed new lift r part of Premises to be let. Further advices. Deferred for her report as to

13 September 1887

Blackmann & Sulman. Architects. Letter 12th September.
Head Office Extension. Additional Passenger Lift. Tender accepted and signed.

20 September 1887

Blackmann & Sulman. Architects. Letter 17th September.
Head Office Extension. Additional Passenger Lift. Professor Warren willing to supervise the lift. Fee £15.15.0 in lieu of Mr. Selfe.

Secure this gentleman's services.

25 October 1887

Blackmann & Sulman. Architects. Letter 21 Oct.
Mr. Try's Workmen's Picnic. Subscription asked. Declined.

Board Minute Book No. 39

2 March 1888

Blackmann & Sulman. Architects. Letter 1st March.
Head Office Statues. Report on work of placing in position.
Mr. Birch's account. Read. Original contract must be adhered to.

6 March 1888

Blackmann & Sulman. Architects. Letter 2nd March.
Head Office Extension. Otis Elevator Company require £370, half amount of contract, on delivery of Bills of Lading. To be paid.
Letter 3rd March. Head Office Extension. Monthly Report. Read.

9 March 1888

Blackmann & Sulman. Architects. Letter 7 March.
Head Office Extension. Respecting Gas and Water pipes. The architect will place the water pipes as free as he can, and with some little regard to the appearance.

Letter 8 March

Head Office Extension. 1. Spandril of stairs should be constructed brick resting on iron girder. Extra cost £12.0.0.

Carry this out.

2. Wooden gratings over lead gutters of roof £10.15.0

Carry this out.

3. Rough flooring in the roof £24.10.0.

Do not think this desirable may have further information.

4. Variations in gas piping giving 12 separate meters £39.10.0

Yes.

5. Lavatories & W.C.s Tiled Flooring £107.

16 March 1888

Blackmann & Sulman, Architects. Letter 14th March.

Head Office Extension. Lavatories & W.C.s. Tiled Flooring. Use tiles in all W.C.s and Lavatories. Say to cost £107.

Speaking Tubes. Use the tin tubes as per contract.

Letter 15 March.

Head Office Lift Shafts. Carry this out as per Architect's letter.

Letter 9 March.

Head Office Extension. Sandy & Co. Architects suggest firm should order one or two extra sheets bent glass for shop fronts. Price £55.7.6 each.

The Board think it not necessary.

23 March 1888

Blackmann & Sulman. Architects. Letter 19 March.

Head Office Extension. Utilization of space under first flight of public staircase.

Carry out the room complete for a safe.

27 March 1888

Blackmann & Sulman. Architects. Letter 26 March.

Head Office Statues. Account £30 for the erection of.

Pay this.

Recommend £10 to Mr. Williams.

Pay Williams £10.

3 April 1888

Blackmann & Sulman. Architects. Letter 23 March.

Head Office. Bullion Lift. Suggest scheme for protection of. Estimated cost £40.

Carry this out.

6 April 1888

Blackmann & Sulman. Architects. Letter 4th April.

Head Office Extension. Monthly Report No. 14. Read.

20 April 1888

Blackmann & Sulman. Architects. Letter 19th April.

Head Office Extension. Ask £500 on account of commission on work. £792.10.0 already paid.

This may be paid.

staircase. Sends specimen of tiles procurable in Sydney. The dado approved to be cedar.

Letter 3rd September.

Marble staircase. Sketch for stained glass circular ceiling light over Bank staircase.

Approved.

Letter 3rd September.

Erection of marble statues £157. Letter from John Young.

Wait Mr. Youhg's arrival.

25 September 1888

John Sulman. Architect. Letter 21st September.

Head Office Extension. Entrance hall. Wishes Board to select marble for dado. The marble declined. Procure tiles.

2 October 1888

John Sulman. Architect. Letter 1st October.

Head Office Extension. Revolving shutters in lieu of iron grilles. estimated cost £241.

Carry out the revolving shutters taking care to have them made good and neat.

Board Minute Book No. 40

5 October 1888

John Sulman. Architect. Letter 2nd October.

Head Office Extension. Casing of lift. Ropes at the back. Casing not required.

Letter 3rd October.

~~Etx~~ Flagging in front. Wilson Corben & Co. a/c £88.14.3. Pay this account.

~~Letter 2nd October~~

16 October 1888

John Sulman. Architect. Letter 12th October.

Head Office Extension. Dado of painted & glazed tiles in hall of letting portion. Cost £73 p. sketch.

Deferred.

Hardie & Gorman. Sydney. Letter 20th October.

Head Office Extension. Acceptance of Sydney Land Bank & Financial Agency Co.'s offer to lease office on ground floor at £500 per annum free of rates and taxes for 5 years from 1st January 1889.

Noted.

John Sulman. Architect. Letter 13th October.

Head Office Extension. Proposed archway from banking room to marble staircase. Sketch

6 November 1888

John Sulman. Architect. Letter 5th November

Head Office Extension. Tiling to dado of hall. Sends sketch of proposed painted tiles. Cost £60.

Approved.

23 November 1888

John Sulman. Architect. Letter 20th Novr.

Head Office Extension. Estimates for decoration of Board Room. Lyon, Wells, Cottier & Co. £150. Bradbury £135. Murray £130. Lyon, Wells, Cottier & Co. design accepted, but the Board think the wall cannot yet be sufficiently set for the painting.

11 January 1889

John Sulman. Architect. Letter 8 January.

Head Office Extension. Monthly report No. 23. The staircase. The lift. Elevator in letting portion.

Read.

15 January 1889

Head Office Extension. Letter ~~fx~~ G. J. Sly 14th instant. Offers to take for a year certain the four rooms on first floor as stated. Rent £500 for the year say quarterly with usual cesser or abatement of rent in case of fire.

Accept Mr. Sly's offer.

John Sulman. Architect. Letters 14th January.

Head Office Extension. Estimate for coal place £14. Carry this out. Clerk of Works. Proposes Williams supervision at least once every day without expense to Bank. Carry out this arrangement.

25 January 1889

Head Office Extension. Letter Hardie & Gorman 23 January. Offer of £6 per week for the basement for a billiard saloon.

Declined.

5 February 1889

John Sulman. Architect. Letter 1st February.

Head Office Extension. Professor Warren's report on the Bank passenger lift. Recommends saving space in the engine room, cost about 30/-. Make the necessary alterations.

12 February 1889

John Sulman. Architect. 11 February.

Head Office. Ventilation of banking room. Plans & sample ventilation

22 February 1889
Head Office. Passenger lift and engineer. Make the appointment of Thomas Thomas.

19 March 1889
John Sulman. Architect. Letter 14th March.
Head Office Extension. Dr. Sly's requirements. Paint the panel for the names and let the blinds be where they are.

26 March 1889
John Sulman. Architect. Letter 21st March.
Head Office Extension. Contractor's insurance £16,000 expires 25th instant. Present insurance in Bank's name £36,300. Instructions asked.

Insure additional on the new building £20,000 (£10,000 to go to the Lion Insce) to fall in 1st March 1890. If convenient take out new policy for £50,000 on the whole building.

9 April 1889
John Sulman. Architect. Letter 8th April.
Head Office Extension. Lifts. Read.
Letter 4th April. Monthly Report. Decoration of staircase & passages. No further doécorations for the present.
~~Letter~~

23 April 1889
John Sulman. Architect. Letter 16th April.
Head Office Extension. Board Room. Sũggests entirely new furniture with exception of clock. The present furniture will do except a few odd things.

3 May 1889
John Sulman. Architect. Letter 30th April.
Head Office Extension. Board Room brackets to choose. Take the (Griffin) 65/- bracket.

14 May 1889 '- latter 6th inst.
Head Office Premises: John Young's account explaining certificate p. £5127 signed by Mr. Blackmann, Architect 27th November 1886. Desires payment for erection of Sttues £156.19/2 in March 1888. This amount to be paid.

11 June 1889
John Sulman. Architect. Letter 8th June.
Head Office Extension. Report on working of lifts. A new pump is to be fixed, and it seems probable a more powerful engine will be needed. Wait arrival of the new pump for proof trial.
Letter 7th June. New Head Office original portion. Recommends

rebated fillets to be fixed on back edges of all louvres, estimated cost £30. This work to be done.

Ironwork on roof needs repainting, also all the wooden window frmaes sashes & doors of original building, estimate from Sandy & Co. £55.10.0 This ~~paintingxtxm~~ painting to be done, nothing but the best lead paint to be used.

16 July 1889

Sulman & Power. Architects. Letter 11th July.

Head Office Extension. Statement of accounts. Balance due contractor £1,316. This balance may be paid.

26 July 1889

Head Office Extension. Sulman & Power's letter 24 July. Their account balance £659.13.0. This account is to be paid.

16 August 1889

Head Office. Lifts. Letter Sulman & Power 9th inst. Report from Professor Warren and Mr. Sulman as to new and improved pump. The Board think may try both lifts for a week.

Head Office. Letting Portion. Requisition of 2nd instant for working of lift.

Noted.

W. D. WATSON & WHITE
MECHANICAL AND ELECTRICAL
CONSULTING ENGINEERS

W. D. WATSON, A.M.I.E., AUST.
C. H. WHITE, A.M.I.E., AUST.

PHONE B 1454

PRIVATE PHONE Y 2931

117 Pitt Street
Sydney

January 20th, 1932.

Messrs. Robertson and Marks,
Architects,
117 Pitt Street,
SYDNEY.

Dear Sirs,

SIGNAL CONTROL,
LIFTS NOS. 3 and 4,
BANK OF NEW SOUTH WALES.

Immediately following the conference held in Mr. Marks' office on 14th instant, relative to the above, we placed the proposal before Waygood-Otis Ltd., requesting a "bedrock" tender for the conversion of the units, and have to report as follows:-

The initial tender submitted for the work was not satisfactory in detail and was returned to the Contractors.

We attach hereto a copy of the Contractors' final tender, which we have reasons to believe is on a bedrock basis.

We attach the copy of the Contractors' letter in order that we may draw your attention to certain contained terms which require amending before accepting, should such be considered.

Signal Control as applied to these units will be advantageous in the following respects:-

1. Save loss of time to passengers by:-

(a) Enables the driver to use maximum acceleration between floors.

(b) Eliminates overshooting of the landing.

(c) Permits maximum speed in approaching the landing, and uses a minimum distance in which to arrest motion.

(d) Eliminates overcarrying.

(e) Eliminates the passing of an intending passenger on the landing.

2. Saves wear and tear on the equipment generally, particularly on ropes.

3. Saves power (actually this item is not of great moment).

In the matter of inter-car signalling, we are still of the opinion that little is to be gained by it, as, in direct opposition to the modern trend, it adds to the "human" element, whilst with the signal control, inter-car signalling would provide no beneficial result.

A simple arrangement whereby the car leaving Ground Floor would "buzz" to the car waiting at the Top floor could readily be added.

Similarly an automatic system of light signals could be installed, and such lights may be on the top landing or in the cars.

Either of these simple arrangements would eliminate the necessity in this respect for a dispatcher, which is apparently the desired result.

The Contractors in the second paragraph claim that the removed material is to become their property, and yet suggest that they will hold the controllers for two years, and if a sale is effected "a credit of £500. or whatever amount we (they) are able to secure for them" is suggested, and the question immediately arises - who owns the controllers if they are not sold?.

At thie juncture it does not appear to us to be necessary to make a definite recommendation, but we take the opportunity of stating that in our opinion Signal Control is the greatest advancement made in any one item in the Lift business.

Yours faithfully,

W R Watson

W. D. WATSON AND WHITE.

31st December 1939

NEW HEAD OFFICE PREMISES

LIFTS 3 & 4

Tender accepted. See that the indicators in each lift work in parallel. RJP.

Lifts 3 & 4 are separated by an air duct and the Driver of one lift cannot at present determine the position of the other lift when the cars are in motion.

An indicator can be installed in each lift to show the position of the other lift. Such an installation would be a decided advantage, would enable the service to be improved and may free a Lift Director for other duty. If this can be done the installation would pay for itself in 15 months.

Waygood Otis (Aust) Pty. Ltd., the Company which installed all our lifts has submitted an estimate of £258 (Two hundred and fifty-eight pounds) for carrying out the installation in ordinary time and approximately an additional £10 for carrying out the work in overtime. It would of course be quite worth the additional sum to have the work carried out without interrupting our lift service.

An installation very similar to the one suggested is at present in use in the T & G. Building and it is reported to be a success. The Lift Attendants themselves say that it saves them much time and consequently greatly improves the service.

It is suggested that the device be installed in Lifts 3 & 4 at a total cost of £268 (Two hundred and sixty-eight pounds) and if the suggestion is approved authority is sought for the expenditure.

Recommended

H.O. Premises Lifts

Specifications provide for 3 lifts in centre of new Premises & Architect recommended 4 lifts but Board Mems 4.5.28 cut out one of the lifts and an extra lift well is provided.

H.O. Building Committee after 6 months experience with the 3 lifts at present in operation suggest that to meet probable requirements of the traffic the Board should install 2 lifts with about 600 ft a minute control at [illegible] each [illegible] instead of 1 lift [illegible]

[illegible]

From observation it seems that one of the main attractions in modern office accommodation is an effective lift service and on completion of the Building it will be found that four lifts are necessary to cope with the traffic satisfactorily.

[illegible]

21st October 1930

NEW HEAD OFFICE PREMISES

ELEVATORS Nos. 1, 2, 3 and 4. "SIGNAL CONTROL SYSTEM"

Messrs. Watson and White, Consulting Engineers to our Architects in their letter of 10th inst. addressed to the latter strongly advise the Bank to consider installing in Lifts Nos 1 and 2 the very latest improvement in lift signalling and control.

The system is explained at length and very clearly by the Engineers in their letter of 10th inst. attached. Briefly described the system eliminates the human factor to the point of requiring the Driver to only start the lift after each stop which latter action is carried out automatically. Once the lift is loaded with passengers and started with each passenger's destination registered in a mechanical brain which cannot forget the Driver's work is completed and machinery performs the remaining requirements (except starting) unerringly. Once an upward or downward trip is commenced all intermediate calls for upward or downward conveyance are attended to automatically, thus eliminating:

(1) The annoyance which is very often caused by a lift passing you at a floor.
(2) The necessity and waste of time to other passengers for the driver to reverse and pick up a waiting passenger.
(3) The necessity for the driver to watch the indicator for calls.

In lifts travelling at 600 feet per minute as Nos. 1, 2, 3 and 4 will do it is a very easy matter for the lift to travel past your floor before you are noticed, and even if you are noticed the lift is very often far past the floor before the Driver has time to transform his thoughts into action.

Another marked advantage is that the lift, on an automatic and pre-determined stop, obtains the full benefit of its high speed in that it does not commence to decrease its speed until the very latest possible second whereas with a Driver the position at which the machinery must be stopped must be gauged at each operation with the result that the speed is decreased long before it is necessary. With a fast moving machine a Driver, while engaged in answering enquiries from passengers and attending to other matters, is apt and frequently does pass a floor at which a passenger is waiting, or else slows down long before it is necessary. Signal control eliminates any annoyance or waste of this kind.

In the case of a pair of lifts such as 1 and 2, and 3 and 4 many people will ring for both lifts with the idea of getting one or the other more quickly, thus two lifts will often stop at one floor for the same passenger - with signal control only the neare[st] lift to the floor calling will stop while the other speeds on to its destination. With signal control there is only one button (common to the two lifts) to press.

The Driver simply records with a button the floor on which each passenger wishes to alight and starts his lift. His work (with the exception of starting after each stop) is then at an end - machinery does the rest.

In slow lifts of course the advantage of this system will not be so apparent but in fast lifts the advantage can well be imagined.

At present there are no other lifts in Australasia with this system installed and Waygood Otis Ltd. in an endeavour to have an initial installation seem to have reduced their price considerabl[y]. According to their pamphlet the Chrysler Building, New York, and The Canadian Bank of Commerce, Toronto, the former one of the tallest and largest buildings in America and the latter the tallest building in the British Empire, both very recently constructed have installed the Signal Control System on their lifts.

The cost of installing the system on Lifts 1 and 2 would be £609 for the two units.

The cost of installing the system on Lifts 1,2,3 and 4 would be £2259 in all.

23/10/30.

Messrs. Watson & White in their letter of 22/10/30 analyse the prices as follows:

Lifts	1 and 2	£609
"	3 and 4	1650

They point out that the very low price quoted for 1 and 2 is on account of the desire of Waygood Otis Ltd. to instal an initial system in Australia and the extent of their reduction is made apparent when compared with their quotation for Lifts 3 and 4.

Messrs. Watson and White strongly recommend the installation in Lifts 1 and 2 believing that the extremely low price makes it a first class investment. They refrain from making a "direct" recommendation for Lifts 3 and 4 as they believe it is not such a good investment on account of the higher price and as they consider its success will depend upon the amount of public traffic that these two units will be called upon to carry.

Apparently there is no doubt as to the efficacy of the Signal Control System. Lifts 1 and 2 will serve the Tenants primarily while Lifts 3 and 4 will serve the Staff and our own customers mainly. It seems that an efficient lift service will be just as desirable for our own customers as for our Tenants and as the system undoubtedly saves time - taking into consideration the number of our Staff which will use Lifts 3 and 4 - any saving of time would mean that economically, the system, if installed in these two lifts also, would be an advantage to the Bank

A count was recently made of the number of passengers carried daily in Lifts Nos. 5, 6 and 7 and it totalled [illegible]. When the building is double the size, has more Tenants, and more Staff, no doubt the number carried daily will reach over 3000. With a saving of a few seconds only to each of these persons the advantage can well be imagined.

Signal Control System has only been on the market 6 years and as yet there are only 15 elevators outside America with the System viz.

National Telephone Co. Madrid	4
Westminster Bank Ltd. London	2
Sanshin Building Tokio	5
Scottish Light Life Assurance Society Glasgow	4

The accompanying list shows the large number of buildings equipped with the system in United States and Canada and the pamphlet attached describes "An Almost Human Elevator."

At the present time Lifts 3 and 4 are in course of construction in America. Should we decide to have Signal Control certain alterations will have to be made to the machinery and in order that the work will not have advanced too far to effect these changes Waygood Otis Ltd. have cabled their Principals to hold up construction for 10 days from 20th inst. and they ask us to let them have our decision on this matter as soon as possible.

4.

The Bank is now asked to decide:

(1) Whether it is considered desirable to instal the Signal Control System and if so whether it is to be installed
(a) On Lifts Nos. 1 and 2 at a cost of £609, or
(b) On Lifts 1, 2, 3 and 4 at a cost of £2259.

It will be noted from Messrs. Watson & White's letter of 10/10/30 that the cost of Elevators Nos. 1 and 2 has been increased as under owing to the imposition of additional Customs Duties.

Lift No.	Contract Price	Present day cost owing to additional duty
1	£7,406	£7,771. 5. 0
2	£7,488	7,858. 0. 0
	£14,894	£15,629. 5. 0

Increase £735. 5. 0

R. J. Parker

Mr Perkins
Please let us have
... of this ...

W. D. WATSON & WHITE
MECHANICAL AND ELECTRICAL
CONSULTING ENGINEERS

W. D. WATSON, A.M.I.E., AUST.
C. H. WHITE, A.M.I.E., AUST.

PHONE B 1454

PRIVATE PHONE Y 2931

117 Pitt Street
Sydney

October 10th, 1930.

Messrs. Robertson and Marks,
Architects,
117 Pitt Street,
S Y D N E Y.

Dear Sirs,

ELEVATORS NOS. 1 AND 2,
BANK OF NEW SOUTH WALES.

In the original tenders received for the Elevator Equipment for this Building was a proposal by Waygood-Otis Ltd. to instal for the George Street Units - a type of equipment known as SIGNAL CONTROL. This proposal was not officially put forward to you at the time, owing to the cost, which, in our opinion, was excessive, and which we anticipated would be reviewed by the Contractors before the date at which the equipment would be required, and we now have to report that our anticipations were indeed correct, as the proposal has been amended on two occasions, and is now presented in a highly satisfactory form.

The term SIGNAL CONTROL is that applied to a peculiar system of operation developed by the Otis Company of America, and is the "last word" in Elevator Control. Being the refinement de luxe, the Contractors are particularly anxious to have installed in the Commonwealth an example of the equipment, and we naturally desire to have in these particular Units - equipment which will be referred to as being the best known at the date of installation, hence the periodic amending of the cost of the proposal.

SIGNAL CONTROL eliminates the Lift Driver to the last possible degree, by causing the major portion of the functions of driving to be entirely Automatic and infallible, thus the imperfections of driving which are common to all drivers (some being more acutely so than others) are removed, and a service obtained of the highest possible efficiency.

In order to analyse the functions, assume that one of the two cages is at Ground Floor ready to receive its load of passengers, we have:-

1. The driver stands in his driving position, and as each person enters the car he (the driver) presses a button (similar to the button box in an automatic lift) corresponding to the floor at which the respective passenger desires to alight. Should two or more persons be present for a floor, any repeated pressing of a button has no effect on the initial registration.

2. The cage is now loaded, the driver operates his Car-switch and gates, identically as in the case of No.6 Elevator now in operation.

3. The cage travels full speed to the nearest destination registered on the button box, it stops level and opens the gates .

4. The driver again operates his Car-switch, and so the delivery of the load of passengers is correctly made as initially registered on the button box.

5. Each landing has two buttons, being an "Up" and a "Down", common to the two lifts. An intending passenger desiring to go up presses the "up" button, this causes the up-travelling cage to stop, irrespective of any action on the part of the driver, providing the call was "registered" before the cage reached a position say - six feet from the subject floor, in fact it is not necessary for the driver to know of the intending passenger.

6. Thus the mechanism, when the cage commenced its upward travel, was fully instructed regarding the contained passengers, and was similarly instructed regarding any intending "up" passenger, then waiting on a landing or who may, in the interval of up-travel to his landing, register his requirements.

7. "Down" travels are, of course, identical in character to that described for "up".

8. In the event of both Lifts approaching a landing on which an intending passenger has registered his requirements, only one lift (the first to arrive) will stop, the other passing on as though no registration had been made.

9. It will readily be noted that the driver has no responsibilities regarding intending passengers awaiting on intermediate landings; his duty is to travel until "something" stops him, and that "something" is entirely outside his control.

10. The annoying slowing down to ascertain if a person is waiting on a landing, the more annoying passing the landing and coming back again for a passenger, and the equally annoying over-travelling of a passenger in the car, are all swept aside in one act.

11. Indicators of the mechanical type are not used, their place being taken by a flashing lamp on each landing, which flashes when the cage is approaching and is say - two floors away; in any case if the intending passenger presses the bell, a lift stops and picks him up, and if he fails to ring the bell he will never be picked up, thus the purpose of an indicator ceases to exist.

12. Study for a moment the difficulties of a driver who receives a "call" on his indicator when approaching a floor at full speed, and when within say - ten feet of the said floor; what chance has he of absorbing the information and stopping at the floor?, the answer is - none at all, resulting in an intending passenger,who has carried out all that is required of him, being left behind, or, alternatively, a return to the floor to pick him up, being an annoyance to the remaining passengers in the car, a waste of time, a waste of power, an increased wear on ropes etc., and withal an inefficient service.

Before setting out the periodic amendments in the cost of this Equipment, it will be correct to define the actual CONTRACT SUM for these Units as it stands at this date:-

The initial Contract Sum for No.1 was	-	£7,406: 0: 0:
" " " " " " No.2 was	-	7,488: 0: 0:
Total -	-	£14,894: 0: 0:

Variations in Tariff have been imposed on No.1, as follows:-

		June 1930.		Primage July 2½%.
3000 x 600 C.S.	-	£250:0:0:	-	£44:0:0:
Pneumatics Base	-	16:0:0:	-	3:0:0:
Operators	- -	33:0:0:	-	5:10:0:
Runners	- -	13:15:0:	-	----
Cover Plates	- -	----	-	----
Indicators	- -	----	-	----

Thus the Contract Sum at this date stands at - £7,771:5:0:.

Variations in Tariff have been imposed on No.2, as follows:-

		June 1930.		Primage July 2½%.
3000 x 600 C.S.	-	£250:0:0:	-	£44: 0:0:
Pneumatics base	-	16:0:0:	-	3: 0:0:
Operators	- -	36:0:0:	-	6: 0:0:
Runners	- -	15:0:0:	-	----
Cover Plates	- -	----	-	----
Indicators	- -	----	-	----

Thus the Contract Sum at this date stands at - £7,858:0:0:.

Finally the total Contract Sum at this date is - £15,629:5:0:.

The initial tender of Waygood-Otis Ltd. for Signal Control on these two Units was an increase of - £2,700:0:0: on the price accepted.

On May 1st, 1930, Waygood-Otis Ltd. offered two Signal Controls at - £1,886:0:0: extra, stating that the phenomenal "run" on this equipment in U.S.A. permitted a reduction in (in) manufacturing costs. On June 30th, 1930, the extra cost was set down as - £1,856:0:0:.

On August 22nd, 1930, a final attempt was made by the Contractors to establish an example of the equipment, and after numerous conferences between the Contractors and Ourselves, the extra cost was finalised early this month, being - £609:0:0:, for the two Units, making a total overall cost of - £16,238:5:0:.

It is considered that the new scheme, if accepted, is virtually a repeat of the initial contract, and therefore not subject to Sales Tax.

Possibly the extra cost will be subject to Sales Tax, and if so the Contractors agree to cover it.

In March 1928 there had been installed in various parts of the World (mainly in U.S.A.) 400 Units of Signal Control, and there were in hand 300 Units, making a total of 707 Units of Signal Control Elevators in 94 Buildings.

Since that date hundreds of added units have been installed and the attached Brochure shows that as many as 58 Units of this equipment have been installed in one Building.

We have to advise you to give consideration to the proposal, it is, in our opinion, a first class investment, remembering that for an added cost of - £609:0:0: the most modern improvements are offered, improvements which reduce the human element to the lowest possible minimum, and correspondingly improve the service and efficiency of the Installation.

May we suggest that before rejecting the proposal (if such should be imminent) that a conference be held at which we will be pleased to further set out the case.

Yours faithfully,

W. D. Watson

W. D. WATSON AND WHITE.

NEW HEAD OFFICE PREMISES

LIFTS

The following equipment has been provided for use in the finished building:

Lift No.	Speed in feet p.m.	Method of operating: Doors	Method of operating: Gates	Control	Cost	Description
1	600	Automatic	Automatic	Manual	£7,406	Passenger
2	600	"	"	"	7,488	"
3	Lift well provided in building but no lift yet authorised to be installed					
4	450	Manual	Manual	Manual or Collective Automatic	7,021	"
5 (already installed)	300	Manual	Manual	Manual or Automatic	3,470	Goods
6 (already installed)	600	Automatic	Automatic	Manual	7,198	Passenger
7 (already installed)	450	Manual	Manual ~~or Automatic~~	Manual or Collective Automatic	7,291	"
					£39,874	

It is now suggested that the following lift equipment be provided in the finished building:

Lift No.	Speed in feet p.m.	Method of operating: Doors	Method of operating: Gates	Control	Cost	Description
1	600	Automatic	Automatic	Manual	£7,406	Passenger
2	600	"	"	"	7,488	"
3	600	Automatic	Automatic	"	7,309	"
4	600	"	"	"	7,309	"
5 (already installed)	300	Manual	Manual	"	3,470	Goods
6 (already installed)	600	Automatic	Automatic	"	7,198	Passenger
7 (already installed)	450	Manual	Manual	Manual or Automatic	7,291	
					£47,471	

The following reasons are put forward for suggesting an additional lift, an alteration in the method of operation and an increase in the travelling speed of lifts 3 and 4.

(1) It has been found that the three lifts at present installed and serving less than half of the finished building cannot successfully cope with the existing traffic much less the additional traffic which must come when all the office space

is let. therefore it is expected that 6 lifts as originally decided upon (against the Architects' recommendation to instal 7) will not cope with the traffic when the whole building is completed and fully occupied by the Bank and Tenants. Mr. Marks states that though the Bank would not hitherto agree to the seventh lift being installed yet it sanctioned the provision of a lift well in which an extra lift could be installed.

(2) In the centre lift bank only one lift has so far been provided and with 13 points to serve it can be readily realised that ~~they~~ it will not be sufficient. If for instance a person were on the Mezzanine Floor and wished to travel to the 9th floor when the lift was at the 8th floor on a downward trip, he would have to wait until the lift descended to the basement and returned on its upward trip. If two lifts of the same speed and having the same method of operation are installed it can be arranged that one lift will always be at the top of the building while the other is at the lowest floor; in this way a person wishing to use the lifts can obtain one to go up or down with a minimum of delay. This system is adopted in the Mercantile Mutual Insurance Building where two lifts very successfully cope with the traffic of the Company's Staff and 9 floors occupied by Tenants.

9 floors
Mez.
1st
Grd
Base.
3
9
Gr
Bas

(3) It is suggested that the speed of Nos. 3 and 4 be 600 feet per minute owing to the large number of floors to be served and owing to the fact that there will be a great deal of traffic from the Ground, Mezzanine, 1st and 2nd floors direct to 9th floor. (Lunch Room)

yes

(4) No. 4 lift at present is specified to have a manual or automatic control which latter precludes the use of automatic doors and gates. The automatic control was specified so that the lift could be used after hours without an attendant but Nos. 5 and 7 at present installed can be made automatic after hours and it is suggested that these two or even one could wel cope with all traffic after ordinary office hours. Our experience with the present lifts is that automatic control is a failure during business hours and an attendant must always be in the lift. It is therefore suggested that lifts 3 and 4 be manually controlled with automatically opening and closing gates and doors and that the automatic control on these two lifts be dispensed with.

(5) Messrs. Watson and White suggest that no provision be made for lifts 3 and 4 to stop on floors 3, 4, 5, 6 and 7 which will probably be occupied by Tenants. The saving effected

3.

by omitting these floors would amount to ~~£330~~ £466 per lift but at some future time the Bank may want to occupy the third floor and also any Tenants who may bank with us would find it very convenient to use lifts 3 and 4 from the floor occupied by them. Comparatively the additional cost to make the lifts serve all floors will be small and may be worth while; if required the lift attendant could be instructed not to stop at certain floors occupied by Tenants. An amount of £1194 — already authorised for an Compressor has not been included in the figures quoted on the first page. Messrs Watson Wrights' report is attached.

This proposal provides for an extra lift, & increased speed in another, at a further cost of £7597. After the experience of over four months Managers are strongly of opinion that the increased accommodation should be provided.

[illegible]

17/6/20.

ROBERTSON & MARKS
ARCHITECTS
PARTNERS
T. J. MARKS
S. ROBERTSON
L. C. McCREDIE

PHONE: B 7327
(TWO LINES)

117 PITT STREET
SYDNEY

TJM/DS

RECEIVED
MAY 10 1930 6
ANS

9th May, 1930

THE MANAGER
BANK OF NEW SOUTH WALES
GEORGE STREET.

Dear Sir,

re NEW HEAD OFFICE PREMISES

We herewith reply to your letter of the 22nd ultimo regarding the advisability of installing a second Elevator in the Banking Chamber, together with our views and estimates of the cost.

As you are aware the original Plan provided for two Elevators which we considered necessary at the time, and we are still of the opinion that one will be insufficient to cope with the traffic, particularly during the Luncheon hours.

We have discussed this matter very fully with our Engineers who have obtained estimates of the cost of both Car-switch and Dual Control. We are enclosing their report which provides all details in connection with the equipment, etc.

We suggest installing Lifts of the maximum speed of 600 F.P.M. to serve all floors excepting those from the 3rd to the 7th inclusive.

We consider that a load capacity of 2,500-lbs. will be ample which will carry 13 passengers, so we therefore recommend the acceptance of two Elevators costing £6,843 each, at 600 F.P.M. in lieu of the one already accepted, being Dual Control for £7,021 at 450 F.P.M.

Yours faithfully,

Robertson & Marks

Enc:1

The present lift service is most unsatisfactory - we have 2 lifts each with a different speed.
CR
10/5/30

PRIVATE PHONE Y 2931

W. D. WATSON & WHITE
MECHANICAL AND ELECTRICAL
CONSULTING ENGINEERS

W. D. WATSON, A.M.I.E., AUST.
C. H. WHITE, A.M.I.E., AUST.

PHONE B 1454

117 Pitt Street
Sydney

May 8th, 1930.

Messrs. Robertson and Marks,
Architects,
117 Pitt Street,
S Y D N E Y.

Dear Sirs,

PASSENGER LIFTS,
BANK OF NEW SOUTH WALES.

In accordance with your instructions, having been handed the attached letter, dated 22nd ultimo, addressed you by your Clients, we have to make the following report:-

Firstly - The necessity of having two Lift Units in the centre of this Building, as set out in the original plans, is now more apparent than formerly.

The inter-floor traffic of the Bank Staff is a problem in itself; particularly so is this the case at meal periods.

Secondly - The Staff inter-floor traffic could be confined to the following floors:-

Sub-basement,
Basement,
Ground,
Mezzanine,
First,
Second,
Eighth, and -
Ninth.

What is the saving in cutting out the 5 floors?
£380 per lift

We are of the opinion that there should be practically no Staff inter-floor traffic other than as above set out, and, in any case, should an occasional visit of Staff be required to other floors, the Eastern or Western Units could be used. Similarly, should a Member of the Staff desire to accompany a Customer, who is a Tenant of one of the excluded floors, the Lifts at the ends of the Building could be used.

But tenants would [illegible] Bank

Thirdly - It is most evident that high speed of travel is a necessity, particularly so where a large portion of the traff-

(traffic) will be to Ninth floor, running express through many of the floors (whether these floors are arranged to be served or not), thus we have to recommend that, if possible, the maximum speed of 600 F.P.M. be installed.

Fourthly - The question of Dual control is one requiring the keenest consideration, remembering that in order to have the two controls, many complications and additional costs are added, which would be dispensed with where the control is Carswitch only.

The basic purpose of Automatic control is to enable a service to be maintained during non-business hours, when it is not economical to employ a Driver, and never the intention to dispense with the Driver during business hours.

The Staff traffic during non-business hours will be very small, therefore, being of minor importance, it could readily be compelled to travel by the automatic lift at the Western end.

For quick action of enclosure gates, (and quick action is as essential as is high speed) there are two methods to employ:-

1. Mechanically operated car gate and mechanically operated enclosure gates having a wide opening.

2. Manually operated enclosure gates of a maximum width of 2 ft. 9 ins., with which a car gate is unnecessary when dual control is excluded.

....

We have therefore to recommend that Dual Control be eliminated on the two Units under consideration, notwithstanding that the original scheme provided for one Dual Control Unit which was added expressly at the instructions of your Clients' Representative.

Fifthly - The saving effected by the elimination of the Dual control in the existing Contract, and the further elimination of enclosure doors and door attachments on the excluded floors (5) (floors) will form a large portion of the added cost of increasing the existing contracted speed of 450 F.P.M. to 600 F.P.M., and the further added advantage of mechanically operated gates.

Your Clients are suggesting that two Lifts be installed, similar to those now in operation in the Mercantile Mutual Building, to which we have to say - that your Clients may readily be mislead in making this comparison, as we know that the ideas of their Officials are based entirely on the ease by which the operation of the enclosure doors is effected.

In the Mercantile Mutual Building, the doors are of wooden construction, which is not possible to employ in the case of the Bank, owing to the difference in fire protection arrangements, and it must be remembered that doors having a greater width of opening are desirable.

The Fire resisting door, owing to its weight, if fitted in the Mercantile Mutual Building Installation would greatly lower the efficiency of the equipment. Actually the equipment contracted to be installed in the Bank of New South Wales is superior to that of the Mercantile Mutual Building, owing to the latest improvements in control.

We are of the opinion that the mechanically operated doors, where possible to be used, should be adhered to, and that no attempt be made to use the cheaper form of car gate in preference to the safety Otis Gate, which is proving so very effective on No.6 Lift, now in operation.

We have now to place before you the cost of installing an extra Lift (No.3) and the substitution of Carswitch Equipment in lieu of the Dual Equipment now contracted for, as follows:-

The cost of the No.4 Unit, as now contracted for, being Collective Automatic Dual Control at 450 F.P.M. and 2500 Lbs. load capacity is £7,081:0:0:

The saving effected in the elimination of the Enclosure Doors for the excluded floors is approximately - £380:0:0:.

We believe that we are correct in assuming that the cost of building in the door openings with straight-joint brickwork will be about equal to the cost of finishing the opening, and therefore has little or no influence in the matter.

We have therefore a total amount at our disposal of - £7,401:0:0:.

A question has arisen as to whether these two units if increased to 600 F.P.M. should be of the capacity of 2500 Lbs., or 3000 Lbs.; we are of the opinion that this particular size of cage will be effectively served by a load capacity of 2500 Lbs.

An important change takes place in the equipment when the number of floors to be served exceeds - ten, thus it will be necessary to consider whether this maximum will be exceeded at a later date.

We have prepared the subtended Schedule of alternatives on a basis that if Carswitch is used, any number of floors may be served without structural alteration, but in the case of the Collective Automatic we have prepared for a maximum of Ten Floors.

	600 F.P.M.		450 F.P.M.	
Complete with Pneumatics for Car-Switch and with hand-operator for Dual for eight floors only.	3000 Lbs.	2500 Lbs.	3000 Lbs.	2500 Lbs.
Carswitch -	£7311:0:0:	£6843:0:0:	......	£6104:0:0
Dual Coll. Automatic	£7378:0:0:	£6910:0:0:	......	£6357:0:0

In the event of the Collective Automatic being required to be prepared for serving future openings above ten in number, the added cost is - £427:0:0:, and if not included initially, will entail an additional cost of - £50:0:0:.

On the Carswitch Equipment the added cost of the change in selector is - <u>£46:0:0:</u>, which has been included in the above Schedule, and should the number be reduced to ten or less, permanently, the <u>£46:0:0:</u> could be deducted.

We would greatly appreciate the opportunity of attending a discussion on the subject with your Clients' Representatives, and in the meantime have to confirm our recommendation that two Units of 600 F.P.M., Carswitch Control only, be installed, with service excluding Third, Fourth, Fifth, Sixth and Seventh Floors.

Yours faithfully,

W. D. Watson

W. D. WATSON AND WHITE.

What would be the cost for all floors?

IN REPLYING PLEASE QUOTE

ALL LETTERS TO BE ADDRESSED TO "THE MANAGER"

BANK OF NEW SOUTH WALES EST^D 1817

Bank of New South Wales.

(WITH WHICH IS AMALGAMATED THE WESTERN AUSTRALIAN BANK.)

G.P.O. Box 2722 C

Sydney 22nd April 50

Messrs. Robertson & Marks,
Architects,
117 Pitt Street,
SYDNEY.

Dear Sirs,

L I F T S.

With a view to giving consideration to the advisability of installing a second lift in the centre of the Banking Chamber we shall be glad if you will furnish us with the approximate additional cost of such installation and your views on the necessity of having a second lift in this position.

We do not know what type of lift has been chosen for the one already specified for the centre, but in placing the matter before the Bank the writer has in view the recommending of two lifts similar to those installed in the Mercantile Mutual Building.

Yours faithfully,

pro Manager.

APPENDIX 2

Major Buildings listed in the Municipal City Council Annual Reports 1892, 1893, 1894.

1892

I would again respectfully point out, as I have done in my former reports, the urgent necessity of amending the present Building Act, so that the Council will have more power to deal with dilapidated buildings and premises unfit for occupation, and also to regulate the erection of new buildings, the sizes of rooms, regulations appertaining to dormitories and lodging-house accommodation (especially in reference to Chinese dens), air spaces for dwellings, and many other matters of great importance regarding the health and well-being of the citizens, and the safety and stability of these buildings.

The building operations throughout the City have this year shown a considerable falling off, especially in buildings of the first class.

The following are some of the principal buildings completed during the year:—

Business premises, Moore Street, for Hy. Bull and Co.
Two large warehouses in Pitt Street, for E. Vickery.
Lyceum Theatre, Pitt Street.
Extensive additions, Criterion Theatre, Pitt Street.
Warehouse and shops, Liverpool Street, for C. Nettheim.
Extensive additions, Tooth's Brewery, George Street West.
Warehouses, Windmill and Kent streets, for W. H. Hentsch.
Two shops, Hunter Street, for Fairfax and Roberts.
Banking premises and hotel, York and Druitt streets.
Extensive additions to premises, 57 and 59 York Street, for Dr. Hurst.
Business premises, Pitt Street, for E. Way.
Water and Sewerage Board's premises, Pitt Street.
Warehouses, Windmill Street, for A. Lamb and Co.
Business premises, Barrack and Clarence streets, for C. Nettheim.
" " Pitt and Gipps streets, for A. Hordern and Sons.
Store, Pyrmont, for Sanders and Co.
Factory, Kent Street and Amos Place.
Warehouse, Wynyard and Carrington streets, for Lark, Sons and Co.
Business premises, York and King streets.

In the business parts of the City considerable improvements are being made in the class of buildings erected, and during this year a few very important buildings have been commenced, and are now rapidly nearing completion. Several of these buildings will be classed amongst the finest in the City.

The principal buildings now in course of erection are the following :—

Shops, Goulburn Street, for Angus and Monie.
Shops and offices, King Street, for H. H. Farrell.
City Bank, Pitt Street.
Iron store, Jones Street, for Scrutton and Co.
Business premises, Campbell Street, for M. O'Neill.
" " George Street, for J. Plummer.
British Seamen Hotel, Argyle Street, for R. Gill.
Black Swan Hotel, George Street, for W. H. Linsley.
Cheshire Cheese Hotel, Elizabeth Street, for T. Durack.
Green Park Hotel, Victoria Street, Mrs. Wanganheim.
Bank of New South Wales, Regent Street.

Warehouse, George Street North, for O. Beale.
Wool store, Pyrmont, for Barker and Co.
Equitable Life Assurance Society's buildings, George Street.
Six houses, Challis Avenue, for J. Gilchrist.
Ten houses, Nobbs street, for J. D. Schwegler.
Five houses, Dick Street, for A Rogalsky.
Ten houses, Wilton Street, for J. Wooller.
Sixteen houses, Moore Park Road, for J. B. Moore.

The clerical work of both departments has been carried out in a very satisfactory manner by Mr. W. H. Eves, and the out-door work by Mr. W. McAnally.

In conclusion, I take this opportunity of thanking His Worship the Mayor (W. P. Manning, Esq.) and the Aldermen for their courtesy and the support they have tendered to the City Architect's and Building Surveyor's Departments and myself.

I have the honour to be,

Sir,

Your obedient Servant,

GEO. McRAE,

City Architect and Building Surveyor.

3

The building operations within the City have shown this year a considerable falling off, especially in the erection of better-class buildings, and is very much under the average of the last 12 years, as will be seen by the table of building fees shown on page 6, collected since 1881.

The following are some of the principal buildings completed during the year:—

Shop, Hunter Street, for Fairfax and Roberts.

Convent of Mercy, Charlotte Place.

Lead Mills, Blackfriars' Estate, for Danks and Son.

Presbyterian Church, Foster Street, for Chinese.

Hotel, George Street, for J. F. Liddy.

Business premises, George Street, for Fitzwilliam Wentworth.

Hotel, King and Elizabeth streets, for F. Riley.

Store, Kent Street, for Jas. Stedman.

Hotel and shops, George Street, for T. Curley.

Store, Liverpool Street, for Tillock and Co.

Mutual Life Assurance Co.'s offices, Hunter and Bligh streets.

True Briton Hotel, Elizabeth Street, for W. Monie.

Business premises, Oxford Street, for Mr. Williams.

Additions to Standard Brewery, for J. T. and J. Toohey.

Residence, Selwyn Street, for R. Jenkins.

Business premises, Riley Street, for W. Buckingham.

Terrace, Riley Street, for F. Rudd.

Business premises, Erskine Street, for R. Miller.

Store, Harris Street, for A. Sneddon.

Residence, Park Road, for C. Lee.

Cooperage, Burns Street, for A. W. Cormack.

Shop and dwellings, George Street West, for T. Curley.

Offices, Chowne Street, for Colonial Sugar Co.

Terrace, William Henry Street, for A. Bone.

Hotel, Ultimo Street, for Australian Brewery Co.

The principal buildings now in course of erection are the following :—

Mutual Life Insurance Co.'s offices, Martin Place.

Business premises, George Street, for G. Cohen.

Hotel, George and Liverpool streets.

Additions, Manchester Unity Hall.

Trades Hall, Goulburn Street.

Flour Mills, Bathurst Street.

Shops, Kent Street, for John Paul.

Terrace first-class residences, Roslyn Gardens.

Additions, Harbour Street, for Fresh Food and Ice Co.

The clerical work of both Departments has been ably and well carried out by Mr. W. H. Eves, and the out-door work by Mr. W. McAnally.

In conclusion, I take this opportunity of thanking His Worship the Mayor (Sir W. P. Manning) and the Aldermen for their courtesy, and the support they have tendered to the City Architect's and Building Surveyor's Departments and to myself.

I have the honor to be,

Sir,

Your obedient Servant,

GEO. McRAE,

City Architect and Building Surveyor.

Alterations and additions to existing buildings ...	243
Business premises	2
Buildings pulled down	32
Banks	1
Premises dealt with under 29th section	50

(For further details see "Schedule A.")

The following are some of the principal buildings completed during the year:—

Large residence, Potts Point, for G. Sydney Jones.

Extensive additions, Court House.

Hotel, Bourke and Oxford streets, for W. Kelly.

Stores and shops, King and Kent streets, for J. Ahearn.

Large residence, Challis Avenue, for Florence Hordern.

Hotel and shops, Park and Castlereagh streets, for Florence Hordern.

Chilling rooms, &c., Harbour Street, for Fresh Food and Ice Co.

Extensive additions, Pitt and Bridge streets, for North Queensland Insurance Co.

Shops, Bathurst Street, for G. Hurst.

Two dwellings, Wattle Street, for G. Cohen.

Shops and dwellings, Oxford and Pelican streets, for W. J. Hickey.

Shops and offices, Rowe Street, for W. Oldershaw.

Shops, Pitt and Bathurst streets, for H. Leslie.

Shop, Oxford and Brisbane streets, for Mark Foy.

Offices, Towns' Wharf, for Dalgety and Co.

Wool store, Dibbs Wharf, for Dalgety and Co.

Extension of wool store, Wattle Street, for Winchcombe, Carson & Co.

Shops, Elizabeth Street, for J. S. Perry.

Dwellings, Quay Street, for L. C. Russell.

Tobacco Factory, Castlereagh Street, for Dixson and Sons.

Bulk store, Knox Street, for H. R. Cooper.

Shops and Stores, Elizabeth Street, for Mark Foy.

Castlemaine hotel, Hay and Harbour streets, for J. Sulman.

Dwellings, Challis Avenue, for B. F. Marks.

Shop, George Street, for H. Goodwin.

Factory and dwelling, Shepherd street, for C. S. Palmer.

Hotel, Hay and Dixon streets, for G. Whiting.

Store, Bathurst Street, for A. Barnett.

Dwellings, Moore Park, for P. Ryan.

Dwellings, Dowling Street, for Mrs. Lucy Brown.

Shop and Dwelling, Devonshire and Wilton streets, for Wright Bros.

Terrace, Mary Ann Street, for J. Ekin.

Terrace, Rose and Shepherd streets, for W. Farley.

Terrace, Riley Street, for F. Rudd.

Terrace, Wattle Street, for H. Ekin.

Terrace, Goodlet Street, for T. Wood.

Terrace, Selwyn and Church streets, for J. Rowe.

Dwellings, Victoria Street, for W. Deane.

Additions to Convent, Victoria Street.

Dwellings, Princes Street, for J. W. Boylan.

The principal buildings now in course of erection are the following :—

Shops and Dwellings, George Street West, for Tooth & Co.

Bank, George and Bathurst streets, for Bank New South Wales.

Hotel, King and Sussex streets, for E. J. Edrop.

Business premises, Pitt Street and Queen's Place, for D. Thompson.

Terrace, Macleay Street, for M. Benjamin.

Stores, Kent Street, for R. H. Binnie.

Shops, Darlinghurst Road, for D. Spillane.

Business premises, George Street, for J. Lawler.

Shops, George Street, for W. Hordern.

Terrace, Gipps Street, for W. E. Sparke.

Business chambers, Castlereagh Street, for A. Rofe & Sons.

Store, Goulburn and Sussex streets, for J. Israel.

Dwellings, Darlinghurst Road, for D. Spillane.

Alterations, St. James' Church.

APPENDIX 3

(A) List of Changes to Regulations controlling the City Council.

(B) City of Sydney - Value of Property 1875-1916.

NEW SOUTH WALES.—SHIRES.—REVENUE AND EXPENDITURE, 1907 TO 1916.

Year ending 31st December.	Revenue.				Expenditure.			
	Rates.	Government Endowment and Grants.	Other.	Total.	Administration.	Works.	Other.	Total.
	£	£	£	£	£	£	£	£
1907 ..	287,635	235,794	100,666	624,095	100,435	249,868	101,163	451,466
1908 ..	382,336	220,925	23,607	626,868	116,932	516,072	23,215	656,219
1909 ..	374,540	309,005	33,599	717,144	117,696	529,954	29,134	676,784
1910 ..	421,596	323,658	49,120	794,374	125,699	599,945	39,388	765,032
1911 ..	463,501	355,286	62,243	881,030	128,126	647,220	56,860	832,206
1912 ..	517,025	402,820	79,653	999,498	83,721	773,479	76,125	933,325
1913 ..	562,820	183,315	90,376	836,511	91,450	707,923	86,717	886,090
1914 ..	609,580	329,944	105,468	1,044,992	95,760	801,542	99,169	996,471
1915 ..	612,612	339,062	114,447	1,066,121	87,527	813,400	117,943	1,018,870
1916 ..	626,303	331,434	135,286	1,093,023	100,224	843,803	134,870	1,078,897

NEW SOUTH WALES.—SHIRES.—ASSETS, LIABILITIES, AND OUTSTANDING LOANS, 1907 TO 1916.

Year ending 31st December.	Assets.	Liabilities.	Outstanding Loans.	Year ending 31st December.	Assets.	Liabilities.	Outstanding Loans.
	£	£	£		£	£	£
1907 ..	..	..	12,763	1912 ..	455,420	77,494	17,212
1908 ..	228,729	35,153	8,810	1913 ..	440,252	109,453	36,783
1909 ..	258,214	24,622	7,414	1914 ..	488,004	109,717	45,304
1910 ..	307,708	44,770	11,147	1915 ..	560,479	129,181	49,220
1911 ..	379,589	67,827	12,445	1916 ..	589,788	152,777	148,387

appendix 3

(B) City of Sydney.

1. **General.**—The City of Sydney, as already stated, is incorporated under special Acts, and the following is a brief résumé of the various matters relating thereto.

2. **Legislation previous to Incorporation in 1842.**—The first Act relating to Sydney was passed in 1833, under the provisions of which the Governor could appoint two Police Magistrates, who were authorized to nominate a police force, and penalties were fixed for various offences. A Town Surveyor was to be appointed, whose duties were to set out the carriage and footways, and affix names of streets. Carters and boatmen were to be licensed, and the Justices were to fix the fares to be charged by them.

The first Building Act was passed in 1834, and prescribed that no building might be erected within 12 feet of the exterior edge of the kerbstone, and that notice of intention to build must be given to the Town Surveyor.

In 1837 the *Sydney Building Act* was passed, by which buildings were classified and the thicknesses of walls determined; but this was in 1839 limited in its effect to a certain district within the town limits.

3. **Incorporation of the City of Sydney Act 1842.**—In 1842 Sydney was proclaimed a City. It was divided into six Wards, and its boundaries were defined. All occupiers of houses, counting-houses, and shops of the value of £25 per annum were enrolled as

Citizens, provided that they were householders resident within 7 miles of the City. In order to be qualified as a Councillor, Auditor, or Assessor, a candidate had to be possessed of real or personal estate of the total value of £1,000, or be rated at the annual value of £50, ministers of religion not being eligible. Four Councillors for each Ward were to be elected on the first of November, one Councillor in each Ward to retire annually. After the election of Councillors they were, on the ninth of November, to elect from among themselves six Aldermen for a period of six years, one-half of whom were to retire every third year. One Alderman was to represent each Ward. The Councillors and Aldermen elected the Mayor. If a Councillor refused to accept office, or resigned his seat, he was liable to a penalty of from £25 to £50, and under like circumstances a Mayor was liable to a penalty of from £50 to £100. On the first of March the ratepayers were to elect two Assessors for each Ward, and two Auditors for the whole City. The duties of the Council were to keep the streets in repair, construct common sewers and waterworks, make by-laws, levy rates, and appoint police. The City rate was not to exceed one shilling in the pound, the police rate sixpence, and the lighting rate fourpence. Borrowing up to an amount equal to three years' average revenue was permitted. Fees taken at police offices, except at the water-police office, were to be applied to the maintenance of the Sydney Police, and a Government subsidy of pound for pound was granted on the police rates up to £5,000, and on the City rates up to the same amount.

The system of municipal police does not appear to have worked satisfactorily, as an Act was passed in 1844 suspending the collection of the rate for 1845. This Act was renewed annually until 1850, when the police force for the whole Colony was constituted.

In 1844 the qualification for Citizens was reduced to an annual value of £20, while that for Councillors was raised to £100.

In 1847 the Council was empowered to make by-laws for licensing and regulating hackney carriages.

4. **Sydney Corporation Act 1850.**—By this Act, that of 1842 was repealed, except as far as concerned the incorporation and boundaries of the City. Most of the provisions of the previous Act were reincorporated, but there were several important amendments, of which the following were the chief:—Unnaturalized aliens and persons who had received eleemosynary relief during the previous twelve months were not eligible as Citizens. The Citizens were to elect the Mayor from among the Aldermen or Councillors. The maximum amount of City rates which could be levied was raised to one shilling and sixpence and the lighting rate to sixpence per pound of annual value, and the borrowing powers were extended to the amount of five years' revenue instead of three years'.

5. **Dissolution of the City Council, 1853.**—On the 31st December, 1853, the City Council was dissolved and its duties handed over to three Commissioners, appointed by the Governor, who were also to carry out the provisions of two proposed Acts relating to sewerage and water supply. In 1854, carters plying for trade within 8 miles of the City were required to be licensed by the Commissioners, and in the same year the Commissioners were empowered to water the streets, levy a rate for the same, and lease markets and tolls.

6. **Restoration of the City Council, 1857.**—By an Act passed on the 18th March, 1857, the Commissioners were relieved of their duties, and the City Council restored in their place. All persons on the electoral roll for Sydney, who were ratepayers, were entitled to be Citizens. The number of Wards was raised from six to eight, and sixteen Aldermen were to be elected, two for each Ward, of whom eight were to retire annually. Any Citizen was qualified to be an Alderman. The Mayor was to be elected by the Aldermen, not by the Citizens. Fresh boundaries of the City were scheduled. The carrying out of the *Sewerage and Water Act* 1853 was vested in the Council, which was authorized to borrow up to £100,000 for City purposes, up to £200,000 for sewerage purposes, and up to £150,000 for waterworks.

In 1866 the whole cost of paving footways in certain scheduled streets was placed on the owners of the adjoining property. In 1870 the boundaries of the City were altered, the number of Wards still remaining at eight, and the Council was authorized to purchase lands and erect cattle sale yards, and to borrow up to £12,000 for the purchase.

In 1873 the licensing of public vehicles was vested in a Commission, and in 1879 provision was made that a building surveyor should be appointed and that no dwelling should be permitted in any lane less than 20 feet in width.

7. **Sydney Corporation Act 1879.**—This Act was a consolidation of the previous existing Act and amendments. The number of Aldermen was raised to 24, being three for each Ward, and the penalties for refusing to accept office were repealed. No street was permitted to be less than 66 feet in width, and no lane less than 20 feet. The maximum amount of the City rate was raised to two shillings per pound of annual value, exclusive of lighting, and special or local rates were not to exceed sixpence. The Council was to secure a supply of pure water, and was authorized to levy a water rate on premises within 150 feet of a main water pipe.

A temporary endowment was granted by the Government for ten years, not to exceed £25,000 a year, and not to exceed a pound for pound grant on rates raised in excess of one shilling. At the same time the Council was relieved of a debt of £40,000 to the Consolidated Revenue incurred for sewerage. The Council was also allowed to borrow up to £75,000 on the guarantee of the Consolidated Revenue for the purpose of liquidating an overdraft on the sewerage account. Further borrowing powers were granted from time to time.

8. **Sydney Corporation Amendment Act 1900.**—The City was divided into twelve Wards, each with two Aldermen, who were to retire every second year, but were eligible for re-election. The qualification for Citizens was altered, and the following persons were entitled to citizenship:—Any person, male or female, who was a natural-born or naturalized British subject; who was the owner of freehold property assessed at £5 or upwards, or, if leasehold, of the yearly value of £25; or was the owner of a house, shop, &c., of the value of £10; or had been a lodger continuously for six months, and had occupied lodgings of the value of £10 or upwards. Any male person on the roll was eligible as Alderman. The Council was also empowered to resume land for municipal purposes.

9. **Sydney Corporation Act 1902.**—This Act consolidated and repealed previous existing Acts, but practically no fresh provisions of importance were inserted.

In 1908 an important amendment was made, by which the Council was enabled to assess the general rates on the unimproved capital value, instead of on the improved value, and under such conditions the levying of the land tax within the City was suspended. This general rate must not be less than one penny in the pound, in addition to any other rate, but the total amount leviable of all rates must not exceed threepence in the pound on the unimproved value, or two shillings in the pound on the average annual value. A valuation of the unimproved capital value is to be made every five years. Camperdown was added to the City as an additional Ward. The maintenance and control of the lending branch of the Public Library was vested in the Council.

In 1912 an Act was passed empowering the Council to purchase or resume land, erect dwelling houses, and to let them to working men.

In 1916 the maximum amount of the general rate on the unimproved capital value was raised to sixpence in the pound, provided that if such a rate were made, no other general or City rate should be levied.

10. **Revenue, Expenditure, &c.**—In the following tables are given (i) the revenue and expenditure for the years 1858 to 1916; (ii) the assets and liabilities from 1895 to 1916, and the outstanding loans from 1888 to 1916; and (iii) the area, number of dwellings, population, number of rateable properties, length of streets, unimproved capital value, annual value and improved capital value from 1859 to 1916 of the City of Sydney.

Particulars of the revenue and expenditure of the City Council on water supply and sewerage for 1858 to 1889, prior to the transference of these works to the Metropolitan Water and Sewerage Board, are included. Further details of the revenue and expenditure on water and sewerage are given in the chapter dealing with those subjects (see pages 157 and 161).

NEW SOUTH WALES.—CITY OF SYDNEY.—REVENUE AND EXPENDITURE, 1858 TO 1916.

Year ending 31st December.	Revenue.			Expenditure.			
	Rates.	Other.	Total.	Administration.	Works.	Other.	Total.
	£	£	£	£	£	£	£
1858 ..	29,330	126,425*	155,755	10,823	80,273	60,062	151,158
1859 ..	32,912	31,326	64,238	8,869	74,431	44,484	127,784
1860 ..	41,611	45,953	87,564	8,402	27,182	29,383	64,967
1861 ..	35.213	71,886	107,099	8,600	58,338	18,731	85,669
1862 ..	34,120	43,064	77.184	9,368	63,960	31,780	105,108
1863 ..	31,611	104,119	135,730	9,391	52,819	47,964	110,174
1864 ..	32,638	43,108	75,746	10,007	56,188	23,703	89,898
1865 ..	34.644	66,619	101,263	10,930	58,153	38,510	107,593
1866 ..	38,444	54.710	93,154	11,334	46,275	32,408	90,017
1867 ..	38,220	69,619	107,839	8,750	52,456	49,794	111,000
1868 ..	39,779	131,447	171,226	8,276	75,452	72,191	155,919
1869 ..	40,459	125,708	166,167	8,823	95,208	44,016	148,047
1870 ..	41,304	87,954	129,258	9,344	77,208	71,737	158,289
1871 ..	38,536	141,670	180,206	9,805	46,632	87,005	143,442
1872 ..	37,952	130,234	168,186	9,859	62,085	90,840	162,784
1873 ..	36,929	75,210	112,139	10,389	62,533	126,206	199,128
1874 ..	37,362	129,975*	167,337	10,624	72,785	65,656	149,065
1875 ..	37,632	137,386*	175,018	10,186	52,685	53,295	116,166
1876 ..	39,218	67,342	106,560	10,332	92,027	58,834	161,193
1877 ..	45,673	191,534	237,207	10,455	106,956	75,812	193,223
1878 ..	46,619	114,951	161,570	11,003	123,319	66,792	201,114
1879 ..	48,902	149,219*	198,121	10,888	119,488	83,485	213,861
1880 ..	111,107	151,303	262,410	22,558	144,574	78,548	245,680
1881 ..	134,120	123,873	257,993	23,344	153,459	60,389	237,192
1882 ..	137,439	151,805	289,244	16,672	179,474	63,915	260,061
1883 ..	157,012	188,401†	345,413	17,422	197,329	87,008	301,759
1884 ..	161,705	179,965‡	341,670	18,196	248,069	107,526	373,791
1885 ..	162,988	157,467§	320,455	19,012	217,921	88,490	325,423
1886 ..	170,668	195.408§	366,076	19,014	229,805	87,663	336,482
1887 ..	186,823	149,243‖	336,066	18,856	207,335	105,143	331,334
1888 ..	194,843	78,836‡	273,679	11,672	141,714	204,363	357,749
1889 ..	203,314	48,021¶	251,935	10,914	108,259	121,722	240,895
1890 ..	163,474	42,028	205,502	8,861	100,056	84,091	193,008
1891 ..	159,160	64,162	223,322	10,704	258,175	74,914	343,793
1892 ..	163,173	305,041	468,214	11,883	355,613	88,762	456,258
1893 ..	155,498	55,028	210,526	12,113	241,201	107,435	360,749
1894 ..	160,137	349,982	510,119	12,081	206,460	101,369	319,910
1895 ..	143,563	45,782	189,345	12,266	152,984	91,387	256,637
1896 ..	133,942	120,310	254,252	12,027	171,969	96,241	280,237
1897 ..	134,007	119,072	253,079	11,975	166,927	104,760	283,662
1898 ..	132,418	70,755	203,173	9,713	144,096	102,508	256,317
1899 ..	129,006	59,544	188,550	8,668	87,400	90,478	186,546
1900 ..	140,763	61,059	201,822	13,039	117,445	92,047	222,531
1901 ..	187,166	246,668	433,834	16,503	146,376	134,849	297,728
1902 ..	178,334	65,363	243,697	18,881	118,976	126,737	264,594
1903 ..	179,558	154,189	333,747	16,694	133,560	106,495	256,749
1904 ..	180,427	216,736	397,163	16,793	126,755	289,230	432,778
1905 ..	179,154	158,774	337,928	17,783	121,280	216,495	355,558
1906 ..	179,776	202,353	382,129	19,940	146,672	141,942	308,554
1907 ..	193,053	291,566	484,619	20,643	136,745	240,942	398,330
1908 ..	196,780	243,358	440,138	30,142	186,554	229,605	446,301
1909 ..	281,213	264,990	546,203	39,269	216,429	239,529	495,227
1910 ..	290,030	288,086	578,116	35,072	217,367	326,546	578,985
1911 ..	319,633	338,588	658,221	38,463	228,396	357,141	624,000
1912 ..	326,955	391,153	718,108	39,305	237,180	429,771	706,256
1913 ..	393.515	523,634	917,149	39,983	304,461	521,398	865,842
1914 ..	455,677	528,554	984,231	42,873	287,875	562,941	893,689
1915 ..	464,232	610,915	1,075,147	45,992	314,501	609,698	970,191
1916 ..	525.869	672,116	1,197,985	45,839	343,335	698,099	1,087.273

* Including £10.000 from Government. † Including £75,000 from Government. ‡ Including £25 000 from Government. § Including £18,750 from Government. ‖ Including £31,250 from Government. ¶ Including £6,250 from Government.

NEW SOUTH WALES.—CITY OF SYDNEY.—ASSETS, LIABILITIES, AND OUTSTANDING LOANS, 1888 TO 1916.

Year ending 31st Dec.	Assets.	Liabilities.	Outstanding Loans.	Year ending 31st Dec.	Assets.	Liabilities.	Outstanding Loans.
	£	£	£		£	£	£
1888	..	..	735,000	1903	2,140,489	1,617,527	1,585,000
1889	..	..	740,000	1904	2,086,599	1,615,522	1,590,000
1890	..	..	710,000	1905	2,067,883	1,736,364	1,660,000
1891	..	..	710,000	1906	2,180,057	1,809,259	1,735,000
1892	..	..	960,000	1907	2,324,902	2,0:8,764	1,880,000
1893	..	..	1,260,000	1908	2,622,898	2,408,062	2,105,000
1894	....	..	1,260,000	1909	3,677,159	2,994,579	2,679,000
1895	2,410,968	1,301,958	1,260,000	1910	4,318,028	3,794,063	3,231,900
1896	2,028,650	1,414,720	1,355,000	1911	4,845,111	4,310,441	3,870,600
1897	2,045,442	1,525,798	1,410,000	1912	6,030,411	5,654,811	4,977,500
1898	1,983,375*	1,543,531*	1,410,000	1913	7,456,600	7,195,657	5,627,300
1899	1,921,308	1,561,265	1,410,000	1914	8,397,918	8,142,616	6,163,800
1900	2,057,069	1,588,233	1,410,000	1915	9,124,125	8,877,853	6,715,100
1901	2,078,927	1,612,008	1,570,000	1916	10,005,232	9,751,011	7,050,100
1902	2,095,859	1,588,123	1,535,000				

* Estimated.

NEW SOUTH WALES.—CITY OF SYDNEY.—AREA, POPULATION, AND VALUATIONS, 1859 TO 1916.

Year ending 31st Dec.	Area.	Number of Dwellings.	Population.	Number of Rateable Properties.	Valuations. Unimproved Capital Value.	Valuations. Annual Value of Improved Land, Buildings, &c.	Valuations. Capital Value of all Property.	Length of Streets.
	Acres.	No.	No.	No.	£	£	£	Miles.
1859	..	..	..	10,900	..	..	..	..
1860	..	..	..	11,150	..	753,900	..	..
1861	..	..	..	11,721	..	760,000	..	..
1862	..	..	..	11,912	..	760,000	..	..
1863	..	..	..	12,123	..	704,000	7,040,000	90
1864	..	..	..	12,150	..	622,000	6,220,000	90
1865	..	..	..	12,445	..	637,600	..	90
1866	..	..	..	12,740	..	652,900	..	95
1867	..	..	..	12,908	..	702,903	..	95
1868	..	..	..	13,098	..	708,400	..	95
1869	..	..	..	13,538	..	729,100	..	95
1870	..	..	..	13,995	..	750,524	..	96
1871	..	..	..	14,855	..	781,293	..	96
1872	..	..	..	14,751	..	732,168	..	97
1873	..	..	..	15,100	..	738,816	..	97
1874	..	..	..	15,472	..	748,235	..	100

NEW SOUTH WALES.—CITY OF SYDNEY.—AREA, POPULATION, AND VALUATIONS, 1859 TO 1916—*continued.*

Year ending 31st Dec.	Area.	Number of Dwellings.	Population.	Number of Rateable Properties.	Valuations. Unimproved Capital Value.	Valuations. Annual Value of Improved Land, Buildings, &c.	Valuations. Capital Value of all Property.	Length of Streets.
	Acres.	No.	No.	No.	£	£	£	Miles.
1875	..	..	..	15,909	..	769,074	..	100
1876	..	..	..	15,956	..	760,000	..	100
1877	..	..	..	16,360	..	757,000	..	100
1878	..	..	..	16,590	..	947,000	..	100
1879	..	..	..	17,140	..	960,000	..	100
1880	..	..	..	18,062	..	1,037,000	..	100
1881	..	..	..	19,932	..	1,436,765	..	100
1882	..	..	..	20,105	..	1,449,857	..	100
1883	..	..	..	20,197	..	1,490,357	29,807,140	100
1884	..	..	..	21,271	..	1,671,493	36,772,840	100
1885	..	..	..	21,352	..	1,799,793	39,595,440	100
1886	..	..	..	20,716*	..	1,850,214	40,704,700	100
1887	..	..	..	7,946†	..	1,905,888	41,929,5:0	100
1888	..	..	..	8,172†	..	1,936,253	42,529,525	105
1889	..	21,437	128,158	6,321†	..	2,228,817	44,576,340	110
1890	2,880	21,500	128,880	20,966	..	2,276,362	45,527,240	115
1891	2,880	21,245	112,570	22,009	..	2,710,488	51,237,600	115
1892	2,880	21,767	113,430	22,358	..	2,785,846	55,716,900	115
1893	2,880	21,900	114,100	22,428	..	2,777,245	55,550,000	115
1894	2,880	22,400	114,820	22,428	..	2,496,175	55,470,000	115
1895	2,880	22,500	115,490	21,989	..	2,361,290	47,225,800	115
1896	2,880	23,190	115,980	22,228	..	2,237,040	44,740,700	115
1897	2,880	23,185	116,640	22,486	..	2,173,260	43,465,200	115
1898	2,880	22,877	117,270	22,428	..	2,145,800	43,159,900	117
1899	2,880	21,137	117,880	23,569	..	2,135,700	43,128,600	115
1900	2,880	21,137	118,480	31,131	..	2,144,830	42,896,500	115
1901	2,880	21,137	120,420	31,131	..	2,168,500	43,370,000	113
1902	2,880	22,207	121,200	34,932	..	2,239,750	44,795,100	113
1903	2,880	21,604	116,150	34,932	..	2,291,780	44,834,400	113
1904	2,880	21,399	113,240	37,502	..	2,307,800	44,889,000	113
1905	2,880	21,331	110,820	37,058	20,207,812	2,312,830	45,545,700	117
1906	2,880	22,296	110,760	37,058	20,207,812	2,323,040	45,749,800	117
1907	2,880	21,445	112,000	37,058	20,207,812	2,236,849	45,749,800	117
1908	2,892	23,035	112,900	42,149	20,207,812	2,249,760	49,060,600	118
1909	3,327	..	120,660	42,149	19,970,365	2,292,671	50,948,240	133
1910	3,327	..	119,800	42,149	19,952,793	2,346,399	52,142,200	133
1911	3,327	18,768	118,800	46,583	23,940,030	2,498,429	55,520,640	133
1912	3,327	..	116,400	46,583	23,988,480	2,582,788	57,395,288	134
1913	3,327	..	115,900	46,583	23,837,157	2,753,408	64,080,440	134
1914	3,327	..	110,700	43,683	27,395,826	3,271,102	75,786,580	134
1915	3,327	..	104,200	43,683	27,226,283	3,391,759	78,580,300	134
1916	3,327	..	106,000	43,683	31,168,904	3,466,550	80,264,720	1:4

* Number of persons paying City rates, 7,963.
† Number of electors on roll.

(c) Summary Tables.

1. **Revenue, Expenditure, &c.**—The following tables give summaries of (i) the revenue and expenditure of all Road Trusts, Municipalities, and Shires, and of the City of Sydney, for the years 1858 to 1916; and (ii) the annual value of all property from

APPENDIX 4

Copy of the Act granting the Sydney & Suburban Hydraulic Power Company Limited the right to supply High Pressure water to the City.

THE SYDNEY & SUBURBAN HYDRAULIC
POWER COMPANY LIMITED.

New South Wales.

ANNO QUINQUAGESIMOECUNDO

VICTORIÆ EGINÆ.

The "Sydney Hydraulic Power Company's Act, 1888 was

An Act to facilitate the supply of mot power on the high-pressure hydraulic system for usen wharves, in warehouses, and other buildings, for eltric lighting, and for the extinguishing of fires, and othpurposes, in the City of Sydney and its Suburbs. [Assented to, 13th December, 1888.]

assented 13/12/88

WHEREAS the establishment of a sym for applying motive power by hydraulic pressure for use wharves, in warehouses, factories, hotels, offices, and dwellings, as a in electric lighting and fire extinction in the city of Sydney and its burbs, would be of great local and public advantage. And whereas William Gardiner of the city of Sydney, merchant, William Henry Ling, of the same place, merchant, William Thomas Poole, of the sar place, Esquire, James Angus, of the same place, contractor, and Jon William Cliff, of the same place, merchant, are willing to undertke the establishment of such a system, but the same cannot be arried out without the authority of Parliament. And whereas it is xpedient to confer upon the said William Gardiner, William Henry aling, William Thomas Poole, James Angus, and John William Cliff legislative authority to establish, maintain, and use the said system. And whereas it is expedient that power should be conferred upon the said William Gardiner, William Henry Ealing, William Thomas oole, James Angus, and John William Cliff, to transfer and assin their rights, powers, authorities, obligations, and liabilities un er this Act, to any company duly incorporated for that purpose. Be it therefore enacted by the Queen's Most Excellent Majesty, by and ... — Preamble.

of the Legislative Council and the Legislative Assembly of New South Wales in Parliament assembled, and by the authority of the same as follows, that is to say:—

Introduction.

Short title.

1. This Act may be cited as the "Sydney Hydraulic Power Company's Act, 1888," and shall come into operation on the passing of this Act.

Interpretation of terms.

2. The following words and expressions in this Act shall have the meanings hereby assigned to or included in them, unless there be something in the subject or context repugnant to such construction, that is to say—

The promoters.

The expression "the promoters" shall mean the said William Gardiner, William Henry Paling, William Thomas Poole, James Angus, and John William Cliff, and include their and each of their heirs, executors, administrators, and assigns.

The undertaking.

The expression "the undertaking" as applied to the promoters shall mean the supplying of hydraulic power within the limits within which the promoters are authorized by this Act to supply hydraulic power, and the constructing of all works and the doing of all other things necessary or convenient for that purpose, subject to the provisions of this Act.

Street.

The word "street" shall include not only any street commonly called, but also any highway, public road, lane, court, or passage, market-place, square, wharf, pier, or other thoroughfare, or public place within the limits of this Act.

Apparatus.

The expression "apparatus" shall mean and include all mains, pipes, fire extinguishers, hydrants, lifts, fixed or portable cranes, and all other machines, mechanical fittings, and appliances necessary or proper for or which may be used for the purpose of or in connection with the carrying on of the business or affecting any of the objects of the promoters.

Local authority.

The expression "local authority" shall mean the Municipal Council of Sydney and the Municipal Council of any borough or municipality.

District.

The word "district" in relating to a local authority shall mean the area within the jurisdiction of such local authority.

Justice.

The word "Justice" shall mean a Justice of the Peace for the Colony of New South Wales.

Limits of Act.

3. The limits of this Act shall extend to and include the city of Sydney, and with the consent of the local authority to any borough or municipal district within the suburbs thereof.

PART I.

By-laws.

By-laws.

4. It shall be lawful for the promoters from time to time to make such by-laws as they may deem necessary for the purpose of regulating, controlling, or protecting the apparatus of the promoters, or for the supply of hydraulic power or for fixing the charges for the same, and for the purpose of regulating the conduct of the officers and servants of the promoters and for providing for the due management of the affairs of the promoters in all respects, and from time to time by other by-laws to alter or repeal any such by-laws.

By-laws to be approved by Governor in Council and gazetted.

5. All or any such by-laws being consistent with the provisions of this Act and not repugnant to any other Act or law in force within the Colony of New South Wales shall have the force of law when confirmed

confirmed by the Governor, with the advice of the Executive Council, and published in the *Government Gazette*, but not sooner or otherwise. The production of the *Government Gazette* with any such by-laws so published as aforesaid shall in any suit or proceeding whatsoever be sufficient evidence that such by-laws have been confirmed and published as is herein required.

6. Any by-laws made under this Act may state some minimum and maximum penalty for any neglect or breach thereof respectively. Provided that no such maximum penalty shall exceed ten pounds. By-laws to be enforced by penalty

7. All by-laws made under the authority of this Act shall be painted on boards, or printed on paper and posted on boards and hung up and affixed and continued on the front or other conspicuous part of every central pumping station or office belonging to the promoters, and such board shall from time to time be renewed as often as the by-laws thereon or any part thereof shall be obliterated or destroyed, and no penalty imposed by any by-law shall be recoverable unless the same shall have been published and kept published in manner aforesaid. Publication of by-laws.

8. It shall be lawful for the promoters by any such by-law or by-laws to provide for compelling any officer or servant of the promoters to perform on all or any Sundays and holidays throughout the year, any work which such officer or servant may have agreed with the promoters to perform, and which in the opinion of the promoters may be necessary for the extinction of fires, or the working of lifts in hotels, coffee palaces, lodging-houses, and private residences, and no by-law framed for the said purpose shall be deemed repugnant to the laws of the Colony of New South Wales, nor shall any agreement made between the promoters and any officer or servant of the promoters, whether in writing or verbal, be deemed invalid by reason of any stipulation contained therein binding any such officer or ~~servant~~ to work on Sundays or holidays. By-laws may compel necessary working on Sundays and holidays.

Powers and responsibilities of the Promoters as regards the execution of Works.

9. The promoters, under such superintendence as is hereinafter specified, may with the previous consent in writing of the local authority open and break up the road, path, or pavement of any streets within the limits of this Act, and may open and break up any sewers, drains, or tunnels within or under such street, and lay down and place within the same limits, mains, conduits, service-pipes, and other apparatus, and from time to time repair, alter, or remove the same, and for the purposes aforesaid, may remove and use all earth and materials in or under such street, and the promoters may do all other acts which the promoters shall, from time to time, deem necessary for supplying hydraulic power within the limits of this Act, and it shall be lawful for the promoters to lay any pipe, branch, or other apparatus from any main or branch pipes, into, through, or against any building for the purpose of providing and supplying such power and to provide and set up any apparatus necessary for securing to any building a supply of hydraulic power, and for measuring and ascertaining the extent of such supply. Provided always that nothing herein shall authorize the promoters to lay down or place any pipe or other works into, through, or against any building, or in any land not dedicated to public use, without the consent of the owners and occupiers thereof, except that the promoters may at any time enter upon any land for the purpose of laying or placing, and may lay or place any new pipe in the place of an existing pipe in any land wherein any pipe shall have been lawfully laid down by the promoters or placed, and may repair or alter any pipe so laid down or placed. Power to break up streets under superintendence and to open drains. And to lay pipes for supplying buildings. Not to enter on private land without consent.

10.

Notice of intention to be served on persons having control, &c., before breaking up streets or opening drains.

10. Before the promoters proceed to open or break up any street, sewer, drain, or tunnel they shall give to the local authority under whose management or control the same may be, and in the case of sewers or water mains then to the Water and Sewerage Board, or to its clerk, surveyor, or other officer, notice in writing of their intention to open or break up the same not less than seven clear days before beginning the work, except in cases of emergency arising from accidents to or defects in the pipes or other works, and then so soon as is possible after the beginning of the work or after the necessity for the same shall have arisen.

Streets or drains not to be broken up except under the superintendence of local authority or officer.

11. No such street, sewer, drain, or tunnel shall, except in cases of emergency as aforesaid, and except as hereinafter provided, be opened or broken up except under the superintendence of the local authority having the management or control thereof or its officer, and according to such plan as shall be approved of by the local authority the promoters shall make such temporary or other works as may be necessary for guarding against any interruption of the drainage during the execution of any works which interfere with any sewer or drain. Provided always that if no officer appointed by the local authority shall attend at the time fixed for the opening of any such street, drain, or tunnel, after such notice of the promoter's intention as aforesaid shall have been duly given, or if the local authority or its officer shall refuse or neglect to superintend the operations, the promoters may perform the work specified in the notice without the superintendence of the local authority or its officer.

Streets or drains broken up to be reinstated without delay.

12. When the promoters open or break up the road, path, or pavement of any street, or any sewer, drain, or tunnel, the promoters shall with all convenient speed complete the work for which the same shall be broken up, and fill in the ground and reinstate and make good to the satisfaction of the local authority or its officer, the road, path, or pavement, or the sewer, drain, or tunnel so opened or broken up, and carry away the rubbish occasioned by the work, and the promoters shall at all times whilst any such road, path, or pavement shall be so opened or broken up, cause the same to be fenced and guarded, and shall cause a light sufficient for the warning of passengers to be set up and maintained against or near such road, path, or pavement where the same shall be opened or broken up every night during which the same shall be continued open or broken up and shall keep the road, path, or pavement which has been so broken up, in good repair for three months after replacing and making good the same, and for the further time (if any) not being more than twelve months on the whole during which the soil so broken up shall continue to subside.

Promoters alone responsible for damages.

13. The promoters shall be alone answerable for all accidents, damages, and injuries happening through their act or default, or through the act or default of any person in their employment by reason or in consequence of any of their works or apparatus, and shall save harmless all local and other authorities, companies, or bodies, collectively and individually, and their officers and servants from all damages and costs in respect of such accidents, damages, or injuries.

Penalty for delay, &c., in reinstating streets, &c.

14. If the promoters open or break up any street or sewer, drain or tunnel, without giving such notice as aforesaid, or in a manner different from that which should have been approved of or determined as aforesaid, or without making such temporary or other works as aforesaid when so required, except in the cases in which the promoters are hereby authorized to perform such works without any such superintendence or notice, or if the promoters make any delay in completing any such work or in filling in the ground, or reinstating and making good the road, path, or pavement, or the sewer, drain, or tunnel so opened or broken up, or in carrying away the rubbish

occasioned

occasioned by the work, or if the promoters neglect to cause the place where such road, path, or pavement has been broken up to be fenced, guarded, and lighted, or neglect to keep the road, path, or pavement in repair for the space of three months next after the same is made good, or such further time as aforesaid, the promoters shall incur a penalty not exceeding fifty pounds for every such offence, and the promoters shall incur an additional penalty of five pounds for each day during which any such delay as aforesaid shall continue after the promoters shall have received notice thereof.

In case of delay or omission parties may reinstate and recover the expenses.

15. If any such delay or omission as aforesaid takes place, the local authority having the management or control of the street, sewer, drain, or tunnel, in respect of which such delay or omission shall take place may cause the work so delayed or omitted to be executed, and the expenses of executing the same shall be repaid to such local authority by the promoters, and such expenses shall be recoverable in the same manner as damages are recoverable under this Act.

Compensation to be made by promoters for damage.

16. The promoters shall do as little damage as may be in the execution of the powers by this Act granted, and shall make compensation for any damage which may be done in the execution of such power.

Notice of alteration in situation of pipes

17. If at any time any local authority should think it necessary or expedient to require the promoters to raise or sink or otherwise alter the situation of any of the pipes which shall be laid down for the purposes of the promoters, or to alter the situation of any pipes which shall have been laid down contrary to any of the provisions of this Act, the promoters shall, within ten days next after being required so to do by notice in writing, raise or sink or otherwise alter the situation of such pipes according to the notice, and in default thereof it shall be lawful for the local authority to cause such pipes to be so raised or sunk or the situation thereof otherwise altered, and the expense of doing the work shall be paid by the promoters or repaid by the promoters, and such expenses shall be recoverable in the same manner as damages are recoverable under this Act: Provided that the promoters be not called upon to make such alterations in the situation of their pipes unless such alteration be necessary for the carrying out of city improvements or municipal works.

Offences against the promoters and protection of the promoters' privileges and charges.

Penalty for injuring promoters' apparatus or defrauding the promoters.

18. Every person who shall lay or cause to be laid, any pipe to communicate with any pipe belonging to the promoters without their consent, or shall wilfully or by culpable negligence injure, or suffer to be injured any pipe, meter, or other apparatus belonging to the promoters, or shall alter the index to any meter, or prevent any meter from duly registering the quantity of hydraulic power supplied, or shall fraudulently abstract any water of the promoters, shall, without prejudice to any right or remedy for the protection of the promoters or the punishment of the offender, forfeit and pay to the promoters for every such offence, a sum not exceeding ten pounds, and in addition thereto the promoters may recover the amount of any damage sustained by the promoters by any such wrongful act; and in any case in which any person has wilfully or by culpable negligence injured, or caused to be injured, any pipe, meter, or other apparatus belonging to the promoters, or altered the index to any meter, or prevented any meter from duly registering the quantity of hydraulic power supplied, the promoters may also, until the meter complained of has been remedied but no longer, discontinue the supply of hydraulic power to the person so offending, notwithstanding any contract previously existing.

19.

Penalty for interrupting promoters' workmen.

19. Every person who shall wantonly or maliciously hinder or interrupt any of the officers, workmen, or servants of the promoters in the legal performance of their duties, or shall in anywise cause or procure such hindrance or interruption to take place, and shall be convicted of so doing before any Stipendiary or Police Magistrate, shall for every such offence incur such penalty as such Magistrate may award, not exceeding ten pounds, and such Magistrate shall also order the offender to pay to the promoters the full amount of the damage which the promoters may sustain by such hindrance or interruption. Provided always that nothing herein contained shall be construed to restrain any local authority or any person duly authorized by such local authority for the purpose from preventing the promoters from infringing any regulation of such local authority for the improvement of the streets within its district, or shall expose any such local authority or any person so authorized to any penalty or payment for so doing.

Remedies for recovering of charges, &c., due to the promoters.

20. If any person supplied with hydraulic power by the promoters neglects to pay any charges or other moneys due for the same under any contract made by and between the promoters, and such person for the space of seven days next after a demand of the amount due signed by the promoters or one of them shall have been left at or upon the building or premises so supplied the promoters may stop the supply of water from the mains or apparatus of the promoters from entering the premises of such person by cutting off the service pipes or by such means as the promoters shall think fit, and may recover the expense of so doing, together with the charges so due and unpaid by action in any Court of competent jurisdiction.

Power to take away pipes, &c.

When supply discontinued.

21. In all cases in which the promoters are authorized to cut off and take away the supply of hydraulic power from any building or premises under the provisions of this Act the agents or workmen of the promoters may after seven days' notice has been given to the occupier enter into any such building or premises between the hours of nine in the forenoon and four in the afternoon, and remove and carry away any pipes, meters, or other apparatus the property of the promoters. Provided that all damage to property of whatever description occasioned by such removal as aforesaid shall be made good by or at the expense of the promoters.

Offences by the Promoters and Protection of the Public.

Daily penalty during escape of water after notice.

22. The promoters shall not at any time cause or permit any overflow or leakage of water from any main or pipe laid down by or belonging to the promoters; and in case of any such occurrence, immediately after the receipt of notice thereof in writing from the local authority or any of its officers or servants, the promoters shall effectually stop and prevent such overflow or leakage, and in case the promoters shall neglect to do so within eight hours of the receipt of such notice, they shall, for every such offence, in addition to any proceedings by way of indictment or otherwise, to which they may be subject, forfeit and pay a sum not exceeding ten pounds for each and every day during which such escape or leakage shall continue after the expiration of the said period of eight hours.

Power after notice to examine pipes to ascertain escape of water.

23. For the purpose of ascertaining whether any water be escaping from the pipes or apparatus of the promoters, the local authority of the district may cause the ground to be dug up and the pipes, conduits, and works of the promoters to be examined. Provided that such local authority, before proceeding with such digging or examination shall give eight hours' notice in writing to the promoters of the time at which such digging and examination is intended to take place; and if it shall be found that such escape was actually taking place

place from the pipes and apparatus of the promoters, they shall be subject to the like obligations of reinstating the road, path, or pavement disturbed, and the same penalties for any delay or any misfeasance or nonfeasance therein, as are hereinbefore provided with respect to roads, paths, and pavements broken up by the promoters for the purpose of laying their pipes.

By whom expenses of examination, &c., are to be borne.

24. If, upon any such examination, it shall appear that the water was escaping from the pipes or apparatus belonging to the promoters, the expense of the digging and examination and of the repair of the street or place disturbed in any such examination shall be paid by the promoters.

Legal proceedings and application of penalties.

How damages, &c., and penalties to be recovered.

25. Subject to the express provisions of this Act, all damages, expenses, or other sums of money directed by this Act to be paid by or to the promoters or any other person and all penalties imposed by this Act for offences or by any by-law made in pursuance of this Act shall, where the amount sought to be recovered does not exceed fifty pounds, be recoverable in a summary way before a Stipendiary or Police Magistrate, and payment of any sum adjudged to be paid shall be enforceable as thereby provided, and where the amount sought to be recovered shall exceed fifty pounds, all such damages, expenses, or other sums of money, and all such penalties shall be recoverable by action in the Supreme Court or any other Court of competent jurisdiction.

Contents of summonses or warrants.

26. Any summons or warrant issued for any of the purposes of this Act may contain in the body thereof or in a schedule thereto several names and sums; and where by this Act any damages or expenses are directed to be paid in addition to any penalty or penalties the amount of such damages and expenses shall be ascertained and adjudged by the Stipendiary or Police Magistrate before whom the offender shall be convicted.

Warrants of distress should include costs.

27. Any Stipendiary or Police Magistrate who issues a warrant of distress in pursuance of the provisions of this Act may order that the costs of the proceedings for the recovery of the money to be levied shall be paid by the person liable to pay such money, and such costs shall be ascertained by the Stipendiary or Police Magistrate and shall be included in the warrant of distress for the recovery of such money.

Form of conviction.

28. The Stipendiary or Police Magistrate before whom any person shall be convicted of any offence against this Act may cause the conviction to be drawn up according to the following form (that is to say):—

To wit. { Be it remembered that on the day of in the year of our Lord

A.B. is convicted before me C.D. one of Her Majesty's Justices of the Peace for the *[hereby describe the offence generally and the time and place where and when committed]* contrary to the "Sydney Hydraulic Power Company's Act 1888." *[Here state penalty imposed.]*

Given under my hand and seal at in the Colony of New South Wales, the day and year first above written.

C.D.

Justices not disqualified on account of being customers, but shareholders to be disqualified.

29. No Stipendiary or Police Magistrate shall be disqualified from acting in the execution of this Act by reason of his being a customer of the promoters, but no such Magistrate who shall hold shares in the Company if formed, as hereinafter provided, shall be qualified to sit on the trial of any complaint or information laid under this Act.

Nothing to exempt promoters from being indicted for nuisance.

30. Nothing in this Act contained shall prevent the promoters from being liable to an indictment for nuisance or to any other legal proceeding to which they may be liable in consequence of supplying hydraulic power.

Proof of debts in bankruptcy.

31. If any person against whom the promoters shall have any claim or demand shall have his estate sequestrated, or make any liquidation by arrangement or compound with his creditors, or shall otherwise come under the provisions of any Act relating to bankrupt debtors, it shall be lawful for any one of the promoters, in all proceedings under any such Act, or with respect to the estate of any such bankrupt to represent the promoters, and act in their behalf in all respects as if such claim or demand had been the claim or demand of such individual promoter.

Saving rights of Her Majesty.

32. Nothing in this Act contained shall be deemed to affect or apply to any right, title, or interest of Her Majesty, her heirs or successors.

Power of the corporation of Sydney to purchase at prescribed periods.

33. The corporation of the city of Sydney within whose limits the undertaking, property, and apparatus of the promoters or any part thereof passes or is situate may, after the expiration of twenty years from the date of the passing of this Act or at the expiration of each succeeding ten years thereafter, by giving six months' notice in writing, require the promoters to sell, and thereupon the promoters shall sell to the corporation of the city of Sydney the undertaking, property, apparatus, and business of the promoters upon the terms of paying to the promoters the then value thereof, such value, in case of difference, to be determined by three arbitrators, or any two of them, one of whom shall be appointed by the corporation of the city of Sydney so purchasing, another by the promoters, and the third by such other two arbitrators before they proceed in the arbitration. If either the corporation of the city of Sydney so purchasing or the promoters shall neglect or refuse to appoint an arbitrator pusuant to the above provision for two calendar months after the other of them shall have appointed an arbitrator and given notice thereof to the other of them, then the arbitrator already appointed shall appoint a second arbitrator and such two arbitrators shall jointly appoint the third arbitrator. When any such sale has been made all the rights, powers, and authorities of the promoters in respect to the undertaking, property, apparatus and business shall be transfered to, vested in, and may be exercised by such corporation of the city of Sydney.

As to appointment of arbitrators.

When sale made, rights, &c. of promoters to vest in and may be exercised by corporation.

Moiety of excess of net profits over ten per cent. to be set apart to secure the handing over of the works in good repair, and to be applied in or towards the purchase money payable by the corporation of Sydney.

34. When the net profits earned by the promoters shall exceed ten per centum per annum on the capital invested in the undertaking, property, apparatus, and business, one moiety of such excess shall be paid by the promoters to trustees to be appointed as hereinafter provided. And such trustees shall invest the same, and the interest to accrue due thereon on behalf of the corporation of the city of Sydney, so as to accumulate the same by way of compound interest, and when and if the corporation of the city of Sydney shall exercise the right of purchase hereby conferred, then the said trustee shall apply the amount of the aforesaid investment in or towards payment of the amount of purchase money agreed or awarded to be paid the promoters by the said corporation, and shall pay over the balance of the said investment (if any) to the promoters.

As to appointment of trustees.

35. The trustees aforesaid shall be appointed in manner following; one trustee shall be appointed in writing by the corporation of the city of Sydney, one trustee shall be appointed in writing by the promoters, and the third trustee shall be appointed by the said two trustees so appointed, and as often as any trustee shall die or desire to be discharged from or refuse or become unfit or incapable to act in the trust aforesaid, another trustee shall be appointed in his place by the same persons or corporation by whom such trustee occasioning the vacancy was appointed.

36.

Powers of promoters to cease in the event of their not commencing works within eighteen months.

36. The promoters shall, and are hereby required, to *boná fide* commence their works within eighteen months from the passing of this Act, and in the event of their failing to do so, and of such failure being certified under the common seal of the Mayor and Aldermen of the city of Sydney, and published in the *Government Gazette*, all the powers and authorities conferred by this Act shall thereupon *ipso facto* cease and determine to all intents and purposes whatsoever.

Penalty for discontinuance of operations.

37. If at any time the promoters discontinue the undertaking for a period of twelve months, such discontinuance being proved to the satisfaction of a judge of the Supreme Court who shall try the issue of fact as not having been occasioned by circumstances beyond the control of the promoters, then and in such case, all the pipes of the promoters laid in the streets shall belong to and vest in the corporation of the city of Sydney. In this section "circumstances beyond the control of the promoters" shall not include the want of sufficient capital or funds.

Maximum price to be charged for water.

38. The maximum price to be charged by the promoters for water supplied to the public at seven hundred pounds pressure shall not exceed twelve shillings and sixpence per one thousand gallons.

Rights, powers, &c., under this Act may be assigned, &c., to incorporated Company.

39. It shall be lawful for the promoters, at any time after the passing hereof, to assign, transfer, convey, and release to any Company duly incorporated for that purpose all the rights, powers, authorities, privileges, liabilities, and obligations conferred and imposed upon them by this Act, together with all lands, tenements, hereditaments, estates, chattels, and effects of every kind acquired by them under or in pursuance thereof, and purchased and occupied, or used in connection with the undertaking, and the working and maintenance thereof; and upon and after the completion of such assignment, transfer, conveyance, and release, the said Company, their officers, agents, and servants, may lawfully exercise and enjoy all the rights, powers, authorities, and privileges, and shall be, and continue to be, subject to all the liabilities, obligations, penalties, and forfeitures to which the said promoters or their officers, agents, or servants, would have been entitled or subject had no such assignment, transfer, conveyance, and release been completed; provided, however, that nothing herein contained shall prejudice or affect any rights accrued, action or proceedings taken against, or liabilities, obligations, penalties, or forfeitures incurred by the said promoters before the completion of the said assignment, transfer, conveyance, and release.

How Act to be read upon completion of assignment, &c., under last preceding section.

40. Upon the completion of any such assignment, transfer, conveyance, or release, as in the last preceding section mentioned, this Act shall be read so that wherever the words "the promoters," or "any one of the promoters," occur they shall be omitted and the words "the Company" shall be inserted in their stead, and wherever the words "the signatures" or "their signatures" occur they shall be omitted and the words "the common seal of the Company" be inserted in their stead.

By Authority: Charles Potter, Government Printer, Sydney, 1888.

[illegible]

nade by the SYDNEY AND SUBURBAN ULIC POWER COMPANY (LIMITED), in f the powers in that behalf conferred upon the pany by the Sydney Hdyraulic Power Company's

struction of these By-laws, unless the context uires, the expression "Apparatus" means all hanical fittings and appliances used in connection ation of hydraulic power.

y" means the Sydney and Suburban Hydraulic er Company (Limited).

er" means any person who has entered into an ement with the Comny for the supply o ulic power.

" means the supply of hydraulic power.

mpany's supply shall not be available for any upon the conditions and in accordance with the these By-laws, and every consumer or applicant shall agree with the Company to be bound by the

mpany shall not be responsible for any loss or ed by any variation, deficiency, or excess of pressany interruption or cessation of the supply, or rom any matter connected with any machinery, r apparatus fixed on the consumer's premises.

...ted from Government Gazette
24 Feb 1894

4. Any necessary repairs to the Company's works or mains which may involve a cessation of the supply shall, if practicable, be executed by night, or, if necessary, continuously by day and night, and due notice of any such cessation shall be given to the consumer whenever it shall be possible to do so.

5. The water in the Company's mains shall, as far as practicable, be kept by day and night subject to a pressure not less than 700 lbs. to the square inch, measured at the Company's accumulators.

6. The charges payable to the Company for any supply used otherwise than by means of hydrants shall be computed for each quarter of the year separately, and shall be reckoned according to the quantity of water shown by such meter to have been consumed.

7. The scale of charges for water shown by a meter to have been consumed shall be the following, that is to say:—

					Per 1,000 gallons. s.	d.
Exceeding	5,000 and not exceeding	10,000	gallons	......	12	6
„	10,000 „	15,000	„	......	12	1
„	15,000 „	20,000	„	......	11	8
„	20,000 „	25,000	„	......	11	3
„	25,000 „	30,000	„	......	10	10
„	30,000 „	35,000	„	......	10	5
„	35,000 „	40,000	„	......	10	0
„	40,000 „	45,000	„	......	9	7
„	45,000 „	50,000	„	......	9	2
„	50,000 „	75,000	„	......	8	9
„	75,000 „	100,000	„	......	8	4
„	100,000 „	125,000	„	......	7	11
„	125,000 „	150,000	„	......	7	6
„	150,000 „	175,000	„	......	7	1
„	175,000 „	200,000	„	......	6	8
„	200,000 „	225,000	„	......	6	3
„	225,000 „	250,000	„	......	5	10
„	250,000 „	275,000	„	......	5	5
„	275,000 „	300,000	„	......	5	0

8. If the quantity consumed during any quarter of a year is less than 5,000 gallons, the consumer shall pay the minimum charge, which shall be £3. If the quantity so consumed is more than 300,000 gallons the rate of charge may be reduced, but in default of an agreement for such reduction, the rate charged shall be five shillings per thousand gallons.

9. The rentals for hydrants shall be as follow:—For one hydrant, a minimum charge of £5 per annum. For more than one and not more than three hydrants, a minimum charge of £4 per annum per hydrant. For any number of hydrants exceeding three, a minimum charge of £3 5s. 3d. per annum per hydrant. When a hydrant has been used for extinguishing fire, the charges payable therefor in addition to the above rental shall be at the rate of £20 for the first hour or portion thereof for each hydrant during which the same may have been used, and at the rate of £10 for each succeeding hour or portion thereof.

10. The quarters of the year shall, for the purposes of the preceding By-laws, be taken to commence on the first days of the months of January, April, July, and October respectively, and consumers shall pay the charges for each quarter at the termination of such quarter.

11. Application for a supply from the Company's mains shall be made to the Secretary of the Company, and an estimate of the quantity of water which will probably be consumed shall, if possible, be furnished with the application.

12. The service pipe, with stop-cock, from the street main to the inside of the building or to within the premises of the intending consumer, shall be laid or fixed by the Company's officers and not otherwise.

13. All cylinders, rams, pipes, valves, or other apparatus which will be subjected to the pressure from the mains shall be so proportioned as to convey the pressure without undue loss.

14. All cylinders, rams, pipes, valves, or other apparatus as aforesaid shall be capable of standing a pressure of 2,400 lbs. to the square inch, and a certificate under the maker's hand, that they have been successfully tested to stand that pressure, shall in all cases be furnished to the Company before they are passed by the Company's Engineer.

15. All hydraulic machinery having rams working in cylinders shall be provided with permanent stops sufficient to prevent the rams being forced out of the cylinders, and such stops shall be in addition to and independent of any required valve gear or tappet gear.

16. An independent screw-down stop-cock shall be fixed immediately inside the consumer's building or premises, in addition to the stop-cock fitted by the Company to its service pipe.

17. A back-pressure valve, non-return valve, or other similar apparatus of an approved kind, shall be fitted to every service pipe, and shall be placed as near as possible to the inlet ... the consumer's building or premises.

18. Hydraulic cylinders, valves, and pipes shall be so arranged and shall be fitted with such air-cocks and drain-cocks that they may be effectually drained and washed out.

19. A relief valve loaded to 800 lbs. to the square inch shall be fixed on any service pipe the internal diameter of which exceed three-quarters of an inch, and shall be placed as near as possible to the main stop-cock inside the consumer's building or premises. The escape pipe from this relief valve shall be connected with the general system of return water pipes.

20. The water from all machines used by the same consumer in the same building or on the same premises shall, after use, be passed wherever the same may be practicable into one system of return mains, and such mains shall be led to the drain in such a manner as will permit the Company's meters being fixed in accordance with the directions of the Company's Engineer.

21. The connecting pipes on each side of the meter and tank shall be fitted at the expense of the consumer under the supervision and to the satisfaction of the Company's Engineer or Inspector.

22. The Company's Engineer shall inspect and test the whole of the machinery, pipes, and other apparatus which are intended to be used in connection with the supply, or the utilisation thereof, and the same shall be passed and approved by him before the consumer becomes entitled to use the supply.

23. When all the requirements of these By-laws have been complied with to the satisfaction of the Company's Engineer, the intending consumer shall receive the key of the street valve, and shall thereupon become entitled to use the supply.

24. The Company shall at its own cost provide one or more meters on the consumer's premises for registering the amount of water supplied to such consumer, and any repairs to the same shall be done by the Company's officers and servant at the Company's cost.

25. The cost of laying down the service pipe with stop-cock to a consumer's premises shall be repaid to the Company upon demand, and the Company may, if it so see fit, refuse to lay down any such pipe, or to establish any connection with a main unless the estimated cost of so doing shall first have been paid.

26. The consumer shall pay to the Company a meter rent of 5s. and upwards per quarter according to the size of the meter, and such rent shall be in addition to any minimum charge for the supply of power or on account of hydrants.

27. The consumer shall at his own cost keep all machinery, pipes, or other apparatus upon his premises in good repair and to the satisfaction of the Company's Engineer, and if he shall fail so to do, or if such machinery, pipes, or other apparatus are found not to have been made, laid down, or erected in accordance with the requirements of these By-laws, the Company ... may discontinue the supply.

28. At all times after working hours the consumer shall cause the stop-cock to be screwed down, and shall keep the same screwed down until he again requires to use the supply.

29. If any defect or leakage shall exist, arise, or occur in connection with the machinery, pipes, or other apparatus on a consumer's premises, the consumer shall, without delay, give written notice thereof to the Secretary of the Company.

30. Every consumer shall allow to the officers and servants of the Company all reasonable facilities for examining, repairing, or removing any meter belonging to the Company which may have been placed upon such consumer's premises.

31. Except in the case of water supplied through hydrants the water supplied by the Company shall not be used for any other purpose than motive power. Any water supplied by the Company through hydrants shall be used only for the purpose of fire extinction.

32. All officers and servants of the Company shall, if so required by the Company, perform their respective duties on all or any Sundays and holidays throughout the year, so far as the Company may deem performance of the same to be necessary for the extinction of fires, or the working of lifts in hotels, coffee palaces, lodging houses and private residences.

33. Upon the happening of any accident, damage, or injury through the act or default of any such officer or servant of the Company or by reason or in consequence of any of the Company's works or apparatus under such officer or servant's control or charge, he shall forthwith, upon having knowledge of the same, give notice thereof to the Company.

34. The officers and servants, or officers or servants of the Company shall not enter into any combination to quit the service of the Company in compliance with the request or instructions of any person or association whatsoever (not being the Company).

35. Any person offending against any of the last seven preceding By-laws shall be liable to a penalty of not less than five shillings, nor more than ten pounds.

Signed on behalf of the Promoters,

JAMES ANGUS,
W. T. POOLE, } Directors.
C. F. STOKES,

1858 £2 15s.

APPENDIX 5

Connections to HP Mains in the CBD 1892-1931.

APPENDIX 5

TABLE

Connections to HP Power Supply

Period	Connections	Annual % Increase/ Decrease
Oct/Dec 1891	87	-
Dec91/Dec 92	134	35.0
93	194	30.9
94	218	11.0
95	247	11.7
96	300	17.67
97	340	11.76
98	380	10.53
99	407	6.63
1900	442	7.92
01	488	9.43
02	524	6.87
03	544	3.68
04	573	5.06
05	605	5.29
06	634	4.57
07	655	3.21
08	680	3.68
09	672	-1.19
10	670	-.30
11	685	2.19
12	697	1.72
13	711	1.97
14	699	-1.72
15	711	1.69
16	714	.05
17	710	-.56
18	714	.06
19	723	1.24
20	727	.55
21	735	1.09
22	740	.68
23	733	-.95
24	730	-.41
25	734	.54
26	728	-.82
27	726	-.28
28	758	4.22
29	767	1.77
30	767	-
31	743	-3.23

Subsequent data not available

These figures do not dovetail in with the figures issued by the Dept. of Labour, Table?4 (P50) nor with the AGM 1892 of INCREASES + 100?%/300?% Note the sharp dip in the Dept's figures 1913/14 (p.62?). This dip is not supported by the Co. Minute figures (see ~~Table?~~ P119) for the same period. Either there were over 100 independent hydraulic lifts which dropped out in '13/14 or the Minute figures counterbalance a drop in lift connections and an increase in other types of connections. This is not mentioned in the Minutes. In this period there was turbulance in the Co.

1. Wood for fuel
2. UK imports of tubing stopped
3. Board coup
4. There were few sales

In general the Dept of Labour figures show a higher level of hyd. installations than do the HP Supply Co but both reveal the upward growth of lifts in general during a period of depression in general and the fact of electric lifts becoming the dominant force in vertical transport is apparent in the Minutes by the fact that the HP Supply Co started to sell & service electric lifts by at least 1920 but T Dickenson in 1902 was sent around the world by the Co to research the role of electric lifts. Water usage in another gauge to the historical use by lifts in Sydney.

APPENDIX 6

Preliminary Draft of a Sketch of the Melbourne Hydraulic Power Supply.

PRELIMINARY DRAFT. Comments or additions will be much appreciated

MELBOURNE HYDRAULIC POWER SUPPLY.

On the 17th., December 1887 the government of the State of Victoria passed "An Act to facilitate the supply of Motive Power on the High Pressure Hydraulic System for the Extinguishing of Fires and other purposes in Melbourne and its vicinity." This Act defined the powers of a company already in existence permitting it to operate for thirty years from a stipulated date after which its assets would become the property of the Local Authority. The commencing date for the thirty year period was finally fixed by an amending act of 24th., October 1890 as January 1st., 1895.

A company called The Melbourne Hydraulic Power Company Limited had been registered and incorporated as a Joint stock Company under the Companies Statute Act of the State of Victoria on 24th., June 1886.

The company commenced supply in July 1889. It ceased to operate as a public company on the 31st., December 1924 when it was taken over by the Melbourne City Council in accordance with the act of 1887. The company had operated profitably up to 1924 and sought an extension of their operating rights by a lease from the City Council for seven years but this was not granted. Two steam driven stations were replaced by electrically driven pumps in 1928. The City Council supplied hydraulic power from 1925 to the end of 1967 when high maintenance costs and decreasing revenue resulted in closure of operations.

A pamphlet issued by the company in December 1889 states that seven miles of mains had been laid from Australian Wharf up Flinders Lane, Little Collins Street, Little Bourke Street to Parliament Houses, parts of King Street, Elizabeth Street, Queen Street, etc., thus embracing nearly the whole of the city. These mains were supplied with water at a pressure of 700 lb./ sq. inch by the Central Pumping Station at Australian Wharf. Two hydraulic accumulators were used. The water supply was taken from the Yarra and passed through a system of filters. The power was available day and night. Greathead fire hydrants were available the minimum charge for one hydrant being £5 per annum and for one to three £4 per annum . The charge for the first hour's use during a fire was £20 and each hour after £10. Various types of machines were available on deferred payments or hire and the pamphlet listed some 102 consumers. By 1894 the company was supplying power to 413 machines consuming 1,500,000 gallons per week with a total mains length of 18 miles.

? No details of the station plant are available. At the time of the reversion of the undertaking to the City Council two pumping stations were mentioned, a No.1 station owned by the Harbour Trust Commissioners and leased to the company and a No.2 station on freehold land in Francis Street. Arrangements were made for No. 1 station to be leased to the Council for three years from January 1st, 1925. Then the equipment of No. station was listed as

2 main pumping engines. } Query similar to those at Sydney?
2 small pumping engines.
2 accumulators.
3 multi-tubular boilers and associated piping. ?
2 tanks which formed the roof of the engine room.

The company then had 709 customers the equipment being listed as

Hydraulic Goods Lifts	426.
" Passenger Lifts	168.
" Presses	42.
" Jiggers	14.
" Hydrants	41
" Capstans	6
" Cranes	6.
" Gates	2.
" Vacuum cleaner	1.
" Ejector	1.

hydraulic accumulators were used. The water supply was taken from the Yarra and passed through a system of filters. The power was available day and night. Greathead fire hydrants were available the minimum charge for one hydrant being £5 per annum and for one to three £4 per annum. The charge for the first hour's use during a fire was £20 and each hour after £10. Various types of machines were available on deferred payments or hire and the pamphlet listed some 102 consumers. By 1894 the company was supplying power to 413 machines consuming 1,500,000 gallons per week with a total mains length of 18 miles.

? No details of the station plant are available. At the time of the reversion of the undertaking to the City Council two pumping stations were mentioned, a No.1 station owned by the Harbour Trust Commissioners and leased to the company and a No.2 station on freehold land in Francis Street. Arrangements were made for No. 1 station to be leased to the Council for three years from January 1st, 1925. Then the equipment of No. station was listed as

2 main pumping engines. } Query similar to those at Sydney?
2 small pumping engines. }
2 accumulators.
3 multi-tubular boilers and associated piping. ?
2 tanks which formed the roof of the engine room.

The company then had 709 customers the equipment being listed as

Hydraulic	Goods Lifts	426.
"	Passenger Lifts	168.
"	Presses	42.
"	Jiggers	14.
"	Hydrants	41
"	Capstans	6
"	Cranes	6.
"	Gates	2.
"	Vacuum cleaner	1.
"	Ejector	1.

On reversion the hydraulic undertaking became the resposibility of the Electric Supply Committee of the Council and the equipment was ultimately transferred to the Electric Power Station the then engineer to the Hydraulic Company becoming a consultant under the City Electrical Engineer.

APPENDIX 7

Copy of Regulations of the Scaffolding & Lifts Act 1912 which had to be displayed in all Lifts.

Hydraulic Power, Electric and Hydraulic Lifts Limited

14 MARTIN PLACE, SYDNEY.

Service Calls - - - Tel.: B6128 (2 lines); After Hours: MA5550

SCAFFOLDING AND LIFTS ACT, No. 38, OF 1912.

REGULATIONS.

PART V.

WORKING OF LIFTS.

43. (*a*) The indiscriminate working or operating of lifts, except those automatically controlled by the general staff of employees in any building wherein a lift is situated, is prohibited.

No person other than those specifically empowered to do so by their employer shall operate any goods lift except such lift is automatically controlled.

(*b*) The name of the persons empowered to work or operate any goods lift shall be posted in the car of the lift, and in the case of cranes, whips, etc., alongside the control.

(*c*) It shall be unlawful for any person, other than a workman engaged in erecting, repairing, or inspecting the lift, to work or operate any lift that comprises a car operated by means of a rope in the well from any floor or any other place than the car, or to work or operate any electric lift from the control board.

All automatically controlled lifts shall be operated in a proper manner, by means of the car or floor control button switches, and no person shall operate such lift in an improper manner by means of the enclosure gate contacts or fastenings.

(*d*) No attendant in charge of any lift shall move the car from any floor unless the enclosure doors or gates upon the floor and the car are closed and fastened.

(*e*) No attendant shall load or unload a car nor take in or let out passengers, unless the power is absolutely shut off the machine: and if it is necessary for the attendant to remove his hand from the control, the control must be locked in the "stop" position or the switch handle removed.

(*f*) No person other than the one at the time operating the lift shall interfere with the machinery or the controlling mechanism, nor with any enclosure, door, gate, or fastening. This does not apply to any *bona fide* workmen engaged in inspecting, erecting, or repairing a lift or in case of emergency.

(*g*) If an accident occurs in connection with any lift, from any cause whatsoever, it shall be necessary for the person at the time in charge of the building where the lift is situated, to forthwith notify in writing the Chief Inspector of Scaffolding and Lifts of such accident and the circumstances surrounding its occurrence.

(*h*) No lift shall be loaded in excess of the maximum load which the lift is designed to take; this applies to both lifting or lowering.

(*i*) A copy of Part V of these Regulations and the following extract from the Scaffolding and Lifts Act, 1912, shall be placed and retained in the car of every passenger or goods lift, and alongside the ground-floor control of every service lift, crane, whip, etc.:—

[*Extract from the Scaffolding and Lifts Act*, 1912.]

Passenger Lifts.

11. If any person other than an authorised attendant works, operates, or interferes with the working of a passenger lift, he shall be liable to a penalty not exceeding ten pounds.

Provided that this section shall not apply to the *bona fide* owner, lessee, or manager of the building wherein the lift is situated, in case of emergency, nor to any workman engaged in inspecting, repairing, or erecting a lift, nor to any automatically controlled lift.

12. The owner, lessee, or manager of any building containing a passenger lift, shall cause the name of every authorised attendant working the lift to be legibly written or printed, and placed and retained in a prominent part of the car of the lift. Any such owner, manager, or lessee failing to comply with the provisions of this section shall be liable to a penalty not exceeding ten pounds.

14. Where it appears to an inspector that any person working a passenger or goods lift is careless, incompetent, or untrustworthy, the inspector may direct such person to, and he shall thereupon cease to work, operate, or be in charge of such lift; and if any owner, lessee, or manager of any premises employs such person in connection with a lift, without the authority, in writing, of an inspector, he shall be liable to a penalty not exceeding ten pounds.

(*j*) In any case where the ownership or right of control of any lift has been changed by sale, transfer, or otherwise, then the person buying, leasing, or otherwise acquiring such ownership or right of control shall, within seven days, give notice to the Chief Inspector of Scaffolding and Lifts in the Form B annexed.

LOAD 3 PERSONS

APPENDIX 8

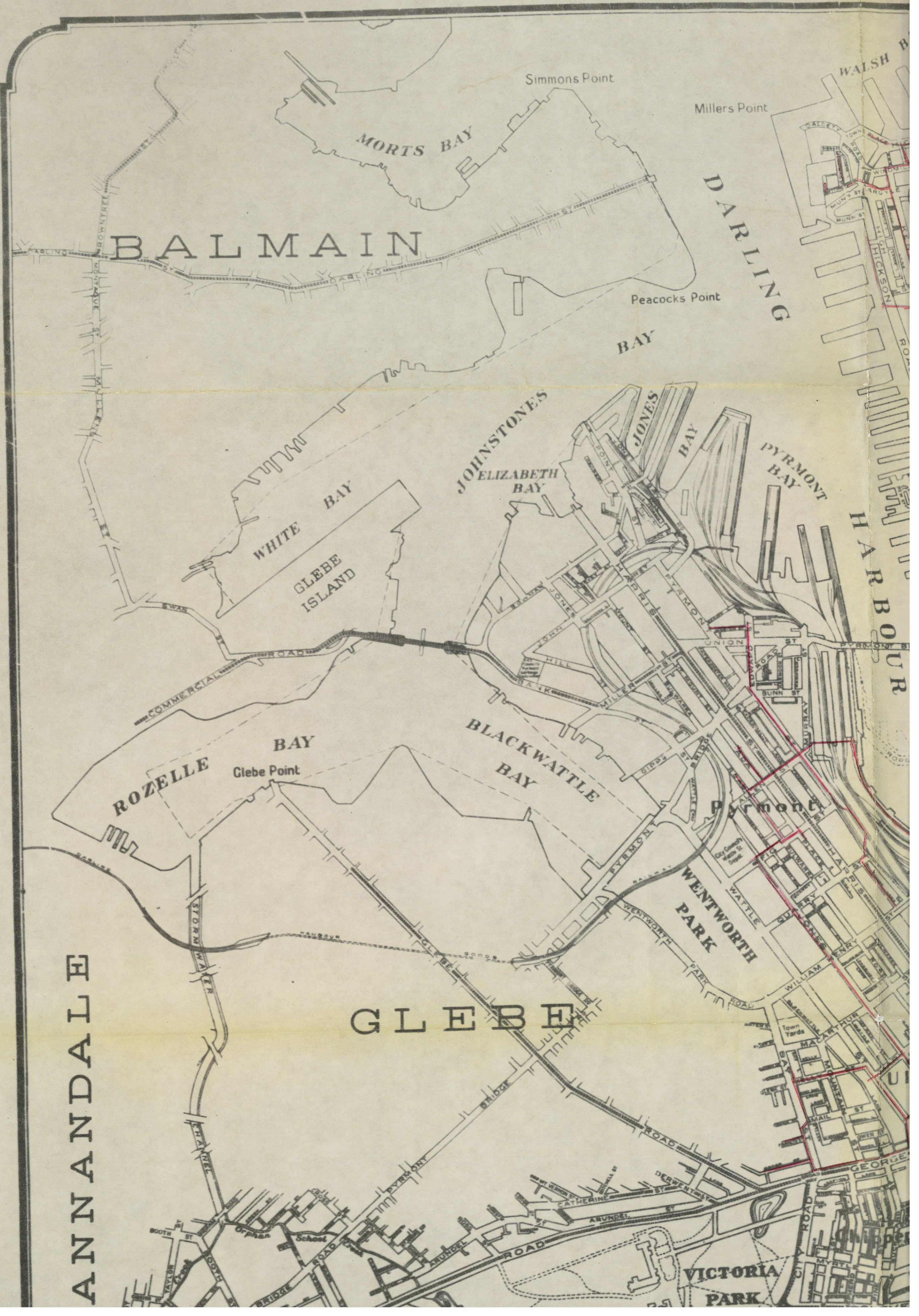
Map showing the reticulation system
of High Pressure Mains in the City of Sydney
drawn in (a) 1924, (b) 1973.

...ban Hydraulic Power Co. Ltd.

...LIAMENT, 1889.

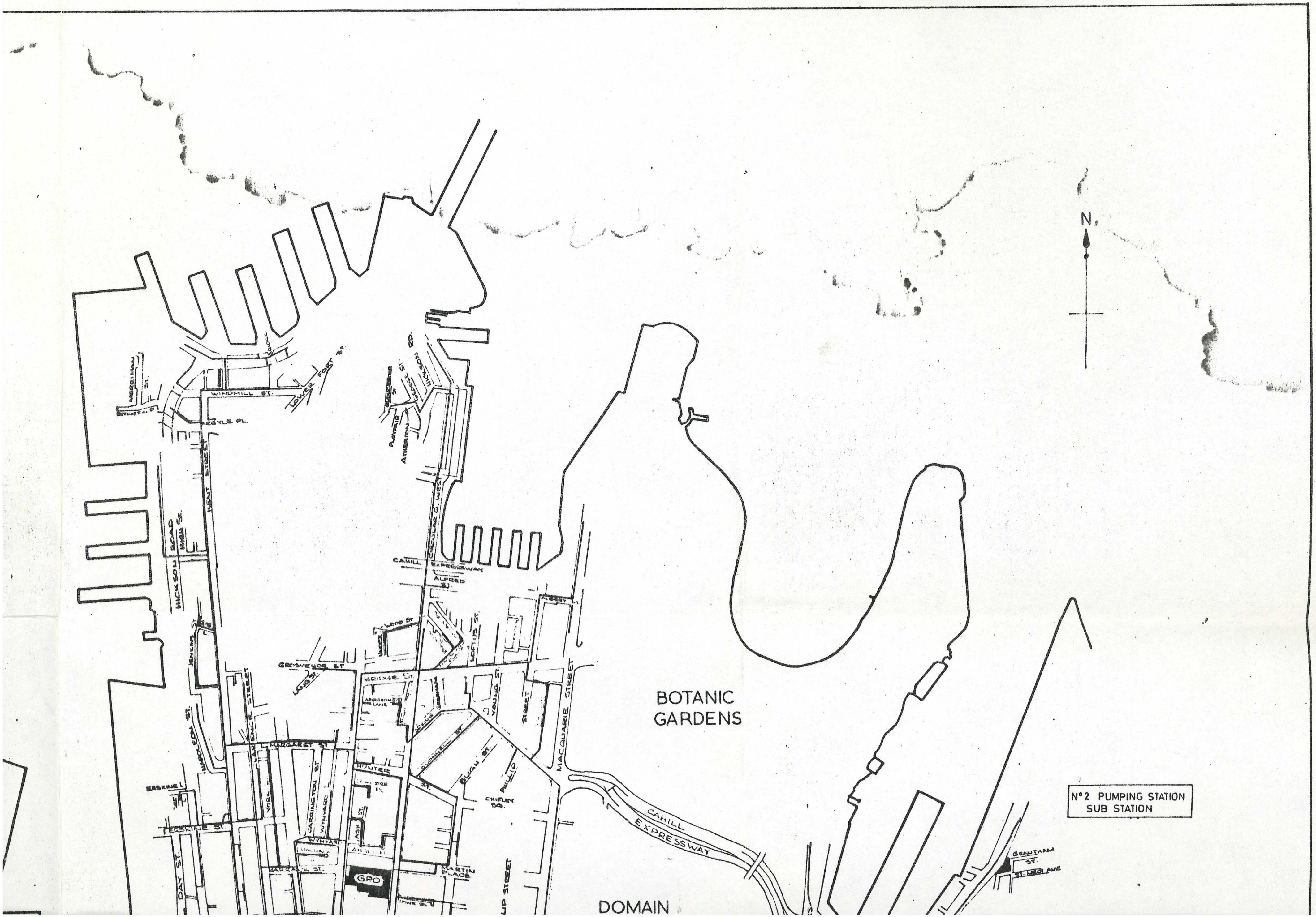
High Pressure Mains of the

INCORPORATED

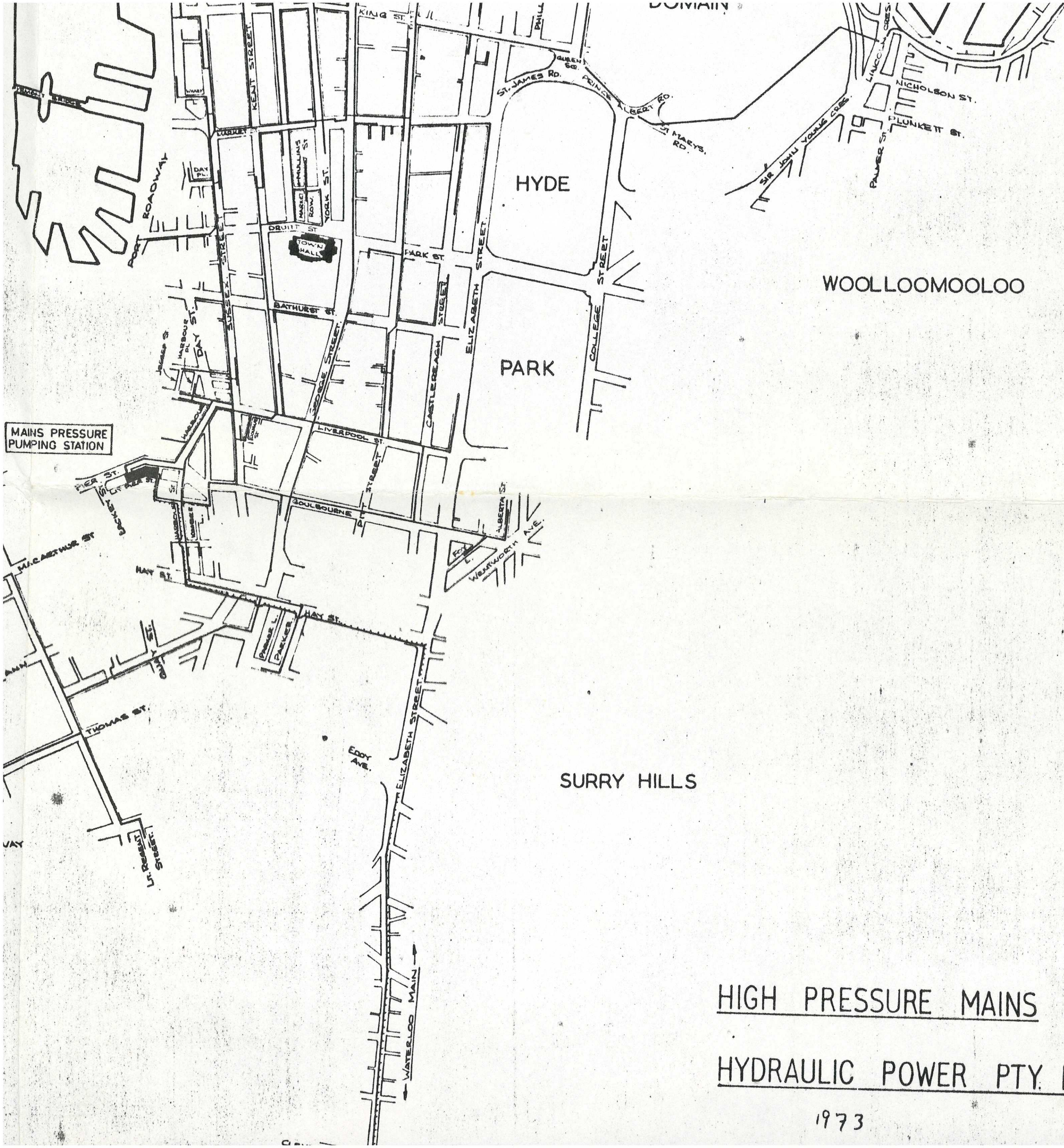



CITY OF SYDNEY
By H.E. C. Robinson Ltd.
221-3 George St. Sydney.
COPYRIGHT.
Scale 16 chains to an inch.
PADDINGTON
REDFERN
WATERLOO
RANDWICK
CENTENNIAL
PARK
MOORE
PARK
MOORE
PARK
Victoria Barracks
Sydney Sports Ground
Sydney Cricket Ground
Royal Agricultural Society Show Ground
Sydney Girls High School
PRINCE ALFRED PARK
CENTRAL STATION
Haymarket
Ultimo
Technical College
Chippendale
Surry Hills
East Sydney Technical College
Darlinghurst Court House
ANZAC PARADE
OXFORD ST
CLEVELAND STREET
DOWLING
MOORE PARK ROAD
LANG ROAD
ALISON ROAD
ANZAC
DRIVER AVENUE
FLINDERS STREET
CROWN
GEORGE ST
CHALMERS
DEVONSHIRE
FOVEAUX
CAMPBELL
GOULBURN
WENTWORTH AVE
BURTON
VICTORIA
NAPIER ST
GREENS RD
STEWART ST
QUEEN ST
COOK ROAD
CITY ROAD
REGENT ST
DACEY AVENUE
M2 811.17/19


CITY OF SYD
By H.E.C. Robinson
221-3 George St. Syd
COPYRIGHT
Scale 16 chains to an inch.
PETERSHAM
ANNANDALE
NEWTOWN
GLEBE
DARLINGTON
REDFERN
UNIVERSITY GROUNDS
Prince Alfred Hospital
CAMPERDOWN PARK
VICTORIA PARK
WENTWORTH PARK
PRINCE ALFRED PARK
CENTRAL STATION
Chippendale
Ultimo
Technical College
Haymarket
PARRAMATTA ROAD
CITY ROAD
GEORGE ST
PITT ST
CASTLEREAGH ST
ELIZABETH ST
CHALMERS ST
PYRMONT BRIDGE ROAD
GLEBE ROAD
DARLINGTON ROAD
WILSON ST
ARUNDEL ST
MISSENDEN RD
JOHNSTONES CREEK
STORMWATER CHANNEL
WENTWORTH ST
GOULBURN
CAMPBELL ST
MARY ST
COMMONWEALTH ST
WATERLOO



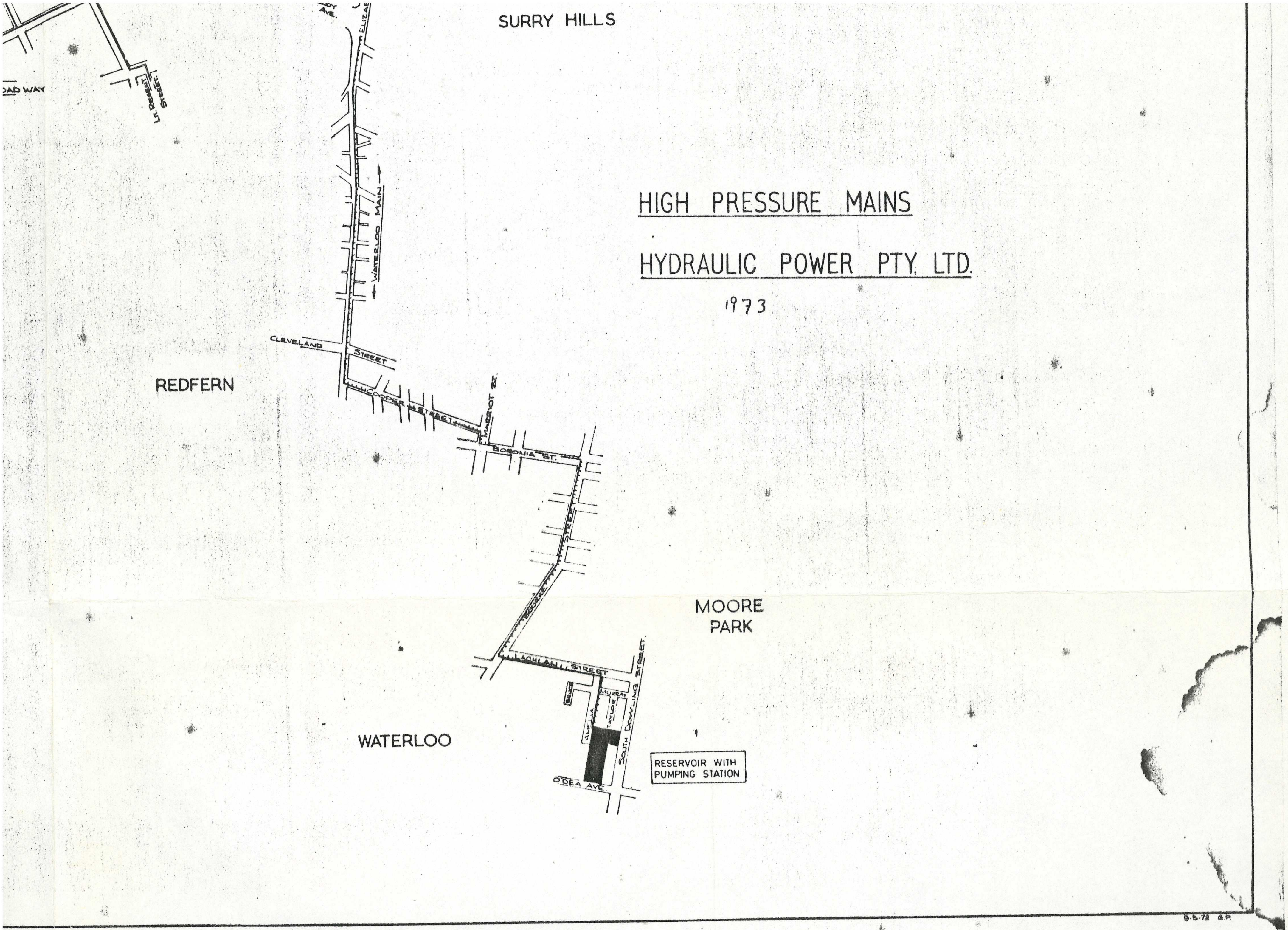
N
N°2 PUMPING STATION
SUB STATION
BOTANIC
GARDENS
DOMAIN
CAHILL
EXPRESSWAY
MACQUARIE STREET
YOUNG ST.
LOFTUS ST.
ALFRED ST.
CAHILL EXPRESSWAY
CIRCULAR Q. WEST
HICKSON RD.
GEORGE ST.
PLAYFAIR
ATHERTON
LOWER FORT ST.
WINDMILL ST.
ARGYLE PL.
KENT STREET
HICKSON ROAD
HIGH ST.
JENKINS ST.
GROSVENOR ST.
MARGARET ST.
CLARENCE STREET
NAPOLEON ST.
ERSKINE L.
ERSKINE ST.
DAY ST.
YORK
CARRINGTON ST.
WYNYARD
BARRACK ST.
HUNTER
ABERCROMBIE LANE
BLIGH ST.
PHILLIP
CHIFLEY SQ.
MARTIN PLACE
GPO
ASH ST.
ANGEL PL.
GRANTHAM ST.
ST. NEOT AVE

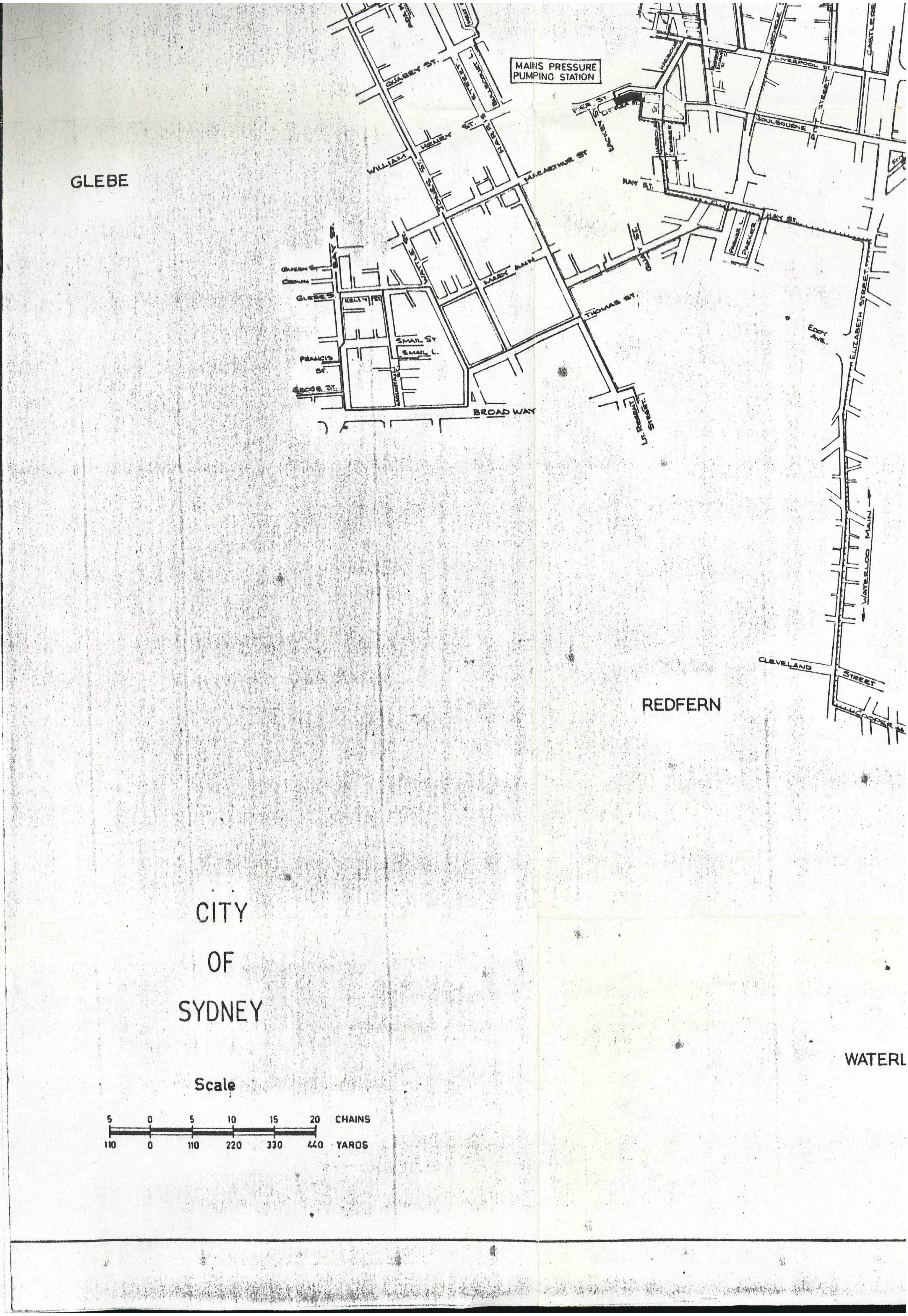


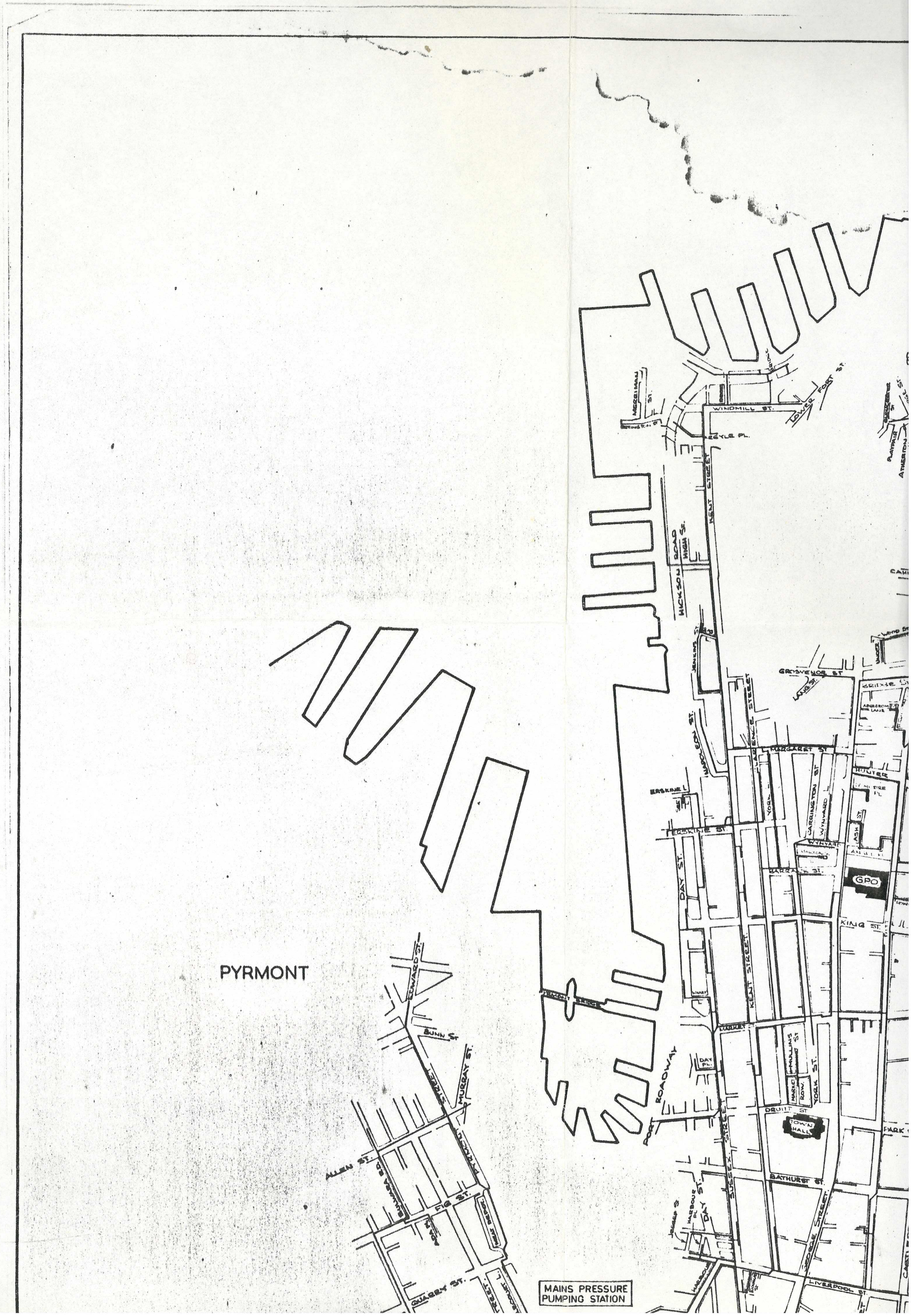
HIGH PRESSURE MAINS

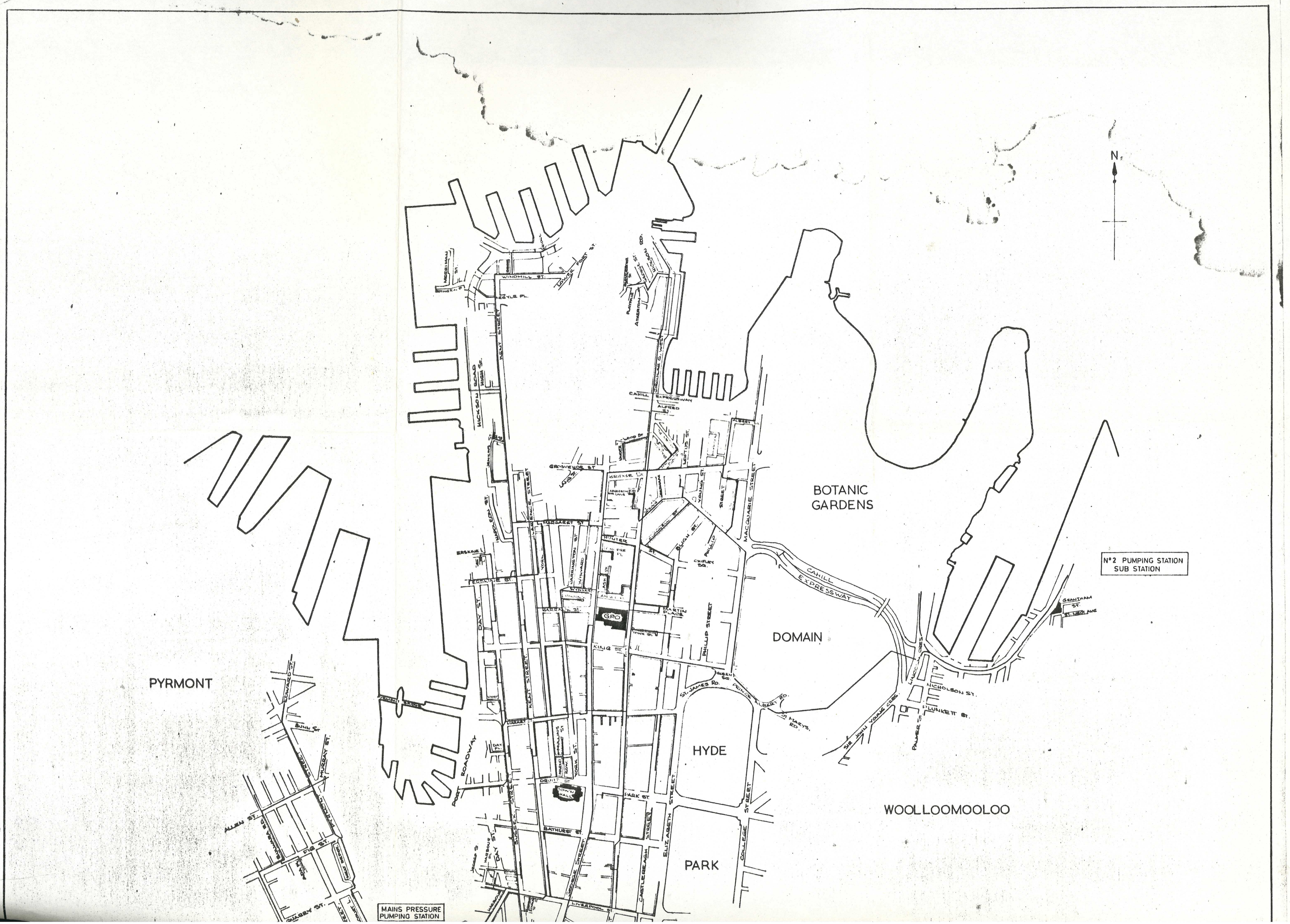
HYDRAULIC POWER PTY. LTD.

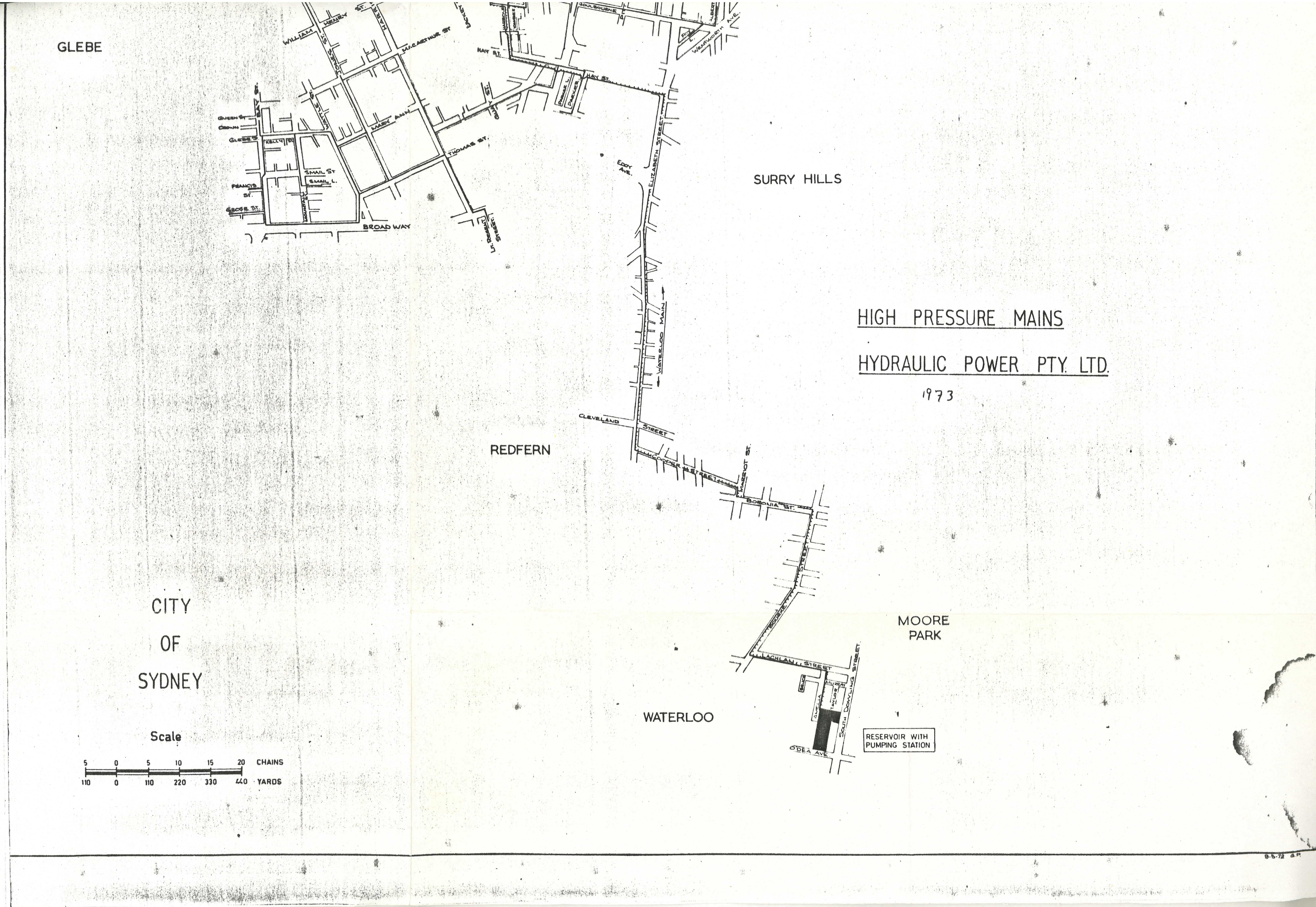
1973

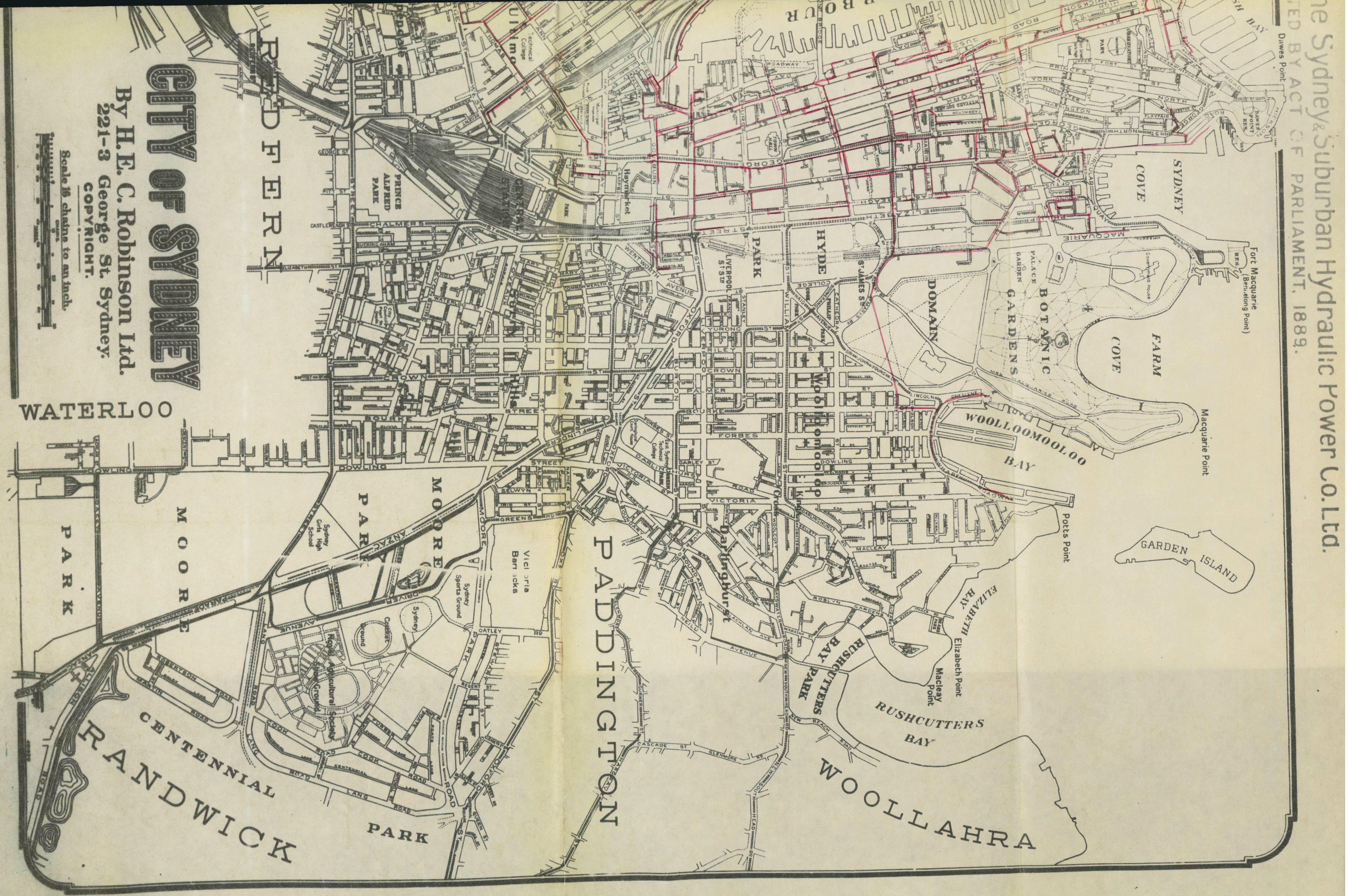

HIGH PRESSURE MAINS
HYDRAULIC POWER PTY. LTD.
1973
SURRY HILLS
REDFERN
MOORE PARK
WATERLOO
WATERLOO MAIN
CLEVELAND STREET
COOPER STREET
MARRIOT ST.
BOURKE STREET
LACHLAN STREET
SOUTH DOWLING STREET
O'DEA AVE.
TAYLOR
MURRAY
AMELIA
RESERVOIR WITH PUMPING STATION
LT. REGENT STREET
9-5-72 G.P.


GLEBE
MAINS PRESSURE
PUMPING STATION
QUARRY ST.
WILLIAM
HENEY ST.
HARRIS STREET
JONES ST.
WATTLE ST.
MACARTHUR ST
HAY ST.
LIVERPOOL ST
GOULBOURNE
CASTLEREAGH
PIER ST.
DICKSON ST.
BAY ST.
QUEEN ST.
CROWN
GLEBE ST.
KELLY ST.
FRANCIS ST.
GEORGE ST.
SMAIL ST
SMAIL L.
MARY ANN
THOMAS ST.
QUAY ST.
BROADWAY
LT. REGENT STREET
EDDY AVE.
ELIZABETH STREET
WATERLOO MAIN
CLEVELAND
STREET
REDFERN
CITY
OF
SYDNEY
WATERL
Scale
5 0 5 10 15 20 CHAINS
110 0 110 220 330 440 YARDS


WINDMILL ST.
LOWER FORT ST.
ARGYLE PL.
KENT STREET
HICKSON ROAD
HIGH ST.
GROSVENOR ST.
MARGARET ST.
HUNTER
ERSKINE ST.
DAY ST.
YORK
CARRINGTON ST.
WYNYARD
BARRACK ST.
GPO
KING ST.
KENT STREET
MARKET
DAY PL.
PORT ROADWAY
DRUITT ST.
TOWN HALL
SUSSEX STREET
YORK ST.
GEORGE STREET
BATHURST ST.
LIVERPOOL ST.
PYRMONT
EDWARD ST.
BUNN ST.
MURRAY ST.
ALLEN ST.
FIG ST.
QUARRY ST.
MAINS PRESSURE
PUMPING STATION


N
BOTANIC GARDENS
DOMAIN
HYDE
PARK
WOOLLOOMOOLOO
PYRMONT
Nº2 PUMPING STATION
SUB STATION
MAINS PRESSURE
PUMPING STATION
CAHILL
EXPRESSWAY
GPO
MACQUARIE STREET
PHILLIP STREET
ELIZABETH STREET
COLLEGE STREET
CASTLEREAGH STREET
GEORGE STREET
KENT STREET
SUSSEX STREET
YORK ST.
KING ST.
PARK ST.
BATHURST ST.
LIVERPOOL ST.
MARTIN PLACE
HICKSON ROAD
PORT ROADWAY
TOWN HALL
NICHOLSON ST.
PLUNKETT ST.
PRINCE ALBERT RD.
ST. JAMES RD.


GLEBE
SURRY HILLS
HIGH PRESSURE MAINS
HYDRAULIC POWER PTY. LTD.
1973
REDFERN
CITY
OF
SYDNEY
MOORE
PARK
WATERLOO
RESERVOIR WITH
PUMPING STATION
BROADWAY
HAY ST.
THOMAS ST.
MARY ANN
ELIZABETH STREET
WATERLOO MAIN
CLEVELAND STREET
COOPER STREET
LACHLAN STREET
SOUTH DOWLING STREET
O'DEA AVE.
Scale
5 0 5 10 15 20 CHAINS
110 0 110 220 330 440 YARDS



CITY OF SYDNEY
By H.E.C. Robinson Ltd.
221-3 George St. Sydney.
COPYRIGHT.
Scale 16 chains to an inch.
The Sydney & Suburban Hydraulic Power Co. Ltd.
ATED BY ACT OF PARLIAMENT, 1889.
REDFERN
WATERLOO
MOORE PARK
PADDINGTON
WOOLLAHRA
RANDWICK
CENTENNIAL PARK
HYDE PARK
DOMAIN
BOTANIC GARDENS
FARM COVE
SYDNEY COVE
WOOLLOOMOOLOO BAY
GARDEN ISLAND
RUSHCUTTERS BAY
RUSHCUTTERS BAY PARK
ELIZABETH BAY
Darlinghurst
Woolloomooloo
Potts Point
Macquarie Point
Fort Macquarie (Bennelong Point)
Dawes Point
Elizabeth Point
Macleay Point
PRINCE ALFRED PARK
CENTRAL STATION
Victoria Barracks
Sydney Sports Ground
Royal Agricultural Society's Show Ground

High Pressure Mains of t

INCORPORA