DARLING HARBOUR

CONSERVATION AND RE-USE

with particular reference

to

PYRMONT BRIDGE

G.B. WILSON

A thesis submitted for the degree

of

Master of Science (Architecture) (Conservation)

1982

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G.B. Wilson

Pyrmont Bridge, As A Market, Looking Towards the City.

Source, Ken McDonald

FOREPIECE

ABSTRACT

Part I of this thesis considers that part of Darling Harbour which lies south of Pyrmont Bridge in the City of Sydney. It traces the history of Darling Harbour from the time of the First Fleet through its development as:

(i) a commercial port;
(ii) the birthplace of Australian industry; and
(iii) the largest railway Goodsyard in the State.

Part II studies the present circumstances of the area and its potential. It examines the existing constraints upon the site and assesses the conflicting plans of various Australian, State and Local Government agencies. The question of conservation, or rather, the lack of conservation, is considered. Part II concludes by rejecting the proposal for the extension of longshore wharves south of Pyrmont Bridge and recommends the recycling of the Goodsyard for a major people oriented open space of regional significance together with a certain amount of housing and commercial development.

Part III developes a proposal in which conservation is an essential and integral part. Without the retention of key historic structures like Pyrmont Bridge and the Darling Harbour Forwarding Station the proposal could not realise the full potential of Darling Harbour.

The proposal envisages a Bicentennial waterfront park with a multitude of activities. Certain Government-owned land on the edge of the Goodsyard is earmarked for private development. Conservation includes the retention of Pyrmont Bridge, the Darling Harbour Forwarding Station, and the Corn Exchange and part of a railway shed. The success of the conservation proposals hinge on the construction of a pedestrian bridge link from Pyrmont Bridge to Market Street in the City Centre. Life and finance are injected into the conservation proposals by locating Paddy's Market on the Bridge and the Sydney Maritime Museum and the Sydney Fishing Museum beneath it. The Museum of Applied Arts and Sciences operates the swing span and operates the "Pyrmont Bridge Station".

This thesis includes a brief statement on a management structure which has insured the conservation of other bridges in NSW, and concludes that conservation, the forgotten element in all current plans, is an essential ingredient for the future of Darling Harbour.

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ABBREVIATIONS

CBD	Central Business District
CSIRO	Commonwealth Service Investigation and Research Organisation
DEP	Department of Environment and Planning
DMR	Department of Main Roads
FSR	Floor Space Ratio
LASH	Lighter Aboard Ship
LEP	Local Environmental Plan
MSB	Maritime Services Board
SATS	Sydney Area Transportation Study
SRA	State Rail Authority
a.	Archives
o.p.	Official publication
p.	Periodicals
p.a.	Publishing Agency
p.b.	Printed books
p.n.u.	Page number unknown
p.u.	Publisher unknown
u.p.	Unpaginated

ACKNOWLEDGEMENTS

Without the help of the following people and organisations, this thesis would never have been commpleted. I extend my sincere thanks to:

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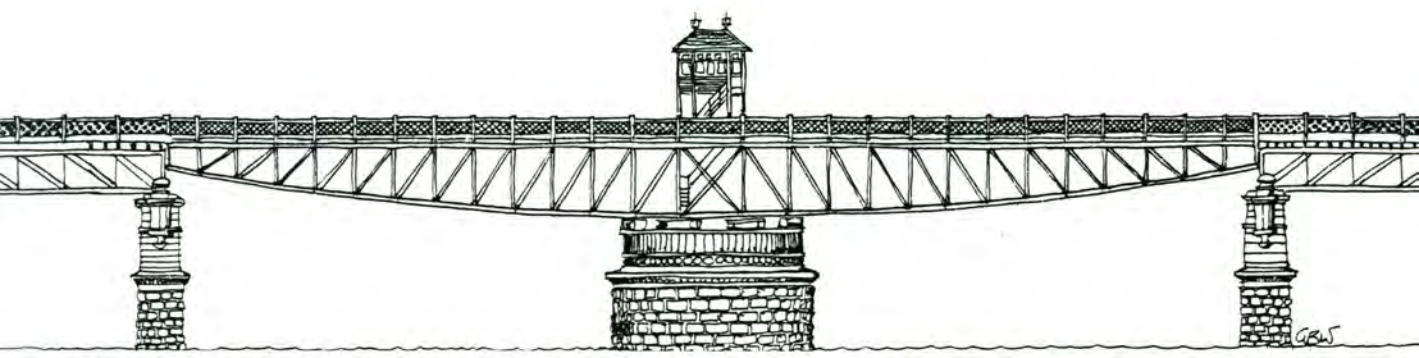
INTRODUCTION



INTRODUCTION

The purpose of this thesis is to examine the opportunities for conservation at the southern end of Darling Harbour[1] - an area in the City of Sydney which is characterised by an obsolete Railway Goodsyard and a semi-derelict commercial waterfront which will undergo great change in the future. Conservation has been treated as part of the cycle of change which takes place in every city. It is the key factor in a proposal to transform this under-utilised area into a people-orientated place incorporating a waterside park.

Darling Harbour was selected because:

1. the Ultimo/Pyrmont/Haymarket Action Plan by the Sydney City Council had highlighted the desirability of continued access between Pyrmont and the City using Pyrmont Bridge;

2. the Sydney Area Transportation Study (SATS) prepared in 1973 concluded that the Darling Harbour Goodsyard was obsolete;

3. the State Government had already examined and rejected the proposal to hold an International Exhibition as part of the Bicentenary celebrations on the site of the Goodsyard.

All this planning took place apparently without the history or the cultural significance of Darling Harbour being taken into consideration. Only three structures within the study area are included on the list of Classified Buildings prepared by the National Trust. They are Pyrmont Bridge, the Corn Exchange and 200 Sussex Street. Pyrmont Bridge is part of the National Estate.[2]

During the two hundred years since European colonisation shipping exerted the greatest influence on the development of Darling Harbour; industry was second. The use of the steam engine as a means of grinding grain in the early 19th Century and the development of associated engineering and industrial processes make Darling Harbour the birthplace of industry in

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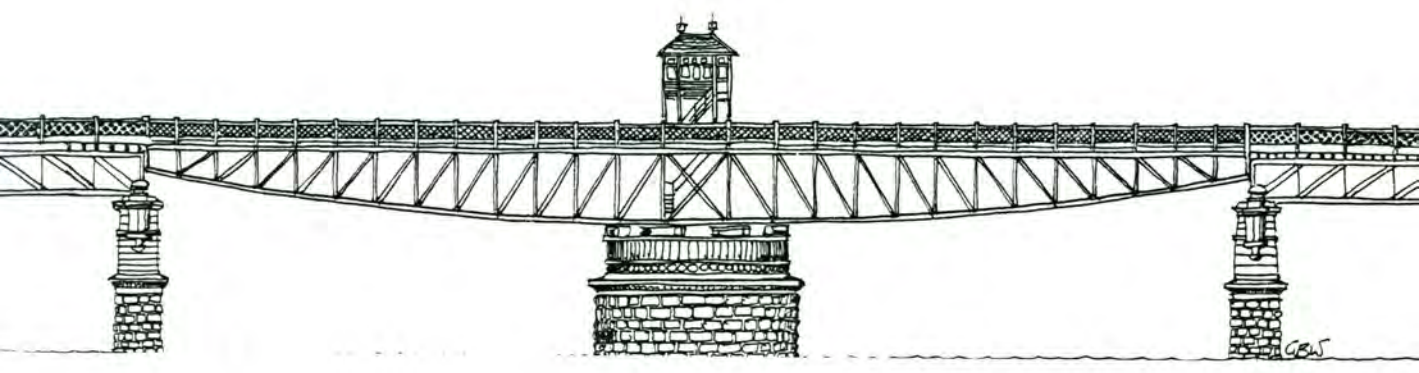
1. Refer to MAP 1.
2. Refer to Part II, 4.5 Australian Heritage Commission.

Australia. The introduction of railways in the 1850s reinforced the developing maritime/industrial environment. These uses are still the predominant ones in the area, and certain buildings still in existance represent the original use of that land by the colonists.

Darling Harbour presents a unique opportunity to secure for posterity certain parts of Australia's maritime, industrial and engineering heritage.

PART I
HISTORY



Darling Harbour From St. Phillips Church, Circa 1875.

PLATE NO.1

Source, SRA Archives

1.0 COCKLE BAY

Darling Harbour was first known as Cockle Bay because the first European settlers found large numbers of cockles in the mud at the head of the bay. For twenty two years, after the establishment of the Colony at Sydney Cove in 1788, it remained uninhabited. The approaches from Sydney Cove were too steep for cart traffic and the bay remained uncleared until the time of Governor Lachlan Macquarie.(1) However, subdivision of the land began in 1795 when a grant of 22 ha (55 acres) on the west side of Cockle Bay was made to Thomas Jones.(2)

Lieutenant-General Sir Ralph Darling, who was Governor of NSW from 1825 to 1831, gave his name to Cockle Bay in 1827. A newspaper article in 1828 referred to this portion of Sydney Harbour, thus:

> "We should be happy to ascertain the motive that influences our contemporaries, in adverting to Darling Harbour, at all times carefully to style it with the unmeaning and preposterous name of Cockle Bay. The latter appellation, very properly, has been pronounced extinct, and the name of Darling Harbour, by which it is most deservedly distinguished, has been officially recognised, and it will not, and therefore cannot, go by any other name ... the present designation of this fine harbour has been recognised in the Office of the Surveyor-General, as well as in Official notifications".(3)

2.0 THE EARLY DEVELOPMENT OF DARLING HARBOUR

Governor Macquarie, who can be described justifiably as the Colony's first town planner, evolved the idea of moving the City Market from Sydney Cove to the intersection of George Street and Market Street. A row of market sheds was erected where the Queen Victoria Building now stands. At the same time a new Government wharf was erected in Cockle Bay at "Wharf Street" near the recently demolished eastern abutments of Pyrmont Bridge. It was the beginning of development in Cockle Bay. PLATE 2.

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1. Stephensen & Kennedy, The History and Description of Sydney Harbour, (Sydney: A.H. and A.W. Reed, 1980), p.145.
2. "Port Jackson, Its Romantic Growth," Journal of the Royal Australian Historical Society,, Vol.XXXI, Part VI, (1945), p.392.
3. Sydney Gazette, 4 July, 1828.

PLAN
OF THE
TOWN AND SUBURBS
OF
SYDNEY
August, 1822.

N.B. The Soundings are in Fathoms at L. Water

Variation observed with a Kater's Theodolite

By 4 Azimt At a...on the Race Ground ..... 9°. 27' East
By 8° At North end Macquarie Street ..8..15 East
By 8° At N.E bastion Fort Macquarie ..8..1 East
By 8° At Flagstaff of Bowes' Battery ...9..6½ East

Dip of South end Magnetic Needle in November 1817 by numerous observations at b. on Bunker's Hill, 62° ½

Latitude 33° 51' 53" South

Sydney Cove

Farm Cove

Palmers Cove

BAY

COCKLE

Hunters Hill

Darling Harbour

to South Head

1 mile
½ mile
¼ mile

A Statute Mile, containing 1760 Yards

SYDNEY IN 1822

No.50, at the edge of Cockle Bay is captioned "Macarthurs Wharf". Governor Macquarie ordered the construction of the first wharf near this spot in 1812.

No.51, at the southern tip of Cockle Bay, is captioned "Steam Mills for Grinding Corn" and refers to Dickson's steam engine which, in 1822, was the only one operating in the Colony.

Source, Mitchell Library PLATE NO.2

On the 16th February, 1811, Macquarie instructed that vessels arriving from the Hawkesbury, Parramatta and Kissing Point were to go to the new "Market Wharf and not to the Hospital Wharf as here to fore all the produce landed at the Market Wharf is to be carried direct to the market place where they are to be reported to the clerk of the market, who is to make regular entry thereof".(1)

Until 1824 all the wharves built were the property of the Government, managed under strict regulations to prevent the escape of convicts. In 1824, Robert Campbell was given permission to build the first private wharf in the Colony at the bottom of George Street and from that time wharves gradually appeared around the shores of Cockle Bay.(2) The first private wharf in Cockle Bay was erected close to the Market Wharf and was known as "Macarthurs". South of Market Street, very long jetties had to be built over the mud flats to reach deep water.

Throughout the century, industry and wharfage developed along the water's edge. Behind it some terrace houses were built, mainly in Kent Street and Day Street.

In 1839, Darling Harbour was described thus:

> "For many years the shores of Darling Harbour, on the western side of Sussex Street, were regarded as land of little or no value; but no sooner had Sydney begun to rise in importance as a commercial town than the land in this vicinity had its value discovered, and almost the whole of the water frontage was secured by men of capital, who have of late years further enhanced its value by the erection of substantial and extensive warehouses, stores, and other buildings, many of which will bear comparison with most of the stone houses and commercial depositories of respectable firms in either North or South Britain."(3)

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1. "Port Jackson, Its Romantic Growth," Royal Australian Historical Society, Vol.35, Part VI, (1949), p.n.u.
2. Cyclopedia of New South Wales, (Sydney; McCarron and Stewart, 1907) p.347.
3. Ibid, p.354.

At the northern end of Kent Street a considerable population had gathered before 1836. At the southern end there were several residences with gardens attached, the site being popular on account of the "beautifully diversified landscape view of the waters and shores of Darling Harbour, extending to the westward over an extensive range of thickly wooded undulating country, between which, in a north-west direction of the waters of Port Jackson are so broken by the coast, that it only requires to be seen in order to be appreciated as one of the most romantic prospects that the eye can behold, or the most fastidious critic of natural scenic beauty desire."(1)

Housing in Pyrmont, apart from the grand plans of Macarthur in the 1820s, developed in poor conditions keeping pace with the demand for waterside workers to man the Pyrmont wharves. These hovels were gradually replaced with stone and brick terrace houses until Pyrmont became a neat and respectable suburb of Sydney.

In addition to commercial activity and housing, Darling Harbour provided the site of the first bathing enclosure in Australia.

The Headquarters of the British Garrison, "the biggest barracks in the British Empire" according to Macquarie, was located near the site of the present-day Regiment Square and remained there from 1810 to 1850. A track led down the hill from the barracks, in the vicinity of the present day Erskine Street, to Soldiers Point, where the troops enjoyed harbour bathing in the Military Bath House.(2)

Most convicts, once they had been transported to NSW, must have thought that they had seen the last of the notorious prison hulks of England. However, around 1830 a prison hulk, known as the Phoenix, was moored near the foot of Erskine Street. Convicts who had been re-convicted in the Colony were confined aboard the hulk when the Town Gaol at the corner of Essex and George Street was full. They worked on shore, in chain gangs, at road building.(3)

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1. Ibid., p.n.u.
2. Stephensen & Kennedy, op.cit., p.158.
3. Ibid., p.159.

3.0 THE ADVENT OF STEAM, INDUSTRIAL REVOLUTION

Darling Harbour is the cradle of Industrial development in Australia.

An enterprising engineer named John Dickson emigrated from England and arrived in Australia aboard the Earl Spencer in 1813. He brought with him, a steam engine. So impressed with the potential of steam was Governor Macquarie that he gave John Dickson a grant of nearly 6.5 ha (16 acres) between Cockle Bay and George Street. Steam Mill Street remains to this day, named after that first steam engine - a shabby memorial to the advent of the industrial era in Australia.

Dickson's engine was assembled and on 29th May, 1815, in the presence of Governor Macquarie, grain was crushed at the astonishing rate of 260 bushels per day. At that time the best windmill, wind permitting, could crush only 12 bushels per day.(1)

It is claimed that the engine in question was a Boulton & Watt rotative beam engine which employed a low pressure wagon type boiler to generate the steam.

An important industrial archaeological find which supports this claim was made during site works for the North Western Freeway. Excavation at Day Street near the site of Dickson's Mill revealed an unusually shaped section of a boiler. Max Underhill, DMR Engineer in charge, consulted the Museum of Applied Arts and Sciences and the boiler was identified subsequently as a Boulton & Watt wagon boiler of the type used before the end of the 18th Century. A wagon boiler is a long rectangular vessel with a rounded top, like that of a horse-drawn carrier's wagon, from which it derives its name. The boiler showed signs of an explosion and its location indicated that it had been dumped in Darling Harbour as part of an early reclamation project.(2) PLATE 3.

Whilst it is not yet certain that the boiler belonged to John Dickson, the evidence points in that direction. It is an interesting area of future research.

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1. Frank Clime, Saga of Sydney, (Sydney: Halstead, 1961), p.n.u.
2. Norm Harwood, "An Industrial Relic of the Past Uncovered", Australian Society for Industrial Archaeology Newsletter (June 1977), p.6.

Wagon Boiler Discovered in Darling Harbour. PLATE NO.3

Source, DMR

John Dickson prospered mightily. The Census for 1828 records that, besides fathering five children born in the Colony, he was a miller and brewer at Darling Harbour. He also owned 6,790 ha (17,000 acres) of country land, 68 horses, 3,000 cattle and 2,000 sheep, largely because he had enough vision to bring the first steam engine to Australia.

In the early 1800s there were dozens of windmills on the ridge tops of Sydney to provide power for grinding grain. Within ten years of Dickson introducing his steam engine, most of the windmills had disappeared, and several more steam mills had been erected in Sussex Street close to the wharves. One of the steam mills was erected by John Dickson's son-in-law, Thomas Barker, in 1827, near Goulburn Street.

The Market Wharf and the various small jetties serving the steam flour-mills, inaugurated the waterfront activities along Sussex Street. By 1830, the shipping activity was already fairly well developed, with importations of grain for the flourmills, every sort of farm-produce for the markets, coal (from the Hunter River) for the steam engines of the flourmills and as galley-coals for sailing ships, and for domestic heating.(1) Ship building developed and with it the need for timber to be brought in by sea.

The Australian Steam Navigation Company was established in 1832 with its Wharf at the foot of Margaret Street. In 1833, Captain Fortheringham established the first patent slipway in the southern Hemisphere in Darling Harbour not far from Erskine Street.(2) Soon afterwards Mort's slipway was constructed and another at Cockatoo Island provided Sydney with three of the largest graving docks in the world.

In 1836 the first gaslight company was formed in Sydney and by 1841 gas lights were operating in Sydney. The gasworks were built on a freehold property on the waterfront, between Kent Street and the shore. The name of Gas Lane now indicates its site. The Darling Harbour Gasworks were the first in Australia. Coal was brought from the Hunter River in sailing-vessels and, later, in steamers; it was unloaded at the Gas Wharf. Two large gas-holders were built on the shore adjacent, and remained there, with the gas-making retorts and huge dumps of coal, until 1922 when the works were moved to Mortlake on the Parramatta River.(3)

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1. P.R. Stephensen & Brian Kennedy, ibid., p.158.
2. Cyclopedia of New South Wales, op.cit., p.358.
3. Stephensen & Kennedy, op.cit., p.159

4.0 CHANGING PATTERNS OF TRADE

In the middle of the nineteenth century, it was the coastal trade which increased and resulted in the development of Darling Harbour. However, development in two entirely different fields had ramifications for the port. The first was the introduction of the railways. Steam trains which were brought to Sydney in the 1850's were soon recognised as an essential backup to port activity. In 1864 contracts were let to level the yard at the Redfern Railway Terminus and transport the material to fill in Darling Harbour up to the line of Liverpool Street. This process of filling in the shallow southern end and extending the railway yards continued until the 1920s.(1)

Around 1890, the railway north, to the Hunter Valley and Newcastle, was completed. This had the immediate effect of reducing the coastal trade. However, this coincided with an increase in overseas trade and as a result the small coastal wharves and jetties were replaced with larger wharves to accommodate the large ocean going cargo ships. The giant wool stores of Pyrmont were built at this time and the railway sidings were extended along the Pyrmont side of the Harbour.

The changes which began around 1890 to handle the overseas trade are continuing at present. The Maritime Services Board which replaced the Sydney Harbour Trust in 1936, has maintained the policy of continual upgrading. So effectively has this policy been pursued that almost nothing survives of the timber wharf sheds in Darling Harbour which were built before the Second World War.

5.0 THE OLD BRIDGE

By the 1850s, a growing demand developed for better access from the city to the emerging western waterside suburbs. Johnstone's Bay was developing as a centre of business. The wharves of Pyrmont, which accommodated the trade in wheat, wool and coal, were expanding rapidly at Darling Island in comparative isolation from the City. It was clear that

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1. Extracts from Old Time Newspapers, dated 13th Sept., 1864, (The Star, 20 September 1913.) u.p.

WOOLCOTT & CLARKE'S MAP of the City of Sydney

with the environs of

BALMAIN AND GLEBE, CHIPPENDALE

REDFERN, PADDINGTON &c.

1854

PORT JACKSON

SYDNEY COVE

DARLING HARBOUR

BALMAIN

RIVER

PYRMONT BAY

STONES BAY

MACARTHURS POINT

ELIZABETH BAY

DARLING POINT

MILLERS POINT

DAWES POINT

DAWES BATTERY

FORT PHILLIP

GOVERNMENT HOUSE

FARM COVE

WOOLLOOMOOLOO

HYDE PARK

SWAMP COVE

THE ULTIMO ESTATE

SYDNEY IN 1854

This map names "Dixon's Wharf (Dickson's) and Barker's Wharf". Barker, who began operating a steam flour mill in 1835, was Dickson's son-in-law. Dixon Street has been set out. The east side of the Harbour is fully developed with wharves. Provision is shown for the railway on the West Shore and Darling Harbour still extends south of the line of Hay Street.

Source, Mitchell Library PLATE NO.4

the working class residents of Pyrmont and Ultimo would derive great benefits from improved access to the city as would the influencial and well-to-do residents of fashionable Glebe and Glebe Point. In 1855, the demand had grown to the extent that private enterprise considered the building and operation of a toll bridge to be an economically viable proposition.

In December 1855, the Governor of NSW, Sir William Denison, approved an Act to Incorporate the Pyrmont Bridge Company. This Act contained over 50 clauses detailing the responsibilities and scope of the company. The following extracts, taken from the preamble to the Act, give some idea of the conditions under which the Company was to operate. According to the preamble, the Company was to be responsible for:

> "... constructing and maintaining a bridge across Darling Harbour ...from the Market Wharf, in the City of Sydney, to Union Street, Pyrmont ... capable of admitting vessels of all classes, ... to pass and repass through the same.
>
> "And for making and maintaining a bridge or viaduct across Black Wattle Swamp, in the said harbour, from Pyrmont to the Glebe, and all the necessary roads and approaches to such bridges and viaducts, and for the construction thereof with the said bridge from Market Street to Union Street aforesaid;
>
> "And for connecting such bridge with Parramatta and Balmain roads respectively at some convenient points, and with the terminus of the Sydney Railway;
>
> "And for the erection of offices, work-shops, cranes, weighing and other machines, steam engines, appliances and conveniences necessary for the construction and purposes of such bridges ... and for the purchase or hire of one or more tugs or vessels to be employed in commission with the said bridge ... and otherwise in and about the said harbour;
>
> "And for the acquisition of profits to be derived from tolls to be taken at such bridges and roads, or any of them."

The paid-up capital of the Company was 50,000 pounds[1] issued in 5 shares. The shareholders were George Allen, John Fairfax, R.A. Moreheas, John Taylor and Walter Beames; David Jones was the auditor, E.O. Moriarty, the engineer, and Thomas Smith, the secretary.[2]

The bridge was constructed from iron bark timbers, incorporating a swing panel operated by a hand-windlass. It had a clearance of only 1.65 m (5 ft. 6 ins.) at high water. It cost 75,830 pounds.
PLATES 5, 6, 7, 8.

Thomas Alston, the contractor, announced the opening of the bridge by placing the following advertisement in the press:

> "PYRMONT BRIDGE. Pyrmont Bridge will be opened on the 17th March (St. Patrick's Day), for public traffic, by the sufferance of the contractor. THOMAS ALSTON." [3]

Although many writers have stated that the opening of the bridge was celebrated by a spectacular regatta, it appears that this happened by chance. A St. Patrick's Day regatta had been organised in Darling Harbour quite independently of the opening ceremony for the bridge:

> "Wednesday last was the Festival of St. Patrick ... celebrated by two events ... the opening for the first time, of the new bridge from the Market Wharf to Pyrmont, and a regatta in the same vicinity ... There was a little delay in the opening of the bridge on Wednesday morning, owing to some dispute with the City Corporation as to an alleged encroachment on its approaches; but after a conference by the directors with City Improvement Committee, this difficulty was got over, and all the remainder of the day this bridge was crowded with passengers and lookers on at the regatta."[4]

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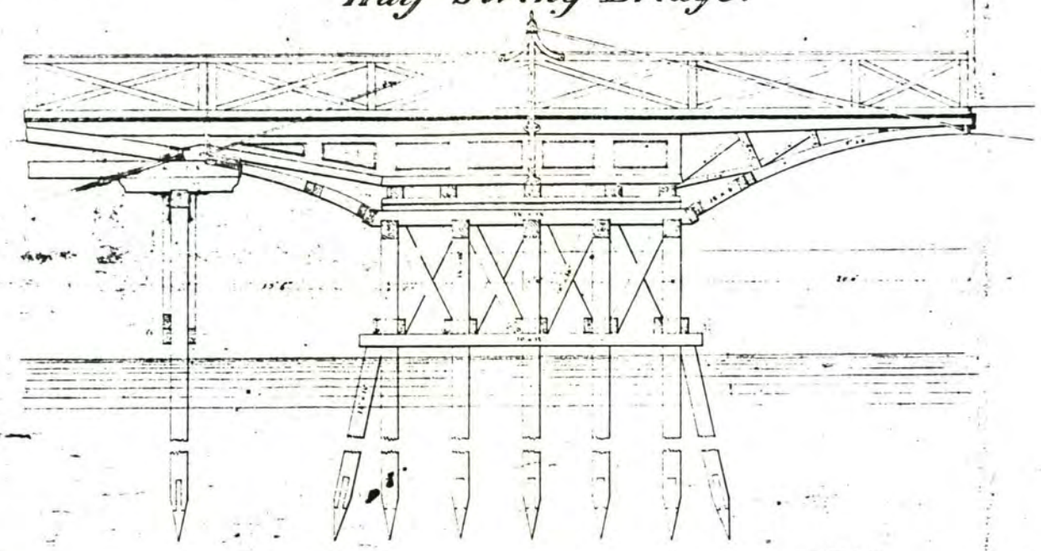
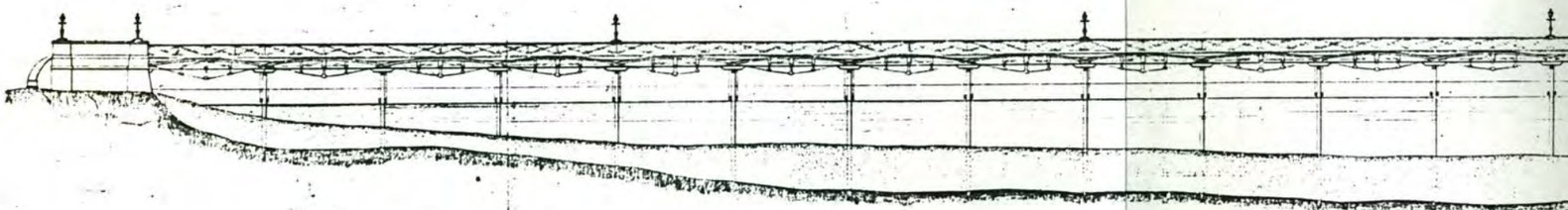
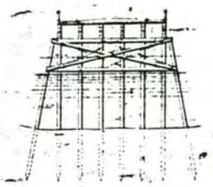
1. Decimal currency was introduced in Australia on 14 February, 1966. 1 Pound - $2.00.
2. Lord Mayor's Engagement List, Address by The Lord Mayor on Pyrmont Bridge and The Glebe, 7th March 1964.
3. Sydney Morning Herald, 17 March, 1858.
4. "Notes of the Week", Sydney Morning Herald, 22nd March 1858.

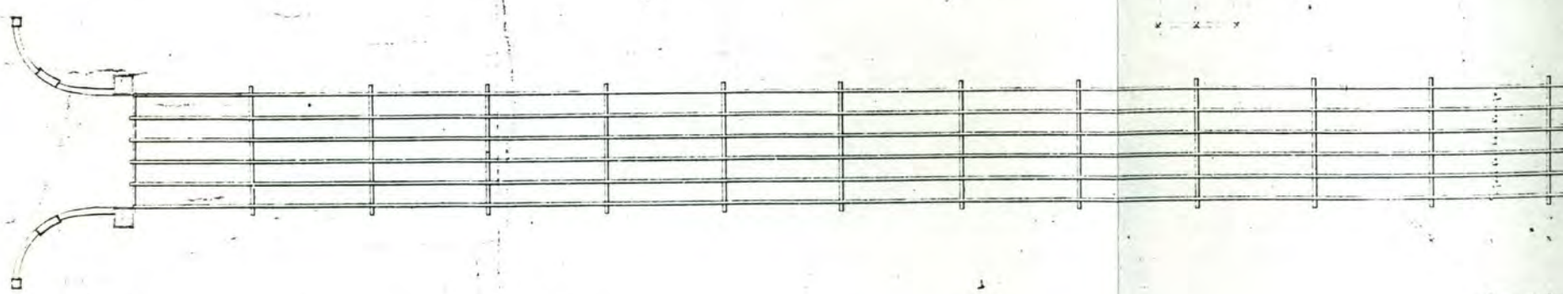
Half Swing Bridge.





Cross Section





Plan No. 1. of the Plans referred to in the Contract and Specification bearing date the Eleventh day of September A.D. 1856 made between myself of the one part and the Pyrmont Bridge Company of the other part.

Thomas Alston

Witness

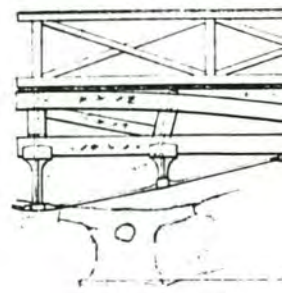
PLAN
OF
DARLING HARBOUR
BRIDGE

E. Merriman Engineer

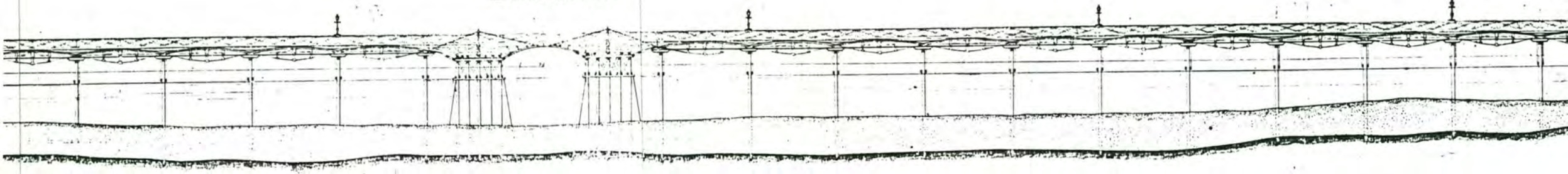
Scale of Bridge

Scale of Enlarged Plans

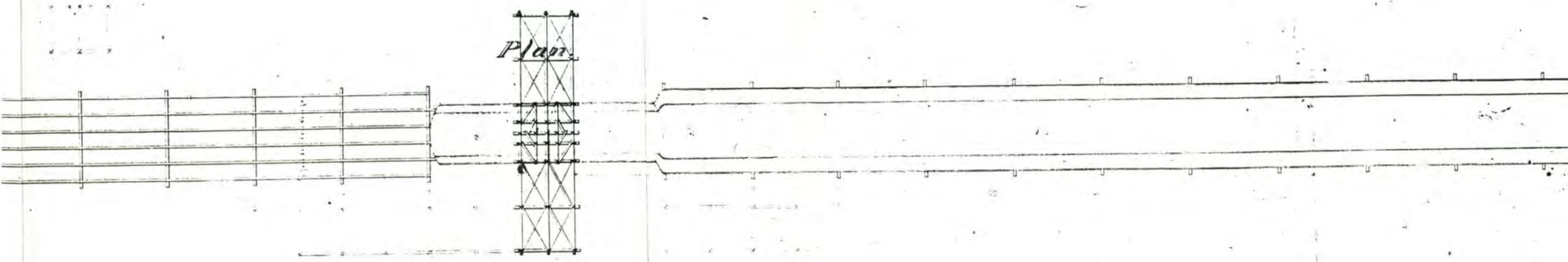
Enlar



Elevation.



Plan.



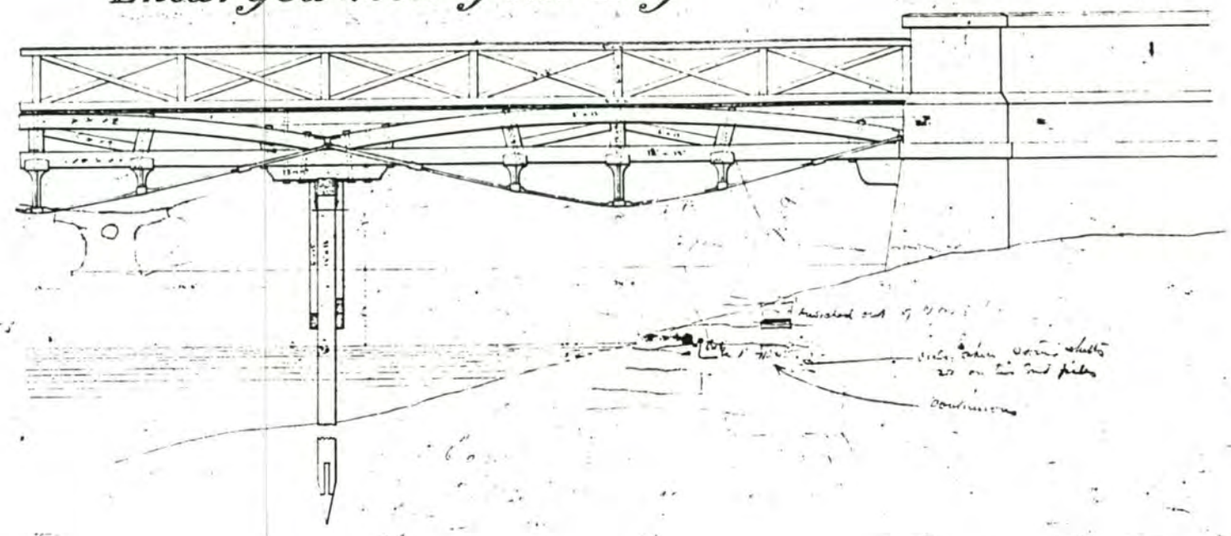
PLAN
OF
ING HARBOUR
BRIDGE

E University Engineer

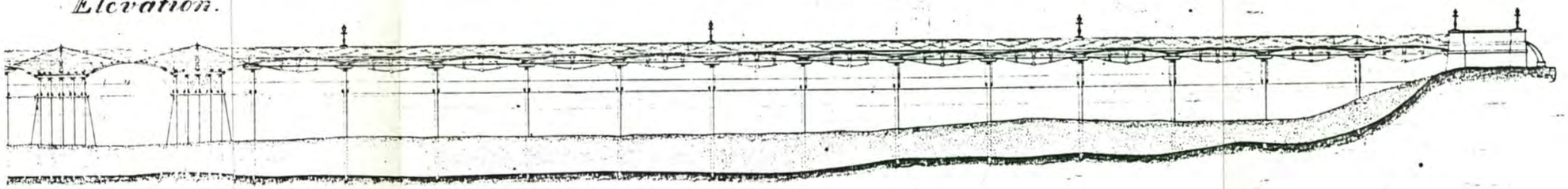
Scale of Bridge

Scale of Enlarged Plans

Enlarged View of one Bay



Elevation.



Plan.

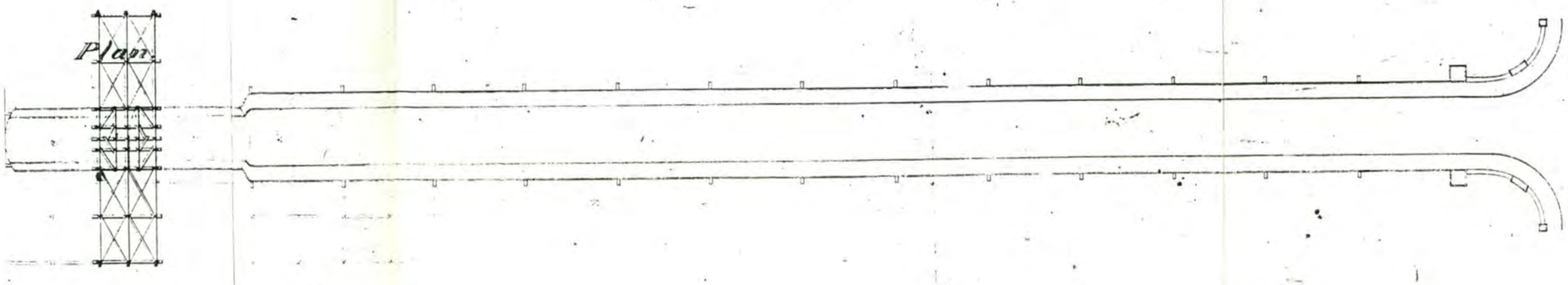


PLATE 5

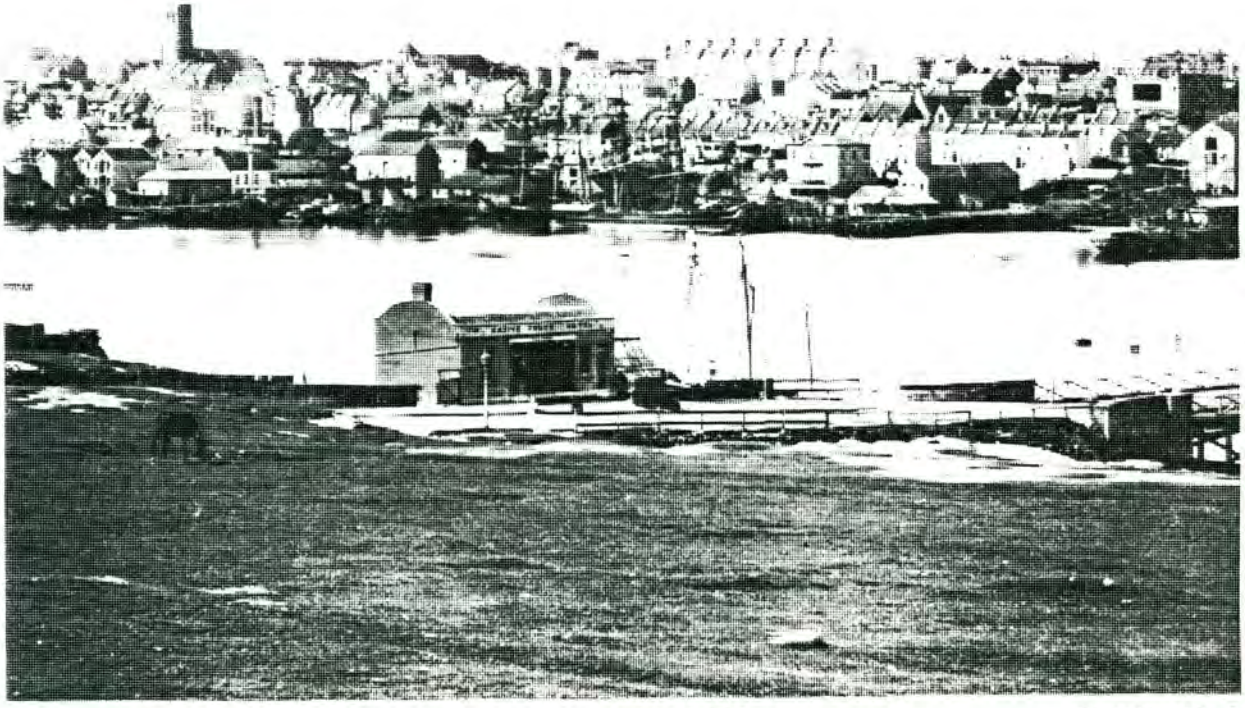
Old Pyrmont Bridge, With The Present Bridge Under Construction, 1900.

PLATE NO.6

Source, Government Printer's Office

Old Pyrmont Bridge, Circa 1890 PLATE NO.7

Source, Tyrell Collection



The West End of Old Pyrmont Bridge, Circa 1880. PLATE NO.8

Source, Government Printer's Office

5.1 Tolls & Traffic

The new bridge was free to pedestrian and vehicular traffic for the first four days and then a comprehensive system of tolls was introduced. It ranged from a farthing per head for sheep to 2 pence for a coach. An adult pedestrian cost 1 penny and children under twelve, half price.

A traffic survey was carried out between 18th March, 1858, and 31st March, 1858, and the following table indicates the amount and nature of the traffic:

Foot Passengers	20,595
Horse and Rider	125
Carts and Drays	932
Extra Horses	293
Gigs	43
Carriages	17

This gives a grand total of 22,005 for the short period reviewed, so it is obvious that the bridge supplied a long-felt need in the city.(1)

From the time of the opening of the bridge, The Sydney Morning Herald contained the following advertisement daily:

> "PYRMONT BRIDGE. Notice is hereby given that the Swing Bridge for the passage of vessels, will be opened daily at the hours of 7 o'clock a.m., and 3 o'clock p.m. By order of the Board. THOMAS SMITH. Secretary, Pyrmont Bridge Co's Office, Lloyds' Chambers".

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1. Sydney Morning Herald, 10th April, 1958.

5.2 Finance

At the Annual General Meeting of the Company in 1860, it was suggested the tolls to Pyrmont Bridge and Glebe Island Bridge be let. This suggestion was approved and the tolls were let by public competition on 11th March, 1861 for a period of nine months commencing in April of that year. The net rental was 245 pounds per month, free of all lighting, management and maintenance charges, and the tolls collected during the previous period amounted to 1,624 pounds, two shillings and three pence. By 1865, the tolls were being let at an annual rental of 4,680 pounds. After all expenses had been paid, the income received enabled the Company to pay a dividend of 2% per annum to its shareholders.

5.3 The Old Bridge as an Entertainment Venue

The old Bridge was an extremely versatile structure which played an important role in working class society between 1860 and 1880 This role was recalled, with nostalgia, in the 1920s when Darling Harbour was undergoing great change. A scheme had been prepared which involved the demolition of the present Pyrmont Bridge. The following newspaper article recalls the many uses it served its adjacent inhabitants:

> "ON SATURDAY NIGHTS. For several years after the Bridge was opened, only one half of the roadway was used for traffic. Stacks of hardwood decking were stored here and there on the other section, with big open spaces in between. It was here in these spaces that the young people of Pyrmont and the Darling Harbour area held many a Saturday night dance. The English concertina was the only music in those days. Cass dancing, on tip-toes, with shoulders hugged, and not ballroom, was in fashion among the watersiders.
>
> "Foot races also were run on the level decking of the bridgeway. Many a heeler made a name on that hard track.

> "But it was a starting point for most of the old day single sculls and pair-oar races rowed in watermen's skiffs and light skiffs, that the first Pyrmont Bridge was so well known. The course set was from Pyrmont Bridge round Goat Island and home again, a little over two and a half miles. Almost every Saturday during the summer time races were rowed by the old-timers. Rowing was not the only recreation of the old day artisans who lived on the western side of Pyrmont Bridge. Marbles were largely played on several level places within the village every summer afternoon after knockoff time."(1)

5.4 Complaints

In spite of the Bridge's obvious success, it was not without criticism. The carters of stone from the Pyrmont quarries still had to haul their loads around to the city building sites via Broadway because the Bridge could not withstand the heavy loads. The low clearance at high water of 1.65 m (5ft. 6ins.) meant that only rowing boats could gain access to the south end of the Harbour when the Bridge was shut.

Even the pedestrians expressed dissatisfaction with the Bridge. A Pyrmont resident wrote the following letter in 1860:

> "Sir, - Advance is certainly not the Bridge Company's motto, 'for there is the same inconvenient pay place as at first', who in England, ever saw a bridge opened without a turnstile with slabs to place the pence on? But here a man stands with extended hand, and when four or six persons are passing through together, and one or two of them require change, it causes both delay and confusion. Frequently, after passing through, the toll-keeper fancies he has not received his quantum,

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1. "This Progress", Sunday Sun, (Sydney) 27 February, 1927.

> parties are then bawled after, and return to be accused of not having paid the toll, hence perpetual confusion and squabbling arise. Again, during the late heavy rain we unfortunate residents of Pyrmont have to wade through pools of water from one end of the bridge to the other occasioned by the inequalities of the planking, and the insufficiency of outlets for drainage. The company yesterday congratulated themselves on the extra receipts for the last month or two, but when a little fine weather sets in we are determined to patronise the boatmen as much as possible to show the company that inattention to the comfort and convenience of the inhabitants of Pyrmont will not continue to answer their purpose or improve their receipts. - PYRMONT."(1)

It is interesting to note that two years after the Bridge opening, boatmen continued to provide competition.

5.5 Crime

The Bridge provided an attractive venue for crime. A press report of 1862 describes a highway robbery in which the victim was held up with a pistol and relieved of 2 pounds, 4 shillings and 6 pence. The incident was reported to a policeman at the time but he "did not think that he could do much good in the matter".

Several other robberies took place around that time and "the dead body of a woman was found in the water alongside under circumstances of mystery and suspicion which have not yet been elucidated".(2)

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1. Empire, (Sydney) 1st August, 1860.
2. "Peeps at the Past", The Sun, (Sydney) 20 September, 1913

However, the local police sometimes got their man. Ex-policeman George H. Sparkes recalls an exciting incident which took place about 1880:

> "The jump over the side of Pyrmont Bridge which cost young Harry Evans his life on Saturday night recalls a number of cases where the same long dive has been negotiated without accident. Mr. George H. Sparkes who was for many years alderman and mayor of the now defunct municipality of Camperdown, tells a good story of one of his exploits over 30 years ago. 'It was after serving in the Maori war that I came to Sydney', he says, 'and having nothing better to do I joined the police force. I did not remain in it long, but during the time I was in it I had some exciting experiences. Might, to a very great extent, was right in those days, and a very important part of a constable's duty was to be able to take his own part. My most exciting experience happened one day when I had a rough-up with a couple of toughs at the foot of Market Street. They were fighting, and I went to arrest them. They both turned on me, and one, after landing a stiff punch on my jaw, took to his heels and scooted across Pyrmont Bridge at a 10 sec. gait. I was pretty fast in those days, and made after him at top speed. When he realised that I was overhauling him he hopped upon the side of the old bridge and went head first into the bay. The spirit of the chase was on me, and over I went after him. He made for the Pyrmont shore, which he gained before me, as I was hampered considerably by the heavy boots and uniform I wore. However, when we reached land I was not far behind him, and the chase began anew.'
>
> "There were extensive lime-burning areas all over the Pyrmont side in those days, and my quarry made for them. These lime-burners were men generally hard-up and could get nothing else to do so they would gather up shells and burn them for lime. Generally speaking, they were a class not altogether friendly with the police, and I suppose this is why my man made in that direction. I will never forget the figure we cut in

> our wet clothes as we made through the snow-white lime. "I caught the runaway right in the middle of a particularly white patch, and he made a good fight of it. Several times were were on the ground together and rolled over and over in the lime."(1)

By 1860, Kent Street had quietened down from a fairly rowdy Street to something approximating respectability. Therefore it made news when some of the local ladies waged war:

> "Amazonian Battle. The residents of Kent Street were entertained yesterday afternoon with a scene which is rarely presented nowadays to an admiring crowd. Formerly the neighbourhood was noted for rows and squabbles, and it was no uncommon thing after nightfall to see women of questionable repute tearing and beating each other, with all the hate and excitement of furies. Yesterday, however, the engagement was what might be called a general one, as there were nine or ten females participating in the melee. The battle lasted from upwards of fifteen minutes during which time the frail beauties hammered and mauled each other in the most approved style."(2)

5.6 Government Purchases

The Government purchased the old Pyrmont Bridge in 1884 for 40,000 pounds. This was considered to be a good figure after twenty seven years of wear and tear. The tolls, then valued at 10,000 pounds per annum, were abolished.

One of the parties who brought pressure to bear on the Government was the Commissioner for Railways who considered that the tolls charged by the Pyrmont Bridge Company were interfering with the profitable development of the recently completed Darling Harbour Branch line.

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1. "Police Exploit Recalled", The Sun, (Sydney) 26th August, 1912.
2. Star, (Sydney), 31 July, 1909.

The ever increasing size of the city generated additional traffic on the bridge. As ships grew larger, it became more difficult to negotiate the narrow openings. Rot was discovered among the timbers. The Government was forced to consider replacing the bridge only a few years after its purchase.

In 1889, a Board was set up by the Government to advise on the reconstruction of Pyrmont and Glebe Island Bridges and the provision of a tramway to Balmain. The Board advised that a new bridge should be built alongside, and south of, the old Pyrmont Bridge.

The Board's advice was taken into account two years later when a competition for a new bridge was announced.

6.0 RAILWAYS

The Sydney Railway Company was incorporated in 1849 but labour shortages and financial difficulties forced the Company to accept a Government offer to take over all its liabilities and works. In 1854 the Government appointed three Commissioners for Railways.

On 26th September, 1855, a Class 1 locomotive, hauling 11 carriages, steamed out of Sydney amid scenes of great public rejoicing on a journey to Parramatta. It was the first rail service in NSW The journey took 40 minutes without stopping.(1)

At the end of 1855, the Railway Commissioners were considering a rail link to Darling Harbour with a jetty. This first proposal was intended to gain direct access for railway materials from ship to train and was not, at that time, intended to provide a public service.

By 1856 a line had been constructed and estimates prepared to extend it half a mile to reach deep water berths. PLATE 9.

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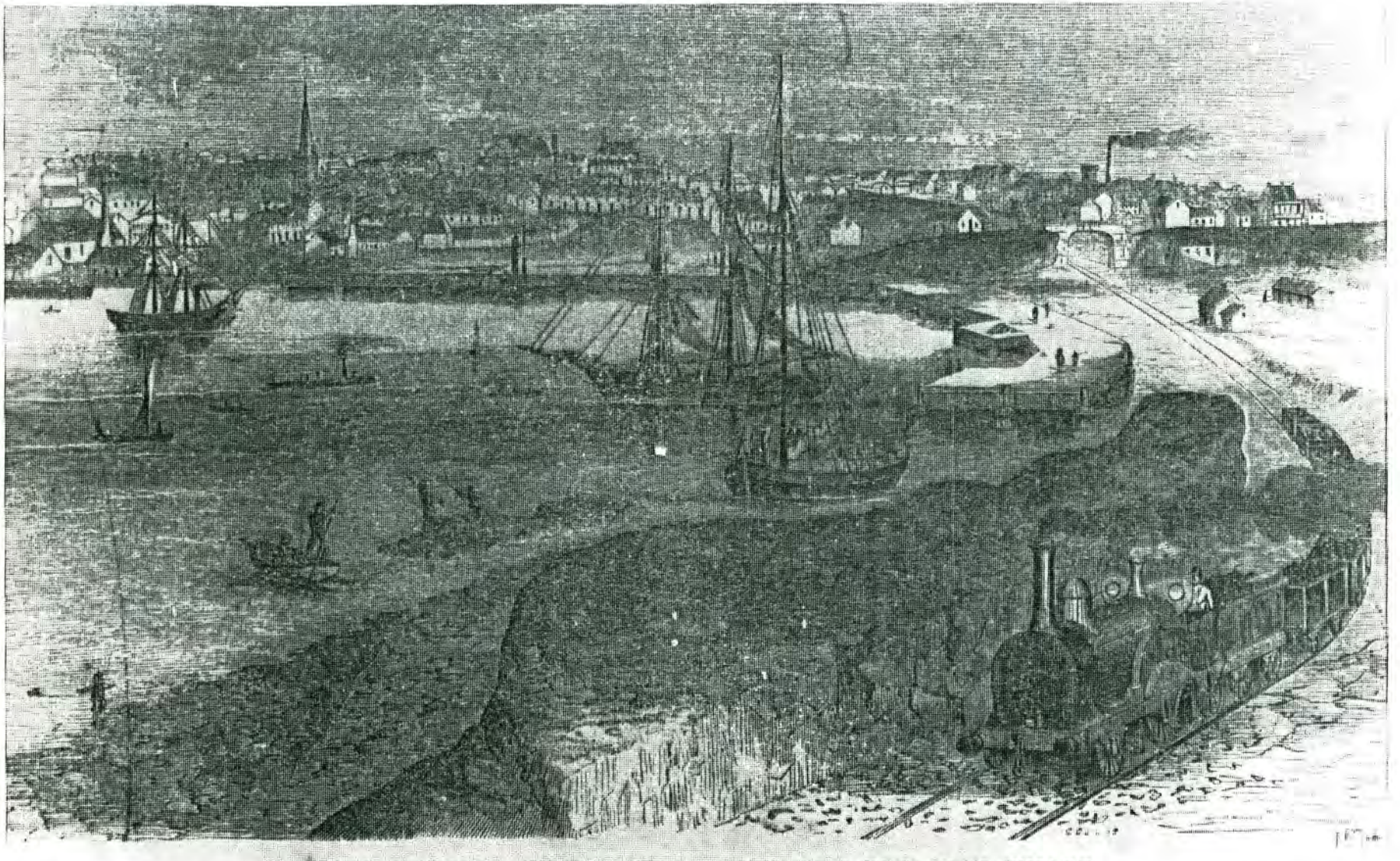
1. State Rail Authority, Brochure, 125th Anniversary of Railways in New South Wales, (1980), u.p.



DARLING HARBOUR EXTENSION—SHOWING THE NEW IRON WHARF.

The Iron Wharf And The First Darling Harbour Branch Line, 1874.

PLATE NO.9

Source, SRA Archives

In 1857, the Directors of the Pyrmont Bridge Company, who had seen the advantages of rail access at the western end of the bridge which was then under construction, were pressing for a Darling Harbour branch line to provide for general traffic with a Terminal Station. The Commissioners for Railways refused the request.

It was not until 1861 that plans were prepared and contracts drawn up to extend the line beyond Pyrmont Bridge and it was much later, in 1890, before it was actually built.

A plan dated 1857 shows a single line on the west side of Darling Harbour, stopping well short of Pyrmont Bridge.

With the exception of a certain amount of local firewood traffic that was unloaded at Newtown, all the goods traffic in and out of Sydney during the late 1850s was handled at Redfern Station. However, with an increase in the goods traffic, it became necessary to transfer certain traffic from Redfern Station to the Darling Harbour branch line to relieve Redfern goods yard.

The first recorded goods traffic for Darling Harbour was handled in 1875. Six men were employed to handle the 35,836 tonnes (35,196 tons) of general goods passed through the depot. By comparison, Redfern handled 155,317 tonnes (152,543 tons) of goods in the same year. By 1879, Darling Harbour had overtaken Redfern in tonnage handled and thereafter increased its lead yearly.(1)

6.1 The Iron Wharf

The port of Darling Harbour received a terrific boost with the construction of the Iron Wharf in 1874. PLATE 9. At this time, the numerous long finger jetties were replaced with an iron and timber wharf which extended from south of the present alignment of Liverpool Street to the Western Side of the Harbour between Fig and Allen Streets. The wharf followed a regular curve and was

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1. Information obtained from State Rail Authority Archives.

divided into 9 berths. 4 berths each 73 m (240 ft.) long followed the shoreline and 5 jetties, each 18 m (60 ft.) wide, projected 12 m (40 ft.) into the Harbour. Vessels moored at the jetties overlapped those moored against the wharf. The wharf had a railway siding running along its entire length, an advantage which the previous wharfage lacked.

The main cargo passing through the Iron Wharf was timber, which was discharged from small coastal ships for despatch by rail, and railway construction material lightered from overseas ships which were too large and too deep in draft to be accommodated at the Iron Wharf. At that time, produce such as wool, tallow, hides and wheat, was brought by train to Darling Harbour. It was then moved by horse-drawn dray to various warehouses in the City where it was sorted into consignments. These consignments were carted back to the wharves prior to shipment overseas.

Apart from inefficient goods handling, the Iron Wharf suffered from two other limitations which contributed to its decline. These were the inability of large ocean going vessels to pass through the fairways of Pyrmont Bridge and the shallow draft of 6.7 m (22 ft.) at low water.

Cargo handling was improved by the construction of new wharves and storage sheds at Darling Island. Served by rail and readily accessible to the largest ocean going ships, these wharves avoided double handling.(1)

The Royal Commission on Sydney Improvement of 1909 recommended the filling in of Darling Harbour to a line between Bathurst and Druitt Streets. This was carried out subsequently and the remains of the Iron Wharf are probably still there with reclaimed land compacted against its seaward side. PLATES 10, 11.

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1. Information obtained from State Rail Authority Archives.

The Iron Wharf Looking Towards The City, Circa 1925. PLATE NO.10

Source, SRA Archives

The Iron Wharf Looking Towards Pyrmont, Circa 1925. PLATE NO.11

Source, SRA Archives

6.2 Darling Harbour Goodsyard

Mr Goodchap, who was appointed Commissioner for Railways in 1878, was not content with the improvements resulting from the construction of the Iron Wharf. He took immediate steps to further improve the facilities at Darling Harbour so that it could cope with increasing goods traffic. At his instigation, the Government resumed an additional area of land and in 1884 purchased Pyrmont Bridge and abolished the tolls.

In 1885 the Goodsyard was extended to Union Street, Pyrmont. Five years later it was extended beyond Union Street to link up with the recenly constructed coal wharves. In May 1891, steam powered cranes were introduced to handle coal. In the same year, a large rail shed capable of holding 120 wagons was built. It was the first of three massive railway sheds which still stand near Murray Street. The last of these sheds, erected in 1925, was built on two levels, each served by sidings. (1)

The railway extension to Darling Island was opened on 22nd January, 1900, and firewood, coal, coke, shale, metal, timber and wheat were handled there. Later, Darling Island became the wheat assembly and shipping depot for the entire State. This traffic is now handled at White Bay where the silos are situated.

The new Pyrmont Bridge, which was opened in 1902, spanned the railway and avoided the level crossings of its predecessor. The main entrance to the Darling Harbour Forwarding station, erected in 1899, on the south side of the Bridge, opened directly onto the footpath on the stone abutments of the Bridge. The Forwarding Station, designed in a robust, functional manner, is a relic of the Goodsyard in its hey day. It is still used by the Yard Foreman as an office and by the dwindling numbers of Yard workmen, as a toilet block and change room.

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1. Ibid.

The Railway reached its peak in the 1920s when the railway yards assumed their present size. By 1960 the Goodsyard was past its prime. Darling Harbour is no longer the ideal location for the Goodsyard. Changes in the nature of shipping, including the rapid development of containers for cargo shipment and the gradual movement of the centre of population and industry westward from the CBD have rendered the Goodsyard obsolete. There is, however, a continuing need for a railway in Darling Harbour to serve the wharves and in addition, to maintain the rail link between Redfern and Rozelle which could be used for public transport in the future.

The Commissioners for Railways were replaced by the Public Transport Commission in 1972. This vast body, which was responsible for trains, buses and ferries, was too unwieldly to be efficient. In 1980, it was dismantled and railways became the responsibility of the NSW State Rail Authority.

7.0 COMPETITION

In 1891, seven years after the former Pyrmont Bridge was purchased by the NSW Government, an international competition for the design of a new bridge was established. Australian entrants were advised by the following press announcement:

> "COMPETITIVE designs are invited by the Government of New South Wales for a new Bridge across Darling Harbour, from the foot of Market Street to Union Street Pyrmont. The author of the first approved design will receive a premium of 700 pounds, the author of the second 300 pounds, and the author of the third 200 pounds. All designs and particulars must be delivered to the Under-Secretary for Public Works, Sydney, on or before the 4th day of January, 1892. Full terms and conditions may be obtained at the Harbors and Rivers Branch of the Public Works Office, Sydney."(1)

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1. The Australian Builder and Contractor's News, (Sydney) 28th November, 1891, p.435.

Approximately 26 schemes were received and prizes amounting to 1,000 pounds were awarded by the Advising Board of Engineers. The winning design, for a steel bridge, was estimated to cost 295,700 pounds.

The conditions upon which the competitive designs were based only called for a swing-span affording a 11.6 m (38 ft.) deck and two 18.3 m (60 ft.) fairways, which in view of the vehicular traffic having increased by 40 percent between 1885 and 1890, and the utilization of the harbour by vessels of 4,580 tonnes (4,500 tons), was considered inadequate. This led to the Department of Public works preparing a design for a steel bridge with a swing-span 16.5 m (54 ft.) wide, affording two 21.3 m (70 ft.) clear fairways.(1)

No further action was taken until 1894 when a Parliamentary Standing Committee on Public Works reported on the proposal to remove Pyrmont and Glebe Island Bridges.

8.0 PARLIAMENTARY STANDING COMMITTEE 1894
(THE BATHURST STREET SCHEME)

The Parliamentary Standing Committee on Public Works met on 3rd October, 1894, to consider for the second time, the removal of Pyrmont and Glebe Island Bridges. At this hearing the Committee wished to have explained the virtues of the scheme prepared by the Department of Public Works.(2)

Percy Allan(3), an Associate Member of the Institute of Civil Engineers, and Chief Draftsman of the Roads and Bridges Branch of the Department of Public Works, who had prepared the Department's Design, gave evidence before the Committee.

Allan told the Committee that the Public Works Department had prepared a new scheme on the same site as the competition winner of 1891 which had certain advantages over the earlier proposal. The proposed bridge would have a carriage way 12.2 m (40 ft.) wide (as opposed to 11m (36 ft.)) and

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1. Institute of Civil Engineers, The Minutes of Proceedings dated 16 May, 1907, Paper 3483, p.137.
2. Parlimentary Standing Committee on Public Works, Minutes of Evidence, Removal of Pyrmont and Glebe Island Bridges. 3rd October, 1984, p.219.
3. See Appendix 1, A Brief Biography on Percy Allan, A.M.I.C.E.

two 2.1 m (7 ft.) footpaths. It would have a headroom of 7.9 m (26 ft.) to enable lighters and barges easy access without opening the bridge. There would be a clear opening for shipping of 21.3 m (70 ft.). The estimated cost was 229,000 pounds which effected a saving of 75,000 pounds over the previous design.

In addition, the Department had prepared an alternative scheme, which the Department favoured. It was presented to the Committee by Percy Allan and it was known as the Bathurst Street Scheme.

Basically, this scheme consisted of filling in the southern end of Darling Harbour up to the line of Bathurst Street, which closely approximates the present southern alignment of Darling Harbour. Bathurst Street would be carried across the area of fill on a stone and iron viaduct which would provide 4.57 m (15 ft.) headroom to the railway sidings below. The western end of this viaduct would linked up with Pyrmont Street. It would be supported on timber piles driven through the fill until such time as they had achieved a friction bearing of 14.5 kPa/m^2 (300 lbs/sq.ft.). The estimated cost of this scheme was 296,500 pounds which included an iron bridge at Glebe Island.

The Department had been asked to comment on a timber bridge in lieu of the steel one proposed adjacent to the old bridge. Percy Allan argued strongly against it on the grounds of costly maintenance. In summing up, he said the Colony would have to pay 3,000 pounds per annum more for a timber bridge at Market Street than for a permanent bridge at Bathurst Street.

Moreover, "the Department did not think a city bridge should be of this description. Such a bridge would be good enough for an outlying country district".[1] Allan favoured the Bathurst Street option which would swiftly compensate for its slightly higher cost by being virtually maintenance free.

An interesting argument in favour of Bathurst Street was the long lasting nature of the timber piles. Allan quoted instances of piles being recovered which were 900 and 5,000 years old.

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1. Parliamentary Standing Committee on Public Works, op.cit.,., p.223.

Not everyone was in favour of the Bathurst Street Scheme. John See, M.P., was a merchant in Sydney for nearly thirty years. His arguments against it are still valid today. He said "I think that it would be a great pity to lessen the water space much as we have of it especially in that particular part of the harbour where it is growing more useful every day ... In my opinion the site of the present bridge is the best position for any construction of the kind; but the bridge that now stands is not wide enough. Bad as it is, however, it is a wonderful convenience ..."(1)

8.1 Decision

After two tedious inquiries extending over many weeks and the consideration of the 26 different schemes, the Committee decided in favour of the design submitted by the Public Works Department, with timber in lieu of the steel side spans originally recommended.(2) The foundation stone was laid by the Hon. E.W. O'Sullivan, State Minister for Works on the 6th September, 1899.

It is interesting to note that Robert Hickson, the former Commissioner for Roads and one of the three Sydney Harbour Trust Commissioners, was a member of the Board set up to advise on the reconstruction of Pyrmont Bridge. As such he was party to the recommendation to locate the new bridge alongside the old one.

However, in 1900, Hickson was to change his mind in favour of the Bathurst Street option favoured by Percy Allan. The main objection to it was the anticipated high cost of resuming waterfront land at the south end of Darling Harbour. However, at the beginning of 1900 there was an outbreak of bubonic plague and all the waterfront land was resumed anyway in an attempt to clean it up. Hickson's change of mind came just too late: the foundation stone had already been laid.

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1. Ibid; p.224.
2. Institute of Civil Engineers, op.cit., p.137.

Hickson expressed his objections as follows:

> "One of the principal reasons, which I believe governed the decision of the Committee, was the cost which would be involved by the proposed resumption in connection with either the Liverpool or Bathurst Street scheme. As these areas have now been resumed this difficulty had disappeared, and I cannot help thinking, even at this late period in the transaction, it would be better to take steps to cancel the arrangement for the erection of the bridge ... The traffic crossing to Pyrmont is now asuming very large proportions, and the inconvenience caused to this by the opening and closing of the bridge is a most serious consideration.
>
> "The doing away with the bridge would give a complete harbour capable of being designed for all classes of vessels, and the Bathurst Street Bridge ... would be better in every respect than access via Market Street.(1)

It is highly probable that had Sydney's outbreak of bubonic plague occurred six months earlier, Pyrmont Bridge would never have been built.

9.0 THE PLAGUE

The most memorable and disastrous event in Sydney during the year 1900 was the outbreak of bubonic plague. The disease was traced to the wharves, which at that time were privately owned, where incoming vessels had brought plague-stricken rats from overseas ports.

In 1900 approximately 1% of the Sydney population was Chinese. They were concentrated mainly in The Rocks and the area south of Hyde Park, extending west to Dixon Street. The Chinese had a virtual monopoly of market gardening in and around Sydney.

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1. "Robert Hickson", Journal of Royal Australian Historical Society, Vol LV., Part 3, p.233.

John Clare, writing on Darling Harbour states that "the Chinese were seen on the one hand as cheap labour, a threat to Workingman's Paradise, and on the other as merchants and business men who were too clever by half. They were commonly believed to be opium smoking seducers and corrupters, and they were popularly blamed for the dreaded Bubonic Plague."(1)

10.0 THE SYDNEY HARBOUR TRUST

As a result of the plague the Government, on 23rd March, 1900, decided to quarantine the Darling Harbour area and to resume the whole of the foreshores. The resumed premises were temporarily vested in a specially created authority, the Darling Harbour Resumptions Advisory Board, under the chairmanship of Robert Hickson. The resumption was gazetted on 3rd May, 1900.(2)

The establishment of the Board was an emergency measure pending the establishment of the Sydney Harbour Trust by an Act of Parliament which received Royal Assent on the 11th February, 1901. Robert Hickson was appointed Chairman of the Board as well as serving as a Commissioner of the Harbour Trust. (3)

In 1909 a description of the actions of the Sydney Harbour Trust observed that:

> "Shortly after the appointment of the commissioners a vigorous onslaught was made upon the insanitary conditions then prevalent at the various wharves, and one of their first acts was to pass a by-law compelling ship-masters to affix a metal disc to the hawsers or mooring-lines of vessels berthing at the various wharves, in order to prevent the passage of rats to and from such vessels. As soon as suitable offices could be procured officers were appointed and the staff organised, which occupied several months. It was not long before the commissioners were able to put into effect a series of reforms

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1. John Clare, "Darling Harbour", Sydney City Monthly, October, 1980, p.110.
2. Journal of the Royal Australian Historical Society, op.cit., p.236.
3. Cyclopedia of New South Wales, op.cit., p.362.

in the area under their charge, the wide-reaching effects of which are only now beginning to be apparent to the business and general community of Sydney. The visitation of the plague, which had played such a terrible part of the history of the year 1900, was stayed, and the panic which its presence had created was at once allayed. This was accomplished by the simple expedient of joining hands with the Public Health Department and the City Council in the systematic destruction of rats and in thoroughly scavenging the waters of Port Jackson from all putrid and offensive matter. In this way tons of dead rats and other animals and garbage were removed from the harbour every week and destroyed, and the outlets of all sewers discharging into Darling Harbour and wharves were systematically steamed with a powerful steam jet. All these measures, carried on with unvarying regularity from week to week and from month to month, at last resulted in the proclamation of Sydney as a clean port in the following year."(1)

The Trust lost no time in making improvements to Darling Habour and other parts of Sydney Harbour. Works at Darling Island were completed together with a new double storeyed cargo shed and a new wharf. Certain projects were taken over from the Public Works Department including the construction of various sheds at Market Wharf and the reconstruction of Druitt Street and Wharf Street consequent upon alteration in the design of the approaches to the new Pyrmont Bridge.(2) An entirely new wharf was built on the site of the old Pyrmont Bridge which was occupied by the Melbourne Steamship Company. PLATE 12.

10.1 The Maritime Services Board

The MSB replaced the Sydney Harbour Trust in 1936 and the authority and responsibility of the new body extended to all harbours and navigable waterways within the State.

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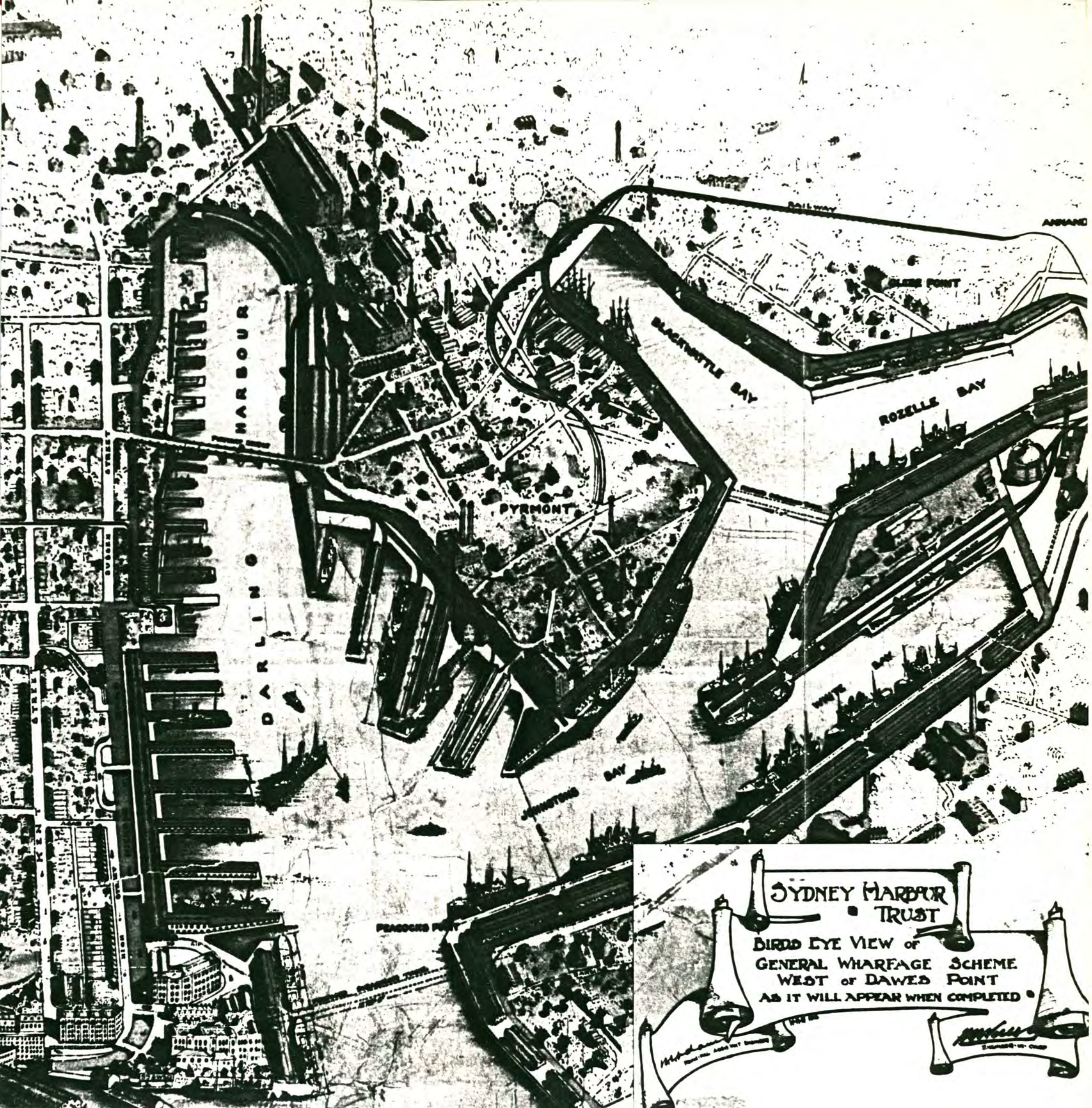
1. Ibid., p.363
2. Ibid., p.363



SYDNEY HARBOUR TRUST

BIRDS EYE VIEW OF GENERAL WHARFAGE SCHEME WEST OF DAWES POINT AS IT WILL APPEAR WHEN COMPLETED

THE SYDNEY HARBOUR TRUST PLAN FOR DARLING HARBOUR, 1914

This bird's-eye view shows berthage for 127 vessels along 11.9 miles of wharf. Darling Harbour is filled entirely with finger wharves. The longshore wharves are confined to Johnston's, Blackwattle, Rozelle and White Bays. Note that Glebe Island Bridge has been replaced by a "sub-aqueous tunnel".

Source, Mitchell Library PLATE NO.12

The MSB's present attitude to Pyrmont Bridge is contained in its submission to the City Council on the 1980 City of Sydney Strategic Plan:

> "The Board's preference in this area is, as you will know, the removal of Pyrmont Bridge and the redevelopment of southern Darling Harbour for commercial port purposes."(1)

11.0 PYRMONT BRIDGE

11.1 The Opening Ceremony

The foundation stone was laid in the previous century but the opening took place on the 28th June, 1902, amid considerable pomp and ceremony and some exceedingly long speeches. The Governor, Sir H.H. Rawson, K.C.B. and Lady Rawson performed the Opening Ceremony which was reported in great detail in the press(2).

The Minister for Works, E.W. O'Sullivan(3), with his Ministerial party, and the Governor and his Lady took their positions on a platform erected on the swing span. Crowds of onlookers swarmed over the rest of the Bridge. The swing span opened, the dignitaries revolving with it, whilst the police watched anxiously in case the crowd pressed forward forcing those at the edge of the gap into the water.

11.2 A Brief Description of the Bridge

A brief description of the Bridge from a Public Works Departmental report, dated 1902, follows:

> "The work as actually carried out provided for timber side spans, in lieu of steel, with a full roadway of 54 ft. at the swing span, and two fairways of 70 ft.

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1. Letter, Maritime Services Board to Sydney City Council, 20th February, 1981.
2. "Pyrmont Bridge, the Opening Ceremony", Sydney Morning Herald, 30th June, 1902. See Appendix 2.
3. Ibid.

each for vessels, as against 38 ft. and two fairways of 60 ft. in the premiated design; and has been completed within the estimated cost of 112,500 pounds.

"The total length of the structure and its approaches is 1,758 ft., the bridge itself spanning a distance of 1,200 ft., of which total the swing span represents 223 ft., the remainder being covered by the twelve side spans, each of 82 ft. 4 ins. The swing span, weighing 800 tons, is carried on a pivot which has its foundation on a caisson of 42 ft. diameter sunk to a depth of 62 ft.. Its floor space is 12,000 superficial feet, as against 10,600 on the Newcastle-on-Tyne Bridge, and the roadway is 4 ft. wider than than on the Tower Bridge of London. The swing itself, which is operated by two 50 h.p. electrical motors supplied with power from the Ultimo power-house, can be opened or closed in forty-four seconds, at a cost of five farthings for the double operation, which includes the opening and closing of the gates as well as the swing. Compared with the tedious method of hand-power in the old structure the advantage is obvious.

"In view of the diversity of the work to be executed, it was determined, with the object of securing better competition, to let the contracts in three sections, namely, timber side spans; pivot and swing span; and masonry, &c., in connection with the abutments, the whole to proceed simultaneously.

"The successful tenderers were Mr. McClure, Messrs J. McCormic & Sons, and Messrs Farley and McCarthy, respectively, all of whom have performed their work with satisfaction; and it can be safely said that the results derived from thus dividing the contracts have thoroughly justified the experiment."(1)

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1. Public Works Department, National and Local Government Works Branch. Report for the Year ended 30th June, 1902", p.74.

11.3 Percy Allan's Address to The Institute of Civil Engineers

Percy Allan designed Pyrmont Bridge and supervised its construction.(1) On 16th April, 1907, Percy Allan gave an address to the Instiute of Civic Engineers in London.(2) It contains, in some detail, a description of the bridge, the reasons why it was designed the way it was and the method of construction. Percy Allan's paper was accompanied by 24 drawings, numerous tables, and an album of photographs. PLATES 13, 14, 15.

The President of the Institute in proposing a vote of thanks to the author described Pyrmont Bridge as one of the largest swing span bridges in the world.

The meeting concluded with a general discussion and Mr. Burge, an authority on the use of Australian timber, who had represented Percy Allan in the past, offered an explanation about the use of timber in the bridge.(3)

> "Some members might have been surprised to see that such a structure as the Pyrmont swing-bridge, a substantial work in one of the great cities of the Empire, should be flanked on each side by a row of timber spans, which gave it a temporary and inferior appearance. The design involving the timber spans had been agreed upon in opposition to the opinion of the engineers on the spot. The Engineer-in-Chief had been very anxious to have a bridge entirely of steel, but the decision had rested with the Committee of Public Works, who were Members of Parliament, but none of them engineers. There was, however, something to be said for construction in timber, because New South Wales timber was of very high quality. The strength of the

---

1. Percy Allan, M. Inst. C.E., M. Am.Soc. C.E., was Engineer in charge of Bridge Design under Mr. C.W. Darley, M. Inst. C.E., Engineer in Chief for Public Works. H.H. Dare, Assoc. M. Inst. C.E., and Lincoln Buswell were his principal assistants in the office and on the works respectively.
2. "Allan on Pyrmont Bridge, Sydney, NSW" Proceedings of the Institute of Civil Engineers, 16th April, 1907, London, p.137. See Appendix 3.
3. Proceedings of the Institute of Civil Engineers. Ibid, p.179

PYRMONT BRIDGE

GENERAL ELEVATION & PLAN

PYRMONT

PYRMONT ABUTMENT

PIER No 1

PIER No 2

PIER No 3

REST PIER

PIER

PIVOT

PIER

REST PIER

PLAN

PRESENT APPROACH

PORTION OF EXISTING BRIDGE TO BE REMOVED

OFFICE

END OF CONTRACT

RAILWAY YARDS

GOVERNMENT WHARF

RAILWAY GOODS SHED

ENQUIRY

CASHIERS & INVOICE

OFFICE

PLATFORM

PLATFORM

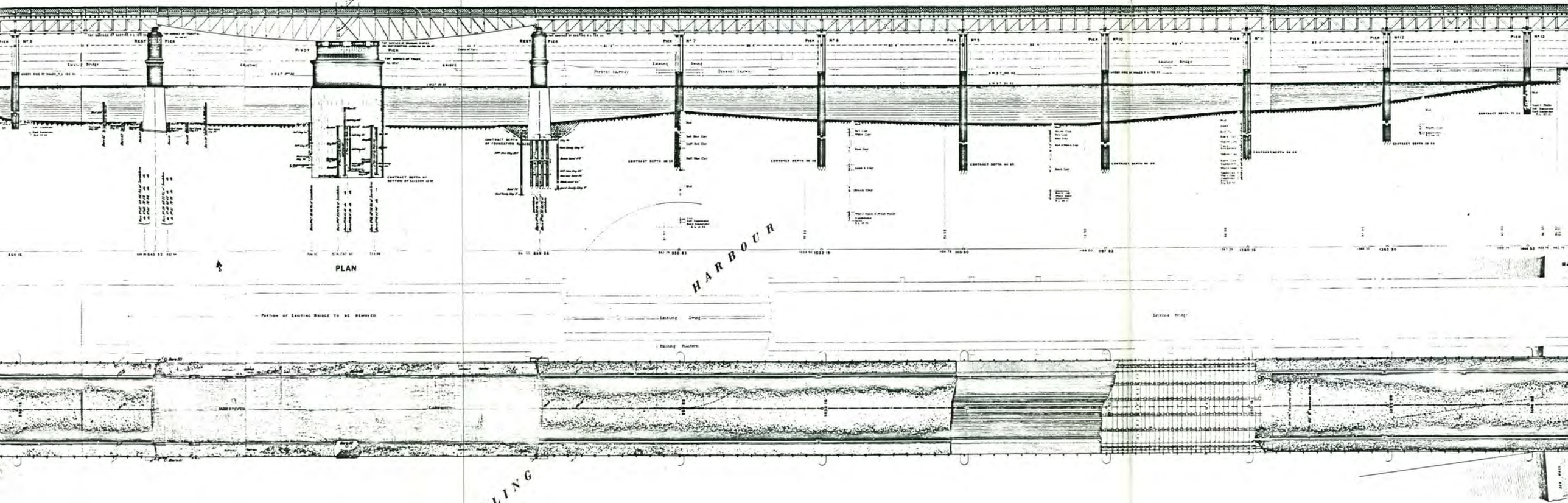
MURRAY STREET

DARLING

PYRMONT BRIDGE

GENERAL ELEVATION & PLAN

SCALE



SYDNEY

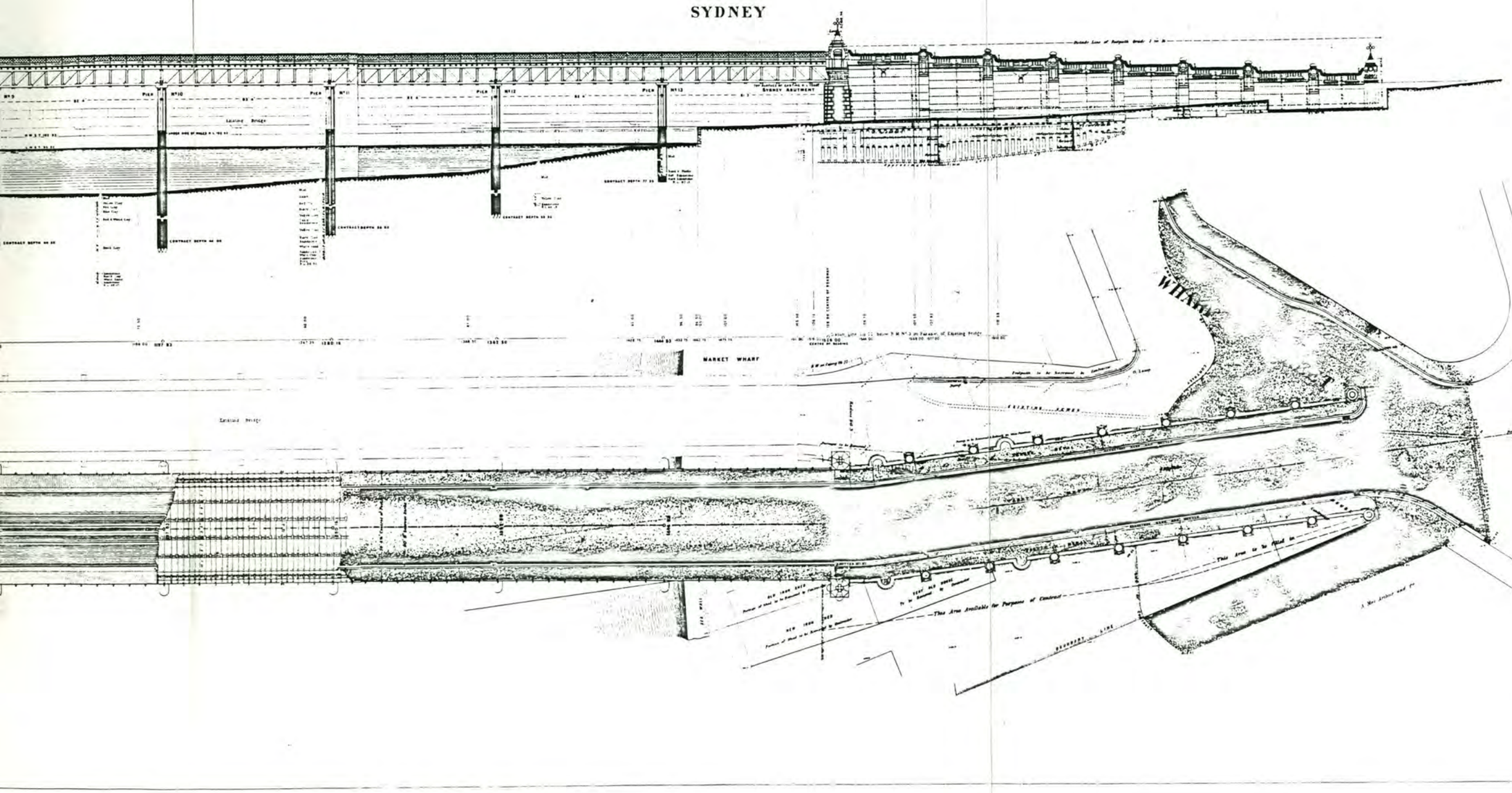


PLATE 13

DEPARTMENT OF PUBLIC WORKS

BRIDGES BRANCH

CONTRACT 3

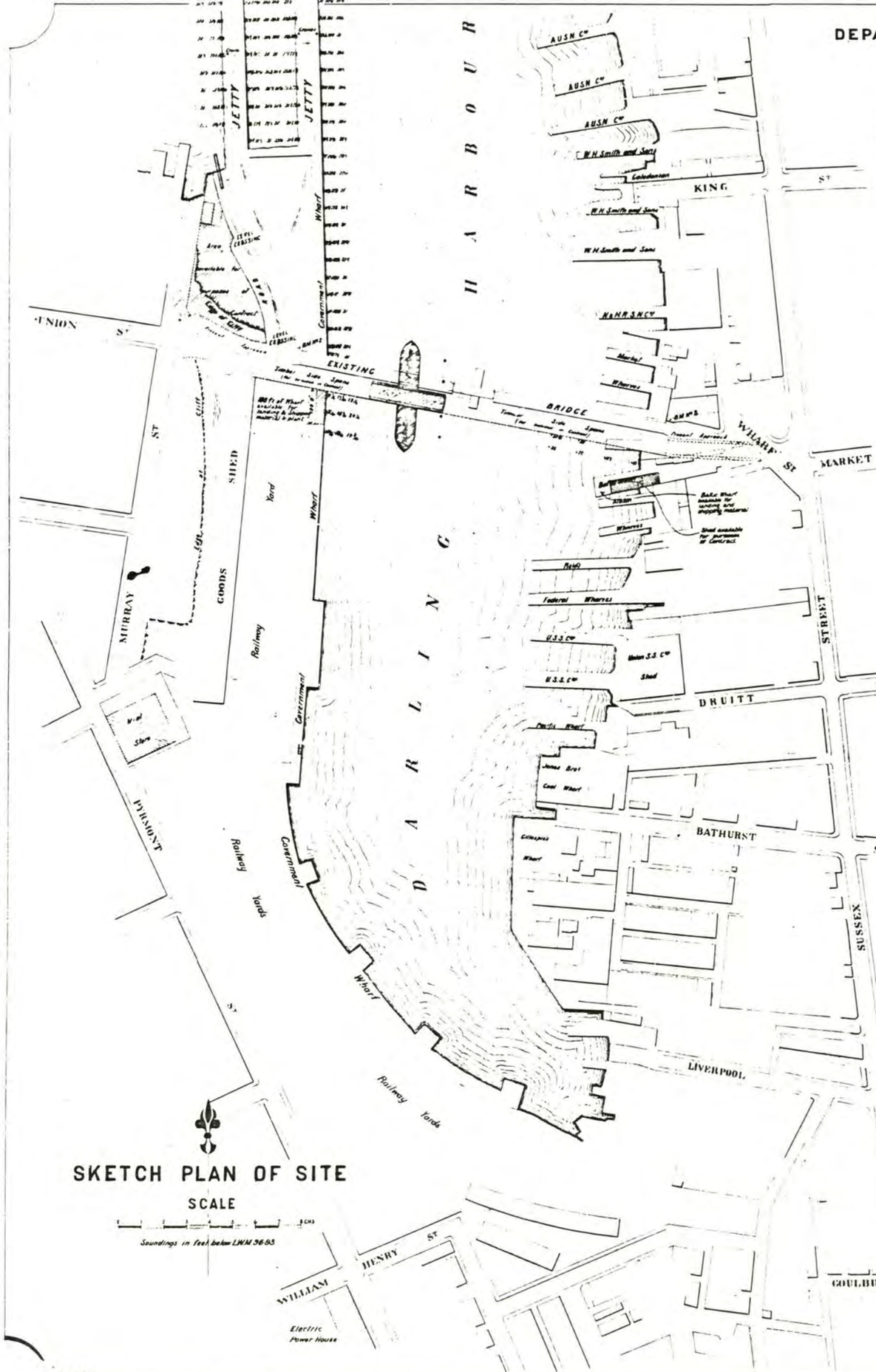
DRAWING Nº 2

PYRM

GENERAL

PYRMONT END

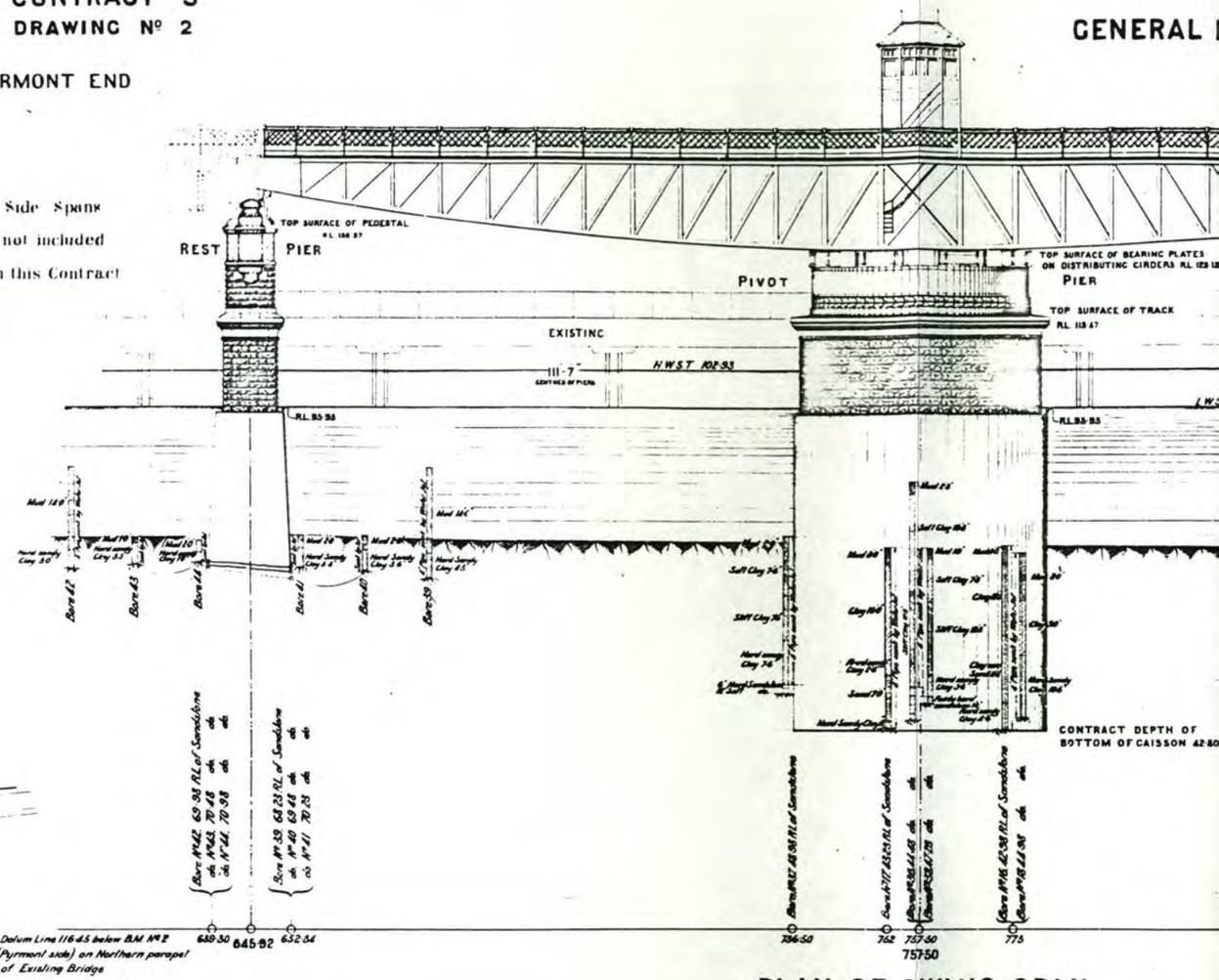
Side Spans not included in this Contract



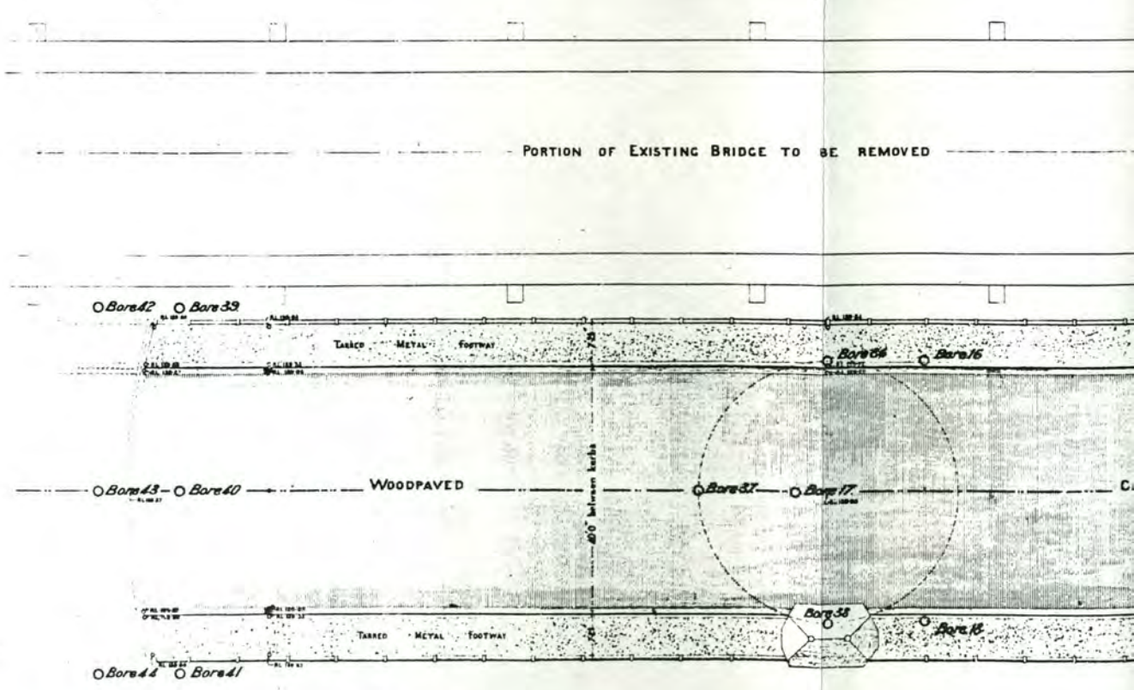
SKETCH PLAN OF SITE

SCALE

Soundings in feet below LWM 36·83



PLAN OF SWING SPAN



DEPARTMENT OF PUBLIC WORKS
BRIDGES BRANCH
CONTRACT 3
DRAWING Nº 2

PYRMONT BRIDGE

GENERAL ELEVATION OF SWING SPAN

SCALE 1" = 20'

C. Darley 20-1-99
Engineer-in-Chief for Public Works

PYRMONT END

SYDNEY END

Side Spans not included in this Contract

Side Spans not included in this Contract

REST PIER

PIVOT PIER

REST PIER

TOP SURFACE OF PEDESTAL R.L. 130.87

TOP SURFACE OF BEARING PLATES ON DISTRIBUTING CINDERS R.L. 123.137

TOP SURFACE OF TRACK R.L. 118.47

TOP SURFACE OF CASTING R.L. 128.24

EXISTING BRIDGE

111-7" CENTRES OF PIERS

H.W.S.T. 102.93

L.W.S.T. 395.93

R.L. 85.58

R.L. 86.93

R.L. 95.93

MARKET ST

STREET

SUSSEX ST

GOULBURN ST

Bore 42 69.38 R.L. of Sandstone
Bore 43 70.48 do.
Bore 44 70.98 do.

Bore 39 68.23 R.L. of Sandstone
Bore 40 69.48 do.
Bore 41 70.28 do.

Bore 16 R.L. 42.38 R.L. of Sandstone
Bore 15 R.L. 44.38 do.

Bore 13 R.L. 35.36 R.L. of Sandstone
Bore 14 R.L. 33.48 R.L. of Sandstone

Soft Clay 74'
Soft Clay 70'
Soft Clay 86'
Soft blue Clay 29.5'
Clay 74'
Hard sandy Clay 16'
Brown Sand 11.9'
Soft blue Clay 60'
Hard sand Sand 84'
White sand 6.6'
Hard Sandy Clay 5'

CONTRACT DEPTH OF BOTTOM OF CAISSON 42.80

CONTRACT DEPTH OF FOUNDATION R.L. 64.98

Datum Line 116.45 below B.M. Nº 2 (Pyrmont side) on Northern parapet of Existing Bridge
Datum raised 10 feet

639.30 645.92 652.54 736.50 762 757.50 757.50 775 869.08

Datum Line 116.22 below B.M. Nº 3 (Sydney side) on Northern parapet of Existing Bridge
Datum raised 10 feet

PLAN OF SWING SPAN

PORTION OF EXISTING BRIDGE TO BE REMOVED

EXISITING

SWING

Bore 42 Bore 39 Bore 43 Bore 40 Bore 44 Bore 41 Bore 37 Bore 17 Bore 38 Bore 18 Bore 16 Bore 13 Bore 14

TABRED METAL FOOTWAY

WOODPAVED

CARRIAGEWAY

40' between kerbs

Engineer-in-Charge of Bridge Design

PLATE 14

DEPARTMENT OF PUBLIC WORKS
BRIDGES BRANCH
CONTRACT 3
DRAWING Nº14

PYRMONT BRIDG

DETAILS OF CONTROLLINC HOUSE

SCALES

SECTION AT AA

SECTION AT BB

OUTER ELEVATION

House to be erected on Southern side of Bridge

SECTION & ELEVATION AT CC

GUARD POST

PLAN

TOP ANGLE OF COLUMN

PYRMONT BRIDGE

DETAILS OF CONTROLLINC HOUSE

SCALES

20.1.99.
Engineer-in-Chief
for Public Works

OUTER ELEVATION

SECTION & ELEVATION AT CC

SECTION AT DD

House to be erected on Southern side of Bridge

TELL TALE FOR END LIFTS

TELL TALE FOR END LIFTS

LEVER FOR LATCHES

CONTROLLER FOR WESTERN GATE

CONTROLLER FOR EASTERN GATE

Controller for East Lifts

GUARD POST

This metal tube is in lieu of 1¼ as specified

PLAN

TOP ANGLE OF COLUMN

Percy Allan
Engineer in Charge of Bridge Design
23/Jan/99

DEPARTMENT OF MAIN ROADS
PLAN ROOM
2 OCT 1935

B45

PLATE 15

> iron-bark used for the timber spans was nearly one-half that of wrought-iron: it could withstand a tension of 10 tons and a compression of 4-1/2 tons per square inch, and its density was so high that it weighed about 80 lbs. per cubic foot. In the form of piles or girders ironbark had generally a life of 30 to 35 years; and it had been thought that the saving by constructing a large part of the bridge of timber was worth effecting, because at compound interest it would provide more than a sufficient sum after 30 years to renew the bridge in steel. The Railway Construction Department, with which he himself had had to do, had built a large number of viaducts of timber on the basis arrived at by careful calculation - that if a bridge could be built in timber for less than one-half of the cost of a steel bridge it was better, economically, to build it so; but those bridges were up in the bush and not, like the bridge under consideration, in the heart of Sydney. It seemed to him that it would have been worth while for a rich Government like that of New South Wales to build a steel bridge throughout, even though the latter would have cost a little more. Mr. Burge then exhibited a series of lantern-slides illustrating the Pyrmont Bridge and its construction."(1)

J.S. Wilson who had supervised the construction of the swing span and caisson in Belgium by the Societé Anonyme des Atelois de Construction de Hal, on behalf of the Engineer to the New South Wales Government explained how they were built and tested.(2)

The swing span was completely erected and turned on its pivot prior to delivery. Some of the parts were so large that a horse, which had been trained to work a roundabout, was used during the machining process.

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1. See Appendix 4.
2. "Mr Wilson's Remarks on the Construction of Pyrmont Bridge". Proceedings of the Institute of Civil Engineers, 16th April, 1907, London, p.193. See Appendix 5.

The New Pyrmont Bridge Under Construction PLATE NO.16

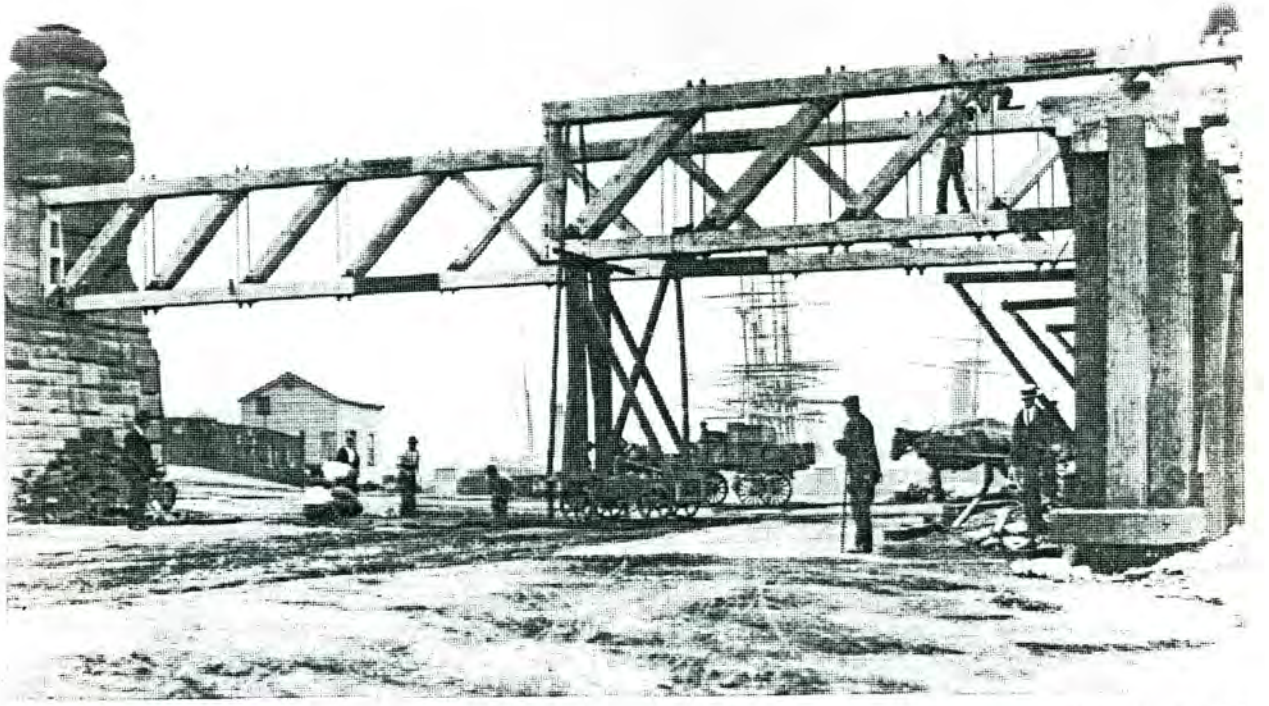
Alongside The Old Bridge, 1900.

Source, DMR Archives

Pyrmont Bridge Under Construction, PLATE NO.17

The Eastern Approaches, 1900.

Source, DMR Archives



Pyrmont Bridge Under Construction,
Erecting The Timber Trusses, 1900.
Source, DMR Archives

PLATE NO.18

Pyrmont Bridge Under Construction, The Western Abutments, 1900. PLATE NO.19
Source, DMR Archives

Pyrmont Bridge, Western Approach. Early 1900's.

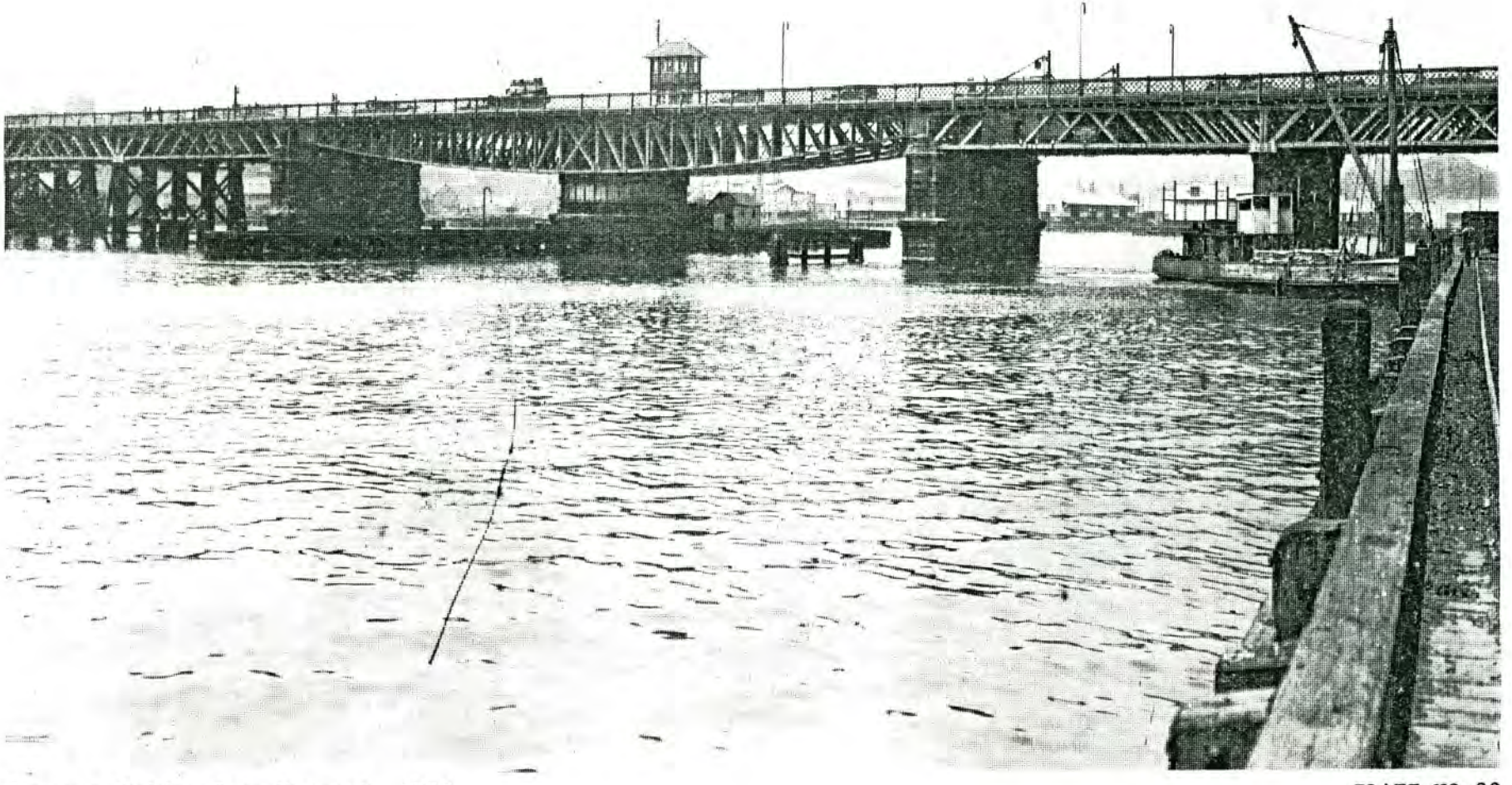
PLATE NO.20

Source, DMR ARchives

Pyrmont Bridge, Looking Towards The City. Early 1900's.

PLATE NO.21

Source, Tyrell Collection



Pyrmont Bridge From Pyrmont, 1932.

Source, Government Printer's Office

PLATE NO.22

One of the critical aspects of the construction was to ensure that the weight of the swing span was supported by as many of the 66 cast steel rollers as possible. A check, which was made wih a feeler gauge, revealed that only one roller had a gap of 0.15 mm (0.006 inches). The manufacturer considered that the adjustment of this giant roller bearing was good.

11.4 Speed of Operation

As well as being one of the world's largest swing span bridges, Pyrmont Bridge is also one of the world's fastest - 38 seconds to open. By comparison a hydraulically operated swing span bridge at Bristol, England took 1 min. 45 seconds.(1)

11.5 Cost of Operation

In 1919 Pyrmont Bridge opened 5,315 times to permit the passage of 8,188 vessels. The total cost for electric power, including lighting on the bridge deck and in the control tower amounted to 148 pounds and 6 pence. This sum did not include labour costs.(2)

11.6 Control

Three years after it was completed, the Premier, considered the question of the control of Pyrmont Bridge and whether the cost of maintenance and working of the Bridge was a fair charge against the Government. The Premier was of the opinion that the bridge provided a service for the City and therefore the City Council should take full charge of the structure, paying all the costs associated with it.

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1. Proceedings of the Institute of Civil Engineers, op.cit., p.200.
2. "National and Local Government Works Branch, Report for the Year Ended, 30th June, 1919", Public Works Department, 1919, p.54.

The Premier presented his views to the City Council by letter and in it he pointed out that :

> "Since its completion it has been maintained and worked by the Department of Public Works at an annual cost of 1,929 pounds. The staff connected with the bridge, however, had been re-arranged and reduced, and with other improvements recently effected it had been anticipated that the annual expenses for maintenance and working would be decreased by 200 pounds."(1)

The City Council was not moved by the Premier's case and after considering a report dated 20th April, 1905, by the City Surveyor, rejected his proposal.

The Town Clerk reported that:

> "Without considering the important question of cleansing, lighting, maintenance and working expenses, which it was recognised would be a serious charge upon the finances of the Council, without any increase in revenue, the Works Committee decided that the suggestion of the Premier could not be entertained and this decision was afterwards approved and adopted by the Council."(2)

11.7 Threats to Pyrmont Bridge

By 1917 the pressure to extend, both the Darling Harbour Goodsyard and the actual extent of the Harbour to accommodate large ships, had increased to such an extent that major remodelling was proposed.(3)

The proposal was similar to the Bathurst Street Scheme which had been favoured by Allan and latterly by Hickson.

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1. Proceedings of the Council of the City of Sydney, 2nd May, 1905. p.177.
2. Ibid., p.178.
3. Evening News, (Sydney), 27th April, 1917.

It was proposed to use 611,280 m^3 (800,000 cubic yards) of spoil to reclaim 6.8 ha (17 acres) of land on which the Railway Commissioners intended three new goods sheds each 305 m (1,000 ft.) long. Bathurst Street was to be continued to Pyrmont Street and Pyrmont Bridge dismantled and relocated at the Spit, Mosman.

Another major attraction of the Scheme was the convenient location of Darling Harbour for dumping spoil from the City underground railway. It was estimated that there would be a small surplus of material once the railway tunnels were completed and the spoil dumped. The land reclamation part of the Scheme was completed in the 1920s and Darling harbour achieved its present shape at that time.

The timber wharf sheds at the southern end of Darling Harbour, which were demolished in 1981, were built on completion of the land fill programme and were the last of the coastal trade wharf sheds to be built. They had a Recorded Listing in the Register of the National Trust.

That part of the plan involving the continuation of Bathurst Street and the relocation of Pyrmont Bridge was shelved.

In 1945, new plans were prepared which involved the demolition of Pyrmont Bridge. The Department of Main Roads, which replaced the Main Roads Board in 1932, intended to site the huge multi-level intersection of the proposed Southern, Western and North Western Expressways at the southern end of Darling Harbour over the Goods-yard. The railway lines would thread their way between the road deck piers and with the demolition of Pyrmont Bridge, port expansion would have clear access to the southern end of the Harbour.

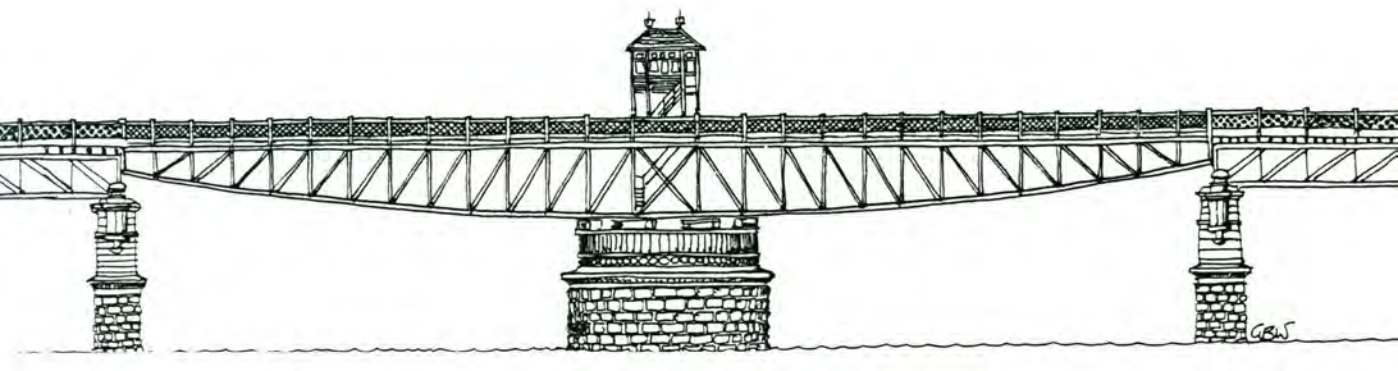
Little of this proposal was executed. However, the partial construction of the North Western Freeway has had a direct and significant effect on Darling Harbour and it replaced Pyrmont Bridge as a trafficable roadway in 1980. PLATE 23.

The Last Car To Cross Pyrmont Bridge.

Source, Sydney City Council Planning Department

PLATE NO.23

PART II
BACKGROUND



Aerial View of Darling Harbour And The City Centre, 1980.

PLATE NO.24

Source, Sydney City Council Planning Department

LOCATION

PLAN

MAP 1

PORT JACKSON

MORT BAY

WALSH BAY

SYDNEY COVE

FARM COVE

DARLING HARBOUR

JOHNSTON'S BAY

WHITE BAY

BLACKWATTLE BAY

EICHHARDT

BALMAIN

GLEBE ISLAND

GLEBE

PYRMONT

ULTIMO

HAYMARKET

THE ROCKS

MILLERS POINT

DAWES POINT

BOTANIC GARDENS

THE DOMAIN

HYDE PARK

WOOLLOOMOOLOO

DARLINGHURST

SURRY HILLS

Simmons Point

Ballast Point

GOAT ISLAND

Peacock Point

Darling Island

Glebe Point

Millers Point

Bennelong Point

Mrs. Macquarie Point

Scale in Metres

Scale in Feet

1.0 BACKGROUND

Darling Harbour is part of Port Jackson. It lies on the western side of the CBD. It separates the Pyrmont peninsula from the City. The part of Darling Harbour which is the concern of this report lies immediately south of Pyrmont Bridge. It includes the Darling Harbour Goodsyard and certain waterfront land owned by the Maritime Services Board. MAPS 1 and 2.

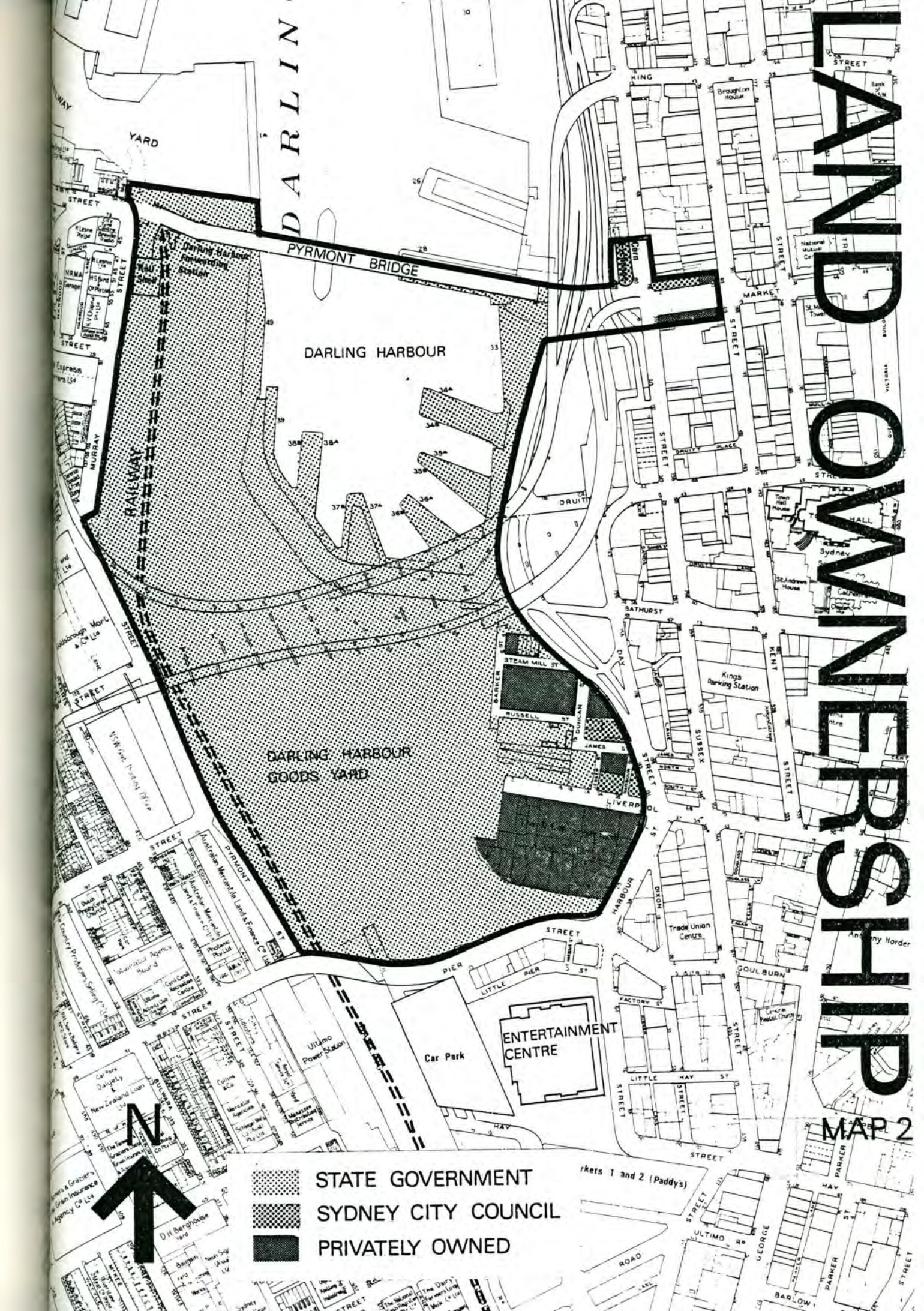
It has an open northerly aspect. The Goodsyard forms the floor of a natural amphitheatre contained in the east by the high office towers of the CBD and in the west by the bulky woolstores of Ultimo and Pyrmont. The Goodsyard is obsolete and underutilised and this is manifested by the general air of neglect and dilapidation.

Darling Harbour has the unique distinction of being relatively close to all the inner Metropolitan residential areas without being identified with any particular one. Most of the Eastern Suburbs, South Sydney, Marrickville, Botany, Leichhardt and the northern suburbs of Mosman, North Sydney and Willoughby, lie within 8 km of the Goodsyard. It is neutral territory for a large number of people. This is important when considering its future. No one can claim that recycling the Goodsyard for people-oriented activities will benefit an exclusive minority. It could become a considerable asset to the city and the improvement would be felt throughout the Metropolitan area.

Located adjacent to the city centre, the Goodsyard is visible from the North Western Freeway and from the large woolstores in Ultimo/Pyrmont, some of which are being converted to residential and commercial use. It is adjacent to the new Entertainment Centre, the Museum of Applied Arts and Sciences and the Dixon Street/China Town precinct.

1.1 Area

The Goodsyard has an area of 14 ha. and is constructed almost entirely on fill. The area of water south of the Bridge amounts to approximately 2.7 ha.


LAND OWNERSHIP
MAP 2
DARLING HARBOUR
DARLING HARBOUR GOODS YARD
PYRMONT BRIDGE
RAILWAY
ENTERTAINMENT CENTRE
Car Park
Ultimo Power Station
Trade Union Centre
Kings Parking Station
STATE GOVERNMENT
SYDNEY CITY COUNCIL
PRIVATELY OWNED

1.2 Access

Pedestrian and bicycle access can be provided easily from Ultimo/ Pyrmont and from the Haymarket. However, access from the City is impeded by the freeway and a new link will be required at Market Street.

Park Street, George Street and York Street buses serving the Eastern and Western Suburbs are all within 0.5 km of the eastern end of Pyrmont Bridge. Bus services in the Ultimo/Pyrmont peninsula are poor at present but they will improve as the population rises. Tourist coaches, should the area ever become a tourist attraction, would approach and park in Liverpool Street which is one of the main entrances to the Goodsyard at present.

Central Railway, Town Hall and Wynyard Stations, are all within 0.75 km of the Goodsyard and the possibility exists of using existing rail lines to serve the Museum of Applied Arts and Sciences and Pyrmont Bridge itself.

Car travellers coming from the west would use Victoria Street or Pyrmont Bridge Road. The southern approach would be by Harris Street and the widened Wheat Road leading to the Entertainment Centre Car park. From the north, cars would come by Day Street and from the east, by Liverpool Street.

Thus, with certain modifications to existing access systems and the introduction of new bus routes and a new transportation system within the present area of the Goodsyard, accessibility will be excellent.

1.3 Foreshore Land Use

At present the City of Sydney foreshore land is used as follows:

Port Uses	7.8 kms
Defence	2.2 kms
Industrial	1.1 kms
Open space	4.16 kms
Residential	0.74 kms
Other	1.22 kms(1)

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1. City Planning Department, 1980 City of Sydney Strategic Plan, (Sydney: Council of the City of Sydney, 1980), p.163.

Only 23.5% of the City's foreshore is accessable to the public. Darling Harbour, south of Pyrmont Bridge, has a shoreline of 500 m. Approximately 150 m. of this is used by the MSB for mooring LASH lighters and unloading their cargo. There are two old style cargo sheds on finger wharves. Berth No.28 is underneath Pyrmont Bridge and it is in a very delapidated condition. Berths Nos.34A and 34B have a timber wharf shed which is approximately 60 m long and usually empty. Berths Nos.35A and 35B have covered space. Berth No.39 is used as a heliport but this is not expected to be permanent because the operators have failed to gain a full commercial operators' licence.

The remainder of the foreshore is basically derelict, occupied by old railway sidings and crumbling wharves.

A variety of old and interesting ships are moored temporarily alongside the old wharves. These include the South Steyne, last of the steam powered harbour ferries, the New Endeavour, a three masted barque used for sail training purposes, and a wooden minesweeper, dating from the Second World War. These vessels are useful to give some idea of the visual impact a maritime museum would have in Darling Harbour.

2.0 PLANNING CRITERIA

2.1 The City of Sydney Planning Scheme

The City of Sydney Planning Scheme has the Darling Harbour Goodsyard zoned for railway purposes. A broad corridor of land on the eastern side of the Goodsyard running in a north-south direction is zoned County Road and was intended originally for the Southern and Western Expressways. The North Western Freeway, partly constructed, runs east-west across the Goodsyard in a County Road zone. To the east of the expressway corridor, the CBD is zoned County Centre, which permits almost any use except certain heavy industries. Those areas owned by the MSB are zoned Special Uses, Port Purposes. There are no Height Limits at all and there are no conservation requirements of a statutory nature on any of the buildings or structures. MAP 3.


PLANNING SCHEME
MAP 3
PYRMONT BRIDGE
DARLING HARBOUR
DARLING HARBOUR GOODS YARD
ENTERTAINMENT CENTRE
Car Park
Ultimo Power Station
Trade Union Centre
Kings Parking Station
SPECIAL USES 'A' PORT PURPOSES
SPECIAL USES B RAILWAYS
COUNTY CENTRE
COUNTY ROAD
N

The City of Sydney Planning Scheme which was begun in the late 1940s and finally gazetted in 1971 clearly illustrates the highway planning attitudes of the early post-war years. Vast areas of the city were zoned County Road. Houses, mainly occupied by low income earners, were the principal casualties of the areas zoned for new roads. Rising construction prices and growing public unrest at the destruction of residential areas led to the gradual abandonment of many planned freeways. The North Western Freeway is the only survivor of an extensive County Road system.

Floor Space Ratio (FSR) controls as laid down in the City Council's Floor space ratio Code 1971, do apply to the land zoned County Centre but it is likely that any proposal for a major new development would be treated as a special case.

2.2 1980 City of Sydney Strategic Plan

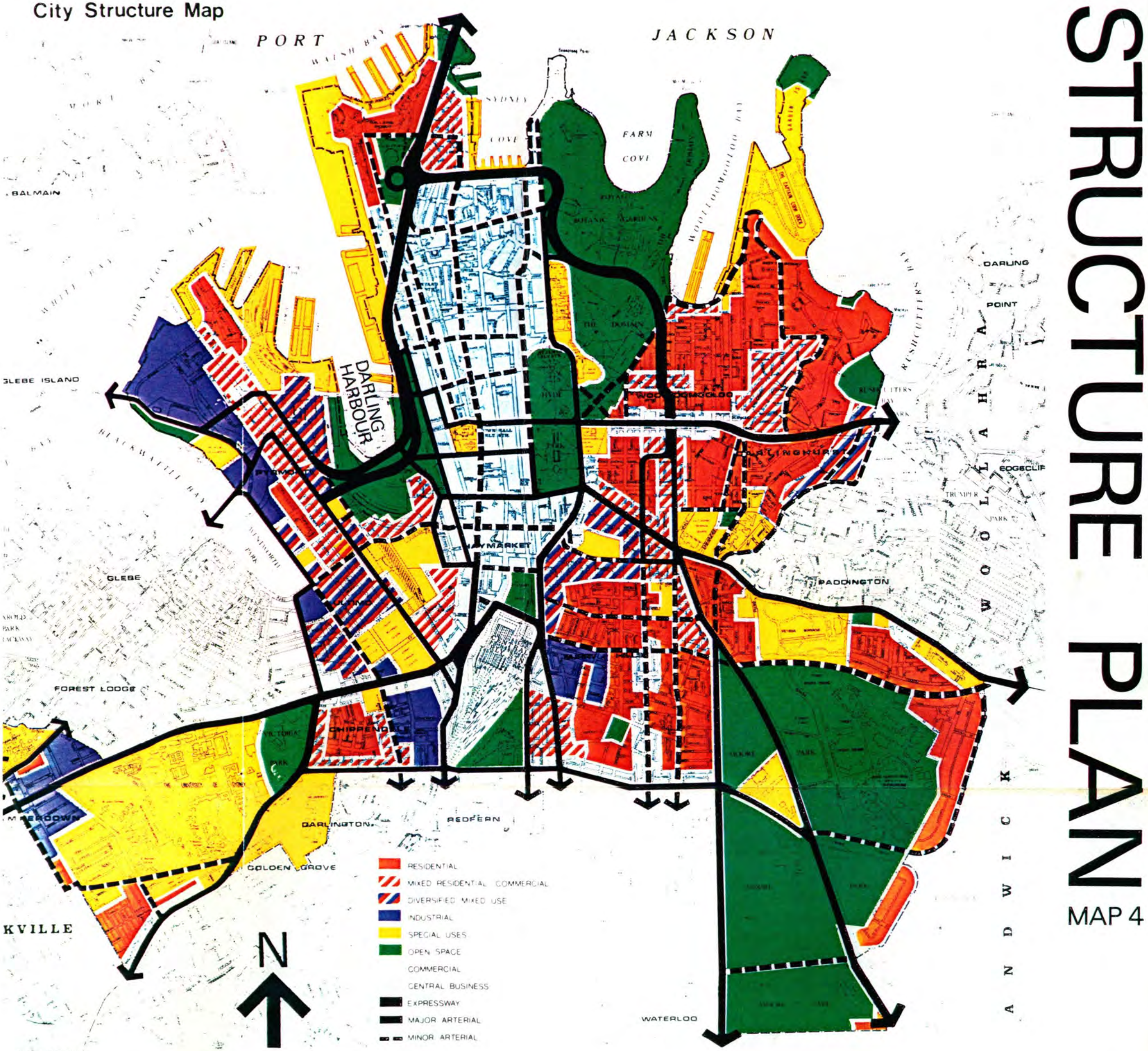
In 1979 a Council Planning team set up office in a vacant Harris Street shop and with the active participation of the local residents, prepared an Action Plan for the Ultimo/Pyrmont/Haymarket precinct.

The Action Plan was incorporated in 1980 City of Sydney Strategic Plan. The structure plan for the area shows most of Darling Harbour Goodsyard set aside for park with mixed residential/commercial use on the south/eastern fringe and residential on the site of the rail sheds adjacent to Murray Street. MAP 4.

The concept of a Bicentennial Park is described in the City of Sydney Strategic Plan as follows:

> "The area's natural attributes rendered parts of it particularly suitable for open space which could be continued between the pylons of the North-Western Distributor. Council has adopted a policy of actively encouraging the redevelopment of Darling Harbour Goodsyard to provide a mix of public open space and housing with a small component of commercial and community uses. Part of the Darling Harbour waterway could be used for recreational and boating purposes.

City Structure Map



STRUCTURE PLAN

MAP 4

"There is a crucial need to redress the imbalance in the provision of recreational open space. Whilst the eastern side of the City is comparatively well provided with major parklands such as Centennial Park, the Botanical Gardens and Moore Park, the western side is bereft of any significant areas of open space.

"The State Government has recently announced proposals to stage 'Expo 88', a major trade and cultural fair, in Sydney to mark Australia's bicentenary. The site identified - the preferred site of five alternatives in the Sydney Metropolitan region - is the southern foreshores of Darling Harbour, Darling Harbour Goodsyard and the Market Buildings in Haymarket. The State Government is currently negotiating with the Australian Government on funding and the apportionment of costs associated with staging 'Expo 88'."(1)

"The southern foreshores of Darling Harbour and the Darling Harbour Goodsyard could be more appropriately utilised as the site for Bicentennial Park.

"Sydney provided the setting for the Centennial Park in 1888. It is appropriate for Sydney, as Australia's oldest and premier City to provide the setting for the proposed Bicentennial Park. The Darling Harbour Goodsyard provides a magnificent opportunity to achieve this. The Yards are more than 30 ha.(2) in extent, comparable in size with the Domain and Hyde Park. Furthermore, this area is bordered by, and provides direct access to, some 800 metres of prime Harbour foreshore, again comparable with the length of waterfront in Farm Cove within the Royal Botanic Gardens and Domain. Because of its location and natural attributes, this area could be landscaped to create a magnificent parkland with outstanding views of the

---

1. The plan to Stage 'Expo 88' was dropped after a disagreement between State and Federal Governments on the allocation of costs. The estimate of $859 m was considered excessive and named as the reason for abandoning the project.
2. This is a misprint. It should be '30 acres'.

"Harbour and the City. It could be made directly accessible for City residents and workers as well as being a major tourist attraction.

"The proposed redevelopment of the Goodsyard will improve the environment of Darling Harbour immeasurably and remove this visual and physical barrier between Ultimo/Pyrmont and the City. The potential of this prime area cannot be overstated, and its rejuvenation for this purpose will be vigorously pursued by Council as it opens up a whole range of new possibilities for City living as well as greatly enhancing the whole image of the City."(1) PLATE 25.

The City of Sydney Strategic Plan discusses the North Western Freeway and the various stages of additional construction which are required to make it work efficiently.

"The original concept of the North Western Freeway was of a road from Druitt Street in the City to Pyrmont Bridge Road at Wentworth Park with subsequent extension to Gladesville Bridge. The connection to Gladesville Bridge is now proposed via Victoria Road and the connection with Druitt Street has been deferred.

"The roadways that have recently been opened were an afterthought to the original concept and designed for construction only after the main roadways had been completed. The lack of the upper level roadways has led to total reliance on connections that were never designed to carry their current load. The peak hour problems in the City Centre and in Pyrmont are ample evidence of this. Urgent action is needed by the State Government to restore balance to this part of the road system.

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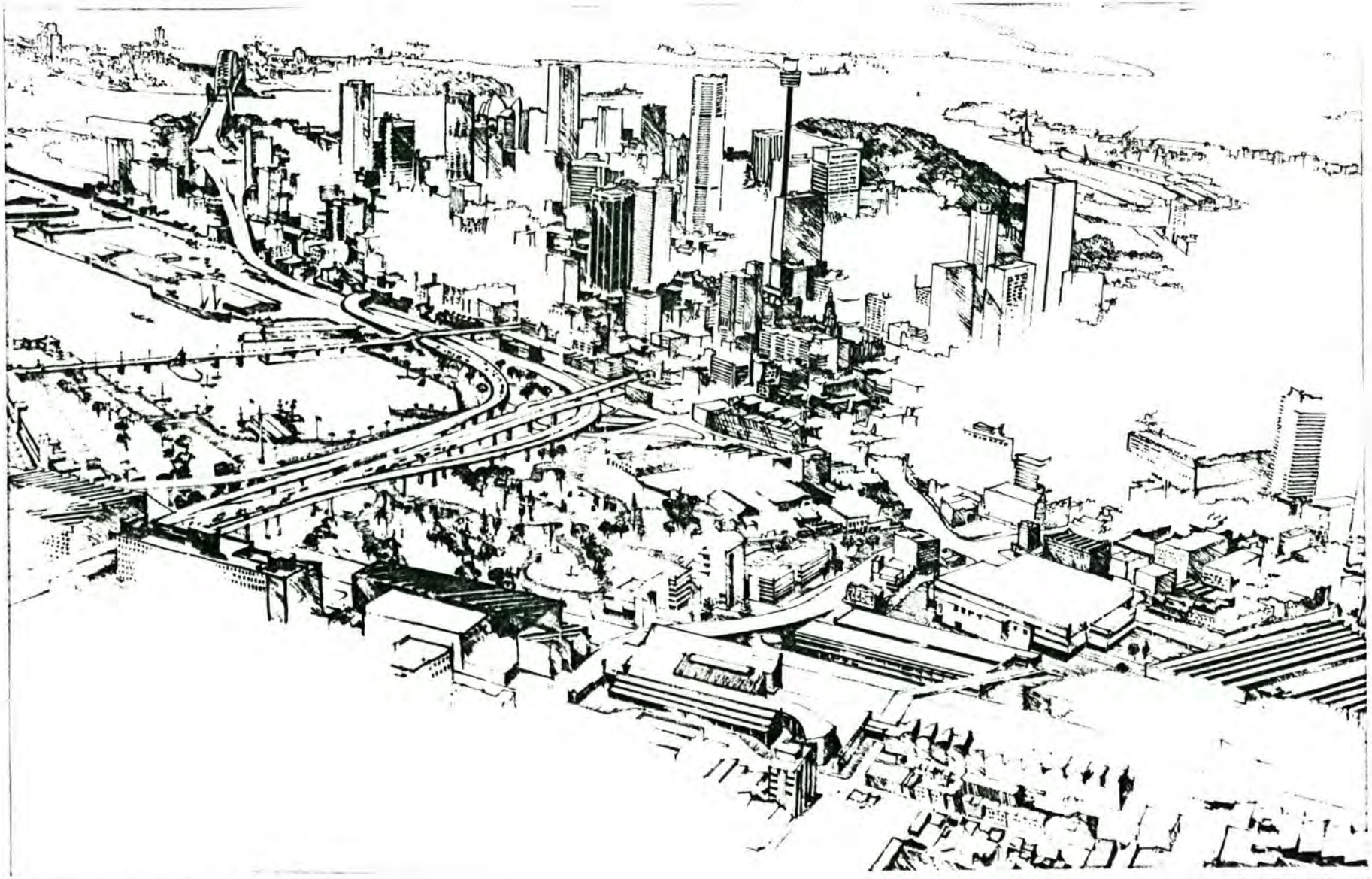
1. City Planning Department, 1980 City of Sydney Strategic Plan, Sydney: Council of the City of Sydney, 1980, p.165.



Proposed Bicentennial Park.

Source, City of Sydney Strategic Plan 1980

PLATE NO.25

> "The North Western Freeway has proceeded over the years from the concept of a road from Druitt Street across Darling Harbour to Pyrmont Bridge Road (1964); through its design as a complex major freeway route involving the removal of Pyrmont Bridge (1969); to a road (1980) surrounded by the tombstones of the designer's dream."(1)

In the long term, however, it is likely that much of the design will be completed providing a significant increase in capacity. The ramps to Harris Street and from Pyrmont Street will then serve as local connectors linking Pyrmont and the CBD. The upper level roadways across Darling Harbour will be available for long distance traffic. These new roadways will link to Victoria Road via Bank street in Pyrmont, and a new Glebe Island Bridge. The old Glebe Island Bridge, with its swing span identical to that of Pyrmont Bridge, will be demolished.

The Strategic Plan suggests a six stage programme providing ultimate connection of the Freeway to Victoria Road at The Crescent, Rozelle, and it points out that all the piers required to construct the Freeway up to Stage 6 have been built already. PLATE 26.

The Strategic Plan makes no mention of conservation in Darling Harbour.

2.3 Local Environmental Plan

Since 1980, the plans have been refined into a Draft Local Environmental Plan (LEP) and submitted to the Minister for Planning and Environment for gazettal. Once gazetted the LEP will become a Statutory Planning Document and replace the old City of Sydney Planning Scheme.(2)

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1. Ibid., p.77.
2. The Department of Environment & Planning (DEP) has indicated that the area of Darling Harbour and the Goodsyard which is subject to the Draft Darling Harbour Management Plan will be deleted from the LEP.

North-Western Freeway.

PLATE NO.26

Source, City of Sydney Strategic Plan 1980

2.4 The Draft Darling Harbour, Haymarket Management Plan

The Draft Darling Harbour Haymarket Management Plan[1] arose from a request by the Premier for the Minister for Planning and Environment to arrange for the preparation of a management plan for Darling Harbour and associated area.

The introduction to the Plan states that:

> "The NSW Government has major interests in this area. A new Entertainment Centre is under construction, and the old Pyrmont Power House is in the process of being converted into a new Museum of Applied Arts and Sciences. The NSW Institute of Technology is also involved in major construction projects nearby. In addition, the state Government has very large and valuable land holdings in the area, in the form of Market Buildings 1 and 2, MSB port facilities, the expressways and land beneath them, the heliport, and the Department of Agriculture Plant Quarantine Station. The most extensive and significant State Government land holding in the area is the Darling Harbour Railway Goods Yards."

The Plan is divided into two Stages:

Stage 1 incorporates proposals to: MAP 6.

(i) improve pedestrian convenience and amenity in the vicinity of the Entertainment Centre;

(ii) improve traffic movement in the vicinity of the Entertainment Centre;

(iii) improve the existing finger wharves and old Port roadway area at the head of Darling Harbour as public open space;

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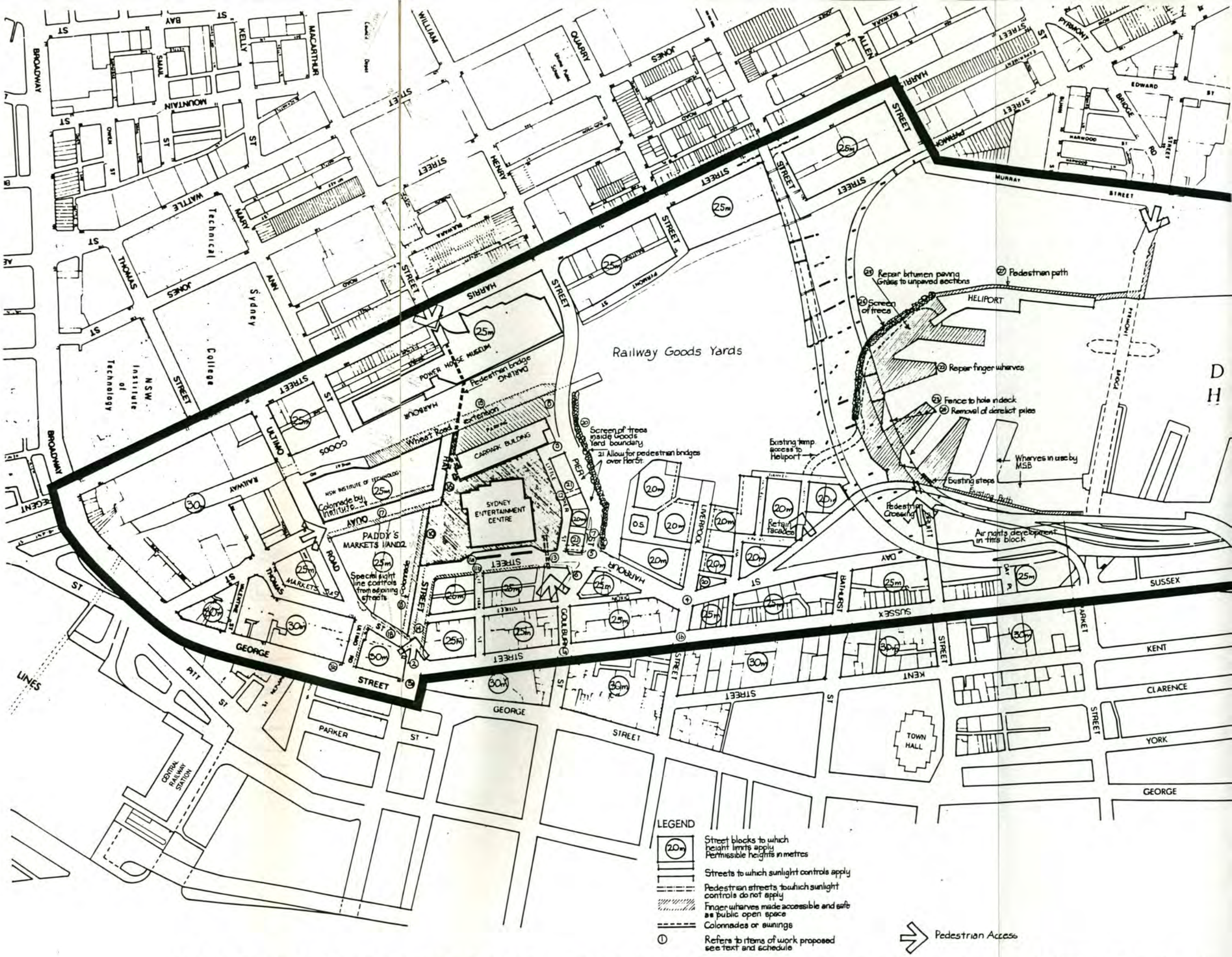
1. DEP The Draft Darling Harbour, Haymarket Management Plan, released Sydney: 14th April, 1982.

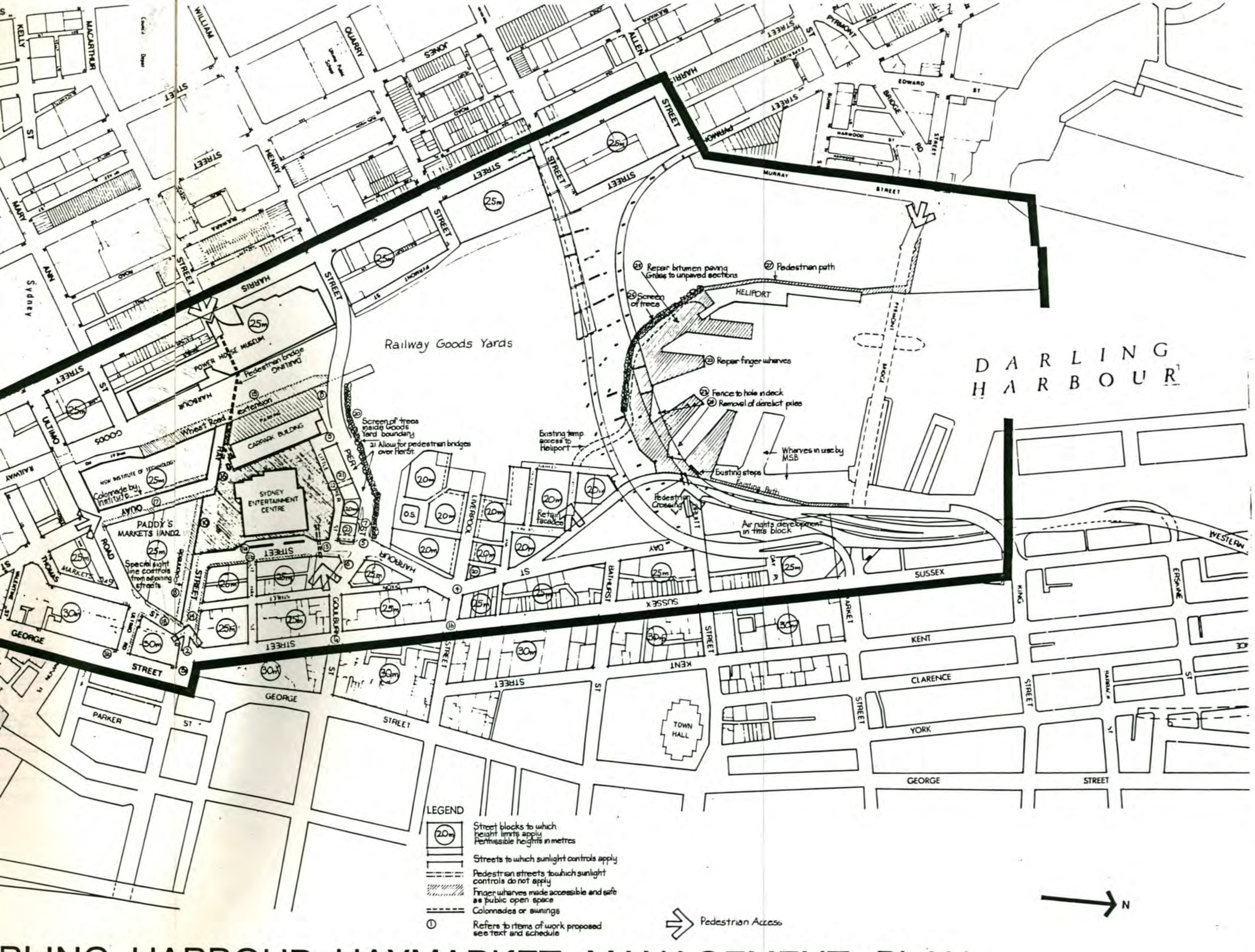


DARLING HARBOUR HAYMARKET MANAGEMENT PLAN

STAGE 1 PROPOSALS

SCALE 1:2000

20 0 20 40 60 80 100 120m



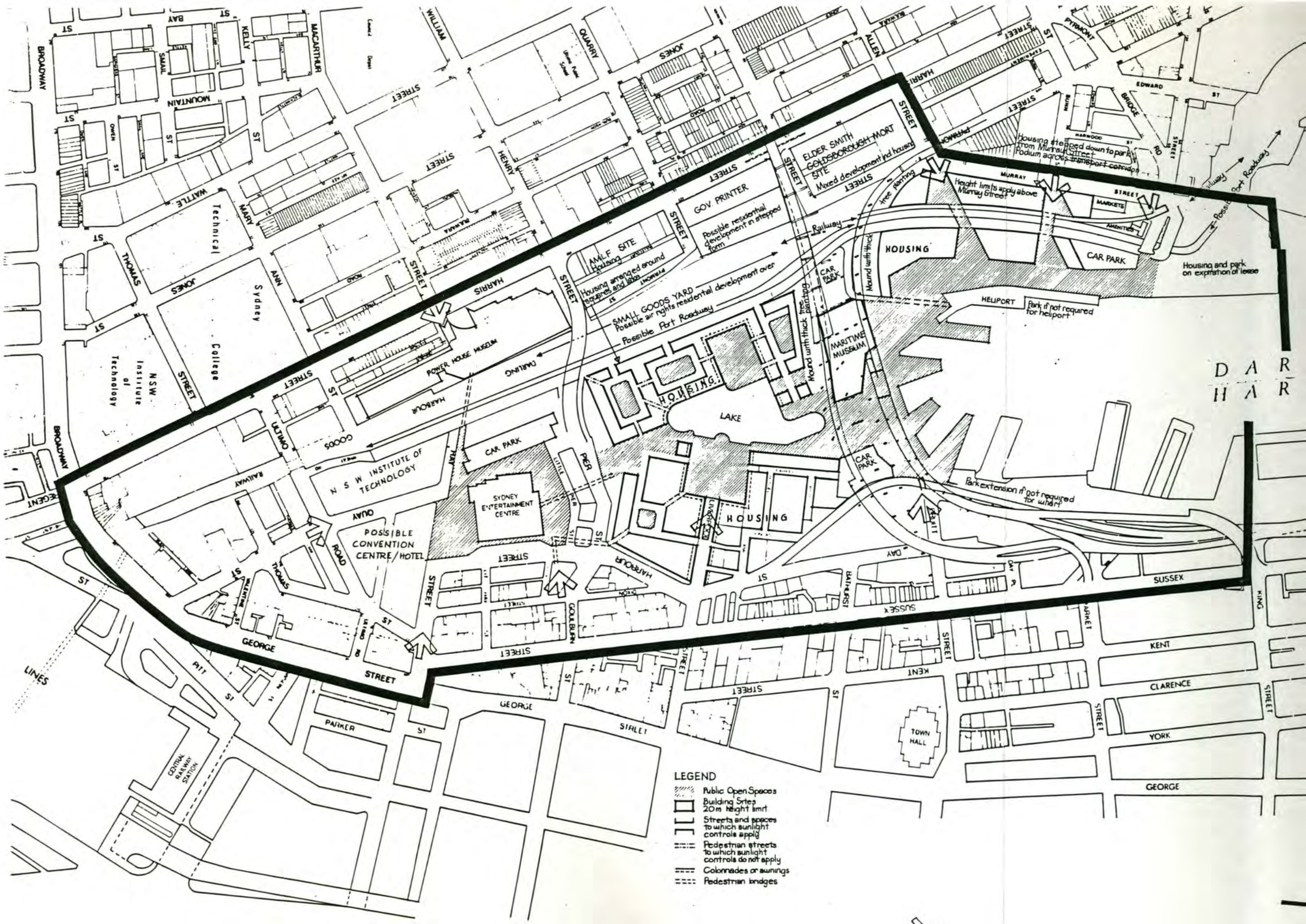
RLING HARBOUR HAYMARKET MANAGEMENT PLAN

STAGE 1 PROPOSALS

E 1:2000

MARCH 1982 MAP 5

MANAGEMENT PLAN 1

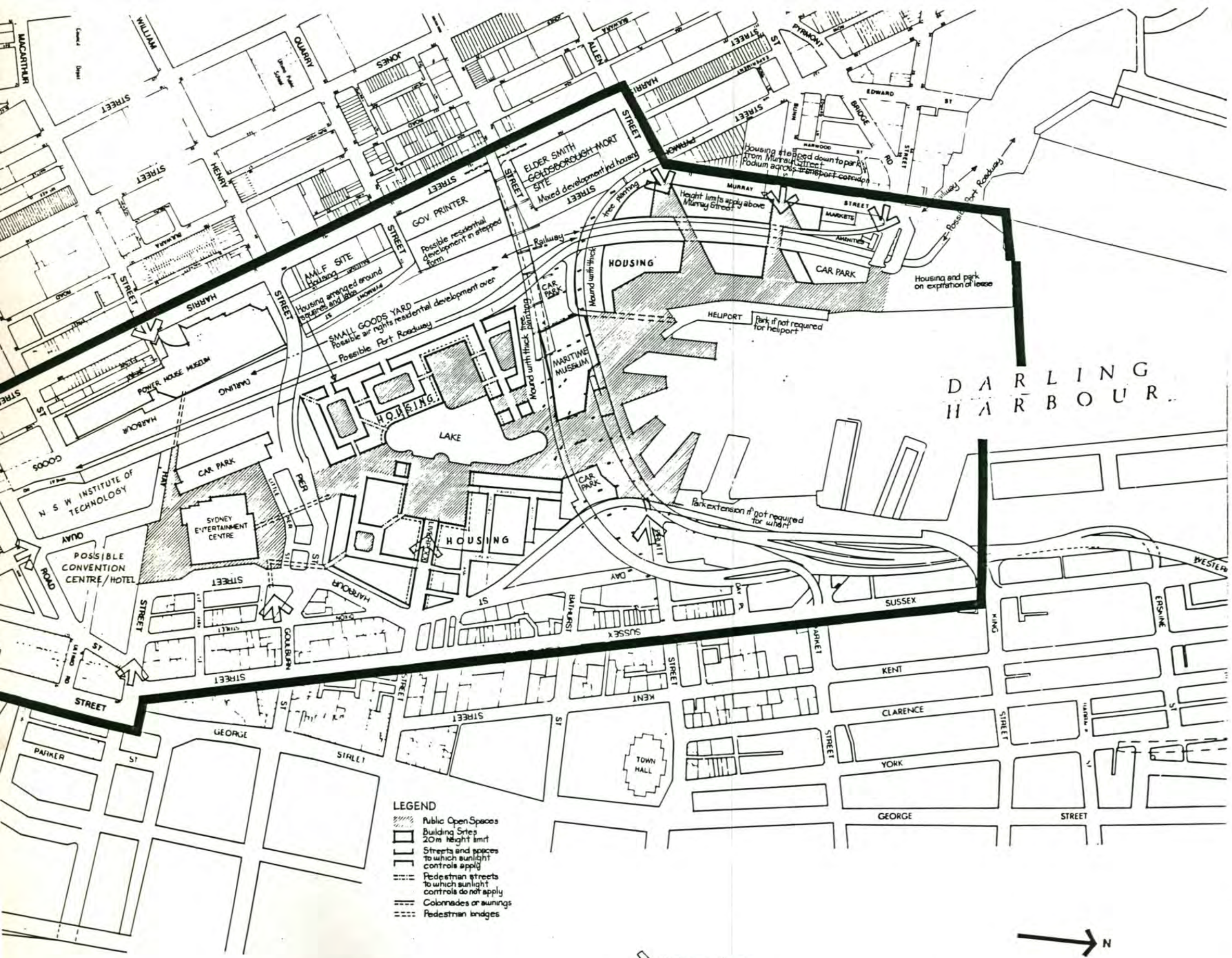


DARLING HARBOUR HAYMARKET MANAGEMENT PLAN

STAGE 2 PROPOSALS

SCALE 1:2000

MARCH



MANAGEMENT PLAN 2

NG HARBOUR HAYMARKET MANAGEMENT PLAN

STAGE 2 PROPOSALS

MARCH 1982

MAP 6

(iv) improve public access to the area;

(v) redevelop Markets 1 and 2 (presently Paddy's Market); and

(vi) impose a range of height and sunlight controls to reflect the topography of the valley (20 m. for the valley floor to 30 m. for surrounding areas).

The Plan points out that Stage 1 could proceed almost immediately.

Stage 2 is based on the fact that Darling Harbour Goodsyard is to be relocated in 5 to 6 years. It proposes: MAP 7

(i) substantial open space;

(ii) high density low rise residential development;

(iii) the extension of the Stage 1 pedestrian network; and

(iv) the establishment of a National Maritime Museum as a Bicentennial Project.

The Plan states that after provision of all the items listed above "an overall surplus to the Government would be possible". Preliminary figures contained in the Plan indicate that the overall surplus could be as much as $50,000,000.

Other relevant cost estimates included are:

(i)	Relocation of the Goodsyard	$20,000,000
(ii)	Basic improvements to provide limited public access to the waterfront (could be carried out immediately)	$ 142,000
(iii)	Cost of provision of open space lake, etc.	$16,000,000

As a result, the proposals embodied in Stage 2 allocate over 50% of the area of the Goodsyard for private development and private open space. The remainder becomes a public park which is likened to the Tivoli Gardens in Copenhagen and the Street Markets of Singapore. 50% of the park area is recommended for lease to concessions. The Plan maximises the redevelopment opportunities of the site at the expense of creating a regionally significant park.

The Plan "allows for the removal of Pyrmont Bridge by separate action by the Department of Main Roads". The loss of Pymont Bridge virtually eliminates any opportunity to create a satisfactory link to Market Street and the Central Business District. Bathurst Street will be the most northerly point of access on the eastern side and so the park will be identified more with the southern end of the City and its potential regional status will be further reduced.

Significantly, the Plan recommends that the Maritime Services Board review its plans for the southern end of Darling Harbour with a view to abandonning the proposed continuation of the long shore wharves.

There are no references to conservation in the Plan.

The most positive aspects of the Plan arise from the fact that it has invited and stimulated public comment and submissions. Several submissions have been presented to the Government including those from Government Departments and the City Council. At least two detailed submissions have been received from Planning Consultants[1]. Both of these submissions grasp the potential for regionally significant open space to a greater extent than the Management Plan.

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1. Submissions were received from Conybeare, Morrison and Partners, Architects and Planners, on behalf of the Subud Brethern (an international organisation interested in building a conference centre in Sydney), and Wellings, Smith and Byrnes, Architects and Planners, on behalf of the Yates Development Corporation.

2.5 The Sydney Area Transportation Study[1]

The Darling Harbour Goodsyard is the main freight terminal handling intrastate general rail freight. However, since the Second World War, the role of the Goodsyard has undergone significant change due to the following factors:

(i) Opening of goodsyard at Cooks River in 1947 and subsequent transfer of goods traffic to Alexandria and Cooks River yards from Darling Harbour Goodsyard.

(ii) Establishment at Yennora of centralised wool storage and marketing centre. This centre has resulted in the virtual elimination of wool traffic to Darling Harbour.

(iii) Relocation of City Markets from the inner city to Flemington in 1974 which resulted in the transfer from Darling Harbour of most inward fruit and vegetable traffic.

(iv) Establishment of wholesale warehouses in peripheral areas such as Blacktown suggests the need for a terminal in the outer areas.

(v) The removal of Tooheys breweries which led to a significant reduction in the cartage of beer from Darling Harbour.

The Sydney Area Transportation Study (SATS) of 1974 describes the Goodsyard as follows:

> "Freight handling techniques, facilities and equipment are largely outmoded and in need of rehabilitation. Limited space is available for expansion. Deficiencies in both road and rail access often lead to congestion inside and outside the yard. Carriers serving the area are subject to frustrating and costly delays."[2]

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1. Sydney Area Transportation Study, Summary Report Freight Transport Systems, Dr. R.S. Neilson, Study Director. Sydney: 4th May, 1974.
2. Ibid, p.I-14.

The SATS report goes on to state that all the land which is not required to serve the port areas, the marshalling areas and private sidings between Darling Harbour and Rozelle, should be sold at market value. It suggested that the land be used for commercial and residential purposes with a "certain" amount of open space. This "certain" amount of open space was based on the assumption that the nearest residential area is Glebe. When the study was undertaken, it had not been foreseen that Pyrmont and Ultimo, nor indeed the City centre itself would support a considerable residential population.

The introduction of industrial uses to the Goodsyard was not favoured because heavy road trucks could not be handled efficiently by present and projected transport access.

The report recommended that the monies raised by the sale of this land should be assigned direct to the State Rail Authority for its own use.

In conclusion the SATS report has this to say:

> "It is emphasized that the role of Darling Harbour is no longer of vital significance in future development of the railway system. The operations at Darling Harbour are inefficient - and costly - and are performed as marginal additions to the total system. The transfer of Darling Harbour activities to other rail terminals will increase efficiency and lower costs and allow the land at Darling Harbour to be sold for more effective use."(1)

Thus the removal of the Darling Harbour Goodsyard is not an issue. The SATS report is most emphatic in stating that it makes sound economic and operational sense to transfer its functions elsewhere.

The real planning issue is the determination of appropriate new uses, and how and when they can be implemented.

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1. Ibid, p.I-57.

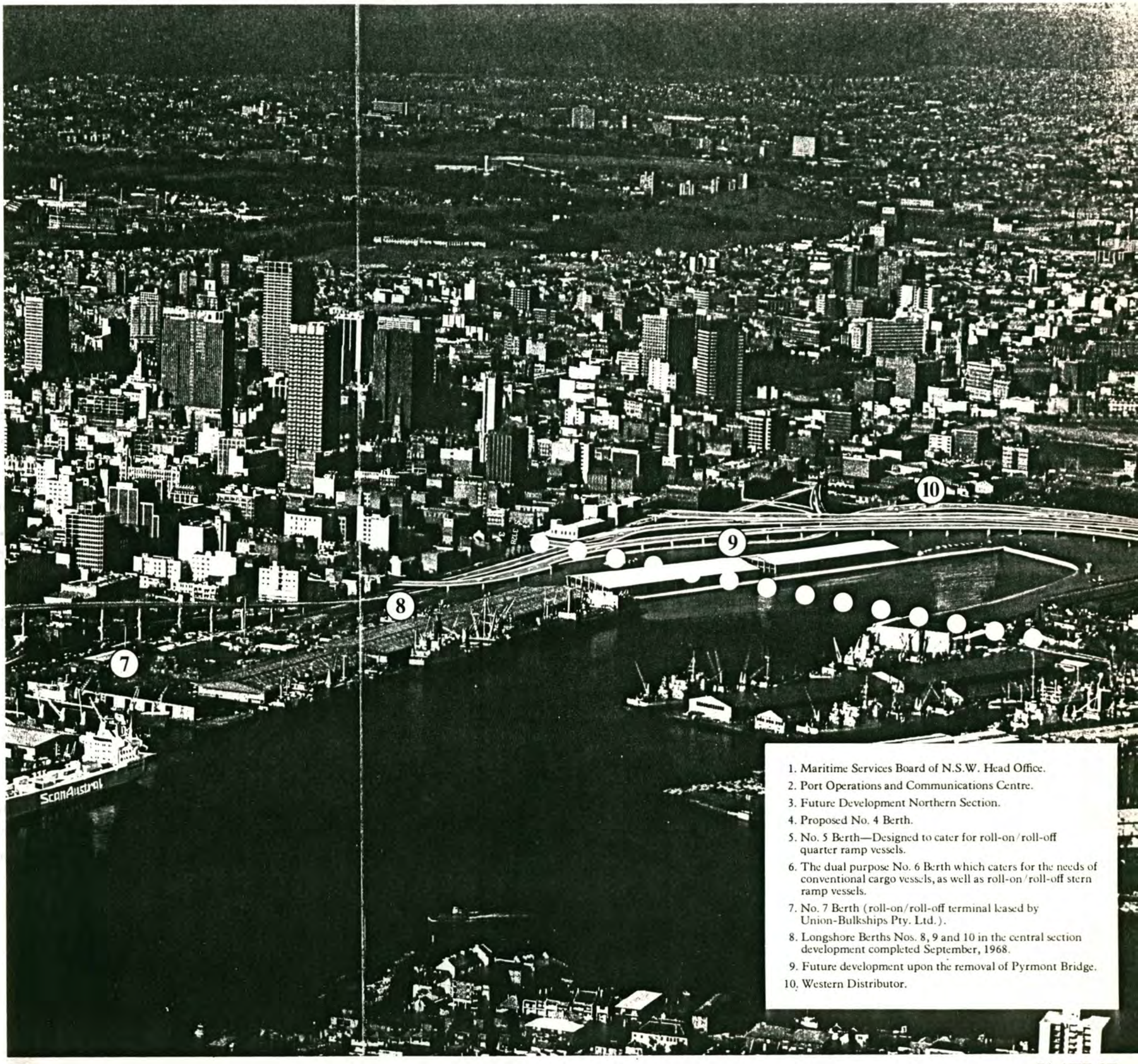
2.6 The Maritime Services Board Plan

Even though its importance had declined, interstate and intrastate shipping trade was still centred on Darling Harbour in the early 1950s. At that time the MSB intended to rebuild many of the old finger wharves and built one new long shore berth. A decline in the local Australian shipping trade prompted the MSB to change its plans and in the late 1950s the Darling Harbour Reconstruction Scheme was born. PLATE 27.

The first stage of the Scheme called for the construction of a four berth wharfage complex, consisting of a berth with special facilities for the handling of roll-on/roll-off cargo and three longshore general cargo berths.

The roll-on/roll-off terminal known as Berth No.7 was completed in 1964 and by September, 1968, Berth No.10 last of the three long store berths, had been completed. The size of the wharf sheds is quite enormous. The shed at Berth No.7 is 145 m long and 37 m wide. In addition, there is a large open storage area for manouvering vehicles and storing goods not requiring cover. The first stage was completed at a cost of $10,000,000. It occupies 10 hectares of land and provides 732 metres of wharfage space, together with 2.47 hectares of covered storage space in the wharf sheds provided.

Work on the second stage, involving demolition of finger wharfs, site clearing and construction of wharfage in the northern section of Darling Harbour, began during 1968. This section consists of three modern longshore berths and a roll-on/roll-off berth for the general trade. Berth No.6 which came into operation in September, 1972, was the first of the second stage berths to be completed. Berth No.5 was completed in the mid seventies and Berth No.6 was completed in 1977 at a cost of almost $6million. Part of the preparatory work involved the demolition of Dalgety & Co. Ltd. warehouse. This building, which was the centre of the company's Sydney wool selling activities, had been a landmark since the late 1880s.



1. Maritime Services Board of N.S.W. Head Office.
2. Port Operations and Communications Centre.
3. Future Development Northern Section.
4. Proposed No. 4 Berth.
5. No. 5 Berth—Designed to cater for roll-on/roll-off quarter ramp vessels.
6. The dual purpose No. 6 Berth which caters for the needs of conventional cargo vessels, as well as roll-on/roll-off stern ramp vessels.
7. No. 7 Berth (roll-on/roll-off terminal leased by Union-Bulkships Pty. Ltd.).
8. Longshore Berths Nos. 8, 9 and 10 in the central section development completed September, 1968.
9. Future development upon the removal of Pyrmont Bridge.
10. Western Distributor.

THE DARLING HARBOUR RECONSTRUCTION SCHEME

This photo montage shows the effects of the Darling Harbour Reconstruction Scheme at the Southern end of the Harbour. The position of Pyrmont Bridge is shown by the line of white dots. Approximately 50% of the existing area of water south of Pyrmont Bridge will be reclaimed for wharf sheds and cargo stacking area.

Source, MSB

PLATE NO.27

Berth No.3 Darling Harbour which handles general cargo was completed in 1981. The historic Moore's Wharf bond store, built in the 1830s and now known as Town's Bond, which was demolished to permit the construction of wharf sheds at Berth No.3 has been re-erected about 46 m north of its original site at a cost of $750,000 and it will house Customs and Delivery offices and an amenities block for waterside workers.(1)

The third stage of the Darling Harbour Reconstruction Scheme involves the demolition of Pyrmont Bridge and the extension of the longshore wharves to the southern end of Darling Harbour. This will involve the reclamation of over 50% of the present area of water south of the bridge and the construction of two additional cargo sheds.

In 1966 the MSB published an alternative plan for the southern end of Darling Harbour in the "Ten Year Port Development Plan"(2) which allowed for the retention of Pyrmont Bridge.

The MSB sees the continuing development of Port Jackson as taking precedence over the development of Botany Bay. The Board's determined attitude to the redevelopment of Port Jackson can be explained in part by what could be considered as loss of some areas traditionally used for port purposes:

(i) Resident action in Balmain against the invasion of narrow residential streets by massive container trucks, has been successful in cutting down port activity.

(ii) The Royal Australian Navy has taken over the obsolete commercial shipping berths on the East side of Woolloomooloo Bay.

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1. Maritime Services Board of New South Wales Annual Report 1979-80, p.12.
2. Citizens Committee for the Preservation of Pyrmont Bridge, Citizens Committee Summary Report, September 1982, Attachment "C".

(iii) Conservation pressure has resulted in some of the old finger wharves at Walsh Bay being re-used for non-port purposes. For example:

(a) a Fishermans' Wharf complex with restaurants, entertainment and retailing at Berth No.1;

(b) a museum for fire engines at Berth Nos.4 and 5, and

(c) a theatre for the Sydney Theatre Company at Berth Nos.6 and 7.

As a consequence, the Board has renewed its attempts to secure the southern end of Darling Harbour and the Goodsyard for port purposes.

In addition, it has purchased land sought by the City Council and the Lands Commission for housing development at Pyrmont Point. The aim is to quarry the entire Point down to wharf level and fill in the harbour between the existing finger wharves with the spoil in a similar fashion to Millers Point. The land obtained in this way will be used for general cargo handling, including containers. The Sydney Area Transportation Study report suggests that railway land adjacent to the existing wharves be included in the modernisation programme. This would improve efficiency and reduce the need to acquire land with good residential potential.

The Board is also maintaining the option of demolishing and infilling parts of Walsh Bay.

Statistics contained in the Annual Report of the MSB for 1979-80 show the annual tonnage of cargo handled in Port Jackson continues to rise, notwithstanding the fact that the number of ships calling at Port Jackson has decreased. This apparent anomaly arises from the facts that ships are getting larger and, due to the efforts of the MSB, cargo handling methods have become more efficient.

Thus it can be argued, that it is not necessary to expand the longshore wharves into the southern end of Darling Harbour to accommodate fewer ships, but it is necessary to continue to update the existing wharves in order to improve their efficiency.

One consequence of expanding port activities along the City side of Darling Harbour would be additional discomfort created by heavy lorries. This site has no rail access and this means that the city is subjected to sudden bursts of heavy vehicles each time a ship unloads. This causes conjestion and heavy wear and tear on the roads.

It has been suggested that a Port Railway be built to serve these wharves. This idea has a great deal of commonsense and it would ease the City's traffic problems. However, it is unlikely to be politically acceptable because it would mean a large investment by the State Rail Authority, a body already burdened with huge defecits and it would meet with strong opposition from trucking companies and owner drivers who have a vested interest in hauling freight over public roads.

3.0 PUBLIC PARTICIPATION

Up until December 1981, public participation in planning the future of Darling Harbour has been limited to a Public Meeting on the future of Pyrmont Bridge and a Workshop on Darling Harbour. A second public meeting was convened following the Premier's news release stating that Pyrmont Bridge would be demolished.

3.1 The First Public Meeting

This Meeting was convened especially to seek the conservation of Pyrmont Bridge. It was held in the Lower Town Hall on 8th June, 1980.

A newspaper account of the meeting recorded that:

> "A public meeting of 200 people voted overwhelmingly yesterday for the saving of Pyrmont Bridge in the face of warnings from engineers that it is worn out and decaying.
>
> "The Chief Bridge Engineer of the Department of Main Roads, Mr. Brian Pearson, said the timber piles had been driven 80 years ago. Severe settlement, he said, could occur 'without warning'.

"The meeting passed a motion by a Pyrmont resident backing the City Council's efforts to persuade the State Government to retain the 78 year old bridge.

"It called on the State Government to keep the bridge 'intact and maintained' to serve as a public thoroughfare for pedestrians and cyclists and for other public uses.

"The meeting was shown drawings of a scheme to build a broad pathway which would begin in Market Street just below Kent Street, pass over Sussex Street and the new expressway, then curve down to the bridge.

"This pathway, or platform, would carry cyclists and pedestrians and have space for restaurants and shops on it.

"The proposers of the scheme, the Civic Design Society of the University of NSW, see it fitting with landscaping of the bridge to make it, in effect, a harbour park."(1)

The meeting was chaired by Mr Justice Else-Mitchell. Notable personalities in support of the Bridge were - Professor Elias Duek-Cohen, John Morris, Director of the National Trust, Don Morrison, Bicycle Institute of NSW, Andrew Briger, AM, and Robert Tickner, Aldermen of the City Council.

Spokesman from the Maritime Services Board and the Department of Main Roads emphasised the need for additional berths and the difficulties of preserving an old bridge respectively.

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1. Sydney Morning Herald, 9th June, 1980.

3.2 The Lawrence Halprin, Darling Harbour Workshop[1]

In 1981 the combined Institutes of architects, planners and landscaped architects organised a workshop to be conducted by the emminent American urban designer, Lawrence Halprin. He was in NSW as one of the assessors of the Newcastle Harbour Foreshore competition.

Halprin's reputation had been established in Australia by numerous magazine articles and such books as the Research Selection Valuation Proceed (RSVP) Cycle. His primary concern is for people and his method of designing for people lays great emphasis on their feelings rather than their purely physical dimensions.

Darling Harbour Goodsyard was suggested as a suitable topic for the Halprin Workshop by the staff of the City Planning Department. This suggestion was adopted.

Approximately 125 people attended the workshop and although most of the participants were either planners, architects or landscape architects, there was sufficient diversity among the others to judge community attitudes.

The format of the workshop was interesting and unusual. To begin with each participant was invited to explore the area; to walk along the foreshore, look up at the Freeway from beneath, to soak in the atmosphere of the Goodsyard and, above all, to identify their feelings towards this environment. Talking to fellow participants was forbidden.

On returning to the canteen, the participants were divided into groups and told to express their impressions of the area. The presentation of these impressions, (which tended to identify spaces and dominant physical objects) varied significantly although a number of elements appeared common to each presentation.

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1. On the 14th November, 1981, Lawrence Halprin conducted the Darling Harbour Workshop in the canteen of the Government Printer's Building in Harris Street which overlooks, directly, the Darling Harbour Goodsyard.

In the next stage these impressions were developed into an expression of FEELINGS and it was here that the personality of Lawrence Halprin made its presence felt. By instilling a certain confidence into each person he succeeded in banishing many of their inhibitions. Normally conservative people reacted to the Darling Harbour situation in a refreshingly honest way.

Some group feelings were portrayed on precise maps, or with improvised models using canteen furniture and whatever came to hand. Abstract pictures and collages depicted the sky, the silence, the birds and the edge of the space. Others developed their feelings into the form of a chant and one senior engineer in the public service recited a poem about Darling Harbour which he had written all by himself.

For most people attending the workshop it was the first time they had ever been in the Goodsyard or near the water at the end of the Darling Harbour. They were surprised by what they found.

The following list outlines the most commonly felt impressions:

(i) the size of the space - most people had little idea of its full extent;

(ii) the inactivity and sense of dereliction; some people talked of death with skeletons and tombstones old and new;

(iii) hostility arising from the fact that most had been confronted by security guards;

(iv) the sense of enclosure, an amphitheatre created by the high buildings of the city centre and the woolstores of Pyrmont and, as a result, the sky was very much overhead as opposed to all around;

(v) the silence resulting from the inactivity and the fact that the expressway is so elevated. The absence of traffic noise was remarkable in comparison to the din in Harris Street nearby;

(vi) the fact that the physical presence of the Freeway was not nearly so intimidating as most people had anticipated. There are tantalising views of the water between the vast concrete pylons;

(vii) the lack of wind on an otherwise windy day;

(viii) Pyrmont Bridge was discovered by many for the first time. They were able to walk under Bridge and see for themselves the mighty timber trusses supporting the roadway, examine the timber supports and the details of the stone abutments. The weight of opinion seeking the conservation of the Bridge received a boost from those who suddenly realised its significance;

(ix) an urban wilderness with vast changes of scale and details. Big and quiet and hidden;

(x) a sense of history from the fact that one role had been played out and the new role had not yet begun; and

(xi) a sleeping giant which posed the question - should it be awakened now to a multitude of new uses and bright ideas, or left to rest, with its decaying goods sheds and crumbling wharves, as a monument to past activity.

Up until now the Workshop had concentrated on people getting to know the site and assessing their feelings towards it. In the final stage each group had to develop and present its ideas for the future within the space of one hour. Due to this time constraint, each group decided to stage a performance of ideas rather than prepare a static plan. These performances produced a variety of uninhibited and spontaneous behaviour which has never been seen at a Planning Workshop before.

In acting out the future, the groups were unanimous in demonstrating that Darling Harbour should become a place for people. Another commonly expressed concept was the amphitheatre with views through the expressway columns to the water with Pyrmont Bridge and goat Island beyond. The presence of the water was important. They had discovered a unique backwater framed against the giant container ships of the commercial port - a place where an old steam ferry and an even older square rigger are berthed. It was proposed by some that water should be reintroduced into the Goodsyard area.

Most people saw Pyrmont Bridge contributing to the sense of place. Not only could it function as a practical line of communication but it formed a line of demarkation between commerce and trade on the one hand and the place where people should have priority on the other.

Everyone saw the place as providing a great variety of activities which would have a wide appeal to the community. Some people went so far as to suggest Luna Park and Tivoli garden type uses. The sheer size of the place indicated that such variety is quite feasible. At the other end of the scale some people discovered that they had a sentimental attachment to the place. An attachment borne of a sense of nostalgia about the ships and trains and woolstores which contributed so much to the development of the wool industry. Australia, after all, rides on the sheep's back.

Darling Harbour played a prominent role in a proposal documented and tabled by one workshop participant. This proposal involved the construction of an historic tramway from Central Railway to Circular Quay.(1)

The Halprin Workshop provided a valuable insight into the way other people view the area. It revealed certain subtleties and perceptions which were unrecorded until the Workshop.

It also confirmed that conservation in Darling Harbour, incuding Pyrmont Bridge, had not been an issue to many people simply because they had never been there. They had never seen anything of Pyrmont Bridge except the road deck. The world of timber trusses with steel ties was entirely unknown to them. Once confronted with the real structure their indifference was replaced by appreciation. The perceived sense of history extended to Darling Harbour's industrial growth, including the development of the railways. The group's collective opinion endorsed the proposition that any comprehensive redevelopment scheme for Darling Harbour should have a component of conservation which would include the Pyrmont Bridge and relate to the industrial development.

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1. See Appendix G, "Tramway Proposal, 1981".

3.3 The Second Public Meeting

Following the Premier's announcement that Pyrmont Bridge would be demolished the City Council renewed its efforts to seek its retention. On 13th May, 1982, a Public Meeting was held in the Syd Fegan Centre in Ultimo. The Lord Mayor presided and most of the Aldermen were present. The Deputy City Planner presented a scheme for Darling Harbour which proposed that the Goodsyards be re-used as a Bicentennial Park with certain areas of land set aside for housing and other uses. The proposal included the conservation of Pyrmont Bridge as an integral part of the scheme. This scheme was well received.

Harry Trueman, A.M.I.E.(Aust.) addressed the meeting. He stated that Pyrmont Bridge ranked as Category A on the list of important engineering structures which had been prepared by the Institute of Engineers. He outlined some of the history of the Bridge and some of the technical problems encountered during its construction. This was the first time that a member of the engineering profession had publicly supported the conservation of Pyrmont Bridge.(1)

The Meeting concluded by passing the following resolution:

"(A) That this public meeting of residents of the Pyrmont/ Ultimo Area of the city of sydney, held at the Sid (Sic) Fegan Centre on the 13th May, 1982, fully endorses and supports the resolution of The Council of the City of Sydney of the 5th April, 1982, whereby it was decided that Council:-

(1) strongly reaffirms its policy that Pyrmont Bridge be retained and restored as a pedestrian and cyclist link from Pyrmont/Ultimo to the city and for a diverse range of revenue earning recreation, leisure, market and tourist uses;

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1. Trueman became a member of the "Citizens' Committee for the Preservation of Pyrmont Bridge" and was elected Chairman of the Working Party which prepared a detailed submission on Pyrmont Bridge.

(2) press the Premier of New South Wales to reconvene the proposed Ministerial/Lord Mayoral/Aldermanic Conference to further discuss the future of Pyrmont Bridge, as a matter of urgency;

(3) express concern at the narrow economic consideration on which the decision by the state Cabinet to demolish the Pyrmont Bridge appears to have been based;

(4) press for the release of the recent under-water investigation of the Pyrmont Bridge, as a matter of urgency, for public scrutiny and evaluation by Council;

(5) ascertain from the Minister for Main Roads, as a matter urgency, an estimate of the cost of demolishing Pyrmont Bridge;

(6) ascertain from the Minister for Planning and Environment whether the proposed demolition of the Bridge is in accord with the overall Darling Harbour Management Plan prepared by the Department of Environment and Planning.

(B) That consistant with the above resolution and in order to implement an ongoing public campaign to save Pyrmont Bridge the Lord Mayor and Chairman of the City Planning Committee be requested to convene a Citizens Committee to Save Pyrmont Bridge - such Committee to include representatives of the Council, local residents, Civic Design Society, National Trust, Sydney Division of Institute of Engineers and concerned citizens of Sydney."

4.0 CONSERVATION MAP 7

4.1 National Trust

The National Trust has given a Classified Listing to the Corn Exchange Building, Pyrmont Bridge and No. 200 Sussex Street within the Study Area. The Goodsyard and the industrial area at the western end of Liverpool Street have yet to be examined.

The National Trust classified the Pyrmont Bridge in February 1976 as a joint listing by its Historic Buildings Committee, (which recognised its historic and social significance in the development of the Sydney environs), by the Urban Conservation Committee (which considered the value of its visual and spatial relationship to the City and to the suburb of Pyrmont and the whole of the Darling Harbour area generally), and by the Industrial Archaeology Committee (which identified it as a fine example of a substantial timber bridge with a swing-opening span, and finely detailed balustrading in both stone and cast-iron).

The bridge is considered highly significant, and it is certainly one of the finest examples of its type in the world. The Glebe Island Bridge, while technologically similar, lacks both the fine detailing, the grand stone approaches, and the social and physical significance to its environment that is evident at Pyrmont. Historically, the bridge has always been a major factor in the usage and development of the surrounding areas, and its construction was considered a major advance in the technological competence of Australian engineering and building at that time.

The appraisal of Pyrmont Bridge states:

> "A 12-span steel, timber and stone bridge with a large swing-opening span to permit passage of shipping. Designed by Percy Allan, engineer for the Department of Public works for 46 years, designing in that time over 550 bridges, this bridge was built over three years for a cost of 112,500 pounds. The foundation stone was laid on 6th December, 1899, and the bridge was opened for traffic on 28th June, 1902. It replaced a timber-truss bridge built in 1858 by the Pyrmont Bridge Company, and operated by them until 1884, when its operation was taken over by the Government.


CONSERVATION
MAP 7
CORN EXCHANGE
Darling Harbour Forwarding Station
RAIL SHED
DARLING HARBOUR
200 SUSSEX STREET
RAILWAY
2-12 STEAM MILL STREET
49-57 STEAM MILL STREET
19 DUNCAN STREET
DARLING HARBOUR
GOODS YARD
ENTERTAINMENT CENTRE
Car Park
Markets 1 and 2 (Paddy's)
Ultimo Power Station
Trade Union Centre
Kings Parking Station
The N.S.W. Fresh Food & Ice Co Ltd
Anthony Hordern
N

"The bridge is 1,208 feet long, excluding the built-up approaches. Its width between the kerbs is 40 feet, with 7 foot wide footpaths on each side. The bridge is an 'Allan' timber truss especially designed by Percy Allan, with three spans of steel girder and buckle-plate construction on the city side, and a steel swing-opening span electrically driven and turning upon a massive concrete filled steel caisson founded upon the bedrock of the harbour. The timber-truss spans are 82 feet long consisting of six ironbark trusses (with iron tension members) placed at nine foot centres. the steel spans are 30 feet long, and the swing-span is 222 feet long and it weighs about 800 tons. The rest-piers are of sandstone blocks, presumably on piles which were encased with cement to the mudline of the harbour during the 1930s. The approaches support elaborate sandstone balustrading and decorative rounded pylons, and four large cast-iron lamp standards mark the extremities of each approach wall. A lattice steel balustrade over the edge of the bridge proper supports a hand-rail hollow-cast in iron.

"The control-tower is of weatherboard with a slate-tile roof and has the original brass controls, meters, and dials that were converted for this use from their original functioin as tramway controls. In 1948 the timber deck overlaid on steel girders was removed and replaced with a reinforced concrete deck.

"The bridge carries four lanes of traffic and two foot-paths, and a concrete staircase and a steel spiral staircase have recently been added to the eastern abutment."(1)

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1. National Trust of Australia (NSW), Listing Card: Pyrmont Bridge, Feb, 1976. See Appendix 7, for the full text of the listing card.

The appraisal of the Corn Exchange states:

> "Built in 1887 for the City Council to a design most likely prepared by the then City Architect, George McRae. The builder was A.M. Allan and the cost, 7770 pounds. It is a two-storey building with basement built with stuccoed load-bearing external walls, cast iron pillars and floor beams internally and slate covered timber roof. The ground floor former market area is roofed by a system of transverse and longitudinal arches supporting a series of shallow transverse vaults lined with corrugated steel. Considering the building's age and the obvious lack of attention given it over the years, it is still in remarkably good condition and capable of restoration.
>
> "An important former public services building and the earliest remaining market building in Sydney. It has considerable townscape value, presenting a fine pattern of pitched roofs and unusual and well considered curved facade externally, and a pleasant colonnaded space internally, framed by well designed columns and arches. A rare Sydney building from that period not to have been mutilated by the later ubiquitous cantilevered steel awning."(1)

4.2 Sydney City Council

The City Council included the Corn Exchange on its list of buildings to be preserved as part of Action Plan 13 Preservation.

The Ultimo, Pyrmont, Haymarket, draft Local Environment Plan, shows the Corn Exchange, Pyrmont Bridge, the old Darling Harbour Forwarding Station building and York Motors building on the conservation map.

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1. National Trust of Australia, NSW, Listing Card: Corn Exchange, See Appendix 7.

Pyrmont Bridge, the Corn Exchange and No. 200 Sussex Street (now the Spice Islands Restaurant) are included in the City of Sydney Strategic Plan 1980 as "Buildings and Structures of Architectural and Historic Significance"(1)

4.3 Institute of Engineers

The Engineering Heritage Committee of the Sydney Division of the Institute of Engineers has studied the bridge from the viewpoint of engineering heritage and has classified it Category A. This means that the bridge is regarded as being worthy of a high priority for preservation.

In support of its classification, the Engineering Heritage Committee states:

> "The bridge was designed by Percy Allan, who rates with Bradfield, Lennox, Whitton, McDonald and de Burgh as the great early bridge engineers of this State. Allan in his 46 years service to the State, designed over 550 bridges in N.S.W. He is specially remembered for his development of the timber truss system which bears his name. This was a modification of the American Howe truss that allowed the taking up of shrinkage during use, more efficient maintenance, and the more economical use of timber. The Howe truss represented the ultimate development of timber trusses overseas, and the Allan truss therefore probably represents the ultimate development of the timber truss throughout the world. The trusses at Pyrmont were amongst the finest of the Allan trusses and certainly Allan considered this bridge his greatest work. The calculations for the bridge were carried out by a young JJC Bradfield who gave a paper to the Sydney Engineering Society on the design of the retaining walls associated with the bridge. Dr Bradfield was later, of course, associated with the Sydney Harbour Bridge."(2)

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1. City Planning Department, 1980 City of Sydney Strategic Plan, p.174.
2. Information supplied by Harry Trueman, B.E., Dip. Cons. Stud. (York), AMIE (Aust.).

4.4 The Heritage Council

The Heritage Council of NSW placed an Interim Conservation Order on the Corn Exchange in 1978. It lapsed in 1980 and has not been renewed.

4.5 The Australian Heritage Commission

Pyrmont Bridge is included on the register of the National Estate[1]. It is described as follows:

> **"Pyrmont Bridge extension of Market Street, over Darling Harbour, Sydney**
> A 12-span iron, steel and timber bridge with timber pile supports and sandstone approaches with decorative balustrading and rounded pylons. It has a central swing span to provide access for shipping. One of the last of Sydney's early steel, cast iron, timber and sandstone bridges."

4.6 1980 Survey.

An historic building survey[2] was carried out in 1980, together with an examination of old maps in the Mitchell Library[3]. This survey revealed several buildings[4] which previously had not been identified as worthy of conservation. MAP 7, PLATE 28.

A complete list of buildings and structures having cultural significance is as follows:-

(i)	Pyrmont Bridge	PLATES 29, 30, 31.
(ii)	Corn Exchange	PLATES 32, 33, 34, 35.
(iii)	The Darling Harbour Forwarding Station	PLATE 36.

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1. The Register of the National Estate (Melbourne, Australian Heritage Commission/McMillan, 1982), p.2/105.
2. The survey was carried out by the author.
3. Refer to Plates numbered 2, 4 and 28.
4. Refer to Part 3, for a detailed description of these buildings.

BATHURST

GARDEN

JENNING'S PICKERING & Co
ANCHOR WHARF

J.H. SEAMERS
TIMBER YARD

ANCHOR ROLLED FLOUR MILLS

RUSSELLS WHARF

BARKER STREET

SEAMERS TIMBER YARD

BARBER LANE

STEAM MILL STREET

DUNCAN ST

PHILLIPS COAL YARD

HORN'S VINEGAR WORKS

VICARS TWEED FACTY

HARPER

SPICE

JANE

JAMES

THOMAS ST

DUNCAN STREET

GOVERNMENT STORES

MILLER & HARRISON SAW MILLS

WHARF

Stables

FRESH FOOD & ICE COMPANYS

JAMES STREET

NORTH STREET

SOUTH COAST & WEST CAMDEN CO OPERATIVE Co'y

SOUTH STREET

HARBOUR PLACE

MURPHY'S WHARF

LIVERPOOL

BURN'S WHARF

PORT JACKSON IRON WORKS

Stables

WHARF

KERSEY LANE

NEW SOUTH WALES FRESH FOOD AND ICE COMPANY

MORIARTY'S WHARF

RAILWAY LINES

SHEDS

SHEDS

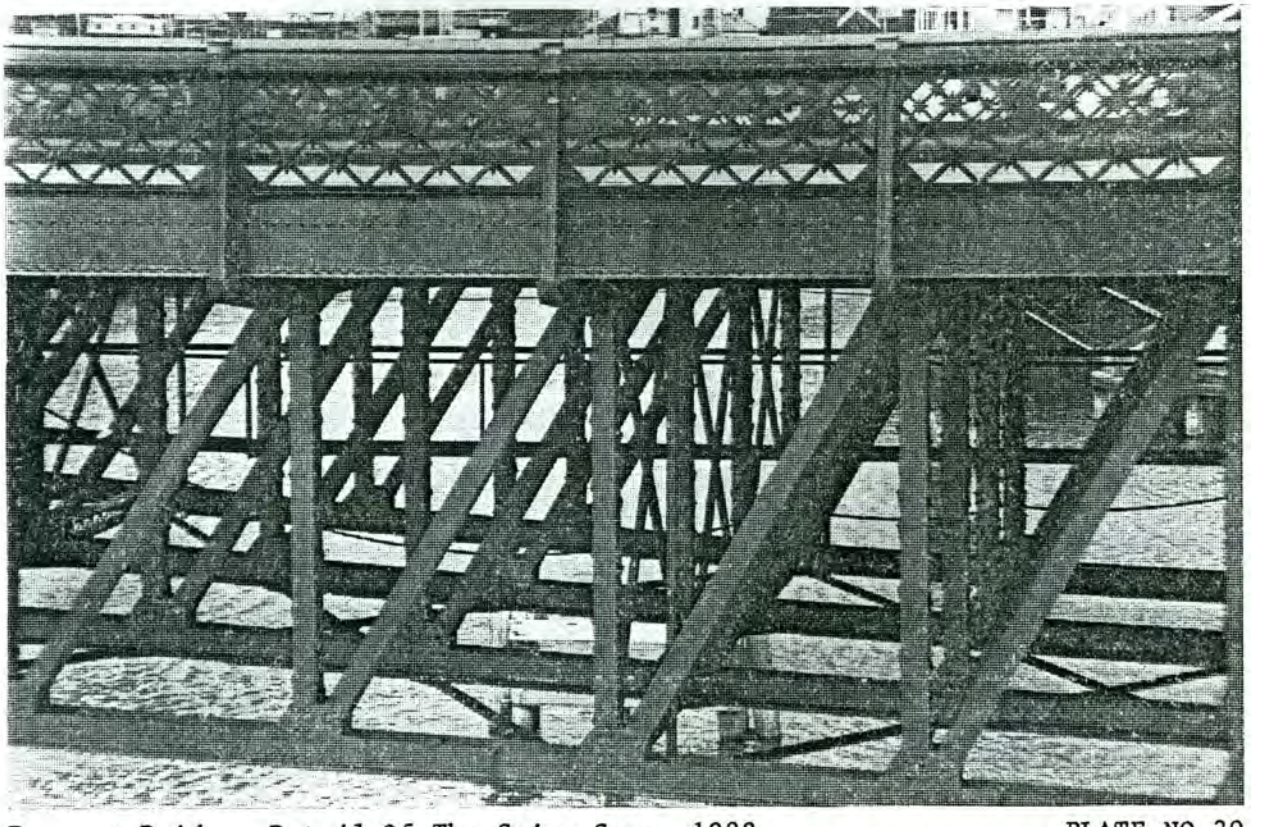
SYDNEY IN 1888

This map of the City of Sydney 1888 shows the industrial development of the southern end of Darling Harbour. Industries include smelting works, tweed mills, flour mills, spice mills, timber and coal yards and the Fresh Food and Ice Company. The Goodsyard is well established and Moriarty's Wharf, the east end of the Government Wharf, has been there since 1875. Some of the buildings shown on this map still exist.

Source, Mitchell Library PLATE NO.28

Pyrmont Bridge, The Swing Span, 1982. PLATE NO.29

Source, Sydney City Council Planning Department

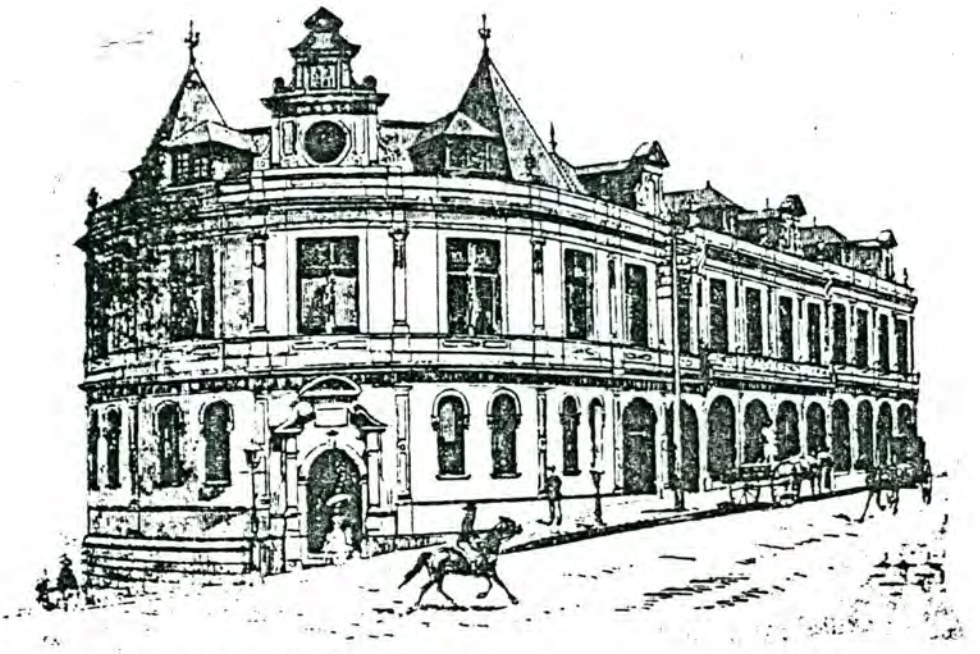


Pyrmont Bridge, Detail Of The Swing Span, 1982. PLATE NO.30

Source, Sydney City Council Planning Department

Pyrmont Bridge, Detail Of The Control House, 1982. PLATE NO.31

Source, Sydney City Council Planning Department



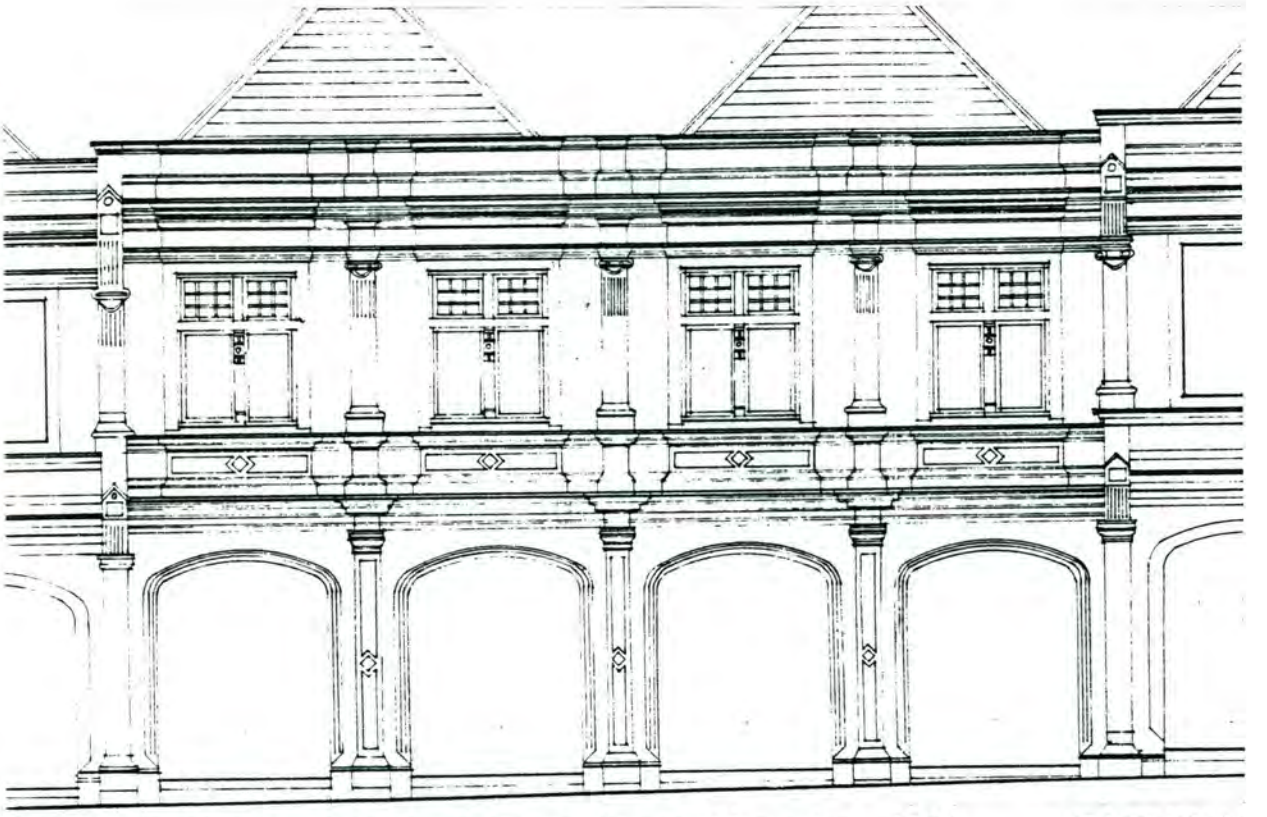
The Sussex-street Market, Sydney.

The Sussex Street Market, Sydney, 1887. PLATE NO.32

Source, Sue Britten and Phillip Rose.

The Corn Exchange, Circa 1925. PLATE NO.33

Source, Sue Britten and Phillip Rose.



The Corn Exchange, Detail of Sussex Street Elevation, 1976. PLATE NO.34

Source, Sue Britten and Phillip Rose.

The Corn Exchange, 1976. PLATE NO.35

Source, Sue Britten and Phillip Rose.

The Darling Harbour Forwarding Station, 1901.

PLATE NO.36

Source, DMR Archives

(iv) 49-57 Steam Mill Street and 1-17 Duncan Street (York Motors) PLATE 37.

(v) 1-9 Barker Lane and 4-12 Steam Mill Street PLATES 38, 39.

(vi) 19 Duncan Street PLATES 40, 41.

(vii) 200 Sussex Street PLATE 42.

5.0 FUTURE LAND USE PROPOSALS

After the Government announced proposals for 'Expo 88', and thereby stated publicly that the Goodsyard could be relocated, Government Departments, planning organisations and special interest groups have been staking their claim on the anticipated recycled Darling Harbour territory.

Following is a list of possible uses for the Darling Harbour study area which are considered legitimate for serious consideration:

(i) Railway Access

The SRA advocates the existing line from Redfern to Rozelle to remain and the retention of a minor marshalling area.

(ii) Wharfage

The MSB advocates facilies for commercial longshore wharves and cargo handling with new rail access. PLATE 23.

(iii) Heliport

This is considered to be an asset to the City. It must be licenced to handle regular commuter flights. The existing Heliport is not licenced because the approaches do not meet the necessary safety standards. The Department of Environment and Planning is investigating alternative locations.

47-57 Steam Mill Street And 1-17 Duncan Street, 1982. PLATE NO.37

Source, Author

The Industrial Group, 1982.

PLATE NO.38

Source, Author

4-12 Steam Mill Street, 1982.

PLATE NO.39

Source, Author

19 Duncan Street, 1982.

PLATE NO.40

Source, Author

19 Duncan Street, Rear Yard, 1982.

PLATE NO.41

Source, Author

200 Sussex Street, 1982. Formerly The Shellbourne Hotel. PLATE NO.42

Source. Author

(iv) Commercial Development

This use is considered suitable because of its income raising potential for the State Government and because of its central location and good access. Hotel, and Convention Centre interests are considering sites in the area because of the close proximity to the city and the Entertainment Centre.

(v) Industry

Traditionally, industry located in this area since 1815. At present a certain amount remains on the perimeter of the Goodsyard near Steam Mill Street.

(vi) Housing

The City Council in its Ultimo/Pyrmont/Haymarket Action Plan and the Department of Planning and Environment in the Draft Darling Harbour, Haymarket Management Plan have proposed public and private housing.(1)

(vii) Pedestrian and Cycle Route

Practical, as a means of travel and recreation, walking and cycling in a park. Pyrmont Bridge is an essential part of the pedestrian cycle network.

(viii) Port Roadway

Required to keep port traffic off city streets.

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1. See Appendix 8, "The Draft Darling Harbour, Haymarket Management Plan".

(ix) Public Open Space

The State Government & City Council agree on the need for more public open space in the Study area. This is the suggested site of Bicentennial Park which could provide better public access to the foreshore. This is a very desirable proposal, compatible with Council's policies and plans for increasing the population of the City and Pyrmont/ Ultimo.

(x) Maritime Museum

Darling Harbour is the ideal location for Sydney Maritime Museum. The Museum has requested the Bicentennial Authority to consider the relocation of the Museum from Birkenhead Point to Darling Harbour as a suitable Bicentennial project.(1)

(xi) Fishing Museum

Sydney City Council has received a submission from the Australian Fishing Museum asking to be included in Council's future plans for Darling Harbour.

(xii) Public Ferry Wharf

The eastern end of Pyrmont Bridge was identified as a suitable site for a mid City public ferry wharf in the City of Sydney Strategic Plan. The case in favour of the wharf has been strengthened by the proposed increase in population in Ultimo and Pyrmont and the re-use of the old wharves in Walsh Bay for a fisherman's wharf complex, a museum for fire engines and a theatre. New ferry routes have been suggested to connect Circular Quay, Dawes Point, Pyrmont Point, Pyrmont Bridge (city) and the southern end of Darling Harbour (for access to the Entertainment Centre and the Museum of Applied Arts and Sciences.)

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1. The Sydney Maritime Museum. Proposal to the Bicentenary Committee 14th August, 1981.

6.0 THE OPTIONS

At present there are two basic options for the future of Darling Harbour:

A. Relocate the Goodsyard and use the land made available predominantly for port purposes. This would involve the demolition of Pyrmont Bridge, the extension of the long-shore wharves and the construction of cargo sheds and stacking areas. It would mean the exclusion of most of the other land use proposals.

B. Relocate the functions of the Goodsyard elsewhere and use the land made available for commercial, entertainment and residential development, and a major open space to service the increasing city population. This would involve the conservation of Pyrmont Bridge and its integration into a multi purpose park.

6.1 Option A.

The MSB has based its case for expanding its activities into the southern end of Darling Harbour on the fact that cargo tonnage handled in Port Jackson continues to rise. There are serious arguments against this case and they are listed below:

(i) the development of Port Botany will relieve the pressure on Port Jackson;

(ii) the cargo handling capacity of Port Jackson is increasing as a result of improved efficiency and reconstruction; the number of ships calling at the Port is reducing;

(iii) the SATS report has stated that the Darling Harbour Goodsyard is unsuitable for industrial use on the basis of poor access for heavy vehicles. It follows then, that it must be unsuitable for additional port activity which is a great generator of heavy lorries; and

(iv) the SATS report was written at a time when it was still planned to go ahead with the Western, North Western and Southern Freeways. Now that the freeway programme has been abandoned, the situation would be much worse with heavy trucks using the existing congested city streets.

6.2 Option B.

This proposal can combine the requirements of most of the future land use proposals listed above , and do so in such a way as to create an urban environment of benefit to the widest cross-section of the community. Through recent T.V. and press publicity for the preservation of Pyrmont Bridge and the creation of a Bicentennial Park, and the opinions of such organisations as the Chamber of Commerce and private citizens, it is apparent that there is a great deal of interest in the area. For example:

(i) market retailers are keen to be involved in a Pyrmont Bridge Market;

(ii) a consortium of hotel and construction interests is developing in convention centre/hotel complex with grade separated pedestrian links to the Entertainment Centre. This proposal relies on the creation of the park to provide a suitable setting;

(iii) restauranteurs and night club proprietors are keen to capitalise on the upgraded Harbour setting. The idea of a revolving restaurant or night club located on the swing span of Pyrmont Bridge has caught their imaginations;

(iv) existing woolstore recycling projects in Ultimo are made much more attractive by the prospect of a park with foreshore access; and

(v) as a result of the Draft Darling Harbour, Haymarket Management Plan at least two private companies have prepared comprehensive submissions on the future use of the Darling Harbour Goodsyard. These submissions involve the retention of Pyrmont Bridge.

The introduction of a waterfront park with associated maritime uses would have very little effect on the present balance of harbour foreshore use. The land which would be lost to Port uses is under-utilised and largely derelict. The continued use of Berths Nos.34A and 34B, together with the wharf shed by the MSB, is quite compatible with the concept of a park provided these uses are kept low key as they are at present. Indeed the passage of tugs and the movement of lighters would contribute to the maritime character of the area.

In short, the people of the Sydney metropolitan area would gain about 400 m of accessible foreshore and the Maritime Services Board would suffer little loss to its port activities.

Option A is rejected on the grounds that it is not the most appropriate use for this piece of land adjacent to the city centre and Option B has been developed to provide a balance of development sites, public open space and conservation. This decision recognises the imbalance which exists in the distribution of open space in the city. The eastern side has the Botanic Gardens, the Domain and Hyde Park. The western side has Wentworth Park which is separated from the water by an industrial road, a railway viaduct, coal loader and a concrete batching plant. A park with water frontage located on the site of the Goodsyard will provide a valuable breathing space which will benefit resident, worker and tourist.

Pyrmont Bridge can become a vital part of the park by connecting its eastern and western sides. The retention of the bridge would form an effective line of demarkation between the activities of the Park on the one hand and the adjacent commercial port facilities on the other.

The conservation of Pyrmont Bridge is considered a fundamental requirement of the success of the proposed redevelopment of Darling Harbour.

PART III
PROPOSAL

1.0 THE PROPOSAL

Darling Harbour contains buildings and structures which have sufficient cultural significance to merit their conservation. However, it is apparent that any policy for conservation, based on the consideration of individual buildings and structures, would have little chance of success.

Such is the present extent of dereliction of the area that the general public, the State Government and private institutions are more in favour of wholesale clearing and redevelopment than conservation. The one exception is Pyrmont Bridge, which is highly regarded by public opinion and the City Council, more for its practical value rather than its historic merit.

Conservation has to be shown as something positive, something which will contribute to the environmental improvement and economic success of recycling the Goodsyard.

Thus, the adopted strategy involves the preparation of a viable and comprehensive Proposal for the Darling Harbour Goodsyard and surroundings, in which the conservation of Pyrmont Bridge and associated old buildings forms an integral part of the overall plan. Their conservation cannot be construed as an isolated extravagance which the City or State can ill afford because, without them, the success of the Proposal would be in jeopardy.

In this case, the Proposal provides a framework for conservation. It takes into account the need for development which achieves an acceptable balance between public open space and conservation on the one hand, and the need to finance the Proposal by the sale or lease of Government Land, on the other. It illustrates, in some detail, how the potential of the area can be realised.

Income to finance the Proposal could be realised by the following means:

(i) allocating approximately four hectares of land for sale or lease for housing and commercial development sites;

(ii) locating income-producing uses on and within structures and buildings to be preserved, e.g. Pyrmont Bridge becomes the host structure for a full scale Paddy's Market and two water based museums; and

(iii) permitting concessions within the Park which will provide restaurants, cafes, ethnic food and souvenir stalls, and stalls selling produce grown within the Park.

The Proposal will continue the transformation which began with the Entertainment Centre and includes the eventual construction of a Convention Centre, International Trade Centre and a major hotel.

The Proposal requires the State Government to:

(i) abandon the Maritime Services Board's plans to extend longshore wharves to the southern end of Darling Harbour;

(ii) bring forward the planned relocation of the remaining functions of the obsolete Darling Harbour Goodsyard; and

(iii) conserve Pyrmont Bridge and provide a new pedestrian link to Market Street.

The actions which are necessary to realise the Proposal are:

(i) relocate the functions of Darling Harbour Goodsyard;

(ii) rezone certain areas for housing and certain areas for open space;

(iii) create a multi-purpose regionally signficant Bicentennial Park;

(iv) build a pedestrian link from Pyrmont Bridge to Market Street spanning the Freeway, and linking with the Corn Exchange Building;

(v) build an open ended covered market on the eastern end of the Bridge deck;

(vi) locate Paddy's Market on the Bridge;

(vii) use the northern 50 m of the Murray Street train shed as a Hall for perishable goods in conjunction with Paddy's Market;

(viii) convert the Darling Harbour Forwarding Station to contain administration, restaurant, railway station, concessions and public toilets;

(ix) provide new premises for the Sydney Maritime Museum and the Australian Fishing Museum;

(x) provide a tourist transport system utilising railway lines already on site and old tramcars supplied by the Sydney Tramway Museum;

(xi) donate the Pyrmont Bridge swing span, and responsibility for its operation, to the Museum of Applied Arts and Sciences;

(xii) encourage the Museum of Applied Arts and Sciences to use "Pyrmont Bridge Station" in the former Darling Harbour Forwarding Station as one of its regular steam train stops;

(xiii) build an access ramp from the east end of Pyrmont Bridge to Wharf level thereby completing the circuit and linking the CBD with Bicentennial Park;

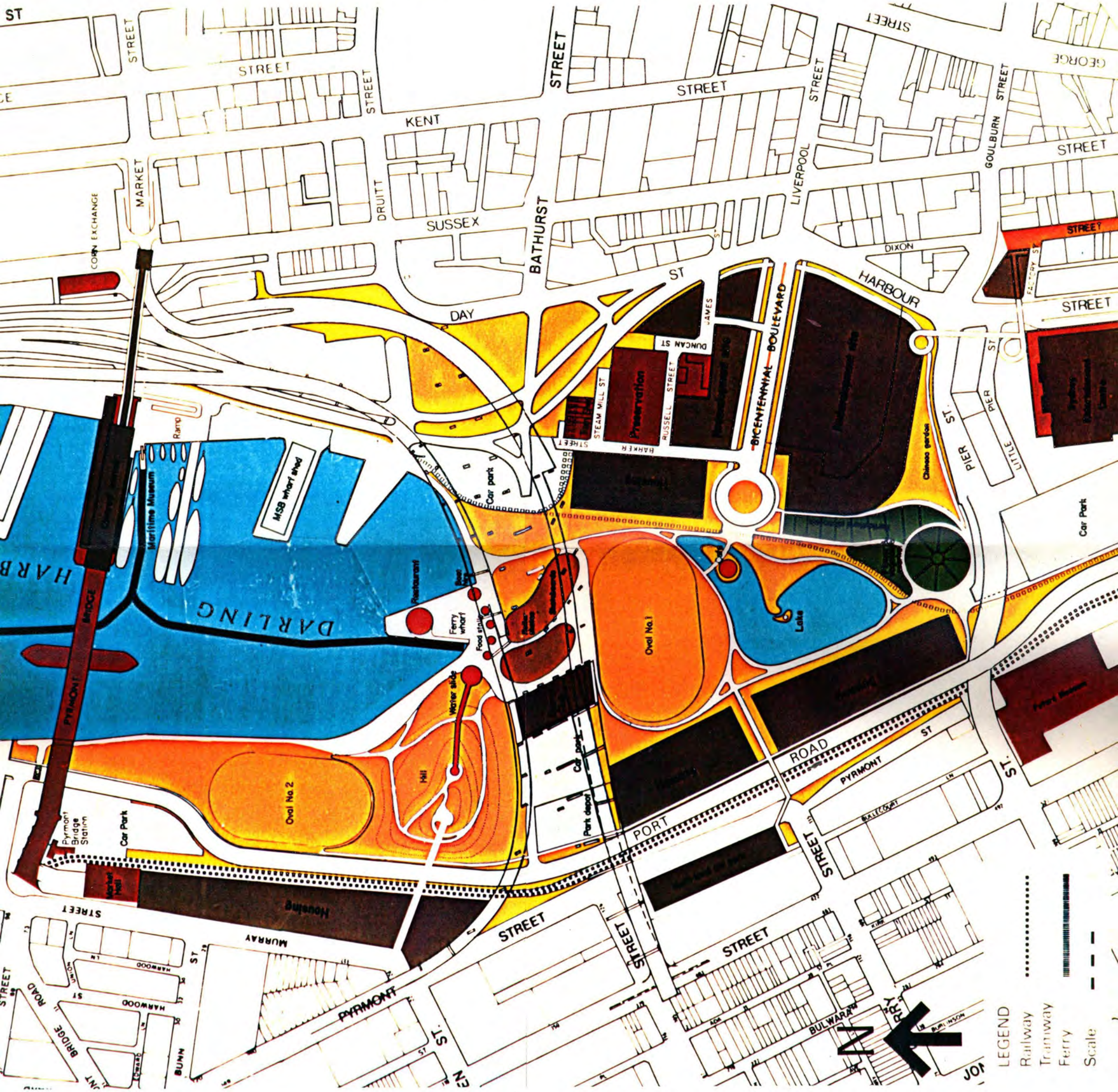
(xiv) introduce a Darling Harbour Ferry Service with a stop at Pyrmont Bridge, east end, and the southern end of the harbour; and

(xv) conserve the group of industrial buildings adjacent to Steam Mill Street as a tram shed and a reminder that Australian industry developed there.

The key feature of the proposal is Bicentennial Park. PLATE 43.

THE PROPOSAL

PLATE 43



2.0 BICENTENNIAL PARK

Bicentennial Park is planned as a regional open space with a large resident and working population close by. Activity is the main theme of the Park with facilities ranging from sports ovals to horticultural allotments.

The Park will draw on institutions and organisations located in and around it to participate in the activity theme. For example, the Sydney Maritime Museum could relocate and operate its fleet at the southern end of Darling Harbour; the Museum of Applied Arts and Sciences, to be located in the old Ultimo Power House, could run steam trains to Pyrmont Bridge and operate the swing span for passing historic ships. Both of these ideas are explored in detail.

As an educational facility, the Park could become one of the most important in the City and of particular value to the inner city schools.

The various activities described hereunder are by no means exhaustive but they establish the type of character most appropriate for this park. In addition, it must maintain sufficient flexibility in design to accommodate the changing needs of its users.

The Park will be part of a comprehensive Urban Forest within the City of Sydney. The main components of the Urban Forest[1] will be Moore Park, currently the subject of a study by the City Council,[2] the recently announced Sydney Park at St. Peters and the proposed Bicentennial Park in Darling Harbour.

Some of the factors influencing the design of the Park, such as access, circulation within the park and car parking are closely linked with Pyrmont Bridge. These matters are covered in some detail in the section dealing with Pyrmont Bridge.

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1. See Appendix 7, "Bicentennial Park as an Urban Forest".
2. Dr John French, CSIRO, an authority on Urban Forestry, is advising the Council of the City of Sydney on methods of implementation.

2.1 The Site

The 10 hectares of Bicentennial Park are virtually all on reclaimed land and a special study of existing soil and subgrade conditions will be required prior to the preparation of final design drawings and the selection of plant material.

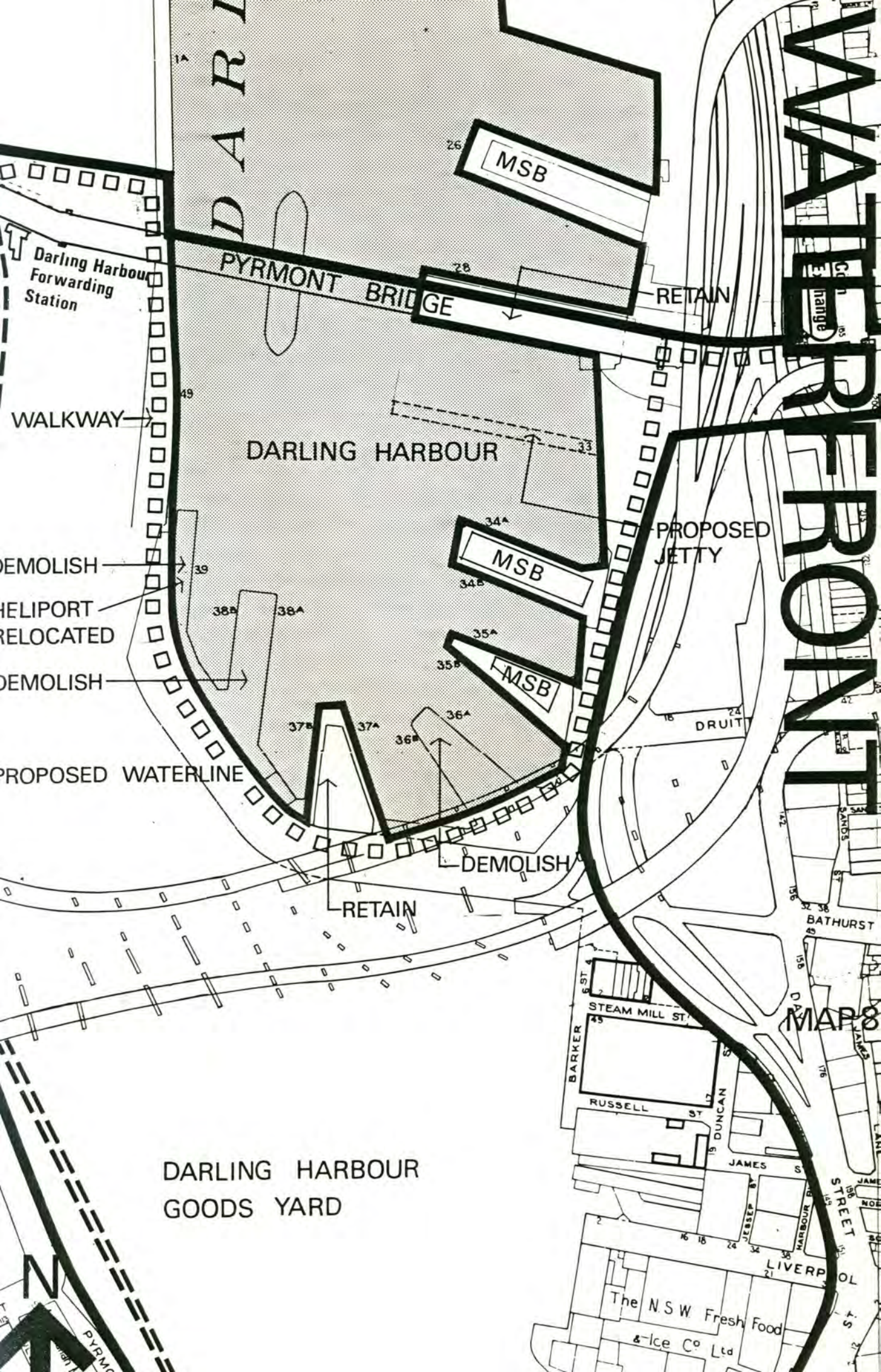
2.2 The North Western Freeway

The North Western Freeway passes over the central section of the Park. The Freeway is incomplete and actually creates more traffic problems than it solves in Ultimo. The City Council is pressing the State Government to complete that section of the Freeway which connects with Victoria Road. Later stages of construction will involve additional road decks spanning the Goodsyard. In order to accommodate this anticipated engineering work, buildings beneath the expressway have been kept to a minimum. Car parks, maintenance depots, public toilets and hard surface sports areas predominate. Views of the water seen through the concrete piers of the Freeway are to be preserved.

2.3 The Park Foreshore PLATE 43, MAP 8.

The Park will extend south along the western side of Darling Harbour from Pyrmont Bridge. The western side, will be characterised by grass and trees with barbeque areas, a childrens' playground, and a sports oval. The footpath will closely follow the sea wall and anglers will be able to cast a line from the path. The heliport is to be relocated, extraneous structures demolished and the area landscaped behind the sea wall. The outlook across the bay will be to the ships of the Maritime Museum and the MSB lighters.

At the southern tip of the Harbour it is proposed that the pool at the foot of the waterslides will be located near the footpath. Wharf No.37, where the path will pass under the Freeway will accommodate a restaurant with outdoor seating and the base for the rowing boat hire business. Rowing boats and paddle boats will be permitted south of Pyrmont Bridge. The Bicentennial Park public ferry terminal is to be located on the west side of Wharf No.37.


DARLING HARBOUR
WATERFRONT
MSB
PYRMONT BRIDGE
RETAIN
Darling Harbour Forwarding Station
WALKWAY
DARLING HARBOUR
PROPOSED JETTY
MSB
MSB
DEMOLISH
HELIPORT RELOCATED
DEMOLISH
PROPOSED WATERLINE
DEMOLISH
RETAIN
DRUITT
BATHURST
STEAM MILL ST
BARKER
RUSSELL ST
DUNCAN
JAMES
JESSEP
HARBOUR
LIVERPOOL
STREET
The N.S.W. Fresh Food & Ice Co Ltd
DARLING HARBOUR GOODS YARD
MAP 8
N

Adjacent to Wharf No.37 will be food stalls and an outdoor eating area where one can sample a variety of ethnic foods. A roller skating rink and a skate board ramp are to be located nearby, beneath the Freeway viaduct. (The hard areas under the viaduct can be adapted to suit whichever roller sport happens to be popular at the time).

From Wharf No.37 to Wharf No.34, there will be a new seawall with limited reclamation to provide adequate space for a footpath, vehicular access and a tramway. Wharf No.36, partly demolished during the construction of the Freeway, and Wharf No.38 will be removed.

In contrast to the green environment of the western shore of the Park, the eastern side will consist of concrete, asphalt and paving. Wharf No.35, with its covered cargo stacking area, and Wharf No.34, with its timber cargo shed, the last one south of Pyrmont Bridge, will remain in use as part of the MSB's port area. LASH lighters which can pass under the Bridge will continue to unload their cargo onto the existing hard standing. The MSB wharves will give the public the opportunity of seeing, albeit through a chain link fence, real commercial port activities in operation. This is an added attraction for the Park; part of its overall learning experience.

A pathway will be located between the MSB area and the Day Street section of the Freeway. It will be very much a working environment with cargo from the lighters, trucks and cars.

Beyond the cargo wharves there will be the outdoor display area of the Maritime Museum. A new jetty will be built parallel to Pyrmont Bridge enclosing a portion of water which will be entirely devoted to historic ships. The Maritime Museum and the Fishing Museum building is to be situated on Wharf No.28 which is located under the deck of Pyrmont Bridge and between the piers supporting it. The delapidated shed which occupies the wharf at present will be demolished to make way for the new Museum building.

Pyrmont Bridge ferry wharf is to be located at the eastern end of the Bridge. Disembarking passengers will arrive adjacent to the pathway to the park and a ramped pedestrian path to the eastern end of Pyrmont Bridge. From there the proposed new link will bridge the Freeway to Market Street in the City Centre. It is anticipated that it will be the most important pedestrian connection between the City and the waterfront, and consequently it will be heavily used.

A variety of different harbourside environments will be experienced by the visitor to the Park in the short distance of half a kilometre.

2.4 The Lake

The flat terrain of the Goodsyard will be varied by excavating a lake and using the spoil to create a hill. The lake is intended to be picturesque and useful. Its waters are intended to accommodate radio-controlled model power boats and yachts. Park visitors may stroll along the lakeside paths or enjoy afternoon tea on the terrace of an island cafe.

The lake will be available for demonstrations of boating safety, canoeing and other maritime pursuits. The shoreline of the lake will be designed to create park vistas. The island will be accessible by a foot bridge close to the Bicentennial Boulevard[1] entrance. It will be a fresh water lake, unaffected by tides.

2.5 The Hill

A hill rising to a height of 25 m, will lie on the northern side of the Freeway on the western side of the Harbour. Its most gentle slopes will face north east to Port Jackson. The hill will screen the Park from the proposed port road and to some extent the Freeway. From the top of the hill, an onlooker will have an extensive view over Pyrmont Bridge to the main harbour beyond and the city centre. The hill will incorporate picnic spots shielded from the Freeway.

A pedestrian walkway will bridge the existing railway (the Redfern to Rozelle line) and proposed port road and link Murray Street in Pyrmont to the hill. This avoids ramps or stairs and provides pedestrians with a gentle grade to park level.

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(1) Bicentennial Boulevard is the western end of Liverpool Street, widened and landscaped to create the main vehicular entrance to the Park.

A tree and plant nursery to service the Park is to be located at the base of the hill on the southern side. It will be adjacent to a maintenance depot and yard under the Freeway viaduct.

2.6 The Waterslide

A waterslide consisting of three fibreglass shutes will run down the north eastern slope of the hill. The top of the slides will be located below the summit (to avoid interfering with views) and the slide will terminate in a shallow pool at water level. Watersliders will pay for their entertainment and generate income for the Park.

2.7 The Circuits

The pathway system is designed to cater for the walker, the jogger and the cyclist. The outer circuit which caters for walkers and joggers will incorporate Pyrmont Bridge. The inner circuit will incorporate a cycle track Both circuits will provide a variety of different surroundings ranging from lakeside to hill top.

2.8 The Ovals

Two sports ovals are to be provided. One will be capable of accommodating a full sized football pitch. The other, due to constraints on the site, is to be slightly smaller. Both these ovals could handle the lunchtime touch football competitions which are popular in the Domain and Rushcutters Bay Park. Areas will be set aside for model aeroplanes and kites. All facilities will be available to the Museum of Applied Arts and Sciences for the outdoor display and demonstration of its exhibits.

2.9 Horticultural Display Allotments

A series of horticultural display allotments will be available for lease. The allotments will be used to grow, display and sell flowers, plants, trees, fruit and crops. An area within the allotments will be available as a small open air produce market where items which are grown in the Park will be offered for sale.

Companies which specialise in landscape will be able to display their products and their design ability in the heart of the city. Allotment sizes will include the traditional '1/4 acre' block and replicas of prize winning gardens can be reproduced in the park. National Parks and Wildlife, the State Forestry Commission and the City Council's Parks Department can publicise their areas of expertise in a landscaped setting.

This aspect of the Park is designed to become a major attraction of the city. As well as appealing to inner-city dwellers, bus loads of people from outer suburban areas could combine a day in the city with a visit to the park where they could view, in a comparatively small area, a wealth of garden produce.

2.10 Chinese Garden

Sydney's Chinese community has expressed interest in establishing a traditional Chinese Garden in Sydney. Undoubtedly the best place is as close as possible to Dixon Street within view of the people who will flock across a pedestrian bridge between Dixon Street and the Entertainment Centre. Such a site lies adjacent to Pier Street on the southern boundary of the Park.

New development on the site bounded by Liverpool, Harbour and Pier Streets will provide a pedestrian bridge from the Entertainment Centre across Pier Street, so it would be possible to walk from Dixon Street to the Chinese Garden without confronting a single vehicle.

The Chinese Garden would be constructed at the expense of the Chinese Community on land leased at a nominal rent.

2.11 The Sports Club

Beneath the Freeway viaduct, adjacent to a car park will stand the Sports Club building. The club would serve as the headquarters for many of the sporting activities which will occur in the Park. For example, the club will provide space for modellers who sail their model boats on the lake; cyclists and joggers will have lockers and showers available; football and other team game players would have access to changing rooms and a licensed bar.

Within the building the club would provide a gymnasium, sauna, swimming pool, change rooms, a games room, areas for table tennis and billiards, squash, storage, and a bar-restaurant and members bar. The manager would have a flat on the premises.

It is anticipated that the club would draw members from two sources:

(i) city workers who would use the facilities at lunchtime and early evening; and

(ii) local residents who would use the club during evenings and weekends.

The club would be run on a commercial basis and it would pay a full commercial rent for the site.

2.12 Transport

The distance from Hay Street on the southern side of the Entertainment Centre to Pyrmont Bridge is about 600 m as the crow flies. This distance indicates that some form of public transport is necessary to serve the combined Entertainment and Park complex.

A suitable public transport system could be privately run, scheduled to operate on demand and it would not interfere with the Urban Transit Authority or the State Rail authority.

The system should have the following characteristics:

(i) low cost;

(ii) convenience;

(iii) safety - slow moving vehicles;

(iv) a visually appealing design;

(v) an ability to contribute to the overall sense of fun and action; and

(vi) a capability of shifting large numbers of people.

Consideration of these requirements would eliminate the use of horse-drawn vehicles and open top charabancs. Tramcars, however, could meet the requirements and a tramway constructed from tracks salvaged from the Railyard has been incorporated in the Proposal.(1)

The Sydney Tramway Museum operates very successfully at Loftus, on the southern fringe of the Metropolitan Area. The curator, Mr. Bob Casey, considers that the Museum could provide the rolling stock and the expertise to set up a Tourist Tramway in the City. The Museum is constructing a new tramway at Loftus and it has several R type tramcars which have a seating capacity of 48 and the capability to provide a regular service. PLATE 44.

The tram operator would lease the tramway. The Museum would consider leasing restored tramcars to a commercial operator and training tramcar drivers.

The Museum would regard the City Tramway as a source of revenue which would permit the restoration of more cars and as an effective advertisement for their Loftus Headquarters.

2.13 Income

The Park will generate an income from many of the activities and concessions within it. Leasing or hiring out facilities will provide the main source.

The following list shows the potential income earners:

(i) sports club;
(ii) sports facilities - ovals, rinks etc.;
(iii) waterslides;
(iv) harbourside cafe/restaurant on Wharf No.37;
(v) rowing boat hire;
(vi) the island cafe;

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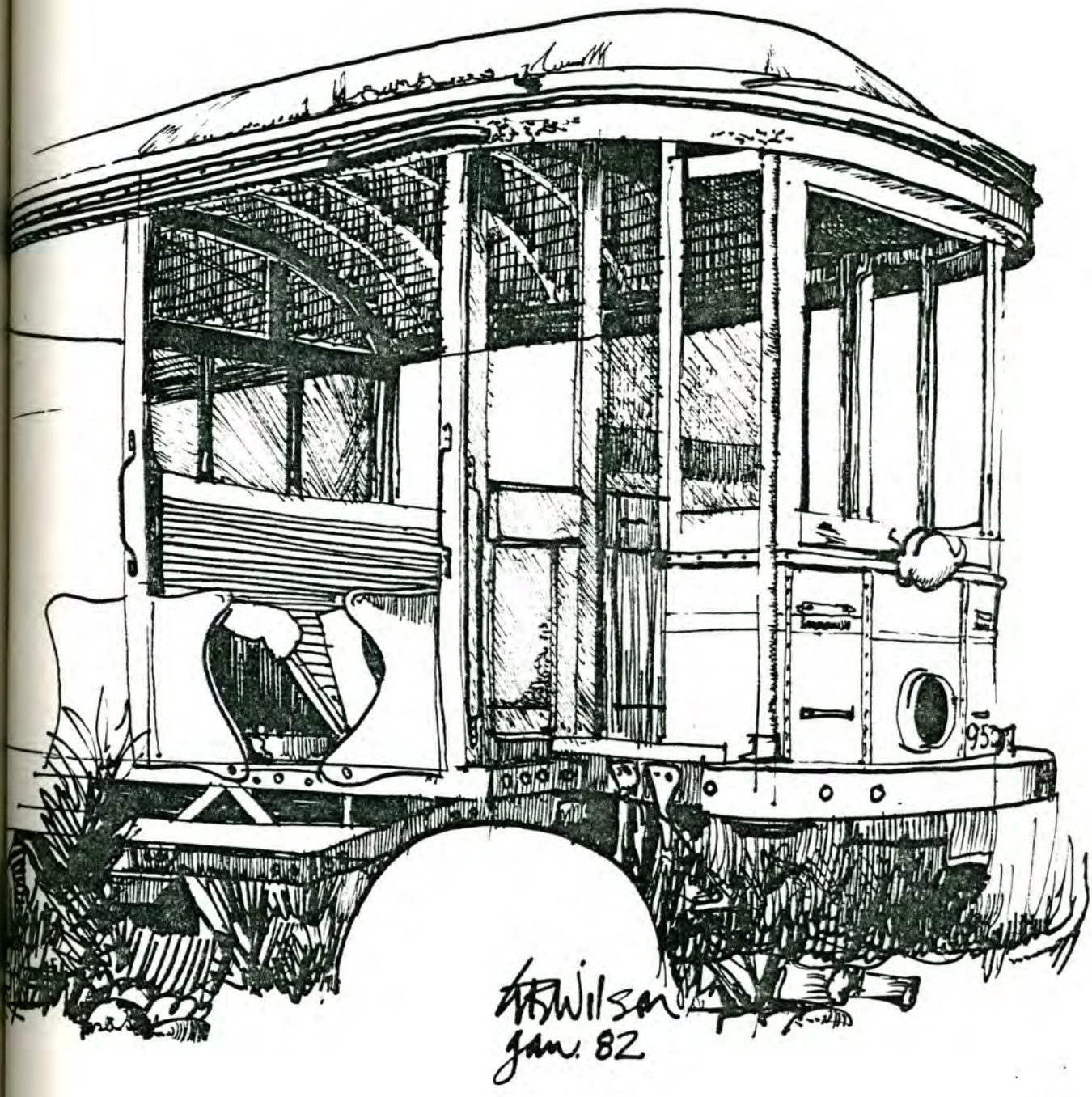
1. See Appendix 6, "Tramway Proposal", by Toby Prentice.



Old Tram Awaiting Restoration For The Darling Harbour Run. PLATE NO.44
Source, Author

(vii) car parking fees;
(viii) the horticultural display allotments;
(ix) tramway;
(x) cycle hire;
(xi) urban forest - timber harvesting;
(xii) chinese garden;
(xiii) tourist information kiosk;
(xiv) souvenior shop;
(xv) ice cream kiosk; and
(xiv) food stalls, incorporating ethnic foods, e.g. saté, as well as fish and chips and hamburgers.

Other non-income facilities such as public telephones, toilets, childrens' play areas, seats and barbeques would be provided.

3.0 BICENTENNIAL BOULEVARD

A park of the magnitude and importance of the one proposed needs an impressive main entrance. It is to the main entrance that tourist buses will go to discharge their passengers and it is at this entrance that visiting dignitaries will arrive.

The approach to the main entrance should be a prelude to the experience of entering the park itself. It should be a street which displays a different character from the City Centre. It is a transition - a boulevard with an air of spaciousness and trees.

The western end of Liverpool Street has the potential to create such a boulevard. From a bustling city centre street it becomes, in the space of two short blocks, an industrial road leading to the Goodsyard. The western end displays all the shabby decay of an area ready for redevelopent. With the Goodsyard's impending transformation to a park and the whole of the south side of Liverpool Street, west of Day Street for sale, as a redevelopment site[1], it is inevitable that the character of Liverpool Street will change. It is proposed to guide these changes to ensure that the maximum civic improvement is obtained.

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1. Known as the Peter's site, the option to purchase has been acquired by Yates Property Corporation Pty. Ltd. The corporation is investigating the site for a Convention Centre and International Hotel which requires the environmental improvements of a Bicentennial Park to succeed.

3.1 The Boulevard

It is proposed to widen Liverpool Street by 10 m on each side west of Day Street. However, developers will be permittd to include this area when calculating floor space ratios so there will be no loss of floor area in new development. The increase in width will provide enough space for generous grass verges, trees, footpaths and a central median strip. There will be three rows of trees, one on each side and one down the centre in the median. The Boulevard will be 38 m wide with new development on either side.

At the western end, the Boulevard will terminate in a turning circle 50 m in diameter with a central island capable of accommodating a substantial monument or sculpture. Development sets back 16 m on either side of the turning circle to create a space 70 m wide. The sequence of spaces approaching the park from George Street would be:

Liverpool Street	18 m commencial urban street
Boulevard	38 m trees, new development
The turning circle	70 m civic space, monument
The Bicentennial Park	400 m vistas, trees, lake.

People alighting from vehicles at the turning circle will have the lake before them and the choice of either walking through the Park or catching the tram to Pyrmont Bridge or the Entertainment Centre.

The re-designed western end of Liverpool Street should be called Bicentennial Boulevard.

4.0 PYRMONT BRIDGE PLATES 13, 14, 15 & 22.

Pyrmont Bridge is described in Part I, and a comprehensive description of the bridge and the method by which it was constructed is contained in Appendix 3.(1)

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1. See Appendix 3, "Allan on Pyrmont Bridge, Sydney, NSW".

4.1 Cultural Significance

In 1964, the International Council of Monuments and Sites (ICOMOS) prepared the "Venice Charter". This charter set down internationally acceptable guidelines for conservation.

Australian members of this organisation have adapted the Venice Charter to make it apply more specifically to conservation in Australia. This amended charter, which was prepared in 1979, is known as the "Burra Charter".

In the Burra Charter, cultural significance means aesthetic, historic, scientific or social value for past, present or future generations.

A recent submission to the National Estate on the subject of Pyrmont Bridge[1] included a precis of the cultural significance couched in the following terms:

(1) AESTHETIC - A visual link between Pyrmont and the City centre over Darling Harbour where the pattern of the wooden trusses is in marked contrast with the new concrete expressway. A fine example of the use of appropriate materials to carry out different tasks, e.g. timber spans, steel swing span, stone abutments. It is a unique element in the City fabric and represents a type of engineering design and skill which is irreplaceable.

(2) HISTORIC - Provided access to the store houses for wheat, wool and coal at Pyrmont and Darling Island, thereby facilitating trade. One of the largest swing span bridges in the British empire at time of construction. Designed and supervised by an Australian Engineer. At that time this was unusual and it was hailed as proof of the Colony's growing competence.

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1. Prepared by the author, 4 August, 1980.

(3) SCIENTIFIC - One of the first swing span bridges to be powered by high speed electric motors.

(4) SOCIAL - By virtue of its city centre location, it is visible to and accessible to millions of Australians. It contributed to the growth of industrial and residential areas immediately west of the city centre.

Until recently, the foreshadowed demolition of Pyrmont Bridge has given rise to remarkably little public concern and when one considers the situation of the bridge it is easy to understand why.

Aesthetically, many people percieve the bridge as just another strip of heavily trafficked bitumen roadway. The rusted handrails and the Control Tower serve as a reminder of the bridge's potential as much as a testament of its disrepair.

Side views of the bridge were available from so far away that few people realised that it was a timber bridge. It was commonly throught to be made of steel. The grey metallic paint and delapidated wharf sheds beneath the bridge deck only served to degrade the worth and significance of the structure in the community's eyes.

However, if the bridge is preserved as part of a Bicentennial Park Project, its aesthtic quality will achieve great prominance. The bridge could become the dividing line between the commercial port and the people-orientatd park. It will be seen at close range and used by people who will have the opportunity to see and appreciate its structure, materials and construction. The Halprin Workshop[1] demonstrated just how impressed people were with the Bridge once they stood at the waterfront beside it.

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1. The Halprin Workshop is described in detail in Part II.

The historic significance of the bridge, like its aesthetic significance, is not widely appreciated. One of the most important aspects of its historic significance pertains to the relationship of the Colony of NSW to the centre of the empire - London and the Westminister government. At the end of the 19th Century, NSW was still bound by colonial status and thus heavily reliant on Great Britain for professional and engineering expertise. It would be expected that a bridge of such complexity with one of the largest swing spans in the world powered by electricity would have been designed in Britain and the construction supervised by British engineers.

It came as a surprise, in London, when, after the holding of an international design competition and the awarding of prizes, the colonial Government of NSW eventually selected a design by an Australian engineer employed in its Department of Public Works.

Pyrmont Bridge symbolises the development and progresss of engineering expertise in the closing stage of a colonial Australian society. It represented not merely the develpment of natural resources but also the development of professional and technical skills. In London, it was equated with the acquisition of maturity.

Pyrmont Bridge was the first major swing span bridge in Australia and it ranks amongst the best in the world.

4.2 Future Uses for the Bridge

The Council of the City of Sydney, in 1980, indicated that it would be prepared to accept responsibility for the bridge, provided that it did not become an undue burden on the ratepayers. This emphasises the importance placed on the bridge by the Council as a link between the City and the rapidly expanding population of Ultimo and Pyrmont. It also meant that income producing uses would have to be found for the bridge in order to defray the cost of maintenance. (It was assumed that the estimated cost of demolition, one million dollars[1] would go towards the essential eastern link and on bringing the bridge up to a reasonable state of repair prior to the handover).

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1. Premier of New South Wales, Letter to the Town Clerk, City of Sydney, 17 May 1982.

Amongst suggestions for alternative uses are the following:

(i) restaurants;
(ii) fun fair;
(iii) fish market;
(iv) tourist centre and scenic cruise terminal;
(v) museum exhibit;
(vi) venue for fairs, advertising promotions, 'Hire a Bridge';
(vii) specialist market for coins, stamps, books, Australiana, etc. This market would be specially designed to fill the market gap in Sydney; and
(viii) Paddy's Market.

In considering these uses, it was obvious that an estabished enterprise, with a known and substantial cash income, would be preferred. Paddy's market falls into this category and is discussed in detail later.

The Museum of Applied Arts and Sciences would be an ideal custodian of the swing span and all its mechanical entrails. It could be regarded as the Museum's largest in situ working exhibit - an 815 tonnes (800 tons) swing span on a 6924 tonnes (6800 tons) base. Preliminary discussions with Dr Lindsey Sharp, Director of the Museum, indicate that the idea is attractive to the Museum though additional funds would be required to assume reponsibility for the swing span.

4.3 Pyrmont Bridge - Present Condition

Pyrmont Bridge had a life expectancy of about forty years when it was built. The Colonial Government reckoned that forty years after it was constructed there would be sufficient money available to built a new bridge or to replace the timber trusses with steel trusses.

Just after the Second World War, the Department of Main roads produced the plan of a system of expressways which rendered the Bridge redundant. Almost 40 years had passed before the implementation of that plan removed vehicular traffic from the bridge.

During its eighty year life, the bridge has remained remarkably unaltered. The only major alteration was the removal of the tallow wood block road surface in 1949 and its replacement with a concrete slab. Most of the structural problems evident at present, result from that concrete deck. The vibration resulting from increasingly heavy vehicles has caused breakdown of the construction joints between the slabs. It has proved virtually impossible to seal the joints, and water penetration over the past twenty five to thirty years has caused rot in the top chords of the trusses.

The question of removing the slab was considered by the City Engineer, John Lindsey, at the time when council first indicated some willingness to take over responsibility for maintaining the bridge. At an interview on the 10th November, 1980, John Lindsey rejected the idea of removing the concrete on the grounds of cost. He considered water-proofing the deck to be quite feasible, provided heavy trucks and their excessive vibration were removed. In addition, he recommended improving surface drainage by increasing the camber.

The bridge has lost its elegant carbon arc lamposts largely because they were spaced so far apart that the light they cast proved inadequate by present day standards. Drawings of the original lamp posts survive. PLATE 45.

The bridge has accumulated a variety of road signs, now redundant, as well as modern street lamps.

4.4 Inspection Report

In September, 1980, the Department of Main Roads carried out an inspection of the bridge[1]. The tone of the Report is pessimistic since the longstanding intention to demolish the structure has led to serious neglect of its maintenance.

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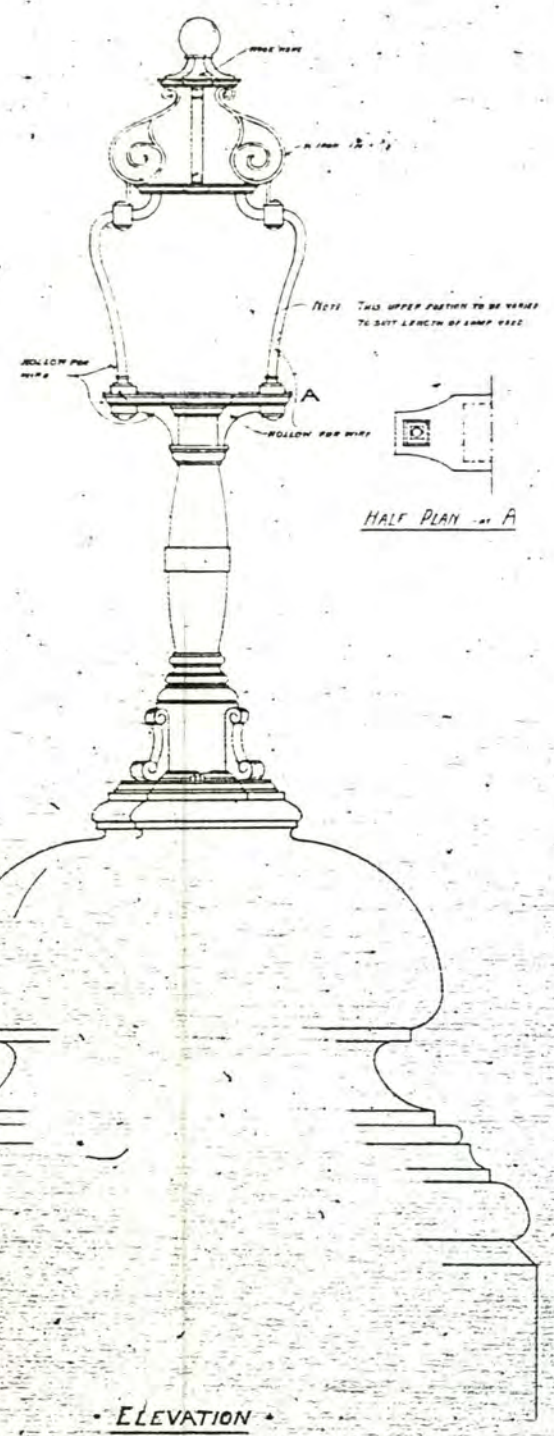
1. See Appendix 9, "Inspection Report, September, 1980" by the DMR.

DETAILS OF LAMP STANDARDS FOR PYRMONT BRIDGE



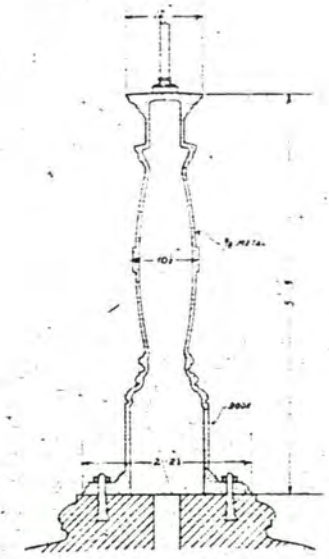
HALF PLAN at A

ELEVATION

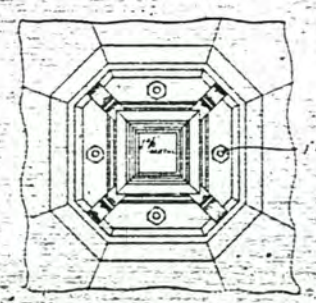
STANDARDS ON STONE PIERS

EIGHT REQUIRED

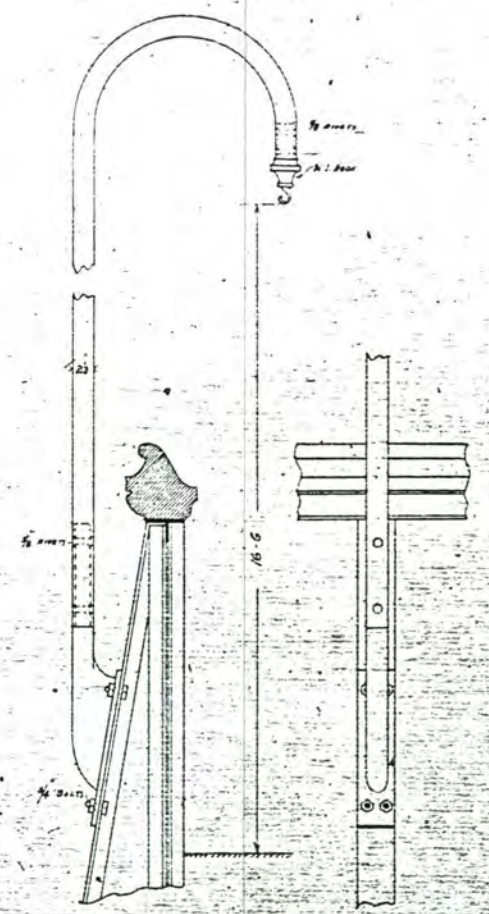
3/4 IN SCALE



SECTION



PLAN



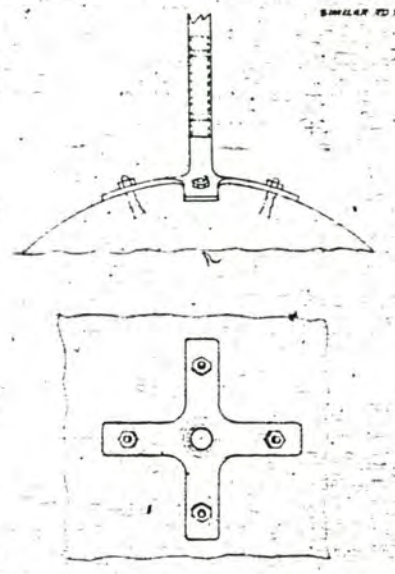
SIDE

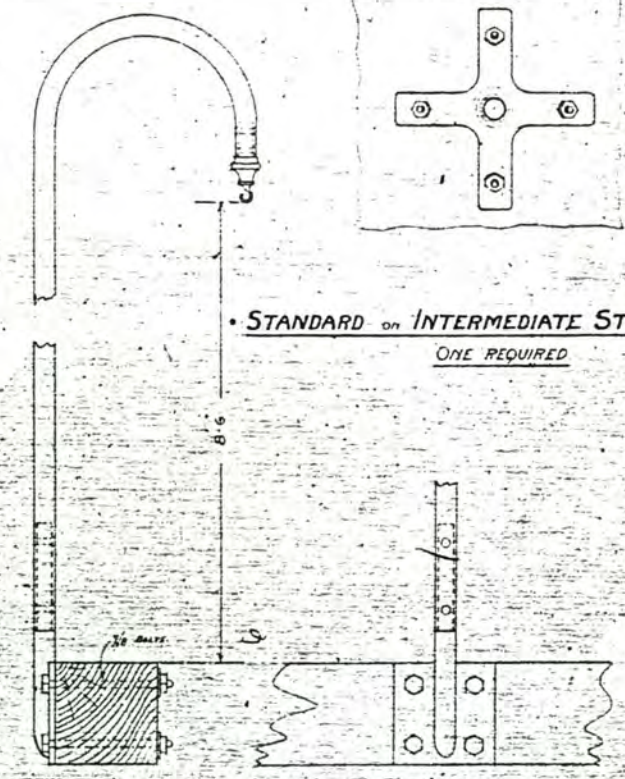
FRONT

STANDARDS ON BRIDGE PARAPET

TEN REQUIRED

1 IN SCALE





STANDARD ON INTERMEDIATE STONE PIER

ONE REQUIRED

SIDE

FRONT

STANDARDS ON PLATFORM

SIX REQUIRED

PLATE 45

Moreover, it had been prepared by the Department, which owned the bridge and had absolutely no use for it. A similar report, prepared by an organisation charged with a task of conserving the bridge would be couched in much more optimistic terms. In many respects, the bridge is in remarkably good condition, in full working order and still considered safe enough to carry the heaviest of road transport.

The report outlines the damage caused by the vibration created by heavy traffic. As previously mentioned this relates to the failure of the construction joints in the concrete deck resulting in water penetration and rot in the top chords of the trusses. The fractured lowed chord members are also attributable to heavy traffic and will not be a continuing problem.

4.5 Maintenance Costs[1]

From 1976 to 1980, maintenance expenditure on the bridge has been as follows:

1976/77	$238,000
1977/78	$276,000
1978/79	$160,000
1979/80	$234,000

or $227,000 per year (average).

The expenditure 1979/80 of $234,000 was distributed in the following manner:

(i)	routine maintenance	$ 8,460
(ii)	power and light	5,600
(iii)	operation of swing span	28,000
(iv)	inspection and maintenance of electrical installations	2,800

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1. DMR, Letters to the Town Clerk, City of Sydney, 11th July, 1980, and 16th December, 1980.

(v)	inspection and maintenance of mechanical installations	2,800
(vi)	inspection and maintenance of timber components	101,000
(vii)	repainting of truss members (outer timber trusses only)	53,200
(viii)	scaffolding upgrading	18,000
(ix)	repair of deck joints	14,000
		$234,000

The cost of operating and maintaining the swing span can be assessed from the above at about $30,000 per annum Item (c) and portions of Items (d) and (e).

The Department of Main Roads has stated that for some time, only essential - not preventative - maintenance has been undertaken on the bridge.

The following items have been deducted from the average annual expenditure on operation and maitenance of $227,000, on the basis that the bridge will no longer be used for heavy through traffic.

(i)	operation and maintenance of the swing span (Museum of Applied Arts and Sciences)	$ 30,000
(ii)	inspection and maintenance of timber components (reduced by 60% due to elimination of heavy traffic)	40,000
(iii)	repair of deck joints	14,000
		$ 84,000

Therefore, the future annual maintenance bill, based on 1978 prices, would be, approximately, $143,000.

The Department of Main Roads has prepared a summary of the inspection, testing and repair works carried out on the bridge from October, 1959 to November, 1979. The list runs to 71 items and covers everything from routine inspections to repairing collision damage inflicted by passing ships. The individual items on the list are not costed so it serves mainly to show that continuing maintenance and repair is required, on average 3.5 items per annum.

4.6 Underwater Inspection

Following considerable pressure from Council, including two deputations to Cabinet Ministers on the future of the bridge, it was agreed by the Deputy Premier, the Hon. L.J. Ferguson, that an underwater survey would be carried out. It had been argued for some time that the future of the bridge would be decided on the results of that survey.

The survey was carried out during November, 1981, and the Department of Main Roads prepared a report known as Status Report, Pyrmont Bridge,[1] which was forwarded to Cabinet.

In May, 1982, the Premier released details of this Report to Sydney City Council[2] and provided the following cost estimates:

(i)	Demolition of Pyrmont Bridge	$1 million
(ii)	Essential repairs	$1.52 million
(iii)	Annual Maintenance (incl. $30,000 for the swing span)	$230,000
(iv)	The link between Pyrmont Bridge and Market Street	$2-4 million (varies according to width)

No figures were produced to support the $2-4 million estimate for the link and no indication was given about the widths considered.

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1. See Appendix 10, "Status Report - Pyrmont Bridge", by the DMR.
2. The Premier of NSW, Letter to the Town Clerk, City of Sydney, dated 17th May, 1982.

The Status Report - Pyrmont Bridge, under the heading "Summary of Estimated Repair Costs", contained the following breakdown of the overall costs:

"(i)	Replacement of Piles	$450,000
(ii)	Repairs to Trusses, Corbels and Footway	425,000
(iii)	Repairs to Fender System	225,000
*(iv)	Repair and Painting of Swing Span and Handrailing	165,000
*(v)	Painting of forty-eight internal trusses	205,000
*(vi)	Replacement of electrical wiring and submarine cables	55,000
		$1,525,000

* Work previously deferred in anticipation of demolition of bridge.
The estimated time required to complete the above repair is three years."

The Report states also that the natural deterioration of the timbers will be exacerbated by the accumulation of excessive moisture which would normally be expelled by the movement of the structure induced by traffic. This is quite contradictory to previous statements which blamed the movement caused by traffic for the leaks in the bridge deck which in turn caused rotting of the timbers.

The existing fender system, which will cost $205,000 to repair, may not be necesary in its present robust form. If the southern end of Darling Harbour is closed to commercial shipping and only the Maritime Museum fleet and tugs with lighters pass through the fairway, a much less elaborate and less costly fender system will suffice.

4.7 Conservation

The Burra Charter states:

> "Conservation means all the processes of looking after a place so as to retain its cultural significance. It includes maintenance and may according to circumstance include preservation, reconstruction and adaption and will be commonly a combination of more than one of these".

In the case of Pyrmont Bridge maintenance, the continuous protective care of the bridge, has been neglected, and now extensive repair, or restoration, is necessary. Many of the items contained in the Status Report can be classified as restoration. However, because the bridge is sustantially as originally designed and the working drawings are still in existance, its physical restoration is not a complex issue.

The main changes which have taken place to the fabric of the bridge are:

(i) the removal of the original street lamps;
(ii) the removal of the timber roadway and its replacement with concrete, and
(iii) the addition of the iron staircase leading down from the control tower to the fender.

Originally there were 19 arc-lamps on the bridge and approaches and 6 marine type arc-lamps with red globes and guard cages on the protecting platform. In this Proposal, the bridge deck will have original style electric lamp standards reinstated though placed much closer together to provide an acceptable standard of illumination. Those parts of the bridge which are enclosed by the market structure will be lit by lamps which are incorporated into that structure.

The concrete bridge deck laid down in 1949 will remain. The joints will be sealed and a new bitumen surface incorporating an increased camber will be laid down. The footpath will be resurfaced, the kerbs replaced in hardwood and gutters with increased falls will have a greater number of outlets. Those parts of the bridge deck protected by the market structure will have a much flatter deck

topping. Falls will be adjusted to cope with hosing down rather than torrential downpours. There will be no kerb and gutter which will improve the flexibility of the area for market use.

It is considered that the adaptation of the bridge for market purposes is necessary for its conservation and that its cultural significance will not be impaired as a result. The iron staircase to the fender will remain.

4.8 Colour

The bridge, as constructed, had the timber members unpainted and the original colours of the painted steelwork and cast iron handrail are unknown. The DMR, as part of the routine maintenance programme, painted the entire bridge in a metallic grey colour. Therefore, repainting is now a necessary part of the restoration/maintenance programme.

The colour scheme selected attempt to show the real nature of the materials and indicate their function. The timber trusses are to be painted mid-brown while the steel members of the swing span, dark metallic grey. The handrail and infill panels are to be black and grey. The steel drum and visible parts of the swing mechanism will be painted red and black. The control tower will retain its familiar green and yellow and it will stand out in bright contrast to the grey and black around it.

Thus, the base colours are to be the browns of the sandstone and timber and the grey and black of the steel. These muted colours will be enlivened by splashes of red, yellow and green. The new structures on the bridge will pick up the established theme. Yellow will be the predominant bright colour. PLATE 46.

5.0 THE LINK

The future of Pyrmont Bridge as a pedestrian route, a cycle route, an access route to Bicentennial Park and a venue for Paddy's Market depends upon a link being built between the present eastern end of the bridge and Market Street, passing over the Freeway. Without this link, the bridge is useless, except as an historic monument.

Proposed Colour Scheme.

Source, Author

PLATE NO.46

The levels are favourable. The highest part of the Freeway is approximately 1.35 m below the deck of the bridge. Allowing headroom of 5 m above the Freeway and 1.2 m for the depth of the link structure, the pavement level of the link should be 4.85 m above the bridge deck. This means that the ramp down from the link would extend 45 m from the end of the bridge if the gradient is 1:12 and therefore adequate for use by disabled persons. PLATE 47.

The pavement on the link is only 1.5 m below the level of Kent Street. This means that the link can merge with the Market Street footpaths just below Kent Street, without the need for additional ramps or stairways.

From the bottom of the ramp on the bridge to the footpath on Market Street would be a distance of 230 m. From Centre Point, at the corner of Pitt and Market Streets, to the first market stall above Sussex Street would be a distance of 400 m.

There are development sites on either side of Market Street between Kent Street and Sussex Street where the link would connect with the street system. The opportunity has been taken to create a vital pedestrian system with new development providing pedestrians with an attractive terminus to their bridge walk. Shops, cafes, market stalls, sun and shade, car parks, a through-site connection leading towards Town Hall Station, trees, good access to the Queen Victoria Building (which will have subway access to Town Hall Station and the Myer department store), are all points which add to the attractiveness of the link.

The design of the link must satisfy the following criteria:

(i) the link must provide easy access between -
CBD, (Market Street)
Pyrmont Bridge (Pyrmont)
Bicentennial Park
The Corn Exchange;

(ii) the link must create a visual connection across the Freeway and bring the character and market atmosphere of the Bridge to the City;

(iii) the link must provide shelter, shade and a sense of security;

(iv) the link must be capable of providing continuous market retailing on market days; and

(v) the link must have a structural integrity of its own which will compliment Pyrmont Bridge. These two elements in the Darling Harbour environment must reinforce each other in order to emphasise the unique qualities of the bridge.

5.1 Description

The principal structural members of the link are to be 2.4 m deep steel trusses supported by circular reinforced concrete columns set between the road decks of the Freeway. The trusses will be laterally braced and triangular in section which gives them the quality of a space frame. There will be two of these trusses supporting each span with a light weight concrete deck 10 m wide set between them. The deck is to be supported by a steel space frame which will rest on the bottom chord of truss; the top chords will form the handrails to the link. The main spans will vary in length according to the location of the roadways below.

A permanent canopy 5 m wide will run along the centre of the link for its entire length. It is to be supported on steel columns at 5.5 m centres. The canopy will be barrel vaulted in corrugated iron with a longitudinal ventilator on top.

At the eastern end above Sussex Street the link will terminate in a pavilion supported by four columns set on four small traffic islands. The traffic islands were created as part of the traffic management measures necessitated by the North Western Freeway. As well as channeling traffic, these islands provide pedestrian refuge and sites for traffic lights. The pavilion marks the city end of the bridge market and it has been designed to form an effective and conspicuous terminus.

From Sussex Street, the link will divide and become part of the anticipated new developments on either side of Market Street.

At its western end, the covered centre portion of the link, will ramp down to the Bridge deck. The two open side portions will continue at the same level to become the mezzanine level of the covered market space on the Bridge.

The design of the link has been inspired by the bridge and its covered market space, but it is essentially modern in concept. The scale of the principal trusses reflects the scale of the great timber trusses of the bridge but the use of welded high tensile tubular steel permits the long spans required. The barrel roofed canopy will provide the shade and shelter.

The space between the link footway and the handrail (top chord) will be occupied by a metal grid which would echo the texture of the bridge balustrade. The space frame structure of the covered market space on the bridge will have an affiliation with the three dimensional qualities of the principal trusses.

The whole effect will be seen as a continuity of character. A character which begins in Pyrmont and extends across the Harbour to Sussex Street. The individual units which share this character differ in age, design and technology but together they form a coherent whole. PLATES 43, 44, 45, & 46.

5.2 Responsibility

The Department of Main Roads, by severing the connection between Pyrmont Bridge and the City has cut off direct pedestrian access from Pyrmont. The new footpath which runs along the city-bound Freeway link, adds to the walking distance considerably. Moreover, by virtue of its height, exposure, isolation, the number of steps, traffic lights and dangerous traffic crossings, it is considered to be completely inadequate. There is no provision for cyclists.

It is the DMR's responsibility to restore convenient access for pedestrians and cyclists and to bear the cost of doing so.

5.3 The Link and the Corn Exchange

The Corn Exchange[1] suffers from isolation by traffic, even though it is very close to the centre of town. The new roadworks related to the Freeway have done nothing to decrease this isolation.

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1. Sue Britten and Phillip Rose, The Corn Exchange and Sussex Street Precinct - Sydney - A Conservation and Restoration Proposal, unpublished undergraduate thesis, (Architecture Library, University of Sydney, 1976).

As a market building, constructed during the period of the first Pyrmont Bridge, it is closely related to the Proposal and it would benefit greatly by becoming part of it. The most obvious way of doing this is to physically connect it to the bridge complex. This can be done by constructing a staircase from the link to the Sussex Street level adjacent to the Corn Exchange. PLATE 48.

6.0 PADDY'S MARKET

6.1 History

When the Belmore Produce market opened on the block bounded by Castlereagh, Hay, Pitt and Campbell Streets in 1869, Paddy's Market was already flourishing on the vacant block across the road on what is now Belmore Park. It consisted of a series of crude shopping stalls which combined as a Saturday night bazaar. A second Belmore Market was built on this site in 1893.

Paddy's Market was relocated in the Haymarket in No.1 Market Building in 1909, and in 1938 it moved across the street to No.6 Produce Market, which was considered to be too clean and too modern to sustain the romantic memories of the dirty old bazaar.

In 1978, when the State Government decided to build the Entertainment Centre on the site of No.6 Produce Market, Paddy's moved back across the road to its old home in Market No.1.(1)

Paddy's Market has played a long and colourful part in the history of Sydney and preserving the market is just as important as preserving an historic building. Therefore, if the opportunity arises whereby Paddy's Market can continue to operate by moving to Pyrmont Bridge and at the same time Nos.1 and 2 Market Building can be redeveloped profitably, that opportunity should be grasped.

---

1. Sydney Farm Produce Market Authority, The Restless Markets of Sydney Town, (Brochure, undated).

Paddy's Market still occupies the Nos.1 and 2 Vegetable Market Buildings adjacent to the new Entertainment Centre at Haymarket. However, the NSW Government has decided that the site of these buildings is to be redeveloped to incorporate a hotel, convention centre and exhibition facilities, as well as the "principal features" of Paddy's Market.(1)

The main facade of the building fronting Hay Street is classified by the National Trust and would be incorported in any new works.

In addition, it is planned to provide a colonnaded walkway to the Entertainment Centre along Hay Street. This walkway would be set behind the Hay Street facade so that the arched doorways would form part of the colonnade. This attractive idea would reduce the area of Paddy's by about 860 m^2.

6.2 Relocation

The question of relocating Paddy's Market on Pyrmont Bridge has been discussed with Bill Stavert, the Paddy's Market Manager. The discussion did not cover the policy question - "Should the Market be relocated?" but canvassed the issue "If the Market has to be relocated could it be accommodated on Pyrmont Bridge?"

The answer to the latter question is "Yes, subject to certain conditions".

These conditions are:

(i) the link from the existing bridge deck to Market Street, City is essential;

(ii) covered space on the bridge would be highly desirable;

(iii) storage space would be required for the stalls;(2)

---

1. Premier of New South Wales, New Release, 14 April 1982.
2. Stall holders are responsible for providing their own stalls although the Market Authority provides a hiring service.

(iv) good accessibility from the western suburbs; and

(v) reasonable car parking.

Mr. Stavert recognised that Pyrmont Bridge offers an attractive alternative venue for the market - a conspicuous site and identity with the bridge and the Market sharing the same nostalgic sentimental appeal in the eyes of the people.

6.3 Size

Market size is not as important as market quality. Therefore, some reduction in size would not affect the viability of the Market. It has been calculated that the present Paddy's market occupies a gross ground floor area of approximately 14,250 m^2.

Market areas available at Pyrmont Bridge are as follows:

		m^2	m^2
Selling:			
(i)	Bridge Deck (incl. covered area)	6,070	
(ii)	Western Abutments (incl. area in front of train shed - 1000 m^2)	2,164	
(iii)	The Link	1,350	
(iv)	The Railway Shed Miller Street level	1,500	
(v)	Mezzanine within covered Market Space on bridge deck	585	11,669
Storage and Administration:			
(vi)	The Railway Shed Lower Level	1,500	
(vii)	The Darling Harbour Forwarding Station	150	1,650
	TOTAL:		13,319

Of this total, 5735 m^2 could be covered space including 1500 m^2 of storage space. A move to Pyrmont Bridge would involve a reduction in size of approximately 6.5%. But, if the loss of area, resulting from the colonnaded walkway to the Entertainment Centre being located in Market No.1, is taken into account, the reduction in size becomes 0.5%.

At present, Paddy's Market contains approximately 950 stalls and there is a five year waiting list. Taking the reduction in area into account, this means that Pyrmont Bridge and associated buildings could accommodate 888 stalls.

The average market stall area, including its share of circulation space, is 15 m^2, but this figure is misleading because most stall holders occupy more than one site. A typical stall unit would be about 3 m x 2 m, fronting an aisle 5 m in width.

6.4 Layout

The most efficient layout of market stalls on the bridge deck would involve two pedestrian walkways or aisles and three rows of stalls. There would be one row of stalls along each of the existing footpaths, 2.1 m wide, facing inwards. Down the centre of the roadway would be the third row of stalls, with frontage to the walkway on either side. The central stalls would be 4.2 m wide which would permit them to be subdivided into two back-to-back stalls. The two pedestrian walkways would each be 3.8 m wide. This is 200 mm wider than the standard city footpath and it would be unencumbered by lamp posts, traffic signs and parking meters. At regular intervals, there would be gaps in the lines of stalls to permit service vehicles to turn around; to permit pedestrians to change from one walkway to another; and to permit market shoppers to sit down and enjoy the view.

6.5 Income

Paddy's Market, Haymarket, has an annual turnover of approximately $650,000. Of that, approximately $500,000 could be termed profit which ends up as income for the Sydney Farm Produce Market Authority.

It was suggested, in a Sydney City Council Report[1], that the Sydney Farm Produce Market Authority would be capable of paying a substantial rent for Pyrmont Bridge - a rent which would service the cost of maintenance and the provision of special market facilities. The Market Authority responded by stating that all income was required to service the loans for the recently constructed Flemington markets and should not be regarded as a potential source of income for Pyrmont Bridge.

6.6 Servicing

In order to establish the number of vehicles required to service Paddy's market, a survey of service vehicles in Market Building No.1 was undertaken on 15th November, 1980.

No. of Service Vehicles	Time (a.m.)
17	6.00
32	6.30
50	7.00
68	7.30

By 7.30 a.m. Market Building No.1 was absolutely filled with stalls and vehicles. Stall holders were putting up the final touches and the general public was beginning to flow into the hall. Within the next half an hour, every service vehicle which did not form part of a stall, left. At peak service time there is one service vehicle for every 140 m^2 of market. Transferring that figure to that part of Pyrmont Bridge deck which would be serviced by vehicles, means that 43 service vehicles would be parked upon the bridge at peak unloading time.

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1. Sydney City Council, City Planners Report, Pyrmont Bridge, 9th September, 1981.

There is space enough on the bridge deck to accommodate these vehicles and to provide turning areas, but the regulation of vehicles moving onto and off the bridge was seen to be difficult and complicated. This concern was expressed to Mr. Stavert. However, he did not see it as a major difficulty and advised against spending long hours evolving a complex traffic management scheme. The stall holders, he said, would ignore it anyway and devise a system of their own. He remarked on their ingenuity and considered them quite capable of solving this problem notwithstanding the restriction of the Bridge.

Direct vehicular access to the link is not possible, but advantage can be taken of the redevelopment site between Kent and Sussex Streets on the northern side of Market Street, because any redevelopment proposal will contain loading docks and goods lifts.

It is proposed that the loading docks will be made available to stall holders on the link and that one goods lift will open onto the link where it abuts the new development. The Market operates on Thursday evenings and weekends. Servicing the Market will not interfere with the servicing needs of the building.

The architect who is preparing preliminary designs for the site has been advised of this proposal. He was most enthusiastic because the link and Paddy's market would bring people and prominence to this site. The provision of loading facilities was seen to be a surmountable design problem. The Sydney City Council has a controlling interest in this site because it owns a narrow strip of land along the Market Street frontage. This land could be sold or leased to the developer subject to conditions relating to the link and service access. Electrically powered hand carts would transfer goods from the goods lift to the point of sale on the deck.

Servicing the western abutments and the Market Shed (former rail shed) would take place prior to official market opening time. Vehicles would be allowed unlimited access until then.

The commercial vehicles servicing the markets tend to be fairly small. A survey at Paddy's Market revealed that the most popular vehicles were forward control vans like the V.W. Kombi and Toyota Hi Ace, with a maximum length of 5 m. Next came the traditional station wagon, like Holden and Ford with a maximum length just over 5 m. Of the larger vehicles, the most popular was a van body on a long wheelbase Ford F100 chassis with an overall length of approx

imately 6 m. Very few vehicles were bigger than this. The goods sold at the market are relatively light in weight and the vehicles reflected this. Very few vehicles could carry a pay load in excess of two tonnes.

6.7 Car Parking

Present parking facilities for the existing Paddy's Market are inadequate but this situation does not deter intending shoppers as increasing popularity of the market shows. The limiting factor on the number of people who visit the Market is determined by the circulation space between the stalls and not the number of car parking spaces.

In 1982, the car park for the Entertainment Centre opened as a public parking station. The Entertainment Centre is not scheduled for complete until 1983. This means that Paddy's Market enjoys, albeit temporarily, better parking facilities than it has ever done in the past. 1,000 spaces are available in the parking station. The following nearby streets contain approximately 560 spaces: Little Pier Street, Harbour Street, Hay Street, Quay Street, Ultimo Road, Thomas Street and Thomas Lane. This means that approximately 1,560 spaces are available in the immediate vicinity of the Markets.

Prior to the opening of the Entertainment Centre, landscaping, the creation of pedestrian streets and bus stops will eliminate about 235 of the kerb side spaces.(1) The number of spaces available to patrons of the Market will drop to 1,326.

When the Entertainment Centre is fully operational, it is quite possible that performances will be held on Thursday evenings and on Saturday afternoons as Matinees. This will clash with market days. This means that the Parking Station will be reserved for patrons of the Entertainment Centre and competition for kerb side parking will be very fierce. (The Entertainment Centre has capacity for 13,000 patrons). On these occasions the Market will have only 326 kerb side spaces in the vicinity.

---

1. Substantial portions of Hay and Quay Streets will be closed to traffic and the western side of Harbour Street will accommodate bus and car set down and pick up areas).

In comparison, Pyrmont Bridge is well supplied with parking spaces which will not be subject to the sudden demands of a major traffic generator like the Entertainment Centre.

At the City end of the Bridge, the Wilson and Evacon Parking Stations provide 1,260 off-street car spaces. At weekends, and in the evenings, they are under-utilised. The Wilson car park has development consent for a project which will increase the number of spaces in the public car park by 250. The site on the northern side of Market Street (mentioned previously in relation to servicing the link) is being considered as a possible parking station. Kent and Sussex Streets, between King Street and Druitt Street, provide approximately 100 kerb side spaces.

At the Pyrmont end, a surface car park is proposed on Goodsyard land underneath and adjacent to the Bridge with an approximate capacity of 180 cars. Now that the Bridge has been closed to traffic, an estimated 200 kerb side spaces are available in Pyrmont Bridge Road, Union Street, Murray Street, Edward Street and Bunn Street. There will be provision for 28 trucks adjacent to the MSB land immediately north of the bridge.

This means that a total of about 1,768 car parking spaces exist within 250 m of Pyrmont Bridge and future development may increase this number.

7.0 NEW STRUCTURES ON AN OLD BRIDGE PLATES 47, 48, 49, 50.

In deciding to put Paddy's Market on Pyrmont Bridge, it was accepted that this would involve building new structures on the Bridge deck. Prior to making this decision, the question of whether Pyrmont Bridge was capable of accommodating the additional loads imposed by new structures was considered.

PYRMONT BRIDGE

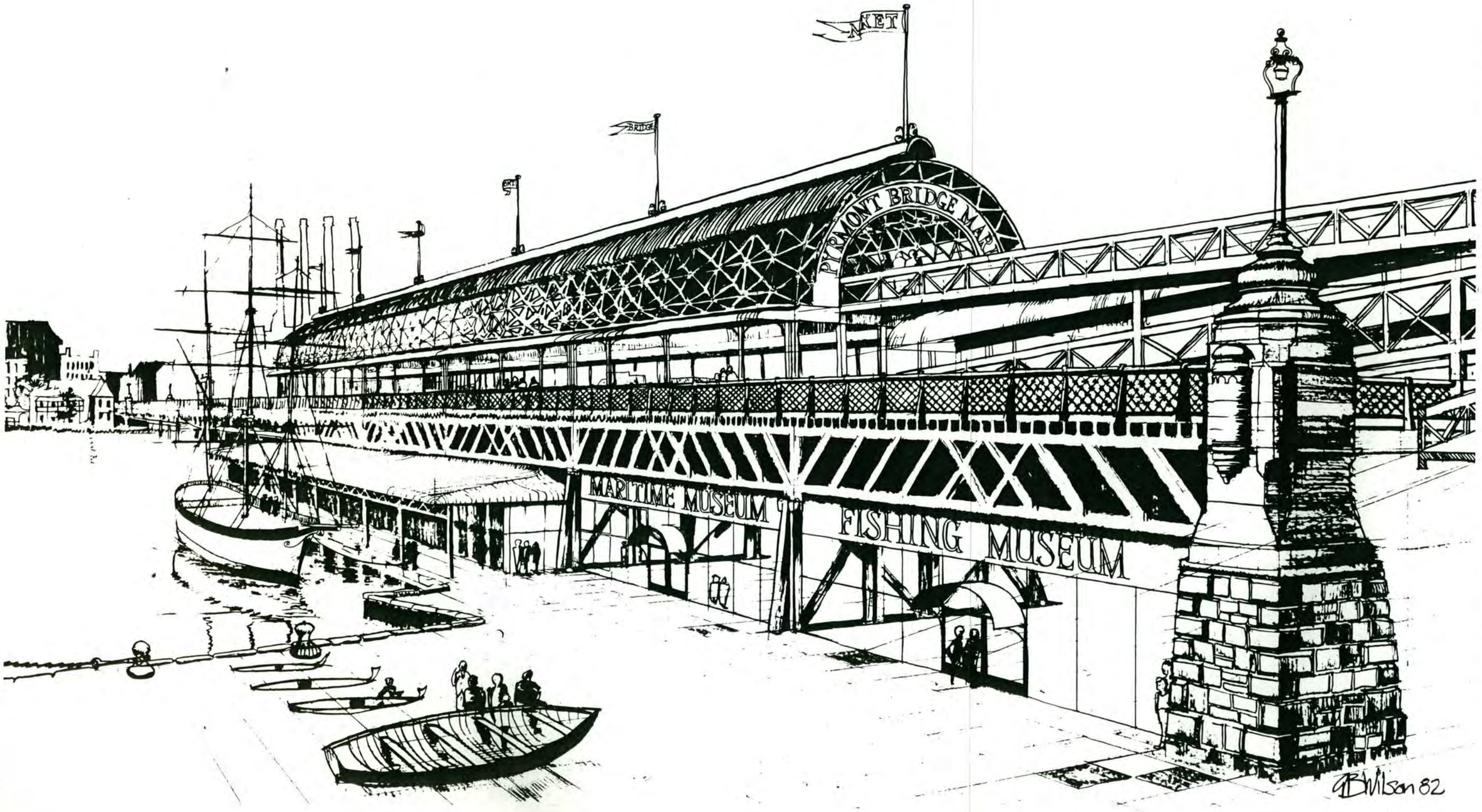
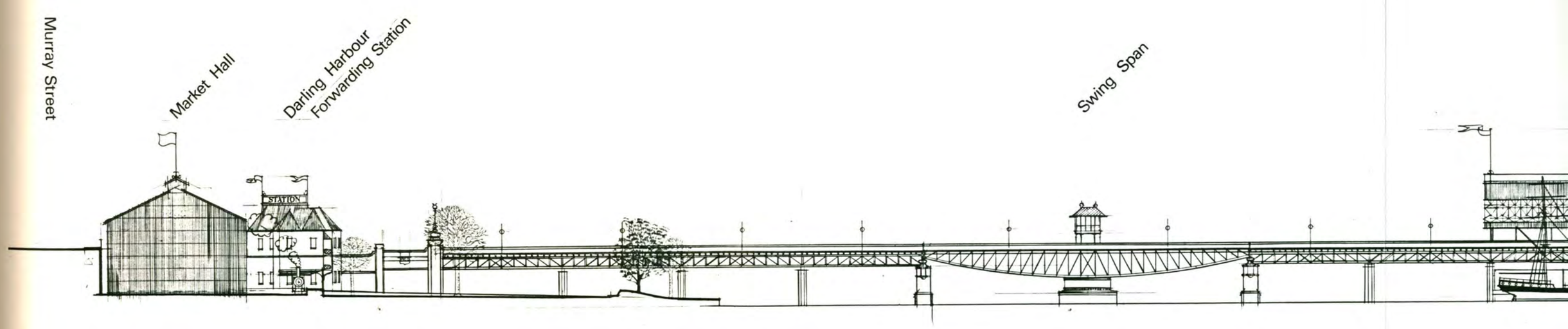


PLATE 47



South Elevation

James Craig

Covered Market Space

Ferry Wharf

North Western Freeway

The Link

Corn Exchange

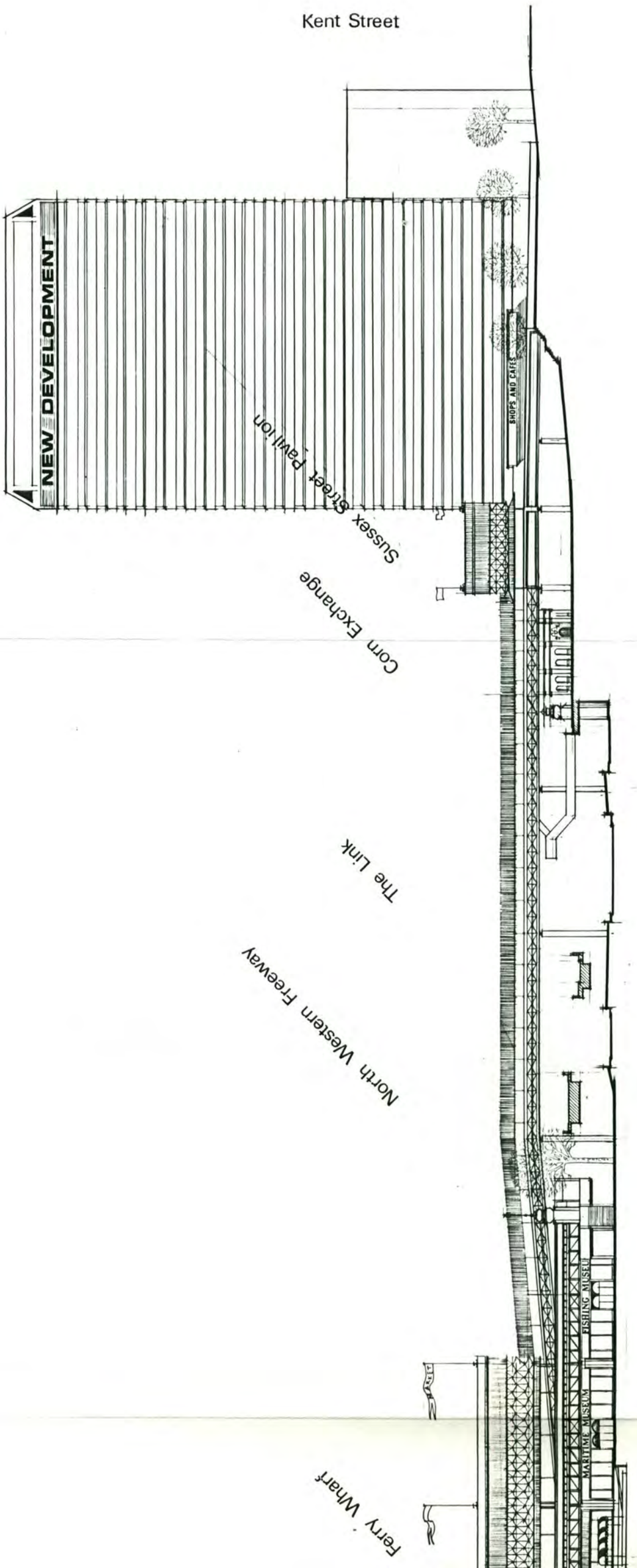
Sussex Street

MARITIME MUSEUM

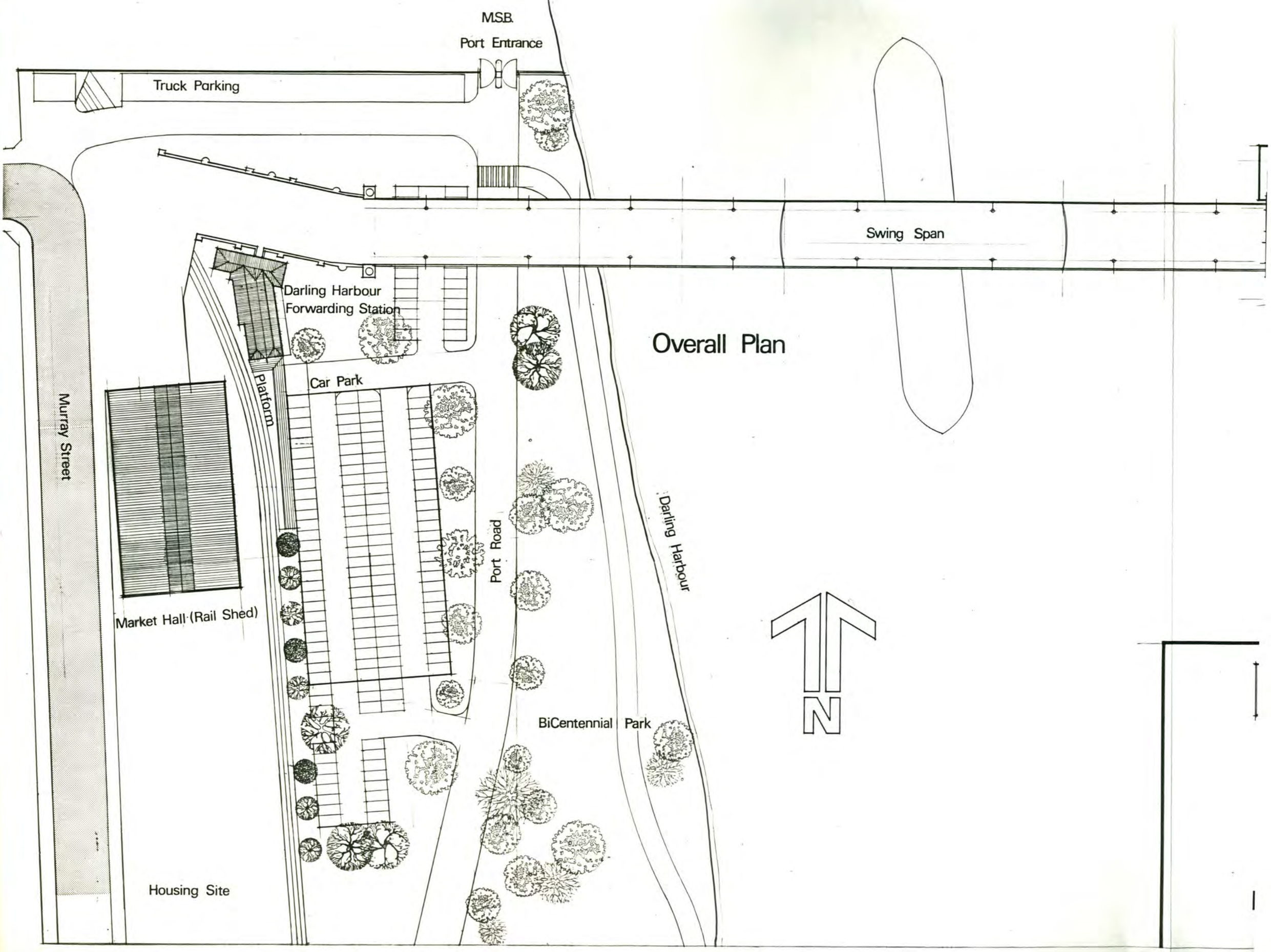
FISHING MUSEU

PYRMONT BRIDGE

PLATE 48



Overall Plan



M.S.B.

Corn Exchange

Pavilion

The Link

Covered Market

Ferry Wharf

James Craig

Tramway

Ramp

Maritime Museum

Outside Display

New Jetty

North Western

M.S.B.

Future Air Space Development

Outside Display

Workshop

Maritime Museum

Fishing Museum

Outside Display

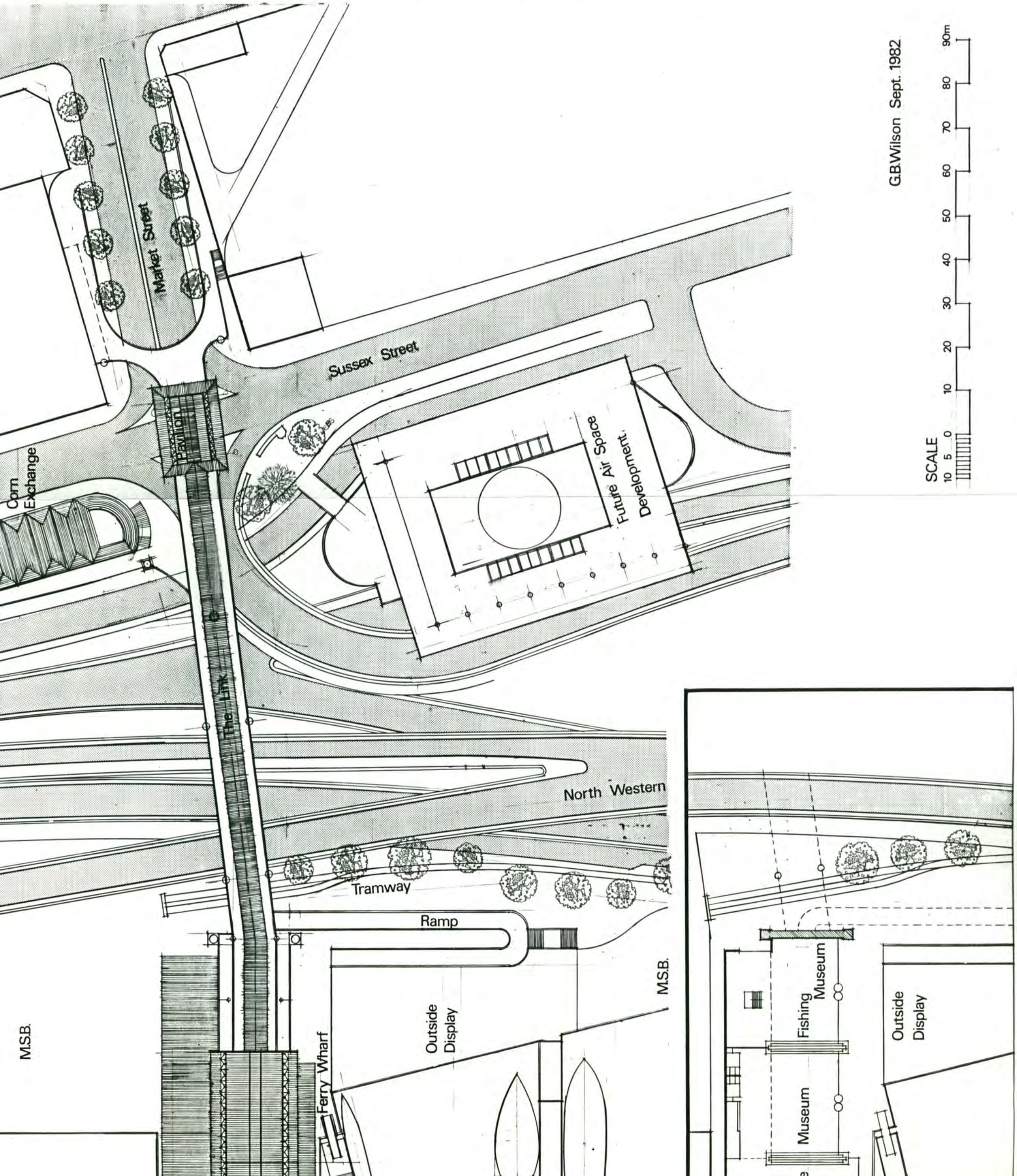
Museum Level Plan

SCALE

10 5 0

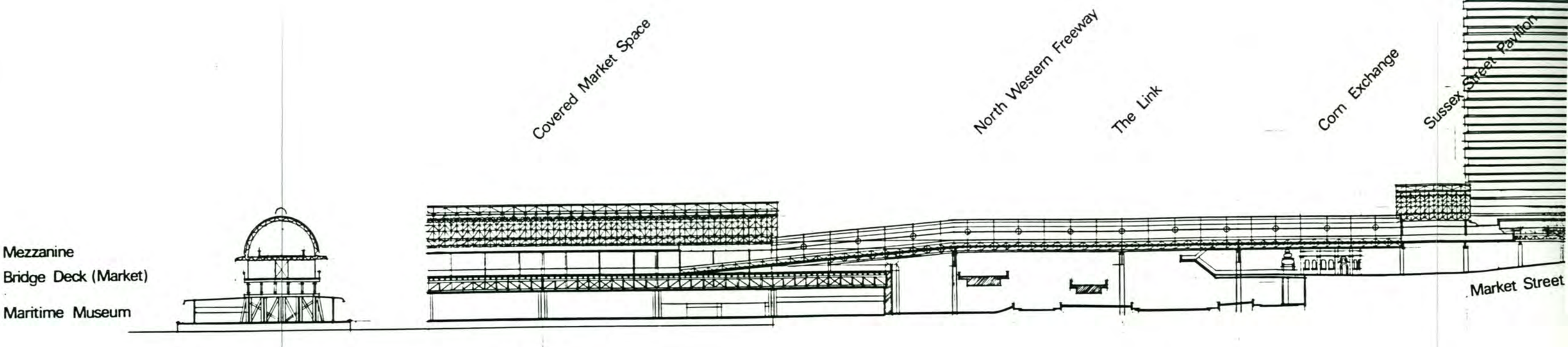
PYRMONT BRIDGE

PLATE 49



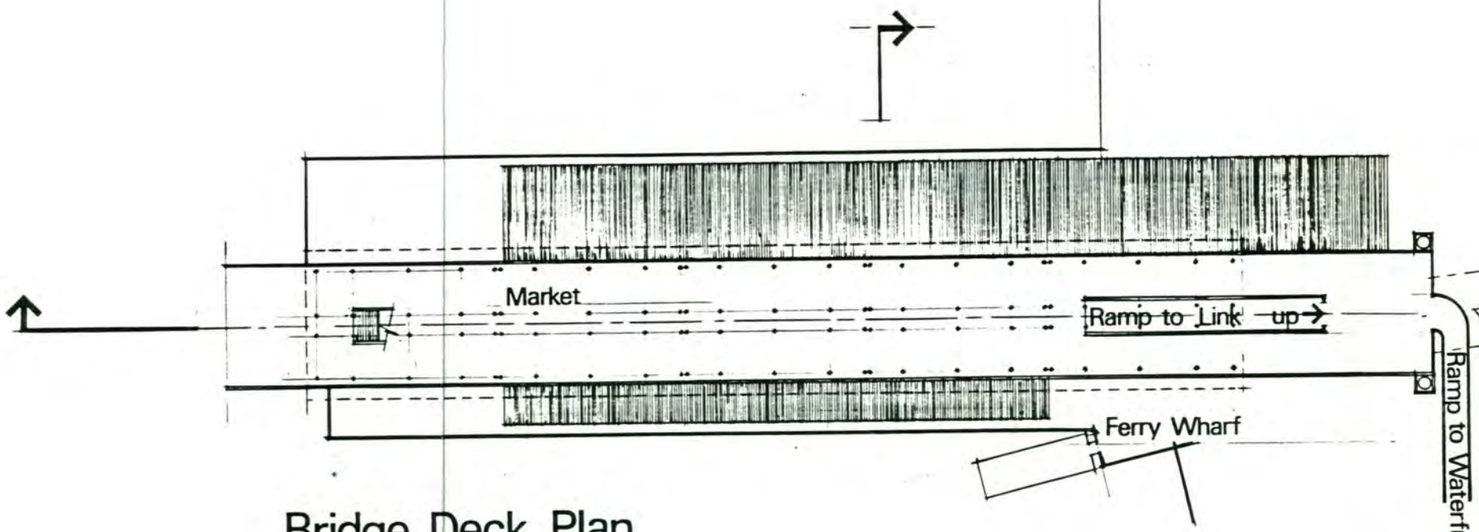
G.B.Wilson Sept. 1982

SCALE
10 5 0 10 20 30 40 50 60 70 80 90m

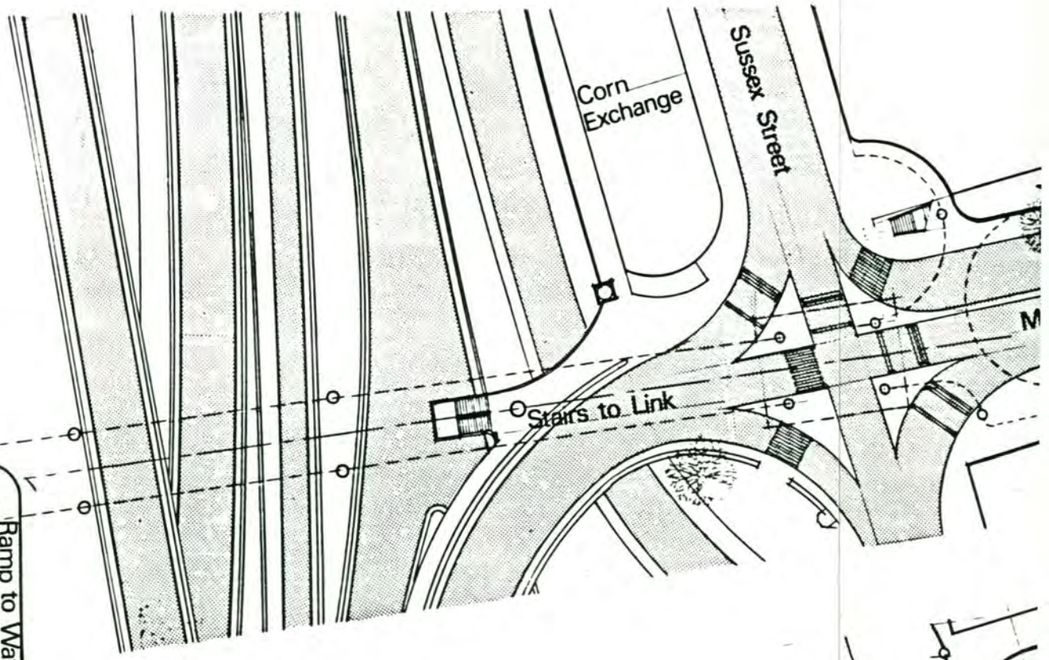


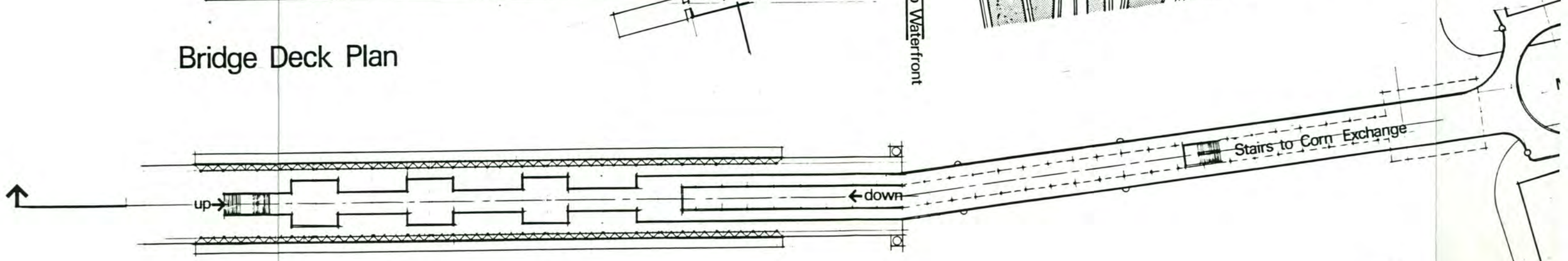
Cross Section

Long Section



Bridge Deck Plan





Mezzanine Plan

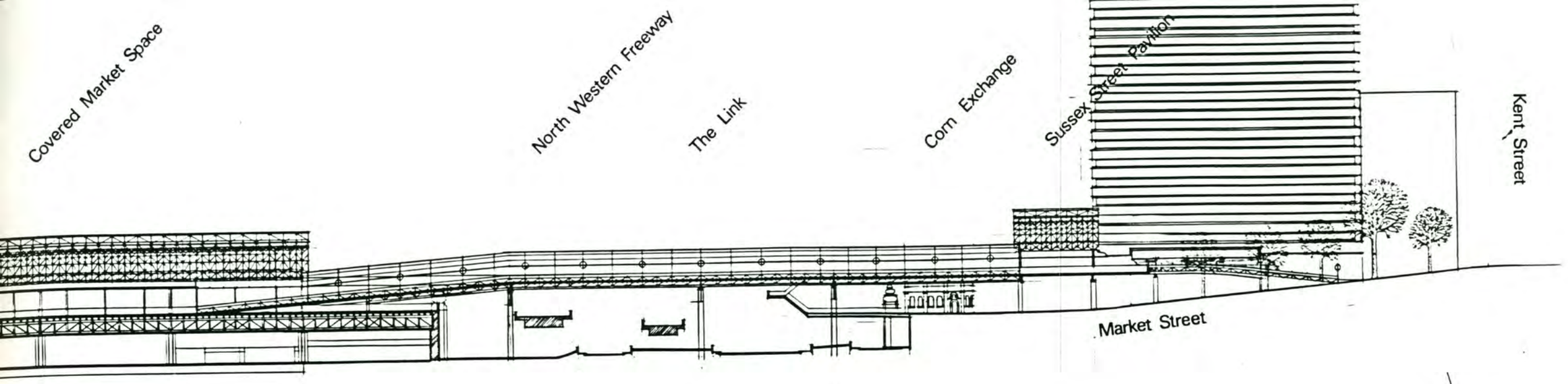
SCALE

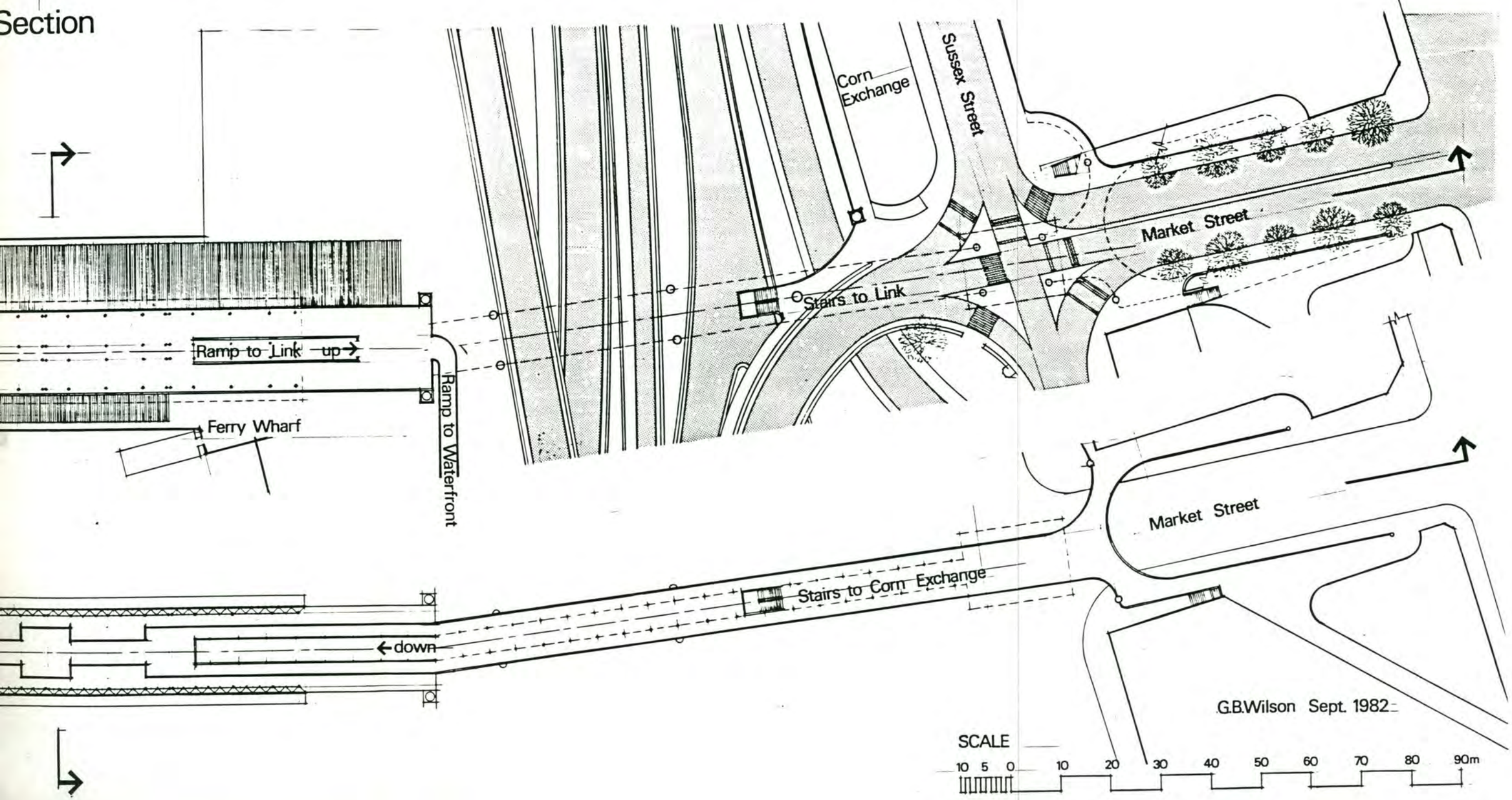
10 5 0 10 20

PYRMONT BRIDGE

PLATE 50

Section





In 1924 Percy Allan stated that:

> "The bridge was designed to carry a distributed load of 100 psf, and also for a concentrated load of 20 tons on four wheels with a 10 ft x 5 ft wheel base"(1)

The design live load for retail shops is 5 kPa (approximately 100 psf) and for footpaths, terraces and plazas 4 kPa (approximately 80 psf). Investigations into the timber design stresses used by Percy Allan indicate that these were very conservative compared to current codes and consequently the design loading could perhaps be increased by over 100%, thus allowing two levels of development. However the effect on joints, connections, and piles would need to be checked.(2)

The practical arguments in favour of additional structure are simple and straight forward:

(i) Pyrmont Bridge merits preservation on account of its cultural significance and as a pedestrian link to the City;

(ii) in order to preserve the bridge, a successful proposal must be capable of producing an income to offset restoration and maintenance costs. Paddy's Market produces income; and

(iii) Paddy's Market needs covered selling space, therefore a covered market must be built on the Bridge.

The arguments relating to aesthetic considerations are less easy to define. The actual bridge deck between the stone abutments is 366 m long, and approximately 75% of the deck is over water. However, there is a wharf on the east side built out under the bridge deck with a very delapidated wharf shed on it which effectively blots out any appreciation of the bridge. Taking the wharf into account, only 40% of the bridge is over clear water. Fortunately, that 40% is the most significant part of the structure containing the swing span and control tower right in the middle of it. If that part of the bridge which is over clear water remains free of additional structure a covered market area could be built at the eastern end without impairing the appearance of the bridge.

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1. Percy Allan, "Weekly Articles on Pyrmont Bridge" Industrial Australian and Mining Standards, 14th August, 1924 - 18th September, 1924, p.u., p.243 to p.436.
2. Information obtained from Harry Trueman, A.M.I.E. (Aust.)

The covered market will consist of a lightweight steel space frame supporting a barrel vaulted corrugated steel roof. It is to be open-sided and top-vented to ensure there is no heat build up during summer.

A 1:50 scale model of a typical bridge span was constructed in timber. The purpose of the model was twofold:

(i) by actually making a part of the Bridge one could arrive at a true feeling for the structure; and

(ii) it could be used as a test bed for various roof shapes and supporting structures.

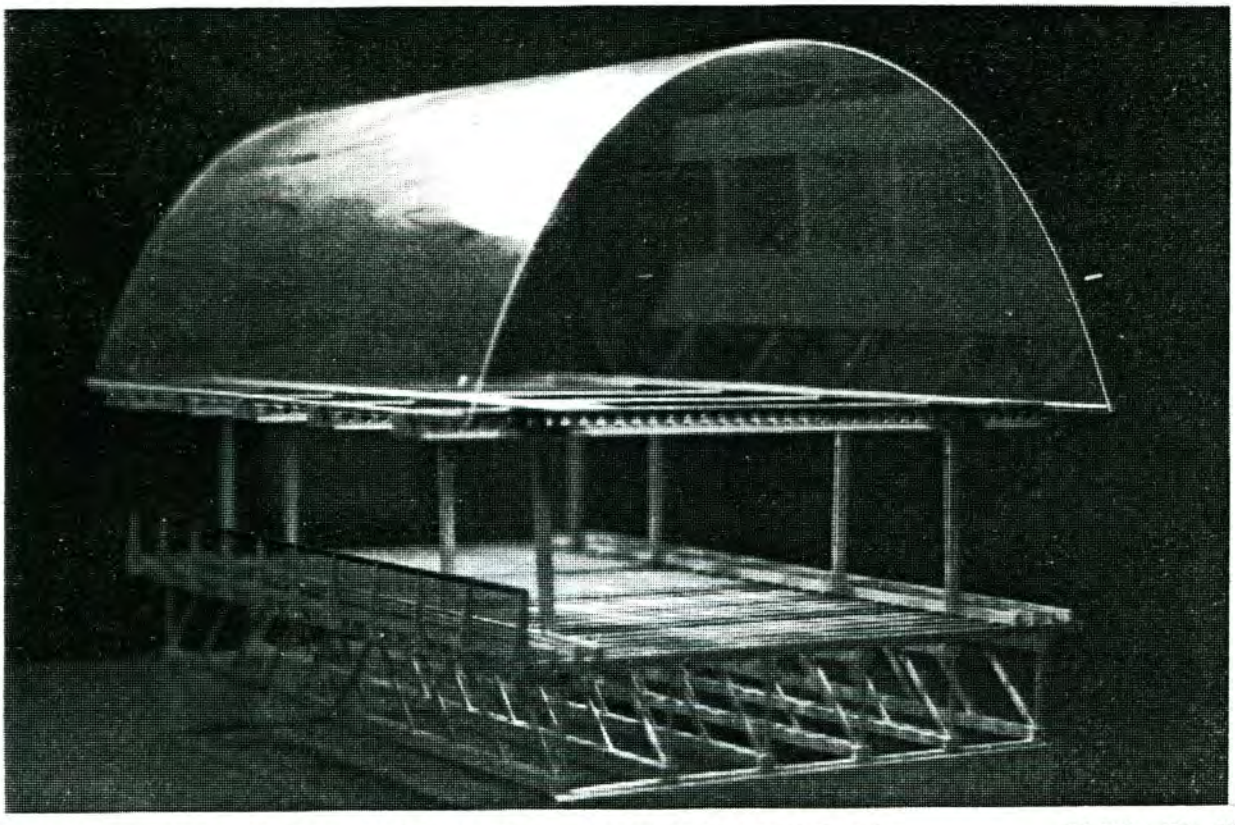
The half round barrel roof was selected as the most appropriate after testing on the model. PLATES 51, 52.

The cladding on the upper part of the roof is to be fixed to the outside of the space frame, whereas the cladding of the lower part of the roof is to be fixed to the innerside. This would assist ventilation, admit light and avoid rain penetration. It would also expose the structure such as the Bridge exposes the trusses.

There will be a mezzanine which provides space for more specialist market stalls which are not part of the present Paddy's. Coins, stamps, jewellery, antiques and other collectors items will be located there. Access to the mezzanine would be directly from the link to Market Street or by stairs from the bridge deck at the western end of the Market Hall.

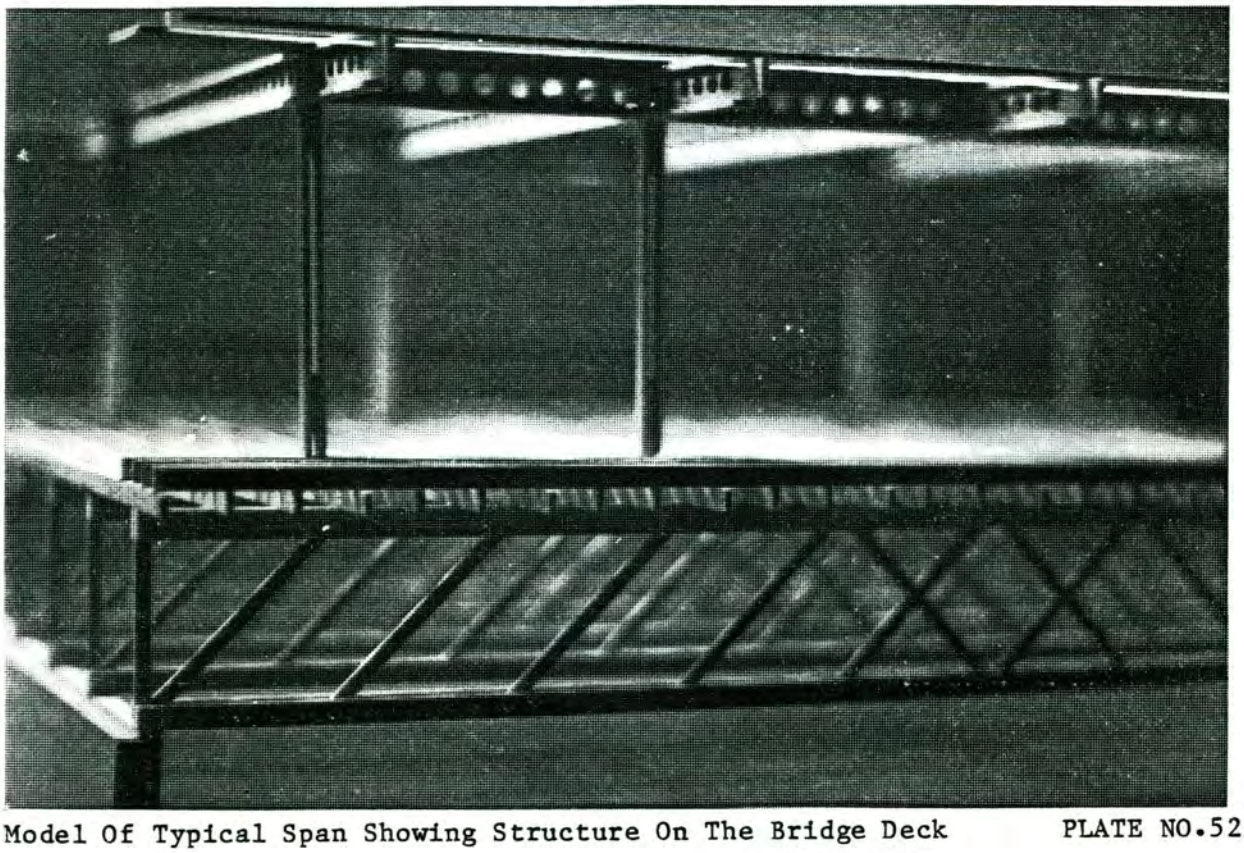
The weight of the roof and mezzanine is to be distributed over four of the main timber trusses. At the bottom of the barrel roof on each side there will be an awning projecting beyond the handrail to ensure adequate weather protection.

The style of the covered market will be reminiscent of the barrel roofed passenger wharves which used to be at Circular Quay. It will sit comfortably on the bridge and look at home in its maritime setting. The intricate pattern of the steel space frame will echo the intricate pattern of the timber trusses. The roof surmounted by flag poles, with its variety of textures and strong contrast between light and shade, will have the carnival atmosphere associated with markets. PLATE 53.



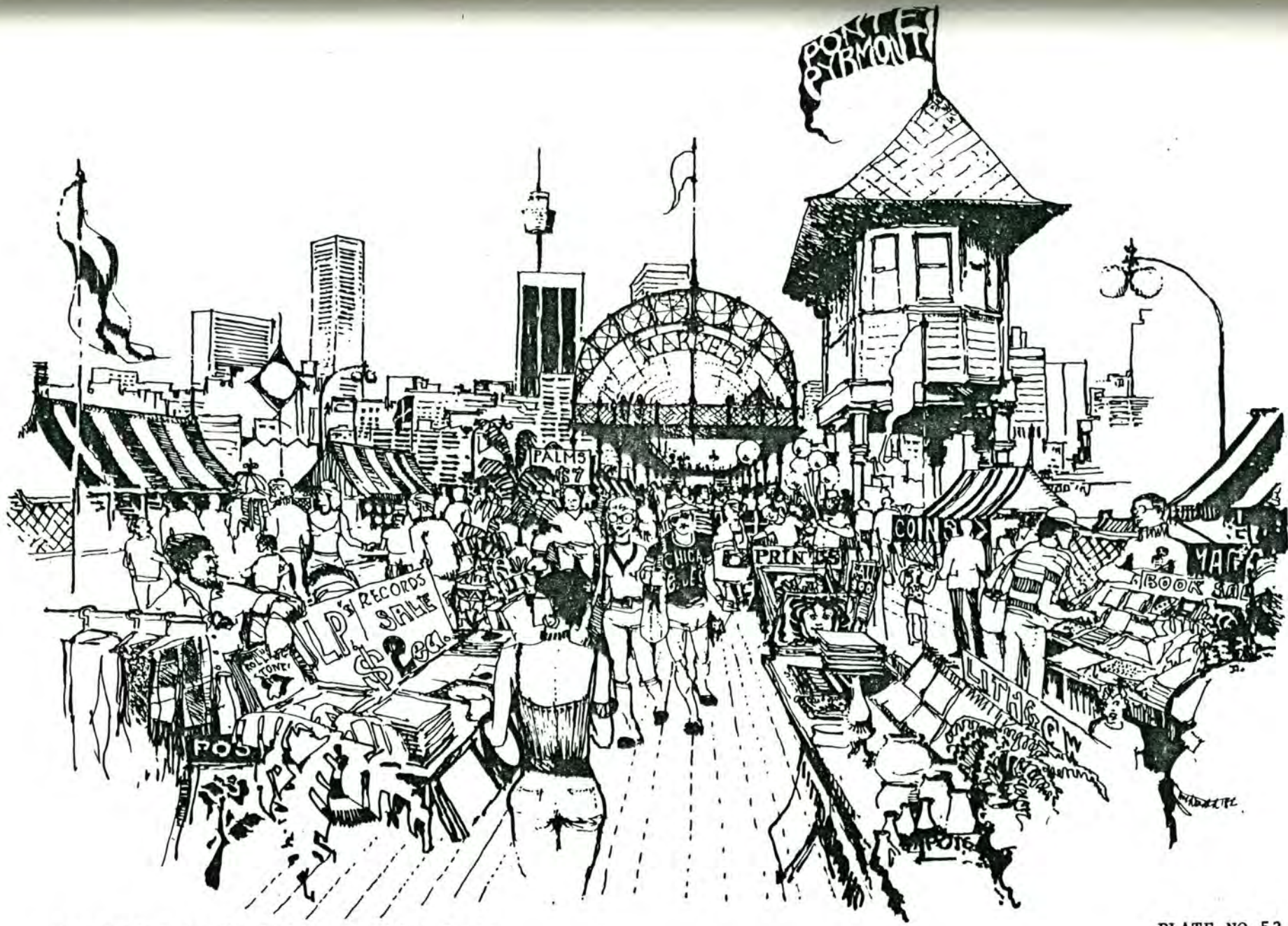
Model Of Typical Span 1:50 Scale. Showing Barrel Roof. PLATE NO.51

Source, Author



Model Of Typical Span Showing Structure On The Bridge Deck (1:50 Scale). PLATE NO.52

Source, Author



The Market On The Bridge, Looking East.

Source, Ken McDonald

PLATE NO.53

8.0 THE MARKET ON THE LINK

Market stalls will be set along each side facing into the space under the canopy. A special framework will be built into the principal trusses which will enable the stall holders to erect canvas awnings when necessary.

The Pavilion, to be prominently sited on the axis of Sussex and Market Streets, will mark the eastern extremity of Paddy's Market in the CBD The design is based on the covered market on the bridge. The roof displays the same barrel vaulted form supported on space frames, and a cantilevered awning projects on all four sides. It provides the opportunity to advertise the Market and, at the same time, indicate to pedestrians that here is the prominent entry to Bicentennial Park and the route to Pyrmont. It is to be a focal point, a meeting place. PLATE 55.

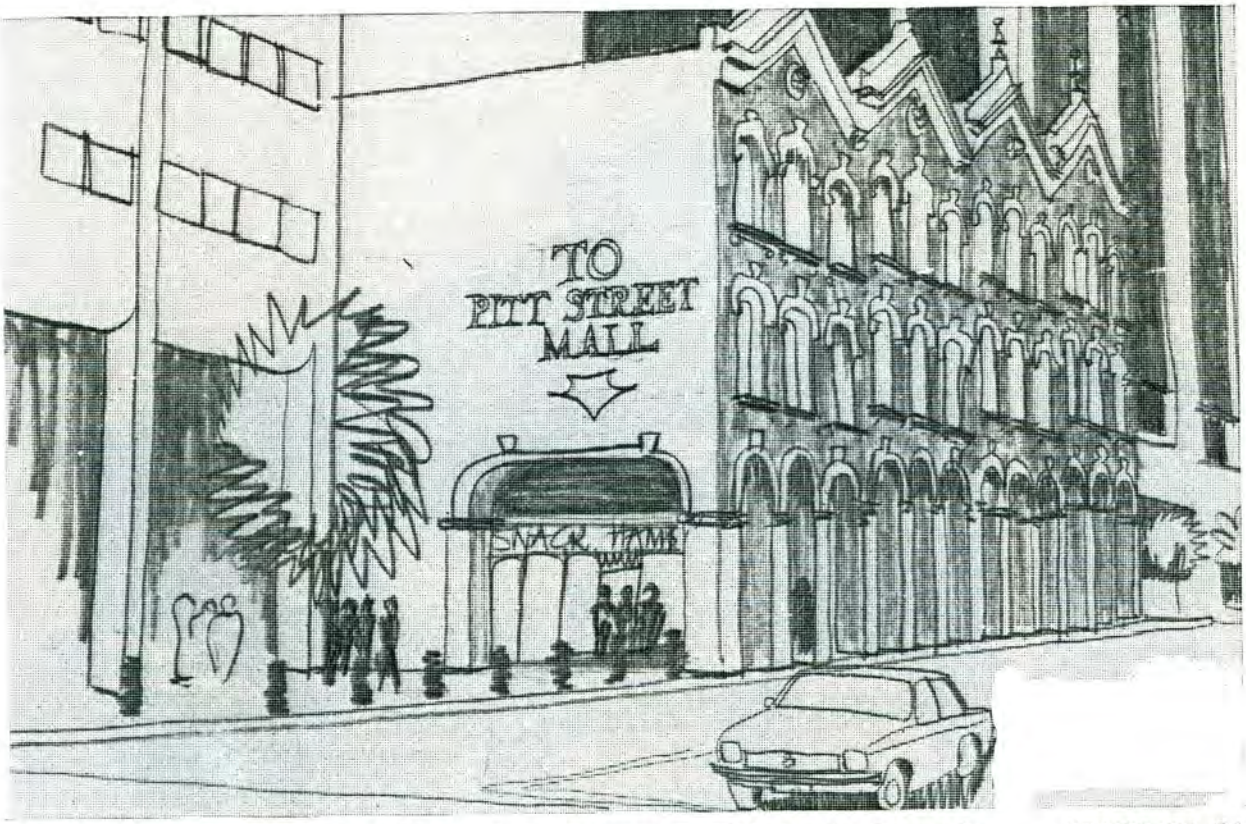
9.0 THE TRAIN SHED PLATES 56, 57.

If Pyrmont Bridge is to be the future home of Paddy's Market, it creates a demand for specific types of accommodation. The Market, at present, retails fish but it prevented from retailing meat by the lack of suitable premises. A market hall with permanent fixtures and refrigeration catering for such perishables as meat and fish would be highly desirable. It would broaden the range of market produce and at the same time widen appeal.

The Market requires a certain amount of storage space. At present it provides storage in large trunks for stall holders who operate from the City Paddy's and do not cart merchandise from one market location to another. Stall equipment, such as folding tables, is also rented to stall holders and requires storage space.

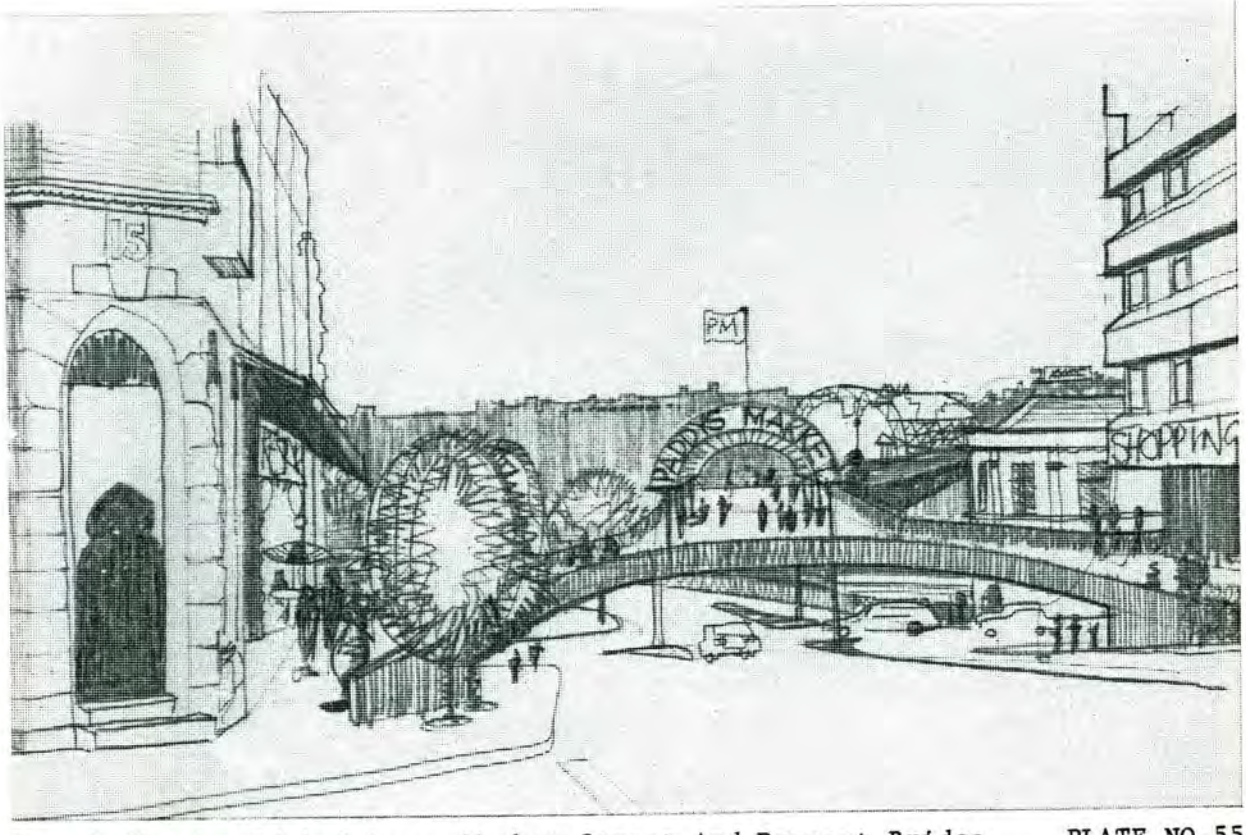
If the Market relocates on the bridge, the Market Authority will have to rent out awnings, provide lettable storage space and provide such things as electric handcarts and fork lifts.

The rail shed nearest to Murray Street has an open space at its northern end which abutts the western approach to the bridge. This space is an obvious extension of bridge marketing. It provides 1,000 m^2 of market area. As a result the shed is ideally situated to provide a permanent market hall.



Sketch Showing Adaption Of Market Street Building To Provide Better Pedestrian Access To Pyrmont Bridge. PLATE NO.54

Source, Author

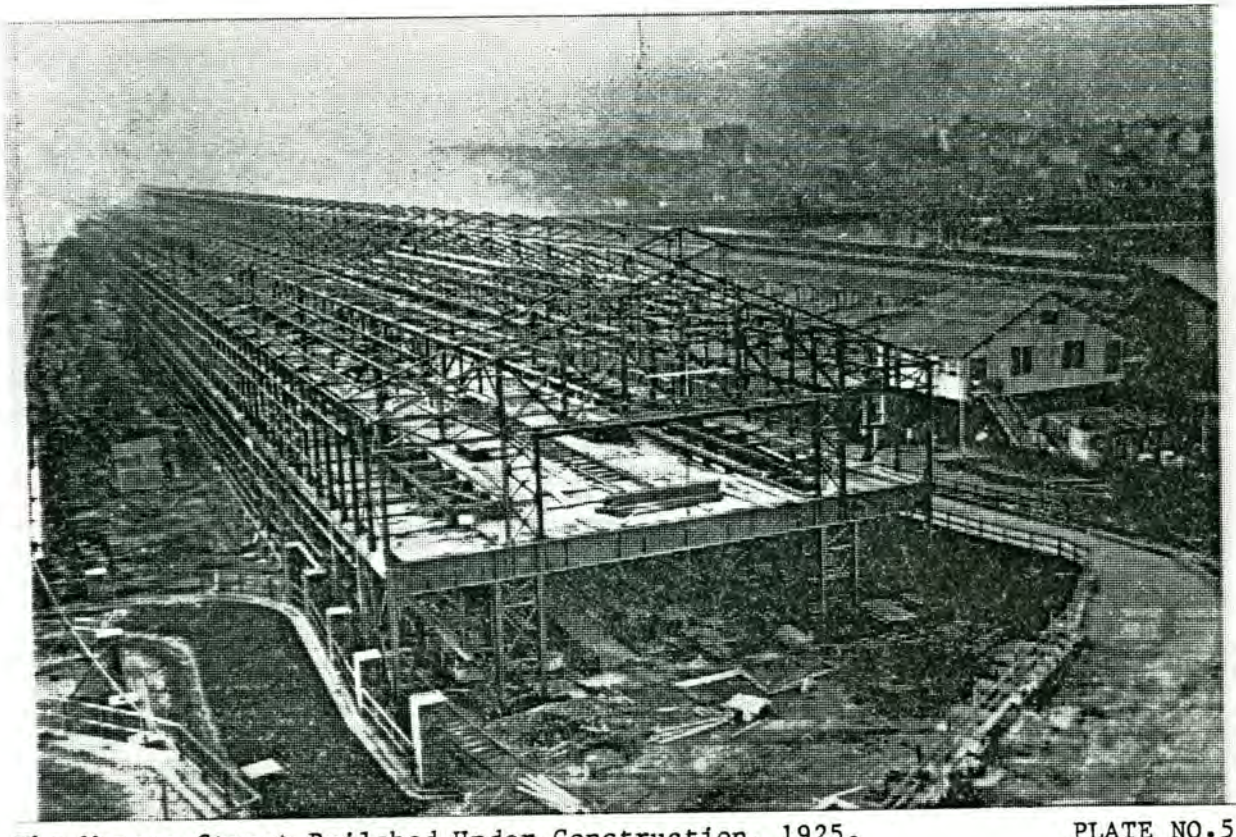


Sketch Showing Link Between Market Street And Pyrmont Bridge. PLATE NO.55

Source, Author

The North End Of The Murray Street Rail Shed, 1981. PLATE NO.56

Source, Author



The Murray Street Railshed Under Construction, 1925. PLATE NO.57

Source, Author

It is a two storey structure, built in 1925, with two sets of railway sidings on each floor. The lower floor is constructed on rock. The upper, or Murray Street level, is concrete and designed to carry loads far in excess of that required for a Market.

It is a steel frame structure, bolted and rivetted together, and clad in corrugated iron and asbestos cement sheets. Much of the iron needs to be renewed and some rust has attacked the steelwork where it enters the lower floor slab. The concrete floor of the Murray Street level betrays the weakness of concrete construction methods of that era: insufficient vibration, porous concrete and lack of cover on the reinforcement.

Notwithstanding these structural faults, corrosion prevention measures taken now, or in the near future, would ensure a 25-30 years' life span for the frame and floors. The cladding would have an equal life span if it was replaced in the near future.

The lower floor of the Murray Street shed is ideal for storage. Lorry access is available from the proposed port road with a level crossing over the railway line. Access to the lower level has been provided in this way ever since the shed was built. A goods lift will be installed to the Murray Street level for quick easy movement of smaller items.

The shed is 30 m wide and over 300 m long. Estimated floor area requirements indicate that only 50 m of the shed will be required for market purposes. The remainder will be demolished to make way for new housing.

9.1 Other Requirements

In addition to the accommodation outlined already, Paddy's market requires a Market Administrator's office, toilets for stall holders and the general public, and access to Bicentennial Park. The former Darling Harbour Forwarding Station can provide space for these purposes at the western end of the bridge.

10.0 DARLING HARBOUR FORWARDING STATION[1] PLATES 58, 59.

10.1 History

The Darling Harbour Forwarding Station was known also as the Outwards Goods Office.[2]

It was built in 1899 at the same time as the Pyrmont Bridge foundation stone was laid.

Originally, the building was much smaller than it is now. The main elevation to Pyrmont Bridge was symmetrical, with an arched window on each side of the door which was connected to the bridge abutments with a small footbridge bearing the same balustrade details. It is a two storey building.

In 1922, the building was extended. On the western side near the railway lines the lavatories were extended. The junction of the two parts is well handled on the bridge side and is difficult to detect, but on the western side at the lower levels the quality of design deteriorates. The designers were interested solely in proping up the new floor and avoiding the railway lines. The floor of the addition is concrete poured on permanent arched corrugated iron shuttering, similar to the Corn Exchange, but with much shorter spans.

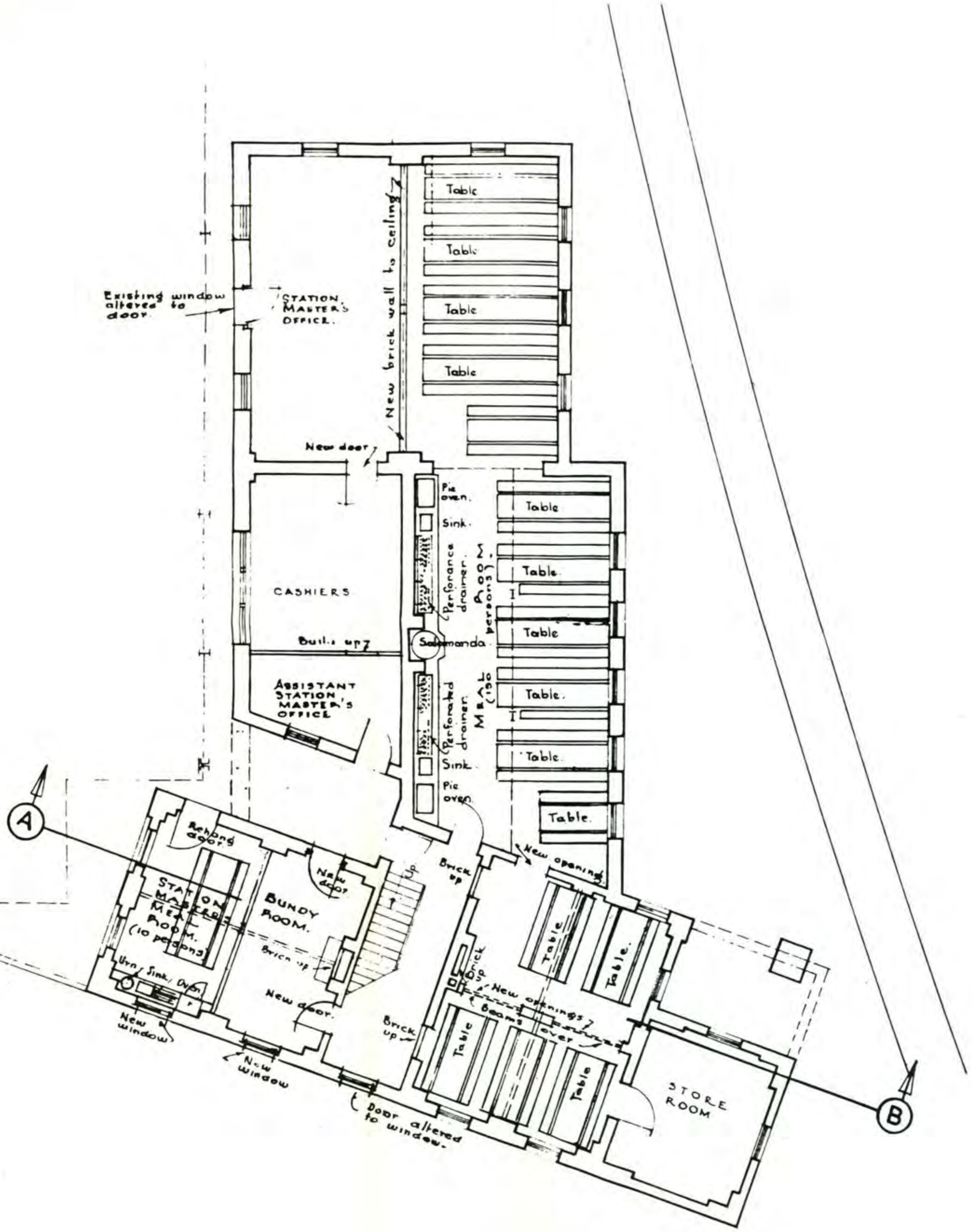
On the southern side, the original building had a wing which ran parallel to the rail sheds with one large room on each floor. These rooms featured coloured glass windows and fireplaces. This wing was extended also in 1922 by the addition of rooms on the east and southern sides. On the top floor, openings were made in what was once the outside walls of the original room to make one large space for the handling and storage of consignment notes.

In 1948, the building was converted into a staff amenities block. The only offices to remain were on the ground floor for the Station Master, the Assistant Station Master and the Cashier. The rest of the ground floor was given over to lunch rooms. The first floor

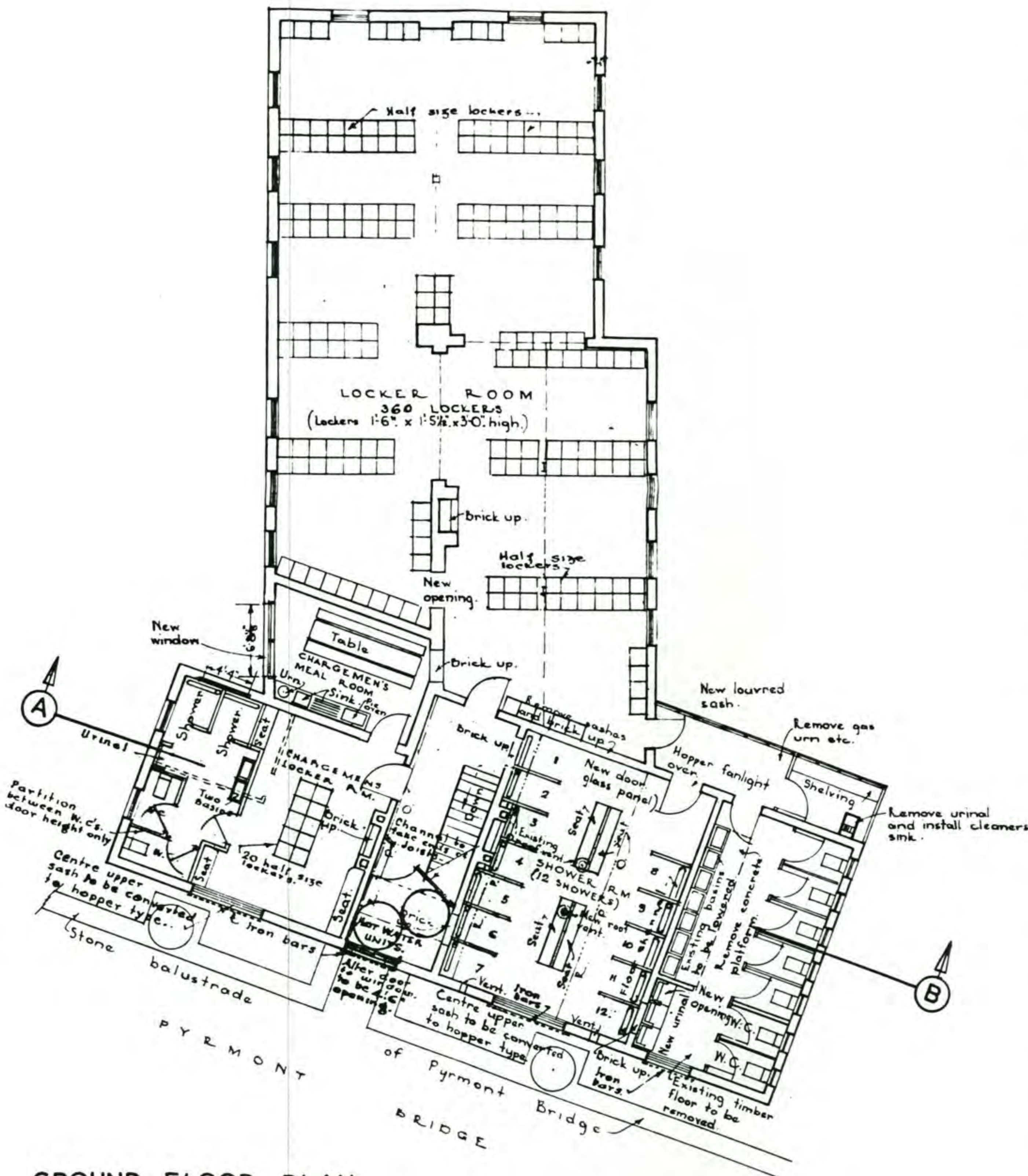
---

1. Information obtained at the New South Wales State Rail Authority Archives Department and Plan Rooms.
2. The former title has been selected for this report because a photograph, taken in the early years of this century, shows the building with a sign above the front door bearing the words "Darling Harbour Forwarding Station".

FORWARDING STATION



LOWER GROUND FLOOR PLAN



GROUND FLOOR PLAN

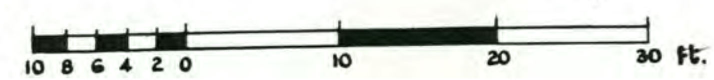
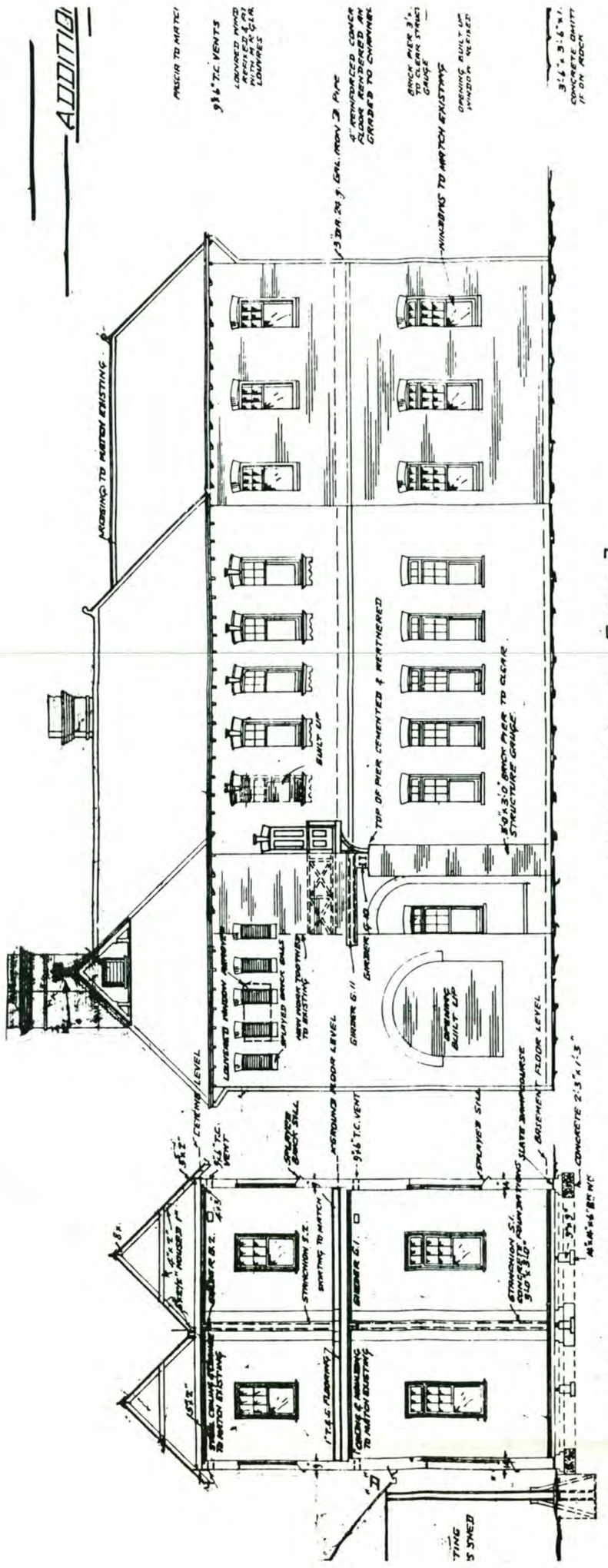


PLATE 58

FORWARDING STATION

PLATE 59



level was converted to toilets and change rooms and the hot water service was installed immediately behind the front door on the landing completely blocking it as a point of entry. At some time the front door opening has been widened, possibly in 1948 to get the water tanks in. The alterations were crudely built for the arched brick lintel now bears no relation to the actual width of the opening.

10.2 Monument

The Darling Harbour Forwarding Station is the only building suitable to represent and commemorate the once great railway presence in Darling Harbour. For 100 years, the railway thrived and developed there. For the last 30 years, it has gradually declined.

In this proposal the old Forwarding Station will experience a change of character - from a gloomy, smoke-stained railway mens' toilet block to a passenger station and restaurant with market connections. It will carry signs in the best railway tradition, indicating the functions which are carried on within. The costs of conservation will be met by adapting the building to new uses.

10.3 Construction

The walls are solid load bearing brickwork in English bond with massive relieving arches in the original sections of the wall. The roof was originally clad in shingles but they have been overlaid or replaced by corrugated iron. The brickwork is in excellent condition but the corrugated iron is badly rusted.

Part of the roof of one of the goods sheds is supported on a massive brick corbell projecting from the north/south wing. The two wings meet at an angle of 72% which gives rise to a confusion of pitched roofs and some unusual room shapes inside.

The principal rooms in the interior have Wunderlich pressed metal ceilings and cornices. One may distinguish between the original and the additions by the changes of pattern in the ceiling. However, poor maintenance and leaking roofs has resulted in the partial collapse of the ceilings and cornices.

The ground floor ceiling is very high, 6.55 m, and it reflects the height of the bridge abutment above the Goodsyard. The first floor has a ceiling height of 4.27 m. PLATE 55.

10.4 Appraisal

Whilst the Darling Harbour Forwarding Station is not of great architectural merit, it is the best example of surviving Victorian railway buildings in the Goodsyard. The north elevation has a strong architectural character and the ornate sills and arched windows compliment the stonework of the bridge abutments. It is uniquely and physically tied to Pyrmont Bridge and it is a vital part of the Proposal.

10.5 Future Uses PLATE 60.

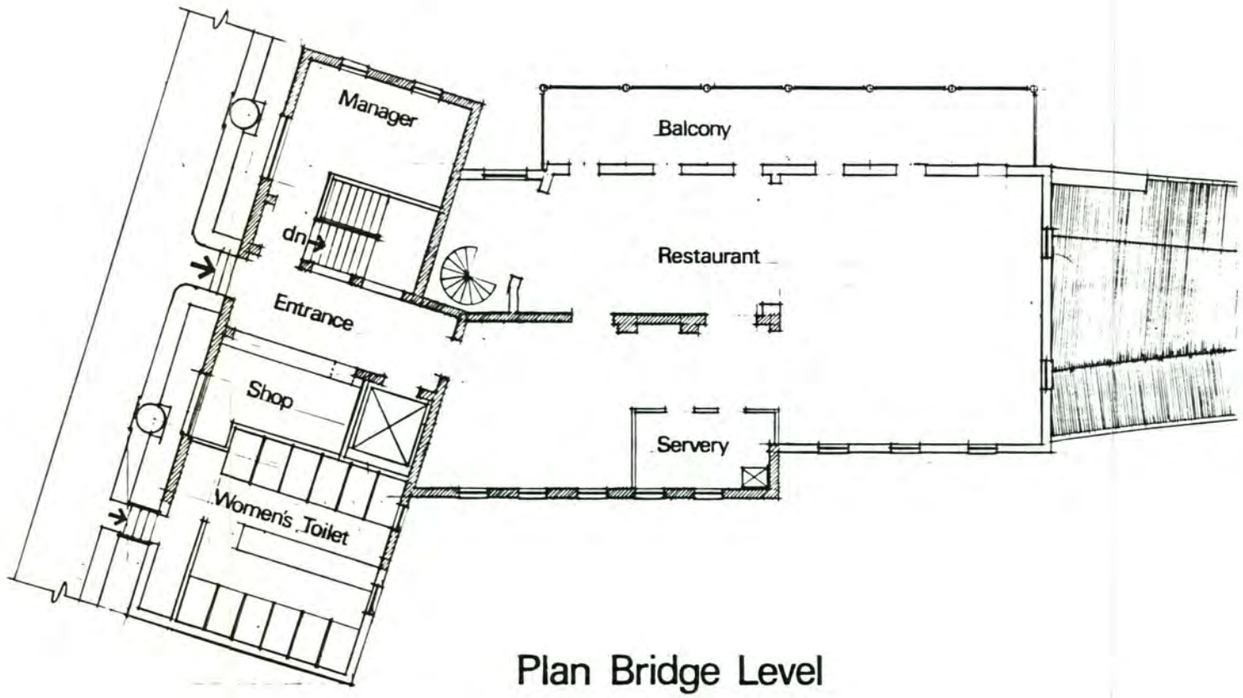
It is proposed to convert the building to accommodate many of the service functions necessary for the Market on the Bridge, Bicentennial Park and the extension of the Museum of Applied Arts and Sciences to Pyrmont Bridge. Because of the high ground floor ceilings, an additional floor would be inserted to increase available usable floor space.

The building will accommodate the following functions:

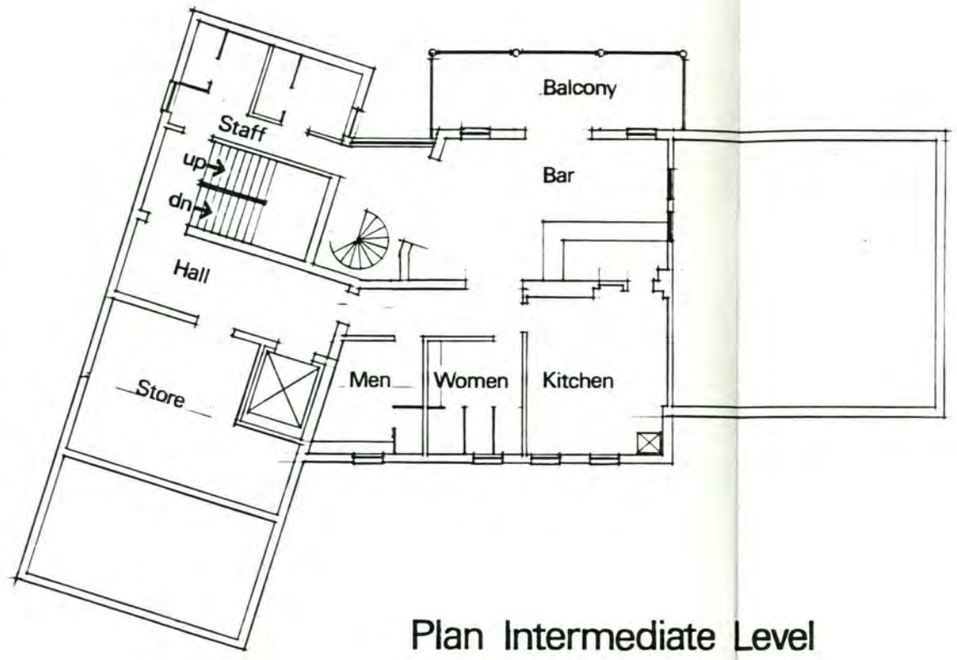
(i) restaurant and bar;
(ii) Pyrmont Bridge Railway Station;
(iii) Market Manager's office;
(iv) staircase from Bridge to park level;
(v) souvenir shop;
(vi) lift;
(vii) public toilets; and
(viii) handicapped persons toilet.

10.6 Bridge and Deck Level

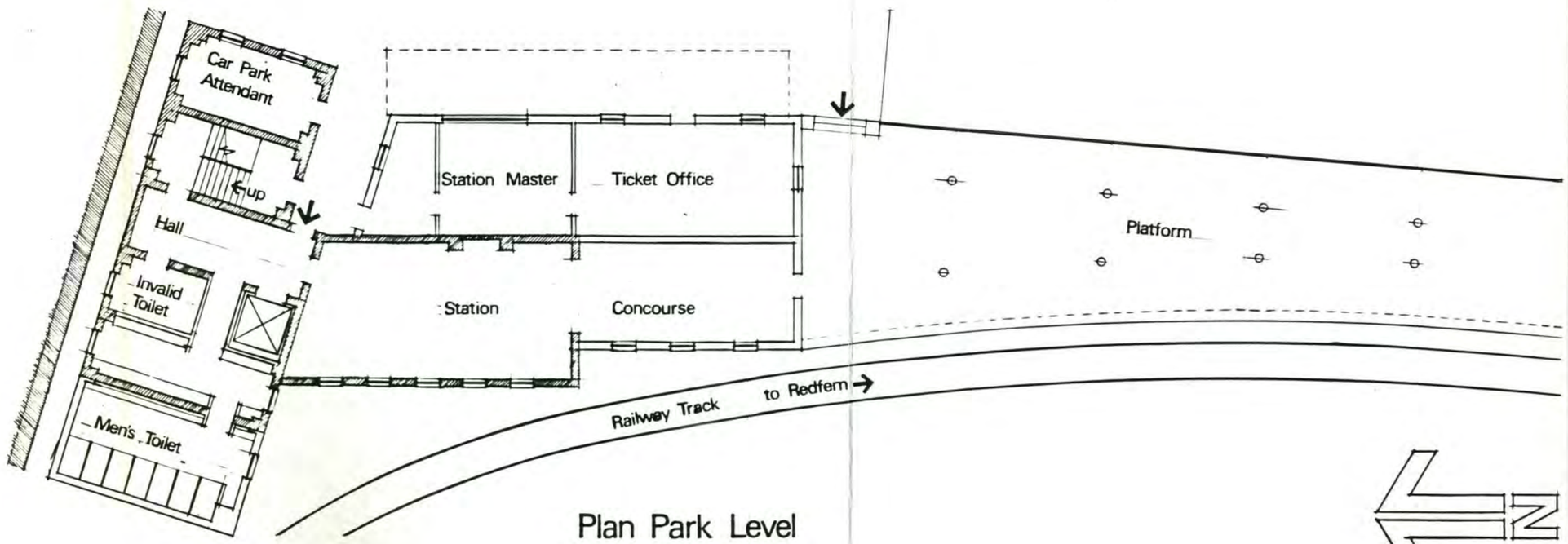
This floor, apart from having direct access to the bridge, will enjoy excellent views over the Harbour to the City. Because of the unusual angle of the two wings, Pyrmont Bridge will be prominently in view. The entrance hall will house the souvenir shop on one side, the stairway on the other and the restaurant beyond.



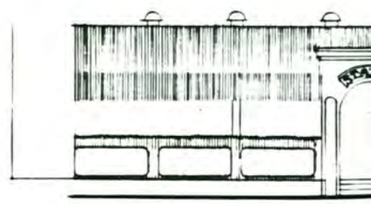
Plan Bridge Level



Plan Intermediate Level



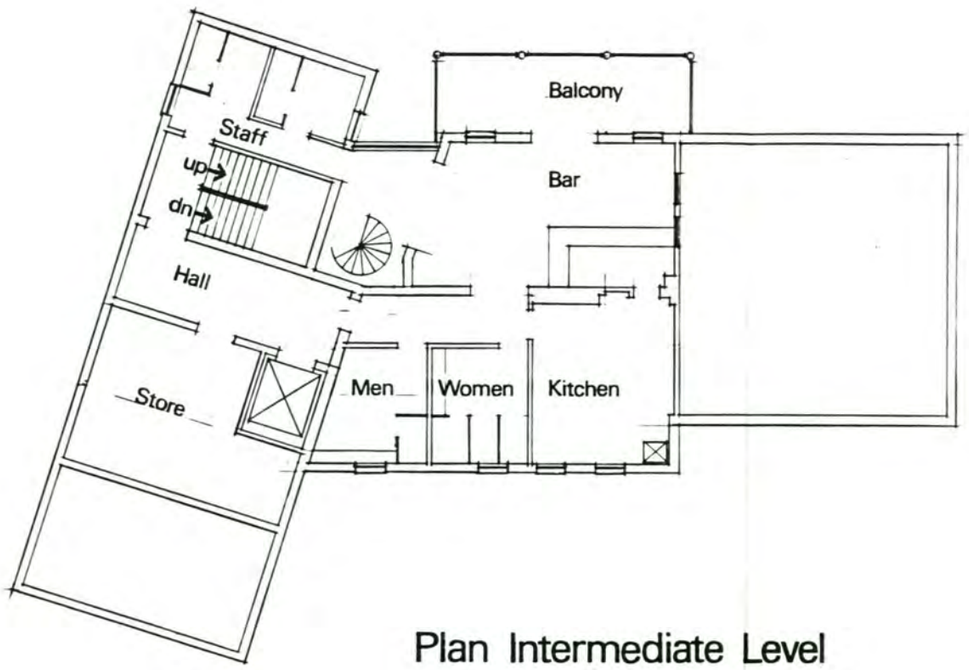
Plan Park Level



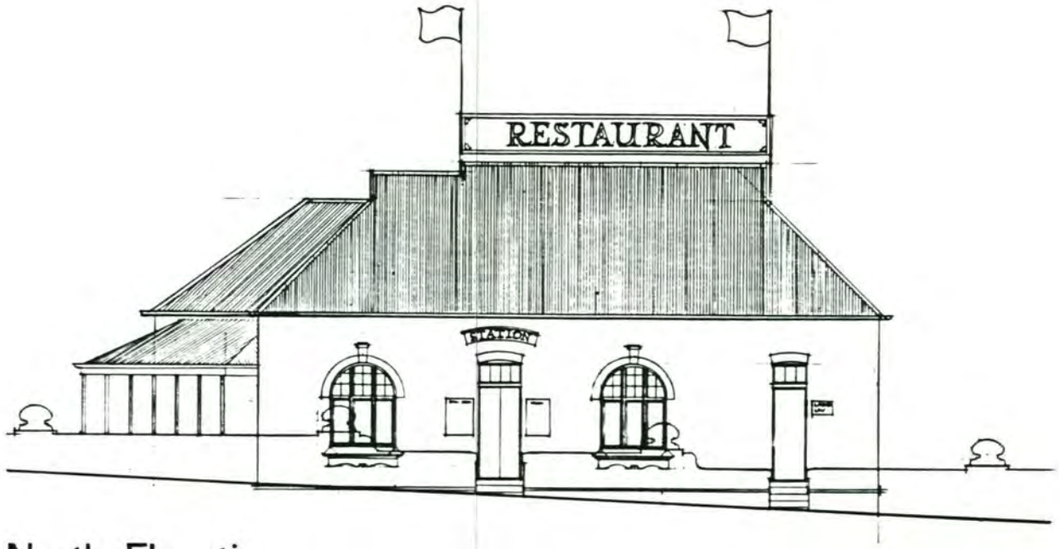
Eas

No

FORWARDING STATION

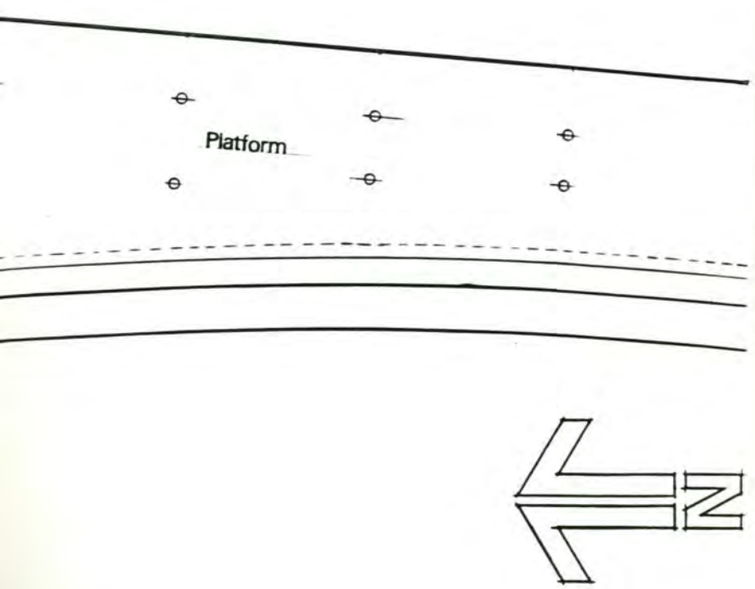


Plan Intermediate Level



North Elevation

East Elevation



G.B.Wilson Sept. 1982

SCALE

1 0 1 2 3 4 5 6 7 8 9 10 20m

PLATE 60

Most of the floor space will be taken over by the restaurant and bar which will extend onto the floor below. The restaurant will have seating for 150 patrons and the bar will serve about 50 people. The eastern side of the building will have balconies added to take advantage of the outlook. The proposed restaurant will have the following features in its favour:-

(i) convenient location;
(ii) premises in an historic building;
(iii) excellent views;
(iv) good pedestrian access;
(v) car parking adjacent; and
(vi) a variety of tourist and entertainment orientated uses in the vicinity.

Because there are no houses adjacent, it will be suitable for late night closing and noisy entertainment. "Venues for Hire" for this type of use are becoming increasingly rare in the city.

The Market Manager's office will have an outlook along the length of the bridge and the Manager will be easily accessible to the stall holders.

Women's public toilets will be accommodated at this level. There are to be 12 cubicles and a cleaners store. Separate access from the bridge deck will be provided by a new foot bridge to a new doorway where there is an existing window. The provision of separate access and the resultant alterations to the Bridge and the building are necessary, because it is unacceptable to have a restaurant and a public toilet sharing the same entrance to a building. The restaurant and bar are seen to be major income producers.

10.7 The New Intermediate Level

This level will contain the bar, the kitchen, store room, patron and staff toilets. Like the restaurant above, the bar will have a balcony overlooking the Harbour and new windows set into an otherwise blank section of wall.

10.8 The Park Level

Pyrmont Bridge Railway Station will occupy most of this level.

A new passenger platform will be constructed immediately south of the building on the east side of the line. It will be screened from the car park and roofed in galvanised iron. Passengers alighting at this stop will enter the station building and proceed to the bridge via the lift or stairs or pass through a gate to the park. The ticket collectors' office, to be located on the former station master's office, will serve both routes. There is sufficient space on the lower floor to set up the station as a working 'Museum of the Steam Train' era with additional railway exhibits.

Other uses include the car park attendant's office, the men's toilet and the handicapped persons' lift.

11.0 CORN EXCHANGE PLATES 32, 33, 34, 35.

The Corn Exchange, its future use and conservation, has been well documented in the past[1].

The Corn Exchange is owned by the Sydney City Council. It is 50 m long and 15 m wide and it consists of three levels:

(i) the basement, which has been left open, exposed and inaccessible by the North West Freeway, is vacant;

(ii) the ground floor with access from Sussex Street is used as a car park; and

(iii) the first floor is occupied by the PACT Co-operative Limited[2] at a nominal rent.

---

1. Sue Britten and Phillip Rose, The Corn Exchange and Sussex Street Precinct - Sydney - A Conservation and Restoration Proposal, unpublished undergraduate thesis, (Architectural Faculty Library, University of Sydney, 1976.)
2. PACT Co-operative Limited is a Theatre group which specialises in teaching young people. It is partly funded by the State Government. PACT stands for Producers, Authors, Composers, Talents.

The building has an air of delapidation in common with the Goodsyard and the old wharf structures.

The Proposal aims to make the conservation of the Corn Exchange a much more viable financial proposition by:

(i) improving the accessibility of the building;

(ii) making its surroundings much more attractive; and

(iii) making the space within the building more usable.

Accessibility will be improved by providing a staircase from the link to Sussex Street level. The staircase will connect to an extension of the Sussex Street footpath and cantilever over the Freeway.

The ground floor level of the Corn Exchange will be extended by the provision of a terrace up to the alignment of the Freeway. The terrace will connect to the Sussex Street footpath at both ends of the building.

It will provide excellent views to the west over Darling Harbour and Pyrmont Bridge and it will form the roof of an extended basement. the existing stone retaining wall at Freeway level will be heightened to form the western wall of the basement.

The ground floor will have access all round to footpaths and terraces. the enlarged basement will provide additional lettable floor space. The building will become a part of the Bridge Market Complex.

12.0 THE SYDNEY MARITIME MUSEUM

The Sydney Maritime Museum was formed in 1965 with the object of preserving historic ships in working order and to create in Sydney a museum to display the collection of artifacts associated with the Harbour and the sea.

The Museum is presently part of the Birkenhead Point Shopping complex which was created in the former Dunlop Tyre factory. The Museum is housed on two floors of a warehouse and nearby, but out of sight, the fleet of historic ships are moored at a new wharf. There is a large workshop on the lower floor of yet another building.

The fragmentation of the Museum buildings and fleet, coupled with the fact that Birkenhead Point is not a significant tourist attraction has meant that the number of paying visitors to the Museum has been less than anticipated. The lease agreement, under which the Museum operates, has geared the rent to the number of visitors, and this means that the owners of the complex are receiving much less income than originally estimated.

Recently, the complex changed hands and the Museum is fearful that the new owners will re-negotiate the lease with a view to putting it on a proper commercial footing: a great financial outlay for the Museum without a commensurate increase in income.

The apparent lack of patronage at the Museum does not mean that the Museum itself is unpopular. In relation to the overall trading figures of the shopping complex, the Museum is doing very well. Given a properly integrated Museum, located in a popular tourist area, its income would rise dramatically.

It was with these thoughts in mind that the Museum submitted a Proposal[1] to the Sydney Bicentenary Committee[2] seeking the Committee's support for a move to Darling Harbour.

The Proposal states that,

> "Our proposal is that the Sydney Maritime Museum be given assistance to:
>
> (i) make a case to relevant authorities for a site on the waterfront in Darling Harbour to the south of Pyrmont Bridge, and
>
> (ii) establish a building on that site in which a Maritime Museum be established."

---

1. The Sydney Maritime Museum, Proposal to the Bicentenary Committee, 14th August, 1981.
2. The Sydney Bicentenary Committee has been established as a regional committee under the Chairmanship of the Lord Mayor of Sydney to monitor suggestions for the Bicentenary prior to their consideration by the Bicentennial Authority.

The Proposal goes on to state that,

> "Darling Harbour would provide the Sydney Maritime Museum with the security and the environment necessary to facilitate completion of the Museum's current restoration projects in time to play an active role in the Bicentennial Celebrations. It would also:
>
> (i) provide a major tourist attraction;
>
> (ii) provide a suitable environment, not only for the display of the Museum's current exhibits, but also to attract new exhibits of a calibre worthy of display, for example perhaps providing a permanent home for the "Krait";
>
> (iii) provide the necessary facilities to undertake additional restoration projects, and thus to save worthwhile vessels that would otherwise be lost to future generations; and
>
> (iv) it is close to existing main tourist areas, the Opera House and The Rocks, as well as being close to the new Haymarket Entertainment Centre.
>
> It offers a site that is suitable for development and a protected anchorage away from main shipping areas."

The Museum's income is derived from membership fees, gate takings, art unions, functions and donations. At present, gate takings amount to $50,000 per annum. The move to Darling Harbour is conservatively expected to boost these takings to $100,000 per annum. In the United Kingdom, the Cutty Sark has over 460,000 visitors per annum, and in Melbourne the Polly Woodside has 100,000.

The Museum points out that tourist figures for The Rocks number in excess of 800,000. This is only slightly less than the Opera House. Compared to these figures, and without allowing for the site's proximity to the Haymarket, a goal of 250,000 visitors seems to be conservative.

12.1 Museum's Space Requirements

Existing -

Area occupied for internal display and administration	1785 m^2
Workshop	468 m^2
Length of wharfside occupied by ships	206 m

The dimensions and tonnage of the ships are -

James Craig - hull, three mast barque
55.0 m length; 9.4 m beam; 3.0 m draught 650 tonnes

John Oxley - steamship
51.2 m length; 9.8 m beam; 3.8 m draught 544 tonnes

Waratah - steamship
33.1 m length; 6.2 m beam; 3.1 m draught 134 tonnes

Lady Hopetoun - steam yacht
23.4 m length; 4.0 m beam; 2.0 m draught 38.5 tonnes

Protex - harbour ferry
10.6 m length; 3.9 m beam; 1.2 m draught 10 tonnes

In addition to the Museum's fleet, it is proposed to provide berths for other historic ships which are in private ownership. These include the South Steyne, the New Endeavour and the Krait. It can be expected that other vessels, like an America's Cup contender, will be added to the fleet.

13.0 THE AUSTRALIAN FISHING MUSEUM

The Australian Fishing Museum is located at Birkenhead Point in the same shopping complex as the Maritime Museum. It leases approximately 650 m^2 on one of the upper floors.

The lease arrangements are similar to that of the Maritime Museum, whereby the amount paid is less than a realistic economic rental value of the premises. Again a higher turnover of paying visitors would boost income and this could happen in a location such as Darling Harbour.

The Australian Fishing Museum was established:

(i) to record Australian fishing history;

(ii) to provide an information service to the community on all aspects of fish and fishing;

(iii) to encourage research into management and conservation of fish resources;

(iv) to maintain a Reference Library, including an audio-visual section; and

(v) to fill an educational need.

The items on display range in size from fish hooks to fishing boats and include a large number of ferocious-looking replicas of sharks suspended from the ceiling. The Museum changes some of its displays from time to time and requires storage space for items not on display.

14.0 THE SYDNEY MARITIME MUSEUM AND THE AUSTRALIAN FISHING MUSEUM AND THE PYRMONT BRIDGE PLATE 47.

At the eastern side of Pyrmont Bridge there is an old wharf which extends about 150 m from the remainder of the stone eastern abutment of the bridge towards the swing span. It is 37 m wide and the underside of the bridge trusses are approximately 5.8 m above the wharf deck.

The total area of this wharf is 4550 m^2 and the length of wharfage on the southern side is 110 m.

This wharf, Berth No.28, supports a very dilapidated galvanised iron shed. The roof of this shed is suspended from the trusses of the bridge above. The massive timber bridge piers penetrate the wharf and disappear into the water.

It is proposed to relocate the Maritime and the Fishing Museums on this wharf. The existing shed will be demolished. The wharf repaired as necessary (at present it is rated to carry a deck floor loading of 2756 kg/m^2 and a wheel loading of 4.2 tonnes). A new Museum building will be erected upon the wharf which is specifically designed to compliment the structure of Pyrmont Bridge.

The total area of this building will be about 3500 m^2 but, in addition, there will be space at mezzanine level for administrative offices, public toilets and other facilities.

The Fishing Museum would have a ground floor area of 625 m^2 plus a mezzanine of 200 m^2.

The Maritime Museum would have a display space of 2100 m^2, a workshop of 750 m^2, plus an external display area of approximately 1000 m^2 on the wharf immediately south of the bridge. These areas allow ample room for expansion.

The additional berths required to accommodate the historic fleet would be created by building a new jetty parallel to Pyrmont Bridge and 50 m south of it. It would project into the Harbour as far as the existing wharf below the bridge and it would provide another 250 m of wharf where ships could tie up alongside. Additionally, it would provide berths for privately owned, historic vessels as well as room for the expansion of the Museum's fleet.

This site is considered to be nearly ideal for both Museums. It has the following attributes in its favour.

(i) Visibility - from the Freeway, the City, Pyrmont/Ultimo and the proposed Bicentennial Park;

(ii) Location - close to the established tourist attractions of the City and the Haymarket, and part of the potential tourist attraction of Pyrmont Bridge and Darling Harbour;

(iii) Accessibility - on foot from the City and Bicentennial Park;

(iv) Transport - on proposed ferry route,
on proposed tramway,
rail station at Town Hall, 500 m away
city buses in Market Street; and

(v) Car Parking - car parking available in the CBD commercial car parks and as proposed for Bicentennial Park.

15.0 THE DARLING HARBOUR INDUSTRIAL GROUP

The Darling Harbour industrial group is contained within the area bounded by Day Street, Harbour Street, Pier Street and the Goodsyard. The buildings there represent the continuous use of the area for industrial purposes since the first steam engine ran in 1815.

Street names in the area reflect the industrial beginnings. Steam Mill Street, commemorates the early steam engines. Barker Street and Barker Lane were named after the son-in-law of John Dickson, the man who introduced steam engines to Australia.

A comparison of the map of 1888 and the existing buildings reveals that very few of the early buildings survive. Those which do are noted below. PLATE 28.

(i) 1-9 Barker Lane
4-12 Steam Mill Street

The remains of two rows of terrace houses which backed onto one another. At one time the back yards were built over and the cross walls removed. The ground floor front walls have large openings and roller shutter doors. Currently, the houses are used as a workshop by the DMR. PLATES 38, 39.

(ii) 19 Duncan Street

In 1888, this building was used by Miller and Harrison Saw Mills with direct access to a Darling Harbour wharf. Three of the original buildings remain and form a pleasant group of two storey brick buildings around a yard. PLATES 40, 41.

(iii) Rear of 2-16 Liverpool Street

Between Miller and Harrison's yard and Liverpool Street lies the stables for the Fresh Food and Ice Company. The stables are still there although the stalls and hay boxes have been removed to make way for parked cars. Beneath the concrete floors of some of the adjoining sheds lie the original stone setts which were shipped out to Australia as ballast from South America.

(iv) 49-57 Steam Mill Street and 1-17 Duncan Street

The York Motors building which occupies the entire block bounded by Steam Mill Street, Duncan Street, Thomas Street, and Barker Street. It is a two storey industrial building with large arched windows to the ground floor. Above each arch are double rectangular windows with projecting pillasters defining the bays. The parapet is punctuated with urns. The principal feature on the north facade is the double arched doorways set in one large stone archway. The building was opened in 1904 by the Right Honourable, the Lord Mayor of Sydney, S.W. Lees.

The style of the building suggests that the architect was inspired, to some extent, by the Queen Victoria building, completed a few years previously, a simplified industrial version of the Byzantine style. PLATE 37.

(v) 1-33 Liverpool Street and 1-25 Harbour Street

The Fresh Food and Ice Company's original premises were located on the site of the present Peters' Milk premises. Most of the site is on land reclaimed between 1854 and 1888. Many of the buildings were erected in 1925 by the Fresh Food and Ice Company.

> In 1888, access to the Company wharf was by Kersey Lane which ran at right angles off Harbour Street. On the south side of the land at the junction with Harbour Street, there was a simple two storey building with load bearing brick walls, two bays wide with hardwood columns down the middle. Parts of this building still exist. The eastern end was demolished and a new facade erected when Harbour Street was widened. The western end of the building was removed to improve vehicular circulation within the yard.(1)

None of these buildings have been classified by the National Trust or listed by the NSW Heritage Council.

This area saw the birth of the Industrial Revolution in Australia with the introduction of steam engines in 1815. Industry has maintained a continuous and historic association with the place ever since.

Conservation of part of this industrial heritage is necessary now, because future environmental improvements will create increased pressure for redevelopment. As a result of projects like the Entertainment Centre and, in anticipation of a park on the Goodsyard, plans are being prepared already for the redevelopment of the Peter's site.

In selecting buildings for conservation consideration was given to the following questions:

(i) did the building have historic and architectural significance?

(ii) was the building a good example of its type and style?

(iii) was the building still used for industrial purposes?

(iv) did the building form part of a group, or was it likely to be isolated by future redevelopment? and

(v) did the building have any relevance to the Bicentennial Park proposal?

---

1. An old employee of the Company claims that parts of the original Company's wharf are still visible within one of the buildings. An inspection of the premises failed to verify this claim.

It was apparent that the Steam Mill Street, Duncan Street group best met these criteria. It comprises:

(i) 1-9 Barker Lane,
4-12 Steam Mill Street; PLATES 38, 39.

(ii) 49-57 Steam Mill Street and 1-17 Duncan Street, (the York Motors Building); and PLATE 37.

(iii) 19 Duncan Street. PLATES 40, 41.

By conserving these buildings, No. 2 Steam Mill Street, a 3-1/2 storey brick warehouse factory built in the 1920s, becomes isolated. With its small site and comparatively high floor space ratio, it is unlikely to be redeveloped. The building is totally devoid of ornamentation. It is a square brick box with multiple pane metal frame windows. Visually, it forms part of the group. It is proposed to include this building within the conservation group. These buildings occupy about 20% of the industrial zoned land in this part of the city.

In preserving these buildings, it is important to preserve the industrial uses as well. This could be achieved by including the premises in a conservation area and permitting only industrial uses. These measures could become part of the Darling Harbour Management Plan, or, alternatively, they could be incorporated in an LEP prepared by the City Council.

The 1-9 Barker street, 4-12 Steam Mill Street terraces, should be retained as workshops, repaired as necessary and leased, once the DMR has no further use for them.

The 49-57 Steam Mill Street, York Motors building, is suitable for limited redevelopment. Most of the facade should be preserved and new work would require to be of an appropriate scale and carefully detailed.

The Saw Mill at 19 Duncan Street is still used as a joiners shop and it should remain in this type of use. The oldest building of the group, a two storey sand-stock brick workshop is perilously close to collapse. This group is owned by the SRA.

The brick factory at 2 Steam Mill Street should remain in its present use, however the ground floor should be adapted to a Tram Shed as part of the Bicentennial Park tramway proposal.

CONCLUSION

CONCLUSION

Darling Harbour has more potential than any other part of the City to improve the urban environment for citizens, workers and visitors alike.

Most of this potential arises from the fact that Darling Harbour Goodsyard is obsolete and the land will become available for other uses. Some of the potential rests with Pyrmont Bridge, although it is no longer required for vehicles, it is still a necessary link between Pyrmont/Ultimo and the City. Its unique harbour location and potentially good access to the city give is a viable commercial future. The remainder of this potential is derived from the stock of old buildings which have a considerable amount of adaptability and varying amounts of historic and cultural significance.

The realisation of this potential lies in the hands of the State Government. Most of the land is owned by Government departments. The construction of the Entertainment Centre, the establishment of the Museum of Applied arts and Sciences in the old Ultimo Power station, the Institute of Technology's imaginative proposals for No.3 Market on Quay Street and the transformation of Dixon street by the City Council as the focal point of Chinatown, all confirm the changing nature of this area.

At present this area is a little known semi-derelict urban wilderness in the heart of the city. It is isolated because public access is denied, and its potential is largely unrecognised because so few people have ever been there.

Prior to 14th May, 1982, when the Citizens' Committee for the Preservation of Pyrmont Bridge was formed, the area had a total lack of identification with any organisation or residential group. This fact, together with the unaccessability of the Goodsyard meant that no special interest group had formed to promote the idea of recycling the place for people or preserving any of its buildings or structures. This meant that, apart from the City Council and the Civic Design Society of NSW, no organisation has brought pressure to bear on the State Government to consider alternative plans to those of the MSB and the DMR. The fate of Darling Harbour, the Goodsyard and Pyrmont Bridge is not a political issue. If the tremendous potential is to be realised, it must be made into a political issue. Perhaps the formation of the Citizens Committee for the preservation of Pyrmont Bridge is an indication that this process has begun.

One of the first acts of the Citizens Committee for the Preservation of Pyrmont Bridge concerned the future ownership of the bridge. It suggested that the successful plan[1] which had been developed jointly by the Heritage Council, the DMR and Wollondilly Shire Council for the acquisition, restoration, preservation and maintenance of Maldon Suspension Bridge at Picton be adopted for Pyrmont Bridge.[2]

The Proposal, detailed in Part III of this report, has resulted from a comprehensive study of an entire area which is ripe for change. Conservation is an integral and essential part of the overall scheme. It seeks to exploit the great potential of the area by:

(i) achieving a balance of uses in the Goodsyard area including a major open space; and

(ii) ensuring the conservation of the culturally significant buildings and structures by providing viable future uses.

In preparing and describing the Proposal any available costs relating to the demolition and or maintenance of Pyrmont Bridge have been included. The estimated cost of relocating the Darling Harbour Goodsyard fluctuates wildly between $20 million and $60 million. The draft Darling Harbour Management Plan contained preliminary estimates of the cost of creating a park, but, as the design is considered unappropriate the estimates bear little relationship to the Proposal in this report. In addition, the income which the Government could derive from the sale or lease of Government land to defray the cost of establishing the Park is unknown.

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1. Harry Trueman, B.E., Dip.Cons.Stud.(York). A.M.I.E.(Aust.) Chairman of the Citizens Committee for the Preservation of Pyrmont Bridge Working Party, Draft Paper on Historic Bridge Management, September, 1982.
2. The plan involves the establishment of a Trust, preferably by Sydney City Council, which purchases the bridge, for $1.00 , in good condition from the DMR, and has the responsibility for the future development of the bridge and maintenance of the fabric. The Trust would also bear responsibility for preserving the cultural significance of the bridge. At Maldon Bridge, the DMR used the demolition money to restore the bridge for transfer to the Trust.

In the midst of this financial uncertainty Pyrmont Bridge, repaired, maintained and available for commercial use, appears to have a viable future.

The Premier's latest announcement[1], that Markets 1 and 2 (Paddy's Market) will be redeveloped as a high rise international hotel and conference centre, with construction beginning in mid-1983, means that Paddy's Market will be looking for a new home in the near future. Pyrmont Bridge would provide an ideal location.

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1. Sydney Morning Herald, 18th October, 1982.

APPENDICES

APPENDIX I

A BRIEF BIOGRAPHY OF PERCY ALLAN A.M.I.C.E.
Engineer and Designer of Pyrmont Bridge

Percy Allan was born on 12th July, 1861 in Sydney. His father was Maxwell Rennie Allan who was an Under Secretary in the Colonial Secretary's Office , NSW. His mother was called Frances Stubbs.

Young Percy went to school at Calder House, Sydney and joined the Roads Branch of the Public Works Department as a cadet on 8th September, 1878 at the age of 17. The quality of his evidence to the Royal Commission of 1894 and his paper to the Institute of Civil Engineers, London, in 1907, both testify to a man of considerable intelligence and academic ability.

After 4 years as a cadet, Percy was promoted to Assistant Draftsman in 1882 and Chief Draftsman in 1889. His training by pupilage continued under senior engineers within the Deptartment in accordance with the conditions prescribed by the Institute of Engineers, London.

He was a keen rugby football player and a member of the Warrigal Football Club which toured New Zealand in 1886. He maintained a keen interest in the game and became a referee. In later life he was a keen golfer.

In 1890 he went to Melbourne and in the Roman Catholic Church at Hawthorn, he married a farmer's daughter named Alice Mary Tranginar. They had two sons.

In 1894 a Parliamentary Standing Committee on Public Works considered the replacement of Pyrmont and Glebe Island Bridges. In his capacity as Chief Draftsman, Percy Allan presented evidence to the Committee on how Pyrmont Bridge could be replaced by an alternative road viaduct, which spanned reclaimed land, on the same alignment as Bathurst Street. This proposal had considerable merit but it was not recommended by the Standing Committee. This was his introduction to Pyrmont Bridge.

Percy's rise through the public service was sure and steady. On 1st January, 1895 he was appointed an Assistant Engineer for Bridges and a year later he was promoted to Engineer-In-Charge of Bridge Design, and it was in this capacity that he designed Pyrmont Bridge.

His design featured a roadway 16.5 m (54 ft.) wide including 2.1 m (7 ft.) footpaths. It is supported, for the most part, by ironbark trusses spanning 25 m (82 ft. 4 ins.). The swing span, made of steel, provides for two 21.3 m (70 ft.) fairways for shipping. The swing span weighs 813 tonnes (800 tons). The total length of the structure and the approaches was 536 m (1,758 ft.) and it is one of the largest swing span bridges in the world. It has been classified by the National Trust.

On 1st January, 1906, at the age of 44, he became Principal Assistant Engineer Water Conservation and 2 years later in 1908 he was appointed District Engineer at Newcastle.

In 1911 he was promoted to Chief Engineer for Public Works, Newcastle but the following year he returned to Sydney as assistant to G. Davis Director General of Public Works. When railway construction was transferred to the Railway Commissioners and the position of Director General was abolished, Percy, was confirmed on 14th July, 1918 as Chief Engineer, National and Local Government Works, at 1,250 pounds per annum. When he retired in 1927 his department had designed 583 bridges in his time.

The range of projects in which Percy was involved was very extensive. Apart from bridges he was involved with rivers, artesian bores, water-supply and drainage. His work included supervising the construction of Sydney's Sewerage System with ocean outfalls. These ocean outfalls still handle the city's sewage disposal. At Newcastle between 1908-11 he constructed the Northern Breakwater designed by E.M. de Burgh. He personally designed and built additional coal loading wharves and cranes.

He took great interest in the running of the Engineering Profession in the Colony/State. In 1908, at Newcastle, he was a founder and first President of the Northern Engineering Institute of New South Wales.

In 1900 he became a member of the Institute of Engineers, and he presented four papers on engineering works in the Colony of NSW to the Institute in London. These papers were entitled - "Port improvements at Newcastle, NSW" which was awarded a Telford Premium in 1921. "Georges River Bridge", "The Wagga Wagga timber bridge NSW" and "Pyrmont Bridge, Sydney" complete with lantern slides. The latter illustrated talk on Pymont Bridge was used also as the first of many talks at the Northern Engineering Institute.

The recorded discussion of these papers at the Institute Headquarters in London show a lively interest in the achievements of colonial engineers. The Pyrmont Bridge paper was hailed as an indication of the Colonies growing maturity. He joined the American Society of Civil Engineers, no doubt to keep abreast of the latest engineering trends in the New World. He was also a member of the Australasian Pioneers' Club.

Percy Allan retired from the public service at the end of February, 1926 and on his retirement the National and Local Government Works Branch was amalgamated with the Harbour and Drainage Branch. Mr. T.E. Burrows became Chief Engineer, Harbours, Roads and Bridges.

Percy Allan rates with Bradfield, Lennox, Whitton, McDonald and de Burgh as one of the great early bridge engineers of NSW. He is specially remembered for his development of the timber truss system which bears his name. This was a modification of the American Howe truss that allowed the taking up of shrinkage during use, more efficient maintenance, and the more economial use of tmber. The Howe truss probably represented the ultimate development of timber trusses overseas, and the Allan truss therefore probably represents the ultimate development of the timber truss throughout the world. The trusses at Pyrmont Bridge were amongst the finest of the Percy Allan trusses and Allan considered this bridge his greatest work.

Percy Allan lived at Double Bay and it was there, on the 7th May, 1930 at 68 years of age that he died of angina and cardiac failure. He was buried in South Head Cemetary.

He was survived by his wife and two sons who inherited his estate, valued for probate in NSW and Victoria at 6,158 pounds. His wife died on 27th March, 1947 at the age of 82. She was interred beside her husband.

Sources:

(i) Dept. of Public Works
(ii) Australian Directory of Biographies
(iii) Harbours, Roads and Bridges Branch PWD. Report for years ended 30th June, 1926
(iv) South Head Cemetary, tombstone.
(v) Harry Trueman, Institute of Engineers.

APPENDIX 2

PYRMONT BRIDGE, THE OPENING CEREMONY

On the 30th June, 1902, The Sydney Morning Herald printed the following article which contains a description of the Opening Ceremony and the text of the speeches by the Governor, Sir H.H. Rawson, K.C.B., and the Minister for Works, Mr. E.W. O'Sullivan:

"THE NEW PYRMONT BRIDGE
OPENED BY LADY RAWSON
AN INTERESTING CEREMONY
SPEECH BY SIR H.H. RAWSON, K.C.B.
DISAPPEARANCE OF AN OLD
LANDMARK
MEMENTOES OF THE OLD
STRUCTURE
ADDRESS BY THE MINISTER FOR
WORKS

"The ceremony of opening the new Pyrmont Bridge was performed on Saturday morning conjointly by his Excellency Sir H.H. Rawson, K.C.B., and Lady Rawson, in the presence of a large gathering of people. It was accompanied by several interesting incidents connected with the life history of the old bridge which has been superseded by the new structure, and will shortly disappear altogether from view. The time fixed for performing the ceremony was midday, and long before that hour a large number of people assembled to witness it. In order to prevent accidents when the central swinging span was set in motion a fence was erected across the bridge and about 50 yards from the swinging span, and only those specially invited by ticket were allowed by the police to pass through the gate in the fence. In the centre of the swinging span a temporary platform was erected for the accommodation of the vice-regal party and some 30 guests, who were to enjoy the privilege of being the first to sit on the span whilst it opened and shut for the first time in public.

"At noon his Excellency Sir H.H. Rawson, accompanied by Lady Rawson, Miss Rawson, Master Rawson, and Captain Watt, A.D.C., arrived, and was received on the bridge by the Minister for Works (Mr.E.W. O'Sullivan), the Minister for Education (Mr. Perry), the Minister for Mines and Agriculture (Mr. Kidd), Sir George Dibbs, Sir H.N. MacLaurin, M.D., M.L.C., the Mayor of Sydney (Ald. Thomas Hughes) and his colleagues, a number of members of the Legislative Assembly, and public officers. A guard of honour was furnished by the Civil Service Corps. Mr. O'Sullivan, on behalf of the citizens of Sydney, welcomed his Excellency and Lady Rawson on their arrival upon the bridge. Mrs.O'Sullivan then presented Lady Rawson with a handsome bouquet of flowers made up in spray form by Searle Brothers.

"His Excellency and Lady Rawson, with the Ministerial Party, having taken seats on the temporary platform erected on the swinging span, that structure was swung open and then closed again. Whilst it was opened, a great crowd of people lined the yawning gap that looked down into the river. It was very fortunate that the people behind, in their eagerness to secure a good position, did not press forward. Had they done so many people would have been tumbled into the river, and perhaps on to the timbers below. It was an anxious moment for the policemen who lined the gap. When the bridge swung back into its place there was a great rush on the part of the public to secure good positions around the platform from whence the speeches were to be delivered, and the ceremony of cutting the ribbon was to be performed by Lady Rawson. The arrangements for preserving anything like order in front of the platform were very bad indeed. The crowd rushed in pell mell, and even the guard of honour with fixed bayonets, dangerous weapon in a crowd, was completely helpless to keep a clear space.

"When something like order had been secured, Mr. O'Sullivan said he had great pleasure in asking Lady Rawson to cut the blue ribbon stretched across the bridge as a signal that it was open for public traffic. For that purpose Mr. O'Sullivan presented her Ladyship with a beautiful pair of gold scissors from the establishment of Messrs. Hardy Brothers. In

consequence of the Minister jocularly remarking that that particular piece of ribbon would, in the course of a few years, be worth 5 pounds a piece as a memento of the occassion, hundreds of hands grasped the ribbon, intent upon securing a piece. For a moment or two there was an unseemly struggle amongst the people, but the ribbon was partially released on Mr. O'Sullivan calling out that Lady Rawson would not cut it unless it was left free. The next instant her Ladyship severed the ribbon, every particle of which disappeared in a moment.

DECLARING THE BRIDGE OPEN

"His Excellency said:- Lady Rawson having, on behalf of the Government of this state, performed the ceremony which will formally hand over this splendid structure to the people for all time, I desire to briefly refer to some particulars I have procured regarding it and the penny bridge it is to supersede. As to the old structure, I am sure there are many who, although they appreciate to the utmost all the improved facilities this new work will give, still have a feeling of regret when they comtemplate the demolition of yet another of what I might term your old Landmarks. It is one that has rendered invaluable service for many years to the busy throngs that have daily used it as a means of communication with your western water suburbs; and one upon which the demands from year to year have become greater and greater, for at the onset I do not suppose there were many of those great businesses all along what you call Johnstone's Bay, and the other industries now on your water side in that direction, nor was there required the great accommodation at Darling Harbour and Darling Island for wheat, wool, and coal traffic, which is now such an absolute necessity for your Railway Commissioners. Thus, while it is good to cherish a sentiment of fondness for these old connecting links with the past, present needs push on, and the irresistible march of development demands attention. All that increased knowledge in engineering skill, yea, and in every branch of science and art, must be obtained for the advancement of that great national characteristic that has planted and kept the Britisher and his sons at the head of the world - commerce.

And so, as we bid farewell to this old friend who has served you so faithfully, and bears the highest testimony to the durability of that splendid hardwood of yours, ironbark, we might well give a few historical facts. Constructed by a private company at a cost, it is stated, of 75,830 pounds, it was opened for traffic on St. Patrick's Day, 1857, and was retained by the company up till 1884, when it was purchased by the Government under the Pyrmont Bridge Act for the sum of 49,600 pounds, and with this acquisition came the boon of free access by the people, for the tolls which had hitherto been charged were then abolished. Seven years later it was feared that the crisis of its life was approaching, and a decision was then arrived at, I understand, to invite competitive designs from every part of the world, for a bridge to be erected upon the site on which this new one one stands. Numerous schemes were received, and upon adjudication premiums amounting to 1,000 pounds were awarded by the Advising Board of Engineers; the first premiated design being one, for a steel bridge, estimated to cost 295,700 pounds. No further action was taken, however, until early in 1894, when the question of the removal of the old bridge and the construction in its place of certain other means of communication was referred by your Parliament to the Parliamentary Standing Committee on Public Works, for inquiry and report. After two inquiries extending over many weeks, during which time I am informed no less than 26 schemes were under consideration, the committee ultimately decided in favour of the design for the bridge which has just been completed. It should be explained just here, though, that as the first premiated design only allowed for a roadway on the swing span of 38 ft., and two fairways for shipping of 60 ft., each, it was decided by your Public Works Department to submit the design now carried out, which is entirely different, in that the throttling of the road traffic has been avoided by making the roadway on the swing span the same width as that on the rest of the bridge, namely, 54 ft. Provision was also made for two fairways of 70 ft. in order to better meet the tendency nowadays to increase the beam of vessels, and this also given the additional advantage of allowing all vessels to pass through more quickly; while a further improvement, as compared with the old structure, is given by the building of the other

spans with a headway of 26 ft. above high water, as against the 6 ft. available previously. Thus your vehicular and pedetrian traffic is retarded but a minimum of time, while the most liberal provision is made for your shipping interests. In passing on I should just like to mention a few facts that have interested me considerably in conection with the swing span. Dealing with its floor space, the area of 12,000 superficial feet compares more than favourably with the 10,600 ft. of the Newcastle-on-Tyne bridge swing, the 9400 ft. of the swing of the bridge in connection with the Manchester ship canal, and the 87,000 ft. of the swing in the bridge at Hawarden. As to other matters, whilst I believe there are larger swings in American bridges, yet is is doubtful if at the present time there are any in the world more up-to-date in regard to equipment, for in the case of the bridge we are now opening the slewing of the swing, the lifting of the ends, the operating of the gates, and the lighting of the roadway are all done by electricity controlled by one man stationed in the small conning tower yonder. What a great lesson this teaches us all in progression, when we consider this hugh swing, some 223 ft. long, and weighing 800 tons, opened or closed in a space, I am given to understand, of 44 seconds, simply by a man pressing a button. Compare it with the cumbersome and tedious method of hand-power, as exists in the old bridge alongside, and we are brought face to face with another great example of human progress, and, considered in an economic light, think what a saving it is of what I suppose is counted, certainly by your business men, as perhaps the most precious thing to man; on our large steamships, the Atlantic liners, for instance, the shortening of the trips by minutes even counts; on our railways, too, where water is picked up while the train flies on at unslackened speed. And so we might enumerate everything that saves even a little time as an achievement, and I would thus congratulate you in this respect on obtaining such a marked improvement on what has hitherto obtained. But all this has only been got by the power of men's brains and their capacity for work, and you must have men in your midst in connection with your public departments who have shown they are possessed of these qualifications to no mean extent, else you could never have the architectural and engineering triumphs which I, but so

shortly in Sydney, have seen so many fine examples of since my arrival. In concluding, there is just one other comparison I should like to make. Doubtless many of you have seen the great Tower Bridge of London, and such of you as have not have heard of it; well, the roadway of your bridge away out here in Sydney is 4 ft. wider than its roadway, and will, therefore, give more traffic facilities than that celebrated structure. I can only add that I sincerely trust the progress which has rendered the construction of such a bridge as this imperative may be continued to you (Cheers). I now declare this bridge open for the use of the public.

"After the cheers of the people had subsided,

"His Excellency said he was sure that all present regretted the illness of the King, and he was certain that everyone would join in an earnest prayer for the King's return to health. (Cheers).

"At the call of his Excellency for cheers for the King they were given with great heartiness. Cheers were also given for the architect and engineers who designed and built the bridge; and finally cheers were given for the Governor and Lady Rawson.

SPEECH BY THE MINISTER FOR WORKS

"The Minister for Works (Mr. E.W. O'Sullivan), on coming forward to address the assemblage, was received with hearty applause. He said:- "Those of us present who knew the locality under the old conditions, and I suppose most of us did, with the somewhat awkward approaches, the cramped thoroughfare for the continuous stream of vehicles that crossed the old bridge, the dangers pedestrians ran, and the vexatious delays that occurred when the swing had to be opened, will be ready to appreciate to the full all the more expeditious facilities and conveniences modern engineering skill has placed at our disposal. And, as we view the fine broad and direct approaches, we must be reminded of those wise men who effected changes in the configuration of great cities, such a Birminghan, and who thus made themselves benefactors to the

dwellers in such places for all time. No wild dream of works simply for decorative purposes, but good solid ones of permanent improvement. These are what we desire to leave behind. Mr. J.H. Young was the Minister who proposed and legalised the work, but I carried it out. Turning more particularly to the bridge itself, from press statements I have read from time to time I have learnt that the result we now have before us has not been brought about without considerable anxiety and care on the part of those immediately responsible for the construction. We live in the time of 'records', records for everything, even for talking and the duration of our Parliamentary sessions, but in the case I now refer to it is for cylinder sinking. Naturally, the part of the bridge where the mechanism is situated interests us most, and this is in connection with the swing span. A pivot has had to be built for this monster of 800 tons to be sent round on by electricity, which involved the sinking of a caisson, the largest put down in this hemisphere, no less than 42ft. in diameter, with a depth of 62ft. from what is known as the 'cutting edge', which goes away down into the bed of the harbour to the rim from which point the masonry we can see rises. And the total weight of this pivot pier, the cylinder being filled solid with concrete and blocks of stone, is estimated at 6800 tons; so if there are any master mariners present who occasionally come through the bridge span, I would advise them not to attempt to shift the pivot with their vessels, for they will find it pretty tight on its seat. (Laughter). Apart from the swing span there are 12 other spans, each about 82ft. in length, and while the material in the swing span is iron, these others are constructed of what we call the king of woods - our Australian ironbark. Reference has been made often to its marvellous durability, but I would just like to mention an incident that occurred in connection with the old bridge. One of the piles had to be removed, and after it had been drawn up it was sawn in two at the section situated at the spot most liable to destruction, namely, between the tides, when, despite the fact that it had been in position for a period of 43 years, it was found to have deteriorated little, if anything, being still serviceable. The total length of bridging is about 400 yards, and, including the approaches, the distance from end to end is 586 yards.

Speaking of the old bridge one is reminded of some of the incidents connected with its life, more particularly the one in 1881, when our friend Sir George Dibbs took possession of it from the private company which had previously owned it. A reference to The Sydney Morning Herald of August 1 in that year will recall the display that accompanied this taking over, and from that time onward the people have enjoyed the right of free access without any burden of tollage, and the relief that this afforded may to some extent be realised when it is mentioned that for the few years previous the bridge company's secretary stated that tolls had varied between 9,000 pounds and 10,000 pounds per annum. Originally, competitive designs for the work were invited, and the one which was awarded the first premium, and provided for steel construction throughout, was estimated to cost 295,700 pounds. The total cost of the newly completed structure, which was designed entirely in the Works Department and provides, as we can see, for full width roadway from end to end instead of narrowing it at the swing span as was proposed in the design just alluded to, is set down at 112,500 pounds; and it is well to mention that owing to the Darling Harbour resumptions and the necessity for giving a road right round the foreshore, the Sydney approach as designed and as carried out is somewhat different. Provision for the road, however, has been duly made, so that now the bridge will not interfere in any way with the scheme of which this roadway forms a part. The estimated life of the bridge is set down at 50 years, and it is interesting just to conjecture what improvements may take place in and around this portion of the city by the expiry of that time. One can only hope that the progress and development that have taken place here in the past 50 years, and in all the states, despite our bad seasons, and which have made works of this kind necessary, may continue, and as the demands come the men will be found who will carry out the works. I might say the designer in this instance, Mr. Percy Allan, M.Inst. C.E., is an Australian, and his work proves that the native-born are giving evidence of high ability in every department of engineering, as they have already done in science, art, literature, music, vocalisation, and sports." (Cheers).

DESCRIPTION OF THE BRIDGE

The Minister for Works proceeded to give an interesting description of the operations connected with the construction of the bridge. In the course of his speech he said:- The initial operations in connection with the work now completed were performed on September 6, 1899, when I laid the foundation-stone of the abutments, and drove one of the main piles. It was determined at the onset not to let the work in one entire contract, but to divide it into three sections, mainly with the object of securing wider competition for the respective classes of work, i.e. timber spans, pivot and swing span, and masonry, etc., in connection with the abutments. The whole, however, has been carried on simultaneously, with the result that considerable expedition has taken place in completion. No. 1 contract was let to Messrs. Farley and McCarthy, and covered the construction of the abutments, the retaining walls, and embanked approaches on the Sydney and Pyrmont sides of the harbour. The abutments and northern retaining walls are built of concrete faced with rock-faced masonry and with plasters, string courses, weatherings, and balustrades of chiselled and rubbed sandstone, while the southern retaining walls, being little exposed, have been built entirely of concrete. Some 230 piles had to be driven in connection with the Sydney side, the nature of the formation being made ground, and consequently not sufficiently secure, but on the Pyrmont side of the foundations have been carried to the rock, although some difficulty has been met with on a portion of the abutments, but this was successfully dealt with. Consequent on the desire of the Harbour Trust to have a roadway round the foreshore, not provided for in the design originally, as the resumptions had not then taken place, some alterations were necessary at the Sydney approach, and these were carried out by day labour. Contract No. 2, which has been carried out by Mr. McClure, includes the timber side spans between the abutments and each end of the swing span. These are 12 in number, and are formed of 72 timber trusses, six in each span, 8ft, deep, spaced 9ft. apart between the four central and 10ft. bin, apart between the two outer trusses. There are 22 piles driven into the solid bed of the harbour, in some cases to 53 ft. below low water mark, in each of the 10 timber piers, and

these piles, sheathed with Muntz metal, are rigidly braced and stiffened. Contract No.3 was in the hands of Messrs. J. McCormick and Sons, and provided for the swing span, pivot pier, rest piers, and protecting platforms. It is in connection with this contract that the more intricate part of the whole of the work has been found, the sinking of the caisson, of which particulars have appeared in the press from time to time, being a feat of engineering skill, and reflecting the highest credit alike on the supervising engineer (Mr. Percy Allan) and his staff and the contractors. The huge chamber, for it has a diameter of 42ft. was first started on August 2, 1900, and by October 29 sufficient of it had been completed to permit of its being grounded, by means of girders and wedges, in the position it is to now permanently occupy in the bed of the harbour. Then it had to be gradually worked down to a depth of 46ft. below low water mark, at which point the cutting edge touched rock on one side, when after the necessary damming the chamber was pumped out. Excavation was then carried on in the 'dry' until a 'blow' occurred, when the tedious process of excavation with the water in the chamber had to be resorted to. Ultimately the work was satisfactorily completed, the caisson being poised with the nicest accuracy. Filling operations then proceeded, and it is now a solid block of concrete and stone. As most of you are aware, the motive power for working the swing span is electricity, supplied from the Ultimo Power-House. This is a very decided improvement on the old method. Both the slewing and the lift motors are carried on a platform inside the drum, the former working through a train of gears a vertical shaft, on the lower end of which is a cast steel pinion meshing, with a cast steel rack secured to the top of a pivot pier, whilst the end lift is effected by means of cones on horizontal shafts worked by a 35-horse-power motor gearing on to a longitudinal shaft running the whole length of the bridge. The total length of the bridging is 1200 ft., the swing span is 223 ft., while the entire length of the work from the end of the Sydney aproach to the end of that of Pyrmont measures some 586 yards. It is anticipated the cost of the work, when everything is fixed, will be about 112,000 pounds. The design was one submitted by the Department when the Public works committee were inquiring into the proposal, and was selected out of some 26 schemes

considered. Originally competitive designs were invited, and the design that secured the first premium was estimated to cost 295,700 pounds, but this provided for steel construction throughout. The greatest attention has been paid in every respect to make the work as complete as possible, the shipping interests having been studied by the provision of two 70 ft. fairways and a 26 ft. headway above high-water mark under the fixed spans, while a full roadway has been provided from end to end, and a quickly opening and closing span for the benefit of vehicular and pedestrian traffic. (Loud cheers.)

"It only remains to be said that the bridge was designed by and constructed under Mr. Percy Allan, M.Inst. C.E., one of the engineers of the Public Works Department, who had the privilege in the earlier stages of the work of consulting with Mr. C.W. Darley, M.Inst. C.E., then Engineer-in-Chief for Public Works, and Mr. O. Brain, Chief Electric Engineer for Railways. In the construction of the work he had the benefit of the experience of the present Commissioner and Engineer for Roads and Bridges, Mr. W.J. Hanna, Mr. Boswell was the assistant engineer, and Mr. Thackray, the inspector on the works. Messrs. Farley and McCarthy were the contractors for the original approaches, the extension of the Sydney approach having been carried out by the Department by day labour. The fixed spans on either side of the swing span were carried out under contract by Mr. C. McClure. The swing span, pivot pier, rest piers, and protecting platforms were carried out by Messrs. J. McCormack and Son; whilst the electric equipment had been supplied by and installed by the Australian General Electric company. The whole of the contractors, including Mr. R.C. Jeffcott, the electrical engineer, personally directed operations, to which is largely due the fact that the work has been carried out satisfactorily and without loss of life."

APPENDIX 3

ALLAN ON PYRMONT BRIDGE, SYDNEY N.S.W.

On 16 April, 1907, Percy Allan gave an address to the Institute of Civil Engineers in London, on the subject of Pyrmont Bridge. His address was published in full in the Proceedings of the Institute and is reproduced below.

16 April, 1907.

Sir ALEXANDER B. W. KENNEDY, LL.D., F.R.S., President, in the Chair.

(*Paper No. 3483*).

"The Pyrmont Bridge, Sydney, N.S.W."

By PERCY ALLAN, M. Inst. C.E.

THE old Pyrmont Bridge crossing Darling Harbour—an arm of Port Jackson extending into the heart of the City of Sydney—was constructed by a private company in 1857 at a cost of £75,830.

The Government purchased the structure in 1884 for £49,600, when the tolls—then valued at £10,000 per annum—were abolished. Seven years later competitive designs were invited for a new bridge on the south side of the old structure, and, after adjudication, premiums amounting to £1,200 were awarded by the Advisory Board of Engineers. No further action was taken until early in 1894, when the question of "the removal of the old bridge and the construction in its place of certain other means of communication" was referred by the New South Wales Parliament to the Parliamentary Standing Committee on Public Works for inquiry and report.

The conditions upon which the competitive designs were based only called for a swing-span affording a 38-foot deck and two 60-foot fairways, which—in view of the vehicular traffic having increased by 40 per cent. in 5 years, and the utilization of the harbour by vessels of 4,500 tons—was considered inadequate, and led to the Department of Public Works submitting to the Committee a design for a steel bridge with a swing-span of 54 feet, affording two 70-foot clear fairways.

After prolonged inquiry and the consideration of about twenty-six schemes, the Committee decided in favour of the design submitted by the Public Works Department, with timber in lieu of the steel side spans originally recommended.

The foundation stone of the new bridge was laid by the Hon.

E. W. O'Sullivan, State Minister for Works, on the 6th September, 1899; and the bridge was opened for traffic on the 28th June, 1902, by His Excellency Vice-Admiral Sir Harry Holdsworth Rawson, K.C.B., Governor of New South Wales.

The new bridge and its approaches extend from Sussex Street on the City side to Murray Street on the Pyrmont Shore (Fig. 1, Plate 3), a distance of 1,825 feet, the length of the main bridge being 1,210 feet. A steel overbridge, affording three 30-foot clear openings for the vehicular traffic to the wharves, is provided in the Sydney approach, whilst on the Pyrmont side the railway to Darling Island passes under a steel bridge of 25 feet span. The clear headway under the side spans is 26 feet above high water, which meets the requirements of the tugs and lighters visiting the railway wharves above the bridge.

Pivot-Pier (Figs. 2 and 3, Plate 3).—The five bore-holes sunk on the site of the pivot-pier passed through an average of 3 feet of mud and 25 feet of arenaceous clay before reaching the sandstone rock, which had a dip of 8 feet in the diameter of the pier. With such a large body of clay it was determined to sink a wrought-iron caisson to the rock by open dredging, to pump out then the water within the caisson, and to excavate a trench in the sloping rock sufficient to enable the whole periphery of the cutting edge to be bedded on the solid.

The caisson, 42 feet in external diameter, 32 feet in internal diameter, and 53 feet 1½ inch long, is founded 54 feet below low water, and is formed of two concentric rings of plating connected with angle-bar bracing, the inner ring being splayed out at the bottom to form the cutting edge. The plates vary in thickness between ½ inch and $\frac{5}{16}$ inch, the outer ring—to ensure verticality in sinking—being plumb for a height of 27 feet, with circumferential butt joints and countersunk rivets; in the remaining length of outer ring and in the inner ring from bell mouth to top, the circumferential joints are lapped "in and out" with cup-headed rivets. All the vertical joints are butted, with cup-headed rivets for the whole length of the caisson, it being considered that the clay would swell sufficiently to prevent leaks in sinking due to the projecting heads. All joints were caulked, and most of the rivets were closed with pneumatic riveters. The walls of the caisson were remarkably dry under 29 feet of water.

The first section of the caisson, weighing 50 tons, was put together directly over the pier-site on a square ironbark frame, the ends of the four sticks being allowed to project and form the eight points from which the frame with its load was suspended

by wire ropes from the protecting platform, already in position. The ropes were simply passed over and under rounded timbers spiked to the top of the platform and the underside of the frame, and were eased away by hand by twelve men until (after 4 hours) the caisson floated with a draught of 7 feet 3 inches. Fresh sections were quickly built on, and sinking was proceeded with by depositing concrete between the shells, each foot of concrete increasing draught by 2 feet 1 inch. When within a few inches of the bed of the harbour, the caisson was brought into correct position by folding wedges working between long timber guides bearing against the side of the caisson and the piles of the platform; concreting was then rapidly proceeded with at the bottom of a tide, so that with the next ebb the caisson was quietly grounded in a true position and with sufficient weighting to prevent it from lifting.

The material within the caisson overlying the rock was excavated with a bucket dredger worked by a floating crane, and no difficulty was experienced in controlling sinking or keeping the caisson level, a result which the Author considers to be due to the plumb sides adopted as much as to any uniformity in the strata. Advantage was derived from the expedient of having four draught-gauges painted on the inner wall, the cut of the water showing at a glance any movement out of level, and enabling prompt action to be taken by dredging and weighting to counteract the deviation. The greatest amount out of level up to the time of pumping out was $5\frac{7}{8}$ inches in 42 feet. By excavating in the middle below the level of the cutting edge, it was generally found that the weight of the caisson forced the material into the "well" and allowed of very gradual and uniform settlement, working within 5 feet of the inner wall being rarely necessary until nearing the rock, when dredging on the high point of the rock was conducted as close to the inner wall as possible, a good band of clay being left on the low side for the cutting length to bed in when the water was pumped out of the caisson.

Upon pumping out, the caisson listed 11 inches out of level, but only two small leaks showed, and these were easily dealt with by a small pulsometer. No time was lost in excavating the rock on the high side, and in 48 hours the caisson was lowered 2 feet, when a blow occurred, the water filling the caisson in 20 minutes and bringing with it a small quantity of sand and mud, the vertical line of the caisson, however, not being altered.

The Author is of opinion that had some clay been available for placing round the caisson, the leaks, small as they were, would not have developed into a blow.

Although the contingency of excavating the rock by divers and depositing the bottom 12 feet of concrete through the water had been provided for, yet the advantages of a dry foundation were considered so desirable that another effort to pump out the caisson was decided upon. A large bank of clay was placed in position surrounding the caisson, and the excavation of the remaining 6 feet of rock by "jumpers" was proceeded with.

A jumper formed of an ironbark pile 64 feet long, carrying on its end a heavy steel casting provided with three steel cutters, was used for excavating the rock from the line of the inner wall 5 feet inwards; the jumper was hoisted vertically by a steam crane and was tripped in the usual way with a 6-foot to 8-foot drop. On obtaining a face with the vertical jumper, the rock under the bell-mouth and cutting edge was removed with a jumper formed of a flat-footed rail having a steel chisel-point bolted to its lower end; this jumper worked within a hollow chute furnished with a wrought-iron plate upon which the flat foot of the rail rested and worked. By means of guys fastened to the bottom and top of the chute, the jumper could be set at a sufficient angle to reach anywhere under the bell-mouth or cutting edge, the position of the cut being directed by a diver; the jumper was hoisted with a steam-crane and was tripped with a drop of 10 to 12 feet. The jumpers, although slow, did their work well. Divers were employed to clear the rock at the back of the butt straps, the cup-headed rivets in these straps, as well as in the vertical seams, causing some trouble and necessitating more cutting back than would have been required had flush riveting been adopted.

During the course of excavation, the water was usually kept near the top of the inner wall, and upon the rock being cleared for 10 or 12 inches in depth the water was pumped down about 23 feet and the caisson was allowed to settle; this process was followed until the contract-depth was reached, the caisson having in the meanwhile been gradually straightened until it was finally only $2\frac{1}{4}$ inches out of level with the cutting edge in its correct position, and the top was well within the margin of 12 inches allowed for errors in placing and sinking.

The few places where the cutting edge was not bearing on the rock were cleaned with a water-jet, and the space was filled with fine rich basalt concrete deposited in bags and packed by divers. Around the caisson, for a distance of 4 feet from the outer shell, rings of concrete bags were laid, headers and stretchers, to a height of 4 feet, the space between the ring of bags and the cutting length being filled with concrete deposited loose by means of a bell-mouthed canvas bag

lowered through the water and tripped by divers when in position. This work was carried out in eight sections to ensure the rock being well washed off with the jet before concreting. In order to stiffen the concrete under the bell-mouth, a circular sand-bag wall was built 11 feet inwards from the outer shell, and concrete was deposited in the space through 50 feet of water by automatic self-tripping boxes. This work also was carried out in sections, and after it had been allowed to set for 9 days the water was pumped out of the caisson in 12 hours.

After the water had been pumped out the sand-bag wall was removed and the rock and concrete were thoroughly washed with a jet, the concrete being found to have set very hard and to have been well placed by the divers. Three small leaks were apparent, and were collected in 3-inch iron pipes surrounded with neat cement and led to a sump. Sandstone concreting was then carried on night and day up to 12 feet above the cutting edge. From this point to the top, the interior of the caisson was filled with rubble sandstone concrete, the plums weighing up to 3 tons. The water in the sump was easily kept down, and the concrete was laid in the dry without trouble. The sump was carried up to low-water mark before being finally filled.

On the completion of the masonry the temporary caisson which extended 2 feet above high-water mark was removed, leaving nothing but the stonework of the pier visible.

The proportions and cost of concrete used in the pier are given in Table I of the Appendix.

The total weight on the foundations of the pier, neglecting friction and buoyancy, is 6,800 tons. The time taken in sinking the caisson was 9 months, of which 7 weeks were occupied in reaching the bed of the harbour, 11 weeks in passing through the 24 feet of material overlying rock, and 4½ months in sinking the last 6 feet to the contract-depth.

Rest-Piers.—The Pyrmont rest-pier is founded on the rock, whilst the Sydney rest-pier is carried on fifty-eight piles driven to the rock bottom about 64 feet below low-water mark.

At the site of the Sydney rest-pier an area somewhat larger than the pier was excavated with a ladder dredger until a level clay bottom was obtained 32 feet below low-water mark. The foundation-piles—finishing alternately 2 feet and 3 feet 6 inches above the excavated bottom—were then driven with a follower until the rock was reached, when, by tapping out bolts which passed through the four projecting flitches and the pile-head, the follower was released by a diver. Some of the piles, with the follower, measured 78 feet in

length, but no difficulty was found in pitching or keeping them in place. The follower, which was used repeatedly, was provided with a ring at top and bottom, but no ring was used on the pile-heads, the toughness of the ironbark timber preventing trouble from brooming or splitting.

To ensure the guide-piles being driven correctly, a rectangular hardwood frame was lowered on to the bottom and was held in place while the guide-piles were driven 10 feet. The frame was then removed. Each set of horizontal walings, after being fitted with a guide passing round each pile, was bolted to vertical Oregon runners, by which the walings were forced below water. Successive sets of walings about 5½ feet apart were bolted to the runners and forced down until the bottom was reached. Vertical sheathing of hardwood was next lowered in 6-foot sections, the back of each section being provided at each waling with two battens blocked off and set at an angle, so as to draw the sheathing hard up against the waling when forced down from the top.

When the sheathing was completed, the silt which in the meanwhile had settled between the heads of the foundation-piles was removed by divers, the marine growth being also cleared off the pile-heads. Sand equivalent to a depth of 6 inches was then deposited over the whole area of the pier and a clean bottom was thus obtained.

Between the pile-heads, the concrete was deposited through the water in long timber boxes, fitting the space between the piles and provided with top and bottom doors: these boxes were guided into place by divers and pumping. Above the pile-heads and up to within 2 feet of low-water mark the concrete was deposited through the water in single-rope self-tripping iron boxes designed by the Author with a view to reduce disturbance. Each box, holding 22 cubic feet of concrete, was provided with top and bottom doors, the latter being set on an angle and suspended on the outside of the box from the crane-rope, so that on reaching the bottom the slackening of the rope allowed the weight of the concrete to force open the doors and to bring into engagement the two hooks with which the box was hoisted with the doors hanging free. Although these boxes did their work well, the Author is of opinion that, where suitable gear is available, boxes of a larger capacity would be preferable. The work of concreting was carried on continuously through the water until its completion, the 1,850 cubic yards in the bases of the two piers being finished in 19 days.

This expeditious placing of the concrete minimized trouble from slurry, but in a few instances slurry formed and was removed by

divers. In depositing the concrete, it was generally kept with a slight dip towards the centre so as to avoid the risk of slurry forming face cavities. After the concrete had been allowed to set for 14 days the dam was pumped out, and a fair amount of slurry of the consistency of chalk was removed before the remaining 12 inches of concrete in the bases of the piers was deposited in the dry; the masonry work starting from 1 foot below low-water mark was also laid in the dry.

On the completion of the piers the timberwork was removed and a rigid inspection of the surfaces was made by a diver, the piers being reported to have a smooth face and to have set very hard, a report which the Author's subsequent inspection of one of the piers confirmed. The proportions and cost of concrete and the prices of materials are given in Table I (Appendix).

Swing-Span (Figs. 2 and 4, Plate 3).—The swing-span consists of four main girders with horizontal top and curved bottom booms, 223 feet long, 15 feet deep at the centre and 5 feet deep at the ends, spaced 13 feet 4 inches apart and rigidly braced together over the pivot-pier and at the ends, whilst vertical and diagonal bracing connect the top and bottom booms at intermediate points. The girders are also connected at their upper panel-points by cross girders carrying a rolled-joist and buckled-plate deck, the buckled plates being riveted to the projecting bottom flange-plates of the top booms, which gives the rigidity so desirable in a high-speed swing-span. Upon the steel deck is laid coke concrete, covered with tallow-wood blocks on the carriage-way and asphalt on the footpaths.

The swing is of the rim-bearing type, the whole weight, 800 tons when swinging, being distributed by means of eight small girders to sixteen equidistant points on the drum.

The swing-span is designed to carry a distributed live load of 100 lbs. per square foot of deck, and a concentrated load of 20 tons on a 10-foot by 5-foot wheel-base. The main girders were calculated to have a deflection of 4 inches, and the actual deflection is 4¼ inches; but as the maximum stresses over the pivot-pier occur when the bridge is swinging, the ends are lifted only 1¼ inch, the dead load taken by the cams at each end being about 40 tons, which reduces the time of lifting, and is sufficient to prevent chattering due to heavy loads concentrated at the ends.

The span was built out from the pivot-pier without staging, a stationary crane on the platform alongside raising the material to a crane travelling on the top of the span, by which the different members were placed in position.

To avoid the cracking of the cement rendering upon which the wood blocks are laid, the ends of the swing-span were weighted to give an equivalent deflection to that produced by the blocks, the rendering was then completed, and the weighting was gradually removed as the laying of the blocks proceeded.

Turn-table.—The drum, which is 35 feet in diameter and 5 feet deep, is provided with sixteen radial struts connected at their inner ends to two disk plates fitted over and revolving about the cast-iron pivot. A steel coned tread is secured to the underside of the drum and bears on sixty-six cast-steel rollers, 10½ inches wide over all, with a bearing width of 10 inches face. The rollers are connected with 1¼-inch radial rods to two circular disk plates revolving about the pivot with ¼-inch play, the whole forming a flexible turn-table.

The bottom tread is of the same section as the top tread, and is secured to a cast-iron track of bridge section machined top and bottom, and bedded hard on the masonry. It was not found practicable to machine the treads and track without building a special lathe with a rigid face-plate or table at least 37 feet in diameter. It was therefore determined to construct a special attachment to a planing-machine, and to plane each section of the tread separately to the correct radius, and to fit the sections together afterwards to form the circle.

Some weeks after the opening of the bridge for traffic, the pivot was found to be moving with the turn-table, due to the drawing of the holding-down bolts and some slackness in the bolt-holes. This was rectified by the addition of four wrought-iron keeper-plates 8 inches wide by 1¾ inch thick, with the outer edges turned down 3 inches. The plates rested on the bed-stone, the lip being let down into the stone, whilst the circular inner edge bore against the bottom flange of the pivot, the thrust from the pivot being taken by the back of the lip bearing against the bed-stone, and the keeper-plates being held down by a couple of 1¼-inch bolts run in with lead. Very great care was taken in fitting these plates, and when in position, the bed-stone was covered, and the pivot surrounded up to the top of the bottom flange, with rich concrete.

Much trouble was experienced through the rollers seizing and tearing off the ends of the radial rods, caused by the iron borings which had not been thoroughly cleaned out of the tapped holes for the grease-cups finding their way with the grease on to the rods. This caused scoring and eventually seizing of the rods, which in the first instance were too neat a fit. Also, the gun-metal nuts against which the rollers bear had no oil-runs; and whilst the lock-nut was effective when opening the swing, yet, in closing it, the friction of

some of the rollers was sufficient to make the gun-metal nuts revolve with the rollers until the ends of the radial rods were torn off.

Accordingly the rods were straightened, some were welded, and all were turned down $\frac{1}{16}$ inch. Oil-runs were also cut on the rods and gun-metal nuts, whilst the links connecting the outer ends of radial rods were slotted $\frac{1}{2}$ inch at each end and provided with machined fillers; so that by knocking back a filler the links can now be taken off without having to free three radial rods, as was previously necessary for the removal of a single roller.

A long delay was occasioned through the rods and rollers not being interchangeable, as it was necessary to replace every roller on its own rod. To prevent the running back of the bearing nuts, small inverted U-shaped steel castings have been provided, with a claw fitting the nut like a spanner, whilst lugs on the castings, machined to fit under the bottom edge of the connecting links, take the pull. During 3 years after these alterations were made the bridge was swung 18,816 times without a hitch, or any expenditure on repairs, whilst the even distribution of the weight on the rollers is shown by the absence of any idle roller in the ring.

Motive Power.—The machinery both for sluing the swing-span and for lifting its ends, as well as for working the roadway-gates on the side spans, is actuated by electric motors driven by current supplied from the tramway power-house about $1\frac{1}{2}$ mile from the site, and controlled from a small house situated over the footpath at the centre of the swing-span. The motors, controllers, and electrical apparatus generally, so far as the conditions permitted, are of the tramway type adopted by the Railway Commissioners of New South Wales, which ensures duplicate parts being always available, and speedy replacement or repairs. The potential of the current ranges from 550 to 600 volts.

The two 50-HP. series-wound motors for sluing the swing-span are of the General Electric Company's standard "G.E. 57" type, and were guaranteed capable of exerting together a starting-effort of 5,384 lbs. at 3·143 inches radius from the centre of the armature-shaft, and, with this load, of attaining an armature-speed of 509 revolutions per minute at the end of 24 seconds without the current exceeding 130 amperes in either motor. An allowance of 100 per cent. upon the calculated maximum effort required at the pitch-circle of the rack in a heavy wind is included in these figures to cover the friction in the gear between the motors and the rack.

The motors are fixed to the machinery-platform within the drum, and drive, through cut steel spur-gearing, a main horizontal shaft carrying at each end a bevel-pinion meshing with bevel gears (one

looking up and the other looking down) keyed to the tops of the two vertical shafts on the outside of the drum. The vertical shafts carry pinions on their lower ends, which tooth into the rack fixed to the cast-iron track running right round the pivot-pier.

The shafting and gearing is so designed as to allow of either or both motors driving through one vertical shaft, whilst the gear reduction is 1,223 revolutions of the armature to one complete revolution of the swing-span.

In Table II (p. 154) are given the results of twenty runs at different speeds, the maximum effort exerted by the motors to slue the span in 30 seconds having been 89 HP., at a cost of 0·357*d.*; whilst 15 HP. was exerted by the motors for a 69-second run at a cost of 0·221*d.*; the most economical run of the series was one in 55 seconds, at a cost of 0·183*d.*, with a maximum motor-effort of 48 HP. The smoothness of the track and the easy running of the turn-table is shown by the tests, the span in some cases having "coasted" through 70 degrees after the current was cut off.

Auxiliary hand-gear is provided, the 6-foot capstan-bars on deck working two vertical shafts carrying on their lower ends mitre-wheels driving two horizontal shafts having cut pinions meshing with the large cut gears keyed to the main horizontal shaft. The reduction is 352 revolutions of the capstan-head to one complete revolution of the swing-span.

The armature-shaft of each motor is extended at the commutator end to carry a brake-wheel, the two brake-straps being connected with levers actuated by a screw and hand-wheel worked by the man in the controlling-house. Before the brakes were in working order, the swing-span was occasionally stopped by reversing the controller, but with the amount of back-lash in the gearing this was found to strain the machinery seriously, and resulted on one occasion in the outer bearings of the horizontal shaft being lifted and broken. Heavier cast-steel brackets were substituted, and reversing whilst the span is in motion has been avoided, the hand-brakes alone being now used for slowing the swing.

A mechanical tell-tale driven off the main horizontal shaft shows on a dial in the controlling-house the position of the span, and by this means the point of cutting-off of the current, and the time for application of the hand-brakes is determined. Whilst the wind has an effect on coasting, yet the constant practice enables the operator, after a couple of swings, to ascertain the allowance to be made according to the weather.

In order to take up the back-lash in the gear and to stop the span in correct position without jar, a latch and catch is provided over

each rest-pier. The latch, carrying on its end a small wheel, is free to move vertically upwards in brackets secured to the swing-span, and is so adjusted by a counterweight as to drop into the recess in the catch with the required velocity. The catch is pivoted and secured at its lower end to a girder on the rest-pier, whilst near the upper end of the catch are placed two heavy coil springs. In closing the span, the latch-wheel meets and rolls up the inclined plane at the top of the catch and drops into the recess, when the momentum of the span brings into play the coil springs, which either bring the ends of the span back into their correct positions, or move enough to allow the latches to release themselves, when, by reversing the controller, the latches are again brought into engagement. If the span be travelling too quickly, the latch-wheels jump the recess in the catches. Preparatory to opening the swing-span the latches are drawn by means of a hand-lever in the controlling-house.

The 35-HP. series-wound motor for operating the end lifts is of the "G.E. 1,000" type with nose suspension, and is situated at the centre of the swing-span. It drives through a cut pinion and spur-wheel a longitudinal shaft actuating at each end, by means of right- and left-hand worm-gearing, two transverse shafts each provided with four cams having 1½-inch throw, which raise or lower the ends of the span 1¼-inch, the remaining 1¾-inch vertical movement in the cams being for lifting the foot-blocks clear of the pedestals on the rest-piers. The gear-reduction is 147 revolutions of armature-shaft to one complete revolution of the cam-shaft. In Table III are given the results of six tests, the cost of raising ends having in one trial been 0·044*d.*, the time taken 8 seconds, and the maximum effort exerted by the motor 29 HP.

For stopping the cams in their correct positions a solenoid brake is provided, with a weighted lever attached to a strap passing over the brake-wheel keyed to the armature-shaft. The solenoid is arranged in series with the motor holding up the weighted lever, and releases it when current ceases to pass, thereby applying the strap brake and stopping the motor, the worm-gearing being suitable for this quick action.

A mechanical tell-tale worked off the main longitudinal shaft shows on a dial in the controlling-house the position of the cams, from which the time of cutting off the current is determined. Although the cams can be worked either way, in practice they are run in one direction.

No difficulty was encountered in ensuring the ends of the span being lifted exactly 1¼ inch, the wedges in the pedestals over the rest-piers permitting of adjustment to the required amount. As

designed, each foot-block was provided with two light springs to keep the pin at the bottom of the eccentric in line with the centre of the cam-shaft; these springs were, however, ineffective, allowing the eccentrics to slide the foot-block along the pedestal without lifting the ends. This was rectified by the provision of four ⅜-inch coil springs to each block, which kept the pins vertically in line, and allowed the cams to do their work without subsequent trouble. Auxiliary hand-gear is provided, worked by capstan-bars on the deck by three men, the ratio of the gearing being 32 revolutions of the capstan-head to one complete revolution of the cam-shaft.

At the junction of the swing with the side spans, the camber of the roadway is worked out so as to give a level cross section of deck. The chequered plates on the terminal girders of the fixed spans overhang the terminal girders on the swing-span and give 1¼ inch vertical clearance when the swing is ready for opening; the lifting of the ends brings the terminal girders on the swing-span hard up against the underside of the chequered plates on the fixed span.

Gate-Machinery.—To avoid the provision of separate mechanism, the hinges of each footpath-gate are keyed to the spindle of the roadway-gate: the two gates thus work as one, the spindle being extended to the machinery-platform underneath the deck of the side spans.

For each pair of gates a 5-HP. four-pole series-wound motor of General Electric type, running at 1,200 revolutions per minute, drives, through a bevel-pinion and gear, a longitudinal threaded shaft, carrying a gun-metal travelling nut having projecting pins at top and bottom. These pins pass through, and work in, long slotted holes in two wrought-iron bars, the upper one being cranked down and bolted to the lower, which is extended and is keyed firmly to the bottom of the gate-spindle, and forms the lever for moving the gates. Attached to the underside of the lever is a copper loop which—at the open and closed position of the gates—engages with and short-circuits two adjustable brass springs secured to the floor of the platform, thereby energizing an auxiliary tripping-coil on the circuit-breaker in the controlling-house, which cuts off the current from the motor. The motor being supplied with a solenoid brake, the cutting off of the current causes a weighted lever to drop and stop the motor: the brake-lever is attached to a strap passing over a brake-wheel keyed to the armature-shaft. When the controller is reversed and current applied, the solenoid, which is in series with the motor, lifts the weighted lever and releases the brake. For 3½ revolutions of the armature-shaft, the nut on the threaded shafts moves 1 inch. Although the gate-

machinery will not permit of movement of the gates other than by revolving the threaded shaft, automatic latches are provided, the gun metal nuts towards the end of their travel engaging small levers which force up through the centre of the roadway a pair of wrought-iron pins behind and in front of the gates. In Table IV (p. 156) are given the results of nine runs; the time of opening the gate in one of the trials was 18 seconds, at a cost of 0·014*d*., with a maximum motor-effort of 2·9 HP.

The controller for the sluing-motors is of the standard "G.E., K 11" series-parallel type. The controller for the end lifts and the four for the gate-motors are of the usual rheostatic type, having a separate reversing-barrel on which are placed the additional contacts for interlocking the circuit-breaker with the position of the gates, so that the motors cannot be driven in a wrong direction, whether the gates are open or closed.

Lighting.—There are nineteen arc-lamps on the bridge and approaches, whilst the six arc-lamps on the protecting platform are of the marine type, with ruby globes and guard-cages. The arc-lamps, arranged in series of five, are of the enclosed long-burning type, in which the automatic cut-out and substitutional resistance is contained in the lamp-case itself.

Cables.—The two main cables are brought on poles from the power-house to the Pyrmont end of the bridge, thence along the bottom chord of the side spans to the rest-pier, at which point two lightning-arresters with kicking coils are placed, together with a 300-ampere main switch. From the switch the two armoured submarine main cables pass down the end of the rest-pier and are laid in a trench across the fairway excavated in the bed of the harbour to a depth of 30 feet below low-water mark. The cables are taken thence up the side of the pivot-pier under the track and up through the centre of the hollow pivot, thence to the underside of the footpath, where they enter a wrought-iron box reaching from the curb to the underside of the controlling-house, and they finally pass through hollow cedar pedestals in the inside of the house to their connections with the main bus-bar on the switchboard. Two seven-conductor armoured submarine cables for the two gate-motors, and one for the arc-lighting, laid in a similar manner to the main cables, extend from the controlling-house to each rest-pier; whilst a four-conductor submarine cable is also provided on the Sydney side for the operator's direct telephonic communication with the power house and the City Exchange.

To prevent twisting of the cables (due to the swinging of the bridge) from occurring at the bottom of the pivot, where it would be difficult to effect repairs, the cables are bunched together and are made fast to the top of the pivot; they are then given a complete coil of large diameter, the coil resting on horizontal wooden rollers carried on the radial struts, which permit the coil to wind and unwind with the movement of the swing-span.

As the sluing-motors are worked on the series-parallel system, and as their direction of rotation has to be reversed, the field- and armature-leads of both motors are brought into the controlling-house, which is accomplished by using an eight-conductor cable. The four leads of the end-lift motors are likewise brought into the controlling-house in a four-conductor cable. Although the wiring in the controlling-house is so encased as to be hidden from view, yet it is readily accessible, and all wires are tagged and numbered.

Switchboards.—The operating cedar switchboard, provided with porcelain insulators throughout, is placed directly over the controllers and carries a 300-ampere main switch; a 250-ampere switch with a 250-ampere circuit-breaker for the sluing-circuit; a 100-ampere switch with 150-ampere circuit-breaker for the end-lift circuit; and a switch for the four gate-motor circuits, with a circuit-breaker for each gate-circuit. A feature of the last-mentioned is that each is provided with an auxiliary tripping-coil connected with the contacts at the gates, so that when once a gate is started the operator's further attention is not needed, the contact when the gate is in position causing the circuit-breaker to trip: it is then impossible to move the gate or to close the circuit-breaker unless the controller be reversed. Weston ammeters are placed immediately over each controller and a 600 Weston voltmeter is placed at the centre of the board. The cedar switchboard for the arc-lighting is placed at one end of the house and carries a 100-ampere main switch, a 40-ampere circuit-breaker, five switches for the five arc-lamp circuits, two switches for the ten glow-lamps in the house and machinery-room, and a switch for the pilot-light in the house which is in series with two red glow-lamps on the mast-head used for signalling to shipping.

Cost of Power.—The charge made by the Railway Commissioners for the supply of current is 1*d*. per Board-of-Trade unit, the main cables from the power-house having been laid at the cost of the Public Works Department; one complete cycle of operations costs $\frac{3}{4}d$., which includes the closing and opening of the four gates, the lowering and raising of the ends of the span, and the opening and closing of the swing-span, the whole—including the lighting—being controlled by one man in the controlling-house. The detailed cost of operating the swing-span and lighting the bridge

for 4 years is given in Table V, the cost of current for 24,610 openings having been £83 6*s.* 5*d.*

Protecting Platform and Dolphins.—A platform built of turpentine piles, 325 feet long and 3 feet 4 inches wider than the over-all width of the swing-span when open, affords protection from passing vessels. Dolphins connected by stout rubbing-strips shield the rest-piers, the platform and dolphins forming two long fairways, which materially facilitate the passage of vessels through the openings.

Side Spans (Figs. 5, Plate 3).—The six ironbark trusses in each side span carry transverse floor-beams on which is laid 6-inch by 4-inch longitudinal planking alternately on flat and edge, covered with tarred metal, to form the road-surface; asphalt is laid on the foot-paths, whilst the wrought-iron parapet is carried from end to end of the bridge. With the heavy traffic the tarred metal has not been a success, and it is being replaced by wood blocks.

The trusses are of the Howe type, in which redundant members have been omitted. As the success of timber trusses is largely dependent on the strength of the bottom chord-joint, it was decided to test the full-size joint in a machine specially designed for the purpose under the direction of Mr. C. W. Darley, M. Inst. C.E. This machine consisted of a heavy ironbark frame and large hydraulic jack, a steam-pump being used for working the jack, whilst a pipe-connection between the jack and a 50-ton testing-machine enabled the results to be read on the latter. In the three tests, failure occurred by the shearing of the bolts and of the timber between the notches, the recorded results showing an ultimate strength of 151 tons, 160 tons, and 182 tons respectively. In making the joints in the actual work, the notches were carefully cut in the timber, and the plates on either side were then cramped hard up. The joint was placed under a steam-drill, the drill passing through the steel plates and the timber in the one action, twelve turned bolts were then driven through the holes to complete the joint, thus ensuring the bolts bearing on the timber and the two plates. The trusses, weighing 15 tons, were put together on the wharf close to the bridge-site and were hoisted about 30 feet on two pile-driving machines, being then towed to the site and placed on the piers. In finishing the bridge, twelve trusses were lifted from the wharf and placed in position in 7 hours, whilst half a pier and two spans with roadway-gates were completed for traffic in 8 days.

Approaches.—The approaches on either side consist of embankments and concrete retaining-walls, the abutments and northern retaining-walls, which are the more exposed to view, being faced with sandstone, whilst a stone parapet extends the whole length of the approaches. The Pyrmont approach is founded on the rock, whilst

the Sydney approach is for the greater portion of its length carried on 368 piles driven to the rock.

The work was designed by the Author, then Engineer-in-Charge of Bridge Design under Mr. C. W. Darley, M. Inst. C.E., Engineer-in-Chief for Public Works. The Author also supervised the construction of the work under Mr. Darley until his departure for England, by which time the piers were nearly all in place, and subsequently until its completion under Mr. W. J. Hanna, the Commissioner and Principal Engineer for Roads and Bridges.

Mr. H. H. Dare, Assoc. M. Inst. C.E., and Mr. Lincoln Buswell were the Author's principal assistants in the office and on the works respectively.

The cost of the completed work, including all contingencies and engineering expenses, was £112,500, as detailed in Table VI, the rate of wages paid being given in Table VII, and the cost of materials in Table I.

The Author is indebted to Mr. J. Davis, M. Inst. C.E., Under-Secretary for Public Works, for the plans and photographs illustrating the Paper, and to Mr. O. W. Brain, Electrical Engineer for Railways, for advice in connection with the electric equipment.

The Paper is accompanied by twenty-four drawings, from which the illustrations in Plate 3 have been selected for reproduction, and by numerous Tables; also by an album of photographs.

APPENDIX 4

TIMBER BRIDGE DESIGN

The development of the wool and mining industries during the latter part of the 19th Century necessitated the development of new standard bridge designs to carry heavier loads. New types of trusses for 27.5 m (90 ft.), 23 m (75 ft.) and 20 m (65 ft.) spans were developed which featured a double principal truss, double suspension bolts and butting blocks and wedges at the feet of the diagonal braces.

Generally speaking the testing of the structural properties and durability of Australian timbers had been neglected up until 1875. In that year, an Englishman, Mr. T. Laslett[1] included Australian timbers in his book Timber and Timber Trees, Native and Foreign. However, very little was known until Professor W.H. Warren, Member of the Institute of Civil Engineers and Professor of Engineering at the University of Sydney, carried out systematic tests in 1886. In 1893, Professor Warren's results were published in a paper entitled Australian Timbers. By detailed and regular inspection of all timber in bridges and by making use of this more accurate information on timber strength, the life of timber bridges was greatly increased.

Further variations to standard timber bridge design were effected in 1893 with the production of a new design for a truss, having two piece open top chords and multiple flitch bottom chords, double principals, no wedges at the feet of the braces and cross girders only at the suspension bolts. Spans for this design were 21.3 m (70 ft.) to 27.5 m (90 ft.) Another feature of the design was the introduction of cast iron shoes at top and bottom for the diagonal braces to butt on. Pyrmont Bridge, with side spans of 25 m (82 ft.), represented the latest development of this form of truss and incorporated cast iron shoes. Percy Allan referred to the Pyrmont Bridge trusses as the Howe type in which the reduntant members were omitted.

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1. T. Laslett, Timber and Timber Trees, Native and Foreign, (London, p.u., 1875).

These trusses became known as Allan trusses, after Percy Allan who first used them. In 1896, a bridge of this type (replaced in 1961) was built over the Wingecarribee River at Berrima on the Hume Highway. A modification of the design was used for a number of other bridges, including the existing 197 m (645 ft.) long bridge over the Murrumbidgee River near Wagga Wagga, built in 1895 and known as Hampden Bridge.

Many improvements were made to the standard timber trusses, which had timber chords and braces and vertical suspension rods to make them more durable and less costly to maintain. The bridge with the longest timber truss span in Australia 47 m (153 ft.) was built in 1900 over the Macleay River at Kempsey and lasted almost 60 years.

APPENDIX 5

J.S. WILSON'S REMARKS ON THE CONSTRUCTION OF PYRMONT BRIDGE (1907)

Following Percy Allan's address to the Institute of Civil Engineers on Pyrmont Bridge on 16th April 1907, a general discussion on the subject of swing bridges took place.

Mr. J.S. Wilson, who had supervised the manufacture of the swing span in Belgium on behalf of the Engineer to the New South Wales Government, contributed to the discussion by adding a few details that are of interest. Wilson's remarks are reproduced below:

> "The swing-span of the Pyrmont bridge and the caisson were constructed in Belgium by the Societe Anonyme des Ateliers de Construction de Hal, near Brussels, and he carried out the inspection of the work there on behalf of the Engineer to the New South Wales Government. The specification required that the swing-span should be completely erected at the girder-yard and turned on its pivot before leaving. That of course necessitated not only that special foundations should be prepared, but that the work should be erected in a position where the necessary space was available. It was also necessary that all the joints should be made in a suitable manner to support the weight of the bridge. When swung at the bridge-builder's works, it must have weighed about 500 tons. The foundations under the roller-path were put in to a depth of about 1.28 8m. Reference was made in the Paper to the difficulty experienced with regard to machining, and the impossibility of turning the cast-iron ring and roller-paths. This part of the work was carried out as follows:-
> The cast-iron segments were planed parallel top and bottom in an ordinary planing-machine; the ends were then machined and the whole of the segments bolted up into a ring. The ring was laid down and carefully levelled with a surveyor's level, and the pivot to be used for the bridge was mounted in the centre.

A special carriage was constructed with two rollers running on the top of the ring and constrained to move round the centre pivot by a radius beam. A tool in a tool-box fixed on the carriage could be brought to bear on the vertical edges of the cast-iron ring, and the carriage was pulled round by a horse (which had been trained to work a roundabout) harnessed to a projecting arm. The vertical edges were satisfactorily turned in that manner. The conical-faced treads had to be secured to the drum on which the whole weight of the bridge rested, without intervening packing of any sort, and the manufacturers anticipated that without very special care it would be difficult to make a good job of the arrangement. While the cast-iron ring was perfectly level the drum with its flange angles were then clamped down on to the ring, and while in that position the holes were rimered through and the rivets were closed. With regard to the accuracy with which this part of the work was fitted together, he tried all the rollers while they were supporting the whole weight to see how many were bearing. He found that he could only get a No.6 feeler (0.006 inch) between one roller and the upper tread, and considered the adjustment was good. With regard to the temporary erection of the main girders, these were to have no initial camber, and they were packed up till the top booms were quite horizontal and the holes through the ties and struts were rimered through with pneumatic tools. The joints were made with turned bolts and parallel drifts, and the deflection was about 1 inch under the girder's own weight. He wished to ask Mr. Allan one question with reference to the camber of the bridge. To work the end-lifting mechanism, a shaft ran the whole length of the girders, and on account of the camber varying, the bearings of the shaft must get out of line. From the figures given in the Paper there appeared to be a good deal of friction, and he would like to know whether the Author recommended that system in similar cases, or whether he would consider it advisable to work the end-lifting mechanism by a separate motor at each end of the bridge. He thought the Author was to be congratulated not only on having designed a bridge so fine in appearance, but on having carried out the erection so successfully, and on the very satisfactory manner in which the bridge could be operated."

APPENDIX 6

TRAMWAY PROPOSAL (1981)

On 14 November, 1981, Mr. Toby Prentice, M.A., Dip.Ed., distributed copies of his paper on Tramways to the Lawrence Halprin, Darling Harbour Workshop. Mr. Prentice's paper varies to some extend from the Proposal detailed in this thesis. For example, he proposes to relocate the entire Loftus Tramway Museum in Darling Harbour and operate a tram system from Darling Harbour to the Opera House. This thesis proposes that the Loftus Tramway Museum instruct drivers and leases tramcars to a private company operating a tourist tramway from the Entertainment Centre to Pyrmont Bridge. This proposal does not detract from any scheme to provide a public transport system extending from Central Station to the Opera House, linking tourist attractions such as the entertainment Centre, Bicentennial Park, Pyrmont Bridge, the Rocks, Pier No.1, and Circular Quay.

Mr. Prentice's submission is reproduced below:

"SUBMISSION TO THE SEMINAR ON THE
FUTURE OF DARLING HARBOUR

"TRAMWAY PROPOSAL

Whether the Darling Harbour area becomes a mixed redevelopment of the Copenhagen Tivoli Gardens type,or is given over entirely to open space, there is a wonderful facility already existing in Sydney that could be incorporated in it to a very great advantage. That facility is the Sydney Electric Tramway Museum, presently housed on very inadequate premises (including only 100 metres of track) at Loftus. The museum contains working trams from several of Australia's many defunct tramway systems. They are mostly in good condition, many of them are very old, and they are all fascinating to look at and ride in. The nostalgic charm of these old vehicles cannot be exaggerated, and it is a great pity that their enormous potential is at present being wasted.

PROPOSAL

a. That the Tramway Museum be moved from Loftus to Darling Harbour and be incorporated in the development, providing practical transport throughout the area, as well as a powerful tourist drawcard.

b. That the scheme be widened to provide a connection with the Sydney Opera House, via the wide, little-used streets around the Darling Harbour wharves, under the Harbour Bridge at George St. North, or Hickson St. near the old Dawes Pt. battery, through the Rocks, across Circular Quay (which has been recently reserved for public transport) and out to Bennelong Point.

ADVANTAGES

1. Practical

There is already a large amount of railway track laid throughout the Darling Harbour site. This track is of standard gauge and therefore suitable for tramway use. (Tram tracks in Sydney streets were lighter than railway tracks but of the same gauge. Trams crossed the Harbour Bridge on railway track intended for the Warringah Railway). A certain track route could be marked for preservation (e.g. around the perimeter) and the development designed around that. One of the present railway sheds could be kept from tram storage.

2. Tourism

The tourist potential cannot be exaggerated. Most people have a sentimental attraction to old forms of transport especially trams. The trams were removed from the streets amid great controversy particularly in Sydney which had the second largest tramway system in the world. Many of the Sydney trams were of the cross bench or 'toastrack' design, having no corridor, but plank-walkways for the conductors, along the outside. Sydney people were attached to these huge old vehicles

and visitors found them exotic and extraordinary. There are examples of them in the Loftus museum, and they would, together with the other historical cars be a very big attraction. A tram ride would become an essential part of a visit to the area, and would entice people to the area for that purpose alone. Stage (b) - the laying of tracks to connect the Darling Harbour area with the Opera House - would provide a link between the new area and Sydney's present tourist centres - the Opera House and the Rocks. The link would be physical - cheap, quick transport between the three centres - as well as historical, - picturesque vehicles which played a big part in Sydney's development restored to provide a link between four very historical centres, all revitalised in their own way: Bennelong Point, Circular Quay, the Rocks and Darling Harbour.

SOCIAL

Stage (a) of the scheme would draw Sydneysiders to the area for the novelty and nostalgia of trams. At the same time it would link the new Haymarket Entertainment Centre, the new Powerhouse Museum and the recreational areas of the Darling Harbour Development; connect them in both a physical and conceptual sense. In so doing it would contribute greatly to bringing the area alive for Sydney people as well as tourists.

Stage (b) - (the extension to the Opera House) - as well as providing a conceptual link between four of Sydney's key historical and recreational centres - would be of great assistance in physically transporting people, without the use of cars, around and between these vital downtown areas.

The scheme would add another sense of fun and enjoyment to a day's or evening's visit to the city.

HISTORICAL

Using and displaying the working trams would fit in perfectly with the historical context of the area - with the Powerhouse Museum on the site, and the state Rail Authority's proposal to run steam trains to the area from the restored Mortuary Station at Regent St. near Central Railway. The area would thus attain a number of links with Sydney's and Australia's past - links which are important in building up a sense of unity in the community.

STEAM TRAMS

It may be possible to incorporate the Parramatta Steam Tram museum or part thereof, in the scheme. These vehicles, also in working order, are from an even earlier period of Sydney's development, and most people probably are not aware that they were the backbone of the urban transport system for some 30 years. With their old liveried carriages and tiny locomotives, they provide a rare and exotic sight. They could be at least displayed in the area, and perhaps given holiday excursions around the track, subject of course to their not contributing significantly to air pollution. If Stage (b) of the scheme was developed, they could take excursions to the Opera House on special historical occasions, or public holidays and the like.

CONCLUSION

With the existing track and the vehicles already restored, the scheme need not be excessively costly. The costs would be far outweighed by the advantages in bringing people to the area (bringing them by enticement and also in the case of Stage (b) by physically carrying them from The Rocks-Quay-Opera House tourist centre). Some of the costs of implementation and/or maintenance could well be borne by the private developers involved in the Darling Harbour scheme.

The people from the Loftus and Parramatta Museums - who have already contributed a great amount to the community by saving these valuable vehicles from being lost - might perhaps be offered full or part-time employment as tram crews and restorers.

I think this scheme is imaginative but practical, exciting but not overly fanciful, and I would appreciate it if it receives serious consideration.

Toby Prentice

55 Short Street
BALMAIN 2041

Tel. 818 3560".

APPENDIX 7

NATIONAL TRUST LISTING CARDS - PYRMONT BRIDGE,
THE CORN EXCHANGE AND 200 SUSSEX STREET

Town or District	Name or Identification of Proposed Listing	Address or Location
SYDNEY	PYRMONT BRIDGE	Extension of Market Street over Darling Harbour
Post Code 2000 Local Govt Area Sydney City Council		
Author of Proposal: D. Sheedy		
Date of Proposal: 3/2/75		
Suggested Listing Category: CLASSIFIED	Bibliography	Owner and Address: Department of Main Roads
Committee (Trust Use): H.B.C., U.C.C.		
Council (Trust Use): APPROVED CL 24/2/76 Former C		Advised - 25.3.76

Description — Briefly cover the points on the following check list where they are relevant and within your knowledge.

Style
Construction
Use
Architect/s
Builder/s
Date of Construction
Present Condition
History
Owners
Boundaries of proposed listing

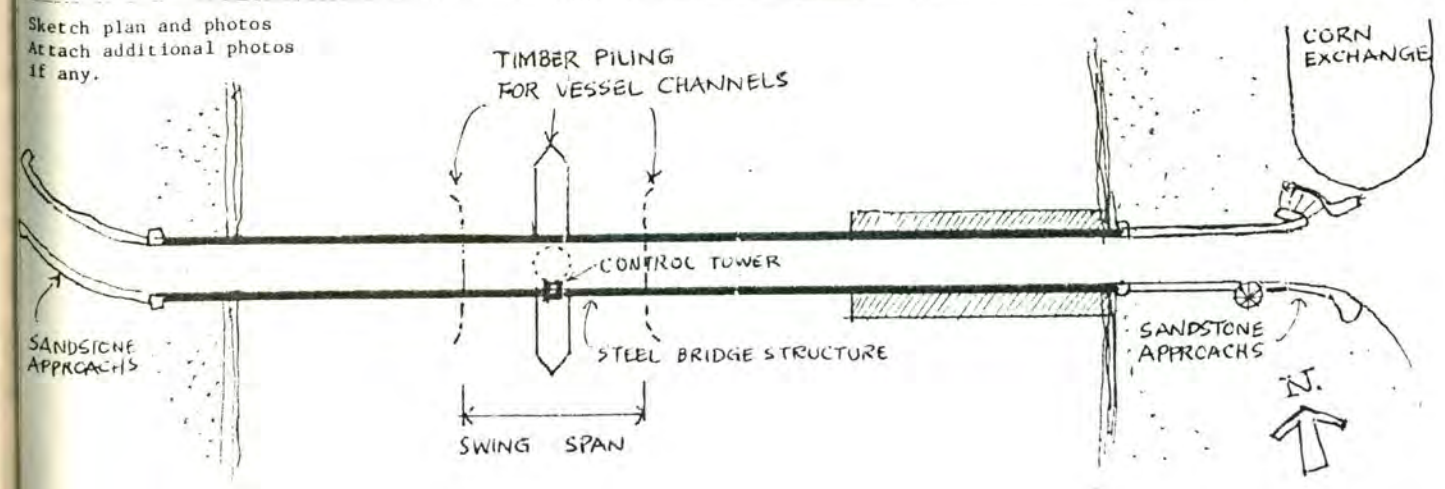
A 12-span steel, timber & stone bridge with large swing span to permit passage of shipping designed by Percy Allan, Engineer, who also supervised the building. The foundation stone was laid in 1899 and the bridge was opened for traffic on 28/6/1902. It replaced a timber structure built in 1858 by the Pyrmont Bridge Company and operated by them until 1884 when the operations were taken over by the Government.

The approaches are built of composite iron beams on sandstone piers supporting elaborate sandstone balustrading and decorative rounded pylons. Four large cast iron lamp standards which were originally gas lit mark the extremities of each approach wall and a lattice steel balustrade over the edge of the bridge proper supports cast iron handrails. Four traffic lanes and two footpaths are carried, access being gained by a handsome flight of stairs to one side and an elegant steel spiral stair (newly added) to the other. The bridge appears to be in good condition, but eastern approach has been defaced by introduction of unsympathetic pedestrian overpass. The main span open truss sections either side of the opening span are built of timber with iron tension members, all on timber piles

Reasons for listing

One of the last of Sydney's early steel, cast iron, timber and sandstone bridges that continues to perform a valuable function for which it was designed and which is a picturesque asset to the townscape and foreshores of the Darling Harbour and Pyrmont areas.

Sketch plan and photos
Attach additional photos if any.



SYDNEY (Town or District)	Former CORN/EXCHANGE and Fruit Market Part of SUSSEX STREET GROUP	173-185 Sussex Street,
Post Code 2000 Local Govt Area Sydney City Ccl.		
Author of Proposal D. SHEEDY	CARD 12 of 13.	
Date of Proposal 20.9.74.	(Name or Identification of Listing)	(Address or Location)
Suggested Listing Category CLASSIFIED INDIVIDUALLY	Bibliography SURVEY AND REPORT ON SYDNEY, JAN.1971 No. 149.	Owner and Address N.S.W. Dept. of Lands, Leased by Sydney City Council.
Committee (Trust Use) HBC		
Council (Trust Use) APPROVED CL 21.4.75.		advised 27.6.75.

Description — Briefly cover the points on the following check list where they are relevant and within your knowledge.

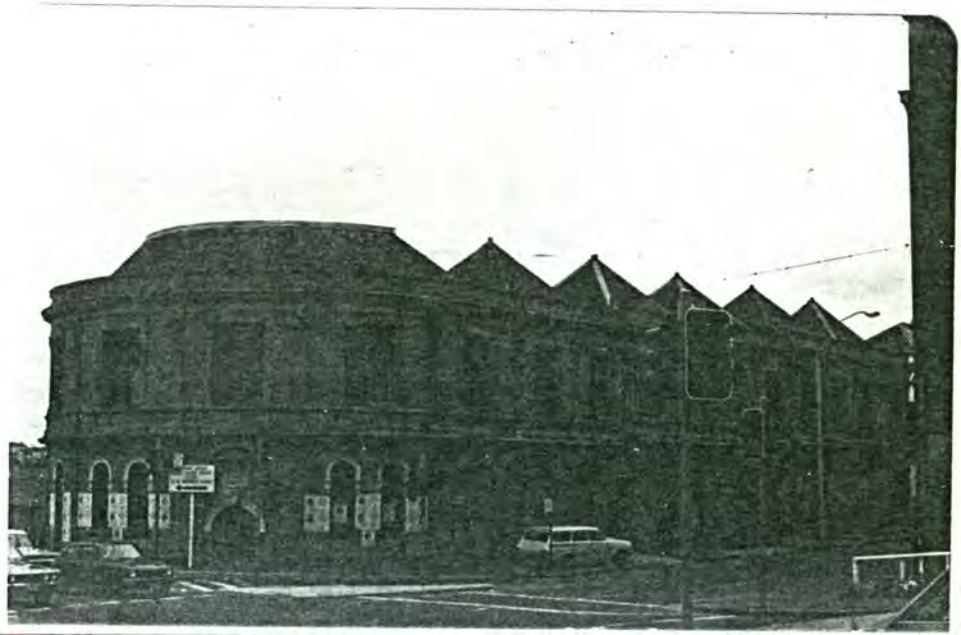
Style
Construction
Use
Architect/s
Builder/s
Date of Construction
Present Condition
History
Owners
Boundaries of proposed listing

Built in 1887 for the City Council to a design most likely prepared by the then City Architect, George McRae. The Builder was A.M. Allan and the cost 7770 pounds. It is a two-storey building with basement built with stuccoed load-bearing external walls, cast iron pillars and floor beams internally and slate covered timber roof. The ground floor former market area is roofed by a system of transverse and longitudinal arches supporting a series of shallow transverse vaults lined with corrugated steel. Considering the building's age and the obvious lack of attention given it over the years, it is still in remarkably good condition and capable of restoration.

Reasons for listing

An important former public services building and the earliest remaining market building in Sydney. It has considerable townscape value, presenting a fine pattern of pitched roofs and unusual and well considered curved facade externally, and a pleasant colannaded space internally, framed by well designed columns and arches. A rare Sydney building from that period not to have been mutilated by the later ubiquitous cantilevered steel awning.

Sketch plan and photos
Attach additional photos if any.



SYDNEY (Town or District)	SHELBOURNE HOTEL Part of SUSSEX STREET GROUP CARD 13 of 13. (Name or Identification of Listing)	200 Sussex Street, corner Market Street (Address or Location)
Post Code 2000 Sydney Local Govt Area City Ccl.		
Author of Proposal H. TANNER		
Date of Proposal JULY 1976		
Suggested Listing Category CLASSIFIED Indiv.	Bibliography City of Sydney Strategic Plan 71. Preservation No. 121. Survey & Report on Sydney Jan 71- No. 152. HISTORIC BUILDING STUDIES - UNIVERSITY N.S.W (MITCHELL LIBRARY)	Owner and Address Tooth & Co Ltd 26 Broadway Sydney 2000
Committee (Trust Use) HBC		
Council (Trust Use) APPROVED CL 5/4/76		

Description — Briefly cover the points on the following check list where they are relevant and within your knowledge.

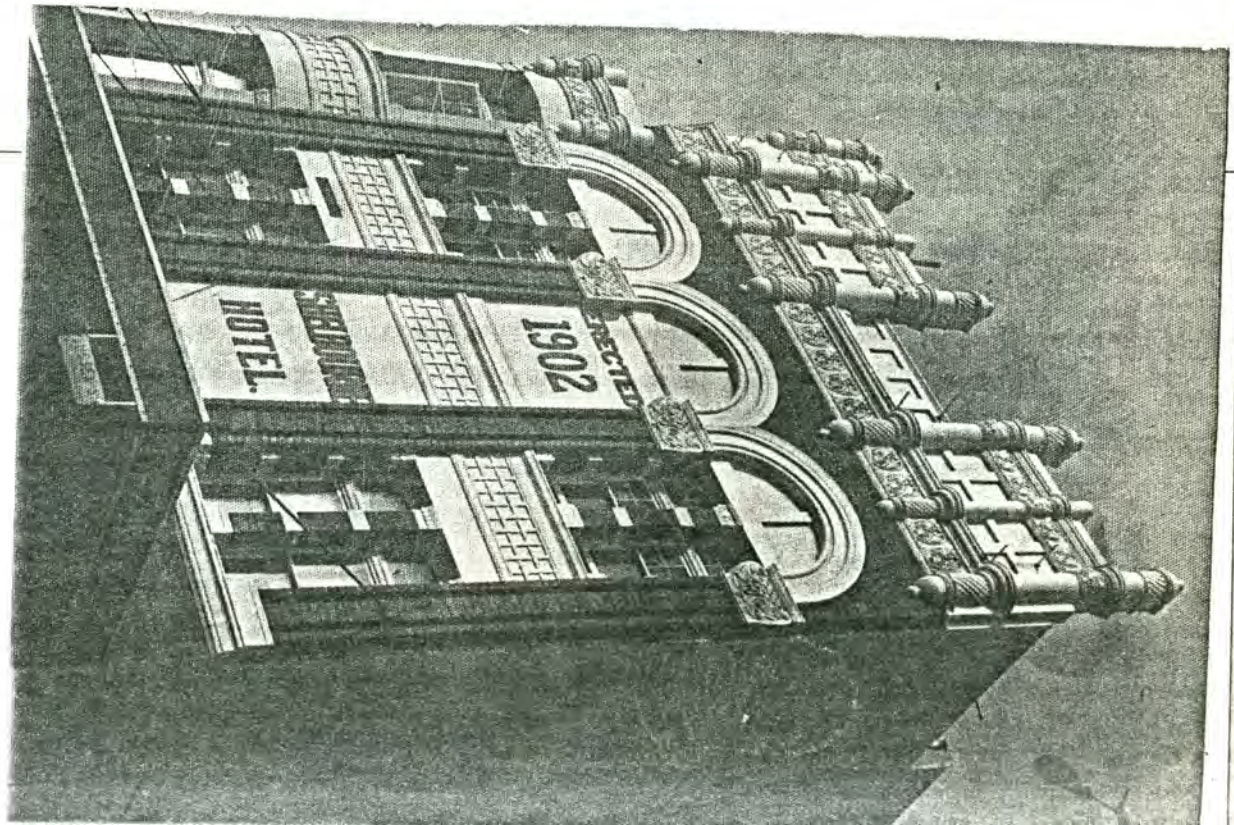
Style, Construction, Use, Architect/s, Builder/s, Date of Construction, Present Condition, History, Owners, Boundaries of proposed listing

Built in 1902, this elaborate example of commercial Federation architecture was designed by the architectural firm of Wilson, Neave & Berry as an hotel and operated as such until a year ago. It is a three-storey building, constructed of load bearing brickwork and decorated with bands and lintols of patterned stucco work, the parapets being the most lively and decorative elements in the composition. The style is a modified version of ' American Romanesque' and probably one of the last city buildings in this vein, the style reaching its peak of popularity in the 1890's.
The shopfront appears to be of 1920's vintage but still in good condition as is the remainder of the facade. All joinery, window sashes, etc. appear to be original, the only apparent change externally being the cantilevered steel awning.

Reasons for listing

A well designed and detailed corner pub from the early Federation era remaining virtually intact. The building presents lively elevations to both Sussex Street and Market Street and is important in its streetscape contribution and scale in relation to the other Victorian warehouse buildings along Sussex Street.

Sketch plan and photos (attach additional photos if any.)



APPENDIX 8

BICENTENNIAL PARK AS AN URBAN FOREST

The Challenge of Urban Forestry is the title of an article by Dr John French of the CSIRO, who is the acknowledged Australian expert in Urban Forestry. It is a challenge which the City Planning Department will face in 1982 with the assistance of Dr French who has been commissioned by the City Council. His main task will be the landscaping of Moore Park, but the question of urban forestry will be raised in relation to all city parks. Bicentennial Park, and the associated green areas around and under the North Western Freeway are appropriate for inclusion in an integrated Urban Forest.

Dr French states that:

> "Urban forestry is a specialised branch of forestry. It is a method of intensive land use in the urban environment. Trees are planted, maintained and harvested in cities, not only for their shade and beauty, but for their commercial value. These forests would not only give city-dwellers wood products and recreational areas, but also act as wildlife habitats."

In creating an urban forest, parcels of land from 0.2 ha. upwards can be used. Depending on the working plan adopted in any specific area, single species of fast growing eucalypts, producing sawlogs, pulpwood, veneer or products for medicinal and scientific uses, or a mixture of native and exotic species could be chosen. The knowledge exists and Darling Harbour provides an opportunity to put it into practice.

Urban forestry requires new and imaginative planting and harvesting techniques. Portable electric cutters, chippers, loaders and other machinery to handle variable sized trees are needed. Clear felling must be avoided and the beauty of an urban forest must rank in importance with commercial viability. A public information system is essential to keep the people abreast of management techniques and to avoid public concern at felling in a public place.

One of Dr. French's most convincing arguments in favour of the viability of Urban Forestry relates to the use of subsidies. He states:

> "At present for instance, the Industries Assistance Commission subsidises the forest and wood-based industries to the tune of something in excess of $160 million annually(1). The 'lion's share' of this 'net subsidy equivalent' ($106 million p.a.) goes to wood products that are manufactured only with high energy input, which create environmental pollution and whose many end products are non-recyclable (e.g. particleboard, tissue, sanitary paper). ..... I consider that the past and present lack of balanced urban planning, with respect to ecological management, reflects the attitudes of those who control so-called 'growth and development' of our land. The profiteers of rapid urban growth are few in number, the benefits tend to go their way, the main costs to the public."

Approximately 8 ha. would be available for an urban forest in the Darling Harbour area. This includes land within the Park including the plant nursery and DMR land under, and adjacent to, the North Western Freeway. It does not include land leased for commercial horticulture.

The success of an Urban Forest in Sydney is clearly related to the total area available and the efficiency of the management structure. The expanded City of Sydney (1st January 1982) would have Moore Park, Darling Harbour Goodsyard, and the old brick pits at St. Peters as the basis for the Sydney Forest.

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(1) Industries Assistance Commission, 1973-74 Annual Report.

APPENDIX 9

INSPECTION REPORT - SEPTEMBER, 1980 (ON PYRMONT BRIDGE)
Prepared by the Department of Main Roads

a) Handrails - The paint on the handrails is badly chipped and peeling and they require repainting. In addition, the bases of many posts are rusted and will need to be replaced.

b) Wearing Surface - The construction joints in the concrete slab are breaking up with traffic movement and require constant patching.

c) Trusses:

(i) Timber - The Bridge's timber trusses require constant maintenance. Fungal attack at the wood interfaces brought about by the moist environment has necessitated the replacement of many braces, spacer blocks, corbels and king posts in the past twelve months. It is expected that such repairs will continue to be required. However, a full test bore of the bridge is needed to establish the extent of the problem.

The stringers under the deck, in particular, have suffered from extensive rot, due to the amount of water leaking from the deck construction joints and the porous asphalt and timber footway. Many stringers have been replaced recently.

Several fractured lower chord members have been found in the past twelve months and the general method of repair has been to add splice plates and flitches to the area of the fracture. These repairs are temporary and replacement of lower chord members will be required if the bridge is to be kept in service beyond 1982.

As shown in Figure 8, the paint is very patchy on the internal trusses, and it will be necessary to repair them if the bridge is retained.

(ii) Steel - The steel trusses of the swing span require a full repaint. The paint film is extensively weathered over the entire length of the bridge with corrosion apparent in nearly every buckle plate and serious deep-seated corrosion in several areas along the bottom chords of the two outside trusses. Many of these sections will require replacement of steel members and plates before they are repainted.

The cantilevered footway supports in the area of the turntable are also badly rusted and will require similar treatment.

d) Piers:

Timber - the timber piers will require a full test bore to establish the extent of decay. However, at least four pier members currently require replacement.

e) Fenders - from visual inspection above water it is estimated that 40 piles require replacement. It is possible that more would require replacement but this cannot be ascertained without a diving inspection. Furthermore, there is extensive rot and white ant infestation in some members of the fenders which will necessitate their replacement.

f) The mechanical and electrical components of the bridge are in good condition. However, most of the electrical conduit and some of the wiring and associated fittings on the bridge will need to be replaced. Furthermore, the submarine cables providing power to the bridge are 22 years old and of doubtful reliability. It would be necessary to replace them. In addition, despite proper electrical and mechanical maintenance of the motors and opening mechanisms, their reliability must be questionable due to their age."

APPENDIX 10

STATUS REPORT - PYRMONT BRIDGE
Prepared by the Department of Main Roads

The following report accompanied a letter from the Premier of New South Wales to the Town Clerk of the City of Sydney, dated 17 May 1982. The subject of the letter is the Government's decision to demolish Pyrmont bridge.

"1. Inspection by the Department of Main Roads

Inspection of the timber trusses and piers above water level, including test boring of the timber members to assess their soundness, has been undertaken by the Department. Test boring was carried out on all pier members as well as on two out of the six trusses in each span of the bridge.

The inspection and test boring results revealed that extensive work is required to restore the superstructure and substructure of the bridge to a satisfactory condition and that this work is essential if the bridge is to be retained.

Further, experience has shown that even if this work is undertaken, the structure is likely to continue to deteriorate owing to rotting of the timbers. This deterioration will be exacerbated by the accumulation of excessive moisture which would normally be expelled by the movement of the structure induced by traffic.

Consequently, it might be expected that additional repairs would need to be initiated during the three year restoration period and continuing major repairs to the superstructure and substructure could be necessary in the future and at more frequent intervals than would normally be encountered.

For the purpose of estimating the cost of the repairs now required to the superstructure and substructure of the bridge above pile armour level, the results of the detailed test boring of the two trusses of each span have been extrapolated.

It is the Department's experience in these circumstances, that additional items requiring repair are inevitably exposed when the work is opened up, and accordingly, the final cost of the work exceeds the estimate even though the estimate is prepared as accurately as possible.

2. Inspection by Department of Public Works

The Department of Public works has submitted a preliminary report on a below water level inspection of the timber piles of the Pyrmont Bridge, conducted during the period 8th to 18th September, 1981.

This inspection consisted of test boring a representative sample of the piles at mid-tide level and at mud level, excluding those below the eastern rest pier which are inaccessible. Of the sixteen piles tested, seven were found to be unsound at the mid-tide level even though they are generally sound at mud level.

In this respect, the original design calculations for the bridge held by the Department of Main Roads indicate that the dead load on each pile, from the weight of the structure, is 20 tonnes and the design live load is 9 tonnes, giving a total pile load of 29 tonnes. Accordingly, two thirds of the pile capacity is required to support the bridge, even with no added load.

Mr. G. Harvey of Australian Wharf and Bridge Pty. Limited, an expert in the field of marine timber maintenance and construction, was commissioned by the Department of Main Roads to comment on the cost of pile repairs and on the validity of extrapolating the results from the piles tested by the Department of

Public works, to the total number of piles supporting the bridge. Mr. Harvey's report agrees that the sampling method used is a satisfactory basis for an estimate but notes that if pile repairs are to proceed, every pile will need to be examined.

The Department of Public works has indicated that such further underwater inspection and test boring to cover all the bridge piles would cost of the order of $104,000 and would take approximately 24 weeks to complete.

The repair method proposed by Mr. Harvey for the majority of piles is to splice in a new length of pile in the length from low tide level to 3 m above pile cap level, rather than to completely replace the pile. this is considered a satisfactry repair method.

3. Summary of Inspection Reports

On the basis of the preliminary underwater inspection report, and the report provided by Mr. Harvey, it is assessed that a minimum of 100 of the 220 piles in the bridge piers require replacement in the tidal zone. further twenty piles require replacement above the tidal zone.

In addition to the pier piles, it is estimated from visual inspection only that at least 50 piles in the fender system which contains 165 piles, will require replacement. No major repairs have been effected to the fender system since 1975.

Inspection of the superstructure and substructure of the bridge by the Department of Main Roads has revealed that extensive repairs to the timber trusses, corbels and the footway are required, together with painting of the swing span and handrailing. In addition, painting of the forty-eight internal timber trusses and replacement of electrical wiring and submarine cables, which were deferred in anticipation of the demolition of the bridge, would be necessary to restore the structure to an acceptable condition.

Again, it must be emphasised that the overall anticipated repairs to the bridge now envisaged are based largely on the extrapolation of available test bore sampling and visual inspection where possible. It can be expected that closer examination, together with further deterioration of the structure over the estimated repair period of three years, might well disclose the need for extensive additional repairs to be undertaken.

(a)	Replacement of Piles	$450,000
(b)	Repairs to Trusses, Corbels and Footway	$425,000
(c)	Repairs to Fender System	$225,000
*(d)	Repair and Painting of Swing Span and Handrailing	$165,000
*(e)	Painting of forty-eight internal trusses	$205,000
*(f)	Replacement of electrical wiring and submarine cables	$ 55,000
		$1,525,000

* Work previously deferred in anticipation of demolition of bridge.

The estimated time required to complete the above repairs is three years."

BIBLIOGRAPHY

p.b. AIRD, W.B., Water Supply, Sewerage and Drainage of Sydney 1788-1960. Sydney: p.a.?, 1961.

p.b. Australia, the First Hundred Years, (a facsimile of Vols. I & II of the Picturesque Altas of Australasia, 1888, ed. Hon. Andrew Garron), Sydney: Paul Hamlyn, 1978.

p.b. BOURNE, J. A Treatise of the Steam Engine, p.u., 1846.

p.b. CLIME, Frank. Saga of Sydney. Sydney: Halstead, 1961.

p.b. Cyclopedia of New South Wales, Sydney: McCarron, Steward and Co., 1909.

p.b. PADDISON, Leonie I., The Railways of N.S.W. 1855-1955. Sydney: Department of Railways N.S.W., 1955

p.b. STEPHENSEN, P.R., and KENNEDY, Brian, The History and Description of Sydney Harbour. Sydney: A.H. & A.W. Reed, 1980.

o.p. City of Sydney Planning Scheme, gazetted, 16th July 1971.

o.p. City Planning Department, 1980 City of Sydney Strategic Plan. Sydney: Council of the City of Sydney, 1980.

o.p. City Planning Department, Ultimo, Pyrmont, Haymarket Action Plan. Sydney: Council of the City of Sydney, 1979.

o.p. Council of the City of Sydney, Development Control and Floor Space Ratio Code, 1971

o.p. Council of the City of Sydney, Proceedings, 2nd May 1905.

o.p. Department of Environment and Planning (N.S.W.), The Draft Darling Harbour, Haymarket Management Plan. released Sydney: 14th April 1982.

o.p. Lord Mayor's Engagement List, Address by the Lord Mayor on Pyrmont Bridge and the Glebe, 7th March 1964.

o.p. Maritime Services Board of New South Wales, Annual Report 1979-80

o.p. Maritime Services Board of New South Wales, Commissioning of No.4 Darling Harbour. November 1977.

o.p. Parliamentary Standing Committee of Public Works, Report Relating to the Proposed Removal of Pyrmont and Glebe Island Bridges. Sydney: Charles Potter, Government Printer, 1894.

o.p. Sydney Area Transportation Study, Summary Report Freight Transport Systems. Dr. R.S. Neilson, Study Director, Sydney: 10th May 1974.

o.p. Sydney Maritime Museum. Proposal to the BiCentennary Committee. 14th August 1981.

p. CLARE, John, "Darling Harbour", Sydney City Monthly. October 1980.

p. Department of Main Roads, Main Roads, Vol.45, 1979-1980.

p. FRENCH, Dr. John, "Urban Forest, The Challenge of Urban Forestry", Architecture in Australia, October 1975.

p. HARWOOD, Norm. "An Industrial Relic of the Past Uncovered", Australian Society for Historical Archaeology Newsletter, June 1977.

p. Institute of Civil Engineers, Minutes of Proceedings, 16th May 1907, London.

p. "Robert Hickson", Royal Australian Historical Society, Vol. 55,Part 3, 1959.

p. "Port Jackson, Its Romantic Growth", Royal Australian Historical Society, Vol.31, Part 6, 1945. Vol.35, Part 6, 1949.

Paddy's Meets the Challenge of the 80's. ed. Bill Stavert (collection of brochures in folder).